ENCLOSURE 2
WATTS BAR NUCLEAR PLANT (WBN)
CALCULATION WBN-EEB-MS-TI08-0008
480V 1E COORDINATION/PROTECTION

TVA 10697 (DNE-6-86) **QA Record** DNE CALCULATIONS

PAGE ~~1E~~ 1F

TITLE	PLANT/UNIT
480V 1E COORDINATION/PROTECTION	WBNP 1 & 2

[redacted]ARING ORGANIZATION [redacted]NE-EE	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) ~~EEB~~, CALC, 480V 1E, PROTECTION, SHORT CIRCUIT
BRANCH/PROJECT IDENTIFIERS WBN EEB-MS-TI08-0008	Each time these calculations are issued, preparers must ensure that the original (RO) RIMS accession number is filled in.

Rev	(for RIMS' use)	RIMS accession number
R0	900524D0004	B269000405406
R18		B26 '92 0414 400
R _		
R _		

APPLICABLE DESIGN DOCUMENT(S)
WB-DC-30-28 R0
EEB TI08 R0
FSAR CHAPTER 8

SAR SECTION(S)	UNID SYSTEM(S)
8.1	236

Revision 0	R18	R2	R3
ECN No. (or indicate Not Applicable) N/A	DCN M-15092-A		
Prepared G. S. Bates*			
Checked T. B. Thorsell*			
Reviewed T. B. Thorsell*			
Approved P. D. Schaffer/ M. C. Brickey*	for MCB		
Date 4-5-90	4/14/92		
List all pages added by this revision.	SEE REV. LOG		
List all pages deleted by this revision.	SEE REV. LOG		
List all pages changed by this revision.	SEE REV. LOG.		

Use form TVA 10534 if more space required

Safety-related? Yes ☒ No ☐

Statement of Problem

TO ASSURE PROTECTION OF 480V ELECTRICAL LOADS AGAINST OVERLOAD AND SHORT CIRCUIT CONDITIONS, AND TO ASSURE SELECTIVE COORDINATION OF THE PROTECTIVE DEVICES. PROPER CIRCUIT BREAKER, FUSE AND THERMAL OVERLOAD SIZING IS NECESSARY.

ORIGINAL

Abstract

These calculations contain an unverified assumption(s) that must be verified later. Yes ☒ No ☒

THIS CALCULATION REVIEWS THE COORDINATION OF 480V PROTECTIVE DEVICES AND 6900V PROTECTIVE DEVICES ON TRANSFORMERS WHICH FEED 480V BUSES. IT IS ALSO DEVELOPED CRITERIA FOR LOAD PROTECTION OF THE 480V 1E LOADS AND REVIEWS EACH LOAD AGAINST THIS CRITERIA. IN ADDITION, MINIMUM CABLE SIZING BASED ON SHORT CIRCUITS IS EVALUATED. REFER TO SECTION 8.0 AND 9.0 FOR RESULTS AND CONCLUSIONS.

SEE REV. LOG FOR TOTAL PAGES AND FSAR COMPLIANCE.

*SEE REVISION 0 FOR ORIGINAL SIGNATURES

☐ Microfilm and store calculations in RIMS Service Center.

☒ Microfilm and return calculations to: CALCULATION CONTROL CENTER

Microfilm and destroy. ☐

Address: ~~QAC 1F WBN~~ TOB 1E WBN

cc: RIMS, SL 26 C-K

TVA 10697 (DNE 6-86) **QA Record** ORIGINAL DNE CALCULATIONS

Page 1E

TITLE: 480V 1E Coordination/Protection	PLANT/UNIT: WBNP 1 & 2
PREPARING ORGANIZATION: NE-EE	KEY NOUNS (Consult RIMS DESCRIPTORS LIST): EED, Calc, 480V 1E, Protection, Short Circuit
BRANCH/PROJECT IDENTIFIERS: WBN EED-MS-TI08-0008	Each time these calculations are issued, preparers must ensure that the original (RO) RIMS accession number is filled in.
APPLICABLE DESIGN DOCUMENT(S): WB-DC-30-28 R0, EED TI08 R0, FSAR Chapter 8	SAR SECTION(S): 8.1 — UNID SYSTEM(S): 236

Rev	(for RIMS' use)	RIMS accession number
R0	900524D0004	B26 900405 406
R15	910905CU002	B26 '91 0717 402
R16		B26 '91 0918 400
R17	920107D0015	B26 '91 1019 401

Revision 0	R15	R16	R17
ECN No. (or indicate Not Applicable)	See rev. Log	See Rev Log	DCN No. P-06202-B
Prepared: G.S. Bates*	6/27/91	9/12/91	10-17-91
Checked: T.B. Thorsell*	7/1/91	9/12/91	10-17-91
Reviewed: T.B. Thorsell*	7/2/91	9/17/91	10-17-91
Approved: R.D. Schaffer/M.C. Brickey*		C.C. Lyke for MCB	C.C. Lyke for MCB
Date	7-MAY	9/17/91	9/18/91
List all pages added by this revision.	See rev. Log	See Rev Log	See Rev Log
List all pages deleted by this revision.	See rev. Log	See Rev Log	
List all pages changed by this revision.	See rev. Log	See Rev Log	

Use form TVA 10534 if more space required

Safety-related? Yes ☒ No ☐

Statement of Problem

To assure protection of 480V Electrical Loads against overload and short circuit conditions, and to assure selective coordination of the protective devices. Proper circuit breaker, fuse and thermal overload sizing is necessary.

Abstract

These calculations contain an unverified assumption(s) that must be verified later. Yes ☒ No ☐

This calculation reviews the coordination of 480V protective devices and 6900V protective devices on transformers which feed 480V buses. It also criteria for load protection of the 480V 1E loads and reviews each load against this criteria. In addition, minimum cable sizing based on short circuits is evaluated. Refer to sections 8.0 and 9.0 for results and conclusions.

See rev. log for total pages and FSAR compliance.

* See revision 0 for original signatures.

☐ Microfilm and store calculations in RIMS Service Center. Microfilm and destroy. ☐

☒ Microfilm and return calculations to: Calculation Control Center Address: QAC-IC-WBN

cc: RIMS, SL 26 C-K

TVA 10697 (DNE 6-86) **QA Record** DNE CALCULATIONS ORIGINAL Page 1D

TITLE 480V 1E Coordination/Protection	PLANT/UNIT WBNP 1 & 2
PREPARING ORGANIZATION NE-EE	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) EEB, Calc, 480V 1E, Protection, Short Circuit
BRANCH/PROJECT IDENTIFIERS WBN EEB-MS-TI08-0008	Each time these calculations are issued, preparers must ensure that the original (R0) RIMS accession number is filled in.

Rev	(for RIMS' use)	RIMS accession number
R0		B26 90 0405 406
R13	901220F0026	B18 901126 508
R14	910220A0022	B26 '90 1219 406
~~R15~~		~~B26 '91 0228 421~~

APPLICABLE DESIGN DOCUMENT(S): WB-DC-30-28 R0, EEB TI08 R0, FSAR Chapter 8

SAR SECTION(S): 8.1 UNID SYSTEM(S):

Revision 0	R13	R14	R15
ECN No. (or indicate Not Applicable)	See Rev Log	See Rev Log	N/A
Prepared G.S. Bates *	11/14/90	12/8/90	12/19/90
Checked T.B. Thorsell *	11-16-90	12-10-90	12/19/90
Reviewed T.B. Thorsell *	11/21/90	12-14-90	12/19/90
Approved P.D. Schaffer/M.C. Brickey *			
Date	11-21-90	12-14-90	12/28/90
List all pages added by this revision.	See TVA Form 10534		
List all pages deleted by this revision.			
List all pages changed by this revision.	Rev Log		

Use form TVA 10534 if more space required.

Safety-related? Yes ☒ No ☐

Statement of Problem

To assure protection of 480V Electrical Loads against overload and short circuit conditions, and to assure selective coordination of the protective devices. Proper circuit breaker, fuse and thermal overload sizing is necessary.

Abstract * See Rev 0 for signatures

These calculations contain an unverified assumption(s) that must be verified later. Yes ☐ No ☒ 6/26/91

E15

This calculation reviews the coordination of 480V protective devices and 6900V protective devices on transformers which feed 480V buses. It also develops criteria for load protection of the 480V 1E loads and reviews each load against this criteria. In addition, minimum cable sizing based on short circuits is evaluated.

See Rev log for total pages & FSAR Compliance

☐ Microfilm and store calculations in RIMS Service Center. Microfilm and destroy. ☐

☒ Microfilm and return calculations to: Calculation Control Center Address: QAC-IC-WBN

TVA 10697 (DNE 6-86) **QA Record** NE CALCULATIONS **ORIGINAL**

TITLE 480VAC IE COORDINATION / PROTECTION	PLANT/UNIT WBNP 1 & 2
PREPARING ORGANIZATION NE, EE	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) EEB, CALC, 480VAC IE, PROTECTION, SHORT CIRCUIT
BRANCH/PROJECT IDENTIFIERS WBN EEB-MS-TI08-0008	Each time these calculations are issued, preparers must ensure that the original (R0) RIMS accession number is filled in.

Rev	(for RIMS' use)	RIMS accession number
R0		B26 '90 0405 406
R9	901030D0037	B26 '90 1005 41
R11	901105D00119	B18 901023 506
R12	910226F0015	B18 901110 515

APPLICABLE DESIGN DOCUMENT(S)
WB-DC-30-28 R0
EEB TI-08 R0
FSAR CHAPTER 8

SAR SECTION(S): 8.1
UNID SYSTEM(S):

Revision 0	R10	R11	R12
ECN No. (or indicate Not Applicable)	~~DCN 100~~ Δ ~~M-13213-A~~ ~~M-12280~~	F13942A	005146A
Prepared G. S. BATES*	9/26/90	10/19/90	11/2/90
Checked T. B. THORSELL*	10-1-90	10/20/90	11-02-90
Reviewed T. B. THORSELL*	10-5-90	10/21/90	
Approved P.D. SCHAFFER / M.C. BRICKEY*	C.C. Lyle for MCB		
Date 4-5-90	10/5/90	10-22-90	11-9-90
List all pages added by this revision.	SEE TVA FORM 10534		
List all pages deleted by this revision.			
List all pages changed by this revision.	REV LOG		

Use form TVA 10534 if more space required

Safety-related? Yes ☒ No ☐

Statement of Problem

TO ASSURE PROTECTION OF 480V ELECTRICAL LOADS AGAINST OVERLOAD AND SHORT CIRCUIT CONDITIONS, AND TO ASSURE SELECTIVE COORDINATION OF THE PROTECTIVE DEVICES, PROPER CIRCUIT BREAKER, FUSE, AND THERMAL OVERLOAD SIZING IS NECESSARY.

Abstract * SEE REV. 0 FOR SIGNATURES Δ SEE REV LOG

These calculations contain an unverified assumption(s) that must be verified later. Yes ☒ No ☐

THIS CALCULATION REVIEWS THE COORDINATION OF 480V PROTECTIVE DEVICES AND 6900V PROTECTIVE DEVICES ON TRANSFORMERS WHICH FEED 480V BUSES. IT ALSO DEVELOPS CRITERIA FOR LOAD PROTECTION OF THE 480V IE LOADS AND REVIEWS EACH LOAD AGAINST THIS CRITERIA. IN ADDITION, MINIMUM CABLE SIZING BASED ON SHORT CIRCUITS IS EVALUATED.

SEE REV LOG FOR TOTAL PAGES & FSAR COMPLIANCE

☐ Microfilm and store calculations in RIMS Service Center.

☒ Microfilm and return calculations to: ~~BECKY YOUNG~~ DL - 10/23/90

Microfilm and destroy. ☐ DL

Address: ~~113 TSOB - WBN~~

TVA 10697 (DN: 4-88) **QA Record** DNE CALCULATIONS ORIGINAL PAGE 1B

TITLE 480VAC IE COORDINATION / PROTECTION	PLANT/UNIT WBNP 1&2
PREPARING ORGANIZATION NE, EE	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) EEB, CALC, 480VAC IE, PROTECTION, SHORT CIRCUIT
BRANCH/PROJECT IDENTIFIERS WBN EEB-MS-TI08-0008	Each time these calculations are issued, preparers must ensure that the original (R0) RIMS accession number is filled in.
APPLICABLE DESIGN DOCUMENT(S) WB-DC-30-28 R0, EEB TI08 R0, FSAR CHAPTER 8	SAR SECTION(S) 8.1 / UNID SYSTEM(S)

Rev	(for RIMS' use)	RIMS accession number
R0		B26 '90 0405 406
R7		B26 '90 0823 411
R8		B26 '90 0828 404
R9		B26 '90 0906 405

Revision 0	R7	R8	R9
ECN No. (or indicate Not Applicable)	DCN P-04060-A	DCN M-10541-B	DCN M-11413-A
Prepared G. S. BATES*	8-21-90 T.M. Barber	8-25-90 T.M. Barber	8/31/90
Checked T. B. THORSELL*	8/21/90	8-27-90	8-31-90
Reviewed T. B. THORSELL*	8/22/90 C.C. Lyke	8-27-90	9-5-90
Approved P.D. SCHAFFER / M.C. BRICKEY*		C.C. Lyke for MCB	
Date 4-5-90	8-22-90	8/27/90	9-6-90
List all pages added by this revision.	SEE TVA FORM 10534		
List all pages deleted by this revision.			
List all pages changed by this revision.	REV LOG		

Use form TVA 10534 if more space required

Safety-related? Yes ☒ No ☐

Statement of Problem

TO ASSURE PROTECTION OF 480V ELECTRICAL LOADS AGAINST OVERLOAD AND SHORT CIRCUIT CONDITIONS, AND TO ASSURE SELECTIVE COORDINATION OF THE PROTECTIVE DEVICES. PROPER CIRCUIT BREAKER, FUSE, AND THERMAL OVERLOAD SIZING IS NECESSARY.

Abstract * SEE REV. 0 FOR SIGNATURES

These calculations contain an unverified assumption(s) that must be verified later. Yes ☒ No ☐

THIS CALCULATION REVIEWS THE COORDINATION OF 480V PROTECTIVE DEVICES AND 6900V PROTECTIVE DEVICES ON TRANSFORMERS WHICH FEED 480V BUSES. IT ALSO DEVELOPS CRITERIA FOR LOAD PROTECTION OF THE 480V IE LOADS AND REVIEWS EACH LOAD AGAINST THIS CRITERIA. IN ADDITION, MINIMUM CABLE SIZING BASED ON SHORT CIRCUITS IS EVALUATED.

SEE REV LOG FOR TOTAL PAGES & FSAR COMPLIANCE

☐ Microfilm and store calculations in RIMS Service Center. Microfilm and destroy. ☐

☒ Microfilm and return calculations to: BECKY YOUNG Address: 113-TSOB-WBN

cc: RIMS, SL 26 C-K

TVA 10697 (DNE 6 86) Of Record DNE CALCULATIONS Page 1 of 561

TITLE	PLANT/UNIT
480 Vac 1E Coordination/Protection	WBNP 1&2

PREPARING ORGANIZATION	KEY NOUNS (Consult RIMS DESCRIPTORS LIST)
NE, EE	EEB, Calc, 480V AC 1E, Protection, Short Circuit

BRANCH/PROJECT IDENTIFIERS: WBN EEB-IS-TI08-0008

Each time these calculations are issued, preparers must ensure that the original (RO) RIMS accession number is filled in.

APPLICABLE DESIGN DOCUMENT(S): WB-DC-30-28 RO; EEB TI-08 RO; FSAR Chapter 8

SAR SECTION(S): 8.1 UNID SYSTEM(S):

Rev	(for RIMS' use)	RIMS accession number
R0	900524D0004	B26 '90 0405 406
R1	900524D0004	B26 '90 0413 408
R2	900711E0021	B26 '90 0511 406
R3	900625D0023	B26 '90 0525 425

Revision 0 / SEL R1	R1	R2	R3
ECN No. (or indicate Not Applicable) N/A	SEE REV. LOG	DCN R5297-A	SEE REV. LOG
Prepared	4-13-90 T. Bacher	5-4-90 T. Bacher	5-21-90 T. Bacher
Checked	4/13/90 CWH	5/7/90	5/23/90 CWH
Reviewed	4/13/90 CWH	5/7/90	5/23/90 CWH
Approved	C.C. Lyke for MCB	C.C. Lyke for MCB	MCB
Date 4-5-90	4/13/90	5/10/90	5-25-90

Safety-related? Yes ☒ No ☐

Statement of Problem

To assure protection of 480 V electrical loads against overload and short circuit conditions, and to assure selective coordination of the protective devices, proper circuit breaker, fuse, and thermal overload sizing is necessary.

ORIGINAL

Use form TVA 10534 if more space required	
List all pages added by this revision.	See TVA
List all pages deleted by this revision.	Form 10534
List all pages changed by this revision.	Rev. Log

Abstract

These calculations contain an unverified assumption(s) that must be verified later. Yes ☒ No ☐

This calculation reviews the coordination of 480 V protective devices and 6900 V protective devices on transformers which feed the 480 V buses. It also develops criteria for load protection of the 480 V 1E loads and reviews each load against this criteria. In addition, minimum cable sizing based on short circuits is evaluated.

R0: FSAR Compliance Review MCB Date 4-5-90

R1: FSAR COMPLIANCE REVIEW C.C. Lyke for MCB DATE 4/13/90

~~THIS CALCULATION CONTAINS 350 PAGES INCLUDING PAGES 109A-109F AND 561A-561H AND EXCLUDING 393 PAGES 152-155, 174, 194-196, 201-204, 206, 272, 290-454, 457-486, 488, 495-503, 505, 531-535, 5.~~

INCLUDING p. 6A & ATTACHMENT M08663A (SH1→40) & 5A & 5B)

R2: FSAR COMPLIANCE REVIEW C.C. Lyke for MCB DATE 5/10/90

SEE REV. LOG FOR TOTAL PAGES

~~This calculation contains 567 pages including pages 109A, 109B, 109C, 109D, 109E and 109F.~~

☐ Microfilm and store calculations in RIMS Service Center. Microfilm and destroy. ☐

☒ Microfilm and return calculations to: Becky Young Address: 113-TSOB-WBN

cc: RIMS, SL 26 C-K

COMPUTED TMB DATE 4-11-90
CHECKED WSH [redacted] 4/12/90

Title: WBN EEB-MS-TI08-0008
480 Vac 1E Coordination/Protection

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
0	Initial Issue	
1	ADDED ATTACHMENT M08663A (SHEETS 1-40) 5A,5B TO EVALUATE MODIFICATIONS FOR DCN'S M-08663-A, M-09166-A, M-09228-A, A-06885-B, A-07054-B, P-03065-A, & P-01136-A REVISED P. 1, 4, 3 ADDED P. 6A	
2	ADD ATTACHMENT NO. P5297A (SH. 1→4), ADD PAGE 6B, REV. PAGES 1, 2, 3, & 4. TOTAL PAGES REV. 2 = 8 . FOR COMPLETE CALCULATION ~~SEE~~ ADD REV. 1 & 2 TO REV. 0.	TMB 5-4-90 SP 4/7/90
3	ADDED: ATTACHMENT E110010-11 (DCN'S F-10125-A & F-10150-A) p. 1→4 ATTACHMENT G1IADCNS (DCN'S A-06885-C, ~~A-07054-B~~) p. 1→4 PAGE 6C REVISED: PAGE 1, 2, 3, & 4 TOTAL PAGES REV. 3 = 13 FOR COMPLETE CALCULATION COMBINE REV. 0, 1, 2, 3 FSAR COMPLIANCE REVIEW _____ DATE _____ RIS	TMB 5-21-90
4	ADDED: ATTACHMENT M10448A (P. 1 5A→27) (DCN'S M-10448-A, M-10522-A, M-10473-A, M-10511-A) PAGE 6D & 1A REVISED: PAGE 2, 3, & 4 TOTAL PAGES REV. 4 : ~~29~~ ~~30~~ 34 FOR COMPLETE CALCULATION COMBINE REV. 0→4 FSAR COMPLIANCE REVIEW [signature] ABC/LE DATE 6-15-90	TMB 6-5-90
5	ADDED: SHEET 6E REVISED: PAGE 1A, 2, 4. PAGE 10 OF ATTACHMENT M10448A (ADDED ON REV. 4) WAS REVISED TO CORRECT FUSE TYPE FOR DSL AUX BD C2-S COMPT CA FROM TRS1.5R TO TRS1.6R TOTAL PAGES REV 5 : ~~6~~ 33 FOR COMPLETE CALCULATION COMBINE REV. 0→5 FSAR COMPLIANCE REVIEW ~~J.F. TORDRA FOR M.C. BIRKEY~~ ABC/LE DATE 6-16-90	TMB 6-15-90 EJJ 6/16/90
6	Added: Sheet 6F & Attachment M10755A Revised Pages: 1A, 2, 3, 4 Total Pages Rev 6: 19 For complete calculation Combine Rev 0→6 FSAR Compliance Review ~~J.F. TORDRA FOR M.C. BIRKEY~~ LE Date 6-29-90 Attachment M10755A includes unverified assumptions	WSH 6/27/90 RIS

TVA 10534 (EN DES-4-78)

TVA

WBN EEB-MS-TI08-0008

Title: 480VAC IE COORDINATION / PROTECTION

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
7	ADDED: ATTACHMENT P04060A (FOR DCN P-04060-A) PAGE 1B, 2A, 6G REVISED: PAGE 3, 4 TOTAL PAGES REV. 7: 9 FOR COMPLETE CALCULATION COMBINE REV 0→7 FSAR COMPLIANCE REVIEW [signature] DBC/LE DATE 8-27-90	
8	O-MTR-31-203/204 (C&A BLDG VENT BD 1A2-A, NODE 204 COMPT 4B) DELETED PER DCN M-10541-B. THIS DELETION IS CONSERVATIVE AND WILL BE INCORPORATED INTO THE CALCULATION ON A LATER REVISION. ~~ADDI PAGE 1B~~ (M) TOTAL PAGES REV. 8 : 2 REVISED: PAGE 2A & 1B FOR COMPLETE CALCULATION COMBINE REV 0→8	Tom 3 8-28-90 TAD 8-27-90
9	Added Attachment M11413A (for DCN M-11413-A) page 6H Revised pages 1B, 2A, 3 Total Pages Rev 9 : 8 For complete calculation combine Rev 0→9 FSAR Compliance Review [signature] Date 8-6-90 FSAR Section 8 was reviewed and no discrepancies were noted.	WJH 8/31/90
10	Added Attachment M12212 (pages 1-158) pages: 6I, 1C Revised pages: 2A, 3 Total pages Rev 10: ~~162~~ 163 GCP 10-4-90 For complete calculation combine Rev 0→10 FSAR Compliance Review C.C. Lyhe for MCB Date 10/5/90 FSAR Section 8 was reviewed and no discrepancies were noted. For Complete Calculation Combine Rev 0→10 THIS REVISION EVALUATES DCN'S M-12212-A, M-12825-A, F-13654-A, M13005-A, M12064-A This attachment includes unverified assumptions	WJH 9/26/90 IR15

TVA 10534 (EN DES-4-78)

TVA

WBN EEB-MS-TI08-0008

Title: 480VAC 1E Coordination/Protection

REVISION LO

Revision No.	DESCRIPTION OF REVISION	Date Appro
11	Added Attachment F-13942A (pages 1-5) This page, 6J. Revised pages 1C, 3 Total pages Rev 11 : 9 For complete calculation combine R0 thru R11 FSAR section 8 was reviewed and no discrepancies were noted. FSAR Compliance Review RDH [signature] Date 10-22-90	WJH 10/19/ EJ 10/20/90
12	ADDED ATTACHMENT 005146A (PAGES 1-5), 6K REVISED PAGE 1C, 2B, 3 TOTAL PAGES REV. 12 : 9 FOR COMPLETE CALCULATION COMBINE R0 THRU R12 FSAR SECTION 8 WAS REVIEWED AND NO DISCREPANCIES WERE NOTED. FSAR COMPLIANCE REVIEW _____ DATE _____ R15	Flow 11-0 B.A. 11/2
13	Added Attachment No. GR12DCNS (pages 1-5) pages 1D, 3A, 6L Revised page 2B DCN's F-12463-A, F-12550-A, F-12656-A, F-12766-A, F-12813-A, M-04277-C, M-12070-A, M-13725-A, P-04468-A, F-14470-A, F-14471-A FSAR Section 8 was reviewed and no discrepancies were noted FSAR Compliance Review [signature] Date 11-21-90 RDH 11/21/90 For complete calculation combine R0 thru R13 Total pages Rev 13 : 10	

TVA

WBN EEB-MS-TI08-0008

Title: 480VAC 1E Coordination/Protection

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
14	Added Attachment M09494A (pages 1-~~8~~ 9) WJH 12/7/90 This page, ~~GKBM~~ 4/12/90 Revised pages 1D, 3A Total pages Rev 14 : 13 For complete calculation combine R0 → R14 FSAR section 8 was reviewed and no discrepancies were noted. FSAR Compliance Review [signature] Date 12-14-90	WJH 12/7/90
15	Removed the unverified assumptions in Rev 0 and added motor overload selection tables for continuous duty motors. Added pages 15-1 thru 15-63, 6N Revised pages 1D, 2C, 3A, 9, 10, 11, 12, 13 Editorial changes on pages 190-193, 455, 504, 152, 174, 194, 201, 206, 212, 290, 457, 488, 495, 505, 507, 531 GCB 1-9-91 Total pages Rev 15: ~~736~~ ~~738~~ 734 FSAR Compliance Review C.C. Lyke for MCB Date 2/28/91 FSAR Section 8 was reviewed and no discrepancies were noted	WJH 12/7/90

R1

TVA

WBN EEB-MS-TI08-0008

Title: 480VAC 1E Coordination/Protection

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
15	Revised pages 9, 12 and 13 and added Attachment R-15 to resolve unverified assumptions 2.5, 2.6, 2.8, 2.10 and 2.11. Revised pages 10, 11, 152, 174, 190-194, 201, 206, 272, 290, 455, 457, 488, 495, 504, 505, 507 and 531 to correct references and account for page numbering in accordance with self-assessment program findings. Revised Attachment M08663A page 2; Attachment M10448A page 2; and Attachment M12212A pages 2, 3, 4, 7 and 8 to remove UVA's added by DCN attachments. GP 7/1/91 GP 7/1/91 Revised pages 2 and 2A to identify that UVA's were added by DCN attachments in previous revisions. Added page 522A, revised pages 12, 175, 178, 184; page 4 of Attachment M08663A, page 4 of Attachment M10448A, and pages 83-92 of Attachment M12212 in accordance with WBFIR910179112. Reviewed revisions 1 through 15 to verify that the effects of unverified assumptions on design margins, results and conclusions were appropriately considered in accordance with WBFIR910184112. Revised pages 1D, 2C, 3A and added pages 1E, 2D and 6N. Total pages R15 = 737 FSAR Section 8 was reviewed and no discrepancies were identified. WTH 6/27/91 R15 FSAR Compliance Review [signature] Date 7-17-91 Existing design margins are not adversely affected by this revision and therefore, existing design inputs and previously made engineering judgements and assumptions are not invalidated.	See cover sheet for approval and date. GP 7/1/91

TVA

WBN EEB-MS-TI08-0008

Title: 480VAC 1E Coordination/Protection

REVISION LO

Revision No.	DESCRIPTION OF REVISION	Date Approve
16	Revised Attachment M10755A pages 10 & 11 and removed the UVA's Revised Attachment M12212 pages 44, ~~46~~, 47, 102, 51, & 53 to incorporate mini-calcs WBPE0678909038, WBPE0678808041 and WBPEVAR9001004. Valve 1-FCV-70-100-A was added page 44, and the stroke times for valves 0-FCV-67-144-B, 1-FCV-67-143-A, 1-FCV-67-223-A and 2-FCV-67-~~223~~ 143-A pages 51, 47, ~~46~~ and 53 respectively. WTH 9/12/91 Revised Attachment M12212 pages 7 and 8 to add DCN numbers. Removed UVA pages 4 & 8. Added page 159 to Attachment M12212. Added pages 2E, 6Ø, Attachment M10755A pages 19 & 20 FSAR Section 8 was reviewed and no discrepancies were identified. WTH 9/10/91 R16 FSAR Compliance Review C.C. Lyke for MCB Date 9/17/91 Total No. of pages R16 = 742 Existing design margins are not adversely affected by this revision, and therefore, existing design inputs and previous made engineering judgements and assumptions are not invalidated by this revision.	See Cov Sheet

TVA

REVISION LOG

WBN EEB-MS-TI08-0008

Title: 480 VAC 1E COORDINATION/PROTECTION

Revision No.	DESCRIPTION OF REVISION	Date Approved
167 J.L.H. 10-17-91	Added Attachment No. P06202B to update breaker settings and thermal overload sizing for motor O-MTR-31-27-B. This motor is changed from a 1.5 HP motor to a 2 HP motor. Pages added: ~~2B~~ 2F J.L.H. 10-17-91 DPH 10/17/91, ~~60~~ 60, Attachment P06202B (10 pages) Pages deleted: None Pages changed: 1E, 3A Total pages ~~R16~~ R17: ~~749~~ ~~J.L.H. 10-17-91 DPH 10/17/91~~ 755 J/C 12/11/91 FSAR Compliance Review: FSAR Section 8 was reviewed and no discrepancies were identified. FSAR Compliance Review C.C. Lyle for MCB (ABC/LE) 10/18/91 (DATE) Existing design margins are not adversely affected by this revision and therefore, existing design inputs and previously made engineering judgements and assumptions are not invalidated. R167 J.L.H. 10-17-91 Prepared by [signature] Date 10-16-91 DPH 10-17-91 Checked by DP Hundley Date 10-17-91	

TVA

REVISION LOG

Title: 480 VAC 1E COORDINATION/PROTECTION

WBN EEB-MS-TI08-0008

Revision No.	DESCRIPTION OF REVISION	Date Approved
18	REVISED CALCULATION TO SUPPORT DCN M-15092-A WHICH INCREASES THE SIZE OF CABLES 1PL1060A, 1PL1080B, 1PL4895B, 1PL6380B, 2PL4540B, ~~2PL4540B~~, 2PL4895A AND 1PL6385A DJG 12/11/91 ADDED PAGES: 1F 2G, 3Q AND ATTACHMENT NO M15092A (8 PAGES) DELETED PAGES: NONE REVISED PAGES: 3A TOTAL PAGES: 766 FSAR COMPLIANCE REVIEW: FSAR SECTION 8 WAS REVIEWED AND NO DISCREPANCIES WERE IDENTIFIED. REVIEWER C.C. Lyles for MCB ABC/LE DATE: 4/14/92 Also, Rev 18 (Attachment M12212) Removes UVA 2.4 & Revises the Appendix R loading for PER WBPER920050. REVISED pages 2, 3, 4, 7, 8, 11, 14, 15, 16, 19, 20, 104-130, 132, 133, 134, 137, 138, 141, 142, 144-156 (Attachment Rev 15) Added note to the Amptector 1-A time-current curve for SCAR WBSCA910278 page 15-34 Removed UVA 2.1 in Attachment 3 of the base calc (page 205). This UVA was a duplicate of 2.8 of the base calc (page 8).	See Cover Sheet 4/14/92

R1: DATE 4-12-90 R2 DATE 5-4-90 R3: DATE 5-21-90

DATE 4/12/90 DATE 5/7/90

WBN EEB-MS-TI08-0008 R0
Project No. 8573-27

Prepared Date 2/7/90 Checked Date 2-8-90
4/4/90 4-4-90

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(This sheet added by R13)

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GP12DCNS

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ATTACHMENT M15092A R18

FSAR COMPLIANCE

FSAR Compliance for R0: This FSAR Compliance Review is performed in accordance with PM 87-13 (EEB).

a. No discrepancies exist between this calculation and the FSAR

b. Applicable FSAR Sections:

8.1

c. Time - Current coordination curves included in the FSAR may require revision once new protective device settings have been implemented.

FSAR COMPLIANCE FOR R1: FSAR SECTION 8.1 WAS REVIEWED. NO DISCREPANCIES WERE NOTED. R1

FSAR COMPLIANCE FOR R2: FSAR SECTION 8.1 WAS REVIEWED. NO DISCREPANCIES WERE NOTED R2

FSAR COMPLIANCE FOR R3: FSAR SECTION 8.1 WAS REVIEWED. NO DISCREPANCIES WERE NOTED. R3

FSAR COMPLIANCE FOR R4: FSAR SECTION 8.1 WAS REVIEWED. NO DISCREPANCIES WERE NOTED. R4

FSAR COMPLIANCE FOR R5: FSAR SECTION 8.1 WAS REVIEWED. NO DISCREPANCIES WERE NOTED. R5

FSAR Compliance For R6: FSAR Section 8.1 was reviewed No Discrepancies were noted. R6

FSAR COMPLIANCE FOR R7: FSAR SECTION 8.1 WAS REVIEWED, NO DISCREPANCIES WERE NOTED. R7

THIS SHEET INTENTIONALLY LEFT BLANK FOR PAGE ACCOUNTABLY.

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008	0
Calculation No.	Revision

Method of design verification (independent review) used (check method used):

1. Design Review ___X___
2. Alternate Calculation _____
3. Qualification Test _____

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Independently reviewed Calculation WBN-EEB-MS-TI08-0008, R0 for technical adequacy as addressed in 10CFR50, Appendix B (NEP 3.1, Attachment 10). The design input data and assumptions were reviewed and found appropriate and reasonable. The calculation methods were based on Branch Technical Instruction EEB-TI08, Rev. 0. The results and conclusions are adequate.

TB Thrnell — Design Verifier (Independent Reviewer)

4-4-90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN-EEB-MS-TI08-0008
Calculation No.

1
Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Reviewed R1 for technical adequacy as addressed in NEP 3.1 Attachment 10. The design input data and assumptions were reviewed and found appropriate and reasonable. The calculation methods were based on RO and Branch Technical Instruction EEB-TI08 Rev 0. The results and conclusions are adequate.

William S. Hollert
Design Verifier
(Independent Reviewer)

4/18/90
Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008
Calculation No.

2
Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Reviewed to verify technical adequacy. Inputs and outs are appropriate and reasonable based on experience and engineering judgement. Purpose, assumptions, methodology and conclusions were reviewed to verify adequacy.

[illegible]
Design Verifier
(Independent Reviewer)

5/2/90
Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008 — Calculation No.

3 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Reviewed R3 for technical adequacy as addressed in NEP 3.1 Attachment 10. The methodology used in R3 was in accordance with PM86-18 and similar to the methodology used in R0. The results and conclusions are reasonable.

William T. Hollert — Design Verifier (Independent Reviewer)

5/23/90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008 — Calculation No.

Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

P4 was reviewed for technical adequacy as addressed in NEP 3.1 attachment 10. The design input data and methodology were reviewed and found to be appropriate. The results and conclusions are adequate.

William T. Hollert — Design Verifier (Independent Reviewer)

6/5/90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008 — Calculation No.

5 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

REVIEWED REVISION 5 FOR TECHNICAL ADEQUACY AS ADDRESSED IN NEP 3.1.

VERIFIED THAT THE DESIGN INPUTS AND OUTPUTS ARE CONSISTENT AND APPROPRIATE. THE RESULTS AND CONCLUSIONS ARE ADEQUATE.

E. J. Galasos — Design Verifier (Independent Reviewer)

6/16/90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN-FEB-MS-TI08-0008 — Calculation No.

R6 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Independently reviewed calculation WBN-FEB-MS-TI08-0008 R6 for technical adequacy. The design input data and assumptions were reviewed and were found appropriate and reasonable. The results and conclusions are adequate

T. A. Clemmer — Design Verifier (Independent Reviewer)

6/25/00 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008
Calculation No.

7
Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Reviewed R7 for technical adequacy as addressed in NEP 3.1 Attachment 10. The summary and conclusions are adequate.

William S. Hollett
Design Verifier
(Independent Reviewer)

8/21/90
Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN-EEB-MS-TI08-0008 — Calculation No.

9 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy o the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handboo methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculatio package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Reviewed R9 for technical adequacy as defined in NEP 3.10 Attachment 10. The design input data and assumptions were reviewed and found to be appropriate. The results and conclusions are adequate.

G Patel — Design Verifier (Independent Reviewer)

8-31-90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN-EEB-MS-TI08-0008 — Calculation No.

R10 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy o the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handboo methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculatio package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Reviewed for technical adequacy per NEP 3.1 Attachment 10. The design input data was reviewed and found to be appropriate and reasonable. The results and conclusions are adequate.

GCPatel — Design Verifier (Independent Reviewer)

10-1-90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN-EEB-MS-TI08-0008
Calculation. No.

11
Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Independently reviewed revision 11 of calculation WBN-EEB-MS-TI08-0008 for technical adequacy as addressed in NEP 3.1, Attachment 10.

The design inputs were verified and were found reasonable and appropriate. The results and conclusion are adequate.

E. J. Igharas
Design Verifier
(Independent Reviewer)

10/20/90
Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN 688-MS-TI08-0008 — Calculation No.

12 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review *
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

* Independently reviewed calculation WBN 688-MS-TI08-0008 R12 for technical adequacy. The design input data and assumptions were reviewed and were found appropriate and reasonable. The results and conclusions are adequate.

William L. Hollenbeck — Design Verifier (Independent Reviewer)

11/8/90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN-EEB-MS-TI08-0008 — Calculation No.

R13 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Performed review to verify technical adequacy in accordance with NEP 3.1. The design inputs came from the appropriate sources, appropriate methodology was used in the calculation and the results and conclusions are reasonable based on experience and engineering judgement.

S Peterson — Design Verifier (Independent Reviewer)

11/17/90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN-EEB-MS-TI08-0008 — Calculation No.

14 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Reviewed R14 for technical adequacy per NEP 3.1 Attachment 10. The design input data, results and conclusions are adequate.

GCPatel — Design Verifier (Independent Reviewer)

12-14-90 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008 — Calculation No.

15 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

Performed review to verify technical adequacy in accordance with NEP3.1. The design inputs came from appropriate sources, appropriate methodology was employed in the calculation and the results and conclusions are reasonable based on experience and engineering judgement.

[signature] — Design Verifier (Independent Reviewer)

7/1/91 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008 — Calculation No.

16 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

PERFORMED REVIEW TO VERIFY TECHNICAL ADEQUACY IN ACCORDANCE WITH NEP 3.1. THE DESIGN INPUTS CAME FROM APPROPRIATE SOURCES, APPROPRIATE METHODOLOGY WAS EMPLOYED IN THE CALCULATION AND THE RESULTS AND CONCLUSIONS ARE REASONABLE BASED ON EXPERIENCE AND ENGINEERING JUDGEMENT.

Don Lashley — Design Verifier (Independent Reviewer)

9-12-91 — Date

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN EEB-MS-TI08-0008
Calculation No.

25/17 J.L.H. 10-17-91 DPH 10/17/91
Revision

Method of design verification (independent review) used (check method used):

1.	Design Review	*
2.	Alternate Calculation	NR
3.	Qualification Test	NR

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

* Performed review to verify technical adequacy in accordance with NEP 3.1. The design inpputs came from appropriate sources, appropriate methodology was employed in he calculation and the results and conclusions are reasonable based on experience and engineering judgement.

D P Hundley
Design Verifier
(Independent Reviewer)

10/17/91
Date

THIS SHEET ADDED BY REV. 167 J.L.H. 10-17-91 DPH 10-17-91

4816x

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBN-EEB-MS-TI08-0008
Calculation No.

18
Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1. In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

INDEPENDENTLY REVIEWED CALCULATION WBN-EEB-MS-TI08-0008 FOR TECHNICAL ADEQUACY AS ADDRESSED IN 10CFR50. APPENDIX B (NEP 3.1, ATTACHMENT 10) THE DESIGN INPUT DATA AND ASSUMPTIONS WERE REVIEWED AND WERE FOUND APPROPRIATE AND REASONABLE.

E. I. Karas
Design Verifier
(Independent Reviewer)

4/13/92
Date

Prepared [illegible] Date 2/7/90 Checked [illegible] Date 2-8-90

1.0 Purpose:

The purpose of this calculation is to review the protection and coordination of 480 V Class 1E circuits and to provide guidelines that can be used when any modifications are made to 480 V 1E switchgear or motor control center feeds. It is also the purpose of this calculation to review minimum cable sizes used at Watts Bar Nuclear Plant (WBNP) and determine the acceptability of the minimum cable sizes in terms of short circuit withstand capability.

1.1 Scope:

This calculation applies to all safety-related motor control centers (MCC) and switchgear lineups. The following buses are addressed in this calculation:

480 V Shutdown Board	1-BD-212-A1-A	2-BD-212-A1-A
480 V Shutdown Board	1-BD-212-A2-A	2-BD-212-A2-A
480 V Shutdown Board	1-BD-212-B1-B	2-BD-212-B1-B
480 V Shutdown Board	1-BD-212-B2-B	2-BD-212-B2-B
480 V Reactor MOV Board	1-MCC-213-A1-A	2-MCC-213-A1-A
480 V Reactor MOV Board	1-MCC-213-A2-A	2-MCC-213-A2-A
480 V Reactor MOV Board	1-MCC-213-B1-B	2-MCC-213-B1-B
480 V Reactor MOV Board	1-MCC-213-B2-B	2-MCC-213-B2-B
480 V C&A Bldg. Vent Board	1-MCC-214-A1-A	2-MCC-214-A1-A
480 V C&A Bldg. Vent Board	1-MCC-214-A2-A	2-MCC-214-A2-A
480 V C&A Bldg. Vent Board	1-MCC-214-B1-B	2-MCC-214-B1-B
480 V C&A Bldg. Vent Board	1-MCC-214-B2-B	2-MCC-214-B2-B
480 V Diesel Aux. Board	1-MCC-215-A1-A	2-MCC-215-A1-A
480 V Diesel Aux. Board	1-MCC-215-A2-A	2-MCC-215-A2-A
480 V Diesel Aux. Board	1-MCC-215-B1-B	2-MCC-215-B1-B
480 V Diesel Aux. Board	1-MCC-215-B2-B	2-MCC-215-B2-B
480 V Reactor Vent Board	1-MCC-232-A-A	2-MCC-232-A-A
480 V Reactor Vent Board	1-MCC-232-B-B	2-MCC-232-B-B
480 V Swgr. Diesel Aux. Board	0-BD-215-C-S	
480 V MCC Diesel Aux. Board	0-MCC-215-C1-S	
480 V MCC Diesel Aux. Board	0-MCC-215-C2-S	
Pressurizer Heater Panels	1-DPL-68-341-A-A	2-DPL-68-341-A-A
	1-DPL-68-341 F	2-DPL-68-341 F
	1-DPL-68-341 D-B	2-DPL-68-341 D-B
	1-DPL-68-341 H	2-DPL-68-341 H

The load protection review includes all circuits having defined loads. Protection of feeds to non-safety related receptacle circuits, ice condensing unit circuits and some other multiple load circuits fed from MCCs do not have defined loads. Since protection of the non-1E cables is the primary concern for those feeds, the review of these circuits is

included as part of the non-1E associated circuits calculation, Calculation WBN EEB-MS-TI15-0011, "480 V Non Class 1E Power Cables Associated Circuits." Similarly, MCC feeds from the switchgear buses have not been reviewed for protective settings. These are based on MCC loading and are not within the scope of this calculation.

The scope of this calculation for protection and coordination is only to determine acceptability. For the protection study; however, replacement settings and thermal overload heater sizes for 480 Vac loads, which meet the criteria developed, are included as Attachment 1 to this calculation.

2.0 Assumptions:

2.1 Package control units, such as air conditioning systems, where a load switching control panel exists remote from the Motor Control Center (MCC) is assumed to provide protection for each individual load which is being fed from that control unit. Review of this protection is outside the scope of the calculation. This review considers only the rating of the feed to that package unit (typically a thermal magnetic breaker), provided adequate walkdown data is available to review this protection.

2.2 Walkdown data which shows a starter but does not indicate which catalog number thermal overload heater has been installed is assumed to not have a heater presently installed. In this case, the calculation indicates that a heater should be installed (where required) along with an appropriate catalog number.

2.3 Valve motor operators draw locked rotor current for less than 4 1/2 seconds during one stroke (open or closed)

2.4 THERMAL OVERLOAD HEATERS ARE SELECTED BASED ON AN AMBIENT TEMPERATURE OF 40°C AND THE STARTER AND MOTOR LOCATED IN THE SAME AMBIENT.

2.5 The thermal overload relay knobs are all set on the 100% mark.

2.6 All motors at Watts Bar have standard efficiencies.

2.7 In the event of a fault at the 480-V switchgear or 480 V MCCs, the motor contribution is assumed to equal 17% of the total available fault current. The remaining 83% of the total available fault current is assumed to be system contribution.

2.8 In most cases, the vendor certified curves are not available for Watts Bar Nuclear Plant. In order to be consistent with the TVA calculation practices, the tripping characteristics of the protection devices, with the following exceptions, have been taken

from Medium and Low Voltage Penetration Calculation EEB-MS-TI08-0015, and Appendix R Calculation DS 0684E2, Rev. 1 (Ref. 3.4).

The following vendor published curves which are not part of the above mentioned calculation have been used in this calculation:

ITE Gould Curve TD-9002, Rev. 1 for SS4
GE E150 Line (TED 1364T 150) Curve GES-61218
GE J600 Line GES-6104C for TJK Breaker
GE IFC53 Relay Curve GES-7015A
W CO-8 Relay Curve 418265
Gould Shawmut CP Cable Protector Curve 1698E
ITE Breaker Curve for ITE-EF3 Breakers
ITE Breaker Curve for ITE-FJ3 Breakers
Gould Shawmut TRS15R, TRS30R Fuse Curves
GE IAC51 Relay Curve GES-7001B
W DSL-416 Limiter Curve 639431
W DS-Breaker Curve 1

The tripping characteristic of these devices are assumed to be applicable for Watts Bar. ~~This is an unverified assumption.~~ R15 GP 12/7

2.9 It is assumed that the interrupting rating of 6.9-kV shutdown boards is 500 MVA.

2.10 Vendor information supplied to Sargent & Lundy necessary to size General Electric thermal overload heaters, for MOVs, cannot unquestionably be tied back to the model number of the starter that is installed at Watts Bar in 0-MCC-215-C1-S. It is assumed, that it is the correct documentation. The documentation is part of Attachment 5. ~~This is an unverified assumption.~~ R15 GP 12/7

2.11 THE RANGE USED IN THE CALCULATION FOR MAGNETIC ONLY MOLDED CASE CIRCUIT BREAKER TRIP SETTINGS DIFFERS FROM THE RANGE SHOWN IN TI-8. ~~THIS IS AN UNVERIFIED ASSUMPTION.~~ R15 GP 12/7

3.0 Sources of Design Input Information (References)

3.1 WBN Calculation No. WBN EEB-MS-~~105~~ TI05-0001, RO "TVA Auxiliary Power System" (TELAS 1.0) WTN 12/19/90 GCP 12-19-90 R15

3.2 Walkdown data (WBEP-WP-37)

3.3 Drawing (ITE) L-27903-M (B26 870601 77)

3.4 Drawing (ITE) L-27904-M (B26 870601 776)

3.5 Sheet D8 of D26 from Calculation DS0684E2 "ITE Class G30 Heater Selection Tables."

3.6 QIR MNN WBN 89006, RO Subject: "Motor Operated Valves - Stroke Times"

Prepared [illegible] Date 2/7/90 Checked [illegible] Date 2-8-90

3.7 45W724-1 R15

3.8 45W724-2 R15

3.9 ~~45W724-3 R16~~ G.-ld-ITE "Speed Fax" Catalog 1982 | R15

3.10 45W724-4 R15

3.11 45W760-68-3 R11

3.12 45W760-68-4 R8

3.13 45W749-1 R23

3.14 45W749-2 R22

3.15 45W749-3 R22

3.16 45W749-4 R23

3.17 ~~45W724-1 R15~~ 45W733-3 R5 | R15

3.18 ~~45W724-2 R15~~ 45W733-4 R5

3.19 45W751-1 R23

3.20 45W751-2 R17

3.21 45W751-3 R18

3.22 45W751-4 R21

3.23 45W751-5 R20

3.24 45W751-6 R15

3.25 45W751-7 R25

3.26 45W751-8 R15

3.27 45W751-9 R20

3.28 45W751-10 R22

3.29 45W751-11 R17

3.30 45W751-12 R12

3.31 45W756-1 R22

Prepared GHBates GHBates Date 2/7/90 4/4/90 Checked TS Thrall TBT Date 2-8-90 4-4-90

3.32 45W756-2 R30

3.33 45W756-3 R22

3.34 45W756-4 R11

3.35 45W756-5 R21

3.36 45W756-6 R31

3.37 45W756-7 R17

3.38 45W756-8 R12

3.39 45W732-1 R20

3.40 45W732-2 R19

3.41 45W732-3 R15

3.42 45W732-4 R14

3.43 45W755-1 R13

3.44 45W755-2 R16

3.45 45W755-3 R14

3.46 45W755-4 R13

3.47 ~~45W724-1 R15~~ 45W733-5 R5

3.48 ~~45W724-2 R15~~ 45W733-6 R4 R15

3.49 ~~45W724-3 R16~~ 45W733-7 R2

3.50 ~~45W724-4 R15~~ 45W724-3 R16

3.51 15E500-2 R3

3.52 General Electric Co. "Motor Operated Valve Thermal Overload Relay Characteristic Analysis" (B22 890802 202)

3.53 Gould - ITE "Time Current Curves, Circuit Breaker "E" Frame."

3.54 ~~Gould - ITE "Speed Fax" Catalog. 1982~~ R15

3.55 GE Controls Catalog. "GEP-1260F", 1986.

3.62 PSO ORIGINATED RELAY SETTING SHEET MANUAL VOL. I SECTIONS 1A.27 THROUGH 1A.30

Prepared [illegible] Date 4/4/90 Checked [illegible] Date 4-4-90

3.56 Procedure Method PM86-18 R2 (EE), Motor Overload Heater Selection (B43 89 1201 903)

3.57 Gould Shawmut "Advisor," 1988

3.58 Buss "Full Line Condensed Catalog FLC", January 1985

3.59 WBN Calculation No. WBN-EEB-MS-TI08-0015, R0: Watts Bar NP Containment Penetration Protection Study, Voltage Level V4, V5, Appendix A.

3.60 For additional references, see Section 3 of Attachments 2 and 3.

3.61 IEEE TRANSACTIONS PAPER F 79 669-3 "MOTOR OVERLOAD PROTECTION FOR MOTOR ACTUATED VALVES" VOL. PAS-100 NO. 1, JANUARY 1981

4.0 Design Input Data

The design input data is tabulated in Attachment 1 for each switchgear and Motor Control Center (MCC).

The load data was obtained from Reference 3.1. Missing data was added from Reference 3.2 and 3.59. This includes horsepower or kVA rating, full load current, motor service factor, and locked rotor current.

All protective information (circuit breaker type and setting, heater size, and starter size were obtained from Reference 3.2 and 3.59.

Valve stroke times used for valve thermal overload sizing, were obtained from Reference 3.6.

Key Diagram Drawings (Reference 3.7 through 3.50) were used only as information in determining the types of loads being served.

5.0 Documentation of Input/Assumptions:

5.1 Walkdown data was not completed for package units such as air conditioning systems, ~~therefore Assumption 2.1 is necessary due to lack of information.~~ The lack of information is internal to the package unit and does not impact the calculation. Credit is taken for the vendor to correctly size the internal protective devices. R15

5.2 Assumption 2.2 is inconsequential. Where a heater is not shown in the walkdown data, one is being recommended. If that heater already exists in the field, no action is required.

5.3 Assumption 2.3 is REASONABLE BASED ON THE MAXIMUM LOAD TIMES INDICATED IN REFERENCE 3.61. NO FURTHER VERIFICATION IS REQUIRED.

5.4 HEATER SELECTION IS CONSISTANT WITH DS-EEB-ESC-154. EXACT VARIATION IN THE AMBIENT TEMPERATURE BETWEEN THE STARTER AND THE MOTOR IS INDETERMINENT. EXPECTED VARIATION WILL HAVE LESS THAN 10% AFFECT ON THE LEVEL OF PROTECTION. NO FURTHER VERIFICATION IS REQUIRED.

5.5 ~~Assumption 2.5 is unverified. This setting should be verified during installation of the new TOL heaters.~~ Refer to Attachment Rev. 15 for justification. R15

Prepared GWBates Date 4/4/90 Checked TBT Date 4-9-90

5.6 ~~Assumption 2.6 is unverified. No indication was seen that any high efficiency motors exist in the loads within the scope of this calculation.~~ Refer to Attachment Rev. 15 for justification. R15 6/12/20/9

5.7 Assumption 2.7 is based on THE SAMPLE CALCULATION IN DS-EEB-151 AND THE INCLUSION OF RESISTIVE LOAD. NO FURTHER VERIFICATION IS REQUIRED.

5.8 ~~Assumption 2.8 is an unverified assumption. The unverified vendor data (T-C characteristic curves of breakers, fuses, etc.,) should be verified later on receipt of certified vendor T-C curves.~~ Refer to Attachment Rev. 15 for justification. R15 6/12/20/9

5.9 Assumption 2.9 - The only interrupting size available for 6.9-kV switchgears is 500 MVA. This assumption does not require verification.

5.10 ~~Assumption 2.10 is an unverified assumption.~~ Refer to Attachment Rev. 15 for justification. R15 6/12/20/9

5.11 ~~THE RANGE USED IS TECHNICALLY ADEQUATE. APPROVAL OF THE DEVIATION FROM TS 3 IN ACCORDANCE WITH EEB-CS-1 IS REQUIRED. THIS ASSUMPTION IS UNVERIFIED.~~ Refer to Attachment Rev. 15 for justification. R15 6/12/20/9

6.0 Computation Analyses:

6.1 Methodology

After tabulation of input data (as discussed in Section 4) each switchgear and motor control circuit was evaluated against the protection criteria that was developed as part of this calculation, Attachment 2. Each circuit was identified by a Y or N (Yes or No) for acceptability of its heater size and breaker size and settings. In instances where an "N" was entered on the MCC tabulation, a heater size, breaker size and/or setting which meets the acceptance criteria is shown in the "Remarks" column or the reason for non-compliance is stated. For the switchgear settings or trip device size an "N" was entered on the tabulation and a setting or trip device size which meets the acceptance criteria was listed under the existing setting or size and is circled.

Magnetic trip only breakers were reviewed for both their instantaneous trip setting as well as their continuous current rating.

The methodology described above is for the load protection portion of the calculation.

Methodology used in the coordination study is discussed in Attachment 3. Selective coordination needs to also exist for a postulated Non-1E overload equal to rating of the largest breaker supplying a Non-1E load. This requirement was not addressed, due to the existing lack of coordination, but needs to be included in establishing the revised settings.

6.2 Engineering Judgments

Each circuit was evaluated against the criteria provided in Attachment 2. During the application of this criteria, the following engineering judgments were made:

6.2.1 During the review of instantaneous trip settings for motors, some cases were encountered where a breaker setting position was not available within the range of 185% to 235% of locked rotor current as specified in the criteria. Where this occurred, a setting was chosen above the range given in Attachment 2, rather than below it.

Justification: A setting below 185% locked rotor current is not considered to be adequate margin for a motor during starting. A setting slightly above the 235% criteria is preferable to assure that the motor will start. This violation of the upper limit will not reduce the protection of the motor significantly. It is preferable that a safety related motor be assured of starting over the minor reduction in protection that is provided when the upper range is exceeded by going to the next higher available higher setting.

6.2.2 Truncation of digits to the right of the decimal point was done, after multiplying by the appropriate factor, when checking if a rating is within the range specified in the sizing criteria (Attachment 2). Example: If the setting of a magnetic only breaker divided by the locked rotor current of a motor resulted in a value of 235.6% (the acceptable range is 185% to 235 %) the .6 was truncated and the setting was identified as acceptable. In the same example, a value of 236% was not found to be acceptable.

Justification: The accuracy of the digit in the fourth position is questionable and does not justify a breaker replacement. Most data used only has two or three significant digits.

6.2.3 The installation of thermal overload heaters in starters controlling heater loads was found to be inconsistent, but judgment indicates that this is acceptable.

Justification: Heater circuits are protected by a thermal magnetic breaker at the MCC. A second thermal trip device (thermal overload relay), while not required, is not a degradation of the circuit and therefore is acceptable.

6.2.4 There are instances where all the MOV THERMAL OVERLOAD SIZING CRITERIA CANNOT BE MET BASED ON ALL THE DATA (i.e., FULL LOAD

current, locked rotor current, and stroke time). IN DETERMINING SUGGESTED TOL HEATER SIZES WHERE ALL OF THE CRITERIA CANNOT BE MET, HEATERS ARE SIZED IN ACCORDANCE WITH THE FOLLOWING ORDER OF IMPORTANCE:

a. The heater tripping time is at least twice the valve stroke time at 141% FLC.

b. The heater tripping time is less than 15 seconds at locked rotor current.

c. The heater tripping time is less than eight minutes at 141% FLC.

- o Criterion (1) has always been met.
- o Criterion (2) and (3) cannot be satisfied in several instances.

Justification: It is necessary that these valves operate when required. The need to operate takes precedence over the small reduction in protection resulting from exceeding these criteria.

6.3 MOV Thermal Overload Heater Sizing

Using the ITE heater characteristics curves (Reference 3.3 and 3.4), the criteria defined by Attachment 2 and the stroke times identified by Reference 3.6, a table was prepared for the different combinations of stroke times, FLC, and LRC that exist for Watts Bar MOVs. This table is included in Attachment 5 to this calculation.

This table of values was then used each time an MOV occurred on the motor control circuit review sheets (Attachment 1). The heater catalog number was calculated using the curves and criteria. See Section 7.0 for the curve that was used in this sizing calculation. Use of the table assures consistent application of a heater size to certain MOV characteristics.

WHEREEVER THE INSTALLED THERMAL OVERLOAD HEATER DOES NOT MEET ALL OF THE SIZING CRITERIA, IT IS IDENTIFIED WITH AN "N" AND SUGGESTED HEATER SIZES MEETING THE CRITERIA AS DESCRIBED IN SECTION 6.2.4 ARE SHOWN IN REMARKS.

The curves included in Section 7.0 represent the numbers used in the MOV heater sizing, where the number along the left hand side of the curve represents a percentage of the minimum heater current from the ITE Heater sizing chart in Section 10.0 of Attachment 2. To meet the criterion that the thermal overload (TOL) relay must trip within eight minutes at 141% of full load current, it can be seen from the curve that the eight minute line intersects the maximum side of the trip tolerance at a point adjacent to 170% of the minimum heater current value from the heater sizing chart.

To meet the criterion that the TOL relay must not trip for one duty cycle (2 times stroke time) of the valve at 141% of full load current, a vertical line is drawn at a location dependent on the particular valve's stroke time. On the curve in Section 7.0, a sample is shown for a valve with a 30 second stroke time. This line intersects the minimum side of the trip tolerance at a point adjacent to 250% of the minimum heater current value from the heater sizing chart.

To meet the criterion that the TOL relay must trip within 15 seconds at locked rotor current of the valve, a vertical line is drawn at the 15 second time on the curve. It intersects the maximum side of the trip tolerance at a point adjacent to 830% of the minimum heater current value from the heater sizing chart.

These three criteria are summarized as follows for a valve with a 30 second stroke time using a Size 1 starter:

$$1.7 < \frac{1.41\ (FLC)}{\text{Min. Heater Current from Table}} < 2.5$$

$$8.3 < \frac{LRC}{\text{Min. Heater Current from Table}}$$

The percentages corresponding to the above formulas are indicated on Attachment 5 for the different valve parameters and TOL heaters selected.

The methodology used is identical for other sizes at starters, different stroke times, and for the General Electric TOL heaters which are installed in 0-MCC-215-C1-S and 0-MCC-215-C2-S.

Prepared [illegible] Date 2/7/90 Checked [illegible] Date 2-9-90

6.4 Fuse Protection for Diesel Aux Boards

The two Diesel Aux. Boards, O-MCC-215-C1-S and O-MCC-215-C2-S, require a slightly different review since protection is provided by fuses rather than molded case circuit breakers. The protection criteria that is presented in Attachment 2 to this calculation, was applied to the fuse protection review as closely as applicable for fuses.

For resistive loads the fuses were reviewed using the criteria that the continuous rating of the fuse must be 140 - 200% of full load current. For motor loads, a time-current fuse characteristic curve was used to review fuse melting time at locked rotor current, and also at 185% locked rotor current. To provide protection by a magnetic only trip circuit breaker the following times were used to evaluate the fuse short circuit protection:

15 sec. < tripping time @ LRC < 60 sec.

0.1 sec. < tripping time @ 185% LRC

Thermal overload heater sizes were reviewed using the same criteria as has been used in all other MCCs.

Section 7.0

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B26 '87 06 01 7

MOTOR CONTROL—A-C MAGNETIC LINE VOLTAGE

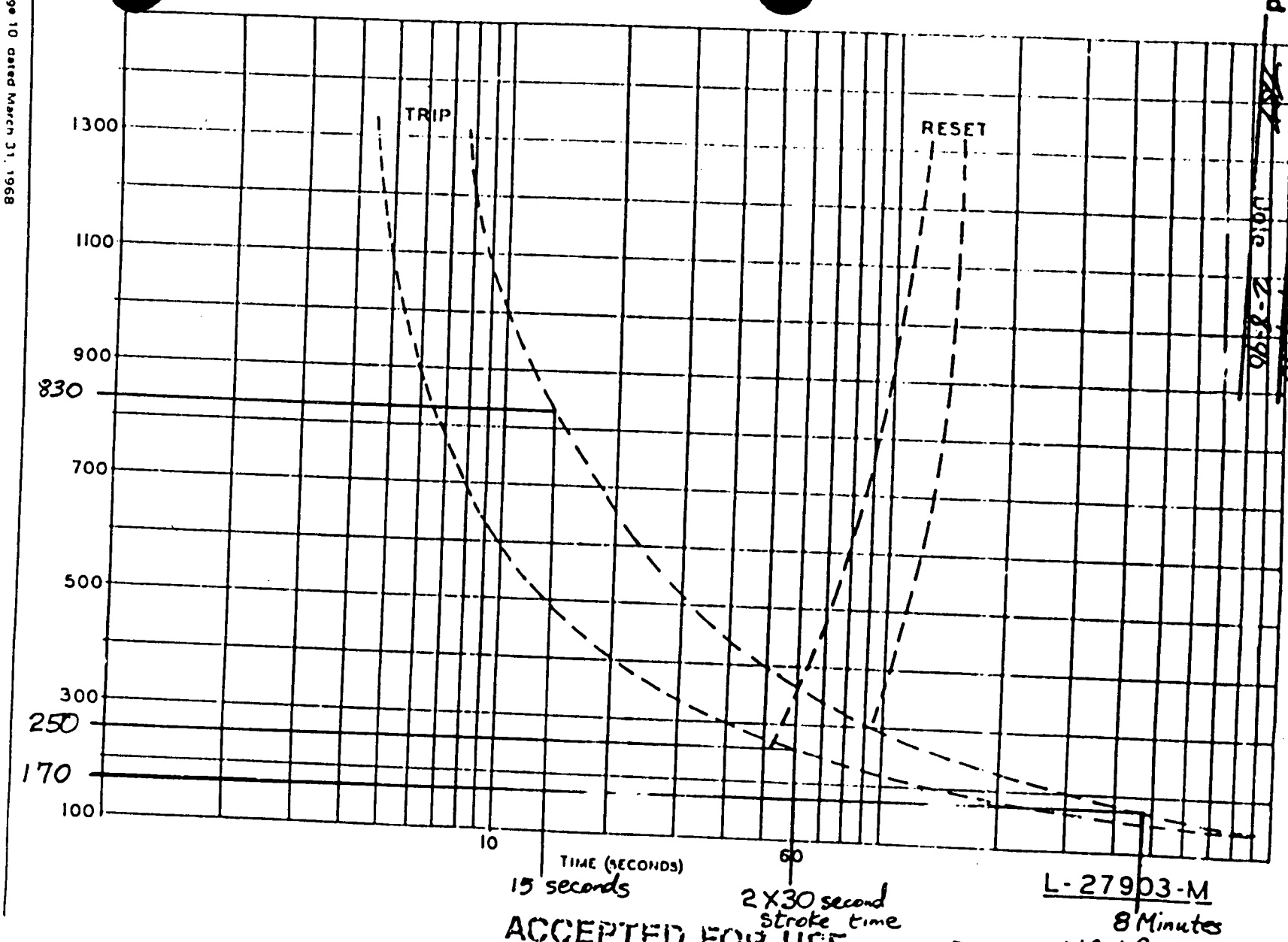
WBN EEB-MS-TI08-0008, R

TYPE CHARACTERISTICS

SIZE 0, 1, 2 OVERLOAD RELAYS AND C20 STARTERS

Prepared [illegible] Date 2/2/90

Verified [illegible] Date 2-8-90



L-27903-M

ACCEPTED FOR USE
TENNESSEE VALLEY AUTHORITY

Date: 6-1-87

WBLJW032
Wells Bar Project Engineer

PROJECT WBNP DISCIPLINE E
CONTRACT 74CS-84646 UNIT 1&2
DWG/DOC NO. L-27903-M
SHEET — OF — REV 0
DATE 6-1-87 FILE —

ACCEPTED FOR USE
TENNESSEE VALLEY AUTHORITY

Date: 6-1-87

WBKTW032
Watts Bar Project Engineer

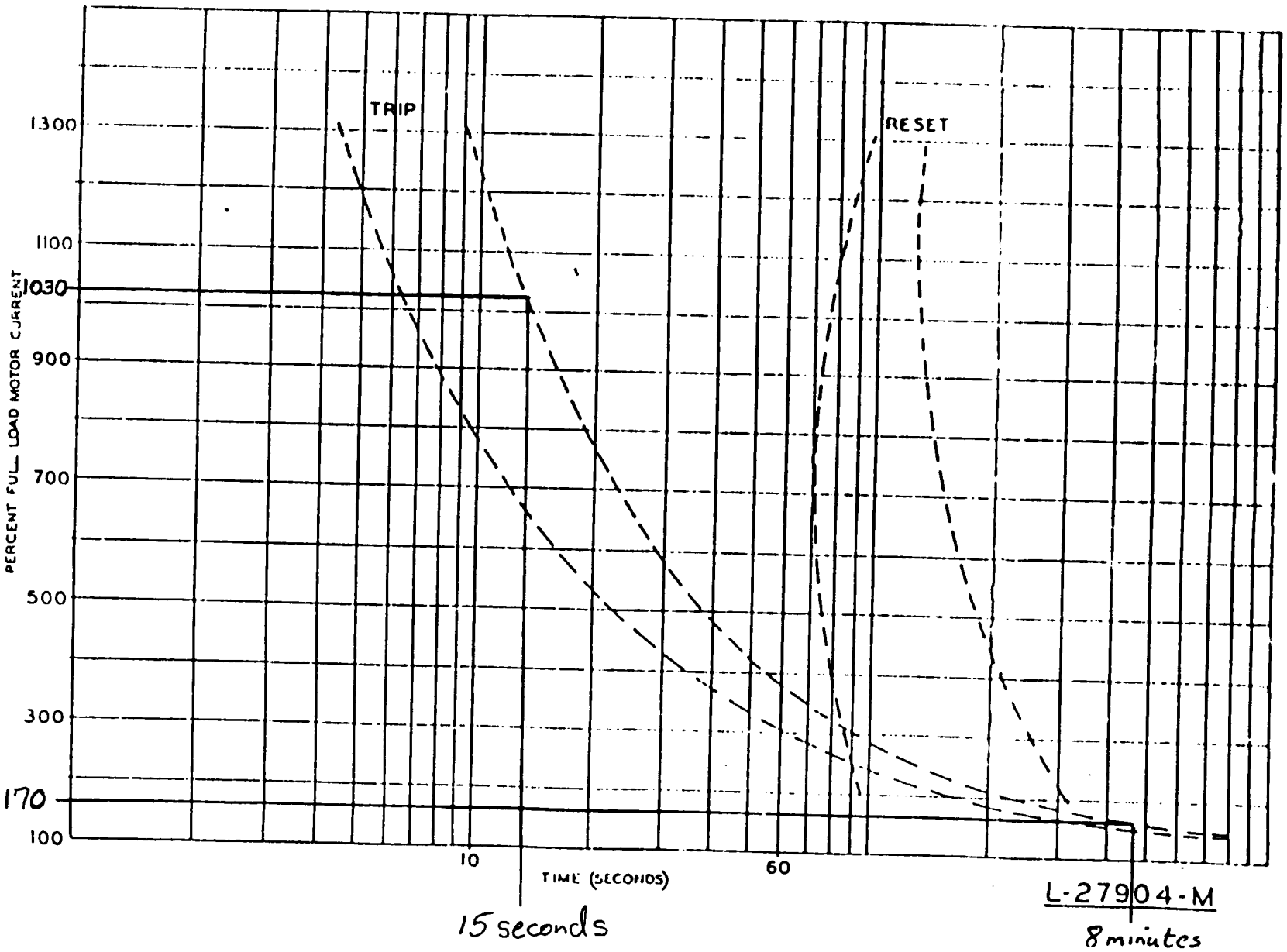
WBNP DISCIPLINE E
CONTRACT 74C5-84646 UNIT 1&2
DRAWING NO. L-27904-M
SHEET — OF — REV 0
DATE 6-1-87 FILE

Prepared Date 2/2/90
Verified Date 2-8-90

MOTOR CONTROL—A-C MAGNETIC LINE-VOLTAGE

TYPE CHARACTERISTICS

SIZE 3, 4, OVERLOAD RELAYS



L-27904-M

WBN EEB-MS-TI08-006
RO

OCTOBER 19

SECTION 6.2.6
PAGE

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DCD 87 0602

Prepared GABate Date 2/7/90 Checked TBT Date 2-8-90

8.0 Summary of Results:

The criteria developed and included as Attachment 2 to this calculation has been used to review all circuits from Class 1E, 480 V switchgear and MCCs for load protection. The criteria has been strictly followed during this review.

The results are given on the tabulation sheets which have been prepared for each switchgear lineup and MCC (Attachment 1). Pressurizer heater panels are discussed in 6.2.5.

Where settings or sizes fell outside of the criteria, recommendations have been made for a setting change, breaker replacement, or TOL heater replacement that will fall within the criteria. These suggested settings may need to be adjusted to obtain the desired coordination.

A review of the Watts Bar coordination at the 480 V level was prepared as Attachment 3 to this calculation. Coordination problems are addressed in this attachment.

A summary of the results of the minimum cable sizing review, Attachment 4, is contained in Section VIII of that attachment. This summary is made up of a table that lists approximate minimum cable length required to limit the conductor temperature to within its short circuit rating.

9.0 Conclusions:

Protective devices for 480 V loads were reviewed to determine if adequate protection was provided for the corresponding loads. A significant number of load protective devices require adjustment; coordination of upstream devices based on existing settings was also reviewed. Coordination of upstream protective devices does not always exist.

Selective coordination of all protective devices is desirable. For non-1E loads supplied from a 1E bus selective coordination is necessary to insure that a fault on a non-1E load does not disable 1E loads supplied from the same bus. Also, upstream protective devices need to allow continuous operation at full load on the bus coincident with an overload equal the breaker/fuse rating of the largest breaker/fuse supplying a non-1E load to insure that overload of a non-1E load does not disable 1E loads supplied from the same bus. Similarly, for non-Appendix R loads supplied from 1E buses, coordination of upstream protective devices is necessary to insure that a fire does not disable both trains of shutdown equipment.

Based on the above, all 480 V switchgear protective device settings need to be revised and the criteria for load protection and selective coordination need to be applied in establishing the new settings.

The cable sizes used at the Watts Bar Station were found to be acceptable in terms of short circuit withstand capability. This is demonstrated by the kw value of cable impedance (and hence cable length) required to limit the cable conductor temperatures, during the instantaneous clearing of short circuits, to below the maximum allowable cable insulation temperature.

80 Vac 1E Coordination/Protection

repared B S Bhatia Date 1-10-90 2-8-90 Checked R.H. Baukert / R.H.B. 2-8-90 / T.M. McCauley 2/8/90 (Prepared) Date 1-12-90 D.S. Galanin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-A1-A

ub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
B	Fdr. Fm. xfmr. 1A1-A			2700 A		632 See remark	51N Relay		51N Relay		51N Relay		No rating for cont. current is given in wlkdn data.
D	Future												
B	Future												
D	Future												
C	Spare												
D	Future												
B	Alt. Fdr. Fm. Xfmr. 1A-A			2700 A		632 See remark	51N Relay		51N Relay		51N Relay		No rating for cont. current is given in wlkdn data.
D	Future												
A	Alt. Fdr. 250 V Btry. Chgr. No. 1		82.61	150		206 300A	6		.75		20		
B	Nor. Fdr. Rx. Mov. Bd. 1A1-A & Alt. Fdr. Rx Mov. Bd. 1A2-A			600 600		W 206 400A 600A	— 6	N	.65 1.25	N	20	Y	

NOTE: Existing values are uncircled - Proposed values are circled

480 V SHUTDOWN BOARDS
1-BD-212-A1-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
8C	Spare												
8D	Dsl. Aux. Bd. 1A1 (Nor) & 1A2 (Alt) - A			600		W 206 300A 600A	6	N	1.18	N	20	Y	
									1.25				
9A	Future												
9B	Not. Fdr. Rx Vt Bd 1A-A			600		206 400A 600A	6	N	.9	N	20	Y	
									1.25				
9D	Spare												
10AA	Nor Fdr. 125 V Vital Bat Chgr 1		25.6 kw	53		See Cubicle 10AC, Page 24							
10AB	Nor Fdr. 120 VAC Vital Inv. 1-I		34.92 kVA	42									

NOTE: Existing values are uncircled - Proposed values are circled

WBN EEB-M[illegible]8-0008 R0, Attachment 1 Page 24 of [illegible]
480 Vac 1E [illegible]ordination/Protection
Prepared R. Sukkar / B.B. Bhatt Date 1-10-90 / 1-10-90 Checked R.H. Bennett / Date 1-12-90
RS 2-8-90 / 2-8-90 R.H.B. 2-8-90 / T.M. McCarty 2/8/90 (Prepared) D.P. Galvin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-A1-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
2C	1-MTR-30-103 FAN	1.15	100 HP	120	622 F	416 300A 200A	7	Y	0.5 0.9	N	8 4	N	
3B	1-MTR-70-46-A PUMP	1.15	350 HP	389	2084 F	416 600A	11 8	N	0.82 0.95	N	8 4	N	
7A	0-MTR-78-35-S PUMP	1.15	100 HP	115	646.7 G	206 200A	10 7	N	0.75 0.80	N	20 4	N	
7B	1-MTR-30-83/1-A FAN	1.15	75 HP	97	413 D	206 150A	12 6	N	0.64 0.95	N	12 4	N	
7C	1-MTR-30-74-A FAN	1.15	40 HP	54	307 G	206 100A	10 7	N	0.7 0.8	N	12 4	N	
7D	1-MTR-30-83/2-A FAN	1.15	75	97	413 D	206 150A	12 6	N	0.83 0.95	N	12 4	N	
9C	0-MTR-31-308-A PUMP	1.15	50 Hp	56.5	378.28 G	206 150A 100A	8	Y	0.6 0.8	N	8 4	N	
10C	1-MTR-30-38-A FAN	1.0	100 Hp	115	869 J	206 200A	10	Y	0.75	Y	12 10	N	
10AC	Nor Fdr. 120 Vac Vital Vital Inv. 2-I	34.92	42 kVA			206 400A	6	Y	0.76 0.85	N	20 4	N	

NOTE: Existing values are uncircled - Proposed values are circled

Prepared R. Sukkar / [illegible] Date 1-10-90 / 1-10-90 Checked R.H. Bendrick / Date 1-12-90
RS 2-8-90 / [illegible] 2/8 2-8-90 2.8.90 / T.M. McCauley 2/8/90 (Prepared) D.P. Galanis 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-A1-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
10AD	Inst. Pwr Dist Pnl. 1A		50 kVA	104.17	See Cub. 10AC, Page 24								
10B	Nor Fdr. C&A Bldg. vt Bd. 1A1-A					206 600A			1.0		8		
10D	Alt Fdr. C&D Bldg vt Bd. 1A2-A					206 600A			0.6		8		
12B	Spare												
12D	Bustie					DSL 416 See remark							No rating for cont. current is given in wlkdn data

NOTE: Existing values are uncircled - Proposed values are circled

Prepared R. Supkar/B.J. Bhatia Date 1-5-90/1-11-90 Checked R.H. Bachert, Date 1-12-90
RS 2-8-90 / BJB 2-8-90 R.H.B 2-8-90 / T.M. McCauley 2/8/90 (Prepared) D.B. Gadamin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-A2-A

Sub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
2C	0-MTR-31-80-2-A COMPR	1.15	250 HP	275	1825 A/G	416 600A	6 (7)	N	0.6 (0.7)	N	20 (4)	N	
3B	0-MTR-70-51-S PUMP	1.15	350 HP	389	2084 F	416 600A	11 (8)	N	0.83 (0.95)	N	8 (4)	N	
3D	0-MTR-32-25 COMPR	1.15	125 HP	162	770 E	416 300A (200A)	10 (9)	N	0.75 (1.15)	N	12 (4)	N	
1D	1-MTR-26-1-A PUMP	1.0	200 HP	230	1400 F	416 600A (400A)	7 (8)	N	1.25 (0.8)	N	4	Y	
7A	1-MTR-30-88/1-A FAN	1.15	75 HP	97	413 D	206 150A	12 (6)	N	0.83 (0.95)	N	12 (4)	N	
7B	1-MTR-30-159 FAN	1.15	125 HP	147	986.83 G	206 300A	9 (7)	N	0.66 (0.7)	N	12 (6)	N	
7D	1-MTR-30-77-A FAN	1.15	40 HP	54	307 G	206 100A	10 (7)	N	0.7 (0.8)	N	12 (4)	N	
3A	1-MTR-30-88/2-A FAN	1.15	75 HP	97	415.7 D	206 150A	12 (6)	N	0.9 (0.95)	N	12 (4)	N	
3D	0-MTR-31-45-A FAN	1.15	75 HP	92	592.1 G	206 150A	11 (9)	N	0.65 (0.9)	N	14 (8)	N	

NOTE: Existing values are uncircled - Proposed values are circled

Prepared R. Sukkar / B.J. Bach Date 1-5-90 / 1-11-90 Checked R.H. Bachert / Date 1-12-90
RS 2-8-90 / 2-8-90 R.H.B. 2-8-90 / T.M.K. Cauly 2/8/90 (Prepared) D.P. Galani 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-A2-2

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
1B	Fdr From Xfmr 1A2-A					632 See Remark							No rating for cont. current is given in wlkdn data
1D	Future												
2B	Spare												
2D	Future												
3C	Spare												
4B	Fdr from Xfmr 1A-A					632 See Remark							No rating for cont. current is given in wlkdn data

NOTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] / B.J. Bhatia Date 1/10/90 / 1-11-90 2-8-90 Checked R.H. Bauchat R.H.B. 2-8-90 Date 1-12-90 / T.M. McCauley 2/8/90 (Prepared) D.C. [illegible] 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-A2-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
10A	Alt Fdr Rx Vt Bd 1A-A			600		206 600A			0.58		8		
10B	Spare												
10C	Spare												
10D	Future												
12B	Spare												
12D	Bus Tie Fdr					DSL 416 See Remark							No rating for cont. current in wlkdn data
7C	Spare												
8B	Rx Mov Bd 1A2 (NOR) & 1A1 (Alt) - A					206 300A			0.83		20		
8C	DSL Aux Bd 1A2-A, 1A1-A (Alt)					206 300A			1.18		20		
8D	Spare												

NOTE: Existing values are uncircled - Proposed values are circled

480 Vac 1E [redacted]dination/Protection

Prepared [redacted] / B.S. Bhatia Date 1-11-90 [redacted]ked R.H. Bischof / Date 1-12-90

1/10/90 2-8-90 R.H.B. 2-8-90 T.M.M. 2/8/90 (Prepared) D.L. Gossman 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-A2-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
9AA	Alt Fdr 125 V Vital Bat Chgr 2		25.6 kW	53		206 400A	6.1 (6.0)	N	0.77 (0.85)	N	20 (4)	N	
9AB	Alt Fdr 120 Vac Vital Inv. 1-II		34.92 kVA	42									
9AC	Alt Fdr 120 Vac Vital Inv. 2-II		34.92 kVA	42									
9AD	Alt Fdr Inst Pwr Dist Pnl 1B		50 kVA	104.17									
9B	Alt Fdr C&A Bldg Vt Bd 1A1-A			104.17		206 600A			1.0		8		
9C	Alt Fdr C&A Bldg Vt Bd 1A2-A			600		206 400A			0.88		20		

NOTE: Existing values are uncircled - Proposed values are circled

480 V SHUTDOWN BOARDS
1-BD-212-B1-B

b.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
	Future												
	Future												
	Future												
	Alt Fdr from Xfmr 1B-B					632 See Remark							Bkr cont. current rating not given wlkdn
	Spare												
AA	Alt Fdr 125 V Vital Bat. Chgr 1		25.6 KW	53		206 400	6	Y	0.75 (0.85)	N	20 (4)	N	
AB	1-INV-235-1-D (Inv 1-I) Alt Fdr		34.92 kVA	42									
AC	AH Fdr 120 Vac Vital Inv. 2-I		34.92 kVA	42									
AD	AH Fdr Inst. Pwr. Dist. Pnl. 1A		50 kVA	104.17									

TE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 Checked [illegible] Date

R. Sumpter 1-10-90
R.H. Burchart 1-10-90

[illegible] 1-11-90 T.M. [illegible] 2/8/90 (Prepared) D.P. Galanin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-B1-B

ıb.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
ı	1-MTR-30-102 FAN	1.15	100	120	624 F	406 300A 200A	7	Y	0.5 0.9	N	7.5 4	N	
ı	1-MTR-62-101 PUMP	1.15	200	221	1578.9 G	406 400A	10 9	N	0.75 0.8	N	20 4	N	
:	1-MTR-70-38-B PUMP	1.15	350	389	2084 F	406 600A	10 8	N	0.83 0.95	N	8 4	N	
ı	O-MTR-32-26 COMPR	1.15	125	162	770 E	406 300A 200A	9.8 9	N	0.75 1.15	N	12 4	N	
	O-MTR-31-31B-B FAN	1.15	50	62.5	360 G	206 100A	10.8 6	N	0.9	Y	12 6	N	
	1-MTR-30-92/1-B FAN	1.15	75	97	413 D	206 150A	12 6	N	0.87 0.95	N	12 4	N	
	1-MTR-30-75-B FAN	1.15	40	54	307 G	206 100A	10 7	N	0.71 0.8	N	12 4	N	
D	1-MTR-30-92/2-B FAN	1.15	75	97	413 D	206 150A	12 6	N	0.86 0.95	N	12 4	N	
	Nov Fdr From Xfmr 1B1-B					632 See Remark							Bkr cont. current rating not given wlkdn

TE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 [illegible]ed Date
R. Supkar 1-10-90
R. A. Buchet 1-10-90
[illegible] 1-11-90
T.M.M. [illegible] 2/8/90 (Prepared)
D.R. Galavin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-B1-B

Nb.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
1B	1-MCC-214-B1-B Nor Fdr.					206 See remark			1.0		8		Wldn. data has rated con. crnt. stamped 400 with a 6 stamped over the 4.
1C	Spare												
B	Spare												
D	Bus Tie Fdr												Not in wlkdn data.
	Spare												
	Spare												
	1-MCC-213-B1-B Norm. Fdr. 4 1B2-B Alt.					206 300A			0.83		20		
	Spare												
	1-MCC-215-B1-B Norm Fdr 4 1B2-B Alt					206 300A			1.17		20		

TE: Existing values are uncircled - Proposed values are circled

repared [redacted] Date 1/10/90 [redacted]ked [redacted] Date [redacted]

R. Supkar 1-10-90
R.H. Buchat 1-10-90
1-11-90 T.M.M.S 2/8/90 (Prepared)
D.P. Galanin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-B1-B

ub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
4	Alt. Fdr. 1-MCC-214-B2-B					206 800A			0.55		8		
3	Norm. Fdr. 1-MCC-232-B-B					206 400A			0.85		20		
:	Future												
)	Spare												

TE: Existing values are uncircled - Proposed values are circled

480 V SHUTDOWN BOARDS
1-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
2B	0-MTR4-31-96/ 2-B COMPR	1.15	250	275	1825 A/G	416 600A	8 (7)	N	0.57 (0.7)	N	20 (4)	N	
3B	1-CRN-271-R1	1.0 1.0 1.0 1.0	5 5 5 5 3 15 kVA 50 50	7.2 7.2 7.2 7.2 169 DC 169 DC		416 300A	6		1.0		20		Not Evaluated
3C	0-MTR-31-49/2 -B COMPR		240	247	1209	416 400A	11 (7)	N	0.88	N	12 (4)	N	
4D	1-MTR-26-4-B PUMP	1.0	200	230	1400	416 600A (400A)	7 (8)	N	1.25 (0.8)	N	(4)		No wlkdn data Calc # DS06811E2 Pg. B 112
7A	1-MTR-30-162 FAN	1.0	125	147	854 G	206 300A	9 (7)	N	0.65	N	12 (4)	N	
7B	1-MTR-30-80/1 -B FAN	1.15	75	97	413 D	206 150A	12 (6)	N	0.85 (0.95)	N	12 (4)	N	

NOTE: Existing values are uncircled - Proposed values are circled

WBN EEB-[redacted]I08-0008 R0, Attachment 1
430 Vac [redacted] Coordination/Protection
Prepared R. Supkar RS 2-8-90 Date 1-10-90 Checked [illegible] 4/5/90 / F. M. McCarty 2/8/90 (Prepared) Date D. B. Goldman (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
7D	1-MTR-30-78-B FAN	1.15	40	54	307 G	206 100A	10 (7)	N	0.7 (0.8)	N	12 (4)	N	
9A	0-MTR-78-9-B PUMP	1.15	100	115	646.7 F	206 200A	10 (7)	N	0.75 (0.8)	N	12 (4)	N	
9C	1-MTR-30-39-B FAN	1.0	100	115	828 J	206 200	10 (9)	N	0.75 (0.8)	N	24 (4)	N	
9D	0-MTR-31-55-B FAN	1.15	75	92	592.1 G	206 150A	11 (9)	N	0.6 (0.9)	N	16 (8)	N	
10C	1-MTR-30-80/2 -B FAN	1.15	75	97	413 D	206 150A	12 (6)	N	(0.95)	N	12 (4)	N	
1B	Nor. Fdr. from 1B2-B					632 See remark							No rating for cont. current is given by wlkdn data.

Prepared [illegible] Date 1/10/90 1-10-90 Checked B.S. Bhatia Date 1-11-90

T.N. McCauley 2/8/90 (Prepared) D.G. Galavis (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
1D	Future												
2C	Future												
2D	Future												
3D	Emer Fdr. O-BD-206-A					416 300A			1.0		20		
4B	Fdr from xfmr. 1B-B					632 See remark							No rating for cont. current given in wlkdn data.
10AA	Norm Fdr. O-CHGR-236-2-E		25.6 kw	53		206 400A	6	Y	0.75 0.85	N	20 4	N	
10AB	Norm Fdr. 1-INV-235-2-E		34.92 kVA	42									
10AC	Norm Fdr. 2-INV-235-2E		34.92 kVA	42									
10AD	Norm Fdr. 1-DWF-237-B		50 kVA	104.17									

NOTE: Existing values [illegible] Proposed values are circled.

WBN EEB-[illegible]I08-0008 RO, Attachment 1
480 Vac [illegible]oordination/Protection
Prepared [illegible] Date 1/10/90 Checked B.S. Chhatia Date 1-11-90
Engineer R.H. Bachat 1-10-90 / T.M. McCarty 2/9/90 (Prepared) D.B. Calavin (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
10B	Norm Fdr. 1-MCC-214-B2-B					206 400A			0.85		20		
10D	AH. Fdr. 1-MCC-232-B-B					206 600A			0.6		20		
12B	Spare												
12D	Bus Tie Fdr.					DSL 416 See remark							No rating for cont. current given in wlkdn. data.
7C	Spare												
8A	AH. Fdr. O-CHGR-239-5		82.88 kW	150		206 300A	6	Y	0.75 (0.7)	N	20	Y	
8B	Norm Fdr. 1-MCC-213-B2-B Alt. 1B1-B					206 300A			0.85		20		
8C	Spare												

NOTE: Existing values are unpaneled - Proposed values are circled

WBN EEB-[redacted]I08-0008 R0, Attachment 1
480 Vac [redacted] Coordination/Protection
Prepared [illegible] Date 1/10/90 Checked B.S. Bhatia Date 1-11-90
Engineer R.K. Brabant 1-10-90 F.M. [illegible] 2/8/90 (Prepared) D.P. Galvin (Reviewed)

480 V SHUTDOWN BOARDS
1-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
8D	Norm Fdr. 1-MCC-215-B2-B Alt. 1B1-B					206 300A					20		
9B	Alt. Fdr. 1-MCC-214-B1-B					206 600A			1.0		8		

T.M. McCauley 2/5/90 (Prepared) D.G. Galanis 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-A1-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
1B	Fdr from Xfmr 2A1-A					-632							
1D	Future												
2B	Future												
2D	Future												
3C	Spare												Bkr not installed
3D	Future												
4B	Alt Fdr from Xfmr 2A-A					-632							
4D	Future												
10AA	Norm Fdr O-CHG2-236-3-F		25.6 kW	53		-206 400 A	6	Y	0.75 0.85	N	20 4	N	
10AB	Norm Fdr 1-INV-235-3-F		34.92 kVA	42									
10AC	Norm Fdr 2-INV-235-3-F		34.92 kVA	42									

NOTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 2/5/90 Checked R.H. [illegible] Date 1-12-90

T.M. McCauley 2/8/90 (Prepared) D.P. Galassi 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-A1A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
10AD	Norm Fdr 2-DXF-237-A		50 kVA	104.17									
10B	Norm Fdr 2-MCC-214-A1-A					-206 600 A			1.0	Y	8	Y	
10D	Alt Fdr C&A Bldg Vt Bd 2A2-A					-206 600 A							
12B	Spare					DSL-416 rating							
12D	Bus Tie Fdr					DSL-416 rating							
7A	Future												
8A	Alt Fdr 0-CHGR-239-2		83.75 kW	150		-206 300A	6	Y	0.75 0.7	N	20 4	N	
8B	Norm Fdr 2-MCC-213-A1-A					-206 400 A			0.65		20		
8C	Spare					-206 150 A	6		0.65		20		

NOTE: Existing values are uncircled - Proposed values are circled

480 V SHUTDOWN BOARDS
2-BD-212-A1-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
8D	Norm Fdr 2-MCC-215-A1-A Alt 2A2-A					-206 300A			1.15		20		
9A	Future												
9B	Norm Fdr 2-MCC-232-A-A					-206 300A			0.88		20		
9D	Spare												Bkr not installed

NOTE: Existing values are uncircled - Proposed values are circled

Engineer 2/5/90 Engineer

Checked: Z.A. Burkett / T.W. McCarty 2/8/90 (Prepared) D.R. Galanin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-A1-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
7D	Control Rod Drive Mech Cooler Fan 2A-A MTR 2 2-MTR-30-83/2-A	1.15	75	97	413/D	DS-206 150 A	10 (6)	N	.83 (0.95)	N	12 (4)	N	
9C	Electric Board Room AHU B-A 0-MTR-31-30D-A FAN	1.15	50	56.5	394.73/G	DS-206 150 A	8 (6)	N	.6 (0.5)	N	8 (4)	N	
10C	Containment Air Return FAN 2A-A 2-MTR-30-38-A	1.0	100	115	869/J	DS-206 200 A	10	Y	.75	Y	12 (10)	N	
2C	Aux Bldg General Supply 2-MTR-30-104 FAN 2A	1.15	100	120	630/F	DS-416 300 A (200A)	7	Y	.5 (0.9)	N	8 (4)	N	
3B	Component Cooling System PUMP 2A-A 2-MTR-70-59-A	1.15	350	389	2084/F	DS-416 600 A	11 (8)	N	.82 (0.95)	N	8 (4)	N	

NOTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 2/5/90 Checked R.H. Bachert / T.M. [illegible] 2/8/90 (Prepared) Date 1-18-90 D.P. Galavin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-A1-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
7B	Control Rod Drive Mech Cooler Fan 2A-A MTR-1 2-MTR-30-83/1-A	1.15	75	97	413/D	DS-206 150 A	12 (6)	N	.83 (0.95)	N	12 (4)	N	
7C	Reactor Lower Compartments Cooler Fan 2A-A 2-MTR-30-74-A	1.15	40	47	310	DS-206 100A	10 (7)	N	.7	Y	12 (4)	N	

NOTE: Existing values are uncircled - Proposed values are circled

Prepared Kughudal Date 1/10/90 2/5/90 Checked B.J. Bhatia Date 1-11-90

T.M. McCarley 2/8/90 (Prepared) D.B. Galanis 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-A2-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
1B	Norm Fdr from Xfmr 2A2-A					-632							Bkr cont. rating not shown in wkdn
1D	Future												
2B	Spare					-632 100 A wkdn	9		1.0		20		N.P. has DS-416 type bkr
2D	Future												
3B	Future												
3D	Future												
4B	Alt Fdr from Xfmr 2A-A					-632							Bkr cont. rating not shown in wkdn
10A	Alt Fdr 2-MCC-232-A-A					-206 600 A							
10B	Spare					-206 400 A							Amptector removed
10C	Spare												Bkr not installed
10D	Future												

NOTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 2/8/90 Checked B.J. Bhatia Date 1-10-90

T.M. McCauley 2/8/90 (Prepared) D.R. Galavis 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-A2-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
12B	Spare					DSL-416							
12D	Bus Tie Fdr					DSL-416							
8B	Norm Fdr 2-MCC-213-A2-A					-206 300A			0.84		20		
8C	Norm Fdr 2-MCC-215-A2-A					-206 300A			1.17		20		
9AA	Alt Fdr O-CHGR-236-4-G		25.6 kW	53		-206 400 A 100A	6.1 4	N	0.75 0.8	N	20 4	N	
9AB	Alt Fdr 1-INV-235-4-G		34.92 kVA	42									
9AC	Alt Fdr 2-INV-235-4-G		34.92 kVA	42									
9AD	Alt Fdr 2-DXF-237B		50 kVA	104.15									
9B	Alt Fdr 2-MCC-2/4-A1-A					-206 600A			1.0		8		
9C	Norm Fdr 2-MCC-214-A2-A					-206 400A			0.88		20		

NOTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 2/5/90 Checked R.S. Bhatia F.M. [illegible] 2/8/90 (Prepared) Date 1-18-90 D.B. Galavin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-A2-A

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
2C	Elect Bd Rm Air Cond. A-A Compressor O-MTR-31-128/2A	1.15	250	275	1825/	DS-416 600A	8 (7)	N	.56 (0.7)	N	20 (4)	N	
3C	480 V Shtdn Bd Rm Chiller Pkg A-A O-MTR-31-36/2A		240	247	1209/ LE	DS-416 400A	11 (7)	N	.89		12 (4)	N	
9D	Spent Fuel Pit Pump A-A O-MTR-78-12-A		100	113.82	646.7	DS-206 200A	10 (7)	N	.75 (0.8)	N	12 (4)	N	
4D	Station Fire Pump 2A-A 2-MTR-26-9-A	1.0	200	230	1403.21 F	DS-416 600A (400A)	7 (8)	N	1.25 (0.8)	N	4	Y	
7A	CRD Mech. Cooler Fan 2C-A MTR-1 2-MTR-30-88/1A		75	97	413/D	DS-206 150A	8 (6)	N	.82 (0.95)	N	12 (4)	N	

NOTE: Existing values are uncircled - Proposed values are circled

WBN EEB-[illegible]TI08-0008 R0, Attachment 1
480 Vac [illegible]oordination/Protection
Prepared Kingsley Clay Date 1/10/90 Checked B.S. Bhatia / T.M.M.S. Cauley 2/8/90 (Prepared) Date 1-11-90 D. B. Galanis 2-8-90 (Reviewed)
Kingsley Clay 2/5/90

480 V SHUTDOWN BOARDS
2-BD-212-A2-2

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
7B	Aux Bldg General Exhaust Fan 2A 2-MTR-30-27/4	1.0	125	147	866/F	DS-206 300A	9.1 (7)	N	.67	Y	12 (4)	N	
7D	Reactor Lower Compartment Cooler Fan 2C-A 2-MTR-30-77-A	1.15	40	54	307/D	DS-206 100A	10 (7)	N	.7 (0.8)	Y	12 (4)	N	
8A	CRD Mech. Cooler Fan 2C-A Motor 2 2-MTR-30-88/2A	1.15	75	97	413/D	DS-206 150A	8 (6)	N	.8 (0.95)	Y	12 (4)	N	
8D	480 V Shutdn Board Room Air Handling Unit B-A FAN 0-MTR-31-44-A	1.15	75	92	592.1/ G	DS-206 150A	11.1 (9)	N	.6 (0.9)	Y	16 (8)	N	
7C	Fuel Handling Exh. Fan A 0-MTR-30-136	1.15	100	120	624/F	DS-206 200A	11 (7)	N	.75 (0.9)	Y	12 (4)	N	

NOTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 2/8/90 Checked R.H. Pankert R.H.B. 2-8-90 Date 1-16-90

T.M. McCauley 2/8/90 (Prepared) D.B. Galavin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-B1-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
1B	Fdr. From Xfmr 2B1-B					632							
1D	Future												
2C	Future												
2D	Future												
3D	Future												
4B	Fdr From Xfmr 2B-B					632							
4D	Spare												Bkr removed per #A491941
10A	Alt Fdr O-CHGR-236-3-F		25.6 kW	53		-206 400A	6	Y	0.75 (0.85)	N	20 (4)	N	
10AB	Alt Fdr 1-INV-235-3-F		34.92 kVA	42									
10AC	Alt Fdr 2-IVN-235-3-F		34.92 kVA	42									

NOTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 Checked [illegible] Date 1-16-90

R.A.B. 2-8-90 / T.M. McCauley 2/8/90 (Prepared) D.R. Galanis 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-B1-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
10AD	Alt Fdr 2-DXF-237-A		50 kVA	104.17		206 400A							
10B	Norm Fdr 2-MCC-214-B1-B					206 600A			1.0		8		
10C	Spare					-206 400A							Amptector not installed
12B	Spare					DSL-416							
12D	Bus Tie Fdr					DSL-416							
8A	Spare					-206 400A			0.88		20		
8B	Norm Fdr 2-MCC-213-B1-B					-206 300A			0.82		20		
8C	Spare					-206 300A	6	Y	0.65		20		
8D	Norm Fdr 2-MCC-215-B1-B					-206 300A			1.18		20		
9A	Alt. Fdr 2-MCC-214-B2-B					-206 600A			0.6		3		

NOTE: Existing values are uncircled. Proposed values are circled

Prepared [illegible] Date 1/10/90 4/8/90 Checked [illegible] Date 1-16-90
R.H.B. 2-8-90 / F.M.M.S. 4/8/90 (Prepared) D.P. Galanis 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-B1-B

ub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
IB	Norm Fdr 2-MCC-232-B-B					-206 400A			0.89		20		
C	Future												
D	Spare					-206 300A	6		1.0		20		
B	Aux. Bldg. General Supply Fan 2B 2-MTR-30-105	1.15	100	120	626/F	DS-416 300A 200A	7	Y	0.5 0.9	N	8 4	N	
B	Reciprocating Charging Pump 2-MTR-62-101	1.15	200 93/G	221 400A	1578.	DS-416	10 9	N	.75 0.8	N	20 4	N	
C	Component Cooling System Pump 2B-B 2-MTR-70-33-B	1.15	350	389	2084/F	DS-416 600A	11 8	N	.825 0.95	N	8 4	N	
B	Spent Fuel Pit Pump C-5 0-MTR-78-35-5	1.15	100	115	646.7/G	DS-206 300A 200A	7	Y	.5 0.8	N	8 4	N	

OTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 2/8/90 Checked [illegible] Date 1-16-90

R.H.B. 2-8-90 / E.M.-R. [illegible] 2/8/90 (Prepared) D.C. Galanis 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-B1-B

ıb.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
2/8/90													
7A	Electric Bd Rm AHU FAN D-B 0-MTR-31-31D-B	1.15	50	62.5	360	DS-206 150A 100A	8	Y	.6 0.9	N	12 6	N	
2/8/90													
7C	CRD Mechanism Cooler FAN 2B-B MTR 1 2-MTR-30-92/1-B		75 1.15	54 97	307 413/D	DS-206 200A 150A	4.5 6	N	.6 0.95	N	12 4	N	
2/8/90													
7D	Reactor Lower Compartment Cooler FAN 2B-B 2-MTR-30-75-B	1.15	40	54	307/D	DS-206 100A	10 7	N	.7 0.8	N	12 4	N	
D	CRD Mechanism Cooler FAN 2B-B MTR2 2-MTR-30-92/2-B	1.15	75	97	413/D	DS-206 200A 150A	4.5 6	N	.6 0.95	N	12 4	N	

TE: Existing values are uncircled - Proposed values are circled

Prepared [signature] Date 1/10/90 2/8/90 Checked [signature] R.H.B. 2-8-90 / T. M. M. [signature] 2/8/90 (Prepared) Date 1-12-90 D. R. Galanis 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
1B	Fdr From xfmr 2B2-B					-632							Xfmr rating and bkr cont. rating not shown in wkdn
1D	Future												
2C	Future												
3C	Spare												Bkr removed
3D	Emer Fdr 0-BD-206-A					-416 300A			1.0		20		
4B	Fdr From xfmr 2B-B		2000 kVA 6.62% Imp.			-632							Bkr cont. rating not shown in wkdn sheets
10AA	Norm Fdr 0-CHGR-236-A-G		25.6 kW	53		-206 400A	6	Y	0.75 0.85	N	20 4	N	
10AB	Norm Fdr 1-INV-235-4-G		34.92 kVA	42									
10AC	Norm Fdr 2-INV-235-4-G		34.92 kVA	42									

NOTE: Existing values are uncircled - Proposed values are circled

480 Vac 1E Coordination/Protection

Prepared [illegible] Date 1/10/90 2/8/90 Checked R.H. Benhat R.H.B. 2-8-90 / T.M. McCauley 2/8/90 (Prepared) Date 1-12-90 D.B. Galanin 2-8-90 (Reviewed)

480 V SHUTDOWN BAORDS
2-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
10AD	Norm Fdr 1-DXF-237-B		50 kVA	104.17									
10B	Norm Fdr 2-MCC-214-B2-B					-206 400A			0.85		20		
10D	Spare					-206 150A							Amptector removed per MR #A511633
12B	Spare					DSL-416							Bkr rating not shown in wkdn
12D	Bus Tie Fdr					DSL-416							
8A	Spare					-206 150A	6		.825		20		
8B	Norm Fdr 2-MCC-213-B2-B					-206 300A			.825		20		
8C	Spare					-206 300A			1.0		20		

480 V SHUTDOWN BOARDS
2-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
8D	Norm Fdr 2-MCC-215-B2-B Alt-2B1-B					-206 300A			1.15		20		
9A	Alt Fdr 2-MCC-232-B-B					-206 600A			0.6		8		
9B	Alt Fdr 2-MCC-214-B1-B					-206 600A			1.0		8		
2B	Control Room Air Cond. B-B 0-MTR-31-129/ 2-B COMPR	1.15	250	275	1825/ A/G	DS-416 600A	8 7	N	.58 0.7	N	20 4	N	
3B	Unit 2 Reactor Building CRANE 2-CRN-271-R1	1 1 1 1	5 5 5 5 15 kVA 50 50	7.2 7.2 7.2 7.2 1.69 (dc) 169	- - - -	DS-416 300A	6	Y	1	Y	20 4	N	
7C	Fuel Handl Exh FAN B 0-MTR-30-139	1.15	100	120	624/F	DS-206 200A	11 7	N	.775 0.9	N	12 4	N	

NOTE: Existing values are uncircled - Proposed values are circled

Prepared [illegible] Date 1/10/90 2/8/90 Checked [illegible] 2-8-90 / T.M.M. [illegible] 2/8/90 (Prepared) Date 1-12-90 D.C. Galanin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
4D	Station Fire PUMP 2B-B 2-MTR-26-11-B	1.0	200	230	1403. 21/F	DS-416 600A (400A)	7 (8)	N	1.25 (0.8)	N	4	Y	
7A	Aux Bldg General Exhaust FAN 2B 2-MTR-30-278	1.0	125	147	850/G	DS-206 300A	9 (6)	N	.65	Y	12 (4)	Y	
7B	CRD Mech Cooler FAN 2D-B MTR 1 2-MTR-30-80/ 1-B	1.15	40	54	307/G	DS-206 150A (100)	8 (7)	N	.83 (0.8)	N	12 (4)	N	
7D	Reactor Lower Compartment Cooler FAN 2D-B 2-MTR-30-78-B		40	54	307/G	DS-206 100A	10 (7)	N	.7 (0.8)	N	12 (4)	N	

NOTE: Existing values are uncircled - Proposed values are circled

R.H.S. 2-8-90 / T.M.K. Cauly 2/8/90 (Prepared) D.C. Galvin 2-8-90 (Reviewed)

480 V SHUTDOWN BOARDS
2-BD-212-B2-B

Cub.	Service	Serv. Fact.	HP KW	FLA	LRA Code	Breaker Type W DS	Settings Inst.	Y/N	Long Delay Pickup	Y/N	Long Delay Time	Y/N	Remarks
9C	Containment Air Return FAN 2B-B 2-MTR-30-39-B	1.0	100	115	1002. 83/J	DS-206 200A	10 (11)	N	.75	Y	24 (10)	N	
9D	480V Shutdn Bd Room AHU D-B FAN 0-MTR-31-61-B	1.15	75	92	592.1/G	DS-206 150A	10.9 (9)	N	.6 (0.9)	N	15.9 (8)	N	
10C	CRD Mech Cooler FAN 2D-B Mtr 2 2-MTR-30-80/2-B	1.15	75	97	826/D	DS-206 150A	12 (6)	N	.75 (0.95)	N	12 (4)	N	
2D	Cmpnt Cooling Sys PUMP C-S Norm Fdr 0-MTR-70-51-S	1.15	350	389	2084/F	DS-416 600A	11 (8)	N	.81 (0.95)	N	8 (4)	N	

NOTE: Existing values are uncircled - Proposed values are circled

Page No. 1
01/19/90

Prepared Kraftmanford Date 1/3/90 BSBlake 1/5/90 / Date 2/5/90 1/20/90

Verified E.H. Burchett Date 1-19-90 / T.M. McCauley 1/25/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TWCABLE.DAT)

WBN EEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No.
Sheet of

PREPARED TMT 4-4-90
VERIFIED 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR. TRIP HTR SIZE CAT # : POINT ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SET SETTING	SET FOR ACCEPT?	REMARKS
** NODE 203												
* CLASSIFICATION 0 1-MCC-214-A1-A												
1A1	NOR. FDR. FR. 480V SHUTDOWN BOARD 1A1-A							ETS-KX350000:	800			
1A2	ALT. FDR. FR. 480V SHUTDOWN BOARD 1A2-A							ETS-KX350001	800			
2F1	SAFETY INJECT SYSTEM HT. TR. 1FHR. A	5KVA		10.03				ET3-0020	20		Y	
2F2	RHR., SHPKS., & FIRE PROT. (1 PH)	37.5KVA		70.2				ET3-0070	70		N	Change breaker ACS-AH5
3A	SPARE											
3B	FUTURE											
3D	SPARE											
4C	CONT. 1FHR. (1 PHASE)							ET3-0020	20		Y	
4F1	SPARE											
4F2	SPARE											
5D	AUT. DIST. PNL. FDR. 1FHR.	1.5KVA		3.13				ET3-0020	20		Y	
5F2	NOR. 125V DP. VTL. BTTY. CHGR. 1-S	25.60KW		53.0				ET3-0070	70		Y	
6F2	SPARE											
7A	SPARE											
7B	FUTURE											
7E	FUTURE											
8E	FUTURE											
8F2	STANDBY LTG. CAB. # 4	45.0KVA		54.10				ET3-0100	100		Y	
9F2	SPARE											

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Page No.
01/19/90

Prepared [illegible] Date 1/3/90 / B.S. [illegible] 2/5/90 / [illegible] 2/5/90 / [illegible] 1/20/90

Verified R.H. Brobert Date 1-9-90 / T.M. McCauley 1/25/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN EEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : NTD. TOIP CAT B : POINT	HTR SIZE	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	BKR. POS	SET ACCEPT?	REMARKS
	1-MCC-214-A1-A														
10D	SPARE														
10F2	SPARE														
11D	SPARE														
11F	FUTURE														
12E2	SPARE														
12F2	SPARE														
13F1	SPARE														
13F2	SPARE														
2A	CONT. BUILDING EMERGENCY AIR CLEAN UP FAN A-A	10 HP		12.2	110	2	T43	16.375	N	EF3-L050	50 LB	260	3	N	Change heater to T42, Breaker to pos 2
2B	5th VITAL BTTY. ROOM INTAKE FAN 1A1-A	1.5 HP	1.0	2.5	15.04	1	T33	5.4[illegible]	N	EF3-A010	10	50	4	N	Change heater to T32, Breaker to pos 2
2D	PRIMARY MAKE UP WATER PUMP 1A	30 HP	1.15	36.1	236.85	3	T52	47.1[illegible]	Y	EF3-H050	50 HI	400	2	N	Change Breaker to pos 3
2C	PENETRATION ROOM EL. 692 CLR FAN	3.0 HP	1.0	4	25	1	T33	5.425	N	EF3-A010	10	45	3	N	Change heater to T32, Breaker to pos 4
3C	CONTAINMENT SPRAY PUMP 1A-A ROOM CLR. FAN	7.5 HP	1.0	9	62	1	T41	12.313	N	EF3-A02[illegible]	25	125	3	Y	Change heater to T40
3F1	CONDENSER VAC PUMP AIR EXH. MON.	0.75 HP		1.4	12.5					EF3-B020	20			Y	
3F2	VALVE & STRAINER ROOM SUMP A PUMP 1A-A	1.5 HP		2.65	20					EF3-B020	20			Y	
4A	BTTY. ROOM EL. 692 EXHAUST FAN A-A	1.0 HP		2.2	19.5	1	T29	3.438	N	EF3-A010	10	27	LB	N	Change heater to T27, Breaker to pos 3
4B	5TH VITAL BTTY. ROOM EXHAUST FAN 1B1-A	1.5 HP	1.0	2.5	14.5	1				EF3-B070	20			N	Add heater T28, Breaker to A005 pos 4
4D	EMER. GAS TREATMENT FAN A-A	20 HP	1.0	25	132	2	T50	30.375	Y	EF3-L050	50 LB	260	3	Y	
4E	CCW STRAINER 1A-A BACKWASH VALVE 1-FCV-67-9A-A	0.33 HP		0.75	5.7	1	T15	0.888	N	EF3-A003	3	7	LB	N	Change heater to T15, Breaker to pos 3

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Page No. 3
01/19/90

Prepared [illegible] / B.S. Mathis 2/5/90 / D Bate 2/5/90 1/3/90 1/20/90 Date

Verified R.H. Bucholz / T.B. McCauley 1-19-90 / 1/25/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN DSS-MS-T708-0008 R0
Attachment No. 1
Calc. No.
Sheet of

PREPARED TBT 4-4-90
VERIFIED DLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-214-A1-A														
5A	SPENT FUEL PIT PUMP A-A, TB BSTR. PUMP SPACE CLR. FAN	7.5 HP	1.0	9.0	62	1	141	12.313	N	EF3-A0252	25	125	3	Y	Change heater to T40
5E	CCS & AFW PUMPS SPACE CLR. FANS A-A	20 HP	1.0	24.5	139.9	2	150	30.375	Y	EF3-L050	50 LB	250	3	Y	
5F1	SERVICE BUILDING VT. ROM.	3 HP		4.6	32					EF3-B020	20			Y	
6A	SHUTDOWN BOARD ROOM A PRESS. FAN A-A	3 HP	1.0	4.6	20	1	T34	5.700	Y	EF3-A010	10	50	4	Y	
6B	ERCW STRAINER 1A-A	3 HP	1.0	6	30.00	1	T36	6.938	Y	EF3-A010	10	50	4	Y	
6C	TRAVELLING SCREEN 1A-A	5 HP	1.15	6.8	41.1	1	T36	6.938	N	EF3-A0252	25	75	LB	N	Change heater to T38, breaker to pos. 2
6D	EMER. GAS TREATMENT SYSTEM A-A HUMIDITY HEATERS	20KW		24.06		2	T59	30.375	Y	EF3-B030	30			Y	
6E	ERCW STRAINER 1A-A FLUSH VALVE 1-FCV-67-98-A	0.33 HP		0.75	5.7	1	T15	0.208	N	EF3-A003	3	7	LB	N	Change heater T13, breaker to pos 3
6F1	CONTAINMENT BUILDING LOWER COMPARTMENT AIR MONITOR	3 HP		4.6	32.0					EF3-B020	20			Y	
7B	125V DC VITAL BTTY. ROOM I(IV) EXH. FAN 1A1-A	0.5 HP		1.1	5.05	1	T20	1.4	Y	EF3-A005	5	14	LB	N	Change breaker to A003, pos. 2
7C	MP FIRE PUMP STRAINER A-A	0.75 HP	1.0	2.05	8.46	1	T26	2.538	Y	EF3-A005	5	22	3	N	Change breaker to 2
8A	SI PUMP 1A-A ROOM CLR. FAN	5 HP	1.0	6.1	45.0	1	T37	7.875	Y	EF3-A0252	25	75	LB	N	Change breaker to pos. 2
8B	PENE. ROOM EL. 737 CLR. FAN 1A-A	3 HP	1.0	4	25.3	1	T33	5.425	N	EF3-A010	10	45	3	N	Change heater to T32, breaker to pos. 4
8C	480V IFHR. ROOM 1A EXHAUST FAN 1A2-A	3 HP		4.7	28.8	1	T34	5.700	Y	EF3-A010	10	50	4	Y	
8D	480V IFHR. ROOM 1A EXHAUST FAN 1A3-A	3 HP		4.7	28.8	1	T34	5.700	Y	EF3-A010	10	50	4	Y	
8F1	CONT. ROOM A/C SYSTEM OIL PUMP	3.11 HP		3.9	31					EF3-B030	30			N	Change breaker to B020
9A	RHR PUMP 1A-A ROOM CLR. FAN	5 HP	1.0	6.1	45	1	T37	7.875	Y	EF3-A0252	25	75	LB	N	Change breaker to pos. 2
9B	CONT. ROOM A/C CIR. PUMP A-A	15 HP	1.15	20	118.42	2	T48	23.125	N	EF3-L050	50 LB	250	3	Y	Change heater to T49

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Prepared [illegible] Date 1/3/90 / 1/20/90

Verified [illegible] Date 1-18-90 / T. McCauley 1/25/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN CEB-MS-TI08-0008 R0
Attachment No. 1
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-214-A1-A														
9C	480V BOARD ROOM 1A PRESS. SUPPLY FAN 1A1-A	3 HP	1.0	4.6	28.0	1	T34	5.736	Y	EF3-A010	10	50	4	Y	
9D	480V IFNR. ROOM 1A EXHAUST FAN 1A1-A	3 HP		4.7	28.0	1	T34	5.788	Y	EF3-A010	10	50	4	Y	
9E	PERM. HYDROGEN MITIGATION SYSTEM	10KVA ~~25.7KVA~~		43		2				EF3-B050Z	50			N	change Breaker to B070
9F1	CONT. ROOM INTAKE MONITOR	0.75 HP		1.4	12.5					EF3-B020	20			Y	
10A	CENTIF. CHG. PUMP 1A-A ROOM CLR. FAN	5 HP	1.0	6.1	45.0	1	T37	7.875	Y	EF3-A025I	25	75	LB	N	change Breaker to pos 2
10B	PENE. ROOM EL. 713 CLR. FAN 1A-A	3 HP	1.0	4.0	26.0	1	T33	5.425	N	EF3-A010	10	45	3	N	change heater to T32, Breaker to pos. 4
10C	PIPE CHASE CLR. FAN 1A-A	3 HP	1.0	4.0	25.2	1	T33	5.425	N	EF3-A010	10	45	3	N	Chang. heater to T33 Breaker to pos. 6
10F1	AUX. BUILDING VT. MONITOR	3 HP		4.6	32.0					EF3-B020	20			Y	
11A	480V BOARD ROOM 1B PRESS. SUPPLY FAN 1B1-A	3 HP	1.0	4.6	28.0	1	T34	5.788	Y	EF3-A010	10	50	4	Y	
11C	480V BOARD ROOM 1A A/C AHU 1A-A	10 HP	1.15	12.0	78.94	1	T43	14.625	N	EF3-A025I	25	170	4	Y	change heater to T44
11D	CONT. RM. AHU A-A	60 HP	1.15	72.0	413.0	4	T58	89.	Y	EF3-A100	100	760	3	N	change heater to T59, Breaker to pos 4
12A	125V VITAL BTTY. RM. 1(((1)) EXH. FAN 1B1-A	0.5 HP		1.1	5.05	1	T20	1.4	Y	EF3-A005	5	14	LB	N	change Breaker to A003 pos. 2
12B	CONT. BLDG. EMER. PRESS. FAN A-A	1 HP	1.0	1.7	15.0	1	T24	2.038	Y	EF3-A005	5	22	3	N	change Breaker to pos. [illegible]
12C	480V BD. RM. 1A A/C CONDENSER 1A-A	15 HP	1.15	21	111.0	2	T49	26.75	Y	EF3-L050	50 LB	260	3	Y	
12D	CONT. BLDG. PRESS FAN A-A	2 HP	1.0	3.65	27.0	1	T31	4.35	Y	EF3-A010	10	45	3	N	change Breaker to pos. 4
12E1	GASEOUS EFFLUENT RAD. MON.	5 HP		7.25	46.0					EF3-B020	20			Y	
12F1	CONTAINMENT PURGE AIR RAD. EVM. MON.	0.75 HP		1.4	12.5					EF3-B020	20			Y	

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Prepared [illegible] 1/3/90 / [illegible] Date 1/3/90 / [illegible] 1/30/90

Verified R.H. Bachert / 1-19-90 / T.R.R. Crowley 1/25/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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WBN [redacted]-MS-TI08-0006 RO

Attachment No. 1
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-214-A1-A														
13A	AUX. CHARGING PUMP 1A	1 HP	1.0	1.8	12.54	1	T25	2.3	Y	EF3-A005	5	22	3	N	change Breaker to pos 4
13B	AUX. CHARGING BOOSTER PUMP	1 HP	1.15	1.8	11.28	1	T25	2.3	Y	EF3-A005	5	22	3	Y	
13C	CONTAINMENT ANNULUS VAC. FAN 1A	5 HP		7.25	46.0	1	T37	7.875	N	EF3-A025	25	75	LB	N	change heater to T38, breaker to pos. 2
13D	ERCW SCREEN WASH PUMP 1A-A	40 HP	1.00	49.8	315.8	3	T54	58.125	Y	EF3-A100	100	475	LB	N	change breaker to pos 2

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Prepared R.K. Buchat 1-16-90 / BS Bhatia 1-19-90 Date / Bate 1-19-90

Verified BS Bhatia / [illegible] Date [illegible] 2/5/90

TVA WATTS BAR NUCLEAR PROJECT
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Prepared _____ Date _____
Verified _____ Date _____

WBNEEB-MS-TI08-0008 R0
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : NTR. TRIP CAT 0 : POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 204														
* CLASSIFICATION 0 1-NCC-214-A2-A														
1A1	NOR. FDR. FM. 480V SHTDN. BD. 1A2-A								ETS-EH3S41002	800				
1A2	ALT. FDR. FM. 480V SHTDN. BD. 1A1-A								ETS-EH3SP1002	800				
2B	SPARE													
2C	FUTURE													
2D2	AUX. BLDG. 480V RCPTS.								EF3-B100	100				
2F1	SPARE													
2P2	AUX. BLDG. 480V RCPTS								EF3-B100	100				
3B	FUTURE													
3C	FUTURE													
3D2	AUX. BLDG. 480V RCPTS.								EF3-B100	100				
4C	CONTROL XFMR. (1 PHASE 1.0KVA)								EF3-B020	20			Y	
4D	FUTURE													
4E2	SPARE													
4F2	SPARE													
5B	FUTURE													
5C	FUTURE													
5E2	SPARE													
6A	SPARE													
6B	FUTURE													
6C	FUTURE													
6D1	SPARE													

R.H. Burchat / B.P. Bhatia 1-15-90 / G Bates 1-19-90

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Prepared 1-16-90 Date _____
Verified B.P. Bhatia/M Murthy Date 1-20-90/2/5/90

TVA WATTS BAR NUCLEAR PROJECT
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Prepared _____ Date _____
Verified _____ Date _____

WBNEES-NS-TI08-0008 R0

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PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

1-MCC-214-A2-A

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	NTR. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	BKT POS ACCEPT?	REMARKS
6E2	SPARE													
6F1	SPARE													
7A	SPARE													
7B	SPARE													
7C	FUTURE													
7D1	SPARE													
7F1	SPARE													
8D	FUTURE													
8E1	SPARE													
8E2	SPARE													
8F1	SPARE													
8F2	SPARE													
2A	HOT INST. SHOP BOOSTER PUMP	3/4 HP		1.2	12.5	1	120	1.4	Y	ITE-CF30003	3	12	3	N	CHANGE BRKR TO BPS-A005 WITH SET POSITION 4
2D1	480V BD. RM. 1A UNIT NTRS. EL. 772 NTR. A	10KW		12.3						ITE-CF30020	20			Y	
2E1	480V BD. RM. 1A UNIT NTRS. EL. 772 NTR. B	10KW		12.3						ITE-CF30020	20			Y	
2E2	FIFTH VITAL BTTY. RM. DUCT NTR. A	22KW		30.5						ITE-CF300501	50			Y	
3A	NORTH MAIN STEAM VAULT EXH. FAN	3 HP		4.6	32.0	1	132	4.00	N	ITE-CF30010	10	45	3	N	REPLACE NTR WITH T34 CHANGE BRKR SET POS TO 3 BY BGA (2012%)
3D1	CONT. ROD. DR. EQPT. RM. UNIT NTR. A	10KW		12.3						ITE-CF30020	20			Y	
3E1	480V BD. RM. 1A UNIT NTRS. EL. 772	7.5KW		9.03						ITE-CF30020	20			Y	
3E2	480V BD. RM. 1A DUCT NTR.	30KW		36.09						ITE-CF300501	50			Y	

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R.H. Brackett / ~~BBBhatia 1-19-90~~ / B Bates 1-19-90

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01/19/90

Prepared 1-16-90 Date _____

Verified BBBhatia / [illegible] Date 1-20-90 / 2/5/90

TVA WATTS BAR NUCLEAR PROJECT
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(TWACABLE.BDF)

Prepared _____ Date _____

Verified [illegible] Date _____

WBN EEB-MS-TI08-0008 R0

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PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : CAT # :	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-214-A2-A														
3F1	TOILET & LOCKER RM. DUCT HTR.	10KW		12.03						ITE-EF30020	20			Y	
3F2	480V SWTGR. RM. RM. 1A UNIT HTR.	3KW		3.7						ITE-EF30020	20			Y	
4A	SAMPLING RM. HOOD EXH. FAN 1A	1 HP		1.7	15.0	1	T24	..44	Y	ITE-EF3A400	5	18	2	NO	CHANGE BARA SET POS TO 4
4B	SMOKE REMOVAL FAN	7.5 HP	1.0	9.7	63.5	1	T44	15.5	N	ITE-EF3A402	25	125	3	Y	REPLACE HTR WITH T41
4E1	CONT. ROD. DR. EQPT. RM. UNIT HTR. B	10KW		12.3						ITE-EF30020	20			Y	
4F1	CONT. ROD. DR. EQPT. RM. UNIT HTR. C	10KW		12.3						ITE-EF30020	20			Y	
5A	NORTH MAIN STEAM VAULT BACKUP EXH. FAN	3 HP		4.6	32.0	1	T24	5.79	Y	ITE-EF3A016	10	45	3	N	CHANGE BARA SET POS TO HI BAR (144%)
5E1	CONTROL BLDG. EL. 692 FLOOR SPPLY. HTR.	20KW		24.06						ITE-EF30030	30			Y	
5F1	TRANSFORMER RM. 1A UNIT HEATER EL. 772	10KW		12.3						ITE-EF30020	20			Y	
5F2	AUX. BLDG. SPACE HTR. EL. 692	5KW		6.1						ITE-EF30020	20			Y	
6E1	SOUTH MAIN STEAM VAULT RM. UNIT HTR.	20KW		24.06						ITE-EF30030	30			Y	
6E2	NORTH MAIN STEAM RM. UNIT HTR. 1	30KW		36.1						ITE-EF30050	50			Y	
6F2	125V VITAL BTTY. RM. 1 UNIT HTR.	5KW		6.1						ITE-EF30020	20			Y	
7D2	FUEL HANDLING AREA UNIT HTR. A EL. 757	25KW		30.1						ITE-EF30040	40			Y	
7E1	AUX. CONTROL INST. RM. 1A UNIT HTR.	3KW		3.7						ITE-EF30020	20			Y	
7E2	FUEL HANDLING AREA UNIT HTR. B EL. 757	25KW		30.1						ITE-EF30040	40			Y	
7F2	FUEL HANDLING AREA UNIT HTR. A EL. 757	25KW		30.1						ITE-EF30040	40			Y	

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Prepared 1-16-90 Date R H. Bulatt / 1-19-90 / D Bates 1-19-90

Verified Date 2/5/90

TVA WATTS BAR NUCLEAR PROJECT
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Prepared Date

Verified Date

Attachment No. 3
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Sheet of

PREPARED JRT 4-4-90
VERIFIED LMB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR. TRIP HTR SIZE CAT # : POINT ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-214-A2-A												
0A	CONTROL ROD DRIVE EQUIPMENT RM. A/C 1A	47.5 HP		70.5	376.5			ITE-FJ30125	125	1600	HI	N	CHANGE INST TRIP SET POS TO LOW
0B	CONTROL BLDG. STEAM GEN.	75KW		90.22				ITE-FJ30125	125	1500	4	Y	

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R.H. Bennett 1-16-90 / [illegible] 1-16-90 / M Bates 1/20/90

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Prepared _____ Date _____

Verified [illegible] 1-15-90 TBT for JSB 2-7-90 Date _____

TVA WATTS BAR NUCLEAR PROJECT
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PREPARED TBT 4-4-90
VERIFIED JSB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR. TRIP CAT # : POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SET SETTING POS	ACCEPT?	REMARKS
** NODE 205													
* CLASSIFICATION # 1-MCC-214-B1-B													
1A1	NOR. FDR. FR. 480V SHUTDOWN BOARD 1B1-B								ETS-KXXS00017	800			
1A2	ALT. FDR. FR. 480V SHUTDOWN BOARD 1B2-B								ETS-KXXS00012	800			
2F1	SAFETY INJECT. SYS. HTR. TR. XFMR. B	9KVA		10.83					EF3-0020	20		Y	
4C	CONT. XFMR. (1 PHASE)								EF3-0020	20		Y	
4F2	SPARE												
5B	AUT. DIST. PNL. FDR.	1.5KVA		3.13					EF3-0020	20		Y	
5F1	SPARE												
5F2	SPARE												
6F1	ALT. 125V DP. VTL. DIST. CHGR.	28.6KW		53					EF3-0070	70		Y	
6F2	FUTURE												
7B	FUTURE												
7E	FUTURE												
8F2	STANDBY LTG. CAB. # 2	45KVA		54.14					EF3-0100	100		Y	
9F1	UNIT CONT. ANN. SYS. XFMR.	6.95KVA		8.36					EF3-0020	20		Y	
9F2	SPARE												
10B	SPARE												
10F2	SPARE												
11F	FUTURE												
12B	SPARE												
12E2	SPARE												

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Prepared Z.H. Bushart 1-16-90 / [illegible] 1-16-90 / D Bates 1/20/90 Date

Verified [illegible] 1-15-90 / TBT for USE 2-2-90 Date

TVA WATTS BAR NUCLEAR PROJECT
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WBN EEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No.
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1-MCC-214-B1-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OL RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
12F2	SPARE														
13F1	CVC. SYS. HT. TRACE RFHR. B4	9KVA		10.83						EF3-B020Z	20			Y	
2A	CONT. BLDG. EMER. AIR CLEANUP FAN B-B	10 HP	1.0	12.2	110.0	2	T46	[illegible]	N	EF3-A025	25	210	NI	Y	REPLACE HTR WITH T42 (15A)
2B	SPARE														
2C	PENE. ROOM EL. 713 CLR. FAN 1B-B	3 HP	1.0	4	26	1	T33	5.43	N	EF3-A010	10	45	3	N	INCREASE BKR. INST SETTING TO POS. 4 (50A). REPLACE HTR WITH T32 (4.9A)
2D	PRIM. MAKEUP WATER PUMP 1B	30 HP	1.15	36	236.84	3	T52	47.125	Y	EF3-H050	50 HI	400	2	N	INCREASE BKR. INST. SETTING TO POS. 6 (470A)
2F2	VALVE & STRAINER ROOM SUMP B PUMP 1B	1.5 HP		2.65	20					EF3-B020	20			Y	
3A	SHUDOWN BOARD ROOM CHLR. CW. CIR. PUMP B-B	25 HP	1.15	31	197.37	2	T5[illegible]	[illegible]	N	EF3-L050	50 LO	260	3	N	REPLACE HTR WITH T39 (40.7A) INCREASE SETTING TO POSITION H2' (470A) 238%
3B	PIPE CHASE CLR. FAN 1B-B	3 HP	1.0	4	25.2	1	T32	5.43	N	EF3-A010	10	45	3	N	2-7-90 REPLACE HTR WITH T32 (4.9A) INCREASE BKR. ~~[illegible]~~ TO POSITION 4 (50A)
3C	CONT. SPRAY PUMP 1B-B ROOM CLR. FAN	7.5 HP	1.0	9	62	1	T41	12.38	N	EF3-A025Z	25	125	3	Y**	REPLACE HTR WITH T40 (11.1A)
3D	SPARE														
3F1	CONT. BLDG. UPPER COMPT. AIR MON.	3 HP		4.6	32					EF3-B020	20			Y	
3F2	SPARE														
4A	BTTY. RM. EL. 692 EXH. FAN B-B	1 HP		2.2	19.5	1	T29	3.44	N	EF3-A010	10	27	LO	N	REPLACE WITH T27 (2.8A) INCREASE BKR INST TO POS 2 (36A)
4B	SPARE														
4D	EMER. GAS TRTMT. SYS. FAN B-B	20 HP	1.0	25	132	2	T50	30.38	Y	EF3-L050	50 LO	260	3	Y	
4E	ERCW STRAINER 1B-B BACKWASH VLV.	0.33 HP		0.75	5.7	1	T15	0.89	N	EF3-A003	3	7	LO	N	INCREASE BKR INST TO POS 3 (18A) REPLACE HTR WITH T15 (.71A)
4F1	CONT. PURGE AIR EXH. MON.	0.75 HP		1.4	12.5					EF3-B020	20			Y	
5A	SF PIT PUMP B-B & TB BSTR. PUMP SPACE CLR. FAN	7.5 HP	1.0	9	62	1	T41	12.38	N	EF3-A025Z	25	125	3	Y	REPLACE HTR WITH T40 (11.1A)

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01/23/90

Prepared R.H. Bucheit 1-16-90 Date 1-16-90 / Date 1/20/90

Verified 1-15-90 Date

TBT FOR USE 2-7-90

TVA WATTS BAR NUCLEAR PROJECT
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(TVACABLE.DBF)

WBNEEB-MS-TI05-0008 R0

Attachment No. 1
Calc. No.
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1-MCC-214-B1-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
5E	CCS & AUX. FD. PUMPD SPACE CLR. FAN B-B	20 HP	1.0	24.5	139.9	2	T50	30.38	Y	EF3-L050	50 LO	330	4	Y	
6A	SHTDN. BD. RM. A PRESS. FAN C-B	3 HP	1.0	4.6	28	1	T32	4.68	N	EF3-A010	10	50	4	Y	REPLACE HTR. WITH T34 (5.8A)
6B	ERCW STRAINER 1B-B	3 HP	1.0	6.0	30.08	1	T36	6.94	Y	EF3-A010	10	50	4	Y	
6C	TRAVELLING SCRN. 1B-B	5 HP	1.15	6.8	41.10	1	T37	7.88	N	EF3-A0252	25	105	2	Y	REPLACE HTR. WITH T38 (8.9A) BKR 1986
6D	EMER. GAS TRTMT. SYS. B-B HUMIDITY HTRS.	20KW		24.06		2	T50	30.38	Y	EF3-B030	30			N	REPLACE BKR. WITH B040
6E	ERCW STRAINER 1B-B FLUSH VLV.	0.33 HP		0.75	5.7	1	T15	0.89	N	EF3-A003	3	7	LO	N	REPLACE HTR. WITH T15 (.71A) INCREASE BKR SETTING TO POSITION 3 (12A)
7A	FIFTH VITAL BTTY. RM. INTAKE FAN 1A2-B	1.5 HP	1.0	2.5	14.5	1				EF3-A005	5	29	4	Y	
7B	125V VITAL BTTY. RM. 1 (IV) EXH. FAN 1A2-B	0.5 HP		1.1	5.05	1	T20	1.40	Y	EF3-A005	5	15	LO	N	REPLACE BKR. WITH A003 SET POS. 2 (6A)
7C	MP FIRE PUMP STRAINER B-B	0.75 HP	1.0	2.05	8.46	1	T26	2.54	Y	EF3-A005	5	22	3	N	REDUCE THRST. SETTING TO 2 (18A)
8A	SI PUMP 1B-B RM. CLR. FAN B-B	5 HP	1.0	6.1	50.14	1	T37	7.88	Y	EF3-A0252	25	75	LO	N	INCREASE BKR. SETTING TO 2 (105A)
8B	PENE. RM. EL. 692 CLR. FAN 1B-B	3 HP	1.0	4.0	25	1	T33	5.42	N	EF3-A010	10	45	3	N	REPLACE HTR. WITH T32 (4.9A) INCREASE BKR. SETTING TO 4 (58A)
8C	SHTDN. IFMR. RM. 1B EXH. FAN 1B2-B	3 HP		4.7	28.8	1	T34	5.79	Y	EF3-A010	10	50	4	Y	
8D	SHTDN. IFMR. RM. 1B EXH. FAN 1B3-B	3 HP		4.7	28.8	1	T34	5.79	Y	EF3-A010	10	50	4	Y	
8E	CONT. RM. A/C CIR. PUMP B-B	15 HP	1.15	20	118.42	2	T49	26.75	Y	EF3-L050	50 LO	260	3	Y	
8F1	CONT. RM. A/C SYS. OIL PUMP	3 HP		4.6	32.0					EF3-B020	20			Y	
9A	RHR PUMP 1B-B RM. CLR. FAN	5 HP	1.0	6.1	45.0	1	T37	7.88	Y	EF3-A0252	25	75	LO	N	INCREASE BKR SETTING TO 2 (105A)
9B	FIFTH VITAL BTTY. RM. EXH. FAN 1B2-B	1.5 HP	1.0	2.5	14.5	1			N	EF3-A0252	25	105	2	N	ADD HEATER T28 (3.1A). REPLACE BKR TO A005 SET POS. 4 (29A)
9C	4BOV BD. RM. 1A PRESS. SPPLY. FAN 1A2-B	3 HP	1.0	4.6	28.0	1	T34	5.79	Y	EF3-A010	10	50	4	Y	

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Prepared T.H. Bucket 1-16-90 / 1-16-90 / 1/20/90

Verified 1-15-90 / TBT FOR USE 2-7-90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN EEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No. _____
Sheet _____ of _____

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-214-B1-B														
9D	SHTDN. BRD. RM. 1B EXH. FAN 1B1-B	3 HP		4.7	28.0	1	T24	5.7[illegible]	Y	EF3-A010	10	50	4	Y	
9E	PENE. RM. EL. 737 CLR. FAN 1B-B	3 HP	1.0	4.0	25.3	1	T33	5.42	N	EF3-A010	10	45	3	N	REPLACE HTR. WITH T8R (4.8A) INCREASE BKR TO POS 4 (50A)
10A	CNTFGL. CHG. PUMP 1B-B RM. CLR FAN	5 HP	1.0	6.1	45	1	T37	7.22	Y	EF3-A025B	25	75	LO	N	INCREASE BKR TO POS. 2 (105A)
10B	480V BD. RM. 1B PRESS SPPLY. FAN	3 HP	1.0	4.6	28	1	T24	5.79	Y	EF3-A010	10	50	4	Y	
10C	125V VITAL BTTY. RM. II (III) EXH. FAN 1B2-B	0.5 HP		1.1	5.05	1	T20	1.4	Y	EF3-A003	3	10	2	Y	
10F	CONT. RM. INTAKE MON.	0.15 HP		1.4	12.5					EF3-B020	20			Y	
11A	CONT. BLDG. EMER. PRESS FAN B-B	1 HP	1.0	1.7	15.0	1	T[illegible]4		Y	EF3-A005	5	22	3	N	INCREASE BKR TO POS 4 (19A)
11B	480V BD. RM. 1B A/C AHU 1B-B	20 HP	1.15	25	142	2	T51	34.0	Y	EF3-M050J	50	320	LO	Y	
11C	480V BD. RM. 1B A/C CONDENSER 1B-B	20 HP	1.15	25	142	2	T51	34.0	Y	EF3-M050	50 MI	320	LO	Y	
11D	CONT. RM. AHU B-B	60 HP		72.0	413.0	4	T58	89.0	Y	EF3-A100	100	760	3	Y	
12A	RECIP. CHGR. PUMP RM. CLR. FAN	3 HP	1.15	4.3	26.7	1	T33	5.43	Y	EF3-A010	10	45	3	N	INCREASE BKR TO POS 4 (50A)
12C	PERM. HYD. MITIGATION SYS.	35.75KVA		43		2				EF3-B050	50			N	REPLACE BKR TO B070
12D	CONT. BLDG. PRESS. FAN B-B	2 HP	1.0	3.65	27.0	1	T32	4.86	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T9 (4.35A) INCREASE BKR INST TO POS. 4 (50A)
12E1	GASEOUS EFFLUENT RAD. MON.	5 HP	1.0	7.1	44.5					EF3-B020	20			Y	
12F1	COND. VAC. PUMP HI RANGE AIR EXH. MON.	0.75 HP		1.4	12.5					EF3-B020	20			Y	
13A	AUX. CHARGING PUMP 1B	1 HP	1.0	1.8	12.53	1	T23	1.84	N	EF3-A005	5	22	3	N	REPLACE HTR WITH T28 (2.5A) INCREASE BKR TO POS 4 (20A)
13B	AUX. CHARGING BOOST PUMP	1 HP	1.15	1.8	11.20	1	T24	2.04	N	EF3-A005	5	22	3	Y	REPLACE HTR. WITH T25 (2.2A)
13C	CONT. ANNULUS VAC. FAN 1B	5 HP	1.15	6.8	50.14	1	T37	7.88	N	EF3-A025	25	75	LO	N	REPLACE HTR. WITH T38 (8.3A) INCREASE BKR. INST TO. POS 2
13D	ERCW SCREEN WASH PUMP 1B-B	40 HP	1.0	49.0	315.79	3	T54	58.13	Y	EF3-A100	100	630	2	Y	
13F2	SHTDN. BD. RM. CHLR. PKG. B-B CCL PUMP	2KVA		4.18						EF3-B020	20			Y	

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Prepared R. H. Buchert 1-9-90 / B B Bhatia 1-9-90 Date / B Bate 1-22-90

Verified B B Bhatia 1-23-90 / F. M. McCauley 1/24/90 Date

TVA WATTS BAR NUCLEAR PROJECT
CONFORMATION ONLY
(TVACABLE.DBF)

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Attachment No. 1
Calc. No. _____
Sheet _____ of _____

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : CAT # :	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 296															
* CLASSIFICATION # 1-MCC-214-B2-B															
1A1	NOR. FDR. FM. 480V SHTDN. BD. 1B2-B									KM3S-B0092	800				
1A2	ALT. FDR. FM. 480V SHTDN. BD. 1B1-B									KM3S-B0032	800				
2A	SPARE														
2C	FUTURE														
2D	SPARE														
3A	SPARE														
3D	FUTURE														
3F2	SPARE														
4A	SPARE														
4C	CONTROL XFMR. (1 PHASE)									EF3-B02[illegible]	20				
4D	FUTURE														
5A	SPARE														
5B	AUX. DIST. PANEL FDR (1 PHASE)	1.5KVA		3.12						EF3-B02[illegible]	20				
5E2	SPARE														
5F2	SPARE														
6A	SPARE														
6C	FUTURE														
6D	FUTURE														
6E2	SPARE														
6F2	SPARE														

Prepared R.H. Bachert 1-9-90 / BC Martin 1-9-90 Date / D Bate 1-22-90

Verified BC Martin 1-23-90 / T.M. McCauley 1/24/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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Calc. No.
Sheet of

PREPARED TBT 4-4-90
VERIFIED DLB 4/4/90

1-MCC-214-B2-B

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
7A	SPARE														
7B	SPARE														
7C	FUTURE														
7F2	SPARE														
8A	SPARE														
8B	SPARE														
8C	FUTURE														
8D	SPARE														
8E1	SPARE														
8E2	SPARE														
8F2	AUX. & CONT. BLDG. 480V RCPTS.									EF3-B100	100			Y	
9B	FUTURE														
9B	SPACE														
2B	TOILET & LOCKER RM. EXH. FAN 0-MTR-31-410	0.33 MTR		1.0	10.0	1	120	3.06	N	EF3-A005	5	20	4	N	change breaker & T10 breaker & pos. 3
2E1	480V BD. RM. 1B UNIT MTRS. A EL. 772 1-MTR-30-A10	10KW		12.3						EF3-B020	20			Y	
2E2	FUEL HAND. AREA UNIT MTR. G EL. 757 0-MTR-30-GFA	25KW		30.1						EF3-B040	40			Y	
2F1	480V BD. RM. 1B UNIT MTS. EL. 772 1-MTR-30-B10	10KW		12.3						EF3-B020	20			Y	
2F2	480V BD. RM. DUCT MTR. 1-MTR-31-BRD	30KW		36.09						EF3-B050	50			Y	
3B	SAMPLING RM. HOOD EXH. FAN 1B 1-MTR-30-204	1.0 HP		1.7	15.0	1	124	2.04	Y	EF3-A005	5	10	2	N	change breaker & pos. 4
3C	SAMPLING RM. HOOD EXH. FAN 1C 1-FTR-30-66	1.0 HP		1.7	15.0	1	124	2.04	Y	EF3-A005	5	10	2	N	change breaker & pos. 4

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SARGENT & LUNDY LLC

Page No. 16
01/19/90

Prepared Z.H. Bankert 1-9-90 / Bob Dhatt 1-9-90 / D Bates 1-22-90 Date

Verified Bob Dhatt 1-23-90 / T.H. R.S. Cauley 1/24/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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Attachment No. 3
Calc. No.
Sheet of

PREPARED TBC 4-4-90
VERIFIED LAB 4/4/90

1-NCC-214-182-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
3E1	480V BD. RM. UNIT HTRS. C EL. 772 1-HTR-30-C18	10KW		12.3						EF3-B020	20			Y	
3E2	FUEL HAND. AREA UNIT HTR. N EL.757 0-HTR-30-NFA	25KW		30.1						EF3-B040	40			Y	
3F1	PRESS. HTR. IFNR. RM. UNIT HTR. 1-HTR-30-P01	10KW		12.3						EF3-B020	20			Y	
3F2	RELAY RM. ELECT. HTR. 0-HTR-31-93									EF3-B040	40A				
4B	SOUTH MAIN STR. VAULT BACKUP EXH. FAN 1-HTR-30-302	3 HP		4.6	32.0	1	132	4.80	N	EF3-A010	10	45	3	N	change heater to T33, Breaker to pos NI
4E1	SHIFT ENGR. INST. CAL. 1B CHART STR. RM. HTR. 0-HTR-31-95	5KW		6.02						EF3-B020	20			Y	
4E2	FUEL HANDLING AREA UNIT HTR. N 0-HTR-30-NFA EL. 757	25KW		30.00						EF3-B040	40			Y	
4F1	480V BATTRM. BD. RM. 1B UNIT HTR. EL. 757 1-HTR-30-S8U	3KW		3.61						EF3-B020	20			Y	
4F2	AUX. CONT. INST. RM. 1B UNIT HTR. 1-HTR-30-U113	3KW		3.7						EF3-B020	20			Y	
5E1	AUX. INST. RM. HTR. 1-HTR-31-87	10KW		12.03						EF3-B020	20			Y	
5F1	125V VITAL BTTY. RM. II UNIT HTR. 0-HTR-30-RH2	5KW		6.1						EF3-B020	20			Y	
6B	SOUTH MAIN STR. VAULT EXH. FAN 1-HTR-30-26	3 HP		4.6	32.0	1	132	4.80	N	EF3-A010	10	45	3	N	change heater to T33, Breaker to pos NI
6E1	AUX. BLDG. SPACE HTR. EL. 737 1-HTR-30-A87	5KW		7.0						EF3-B020	20			Y	
6F1	IFNR. RM. 1B HTR. 1-HTR-30-T18	10KW		12.3						EF3-B020	20			Y	
7B	CONT. BLDG. FRESH AIR HTR. 0-HTR-31-421	144KW		173.22						FJ3-B225	225	2000	NI	Y	

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SARGENT & LUNDY

Page No. 17
01/19/90

Prepared R.H. Burchett 1-9-90 / [illegible] 1-9-90 / [illegible] 1-22-90 Date

Verified [illegible] 1-23-90 / [illegible] 1/24/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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WBN EEB-MS-TI08-0008 R0

Attachment No. 1
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Sheet of

PREPARED JRT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	STARTR SIZE	THERMAL O/L RELAY MODEL CAT #	MAG. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-214-B2-B														
7E1	KITCHEN ELECT. NTR. 0-NTR-31-99	5KW		6.1						EF3-0020	20			Y	
7E2	SHTDN. BD. RM. PRESS. FANS DUCT NTR. 0-NTR-31-72	20KW		24.06						EF3-0030	30			Y	1
7F1	NOR. MAIN STM. VAULT PM. NTR. Z 1-NTR-30-NN2	30KW		36.09						EF3-0050Z	50			Y	
8E2	~~SPARE AUX. BLDG. SPACE NTR. 0-NTR-30-A14~~	~~5KW~~		~~7.0~~						~~EF3-0040~~	~~40~~				
8F1	FIFTH VITAL BTTY. RM. DUCT NTR. B 0-NTR-31-494	32KW		38.5						EF3-0040	40			N	CHANGE BKR TO EF3-B050 1
9A	CONT. ROD DRIVE EQUIP. RM.A/C 1B	47.5 HP		70.4	370.5					FJ3-0125		750	LO	Y	

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SARGENT & LUNDY

Prepared [illegible] Date 1/2/90 — 2-5-90 / [illegible] 2/5/90 1/20/90

Verified [illegible] Date [illegible] 1-25-90 — [illegible] 1/22/90

WBN-ECG-MS-TIDS-0005 R0

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WATTS BAR NUCLEAR PROJECT
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OL RELAY MODEL CAT #	MTR. TRIP POINT	MTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** MODE 207															
* CLASSIFICATION # 2-MCC-214-A1-A															
1A1	NORMAL FDR-480V C&A BLDG. VTL. BD. 2A1-A									ITE KM350-0-B2 ETS 146	800				
1A2	ALT. FDR-480V C&A BLDG. VTL. BD. 2A1-A									ITE KM350-0-B2 ETS 146	800				
2A	AUX. CONT. AIR COMPRESSOR A-A 0-MTR-32-60-A	20 HP	1.15	26	157.89	2				EF3-L050	55	330	4	Y	
2B	SPARE									EF3-A010	10	50	4		
2C	PANEL RM. EL. 692 CLR. FAN 2A-A 2-MTR-30-186-A	3 HP	1.15	4.3	26.69	1	[illegible]	[illegible]	Y	EF3-A010	10	45	3	N	change to position 4 on Breaker
2D	PRIM. MAKE-UP MTR. PUMP 2A 2-MTR-81-3	30 HP		38.3	217.5	3	[illegible]	[illegible]	N	EF3-M050	50	400	2	Y	change heater to T52
2F1	SIS HEAT TRACE IFMR. 0-DIF-234-A2/SIS	9KVA		10.84						EF3-B020	20			Y	
2F2	RAD. MON. & SMPL. & FP. IFMR. (10) 2-DIF-242-1	37.5KVA		78.2						EF3-B070	70			N	change to EF3-B090
3A	SHTDN. BD. RM. CHLR. CIR. PUMP A-A 0-MTR-31-36/1-A	25 HP	1.15	31	197.37	2				EF3-L050	50	260	3	N	change to position #2 on breaker
3C	CONT. SPR. PUMP 2A-A CLR. FAN. 2-MTR-30-177-A	7.5 HP	1.0	10	75.21	1	T41	[illegible]	Y	EF3-A025Z	25A	125	3	N	change to position 4 on breaker
3D	AUX. BLDG. GAS TRTMT. SYS. FAN A-A 2-MTR-30-146-A	50 HP	1.0	62	304	3	T56	73.96	Y	EF3-A100	100	750 ~~360~~	3	Y	
3F1	COND. VAC. PUMP AIR EXH. MON. 2-RE-90-119	0.75 HP		1.4	12.5					EF3-B020	20			Y	
3F2	SPARE									EF3-B050	50				
4A	EMER. GAS TRTMT. SYS. A-A RM. CLR. FAN 2-MTR-30-200-A	3 HP	1.0	4.1	27	1	T33	5.4[illegible]	N	EF3-A010	10	45	3	N	change heater to T32, Breaker to setting pos 4
4B	SPARE									EF3-B020	20				

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Prepared: [illegible] / [illegible] / [illegible] 2/5/90 [illegible] 2/20/90 Date: 1/3/90

Verified: [illegible] / T.M.M. [illegible] 1/22/90 Date: ~~2/5/90~~ 1/15/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

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WBNEEB-NS-TCAB-0005 R0

Attachment No. 1
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Sheet of

PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

2-MCC-214-A1-A

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
4C	CONT. BFWR. (10) OP BUSS UV RELAY	100 VA								EF3-B020	20			Y	
4D	SPARE									EF3-L050	50LB	330	4		
4E	ECCW STRN. 2A-A BACKWASH VLV. 2-FCV-67-96-A	0.33 HP	1.0	0.75	5.79	1	T12	0.71	N	EF3-A003	3	7	LB	N	change heater to T15, breaker pos. to 3
4F1	SPARE									EF3-B030	30A				
4F2	CVCS HEAT TRACE BFWR. A4 0-BFF-234-A4/CVCS	9KVA		10.84						EF3-B020	20			Y	
5A	SPARE									EF3-A025I	25	125	3	Y	
5B	AUT. DIST. PANL. FAN. BFWR.	1.5KVA		3.13						EF3-B020	20			Y	
5E	AFW & BORIC ACID BFD. SPACE CLR. FAN A-A 2-HTR-30-184-A	15 HP	1.0	20.2	105.24	2	T48	23.13	Y	EF3-L050	50LB	210	2	Y	
5F1	SPARE									EF3-B020	20				
5F2	NOR. 125V SPACE VTL. BTTY. CHGR. 2-S 0-CHGR-236-2AC-S	20.6KW		33						EF3-B070	70			Y	
6A	SHTDN. DG. DH. PRESS. FAN D-A 0-HTR-31-62-A	3 HP	1.0	4.6	20	1	T32	4.00	N	EF3-A010	10	50	4	Y	change heater to T33
6B	ERCW STRN. 2A-A 2-HTR-67-94-A	2 HP	1.0	6	30.00	1	T36	6.94	Y	EF3-A010	10	50	4	Y	
6C	TRAVELING SCREEN 2A-A 2-HTR-67-439-A	5 HP	1.15	6.8	41.1	1	T38	6.94	N	EF3-A25I	25	75	LB	N	Change heater to T38 Breaker to pos 2
6D	SPARE									EF3-B040	40				
6E	ERCW STRN. 2A-A FLUSH VALVE 2-FCV-67-98-A	0.33 HP		0.75	5.79	1	T15	0.89	N	EF3-A003	3			N	Change heater to T13, Breaker set pos to 3
6F1	CONT. BLDG. LOWER COMPT. AIR HDN. 2-RE-90-106-A	3 HP		4.6	32					EF3-B020	20			Y	
6F2	SPARE									EF3-B050	50				
7A	SPARE									EF3-L050	50LB	260	3		

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Prepared [illegible] / [illegible] 1/5/90 / [illegible] Date 1/20/90
Date 1/3/90
Verified T. M. McCauley Date 1/5/90 / 1/22/90

TVA WATTS BAR NUCLEAR PROJECT
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WBN EEB-MS-TI08-0006 R0
Attachment No. ____
Calc. No. ____
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-214-A1-A														
7B	125 VDC. BTTY. RM. II EXH. FAN 2A1-A 2-HTR-31-287-A	0.5 HP		1.1	5.05	1	T26	[illegible]	Y	EF3-A007	5	14	LO	Y	
7C	SPARE									EF3-A009	5	22	3		
7D	CVCS HEAT TRACE IFNR. A1 0-DIF-234-A1/CVCS	75KVA		90.22						FJ3-B125	125			Y	
8A	SI PUMP 2A-A RM. CLR. FAN 2-HTR-30-180-A	5 HP	1.0	7	50.14	1	T36	6.94	N	EF3-A025Z	25	75	LO	N	Change heater to T38 Breaker pos to 2
8B	PENE. RM. EL. 737 CLR. FAN 2A-A 2-HTR-30-194-A	3 HP	1.0	4	25.53	1	T33	5.42	N	EF3-A011	10	45	3	N	Change heater to T32, Breaker pos to 4 ?
8C	480V IFNR. RM. 2A EXH. FAN 2A2-A 2-HTR-30-250F-A	3 HP		4.7	28.8	1	T34	5.79	Y	EF3-A011	10	50	4	Y	
8D	480V IFNR. RM. 2A EXH. FAN 2A3-A 2-HTR-30-250G-A	3 HP		4.7	28.8	1	T34	5.79	Y	EF3-A01[illegible]	10	50	4	Y	
8F1	ELECT. BD. RM. A/C SYS. OIL PUMP 0-HTR-31-128/S-A	3.11 HP		3.9	31					EF3-B03X	30			Y	
8F2	SPARE									EF3-B10X	100A				
9A	RHR PUMP 2A-A RM CLR. FAN 2-HTR-30-175-A	5 HP	1.0	7	50.14	1	T36	6.94	N	EF3-A025	25	75	LO	N	Change heater to T38, Breaker pos to 2
9B	CONT. BLDG. ELECT. BD. RM. AC CIR. PUMP A-A 0-HTR-31-128/1-A	20 HP	1.15	25	157.09	2	T50	30.30	N	EF3-L05X	50	250	3	N	Change heater to T51, Breaker pos to 4
9C	480V BD. RM 2A PRESS. SPLY. FAN 2A1-A 2-HTR-31-462-A	3 HP	1.0	4.6	28	1	T34	5.79	Y	EF3-A01[illegible]	10	50	4	Y	
9D	480V IFNR. RM. 2A EXH. FAN 2A1-A 2-HTR-30-250E-A	3 HP		4.7	28.8	1	T34	5.79	Y	EF3-A01[illegible]	10	50	4	Y	
9E	PERM. HYD. MITIGATION SYS. 2-DIF-268-1-A	35.75KVA		43		2				EF3-L05X	50	330	4	Y	
9F1	CONT. RM. INTK MON. 0-RE-90-125-A	0.75 HP		1.4	12.5					EF3-B02X	20			Y	
9F2	SPARE										100				

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Prepared [illegible] Date 1/3/90
Verified [illegible] Date 1/15/90
T.M. McCauley 1/22/90

TVA WATTS BAR NUCLEAR PROJECT
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WBN EEB-MS-TI03-0008 R0
Attachment No. 2
Calc. No.
Sheet of

PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-214-A1-A														
10A	CHTT. CHGR. PUMP 2A-A PH. CLR. FAN 2HTR-30-183-A	5 HP	1.0	7	50.14	1	T36	6.94	N	EF3-A025I	25	75	LO	N	Change heater to T38, Breaker to pos. 2
10B	PENE. BH. EL. 713 CLR. FAN 2A-A 2-HTR-30-196-A	3 HP	1.15	4.3	26.69	1	T32	5.43	Y	EF3-A010	10	45	3	N	Change breaker to pos. 4
10C	PIPE CHASE CLR. FAN 2A-A 2-HTR-30-201-A	3 HP	1.15	4.3	25.2	1	T32	5.43	Y	EF3-A010	10	45	3	N	Change breaker to pos. 4
10D	AUX. BLDG. GAS TRTMT. HUMIDITY HTR A-A 0-HTR-30-147-A	50KW		60.15		3	T61	[illegible]	N	EF3-B100	100			N	Change heater to T56 CHANGE BKR TO EF3-B070
10F1	VLV. & STRM. RM. SUMP A PUMP 2A 2-HTR-40-38	1.5 HP		2.65	20					EF3-B020	20			Y	
10F2	SPARE									EF3-B070	70				
11A	480V BD. RM. 2B PRESS. SPLY. FAN 2B1-A 2-HTR-31-470-A	3 HP	1.0	4.6	28	1	T34	5.79	Y	EF3-A010	10	50	4	Y	
11B	SPARE									EF3-H050	50 HI				
11C	480V BD. RM. 2A A/C AHU 2A-A 2-HTR-31-461-A	10 HP	1.15	12	78.94	1	T43	14.63	N	EF3-A025I	25	125	3	N	Change heater to T44. Change breaker to pos. 4
11D	SPARE									EF3-A225	225	960	LO		
12A	125V VTL. BTTY. RM. III EXH. FAN 2B1-A 2-HTR-31-285-A	0.5 HP		1.1	5.05	1	T20	1.4	Y	EF3-A005	5	14	LO	N	Change breaker to A003 pos 2
12B	SPARE									EF3-A005	5	22	3		
12C	480V BD. RM. 2A A/C COMB. 2A-A 2-HTR-31-290-A	15 HP	1.15	21	111	2	T49	20.75	Y	EF3-L050	50	260	3	Y	
12D	SPARE									EF3-L050	50 LO	260	3		
12F1	CONT. PURGE AIR EXH. MON. 2-RE-90-130-A	0.75 HP		1.4	12.5					EF3-B020	20			Y	
12F2	STBY. LTG. CAB. B1 - IFNR. 0-BIF-227-1	30KVA		36.09						EF3-B050	50			Y	
13A	AUX. CHGR. PUMP 2A 2-HTR-84-16	1 HP	1.0	1.8	12.53	1	T25	2.3	Y	EF3-A005	5	22	3	N	Change breaker to pos 4

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T.R.M. [illegible] 1/22/90

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TVA WATTS BAR NUCLEAR PROJECT
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OL RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-214-A1-A														
13B	SPARE									EF3-A005	5	22	3		
13C	CONT. ANNULUS VAC. FAN 2A 2-HTR-65-77	5 HP		7.25	46	1	T31	4.35	N	EF3-A005	5	41	HI	N	Change heater to T38, Breaker to A010 at pos Hi
13D	ERCW SCREEN WASH PUMP 2A-A 2-HTR-67-437-A	40 HP		49.8	315.79	3	T54	55.12	Y	EF3-A100	100	475	LO	N	Change breaker to pos 2
13F1	SHTDN. BD. RM. CHLR. PKG. A-A OIL PUMP 0-RTR-31-36/3-A	2KVA		4.17						EF3-B020	20			Y	
13F2	SPARE									EF3-H054	50 HI	670	HI		
12E1	GASEOUS EFFLUENT RAD. MON. 2-PML-90-L398	5 HP		7.25	46					EF3-B020	20			Y	
12E2	SPARE									EF3-B020	20				

Prepared R.H. Bechet 1-10-90 / Date 1-12-90 / 1/20/90

Verified 1-10-90 / Date 2-5-90

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COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 208															
* CLASSIFICATION # 2-MCC-214-A2-A															
1A1	NOR. FDR. FM. 480V SHTDN. BD. 2A2-A									KM3S-00012	800				
1A2	ALT. FDR. FM. 480V SHTDN. BD. 2A1-A									KM3S-00082	800				
2A	SPARE														
2B	SPARE														
2C	FUTURE														
2D1	480V BD. RM. 2A UNIT HT. A EL. 772	10KW		12.3						EF3-0020	20			Y	
2D2	SPARE														
2E1	480V BD. RM. 2A UNIT HTR. B EL. 772	5KW		6.1						EF3-0020	20			Y	
2E2	SPARE														
2F1	SPARE														
2F2	SPARE														
3A	NOR. MAIN STM. VLT. EXH. FAN	3 HP		4.6	32.0	1	T31	4.75	N	EF3-0010	10	45	3	N	REPLACE HTR WITH T33 (5.43A) INCREASE BRK SETTING TO PLS HI (54A) 263%
3B	FUTURE														
3C	FUTURE														
3D1	CONT. ROD DR. EQPT. RM. UNIT HTR A	10KW		12.3						EF3-0020	20			Y	
3D2	SPARE														
3E1	480V BD. RM. 2A UNIT HTR. C EL. 772	7.5KW		9.03						EF3-0020	20			Y	
3E2	480V BD. RM. 2A DUCT HTR.	30KW		36.09						EF3-0050	50			Y	
3F1	RECORD STOR. VLT. UNIT HTR.	10KW		12.03						EF3-0020	20			Y	

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LUNDY

Prepared R. H. Burdett 1-10-90 Date 1-12-90 / 1/20/90

Verified 1-20-90 Date 2-5-90

TVA WATTS BAR NUCLEAR PROJECT
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PREPARED TBT 4-4-90
VERIFIED LB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	MIN. TRIP POINT	MTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-214-A2-A														
3F2	480V SD. BD. RM. 2A UNIT NTR. EL. 757	3KW		3.7						EF3-B020	20			Y	
4A	SWPLG. RM. HOOD EXH. FAN 2A	1.5 HP		2.65	20.0	1	129	2.44	Y	EF3-A005	5	29	4	N	INCREASE BRK SETTING TO POS HI(4A)
4B	SPARE														
4C	CONT. XFMR. 1 PHASE									EF3-B020	20			Y	
4D	FUTURE														
4E1	CONT. BLDG. BD. EQPT. RM. UNIT NTR. B	10KW		12.3						EF3-B020	20			Y	
4E2	SPARE														
4F1	CONT. BLDG. BD. EQPT. RM. UNIT NTR. C	10KW		12.3						EF3-B020	20			Y	
4F2	SPARE														
5A	NORTH MAIN ST. VLT. BKUP. EXH. FAN	3 HP		4.6	32.0	1	134	5.79	Y	EF3-A010	10	45	3	N	INCREASE BRK SETTING TO POS HI(8A) 262%
5B	FUTURE														
5C	FUTURE														
5E1	SWTBH. BD. RM. PRESS. FANS DUCT NTR.	20KW		24.06						EF3-B030	30			Y	
5E2	SPARE														
5F1	XFMR. RM. 2A UNIT NTR. EL. 772	10KW		12.03						EF3-B020	20			Y	
5F2	AUX. BLDG. SP. NTR. EL. 692	5KW		7.0						EF3-B020	20			Y	
6A	SPARE														
6B	FUTURE														
6C	FUTURE														
6D1	AUX. BLDG. SP. NTR. EL. 737	5KW		7.0						EF3-B020	20			Y	

Prepared R.H. Bunkert 1-10-90 Date 1-12-90 / Bate 1/20/90

Verified 1-10-90 Date 1-12-90

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Attachment No. 1
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PREPARED TRT 4-4-90
VERIFIED MLB 4/4/90

2-MCC-214-A2-A

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : MIN. TRIP CAT # : POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET FOR	ACCEPT?	REMARKS
6B2	SPARE													
6E1	SOUTH MAIN ST. VLT. RM. UNIT HTR.	20KW		24.06					EF3-0030	30			Y	
6E2	NORTH MAIN ST. VLT. RM. UNIT HTR. 1	30KW		36.0					EF3-0050	50			Y	
6F1	HOT INST. SHOP UNIT HTR.	5KW		6.1					EF3-0020	20			Y	
6F2	125V VTL. BTTY. RM. III UNIT HTR. EL. 772	5KW		6.1					EF3-0020	20			Y	
7A	SPARE													
7B	SPARE													
7C	FUTURE													
7B1	AUX. BLDG. SP. HTR. EL. 737	10KW		13.0					EF3-0020	20			Y	
7B2	FUEL HDL. AREA UNIT HTR. B EL. 757	25KW		30.0					EF3-0040	40			Y	
7E1	AUX. CONT. INST. RM. 2A UNIT HTR.	3KW		3.7					EF3-0020	20			Y	
7E2	FUEL HDL. AREA UNIT HTR. E EL. 757	25KW		30.0					EF3-0040	40			Y	
7F1	SPARE													
7F2	FUEL HDL. AREA UNIT HTR. F EL. 757	25KW		30.0					EF3-0040	40			Y	
8A	CONT. ROD. DR. EQPT. RM. A/C 2A	47.5HP		76.4	376.5				FJ3-0125L	125	1600	HI	N	RESET INSTAN. TO LO (750A)
8B	CONT. BLDG. ST. GEN.	75KW		90.22					FJ3-0125L	125	1600	HI	N	RESET INSTAN. TO LO (750A)
8B	FUTURE													
8E1	SPARE													
8E2	SPARE													

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R. K. Buchert

Prepared 1-9-90 Date 1-12-90 / Bhatia / D Bate 1/30/90

Verified 1-20-90 Date

TVA WATTS BAR NUCLEAR PROJECT
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2-MCC-214-A2-A

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
BF1	SPARE														
BF2	SPARE														

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Prepared [illegible] / [illegible] 2/5/90 / [illegible] 2/5/90 Date 1/3/90
Verified [illegible] / [illegible] Date 2/5/90 / 2-5-90

TVA WATTS BAR NUCLEAR PROJECT
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Attachment No 1
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 209															
* CLASSIFICATION # 2-MCC-214-B1-B															
2A	AUX. CONT. AIR COMP. B-B 0-MTR-32-86-B	20 HP	1.15	27	157.89	2	T31	24.	Y	EF3-L050	50 LB	230	4	Y	
1A1	NORM. FDR. 480V C&A VTG. BD. 2B1-B									ITE KM3S-B0002 ETS	800			—	
1A2	ALT. FDR. 480V C&A VTG. BD. 2B1-B									ITE KM3S-B0002 ETS	800			—	
2B	SPARE														
2C	PENE. RM. EL. 713 CLR. FAN 2B-B 2-MTR-30-197-B	3 HP	1.15	4.8	26.69	1	T32	5.43	Y	EF3-A010	10	45	3	N	RESET BKR TO 4
2D	PRIM. MAKE-UP MTR. PUMP 2B 2-MTR-81-7	30 HP	1.15	36	236.84	3	T51	41.0	N	EF3-M050	50 MI	400	2	N	REPLACE MTR WITH T52 RESET BKR TO 3
3A	SPARE														
3F1	CONT. BLDG. UPPER CONPT. AIR MON. 2-2E-90-112-B	3 HP		4.6	132					EF3-B020	20			NOT EVALUATED	
2F1	VLV. & STRN. RM. SUMP B PUMP 2B 2-MTR-40-66-B	1.5 HP		2.65	20					EF3-B020	20			NOT EVALUATED	
2F2	SPARE														
3B	PIPE CHASE CLR. FAN 2B-B 2-MTR-30-202-B	3 HP	1.0	4	25.2	1	T33	5.10	N	EF3-A010	10	45	3	N	REPLACE MTR WITH T32 RESET BKR TO 4
3C	CONT. SPRAY PUMP 2B-B RM. CLR. FAN 2-MTR-30-178-B	7.5 HP	1.15	9	75.71	1	T41	12.31	Y	EF3-A025	25	125	3	N	RESET BKR TO 4
3D	AUX. BLDG. GAS TRTMT. SYS. FAN B-B 2-MTR-30-157-B	50 HP	1.0	62	304	3	T56	73.88	Y	EF3-A100	100	760	3	N	RESET BKR TO 2
3F2	SIS HEAT TRACE TFMR. B2 0-BXF-234-B2/SIS	9KVA		10.84						EF3-B020	20			Y	
4A	BTTY. RM. EL. 692 EXH. FAN C-B 0-MTR-31-27-B	1.5 HP		3.3	27.1	1	T32	4.68	N	EF3-A010	10	45	3	N	REPLACE MTR WITH T30 RESET BKR TO 4

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01/19/90

Prepared Kaylmuder/ 2/5/90 Date 2/5/90
Verified Bates/ Date 2/5/90 2-5-90

TVA WATTS BAR NUCLEAR PROJECT
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Attachment No. 7
Calc. No.
Sheet of

PREPARED TBT 4-4-90
VERIFIED JLD 4/4/90

2-MCC-214-B1-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY PANEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	INV. INST. SETTING	SET POS	ACCEPT?	REMARKS
4B	SPARE														
4C	CONT. XFMR. FOR BUS UV RELAY	100 VA								EF3-B020	20			Y	
4D	SPARE														
4E	ERCW STRN. 2B-B BACKWASH VLV. 2-FCV-67-104-B	0.33 HP	1.0	0.75	5.79	1	115	0.89	N	EF3-A003	3	7	LO	N	RESET BKR TO 3 REPLACE HTR WITH T13
4F1	CONT. PURGE AIR EXH. HOM. 2-HE-90-131-B	0.75 HP		1.4	12.5					EF3-B020	20			Y	
4F2	SPARE														
5A	SPARE														
5B	AUT. DIST. PANEL XFMR.	1.5KVA		3.13						EF3-B020	20			Y	
5E	AFW & BORIC ACID XFR. PUMPS SPACE CLR. FAN B-B 2-HTR-30-185-B	15 HP	1.15	19	133.48	2	[illegible]	[illegible]	N	EF3-L050	50 LO	210	2		REPLACE HTR WITH T49 RESET BKR TO 3
5F1	SPARE														
5F2	SPARE														
6A	SHTDN. BD. RM. 1B PRESS. FAN B-B 0-HTR-31-68-B	3 HP	1.0	4.6	28.0	1	132	4.68	N	EF3-A010	10	58	4	Y	REPLACE HTR WITH T34
6B	ERCW STRN. 2B-B 2-HTR-67-108-B	3 HP	1.0	6	30.08	1	136	6.94	Y	EF3-A010	10	58	4	Y	
6C	TRAVEL. SCREEN 2B-B 2-HTR-67-451-B	5 HP	1.15	6.8	41.1	1	134	5.79	N	EF3-A025	25	170	4	N	REPLACE HTR WITH T38 RESET BKR TO 4.0
6D	SPARE					2				EF3-L050	50 LO	260	3		
6E	ERCW STRN. 2B-B FLUSH VLV. 2-FCV-67-100-B	0.33 HP		1	5.79	1	115	0.89	N	EF3-A003	3	7	LO	N	REPLACE HTR WITH T13 RESET BKR TO 3
6F1	ALT. 125V SPARE VTL. BTTY. CHGR. 2-B 0-CHGR-236-2AC-S	20.6KW		53						EF3-B070	70			Y	
7A	SPARE									EF3-B070	70				
7B	125V VTL. BTTY. RM. IV EXH. FAN 2A2-B 2-HTR-31-288-B	0.5 HP		1	10	1	120	1.4	N	EF3-A005	5	14	LO	N	REPLACE HTR WITH T18 RESET BKR TO 3

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SARGENT & LUNDY

Prepared Kenjiro Ito / [illegible] 2/5/90 Date 1/3/90
Verified [illegible] / [illegible] Date 2/5/90 / 2-5-90

TVA WATTS BAR NUCLEAR PROJECT
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WBN EEB-MS-TI08-0008 R0
Attachment No. 1
Calc. No.
Sheet of

PREPARED JBT 4-4-90
VERIFIED [illegible] 4/4/90

2-MCC-214-B1-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	MIN. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
7C	SPARE														
7D	CVCS HEAT TRACE IFNR. B1 0-BJF-234-B1/CVCS	75KVA		90.22						FJ3-B125	125	1600	HI	Y	
8A	SI PUMP 2B-B RM. CLR. FAN 2-HTR-30-179-B	5 HP	1.15	7	50.14	1	137	[illegible]	N	EF3-A0252	25	75	LO	N	REPLACE HTR WITH T38 RESET BKR TO 2
8B	PENE. RM. EL. 692 CLR. FAN 2B-B 2-HTR-30-187-B	3 HP	1.15	4.3	26.69	1	133	5.40	Y	EF3-A010	10	45	3	N	RESET BKR TO 4
8C	SHTDN. IFNR. RM. 2B EXH. FAN 282-B 2-HTR-30-246G-B	3 HP		4.7	28.8	1	134	5.79	Y	EF3-A010	10	50	4	Y	
8D	SHTDN. IFNR. RM. 2B EXH. FAN 283-B 2-HTR-30-246H-B	3 HP		4.7	28.8	1	134	5.79	Y	EF3-A010	10	50	4	Y	
8E	CONT. BLDG. ELECT. BD. RM. A/C CIRC PUMP B-B 0-HTR-31-129/1-B	20 HP	1.15	25	157.09	2	150	[illegible]	N	EF3-L050	50 LO	250	3	N	REPLACE HTR WITH T51 RESET BKR TO 4
8F1	ELECT. BD. RM. A/C SYS. OIL PUMP 0-HTR-31-129/3-B	3 HP		3.9	31					EF3-D020	20			Y	
8F2	SPARE														
9A	RHR PUMP 2B-B RM. CLR. FAN 2-HTR-30-176-B	5 HP	1.0	7.25	46	1	137	7.89	N	EF3-A0252	25	75	LO	N	REPLACE HTR WITH T38 RESET BKR TO 2
9B	SPARE														
9C	480V BD. RM. 2A PRESS. SPLY. FAN 2A2-B 2-HTR-31-463-B	3 HP	1.0	4.6	28	1	134	5.79	Y	EF3-A010	10	50	4	Y	
9D	SHTDN. IFNR. RM 2B EXH. FAN 281-B 2-HTR-30-246F-B	3 HP		4.7	28.8	1	134	5.79	Y	EF3-A010	10	50	4	Y	
9E	PENE. RM. EL. 737 CLR. FAN 2B-B 2-HTR-30-195-B	3 HP	1.0	4	24.50	1	133	5.40	N	EF3-A010	10	45	3	Y	REPLACE HTR WITH T32
9F1	UNIT CONTROL ANN. SYS. IFNR. 2-IFNR-290-236	5KVA		6.02						EF3-D020	20			Y	
9F2	SPARE														
10A	CHT'L. CNG. PUMP 2B-B RM. CLR. FAN 2-HTR-30-182-B	5 HP	1.0	7	50.14	1	136	6.14	N	EF3-A0252	25	75	LO		REPLACE HTR WITH T38 RESET BKR TO 2

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Prepared [illegible] Date 1/3/90 / [illegible] 2/5/90
Verified [illegible] / [illegible] Date 2/5/90 / [illegible]

TVA WATTS BAR NUCLEAR PROJECT
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WBNEEB-MS-TI08-0008 R0

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PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OVERLOAD RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SIT POS	ACCEPT?	REMARKS
	2-MCC-214-B1-B														
10B	480V BD. RM. PRESS. SPLY. FAN 282-B 2-HTR-31-477-B	3 HP	1.0	4.6	28	1	[illegible]	[illegible]	Y	EF3-A010	10	58	4	Y	
10C	125V VTL. BTTY. RM. III EXH. FAN 282-B 2-HTR-31-286-B	0.5 HP		1	10	1	[illegible]		N	EF3-A003	3	10	2	N	REPLACE HTR WITH T18 RESET BKR TO 4-8
10D	AUT. BLDG. GAS TRTMT. SYS. HUMID. HTR. B-B 0-HTR-30-156-B	50KW		60.15		3	[illegible]	[illegible]	N	EF3-100	100			Y	REPLACE HTR WITH T56
10F1	CONT. RM. INTAKE MON. 0-RE-90-126-B	0.75 HP		1.4	12.5					EF3-D020	20			Y	
10F2	SPARE														
11A	SPARE														
11B	480V BD. RM. 2B A/C AHU 2B-B 2-HTR-31-475-B	20 HP	1.15	25	142	2	[illegible]	[illegible]	Y	EF3-L050	50 LO	260	3	N	RESET BKR TO 4
11C	480V BD. RM. A/C CONDENSER 2B-B 2-HTR-31-289-B	20 HP	1.15	25	142	2	[illegible]	[illegible]	Y	EF3-H050	50 HI	475	3	N	RESET BKR TO LO
11D	SPARE														
12A	RECIP. CHARGING PUMP RM. C/R FAN 2-HTR-30-181	3 HP	1.15	4.3	26.7	1	[illegible]	4.50	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T33 RESET BKR TO 4
12B	EMER. GAS. TRTMT. SYS. B-B RM. C/R FAN 2-HTR-30-207-B	3 HP	1.0	4.1	27	1	[illegible]	5.40	N	EF3-A010	10	45	3	N	RESET BKR TO 4 REPLACE HTR WITH T32
12C	PERM. HYD. MITIGATION SYS. 2-DIF-286-2-B	30KVA		36.1		2			N	EF3-L050	50 LO	260	4	Y	REPLACE HTR WITH T5V IF APPLICABLE
12D	SPARE														
12F1	COND. VAC. MIRING AIR EXH. MON. 2-RE-90-99	0.75 HP		1.4	12.5					EF3-D020	20			Y	
12F2	STBY. LTG. CAB. 83 XFMR. 0-DIF-227-2	30KVA		36.1						EF3-D070	70			Y	
13A	AUT. CHRG. PUMP 2B 2-HTR-84-21	1 HP	1.0	1.8	12.53	1	[illegible]	[illegible]	Y	EF3-A005	5	22	3	N	RESET BKR TO 4
13B	SPARE														

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Prepared [illegible] Date 1/31/90 / [illegible] Date 2/5/90
Verified [illegible] Date 2/5/90 / 2-5-90

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TVA WATTS BAR NUCLEAR PROJECT
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OVERLOAD RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-214-B1-B															
13C	CONT. ANNULUS VAC. FAN 2B 2-HTR-65-74	5 HP		7.25	46	1	T31		N	EF3-A00[illegible]	5	41	HI	N	REPLACE HTR WITH T32 REPLACE BKR WITH EF3-A-015 SET AT 2
13D	ERCW SCREEN WASH PUMP 2B-B 2-HTR-67-447-B	40 HP	1.0	49.8	315.79	3	T54	50.13	Y	EF3-A10[illegible]	100	930	4	N	RESET BKR TO 2
13F1	SPARE														
13F2	SPARE														

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R.H. Bachert 1-10-90 / B.S. Abbotts 1-10-90 / J. Bates 1/20/90

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Prepared _____ Date _____

Verified B.S. Abbotts 1-17-90 / J.M. McCarley 1/24/90 Date _____

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PREPARED TBT 4-4-90
VERIFIED ZLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR. CAT # :	POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET PRG	ACCEPT?	REMARKS
** NODE 210															
* CLASSIFICATION # 2-NCC-214-02-B															
1A1	NOR. FDR. FN. 480V SWTGH. BD. 202-B									EKCS00002	000				not evaluated
1A2	ALT. FDR. FN. 480V SWTGH. BD. 201-B									EKCS00002	000				not evaluated
2A	SPARE														
2B	ELEV. MACH. RM. EXH. FAN	1.50 HP		2.63	20.0	1	129	2.76	N	EF3-A005	5	29	4	N	Change heater to T20, breaker to pos HI
2C	FUTURE														
2D	SPARE														
2E1	480V BD. RM. 2B UNIT HT. A EL. 772	10KW		12.3						EF3-B020	20			Y	
2E2	FUEL HDL. AREA UNIT HTR. K EL. 757	25KW		30.1						EF3-B040	40			Y	
2F1	480 BD. RM.2B UNIT HT. B EL. 772	10KW		12.3						EF3-B020	20			Y	
2F2	480 BD. RM. 2B DUCT HTR.	30KW		36.09						EF3-B050	50			Y	
3A	SPARE														
3B	SWPLG. RM HOOD EXH. FAN 2B	1.50	1.15	3.0	16.92	1	129	3.44	N	EF3-A005	5	29	4	N	Change heater to T20, breaker to pos HI
3C	SPARE														
3D	FUTURE														
3E1	480 BD. RM. 2B UNIT HT. C EL. 772	10KW		12.3						EF3-B020	20			Y	
3E2	FUEL HDL. AREA UNIT HTR. L EL. 1757	25KW		30.00						EF3-B040	40			Y	
3F1	PRESSIR. HTR. 1FHR. RM. UNIT HTR.	10KW		12.3						EF3-B020	20			Y	

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Prepared R.H. Bennett 1-18-90 / BS Bhatt 1-18-90 / D Bates 1-20-90 Date

Verified BS Bhatt 1-17-90 / T.M. McCarty 1/24/90 Date

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PREPARED TBT 4-4-90
VERIFIED DLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/EVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	MIN. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET	PRO	ACCEPT?	REMARKS
	2-MCC-214-B2-B															
3F2	ELV. RM. ELEC. HTR.	25KW		30.00						EF3-0040	40				Y	
4A	SPARE.															
4B	SOUTH MAIN ST. VLT. BKUP. EXH. FAN	3HP		4.6	32.0	1	133	5.43	N	EF3-A010	10	45 43	3		N	Change heater to T33, breaker to pro HI
4C	CONT. XFMR. (1 PHASE)									EF3-0020	20				Y	Not evaluable
4D	FUTURE															
4E1	COMPUTER RM. HTR.	10KW		12.03						EF3-0020	20				Y	
4E2	FUEL HDL. AREA UNIT HTR. P EL. 757.	25KW		30.1						EF3-0040	40				Y	
4F1	480V SD. DD. RM. 2B UNIT HTR. EL. 757.	3KW		3.7						EF3-0020	20				Y	
4F2	AUX. CONT. INSTR. RM. 2B UNIT HTR.	3KW		3.7						EF3-0020	20				Y	
5A	SPARE.															
5B	FUTURE.															
5C	FUTURE.															
5E1	AUX., INSTR. RM. HTR.	10KW		12.03						EF3-0020	20				Y	
5E2	SPARE.															
5F1	125V VTL. BTTY. RM. IV UNIT HTR.	5KW		6.1						EF3-0020	20				Y	
5F2	AUX. & CONT. RM. UNIT HTR.	3KW		3.7						EF3-0020	20				Y	
6A	SPARE															
6B	SOUTH MAIN ST. VLT. EXH. FAN	3.0 HP		4.6	32.0	1	133	5.43	Y	EF3-A010	10	45	3		N	Change breaker to pro. HI
6C	FUTURE.															
6D	FUTURE.															

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Prepared R.H. Brackett 1-10-90 Date 1-10-90 / DBates 1-20/90

Verified 1-17-90 / T.M. McCarty 1/24/90 Date

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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	STAR SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-214-B2-B														
6E1	AUX. BLDG. SPACE HTR. EL. 737	5KW		7.0						EF3-B020	20			Y	
6E2	SPARE														
6F1	IFHR. RM. 2B UNIT HTR. EL. 772	10KW		12.3						EF3-B020	20			Y	
6F2	SPARE														
7A	SPARE														
7B	SPARE														
7C	FUTUPE														
7D	FUTURE														
7E1	KIT. ELEC. HTR.	5KW		6.02						EF3-B020	20			Y	
7E2	SPARE														
7F1	N. MAIN ST. VLT. RM. UNIT HTR. 2	30KW								EF3-B050	50			Y	
7F2	SPARE														
8A	SPARE														
8B	SPARE														
8C	FUTURE														
8D	SPARE														
8E1	SPARE														
8E2	AUX. BLDG. SPACE HTR. EL. 713	5KW		7.0						EF3-B020	20			Y	
8F1	SPARE														
8F2	AUX. & CONT. BLDG. 480V RCPTS.									EF3-B100	100				Not wchated
9A	CONT. ROD. DR. EQPT. RM. A/C 2B	47.5 HP		78.4	378.5					EF3-B125	125	750	LO	Y	
9B	FUTURE														

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Prepared R.H. Bruchet 1-10-90 / B.S. Bates 1-10-90 / J. Bates 1/24/90 Date

Verified B.S. Bates 1-17-90 / F. M. McCauley 1/24/90 Date

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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OL RELAY MODEL CAT #	TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-214-B2-B														
98	TEST BLOCK IN PLY. BDS. & DPO ENG'S. SHOP	1.5KVA		1.81						EF3-002	20			Y	

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Prepared [illegible] 12-19-89 / [illegible] 1-5-90 Date

Verified R.H. Buckelew 1-9-90 / T.M. McCarley 1/23/90 Date

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VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 217															
* CLASSIFICATION # I-MCC-215-A1-A															
1A1	NOR. FDR. FR. 480V SWTGH. BD. 1A1-A									ETS-EX3S00012	800				
1A2	ALT. FDR. FR. 480V SWTGH. BD. 1A2-A									ETS-EX3S00432	800				
2E1	SPARE														
2E2	SPARE														
2F1	BD. 1A-A BT/Y. CHGR. ALT. FDR.	4.16KVA		5.0						EF3-B020	20			Y	
2F2	SPARE														
3A	EX. BD. NX. 1A1 & 1A2 SUPPLY VALVE	0.125 HP		0.39	2.6	1	T1	0.48	N	EF3-A003	3	7	LB	Y	CHANGE HTR TO T7
3B	SPARE														
3E	SPARE														
3F1	SPARE														
3F2	SPARE														
4A	SPARE														
4C	CONT. XFMR. (1 PHASE)														
4F1	BD. BLDG. LTG. CAB. 45 XFMR.	45KVA		54.1						EF3-B100	100			Y	
4F2	FUTURE														
5B	CONT. XFMR. (1 PHASE)	1.5KVA		3.13						EF3-B020	20			Y	
5E	SPARE														
2A	DIESEL GEN. 1A-A BT/Y. NOOB EXH. FAN	1/3 HP		1.0	10	1	T20	3.06	N	ITE-EF3A005	5	29	4	N	REPLACE HTR WITH T19 CHANGE TRIP SET POS TO 8
2B	DIESEL GEN. 1A-A BR. EXH. FAN 1A-A	15 HP	1.15	19.5	118.42	2	T40	23.13	N	ITE-EF3L050	50	210	2	N	REPLACE HTR WITH T49 CHANGE TRIP SET POS TO 3

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Prepared G. DePew 12-14-89 / [illegible] 1-5-90 Date

Verified R.A. Burkett 1-9-90 / T.M. McCarty 1/24/90 Date

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PREPARED TET 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OL RELAY RANGE AT 0	MIN. TRIP POINT	MIN SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-215-A1-A														
2C	DIESEL GEN. 1A-A WATER HEATER 1	15KW		18.5		1				ITE-EF3B031	30			Y	
2D	DIESEL GEN. 1A-A LUBE OIL CIRCULATION PUMP 1 LA	1 HP	1.15	1.95	8.25	1	[illegible]	[illegible]	N	ITE-EF3A005	5	14	HLO	N	REPLACE HTA WITH T26 CHANGE BKR SET POS TO 2.
3A	EMER. DIESEL ENG. HT. EXCH. 1A1 & 1A2 S/PLY. VLV. 1-FCV-67-66-A MOP.1A	1/8 HP		.39	2.6	1	[illegible]	[illegible]	N	ITE-EF3A003	3	7	LO	Y	change heater to T7
3D	DIESEL GEN. 1A-A DAY TANK FUEL OIL TRANSFER PUMP 1-A	1 HP	1.15	1.85	11.28	1	[illegible]	[illegible]	N	ITE-EF3A003	3	21	HI	Y	Change heater to T26
4B	DIESEL GEN. 1A-A AUX. AC LUBE OIL CIRC. PUMP A	3/4 HP	1.0	1.5	8.46	1	[illegible]	[illegible]	Y	ITE-EF3A003	3	16	4	Y	
4D	DIESEL GEN. 1A-A FNL. VENT. FAN	15 HP	1.0	20	118.42	2	[illegible]	[illegible]	Y	ITE-EF3L054	50	210	2	N	Change Breaker to pos. 3
4E	DIESEL GEN. 1A-A 480V ELECTRICAL BD. RM. EXHAUST FAN	2 HP	1.0	2.7	22.56	1	[illegible]	[illegible]	N	ITE-EF3A010	10	17	LO		change heater to T29, Breaker to pos 3
5A	DIESEL GEN. 1A-A AIR COMPRESSOR 2	5 HP	1.15	7.1	44.49	1	[illegible]	[illegible]	N	ITE-EF3A02[illegible]	25	75	LO	N	change heater to T39, Breaker to pos 2
5F2	POWER OUTLET									EF3-0100	100A				
6B	FUTURE														
6C	FUTURE														
6D	FUTURE														
6E1	SPARE														
6E2	SPARE														
6F2	SPARE														
5F1	CORRIDOR ELEC. HTR. 1A EL. 742	7.5KW		9.03						ITE-EF3B020	20		Y		
6A	DIESEL GEN. 1A-A MUFFLER RM. EXH. FAN	1.5 HP		2.65	20	1	[illegible]	[illegible]	N	ITE-EF3A003	5	15	2	N	Change heater to T28, Breaker to pos. HI
6F1	LUBE OIL STORAGE RM. HEATER	10KW		12.3						ITE-EF3B020	20		Y		

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Prepared G. Ulrich 12-14-89 / B. Bohlinger 1-8-90 / D. Bates 1/20/90

Verified F.H. Burchett / 1-10-90 / T.M. McCauley 1/23/90

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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 218															
* CLASSIFICATION # 1-NCC-215-A2-A															
1A1	NOR. FDR. FR. 480V SWTGM. BD. 1A2-A									ETS-EKC580002	800				
1A2	ALT. FDR. FR. 480V SWTGM. BD. 1A1-A									ETS-EKC580002	800				
2E1	SPARE														
2F2	SPARE														
3B	SPARE														
3E2	SPARE														
4A	SPARE														
4B	SPARE														
4C	CONTROL XFMR. (1 PHASE)	100 VA								EF3-B02	20			Y	
4D	SPARE														
4E	FUTURE														
4F	FUTURE														
5B	FUTURE														
5C	FUTURE														
5E2	SPARE														
5F2	SPARE														
6B	FUTURE														
6E1	SPARE														
6E2	SPARE														
6F1	SPARE														

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Prepared J. Dilas 12-19-89 / [illegible] 1/20/90 / [illegible] 1/20/90 Date

Verified R. H. Burkart 1-10-90 / T. M. McCauley 1/23/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OVERLOAD MODEL CAT #	TRIP POINT	MIN SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-215-A2-A														
6F2	SPARE														
2A	DIESEL GEN. 1A-A AUX. AC LUBE OIL CIRCULATION PUMP B	3/4 HP	1.0	1.5	8.46	1	T23	1.84	Y	ITE-EF3A403	3	16	4	Y	
2B	DIESEL GEN. 1A-A RM. EXH. FAN 2A	15 HP	1.15	19.5	118.42	2	T48	[illegible]	N	ITE-EF3L(54	50	210	2	N	Change heater to T49 Breaker to pos. 3
2C	DIESEL GEN. 1A-A WATER HEATER 2	15KW		18.05		1				ITE-EF3D 20	30			Y	
2D	DIESEL GEN. 1A-A LUBE OIL CIRCULATING PUMP 2	1 HP		1.7	15.0	1	T24	[illegible]	Y	ITE-EF3A405	5	22	3	N	Change breaker to pos 4
2E2	CO2 STORAGE RM. ELECTRIC HEATER	25KW		30.10						ITE-EF3D40	40		Y		~~Change breaker to [illegible]~~ TAT 4-4-90 MLD 4/4/90
2F1	DIESEL GENERATOR 1A-A BTTY. CHGR. NOR. FDR.	4.16KVA		5.0						ITE-EF3D420	20			Y	
3A	EMER. DSL. ENG. HT. EXCHGR. 1A1 & 1A2 SUPP. VLV. FROM 1-FCV-67-68-A NOR. 2B	0.125 HP		.39	2.60	1	T9	.48	N	ITE-EF3A403	3	7	LO	Y	Change heater to T7
3D	DIESEL GEN. 1A-A DAY TANK FUEL OIL TRANSFER PUMP 2A	1 HP	1.15	1.85	11.20	1	T24	[illegible]	N	ITE-EF3A403	3	21	MI	Y	Change heater to T26
3E1	DIESEL GEN. 1A-A 480V ELEC. BD. RM. ELECTRIC HEATER	7.5KW		9.3						ITE-EF3D420	20			Y	
3F1	DIESEL GEN. 1A-A RM. HEATER A	15KW		18.05						ITE-EF3D430	30			Y	
3F2	DIESEL GEN. 1A-A RM. HEATER B	15KW		18.05						ITE-EF3D030	30			Y	
5A	DIESEL GEN. 1A-A COMPRESSOR 1	5 HP	1.15	7.1	44.49	1	T38	8.81	N	ITE-EF3A425Z	25	75	LO	N	Change heater to T39, breaker to pos 2
5E1	FALLOUT SHELTER ELEC. HEATER	15KW		18.6						ITE-EF3D430	30			Y	
5F1	DIESEL GEN. BLDG. CO2 REFRIG-UNIT	2 HP		3.10	25.0					ITE-EF3D720	20			Y	
6A	LUBE OIL & CO2 STORAGE ROOM EXHAUST FAN	3/4 / 1/8		1.4	12.5	1	T26	2.03	NJ	ITE-EF3A005	5	29	4	Y	Change heater to T22
6D	DIESEL GEN. 1A-A SPACE HEATER	4.5KW		5.42		1				ITE-EF3D420	20			Y	

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J. DeRos 12-28-89 / B S Bhatia 1-5-90 / D Bates 1-21-90

Page No. 40
01/19/90

Prepared _____ Date _____

Verified R.H. Burkhart / Date _____
1-17-90 / 1-25-90 Cauley
1/25/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBNEEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No. _____
Sheet _____ of _____

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 219															
* CLASSIFICATION B 1-MCC-215-B1-B															
2A	DIESEL GEN. 1B-B DTTY. HOOD EXH. FAN	1/3 HP		1	10	1	T18	2.06	N	ITE-EF3A005	5	29	4	Y	Change heater to T18, Breaker to pos 3
2B	DIESEL GEN. 1B-B RM. EXH. FAN 1-B	15 HP	1.15	19.5	118.42	2	T48	22.13	N	ITE-EF3L050	50	210	2	N	Change heater to T49, Breaker to pos 3
2C	DIESEL GEN. 1B-B WATER HEATER 1	15KW		18.05		1				ITE-EF31120	30			Y	
2D	DIESEL GEN. 1B-B LUBE OIL CIRCULATING PUMP 1	1 HP	1.0	2.05	11.28	1	T24	[illegible]	N	ITE-EF3A005	5	22	3	Y	Change heater to T26,
2F1	DIESEL GEN. 1B-B DTTY. CHGR. - ALT. FDR.	4.16KVA		5.0						ITE-EF38020	20			Y	
3A	EMER. DIESEL ENG. HEAT EXCHANGERS 1B1 & 1B2 SPPLY. VLV. 1-FCV-67-67 FROM HDR 1B	.12 ~~1/8~~ HP		0.39	2.60	1	T9	0.45	N	ITE-EF3A003	3	7	LB	Y	
3D	DIESEL GEN. 1B-B DAY TANK FUEL OIL TRANSFER PUMP 1-B	1 HP	1.15	1.85	11.28	1	T25	2.20	N	ITE-EF3A003	5	22	3	Y	Change heater to T26
4B	DIESEL GEN. 1B-B AUX. AC LUBE OIL CIRCULATION PUMP A	3/4 HP	1.0	1.5	8.46	1	T23	1.84	Y	ITE-EF3A003	3	16	4	Y	
4C	UNDER VOLTAGE RELAY COMPARTMENT									ITE-EF38020	20			Y	Not wiched
4D	DIESEL GEN. RM. 1B-B PANEL VENT. FAN	15 HP	1.0	20	118.42	2	T48	22.13	Y	ITE-EF3L050	50	210	2	N	Change Breaker to pos 3
4E	DIESEL GEN. 1B-B 480V ELEC. BD. RM. EXH. FAN	2 HP	1.0	2.75	22.56	1	T28	2.06	N	ITE-EF3A010	10	27	LB	N	Change heater to T29, Breaker to pos 3
4F1	DIESEL GEN. BUILDING LIGHTING CABINET 47 IFNR.	45KVA								ITE-EF39100	100			Y	Not wiched
5A	DIESEL GEN. 1B-B AIR COMPRESSOR 2	5 HP	1.15	7.1	44.5	1	T38	8.81	N	ITE-EF3A025Z	25	75	LB	N	Change heater to T39, Breaker to pos. 2
5F1	EL. 742 CORRIDOR ELECTRIC HEATER 1B	7.5KW		9.3						ITE-EF38020	20			Y	

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J. Rao 12-28-89 / [illegible] 1-5-90 / D Bates 1-21-90

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01/19/90

Prepared _____ Date _____

Verified R.H. Buchert / Date _____
1-17-90 / T.M. McCarley 1/25/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.BGF)

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Attachment No. 1
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CONPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	STARTR SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-215-B2-B														
6A	DIESEL GEN. 1B-B MUFFLER RM. EXH. FAN	1.5 HP		2.65	20	1	T26	2.5	N	ITE-EF3A001	5	18	2	N	Change heater to T28, Breaker to pos H2
1A1	NOR. FDR. FM. 480V SHTDN. BD. 1B1-B									DS-KM3500B2	800				
1A2	ALT. FDR. FM. 480V SHTDN. BD. 1B2-B									DS-KM3500B2	800				
2E1	SPARE														
2E2	SPARE														
2F2	SPARE														
3B	SPARE														
3E	SPARE														
3F1	SPARE														
3F2	SPARE														
4A	SPARE														
4B	DG. 1B-B AUX. LUBE OIL CIRC. PUMP A	3/4 HP	1.0	1.5	8.46	1	T23	1.64	Y	EF3-A00[illegible]	3	16	4	Y	
4F2	FUTURE														
5B	CONT. XFMR. (1 PHASE)	1.50KVA		3.14											
5E	SPARE														
5F2	SPARE														
6B	FUTURE														
6C	FUTURE														
6D	FUTURE														
6E1	SPARE														
6E2	SPARE														

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Prepared J. Bakoo 12-28-89 / B.S. [illegible] 1-5-90 Date / D Bates 1-21-90

Verified R.H. Bucholz 1-17-90 / T. McCauley 1/25/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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Attachment No. 1
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTP. TRIP CAT 0 : POINT	MIN SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CONN. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-215-B2-B													
6F1	SPARE													
6F2	SPARE													

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J. DeRoo 12-21-89 / S. Sebbetic 1-5-90 / D. Bates 1-20-90

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Prepared _____ Date _____

Verified R.H. Bucklet / 1/17/90 Date T.M. McCauley 1/23/90

TVA WATTS BAR NUCLEAR PROJECT
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WBN EDB-NS-TI08-0008 R0

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PREPARED TBT 4-4-90
VERIFIED 4/4/90

CONPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 220															
* CLASSIFICATION # 1-MCC-215-B2-B															
2A	DIESEL GEN. 1B-B AUX. LUBE OIL CIRC. PUMP B	3/4 HP	1.0	1.5	8.46	1	T33	1.34	Y	ITE-EF3A096	5	18	2	Y	
2B	DIESEL GEN. 1B-B EXHAUST FAN 2-B	15 HP	1.15	19.5	118.42	2	T48	20.10	N	ITE-EF3L050	50	210	2	N	change heater to T49, breaker to pos 3
2C	DIESEL GEN. 1B-B WATER HEATER 2	15KW		18.05		1				ITE-EF3B030	30			Y	
2D	DIESEL GEN. 1B-B LUBE OIL CIRC. PUMP 2	1 HP	1.0	2.05	11.28	1	T24	2.04	N	ITE-EF3A095	5	22	3	Y	change heater to T26
3A	EMERG. DIESEL ENGI GEN. HT. EXCHGR. 1B1 & 1B2 SPPLY. VLV. 1-FCV-67-65-B FROM NOR. 2A	0.125 HP		0.39	2.6	1	T9	0.40	N	ITE-EF3A003	3	7	LB	Y	change heater to T7
3D	DIESEL GEN. 1B-B DAY TANK FUEL OIL TRANSFER PUMP 2B	1 HP	1.15	1.85	11.28	1	T24	2.04	N	ITE-EF3A003	3	21	HI	Y	change heater to T26
3E1	DIESEL GEN. 1B-B 480V ELECTRIC BD. RM. ELECTRIC HEATER	7.5KW		9.3						ITE-EF3B020	20			Y	
3F1	DIESEL GEN. 1B-B RM. HTR. A	15KW		18.6						ITE-EF3B030	30			Y	
1A1	NOR. FDR. FM. 480V SHTDN. BD. 1B2-B									EATS-KR3500002	800				
1A2	ALT. FDR. FM. 480V SHTDN. BD. 1B1-B									EATS-KR3500002	800				
2E1	SPARE														
2E2	SPARE														
2F1	DG. 1B-B BT/R T. CHGR. NOR. FDR.	4.16KVA		5.0						EF3-B020	20A			Y	
2F2	SPARE														
3B	SPARE														
3E2	SPARE														

Prepared G. Dukes 12-21-89 / B.S. Aly 1-5-90 / D Baker 1-20-90

Verified R.A. Buckalt 1-17-90 / T.M. McCauley 1/24/90

TVA WATTS BAR NUCLEAR PROJECT
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1-MCC-215-B2-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
4A	SPARE														
4B	SPARE														
4C	CONTROL IFWR. (1 PHASE)														
4D	SPARE														
4E	FUTURE														
4F	FUTURE														
5B	FUTURE														
5C	FUTURE														
5E1	SPARE														
5E2	SPARE														
5F1	SPARE														
5F2	DG. ROOMS POWER OUTLETS									EF3-B100	100A				
6A	SPARE														
6B	FUTURE														
6E1	SPARE														
6E2	SPARE														
6F1	SPARE														
6F2	SPARE														
3F2	DIESEL GEN. 1B-B RM. HEATER B	15KW		18.05						ITE-EF3B430	30			Y	
5A	DIESEL GEN. 1B-B AIR COMPRESSOR 1	5 HP	1.15	7.1	44.5	1	T38	8.91	N	ITE-EF3M252	25	75	LB	N	Change to table & T39, Breaker to pos 2
6B	DIESEL GEN. 1B-B SPACE HEATER	4.5KW		5.42		1				ITE-EF3B430	20			Y	

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Prepared 1-16-90 / R.H. Buchert / 1-17-90 / 1-20-90 Date

Verified 1-17-90 / TBT EXC USE 2 7 90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

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WBN EEB-MS-T108-0008 R0

Attachment No 1
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : CAT # :	HTR. POINT	TRIP HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SET SETTING	POS ACCEPT?	REMARKS
** NODE 221														
* CLASSIFICATION # 2-MCC-215-A1-A														
1A1	NOR. FDR. FR. 480V SHTDN. BD. 2A1-A									ETS-EK3S40B2	800			
1A2	ALT. FDR. FR. 480V SHTDN. BD. 2A2-A									ETS-EK3S40B2	800			
2E1	SPARE													
2E2	SPARE													
2F1	DG. 2A-A BTRY. CHGR. ALT. FDR.	4.16KVA		5.0						EF3-B024	20		Y	
2F2	SPARE													
3B	SPARE													
3E	SPARE													
3F1	SPARE													
3F2	SPARE													
4A	SPARE													
4C	CONT. XFMR. (1 PHASE)									EF3-B079	20		Y	
4F1	DG. BLDG. LTG. CAB. 46 XFMR.	45KVA		34.19						EF3-B106	100		Y	
4F2	FUTURE													
5B	CONT. XFMR. (1 PHASE) 1E	1.50KVA		3.13						EF3-B028	20		Y	
5E	SPARE													
5F2	POWER OUTLET									EF8-B200	200		2/7/90 Not Evaluated	
6B	FUTURE													
6C	FUTURE													
6D	FUTURE													

Prepared R.H. Buchat 1-16-90 / B.J. Martin 1-17-90 / D Bates 1-20-90

Verified B.J. Blair 1-17-90 / TBT for JSE 2-7-90 Date

WATTS BAR NUCLEAR PROJECT
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Attachment No. 1
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Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	THERMAL O/L RELAY HTR. SIZE (FOIN)	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-215-A1-A														
6E1	SPARE														
6E2	SPARE														
6F1	SPARE														
6F2	SPARE														
2A	DIESEL GENERATOR 2A-A BTRY. HOOD EXHAUST FAN	0.33 HP	1.15	2.2	9.27	1	T26	[illegible]	Y	ITE-EF3A045	5	29	4	N	DECREASE BKR SETTING TO POS 2 (18A)
2B	DIESEL GENERATOR 2A-A ROOM EXHAUST FAN 2A	15 HP	1.15	19.5	118.42	2	T48	22.13	N	ITE-EF3L030	50	210	2	N	REPLACE HTR. TO T49 (26.8A) INCREASE BKR SETTING TO POS 3 (260A)
2C	DIESEL GENERATOR 2A-A WATER HEATER 1	15KW		18.05		1				ITE-EF3B030	30			Y	
2D	DIESEL GENERATOR 2A-A LUBE OIL CIRCULATION PUMP 1	1 HP		1.7	15	1	T24	[illegible]	Y	ITE-EF3A013	5	22	3	N	INCREASE BKR SETTING TO POS 4 (29A)
3A	EMER. DIESEL ENGINE HEAT EXCHANGER 2A1 & 2A2 SUPPLY VALVE FROM HEADER 2A	0.125 HP		0.39	2.6	1	T4	[illegible]	N	ITE-EF3A013	3	7	LO	Y	REPLACE HTR WITH T7 (.44)
3D	DIESEL GENERATOR 2A-A DAY TANK FUEL OIL TRANSFER PUMP	1.0 HP	1.15	1.85	11.28	1	T24	2.04	N	ITE-EF3A013	3	21	HI	Y	REPLACE HTR WITH T26 (2.56A)
4B	DIESEL GENERATOR 2A-A AUT. AC LUBE OIL CIRCULATION PUMP A	3/4 HP	1.0	1.5	8.46	1	T22	1.84	Y	ITE-EF3A013	3	16	4	Y	
4D	DIESEL GENERATOR ROOM 2A-A PANEL VENT. FAN	15 HP	1.0	20	118.42	2	T48	22.13	Y	ITE-EF3L030	50	210	2	N	INCREASE BKR. SETTING TO POS 3 (260A)
4E	DIESEL GENERATOR 2A-A 480V ELEC. BOARD ROOM EXHAUST FAN	2 HP	1.0	2.7	22.56	1	T28	2.96	N	ITE-EF3A010	10	58	4	N	REPLACE HTR WITH T29 (3.44A) CHANGE BKR. SETTING TO POS 3 (45A)
5A	DIESEL GENERATOR 2A-A AIR COMPRESSOR 2	5 HP	1.15	7.1	44.49	1	T38	5.61	N	ITE-EF3A032	25	75	LO	N	REPLACE HTR WITH T39 (7.65A) INCREASE BKR SETTING TO POS 2 (105A)
5F1	EL. 742 CORRIDOR ELEC. HEATER 2A	7.5 HP		9.3						ITE-EF3B010	20			Y	
6A	DIESEL GENERATOR 2A-A MUFFLER ROOM EXHAUST FAN	1.5 HP		2.65	20	1	T26	[illegible]	N	ITE-EF3A015	5	18	2	N	REPLACE HTR WITH T28 (3.07A) INCREASE BKR SETTING TO POS. HI (41A)

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Prepared R. N. Bachert 1-4-90 / [illegible] 1-6-90 / [illegible] Date 1-22-90
Verified [illegible] 1-17-90 / [illegible] 1-24-90 Date

WBN EEB-MS-TI08-0008 R0

Attachment No. 1
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TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY
(TVACABLE.DBF)

Prepared Date
Verified Date

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : MTR. TRIP CAT 0 : POINT	MTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 222														
* CLASSIFICATION 0 2-MCC-215-A2-A														
1A1	MOR. FDR. FR. 480V SHUTDOWN BOARD 2A2-A								ETS-KM3SW04B2					
1A2	ALT. FDR. FR. 480V SHUTDOWN BOARD 2A1-A								ETS-KM3SW04B2					
2E1	SPARE													
2E2	SPARE													
2F1	DG. 2A-A BTTY. CHGR. MOR. FDR.	4.16KVA		5.0					EF3-B02C	20			Y	
2F2	SPARE													
3B	SPARE													
3E2	SPARE													
4A	SPARE													
4B	SPARE													
4C	CONT. IFHR. (1 PHASE)								EF3-B02P	20			Y	
4D	SPARE													
4E	FUTURE													
4F	FUTURE													
5B	FUTURE													
5C	FUTURE													
5E1	SPARE													
5E2	SPARE													
5F1	SPARE													
5F2	SPARE													

WBN EEB-MS-TI08-0008 R

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Prepared F.H. Burkett 1-4-90 / B.S. Bhatia 1-22-90 Date
Verified B.S. Bhatia / M.Beaver 1-22-90 Date 1-11-90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY
(TVACABLE.DEF)

Prepared Date
Verified M.Beaver Date M.Beaver

PREPARED TBJ 4-4-90
VERIFIED KLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	STARTER SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SET SETTING	POS	ACCEPT?	REMARKS
	2-MCC-215-A2-4														
6A	SPARE														
6B	FUTURE														
6E1	SPARE														
6E2	SPARE														
6F1	SPARE														
6F2	SPARE														
2A	DIESEL GENERATOR 2A-A AUX. AC LUBE OIL CIRC. PUMP	3/4 HP	1.0	1.5	8.46	1	T23	1.84	[illegible]	ITE-EF3[illegible]05	5	18	2	Y	
2B	DIESEL GENERATOR 2A-A ROOM EXHAUST FAN 2-A	15 HP	1.15	19.5	118.42	2	[illegible]	23.13	N	ITE-EF3[illegible]050	50	210	2	N	REPLACE WITH T49 HTR RESET BKR TO 3
2C	DIESEL GENERATOR 2A-A WATER HEATER 2	15KW		18.05		1				ITE-EF3[illegible]030	30			Y	
2D	DIESEL GENERATOR 2A-A LUBE OIL CIRC. PUMP 2	1 HP	1.0	2.05	12.53	1	T20	[illegible]	N	ITE-EF3[illegible]05	5	22	3	N	REPLACE WITH T-6 HTR RESET BKR TO 4
3A	EMER. DIESEL GENERATOR HEAT EXCHANGER 2A1 & 2A2 SUPPLY VALVE FROM HEADER 2B	1/8 HP		0.39	2.6	1	T9	.48	N	ITE-EF3[illegible]03	3	7	LO	Y	CHANGE HTR TO T7
3D	DIESEL GENERATOR 2A-A DAY TANK FUEL OIL TRANSFER PUMP 2A	1 HP	1.15	1.85	11.20	1	T24	[illegible]	N	ITE-EF3[illegible]03	3	21	HI	Y	REPLACE WITH T26 HTR
3E1	DIESEL GENERATOR 2A-A 480V ELEC. BOARD ROOM ELEC. HEATER	7.5KW		9.3						ITE-EF3[illegible]020	20			Y	
3F1	DIESEL GENERATOR 2A-A ROOM HEATER A	15KW		18.3						ITE-EF3[illegible]030	30			Y	
5A	DIESEL GENERATOR 2A-A AIR COMPRESSOR 1	5 HP		7.25	46	1	T38	8.81	Y	ITE-EF3[illegible]25Z	25	75	LO	N	RESET BKR TO 2
6D	DIESEL GENERATOR 2A-A SPACE HEATER	4.5KW		5.42		1				ITE-E[illegible]3[illegible]020	20			Y	
3F2	DIESEL GENERATOR 2A-A ROOM HEATER A	15KW		18.05						ITE-EF3[illegible]30	30			Y	

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G. DeRos 12-19-89 / [illegible] 1-6-90 / D Bate 1/20/90

Prepared _____ Date _____

Verified [illegible] / [illegible] Date _____ FOR JSE 8-7-90

TVA WATTS BAR NUCLEAR PROJECT
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WBN EEB-MS-TI05-0008 R0

Attachment No. 1
Calc. No. _____
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PREPARED TRT 4-4-90
VERIFIED GLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT B	MFG. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 223															
* CLASSIFICATION 0 2-MCC-215-B1-B															
2A	DIESEL GENERATOR 2B-B BTRM. HOOD EXHAUST FAN	1/3 HP		1.0	10.0	1	T28	2.96	N	ITE-EF3A005	5	29	4	N	REPLACE HTR. WITH T18 (1.22A) DECREASE BKR. SETTING TO POS. 3 (22)
2B	DIESEL GENERATOR 2B-B ROOM EXHAUST FAN 1-B	15 HP	1.15	19.5	118.42	2	T49	25.11	N	ITE-EF3[illegible]050	50	210	2	N	REPLACE HTR WITH T49 (26.8A) INCREASE BKR SETTING TO POS. 3 (260A)
2C	DIESEL GENERATOR 2B-B WATER HEATER 1	15KW		18.05		1				ITE-EF2[illegible]03D	30			Y	
2D	DIESEL GENERATOR 2B-B LUBE OIL CIRC. PUMP 1	1 HP	1.15	1.95	7.89	1	T24	2.04	N	ITE-EF3[illegible]015	5	22	3	N	REPLACE HTR WITH T26 (2.6A) DECREASE BKR SETTING TO POS. 2 (18A)
3A	EMER. DIESEL ENG. HEAT EXCHGR. 2B1 & 2B2 SPLY. VLV.2-FCV-67-67-B FROM HEADER 1B	0.125 HP		0.39	2.6	1	T9	0.49	N	ITE-EF[illegible]003	3	7	LO	Y	CHANGE HTR TO T7
3D	DIESEL GENERATOR 2B-B DAY TANK FUEL OIL TRANSFER PUMP 1B	1 HP	1.15	1.85	11.28	1	T24	2.04	N	ITE-EF[illegible]003	3	12	3	N	REPLACE HTR WITH ~~T20 (2.0A)~~ T26. INCREASE BKR SETTING TO POSITION HI (21A) GLB 1/8/90
4B	DIESEL GEN. 2B-B AUX. BLDG. AC LUBE OIL CIRC. PUMP A	3/4 HP	1.0	1.15	8.46	1	T24	2.04	N	ITE-EF[illegible]003	3	16	4	Y	REPLACE HTR WITH T20 (1.40A)
4D	DIESEL GEN. ROOM 2B-B PANEL VENT. FAN	15 HP	1.0	20	118.42	2	T48	25.13	Y	ITE-EF[illegible]050	50	210	2	N	INCREASE BKR SETTING TO POSITION 3 (260A)
4E	DIESEL GEN. 2B-B 480V ELEC. BOARD ROOM EXHAUST FAN	2 HP	1.0	2.7	22.56	1	T28	3.96	N	ITE-EF[illegible]010	10A	27	1	N	REPLACE HTR. WITH T29 (3.17A) INCREASE BKR SETTING TO POS. 3 (45A)
5A	DIESEL GENERATOR 2B-B AIR COMPRESSOR 2	5 HP	1.15	7.1	44.5	1	T38	8.81	N	ITE-EF[illegible]252	25	75	LO	N	REPLACE HTR WITH T39 (9.85A) INCREASE BKR SETTING TO POS 2 (105A) 236%
5F1	EL. 742 CORRIDOR ELEC. HEATER 2B	7.5 HP		9.3						ITE-EF[illegible]20	20			Y	
6A	DIESEL GENERATOR 2B-B MUFFLER ROOM EXHAUST FAN	1.5 HP		2.65	20	1	T26	2.54	N	ITE-EF3A005	5	18	2	N	REPLACE HTR. WITH T29 (3.44A) INCREASE BKR SETTING TO POS HI (44A)
1A1	NOR. FDR. FR. 480V SHUTDOWN BOARD 2B1-B									ETS-KR[illegible]0082	800				
1A2	ALT. FDR. FR. 480V SHUTDOWN BOARD 2B2-B									ETS-KR[illegible]0082	800				

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9. DeRoo 12-14-89 / [illegible] 1-5-90 / [illegible] 1/20/90

Prepared _____ Date _____

Verified [illegible] 1-02-90 / TBT FOR JSE 2-7-90 Date _____

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN-EEB-MS-TI05-0008 R0

Attachment No. 1
Calc. No. _____
Sheet _____ of _____

2-MCC-215-B1-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : NTP. TRIP CAT B : POINT	NTB SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2E1	SPARE													
2E2	SPARE													
2F1	DG. 2B-B BTTY. CHGR. ALT. FDR.	4.16KVA		5.0					EF3-B020	20			Y	
2F2	SPARE													
3B	SPARE													
3E	SPARE													
3F1	SPARE													
3F2	SPARE													
4A	SPARE													
4C	CONT. IFNR. (1 PHASE)								EF3-B0[illegible]	20			Y	
4F1	DG. LTG. CAB. 4B IFNR.	45KVA		54.1					EF3-B10[illegible]	100			Y	
4F2	FUTURE													
5B	CONT. IFNR. (1 PHASE)	1.5KVA		3.14					EF3-B02[illegible]	20			Y	
5E	SPARE													
5F2	POWER OUTLET								EF3-B1[illegible]	100			NOT EVALUATED	
6B	FUTURE													
6C	FUTURE													
6D	FUTURE													
6E1	SPARE													
6E2	SPARE													
6F1	SPARE													
6F2	SPARE													

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01/15/90

Prepared 9. Ulrich 12-28-89 / B.S. Ahuja 1-5-90 / J Bate 1/20/90 Date

Verified [illegible] 01-8-90 Date J Bate 2-5-90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DOF)

WBN-TSB-MS-TJC8-0008 R0

Attachment No. 1
Calc. No.
Sheet of

PREPARED TRT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	% HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	BKR POS	ACCEPT?	REMARKS
** NODE 224															
* CLASSIFICATION 0 2-MCC-215-B2-B															
2A	DIESEL GENERATOR 2B-B AUX. LUBE OIL CIRC. PUMP B	3/4 HP	1.0	1.6	8.46	1	T24	2.04	Y	ITE-EF34005	5	10	2	Y	
2B	DIESEL GENERATOR 2B-B ROOM EXHAUST FAN 2-B	15 HP	1.15	19.5	118.42	2	T40	23.13	N	ITE-EF3L350	50	210	2	N	REPLACE HTR WITH T49 (26.8A) INCREASE BRK SETTING TO POS 3 (210A)
2C	DIESEL GENERATOR 2B-B WATER HEATER 2	15KW		18.05		1				ITE-EF30030	30			Y	
2D	DIESEL GENERATOR 2B-B LUBE OIL CIRC. PUMP 2	1 HP	1.0	2.05	11.28	1	T24	2.04	N	ITE-EF34005	5	22	3	Y	REPLACE HTR WITH T26 (2.89A)
3A	EMERGENCY DIESEL ENGINE HEAT EXCHANGER SUPPLY VALVE FROM HEADER 2A - 2-FCV-67-65-B	0.125 HP		0.39	2.6	1	T9	0.40	N	ITE-EF34003	3	7	LB	Y	REPLACE HTR WITH T7 (.4A)
3B	DIESEL GENERATOR 2B-B DAY TANK FUEL OIL TRANSFER PUMP 2B	1 HP	1.15	1.85	11.28	1	T24	2.04	N	ITE-EF34003	3	21	HI	Y	REPLACE HTR WITH T25 (2.2A)
3E1	DIESEL GEN. 2B-B 480V ELECTRIC BOARD ROOM ELECTRIC HEATER	7.5KW		9.3						ITE-EF30020	20			Y	
3F1	DIESEL GENERATOR 2B-B ROOM HEATER A	20KW		24.7						ITE-EF30030	30			Y	
6E1	SPARE														
6E2	SPARE														
6F1	SPARE														
6F2	SPARE														
3F2	DIESEL GENERATOR 2B-B ROOM HEATER B	20KW		24.7						ITE-EF30030	30			Y	
5A	DIESEL GENERATOR 2B-B AIR COMPESSOR 1/2	5 HP	1.15	7.25	44.5	1	T38	8.81	N.	ITE-EF34025	25	75	LB	N	REPLACE HTR WITH T39 (9.83A) INCREASE BRK SETTING TO POS 2 (105A) 236%
6B	DIESEL GENERATOR 2B-B SPACE HEATER	4.5KW		5.42		1				ITE-EF30020	20			Y	

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Page No. 52
01/19/90

Prepared 9. DeRo 12-28-89 / B.S. Dhatt 1-5-90 Date / B Bates 1/20/90

Verified B S Dhatt 01-04-90 Date [redacted]

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

J P Eaton 25-46 (TVACABLE.BAF)

WBN EEB-MS-TI08-0008 R0

Attachment No 1
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR. TRIP CAT # : POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-215-B2-B													
4B	DIESEL GENERATOR BUILDING FUEL OIL TRANSFER PUMP	7.5 HP	1.0	11.1	63.5	1		V	ITE-EF3-0252	25	125	3	Y	REPLACE HTR WITH T42 (13 X A)
1A1	NOR. FDR. FR. 480V SHUTDOWN BOARD 2B2-B								ETS-EK3-B40B2	800				
1A2	ALT. FDR. FR. 480V SHUTDOWN BOARD 2B1-B								ETS-EK3-B40B2	800				
2E1	SPARE													
2E2	SPARE													
2F2	SPARE													
2F1	DG. 2B-B BTTY. CHGR. NOR. FDR.	4.16KVA		5.0					EF3-B024	20			Y	
3B	SPARE													
3E2	SPARE													
4A	SPARE													
4C	CONTROL XFMR. (1 PHASE)								EF3-B021	20			Y	
4D	SPARE													
4E	FUTURE													
4F	FUTURE													
5B	FUTURE													
5C	FUTURE													
5E1	SPARE													
5E2	SPARE													
5F1	SPARE													
5F2	SPARE													
6A	SPARE													

Page No. 53
01/19/90

Prepared J. Duke 12-29-89 Date B.J. Blackstone 1-5-90 / D Bates 1/20/90

Verified B.J. Blackstone 1/24/90 Date J. Estabrook 2-5-90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY
(TVACABLE.DBF)

WBN ESS-MS-TI08-0008 R0

Attachment No. 1
Calc. No. _____
Sheet _____ of _____

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : CAT # :	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-215-B2-B														
6B	FUTURE														
6E1	SPARE														
6E2	SPARE														
6F1	SPARE														
6F2	SPARE														

Prepared [illegible] / [illegible] Date 1/31/90 1/2/90

Verified [illegible] Date 1-5-90 / T.M. McCauley 2/8/90

WBN EEB-MS-TI08-0008, R0
Attachment 1

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DAT)

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	I NTB. TRIP POINT	NTB SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	FUSE (ACCEPT)	REMARKS
** NODE 225															
* CLASSIFICATION # 0-MCC-215-C1-S															
AA	FEEDER BKR.									GE-E11592-8	300A		NI		
AG	480-120 XFMR.	3.0KVA		6.25											
BA	SPARE														
BB	SPARE														
BG	SPARE														
BK	FUTURE														
BU	AUX. RELAY COMPTS.														
CJ	SPARE														
CN	SPARE														
CR	SPARE														
CU	D. G. BAT. CHGR.	10.0KVA		13.0						GE-TED 136 YT150				Y	Shown Fuse A4J20
CY	SPARE														
DJ	AUX. RELAY COMPTS.														
DN	SPARE														
DR	SPARE														
DU	SPARE														
DY	FUTURE														
EJ	SPARE														
EN	AUX. RELAY COMPTS.														
ES	SPARE														
EV	FUTURE														

Prepared [illegible] / Date 1/2/90 — J Batts 1/31/90

Verified [illegible] / Date 1-5-90 / T.H.R.S. Cauley 2/8/90

WBN EEB-MS-TI08-0008, R0
Attachment 1

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	I HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SET SETTING	FUSE POS ACCEPT?	REMARKS
EN	SPARE													
FA	AUX. COMPT.													
FE	SPARE													
FJ	SPARE													
FN	SPARE													
FR	SPARE													
FU	SPARE													
GA	SPARE													
GD	SPARE													
GG	SPARE													
GK	ADGB LIGHTING CAB.	45KVA		54.0						GE-TED-136YT150	150		N	SHAMUT A4J20 REPLACE FUSE
GM	SPARE													
GR	AUX. RELAY COMPTS.													
GV	SPARE													
EE	D. G. DAY TANK FUEL OIL XFR. PUMP 2,0-MTR-10-1000-S	1 HP	1.15	2	10.03	1	C268A	2.475	N				Y	SHAMUT TRS 2½ REPLACE HTR WITH C301A
EA	D. G. DAY TANK FUEL OIL XFR. PUMP 1,0-MTR-10-1000-S	1 HP	1.15	2	10.03	1	C268A	2.475	N				Y	SHAMUT TRS 2½ REPLACE HTR WITH C301A
DE	EXCH TO DGL GEN DC-S MTR VALVE 1-FCV-67-72-S	0.13 HP		0.6	2.6	1	C0.66A	0.538	N				Y	SHAMUT TRS 1A REPLACE HTR WITH C066A
DA	EXCH TO DGL GEN DC-S MTR VALVE 2-FCV-67-72-S	0.13 HP		0.6	2.6	1	C0.66A	0.538	N				Y	SHAMUT TRS 1A REPLACE HTR WITH C066A
CE	6.9KV DD. RM. EXH. FAN 0-MTR-30-220-S	10 HP	1.15	12	78.93	1	C16.2B	16.125	Y	GE-TED136YT-150	150A		N	SHAMUT TRS 15R REPLACE FUSE
CA	480V AUX. DD. RM. EXH. FAN 0-MTR-30-221-S	1.5 HP	1.15	1.95	13.35	1	C268A	2.426	Y	GE-TED136YT-150	150A		N	SHAMUT TRS 15R REPLACE FUSE

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Prepared [illegible] / [illegible] Date 1/2/90 1/31/90
Verified [illegible] Date
1-5-90

WBN EEB-MS-TI08-0008, R0
Attachment 1

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	I HTR. TRIP POINT	HTR SIZE ACCEPTABLE ?	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	FUSE ACCEPT?	REMARKS
BH	B. G. RM. EXH. FAN 2 0-HTR-30-332-S	15 HP	1.15	18	105.24	1	C19.88	20.325	N					Y	SHAMUT TRS 25R REPLACE HTR WITH C228B
BS	B. G. RM. EXH. FAN 1 0-HTR-30-334-S	15 HP	1.15	18	105.24	1	C19.88	20.376	N					Y	SHAMUT TRS 25R REPLACE HTR WITH C228B

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Prepared [illegible] Date 1/2/90
Verified [illegible] Date 1-5-90 T. A. McCarley 2/8/90

WBN EEB-MS-TI08-0008, R0
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TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : NTR. TRIP NTR SIZE CAT # : POINT ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SET SETTING POS	FUSE ACCEPT?	REMARKS
** NODE 226												
* CLASSIFICATION # 0-NCC-215-C2-S												
AA	FEEDER BKR.							GE-E11592 #	300	NI		
A6	480 - 120V 1/HR.	3.0KVA		6.26							N	Aux fuse not identified
BJ	FUTURE											
BU	AUX. RELAY COMPT.											
BY	FUTURE											
DA	SPARE											
DE	SPARE											
DJ	AUX. RELAY COMPT.											
DY	FUTURE											
EJ	SPARE											
EN	SPARE											
ES	SPARE											
EU	AUX. RELAY COMPT.											
FE	SPARE											
FJ	SPARE											
FN	SPARE											
FV	FUTURE											
FZ	FUTURE											
GK	ADM. BLDG. PWR. OUTLETS							GE-TED-136YT150	150			Not Evaluated
GN	SPARE											
GU	FUTURE											

Prepared [illegible] / Date 1/2/90 — JBatey 1/31/90

Verified [illegible] Date 1-5-90 — T. M. McCauley 2/8/90

WBN EEB-MS-TI08-0008, R0
Attachment 1

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

PREPARED TRT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	I NTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	MCR. INST. SET SETTING	FUSE POS ACCEPT?	REMARKS
GV	SPARE													
EA	D. G. MUFFLER RM. EXH. FAN 0-MTR-30-327	1.15 HP	1.15	1.95	12.5	1	C148A	1.975	N				N	SHAMUT TRS 1 6/10, REPLACE FUSE REPLACE HTR WITH C268A
CJ	D. G. ENG. B MTR. MTR. 0-MTR-82-CB-S	15KW		18.05		1	C21.48	22.375	N	GE-TED136VT-150	150A		N	SHAMUT TRS 20R, REPLACE FUSE REPLACE HTR WITH C250 B
CU	FIRE PROT. RM. MTR. 0-MTR-30-325	7.5KW		9.03						GE-TED136VT-150	150A		Y	SHAMUT A4J15
CM	D. G. RM. MTR. 1 0-MTR-30-317	20KW		26.25						GE-TED136VT-150	150A		Y	SHAMUT A4J30
CR	D. G. RM. MTR. 2 0-MTR-30-322	20KW		24.06						GE-TED136VT-150	150A		Y	SHAMUT A4J30
DM	D. G. BLDG. FUEL OIL XFER. PUMP 0-MTR-10-110	10 HP	1.0	13	100.28	1	C12.58	12.5	N				N	SHAMUT TRS 15R, REPLACE FUSE REPLACE HTR WITH C163B
DR	D. G. AIR COMPRESSOR 1 0-MTR-82-320	5 HP	1.15	7.1	44.49	1	C8.67A	8.65	N				Y	SHAMUT TRS 9R REPLACE HTR WITH C955A
DU	D. G. AIR COMPRESSOR 2 0-MTR-82-321	5 HP	1.15	7.1	44.49	1	C8.67A	8.65	N				Y	SHAMUT TRS 9R REPLACE HTR WITH C955A
CE	D. G. ENG. A MTR. MTR. 0-MTR-82-CA-S	15KW		18.05		1	C21.48	22.375	N	GE-TED136VT-150	150A		N	SHAMUT TRS 20A, REPLACE FUSE REPLACE HTR WITH C250 B
EE	D. G. SPACE MTR. 0-MTR-82-C-S	4.5KW		5.42		1	C595A	7.212	Y				Y	SHAMUT TRS10R
CA	FUEL OIL XFER. RM. EXH. FAN 0-MTR-30-329	0.5 HP		1.0	10.0	1	C0.97A	0.925	N	GE-TED136VT-150	150A		N	SHAMUT TRS 1R, REPLACE FUSE REPLACE HTR WITH C118A
GR	480V DB. RM. MTR. 0-MTR-30-326	7.5KW		9.03						GE-TED136VT-150	150A		N	SHAMUT A4J20, REPLACE FUSE
CI	INV. RM. MTR. 0-MTR-30-324	7.5KW		9.03						GE-TED136VT-150	150A		Y	SHAMUT A4J15
DM	PIPE GALLERY RM. MTR. 2	7.5KW		9.03						GE-TED136VT-150	150A		Y	SHAMUT A4J15
DR	6.9KV DB. RM. MTR. 2 0-MTR-30-319	7.5KW		9.03						GE-TED136VT-150	150A		Y	SHAMUT A4J15
GA	6.9KV DB. RM. MTR. 1 0-MTR-30-318	7.5KW		9.03						GE-TED136VT-150	150A		Y	SHAMUT A4J15
DD	PIPE GALLERY RM. MTR. 1 0-MTR-30-320	7.5KW		9.03						GE-TED136VT-150	150A		Y	SHAMUT A4J15

Prepared [illegible] / Date 1/2/90 D Bates 1/31/90

Verified [illegible] / Date 1-3-90 / T. M. A. S. Bailey 2/8/90

WBN EEB-MS-TI08-0008, R0
Attachment 1

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

PREPARED TRT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	FUSE ACCEPT?	REMARKS
GG	VESTIBULE HTR. 0-HTR-30-323	7.5KW		9.03						GE-TED136VT-150	150A			Y	SHAMUT A4J15
BA	D. G. ENGINE A LUBE OIL CIR. PUMP 1 0-HTR-82-C1-S	2 HP	1.0	3.5	22.57	1	C3.01A	2.80	N	GE-TED136VT-150	150A			Y	FUSETRON FRS-R4 REPLACE HTR WITH C419A
FS	HOIST POWER OUTLET 0-PO-215-12	60 A								GE-TED136VT-150	150A			N	SHAMUT A4J40, REPLACE FUSE
FN	HOIST POWER OUTLET 0-PO-215-12	60 A								GE-TED136VT-150	150A			N	SHAMUT A4J60, REPLACE FUSE
BE	D. G. ENGINE B LUBE OIL CIR. PUMP 2 0-HTR-82-C2-S	2 HP	1.0	3.5	22.57	1	C3.01A	2.80	N	GE-TED136VT-150	150A			Y	SHAMUT TRS9A REPLACE HTR WITH C419A

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Prepared R.H. Buchat 1-20-90 / B.S. Bhatia 1-23-90 / G Bato 1-23/90 Date

Verified B.S. Bhatia 1-24-90 / T.M. McCarty 1/25/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(THACABLE.DBF)

WBN EEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY POSI. CAT B	NO. POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SET SETTING	POS ACCEPT?	REMARKS
** NODE 235														
* CLASSIFICATION B I-MCC-213-A1-A														
1A1	MOR. FDR. FR. 480V SHTDN. BD. 1A2-A									KM3S-B0082	800			Not isolated
1A2	ALT. FDR. FR. 480V SHTDN. BD. 1A2-A									KM3S-B0082	800			Not isolated
2E2	SPARE													
2F2	SPARE													
3B	FUTURE													
3C	~~SPARE~~ FUTURE													
3F1	SPARE													
4B	SPARE													
4D	SPARE													
5C	FUTURE													
5F	SPARE													
6A	SPARE													
6B	SPARE													
7F	SPARE													
8F	SPARE													
9D	SPARE													
13D	SPARE													
15A	SPARE													
15B	SPARE													
15D	FUTURE-													

SAMPLE COPY

Prepared Z.N. Buchert / B.S. Blatto 1-23-90 / D Bato 1-20-90 Date

Verified B.S. Blatto / 1-24-90 / J.R. McCarty 1/25/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBA)

WBN EEB-MS-TI03-0008 R0

Attachment No. 1
Calc. No.
Sheet of

PREPARED TBT 4-4-90
VERIFIED KLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-A1-A														
15E	FUTURE														
17B	SPARE														
18B	SPARE														
	BORIC ACID TANK A HTR NO A1														
2A	1-HTR-62-239-A	9KW		11		1				EF3-B020	P.D			Y	
	BORIC ACID TRANSFER PUMP 1A-A														
2B	1-HTR-62-230-A	15 HP	1	18	105.24	2	T4[illegible]	[illegible]		EF3-L050	50	210	2	Y	Add Heater T48
	THERMAL SAVER FOR CONTROL ROOM 1A-A														
2C	1-HTR-70-131-A	10 HP	1.15	14	70.16	2	T44	17.6	Y	EF3-L051	50	260	3	N	Change Breaker to pos 20
2C1	FCV-63-1	10.5 HP	1.0	13.8	118.5				N	EF3-B040	40				See compt 10A
2F1	TORNADO DAMPER CONT. TRANSFER			3.62						EF3-B020	20			Y	
3A	HTR-62-243	9KW		11		1				EF3-B020	20			Y	
3E	HTR-62-AOP	2 HP	1.15	3.1	22.57	1	T30	3.83	N	EF3-A010	10	36	2	N	Change heater to T31 Breaker to pos. 3
3F2	FCV-63-118	19.5 HP		25.2	208.0				N	EF3-H050	50	400	2	Y	See compt. 8D
4A	HTR-63-37	6KW		7.22		1				EF3-B020	20			Y	
4C	480 - 120V CONT. XFER.	0.1KVA				1				EF3-B020	20				Not available
4E	HTR-3-118D	0.25	1	0.56	3.51	1	T12	0.69	N	EF3-A003	3	7	LB	Y	Change heater to T13
4F	OL BYPASS CONTROL	0.5 KVA								EF3-B020	20			Y	
5A	0-FCV-26-3	0.125 HP		0.45	2.6	1	T9	0.48	N	EF3-A003	3	7	LB	Y	USE EXISTING T9 HTR
5B	FCV-74-1	2.6 HP	1.0	4.73	38				N	EF3-B020	20			Y	See compt 10D
5E	0-FCV-26-6	0.33 HP		0.75	5.7	1	T14		N	EF3-A003	3	7	LB	N	Change heater to T13, Breaker to pos. 3
6D	FCV-68-333	1.9 HP		3.5	26	1	T31	4.25	N	EF3-A010	10	45	30	N	Change heater to T29, Breaker to pos 4
6F	0-FCV-26-126	0.33 HP		0.75	5.7	1	T14		N	EF3-A003	3	7	LB	N	Change heater to T12, Breaker to pos 3
7A	FCV-62-63	1.9 HP		3.5	26	1	T31		N	EF3-A010	10	45	3	N	Change heater to T29, Breaker to pos 4
7B	FCV-62-90	1.9 HP		3.5	26	1	T31		N	EF3-A010	10	45	3	N	Change heater to T29, Breaker to pos 4
7D	FCV-63-8 TO COMPT. 17F2	~~19.6~~ HP		~~23.2~~	70.8	2	T50	20.98	N	EF3-B060	60				Change heater to [illegible], Breaker to 2050 per NEC

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SARGENT & LUNDY

E.N. Bamhart / R.C. Hastie 1-20-90 / 1-22-90 / G Bato 1-23/90

Page No. 62
01/19/90

Prepared _____ Date _____

Verified B.S. Hastie / 1-24-90 / P.M. McCauley 1/25/90 Date _____

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN EEB-MS-TI06-0008 R0

Attachment No. 1
Calc. No. _____
Sheet _____ of _____

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COMPT. NO.	SERVICE	RATING HP/EVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR. TRIP CAT # : POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-A1-A													
8A	FCV-62-98	0.7 HP		2.3	12.0	1	T27	N	EF3-A01[illegible]	10	27	LO	Y	change heater to T22,
8B	LCV-62-132	1.9 HP		3.5	26	1	T31	N	EF3-A01[illegible]	10	45	3	N	change heater to T29, Breaker to pos 4
8D	FCV-63-118 TO COMPT. 3F2	~~19.5 HP~~		~~23.1~~	208	2	T5[illegible]	N	EF3-B06[illegible]	60			N	change heater to T48, Breaker to LO50 pos HI
9A	LCV-62-135	1.9 HP		3.5	26	1	T31	N	EF3-A01[illegible]	10	45	3	N	change heater to T29, Breaker to pos. 4
9B	FCV-63-177	1.9 HP		3.5	26	1	T31	N	EF3-A01[illegible]	10	45	3	N	change heater to T29, Breaker to pos 4
9F	FCV-72-22	3.2 HP		5.2	36	1	T35	N	EF3-B02[illegible]	20			N	change heater to T32, Breaker to A010 pos HI
10A	FCV-63-1 TO COMPT. 2E1	~~10.5 HP~~		~~13.8~~	118.5	1	T45	N	EF3-B03[illegible]	30			N	change heater to T42, Breaker to LO50 pos 3
10B	FCV-63-3	0.66 HP	1.0	2.3	12	1	T27	N	EF3-A01[illegible]	10	27	LO	Y	change heater to T22
10D	SB	~~2.6 HP~~		~~4.2~~	38	1	T34	N	EF3-A02[illegible]	10	58	4	N	change heater to T35, Breaker to 10HI
10F	FCV-72-34	0.125 HP		0.45	2.6	1	T11	N	EF3-AC0[illegible]	3	7	LO	Y	change heater to T6
11A	FCV-63-7	1.9 HP		3.5	26	1	T31	N	EF3-A01[illegible]	10	45	3	N	change heater to T29, Breaker to pos 4
11B	FCV-63-8	1.9 HP		3.5	26	1	T31	N	EF3-B02[illegible]	20			N	change heater to T29, Breaker to A010 pos 4
11D	FCV-63-26	1.9 HP		3.5	26	1	T31	N	EF3-A01[illegible]	10	45	3	N	change heater to T29, Breaker to pos. 4
11E	FCV-63-39	1.9 HP		3.5	26	1	T31	N	EF3-B0[illegible]	20			N	change heater to T29, Breaker to A010 pos 4
12A	FCV-63-47	1.9 HP		3.5	26	1	T31	N	EF3-A01[illegible]	10	45	3	N	change heater to T29, Breaker to pos 4
12B	FCV-63-72	12.0 HP	1.0	18.1	144.43	2	T47	N	EF3-B040	40			N	change heater to T45, Breaker to LO50 pos 4
12D	FCV-63-93	10.5 HP	1.0	13.8	118.48	1	T45	N	EF3-B03[illegible]	30			N	change heater to T42, Breaker to LO50 pos [illegible]
12E	FCV-63-152	1.9 HP		3.5	26	1	T31	N	EF3-A01[illegible]	10	45	3	N	change heater to T29, Breaker to pos. 4
13A	FCV-63-156	1.9 HP		3.5	26	1	T31	N	EF3-A01[illegible]	10	45	3	N	change heater to T29, Breaker to pos. 4
13B	FCV-72-44	3.2		5.2	36	1	T35	N	EF3-B02[illegible]	20			N	change heater to T32, Breaker EF3-A010 pos HI
13E	FCV-72-39	3.2		5.2	36	1	T35	N	EF3-B02[illegible]	20			N	change heater to T32, Breaker to EF3-A010 pos HI
14A	FCV-72-40	1.9 HP		3.5	26	1	T31	N	EF3-B02[illegible]	20			N	change heater to T29, Breaker to A010 pos 4
14B	FCV-70-3	10.5 HP	1.0	13.8	118.48	1	T45	N	EF3-B040	40			N	change heater to T42, Breaker to LO50 pos 3

Prepared Z.H. Burchett 1-20-90 / B.S. Bhatia 1-22-90 Date / D Bates 1/23/90

Verified B.S. Bhatia 1-26-90 / T.M. McCauley 1/25/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN EEB-MS-TI08-0008 R0

Attachment No. 7
Calc. No.
Sheet of

PREPARED TRT 4-4-90
VERIFIED RLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-A1-A														
14D	FCV-74-12	0.13 HP		0.45	2.6	1	111	0.58	N	EF3-A003	3	7	LB	Y	Change heater to 78
14E	FCV-74-33	1.9 HP		3.5	26	1	131	4.35	N	EF3-A010	10	45	3	N	Change heater to T20, Breaker to pos 4
16A	HTR-31-265	3 HP	1.15	4.3	26.7	1	132	4.9	N	EF3-A010	10	45	3	N	Change heater to T33, Breaker to pos. 4
16G	HTR-77-129	1.5 HP	1.0	2.4	16.93	1	127	2.8	Y	EF3-A010	10	27	LB	N	Change breaker to pos 2
16D	0-FCV-26-141	0.26 HP		0.55	5.7	1	111	0.58	N	EF3-A003	3	7	LB	N	Change breaker to pos. 3 USE EXISTING TII HTR
16E	0-FCV-26-7	0.26 HP		0.55	5.7	1	111	0.58	N	EF3-A003	3	7	LB	N	Change breaker to pos. 3 USE EXISTING TII HTR
16F1	0-ISW-252-1	7.5KW		17						EF3-B020	20			N	Change breaker to B030
16F2	HTR-31-303/2	3 HP		4.6	32				N	EF3-B020	20			N	
17A	HTR-62-228/2	22.5KW		27.07		2				EF3-B030	20			N	Change breaker to B040
17B	FCV-26-240	0.67 HP	1.0	2.1	10.5	1	126	2.54	N	EF3-A010	10	27	LB	N	Change heater to T21, Breaker to A005 pos. 3
17C	FCV-26-242	0.67 HP	1.0	2.1	10.5	1	126		N	EF3-A010	10	27	LB	N	Change heater to T21, Breaker to A005 pos. 3
17E	POWER OUTLETS PO-213-A1/1 THRU 5									EF3-B100	100	475	LB		Not evaluated
17F1	0-ISW-240	25 KW		15						EF3-B020	20			Y	
17F2	FCV-63-80	19.5 KW		25.2	200				N	EF3-LA512	50				See compt 7D Breaker data not available
18A	0-HTR-78-19	20 HP	1.15	26	143	2	151	34	Y	EF3-L050	50	260	3	N	Change breaker to pos. 4
18C	HTR-31-303/1	3 HP	1.15	4.2	30.00	1	132	4.9	N	EF3-A010	10	45	3	N	Change heater to T33, Breaker to pos. 4
18D	0-HTR-62-226	1 HP	1.0	2.05	12.54	1	126	2.5	Y	EF3-A005	5	22	3	N	Change Breaker to pos. 4
18E	FCV-26-243	0.67 HP	1.0	2.1	10.5	1	126	2.5	N	EF3-A010	10	27	LB	N	Change heater to T21, Breaker to A005 pos. 3
18F1	0-ISW-250-1	7.5KW		15						EF3-B020	20			Y	
18F2	POWER OUTLETS PO-213-A1/6 THRU 10									EF3-A100	100	475	LB		Not evaluated

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01/19/90

Prepared R. Supka / [illegible] Date 1-5-90 / 1-20-90

Verified R.H. Buchert / T.M.K. [illegible] Date 1/17/90 / 1/22/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY
(TVACABLE.BWI)

WBN EEB-MS-T108-0008 R0

Attachment No. 1
Calc. No
Sheet of

PREPARED TGT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** MODE 236															
* CLASSIFICATION # 1-MCC-213-A2-A															
1A1	MOR. FDR. FR. 480V SHTDN. BD. 1A2-A									1R35-[illegible]032	800				
1A2	ALT. FDR. FR. 480V SHTDN. BD. 1A1-A									1R35-B1032	800				
2A	ERCW MOR. A ISOL. VLV. 1-FCV-3-116A-A	0.125 HP		0.45	2.6	1	T10	0.53	N	EF3-A0[illegible]3	3	7	LO	Y	REPLACE HTR. WITH T6
2B	ERCW MOR. A ISOL. VLV. 1-FCV-3-116B-A	0.125 HP		0.45	2.6	1	T10	0.53	N	EF3-A[illegible]3	3	7	LO	Y	REPLACE HTR. WITH T6
2D	AUX. FW. PUMP TURB. STEAM SPLY. FROM SG. 1 1-FCV-15-A	1.0 HP		2.8	16.0	1	T29	3.44	N	EF3-A010	10	27	LO	N	REPLACE HTR. WITH T24 INCREASE BKR SETTING TO POSITION 2 (36A)
2E	STEAM FLOW TO AUX. FEED WTR. PUMP ISOL. VLV. 1-FCV-1-17-A	1.0 HP		2.8	16.0	1	T29	3.44	N	EF3-A010	10	27	LO	N	REPLACE HTR. WITH T24 INCREASE BKR. SETTING TO POSITION 2 (36A)
3A	ERCW MOR. A ISOL. VLV. 1-FCV-3-136A-A	0.33 HP		0.75	5.7	1	T15	0.89	N	EF3-A013	3	7	LO	N	REPLACE H:Z WITH T9 INCREASE BKR. SETTING TO POSITION 3 (12A)
3B	ERCW MOR. A ISOL. VLV. 1-FCV-3-136B-A	0.33 HP		0.75	5.7	1	T15	0.89	N	EF3-A013	3	7	LO	N	REPLACE HTR WITH T13 INCREASE BKR SETTING TO POSITION 3 (12A)
3D	STEAM GEN. #1 FEEDWTR. ISOL. VLV. 1-FCV-3-33-A	39.4 HP	1.0	48.1	494.02	3	T53	51.0	N	EF3-A130	100	1125	HI	Y	USE EXISTING T53 HTR
4A △	LOOP 1 DEAREATION LINE VLV. 1-FCV-3-191	1.6 HP		4.[illegible]	25	1	T32	4.88	[illegible]	EF3-A1[illegible]0	10	45	3	N	REPLACE HTR. WITH T88 INCREASE BKR SETTING TO POSITION 4 (58A)
4B △	LOOP 2 DEAREATION LINE VLV. 1-FCV-3-192	1.6 HP		4.0	25	1	T32	4.88	N	EF3-A1[illegible]0	10	45	3	N	REPLACE HTR WITH T88, INCREASE BKR SETTING TO POSITION 4 (58A)
4C	CONT. ENTR. ANNUCIATOR	0.1KVA								EF3-[illegible]10	20			Y	
4D	STM. GEN. #3 FEEDWATER ISOL. VLV. 1-FCV-3-87-A	39.4 HP	1.0	48.1	494.02	3	T53	51.0	N	EF3-B130	100			N	REPLACE BKR. WITH EF3-A100, SET ON POSITION 4 (90A) USE EXISTING T53 HTR
5A	SAMPLE HEAT EXCH. ISOL. VLV. 1-FCV-70-215-A	0.24 HP		1.0	5.7	1	T32	4.88	N	EF3-A005	5	14	LO	N	REPLACE HTR. WITH T19. REPLACE BKR. WITH EF3-A003, SET ON POSITION 3 (12A)
5B	SUPPLY MOR. 1A TO MOR. 2B ISOL. VLV. 1-FCV-67-147-A	0.33 HP	1.0	0.83	5.0					~~EF100-[illegible]~~	20			N	~~DOS~~ COMPARTMENT 118 BKR TYPE NOT AVAILABLE

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[illegible] LUNDY

Page No. 65
01/19/90

R. Slupkow/DBato 1-5-90 1-20-90

Prepared _____ Date _____

Verified R.H. Burkett Date _____
1-17-90 / T.M. Rees Cauley 1/28/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN EEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No. _____
Sheet _____ of _____

PREPARED TJT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-A2-A														
5C	OVERLOAD BYPASS CONTROL 1A2	0.5KW								EF3-B020	20			Y	
5D	FUTURE														
5E	CONT. SPRAY HEAT EXCH. 1A SUPPLY CONT. VLV. 1-FCV-67-125-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16, INCREASE BKR. SETTING TO POSITION 3 (12A)
5F	CONT. SPRAY HEAT EXCH. 1A DISCH. VLV. 1-FCV-67-126-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 INCREASE BKR. SETTING TO POSITION 3 (12A)
6A	AUX. FW. PUMP. TURB. STEAM SUPPLY FROM STM. GEN. 1-FCV-1-16-A	1.0 HP		2.8	16.0	1	T29	3.44	N	EF3-A010	10	27	LO	N	REPLACE HTR. WITH T24 INCREASE BKR. SETTING TO POSITION 2 (5GA)
6B	SPARE														
6D	RHR. SYS. ISOL. VLV. 1-FCV-74-8-A	1.6 HP		4.0	25.0	1	T32	4.88	N	EF3-A010	10	45	3	N	REPLACE HTR. WITH T31. INCREASE BKR. SETTING TO POSITION 4 (5BA)
6F	SUPPLY HDR. 1B TO HDR. 2A ISOL. VLV. 1-FCV-67-223-A	0.66 HP		2.3	12.0					ET-98010	20				SEE COMPARTMENT 13A
7A	SPARE														
7B	ERCW HDR. A ISOL. VLV. BEFORE STRAINER 1-FCV-67-22-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	SETTING TO POSITION 3 (12A) INCREASE BKR USE EXISTING T17 HTR
7D	LOWER CONT. 1A COOLERS - DISCH. ISOL. VLV. INSIDE CONT. 1-FCV-67-87-A	0.125 HP		0.45	2.6	1	T10	0.53	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T9
7F	UPPER CONT. VENT COOLER 1A SUPPLY ISOL. VLV. 1-FCV-67-130	0.125 HP		0.45	3.15	1	T10	0.53	N	EF3-A003	3	7	LO	Y	REPLACE HTR. WITH T7
8A	AUX. BLDG. ERCW SUPPLY HDR. 1A ISOL. VLV. 1-FCV-67-81-A	0.67 HP	1.0	1.9	7.56	1	T25	2.30	N	EF3-A003	5	22	3	N	REPLACE HTR WITH T24 REDUCE BKR. SETTING TO POSITION LO (14A)
8B	LOWER CONT. 1A COOLERS SUPPLY ISOL. VLV. 1-FCV-67-83-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR. WITH T15. INCREASE BKR SETTING TO POSITION 3
8D	LOWER CONT. 1C COOLERS DISCH. ISOL. VLV. INSIDE CONT. 1-FCV-67-95-A	0.125 HP	1.0	0.45	2.19	1	T10	0.53	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7

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Page No. 66
01/19/90

Prepared R. Sulphur/[illegible] Date 1-5-90 / 1-20-90

Verified R.H. Bucholt / [illegible] Date 1-17-90 / 1/29/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN EEB-MS-TI08-0005 R0

Attachment No. 1
Calc. No. ____
Sheet ____ of ____

PREPARED TRT 4-4-90
REVIEWED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-A2-A														
8F	UPPER CONTAINMENT VENT COOLER 1C SUPPLY ISOL. VLV. 1-FCV-67-133-A	0.125 HP	1.0	0.45	3.15	1	T10	0.53	N	EF3-A00[illegible]	3	7	LO	Y	REPLACE HTR. WITH T7
9A	LOWER CONT. 1C COOLERS SUPPLY ISOL. VLV. 1-FCV-67-91-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A00[illegible]	3	10	2	N	REPLACE HTR. WITH T15 INCREASE BKR. SETTING TO POSITION 3 (12A)
9B	LOWER CONT. 1B COOLERS DISCH. ISOL. VLV. OUTSIDE CONT. 1-FCV-67-104-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A00[illegible]	3	10	2	N	REPLACE HTR. WITH T15 INCREASE BKR SETTING TO POSITION 3 (12A)
9D	UPPER CONT. VENT COOLER 1A DISCHARGE ISOL. VLV. 1-FCV-67-295-A	0.125 HP	1.0	0.45	3.14	1	T11	0.58	N	EF3-A00[illegible]	3	7	LO	Y	REPLACE HTR. WITH T7
9F	UPPER CONT. VENT COOLER 1B DISCHARGE ISOL. VLV. 1-FCV-67-139-A	0.125 HP	1.0	0.45	3.15	1	T10	0.53	N	EF3-A00[illegible]	3	7	LO	Y	REPLACE HTR. WITH T7
10A	LOWER CONT. 1D COOLER DISCH. ISOL. VLV. OUTSIDE CONT. 1-FCV-67-112-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A00[illegible]	3	10	2	N	INPLACE HTR WITH T15, INCREASE BKR SETTING TO POSITION 3 (12A)
10B	AUX. BLDG. AIR CLRS. SPLY. HDR. 1A ISOL. VLV. 1-FCV-67-127-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A00[illegible]	3	10	2	N	REPLACE HTR. WITH T14. INCREASE BKR. SETTING TO POSITION 3 (12A)
10D	UPPER CONT. VENT COOLER 1C DISCH. ISOL. VLV. 1-FCV-67-296-A	0.125 HP	1.0	0.45	3.14	1	T11	0.58	N	EF3-A00[illegible]	3	7	LO	Y	REPLACE HTR WITH T7
10F	UPPER CONT. VENT COOLER 1B DISCH. ISOL. VLV. 1-FCV-67-142-A	0.125 HP	1.0	0.45	3.15	1	T11	0.58	N	EF3-A00[illegible]	3	7	LO	Y	REPLACE HTR. WITH T7
11A	COMPT. EICH. A DISCH. CONT. VLV. 1-FCV-67-146-A	0.33 HP		0.83	5.7	1	T16	0.79	N	EF3-A[illegible]	3	10	2	N	INCREASE BKR SETTING TO POSITION 3 (12A) USE EXISTING T16 HTR
11B	TO COMPT. 5B	0.67 HP				1	T25	2.3	N	EF3-A00[illegible]	5	22	3	N	REPLACE HTR. WITH T16 REPLACE BKR. WITH EF3-A003. SET ON POSITION 2 (0A)
11D	R. C. PUMP THRM. BARR. RETURN CONT. ISOL. VLV. 1-FCV-70-90-A	0.70 HP	1.0	2.3	12.0				N	EF3-P32[illegible]	20			Y	SEE COMPT 16A
11E	RCP. THERMAL BARRIER CONT. ISOL. VLV. 1-FCV-70-133-A	0.13 HP		0.45	2.6					ET-900[illegible]	20			Y	SEE COMPARTMENT 16B

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Prepared R. Sirpher/JBato Date 1-5-90/1-20-90

Verified R.H. Burchett Date 1-17-90 / T.M. McCauley 1/23/90

TVA WATTS BAR NUCLEAR PROJECT
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1-MCC-213-A2-A

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
11F	MAIN CONT. RM. PRESS. DRAIN VLV. 0-FCV-40-90-A	0.13 HP		0.60	2.6	1	T10	0.53		EF3-A003	3	7	LO		PER MMM WBN B9000, R0 DATED 11/20/89 INDICATES VALVE DELETED
12A	COMPT. COOLING HEAT EXCH. C DISCH. VLV. TO HDR. A 0-FCV-67-151-A	0.67 HP	1.0	1.9	7.56	1	T25	2.30	N	EF3-A005	5	22	3	N	REPLACE HTR WITH T24 REDUCE BKR. SETTING TO POSITION LO (4A)
12B	STATION SERV. & CONT. AIR GPRSR. SUPPLY HDR. A ISOL. VLV. 0-FCV-67-205-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR. WITH T15 INCREASE BKR. SETTING TO POSITION 3 (12A)
12D	RC PUMP OIL COOLER RETURN CONT. ISOL. VLV. 1-FCV-70-92-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15. INCREASE BKR SETTING TO POSITION 3 (12A)
12E	AUX. WASTE EVAP. PACKAGE OUTLET VLV. 0-FCV-70-111-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR. WITH T14 INCREASE BKR. SETTING TO POSITION 3 (12A)
12F	RCP OIL COOLER HDR. CONT. ISOL. VLV. 1-FCV-70-139-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T14. INCREASE BKR. SETTING TO POSITION 3 (12A)
13A	TO COMPT. 6F	0.67 HP				1	T25	2.30	N	EF3-A005	5	22	3	N	REPLACE HTR WITH T26 INCREASE BKR SETTING TO POSITION 4(29A)
13B	SPARE														
13D	BORIC ACID AND GAS STRIP EVAP. PKG. 1A FCV 1-FCV-70-168-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15 INCREASE BKR. SETTING TO POSITION 3 (12A)
13E	ANNULUS SPRINKLER ISOL. VLV. 1-FCV-26-245-A1-FCV-70-168-A	0.67 HP	1.0	2.1	5.0	1	T26	2.54	N	EF3-A01v	10	27	LO	N	REPLACE HTR WITH T19. REPLACE BKR WITH EF3-A000; SET ON POSITION 2(10A)
13F	LOCAL CONT. STATION														
14A	RHR HEAT EXCH. A HDR. INLET VLV. 1-FCV-70-2-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR. WITH T14. INCREASE BKR. SETTING TO POSITION 3 (12A)
14B	MISC. EQPT. HDR. INLET VLV. 1-FCV-70-4-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR. WITH T14. INCREASE BKR. SETTING TO POSITION 3(12A)
14D	CCS HEAT EXCH. A OUTLET VLV. 1-FCV-70-8-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR. WITH T14. INCREASE BKR SETTING TO POSITION 3 (12A)
14E	CCS HEAT EXCH. A & C OUTLET ISOL. VLV. 1-FCV-70-10-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T14. INCREASE BKR. SETTING TO POSITION 3 (12A)
15A	SPARE														

Prepared R. Suphar / B Bates Date 1-5-90 / 1-20-90

Verified R.H. Buchat / T.M. McCauley Date 1-17-90 / 1/29/90

TVA WATTS BAR NUCLEAR PROJECT
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WBN BEB-MS-TI08-0008 R0

Attachment No 1
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Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-A2-A														
15D	CCS HEAT EXCH. A & C INLET ISOL. VLV. 1-FCV-70-23-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A041	3	10	2	N	REPLACE HTR WITH T16 INCREASE BKR SETTING TO POSITION 3 (12A)
15D	CCS HEAT EXCH. A INLET VLV. 1-FCV-70-25-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A041	3	10	2	N	REPLACE HTR WITH T16. INCREASE BKR SETTING TO POSITION 3 (12A)
15E	ERCW TO COMPT. COOLING HEAT EXCH. 1-FCV-67-458-A	0.67 HP		1.9	7.56	1	T25	2.30	N	EF3-A007	5	22	3.5	N	REPLACE HTR WITH T14. REDUCE BKR SETTING TO POSITION LO (14A)
16A	TO COMPT. 11D	0.7 HP		2.3		1	T27	2.76	N	EF3-A045	5	29	4	Y	REPLACE HTR. WITH T14
16D	TO COMPT. 11E	0.125 HP 0.13		0.45	2.6	1	T10	0.53		EF3-A011	3	7	LO	Y	REPLACE HTR. WITH T6
16D	EXCESS LETDOWN HEAT EXCH. CONTROL INLET ISOL. 1-FCV-70-143-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A041	3	10	2	N	REPLACE HTR. WITH T16. INCREASE BKR. SETTING TO POSITION 3 (12A)
16E	RHR. HEAT EXCH. A-A OUTLET VLV. 1-FCV-70-156-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A041	3	10	2	N	REPLACE HTR. WITH T16 INCREASE BKR SETTING TO POSITION 3 (12A)
17A	SMPLE HEAT EXCH. HDR. OUTLET VLV. 1-FCV-70-183-A	0.125 HP		0.45	2.6	1	T10	0.53	N	EF3-A011	3	7	LO	Y	REPLACE HTR. WITH T6
17D	SFPCS HEAT EXCH. SUPPLY HDR. ISOL. VLV. 0-FCV-70-197-A	0.33 HP		0.95	5.7	1	T17	1.10	N	EF3-A041	3	10	2	N	REPLACE HTR. WITH T16. INCREASE BKR. SETTING TO POSITION 3 (12A)
17D	SPARE														
17E	480V BD. PH. 1A A/C CPRSR 1A-A 1-HTR-31-463-A	50 HP	1.15	57	350.8					FJ3-B175	125	1600	MI	N	REDUCE BKR. SETTING TO POSITION LO (750A)

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Prepared Z.A. Buckert 1-6-90 Date 1-6-90 / 1-20-90
Verified 1-19-90 Date 3/5/90

TVA WATTS BAR NUCLEAR PROJECT
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PREPARED 4-4-90
VERIFIED 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	MIN. TRIP POINT	MTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET PER	ACCEPT?	REMARKS
** NODE 237															
* CLASSIFICATION # 1-MCC-213-B1-B															
2E1	SPARE														
2E2	SPARE														
2F1	TORNADO DAMPER CONT. XFMR.	1.5KVA		1.81						EF3-B020	20			Y	
3B	FUTURE														
3C	SPARE														
3F1	MOV 249 CAP. BYS. BTTY. CHGR. NO.2	7.5KW		17.0						EF3-B020	20			Y	
4B	SPARE														
4C	CONTROL XFMR. (1 PHASE) 100VA									EF3-B020	20			Y	
4E	SPARE														
5A	SPARE														
6A	SPARE														
6B	SPARE														
7F	SPARE														
9B	SPARE														
13E	SPARE														
14B	SPARE														
15E	SPARE														
16B	SPARE														
16C	OL BYPASS CONTROL (1 PHASE) 350VA									EF3-B020	20		Y		
16E	POWER OUTLETS									EF3-B1000050\	100		Y		
16F1	ALT. FDR. 48V SPARE BTTY. CHGR	7.5KW		15A						EF3-B020	20		Y		

SARGENT & LUNDY

Prepared R.H. Bunkat 1-6-90 / [illegible] 1-8-90 / [illegible] 1-20-90 Date

Verified [illegible] 1-19-90 Date 2/5/90

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Attachment No. 3
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PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

1-MCC-213-B1-B

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	MIN. TRIP POINT	MTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
17C	FUTURE														
17E	POWER OUTLETS									EF3-B10000001	100			Y	
17F1	ALT. FOR 48V PLT. UTIY. CHGR.	7.2KW		15						EF3-B020	20			Y	
18B	SPARE														
1A1	NOR. FDR. FR. 480V SWTGR. BD. 1B1-B									ETS-KX3S00002	800				
1A2	ALT. FDR. FR. 480V SWTGR. BD. 1B2-B									ETS-KX3S00002	800				
2A	BORIC ACID TK A HTR. B-B	9KW		10.83		1				EF3-B020	20			Y	
~~2B~~	~~BORIC ACID XFER. PUMP 1B-B~~	~~15 HP~~	~~1.0~~	~~18~~	~~105.24~~	~~2~~	~~T-46~~	~~20.13~~	~~N~~	~~EF3-L050~~	~~50 LB~~	~~210~~	~~2~~	~~Y~~	
2B	BORIC ACID XFER. PUMP 1B-B (HIGH SPEED)	15 HP	1.0	18	105.24	2	T-46	20.13	N	EF3-L050	50 LB	210	2	Y	REPLACE HIGH SPEED HTR WITH T47
2B	BORIC ACID XFER. PUMP 1B-B (LOW SPEED)	~~10 HP~~	1.0	~~40.13~~	~~406.24~~	2	T-46	41 / 41.375	N	EF3-L050	50 LB	210	2	Y	REPLACE LOW SPEED HTR WITH T42
2C	COMPT. CLR. BOOSTER PUMP 1B-B	10 HP	1.15	13	70.16	2	T-44	17.63	Y	EF3-L050	50 LB	160	LB	Y	
2F2	SIS PUMP COLD LEG INJECT. 1-FCV-63-22-B	1.9 HP		3.5	26					EF3-A010	10	30	4	Y	SEE COMPT 11D
3A	BORIC ACID TK C HTR. B-B	9KW		10.83		1				EF3-B020	20			Y	
3C	CHR. DERIN. MST. EVAP. BLDG. SUPP. VLV. 1-FCV-70-207-B	125 HP	1.0	.43	3.14	1	T10	.53	N	EF3-A003	3	7	LB	Y	REPLACE HTR WITH T7
3F2	SIS ACCUM. TK. FLOW ISOL VLV. 1-FCV-63-98B	19.5 HP		25.2	200					EF3-H050	50 HI	400	2	Y	SEE COMPT 8D
4A	SIS BORON INJECT. TK HTR. 1B-B (STRIP HTR.)	6KW		7.22		1				EF3-B020	20			Y	
4B	CENTRIF. CHGR. PUMP 1B-B AUX. OIL PUMP	2 HP	1.15	3.1	22.57	1	T30	3.83	N	EF3-A010	10A	30	2	N	REPLACE HTR WITH T31 CHANGE BRKR SET POS TO 3
4F	MP FP AUX. BLDG. TR. 'B' MOR. VLV. 0-FCV-26-127B	.33 HP		.75	5.7	1	T14	80.	N	EF3-A003	3	7	LB	N	REPLACE HTR WITH T13 CHANGE BRKR SET POS TO 3
5B	RHR. ISOL. VLV. 1-FCV-74-2B	2.6 HP	1.0	4.73	30					EF3-B020	20				SEE COMPT. 10D
5C	RHR. ISOL. BYP. VLV. 1-FCV-74-9-B	1.6 HP		4	25	1	T32	4.80	N	EF3-B020	20			N	1. REPLACE HTR WITH T31 2. REPLACE BRKR WITH EF3-B040 SET POS 4

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01/19/90

Prepared R.H. Burchat 1-6-90 / B.Blakefield 1-8-90 / D Bate 1-20-90 Date

Verified B.P. Blakefield 1-19-90 Date 2/5/90

TVA WATTS BAR NUCLEAR PROJECT
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Attachment No. 1
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PREPARED TBT 4-4-90
VERIFIED 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	% NTR. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-B1-B														
5E	RCS. PRESS RELIEF FLOW CONT. VLV. 1-FCV-68-332B	1.7 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE NTR WITH T29 CHANGE BKR SET POS TO 4
6D	SEAL FLOW RETN ISOL. VLV. 1-FCV-62-61-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE NTR WITH T29 CHANGE BKR SET POS TO 4
8B	RHST. TO CHGR. PUMP VLV. CONT. 1-LCV-62-136-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE NTR WITH T29 CHANGE BKR SET POS TO 4
17A	BORIC ACID BATCHING TK NTR. 1 (STRIP NTR.)	22.5KW		27.7		2				EF3-B040	40			N	REPLACE BKR WITH EF3-B035
17D	ANNULUS. STAND-PIPE ISOL. VLV. 1-FCV-26-241B	.67 HP		2.1	5	1	T26	2.54	N	EF3-A010	10	27	LO	N	REPLACE NTR WITH T19 REPLACE BKR WITH EF3-B003 SET POS 2
7A	CHARGING FLOW ISOL. VLV. 1-FCV-62-91-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE NTR WITH T29 CHANGE BKR SET POS TO 4
7B	CHARGING PUMP 1A-A MINI FLOW 1-FCV-62-99-B	66 HP		2.3	12	1	T27	2.86	N	EF3-A010	10	27	LO	Y	REPLACE NTR WITH T20
7B	TO COMPT. 16F2					2	T50	30.30	N	EF3-B060	60			N	REPLACE NTR WITH T48 REPLACE BKR WITH EF3-B060 SET POS 2
16F2	SIS ACCUM TK FLOW ISOL. VLV. 1-FCV-63-67-B	19.5 HP		25.2	200					EF3-B050Z	50			Y	SEE COMPT 7D
8A	VOL. CONT. TK OUTLET ISOL. VLV. 1-LCV-62-133-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE NTR WITH T29 CHANGE BKR SET POS TO 4
8D	TO COMPT. 3F2					2	T50	30.30	N	EF3-B060	60			Y	REPLACE NTR WITH T48
8F	RH CONT. RM. PRESS DRAIN VLV. 0-FCV-40-91-B	.13 HP		0.6	2.6	1	T10	0.53		EF3-A002	3	7	LO		VALVE DELETED
9A	EMER. BORATION FCV 1-FCV-62-138-B	1.3 HP		2.4	16	1	T27	2.76	N	EF3-A005	5	29	4	N	REPLACE NTR WITH T24 REPLACE BKR WITH EF3-A010 SET POS 3
9B	RHR. TO RCS HOT LEG 1 & 3 FLOW ISOL. VLV. 1-FCV-63-172-B	2.6 HP	1.0	4.73	36	1	T34	5.79	N	EF3-B020	20			N	REPLACE NTR WITH T33 REPLACE BKR WITH EF3-B020 SET POS N
9F	CONT. SPRAY PUMP 1B-B RECIRC FCV 1-FCV-72-13-B	0.125 HP		0.45	2.6	1	T11	0.58	N	EF3-A003	3	7	LO	Y	REPLACE NTR WITH T6
10A	SIS PUMP 1A-A DISCH TO RHST SHUTOFF VLV. 1-FCV-63-4-B	0.66 HP		2.0	16	1	T27	2.76	N	EF3-A010	10	27	LO	N	REPLACE NTR WITH T24 CHANGE BKR SET POS TO 2
10B	REFR NTR. STORAGE TK. TO SIS PUMP FCV 1-FCV-63-5-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE NTR WITH T29 CHANGE BKR SET POS TO 4
10D	TO COMPT. 5D					1	T34	5.79	N	EF3-A010	10	58	4	N	REPLACE NTR WITH T33 CHANGE BKR SET POS TO N
10F	RHST TO SPRAY HDR 1B FCV 1-FCV-72-21-B	3.2 HP		5.2	36	1	T34	5.79	N	EF3-B020	20			N	REPLACE NTR WITH T33 REPLACE BKR WITH EF3-B020 SET POS N

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SARGENT - LUNDY

Prepared R.H. Burkhart 1-6-90 / B.S. Bhatia 1-8-90 / D Bates 1/20/90 Date

Verified B.S. Bhatia 1-19-90 / M Manley Date 2/5/90

TVA WATTS BAR NUCLEAR PROJECT
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WBNEEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No. _____
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-B1-B														
11A	SIS PUMP INLET TO CVCS CHARGING PP. 1-FCV-63-6-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T29 CHANGE BKR SET POS TO 4
11B	RHR H X B TO SIS PUMP 1-FCV-63-8-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-B020	20			N	REPLACE HTR WITH T29 REPLACE BKR WITH EF3-B020 SET POS 4
11D	TO COMPT. 2F2 (SIS PUMP COLD LEG INLET) 1-FCV-63-22B					1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T29 CHANGE BKR SET POS TO 4
11E	SIS BORON INJECT. TK SHUTOFF VLV. 1-FCV-63-25-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T29 CHANGE BKR SET POS TO 4
12A	SIS BORON INJECT. TK INLET SHUTOFF VLV. 1-FCV-63-40-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-B020	20			N	REPLACE HTR WITH T29 REPLACE BKR WITH EF3-B020 SET POS 4
12B	SIS PUMP 1B-B INLET VLV. 1-FCV-63-69-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T29 CHANGE BKR SET POS TO 4
12D	CONT. SUMP TO RHR PUMP B-B 1-FCV-63-73-B	12.8 HP	1.0	18.1	144.93	2	T47	22.25	N	EF3-B040	40			N	REPLACE HTR WITH T45 REPLACE BKR WITH EF3-B040 SET POS 4
12E	SIS TO RCS LOOP 1 & 4 FCV 1-FCV-63-74-B	10.5 HP	1.0	13.8	118.48	1	T45	17.13	N	EF3-B030	30			N	REPLACE HTR WITH T42 REPLACE HTR WITH EF3-B030 SET POS 4
13A	SIS PUMP 1B-3 OUTLET FCV 1-FCV-63-183-B	1.9 HP		3.5	26.0	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T29 CHANGE BKR SET POS TO 4
13B	SIS PUMP OUTLET RCS LOOP 2 & 4 HOT LEG 1-FCV-63-157-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T29 CHANGE BKR SET POS TO 4
13D	SIS PUMP 1B-B BISCH TO RWST SHUTOFF VLV. 1-FCV-63-178-B	.7 HP		2.3	16	1	T27	2.76	N	EF3-A010	10	27	LB	N	REPLACE HTR WITH T24 CHANGE BKR SET POS TO 2
14A	CONT. SPRAY HDR. 1B ISOL. VLV. 1-FCV-72-2-B	3.2 HP		5.2	36	1	T35	6.30	N	EF3-A010	10	58	4		REPLACE HTR WITH T32 CHANGE BKR SET POS TO HI
14D	RHR. SPRAY HDR. 1B ISOL. VLV. 1-FCV-72-41-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-B020	20			N	REPLACE HTR WITH T29 REPLACE BKR WITH EF3-B020 SET POS 4
14E	CONT. SUMP TO SPRAY HDR 1B FCV 1-FCV-72-45-B	3.2 HP		5.2	36	1	T35	6.30	N	EF3-B020	20			N	REPLACE HTR WITH T32 REPLACE BKR WITH EF3-B020 SET POS HI
15A	RHR PUMP 1B-B INLET FCV 1-FCV-74-21-B	10.5 HP	1.0	13.8	118.48	1	T45	17.13	N	EF3-B040	40			N	REPLACE HTR WITH T42 REPLACE BKR WITH EF3-B040 SET POS 4
15B	RHR PUMP 1B-B MINI. FLOW VLV. 1-FCV-74-24-B	13 HP	1.0	0.45	3.15	1	T11	0.58	N	EF3-A002	30	7	LB	Y	REPLACE HTR WITH T7
15D	RHR HEAT EXCH 1B BYP. VLV. 1-FCV-74-35-B	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T29 CHANGE BKR SET POS TO 4
16A	INCORE INSTR. RM COOLER FAN 1B	3 HP	1.15	4.3	26.7	1	T32	4.88	N	EF3-A010	10	45	3	N	REPLACE HTR WITH T33 CHANGE BKR SET POS TO 4
17B	AUX. FW PUMP B-B L.O. PUMP B-B	.25 HP	1.0	0.56	3.51	1	T12	0.64	N	EF3-A003	3	7	LB	Y	REPLACE HTR WITH T13
17F2	INCORE INSTR. RM CHILLED WTR. COMPRSR 1B	3 HP		4.6	95					EF3-B020	20			Y	

Prepared 1-6-90 Date 1-8-90 / Date 1-20-90

Verified 1-19-90 Date 2/5/90

TVA WATTS BAR NUCLEAR PROJECT
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WBNEEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No.
Sheet cf

1-MCC-213-B1-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	BKR. SET POS	ACCEPT?	REMARKS
18A	REFUEL WTR. PURIF. PUMP B-B	20 HP	1.15	26	145	2	T51	34.00	Y	EF3-L05	50 LO	330	4	Y	
18C	INCORE INSTR. RM CIRC PUMP 1B	3 HP	1.15	4.2	30.00	1	T3	4.880	N	EF3-A01	10	45	3	N	REPLACE HTR WITH T33 CHANGE BKR SET POS TO 4
18D	AUX. BORATION TANK AGITATOR O-MTR-84-2	1.0 HP	1.0	2.2	12.53	1	T26	4.66	Y	EF3-A01	5	12.5	3	N	CHANGE BKR SET POS TO 4
~~18D~~	~~AUX. BORATION TANK AGITATOR~~	~~1.0 HP~~	~~1.0~~	~~2.2~~	~~12.53~~	~~1~~	~~T26~~	~~4.66~~		~~EF3-A004~~	~~5~~	~~32~~	~~0~~		
18E	MPFP NDR STRAINER B-B BACKFLUSH VLV. O-FCV-26-193-B	0.26 HP		0.55	5.7	1	T12	0.64	N	EF3-A003	3	7	LO	N	REPLACE HTR WITH T11 CHANGE BKR SET POS TO 3
18F	MPFP NDR STRAINER B-B BACKFLUSH VLV. O-FCV-26-14-B	0.26 HP		0.55	5.7	1	T12	0.64	N	EF3-A002	3	7	LO	N	REPLACE HTR WITH T11 CHANGE BKR SET POS. TO 3
6F	SPARE					1	T27	2.76		EF3-A01	10	27	LO		
7F	SPARE					1	T27	2.76		EF3-A01	10	27	LO		
~~7F~~	~~SPARE~~					~~1~~	~~T27~~	~~2.76~~		~~EF3-A01~~	~~10~~	~~27~~	~~LO~~		

Prepared R.N. Bucholtz Date 1-16-90 / 1/19/90
Verified [illegible] / D.P. [illegible] Date 2-5-90
1-20-90

TVA WATTS BAR NUCLEAR PROJECT
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WBN EEB-MS-TI05-0008 R0
Attachment No. 1
Calc. No. ____
Sheet ____ of ____

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : NTR. TRIP CAT # : POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPTABLE	REMARKS
** NODE 238														
* CLASSIFICATION # 1-MCC-213-B2-B														
1A1	MDR. FDR. 480V SHTDN. BD. 1B2-B								ETS-KM3B4002	800				
1A2	ALT. FDR. FN. 480V SHTDN. BD. 1B1-B								ETS-KM3B4002	800				
2D	SPARE													
4C	ANNUNCIATION BREAKER (WBMB)	100VA							EF3-B021	20			Y	
5C	FUTURE													
6A	SPARE													
6B	SPARE													
6F	OL BYPASS CONTROL (1PHASE) XFMR	500VA							EF3-B021	20			Y	
7A	SPARE													
7B	SPARE													
11B	FUTURE													
11F	FUTURE													
13A	SPARE													
16B	SPARE													
17A	SPARE													
17D	SPARE													
17E	FUTURE													
18A	SPARE													
18B	SPARE													
18E	FUTURE													

Prepared R.H. Rockett / M Bates Date 1-16-90 / 1-19-90
Verified [illegible] / D.S. Goldman / Hrla 2-5-90
1-20-90

TVA WATTS BAR NUCLEAR PROJECT
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WCN BBB-NS-T20K-0008 RC
Calculation No. 1
Calc. No. ____
Sheet ____ of ____

PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-B2-B														
2A	ERCW HDR. B ISOL. VLV. (1-FCV-3-126A-B)	0.125 HP		0.45	2.6	1	T10	0.53	N	EF3-A003	3	7	LB	Y	REPLACE HTR WITH T6
2B	ERCW HDR. B ISOL. VLV. (1-FCV-3-126B-B)	0.125 HP		0.45	2.6	1	T10	0.53	N	EF3-A003	3	7	LB	Y	REPLACE HTR WITH T6
2E	STM. FLOW TO AFW PUMP TURB. ISOL. VLV. (1-FCV-1-18-B)	1 HP		2.8	16.0	1	T25	3.44	N	EF3-A010	10	27	LB	N	REPLACE HTR WITH T24. CHANGE BKR SETTING TO POSITION 2 (36A)
3A	ERCW HDR. B ISOL. VLV. (1-FCV-3-179A-B)	0.33 HP		0.75	5.7	1	T15	0.89	N	EF3-A003	3	7	LB	N	REPLACE HTR WITH T13 CHANGE BKR SETTING TO POSITION 3 (12A)
3B	ERCW HDR. B ISOL. VLV. (1-FCV-3-179B-B)	0.33 HP		0.75	5.7	1	T15	0.89	N	EF3-A003	3	7	LB	N	REPLACE HTR WITH T13 CHANGE BKR SETTING TO POSITION 3 (12A)
3D	STM. GEN. 2 FW ISOL. VLV. (1-FCV-3-047-B)	39.4 HP	1.0	48.1	494.02	3	T53	51	N	EF3-B100	100			N	REPLACE BKR WITH EF3-A100, USE EXISTING SET AT POSITION 4 (950A) T53 HTR
4A	LOOP 3 - DEARATION LINE VLV. (1-FCV-3-193)	1.6 HP		4.0	25.0	1	T32	4.88	N	EF3-A010	10	45	3		REPLACE HTR WITH T28
4B	LOOP 4 - DEARATION LINE VLV. (1-FCV-3-194)	1.6 HP		4.0	25.0	1	T32	4.88	N	EF3-A010	10	45	3		REPLACE HTR WITH T28
4D	STM. GEN. 4 FW ISOL. VLV. (1-FCV-3-190-B)	39.4 HP	1.0	48.1	494.02	3	T53	51	N	EF3-B100	100			N	REPLACE BKR WITH EF3-A100, USE EXISTING SET AT POSITION 4 (950A) T53 HTR
5A	MPFP COMMON HDR. TO YD FCV (0-FCV-26-17-B)	0.33 HP		0.75	5.7	1	T14	0.8	N	EF3-A003	3	7	LB	N	REPLACE HTR WITH T13 CHANGE BKR SETTING TO POSITION 3 (12A)
5B	CNDS. DMNRLZR WST. EVAP. RETN. VLV. (0-FCV-70-206-B)	0.125 HP	1.0	0.45	2.6	1	T11	0.58	N	EF3-A003	3	7	LB	Y	REPLACE HTR WITH T6
5E	CONT. SPRAY HEAT EXCH. 1B SPLY. CONT. VLV. (1-FCV-67-173-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION 3 (12A)
5F	CONT. SPRAY HEAT EXCH. 1B DISCH. VLV. (1-FCV-67-124-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION 3 (12A)
6D	RC PUMP THERM. BARRIER RETN. CONT. ISOL. VLV. (1-FCV-70-87-B)	0.7 HP	1.0	2.3	12.0				—	EF3-D020	20			Y	SEE COMPT. NO 12D
6E	RC PUMP THERM. BARRIER CONT. ISOL. VLV. (1-FCV-70-134-B)	0.125 HP		0.45	2.6				—	EF-98010	20			Y	SEE COMPT NO. 10B
7D	LOWER CONT. 1B CLRS. DISCH. ISOL. VLV. INSIDE CONT. (1-FCV-67-103-B)	0.125 HP	1.0	0.45	3.14	1	T10	0.53	N	EF3-A003	3	7	LB	Y	REPLACE HTR WITH T7
7F	UPPER CONT. VENT CLR. 1A DISCH. ISOL. VLV. (1-FCV-67-131-B)	0.125 HP	1.0	0.45	3.15	1	T10	0.5	N	EF3-A003	3	7	LB	Y	REPLACE HTR WITH T7
8A	ERCW HDR. 1B ISOL. VLV. BEFORE STRAINER (1-FCV-67-24-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION 3 (12A)

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Prepared R.H. Bartlett / D. Bates Date 1-16-90 / 1-19-90

Verified [illegible] / D. C. Gibson Date 1-20-90 / 3-5-90

TVA WATTS BAR NUCLEAR PROJECT
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(TVACABLE.DBF)

WBNEEB-MS-TI08-0008 R0
Attachment No. 1
Calc. No.
Sheet of

1-MCC-213-B2-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
8B	AUX. BLDG. ERCW SPLY. HDR. 1B ISOL. VLV. (1-FCV-67-82-B)	0.67 HP	1.0	1.9	7.56	1	T5	[illegible]	N	EF3-A005	5	22	3	N	REPLACE HTR WITH T24 CHANGE BKR SETTING TO POSITION LO (14A)
8D	LOWER CONT. 1D CLRS. DISCH. ISOL. VLV. INSIDE CONT. (1-FCV-67-111-B)	0.125 HP	1.0	0.45	2.6	1	T10	0.53	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7
8F	UPPER CONT. VENT CLR. 1C DISCH. ISOL. VLV. (1-FCV-67-134-B)	0.125 HP	1.0	0.45	3.15	1	T10	[illegible]	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7
9A	LOWER CONT. 1A CLRS. DISCH. ISOL. VLV. OUTSIDE CONT. (1-FCV-67-88-B)	0.33 HP		0.95	5.7	1	T17	[illegible]	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15 CHANGE BKR SETTING TO POSITION 3 (12A)
9D	LOWER CONT. 1C CLRS. DISCH. ISOL. VLV. OUTSIDE CONT. (1-FCV-67-96-B)	0.33 HP		0.95	5.7	1	T17	[illegible]	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15 CHANGE BKR SETTING TO POSITION 3 (12A)
9D	UPPER CONT. VT. CLR. 1D DISCH. ISOL. VLV. (1-FCV-67-297-B)	0.125 HP	1.0	0.45	2.6	1	T11	0.58	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7
9F	UPPER CONT. VT. CLR. 1B SPLY. ISOL. VLV. (1-FCV-67-138-B)	0.125 HP	1.0	0.45	3.14	1	T10	0.53	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7
10A	LOWER CONT. VT. CLR. 1B SPLY. ISOL. VLV. (1-FCV-67-99-B)	0.33 HP		0.95	5.7	1	T17	[illegible]	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15 CHANGE BKR SETTING TO POSITION 3 (12A)
10B	LOWER CONT. 1D CLRS. SPLY. ISOL. VLV. (1-FCV-67-107-B)	0.33 HP		0.95	5.7	1	T17	[illegible]	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15 CHANGE BKR SETTING TO POSITION 3 (12A)
10D	UPPER CONT. VENT CLR. 1D DISCH. ISOL. VLV. (1-FCV-67-298-B)	0.125 HP	1.0	0.45	3.14	1	T11	0.58	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7
10F	UPPER CONT. VENT CLR. 1B SPLY. ISOL. VLV. (1-FCV-67-141-B)	0.125 HP	1.0	0.45	3.15	1	T10	0.53	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7
11A	AUX. BLDG. AIR CLRS SPLY. HDR. 1B ISOL. VLV. INSIDE CONT. (1-FCV-67-178-B)	0.33 HP		0.95	5.7	1	T17	[illegible]	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15 CHANGE BKR SETTING TO POSITION 3 (12A)
11B	STA SERVICE CONT. AIR COMP. SPLY. HDR. B ISOL. VLV. (0-FCV-67-208-B)	0.33 HP		0.95	5.7	1	T17	[illegible]	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15 CHANGE BKR SETTING TO POSITION 3 (12A)
12A	YARD HDR. B DISCH. VLV. TO COOLING TOWER (0-FCV-67-362)	1 HP		2.8	16.0	1	T28	3.06	N	EF3-A010	10	27	LO	N	REPLACE HTR WITH T29 CHANGE BKR SETTING TO POSITION 2 (30A)
12B	ERCW TO COMPT. COOLING HEX A. (1-FCV-67-478-B)	0.7 HP	1.0	2.3	12.0	1	T27	2.76	N	EF3-A010	10	27	LO	Y	REPLACE HTR WITH T26
12D	TO COMPT. 6B RC PUMP THERM. BARRIER CONT. ISOL. VLV. (1-FCV-70-87-B)	0.7 HP	1.0	2.3	12.0	1	T27	2.76	N	EF3-A005	5	41	HI	N	REPLACE HTR WITH T24 REPLACE BKR WITH EF3-A010, SET AT POSITION LO (27A)

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Prepared RHBulat / DBate Date 1-16-90 / 1-19-90
Verified [illegible] / D. Graham Date 2-5-90
1-20-90

TVA WATTS BAR NUCLEAR PROJECT
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WBNEEB-MS-TI08-0008 R0
Attachment No. 1
Calc. No. ____
Sheet ____ of ____

PREPARED TMT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT B	MIN. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-213-B2-B														
12F	ANNULUS SPRINKLER ISOL. VLV. (1-FCV-26-244-B)	0.67 HP	1.0	2.1	5.0	1	T26	2.54	N	EF3-A003	10	27	LO	N	REPLACE HTR WITH T19 REPLACE BKR WITH EF3-A003, SET AT POSITION 2(10A)
13B	CCS HEAT EXCH. A & C INLET ISOL. VLV. (1-FCV-70-15-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POS. B (12A)
13D	RC PUMP OIL CLR. RETN. CONT. ISOL. VLV. (1-FCV-70-89-B)	0.125 HP	1.0	0.45	3.14	1	T10	0.52	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7
13F	RC PUMP OIL CLR. HDR. CONT. ISOL. VLV. (1-FCV-70-140-B)	0.33 HP		0.95	5.7	1	T18	1.21	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T15 CHANGE BKR SETTING TO POSITION B(12A)
14A	CCS HEAT EXCH. C OUTLET VLV. (0-FCV-70-12-B)	0.33 A		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION B (12A)
14B	RHR HEAT EXCH. B INLET VLV. (1-FCV-70-3-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION B (12A)
14D	CCS PUMPS 1A-A & 1B-B TO C-S OUTLET ISOL. VLV. (1-FCV-70-26B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION B (12A)
14E	CCS PUMPS 1A-A TO 1B-B ISOL. VLV. (1-FCV-70-34-B)	0.67 HP	1.0	1.9	7.56	1	T25	2.3	N	EF3-A005	5	22	3	N	REPLACE HTR WITH T24 CHANGE BKR SETTING TO POSITION LO (14A)
15A	RHR HEAT EXCH. B RETN. HDR. ISOL. VLV. (1-FCV-70-75-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION B (12A)
15B	CCS HEAT EXCH. A & C OUTLET ISOL. VLV. (1FCV-70-9-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION B (12A)
15D	CCS PUMPS 1A-A & 1B-B TO C-S INLET ISOL. VLV. (1-FCV-70-64-B)	0.67 HP	1.0	1.9	16.0	1	T25	2.3	N	EF3-A005	5	22	3	N	REPLACE BKR WITH EF3-A010, SET AT POSITION 2 (3CA) USE EXISTING T25 HTR
15E	RHR HEAT EXCH. B-B OUTLET VLV. (1-FCV-70-163-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION B (12A)
16A	CCS PUMPS 1A-A & 1B-B TO C-S INLET ISOL. VLV. (1-FCV-70-74-B)	0.67 HP	1.0	1.9	7.56	1	T25	2.3	N	EF3-A005	5	22	3	N	REPLACE HTR WITH T24 CHANGE BKR SETTING TO POSITION LO (14A)
16B	TO COMPT. 6E RC PUMP THERM. BARRIER CONT. ISOL. VLV. (1-FCV-70-134-B)	0.125HP		0.45	2.6	1	T10	0.52	N	EF3-A003	3	7	LO	Y	REPLACE HTR WITH T7
16E	CCS HEAT EXCH. C INLET VLV. (0-FCV-70-22-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION B(12A)
17B	CCS PUMPS 1A-A & 1B-B TO C-S OUTLET ISOL. VLV. (1-FCV-70-27-B)	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A003	3	10	2	N	REPLACE HTR WITH T16 CHANGE BKR SETTING TO POSITION B (12A)
18D	480V BD. RM 1B A/C COMPRESSOR 1B-B (1-MTR-31-447-B)	75 HP		91.5	542.5					EF3-B125	125	1600	HI	N	Change Bkr Setting to Position X(12A)

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TWCABLE.DAT)

PREPARED JBJ 4-4-90
VERIFIED MAB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	I NTRL TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-A1-A															
2A	BORIC ACID TK. B HTR. A-A 2-HTR-62-239-A	9KW		10.83		1				EF3-B4.7	40			Y	
2B	BORIC ACID TRANSFER PUMP 2A-A 2-HTR-62-230-A	15 HP	1.15	13 LO 16 HI	165.24		T43 T47		N	EF3-LBCU	50 LO	210	2	Y	RCH HEATER SIZE NOT EVALUATED - STARTER SIZE UNKNOWN
2C	THERMAL BARRIER SYS. PUMP 2A-A 2-HTR-70-131-A	10 HP	1.15	13	78.16	2	T44	17.63	Y	EF3-LBCP	50 LO	160	LO	Y	
2E1	RWST TO RHR PUMP FLOW CONT. VLV. 2-FCV-63-1-A STROKE TIME 20	10.5KW		13.8	114					EF3-B040	40				SEE COMP. 161
2E2	SPARE														
2F1	SPARE														
2F2	SPARE														
3A	SPARE														
3C	SPARE														
3E	CHTFGL. CHGR. PUMP 2A-A ACP 2-HTR-62-AMP-A	2 HP	1.15	3.1	22.57	1	T30	3.63	N	EF3-6010	10	30	2	N	REPL. HTR. WITH T21 INCR. BKR SETTING TO POS. 3(450)
3F1	SPARE									EF3-B020	50				
3F2	SIS ACCUM. TK. 1 FLOW ISOL. VLV. 2-FCV-63-118-A STROKE TIME 15	19.5		25	200					EF3-H050	50 HI	400	2	Y	SEE COMPT. 60
4A	SIS BORON INJ. TK. HTR. 2A-A 2-HTR-63-37-A	6KW		7.22		1				EF3-B020	20			Y	
4B	SPARE									EF3-B040	40				
4C	RANCH. BKR. V CONT. XFMR	100 KVA								EF3-B020	20			Y	
4D	SPARE									EF3-A005	5	22	3		

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.16F)

PAGE 129 OF 561
PREPARED TJT 4-4-90
VERIFIED RLB 4/4/90

2-MCC-213-A1-A

COMPT. NO.	SERVICE	RATING HP/KWA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
4E	AFW PUMP A-A LUBE OIL PUMP A-A 2-MTR-3-1160-A	.25 HP	1.0	.56	3.51	1			N	EF3-A010	5	22	3	N	INST. T13 HTR. REPL. BKR. WITH A003, SET ON POS. LO(70)
4F	OL BYP. CONT. 1FRR. (10)	.5 KWA								EF3-B020	20			Y	
5B	AHU SYS. ISOL. VLV. 2-FCV-74-1-A STROKE TIME 120	2.6 HP		5.86	38					ET50010	20			Y	SEE COMP. 16D
5F	POS. DISPLACEMENT RECIRC. FCV 2-FCV-62-275-A STROKE TIME 10 SECONDS	8.7 HP		2.8	16	1	T27	2.76	N	EF3-C010	10	27	LO	N	REPL. HTR. WITH T25 INCR. BKR. SETTING TO POS. 2(36A)
6A	SPARE														
6B	SPARE									EF3-A003	3	10	2	N	NOT SHOWN IN TELAS
										EF3-A003	3	12	3		
6D	RCS PRESS RELIEF FLOW CHART VLV. 2-FCV-68-333-A STROKE TIME 10 SECONDS	1.9 HP		3.5	26	1			N	EF3-A010	10	45	3	N	INST. T29 HTR. INCR. BKR. SETTING TO POS. 4(50A)
7A	SEAL FLOW RETN. ISOL. VLV. 2-FCV-62-63-A STROKE TIME 10	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	INST. T29 HTR. INCR. BKR. SETTING TO POSITION 4(50A)
7B	CHARGING FLOW ISOL. VLV. 2-FCV-62-90-A STROKE TIME 10	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	INST. T29 HTR. INCR. BKR. SETTING TO POSITION 4(50A)
7D	FDR BKR. TO COMP. 17F2 (2-FCV-63-88-A) STROKE TIME 15					2	T50	38.38	N	EF3-B060	60			N	REPL. HTR. WITH T40 REPL. BKR. WITH EF3-H050, SET POS. 2(400A)
7F	SPARE					1	T28			EF3-A010	10	27	LO		
8A	CHRG. PUMP 2A-A MIN. FLOW 2-FCV-62-98-A STROKE TIME 10	8.7 HP		2.8	16	1	T27	2.76	N	EF3-A010	10	27	LO	N	REPL. HTR. WITH T25 INCR. BKR. SETTING TO POS. 2(36A)
8B	VCL. CONT. TK. OUTLET ISOL. VLV. 2-LCV-62-132-A STROKE TIME 10 SECONDS	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 4(50A)
8D	FDR. BKR. TO COMP. 3F2 (2-FCV-63-118-A) (STROKE TIME 15 SECONDS)					2	T50	38.38	N	EF3-B060	60			N	REPL. HTR. WITH T40 REPL. BKR. WITH EF3-H050, SET ON POS. 2 (400A)
8F	SPARE									EF3-A010	10	27	LO		

[illegible] NUCLEAR PROJECT
FOR INFORMATION ONLY

(TUCKABLE.BOX)

PAGE 130 OF 56)
PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KWH	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-A1-A															
9H	RWST. TO CHRG. PUMPS CONTROL 2-LCV-62-135-A STROKE TIME 15 SECONDS	1.9 HP		3.5	20	1	T27	2.76	N	EF3-[illegible]	10	[illegible]	30	Y	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 4(50A)
9B	SIS. PUMP INLET TO CVCS CHRG. PUMP 2-FCV-63-177-A STROKE TIME 15 SECONDS	1.3 HP		2.3	16	1	T27	2.76	N	EF3-[illegible]	10	27	LO	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 2(36A)
9D	SPARE					2				EF3-[illegible]	50 LO	330	4		
9F	RWST. TO SPRAY HDR. 2A FCV 2-FCV-72-22-A STROKE TIME 20 SECONDS	3.2 HP		5.2	36	1	T30	5.79	N	EF3-[illegible]	20			N	REPL. HTR. WITH T32 REPL. BKR WITH EF3-[illegible], SET POS. H1(8-A)

TVA WATTS BAR NUCLEAR PLANT
FOR INFORMATION ONLY

(CABLE.DBF)

PAGE 131 OF 561
PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** NODE 239															
* CLASSIFICATION # 2-MCC-213-A1-A															
10A	FDR. BKR. TO CNMT. 2E1 (2-FCV-63-1-A) STROKE TIME 20 SECONDS					1	T45	17.13	N	EF3-B[illegible]	30			N	REPL. HTR. WITH T45 REPL. BKR. WITH EF3-L050, SET POS. 3(250)
10B	SIS PUMPS RECIRC. TO RWST. 2-FCV-63-3-A STROKE TIME 10 SECONDS	0.70 HP		2.8	16	1	27	2.76	N	EF3-B040	12	27	LO	N	REPL. HTR. WITH T25 INCR. BKR. SETTING TO POS. 2(36A)
10C	FDR. BKR. TO CONT. 5A (2-FCV-74-1-A) STROKE TIME 120)					1	T[illegible]	[illegible]	N	EF3-[illegible]	10	50	4	N	INCR. BKR. SETTING TO POS. [illegible] USE EXISTING T36 HTR
10F	CNTNT. SPRAY PUMP 2A-A RECIRC. FCV 2-FCV-72-34-A STROKE TIME 10	0.13 HP		0.6	2.0	1	T10	0.53	N	EF3-[illegible]	3	7	LO	Y	REPL. HTR. WITH T6
11A	SIS. PUMP INLET TO CVCS CHRG PUMP 2-FCV-63-7-A STROKE TIME 10	1.9 HP		3.5	26	1	T31	4.35	N	EF3-[illegible]	10	45	30	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 4(30A)
11B	RHR HX A TO CVCS CHGR PUMP 2-FCV-63-8-A STROKE TIME 15	1.9 HP		3.5	26	1	T31	4.35	N	EF3-B[illegible]	20			N	REPL. HTR. WITH T29 REP. BKR. WITH EF3-A010, SET ON POS. 4(50A)
11D	SIS BORON INJ. TK. SHUTOFF VLV. 2-FCV-63-26-A STROKE TIME 10	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	45	3	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 4(50A)
11E	SIS BORON INJ. TK. INLET SHUTOFF VLV. 2-FCV-63-39-A STROKE TIME 10 SECONDS	1.9 HP		3.5	26	1	T31	4.35	N	EF3-B[illegible]	20			N	REPL. HTR. WITH T29 REP. BKR. WITH EF3-A010, SET ON POS. 4(50A)
12A	SIS PUMP 2A-A INLET VLV. 2-FCV-63-47-A STROKE TIME 15 SECONDS	1.9 HP		3.5	26	1	T31	4.35	N	EF3-[illegible]	10	45	3	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 4(50A)
12B	CNTNT SUMP TO RHR PUMP A-A 2-FCV-63-72-A STROKE TIME 22	12.8 HP		18	145	2	T47	22.25	N	EF3-B040	40			N	REPL. HTR. WITH T45 REPL. BKR. WITH EF3-L050, SET ON POS. 4(130A)
12D	SIS TO RCS LOOPS 2 & 3 FCV 2-FCV-63-93-A STROKE TIME 10	18.5 HP		13.8	11.	1	T45	17.13	N	EF3-B[illegible]	30			N	REPL. HTR. WITH T45 REPL. BKR. WITH EF3-L050, SET ON POS. 3(250A)
12E	SIS PUMP 2A-A OUTLET FCV 2-FCV-63-152-A STROKE TIME 10	1.9 HP		3.5	26	1	T31	4.35	N	EF3-A010	10	50	4	Y	REPL. HTR. WITH T29

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PREPARED 4-4-90
VERIFIED 4/4/90

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	STARTER SIZE	THERMAL OVL RELAY REPL. CAT #	HTR. TB.B POINT	HTR SIZE ALLOWABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	RELIEF?	REMARKS
2-MCC-213-A1-A															
13A	SIS PUMP OUT. RCS LOOP 1 & 3 HOT LEG 2FCV-63-156-A STROKE TIME 10 SECONDS	1.9 HP		3.5	20	1	T31	4.35	N	EF3-4010	10	45	3	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 4(50A)
13B	CNTMT. SUMP TO SPRAY HDR. 2A FCV 2-FCV-72-44-A STROKE TIME 15 SECONDS	3.2 HP		5.2	28	1	T30	5.79	N	EF3-0420	20			N	REPL. HTR. WITH T32 REPL. BKR. WITH EF3-4010, SET ON POS. N1(60A)
13D	SPARE					2				EF3-4020	25	100	1		
13E	CNTMT. SPRAY HEADER 1A INCL. VLV. 2-FCV-72-39-A STROKE TIME 15 SECONDS	3.2 HP		5.2	1.0	1	T28	6.3	N	EF3-0420	20			N	REPL. HTR. WITH T32 REPL. BKR. WITH EF3-4020, SET ON POS LO(75A)
14A	RHR SPRAY HDR. 2A INCL. VLV. 2-FCV-72-40-A STROKE TIME 15	1.9 HP		3.5	20	1	T31	4.35	N	EF3-0420	20			N	REPL. HTR. WITH T29 REPL. BKR. WITH EF3-4010, SET POS. 4(50A)
14B	RHR PUMP 2A-A INLET FCV 2-FCV-74-3-A STROKE TIME 20 SECONDS	10.5		13.8	119	1	T45	17.13	N	EF3-0040	40			N	REPL. HTR. WITH T46 REPL. BKR. WITH EF3-4050, SET ON POS. [illegible]
14D	RHR PUMP 2A-A MIN. FLOW VLV. 2-FCV-74-12-A STROKE TIME 10 SECONDS	0.7 HP		2.8	16	1	T16	8.53	N	EF3-00102	10	27	LO	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 2(30A)
14E	RHR HX 2A BYP VLV. 2-FCV-74-33-A STROKE TIME 15 SECONDS	1.9		3.5	20	1	T31	4.35	N	EF3-00102	10	45	3	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 4 (50A)
15A	SPARE									EF3-4003	3	16	4		
15B	SPARE									EF3-4050	50 LO	350	4		
16A	INCORE INST. RM. C/B FAN 2A 2-HTR-31-265	3 HP	1.15	4.3	26.7	1	T34	5.79	Y	EF3-4010	10	45	3	N	INCR. BKR. SETTING TO POS. 4(50A)
16B	REACTOR CNTMT AT SUMP EJECT PUMP 2-HTR-77-129	1.5 HP	1.3	2.4	16.23	1	T27	2.76	N	EF3-4010	10	27	LO	N	REPL. HTR. WITH T29 INCR. BKR. SETTING TO POS. 2(30A)
16F1	24V CAP SYS. BAT CHGR. NO. 1 (ALT) 0-CHGR-252-1	7.57KW		17						EF3-0420	20			N	CHARGER NOT INSTALLED PER MAINTENANCE REPL. BKR. WITH EF3-0830
16F2	INCORE INST. RM. CHLD. WTR. COMPR. 2A 2-HTR-31-303/2	3 HP		4.6	32					EF3-0420	20			Y	NPR. NAME PLATE HAS DIFFERENT EQUIPMENT ID

TWO WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TWCABLE.DBF)

PAGE 133 OF 561
PREPARED TBT 4-4-90
VERIFIED ZLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KWA	DERN. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-A1-A															
17A	BORIC ACID BATCH TK. HTR. 4 2-HTR-62-228	22.5KW		27.07						EF3-B030	30			N	REPL. BKR. WITH EF3-B040
17B	CNTNT STANDPIPE ISOL. VLV. 2-FCV-26-240-A STROKE TIME 20 SECONDS	0.67 HP		2.0	16	1			N	EF3-A010	10	27	LO	N	INSTALL T24 HEATER INCR. BKR. SETTING TO POS. 21(B)
17C	ANNULUS STANDPIPE ISOL. VLV. 2-FCV-26-242-A STROKE TIME 20 SECONDS	0.67 HP		2.0	16	1			N	EF3-A010	10	27	LO	N	INSTALL T24 HEATER INCR. BKR. SETTING TO POS. 21(BA)
17D	SPARE														
17E	POWER OUTLETS 2-PO-213-A1/1-5									EF3-A005	5	29	4		
17F1	SPARE									EF3-B100	100				NOT EVALUATED
17F2	SIS ACCUM TANK 3 FLOW ISOL. VLV. 2-FCV-63-88-A STROKE TIME 15	19.5 HP		25	200					EF3-A025	25	170	6		
										EF3-B050	50			Y	SEE COMPT. 7D
18A	SPARE														
18B	SPARE									EF3-B050	50A				
										EF3-B040	40				
18C	INCORE INST. RM. CIRC. PUMP 2A 2-MTR-31-383/1	3 HP	1.15	4.2	38.00	1	T32	4.60	N	EF3-A010	10	45	3	N	REPL. MTR. WITH T33 INCR. BKR. SETTING TO POS. 4(5BA)
18D	SPARE									EF3-A005	5	22	3		
18E	RCP SPRY ISOL. VLV. 2-FCV-26-243-A STROKE TIME 20 SECONDS	0.67 HP		2.0	16				N	EF3-A010	10	27	LO	N	INSTALL T24 MTR. INCR. BKR SETTING TO POS 21(BA)
18F1	ALT. 24V MICROWAVE BATT. CHGR. 1. 0-CHGR-253-A	3.5KW		7						EF3-B020	20			Y	
18F2	POWER OUTLETS 2-PO-213-A1/6-10	SEE REMRK								EF3-B100	100				NOT EVALUATED
1A1	NORM FDR FROM 480V SHUTDOWN BD 201-A									ITE-HK35A0002 ETS	800				
1A2	ALT. FDR. FROM 480V SHUTDOWN BD 202-A									ITE-HK35A0002 ETS	800				

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TWACABLE.DBF)

PAGE 134 OF 561
PREPARED TET 4-4-90
VERIFIED MLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KW	DERAT. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT. #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CLEAR. SETTING	BKR. INST. SETTING	SET PLUG	ALLOWED?	REMARKS
2-MCC-213-A2-A															
2D	AFWP TURB. STM. SUPPLY FROM STEAM GEN. 1 2-FCV-1-15-A STROKE TIME 20 SECONDS	1 HP		2.0	16		T20	3.00	N	EF3-[illegible]	10	27	LU	N	REPL. HTR. WITH T20 INCR. BKR. SETTING TO POS. 2(36A)
2E	SSTM FLOW TO AFWP TURB. ISOL. VLV. 2-FCV-1-17-A STROKE TIME 16 SECONDS	1 HP		2.0	16	1	T20	3.00	N	EF3-[illegible]	10	27	LU	N	REPL. HTR. WITH T20 INCR. BKR. SETTING TO POS. 2(36A)
3A	ERCW HDR. A ISOL. VLV. 2-FCV-3-136A-A STROKE TIME 15 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	7	LU	N	INSTALL T13 HTR. INCR. BKR. SETTING TO POS. 3(12A)
3B	ERCW HDR. A ISOL. VLV. 2-FCV-3-136B-A STROKE TIME 15 SECONDS	0.33 HP		1.0	5.7				N	EF3-[illegible]	3	7	LU	N	INSTALL T13 HTR. INCR. BKR. SETTING TO POS. 3(12A)
3D	STM. GEN. NO.1 FW ISOL. VLV. 2-FCV-3-33-A STROKE TIME 65 SECONDS	35.4 HP		52	290	3			N	EF3-[illegible]	100			N	INSTALL T40 HTR. REPL. BKR. WITH A100, SET POS. [illegible]
4A	LOOP 1 DEAERATION LINE VLV. 2-FCV-3-191 STROKE TIME 30 SECONDS	1.6 HP		4	25	1	T31	4.35	N	EF3-[illegible]	10	45	3	N	REPL. HTR. WITH T20 INCR. BKR. SETTING TO POS. 4(56A)
4B	LOOP 2 DEAERATION LINE VLV. 2-FCV-3-192 STROKE TIME 30 SECONDS	1.6 HP		4	25	1	T31	4.35	N	EF3-[illegible]	10	45	3	N	REPL. HTR. WITH T20 INCR. BKR. SETTING TO POS. 4(56A)
4C	CONT. APPR. (10)	100VA								EF3-[illegible]	20			Y	
4D	STM. GEN. NO.3 FW ISOL. VLV. 2-FCV-3-87-A STROKE TIME 6.5 SECONDS	35.4 HP		52	290	3			N	EF3-[illegible]	100			N	INSTALL T40 HTR. REPL. BKR. WITH A100, SET POS. ON 2(63A)
5A	SMPL. HX ISOL. VLV. 2-FCV-70-215-A STROKE TIME 15 SECONDS	0.24 HP		1.0	5.7	1			N	EF3-[illegible]	5	14	LU	N	INSTALL T13 HTR. REPL. BKR. WITH [illegible], SET POS. ON 3(12A)
5B	SPARE									SPL. NO. ET360	20				
5C	RHR SPS ISOL. VLV. 2-FCV-74-8-A STROKE TIME 120 SECONDS	1.6 HP		4	25	1	T32	4.88	N	EF3-[illegible]	10	45	3	N	REPL. HTR. WITH T31 INCR. BKR. SETTING TO POS. 4(58A)
5E	CNTMT SPRAY HX 2B SUPPLY CONT. VLV. 2-FCV-67-125-A STROKE TIME 90 SECONDS	0.33 HP		.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	6	N	REPL. HTR. WITH T16 INCR. BKR. SETTING TO POS. 3(12A)

TVA WATTS BAR NUCLEAR PLANT
FOR INFORMATION ONLY

(TWCABLE.DBF)

PAGE 135 OF 561
PREPARED TBT 4-4-90
VERIFIED XAB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BKR TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-A2-A															
5F	CNTMT SPRAY HX 2A DISCH VLV. 2-FCV-67-126-A STROKE TIME 90 SECONDS	0.33 HP		.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPL. HTR. WITH T16 INCR. BKR. SETTING TO POS. 3(120)
6A	RHR TURB. STM. SUPPLY FROM STM. CLR. 4 2-FCV-1-16-A STROKE TIME 20 SECONDS	1 HP		2.0	16	1			N	EF3-[illegible]	10	27	LO	N	INSTALL T24 HTR. INCR. BKR. SETTING TO POS. 2(200)
6B	SPARE														
6D	OL BYP. CONT. 1FAR. (1A)	540 VA								EF3-[illegible]	3	10	2		
6F	SPARE									EF3-[illegible]	20				
7A	SPARE									EF3-[illegible]	20				
										EF3-[illegible]	5	[illegible]	[illegible]		
7B	EACH HDR. 2A ISOL. VLV. BEFORE STM. 2-FCV-67-22-A STROKE TIME 120 SECONDS	0.33 HP		.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	INCR. BKR. SETTING TO POS. 3(120) USE EXISTING T17 HTR.
7D	LWR. CNTMT. 2A CLR. DISCH ISOL. VLV. 2-FCV-67-87-A STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	10	2	N	REPL. HTR. WITH T16 INCR. BKR. SETTING TO POS. 3(120)
7F	UPR. CNTMT. VT. CLR. 2A SUPPLY ISOL. VLV. 2-FCV-130-A STROKE TIME 66 SECONDS	0.13 HP		0.6	2.6	1			N	EF3-[illegible]	3	7	LO	Y	INSTALL T11 HTR.
8A	AUX. BLDG. EACH SUPPLY HDR. ISOL. VLV. 2-FCV-67-81-A STROKE TIME 120 SECONDS	0.67 HP	1.0	1.9	7.56	1	T25	2.3	N	EF3-[illegible]	5	22	3	N	REPL. HTR. WITH T24 DECREASE BKR. SETTING TO POS. LO(140)
8B	LWR. CNTMT 2A CLR. SUPPLY ISOL. VLV. 2-FCV-67-83-A STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	10	2	N	INSTALL T16 HTR. INCR. BKR. SETTING TO POS. 3(120)
8D	LWR. CNTMT 2C CLR. DISCH ISOL. VLV. 2-FCV-67-95-A STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	10	2	N	INSTALL T16 HTR. INCR. BKR. SETTING TO POS. 3(120)
8F	UPR. CNTMT VT CLR. 2C SUPPLY ISOL. VLV. 2-FCV-67-133-A STROKE TIME 66 SECONDS	0.13 HP		0.6	2.6	1			N	EF3-[illegible]	3	7	LO	Y	INSTALL T11 HTR.
9A	LWR. CNTMT 2C CLR. SUPPLY ISOL. VLV. 2-FCV-67-91-A STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	10	2	N	INSTALL T16 HTR. INCR. BKR. SETTING TO POS. 3(120)

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PREPARED TBJ 4-4-90
VERIFIED RLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL / CAT #	HTR. TRIP POINT	HTR SIZE ALCO>TWCA	BREAKER TYPE	BREAKER CONT. OVRL SETTING	BKR. INST. SETTING	SET POS	ALCO/T?	REMARKS
2-MCC-213-A2-A															
9B	LWR. CNTMT 2B CLR. DISCH ISOL. VLV. 2-FCV-67-104-A STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EJ3-RMJ	3	10	2	N	INSTALL T10 HTR. INCR. BKR. SETTING TO POS. 3(120)
9D	UPR. CNTMT VT CLR. 2A DISCH ISOL. VLV. 2-FCV-67-295-A STROKE TIME 66 SECONDS	0.33 HP		0.6	2.6	1			N	EJ3-RMJ	3	7	LO	Y	INSTALL T11 HTR.
9F	UPR. CNTMT VT CLR. 2B DISCH ISOL. VLV. 2-FCV-67-135-A STROKE TIME 66 SECONDS	0.13 HP		0.6	2.6	1			N	EJ3-RMJ	3	7	LO	Y	INSTALL T11 HTR.

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PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SEC	THERMAL OVL RELAY MODEL CAT #	MIN. TRIP POINT	MIN SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CLRN. SETTING	BKR. INST. SETTING	[illegible]	ACCEPT?	REMARKS
** NUMBER 242															
* CLASSIFICATION # 2-MCC-213-A2-A															
10A	LWR. CNTMT 2D CLR. DISCH ISOL. VLV. 2-FCV-67-116-A STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	10	C	N	INSTALL T16 MTR. INCR. BKR. SETTING TO POS. 311CA
10B	AUX. BLDG. AIR CLR. SUPPLY HDR. 2B ISOL. VLV. 2-FCV-67-127-A STROKE TIME 40 SEC.	0.33 HP		0.95	5.7	1	T.7	1.1	N	EF3-[illegible]	3	10	C	N	REPL. MTR. WITH T16 INCR. BKR. SETTING TO POS. 311CA
10D	LWR. CNTMT. VT. CLR. 2D DISCH ISOL. VLV. 2-FCV-67-[illegible]-A STROKE TIME 66 SECONDS	0.13 HP		0.0	2.0	1			N	EF3-[illegible]	3	7	LO	Y	INSTALL T11 MTR.
10F	LWR. CNTMT. VT. CLR. 2D DISCH ISOL. VLV. 2-FCV-67-146-A STROKE TIME 66 SECONDS	0.13 HP		0.0	2.0	1			N	EF3-[illegible]	3	7	LO	Y	INSTALL T11 MTR.
11A	CNTMT. CLG. HX A DISCH CONT. VLV. 2-FCV-67-[illegible]-A STROKE TIME 120 SECONDS	0.67 HP		1.9	10	1	T25	2.3	N	EF3-[illegible]	3	20	MI	N	REPL. BKR. WITH [illegible] SET ON [illegible] USE EXISTING T25 MTR.
11B	FDR TO COMP. 5B									EF3-[illegible]	3	20	*		
11D	RCP THERM. BARR. RTN. CNTM. ISOL. VLV. (2-FCV-70-90-A) STROKE TIME 66 SECONDS	0.70		2.3	16.0					EF3-[illegible]	60			Y	SEE COMP. 16A
11E	RCP THERM. BARR. CNTMT. ISOL. VLV. 2-FCV-70-133-A STROKE TIME 15 SECONDS	0.13 HP		0.45	2.6					EF3-[illegible]	20			Y	SEE COMP. 16B
11F	CONE BLDG. SUPPLY VLV. 0-FCV-70-[illegible]-A STROKE TIME 60 SECONDS	0.13 HP	1.0	0.45	2.6	1	T10	.53	N	EF3-[illegible]	3	7	LO	Y	REPL. MTR. WITH T7
12A	SPARE									EF3-[illegible]	3	16	*		
12B	SPARE									EF3-[illegible]	3	10	2		
12D	RCP OIL CLR. RTN. CNTMT ISOL. VLV. 2-FCV-70-92-A STROKE TIME 46 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPLACE MTR. WITH T15 INCR. BKR. SETTING TO POS 311CA

TVA WATTS BAR NUCLEAR PROJECT
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PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KWA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	MIN. TRIP POINT	MIN SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET PUS	ACCEPT?	REMARKS
2-MCC-213-A2-A															
12F	RCP OIL CLR. HDR. CNTMT ISOL. VLV. 2-FCV-70-139-A STROKE TIME 30 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPLACE HTR. WITH T15 INCR. BKR. SETTING TO PUS 3(120)
13A	SUPL. HDR. 24 TO HDR 18 ISOL. VLV. 2-FCV-67-223-A STROKE TIME 120 SECONDS	.67 HP		1.9	16	1	T[illegible]	2.3	N	EF3-[illegible]	5	20	3	N	INCREASE BREAKER SETTING TO PUS. 4 (BAA)USE EXISTING T25 HTR.
13B	YD HDR. A DISCH VLV. TO CLG. FWR 0-FCV-67-360 STROKE TIME 180 SECONDS	1.0 HP		2.6	16	1	T[illegible]	3.06	N	EF3-[illegible]	10	27	11	N	REPLACE HTR. WITH T29 INCR. BKR. SETTING TO PUS. 2(360)
13D	BW & DUAL STMTR EVAP. PRES. 24 FCV 2-FCV-70-168-A STROKE TIME 30 SECONDS	0.33 HP		.95	5.7	1	T17	1.1	N	EF3-[illegible]	30	10	2	N	REPLACE HTR. WITH T15 INCR. BKR. SETTING TO PUS. 2(120)
13E	ANNULUS SPR. ISOL. VLV. 2-FCV 2-FCV-26-245-A STROKE TIME 20 SECONDS	0.67 HP		2.0	16	1			N	EF3-[illegible]	10	27	11	N	INSTALL T29 HTR. INCR. BKR SETTING TO PUS. 2(360)
13F	LCS AUXL. ISOL. (10) LOCA. CONT. STMT. (2-FCV-67-67/95) STROKE TIME 60 FOR EACH FCV														NO INFO IN TELAS NO CALCULATION DATA
14A	RHR HX A HDR. INLET VLV. 2-FCV-70-2-A STROKE TIME 30 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPLACE HTR. WITH T15 INCR. BKR. SETTING TO PUS. 3(120)
14B	MISC. EQUIP. HDR. INLET VLV. 2-FCV-70-4-A STROKE TIME 30 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPLACE HTR. WITH T15 INCR. BKR. SETTING TO PUS. 3(120)
14D	CCS HX B OUTLET VLV. 2-FCV-70-15-A STROKE TIME 180 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPLACE HTR. WITH T15 INCR. BKR. SETTING TO PUS. 3(120)
14E	CCS HX B & C OUTLET VLV. 2-FCV-70-195-A STROKE TIME 180 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPLACE HTR. WITH T15 INCR. BKR. SETTING TO PUS. 3(120)
15A	SPARE									EF3-[illegible]	3	10	2		
15B	CCS HX B & C INLET ISOL. VLV. 2-FCV-70-18-A STROKE TIME 180 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPL. HTR. WITH T15 INCR. BKR. SETTING TO PUS 3(120)

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PREPARED JBT 4-4-90
VERIFIED MLG 4/4/90

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OVL RELAY MODEL CAT #	I NTR. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT.	REMARKS
2-MCC-213-A2-A															
15D	CCS HX B INLET ISOL. VLV. 2-FCV-70-16-A STROKE TIME 180 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPL. HTR. WITH T15 INCR. BKR. SETTING TO POS. 3(LOW)
15E	SPARE									EF3-[illegible]	3	10	2		
16A	FDR. BKR. TO CONT. [illegible] (2-FCV-70-90-A) STROKE TIME 60 SECONDS					1	T17	[illegible]	N	EF3-[illegible]	3	10	6	N	REPL. HTR. WITH T15 REPL. BKR. WITH NEW, SET ON POS. 2(LOW)
16B	FDR. BKR. TO CONT. 116 (2-FCV-70-133-A) STROKE TIME 15 SECONDS					1	T10	0.53	N	EF3-[illegible]	3	7	LO	Y	REPL. HTR. WITH T6
16D	EXCS. LTD HX CONT. INLET ISOL. VLV. 2-FCV-70-143-A STROKE TIME 60 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPL. HTR. WITH T15 INCR. BKR. SETTING TO POS. 3(LOW)
16E	RHR HX A-A OUTLET VLV. 2-FCV-70-156-A STROKE TIME 90 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPL. HTR. WITH T15 INCR. BKR. SETTING TO POS. 3(LOW)
17A	SPRL. HX RDR. OUTLET VLV. 2-FCV-70-183-A STROKE TIME 15 SECONDS	0.13 HP		0.45	2.6	1	T10	0.53	N	EF3-[illegible]	3	7	LO	Y	REPL. HTR. WITH T6
17B	SPARE									EF3-[illegible]	3	10	2		
17D	SPARE									EF3-[illegible]	3	10	2		
17E	480V BD. RM. 2A A/C COMPSR. 2A-A 2-MTR-31-465-A	50 HP	1.15	57	358.8					FJ3-[illegible]			M1	N	REPL. BKR. WITH FJ3-[illegible] SET POS. ON LO(75A)
1A1	NORM. FDR. FROM 480V SHUTDOWN BD. 2A2-A									ITE-[illegible] ETS	[illegible]				
1A2	ALT. FDR FROM 480V SHUTDOWN BD. 2B1-A									ITE-[illegible] ETS	[illegible]				
2A	ERCW HDR. A ISOL. VLV. 2-FCV-3-116A-A STROKE TIME 6 SECONDS	0.13 HP		0.6	2.6	1	T9	0.48	N	EF3-[illegible]	3	7	LO	Y	REPL. HTR. WITH T6
2B	ERCW HDR. A ISOL. VLV. 2-FCV-3-116B-A STROKE TIME 6 SECONDS	0.13 HP		0.6	2.6	1	T9	0.48	N	EF3-[illegible]	3	7	LO	Y	REPL. HTR. WITH T6

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PREPARED JBT 4.4.90
VERIFIED LLR 4/4/90

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET PUS	ACCEPT?	REMARKS
2-MCC-213-B1-B															
1A2	ALT. FDR. FROM 480V SHUTDOWN BD. 2B6-B									[illegible]	800				CAT. # 5640-U3D-111-0-0 ORDER # 84-16297
2A	SPARE									EF3-[illegible]	25	170	4		
2B	BORIC ACID TRANSF. PUMP 2B-B 2-MTR-62-236-B	15 HP	1.15	13 LR 18 HI	145.24	2	T46 T46	15.38 20.13	N N	EF3-[illegible]	50 LO	600	2	Y	REPL. LOW SPEED HTR. WITH T43 REPL. HIGH SPEED HTR. WITH T48
2C	CHRNT. CLG. SPG. WATR. PUMP 2B-B 2-MTR-70-130-B	10 HP	1.15	13	18.16	2	T46	15.0	N	EF3-[illegible]	50 LO	300	20	Y	REPL. HTR. WITH T43
2E1	SPARE									EF3-[illegible]	25	170	4		
2E2	SPARE									EF3-[illegible]	10	50	4		
2F1	SPARE									EF3-[illegible]	25	170	4		
2F2	SIS PUMP COLD LEG. INJ. 2-FCV-63-22-B STROKE TIME 10 SECONDS	1.9 HP		3.5	20					EF3-[illegible]	10	50	4		SEE COMP. 11B
3A	BORIC ACID TK. B HTR. B-B 2-HTR-62-245-B	9KW		10.83		1				EF3-[illegible]	20			Y	
3C	SPARE									EF3-[illegible]	50 LO	200	3		
3E	CONT BLDG. SUPPLY VLV. 2-FCV-70-207-B STROKE TIME 30	0.13 HP	1.0	0.45	2.6	1	T11	0.26	N	EF3-[illegible]	3	7	20	Y	REPL. HTR. WITH T6
3F1	ALT. FDR. 24V CRP SYS. BATT. CHGR. 2 B-CHGR-252-2	7.57KW		17						EF3-[illegible]	20			N	REPL. BKR. WITH EF3-[illegible]
3F2	SIS ACCUM. TK. FLOW ISOL. VLV. 2-FCV-63-58-B STROKE TIME 15 SECONDS	19.5 HP		25	200					EF3-[illegible]	50 HI	400	2	Y	SEE COMP. 8G
4A	SIS BORON INJ. TK. HTR. 2B-B 2-HTR-63-36-B	6KW		7.22		1				EF3-[illegible]	20			Y	HEATER NOT INSTALLED
4B	SPARE									EF3-[illegible]	50				
4C	CONT. XFMR. (1B) (FOR BUS UV RELAY)	100VA								EF3-[illegible]	20			Y	

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(MCC.DAT)

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PREPARED JBT 4-4-90
VERIFIED JLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	STARTER SIZE	THERMAL O/L RELAY MODEL CAT #	MIN. TRIP POINT	MIN SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. RATING	BKR. INST. SET SETTING	SET PUS	ACCEPT?	REMARKS
2-MCC-213-B1-B															
4D	CONT. FG. 1 CHG. PUMP 2B-B RCP	2 HP	1.15	3.1	32.57	1	T48	3.63	N	EF3-[illegible]10	10	36	3	N	REPL. MTR. WITH 3[illegible] BKR. SETTING TO POS. 3(4[illegible])
4E	SPARE									EF3-[illegible]	5	22	3		
5A	HPFP SYS. LOW LEVEL INTAKE VLV. 0-FCV-26-8-B STROKE TIME 90 SECONDS	0.13 HP		.45	2.6	1	[illegible]	[illegible]	N	EF3-[illegible]	3	7	60	Y	REPL. MTR. W/ M 19
5B	RHR SYS. ISOL. VLV. 2-FCV-74-3-B STROKE TIME 120 SECONDS	2.6 HP		5.8	38					EF3-[illegible]10	30			Y	SEE COMP. 18D
5C	RHR SYS. ISOL. BYP. VLV. 2-FCV-74-9-B STROKE TIME 120 SECONDS	1.6 HP		4	25	1	T32	4.06	N	EF3-[illegible]20	20			N	REPL. MTR. WITH T31 REPL. BKR. WITH EF3-4010 SET POS. 4(5[illegible])
5E	RCS PRESS RELIEF FCV 2-FCV-68-332-B STROKE TIME 10 SECONDS	1.9 HP		3.5	26	1			N	EF3-[illegible]24	30	45	3	N	INSTALL T29 MTR. CHANGE BKR. SETTING TO POS. 4(5[illegible])
6A	SPARE									EF3-[illegible]32	40	105	6		
6B	SPARE									EF3-[illegible]	5	[illegible]	4		
6D	SEAL FLOW RETN. ISOL. VLV. 2-FCV-62-61-B STROKE TIME 10 SECONDS	1.9 HP		3.5	26	1	T31	4.32	N	EF3-[illegible]10	10	45	3	N	REPL. MTR. WITH T29 CHANGE BKR. SETTING TO POS. 4(5[illegible])
6F	SPARE									EF3-[illegible]01	30	27	[illegible]		
7A	CHGR. FLOW ISOL. VLV. 2-FCV-62-41-B STROKE TIME 10 SECONDS	1.9 HP		3.5	26	1	T31	4.32	N	EF3-[illegible]	10	45	3	N	REPL. MTR. WITH T29 CHANGE BKR. SETTING TO POS. 4(5[illegible])
7B	CHGR. PUMP 2A-A MIN. FLOW 2-FCV-62-99-B STROKE TIME 10 SECONDS	0.7 HP		2.6	16	1	T27	2.76	N	EF3-[illegible]	10	27	[illegible]	N	REPL. MTR. WITH T25 CHANGE BKR. SETTING TO POS. 2(3[illegible])
7D	FDR. BKR. TO COMP. 16F2 (2-FCV-63-67-B) STROKE TIME 15 SECONDS					2	T50	30.38	N	EF3-[illegible]	60			N	REPL. MTR. WITH T48 REPL. BKR. WITH EF3-[illegible] SET POS. 2(4[illegible])
7F	SPARE									EF3-[illegible]	10	27	[illegible]		

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PREPARED TBT 4-4-90
VERIFIED MLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OVL RELAY MODEL CAT #	I MIN. TRIP POINT	MIN SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CLEAR. SETTING	BRK. INST. SETTING	SET PLS	ACCEPT?	REMARKS
2-MCC-213-B1-B															
8A	VOL. CONT. TK. OUTLET ISOL. VLV. 2-LCV-62-133-B	1.9 HP		3.5	26	1	131	4.35	N	EF3-[illegible]	10	42	3	N	REPL. MIN. WITH 1.5V INCR. BRK. SETTING TO POS. 4(50A)
8B	RWST TO CHRG. PUMP COLD. CONT. 2-LCV-62-136-B STROKE TIME 15 SECONDS	1.9 HP		3.5	26	1	77	2.76	N	EF3-4010	10	42	3	N	REPL. MIN. WITH 1.5V INCR. BRK. SETTING TO POS. 4(50A)
8D	FDW. BRK. TO COMP. SPC (2-FCV-63-98-B (STROKE TIME 15 SECONDS)					2	150	38.38	N	EF3-[illegible]	60				REPL. MIN. WITH 150
8F	SPARE									EF3-4003	3	16	4		
9A	EMER. BORATION FLOW CONT. VLV. STROKE TIME 15 SECONDS	1.3 HP		[illegible]	26	1	147	[illegible]	N	EF3-[illegible]	5	21	4	N	REPL. MIN. W. [illegible] INCR. BRK. SETTING TO POS. 4(40A)
9B	RHR TO RCS HOT LEG 1 & 3 FLOW ISOL. VLV. 2-FCV-63-172-B STROKE TIME 120 SECONDS	2.6 HP		5.6	38	1	150	5.71	N	EF3-[illegible]	20			N	[illegible] MIN. WITH 150 REPL. BRK. WITH EF3-4010 SET AT POS. 4(60A)
9D	SPARE									EF3-4015	5	41	4		
9F	CNTMT SPR. PUMP 2B-B RECIRC. FCV 2-FCV-72-13-B	0.13 HP		0.6	2.6	1	1.0	0.33	N	EF3-4003	3	7	1.5	Y	REPL. MIN. WITH 1.0

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PREPARED TBT-44-90
VERIFIED [illegible] 4/4/90

[illegible]

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OVL RELAY NOMINAL CURR	TRIP POINT	MAX SIZE ALLOWABLE	BREAKER TYPE	BKR. SHORT CIRC. SETTING	BKR. INST. SET SETTING	PUB	REMOVE	REMARKS
** NODE 241															
* CLASSIFICATION # 2-MCC-213-B1-B															
10A	SIS 2B-B DISCH TO RWST SHUTOFF VLV. 2-FCV-63-5-B STROKE TIME 12 SECONDS	0.7 HP		3.0	18	1	T27	0.19	N	[illegible]	15	2	[illegible]	N	REPL. MTR. WITH T25 INST. BKR. SETTING TO POS. 4(50A).
10B	RWST TO SIS PUMP 2-FCV-63-9-B STROKE TIME 12 SECONDS	1.9 HP		3.0	20	1	T31	0.35	N	[illegible]	15	45	3	N	REPL. MTR. WITH T29 INST. BKR. SETTING TO POS. 4(50A).
10D	FDR. BKR. TO COMPT. 2E (2-FCV-[illegible] STROKE [illegible] 10D)					1	T20	0.19	M	[illegible]	10	20	0	N	INST. BKR. SETTING TO POS. [illegible] USE EXISTING T26 MTR.
10F	RWST. TO SHUT FDR. 2B FCV 2-FCV-72-21-B STROKE TIME 20 SECONDS	3.0 HP		3.0	20	1	T20	0.19	N	EF3-B020	20			N	REPL. MTR. WITH T20 REPL. BKR. WITH EF3-B010 SET BKR. ON POS. 4(50A).
11A	SIS PUMP INLET TO CVCS CHRG. PUMP 2-FCV-63-6-B STROKE TIME 10 SECONDS	1.9 HP		3.5	20	1	T31	0.35	N	EF3-B010	10	45	3	N	REPL. MTR. WITH T29 INST. BKR. SETTING TO POS. 4(50A).
11B	PMP NO 8 TO SIS PUMP 2-FCV-63-11-B STROKE TIME 15 SECONDS	1.9 HP		3.5	20	1	T31	0.35	N	EF3-B020	20			N	REPL. MTR. WITH T29 REPL. BKR. WITH EF3-B010 SET ON POS. 4(50A).
11D	FDR. BKR. TO COMPT. 2F2 (2-FCV-63-22-B) (STROKE TIME 10 SECONDS)					1	T31	0.35	N	EF3-B010	10	45	3	N	REPL. MTR. WITH T29 INST. BKR. SETTING TO POS. 4(50A).
11E	SIS BORON INJ. TK. SHUTOFF VLV. 2-FCV-63-25-B STROKE TIME 10 SECONDS	1.9 HP		3.5	20	1	T31	0.35	N	EF3-B010	10	45	3		REPL. MTR. WITH T29 INST. BKR. SETTING TO POS. 4(50A).
12A	SIS BORON INJ. TK. INLET SHUTOFF VLV. 2-FCV-63-48-B STROKE TIME 10 SECONDS	1.9 HP		3.5	20	1	T31	0.35	N	EF3-B020	20			N	REPL. MTR. WITH T29 REPL. BKR. WITH EF3-B010, SET ON POS. 4(50A).
12B	SIS PUMP 2B-B INLET VLV. 2-FCV-63-48-B STROKE TIME 15 SECONDS	1.9 HP		3.5	20	1	T31	0.35	N	EF3-B010	10	45	3	N	REPL. MTR. WITH T29 INST. BKR. SETTING TO POS. 4(50A).
12D	CNTMT. SUMP TO RHR PUMP B-B 2-FCV-63-73-B STROKE TIME 22 SECONDS	12.8 HP		18	145	2	T47	22.25	N	EF3-B040	40			N	REPL. MTR. WITH T45 REPL. BKR. WITH EF3-B030, SET ON POS. 4(130).

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(FORCEABLE.DAT)

CONT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL OVL RELAY RELAY CAT #	MIN. TRIP POINT	WIR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. COMP. SETTING	BRK. INST. SETTING	SC. POS	MULE??	REMARKS
	2-MCC-213-B1-B														
12E	SIS TO RCS LOOPS 1 & 4 MOV 2-FCV-63-94-B STROKE TIME 20 SECONDS	16.5 HP		13.9	114	1	143	17.13	N	E-3-[illegible]	30			Y	REPL. WITH WITH 143 REPL. BRK. WITH E-3-[illegible], SET ON POS. 3(60A)
13H	SIS PUMP 2B-B OUTLET MOV 2-FCV-63-153-B STROKE TIME 10 SECONDS	1.9 HP		3.2	28	1	131	4.35	N	E-3-[illegible]	10	45	3	N	REPL. WITH WITH 131 INCR. BRK. SETTING TO POS. 4(50A)
13B	SIS PUMP OUT RCS LOOP 1 & 4 HL 2-FCV-63-157-B STROKE TIME 10 SECONDS	1.9 HP		3.2	28	1	131	4.35	N	E-3-[illegible]	12	45	3	N	REPL. WITH WITH 131 INCR. BRK. SETTING TO POS. 4(50A)
13D	SIS 2B-B DISCH TO RHRT SPECIAL VLV. 2-FCV-63-175-B STROKE TIME 10 SECONDS	0.7 HP		2.0	16	1	127	2.79	N	E-3-[illegible]	10	27	30	N	REPL. WITH WITH 127 INCR. BRK. SETTING TO POS. 2(30A)
13E	SPARE									E-3-[illegible]	15	100	3		
14H	CNTMT. SPRAY HDR. 2B ISOL. VLV. 2-FCV-72-2-B STROKE TIME 15 SECONDS	3.2 HP		5.5	30	1	135	6.3	N	E-3-[illegible]	10	50	4	N	REPL. WITH WITH 135 INCR. BRK. SETTING TO POS. 4(100A)
14B	SPARE									E-3-[illegible]	15	100	3		
14D	RHR SPRAY HDR. 2B ISOL. VLV. 2-FCV-72-41-B STROKE TIME 15 SECONDS	1.9 HP		3.5	28	1	131	4.35	N	E-3-[illegible]	20			Y	REPL. WITH WITH 131 REPL. BRK. WITH E-3-[illegible], SET ON POS 4(50A)
14E	CNTMT. SUMP TO SPRAY HDR. 2B FCV 2-FCV-72-45-B STROKE TIME 15 SECONDS	3.2 HP		5.2	36	1	134	5.79	N	E-3-[illegible]	20			Y	REPL. WITH WITH 134 REPL. BRK. WITH E-3-[illegible], SET ON POS 4(60A)
15H	RHR PUMP 2B-B INLET FCV 2-FCV-74-21-B STROKE TIME 20 SECONDS	16.5 HP		13.8	114	1	143	17.13	N	E-3-[illegible]	40			Y	REPL. WITH WITH 143 INCR. BRK. WITH E-3-[illegible], SET ON POS. 3
15B	RHR PUMP 2B-B MIN. FLOW VLV. 2-FCV-74-24-B STROKE TIME 10 SECONDS	0.7 HP		2.0	16	1	110	0.53	N	E-3-[illegible]	10	27	30	N	REPL. WITH WITH 110 INCR. BRK. SETTING TO POS. 2(30A)
15D	RHR HX 2B BYP. VLV. 2-FCV-74-35-B STROKE TIME 15 SECONDS	1.9 HP		3.5	28	1	131	4.35	N	E-3-[illegible]	10	45	3	N	REPL. WITH WITH 131 INCR. BRK. SETTING TO POS. 4(50A)
15E	SPARE									E-3-[illegible]	3	10	2		

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PREPARED TBT 4-4-90
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COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY HOUSE. CAT #	I NTR. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-B1-B															
16A	INCORE INST. RM. CLR. FAN 2B 2-MTR-31-266	3 HP	1.15	4.2	26.7	1	T36	5.79	Y	EF3-[illegible]	10	45	3	N	INCR. BKR. SETTING TO POS. 4(30A)
16B	SPARE									EF3-[illegible]	25	140	2		
16D	SL BYP CONT. APPR. (18)	500 VA								EF3-[illegible]	20			Y	
16E	POWER OUTLETS B1/1-5									EF3-[illegible]	100				NOT EVALUATED
16F1	SPARE									EF3-[illegible]	20				
16F2	SIS ACCUM. IN. FLOW ISOL. VLV. 2-FCV-63-67-B STROKE TIME 15 SECONDS	19.5 HP		25	240					[illegible]	50			Y	SEE COMM. 70
17A	BORIC ACID BATCH IN. MTR. 3 2-MTR-62-228/3	22.5KW		27.07		2				EF3-[illegible]	40			Y	
17B	ANNULUS STRUCTURE ISOL. VLV. 2-FCV-26-241-B STROKE TIME 20 SECONDS	0.67 HP		2.0	16					EF3-[illegible]	10	47	1.0	N	INSTALL 120 MTR. INCR. BKR. SETTING TO POS. 2(20A)
17D	RHR PUMP B-B L.O. PUMP B-B 2-MTR-3-1280-B	0.25 HP	1.0	0.56	3.51	1				EF3-[illegible]	3	7	1.5	Y	INSTALL 113 MTR.
17E	POWER OUTLETS B1/6-10	SEE REMRK								EF3-[illegible]	100A				NOT EVALUATED
17F1	ALT. FDR. 24V MAINE BATT. CHGR. 2 B-CHGR-251-2	1.5KW		7						[illegible]	20			Y	
17F2	INCORE INST. RM. CH. MTR. COMPR. 2B 2-MTR-31-324/2	3 HP		4.6	32					[illegible]	24			Y	
18A	SPARE									EF3-[illegible]	40				
18B	SPARE									EF3-[illegible]	20				
18C	INCORE INST. RM. CIRC. PUMP 2B 2-MTR-31-324/1	3 HP	1.15	4.2	30.0a	1	T32	4.00	N	EF3-[illegible]	10	45	3	N	REPL. MTR. WITH T33 INCR. BKR. SETTING TO POS. 4
17C	FUTURE (PER TELAS)									EF3-[illegible]	10				
18D	SPARE									EF3-[illegible]	5	22	3		
1A1	NORM. FDR. FROM 480V SHUTDOWN BD. 2B1-B									ITE-KXLG00002 ETS	800				

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VERIFIED MLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KWA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	I NTR. TRIP POINT	MTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-B2-B															
3B	EROM HDR. B ISOL. VLV. 2-FCV-3-179B-B STROKE TIME 15 SECONDS	0.33 HP		1.8	15.7	1			N	EF3		7	LO	N	BKR. ID TAG MISSING INSTALL T.3 MTR. INCR. BKR. SETTING TO POS. 3(12A)
3D	STM. GEN. NO.2 FW ISOL. VLV. 2-FCV-3-47-B STROKE TIME 65 SECONDS	39.4 HP		52	290	3			N	EF3-B-40	100			Y	INSTALL 140 MTR. REPL. BKR. WITH EF3-0100, SET ON POS. 2(630A)
4A	LOOP 3 DEAERATION LINE VLV. 2-FCV-3-193 STROKE TIME 30 SECONDS	1.6 HP		4	25	1	T31	4.35	N	EF3-0010	10	45	3	N	REPL. MTR. WITH T.8 INCR. BKR. SETTING TO POS. 4(50A)
4B	LOOP 4 DEAERATION LINE VLV. 2-FCV-3-194 STROKE TIME 30 SECONDS	1.6 HP		4	25	1	T31	4.35	N	EF3-0102	10	45	3	N	REPL. MTR. WITH T26 INCR. BKR. SETTING TO POS. 4(50A)
4C	CONT. XFMR. (10) (FOR BUS UV RELAY)	100KVA								EF3-B030	20			Y	
4D	STM. GEN. NO.4 ISOL. VLV. 2-FCV-3-180-B STROKE TIME 6.5 SECONDS	39.4 HP		52	290	3			N	EF3-B140	100			N	INSTALL 140 MTR. REPL. BKR W.TH EF3-0010, SET ON POS 2(630A)
5A	HPFP CON. HDR. FCV 0-FCV-26-15 STROKE TIME 40 SECONDS	0.07 HP		0.6	2.6	1	T6	0.36	N	EF3-0043	3	7	LO	Y	REPL. MTR. WITH T9
5B	HPFP CON HDR. FCV 0-FCV-26-16 STROKE TIME 40 SECONDS	0.07 HP		0.6	2.6	1	T6	0.36	N	EF3-0015	3	7	LO	Y	REPL. MTR. WITH T9
5E	CNTMT. SPRAY HX 2B SUPPLY CONT. VLV. 2-FCV-67-123-B STROKE TIME 90 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-0043	3	10	2	N	REPL. MTR. WITH T16 INCR. BKR. SETTING TO POS. 3(12A)
5F	CNTMT. SPRAY HX 2B DISCH VLV. 2-FCV-67-124-B STROKE TIME 90 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-0043	3	10	2	N	REPL. MTR. WITH T16 INCR. BKR. SETTING TO POS. 3(12A)
6A	SPARE									EF3-0003	3	10	2		
6B	SPARE									EF3-0003	3	10	2		
6D	RCP THERM. BARR. RTN. CNTMT. ISOL. VLV. 2-FCV-70-67-B STROKE TIME 66 SECONDS	0.7 HP	1	2.8	16					EF-ET96010	20			Y	SEE COMPT. 12D

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PREPARED TBT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KWA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT*	REMARKS
2-MCC-213-B2-B															
6E	RCP THERM. BARR. CNTMT. ISOL. VLV. 2-FCV-70-134-B STROKE TIME 66 SECONDS	0.13		0.6	2.6					EF3-E1[illegible]	20			Y	6E CONT. 16D
6F	OL BYP CONT. UPR (1D)	0.5KVA								EF3-BA.0	20			Y	
7A	SPARE									EF3-[illegible]	3	10	2		
7B	SPARE									EF3-[illegible]	3	10	2		
7D	LWR. CNTMT. 2B CLR. DISCH ISOL. VLV. 2-FCV-67-103-B STROKE TIME 66 SECONDS	0.33		1.0	5.7	1			N	EF3-A[illegible]	3	10	2	N	SHORT N-5,3A FULL INST. T16 HTR. INCR. BKR. SETTING TO POS. 3(12A)
7F	UPR. CNTMT. VT. CLR. 2A DISCH ISOL. VLV. 2-FCV-67-131-B STROKE TIME 66 SECONDS	0.13 HP		0.6	2.6	1			N	EF3-A[illegible]	3	10	2	N	INST. T11 HTR. REDUCE BKR. SETTING TO LO (7A)
8A	ERCW HDR. 2B ISOL. VLV. BEFORE STR. 2-FCV-67-24-B STROKE TIME 120 SECONDS	0.33 HP		0.95	5.7	1	T17	1-1	N	EF3-A[illegible]	3	10	2	N	INCR. BKR. SETTING TO POS. 3(12A) USE EXISTING T17 HTR.
8B	AUX. BLDG. ERCW SUPPLY HDR. 2B ISOL. 2-FCV-67-62-B STROKE TIME 120 SECONDS	0.67 HP		1.9	16	1	T25	2.3	N	EF3-A[illegible]	5	22	3	N	INCR. BKR. SETTING TO HI(40A) USE EXISTING T25 HTR.
8D	LWR. CNTMT. 2D CLR. DISCH ISOL. VLV. 2-FCV-67-111-B STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-A[illegible]	3	10	2	N	INSTALL T16 HTR. INCR. BKR. SETTING TO POS. 3(12A)
8F	UPR. CNTMT. VT. CLR. 2C DISCH ISOL. VLV. 2-FCV-67-134-B STROKE TIME 66 SECONDS	0.13 HP		0.6	2.6	1			N	EF3-A[illegible]	3	7	LO	Y	INSTALL T11 HTR.
9A	LWR. CNTMT. 2A CLR. DISCH ISOL. VLV. 2-FCV-67-88-B STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-A[illegible]	3	10	2	N	INSTALL T16 HTR. INCR. BKR. SETTING TO POS. 3(12A)
9B	LWR. CNTMT. 2C CLR. DISCH ISOL. VLV. 2-FCV-67-96-B STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-A[illegible]	3	10	2	N	INSTALL T16 HTR. INCR. BKR. SETTING TO POS. 3(12A)
9D	UPR. CNTMT. VT. CLR. 2B DISCH ISOL. VLV. 2-FCV-67-297-B STROKE TIME 66 SECONDS	0.13 HP		0.6	2.6	1			N	EF3-A[illegible]	3	7	LO	Y	INSTALL T11 HTR.

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VERIFIED MLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KWA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-B2-B															
9F	UPR. CNTMT. VT. CLR. 2B SUPL. ISOL. VLV. 2-FCV-67-138-B STROKE TIME 66 SECONDS	0.13 HP		0.6	2.6	1			N	EJ3-400	3	7	LO	Y	INSTALL TIS HTR.

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TVA WATTS BAR NUCLEAR PLANT.
FLA INFORMATION ONLY

(TWNCABLE.DAT)

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. LURN. SETTING	BKR. INST. SETTING	SET POS	ACCEPT	REMARKS
** NODE 242															
* CLASSIFICATION # 2-MCC-213-B2-B															
10A	LWR. CNTNT. 2D CLR SUPPLY ISOL. VLV. 2-FCV-67-99-B STROKE TIME 60 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	10	2	N	INSTALL T16 HTR, INCRS. BKR. SETTING TO POS. 3(120)
10B	LWR. CNTNT. 2D CLR SUPPLY ISOL. VLV. 2-FCV-67-107-B STROKE TIME 60 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	10	2	N	INSTALL T16 HTR. INCRS. BKR. SETTING TO POS. 3(120)
10D	UPR. CNTNT. VT. CLR 2D DISCH ISOL. VLV. 2-FCV-67-298-B STROKE TIME 60 SECONDS	0.13 HP		0.6	2.6	1			N	EF3-[illegible]	3	7	LO	Y	INSTAL. T11 HTR.
10F	UPR. CNTNT. VT. CLR 2D SUPPLY ISOL. VLV. 2-FCV-67-141-B STROKE TIME 60 SECONDS	0.13 HP		0.6	2.6	1			N	EF3-[illegible]	3	7	LO	Y	INSTALL T11 HTR.
11A	AUX. BLDG. AIR CLR. SUPPLY HDR. 2B ISOL. VLV. 2-FCV-67-126-B STROKE TIME 60 SEC.	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPL. HTR. WITH T16 INCR. BKR. SETTING TO POS 3(120)
11B	SPARE									EF3-[illegible]	3	10	3		
11F	HPFP TUR B HDR. FCV TO YARD 0-FCV-26-13-B STROKE 60 SECONDS	0.33 HP		0.75	5.7	1	T14	0.8	N	EF3-[illegible]	3	7	LO	N	REPL. HTR. WITH T13 INCR. BKR. SETTING TO POS.3(120)
12A	SPARE								Y	EF3-[illegible]	5	22	3		
12B	CCS HX C DISCH VLV. TO HDR. B 0-FCV-67-152-B STROKE TIME 120 SECONDS	0.67 HP	1.0	1.9	7.56	1	T25	2.3	N	EF3-[illegible]	5	22	3	N	REPLACE HTR. WITH T24 REDUCE [illegible] SETTING TO LO(14)
12D	FDR BKR. TO COMPT. 6D (2-FCV-70-87-B) STROKE TIME 60 SECONDS					1	T26	2.54	N	EF3-[illegible]	5	22	3	N	INCR. BKR. SETTING TO POS. [illegible] USE EXISTING T26 HTR
12F	ANNULUS SPR. ISOL. VLV. 2-FCV-26-244-B STROKE TIME 20 SECONDS	0.67 HP		2.8	16	1			N	EF3-[illegible]	10	27	LO	N	INSTALL T24 HTR. INCR. BKR. SETTING TO POS. 2(36A)
13A	SUPPLY HDR. 2B TO HDR. 1A ISOL. VLV. 2-FCV-67-147-B STROKE TIME 120 SECONDS	0.66 HP		1.9	12	1	T25	2.3	N	EF3-[illegible]	5	22	3	N	INCR. BKR. SETTING TO POS. 4(250) USE EXISTING T25 HTR

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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-B2-B															
13B	CCS HX BAC INLET ISOL. VLV. 2-FCV-70-14-B STROKE TIME 100 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A0V6	3	10	2	N	REPLACE HTR. WITH T16 INCR. BKR. SETTING TO 3(12A)
13D	RCP OIL CLR RETN CNTMT ISOL VLV. STROKE TIME 66 SECONDS	0.13 HP		0.6	2.6	1	T9	.48	N	EF3-A0M3	3	7	LO	Y	REPLACE HTR. WITH T11
13F	RCP OIL CLR. HDR. CNTMT ISOL. VLV. 2-FCV-70-143-B STROKE TIME 66 SECONDS	0.33 HP		1.0	5.7	1	T17	1.1	N	EF3-A0M4	3	10	2	Y	REPLACE HTR. WITH T16 INCR. BKR. SETTING TO PUS. 3(12A)
14A	SPARE									EF3-A0M3	3	10	2		
14B	RHR HX B HDR. INLET VLV. 2-FCV-70-3-B STROKE TIME 90 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A0V3	3	10	2	N	REPLACE HTR. WITH T16 INCR. BKR. SETTING TO PUS. 3(12A)
14D	CCSP 2A & 2B TO C-S OUTLET ISOL. VLV. 2-FCV-70-28-B STROKE TIME 100 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A0V2	3	10	2	N	REPLACE HTR. WITH T16 INCR. BKR. SETTING TO PUS. 3(12A)
14E	CCS PUMPS 2A-A TO 2B-B ISOL. VLV. 2-FCV-70-39-B STROKE TIME 120 SECONDS	0.67 HP		1.9	16	1	T25	2.3	N	EF3-A0AC	5	22	3	N	INCR. BKR. SETTING TO PUS. 5(16A) USE EXISTING T25 HTR
15A	RHR HX B RTN. HDR. ISOL. VLV. 2-FCV-70-75-B STROKE TIME 90 SECONDS	0.33 HP		.95	5.7	1	T17	1.1	N	EF3-A0V.	3	10	2	N	REPL. HTR. WITH T16 INCR. BKR. SETTING TO PUS. 3(12A)
15B	CCS HX B & C OUTLET ISOL. VLV 2-FCV-70-196-B STROKE TIME 100 SECONDS	0.33 HP		.95	5.7	1	T17	1.1	N	EF3-A0V.	3	-10	2	N	REPL. HTR. WITH T16 INCR. BKR. SETTING TO PUS. 3(12A)
15D	CCSP 2A & 2B TO C-S INLET ISOL. VLV. 2-FCV-70-78-B STROKE TIME 120 SECONDS	0.67 HP		1.9	16	1	T25	2.3	N	EF3-A0AC	5	22	3	N	INCR. BKR. SETTING TO PUS. 5(16A) USE EXISTING T25 HTR
15E	RHR HX B-B OUTLET VLV. 2-FCV-70-153-B STROKE TIME 90 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-A0V3	3	10	2	N	REPL. HTR. WITH T16 INCR. BKR. SETTING TO PUS. 3(12A)
16A	CCSP 2A & 2B TO C-S INLET ISOL. VLV. 2-FCV-70-76-B STROKE TIME 120 SECONDS	0.67 HP		1.9	16	1	T25	2.3	N	EF3-A0AC	5	22	3	N	INCR. BKR. SETTING TO PUS. 5(16A) USE EXISTING T25 HTR

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PREPARED JRT 4-4-90
VERIFIED JLB 4/4/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CLAR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
2-MCC-213-B2-B															
16B	FDR BKR. TO COMPT 6E (2-FCV-70-138-B)					1	T10	[illegible]	N	EF3-[illegible]	3	7	LO	Y	REPL. HTR. WITH T11
16D	SPARE									EF3-[illegible]	3	10	2		
16E	SPARE									EF3-[illegible]	3	10	2		
17A	SFPCS HX SUPPLY HDR. ISOL. VLV. 6-FCV-70-194-B STROKE TIME 100 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPLACE HTR. WITH T16 INCR. BKR. SETTING TO POS. 3(120)
17B	CCSP 2BN & 2SB TO C-S OUTLET ISOL. VLV. 2-FCV-70-29-B STROKE TIME 100 SECONDS	0.33 HP		0.95	5.7	1	T17	1.1	N	EF3-[illegible]	3	10	2	N	REPLACE HTR. WITH T16 INCR. BKR. SETTING TO POS. 3(120)
17D	SPARE									EF3-[illegible]	3	10	2		
19A	SPARE									EF3-[illegible]	5	[illegible]	3		
18D	480V BD. MN. 2B A/C CMPRSR. 2B-B 2-MTR-31-447-B	75 HP	1.15	90	526.2					FJ3-B1[illegible]	125	1600	HI	N	REPL. BKR. WITH FJ3-B175, SET ON POS. 3(1300A)
1A1	NORM. FDR FROM 480V SHUTDOWN BD. 2B2-B									ITE-[illegible] ETS	800				
1A2	ALT. FDR. FROM 480V SHUTDOWN BD. 2B1-B									ITE-[illegible] ETS	800				
2A	ERCW HDR. B ISOL VLV. 2-FCV-3-126A-B STROKE TIME 6 SECONDS	0.13 HP		0.6	2.6	1	T9	0.46	N	EF3-[illegible]	3	7	LO	Y	REPL. HTR. WITH T6
2B	ERCW HDR. B ISOL VLV. 2-FCV-3-126B-B STROKE TIME 6 SECONDS	0.13 HP		0.6	2.6	1	T9	0.46	N	EF3-[illegible]	3	7	LO	Y	REPL. HTR. WITH T6
2D	SPARE									EF3-[illegible]	5	29	4	N	
2E	STM. FLOW TO AFWP TURB. ISOL. VLV. 2-FCV-1-18-B STROKE TIME 16 SECONDS	1 HP		2.8	16	1	T29	3.44	N	EF3-0010	10	27	LO	N	REPL. HTR. WITH T26 INCR. BKR. SETTING TO POS. 2(36A)
3A	ERCW HDR. B ISOL. VLV. 2-FCV-3-179A-B STROKE TIME 15 SECONDS	0.33 HP		1.0	5.7	1			N	EF3-[illegible]	3	7	LO	N	INSTALL T13 HTR. INCR. BKR. SETTING TO POS. 3(120)

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Prepared R.H. Buchanan 1-6-90 / B.S. Bhatia Date 1-8-90
Verified B.S. Bhatia 1-21-90 / R.N. Beaver 1-24-90 Date

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TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY
(TVACABLE.BWF)

Prepared _____ Date _____
Verified _____ Date _____

Attachment No. 1
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O-L RELAY MODEL : HTR. TRIP CAT # : POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS ACCEPT?	REMARKS
** MODE 243													
* CLASSIFICATION # 1-MCC-232-A-A													
1A1	NOR. FDR. FM. 480V SHTDN. BD. 1A1-A								ITE ETS-[illegible]0002	800			
1A2	ALT. FDR. FM. 480V SHTDN. BD. 1A2-A								ITE ETS-[illegible]0002	800			
2B	FUTURE												
2F2	SPARE												
3D	SPARE												
3E	FUTURE												
3F1	SPARE												
3F2	SPARE												
4A	SPARE												
4B	SPACE												
4C	CONT. IFHR. (1PHASE)								EF3-B020	20			
4F	FUTURE												
5B	FUTURE												
5C	FUTURE												
5F	FUTURE												
5E	SPARE												
6B	SPARE												
6D	SPARE												
6E	FUTURE												
6F1	INTAKE PUMP STA. HT. IFER. SYS. A	20KVA		24.07					EF3-B030	30	N		REPLACE WITH EF3-B040

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Prepared R.H. Bunkert 1-6-90 Date B.S. Martin 1-6-90
Verified B.S. Martin / R.H. Beaver 1-21-90 Date 1-24-90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY (TVACABLE.DBF)

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Prepared _____ Date _____
Verified _____ Date _____

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Calc. No. _____
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PREPARED TBT 4-4-90
VERIFIED HLB 4/4/90

1-MCC-232-A-A

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	NTR. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
6F2	SPARE														
7A	SPARE														
7F1	SPARE														
7F2	AUX. & CONT. BLDG. 480 V RCPTS.									EF3-B100	100A			NOT EVALUATED	
8A	SPARE														
8F1	SPARE														
8F2	AUX. & CONT. BLDG. 480V RCPTS.									EF3-B100	100A			NOT EVALUATED	
9A	SPARE														
9B	SPARE														
9F1	SPARE														
9F2	AUX. & CONT. BLDG. 480V RCPTS.									EF3-B100	100A			NOT EVALUATED	
10A	SPARE														
10B	SPARE														
11A	SPARE														
11B	SPARE														
12A	FUTURE														
12B	FUTURE														
12D	SPARE														
13D	SPARE														
13DA	ICE COND. AIR HANDLING UNIT 1 (EQPT. NO. 1-AHU-1-17020)	24.0 HP		40.8	320.0					FJ3-B17500501	175A	1600	NI	NOT EVALUATED	
2A	COND. FLOOR & EQPT. DRAIN ~~SUMP PUMP NO. 1-AHU-1-17020~~ SUMP PUMP 1A	3 HP	1.15	4.6	33.85	1	135	6.3	Y	ITE EF3-A010	10	45	3	N	SET BKR TO HI
2D	HYDROGEN ELECTRIC RECOMBINER 1A-A	75KW		90.22						ITE FJ3-B125	125	1600	NI	N	SET BKR TO LO

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Prepared R.H. Bischat/BSBhatia 1-6-90 Date 1-8-90
Verified BSBhatia/MRaveen 1-21-90 Date 1-24-90

TVA WATTS BAR NUCLEAR PROJECT
TOP INFORMATION ONLY (TVACABLE.DBF)

Prepared _____ Date _____
Verified _____ Date _____

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1-MCC-232-A-A

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. POINT	TRIP HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SET SETTING	POS ACCEPT?	REMARKS
2F1	HYDROGEN DETECTION SYSTEM	8KW		9.63						1TE EF3-B020	20		Y	
3A	INCORE FLUX DETECTOR DRIVE UNIT 1D	3.42 HP		7.25	46					1TE EF3-B020	20		N NOT EVALUATED	
3B	INCORE FLUX DETECTOR DRIVE UNIT 1E	3.42 HP		7.25	46					1TE EF3-B020	20		N NOT EVALUATED	
3C	INCORE FLUX DETECTOR DRIVE UNIT 1F	3.42 HP		7.25	46					1TE EF3-B020	20		N NOT EVALUATED.	
4B	ICE CONDENSER FLOOR COOLING PUMP	22.79 HP		27.8	222.47	2	T51	24	Y	1TF EF3-L050	50 LO	330 4	N	RESET BKR TO HI
4E	ICE CONDENSER FLOOR DEFROST HTR.	30KW		36.09		2	T51A	24	~~Y~~ N	1TF EF3-B050	50		Y	Repl. HTR with T54
5A	SPREADING RM. SUPPLY FAN	0.25 HP		1.0	10.0	1	T8	2.46	N	1TF EF3-A005	5	29 4	N	NOW REPLACE WITH T18 HTR RESET BKR TO 3
6A	SPREADING RM. EXHAUST FAN A	3 HP		4.6	32	1	T34	5.79	Y	1TF EF3-A010	10	58 4	N	RESET BKR TO HI
6C	WASTE GAS COMPRESSOR PACKAGE A	25 HP	1.15	30	197.37	2	T52	36.5	N Y	1TF EF3-H050	50 HI	320 LO	N	REPLACE WITH T53 HTR RESET BKR TO 2
7B	REACTOR COOLANT PUMP 1 MOTOR HEATER	2.75KW	3.46	3.46		1	T36	6.94	N	1TE EF3-A014	10	36 2	Y	REPLACED WITH T31 HTR
13BB	ICE COND. AIR HANDLING UNIT 1 EQPT. NO. ~~1-AHU-61-20~~ 1-AHU-61-1T028	65.39KVA		78.66						FJ3-B175Ox501	175 A	1600 HI		NOT EVALUATED
13F	SPARE													
14A	SPARE													
14BA	ICE COND. AIR HANDLING UNIT 1 (EQPT. NO. 1-AHU-61-3T027)	21.0 HP		35.7	280.0					FJ3-B150Ox01	150	1600 HI		NOT EVALUATED
14BB	ICE COND. AIR HANDLING UNIT 1 (EQPT. NO. 1-AHU-61-3T027)	57.22KVA		68.82	280.0					FJ3-B150Ox01	150	1600 HI		NOT EVALUATED
14F	FUTURE													
15B	FUTURE													
15F	FUTURE													

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Page No. 01/19/90 01 Prepared R.H. Buchat / [illegible] 1-6-90 Date [illegible]-90

Verified [illegible] / [illegible] 1-21-90 Date 1-21-90

TVA WATTS BAR NUCLEAR PROJECT FOR INFORMATION ONLY (TVACABLE.DAT) Prepared _____ Date _____ Verified _____ Date _____

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PREPARED TJT 4-4-90
VERIFIED [illegible] 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	NTR. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-232-A-A														
16D	SPARE														
16F	FUTURE														
18D	LOCAL CONTROL STATION														
7D	REACTOR COOLANT PUMP 1 OIL LIFT PUMP	10 HP		13.6	81.0	1	T44	15.5	N	ITE-EJ30040	40			N	REPLACE WITH T45 HTR REPLACE BKR WITH EF3-A025 SET AT 4
8D	REACTOR COOLANT PUMP 3 MOTOR HEATER	2.75KW		3.46		1	T36	6.94	N	ITE-EJ30010	10	36	2	Y	REPLACE WITH T31 HTR
8D	REACTOR COOLANT PUMP 3 OIL LIFT PUMP	10 HP		13.6	81.0	1	T45	17.13	Y	ITE-EJ30025	25	125	3	N	~~[illegible]~~ RESET BKR AT 4
9D	REACTOR UPPER COMP. COOLER FAN 1A	5 HP		9.1	39.5	1	T40	11.03	Y	ITE-EJ30025	25	75	LB	Y	
10D	REACTOR UPPER COMP. COOLER FAN 1C	5 HP		9.1	39.5	1	T40	11.03	Y	ITE-EJ30025	25	105	2	Y	
10F	STUB TENSION HOIST PWR OUTLETS									ITE-EJ30020	20			NOT EVALUATED	
11D	REACTOR COOLANT DRAIN TANK PUMP 1A	7.5 HP	1.15	9.5	66.74	2	T45	18.5	N	ITE-EJ30030	30			N	REPLACE WITH T40 HTR REPLACE BKR WITH EF3-A015 SET AT 3
11F	REACTOR LOWER COMPT. UNIT HTR. 1A	10KW		12.03						ITE-EJ30020	20			Y	
12F	CONT. INST. RM. UNIT HTR. 1A	5KW		6.02						ITE-EJ30020	20			Y	
13A	REACTOR BLDG. MANIPULATOR CRANE 1	8 HP		13.6	81.0					ITE-EJ30040	40			NOT EVALUATED	
14D	ICE COND. EXD WALL DOOR 81	2 HP	1.15	2.9	25.0	1	T29	3.44	N	ITE-EJ30010	10	36	2	N	RESET BKR TO 4 REPLACE WITH T30 HTR.
15A	REACTOR UPPER COMPT. HTR. 1A	50KW		60.2						ITE-EJ30070	70			Y	
15D	CONT. PURGE AIR SUPPLY FAN 1A	50 HP	1.0	62	350	3	T56	73.08	Y	ITT EJ38100	100			N	REPLACE BKR WITH EF3-A100 SET AT 3
16A	REACTOR UPPER COMPT. HTR. 1C	50KW		60.2						ITT-EJ30070	70			Y	
16D	CONT. PURGE AIR EXHAUST FAN	50 HP	1.0	62.0	312.0	3	T56	73.08	Y	ITT-EJ38100	100	345 750	3	Y	

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Prepared Z.H. Dashet 1-4-90 / B.S. Bhatia 1-4-90 Date

Verified B.S. Bhatia 1-15-90 / T.M. McCauley 1/24/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.BWI)

WBN EEB-MS-TI08-0008 R0

Attachment No. 1
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COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR. TRIP POINT / CAT # : HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** MODE 244													
* CLASSIFICATION # 1-MCC-232-B-B													
1A1	MOR. FDR. FR. 480V SHUTDOWN BOARD 1B1-B							ETS-KM3580-015	800				
1A2	ALT. FDR. FR. 480V SHUTDOWN BOARD 1B2-B							ETS-KM3560-015	800				
2B	FUTURE												
2F2	SPARE												
3D	SPARE												
3E	FUTURE												
3F1	SPARE												
3F2	SPARE												
4A	SPARE												
4B	SPARE												
4C	CONT. EFWR. (1 PHASE)							EF3-0020	20			Y	
4D	SPARE							EF3-0020	20				
4E	SPARE							EF3-0020	20				
4F	FUTURE												
5A	SPARE												
5B	AUX. DIST. PNL. 1	1.50KVA		3.14				EF3-0020	20			Y	
5F	FUTURE												
6B	SPARE												
6F2	SPARE												
7A	SPARE												

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Prepared R. H. Buchat 1-5-90 / B. C. Bhatt 1-5-90 Date

Verified B. C. Bhatt 1-15-90 / T. M. McCarty 1/21/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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1-MCC-232-B-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : CAT # :	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
7F1	SPARE														
7F2	SPARE														
8A	SPARE														
8F1	INTAKE PUMP STATION HEATER TR. SYSTEM B	20KVA		24.07						EF3-0030	30A			N	Repl Bkr with EF3-0035
8F2	SPARE														
9A	SPARE														
9D	SPARE														
9F1	SPARE														
9F2	SPARE														
10A	SPARE														
10D	SPARE														
11A	SPARE														
11D	SPARE														
12A	FUTURE														
12D	FUTURE														
12D	SPARE														
13A	SPARE														
14A	SPARE														
15D	SPARE														
15F	SPARE														
16D	SPARE														
16F	FUTURE														

Prepared R. H. Bucheit 1-5-90 / B. S. Bhatia 1/5/90 Date

Verified B. S. Bhatia 1-15-90 / T. M. McCauley 1/26/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBNEEB-MS-TI08-0008 R0
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PREPARED TBT 4-4-90
VERIFIED 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-232-B-B														
2A	CONTAINMENT FLOOR & EQUIPMENT DRAIN SUMP PUMP 1B	3 HP		4.3	33.05	1	T33	5.43	Y	ITE-EF34010	10	45	3	N	Inc Bkr Inst Setting To Pos Hi. (84A)
2B	HYDROGEN ELEC. RECOMBINER 1B-B	75KW		90.22						ITE-FJ30125	125	750	LO	Y	
2F1	HYDROGEN DETECTION SYSTEM	8KW		9.63						ITE-EF30040	20			Y	
3A	INCORE FLUX DETECTOR DRIVE UNIT 1A	3.42 HP		7.25	46.0					ITE-EF30020	20			Y	
3B	INCORE FLUX DETECTOR DRIVE UNIT 1B	3.42 HP		7.25	46.0					ITE-EF30020	20			Y	
3C	INCORE FLUX DETECTOR DRIVE UNIT 1C	3.42 HP		7.25	46.0					ITE-EF30020	20			Y	
5E	INCORE INST. ROOM EXHAUST SYSTEM FAN	1/4 HP		1.0	10	1	T16	.99	N	ITE-EF34003	3	10	2	N	Repl Htr with T18 (1.21A) Incr. Bkr Setting to Hi (84A)
6A	SPREADING ROOM EXHAUST FAN B	3 HP		4.6	32	1	T34	5.79	Y	ITE-EF34010	10	50	4	N	Incr. Bkr Setting to Hi (84A)
6C	ICE CONDENSER FLOOR COOLING PUMP 1B	25 HP		27.8	182.5	2	T51	34	Y	ITE-EF34050	30	220	4	N	Incr. Bkr Setting to Hi (84A)
6D	ICE CONDENSER FLOOR DEFROST HEATER 1B	30KW		36.09		2	T51A	34	N	ITE-EF34050I	30			Y	Repl Htr with T54 (1.21A)
6E	INCORE INST. ROOM PURGE EXHAUST FAN	1/3 HP		1.0	10.0	1	T16	0.99	N	ITE-EF34003	3	10	2	N	Repl Htr with T18 (1.21A) Incr Bkr Setting To Hi (84A)
6F1	CONTROL BAY SUMP PUMP 1	5 HP		7.25	46.0					ITE-EF30020	20			Y	
7B	REACTOR COOLANT PUMP 2 MOTOR HEATER	2.75KW		3.31		1	T36	6.94	N	ITE-EF34010	10	50	4	N	Repl Htr with T30 (3.21A) Incr. Bkr Setting To Hi LO
7D	REACTOR COOLANT PUMP 2, OIL LIFT PUMP	10 HP	1.15	13.5	78.95	1	T44	15.5	N	ITE-EF30040	40			N	Repl Htr with T45 Repl Bkr with EF-40E3, set on Pos 4 (72A)
8B	REACTOR COOLANT PUMP 4 MOTOR HEATER	2.75KW		3.31		1	T36	6.94	N	ITE-EF34010	10	36	2	N	Repl Htr with T30 (3.21A) Reduce Bkr Setting To Lo
8D	REACTOR COOLANT PUMP 4, OIL LIFT PUMP	10 HP		13.6	81	1	T44	15.5	N	ITE-EF30040	40			N	Repl Htr with T45 Repl Bkr with EF-40E3 setting 4
9B	REACTOR UPPER COMPT. COOLER FAN 1B	5 HP		9.1	39.5	1	T40	11.03	Y	ITE-EF30025	25	75	LO	Y	

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Prepared R.H. Buckett / B.S. Bhatt 1-5-90 Date 1-5-90

Verified B.S. Bhatt 1-15-90 / T.M. McCarty 4/21/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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Attachment No. 7
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PREPARED TBT 4-4-90
VERIFIED JLB 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-232-B-B														
10B	REACTOR UPPER COMPT. COOLER FAN 1B	5 HP		9.1	39.5	1	T40	11.03	Y	ITE-EF2-025	25	105	2	N	REDUCE BKR SETTING TO LO (75A)
10F	REACTOR BUILDING JIB CRANE	5 HP		7.25	46.0					ITE-EF30020	20			Y	
11B	REACTOR COOLANT DRAIN TANK PUMP 1B	15 HP	1.15	18.2	110.42	2	T49A	26.0	N	ITE-EF30140	100			N	REPL HTR WITH T48 REPL BKR WITH EF3-1080 SET ON POS 3 (2140)
11F	REACTOR LOWER COMPT. UNIT HEATER 1B	10KW		12.6						ITE-EF30020	20			Y	
12F	CONTAINMENT INST. ROOM UNIT HEATER 1B	5KW		6.02						ITE-EF30010	20			Y	
13B	ICE CONDENSER END WALL DOOR 0 1B	2 HP	1.15	2.9	25.0	1	T29	3.44	N	ITE-EF30080	10	36	2	N	INCR BKR SETTING TO 2054. REPL HTR WITH T30
13F	ICE CONDENSER BRIDGE CRANE	0.5 HP	1.0	2.0						ITE-EF30050	50			NOT EVALUATED	
14B	RCC CHARGE HOIST	1/3 HP		1.0	10.0	1	T12	.64	N	ITE-EF30003	3	7	LB	N	REPL HTR WITH T 18 (1.21A) INCR BKR SETTING TO POS HI
14B	ICE CONDENSER AIR HANDLING UNITS									ITE-F33150	150	1600	HI	NOT EVALUATED	
14F	EQUIPMENT HATCH HOIST	10/3.33HP	1.0	145 ea 88.6	100.28					ITE-EF.3040	40			N	REPL BKR WITH EF3-8050
15A	REACTOR UPPER COMPT. HEATER 1B	50KW		60.2						ITE-EF30070	70			Y	
15B	CONTAINMENT PURGE AIR SUPPLY FAN 1B	50 HP	1.0	62.0	250.0	3	T57	80	N	ITE-EF30100	100	5 700	3	Y	REPL HTR WITH T56 (74.0A)
16A	REACTOR UPPER COMPARTMENT HEATER 1B	50KW		60.15						ITE-EF30070	70			Y	
16B	COMPARTMENT PURGE AIR EXHAUST FAN 1B	50 HP	1.0	62	312	3	T57	80	N	ITE-EF30100	100	5 700	3	Y	REPL HTR WITH T 56 (74.0A)

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SARGENT & LUNDY

Page No. 1
01/22/90

Prepared R.H. Bucket 1-18-90 / B.S. Bhatia 1-20-90 Date

Verified B.S. Bhatia 1-21-90 / T.M. Pt 1/22/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(IVACABLE.DBF)

WBN ~~SSB~~-NS-TI08-0008 R0
Attachment No. 1
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KW	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : CAT # :	HTS. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPTABLE	REMARKS
** NODE 245															
* CLASSIFICATION # 2-NCC-232-A-A															
1A1	NOR. FDR. FM. 480V SHUTDOWN BOARD 2A1-A									ETS-KM3S0*#0	800				
1A2	ALT. FDR. FM. 480V SHUTDOWN BOARD 2A2-A									ETS-KM3S0X002	800				
2B	FUTURE														
2F2	SPARE														
3D	SPARE														
3E	FUTURE														
3F1	SPARE														
3F2	SPARE														
4A	SPARE														
4B	SPARE														
4C	CONT. IFNR. (1 PHASE)									EF3-D020	20		Y		
4F	FUTURE														
5B	FUTURE														
5C	FUTURE														
5E	SPARE														
5F	FUTURE														
6A	SPARE														
6B	SPARE														
6D	SPARE														
2A	CONTAINMENT FLOOR & CONTAINMENT DRAIN SUMP PUMP 2A 2-MTR-77-125A	3 HP	1.0	4.3	35.85	1	T33	5.43	Y	ITE-EF3AW10	10	45	3	N	Change Breaker to pos. Rt

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SARGENT & LUNDY

Page No. 2
01/22/90

Prepared R.H. Burchett / B.S. Abbitt 1-18-90 Date 1-20-90

Verified B.S. Abbitt / T.M. McCauley 1-20-90 Date 1/23/90

TVA WATTS BAR NUCLEAR PROJECT
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(TVACABLE.DBF)

WBN EEB-NS-TI08-0008 RO

Attachment No. 1
Calc. No.
Sheet of

PREPARED TBT 4-4-90
VERIFIED 4/4/90

COMPT. NO.	SERVICE	RATING HP/KVA	DERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	I NTR. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-232-A-A														
2B	HYDROGEN ELECT. RECOMBINER 2A-A	75KW		90.22						ITE-CF3015	125			Y	
2F1	HYDROGEN DETECTION SYSTEM	8KW		9.63						ITE-CF3030	20			Y	
3A	INCORE FLUX DETECTOR UNIT 2D	0.25 HP		3.7	12.5					ITE-CF3007	20			Y	
3B	INCORE FLUX DETECTOR UNIT 2E	0.25 HP		3.7	12.5					ITE-CF3009	20			Y	
3C	INCORE FLUX DETECTOR UNIT 2F	0.25 HP		3.7	12.5					ITE-CF3020	20			Y	
4B	ICE CONDENSER FLOOR COOLING PUMP 2-MTR-61-51	22.79 HP		27.0	202.0	2	T51	34.0	Y	ITE-CF3L450	30 LB	330	4	N	change breaker to pos. HZ
4E	ICE CONDENSER DOOR DEFROST MOTOR 2-MTR-61-92	30KW		36.09		2	T51	34.0	N	ITE-CF3040	50			Y	change heater to T54
5A	SPARE														
6E	FUTURE														
6F1	SPARE														
6F2	SPARE														
7A	SPARE														
7F1	SPARE														
7F2	AUX. & CONT. BLDG. 480V RCPTS.									EF3-03100	100				
8A	SPARE														
8F1	SPARE														
8F2	AUX. & CONT. BLDG. 480V RCPTS.									EF3-0810J	100				
9A	SPARE														
9B	SPARE														
9F1	SPARE														
9F2	SPARE														

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SARGENT & LUNDY

Prepared R.N. Burchett / B.S. Abatie 1-18-90 Date

Verified B.S. Abatie / R.N. Burchett 1-21-90 / 1/23/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DAT)

WBNEEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No.
Sheet of

2-MCC-232-A-A

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR. TPIP CAT 8 : POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
10A	SPARE													
10B	SPARE													
11A	SPARE													
11B	SPARE													
12A	FUTURE													
12B	FUTURE													
12D	SPARE													
13B	SPARE													
13F	SPARE													
14A	SPARE													
14F	FUTURE													
15B	SPARE													
15F	FUTURE													
16B	SPARE													
16F	FUTURE													
6A	SPARE													
6C	WASTE GAS COMPRESSOR PACKAGE B.	25 HP	1.15	30	197.37	2	T52	36.5	N	ITE-EF3D950	50 MI	320	LB	N Change heater to T5.; Breaker to pos. 2
7D	REACTOR COOLANT PUMP 1 OIL LIFT PUMP	10 HP	1.0	13.5	88.99	1	T44	15.5	Y	ITE-EF3H925	25	170	4	Y
7D	REACTOR COOLANT PUMP 1 MOTOR HEATER	2.75KW		3.31		1	T36	6.94	N	ITE-EF3A010	10		2	Y Change heater to T30. Breaker to pos. 2
8D	REACTOR COOLANT PUMP 3 MOTOR HEATER	2.75KW		3.31		1	T36	6.94	N	ITE-EF3H410	10	36	2	Y Change heater to T30
8D	REACTOR COOLANT PUMP 3 OIL LIFT PUMP	10 HP	1.0	13.5	88.99	1	T44	15.5	Y	ITE-EF3H425	25	125	3	N Change Breaker to pos. 4

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Prepared R.H. Rembert 1-18-90 / B.S. Bhatia 1-20-90 Date

Verified B.S. Bhatia 1-21-90 / R.M. Bailey 4/23/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY
(TVACABLE.DBF)

WBNEEB-MS-TIAS-0008 R0
Attachment No. 7
Calc. No.
Sheet of

PREPARED TST 4-4-90
VERIFIED JLB 4/4/90

2-MCC-232-A-A

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	NTR. TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
9B	REACTOR UPPER COMPARTMENT COOLER FAN 2A	5 HP		9.1	39.5	1	140	11.03	Y	ITE-EF3A015	25	75	LO	Y	
10B	REACTOR UPPER COMPARTMENT COOLER FAN 2C	5 HP		9.1	39.5	1	144	15.5	N	ITE-EF3A025	25	105	2	N	Change heater to T40 breaker to pos LO
10F	STUD TENSION HOIST 2HST-70-ST-1 TO 3									ITE-EF3A020	20				
11B	REACTOR COOLANT DRAIN TANK PUMP 2A	7.5 HP	1.15	9.5	52.62	2	147	22.25	N	ITE-EF3B030	30				Change heater to T40
11F	REACTOR LOWER COMPARTMENT UNIT HEATER 2A	10KW		12.6						ITE-EF3A020	20			Y	
12F	CONTAINMENT INST. ROOM UNIT HEATER 2A	5KW		6.3						ITE-EF3B020	20			Y	
13A	REACTOR BUILDING MANIPULATOR CRANE	1 HP		13.6	81.0					ITE-EF3B040	40			N	Change breaker to EFS-B020
13B	ICE CONDENSER AIR HANDLING UNITS									FJ3B175	150	1600	HI		
14B	ICE CONDENSER END WALL DOOR # 1	2 HP	1.15	2.9	25	1	129	3.44	N	ITE-EF3A010	10	36	2	N	Change heater to T30, breaker to pos. 4
14B	ICE CONDENSER AIR HANDLING UNITS	57.22 KVA	95.7	6192	280					ITE-EF3B150	150	1600	HI		
15A	REACTOR UPPER COMPARTMENT HEATER 2A	50KW		60.2						ITE-EF3B070	70			Y	
15B	CONTAINMENT PURGE AIR SUPPLY FAN 2A	50 HP	1.0	62	350	3	T56	73.00	Y	ITE-EF3A100	100	750	3	Y	
16A	REACTOR UPPER COMPARTMENT HEATER 2C	50KW		60.2						ITE-EF3B070	70			Y	
16B	CONTAINMENT PURGE AIR EXHAUST FAN 2A	50 HP	1.0	62.0	312.0	3	T56	73.00	Y	ITE-EF3A100	100	760	3	Y	

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SARGENT & LUNDY

Page No. 1
01/22/90

Prepared R.A. Bruchert 1-8-90 Date 1-10-90
Verified 1-16-90 Date 1/21/90

WAN CEB-MS-TI08-0008 RO
Attachment No. 1
Calc. No.
Sheet of

A WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL : HTR CAT # :	TRIP INT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
** MODE 246															
* CLASSIFICATION # 2-MCC-232-B-B															
1A1	MOR. FDR. FM. 480V SHUTDOWN BOARD 2B1-B									EMSB0002	800				
1A2	ALT. FDR. FM. 480V SHUTDOWN BOARD 2B2-B									EMSB0002	800				
2B	FUTURE														
2F2	SPARE														
3D	SPARE														
3E	FUTURE														
3F1	SPARE														
3F2	SPARE														
4A	SPARE														
4B	SPARE														
4C	AMM. BKR.														
4D	SPARE														
4E	SPARE														
4F	FUTURE														
5A	SPARE														
5B	AUX. DIST. PNL. FDR	1.5 KVA		1.81											
5F	FUTURE														
6A	SPARE														
6B	SPARE														
6F2	AUX. & CONT. BLDG. 480V RCPTS.									EF3-B100	100				NOT EVALUATED

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Prepared R.H. Buchert 1-8-90 Date 1-10-90

Verified 1-16-90 / T.M. McCarthy 1/24/90 Date

WBNEEB-MS-TI08-0005 R0

Attachment No. 1
Calc. No.
Sheet of

WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	NTL. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-232-B-B														
7A	SPARE														
7F1	SPARE														
7F2	SPARE														
8A	SPARE														
8F1	SPARE														
8F2	AUX. & CONT. BLDG. 480V RCPTS									EF3-0100	100				NOT EVALUATED
9A	SPARE														
9D	SPARE														
9F1	SPARE														
9F2	SPARE														
10A	SPARE														
10D	SPARE														
11A	SPARE														
11D	SPARE														
12A	FUTURE														
12D	FUTURE														
12D	SPARE														
13A	SPARE														
14A	SPARE														
15D	SPARE														
15F	SPARE														
16D	SPARE														
16F	FUTURE														

Page No. 3
01/22/90

Prepared R. N. Buchat / [illegible] Date 1-8-90 / 1-10-90

Verified [illegible] / C. M. McCarley Date 1-16-90 / 1/21/90

WBN-EGS-MS-TIC8-0005 RO

Attachment No. 1
Calc. No.
Sheet of

PREPARED TRT 4-4-90
VERIFIED

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

COMPT. NO.	SERVICE	RATING HP/KWA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	2-MCC-232-B-B														
2A	CONTAINMENT FLOOR AND EQUIPMENT DRAIN SUMP PUMP 2B	3 HP	1.0	4.3	33.05	1	T33	3.43	Y	ITE-6F3A010	10	45	3	N	INCR BKR INS SETTING TO POS. HI
2B	HYDROGEN ELEC. RECOMBINER 2B-B	75KW		90.22						ITE-F23B125	125	1640	HI	N	SET ON LO
2F1	HYDROGEN DETECTION SYSTEM	8KW		9.63						ITE-6F3B020	20			Y	
3A	INCORE FLUX DETECTOR DRIVE UNIT 2A	3.42 HP		7.25	46.0					ITE-6F3B020	20			Y	
3B	INCORE FLUX DETECTOR DRIVE UNIT 2B	3.42 HP		7.25	46.0					ITE-6F3B020	20			Y	
3C	INCORE FLUX DETECTOR DRIVE UNIT 2C	3.42 HP		7.25	46.0					ITE-6F3B020	20			Y	
5E	INCORE INST. ROOM PURGE SUPPLY FAN	1/4 HP		1.0	10.0	1	T16	0.99	N	ITE-6F3A003	3	16	4	N	REPL HTR WITH T18 INCR BKR SETTING TO HI
6A															
6C	ICE CONDENSER FLOOR COOLING PUMP	22.79 HP		32.3	182.5	2	T51	34	N	ITE-6F3B050	50	330	4	N	REPL HTR WITH T55 INCR BKR SETTING TO HI
6D	ICE CONDENSER FLOOR DEFROST HEATER	30KW		36.09		2	T51	34	N	ITE-6F3B050	50			N	REPL HTR WITH T54 REPL BKR WITH BFS-8060
6E	INCORE INST. ROOM PURGE EXHAUST FAN	1/3 HP		1.0	10.0	1	T16	0.99	N	ITE-6F3A003	3	10	2	Y	REPL HTR WITH T18
6F1	CONTROL BAY SUMP PUMP 1	5 HP		7.25	46.0					ITE-6F3B020	20			Y	
7B	REACTOR COOLANT PUMP 2 MOTOR HEATER	2.75KW		3.31		1	T36	6.94	N	ITE-6F3A010	10	36	2	N	REPL HTR WITH T30 REDUCE BKR SETTING TO LO.
7D	REACTOR COOLANT PUMP 2 OIL LIFT PUMP	10 HP	1.15	13.5	78.94	1	T44	15.5	N	ITE-6F3A025	25	170	4	Y	REPL HTR WITH T45
8B	REACTOR COOLANT PUMP 4 MOTOR HEATER	2.75KW		3.31						ITE-6F3A010	10			Y	
8D	REACTOR COOLANT PUMP 4 OIL LIFT PUMP	10 HP	1.0	13.5	88.99	1	T44	15.5	N	ITE-6F3A025	25	170	4	Y	REPL HTR WITH T45
9B	REACTOR UPPER COMPARTMENT COOLER FAN 2B	5 HP		7.25	46.0	1	T40	11.03	N	ITE-6F3A025	25	75	1	N	REPL HTR WITH T38 INCR BKR SETTING TO 2/10-79

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Page No.
01/22/90

Prepared R.A. Buchanan 1-8-90 / [illegible] 1-10-90 Date

Verified [illegible] 1-16-90 / T.H. McCarthy 1/24/90 Date

TVA WATTS BAR NUCLEAR PROJECT
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WBN EEB-MS-TI08-0006 R0

Attachment No. 1
Calc. No.
Sheet of

PREPARED JRT 4-4-90
VERIFIED DLB 4/4/90

2-MCC-232-B-B

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	INST POS	ACCEPT?	REMARKS
10D	REACTOR UPPER COMPARTMENT COOLER FAN 2B	5 HP		7.25	46.0	1	T40	11.03	N	ITE-6F36025	25	105	2	YES	REPL HTR WITH T38 (8.8A)
10F	REACTOR BUILDING JIB CRANE	7.5/2.5HP	1.0	10/7.5	75.21					ITE-1F30020	20			Y	
11D	REACTOR COOLANT DRAIN TANK PUMP 2B	15 HP	1.15	18.2	118.42	2	T47	22.25	N	ITE-6F30050	50			N	REPL HTR WITH T48 (23.11A) REPL BKR WITH EFS-1050 SET ON POSITION 3 (250A)
11F	REACTOR LOWER COMPARTMENT UNIT HEATER 2B	10KW		12.03						ITE-6F30020	20			Y	
12F	CONTAINMENT INST. ROOM UNIT HEATER 2B	5KW		6.1						ITE-1F30020	20			Y	
13D	ICE CONDENSER END WALL DOOR 2B	2 HP	1.15	2.9	25.0	1	T29	3.44	N	ITE-6F36010	10	36	2	N	REPL HTR WITH T30 (3.89A) INC BKR SETTING POS TO 4
13D	ICE CONDENSER AIR HANDLING UNITS									ITE-6F30175	175	1600	HI	Not	Evaluated
13F	ICE CONDENSER BRIDGE CRANE	10/3.3 HP		14.3						ITE-6F30050	50			Not	Evaluated
14D	RCC CHARGE HOIST	1/3 HP		1.0	10.0	1				ITE-7F36003	3	7	LO	N	INC. BKR SETTING POS TO 4' INCL T18 HTR.
14D	ICE CONDENSER AIR HANDLING UNITS									ITE-6F30150	150	1600	HI	Not	Evaluated
14F	EQUIPMENT HATCH HOIST	10 HP		13.6	81.0					ITE-1F30040	40			N	Repl Bkr. with EFS-8020
15A	REACTOR UPPER COMPARTMENT HEATER 2B	50KW		60.2						ITE-6F30070	70			Y	
15D	CONTAINMENT PURGE AIR SUPPLY FAN 2B	50 HP	1.0	62	350	3	T56	73.9	Y	ITE-1F36100	100	~~350~~ 5	3	Y	
16A	REACTOR UPPER COMPARTMENT HEATER 2B	50KW		60.15						ITE-6F30070	70			Y	
16D	CONTAINMENT PURGE AIR EXHAUST FAN 2B	50 HP	1.0	62	312	3	T56	73.9	Y	ITE-6F36100	100	750	3	Y	

WBN EEB-MS-TI08-0008, R0

Attachment 1

480V POWER DIST. CAB. NO.	BKR MFR	BKR MODEL NO.	BKR SETTING (A)	BKR QUANTITY	FUSE 'A' MFR	FUSE 'A' MODEL NO.	FUSE 'A' SETTING (A)	FUSE 'A' QUANTITY	FUSE 'B' (SEPARATELY INSTALLED OUTSIDE CABINET) MFR	FUSE 'B' MODEL NO.	FUSE 'B' SETTING (A)	FUSE 'B' QUANTITY	PRESSURIZER HEATER IDENTIFICATION SEE NOTE ⑥
1-DPL-68-341 A-A	FEDERAL PACIFIC	XJL	100	7	FEDERAL PACIFIC	XJL	225	21	BUSSMANN	JJS	225	21	1-HTR-68-341A/A1-A THRU A7-A
△ F			100	6			225	18			225	18	341F/D1 THRU D6
D-B			100	7			225	21			225	21	341D/B1-B THRU B7-B
△ H			100	6			225	18			225	18	341H/C1 THRU C6
2-DPL-68-341 A-A			100	7			225	21			225	21	2-HTR-68-341A/A1-A THRU A7-A
△ F			100	6			225	18			225	18	341F/D1 THRU D6
D-B			100	7			225	21			225	21	341D/B1-B THRU B7-B
△ H			100	6			225	18			225	18	341H/C1 THRU C6

NOTES: ① '△' SYMBOL SHOWN FOR NON-SAFETY RELATED LOADS FROM DESIGNATED POWER CABINETS.

② EACH SAFETY RELATED LOAD FEEDING CABINET HAS 7 THREE-PHASE CIRCUITS.

③ EACH NON-SAFETY RELATED LOAD FEEDING CABINET HAS 6 THREE-PHASE CIRCUITS.

④ INDIVIDUAL CIRCUIT HAS BREAKER, FUSE 'A' AND FUSE 'B' IN SERIES.

⑤ EACH PRESSURIZER HEATER IS RATED 69.2.4 KW (83.28 A). BREAKER IS 120% FLC. (All breakes require replacement)

POWER CIRCUITS TO UNIT 1 & 2 PRESSURIZER HEATERS.

Attachment No. _____
Calc. No. _____
Sheet _____ of _____

PREPARED BY: K MAJUMDAR 1/25/90

REVIEWED BY: B.S. Bhatia 1-30-90

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Prepared JBW for JMP Date 2/2/90 4-4-90 Checked H. [illegible] Date 2/2/90 4/4/90

0. Revision Status: Revision 0, prepared 1-26-90, first issue

1. Purpose

The purpose of this calculation is to develop guidelines for setting 480 V load breakers at MCCs and switchgear fuses, and to specify the method of selecting the overload heaters for low voltage motors. The settings for MCC feeder breakers are not included in this calculation. (REFER TO REFERENCE 3.1 FOR SETTING OF MCC FEEDER BREAKERS)

Calc. No. 8573-27-EAC-3	
Rev. 0	Date 1-26-90
Page 1 of 21	
Proj. No. 8573-27	

Safety-Related Client: TVA

PROJ. No. 8573-27		1 of 21
PROJECT Watts Bar		
PREPARED James M. Bedrick		1-26-90
REVIEWED H. [illegible]		1-26-90
APPROVED James B. Wisniewski		1-26-90

2. Assumption:

All motors at Watts Bar have standard efficiencies. The instantaneous unit pickup values will be based on this assumption.

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3. Sources of Design Input Information (References)

3.1 Sargent and Lundy standard ESC-152, 1-5-87 "Electrical Engineering Reference for 480 V Switchgear Circuit Breaker Ratings and Settings" (B43881221907) | R15

3.2 Sargent and Lundy standard ESC-154, 11-11-85 "Electrical Engineering Reference for the Application of 480 Volt AC Air Circuit Breakers and Magnetic Contactors" (B43881221908) | R15

3.3 ANSI Appendix C57.96 "Guide for Loading Dry-Type Distribution and Power Transformers"

3.4 Document DS0684E2, pages D8, D11, D12 Revision 1 "Class 630 Heater Selection Tables" for ITE thermal overload relays
RIMS 851226B003

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3.5 45W760-62-3, rev F
45W760-62-7, rev K
45W760-62-5, rev H
45W760-67-4, rev H
45W760-270-2, rev J
(These drawings indicate that the overload relays for the MOVs are normally bypassed, and that 3 heaters are used for each motor.)

3.6 Industrial Power Systems Handbook by Beeman, 1955

3.7 TVA Procedure Method PMS6-18 R2 "Motor Overload Heater Selection"

Prepared JBW for JMP Date 2/2/90 Checked HA Date 2/2/90

.10 Amptector I.-A Curve No. 705501, November 1978

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4.0 Design Input Data

There is no design input data for this calculation, since the settings of particular breakers are not analyzed in this calculation.

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5.0 Documentation of Assumptions

Not Applicable

Prepared JBW for JMP Date 2/2/90 Checked HA Date 2/12/90

.0 Analysis
.1 Setting Philosophy

The setting ranges have been selected so as o emphasize the continued operation of the loads ather than motor protection, in accordance with VA design practice.

1.1 The pickup points for the long time delay units the switchgear breakers, and the overload heater tings, have been selected to avoid false trips heavy load conditions, in accordance with reference 3.7.

.2 The setting range of magnetic only breaker. s been selected to avoid false trips upon motor ergization. If the required setting is higher han 13 times the motor full load current, some amage to the overload heater may occur under high impedance fault condition. It is felt hat it is preferable to risk this damage, than to sk a false trip due to dc offset at a critical me such as during a LOCA.

~~Note that overload heaters should be placed after a fault downstream of the starter~~ RIS

Prepared JBW for JMP Date 2/2/90 Checked AA Date 2/2/90

.2 480 V Switchgear Circuit Breakers Feeding Motors

.2.1 Long Time Pickup Setting for 1.0 Service Factor Motors

REFERENCE 3.1 PROVIDES GUIDANCE ON MOTOR PROTECTION. CONSIDER ~~The TVA procedure method PM86 18 R2 (Reference 3.7)~~ ~~specifies~~ a degree of protection between 115% and 130% f the motor full load current. Apply this criterion to e switchgear motors by considering the above ercentages to be the pickup values after a tolerance applied. To find the nominal pickup value range, ivide the above numbers by .9 to account for a % tolerance

Minimum Pickup Value-128% of motor full load current
Maximum Pickup Value-144% of motor full load current

2.2 Long Time Pickup Setting for 1.15 Service Factor Motors

CONSIDER A ~~The above TVA procedure method specifies a~~ egree of protection between 125% and 140% of the otor full load current for 1.15 service factor motors. o find the nominal pickup value range, divide the bove numbers by .9 to account for a 10% tolerance.

Minimum Pickup Value-139% of motor full load current
Maximum Pickup Value-156% of motor full load current

5.2.3 Long Time Delay Unit Time Settings

A typical 200 hp motor has a cold start locked rotor thermal limit time of 18 seconds and a hot start thermal limit time of 12 seconds. ~~(Reference 3.8)~~

The starting time of a 250 hp cooling tower fan was 3.4 seconds at 100% voltage and 5.3 seconds at 80% voltage. The hot start thermal limit time was 15 seconds at 100% voltage. The cold start thermal limit time was 25 seconds at 100% voltage. ~~(Reference 3.9)~~

Pump motors generally have shorter acceleration times than fan motors.

The lower edge of the tripping band should be greater than 5 seconds and less than 10 seconds when a pump motor draws locked rotor current.

The lower edge of the tripping band should be greater than 10 seconds and less than 15 seconds when a fan motor draws locked rotor current.

Prepared JBW for TMP Date 2/2/90 Checked [illegible] Date 2/2/90

2.4 Instantaneous Unit Setting

From figure 1.22 of reference 3.6, the multiplying factor for DC decrement at $\frac{1}{2}$ cycle for $X/R \approx 8$ is about 1.4.

Increase the factor by 1.33 for a limit of 33 Volts/Hz during bus transfer. This limit takes into account both overvoltage and phase angle difference.

Divide by .9 to account for breaker tolerance

$$1.33 \cdot \frac{1}{.9} = 2.07 \approx 2.00\,\%/1$$

The minimum setting of the instantaneous unit should be 200% of locked rotor current.

Use a band of 50%.

The maximum setting of the instantaneous unit should be 250% of locked rotor current.

.3 Magnetic Only Molded Case Circuit Breakers Feeding Motors at MCCs

The motors at MCCs will have a lower X/R ratio than the motors at the switchgear.

From figure 1.22 of reference 3.6, the multiplying factor for dc decrement at ½ cycle for X/R ≈ 5 is about 1.25.

Increase the factor by 1.33 for a limit of .3 Volts/Hz during bus transfer.

Divide by .9 to account for breaker tolerance

$.25 \cdot 1.33 \cdot \frac{1}{.9} = 1.85$ % of locked rotor

Use a minimum setting of 185% of locked rotor

Use a band of 50%

Use a maximum setting of 235% of locked rotor

The effect of these settings on the thermal capability of the overload has been discussed in section 6.1.2.

Note that the smallest size of magnetic only breaker available is 3A. The minimum setting for this breaker is 7A. This setting may result in a percentage pickup higher than 235% locked rotor for very small motors

6.4 Thermal Overload Heaters Feeding Pump and Fan Motors at MCCs (Non Valve Motors)

The thermal overload relays should be selected utilizing the data provided in the tables on sheet 8 of document DS0684E2.
(Class 6.30 Heater Selection Tables - Reference 3.4)

The heater trip current is 1.25 times the minimum current value for the heater.

Calculate the heater trip current as a percentage of the motor full load current

For a 1.0 service factor motor, the heater trip current should be between 1.15 °/1 and 1.30 °/1 of the motor full load current.

For a 1.15 service factor motor, the heater trip current should be between 1.25 °/1 and 1.40 °/1 of the motor full load current.

~~This sizing method is in accordance with the TVA procedure method PM86-18R2 (reference 3.7). In this procedure the completion of the motor function is emphasized over motor protection, and is therefore more conservative than the manufacturer's method.~~

The table values for overload heaters and

6.5 Thermal Overload Heaters Feeding Motor Operated Valve

The thermal overload heaters which feed safety-related motor operated valves are normally ~~bypassed~~ in the circuit. MOV Thermal overload relays are ~~inserted~~ bypassed ~~into the circuit~~ only during a design basis event-safety injection. ~~testing~~ (Reference 3.5) RI

Refer to TVA procedure method PM86-18R2 (Reference 3.7).

The curves L-27903 M or L-27904-M (Reference 3.5) should be used to determine the tripping time.

At 141.4% of full load current the lower edge of the tripping time band should be greater than twice the stroke time, in order to allow the motor to operate at 200% torque, and the upper edge of the tripping time band should be less than 8 minutes, in order to protect the motor during running conditions.

At locked rotor current the upper edge of the tripping time band should be less than 15 seconds in order to provide motor locked rotor protection.

Prepared TBW for JMP Date 2/2/90 Checked HB Date 2/2/90

5.6 Thermal Magnetic Breakers Feeding Electric Heaters

Section 7.2 of ESC-154 recommends a breaker trip-ating of 1.4 times the heater rated current.

SINCE HEATERS CANNOT BE OVERLOADED DURING NORMAL OPERATION BUT MAY DRAW EXCESSIVE CURRENT DURING ABNORMAL CONDITIONS CAUSING THE FEEDER CABLE TO BE OVERLOADED, USE A RANGE OF 1.15 TO 1.4 TIMES HEATER RATED CURRENT EXCEPT WHEN 20A AND 30A BREAKERS ARE USED AND THE RANGE IS NOT OBTAINABLE DUE TO THE INCREMENTAL SIZE OF BREAKERS.

Use this range for battery chargers also.

Prepared TBW for TMP Date 2/2/90 Checked HA Date 2/2/90

5.7 Thermal Magnetic Breakers Feeding Transformers

Standard ESC-154 recommends using a minimum breaker trip rating of 1.4 times the transformer full load current.

Table 96-01.250 of ANSI standard C57.96 gives allowable overloads for various time periods. The overloads vary from 1.06 °/1 for an 8 hour period to 2.00°/1 for a ½ hour period.

Use a maximum breaker trip rating of 1.8 times the transformer full load current, but in no case will the breaker size be less than 20A

In the following tables numbers are rounded to A sizes, with the rounding increasing the allowable rang

3Φ Transformers

Transformer Size (KVA)	Transformer Full Load Current (A)	Circuit Breaker Trip Rating Minimum (A)	Circuit Breaker Trip Rating Maximum (A)
3	3.6	20	20
6	7.2	20	20
9	10.8	20	20
15	18	25	35
30	36	50	65
45	54	75	100

1Φ Transformers

Transformer Size (KVA)	Transformer Full Load Current (A)	Circuit Breaker Trip Rating Minimum (A)	Circuit Breaker Trip Rating Maximum (A)
3	6.2	20	20
5	10.4	20	20
7.5	15.6	20	30
10	20.8	30	40
15	31.3	40	60

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7.0 Supporting Graphics
Not applicable

8.0 Summary of Results

8.1 Switchgear Feeding Motors

Long Time Pickup 128%-144% of FLC 1.0 Service Factor
139%-156% of FLC 1.15 Service Factor

Long Time Delay Pumps - The lower edge of the tripping band should not less than 5 seconds, nor more than 10 seconds, when the motor draws locked rotor current.

Fans - The lower edge of the tripping band should be less than 10 seconds, nor more than 15 seconds when the motor draws locked rotor current.

Instantaneous Pickup 200%-250% of locked rotor

8.2 Continuous Duty Motors at MCCs
Magnetic Pickup 185% - 235% of locked rotor

Thermal Overload Page D8 of DS0624E2
Heater Trip Rating 115%-130% of FLC 1.0 service factor
125%-140% of FLC 1.15 service factor

Heater Trip Rating = 1.25 × minimum current in table

Use the table values for 3 overload heaters and the proper NEMA size starter.

3.3 Motor Operated Valves

Magnetic Pickup 185%-235% of locked rotor

Thermal Overload Trip Time as given by either curve L-27903-M or L-27904-M

- Upper edge of band less than 15 seconds @ locked rotor
- Lower edge of band greater than twice the stroke time at 141.4% of full load current
- Upper edge of band less than 8 minutes at 141.4% of full load current

4 Thermal Magnetic Breakers for Heaters and Battery Chargers (20A minimum size)

Trip Rating 1.4 - 2.0 % of Load Rated Current

5 Thermal Magnetic Breakers Feeding Transformers (20 A minimum size)
Trip Rating 1.4 - 1.8 % of Transformer Rated Current
(Refer to section 6.7 for tables of breaker sizes)

) Conclusions
Not Applicable

0 Attachments

.1 Document DS0684E2 pages D8, D11, D12 "Class 630 Heater Selection Tables" for ITE Thermal Overload Relays

2 Amptector I-A curve 705 501, November, 1978

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Prepared [illegible] for TMP Date 2/2/90
Verified [illegible] Date 2/2/90

SHEET D8 OF D26

Class G30 Heater Selection Tables●

FOR MSCP OR HFCP STARTERS OR AMBIENT COMPENSATED OVERLOAD CONSULT FACTORY FOR HEATER SELECTION FVNR, TWO-SPEED, REVERSING STARTERS

Motor Continuous Rating °C Rise	Heater Requirements By Operating Conditions		
	Ambient Same At Starter And Motor	Ambient Higher At Starter Than At Motor	Ambient Lower At Starter Than At Motor
1.15 service factor 40°C rise	As specified from tables	One size larger than specified for each 15°C difference	One size smaller than specified for each 15°C difference
1.0 service factor above 40°C rise	One size smaller than for 1.15 service factor above	One size smaller than for 1.15 service factor above	One size smaller than for 1.15 service factor above

D S0684E2

The current at which heaters will trip the overload relay with the knob at 100% mark in an ambient of 40°C is 1.25 times the minimum full-load motor current in the table. Heaters so selected give 125% protection.

● Heater coils should be selected at 58% of full load current for WYE delta and 50% of full load for part winding

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NEMA SIZE 1 STARTERS

Heater Cat. No.	FULL-LOAD MOTOR CURRENT—Amperes: 1 Overload Relay Min.	1 Overload Relay Max.	2 Overload Relays Min.	2 Overload Relays Max.	3 Overload Relays Min.	3 Overload Relays Max.
G30T6	.32	.36	.32	.34	.29	.31
G30T7	.36	.39	.35	.38	.32	.34
G30T8	.40	.43	.39	.42	.35	.37
G30T9	.44	.46	.43	.45	.38	.41
G30T10	.47	.50	.46	.49	.42	.45
G30T11	.51	.57	.50	.56	.46	.50
G30T12	.58	.62	.57	.61	.51	.56
G30T13	.63	.70	.62	.70	.57	.63
G30T14	.71	.79	.71	.77	.64	.70
G30T15	.80	.88	.78	.86	.71	.78
G30T16	.89	.98	.87	.96	.79	.87
G30T17	.99	1.08	.97	1.06	.88	.96
G30T18	1.09	1.17	1.07	1.14	.97	1.04
G30T19	1.18	1.29	1.15	1.25	1.05	1.11
G30T20	1.30	1.42	1.26	1.39	1.12	1.24
G30T21	1.43	1.55	1.40	1.52	1.25	1.35
G30T22	1.56	1.67	1.53	1.64	1.36	1.46
G30T23	1.68	1.84	1.65	1.81	1.47	1.62
G30T24	1.85	2.08	1.82	2.04	1.63	1.83
G30T25	2.10	2.30	2.05	2.26	1.84	2.02
G30T26	2.31	2.53	2.27	2.47	2.03	2.20
G30T27	2.54	2.78	2.48	2.73	2.21	2.44
G30T28	2.79	3.13	2.74	3.07	2.45	2.74
G30T29	3.14	3.49	3.08	3.41	2.75	3.05
G30T30	3.50	4.04	3.42	3.84	3.06	3.47
G30T31	4.05	4.52	3.85	4.31	3.48	3.89
G30T32	4.53	5.04	4.32	4.90	3.90	4.33
G30T33	5.05	5.33	4.81	5.05	4.34	4.62
G30T34	5.34	5.83	5.06	5.55	4.63	5.03
G30T35	5.84	6.39	5.56	6.06	5.04	5.54
G30T36	6.40	7.24	6.07	6.89	5.55	6.29
G30T37	7.25	8.17	6.90	7.79	6.30	7.04
G30T38	8.18	9.15	7.80	8.71	7.05	7.85
G30T39	9.16	10.1	8.72	9.74	7.86	8.81
G30T40	10.2	11.3	9.75	11.0	8.82	9.84
G30T41	11.4	12.6	11.1	12.0	9.85	10.9
G30T42	12.7	13.4	12.1	12.7	11.0	11.6
G30T43	13.5	14.9	12.8	14.2	11.7	12.3
G30T44	15.0	15.9	14.3	15.1	12.4	13.6
G30T45	16.0	17.4	15.2	16.6	13.7	14.7
G30T46	17.5	19.6	16.7	18.7	14.8	16.7
G30T47	19.7	21.2	18.8	20.1	16.8	18.0
G30T48	21.3	22.2	20.2	22.2	18.1	19.4
G30T49	22.3	26.5	22.3	25.4	19.5	21.6
G30T50	26.6	29.5	25.5	28.2	21.7	24.3
G30T51	29.6	31.2	28.3	30.0	24.4	27.7
G30T52	—	—	—	—	27.8	30.0

NEMA SIZE 2

Heater Cat. No.	FULL-LOAD MOTOR CURRENT—Amperes: 2 Overload Relays Min.	2 Overload Relays Max.	3 Overload Relays Min.	3 Overload Relays Max.	Heater Cat. No.	FULL-LOAD MOTOR CURRENT—Amperes: 2 Overload Relays Min.	2 Overload Relays Max.	3 Overload Relays Min.	3 Overload Relays Max.
G30T36	6.42	7.22	6.16	6.94	G30T46	16.7	18.3	16.1	17.7
G30T37	7.23	7.86	6.95	7.56	G30T47	18.4	19.2	17.8	18.4
G30T38	7.87	8.92	7.57	8.55	G30T48	19.3	22.2	18.5	21.3
G30T39	8.93	10.0	8.56	9.71	G30T49	22.3	25.2	21.4	24.2
G30T40	10.1	11.5	9.72	10.6	G30T50	25.3	28.2	24.3	27.1
G30T41	11.6	12.7	10.7	11.9	G30T51	28.3	30.3	27.2	29.1
G30T42	12.8	13.5	12.0	13.0	G30T52	30.4	34.1	29.2	32.4
G30T43	13.6	14.6	13.1	14.0	G30T53	34.2	37.6	32.5	35.2
G30T44	14.7	15.2	14.1	14.7	G30T54	37.7	41.0	36.3	39.4
G30T45	15.3	16.6	14.8	16.0	G30T55	41.1	47.0	39.5	45.1
					G30T56	47.1	50.0	45.2	50.3

NEMA SIZE 3

Heater Cat. No.	FULL-LOAD MOTOR CURRENT—Amperes: 2 Overload Relays Min.	2 Overload Relays Max.	3 Overload Relays Min.	3 Overload Relays Max.
G30T46	20.8	23.9	19.2	21.5
G30T47	24.0	26.3	21.6	24.7
G30T48	26.4	27.9	24.8	25.3
G30T49	28.0	32.7	25.4	30.3
G30T50	32.8	35.1	30.4	32.7
G30T51	35.2	38.9	32.8	37.6
G30T52	40.0	45.5	37.7	40.7
G30T53	45.6	50.3	40.8	46.4
G30T54	50.4	53.0	46.5	51.0
G30T55	53.1	63.0	51.1	59.0
G30T56	63.1	68.7	59.1	63.9
G30T57	68.8	75.1	64.0	70.4
G30T58	75.2	83.3	70.5	78.4
G30T59	83.4	89.9	78.5	85.5
G30T60	90.0	100.0	85.6	95.1
G30T61	—	—	95.2	100.0

NEMA SIZE 4

Heater Cat. No.	FULL-LOAD MOTOR CURRENT—Amperes: 2 Overload Relays Min.	2 Overload Relays Max.	3 Overload Relays Min.	3 Overload Relays Max.
G30T51	35.2	39.9	32.8	37.6
G30T52	40.0	45.5	37.7	40.7
G30T53	45.6	50.3	40.8	46.4
G30T54	50.4	52.8	46.5	49.8
G30T55	52.7	61.5	49.7	57.4
G30T56	61.6	68.7	57.5	64.7
G30T57	68.8	75.1	64.8	71.1
G30T58	75.2	83.3	71.2	78.9
G30T59	83.4	89.9	80.0	85.5
G30T60	90.0	101.9	85.6	95.2
G30T61	102.0	113.9	95.3	103.9
G30T62	114.0	126.4	104.0	114.9
G30T63	126.5	135.4	115.0	129.9
G30T64	135.5	150.0	130.0	133.9
G30T65	—	—	134.0	150.0

NEMA SIZE 5

Heater Cat. No.	FULL-LOAD MOTOR CURRENT—Amperes: 2 Overload Relays Min.	2 Overload Relays Max.	3 Overload Relays Min.	3 Overload Relays Max.
G30T27	84	92	79	87
G30T28	93	103	88	97
G30T29	104	113	98	107
G30T30	114	127	108	120
G30T32A	128	138	121	130
G30T32	139	152	131	144
G30T33	153	169	145	160
G30T34	170	184	161	174
G30T35	185	204	175	193
G30T36A	205	226	194	214
G30T37	227	250	215	236
G30T38	251	269	237	254
G30T39	270	300	255	284
G30T40	—	—	285	300

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TYPE CHARACTERISTICS

OVERLOAD RELAY

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Calc. No.

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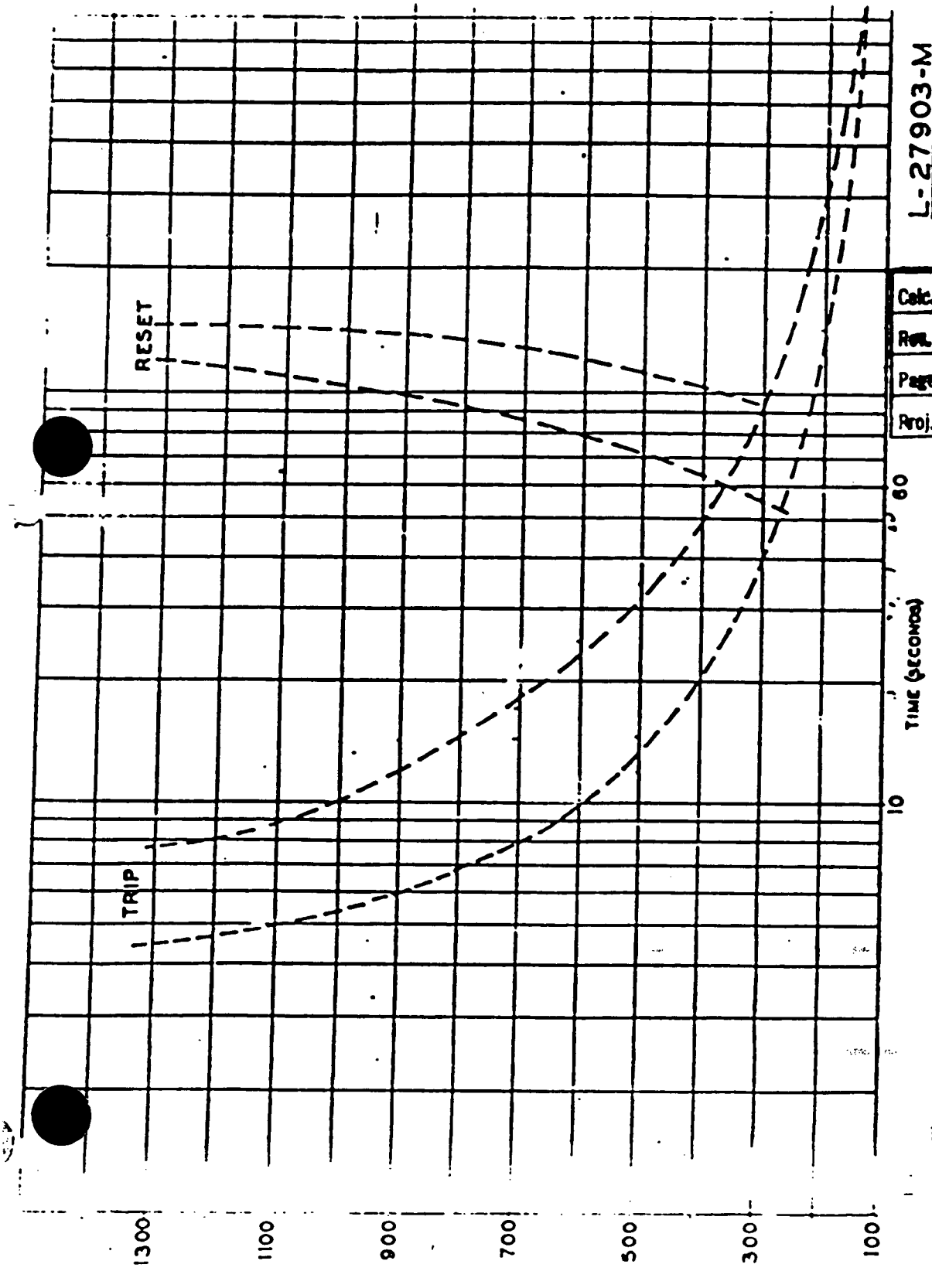

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TYPE CHARACTERISTICS

SIZE 3, 4, OVERLOAD RELAYS

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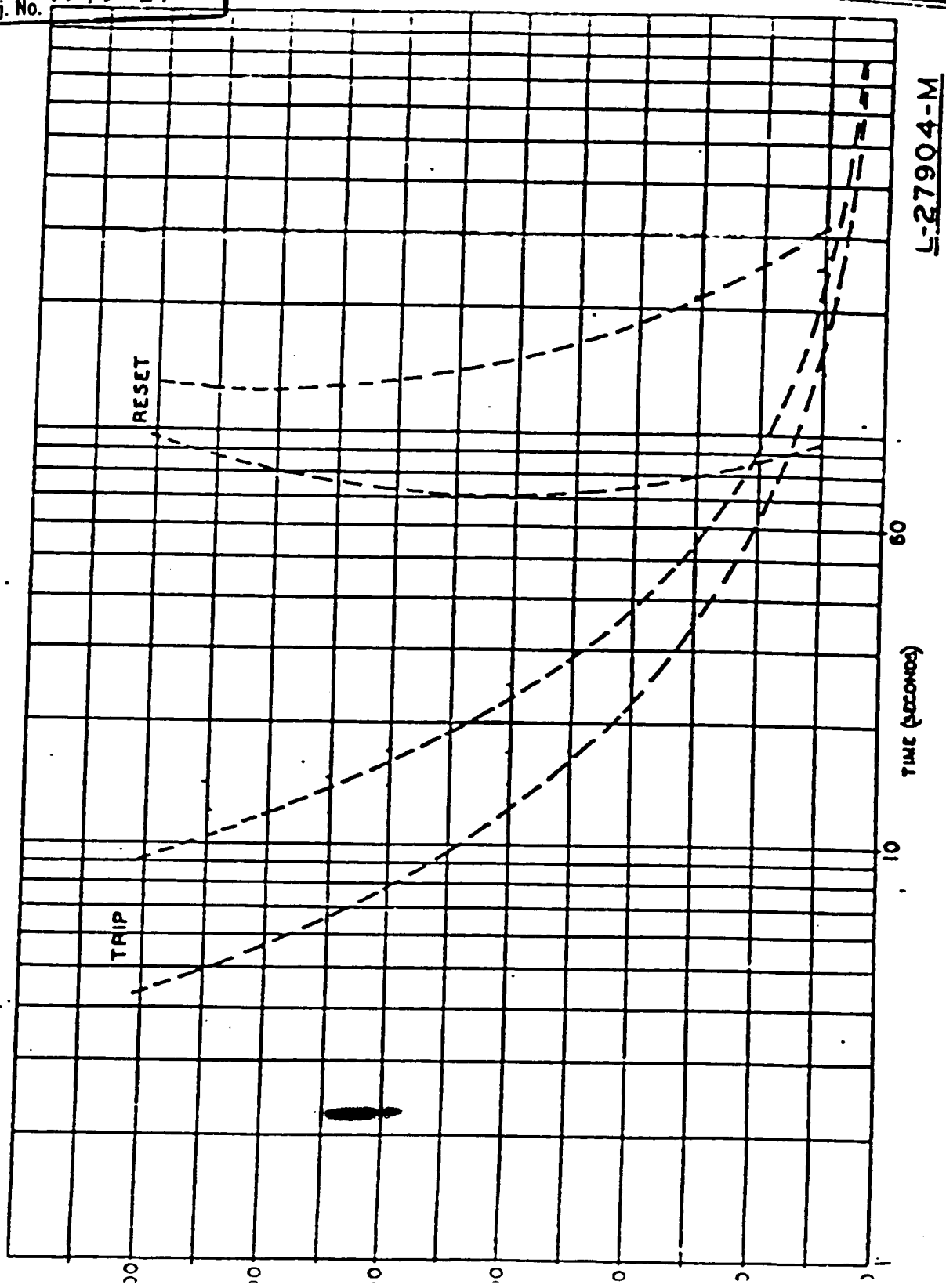

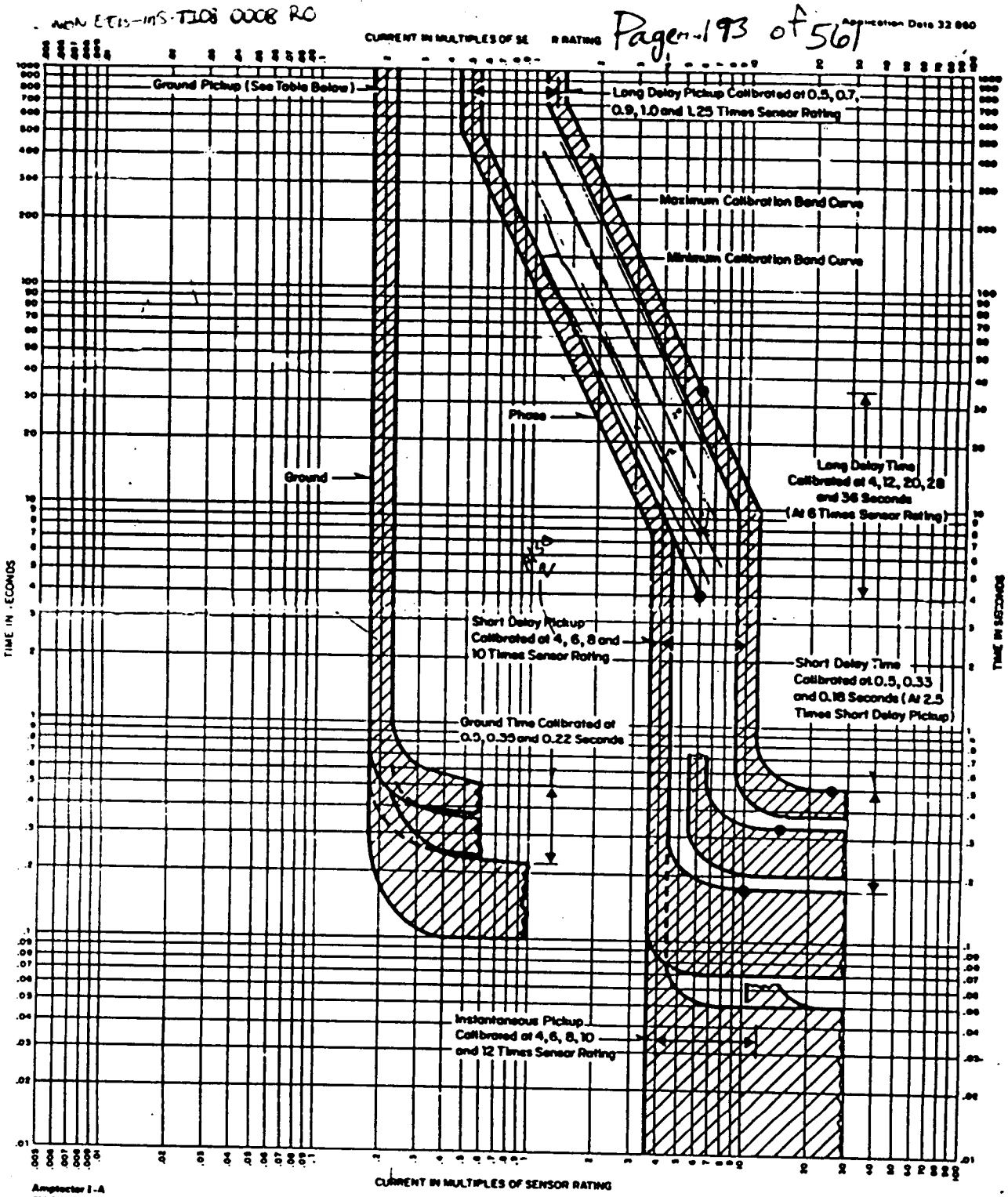

Amptector I-A

Ground Pick-Up Value—Amperes

Dial Setting	50	100	150	200	300	400	600	800	1200	1600	2000	2400	3200	4000	Secondary Current ①
	Sensor Rating														
A	13	57	60	65	90	110	145	190	260	330	400	530	640	800	1.0
B	18	67	75	85	110	150	205	280	385	505	600	770	1000	1200	1.5
C	22	75	85	100	130	185	250	325	460	625	760	960	1200	N.A.	1.9
D	33	100	120	145	200	270	385	500	730	970	1200	N.A.	N.A.	N.A.	3.0

All pick up values may vary ± 10%

① Current of this value from the secondary of an external ground transformer will cause the ground element to function. Ground element pick-up can also be tested using this value. All sensors must be disconnected during test.

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Amptector I-A

Time - Current Characteristics

Westinghouse Electric Corporation
Switchgear Division, East Pittsburgh, Pa. 15112
Printed in USA

Attachment No. 10.22 with 10/9/90 GCP 12-19-90
Calc. No. _____
Sheet 1 of 1

Curve No. 705801
New Information
November, 1970

Prepared YBW for JMP Date 2/2/90
Verified [signature] Date 2/2/90

PAGES 195 THRU 196 OMITTED IN INITIAL ISSUE

1. PURPOSE

The Purpose of this calculation is to assess Coordination between the Protective devices at 480 V class 1E Switchgear buses and MCC's of units 1 and 2.
The 480 V Switchgears and MCCs Covered in this Calculation are :-

	UNIT 1	UNIT 2
480V SWGR Shutdown Board	1A1-A	2A1-A
	1A2-A	2A2-A
	1B1-B	2B1-B
	1B2-B	2B2-B
Rx MOV Board (MCC)	1A1-A	2A1-A
	1B1-B	2B1-B
	1A2-A	2A2-A
	1B2-B	2B2-B
Cont & Aux Bldg Vent Board (MCC)	1A1-A	2A1-A
	1B1-B	2B1-B
	1A2-A	2A2-A
	1B2-B	2B2-B
Diesel Aux Board (MCC)	1A1-A	2A1-A
	1B1-B	2B1-B
	1A2-A	2A2-A
	1B2-B	2B2-B
Reactor Vent Board (MCC)	1A-A	2A-A
	1B-B	2B-B

PURPOSE (CONT.):

	UNIT 1	UNIT 2
480V Pressurizer Heater Distribution Panels.	1A-A	2A-A
	1B-B	2B-B
	1C	2C
	1D	2D

480 V Swgr Diesel Aux Board C-S

480 V MCC Diesel Aux Boards C1-S
C2-S

Form GQ-3.68.1 Rev. 2 BL-F647 10-86 KPB

2. ASSUMPTION

2.1 In most cases the Vendor Certified Curves are not available for Watts Bar Nuclear Plant. In order to be consistent with the TVA Calculation practices, the tripping characteristics of the protection devices, with the following exceptions, have been taken from medium and low voltage penetration calculation

EEB-MS-TI08-0015 and Appendix R Calculation DS0684E2, Rev 1 (Ref 3.4)

The following Vendor Published Curves which are not the part of the above mentioned calculation have been used in this calculation.

ITE Gould Curve TD-9002 Rev 1 for SSL
GE E150 LINE (TED 134T 150) Curve # GES-6121B.
GE J600 LINE GES-6104C for TJK BKR.
GE IFC53 Relay Curve GES-7015A
W Co-8 Relay curve #41 8265
Gould Shawmut cp cable Protector Curve # 16985.
ITE Breaker Curve for ITE-EF3 Breakers

Form GQ-3.08.1 Rev. 2 SL-F847 10-85 KP8

ITE Breaker Curve for ITE-FJ3 Breakers.
Gould Shawmut TRS 15R, TRS 30R fuse Curves.
GE IAC 51 Relay Curve # GES-7001B
W DSL-416 Limiter Curve # 639431.
W DS-Breaker Curve # 1
The tripping characteristic of these devices should be verified once the certified curves are available

2.2 It is assumed that the interrupting rating of 6.9 Kv Shutdown Boards is 500MVA.

PAGES 202 THRU 204 OMITTED IN INITIAL ISSUE

N EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared MAN/HA Date 2/2/90 Checked RWH Date 2/3/90

4. DOCUMENTATION OF ASSUMPTIONS:

4.1 Assumption 2.1

WTH 4/11/92 ~~This is a unverified assumption.~~ The unverified vendor data (T-C characteristic curves of Breakers, fuses, etc.) must be verified later on receipt of Certified Vendor T-C curves. Refer to Attachment Rev 15 for justification R R

4.2 Assumption 2.2 WTH 4/11/92 EJJ 4/13/92

The only interrupting size available for 6.9 KV Switchgears is 500 MVA. This assumption does not require verification.

Form GQ-3.08.1 Rev. 2 BL-F647 10-86 KPB

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6. METHODOLOGY:

Since the Purpose of this Calculation is to assess Coordination between Protective devices at the 480V Switchgear and MCC level, the following Steps will be taken to discuss the subject of selectivity.

- A few larger size load breakers and any large fuses will be identified at each 480V MCC.
- The settings of all 480V Switchgear breakers feeding MCCs will be obtained.
- The setting of the largest Switchgear feeder breaker or load breaker (other than MCC feed breaker) will be established.
- Sketches will be drawn to discuss the need of Coordination requirement between upstream Protective device and the large size load breakers at the 480 V Switchgear and MCCs.
- A few "Bounding" time - Current Characteristic Curves will be drawn to highlight the selectivity issue between the Protective devices.
- The Coordination Analysis will be based on maximum fault current limited by the interrupting rating of the breakers.

Form QQ-3.58.1 Rev. 2 BL-F647 10-86 KPB

EB-MS-TI08-0008 R0
ac 1E Coordination/Protection

Prepared MAN / HA Date 2/2/90 Checked RWH Date 2/3/90

Coordination problem could be experienced or it will become worse if the interrupting rating of the breakers is increased in future.

Coordination between Protective devices will be analyzed. This will be done by reviewing the tripping time Current characteristics of the Protective devices in Conjunction with the "Bounding" curves.

Form GQ-3.08.1 Rev. 2 BL-F647 10-86 KPS

- Where applicable the TC Curves from Appendix R Calculation DS0684E2 (Ref. 3.4) have been used in the Calculation to access coordination between protective devices.
- Identification of larger size fuses at Diesel Aux Boards C1-S & C2-S and larger size molded case breakers at all 480V MCCs have been taken from reference 3.1, 6, 7, 13.
- The Switchgear breaker settings used in this Calculation have been taken from the tabulation shown on 480V Shutdown Board Drawings 45W749- Sheets 1 through 4 as listed in reference 3.1. These drawings are included in Appendix C of this Calculation.
- the tripping characteristics of DS breakers as shown on curves S42, S43, and S44 of Appendix R Calculation DS0684E2 have been used in this calculation.

- TC Curves S40 and S41 of Appendix R Calculation DS0684 E2 (Ref 3.4) have been used to analyze coordination between protective devices on Pressurizer Heater Circuits.

- The operating characteristic of 500 MCM Cable protector as shown in S42, S43, and S44 of Appendix R calculation has been used in this calculation

- The operating characteristic of 350 MCM Cable protectors as shown on Vendor Curve 1698E has been used in this calculation.

- The relay setting information on CO-8 relays at the Main, reserve and Tie Breakers of the 480V shut-down boards have been taken from Reference 3.3

- The relay setting information on BFC 53 relays located on the 6.9 kV side of the 480V shut down board transformers are in Ref. 3.8. The relay setting information on BAC 51B relays located on the 6.9 kV side of the Pressure Heater Transformer are in reference 3.6

- According to IEEE Standard 242-1975, (Ref. 3.12) the Coordinating time interval of 0.3 - 0.4 Seconds is used for determining selectivity between inverse time over Current relays.

- When Coordinating Circuit Breakers equipped with direct acting trip units, the characteristic curves should not overlap. In general only a slight separation is planned between different characteristic curves.

- When Coordinating direct acting trip low voltage power Circuit breakers with Source side fuses at the same voltage level a 10 percent current margin is sometimes used. A 20 percent Margin in time is used to correct for ambient temperature and pre loading of the fuses.

Form QQ-3.08.1 Rev. 2 BL-F4477 10-86 KPB

A review of the single line drawings for 480V Boards (MCCs) listed in Reference 3.1 indicates that fuses have been installed in series with some molded case load breakers (usually smaller breakers). Some molded case breakers dont have fuses installed in series. In order to be conservative in the results of this calculation, such fuses have not been considered in evaluating the coordination.

Circuits fed from magnetic only breakers are normally equipped with thermal over load heaters. These heaters are faster in the tripping characteristic than the thermal element of the comparable size thermal magnetic breakers and therefor are less conservative than the thermal-magnetic breaker. The thermal over load heaters on the magnetic only breakers have not be discussed separately in the analysis.

Form QA-3.08.1 Rev. 2 BL-F4717 10-86 KPB

Sketches were then drawn to illustrate the location of the protective devices for MCCs, Pressurizer Heater Distribution Panels, and 480V shutdown Boards. These sketches show large size load breakers and/or fuses at the MCCs and upstream protective devices on the feeder to the MCCs. These sketches are included in the following section and will be used to discuss the Coordination requirement between these protective devices.

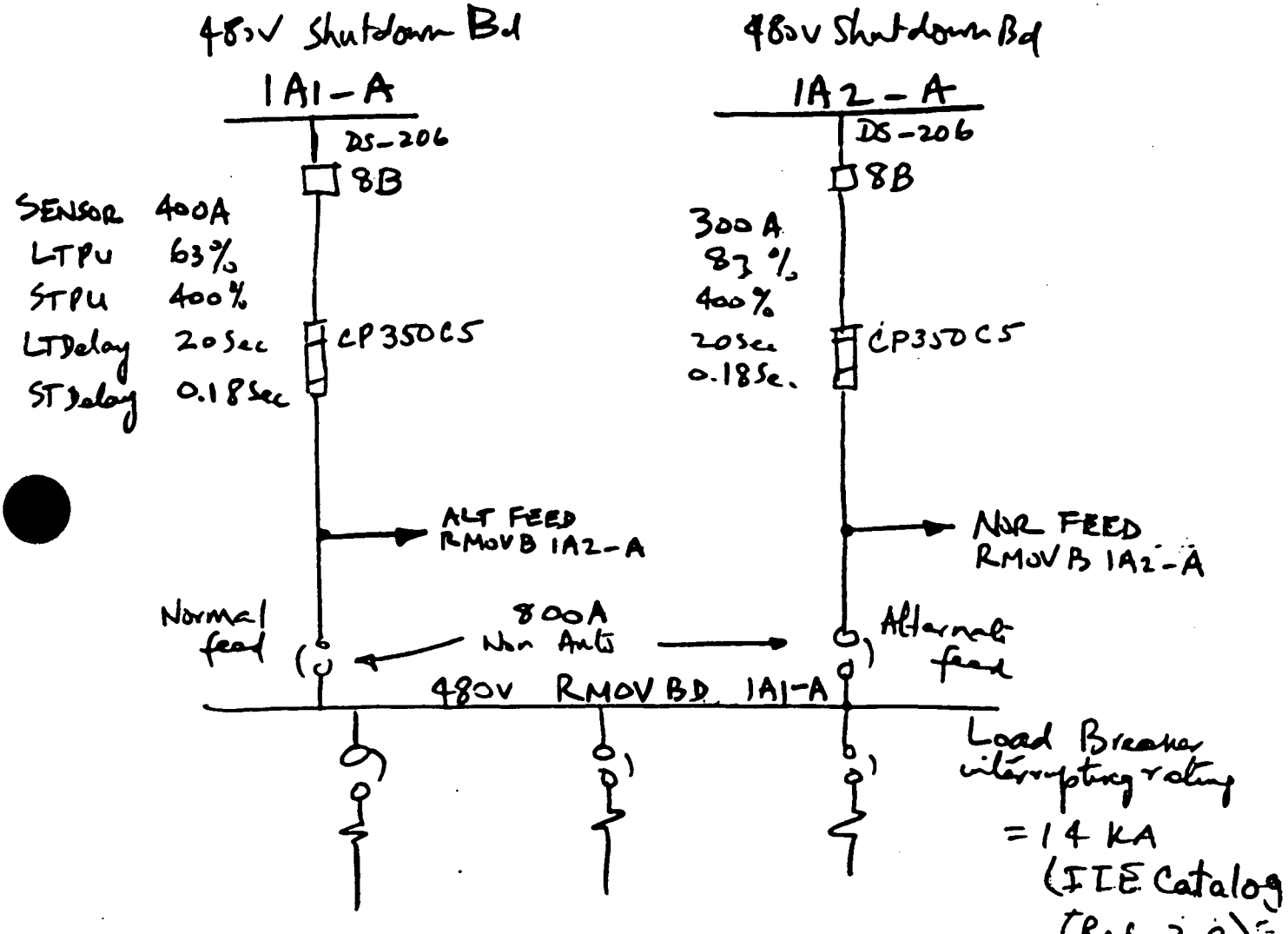
Form GQ-3.08.1 Rev. 2 BL-F647 10-85 KPB

1. DESIGN INPUT DATA:

The sketches included in this section were prepared to discuss coordination between the protective devices. These sketches show the larger size load breakers at the MCC, their settings if applicable, the settings of the switchgear breakers feeding the MCCs and other protective devices in the MCC feeder circuit.

Form QQ-3.08.1 Rev. 2 BL-F647 10-85 KPS

Prepared MAN/HA Date 2/2/90 Checked RWH Date 2/3/90



LARGER SIZE Load Breakers

INST. Setting

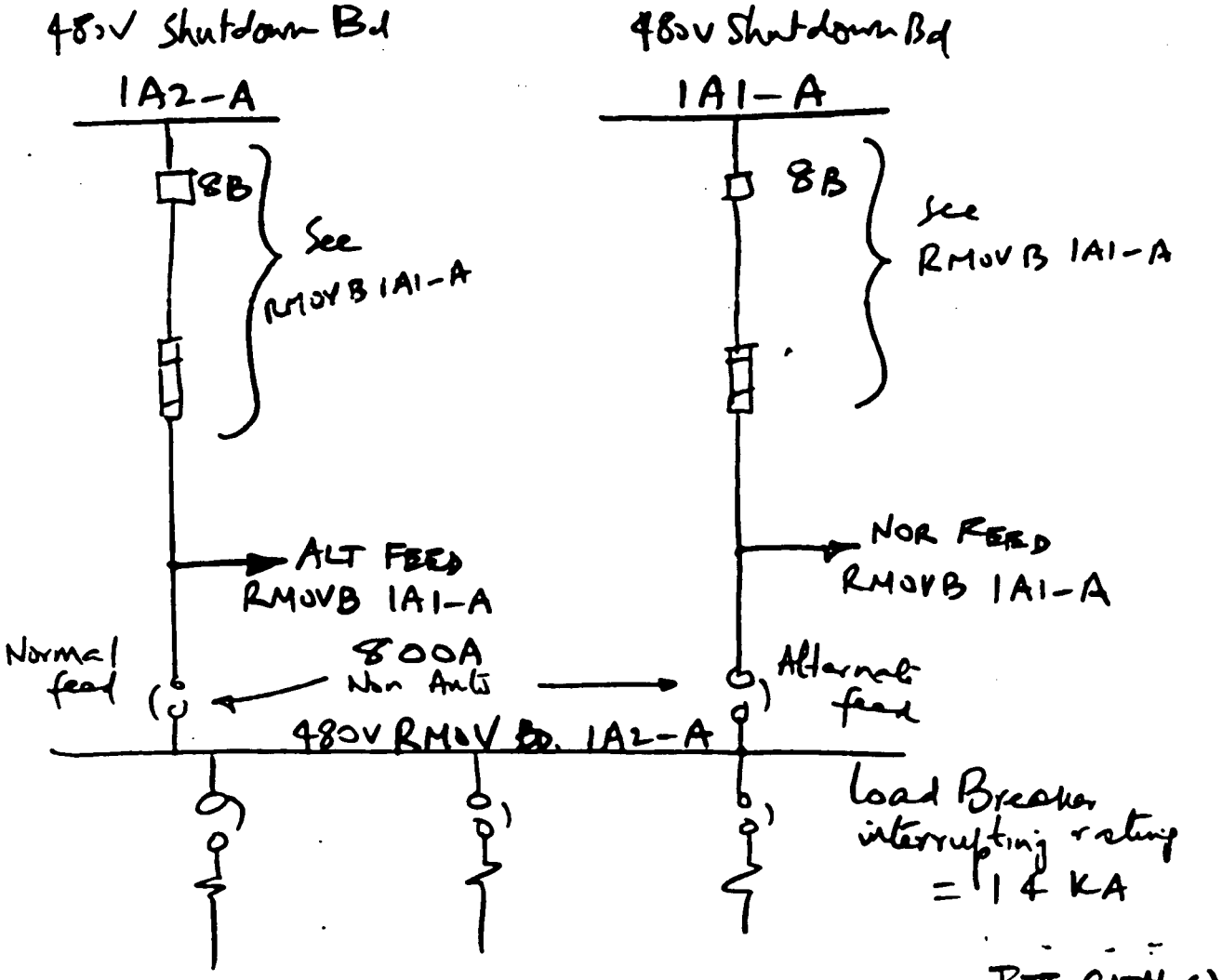
EF3 – B 100

– A 100 (415A)

Sketch # 1

Form QQ-3.08.1 Rev. 2 BL-F847 10-90 KPB

Prepared MAN/AA Date 2/2/90 Checked RWA Date 2/3/90



LARGER SIZE Load Breaker

INST. Setting

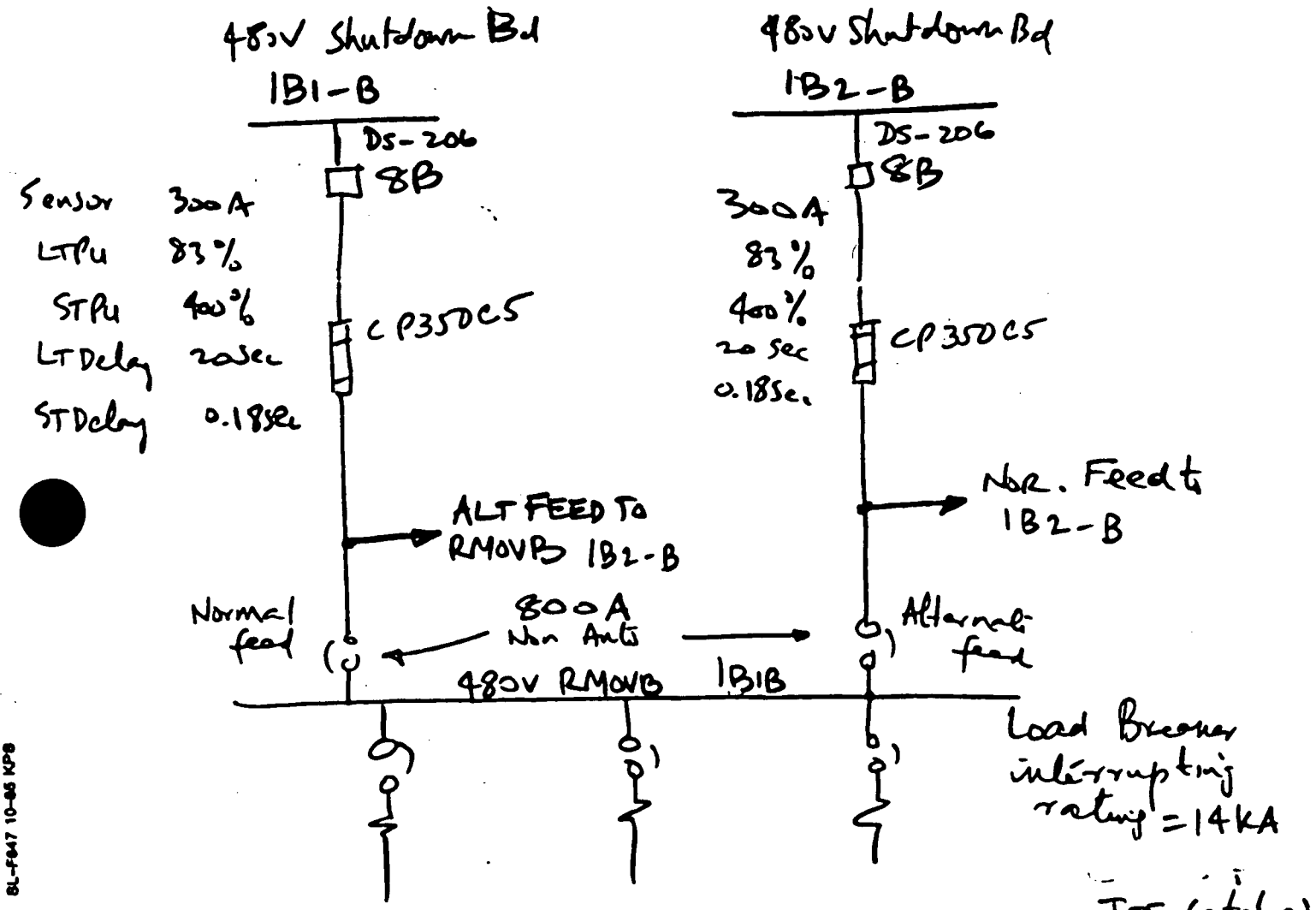
EF3- B100

A100 (1125 A) 98 A Thermal Load

FJ3- B125 (1600 A)

Sketch #2

Form GQ-3.08.1 Rev. 2 8L-F647 10-85 KPS



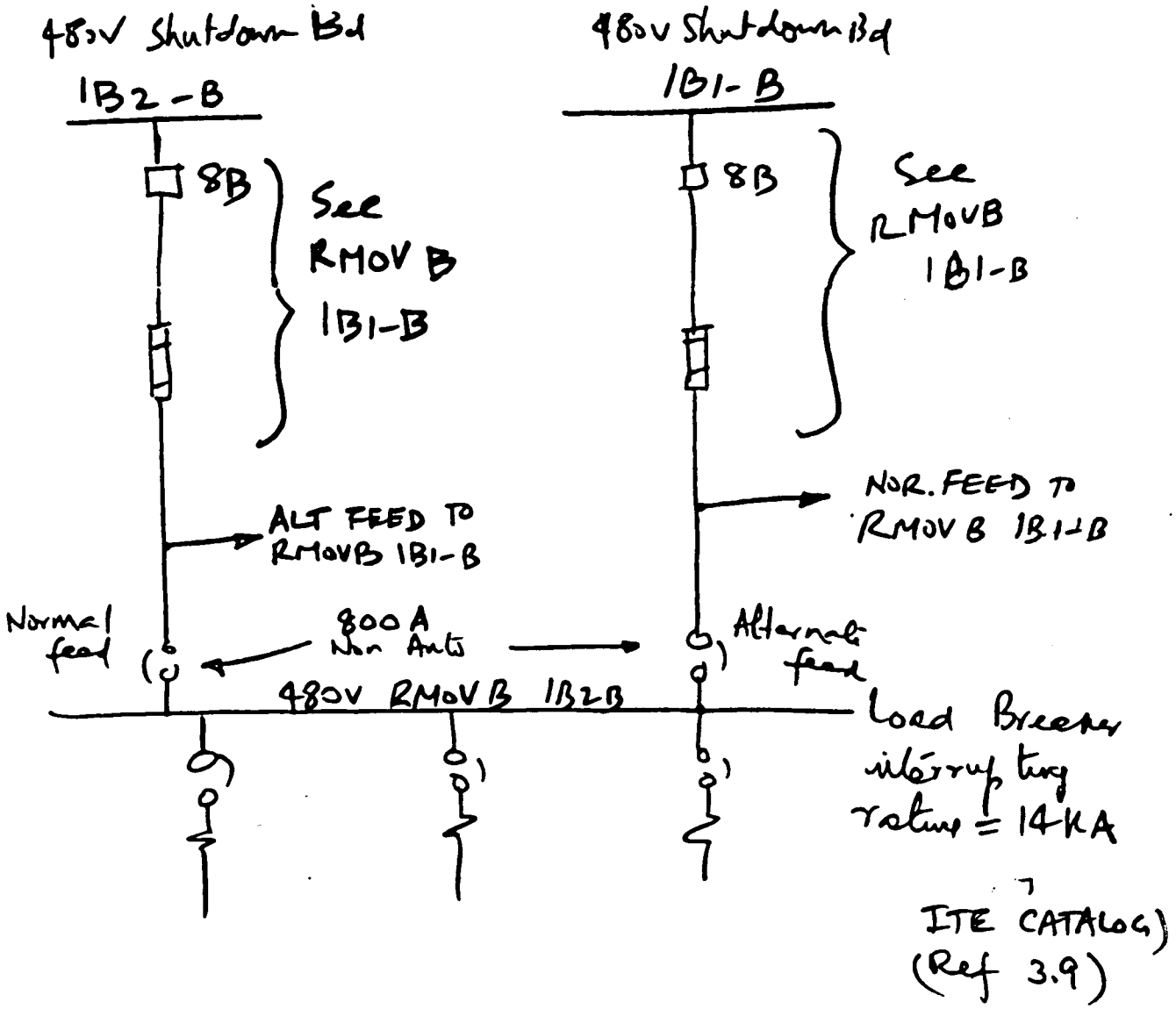
LARGER FEEDER LOAD BREAKER
INST. Setting

EF3- B050
- B100
- H050 (400A)

Sketch #3

W[redacted]EB-MS-TI08-0008 R0
[redacted]ac 1E Coordination/Protection

Prepared MAN/[illegible] Date 2/2/90 Checked RWA Date 2/3/90



LARGER SIZE FEEDER BREAKERS

INST. Setting

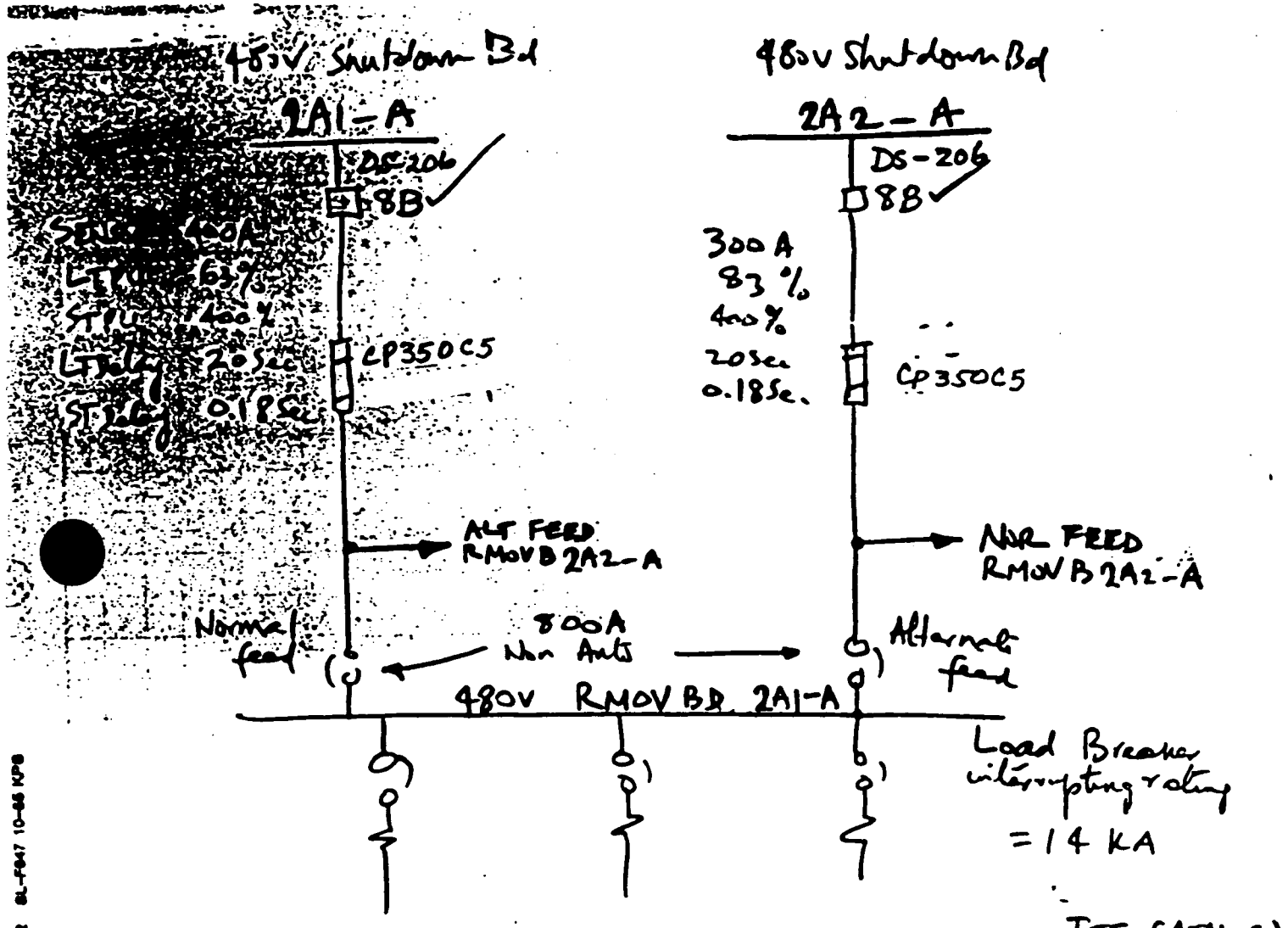
EF 3 - B100

FJ 3 - B125 (1600 A)

Sketch #4

Form GQ-3.06.1 Rev. 2 BL-F847 10-86 KJ-8

Prepared MAN/HA Date 2/2/90 Checked RWH Date 2/3/90



ITE CATALOG)
(Ref 3.9)

LARGER SIZE Load Breakers

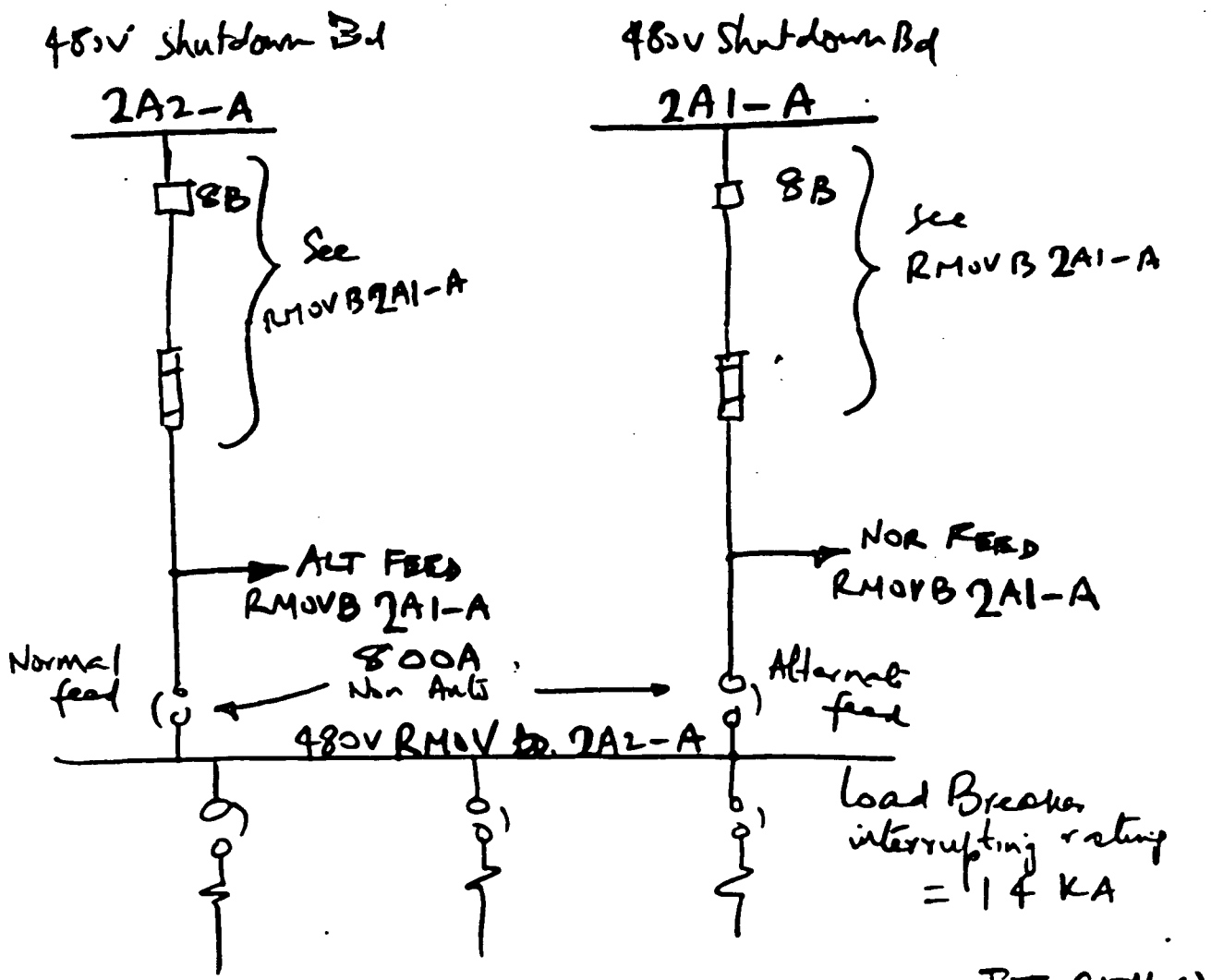
INST. Setting

EF3-B 100

-A 100 (475A)

Sketch #5

Form GQ-3.08.1 Rev. 2 BL-F947 10-86 KPB



(ITE CATALOG)
(Ref 3.9)

LARGER SIZE Load Breaker

INST. setting

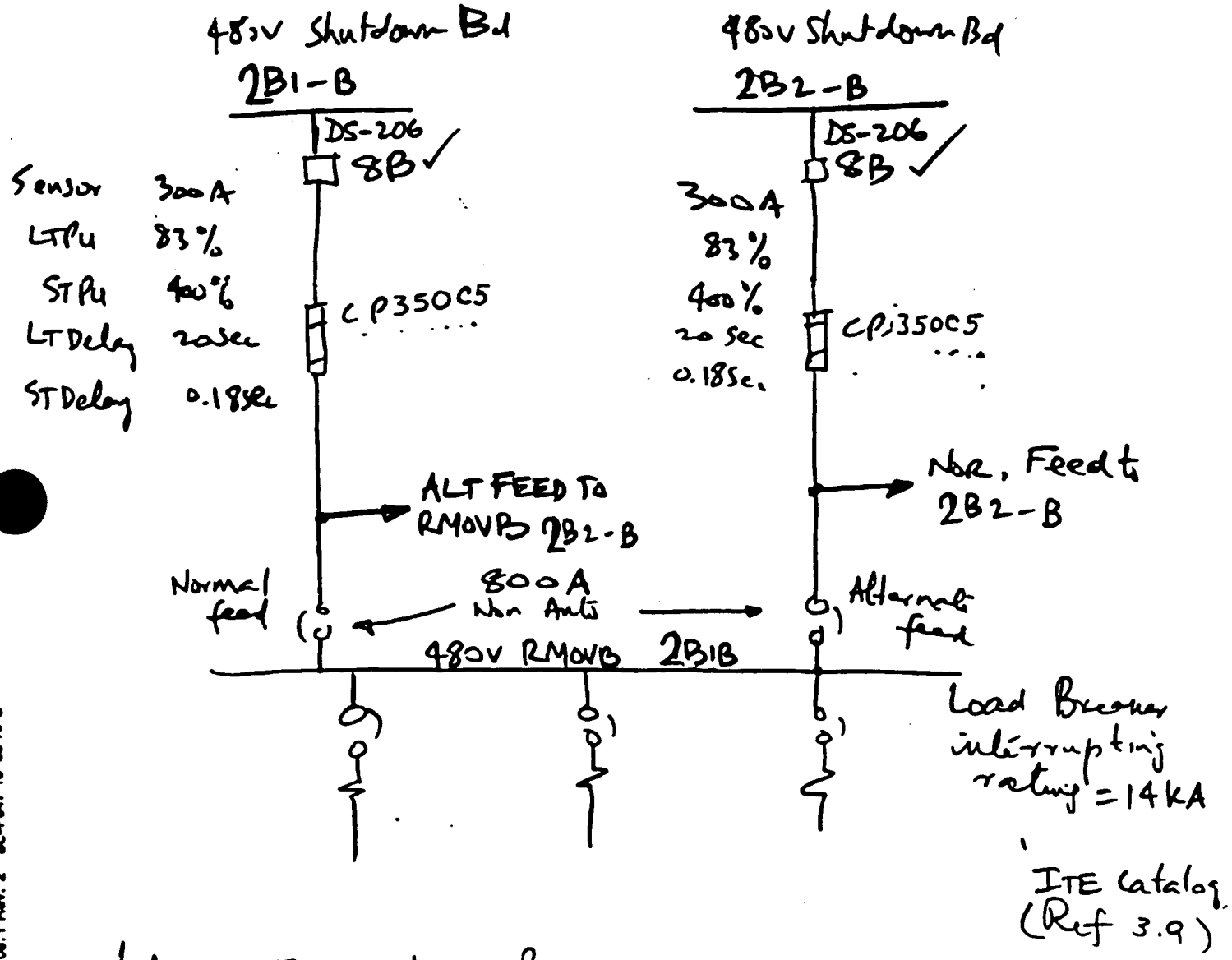
EF3- B100

FJ3- B125 (1600A)

Sketch #6

BN EEB-MS-TI08-0008 R0
0 Vac 1E Coordination/Protection

Prepared MAN/HA Date 2/2/90 Checked RWA Date 2/3/90

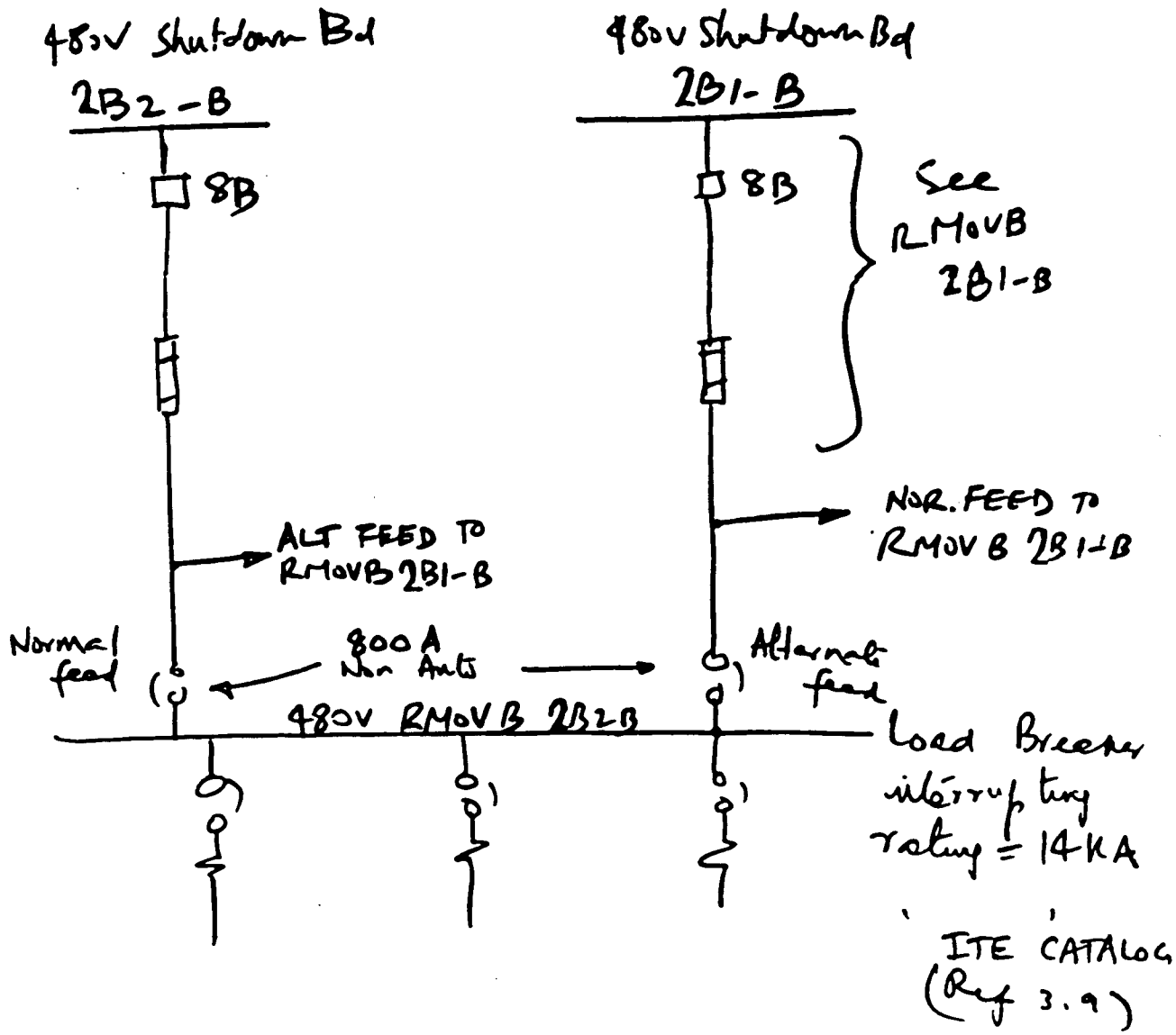


LARGER FEEDER LOAD BREAKER
INST. Setting

EF3- B050
- B100
- H050 (400A)

Sketch #7

Form QQ-3.06.1 Rev. 2 BL-F647 10-86 KPB



LARGER SIZE FEEDER BREAKERS

INST. setting

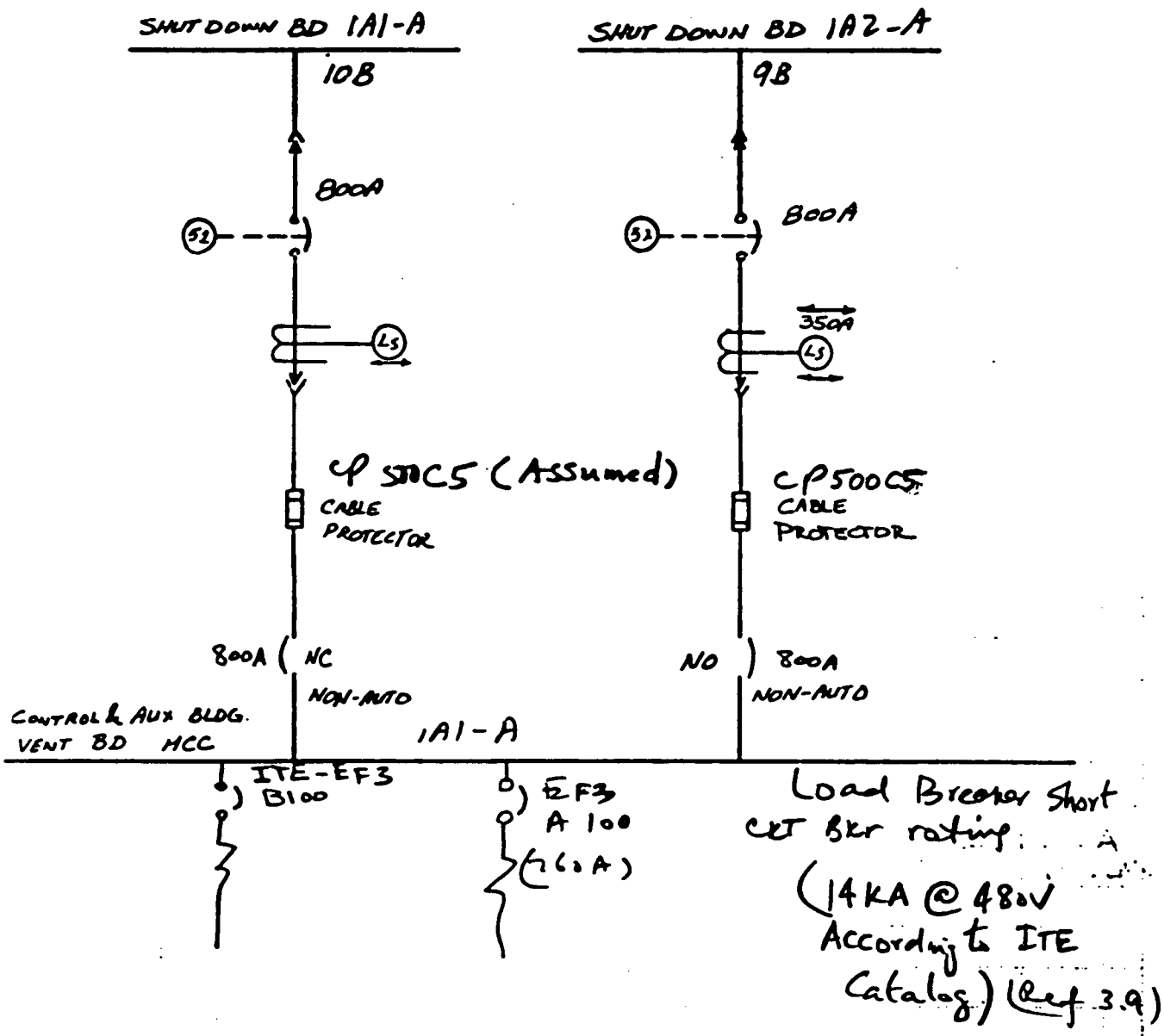
EF 3 - B100

FJ 3 - B125 (1600A)

Sketch #8

EEB-MS-TI08-0008 R0
ac 1E Coordination/Protection

Prepared MAN/HA Date 2/2/90 Checked RWH Date 2/3/90

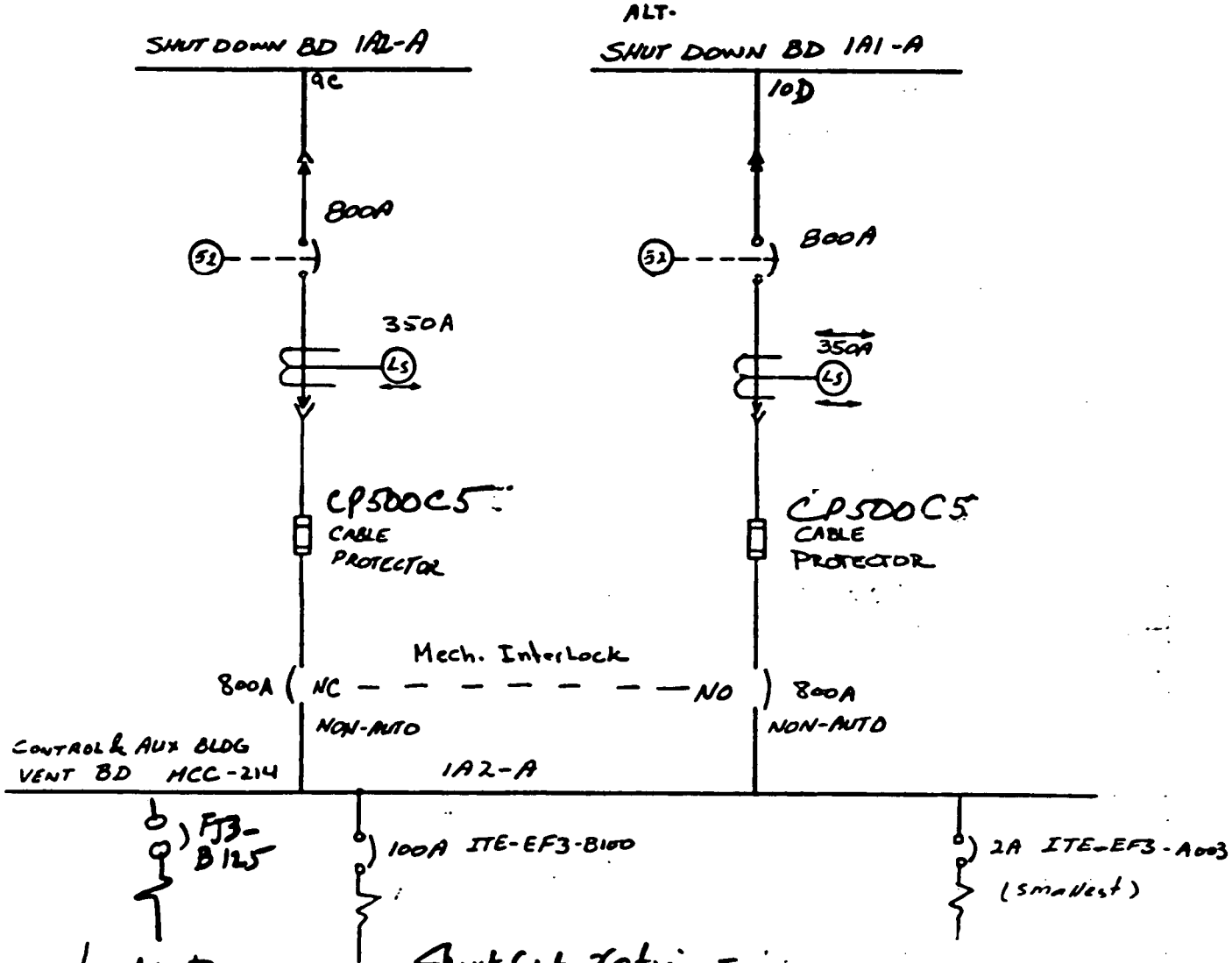


BKR TYPE	TRIP DEVICE RATING	LONG Time Delay p.u.	Short time Delay p.u.	Long time (sec)	Short time (sec)
DS-206	600	100%	400%	8	0.18
DS-206	600	100%	400%	8	0.18

Sketch #9

W[redacted]EB-MS-TI08-0008 R0
A[redacted]ac 1E Coordination/Protection

Prepared MAN/[redacted] Date 2/2/90 Checked [redacted] Date 2/3/90



LOAD BREAKER

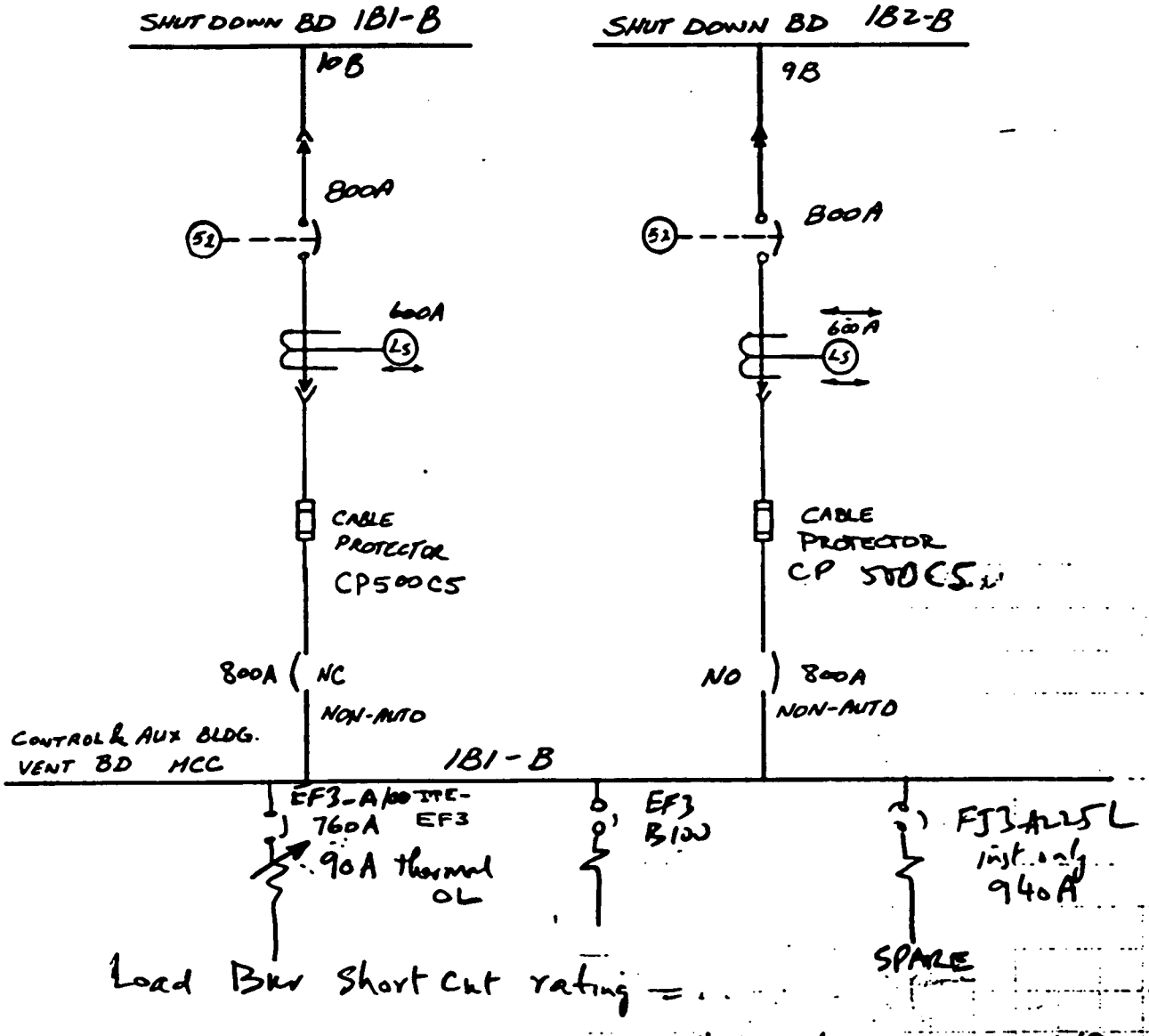
Short Ckt rating =
= 14 KA (ITE CATALOG)
(Ref 3.9)

	BKR TYPE	Trip Device Rating T.D. RATING (A)	Long Time Delay P.U. L.T.D. P.U.%	Short Time Delay P.U. S.T.D.P.U. %	Long Time (sec) L.T. (sec)	Short Time (sec) S.T. (sec)
9[redacted]	DS-206	400	88%	400%	20	0.18
10)	DS-206	600	60%	400%	8	0.18

Sketch # 10

W[redacted]EB-MS-[redacted]1108-0008 R0
A[redacted]ac 1E Coordination/Protection

Prepared MANHA Date 2/2/90 Checked RWH Date 2/3/90



Load Bkr Short Ckt rating = ...

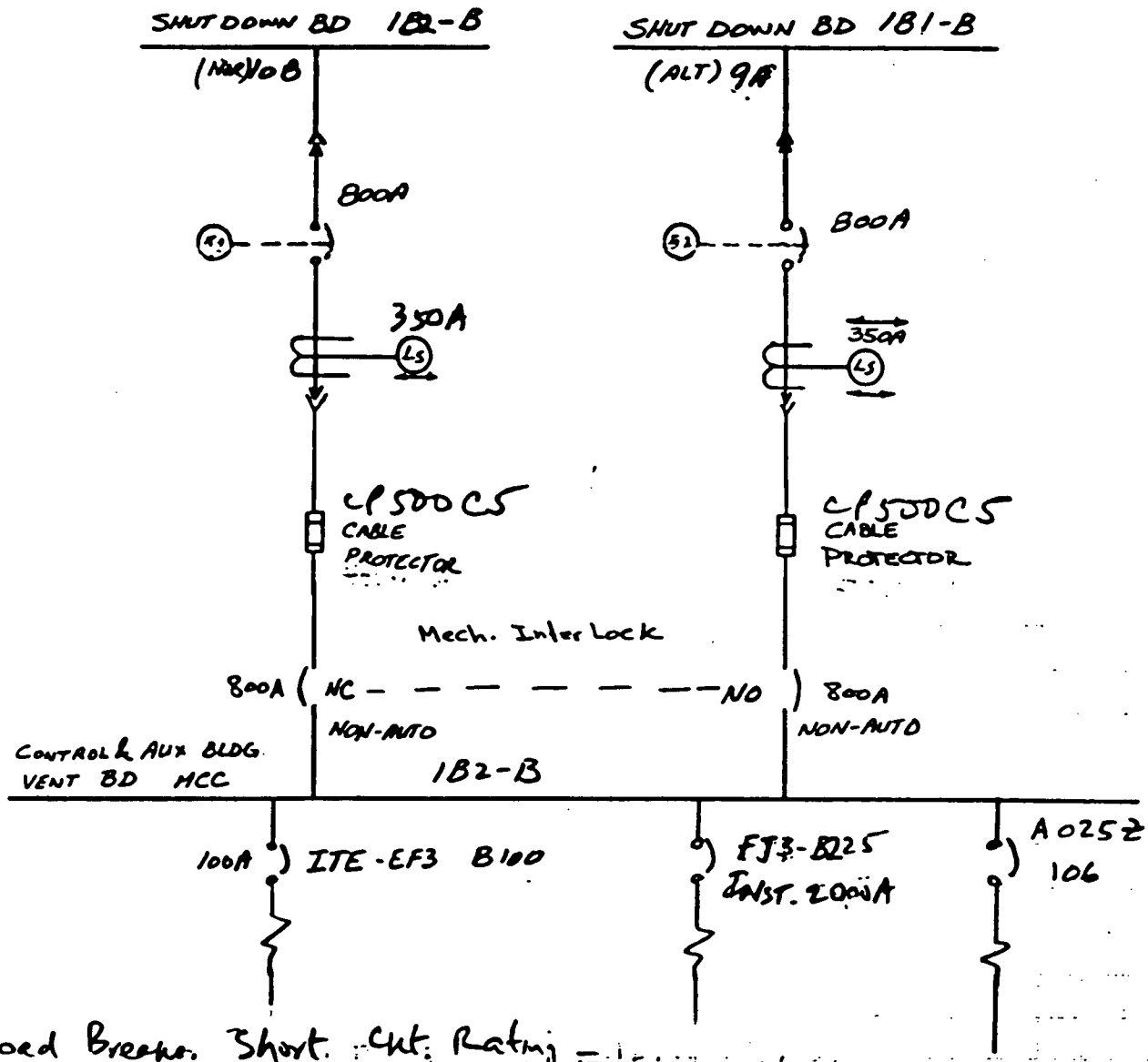
=14 kA (ITE CATALOG) (Ref 3.9)

BKR TYPE	TRIP DEVICE RATING (A)	LONG TIME DELAY P.U. %	SHORT TIME DELAY P.U. %	LONG TIME (SEC)	SHORT TIME (SEC)
1[redacted] DS-206	600	100	400	8	0.18
9[redacted] DS-206	600	100	400	8	0.18

Sketch #11

EEB-MS-TI08-0008 R0
0 Vac 1E Coordination/Protection

Prepared NAN/AA Date 2/2/90 Checked RWH Date 2/3/90



Load Breaker Short Ckt Rating = 14KA (ITE CATALOG) (Ref 3.9)

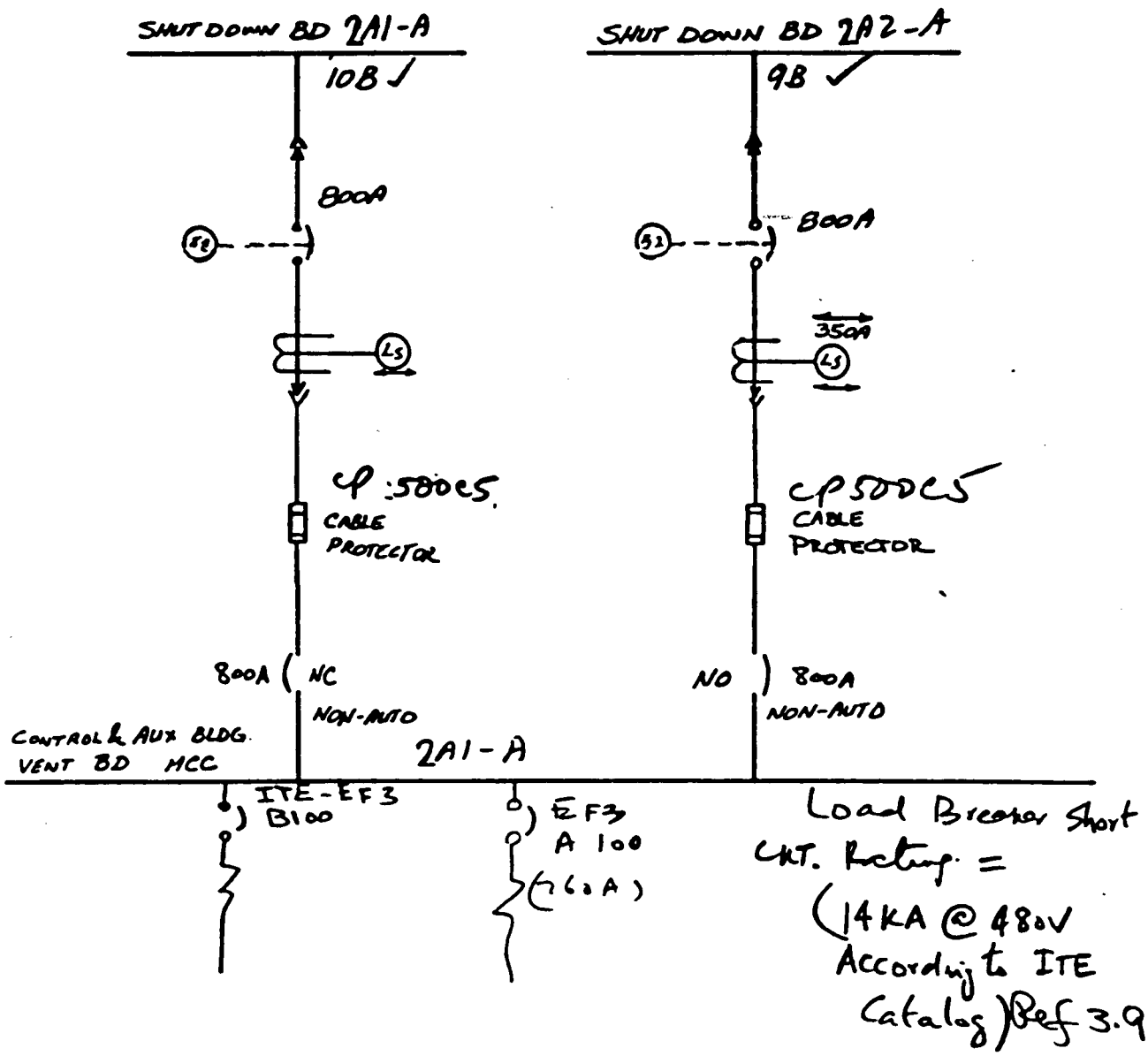
BKR TYPE	TRIP DEVICE RATING (A)	LONG TIME DELAY P.U. %	SHORT TIME DELAY P.U. %	LONG TIME (SEC).	SHORT TIME (SEC)
10B DS-206	400	88	400	20	0.18
(ALT) 9A DS-206	600	58	400	8	0.18

Sketch # 12

Form QQ-3.08.1 Rev. 2 SL-F847 10-85 KPS

EEB-MS-TI08-0008 R0
480 Vac 1E Coordination/Protection

Prepared MAN/HA Date 2/2/90 Checked RWH Date 2/3/90

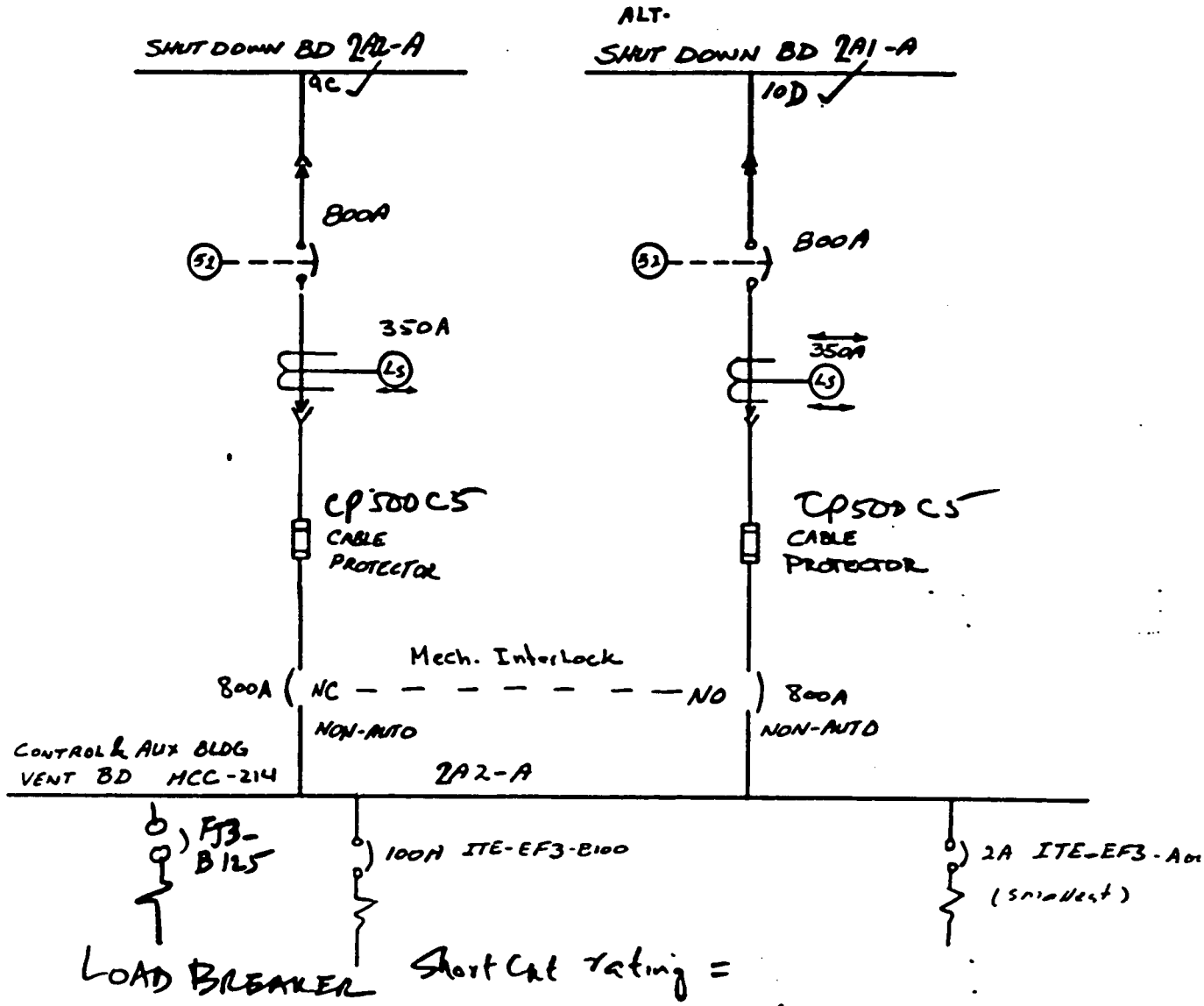


BKR TYPE	TRIP DEVICE RATING	LONG Time Delay P.U.	Short time Delay P.U.	Long time (sec)	Short time (sec)
10B	DS-206	600	100%	400%	8	0.18
9B	DS-206	600	100%	400%	8	0.18

Sketch #13

EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared MAN/HA Date 2/2/90 Checked RWA Date 2/3/90



LOAD BREAKER

Short Ckt rating =
= 14 KA (ITE CATALOG)
(Ref 3.9)

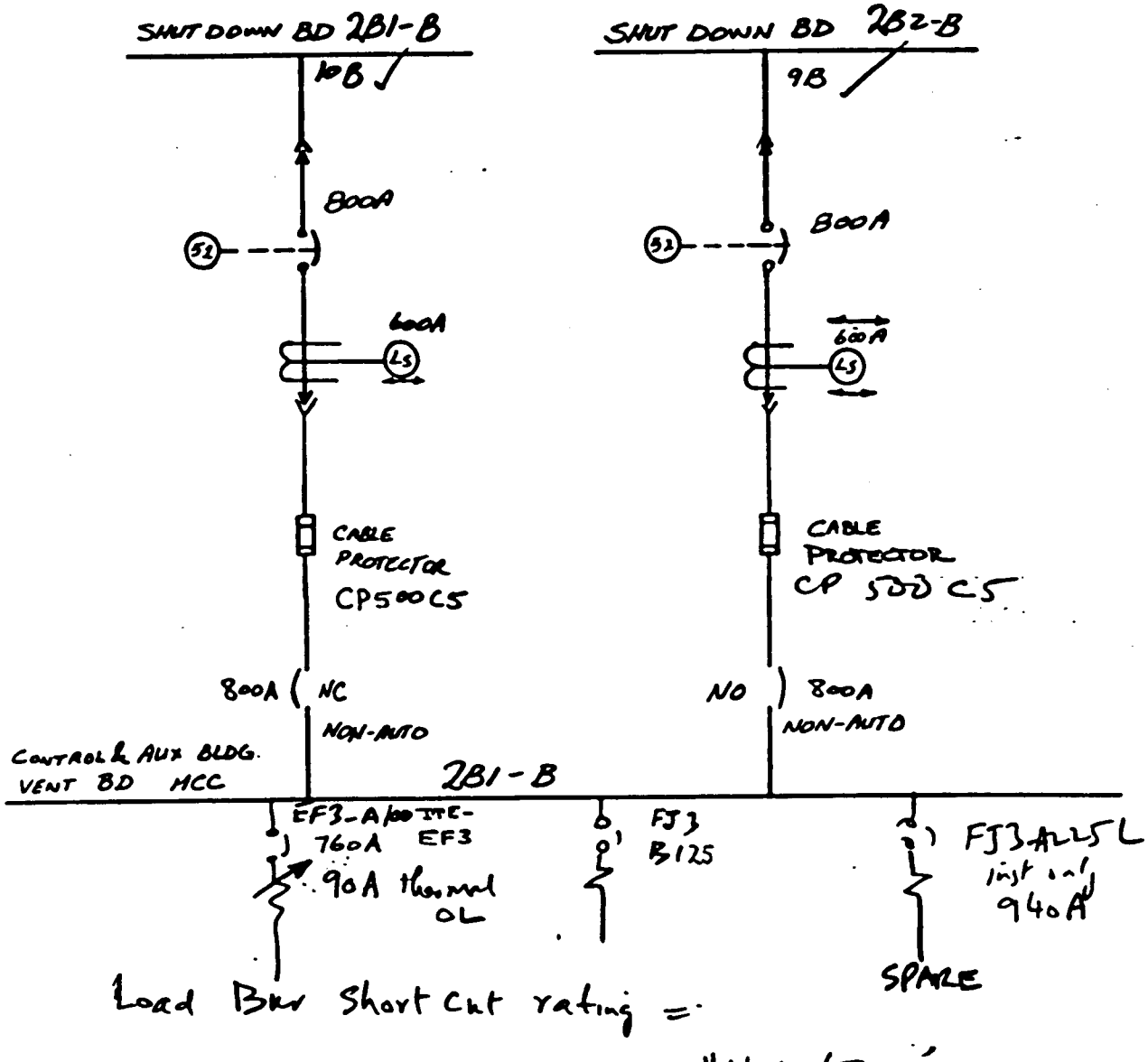
	BKR TYPE	Trip Device Rating T.D. RATING (A)	Long Time Delay P.U. L.T.D. P.U.%	Short Time Delay P.U. S.T.D.P.U.%	Long Time (Sec) L.T.(Sec)	Short Time (Sec) S.T.(Sec.)
9C	DS-206	400	88%	400%	20	0.18
10D	DS-206	600	60%	400%	8	0.18

Sketch #14

Form QQ-3.08.1 Rev. 2 BL-F647 10-85 KPB

EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared MAN/AA Date 2/2/90 Checked RWA Date 2/3/90



Load Bkr Short Ckt rating =

=14 kA (ITE CATALOG) (Ref 3.9)

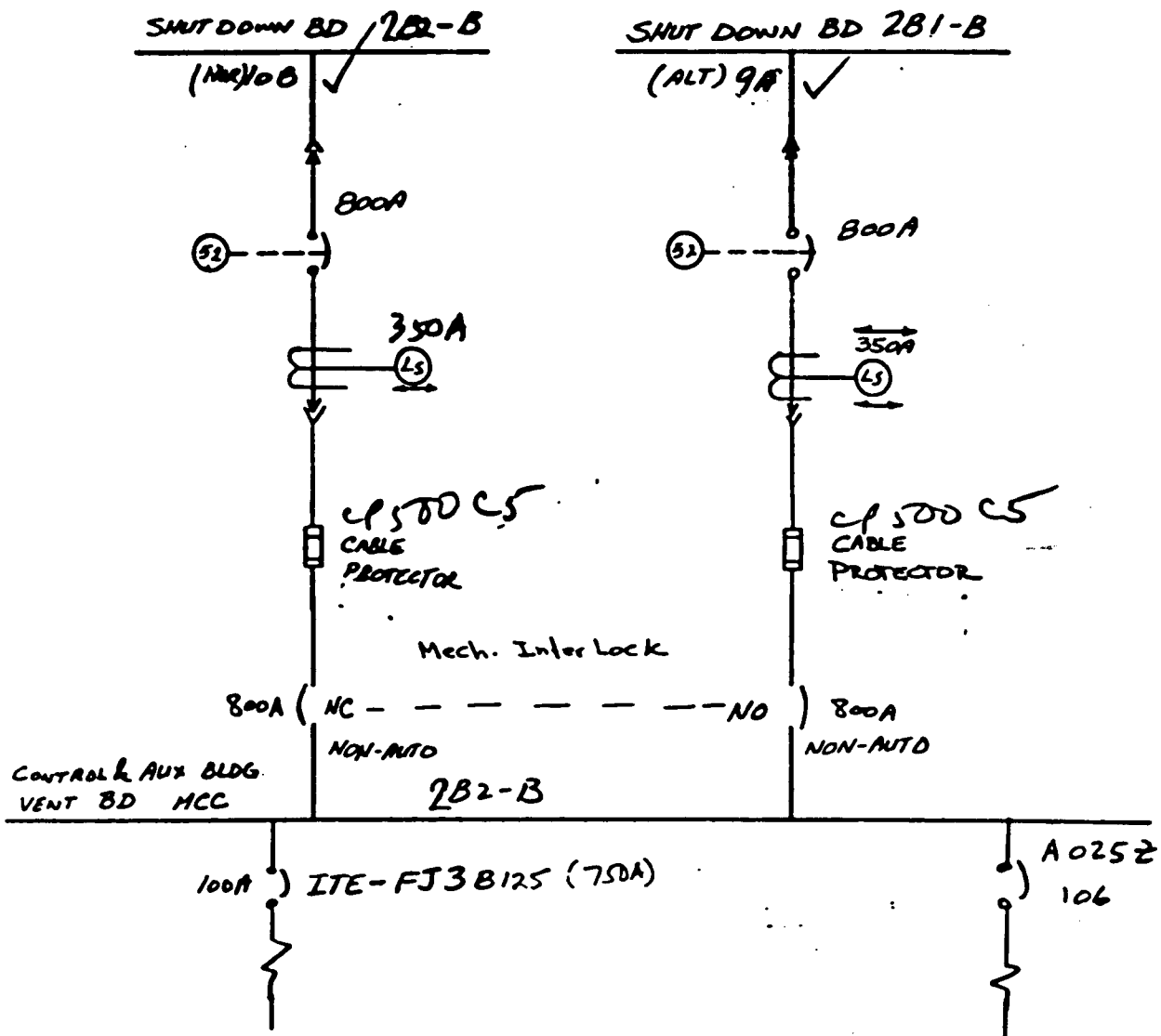
BKR TYPE	TRIP DEVICE RATING (A)	LONG TIME DELAY P.U. %	SHORT TIME DELAY P.U. %	LONG TIME (SEC)	SHORT TIME (SEC)
DS-206	600	100	400	8	0.18
DS-206	600	100	400	8	0.18

Sketch #15

Form GQ-3.08.1 Rev. 2 SL-F847 10-86 KPB

BN EEB-MS-TI08-0008 R0
0 Vac 1E Coordination/Protection

Prepared NAN/HL Date 2/2/90 Checked RWH Date 2/3/90



Load Breaker. Short Ckt. Rating = 14KA (ITE CATALOG) Ref 3.9

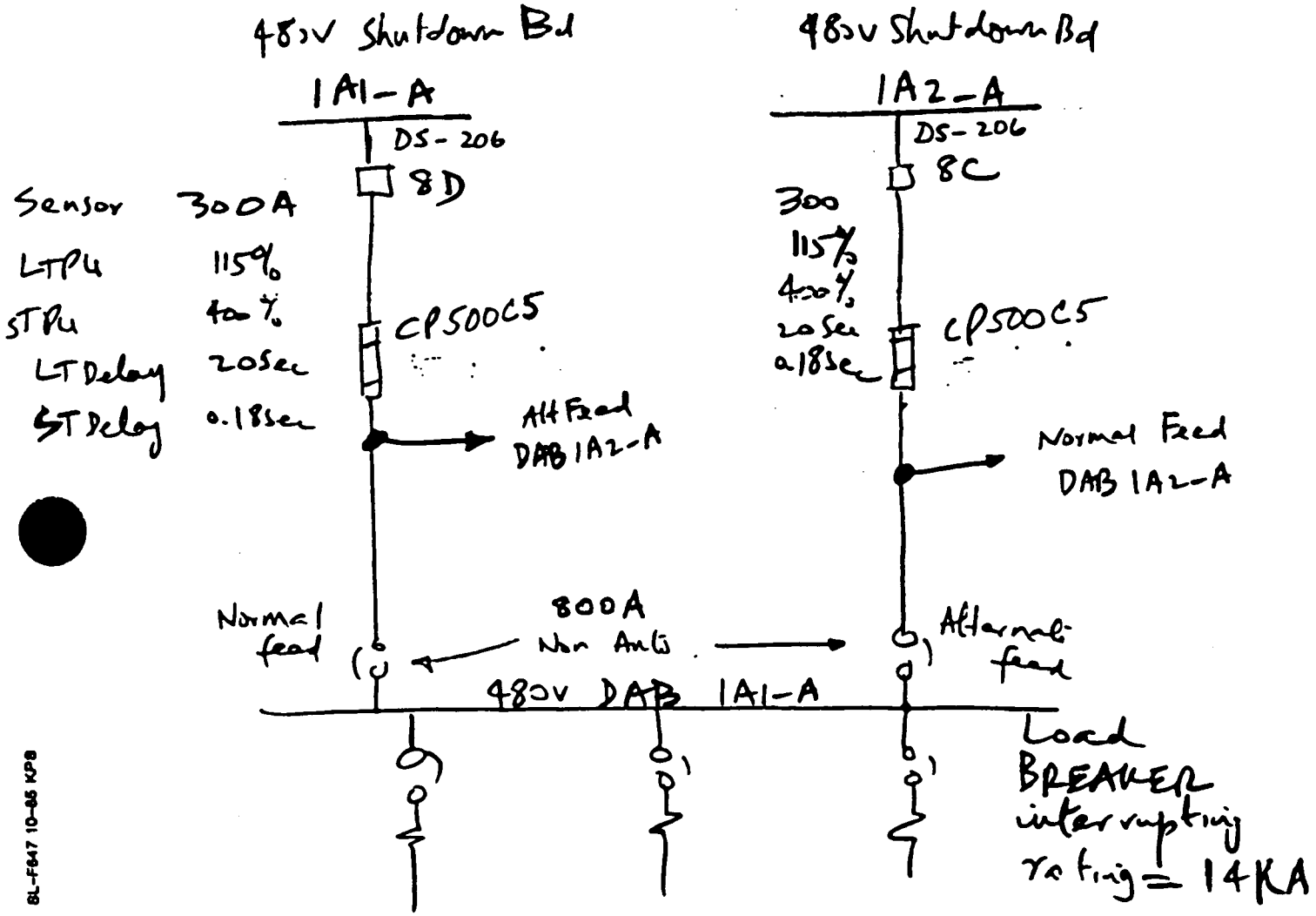
BKR	TYPE	TRIP DEVICE RATING (A)	LONG TIME DELAY P.U. %	SHORT TIME DELAY P.U. %	LONG TIME (SEC).	SHORT TIME (SEC)
10B	DS-206	400	88	400	20	0.18
(ALT) 9A	DS-206	600	58	400	8	0.18

Sketch #16

Form QQ-3.08.1 Rev. 2 BL-F647 10-86 KPB

WBN EEB-MS-TI08-0008 R0
480 Vac 1E Coordination/Protection

Prepared MAN/AH Date 2/2/90 Checked Rwh Date 2/5/90



(ITE CATALOG)
(Ref 3.9)

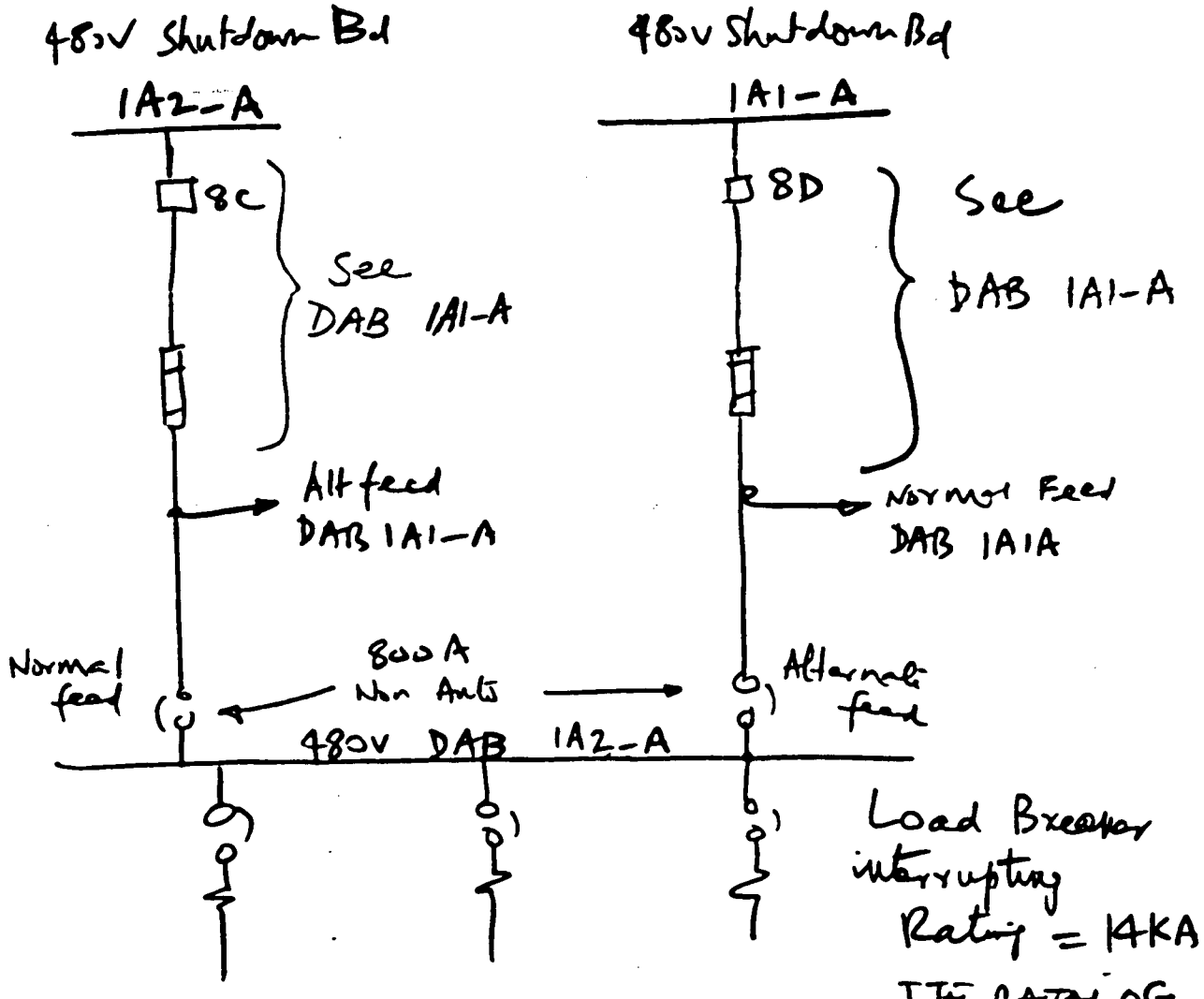
LARGER SIZE FEEDER BKR
INST. setting

ITE/ EF3_ A025
_ L050 (210A)
_ B 50
_ B 100

Sketch #17

Form QQ-3.06.1 Rev. 2 BL-F647 10-85 KPB

Prepared MAN / AA Date 2/2/90 Checked RWAA Date 2/3/90



Larger Size
Load Breaker

INST. Setting

EF3_ L050 (330A)

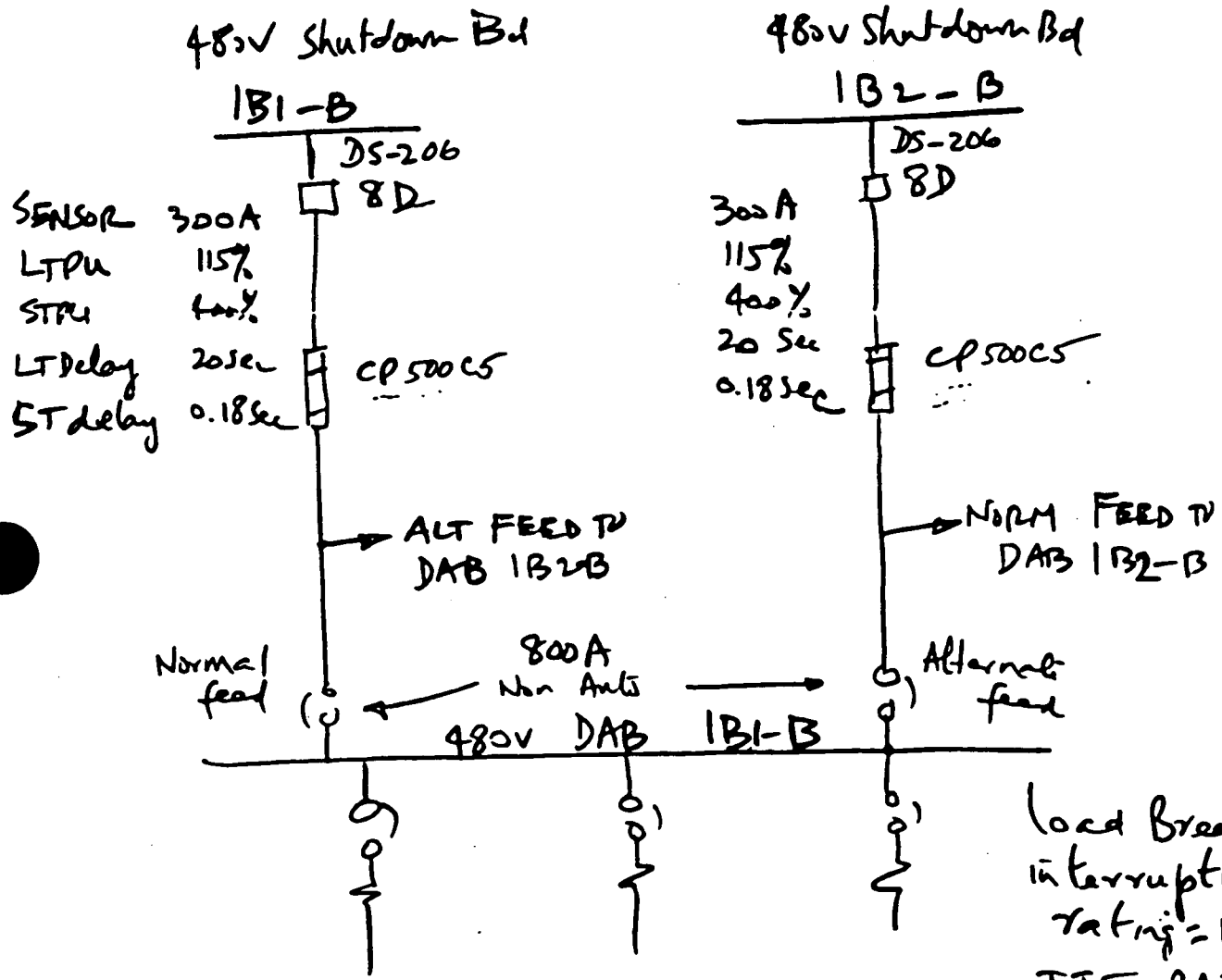
— B 50

Sketch #18

Form QQ-3.04.1 Rev. 2 BL-F647 10-86 KPS

EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared NAN/AA Date 2/2/90 Checked RWA Date 2/3/90



load Breaker interrupting rating = 14 KA
ITE CATALOG
(Ref 3.9)

LARGER SIZE LOAD BKR

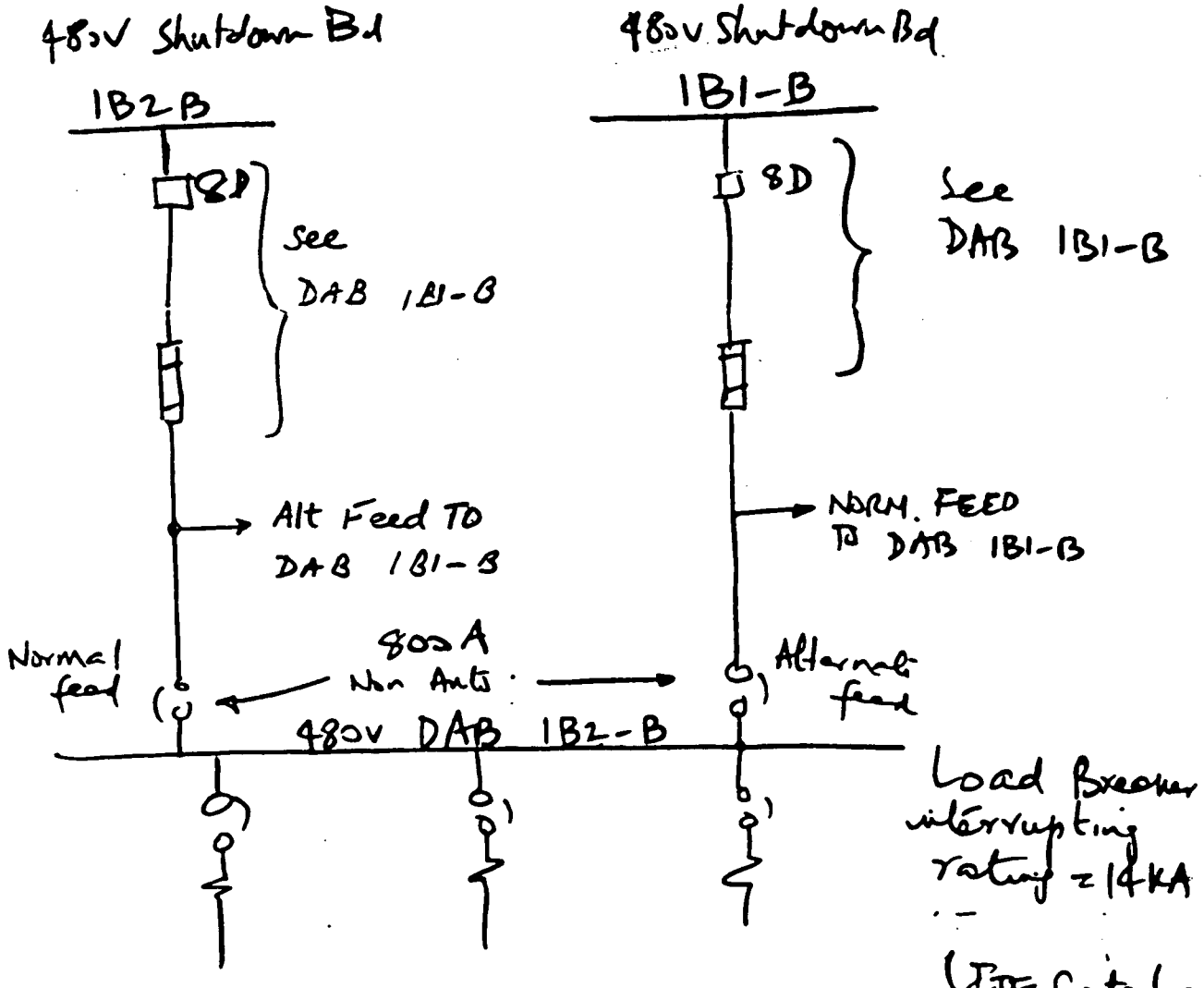
		INST. Setting	
EF3	B100		
	A0 25	(170 A)	27 A HTR
	L0 50	(210 A)	45 A HTR

Sketch #19

Form QQ-3.08.1 Rev. 2 BL-F647 10-85 KPB

N EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared MAN/ Date 2/2/90 Checked Date 2/3/90



LARGER SIZE BREAKERS (LOAD)

INST. Setting

EF3- L050 (210A) 45 A HTR

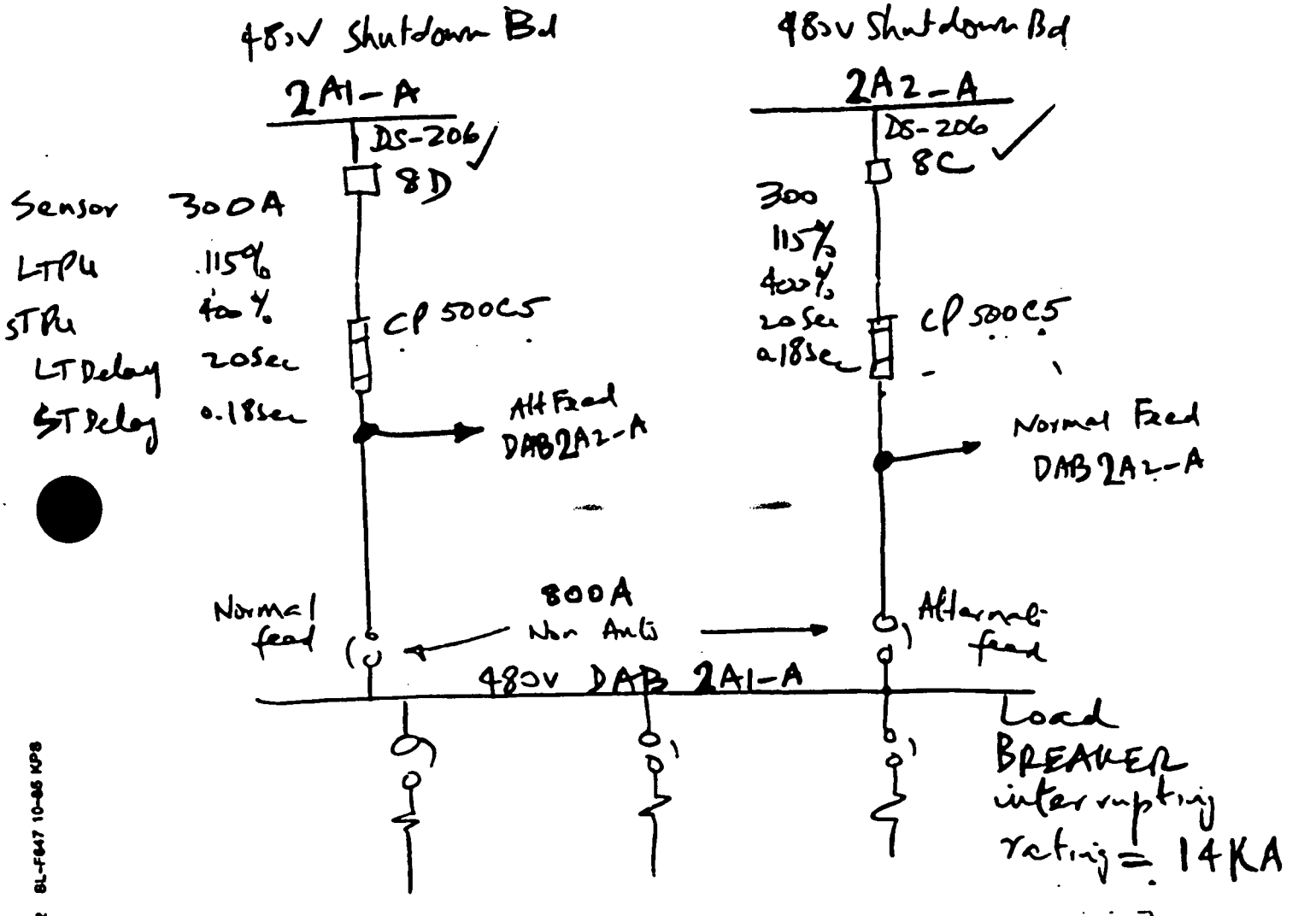
B100

Sketch # 20

Form GQ-3.08.1 Rev. 2 BL-F047 10-86 KPB

EEB-MS-TI08-0008 R0
480 Vac 1E Coordination/Protection

Prepared MANI/HA Date 2/2/90 Checked RWA Date 2/3/90



LARGER SIZE FEEDER BKR

INST. setting

ITE/ EF3- A 025

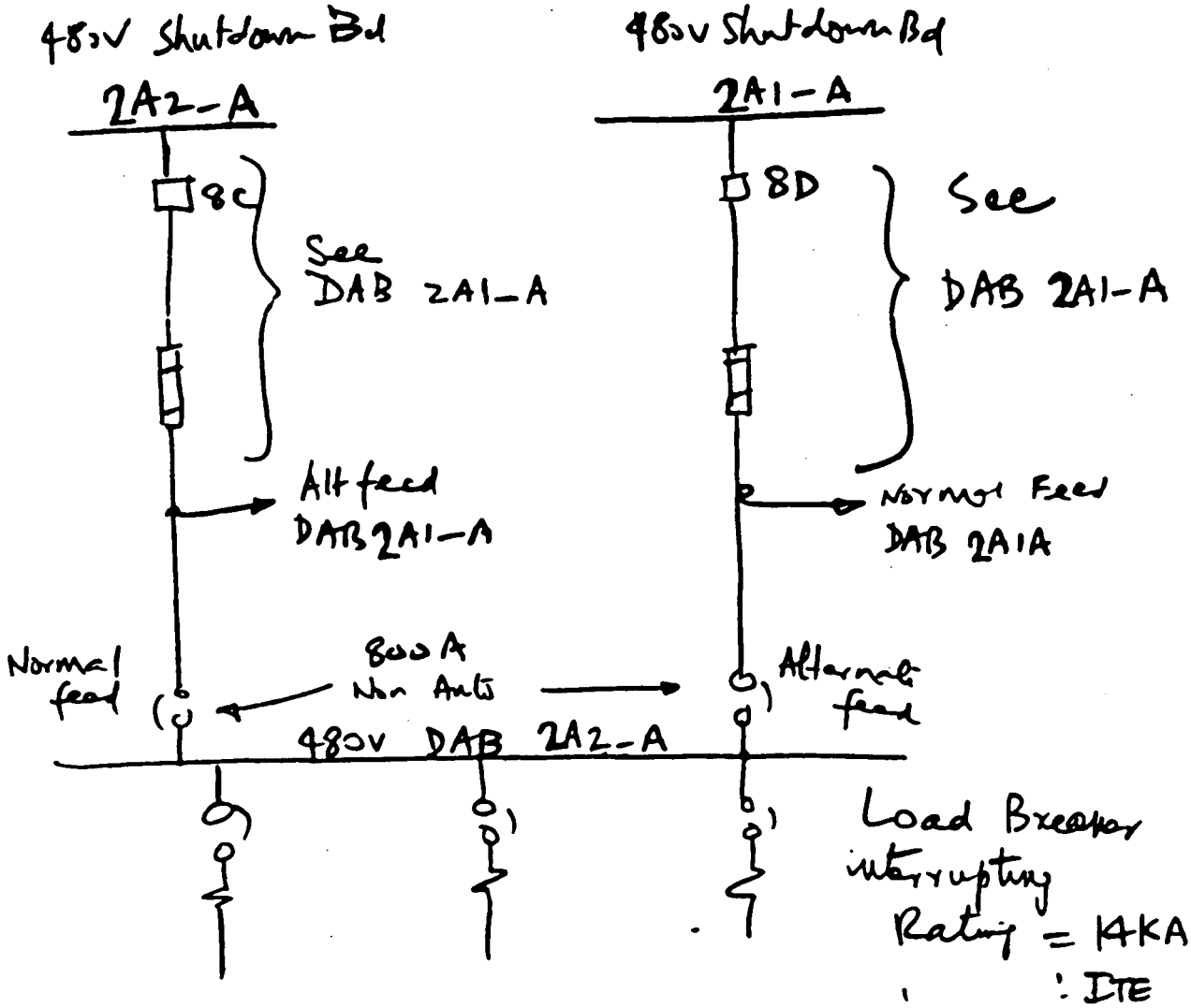
- L 050 (210A)
- B 50 ←
- B 100

Sketch #21

Form QQ-3.06.1 Rev. 2 BL-F847 10-86 KPB

EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared MAN/HA Date 2/2/90 Checked RWA Date 2/3/90

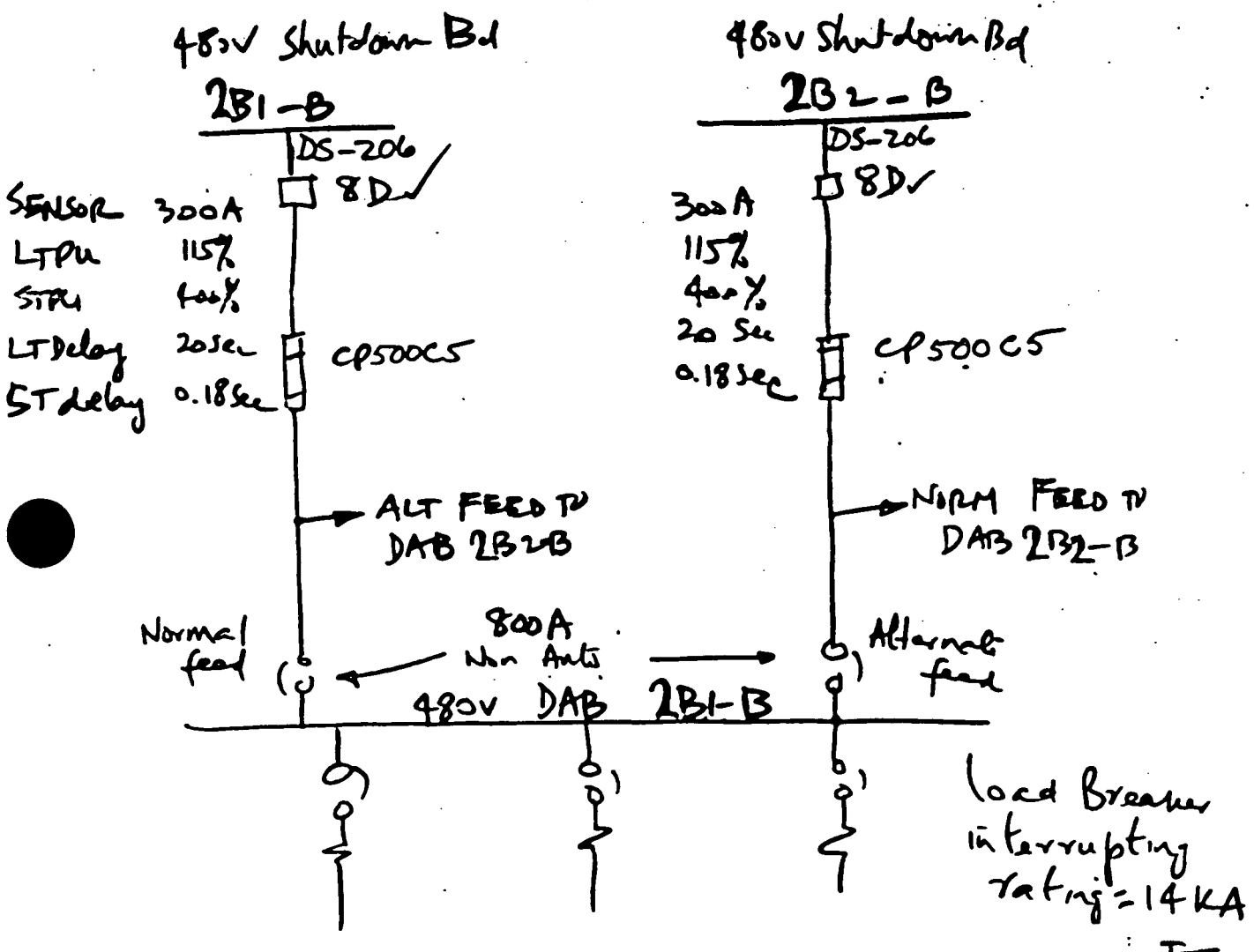


Larger Size Load Breaker	INST setting
EF3_ L050	(330A)
— B 50	←

Sketch #22

Form QQ-3.06.1 Rev. 2 BL-F647 10-85 KPB

Prepared MAN/AA Date 2/2/90 Checked RwA Date 2/3/90



load Breaker interrupting rating = 14 KA (ITE Catalog) (Ref 3.9)

LARGER SIZE LOAD BKR

INST. Setting

EF3 — B100

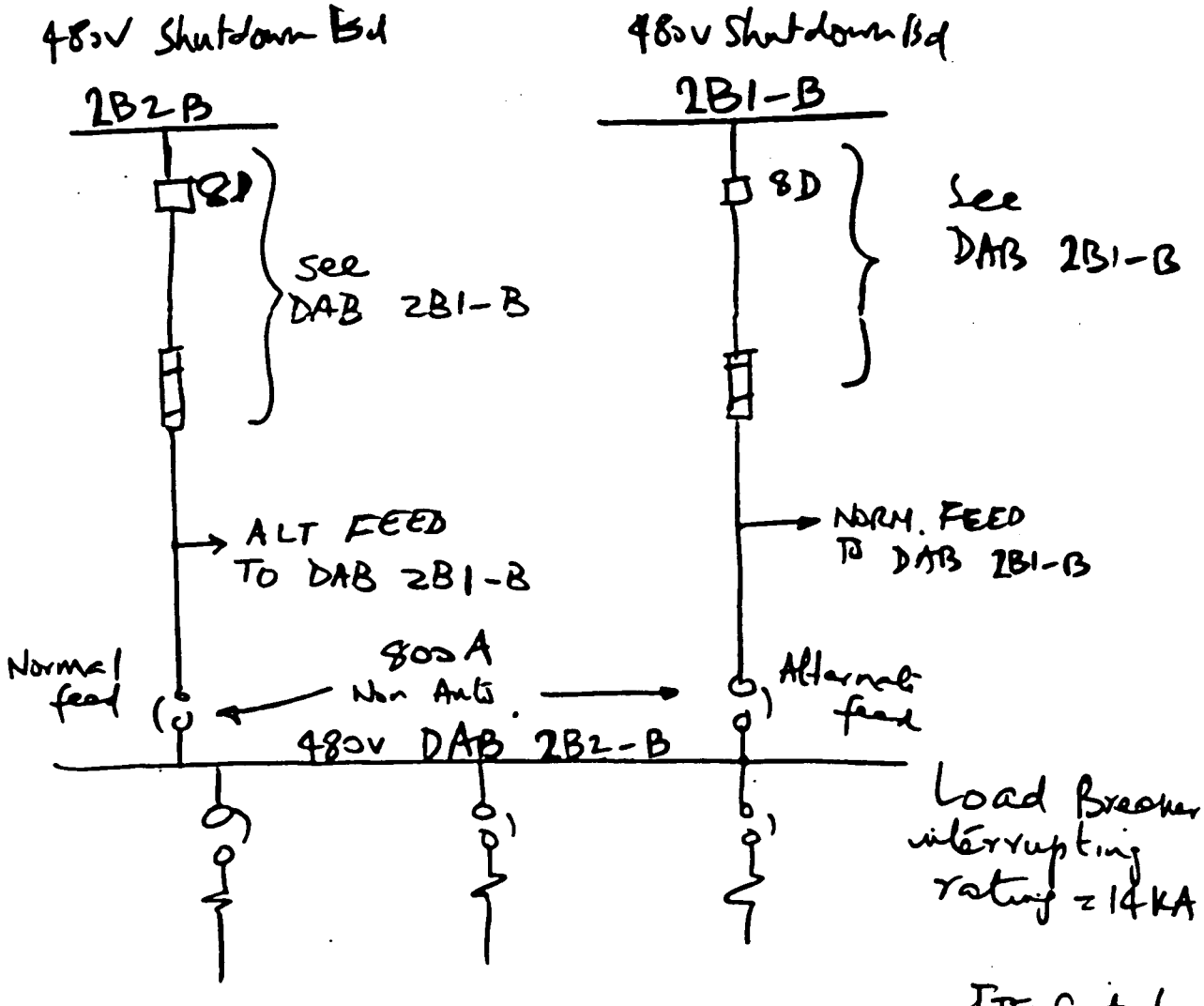
A 025 (170A) 27 A HTR

L 050 (210A) 45 A HTR

Sketch #23

EEB-MS-TI08-0008 R0
ac 1E Coordination/Protection

Prepared MAN/HH Date 2/2/90 Checked RWH Date 2/3/90



ITE Catalog (Ref 3.9)

LARGER SIZE BREAKERS (LOAD)

INST. Setting

EF3- L050 (210A) 45 A HTR

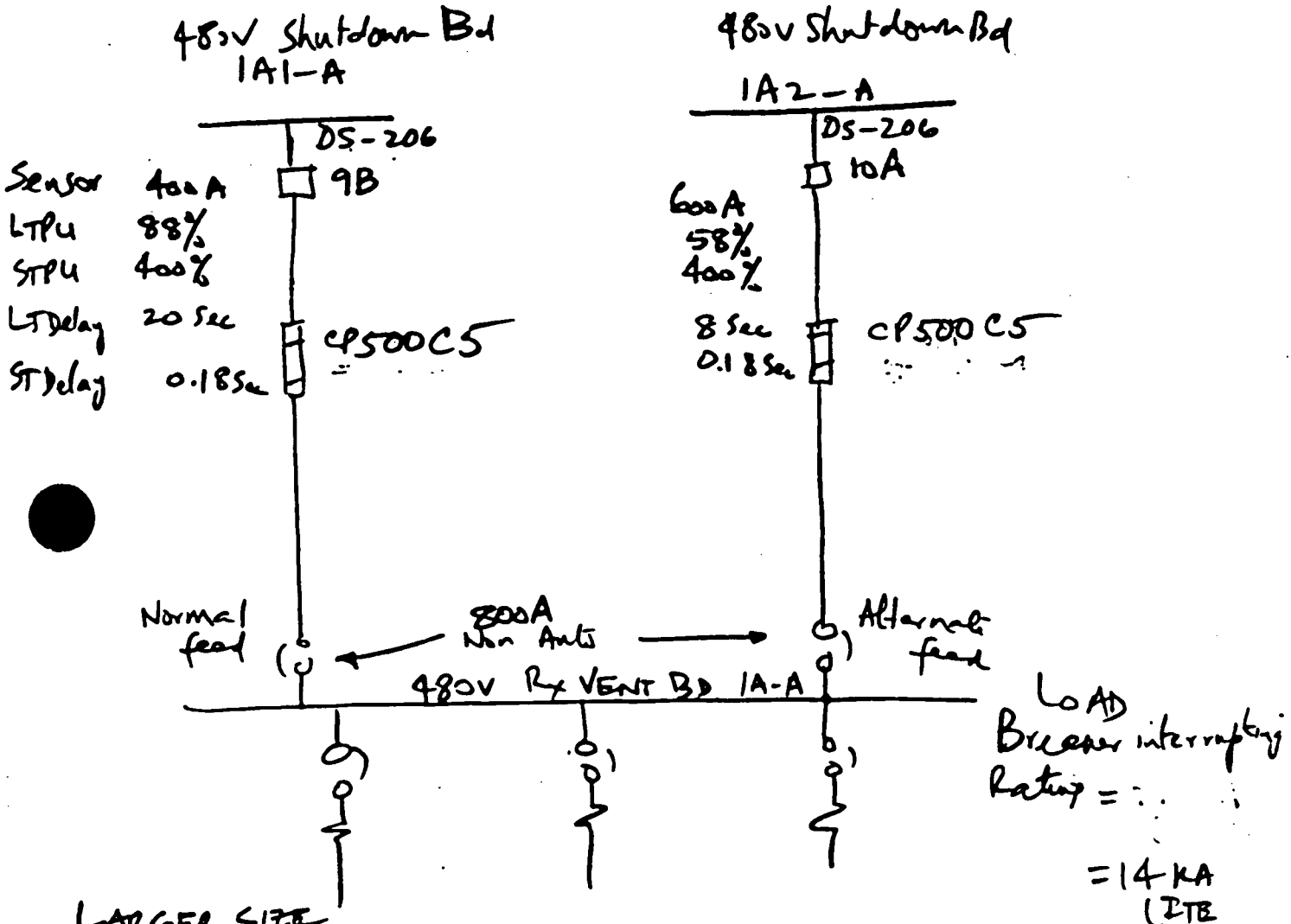
B100

Sketch #24

Form QQ-3.08.1 Rev. 2 BL-1841 10-80 NP

WB[redacted]-MS-TI08-0008 R0
480[redacted] 1E Coordination/Protection

Prepared MAN/HA Date 2/2/90 Checked Rwh Date 2/3/90



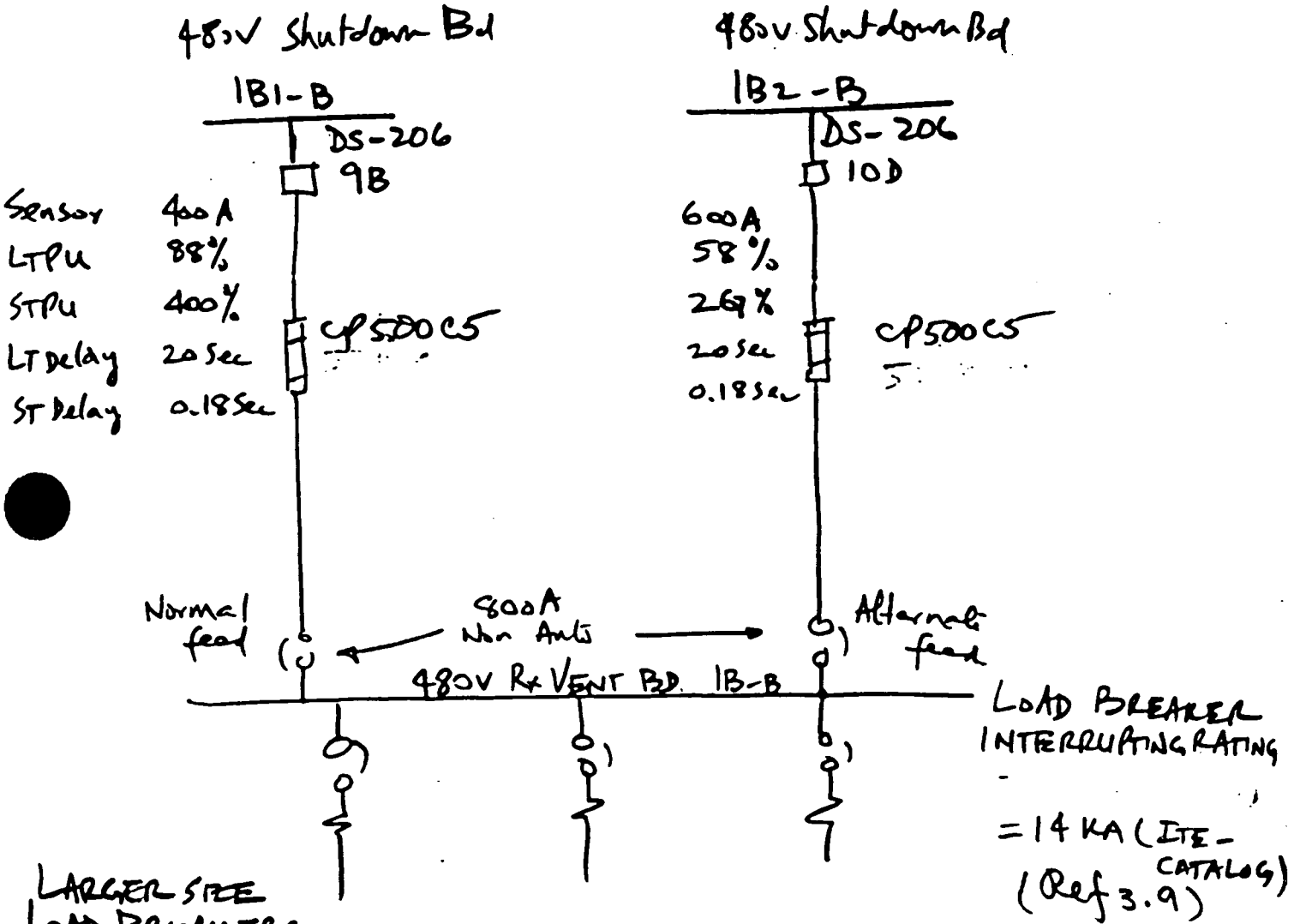
LARGER SIZE FEEDER BREAKERS — INST. setting

EF3 — A 100 (630A) TRS 100
— A100 (760A) HTR 90A
— B100
— B100 HPCP 100A (Sketch #25)

J3 — A225A (960A) HTR 136A
— B125A (1600A) CP6A (#1)
— B175A (1600A) CP6A (4/0) ←
— [illegible] (1600A) CP6A (4/0)

EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared MAN/AL Date 2/2/90 Checked RWH Date 2/3/90

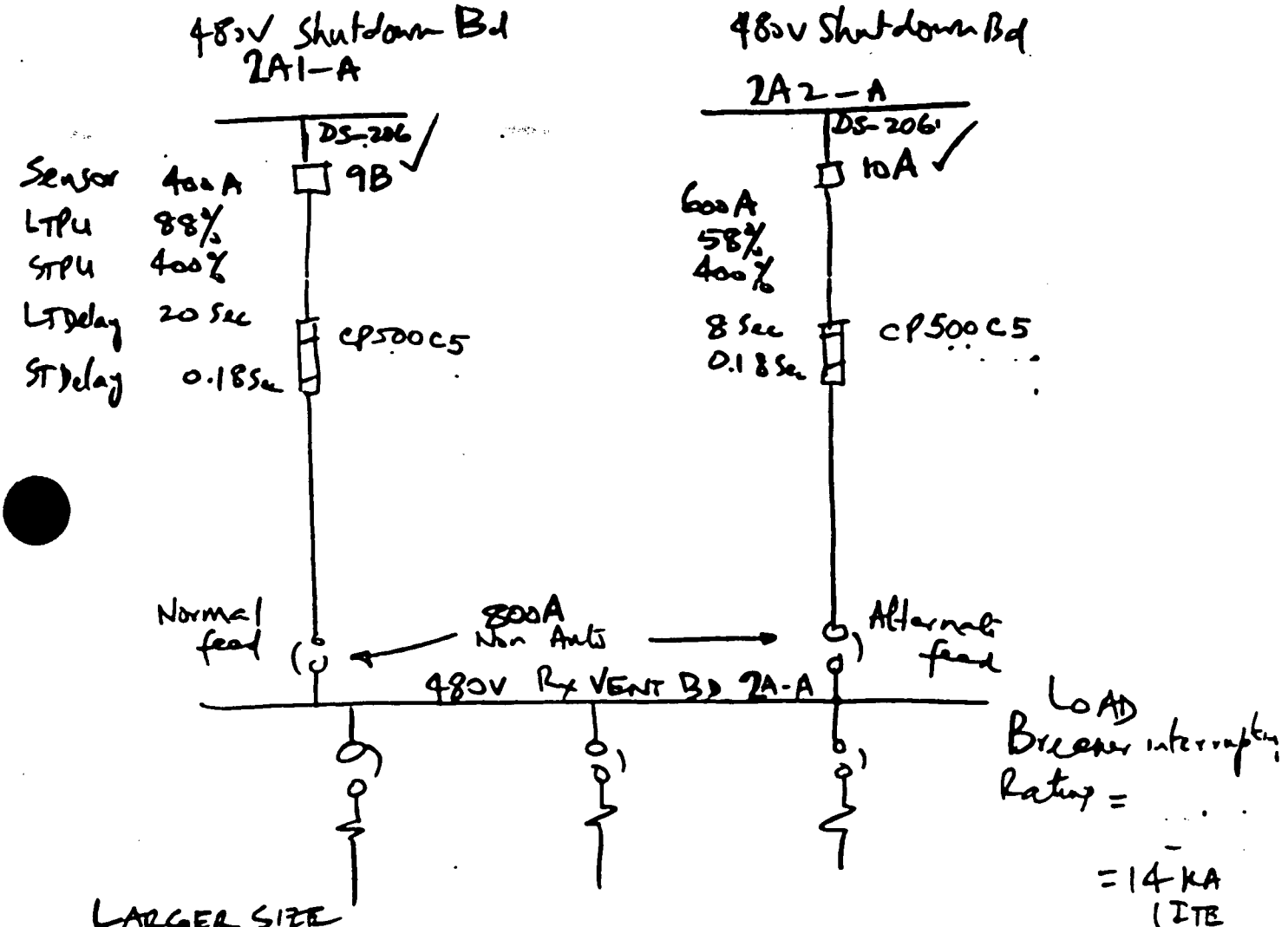


LARGER SIZE LOAD BREAKERS

		INST. setting	HFCP — 100A
EF3-	B100		
	-A100	(630A)	TRS 100A
	-A100	(760A)	90A HTR
FJ3	-B125	(750A)	CP6A #1 Conductor
	-B175	(1600A)	CP6A #4/0 ←

Sketch # 26

Prepared MAN/AA Date 2/2/90 Checked RWH Date 2/3/90

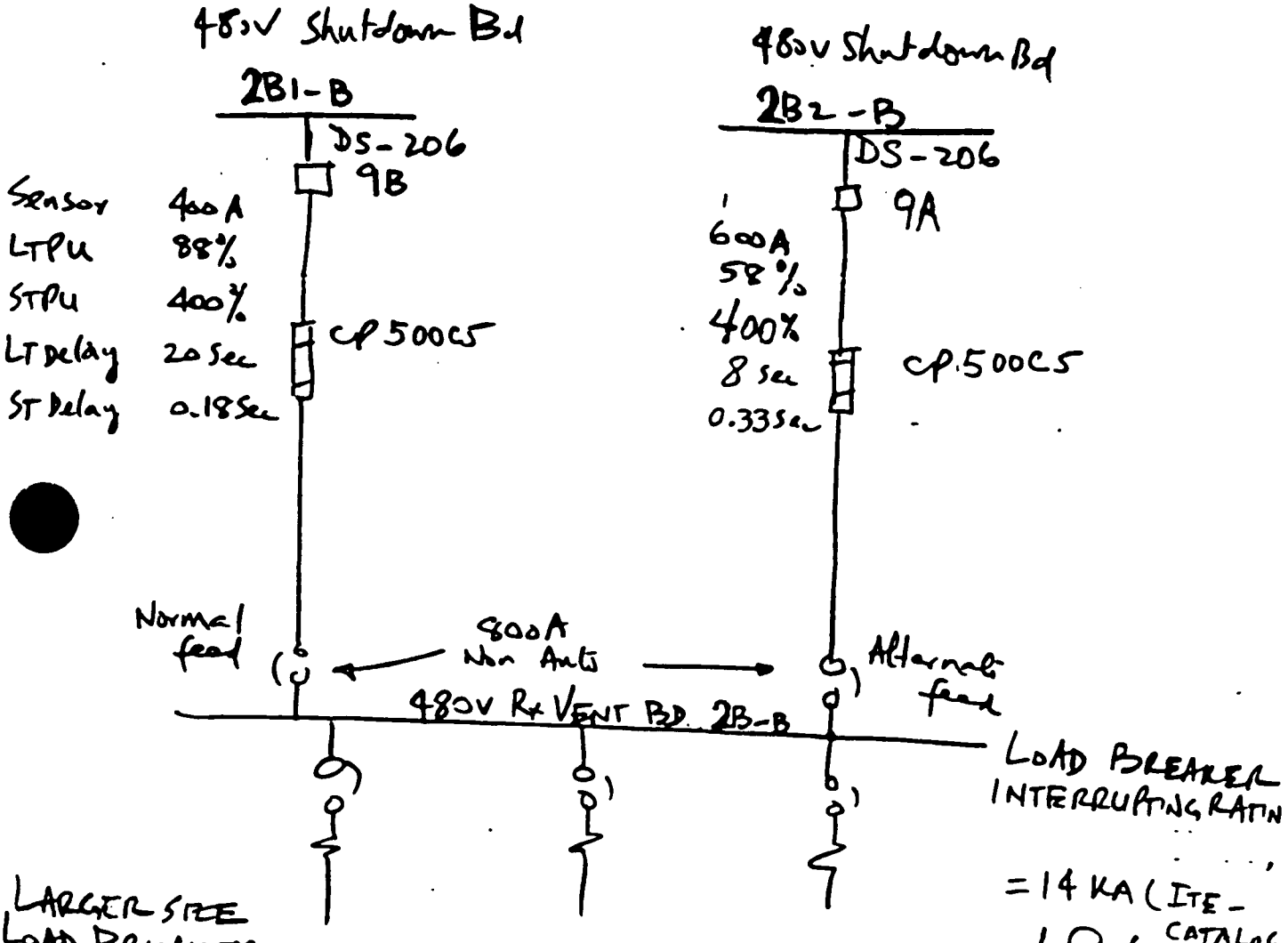


LARGER SIZE FEEDER BREAKERS

		INST. Setting	
EF3	– A 100	(630A)	TRS 100
	– A100	(760A)	HTR 90A
	– B100		
	– B100		HPCP 100A
FJ3	– A225A	(960A)	HTR 136A
	– B125A	(1600A)	CP6A (#1)
	– B175	(1600A)	CP6A (4/0)

Sketch #27

Prepared MAN/ HD Date 2/2/90 Checked RMA Date 2/3/90



LARGER SIZE LOAD BREAKERS

		INST. Setting
EF3-	B100	
	-A100	(630A)
	-A100	(760A)
FJ3	-B125	(750A)
	-B175	(1600A)
	-B150	(1600A)

HFCP -100A

TRS 100A

90A HTR

CP6A #1 Conductor

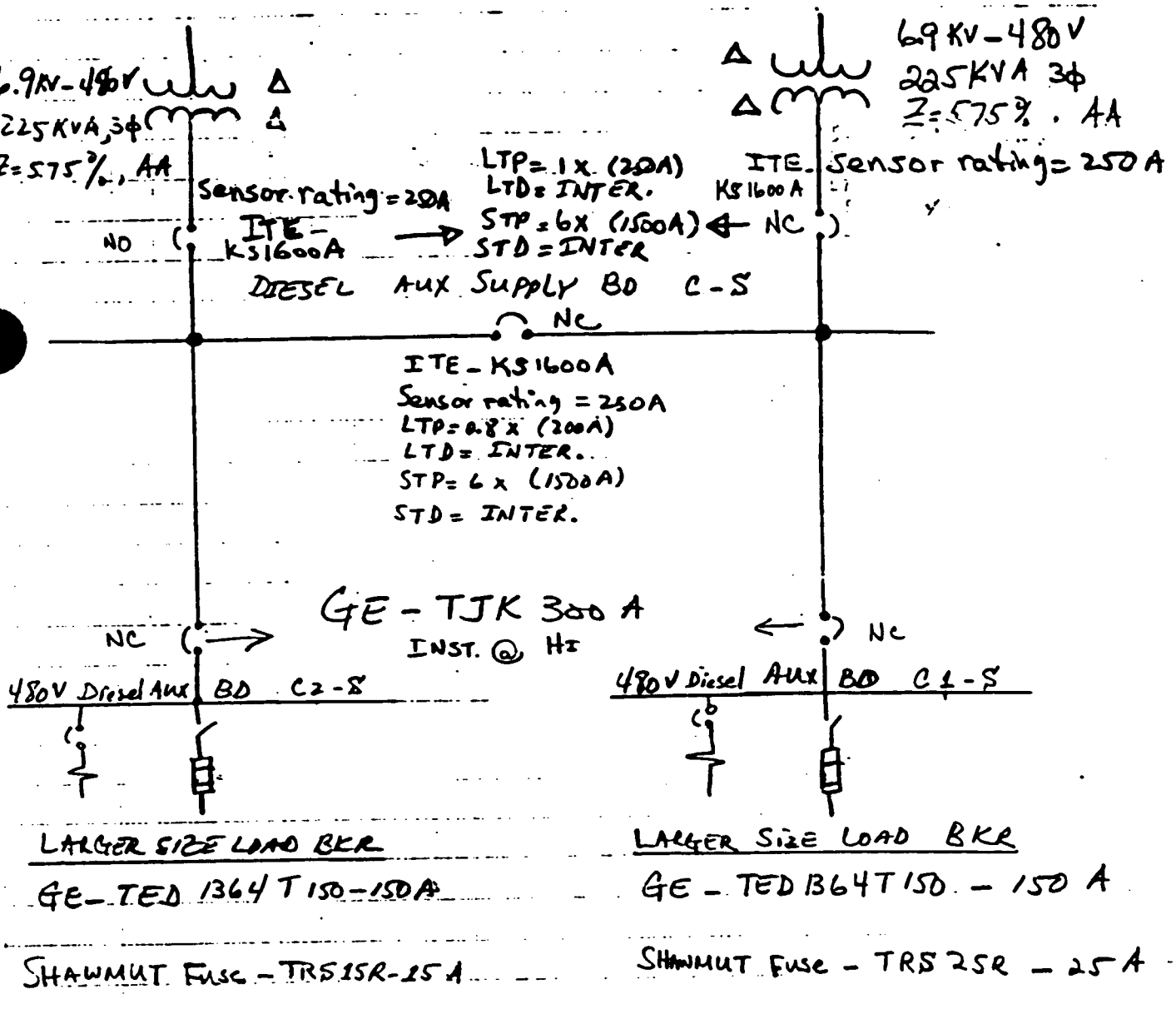
CP6A #4/0

CP6A #4/0

Sketch #28

EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

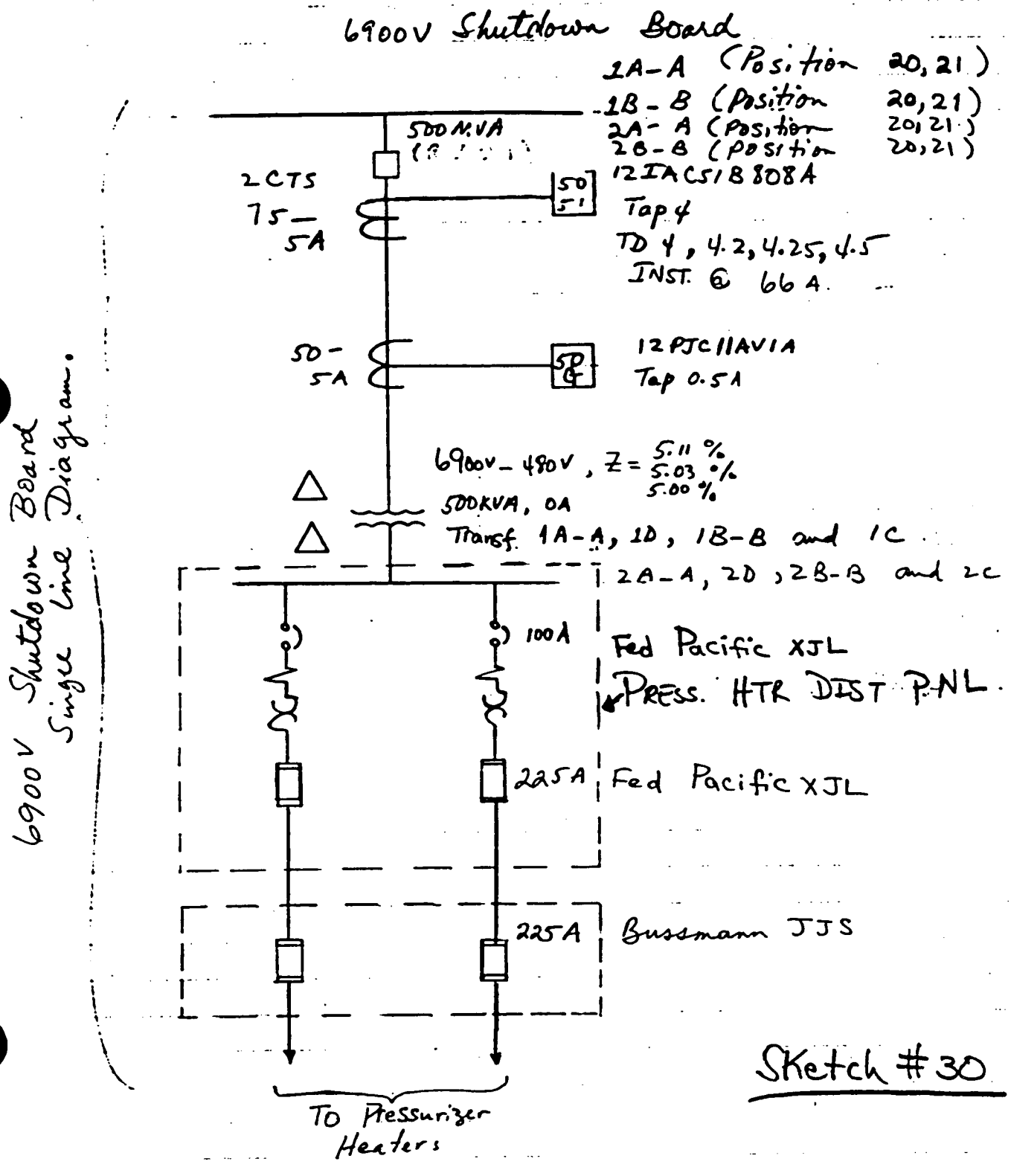
Prepared NAN/HA Date 2/2/90 Checked RWH Date 2/3/90



Sketch #29

N EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared MAN/AA Date 2/2/90 Checked RWA Date 2/3/90

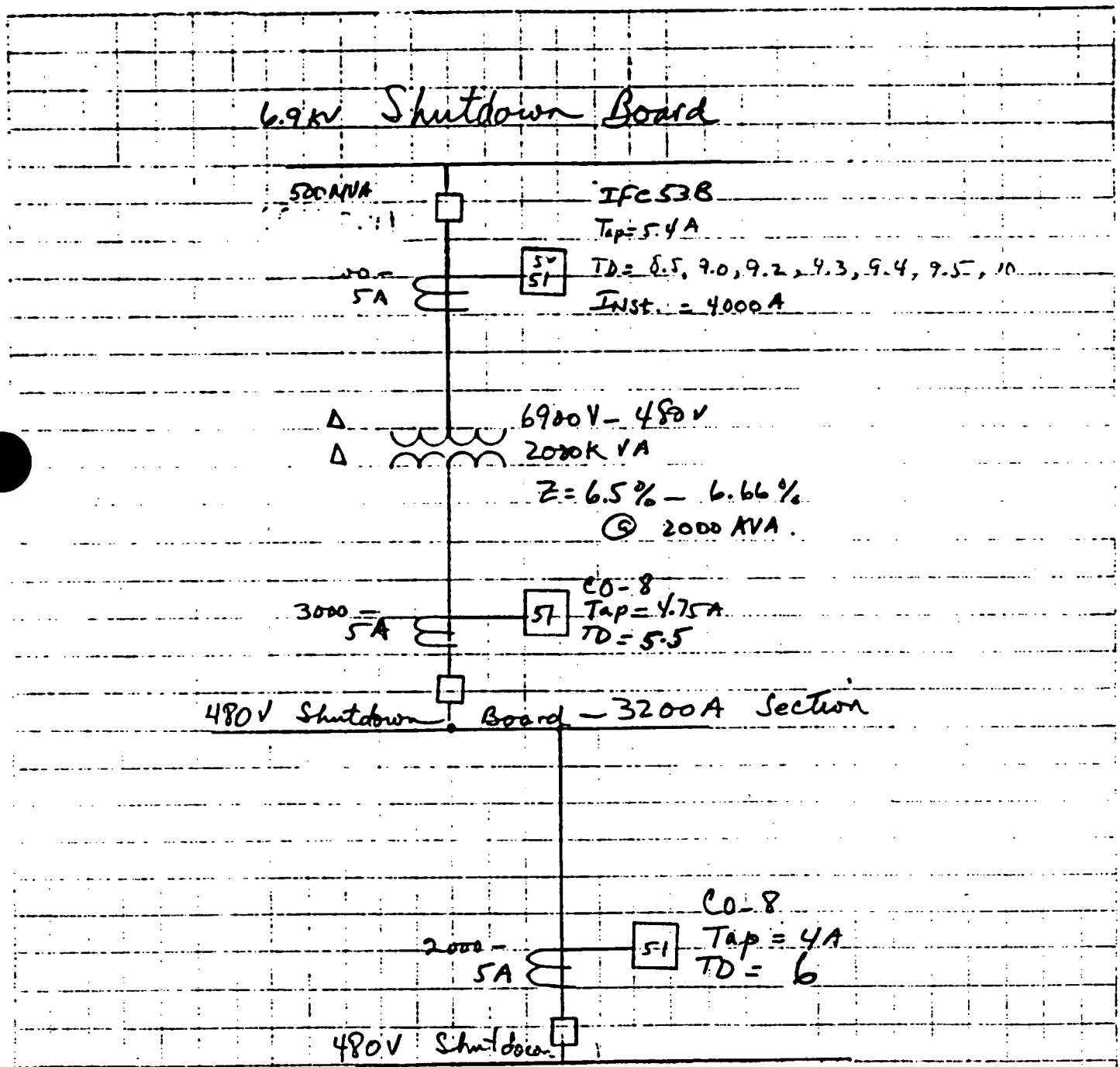


6900V Shutdown Board Single Line Diagram.

Sketch #30

EEB-MS-TI08-0008 R0
480 Vac 1E Coordination/Protection

Prepared MAN/[illegible] Date 2/2/90 Checked [illegible] Date 2/3/90



Sketch #31

Form QQ-3.08.1 Rev. 2 BL-F447 10-86 KPB

8. COMPUTATIONS AND ANALYSIS:

After reviewing the information contained on the sketches included in the previous section, a few "Bounding" Time-Current Characteristic curves were drawn to discuss coordination between the protective devices at the 480v level covered by this calculation. These "Bounding" curves are included in section 9.
The results of our analysis are described on the following pages.

8.1 480V Reactor MOV Boards (MCCs)
1A1-A, 1B1-B, 1A2-A and 1B2-B
2A1-A, 2B1-B, 2A2-A, and 2B2-B.

By comparing the breaker and setting information shown on Sketches 1 through 8 with the time - current characteristic curves on Figure 1, the following observations can be made:-

8.1.1. Coordination does not exist between EJ3-B125 load breakers and upstream switchgear breaker at shutdown board for fault current between 1100 Amperes and 1800 Amperes

8.1.2. Coordination does not exist between 100A rated EF3 load breakers and the upstream breakers in position 8B of shutdown boards 1A2-A, 1B1-B, 1B2-B, 2A2-A, 2B1-B and 2B2-B for fault current between 1100 A and 1250 A. This is true for cases where instantaneous setting in the EF3 load breakers is above 1000 A

8.1.3 The operating characteristic of 350 MCM Cable protector is based on information shown on Vendor Curve 1698E.

It is concluded from Fig 1 that coordination between 350 MCM cable protector and load breaker at Reactor MOV Boards does not exist for faults above 11000 A. The cable protector characteristic has changed over years and the coordination problem becomes worse if the cable protector has a faster operating characteristic than shown in the figure 1.

Form QC-3.08.1 Rev. 2 EC-F0477 0-86 KPB

8.2 CONT & AUX. Bldg. Vent Boards (MCCS)

By Comparing the breaker ratings and settings information shown on Sketches 9 through 16 with the Time-Current Characteristic curves shown on figure 2, the following observations can be made:—

8.2.1. Coordination exists between the largest Load breaker in service at the following MCCS and the upstream feeder Switchgear at the Shutdown Board

Cont & Aux Bldg Vent Boards:

1A1-A
2A1-A
1B1-B
2B1-B
& 2B2-B

Form QQ-3.08.1 Rev. 2 SL-F847 10-86 KPB

8.2.2 The operating characteristic of 500 MCM cable protector has been duplicated from TC curves 542, 543, and 544 of Appendix R calculation (Ref. 3.4) the cable protector characteristic has changed over the years. the cable protector characteristic shown in figure 2 is the most optimistic characteristic from the coordination stand point with down stream devices. It is concluded from figure 2 that coordination exists between the cable protector and MCC load breakers for available fault current at the vent boards upto 22000A. The coordination problem will experienced if the cable protector has a faster operating characteristic.

Form QQ-3.08.1 Rev. 2 BL-F847/10-85 KPB

Unit EEB-MS-TI08-0008 R0
Vac 1E Coordination/Protection

Prepared MAN/RH Date 2/2/90 Checked RWH Date 2/3/90

8.2.3. Coordination between the largest Feeder breaker in Service (FJ3-B225) at the C&A Bldg MCC 1A2-A, 1B2,B, 2A2-A and the upstream Switchgear breaker at Shutdown Boards 1A2-A, 1B1-B, 1B2,B and 2A2-A Can not be assured for faults below 2200 A.

Coordination however exists between the 100 A rated load breakers at the above mentioned MCCs and the upstream Switchboard breakers.

8.3 480V Diesel Aux Boards (MCCs)

1A1-A, 1B1-B, 1A2-A & 1B2-B
2A1-A, 2B1-B, 2A2-A & 2B2-B

By comparing the breaker rating and settings information shown on sketches 17 through 24 with the time-current characteristics curve shown on fig. 3, the following observations can be made:-

8.3.1. As explained in Section 8.2.2, it is concluded that coordination exists between 500 MCM cable protector and MCC load breakers for fault level upto 22000A. The coordination problem will be experienced if the cable protector has a faster operating characteristic.

8.3.2. Lack of coordination (within the fault current range of 1,100 A – 1250 A) exists between the 50A and the larger EFS load breakers at the Aux Boards and the switchgear breaker at the Shutdown Boards because in such cases, the nominal instantaneous trip point of the load breakers is above 1,000 A.

8.4 480 V Reactor Vent Boards (MCCs).

1A-A, 1B-B, 2A-A and 2B-B.

By Comparing the breaker and setting information shown on sketches 25 through 28 with the time - current characteristic curve shown on fig. 2, the following observations can be made :-

8.4.1 As explained in Section 8.2.2, it is concluded that coordination exist between 500 MCM cable protector and MCC load breaker for fault current level upto 22000 A at the Reactor Vent Board. The coordination problem will be experienced if the cable protector has a faster operating characteristic.

8.4.2 Coordination can not be assured between FJ3-B175 load breakers (with INST set at 1600 A) and switchgear at the shutdown boards for fault current between 1,450 A and 1,750 A. Coordination exists between 100 A rated EF3 load breakers and upstream switchgear breakers at the shutdown boards.

Form GQ-3.08.1 Rev. 2 BL-F647 10-86 KPB

8.5 480V Shutdown Boards (SWGRS)

1A1-A, 1A2-A, 1B1-B, 1B2-B,
2A1-A, 2A2-A, 2B1-B and 2B2-B

8.5.1. By comparing the breaker and relay settings contained in appendix C and the time-current characteristic curves shown on Fig. 475, the following observations can be made:-

a) Coordination exists between the load breakers presently in service and the normal as well as emergency source breakers at 3200A rated section of the above shutdown boards.

b. Coordination exists between the main breaker at 1600 A rated section and the normal as well as emergency source breaker at the 3200 A rated section

c. Because of the use of 1600 A rated current limiter in DSL-416 main breaker at the 1600A rated Bus section of all 480V Shutdown Boards except 2B2-B, coordination between this main breaker and the load breakers is lost for fault currents above 14,000 A. In the case of 4 Rov Shutdown Board 2B2-B, the coordination is lost for fault currents above 13,000 A.

Form QQ-3.08.1 Rev. 2 8L-F847 10-86 KPB

8.5.2. By comparing the relay settings contained in Sketch 3 and the time current characteristic curves shown on Fig. 9, the following observations can be made:-

a). Coordination does not exist between the phase overcurrent relays located in the 6.9 KV switchgear cubicle feeding the 480V shutdown boards transformers and the downstream main breaker relay.

b) Adequate coordinating time interval (CTI) does not exist between the 6.9 KV phase overcurrent relays and the phase overcurrent relay located on the main breaker at the 1600 A section of the shutdown board when the TD setting of the 6.9 KV relay is lower than 10.

c). The instantaneous unit in the phase overcurrent relays at the 6.9 KV level is set to trip at 177% of the transformer secondary fault current. This low setting may cause the relay to trip unnecessarily on transformer secondary faults.

Form 00-3.08.1 Rev. 2 BL-F447 10-86 KP-8

8.6 480V Diesel Aux Board C-S feeding Boards C1-S & C2-S:

By comparing the breakers and settings on Sketch 29 with time - Current Characteristics Curves shown in fig 6, the following observations can be made :-

8.6.1. The main breakers at Boards C1-S and C2-S have the instantaneous trip feature, and therefore the coordination between the Gould Shawmut feeder fuses (TRS-15 & TRS-25) and the main breakers at the C1-S & C2-S BDS can not be assured.

8.6.2. Coordination does not exist between the load breaker GE-TED 1364 T150 and breakers feeding the C1-S & C2-S (GE-TJK300A) for fault currents above 2,600 A.

8.6.3. Coordination does not exist between the GE type TED 150A rated load breaker at Boards C1-S & C2-S and the upstream ITE K-1600S breaker feeding the Diesel Aux Boards C1-S & C2-S.

8.6.4. For fault currents lower than 3,300 A, Coordination does not exist between the TJK300A main breaker at the Diesel Aux Boards C1-S and C2-S and the upstream ITE breaker at the C-S Board feeding the two Boards.

Form GQ-3.06.1 Rev. 2 SL-F647 10-86 KPS

8.7: 480V Pressurizer Heater fed from the 6.9 KV Bus

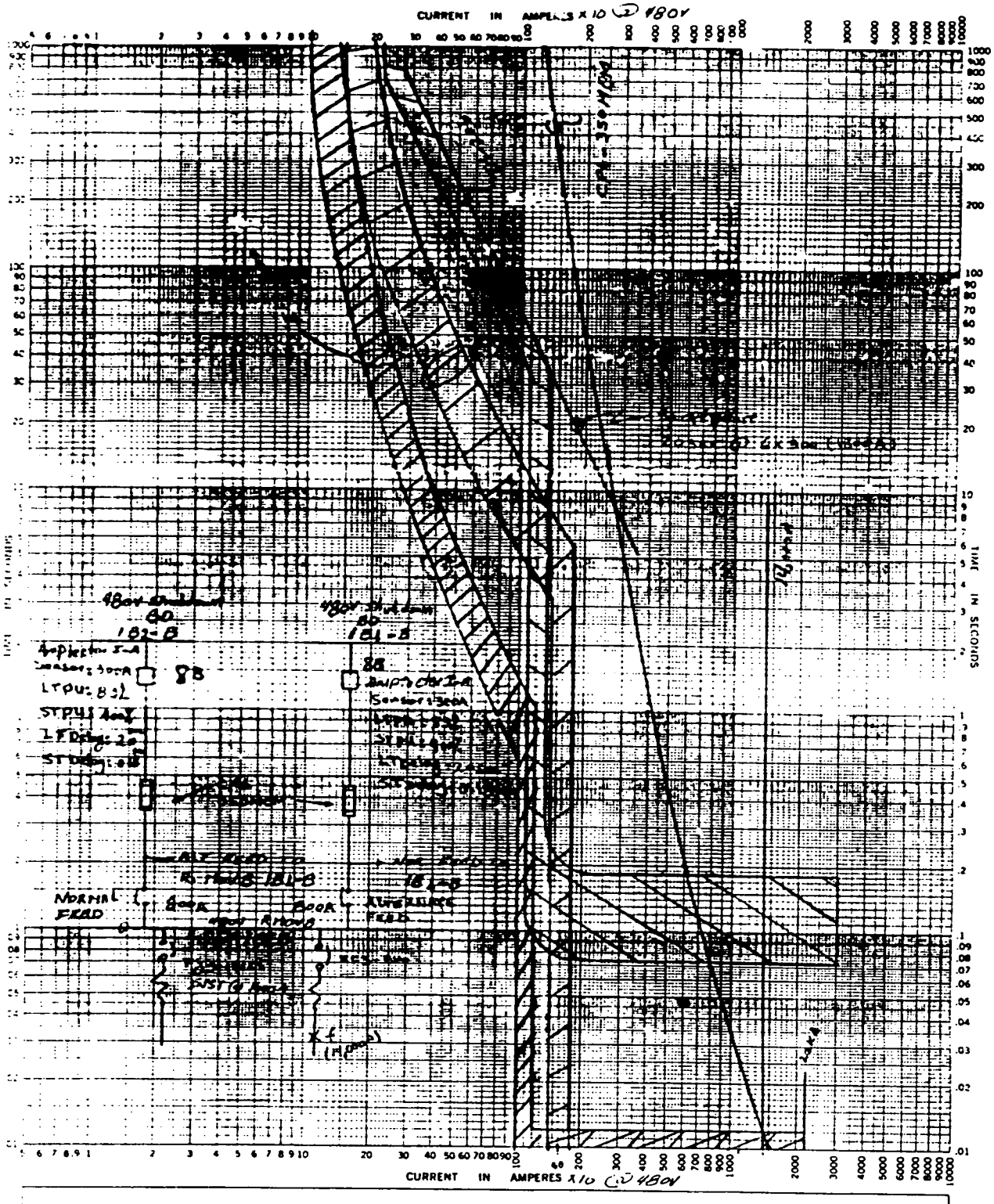
By comparing the information shown on sketch #30 and the time-current tripping characteristic curves shown on figures 7 & 8, it is concluded that coordination exists between the branch circuit protective devices at the 480 V Pressurizer Heater Panel and the time over-current relay at the 6900 V level feeding the Panel.

The RMS symmetrical fault current seen by the overcurrent relay at the 6900 V Bus for fault on the secondary side of the 500 KVA Transformer is 820 A. The instantaneous element in the over-current relay is set to trip at 990 A i.e. 120.7% of the secondary fault. The relay therefore will trip the 6.9 KV Breaker for fault at the Pressurizer heater feeder. The instantaneous element should be reset to trip at 200 % of the secondary fault current i.e at 1650 Amperes Primary or 110 A relay current.

Form QQ-3.08.1 Rev. 2 SL-TSW 10-30-89

9. SUPPORTING GRAPHICS:

The following 9 sheets are the "bounding" coordination sheets required to evaluate the coordination at the 480 V distribution system at the WATTS BAR Plant Unit 1 & 2.



For REACTOR MOV BOARD 1B2-B — TIME-CURRENT CHARACTERISTIC CURVES

Fuse Links. In

BASIS FOR DATA Standards. Dated

1. Tests made at Volts a-c at p.f., starting at 25C with no initial load
2. Curves are plotted to Test points so variations should be

No.
Date MF 12-20-89

FIG. 1

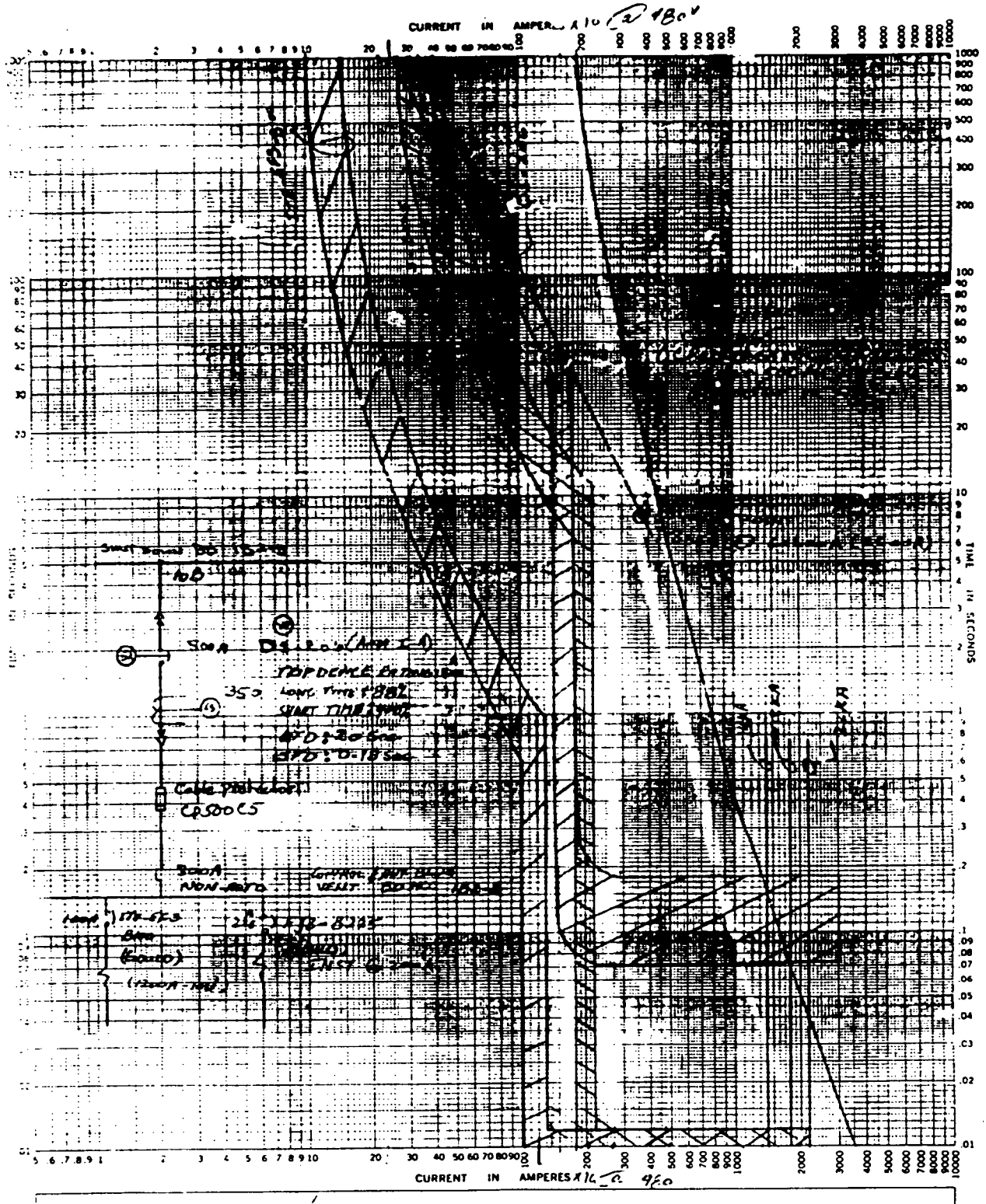
K-E TIME-CURRENT CHARACTERISTIC KEUFFEL & ESSER CO. 48 5258

Also used for:-
Reactor MOV Boards
1A1-A, 1A2-A, 1B1-B,
2A1-A, 2A2-A, 2B1-B and 2B2-B

See Sketches 1 Through 8

No.	8573-27-EAD-8
Rev.	
Page	55
Proj. No.	5573-27

MAN 2/3/90
Verified 2/3/90
Date 2/3/90



For Control Bldg Vent BD MCC 1B2-B TIME-CURRENT CHARACTERISTIC CURVES

Fuse Links In

BASIS FOR DATA Standards (IVA) Dated

1. Tests made at Volts a-c at p-f., starting at 25C with no initial load

2. Curves are plotted to Test points so variations should be

No.

Date NF 12-15-89

FIG. 2

K+E TIME-CURRENT CHARACTERISTIC 48 5258

Also used for:
CA Bldg Vent BD MCC's 1A1-A, 1A2-A, 2A1-A, 2A2-A, 1B1-B, 2B1-B and 2B2-B. See Sketches 9 through 16

Rx Vent BD MCC's 1A1-A, 1A2-A, 2A1-A, 2A2-A, 2B1-B and 2B2-B. See Sketches 25 through 28.
1B1-B and 1B2-B

8573-27-GD-8

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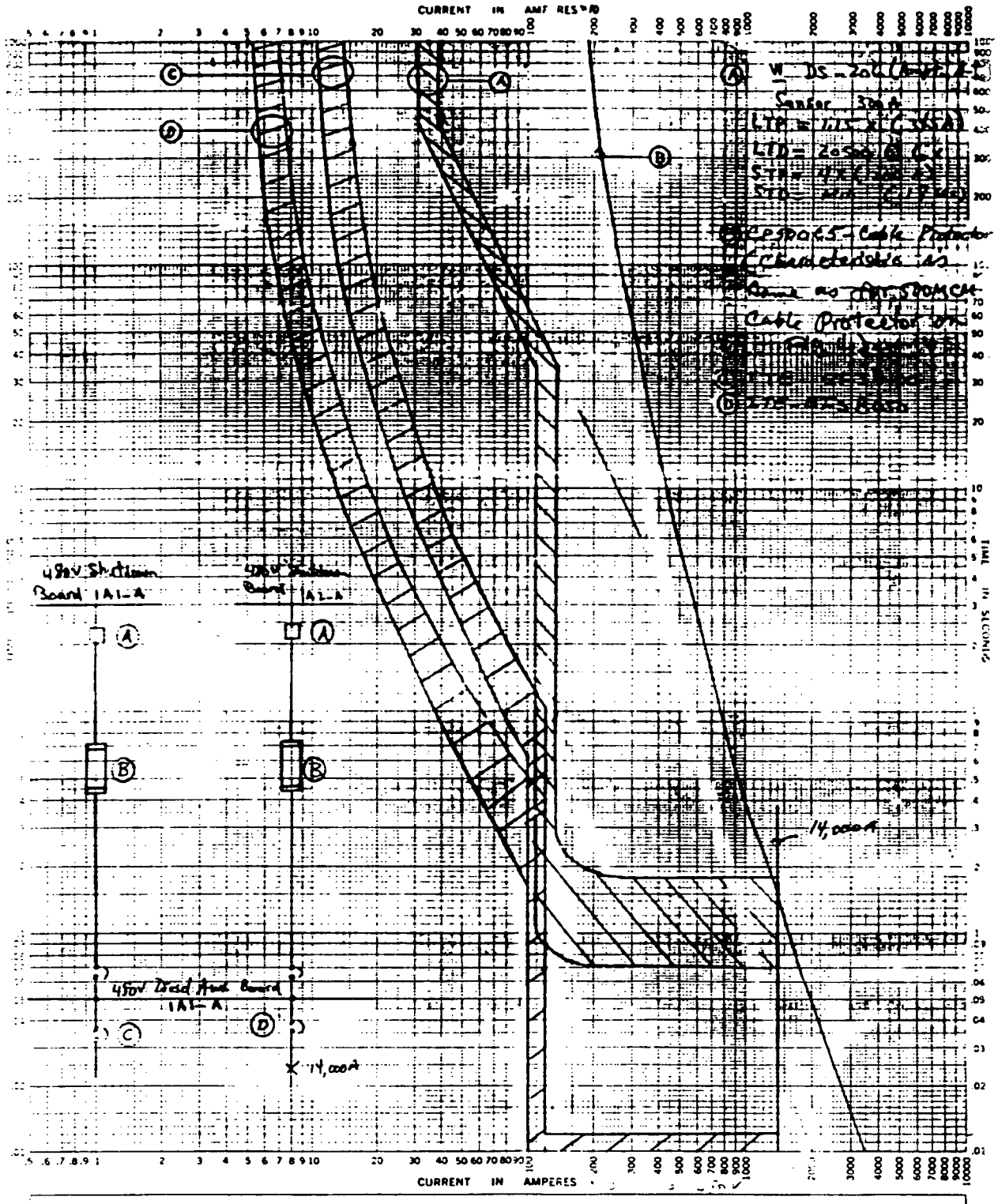
Prepared 2/2/90
Verified 2/3/90
Verified 2/2/90



For 1A1-A TIME-CURRENT CHARACTERISTIC CURVES

Fuse Links. In

BASIS FOR DATA Standards Dated

1. Tests made at Volts a-c at p.f., starting at 25C with no initial load.
2. Curves are plotted to Test points so variations should be

No.

Date

K+E TIME-CURRENT CHARACTERISTIC 48 5258

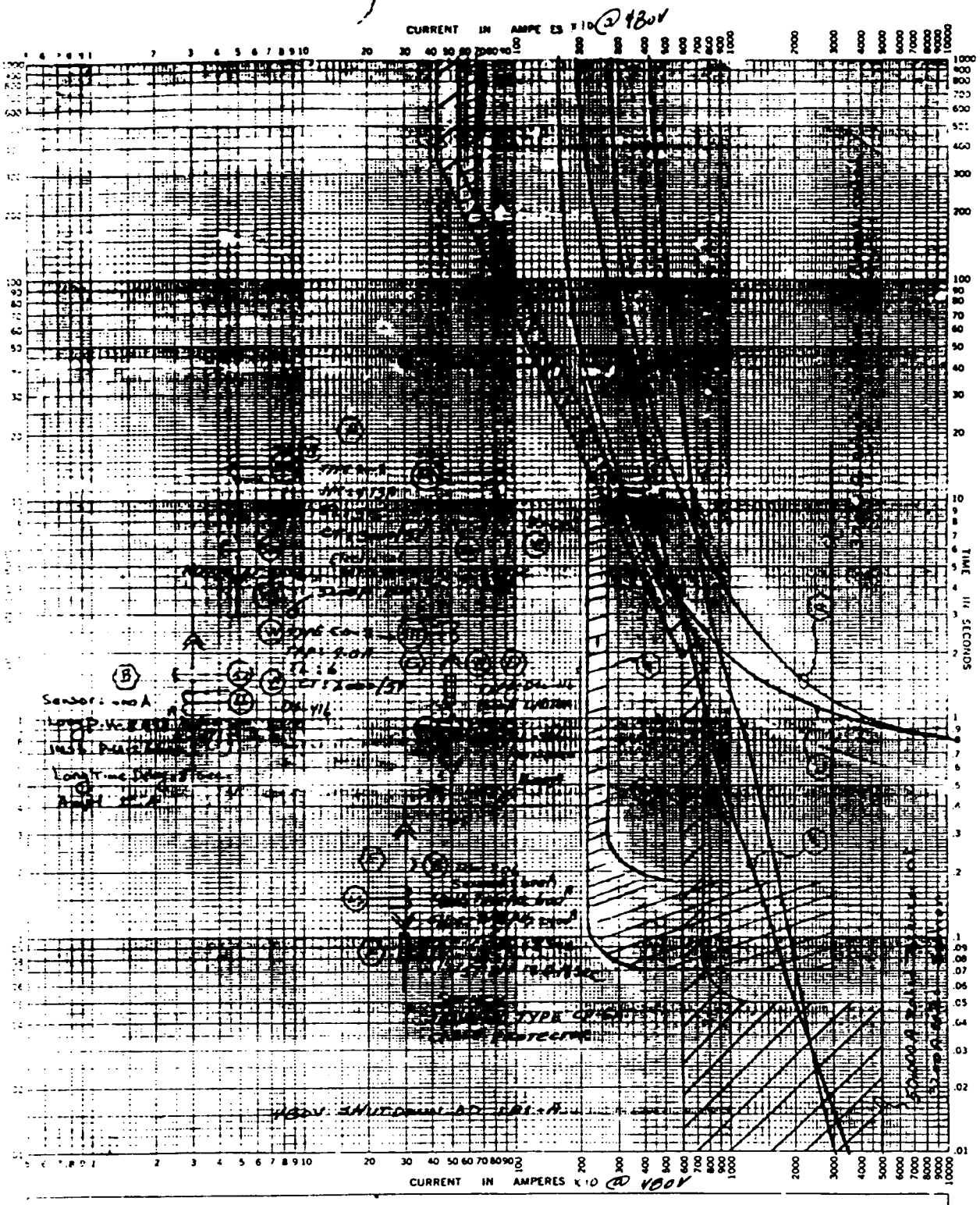
Also used for:

Diesel Aux BDS. 1A2-A, 1B1-B, 1B2-B, 2A1-A, 2A2-A, 2B1-B and 2B2-B.

See Sketches 17 Through 24

FIG 3

Calc No	8573-27-EMD-8
Rev. 0	Date
Page	57
Proj No.	8573-27



TIME-CURRENT CHARACTERISTIC CURVES

For ..... Fuse Links. In .....

BASIS FOR DATA Standards ..... Dated .....

1 Tests made at ..... Volts a-c at ..... p-f., starting at 25C with no initial load

2 Curves are plotted to ..... Test points so variations should be .....

No. TC-542(R1)

Date 12-12-83 JF

FIG. 4

See Sheet #31

K+E TIME-CURRENT CHARACTERISTIC 48 5258 KEUFFEL & ESSER CO.

Calc. No. 8573-27-EAD-8

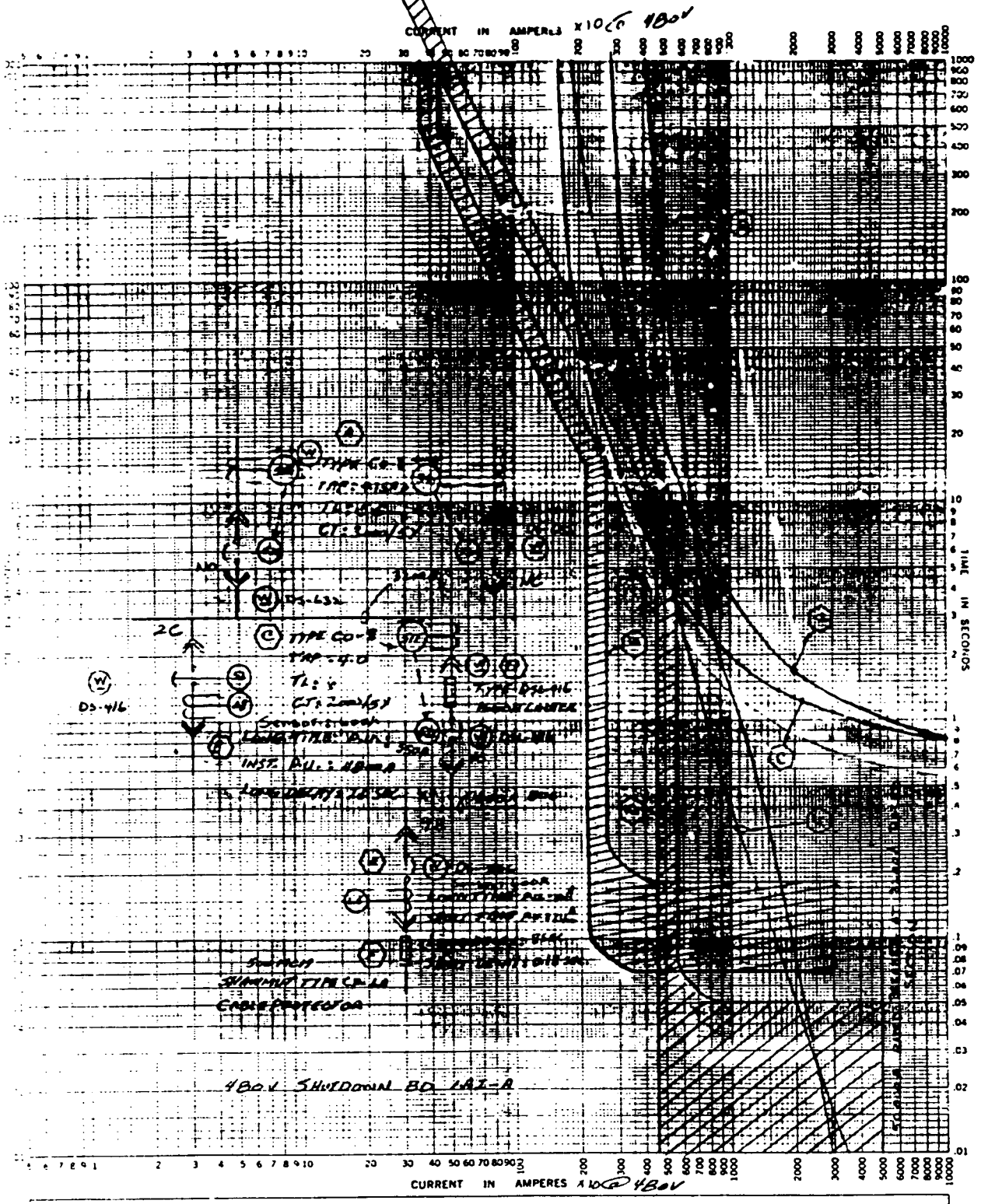
Rev. 1 Date

Page 58

Proj. No. 8573-27

The sheet has been redrawn from TC-542 of Ref. 3.4
This sheet could also be used to verify Coordination between Protective devices on 480V Shut Down Boards
1B1-B, 1A2-A, 1B2-B,
2A1-A, 2A2-A, 2B1-B and 2B2-B

Prepared [illegible] Date 2/5/90
Verified [illegible] Date 2/7/90
Ver Lvl 3 [illegible]



TIME-CURRENT CHARACTERISTIC CURVES

For ..... Fuse Links. In .....

BASIS FOR DATA Standards. ..... Dated .....

1. Tests made at ..... Volts a-c at ..... p.f., starting at 25C with no initial load .....
2. Curves are plotted to ..... Test points so variations should be .....

No. TC-544 (R1)
Date 12-11-89 MF

FIG. 5

K-E TIME-CURRENT CHARACTERISTIC 48 5258
KEUFFEL & ESSER CO. MADE IN U.S.A.

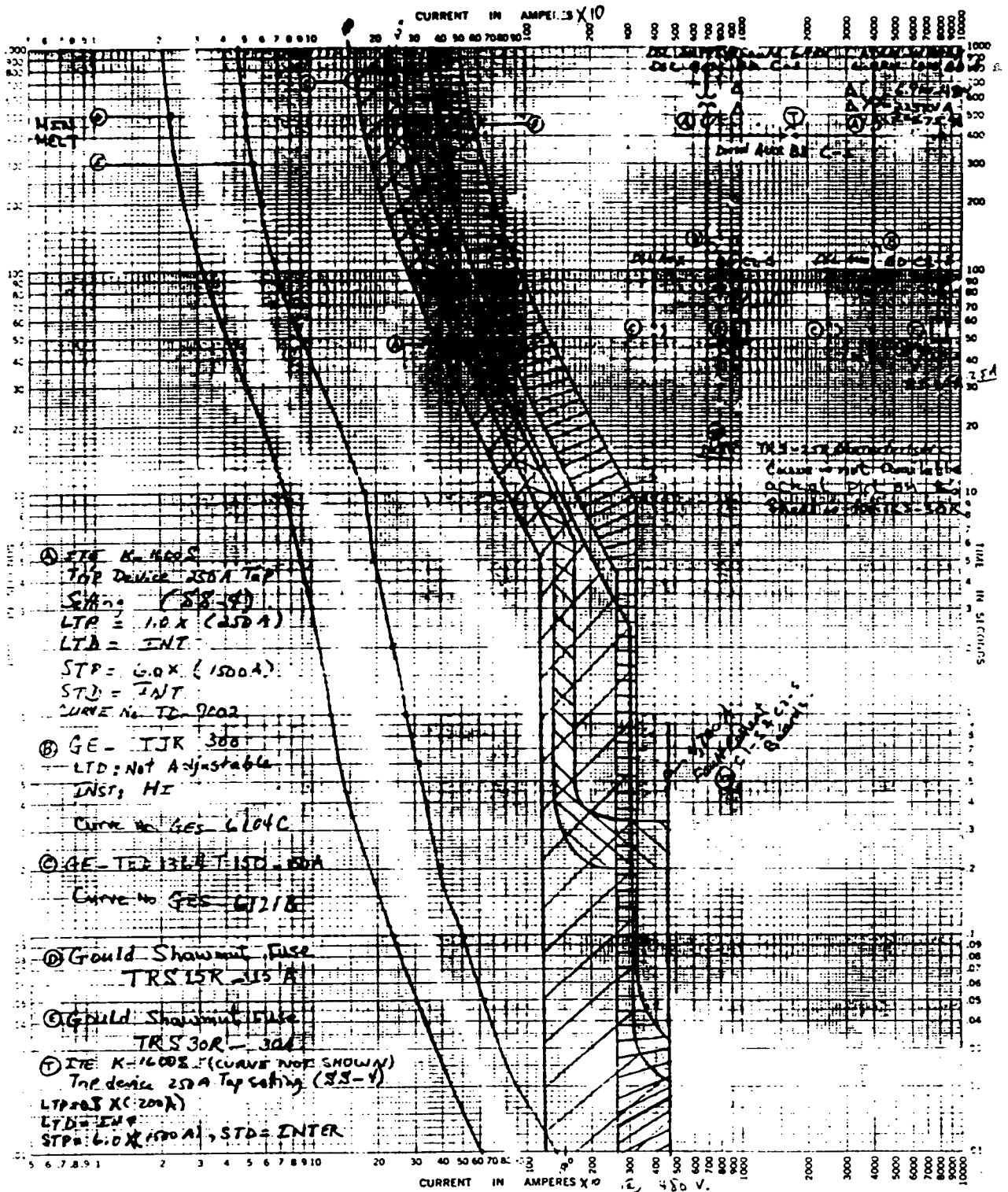
This sheet has been redrawn from TC-544 of Ref 3.4
This sheet could also be used to verify coordination between protective devices on 480V Shutdown Boards
1A1-A, 1B1-B, 1B2-B
2A1-A, 2A2-A, 2B1-B and 2B2-B

See Sketch #31

Doc. No. 8573-22-EAD-B
Sheet 59
Rev. No. 0573-27

Prepared MAN 2/2/90
Verified [illegible] 2/3/90

WBN EEB-MS TIO? OCOP-RC



For DIESEL ... TIME-CURRENT CHARACTERISTIC CURVES

Fuse Links In

BASIS FOR DATA Standards Dated

1. Tests made at Volts a-c at p.f., starting at 25C with no initial load

2. Curves are plotted to Test points so variations should be

No.

Date 1-5-79

K&E TIME-CURRENT CHARACTERISTIC 48 5258

FIG. 6

See Sketch #29

Prepared MAY 4 2018 8/8/80

Verified 27/2/80

Ver First Final

Proj. No. 8573-27-EAD-8

Rev. 0

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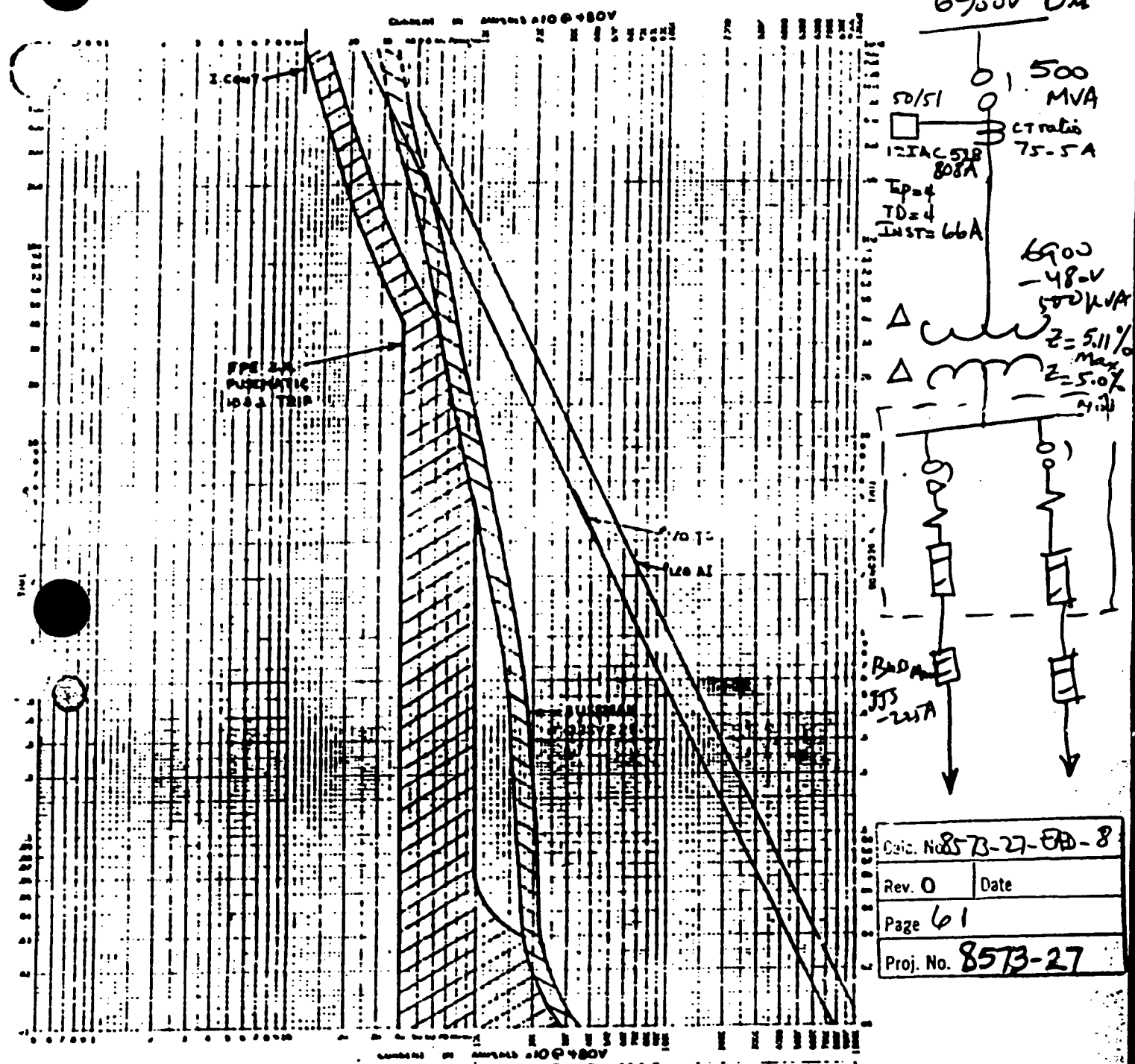
Proj. No. 8573-27



WBNP APPENDIX R CABLE ANALYSIS

TC-541

Fig 7

PRESS. HTR DIST PNL

See sketch #30

Prepared MAN 2/2/90

Verified JMS / RWA 2/3/90

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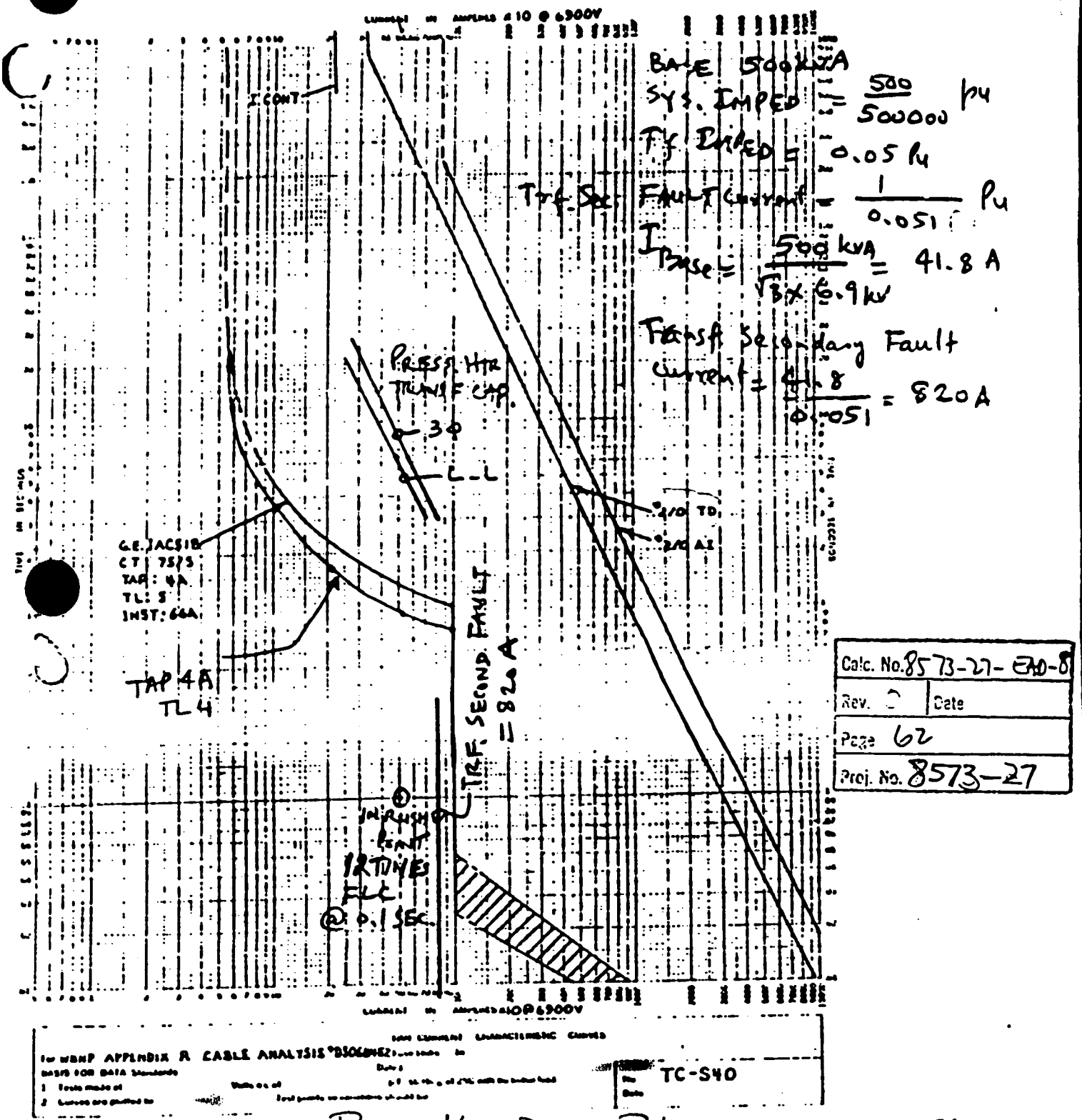
SHEET C42 OF C 122



Calc. No. 8573-27-EAD-8	
Rev. 0	Date
Page 62	
Proj. No. 8573-27	

Fig 8

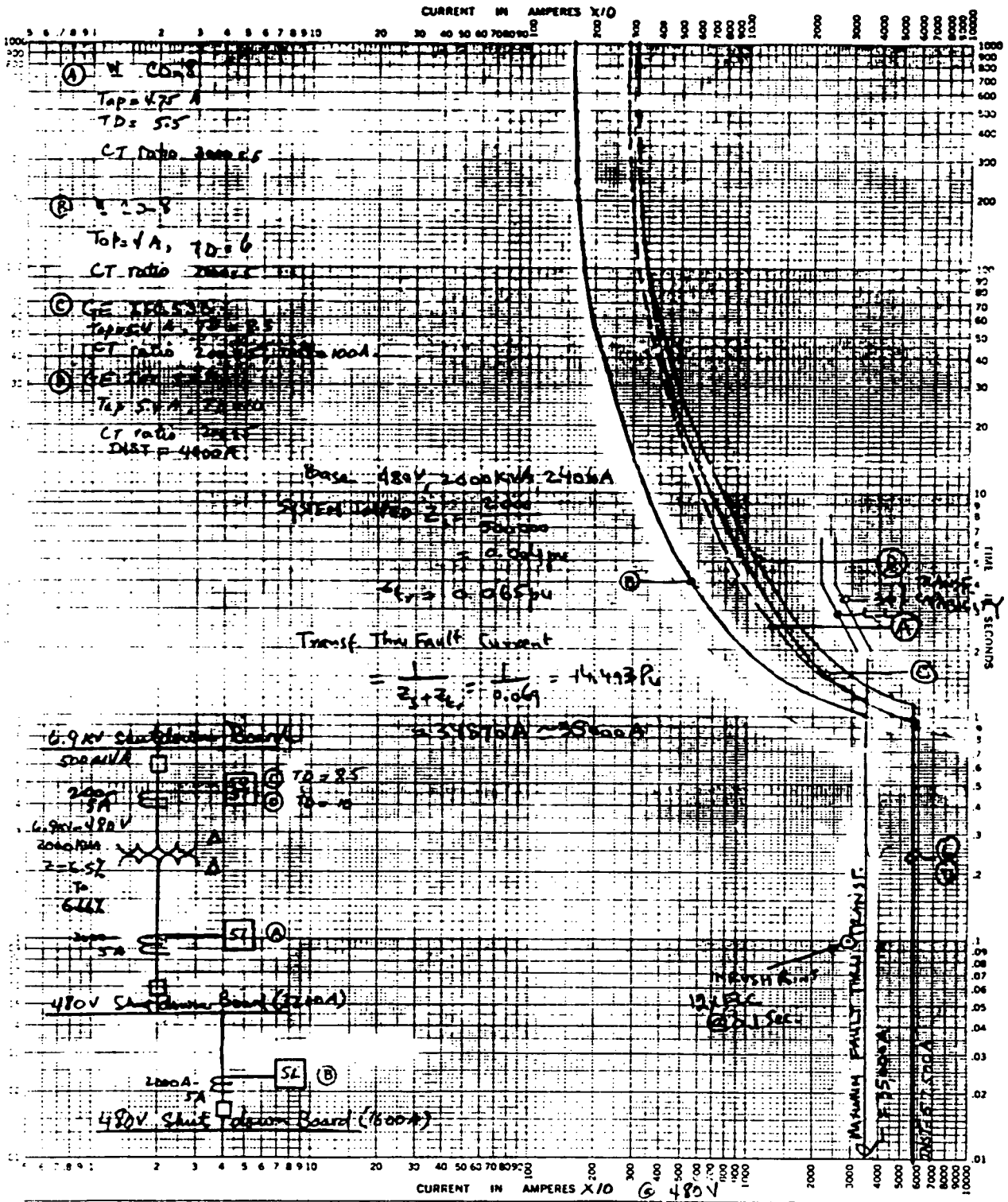
See sketch #30

Prepared MAN/HA Date 2/2/90

Verified JMI/RWH Date 2/3/90

DS068402

SHEET C41 OF C122



480 V Shutdown Boards. TIME-CURRENT CHARACTERISTIC CURVES

Fuse Links In

Dated

Date

Fig. 9

See Sketch # 31

5573-27-0008

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Proj. No. 5573-27

Prepared Date 2/12/90

Verified Date 2/13/90

10. CONCLUSION :

It has been determined in the analysis section that lack of proper coordination exists between the protective devices at the 480V level. This lack of coordination exists because of the following reasons :—

- Use of cable protector on feeders to Reactor MOV Boards.
- Coordination problem will be experienced on other Boards if the cable protectors have faster operating characteristic than used in the calculation.
- Improper switchgear breaker settings at the 480V shut down Boards.
- Use of current limiter in the main breaker at the 1600A bus section of the 480V Shutdown Boards.
- Use of molded case automatic trip breakers at the Diesel Aux Boards C1-S and C2-S.
- Use of load breaker having a wide range tolerance in magnetic trip element at the Diesel Aux Boards C1-S and C2-S.
- Improper setting of the instantaneous element in the phase overcurrent relays at the 6900V level feeding Pressurizer Heater and Shutdown Board Transformers.

The lack of coordination identified in this calculation can be corrected by taking the following actions :—

- Remove the cable protectors on the cables between the 480V shutdown Boards and other Auxiliary Boards

- Remove the current limiter from the DSL main breaker at the 1600 A rated section of the shutdown Boards.

- Reset the 480 V Switchgear breaker setting at the 480 V shutdown boards feeding the Aux boards.

- Review and reset the overcurrent relays on the source breakers at the 1600 A and 3200 A rated sections of the 480 V Shutdown boards.

- Disconnect the automatic trip feature from the GE type TJK main breakers at the Diesel Aux Boards C1-S and C2-S.

- Reset the tie breaker at the Diesel Aux Board C-S to Coordinate with the main and reserve breakers at this board.

- Reset, if necessary, the main and reserve breakers at the Diesel Aux Board C-S to Coordinate with the tie breaker at this board.
- Investigate the use of load breakers with narrow tolerance in their tripping Characteristic at the Diesel Aux Board C1-S and C2-S which will permit Coordination with the tie breaker at the C-S board.

- Reset the instantaneous element in the Phase Overcurrent relays at 6900V level feeding the Pressurizer Heater Panels. The instantaneous element should be reset to trip at 110A relay Current.

Prepared MAN/AA Date 2/2/90 Checked RWA Date 2/3/90

- Reset Phase Overcurrent relays in the 6.9 KV switchgear cubicles feeding 480V Shutdown Transformers to Coordinate with the feeder breakers at the Shutdown Boards.
Reset the instantaneous trip element in these relays to trip at 115 A relay current.

Form GQ-3.08.1 Rev. 2 BL-F047 10-88 R0

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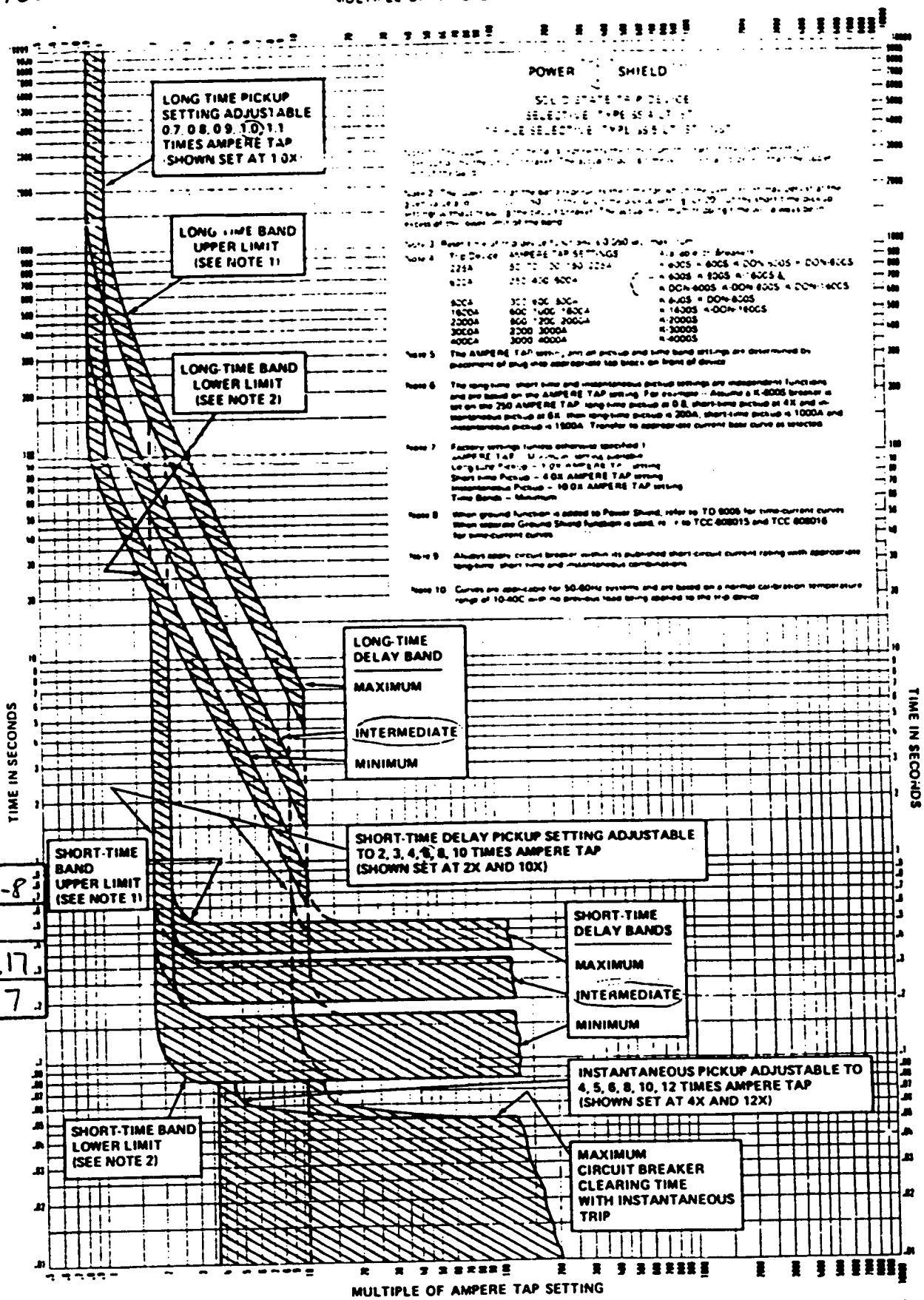
WBN EEB-MS-TI08-0008 R0
Attachment 3

MULTIPLE OF AMPERE TAP SETTING



MULTIPLE OF AMPERE TAP SETTING

Calc. No.	8573-27-EAD-8
Rev.	0
Date	
Page	B.1 of B.17
Proj. No.	8573-27

TIME-CURRENT CHARACTERISTIC CURVES: SOLID-STATE TRIP DEVICE
I-T-E TYPE SS-4; LONG-TIME AND SHORT-TIME, SELECTIVE
SS-5; LONG-TIME, SHORT-TIME AND INSTANTANEOUS, TRIPLE SELECTIVE

FOR K-LINE AND K-DON CIRCUIT BREAKERS

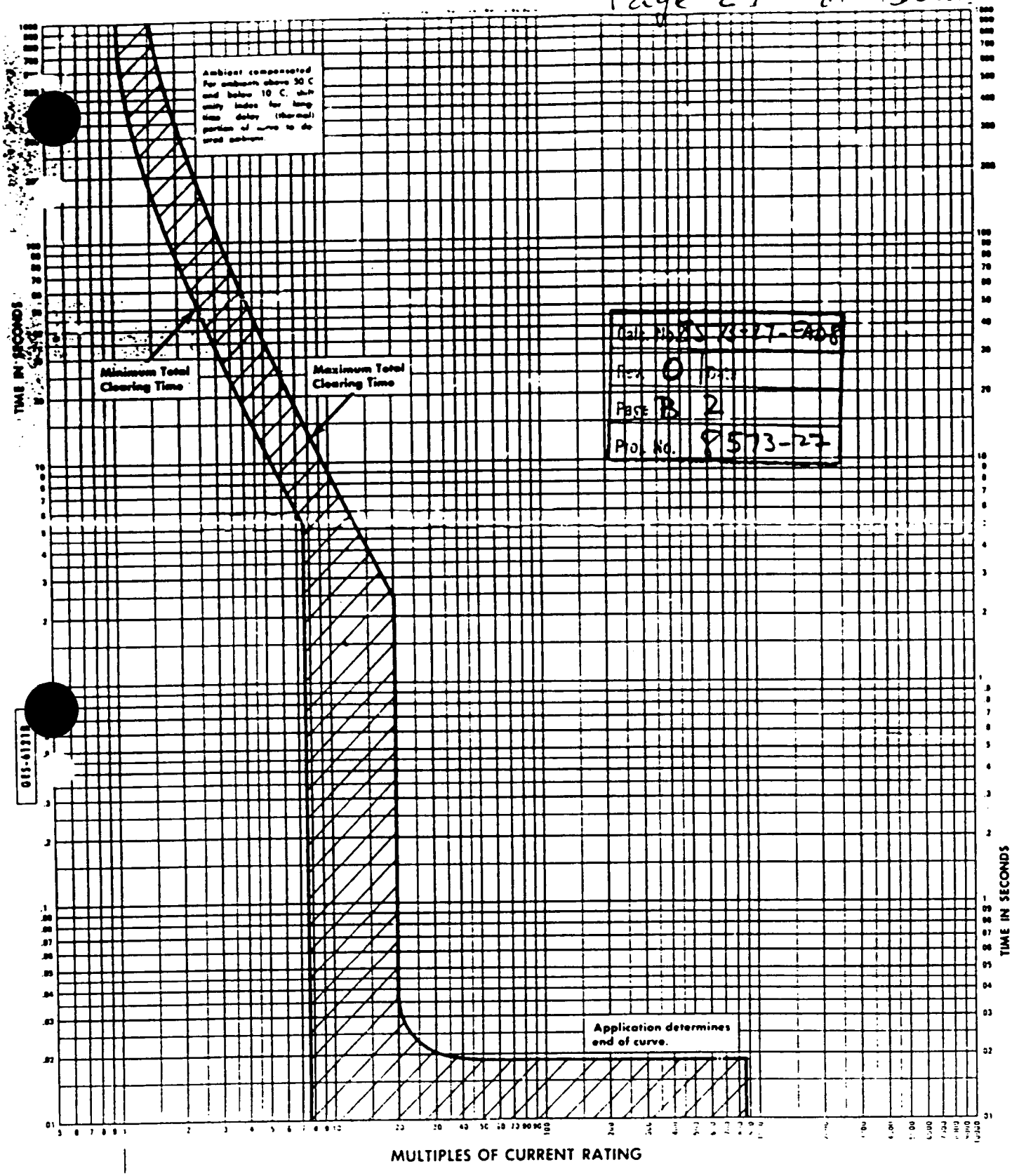
MODEL 1-GRAY

GOULD — SWITCHGEAR DIVISION, Manufacturer of I-T-E Equipment

DWN. BY F. C. Teufel DATE 11-17-79

NO. TD-9002 REV. 1

Verified 2/2/90
Verified 2/3/90



GENERAL ELECTRIC

MOLDED-CASE CIRCUIT BREAKER

E 150 LINE

Types TED and THED, 90 - 150 amperes

Ambient Compensated

Long-time Delay and Instantaneous Time-current Curves

GES-61218

Current Ratings

Voltage Ratings

Frequency Rating

Adjustments

GENERAL ELECTRIC CO. CIRCUIT PROTECTIVE DEVICES PRODUCT DEPT. PLAINVILLE, CONN.

Prepared MAN Date 2/2/90

Verified RWH Date 2/3/90

WBN EEB MS-TI08-0008 R0
Attachment 3

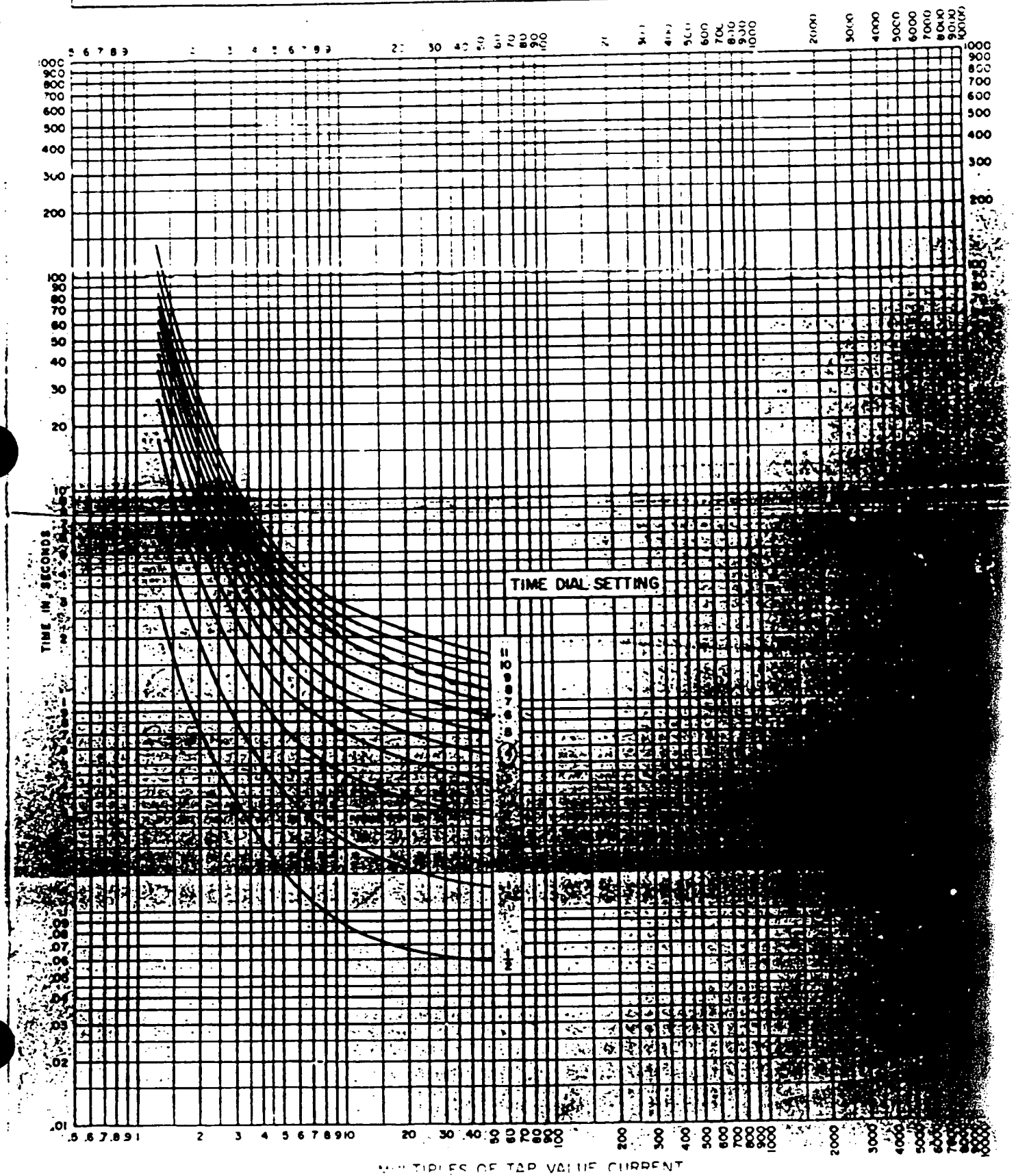
EEB-MS-TI08 0008 R0
Attachment 3

Prepared MAN Date 2/2/90
Verified Date 2/3/90

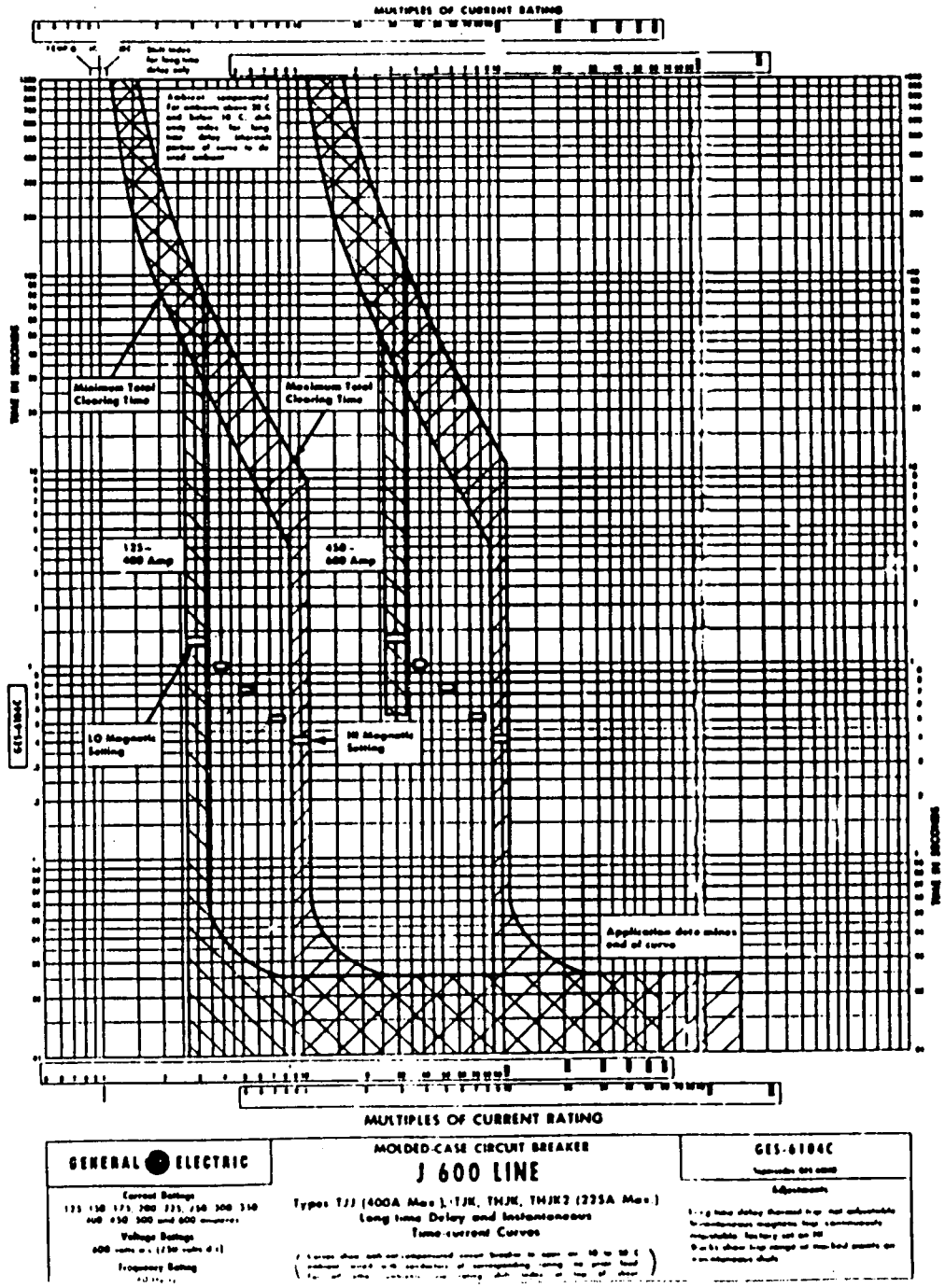
573-27-EA0-3

TYPE CO-8 INVERSE TIME OVERCURRENT RELAY
TYPICAL 50 60 CYCLE CURRENT TIME CURVES

WESTINGHOUSE ELECTRIC CORPORATION NEWARK N.J. U.S.A.



WBN ~~EEB~~-MS-TI08-0008 RD
Attachment 3

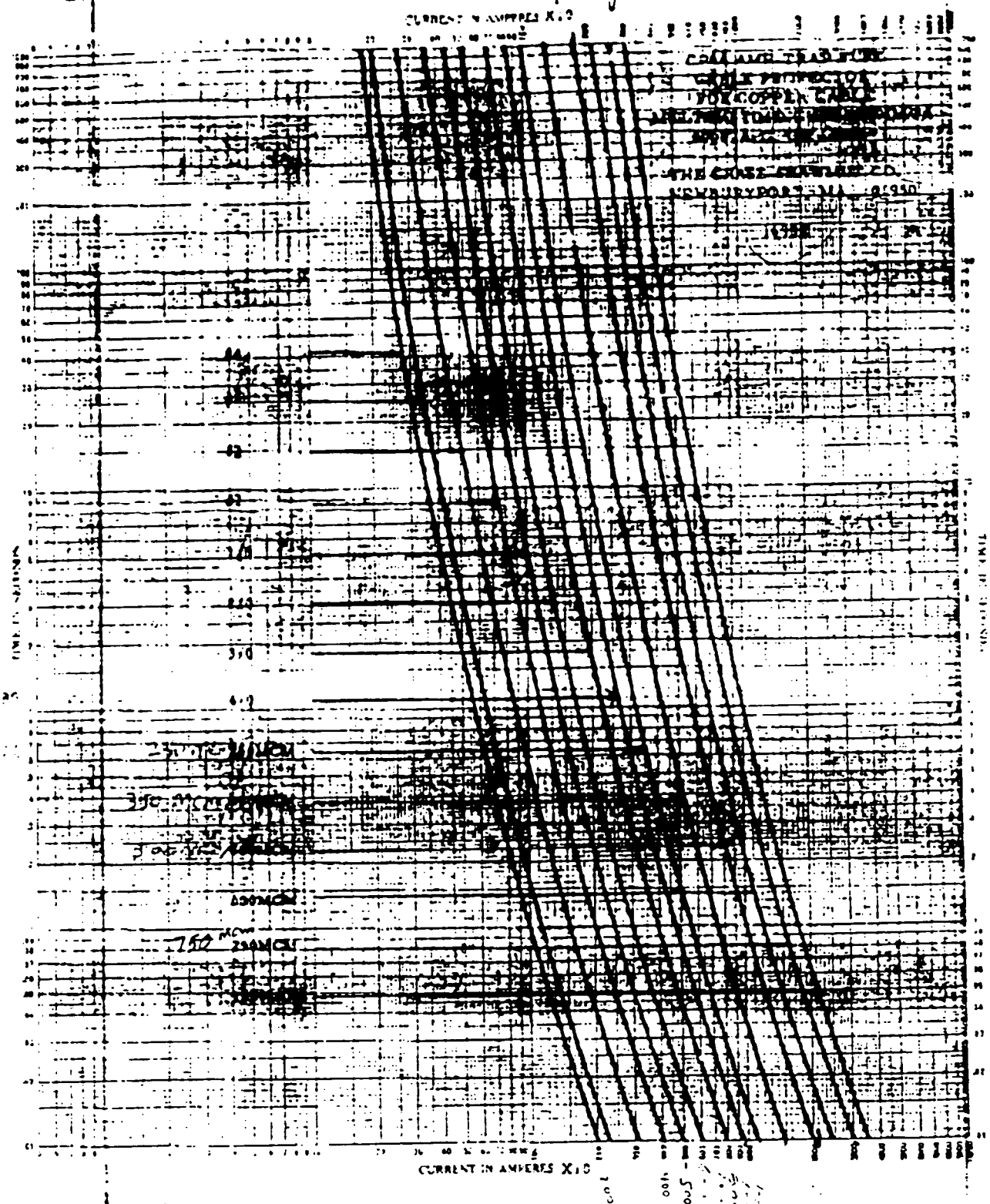


Calc. No. 5572-27-EQ-8
Rev. 0 Date
Page 24
Doc. No. 85-73-27

Prepared [illegible] Date 2/2/90
Verified [illegible] Date 2/3/90

Page 276 of 561

Active since 1974

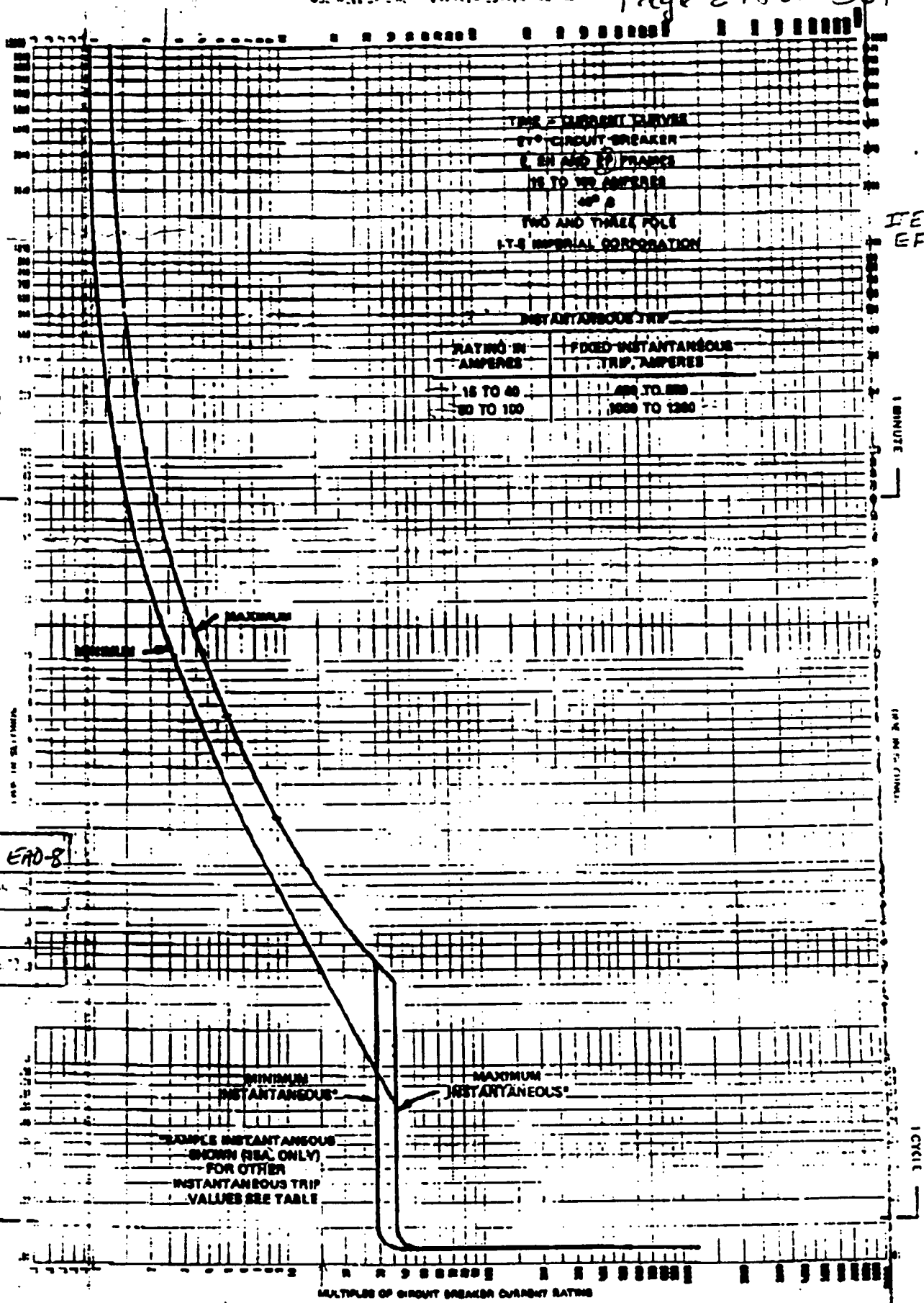


Received from John Wall, Shipment 2/10/86.
JRB
Has not been opened since 1974.

Calc. No. S573-27-EAD-8	
Rev. 0	Date
Page B.5	
Proj. No. S573-27	

Prepared MAN/HA Date 2/2/90
Verified RWA Date 2/3/90

WPN EEB MS-1108 0005-R0
Attachment 3



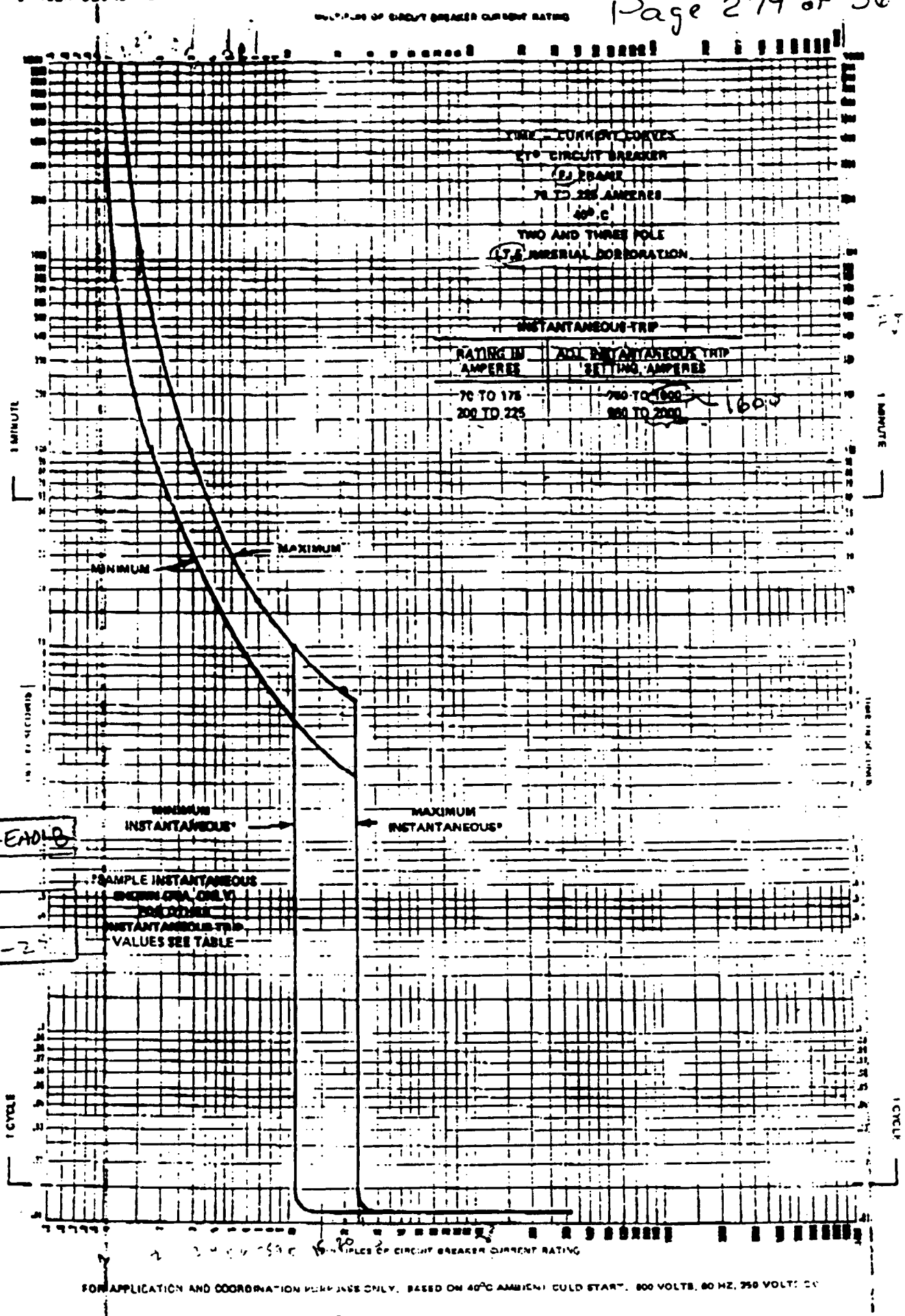
IE-EF

Calc. No. S573-27-EAD-8
Rev. 0 Date
Page B.6
Proj. No. S

FOR APPLICATION AND COORDINATION PURPOSES ONLY. BASED ON NEW CONDITIONS
E FRAME: 240 VOLTS, 60 HZ., 125/250 VOLTS DC
SH FRAME: 480 VOLTS, 60 HZ., 250 VOLTS DC
SF FRAME: 600 VOLTS, 60 HZ., 250 VOLTS DC

WBN EEB-MS-TI08-0008 R0
Attachment 3

Prepared MAN / HA Date 2/2/90
Verified RWA Date 2/3/90



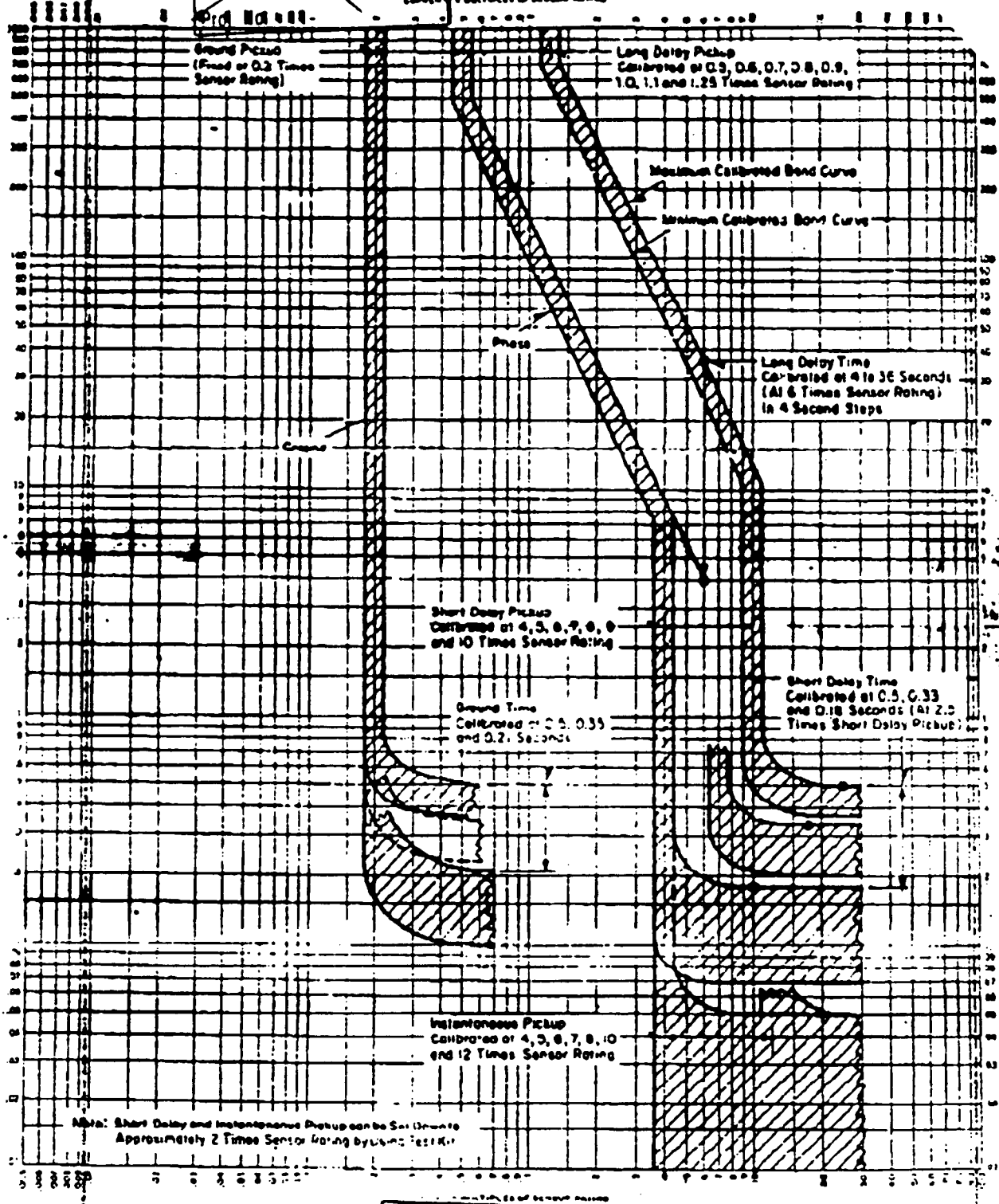
Prepared Mark Hill Date 2/2/90
Verified Ruth Date 2/3/90

Calc. No. 8573-27-EA018
Rev. 0
Page B7
Proj. No. 5573-27

WBN-EEB-MS-TI08-0008 R0
Attachment 3

Calc. No.
Rev. Date
Page
Proj. No.

Application No.



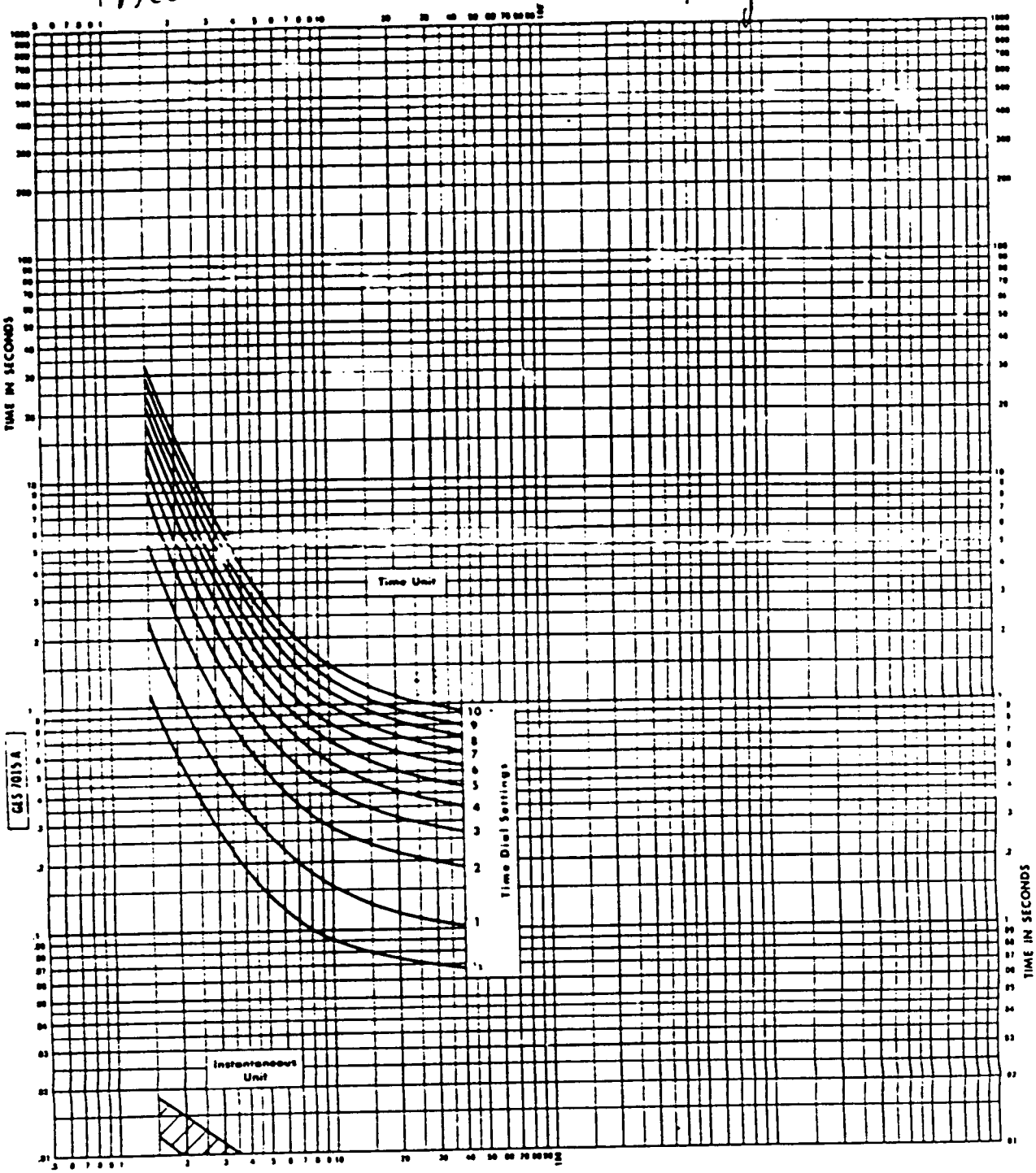
Type DS Air Circuit Breakers
For Application up to 600 Volts Ac
Time Current Characteristics

Calc. No. S573-27-EAD-8
Rev. 0 Date
Page B.8
Proj. No. S573-27

Curve No. 1

Reference

WBN EEB-MS-TI08-0008 R0
Attachment 3



GENERAL ELECTRIC

TIME OVERCURRENT RELAY

IFC 53 RELAY

Very Inverse Standard Time
Time-current Curves

GES-7015 A

Ratings (Amperes)
Time Unit 0.5-4 1.0-12
Instantaneous Unit 2.50-150

Frequency Rating
60 Hertz

Settings
Time Unit Settings
0.15 0.2 0.25 0.3 0.4 0.5 0.6 0.7 0.8 1.0 1.2
0.5 0.6 0.7 0.8 1.0 1.2 1.5 2.0 2.5 3.0 4.0
1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 7.0 8.0 10.0 12.0
Time Unit
Continuous Adjustable

GENERAL ELECTRIC CO. POWER SYSTEMS MANAGEMENT BUSINESS DEPT. MALVERN PA 19355

Prepared MAN/HA Date 2/2/90
Verified PMA Date 2/3/90

Calc. No. 8573-27-EAD-8
Rev. 0
B.9
8573-27

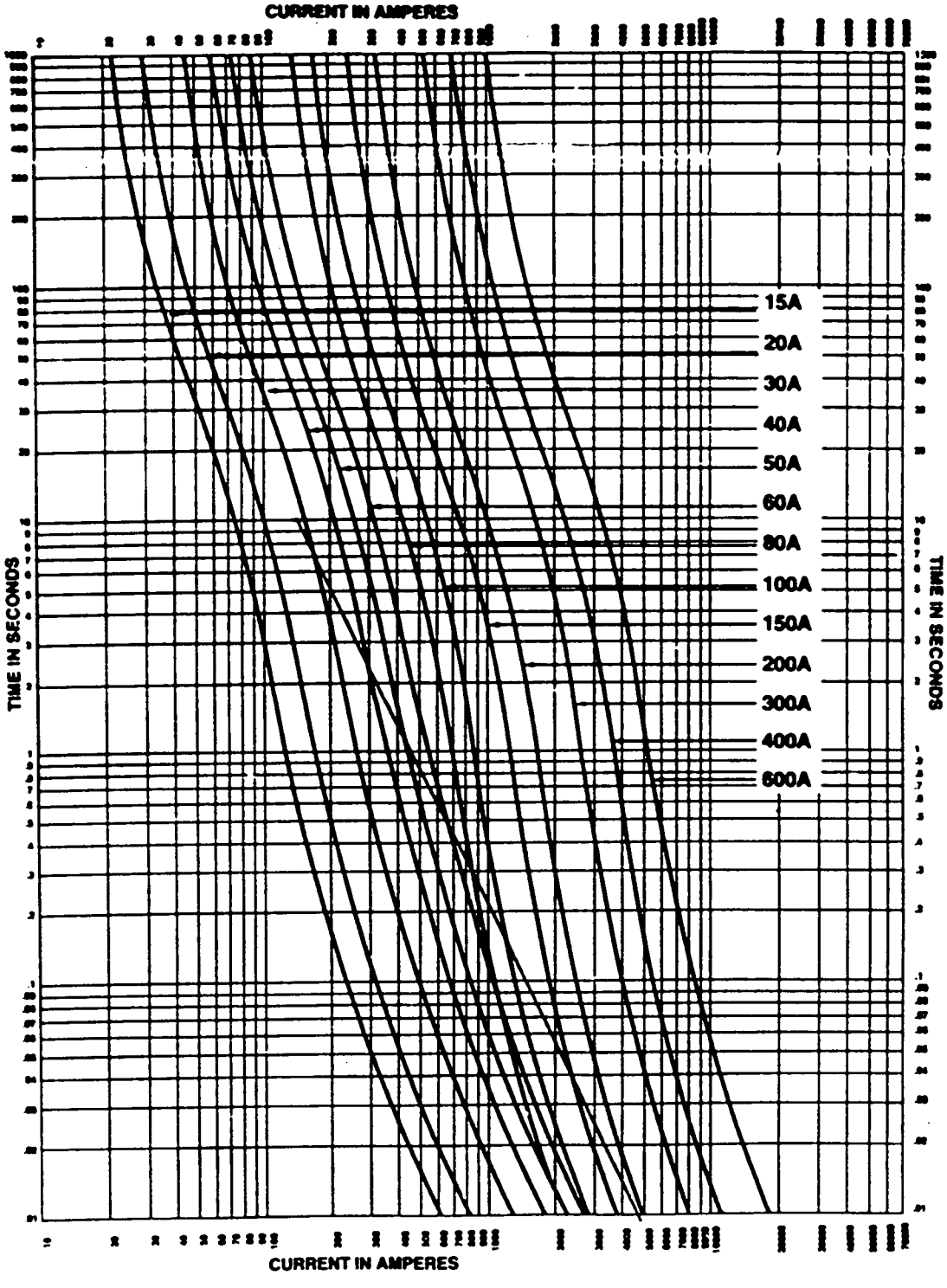
WBN-EEB-MS-TI08-0008 R0
Attachment 3

GOULD SHAWMUT

Calc. No 8573-27-EAD-8	
Rev. 0	Date
Page B.10	
Proj. No. 8573-27	

Tri-onic®–Class RK5
Time Delay Fuses
TRS

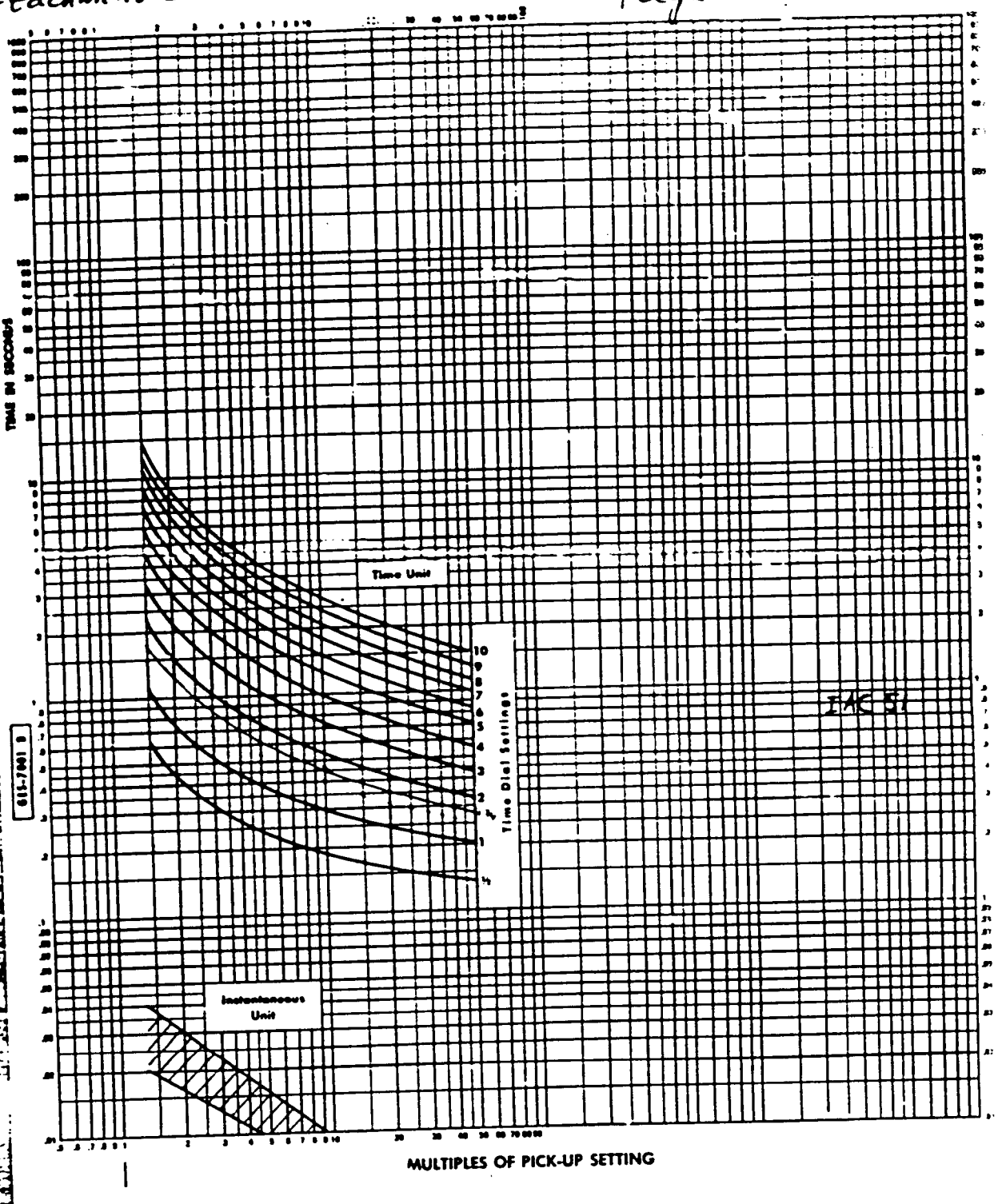
Melting Time—Current Data
15-600 Amperes, 600 Volts AC



Prepared [illegible] Date 2/2/90
Verified [illegible] Date 2/3/90

WBN-EEB-MS-TI08-0008 R0
Attachment 3

Prepared GW/AA Date 2/90
Verified RWA Date 2/3/90



GENERAL ELECTRIC

TIME OVERCURRENT RELAY

IAC 51 RELAY

Inverse Standard Time
Time-Current Curves

(Other relays with duplicate time delay characteristics
GYC51, IAC52-60, IBC51-52, IBCG51-52,
IBCV51-52, JBC51-52, JBCG51-52,
JBCV51-52)

GES-7001 B

Ratings (Amperes)

Time Unit	Instantaneous Unit
0.5-2	0.5-4 10-80
0.5-4	2.0-8 20-80
1.5-6	2.0-16 20-160
2.0-16	4.0-16 40-160
4.0-16	10-80

Settings

Time Unit (Taps)	Inst. Unit
0.5,0.6,0.8,1.0,1.2,1.5,2.0	Continuously Adjustable
0.5,0.6,0.7,0.8,1.0,1.2,1.5,2.0,2.5,3.0,4.0	
1.5,2.0,2.5,3.0,4.0,5.0,6.0	
2.0,2.5,3.0,4.0,5.0,6.0,7.0,8.0,10.0,12.0,16.0	
4.0,5.0,6.0,8.0,10.0,12.0,16.0	
4.0,5.0,6.0,7.0,8.0,10.0,12.0,16.0	

GENERAL ELECTRIC CO., POWER SYSTEMS MANAGEMENT BUSINESS DEPT., PHILADELPHIA, PA. 19142

Calc. No. 8573-27-EAD-8	
Rev. 0	Date
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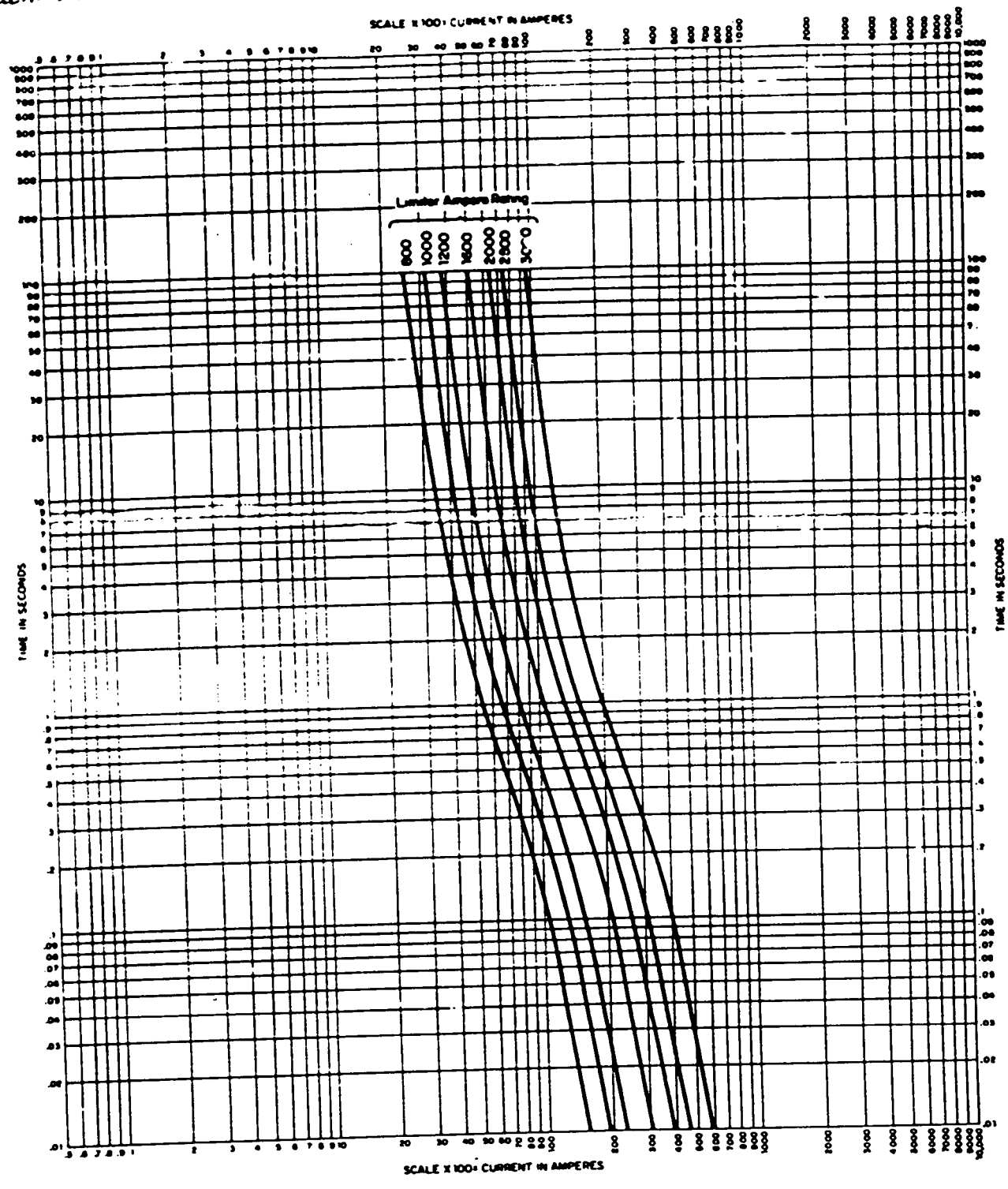
Proj. No. 8573-27	

WBN EEB-MS-TI08-0008 R0
Attachment 3

Application Data 32-660



Prepared MAN/AA Date 2/90
Verified RWB Date 2/3/90

Type DSL-416 Limiters
Average Melting Time - Current Characteristics

Westinghouse Electric Corporation
Switchgear Division, East Pittsburgh, Pa. 15112
Printed in USA

Calc. No.	SS73-27-EAD-8
Rev. 0	Date
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Curve No. 639431
New Information
November, 1978

WBN EEB-MS-TI08-0008 R0
Attachment 3

Doc.	73-27-EAD-8
Rev.	Date
Page	B.13
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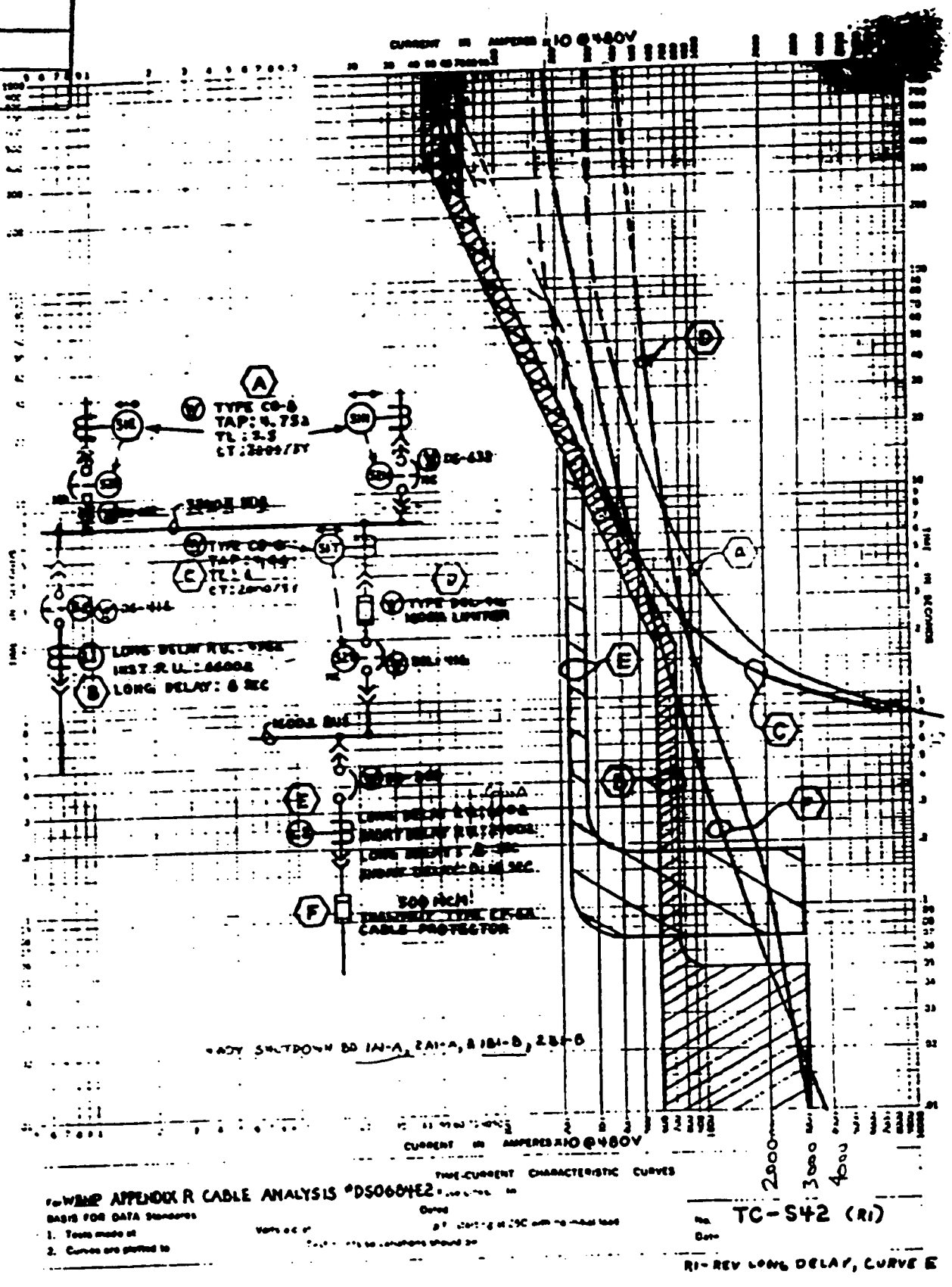


Prepared [illegible] Date 2/3/90
Verified [illegible] Date 2/3/90

TIME-CURRENT CHARACTERISTIC CURVES

WBNP APPENDIX R CABLE ANALYSIS #DS0684E2

BASIS FOR DATA SHOWN

1. Tests made at
2. Curves are plotted to

TC-S42 (R1)

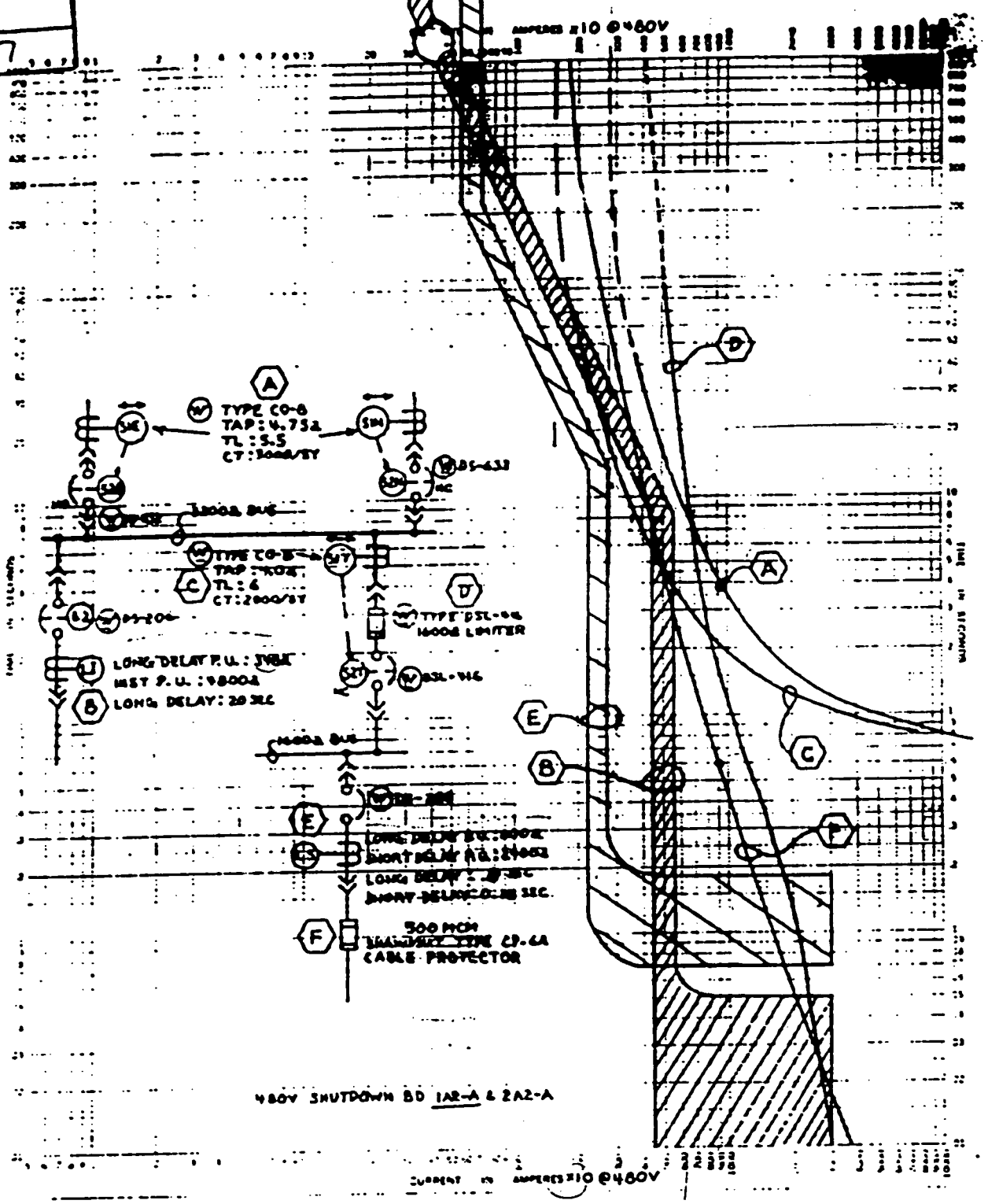
R1- REV LONG DELAY, CURVE E

K-E

R0 COMPUTED BY [illegible] DATE [illegible]
CHECKED [illegible] DATE 6-30-89
R1 COMPUTED [illegible] DATE 3-28-90
CHECKED [illegible] DATE 3-28-90

DS0684E2

No. SS 73-27-EAD-S
0 Date
eB
J. No. SS 73-27



WBNP APPENDIX R CABLE ANALYSIS PDS0684E2

BASIS FOR DATA SHOWNOTES
1. Trips made at
2. Curves are plotted to

TC-543 (R1)

R1-REV LONG DELAY, CURVE E

K-E

Prepared MAN/HH Date 2/20/00
Verified Date 2/3/

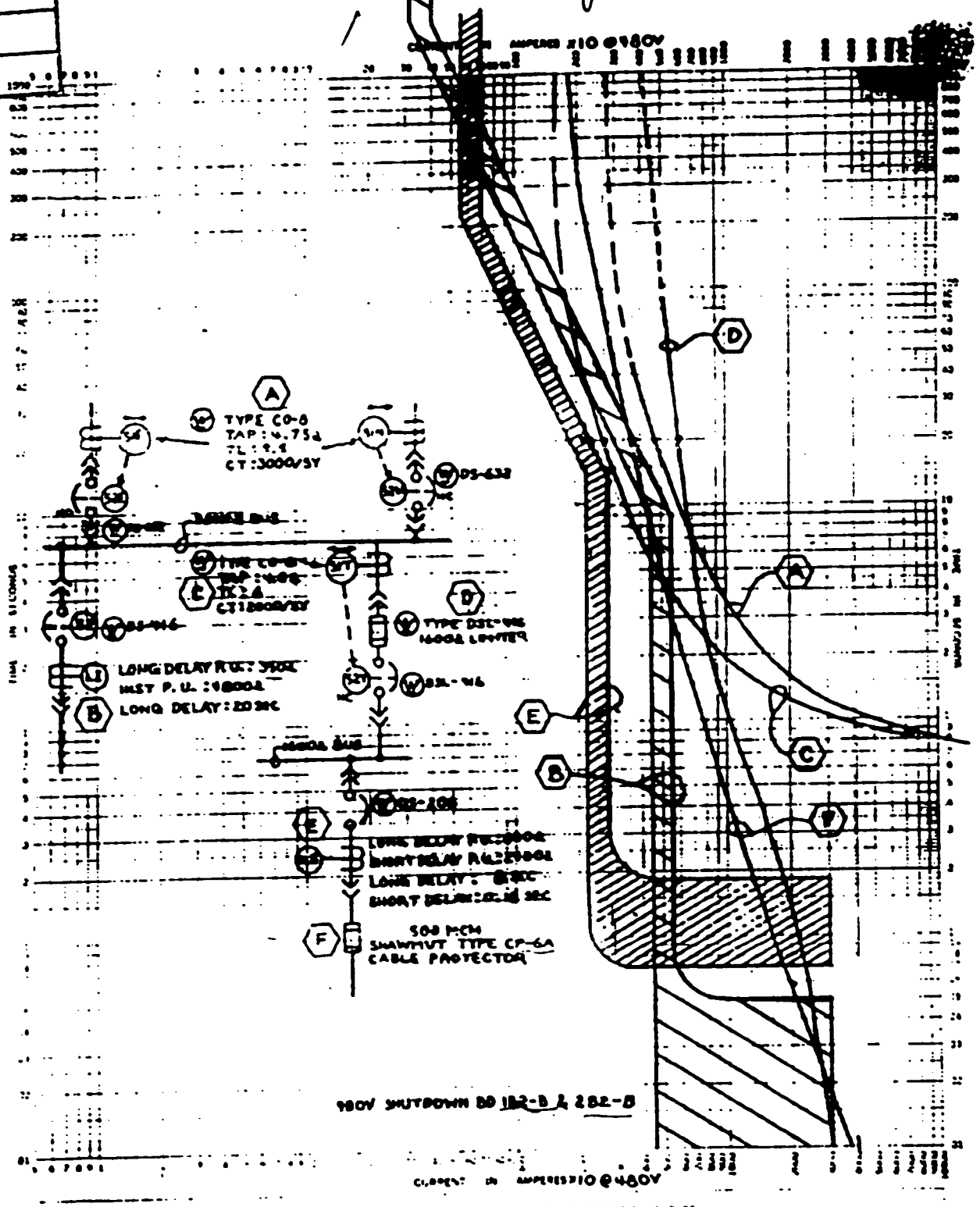
RO COMPUTED DATE
CHECKED DATE
R1 COMPUTED DATE 2-23-00
CHECKED DATE 2-28-00

DS0684E2

WBN EEB-MS; TI08-0008 RO

No. 73-27 EAD-8
B.15
No. 8573-27

Prepared MAN/HA 2/2/90
Verified RMH Date 2/3/90



APPENDIX R CABLE ANALYSIS PDS0684E2

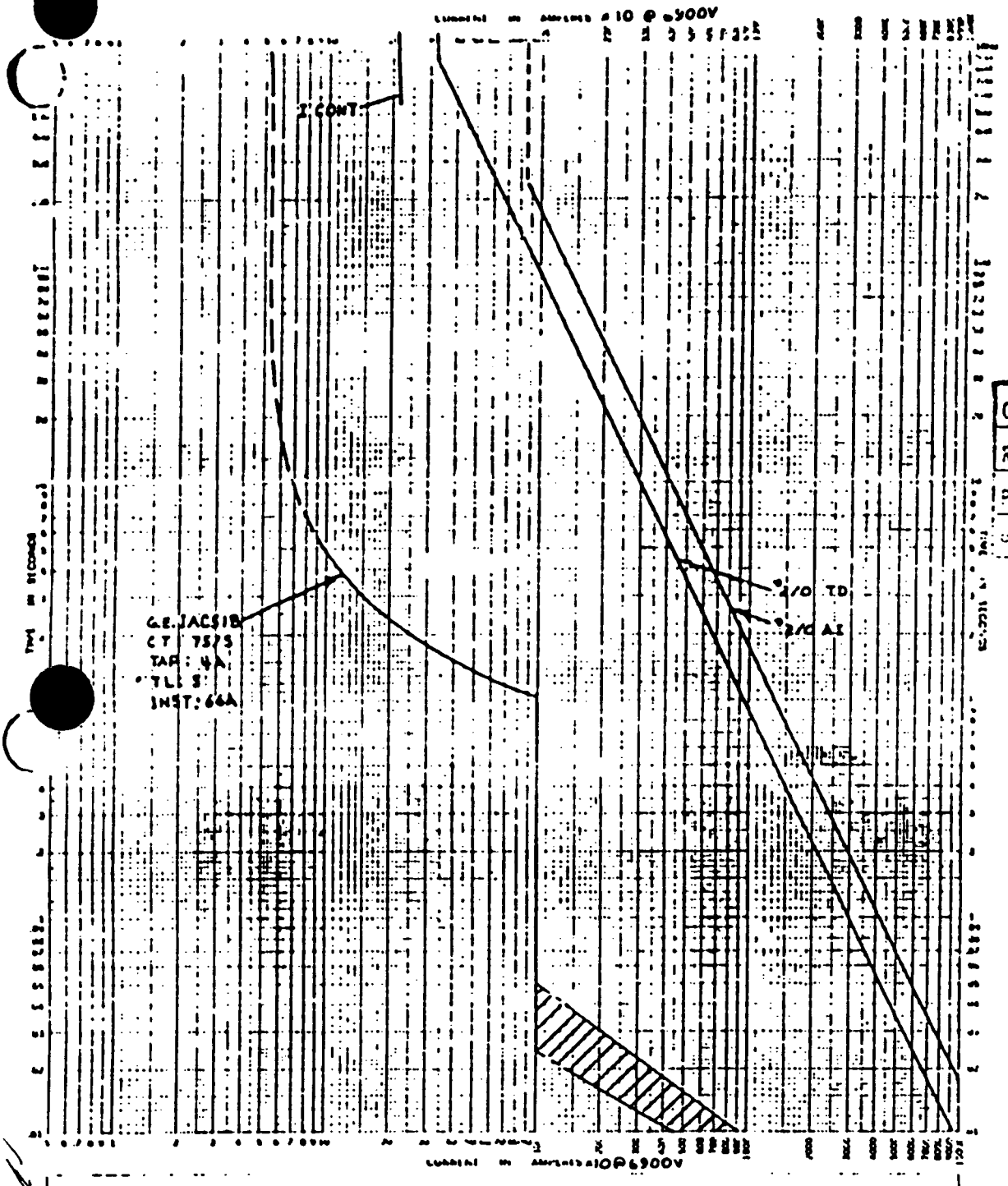
TC-S44 (R1)

R1-REV LONG DELAY CURVE
480 2B2-B

RO COMPUTED DATE
CHECKED DATE 6-30-89
R1 COMPUTED DATE 2-22-90
CHECKED DATE 2-28-90

PDS0684E2

WBN EEB-MS-TI08-0008 R0



Calc. No. 5573-27-END-8	
Rev. 0	Date
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Proj. No. 5573-27	

For WBNP APPENDIX R CABLE ANALYSIS DS068NE2

TC-S40

Prepared MAW/HA Date 2/2/90

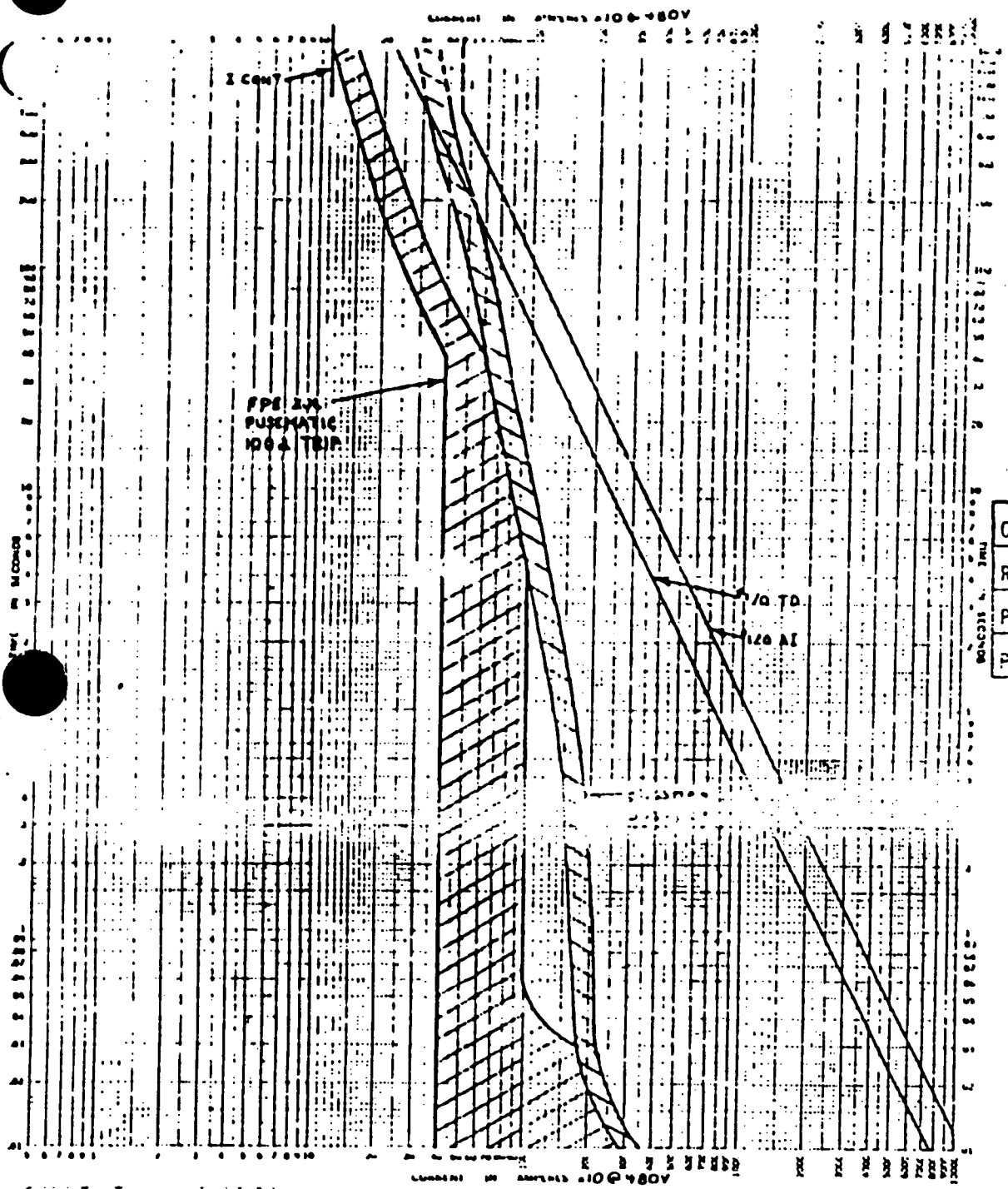
Verified RMA Date 2/3/90

DS068402

WBN EEB-MS-TI08-0008 R0
Attachment 3

SHEET C41 OF C122

WBN EEB-MS-TI08-0008 R0
Attachment 3



Calc. No.	SS73-27-EAD-8
Rev. 0	Date
Page	B.17 of Final
Proj. No.	SS73-27

WBNP APPENDIX R CABLE ANALYSIS #DS06BYE2

TC-S41

Prepared MAN / HA Date 2/2/90
Verified RWA Date 2/3/90

DS06BYE2

SHEET C42 OF C 122

PAGES 291 THRU 454 OMITTED IN INITIAL ISSUE

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WBN EEB-MS-7108-0008 KU

BOARD	Attachment 3 COMPT NO	RELAY 51/50 MFR	MODEL NO.	RANGE (A)	SETTINGS SEC (A)	PRIM. (A)	TIME (SEC)	RELAYING SERVICE	REMARKS
6.9 KV SHTDN BD 1A-A 1-BD-211-A-A	20	GE	12IAC51B808A	2-16	4	60	4.5	O.C.	PZR HTRS BACK-UP GROUP 1A-A
			GGK	20-160	66	990	—	INSTANT. ELEMENT	
↓	21	GE	12IAC51B808A	2-16	4	60	4.5	O.C.	PZR HTRS CONTROL GROUP 1D
			GGK	20-160	66	990	—	INSTANT. ELEMENT	
6.9 KV SHTDN BD 1-BD-211-B-B	20	GE	12IAC51B808A	2-16	4	60	4.25	O.C.	PZR HTRS BACK-UP GROUP 1B-B Two different time dials on two phase relays
			—	20-160	66	990	—	INSTANT. ELEMENT	
↓	21	GE	12IAC51B808A	2-16	4	60	4.25	O.C.	PZR HTRS BACK-UP GROUP 1C
			—	20-160	66	990	—	INSTANT. ELEMENT	
6.9 KV SHTDN BD 2-BD-211-A-A	20	GE	12IAC51B808A	2-16	4	60		O.C.	PZR HTRS BACK-UP GROUP 2A-A Time dial setting not shown on walkdown sheet
			—	20-160	66	990	—	INSTANT. ELEMENT	
↓	21		12IAC51B808A	2-16	4	60		O.C.	PZR HTRS CONTROL GROUP 2D Time dial setting not shown on walkdown sheet
			—	20-160	66	990	—	INSTANT ELEMENT	
6.9 KV SHTDN BD 2-BD-211-B-B	20	GE	12IAC51B808A	2-16	4	60	4.0	O.C.	PZR HTRS BACK-UP GROUP 2B-B
			—	20-160	66	990	—	INSTANT ELEMENT	
↓	21	GE	12IAC51B808A	2-16	4	60	4.2 4.0	O.C.	PZR HTRS BACK-UP GROUP 2C Two different time dials on two phase relays
			—	20-160	(66)	990	(—)	INSTANT ELEMENT	

NOTES: ① '△' SYMBOL SHOWN FOR NON-SAFETY RELATED LOADS.

② PRIMARY SETTINGS; AND THE INFORMATION FOR INSTANTANEOUS ELEMENTS (WHICH IS MISSING ON WALKDOWN SHEETS) ARE OBTAINED FROM PSO ORIGINATED RELAY SETTING SHEET MANUAL, VOL. I, SECTIONS 1A.27 THROUGH 1A.30.

UNITS 1 & 2 6.9 KV SHUTDOWN BOARDS — RELAYING INFORMATION FOR PRESSURIZER HEATER LOADS

PREPARED BY: K. MAJMUDAR
REVIEWED BY:

Prepared _____ Date _____
Verified _____ Date _____

Calc. No 8573-27-EAD-8	
Rev. 0	Date
Page F.3	
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PAGES 458 THRU 486 OMITTED IN INITIAL ISSUE

WBN EEB-MS-TI06-0008 - R0
Attachment 3

MI-57.27
Page 1 of 4
Revision 1

Molded Case Breaker Data Sheet

Unit 0

Breaker ID: BKR-215-C2/S/AA

.1 Equipment description: Main Breaker for 480V D/C Aux Board C2-S

.2 Manufacture: G.E. Breaker Type: TJK Trip Setting: High

TEST EQUIPMENT: Description	Mfg	Model	TVA Tag No.	Calibration Date	Initial/Date
1.3/5.1.4 Multi-Amp Corp. test set		CB7140	340312	12-4-86	RM/10-15-86
1.5 Digital Multimeter:	Fluke	8060A	461176	1-1-87	RM/10-14-86
1.6 Potentiometer:	L+N	8662A	305413	3-5-87	RM/10-18-86
1.7 Oscillograph:	Sanborn	2-channel	528637	12-12-86	RM/10-18-86
1.8 Amplifier:	N/A	N/A	N/A	N/A	N/A
1.9 Shunt 5000 Amp.	100 MV		402961	7-15-87	RM/10-18-86
1.9 Shunt	N/A		N/A	N/A	N/A

REFERENCES:

3 Drawings: ~~45B1788~~ R-10-16-86 45B1788-4H-R3

.7 Current-Time Characteristic Curve: ~~TJK~~ 10-18-86 TJS

.8 Mechanical linkage acceptable: Y (Y/N) R 10/18/86 JWH 10-18-86

Auxiliary contacts acceptable: Y (Y/N) N/A N/A N/A N/A

.10 Test Results:

Phase† Mark (+) and (-) for dc breakers	6.10.4.4 Load Test (Did breaker trip before 30 min?)	6.10.1.5 Thermal Trip Test: Applied Current (Amps)	Time in Seconds: Accept Criteria (Range)	Time in Seconds: Actual Time	6.10.3.10 Instantaneous Trip Test: Applied Current (Amps)	Time in Seconds: Accept Criteria (Max)	Time in Seconds: Actual Time
A-Ø		N/A	N/A	N/A		Not to Scale	
B-Ø		↓	↓	↓			
C-Ø		↓	↓	↓			

6.10.2 Ambient temperature: 78 °F

6.10.5 The above test was performed per steps 6.10.1 through 6.10.4.5 by:

R. H. Hardy 10-18-86 Craftsman Date

Alan M. Hess 10-18-86 Craftsman Date

6.20 The test results were evaluated and found acceptable per the acceptable criteria by:

Not Acceptable
R. M. Hinkley 11-3-86
Maintenance Engineer Date

Calc. No. 8573-27-EAL-8
Rev. 0 Date
Page G.2 of final
Proj. No. 5573-27

Prepared MAN/HA Date 2/2/90
Verified RWA Date 2/3/90

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6.9 KV SWGR 1-BD-211-A-A

COMPT NO.	SERVICE	RELAY 51/50 MFR	MODEL NO.	RANGE (A)	SETTINGS SEC (A)	PRIM. (A)	TIME (S)	RELAYING SERVICE	REMARKS
3	1-ϕXF-212-A1-A (Z = 6.55 %)	GE	12IFC53BD1A	1-12	6	216	9	O.C.	—
				6-150	100	4000	—	INSTANT.	
4	1-ϕXF-212-A2-A (Z = 6.53 %)	GE	↓	1-12	6	216	9.5	O.C.	Different time dial setting on phase relays ← ①
				6-150	100	4000	—	INSTANT.	
5	1-ϕXF-212-A-A (Z = 6.53 %)	GE	↓	1-12	6	216	9	O.C.	—
				6-150	100	4000	—	INSTANT.	
			6.9 KV	SWGR	1-BD	-211-	B-B		
3	1-ϕXF-212-B1-B (Z = 6.66 %)	GE	12IFC53BD1A	1-12	6	216	9, 9.3	O.C.	(1) same as ① above (2) model no. from Ref. No. 2
				6-150	100	4000	—	INSTANT	
4	1-ϕXF-212-B2-B (Z = 6.50 %)	GE	↓	1-12	6	216	9.2, 9.5	O.C.	same as ① above
				6-150	100	4000	—	INSTANT.	
5	1-ϕXF-212-B-B (Z = 6.62 %)	GE	↓	1-12	6	216	9, 9.4	O.C.	same as ① above
				6-150	100	4000	—	INSTANT.	
			6.9 KV	SWGR	2-BD	-211-	A-A		
3	2-ϕXF-212-A1-A (Z = 6.58 %)	GE	12IFC53BD1A Sr. No. 021629, 30	A-J (1-12)	A (5.4)	216	D (10)	O.C.	values in parenthesis are from Ref. No. 2
				(6-150)	100	4000	—	INSTANT.	
4	2-ϕXF-212-A2-A (Z = 6.63 %)	GE	12IFC53BD1A Sr. No. 216234	A-J (1-12)	A (5.4)	216	D (10)	O.C.	↓
				(6-150)	100	4000	—	INSTANT.	
5	2-ϕXF-212-A-A (Z = 6.61 %)	GE	12IFC53BD1A Sr. No. 021643, 37	A-J (1-12)	A (5.4)	216	D (10)	O.C.	
				(6-150)	100	4000	—	INSTANT.	

Prepared MAN Date 2/2/90

Verified _____ Date _____

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Prepared [illegible] Date [illegible]

Verified [illegible] Date _____

6.9 KV SWGR [illegible] BD-211-B-B

COMPT NO.	SERVICE	RELAY 51/50 MFR	MODEL NO.	RANGE (A)	SETTINGS SEC (A)	PRIM. (A)	TIME (S)	RELAYING SERVICE	REMARKS
3	2-ØXF-212-B1-B (Z = 6.63 %)	GE	12IFC53BD1A	1-12, A-I	6, A	216	9, D	O.C.	Ref. No. 1 has both types of values, but Ref. No. 2 has only numeric values.
				6-150	100	4000	—	INSTANT	
4	2-ØXF-212-B2-B (Z = 6.58 %)	GE	12IFC53BD1A Sr. No. 021619, 32	1-12, A-I	6, A	216	8.5, D	O.C.	
				6-150	100	4000	—	INSTANT	
5	2-ØXF-212-B-B (Z = 6.62 %)	GE	12IFC53BD1A Sr. No. 021617, —	1-12, A-I	6, A	216	9, 9.1, D	O.C.	
				6-150	100	4000		INSTANT	

REFERENCES:

(1) FIELD VERIFIED WALKDOWN DATA.

(2) RELAY PRIMARY SETTINGS AND ALSO SECONDARY SETTINGS FOR INSTANTANEOUS ELEMENTS ARE OBTAINED FROM PSO ORIGINATED RELAY SETTING SHEET MANUAL, VOL. I, SECTIONS 1A.27 THROUGH 1A.30

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Page H.3 of final
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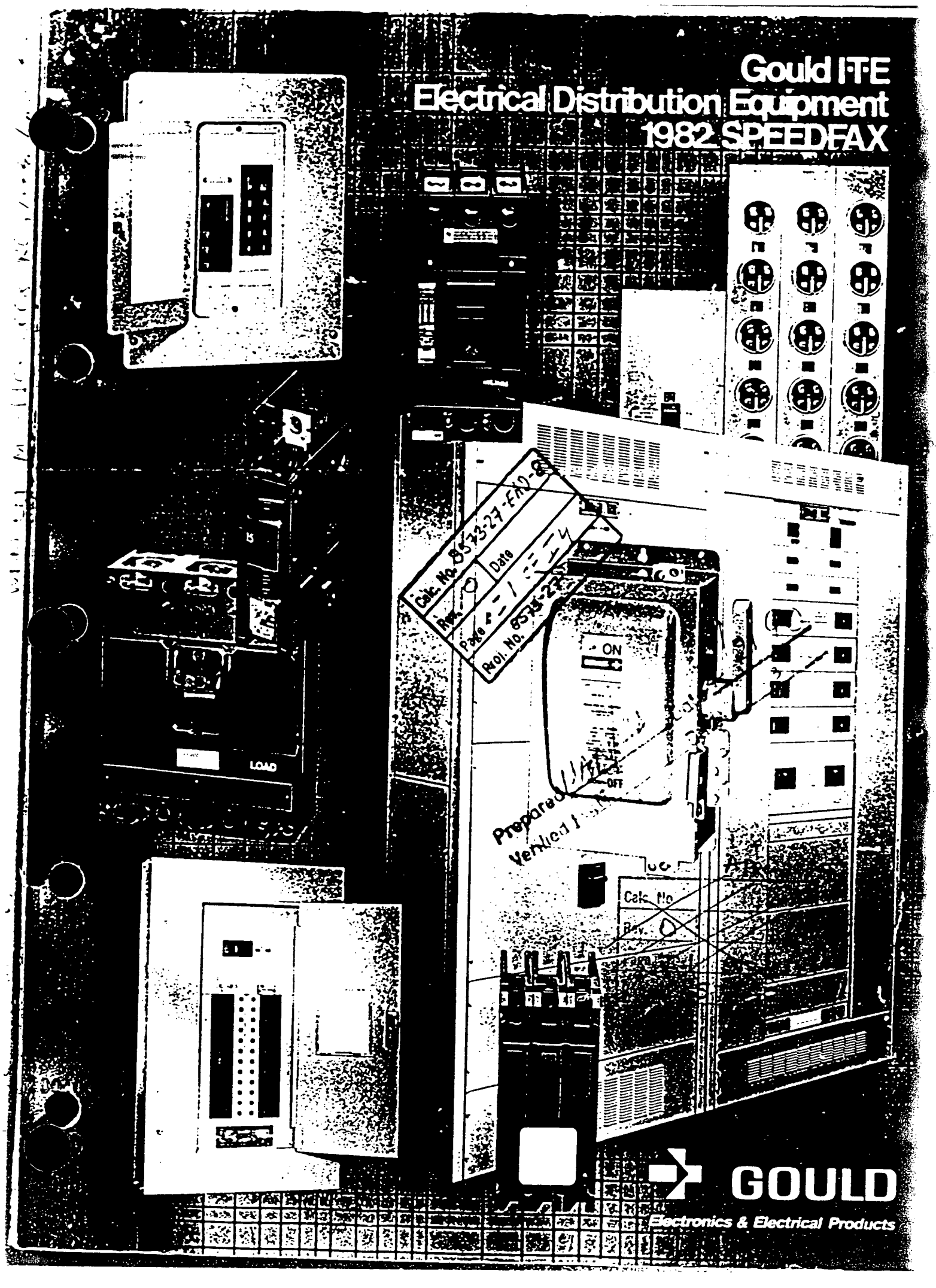
Gould I-T-E
Electrical Distribution Equipment
1982 SPEEDFAX



GOULD

Electronics & Electrical Products

WBN EEB-MS-TI08-0008 R0
Attachment 3

I-T-E CIRCUIT BREAKERS GOULD

MOLDED CASE
HEAVY DUTY—ET

Calc No. 8573-27 EAU-2
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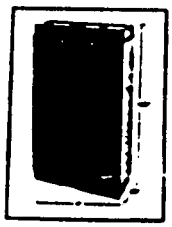
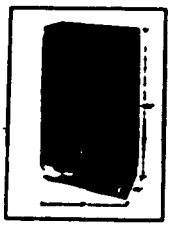


KM



KP

KM-KP
Designed to provide service entrance protection and as main distribution feeder circuit breakers in switchboards. Also used in transfer switches, motor control centers and all types of individual enclosures.

KM FRAME—800 AMPERE
INTERCHANGEABLE TRIP

Rating Amperes	Instantaneous Trip Range Min.	Max.	Complete Breaker, Unenclosed① Cat. No.	List Price①	Trip Unit Only Cat. No.	List Price
2 POLE				600 VOLTS AC/250 VOLTS DC		
250	1050	2250	KM2-B250		KM2-T250	
300			KM2-B300		KM2-T300	
350			KM2-B350		KM2-T350	
400			KM2-B400		KM2-T400	
450	1900	3500	KM2-B450	$1982.00	KM2-T450	$905.00
500			KM2-B500		KM2-T500	
600			KM2-B600		KM2-T600	
700	3200	5600	KM2-B700	2018.00	KM2-T700	
800			KM2-B800		KM2-T800	
800②	—	—	KM2-S800	1150.00	—	—
3 POLE				600 VOLTS AC		
250	1050	2250	KM3-B250		KM3-T250	
300			KM3-B300		KM3-T300	
350			KM3-B350		KM3-T350	
400			KM3-B400		KM3-T400	
450	1900	3500	KM3-B450	2544.00	KM3-T450	1150.00
500			KM3-B500		KM3-T500	
600			KM3-B600		KM3-T600	
700	3200	5600	KM3-B700	2598.00	KM3-T700	
800			KM3-B800		KM3-T800	
800②	—	—	KM3-S800	1499.00	—	—
Shp. Wt.			33 lbs			4 lbs

Breaker Frame Only	Number of Poles	Cat. No.	List Price	Shp. Wt.
KM	2	KM2-F800	$981.00	29
	3	KM3-F800	1250.00	22

KP FRAME—1200 AMPERE
INTERCHANGEABLE TRIP

Rating Amperes	Instantaneous Trip Range Min.	Max.	Complete Breaker, Unenclosed① Cat. No.①	List Price①	Trip Unit Only Cat. No.	List Price
3 POLE				600 VOLTS AC/250 VOLTS DC		
600	3200	5600	KP3-B600		KP3-T600	
700	3200	5600	KP3-B700		KP3-T700	
800	3200	5600	KP3-B800	$4491.00	KP3-T800	$1938.00
900	4000	8000	KP3-B900		KP3-T900	
1000	4000	8000	KP3-B100		KP3-T100	
1200	4000	8000	KP3-B120		KP3-T120	
1200②	—	—	KP3-S120	2290.00	—	
Shp. Wt.			46 lbs			6 lbs

Breaker Frame Only	Number of Poles	Cat. No.	List Price	Shp. Wt.
KP	3	KP3-F120	$2061.00	40

UL INTERRUPTING RATINGS

Frame	Voltage		Amperes Asymmetrical	Amperes Symmetrical
KM, KP	AC	240	50,000	42,000
		480	35,000	30,000
		600	25,000	22,000
	DC	250	20,000	

ENCLOSURES

Frame	NEMA Type	Cat. No.	List Price	Weight—Pounds
KM	1	KM1	$153.00	132
	3R③	KM3	570.00	148
	4, 5, 9	KM9	2670.00	198
	7	KM7	2670.00	198
	12	KM12	441.00	136
	12K	KM1A	441.00	132
KP	1	KP1	284.00	136
	3R③	KP3	680.00	136
	12	KP12	580.00	136
	12K	KP1A	580.00	136

INSULATED GROUNDABLE NEUTRAL

Breaker Frame	Cable Range (Cu or Al)	Catalog Number Sheet Steel	Catalog Number Cast Aluminum	List Price
KM	3—#1/0 Awg-500 MCM	N-800	NC-800	$72.00
KP	4—#1/0 Awg-500 MCM	N-1200	—	136.00

PRESSURE WIRE CONNECTORS

Breaker Frame	Rating Amperes	Cable Range (Cu or Al)	Cat. No.	List Price
KM	250–600	2—#1 Awg-500 MCM	TA2-K500	$24.00
	700–800	3—300–350 MCM	TA3-K350	33.00
	700–800	3—400 MCM	TA3-K400	33.00
KP	600–1200	4—250–500 MCM	TA4-P500	82.00

① List price of "Complete Breaker Unenclosed" is shown for price estimating convenience only. Price includes circuit breaker and 2 Pressure Wire Connectors per pole. To order complete breaker order and price circuit breaker and pressure wire connectors as separate items.

② Molded Case Switch. (Non-automatic circuit interrupter.)

③ Hubs—Priced and shipped separately. See Hub Table on page 60 for data and prices.

For Optional Accessories—Refer to pages 62–71.

For Enclosure Information—Refer to pages 58–61.

Prepared MAN/HA Date 2/2/90
Verified RWA Date 2/3/90

I-T-E CIRCUIT BREAKERS GOULD
MOLDED CASE

ADJUSTABLE ET AND ETI DATA

The nominal ac instantaneous trip points are given in the table below. For dc instantaneous trip points add 15% to nominal values given in table.

Tolerances on all settings are plus or minus 10%.

To change instantaneous trip point, depress indicating knob, then rotate to desired position.

Instantaneous trip adjustment is made through the breaker cover on all frame breakers.

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Frame	Maximum Continuous Amperes	AC Adjustable Trip Range Low	2	3	4	5	6	7	High	ETI Catalog Number 2-Pole	ETI Catalog Number 3-Pole	ET Catalog Number 2-Pole	ET Catalog Number 3-Pole
FJ6	70	600	640	690	730	770	810	850	900	–	–	FJ62-B070	FJ63-B070
	80	600	640	690	730	770	810	850	900	–	–	FJ62-B080	FJ63-B080
	90	600	640	690	730	770	810	850	900	–	–	FJ62-B090	FJ63-B090
	100	700	770	840	920	990	1060	1140	1200	–	–	FJ62-B100	FJ63-B100
	110	700	770	840	920	990	1060	1140	1200	–	–	FJ62-B110	FJ63-B110
	125	800	900	1000	1100	1200	1300	1400	1500	–	–	FJ62-B125	FJ63-B125
	150	800	900	1000	1100	1200	1300	1400	1500	–	–	FJ62-B150	FJ63-B150
	175	900	1060	1210	1370	1520	1780	1930	2000	–	–	FJ62-B175	FJ63-B175
	200	900	1060	1210	1370	1520	1780	1930	2000	–	–	FJ62-B200	FJ63-B200
	225	1100	1300	1500	1700	1900	2100	2300	2500	–	–	FJ62-B225	FJ63-B225
	250	1100	1300	1500	1700	1900	2100	2300	2500	FJ62-A250	FJ63-A250	FJ62-B250	FJ63-B250
F6	70	600	640	690	730	770	810	850	900	–	–	F62-B070	F63-B070
	80	600	540	690	730	770	810	850	900	–	–	F62-B080	F63-B080
	90	600	640	690	730	770	810	850	900	–	–	F62-B090	F63-B090
	100	700	770	840	920	990	1060	1140	1200	–	–	F62-B100	F63-B100
	110	700	770	840	920	990	1060	1140	1200	–	–	F62-B110	F63-B110
	125	800	900	1000	1100	1200	1300	1400	1500	–	–	F62-B125	F63-B125
	150	800	900	1000	1100	1200	1300	1400	1500	–	–	F62-B150	F63-B150
	175	900	1060	1210	1370	1520	1780	1930	2000	–	–	F62-B175	F63-B175
	200	900	1060	1210	1370	1520	1780	1930	2000	–	–	F62-B200	F63-B200
	225	1100	1300	1500	1700	1900	2100	2300	2500	–	–	F62-B225	F63-B225
	250	1100	1300	1500	1700	1900	2100	2300	2500	–	–	F62-B250	F63-B250
JD	250	1050	1350	1650	1950	–	–	–	2250	–	–	JD2B250	JD3B250
	300	1050	1350	1650	1950	–	–	–	2250	–	–	JD2B300	JD3B300
	350	1900	2300	2700	3100	–	–	–	3500	–	–	JD2B350	JD3B350
	400	1900	2300	2700	3100	–	–	–	3500	–	–	JD2B400	JD3B400
JJ	250	1050	1350	1650	1950	–	–	–	2250	–	–	JJ2-B250	JJ3-B250
	300	1050	1350	1650	1950	–	–	–	2250	–	–	JJ2-B300	JJ3-B300
	350	1900	2300	2700	3100	–	–	–	3500	–	–	JJ2-B350	JJ3-B350
	400	1900	2300	2700	3100	–	–	–	3500	–	–	JJ2-B400	JJ3-B400
JL	125	750	960	1175	1400	–	–	–	1600	–	–	JL2-B125	JL3-B125
	150	750	960	1175	1400	–	–	–	1600	–	–	JL2-B150	JL3-B150
	175	750	960	1175	1400	–	–	–	1600	–	–	JL2-B175	JL3-B175
	200	960	1200	1450	1800	–	–	–	2000	–	–	JL2-B200	JJ3-B200
	225	960	1200	1450	1800	–	–	–	2000	JL2-A225	JL3-A225	JJ2-B225	JJ3-B225
	250	1050	1350	1650	1950	–	–	–	2250	–	–	JL2-B250	JJ3-B250
	300	1050	1350	1650	1950	–	–	–	2250	–	–	JL2-B300	JL3-B300
	350	1900	2300	2700	3100	–	–	–	3500	–	–	JL2-B350	JL3-B350
	400	1900	2300	2700	3100	–	–	–	3500	JL2-L400	JL3-L400	JL2-B400	JL3-B400
	400	3200	3600	4100	5100	–	–	–	5600	JL2-H400	JL3-H400	–	–
LL	450	1900	2300	2700	3100	–	–	–	3500	LL2A450	LLA450	LL2B450	LL3B450
	500	1900	2300	2700	3100	–	–	–	3500	–	–	LL2B500	LL3B500
	600	1900	2300	2700	3100	–	–	–	3500	–	–	LL2B600	LL3B600
	600	3200	3600	4100	5100	–	–	–	5600	LL2L600	LL3L600	–	–
	600	5000	6100	6700	7400	–	–	–	8000	LL2H600	LL3H600	–	–
KM	250	1050	1350	1650	1950	–	–	–	2250	–	–	KM2-B250	KM3-B250
	300	1050	1350	1650	1950	–	–	–	2250	–	–	KM2-B300	KM3-B300
	350	1900	2300	2700	3100	–	–	–	3500	–	–	KM2-B350	KM3-B350
	400	1900	2300	2700	3100	–	–	–	3500	–	–	KM2-B400	KM3-B400
	500	1900	2300	2700	3100	–	–	–	3500	–	–	KM2-B500	KM3-B500
	600	1900	2300	2700	3100	–	–	–	3500	KM2-A600	KM3-A600	KM2-B600	KM3-B600
	700	3200	3600	4100	5100	–	–	–	5600	–	–	KM2-B700	KM3-B700
	800	3200	3600	4100	5100	–	–	–	5600	KM2-L800	KM3-L800	KM2-B800	KM3-B800
	800	5000	6100	6700	7400	–	–	–	8000	KM2-H800	KM3-H800	–	–
KP	600	3200	3600	4100	5100	–	–	–	5600	–	–	KP2-B600	KP3-B600
	800	3200	3600	4100	5100	–	–	–	5600	–	–	KP2-B800	KP3-B800
	1000	4000	5000	6000	7000	–	–	–	8000	–	–	KP2-B100	KP3-B100
	1200	4000	5000	6000	7000	–	–	–	8000	–	–	KP2-B120	KP3-B120

Prepared Mon/Ant Date 2/2/90
Verified Rutt Date 2/3/90

GOULD I-T-E CIRCUIT BREAKERS
MOLDED CASE

ADJUSTABLE ET AND ETI DATA

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Frame	Maximum Continuous Amperes	AC Adjustable Trip Range Low	2	3	4	High	ETI Catalog Number 2-Pole	ETI Catalog Number 3-Pole	ET Catalog Number 2-Pole	ET Catalog Number 3-Pole
HF6	70	600	640	690	730	900	–	–	HF62-B070	HF63-B070
	80	600	640	690	730	900	–	–	HF62-B080	HF63-B080
	90	600	640	690	730	900	–	–	HF62-B090	HF63-B090
	100	700	770	840	920	1200	–	–	HF62-B100	HF63-B100
	110	700	770	840	920	1200	–	–	HF62-B110	HF63-B110
	125	800	900	1000	1100	1500	–	–	HF62-B125	HF63-B125
	150	800	900	1000	1100	1500	–	–	HF62-B150	HF63-B150
	175	900	1060	1210	1370	2000	–	–	HF62-B175	HF63-B175
	200	900	1060	1210	1370	2000	–	–	HF62-B200	HF63-B200
	225	1100	1300	1500	1700	2500	–	–	HF62-B225	HF63-B225
	250	1100	1300	1500	1700	2500	–	–	HF62-B250	HF63-B250
HJ	125	750	960	1175	1400	1600	–	–	–	HJ3-B125
	150	750	960	1175	1400	1600	–	–	–	HJ3-B150
	175	750	960	1175	1400	1600	–	–	–	HJ3-B175
	200	960	1200	1450	1800	2000	–	–	–	HJ3-B200
	225	960	1200	1450	1800	2000	–	–	–	HJ3-B225
	250	1050	1350	1650	1950	2250	–	–	–	HJ3-B250
	300	1050	1350	1650	1950	2250	–	–	–	HJ3-B300
	350	1900	2300	2700	3100	3500	–	–	–	HJ3-B350
	400	1900	2300	2700	3100	3500	–	–	–	HJ3-B400
HL	450	1900	2300	2700	3100	3500	–	–	–	HL3B450
	500	1900	2300	2700	3100	3500	–	–	–	HL3B500
	600	1900	2300	2700	3100	3500	–	–	–	HL3B600
HK	700	3200	3600	4100	5100	5600	–	–	–	HK3B700
	800	3200	3600	4100	5100	5600	–	–	–	HK3B800
	1000	4000	5000	6000	7000	8000	–	–	–	HK3B100
	1200	4000	5000	6000	7000	8000	–	–	–	HK3B120
HP	600	3200	3600	4100	5100	5600	–	–	–	HP3-B600
	800	3200	3600	4100	5100	5600	–	–	–	HP3-B800
	1000	4000	5000	6000	7000	8000	–	–	–	HP3-B100
	1200	4000	5000	6000	7000	8000	–	–	–	HP3-B120
	1400	4000	5000	6000	7000	8000	–	–	–	HP3-B140
	1600	4000	5000	6000	7000	8000	–	–	–	HP3-B160
HR	1800	4000	5000	6000	7000	8000	–	–	–	HR3-B180
	2000	4000	5000	6000	7000	8000	–	–	–	HR3-B200
HS	2500	8000	9000	10,000	11,000	12,000	–	–	–	HS3-B250
	3000	8000	9000	10,000	11,000	12,000	–	–	–	HS3-B300
	4000	8000	9000	10,000	11,000	12,000	–	–	–	HS3-B400
CJ	125	750	960	1175	1400	1600	–	–	CJ2-B125	CJ3-B125
	150	750	960	1175	1400	1600	–	–	CJ2-B150	CJ3-B150
	175	750	960	1175	1400	1600	–	–	CJ2-B175	CJ3-B175
	200	960	1200	1450	1800	2000	–	–	CJ2-B200	CJ3-B200
	225	960	1200	1450	1800	2000	CJ2-A225	CJ3-A225	CJ2-B225	CJ3-B225
	250	1050	1350	1650	1950	2250	–	–	CJ2-B250	CJ3-B250
	300	1050	1350	1650	1950	2250	–	–	CJ2-B300	CJ3-B300
	350	1900	2300	2700	3100	3500	–	–	CJ2-B350	CJ3-B350
	400	1900	2300	2700	3100	3500	CJ2-L400	CJ3-L400	CJ2-B400	CJ3-B400
	400	3200	3600	4100	5100	5600	CJ2-H400	CJ3-H400	–	–
CN	400	1900	2300	2700	3100	3500	–	–	–	CN3-B400
	500	1900	2300	2700	3100	3500	–	–	–	CN3-B500
	600	1900	2300	2700	3100	3500	–	–	–	CN3-B600
	700	3200	3600	4100	5100	5600	–	–	–	CN3-B700
	800	3200	3600	4100	5100	5600	–	CN3-L800	–	CN3-B800
	800	5000	6100	6700	7400	8000	–	CN3-H800	–	–
CP	600	3200	3600	4100	5100	5600	–	–	–	CP3-B600
	800	3200	3600	4100	5100	5600	–	–	–	CP3-B800
	1000	4000	5000	6000	7000	8000	–	–	–	CP3-B100
	1200	4000	5000	6000	7000	8000	–	–	–	CP3-B120
	1400	4000	5000	6000	7000	8000	–	–	–	CP3-B140
	1600	4000	5000	6000	7000	8000	–	CP3-H160	–	CP3-B160
	1600	3200	3600	4100	5100	5600	–	CP3-L160	–	–

Prepared MAN/AA Date 2/2/90
Verified Ruth Date 2/3/90

PAGES 496 THRU 503 OMITTED IN INITIAL ISSUE

Prepared _____ Date 2/3/90 Checked _____ Date 2/5/90

Minimum Cable Sizing Based on Short Circuits for 480 V and 120 V Systems

R15

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I PURPOSE

The purpose of this calculation is to, through the use of input parameters which typify the equipment at the Watts Bar Station, determine the acceptability of the minimum cable sizes used at the Watts Bar station in terms of short circuit withstand capability. The scope of this calculation will cover the following: the instantaneous fault clearing by 30kA circuit breakers at the 480V switchgear, 22kA molded case circuit breakers at the 480V MCCs, and 22kA molded case circuit breakers at the 208/120V Distribution panels.

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II ASSUMPTION

In the event of a fault at the 480v switchgear or 480v MCCs, the motor contribution is assumed to equal 17% of the total available fault current. The remaining 83% of the total available fault current is assumed to be system contribution.

III DOCUMENTATION OF ASSUMPTION

THE ABOVE ASSUMPTION IS CONSISTANT WITH THE SAMPLE CALCULATION CONTAINED IN ESC-151 CONSIDERING A PORTION OF THE LOAD TO BE RESISTIVE

IV SOURCE OF DESIGN INPUT INFORMATION (References)

1) GE BUY LOG Ordering and Pricing guide, GEP-1100E, 4/83, (Lists avialable General Electric molded case breakers with 22kA interrupting rating).

2) Gould I.T.E Electrical Distribution Equipment, 1982 SPEED FAX (Lists available ITE Moloed Case breakers with 22kA interrupting rating).

3) Square "D" Digest 167, March 1988 (Lists available ITE molded case breakers with 22kA interrupting rating).

4) Electrical standards

   a. ESC 151 short circuit calculations for 480V Switchgear 11-2-79 (Defines typical X/R value for low voltage systems = 6)

   b. ESA 102 Electrical and Physical Characteristics of Electrical Cable 7-6-87 (Defines cable impedances & cable Area in cm, and conversion equation for cable impedances

5) Manufacturers Time-Current Curves (used to determine maximum fault clearing times)

a. Westinghouse Descriptive Bulletin 32-850, page 17, July 1985 50-800A (0.05 second).

b. ITE SS-13, No. TD-9003, Rev 1, 11-17-78, 50-800A (0.05 second).

c. ITE E Frame 14-40A No. TD-4947 Rev 1, 12/8/76 (0.01667 second).

D. Square "D", QO, 15A, curve No 910-1, 5/85 (0.01667 seconds).

6) TVA Calculation 2GDS211RP, Revision 0, Pages 81A, 82A, and 83A, Watts Bar Electrical Design (Temperature rating of the cables 75°C and 90°C)

7) S&L General Relay File, 460V Motors (This reference identifies the short circuit time constants for 6 460V westinghouse motors — all are less than 0.123 seconds).

8) ANSI standard C37.16-1980, American National Standard Preferred Ratings, Related Requirements, and application Recommendations for Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors (Lists instantaneous interrupting ratings for 480V Air Circuit breakers - 30KA, 600A Frame)

9) TVA Electrical Design Standard DS-E12.6.3, Rev 1, DATE 11-7-86 (Lists Ampacity for #14 and #12 cable in cable tray 6A & 8A)

~~10) Letter from R.O.D. Witt of Westinghouse To E.J. Hirn of Westinghouse dated July 13, 1973 copy filed in LAO General file on 460V motors (this reference defines the range and impedance of Westinghouse heaters)~~

11) IEEE 242-1986 BUFF BOOK, PROTECTION AND COORDINATION OF INDUSTRIAL COMMERCIAL POWER SYSTEMS (CHAPTER 2 CONDUCTOR PROTECTION)

12) S&L Computer program entitled "Cable Conductor Temperature During Short Circuit" Program Number 03.7.086-1.00, Dated 1986

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Rev. 0	Date
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V INPUT DATA

A. CABLE SIZES

The following cable sizes were selected for analysis:

SERVICE	SIZE	AREA Cir. Mils	CONTINUOUS TEMPERATURE RATING °C	SHORT-CIRCUIT TEMPERATURE RATING °C
480V SWGR	#6	26240	75/90	150/250
480V SWGR	#2	16510	75/90	150/250
480V MCCs	#12	6530	75/90	150/250
480V MCCs	#14	4110	75/90	150/250
208/120V Dist. Pnl.	#12	6530	75/90	150/250
208/120V Dist. Pnl.	#14	4110	75/90	150/250
		Ref 4	Ref 6	Ref 6

Prepared gmf Date 2/2/90 Checked AA Date 2/2/90

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Rev. 0	Date
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2. CABLE IMPEDANCE AT 90°C

The cable impedances in Ω/100 ft were taken from Ref 4b and converted, for the given lengths, into ohms.

CABLE SIZE	CABLE LENGTH (ft)	CABLE IMPEDANCE IN OHMS
#14 208/120V DIST PNL	10	0.0328 + i 0.000371
#14 208/120V DIST PNL	15	0.0492 i 0.000556
#14 480V MCCs	1.5	0.00492 + i 0.000063
#14 480V MCCs	25	0.0820 + i 0.001045
#14 480V MCCs	30	0.0984 i 0.001254
#12 480V MCCs	1.5	0.00309 + i 0.000059
#12 480V MCCs	20	0.0412 + i 0.00078
#12 480V MCCs	25	0.0515 + i 0.000975
#8 480V SWGR	2	0.001636 + i 0.000072
#8 480V SWGR	45	0.0368 + i 0.001629
#8 480V SWGR	50	0.0409 i 0.00121
#6 480V SWGR	2	0.001026 + i 0.000068
#6 480V SWGR	40	0.0205 i 0.001364
#6 480V SWGR	45	0.02308 i 0.001534

Prepared [illegible] Date 2/3/90 Checked [illegible] Date 2/7/90

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C. CABLE IMPEDANCE AT 75°C

The cable impedance in ohms per 100ft at 90°c was taken from Ref 4b and converted, for the given length, into ohms at 75°c. The equation used to convert the cable resistance at 90°c to 75°c was also taken from ref 4b:

$$R_t = \left(\frac{234.5 + t}{324.5}\right) R_{90} = 0.953775 R_{90}$$

Where t is the cable temperature (75°c)

CABLE SIZE	CABLE LENGTH (ft)	CABLE IMPEDANCE IN OHMS @ 75°C
#14 208V/120V DIST PNLS	19	0.0594 + i 0.000705
#14 208V/120V DIST PNLS	20	0.0626 + i 0.000742
#14 480V MCCs	1.5	0.00469 + i 0.000063
#14 480V MCCs	45	0.14080 + i 0.001881
#12 480V MCCs	1.5	0.00295 + i 0.000059
#12 480V MCCs	40	0.07860 + i 0.001560

Prepared gmf Date 2/3/90 Checked HH Date 2/5/90

CABLE IMPEDANCE AT 75°C (continued)

CABLE SIZE	CABLE LENGTH (ft)	CABLE IMPEDANCE IN OHMS
#12 480V mcc.	45	0.08840 + j0.001755
#8 480V sugr	2	0.001560 + j0.000072
#8 480V sugr	75	0.05850 + j0.002710
#8 480V sugr	80	0.06240 + j0.002900
#6 480V sugr	2	0.000979 + j0.000068
#6 480V sugr	70	0.03420 + j0.002390
#6 480V sugr	75	0.03670 + j0.002560

D. MOTOR & SYSTEM CONTRIBUTION

Typical interrupting ratings for 480V switchgear, 480V MCCs, and 208V/120V Distribution Panels were used as the maximum 3-Ø fault current available at the source side of the cable:

480V SWITCHGEAR / WITH #8 or #6 CABLE

480V Air Circuit Breakers, instantaneous interrupting rating 30KA, 800A Frame Reference 8

480V MCCs / WITH #12 or #14 CABLE

- 480V Molded Case Circuit Breakers, Interrupting rating 22KA, 250A Frame From reference 1, 2, 3

208V/120V DISTRIBUTION PANELS / WITH #14 CABLE

208V Molded Case Circuit Breakers Interrupting rating 22KA, 15-100A Frame From references 2, 3

17% of the available fault current was considered as motor contribution and the remaining 83% as system contribution.

MOTOR & SYSTEM CONTRIBUTION (continued)

A motor short circuit contribution of 17% of breaker rating and a system contribution of 83% of breaker rating, were selected based on S&L's experience with low voltage systems

Division of current into system and motor components

1) 480V SWGR's

- $I_m = 0.17 * 30kA = 5100A$

  $I_s = 30kA - 5100A = 24,900A$

2) 480V MCCs

$I_m = 0.17 * 22kA = 3740A$

$I_s = 22kA - 3740 = 18260A$

3) 208/120V Distribution Panels

$I_m = 0$ (No motor > 50HP)

$I_s = 22kA$

E. SYSTEM X/R RATIO

An X/R ratio of 6 was used for the system contribution at the 480V switchgear, 480V MCCs, and 208/120V Distribution Panels. An X/R ratio of 6 for the system contribution at the 480V switchgear is typical of low voltage systems, Ref 4a. Use of the same X/R ratio, 6, for the 480V MCCs and 208V Distribution Panels is conservative since in actuallity the X/R ratio at these services would be less than at the 480V switchgear.

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F. MOTOR TIME CONSTANT

A conservative value for the motor time constant of 0.123 seconds was used for the motor S.C. contribution at the 480V switchgear and 480V MCCs, Ref 7

G. FAULT CLEARING TIME AT 480V SWITCHGEAR

A fault clearing time of 0.05 seconds was used for the 480V switchgear since, in the instantaneous region, the maximum clearing time for 480V switchgear Air circuit breakers is typicaly 0.05 seconds, Ref 5a, 5b.

H. FAULT CLEARING TIME AT 480V MCCs

A maximum fault clearing time of 1 cycle was used for the 480V MCCs and 208V/120V Distribution Panels. The 1 cycle clearing time was selected based on time-current curves of circuit breaker types which are used at the Watts Bar Station Ref 5c, 5d

VI COMPUTATION AND ANALYSIS

A. The input data was entered into the Sargent & Lundy computer program entitled Cable Conductor Temperature During Short Circuit, program number 03.7.026. The input data which was entered into the computer is shown on pages 18 and 22. The The outputs are shown on pages 19 and 23.

WBN EEB-MS-TI08-0008

Page 522A

FOR	NAME: W.T. HOLBERT	DATE: 4/15/91
	ADDRESS:	☐ Delta ☐ M.S. ☐ Knox ☐ Nor.

Fold here for return

FROM	NAME: L.K. WELLS	EXTENSION: 1710
	ADDRESS: TR 6-33	☐ Delta ☐ M.S. ☐ Knox ☐ Nor.

A QUESTION CONCERNING THE QA APPLICABILITY WAS RAISED WITH REGARDS TO S&L COMPUTER PROGRAM "CABLE CONDUCTOR TEMPERATURE SHORT CIRCUIT" PROGRAM NUMBER 03.7.086-1.00 (1986).

I CALLED C. RUTH OF CHICAGO S&L, THE RESPONSIBLE ENGINEER FOR THE RECORD RETENTION OF COMPUTER SOFTWARE IN THE ELECTRICAL DEPARTMENT.

MR. RUTH INDICATED THAT THE ABOVE SOFTWARE WAS VERIFIED AND VALIDATED TO THE QA REQUIREMENTS IN PLACE IN 1986.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CALL ME

TVA 450 (05-9-80) INTEROFFICE MAILING SLIP

Prepared [illegible] Date 2/2/90 Checked [illegible] Date 4/3/90

B. COMPUTER INPUT 90°C CONDUCTORS

Calc. No. 8573-27-EAD-2	
Rev. 0	Date
Page 20 OF 33	
Proj. No. 8573-27	

INPUT FILE TEST90.IN, ENTERED 1/90

Card Number	Cable Size AWG	Cable Length	Cable Voltage Rating	Cable Area Cir. Mils	Cable Resistance In Ohms	Cable Reactance In Ohms	Prefault L-L Voltage	System SC Contribution	Motor SC Contribution	System X/R Ratio	Motor SC Time Constant	Fault Clearing Time	Initial Cable Temp
1	#6	45ft	600	26240	.02308	.001534	480	24900	5100	6	.123	.05	90
1	#6	40ft	600	26240	.0205	.001364	480	24900	5100	6	.123	.05	90
1	#6	2ft	600	26240	.001026	.000068	480	24900	5100	6	.123	.05	90
1	#8	2ft	600	16510	.001636	.000072	480	24900	5100	6	.123	.05	90
1	#8	50ft	600	16510	.0409	.001610	480	24900	5100	6	.123	.05	90
1	#8	45ft	600	16510	.0368	.001629	480	24900	5100	6	.123	.016	90
1	#12	1.5ft	600	6530	.00309	.000585	480	18260	3740	6	.123	.016	90
1	#12	20ft	600	6530	.0412	.00078	480	18260	3740	6	.123	.016	90
1	#12	25ft	600	6530	.0515	.000975	480	18260	3740	6	.123	.016	90
1	#14	30ft	600	4110	.0984	.001254	480	18260	3740	6	.123	.016	90
1	#14	25ft	600	4110	.082	.001045	480	18260	3740	6	.123	.016	90
1	#14	1.5ft	600	4110	.00492	.000627	480	18260	3740	6	.123	.016	90
1	#14	15ft	600	4110	.0492	.000536	208	22000	0.	6	.123	.016	90
1	#14	10ft	600	4110	.0328	.000371	208	22000	0.	6	.123	.016	90
2													

WBN EEB-MS-T108-0008 R0
480 Vac 1E Coordination/Protection

Prepared [illegible] Date 2/2/90 Checked [illegible] Date 2/2/90

Page 524 of 561 ATTACHMENT 4
2-7-90

C. COMPUTER OUTPUT FOR 90°C CABLE

Date- 19 Jan 90

Time- 11:19:13

Program Number 03.7.026

Sargent & Lundy Cable Short Circuit Heating Calculation

Page 1

CONDUCTOR DATA					FAULT CURRENT DATA						CONDUCTOR TEMP	
SIZE AWG OR CM		VOLTAGE CLASS	AREA CIR MIL	RESISTANCE OHMS AT 90C	REACTANCE OHMS	PREFAULT VOLTS	SYSTEM AMPS	MOTOR AMPS	X/R RATIO	MOTOR SCTC SECONDS	FAULT CLEARING TIME IN SECONDS	START DEGREES C	FINAL
#6	45ft	600.	26240.	.023060	.001534	480.	24900.	5100.	6.	.12300	.0500	90.	238.
#6	40ft	600.	26240.	.020500	.001364	480.	24900.	5100.	6.	.12300	.0500	90.	266.
#6	2ft	600.	26240.	.001026	.000066	480	24900.	5100.	6.	.12300	.0500	90.	5344.#
#8	2ft	600.	16510.	.001636	.000072	480.	24900.	5100.	6.	.12300	.0500	90.	7253.#
#8	50ft	600.	16510.	.040900	.001810	480.	24900.	5100.	6.	.12300	.0500	90.	228.
#8	45ft	600.	16510.	.036800	.001629	480.	24900.	5100.	6.	.12300	.0500	90.	253.
#12	1.5ft	600.	6530.	.003090	.000059	480.	18260.	3740.	6.	.12300	.0160	90.	6024.#
#12	20ft	600.	6530.	.041200	.000780	480.	18260.	3740.	6.	.12300	.0160	90.	312.
#12	25ft	600.	6530.	.051500	.000975	480.	18260.	3740.	6.	.12300	.0160	90.	250.
#14	30ft	600.	4110.	.098400	.001254	480.	18260.	3740.	6.	.12300	.0160	90.	219.
#14	25ft	600.	4110.	.082000	.001045	480.	18260.	3740.	6.	.12300	.0160	90.	262.
#14	1.5ft	600.	4110.	.004920	.000063	480.	18260.	3740.	6.	.12300	.0160	90.	6039.#
#14	15ft	600.	4110.	.049200	.000556	208.	22000.	0.	6.	.12300	.0160	90.	194.
#14	10ft	600.	4110.	.032800	.000371	208.	22000.	0.	6.	.12300	.0160	90.	289.

Note : This temperature exceeds the melting point of copper (1083 degrees C).

Prepared GMP Date 2/3/90 Checked AA Date 2/17/90

D. MINIMUM CABLE LENGTHS TO LIMIT CONDUCTOR TEMPERATURE TO MAXIMUM SHORT CIRCUIT TEMPERATURE, 90°C cont/250°C S.C. CABLES

1) 208/120V, 22KA, 1 CYCLE FAULT CLEARING TIME
#14 AWG CABLE (208/120V Dist Pnls)

a. For a fault 10 ft. out, the conductor temperature is 289°C
b. For a fault 15ft out, the conductor temperature is 194°C
c. The minimum cable length is

$$10 + \frac{289-250}{289-194} * 5 = 12 \text{ ft}$$

2) 480V, 22KA, 1 CYCLE FAULT CLEARING TIME, #14 AWG CABLE (480V MCCs)

a. For a fault 25 ft out, the conductor temperature is 262°C
b. For a fault 30ft out the conductor temperature is 219°C
c. The minimum cable length is

$$25 + \frac{262-250}{\cancel{\ }} * 5 = 27 \text{ ft}$$

3) 480V, 22KA, 1 CYCLE FAULT CLEARING TIME, #12 AWG CABLE (480V MCCs)

a. For a fault 25 ft out, the conductor temperature is 250°C

b. The minimum cable length is 25 ft

4) 480V, 30KA, 3 CYCLE FAULT CLEARING TIME #8 AWG CABLE (480V Swgr)

a. For a fault 45ft out, the conductor Temperature is 253°C

b. For a fault 50ft out, the conductor Temperature is 228

c. The minimum cable length is

$$45 + \frac{253-250}{253-228} * 5 = 46 \text{ ft}$$

5) 480V, 30KA, 3 CYCLE FAULT CLEARING TIME, #6 AWG CABLE (480V Swgr)

a. For a fault 40ft out, the conductor temperature is 266°C

b. For a fault 45ft out, the conductor temperature is 238°C

c. The minimum cable length is

$$40 + \frac{266-250}{266-238} * 5 = 43 \text{ ft}$$

Prepared [illegible] Date 2/3/90 Checked [illegible] Date 2/7/90

E. COMPUTER INPUT 75°C CONDUCTORS

INPUT FILE
TEST75.IN, ENTERED 1/90

Card Number	Cable Size AWG	Cable Length	Cable Voltage Rating	Cable Area Cir. Mils	Cable Resistance In Ohms AT 75°C	Cable Reactance In Ohms	Prefault L-L Voltage	System SC Contribution	Motor SC Contribution	System X/R Ratio	Motor SC Time Constant	Fault Clearing Time	Initial Cable Temp
1	#6	70ft	600	26240	.0342	.00259	480	24900	5100	6	.123	.05	75
1	#6	75ft	600	26240	.0367	.00256	480	24900	5100	6	.123	.05	75
1	#6	2ft	600	26240	.000979	.000068	480	24900	5100	6	.123	.05	75
1	#8	2ft	600	16510	.001560	.000072	480	24900	5100	6	.123	.05	75
1	#8	75ft	600	16510	.0585	.00271	480	24900	5100	6	.123	.05	75
1	#8	80ft	600	16510	.0624	.00290	480	24900	5100	6	.123	.05	75
1	#12	1.5ft	600	6530	.00295	.0000585	480	18260	3740	6	.123	.016	75
1	#12	45ft	600	6530	.0884	.001755	480	18260	3740	6	.123	.016	75
1	#12	40ft	600	6530	.0786	.001560	480	18260	3740	6	.123	.016	75
1	#14	1.5ft	600	4110	.00469	.0000627	480	18260	3740	6	.123	.016	75
1	#14	45ft	600	4110	.1408	.001861	480	18260	3740	6	.123	.016	75
1	#14	20ft	600	4110	.0626	.000742	208	22000	0.	6	.123	.016	75
1	#14	19ft	600	4110	.0594	.000705	208	22000	0.	6	.123	.016	75
2													

NOTE: The resistance component of the cable impedances are based on allowable continuous operating temperature of 75 degrees celcius

F COMPUTER OUTPUT 75°C CONDUCTOR

Program Number 03.7.086

Date- 19 Jan 90

Time- 11:20:00

Sargent & Lundy Cable Short Circuit Heating Calculation

Page 1

CONDUCTOR DATA					FAULT CURRENT DATA						CONDUCTOR TEMP	
SIZE AWG OR CM		VOLTAGE CLASS	AREA CIR MIL	RESISTANCE OHMS AT 90C	REACTANCE OHMS	PREFAULT VOLTS	SYSTEM AMPS	MOTOR AMPS	X/R RATIO	MOTOR SCTC SECONDS	FAULT CLEARING TIME IN SECONDS	START DEGREES C	FINAL DEGREES C
#6	70ft	600.	26240.	.034200	.002390	480.	24900.	5100.	6.	.12300	.0540	75.	157.
#6	75ft	600.	26240.	.036700	.002560	480.	24900.	5100.	6.	.12300	.0540	75.	148.
#6	2ft	600.	26240.	.000979	.000068	480.	24900.	5100.	6.	.12300	.0500	75.	5549.*
#8	2ft	600.	16510.	.001560	.000072	480.	24900.	5100.	6.	.12300	.0500	75.	7625.*
#8	75ft	600.	16510.	.058500	.002710	480.	24900.	5100.	6.	.12300	.0500	75.	154.
#8	80ft	600.	16510.	.062400	.002900	480.	24900.	5100.	6.	.12300	.0500	75.	145.
#12	1.5ft	600.	6530.	.002950	.000059	480.	18260.	3740.	6.	.12300	.0160	75.	6415.*
#12	45ft	600.	6530.	.088400	.001755	480.	18260.	3740.	6.	.12300	.0160	75.	144.
#12	40ft	600.	6530.	.078600	.001560	480.	18260.	3740.	6.	.12300	.0160	75.	159.
#14	1.5ft	600.	4110.	.004690	.000063	480.	18260.	3740.	6.	.12300	.0160	75.	6457.*
#14	45ft	600.	4110.	.140600	.001881	480.	18260.	3740.	6.	.12300	.0160	75.	146.
#14	20ft	600.	4110.	.062600	.000742	208.	22000.	0.	6.	.12300	.0160	75.	146.
#14	19ft	600.	4110.	.059400	.000703	208.	22000.	0.	6.	.12300	.0160	75.	153.

* Note : This temperature exceeds the melting point of copper (1083 degrees C).

Prepared [illegible] Date 2/3/90 Checked [illegible] Date 2/5/90

G. MINIMUM CABLE LENGTHS TO LIMIT CONDUCTOR TEMPERATURES TO MAXIMUM SHORT CIRCUIT TEMPERATURE, 75/150°C CABLES

1) 208/120V, 22KA, 1 CYCLE FAULT CLEARING TIME
14 AWG CABLE (208/120V Dist. Pnl)

a. For a fault 20 ft out, the conductor temperature is 146°C

b. For a fault 19 ft out, the conductor temperature is 153°C.

c. The minimum cable length is 20 ft.

2) 480V, 22KA, 1 CYCLE FAULT CLEARING TIME
14 AWG CABLE (480V MCCs)

a. For a fault 45ft out, the conductor Temp is 148°C

b. The minimum cable length is 45 ft

3) 480V, 22KA, 1 CYCLE FAULT CLEARING TIME. # 12 AWG CABLE (480V MCCs)

a. For a fault 40ft out the conductor Temperature is 159°C

b. For a fault 45ft out, the conductor Temperature is 144°C

c. The minimum cable length is $40 + \frac{159-150}{159-144}(5) = 43$ ft

Prepared [illegible] Date 2/3/90 Checked [illegible] Date 2/5/90

4) 480V, 30KA, 3 CYCLE FAULT CLEARING TIME
#8 AWG CABLE (480V SWGR.)

a. For a fault 80ft out, the CONDUCTOR TEMPERATURE IS 145°C

b. For a fault 75ft out, the CONDUCTOR TEMPERATURE IS 154°C

c. THE MINIMUM CABLE LENGTH IS $75 + \frac{154-150}{154-145} 5 = 77$ ft

5) 480V, 30KA, 3 CYCLE FAULT CLEARING TIME
#6 AWG CABLE (480V SWGR)

a. For a fault 75ft out, the CONDUCTOR TEMPERATURE IS 148°C

b. For a FAULT 70ft out, the CONDUCTOR TEMPERATURE IS 157°C

c. The MINIMUM CABLE LENGTH IS $70 + \frac{157-150}{157-148} 5 = 74$ ft

PAGES 532 THRU 535 OMITTED IN INITIAL ISSUE

Prepared gmf Date 2/3/90 Checked HA Date 4/1/90
TBT 4-4-90 4/4/90

IX CONCLUSION

The cable sizes used at the Watts Bar station are acceptable in terms of S.C. withstand capability. This is demonstrated by the low value of cable impedance (and hence the cable length) required to limit the cable conductor temperatures, during the instantaneous clearing of short circuits, to below the maximum allowable cable insulation temperature. For economical reasons, the "calculated minimum cable lengths" are a deciding factor in determining the acceptability of the minimum cable sizes — only short segments of otherwise undamaged cable would require replacment. THE ACTUAL CABLE LENGTHS ASSOCIATED WITH MCC'S WOULD BE LESS THAN THE CALCULATED VALUES DUE TO THE IMPEDENCE OF THERMAL OVERLOAD HEATERS

X APPENDIX A

WRN EEB-MS-TI08-0008 RO
Attachment 4
Ref 1

Prepared [illegible] Date 2/2/90
Verified HA Date 2/5/90

Molded Case Circuit Breakers

Quick Reference Guide

Ratings do not apply to molded case switches.

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Rev. 0 Date
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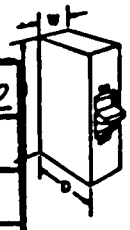
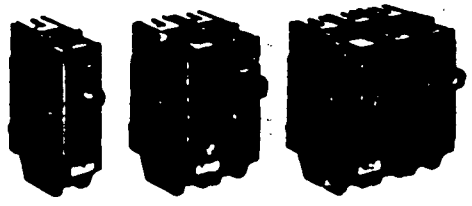
No. 8573-27





TQL, THQL, THHQL, TXQL

Table 2

Circuit Breaker Type	Rating (Amps)	No Poles	Maximum Voltage Rating ac	Maximum Voltage Rating dc	UL Listed Interrupting Ratings—RMS Symmetrical Amps (In Thousands) ac Voltage 120	ac Voltage 120/240	ac Voltage 240	ac Voltage 277	ac Voltage 480	ac Voltage 600	dc Voltage 125	dc Voltage 250	Dimensions (in) H	W	D	A	B	C	E	Approx Ship Wt / Std Pack
Q Line (UL File E11592; Fixed Thermal Magnetic Trip Unit)																				
THOP	15-50	1	120/240			10							3 9/32	1/2	2 7/8					9 lb/48
		2②												1						6 lb/24
THHOP	15-20	1	120/240			22							3 9/32	1/2	2 7/8					9 lb/48
		2												1						6 lb/24
TQL	5-10	1	120/240			5③							3 9/32	1	2 7/8					8 lb/24
		2					5①							2						6 lb/12
		3	240											3						7 lb/8
TQAL	110-125	2	120/240			10							3 9/32	2	2 7/8					8 lb/24
[illegible]	5-10	1	120/240			5③							3 9/32	1	2 7/8					16 lb/48
		2					5①							2						12 lb/24
		3	240											3						6 lb/16
TQC	5-10	1	120/240			5③							3 7/8	1	2 7/8					9 lb/24
		2					5①							2						10 lb/12
		3	240											3						9 lb/8
THQL THQAL	15-70	1	120/240			10							3 9/32	1	2 7/8					8 lb/24
	15-100	2					10							2						6 lb/12
		3	240											3						7 lb/8
THQB	15-70	1	120/240			10							3 9/32	1	2 7/8					16 lb/48
	15-100	2					10							2						12 lb/24
		3	240											3						16 lb/16
THQC	15-70	1	120/240			10							3 7/8	1	2 7/8					9 lb/24
	15-100	2					10							2						10 lb/12
		3	240											3						9 lb/8
THHQB	15-70	1	120/240			22							3 9/32	1	2 7/8					16 lb/48
	15-100	2					22							2						16 lb/24
		3④	240											3						7 lb/8
THHQC	15-70	1	120/240			22							3 7/8	1	2 7/8					9 lb/24
	15-100	2					22							2						10 lb/12
		3④	240											3						9 lb/8
THHQL THHQAL	15-70	1	120/240			22							3 9/32	1	2 7/8					8 lb/24
	15-125	2					22							2						6 lb/12
	15-100	3④	240											3						7 lb/8
TXQL	15-30	1	120/240			65							3 9/32	1	2 7/8					8 lb/24
		2					65							2						6 lb/12
		3	240											3						7 lb/8
[illegible]QB	15-30	1	120/240			65							3 7/8	1	2 7/8					8 lb/24
		2					65							2						6 lb/12
		3	240											3						7 lb/8
TXQC	15-30	1	120/240			65							3 7/8	1	2 7/8					9 lb/24
		2					65							2						10 lb/12
		3	240											3						9 lb/8

① Not UL listed.
② 15-60 amp listed HACR type (15-50 amp THQP).
③ 5 amp not UL listed.
④ 40-100 amp available 4th quarter 1983

continued on page 5

WBN EEB-MS-TI08-0008 RO Attach 4

Prepared JMY Date 2/3/90
Verified [illegible] Date 2/5/90

Calc. No. 8573-27-EAD-2
Rev. 0 Date
Page A2 of A17
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Ref 2

I-T-E CIRCUIT BREAKER
MOLDED CASE

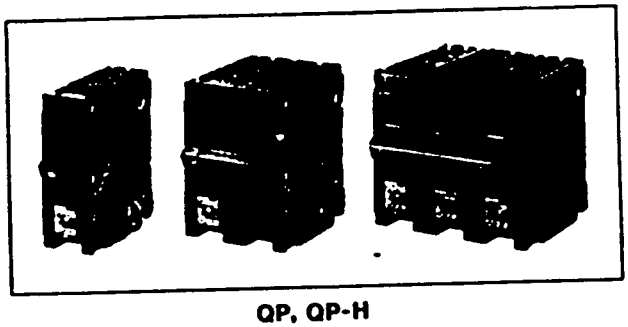
REFERENCE GUIDE

			EQ®—NORMAL DUTY							
Type			QP	QPH	BQ	BQC	BQH	QJ	QJH	JD
PAGE			32	33	34	34	35	36	36	37
	Poles		1, 2, 3	1, 2, 3	1, 2, 3	1	1, 2	2, 3	2, 3	2, 3
RATINGS AC	Amperes, Continuous		15–125①③	15–125①③	15–100①	15–30	15–100①	125–225	125–225	250–400
	Volts (60 Hertz)		1, 2P–120/240 2, 3P–240	1, 2P–120/240 3P–240	1, 2P–120/240 2, 3P–240	277	1, 2P–120/240 3P–240	240	240	240
	Interrupting Rating—UL Symmetrical Rms Amperes	240V	10,000	22,000	10,000	10,000 at 277V AC	22,000	10,000	18,000	22,000
		480V	—	—	—		—		—	—
		600V	—	—	—		—		—	—
RATINGS DC	Volts—2 Pole		—	—	—	—	—		—	250
	Interrupting Rating—Amperes		—	—	—	—	—		—	10,000
OVER-CURRENT DEVICES	Thermal and Fixed Magnetic Trip		✓	✓	✓	✓	✓	✓	✓	—
	Thermal and Adjustable Magnetic Trip		—	—	—	—	—		—	✓
	FTI Adjustable Magnetic Trip only Motor Circuit Protector		—	—	—	—	—		—	—
	Molded Case Switch		✓	—	✓	—	—	✓	✓	✓
ACCESSORIES MODIFICATIONS	Undervoltage Trip		—	—	—	—	—		—	✓
	Shunt Trip Attachment		✓	✓	✓	—	✓	✓②	✓②	✓
	Auxiliary Switch Attachment		✓	✓	✓	—	✓	✓②	✓②	✓
	Alarm Switch Attachment		—	—	—	—	—		—	✓
	Mechanical Interlock Arrangement		—	—	—	—	—	✓	✓	✓
	Rear Connection Studs (Breaker Removable From Front)		—	—	—	—	—		—	✓
	TELEMAND® Motor Operator		—	—	—	—	—		—	✓
	Plug-in Mounting Arrangement		—	—	—	—	—		—	✓
	Fungus Proofing		✓	✓	✓	✓	✓	✓	✓	✓
INDIVIDUAL ENCLOSURES	Type 1—Indoor, Surface		✓	✓	—	—	—	✓	✓	—
	Type 1—Indoor Flush		✓	✓	—	—	—	✓	✓	✓
	Type 3R—Outdoor-Rainproof		✓	✓	—	—	—	✓	✓	✓
	Type 4, 5, 9—Watertight, Combustion Dusttight		—	—	—	—	—		—	✓
	Type 7—Flammable Gas Atmosphere		—	—	—	—	—		—	✓
	Type 12—Lint, Fine Dust, Oils, Coolants		—	—	—	—	—		—	✓
	Type 12K—Semi-Dusttight		—	—	—	—	—		—	✓

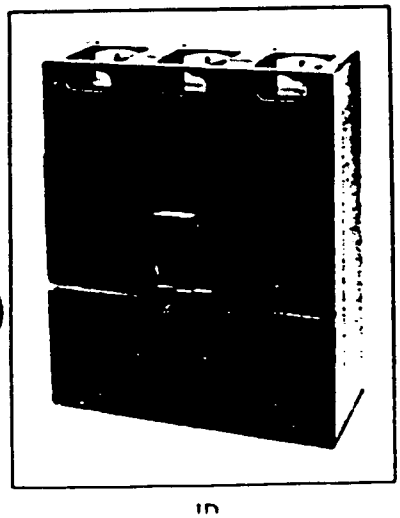
①Single pole breakers available in ratings 15–70 amperes only.

②Three pole breakers only.

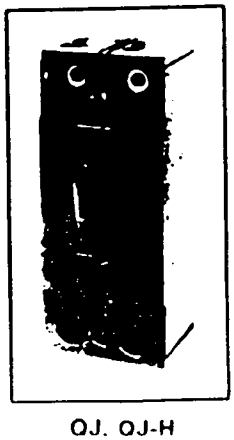
③125A 2 pole only.



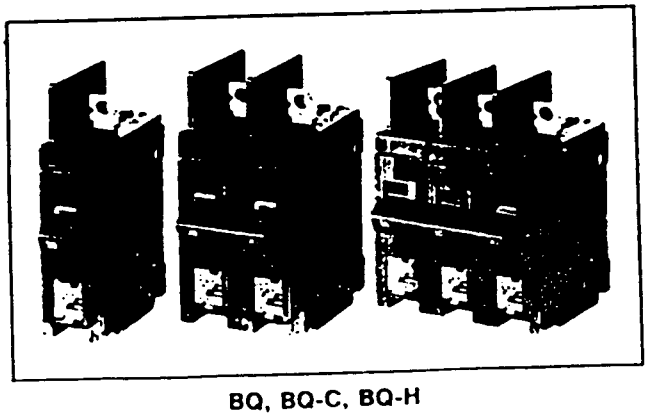
QP, QP-H



JD



QJ, QJ-H



BQ, BQ-C, BQ-H

CIRCUIT BREAKER INFORMATION

Calc. No. 8373-27-EAD
Rev. 0 Date
Page 15 OF 17
Calc. No. 8373-27

	No. of Poles	Cont. Ampere Rating	UL Listed Interrupting Rating — RMS Symmetrical Amperes AC Voltage 120	120/240	240	277	480Y/277	480	600	DC Volts 250	Federal Specs W-C-375B/GEN	IEC 157-1 P1 Rating AC Voltage 380/220	415/240	Digest 187 Page No.
[illegible]	1	15-30	10K								11a			3, 58, 86, [illegible]
	2	15-60	...	10K							10a, 12a			
[illegible]	1	15-30	22K								11a			3, 58, 86, 87
QGB-VHGFI	1	10-70	...	10K						■	10a, 11a, 12a			2, 58, 86, 87
[illegible]	2	10-125	...	10K						■	10a, 12a			
QGB	3	10-100	...	...	10K					■	10b, 11b, 12b			
QGB-HO	2	15-100	...	...	10K						10b, 11b, 12b			2, 86, 87
[illegible]	1	15-30	...	10K							10a, 11a, 12a			2
[illegible]	1	15-30	...	22K							14a			2, 86, 87
QGB-VH	2	15-100	...	22K							14a			
	3	15-100	...	...	22K						14a			
[illegible]	1	15-30	...	65K							15a			2, 86, 87
[illegible]	2	15-30	...	65K							15a			
[illegible]	3	15-30	...	...	65K						15b			
[illegible]	2	70-125	...	22K									10K	7
[illegible]	2	100-225	...	22K										7
[illegible]	2	70-200	...	22K									10K	27
[illegible]	3	70-200	...	...	22K									
[illegible]	1	15-60	65K	...	...	14K					11a, 13a			62, 94
[illegible]	2	15-100	...	65K	...	...	14K				13b, 15b			
[illegible]	3	15-100	...	...	65K	...	14K				13b, 15b			
[illegible] I-LINE														
[illegible]	1	10-100	...	10K	...					■	10a, 12a			61
[illegible]	2	10-100	...	10K	...					■	10a, 12a			
[illegible]	3	10-100	...	...	10K					■	10b, 11b, 12b			
[illegible]	4	15-34		[illegible]	10K									61
[illegible]	2	100-225	...	10K	...									63, 100
[illegible]	3	100-225	...	...	10K						12b			
QB-HO	2	100-225		...	22K						12b, 14b			63, 100
[illegible]	3	100-225		...	22K						12b, 14b			
QBH	2	100-225		...	42K						12b, 14b			63, 100
Q4◊	2	250-400		...	25K						14b			63, 100
[illegible]	3	250-400		...	25K						14b			
FY	1	15-30	18K		...	14K					11a, 13a			100
[illegible]	1	15-100	10K		...					5K◆	11a			65, 100
[illegible]	2	15-100			10K					5K	11b, 12b			
[illegible]	3	15-100			10K					...	11b, 12b			
[illegible]	1	15-100	25K	...	...	18K				10K◆	11a, 12a, 13a	...	18K	65, 100
[illegible]	2	15-100	...	...	25K	...	...	18K		10K	13b	...	18K	
[illegible]	3	15-100	...	...	25K	...	...	18K		...	13b	...	18K	
FHA	2	15-100	...	...	25K		...	18K	14K	10K	18a	...	18K	65, 100
[illegible]	3	15-100		...	25K	...	...	18K	14K	10K	18a	...	18K	
[illegible]	1	15-30		...	...	65K	...			10K◆	13a	...	25K	65, 100
FHA	1	35-100	65K	...	...	25K	...			10K	13a	...	25K	
	2, 3	15-100	...	...	65K	...	...	25K	18K	†	22a	...	25K	
FC	2, 3	20-100	...	...	100K	...	...	65K			22a	...	50K	65, 100
KA◊	2, 3	70-250	...	...	42K	...	...	25K	22K	10K	19a, 20a	...	25K	65, 101
[illegible]◊	2, 3	70-250	...	...	65K	...	...	35K	25K	★	23a	35K	30K	65, 101
NC	2, 3	110-250	...	...	100K	...	...	65K			23a	...	65K	65, 101
LAA	2, 3	125-400	...	...	42K	...	...	30K	22K	10K	21a	35K	30K	65, 101
LHA	2, 3	125-400	...	...	65K	...	...	35K	25K	★	23a	42K	35K	65, 101
MA◊	2, 3	125-1000	...	...	42K	...	...	30K	22K	14K	21a	35K	30K	67
	2, 3	125-800	...	...	42K	...	...	30K	22K	14K	21a	35K	30K	101
MH◊	2, 3	125-1000	...	...	65K	...	...	50K	25K	★	23a	...	50K	67
	2, 3	125-800	...	...	65K	...	...	50K	25K	14K	23a	...	50K	101
NA	2, 3	800-1200	...	...	100K	...	...	50K	25K		23a	...	50K	67, 101
NC	2, 3	800-1200	...	...	125K	...	...	100K	65K		25a	...	100K	67, 101
[illegible]	2, 3	800-2000	...	...	65K	...	...	50K	42K		24a	...	50K	68
[illegible]	2, 3	800-2000	...	...	125K	...	...	100K	65K		25a	...	100K	68
[illegible]	2, 3	1600-2500	...	...	125K	...	...	100K	65K		25a	...	100K	68
[illegible] Limiting Circuit Breakers														
[illegible]	2, 3	20-100	...	...	200K	...	...	200K	100K		16a	...	200K	69, 101
[illegible]	2, 3	110-250	...	...	200K	...	...	200K	100K		16a	...	200K	69, 101
[illegible]	3	250-400	...	...	200K	...	...	200K	...		...	...	200K	69, 101
[illegible] Circuit Breakers														
[illegible] ME, MEC	2, 3	100-800	...	...	65K	...	...	50K	25K		23a	...	50K	70, 71, 102
[illegible] ME MEC	2, 3	800-1200	...	...	125K	...	...	100K	65K		25a	...	100K	70, 71, 102
[illegible]	2, 3	1000-2000	...	...	125K	...	...	100K	65K		25a	...	100K	70, 71

[illegible] 72 AND 73 FOR ADDITIONAL INFORMATION.
[illegible] AIC at 48 volts dc. (1, 2P, 10-70A, and 3P, 10-60A.)
[illegible] available for 240V. 3Ø Gr. BØ for 2-pole breaker.

▲ Separate UL rating available for 240V. 3Ø Gr. BØ for 2-pole breakers. Special construction required for FA and LA circuit breakers. Contact Local Field Office for ordering instructions.
† UL listed 500V. dc 10,000 AIC for use on ungrounded systems. Must be connected 3 poles in series.
★ UL listed 500V. dc 20,000 AIC for use on ungrounded systems. Must be connected 3 poles in series.

[illegible] are Registered Trademarks of Square D Company.

Ref 3

Prepared [illegible] Date 2/13/90
Verified [illegible] Date 2/15/90

WBN EEB-MS-TI08-0008 R0 Attach 4

Calc. No. 8572-[illegible]
Rev. 0 Date
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Proj. No. 8572-[illegible]

Prepared [illegible] Date [illegible]
Verified [illegible] Date 2/15/[illegible]

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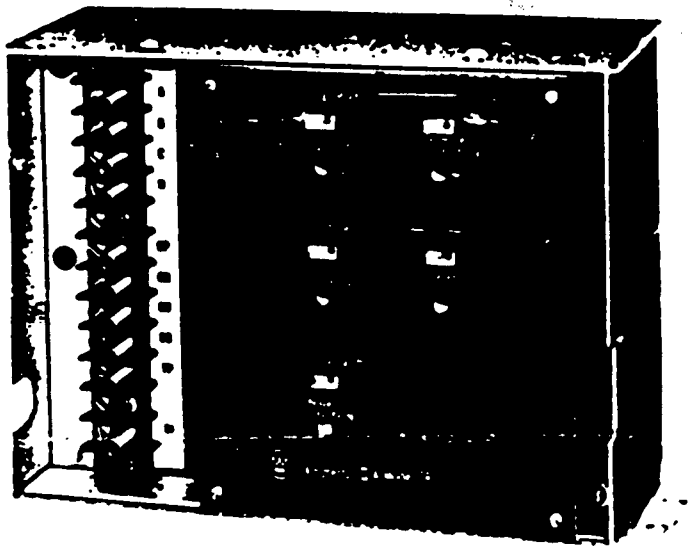
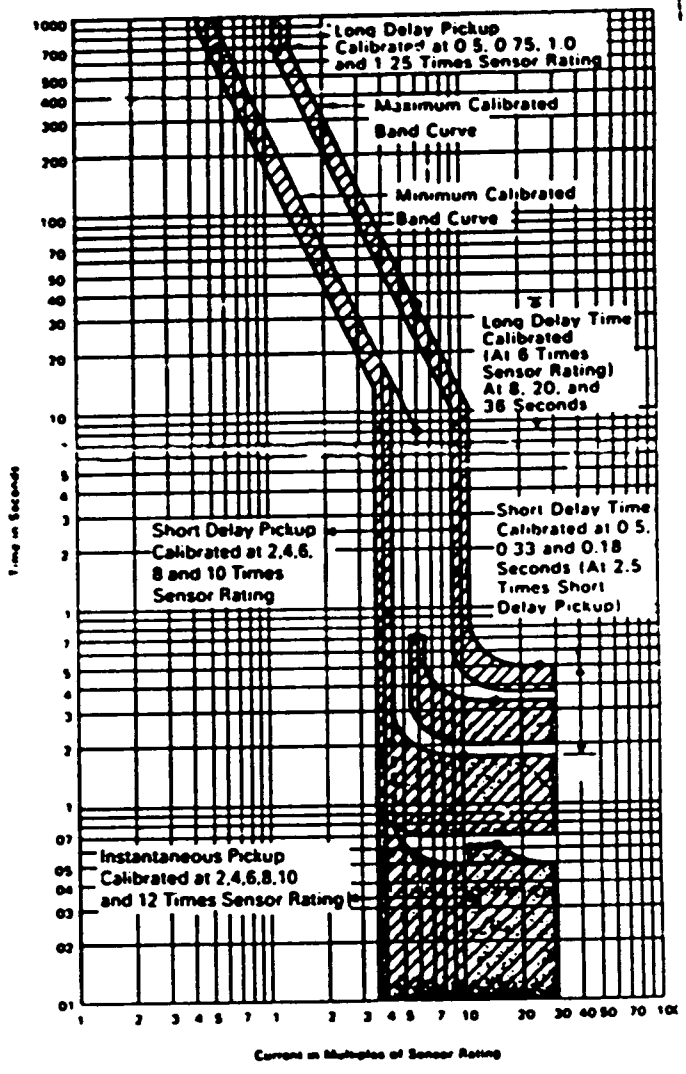
Power Centers With Type DS Secondary Switchgear

Standard Amptector II-A Solid-State Trip



Amptector II-A Characteristics



The Westinghouse Amptector II-A is a solid-state device that provides adjustable overcurrent tripping for Westinghouse Type DS low voltage Ac power circuit breakers. Only one Amptector II-A is required per breaker, and it receives all its energy from a set of sensors—one mounted on each pole of the breaker. It develops an output for an associated trip actuator when preselected conditions of current magnitude and duration are exceeded.

The device can be supplied in three models or combinations of three independent continuously adjustable overcurrent tripping functions: long delay, short delay and instantaneous. These models are:

DU (Dual)—Long delay and instantaneous
SE (Selective)—Long delay and short delay
TR (Triple)—Long delay, short delay and instantaneous

Model DU is the basic standard, and will be supplied when not otherwise indicated or required.

Amptector I-A and II-A

Each Amptector includes terminal receptacles to permit easy field checking of operation and calibration with an external power supply. A specially designed portable test device with a plug to match the Amptector receptacle is available to provide the utmost in simplicity for checking Amptector operation.

Available Sensor Ratings

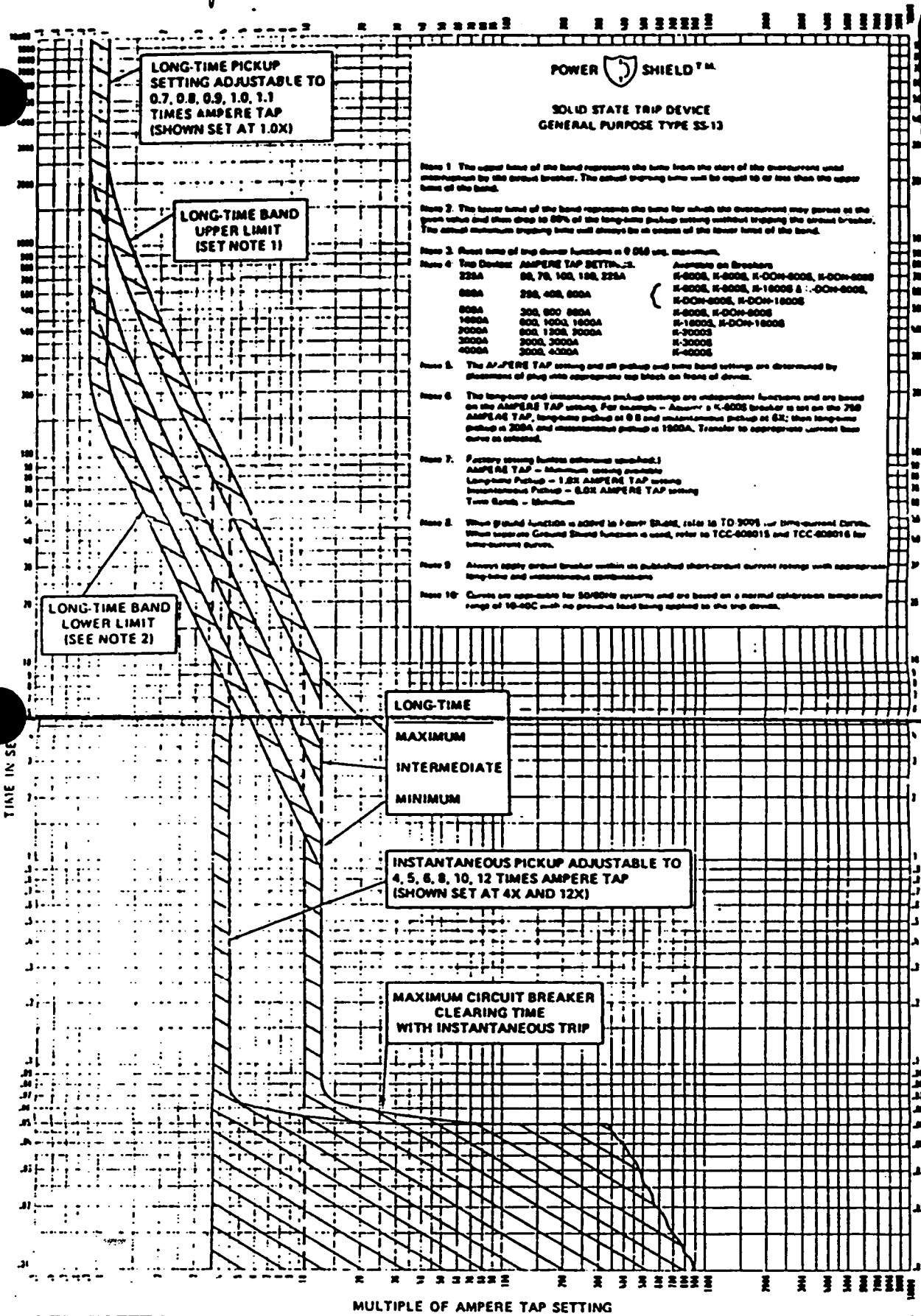
Breaker	Frame Size, Amperes	Sensor Ratings, Amperes
DS-206, DSL-206 or DS-206S	800	50, 100, 150, 200, 300, 400, 600, 800
DS-416, DSL-416 or DS-416S	1600	100, 150, 200, 300, 400, 600, 800, 1200, 1600
[illegible]-420	2000	1200, 1600, 2000
[illegible]-632	3200	2400, 3200
DS-840	4000	4000

The narrow-band characteristic curves graphically illustrate the close coordination obtainable in breaker systems with Amptector tripping devices. Repeatability within 2%.

The particular breaker current rating for any breaker frame size is determined by the rating of the sensor used.

The breaker current rating for any frame size can be changed by simply changing the sensors, which are easily removed from the breaker drawout element. The wide range of long-delay pickup makes one set of sensors suitable for a number of current ratings. The Amptector itself need not be changed when the associated sensors are changed.

MULTIPLE OF AMPERE TAP SETTING



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Prepared Date 2/3/86
Verified Date 2/5/86

MULTIPLE OF AMPERE TAP SETTING

TIME-CURRENT CHARACTERISTIC CURVES: SOLID-STATE TRIP DEVICE I-T-E TYPE SS-13; LONG-TIME AND INSTANTANEOUS; GENERAL PURPOSE	GOULD SWITCHGEAR DIVISION Manufacturer of I-T-E Equipment	
	DWN. BY F. C. Teufel	DATE 11-17-78
FOR K-LINE AND K-DON CIRCUIT BREAKERS MODEL 1-GRAY	NO. TD-9003	REV. 1

WBN EEB-MS-TI08-0008, R0
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GOULD
T-T-E

FRAME: E
GOULD INC.
CIRCUIT PROTECTION DIV.

POLE 5

For application and coordination purposes only. Based on 40°C ambient cold start. Connected with 4 feet of rated wire (60°C) per terminal. Tested in open air with current in all poles.

E FRAME: 240 VOLTS, 60 HZ., 125/250 VOLTS DC.
FRAME: VOLTS, HZ., VOLTS DC.
FRAME: VOLTS, HZ., VOLTS DC.

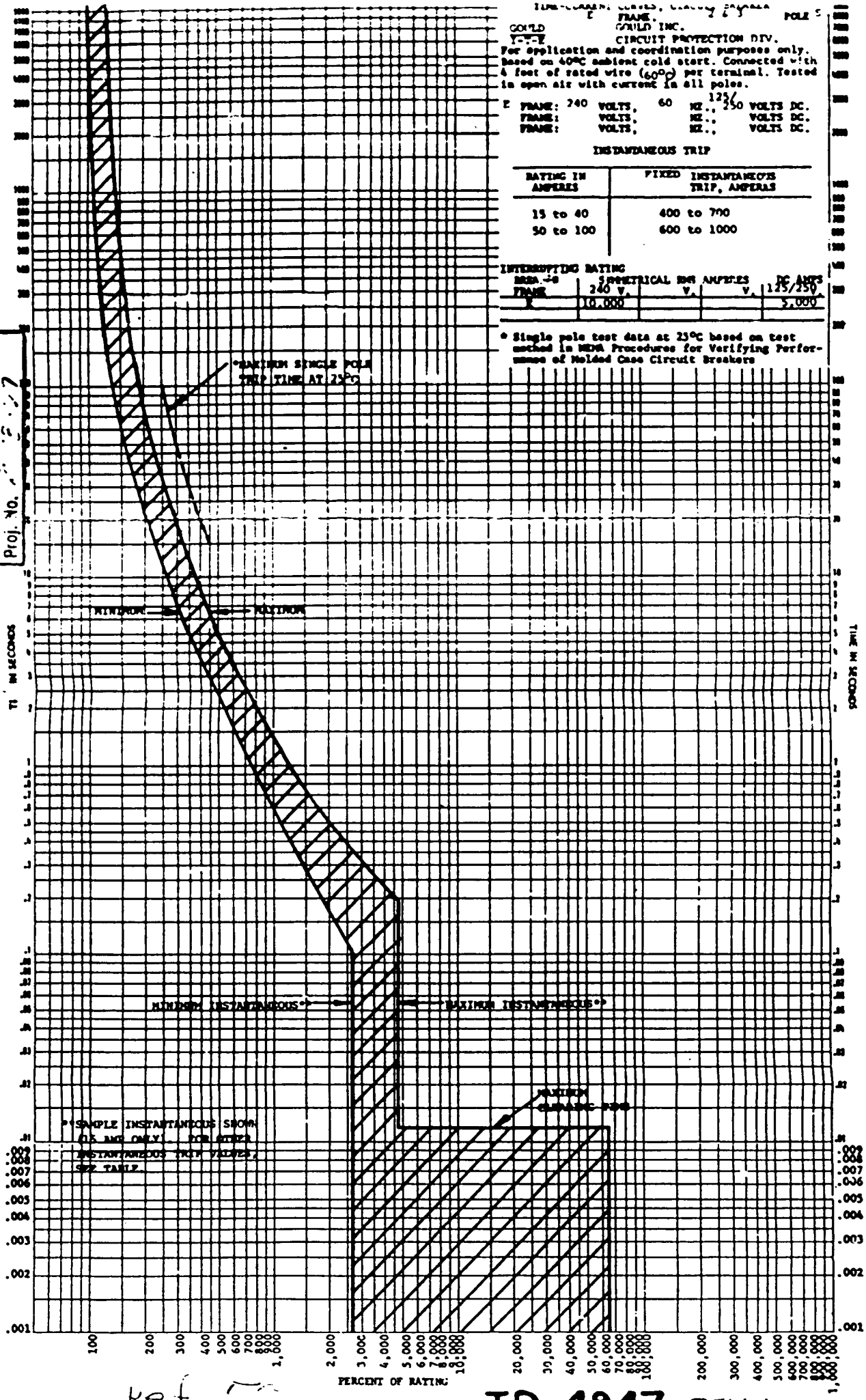
INSTANTANEOUS TRIP

RATING IN AMPERES	FIXED INSTANTANEOUS TRIP, AMPERES
15 to 40	400 to 700
50 to 100	600 to 1000

INTERRUPTING RATING

NEMA FRAME	SYMMETRICAL RMS AMPERES 240 V.	V.	V.	DC AMPS 125/250
E	10,000			5,000

* Single pole test data at 25°C based on test method in NEMA Procedures for Verifying Performance of Molded Case Circuit Breakers



Rev. C Date
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Proj. No.

Verified HH Date 2/5/75

Ref 53

TD-4947 REV. 1

WBN EEB-MS-110K-0008 R0
Attach. 4

MULTIPLES OF RATED CURRENT

QO FAMILY MOLDED CASE CIRCUIT BREAKERS
CHARACTERISTIC TRIP CURVE NO. 910-1

CIRCUIT BREAKER INFORMATION

Circuit Breaker Rating	Continuous Amperes Rating	Maximum AC Voltage	No. Poles
QO-GFI QO-VH-GFI	15	120	1

This curve is to be used for application and coordination purposes only. The EZ-AMP overlay feature at the bottom of the page should be used during coordination studies. (See Appendix B)

All time/current characteristic curve data is based on 40° C ambient cold start. Terminations are made with conductors of appropriate length and ratings.

For more information:

"Interrupting and Series Connected Ratings" (UL Listed, CSA, IEC, Self-Certified) ..... Appendix A

"All About Trip Curves" (Interpretation, EZ-AMP method, Derating) ..... Appendix B

"Circuit Breaker Field Testing and Verification Procedures" ..... Appendix C

MAXIMUM SINGLE POLE TRIP TIMES AT 25°C BASED ON NEMA AB-3, 1989

TIME IN SECONDS

MAXIMUM CLEARING TIME (AT 60 Hz) (AT 50 Hz)

1 CYCLE (60 Hz)

½ CYCLE (60 Hz)

1 CYCLE (50 Hz)

½ CYCLE (50 Hz)

INTERRUPTING RATING (REFER TO NEMA AB-3)

EZ-AMP™

Ref 2

MULTIPLES OF RATED CURRENT

SQUARE D®

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Verified [illegible] Date 2/5/90

WBN ~~EEB~~-MS-T108-0008 R0
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SHEET 81A OF 85A

Ref 6

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160.01
Page 1
Electrical
Design Memorandum
September 28, 1964

Tennessee Valley Authority
Knoxville, Tennessee

Subject: CABLE AND WIRE
INSULATED CONDUCTORS
EMERGENCY OVERLOAD CAPACITY

The Electrical Design Branch has standardized at present on the following TVA types of cable for auxiliary power:

Type PJ - For normal service--current carrying capacities on Standard Drawing 30A1020.

Emergency overloads shall not exceed 120 percent of normal current carrying capacity for not more than 8 hours for any one period or a total of 100 hours per year.

75°C

Type CPJ - For service where higher current carrying capacity is required or for hot ambients--current carrying capacities on Standard Drawing 30A1021.

Emergency overloads shall not exceed 135 percent of normal current capacity for not more than 8 hours for any one period or a total of 100 hours per year.

90°C

RPC:
9-9-81

(1) JRD
(2) AMoN
(3) LRS
(4) CMcC:MPG.

Prepared [illegible] Date 2/2/90
Verified [illegible] Date 2/3/90

CONDUCTOR DESIGN TEMPERATURE FOR CABLES OUTSIDE PRIMARY CONTAINMENT UNDER SPECIFIED SERVICE CON.

Cable Type/Application	Conductor (Copper) Temperature Service Conditions: Normal Operations	Emergency Overloads	Short Cir.
Power cables; 601 V-15 kV, 60 Hz ac	90°C	130°C	250°C
Auxiliary power cables; 600 V or less, direct current or 60 Hz ac; on cable trays	90°C	130°C	250°C
Control cables; 600 V or less, direct current or 60 Hz ac	75°C	95°C	150°C
Medium level and low level (except thermocouple) cables; 600 V or less, multiconductor (either twisted pair or twisted bundle)	90°C	130°C	250°C
Thermocouple cables[1], twisted pair	90°C	100°C	100°C
Lighting cables; 600 V or less, direct current or 60 Hz ac (from lighting cabinets)	90°C	130°C	250°C

Notes

1. Thermocouple cable shall be extension grade of the type conductor material to match the thermocouple.

Prepared JMJ Date 2/3/90
Verified AA Date 2/3/90

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B4209K.

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Attachment 4

CONDUCTOR DESIGN TEMPERATURE FOR CABLES INSIDE PRIMARY CONTAINMENT UNDER SPECIFIED SERVICE CONDITIONS

Cable Type/Application	Conductor (Copper) Temperature Service Conditions: Normal Operations	Emergency Overloads	Short Circ.
Power cables; 601 V-15 kV, 60 Hz ac	90°C	130°C	250°C
Auxiliary and control power cables; 600 V or less, direct current or 60 Hz ac	125°C	260°C	NA
Control cables; 600 V or less, direct current or 60 Hz ac	125°C	260°C	NA
Medium level and low level (except thermocouple) cables; 600 V or less, multiconductor (either twisted pair or twisted bundle)	90°C	130°C	250°C
Thermocouple cables[1], twisted pair	90°C	100°C	100°C
Lighting cables; 600 V or less, direct current or 60 Hz ac (from lighting cabinets)	90°C	130°C	250°C

Rev 6

Notes

1. Thermocouple cable shall be extension grade of the type conductor material to match the thermocouple.

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Prepared fmd Date 2/3/80
Verified HH Date 2/5/80

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Table 1
Preferred Ratings for Low-Voltage AC Power Circuit Breakers with Instantaneous Direct-Acting Phase Trip Elements
(See ANSI/IEEE C37.13-1980)

Line No.	System Nominal Voltage (volts)	Rated Maximum Voltage (volts)	Insulation (Dielectric) Withstand (volts)	Three-Phase Short-Circuit Current Rating (symmetrical amperes)*	Frame Size (amperes)	Range of Trip-Device Current Rating (amperes)†
	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
1	600	635	2200	14 000	225	40–225
2	600	635	2200	22 000	600	40–600
3	600	635	2200	22 000	800	100–800
4	600	635	2200	42 000	1600	200–1600
5	600	635	2200	42 000	2000	200–2000
6	600	635	2200	65 000	3000	2000–3000
7	600	635	2200	85 000	4000	4000
8	480	508	2200	22 000	225	40–225
9	480	508	2200	30 000	600	100–600
10	480	508	2200	30 000	800	100–800
11	480	508	2200	50 000	1600	400–1600
12	480	508	2200	50 000	2000	400–2000
13	480	508	2200	65 000	3000	2000–3000
14	480	508	2200	85 000	4000	4000
15	240	254	2200	25 000	225	40–225
16	240	254	2200	42 000	600	150–600
17	240	254	2200	42 000	800	150–800
18	240	254	2200	65 000	1600	600–1600
19	240	254	2200	65 000	2000	600–2000
20	240	254	2200	85 000	3000	2000–3000
21	240	254	2200	130 000	4000	4000

*Ratings in this column are rms symmetrical values for single-phase (2-pole) circuit breakers and three-phase average rms symmetr values of three-phase (3-pole) circuit breakers. When applied on systems where rated maximum voltage may appear across a single pole, the short-circuit current ratings are 87% of these values. See ANSI/IEEE C37.13-1980, 4.6.

†For preferred trip-device current ratings, see Table 22. Note that the continuous-current-carrying capability of some circuit-break trip-device combinations may be higher than the trip-device current rating. See ANSI/IEEE C37.13-1980, 9.1.3.

AMPACITY TABLES FOR AUXILIARY AND CONTROL POWER CABLES
ELECTRICAL DESIGN STANDARD DS-E12.6.3
TABLE 2--SORTED BY VOLT LEV, INSUL TEMP, ALLOW AMPACITY-TRAY

CABLE MARK NO.	CLASS	DESCRIPTION	INSUL TEMP RATNG (NOTE 3)	VOLT LEV	MIN OD	ALLOWABLE AMPACITY IN V3 TRAY (NOTE 4)	ALLOWBLE AMPACITY IN V4 TRAY W/ MAX 30% FILL (NOTE 5) 3"	4"	ALLOWABLE AMPACITY IN V5 TRAY (NOTE 6)	ALLOWABLE AMPACITY IN CONDUIT (NOTE 7)
WPD	1E	#8 AWG 1/C 600V SROAJ LOCA	125	3	0.340	NOTE 1	NA	NA	NA	68
WPF	1E	#6 AWG 1/C 600V SROAJ LOCA	125	3	0.371	NOTE 1	NA	NA	NA	92
WPG	1E	#4 AWG 1/C 600V SROAJ LOCA	125	3	0.415	NOTE 1	NA	NA	NA	120
WPH	1E	#2 AWG 1/C 600V SROAJ LOCA	125	3	0.000	NOTE 1	NA	NA	NA	161
WRD	1E	#12 AWG 4/C 600V SROJJ LOCA	125	3	NOTE 2	NOTE 2	NA	NA	NA	29
WRH	1E	#10 AWG 2/C 600V SROJJ LOCA	125	3	NOTE 2	NOTE 2	NA	NA	NA	39
WRW-1	NC	#8 AWG 3/C 600V SHLD SROJJ	125	3	NOTE 2	NOTE 2	NA	NA	NA	64
WPK-1	1E	#2/0 AWG 1/C 600V SROAJH LOCA	200	3	0.675	29	NA	NA	NA	215
WPF-1	1E	#6 AWG 1/C 600V SROAJH LOCA	200	3	0.380	NOTE 1	NA	NA	NA	115
WPH-1	1E	#2 AWG 1/C 600V SROAJH LOCA	200	3	0.523	NOTE 1	NA	NA	NA	200
WRA-1	1E	#14 AWG 2/C 600V SROJJH LOCA	200	3	NOTE 2	NOTE 2	NA	NA	NA	29
WHB-1	1E	#14 2/C 600V PIMJ	90	4	0.224	NA	6	5	NA	15
WHB-2	1E	#14 2/C 600V PIMJ LOCA	90	4	0.235	NA	6	5	NA	15
WGB-1	1E	#12 2/C 600V PIMJ	90	4	0.243	NA	8	6	NA	20
WGB-2	1E	#12 2/C 600V PIMJ LOCA	90	4	0.247	NA	8	6	NA	20
WHC-1	1E	#14 3/C 600V PIMJ	90	4	0.392	NA	8	7	NA	15
WHC-2	1E	#14 3/C 600V PIMJ LOCA	90	4	0.378	NA	8	6	NA	15
WHD-1	1E	#14 4/C 600V PIMJ	90	4	0.429	NA	8	6	NA	15
WHD-2	1E	#14 4/C 600V PIMJ LOCA	90	4	0.430	NA	8	6	NA	15
WLB	1E	#12 2/C 600V CPJJ	90	4	0.284	NA	9	7	NA	20
WFB-1	1E	#10 2/C 600V PIMJ	90	4	0.275	NA	11	9	NA	28
WGD-1	1E	#12 4/C 600V PIMJ	90	4	0.469	NA	11	9	NA	20
WGD-2	1E	#12 4/C 600V PIMJ LOCA	90	4	0.469	NA	11	9	NA	20
WFB-2	1E	#10 2/C 600V PIMJ LOCA	90	4	0.290	NA	12	10	NA	28
WGC-1	1E	#12 3/C 600V PIMJ	90	4	0.430	NA	12	9	NA	20
WGC-2	1E	#12 3/C 600V PIMJ LOCA	90	4	0.430	NA	12	9	NA	20
WLC	1E	#12 3/C 600V CPJJ	90	4	0.430	NA	12	9	NA	20
WFC-1	1E	#10 3/C 600V PIMJ	90	4	0.484	NA	16	13	NA	28
WFC-2	1E	#10 3/C 600V PIMJ LOCA	90	4	0.478	NA	16	13	NA	28
WFD-2	1E	#10 4/C 600V PIMJ LOCA	90	4	0.548	NA	16	13	NA	28
WFD-1	1E	#10 4/C 600V PIMJ	90	4	0.566	NA	17	14	NA	28
WLD	1E	#10 3/C 600V CPJJ	90	4	0.485	NA	17	14	NA	28
WLP	1E	#10 4/C 600V CPJJ	90	4	0.565	NA	17	14	NA	28

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Attachment 4

Prepared JMJ Date 2/3/96
Verified [illegible] Date 2/8/96

Ref 10

[illegible] Bonds
222-1513
July 13, 1973
DCF Coil Data
A200 Overload Heater Data

Checked, Orig.

Ed Horn

Calc. No. 8573-27-EAD-2
Rev. 0 Date
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Reference is made to your phone call on the above this week. We have managed to pull together the requested data and are attaching a copy of the same. We trust that this will satisfy your customer's request.

R. Whitt

Low Voltage Breaker Division - Consulting Engineer - R. O. D. Whitt

bmm

Attch.

7-24-73

[illegible]

[illegible]

From the desk of: E. H. Horn

Attachment 4 MCP Coil & Breaker Resistance & 60 Cycle Impedance Values

W data

Ref 10

3 Amp Rating (7-22 T.A.)

Average Resistance

Breaker	.1515 Ohms
Coil	.1502 Ohms

Average 60 Cy. Impedance

Breaker Hi	.3566 Ohms
Breaker Lo	.3566 Ohms

7 Amp Rating (18-53 T.A.)

Average Resistance

Breaker	.0515 Ohms
Coil	.0509 Ohms

Average 60 Cy. Impedance

Breaker Hi	.1228 Ohms
Breaker Lo	.1243 Ohms

15 Amp Rating (50-150 T.A.)

Average Resistance

Breaker	.00808 Ohms
Coil	.00784 Ohms

Average 60 Cy. Impedance

Breaker Hi	0.0160 Ohms
Breaker Lo	0.0166 Ohms

30 Amp Rating (100-300 T.A.)

Average Resistance

Breaker	.00203 Ohms
Coil	.00189 Ohms

Average 60 Cy. Impedance

Breaker Hi	.00316 Ohms
Breaker Lo	.00333 Ohms
Coil Hi	.00293 Ohms
Coil Lo	.00320 Ohms

50 Amp Rating (160-480 T.A.)

Average Resistance

Breaker	.00141 Ohms
Coil	.00130 Ohms

Average 60 Cy. Impedance

Breaker Hi	.00190 Ohms
Breaker Lo	.00200 Ohms

100 Amp Rating (275-1000 T.A.)

Average Resistance

Breaker	.000672 Ohms
Coil	.000552 Ohms

Average 60 Cy. Impedance

Breaker Hi	.00100 Ohms
Breaker Lo	.00100 Ohms

150 Amp Rating (450-1550 T.A.)

Average Resistance

Breaker	.0003101 Ohms
Coil	.0002389 Ohms

Average 60 Cy. Impedance

Breaker Hi	.000800 Ohms
Breaker Lo	.000813 Ohms

Hi - Magnetic Trip Adjustment in Hi Position.

Lo - Magnetic Trip Adjustment in Lo Position.

Breaker - Measurement of One Breaker Pole.

Coil - Measurement of Coil and Shunt of One Breaker Pole.

Prepared Date 2/3/90

Verified Date 2/5/90

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Prepared JMJ Date 2/2/90
Verified AA Date 2/5/90

NOMINAL RESISTANCE IN OHMS OF H SERIES HEATERS

H03A	-	42.7
H04A	-	34.8
H05A	-	27.4
H06A	-	23.2
H07A	-	18.4
H08A	-	15.0
H09A	-	12.4
H10A	-	10.4
H11A	-	8.48
H12A	-	6.87
H13A	-	5.56
H14A	-	4.60
H15A	-	3.78
H16A	-	3.14
H17A	-	2.61
H18	-	2.22
H19	-	1.77
H20	-	1.51
H21	-	1.23
H22	-	1.035
H23	-	.880
H24	-	.718
H25	-	.572
H26	-	.485
H27	-	.396
H28	-	.334
H29	-	.283
H30	-	.231
H31	-	.190
H32	-	.160
H33	-	.135
H34	-	.110
H35	-	.0725
H36	-	.0595
H37	-	.0501
H38	-	.0508
H39	-	.0417
H40	-	.0347
H41	-	.0288
H42	-	.0205
H43	-	.0182
H44	-	.0146
H45	-	.0128
H46	-	.0113
H47	-	.00955
H48	-	.00875
H49	-	.00730
H50	-	.00536
H51	-	.00556
H52	-	.00471
H53	-	.00386
H54	-	.00342
H55	-	.00324
H56	-	.00275
H57	-	.00232
H58	-	.00194
H72	-	.00990
H73	-	.00847
H74	-	.00725
H75	-	.00544
H76	-	.00477
H77	-	.00416
H78	-	.00399
H79	-	.00340
H80	-	.00295
H81	-	.00266
H82	-	.00238
H83	-	.00213
H84	-	.00162
H85	-	.00147
H86	-	.00131
H87	-	.00117
H88	-	.00105
H89	-	.000849
H90	-	.000740
H91	-	.000566
H92	-	.000538
H93	-	.000521

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Prepared JMS Date 2/3/90
Verified [illegible] Date 2/5/90

NOMINAL RESISTANCE IN OHMS OF F SERIES HEATERS

FH03-21.0
FH04-16.7
FH05-13.3
FH06-10.9
FH07- 8.55
FH08- 6.97
FH09- 5.49
FH10- 4.58
FH11- 3.93
FH12- 3.10
FH13- 2.66
FH14- 2.15
FH15- 1.92
FH16- 1.56
FH17- 1.30
FH18- .97
FH19- .829
FH20- .753
FH21- .650
FH22- .549
FH23- .453
FH24- .395
FH25- .256
FH26- .215
FH27- .184
FH28- .144
FH29- .127
FH30- .0985

FH31-.0844
FH32-.0742
FH33-.0697
FH34-.0582
FH35-.0479
FH36-.0410
FH37-.0354
FH38-.0293
FH39-.0251
FH40-.0214
FH41-.0184
FH42-.0206
FH43-.0182
FH44-.0146
FH45-.0128
FH46-.00796
FH47-.00685
FH48-.00541
FH49-.00542
FH50-.00473
FH51-.00473
FH52-.00445
FH53-.00283
FH54-.00297
FH55-.00221
FH56-.00177
FH57-.00183
FH58-.00156

FH72-.00977
FH73-.00836
FH74-.00715
FH75-.00537
FH76-.00471
FH77-.00411
FH78-.00394
FH79-.00335
FH80-.00291
FH81-.00263
FH82-.00235
FH83-.00210
FH84-.001599
FH85-.001427
FH86-.001290
FH87 .001158
FH88-.001033
FH89-.000849
FH90-.000740
FH91-.000666
FH92-.000583
FH93-.000521

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Prepared Grm Date 2/3/90
Verified AA Date 2/7/90

Heater Selection

Each heater is identified by a catalog number stamped on one terminal. The heater application table indicates the range of full load motor current to which a given heater may be applied.

Heaters should be selected on the basis of the actual full load current and service factor as shown on the motor nameplate or in the manufacturer's published literature.

When motor and overload relay are in the same ambient and the service factor of the motor is 1.15 to 1.25, select heaters from the heater application table. If the service factor of the motor is 1.0, or there is no service factor shown, or a maximum of 115% protection is desired select one size smaller heater than indicated.

When motor and overload relay are in different ambients and when using non-compensated overload relays, select heaters for the table using adjusted motor currents as follows: decrease rated motor current 1% for each °C motor ambient exceeds controller ambient. Increase rated motor current 1% for each °C controller ambient exceeds motor ambient.

For temperature compensated overload relays, select heaters according to the table and selection information above regardless of ambient.

Protect the heater and starter against short circuits by providing branch circuit protection per National Electric Code.

Heater Tables

For A200 Starters, Sizes 00, 0, 1 and 2

Starter Size	Non-Compensated Open Starters and Ambient Compensated Open or Enclosed Starters: Block Type Overload Using 3 Heaters — Full Load Current of Motor (Amps.)	Non-Compensated Open Starters and Ambient Compensated Open or Enclosed Starters: Single Pole and Two Pole Block Type Overload — Full Load Current of Motor (Amps.)	Non-Compensated Enclosed Starters: Block Type Overload Using 3 Heaters — Full Load Current of Motor (Amps.)	Non-Compensated Enclosed Starters: Single Pole and Two Pole Block Type Overload — Full Load Current of Motor (Amps.)	Heater Code Mark
For Size 2	.26 - .27	.29 - .31	.24 - .25	.28 - .30	FH03
	.28 - .31	.32 - .35	.26 - .28	.31 - .33	FH04
	.32 - .34	.36 - .39	.29 - .31	.34 - .36	FH05
	.35 - .38	.40 - .43	.32 - .35	.37 - .41	FH06
	.39 - .42	.44 - .48	.36 - .39	.42 - .45	FH07
	.43 - .46	.49 - .53	.40 - .43	.46 - .50	FH08
	.47 - .50	.54 - .58	.44 - .47	.51 - .55	FH09
	.51 - .55	.59 - .64	.48 - .51	.56 - .60	FH10
	.56 - .62	.65 - .71	.52 - .57	.61 - .67	FH11
	.63 - .68	.72 - .79	.58 - .63	.68 - .75	FH12
	.69 - .75	.80 - .87	.64 - .70	.76 - .82	FH13
	.76 - .83	.88 - .96	.71 - .77	.83 - .91	FH14
	.84 - .91	.97 - 1.06	.78 - .85	.92 - .99	FH15
For Size 00	.92 - 1.00	1.07 - 1.16	.86 - .93	1.00 - 1.09	FH16
	1.01 - 1.11	1.17 - 1.28	.94 - 1.03	1.10 - 1.20	FH17
	1.12 - 1.22	1.29 - 1.41	1.04 - 1.13	1.21 - 1.32	FH18
	1.23 - 1.34	1.42 - 1.55	1.14 - 1.25	1.33 - 1.46	FH19
	1.35 - 1.47	1.56 - 1.71	1.26 - 1.37	1.47 - 1.60	FH20
	1.48 - 1.62	1.72 - 1.87	1.38 - 1.51	1.61 - 1.76	FH21
	1.63 - 1.78	1.88 - 2.06	1.52 - 1.65	1.77 - 1.93	FH22
	1.79 - 1.95	2.07 - 2.26	1.66 - 1.81	1.94 - 2.12	FH23
For Size 0	1.96 - 2.15	2.27 - 2.48	1.82 - 1.99	2.13 - 2.33	FH24
	2.16 - 2.35	2.49 - 2.72	2.00 - 2.19	2.34 - 2.55	FH25
	2.36 - 2.58	2.73 - 2.99	2.20 - 2.39	2.56 - 2.80	FH26
	2.59 - 2.83	3.00 - 3.28	2.40 - 2.63	2.81 - 3.08	FH27
	2.84 - 3.11	3.29 - 3.60	2.64 - 2.89	3.09 - 3.39	FH28
	3.12 - 3.42	3.61 - 3.95	2.90 - 3.17	3.40 - 3.71	FH29
	3.43 - 3.73	3.96 - 4.31	3.18 - 3.47	3.72 - 4.07	FH30
	3.74 - 4.07	4.32 - 4.71	3.48 - 3.79	4.08 - 4.39	FH31
	4.08 - 4.39	4.72 - 5.14	3.80 - 4.11	4.40 - 4.79	FH32
	4.40 - 4.87	5.15 - 5.6	4.12 - 4.55	4.80 - 5.3	FH33
For Size 1	4.88 - 5.3	5.7 - 6.2	4.56 - 5.0	5.4 - 5.8	FH34
	5.4 - 5.9	6.3 - 6.8	5.1 - 5.5	5.9 - 6.4	FH35
	6.0 - 6.4	6.9 - 7.5	5.6 - 5.9	6.5 - 7.0	FH36
	6.5 - 7.1	7.6 - 8.2	6.0 - 6.6	7.1 - 7.7	FH37
	7.2 - 7.8	8.3 - 9.0	6.7 - 7.2	7.8 - 8.4	FH38
	7.9 - 8.5	9.1 - 9.9	7.3 - 7.9	8.5 - 9.3	FH39
	8.6 - 9.4	10.0 - 10.8	8.0 - 8.7	9.4 - 10.2	FH40
	9.5 - 10.3	10.9 - 11.9	8.8 - 9.5	10.3 - 11.2	FH41
	10.4 - 11.3	12.0 - 13.1	9.6 - 10.5	11.3 - 12.3	FH42
	11.4 - 12.4	13.2 - 14.3	10.6 - 11.5	12.4 - 13.5	FH43
	12.5 - 13.5	14.4 - 15.7	11.6 - 12.6	13.6 - 14.7	FH44
	13.6 - 14.9	15.8 - 17.2	12.7 - 13.8	14.8 - 16.2	FH45
	15.0 - 16.3	17.3 - 18.9	13.9 - 15.1	16.3 - 17.8	FH46
	16.4 - 18.0	19.0 - 20.8	15.2 - 16.7	17.9 - 19.5	FH47
	18.1 - 19.8	20.9 - 22.[illegible]	16.8 - 18.3	19.6 - 21.5	FH48
	19.9 - 21.7	23.0 - 25.[illegible]	18.4 - 20.2	21.6 - 23.6	FH49
	21.8 - 23.9	25.3 - 27.6	20.3 - 22.2	23.7 - 25.9	FH50
	24.0 - 26.2	27.7 - 30.3	22.3 - 24.3	26.0 - 28.5	FH51
	26.3 - 28.7	30.[illegible] - 33.3	24.4 - 26.6	28.6 - 31.1	FH52
	28.8 - 31.4	33.4 - 36.4	26.7 - 29.1	31.2 - 34.2	FH53
	31.5 - 34.5	36.5 - 39.9	29.2 - 32.0	34.3 - 37.5	FH54
	34.6 - 37.9	40.0 - 43.9	32.1 - 35.2	37.6 - 41.3	FH55
	38.0 - 41.5		35.3 - 38.5	41.4 - 45.0	FH56
	41.6 - 45.0		38.6 - 42.3		FH57

For Starter Sizes 3 and 4

Starter Size	Non-Compensated Open Starters and Ambient Compensated Open or Enclosed Starters — All Applications: Full Load Current of Motor Amps	Non-Compensated Enclosed Starters — All Applications: Full Load Current of Motor Amps
For Size 3	10.7 - 11.6	9.9 - 10.7
	11.7 - 12.7	10.8 - 11.8
	12.8 - 14.1	11.9 - 13.0
	14.2 - 15.5	13.1 - 14.2
	15.6 - 17.1	14.4 - 15.9
	17.2 - 18.9	16.0 - 17.4
	19.0 - 20.8	17.5 - 19.1
	20.9 - 22.9	19.2 - 21.1
	23.0 - 25.2	21.2 - 23.2
	25.3 - 27.8	23.3 - 25.6
	27.9 - 30.6	25.7 - 28.1
	30.7 - 33.5	28.2 - 30.8
	33.6 - 37.5	30.9 - 34.5
	37.6 - 41.5	34.6 - 38.2
	41.6 - 46.3	38.3 - 42.6
	46.4 - 50	42.7 - 46
For Size 4	51 - 55	47 - 51
	56 - 61	52 - 56
	62 - 66	57 - 61
	67 - 73	62 - 67
	74 - 79	68 - 73
	80 - 87	74 - 80
	... - ...	81 - 87
	88 - 95	... - ...
	96 - 105	88 - 95
	106 - 116	96 - 105
	117 - 128	106 - 116
	... - ...	117 - 127

List Price: $3 List Each. (Dis. C10-9)

Heaters are packaged in strips of six. If ordering for stock, it is recommended to order in multiples of six.

BN EEB-MS- TI08-0008 R0
OV IE Coordination/Protection

Prepared [illegible] Date 2/2/90 Checked D.P. Galvin Date 2-5-90

TYPICAL HEATER SIZES FOR MOV's

	STROKE TIME	FLC	LRC	HEATER SIZE/MIN FLC	REMARKS
	6/15*	0.45	2.6	T6/0.29 (217% FLC, 897% LRC)	OK
	6	0.6	2.6	T6/0.29 (292% FLC, 897% LRC)	OK
Size 3	6.5	48.1	494.02	T53/40.8 (165% FLC, 1211% LRC)	Outside 8 min range
Size 3	6.5	52	290	T48/24.8 (295% FLC, 1170% LRC)	OK
	10	0.45	2.6	T6/0.29 (219% FLC, 897% LRC)	OK
	10	0.55	5.7	T11/0.46 (167% FLC, 1239% LRC)	Outside 8 min. range
	10	2.3	12	T22/1.36 (237% FLC, 882% LRC)	OK
	10/15	2.3	16	T24/1.63 (198% FLC, 982% LRC)	OK
	10/15	3.5	26	T29/2.75 (178% FLC, 945% LRC)	OK
	10/20	13.9	118.48	T42/11.0 (177% FLC, 1077% LRC)	OK
	10	0.6	2.6	T6/0.29 (293% FLC, 897% LRC)	OK
	10	2.8	16	T25/1.84 (215% FLC, 870% LRC)	OK
	10/20	13.8	114	T42/11.0 (177% FLC, 1036% LRC)	OK
	15	2.4	16	T24/1.63 (206% FLC, 982% LRC)	OK
	16/20	2.8	16	T24/1.63 (240% FLC, 982% LRC)	OK
Size 2	15	25/252	208	T48/18.5 (191% FLC, 1124% LRC)	OK
	15/20	1	5.79	T13/0.57 (246% FLC, 1016% LRC)	OK
	20	2.1	5	T19/1.05 (280% FLC, 476% LRC)	Outside 15 sec. range
	20	2.1	10.5	T21/1.25 (235% FLC, 840% LRC)	OK
	15/20	5.2	36	T32/3.9 (187% FLC, 923% LRC)	OK
Size 2	22	18.1	144.93	T45/14.8 (171% FLC, 979% LRC)	OK
	20	0.75	5.79	T13/0.57 (184% FLC, 1016 LRC)	OK
	30	0.45	2.6	T6/0.29 (219% FLC, 897% LRC)	OK
	30	4.0	25	T28/2.45 (229% FLC, 1020% LRC)	OK
	30/40	0.95	5.7	T14/0.64 (208% FLC, 891% LRC)	OK
	40	0.6	2.6	T9/0.38 (223% FLC, 684% LRC)	Outside 15 sec. range

x/y indicates two stroke times meeting same criteria

ITE

Form GQ-3.08.1 Rev. 2 8L-F647 10-85 KPB

Prepared M S Bates Date 2/2/90 Checked D.R. Galvin Date 2-5-90

Typical Heater Sizes for MOVs – Sheet 2

Stroke Time	FLC	LRC	HEATER SIZE/MIN. FLC	REMARKS
15/60	0.75	5.7	T13/0.57 (184% FLC, 1000% LRC)	OK
60/66	0.45	2.19/2.6	T7/0.32 (197% FLC, 684%/813% LRC)	Outside 15 sec. range
66	0.45	3.14	T7/0.32 (197% FLC, 981% LRC)	OK
50/66	0.95	5.7	T15/0.71 (187% FLC, 803% LRC)	Outside 15 sec. range
66	2.3	12	T24/1.63 (198% FLC, 736% LRC)	Outside 15 sec. range
66	2.3	16	T24/1.63 (198% FLC, 982% LRC)	OK
66	0.6	2.6	T11/0.46 (184% FLC, 566% LRC)	Outside 15 sec. range
66	1.0	5.7	T16/0.79 (178% FLC, 722% LRC)	Outside 15 sec. range
66	2.8	16	T26/2.03 (194% FLC, 788% LRC)	Outside 15 sec. range
90	0.95	5.7	T16/0.79 (168% FLC, 722% LRC)	Outside 8 min & 15 sec range
90	0.39	2.6	T7/0.32 (171% FLC, 813% LRC)	Outside 15 sec. range
90	0.45	2.6	T9/0.38 (166% FLC, 684% LRC)	Outside 8 min. & 15 sec. range
100	0.95	5.7	T16/0.79 (168% FLC, 722% LRC)	Outside 8 min & 15 sec range
120	0.95	5.7	T17/0.88 (152% FLC, 648% LRC)	Outside 8 min & 15 sec. range
120	1.9	12	T25/1.84 (146% FLC, 652% LRC)	Outside 8 min & 15 sec range
120	5.88	38	T36/5.55 (150% FLC, 685% LRC)	Outside 8 min & 15 sec. range
120	1.9	7.56	T24/1.63 (165% FLC, 464% LRC)	Outside 8 min & 15 sec range
120	2.3	12	T26/2.03 (159% FLC, 591% LRC)	Outside 8 min & 15 sec. range
120	1.9	16	T25/1.84 (145% FLC, 870% LRC)	Outside 8 min range
120	4	25	T31/3.48 (161% FLC, 718% LRC)	Outside 8 min & 15 sec. range
120	4.73	38	T33/4.34 (153% FLC, 876% LRC)	Outside 8 min range
120	0.83	5.0/5.7	T16/0.79 (148% FLC, 632/722% LRC)	Outside 8 min & 15 sec. range
180	2.8	16	T29/2.75 (143% FLC, 582% LRC)	Outside 15 sec. & 8 min range
		GE		
* 90	0.6	2.6	C0.66/0.6 (141% FLC, 433% LRC)	Outside 15 sec range

* Based on assumption that the curve which is part of Document B22 890802 202 and GE Doc. 231HA165, Sheet 3 and applicable to this heater.

Form GQ-3.08.1 Rev. 2 BL-F647 10-85 KPB

WBN EEB-MS-TI08-0008, R0

B22 890802 202

Attachment 5

Page 557 of 561

GENERAL ELECTRIC

NUCLEAR PLANT SERVICES DEPARTMENT
GENERAL ELECTRIC COMPANY • P.O. BOX 2000 • DECATUR, AL 35602

Prepared GHBates Date 2/5/90
Verified TBT Date 2-8-90

G-ER-9-176
August 2, 1989

J. H. Rinne
Lead Engineer
Browns Ferry Nuclear Plant
Decatur, Al. 35609

Subject: Deliverables - Motor Operated Valve Thermal Overload Relay Characteristic Analysis.

Please find attached the GE subject deliverable for Task 0028-391490. If there are any questions or comments, please contact the undersigned.

Sincerely,

Ruth Jones for

J. E. Jones
Nuclear Services Manager

JEJ:vnj

cc: G. Mozingo
G. Bettencourt
S. Chakraborty
H. Hutson
ltr bk
file

RIMS, ETSLEEP-K

Prepared [illegible] Date 2/5/90 JAS89130
Verified [illegible] Date 2-8-90

TASK REPORT

TASK SUBJECT: MOTOR OPERATED VALVE THERMAL OVERLOAD RELA' CHARACTERISTIC ANALYSIS

CONTRACT NUMBER: 0028-391429

TASK DESCRIPTION

GE reviewed documentation provided by TVA for thermal overload CR124C and CR124D series A which shows both the original curves as provided by GE and the manner in which TV has extrapolated those curves.

The following is a written assessment by GE of the technical adequacy of (1) the curves being used for the thermal overloads CR124C and D series A, and (2) TVA's extrapolated of the curves originally provided by GE, (GE document 231HA163 sh. 2). The specific selection of the thermal overload series or its application is not within the scope o this study.

This is for CR 109 106 series standard

DISCUSSION

The thermal overload relays, CR124C and CR124D in NEMA type enclosure, are designed in accordance with the requirements of UL 508. The general design criteria for tripping time ar as follows:

Percent of Heater Nominal Rating	Tripping Time
100	Ultimately Trip (less the 8 hrs:
200	less than 3 min.
600	less the 20 sec.

Prepared [illegible] Date 2/5/90

Discussion (cont.) Verified [illegible] Date 2-8-90

The relays are tested to verify that the trip occurs ultimately (within 8 hours) at 100% current in a 40° C environment. The tripping time is also verified by test for current between 200% and 800% of nominal rating. Meaningful test data can not be obtained for currents between 100% and 200% because of the wide band (2 min. to 8 hrs.) of tripping time. Also the test data are not repeatable. Because of cooling effect of the heater in this time zone, it is not possible to accurately calculate the tripping time by the traditional I^2t method.

By definition, tripping time for 100% current is 8 hrs or less. The tripping times for 200% current and higher are tested and given in the curve. Between 100% and 200% the curve could be extrapolated in such a way that it would asymptotically meet the 100% current line in 8 hours. Since the time scale is in log scale the tripping zone would also be wide.

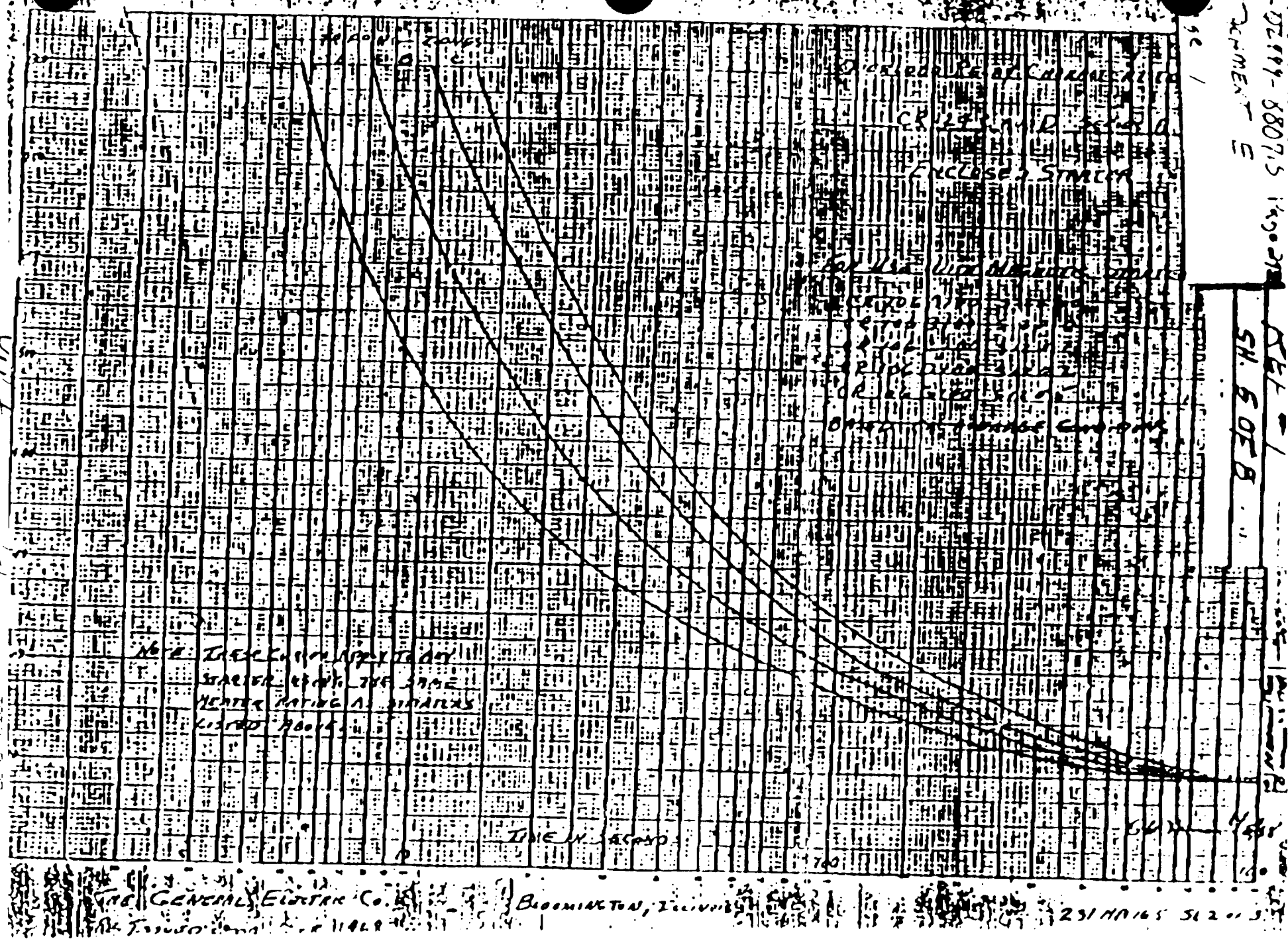
It should be noted that a capability of +/-15% field adjustment of tripping current has been provided. This feature could be used to adjust the ultimate tripping current, thereby, making sure that the trip occurs at the required current while avoiding any nuisance trip. Because of the short time rating of the motor operated valve operators, initial starting current and torque seating are allowed without spurious trips while protecting the motor from stalls and other overloads.

CONCLUSION

The time scale in the curve (231HA165 sh. 2) extends to 1000 seconds. For proper extrapolation of the curve for currents between 100% and 200%, the time scale should be extended to 8 hours. The curves at 200% points should asymptotically meet the 100% line at the 8 hour point. TVA's extrapolation of the curves between 200% and 125% current points is reasonable. However, TVA's extrapolation between 100% and 125% current is less conservative from the motor protection point of view (i.e the actual motor trip time could be longer than the time derived from TVA extrapolated curve) while it is more conservative from MOV operation point of view (i.e. it would be less prone to spurious trips). Again, as explained above, this slight deviation in tripping time could be corrected by field adjustment of tripping current.

PREPARED BY: S. CHAKRABORTY (GENE)

REVIEWED BY: L. GIBSON (GE-ED&C)



Prepared by: [illegible] Date 2/5/90

Verified: TBT Date 2-12-90

TOTAL P.07

WBN EEB-MS-TI08-0008, R0

GENERAL ELECTRIC

231HA165

TITLE OVERLOAD RELAY
HEATER TRIPPING ZONES
(FOR OPEN RELAY-OPEN STARTER OR ENCLOSED STARTERS

FIRST MADE FOR

HEATER	ZONE	HEATER	ZONE
123 C0.36A	A	123 C4.19A	C
C0.39A	A	C4.66A	C
C0.43A	A	C5.26A	C
C0.48A	A	C5.92A	C
C0.54A	B	C6.30A	C
C0.60A	A	C6.95A	C
C0.66A	B	C7.28A	C
C0.71A	B	C8.67A	C
C0.78A	B	C9.55A	C
C0.87A	C	C10.4B	C
C0.97A	B	C11.3B	C
C1.09A	B	C12.5B	C
C1.18A	B	C13.7B	B
C1.31A	C	C15.1B	B
C1.48A	B	C16.3B	B
C1.63A	B	C18.0B	B
C1.84A	B	C19.8B	C
C1.96A	B	C21.4B	B
C2.20A	B	C22.8B	B
C2.39A	B	C25.0B	B
C2.68A	C	C27.3B	C
C3.01A	C	C30.3B	B
C3.26A	C	C33.0B	C
C3.56A	A	C36.6B	C
C3.79A	C	C40.0B	C
		C44.0B	B

FOR TRIPPING RANGES AT 150% TO 800% OF NOMINAL HEATER RATING SEE SHEETS 1 or 2 AS FOLLOWS:

OPEN RELAY	CR124C	CR124D	SHEET 1
OPEN STARTER	CR106A	CR106C	SHEET 1
	CR106B	CR106D	
		CR106G	
ENCLOSED STARTER	CR106A100		SHEET 2
	CR106B100		
	CR106C100		
	CR106D100		
	CR106G100		

REF # 1
SH. 2 OF 8

REVISIONS

1	Oct. 2, 1972	
2	Nov. 14, 1972	
3	April 27, 1973	

MADE BY 1/8/72
CHECKED 1/8/72
APPROVALS
GENERAL PURPOSE CONTROL DEPARTMENT BLOOMINGTON, ILL.
231HA165
G.P.C.

Prepared GLBate Date 2/5/90
Verified TGT Date 2-8-90

MOTOR OVERLOAD PROTECTION FOR MOTOR ACTUATED VALVES

Alan W. Richards, non-member

Charles D. Fornica, non-member

Limitorque Corporation
Lynchburg, Virginia

Abstract

Normal load and abnormal load conditions for valve actuators are discussed and load characteristics are illustrated for typical valves. Overload protection for short time duty rated motors is discussed when twice normal loads occur and when locked rotor occurs. The required performance of the overload device is outlined with emphasis on protection during locked rotor. The condition of locked rotor temperature rise is analyzed and tests conducted to compare with calculated values. Different types of overload protection devices are described and the limited protection provided by the internal temperature sensor under the conditions of locked rotor is pointed out. A systematic approach to external overload relay selection is illustrated.

Introduction

Motor protection historically has concentrated on the thermal capabilities of the motor utilizing the NEMA thermal ratings and limitations. This approach may be satisfactory for the general purpose continuous duty motors, however, it does not adequately handle special purpose short duty rated motors such as those used on valve actuators. This paper approaches the problem of motor protection for valve actuator motors, by first describing the normal loading imposed upon the valve actuator motor and also abnormal loading.

Overload protection is accomplished by selection of the proper type overload relay and size. Various types of devices are discussed and their limitations are pointed out. In order to establish a common means of overload protection which will satisfy all motor frame sizes and operating conditions, emphasis is placed on the limiting factor - the rotor or stator overheating under a locked rotor condition.

It is the opinion of the authors, through experience, that motor overload protection should be accomplished by protecting against these abnormal loading conditions. Selecting larger torque rated motors or longer than standard operating times do not reduce the vulnerability to motor failure when the motor is being misused and can actually increase the vulnerability of the motor to burnout.

The misuse of motors which can occur through such things as excessive jogging or rapid (instantaneous) reversals, cannot be totally protected against by any means. Most of the misuse which occurs in valve actuator motors produces a somewhat equivalent effect on the motor as a locked rotor condition. The locked rotor condition can be handled by proper overload selection.

VALVE MOTOR ACTUATOR APPLICATION

Normal Conditions:

A valve is a device which has two extreme limits of travel, full open and full close. Typically a valve motor actuator will have built in position limit switches to stop the unit at the full open and full closed positions.

In addition to position limit switches, valve motor actuators are equipped with a torque limiting device. This device is designed to limit the output torque of the actuator to the peak torque required by the valve usually to seat or unseat it. The torque limiting device is not intended nor will it adequately protect the assembly, including the motor, against loads less than its set position which is the peak torque.

The vast majority of motor actuated valve applications have a stroking time, full open to full close, of less than two minutes.

There are numerous valve designs - each of which has its own torque requirements. According to valve manufacturer's data and Limitorque experience, most wedge gate valves require torque as shown in Figure 1 where 100% of torque on the motor represents the valve unseating torque and is achieved using the starting torque capability of the motor.

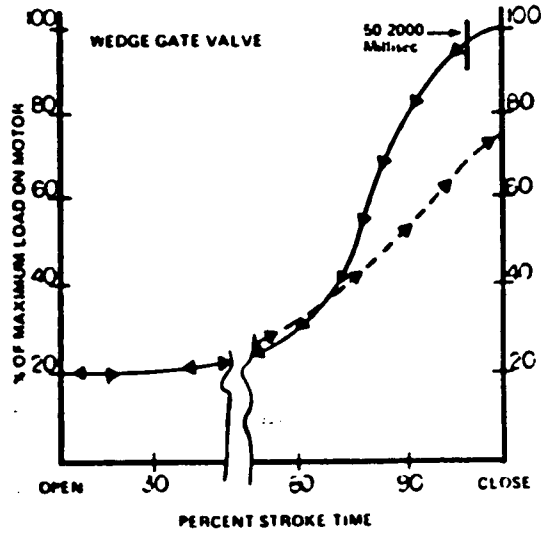


Figure 1. Wedge gate valve torque requirements

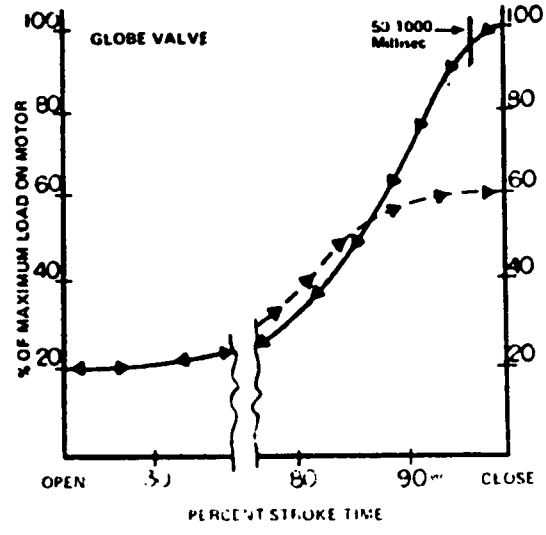


Figure 2. Globe valve torque requirements

F 79 669-3 A paper recommended and approved by the IEEE Power Generation Committee of the IEEE Power Engineering Society for presentation at the IEEE PES Summer Meeting, Vancouver, British Columbia, Canada, July 15-20, 1979. Manuscript submitted February 12, 1979; made available for printing May 1, 1979.

0018-9510/81/0100-0043$00.75 © 1981 IEEE

PREPARED TBT 4-4-90
VERIFIED GLB 4/4/90

ATTACHMENT 6
PAGE 561 A OF 561

Globe valve torque requirements can be expressed as shown in Figure 2. Here the 100% of torque on the motor also represents the valve unseating, assuming the pressure is over the disc/plug and is achieved using the starting torque capability of the motor.

Butterfly valves experience two different extremes of torque requirements. For the valves used in low fluid velocity systems requiring the tight shutoff, the torque requirements are similar to wedge gate valves in that the predominent requirement is seating or unseating. In these applications the stall or starting torque capability of the motor is used to achieve seating or unseating. (See Figure 3)

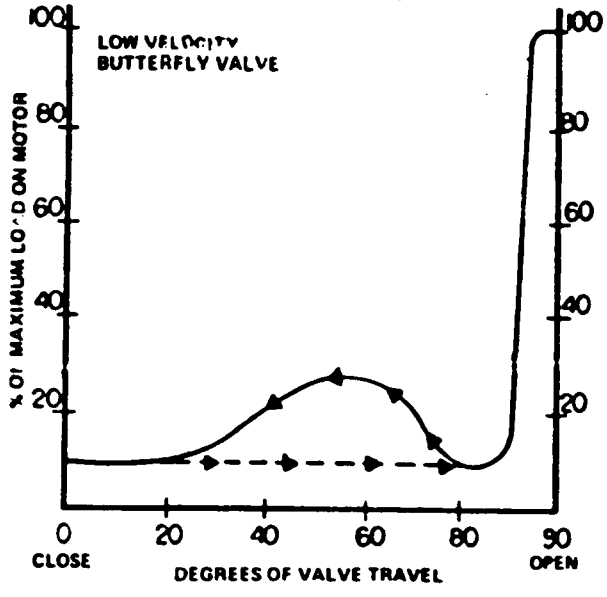


Figure 3. Low velocity B/F valves

For the butterfly valves used in high fluid velocity applications the dynamic torque could be as high or even higher than the seating or unseating torque (See Figure 4). The peak dynamic torque lasts for only a small fraction of the total stroke.

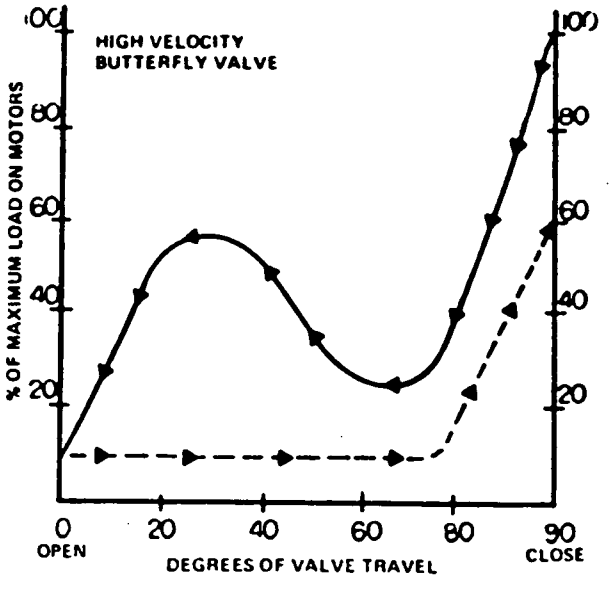


Figure 4. High velocity B/F valves

By allowing the motor stall torque capability to overcome the dynamic torque the only concern to motor integrity would be the motor heat produced while approaching and leaving the peak dynamic torque position. Due to the fact that the peak dynamic torque exists only momentarily and the slope of the torque curve approaching and leaving the peak dynamic torque position is rather steep, the additional heat generated by this above normal motor load can be neglected in valves with a stroke time of 5 minutes or less.

Abnormal Conditions:

As has been indicated above, valve motor actuators are equipped with position limit switches to stop the actuator at each end of travel. As a back-up to the position limit switches is a torque limiting switch in each direction. If these switches are improperly set, the actuator will reach the end of travel in one direction or the other and be mechanically limited from overtraveling. This will allow the motor to go into a stall or locked rotor condition. Motor overload protection must protect the motor for this condition.

In order for the position and torque limiting switches to function as they are intended, the motor rotation must be correct. If the open side of the motor reversing starter is energized, the motor must rotate such that the actuator is opening the valve. If the rotation is the reverse, the position and torque sensing devices will mechanically function but will not electrically stop the motor because they would have been wired into the opposite circuit (open vs. close). Due to the travel being mechanically limited, the motor will go to stall. Motor overload protection must protect the motor for this condition.

In mid travel, high running loads — substantially greater than the normal run loads — can exist due to either a non-lubricated or dirty stem or some type of binding in either the valve disc/wedge or stem. These high running loads would not be high enough to trip the torque switch because the seating/unseating loads or valve peak load (for which the switch is set) is usually three times higher than normal run. This means that the running load on the motor could be as high as 300% of expected before the torque switch would stop the actuator. The only motor protection in this situation is the motor overload device.

It should be pointed out that the typical short operation times for motor operated valves would limit the vulnerability to a motor burnout due to a higher than normal running load.

MOTOR PERFORMANCE / DESIGN

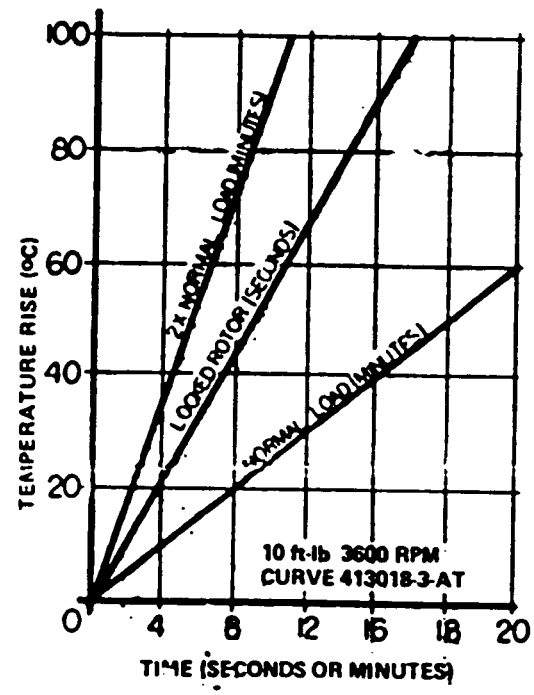
In the previous section, the typical valve torque requirements were defined. The data indicates that the predominent requirement for a motor in valve actuator service is starting/stall torque; Limitorque uses starting and stall torque interchangeably because Limitorque considers stall as locked rotor when approached from full load. Industrially, the proper definition would be starting torque. The motor, therefore, must have sufficient starting torque to overcome all of the seating/unseating or peak torque conditions previously identified.

Recognizing that motor frame size must be kept to a minimum to reduce inertia, it is vitally important to evaluate the running load requirements along with a suitable duty rating to tailor the motor to the application as closely as possible. It is also desired to match the running load requirements of the valve to the normal running load of the motor. This is desirable because when the normal running torque of the motor is equal to the valve required stroking torque, operating problems such as stem binding etc. can be discovered quickly. Oversizing the normal running torque capability of the motor will mask a developing problem which could lead to more serious consequences later. From the previous torque curves for valve requirements (Figures 1 thru 4), it can be seen that a running (normal) torque capability of 20% of rated starting torque would be a proper selection.

Evaluating frame sizes for their inertial impact, a duty rating of 15 minutes is selected. This time rating accommodates almost all standard valve applications. Duty ratings below 15 minutes (for 3-phase) do not produce significant frame/inertia reductions and would serve a much smaller percentage of the number of applications.

PREPARED TBT 4-4-90
VERIFIED MHB 4/4/90

In Figure 5 the temperature rise curve for two Limitorque motors is plotted. The temperature rise shown is for the stator winding. The values shown represent the temperature rise at normal running load, twice the normal running load, and the temperature rise at locked rotor. Curve 413018-3-AT is a 1.33 HP (10 ft. lb. start torque, 3600 rpm) and Curve 2507 is a 10 HP (150 ft. lb. start torque, 1800 rpm). Recognizing that most valve actuator stroke times are two minutes or less, the conservatism of the motor thermal capability even at two times the normal running torque is apparent.



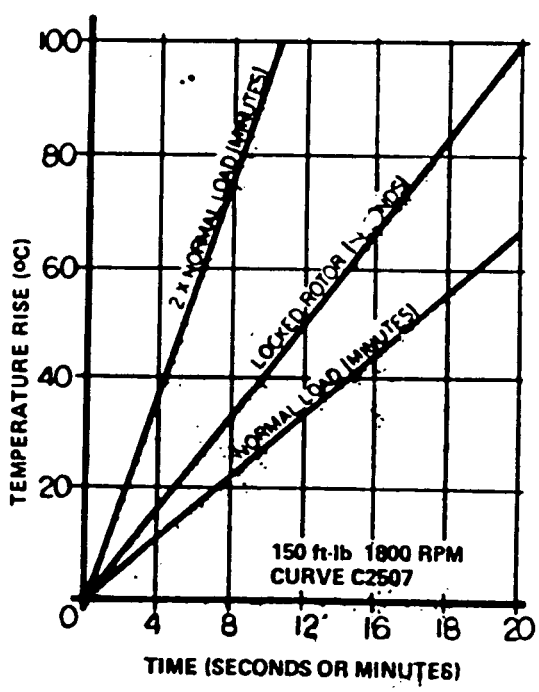


Figure 5. Temperature rise for 10 ft-lb 3600 RPM and for 150 ft-lb 1800 RPM valve actuator motor.

The speed/torque characteristics must be such that the motor does not lose speed at too great a rate as the load increases between the normal running load and twice that value (which would allow for peak dynamic torque as well as some overload in mid stroke). It is not advantageous to have the breakdown torque of the motor greater than the starting torque because the actuator will have an unnecessarily high stall torque. From Figure 6 it is apparent that the efficiency of a valve actuator is its highest above 50% speed, resulting in a compounding effect where the maximum torque of the motor is delivered at the peak efficiency of the actuator.

This extra torque is unusable in that the actuator must be sized for its starting torque capability from a static position (point of lowest efficiency and highest torque).

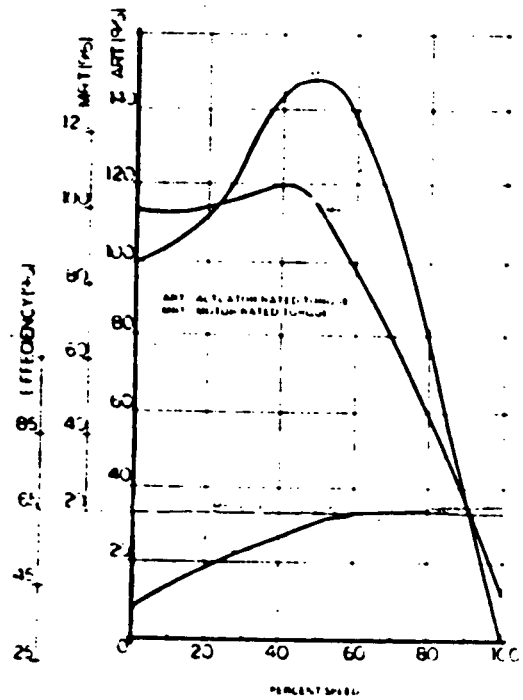


Figure 6. Motor and valve actuator speed-torque curve. Efficiency versus speed.

Figure 6 plots the speed/torque curve of a typical valve actuator motor along with the speed/torque capability for the actuator itself. These two curves do not coincide because of the variations in efficiency of the actuator. For example, at normal running speed, the actuator delivers 33% of its rated torque when the motor is delivering 20% of its rated torque.

For comparison, a plot of speed vs. torque is made of a typical valve actuator (Limitorque) motor along with standard Nema Design B and D in Figure 7.

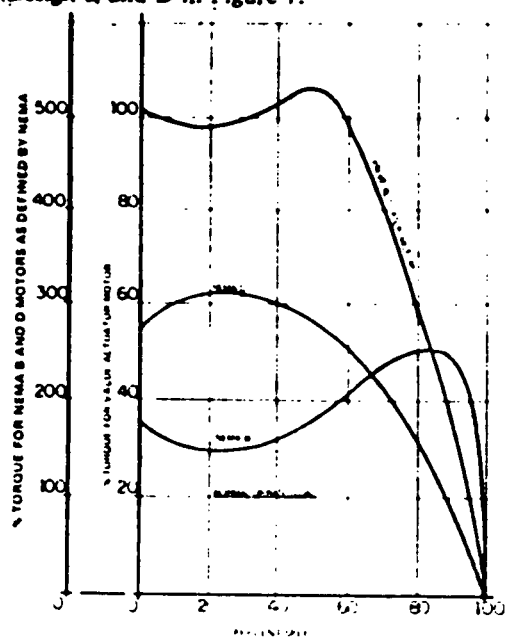


Figure 7. Speed torque curves (typical)

PREPARED TBJ 4-4-90
VERIFIED 4/4/90

ATTACHMENT 6

PAGE 561 C OF 561

OVERLOAD PROTECTION

General Requirements:

The National Electric Code [1] specifies the selection of overload devices intended to protect motors and motor control apparatus against excessive heating due to motor overloads and failure to start. Typical general purpose (continuous duty) motors with 1.0 service factor and Class B insulation use must have their heater selection such that the trip current of the heater does not exceed 115% of the motor nameplate current according to this code. Short time duty rated motors, such as valve actuator motors, are exempt from this criteria. The exemption allows the equipment manufacturer to provide the type of overload protection most appropriate for the motor and application.

Performance:

The performance of the overload device must protect against:

(a) a trip during acceleration
(b) nuisance trips at normal load
(c) nuisance trips at short duration 200% normal load
(d) overheating in the stator winding during running overloads
(e) overheating in the stator winding during locked rotor
(f) overheating in the rotor during locked rotor

An almost instantaneous acceleration (a) is achieved with a valve actuator motor. If sufficient torque is available to overcome the static friction of the actuator under load, movement occurs. The actuator efficiency increases substantially as the actuator begins to move (see Figure 6) which results in a decrease in the load at the motor shaft. The actuator available torque increases for this same reason.

Nuisance overload trips (b) and (c) usually occur due to improperly selected overload types or ratings. The condition of nuisance trips can be avoided by proper selection as discussed later.

The protection against running overload (d) is necessary to protect against abnormally high continuous torque requirements that are less than that necessary to trip the torque switch. Selecting an overload in the method described later will satisfactorily handle this condition.

The most important occurance to protect against in a valve actuator motor is the condition of overheating in the stator or rotor during locked rotor (e) and (f). This overheating, caused by a stalled motor condition, results in a high rate of temperature rise in both the stator winding as well as the rotor squirrel cage. Motor failure due to a locked rotor condition represents over 90% of the reported field problems on value actuator motors.

The NEMA allowable temperature limit of the stator windings is a well standardized value based on the type of insulation used. Class B insulation in totally enclosed non-ventilated (TENV) motors require 125°C maximum continuous temperature limit. For short term stall conditions, this maximum temperature is used as a target temperature rise in order to maintain the maximum life expectancy for the motor. The temperature limit of the rotor squirrel cage is different from the stator and must be kept at a reasonable level relative to the material used as will be discussed later.

Under locked rotor condition, if the stator reaches the insulation temperature limit before the rotor reaches its limiting temperature, the motor is considered "stator limited," however, if the rotor temperature reaches its maximum limit before the stator, the motor is considered "rotor limited."

Stator Temperature Rise:

Stator temperature rise can be accurately measured with winding temperature sensing devices while the motor is in service. Figure 5 illustrates the stator temperature versus time for two motors. Standard Limitorque motors all have full performance tests conducted which provide temperature rise data. Using these curves the stator can be protected by selecting the overload device which trips prior to the safe operating time under locked rotor and normal load. Allowances can also be made in the overload selection for higher than normal running loads if necessary.

Rotor Temperature Rise:

The rotor heating condition under a running overload is virtually impossible to measure in normal service. During a running overload condition, the heat rise generated by the rotor can be ignored as there is sufficient heat transfer from the rotor to the stator to maintain a sufficient uniformity in temperature to make all motor frame sizes "stator limited" while running. This heat is reflected in the stator temperature rise during normal and twice normal loads as shown in Figure 5.

Under locked rotor conditions, the stator temperature is not always indicative of the rotor temperature. To analyze the condition of rotor temperature rise under locked rotor, it is assumed that no heat transfer occurs from the rotor bar to the surrounding material. From this analysis, a range of temperature rises are calculated for magnesium and aluminum which are the two most common metals found in squirrel cage rotors. From the definition of Specific Heat (C_v), the rate of rise is given by:

$$(1)\quad T\,(^\circ C) = \frac{\text{Losses in kilo Joules (kJ)}}{C_v\,(\text{kJ}/\text{Kg}\cdot\Delta^\circ C)\ \text{Weight (kg)}}$$

Substituting in:

$$(2)\quad \text{1 kilowatt second (kW Sec.)} = \text{1 kilo Joule (kJ)}$$

$$(3)\quad \text{1 kilowatt (kW)} = \rho\,\frac{(\text{Ohm-cm})}{(\text{Ohm})} \cdot \frac{[\text{L (cm)}]}{\text{A (cm}^2)} \cdot [\text{L (Amp cm)}/\text{A (cm}^2)]^2$$

$$(4)\quad \text{Weight (kg)} = \rho\,(\text{kg/cm}^3) \cdot \text{L (cm)} \cdot \text{A (cm}^2)$$

The following results are obtained:

$$(5)\quad \frac{T\,(^\circ C)}{(\text{sec})} = \frac{\rho\,(\text{Ohm-cm}) \cdot [\text{L (Amp/cm}^2)]^2}{10^3\,C_v\,(\text{kJ/kg}\cdot\Delta^\circ C) \cdot \rho\,(\text{kg/cm}^3)}$$

From reference [2] representative values for density (ρ), resistivity (ρ) and specific heat (C_v) for aluminum and magnesium were inserted in equation (5). These two metals are the most common currently used in cast squirrel cage rotors.

$$(6)\quad \text{Aluminum}\quad \frac{T\,(^\circ C)}{(\text{sec})} = 1.7 \times 10^{-7}\,[\text{L, Amp/cm}^2]^2$$

$$(7)\quad \text{Magnesium}\quad \frac{T\,(^\circ C)}{(\text{sec})} = 2.7 \times 10^{-6}\,[\text{L, Amp/cm}^2]^2$$

Motor manufacturers have advised that the current density can vary between 3000 amperes per square centimeter and 4500 amperes per square centimeter for this type of high torque motor. Inserting these two values of amps/cm² into (6) and (7), we obtain:

$$(8)\quad \text{Aluminum}\quad \frac{T\,(^\circ C)}{(\text{sec})} = 18\,(^\circ C/\text{Sec}) \text{ to } 34\,(^\circ C/\text{Sec})$$

$$(9)\quad \text{Magnesium}\quad \frac{T\,(^\circ C)}{(\text{sec})} = 29\,(^\circ C/\text{Sec}) \text{ to } 55\,(^\circ C/\text{Sec})$$

The maximum temperature allowable for the rotor varies according to the judgment of the motor manufacturer. Both aluminum and magnesium melt at approximately 650°C [3]. Magnesium alloys are heat treated at 330°C to 415°C [4]. Therefore a maximum allowable temperature of 400°C to 500°C is a reasonable limit. Thus from equation (8) and (9) certain designs can have their rotor temperatures reach a temperature of 500°C in 10-20 seconds.

To verify these calculated values, locked rotor tests were conducted on three frame size motors:

No. 1: 42 frame, 7½ ft. lb., Locked Rotor Torque, 1800 rpm, .48 Hp, 15 minute duty.

No. 2: 56 frame, 10 ft. lb., Locked Rotor Torque, 3600 rpm, 1.33 Hp, 15 minute duty, Curve 413018-3-AT

No. 3: 210 frame, 150 ft. lb., Locked Rotor Torque, 1800 rpm, 10 Hp, 15 minute duty, Curve C2507

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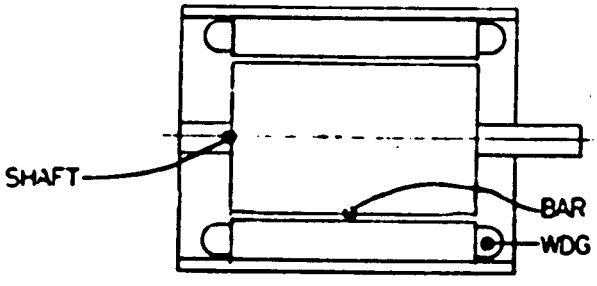
Temperatures were measured at points indicated in Figure 8 under locked rotor conditions. The temperature rises are illustrated in Figure 9. From the test data, motor No. 1 exhibited an initial rotor bar rise of 2.9°C/second. Motor No. 2 had an initial rotor bar rise of 6.4°C/second. Motor No. 3 had an initial rotor bar rise of 40.1°C/second.



BAR - ROTOR BAR
WDG - STATOR WINDING

Figure 8. Location of thermocouples on locked rotor test

These test data present two examples of stator limited designs (Motor No. 1 and 2). The variance of the test data from the calculated data is due to the relatively rapid heat transfer from the rotor bar to the rotor iron. Motor No. 3 is an example of a rotor limited design. The initial rotor bar rise of this motor of 40°C/second is within range of the calculated values.

On high torque motors, the tendency of rotor heat rise being a more severe condition than stator heat rise increases as the motor frame size increases. All test data demonstrated a minimum safe locked rotor time of 15 seconds.

A target of 10 seconds locked rotor time will be established for overload selection to gain the highest degree of safety factor even though 15 seconds locked rotor time is considered adequate protection for value actuator motors.

OVERLOAD DEVICES

Types of Overload Devices:

The types of overload devices in general use for valve actuator motors (42 frame thru 404 frame) are (a) integral devices located on stator windings, (b) external devices actuated by motor current, and (c) a combination of internal and external devices.

The internal temperature sensor (a) located on the stator winding (thermistor or thermal actuated contact) provides adequate protection for running conditions but limited protection under locked rotor conditions. Some motor frame sizes are rotor limited as described previously in which case an internal temperature sensor is ineffective. Figure 9 motor number 3 demonstrates such a case. Additionally, internal sensors tend to be more vulnerable to failure due to heavy vibration found in some actuator applications thereby creating maintenance difficulties. Their accessability and serviceability are severely limited.

External devices (b) or overload relays from our experience have been found to provide better overload protection than any other device throughout the range of actuator motor sizes used.

The overload relay is a simple, well understood electrical control element which has the flexibility to have its trip point adjusted or changed easily. The performance characteristics of overload relays can be matched directly to the requirements of special purpose, short time rated motors and therefore provide the best overload protection.

A combination of (a) and (b) will provide more protection than either device separately. However, suitable protection is provided by the external device, and the second or internal device serves little useful function.

Overload Relays:

The overload relay, being the best suited for valve actuator motor protection, is the primary recommendation of Limitorque. The construction and sizing will be further amplified.

Overload relays consist of the current carrying portion and the tripping mechanism. The current carrying portion is a means to produce heat. This heat must be transferred to the heat sensitive tripping mechanism. A thermal lag exists as the heat transfer occurs. An inexpensive and easily replaceable heater design in the past has generally resulted in one which has a longer thermal delay on high currents.

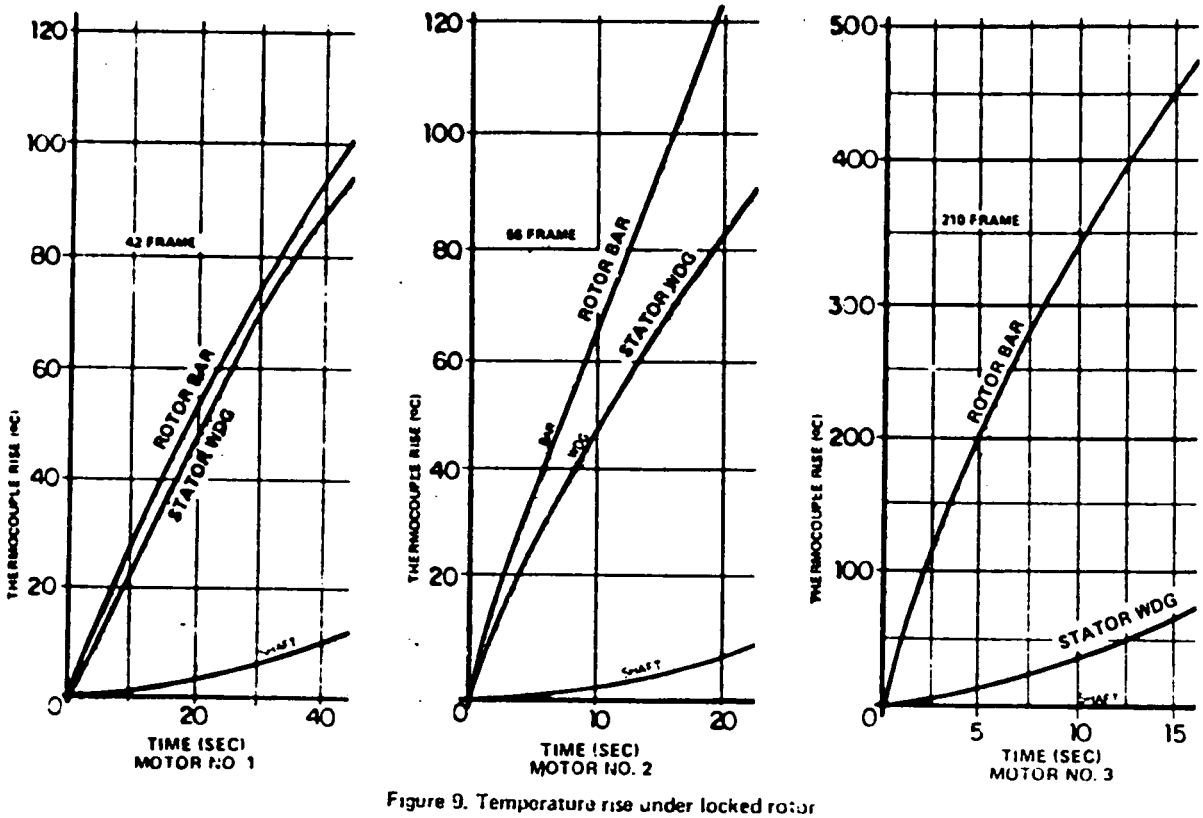


Figure 9. Temperature rise under locked rotor

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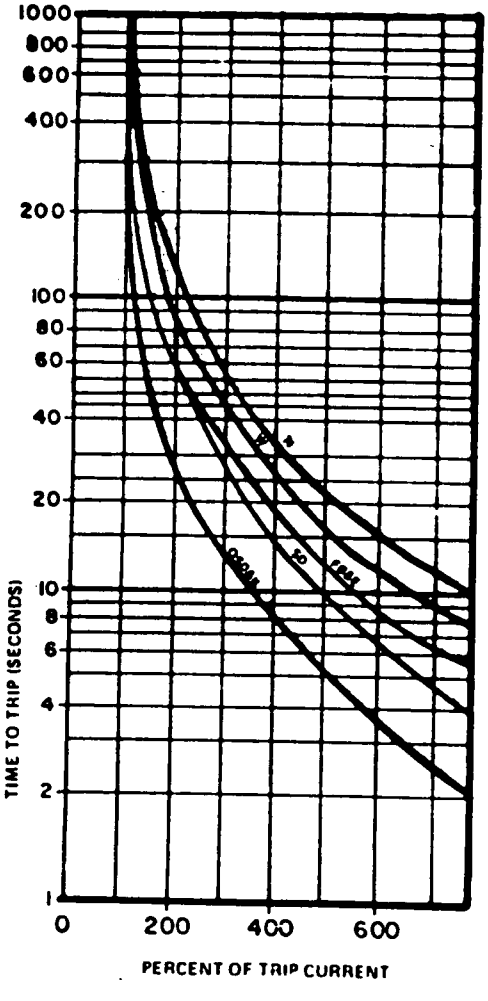
NEMA [5] classifies overload relays by a class number. This indicates the maximum time in seconds at which it will trip when carrying 600% of its trip current. NEMA tests require:

(a) relay must trip (no time limit) at 100% of its trip rating
(b) relay must trip in 480 seconds at a current of 200% of its trip rating
(c) relay must trip in the number of seconds equal to its Class number at a current of 600% of its trip rating

A Class 20 relay must trip in 20 seconds at 600% current; a Class 10 relay must trip in 10 seconds at 600% current. As seen later, an overload relay which meets or exceeds Class 10 requirements is preferable, however other Classes may be used if the heater size is properly selected.

Square D hand reset melting alloy [6] is constructed with the eutectic alloy solder element as part of the replaceable heater. This allows improvement of the heat transfer between this heater and the solder element. The result is the availability of a quick trip device. Allen-Bradley hand reset eutectic alloy thermal over-load device [7] is constructed in a similar matter. Gould, Inc. (Rowan) hand or auto reset bimetal overload relay [8] provides for motor current to pass directly through the bimetal element. Therefore, no thermal transfer delay is experienced. A 3-4 seconds is also achievable with 600% of trip current rating. The time-current curves for all of the above is shown in Figure 10. The Allen-Bradley Type N heater is illustrated as typical of the standard trip type overload relay.



LEGEND: HEATER	MFGR
N, W	ALLEN BRADLEY
OSD, SD	GOULD/ROWAN
K, E	FUSIJAS
FB	SQUARE D

Figure 10. Overload time current characteristics

...NG OF OVERLOAD HEATERS

General:

Some confusion may result in the different terms various manufacturers use for the value of the motor current required to activate an overload device. The current which will eventually cause the overload relay to trip may be called by various manufacturers trip current, rated current, or ultimate current. This paper will use trip current as that current which will eventually cause the relay to operate or trip. The manufacturers time-current characteristics are plotted in trip current versus time (See Figure 10).

Overload heater tables are listed in terms of motor full load amperage. The listed amperes in these tables (minimum value if a range is given) must be converted to trip current in order to provide the correct base or 100% value in the time-current curves of Figure 10. This multiplier (listed vs trip current) will be indicated by the manufacturer and will be 1.15, 1.20, or 1.25. Gould (Rowan) prints their time-current curves in motor full load amps so that no conversion is required. The Gould overload data were plotted in Figure 10 by converting their values to trip current in order to have accurate comparison with the balance of the time-current data.

Heater Selection

In order to find a heater size for standard trip devices, divide the motor normal load current by the multiplier mentioned above (listed vs trip current) and select the heater whose listed amperage value is less than this calculated value. See Figure 11 for an example.

The listed amperage value is converted to trip current by taking its product with the listed vs trip multiplier. This value of trip current becomes the base for calculating percent of trip amps as shown on the abscissa of Figure 10. The motor locked rotor current is divided by this base to arrive at a percentage which will determine the trip time at locked rotor. If trip time is too long, the next smaller heater must be selected. See Figure 11 as an example.

When the trip time under locked rotor condition is found adequate, the trip time under normal load and under twice normal load is determined. A judgment is made based on these trip times relative to the stroking time of the valve in the particular application and/or the thermal capability of the motor as defined by the motor performance curve.

It should be noted that infinite trip time on normal load current is not to be considered injurious to the motor since the valve stroke time limits the amount of run time actually encountered.

Based on the previous discussion on the types of overloads encountered, the most important criteria is the trip time under locked rotor conditions. The allowable locked rotor time must come from the motor manufacturer. Limitorque Corporation requires its motor manufacturers to provide a minimum of 10-15 seconds allowable stall time. This is a realistic value even for rotor limited motors.

The quick trip overloads such as Gould (Rowan), provide more latitude in motor heater selection. Figure 11 also has an overload selection based on these faster trip devices. Note that the trip current of the selected overload relay is equal to the motor full load current. Thus, nuisance trips will be avoided while still providing protection for twice normal loads.

Conclusion

Understanding the application together with the motor performance requirements and design will enhance the selection of the proper overload device.

Rotor heating prevents the use of an internal stator winding temperature device as the sole means of overload protection for all the motor frame sizes currently available. The stator winding temperature devices also present maintainability problems not associated with external devices.

The external overload relay provides satisfactory motor protection against both normal and abnormal actuator/motor loading conditions. The selection procedure outlined will provide the protection required for almost all operating conditions in the special purpose high torque, short time rated motors used in valve actuator service.

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FIGURE 11

Example of overload heater size selection

I. MOTOR TO BE PROTECTED:

10 ft.lb. 3600 RPM. 3/60/460 volt, 1.33 HP, 15 minute duty, heat rise data presented in Figure 5.

Normal load current	2.4 amps
Twice normal load current	3.3 amps
Locked rotor current	16.0 amps

II. TYPE OVERLOAD RELAY USED

Allen Bradley Bul. 816 Type N Per Table 31[a]
Multiplier (listed vs. trip current) = 1.15

2.4 amps (motor normal load) ÷ 1.15 (multiplier) = 2.09 amps.

Selected next smallest heater size = N15
(1.97 amps listed full load)

Trip current = 1.97 (listed) amps x 1.15 (multiplier) = 2.27 amps

Locked rotor % = 16 amps (locked rotor) ÷ 2.27 amps trip current = 705%

From Figure 10 (Type N) it can be seen that it takes 12 seconds to trip an N15 heater with 705% current.

JUDGEMENT: From previous data, 12 seconds trip time at locked rotor would offer adequate protection. However, it is longer than our target of 10 seconds, evaluate a smaller heater.

Select smaller heater size = N14
(1.79 amps listed full load)

Trip current = 1.79 amps x 1.15 (multiplier) = 2.06 amps

Locked rotor % = 16 amps (locked rotor) ÷ 2.06 amps trip current = 777%

From Figure 10 it can be seen that it takes 10 seconds to trip an N14 Heater with 777% current.

JUDGEMENT: Locked rotor target time of 10 seconds has been satisfied. Will the smaller heater size cause nuisance tripping during stroking due to its low current rating?

From Figure 10 (Type N):

Trip time at normal load (2.4 amps) = infinity

Trip time at twice normal load (3.3 amps) = 216 sec.

Trip time at locked rotor (16 amps) = 10 seconds

ANSWER: The N14 overload is properly sized to protect the motor at locked rotor. It will also allow 15 minute (motor duty rating) stroke time at normal load and 216 second stroke time at twice normal load for which the motor thermal rating is 540 seconds (9 minutes) per Figure 5. **SELECTION IS CORRECT.**

[a]The appropriate table for a heater selection for a full voltage reversing starter overload built integral in a Limitorque actuator.

III. TYPE OVERLOAD RELAY USED

Gould (Rowan) type 2150 - Multiplier (listed vs. trip) = 1.2

2.4 amps (motor normal load) ÷ 1.2 = 2.0 amps

Select Catalog size SDAH (set adjustment at 2.0 amps)

Trip current = 2.0 (listed) amps x 1.20 (multiplier) = 2.4 amps

Locked rotor % = 16 amps (locked rotor) ÷ 2.4 amps trip current = 666%

From Figure 10 (Type SD) it can be seen that it takes 5 seconds to trip a size SDAH overload.

JUDGEMENT: Locked rotor target time of 10 seconds has been more than amply satisfied. Will the selection cause nuisance tripping during stroking?

From Figure 10 (Type SD):

Trip time at normal load (2.4 amps) = infinity

Trip time at twice normal load (3.3 amps) = 120 sec.

Trip time at locked rotor (16 amps) = 5 seconds

ANSWER: The SDAH overload is properly sized to protect the motor at locked rotor. It will also allow 15 minutes (motor duty rating) stroke time at normal load and 120 seconds stroke time at twice normal load for which the motor thermal rating is 540 seconds (9 minutes) per Figure 5. **SELECTION IS CORRECT.**

Acknowledgements

The authors received helpful information from both Reliance Electrical Company, Cleveland, Ohio, and Electric Apparatus Company, Howell, Michigan.

Special appreciation for services rendered goes to Mr. Walter Sykes, Manager of Research and Development Laboratories, Limitorque Corporation, for his effort in conducting the testing necessary for the presentation of this paper. The test data presented represents only a small portion of the test work conducted by Mr. Sykes.

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[1] National Electrical Code, 1978 Edition, Boston, NFPA No. 70-1978, National Fire Protective Association, Article 430, Part C, Pages 296-299.

[2] K. Ramajvic, Handbook of Thermodynamic Tables and Charts, New York, McGraw-Hill, 1976, Pages 12-25.

[3] Machinery's Handbook, 20th Edition, New York: Industrial Press, Inc., 1975, Page 2268.

[4] Machinery's Handbook, Ibid, Page 2254.

[5] NEMA Publication No. ICS, 1970, New York, Revision 7, 1977, National Electrical Manufacturers Association, Section ICS 2-22, May, 1974, page 6.

[6] Square D Company Class 9065, December 1969, Page 102.

[7] Allen Bradley Publication No.508-3.0, Bulletin 592, December, 1975, Page 7.

[8] Gould (Rowan) Bulletin 2150, Catalogue No. 1, Page 122.

[9] Furnas Electric Class 48, January, 1972.

Alan W. Richards was born in Cleveland, Ohio, 1932. He received the B.S. in E.E. from Ohio State University, the M.S. in Engineering Administration from Case-Western Reserve University, and the M.S. in E.E. from Cleveland State University in 1957, 1961, and 1970 respectively.

Mr. Richards is a Registered Professional Engineer in the state of Ohio. Since 1972 he has held the position of Manager, Electrical Department, Limitorque Corporation.

Charles D. Formica was born in Atlantic City, New Jersey, on September 27, 1944. He received the BSME degree from Villanova University in 1966.

He joined Limitorque Corporation in 1966 as an Application Engineer. From 1966 he has worked as Service Manager and Application Engineering Manager for Limitorque Corporation before being promoted to his present position as Product Manager.

Mr. Formica has written many papers on the design and performance of valve actuators in various applications.

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VERIFIED AB 4/4/90

ATTACHMENT 6

Discussion

Luke Yu, and Jose De Castro (The Ralph M. Parsons Company, Pasadena, CA). We read this paper with great interest. The motor actuated valves are very common in engineering design and application, but the knowledge in that particular area is rather limited.

We would raise our view points as follows:

1) We think the valve manufacturers should be responsible for choosing a proper motor to match with a specific valve for satisfactory operation.

2) Regarding the misuse of motors, this may be applicable to all motor applications, not only for motors for valve operation. For instance, excessive startings of an induction motor may cause motor burnout. Therefore, operational rules should be placed in practice to prevent the misuse.

3) Why did the author choose 200% normal load as one of the overload protection criteria? We don't see any significance of using 200% normal load criterion in selecting the overload heater.

4) If only motor locked rotor protection is desired, a 51 device (phase current) could be set at a little bit higher than the operating time in which motor draws locked-rotor current. This point should, of course, be below the motor thermal capacity curve and the motor would trip during stalling. This has been widely used in common motors for locked-rotor protection. Whether this application is adequate to motors for valve operation, the author's comment is appreciated.

5) Fig. 10 shows several over-load time-current characteristics from various manufacturers. We don't know whether they are typically for common motor overload protection except curve N looks familiar. In most cases, the overload characteristics of the overload relay is coordinated with the motor thermal capacity curve and generally may not serve the motor as locked rotor protection. Curve QSD, K or others in Fig. 10 may cause tripping during routine motor starting period due to too short time at 600% rated current value. However, they may be adequate for motors for valve applications as the author indicated.

6) Westinghouse type MOR overload relay has versatile characteristics in application. Would the author comment whether it is adequate for the motors for valve application?

Manuscript received August 13, 1979.

Alan W. Richards and Charles D. Formica: 1) It is true that the valve manufacturer must provide the seating and unseating torques required by the valve as well as the expected running torques. An operating time for full valve travel will be agreed upon. These facts must then be used by the actuator manufacturer to size the actuator and select the proper motor. The actuator efficiencies play such an important part in motor sizing that the proper motor selection must remain the responsibility of the actuator manufacturer.

2) We agree that operational rules should prevent motor misuse. The valve actuator motor is perhaps favored since in most cases the process dictates the number of starts required. It is, however, difficult to acquire the number of starts allowed by the motor manufacturer. The special designs (high torque) required for this type of motor does not allow the motor manufacturer to interpolate from previous test data. Thus, operational rules are difficult to determine.

3) The 200 percent normal load criteria was chosen as a check for running overcurrent protection. Slight overloads are protected against by the limiting valve travel. Further, by checking for trip time at twice rated load, nuisance tripping can be avoided.

4) For valves with standard travel, we agree that a 51 device would be easy to apply and would give locked rotor protection. Valves with long running time relative to the duty rating of the motor would, however, need running overcurrent protection.

5) Due to the absence of any appreciable reflected load inertia and the fact that valve actuator motors have 500 percent starting torque, the acceleration time is approximately .25 seconds. Thus, quick trip overload, such as QSD and K curve devices, will not operate during this motor acceleration. We agree that the curve N is difficult to coordinate with a motor whose thermal capacity curve is defined by 10 seconds at stall and 15 minutes at 100 percent current.

6) The Westinghouse Type MOR overload relay with HTM heater module appears to follow the QSD or K curve shown in the paper. The reported trip time at 600 percent of heater rating is four to seven seconds for this device. This fast response to motor locked rotor current makes this device more than adequate for motor protection in valve applications.

Manuscript received June 17, 1980.

PREPARED TBT 4-4-90
VERIFIED GLB 4/4/90

ATTACHMENT 6
PAGE 561H OF 561

PREPARED: T.M. Baker DATE: 4-11-90
VERIFIED: [illegible] DATE: 4/11/90

PURPOSE

The purpose of this Attachment is to evaluate and support modifications to be implemented under the following DCN's: M-08663-A, M-09166-A, M-09228-A, A-06885-3, A-07054-B, P-03065-A, and P-01136-A.

The modifications involve breaker and/or breaker setting, overload heater, and motor changes.

The following baseline calculations evaluate the DCN modifications for their impact. These evaluations are identified by the Attachment No. M08663A and are included in the calculation noted.

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION.....	WBN EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSIS.....	WBN-EEB-MS-TI06-0002
CONTAINMENT PENETRATION PROTECTION STUDY, VOLTAGE LEVEL V4 AND V5.....	EEB-MS-TI08-0015
480V NON-CLASS 1E POWER CABLE ASSOCIATED CIRCUITS.....	WBN EEB-MS-TI15-0011

PREPARED: Y M Baker DATE. 4-11-90
VERIFIED: WJH DATE: 4/11/90

1.0 SCOPE

This revision addresses 480V Class 1E protective devices and cable protection for System Group 1 (systems 32, 67, and 70) that receive power from the Class 1E boards listed within the base calculation (Section 1.1, Page 7). Devices within other systems will be evaluated at a later date.

2.0 ASSUMPTIONS

A. See Unverified Assumptions identified in the base calculation (Section 2.0, Page 8).

B. The maximum stroke time for valves 0-FCV-67-144-B, 1-FCV-67-143-A, and 2-FCV-67-143-A is less than or equal to 120 seconds. ~~THIS IS AN UNVERIFIED ASSUMPTION.~~ WJH 6/26/91 Reference 3.12 | R15 WJH 6/26/91 GP 7/1/91

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TVA Calculation, Auxiliary Power Systems Analyses, Appendix L & M, WBN EEB-MS-TI06-0002, Rev 1, (B26900405404)

3.2 Attachment 1 of the base calculation and Section A of this attachment

3.3 Design Change Notice No. P-06978-A, (B26891209800)

3.4 Design Change Notice No. M-09166-A

3.5 Design Change Notice No. M-09228-A

3.6 Design Change Notice No. A-06885-B

3.7 Design Change Notice No. A-07054-B

3.8 Design Change Notice No. P-03065-A

3.9 Design Change Notice No. P-01136-A, (B26890504801)

3.10 TVA Electrical Design Standard DS-E12.6.2, Rev. 0

3.11 SKM Systems Analysis, Inc. Computer Aided Plotting For Time Overcurrent Reporting (CAPTOR), Version 2.1, Electrical Engineering Computer Software

3.12 TVA Calculation "Valve Stroke Time Determination for System 67" WBN-67-D053, EPM-RM-070789, R4 (B26900605204) | R15 WJH 6/26/91 GP 7/1/91

PREPARED: T M Barker DATE: 4-11-90
VERIFIED: [illegible] DATE: 4/11/90

3.12 UL Standard 489, Molded Case Circuit Breakers and Circuit breaker Enclosures

4.0 DESIGN INPUT DATA

The Design input data consists of the following.

Protective device data was taken from Ref. 3.2

Cable data was taken from Ref. 3.1 and 3.3

Miscellaneous data was taken from Ref. 3.4 through 3.9 as required.

5.0 JUSTIFICATION OF ASSUMPTIONS

See Justification of Assumptions in base calculation (Section 5.0, Page 12).

6.0 METHODOLOGY

The breaker types, settings, and overload heaters selected per the criteria formulated in Revision 0 of this calculation are identified in Appendix A with any changes or additions to the Appendix documented and tabulated in Section A of this attachment (Data shown in Section A supercedes that shown in Attachment 1).

The Design Input Data was tabulated identifying the board, compartment, protective device data, and cable data. (See Section B).

Time-current plots were developed for each device type and rating showing both the protective device and the short time heating limits for various cable sizes. Each plot will show the minimum conductor size which may be used with the device and any limitations on settings for adjustable devices. (See Section C).

The circuits are considered adequately protected if the cables are prevented from reaching thermal damage for ten seconds for a low impedance fault.

PREPARED: TM Baker DATE: 4-11-90
VERIFIED: [illegible] DATE: 4/11/90

By comparison of the protective device data, cable data, and the time current curves for the device it was determined whether the circuit passed or failed and noted in the 'CABLE PROT' column of Section B.

7.0 GRAPHICS

Graphics for cable protection consists of the time-current plots described earlier and shown in Section C. These plots were generated using computer software (Ref. 3.11). Each curve was checked using manufacturer's published curves for the protective device for accuracy. Minor deviations not adversely affecting the results of this calculation were ignored. RIS 6/14/91

8.0 SUMMARY OF RESULTS

The result of this analysis is that the protection for the 480V Class 1E cables within the scope previously outlined have been determined to pass or fail as indicated in Section B.

9.0 CONCLUSION

For those circuits identified as "PASS", the protective device installed will provide adequate cable protection against thermal damage. For those cases where full coordination between the cable damage curve and the molded case circuit breaker instantaneous trip curve cannot be attained, credit is taken for UL Standard 489 (Ref 3.7) to show that the cables are adequately protected against short circuits up to the breaker interrupting rating.

10.0 SECTION REFERENCES

SECTION A - Tabulation of modifications to circuit breakers, settings, and overload heaters for the listed DCN's

SECTION B - Tabulation of protective devices, cable data, and cable protection pass/fail evaluation

SECTION C - Time-current plots for protective devices

PREPARED [illegible] DATE [illegible]
CHECKED [illegible]

GP	ENG_TITLE	NODE_NO	BOARD	CPT NO	EQUIPID_NO	HP	FLI	LRA	SF	OVL SIZE	STROKE TIME	BKR	BKR INST	SET POSIT	DCN
1	ERCW Str 1A-A Backwash Vlv	203	C&A VENT BD 1A1-A	4E	1-FCV-67-9A-A	0.33	0.75	5.7		T14	20	EF3-A003	12	3	M-08663-A
1	ERCW Str 1A-A Flush Vlv	203	C&A VENT BD 1A1-A	6E	1-FCV-67-9B-A	0.33	0.75	5.7		T14	20	EF3-A003	12	3	M-08663-A
1	ERCW Str 1B-B Backwash Vlv	205	C&A VENT BD 1B1-B	4E	1-FCV-67-10A-B	0.33	0.75	5.7		T14	20	EF3-A003	12	3	M-08663-A
1	ERCW Str 1B-B Flush Vlv	205	C&A VENT BD 1B1-B	6E	1-FCV-67-10B-B	0.33	0.75	5.7		T14	20	EF3-A003	12	3	M-08663-A
1	ERCW Str 2A-A Backwash Vlv	207	C&A VENT BD 2A1-A	4E	2-FCV-67-9A-A	0.33	0.75	5.8		T14	20	EF3-A003	12	3	M-08663-A
1	ERCW Str 2A-A Flush Vlv	207	C&A VENT BD 2A1-A	6E	2-FCV-67-9B-A	0.33	0.75	5.8		T14	20	EF3-A003	12	3	M-08663-A
1	ERCW Str 2B-B Backwash Vlv	209	C&A VENT BD 2B1-B	4E	2-FCV-67-10A-B	0.33	0.75	5.8		T14	20	EF3-A003	12	3	M-08663-A
1	Traveling Scrn 2B-B	209	C&A VENT BD 2B1-B	6C	2-MTR-67-451-B	5.00	6.00	41.1	1.15	T38		EF3-A025	105	2	M-08663-A
1	ERCW Str 2B-B Flush Vlv	209	C&A VENT BD 2B1-B	6E	2-FCV-67-10B-B	0.33	1.00	5.8		T14	20	EF3-A003	12	3	M-08663-A
1	EM DG HX 1A1 & 1A2 SPLY VLV	217	DSL AUX BD 1A1-A	3A	1-FCV-67-66-A	0.17	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A
1	EMDG ENG 1A1 & 1A2 SUP VLV	218	DSL AUX BD 1A2-A	3A	1-FCV-67-68-A	0.17	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A
1	EM DG ENG HX SUP VLV FM HDR 1B	219	DSL AUX BD 1B1-B	3A	1-FCV-67-67-B	0.11	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A
1	Emer Dg Hx Sup Vlv From Hdr 2A	220	DSL AUX BD 1B2-B	3A	1-FCV-67-65-B	0.13	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A
1	EM DG ENG HX 2A1 & 2A2 SUP VLV	221	DSL AUX BD 2A1-A	3A	2-FCV-67-66-A	0.17	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A
1	EM DG ENG HX 2A1 & 2A2 SUP VLV	222	DSL AUX BD 2A2-A	3A	2-FCV-67-68-A	0.13	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A
1	EM DG ENG SUP VLV FROM HDR 1B	223	DSL AUX BD 2B1-B	3A	2-FCV-67-67-B	0.11	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A
1	EMDG ENG SUP VLV FROM HDR 2A	224	DSL AUX BD 2B2-B	3A	2-FCV-67-65-B	0.13	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A
1	Sply Hdr 1A To Hdr 2B Isln Vlv	236	RMOV BD 1A2-A	5B	1-FCV-67-147-A	0.74	2.30	12.0			120				M-09220-A
1	Upr Cntm Vt Clr 1A Sup Iso Vlv	236	RMOV BD 1A2-A	7F	1-FCV-67-130-A	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A
1	Lwr Cntmt 1C Clr Disch Iso Vlv	236	RMOV BD 1A2-A	8D	1-FCV-67-95-A	0.13	0.45	2.2		T9	56	EF3-A003	7	LO	M-08663-A
1	Upr Cntm Vt Clr 1C Sup Iso Vlv	236	RMOV BD 1A2-A	8F	1-FCV-67-133-A	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A
1	Upr Cnt Vt Clr 1A Dis Isln Vlv	236	RMOV BD 1A2-A	9D	1-FCV-67-295-A	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A
1	UP CNTM VT CLR 1B DISH ISO VLV	236	RMOV BD 1A2-A	9F	1-FCV-67-139-A	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A
1	UP CNTM VT CLR 1C DISH ISO VLV	236	RMOV BD 1A2-A	10D	1-FCV-67-296-A	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A
1	UP CNTM VT CLR 1D DISH ISO VLV	236	RMOV BD 1A2-A	10F	1-FCV-67-142-A	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A
1	Cmpnt Clg Hx A Disch Cont Vlv	236	RMOV BD 1A2-A	11A	1-FCV-67-146-A	0.33	0.83	5.7		T15	120	EF3-A003	12	3	M-08663-A
1	FDR BKR TO COMP 5B	236	RMOV BD 1A2-A	11B	TO COMPT 5B	0.78	2.30	12.0		T26	120	EF3-A005	29	4	M-09220-A
1	RCP Oil Clr Rtn Cntmt Isln Vlv	236	RMOV BD 1A2-A	12D	1-FCV-70-92-A	0.13	0.60	3.2		T12	66	EF3-A003	7	LO	A-07054-B
1	Aux Waste Evap Pkg Outlet Vlv	236	RMOV BD 1A2-A	12E	0-FCV-70-111-A	0.13	0.60	3.2		T12	30	EF3-A003	7	LO	M-08819-A
1	Misc Eqpt Hdr Inlet Vlv	236	RMOV BD 1A2-A	14B	1-FCV-70-4-A	0.33	0.95	5.7		T14	90	EF3-A003	12	3	A-06885-B
1	CCS HX A DISCH BYPASS CONT VLV	236	RMOV BD 1A2-A	15A	1-FCV-67-143-A	0.13	0.45	3.15		T9		EF3-A003	7	LO	P-01136-A
1	FDR BKR TO COMP 11E	236	RMOV BD 1A2-A	16B	1-FCV-70-133-A	0.13	0.45	2.6		T9	15	EF3-A003	7	LO	M-08663-A
1	RHR Hx A-A Outlet Vlv	236	RMOV BD 1A2-A	16E	1-FCV-70-156-A	0.33	0.95	5.0		T15	90	EF3-A003	10	2	A-06885-B
1	Sample Hx Hdr Outlet Vlv	236	RMOV BD 1A2-A	17A	1-FCV-70-183-A	0.13	0.45	2.6		T9	15	EF3-A003	7	LO	M-08663-A
1	CDWE Bldg Supply Valve	237	RMOV BD 1B1-B	3E	1-FCV-70-207-B	0.13	0.45	3.1		T9	30	EF3-A003	7	LO	M-08663-A
1	CDWE Building Return Valve	238	RMOV BD 1B2-B	5B	0-FCV-70-206-B	0.13	0.45	2.6		T9	30	EF3-A003	7	LO	M-08663-A
1	Lwr Cntmt 1B Clr Dish Iso Vlv	238	RMOV BD 1B2-B	7D	1-FCV-67-103-B	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A
1	Up Cntm Vt Clr 1A Dish Iso Vlv	238	RMOV BD 1B2-B	7F	1-FCV-67-131-B	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A
1	Lwr Cntmt 1D Clr Dish Iso Vlv	238	RMOV BD 1B2-B	8D	1-FCV-67-111-B	0.13	0.45	2.6		T9	66	EF3-A003	7	LO	M-08663-A
1	Up Cntm Vt Clr 1C Dish Iso Vlv	238	RMOV BD 1B2-B	8F	1-FCV-67-134-B	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A
1	Up Cntm Vt Clr 1B Dish Iso Vlv	238	RMOV BD 1B2-B	9D	1-FCV-67-297-B	0.13	0.45	2.6		T9	66	EF3-A003	7	LO	M-08663-A
1	Up Cntm Vt Clr 1B Sup Iso Vlv	238	RMOV BD 1B2-B	9F	1-FCV-67-138-B	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A
1	UP CNTM VT CLR 1D DIS ISO VLV	238	RMOV BD 1B2-B	10D	1-FCV-67-298-B	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A
1	Up Cntm Vt Clr 1D Sup Iso Vlv	238	RMOV BD 1B2-B	10F	1-FCV-67-141-B	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A
1	RCP Oil Clr Rtn Cntnt Isln Vlv	238	RMOV BD 1B2-B	13D	1-FCV-70-89-B	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A
1	CCSP 1AA&1BB To C-S Inl Iso Vl	238	RMOV BD 1B2-B	15D	1-FCV-70-64-B	0.67	1.90	16.0		T24	120	EF3-A010	36	2	M-08663-A
1	FDR BKR TO COMP 6E	238	RMOV BD 1B2-B	16B	1-FCV-70-134-B	0.13	0.45	2.6		T9	66	EF3-A003	7	LO	M-08663-A
1	CCS HX C DISCH BYPASS CONT VLV	238	RMOV BD 1B2-B	17D	0-FCV-67-144-B	0.13	0.45	3.15		T9		EF3-A003	7	LO	P-01136-A
1	ERCW Hdr 2A Iso Vlv Before Str	240	RMOV BD 2A2-A	7B	2-FCV-67-22-A	0.33	0.95	5.7		T17	120	EF3-A003	12	3	M-08663-A
1	Cmpnt Clg Hx A Disch Cont Vlv	240	RMOV BD 2A2-A	11A	2-FCV-67-146-A	0.67	1.90	16.0		T24	120	EF3-A010	36	2	M-08663-A
1	CDWE BLDG SUPPLY VALVE	240	RMOV BD 2A2-A	11F	0-FCV-70-208-A	0.125	0.45	2.6		T9	60	EF3-A003	7	LO	M-08663-A
1	SPLY HDR 2A TO HDR 1B ISLN VLV	240	RMOV BD 2A2-A	13A	2-FCV-67-223-A	0.67	1.90	12.0		T24	120	EF3-A005	29	4	M-08663-A

GROUP 1 MCC LOADS & ASSOCIATED DCN CHANGES WBN-EEB-MS-T108-0008

PREPARED [illegible] DATE [illegible]
CHECKED [illegible] DATE [illegible]

GP	ENG_TITLE	NODE_NO	BOARD	NO	EQUIPID_NO	HP	FLI	LRA	SF	OVLD SIZE	STROKE TIME	BKR	BKR INST	SET POSIT	DCN
1	RA & Gas Strip Evap Pkg 2A PCV	240	RMOV BD 2A2-A	13D	2-PCV-70-168-A	0.37	0.95	5.7		T15	50	EF3-A003	12	J	N-08663-A
1	CCS HX B DISCH BYPASS CONT VLV	240	RMOV BD 2A2-A	15A	2-PCV-67-143-A	0.1[illegible]	0.45	3.15		T9		EF3-A003	7	LO	P-01136-A
1	CDWE Bldg Supply Valve	241	RMOV BD 2B1-B	3E	2-PCV-70-207-B	0.1[illegible]	0.45	2.6		T9	30	EF3-A003	7	LO	N-08663-A
1	A.Bldg ERCW Sup Hdr 2B Iso Vlv	242	RMOV BD 2B2-B	8B	2-PCV-67-82-B	0.67	1.90	16.0		T24	120	EF3-A005	41	HI	N-08663-A
1	Sply Hdr 2B To Hdr 1A Isln Vlv	242	RMOV BD 2B2-B	13A	2-PCV-67-147-B	0.70	2.30	12.0		T26	120	EF3-A005	29	4	N-09228-A
1	CCS Pmps 2A-A To 2B-B Isln Vlv	242	RMOV BD 2B2-B	14E	2-PCV-70-39-B	0.67	1.90	16.0		T24	120	EF3-A005	41	HI	N-08663-A
1	RHR Hx B Rtn Hdr Isln Vlv	242	RMOV BD 2B2-B	15A	2-PCV-70-75-B	0.37	0.75	5.7		T14	90	EF3-A003	12	J	N-09166-A
1	CCSP 2AA62BB To C-S Inlt Iso V	242	RMOV BD 2B2-B	15D	2-PCV-70-78-B	0.67	1.90	16.0		T24	120	EF3-A005	41	HI	N-08663-A
1	CCSP 2AA62BB To C-S Inlt Iso V	242	RMOV BD 2B2-B	16A	2-PCV-70-76-B	0.67	1.90	16.0		T24	120	EF3-A005	41	HI	N-08663-A

\123\MCCLDS

CHECKED [illegible] DATE 4/4/90

G SETTINGS

GP	NODE NO.	SYS	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	INST set.	TIME sec	DCN
1	128	32	AUX CCNT & SERV AIR CPRSR A	480V SHDW BD 1A2-A	3D	0-MTR-32-25	125.00	1.15	162.00	770	300	0.76	228.0	6	4	P03065-B
1	129	32	AUX CCNT & SERV AIR CPRSR B	480V SHDW BD 1B1-B	3D	0-MTR-32-26	125.00	1.15	162.00	770	300	0.76	228.0	6	4	P03065-B

PREPARED TMB DATE 4-11-90
CHECKED CWSH DATE 4/11/90

ATTACHMENT NO. M08663A - SECTION B
WBN EEB-MS-TI08-0008
480. SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
80V SDBD 1A1-A 3200														
1-MTR-70-46-A	DS-416	600	0.95	4			8			1PL4725A	3-1C#500	PASS		
										1PL4726A	3-1C#500			
80V SDBD 1A2-A 3200														
0-MTR-70-51-S	DS-416	600	0.95	4			8			1PL4733A	3-1C#300	PASS		CABLES IN SERIES
										1PL4734A	3-1C#300			WITH 1PL4735S &
														1PL4736S (500 MCM)
80V SDBD 1B1-B 3200														
1-MTR-70-38-B	DS-416	600	0.95	4			8			1PL4743B	3-1C#300	PASS		
										1PL4742B	3-1C#300			
80V SDBD 2A1-A 3200														
2-MTR-70-59-A	DS-416	600	0.95	4			8			2PL4725A	3-1C#500	PASS		
										2PL4726A	3-1C#500			
80V SDBD 2B1-B 3200														
2-M[illegible]-33-B	DS-416	600	0.95	4			8			2PL4742B	3-1C#500	PASS		
										2PL4743B	3-1C#500			
80V SDBD 2B2-B 3200														
0-MTR-70-51-S	DS-416	600	0.95	4			8			2PL4733B	3-1C#500	PASS		CABLES IN SERIES
										2PL4734B	3-1C#500			WITH 1PL4735S &
														1PL4736S (SAME SIZE)

ATTACHMENT NO. M08663A - SECTION B
NBN EEB-MS-T108-0008
480V MCC CLASS 1E CABLE PROTECTION

T	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
480V C&A VT BD 1A1-A										
	1-MTR-67-431-A	EF3-A100	2			1PL3960A	6-1C#1/0	PASS	-	
						1PL3965A	1-3C #4			
	1-FCV-67-9A-A	EF3-A003	3			1V4005A	1-3C #8	PASS	-	
	1-MTR-67-9A-A	EF3-A010	4			1PL3913A	1-3C #10	PASS	-	#4 IN DUCT BANK
	1-MTR-67-434-A	EF3-A025Z	2			1PL3880A	1-3C #2	PASS	-	#4 IN DUCT BANK
	1-FCV-67-9B-A	EF3-A003	3			1V3980A	1-3C #8	PASS	-	
480V C&A VT BD 1B1-B										
	1-MTR-67-440-B	EF3-A100	2			1PL3905B	6-1C#1/0	PASS	-	
						1PL3910B	1-3C #4			
	1-FCV-67-10A-B	EF3-A003	3			1V3996B	1-3C #8	PASS	-	
	1-MTR-67-10B-B	EF3-A010	4			1PL3920B	1-3C #10	PASS	-	#4 IN DUCT BANK
	1-MTR-67-445-B	EF3-A025Z	2			1PL3940B	1-3C #8	PASS	-	#2 IN DUCT BANK
	1-FCV-67-10B-B	EF3-A003	3			1V3988B	1-3C #8	PASS	-	
480V C&A VT BD 2A1-A										
	2-MTR-67-437-A	EF3-A100	2			2PL3960A	6-1C#1/0	PASS	-	
						2PL3965A	1-3C #4			
	[illegible]32-60-A	EF3-L050	4			2PL3785A	1-3C #2	PASS	-	
	2-FCV-67-9A-A	EF3-A003	3			2V4005A	1-3C #8	PASS	-	
	2-MTR-67-9A-A	EF3-A010	4			2PL3913A	1-3C #10	PASS	-	#4 IN DUCT BANK
	2-MTR-67-439-A	EF3-A025Z	2			2PL3880A	1-3C #10	PASS	-	#2 IN DUCT BANK
	2-FCV-67-9B-A	EF3-A003	3			2V3980A	1-3C #8	PASS	-	
480V C&A VT BD 2B1-B										
	2-MTR-67-447-B	EF3-A100	2			2PL3905B	6-1C#1/0	PASS	-	
						2PL3910B	1-3C #4			
	0-MTR-32-86-B	EF3-L050	4			2PL3795B	1-3C #1/0	PASS	-	
	2-FCV-67-10A-B	EF3-A003	3			2V3996B	1-3C #8	PASS	-	
	2-MTR-67-10B-B	EF3-A010	4			2PL3920B	1-3C #10	PASS	-	#4 IN DUCT BANK
	2-MTR-67-451-B	EF3-A025Z	2			2PL3940B	1-3C #8	PASS	-	#2 IN DUCT BANK
	2-FCV-67-10B-B	EF3-A003	3			2V3988B	1-3C #8	PASS	-	
480V DSL AUX BD 1A1A										
	1-FCV-67-66-A	EF3-A003	LO			PL2146A	1-3C #12	PASS	-	
480V DSL AUX BD 1A2A										
	1-FCV-67-68-A	EF3-A003	LO			PL2140A	1-3C #12	PASS	-	
480V DSL AUX BD 1B1B										
	1-FCV-67-67-B	EF3-A003	LO			PL2167B	1-3C #12	PASS	-	
480V DSL AUX BD 1B2B										
	[illegible]67-65-B	EF3-A003	LO			PL2173B	1-3C #12	PASS	-	

10/90

ATTACHMENT NO. M08663A - SECTION B
WBN EEB-MS-TI08-0008
480V MCC CLASS 1E CABLE PROTECTION

LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
480V DSL AUX BD 2A1A									
2-FCV-67-66-A	EF3-A003	LO			PL2160A	1-3C #12	PASS	-	
480V DSL AUX BD 2A2A									
2-FCV-67-68-A	EF3-A003	LO			PL2153A	1-3C #12	PASS	-	
480V DSL AUX BD 2B1B									
2-FCV-67-67-B	EF3-A003	LO			PL2180B	1-3C #12	PASS	-	
480V DSL AUX BD 2B2B									
2-FCV-67-65-B	EF3-A003	LO			PL2187B	1-3C #12	PASS	-	
480V DSL AUX BD C1-S									
2-FCV-67-73-S			TRS1A	1 AMP	PL3303S	1-3C #12	PASS	-	SHAWMUT FUSE
1-FCV-67-72-S			TRS1A	1 AMP	PL3302S	1-3C #12	PASS	-	SHAWMUT FUSE
480V RX MOV BD 1A1-A									
1-MTR-70-131-A	EF3-L050	LO			1PL6120A	1-3C #8	PASS	-	
480V [illegible]V BD 1A2-A									
1-FCV-67-112-A	EF3-A003	3			1V2090A	1-3C #12	PASS	-	
1-FCV-67-127-A	EF3-A003	3			1V2410A	1-3C #12	PASS	-	
1-FCV-67-296-A	EF3-A003	LO			1V3096A	1-3C #12	PASS	-	
					1V3097A	3-1C #12			
1-FCV-67-142-A	EF3-A003	LO			1V3078A	1-3C #12	PASS	-	
1-FCV-67-146-A	EF3-A003	3			1V2422A	1-3C #12	PASS	-	
TO COMPT 5B	EF3-A005	4					PASS	-	
1-FCV-70-90-A					1V2650A	1-3C #12		-	SEE COMPT 16A
1-FCV-70-133-A					1V2660A	1-3C #12		-	SEE COMPT 16B
0-FCV-67-151-A	EF3-A005	LO			1V2791A	1-3C #12	PASS	-	
0-FCV-67-205-A	EF3-A003	3			1V2434A	1-3C #12	PASS	-	
1-FCV-70-92-A	EF3-A003	LO			1V2867A	1-3C #12	PASS	-	
0-FCV-70-111-A	EF3-A003	LO			1V2216A	1-3C #12	PASS	-	
1-FCV-70-139-A	EF3-A003	3			1V2878A	1-3C #12	PASS	-	
TO COMPT 6F	EF3-A005	4					PASS	-	
1-FCV-70-168-A	EF3-A003	3			1V1940A	1-3C #12	PASS	-	
1-FCV-70-2-A	EF3-A003	3			1V2460A	1-3C #12	PASS	-	
1-FCV-70-4-A	EF3-A003	3			1V2472A	1-3C #12	PASS	-	
1-FCV-70-8-A	EF3-A003	3			1V2478A	1-3C #12	PASS	-	
1-FCV-70-10-A	EF3-A003	3			1V2490A	1-3C #12	PASS	-	
1-FCV-67-143-A	EF3-A003	LO			1V1876A	3-1C #10	PASS	-	
1-FCV-70-23-A	EF3-A003	3			1V2520A	1-3C #12	PASS	-	
1-FCV-70-25-A	EF3-A003	3			1V2526A	1-3C #12	PASS	-	
1-FCV-67-458-A	EF3-A005	LO			1V2580A	1-3C #12	PASS	-	
[illegible]MPT 11D	EF3-A005	4					PASS	-	
[illegible]PT 11E	EF3-A003	LO					PASS	-	
1-[illegible]V-70-143-A	EF3-A003	3			1V2292A	1-3C #12	PASS	-	
1-FCV-70-156-A	EF3-A003	2			1V2562A	1-3C #12	PASS	-	

ATTACHMENT NO. M08663A - SECTION B
WBN EEB-MS-T109-0008
480V MCC CLASS 1E CABLE PROTECTION

PT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
A	1-FCV-70-183-A	EF3-A003	LO			1V2568A	1-3C #12	PASS	-	
B	0-FCV-70-197-A	EF3-A003	3			1V2574A	1-3C #12	PASS	-	
	1-FCV-70-215-A	EF3-A003	3			1V2566A	1-3C #12	PASS	-	
	1-FCV-67-147-A					1V2428A	1-3C #12		-	SEE COMPT 11B
	1-FCV-67-125-A	EF3-A003	3			1V2200A	1-3C #12	PASS	-	
	1-FCV-67-126-A	EF3-A003	3			1V2208A	1-3C #12	PASS	-	
	1-FCV-67-223-A					1V2968A	1-3C #12		-	SEE COMPT 13A
	1-FCV-67-22-A	EF3-A003	3			1V2398A	1-3C #12	PASS	-	#8 IN DUCT BANK
	1-FCV-67-87-A	EF3-A003	LO			1V2261A	1-3C #12	PASS	-	
						1V2262A	3-1C #12			
	1-FCV-67-130-A	EF3-A003	LO			1V3020A	1-3C #12	PASS	-	
	1-FCV-67-81-A	EF3-A003	LO			1V1980A	1-3C #12	PASS		
	1-FCV-67-83-A	EF3-A003	3			1V1990A	1-3C #12	PASS	-	
	1-FCV-67-95-A	EF3-A003	LO			1V3210A	1-3C #12	PASS	-	
						1V3211A	3-1C #12			
	1-FCV-67-133-A	EF3-A003	LO			1V3035A	1-3C #12	PASS	-	
	1-FCV-67-91-A	EF3-A003	3			1V2020A	1-3C #12	PASS	-	
	1-FCV-67-104-A	EF3-A003	3			1V2030A	1-3C #12	PASS	-	
	[illegible]-67-295-A	EF3-A003	LO			1V3086A	1-3C #12	PASS	-	
						1V3087A	3-1C #12			
	1-FCV-67-139-A	EF3-A003	LO			1V3060A	1-3C #12	PASS	-	
480V RX MOV BD 1B1-B										
	1-FCV-70-207-B	EF3-A003	LO			1V4050B	1-3C #12	PASS		
480V RX MOV BD 1B2-B										
A	1-FCV-67-99-B	EF3-A003	3			1V2050B	1-3C #12	PASS	-	
B	1-FCV-67-107-B	EF3-A003	3			1V2060B	1-3C #12	PASS	-	
D	1-FCV-67-298-B	EF3-A003	LO			1V3120B	1-3C #12	PASS	-	
						1V3121B	3-1C #12			
F	1-FCV-67-141-B	EF3-A003	LO			1V3069B	1-3C #12	PASS	-	
A	1-FCV-67-128-B	EF3-A003	3			1V2416B	1-3C #12	PASS	-	
B	0-FCV-67-208-B	EF3-A003	3			1V2440B	1-3C #12	PASS	-	
B	1-FCV-67-478-B	EF3-A010	LO			1V3350B	1-3C #12	PASS	-	
D	TO COMPT 6D	EF3-A010	LO					PASS	-	
B	1-FCV-70-13-B	EF3-A003	3			1V2508B	1-3C #12	PASS	-	
D	1-FCV-70-89-B	EF3-A003	LO			1V2854B	1-3C #12	PASS	-	
						1V2855B	3-1C #12			
F	1-FCV-70-140-B	EF3-A003	3			1V2888B	1-3C #12	PASS	-	
A	0-FCV-70-12-B	EF3-A003	3			1V2502B	1-3C #12	PASS	-	
B	1-FCV-70-3-B	EF3-A003	3			1V2466B	1-3C #12	PASS	-	
D	1-FCV-70-26-B	EF3-A003	3			1V2532B	1-3C #12	PASS	-	
E	1-FCV-70-34-B	EF3-A005	LO			1V3220B	1-3C #12	PASS	-	
A	1-FCV-70-75-B	EF3-A003	3			1V1970B	1-3C #12	PASS	-	
B	1-FCV-70-9-B	EF3-A003	3			1V2484B	1-3C #12	PASS	-	
D	[illegible]-70-64-B	EF3-A010	2			1V2544B	1-3C #12	PASS	-	
E	[illegible]-70-153-B	EF3-A003	3			1V2556B	1-3C #12	PASS	-	
A	1-FCV-70-74-B	EF3-A005	LO			1V2550B	1-3C #12	PASS	-	

ATTACHMENT NO. M08663A - SECTION B
WBN EEB-MS-T108-0008
480V MCC CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
16B	TO COMPT 6E	EF3-A003	LO					PASS	-	
16E	0-FCV-70-22-B	EF3-A003	3			1V2514B	1-3C #12	PASS	-	
17B	1-FCV-70-27-B	EF3-A003	3			1V2538B	1-3C #12	PASS	-	
17D	0-FCV-67-144-B	EF3-A003	LO			1V1877B	3-1C #10	PASS	-	
5B	0-FCV-70-206-B	EF3-A003	LO			1V4020B	1-3C #12	PASS	-	
5E	1-FCV-67-123-B	EF3-A003	3			1V2160B	1-3C #12	PASS	-	
5F	1-FCV-67-124-B	EF3-A003	3			1V2170B	1-3C #12	PASS	-	
6D	1-FCV-70-87-B					1V2640B	1-3C #12		-	SEE COMPT 12D
						1V2647B	3-1C #12			
6E	1-FCV-70-134-B					1V2670B	1-3C #12		-	SEE COMPT 16B
7D	1-FCV-67-103-B	EF3-A003	LO			1V2275B	1-3C #12	PASS	-	
						1V2276B	3-1C #12			
7F	1-FCV-67-131-B	EF3-A003	LO			1V3028B	1-3C #12	PASS	-	
8A	1-FCV-67-24-B	EF3-A003	3			1V2404B	1-3C #12	PASS	-	#8 IN DUCT BANK
8B	1-FCV-67-82-B	EF3-A005	LO			1V2000B	1-3C #12	PASS	-	
8D	1-FCV-67-111-B	EF3-A003	LO			1V2283B	1-3C #12	PASS	-	
						1V2284B	3-1C #12			
8F	1-FCV-67-134-B	EF3-A003	LO			1V3043B	1-3C #12	PASS	-	
9A	1-FCV-67-88-B	EF3-A003	3			1V2010B	1-3C #12	PASS	-	
9B	1-FCV-67-96-B	EF3-A003	3			1V2040B	1-3C #12	PASS	-	
9D	1-FCV-67-297-B	EF3-A003	LO			1V3106B	1-3C #12	PASS	-	
						1V3107B	3-1C #12			
9F	1-FCV-67-138-B	EF3-A003	LO			1V3051B	1-3C #12	PASS	-	
18 480V RX MOV BD 2A2-A										
10B	2-FCV-67-127-A	EF3-A003	3			2V2410A	1-3C #12	PASS	-	
11A	2-FCV-67-146-A	EF3-A010	2			2V2422A	1-3C #12	PASS	-	
11F	0-FCV-70-208-A	EF3-A003	LO			2V4020A	1-3C #12	PASS	-	
12D	2-FCV-70-92-A	EF3-A003	3			2V2867A	1-3C #12	PASS	-	
13A	2-FCV-67-223-A	EF3-A005	4			2V2968A	1-3C #12	PASS	-	
13D	2-FCV-70-168-A	EF3-A003	3			2V1940A	1-3C #12	PASS	-	
14A	2-FCV-70-2-A	EF3-A003	3			2V2460A	1-3C #12	PASS	-	
14B	2-FCV-70-4-A	EF3-A003	3			2V2472A	1-3C #12	PASS	-	
14D	2-FCV-70-15-A	EF3-A003	3			2V2478A	1-3C #12	PASS	-	
14E	2-FCV-70-195-A	EF3-A003	3			2V2490A	1-3C #12	PASS	-	
15A	2-FCV-67-143-A	EF3-A003	LO			2V1877B	3-1C #10	PASS	-	
15B	2-FCV-70-18-A	EF3-A003	3			2V2520A	1-3C #12	PASS	-	
15D	2-FCV-70-16-A	EF3-A003	3			2V2526A	1-3C #12	PASS	-	
16E	2-FCV-70-156-A	EF3-A003	3			2V2562A	1-3C #12	PASS	-	
5E	2-FCV-67-125-A	EF3-A003	3			2V2200A	1-3C #12	PASS	-	
7B	2-FCV-67-22-A	EF3-A003	3			2V2398A	1-3C #12	PASS	-	#8 IN DUCT BANK
8A	2-FCV-67-81-A	EF3-A005	LO			2V1980A	1-3C #12	PASS	-	
18 480V RX MOV BD 2B1-B										
3E	2-FCV-70-207-B	EF3-A003	LO			2V4050B	1-3C #12	PASS	-	

ATTACHMENT NO. M08663A - SECTION B
NBN EEB-MS-TI08-0008
480V MCC CLASS 1E CABLE PROTECTION

T	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
480V RX MOV BD 2B2-B										
)	2-FCV-67-128-B	EF3-A003	3			2V2416B	1-3C #12	PASS	-	
)	0-FCV-67-152-B	EF3-A005	3			2V2791B	1-3C #12	PASS		
)	2-FCV-67-147-B	EF3-A005	3			2V2428B	1-3C #12	PASS		
)	2-FCV-70-14-B	EF3-A003	3			2V2508B	1-3C #12	PASS	-	
)	2-FCV-70-3-B	EF3-A003	3			2V2466B	1-3C #12	PASS	-	
)	2-FCV-70-28-B	EF3-A003	3			2V2532B	1-3C #12	PASS	-	
:	2-FCV-70-39-B	EF3-A005	HI			2V3220B	1-3C #12	PASS	-	
)	2-FCV-70-75-B	EF3-A003	3			2V1970B	1-3C #12	PASS	-	
)	2-FCV-70-196-B	EF3-A003	3			2V2484B	1-3C #12	PASS	-	
)	2-FCV-70-78-B	EF3-A005	HI			2V2544B	1-3C #12	PASS	-	
.	2-FCV-70-153-B	EF3-A003	3			2V2556B	1-3C #12	PASS	-	
)	2-FCV-70-76-B	EF3-A005	HI			2V2550B	1-3C #12	PASS	-	
)	0-FCV-70-194-B	EF3-A003	3			2V2514B	1-3C #12	PASS	-	
)	2-FCV-70-29-B	EF3-A003	3			2V2538B	1-3C #12	PASS	-	
	2-FCV-67-123-B	EF3-A003	3			2V2160B	1-3C #12	PASS	-	
	2-FCV-67-124-B	EF3-A003	3			2V2170B	1-3C #12	PASS	-	
	2-FCV-67-24-B	EF3-A003	3			2V2404B	1-3C #12	PASS	-	#8 IN DUCT BANK
	[illegible]-67-82-B	EF3-A005	HI			2V2000B	1-3C #12	PASS	-	

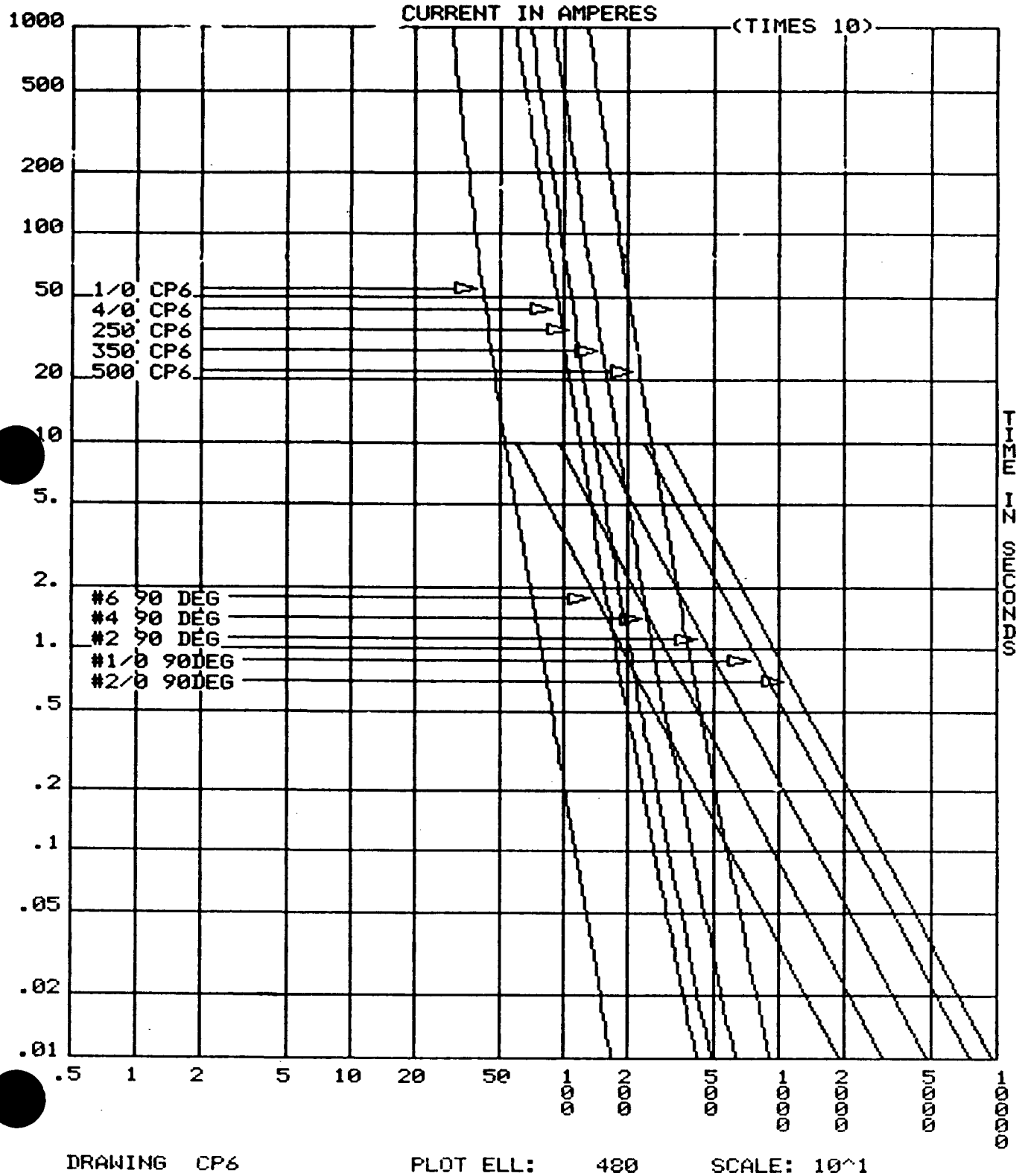
ATTACHMENT M08663A - SECTION C

WAN EEB-MS-T108-0008

PAGE 12

PREPARED TMB DATE 4-2-90

CHK'D WJH DATE 4/11/90



DRAWING CP6 PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M08663A - SECTION C

WBN ECB-MS-TI08-0008

PAGE 13
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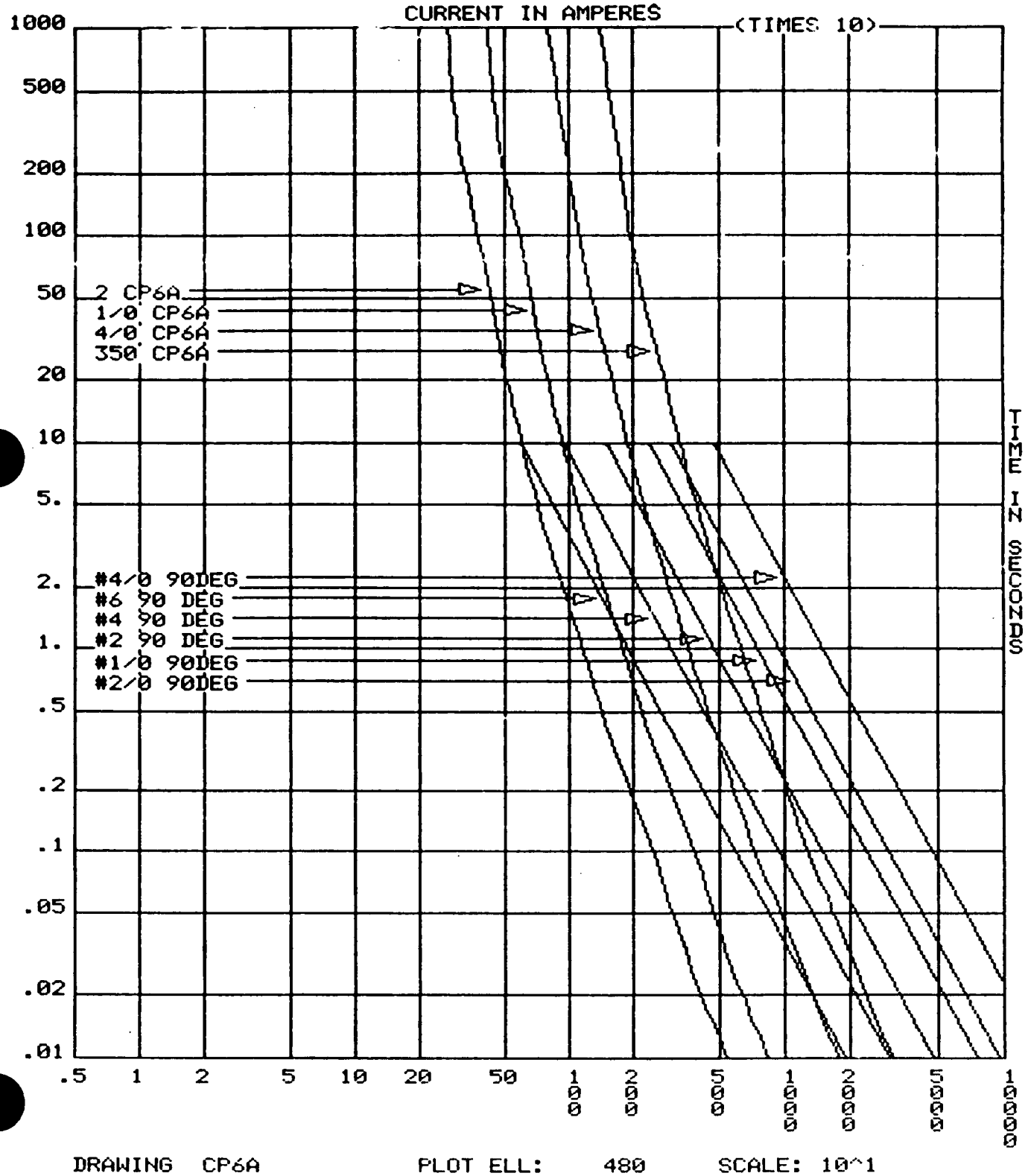
CHECKED [illegible] DATE 4/11/90



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ATTACHMENT M08663A

SECTION C

WAN EEB-MS-TI08-0008

PAGE 14

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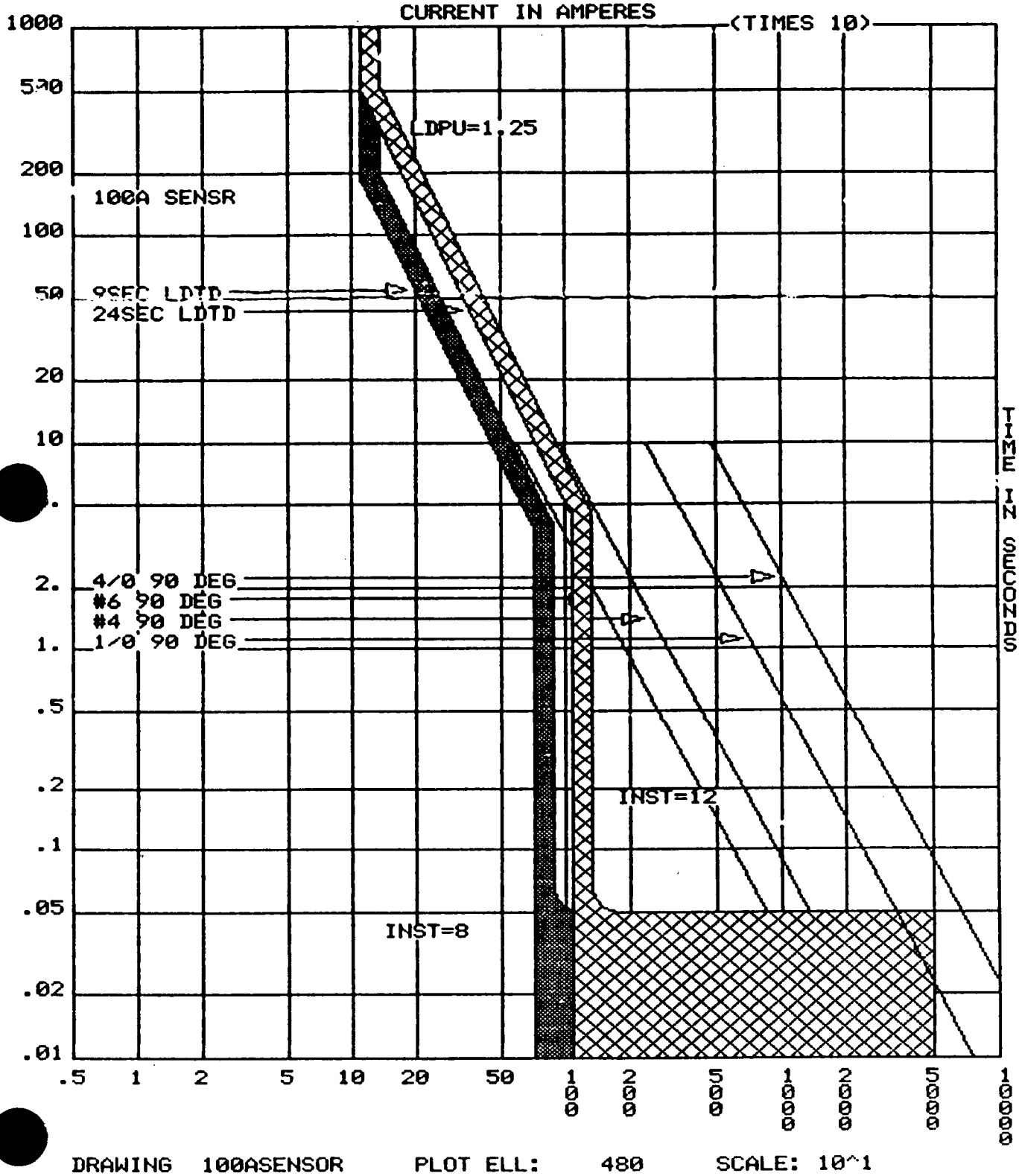
CHK'D CWR DATE 4/11/90



DRAWING 100ASENSOR PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M08663A

SECTION C

WBN GEB-MS-TI08-0008

PAGE 15

PREPARED TMB DATE 4-11-90

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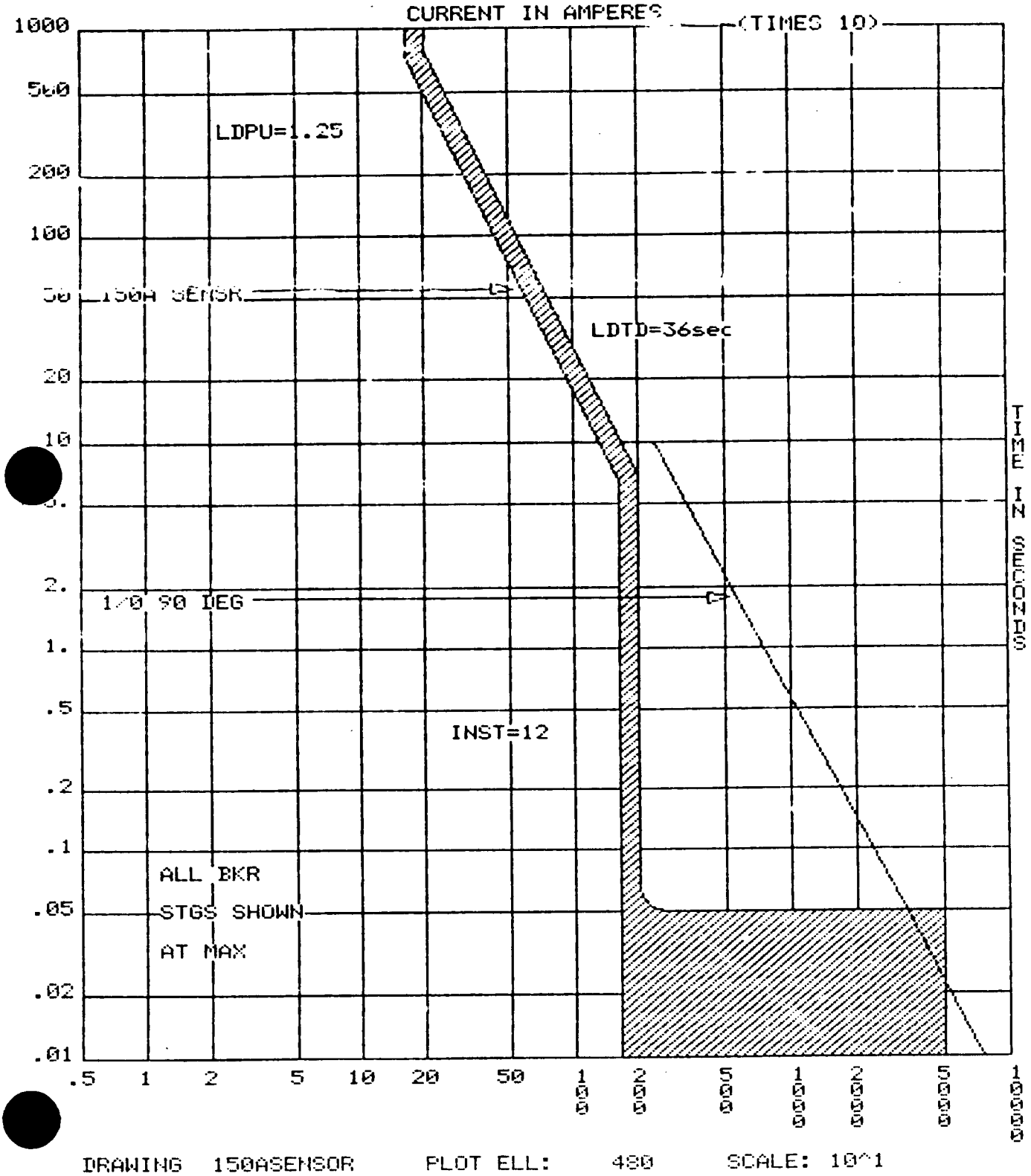

DRAWING 150ASENSOR PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M08683A
SECTION C

WAN EEB-MS-TI08-0008

PAGE 16
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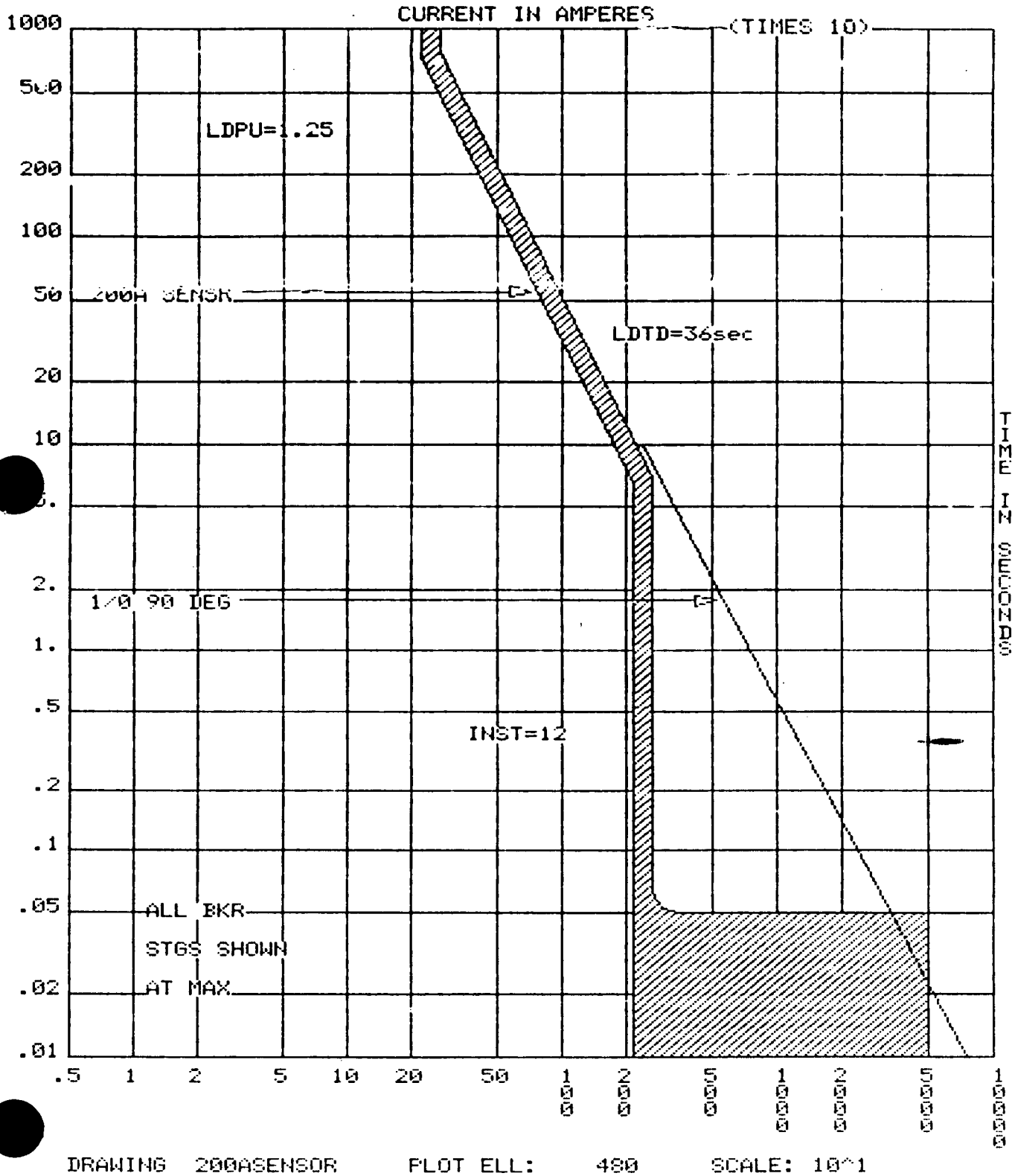
CHECKED [illegible] DATE 4/11/90



DRAWING 200ASENSOR PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M08663A
SECTION C
WAN EEB MS-TI08-0008

PREPARED TMB DATE 4-11-90
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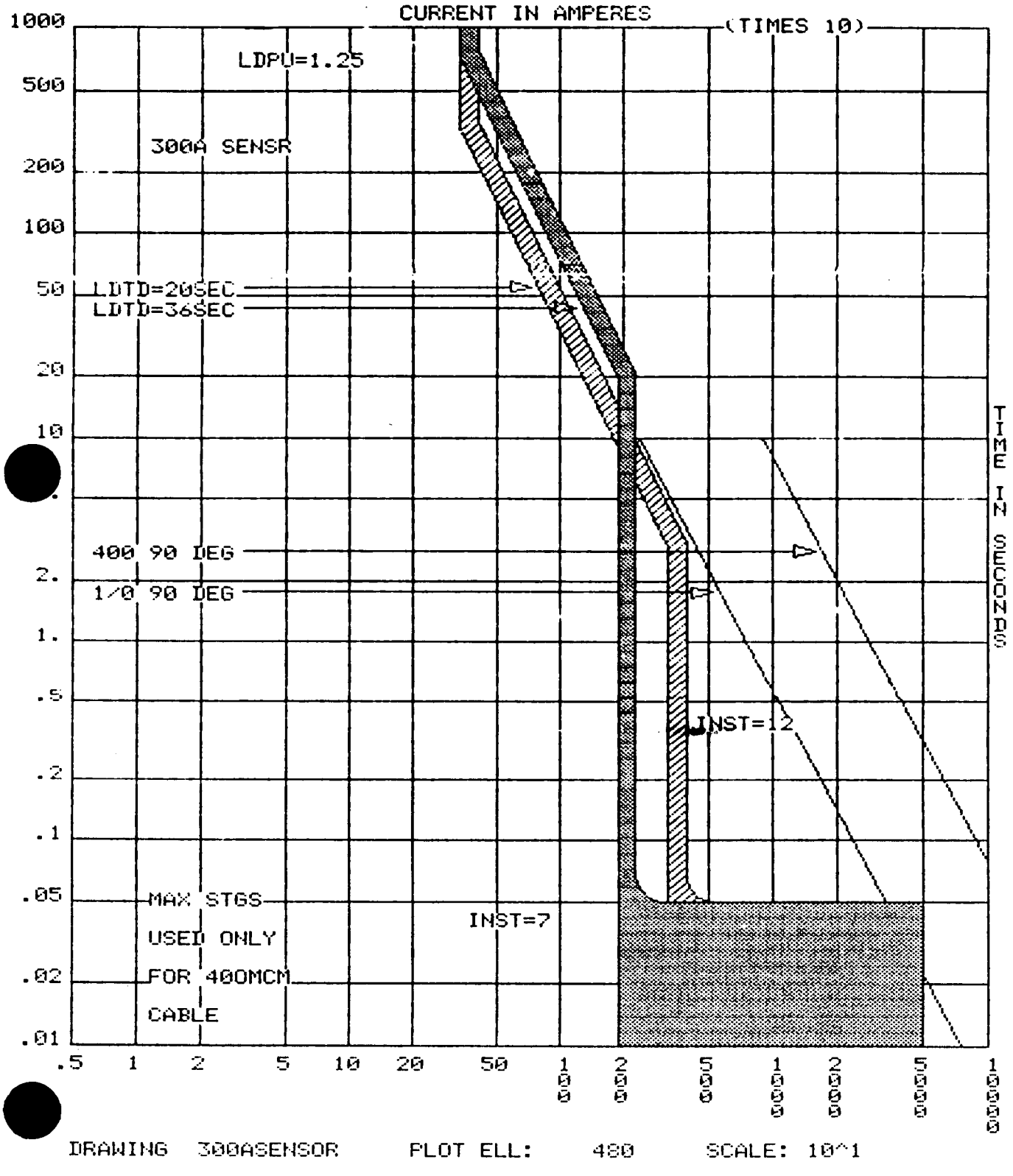

DRAWING 300ASENSOR PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M08663A

SECTION C

WBN EEB-MS-TI08-0008

PAGE 18

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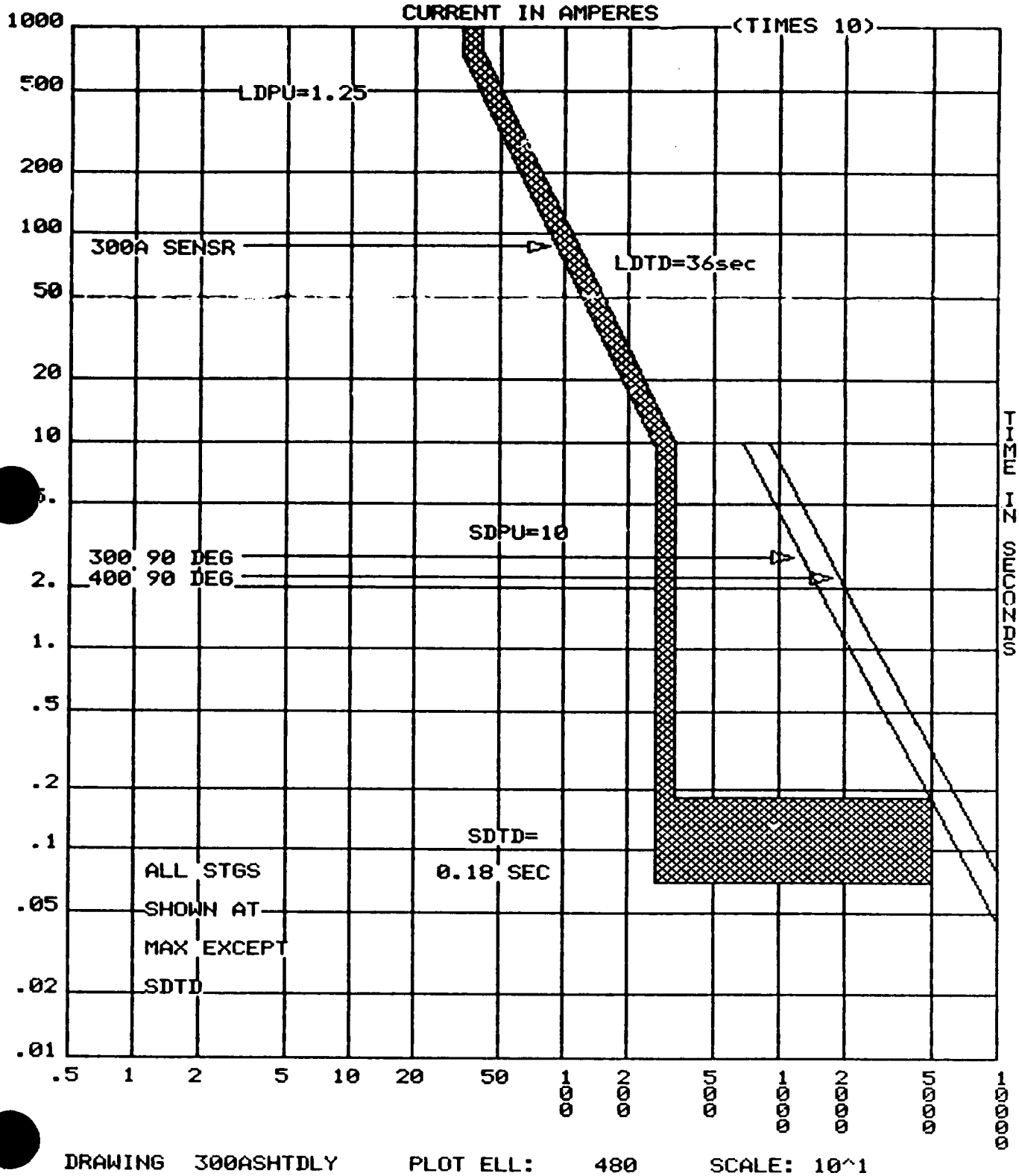
CHECKED [illegible] DATE 4/11/



DRAWING 300ASHTDLY PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M08663A
SECTION C
WBN 6&8-MS-TI08-0008

PAGE 19
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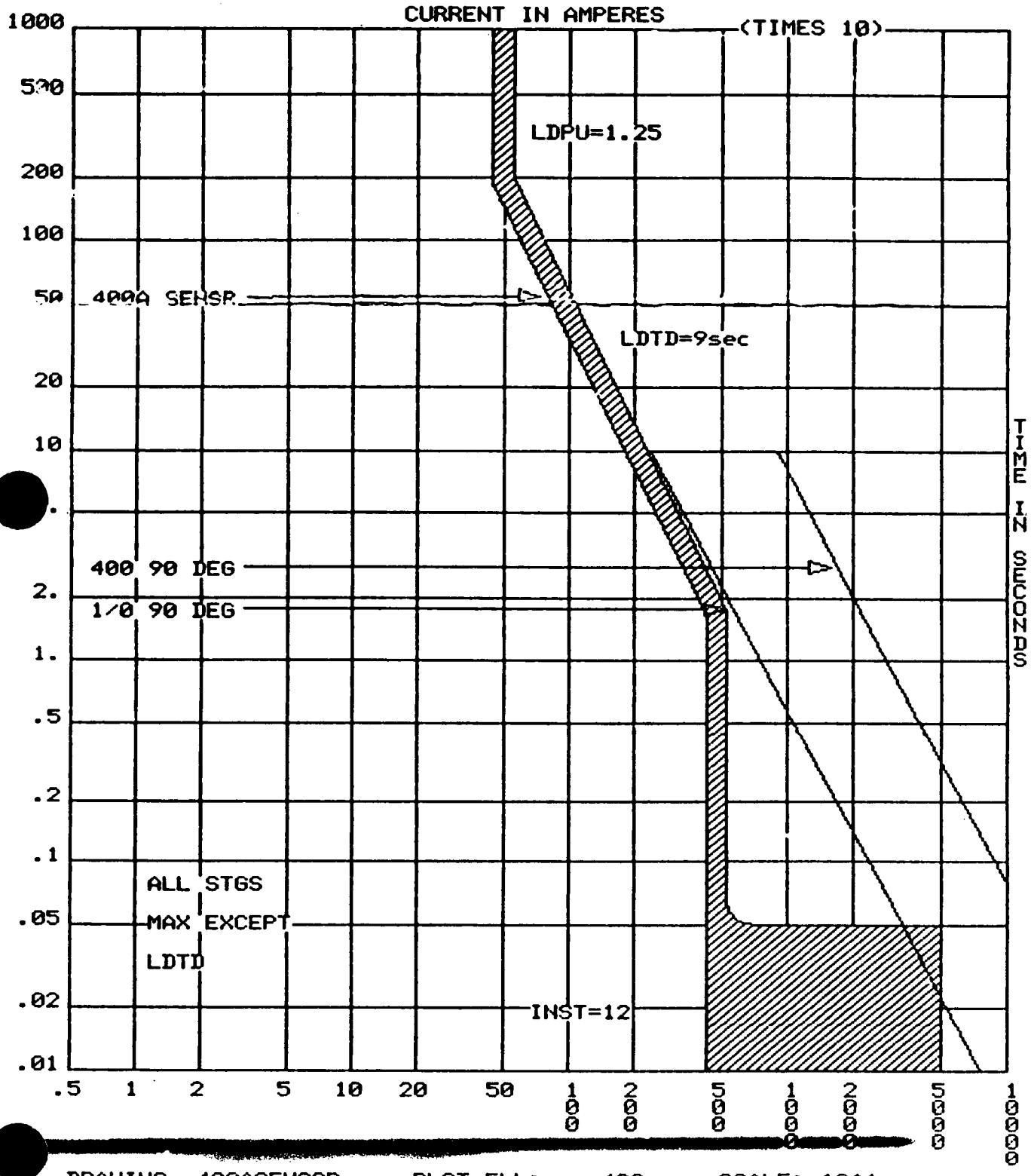

DRAWING 400ASENSOR PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M08663A
SECTION C
WBN EEB-MS-TI08-0008

PAGE 20
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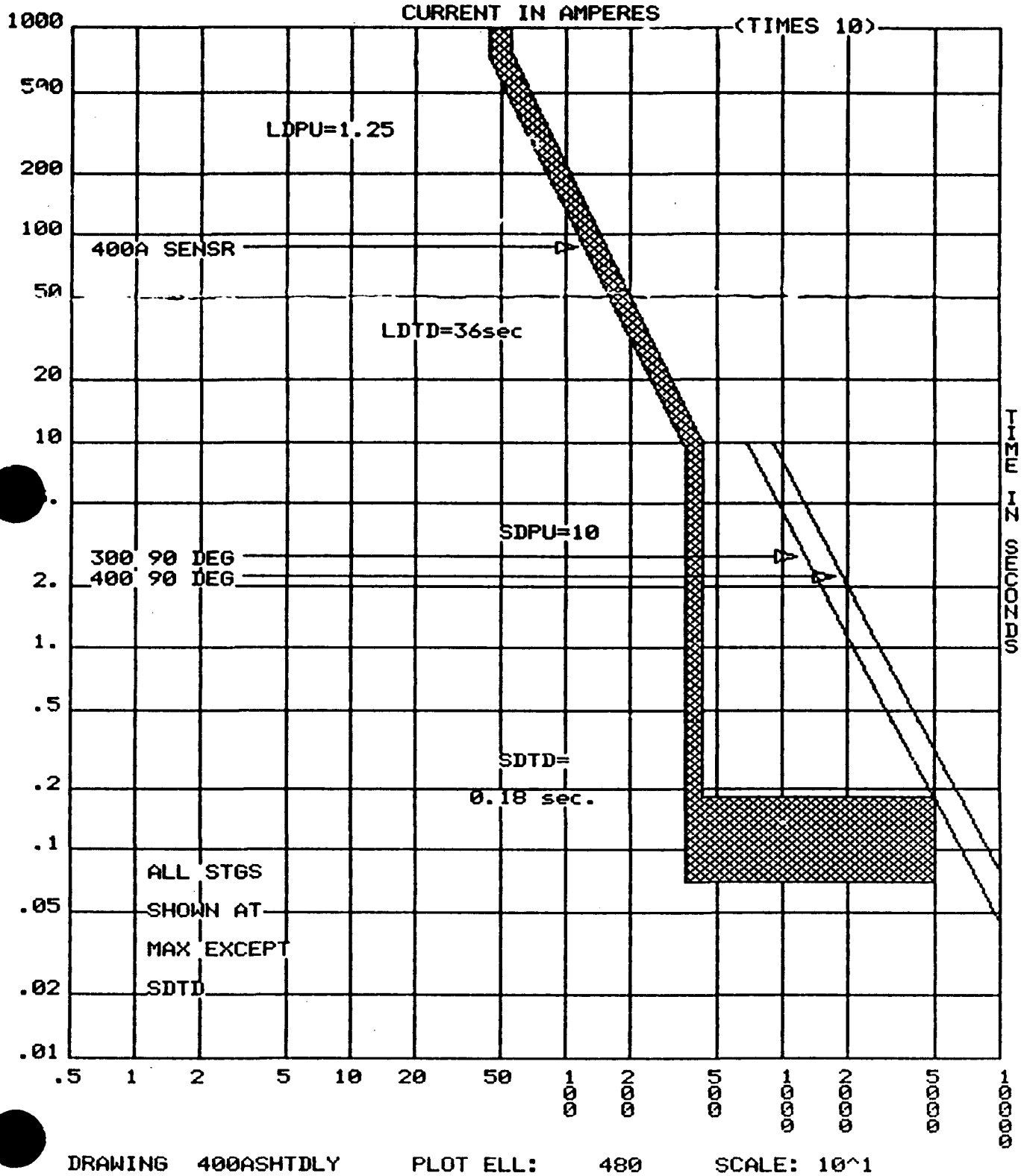

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ATTACHMENT M08663A

SECTION C

WBN EGA-MS-TI08-0008

PAGE 21

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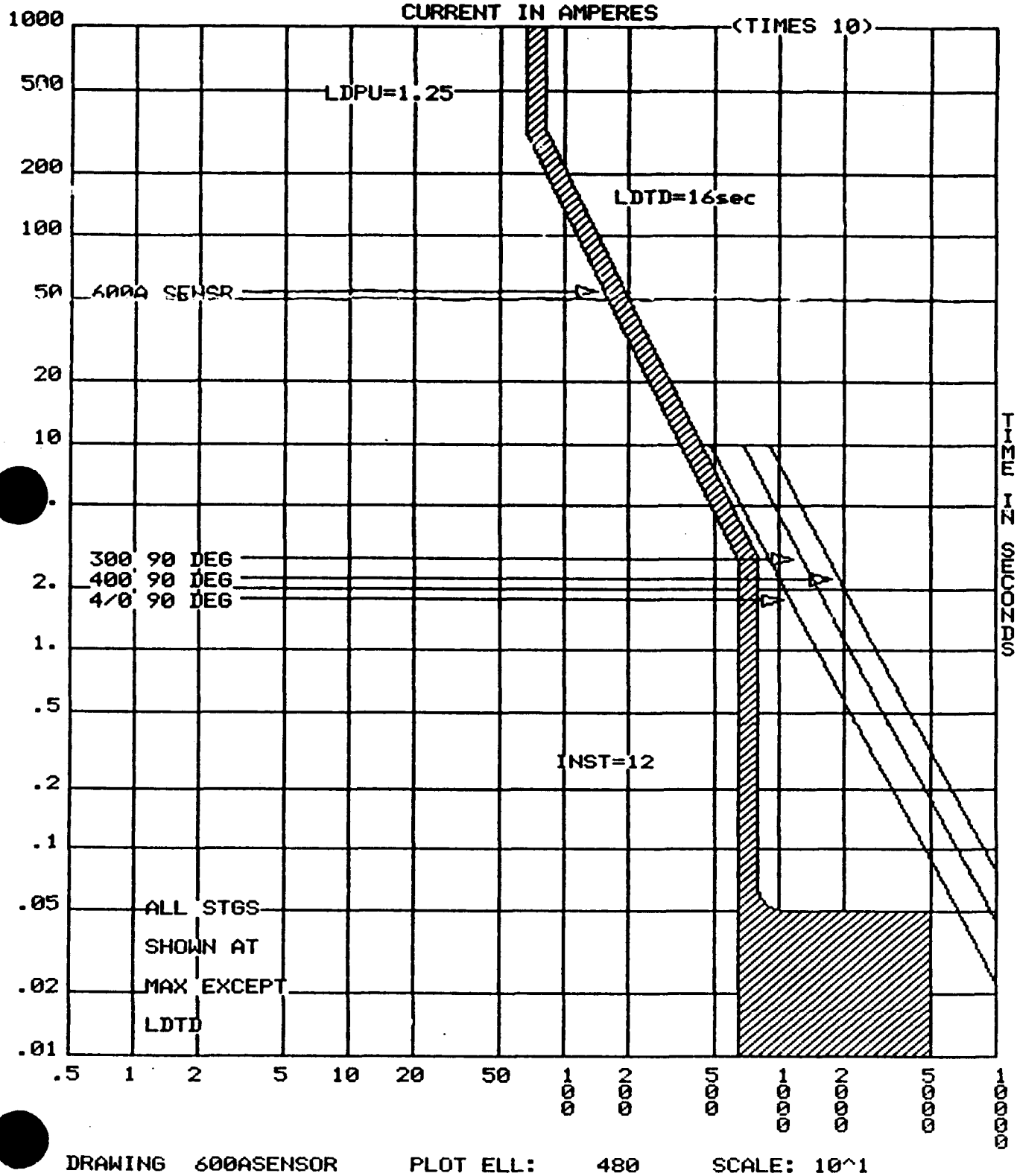
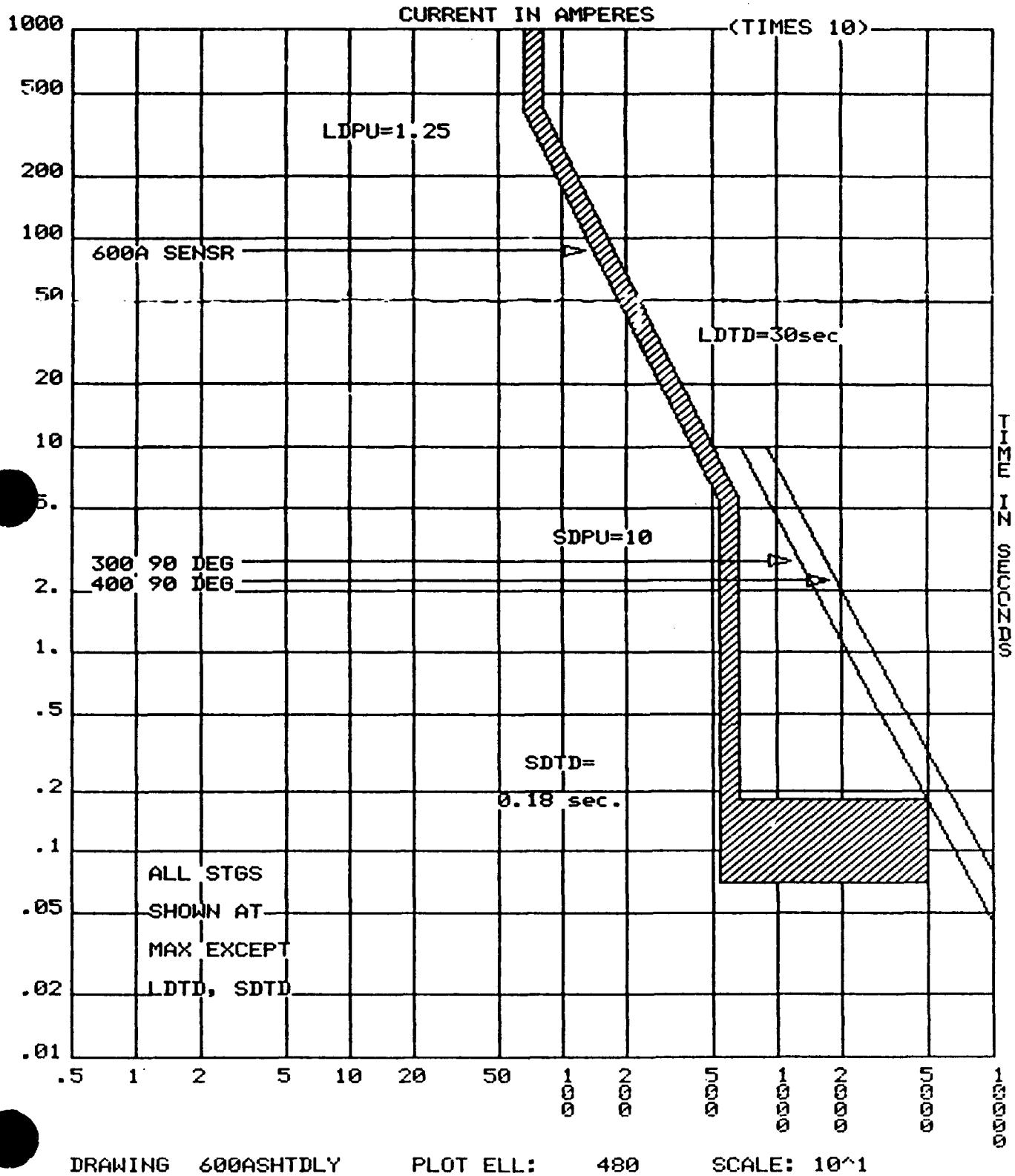
CHECKED [illegible] DATE 4/11/90



DRAWING 600ASENSOR PLOT ELL: 480 SCALE: 10^1



DRAWING 600ASHTDLY PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M08663A
SECTION C
WAN EEB-MS-TI08-0008

PAGE 23
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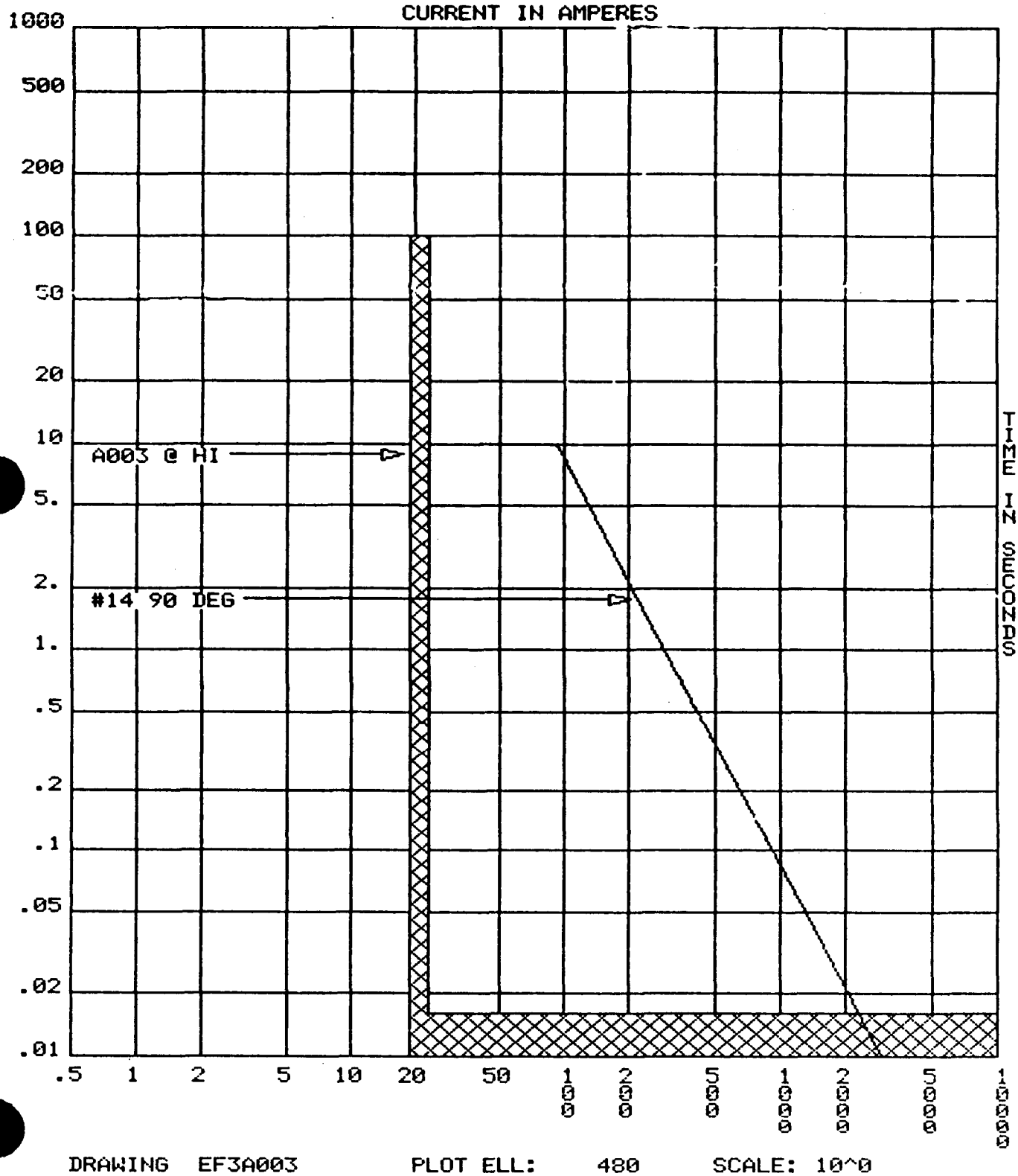


DRAWING EF3A003 PLOT ELL: 480 SCALE: 10^0

ATTACHMENT M08663A

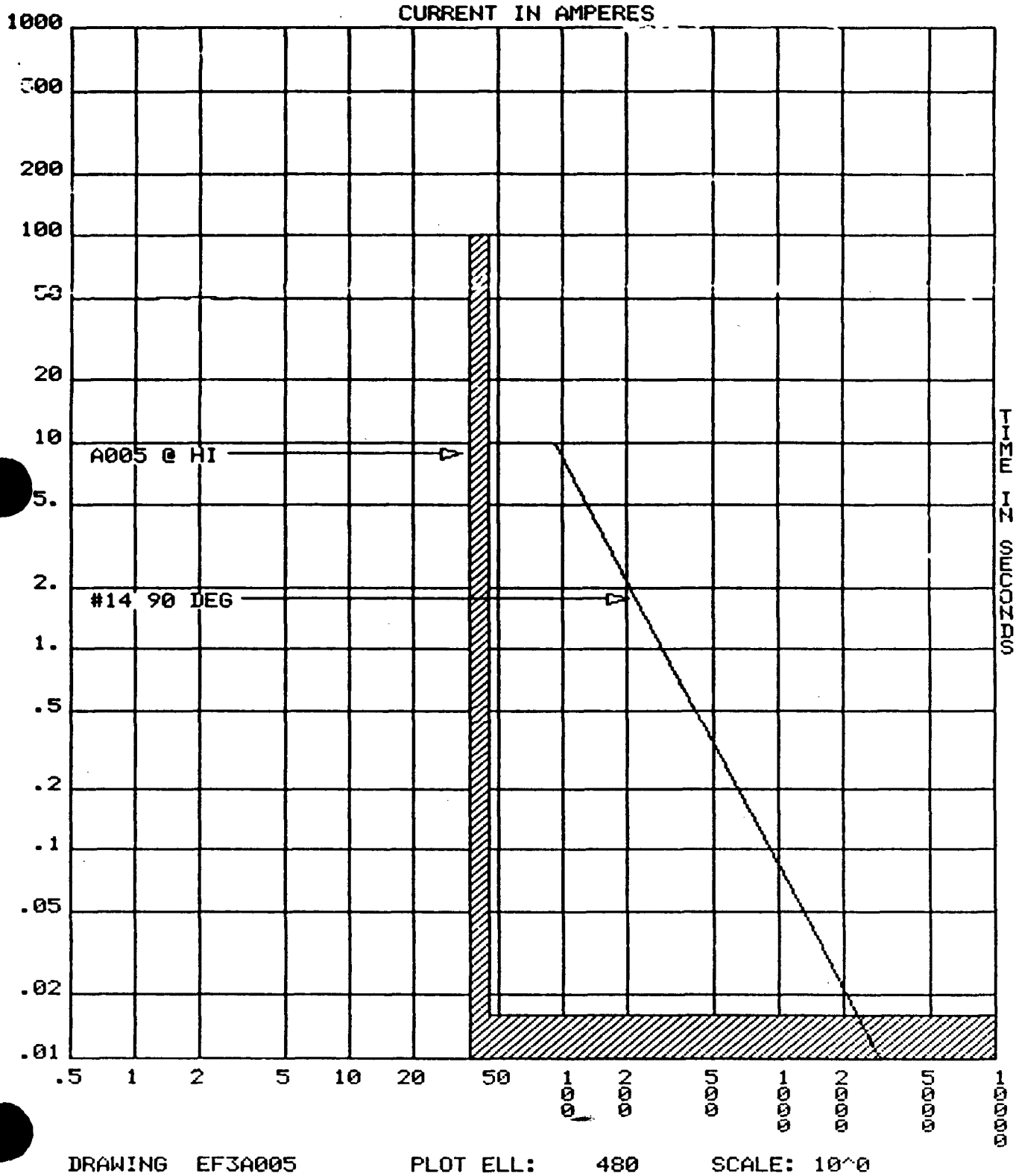
SECTION C

WBNEEB-MS-TI08-0008

PAGE 24

PREPARED TMB DATE 4-

CHECKED WSH DATE 4/11



DRAWING EF3A005 PLOT ELL: 480 SCALE: 10^0

ATTACHMENT M08663A
SECTION C

WBN EEB-MS-TI08-0008[redacted]

PAGE 25
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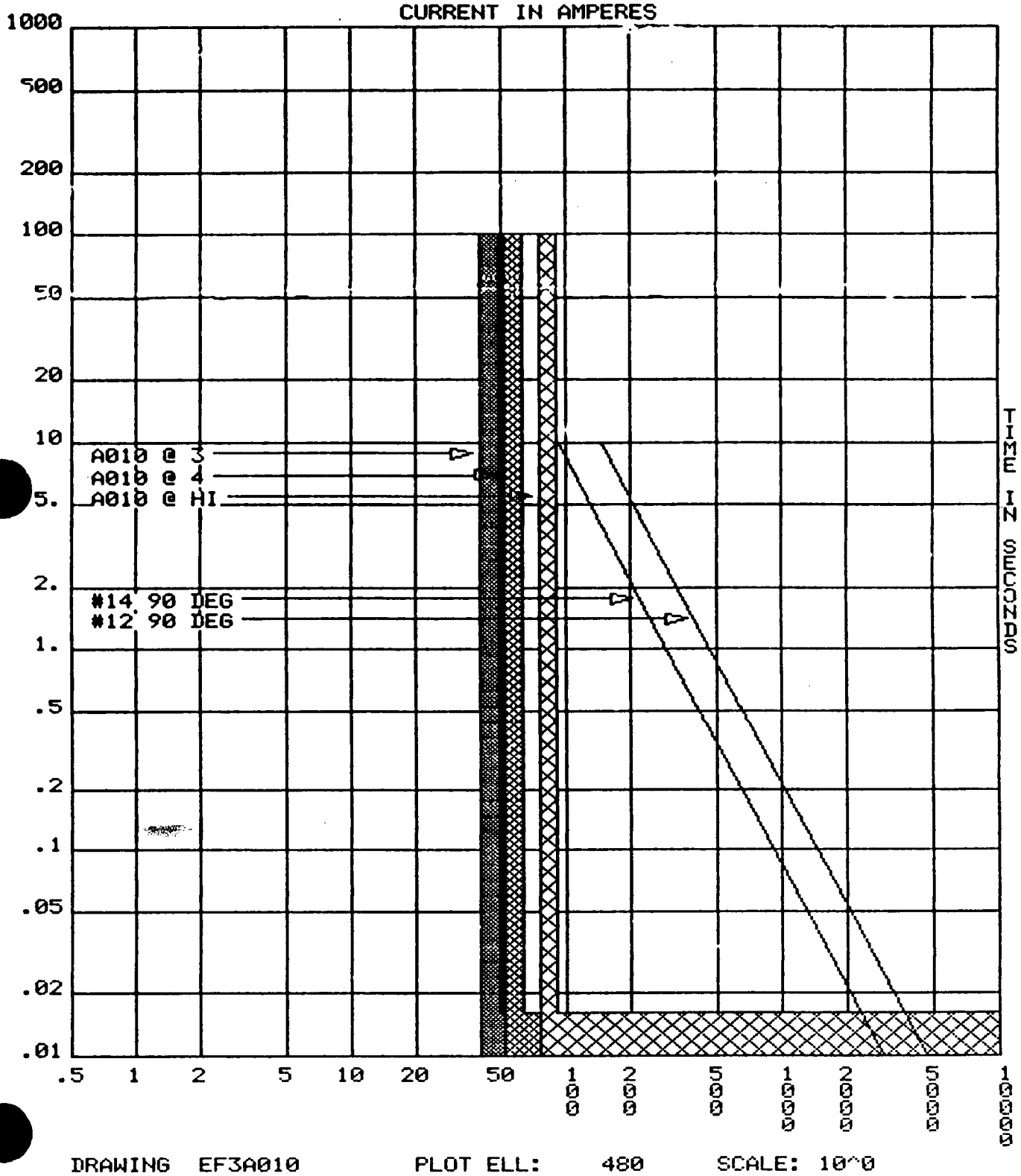
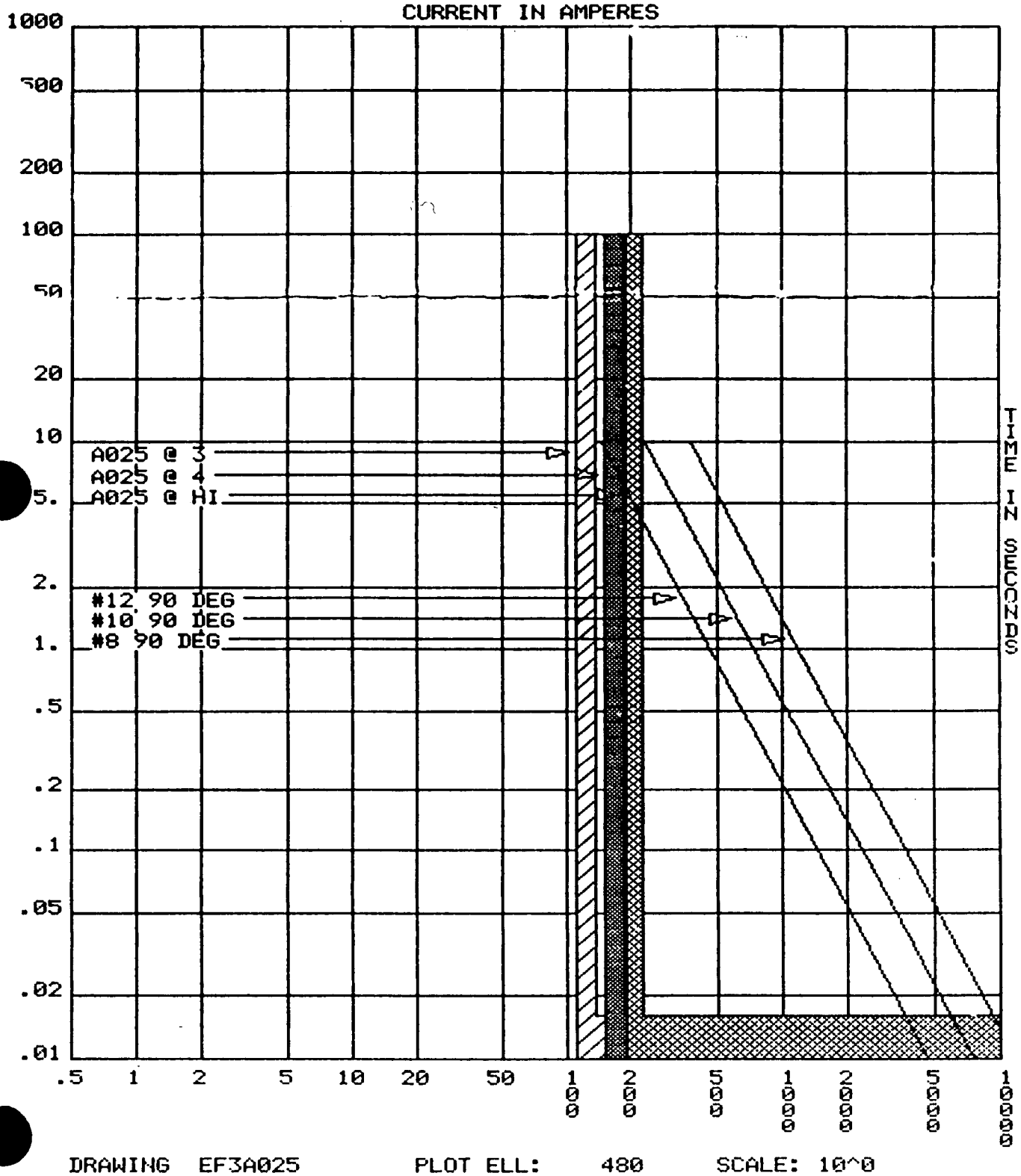


DRAWING EF3A010 PLOT ELL: 480 SCALE: 10^0

ATTACHMENT M08663A
SECTION C
WAN REB-MS-TI08-0008

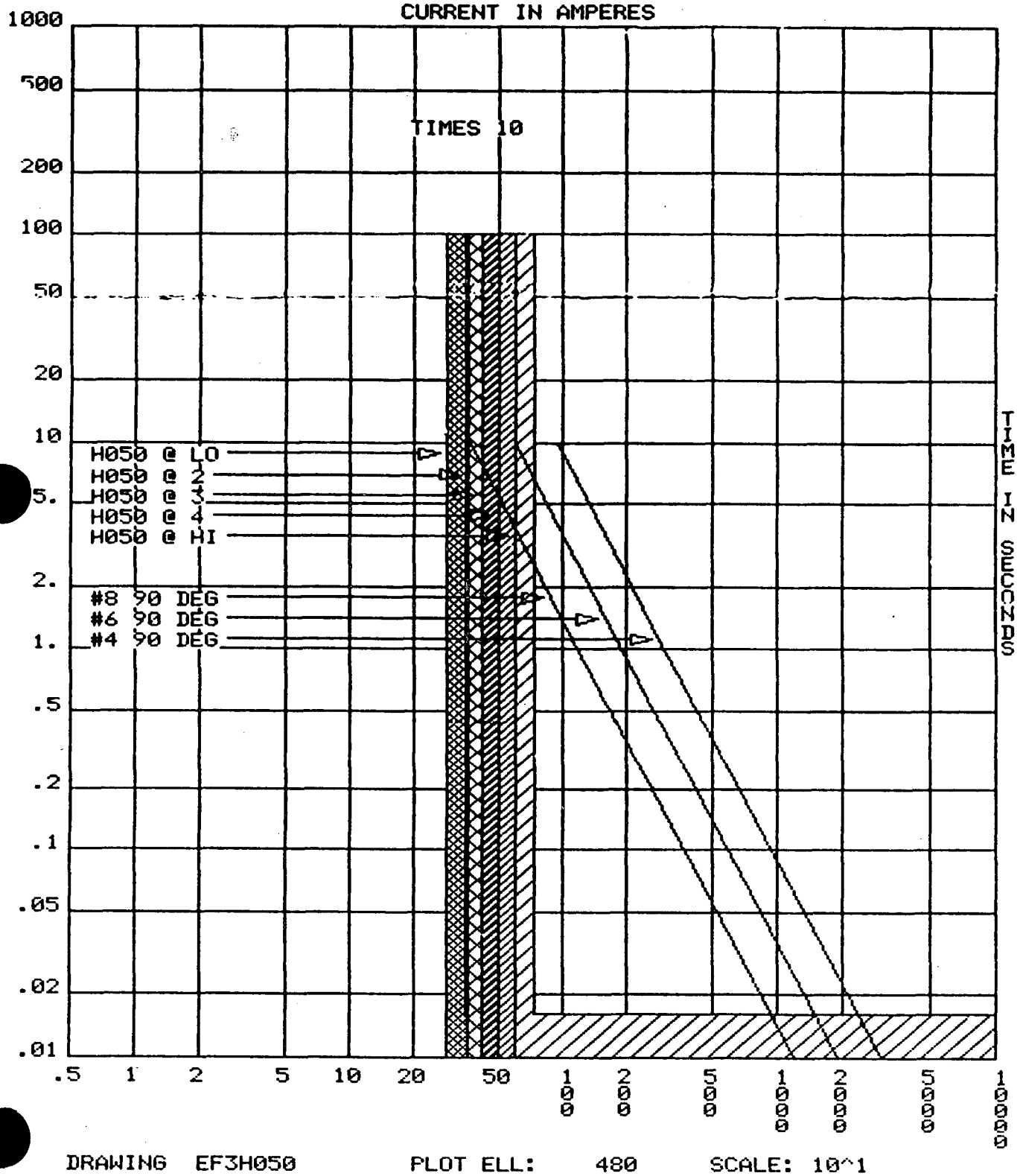
PAGE 26
PREPARED TMB DATE 4-7-
CHECKED WSH DATE 4/11



DRAWING EF3A025 PLOT ELL: 480 SCALE: 10^0

ATTACHMENT M08663A
SECTION C
WBN EEB-MS-TI08-0008

PAGE 27
PREPARED TMB DATE 4-7
CHECKED WLH DATE 4/11/



DRAWING EF3H050 PLOT ELL: 480 SCALE: 10^1

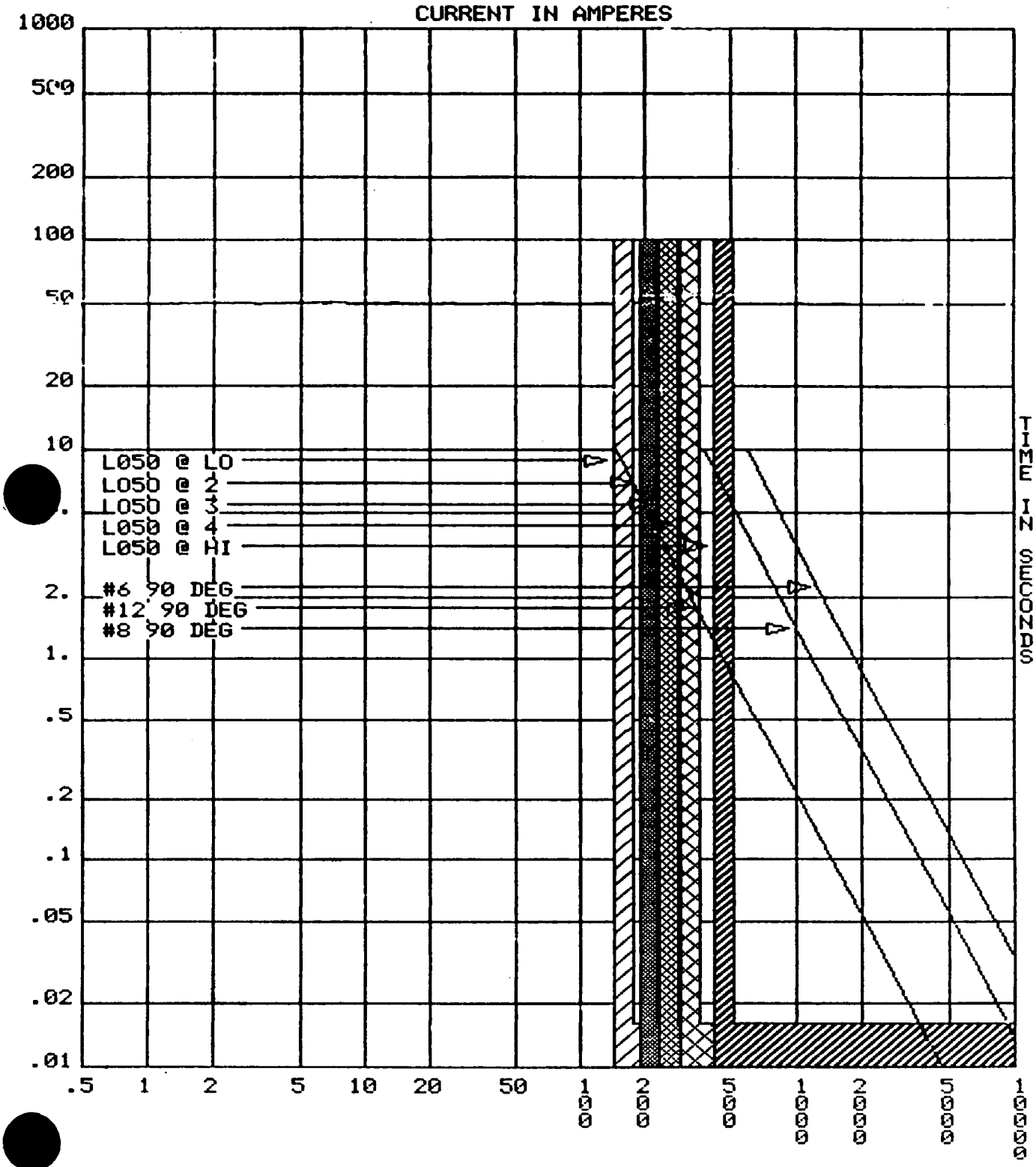
50-390 WATTS BAR 1 TVA

Fire Protection/Appendix Program Calculations
Books 1, 2, 3, 4, and 5

Rec'd w/ltr dtd 6/15/92...9206260059 2

ATTACHMENT M08663A
SECTION C
WBN EEBSMS-TI08-0008

PAGE 28
PREPARED [illegible] DATE 4-7-90
CHECKED [illegible] DATE 4/11/90



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ATTACHMENT M08663A
SECTION C
WBN ECB-MS-TI08-0008

PAGE 29
PREPARED TMB DATE 4-7-
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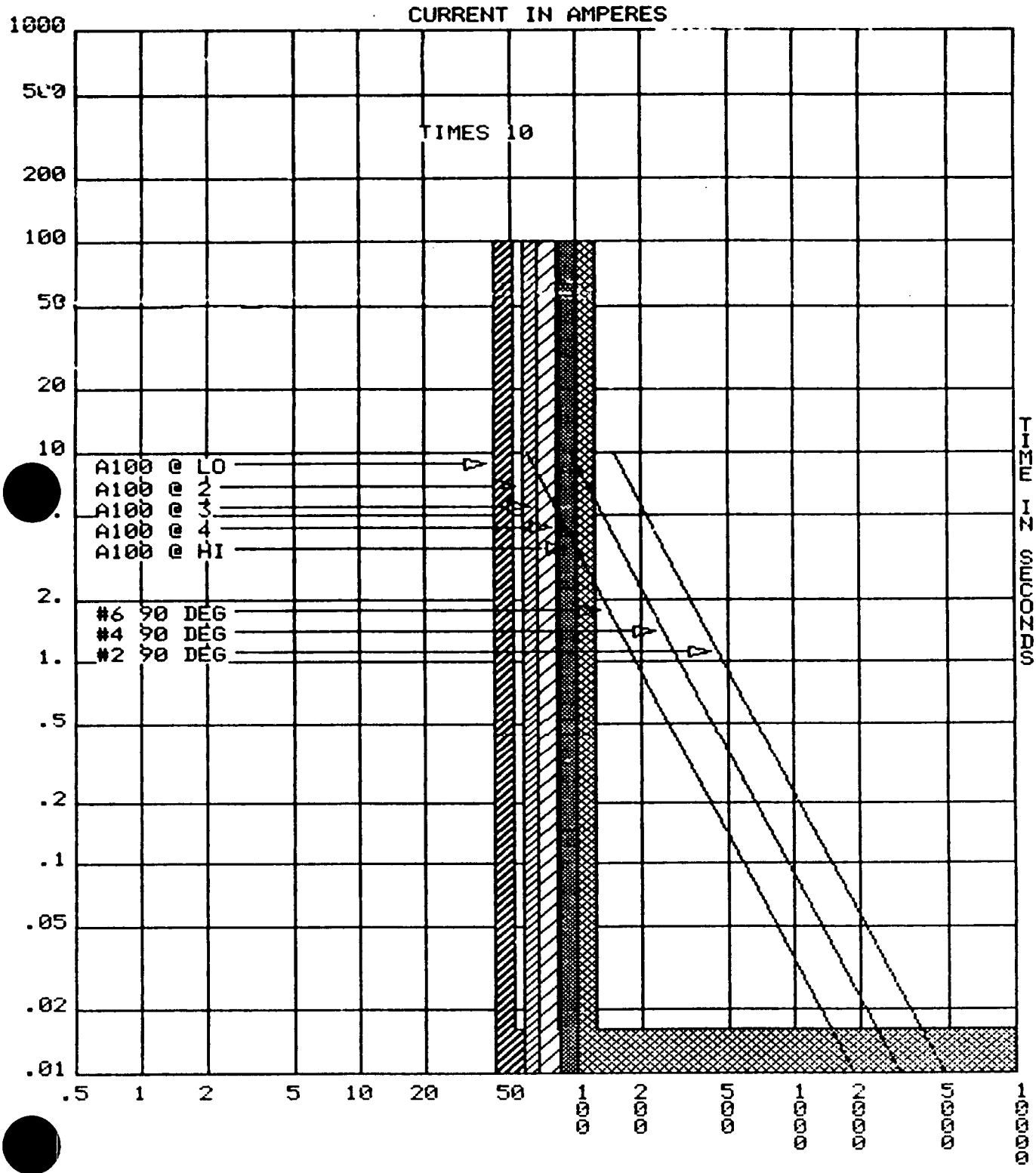

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ATTACHMENT M08663A

SECTION C

WAN GEB-MS-T108-0008

PAGE 30

PREPARED TMB DATE 4-7-9

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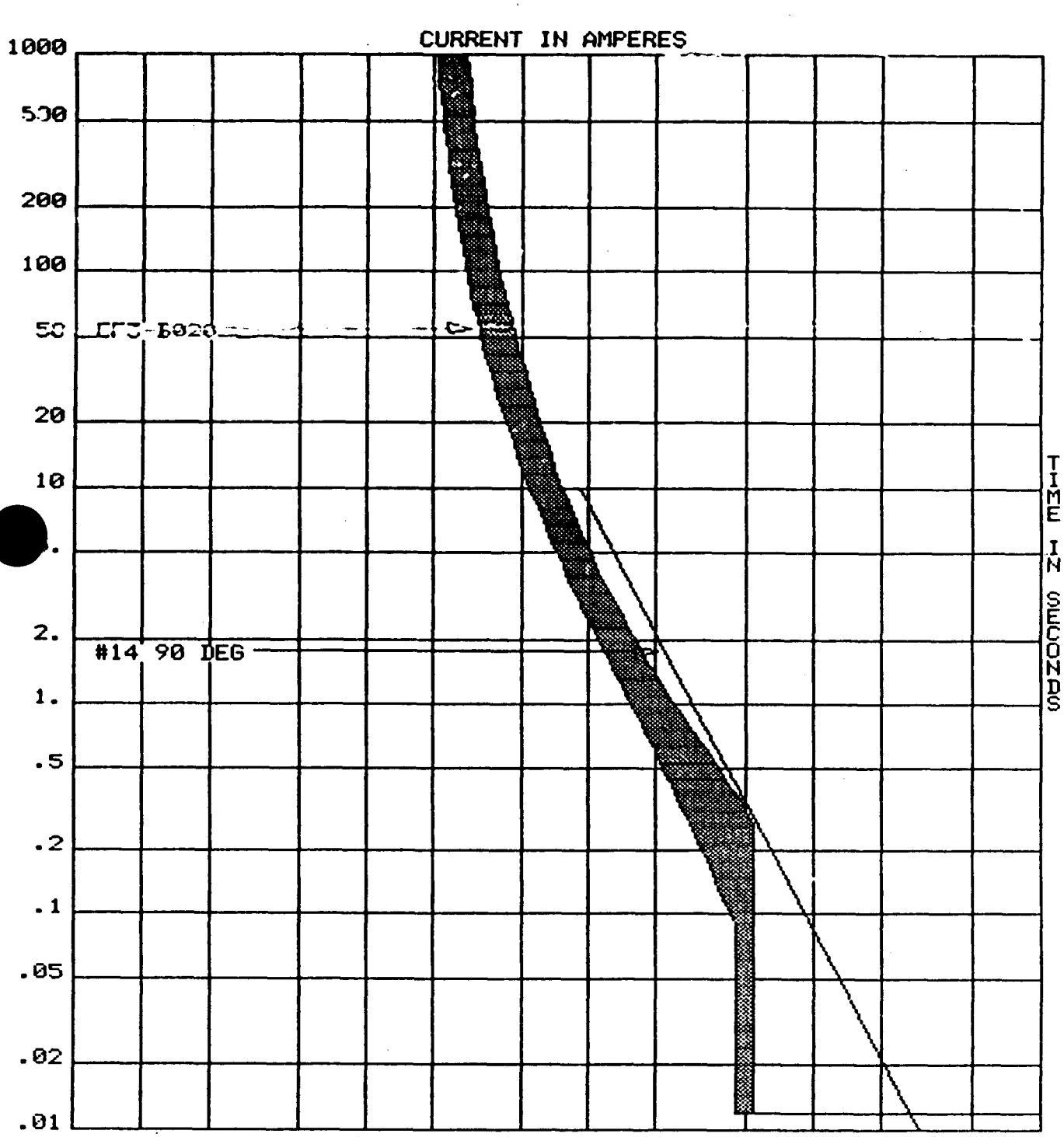

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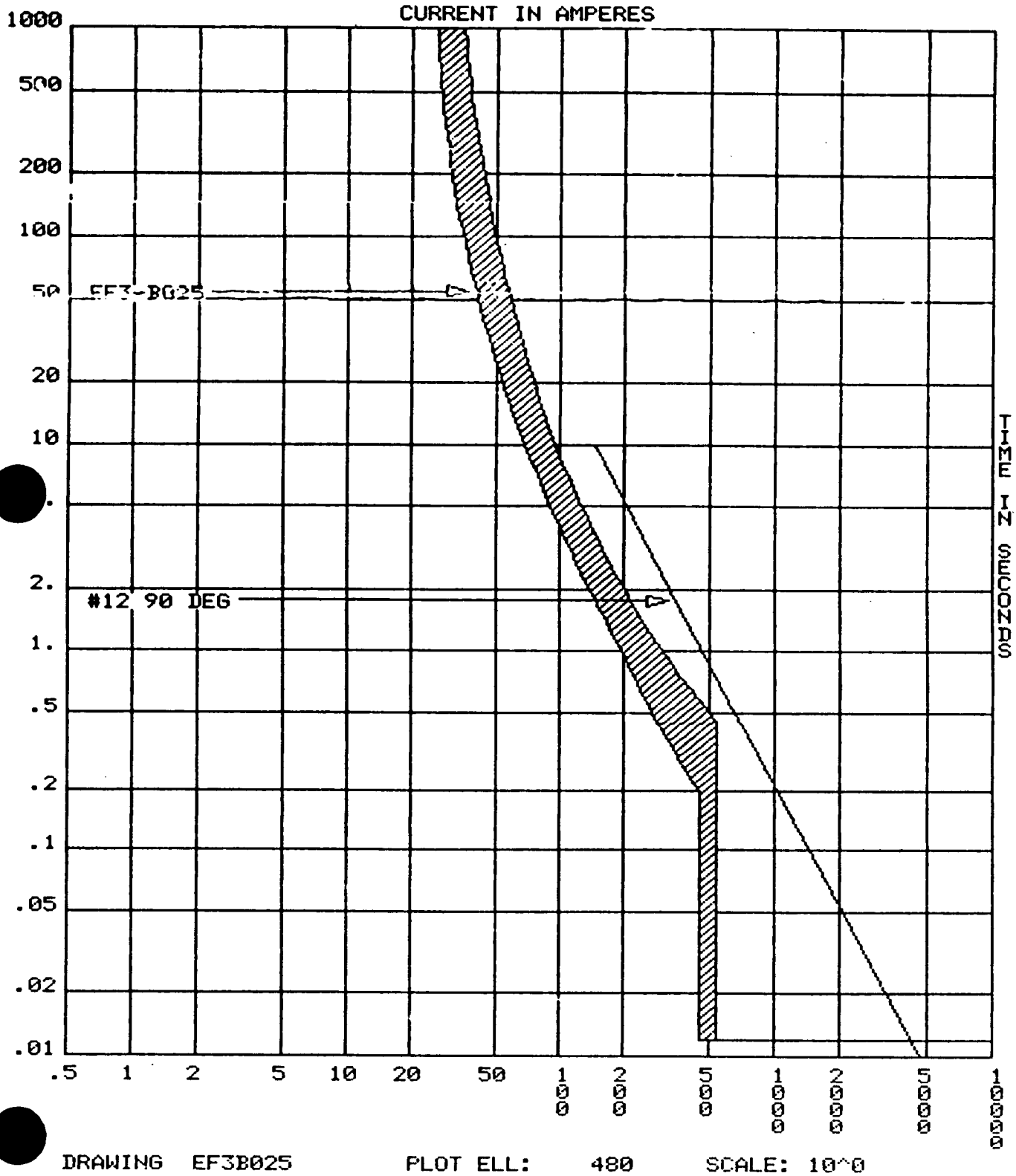
CURRENT IN AMPERES
1000
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EF3-B025
#12 90 DEG
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DRAWING EF3B025
PLOT ELL: 480
SCALE: 10^0

ATTACHMENT M08663A
SECTION C
WBN EEB-MS-TI08-0008

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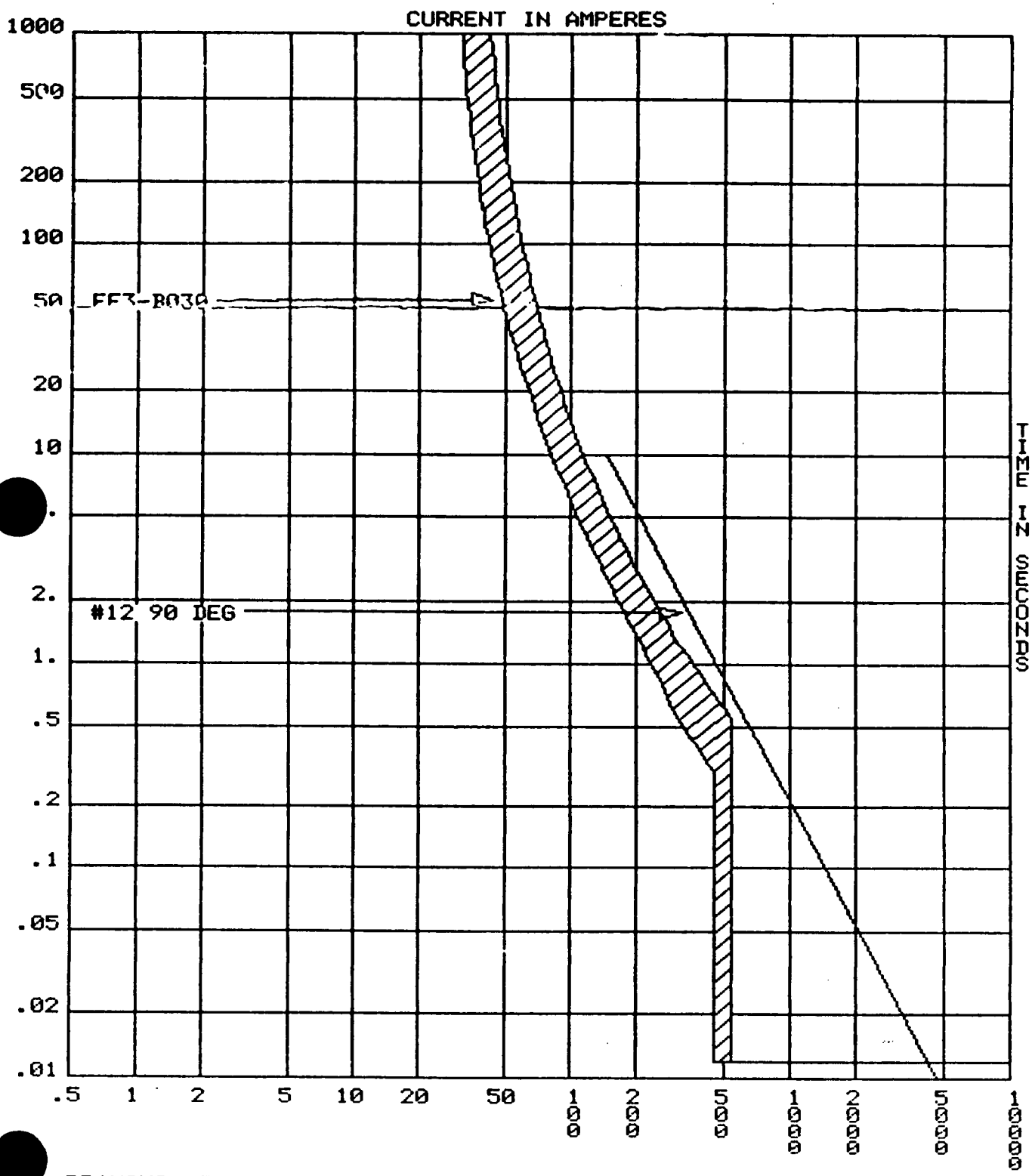
PREPARED TMB DATE 4-7-
CHECKED WJH DATE 4/11/9



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ATTACHMENT M08663A
SECTION C
WBN EEB-MS-TI08-0008

PAGE 33
PREPARED TMB DATE 4-7-90
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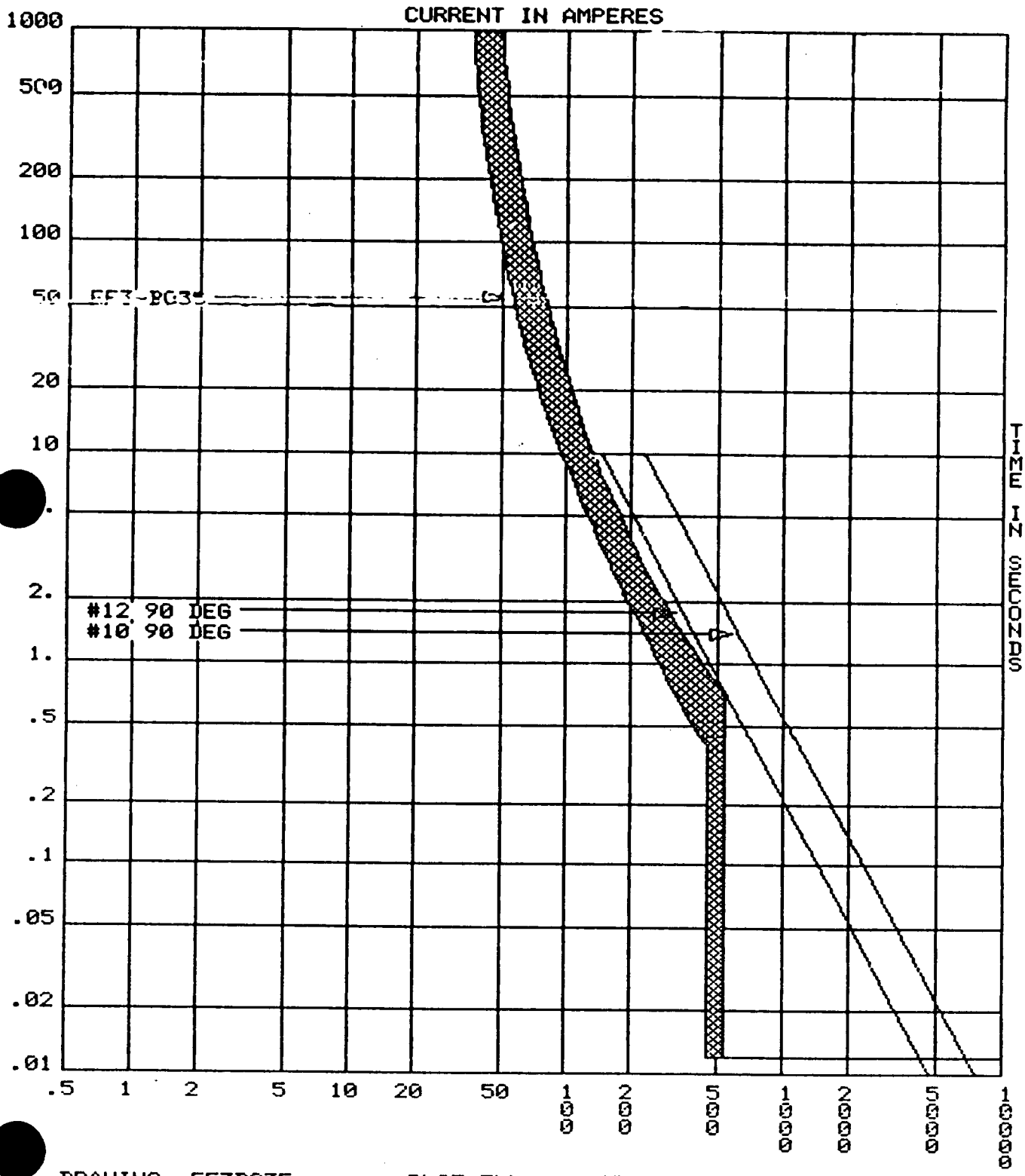

ATTACHMENT M08663A
SECTION C
WBN EEB-MS-TI08-0008

PAGE 34
PREPARED [illegible] DATE 4-7-
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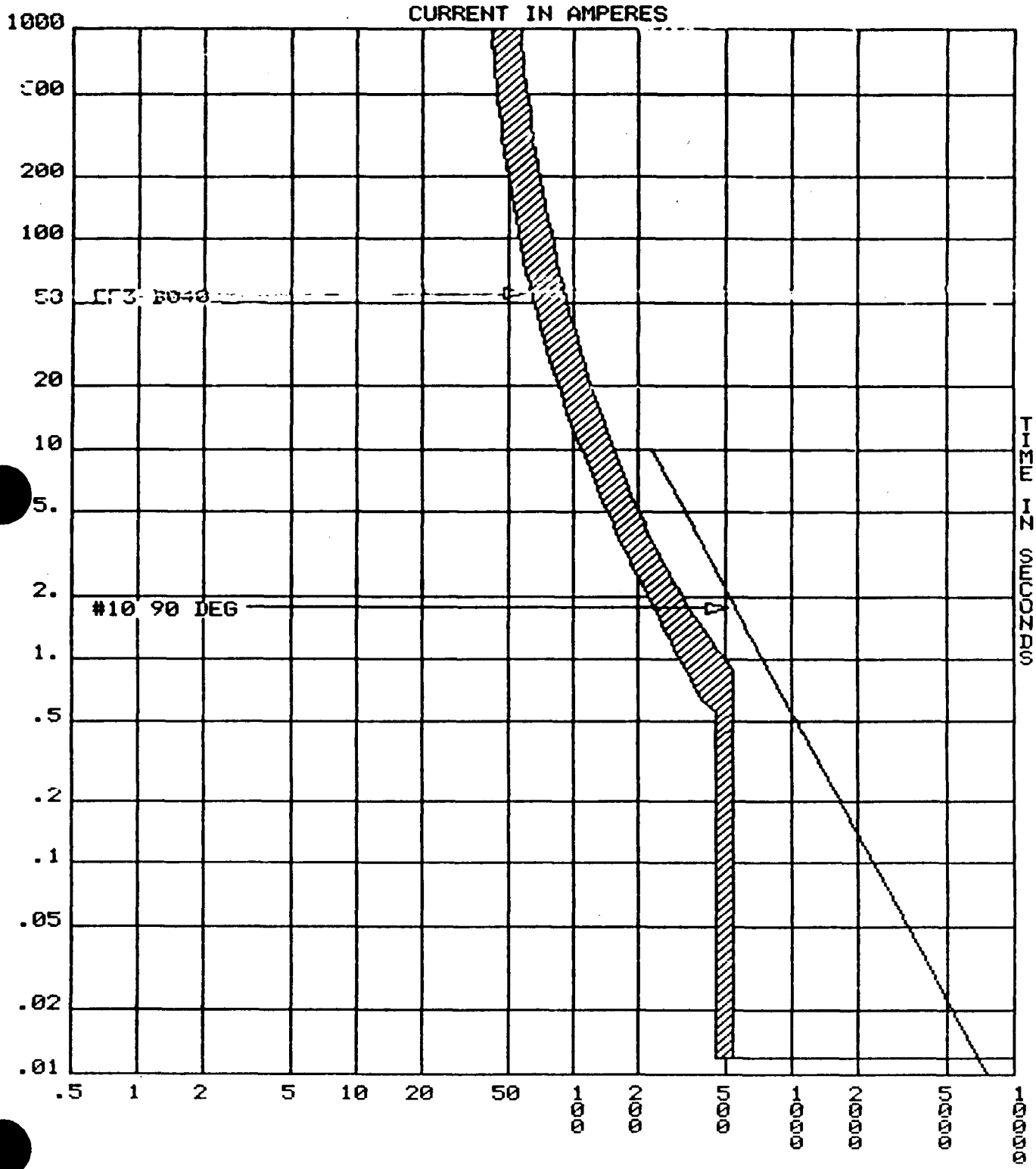
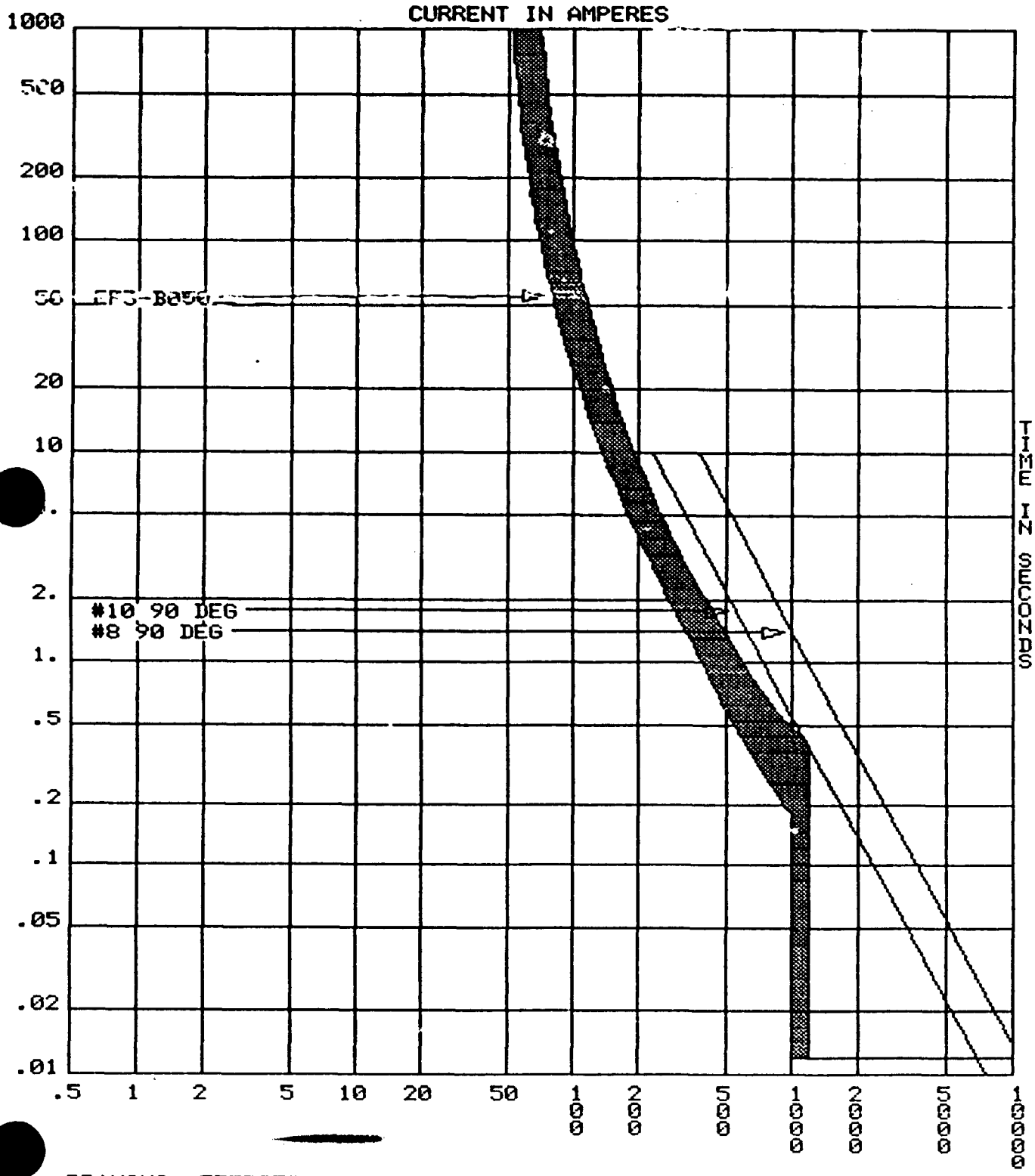


DRAWING EF3B040 PLOT ELL: 480 SCALE: 10^0

ATTACHMENT MQ8663A
SECTION C
WBN EEB-MS-TI08-0008

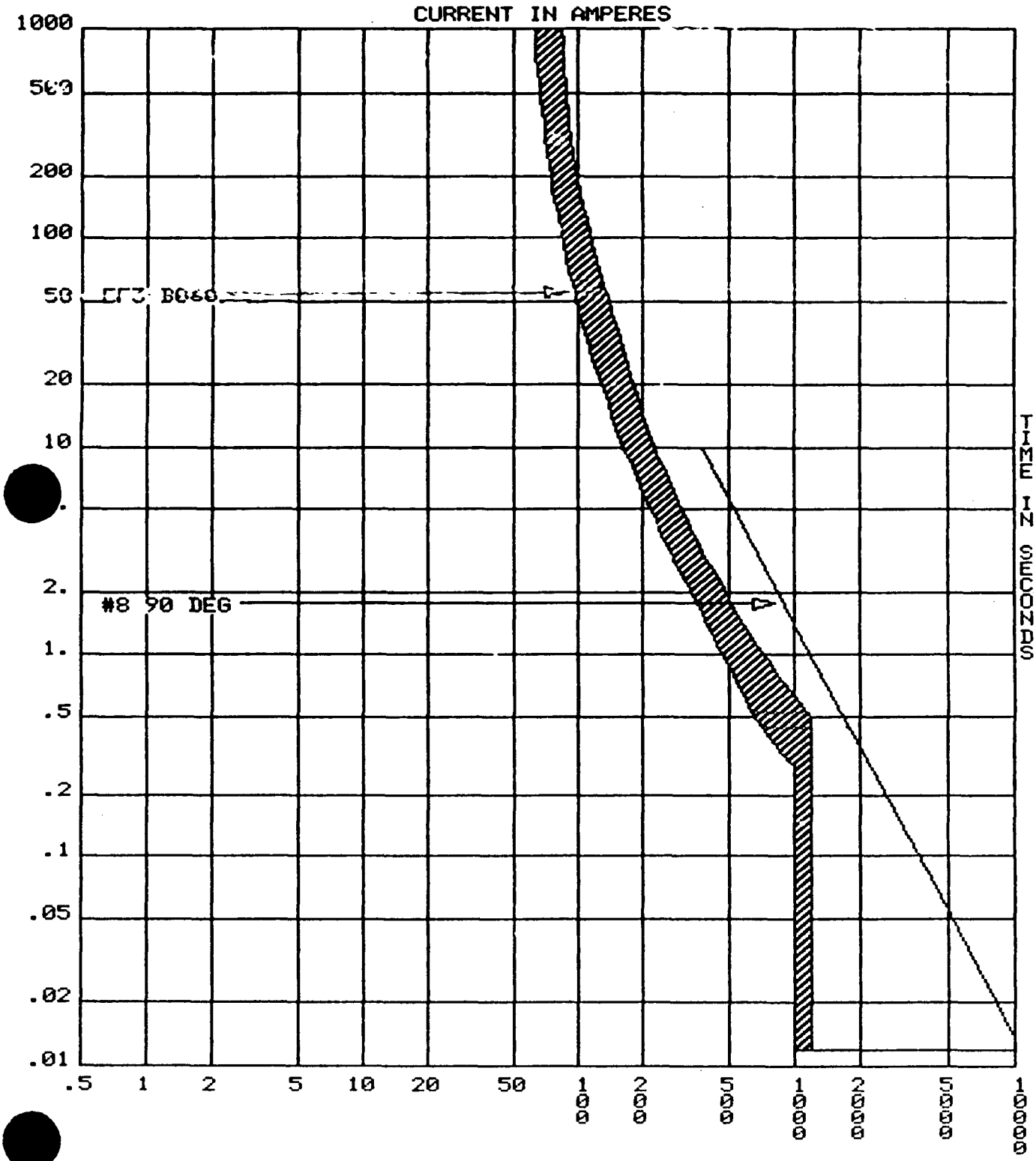
PAGE 35
PREPARED [illegible] DATE [illegible]
CHECKED [illegible] DATE [illegible]

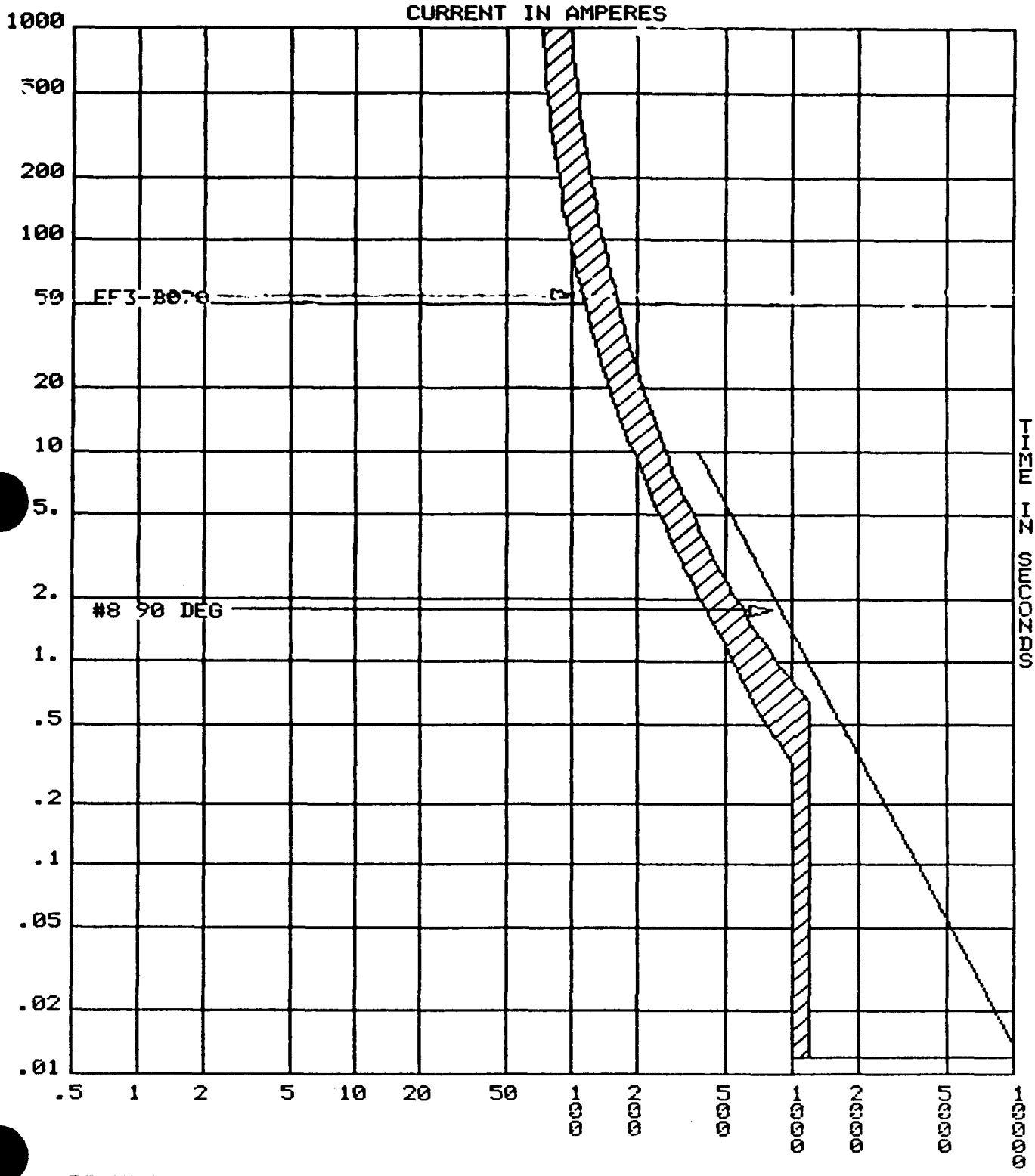


DRAWING EF3B050 PLOT ELL: 480 SCALE: 10^0

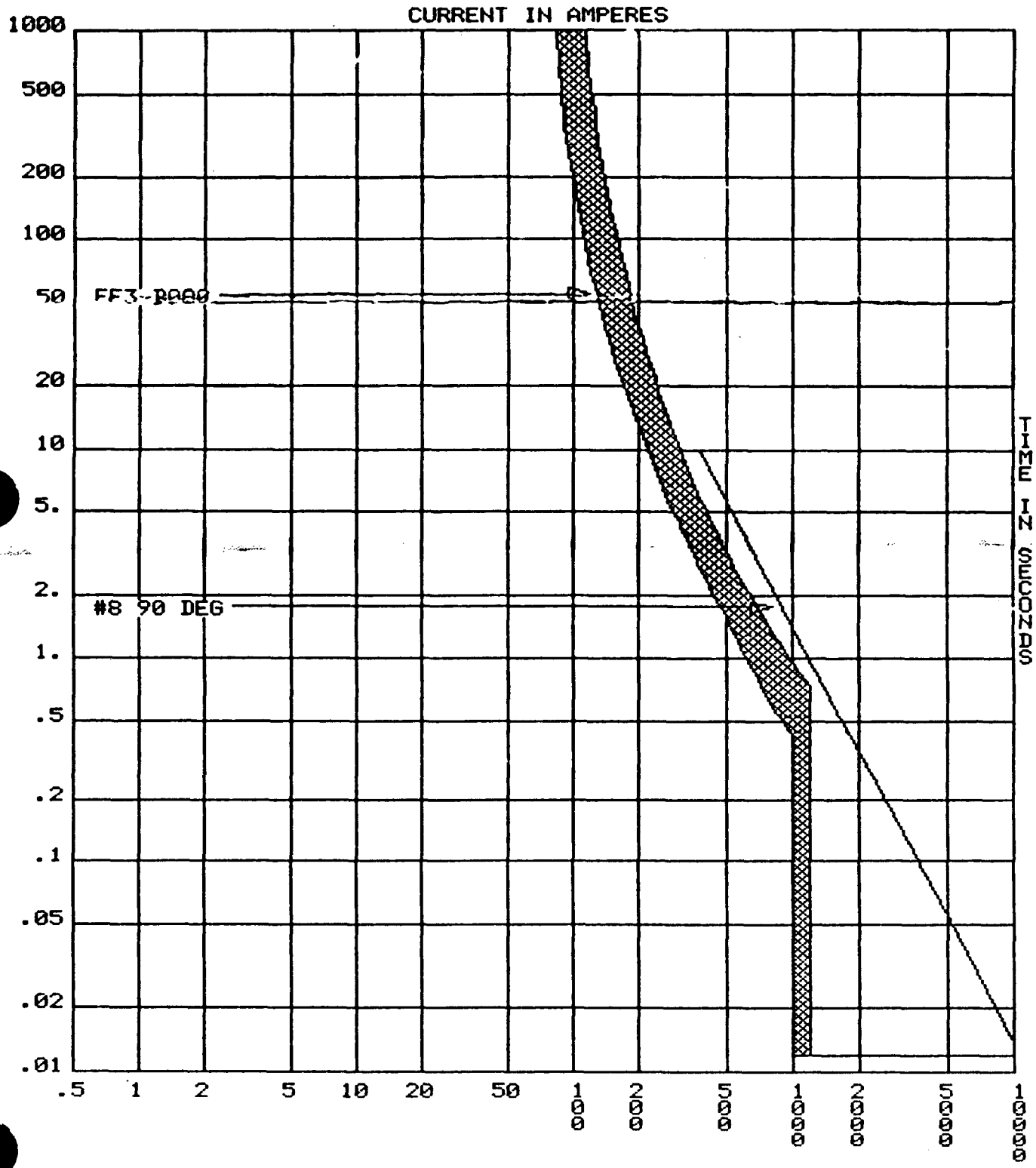
ATTACHMENT M08663A
SECTION C
WBN EEB-MS-TI08-0008

PAGE 36
PREPARED TMB DATE 4-7-
CHECKED [illegible] DATE 4/11/9





DRAWING EF3B070 PLOT ELL: 480 SCALE: 10^0



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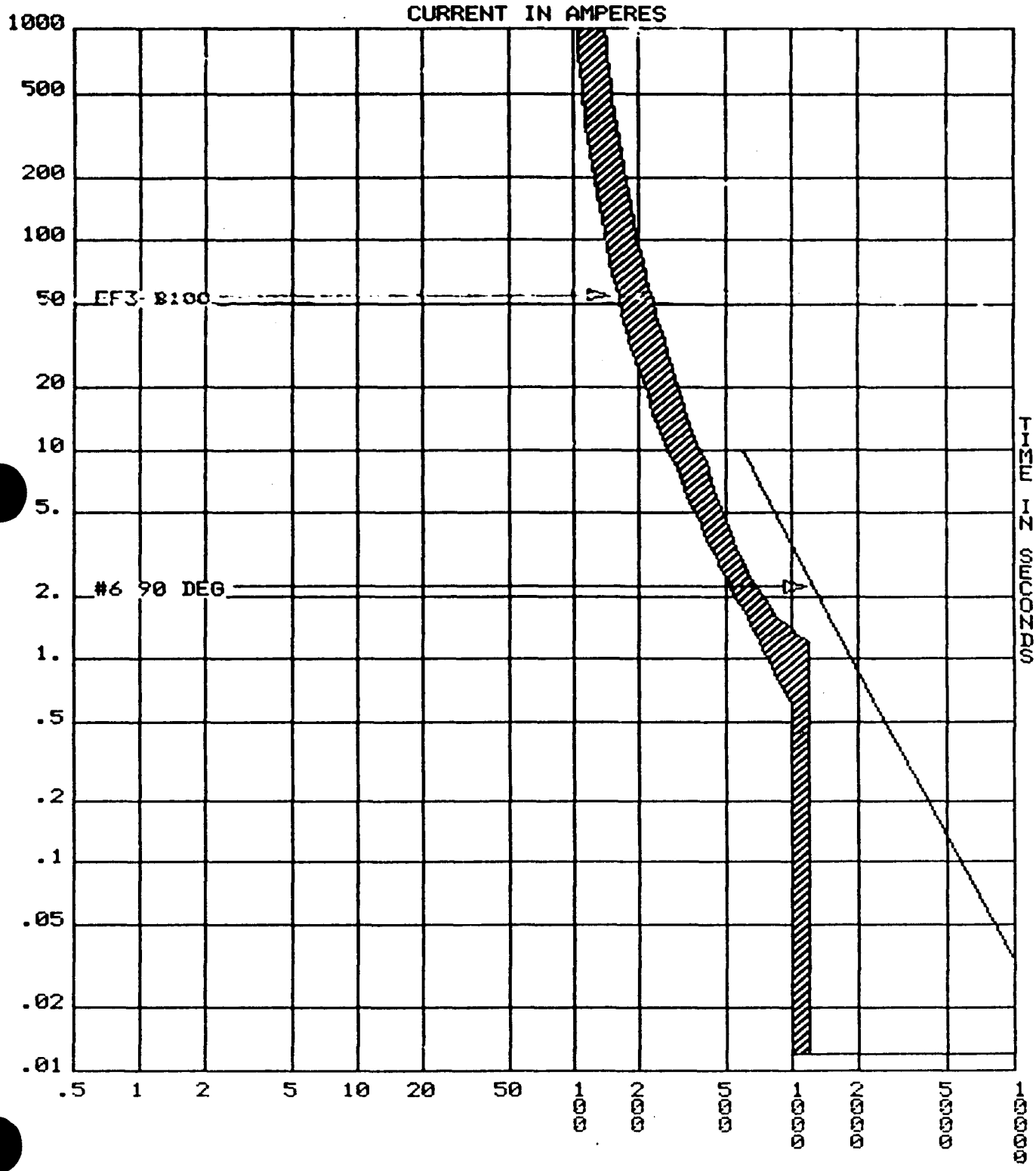
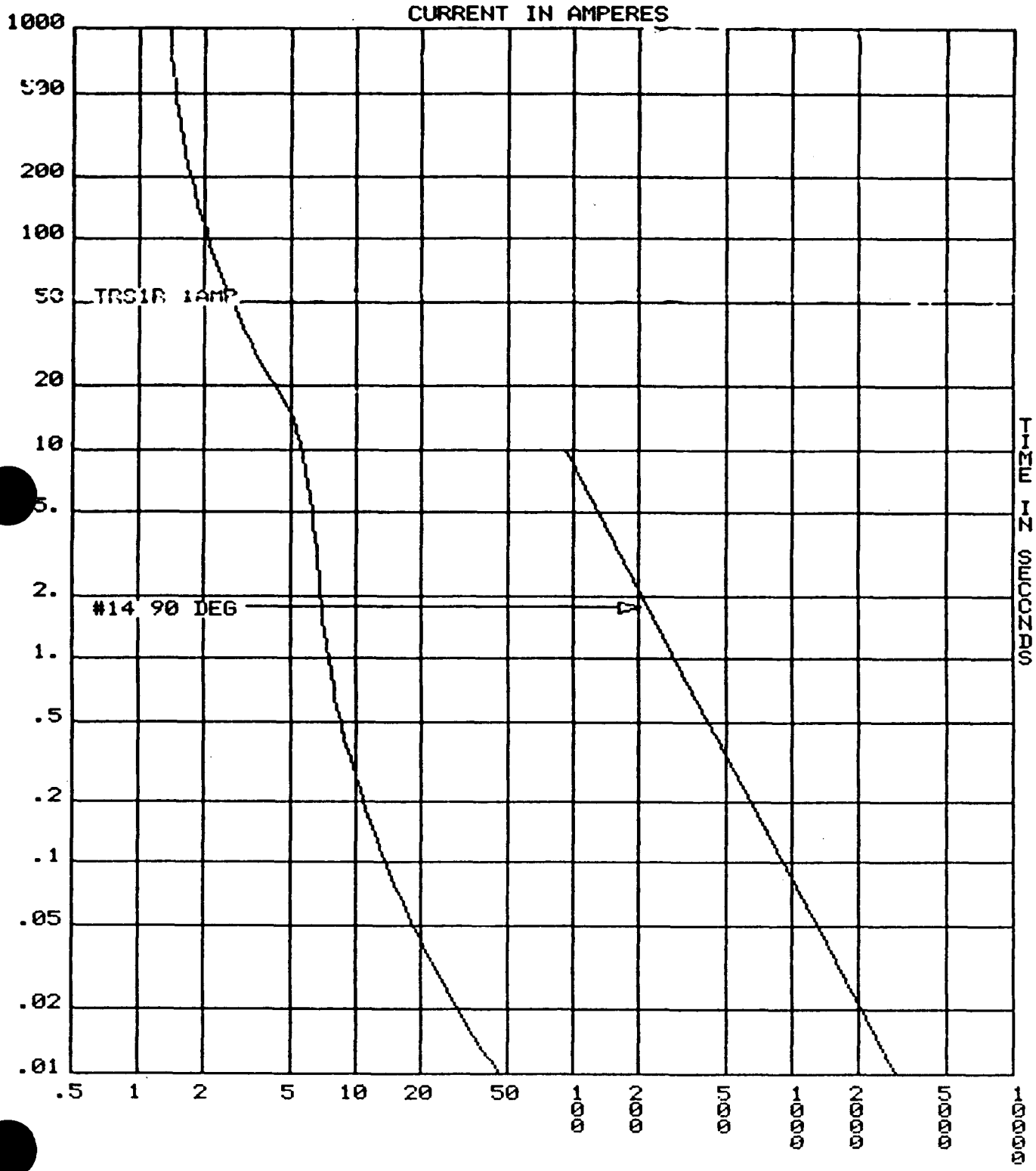


DRAWING EF3B100 PLOT ELL: 480 SCALE: 10^0

ATTACHMENT M08663A
SECTION C
WBN EEB-MS-TI08-0008

PAGE 40
PREPARED [illegible] DATE 4-7-9
CHECKED [illegible] DATE 4/11/9



PREPARED: T W Baker DATE: 5-4-90
VERIFIED: [illegible] DATE: 5/7/90

PURPOSE

The purpose of this Attachment is to evaluate and support modifications to be implemented under DCN P-5297-A.

The modifications involve the addition of two Air Handling Units for the Computer Room HVAC.

The following baseline calculations evaluate the DCN modifications for their impact. Since different aspects of a design modification are evaluated or determined in the calculation controlling that particular feature, interfaces or references between the calculations are necessary. The evaluations for this modification are identified by "ATTACHMENT NO. P5297A" and are included in the following calculations.

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION	WBN EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSES	WBN-EEB-MS-TI06-0002
480V NON-CLASS 1E POWER CABLE ASSOCIATED CIRCUITS	WBN EEB-MS-TI15-0011
REC GUIDE 1.75 ASSOCIATED CIRCUIT and APPENDIX R ANALYSIS for NON-CLASS 1E 120V AC and 250VDC CIRCUITS	WBPEVAR9001006
120V AC CONTROL TRANSFORMER SIZING	WBN EEB-MS-TI02-0019
120V PROTECTION/COORDINATION	WBN EEB-MS-TI07-0018
TELAS	WBN EEB-MS-TI05-0001
CABLE AMPACITY - NV4 and NV5 CABLES in CLASS 1E RACEWAYS	WBPEVAR8909010

PREPARED: T.M. Baker DATE: 5-7-90
VERIFIED: G. Spellman DATE: 5/7/90

1.0 SCOPE

This attachment evaluates and verifies that the proposed design is adequate and meets the guidelines applicable to the baseline calculation.

The loads are proposed as additions to 480V Reactor Vent Boards 1A-A and 2B-B (compartment 11B on both boards).

2.0 ASSUMPTIONS

See "Assumptions" identified in the base calculation (Section 2.0).

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TELAS, WBN EEB-MS-TI06-0001

3.2 480V Non-Class 1E Power Cable Associated Circuits, WBN EEB-MS-TI15-0011

4.0 DESIGN INPUT DATA

Motor data (documented in Ref. 3.1) is as follows:

HP : 7.5	FLI: 9.6A	SERVICE FACTOR: 1.0
RPM: 1755	LRI: 60.0A	CONTINUOUS DUTY
DESIGN: B	VOLTS: 460V	
LRI CODE: H	3 Phase	

5.0 JUSTIFICATION OF ASSUMPTIONS

See "Justification of Assumptions" in base calculation (Section 5.0).

6.0 METHODOLOGY

The methodology for this attachment is similar to that used in the base calculation to verify the proper breaker and overload heater. Cable protection is documented in Ref 3.2.

PREPARED: Tom Barber DATE: 5-4-90
VERIFIED: [illegible] DATE: 9/7/90

7.0 GRAPHICS

Not applicable.

8.0 SUMMARY OF RESULTS

The results of this analysis are shown on the accompanying sheets identifying the loads, circuit breakers, circuit breaker settings and overload heater selection.

9.0 CONCLUSION

Proper load protection is ensured with the following protective device(s):

The existing circuit breakers (ITE Model EF3-A025) should be set at 3 (125 Amps).

The overload heaters should be G30T41.

10.0 TABULATION ATTACHMENTS

Load and protective device tabulation.....Page 4

ATTACHMENT P5297A

WBN-EEB-MS-TI08-0008

COMPUTED TMB DATE 5-4-90
CHECKED [illegible] DATE [illegible]-90

GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROKE TIME	BKR	BKR INST	SET POSIT	DCN
2A	COMPUTER ROOM AHU NO. 1	243	RX VENT BD 1A-A	11B	0-MTR-31-497	7.50	9.60	60.0	1.00	T41		EF3-A025	125	3	P5297A
2A	COMPUTER ROOM AHU NO. 2	246	RX VENT BD 2B-B	11B	0-MTR-31-498	7.50	9.60	60.0	1.00	T41		EF3-A025	125	3	P5297A

PREPARED: [illegible] DATE: 5-21-90
VERIFIED: _____ DATE: _____

PURPOSE

The purpose of this Attachment is to evaluate and support modifications to be implemented under DCN F-10125-A, F-10150-A, ECN Modification Package No. E110010 and E110011.

The modifications involve the evaluation of the motor replacements for the motor operated valves listed below. The motors were replaced under ECN Modification Package No. E110010 and E110011, the overload heaters were replaced under DCN F-10125-A (system 70) and F-10150-A (system 67).

The following baseline calculations evaluate the modifications for their impact. Since different aspects of a design modification are evaluated or determined in the calculation controlling that particular feature, interfaces or references between the calculations are necessary. The evaluations for this modification are identified by "ATTACHMENT NO. E110010-11" and are included in the following calculations.

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION	WBN EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSES	WBN-EEB-MS-TI06-0002
TELAS	WBN EEB-MS-TI05-0001
CABLE AMPACITY - NV4 and NV5 CABLES in CLASS 1E RACEWAYS	WBPEVAR8909010
DIESEL GENERATOR LOADING ANALYSIS	WBN EEB-MS-TI03-0012

VALVE NUMBER	BOARD	NODE	COMPT
1-FCV-67-87-A	480V REACTOR MOV BD 1A2-A	236	7D
1-FCV-67-95-A	480V REACTOR MOV BD 1A2-A	236	8D
1-FCV-67-103-B	480V REACTOR MOV BD 1B2-B	238	7D
1-FCV-67-111-B	480V REACTOR MOV BD 1B2-B	238	8D
1-FCV-70-89-B	480V REACTOR MOV BD 1B2-B	238	13D

PREPARED: [illegible] DATE: 5-21-90
VERIFIED: _____ DATE: _____

1.0 SCOPE

This attachment evaluates and verifies that the proposed design is adequate and meets the guidelines applicable to the baseline calculation.

2.0 ASSUMPTIONS

See "Assumptions" identified in the base calculation (Section 2.0).

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TELAS, WBN EEB-MS-TI06-0001

3.2 Cable Ampacity - NV4 and NV5 Cables in Class 1E Raceways, WBPEVAR8909010

4.0 DESIGN INPUT DATA

Motor data (documented in Ref. 3.1) is as follows:

HP : 0.13	FLI: 0.60A
RPM: 1800	LRI: 3.5A
VOLTS: 460V	3 Phase

The installed cables were not modified.

5.0 JUSTIFICATION OF ASSUMPTIONS

See "Justification of Assumptions" in base calculation (Section 5.0).

6.0 METHODOLOGY

The methodology for this attachment is similar to that used in the base calculation to verify the proper breaker and overload heater.
The methodology used for verification of cable protection is similar to that utilized in Attachment No. M08663A to Revision 1 of this calculation.

PREPARED: [illegible] DATE: 5-21-90
VERIFIED: _____ DATE: _____

7.0 GRAPHICS

Not applicable.

8.0 SUMMARY OF RESULTS

The results of this analysis are shown on the accompanying sheets identifying the loads, circuit breakers, circuit breaker settings and overload heater selection.

9.0 CONCLUSION

Proper load protection is ensured with the following protective device(s):

The existing circuit breakers (ITE Model EF3-A003, set at LO) are adequate and do not require modification.

The overload heaters should be G30T12.

Since the existing cables were not modified and the circuit breakers do not require modification, the cable protection is as determined in Attachment M08663A of Revision 1 to this calculation (PASS).

10.0 TABULATION ATTACHMENTS

Load and protective device tabulation.....Page 4

ATTACHMENT
E110010-11 DATE 18-May-90

CALC NO. WBN-EEB-MS-T108-0000

COMPUTED TWB DATE 5-21-90 PAGE 4

CHECKED _____ DATE _____

N	B	GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSIZE	STROKE TIME	BKR	BKR INST	SET POSIT	PEN	DCN
Y	N	1	RCP Oil Clr Rtn Cntnt Isln Vlv	238	RMOV BD 1B2-B	13D	1-FCV-70-89-B	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	Y	E110010-11
Y	N	1	Lwr Cntmt 1B Clr Dish Iso Vlv	238	RMOV BD 1B2-B	7D	1-FCV-67-103-B	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	Y	E110010-11
Y	N	1	Lwr Cntmt Clr 1A Disch Iso Vlv	236	RMOV BD 1A2-A	7D	1-FCV-67-87-A	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	Y	E110010-11
Y	N	1	Lwr Cntmt 1D Clr Dish Iso Vlv	238	RMOV BD 1B2-B	8D	1-FCV-67-111-B	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	Y	E110010-11
Y	N	1	Lwr Cntmt 1C Clr Disch Iso Vlv	236	RMOV BD 1A2-A	8D	1-FCV-67-95-A	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	Y	E110010-11

PREPARED: [illegible] DATE: 5-21-90
VERIFIED: _____ DATE: _____

PURPOSE

The purpose of this Attachment is to evaluate and support modifications implemented under the advance DCN's listed below.

The modifications involve the evaluation of the motor replacements for the identified motor operated valves.

The following baseline calculations evaluate the modifications for their impact. Since different aspects of a design modification are evaluated or determined in the calculation controlling that particular feature, interfaces or references between the calculations are necessary. The evaluations for this modification are identified by "ATTACHMENT NO. GR1ADCNS" and are included in the following calculations.

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION	WBN EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSES	WBN-EEB-MS-TI06-0002
TELAS	WBN EEB-MS-TI05-0001
CABLE AMPACITY - NV4 and NV5 CABLES in CLASS 1E RACEWAYS	WBPEVAR8909010
DIESEL GENERATOR LOADING ANALYSIS	WBN EEB-MS-TI03-0012

	VALVE NUMBER	DCN NO.
	1-FCV-70-4-A	A-06885-C
	1-FCV-70-156-A	A-06885-C
*	1-FCV-70-92-A	A-07054-B
*	0-FCV-70-111-A	M-08819-A
*	2-FCV-70-75-B	M-09166-A
*	1-FCV-67-147-A	M-09228-A
*	2-FCV-67-147-B	M-09228-A

* The modifications for these loads were evaluated on Revision 1 of this calculation.

PREPARED: [illegible] DATE: 5-21-90
VERIFIED: _____ DATE: _____

1.0 SCOPE

This attachment evaluates and verifies that the design modifications authorized on the Advance DCN's (see Page 1) are adequate and meet the guidelines applicable to the baseline calculation.

2.0 ASSUMPTIONS

See "Assumptions" identified in the base calculation (Section 2.0).

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TELAS, WBN EEB-MS-TI06-0001

4.0 DESIGN INPUT DATA

Motor data shown on the attached sheets is documented in Reference 3.1).

The presently installed cables for these loads were not modified.

5.0 JUSTIFICATION OF ASSUMPTIONS

See "Justification of Assumptions" in base calculation (Section 5.0).

6.0 METHODOLOGY

The methodology for this attachment is similar to that used in the base calculation to verify the proper breaker and overload heater.

The methodology used for verification of cable protection is similar to that utilized in Attachment No. M08663A to Revision 1 of this calculation.

PREPARED: T.A. Baker DATE: 8-21-90
VERIFIED: _____ DATE: _____

7.0 GRAPHICS

Not applicable.

8.0 SUMMARY OF RESULTS

The results of this analysis are shown on the accompanying sheets identifying the loads, circuit breakers, circuit breaker settings and overload heater selection.

9.0 CONCLUSION

Proper load protection is ensured with the following protective device(s):

VALVE NUMBER	CKT BKR	STG	OL HTR
1-FCV-70-4-A	EF3-A003	3 (12A)	G30T14
1-FCV-70-156-A	EF3-A003	2 (10A)	G30T15

Since the existing cables were not modified and the circuit breakers do not require modification, the cable protection is as determined in Attachment M08663A of Revision 1 to this calculation (PASS).

10.0 TABULATION ATTACHMENTS

Load and protective device tabulation.....Page 4

ATTACHMENT GRIA

DCN A-06885-C DATE 23-May-90 WBN-EEB-MS-TI08-0008

PREPARED [illegible] DATE 5-23-9[illegible]

CHECKED _____ DATE _____

GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	RA	SF	OVLD SIZE	STROKE TIME	BKR	BKR INST	SET POSIT	PEN	DCN
1	Misc Eqpt Hdr Inlet Vlv	236	RMOV BD 1A2-A	14B	1-FCV-70-4-A	0.33	0.75	5.79		T14	90	EF3-A003	12	3		A-06885-C
1	RHR Hx A-A Outlet Vlv	236	RMOV BD 1A2-A	16E	1-FCV-70-156-A	0.33	0.83	5.00		T15	90	EF3-A003	10	2		A-06885-C

PREPARED:_____ DATE:_____
VERIFIED:_____ DATE:_____

PURPOSE

The purpose of this Attachment is to evaluate and support modifications to be implemented under DCN's M-10448-A (Group 2A) and M-10522-A (Groups 2B and 2C).

The modifications involve breaker and/or breaker setting and overload heater changes and incorporate data for cables to be replaced on DCN's M-10473-A (Train A) and M-10511-A (Train B).

The following baseline calculations evaluate the DCN modifications for their impact. These evaluations are identified by the Attachment No. M10448A and are included in the calculation noted.

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION	WBN EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSIS	WBN-EEB-MS-TI06-0002
CONTAINMENT PENETRATION PROTECTION STUDY, VOLTAGE LEVEL V4 AND V5	EEB-MS-TI08-0015
480V NON-CLASS 1E POWER CABLE ASSOCIATED CIRCUITS	WBN EEB-MS-TI15-0011
CABLE AMPACITY - NV4 and NV5 CABLES in CLASS 1E RACEWAYS	WBPEVAR8909010

PREPARED:_____ DATE:_____
VERIFIED:_____ DATE:_____

1.0 SCOPE

This attachment addresses 480V Class 1E protective devices and cable protection for System Group 2A, 2B, and 2C that receive power from the Class 1E boards listed within the base calculation (Section 1.1, Page 7).

2.0 ASSUMPTIONS

See Unverified Assumptions identified in the base calculation (Section 2.0, Page 8).

2.1 ~~The protective device coordination revision to the baseline calculation (to be completed as a part of the System Group 4 effort) will have no adverse impact on the protective device selections and settings determined in this attachment. THIS IS AN UNVERIFIED ASSUMPTION~~. R15 WTH 6/26/91 GG 7/1/91

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TVA Calculation, Auxiliary Power Systems Analyses, Appendix L & M, WBN EEB-MS-TI06-0002, Rev 1, (B26900405404)

3.2 Attachment 1 of the base calculation and Section A of this attachment

3.3 TVA Electrical Design Standard DS-E12.6.2, Rev. 0

3.4 SKM Systems Analysis, Inc. Computer Aided Plotting For Time Overcurrent Reporting (CAPTOR), Version 2.1, Electrical Engineering Computer Software

3.5 UL Standard 489, Molded Case Circuit Breakers and Circuit breaker Enclosures

4.0 DESIGN INPUT DATA

The Design input data consists of the following.

Protective device data was taken from Ref. 3.2

Cable data was taken from Ref. 3.1 and 3.3

PREPARED:_____ DATE:_____
VERIFIED:_____ DATE:_____

5.0 JUSTIFICATION OF ASSUMPTIONS

See Justification of Assumptions in base calculation (Section 5.0, Page 12).

5.1 ASSUMPTION 2.1 (THIS ATTACHMENT)

Not applicable.

6.0 METHODOLOGY

The breaker types, settings, and overload heaters selected per the criteria formulated in Revision 0 of this calculation are identified in Section A with any changes or additions documented and tabulated in Section A of this attachment (Data shown in Section A supercedes that shown in Attachment 1 of the base calculation).

The Design Input Data was tabulated identifying the board, compartment, protective device data, and cable data. (See Section B). Some circuits may contain additional protective devices such as fuses or cable protectors. These devices are not listed if the primary device provides adequate protection.

Time-current plots were developed in Revision 1 of this calculation (Attachment M08663A, Section C) for numerous device types and ratings showing both the protective devices and the short time heating limits for various cable sizes. Each plot will show the minimum conductor size which may be used with the device and any limitations on settings for adjustable devices. Additional plots were developed for this evaluation and are contained in Section C of this attachment.

The circuits are considered adequately protected if the cables are prevented from reaching thermal damage for ten seconds for a low impedance fault.

By comparison of the protective device data, cable data, and the time current curves for the device it was determined whether the circuit passed or failed and noted in the 'CABLE PROT' column of Section B.

PREPARED:_____ DATE:_____
VERIFIED:_____ DATE:_____

7.0 GRAPHICS

Graphics for cable protection consists of the time-current plots described earlier and shown in Section C of this Attachment and Attachment M08663A contained in Revision 1 of this calculation. These plots were generated using computer software (Ref. 3.~~8~~4). Each curve was checked using manufacturer's published curves for the protective device for accuracy. Minor deviations not adversely affecting the results of this calculation were ignored. R19 of 4 of 4

8.0 SUMMARY OF RESULTS

The result of this analysis is that the protection for the 480V Class 1E cables within the scope previously outlined have been determined to pass or fail as indicated in Section B.

9.0 CONCLUSION

All cables within the scope of this attachment are adequately protected.

For circuits identified as "PASS", the protective device specified will provide adequate cable protection against thermal damage. For those cases where full coordination between the cable damage curve and the molded case circuit breaker instantaneous trip curve cannot be attained, credit is taken for UL Standard 489 (Ref 3.7) to show that the cables are adequately protected against short circuits up to the breaker interrupting rating.

Circuit breakers, overload heaters, and fuses which require modification are identified in Section A as follows.

COLUMN	CODE	DESCRIPTION
H	N	No change
(overload heaters)	Y	Heater requires replacement with size specified
B	N	No change
(circuit breakers)	Y	Reset breaker as specified
	R	Replace breaker as specified
	F	Replace fuse as specified

PREPARED:_____ DATE:_____
VERIFIED:_____ DATE:_____

10.0 SECTION REFERENCES

SECTION A - Tabulation of modifications to circuit breakers, settings, and overload heaters

SECTION B - Tabulation of protective devices, cable data, and cable protection pass/fail evaluation

SECTION C - Time-current plots for protective devices in addition to those generated and included in Attachment No. M08663A, Revision 1 of this calculation.

GROUP 2A LVSG SETTINGS DATE 31-May-90 ATTACHMENT M10448A SECTION A

GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU	INSTTIME set.	sec
2A	Aux Bldg Gen Sply Fan 1A	480V SHDW BD 1A1-A	2C	1-MTR-30-103	100.0	1.15	120.0	622	200	0.90	180.0	7	4
2A	CRDM Clr Fan 1A-A Mtr 1	480V SHDW BD 1A1-A	7B	1-MTR-30-83/1-A	75.0	1.15	97.0	413	150	0.95	142.5	6	4
2A	Reac Lwr Compt Clr Fan 1A-A	480V SHDW BD 1A1-A	7C	1-MTR-30-74-A	60.0	1.00	73.0	571	100	0.95	95.0	12	9
2A	CRDM Clr Fan 1A-A Mtr 2	480V SHDW BD 1A1-A	7D	1-MTR-30-83/2-A	75.0	1.15	97.0	413	150	0.95	142.5	6	4
2A	Elec Bd Rm AHU A-A	480V SHDW BD 1A1-A	9C	0-MTR-31-30B-A	50.0	1.15	56.5	395	150	0.55	82.5	6	4
2A	Cntmt Air Rtn Fan 1A-A	480V SHDW BD 1A1-A	10C	1-MTR-30-38-A	100.0	1.00	115.0	869	200	0.75	150.0	10	10
2A	CONT RM A/C A-A CPRSR	480V SHDW BD 1A2-A	2C	0-MTR-31-80/2-A	250.0	1.15	275.0	1825	600	0.70	420.0	7	4
2A	CRD Mech Clr Fan 1C-A Mtr 1	480V SHDW BD 1A2-A	7A	1-MTR-30-88/1-A	75.0	1.15	97.0	413	150	0.95	142.5	6	4
2A	Aux Bldg Gen Exhaust Fan 1A	480V SHDW BD 1A2-A	7B	1-MTR-30-159	125.0	1.15	147.0	987	300	0.70	210.0	7	6
2A	Reac Lwr Compt Clr Fan 1C-A	480V SHDW BD 1A2-A	7D	1-MTR-30-77-A	60.0	1.00	73.0	571	100	0.95	95.0	12	9
2A	CRD Mech Clr Fan 1C-A Mtr 2	480V SHDW BD 1A2-A	8A	1-MTR-30-88/2-A	75.0	1.15	97.0	416	150	0.95	142.5	6	4
2A	480V Shutdown Bd Rm AHU A-A	480V SHDW BD 1A2-A	9D	0-MTR-31-45-A	75.0	1.15	92.0	592	150	0.90	135.0	9	8
2A	Aux Bldg Gen Sply Fan 1B	480V SHDW BD 1B1-B	2B	1-MTR-30-102	100.0	1.15	120.0	624	200	0.90	180.0	7	4
2A	Elec Bd Rm AHU C-B	480V SHDW BD 1B1-B	7A	0-MTR-31-31B-B	50.0	1.15	62.5	360	100	0.90	90.0	8	6
2A	CRD Mech Clr Fan 1B-B Mtr 1	480V SHDW BD 1B1-B	7C	1-MTR-30-92/1-B	75.0	1.15	97.0	413	150	0.95	142.5	6	4
2A	Reac Lwr Compt Clr Fan 1B-B	480V SHDW BD 1B1-B	7D	1-MTR-30-75-B	60.0	1.00	73.0	571	100	0.95	95.0	12	9
2A	CRD Mech Clr Fan 1B-B Mtr 2	480V SHDW BD 1B1-B	10D	1-MTR-30-92/2-B	75.0	1.15	97.0	413	150	0.95	142.5	6	4
2A	CONT RM A/C B-B CPRSR	480V SHDW BD 1B2-B	2B	0-MTR-31-96/2-B	250.0	1.15	275.0	1825	600	0.70	420.0	7	4
2A	480V Shdn Bd Rm Chler B-B	480V SHDW BD 1B2-B	3C	0-MTR-31-49/2-B	240.0		247.0	1209	400	0.88	352.0	7	4
2A	Aux Bldg Gen Exhaust Fan 1B	480V SHDW BD 1B2-B	7A	1-MTR-30-162	125.0	1.00	147.0	854	300	0.65	195.0	7	4
2A	CRD Mech Clr Fan 1D-B Mtr 1	480V SHDW BD 1B2-B	7B	1-MTR-30-80/1-B	75.0	1.15	97.0	413	150	0.95	142.5	6	4
2A	Reac Lwr Compt Clr Fan 1D-B	480V SHDW BD 1B2-B	7D	1-MTR-30-78-B	60.0	1.00	73.0	571	100	0.95	95.0	12	9
2A	Cntmt Air Rtn Fan 1B-B	480V SHDW BD 1B2-B	9C	1-MTR-30-39-B	100.0	1.00	115.0	828	200	0.75	150.0	10	10
2A	480V Shutdown Bd Rm AHU C-B	480V SHDW BD 1B2-B	9D	0-MTR-31-55-B	75.0	1.15	92.0	592	150	0.90	135.0	9	8
2A	CRD Mech Clr Fan 1D-B Mtr 2	480V SHDW BD 1B2-B	10C	1-MTR-30-80/2-B	75.0	1.15	97.0	413	150	0.95	142.5	6	4
2A	Aux Bldg Gen Sply Fan 2A	480V SHDW BD 2A1-A	2C	2-MTR-30-104	100.0	1.15	120.0	630	200	0.90	180.0	7	4
2A	Elec Bd Rm AHU B-A	480V SHDW BD 2A1-A	9C	0-MTR-31-30D-A	50.0	1.15	56.5	395	150	0.55	82.5	6	4
2A	Elec Bd Rm A/C A-A Cprsr	480V SHDW BD 2A2-A	2C	0MTR-31-128/2-A	250.0	1.15	275.0	1825	600	0.70	420.0	7	4
2A	480V Shdn Bd Rm Chlr A-A	480V SHDW BD 2A2-A	3C	0-MTR-31-36/2-A	240.0		247.0	1209	400	0.88	352.0	7	4
2A	Aux Bldg Gen Exhaust Fan 2A	480V SHDW BD 2A2-A	7B	2-MTR-30-274	125.0	1.00	147.0	866	300	0.65	195.0	7	4
2A	Fuel Handling Exhaust Fan A	480V SHDW BD 2A2-A	7C	0-MTR-30-136	100.0	1.15	120.0	624	200	0.90	180.0	7	4
2A	480V SHUTDOWN BD RM AHU B-A	480V SHDW BD 2A2-A	8D	0-MTR-31-44-A	75.0	1.15	92.0	592	150	0.90	135.0	9	8
2A	Aux Bldg Gen Sply Fan 2B	480V SHDW BD 2B1-B	2B	2-MTR-30-105	100.0	1.15	120.0	626	200	0.90	180.0	7	4
2A	Elec Bd Rm AHU D-B	480V SHDW BD 2B1-B	7A	0-MTR-31-31D-B	50.0	1.15	62.5	360	100	0.90	90.0	8	6
2A	Elec Bd Rm A/C B-B Cprsr	480V SHDW BD 2B2-B	2B	0MTR-31-129/2-B	250.0	1.15	275.0	1825	600	0.70	420.0	7	4
2A	Aux Bldg Gen Exhaust Fan 2B	480V SHDW BD 2B2-B	7A	2-MTR-30-278	125.0	1.00	147.0	850	300	0.65	195.0	7	4
2A	Fuel Handling Exhaust Fan B	480V SHDW BD 2B2-B	7C	0-MTR-30-139	100.0	1.15	120.0	624	200	0.90	180.0	7	4
2A	480V Shutdown Bd Rm AHU D-B	480V SHDW BD 2B2-B	9D	0-MTR-31-61-B	75.0	1.15	92.0	592	150	0.90	135.0	9	8

GROUP 2A, 2B, & 2C WBN-EEB-MS-T108-0008 ATTACHMENT M10448A SECTION A

H	B	GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROKE SIZE	OVLDSTROKE TIME	BKR	BKR INST	SET POSIT	PEN
Y	Y	2A	Cont Bldg Emerg Air CU Fan A-A	203	C&A VENT BD 1A1-A	2A	0-MTR-31-8-A	10.00	12.20	110.0		T42		EF3-L050	210	2	
Y	Y	2A	5th Vlt Batt Rm Intk Fan 1A1-A	203	C&A VENT BD 1A1-A	2B	0-MTR-31-493A-A	1.50	2.50	15.0	1.00	T28		EF3-A010	36	2	
Y	Y	2A	PEN RM EL 692 CLR FAN 1A-A	203	C&A VENT BD 1A1-A	2C	1-MTR-30-186-A	3.00	4.00	25.0	1.00	T32		EF3-A010	58	4	
Y	N	2A	Cntm Spray Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	3C	1-MTR-30-177-A	7.50	9.00	62.0	1.00	T40		EF3-A025Z	125	3	
Y	Y	2A	Btry Rm El 692 Exh Fan A-A	203	C&A VENT BD 1A1-A	4A	0-MTR-31-28-A	1.00	2.20	19.5		T27		EF3-A010	45	3	
Y	R	2A	5TH VITL BATT.RM.EX. FAN 1B1-A	203	C&A VENT BD 1A1-A	4B	0-MTR-31-493B-A	1.50	2.50	14.5	1.00	T28		EF3-A005	29	4	
N	N	2A	Emerg Gas Trtmt Sys Fan A-A	203	C&A VENT BD 1A1-A	4D	0-MTR-65-23-A	20.00	25.00	132.0	1.00	T50		EF3-L050	260	3	
Y	N	2A	SFP Pmp A-A&TB Bst Pm SpClrFan	203	C&A VENT BD 1A1-A	5A	0-MTR-30-192-A	7.50	9.00	62.0	1.00	T40		EF3-A025Z	125	3	
N	N	2A	CCS & AFW PMPS SP CLR FAN A-A	203	C&A VENT BD 1A1-A	5B	1-MTR-30-190-A	20.00	24.50	139.9	1.00	T50		EF3-L050	260	3	
N	N	2A	Shutdown Bd Rm A Press Fan A-A	203	C&A VENT BD 1A1-A	6A	0-MTR-31-64-A	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
N	N	2A	EG Trtmt Sys A-A Humidity Htrs	203	C&A VENT BD 1A1-A	6D	0-MTR-65-17-A	20.00	24.06			T50		EF3-B030			
N	R	2A	125V Vtl Bat Rm I ExhFan 1A1-A	203	C&A VENT BD 1A1-A	7B	1-MTR-31-287-A	0.50	1.10	5.1		T20		EF3-A003	10	2	
N	Y	2A	Safety Inj Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	8A	1-MTR-30-180-A	5.00	6.10	45.0	1.00	T37		EF3-A025Z	105	2	
Y	Y	2A	Pen Rm El 737 Clr Fan 1A-A	203	C&A VENT BD 1A1-A	8B	1-MTR-30-194-A	3.00	4.00	25.3	1.00	T32		EF3-A010	58	4	
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A2-A	203	C&A VENT BD 1A1-A	8C	1-MTR-30-244G-A	3.00	4.70	28.8		T34		EF3-A010	58	4	
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A3-A	203	C&A VENT BD 1A1-A	8D	1-MTR-30-244H-A	3.00	4.70	28.8		T34		EF3-A010	58	4	
N	R	2A	Cont Rm A/C Sys Oil Pmp	203	C&A VENT BD 1A1-A	8F1	0-MTR-31-80/3-A	3.11	3.90	31.0				EF3-B020			
N	Y	2A	RHR Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	9A	1-MTR-30-175-A	5.00	6.10	45.0	1.00	T37		EF3-A025Z	105	2	
Y	N	2A	Cont Rm A/C Circ Pmp A-A	203	C&A VENT BD 1A1-A	9B	0-MTR-31-80/1-A	15.00	20.00	118.4	1.15	T49		EF3-L050	260	3	
N	N	2A	480V Bd Rm 1A Pr Sup Fan 1A1-A	203	C&A VENT BD 1A1-A	9C	1-MTR-31-462-A	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A1-A	203	C&A VENT BD 1A1-A	9D	1-MTR-30-244F-A	3.00	4.70	28.8		T34		EF3-A010	58	4	
N	Y	2A	Cntfg Chrg Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	10A	1-MTR-30-183-A	5.00	6.10	45.0	1.00	T37		EF3-A025Z	105	2	
Y	Y	2A	PEN RM EL 713 CLR FAN 1A-A	203	C&A VENT BD 1A1-A	10B	1-MTR-30-196-A	3.00	4.00	26.0	1.00	T32		EF3-A010	58	4	
Y	Y	2A	Pipe Chase Clr Fan 1A-A	203	C&A VENT BD 1A1-A	10C	1-MTR-30-201-A	3.00	4.00	25.2	1.00	T32		EF3-A010	58	4	
N	N	2A	480V BD RM 1B PR SUP FAN 1B1-A	203	C&A VENT BD 1A1-A	11A	1-MTR-31-478-A	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
Y	N	2A	480V Bd Rm 1A A/C Ahu 1A-A	203	C&A VENT BD 1A1-A	11C	1-MTR-31-461-A	10.00	12.00	78.9	1.15	T44		EF3-A025Z	170	4	
Y	Y	2A	Cont Rm Ahu A-A	203	C&A VENT BD 1A1-A	11D	0-MTR-31-12-A	60.00	72.00	413.0	1.15	T59		EF3-A100	930	4	
N	R	2A	125V Vtl Bat Rm II ExFan 1B1-A	203	C&A VENT BD 1A1-A	12A	1-MTR-31-285-A	0.50	1.10	5.1		T20		EF3-A003	10	2	
N	Y	2A	Cont Bldg Emerg Press Fan A-A	203	C&A VENT BD 1A1-A	12B	0-MTR-31-6-A	1.00	1.70	15.0	1.00	T24		EF3-A005	29	4	
N	N	2A	480V Bd Rm 1A A/C Cond 1A-A	203	C&A VENT BD 1A1-A	12C	1-MTR-31-290-A	15.00	21.00	111.0	1.15	T49		EF3-L050	260	3	
N	Y	2A	Cont Bldg Press Fan A-A	203	C&A VENT BD 1A1-A	12D	0-MTR-31-1-A	2.00	3.65	27.0	1.00	T31		EF3-A010	58	4	
Y	Y	2A	Cntmt Annulus Vac Fan 1A	203	C&A VENT BD 1A1-A	13C	1-MTR-65-77	5.00	7.25	46.0		T38		EF3-A025Z	105	2	
N	R	2A	Hot Instr Shop Bstr Pmp	204	C&A VENT BD 1A2-A	2A	0-MTR-31-339	0.75	1.20	12.5		T20		EF3-A005	29	4	
N	N	2A	480V Bd Rm 1A Unit Htrs El 772	204	C&A VENT BD 1A2-A	2D1	1-MTR-30-A1A	10.00	12.30					EF3-B020			
N	N	2A	480V BD RM 1A UNIT HTR EL 772	204	C&A VENT BD 1A2-A	2E1	1-MTR-30-B1A	10.00	12.30					EF3-B020			
N	N	2A	5TH VITAL BATT. RM. DUCT HTR.A	204	C&A VENT BD 1A2-A	2E2	0-MTR-31-493	32.00	38.50					EF3-B050Z			
Y	Y	2A	North Main St Vlt Exh Fan	204	C&A VENT BD 1A2-A	3A	1-MTR-30-25	3.00	4.60	32.0		T34		EF3-A010	58	4	
N	N	2A	CONT ROD DR EQPT RM UNIT HTR A	204	C&A VENT BD 1A2-A	3D1	1-MTR-30-ACRD	10.00	12.30					EF3-B020			
N	N	2A	480V Bd Rm 1A Unit Htrs El 772	204	C&A VENT BD 1A2-A	3E1	1-MTR-30-C1A	7.50	9.03					EF3-B020			
N	N	2A	480V Bd Rm 1A Duct Htr	204	C&A VENT BD 1A2-A	3E2	1-MTR-31-D1A	30.00	36.09					EF3-B050Z			
N	N	2A	Toilet And Locker Rm Duct Htr	204	C&A VENT BD 1A2-A	3F1	0-MTR-31-97	10.00	12.03					EF3-B020			
N	N	2A	480V SD B.Rm 1A Unit Htr El757	204	C&A VENT BD 1A2-A	3F2	1-MTR-30-1A1	3.00	3.70					EF3-B020			
N	Y	2A	Smplg Rm Hood Exh Fan 1A	204	C&A VENT BD 1A2-A	4A	1-MTR-30-283	1.00	1.70	15.0		T24		EF3-A005	29	4	
Y	N	2A	Smoke Removal Fan	204	C&A VENT BD 1A2-A	4B	0MTR-31-203/204	7.50	9.70	63.5	1.00	T41		EF3-A025Z	125	3	
N	N	2A	CONT ROD DR EQPT RM UNIT HTR B	204	C&A VENT BD 1A2-A	4E1	1-MTR-30-BCRD	10.00	12.30					EF3-B020			
N	N	2A	CONT ROD DR EQPT RM UNIT HTR C	204	C&A VENT BD 1A2-A	4F1	1-MTR-30-CCRD	10.00	12.30					EF3-B020			
N	Y	2A	N. Main St Vlt Backup Exh Fan	204	C&A VENT BD 1A2-A	5A	1-MTR-30-301	3.00	4.60	32.0		T34		EF3-A010	58	4	
N	N	2A	Cont Bldg El 692 Fl Sply Htr	204	C&A VENT BD 1A2-A	5E1	0-MTR-31-83	20.00	24.06					EF3-B030			
N	N	2A	Xfmr Rm 1A Unit Htr El 772	204	C&A VENT BD 1A2-A	5F1	1-MTR-30-XM1A	10.00	12.30					EF3-B020			
N	N	2A	Aux Bldg Sp Htr El 692	204	C&A VENT BD 1A2-A	5F2	1-MTR-30-AB1	5.00	6.10					EF3-B020			
N	N	2A	South Main St Vlt Rm Unit Htr	204	C&A VENT BD 1A2-A	6E1	1-MTR-30-SMS	20.00	24.06					EF3-B030			
N	N	2A	N. Main St Vlt Rm Unit Htr 1	204	C&A VENT BD 1A2-A	6E2	1-MTR-30-NM1	30.00	36.10					EF3-B050			
N	N	2A	125V VT BAT RM 1 U HTR	204	C&A VENT BD 1A2-A	6F2	0-MTR-30-RM1	5.00	6.10					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr A El757	204	C&A VENT BD 1A2-A	7D2	0-MTR-30-AFH	25.00	30.10					EF3-B040			

GROUP 2A, 2B, & 2C WBN-EEB-MS-T108-0008 ATTACHMENT M10448A SECTION A

H	B	GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROKE SIZE	TIME	BKR	BKR INST	SET POSIT	PEN
N	N	2A	Aux Cont Instr Rm 1A Unit Htr	204	C&A VENT BD 1A2-A	7E1	1-MTR-30-U1A	3.00	3.70					EF3-B020			
N	N	2A	FUEL HDL AREA UNIT HTR B EL757	204	C&A VENT BD 1A2-A	7E2	0-MTR-30-BFH	25.00	30.10					EF3-B040			
N	N	2A	Fuel Hdl Area Unit Htr A El757	204	C&A VENT BD 1A2-A	7F2	0-MTR-30-CFH	25.00	30.10					EF3-B040			
N	Y	2A	Cont Rod Dr Eqpt Rm A/C 1A	204	C&A VENT BD 1A2-A	8A	1-MTR-30-CRD	47.50	78.40	378.5				FJ3-B125	750	LO	
Y	N	2A	Cont Bldg Em Air Clnup Fan B-B	205	C&A VENT BD 1B1-B	2A	0-MTR-31-7-B	10.00	12.20	110.0	1.00	T42		EF3-A025Z	210	HI	
Y	Y	2A	Pen Rm El 713 Clr Fan 1B-B	205	C&A VENT BD 1B1-B	2C	1-MTR-30-197-B	3.00	4.00	26.0	1.00	T32		EF3-A010	58	4	
Y	Y	2A	Shdn Bd Rm Chlr CW Clr Pmp B-B	205	C&A VENT BD 1B1-B	3A	0-MTR-31-49/1-B	25.00	31.00	197.4	1.15	T53		EF3-L050	470	HI	
Y	Y	2A	Pipe Chase Clr Fan 1B-B	205	C&A VENT BD 1B1-B	3B	1-MTR-30-202-B	3.00	4.00	25.2	1.00	T32		EF3-A010	58	4	
Y	N	2A	Cntm Spray Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	3C	1-MTR-30-176-B	7.50	9.00	62.0	1.00	T40		EF3-A025Z	125	3	
Y	Y	2A	Battery Rm El 692 Exh Fan B-B	205	C&A VENT BD 1B1-B	4A	0-MTR-31-29-B	1.00	2.20	19.5		T27		EF3-A010	36	2	
N	N	2A	Emerg Gas Trtmt Sys Fan B-B	205	C&A VENT BD 1B1-B	4D	0-MTR-65-42-B	20.00	25.00	132.0	1.00	T50		EF3-L050	260	3	
Y	N	2A	SFP PmpB-B&TB Bst Pmp SpClrFan	205	C&A VENT BD 1B1-B	5A	0-MTR-30-193-B	7.50	9.00	62.0	1.00	T40		EF3-A025Z	125	3	
N	N	2A	CCS & AFW Pumps Sp Clr Fan B-B	205	C&A VENT BD 1B1-B	5E	1-MTR-30-191-B	20.00	24.50	139.9	1.00	T50		EF3-L050	330	4	
Y	N	2A	SHUTDOWN BD RM A PRESS FAN C-B	205	C&A VENT BD 1B1-B	6A	0-MTR-31-67-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
N	R	2A	EG Trtmt Sys B-B Humidity Htrs	205	C&A VENT BD 1B1-B	6D	0-MTR-65-37-B	20.00	24.06			T50		EF3-B040			
Y	N	2A	5th Vtl Batt Rm Intk Fan 1A2-B	205	C&A VENT BD 1B1-B	7A	0-MTR-31-496A-B	1.50	2.50	14.5	1.00	T28		EF3-A005	29	4	
N	R	2A	125V Vtl Bat Rm I Ex Fan 1A2-B	205	C&A VENT BD 1B1-B	7B	1-MTR-31-288-B	0.50	1.10	5.1		T20		EF3-A003	10	2	
N	Y	2A	Safety Inj Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	8A	1-MTR-30-179-B	5.00	6.10	50.1	1.00	T37		EF3-A025Z	105	2	
Y	Y	2A	Pen Rm El 692 Clr Fan 1B-B	205	C&A VENT BD 1B1-B	8B	1-MTR-30-187-B	3.00	4.00	25.0	1.00	T32		EF3-A010	58	4	
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B2-B	205	C&A VENT BD 1B1-B	8C	1-MTR-30-248F-B	3.00	4.70	28.8		T34		EF3-A010	58	4	
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B3-B	205	C&A VENT BD 1B1-B	8D	1-MTR-30-248G-B	3.00	4.70	28.8		T34		EF3-A010	58	4	
N	N	2A	Cont Rm A/C Clr Pmp B-B	205	C&A VENT BD 1B1-B	8E	0-MTR-31-96/1-B	15.00	20.00	118.4	1.15	T49		EF3-L050	260	3	
N	N	2A	Cont Rm A/C Sys Oil Pmp	205	C&A VENT BD 1B1-B	8F1	0-MTR-31-96/3-B	3.00	4.60	32.0				EF3-B020			
N	Y	2A	RHR Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	9A	1-MTR-30-176-B	5.00	6.10	45.0	1.00	T37		EF3-A025Z	105	2	
Y	R	2A	5th Vitl Batt Rm Exh Fan 1B2-B	205	C&A VENT BD 1B1-B	9B	0-MTR-31-496B-B	1.50	2.50	14.5	1.00	T28		EF3-A005	29	4	
N	N	2A	480V Bd Rm 1A Pr Sup Fan 1A2-B	205	C&A VENT BD 1B1-B	9C	1-MTR-31-463-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B1-B	205	C&A VENT BD 1B1-B	9D	1-MTR-30-248E-B	3.00	4.70	28.8		T34		EF3-A010	58	4	
Y	Y	2A	Pen Rm El 737 Clr Fan 1B-B	205	C&A VENT BD 1B1-B	9E	1-MTR-30-195-B	3.00	4.00	25.3	1.00	T32		EF3-A010	58	4	
N	Y	2A	Cntfg Chrg Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	10A	1-MTR-30-182-B	5.00	6.10	45.0	1.00	T37		EF3-A025Z	105	2	
N	N	2A	480V Bd Rm 1B Pr Sup Fan 1B2-B	205	C&A VENT BD 1B1-B	10B	1-MTR-31-477-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
N	N	2A	125V VTL BAT RM II EXFAN 1B2-B	205	C&A VENT BD 1B1-B	10C	1-MTR-31-286-B	0.50	1.10	5.1		T20		EF3-A003	10	2	
N	Y	2A	Cont Bldg Emerg Press Fan B-B	205	C&A VENT BD 1B1-B	11A	0-MTR-31-5-B	1.00	1.70	15.0	1.00	T24		EF3-A005	29	4	
N	N	2A	480V Bd Rm 1B A/C Ahu 1B-B	205	C&A VENT BD 1B1-B	11B	1-MTR-31-475-B	20.00	25.00	142.0	1.15	T51		EF3-H050	320	LO	
N	N	2A	480V Bd Rm 1B A/C Cond 1B-B	205	C&A VENT BD 1B1-B	11C	1-MTR-31-289-B	20.00	25.00	142.0	1.15	T51		EF3-H050	320	LO	
N	Y	2A	Cont Rm Ahu B-B	205	C&A VENT BD 1B1-B	11D	0-MTR-31-11-B	60.00	72.00	413.0		T58		EF3-A100	930	4	
N	Y	2A	Recip Chgrg Pmp Rm Clr Fan	205	C&A VENT BD 1B1-B	12A	1-MTR-30-181	3.00	4.30	26.7	1.15	T33		EF3-A010	58	4	
Y	Y	2A	Cont Bldg Press Fan B-B	205	C&A VENT BD 1B1-B	12D	0-MTR-31-2-B	2.00	3.65	27.0	1.00	T31		EF3-A010	58	4	
Y	Y	2A	Cntmt Annulus Vac Fan 1B	205	C&A VENT BD 1B1-B	13C	1-MTR-65-74	5.00	6.80	50.1	1.15	T38		EF3-A025Z	105	2	
N	N	2A	Shdn Bd Rm Chlr Pkg B-B O. Pmp	205	C&A VENT BD 1B1-B	13F2	0-MTR-31-49/3-B	2.00	4.18					EF3-B020			
Y	Y	2A	Toilet And Locker Rm Exh Fan	206	C&A VENT BD 1B2-B	2B	0-MTR-31-418	0.33	1.00	10.0	1.00	T18		EF3-A005	22	3	
N	N	2A	480V BDRM 1B UNIT HTR A EL 772	206	C&A VENT BD 1B2-B	2E1	1-MTR-30-A1B	10.00	12.30					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr G El757	206	C&A VENT BD 1B2-B	2E2	0-MTR-30-GFA	25.00	30.10					EF3-B040			
N	N	2A	480V Bd Rm 1B Unit Htrs El 772	206	C&A VENT BD 1B2-B	2F1	1-MTR-30-B1B	10.00	12.30					EF3-B020			
N	N	2A	480V Bd Rm 1B Duct Htr	206	C&A VENT BD 1B2-B	2F2	1-MTR-31-BRB	0.00	36.09					EF3-B050			
N	Y	2A	Smplg Rm Hood Exh Fan 1B	206	C&A VENT BD 1B2-B	3B	1-MTR-30-284	1.00	1.70	15.0		T24		EF3-A005	29	4	
N	Y	2A	Smplg Rm Hood Exh Fan 1C	206	C&A VENT BD 1B2-B	3C	1-MTR-30-66	1.00	1.70	15.0		T24		EF3-A005	29	4	
N	N	2A	480V BD RM 1B UNIT HT C EL 772	206	C&A VENT BD 1B2-B	3E1	1-MTR-30-C1B	10.00	12.30					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr H El757	206	C&A VENT BD 1B2-B	3E2	0-MTR-30-HFA	25.00	30.10					EF3-B040			
N	N	2A	Przr Htr Xfmr Rm Unit Htr	206	C&A VENT BD 1B2-B	3F1	1-MTR-30-PRX	10.00	12.30					EF3-B020			
Y	Y	2A	South Main St Vlt Bkup Exh Fan	206	C&A VENT BD 1B2-B	4B	1-MTR-30-302	3.00	4.60	32.0		T33		EF3-A010	58	4	
N	N	2A	Shft Eng Inst Cal Chart Sto Rm	206	C&A VENT BD 1B2-B	4E1	0-MTR-31-95	5.00	6.02					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr N El757	206	C&A VENT BD 1B2-B	4E2	0-MTR-30-NFA	25.00	30.08					EF3-B040			
N	N	2A	480V SD B.Rm 1B Unit Htr El757	206	C&A VENT BD 1B2-B	4F1	1-MTR-30-SBU	3.00	3.61					EF3-B020			
N	N	2A	Aux Cont Instr Rm 1B Unit Htr	206	C&A VENT BD 1B2-B	4F2	1-MTR-30-U113	3.00	3.70					EF3-B020			

GROUP 2A, 2B, & 2C WBN EEB-MS T108-0008 ATTACHMENT M10448A SECTION A

H	B	GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROKE SIZE	TIME	BKR	BKR INST	SET POSIT	PEN
N	N	2A	Aux Instr Rm Htr	206	C&A VENT BD 1B2-B	5E1	1-HTR-31-87	10.00	12.03					EF3-B020			
N	N	2A	125V Vital Btry Rm II Unit Htr	206	C&A VENT BD 1B2-B	5F1	0-HTR-30-RM2	5.00	6.10					EF3-B020			
Y	Y	2A	South Main St Vlt Exh Fan	206	C&A VENT BD 1B2-B	6B	1-HTR-30-26	3.00	4.60	32.0		T33		EF3-A010	58	4	
N	N	2A	Aux Bldg Sp Htr El 737	206	C&A VENT BD 1B2-B	6E1	1-HTR-30-AB7	5.00	7.00					EF3-B020			
N	N	2A	Xfmr Rm 1B Unit Htr El 772	206	C&A VENT BD 1B2-B	6F1	1-HTR-30-T1B	10.00	12.30					EF3-B020			
N	N	2A	Cont Bldg Fresh Air Htr	206	C&A VENT BD 1B2-B	7D	0-HTR-31-421	144.00	173.22					FJ3-B225	2000	HI	
N	N	2A	Shtdn Bd Rm Prs Fans Duct Htr	206	C&A VENT BD 1B2-B	7E2	0-HTR-31-72	20.00	24.06					EF3-B030			
N	N	2A	N. Main St Vlt Rm Unit Htr 2	206	C&A VENT BD 1B2-B	7F1	1-HTR-30-RM2	30.00	36.09					EF3-B050Z			
N	R	2A	5th Vital Batt.Rm.Duct Htr.B	206	C&A VENT BD 1B2-B	8F1	0-HTR-31-494	32.00	38.50					EF3-B050			
N	N	2A	Cont Rod Dr Eqpt Rm A/C 1B	206	C&A VENT BD 1B2-B	9A	1-HTR-30-CRB	47.50	78.40	378.5				FJ3-B125	750	LO	
Y	Y	2A	Shdn Bd Rm Chlr CW Clr Pmp A-A	207	C&A VENT BD 2A1-A	3A	0-HTR-31-36/1-A	25.00	31.00	197.4	1.15	T53		EF3-L050	470	HI	
N	Y	2A	Aux Bldg Gas Trtmt Sys Fan A-A	207	C&A VENT BD 2A1-A	3D	2-HTR-30-146-A	50.00	62.00	304.0	1.00	T56		EF3-A100	630	2	
Y	Y	2A	EG Trtmt Sys A-A Rm Clr Fan	207	C&A VENT BD 2A1-A	4A	2-HTR-30-200-A	3.00	4.10	27.0	1.00	T32		EF3-A010	58	4	
N	N	2A	AFW & BA XFR SPACE CLR FAN A-A	207	C&A VENT BD 2A1-A	5E	2-HTR-30-184-A	15.00	20.20	105.2	1.00	T48		EF3-L050	210	2	
Y	N	2A	Shutdown Bd Rm B Press Fan B-A	207	C&A VENT BD 2A1-A	6A	0-HTR-31-62-A	3.00	4.60	28.0	1.00	T33		EF3-A010	58	4	
N	N	2A	125V VIT BAT RM IV EXFAN 2A1-A	207	C&A VENT BD 2A1-A	7B	2-HTR-31-287-A	0.50	1.10	5.1		T20		EF3-A005	14	LO	
Y	Y	2A	Pen Rm El 737 Clr Fan 2A-A	207	C&A VENT BD 2A1-A	8B	2-HTR-30-194-A	3.00	4.00	25.5	1.00	T32		EF3-A010	58	4	
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A2-A	207	C&A VENT BD 2A1-A	8C	2-HTR-30-250F-A	3.00	4.70	28.8		T34		EF3-A010	58	4	
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A3-A	207	C&A VENT BD 2A1-A	8D	2-HTR-30-250G-A	3.00	4.70	28.8		T34		EF3-A010	58	4	
N	R	2A	Elec Bd Rm A/C Sys Oil Pmp	207	C&A VENT BD 2A1-A	8F1	0HTR-31-128/5-A	3.11	3.90					EF3-B020			
Y	Y	2A	C.Bldg Ele BdRm AC Clr Pmp A-A	207	C&A VENT BD 2A1-A	9B	0HTR-31-128/1-A	20.00	25.00	157.9	1.15	T51		EF3-L050	330	4	
N	N	2A	480V Bd Rm 2A Pr Sup Fan 2A1-A	207	C&A VENT BD 2A1-A	9C	2-HTR-31-462-A	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A1-A	207	C&A VENT BD 2A1-A	9D	2-HTR-30-250E-A	3.00	4.70	28.8		T34		EF3-A010	58	4	
Y	N	2A	ABGTS HUM HTR A-A	207	C&A VENT BD 2A1-A	10D	0-HTR-30-147-A	50.00	60.15			T56		EF3-B100			
N	N	2A	480V Bd Rm 2B Pr Sup Fan 2B1-A	207	C&A VENT BD 2A1-A	11A	2-HTR-31-478-A	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
Y	Y	2A	480V Bd Rm 2A A/C Ahu 2A-A	207	C&A VENT BD 2A1-A	11C	2-HTR-31-461-A	10.00	12.00	78.9	1.15	T44		EF3-A025Z	170	4	
N	R	2A	125V VltBatRm III Ex Fan 2B1-A	207	C&A VENT BD 2A1-A	12A	2-HTR-31-285-A	0.50	1.10	5.1		T20		EF3-A003	10	2	
N	N	2A	480V Bd Rm 2A A/C Cond 2A-A	207	C&A VENT BD 2A1-A	12C	2-HTR-31-290-A	15.00	21.00	111.0	1.15	T49		EF3-L050	260	3	
N	N	2A	Shtdn BdRm Chlr Pkg A-A OilPmp	207	C&A VENT BD 2A1-A	13F1	0-HTR-31-36/3-A	2.00	4.17					EF3-B020			
N	N	2A	480V BD RM 2A UNIT HT A EL 772	208	C&A VENT BD 2A2-A	2D1	2-HTR-30-A1A	10.00	12.30					EF3-B020			
N	N	2A	480V BD RM 2A UNIT HT B EL 772	208	C&A VENT BD 2A2-A	2E1	2-HTR-30-B1A	5.00	6.10					EF3-B020			
N	N	2A	480V BD RM 2A UNIT HT C EL 772	208	C&A VENT BD 2A2-A	3E1	2-HTR-30-C1A	7.50	9.03					EF3-B020			
N	N	2A	480V Bd Rm 2A Duct Htr	208	C&A VENT BD 2A2-A	3E2	2-HTR-31-D1A	30.00	36.09					EF3-B050			
N	N	2A	Record Stor Vlt Unit Htr	208	C&A VENT BD 2A2-A	3F1	0-HTR-31-91	10.00	12.03					EF3-B020			
N	N	2A	480V SD B.Rm 2A Unit Htr E1757	208	C&A VENT BD 2A2-A	3F2	2-HTR-30-1A1	3.00	3.70					EF3-B020			
N	Y	2A	Smplg Rm Hood Exh Fan 2A	208	C&A VENT BD 2A2-A	4A	2-HTR-30-67	1.50	2.65	20.0		T29		EF3-A005	41	HI	
N	N	2A	Shtdn Bd Rm Prs Fans Duct Htr	208	C&A VENT BD 2A2-A	5E1	0-HTR-31-71	20.00	24.06					EF3-B030			
N	N	2A	Xfmr Rm 2A Unit Htr El 772	208	C&A VENT BD 2A2-A	5F1	2-HTR-30-XM1A	10.00	12.03					EF3-B020			
N	N	2A	Aux Bldg Sp Htr El 692	208	C&A VENT BD 2A2-A	5F2	2-HTR-30-AB1	5.00	7.00					EF3-B020			
N	N	2A	Aux Bldg Sp Htr El 737	208	C&A VENT BD 2A2-A	6D1	0-HTR-30-AB1	5.00	7.00					EF3-B020			
N	N	2A	Hot Instr Shop Unit Htr	208	C&A VENT BD 2A2-A	6F1	0-HTR-31-339	5.00	6.10					EF3-B020			
N	N	2A	125V VtlBatRm III U. Htr E1772	208	C&A VENT BD 2A2-A	6F2	0-HTR-30-RM3	5.00	6.10					EF3-B020			
N	N	2A	Aux Bldg Sp Htr El 737	208	C&A VENT BD 2A2-A	7D1	0-HTR-30-AB2	10.00	13.00					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr D E1757	208	C&A VENT BD 2A2-A	7D2	0-HTR-30-DFH	25.00	30.00					EF3-B040			
N	N	2A	Aux Cont Instr Rm 2A Unit Htr	208	C&A VENT BD 2A2-A	7E1	2-HTR-30-U1A	3.00	3.70					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr E E1757	208	C&A VENT BD 2A2-A	7E2	0-HTR-30-EFH	25.00	30.00					EF3-B040			
N	N	2A	Fuel Hdl Area Unit Htr F E1757	208	C&A VENT BD 2A2-A	7F2	0-HTR-30-FFH	25.00	30.00					EF3-B040			
N	Y	2A	Aux Bldg Gas Trtmt Sys Fan B-B	209	C&A VENT BD 2B1-B	3D	2-HTR-30-157-B	50.00	62.00	304.0	1.00	T56		EF3-A100	630	2	
Y	Y	2A	BATTERY RM EL 692 EXH FAN C-B	209	C&A VENT BD 2B1-B	4A	0-HTR-31-27-B	1.50	3.30	27.1		T30		EF3-A010	58	4	
Y	Y	2A	AFWP&BA XFR PMP SP CLR FAN B-B	209	C&A VENT BD 2B1-B	5E	2-HTR-30-185-B	15.00	19.00	133.5	1.15	T49		EF3-L050	260	3	
Y	N	2A	Shtdn Bd Rm B Press Fan D-B	209	C&A VENT BD 2B1-B	6A	0-HTR-31-66-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
Y	Y	2A	125V Vlt Bat Rm IV ExFan 2A2-B	209	C&A VENT BD 2B1-B	7B	2-HTR-31-288-B	0.50	1.00	10.0		T18		EF3-A005	22	3	
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B2-B	209	C&A VENT BD 2B1-B	8C	2-HTR-30-246G-B	3.00	4.70	28.8		T34		EF3-A010	58	4	
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B3-B	209	C&A VENT BD 2B1-B	8D	2-HTR-30-246H-B	3.00	4.70	28.8		T34		EF3-A010	58	4	

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GROUP 2A, 2B, & 2C WBN-EEB-MS-T108-0008 ATTACHMENT M10448A SECTION A

H	B	GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROKI SIZE	TIME	BKR	BKR INST	SET POSIT	PEN
Y	Y	2A	C.Bldg Ele BdRm AC Clr Pmp B-B	209	C&A VENT BD 2B1-B	8E	OMTR-31-129/1-B	20.00	25.00	157.9	1.15	T51		EF3-L050	330	4	
N	N	2A	Elec Bd Rm A/C Sys Oil Pmp	209	C&A VENT BD 2B1-B	8F1	OMTR-31-129/3-B	3.00	3.90					EF3-B020			
N	N	2A	480V Bd Rm 2A Pr Sup Fan 2A2-B	209	C&A VENT BD 2B1-B	9C	2-MTR-31-463-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B1-B	209	C&A VENT BD 2B1-B	9D	2-MTR-30-246F-B	3.00	4.70	28.8		T34		EF3-A010	58	4	
Y	N	2A	Pen Rm El 737 Clr Fan 2B-B	209	C&A VENT BD 2B1-B	9E	2-MTR-30-195-B	3.00	4.00	24.6	1.00	T32		EF3-A010	45	3	
N	N	2A	480V Bd Rm 2B Pr Sup Fan 2B2-B	209	C&A VENT BD 2B1-B	10B	2-MTR-31-477-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	
Y	Y	2A	125V Vlt BatRm III ExFan 2B2-B	209	C&A VENT BD 2B1-B	10C	2-MTR-31-286-B	0.50	1.00	10.0		T18		EF3-A003	21	HI	
Y	N	2A	ABGTS HUMIDITY HTR B-B	209	C&A VENT BD 2B1-B	10D	0-HTR-30-156-B	50.00	60.15			T56		EF3-B100			
N	Y	2A	480V Bd Rm 2B A/C Ahu 2B-B	209	C&A VENT BD 2B1-B	11B	2-MTR-31-475-B	20.00	25.00	142.0	1.15	T51		EF3-L050	330	4	
N	Y	2A	480V Bd Rm 2B A/C Cond 2B-B	209	C&A VENT BD 2B1-B	11C	2-MTR-31-289-B	20.00	25.00	142.0	1.15	T51		EF3-H050	320	LO	
Y	Y	2A	EG Trtmt Sys B-B Rm Clr Fan	209	C&A VENT BD 2B1-B	12B	2-MTR-30-207-B	3.00	4.10	27.0	1.00	T32		EF3-A010	58	4	
Y	Y	2A	ELEV MACH RM EXH FAN	210	C&A VENT BD 2B2-B	2B	0-MTR-30-27	1.50	2.65	20.0		T28		EF3 A005	41	HI	
N	N	2A	480V BD RM 2B UNIT HT A EL 772	210	C&A VENT BD 2B2-B	2E1	2-HTR-30-A1B	10.00	12.30					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr K El757	210	C&A VENT BD 2B2-B	2E2	0-HTR-30-KFA	25.00	30.10					EF3-B040			
N	N	2A	480V BD RM 2B UNIT HT B EL 772	210	C&A VENT BD 2B2-B	2F1	2-HTR-30-B1B	10.00	12.30					EF3-B020			
N	N	2A	480V Bd Rm 2B Duct Htr	210	C&A VENT BD 2B2-B	2F2	2-HTR-31-BRB	30.00	36.09					EF3 B050			
N	N	2A	480V BD RM 2B UNIT HT C EL 772	210	C&A VENT BD 2B2-B	3E1	2-HTR-30-C1B	10.00	12.30					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr L El757	210	C&A VENT BD 2B2-B	3E2	0-HTR-30-LFA	25.00	30.08					EF3-B040			
N	N	2A	Rly Rm Elec Htr	210	C&A VENT BD 2B2-B	3F2	0-HTR-31-93	25.00	30.08					EF3-B040			
N	N	2A	Computer Room Heater	210	C&A VENT BD 2B2-B	4E1	0-HTR-31-85	10.00	12.03					EF3-B020			
N	N	2A	Fuel Hdl Area Unit Htr P El757	210	C&A VENT BD 2B2-B	4E2	0-HTR-30-PFA	25.00	30.10					EF3-B040			
N	N	2A	480V SD B.Rm 2B Unit Htr El757	210	C&A VENT BD 2B2-B	4F1	2-HTR-30-SBU	3.00	3.70					EF3-B020			
N	N	2A	Aux Cont Instr Rm 2B Unit Htr	210	C&A VENT BD 2B2-B	4F2	2-HTR-30-U113	3.00	3.70					EF3-B020			
N	N	2A	Aux Instr Rm Htr	210	C&A VENT BD 2B2-B	5E1	2-HTR-31-89	10.00	12.03					EF3-B020			
N	N	2A	125V VTL BATRM IV UT HTR	210	C&A VENT BD 2B2-B	5F1	0-HTR-30-RM4	5.00	6.10					EF3-B020			
N	N	2A	Aux Cont Rm Unit Htr	210	C&A VENT BD 2B2-B	5F2	0-HTR-30-U1	3.00	3.70					EF3-B020			
N	N	2A	Aux Bldg Sp Htr El 737	210	C&A VENT BD 2B2-B	6E1	2-HTR-30-AB7	5.00	7.00					EF3-B020			
N	N	2A	Xfmr Rm 2B Unit Htr El 772	210	C&A VENT BD 2B2-B	6F1	2-HTR-30-T1B	10.00	12.30					EF3-B020			
N	N	2A	Kit Elec Htr	210	C&A VENT BD 2B2-B	7E1	0-HTR-31-99	5.00	6.02					EF3-B020			
N	N	2A	Aux Bldg Sp Htr El 713	210	C&A VENT BD 2B2-B	8E2	0-HTR-30-A14	5.00	7.00					EF3-B020			
Y	Y	2A	Dg 1A-A Btry Hood Exh Fan	217	DSL AUX BD 1A1-A	2A	1-MTR-30-455-A	0.33	1.00	10.0		T19		EF3-A005	22	3	
Y	Y	2A	DG 1A-A RM EXH FAN 1-A	217	DSL AUX BD 1A1-A	2B	1-MTR-30-447-A	15.00	19.50	118.4	1.15	T49		EF3-L050	260	3	
N	Y	2A	Dg Rm 1A-A Pnl Vent Fan	217	DSL AUX BD 1A1-A	4D	1-MTR-30-491-A	15.00	20.00	118.4	1.00	T48		EF3-L050	260	3	
Y	Y	2A	Dg 1A-A 480V Elec Bd Rm Ex Fan	217	DSL AUX BD 1A1-A	4E	1-MTR-30-459-A	2.00	2.70	22.6	1.00	T29		EF3-A010	45	3	
N	N	2A	El 742 Corridor Elec Htr 1A	217	DSL AUX BD 1A1-A	5F1	0-HTR-30-479	7.50	9.03					EF3-B020			
Y	Y	2A	Dg 1A-A Muffler Rm Exh Fan	217	DSL AUX BD 1A1-A	6A	1-MTR-30-463	1.50	2.65	20.0		T28		EF3-A005	41	HI	
N	N	2A	Lube Oil Storage Rm Htr	217	DSL AUX BD 1A1-A	6F1	0-HTR-30-483	10.00	12.30					EF3-B020			
Y	Y	2A	DG 1A-A RM EXH FAN 2-A	218	DSL AUX BD 1A2-A	2B	1-MTR-30-451-A	15.00	19.50	118.4	1.15	T49		EF3-L050	260	3	
N	N	2A	Co2 Stor Rm Elec Htr	218	DSL AUX BD 1A2-A	2E2	0-HTR-30-484	25.00	30.10					EF3-B040			
N	N	2A	Dg 1A-A 480V Ele Bd Rm Ele Htr	218	DSL AUX BD 1A2-A	3E1	1-HTR-30-487	7.50	9.30					EF3-B020			
N	N	2A	Dg 1A-A Rm Htr A	218	DSL AUX BD 1A2-A	3F1	1-HTR-30-471	15.00	18.05					EF3-B030			
N	N	2A	Dg 1A-A Rm Htr B	218	DSL AUX BD 1A2-A	3F2	1-HTR-30-472	15.00	18.05					EF3-B030			
N	N	2A	Fallout Shelter Elec Htr	218	DSL AUX BD 1A2-A	5E1	0-HTR-30-485	15.00	18.60					EF3-B030			
Y	N	2A	Lube Oil & Co2 Stor Rm Exh Fan	218	DSL AUX BD 1A2-A	6A	0-MTR-30-470	0.75	1.40	12.5		T22		EF3-A005	29	4	
Y	Y	2A	Dg 1B-B Battery Hood Exh Fan	219	DSL AUX BD 1B1-B	2A	1-MTR-30-457-B	0.33	1.00	10.0		T18		EF3-A005	22	3	
Y	Y	2A	DG 1B-B RM EXH FAN 1-B	219	DSL AUX BD 1B1-B	2B	1-MTR-30-449-B	15.00	19.50	118.4	1.15	T49		EF3-L050	260	3	
N	Y	2A	Dg Rm 1B-B Pnl Vent Fan	219	DSL AUX BD 1B1-B	4D	1-MTR-30-493-B	15.00	20.00	118.4	1.00	T48		EF3-L050	260	3	
Y	Y	2A	DG 1B-B 480V ELEC BD RM EX FAN	219	DSL AUX BD 1B1-B	4E	1-MTR-30-461-B	2.00	2.75	22.6	1.00	T29		EF3-A010	45	3	
N	N	2A	El 742 Corridor Elec Htr 1B	219	DSL AUX BD 1B1-B	5F1	0-HTR-30-481	7.50	9.30					EF3-B020			
Y	Y	2A	Dg 1B-B Muffler Rm Exh Fan	219	DSL AUX BD 1B1-B	6A	1-MTR-30-465	1.50	2.65	20.0		T28		EF3-A005	41	HI	
Y	Y	2A	Dg 1B-B Rm Exh Fan 2-B	220	DSL AUX BD 1B2-B	2B	1-MTR-30-453-B	15.00	19.50	118.4	1.15	T49		EF3-L050	260	3	
N	N	2A	Dg 1B-B 480V Ele Bd Rm Ele Htr	220	DSL AUX BD 1B2-B	3E1	1-HTR-30-489	7.50	9.30					EF3-B020			
N	N	2A	Dg 1B-B Rm Htr A	220	DSL AUX BD 1B2-B	3F1	1-HTR-30-473	15.00	18.60					EF3-B030			
N	N	2A	Dg 1B-B Rm Htr B	220	DSL AUX BD 1B2-B	3F2	1-HTR-30-474	15.00	18.05					EF3-B030			

GROUP 2A, 2B, & 2C WBN-EEB-MS-T108-0008 ATTACHMENT M10448A SECTION A

H	B	GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROKE SIZE	TIME	BKR	BKR INST	SET POSIT	PEN
N	Y	2A	Dg 2A-A Btry Hood Exh Fan	221	DSL AUX BD 2A1-A	2A	2-MTR-30-456-A	0.33	2.20	9.3	1.15	T28		EF3-A005	18	2	
Y	Y	2A	DG 2A-A RM EXH FAN 1-A	221	DSL AUX BD 2A1-A	2B	2-MTR-30-448-A	15.00	19.50	118.4	1.15	T49		EF3-L050	260	3	
N	Y	2A	Dg Rm 2A-A Pnl Vent Fan	221	DSL AUX BD 2A1-A	4D	2-MTR-30-492-A	15.00	20.00	118.4	1.00	T48		EF3-L050	260	3	
Y	Y	2A	2A-A 480V ELEC BD RM EX FAN	221	DSL AUX BD 2A1-A	4E	2-MTR-30-460-A	2.00	2.70	22.6	1.00	T29		EF3-A010	45	3	
N	N	2A	El 742 Corridor Elec Htr 2A	221	DSL AUX BD 2A1-A	5F1	0-MTR-30-480	7.50	9.30					EF3-B020			
Y	Y	2A	Dg 2A-A Muffler Rm Exh Fan	221	DSL AUX BD 2A1-A	6A	2-MTR-30-464	1.50	2.65	20.0		T28		EF3-A005	41	HI	
Y	Y	2A	DG 2A-A RM EXH FAN 2-A	222	DSL AUX BD 2A2-A	2B	2-MTR-30-452-A	15.00	19.50	118.4	1.15	T49		EF3-L050	260	3	
N	N	2A	Dg 2A-A 480V Elec Bd Room Htr	222	DSL AUX BD 2A2-A	3E1	2-MTR-30-488	7.50	9.30					EF3-B020			
N	N	2A	Dg 2A-A Rm Htr A	222	DSL AUX BD 2A2-A	3F1	2-MTR-30-475	15.00	18.30					EF3-B030			
N	N	2A	Dg 2A-A Rm Htr A	222	DSL AUX BD 2A2-A	3F2	2-MTR-30-476	15.00	18.05					EF3-B030			
Y	Y	2A	Dg 2B-B Btry Hood Exh Fan	223	DSL AUX BD 2B1-B	2A	2-MTR-30-458-B	0.33	1.00	10.0		T18		EF3-A005	22	3	
Y	Y	2A	DG 2B-B RM EXH FAN 1B	223	DSL AUX BD 2B1-B	2B	2-MTR-30-450-B	15.00	19.50	118.4	1.15	T49		EF3-L050	260	3	
N	Y	2A	Dg Rm 2B-B Pnl Vent Fan	223	DSL AUX BD 2B1-B	4D	2-MTR-30-494-B	15.00	20.00	118.4	1.00	T48		EF3-L050	260	3	
Y	Y	2A	Dg 2B-B 480V Elec Bd Rm Ex Fan	223	DSL AUX BD 2B1-B	4E	2-MTR-30-462-B	2.00	2.70	22.6	1.00	T29		EF3-A010	45	3	
N	N	2A	El 742 Corridor Elec Htr 2B	223	DSL AUX BD 2B1-B	5F1	0-MTR-30-482	7.50	9.30					EF3-B020			
Y	Y	2A	Dg 2B-B Muffler Rm Exh Fan	223	DSL AUX BD 2B1-B	6A	2-MTR-30-466	1.50	2.65	20.0		T29		EF3-A005	41	HI	
Y	Y	2A	DG 2B-B RM EXH FAN 2-B	224	DSL AUX BD 2B2-B	2B	2-MTR-30-454-B	15.00	19.50	118.4	1.15	T49		EF3-L050	260	3	
N	N	2A	Dg 2B-B 480V Elec Bd Rm Htr	224	DSL AUX BD 2B2-B	3E1	2-MTR-30-490	7.50	9.30					EF3-B020			
N	N	2A	Dg 2B-B Rm Htr A	224	DSL AUX BD 2B2-B	3F1	2-MTR-30-477	20.00	24.70					EF3-B030			
N	N	2A	Dg 2B-B Rm Htr B	224	DSL AUX BD 2B2-B	3F2	2-MTR-30-478	20.00	24.70					EF3-B030			
Y	N	2A	D.G RM EXH FAN 2	225	DSL AUX BD C1-S	BN	0-MTR-30-332-S	15.00	18.00	105.2	1.15	C228B		TRS25R			
Y	N	2A	D.G. RM. EXH FAN 1	225	DSL AUX BD C1-S	BS	0-MTR-30-334-S	15.00	18.00	105.2	1.15	C228B		TRS25R			
N	F	2A	480V AUX BD RM EXH FAN	225	DSL AUX BD C1-S	CA	0-MTR-30-331-S	1.50	1.95	13.4	1.15	C266A		TRSJR			
N	F	2A	6.9KV BD. RM	225	DSL AUX BD C1-S	CE	0-MTR-30-330-S	10.00	12.00	78.9	1.15	C16.3B		TRS20R			
N	N	2A	PIPE GALLERY RM HTR 2	226	DSL AUX BD C2-S	BN	0-MTR-30-321	7.50	9.03					A4J15			
N	N	2A	6.9KV BD RM HTR 2	226	DSL AUX BD C2-S	BR	0-MTR-30-319	7.50	9.03					A4J15			
Y	F	2A	FUEL OIL TRANSFER RM EXH FAN	226	DSL AUX BD C2-S	CA	0-MTR-30-329	0.50	1.00	10.0		C118A		~~TRS1.5R~~ TRS1.6R			
N	N	2A	DG RM HTR 1	226	DSL AUX BD C2-S	CN	0-MTR-30-317	20.00	26.25					A4J30			
N	N	2A	DG RM HTR 2	226	DSL AUX BD C2-S	CR	0-MTR-30-322	20.00	24.06					A4J30			
N	N	2A	FIRE PROTECT RM HTR	226	DSL AUX BD C2-S	CU	0-MTR-30-325	7.50	9.03					A4J15			
N	N	2A	TRANSFORMER RM HTR	226	DSL AUX BD C2-S	CX	0-MTR-30-324	7.50	9.03					A4J15			
N	F	2A	DG MUFFLER RM EXH FAN	226	DSL AUX BD C2-S	EA	0-MTR-30-327	1.50	1.95	12.5	1.15	C268A		TRSJR			
N	N	2A	6.9KV BD RM HTR 1	226	DSL AUX BD C2-S	GA	0-MTR-30-318	7.50	9.03					A4J15			
N	N	2A	PIPE GALLERY RM HTR 1	226	DSL AUX BD C2-S	GD	0-MTR-30-320	7.50	9.03					A4J15			
N	N	2A	VESTIBULE HTR	226	DSL AUX BD C2-S	GG	0-MTR-30-323	7.50	9.03					A4J15			
N	F	2A	480V BO RM HTR	226	DSL AUX BD C2-S	GR	0-MTR-30-326	7.50	9.03					A4J15			
Y	Y	2A	Incore Inst Rm Clr Fan 1A	235	RMOV BD 1A1-A	16A	1-MTR-31-265	3.00	4.30	26.7	1.15	T33		EF3-A010	58	4	Y
N	N	2A	Incore Inst Rm Ch Wtr Cprsr 1A	235	RMOV BD 1A1-A	16F2	1-MTR-31-303/2	3.00	4.60	32.0				EF3-B020			
Y	Y	2A	Incore Inst Rm Circ Pump 1A	235	RMOV BD 1A1-A	18C	1-MTR-31-303/1	3.00	4.20	30.1	1.15	T33		EF3-A010	58	4	
N	Y	2A	480V Bd Rm 1A A/C Cprsr 1A-1	236	RMOV BD 1A2-A	17E	1-MTR-31-465-A	50.00	57.00	350.8	1.15			FJ3-B125	750	LO	
Y	Y	2A	Incore Inst Rm Clr Fan 1B	237	RMOV BD 1B1-B	16A	1-MTR-31-266	3.00	4.30	26.7	1.15	T33		EF3-A010	58	4	Y
N	N	2A	Incore Inst Rm Ch Wtr Cprsr 1B	237	RMOV BD 1B1-B	17F2	1-MTR-31-324/2	3.00	4.60	95.0				EF3-B020			
Y	Y	2A	Incore Inst Rm Circ Pump 1B	237	RMOV BD 1B1-B	18C	1-MTR-31-324/1	3.00	4.20	30.1	1.15	T33		EF3-A010	58	4	
N	Y	2A	480V Bd Rm 1B A/C Cprsr 1B-B	238	RMOV BD 1B2-B	18D	1-MTR-31-447-B	75.00	91.50	542.5				FJ3-B125	1300	3	
N	R	2A	480V BO RM 2A A/C CPRSR 2A-A	240	RMOV BD 2A2-A	17E	2-MTR-31-465-A	50.00	57.00	350.8	1.15			FJ3-B080	750	LO	
N	R	2A	480V Bd Rm 2B A/C Cprsr 2B-B	242	RMOV BD 2B2-B	18D	2-MTR-31-447-B	75.00	90.00	526.2	1.15			FJ3-B175	1300	3	
Y	Y	2A	Spreading Rm Sply Fan	243	RX VENT BD 1A-A	5A	0-MTR-31-406	0.25	1.00	10.0		T18		EF3-A005	22	3	
N	Y	2A	Spreading Rm Exh Fan A	243	RX VENT BD 1A-A	6A	0-MTR-31-25	3.00	4.60	32.0		T34		EF3-A010	58	4	
N	N	2A	Reac Upper Compt Clr Fan 1A	243	RX VENT BD 1A-A	9B	1-MTR-30-95	5.00	9.10	39.5		T40		EF3-A025	75	LO	Y
N	Y	2A	Reac Upper Compt Clr Fan 1C	243	RX VENT BD 1A-A	10B	1-MTR-30-99	5.00	9.10	39.5		T40		EF3-A025	75	LO	Y
Y	Y	2A	COMPUTER ROOM AHU NO. 1	243	RX VENT BD 1A-A	11B	0-MTR-31-497	7.50	9.60	60.0	1.00	T41		EF3-A025	125	3	
N	N	2A	Reac Lwr Compt Unit Htr 1A	243	RX VENT BD 1A-A	11F	1-MTR-30-74H	10.00	12.03					EF3-B020			Y
N	N	2A	Cntmt Instr Rm Unit Htr 1A	243	RX VENT BD 1A-A	12F	1-MTR-30-11H	5.00	6.02					EF3-B020			Y
N	N	2A	Reac Upper Compt Htr 1A	243	RX VENT BD 1A-A	15A	1-MTR-30-35H	50.00	60.20					EF3-B070			Y

R5 TWB 6-16-90 EJJ 6/16/90

GROUP 2A, 2B, & 2C WBN-EEB-MS-T108-0008 ATTACHMENT M10448A SECTION A

H	B	GP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROKE SIZE	TIME	BKR	BKR INST	SET POSIT	PEN
N	R	2A	Cntmt Purge Air Sply Fan 1A	243	RX VENT BD 1A-A	15D	1-MTR-30-1	50.00	62.00	350.0	1.00	T56		EF3-A100	750	3	
N	N	2A	Reac Upper Cmpt Htr 1C	243	RX VENT BD 1A-A	16A	1-HTR-30-33H	50.00	60.20					EF3-B070			Y
N	Y	2A	Cntmt Purge Air Exh Fan 1A	243	RX VENT BD 1A-A	16D	1-MTR-30-1E	50.00	62.00	312.0	1.00	T56		EF3-A100	630	2	
Y	Y	2A	Incore Instr Rm Purge Sply Fan	244	RX VENT BD 1B-B	5E	1-MTR-30-11	0.25	1.00	10.0		T18		EF3-A003	21	HI	
N	N	2A	Spreading Rm Exh Fan B	244	RX VENT BD 1B-B	6A	0-MTR-31-26	3.00	4.60	32.0		T34		EF3-A010	58	4	
Y	Y	2A	Incore Instr Rm Purge Exh Fan	244	RX VENT BD 1B-B	6E	1-MTR-30-11E	0.33	1.00	10.0		T18		EF3-A003	21	HI	
N	N	2A	Reac Upper Compt Clr Fan 1B	244	RX VENT BD 1B-B	9B	1-MTR-30-97	5.00	9.10	39.5		T40		EF3-A025	75	LO	Y
N	Y	2A	Reac Upper Compt Clr Fan 1D	244	RX VENT BD 1B-B	10B	1-MTR-30-100	5.00	9.10	39.5		T40		EF3-A025	75	LO	Y
N	N	2A	Reac Lwr Compt Unit Htr 1B	244	RX VENT BD 1B-B	11F	1-HTR-30-75H	10.00	12.60					EF3-B020			Y
N	N	2A	Cntmt Instr Rm Unit Htr 1E	244	RX VENT BD 1B-B	12F	1-HTR-30-12H	5.00	6.02					EF3-B020			Y
N	N	2A	Reac Upper Compt Htr 1B	244	RX VENT BD 1B-B	15A	1-HTR-30-37H	50.00	60.20					EF3-B070			Y
Y	N	2A	Cntmt Purge Air Sply Fan 1B	244	RX VENT BD 1B-B	15D	1-MTR-30-4	50.00	62.00	350.0	1.00	T56		EF3-A100	750	3	
N	N	2A	Reac Upper Compt Htr 1D	244	RX VENT BD 1B-B	16A	1-HTR-30-100H	50.00	60.15					EF3-B070			Y
Y	Y	2A	Cntmt Purge Air Exh Fan 1B	244	RX VENT BD 1B-B	16D	1-MTR-30-4E	50.00	62.00	312.0	1.00	T56		EF3-A100	630	2	
Y	Y	2A	COMPUTER ROOM AHU NO. 1	246	RX VENT BD 2B-B	11B	0-MTR-31-498	7.50	9.60	60.0	1.00	T41		EF3-A025	125	3	
N	N	2B	Boric Acid Tank A Htr A-A	235	RMOV BD 1A1-A	2A	1-HTR-62-239-A	9.00	10.83					EF3-B020			
Y	N	2B	Boric Acid Transfer Pmp 1A-A	235	RMOV BD 1A1-A	2B	1-MTR-62-230-A	7.50	13.00		1.00	T43		EF3-L050	210	2	
Y	N	2B	Boric Acid Transfer Pmp 1A-A	235	RMOV BD 1A1-A	2B	1-MTR-62-230-A	15.00	18.00	105.2	1.00	T48		EF3-L050	210	2	
N	N	2B	RWST To RHR Pmp Flow Cont Vlv	235	RMOV BD 1A1-A	2E1	1-FCV-63-1-A	10.50	13.80	118.5				EF3-B040			
N	N	2B	Boric Acid Tank C Htr A-A	235	RMOV BD 1A1-A	3A	0-HTR-62-243-A	9.00	10.83					EF3-B020			
Y	Y	2B	CNTFGL CHARG PMP 1A-A AOP	235	RMOV BD 1A1-A	3E	1-MTR-62-AOP-A	2.00	3.10	22.6	1.15	T31		EF3-A010	45	3'	
N	N	2B	SIS Accum Tank 1 Flow Isol Vlv	235	RMOV BD 1A1-A	3F2	1-FCV-63-118-A	19.50	25.20	208.0				EF3-H050	400	2	Y
N	N	2B	SIS Boron Inj Tank Heater 1A-A	235	RMOV BD 1A1-A	4A	1-HTR-63-37-A	6.00	7.22					EF3-B020			
Y	N	2B	AFW Pmp A-A Lube Oil Pmp A-A	235	RMOV BD 1A1-A	4E	1-MTR-3-118D-A	0.25	0.56	3.5		T13		EF3-A003	7	LO	
N	N	2B	RHR Sys Isln Vlv	235	RMOV BD 1A1-A	5B	1-FCV-74-1-A	2.60	4.73	38.0				EF3-B020			Y
Y	Y	2B	Seal Flow Ret Isln Vlv	235	RMOV BD 1A1-A	7A	1-FCV-62-63-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B	CHARGING FLOW ISLN VLV	235	RMOV BD 1A1-A	7B	1-FCV-62-90-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	R	2B	SIS Accum Tank 3 Flow Isol Vlv	235	RMOV BD 1A1-A	7D	1-FCV-63-80-A	19.50	25.20	208.0		T48	15	EF3-L050	470	HI	Y
Y	N	2B	CHARG PMP 1A-A MIN FLOW	235	RMOV BD 1A1-A	8A	1-FCV-62-98-A	0.66	2.30	12.0		T22	10	EF3-A010	27	LO	
Y	Y	2d	Vol Cont Tank Outlet Isln Vlv	235	RMOV BD 1A1-A	8B	1-LCV-62-132-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	N	2B	SIS Accum Tank 1 Flow Isol Vlv	235	RMOV BD 1A1-A	8D	1-FCV-63-118-A	19.50	25.20	208.0		T48	15	EF3-B060			Y
Y	Y	2B	RWST To Charging Pmp Vlv Cont	235	RMOV BD 1A1-A	9A	1-LCV-62-135-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	Y	2B	SIS PMP INLET TO CVCS CHG PMP	235	RMOV BD 1A1-A	9B	1-FCV-63-177-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	R	2B	RWST To Spray Hdr 1A FCV	235	RMOV BD 1A1-A	9F	1-FCV-72-22-A	3.20	5.20	36.0		T32	20	EF3-A010	84	HI	
Y	R	2B	RWST To RHR Pmp Flow Cont Vlv	235	RMOV BD 1A1-A	10A	1-FCV-63-1-A	10.50	13.80	118.5		T42	20	EF3-L050	260	3	
Y	N	2B	SIS Pmp Recirc To RWST	235	RMOV BD 1A1-A	10B	1-FCV-63-3-A	0.70	2.30	12.0		T22	10	EF3-A010	27	LO	
Y	Y	2B	RHR Sys Isln Vlv	235	RMOV BD 1A1-A	10D	1-FCV-74-1-A	2.60	4.73	38.0		T33	120	EF3-A010	84	HI	Y
Y	N	2B	Cont Spray Pmp 1A-A Recirc FCV	235	RMOV BD 1A1-A	10F	1-FCV-72-34-A	0.13	0.45	2.6		T9	10	EF3-A003	7	LO	
Y	Y	2B	SIS Pmp Inlet To CVCS Chrg Pmp	235	RMOV BD 1A1-A	11A	1-FCV-63-7-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	R	2B	RHR Hx A To CVCS Chrgr Pmp	235	RMOV BD 1A1-A	11B	1-FCV-63-8-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	Y	2B	SIS Boron Inj Tank Shutoff Vlv	235	RMOV BD 1A1-A	11D	1-FCV-63-26-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	R	2B	SIS BIT Inlet Shutoff Valve	235	RMOV BD 1A1-A	11E	1-FCV-63-39-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B	SIS Pmp 1A-A Inlet Vlv	235	RMOV BD 1A1-A	12A	1-FCV-63-47-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	R	2B	Cntmt Sump To RHR Pmp A-A	235	RMOV BD 1A1-A	12B	1-FCV-63-72-A	12.80	18.10	144.4	1.00	T45	22	EF3-L050	330	4	
N	R	2B	SIS To RCS Loops 2&3 FCV	235	RMOV BD 1A1-A	12D	1-FCV-63-93-A	10.30	15.10	116.4	1.00	T45	10	EF3-L050	260	3	
Y	Y	2B	SIS Pmp 1A-A Outlet FCV	235	RMOV BD 1A1-A	12E	1-FCV-63-152-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B	SIS Pmp Out RCS Lp 1&3 Hot Leg	235	RMOV BD 1A1-A	13A	1-FCV-63-156-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	R	2B	Cntmt Sump To Spray Hdr 1A FCV	235	RMOV BD 1A1-A	13B	1-FCV-72-44-A	3.20	5.20	36.0		T32	15	EF3-A010	84	HI	
Y	R	2B	Cntmt Spray Hdr 1A Isln Vlv	235	RMOV BD 1A1-A	13E	1-FCV-72-39-A	3.20	5.20	36.0		T32	15	EF3-A010	84	HI	
Y	R	2B	RHR Spray Hdr 1A Isln Vlv	235	RMOV BD 1A1-A	14A	1-FCV-72-40-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	R	2B	RHR Pmp 1A-A Inlet FCV	235	RMOV BD 1A1-A	14B	1-FCV-74-3-A	10.50	13.80	118.5		T42	20	EF3-L050	260	3	
Y	N	2B	RHR Pmp 1A-A Min Flow Vlv	235	RMOV BD 1A1-A	14D	1-FCV-74-12-A	0.13	0.45	2.6		T9	10	EF3-A003	7	LO	
Y	Y	2B	RHR Hx 1A Bypass Vlv	235	RMOV BD 1A1-A	14E	1-FCV-74-33-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
N	R	2B	Boric Acid Batching Tank Htr 2	235	RMOV BD 1A1-A	17A	1-HTR-62-228/2	22.50	27.07					EF3-B040			

GROUP 2A, 2B, & 2C WBN-EEB-MS-TI08-0008 ATTACHMENT M10448A SECTION A

H	GP B	ENG_TITLE	NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROKE TIME	BKR	BKR INST	SET POSIT	PEN
N	N	2B SIS Accum Tank 3 Flow Isol Vlv	235	RMOV BD 1A1-A	17F2	1-FCV-63-80-A	19.50	25.20	208.0				EF3-B050			Y
N	Y	2B Boric Acid Batch Tank Agitator	235	RMOV BD 1A1-A	18D	0-MTR-62-226	1.00	2.05	12.5		T26		EF3-A005	29	4	
Y	N	2B ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	2A	1-FCV-3-116A-A	0.13	0.45	2.6		T9	6	EF3-A003	7	LO	
Y	N	2B ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	2B	1-FCV-3-116B-A	0.13	0.45	2.6		T9	6	EF3-A003	7	LO	
Y	Y	2B ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	3A	1-FCV-3-136A-A	0.33	0.75	5.7		T13	15	EF3-A003	12	3	
Y	Y	2B ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	3B	1-FCV-3-136B-A	0.33	1.75	5.7		T13	15	EF3-A003	12	3	
Y	Y	2B RHR Sys Isln Bypass Vlv	236	RMOV BD 1A2-A	6D	1-FCV-74-8-A	1.60	4.00	25.0		T31	120	EF3-A010	58	4	Y
N	N	2B Boric Acid Tank A Htr B-B	237	RMOV BD 1B1-B	2A	1-HTR-62-245-B	9.00	10.83					EF3-B020			
Y	N	2B Boric Acid Transfer Pmp 1B-B	237	RMOV BD 1B1-B	2B	1-MTR-62-232-B	15.00	18.00	105.2	1.00	T48		EF3-L050	210	2	
Y	N	2B Boric Acid Transfer Pmp 1B-B	237	RMOV BD 1B1-B	2B	1-MTR-62-232-B	7.50	13.00		1.00	T43		EF3-L050	210	2	
N	N	2B SIS Pmp Cold Leg Inj	237	RMOV BD 1B1-B	2F2	1-FCV-63-22-B	1.90	3.50	26.0				EF3-A010	58	4	
N	N	2B Boric Acid Tank C Htr B-B	237	RMOV BD 1B1-B	3A	0-HTR-62-246-B	9.00	10.83					EF3-B020			
N	N	2B SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	3F2	1-FCV-63-98-B	19.50	25.20	208.0				EF3-H050	400	2	Y
N	N	2B SIS Boron Inject Tank Htr 1B-B	237	RMOV BD 1B1-B	4A	1-HTR-63-36-B	6.00	7.22					EF3-B020			
Y	Y	2B Cntfgl Chgrg Pmp 1B-B AOP	237	RMOV BD 1B1-B	4D	1-MTR-62-AOP-B	2.00	3.10	22.6	1.15	T31		EF3-A010	45	3	
N	N	2B RHR Sys Isln Vlv	237	RMOV BD 1B1-B	5B	1-FCV-74-2-B	2.60	4.73	38.0				EF3-B020			Y
Y	R	2B RHR Sys Isln Bypass Vlv	237	RMOV BD 1B1-B	5C	1-FCV-74-9-B	1.60	4.00	25.0		T31	120	EF3-A010	58	4	Y
Y	Y	2B Seal Flow Ret Isln Vlv	237	RMOV BD 1B1-B	6D	1-FCV-62-61-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	Y
Y	Y	2B CHRG FLOW ISLN VLV	237	RMOV BD 1B1-B	7A	1-FCV-62-91-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	N	2B CHRG PMP 1A-A MIN FLOW	237	RMOV BD 1B1-B	7B	1-FCV-62-99-B	0.66	2.30	12.0		T20	10	EF3-A010	27	LO	
Y	R	2B SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	7D	1-FCV-63-67-B	19.50	25.20	208.0		T48		EF3-H050	400	2	Y
Y	Y	2B Vol Cont Tank Outlet Isln Vlv	237	RMOV BD 1B1-B	8A	1-LCV-62-133-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B RWST To Charging Pmp Vlv Cont	237	RMOV BD 1B1-B	8B	1-LCV-62-136-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	N	2B SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	8D	1-FCV-63-98-B	19.50	25.20	208.0		T48		EF3-B060			Y
Y	R	2B Emer Boration Flow Cont Vlv	237	RMOV BD 1B1-B	9A	1-FCV-62-138-B	1.30	2.40	16.0		T24	15	EF3-A010	36	2	
Y	R	2B RHR To RCS H.L. 1&3 Flow Iso V	237	RMOV BD 1B1-B	9B	1-FCV-63-172-B	2.60	4.73	38.0		T33	120	EF3-A010	84	HI	
Y	N	2B Cont Spray Pmp 1B-B Recirc FCV	237	RMOV BD 1B1-B	9F	1-FCV-72-13-B	0.13	0.45	2.6		T9	10	EF3-A003	7	LO	
Y	Y	2B SIS 1A-A DSH TO RWST SHTFF VLV	237	RMOV BD 1B1-B	10A	1-FCV-63-4-B	0.70	2.80	16.0		T24	10	EF3-A010	36	2	
Y	Y	2B RWST To SIS Pump Flow Cont Vlv	237	RMOV BD 1B1-B	10B	1-FCV-63-5-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B RHR Sys Isln Vlv	237	RMOV BD 1B1-B	10D	1-FCV-74-2-B	2.60	4.73	38.0		T33	120	EF3-A010	84	HI	Y
Y	R	2B RWST To Spray Hdr 1B FCV	237	RMOV BD 1B1-B	10F	1-FCV-72-21-B	3.20	5.20	36.0		T32	20	EF3-A010	84	HI	
Y	Y	2B SIS PMP INLT TO CVCS CHRG PMP	237	RMOV BD 1B1-B	11A	1-FCV-63-6-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	R	2B RHR Hx B To SIS Pmp	237	RMOV BD 1B1-B	11B	1-FCV-63-11-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	Y	2B SIS Pmp Cold Leg Inj	237	RMOV BD 1B1-B	11D	1-FCV-63-22-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B SIS Boron Inj Tank Shutoff Vlv	237	RMOV BD 1B1-B	11E	1-FCV-63-25-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	R	2B SIS Brn Inj Tnk Inlt Shtff Vlv	237	RMOV BD 1B1-B	12A	1-FCV-63-40-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B SIS Pmp 1B-B Inlet Vlv	237	RMOV BD 1B1-B	12B	1-FCV-63-48-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	R	2B Cntmt Sump To RHR Pmp B-B	237	RMOV BD 1B1-B	12D	1-FCV-63-73-B	12.80	18.10	144.9		T45	22	EF3-L050	330	4	
N	R	2B SIS To RCS Loops 1&4 FCV	237	RMOV BD 1B1-B	12E	1-FCV-63-94-B	10.30	15.10	116.4		T45	10	EF3-L050	260	3	
Y	Y	2B SIS Pmp 1B-B Outlet FCV	237	RMOV BD 1B1-B	13A	1-FCV-63-153-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B SIS PMP OUT RCS LP 2&4 H. LEG	237	RMOV BD 1B1-B	13B	1-FCV-63-157-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
Y	Y	2B SIS 1B-B Dsh To RWST Shtff Vlv	237	RMOV BD 1B1-B	13D	1-FCV-63-175-B	0.70	2.30	16.0		T24	10	EF3-A010	36	2	
Y	Y	2B Cntmt Spray Hdr 1B Isln Vlv	237	RMOV BD 1B1-B	14A	1-FCV-72-2-B	3.20	5.20	36.0		T32	15	EF3-A010	84	HI	
Y	R	2B RHR Spray Hdr 1B Isln Vlv	237	RMOV BD 1B1-B	14D	1-FCV-72-41-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
Y	R	2B Cntmt Sump To Spray Hdr 1B FCV	237	RMOV BD 1B1-B	14E	1-FCV-72-45-B	3.20	5.20	36.0		T32	15	EF3-A010	84	HI	
Y	R	2B RHR Pmp 1B-B Inlet FCV	237	RMOV BD 1B1-B	15A	1-FCV-74-21-B	10.50	13.80	118.5		T42	20	EF3-L050	260	3	
Y	N	2B RHR Pmp 1B-B Min Flow Vlv	237	RMOV BD 1B1-B	15B	1-FCV-74-24-B	0.13	0.45	3.2		T9	10	EF3-A003	7	LO	
Y	Y	2B RHR Hx 1B Bypass Vlv	237	RMOV BD 1B1-B	15D	1-FCV-74-35-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	
N	N	2B SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	16F2	1-FCV-63-67-B	19.50	25.20	208.0				EF3-B050Z			Y
N	N	2B Boric Acid Batch Tank Htr 1	237	RMOV BD 1B1-B	17A	1-HTR-62-228/1	22.50	27.07					EF3-B040			
Y	N	2B AFW Pmp B-B Lube Oil Pmp B-B	237	RMOV BD 1B1-B	17D	1-MTR-3-126D-B	0.25	0.56	3.5		T13		EF3-A003	7	LO	
Y	N	2B ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	2A	1-FCV-3-126A-B	0.13	0.45	2.6		T9	6	EF3-A003	7	LO	
Y	N	2B ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	2B	1-FCV-3-126B-B	0.13	0.45	2.6		T9	6	EF3-A003	7	LO	
Y	Y	2B ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	3A	1-FCV-3-179A-B	0.33	0.75	5.7		T13	15	EF3-A003	12	3	

GROUP 2A, 2B, & 2C WBN-EEB-MS-T108-0008 ATTACHMENT M10448A SECTION A

H	B	GP	ENG_TITLE	MODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROKE SIZE	TIME	BKR	BKR INST	SET POSIT	PEN
Y	Y	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	3B	1-FCV-3-179B-B	0.33	0.75	5.7		T13	15	EF3-A003	12	3	
N	N	2B	Boric Acid Tank B Htr A-A	239	RMOV BD 2A1-A	2A	2-HTR-62-239-A	9.00	10.83					EF3-B020			
N	N	2B	Boric Acid Transfer Pmp 2A-A	239	RMOV BD 2A1-A	2B	2-MTR-62-230-A	7.50	13.00		1.00	T43		EF3-L050	210	2	
Y	N	2B	Boric Acid Transfer Pmp 2A-A	239	RMOV BD 2A1-A	2B	2-MTR-62-230-A	15.00	18.00	105.2	1.00	T48		EF3-L050	210	2	
Y	Y	2B	Vol Cont Tank Outlet Isln Vlv	239	RMOV BD 2A1-A	8B	2-LCV-62-132-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
N	R	2B	Boric Acid Batching Tank Htr 4	239	RMOV BD 2A1-A	17A	2-HTR-62-228/4	22.50	27.07					EF3-B040			
Y	N	2B	Boric Acid Transfer Pmp 2B-B	241	RMOV BD 2B1-B	2B	2-MTR-62-232-B	7.50	13.00		1.00	T43		EF3-L050	210	2	
Y	N	2B	Boric Acid Transfer Pmp 2B-B	241	RMOV BD 2B1-B	2B	2-MTR-62-232-B	15.00	18.00	105.2	1.00	T48		EF3-L050	210	2	
N	N	2B	Boric Acid Tank B Htr B-B	241	RMOV BD 2B1-B	3A	2-HTR-62-245-B	9.00	10.83					EF3-B020			
Y	Y	2B	Vol Cont Tank Outlet Isln Vlv	241	RMOV BD 2B1-B	8A	2-LCV-62-133-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	
N	N	2B	Boric Acid Batching Tank Htr 3	241	RMOV BD 2B1-B	17A	2-HTR-62-228/3	22.50	27.07					EF3-B040			
N	Y	2C	St Gen No 1 FW Isln Vlv	236	RMOV BD 1A2-A	3D	1-FCV-3-33-A	39.40	48.10	494.0		T53	6.5	EF3-A100	930	4	
Y	Y	2C	Loop 1 Deaeration Line Vlv	236	RMOV BD 1A2-A	4A	1-FCV-3-191	1.60	4.00	25.0		T28	30	EF3-A010	58	4	
Y	Y	2C	Loop 2 Deaeration Line Vlv	236	RMOV BD 1A2-A	4B	1-FCV-3-192	1.60	4.00	25.0		T28	30	EF3-A010	58	4	
N	R	2C	St Gen No 3 FW Isln Vlv	236	RMOV BD 1A2-A	4D	1-FCV-3-87-A	39.40	48.10	494.0		T53	6.5	EF3-A100	930	4	
N	R	2C	ST GEN NO 2 FW ISLN VLV	238	RMOV BD 1B2-B	3D	1-FCV-3-47-B	39.40	48.10	494.0		T53	6.5	EF3-A100	930	4	
Y	Y	2C	Loop 3 Deaeration Line Vlv	238	RMOV BD 1B2-B	4A	1-FCV-3-193	1.60	4.00	25.0		T28	30	EF3-A010	58	4	
Y	Y	2C	Loop 4 Deaeration Line Vlv	238	RMOV BD 1B2-B	4B	1-FCV-3-194	1.60	4.00	25.0		T28	30	EF3-A010	58	4	
N	R	2C	St Gen No 4 FW Isln Vlv	238	RMOV BD 1B2-B	4D	1-FCV-3-100-B	39.40	48.10	494.0		T53	6.5	EF3-A100	930	4	
N	N	2C	Hydrogen Det Sys	243	RX VENT BD 1A-A	2F1	1-H2AM-43-200	8.00	9.63					EF3-B020			
N	N	2C	Hydrogen Det Sys	244	RX VENT BD 1B-B	2F1	1-H2AM-43-210	8.00	9.63					EF3-B020			

ATTACHMENT NO. M10448A - SECTION B
WBN EEB-MS-T108-0008
480V SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

PT	LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
480V SHDN BD 1A1-A															
	1-MTR-30-83/1-A		150	0.95	4			6			1PL4800A 1PL4801A	4/0 1/0	PASS		CABLE 1PL4800A REPLACED (DCN M-09760-A)
	1-MTR-30-74-A		100	0.95	9			12			1PL4750A 1PL4751A	#2 #2	PASS		CABLES REPLACED (ECN 110014R0)
	1-MTR-30-83/2-A		150	0.95	4			6			1PL4816A 1PL4817A	4/0 1/0	PASS		CABLE 1PL4816A REPLACED (DCN M-09760-A)
	0-MTR-31-30B-A		150	0.55	4			6			1PL4500A	4/0	PASS		
	1-MTR-30-38-A		200	0.75	10			10			1PL4875A 1PL4876A	500MCM 1/0	PASS		CABLE 1PL4875A REPLACED (DCN M-09638-A)
480V SHDN BD 1A2-A															
	0-MTR-31-80/2-A		600	0.70	4			7			1PL4522A 1PL4520A	4/0 4/0	PASS		PARALLEL CONDUCTORS
	1-MTR-30-88/1-A		150	0.95	4			6			1PL4820A 1PL4821A	4/0 1/0	PASS		CABLE 1PL4820A REPLACED (DCN M-09760-A)
	1-[illegible]0-77-A		100	0.95	9			12			1PL4775A 1PL4776A	#2 #2	PASS		CABLES REPLACED (ECN 110014R0)
	1-MTR-30-88/2-A		150	0.95	4			6			1PL4836A 1PL4837A	4/0 1/0	PASS		CABLE 1PL4836A REPLACED (DCN M-09760-A)
	0-MTR-31-45-A		150	0.90	8			9			1PL5180A	4/0	PASS		#2 PIGTAIL. CABLE REPLACED (DCN M-09663-A)
480V SHDN BD 1B1-B															
	0-MTR-31-31B-B		100	0.90	6			8			1PL4460B	1/0	PASS		#2 PIGTAIL. CABLE REPLACED DCN (M-09700-A)
	1-MTR-30-92/1-B		150	0.95	4			6			1PL4839B 1PL4840B	4/0 1/0	PASS		CABLE 1PL4839B REPLACED (DCN M-09760-A)
	1-MTR-30-75-B		100	0.95	9			12			1PL4764B 1PL4765B	#2 #2	PASS		CABLES REPLACED (ECN 110014R0)
	1-MTR-30-92/2-B		150	0.95	4			6			1PL4853B 1PL4854B	4/0 1/0	PASS		CABLE 1PL4853B REPLACED (DCN M-09760-A)
480V SHDN BD 1B2-B															
	0-MTR-31-96/2-B		600	0.70	4			7			1PL4429B 1PL4430B	400MCM 400MCM	PASS		PARALLEL CONDUCTORS. #4/0 PIGTAIL
	0-[illegible]1-49/2-B		400	0.88	4			7			1PL5200B	300MCM	PASS		
	1-[illegible]0-80/1-B		150	0.95	4			6			1PL4856B 1PL4857B	4/0 1/0	PASS		CABLE 1PL4856B REPLACED (DCN M-09760-A)

ATTACHMENT NO. M10448A - SECTION B
WBN EEB-MS-T100-0000
480V SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

T LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
1-MTR-30-78-B		100	0.95	9			12			1PL4789P 1PL4790B	#2 #2	PASS		CABLES REPLACED (ECN 110014R0)
1-MTR-30-39-B		200	0.75	10			10			1PL4885B 1PL4886B	500MCM 250MCM	PASS		CABLES REPLACED (DCN M-09638-A)
0-MTR-31-55-B		150	0.90	8			9			1PL5520B	4/0	PASS		CABLE REPLACED (DCN M-09662-A)
1-MTR-30-80/2-B		150	0.95	4			6			1PL4873B 1PL4874B	4/0 1/0	PASS		CABLE 1PL4873B REPLACED (DCN M-09760-A)
480V SHDN BD 2A1-A														
0-MTR-31-38B-A		150	0.95	4			6			2PL4500A	250MCM	PASS		#2 PIGTAIL. CABLE REPLACED (DCN M-09701-A)
480V SHDN BD 2A2-A														
0MTR-31-128/2-A		600	0.70	4			7			2PL4520A 2PL4522A	4/0 4/0	PASS		PARALLEL CONDUCTORS
0-MTR-31-36/2-A		400	0.88	4			7			2PL5120A	500MCM	PASS		300MCM PIGTAIL. CABLE REPLACED (DCN M-09663-A)
0-MTR-31-44-A		150	0.90	8			9			2PL5180A	4/0	PASS		#2 PIGTAIL. CABLE REPLACED (DCN M-09663-A)
480V SHDN BD 2B1-B														
0-MTR-31-31D-B		100	0.90	6			8			2PL4460B	250MCM	PASS		#2 PIGTAIL. CABLE REPLACED (DCN M-09700-A)
480V SHDN BD 2B2-B														
0MTR-31-129/2-B		600	0.70	4			7			2PL4440B 2PL4443B	4/0 4/0	PASS		PARALLEL CONDUCTORS
0-MTR-31-61-B		150	0.90	8			9			2PL5520B	4/0	PASS		CABLE REPLACED (DCN M-09662-A)

ATTACHMENT NO. M10448A - SECTION B
WBN EEB-MS-TI08-0008
480V MCC CLASS 1E CABLE PROTECTION

T	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
C&A VENT BD 1A1-A										
	1-MTR-30-183-A	EF3-A025Z	2			1PL3001A	#10	PASS		
	1-MTR-30-196-A	EF3-A010	4			1PL3111A	#10	PASS		
	1-MTR-30-201-A	EF3-A010	4			1PL3071A	#10	PASS		
	1-MTR-31-478-A	EF3-A010	4			1PL3480A	#10	PASS		
	1-MTR-31-461-A	EF3-A025Z	4			1PL4060A	#4	PASS		CABLE REPLACED (DCN M-09612-A)
	0-MTR-31-12-A	EF3-A100	4			1PL4020A	4/0	PASS		CABLE REPLACED (DCN M-08413-A)
	1-MTR-31-255-A	EF3-A003	2			1PL3570A	#12	PASS		
	0-MTR-31-6-A	EF3-A005	4			1PL3787A	#12	PASS		
	1-MTR-31-290-A	EF3-L050	3			1PL4080A	#2	PASS		#8 PIGTAIL. CABLE REPLACED (DCN M-09685-A)
	0-MTR-31-1-A	EF3-A010	[illegible]			1PL[illegible]1A	#8	PASS		
	0-MTR-31-8-A	EF3-L050	2			1PL3301A	#8	PASS		
	0-MTR-31-493A-A	EF3-A010	2			1PL6440A	#12	PASS		
	1-MTR-30-186-A	EF3-A010	4			1PL3131A	#10	PASS		
	1-MTR-30-177-A	EF3-A025Z	3			1PL3051A	#10	PASS		
	0-MTR-31-28-A	EF3-A010	3			1PL2885A	#12	PASS		
	0-MTR-31-493B-A	EF3-A005	4			1PL6445A	#12	PASS		
	0-MTR-65-23-A	EF3-L050	3			1PL3520A	#2	PASS		#8 PIGTAIL. CABLE REPLACED DCN M-09608-A
	0-MTR-30-192-A	EF3-A025Z	3			1PL3151A	#10	PASS		
	1-MTR-30-190-A	EF3-L050	3			1PL3191A	#6	PASS		CABLE REPLACED (DCN M-09779-A)
	0-MTR-31-64-A	EF3-A010	4			1PL3601A	#12	PASS		
	0-MTR-65-17-A	EF3-B030				1PL3540A	#2	PASS		CABLE REPLACED (DCN M-09608-A)
	1-MTR-31-287-A	EF3-A003	2			1PL3560A	#12	PASS		
	1-MTR-30-180-A	EF3-A025Z	2			1PL2981A	#10	PASS		
	1-MTR-30-194-A	EF3-A010	4			1PL3091A	#10	PASS		
	1-MTR-30-244G-A	EF3-A010	4			1PL2854A	#12	PASS		
	1-MTR-30-244H-A	EF3-A010	4			1PL2837A	#12	PASS		
	0-MTR-31-80/3-A	EF3-B020				1PL3820A	#8	PASS		
	1-MTR-30-175-A	EF3-A025Z	2			1PL3031A	#10	PASS		
	0-MTR-31-80/1-A	EF3-L050	3			1PL3825A	#8	PASS		CABLE REPLACED (DCN M-09779-A)
	1-MTR-31-462-A	EF3-A010	4			1PL3470A	#10	PASS		
	1-MTR-30-244F-A	EF3-A010	4			1PL2846A	#12	PASS		
C&A VENT BD 1B1-B										
	1-MTR-30-182-B	EF3-A025Z	2			1PL3011B	#10	PASS		
	1-MTR-31-477-B	EF3-A010	4			1PL3495B	#10	PASS		
	1-MTR-31-286-B	EF3-A003	2			1PL3575B	#12	PASS		
	0-MTR-31-5-B	EF3-A005	4			1PL3795B	#12	PASS		
	1-MTR-31-475-B	EF3-H050	LO			1PL4070B	#2	PASS		#8 PIGTAIL. CABLE REPLACED (DCN M-09661-A)
	1-MTR-31-289-B	EF3-H050	LO			1PL4090B	#2	PASS		#8 PIGTAIL. CABLE REPLACED (DCN M-09661-A)
	0-MTR-31-11-B	EF3-A100	4			1PL4040B	1/0	PASS		CABLE REPLACED (DCN M-09778-A)
	[illegible]31-2-B	EF3-A010	4			1PL3249B	#8	PASS		
2	[illegible]31-49/3-B	EF3-B020				1PL3760B	#10	PASS		
	0-MTR-31-7-B	EF3-A025Z	HI			1PL3308B	#8	PASS		

ATTACHMENT NO. M1044CA - SECTION B
WBN EEB-MS-T108-0008
480V MCC CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PRCT	BKR COORD	NOTES
2C	1-MTR-30-197-B	EF3-A010	4			1PL3121B	#10	PASS		
3A	0-MTR-31-49/1-B	EF3-L050	HI			1PL4030B	1/0	PASS		#2 PIGTAIL. CABLE REPLACED (DCN M-09614-A)
3B	1-MTR-30-202-B	EF3-A010	4			1PL3081B	#10	PASS		
3C	1-MTR-30-178-B	EF3-A025Z	3			1PL3061B	#6	PASS		CABLE REPLACED DCN (M-09614-A)
4A	0-MTR-31-29-B	EF3-A010	2			1PL2853	#12	PASS		
4D	0-MTR-65-42-B	EF3-L050	3			1PL3530B	#2	PASS		#8 PIGTAIL. CABLE REPLACED (DCN M-09698-A)
5A	0-MTR-30-193-B	EF3-A025Z	3			1PL3161B	#6	PASS		CABLE REPLACED DCN (M-09614-A)
5E	1-MTR-30-191-B	EF3-L050	4			1PL3201B	#6	PASS		CABLE REPLACED (DCN M-09778-A)
6A	0-MTR-31-67-B	EF3-A010	4			1PL3611B	#12	PASS		
6D	0-MTR-65-37-B	EF3-B040				1PL3550B	#8	PASS		
7A	0-MTR-31-496A-B	EF3-A005	4			1PL6450B	#12	PASS		
7B	1-MTR-31-288-B	EF3-A003	2			1PL3565B	#12	PASS		
8A	1-MTR-30-179-B	EF3-A025Z	2			1PL2991B	#8	PASS		CABLE REPLACED (DCN M-09614-A)
8B	1-MTR-30-187-B	EF3-A010	4			1PL3141B	#10	PASS		
8C	1-MTR-30-248F-B	EF3-A010	4			1PL2878B	#12	PASS		
8D	1-MTR-30-248G-B	EF3-A010	4			1PL2862B	#12	PASS		
8E	0-MTR-31-96/1-B	EF3-L050	3			1PL3835B	#8	PASS		CABLE REPLACED (DCN M-09779-A)
8F1	0-MTR-31-96/3-B	EF3-B020				1PL3830B	#8	PASS		
9A	1-MTR-30-176-B	EF3-A025Z	2			1PL3041B	#10	PASS		CABLE REPLACED (DCN M-09778-A)
9B	0-MTR-31-496B-B	EF3-A005	4			1PL6455B	#12	PASS		
9C	1-MTR-31-463-B	EF3-A010	4			1PL3487B	#10	PASS		
9D	1-MTR-30-248E-B	EF3-A010	4			1PL2870B	#12	PASS		
9E	1-MTR-30-195-B	EF3-A010	4			1PL3101B	#10	PASS		
** C&A VENT BD 2A1-A										
10D	0-MTR-30-147-A	EF3-B100				2PL3697A	#2	PASS		
11A	2-MTR-31-478-A	EF3-A010	4			2PL3480A	#8	PASS		CABLE REPLACED (DCN P-05450-A)
11C	2-MTR-31-461-A	EF3-A025Z	4			2PL4060A	#8	PASS		CABLE REPLACED (DCN M-09612-A)
12A	2-MTR-31-285-A	EF3-A003	2			2PL3570A	#12	PASS		
12C	2-MTR-31-290-A	EF3-L050	3			2PL4080A	#2	PASS		#8 PIGTAIL. CABLE REPLACED (DCN M-09685-A)
13F1	0-MTR-31-36/3-A	EF3-B020				2PL3770A	#10	PASS		
3A	0-MTR-31-36/1-A	EF3-L050	HI			2PL4020A	#4	PASS		#8 PIGTAIL. CABLE REPLACED (DCN M-09663-A)
3D	2-MTR-30-146-A	EF3-A100	2			2PL3748A	1/0	PASS		#2 PIGTAIL. CABLE REPLACED (DCN M-09616-A)
4A	2-MTR-30-200-A	EF3-A010	4			2PL3774A	#10	PASS		
5E	2-MTR-30-184-A	EF3-L050	2			2PL3151A	#8	PASS		CABLE REPLACED (DCN M-09779-A)
6A	0-MTR-31-62-A	EF3-A010	4			2PL3601A	#12	PASS		
7B	2-MTR-31-287-A	EF3-A005	LO			2PL3560A	#12	PASS		
8B	2-MTR-30-194-A	EF3-A010	4			2PL3091A	#10	PASS		
8C	2-MTR-30-250F-A	EF3-A010	4			2PL2854A	#12	PASS		
8D	2-MTR-30-250G-A	EF3-A010	4			2PL2837A	#12	PASS		
8F1	0-MTR-31-128/5-A	EF3-B020				2PL3825A	#8	PASS		
9B	0-MTR-31-128/1-A	EF3-L050	4			2PL4000A	#2	PASS		CABLE REPLACED (DCN M-09701-A)
9C	2-MTR-31-462-A	EF3-A010	4			2PL3470A	#10	PASS		

ATTACHMENT NO. M10440A - SECTION B
WBN EEB-MS-TI08-0008
480V MCC CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
D	2-MTR-30-250E-A	EF3-A010	4			2PL2846A	#12	PASS		
C&A VENT BD 2B1-B										
0B	2-MTR-31-477-B	EF3-A010	4			2PL3495B	#10	PASS		
0C	2-MTR-31-286-B	EF3-A003	HI			2PL3575B	#12	PASS		
0D	0-HTR-30-156-B	EF3-B100				2PL3868B	#2	PASS		
1B	2-MTR-31-475-B	EF3-L050	4			2PL4070B	#2	PASS		#8 PIGTAIL. CABLE REPLACED (DCN M-09661-A)
1C	2-MTR-31-289-B	EF3-H050	LO			2PL4090B	#2	PASS		#8 PIGTAIL. CABLE REPLACED (DCN M-09661-A)
2B	2-MTR-30-207-B	EF3-A010	4			2PL3201B	#10	PASS		
D	2-MTR-30-157-B	EF3-A100	2			2PL3760B	#2	PASS		
A	0-MTR-31-27-B	EF3-A010	4			2PL2895B	#12	PASS		
E	2-MTR-30-185-B	EF3-L050	3			2PL3161B	#8	PASS		CABLE REPLACED (DCN M-09779-A)
A	0-MTR-31-68-B	EF3-A010	4			2PL3611B	#12	PASS		
B	2-MTR-31-288-B	EF3-A005	3			2PL3565B	#12	PASS		
C	2-MTR-30-246G-B	EF3-A010	4			2PL2870B	#12	PASS		
D	2-MTR-30-246H-B	EF3-A010	4			2PL2862B	#12	PASS		
E	0MTR-31-129/1-B	EF3-L050	4			2PL3980B	#2	PASS		CABLE REPLACED (DCN M-09700-A)
F1	[illegible]R-31-129/3-B	EF3-B020				2PL3830B	#8	PASS		
C	[illegible]TR-31-463-B	EF3-A010	4			2PL3487B	#10	PASS		
D	2-MTR-30-246F-B	EF3-A010	4			2PL2870B	#12	PASS		
E	2-MTR-30-195-B	EF3-A010	3			2PL3101B	#10	PASS		
DSL AUX BD 1A1-A										
A	1-MTR-30-455-A	EF3-A005	3			PL2580A	#12	PASS		
B	1-MTR-30-447-A	EF3-L050	3			PL2620A	#8	PASS		
D	1-MTR-30-491-A	EF3-L050	3			PL3444A	#8	PASS		
E	1-MTR-30-459-A	EF3-A010	3			PL2520A	#10	PASS		
DSL AUX BD 1A2-A										
B	1-MTR-30-451-A	EF3-L050	3			PL2629A	#8	PASS		
DSL AUX BD 1B1-B										
A	1-MTR-30-457-B	EF3-A005	3			PL2590B	#12	PASS		
B	1-MTR-30-449-B	EF3-L050	3			PL2656B	#8	PASS		
D	1-MTR-30-493-B	EF3-L050	3			PL3452B	#8	PASS		
E	1-MTR-30-461-B	EF3-A010	3			PL2530B	#10	PASS		
DSL AUX BD 1B2-B										
B	1-MTR-30-453-B	EF3-L050	3			PL2665B	#8	PASS		
DSL AUX BD 2A1-A										
A	2-MTR-30-456-A	EF3-A005	2			PL2585A	#12	PASS		
B	2-MTR-30-448-A	EF3-L050	3			PL2638A	#8	PASS		
D	[illegible]MTR-30-492-A	EF3-L050	3			PL3448A	#8	PASS		
E	[illegible]R-30-460-A	EF3-A010	3			PL2525A	#10	PASS		

ATTACHMENT NO. M10440A - SECTION B
WBN EEB-MS-TI08-0008
480V MCC CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
*	DSL AUX BD 2A2-A									
2B	2-MTR-30-452-A	EF3-L050	3			PL2647A	#8	PASS		
*	DSL AUX BD 2B1-B									
2A	2-MTR-30-450-B	EF3-A005	3			PL2595B	#12	PASS		
2B	2-MTR-30-450-B	EF3-L050	3			PL2674B	#8	PASS		
4D	2-MTR-30-494-B	EF3-L050	3			PL3456B	#8	PASS		
4E	2-MTR-30-462-B	EF3-A010	3			PL2535B	#10	PASS		
*	DSL AUX BD 2B2-B									
2B	2-MTR-30-454-B	EF3-L050	3			PL2683B	#8	PASS		
*	DSL AUX BD C1-S									
3N	0-MTR-30-332-S			TRS25R	25A	PL3376S	#8	PASS		SHAWMUT FUSES
3S	0-MTR-30-334-S			TRS25R	25A	PL3370S	#8	PASS		SHAWMUT FUSES
3A	0-MTR-30-331-S			TRS3R	3A	PL3395S	#10	PASS		SHAWMUT FUSES
3E	0-MTR-30-330-S			TRS20R	20A	PL3385S	#8	PASS		SHAWMUT FUSES
*	RMOV BD 1A1-A									
0A	[illegible]CV-63-1-A	EF3-L050	3							TO COMPT 2E1
0B	[illegible]V-63-3-A	EF3-A010	LO			1V2900A	#12	PASS		
0D	1-FCV-74-1-A	EF3-A010	HI					PASS		TO COMPT 5B
0F	1-FCV-72-34-A	EF3-A003	LO			1V3160A	#12	PASS		
1A	1-FCV-63-7-A	EF3-A010	4			1V2326A	#12	PASS		
1B	1-FCV-63-8-A	EF3-A010	4			1V3170A	#10	PASS		
1D	1-FCV-63-26-A	EF3-A010	4			1V2680A	#12	PASS		
1E	1-FCV-63-39-A	EF3-A010	4			1V2695A	#10	PASS		
2A	1-FCV-63-47-A	EF3-A010	4			1V2330A	#12	PASS		
2B	1-FCV-63-72-A	EF3-L050	4			1V3130A	#6	PASS		CABLE REPLACED: #6 MINIMUM (REF. 3.2)
2D	1-FCV-63-93-A	EF3-L050	3			1V2374A	#6	PASS		
2E	1-FCV-63-152-A	EF3-A010	4			1V2362A	#12	PASS		
3A	1-FCV-63-156-A	EF3-A010	4			1V2386A	#12	PASS		
3B	1-FCV-72-44-A	EF3-A010	HI			1V1810A	#10	PASS		
3E	1-FCV-72-39-A	EF3-A010	HI			1V2820A	#10	PASS		
4A	1-FCV-72-40-A	EF3-A010	4			1V2743A	#10	PASS		
4B	1-FCV-74-3-A	EF3-L050	3			1V1920A	#6	PASS		CABLE REPLACED: #6 MINIMUM (REF. 3.2)
4D	1-FCV-74-12-A	EF3-A003	LO			1V1935A	#12	PASS		
4E	1-FCV-74-33-A	EF3-A010	4			1V2606A	#12	PASS		
7F2	1-FCV-63-80-A	EF3-B050				1V2720A	#6	PASS		1V2733A REPLACED: #2 MINIMUM
						1V2733A	#2			(REF. 3.2)
A	1-HTR-62-239-A	EF3-B020				1PL6170A	#6	PASS		#10 PIGTAIL. CABLE REPLACED (DCN M-10089-A)
B	1-MTR-62-230-A	EF3-L050	2			1PL6108A	#2	PASS		2/3C CABLE. #8 PIGTAIL. CABLE REPLACED (DCN M-10089-A)
E1	[illegible]V-63-1-A	EF3-B040				1V2120A	#6	PASS		CABLE REPLACED: #6 MINIMUM (REF. 3.2)

ATTACHMENT NO. M10448A - SECTION B
WBN EEB-MS-TI08-0008
480V MCC CLASS 1E CABLE PROTECTION

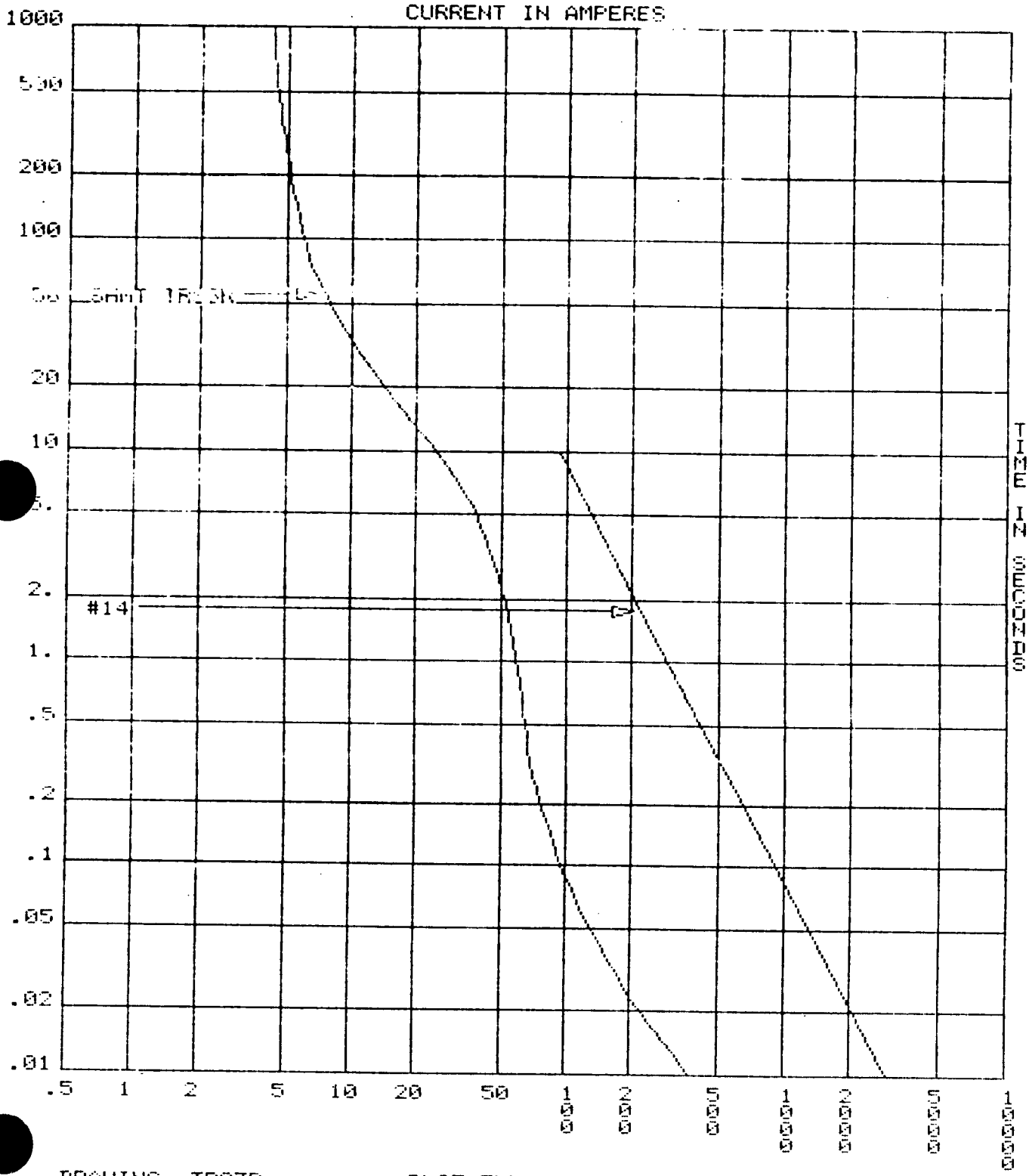
PT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
	0-HTR-62-243-A	EF3-B020				1PL6182A	#6	PASS		#10 PIGTAIL. CABLE REPLACED (DCN M-10089-A)
	1-MTR-62-AOP-A	EF3-A010	3			1PL6145A	#12	PASS		
2	1-FCV 63-118-A	EF3-H050	2			1V2710A	#6	PASS		1V2711A REPLACED: #2 MINIMUM (REF. 3.2)
						1V2711A	#2			
	1-HTR-63-37-A	EF3-B020				1PL6159A	#8	PASS		CABLE REPLACED (DCN M-10089-A)
	1-MTR-3-118D-A	EF3-A003	LO			1PL6320A	#12	PASS		
	1-FCV-74-1 A	EF3-B020				1V2780A	#12	PASS		
						1V2781A	#12			
	1-FCV-62-63-A	EF3-A010	4			1V2800A	#12	PASS		
	1-FCV-62-90-A	EF3-A010	4			1V2247A	#12	PASS		
	1-FCV-63-80-A	EF3-L050	HI							TO COMPT 1F2
	1-FCV-62-98-A	EF3-A010	LO			1V2232A	#12	PASS		
	1-LCV-62-132-A	EF3-A010	4			1V2760A	#12	PASS		
	1-FCV-63-118-A	EF3-B060								TO COMPT 3F2
	1-LCV-62-135-A	EF3-A010	4			1V2070A	#12	PASS		
	1-FCV-63-177-A	EF3-A010	4			1V2112A	#10	PASS		CABLE REPLACED: #10 MINIMUM (REF. 3.2)
	1-FCV-72-22-A	EF3-A010	HI			1V1870A	#10	PASS		
RMO[illegible]A2-A										
	1-MTR-31-465-A	FJ3-B125	LO			1PL2955A	#2	PASS		
	1-FCV-3-116A-A	EF3-A003	LO			1V2930A	#12	PASS		
	1-FCV-3-116B-A	EF3-A003	LO			1V2950A	#12	PASS		
	1-FCV-3-136A-A	EF3-A003	3			1V1950A	#12	PASS		
	1-FCV-3-136B-A	EF3-A003	3			1V1960A	#12	PASS		
	1-FCV-3-33-A	EF3-A100	4			1V2980A	4/0	PASS		CABLE REPLACED: 4/0 MINIMUM (REF. 3.2)
	1-FCV-3-87-A	EF3-A100	4			1V2990A	4/0	PASS		CABLE REPLACED: 4/0 MINIMUM (REF. 3.2)
	1-FCV-74-8-A	EF3-A010	4			1V2140A	#12	PASS		
						1V2141A	#12			
RMOV BD 1B1-B										
	1-FCV-63-4-B	EF3-A010	2			1V2908B	#12	PASS		
	1-FCV-63-5-B	EF3-A010	4			1V2332B	#12	PASS		
	1-FCV-74-2-B	EF3-A010	HI					PASS		TO COMPT 5B
	1-FCV-72-21-B	EF3-A010	HI			1V1850B	#10	PASS		
	1-FCV-63-6-B	EF3-A010	4			1V2320B	#12	PASS		
	1-FCV-63-11-B	EF3-A010	4			1V3185B	#10	PASS		
	1-FCV-63-22-B	EF3-A010	4					PASS		TO COMPT 2F2
	1-FCV-63-25-B	EF3-A010	4			1V2687B	#10	PASS		
	1-FCV-63-40-B	EF3-A010	4			1V2703B	#10	PASS		
	1-FCV-63-48-B	EF3-A010	4			1V2350B	#8	PASS		CABLE REPLACED: #8 MINIMUM (REF. 3.2)
	1-FCV-63-73-B	EF3-L050	4			1V3140B	#4	PASS		CABLE REPLACED: #4 MINIMUM (REF. 3.2)
	1-FCV-63-94-B	EF3-L050	3			1V2380B	#6	PASS		

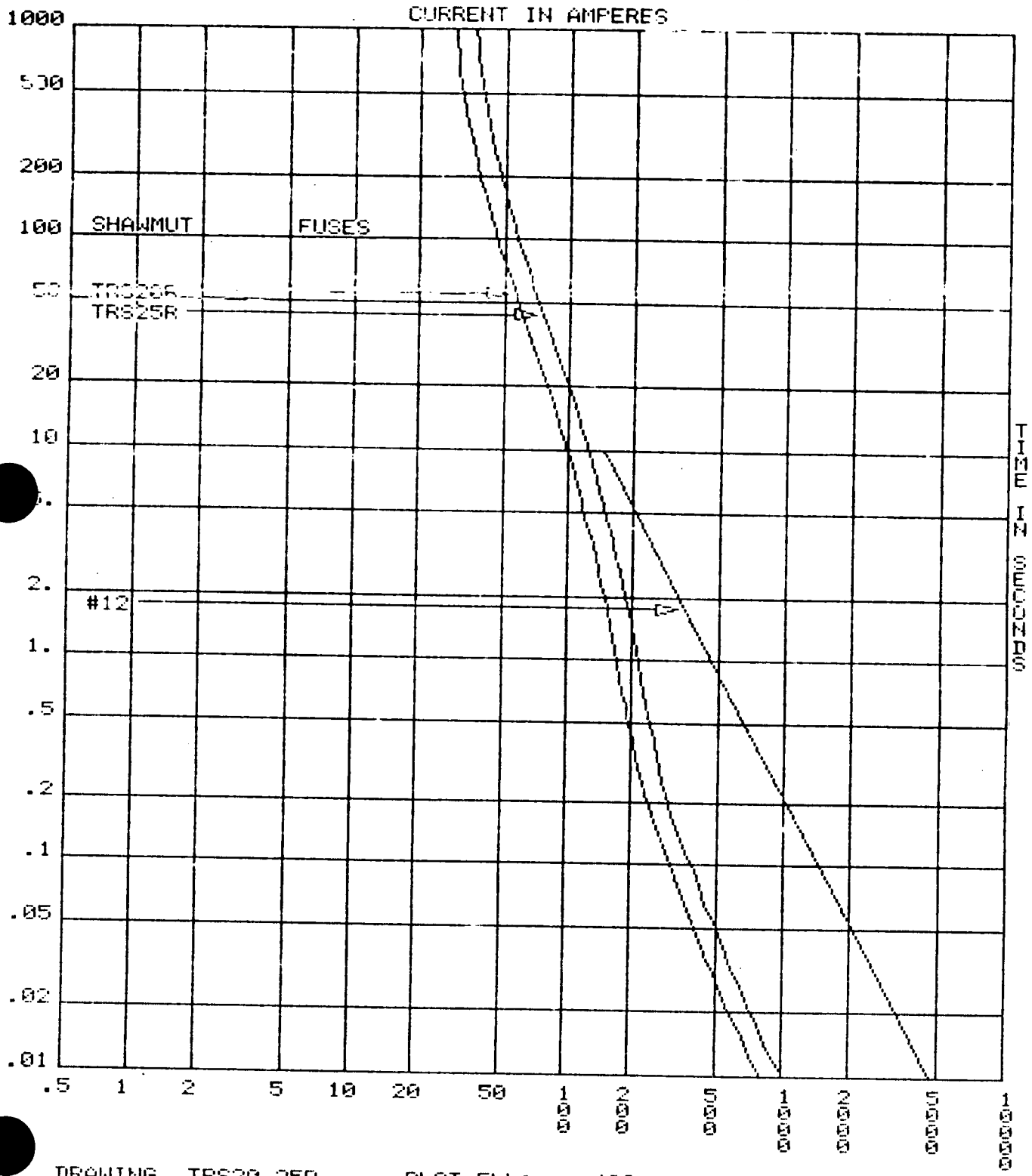
ATTACHMENT NO. M10448A - SECTION B
WBN EEB-MS-TI08-0008
480V MCC CLASS 1E CABLE PROTECTION

PT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
	1-FCV-63-153-B	EF3-A010	4			1V2368B	#12	PASS		
	1-FCV-63-157-B	EF3-A010	4			1V2392B	#10	PASS		
	1-FCV-63-175-B	EF3-A010	2			1V2920B	#12	PASS		
	1-FCV-72-2-B	EF3-A010	HI			1V2830B	#10	PASS		
	1-FCV-72-41-B	EF3-A010	4			1V2752B	#10	PASS		
	1-FCV-72-45-B	EF3-A010	HI			1V1800B	#10	PASS		
	1-FCV-74-21-B	EF3-L050	3			1V1900B	#4	PASS		CABLE REPLACED: #4 MINIMUM (REF. 3.2)
	1-FCV-74-24-B	EF3-A003	LO			1V1915B	#12	PASS		
	1-FCV-74-35-B	EF3-A010	4			1V2612B	#12	PASS		
2	1-FCV-63-67-B	EF3-B050Z				1V3200B	#2	PASS		CABLES REPLACED: #2 MINIMUM
						1V3201B	#2			(REF. 3.2)
	1-MTR-3-128D-B	EF3-A003	LO			1PL6330B	#12	PASS		
	1-MTR-62-245-B	EF3-B020				1PL6176B	#6	PASS		#10 PIGTAIL. CABLE REPLACED (DCN M-10088-A)
	1-MTR-62-232-B	EF3-L050	2			1PL6114B	#2	PASS		2/3C. #8 PIGTAIL. CABLE REPLACED (DCN M-10088-A)
	1-FCV-63-22-B	EF3-A010	4			1V2356B	#12	PASS		
	[illegible]-62-246-B	EF3-B020				1PL6188B	#6	PASS		#10 PIGTAIL. CABLE REPLACED (DCN M-10088-A)
	[illegible]-63-98-B	EF3-H050	2			1V2720B	#2	PASS		CABLES REPLACED: #2 MINIMUM
						1V2725B	#2			(REF. 3.2)
	1-HTR-63-36-B	EF3-B020				1PL6165B	#8	PASS		CABLE REPLACED DCN (M-10088-A)
	1-MTR-62-AOP-B	EF3-A010	3			1PL6152B	#12	PASS		
	1-FCV-74-2-B	EF3-B020				1V2840B	#12	PASS		
						1V2841B	#12			
	1-FCV-74-9-B	EF3-A010	4			1V2150B	#12	PASS		
						1V2151B	#12			
	1-FCV-62-61-B	EF3-A010	4			1V2808B	#12	PASS		
						1V2809B	#12			
	1-FCV-62-91-B	EF3-A010	4			1V2255B	#12	PASS		
	1-FCV-62-99-B	EF3-A010	LO			1V2240B	#12	PASS		
	1-FCV-63-67-B	EF3-H050	2							TO COMPT 16F2
	1-LCV-62-133-B	EF3-A010	4			1V2770B	#12	PASS		
	1-LCV-62-136-B	EF3-A010	4			1V2100B	#12	PASS		
	1-FCV-63-98-B	EF3-B060								TO COMPT 3F2
	1-FCV-62-138-B	EF3-A010	2			1V2975B	#12	PASS		
	1-FCV-63-172-B	EF3-A010	HI			1V2343B	#10	PASS		CABLE REPLACED: #10 MINIMUM (REF. 3.2)
	1-FCV-72-13-B	EF3-A003	LO			1V3150B	#12	PASS		
MOV BD 1B2-B										
	1-MTR-31-447-B	FJ3-B125	3			1PL3860B	400	PASS		#2 PIGTAIL. CABLE REPLACED (DCN M-09610-A)
	1-FCV-3-126A-B	EF3-A003	LO			1V2940B	#12	PASS		
	[illegible]3-126B-B	EF3-A003	LO			1V2960B	#12	PASS		
	[illegible]-179A-B	EF3-A003	3			1V2080B	#12	PASS		
	1-FCV-3-179B-B	EF3-A003	3			1V2130B	#12	PASS		

ATTACHMENT NO. M10448A - SECTION B
WBN EEB-MS-TI08-0008
480V MCC CLASS 1E CABLE PROTECTION

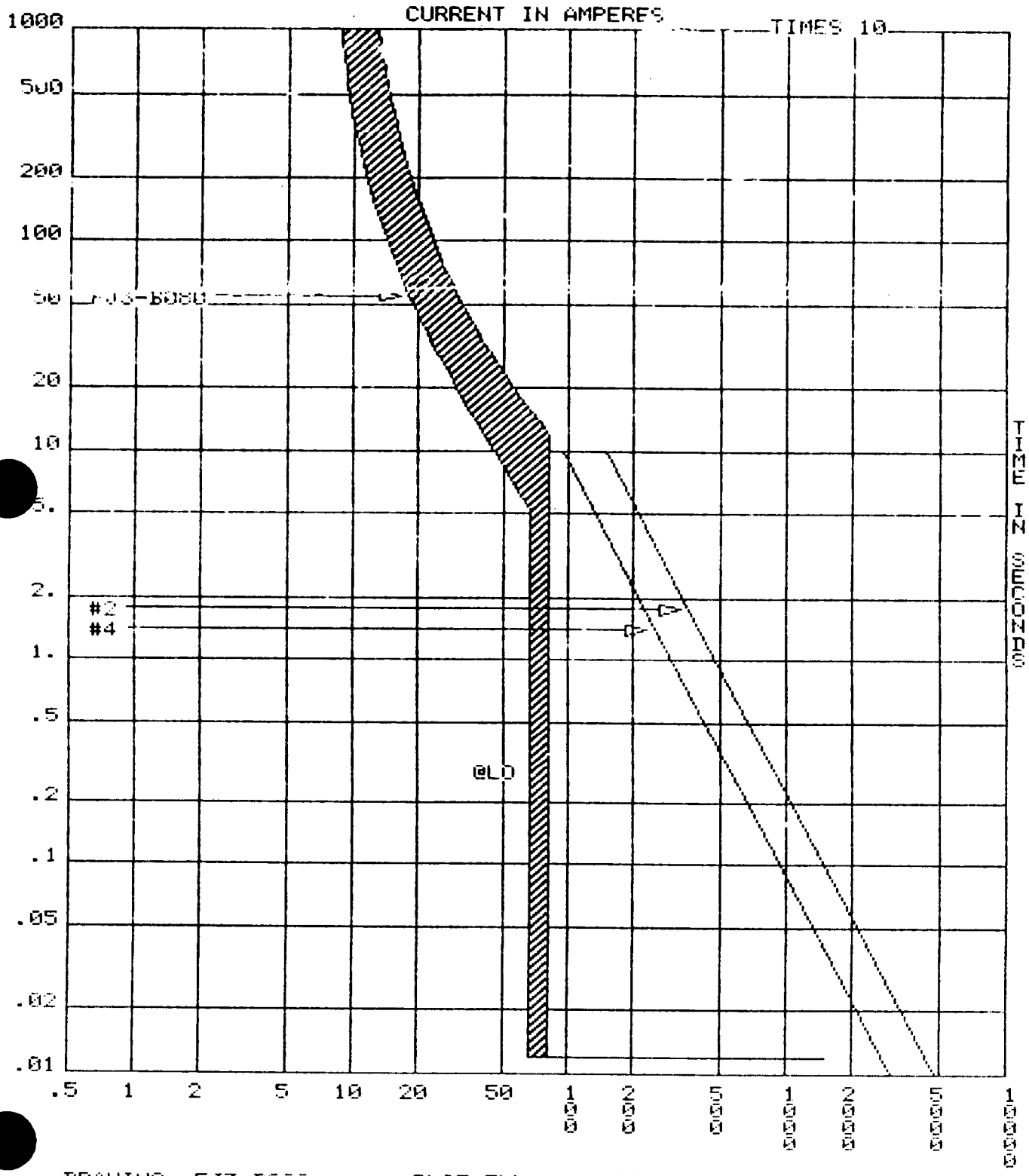
PT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	BKR COORD	NOTES
	1-FCV-3-47-B	EF3-A100	4			1V3000B	300	PASS		CABLE REPLACED: 300MCM MINIMUM (REF. 3.2)
	1-FCV-3-100-B	EF3-A100	4			1V3010B	4/0	PASS		CABLE REPLACED: 4/0 MINIMUM (REF. 3.2)
RMOV BD 2A1-A										
	2-MTR-62-239-A	EF3-B020				2PL6170A	#6	PASS		#10 PIGTAIL. CABLE REPLACED DCN M-10089-A
	2-MTR-62-230-A	EF3-L050	2			2PL6100A	#2	PASS		2/3C. #8 PIGTAIL. CABLE REPLACED (DCN M-10089-A)
	2-LCV-62-132-A	EF3-A010	4			2V2760A	#12	PASS		
RMOV BD 2A2-A										
	2-MTR-31-465-A	FJ3-B080	LO			2PL2955A	#2	PASS		
RMOV BD 2B1-B										
	2-MTR-62-232-B	EF3-L050	2			2PL6114B	#2	PASS		2/3C. #8 PIGTAIL. CABLE REPLACED (DCN M-10088-A)
	2-MTR-62-245-B	EF3-B020				2PL6176B	#6	PASS		#10 PIGTAIL. CABLE REPLACED (DCN M-10088-A)
	[illegible]-62-133-B	EF3-A010	4			2V2770B	#12	PASS		
RMOV BD 2B2-B										
	2-MTR-31-447-B	FJ3-B175	3			2PL3860B	400	PASS		NEW CURVE. #2 PIGTAIL. CABLE REPLACED (DCN M-09610-A)
RX VENT BD 1A-A										
	1-H2AN-43-200	EF3-B020				1M2400A	#10	PASS		
RX VENT BD 1B-B										
	1-H2AN-43-210	EF3-B020				1M2410B	#10	PASS		


CURRENT IN AMPERES
1000
500
200
100
50
20
10
5.
2.
1.
.5
.2
.1
.05
.02
.01
#14
TIME IN SECONDS
.5
1
2
5
10
20
50
100
200
500
1000
2000
5000
10000
DRAWING TRS3R
PLOT ELL: 480
SCALE: 10^0

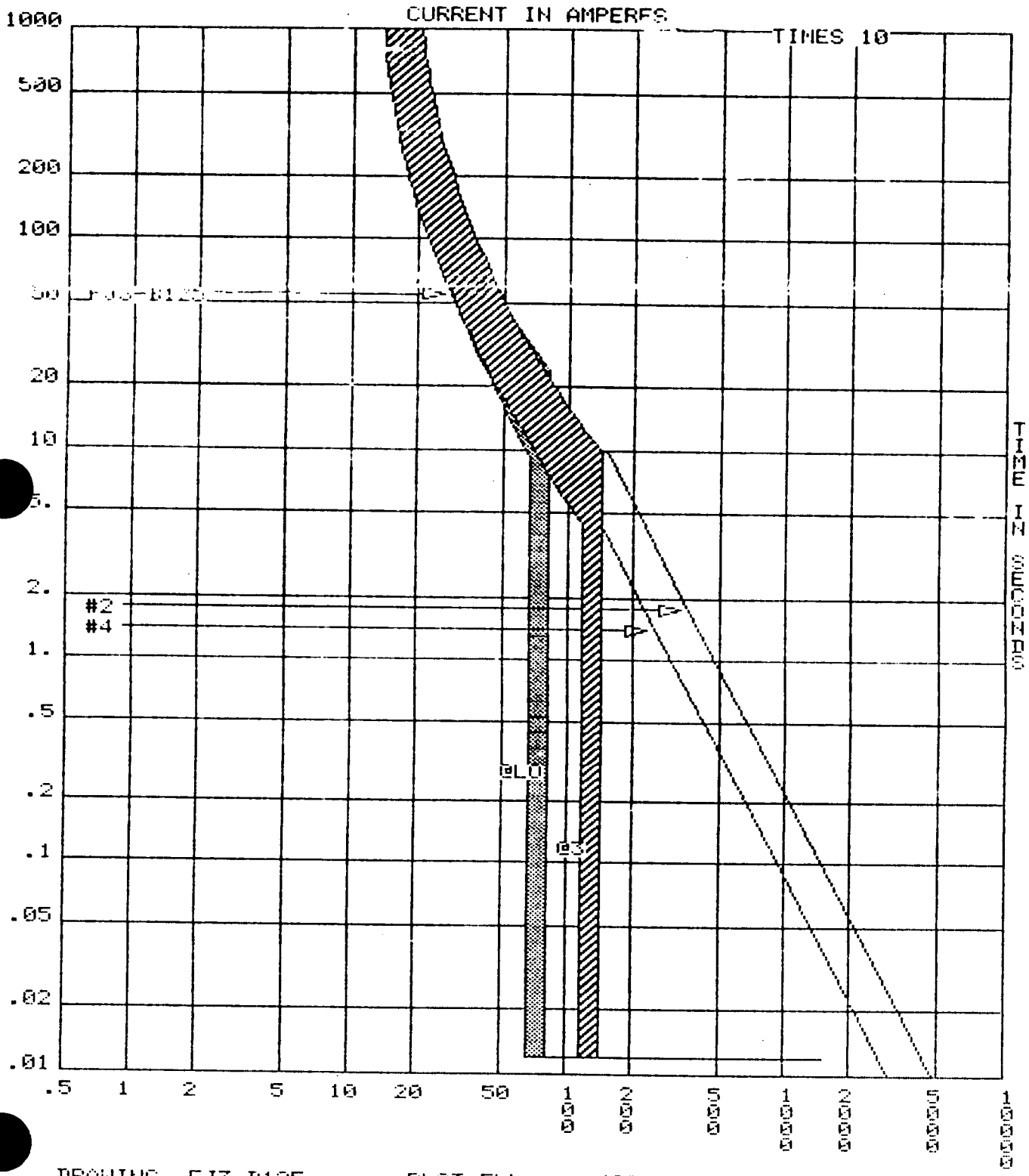


DRAWING TRS20-25R PLOT ELL: 480 SCALE: 10^0

ATTACHMENT M10448A
SECTION C
WBN EEB-MS-TI08-0008



DRAWING FJ3-B080 PLOT ELL: 480 SCALE: 10^1



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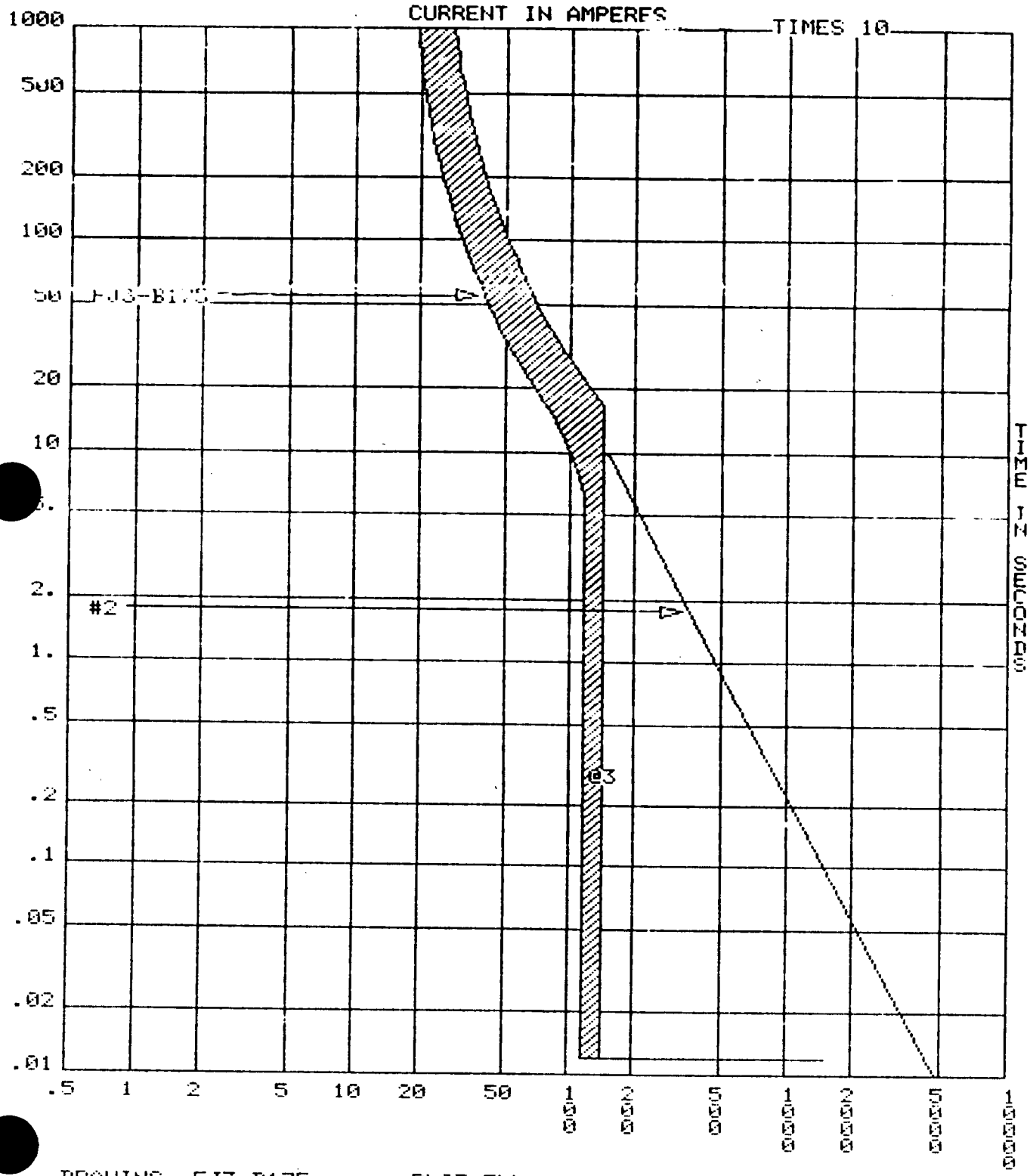

DRAWING FJ3-B175 PLOT ELL: 480 SCALE: 10^1

ATTACHMENT M10755A

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PREPARED: _____ DATE: _____
VERIFIED: _____ DATE: _____

Introduction / PURPOSE

The purpose of this Attachment is to evaluate and support the modifications to be implemented under DCN M-10755-A.

The modifications involve the addition of a 460V brake assembly to the following valves: 1-FCV-3 33-A, 47-B, -87-A, and -100-B.

The following baseline calculations evaluate the DCN modifications for their impact. These evaluations are identified by the Attachment No. M10755A and are included in the calculations noted.

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION.....	WBN EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSIS.....	WBN-EEB-MS-TI06-0002
CABLE AMPACITY - NV4 and NV5 CABLES in CLASS 1E RACEWAYS.....	WBPEVAR8909010

ATTACHMENT M10755A

1.0 PURPOSE

THE PURPOSE OF THIS CALCULATION IS TO SUPPORT THE MODIFICATIONS TO BE PERFORMED AND IMPLEMENTED BY DCN M-10755-A

THE MODIFICATIONS ADD 460V BRAKE ASSEMBLIES TO VALVES 1-FCV-3-33-A, -47-B, -87-A, & 100-B. CABLES AND CONTROLS FOR OPERATION OF THE BRAKE ASSEMBLIES ARE REQUIRED.

2.0 ASSUMPTIONS

REFER TO SECTION 5 FOR DOCUMENTATION AND JUSTIFICATION OF ASSUMPTIONS.

ATTACHMENT M10755A

3.0 SOURCES OF DESIGN INPUT INFORMATION (REFERENCES)

3.1 CALCULATION WBN-EEB-MS-TI06-0002 R0

3.2 TVA DRAWINGS
45W751-4 R21
45W751-10 R24
45W760-3-6 R11
45W760-3-7 R11
45B1767-3D Rev E
45B1767-4D Rev E
45B1769-3D Rev E
45B1769-4D Rev E
47E235-76 R3

3.3 ELECTRICAL DESIGN GUIDE DG-E2.4.6

3.4 PR WITH ATTACHMENT A (ATTACHMENT A)

3.5 DATA ON SQN BRAKES (ATTACHMENT B)

3.6 ELECTRICAL DESIGN STANDARD DS-E12.6.3

3.7 ELECTRICAL DESIGN GUIDE DG-E12.6.2

ATTACHMENT M10755A

4. DESIGN INPUT DATA

4.1 ELECTRICAL CHARACTERISTICS OF BRAKE

MINIMUM PICKUP VOLTAGE 368 VOLTS (REF 3.4)

4.2 MINIMUM MCC BOARD VOLTAGE 432 VOLTS (REF 3.1)

4.3 CABLE DATA (REF 3.3 & 3.6)

4.4 POWER CABLE LENGTHS TO VALVES (REF 3.1)

VALVE	FEET	CABLE NO.
1-FCV-3-33-A	530	1V2980A
1-FCV-3-87-A	508	1V2990A
1-FCV-3-47-B	824	1V3000B
1-FCV-3-100-B	724	1V3010B

4.5 MAXIMUM AMBIENT TEMPERATURE 130F (REF 3.2)

ATTACHMENT M10755A

5.0 ASSUMPTIONS

5.1 THE BRAKE INRUSH CURRENT REQUIREMENTS ARE LESS THAN 6.0 AMPERES. ~~THIS ASSUMPTION WILL REQUIRE VERIFICATION~~.
See Below

5.2 THE BRAKE SEATING (STEADY-STATE) CURRENT REQUIREMENTS ARE LESS THAN 1.0 AMPERE. ~~THIS ASSUMPTION WILL REQUIRE VERIFICATION~~.
See Below

5.3 THE BRAKE POWER FACTOR AT INRUSH IS LESS THAN ~~0.9.~~ 1.0.
~~THIS ASSUMPTION WILL REQUIRE VERIFICATION~~.
See Below

R16 ATH 9/9/91

5.1 (Continued) Data provided by the vendor states the inrush VA is equal to 2270 volt-amps or for minimum board voltage (432 volts) the inrush current is equal to $I = \frac{2270}{(480)(0.9)} = 5.25$ amps

5.2 (Continued) Data provided by the vendor for steady-state conditions (seated) is 285 volt-amps R16

$I = \frac{285}{(480)(0.9)} = 0.66$ amps

5.3 (Continued) Typical power factors for solenoids, relays, and contactors during inrush is 0.5. However, the power factor may range from 0.3 to 1.0 (see calculation on next page) and the terminal voltage will be greater than the minimum pickup voltage required for the brake (368 volts).

ATH 9/9/91

ATTACHMENT M10755A

6.0 COMPUTATIONS & ANALYSIS

VALUES FOR THE BRAKE INRUSH AND SEATING CURRENTS OBTAINED FROM SQN WERE 2.6 AND 0.3 AMPS, RESPECTIVELY. THE CORRESPONDING VALUES ASSUMED FOR THE WBN BRAKES ARE 6.0 AMPS AND 1.0 AMPS. FROM REFERENCE 3.4, THE MINIMUM PICKUP VOLTAGE IS 368 VOLTS, AND FROM REFERENCE 3.1, VALVE 1-FCV-3-47-B CABLE (1V3000B) HAS THE MAXIMUM LENGTH OF 824 FEET. USING A LENGTH OF 2000 FEET, THE VOLTAGE AT THE BRAKE'S TERMINALS WAS CALCULATED FOR MINIMUM MCC VOLTAGE (432 VOLTS), AND FOR POWER FACTORS FROM 0.3 TO ~~0.9~~ 1.0 IN INCREMENTS OF 0.1 USING A #12 CABLE. R16 WTH 9/11/91

6.1 CABLE SIZING

FLI	LOAD FACTOR	MAX TEMP	TEMP FACTOR	RACEWAY FACTOR	REQUIRED AMPACITY
1	2	55C	0.84	0.44	5.4

#12 IS RATED FOR 6.0 AMPERES IN A TRAY.

6.2 BRAKE VOLTAGE

INRUSH CURRENT	POWER FACTOR	Z LOAD	R LOAD	X LOAD	CABLE LENG	TERMINAL VOLTAGE	CABLE SIZE
6	0.3	76.67	23.00	73.14	2000	414.25	#12
6	0.4	76.67	30.67	70.27	2000	410.10	#12
6	0.5	76.67	38.33	66.40	2000	406.09	#12
6	0.6	76.67	46.00	61.33	2000	402.21	#12
6	0.7	76.67	53.67	54.75	2000	398.48	#12
6	0.8	76.67	61.33	46.00	2000	394.88	#12
6	0.9	76.67	69.00	33.42	2000	391.44	#12
6	1.0	76.67	76.67	0.00	2000	388.4	#12

R16 WTH 9/11/91

6.3 #4 CONDUCTOR SHORT CIRCUIT PROTECTION

FIGURE 1 ASSUMES THAT THE CABLE IS OPERATING AT RATED CURRENT AND TEMPERATURE. HOWEVER, THE BRAKE IS ONLY ENERGIZED WHENEVER THE MOV IS OPERATING. USING THE EQUATION IN SECTION 5.2 OF ELECTRICAL DESIGN GUIDE DG-E12.6.2, THE INITIAL CONDUCTOR TEMPERATURE IS

$$T_O' = (T_O - T_A)\left(\frac{I_L}{I_R}\right)^2 + T_A'$$

$$= (90-40)\left(\frac{1}{48}\right)^2 + 55$$

$$\approx 55C$$

At 55°C initial conductor temperature

$$I^2 = \frac{(A^2)(0.0297)}{t}\log_{10}\left(\frac{250+234}{55+234}\right)$$

A = 41740 for #4 cable

$t = 0.01$ $I = 34041$

$t = 10.0$ $I = 1076$

The breaker is set at position 4 (930 amps ± 10%)

The high side will be 1023 amperes.
Since the short time heating limit for the #4 cable at 10 seconds is greater than the upper tolerance of the breaker, the #4 is protected for short circuit conditions.

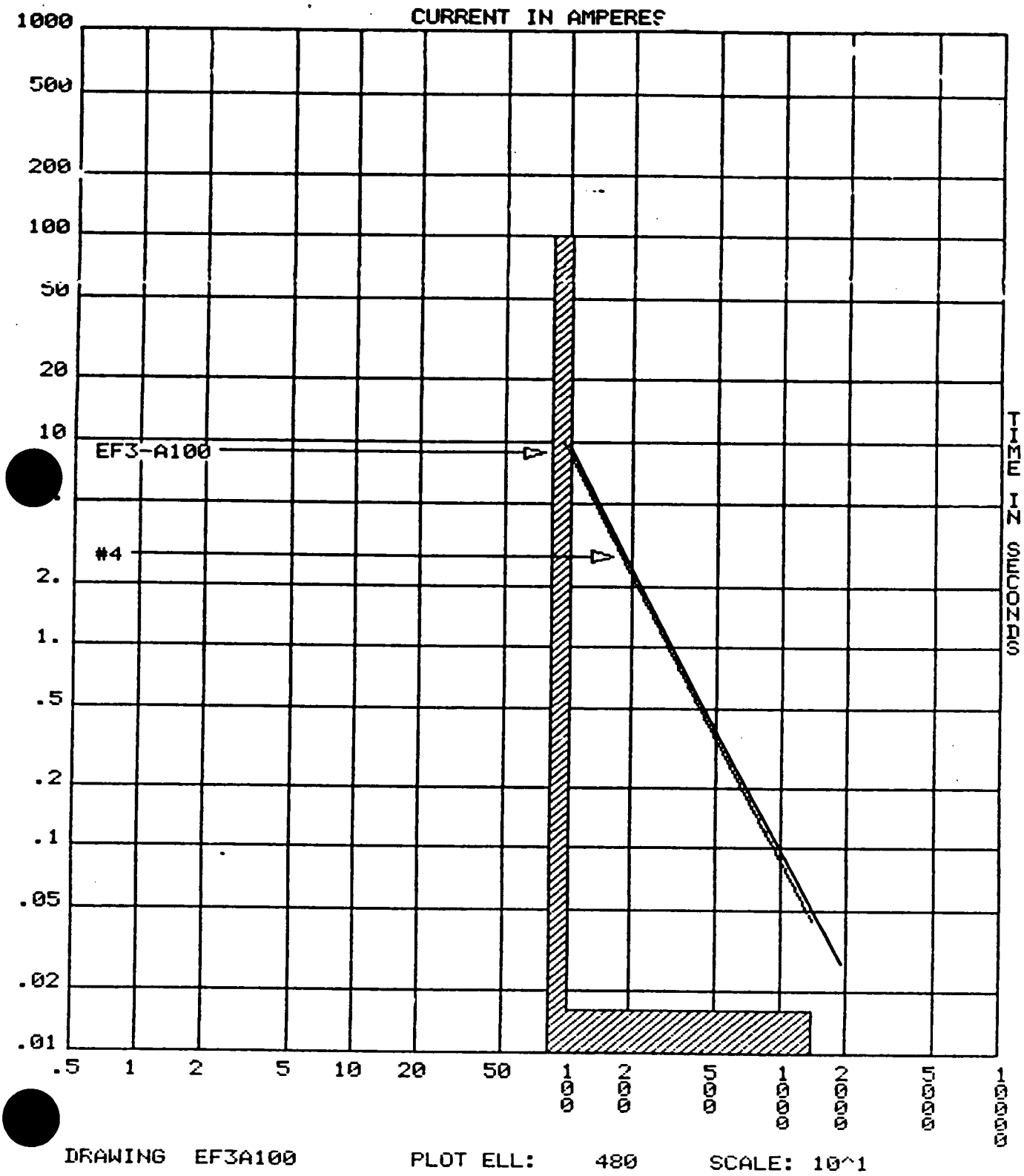
CURRENT IN AMPERES
1000
500
200
100
50
20
10
EF3-A100
#4
2.
1.
.5
.2
.1
.05
.02
.01
.5
1
2
5
10
20
50
100
200
500
1000
2000
5000
10000
TIME IN SECONDS
DRAWING EF3A100
PLOT ELL: 480
SCALE: 10^1

Figure 1

8.0 SUMMARY OF RESULTS

ADEQUATE VOLTAGE IS AVAILABLE TO OPERATE THE MOV'S BRAKE USING A #12 CABLE FOR THE ASSUMED CONDITIONS. A #12 CABL ALSO SATISFIES THE AMPACITY REQUIREMENTS OF THE LOAD.

CABLE LENGTH SHOULD BE LESS THAN 2000 FEET (CIRCUIT LENGTH 4000 FEET).

A #4 CABLE CONNECTED TO THE STARTER'S POWER LUGS IS PROTECTED FOR SHORT CIRCUIT CONDITIONS.

9.0 CONCLUSIONS

THE PRESENT POWER CONDUCTORS TO THE VALVES ARE TO BE REPLACED DUE TO EXCESSIVE CABLE VOLTAGE DROP. USE THESE EXISTING CABLES FOR THE BRAKES AND SAVE PULLING NEW CABLES.

1V2980A
1V2990A
1V3000B
1V3010B

QA Record

B26 90 051-[illegible]

NUCLEAR ENGINEERING
TYPICAL PROCUREMENT REQUEST

Project	TVA Contact and Extension	Date	Date Needed	PR Number and Rev.
WBN	KEITH NAPIER @1613	5-16-90	7-31-90	W-6105 R1

DCN/ECN No.	Design Criteria	Previous Contract #
ECN 6481	WB-DC-40-31.2 R8 - ENVIR DWG # 47E235-76 WB-DC-40-34 R1 TABLE 3.2-1; 5.1 WB-DC-40-36 R4 TABLE 3.1-2	RD839256 - SQN 81Z26-829681

Equip Desc and Loc	UNID(s)	Building/Area	Column Lines	Elevation
	MAIN FEEDWATER ISOLATION VALVE FCV-3-33, -47, -87, -100 SYSTEM 3	N & S STEAM VALVE ROOMS	A1 U-V, X	729'

PWL - BNP - CH

ASME III Class	TVA Piping Class	Class 1E (Y/N)	Seismic Cat.	10CFR50.49 (Y/N)	Basic Comp (Y/N)	Limited QA (Y/N)	ANS Safety Class
NA	NA	Y - HARSH	I	Y	X N	N	2A

References/Remarks REPLACEMENT - MOTOR BRAKES
NEW CONTRACT:
CONTRACT 86XNQ-838100 QA-LEVEL I - SEISMIC ANALYSIS REQUIRED

Attachments

ATT. A - TECHNICAL REQUIREMENTS

Item No.	Description (Include reference to data sheets, mark number, title, codes, and standards)	QTY	Unit	Unit Price	ROP	ROQ
1	FURNISH REPLACEMENT BRAKES & HUBS TO MEET ATTACHED REQUIREMENT					

Account No.	Prepared by	Approved by	Authorized by	Design verified by
1200-05600-0600, A62001	5/16/90 Gilbert M Graham/for KCN.	Kenneth D Kirk 5/16/90	P.D. Matlock for FAK 5/16/90	Keith B. Napier 5/16/90

108 5/17/90

Calculation WCN 22 [illegible]
Attachment M10755A
(Attachment A)

Attachment A
Calc WBN-EEB-MS-TI08-0008
Attachment M1C755A
Page 16

REPLACEMENT MOTOR BRAKES FOR
FEEDWATER ISOLATION VALVES
ECN 6481

TECHNICAL REQUIREMENTS

Furnish replacement brakes and hubs meeting the following requirements:

1. Replacement brakes shall be manufactured:
   a. With a cast iron housing
   b. Waterproof
   c. Dust-tight
   d. with inorganic, non-asbestos brake pads
2. The power supply shall be 460 volt AC, 1 phase. R1
3. The coil shall:
   a. Operate at +10/-20% of the rated voltage.
   b. Have 5 ft continuous (no splices) coil leads, sleeved to allow brake installation without abrasion damage. This sleeve shall be designed to be removed after installation
   c. Have one lead wire colored black
   d. Utilize materials of construction identical to those used in the manufacture of Dings model 6-61009-50 magnetic brake, serial no. 157010.
4. Brakes currently installed are as follows:

Valve ID	Model No.	Serial No.	Brake Torque	Reliance Motor ID
1-FCV-3-033	6-83075-46	52718-6	75 ft-lbs	1MA477806-G3-UC
1-FCV-3-047	6-83075-46	52718-2	75 ft-lbs	1MA477806-G8-UC
1-FCV-3-067	6-83075-46	52718-1	75 ft-lbs	1MA477806-G2-UC
1-FCV-3-100	6-83075-46	52718-4	75 ft-lbs	1MA477806-G4-UC

5. Additional Documentation
   a. Vendor shall submit:
      (1) Outline drawings

Calc WBN-EEB-MS-TI08-0008
Attachment M10755A
Page 17

REPLACEMENT MOTOR BRAKES FOR
FEEDWATER ISOLATION VALVES
ECN 6481

TECHNICAL REQUIREMENTS

(2) Wiring diagrams

(3) Weight & center of gravity calculations

(4) Complete parts list showing part number and material of construction

(5) Instruction manuals suitable to allow proper installation

(6) Maintenance manuals

(7) Certificate of Conformance certifying similarity to brakes tested in Limitorque test report 600198

10 10 100

TO: 6700975337

Calc WBN-EEB-MS-TI08-00028R6
Attachment M10755A
(Attachment B) Page 18

TVA ENG KXV

MSG 844
3/27/86

QA Record

B70 '860327 001

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT O AND PS-2
SODDY DAISY, TN 37379

8604030134 (1)

ATTN: R. A. SESSOMS

SUBJ: YR LTR OF 3/18/86
REPL. MTR. BRAKES, CONTRACT 81Z26-829681,-RD-839256

WE HAVE BEEN ADVISED THAT THE BRAKES WILL REQUIRE 2.6 AMPS INRUSH AND .3 AMPS SEATING AT 460 VOLTS.

YOURS TRULY,

DOMINICK GIAMBALANO
LINITORQUE CORP.

CC: R. J. POOLE - T.V.A. KNOXVILLE, TN.

LINTQ MF

TVA ENG KXV
READ REQUEST COMPLETED
EASYLINK
98252898 27MAR86 14:31 EST
FTS
0

RMS 9.26 CR

0394

Calc WBN-EEB-MS-TI08-0008 R16
Attachment M10755A

QUALITY INFORMATION REQUEST / RELEASE (QIR)
DIVISION OF NUCLEAR ENGINEERING
(INTERNAL USE ONLY)

NEP-3.3
ATTACHMENT 1
PAGE 1 OF 1

This sheet added by R16

QA Record

TO M.C. BRICKEY, IOB 1G-WBN	RIMS ACCNO B26 91 0729 210
	DOCUMENT NUMBER QIR MNMWBN91044 R0
FROM F.A. KOONTZ, IOB 1H-WBN	PAGE 1 OF 2
TYPE OF DOCUMENT ☐ REQUEST NEED DATE	DATE 7-29-91
☒ RELEASE REF. QIR LEEWBN90026 R0	PLANT AND UNIT WBN UNIT 1 & 2

REFERENCED DOCUMENTS

AVAILABLE IN ONE OF THE RIMS SYSTEMS		ATTACHMENT TO THIS QIR	
DOCUMENT	IDENTIFYING NUMBER	DOCUMENT	ATTACHMENT NUMBER
86XNQ-838100	RD-103312	DINGS Co. FAX	PAGE 2 of 2
DCN M-10755-A	B26900719814		

SUBJECT MFIV Motor Brake Electrical Data (Ref. DCN M-10755-A)

SYSTEMS AFFECTED 03A

UNID / SYSTEM ID

QUALITY INFORMATION REQUESTED / RELEASED

The Dings brake current data you requested is attached to this QIR release. Dings has provided the volt-amp data from which brake inrush and steady state current can be determined. Discussions with your W T Holbert indicate that due to the small magnitude of these numbers, the power factors will no longer be required.

PREPARED J. Arrington JBA 7-29-91

REVIEWED (RELEASES ONLY) John O. Tyree 7/29/91

APPROVED (BRANCH CHIEF/PROJECT ENGINEER) Frank A Koontz for WLE Hoff

TVA 10829 (DNE-6-86)

cc (Attachments): RIMS, SL 26 C-K
R.B. Vance

QIR MNMWBN91044 R0 ~~PAGE 2 OF 2~~ 7/19/91

JUL 19 '91 13:50 DINGS CO 414 672 5354

This sheet Added by R16

Calc WBN-EEB-MS-TI08-0008 Attachment M10755A Page 20

Dings CO.
A Venturedyne, Ltd. Company

DYNAMICS GROUP
magnetic group

TELEPHONE # FOR DINGS CO. FAX MACHINE (414) 672-5354 DATE: 7-19-91

TO: TVA

FAX NO. 615-365-1521 or 1522

ATTN: Jim Arrington

Here are the ratings you needed Jim.

for Model # X6-83075-46

460-1-60hz

Volt Amps

Seated	In Rush
285	2270

Thanks

Tom Hetland

IF YOU HAVE ANY TROUBLE RECEIVING THIS MESSAGE OR DO NOT RECEIVE ALL OF THE PAGES, PLEASE CALL: (414) 672-7830, ext. 250.

TOTAL PAGES (Including Cover) OPERATOR

PREPARED:_____ DATE:_____
VERIFIED:_____ DATE:_____

PURPOSE

The purpose of this Attachment is to evaluate and support modifications to be implemented under DCN P-04060-A.

The modifications involve feeding the Hydrogen Detection System from a different power source which will require rerouting sections of the cables listed below.

The following baseline calculations evaluate the DCN modifications for their impact. These evaluations are identified by Attachment No. P04060A included in the calculation noted.

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION	WBN EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSES	WBN-EEB-MS-TI06-0002
TELAS	WBN EEB-MS-TI05-0001
CABLE AMPACITY - NV4 and NV5 CABLES in CLASS 1E RACEWAYS	WBPEVAR8909010
DIESEL GENERATOR LOADING ANALYSIS	WBN EEB-MS-TI03-0012

CABLE NO.	LOAD	EXISTING POWER SOURCE	NEW POWER SOURCE
1M2400A	1-H2AN-43-200-A (1-PNL-43-L448-A)	REAC VENT BD 1A-A, COMPT 2F1 (NODE 243)	REAC MOV BD 1A2-A,COMPT 5D1 (NODE 236)
1M2410B	1-H2AN-43-210-B (1-PNL-43-L449-B)	REAC VENT BD 1B-B, COMPT 2F1 (NODE 244)	REAC MOV BD 1B2-B,COMPT 11F1 (NODE 238)

PREPARED:_____ DATE:_____
VERIFIED:_____ DATE:_____

1.0 SCOPE

This attachment evaluates and verifies that the proposed design is adequate and meets the guidelines applicable to the baseline calculation.

2.0 ASSUMPTIONS

See "Assumptions" identified in the base calculation (Section 2.0).

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TELAS, WBN EEB-MS-TI06-0001

3.2 Cable Ampacity - NV4 and NV5 Cables in Class 1E Raceways, WBPEVAR8909010

4.0 DESIGN INPUT DATA

4.1 LOAD DATA (Ref. 3.1)

KVA: 4.16 FLI: 5.22A

4.2 PROTECTIVE DEVICE DATA (Ref. 3.1)

The existing compartments/protective devices located on 480V Reactor Vent Boards 1A-A, Compartment 2F1 and 1B-B, Compartment 2F1 will be relocated to the following motor control center compartments.

480V Reactor MOV Board 1A2-A, Compt 5D1: EF3-B020
480V Reactor MOV Board 1B2-B, Compt 11F1: EF3-B020

4.3 CABLE DATA (Ref. 3.2)

BOARD/COMPT	CABLE	SIZE
REAC MOV BD 1A2-A/5D1	1M2400A	#10 AWG
REAC MOV BD 1B2-B/11F1	1M2410B	#10 AWG

PREPARED:_____ DATE:_____
VERIFIED:_____ DATE:_____

5.0 JUSTIFICATION OF ASSUMPTIONS

See "Justification of Assumptions" in base calculation (Section 5.0).

6.0 METHODOLOGY

The methodology for this attachment is similar to that used in the base calculation to verify proper circuit breaker selection.

7.0 GRAPHICS

Not applicable.

8.0 SUMMARY OF RESULTS

The results of this analysis are shown on the accompanying sheets identifying the loads and circuit breakers

#10 AWG cable protection is addressed by referring to Curve No. EF3B020 (Attachment No. M08663A, Revision 1 of this calculation). This plot shows that the breaker will adequately protect a minimum conductor size of #14 AWG.

9.0 CONCLUSION

Circuit protection is ensured with the existing ITE Model EF3-B020 circuit breakers (relocated as noted in Section 4.2).

10.0 TABULATION ATTACHMENTS

Load and protective device tabulation.....Page 4

ATTACHMENT P04060A

DCN P-04060-A WBN-EEB-MS-T108-0008 DATE 20-Aug-90

H	B	OP	ENG_TITLE	NODE_NO	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST POSIT	SET PEN	DCN
N	N	2C	Hydrogen Det Sys	236	RMOV BD 1A2-A	501		1-H2AN-43-200	4.16	5.22				EF3-B020			P-04060-A
N	N	2C	Hydrogen Det Sys	238	RMOV BD 1B2-B	11F1		1-H2AN-43-210	4.16	5.22				EF3-B020			P-04060-A

PAGE 4

ATTACHMENT NO. M11413A
WBN-EEB-MS-TI08-0008 R9

PURPOSE

THE PURPOSE OF THIS ATTACHMENT IS TO EVALUATE AND SUPPORT MODIFICATIONS TO BE IMPLEMENTED UNDER DCN M-11413-A.

THE MODIFICATIONS INVOLVE ERCW VALVE CHANGES.

THE FOLLOWING BASELINE CALCULATIONS EVALUATE DCN M-114513-A:

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION	WBN-EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSIS	WBN-EEB-MS-TI06-0002
CONTAINMENT PENETRATION PROTECTION STUDY, VOLTAGE LEVEL V4 AND V5	WBN-EEB-MS-TI08-0015
480V NON-CLASS 1E POWER CABLE ASSOCIATED CIRCUITS	WBN-EEB-MS-TI15-0011
TELAS	WBN-EEB-MS-TI08-0001

ATTACHMENT NO. M11413A
WBN-EEB-MS-TI08-0008 R9

1.0 SCOPE

THIS ATTACHMENT ADDRESSES THE IMPACT THAT DCN M-11413-A HAS ON THE BASE CALCULATION.

2.0 ASSUMPTIONS

SEE ASSUMPTIONS IDENTIFIED IN THE BASE CALCULATION (SECTION 2.0).

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 DCN M-11413-A

4.0 DESIGN INPUT DATA

NEW VALVE NUMBERS WERE OBTAINED FROM 3.1.

5.0 JUSTIFICATION OF ASSUMPTIONS

SEE JUSTIFICATION OF ASSUMPTIONS IN BASE CALCULATION (SECTION 5.0).

6.0 METHODOLOGY

THE VALVE NUMBERS WERE CHANGED IN ACCORDANCE WITH DCN M-11413-A (SEE ATTACHED TABLE FOR THE NEW VALVE NUMBERS).

7.0 GRAPHICS

NONE

8.0 SUMMARY OF RESULTS

THE RESULTS OF THIS ANALYSIS ARE TABULATED IN THE ATTACHED TABLE.

ATTACHMENT NO. M11413A
WBN-EEB-MS-TI08-0008 R9

9.0 CONCLUSION

DCN M-11413-A ONLY CHANGES THE VALVE NUMBER AND DOES NOT IMPACT VALVE PROTECTION.

10.0 SECTION REFERENCES

SECTION A - TABLE M11413 VALVE NUMBER CHANGES

TABLE M11 LVE NUMBER CHANGES WBN-EEB-MS-T108-0008 R9 DATE 31-Aug-90

GP	ENG_TITLE	MODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	TROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CN	REV
1	LWR COMPT 1B CLRS ISLN VLV	235	RMOV BD 1A1-A	5C	1	1-FCV-67-97-A	0.13	0.6	3.5		T11	66	EF3-A003	7	LO	E110011R2	Y	R9
1	LWR COMPT 1D CLRS ISLN VLV	235	RMOV BD 1A1-A	15D	1	1-FCV-67-89-A	0.13	0.6	3.5		T11	66	EF3-A003	7	LO	E110011R2	Y	R9
1	Lwr Cntmt 1A Clr Sply Isln Vlv	236	RMOV BD 1A2-A	8B	1	1-FCV-67-107-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	R9
1	Lwr Cntmt 1C Clr Sply Isln Vlv	236	RMOV BD 1A2-A	9A	1	1-FCV-67-99-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	R9
1	LWR COMPT 1A CLRS ISLN VLV	238	RMOV BD 1B2-B	5C	1	1-FCV-67-113-B	0.13	0.6	3.5		T11	66	EF3-A003	7	LO	E110011R2	Y	R9
1	Lwr Cntmt 1B Clr Sply Isln Vlv	238	RMOV BD 1B2-B	10A	1	1-FCV-67-91-B	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	R9
1	Lwr Cntmt 1D Clr Sply Isln Vlv	238	RMOV BD 1B2-B	10B	1	1-FCV-67-83-B	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	R9
1	LWR COMPT 1C CLRS ISLN VLV	238	RMOV BD 1B2-B	11D	1	1-FCV-67-105-B	0.13	0.6	3.5		T11	66	EF3-A003	7	LO	E110011R2	Y	R9

PURPOSE

The purpose of this Attachment is to evaluate and support modifications to be implemented under DCN's M-12212-A (Group 4), M-12825-A, F-13654-A, M-13005-A, M-12064-A, and identify the necessary changes for Groups 5 and 6.

The following baseline calculations evaluate the DCN(s) for their impact if required. The evaluations for these modifications may be identified by "ATTACHMENT NO. M12212A" OR the calculation will otherwise identify the DCN(s) and the revision in which the modifications are evaluated.

BASELINE CALCULATION	CALCULATION NO.
TELAS	WBN EEB-MS-TI05-0001
AUXILIARY POWER SYSTEM ANALYSIS	WBN-EEB-MS-TI06-0002
480VAC 1E COORDINATION/PROTECTION	WBN EEB-MS-TI08-0008
480V NON-CLASS 1E POWER CABLE ASSOCIATED CIRCUITS	WBN EEB-MS-TI15-0011
DIESEL GENERATOR LOADING ANALYSIS	WBN EEB-MS-TI03-0012
CONTAINMENT PENETRATION PROTECTION STUDY, VOLTAGE LEVEL V4 AND V5	EEB-MS-TI08-0015
CABLE AMPACITY - NV4 and NV5 CABLES in CLASS 1E RACEWAYS	WBPEVAR8909010

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ATTACHMENT NO. M12212
WBN-EEB-MS-TI08-0008 Rev 10

1.0 SCOPE

THIS ATTACHMENT ADDRESSES THE 480V CLASS 1E PROTECTIVE DEVICES, COORDINATION, AND CABLE PROTECTION FOR SYSTEM GROUPS 4, 5, AND 6 THAT RECEIVE POWER FROM THE CLASS 1E BOARDS LISTED WITHIN THE BASE CALCULATION.

2.0 ASSUMPTIONS

IN ADDITION TO THE ASSUMPTIONS LISTED BELOW, SEE ALSO THE ASSUMPTIONS IDENTIFIED IN THE BASE CALCULATION (SECTION 2.0).

2.1 IN ORDER TO ELIMINATE THE OVERLOADED BOARDS IDENTIFIED IN WBN-EEB-MS-TI06-0002 R0,IT IS ASSUMED THAT THE FOLLOWING LOADS WILL BE MOVED FROM THE PRESENT BOARD TO THE NEW BOARD. (REFERENCE DCN M-13005-A)

LOAD	PRESENT BOARD	NEW BOARD	
~~SPP PUMP~~	~~480V SHDN BD 1A1-A~~	~~480V SHDN BD 1A2-A~~	R18
CVC SYS HT XFMR FDR	C&A VT BD 2A1-A	RMOV BD 2A2-A	WTH 4/11/92 EJJ 4/13/92
CVC SYS HT XFMR FDR	C&A VT BD 2B1-B	RMOV BD 2B2-B	
STANDBY LTG CAB #4	C&A VT BD 1A1-A	RMOV BD 1A2-A	
STANDBY LTG CAB #2	C&A VT BD 1B1-B	RMOV BD 1B2-B	
STANDBY LTG CAB #1	C&A VT BD 2A1-A	RMOV BD 2A2-A	
STANDBY LTG CAB #3	C&A VT BD 2B1-B	RMOV BD 2B2-B	
125V SP BAT CHGR 1S	C&A VT BD 1A1-A	RMOV BD 1A2-A	
125V SP BAT CHGR 1S	C&A VT BD 1B1-B	RMOV BD 1B2-B	
125V SP BAT CHGR 2S	C&A VT BD 2A1-A	RMOV BD 2A2-A	
125V SP BAT CHGR 2S	C&A VT BD 2B1-B	RMOV BD 2B2-B	

~~THIS IS AN UNVERIFIED ASSUMPTION.~~ WTH 6/26/91 GJ 6/28/91 R15

RXSCOPE

ATTACHMENT NO. M12212
WBN-EEB-MS-TI08-0008 Rev 10

2.2 IT IS ASSUMED THAT CURRENT LIMITING REACTORS WILL BE ADDED TO EACH 480V SHDN BD, AND THAT THE BUS TIE BREAKERS WITH THEIR ASSOCIATED CURRENT LIMITING FUSES WILL BE DELETED AS RECOMMENDED IN THE BASE CALCULATION.(REFERENCE DCN M-12064-A)

~~THIS IS AN UNVERIFIED ASSUMPTION.~~ WTH 6/26/91 GP 6/28/91 | R15

2.3 IT IS ASSUMED THAT THE CABLE PROTECTORS IN THE MCC AND CONTROL POWER FEEDER CIRCUITS WILL BE DELETED AS RECOMMENDED IN THE BASE CALCULATION.(REFERENCE DCN M-12064-A)

~~THIS IS AN UNVERIFIED ASSUMPTION.~~ WTH 6/26/91 GP 6/28/91 | R15

2.4 IT IS ASSUMED THAT A VARIANCE WILL BE APPROVED FOR THE LARGER SIZE OVERLOAD HEATERS FOR THE FOLLOWING MOTORS:

0-MTR-31-5-B
0-MTR-31-6-A
0-MTR-31-7-B
0-MTR-31-8-A

~~THIS IS AN UNVERIFIED ASSUMPTION.~~ WTH 4/13/92 | R18

2.5 IT IS ASSUMED THAT THE MINIMUM LENGTH OF THE REPLACEMENT MCC FEEDER CABLES WILL BE GREATER THAN OR EQUAL TO THE MINIMUM LENGTHS SPECIFIED IN REFERENCE 3.9, APPENDIX H. | WTH 4/13/92 ESJ 4/13/92

~~THIS IS AN UNVERIFIED ASSUMPTION.~~ | R15 WTH 6/26/91 GP 6/28/91

2.6 IT IS ASSUMED THAT THE ALTERNATE FEEDER CABLES TO THE MCC'S WILL NOT BE REPLACED. ~~AND THAT ALL OF THE ALTERNATE FEEDER BREAKERS ON LVSG WILL BE OPEN (TRIPPED) WHEN NOT IN USE.~~

~~THIS IS AN UNVERIFIED ASSUMPTION.~~ | R15 WTH 6/26/91 GP 6/28/91

2.7 IT IS ASSUMED THAT THE COMBINATION MOTOR STARTERS HAVE AN OVERALL RATING OF 22,000 AMPS.

2.8 IT IS ASSUMED THAT THE POWER FACTOR OF ALL OF THE LOADS IS THE SAME IN CALCULATING THE APPENDIX R LOADING.

2.9 IT IS ASSUMED THAT THE OVERALL RESULTS OF THE APPENDIX R LOADING WILL NOT BE ADVERSELY EFFECTED WHENEVER THE CHANGES/ CALCULATIONS THAT EFFECT BOARD LOADING ARE INCORPORATED.

ATTACHMENT NO. M12212
WBN-EEB-MS-TI08-0008 Rev 10

~~THIS IS AN UNVERIFIED ASSUMPTION.~~
==========

R16

2.10 IT IS ASSUMED THAT THE ACCELERATION TIMES FOR PUMPS AND DIRECT DRIVEN FANS ARE LESS THAN OR EQUAL TO FOUR SECONDS AND FOR BELT DRIVEN FANS EIGHT SECONDS.

WTH 9/11/91

2.11 IT IS ASSUMED THAT THE TRIP SETPOINT FOR THE BREAKER ASSOCIATED WITH THE HIGH IMPEDANCE FAULT IS AT THE UPPER TOLERANCE (+10%).

2.12 IT IS ASSUMED THAT THE CSST'S C & D WILL BE REPLACED WITH TRANSFORMERS THAT HAVE AUTO-LOAD TAP CHANGERS ON THE SECONDARY SIDE.(REFERENCE DCN M-12051-A)

~~THIS IS AN UNVERIFIED ASSUMPTION~~. WTH ~~6/26/91~~ 6/28/91
==========

R15

2.13 It is assumed that the feeder cables to the following MCC's that do not have any Appendix R loads will remain within the same fire zone(s) that the feeder cables to the MCC's fed from the same 480V shutdown board that have Appendix R loads:

C&A Vent Board 1A2-A
1B2-B
2A2-A
2B2-B

Reactor Vent Board 1A-A
1B-B
2A-A
2B-B

R18

WTH 4/11/92
EJJ 4/13/92

ATTACHMENT NO. M12212
WBN-EEB-MS-TI08-0008 Rev 10

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TVA CALCULATION, AUXILIARY POWER SYSTEMS ANALYSES, WBN-EEB-MS-TI06-0002,REV 11.

3.2 ATTACHMENT 1 OF THE BASE CALCULATION

3.3 TVA ELECTRICAL DESIGN STANDARD DS-E12.6.2, REV 0

3.4 SKM SYSTEMS ANALYSIS, INC. COMPUTER AIDED PLOTTING FOR TIME OVERCURRENT REPORTING (CAPTOR), VERSION 2.1, ELECTRICAL ENGINEERING COMPUTER SOFTWARE.

3.5 UL STANDARD 489, MOLDED CASE CIRCUIT BREAKERS AND CIRCUIT BREAKERS ENCLOSURES.

3.6 TVA CALCULATION WBN-EEB-MS-TI06-0010 REV 0

3.7 TELECOPY FROM J. RICHARDS TELEMECANIQUE INC. (ATTACHMENT M12212-1)

3.8 TVA CALCULATION, TELAS, WBN-EEB-MS-TI05-0001 REV 6

3.9 TVA CALCULATION CABLE AMPACITY - NV4 AND NV5 CABLES IN CLASS 1E RACEWAYS WBPEVAR8909010 REV ~~12~~ 13 [illegible] 6/22/91 [illegible] 6/20/91 | R15

3.10 DESIGN CRITERIA WB-DC-30-13 "10CFR50,APPENDIX R, TYPE I, II, AND III CIRCUITS" REV 2

3.11 TVA APPENDIX R CALCULATIONS WBPEVAR9004001
WBPEVAR9004002
WBPEVAR9004003
WBPEVAR9004004
WBPEVAR9004005
WBPEVAR9004006
WBPEVAR9004007
WBPEVAR9004008

3.12 DESIGN CRITERIA WB-DC-30-28 "LOW AND MEDIUM VOLTAGE POWER SYSTEMS" & DIM-WB-DC-30-28-1

4.0 DESIGN INPUT DATA

THE DESIGN INPUT DATA CONSISTS OF THE FOLLOWING:

LOAD DATA REFERENCE 3.8

PROTECTIVE DEVICE DATA WAS TAKEN FROM REFERENCE 3.2

CABLE DATA WAS TAKEN FROM REFERENCES 3.1, 3.3, & 3.9

SHORT CIRCUIT CURRENT VALUES FROM REFERENCE 3.6

APPENDIX R LOADS REFERENCE 3.11

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5.0 5.0 JUSTIFICATION OF ASSUMPTIONS

SEE JUSTIFICATION OF ASSUMPTIONS IN BASE CALCULATION (SECTION 5.0).

5.1 MOVING THE LISTED LOADS IS THE PROPOSED CORRECTIVE ACTION TO ELIMINATE THE OVERLOAD ON THE IDENTIFIED BOARDS.
~~THIS ASSUMPTION REQUIRES LATER VERIFICATION.~~ GP 7/1/91
==========
Reference DCN M-13005-A R16 WTN 9/11/91

5.2 ADDING CURRENT LIMITING REACTORS TO THE LVSG IS THE PROPOSED CORRECTIVE ACTION TO REDUCE THE AVAILABLE SHORT CIRCUIT CURRENTS TO VALUES THAT ARE WITHIN THE EQUIPMENT'S RATINGS.THE CURRENT LIMITING REACTORS WILL ELIMINATE THE NEED FOR THE BUS TIE BREAKERS AND THEIR ASSOCIATED CURRENT LIMITING FUSES.
~~THIS ASSUMPTION REQUIRES LATER VERIFICATION.~~ GP 7/1/91
==========
Reference DCN M-12064-A R16 WTN 9/11/91

5.3 ELIMINATION OF THE CABLE PROTECTORS IS THE PROPOSED CORRECTIVE ACTION FOR SELECTIVE COORDINATION BETWEEN THE PROTECTIVE DEVICES ON THE MCC'S/CONTROL POWER LOADS AND THE LOAD FEEDER BREAKERS ON THE LVSG.
~~THIS ASSUMPTION REQUIRES LATER VERIFICATION.~~ GP 7/1/91
==========
Reference DCN M-12064-A R16 WTN 9/11/91

5.4 THE FOUR MOTORS ARE SIMULTANEOUSLY STARTED WITH SEVERAL OTHER MOTORS BY A SAFETY INJECTION SIGNAL. FOR A SAFETY INJECTION SIGNAL WITH LOW GRID VOLTAGE, THE MOTORS MAY NOT RECEIVE SUFFICIENT VOLTAGE TO START FOR 5 SECONDS, AND PRIOR TO THE MOTOR REACHING RATED SPEED, THE OLD OVERLOAD COULD TRIP THE MOTOR. THE PROPOSED OVERLOAD WILL ALLOW SUFFICIENT TIME FOR THE MOTOR TO START UNDER THE ABOVE STATED CONDITIONS (SAFETY INJECTION SIGNAL & LOW GRID VOLTAGE). C/A per DCN M-17981-A R18
WTN 4/13/92 ~~THIS ASSUMPTION REQUIRES LATER VERIFICATION.~~
==========
WTN 4/13/92 EJJ 4/13/92

5.5 VERIFICATION OF CABLE LENGTHS WILL BE REQUIRED WHEN THEY ARE INSTALLED. APPENDIX H OF WBPEVAR8909010 ESTABLISHES MAXIMUM LENGTH REQUIREMENTS.
~~THIS ASSUMPTION REQUIRES LATER VERIFICATION.~~ R15 WTN 6/28/91 GP 6/28/91
==========

5.6 ALTERNATE FEEDERS TO MCC'S ARE NOT BEING RESIZED DUE TO THE 480V SHDN BDS BEING OVERLOADED IF THE MCC LOADING IS NOT LIMITED.BREAKER SETTINGS ASSOCIATED WITH THE MCC ALTERNATE FEEDERS WILL BE SET TO PROTECT THE FEEDER CABLE FROM OVER-LOAD. THIS ASSUMPTION DOES NOT REQUIRE LATER VERIFICATION.

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5.7 PER ATTACHMENT M12212-1, THE COMBINATION MOTOR STARTERS USED AT WBN HAVE BEEN TESTED FOR 22,000 AMPS AT 480 VOLTS AND THE RESULTS OF THE TESTS WERE ACCEPTABLE PER THE CRITERIA IN UL 845. THIS ASSUMPTION DOES NOT REQUIRE LATER VERIFICATION.

5.8 ASSUMING THAT ALL LOADS HAVE THE SAME POWER FACTOR IS CONSERVATIVE. THIS ASSUMPTION WILL GIVE THE MAXIMUM LOAD CURRENT THAT A BREAKER WILL BE REQUIRED TO CARRY WITHOUT TRIPPING. THIS ASSUMPTION DOES NOT REQUIRE LATER VERIFICATION.

5.9 THERE ARE SEVERAL OUTSTANDING CALCULATIONS ON DESIGN CHANGES THAT HAVE OCCURRED DURING AND SINCE THE ELECTRICAL SYSTEM WALKDOWNS. SOME OF THESE OUTSTANDING ITEMS MAY EFFECT THIS CALCULATION AND SHOULD BE INCORPORATED. Mini-calcs have been reviewed and applicable mini-calcs were incorporated Reference memo page 159 R16 9/17/91
~~THIS ASSUMPTION REQUIRES LATER VERIFICATION.~~
==========

5.10 IEEE 387-1987 PROVIDES A TYPICAL MOTOR ACCELERATION TIME RANGE OF 2.5 TO 4 SECONDS FOR A 460V MOTOR. THE MAXIMUM VALUE FROM IEEE 387-1987 IS BEING USED FOR PUMP AND DIRECT DRIVEN FANS AND DOUBLE THAT FOR BELT DRIVEN FANS. THIS ASSUMPTION DOES NOT REQUIRE LATER VERIFICATION.

5.11 USING THE UPPER LIMIT OF THE BREAKER TOLERANCE TO CALCULATE THE MAXIMUM CURRENT THAT COULD RESULT WITHOUT THE BREAKER TRIPPING FROM A HIGH IMPEDANCE FAULT IS CONSERVATIVE. THIS ASSUMPTION DOES NOT REQUIRE LATER VERIFICATION.

5.12 PLANS ARE TO REPLACE CSST'S C & D WITH TRANSFORMERS HAVING AUTO-LOAD TAP CHANGERS ON EACH SECONDARY WINDING.
~~THIS ASSUMPTION REQUIRES LATER VERIFICATION.~~ 6/7/91
==========
Reference DCN M-12051-A

R16 WTH 4/11/91

5.13 Cables to these MCC's are being replaced due to ampacity. Routing within the same fire zones as the feeder cables to the Appendix R MCC's will be a requirement of this calc Reference DCN's M-11377-A, M-11347-A, M-11378-A, & M-11379-A.

R18 WTH 4/11/92 EH Dilulo

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6.0 COMPUTATIONS & ANALYSES

METHODOLOGY
REFERENCE 3.10 (APPENDIX R DESIGN CRITERIA) HAS IMPOSED ADDITIONAL REQUIREMENTS THAT ARE MORE STRINGENT THAN THE AUXILIARY POWER SYSTEM CRITERIA (REF 3.12). PARAGRAPH 3.1 IN REF 3.10 REQUIRES THAT SELECTIVE COORDINATION BE DEMONSTRATED FOR ALL CIRCUIT PROTECTIVE DEVICES ON REQUIRED POWER DISTRIBUTION BOARDS. THE APS CRITERIA ALLOWS AN EXCEPTION TO THIS WHEN CURRENT LIMITING FUSES ARE REQUIRED TO LIMIT DOWNSTREAM FAULT CURRENTS TO EQUIPMENT RATINGS. COORDINATION CURVES THAT SHOW SELECTIVE COORDINATION ARE PLOTTED IN SECTION B. THE RESULTS OF SECTION B WERE INCORPORATED INTO THE BREAKER SETTINGS IN SECTION A. PARAGRAPH 3.1 OF REF 3.12 ALSO REQUIRES THAT UPSTREAM FEEDER BREAKERS SUPPLYING A BOARD OR PANEL BE EVALUATED FOR A HIGH IMPEDANCE FAULT. APPENDIX C EVALUATES THE FEEDER BREAKERS FOR A HIGH IMPEDANCE FAULT BY CALCULATING THE MAXIMUM BOARD LOADING FOR NORMAL OPERATION, SI PHASE A AND SI PHASE B. APPENDIX B CALCULATES THE OVERLOAD HEATER TRIP TIMES FOR FANS AND PUMPS MOTORS THAT ARE BLOCK STARTED. THESE TIMES ARE THAN COMPARED WITH THE ACCELERATION TIMES OF THE MOTORS AND THE RESULTS FROM REF 3.6 TO DETERMINE IF THE MOTOR WILL START AND RUN.
THE BREAKERS' OVERLOAD SETTINGS FOR THE FIRE PUMPS ARE SET AT 300% TO PROTECT THE MOTOR'S FEEDER CABLES AND NOT THE MOTOR. THIS IS ACCEPTABLE PER THE NATIONAL ELECTRICAL CODE TO SET THE OVERLOAD OF A MOTOR AT A HIGHER VALUE WHEN THE IMMEDIATE SHUTDOWN OF A MOTOR BY A MOTOR OVERLOAD WOULD CREATE ADDITIONAL HAZARDS. VERIFICATION OF CABLE PROTECTION IS SIMOLAR TO THAT UTILIZED IN ATTACHMENT M08663A ADDED ON REVISION 1 OF THIS CALCULATION.

6.1 SECTION A

THE BREAKER TYPES, SETTINGS, FUSES, AND OVERLOAD HEATERS WERE SELECTED PER THE CRITERIA FORMULATED IN REVISION 0 OF THIS CALCULATION. "R10" IN THE REVISION COLUMN IN THE TABLES LOCATED IN SECTION A IDENTIFIES CHANGES MADE BY THIS ATTACHMENT TO THE BASE CALCULATION.THE TABLES IN SECTION A ARE A COMPOSITE LISTING OF THOSE LOADS THAT HAVE BEEN IDENTIFIED AS BEING REQUIRED FOR UNIT 1 SAFETY/OPERATION. THE LINE ITEMS IN THE TABLES IN SECTION A EITHER DUPLICATE OR SUPERCEDE (IF R10 IS IN THE REV COLUMN) ANY PREVIOUS LISTING IN THE BASE CALCULATION OR SUBSEQUENT REVISIONS.

THE LVSG TABLES LIST THE FEEDER AND LOAD BREAKERS WITH THE SENSOR/SETTINGS THAT EACH BREAKER SHOULD HAVE AFTER THE IDENTIFIED DCN HAS BEEN WORKED.

IN THE MCC LISTINGS, THE FOLLOWING CODES HAVE BEEN USED TO IDENTIFY THE PROTECTIVE DEVICE MODIFICATIONS:

COLUMN 'H' (OVERLOAD HEATERS)
'N'= NO CHANGE
'Y'= REPLACE OVERLOAD HEATER WITH THAT SPECIFIED IN COLUMN 'OVLD SIZE'

COLUMN 'B' (CIRCUIT BREAKER/FUSE)
'N'= NO CHANGE
'Y'= RESET BREAKER AS SHOWN IN COLUMN 'SET POSIT'
'R'= REPLACE & SET BREAKER AS SHOWN IN COLUMNS 'BKR' & 'SET POSIT'
'F'= REPLACE POWER FUSES WITH THAT SHOWN IN COLUMN 'BKR'

6.2 SECTION B
TIME-CURRENT PLOTS TO SUBSTANTIATE THE BREAKER SETTINGS IN SECTION A FOR THE LVSG BREAKERS ARE PRESENTED IN SECTION B. SECTION B-1 CONTAINS THE MOTOR FEEDERS, AND SECTION B-2 CONTAINS THE COORDINATION STUDY FOR THE MCC/CONTROL POWER FEEDERS. THESE TIME-CURRENT PLOTS WERE GENERATED USING REFERENCE 3.4.

6.3 SECTION C
THE BREAKER TYPES, SETTINGS, AND OVERLOAD HEATERS SELECTED/ IDENTIFIED IN SECTIONS A AND B OF THIS ATTACHMENT WERE TABULATED ON THE ACCOMPANYING LISTS WHICH IDENTIFIES THE BOARD, COMPARTMENT, PROTECTIVE DEVICE DATA, AND CABLE DATA.

TIME-CURRENT PLOTS WHICH WERE DEVELOPED IN ATTACHMENT NO. M08663A ADDED ON REVISION 1 OF THE BASE CALCULATION AND ADDITIONAL PLOTS WHICH WERE ADDED VIA ATTACHMENTS ON SUBSEQUENT REVISIONS WERE USED IN THE EVALUATION OF CABLE PROTECTION.

THE CIRCUITS ARE CONSIDERED ADEQUATELY PROTECTED IF THE CABLES ARE PREVENTED FROM REACHING THERMAL DAMAGE FOR TEN SECONDS FOR A LOW IMPEDANCE FAULT.

BY COMPARISON OF THE PROTECTIVE DEVICE DATA, CABLE DATA, AND THE TIME CURRENT CURVES FOR THE DEVICE IT WAS DETERMINED WHETHER THE CIRCUIT PASSED OR FAILED AND NOTED IN THE 'CABLE PROT' COLUMN.

6.4 APPENDIX A
APPENDIX A CONTAINS A LISTING OF DATA EXTRACTED FROM REF 3.6 (APS BOARD, AVAILABLE SHORT CIRCUIT CURRENT, X/R RATIO, AND X/R MULTIPLIER).THE SHORT CIRCUIT CURRENT THAT A BREAKER MUST

BE CAPABLE OF INTERRUPTING IS CALCULATED BASED ON THE SHORT CIRCUIT CURRENT AVAILABLE AND THE X/R RATIO AT THE BOARD.

6.5 APPENDIX B
APPENDIX B IDENTIFIES THE PUMP AND FAN MOTORS THAT ARE BLOCK STARTED. THERE ARE SEVERAL MOV'S THAT ARE ALSO BLOCK STARTED BUT THEIR OVERLOADS ARE BYPASSED FOR AN ACCIDENT. THEREFORE, TRIPPING OF OVERLOADS DURING BLOCK START IS NOT A CONCERN FOR MOV'S. THE OVERLOAD HEATER TRIP TIMES ARE CALCULATED BASED ON THE HEATER SIZE AND THE MOTOR'S LOCKED ROTOR CURRENT AT THE STARTING VOLTAGE.THESE TIMES ARE COMPARED WITH THE ACCELERATION TIMES OF THE MOTORS AND THE AVAILABLE VOLTAGES CALCULATED IN REFERENCE 3.6. See Attachment 10.7 in Ref 3.6 for this information. R18

6.6 APPENDIX C
APPENDIX C CONTAINS A LISTING OF THE APPENDIX R LOADS WHICH WERE EXTRACTED FROM REF 3.11.

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6.7 APPENDIX D
APPENDIX D CALCULATES FOR EACH APPENDIX R REQUIRED DISTRIBUTION BOARD THE OVERALL BOARD LOADING WITH A HIGH IMPEDANCE FAULT AS A RESULT OF A FIRE. FOR EACH REQUIRED BOARD, THE APPENDIX R LOADS AND THE LOADS THAT COULD BE OPERATING WERE IDENTIFIED. THE NON-REQUIRED APPENDIX R ENERGIZED LOAD WITH THE LARGEST DIFFERENTIAL BETWEEN THE NORMAL LOAD CURRENT AND THE PROTECTIVE DEVICE SETTING/RATING WAS ASSUMED TO BE SUBJECT TO A HIGH IMPEDANCE FAULT SUCH THAT ITS CURRENT RISES TO JUST BELOW THE TRIP SETPOINT OF ITS ASSOCIATED BRANCH CIRCUIT BREAKER. THE TOTAL CURRENT FOR EACH REQUIRED BOARD WAS EVALUATED TO ENSURE THAT THE UPSTREAM FEEDER BREAKERS SUPPLYING THE BOARD WILL NOT TRIP AS A RESULT OF THE HIGH IMPEDANCE FAULT.

7.0 GRAPHICS

GRAPHICS FOR COORDINATION, MOTOR AND CABLE PROTECTION CONSISTS OF THE TIME-CURRENT PLOTS DESCRIBED EARLIER AND SHOWN IN SECTIONS B & C OF THIS CALCULATION. THESE PLOTS WERE GENERATED USING COMPUTER SOFTWARE (REF.3.4). EACH CURVE WAS CHECKED FOR ACCURACY USING THE MANUFACTURER'S PUBLISHED CURVES FOR THE PROTECTIVE DEVICE. MINOR DEVIATIONS NOT ADVERSELY AFFECTING THE RESULTS OF THIS CALCULATION WERE IGNORED.

8.0 SUMMARY OF RESULTS

8.1 THE PROTECTIVE DEVICES IN THE CONTROL POWER LOADS WILL NOT COORDINATE WITH AN "LI" (LONG TIME AND INSTANTANEOUS SETTINGS) TYPE AMPTECTOR BUT WILL COORDINATE WITH A "LS" (LONG TIME AND SHORT TIME SETTINGS) TYPE.

8.2 WITH THE EXCEPTION OF THE DIESEL AUXILIARY BOARDS, THE AVAILABLE SHORT CIRCUIT CURRENTS AT THE REMAINING SAFETY-RELATED MCC'S EXCEED THE THERMAL MAGNETIC BREAKER INTERRUPTING RATINGS (14,000 AND 18,000 AMPS).

8.3 THE USE OF ALTERNATE FEEDERS TO MCC'S AND NON-1E LOADS IS LIMITED DUE TO LVSG NORMAL LOADING, CABLE FEEDER AMPACITY, LOAD VOLTAGES AND APPENDIX R CONSIDERATIONS. RESTRICTIONS ON THEIR USE ARE NEEDED.

8.4 AS IDENTIFIED IN R0 OF THIS CALCULATION, SELECTIVE COORDINATION BETWEEN THE MCC FEEDER BREAKERS ON THE LVSG AND LOAD BREAKERS ON THE MCC'S CANNOT BE ACCOMPLISHED IF THE CABLE PROTECTORS REMAIN IN THE CIRCUIT. ALSO, R0 IDENTIFIED THAT COORDINATION BETWEEN THE LVSG FEEDER BREAKER AND THE CURRENT LIMITING FUSE IN THE TIE BREAKER ABOVE 14,000 AMPS CANNOT BE ATTAINED.

8.5 THE AVAILABLE FAULT CURRENT AT THE LVSG'S 1600 AMP BUS WILL EXCEED THE LOAD BREAKERS' INTERRUPTING RATINGS WITH THE TIE BREAKER AND ASSOCIATED CURRENT LIMITING FUSE ELIMINATED.

8.6 ADDING THE CURRENT LIMITING REACTORS WILL RESULT IN DECREASED VOLTAGES AT THE MCC'S, ESPECIALLY THE DIESEL AUXILIARY BOARDS THAT ARE SEVERAL HUNDRED FEET AWAY.

8.7 THE LVSG AND MCC TABLES IDENTIFY CHANGES TO BREAKER SETTINGS, OVERLOAD HEATERS, ETC,THAT NEED TO BE IMPLEMENTED FOR SELECTIVE COORDINATION AND PROTECTION FOR GROUPS 4 AND 6 LOADS.

8.8 BLOCK STARTING OF SEVERAL LOADS OCCUR UPON THE INITIATION OF A SAFETY-INJECTION (SI) SIGNAL, AND BLOCK STARTING RESULTS IN THE SYSTEM VOLTAGE TO BE SUPPRESSED DURING THE ACCELERATION OF THE MOTORS THAT ARE BLOCK STARTED. THE VALVE'S OVERLOADS ARE BYPASSED BY THE SI SIGNAL BUT PUMPS/FAN MOTORS ARE NOT. THE OVERLOADS OF FOUR (4) FANS MAY TRIP THE MOTORS OFF BEFORE THE MOTORS CAN ACCELERATE THE FAN TO FULL SPEED DURING THE BLOCK START TRANSIENT.

8.9 EVEN THOUGH THE TWO DIESEL AUXILIARY BOARDS (C1-S & C2-S) FEEDER BREAKERS ARE AUTOMATIC, COORDINATION EXISTS BETWEEN THE

PROTECTIVE DEVICES ON THE DIESEL AUXILIARY BOARDS AND THE LVSG FEEDER BREAKERS DUE TO THE LOW AVAILABLE FAULT CURRENTS.

8.10 PROTECTION FOR THE 480V CLASS 1E CABLES WITHIN THE SCOPE PREVIOUSLY OUTLINED HAVE BEEN DETERMINED TO PASS OR FAIL AS INDICATED ON THE ACCOMPANYING LISTINGS FOR CLASS 1E LVSG AND MCC'S.

9.0 CONCLUSIONS

9.1 THE PRESENT AMPTECTORS ASSOCIATED WITH THE CONTROL POWER FEEDER BREAKERS IN THE LVSG SHOULD BE REPLACED WITH "LS" TYPE.

9.2 EXCEPT FOR THE DIESEL AUXILIARY BOARDS, ALL THERMAL MAGNETIC CIRCUIT BREAKERS ON SAFETY-RELATED MCC'S MUST HAVE AN INTERRUPTING RATING OF 22,000 AMPS OR GREATER OR HAVE A CURRENT LIMITING FUSE TO LIMIT THE CURRENT THAT THE BREAKER INTERRUPTS.THIS REQUIREMENT WILL ALLOW THE MCC RATING TO BE 22,000 AMPS SINCE THE BUSES ARE BRACED FOR 22,000 AMPS AND THE COMBINATION MOTOR STARTERS HAVE BEEN TESTED FOR 22,000 AMPS (REF 3.7).

9.3 THE LVSG BREAKERS ASSOCIATED WITH ALTERNATE FEEDERS SHOULD BE MAINTAINED IN AN OPEN (TRIPPED) POSITION WHEN NOT IN USE AND WHEN BEING USED, A TECH SPEC CONDITION SHOULD EXIST DUE TO THE REASONS CITED IN 8.3.

9.4 THE RECOMMENDATION MADE IN R0 OF THIS CALCULATION TO ELIMINATE THE CABLE PROTECTORS IN THE MCC AND CONTROL POWER FEEDER CIRCUITS AS WELL AS THE CURRENT LIMITING FUSE ASSOCIATED WITH THE LVSG TIE BREAKER SHOULD BE IMPLEMENTED IN ORDER TO HAVE SELECTIVE COORDINATION BETWEEN PROTECTIVE DEVICES AS REQUIRED BY REF 3.10.

9.5 AVAILABLE FAULT CURRENTS ON THE 1600 AMP BUSES IN THE LVSG EXCEED THE LVSG LOAD BREAKERS'INTERRUPTING RATINGS. ADDING CURRENT LIMITING REACTORS WILL LIMIT THE AVAILABLE FAULT CURRENTS TO AN ACCEPTABLE LEVEL AND ALLOW THE ELIMINATION OF THE TIE BREAKER.

9.6 THE DIESEL AUXILIARY BOARDS DO NOT HAVE A SHORT CIRCUIT CURRENT PROBLEM AND TO AVOID A VOLTAGE PROBLEM THE DIESEL AUXILIARY BOARD FEEDERS SHOULD BE MOVED TO THE HIGH SIDE OF THE CURRENT LIMITING REACTORS (3200A BUS).

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9.7 DCN M12212 WILL IMPLEMENT THE CHANGES FOR GROUP 4 AND ANOTHER DCN WILL BE INITIATED FOR GROUP 6 LOAD CHANGES.

9.8 ADDITIONAL ACTION(S) ARE NEEDED TO SUBSTANTIATE THAT THE PRESENT MOTORS WILL OPERATE. THESE ACTIONS COULD CONSIST OF ONE OR A COMBINATION OF THE FOLLOWING:

9.8.1 TIGHTEN THE TOLERANCES ON THE MCC FEEDER CABLE LENGTHS AND CURRENT LIMITING REACTORS.
9.8.2 MEASURE ACCELERATION TIMES OF THE MOTORS.
9.8.3 WALKDOWN THE FEEDER CABLES TO THE MOTORS.
9.8.4 REPLACE THE MOTORS/CABLES.

9.9 DIESEL AUXILIARY BOARDS C1-S & C2-S MAY REMAIN AS IS SINCE THE CURRENT LIMITING FUSES ON THE DIESEL AUX BOARDS REDUCE THE FAULT CURRENT TO A VALUE LESS THAN THE INSTANTANEOUS SETTING OF THE FEEDER BREAKER.

9.10 THE PROTECTIVE DEVICES INSTALLED WILL PROVIDE ADEQUATE CABLE PROTECTION AGAINST THERMAL DAMAGE FOR CIRCUITS WITHIN THE SCOPE OF THIS ATTACHMENT.

9.11 The normal feeders (cables) to the following MCC's need to be routed within the same fire zone(s) as the feeder cables to the MCC's required for Appendix R that are supplied from the same 480V Shutdown Board.

C & A Vent Board 1A2-A
1B2-B
2A2-A
2B2-B

Reactor Vent Board 1A-A
1B-B
2A-A
2B-B

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GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP/ KVA	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	REV
4	480V SHUTDOWN BOARD 1A1-A	480V SHDN BD 1A1-A																
4	Fdr From Xfmr 1A1-A	480V SHDN BD 1A1-A	1B		2000.0		2405.0		51N									
2A	Aux Bldg Gen Sply Fan 1A	480V SHDN BD 1A1-A	2C	1-MTR-30-103	100.0	1.15	120.0	622	200	0.90	180.0	4	7			M-10448-A	1	R0
1	COMPONENT COOL SYS PUMP 1A-A	480V SHDN BD 1A1-A	3B	1-MTR-70-46-A	350.0	1.15	389.0	2084	600	0.95	570.0	4	8			M-08663-A	2	R0
4	Alt Fdr From Xfmr 1A-A	480V SHDN BD 1A1-A	4B	1-OXF-212-A-A	2000.0		2405.0		51N									
6	Spent Fuel Pit Pmp C-S (SPARE)	480V SHDN BD 1A1-A	7A	0-MTR-78-35-S	100.0	1.15	115.0	647	200	0.80	160.0	4	7			M-12212-A	15	R18
2A	CRDM Clr Fan 1A-A Mtr 1	480V SHDN BD 1A1-A	7B	1-MTR-30-83/1-A	75.0	1.15	97.0	413	150	0.95	142.5	4	6			M-10448-A	5	R0
2A	Reac Lwr Compt Clr Fan 1A-A	480V SHDN BD 1A1-A	7C	1-MTR-30-74-A	60.0	1.00	73.8	571	100	0.95	95.0	9	12			E110014	3	
2A	CRDM Clr Fan 1A-A Mtr 2	480V SHDN BD 1A1-A	7D	1-MTR-30-83/2-A	75.0	1.15	97.0	413	150	0.95	142.5	4	6			M-10448-A	5	R0
6	ALT FDR 250V BTRY CHGR NO 1	480V SHDN BD 1A1-A	8A	0-CHGR-239-1	82.6		150.0		300	0.70	210.0	20	6			M-12212-A		R10
4	R. MOV Bd 1A1(Nor)& 1A2(Alt)-A	480V SHDN BD 1A1-A	8B	1-MCC-213-A1-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
4	Dsl Aux Bd 1A1(Nor)&1A2(Alt)-A	480V SHDN BD 1A1-A		1-MCC-215-A1-A	300.0		360.0		600	0.75	450.0	6		4	0.18	M-12212-A	III-2	R10
4	Nor Fdr Reac Vent Bd 1A-A	480V SHDN BD 1A1-A	9B	1-MCC-232-A-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
2A	Elec Bd Rm AHU A-A	480V SHDN BD 1A1-A	9C	0-MTR-31-30B-A	50.0	1.15	56.5	395	150	0.55	82.5	4	6			M-10448-A	6B	
4	ALT FDR CHANNEL II	480V SHDN BD 1A1-A	10A		200.0		240.0		400	0.85	340.0	6		8	0.18	M-12212-A	III-1	R18
4	ALT FDR 125V VITAL BTRY CHGR 2	480V SHDN BD 1A1-A	10AA	0-CHGR-236-E	25.6		53.0		N/A								III-1	R18
4	ALT FDR 120VAC VITAL INV 1-II	480V SHDN BD 1A1-A	10AB	1-INV-235-2E	0.0		42.0		N/A								III-1	R18
4	ALT FDR 120VAC VITAL INV 2-II	480V SHDN BD 1A1-A	10AC	2-INV-235-2E	0.0		42.0		N/A								III-1	R18
4	ALT FDR INST PWR DIST PANEL 1B	480V SHDN BD 1A1-A	10AD	1-DWP-237-B	0.0		104.2		N/A								III-1	R18
4	Nor Fdr C&A Bldg Vent Bd 1A1-A	480V SHDN BD 1A1-A	10B	1-MCC-214-A1-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
2A	Cntmt Air Rtn Fan 1A-A	480V SHDN BD 1A1-A	10C	1-MTR-30-38-A	100.0	1.00	115.0	869	200	0.75	150.0	10	10			M-10448-A	4	R0
4	Alt Fdr C&A Bldg Vent Bd 1A2-A	480V SHDN BD 1A1-A	10D	1-MCC-214-A2-A	*		350.0		600	0.60	360.0	8		6	0.18	M-12212-A	III-7	R10
4	BUS TIE	480V SHDN BD 1A1-A	12D	BUS TIE BKR	1333.0		1600.0		51N									

Preparer [illegible] Date 4/13/92
Check [illegible] Date 4/19/92
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LVSG\LVSGSET * AMPACITY OF ALTERNATE FEEDERS IS LIMITED DUE TO CABLE OR BOARD LOADING

GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP/ KVA	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	REV
4	480V SHUTDOWN BOARD 1A2-A	480V SHDN BD 1A2-A																
4	Fdr From Xfmr 1A2-A	480V SHDN BD 1A2-A	1B	1-OXF-212-A2-A	2000.0		2405		51N									
2A	CONT RM A/C A-A CPRSR	480V SHDN BD 1A2-A	2C	0-MTR-31-80/2-A	250.0	1.15	275.0	1825	600	0.70	420.0	4	7			M-10448-A	7	R0
1	COMPONENT COOL SYS PUMP C-S	480V SHDN BD 1A2-A	3B	0-MTR-70-51-S	350.0	1.15	389.0	2084	600	0.95	570.0	4	8			M-08663-A	2	R0
1	AUX CCNT & SERV AIR CPRSR A	480V SHDN BD 1A2-A	3D	0-MTR-32-25	125.0	1.15	162.0	770	300	0.76	228.0	4	6			P-03065-B	10	
4	Fdr From Xfmr 1A-A	480V SHDN BD 1A2-A	4B	1-OXF-212-A-A	2000.0		2405		51N									
4	Station Fire Pmp 1A-A	480V SHDN BD 1A2-A	4D	1-MTR-26-1-A	200.0		230.0	1400	600	1.25	750.0	4	6			M-12212-A	14	R0
2A	CRD Mech Clr Fan 1C-A Mtr 1	480V SHDN BD 1A2-A	7A	1-MTR-30-88/1-A	75.0	1.15	97.0	413	150	0.95	142.5	4	6			M-10448-A	5	R0
2A	Aux Bldg Gen Exhaust Fan 1A	480V SHDN BD 1A2-A	7B	1-MTR-30-159	125.0	1.15	147.0	987	300	0.70	210.0	6	7			M-10448-A	8	R0
2A	Reac Lwr Compt Clr Fan 1C-A	480V SHDN BD 1A2-A	7D	1-MTR-30-77-A	60.0	1.00	73.8	571	100	0.95	95.0	9	12			E110014	3	
2A	CRD Mech Clr Fan 1C-A Mtr 2	480V SHDN BD 1A2-A	8A	1-MTR-30-88/2-A	75.0	1.15	97.0	416	150	0.95	142.5	4	6			M-10448-A	5	R0
4	R.MOV BD 1A2(NOR) & 1A1(ALT)-A	480V SHDN BD 1A2-A	8B	1-MCC-213-A2-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
4	DSL AUX BD 1A2-A, 1A1-A ALT	480V SHDN BD 1A2-A		1-MCC-215-A2-A	300.0		360.0		600	0.75	450.0	6		4	0.18	M-12212-A	III-2	R10
4	NOR FDR CHANNEL I	480V SHDN BD 1A2-A	9A		200.0		240.0		400	0.85	340.0	6		8	0.18	M-12212-A	III-1	R18
4	NOR FDR 125V VITAL BTRY CHGR 1	480V SHDN BD 1A2-A	9AA	0-CHGR-236-1-D	25.6		53.0		N/A								III-1	R18
4	NOR FDR 120VAC VITAL INV 1-I	480V SHDN BD 1A2-A	9AB	1-INV-235-1-D	0.0		42.0		N/A								III-1	R18
4	NOR FDR 120VAC VITAL INV 2-I	480V SHDN BD 1A2-A	9AC	2-INV-235-1D	0.0		42.0		N/A								III-1	R18
4	INST PWR DIST PANEL 1A	480V SHDN BD 1A2-A	9AD	1-DWT-237-A	0.0		104.2		N/A								III-1	R18
4	Alt Fdr C&A Bldg Vent Bd 1A1-A	480V SHDN BD 1A2-A	9B	1-MCC-214-A1-A	*		600.0		660	1.00	600.0	8		6	0.18	M-12212-A	III-7	R10
4	Nor Fdr C&A Bldg Vent Bd 1A2-A	480V SHDN BD 1A2-A	9C	1-MCC-214-A2-A	500.0		600.0		660	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
2A	480V Shutdown Bd Rm AHU A-A	480V SHDN BD 1A2-A	9D	0-MTR-31-45-A	75.0	1.15	92.0	592	150	0.90	135.0	8	9			M-10448-A	9	R0
4	Altn Fdr Reactor Vent Bd 1A-A	480V SHDN BD 1A2-A	10A	1-MCC-232-A-A	*		210.0		300	0.70	210.0	6		8	0.18	M-12212-A	III-8	R10
4	BUS TIE FDR	480V SHDN BD 1A2-A	12D	BUS TIE	1333.0		1600.0		51N									

Preparer WTH Date 4/13/92
Check EH Date 4/13/92
Rev 18

 * AMPACITY OF ALTERNATE FEEDERS IS LIMITED DUE TO CABLE OR BOARD LOADING

GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	CALC CH	REV
4	480V SHUTDOWN BOARD 1B1-B	480V SHDN BD 1B1-B																	
4	NOR FDR FROM XFMR 1B1-B	480V SHDN BD 1B1-B	1B		2000.0		2405.0		51N										
2A	Aux Bldg Gen Sply Fan 1B	480V SHDN BD 1B1-B	2B	1-MTR-30-102	100.0	1.15	120.0	624	200	0.90	180.0	4	7			M-10448-A	1	N	R0
2B	RECIPROCATING CHARGING PUMP	480V SHDN BD 1B1-B	3B	1-MTR-62-101	200.0	1.15	221.0	1579	400	0.80	320.0	4	9			M-10522-A	13	N	R0
1	COMPONENT COOL SYS PUMP 1B-B	480V SHDN BD 1B1-B	3C	1-MTR-70-38-B	350.0	1.15	389.0	2084	600	0.95	570.0	4	8			M-08663-A	2	N	R0
1	AUX CCNT & SERV AIR CPRSR B	480V SHDN BD 1B1-B	3D	0-MTR-32-26	125.0	1.15	162.0	770	300	0.76	228.0	4	6			P-03065-B	10	Y	
4	Alt Fdr From Xfmr 1B-B	480V SHDN BD 1B1-B	4B		2000.0		2405.0		51N										
2A	Elec Bd Rm AHU C-B	480V SHDN BD 1B1-B	7A	0-MTR-31-31B-B	50.0	1.15	62.5	360	100	0.90	90.0	6	8			M-10448-A	6	N	R0
2A	CRD Mech Clr Fan 1B-B Mtr 1	480V SHDN BD 1B1-B	7C	1-MTR-30-92/1-B	75.0	1.15	97.0	413	150	0.95	142.5	4	6			M-10448-A	5	N	R0
2A	Reac Lwr Compt Clr Fan 1B-B	480V SHDN BD 1B1-B	7D	1-MTR-30-75-B	60.0	1.00	73.8	571	100	0.95	95.0	9	12			E110014	3	Y	
4	R. MOV Bd 1B1(Nor)& 1B2(Alt)-B	480V SHDN BD 1B1-B	8B	1-MCC-213-B1/B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
4	Dsl Aux Bd 1B1(Nor)&1B2(Alt)-B	480V SHDN BD 1B1-B		1-MCC-215-B1-B	300.0		360.0		600	0.75	450.0	6		4	0.18	M-12212-A	III-2	Y	R10
4	Alt Fdr C&A Bldg Vt Bd 1B2-B	480V SHDN BD 1B1-B	9A	1-MCC-214-B2-B	*		350.0		400	0.90	360.0	20		8	0.18	M-12212-A	III-9	Y	R10
4	Nor Fdr Reac Vent Bd 1B-B	480V SHDN BD 1B1-B	9B	1-MCC-232-B-B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
4	ALT FDR CHANNEL I		10A		200.0		240.0		400	0.85	340.0	6		8	0.18	M-12212-A	III-1	Y	R10
4	ALT FDR 125V VITAL BTRY CHGR 1	480V SHDN BD 1B1-B	10AA	0-CHGR-236-1-D	25.6		53.0		N/A								III-1		
4	ALT FDR 120VAC VITAL INV 1-I	480V SHDN BD 1B1-B	10AB	1-INV-235-1-D	0.0		42.0		N/A								III-1		
4	ALT FDR 120VAC VITAL INV 2-I	480V SHDN BD 1B1-B	10AC	2-INV-235-2D	0.0		42.0		N/A								III-1		
4	ALT FDR INST PWR DIST PANEL 1A	480V SHDN BD 1B1-B	10AD	1-DWP-237-A	0.0		104.2		N/A								III-1		
4	Nor Fdr C&A Bldg Vent Bd 1B1-B	480V SHDN BD 1B1-B	10B	1-MCC-214-B1-B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
2A	CRD Mech Clr Fan 1B-B Mtr 2	480V SHDN BD 1B1-B	10D	1-MTR-30-92/2-B	75.0	1.15	97.0	413	150	0.95	142.5	4	6			M-10448-A	5	N	R0

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GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	CALC CH	REV
4	480V SHUTDOWN BOARD 1B2-B	480V SHDN BD 1B2-B																	
4	Fdr From Xfmr 1B2-B	480V SHDN BD 1B2-B	1B	1-OXF-212-B2-B	2000.0		2405.0		51N										
2A	CONT RM A/C B-B CPRSR	480V SHDN BD 1B2-B	2B	0-MTR-31-96/2-B	250.0	1.15	275.0	1825	600	0.10	420.0	4	7			M-10448-A	7	N	R0
6	Unit 1 Reac Bldg Crane	480V SHDN BD 1B2-B	3B	1-CRN-271-R1	152.2		228.8		300	1.00	300.0	4	6			M-12212-A		Y	R10
2A	480V Shdn Bd Rm Chler B-B	480V SHDN BD 1B2-B	3C	0-MTR-31-49/2-B	240.0		247.0	1209	400	0.88	352.0	4	7			M-10448-A	11	N	R0
6	Emerg Fdr 480V Aux Bldg Com Bd	480V SHDN BD 1B2-B	3D	0-BD-206-A	0.0		0.0		300	1.00	300.0	20		6	0.18	M-12212-A		N	R10
4	Fdr From Xfmr 1B-B	480V SHDN BD 1B2-B	4B	1-OXF-212-B-B	2000.0		2405.0		51N										
4	Station Fire Pmp 1B-B	480V SHDN BD 1B2-B	4D	1-MTR-26-4-B	200.0		230.0	1400	600	1.25	750.0	4	6			M-12212-A	14	Y	R0
2A	Aux Bldg Gen Exhaust Fan 1B	480V SHDN BD 1B2-B	7A	1-MTR-30-162	125.0	1.00	147.0	854	300	0.65	195.0	4	7			M-10448-A	12	N	R0
2A	CRD Mech Clr Fan 1D-B Mtr 1	480V SHDN BD 1B2-B	7B	1-MTR-30-80/1-B	75.0	1.15	97.0	413	150	0.95	142.5	4	6			M-10448-A	5	N	R0
2A	Reac Lwr Compt Clr Fan 1D-B	480V SHDN BD 1B2-B	7D	1-MTR-30-78-B	60.0	1.00	73.8	571	100	0.95	95.0	9	12			E110014	3	Y	
6	ALT FDR 250V SPARE BTRY CHGR	480V SHDN BD 1B2-B	8A	0-CHGR-239-S	82.9		150.0		300	0.70	210.0	20	6			M-12212-A		N	R0
4	FDR REAC MOV BD 1B2-B,ALT1B1-B	480V SHDN BD 1B2-B	8B	1-MCC-213-B2-B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
4	FDR DSL AUX BD 1B2-B ALT 1B1-B	480V SHDN BD 1B2-B		1-MCC-215-B2-B	300.0		360.0		600	0.75	450.0	6		4	0.18	M-12212-A	III-2	Y	R10
6	Spent Fuel Pit Pmp B-B	480V SHDN BD 1B2-B	9A	0-MTR-78-9-B	100.0	1.15	115.0	647	200	0.80	160.0	4	7			M-12212-A	15	N	R0
4	Alt Fdr C&A Bldg Vent Bd 1B1-B	480V SHDN BD 1B2-B	9B	1-MCC-214-B1-B	*		600.0		600	1.00	600.0	8		6	0.18	M-12212-A	III-7	Y	R10
2A	Cntmt Air Rtn Fan 1B-B	480V SHDN BD 1B2-B	9C	1-MTR-30-39-B	100.0	1.00	115.0	828	200	0.75	150.0	10	10			M-10448-A	4	Y	
2A	480V Shutdown Bd Rm AHU C-B	480V SHDN BD 1B2-B	9D	0-MTR-31-55-B	75.0	1.15	92.0	592	150	0.90	135.0	8	9			M-10448-A	9	N	R0
4	NOR FDR CHANNEL II		10A		200.0		240.0		400	0.85	340.0	6		8	0.18	M-12212-A	III-1	Y	R10
4	NOR FDR 125V VTL BTRY CHGR 2	480V SHDN BD 1B2-B	10AA	0-CHGR-236-2-E	25.6		53.0		N/A								III-1		
4	NOR FDR 120VAC VITAL INV 1-II	480V SHDN BD 1B2-B	10AB	1-INV-235-2-E	0.0		42.0		N/A								III-1		
4	NOR FDR 120VAC VITAL INV 2-II	480V SHDN BD 1B2-B	10AC	2-INV-235-2E	0.0		42.0		N/A								III-1		
4	NOR INST PWR DIST PANEL 1B	480V SHDN BD 1B2-B	10AD	1-DWP-237-B	0.0		104.2		N/A								III-1		
4	Fdr C&A Bldg Vent Bd 1B2-B	480V SHDN BD 1B2-B	10B	1-MCC-214-B2-B	500.0		600.0		600	1.10	660.0	10		6	0.18	M-12212-A	III-4	Y	R10
2A	CRD Mech Clr Fan 1D-B Mtr 2	480V SHDN BD 1B2-B	10C	1-MTR-30-80/2-B	75.0	1.15	97.0	413	150	0.95	142.5	4	6			M-10448-A	5	N	R0
4	Altn Fdr Reactor Vent Bd 1B-B	480V SHDN BD 1B2-B	10D	1-MCC-232-B-B	*		210.0		300	0.70	210.0	6		8	0.18	M-12212-A	III-8	Y	R10

VSG\LVSGSET * AMPACITY OF ALTERNATE FEEDERS IS LIMITED DUE TO CABLE OR BOARD LOADING

GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP/ KVA	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	REV
4	480V SHUTDOWN BOARD 2A1-A																	
4	Fdr.From XFMR 2A1-A	480V SHDN BD 2A1-A	1B	2-0XF-212-A1-A	2000.0		2405.0		51N									
2A	Aux Bldg Gen Sply Fan 2A	480V SHDN BD 2A1-A	2C	2-MTR-30-104	100.0	1.15	120.0	630	209	0.90	180.0	4	7			M-10448-A	1	R0
1	COMPONENT COOL SYS PUMP 2A-A	480V SHDN BD 2A1-A	3B	2-MTR-70-59-A	350.0	1.15	389.0	2084	601	0.95	570.0	4	8			M-08663-A	2	R0
4	Alt Fdr From Xfmr 2A-A	480V SHDN BD 2A1-A	4B	2-0XF-212-A-A	2000.0		2405.0		51N									
7	CRD Mech Clr Fan 2A-A Mtr 1	480V SHDN BD 2A1-A	7B	2-MTR-30-83/1-A	75.0	1.15	97.0	413	150	0.95	142.5	4	6			U2		R0
7	Reac Lwr Compt Clr Fan 2A-A	480V SHDN BD 2A1-A	7C	2-MTR-30-74-A	40.0	1.15	47.0	310	100	0.70	70.0	4	7			U2		R0
7	CRD Mech Clr Fan 2A-A Mtr 2	480V SHDN BD 2A1-A	7D	2-MTR-30-83/2-A	75.0	1.15	97.0	413	150	0.95	142.5	4	6			U2		R0
6	ALT FDR 250V BTRY CHGR NO 2	480V SHDN BD 2A1-A	8A	0-CHGR-239-2	83.8		150.0		360	0.70	210.0	20	6			M-12212-A		R10
4	FDR REAC MOV BD 2A1-A,(NOR)	480V SHDN BD 2A1-A	8B	2-MCC-213-A1-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
4	Dsl Aux Bd 2A1(Nor)&2A2(Alt)-A	480V SHDN BD 2A1-A		2-MCC-215-A1-A	300.0		360.0		600	0.75	450.0	6		4	0.18	M-12212-A	III-2	R10
4	Fdr Reac Vent Bd 2A-A	480V SHDN BD 2A1-A	9B	2-MCC-232-A-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
2A	Elec Bd Rm AHU B-A	480V SHDN BD 2A1-A	9C	0-MTR-31-30D-A	50.0	1.15	56.5	395	150	0.55	82.5	4	6			M-10448-A	6B	
4	ALT FDR CHANNEL IV	480V SHDN BD 2A1-A	10A		200.0		240.0		400	0.85	340.0	6		8	0.18	M-12212-A	III-1	R18
4	ALT FDR 125V VTL BTRY CHGR IV	480V SHDN BD 2A1-A	10AA	0-CHGR-236-4-G	25.6		53.0		N/A								III-1	R18
4	ALT FDR 120VAC VITAL INV 1-IV	480V SHDN BD 2A1-A	10AB	1-INV-235-4-G	0.0		42.0		N/A								III-1	R18
4	ALT FDR 120VAC VITAL INV 2-IV	480V SHDN BD 2A1-A	10AC	2-INV-235-4-G	0.0		42.0		N/A								III-1	R18
4	ALT FDR INST PWR DIST PANEL 2B	480V SHDN BD 2A1-A	10AD	2-DXF-237-B	0.0		104.2		N/A								III-1	R18
4	Nor Fdr C&A Bldg Vent Bd 2A1-A	480V SHDN BD 2A1-A	10B	2-MCC-214-A1-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
7	Cntmt Air Rtn Fan 2A-A	480V SHDN BD 2A1-A	10C	2-MTR-30-38-A	100.0	1.00	115.0		200	0.75	150.0	10	10			U2		R0
4	Alt Fdr C&A Bldg Vent Bd 2A2-A	480V SHDN BD 2A1-A	10D	2-MCC-214-A2/A	*		350.0		600	0.60	360.0	8		6	0.18	M-12212-A	III-7	R10
4	BUS TIE FDR BKR	480V SHDN BD 2A1-A	12D	BUS TIE	1333.0		1600.0		51N									

Preparer GTN Date 4/13/92
Check EHH Date 4/13/92
Rev 18

LVSG\LVSGSET * AMPACITY OF ALTERNATE FEEDERS IS LIMITED DUE TO CABLE OR BOARD LOADING

GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP/ KVA	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	REV
4	480V SHUTDOWN BOARD 2A2-A																	
4	Nor Fdr From Xfmr 2A2-A	480V SHDN BD 2A2-A	1B	2-OXF-212-A2-A	2000.0		2405.0		51N									
2A	Elec Bd Rm A/C A-A Cprsr	480V SHDN BD 2A2-A	2C	0MTR-31-128/2-A	250.0	1.15	275.0	1825	600	0.70	420.0	4	7			M-10448-A	7	R0
2A	480V Shdn Bd Rm Chlr A-A	480V SHDN BD 2A2-A	3C	0-MTR-31-36/2-A	240.0		247.0	1209	400	0.88	352.0	4	7			M-10448-A	11	
4	Alt Fdr From Xfmr 2A-A	480V SHDN BD 2A2-A	4B	2-OXF-212-A-A	2000.0		2405.0		51N									
4	Station Fire Pmp 2A-A	480V SHDN BD 2A2-A	4D	2-MTR-26-9-A	200.0		230.0	1400	600	1.25	750.0	4	6			M-12212-A	14	R0
7	CRD MECH CLR FAN C-A MTR 1	480V SHDN BD 2A2-A	7A	2-MTR-30-88/1-A	75.0		97.0	413	150	0.95	142.5	4	6			U2		R0
2A	Aux Bldg Gen Exhaust Fan 2A	480V SHDN BD 2A2-A	7B	2-MTR-30-274	125.0	1.00	147.0	866	300	0.65	195.0	4	7			M-10448-A	12	
2A	Fuel Handling Exhaust Fan A	480V SHDN BD 2A2-A	7C	0-MTR-30-136	100.0	1.15	120.0	624	200	0.90	180.0	4	7			M-10448-A	1	R0
7	REAC LWR COMPT CLR FAN 2C-A	480V SHDN BD 2A2-A	7D	2-MTR-30-77-A	40.0	1.15	54.0	307	100	0.80	80.0	4	7			U2		R0
7	CRD Mech Clr Fan 2C-A Mtr 2	480V SHDN BD 2A2-A	8A	2-MTR-30-88/2-A	75.0	1.15	97.0	413	150	0.95	142.5	4	6			U2		R0
4	FDR REAC MOV BD 2A2-A,(NOR)	480V SHDN BD 2A2-A	8B	2-MCC-213-A2-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
4	FDR DSL AUX BD 2A2-A,(NOR)	480V SHDN BD 2A2-A		2-MCC-215-A2-A	300.0		360.0		600	0.75	450.0	6		4	0.18	M-12212-A	III-2	R10
2A	480V SHUTDOWN BD RM AHU B-A	480V SHDN BD 2A2-A	8D	0-MTR-31-44-A	75.0	1.15	92.0	592	150	0.90	135.0	8	9			M-10448-A	9	R0
4	NOR FDR CHANNEL III	480V SHDN BD 2A2-A	9A		200.0		240.0		400	0.85	340.0	6		8	0.18	M-12212-A	III-1	R18
4	NOR FDR VTL BTRY CHGR III	480V SHDN BD 2A2-A	9AA	0-CHGR-236-3-F	25.6		53.0		N/A								III-1	R18
4	NOR FDR 120VAC VITAL INV 1-III	480V SHDN BD 2A2-A	9AB	1-INV-235-3-F	0.0		42.0		N/A								III-1	R18
4	NOR FDR 120VAC VITAL INV 2-III	480V SHDN BD 2A2-A	9AC	2-INV-235-3F	0.0		42.0		N/A								III-1	R18
4	NOR FDR INST PWR DIST PANEL 2A	480V SHDN BD 2A2-A	9AD	2-DXF-237-A	0.0		104.2		N/A								III-1	R19
4	Alt Fdr C&A Bldg Vent Bd 2A1-A	480V SHDN BD 2A2-A	9B	2-MCC-214-A1-A	*		600.0		600	1.00	600.0	8		6	0.18	M-12212-A	III-7	R10
4	Nor Fdr C&A Bldg Vent Bd 2A2-A	480V SHDN BD 2A2-A	9C	2-MCC-214-A2-A	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	R10
6	Spent Fuel Pit Pmp A-A	480V SHDN BD 2A2-A	9D	0-MTR-78-12-A	100.0		113.8	647	200	0.80	160.0	4	7			M-12212-A	15	R0
4	Alt Fdr Reactor Vent Bd 2A-A	480V SHDN BD 2A2-A	10A	2-MCC-232-A-A	*		210.0		300	0.70	210.0	6		8	0.18	M-12212-A	III-8	R10
4	BUS TIE FDR,BKR	480V SHDN BD 2A2-A	12D	BUS TIE	1333.0		1600.0		51N									

Preparer MTN Date 4/13/92
Check EJJ Date 4/13/92
Rev 18

LVSG\LVSGSET * AMPACITY OF ALTERNATE FEEDERS IS LIMITED DUE TO CABLE OR BOARD LOADING

GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	CALC CH	REV
4	480V SHUTDOWN BOARD 2B1-B	480V SHDN BD 2B1-B																	
4	Fdr From Xfmr 2B1-B	480V SHDN BD 2B1-B	1B	2-OXF-212-B1-B	2000.0		2405.0		51N										
2A	Aux Bldg Gen Sply Fan 2B	480V SHDN BD 2B1-B	2B	2-MTR-30-105	100.0	1.15	120.0	626	200	0.90	180.0	4	7			M-10448-A	1	N	R0
7	Reciprocating Charging Pmp	480V SHDN BD 2B1-B	3B	2-MTR-62-101	200.0	1.15	221.0	1578	400	0.80	320.0	4	9			U2		N	R0
1	COMPONENT COOL SYS PUMP 2B-B	480V SHDN BD 2B1-B	3C	2-MTR-70-33-B	350.0	1.15	389.0	2084	600	0.95	570.0	4	8			M-08663-A	2	N	R0
4	FDR FROM XFMR 2B-B	480V SHDN BD 2B1-B	4B	2-OXF-212-B-B	2000.0		2405.0		51N										
2A	Elec Bd Rm AHU D-B	480V SHDN BD 2B1-B	7A	0-MTR-31-31D-B	50.0	1.15	62.5	360	100	0.90	90.0	6	8			M-10448-A	6	N	R0
6	Spent Fuel Plt Pmp C-S ALT FDR	480V SHDN BD 2B1-B	7B	0-MTR-78-35-S	100.0	1.15	115.0	647	200	0.80	160.0	4	7			M-12212-A	15	N	R0
7	CRD Mech Clr Fan 2B-B Mtr 1	480V SHDN BD 2B1-B	7C	2-MTR-30-92/1-B	75.0	1.15	97.0	413	150	0.95	142.5	4	6			U2		N	R0
7	Reac Lwr Compt Clr Fan 2B-B	480V SHDN BD 2B1-B	7D	2-MTR-30-75-B	40.0	1.15	54.0	307	100	0.80	80.0	4	7			U2		N	R0
4	FDR REAC MOV BD 2B1-B,(NOR)	480V SHDN BD 2B1-B	8B	2-MCC-213-B1-B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
4	FDR DSL AUX BD 2B1-B,(NOR)	480V SHDN BD 2B1-B		2-MCC-215-B1-B	300.0		360.0		600	0.75	450.0	6		4	0.18	M-12212-A	III-2	Y	R10
4	Alt Fdr C&A Bldg Vent Bd 2B2-B	480V SHDN BD 2B1-B	9A	2-MCC-214-B2-B	*		350.0		600	0.60	360.0	8		6	0.18	M-12212-A	III-7	Y	R10
4	NOR Fdr Reac Vent Bd 2B-B	480V SHDN BD 2B1-B	9B	2-MCC-232-B-B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
4	ALT FDR CHANNEL III	480V SHDN BD 2B1-B	10A		200.0		240.0		400	0.85	340.0	6		8	0.18	M-12212-A	III-1	Y	R10
4	ALT FDR 125V VIT BTRY CHGR III	480V SHDN BD 2B1-B	10AA	0-CHGR-236-3-F	25.6		53.0		N/A								III-1		
4	ALT FDR 120VAC VITAL INV 1-III	480V SHDN BD 2B1-B	10AB	1-INV-235-3-F	0.0		42.0		N/A								III-1		
4	ALT FDR 120VAC VITAL INV 2-III	480V SHDN BD 2B1-B	10AC	2-INV-235-3-F	0.0		42.0		N/A								III-1		
4	ALT FDR INST PWR DIST PANEL 2A	480V SHDN BD 2B1-B	10AD	2-DXF-237-A	0.0		104.2		N/A								III-1		
4	Nor Fdr C&A Bldg Vent Bd 2B1-B	480V SHDN BD 2B1-B	10B	2-MCC-214-B1-B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
7	CRD MECH CIR FAN 2B-B MTR 2	480V SHDN BD 2B1-B	10D	2-MTR-30-92/2	75.0		97.0		150	0.95	142.5	4	6			U2		N	R0

GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	CALC CH	REV
4	480V SHUTDOWN BOARD 2B2-B	480V SHDN BD 2B2-B																	
4	Fdr From Xfmr 2B2-B	480V SHDN BD 2B2-B	1B	1-OXF-212-B2-B	2000.0		2405.0		51N										
2A	Elec Bd Rm A/C B-B Cprsr	480V SHDN BD 2B2-B	2B	0MTR-31-129/2-B	250.0	1.15	275.0	1825	600	0.70	420.0	4	7			M-10448-A	7	N	R0
1	COMPONENT COOL SYS PUMP C-S	480V SHDN BD 2B2-B	2D	0-MTR-70-51-S	350.0	1.15	389.0	2084	600	0.95	570.0	4	8			M-08663-A	2	N	R0
7	UNIT 2 REAC BLDG CRANE	480V SHDN BD 2B2-B	3B	2-CRN-271-R1	152.2		228.8		300	1.00	570.0	4	6			U2		N	R0
6	Emer Fdr 480V Aux Bldg Com Bd	480V SHDN BD 2B2-B	3D	0-BD-206-A	0.0		0.0		300	1.00	300.0	20		6	0.18	M-12212-A		Y	R10
4	Fdr From Xfmr 2B-B	480V SHDN BD 2B2-B	4B	1-OXF-212-B-B	2000.0		2405.0		51N										
4	Station Fire Pmp 2B-B	480V SHDN BD 2B2-B	4D	2-MTR-26-11-B	200.0		230.0	1400	600	1.25	750.0	4	6			M-12212-A	14	Y	R0
2A	Aux Bldg Gen Exhaust Fan 2B	480V SHDN BD 2B2-B	7A	2-MTR-30-278	125.0	1.00	147.0	850	300	0.65	195.0	4	7			M-10448-A	12	Y	
7	CRD Mech Clr Fan 2D-B Mtr 1	480V SHDN BD 2B2-B	7B	2-MTR-30-80/1-B	75.0	1.15	83.0	307	100	0.80	80.0	4	7			U2		N	R0
2A	Fuel Handling Exhaust Fan B	480V SHDN BD 2B2-B	7C	0-MTR-30-139	100.0	1.15	120.0	624	200	0.90	180.0	4	7			M-10448-A	1	N	R0
7	Reac Lwr Compt Clr Fan 2D-B	480V SHDN BD 2B2-B	7D	2-MTR-30-78-B	40.0		54.0	307	100	0.80	80.0	4	7			U2		N	R0
4	FDR REAC MOV BD 2B2-B, (NOR)	480V SHDN BD 2B2-B	8B	2-MCC-213-B2-B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
4	Dsl Aux Bd 2B2(Nor)&2B1(Alt)-B	480V SHDN BD 2B2-B		2-MCC-215-B2-B	300.0		360.0		600	0.75	450.0	6		4	0.18	M-12212-A	III-2	Y	R10
4	Alt Fdr Reactor Vent Bd 2B-B	480V SHDN BD 2B2-B	9A	2-MCC-232-B-B	*		210.0		300	0.70	210.0	6		8	0.18	M-12212-A	III-8	Y	R10
4	Alt Fdr C&A Bldg Vent Bd 2B1-B	480V SHDN BD 2B2-B	9B	2-MCC-214-B1-B	*		600.0		600	1.00	600.0	8		6	0.18	M-12212-A	III-7	Y	R10
7	Cntmt Air Rtn Fan 2B-B	480V SHDN BD 2B2-B	9C	2-MTR-30-39-B	100.0	1.00	115.0	1002	200	0.75	150.0	10		11		U2		N	R0
2A	480V Shutdown Bd Rm AHU D-B	480V SHDN BD 2B2-B	9D	0-MTR-31-61-B	75.0	1.15	92.0	592	150	0.90	135.0	8	9			M-10448-A	9	N	R0
4	NOR FDR CHANNEL IV	480V SHDN BD 2B2-B	10A		200.0		240.0		400	0.85	340.0	6		8	0.18	M-12212-A	III-1	Y	R10
4	NOR FDR 125V VTL BTRY CHGR IV	480V SHDN BD 2B2-B	10AA	0-CHGR-236-4-G	25.6		53.0		N/A								III-1		
4	NOR FDR 120VAC VITAL INV 1-IV	480V SHDN BD 2B2-B	10AB	1-INV-235-4-G	0.0		42.0		N/A								III-1		
4	NOR FDR 120VAC VITAL INV 2-IV	480V SHDN BD 2B2-B	10AC	2-INV-235-4-G	0.0		42.0		N/A								III-1		
4	NOR FDR INST PWR DIST PANEL 2B	480V SHDN BD 2B2-B	10AD	1-OXF-237-B	0.0		104.2		N/A								III-1		
4	Nor Fdr C&A Bldg Vent Bd 2B2-B	480V SHDN BD 2B2-B	10B	2-MCC-214-B2-B	500.0		600.0		600	1.10	660.0	6		6	0.18	M-12212-A	III-3	Y	R10
7	CRD Mech Clr Fan 2D-B Mtr 2	480V SHDN BD 2B2-B	10C	2-MTR-30-80/2-B	75.0	1.15	97.0	826	150	0.95	142.5	4	6			U2		N	R0

GP	ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	HP	SF	FLI	LRA	SEN-SOR	LONG TIME set.	I (PU)	LONG TIME sec	INST set.	SHORT TIME set.	SHORT TIME sec	DCN	CURVE NO.	CALC CH	REV
4	480V DSL AUX SUPPLY BD C-S	480V BOARD C-S		0-BD-215-C-S															
4	DSL SUPPLY BREAKER	480V BOARD C-S	A	52-DSB					225	1.10	247.5	8		6	0.32	M-12212-A	III-6	Y	R10
4	BUS TIE BREAKER	480V BOARD C-S	C	52-TB					225	0.80	180.0	3		4	3.17	M-12212-A	III-6	Y	R10
4	NORMAL SUPPLY BREAKER	480V BOARD C-S	B	52-NSB					225	1.10	247.5	8		6	0.32	M-12212-A	III-6	Y	R10

GROUP 4 C & A VENT BOARD 1A1-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	Y	2A	Cont Bldg Emerg Air CU Fan A-A	203	C&A VENT BD 1A1-A	2A	2	0-MTR-31-8-A	10.00	12.20	110.0		T43	EF3-L050	210	2	M-10448-A	Y	R10
Y	Y	2A	5th Vlt Batt Rm Intk Fan 1A1-A	203	C&A VENT BD 1A1-A	2B	1	0-MTR-31-493A-A	1.50	2.50	15.0	1.00	T28	EF3-A010	36	2	M-10448-A	N	
Y	Y	2A	PEN RM EL 692 CLR FAN 1A-A	203	C&A VENT BD 1A1-A	2C	1	1-MTR-30-186-A	3.00	4.00	25.0	1.00	T32	EF3-A010	58	4	M-10448-A	N	
N	Y	4	Pri Makeup Wtr Pmp 1A	203	C&A VENT BD 1A1-A	2D	3	1-MTR-81-3	30.00	36.10	236.8	1.15	T52	EF3-A050	475	3	M-12212-A	N	
N	N	6	Safety Inject Sys Ht Tr Xfmr A	203	C&A VENT BD 1A1-A	2F1		0DXF-234-A1/SIS	9.00	10.83				EF3-B020				N	
N	R	6	RDM, Smplg, & Fire Prot (1 Ph)	203	C&A VENT BD 1A1-A	2F2		1-DXF-242-1	37.50	78.20				FXD63B125	1200	5	M-	Y	R10
Y	N	2A	Cntm Spray Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	3C	1	1-MTR-30-177-A	7.50	9.00	62.0	1.00	T40	EF3-A025Z	125	3	M-10448-A	N	
N	N	6	Cond Vac Pmp Air Exh Mon	203	C&A VENT BD 1A1-A	3F1		1-RE-90-119	0.75	1.40	12.5			EF3-B020				N	
N	N	6	VLV AND STR RM SUMP A PMP 1A	203	C&A VENT BD 1A1-A	3F2		1-MTR-40-3A	1.50	2.65	20.0			EF3-B020				N	
Y	Y	2A	Btry Rm El 692 Exh Fan A-A	203	C&A VENT BD 1A1-A	4A	1	0-MTR-31-28-A	1.00	2.20	19.5		T27	EF3-A010	45	3	M-10448-A	N	
Y	R	2A	5TH VITL BATT.RM.EX. FAN 1B1-A	203	C&A VENT BD 1A1-A	4B	1	0-MTR-31-493B-A	1.50	2.50	14.5	1.00	T28	EF3 A005	29	4	M-10448-A	N	
N	N	2A	Emerg Gas Trtmt Sys Fan A-A	203	C&A VENT BD 1A1-A	4D	2	0-MTR-65-23-A	20.00	25.00	132.0	1.00	T50	EF3 L050	260	3		N	
Y	Y	1	ERCW Str 1A-A Backwash Vlv	203	C&A VENT BD 1A1-A	4E	1	1-FCV-67-9A-A	0.33	0.75	5.7		T14	20 EF3-A003	12	3	M-08663-A	Y	
Y	N	2A	SFP Pmp A-A&TB Bst Pm SpClrFan	203	C&A VENT BD 1A1-A	5A	1	0-MTR-30-192-A	7.50	9.00	62.0	1.00	T40	EF3-A025Z	125	3	M-10448-A	N	
N	N	6	AUX DIST PNL FDR XFMR	203	C&A VENT BD 1A1-A	5B			1.50	3.13				EF3-B020				N	
N	N	2A	CCS & AFW PMPS SP CLR FAN A-A	203	C&A VENT BD 1A1-A	5E	2	1-MTR-30-190-A	20.00	24.50	139.9	1.00	T50	EF3-L050	260	3		N	
N	N	6	Serv Bldg Vt Mon	203	C&A VENT BD 1A1-A	5F1		0-RE-90-132	3.00	4.60	32.0			EF3-B020				N	
N	N	2A	Shutdown Bd Rm A Press Fan A-A	203	C&A VENT BD 1A1-A	6A	1	0-MTR-31-64-A	3.00	4.60	28.0	1.00	T34	EF3-A010	58	4		N	
N	N	1	ERCW STRAINER 1A-A	203	C&A VENT BD 1A1-A	6B	1	1-MTR-67-9A-A	3.00	6.00	30.1	1.00	T36	EF3-A010	58	4		N	
Y	Y	1	Traveling Scrn 1A-A	203	C&A VENT BD 1A1-A	6C	1	1-MTR-67-434-A	5.00	6.80	41.1	1.15	T38	EF3-A025Z	105	2	M-08663-A	N	
N	N	2A	EG Trtmt Sys A-A Humidity Htrs	203	C&A VENT BD 1A1-A	6D	2	0-HTR-65-17-A	20.00	24.06			T50	EF3-B030				N	
Y	Y	1	ERCW Str 1A-A Flush Vlv	203	C&A VENT BD 1A1-A	6E	1	1-FCV-67-9B-A	0.33	0.75	5.7		T14	20 EF3-A003	12	3	M-08663-A	Y	
N	N	6	Cntmt Bldg Lwr Compt Air Mon	203	C&A VENT BD 1A1-A	6F1		1-RE-90-106-A	3.00	4.60	32.0			EF3-B020				N	
N	R	2A	125V Vtl Bat Rm I ExhFan 1A1-A	203	C&A VENT BD 1A1-A	7B	1	1-MTR-31-287-A	0.50	1.10	5.1		T20	EF3-A003	10	2	M-10448-A	N	
N	Y	4	High Press Fire Pmp Str A-A	203	C&A VENT BD 1A1-A	7C	1	0-MTR-26-7-A	0.75	2.05	8.5	1.00	T26	EF3-A005	18	2	M-12212-A	N	
N	Y	2A	Safety Inj Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	8A	1	1-MTR-30-180-A	5.00	6.10	45.0	1.00	T37	EF3-A025Z	105	2	M-10448-A	N	
Y	Y	2A	Pen Rm El 737 Clr Fan 1A-A	203	C&A VENT BD 1A1-A	8B	1	1-MTR-30-194-A	3.00	4.00	25.3	1.00	T32	EF3-A010	58	4	M-10448-A	N	
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A2-A	203	C&A VENT BD 1A1-A	8C	1	1-MTR-30-244G-A	3.00	4.70	28.8		T34	EF3-A010	58	4		N	
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A3-A	203	C&A VENT BD 1A1-A	8D	1	1-MTR-30-244H-A	3.00	4.70	28.8		T34	EF3-A010	58	4		N	
N	R	2A	Cont Rm A/C Sys Oil Pmp	203	C&A VENT BD 1A1-A	8F1		0-MTR-31-80/3-A	3.11	3.90	31.0			EF3-B020			M-10448-A	N	
N	Y	2A	RHR Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	9A	1	1-MTR-30-175-A	5.00	6.10	45.0	1.00	T37	EF3-A025Z	105	2	M-10448-A	N	
Y	N	2A	Cont Rm A/C Circ Pmp A-A	203	C&A VENT BD 1A1-A	9B	2	0-MTR-31-80/1-A	15.00	20.00	118.4	1.15	T49	EF3-L050	260	3	M-10448-A	N	
N	N	2A	480V Bd Rm 1A Pr Sup Fan 1A1-A	203	C&A VENT BD 1A1-A	9C	1	1-MTR-31-462-A	3.00	4.60	28.0	1.00	T34	EF3-A010	58	4		N	
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A1-A	203	C&A VENT BD 1A1-A	9D	1	1-MTR-30-244F-A	3.00	4.70	28.8		T34	EF3-A010	58	4		N	
Y	R	6	Perm Hydrogen Mitigation Sys	203	C&A VENT BD 1A1-A	9E	2	1-DXF-268-1-A	35.75	43.00			T56	EF3-B070			M-	Y	R10
N	N	6	Cont Rm Intake Mon	203	C&A VENT BD 1A1-A	9F1		0-RE-90-205-A	0.75	1.40	12.5			EF3-B020				N	
N	Y	2A	Cntfg Chrg Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	10A	1	1-MTR-30-183-A	5.00	6.10	45.0	1.00	T37	EF3-A025Z	105	2	M-10448-A	N	
Y	Y	2A	PEN RM EL 713 CLR FAN 1A-A	203	C&A VENT BD 1A1-A	10B	1	1-MTR-30-196-A	3.00	4.00	26.0	1.00	T32	EF3-A010	58	4	M-10448-A	N	
Y	Y	2A	Pipe Chase Clr Fan 1A-A	203	C&A VENT BD 1A1-A	10C	1	1-MTR-30-201-A	3.00	4.00	25.2	1.00	T32	EF3-A010	58	4	M-10448-A	N	
N	N	6	Aux Bldg Vent Mon	203	C&A VENT BD 1A1-A	10F1		0-RE-90-101	3.00	4.60	32.0			EF3-B020				N	
N	N	2A	480V BD RM 1B PR SUP FAN 1B1-A	203	C&A VENT BD 1A1-A	11A	1	1-MTR-31-478-A	3.00	4.60	28.0	1.00	T34	EF3-A010	58	4		N	
Y	N	2A	480V Bd Rm 1A A/C Ahu 1A-A	203	C&A VENT BD 1A1-A	11C	1	1-MTR-31-461-A	10.00	12.00	78.9	1.15	T44	EF3-A025Z	170	4	M-10448-A	N	
Y	Y	2A	Cont Rm Ahu A-A	203	C&A VENT BD 1A1-A	11D	4	0-MTR-31-12-A	60.00	72.00	413.0	1.15	T59	EF3-A100	930	4	M-10448-A	N	
N	R	2A	125V Vtl Bat Rm II ExFan 1B1-A	203	C&A VENT BD 1A1-A	12A	1	1-MTR-31-285-A	0.50	1.10	5.1		T20	EF3-A003	10	2	M-10448-A	N	
Y	Y	2A	Cont Bldg Emerg Press Fan A-A	203	C&A VENT BD 1A1-A	12B	1	0-MTR-31-6-A	1.00	1.70	15.0	1.00	T25	EF3-A005	29	4	M-10448-A	Y	R10
N	N	2A	480V Bd Rm 1A A/C Cond 1A-A	203	C&A VENT BD 1A1-A	12C	2	1-MTR-31-290-A	15.00	21.00	111.0	1.15	T49	EF3-L050	260	3		N	
N	Y	2A	Cont Bldg Press Fan A-A	203	C&A VENT BD 1A1-A	12D	1	0-MTR-31-1-A	2.00	3.65	27.0	1.00	T31	EF3-A010	58	4	M-10448-A	N	
N	N	6	Gasseous Efl Radn Mon	203	C&A VENT BD 1A1-A	12E1		1-PNL-90-L398	5.00	7.25	46.0			EF3-B020				N	

GROUP 4 C & A VENT BOARD 1A1-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	6	Cntmt Purge Air Radn Exh Mon	203	C&A VENT BD 1A1-A	12F1		1-RE-90-130-A	0.75	1.40	12.5			EF3-B020				N	
N	N	6	Aux Chgrg Pmp 1A	203	C&A VENT BD 1A1-A	13A	1	1-MTR-84-16	1.00	1.80	12.5	1.00	T25	EF3-A005	29	4		N	
N	N	6	Aux Chgrg Bstr Pmp	203	C&A VENT BD 1A1-A	13B	1	0-MTR-84-6	1.00	1.80	11.3	1.15	T25	EF3-A005	22	3		N	
Y	Y	2A	Cntmt Annulus Vac Fan 1A	203	C&A VENT BD 1A1-A	13C	1	1-MTR-65-77	5.00	7.25	46.0		T38	EF3-A025Z	105	2	M-10448-A	N	
N	Y	1	ERCW Scrn Wash Pmp 1A-A	203	C&A VENT BD 1A1-A	13D	1	1-MTR-67-431-A	40.00	49.80	315.8	1.00	T54	EF3-A100	630	2	M-08663-A	N	
				203	C&A VENT BD 1A1-A			TOTALS		585.77	2679.2								

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GROUP 4 C & A VENT BOARD 1A2-A WBN-EEB-T108-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	R	2A	Hot Instr Shop Bstr Pmp	204	C&A VENT BD 1A2-A	2A	1	0-MTR-31-339	0.75	1.20	12.5		T20	EF3-A005	29	4	M-10448-A	N	
N	N	2A	480V Bd Rm 1A Unit Htrs El 772	204	C&A VENT BD 1A2-A	2D1		1 HTR-30-A1A	10.00	12.30				EF3-B020				N	
N	N	4	Aux Bldg 480V Rcpts	204	C&A VENT BD 1A2-A	2D2		0-P0-214-1 To 4	0.00	0.00				EF3-B100				N	
N	N	2A	480V BD RM 1A UNIT HTR EL 772	204	C&A VENT BD 1A2-A	2E1		1-HTR-30-B1A	10.00	12.30				EF3-B020				N	
N	N	2A	5TH VITAL BATT. RM. DUCT HTR.A	204	C&A VENT BD 1A2-A	2E2		0-HTR-31-493	32.00	38.50				EF3-B050%				N	
N	N	4	Aux Bldg 480V Rcpts	204	C&A VENT BD 1A2-A	2F2		0-P0-214-7,8	0.00	0.00				EF3-B100				N	
Y	Y	2A	North Main St Vlt Exh Fan	204	C&A VENT BD 1A2-A	3A	1	1-MTR-30-25	3.00	4.60	32.0		T34	EF3-A010	58	4	M-10448-A	Y	
N	N	2A	CONT ROD DR EQPT RM UNIT HTR A	204	C&A VENT BD 1A2-A	3D1		1-HTR-30-ACRD	10.00	12.30				EF3-B020				N	
N	N	4	Aux Bldg 480V Rcpts	204	C&A VENT BD 1A2-A	3D2		0-P0-214-5,6	0.00	0.00				EF3-B100				N	
N	N	2A	480V Bd Rm 1A Unit Htrs El 772	204	C&A VENT BD 1A2-A	3E1		1-HTR-30-C1A	7.50	9.03				EF3-B020				N	
N	N	2A	480V Bd Rm 1A Duct Htr	204	C&A VENT BD 1A2-A	3E2		1-HTR-31-D1A	30.00	36.09				EF3-B050%				N	
N	N	2A	Toilet And Locker Rm Duct Htr	204	C&A VENT BD 1A2-A	3F1		0-HTR-31-97	10.00	12.03				EF3-B020				N	
N	N	2A	480V SD B.Rm 1A Unit Htr El757	204	C&A VENT BD 1A2-A	3F2		1-HTR-30-1A1	3.00	3.70				EF3-B020				N	
N	Y	2A	Smplg Rm Hood Exh Fan 1A	204	C&A VENT BD 1A2-A	4A	1	1-MTR-30-283	1.00	1.70	15.0		T24	EF3-A005	29	4	M-10448-A	N	
Y	N	2A	Smoke Removal Fan	204	C&A VENT BD 1A2-A	4B	1	0MTR-31-203/204	7.50	9.70	63.5	1.00	T41	EF3-A025%	125	3	M-10448-A	N	
N	N	2A	CONT ROD DR EQPT RM UNIT HTR B	204	C&A VENT BD 1A2-A	4E1		1-HTR-30-BCRD	10.00	12.30				EF3-B020				N	
N	N	2A	CONT ROD DR EQPT RM UNIT HTR C	204	C&A VENT BD 1A2-A	4F1		1-HTR-30-CCRD	10.00	12.30				EF3-B020				N	
N	Y	2A	N. Main St Vlt Backup Exh Fan	204	C&A VENT BD 1A2-A	5A	1	1-MTR-30-301	3.00	4.60	32.0		T34	EF3-A010	58	4	M-10448-A	Y	
N	N	2A	Cont Bldg El 692 Fl Sply Htr	204	C&A VENT BD 1A2-A	5E1		0-HTR-31-83	20.00	24.06				EF3-B030				N	
N	N	2A	Xfmr Rm 1A Unit Htr El 772	204	C&A VENT BD 1A2-A	5F1		1-HTR-30-XM1A	10.00	12.30				EF3-B020				N	
N	N	2A	Aux Bldg Sp Htr El 692	204	C&A VENT BD 1A2-A	5F2		1-HTR-30-AB1	5.00	6.10				EF3-B020				N	
N	N	2A	South Main St Vlt Rm Unit Htr	204	C&A VENT BD 1A2-A	6E1		1-HTR-30-SMS	20.00	24.06				EF3-B030				N	
N	N	2A	N. Main St Vlt Rm Unit Htr 1	204	C&A VENT BD 1A2-A	6E2		1-HTR-30-NM1	30.00	36.10				EF3-B050				N	
N	N	2A	125V VT BAT RM 1 U HTR	204	C&A VENT BD 1A2-A	6F2		0-HTR-30-RM1	5.00	6.10				EF3-B020				N	
N	N	2A	Fuel Hdl Area Unit Htr A El757	204	C&A VENT BD 1A2-A	7D2		0-HTR-30-AFH	25.00	30.10				EF3-B040				N	
N	N	2A	Aux Cont Instr Rm 1A Unit Htr	204	C&A VENT BD 1A2-A	7E1		1-HTR-30-U1A	3.00	3.70				EF3-B020				N	
N	N	2A	FUEL HDL AREA UNIT HTR B EL757	204	C&A VENT BD 1A2-A	7E2		0-HTR-30-BFH	25.00	30.10				EF3-B040				N	
N	N	2A	Fuel Hdl Area Unit Htr A El757	204	C&A VENT BD 1A2-A	7F2		0-HTR-30-CFH	25.00	30.10				EF3-B040				N	
N	R	2A	Cont Rod Dr Eqpt Rm A/C 1A	204	C&A VENT BD 1A2-A	8A		1-HTR-30-CRD	47.50	78.40	378.5			FXD63B125	800	LO	M-10448-A	Y	R10
N	R	6	Cont Bldg St Gen	204	C&A VENT BD 1A2-A	8B		1-HTR-1-CBS	75.00	90.22				FXD63B125	800	LO	M-	Y	R10
				204	C&A VENT BD 1A2-A			TOTALS		553.99	533.5								

GROUP 4 C & A VENT BOARD 1B1-B WBN-EEB-T108-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	N	2A	Cont Bldg Em Air Clnup Fan B-B	205	C&A VENT BD 1B1-B	2A	0	MTR-31-7-B	10.00	12.20	110.0	1.00	T43		EF3-A025Z	210	HI	M-10448-A	Y	R10
Y	Y	2A	Pen Rm El 713 Clr Fan 1B-B	205	C&A VENT BD 1B1-B	2C	1	MTR-30-197-B	3.00	4.00	26.0	1.00	T32		EF3-A010	58	4	M-10448-A	N	
N	Y	4	Pri Makeup Wtr Pmp 1B	205	C&A VENT BD 1B1-B	2D	1	MTR-81-7	30.00	36.00	236.8	1.15	T52		EF3-H050	475	3	M-12212-A	N	
N	N	6	Safety Inject Sys Ht Tr Xfmr B	205	C&A VENT BD 1B1-B	2F1		0DXF-234 B1/S18	9.00	10.83					EF3-B020				N	
N	N	6	VLV & STRAIN RM SUMP B PUMP 1B	205	C&A VENT BD 1B1-B	2F2		1 MTR-40-66A	1.50	2.65	20.0				EF3-B020				N	
Y	Y	2A	Shdn Bd Rm Chlr CW Clr Pmp B-B	205	C&A VENT BD 1B1-B	3A	0	MTR-31-49/1-B	25.00	31.00	197.4	1.15	T53		EF3-L050	470	HI	M-10448-A	N	
Y	Y	2A	Pipe Chase Clr Fan 1B-B	205	C&A VENT BD 1B1-B	3B	1	MTR-30-202-B	3.00	4.00	25.2	1.00	T32		EF3-A010	58	4	M-10448-A	N	
Y	N	2A	Cntm Spray Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	3C	1	MTR-30-178-B	7.50	9.00	62.0	1.00	T40		EF3-A025Z	125	3	M-10448-A	N	
N	N	6	Cntmt Bldg Upper Compt Air Mon	205	C&A VENT BD 1B1-B	3F1		1 RE-90-112-B	3.00	4.60	32.0				EF3-B020				N	
Y	Y	2A	Battery Rm El 692 Exh Fan B-B	205	C&A VENT BD 1B1-B	4A	1	0-MTR-31-29-B	1.00	2.20	19.5		T27		EF3-A010	36	2	M-10448-A	N	
N	N	2A	Emerg Gas Trtmt Sys Fan B-B	205	C&A VENT BD 1B1-B	4D	2	0-MTR-65-42-B	20.00	25.00	132.0	1.00	T50		EF3-L050	260	3		N	
Y	Y	1	ERCW Str 1B-B Backwash Vlv	205	C&A VENT BD 1B1-B	4E	1	1-FCV-67-10A-B	0.33	0.75	5.7		T14	20	EF3-A003	12	3	M-08663-A	Y	
N	N	6	CNTMT PURGE AIR EXH MON	205	C&A VENT BD 1B1-B	4F1		1-RE-90-131-B	0.75	1.40	12.5				EF3-B020				N	
Y	N	2A	SFP PmpB-B&TB Bst Pmp SpClrFan	205	C&A VENT BD 1B1-B	5A	1	0-MTR-30-193-B	7.50	9.00	62.0	1.00	T40		EF3-A025Z	125	3	M-10448-A	N	
N	N	6	AUX DIST PNL FDR XFMR	205	C&A VENT BD 1B1-B	5B			1.50	3.13					EF3-B020				N	
N	N	2A	CCS & AFW Pumps Sp Clr Fan B-B	205	C&A VENT BD 1B1-B	5E	2	1-MTR-30-191-B	20.00	24.50	139.9	1.00	T50		EF3-L050	330	4		N	
Y	N	2A	SHUTDOWN BD RM A PRESS FAN C-B	205	C&A VENT BD 1B1-B	6A	1	0-MTR-31-67-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4	M-10448-A	N	
N	N	1	ERCW STRAINER 1B-B	205	C&A VENT BD 1B1-B	6B	1	1-MTR-67-10B-B	3.00	6.00	30.1	1.00	T36		EF3-A010	58	4		N	
Y	N	1	Traveling Scrn 1B-B	205	C&A VENT BD 1B1-B	6C	1	1-MTR-67-445-B	5.00	6.80	41.1	1.15	T38		EF3-A025	105	2	M-08663-A	N	
N	R	2A	EG Trtmt Sys B-B Humidity Htrs	205	C&A VENT BD 1B1-B	6D	2	0-MTR-65-37-B	20.00	24.06			T50		EF3-B040			M-10448-A	N	
Y	Y	1	ERCW Str 1B-B Flush Vlv	205	C&A VENT BD 1B1-B	6E	1	1-FCV-67-10B-B	0.33	0.75	5.7		T14	20	EF3-A003	12	3	M-08663-A	Y	
Y	N	2A	5th Vtl Batt Rm Intk Fan 1A2-B	205	C&A VENT BD 1B1-B	7A	1	0-MTR-31-496A-B	1.50	2.50	14.5	1.00	T28		EF3-A005	29	4	M-10448-A	Y	
N	R	2A	125V Vtl Bat Rm I Ex Fan 1A2-B	205	C&A VENT BD 1B1-B	7B	1	1-MTR-31-288-B	0.50	1.10	5.1		T20		EF3-A003	10	2	M-10448-A	N	
N	Y	4	High Press Fire Pmp Str B-B	205	C&A VENT BD 1B1-B	7C	1	0-MTR-26-14-B	0.75	2.05	8.5	1.00	T26		EF3-A005	18	2	M-12212-A	N	
N	Y	2A	Safety Inj Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	8A	1	1-MTR-30-179-B	5.00	6.10	50.1	1.00	T37		EF3-A025Z	105	2	M-10448-A	N	
Y	Y	2A	Pen Rm El 692 Clr Fan 1B-B	205	C&A VENT BD 1B1-B	8B	1	1-MTR-30-187-B	3.00	4.00	25.0	1.00	T32		EF3-A010	58	4	M-10448-A	N	
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B2-B	205	C&A VENT BD 1B1-B	8C	1	1 MTR-30-248F-B	3.00	4.70	28.8		T34		EF3-A010	58	4		N	
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B3-B	205	C&A VENT BD 1B1-B	8D	1	1-MTR-30-248G-B	3.00	4.70	28.8		T34		EF3-A010	58	4		N	
N	N	2A	Cont Rm A/C Clr Pmp B-B	205	C&A VENT BD 1B1-B	8E	0	MTR-31-96/1-B	15.00	20.00	118.4	1.15	T49		EF3-L050	260	3		N	
N	N	2A	Cont Rm A/C Sys Oil Pmp	205	C&A VENT BD 1B1-B	8F1		0 MTR-31-96/3-B	3.00	4.60	32.0				EF3-B020				N	
N	Y	2A	RHR Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	9A	1	1-MTR-30-176-B	5.00	6.10	45.0	1.00	T37		EF3-A025Z	105	2	M-10448-A	N	
Y	R	2A	5th Vltl Batt Rm Exh Fan 1B2-B	205	C&A VENT BD 1B1-B	9B	1	0-MTR-31-496B-B	1.50	2.50	14.5	1.00	T28		EF3-A005	29	4	M-10448-A	N	
N	N	2A	480V Bd Rm 1A Pr Sup Fan 1A2-B	205	C&A VENT BD 1B1-B	9C	1	1-MTR-31-463-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4		N	
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B1-B	205	C&A VENT BD 1B1-B	9D	1	1 MTR-30-248E-B	3.00	4.70	28.8		T34		EF3-A010	58	4		N	
Y	Y	2A	Pen Rm El 737 Clr Fan 1B-B	205	C&A VENT BD 1B1-B	9E	1	1-MTR-30-195-B	3.00	4.00	25.3	1.00	T32		EF3-A010	58	4	M-10448-A	N	
N	N	6	Unit Cont Ann Sys Xfmr	205	C&A VENT BD 1B1-B	9F1		1-XFMR-290-236	6.95	8.36					EF3-B020				N	
N	Y	2A	Cntfg Chrg Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	10A	1	1-MTR-30-182-B	5.00	6.10	45.0	1.00	T37		EF3-A025Z	105	2	M 0448-A	N	
N	N	2A	480V Bd Rm 1B Pr Sup Fan 1B2-B	205	C&A VENT BD 1B1-B	10B	1	1-MTR-31-477-B	3.00	4.60	28.0	1.00	T34		EF3-A010	58	4		N	
N	N	2A	125V VTL BAT RM II EXFAN 1B2-B	205	C&A VENT BD 1B1-B	10C	1	1-MTR-31-286-B	0.50	1.10	5.1		T20		EF3-A003	10	2		N	
N	N	6	Cont Rm Intake Mon	205	C&A VENT BD 1B1-B	10F1		0-RE-90-206-B	0.75	1.40	12.5				EF3-B020				N	
Y	Y	2A	Cont Bldg Emerg Press Fan B-B	205	C&A VENT BD 1B1-B	11A	1	0-MTR-31-5-B	1.00	1.70	15.0	1.00	T25		EF3-A005	29	4	M-10448-A	Y	R10
N	N	2A	480V Bd Rm 1B A/C Ahu 1B-B	205	C&A VENT BD 1B1-B	11B	2	1-MTR-31-475-B	20.00	25.00	142.0	1.15	T51		EF3-H050	320	LO		N	
N	N	2A	480V Bd Rm 1B A/C Cond 1B-B	205	C&A VENT BD 1B1-B	11C	2	1-MTR-31-289-B	20.00	25.00	142.0	1.15	T51		EF3-H050	320	LO		N	
N	Y	2A	Cont Rm Ahu B-B	205	C&A VENT BD 1B1-B	11D	4	0-MTR-31-11-B	60.00	72.00	413.0		T58		EF3-A100	930	4	M-10448-A	Y	
N	Y	2A	Recip Chgrg Pmp Rm Clr Fan	205	C&A VENT BD 1B1-B	12A	1	1-MTR-30-181	3.00	4.30	26.7	1.15	T33		EF3-A010	58	4	M-10448-A	N	
Y	R	6	Perm Hydrogen Mitigation Sys	205	C&A VENT BD 1B1-B	12C	2	1-DXF-268-2-B	35.75	43.00			T56		EF3-B070			M-	Y	R1
Y	Y	2A	Cont Bldg Press Fan B-B	205	C&A VENT BD 1B1-B	12D	1	0-MTR-31-2-B	2.00	3.65	27.0	1.00	T31		EF3-A010	58	4	M-10448-A	N	
N	N	6	GASEOUS EFL RADN MON	205	C&A VENT BD 1B1-B	12E1		0-PNL-90-L397	5.00	7.10	44.5				EF3-B020				N	

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H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH REV
N	N	6	Cond Vac Pmp Air Exh Mon	205	C&A VENT BD 1B1-B	12F1		1-RE-90-99	0.75	1.40	12.5			EF3-B020				N
Y	Y	6	Aux Chgrg Pmp 1B	205	C&A VENT BD 1B1-B	13A	1	1-MTR-84-21	1.00	1.80	12.5	1.00	T25	EF3-A005	29	4	M-	N
Y	N	6	Aux Chgrg Bstr Pmp	205	C&A VENT BD 1B1-B	13B	1	0-MTR-84-11	1.00	1.80	11.3	1.15	T25	EF3-A005	22	3	M-	N
Y	Y	2A	Cntmt Annulus Vac Fan 1B	205	C&A VENT BD 1B1-B	13C	1	1-MTR-65-74	5.00	6.80	50.1	1.15	T38	EF3-A025Z	105	2	M-10448-A	N
N	N	1	ERCW SCREEN WASH PUMP 1B-B	205	C&A VENT BD 1B1-B	13D	3	1-MTR-67-440-B	40.00	49.80	315.8	1.00	T54	EF3-A100	630	2		N
N	N	6	CVC Sys Heat Trace Xfmr B4	205	C&A VENT BD 1B1-B	13F1		0DXF234-B4/CVCS	9.00	10.83				EF3-B020				N
N	N	2A	Shdn Bd Rm Chlr Pkg B-B O. Pmp	205	C&A VENT BD 1B1-B	13F2		0-MTR-31-49/3-B	2.00	4.18				EF3-B020				N
				205	C&A VENT BD 1B1-B			TOTALS		574.04	2941.6							

GROUP 4 C & A VENT BOARD 1B2-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	Y	2A	Toilet And Locker Rm Exh Fan	206	C&A VENT BD 1B2-B	2B	1	0-MTR-31-418	0.33	1.00	10.0	1.00	T18	EF3-A005	22	3	M-10448-A	N	
N	N	2A	480V BDRM 1B UNIT HTR A EL 772	206	C&A VENT BD 1B2-B	2E1		1-HTR-30-A1B	10.00	12.30				EF3-B020				N	
N	N	2A	Fuel Hdl Area Unit Htr G El757	206	C&A VENT BD 1B2-B	2E2		0-HTR-30-GFA	25.00	30.10				EF3-B040				N	
N	N	2A	480V Bd Rm 1B Unit Htrs El 772	206	C&A VENT BD 1B2-B	2F1		1-HTR-30-B1B	10.00	12.30				EF3-B020				N	
N	N	2A	480V Bd Rm 1B Duct Htr	206	C&A VENT BD 1B2-B	2F2		1-HTR-31-BRB	0.00	36.09				EF3-B050				N	
N	Y	2A	Smplg Rm Hood Exh Fan 1B	206	C&A VENT BD 1B2-B	3B	1	1-MTR-30-284	1.00	1.70	15.0		T24	EF3-A005	29	4	M-10448-A	N	
N	Y	2A	Smplg Rm Hood Exh Fan 1C	206	C&A VENT BD 1B2-B	3C	1	1-MTR-30-66	1.00	1.70	15.0		T24	EF3-A005	29	4	M-10448-A	N	
N	N	2A	480V BD RM 1B UNIT HT C EL 772	206	C&A VENT BD 1B2-B	3E1		1-HTR-30-C1B	10.00	12.30				EF3-B020				N	
N	N	2A	Fuel Hdl Area Unit Htr H El757	206	C&A VENT BD 1B2-B	3E2		0-HTR-30-HFA	25.00	30.10				EF3-B040				N	
N	N	2A	Przr Htr Xfmr Rm Unit Htr	206	C&A VENT BD 1B2-B	3F1		1-HTR-30-PRX	10.00	12.30				EF3-B020				N	
Y	Y	2A	South Main St Vlt Bkup Exh Fan	206	C&A VENT BD 1B2-B	4B	1	1-MTR-30-302	3.00	4.60	32.0		T33	EF3-A010	58	4	M-10448-A	Y	
N	N	2A	Shft Eng Inst Cal Chart Sto Rm	206	C&A VENT BD 1B2-B	4E1		0-HTR-31-95	5.00	6.02				EF3-B020				N	
N	N	2A	Fuel Hdl Area Unit Htr N El757	206	C&A VENT BD 1B2-B	4E2		0-HTR-30-NFA	25.00	30.08				EF3-B040				N	
N	N	2A	480V SD B.Rm 1B Unit Htr El757	206	C&A VENT BD 1B2-B	4F1		1-HTR-30-SBU	3.00	3.61				EF3-B020				N	
N	N	2A	Aux Cont Instr Rm 1B Unit Htr	206	C&A VENT BD 1B2-B	4F2		1-HTR-30-U113	3.00	3.70				EF3-B020				N	
N	N	2A	Aux Instr Rm Htr	206	C&A VENT BD 1B2-B	5E1		1-HTR-31-87	10.00	12.03				EF3-B020				N	
N	N	2A	125V Vital Btry Rm II Unit Htr	206	C&A VENT BD 1B2-B	5F1		0-HTR-30-RM2	5.00	6.10				EF3-B020				N	
Y	Y	2A	South Main St Vlt Exh Fan	206	C&A VENT BD 1B2-B	6B	1	1-MTR-30-26	3.00	4.60	32.0		T33	EF3-A010	58	4	M-10448-A	Y	
N	N	2A	Aux Bldg Sp Htr El 737	206	C&A VENT BD 1B2-B	6E1		1-HTR-30-AB7	5.00	7.00				EF3-B020				N	
N	N	2A	Xfmr Rm 1B Unit Htr El 772	206	C&A VENT BD 1B2-B	6F1		1-HTR-30-T1B	10.00	12.30				EF3-B020				N	
N	R	2A	Cont Bldg Fresh Air Htr	206	C&A VENT BD 1B2-B	7D		0-HTR-31-421	144.00	173.22				FXD63B225	1500	3		Y	R10
N	N	2A	Shtdn Bd Rm Prs Fans Duct Htr	206	C&A VENT BD 1B2-B	7E2		0-HTR-31-72	20.00	24.06				EF3-B030				N	
N	N	2A	N. Main St Vlt Rm Unit Htr 2	206	C&A VENT BD 1B2-B	7F1		1-HTR-30-NM2	30.00	36.09				EF3-B050Z				N	
N	R	2A	5th Vital Batt.Rm.Duct Htr.B	206	C&A VENT BD 1B2-B	8F1		0-HTR-31-494	32.00	38.50				EF3-B050			M-10448-A	N	
N	N	4	Aux & Cont Bldg 480V Rcpts	206	C&A VENT BD 1B2-B	8F2		1-PO-214-10to12	0.00	0.00				EF3-B100				N	
N	R	2A	Cont Rod Dr Eqpt Rm A/C 1B	206	C&A VENT BD 1B2-B	9A		1-MTR-30-CRB	47.50	78.40	378.5			FXD63B125	800	LO		Y	R10
				206	C&A VENT BD 1B2-B			TOTALS		590.2	482.5								

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	1	AUX CONT AIR COMPRESSOR A-A	207	C&A VENT BD 2A1-A	2A	2	0-MTR-32-60-A	20.00	26.00	157.9	1.15	T51	EF3-L050	330	4		N	
N	N	6	Safety Inject Sys Ht Tr Xfmr A	207	C&A VENT BD 2A1-A	2F1		0DXF-234-A2/SIS	9.00	10.84				EF3-A020				N	
N	R	6	RDM & Smplg & Fire Prot (1 PH)	207	C&A VENT BD 2A1-A	2F2		2-DXF-242-1	37.50	78.20				FXD6 B125	1200	5	M-	Y	R10
Y	Y	2A	Shdn Bd Rm Chlr CW Clr Pmp A-A	207	C&A VENT BD 2A1-A	3A	2	0-MTR-31-36/1-A	25.00	31.00	197.4	1.15	T53	EF3-L050	470	HI	M-10448-A	Y	
N	Y	2A	Aux Bldg Gas Trtmt Sys Fan A-A	207	C&A VENT BD 2A1-A	3D	3	2-MTR-30-146-A	50.00	62.00	304.0	1.00	T56	EF3-L100	630	2	M-10448-A	Y	
Y	Y	2A	EG Trtmt Sys A-A Rm Clr Fan	207	C&A VENT BD 2A1-A	4A	1	2-MTR-30-200-A	3.00	4.10	27.0	1.00	T32	EF3-A010	58	4	M-10448-A	N	
Y	Y	1	ERCW Str 2A-A Backwash Vlv	207	C&A VENT BD 2A1-A	4E	1	2-FCV-67-9A-A	0.33	0.75	5.8		T14	20 EF3-A003	12	3	M-08663-A	Y	
N	N	6	CVC Sys Ht Tr Xfmr A4	207	C&A VENT BD 2A1-A	4F2		0DXF234-A4/CVCS	9.00	10.84				EF3-B020				N	
N	N	2A	AFW & BA XFR SPACE CLR FAN A-A	207	C&A VENT BD 2A1-A	5E	2	2-MTR-30-184-A	15.00	20.20	105.2	1.00	T48	EF3-L050	210	2		N	
Y	N	2A	Shutdown Bd Rm B Press Fan B-A	207	C&A VENT BD 2A1-A	6A	1	0-MTR-31-62-A	3.00	4.60	28.0	1.00	T33	EF3-A010	58	4	M-10448-A	N	
N	N	1	ERCW STRAINER 2A-A	207	C&A VENT BD 2A1-A	6B	1	2-MTR-67-9A-A	3.00	6.00	30.1	1.00	T36	EF3-A010	58	4		N	
Y	Y	1	Traveling Scrn 2A-A	207	C&A VENT BD 2A1-A	6C	1	2-MTR-67-439-A	5.00	6.80	41.1	1.15	T38	EF3-A025	105	2	M-08663-A	N	
Y	Y	1	ERCW Str 2A-A Flush Vlv	207	C&A VENT BD 2A1-A	6E	1	2-FCV-67-9B-A	0.33	0.75	5.8		T14	20 EF3-A003	12	3	M-08663-A	Y	
N	N	2A	125V VIT BAT RM IV EXFAN 2A1-A	207	C&A VENT BD 2A1-A	7B	1	2-MTR-31-287-A	0.50	1.10	5.1		T20	EF3-A005	14	LO		N	
Y	Y	2A	Pen Rm El 737 Clr Fan 2A-A	207	C&A VENT BD 2A1-A	8B	1	2-MTR-30-194-A	3.00	4.00	25.5	1.00	T32	EF3-A010	58	4	M-10448-A	N	
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A2-A	207	C&A VENT BD 2A1-A	8C	1	2-MTR-30-250F-A	3.00	4.70	28.8		T34	EF3-A010	58	4		N	
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A3-A	207	C&A VENT BD 2A1-A	8D	1	2-MTR-30-250G-A	3.00	4.70	28.8		T34	EF3-A010	58	4		N	
N	R	2A	Elec Bd Rm A/C Sys Oil Pmp	207	C&A VENT BD 2A1-A	8F1		0MTR-31-128/5-A	3.11	3.90				EF3-B020			M-10448-A	Y	
Y	Y	2A	C.Bldg Ele BdRm AC Clr Pmp A-A	207	C&A VENT BD 2A1-A	9B	2	0MTR-31-128/1-A	20.00	25.00	157.9	1.15	T51	EF3-L050	330	4	M-10448-A	N	
N	N	2A	480V Bd Rm 2A Pr Sup Fan 2A1-A	207	C&A VENT BD 2A1-A	9C	1	2-MTR-31-462-A	3.00	4.60	28.0	1.00	T34	EF3-A010	58	4		N	
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A1-A	207	C&A VENT BD 2A1-A	9D	1	2-MTR-30-250E-A	3.00	4.70	28.8		T34	EF3-A010	58	4		N	
N	N	6	Cont Rm Intake Mon	207	C&A VENT BD 2A1-A	9F1		0-RE-90-125-A	0.75	1.40	12.5			EF3-B020				N	
Y	N	2A	ABGTS HUM HTR A-A	207	C&A VENT BD 2A1-A	10D	3	0-MTR-30-147-A	50.00	60.15			T56	EF3-B100			M-10448-A	Y	
N	N	2A	480V Bd Rm 2B Pr Sup Fan 2B1-A	207	C&A VENT BD 2A1-A	11A	1	2-MTR-31-478-A	3.00	4.60	28.0	1.00	T34	EF3-A010	58	4		N	
Y	Y	2A	480V Bd Rm 2A A/C Ahu 2A-A	207	C&A VENT BD 2A1-A	11C	1	2-MTR-31-461-A	10.00	12.00	78.9	1.15	T44	EF3-A025Z	170	4	M-10448-A	N	
N	R	2A	125V VitBatRm III Ex Fan 2B1-A	207	C&A VENT BD 2A1-A	12A	1	2-MTR-31-285-A	0.50	1.10	5.1		T20	EF3-A003	10	2	M-10448-A	N	
N	N	2A	480V Bd Rm 2A A/C Cond 2A-A	207	C&A VENT BD 2A1-A	12C	2	2-MTR-31-290-A	15.00	21.00	111.0	1.15	T49	EF3-L050	260	3		N	
N	N	6	GASEOUS EFL RADN MON	207	C&A VENT BD 2A1-A	12E1		2-PNL-90-L398	5.00	7.25	46.0			EF3-B020Z				N	
N	Y	1	ERCW SCREEN WASH PUMP 2A-A	207	C&A VENT BD 2A1-A	13D	3	2-MTR-67-437-A	40.00	49.80	315.8	1.00	T54	EF3-A100	630	2	M-08663-A	N	
N	N	2A	Shtdn BdRm Chlr Pkg A-A OilPmp	207	C&A VENT BD 2A1-A	13F1		0-MTR-31-36/3-A	2.00	4.17				EF3-B020				N	
				207	C&A VENT BD 2A1-A			TOTALS		476.25	1802.4								

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GROUP 4 C & A VENT BOARD 2A2-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	IRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	2A	480V SD RM 2A UNIT HT A EL 772	208	C&A VENT BD 2A2-A	2D1		2-HTR-30-A1A	10.00	12.30				EF3-B020				N	
N	N	2A	480V BD RM 2A UNIT HT B EL 772	208	C&A VENT BD 2A2-A	2E1		2-HTR-30-B1A	5.00	6.10				EF3-B020				N	
N	N	2A	480V BD RM 2A UNIT HT C EL 772	208	C&A VENT BD 2A2-A	3E1		2-HTR-30-C1A	7.50	9.03				EF3-B020				N	
N	N	2A	480V Bd Rm 2A Duct Htr	208	C&A VENT BD 2A2-A	3E2		2-HTR-31-D1A	30.00	36.09				EF3-B050				N	
N	N	2A	Record Stor Vlt Unit Htr	208	C&A VENT BD 2A2-A	3F1		0-HTR-31-91	10.00	12.03				EF3-B020				N	
N	N	2A	480V SD B.Rm 2A Unit Htr El757	208	C&A VENT BD 2A2-A	3F2		2-HTR-30-1A1	3.00	3.70				EF3-B020				N	
N	Y	2A	Smplg Rm Hood Exh Fan 2A	208	C&A VENT BD 2A2-A	4A	1	2-HTR-30-67	1.50	2.65	20.0		T29	EF3-A005	41	HI	M-10448-A	N	
N	N	2A	Shtdn Bd Rm Prs Fans Duct Htr	208	C&A VENT BD 2A2-A	5E1		0-HTR-31-71	20.00	24.06				EF3-B030				N	
N	N	2A	Xfmr Rm 2A Unit Htr El 772	208	C&A VENT BD 2A2-A	5F1		2-HTR-30-XM1A	10.00	12.03				EF3-B020				N	
N	N	2A	Aux Bldg Sp Htr El 692	208	C&A VENT BD 2A2-A	5F2		2-HTR-30-AB1	5.00	7.00				EF3-B020				N	
N	N	2A	Aux Bldg Sp Htr El 737	208	C&A VENT BD 2A2-A	6D1		0-HTR-30-AB1	5.00	7.00				EF3-B020				N	
N	N	2A	Hot Instr Shop Unit Htr	208	C&A VENT BD 2A2-A	6F1		0-HTR-31-339	5.00	6.10				EF3-B020				N	
N	N	2A	125V VtlBatRm III U. Htr El772	208	C&A VENT BD 2A2-A	6F2		0-HTR-30-RM3	5.00	6.10				EF3-B020				N	
N	N	2A	Aux Bldg Sp Htr El 737	208	C&A VENT BD 2A2-A	7D1		0-HTR-30-AB2	10.00	13.00				EF3-B020				N	
N	N	2A	Fuel Hdl Area Unit Htr D El757	208	C&A VENT BD 2A2-A	7D2		0-HTR-30-DFH	25.00	30.00				EF3-B040				N	
N	N	2A	Aux Cont Instr Rm 2A Unit Htr	208	C&A VENT BD 2A2-A	7E1		2-HTR-30-U1A	3.00	3.70				EF3-B020				N	
N	N	2A	Fuel Hdl Area Unit Htr E El757	208	C&A VENT BD 2A2-A	7E2		0-HTR-30-EFH	25.00	30.00				EF3-B040				N	
N	N	2A	Fuel Hdl Area Unit Htr F El757	208	C&A VENT BD 2A2-A	7F2		0-HTR-30-FFH	25.00	30.00				EF3-B040				N	
N	R	6	Cont Rod Dr Eqpt Rm A/C 2A	208	C&A VENT BD 2A2-A	8A		2-HTR-30-CRA	47.50	78.40	378.5			FXD63B125	800	LO	M-	Y	R10
N	R	6	Cont Bldg St Gen	208	C&A VENT BD 2A2-A	8B		2-HTR-1-CBS	75.00	90.22				FXD63B125	800	LO	M-	Y	R10
				208	C&A VENT BD 2A2-A					419.51	398.5								

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GROUP 4 C & A VENT BOARD 2B1-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCM	CALC CH REV
N	N	1	AUX CONT AIR COMP B-B	209	C&A VENT BD 2B1-B	2A	2	0-MTR-32-86-B	20.00	27.00	157.9	1.15	T51	EF3-L050	330	4		N
N	Y	2A	Aux Bldg Gas Trtmt Sys Fan B-B	209	C&A VENT BD 2B1-B	3D	3	2-MTR-30-157-B	50.00	62.00	348.0	1.00	T56	EF3-A180	630	2	M-10448-A	N
		7	CNTMT BLDG UPPER COMPT AIR MON	209	C&A VENT BD 2B1-B	3F1		2-RE-90-112-B	3.00	4.60				EF3-B020				N
N	N	6	Safety Inj Sys Heat Tr Xfmr B2	209	C&A VENT BD 2B1-B	3F2		0DXF-234-B2/SIS	9.00	10.84				EF3-B020				N
Y	Y	2A	BATTERY RM EL 692 EXH FAN C-B	209	C&A VENT BD 2B1-B	4A	1	0-MTR-31-27-B	1.50	3.30	27.1		T30	EF3-A010	58	4	M-10448-A	N
Y	Y	1	ERCW Str 2B-B Backwash Vlv	209	C&A VENT BD 2B1-B	4E	1	2-FCV-67-10A-B	0.33	0.75	5.8		T14	20 EF3-A003	12	3	M-08663-A	Y
Y	Y	2A	AFWP&BA XFR PMP SP CLR FAN B-B	209	C&A VENT BD 2B1-B	5E	2	2-MTR-30-185-B	15.00	19.00	133.5	1.15	T49	EF3-L050	260	3	M-10448-A	N
Y	N	2A	Shtdn Bd Rm B Press Fan D-B	209	C&A VENT BD 2B1-B	6A	1	0-MTR-31-68-B	3.00	4.60	28.0	1.00	T34	EF3-A010	58	4	M-10448-A	N
N	N	1	ERCW STRAINER	209	C&A VENT BD 2B1-B	6B	1	2-MTR-67-10B-B	3.00	6.00	30.0	1.00	T36	EF3-A010	58	4		N
Y	Y	1	Traveling Scrn 2B-B	209	C&A VENT BD 2B1-B	6C	1	2-MTR-67-451-B	5.00	6.80	41.1	1.15	T38	EF3-A025	105	2	M-08663-A	Y
Y	Y	1	ERCW Str 2B-B Flush Vlv	209	C&A VENT BD 2B1-B	6E	1	2-FCV-67-10B-B	0.33	1.00	5.8		T14	20 EF3-A003	12	3	M-08663-A	Y
Y	Y	2A	125V Vlt Bat Rm IV ExFan 2A2-B	209	C&A VENT BD 2B1-B	7B	1	2-MTR-31-288-B	0.50	1.00	10.0		T18	EF3-A015	22	3	M-10448-A	N
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B2-B	209	C&A VENT BD 2B1-B	8C	1	2-MTR-30-246G-B	3.00	4.70	28.8		T34	EF3-A010	58	4		N
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B3-B	209	C&A VENT BD 2B1-B	8D	1	2-MTR-30-246H-B	3.00	4.70	28.8		T34	EF3-A010	58	4		N
Y	Y	2A	C.Bldg Ele BdRm AC Clr Pmp B-B	209	C&A VENT BD 2B1-B	8E	2	0MTR-31-129/1-B	20.00	25.00	157.9	1.15	T51	EF3-L050	330	4	M-10448-A	N
N	N	2A	Elec Bd Rm A/C Sys Oil Pmp	209	C&A VENT BD 2B1-B	8F1		0MTR-31-129/3-B	3.00	3.90				EF3-B020				N
N	N	2A	480V Bd Rm 2A Pr Sup Fan 2A2-B	209	C&A VENT BD 2B1-B	9C	1	2-MTR-31-463-B	3.00	4.60	28.0	1.00	T34	EF3-A010	58	4		N
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B1-B	209	C&A VENT BD 2B1-B	9D	1	2-MTR-30-246F-B	3.00	4.70	28.8		T34	EF3-A010	58	4		N
Y	N	2A	Pen Rm El 737 Clr Fan 2B-B	209	C&A VENT BD 2B1-B	9E	1	2-MTR-30-195-B	3.00	4.00	24.6	1.00	T32	EF3-A010	45	3	M-10448-A	N
N	N	6	UNIT CONT ANN. SYS XFMR	209	C&A VENT BD 2B1-B	9F1		2-XFMR-290-236	5.00	6.02				EF3-B020				N
N	N	2A	480V Bd Rm 2B Pr Sup Fan 2B2-B	209	C&A VENT BD 2B1-B	10B	1	2-MTR-31-477-B	3.00	4.60	28.0	1.00	T34	EF3-A010	58	4		N
Y	Y	2A	125V Vlt BatRm III ExFan 2B2-B	209	C&A VENT BD 2B1-B	10C	1	2-MTR-31-286-B	0.50	1.00	10.0		T18	EF3-A003	21	HI	M-10448-A	N
Y	N	2A	ABGTS HUMIDITY HTR B-B	209	C&A VENT BD 2B1-B	10D	3	0-HTR-30-156-B	50.00	60.15			T56	EF3-B100			M-10448-A	N
N	N	6	Cont Rm Intake Mon	209	C&A VENT BD 2B1-B	10F1		0-RE-90-126-B	0.75	1.40	12.5			EF3-B020				N
N	Y	2A	480V Bd Rm 2B A/C Ahu 2B-B	209	C&A VENT BD 2B1-B	11B	2	2-MTR-31-475-B	20.00	25.00	142.0	1.15	T51	EF3-L050	330	4	M-10448-A	N
N	Y	2A	480V Bd Rm 2B A/C Cond 2B-B	209	C&A VENT BD 2B1-B	11C	2	2-MTR-31-289-B	20.00	25.00	142.0	1.15	T51	EF3-H050	320	LO	M-10448-A	N
Y	Y	2A	EG Trtmt Sys B-B Rm Clr Fan	209	C&A VENT BD 2B1-B	12B	1	2-MTR-30-207-B	3.00	4.10	27.0	1.00	T32	EF3-A010	58	4	M-10448-A	N
N	Y	1	ERCW Scrn Wash Pmp 2B-B	209	C&A VENT BD 2B1-B	13D	3	2-MTR-67-447-B	40.00	49.80	315.8	1.00	T54	EF3-A100	630	2	M-08663-A	N
				209	C&A VENT BD 2B1-B					375.56	1717.3							

GROUP 4 C & A VENT BOARD 2B2-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	Y	2A	ELEV MACH RM EXH FAN	210	C&A VENT BD 2B2-B	2B	1	0-MTR-30-27	1.50	2.65	20.0		T28	EF3-A005	41	HI	M-10448-A	N	
N	N	2A	480V BD RM 2B UNIT HT A EL 772	210	C&A VENT BD 2B2-B	2E1		2-HTR-30-A1B	10.00	12.30				EF3-B030				N	
N	N	2A	Fuel Hdl Area Unit Htr K El757	210	C&A VENT BD 2B2-B	2E2		0-HTR-30-KFA	25.00	30.10				EF3-B040				N	
N	N	2A	480V BD RM 2B UNIT HT B EL 772	210	C&A VENT BD 2B2-B	2F1		2-HTR-30-B1B	10.00	12.30				EF3-B070				N	
N	N	2A	480V Bd Rm 2B Duct Htr	210	C&A VENT BD 2B2-B	2F2		2-HTR-31-BRB	30.00	36.09				EF3-B050				N	
Y	Y	7	Smplg Rm Hood Exh Fan 2B	210	C&A VENT BD 2B2-B	3B	1	2-MTR-30-285	1.50	3.00	16.9	1.15	T30	EF3-A005	41	HI		N	
N	N	2A	480V BD RM 2B UNIT HT C EL 772	210	C&A VENT BD 2B2-B	3E1		2-HTR-30-C1B	10.00	12.30				EF3-B020				N	
N	N	2A	Fuel Hdl Area Unit Htr L El757	210	C&A VENT BD 2B2-B	3E2		0-HTR-30-LFA	25.00	30.08				EF3-B040				N	
N	N	7	Presszr Htr Xfmr Rm Unit Htr	210	C&A VENT BD 2B2-B	3F1		2-HTR-30-PRX	10.00	12.30				EF3-B020				N	
N	N	2A	Rly Rm Elec Htr	210	C&A VENT BD 2B2-B	3F2		0-HTR-31-93	25.00	30.08				EF3-B040				N	
Y	Y	7	South Main St Vlt Bkup Exh Fan	210	C&A VENT BD 2B2-B	4B	1	2-MTR-30-302	3.00	4.60	12.0		T33	EF3-A010	58	4		Y	
N	N	2A	Computer Room Heater	210	C&A VENT BD 2B2-B	4E1		0-HTR-31-85	10.00	12.03				EF3-B070				N	
N	N	2A	Fuel Hdl Area Unit Htr P El757	210	C&A VENT BD 2B2-B	4E2		0-HTR-30-PFA	25.00	30.10				EF3-B040				N	
N	N	2A	480V SD B.Rm 2B Unit Htr El757	210	C&A VENT BD 2B2-B	4F1		2-HTR-30-SBU	3.00	3.70				EF3-B020				N	
N	N	2A	Aux Cont Instr Rm 2B Unit Htr	210	C&A VENT BD 2B2-B	4F2		2-HTR-30-U113	3.00	3.70				EF3-B020				N	
N	N	2A	Aux Instr Rm Htr	210	C&A VENT BD 2B2-B	5E1		2-HTR-31-89	10.00	12.03				EF3-B020				N	
N	N	2A	125V VTL BATRM IV UT HTR	210	C&A VENT BD 2B2-B	5F1		0-HTR-30-RM4	5.00	6.10				EF3-B020				N	
N	N	2A	Aux Cont Rm Unit Htr	210	C&A VENT BD 2B2-B	5F2		0-HTR-30-U1	3.00	3.70				EF3-B020				N	
N	Y	7	South Main St Vlt Exh Fan	210	C&A VENT BD 2B2-B	6B	1	2-MTR-30-26	3.00	4.60	12.0		T33	EF3-A010	58	4		Y	
N	N	2A	Aux Bldg Sp Htr El 737	210	C&A VENT BD 2B2-B	6E1		2-HTR-30-AB7	5.00	7.00				EF3-B020				N	
N	N	2A	Xfmr Rm 2B Unit Htr El 772	210	C&A VENT BD 2B2-B	6F1		2-HTR-30-T1B	10.00	12.30				EF3-B020				N	
N	N	2A	Kit Elec Htr	210	C&A VENT BD 2B2-B	7E1		0-HTR-31-99	5.00	6.02				EF3-B020				N	
N	N	7	N. Main St Vlt Rm Unit Htr 2	210	C&A VENT BD 2B2-B	7F1		2-HTR-30-NM2	30.00	36.09				EF3-B050				N	
N	N	2A	Aux Bldg Sp Htr El 713	210	C&A VENT BD 2B2-B	8E2		0-HTR-30-A14	5.00	7.00				EF3-B020				N	
N	N	4	Aux & Cont Bldg 480V Rcpts	210	C&A VENT BD 2B2-B	8F2		2-PO-214-10to12	0.00	0.00				EF3-B100				N	
N	R	6	Cont Rod Dr Eqpt Rm A/C 2B	210	C&A VENT BD 2B2-B	9A		2-MTR-30-CRB	47.50	78.40	378.5			FXD63B125	800	LO	M-	Y	R10
N	N	7	Tb in Rly Bds & DPO Eng's Shop	210	C&A VENT BD 2B2-B	9D		2-TB-214-15,16	1.50	1.81				EF3-B020				N	
				210	C&A VENT BD 2B2-B			TOTALS		410.38	479.42								

GROUP 4 DSL AUX BOARD 1A1-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH REV
Y	Y	2A	Dg 1A-A Btry Hood Exh Fan	217	DSL AUX BD 1A1-A	2A	1	1-MTR-30-455-A	0.33	1.00	10.0		T19	EF3-A015	22	3	M-10448-A	N
Y	Y	2A	DG 1A-A RM EXH FAN 1-A	217	DSL AUX BD 1A1-A	2B	2	1-MTR-30-447-A	15.00	19.50	118.4	1.15	T49	EF3-L050	260	3	M-10448-A	N
N	N	4	Dg 1A-A Water Htr 1	217	DSL AUX BD 1A1-A	2C		1-HTR-82-A1-A	15.00	18.05				EF3-B030				N
Y	Y	4	Dg 1A-A Lube Oil Circ Pmp 1	217	DSL AUX BD 1A1-A	2D	1	1-MTR-82-A1-A	1.00	1.95	8.3	1.15	T26	EF3-A005	18	2	M-12212-A	N
N	N	4	Dg 1A-A Btry Chgr Alt Fdr	217	DSL AUX BD 1A1-A	2F1		1-CHGR-215-A-A	4.16	5.00				EF3-B020				N
Y	N	1	EM DG HX 1A1 & 1A2 SPLY VLV	217	DSL AUX BD 1A1-A	3A	1	1-FCV-67-66-A	0.12	0.39	2.6		T8	90 EF3-A003	7	LO	M-08663-A	Y
Y	N	4	Dg 1A-A Day Tk FO Xfr Pmp 1-A	217	DSL AUX BD 1A1-A	3D	1	1-MTR-18-55-A	1.00	1.85	11.3	1.15	T26	EF3-A003	21	HI	M-12212-A	N
N	N	4	DG 1A-A AUX LUBEOIL CIRC PMP A	217	DSL AUX BD 1A1-A	4B	1	1-MTR-82-AOPA-A	0.75	1.50	8.5	1.00	T23	EF3-A003	16	4		N
N	Y	2A	Dg Rm 1A-A Pnl Vent Fan	217	DSL AUX BD 1A1-A	4D	2	1-MTR-30-491-A	15.00	20.00	118.4	1.00	T48	EF3-L050	260	3	M-10448-A	N
Y	Y	2A	Dg 1A-A 480V Elec Bd Rm Ex Fan	217	DSL AUX BD 1A1-A	4E	1	1-MTR-30-459-A	2.00	2.70	22.6	1.00	T29	EF3-A010	45	3	M-10448-A	N
N	N	4	DG BLDG LTG CAB 45 XFMR	217	DSL AUX BD 1A1-A	4F1		1-DXF-215-A-A	45.00	54.14				EF3-B100				N
Y	Y	4	Dg 1A-A Air Cprsr 2	217	DSL AUX BD 1A1-A	5A	1	1-MTR-82-181	5.00	7.10	44.5	1.15	T39	EF3-A015	105	2	M-12212-A	N
N	N	2A	El 742 Corridor Elec Htr 1A	217	DSL AUX BD 1A1-A	5F1		0-HTR-30-479	7.50	9.03				EF3-B020				N
N	N	4	Power Outlets	217	DSL AUX BD 1A1-A	5F2		1-PO-215-1,2,3	0.00	0.00				EF3-B100				N
Y	Y	2A	Dg 1A-A Muffler Rm Exh Fan	217	DSL AUX BD 1A1-A	6A	1	1-MTR-30-463	1.50	2.65	20.0		T28	EF3-A005	41	HI	M-10448-A	N
N	N	2A	Lube Oil Storage Rm Htr	217	DSL AUX BD 1A1-A	6F1		0-HTR-30-483	10.00	12.30				EF3-B020				N
				217	DSL AUX BD 1A1-A			TOTALS		157.16	364.48							

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GROUP 4 DSL AUX BOARD 1A2-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCM	CALC CH	REV
N	N	4	DG 1A-A AUX LUBEOIL CIRC PMP B	218	DSL AUX BD 1A2-A	2A	1	1-MTR-82-AOPB-A	0.75	1.50	8.5	1.00	T23	EP3-A003	16	4		N	
Y	Y	2A	DG 1A-A RM EXH FAN 2-A	218	DSL AUX BD 1A2-A	2B	2	1-MTR-30-451-A	15.00	19.50	118.4	1.15	T49	EP3-L050	260	3	M-10448-A	N	
N	N	4	Dg 1A-A Water Htr 2	218	DSL AUX BD 1A2-A	2C		1-HTR-82-A2-A	15.00	18.05				EP3-B030				N	
N	Y	4	Dg 1A-A Lube Oil Circ Pmp 2	218	DSL AUX BD 1A2-A	2D	1	1-MTR-82-A2-A	1.00	1.70	15.0		T24	EP3-A005	29	4	M-12212-A	N	
N	N	2A	Co2 Stor Rm Elec Htr	218	DSL AUX BD 1A2-A	2E2		0-HTR-30-484	25.00	30.10				EP3-B040				N	
N	N	4	DG 1A-A BTRY CHGR NOR FDR	218	DSL AUX BD 1A2-A	2F1		1-CHGR-215-A-A	4.16	5.00				EP3-B020				N	
Y	N	1	EMDG ENG 1A1 & 1A2 SUP VLV	218	DSL AUX BD 1A2-A	3A	1	1-FCV-67-68-A	0.13	0.39	2.6		T8	90 EP3-A003	7	LO	M-08663-A	Y	
Y	N	4	Dg 1A-A Day Tnk FO Xfr Pmp 2-A	218	DSL AUX BD 1A2-A	3D	1	1-MTR-18-54-A	1.00	1.85	11.3	1.15	T26	EP3-A003	21	HI	M-12212-A	N	
N	N	2A	Dg 1A-A 480V Ele Bd Rm Ele Htr	218	DSL AUX BD 1A2-A	3E1		1-HTR-30-487	7.50	9.30				EP3-B020				N	
N	N	2A	Dg 1A-A Rm Htr A	218	DSL AUX BD 1A2-A	3F1		1-HTR-30-471	15.00	18.05				EP3-B030				N	
N	N	2A	Dg 1A-A Rm Htr B	218	DSL AUX BD 1A2-A	3F2		1-HTR-30-472	15.00	18.05				EP3-B030				N	
Y	Y	4	DG 1A-A AIR CPRSR 1	218	DSL AUX BD 1A2-A	5A	1	1-MTR-82-180	5.00	7.10	44.5	1.15	T39	EP3-A0[illegible]5Z	105	2	M-12212-A	N	
N	N	2A	Fallout Shelter Elec Htr	218	DSL AUX BD 1A2-A	5E1		0-HTR-30-485	15.00	18.60				EP3-B030				N	
N	N	6	Dg Bldg Co2 Refrigeration Unit	218	DSL AUX BD 1A2-A	5F1		0-PKG-39-37	2.00	3.10	26.0			EP3-B020				N	
Y	N	2A	Lube Oil & Co2 Stor Rm Exh Fan	218	DSL AUX BD 1A2-A	6A	1	0-MTR-30-470	0.75	1.40	12.5		T22	EP3-A005	29	4	M-10448-A	N	
N	N	4	Dsl Gen 1A-A Space Htr	218	DSL AUX BD 1A2-A	6D		1-HTR-82-100	4.50	5.42				EP3-B020				N	
				218	DSL AUX BD 1A2-A			TOTALS		159.11	237.73								

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GROUP 4 DSL AUX BOARD 1B1-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH REV
Y	Y	2A	Dg 1B-B Battery Hood Exh Fan	219	DSL AUX BD 1B1-B	2A	1	1-MTR-30-457-B	0.33	1.00	10.0		T18	EF3-A005	22	3	M-10448-A	N
Y	Y	2A	DG 1B-B RM EXH FAN 1-B	219	DSL AUX BD 1B1-B	2B	2	1-MTR-30-449-B	15.00	19.50	118.4	1.15	T49	EF3-L050	260	3	M-10448-A	N
N	N	4	DG 1B-B Water Heater 1	219	DSL AUX BD 1B1-B	2C		1-HTR-82-B1-B	15.00	18.05				EF3-B030				N
Y	N	4	Dg 1B-B Lube Oil Circ Pmp 1	219	DSL AUX BD 1B1-B	2D	1	1-MTR-82-B1-B	1.00	2.05	11.3	1.00	T26	EF3-A085	22	3	M-12212-A	N
N	N	4	Dg 1B-B Btry Chgr Alt Fdr	219	DSL AUX BD 1B1-B	2F1		1-CHGR-215-B-B	4.16	5.00				EF3-B020				N
Y	N	1	EM DG ENG HX SUP VLV FM HDR 1B	219	DSL AUX BD 1B1-B	3A	1	1-FCV-67-67-B	0.12	0.39	2.6		T8	90 EF3-A003	7	LO	M-08663-A	Y
Y	N	4	Dg 1B-B Day Tnk FO Xfr Pmp 1-B	219	DSL AUX BD 1B1-B	3D	1	1-MTR-18-55-B	1.00	1.85	11.3	1.15	T26	EF3-A005	22	3	M-12212-A	N
N	N	4	Dg 1B-B Aux LubeOil Circ Pmp A	219	DSL AUX BD 1B1-B	4B	1	1-MTR-82-AOPA-B	0.75	1.50	8.5	1.00	T23	EF3-A003	16	4		N
N	Y	2A	Dg Rm 1B-B Pnl Vent Fan	219	DSL AUX BD 1B1-B	4D	2	1-MTR-30-493-B	15.00	20.00	118.4	1.00	T48	EF3-L050	260	3	M-10448-A	N
Y	Y	2A	DG 1B-B 480V ELEC BD RM EX FAN	219	DSL AUX BD 1B1-B	4E	1	1-MTR-30-461-B	2.00	2.75	22.6	1.00	T29	EF3-A010	45	3	M-10448-A	N
N	N	4	DG BLDG LTG CAB 47 XFMR	219	DSL AUX BD 1B1-B	4F1		1-DXF-215-B-B	45.00	54.14				EF3-B100				N
Y	Y	4	Dg 1B-B Air Cprsr 2	219	DSL AUX BD 1B1-B	5A	1	1-MTR-82-211	5.00	7.10	44.5	1.15	T39	EF3-A0[illegible]52	105	2	M-12212-A	N
N	N	2A	El 742 Corridor Elec Htr 1B	219	DSL AUX BD 1B1-B	5F1		0-HTR-30-481	7.50	9.30				EF3-B020				N
Y	Y	2A	Dg 1B-B Muffler Rm Exh Fan	219	DSL AUX BD 1B1-B	6A	1	1-MTR-30-465	1.50	2.65	20.0		T28	EF3-A005	41	HI	M-10448-A	N
				219	DSL AUX BD 1B1-B			TOTALS		145.28	367.52							

GROUP 4 DSL AUX BOARD 1B2-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	MODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH REV
N	N	4	Dg 1B-B Aux LubeOil Circ Pmp B	220	DSL AUX BD 1B2-B	2A	1	1-MTR-82-AOPB-B	0.75	1.50	8.5		T23	EF3-A065	18	2		N
Y	Y	2A	Dg 1B-B Rm Exh Fan 2-B	220	DSL AUX BD 1B2-B	2B	2	1-MTR-30-453-B	15.00	19.50	118.4	1.15	T49	EF3-L058	260	3	M-10448-A	N
N	N	4	DG 1B-B WATER HEATER 2	220	DSL AUX BD 1B2-B	2C		1-HTR-82-B2-B	15.00	18.05				EF3-B030				N
Y	N	4	Dg 1B-B Lube Oil Circ Pmp 2	220	DSL AUX BD 1B2-B	2D	1	1-MTR-82-B2-B	1.00	2.05	11.3	1.00	T26	EF3-A005	22	3	M-12212-A	N
N	N	4	DG 1B-B BTRY CHGR NOR FDR	220	DSL AUX BD 1B2-B	2F1		1-CHGR-215-B-B	4.16	5.00				EF3-B020				N
Y	N	1	Emer Dg Hx Sup Vlv From Hdr 2A	220	DSL AUX BD 1B2-B	3A	1	1-FCV-67-65-B	0.13	0.39	2.6		T8	90 EF3-A003	7	LO	M-08663-A	Y
Y	N	4	Dg 1B-B Day Tnk FO Xfr Pmp 2-B	220	DSL AUX BD 1B2-B	3D	1	1-MTR-18-54-B	1.00	1.85	11.3	1.15	T26	EF3-A003	21	HI	M-12212-A	N
N	N	2A	Dg 1B-B 480V Ele Bd Rm Ele Htr	220	DSL AUX BD 1B2-B	3E1		1-HTR-30-489	7.50	9.30				EF3-B020				N
N	N	2A	Dg 1B-B Rm Htr A	220	DSL AUX BD 1B2-B	3F1		1-HTR-30-473	15.00	18.60				EF3-B030				N
N	N	2A	Dg 1B-B Rm Htr B	220	DSL AUX BD 1B2-B	3F2		1-HTR-30-474	15.00	18.05				EF3-B030				N
Y	Y	4	Dg 1B-B Air Cprsr 1	220	DSL AUX BD 1B2-B	5A	1	1-MTR-82-210	5.00	7.10	44.5	1.15	T39	EF3-A075Z	105	2	M-12212-A	N
N	N	4	Dg Rooms Power Outlets	220	DSL AUX BD 1B2-B	5F2		1-PO-215-4,5,6	0.00	0.00				EF3-B360				N
N	N	4	Dg 1B-B Sp Htr	220	DSL AUX BD 1B2-B	6D		1-HTR-82-200	4.50	5.42				EF3-B020				N
				220	DSL AUX BD 1B2-B			TOTALS		106.81	196.52							

GROUP 4 DSL AUX BOARD 2A1-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH REV
N	Y	2A	Dg 2A-A Btry Hood Exh Fan	221	DSL AUX BD 2A1-A	2A	1	2-MTR-30-456-A	0.33	2.20	9.3	1.15	T28	EF3-A005	18	2	M-10448-A	N
Y	Y	2A	DG 2A-A RM EXH FAN 1-A	221	DSL AUX BD 2A1-A	2B	2	2-MTR-30-448-A	15.00	19.50	118.4	1.15	T49	EF3-L050	260	3	M-10448-A	N
N	N	4	DG 2A-A WATER HEATER 1	221	DSL AUX BD 2A1-A	2C		2-HTR-82-A1-A	15.00	18.05				EF3-B039				N
N	Y	4	Dg 2A-A Lube Oil Circ Pmp 1	221	DSL AUX BD 2A1-A	2D	1	2-MTR-82-A1-A	1.00	1.70	15.0		T24	EF3-A005	29	4	M-12212-A	N
N	N	4	DG 2A-A BTRY CHGR ALT FDR	221	DSL AUX BD 2A1-A	2F1		2-CHGR-215-A-A	4.16	5.00				EF3-B020				N
Y	N	1	EM DG ENG HX 2A1 & 2A2 SUP VLV	221	DSL AUX BD 2A1-A	3A	1	2-FCV-67-66-A	0.13	0.39	2.6		T8	90 EF3-A003	7	LO	M-08663-A	Y
Y	N	4	Dg 2A-A Day Tnk FO Xfr Pmp 1-A	221	DSL AUX BD 2A1-A	3D	1	2-MTR-18-55-A	1.00	1.85	11.3	1.15	T26	EF3-A003	21	HI	M-12212-A	N
N	N	4	Dg 2A-A Aux LubeOil Circ Pmp A	221	DSL AUX BD 2A1-A	4B	1	2-MTR-82-AOPA-A	0.75	1.50	8.5	1.00	T23	EF3-A003	16	4		N
N	Y	2A	Dg Rm 2A-A Pnl Vent Fan	221	DSL AUX BD 2A1-A	4D	2	2-MTR-30-492-A	15.00	20.00	118.4	1.00	T48	EF3-L050	260	3	M-10448-A	N
Y	Y	2A	2A-A 480V ELEC BD RM EX FAN	221	DSL AUX BD 2A1-A	4E	1	2-MTR-30-460-A	2.00	2.70	22.6	1.00	T29	EF3-A0[illegible]	45	3	M-10448-A	N
N	N	4	DG BLDG LTG CAB 46 XFMR	221	DSL AUX BD 2A1-A	4F1		2-DXF-215-A-A	45.00	54.14				EF3-B160				N
Y	Y	4	Dg 2A-A Air Cprsr 2	221	DSL AUX BD 2A1-A	5A	1	2-MTR-82-241	5.00	7.10	44.5	1.15	T39	EF3-A025Z	105	2	M-12212-A	N
N	N	2A	El 742 Corridor Elec Htr 2A	221	DSL AUX BD 2A1-A	5F1		0-HTR-30-480	7.50	9.30				EF3-B020				N
N	N	4	POWER OUTLET	221	DSL AUX BD 2A1-A	5F2		2-PO-215-1THRU5	0.00	0.00				EF3-B100				N
Y	Y	2A	Dg 2A-A Muffler Rm Exh Fan	221	DSL AUX BD 2A1-A	6A	1	2-MTR-30-464	1.50	2.65	20.0		T28	EF3-A005	41	HI	M-10448-A	N
				221	DSL AUX BD 2A1-A			TOTALS		146.08	370.46							

GROUP 4 DSL AUX BOARD 2A2-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH REV
N	N	4	Dg 2A-A Aux LubeOil Circ Pmp B	222	DSL AUX BD 2A2-A	2A	1	2-MTR-82-AOPB-A	0.75	1.50	8.5	1.00	T23	EF3-A005	18	2		N
Y	Y	2A	DG 2A-A RM EXH FAN 2-A	222	DSL AUX BD 2A2-A	2B	2	2-MTR-30-452-A	15.00	19.50	118.4	1.15	T49	EF3-A050	260	3	M-10448-A	N
N	N	4	DG 2A-A WATER HEATER 2	222	DSL AUX BD 2A2-A	2C		2-HTR-82-A2-A	15.00	18.05				EF3-A030				N
Y	Y	4	Dg 2A-A Lube Oil Circ Pmp 2	222	DSL AUX BD 2A2-A	2D	1	2-MTR-82-A2-A	1.00	2.05	12.5	1.00	T26	EF3-A005	29	4	M-12212-A	N
N	N	4	DG 2A-A BTRY CHGR NOR FDR	222	DSL AUX BD 2A2-A	2F1		2-CHGR-215-A-A	4.16	5.00				EF3-B020				N
Y	N	1	EM DG ENG HX 2A1 & 2A2 SUP VLV	222	DSL AUX BD 2A2-A	3A	1	2-FCV-67-68-A	0.13	0.39	2.6		T8	90 EF3-A003	7	LO	M-08663-A	Y
Y	N	4	Dg 2A-A Day Tnk FO Xfr Pmp 2-A	222	DSL AUX BD 2A2-A	3D	1	2-MTR-18-54-A	1.00	1.85	11.3	1.15	T26	EF3-A003	21	HI	M-12712-A	N
N	N	2A	Dg 2A-A 480V Elec Bd Room Htr	222	DSL AUX BD 2A2-A	3E1		2-HTR-30-488	7.50	9.30				EF3-B020				N
N	N	2A	Dg 2A-A Rm Htr A	222	DSL AUX BD 2A2-A	3F1		2-HTR-30-475	15.00	18.30				EF3-B030				N
N	N	2A	Dg 2A-A Rm Htr A	222	DSL AUX BD 2A2-A	3F2		2-HTR-30-476	15.00	18.05				EF3-B030				N
N	Y	4	Dg 2A-A Air Cprsr 1	222	DSL AUX BD 2A2-A	5A	1	2-MTR-82-240	5.00	7.25	46.0		T38	EF3-A025Z	105	2	M-12212-A	N
N	N	4	Dg 2A-A Sp Htr	222	DSL AUX BD 2A2-A	6D		2-HTR-82-100	4.50	5.42				EF3-B020				N
				222	DSL AUX BD 2A2-A			TOTALS		106.66	199.27							

GROUP 4 DSL AUX BOARD 2B1-B WBN-EEB-T108-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	Y	2A	Dg 2B-B Btry Hood Exh Fan	223	DSL AUX BD 2B1-B	2A	1	2-MTR-30-458-B	0.33	1.00	10.0		T18	EF3-A005	22	3	M-10448-A	N	
Y	Y	2A	DG 2B-B RM EXH FAN 1B	223	DSL AUX BD 2B1-B	2B	2	2-MTR-30-450-B	15.00	19.50	118.4	1.15	T49	EF3-L050	260	3	M-10448-A	N	
N	N	4	DG 2B-B WATER HEATER 1	223	DSL AUX BD 2B1-B	2C		2-HTR-82-B1-B	15.00	18.05				EF3-B030				N	
Y	Y	4	Dg 2B-B Lube Oil Circ Pmp 1	223	DSL AUX BD 2B1-B	2D	1	2-MTR-82-B1-B	1.00	1.95	7.9	1.15	T26	EF3-A005	18	2	M-12212-A	N	
N	N	4	DG 2B-B BTRY CHGR ALT FDR	223	DSL AUX BD 2B1-B	2F1		2-CHGR-215-B-B	4.16	5.00				EF3-B020				N	
Y	N	1	EM DG ENG SUP VLV FROM HDR 1B	223	DSL AUX BD 2B1-B	3A	1	2-FCV-67-67-B	0.13	0.39	2.6		T8	90 EF3-A003	7	LO	M-08663-A	Y	
Y	Y	4	Dg 2B-B Day Tnk FO Xfr Pmp 1-B	223	DSL AUX BD 2B1-B	3D	1	2-MTR-18-55-B	1.00	1.85	11.3	1.15	T26	EF3-A003	21	HI	M-12212-A	N	
Y	N	4	Dg 2B-B Aux LubeOil Circ Pmp A	223	DSL AUX BD 2B1-B	4B	1	2-MTR-82-AOPA-B	0.75	1.15	8.5	1.00	T20	EF3-A003	16	4	M-12212-A	N	
N	Y	2A	Dg Rm 2B-B Pnl Vent Fan	223	DSL AUX BD 2B1-B	4D	2	2-MTR-30-494-B	15.00	20.00	118.4	1.00	T48	EF3-L050	260	3	M-10448-A	N	
Y	Y	2A	Dg 2B-B 480V Elec Bd Rm Ex Fan	223	DSL AUX BD 2B1-B	4E	1	2-MTR-30-462-B	2.00	2.70	22.6	1.00	T29	EF3-A010	45	3	M-10448-A	N	
N	N	4	DG LTG CAB 48 XFMR	223	DSL AUX BD 2B1-B	4F1		2-DXF-215-B-B	45.00	54.10				EF3-B100				N	
Y	Y	4	Dg 2B-B Air Cprsr 2	223	DSL AUX BD 2B1-B	5A	1	2-MTR-82-271	5.00	7.10	44.5	1.15	T39	EF3-A025Z	105	2	M-12212-A	N	
N	N	2A	El 742 Corridor Elec Htr 2B	223	DSL AUX BD 2B1-B	5F1		0-HTR-30-482	7.50	9.30				EF3-B020				N	
N	N	4	Power Outlets	223	DSL AUX BD 2B1-B	5F2		2-PO-215-5,6,7	0.00	0.00				EF3-B100				N	
Y	Y	2A	Dg 2B-B Muffler Rm Exh Fan	223	DSL AUX BD 2B1-B	6A	1	2-MTR-30-466	1.50	2.65	20.0		T29	EF3-A005	41	HI	M-10448-A	N	
				223	DSL AUX BD 2B1-B			TOTALS		144.74	264.09								

GROUP 4 DSL AUX BOARD 2B2-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	4	Dg 2B-B Aux LubeOil Circ Pmp B	224	DSL AUX BD 2B2-B	2A	1	2-MTR-82-AOPB-B	0.75	1.60	8.5	1.00	T24	EF3-A005	18	2		N	
Y	Y	2A	DG 2B-B RM EXH FAN 2-B	224	DSL AUX BD 2B2-B	2B	2	2-MTR-30-454-B	15.00	19.50	118.4	1.15	T49	EF3-A050	260	3	M-10448-A	N	
N	N	4	DG 2B-B WATER HEATER 2	224	DSL AUX BD 2B2-B	2C		2-HTR-82-B2-B	15.00	18.05				EF3-B030				N	
Y	N	4	Dg 2B-B Lube Oil Circ Pmp 2	224	DSL AUX BD 2B2-B	2D	1	2-MTR-82-B2-B	1.00	2.05	11.3	1.00	T26	EF3-A005	22	3	M-12212-A	N	
N	N	4	DG 2B-B BTRY CHGR NOR FDR	224	DSL AUX BD 2B2-B	2F1		2-CHGR-215-B-B	4.16	5.00				EF3-B020				N	
Y	N	1	EMDG ENG SUP VLV FROM HDR 2A	224	DSL AUX BD 2B2-B	3A	1	2-FCV-67-65-B	0.13	0.39	2.6		T8 90	EF3-A003	7	LO	M-08663-A	Y	
Y	N	4	Dg 2B-B Day Tnk FO Xfr Pmp 2-B	224	DSL AUX BD 2B2-B	3D	1	2-MTR-18-54-B	1.00	1.85	11.3	1.15	T26	EF3-A003	21	HI	M-12212-A	Y	R10
N	N	2A	Dg 2B-B 480V Elec Bd Rm Htr	224	DSL AUX BD 2B2-B	3E1		2-HTR-30-490	7.50	9.30				EF3-B020				N	
N	N	2A	Dg 2B-B Rm Htr A	224	DSL AUX BD 2B2-B	3F1		2-HTR-30-477	20.00	24.70				EF3-B030				N	
N	N	2A	Dg 2B-B Rm Htr B	224	DSL AUX BD 2B2-B	3F2		2-HTR-30-478	20.00	24.70				EF3-B030				N	
Y	N	4	Dg Bldg Fuel Oil Xfr Pmp	224	DSL AUX BD 2B2-B	4B	1	0-MTR-18-9B	7.50	11.00	63.5	1.00	T42	EF3-A025Z	125	3	M-12212-A	N	
Y	Y	4	Dg 2B-B Air Cprsr 1	224	DSL AUX BD 2B2-B	5A	1	2-MTR-82-270	5.00	7.25	44.5	1.15	T39	EF3-A025	105	2	M-12212-A	N	
N	N	4	Dg 2B-B Sp Htr	224	DSL AUX BD 2B2-B	6D		2-HTR-82-200	4.50	5.42				EF3-B020				N	
				224	DSL AUX BD 2B2-B			TOTALS		130.81	260.02								

GROUP 4 DSL AUX BOARD C1-S WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	N	2A	D.G RM EXH FAN 2	225	DSL AUX BD C1-S	BM	1	0-MTR-30-332-S	15.00	18.00	105.2	1.15	C228B	TRS25R			M-10448-A	N	
Y	N	2A	D.G. RM. EXH FAN 1	225	DSL AUX BD C1-S	BS	1	0-MTR-30-334-S	15.00	18.00	105.2	1.15	C228B	TRS25R			M-10448-A	N	
N	F	2A	480V AUX BD RM EXH FAN	225	DSL AUX BD C1-S	CA	1	0-MTR-30-331-S	1.50	1.95	13.4	1.15	C268A	TRS3R			M-10448-A	Y	
N	F	2A	6.9KV BD. RM	225	DSL AUX BD C1-S	CE	1	0-MTR-30-330-S	10.00	12.00	78.9	1.15	C16.3B	TRS2LR			M-10448-A	Y	
N	N	4	D.G. BAT CHGR	225	DSL AUX BD C1-S	CU		0-CHGR-215-C-S	10.80	13.00				A4J26				N	
Y	N	1	ERCW TO DSL GEN OC-S HTX VLV	225	DSL AUX BD C1-S	DA	1	2-FCV-67-73-S	0.13	0.60	2.6		C066 90	TRS1A			M-08663-A	N	
Y	N	1	ERCW TO DSL GEN OC-S HTX VLV	225	DSL AUX BD C1-S	DE	1	1-FCV-67-72-S	0.13	0.60	2.6		C066 90	TRS1A			M-08663-A	N	
N	N	4	D.G. DAY TANK FUEL TRANS PMP 1	225	DSL AUX BD C1-S	EA	1	0-MTR-18-108A-S	1.00	2.00	10.0	1.15	C268A	TRS2.5				Y	R10
N	N	4	D.G. DAY TANK FUEL TRANS PMP 2	225	DSL AUX BD C1-S	EE	1	0-MTR-18-108B-S	1.00	2.00	10.0	1.15	C268A	TRS2.5				Y	R10
N	F	4	ADGB LIGHTING CAB	225	DSL AUX BD C1-S	GK		0-LAC-215-49	45.00	54.00				A4J78			M-12212-A	Y	R10
				225	DSL AUX BD C1-S			TOTALS		122.15	327.99								

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GROUP 4 DSL AUX BOARD C2-S WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	F	4	DSL GEN ENG A LUBE OIL PMP 1	226	DSL AUX BD C2-S	BA	1	0-MTR-82-C1-S	2.00	3.50	22.6	1.00	C419A	TRS5A			M-12212-A	Y	R10
Y	F	4	DSL GEN ENG B LUBE OIL PMP 2	226	DSL AUX BD C2-S	BE	1	0-MTR-82-C2-S	2.00	3.50	22.6	1.00	C419A	TRS5A			M-12212-A	Y	R10
N	N	2A	PIPE GALLERY RM HTR 2	226	DSL AUX BD C2-S	BN		0-HTR-30-321	7.50	9.03				A4J15				N	
N	N	2A	6.9KV BD RM HTR 2	226	DSL AUX BD C2-S	BR		0-HTR-30-319	7.50	9.03				A4J15				N	
Y	F	2A	FUEL OIL TRANSFER RM EXH FAN	226	DSL AUX BD C2-S	CA	1	0-MTR-30-329	0.50	1.00	10.0		C118A	TRS1.6R			M-10448-A	Y	
Y	F	4	DG ENG A H20 HTR	226	DSL AUX BD C2-S	CE	1	0-HTR-82-CA-S	15.00	18.05			C228B	TRS25R			M-12212-A	Y	R10
Y	F	4	DG ENG B H20 HTR	226	DSL AUX BD C2-S	CJ	1	0-HTR-82-CB-S	15.00	18.05			C228B	TRS25R			M-12212-A	Y	R10
N	N	2A	DG RM HTR 1	226	DSL AUX BD C2-S	CN		0-HTR-30-317	20.00	26.25				A4J30				N	
N	N	2A	DG RM HTR 2	226	DSL AUX BD C2-S	CR		0-HTR-30-322	20.00	24.06				A4J30				N	
N	N	2A	FIRE PROTECT RM HTR	226	DSL AUX BD C2-S	CU		0-HTR-30-325	7.50	9.03				A4J15				N	
N	N	2A	TRANSFORMER RM HTR	226	DSL AUX BD C2-S	CX		0-HTR-30-324	7.50	9.03				A4J15				N	
Y	F	4	DG BLDG FUEL TRANS, PMP	226	DSL AUX BD C2-S	DM	1	0-MTR-18-110	10.00	13.00	100.3	1.00	C163B	TRS25R			M-12212-A	N	
Y	F	4	DG AIR COMP 1	226	DSL AUX BD C2-S	DR	1	0-MTR-82-320	5.00	7.10	44.5	1.15	C955A	TRS12R			M-12212-A	Y	R10
Y	F	4	DG AIR COMP 2	226	DSL AUX BD C2-S	DU	1	0-MTR-82-321	5.00	7.10	44.5	1.15	C955A	TRS12R			M-12212-A	Y	R10
N	F	2A	DG MUFFLER RM EXH FAN	226	DSL AUX BD C2-S	EA	1	0-MTR-30-327	1.50	1.95	12.5	1.15	C268A	TRS3R			M-10448-A	Y	
N	N	4	DG SPACE HTR	226	DSL AUX BD C2-S	EE	1	0-HTR-82-C-S	4.50	5.42			C695A	TRS10R				N	
N	F	4	HOIST (POWER OUTLET)	226	DSL AUX BD C2-S	FS		0-PO-215-12	0.00	0.00				A4J60				Y	R10
N	N	4	HOIST (POWER OUTLET)	226	DSL AUX BD C2-S	FW		0-PO-215-13	0.00	0.00				A4J60				Y	R10
N	N	2A	6.9KV BD RM HTR 1	226	DSL AUX BD C2-S	GA		0-HTR-30-318	7.50	9.03				A4J15				N	
N	N	2A	PIPE GALLERY RM HTR 1	226	DSL AUX BD C2-S	GD		0-HTR-30-320	7.50	9.03				A4J15				N	
N	N	2A	VESTIBULE HTR	226	DSL AUX BD C2-S	GG		0-HTR-30-323	7.50	9.03				A4J15				N	
N	N	4	ADG BLDG PWR OUTLETS	226	DSL AUX BD C2-S	GK		0-PO-215-8-11	0.00	0.00				A4J90				N	
N	F	2A	480V BO RM HTR	226	DSL AUX BD C2-S	GR		0-HTR-30-326	7.50	9.03				A4J15			M-10448-A	Y	
				226	DSL AUX BD C2-S			TOTALS		201.22	256.9								

* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	2B	Boric Acid Tank A Htr A-A	235	RMOV BD 1A1-A	2A		1-HTR-62-239-A	9.00	10.83					EF3-B02J				N	
Y	N	2B	Boric Acid Transfer Pmp 1A-A	235	RMOV BD 1A1-A	2B	1	1-MTR-62-230-A	7.50	13.00		1.00	T43		EF3-L053	210	2	M-10522-A	Y	
Y	N	2B	Boric Acid Transfer Pmp 1A-A	235	RMOV BD 1A1-A	2B	2	1-MTR-62-230-A	15.00	18.00	105.2	1.00	T48		EF3-L050	210	2	M-10522-A	N	
N	Y	1	THERM BAR SYS BSTR PMP 1A-A	235	RMOV BD 1A1-A	2C	2	1-MTR-70-131-A	10.00	14.00	70.2	1.15	T44		EF3-L050	160	LO	M-08663-A	N	
N	N	2B	RWST To RHR Pmp Flow Cont Vlv	235	RMOV BD 1A1-A	2E1		1-FCV-63-1-A	10.50	13.80	118.5				EF3-B040				N	
N	R	4	TORNADO DAMPER CONTROL XFMR	235	RMOV BD 1A1-A	2F1									ED63B020			M-12212-A	Y	R10
N	N	2B	Boric Acid Tank C Htr A-A	235	RMOV BD 1A1-A	3A		0-HTR-62-243-A	9.00	10.83					EF3-B020				N	
Y	Y	2B	CNTFGL CHARG PMP 1A-A AOP	235	RMOV BD 1A1-A	3E	1	1-MTR-62-AOP-A	2.00	3.10	22.6	1.15	T31		EF3-A010	45	3	M-10522-A	N	
N	Y	2B	SIS Accum Tank 1 Flow Isol Vlv	235	RMOV BD 1A1-A	3F2		1-FCV-63-118-A	19.50	25.20	220.0				EF3-H050	475	3		N	R11
N	N	2B	SPARE	235	RMOV BD 1A1-A	4A									EF3-B020			M-04277-C	N	R13
N	R	4	UV ANN	235	RMOV BD 1A1-A	4C									ED63B02'			M-12212-A	Y	R10
Y	N	2B	AFW Pmp A-A Lube Oil Pmp A-A	235	RMOV BD 1A1-A	4E	1	1-MTR-3-118D-A	0.25	0.56	3.5		T13		EF3-A00J	7	LO	M-10522-A	N	
N	R	4	OVERLOAD BYPASS	235	RMOV BD 1A1-A	4F									ED63B020			M-12212-A	Y	R10
N	N	4	HPFP Sys Low Level Intake Vlv	235	RMOV BD 1A1-A	5A	1	0-FCV-26-3-A	0.13	0.45	3.2		T9	90	EF3-A003	7	LO		N	R11
N	N	2B	RHR Sys Isln Vlv	235	RMOV BD 1A1-A	5B		1-FCV-74-1-A	2.60	4.73	38.0				EF3-B020				N	
N	Y	1	LWR COMPT 1B CLRS ISLN VLV	235	RMOV BD 1A1-A	5C	1	1-FCV-67-97-A	0.13	0.6	3.5		T11	66	EF3-A003	7	LO	E110011R2	Y	R9
Y	Y	4	HPFP TN A HDR FCV TO YARD	235	RMOV BD 1A1-A	5E	1	0-FCV-26-6-A	0.33	0.75	5.7		T14	60	EF3-A003	12	3	M-12212-A	Y	R10
Y	Y	2B	POSIT DISPLMNT PMP RECIRC VLV	235	RMOV BD 1A1-A	5F	1	1-FCV-62-275-A	0.70	2.30	16.0		T26	10	EF3-A010	36	2	M-12809-A	Y	R14
Y	Y	4	RCS Press Relief FCV	235	RMOV BD 1A1-A	6D	1	1-FCV-68-333-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-12212-A	N	
Y	Y	4	HPFP AUX BLDG TN A HDR VLV	235	RMOV BD 1A1-A	6F	1	0-FCV-26-126-A	0.33	0.75	5.7		T13	30	EF3-A003	12	3	M-12212-A	N	
Y	Y	2B	Seal Flow Ret Isln Vlv	235	RMOV BD 1A1-A	7A	1	1-FCV-62-63-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	CHARGING FLOW ISLN VLV	235	RMOV BD 1A1-A	7B	1	1-FCV-62-90-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	N	2B	SIS Accum Tank 3 Flow Isol Vlv	235	RMOV BD 1A1-A	7D	2	1-FCV-63-80-A	19.50	25.20	220.0		T49	15	EF3-L050	470	HI	M-10522-A	N	R11
Y	N	2B	CHARG PMP 1A-A MIN FLOW	235	RMOV BD 1A1-A	8A	1	1-FCV-62-98-A	0.66	2.30	12.0		T22	10	EF3-A010	27	LO	M-10522-A	N	
Y	Y	2B	Vol Cont Tank Outlet Isln Vlv	235	RMOV BD 1A1-A	8B	1	1-LCV-62-132-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	N	2B	SIS Accum Tank 1 Flow Isol Vlv	235	RMOV BD 1A1-A	8D	2	1-FCV-63-118-A	19.50	25.20	220.0		T49	15	EF3-B060			M-10522-A	Y	R11
Y	Y	2B	RWST To Charging Pmp Vlv Cont	235	RMOV BD 1A1-A	9A	1	1-LCV-62-135-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS PMP INLET TO CVCS CHG PMP	235	RMOV BD 1A1-A	9B	1	1-FCV-63-177-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
N	N	1	RCP OIL CLR SUP CNTMT ISOL VLV	235	RMOV BD 1A1-A	9D	1	1-FCV-70-100-A	0.13	0.60	3.5		T11	66	EF3-A003	7	LO	E110010	Y	R16
N	N	2B	RWST To RHR Pmp Flow Cont Vlv	235	RMOV BD 1A1-A	10A	1	1-FCV-63-1-A	10.30	15.10	116.4		T42	20	EF3-L050	260	3	A-06555-A	N	R14
Y	N	2B	SIS Pmp Recirc To RWST	235	RMOV BD 1A1-A	10B	1	1-FCV-63-3-A	0.70	2.30	12.0		T22	10	EF3-A010	27	LO	M-10522-A	N	
Y	Y	2B	RHR Sys Isln Vlv	235	RMOV BD 1A1-A	10D	1	1-FCV-74-1-A	2.60	4.73	38.0		T33	120	EF3-A010	84	HI	M-10522-A	N	
Y	N	2B	Cont Spray Pmp 1A-A Recirc FCV	235	RMOV BD 1A1-A	10F	1	1-FCV-72-34-A	0.13	0.45	2.6		T9	10	EF3-A003	7	LO	M-10522-A	Y	
Y	Y	2B	SIS Pmp Inlet To CVCS Chrg Pmp	235	RMOV BD 1A1-A	11A	1	1-FCV-63-7-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	R	2B	RHR Hx A To CVCS Chrgr Pmp	235	RMOV BD 1A1-A	11B	1	1-FCV-63-8-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS Boron Inj Tank Shutoff Vlv	235	RMOV BD 1A1-A	11D	1	1-FCV-63-26-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	R	2B	SIS BIT Inlet Shutoff Valve	235	RMOV BD 1A1-A	11E	1	1-FCV-63-39-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS Pmp 1A-A Inlet Vlv	235	RMOV BD 1A1-A	12A	1	1-FCV-63-47-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-1057 -A	N	
Y	R	2B	Cntmt Sump To RHR Pmp A-A	235	RMOV BD 1A1-A	12B	2	1-FCV-63-72-A	12.80	18.10	144.4	1.00	T45	22	EF3-L050	330	4	M-10522-A	N	
N	R	2B	SIS To RCS Loops 2&3 FCV	235	RMOV BD 1A1-A	12D	1	1-FCV-63-93-A	10.30	15.10	116.4	1.00	T45	10	EF3-L050	260	3	A-03389-A	D	
Y	Y	2B	SIS Pmp 1A-A Outlet FCV	235	RMOV BD 1A1-A	12E	1	1-FCV-63-152-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS Pmp Out RCS Lp 1&3 Hot Leg	235	RMOV BD 1A1-A	13A	1	1-FCV-63-156-A	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	R	2B	Cntmt Sump To Spray Hdr 1A FCV	235	RMOV BD 1A1-A	13B	1	1-FCV-72-44-A	3.20	5.20	36.0		T32	15	EF3-A010	84	HI	M-10522-A	N	
Y	R	2B	Cntmt Spray Hdr 1A Isln Vlv	235	RMOV BD 1A1-A	13E	1	1-FCV-72-39-A	3.20	5.20	35.0		T32	15	EF3-A010	84	HI	M-10522-A	N	
Y	R	2B	RHR Spray Hdr 1A Isln Vlv	235	RMOV BD 1A1-A	14A	1	1-FCV-72-40-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	

* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	N	2B	RHR Pmp 1A-A Min Flow Vlv	235	RMOV BD 1A1-A	14D	1	1-FCV-74-12-A	0.13	0.45	1.6		T9	10	EF3-A003	7	LO	M-10522-A	Y	
Y	Y	2B	RHR Hx 1A Bypass Vlv	235	RMOV BD 1A1-A	14E	1	1-FCV-74-33-A	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
N	Y	1	LWR COMPT 1D CLRS ISLN VLV	235	RMOV BD 1A1-A	15D	1	1-FCV-67-89-A	0.13	0.6	1.5		T11	66	EF3-A003	7	LO	E110011R2	Y	R9
Y	Y	2A	Incore Inst Rm Clr Fan 1A	235	RMOV BD 1A1-A	16A	1	1-MTR-31-265	3.00	4.30	26.7	1.15	T33		EF3-A010	58	4	M-10448-A	N	
N	Y	4	Reac Cntmt Pit Sump Eject Pmp	235	RMOV BD 1A1-A	16B	1	1-MTR-77-129	1.50	2.40	16.9	1.00	T27		EF3-A015	36	2	M-12212-A	N	
Y	Y	4	HPFP Hdr Str A-A Backwash Vlv	235	RMOV BD 1A1-A	16D	1	0-FCV-26-141-A	0.26	0.55	5.7		T12	10	EF3-A003	12	3	M-12212-A	Y	R10
Y	Y	4	HPFP Hdr Str A-A Backflush Vlv	235	RMOV BD 1A1-A	16E	1	0-FCV-26-7-A	0.26	0.55	5.7		T12	10	EF3-A003	12	3	M-12212-A	Y	R10
N	R	6	NOR-24V CAP SYS BTRY CHGR NO 1	235	RMOV BD 1A1-A	16F1		0-CHGR-252-1	7.57	17.00					ED63B030			M-	N	R10
N	R	2A	Incore Inst Rm Ch Wtr Cprsr 1A	235	RMOV BD 1A1-A	16F2		1-MTR-31-303/2	3.00	4.60	32.0				ED63B020			F-13654-A	Y	R10
N	R	2B	Boric Acid Batching Tank Htr 2	235	RMOV BD 1A1-A	17A	2	1-HTR-62-228/2	22.50	27.07					EF3-B040			M-10522-A	N	
Y	R	4	Cntmt Standpipe Isln Vlv	235	RMOV BD 1A1-A	17B	1	1-FCV-26-240-A	0.67	2.10	10.5	1.00	T21	20	EF3-A005	22	3	M-12212-A	N	
Y	R	4	Annulus Standpipe Isln Vlv	235	RMOV BD 1A1-A	17C	1	1-FCV-26-242-A	0.67	2.10	10.5	1.00	T21	20	EF3-A005	22	3	M-12212-A	N	
N	N	4	Power Outlets	235	RMOV BD 1A1-A	17E		1-PO-213-A1/1-5	0.00	0.00					EF3-B100				N	
N	R	6	NOR FDR 48V SPARE BTRY CHGR	235	RMOV BD 1A1-A	17F1		0-CHGR-240-S	7.50	15.00					ED63B020			M-	N	R10
N	N	2B	SIS Accum Tank 3 Flow Isol Vlv	235	RMOV BD 1A1-A	17F2		1-FCV-63-80-A	19.50	25.20	208.0				EF3-B050				N	
N	Y	6	Refueling Wtr Prfcn Pmp A-A	235	RMOV BD 1A1-A	18A	2	0-MTR-78-19-A	20.00	26.00	145.0	1.15	T51		EF3-L050	330	4	M-	N	
Y	Y	2A	Incore Inst Rm Circ Pump 1A	235	RMOV BD 1A1-A	18C	1	1-MTR-31-303/1	3.00	4.20	30.1	1.15	T33		EF3-A010	58	4	M-10448-A	N	
N	Y	2B	Boric Acid Batch Tank Agitator	235	RMOV BD 1A1-A	18D	1	0-MTR-62-226	1.00	2.05	12.5		T26		EF3-A005	29	4	M-10522-A	N	
Y	R	4	RCP Spray Isln Vlv	235	RMOV BD 1A1-A	18E	1	1-FCV-26-243-A	0.67	2.10	10.5		T21	20	EF3-A005	22	3	M-12212-A	N	
N	R	6	ALT FDR 48V TELE BTRY CHGR	235	RMOV BD 1A1-A	18F1		0-CHGR-250-1	7.50	15.00					ED63B020			M-	N	R10
N	R	4	Power Outlets	235	RMOV BD 1A1-A	18F2		1PO-213-A1/6-10	0.00	0.00					ED63B100			M-12212-A	Y	R10
				235	RMOV BD 1A1-A			TOTALS		643.37	2736.6									

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* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	4	NOR 125V SP VTL BTRY CHGR 1-S	236	RMOV BD 1A2-A			OCHGR-236-1AC-S	25.60	53.00					EF3-B070				N	
N	N	6	Standby Ltg Cab #4	236	RMOV BD 1A2-A			0-DXF-228-2-A	45.00	54.10					ED63B100			M-13005-A	N	R10
Y	N	2B	ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	2A	1	1-FCV-3-116A-A	0.13	0.45	2.6		T9	6	EF3-A003	7	LO	M-10522-A	Y	
Y	N	2B	ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	2B	1	1-FCV-3-116B-A	0.13	0.45	2.6		T9	6	EF3-A003	7	LO	M-10522-A	Y	
Y	Y	6	AFWP Turb Stm Sup Fm Stm Gen 1	236	RMOV BD 1A2-A	2D	1	1-FCV-1-15-A	1.00	2.80	16.0		T24	20	EF3-A010	36	2	M-	N	
Y	Y	6	St Flow To AFWP Turb Isln Vlv	236	RMOV BD 1A2-A	2E	1	1-FCV-1-17-A	1.00	2.80	16.0		T24	20	EF3-A010	36	2	M-	N	
Y	Y	2B	ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	3A	1	1-FCV-3-136A-A	0.33	0.75	5.7		T13	15	EF3-A003	12	3	M-10522-A	N	
Y	Y	2B	ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	3B	1	1-FCV-3-136B-A	0.33	0.75	5.7		T13	15	EF3-A003	12	3	M-10522-A	N	
N	Y	2C	St Gen No 1 FW Isln Vlv	236	RMOV BD 1A2-A	3D	3	1-FCV-3-33-A	39.40	48.10	494.0		T53	6.5	EF3-A100	930	4	M-10522-A	Y	
Y	Y	2C	Loop 1 Deaeration Line Vlv	236	RMOV BD 1A2-A	4A	1	1-FCV-3-191	1.60	4.00	25.0		T28	30	EF3-A010	58	4	M-10522-A	N	
Y	Y	2C	Loop 2 Deaeration Line Vlv	236	RMOV BD 1A2-A	4B	1	1-FCV-3-192	1.60	4.00	25.0		T28	30	EF3-A010	58	4	M-10522-A	N	
N	R	4	UV ANN	236	RMOV BD 1A2-A	4C									ED63B020			M-12212-A	N	R10
N	R	2C	St Gen No 3 FW Isln Vlv	236	RMOV BD 1A2-A	4D	3	1-FCV-3-87-A	39.40	48.10	494.0		T53	6.5	EF3-A100	930	4	M-10522-A	N	
Y	R	1	Sample Hx Isln Vlv	236	RMOV BD 1A2-A	5A	1	1-FCV-70-215-A	0.24	1.00	5.7		T13	15	EF3-A003	12	3	M-08663-A	N	
N	N	1	Sply Hdr 1A To Hdr 2B Isln Vlv	236	RMOV BD 1A2-A	5B		1-FCV-67-147-A	0.70						EF3-B070				Y	
N	R	4	OVERLOAD BYPASS	236	RMOV BD 1A2-A	5C									ED63B020			M-12212-A	N	R10
N	N	2C	Hydrogen Det Sys	236	RMOV BD 1A2-A	5D1		1-H2AM-43-200	4.16	5.22					EF3-B020			P-04060-A	N	
Y	Y	1	Cntmt Spray Hx 1A Sup Cont Vlv	236	RMOV BD 1A2-A	5E	1	1-FCV-67-125-A	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	Cntmt Spray Hx 1A Disch Vlv	236	RMOV BD 1A2-A	5F	1	1-FCV-67-126-A	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	6	AFWP Turb St Sply Frm St gen 4	236	RMOV BD 1A2-A	6A	1	1-FCV-1-16-A	1.00	2.80	16.0		T24	16	EF3-A010	36	2	M-	N	
Y	Y	2B	RHR Sys Isln Bypass Vlv	236	RMOV BD 1A2-A	6D	1	1-FCV-74-8-A	1.60	4.00	25.0		T31	120	EF3-A010	58	4	M-10522-A	N	
N	Y	1	ERCW Hdr 1A Iso Vlv Before Str	236	RMOV BD 1A2-A	7B	1	1-FCV-67-22-A	0.33	0.95	5.7		T17	120	EF3-A003	12	3	M-08663-A	N	
Y	N	1	Lwr Cntmt Clr 1A Disch Iso Vlv	236	RMOV BD 1A2-A	7D	1	1-FCV-67-87-A	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	E110010-11	Y	
Y	N	1	Upr Cntm Vt Clr 1A Sup Iso Vlv	236	RMOV BD 1A2-A	7F	1	1-FCV-67-130-A	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	A.Bldg ERCW Sup Hdr 1A Iso Vlv	236	RMOV BD 1A2-A	8A	1	1-FCV-67-81-A	0.67	2.30	12.0		T26	120	EF3-A005	22	3	M-08663-A	N	R10
Y	Y	1	Lwr Cntmt 1A Clr Sply Isln Vlv	236	RMOV BD 1A2-A	8B	1	1-FCV-67-107-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	R9
Y	N	1	Lwr Cntmt 1C Clr Disch Iso Vlv	236	RMOV BD 1A2-A	8D	1	1-FCV-67-95-A	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	E110010-11	Y	
Y	N	1	Upr Cntm Vt Clr 1C Sup Iso Vlv	236	RMOV BD 1A2-A	8F	1	1-FCV-67-133-A	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	Lwr Cntmt 1C Clr Sply Isln Vlv	236	RMOV BD 1A2-A	9A	1	1-FCV-67-99-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	R9
Y	Y	1	LWR CNTMT 1B CLR DISCH ISO VLV	236	RMOV BD 1A2-A	9B	1	1-FCV-67-104-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
Y	N	1	Upr Cnt Vt Clr 1A Dis Isln Vlv	236	RMOV BD 1A2-A	9D	1	1-FCV-67-295-A	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	UP CNTM VT CLR 1B DISH ISO VLV	236	RMOV BD 1A2-A	9F	1	1-FCV-67-139-A	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	Lwr Cntmt 1D Clr Disch Iso Vlv	236	RMOV BD 1A2-A	10A	1	1-FCV-67-112-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	A.Bldg AirClr Sup Hdr 1A Iso V	236	RMOV BD 1A2-A	10B	1	1-FCV-67-127-A	0.33	0.95	5.7		T14	40	EF3-A003	12	3	M-08663-A	N	
Y	N	1	UP CNTM VT CLR 1C DISH ISO VLV	236	RMOV BD 1A2-A	10D	1	1-FCV-67-296-A	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	N	1	UP CNTM VT CLR 1D DISH ISO VLV	236	RMOV BD 1A2-A	10F	1	1-FCV-67-142-A	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	Cmpnt Clg Hx A Disch Cont Vlv	236	RMOV BD 1A2-A	11A	1	1-FCV-67-146-A	0.33	0.83	5.7		T15	120	EF3-A003	12	3	M-08663-A	Y	
Y	R	1	FDR BKR TO COMP 5B	236	RMOV BD 1A2-A	11B	1	1-FCV-67-147-A	0.70	2.30	11.0		T26	120	EF3-A005	29	4	M-09228-A	Y	
N	N	1	RCP Thrm Barr Rtn Cntm Iso Vlv	236	RMOV BD 1A2-A	11D		1-FCV-70-90-A	0.70						EF3-B020			M-08663-A	N	
N	N	1	RCP THERMAL BARR CONT ISOL VLV	236	RMOV BD 1A2-A	11E		1-FCV-70-133-A	0.13						EF3-B020			M-08663-A	N	
Y	Y	1	Cmpt Clg Hx C Dish Vl To Hdr A	236	RMOV BD 1A2-A	12A	1	0-FCV-67-151-A	0.67	1.90	7.6		T24	120	EF3-A005	14	LO	M-08663-A	N	
Y	Y	1	SS&Con AirCpsr Sup Hdr A Iso V	236	RMOV BD 1A2-A	12B	1	0-FCV-67-205-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	RCP Oil Clr Rtn Cntmt Isln Vlv	236	RMOV BD 1A2-A	12D	1	1-FCV-70-92-A	0.13	0.60	3.2		T12	66	EF3-A003	7	LO	A-07054-B	Y	
Y	Y	1	Aux Waste Evap Pkg Outlet Vlv	236	RMOV BD 1A2-A	12E	1	0-FCV-70-111-A	0.13	0.60	3.2		T12	30	EF3-A003	7	LO	M-08819-A	Y	
Y	Y	1	RCP Oil Clr Hdr Cntmt Isln Vlv	236	RMOV BD 1A2-A	12F	1	1-FCV-70-139-A	0.33	0.95	5.7		T14	30	EF3-A003	12	3	M-08663-A	N	

* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	Y	1	FDK BKR TO COMP 6F	236	RMOV BD 1A2-A	13A	1	1-FCV-67-223-A	0.66	2.30	12.0		T26	120	EF3-A005	29	4	M-08663-A	N	R16
Y	Y	1	BA & Gas Strip Evap Pkg 1A FCV	236	RMOV BD 1A2-A	13D	1	1-FCV-70-168-A	0.33	0.95	5.7		T15	50	EF3-A003	12	3	M-08663-A	N	
Y	R	4	Annulus Spr Isln Vlv	236	RMOV BD 1A2-A	13E	1	1-FCV-26-245-A	0.67	2.10	5.0		T19	20	EF3-A003	10	2	M-12212-A	N	
Y	Y	1	RHR Hx A Hdr Inlet Vlv	236	RMOV BD 1A2-A	14A	1	1-FCV-70-2-A	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	Misc Eqpt Hdr Inlet Vlv	236	RMOV BD 1A2-A	14B	1	1-FCV-70-4-A	0.33	0.75	5.8		T14	90	EF3-A003	12	3	A-06885-C	Y	
Y	Y	1	CCS Hx A Outlet Vlv	236	RMOV BD 1A2-A	14D	1	1-FCV-70-8-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCS Hx A & C Outlet Isln Vlv	236	RMOV BD 1A2-A	14E	1	1-FCV-70-10-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
N	n	1	CCS HX A DISCH BYPASS CONT VLV	236	RMOV BD 1A2-A	15A	1	1-FCV-67-143-A	0.13	0.45	3.2		T9	120	EF3-A003	7	LO	P-01136-A	Y	R16
Y	Y	1	CCS Hx A & C Inlet Isln Vlv	236	RMOV BD 1A2-A	15B	1	1-FCV-70-23-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCS Hx A Inlet Vlv	236	RMOV BD 1A2-A	15D	1	1-FCV-70-25-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	ERCW To Cmpnt Clg Hx A	236	RMOV BD 1A2-A	15E	1	1-FCV-67-458-A	0.67	1.90	7.6		T24	120	EF3-A005	14	LO	M-08663-A	N	
Y	N	1	RCP THRM BARR RET CONT ISOL VL	236	RMOV BD 1A2-A	16A	1	1-FCV-70-90-A	0.70	2.30	12.0		T24	66	EF3-A005	29	4	M-08663-A	N	
Y	N	1	RCP THRM BARR CONT ISOL VLV	236	RMOV BD 1A2-A	16B	1	1-FCV-70-133-A	0.13	0.45	1.6		T9	15	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	Excs Ltdn Hx Cont Inlt Iso Vlv	236	RMOV BD 1A2-A	16D	1	1-FCV-70-143-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	RHR Hx A-A Outlet Vlv	236	RMOV BD 1A2-A	16E	1	1-FCV-70-156-A	0.33	0.83	5.0		T15	90	EF3-A003	10	2	A-06885-C	Y	
Y	N	1	Sample Hx Hdr Outlet Vlv	236	RMOV BD 1A2-A	17A	1	1-FCV-70-183-A	0.13	0.45	1.6		T9	15	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	SFPCS Hx Sply Hdr Isln Vlv	236	RMOV BD 1A2-A	17B	1	0-FCV-70-197-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
N	R	2A	480V Bd Rm 1A A/C Cprsr 1A-1	236	RMOV BD 1A2-A	17E		1-MTR-31-465-A	50.00	57.00	350.0	1.15			FXD63B125	800	LO	F-13654-A	Y	R10

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	2B	Boric Acid Tank A Htr B-B	237	RMOV BD 1B1-B	2A		1-HTR-62-245-B	9.00	10.83					EF3-B020				N	
Y	N	2B	Boric Acid Transfer Pmp 1B-B	237	RMOV BD 1B1-B	2B	2	1-MTR-62-232-B	15.00	18.00	105.2	1.00	T48		EF3-L050	210	2	M-10522-A	Y	
Y	N	2B	Boric Acid Transfer Pmp 1B-B	237	RMOV BD 1B1-B	2B	2	1-MTR-62-232-B	7.50	13.00		1.00	T43		EF3-L050	210	2	M-10522-A	Y	
N	N	1	COMPT CLR BOOSTER PUMP 1B-B	237	RMOV BD 1B1-B	2C	2	1-MTR-70-130-B	10.00	13.00	70.2	1.15	T44		EF3-L050	160	LO		N	
N	R	4	TORNADO DAMPER CONTROL XFMR	237	RMOV BD 1B1-B	2F1									ED63B020			M-12212-A	N	R10
N	N	2B	SIS Pmp Cold Leg Inj	237	RMOV BD 1B1-B	2F2		1-FCV-63-22-B	1.90	3.50	26.0				EF3-A010	58	4		N	
N	N	2B	Boric Acid Tank C Htr B-B	237	RMOV BD 1B1-B	3A		0-HTR-62-246-B	9.00	10.83					EF3-B020				N	
Y	N	1	CDWE Bldg Supply Valve	237	RMOV BD 1B1-B	3E	1	1-FCV-70-207-B	0.13	0.45	3.1		T9	30	EF3-A003	7	LO	M-08663-A	Y	
N	R	6	NOR 24V CAP SYS BTRY CHGR NO 2	237	RMOV BD 1B1-B	3F1		0-CHGR-252-2	7.57	17.00					ED63B030			M-	Y	R10
N	N	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	3F2		1-FCV-63-98-B	19.50	25.20	208.0				EF3-H050	400	2		N	
N	N	2B	SIS Boron Inject Tank Htr 1B-B	237	RMOV BD 1B1-B	4A		1-HTR-63-36-B	6.00	7.22					EF3-B020				N	
N	R	4	UV ANN	237	RMOV BD 1B1-B	4C									ED63B020			M-12212-A	N	R10
Y	Y	2B	Cntfgl Chgrg Pmp 1B-B AOP	237	RMOV BD 1B1-B	4D	1	1-MTR-62-AOP-B	2.00	3.10	22.6	1.15	T31		EF3-A010	45	3	M-10522-A	N	
Y	Y	4	HPFP Aux Bldg Tn B Hdr Vlv	237	RMOV BD 1B1-B	4F	1	0-FCV-26-127-B	0.33	0.75	5.7		T13	30	EF3-A003	12	3	M-12212-A	N	
N	N	2B	RHR Sys Isln Vlv	237	RMOV BD 1B1-B	5B		1-FCV-74-2-B	2.60	4.73	38.0				EF3-B020				N	
Y	R	2B	RHR Sys Isln Bypass Vlv	237	RMOV BD 1B1-B	5C	1	1-FCV-74-9-B	1.60	4.00	25.0		T31	120	EF3-A010	58	4	M-10522-A	N	
Y	Y	4	RCS Press Relief Flow Cont Vlv	237	RMOV BD 1B1-B	5E	1	1-FCV-68-332-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-12212-A	N	
Y	Y	2B	Seal Flow Ret Isln Vlv	237	RMOV BD 1B1-B	6D	1	1-FCV-62-61-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	CHRG FLOW ISLN VLV	237	RMOV BD 1B1-B	7A	1	1-FCV-62-91-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	N	2B	CHRG PMP 1A-A MIN FLOW	237	RMOV BD 1B1-B	7B	1	1-FCV-62-99-B	0.66	2.30	12.0		T20	10	EF3-A010	27	LO	M-10522-A	N	
Y	R	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	7D	2	1-FCV-63-67-B	19.50	25.20	208.0		T48		EF3-H050	400	2	M-10522-A	N	
Y	Y	2B	Vol Cont Tank Outlet Isln Vlv	237	RMOV BD 1B1-B	8A	1	1-LCV-62-133-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	RWST To Charging Pmp Vlv Cont	237	RMOV BD 1B1-B	8B	1	1-LCV-62-136-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
Y	N	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	8D	2	1-FCV-63-98-B	19.50	25.20	208.0		T48		EF3-B060			M-10522-A	N	
N	N	7	SPARE	237	RMOV BD 1B1-B	8F													Y	
Y	R	2B	Emer Boration Flow Cont Vlv	237	RMOV BD 1B1-B	9A	1	1-FCV-62-138-B	1.30	2.40	16.0		T24	15	EF3-A010	36	2	M-10522-A	N	
Y	R	2B	RHR To RCS H.L. 1&3 Flow Iso V	237	RMOV BD 1B1-B	9B	1	1-FCV-63-172-B	2.60	4.73	38.0		T33	120	EF3-A010	84	HI	M-10522-A	N	
Y	N	2B	Cont Spray Pmp 1B-B Recirc FCV	237	RMOV BD 1B1-B	9F	1	1-FCV-72-13-B	0.13	0.45	2.6		T9	10	EF3-A003	7	LO	M-10522-A	Y	
Y	Y	2B	SIS 1A-A DSH TO RWST SHTFF VLV	237	RMOV BD 1B1-B	10A	1	1-FCV-63-4-B	0.70	2.80	16.0		T24	10	EF3-A010	36	2	M-10522-A	N	
Y	Y	2B	RWST To SIS Pump Flow Cont Vlv	237	RMOV BD 1B1-B	10B	1	1-FCV-63-5-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	RHR Sys Isln Vlv	237	RMOV BD 1B1-B	10D	1	1-FCV-74-2-B	2.60	4.73	38.0		T33	120	EF3-A010	84	HI	M-10522-A	N	
Y	R	2B	RWST To Spray Hdr 1B FCV	237	RMOV BD 1B1-B	10F	1	1-FCV-72-21-B	3.20	5.20	36.0		T32	20	EF3-A010	84	HI	M-10522-A	N	
Y	Y	2B	SIS PMP INLT TO CVCS CHRG PMP	237	RMOV BD 1B1-B	11A	1	1-FCV-63-6-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	R	2B	RHR Hx B To SIS Pmp	237	RMOV BD 1B1-B	11B	1	1-FCV-63-11-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS Pmp Cold Leg Inj	237	RMOV BD 1B1-B	11D	1	1-FCV-63-22-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS Boron Inj Tank Shutoff Vlv	237	RMOV BD 1B1-B	11E	1	1-FCV-63-25-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	R	2B	SIS Brn Inj Tnk Inlt Shtff Vlv	237	RMOV BD 1B1-B	12A	1	1-FCV-63-40-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS Pmp 1B-B Inlet Vlv	237	RMOV BD 1B1-B	12B	1	1-FCV-63-48-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
Y	R	2B	Cntmt Sump To RHR Pmp B-B	237	RMOV BD 1B1-B	12D	2	1-FCV-63-73-B	12.80	18.10	144.9		T45	22	EF3-L050	330	4	M-10522-A	N	
N	R	2B	SIS To RCS Loops 1&4 FCV	237	RMOV BD 1B1-B	12E	1	1-FCV-63-94-B	10.30	15.10	116.4		T45	10	EF3-L050	260	3	A-03389-A	D	
Y	Y	2B	SIS Pmp 1B-B Outlet FCV	237	RMOV BD 1B1-B	13A	1	1-FCV-63-153-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS PMP OUT RCS LP 2&4 H. LEG	237	RMOV BD 1B1-B	13B	1	1-FCV-63-157-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
Y	Y	2B	SIS 1B-B Dsh To RWST Shtff Vlv	237	RMOV BD 1B1-B	13D	1	1-FCV-63-175-B	0.70	2.30	16.0		T24	10	EF3-A010	36	2	M-10522-A	N	
Y	Y	2B	Cntmt Spray Hdr 1B Isln Vlv	237	RMOV BD 1B1-B	14A	1	1-FCV-72-2-B	3.20	5.20	36.0		T32	15	EF3-A010	84	HI	M-10522-A	N	
Y	R	2B	RHR Spray Hdr 1B Isln Vlv	237	RMOV BD 1B1-B	14D	1	1-FCV-72-41-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
Y	R	2B	Cntmt Sump To Spray Hdr 1B FCV	237	RMOV BD 1B1-B	14E	1	1-FCV-72-45-B	3.20	5.20	36.0		T32	15	EF3-A010	84	HI	M-10522-A	N	
Y	R	2B	RHR Pmp 1B-B Inlet FCV	237	RMOV BD 1B1-B	15A	1	1-FCV-74-21-B	10.50	13.80	118.5		T42	20	EF3-L050	260	3	M-10522-A	N	
Y	N	2B	RHR Pmp 1B-B Min Flow Vlv	237	RMOV BD 1B1-B	15B	1	1-FCV-74-24-B	0.13	0.45	3.2		T9	10	EF3-A003	7	LO	M-10522-A	Y	

GROUP 4 RMOV BOARD 1B1-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	Y	2B	RHR Hx 1B Bypass Vlv	237	RMOV BD 1B1-B	15D	1	1-FCV-74-35-B	1.90	3.50	26.0		T29	15	EF3-A010	58	4	M-10522-A	N	
Y	Y	2A	Incore Inst Rm Clr Fan 1B	237	RMOV BD 1B1-B	16A	1	1-MTR-31-266	3.00	4.30	26.7	1.15	T33		EF3-A010	58	4	M-10448-A	N	
N	R	4	OVERLOAD BYPASS	237	RMOV BD 1B1-B	16D									ED638020			M-12212-A	N	R10
N	N	4	Power Outlets	237	RMOV BD 1B1-B	16E		1-PO-213-B1/1-5	0.00	0.00					EF3-B100				N	
N	R	6	ALT FDR 48V SPARE BTRY CHGR	237	RMOV BD 1B1-B	16F1		0-CHGR-240-B	7.50	15.00					ED638020			M-	N	R10
N	N	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	16F2		1-FCV-63-67-B	19.50	25.20	208.0				EF3-B050Z				N	
N	N	2B	Boric Acid Batch Tank Htr 1	237	RMOV BD 1B1-B	17A	2	1-HTR-62-228/1	22.50	27.07					EF3-B040				Y	
Y	R	4	Annulus Standpipe Isln Vlv	237	RMOV BD 1B1-B	17B	1	1-FCV-26-241-B	0.67	2.10	5.0		T19	40	EF3-A003	10	2	M-12212-A	N	
Y	N	2B	AFW Pmp B-B Lube Oil Pmp B-B	237	RMOV BD 1B1-B	17D	1	1-MTR-3-128D-B	0.25	0.56	3.5		T13		EF3-A003	7	LO	M-10522-A	N	
N	N	4	Power Outlets	237	RMOV BD 1B1-B	17E		1PO-213-B1/6-10	0.00	0.00					EF3-B100				N	
N	R	6	ALT FDR 48V PLANT BTRY CHGR	237	RMOV BD 1B1-B	17F1		0-CHGR-240-1	7.50	15.00					ED6[illegible]020			M-	N	R10
N	R	2A	Incore Inst Rm Ch Wtr Cprsr 1B	237	RMOV BD 1B1-B	17F2		1-MTR-31-324/2	3.00	4.60	95.0				ED618020				Y	R10
N	N	6	Refueling Wtr Prfcn Pmp B-B	237	RMOV BD 1B1-B	18A	2	0-MTR-78-20-B	20.00	26.00	145.0	1.15	T51		EF3-L050	330	4		N	
Y	Y	2A	Incore Inst Rm Circ Pump 1B	237	RMOV BD 1B1-B	18C	1	1-MTR-31-324/1	3.00	4.20	30.1	1.15	T33		EF3-A010	58	4	M-10448-A	N	
N	R	6	Aux Boration Tank Agitator	237	RMOV BD 1B1-B	18D	1	0-MTR-84-2	1.00	2.20	12.5	1.00	T26		EF3-A005	29	4	M-	N	
N	Y	4	HPFP Hdr Strnr B-B Bkflush Vlv	237	RMOV BD 1B1-B	18E	1	0-FCV-26-142-B	0.26	0.55	5.7		T12	10	EF3-A003	12	3	M-12212-A	Y	R10
N	Y	4	HPFP Hdr Strnr B-B Bkflush Vlv	237	RMOV BD 1B1-B	18F	1	0-FCV-26-14-B	0.26	0.55	5.7		T12	10	EF3-A003	12	3	M-12212-A	Y	R10
				237	RMOV BD 1B1-B			TOTALS		448.1	2502.5									

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	4	ALT 125V SP VTL BTRY CHGR	238	RMOV BD 1B2-B			0CHGR-236-1AC-S	28.60	53.00					EF3-B070				N	R10
N	N	6	Standby Ltg Cab #2	238	RMOV BD 1B2-B			0-DXF-228-1-B	45.00	54.14					ED63B100				N	R10
Y	N	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	2A	1	1-FCV-3-126A-B	0.13	0.45	2.6		T9	6	EF3-A003	7	LO	M-10522-A	Y	
Y	N	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	2B	1	1-FCV-3-126B-B	0.13	0.45	2.6		T9	6	EF3-A003	7	LO	M-10522-A	Y	
Y	Y	6	St Flow To AFWP Turb Isln Vlv	238	RMOV BD 1B2-B	2E	1	1-FCV-1-18-B	1.00	2.80	16.0		T24	16	EF3-A010	36	2	M-	N	
Y	Y	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	3A	1	1-FCV-3-179A-B	0.33	0.75	5.7		T13	15	EF3-A003	12	3	M-10522-A	N	
Y	Y	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	3B	1	1-FCV-3-179B-B	0.33	0.75	5.7		T13	15	EF3-A003	12	3	M-10522-A	N	
N	R	2C	ST GEN NO 2 FW ISLN VLV	238	RMOV BD 1B2-B	3D	3	1-FCV-3-47-B	39.40	48.10	494.0		T53	6.5	EF3-A100	930	4	M-10522-A	N	
Y	Y	2C	Loop 3 Deaeration Line Vlv	238	RMOV BD 1B2-B	4A	1	1-FCV-3-193	1.60	4.00	25.0		T28	30	EF3-A010	58	4	M-10522-A	Y	
Y	Y	2C	Loop 4 Deaeration Line Vlv	238	RMOV BD 1B2-B	4B	1	1-FCV-3-194	1.60	4.00	25.0		T28	30	EF3-A010	58	4	M-10522-A	Y	
N	R	4	UV ANN	238	RMOV BD 1B2-B	4C									ED63B020			M-12212-A	N	R10
N	R	2C	St Gen No 4 FW Isln Vlv	238	RMOV BD 1B2-B	4D	3	1-FCV-3-100-B	39.40	48.10	494.0		T53	6.5	EF3-A100	930	4	M-10522-A	N	
N	Y	4	HPFP Com Hdr To Yd FCV	238	RMOV BD 1B2-B	5A	1	0-FCV-26-17-B	0.33	0.75	5.7		T14	60	EF3-A003	12	3	M-12212-A	Y	R10
Y	N	1	CDWE Building Return Valve	238	RMOV BD 1B2-B	5B	1	0-FCV-70-206-B	0.13	0.45	2.6		T9	30	EF3-A003	7	LO	M-08663-A	Y	
N	Y	1	LWR COMPT 1A CLRS ISLN VLV	238	RMOV BD 1B2-B	5C	1	1-FCV-67-113-B	0.13	0.6	3.5		T11	66	EF3-A003	7	LO	E110011R2	Y	R9
Y	Y	1	Cntmt Spray Hx 1B Sup Cont Vlv	238	RMOV BD 1B2-B	5E	1	1-FCV-67-123-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	Cntmt Spray Hx 1B Disch Vlv	238	RMOV BD 1B2-B	5F	1	1-FCV-67-124-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
N	N	1	RCP THERM BARR RTN CONT ISO VL	238	RMOV BD 1B2-B	6D	1	1-FCV-70-87-B	0.70						EF3-B020				N	
N	N	1	RCP THERM BARR CONT ISO VLV	238	RMOV BD 1B2-B	6E	1	1-FCV-70-134-B	0.13						EF3-B020				N	
N	R	4	OVERLOAD BYPASS	238	RMOV BD 1B2-B	6F									ED63B020			M-12212-A	N	R10
Y	N	1	Lwr Cntmt 1B Clr Dish Iso Vlv	238	RMOV BD 1B2-B	7D	1	1-FCV-67-103-B	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	E110010-11	Y	
Y	N	1	Up Cntm Vt Clr 1A Dish Iso Vlv	238	RMOV BD 1B2-B	7F	1	1-FCV-67-131-B	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	ERCW Hdr 1B Iso Vlv Before Str	238	RMOV BD 1B2-B	8A	1	1-FCV-67-24-B	0.33	0.95	5.7		T16	120	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	A.Bldg ERCW Sup Hdr 1B Iso Vlv	238	RMOV BD 1B2-B	8B	1	1-FCV-67-82-B	0.67	1.90	7.6		T24	120	EF3-A005	14	LO	M-08663-A	N	
Y	N	1	Lwr Cntmt 1D Clr Dish Iso Vlv	238	RMOV BD 1B2-B	8D	1	1-FCV-67-111-B	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	E110010-11	Y	
Y	N	1	Up Cntm Vt Clr 1C Dish Iso Vlv	238	RMOV BD 1B2-B	8F	1	1-FCV-67-134-B	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	Lwr Cntmt 1A Clr Dish Iso Vlv	238	RMOV BD 1B2-B	9A	1	1-FCV-67-88-B	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	Lwr Cntmt 1C Clr Dish Iso Vlv	238	RMOV BD 1B2-B	9B	1	1-FCV-67-96-B	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
Y	N	1	Up Cntm Vt Clr 1B Dish Iso Vlv	238	RMOV BD 1B2-B	9D	1	1-FCV-67-297-B	0.13	0.45	2.6		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	N	1	Up Cntm Vt Clr 1B Sup Iso Vlv	238	RMOV BD 1B2-B	9F	1	1-FCV-67-138-B	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	Lwr Cntmt 1B Clr Sply Isln Vlv	238	RMOV BD 1B2-B	10A	1	1-FCV-67-91-B	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	R9
Y	Y	1	Lwr Cntmt 1D Clr Sply Isln Vlv	238	RMOV BD 1B2-B	10B	1	1-FCV-67-83-B	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	R9
Y	N	1	UP CNTM VT CLR 1D DIS ISO VLV	238	RMOV BD 1B2-B	10D	1	1-FCV-67-298-B	0.13	0.45	3.1		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	N	1	Up Cntm Vt Clr 1D Sup Iso Vlv	238	RMOV BD 1B2-B	10F	1	1-FCV-67-141-B	0.13	0.45	3.2		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	A.Bldg AirClr Sup Hdr 1B Iso V	238	RMOV BD 1B2-B	11A	1	1-FCV-67-128-B	0.33	0.95	5.7		T14	40	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	STA S & C AC SUP HDR B ISO VLV	238	RMOV BD 1B2-B	11B	1	0-FCV-67-208-B	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
N	Y	1	LWR COMPT 1C CLRS ISLN VLV	238	RMOV BD 1B2-B	11D	1	1-FCV-67-105-B	0.13	0.6	3.5		T11	66	EF3-A003	7	LO	E110011R2	Y	R9
N	N	2C	Hydrogen Det Sys	238	RMOV BD 1B2-B	11F1		1-H2AN-43-210	4.16	5.22					EF3-B020			P 34060-A	N	
Y	Y	1	Yd Hdr B Disch Vlv To Clg Twr	238	RMOV BD 1B2-B	12A	1	0-FCV-67-362	1.00	2.80	16.0		T29	180	EF3-A010	36	2	M-08663-A	N	
Y	N	1	ERCW To Cmpnt Clg Hx A	238	RMOV BD 1B2-B	12B	1	1-FCV-67-478-B	0.70	2.30	12.0		T26	120	EF3-A010	27	LO	M-08663-A	N	
Y	R	1	FDR BKR TO COMP 6D	238	RMOV BD 1B2-B	12D	1	1-FCV-70-87-B	0.70	2.30	12.0		T24	66	EF3-A010	27	LO	M-08663-A	N	
Y	R	4	Annulus Spr Isln Vlv	238	RMOV BD 1B2-B	12F	1	1-FCV-26-244-B	0.67	2.10	5.0		T19	20	EF3-A003	10	2	M-12212-A	N	
Y	Y	1	CCS Hx A & C Inlet Isln Vlv	238	RMOV BD 1B2-B	13B	1	1-FCV-70-13-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	N	1	RCP Oil Clr Rtn Cntnt Isln Vlv	238	RMOV BD 1B2-B	13D	1	1-FCV-70-89-B	0.13	0.60	3.5		T12	66	EF3-A003	7	LO	E110010-11	Y	
Y	Y	1	RCP Oil Clr Hdr Cntmt Isln Vlv	238	RMOV BD 1B2-B	13F	1	1-FCV-70-140-B	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCS Hx C Outlet Vlv	238	RMOV BD 1B2-B	14A	1	0-FCV-70-12-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	RHR Hx B Hdr Inlet Vlv	238	RMOV BD 1B2-B	14B	1	1-FCV-70-3-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCSP 1AA&1BB To C-S Outl Iso V	238	RMOV BD 1B2-B	14D	1	1-FCV-70-26-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	

* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	Y	1	CCS Pmps 1A-A To 1B-B Isln Vlv	238	RMOV BD 1B2-B	14E	1	1-FCV-70-34-B	0.67	1.90	7.6		T24	120	EF3-A005	14	LO	M-08663-A	N	
Y	Y	1	RHR Hx B Rtn Hdr Isln Vlv	238	RMOV BD 1B2-B	15A	1	1-FCV-70-75-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCS Hx A & C Outlet Isln Vlv	238	RMOV BD 1B2-B	15B	1	1-FCV-70-9-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	R	1	CCSP 1AA&1BB To C-S Inl Iso Vl	238	RMOV BD 1B2-B	15D	1	1-FCV-70-64-B	0.67	1.90	16.0		T24	120	EF3-A010	36	2	M-08663-A	Y	
Y	Y	1	RHR Hx B-B Outlet Vlv	238	RMOV BD 1B2-B	15E	1	1-FCV-70-153-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCSP 1AA&1BB To C-S Inl Iso Vl	238	RMOV BD 1B2-B	16A	1	1-FCV-70-74-B	0.67	1.90	7.6		T24	120	EF3-A005	14	LO	M-08663-A	N	
Y	N	1	FDR BKR TO COMP 6E	238	RMOV BD 1B2-B	16B	1	1-FCV-70-134-B	0.13	0.45	2.6		T9	66	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	CCS Hx C Inlet Vlv	238	RMOV BD 1B2-B	16E	1	0-FCV-70-22-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCSP 1AA&1BB To C-S Outl Iso V	238	RMOV BD 1B2-B	17B	1	1-FCV-70-27-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
N	N	1	CCS HX C DISCH BYPASS CONT VLV	238	RMOV BD 1B2-B	17D	1	0-FCV-67-144-B	0.13	0.45	3.2		T9	120	EF3-A003	7	LO	P-01136-A	Y	R16
N	R	2A	480V Bd Rm 1B A/C Cprsr 1B-B	238	RMOV BD 1B2-B	18D		1-MTR-31-447-B	75.00	91.50	542.5				FXD63B125	1200	5	P-13654-A	Y	R10
				238	RMOV BD 1B2-B			TOTALS		356.21	1855									

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GROUP 4 RMOV BOARD 2A1-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	2B	Boric Acid Tank B Htr A-A	239	RMOV BD 2A1-A	2A		2-HTR-62-239-A	9.00	10.83				EF3-B020				N	
N	N	2B	Boric Acid Transfer Pmp 2A-A	239	RMOV BD 2A1-A	2B	2	2-MTR-62-230-A	7.50	13.00		1.00	T43	EF3-L050	210	2		N	
Y	N	2B	Boric Acid Transfer Pmp 2A-A	239	RMOV BD 2A1-A	2B	2	2-MTR-62-230-A	15.00	18.00	105.2	1.00	T48	EF3-L050	210	2	M-10522-A	Y	
N	R	4	UV AHN	239	RMOV BD 2A1-A	4C								ED63A020			M-12212-A	N	R10
N	R	4	OVERLOAD BYPASS	239	RMOV BD 2A1-A	4F								ED63B020			M-12212-A	N	R10
Y	Y	2B	Vol Cont Tank Outlet Isln Vlv	239	RMOV BD 2A1-A	8B	1	2-LCV-62-132-A	1.90	3.50	26.0		T29	10 EF3-A010	58	4	M-10522-A	N	
N	R	6	24V CAP SYS BAT CHGR NO 1 (ALT	239	RMOV BD 2A1-A	16F1		0-CHGR-252-1	7.57	17.00				ED63B030			M-	N	R10
N	R	6	INCORE INSTR RM CHILLED H2O	239	RMOV BD 2A1-A	16F2		2-MTR-31-303/2	3.00	4.60	32.0			ED63B020			M-	N	R10
N	R	2B	Boric Acid Batching Tank Htr 4	239	RMOV BD 2A1-A	17A		2-HTR-62-228/4	22.50	27.07				EF3-B040			M-10522-A	N	
Y	Y	4	Cntmt Standpipe Isln Vlv	239	RMOV BD 2A1-A	17B	1	2-FCV-26-240-A	0.67	2.80	16.0		T24	20 EF3-A010	36	2	M-12212-A	N	
Y	Y	4	Annulus Standpipe Isln Vlv	239	RMOV BD 2A1-A	17C	1	2-FCV-26-242-A	0.67	2.80	16.0		T24	20 EF3-A010	36	2	M-12212-A	N	
N	R	4	POWER OUTLETS	239	RMOV BD 2A1-A	17E		2-PO-213-A1/1-5	0.00	0.00				ED63A100			M-12212-A	N	R10
Y	Y	4	RCP Spray Isln Vlv	239	RMOV BD 2A1-A	18E	1	2-FCV-26-243-A	0.67	2.80	16.0		T24	20 EF3-A010	36	2	M-12212-A	N	
N	R	6	ALT 24V MICROWAVE BAT CHGR 1	239	RMOV BD 2A1-A	18F1		0-CHGR-253-1	3.54	7.00				ED63B020			M-	N	R10
N	R	4	Power Outlets	239	RMOV BD 2A1-A	18F2		2PO-213-A1/6-10	0.00	0.00				ED63B100			M-12212-A	N	R10
				239	RMOV BD 2A1-A			TOTALS		109.4	211.2								

* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LIA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	4	NOR 125V SP VTL BTRY CHGR 2-S	240	RMOV BD 2A2-A			0CHGR-236-2AC-S	28.60	53.00					EF3-B070				N	R10
N	R	6	CVC Sys Ht Tr Xfmr A1	240	RMOV BD 2A2-A			0DXF234-A1/CVCS	75.00	90.22					FXD63B125	1200	5	M-	Y	R10
N	N	6	Standby Ltg Cab B1	240	RMOV BD 2A2-A			0-DXF-227-1	30.00	36.09					ED63B069				Y	R10
N	R	4	UV ANN	240	RMOV BD 2A2-A	4C									ED63B028			M-12212-A	N	R10
Y	Y	1	Cntmt Spray Hx 2A Sup Cont Vlv	240	RMOV BD 2A2-A	5E	1	2-FCV-67-125-A	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
N	R	4	OVERLOAD BYPASS	240	RMOV BD 2A2-A	6D									ED63B026			M-12212-A	N	R10
N	Y	1	ERCW Hdr 2A Iso Vlv Before Str	240	RMOV BD 2A2-A	7B	1	2-FCV-67-22-A	0.33	0.95	5.7		T17	120	EF3-A003	12	3	M-08663-A	Y	
Y	Y	1	A.Bldg ERCW Sup Hdr 2A Iso Vlv	240	RMOV BD 2A2-A	8A	1	2-FCV-67-81-A	0.67	1.90	7.6		T24	120	EF3-A005	14	LO	M-08663-A	N	
Y	Y	1	A.Bldg AirClr Sup Hdr 2A Iso V	240	RMOV BD 2A2-A	10B	1	2-FCV-67-127-A	0.33	0.95	5.7		T14	40	EF3-A003	12	3	M-08663-A	N	
N	R	1	Cmpnt Clg Hx A Disch Cont Vlv	240	RMOV BD 2A2-A	11A	1	2-FCV-67-146-A	0.67	1.90	7.6		T24	120	EF3-A003	16	4	F-13942-A	Y	R11
Y	N	1	CDWE BLDG SUPPLY VALVE	240	RMOV BD 2A2-A	11F	1	0-FCV-70-208-A	0.13	0.45	7.6		T9	60	EF3-A003	7	LO	M-08663-A	Y	
Y	Y	1	RCP Oil Clr Rtn Cntmt Isln Vlv	240	RMOV BD 2A2-A	12D	1	2-FCV-70-92-A	0.33	0.95	5.7		T15	66	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	SPLY HDR 2A TO HDR 1B ISLN VLV	240	RMOV BD 2A2-A	13A	1	2-FCV-67-223-A	0.67	1.90	11.0		T24	120	EF3-A00[illegible]	29	4	M-08663-A	Y	
Y	Y	1	YD HDR A DIS VLV TO CLG TWR	240	RMOV BD 2A2-A	13B	1	0-FCV-67-360	1.00	2.80	16.0		T29	180	EF3-A010	36	2	M-08663-A	N	
Y	Y	1	BA & Gas Strip Evap Pkg 2A FCV	240	RMOV BD 2A2-A	13D	1	2-FCV-70-168-A	0.33	0.95	5.7		T15	50	EF3-A003	12	3	M-08663-A	Y	
Y	Y	4	Annulus Spr Isln Vlv	240	RMOV BD 2A2-A	13E	1	2-FCV-26-245-A	0.67	2.80	16.0		T24	20	EF3-A010	36	2	M-12212-A	N	
Y	Y	1	RHR Hx A Hdr Inlet Vlv	240	RMOV BD 2A2-A	14A	1	2-FCV-70-2-A	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	Misc Eqpt Hdr Inlet Vlv	240	RMOV BD 2A2-A	14B	1	2-FCV-70-4-A	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCS Hx B Outlet Vlv	240	RMOV BD 2A2-A	14D	1	2-FCV-70-15-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCS HX B & C OUTLET ISLN VLV	240	RMOV BD 2A2-A	14E	1	2-FCV-70-195-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
N	N	1	CCS HX B DISCH BYPASS CONT VLV	240	RMOV BD 2A2-A	15A	1	2-FCV-67-143-A	0.13	0.45	3.2		T9	120	EF3-A003	7	LO	P-01136-A	Y	R16
Y	Y	1	CCS Hx B & C Inlet Isln Vlv	240	RMOV BD 2A2-A	15B	1	2-FCV-70-18-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCS HX B INLET VALVE	240	RMOV BD 2A2-A	15D	1	2-FCV-70-16-A	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	RHR Hx A-A Outlet Vlv	240	RMOV BD 2A2-A	16E	1	2-FCV-70-156-A	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
N	R	2A	480V BD RM 2A A/C CPRSR 2A-A	240	RMOV BD 2A2-A	17E		2-MTR-31-465-A	50.00	57.00	350.8	1.15			FXD63B080	770	5	F-13654-A	Y	R10
				240	RMOV BD 2A2-A			TOTALS		259.91	484.07									

GROUP 4 RMOV BOARD 2B1-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCM	CALC CH	REV
Y	N	2B	Boric Acid Transfer Pmp 2B-B	241	RMOV BD 2B1-B	2B	2	2-MTR-62-232-B	7.50	13.00		1.00	T43		EF3-A050	210	2	M-10522-A	N	
Y	N	2B	Boric Acid Transfer Pmp 2B-B	241	RMOV BD 2B1-B	2B	2	2-MTR-62-232-B	15.00	18.00	105.2	1.00	T48		EF3-A050	210	2	M-10522-A	N	
N	N	2B	Boric Acid Tank B Htr B-B	241	RMOV BD 2B1-B	3A		2-HTR-62-245-B	9.00	10.83					EF3-B020				N	
Y	N	1	CDWE Bldg Supply Valve	241	RMOV BD 2B1-B	3E	1	2-FCV-70-207-B	0.13	0.45	2.6		T9	40	EF3-A003	7	LO	M-08663-A	Y	
N	R	6	Alt Fdr 24V CAP Sys Bat Chgr 2	241	RMOV BD 2B1-B	3F1		0-CHGR-252-2	7.57	17.00					ED63B030			M-	N	R10
N	R	4	UV ANN	241	RMOV BD 2B1-B	4C									ED63B020			M-12212-A		R10
Y	N	4	HPFP Sys Low Level Intake Vlv	241	RMOV BD 2B1-B	5A	1	0-FCV-26-8-B	0.13	0.45	2.6		T9	90	EF3-A003	7	LO	M-12212-A	N	
Y	Y	2B	Vol Cont Tank Outlet Isln Vlv	241	RMOV BD 2B1-B	8A	1	2-LCV-62-133-B	1.90	3.50	26.0		T29	10	EF3-A010	58	4	M-10522-A	N	
N	R	4	OVERLOAD BYPASS	241	RMOV BD 2B1-B	16D									ED63B020			M-12212-A		R10
N	R	4	Power Outlets	241	RMOV BD 2B1-B	16E		2-PO-213-B1/1-5	0.00	0.00					ED63B100			M-12212-A	N	R10
N	N	2B	Boric Acid Batching Tank Htr 3	241	RMOV BD 2B1-B	17A	2	2-HTR-62-228/3	22.50	27.07					EF3-B040				N	
Y	Y	4	Annulus Standpipe Isln Vlv	241	RMOV BD 2B1-B	17B	1	2-FCV-26-241-B	0.67	2.80	16.0		T24		EF3-A010	36	2	M-12212-A	N	
N	R	4	Power Outlets	241	RMOV BD 2B1-B	17E		2PO-213-B1/6-10	0.00	0.00					ED63B100			M-12212-A	N	R10
N	R	6	Alt Fdr 24V M-wave Batt Chgr 2	241	RMOV BD 2B1-B	17F1		0-CHGR-253-2	3.54	7.00					ED63B020			M-	N	R10
N	R	6	INCORE INSTR RM CHILLED H2O	241	RMOV BD 2B1-B	17F2		2-MTR-31-324/2	3.00	4.60	32.0				ED63B020			M-	N	R10
				241	RMOV BD 2B1-B			TOTALS		104.7	184.4									

GROUP 4 RMOV BOARD 2B2-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	4	ALT 125V SP VTL BTRY CHGR 2-S	242	RMOV BD 2B2-B			0CHGR-236-2AC-S	28.60	53.00					EF3-B070				N	
N	R	6	CVC Sys Ht Tr Xfmr B1	242	RMOV BD 2B2-B			0DXF234-B1/CVCS	75.00	90.22					FXD63B125	1200	5	M-	Y	R10
N	N	6	Standby Ltg Cab #3	242	RMOV BD 2B2-B			0-DXF-227-2	30.00	36.10					ED61B060				Y	R10
N	R	4	UV ANN	242	RMOV BD 2B2-B	4C									ED63B020			M-12212-A		R10
Y	N	4	HPFP Com Hdr FCV	242	RMOV BD 2B2-B	5A	1	0-FCV-26-15	0.07	0.60	2.6		T9	40	EF3-A003	7	LO	M-12212-A	N	
Y	N	4	HPFP Com Hdr FCV	242	RMOV BD 2B2-B	5B	1	0-FCV-26-16	0.07	0.60	2.6		T9	40	EF3-A003	7	LO	M-12212-A	N	
Y	Y	1	Cntmt Spray Hx 2B Sup Cont Vlv	242	RMOV BD 2B2-B	5E	1	2-FCV-67-123-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	Cntmt Spray Hx 2B Disch Vlv	242	RMOV BD 2B2-B	5F	1	2-FCV-67-124-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
N	R	4	OVERLOAD BYPASS	242	RMOV BD 2B2-B	6F									ED63B020			M-12212-A		R10
N	Y	1	ERCW Hdr 2B Iso Vlv Before Str	242	RMOV BD 2B2-B	8A	1	2-FCV-67-24-B	0.33	0.95	5.7		T17	120	EF3-A003	12	3	M-08663-A	N	
N	Y	1	A.Bldg ERCW Sup Hdr 2B Iso Vlv	242	RMOV BD 2B2-B	8B	1	2-FCV-67-82-B	0.67	1.90	16.0		T24	120	EF3 A005	41	HI	M-08663-A	Y	
Y	Y	1	A.Bldg AirClr Sup Hdr 2B Iso V	242	RMOV BD 2B2-B	11A	1	2-FCV-67-128-B	0.33	0.95	5.7		T14	40	EF3-A003	12	3	M-08663-A	N	
Y	Y	4	HPFP Tn B Hdr FCV To Yard	242	RMOV BD 2B2-B	11F	1	0-FCV-26-13-B	0.33	0.75	5.7		T13	60	EF3-A003	12	3	M-12212-A	N	
Y	Y	1	CCS Hx C Disch Vlv To Hdr B	242	RMOV BD 2B2-B	12B	1	0-FCV-67-152-B	0.67	1.90	7.6		T24	120	EF3-A005	14	LO	M-08663-A	N	
Y	Y	4	Annulus Spr Isln Vlv	242	RMOV BD 2B2-B	12F	1	2-FCV-26-244-B	0.67	2.80	16.0		T24	20	EF3-A010	36	2	M-12212-A	N	
Y	Y	1	Sply Hdr 2B To Hdr 1A Isln Vlv	242	RMOV BD 2B2-B	13A	1	2-FCV-67-147-B	0.70	2.30	12.0		T26	120	EF3-A005	29	4	M-09228-A	Y	
Y	Y	1	CCS Hx B & C Inlet Isln Vlv	242	RMOV BD 2B2-B	13B	1	2-FCV-70-14-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	RHR Hx B Hdr Inlet Vlv	242	RMOV BD 2B2-B	14B	1	2-FCV-70-3-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCSP 2AA&2BB To C-S Outl Iso V	242	RMOV BD 2B2-B	14D	1	2-FCV-70-28-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCS Pmps 2A-A To 2B-B Isln Vlv	242	RMOV BD 2B2-B	14E	1		0.67	1.90	16.0		T24	120	EF3-A005	41	HI	M-08663-A	Y	
Y	Y	1	RHR Hx B Rtn Hdr Isln Vlv	242	RMOV BD 2B2-B	15A	1	2-FCV-70-75-B	0.33	0.75	5.7		T14	90	EF3-A003	12	3	M-09166-A	Y	
Y	Y	1	CCS Hx B & C Outlet Isln Vlv	242	RMOV BD 2B2-B	15B	1	2-FCV-70-196-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCSP 2AA&2BB To C-S Inlt Iso V	242	RMOV BD 2B2-B	15D	1	2-FCV-70-78-B	0.67	1.90	16.0		T24	120	EF3-A005	41	HI	M-08663-A	Y	
Y	Y	1	RHR Hx B-B Outlet Vlv	242	RMOV BD 2B2-B	15E	1	2-FCV-70-153-B	0.33	0.95	5.7		T16	90	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCSP 2AA&2BB To C-S Inlt Iso V	242	RMOV BD 2B2-B	16A	1	2-FCV-70-76-B	0.67	1.90	16.0		T24	120	EF3-A005	41	HI	M-08663-A	Y	
Y	Y	1	SFPCS Hx Sply Hdr Isln Vlv	242	RMOV BD 2B2-B	17A	1	0-FCV-70-194-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
Y	Y	1	CCSP 2AA&2BB To C-S Outl Iso V	242	RMOV BD 2B2-B	17B	1	2-FCV-70-29-B	0.33	0.95	5.7		T16	100	EF3-A003	12	3	M-08663-A	N	
N	R	2A	480V Bd Rm 2B A/C Cprsr 2B-B	242	RMOV BD 2B2-B	18D	4	2-MTR-31-447-B	75.00	90.00	526.2	1.15			FXD63B175	1210	3	M-10448-A	Y	R10
				242	RMOV BD 2B2-B			TOTALS		297.07	705.06									

GROUP 4 RX VENT BOARD 1A-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	Y	4	Cntmt Fl & Eqpt Dr Sump Pmp 1A	243	RX VENT BD 1A-A	2A	1	1-MTR-77-125A	3.00	4.60	33.9	1.15	T35	EF3-A010	58	4	M-12212-A	Y	R10
N	N	6	Hydrogen Elec Recombiner 1A-A	243	RX VENT BD 1A-A	2D		1-HTR-83-1-A	75.00	90.22				FJ3-B125	750	LO		N	
N	N	6	Incore Flux Det Dr Unit 1D	243	RX VENT BD 1A-A	3A		1-MTR-94-1D	3.42	7.25				EF3-B020				N	
N	N	6	Incore Flux Det Dr Unit 1E	243	RX VENT BD 1A-A	3B		1-MTR-94-1E	3.42	7.25				EF3-B020				N	
N	N	6	Incore Flux Det Dr Unit 1F	243	RX VENT BD 1A-A	3C		1-MTR-94-1F	3.42	7.25				EF3-B020				N	
N	Y	4	Ice Cond Fl Clg Pmp	243	RX VENT BD 1A-A	4D	2	1-MTR-61-51	22.79	27.80	222.5		T51	EF3-L050	470	HI	M-12212-A	N	
Y	N	4	Ice Cond Fl Defrost Htr	243	RX VENT BD 1A-A	4E	2	1-MTR-61-92	30.00	36.09			T54	EF3-B050			M-12212-A	N	
Y	Y	2A	Spreading Rm Sply Fan	243	RX VENT BD 1A-A	5A	1	0-MTR-31-406	0.25	1.00	10.0		T18	EF3-A005	22	3	M-10448-A	N	
N	Y	2A	Spreading Rm Exh Fan A	243	RX VENT BD 1A-A	6A	1	0-MTR-31-25	3.00	4.60	32.0		T34	EF3-A010	58	4	M-10448-A	Y	
Y	Y	4	Waste Gas Cprsr Pkg A	243	RX VENT BD 1A-A	6C	2	0-MTR-77-91	25.00	30.00	197.4	1.15	T53	EF3-M050	400	2	M-12212-A	N	
N	R	6	Intake Pmp Sta Ht Tr Sys A	243	RX VENT BD 1A-A	6F1		0-DXF-234-A/IPS	20.00	24.07				EF3-B040			M-	N	
Y	Y	4	Reac Cool Pmp 1 Mtr Htr	243	RX VENT BD 1A-A	7B	1	1-HTR-68-8AA	2.75	3.46			T31	EF3-A010	27	LO	M-12212-A	Y	R10
Y	N	4	Reac Cool Pmp 1 Oil Lift Pmp	243	RX VENT BD 1A-A	7D	1	1-MTR-68-84	10.00	13.60	81.0		T45	EF3-B040			M-12212-A	Y	R10
N	N	4	Aux & Cont Bldg 480V Rcpts	243	RX VENT BD 1A-A	7F2		1-PO-232-9 - 11	0.00	0.00				EF3-B100				N	
Y	Y	4	Reac Cool Pmp 3 Mtr Htr	243	RX VENT BD 1A-A	8B	1	1-HTR-68-50AA	2.75	3.46			T31	EF3-A010	27	LO	M-12212-A	Y	R10
N	R	4	Reac Cool Pmp 3 Oil Lift Pmp	243	RX VENT BD 1A-A	8D	1	1-MTR-68-86	10.00	13.60	81.0		T45	EF3-B040			M-12212-A	Y	R10
N	N	4	Aux & Cont Bldg 480V Rcpts	243	RX VENT BD 1A-A	8F2		1-PO-232-1,2,3	0.00	0.00				EF3-B100				N	
N	N	2A	Reac Upper Compt Clr Fan 1A	243	RX VENT BD 1A-A	9B	1	1-MTR-30-95	5.00	9.10	39.5		T40	EF3-A025	75	LO		N	
N	N	4	Aux & Cont Bldg 480V Rcpts	243	RX VENT BD 1A-A	9F2		1-PO-232-5thur8	0.00	0.00				EF3-B100				N	
N	Y	2A	Reac Upper Compt Clr Fan 1C	243	RX VENT BD 1A-A	10B	1	1-MTR-30-99	5.00	9.10	39.5		T40	EF3-A025	75	LO	M-10448-A	Y	
N	N	6	STUD TENSION HOISTS PWR OUTLET	243	RX VENT BD 1A-A	10F		1HST-78-ST1,2,3	0.00	0.00				EF3-B020				N	
Y	Y	2A	COMPUTER ROOM AHU NO. 1	243	RX VENT BD 1A-A	11B	1	0-MTR-31-497	7.50	9.60	60.0	1.00	T41	EF3-A025	125	3	P-5297-A	N	
Y	R	4	Reac Cool Dr Tk Pmp 1A	243	RX VENT BD 1A-A	11D	2	1-MTR-77-4	7.50	9.50	66.7		T40	EF3-A025	125	3	M-12212-A	N	
N	N	2A	Reac Lwr Compt Unit Htr 1A	243	RX VENT BD 1A-A	11F		1-HTR-30-74H	10.00	12.03				EF3-B020				N	
N	N	2A	Cntmt Instr Rm Unit Htr 1A	243	RX VENT BD 1A-A	12F		1-HTR-30-11H	5.00	6.02				EF3-B040				N	
N	N	6	Reac Bldg Manipulator Crane 1	243	RX VENT BD 1A-A	13A		1-CRN-78-1M	8.00	13.60				EF3-B040				N	
N	Y	4	ICE COND AIR HANDLING UNIT 1	243	RX VENT BD 1A-A	13D		1-AHU-61-1T028	89.00	119.50	320.0			FJ3-B115	750	LO	M-12212-A	N	
Y	Y	4	Ice Cond End Wall Door No 1	243	RX VENT BD 1A-A	14B	1	1-MTR-61-280A	2.00	2.90	25.0	1.15	T30	EF3-A010	58	4	M-12212-A	N	
N	Y	4	ICE COND AIR HANDLING UNIT 1	243	RX VENT BD 1A-A	14D		1-AHU-61-3T027	78.00	104.50	280.0			FJ3-B150	750	LO	M-12212-A	N	
N	N	2A	Reac Upper Compt Htr 1A	243	RX VENT BD 1A-A	15A		1-HTR-30-35H	50.00	60.20				EF3-B070				N	
N	R	2A	Cntmt Purge Air Sply Fan 1A	243	RX VENT BD 1A-A	15D	3	1-MTR-30-1	50.00	62.00	350.0	1.00	T56	EF3-A100	750	3	M-10448-A	N	
N	N	2A	Reac Upper Cmpt Htr 1C	243	RX VENT BD 1A-A	16A		1-HTR-30-33H	50.00	60.20				EF3-B070				N	
N	Y	2A	Cntmt Purge Air Exh Fan 1A	243	RX VENT BD 1A-A	16D	3	1-MTR-30-1E	50.00	62.00	312.0	1.00	T56	EF3-A100	630	2	M-10448-A	Y	
				243	RX VENT BD 1A-A			TOTALS		814.5	2150.4								

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	Y	4	Cntmt Fl & Eqpt Dr Sump Pmp 1B	244	RX VENT BD 1B-B	2A	1	1-MTR-77-125B	3.00	4.30	33.9		T33	EF3-A010	58	4	M-12212-A	Y	R10
N	N	6	Hydrogen Elec Recombiner 1B-B	244	RX VENT BD 1B-B	2D		1-MTR-83-2-B	75.00	90.22				FJ3-B125	750	LO		N	
N	N	6	Incore Flux Det Dr Unit 1A	244	RX VENT BD 1B-B	3A		1-MTR-94-1A	3.42	7.25				EF3-B020				N	
N	N	6	Incore Flux Det Dr Unit 1B	244	RX VENT BD 1B-B	3B		1-MTR-94-1B	3.42	7.25				EF3-B020				N	
N	N	6	Incore Flux Det Dr Unit 1C	244	RX VENT BD 1B-B	3C		1-MTR-94-1C	3.42	7.25				EF3-B020				N	
Y	Y	2A	Incore Instr Rm Purge Sply Fan	244	RX VENT BD 1B-B	5E	1	1-MTR-30-11	0.25	1.00	10.0		T18	EF3-A003	21	HI	M-10448-A	N	
N	N	2A	Spreading Rm Exh Fan B	244	RX VENT BD 1B-B	6A	1	0-MTR-31-26	3.00	4.60	32.0		T34	EF3-A010	58	4		Y	
N	N	4	Ice Cond Fl Clg Pmp	244	RX VENT BD 1B-B	6C	2	1-MTR-61-61	25.00	27.80	182.5		T51	EF3-L050	330	4		Y	R10
Y	N	4	Ice Cond Fl Defrost Htr	244	RX VENT BD 1B-B	6D	2	1-HTR-61-93	30.00	36.09			T54	EF3-B050%			M-12212-A	N	
Y	Y	2A	Incore Instr Rm Purge Exh Fan	244	RX VENT BD 1B-B	6E	1	1-MTR-30-11E	0.33	1.00	10.0		T18	EF3-A003	21	HI	M-10448-A	N	
N	N	6	Cont Bay Sump Pmp 1	244	RX VENT BD 1B-B	6F1		1-MTR-40-2	5.00	7.25	46.0			EF3 3020				N	
Y	Y	4	Reac Cool Pmp 2 Mtr Htr	244	RX VENT BD 1B-B	7B	1	1-HTR-68-31AA	2.75	3.46			T31	EF3-A010	27	LO	M-12212-A	Y	R10
Y	N	4	Reac Cool Pmp 2 Oil Lift Pmp	244	RX VENT BD 1B-B	7D	1	1-MTR-68-85	10.00	13.50	79.0	1.15	T45	EF3-B040			M-12212-A	Y	R10
Y	Y	4	Reac Cool Pmp 4 Mtr Htr	244	RX VENT BD 1B-B	8B	1	1-HTR-68-73AA	2.75	3.46			T31	EF3-A010	27	LO	M-12212-A	Y	R10
Y	N	4	Reac Cool Pmp 4 Oil Lift Pmp	244	RX VENT BD 1B-B	8D	1	1-MTR-68-87	10.00	13.60	81.0		T45	EF3-B040			M-12212-A	Y	R10
N	R	6	Intake Pmp Sta Ht Tr Sys B	244	RX VENT BD 1B-B	8F1		0-DXF-234-B/IPS	20.00	24.07				EF3-B040			M-	Y	
N	N	2A	Reac Upper Compt Clr Fan 1B	244	RX VENT BD 1B-B	9B	1	1-MTR-30-97	5.00	9.10	39.5		T40	EF3-A025	75	LO		N	
N	Y	2A	Reac Upper Compt Clr Fan 1D	244	RX VENT BD 1B-B	10B	1	1-MTR-30-100	5.00	9.10	39.5		T40	EF3-A025	75	LO	M-10448-A	N	
N	N	6	Reac Bldg Jib Crane	244	RX VENT BD 1B-B	10F		1-CRN-78-15	5.00	7.25	46.0			EF3-B020				N	
Y	R	4	Reac Cool Dr Tk Pmp 1B	244	RX VENT BD 1B-B	11D	2	1-MTR-77-6	15.00	18.20	118.4	1.15	T48	EF3-B070			M-12212-A	Y	R10
N	N	2A	Reac Lwr Compt Unit Htr 1B	244	RX VENT BD 1B-B	11F		1-HTR-30-75H	10.00	12.60				EF3-B020				N	
N	N	2A	Cntmt Instr Rm Unit Htr 1B	244	RX VENT BD 1B-B	12F		1-HTR-30-12H	5.00	6.02				EF3-B020				N	
Y	Y	4	Ice Cond End Wall Door No 1B	244	RX VENT BD 1B-B	13B	1	1-MTR-61-280B	2.00	2.90	25.0	1.15	T30	EF3-A010	58	4	M-12212-A	N	
N	Y	4	ICE COND AIR HANDLING UNIT	244	RX VENT BD 1B-B	13D		1-AHV-61-2TO30	89.00	119.50	320.0			FJ3-B175	750	LO	M-12212-A	N	
N	R	4	ICE COND BRIDGE CRANE	244	RX VENT BD 1B-B	13F		1-CRN-61-1BC	10.00	13.30				EF3-B030			M-12212-A	Y	R10
Y	Y	6	RCC Change Hoist	244	RX VENT BD 1B-B	14B	1	1-CRN-78-1RCC	0.33	1.00	10.0		T18	EF3-A003	21	HI	M-	N	
N	Y	4	ICE COND AIR HANDLING UNIT	244	RX VENT BD 1B-B	14D		1-AHU-61-5TO29	78.00	104.50	280.0			FJ3-B150	750	LO	M-12212-A	N	
N	R	6	Eqpt Hatch Hoist	244	RX VENT BD 1B-B	14F		1-CRN-78-1EH	10.00	14.50	100.3	1.00		EF3-B030			M-	N	
N	N	2A	Reac Upper Compt Htr 1B	244	RX VENT BD 1B-B	15A		1-HTR-30-37H	50.00	60.20				EF3-B070				N	
Y	N	2A	Cntmt Purge Air Sply Fan 1B	244	RX VENT BD 1B-B	15D	3	1-MTR-30-4	50.00	62.00	350.0	1.00	T56	EF3-A100	750	3	M-10448-A	N	
N	N	2A	Reac Upper Compt Htr 1D	244	RX VENT BD 1B-B	16A		1-HTR-30-100H	50.00	60.15				EF3-B070				N	
Y	Y	2A	Cntmt Purge Air Exh Fan 1B	244	RX VENT BD 1B-B	16D	3	1-MTR-30-4E	50.00	62.00	312.0	1.00	T56	EF3-A100	630	2	M-10448-A	Y	
				244	RX VENT BD 1B-B			TOTALS		814.42	2115.0								

GROUP 4 RX VENT BOARD 2B-B WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH REV
N	N	6	Cont Bay Sump Pmp 1	246	RX VENT BD 2B-B	6F1		2-MTR-40-2	5.00	7.25	46.0			EF3-B020				N
N	N	4	Aux & Cont Bldg 480V Rcpts	246	RX VENT BD 2B-B	6F2		2-PO-232-12to15	0.00	0.00				EF3-B100				N
N	N	4	Aux & Cont Bldg 480V Rcpts	246	RX VENT BD 2B-B	8F2		2-PO-232-16to19	0.00	0.00				EF3-B100				N
Y	Y	2A	COMPUTER ROOM AHU NO. 1	246	RX VENT BD 2B-B	11B	1	0-MTR-31-498	7.50	9.60	60.0	1.00	T41	EF3-\025	125	3	P-5297-A	D

GROUP 4 RX VENT BOARD 2A-A WBN-EEB-TI08-0008 Rev 10 DATE 14-Sep-90

H	B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLDSTROK SIZETIME	BKR	BKR INST	SET POSIT	DCN	CALC CH REV
Y	Y	4	Waste Gas Cprsr Pkg B	245	RX VENT BD 2A-A	6C	2	0-MTR-77-105	25.00	30.00	197.4	1.15	T53	EF3-H050	400	2	M-12212-A	N
N	N	4	Aux & Cont Bldg 480V Rcpts	245	RX VENT BD 2A-A	7F2		2-PO-232-1 to 4	0.00	0.00				EF3-B100				N
N	N	4	Aux & Cont Bldg 480V Rcpts	245	RX VENT BD 2A-A	8F2		2-PO-232-9,10	0.00	0.00				EF3-B100				N

MOTOR CURVES

1 AUX BLDG GEN SUPPLY FAN (ABSUPFAN)

DS 206 BREAKER FRAME 800A
SENSOR 200A
LTPU 0.9
LTD 4.0
INST 700%

2 COMPONENT COOLING SYSTEM PUMP (CCS)

DS 416 BREAKER FRAME 1600A
SENSOR 600A
LTPU 0.95
LTD 4.0
INST 800%

3 REAC LWR COMPT CLR FAN (RXLWRCOMPT)

DS 206 BREAKER FRAME 800A
SENSOR 100A
LTPU 0.95
LTD 9.0
INST 1200%

4 CNTMT AIR RTN FAN (CNMTRETFAN)

DS 206 BREAKER FRAME 800A
SENSOR 200A
LTPU 0.75
LTD 10.0
INST 1000%

5 CRDM CLR FAN (CRDMCLRFAN)

DS 206 BREAKER FRAME 800A
SENSOR 150A
LTPU 0.95
LTD 4.0
INST 600%

6 ELEC BD RM AHU'S C-B & D-B (ELECBDAHU)

DS 206 BREAKER FRAME 800A
SENSOR 100A
LTPU 0.9
LTD 6.0
INST 800%

MOTOR CURVES

6A ELEC BD RM AHU 0-MTR-31-30B-A (MTR-31-30B-A)
DS 206 BREAKER FRAME 800A
SENSOR 100A
LTPU 0.8
LTD 4.0
INST 300%

6B ELEC BD RM AHU 0-MTR-31-30D-A (MTR-31-30D-A)
DS 206 BREAKER FRAME 800A
SENSOR 150A
LTPU 0.55
LTD 4.0
INST 600%

7 CONT RM A/C CPRSR (CONTRMA/C)

DS 416 BREAKER FRAME 1600A
SENSOR 600A
LTPU 0.7
LTD 4.0
INST 700%

8 AUX BLDG GEN EXH FAN 1A (MTR-30-159)

DS 206 BREAKER FRAME 800A
SENSOR 300A
LTPU 0.7
LTD 6.0
INST 700%

9 480V SHDN BD ROOM AHU (480SHBDRMA)

DS 206 BREAKER FRAME 800A
SENSOR 150A
LTPU 0.9
LTD 8.0
INST 900%

10 AUX CCNT & SERV AIR CPRSR (AC&SA)

DS 416 BREAKER FRAME 1600A
SENSOR 300A
LTPU 0.76
LTD 4.0
INST 600%

MOTOR CURVES

11 480V SHDN BD ROOM CHLER (480VCHPKG)

DS 416 BREAKER FRAME 1600A
SENSOR 400A
LTPU 0.88
LTD 4.0
INST 700%

12 AUX BLDG GEN EXH FAN (ABGENEXH)

DS 206 BREAKER FRAME 800A
SENSOR 300A
LTPU 0.65
LTD 4.0
INST 700%

13 RECIPROCATING CHARING PUMP (MTR-62-101)

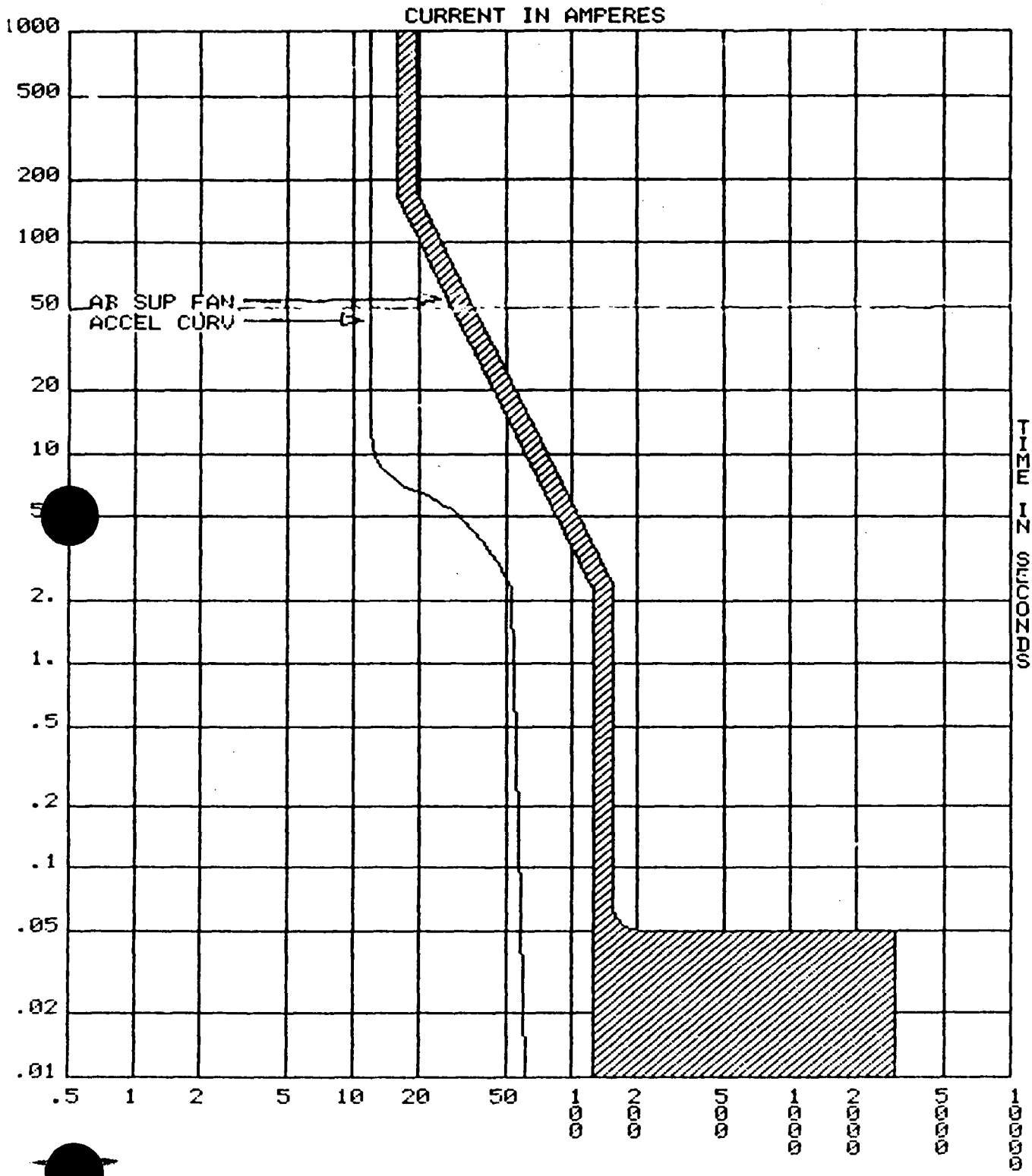
DS 416 BREAKER FRAME 1600A
SENSOR 400A
LTPU 0.8
LTD 4.0
INST 900%

14 STATION FIRE PUMP (FIREPUMP)

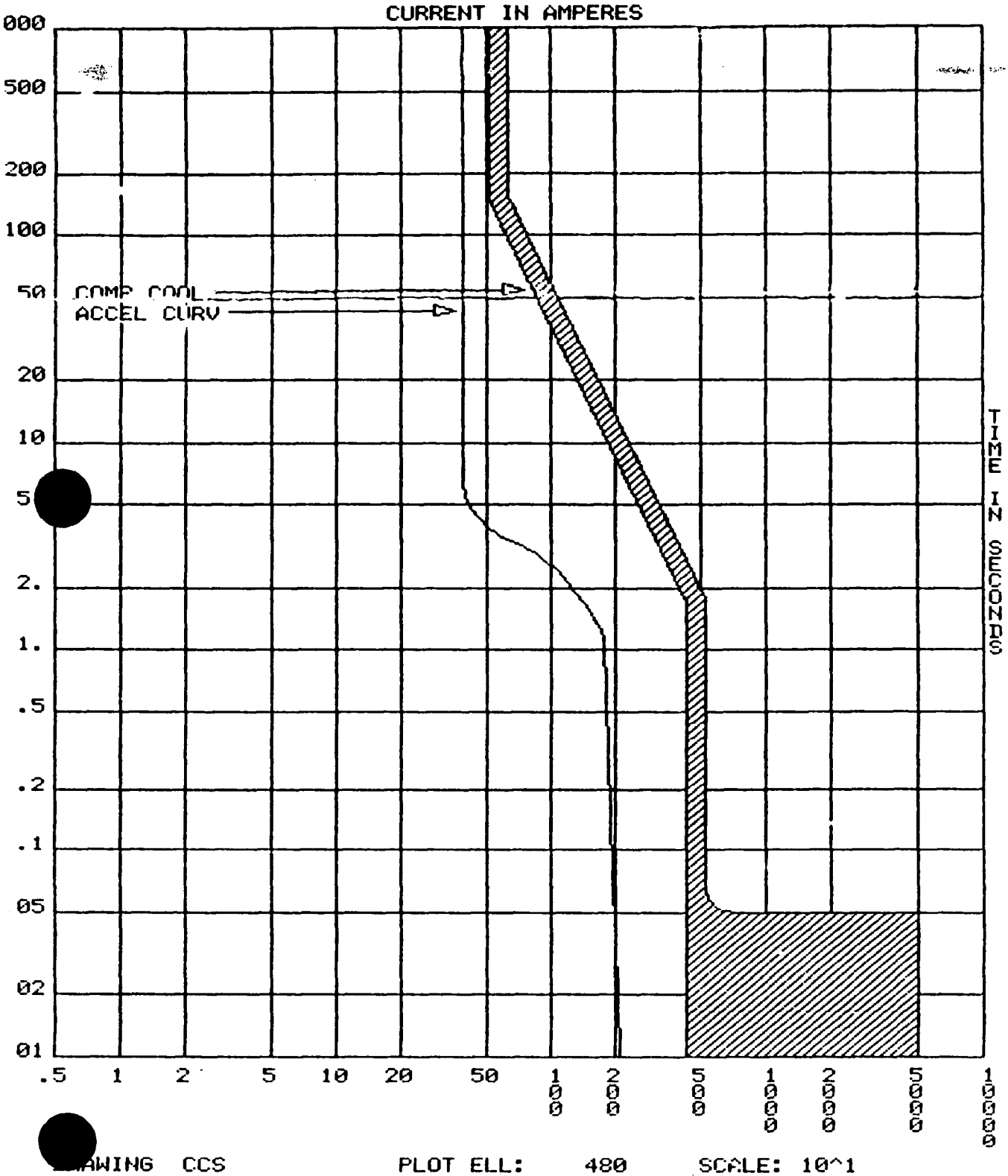
DS 416 BREAKER FRAME 1600A
SENSOR 600A
LTPU 1.25
LTD 4.0
INST 600%

15 SPENT FUEL PIT PUMP (SFPPMP)

DS 206 BREAKER FRAME 800A
SENSOR 200A
LTPU 0.8
LTD 4.0
INST 700%



AWING ABSUPFAN PLOT ELL: 480 SCALE: 10^1



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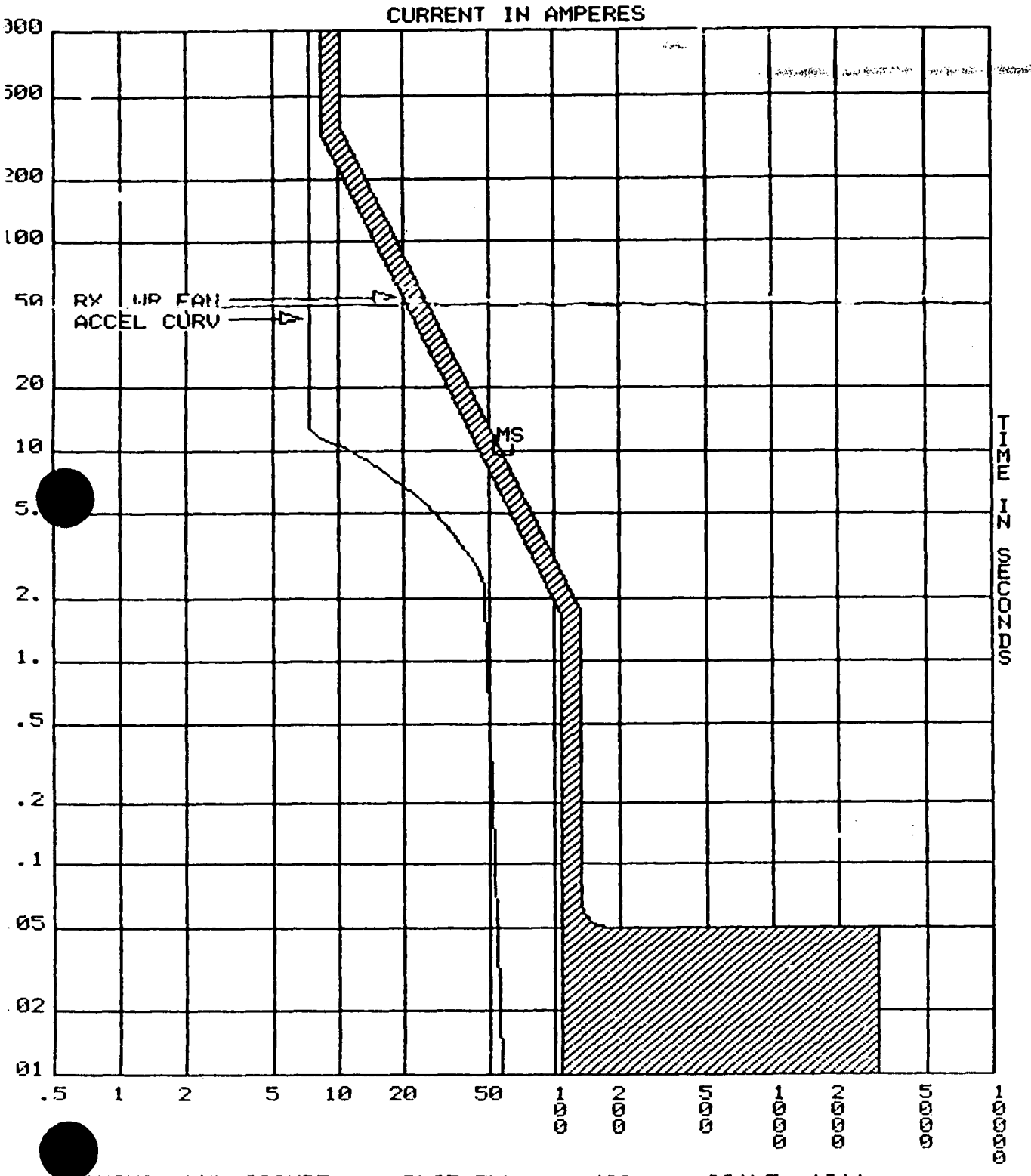
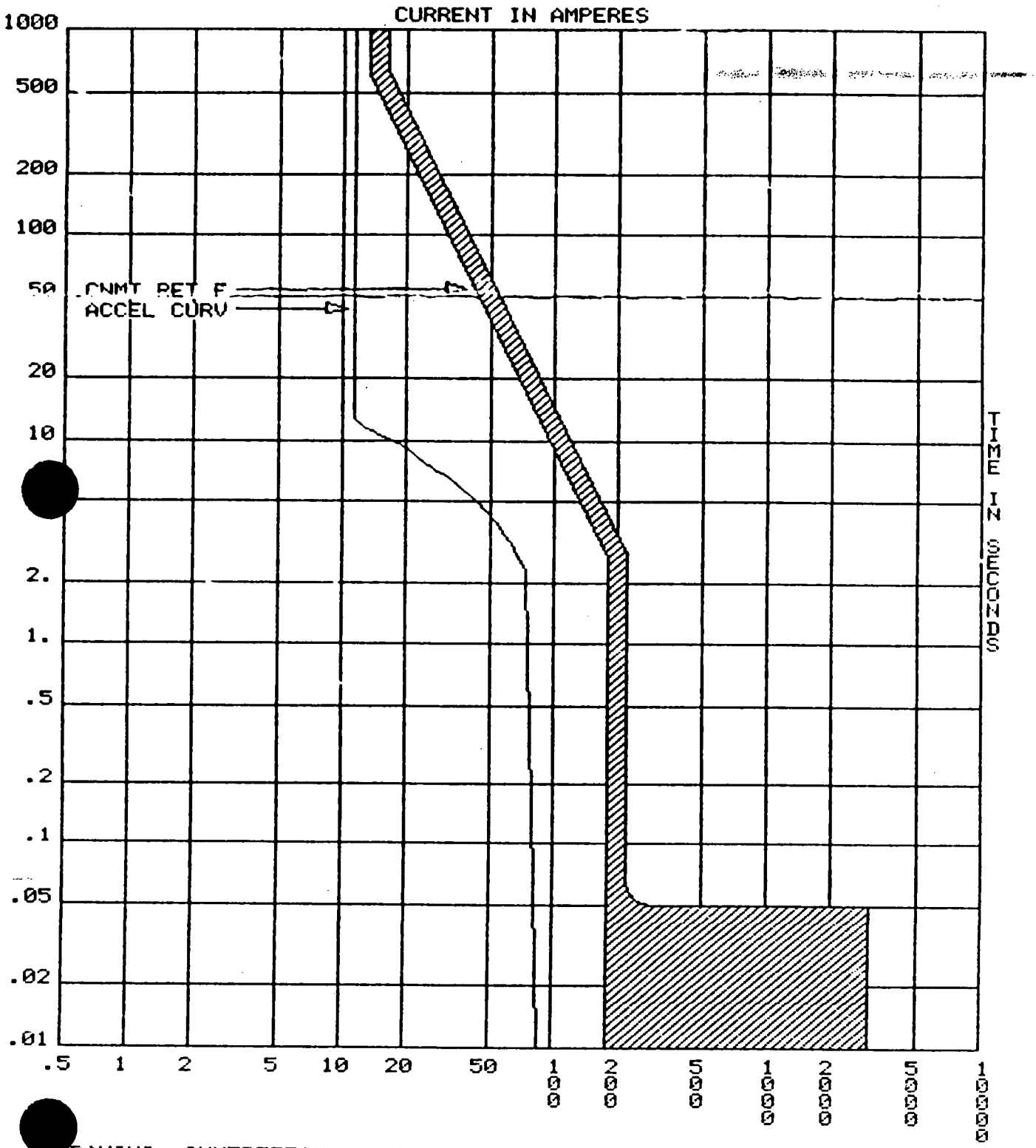
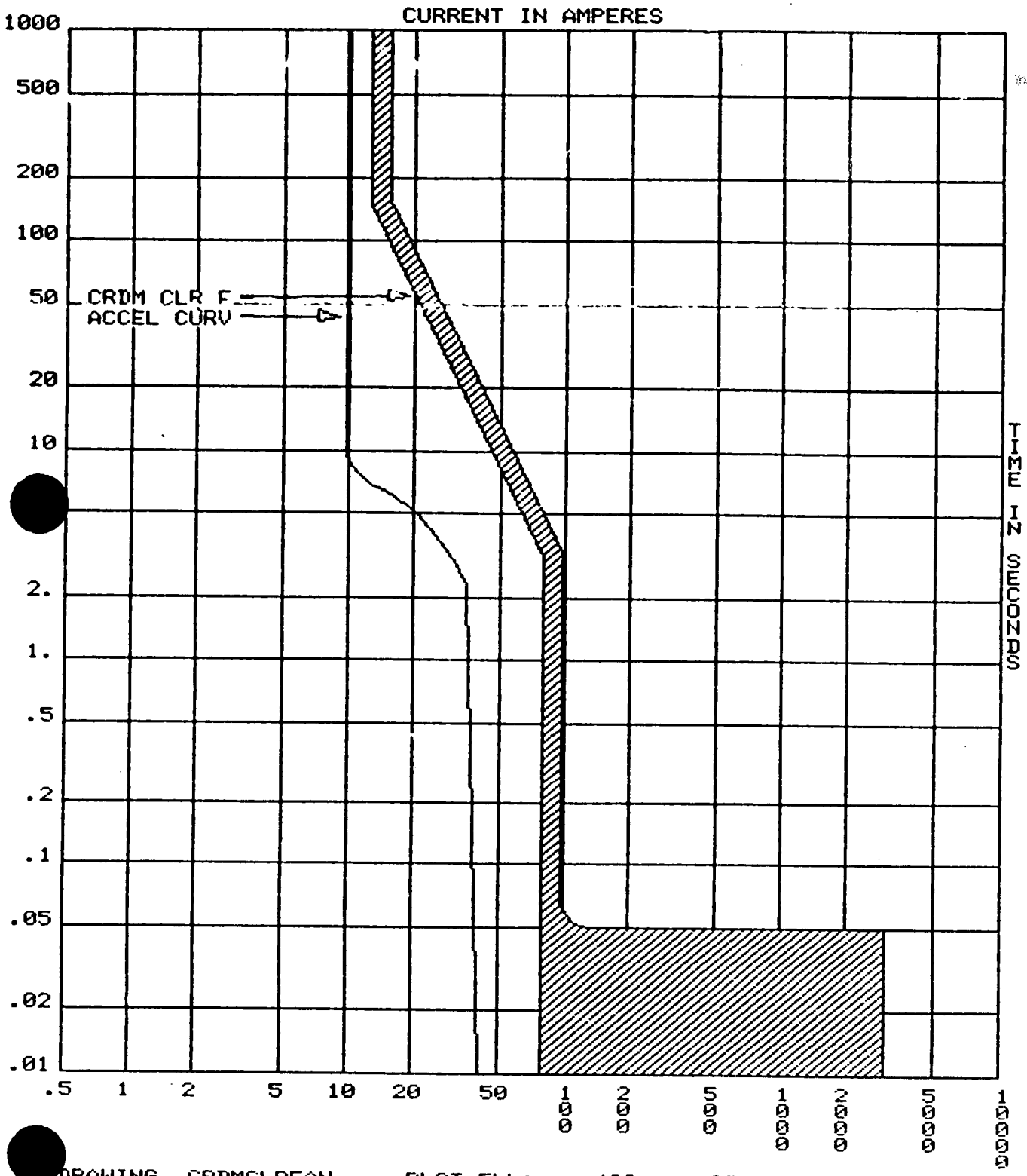


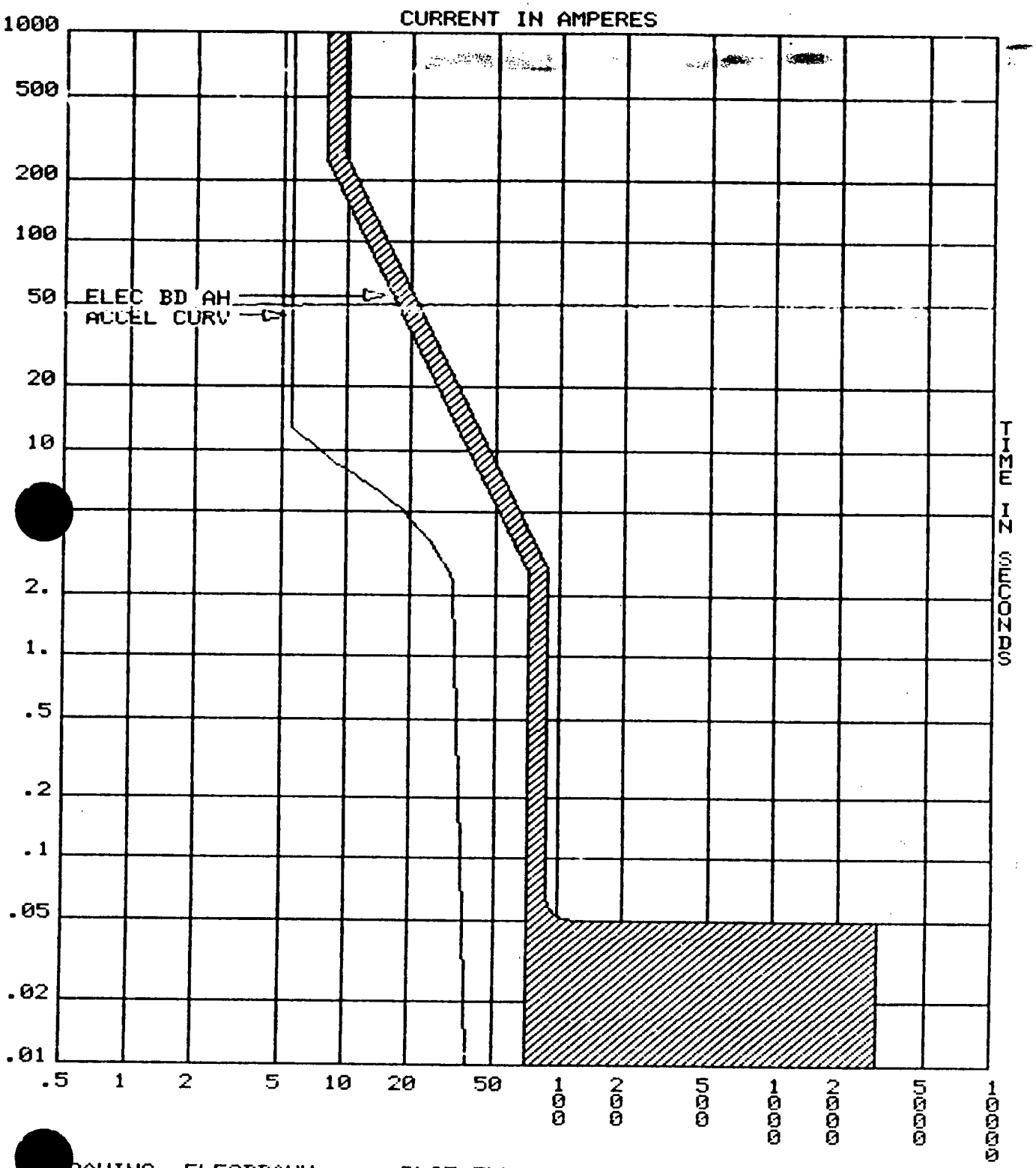
DRAWING RXLWRCOMPT PLOT ELL: 480 SCALE: 10^1



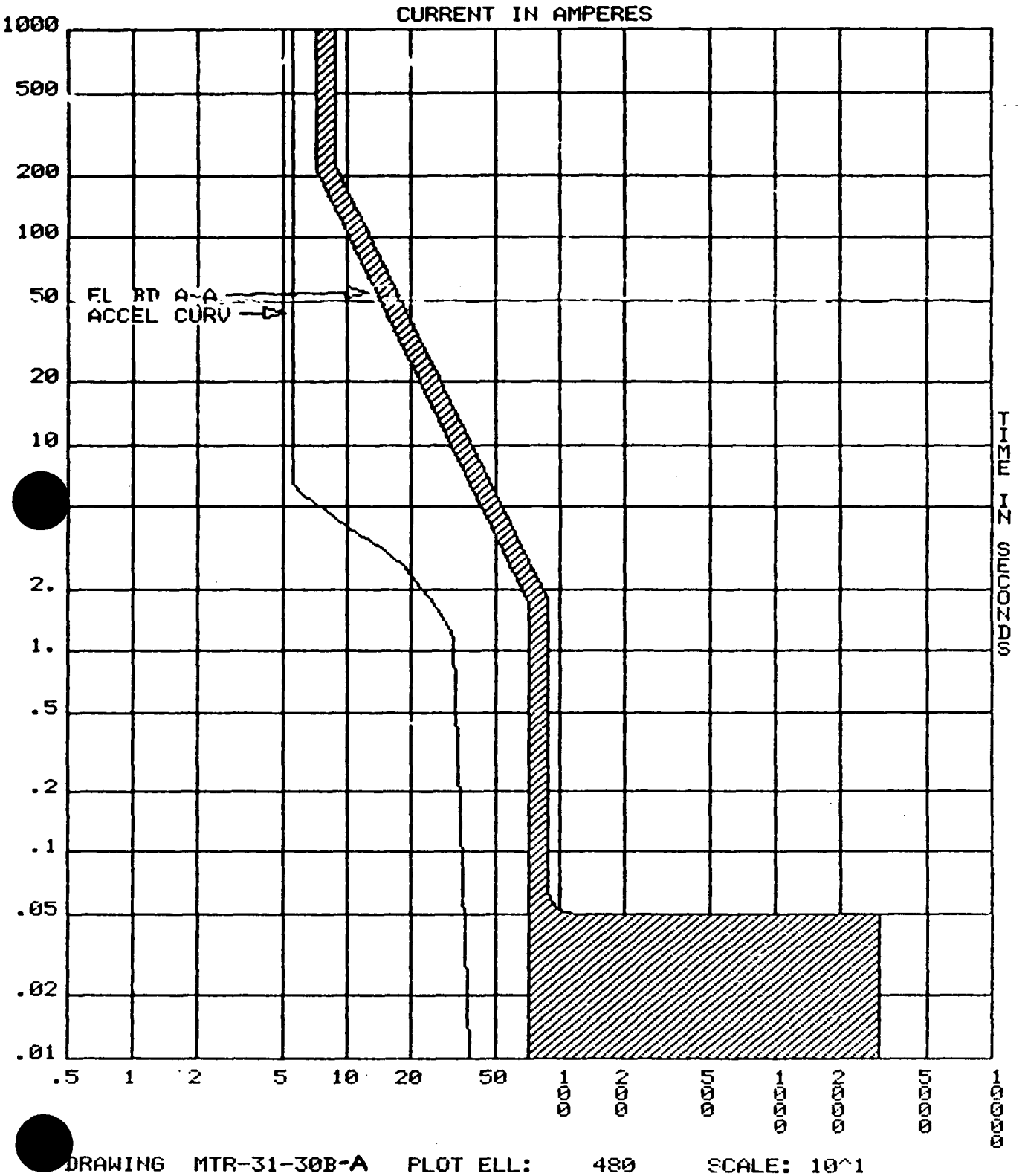
DRAWING CNMTRETFAN PLOT ELL: 480 SCALE: 10^1



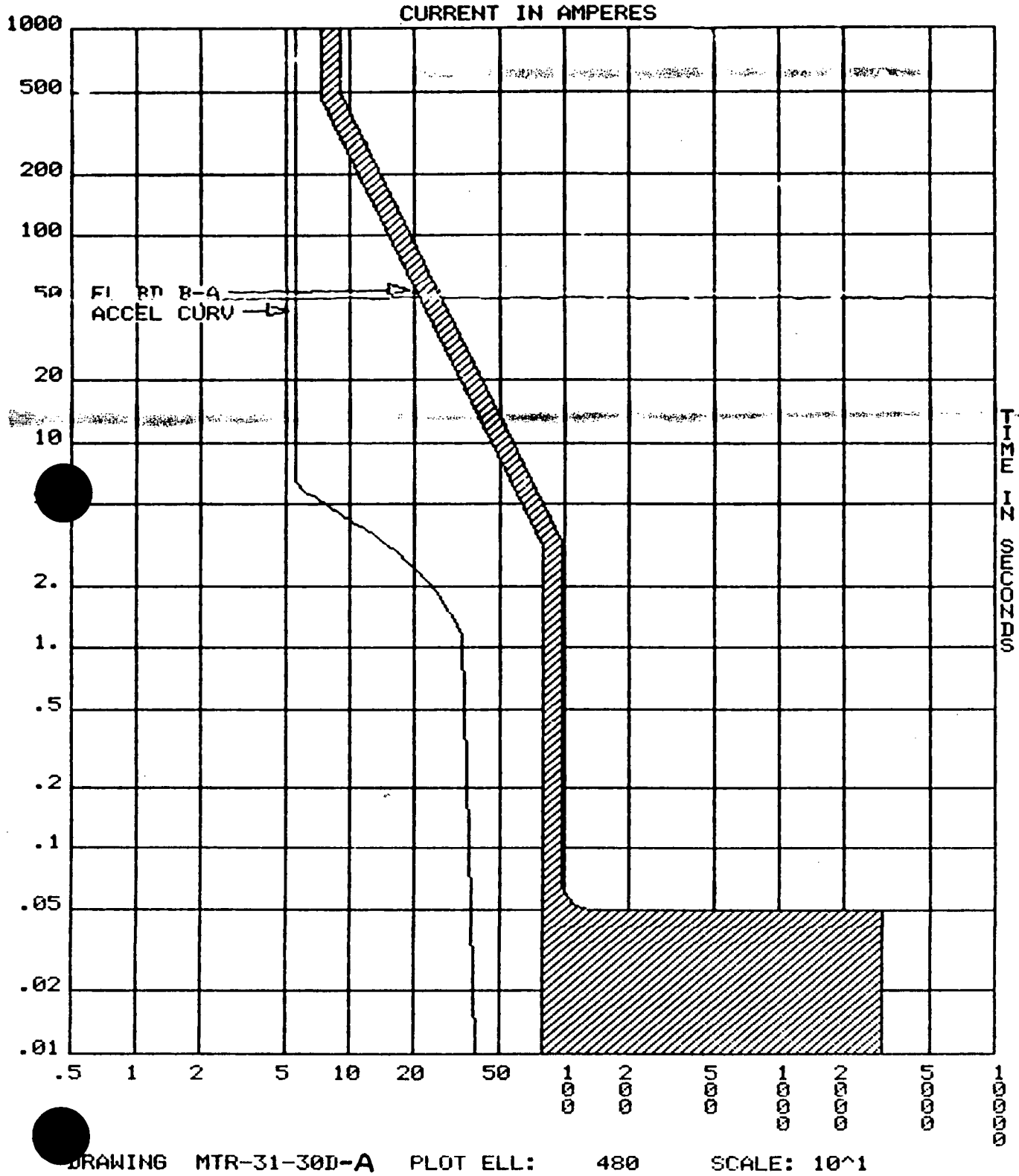
DRAWING CRDMCLRFAN PLOT ELL: 480 SCALE: 10^1



RAWING ELECBDAHU PLOT ELL: 480 SCALE: 10^1



DRAWING MTR-31-30B-A PLOT ELL: 480 SCALE: 10^1



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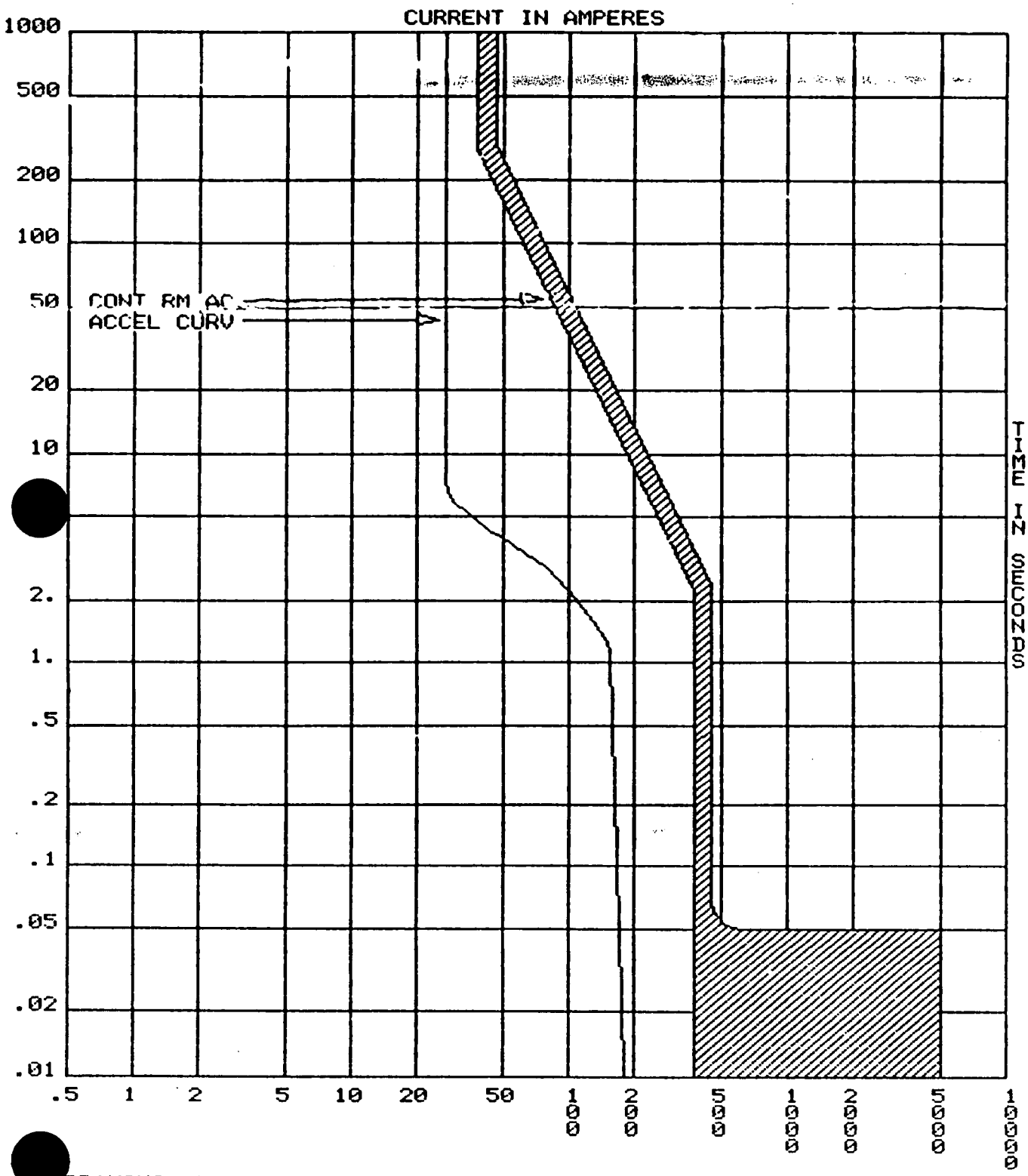
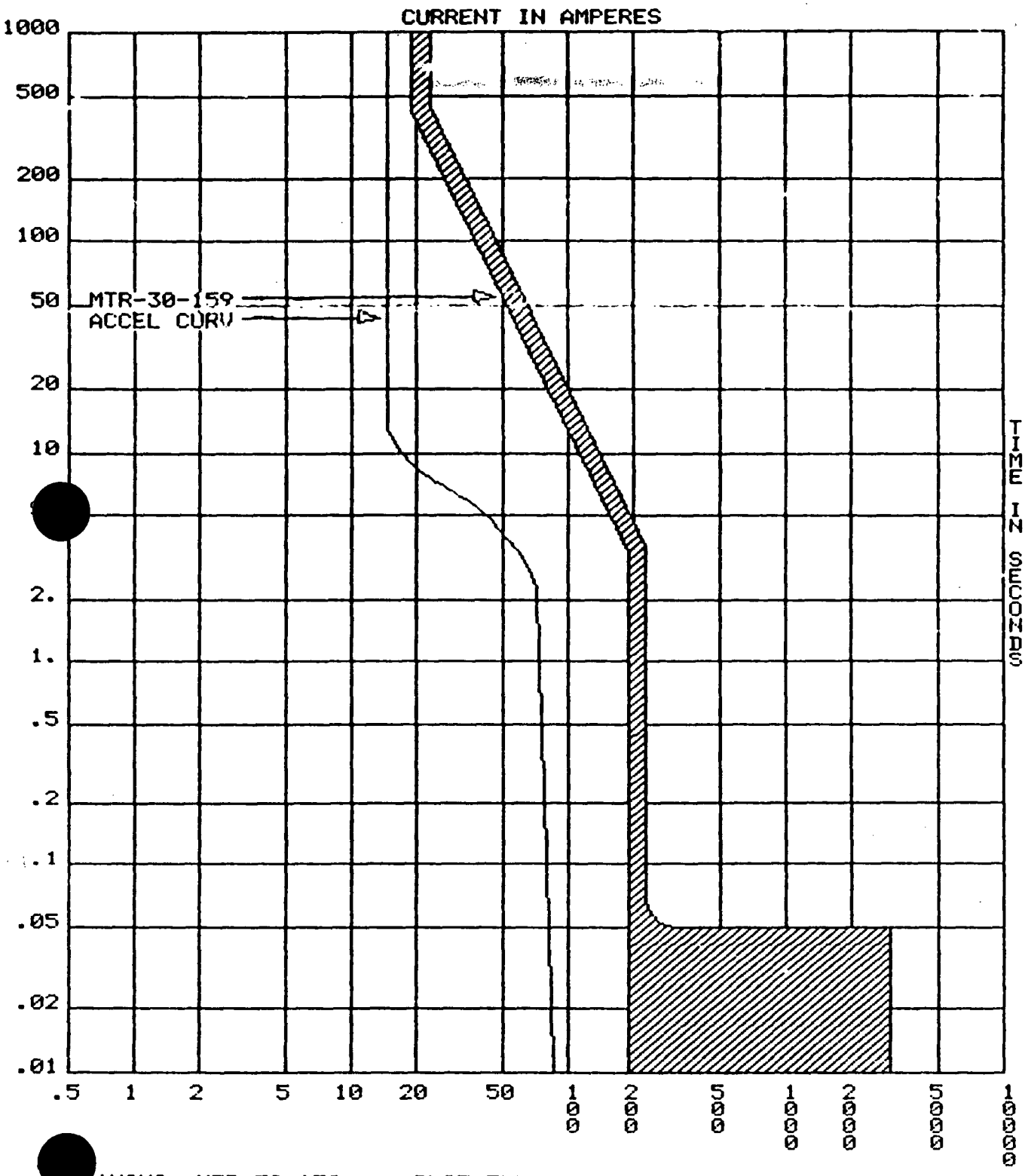
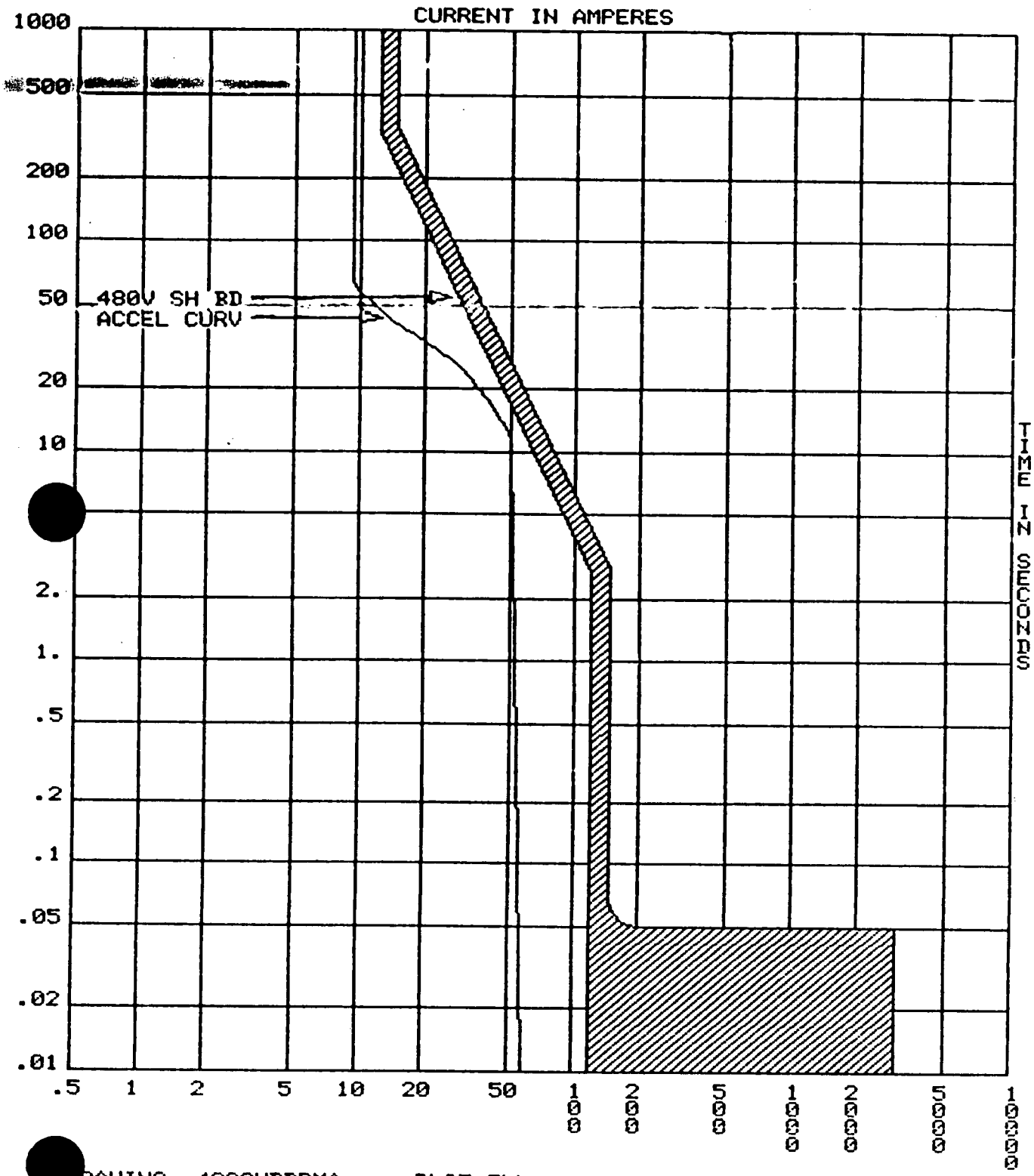


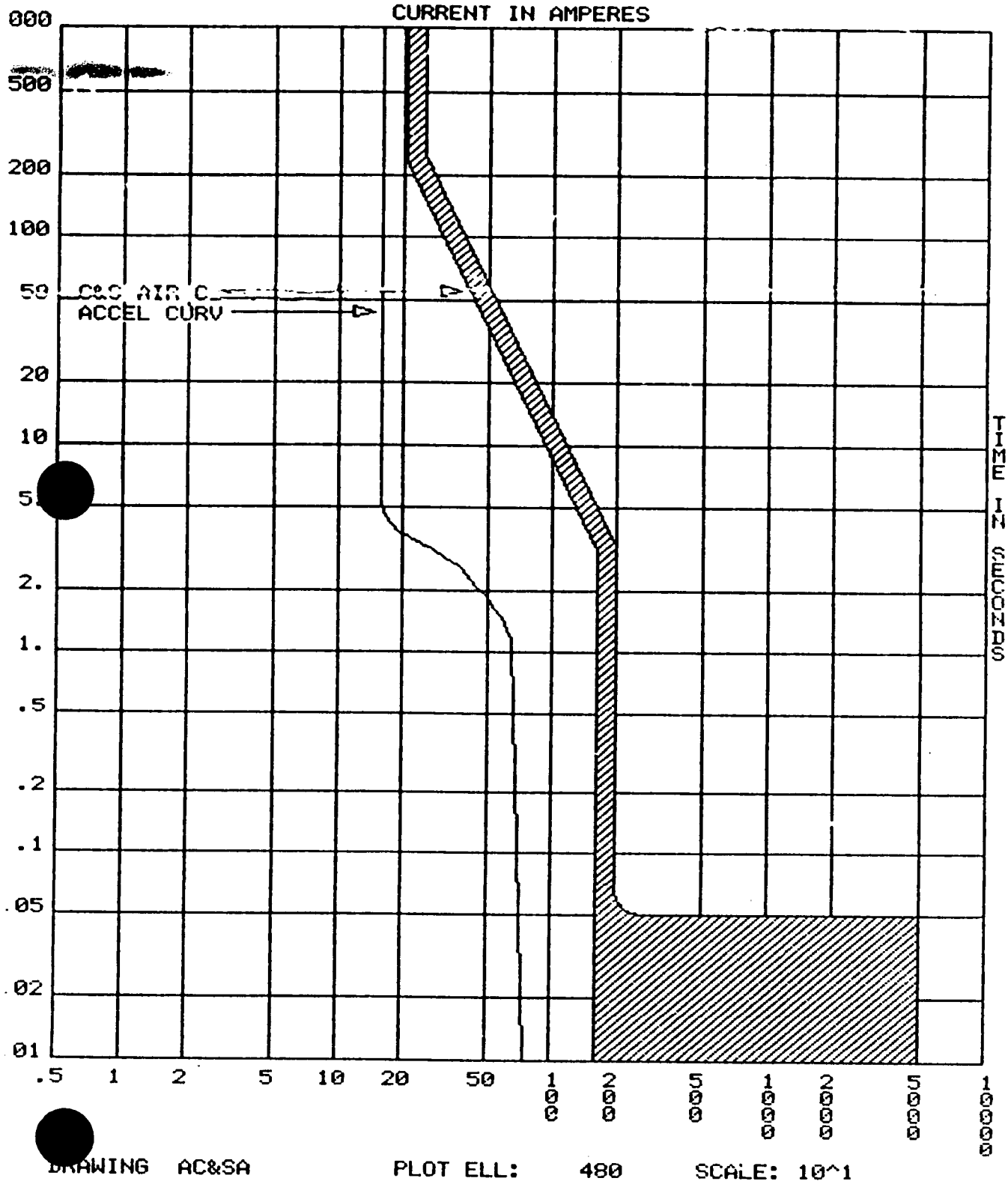
DRAWING CONTRMA/C PLOT ELL: 480 SCALE: 10^1



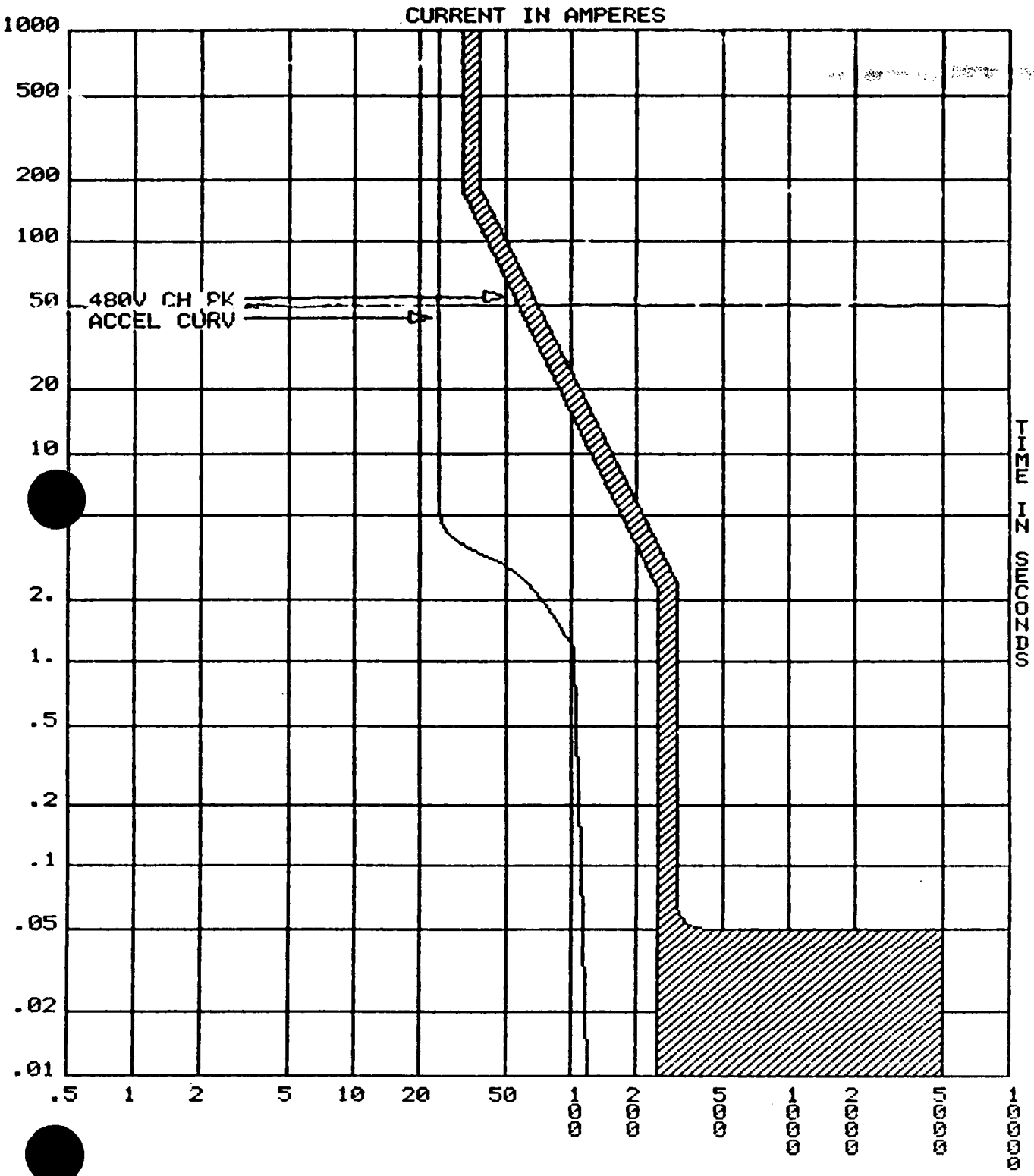
DRAWING MTR-30-159 PLOT ELL: 480 SCALE: 10^1



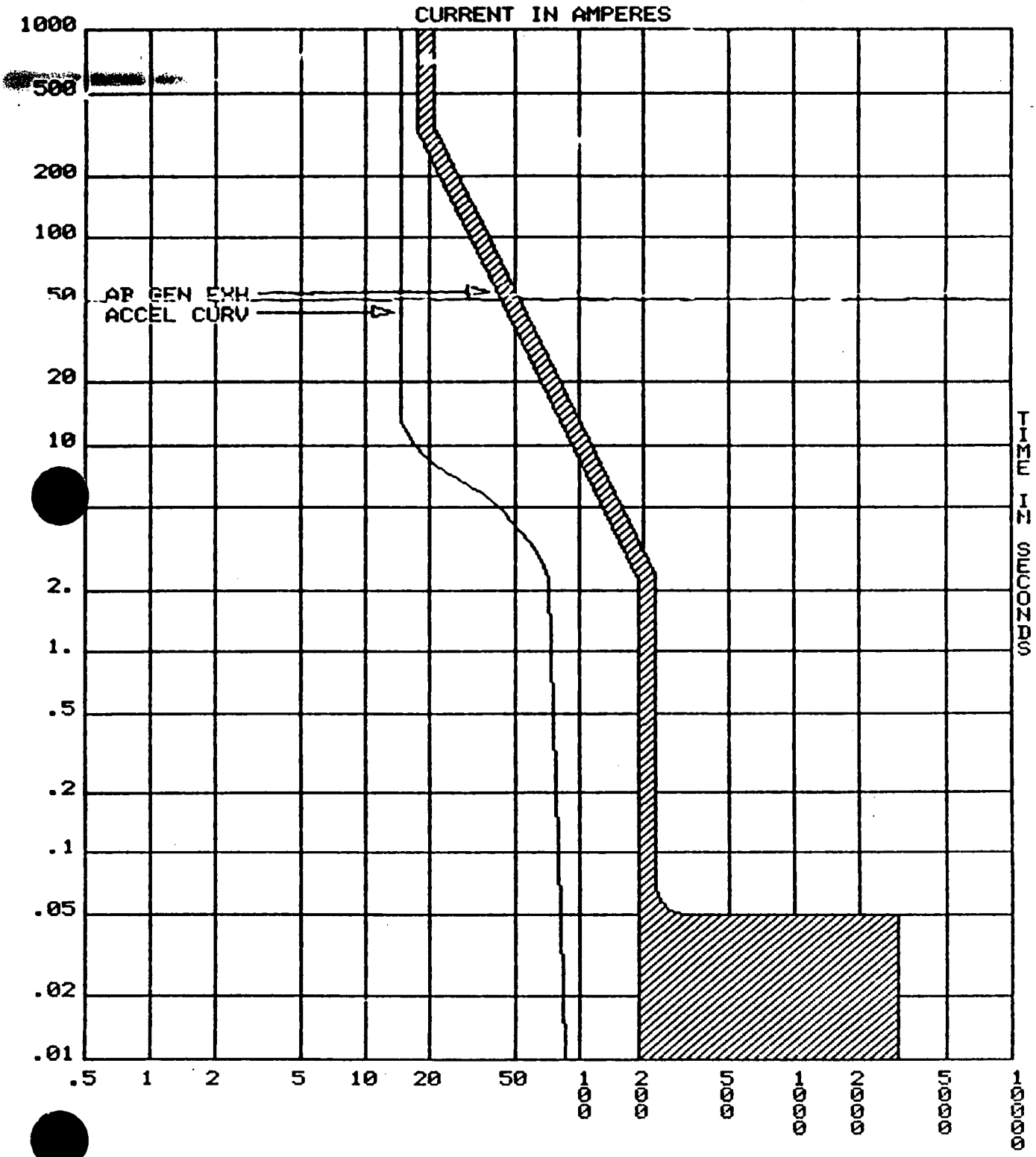
RAWING 480SHBDRMA PLOT ELL: 480 SCALE: 10^1



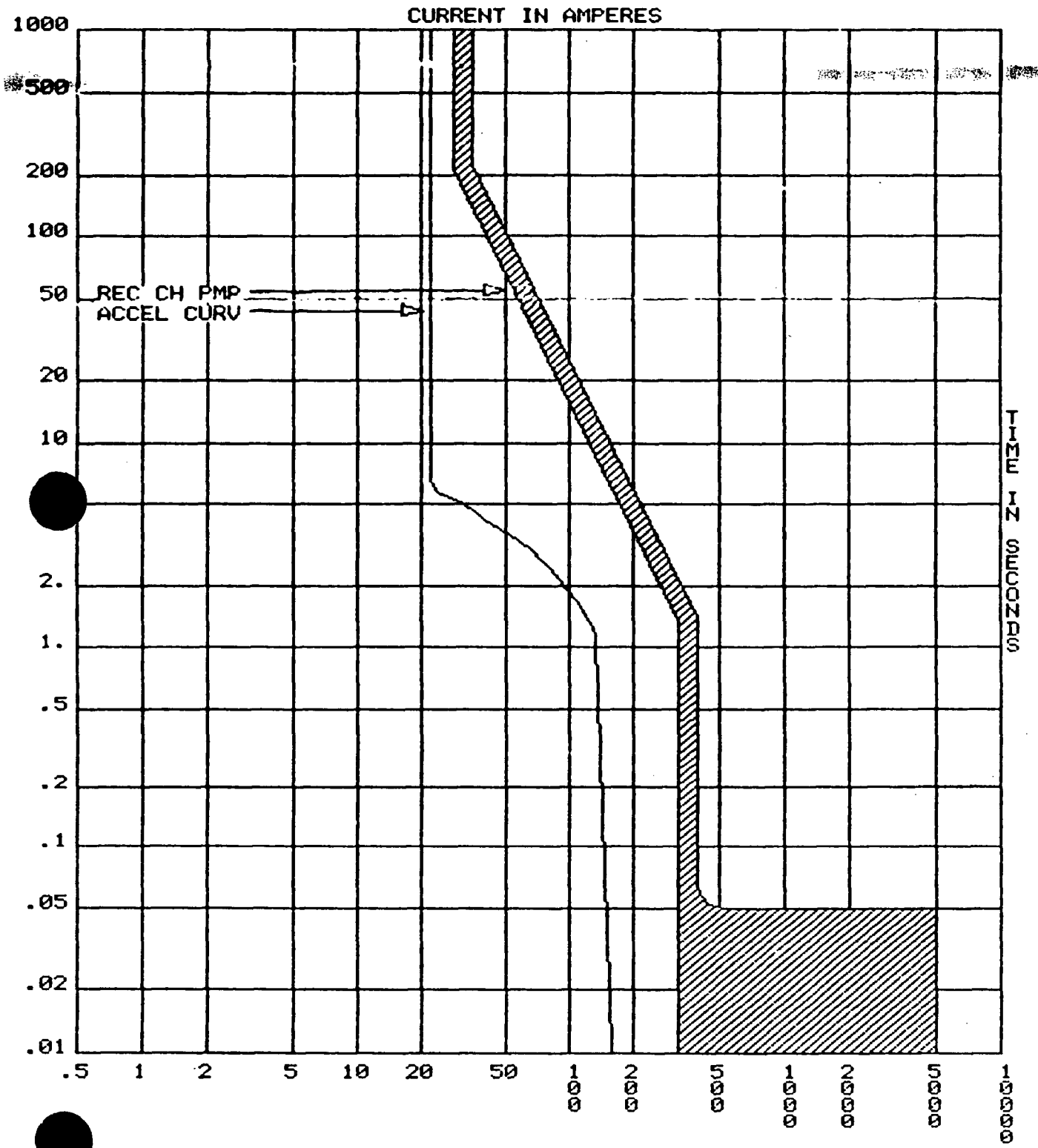
DRAWING AC&SA PLOT ELL: 480 SCALE: 10^1



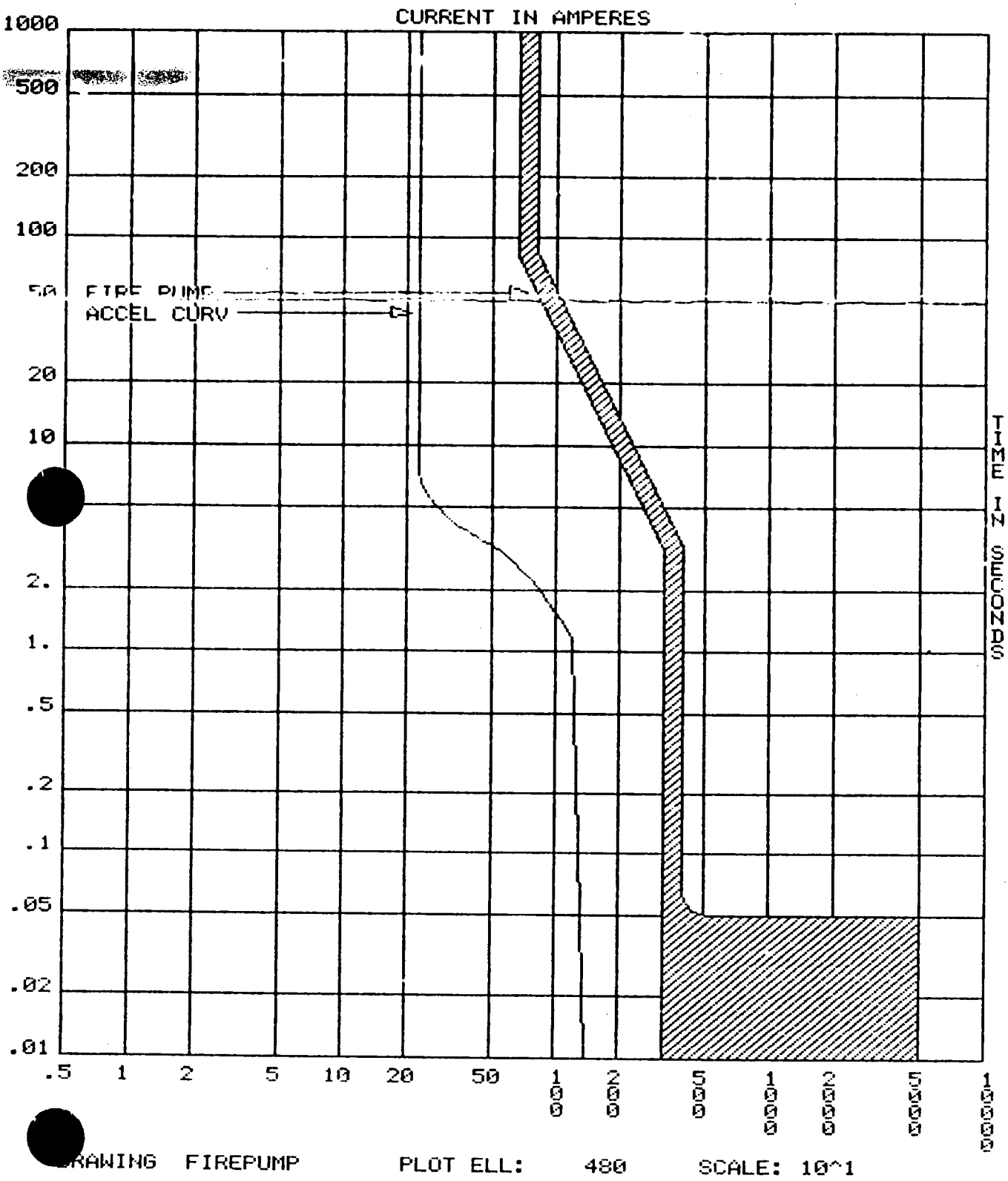
DRAWING 480VCHPKG PLOT ELL: 480 SCALE: 10^1



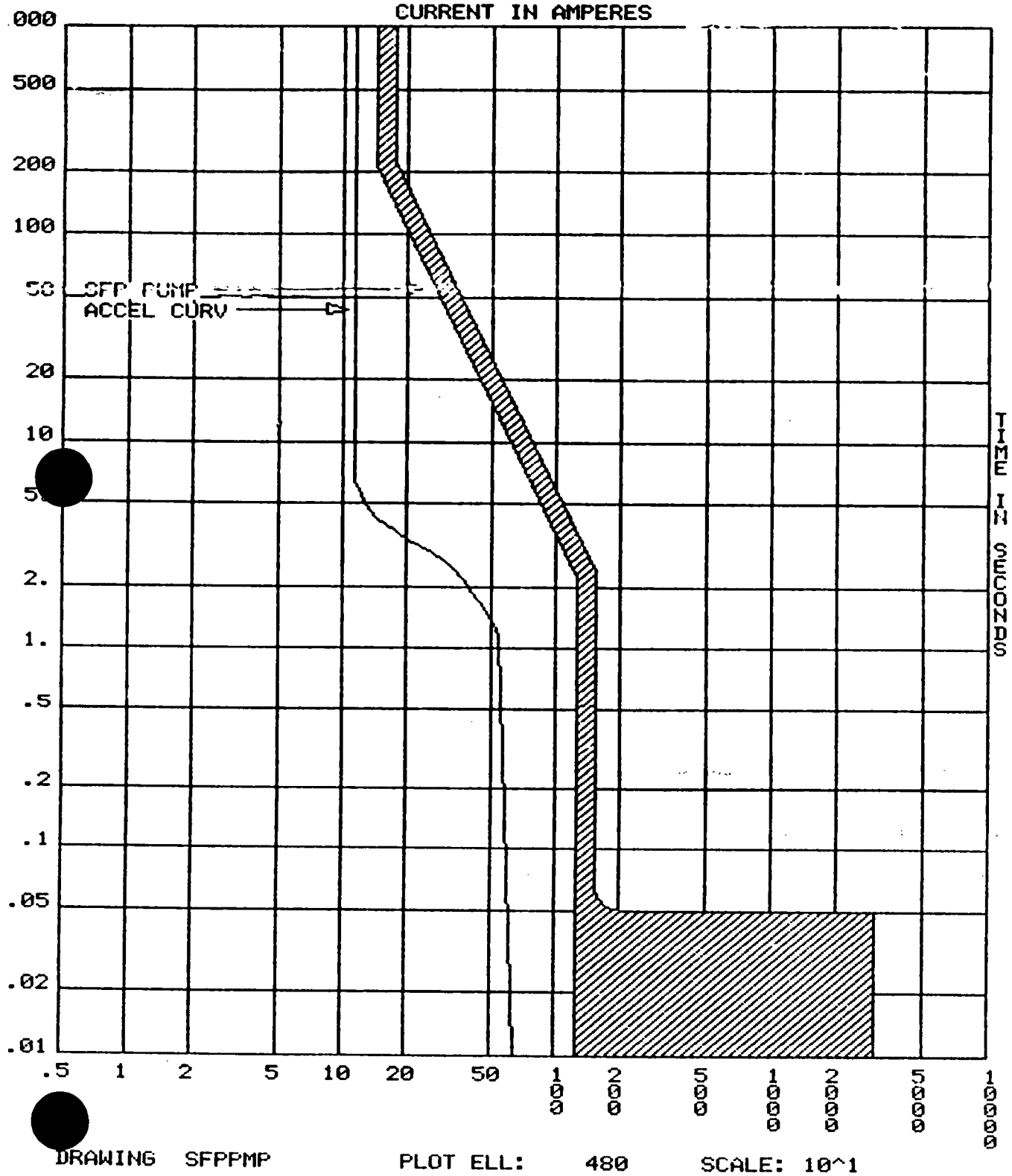
DRAWING ABGENEXHF PLOT ELL: 480 SCALE: 10^1



DRAWING MTR-62-101 PLOT ELL: 480 SCALE: 10^1



DRAWING FIREPUMP PLOT ELL: 480 SCALE: 10^1



DRAWING SFPPMP PLOT ELL: 480 SCALE: 10^1

COORDINATION CURVES

III-1 CONTROL POWER FEEDERS (CONPWRFDR)

125V BATTERY CHARGERS & VITAL INVERTERS HAVE EHB3090 BREAKERS
50 KVA SINGLE PHASE XFMR HAS FRS-125A FUSE
DS 206 BREAKER FRAME 800A
SENSOR 400A
LTPU 0.85
LTD 6.0
STPU 8.0
STD 0.18

III-2 DIESEL AUXILIARY MCC FEEDERS (DSLAUXFDR)

DS 416 BREAKER FRAME 1600A
SENSOR 600A
LTPU 0.75
LTD 6.0
STPU 4.0
STD 0.18

III-3 MCC FEEDERS A.(MCCFDR) & B.(MCC1FDR)

A. DS 206 BREAKER FRAME 800A
SENSOR 600A
LTPU 1.1
LTD 6.0
STPU 6.0
STD 0.18

LOAD BREAKER FJ3-B175 @ HI

B. DS 206 BREAKER FRAME 800A
SENSOR 600A
LTPU 1.1
LTD 6.0
STPU 6.0
STD 0.18

LOAD BREAKER FXD63B175 @ HI

III-4 C & A VENT BOARD 1B2-B FEEDER (C&A1B2-B)

DS 206 BREAKER FRAME 800A
SENSOR 600A
LTPU 1.1
LTD 10.0
STPU 6.0
STD 0.18

LOAD BREAKER FXD63B225 @ 3

III-5 MOTOR FEEDER (MOTORFDR)

DS 416 BREAKER FRAME 1600A
SENSOR 600A
LTPU 1.25
LTD 20.0
STPU 4.0
INST 12

III-6 DIESEL COMMON MCC FEEDERS (DSLCOMFDR)

52DSB & 52NSB FRAME 1600A
SENSOR 225A
LTPU 1.10
LTD 8.0
STPU 6.0
STD 0.32

52TB FRAME 1600A
SENSOR 225A
LTPU 0.8
LTD 3.0
STPU 4.0
STD 0.17

III-7 ALTERNATE MCC FEEDERS (ALTMCC1FDR)

DS 206 BREAKER FRAME 800A
SENSOR 600A
LTPU 0.6
LTD 8.0
STPU 6.0
STD 0.18

LOAD BREAKER FXD63B175 @ HI

III-8 ALTERNATE MCC FEEDERS (ALTMCC2FDR)

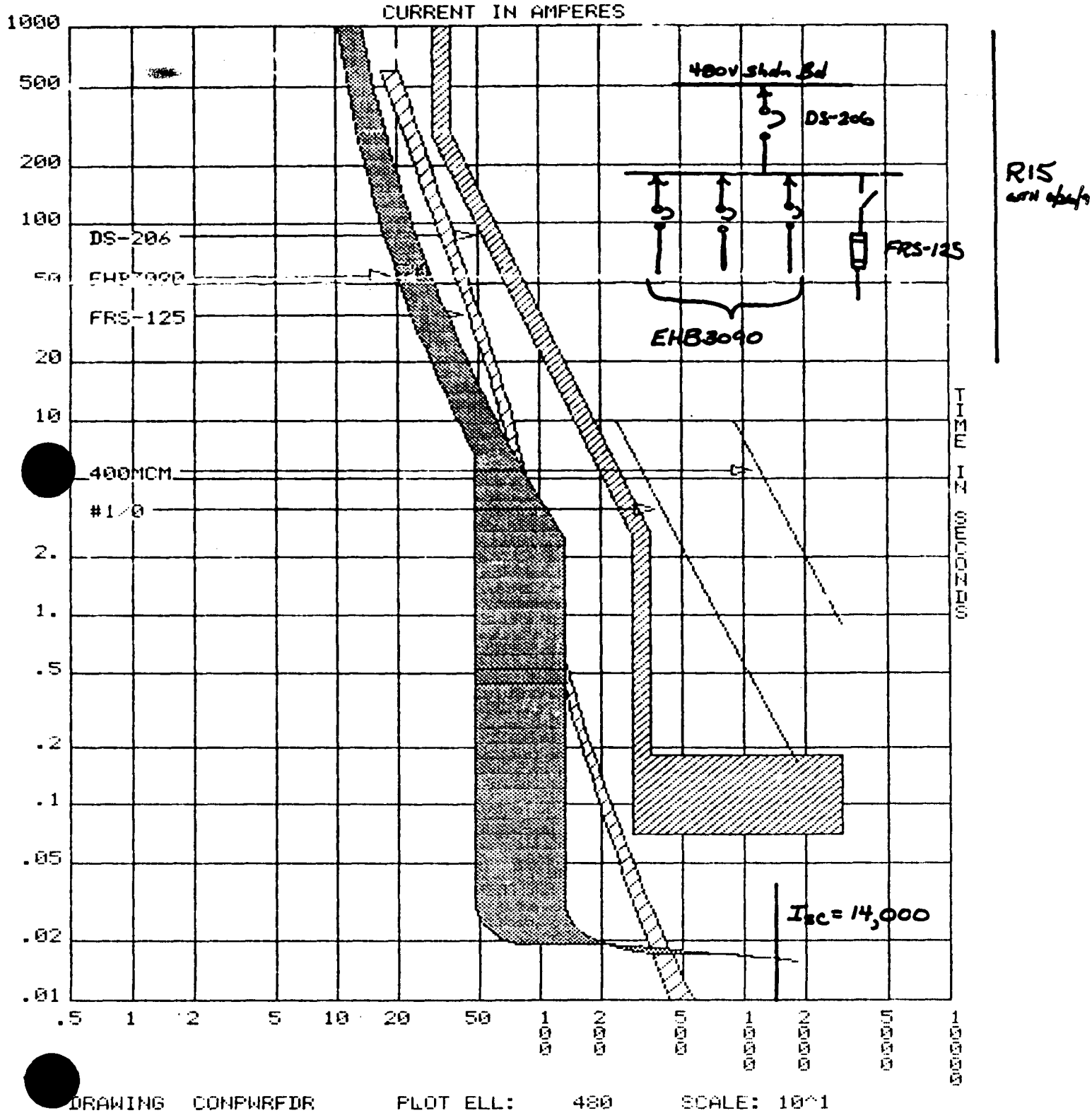
DS 206 BREAKER FRAME 800A
SENSOR 300A
LTPU 0.7
LTD 6.0
STPU 8.0
STD 0.18

LOAD BREAKER EF3-B100

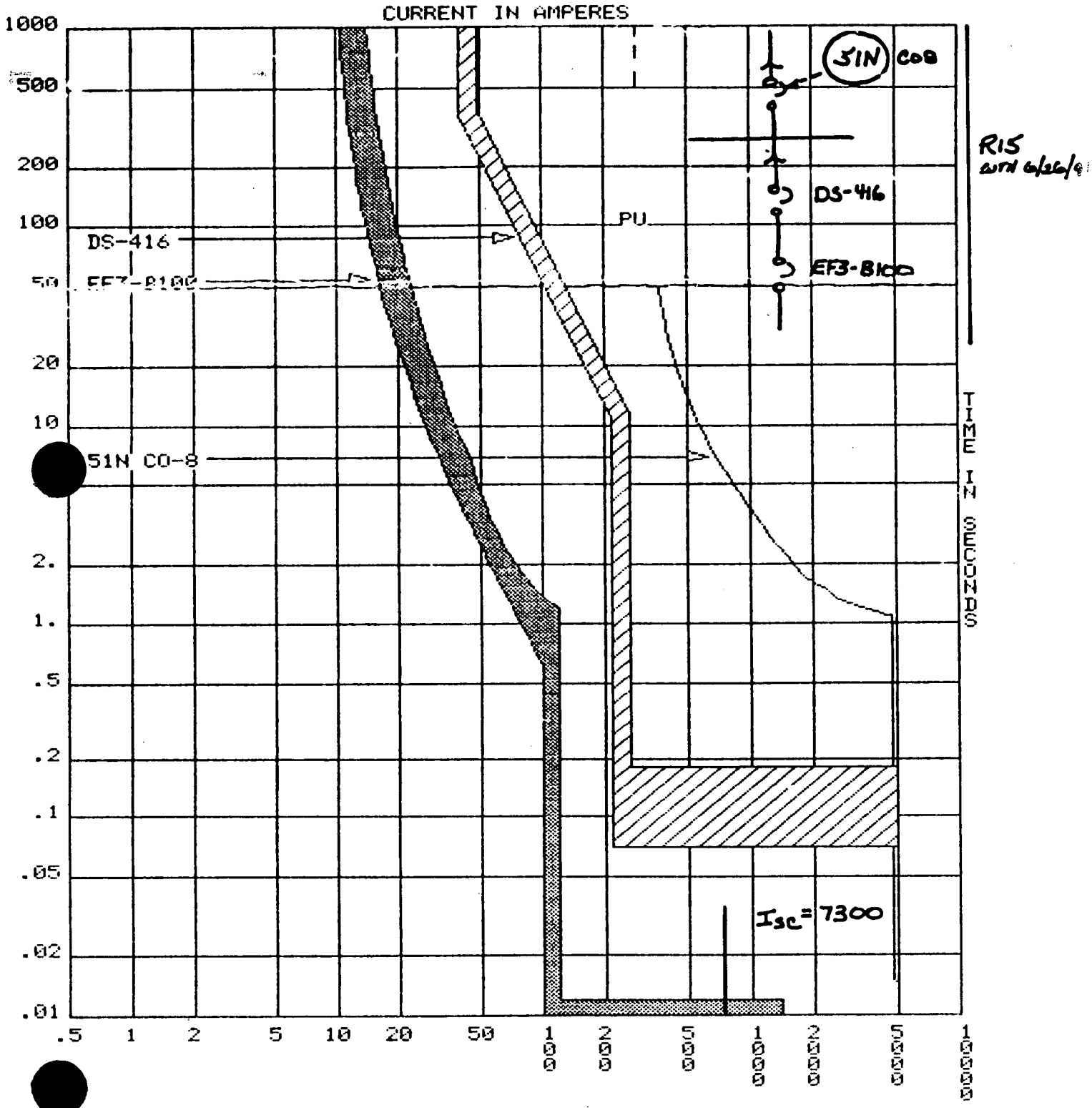
III-9 ALTERNATE MCC FEEDERS (ALTMCC3FDR)

DS 206 BREAKER FRAME 800A
SENSOR 400A
LTPU 0.9
LTD 20.0
STPU 8.0
STD 0.18

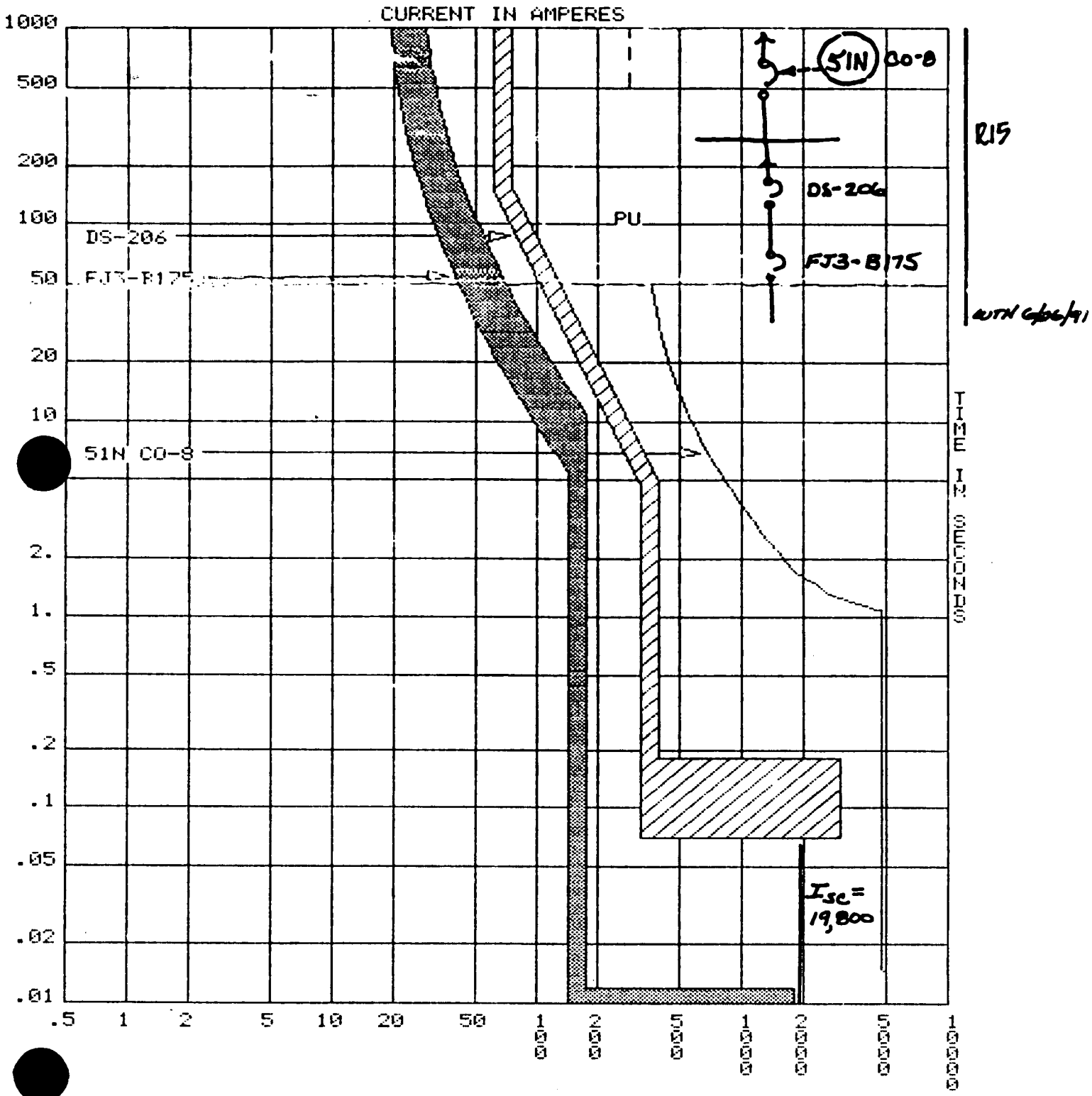
LOAD BREAKER FXD63B175 @ HI



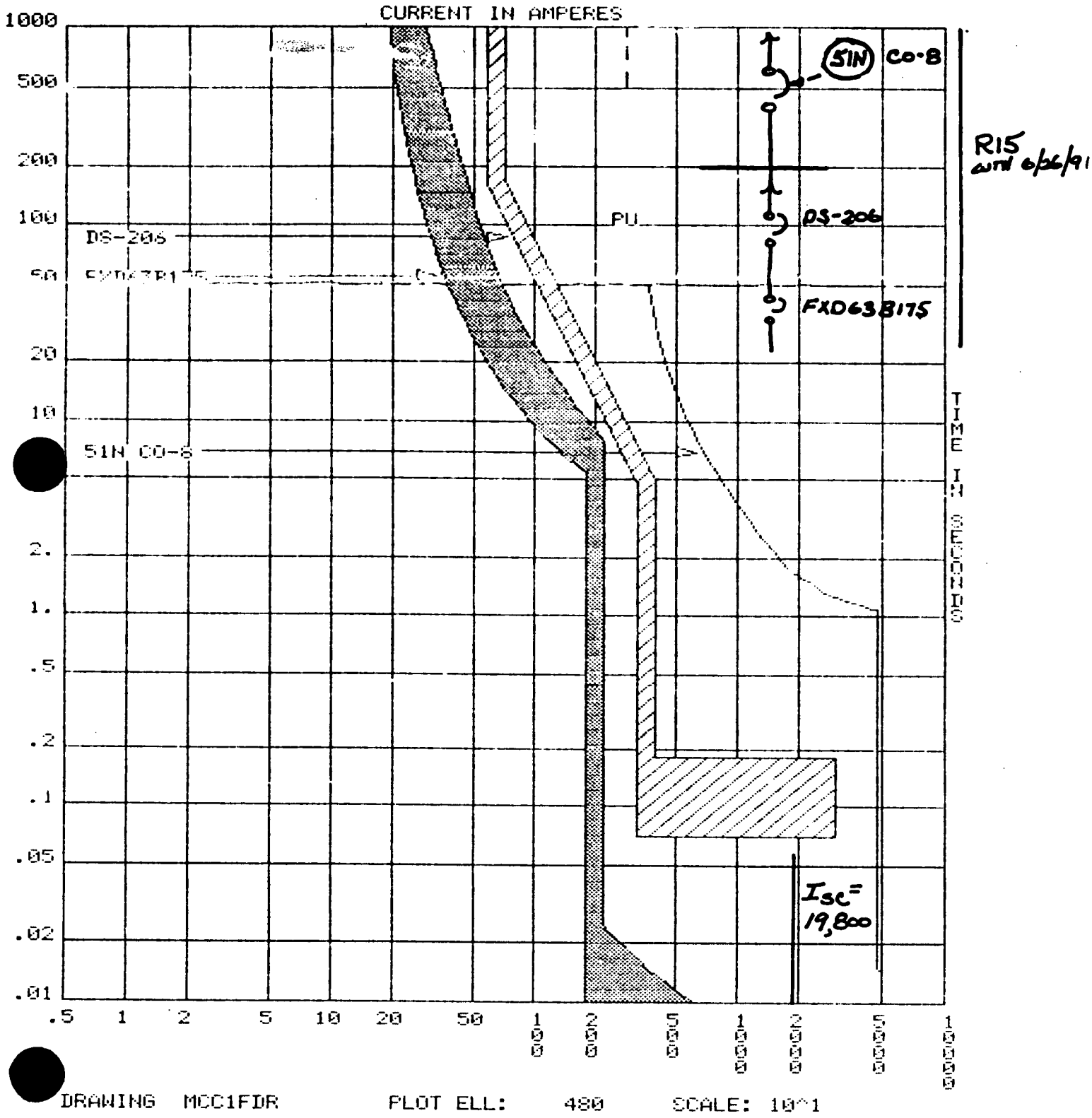
DRAWING CONPWRFDR PLOT ELL: 480 SCALE: 10^1



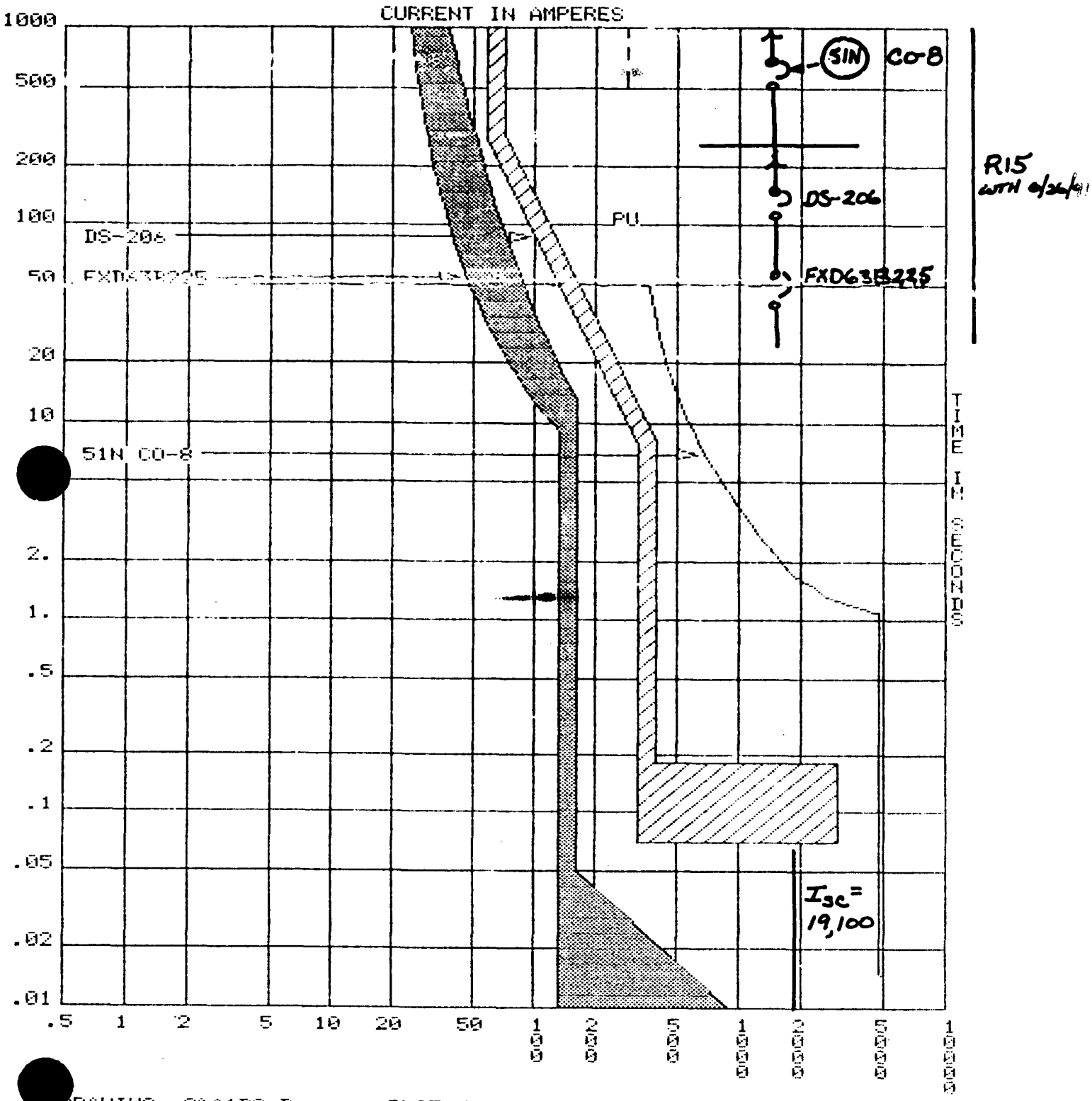
DRAWING DSLAUXFDR PLOT ELL: 480 SCALE: 10^1



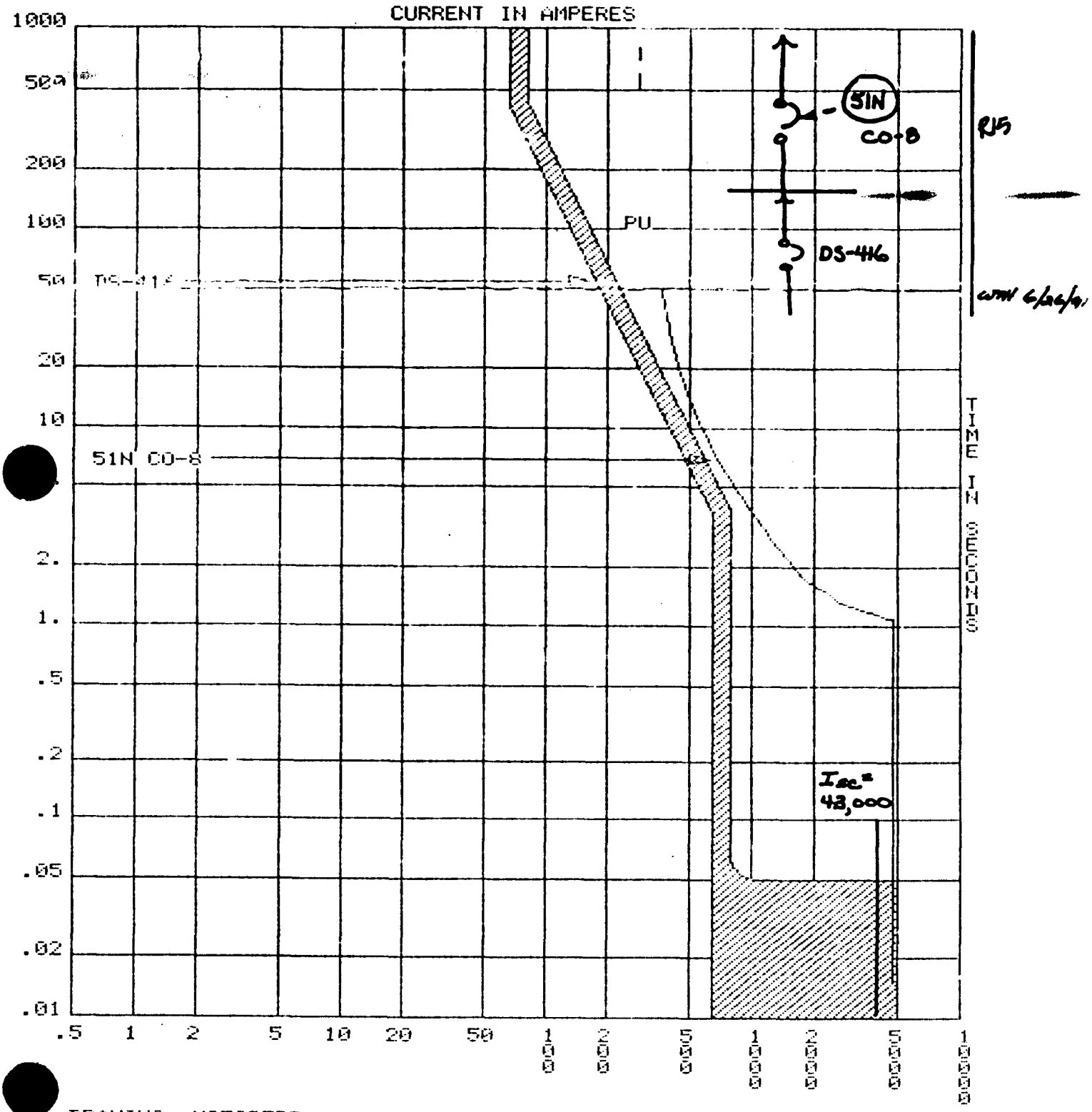
DRAWING MCCFDR PLOT ELL: 480 SCALE: 10^1



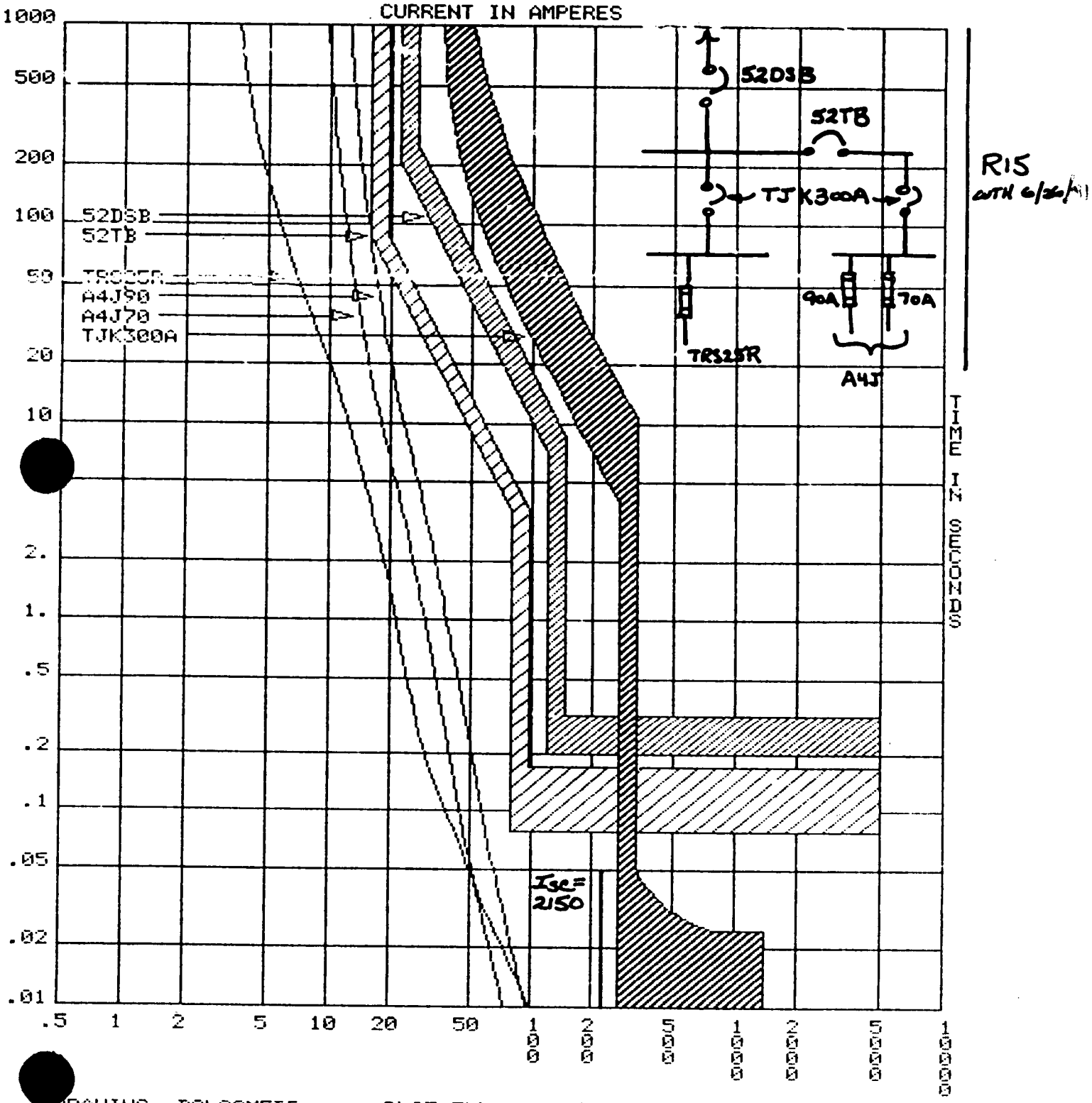
DRAWING MCC1FDR PLOT ELL: 480 SCALE: 10^1



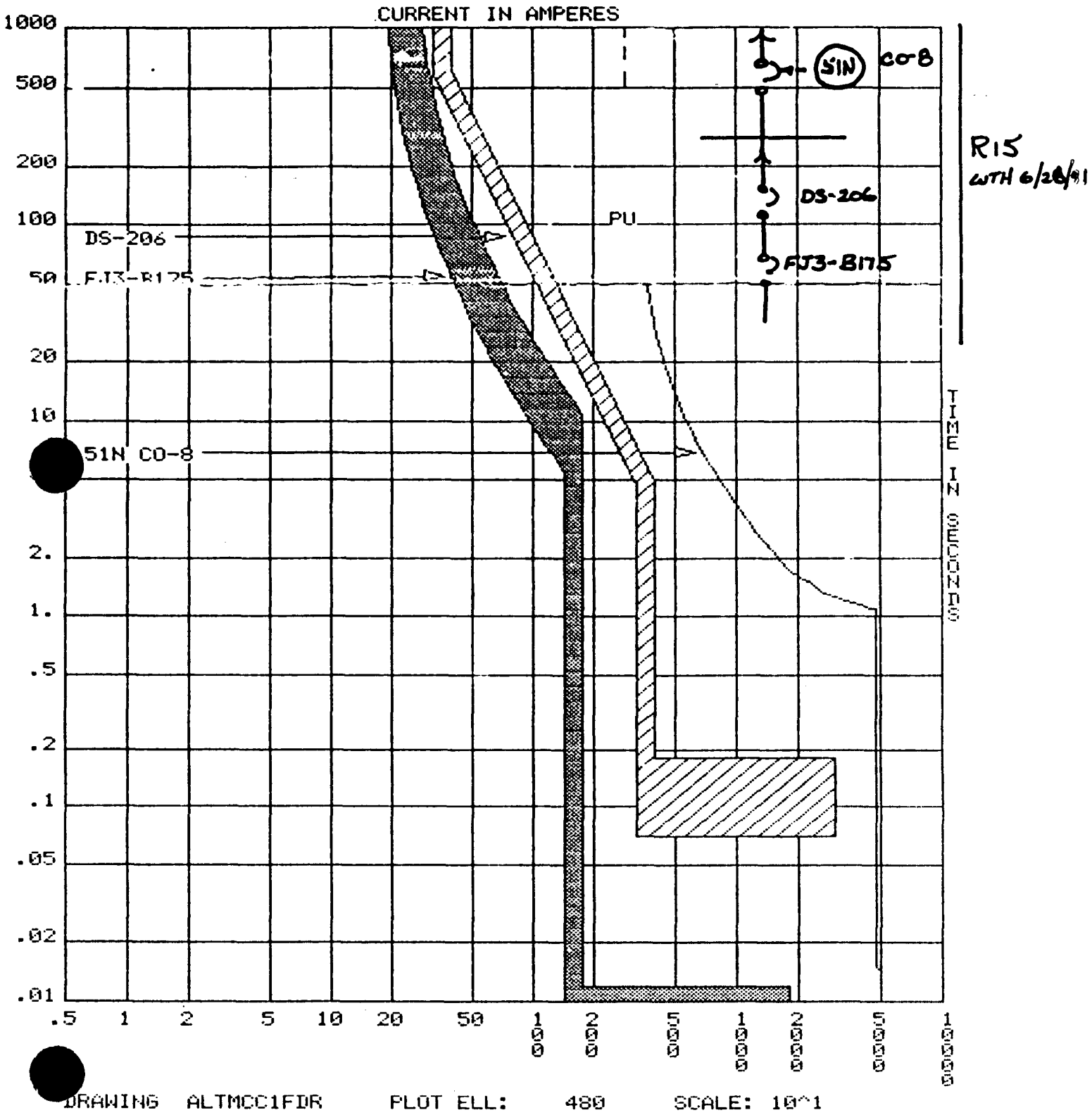
DRAWING C&A1B2-B PLOT ELL: 480 SCALE: 10^1



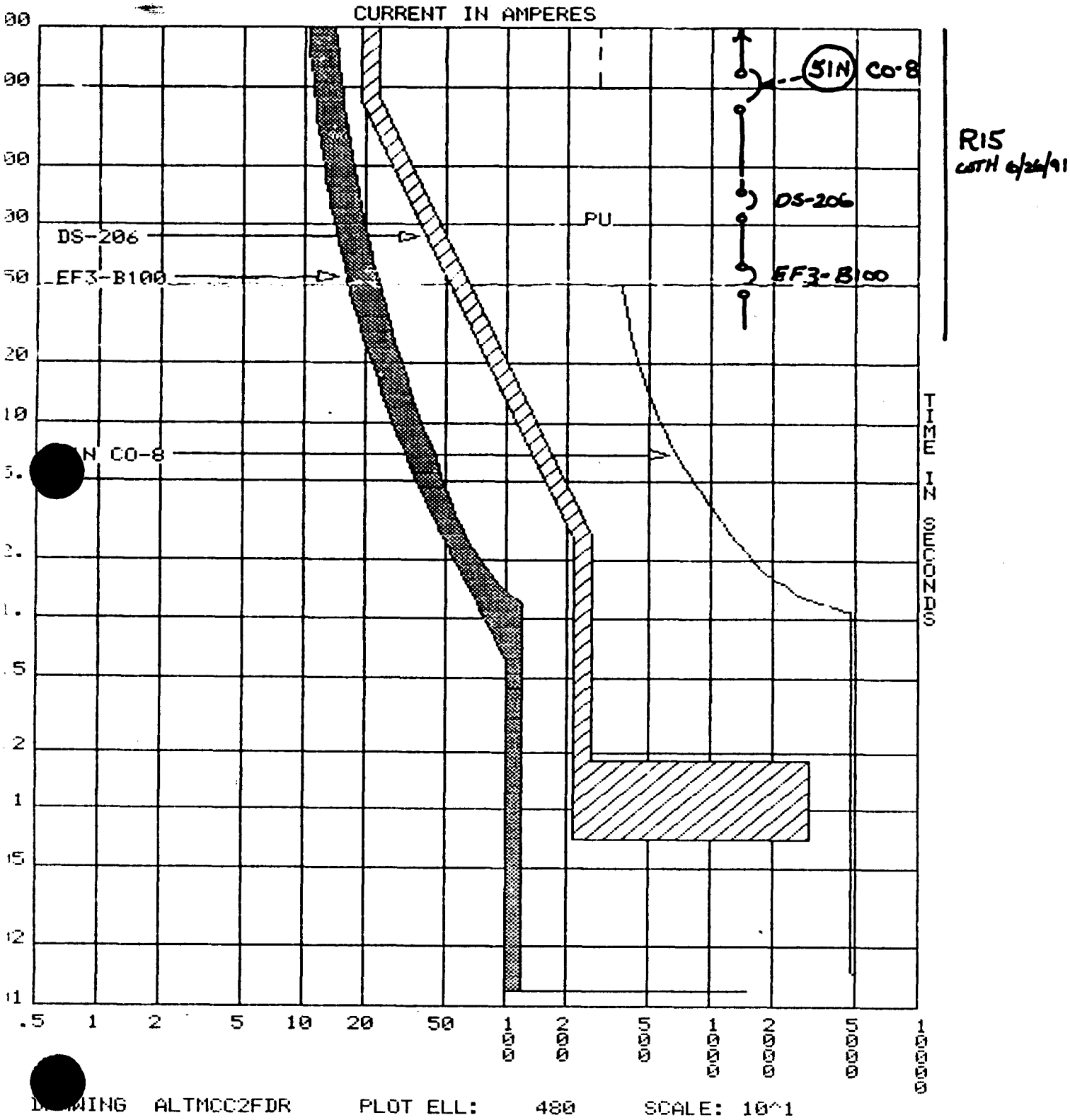
DRAWING MOTORFDR PLOT ELL: 480 SCALE: 10^1



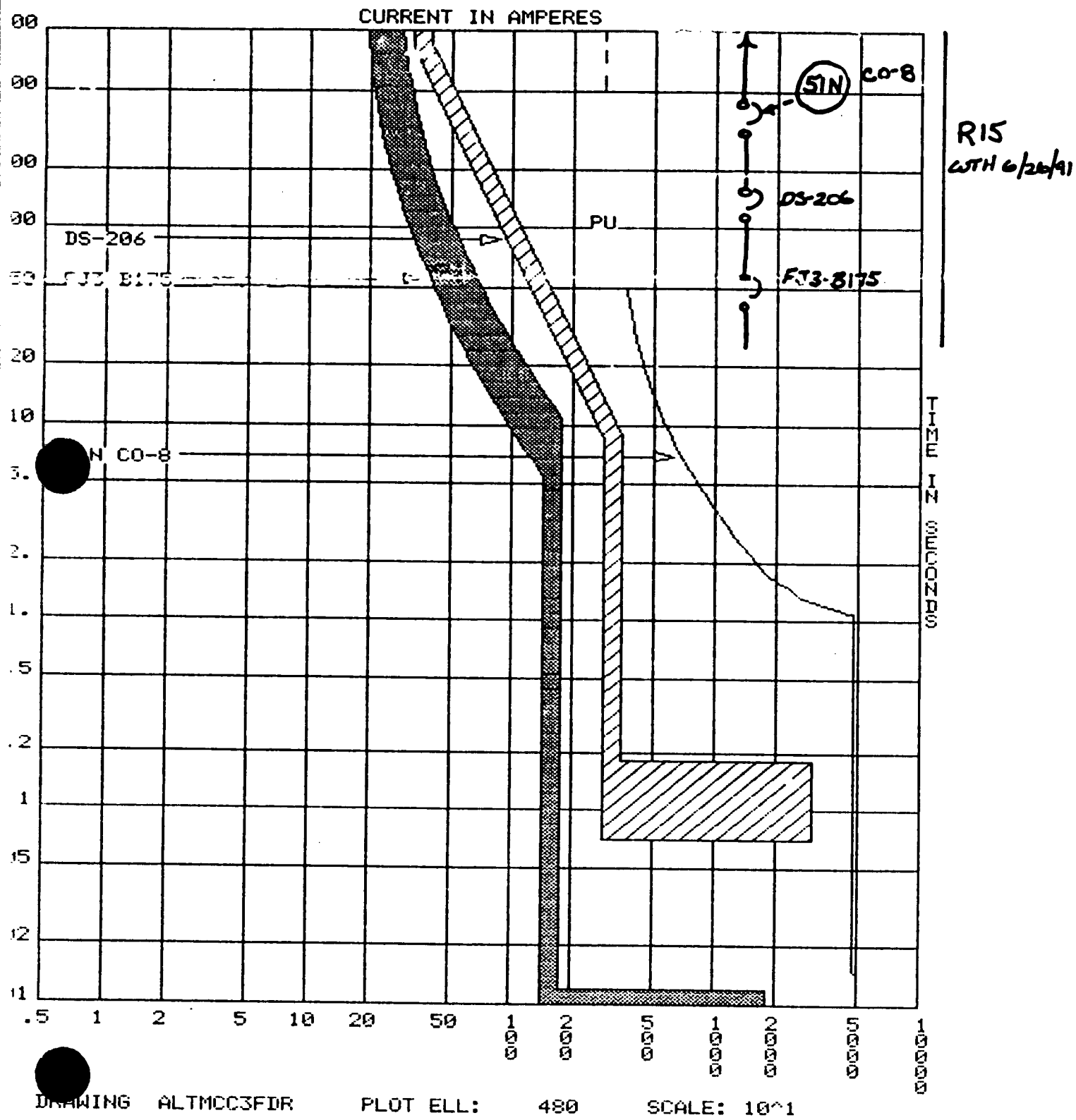
DRAWING DSLCOMFDR PLOT ELL: 480 SCALE: 10^1



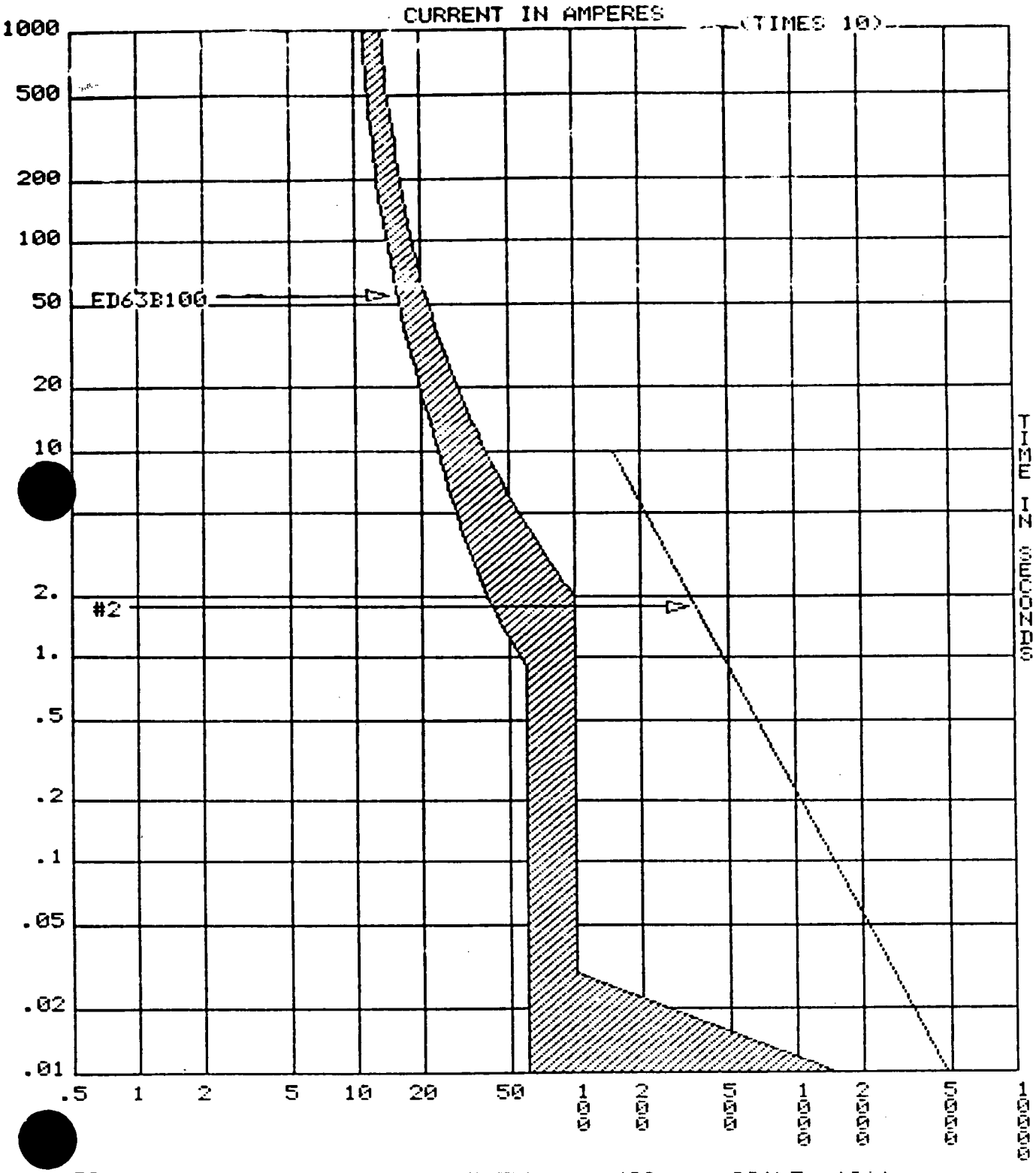
DRAWING ALTMCC1FDR PLOT ELL: 480 SCALE: 10^1



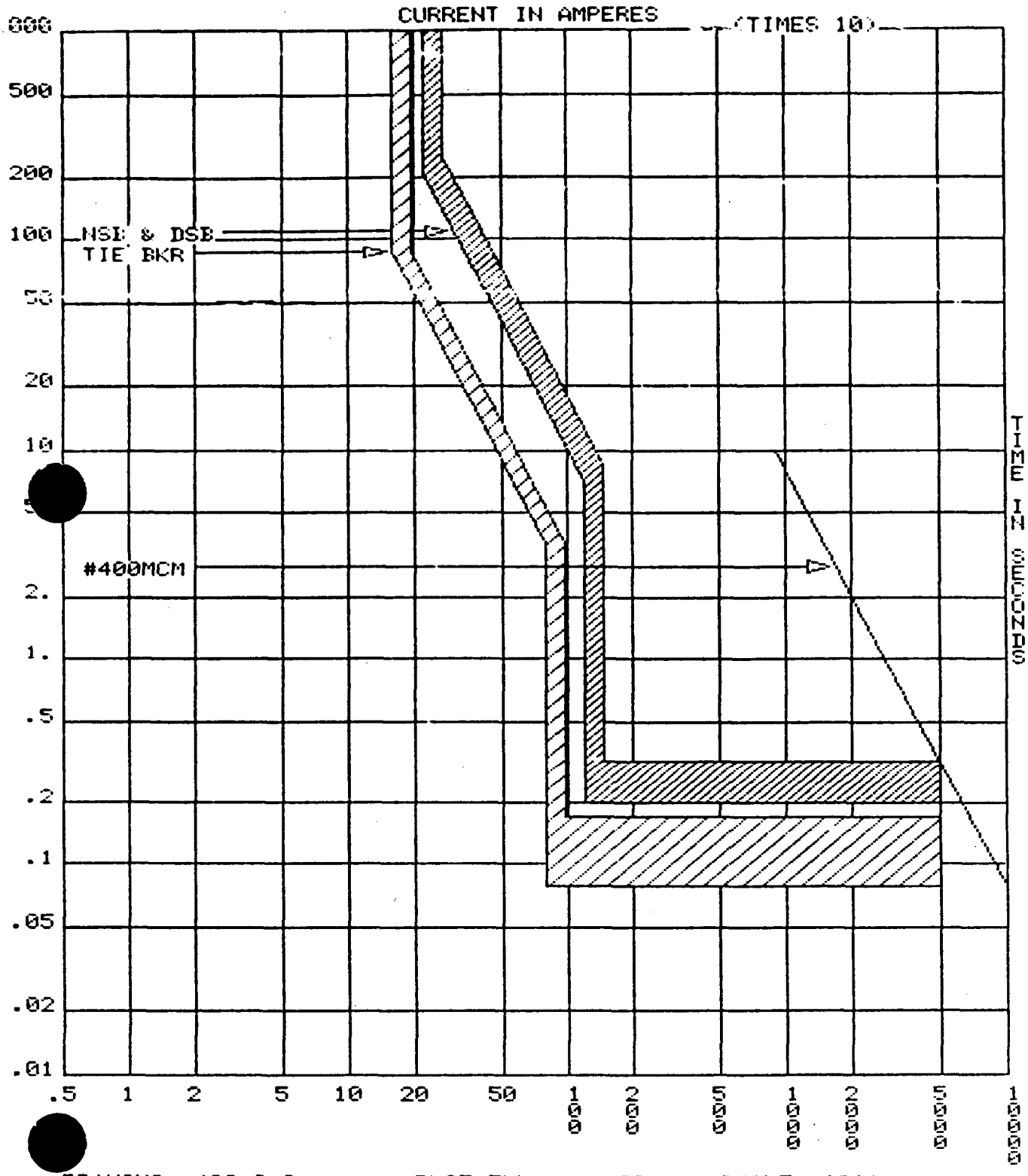
DRAWING ALTMCC2FDR PLOT ELL: 480 SCALE: 10^1



DRAWING ALTMCC3FDR PLOT ELL: 480 SCALE: 10^1



DRAWING ED63B100 PLOT ELL: 480 SCALE: 10^1



DRAWING 480 C-S PLOT ELL: 480 SCALE: 10^1

TABLE C1

SECTION C
ATTACHMENT NO. M12212
WBN EEB-MS-T100-0000, R10
480V SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	CABLE NO	CABLE SZ	CABLE PROT	NOTES
	480V BOARD C-S											
	52-BSB		225	1.10	8	6	0.32		PP1624S	#400	PASS	
									PP1626S	#400		
	52-TB		225	0.80	3	4	0.17		PP1624S	#400	PASS	
									PP1626S	#400		
	52-NSB		225	1.10	8	6	0.32		PP1624S	#400	PASS	
									PP1626S	#400		
	480V SHDN BD 1A1-A											
	1-MCC-215-A1-A		600	0.75	6	4	0.18		1PL4975A	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									1PL4976A	#400		
10A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-1-D								1PL4900A	#400	PASS	SEE COMPT 10A
									1PL4909S	#1/0		
10AB	1-INV-235-1-D								1PL4900A	#400	PASS	SEE COMPT 10A
									1PL4908S	#1/0		
10AC	[illegible]-235-1D								1PL4900A	#400	PASS	SEE COMPT 10A
									1PL4907S	#1/0		
10AD	1-DWF-237-A								1PL4900A	#400	PASS	SEE COMPT 10A
									1PL04,05	#1/0		
10B	1-MCC-214-A1-A		600	1.10	6	6	0.18		1PL4957A	#400*	PASS	* 2 COND/PHASE
10D	1-MCC-214-A2-A		600	0.60	8	6	0.18		1PL4962A	#400	PASS	
8B	1-MCC-213-A1-A		600	1.10	6	6	0.18		1PL4935A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									1PL4936A	#300		
9B	1-MCC-232-A-A		600	1.10	6	6	0.18		1PL4950A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
	480V SHDN BD 1A2-A											
4D	1-MTR-26-1-A		600	1.25	4			6	1PL5004A	#500	PASS	
									1PL5003A	#500		
	1-MCC-215-A2-A		600	0.75	6	4	0.18		1PL4978A	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									1PL4979A	#400		
	0-MTR-78-35-S		200	0.80	4			7	1PL4540A	#4/0	PASS	
									1PL4541S	#1/0		
.0A	1-MCC-232-A-A		300	0.70	6	8	0.18		1PL4951A	#400	PASS	
3B	1-MCC-213-A2-A		600	1.10	6	6	0.18		1PL4938A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									1PL4939A	#300		
9A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 9AA, 9AB, 9AC, AND 9AD
9AA	0-CHGR-236-E								1PL4913A	#400	PASS	SEE COMPT 9A
									1PL4920S	#1/0		
9AB	[illegible]-235-2E								1PL4913A	#400	PASS	SEE COMPT 9A
									1PL4921S	#1/0		
9AC	2-INV-235-2E								1PL4913A	#400	PASS	SEE COMPT 9A
									1PL4922S	#1/0		

TABLE C1

SECTION C
ATTACHMENT NO. M12212
WBN EEB-MS-TI08-0008, R10
480V SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	CABLE NO	CABLE SZ	CABLE PROT	NOTES
9AD	1-DWF-237-B								1PL4913A	#400	PASS	SEE COMPT 9A
									1PL17,18	#1/0		
9B	1-MCC-214-A1-A		600	1.00	8	6	0.18		1PL4958A	#400*	PASS	2 COND/PHASE
9C	1-MCC-214-A2-A		600	1.10	6	6	0.18		1PL4961A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
**	480V SHDN BD 1B1-B											
	1-MCC-215-B1-B		600	0.75	6	4	0.18		1PL4982B	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									1PL4983B	#400		
10A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-1-D								1PL4901B	#400	PASS	SEE COMPT 10A
									1PL4909S	#1/0		
10AB	1-INV-235-1-D								1PL4901B	#400	PASS	SEE COMPT 10A
									1PL4908S	#1/0		
10AC	2-INV-235-2D								1PL4901B	#400	PASS	SEE COMPT 10A
									1PL4907S	#1/0		
10[illegible]	[illegible]F-237-A								1PL4901B	#400	PASS	SEE COMPT 10A
									1PL04,05	#1/0		
10B	1-MCC-214-B1-B		600	1.10	6	6	0.18		1PL4965B	#400*	PASS	* 2 COND/PHASE
8B	1-MCC-213-B1/B		600	1.10	6	6	0.18		1PL4942B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									1PL4943B	#300		
9A	1-MCC-214-B2-B		400	0.90	20	8	0.18		1PL4970B	#400	PASS	
9B	1-MCC-232-B-B		600	1.10	6	6	0.18		1PL4953B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
**	480V SHDN BD 1B2-B											
4D	1-MTR-26-4-B		600	1.25	4			6	1PL5017B	#500	PASS	
									1PL5018B	#500		
	1-MCC-215-B2-B		600	0.75	6	4	0.18		1PL4985B	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									1PL4986B	#400		
10A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-2-E								1PL4914B	#400	PASS	SEE COMPT 10A
									1PL4920S	#1/0		
10AB	1-INV-235-2-E								1PL4914B	#400	PASS	SEE COMPT 10A
									1PL4921S	#1/0		
10AC	2-INV-235-2E								1PL4914B	#400	PASS	SEE COMPT 10A
									1PL4922S	#1/0		
10AD	1-DWF-237-B								1PL4914B	#400	PASS	SEE COMPT 10A
									1PL17,18	#1/0		
10B	1-MCC-214-B2-B		600	1.10	10	6	0.18		1PL4969B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
10D	[illegible]CC-232-B-B		300	0.70	6	8	0.18		1PL4954B	#400	PASS	
8B	1-MCC-213-B2-B		600	1.10	6	6	0.18		1PL4945B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									1PL4946B	#300		

TABLE C1

SECTION C
ATTACHMENT NO. M12212
WBN EEB-MS-TI08-0008, R10
480V SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	CABLE NO	CABLE SZ	CABLE PROT	NOTES
9A	0-MTR-78-9-B		200	0.80	4			7	1PL4895B	#4/0	PASS	
9B	1-MCC-214-B1-B		600	1.00	8	6	0.18		1PL4966B	#400*	PASS	* 2 COND/PHASE
**	480V SHDN BD 2A1-A											
	2-MCC-215-A1-A		600	0.75	6	4	0.18		2PL4975A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									2PL4976A	#400		
10A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-3-F								2PL4900A	#400	PASS	SEE COMPT 10A
									2PL4909S	#1/0		
10AB	1-INV-235-3-F								2PL4900A	#400	PASS	SEE COMPT 10A
									2PL4908S	#1/0		
10AC	2-INV-235-3F								2PL4900A	#400	PASS	SEE COMPT 10A
									2PL4907S	#1/0		
10AD	2-DXF-237-A								2PL4900A	#400	PASS	SEE COMPT 10A
									2PL04,05	#1/0		
10[illegible]	[illegible]MCC-214-A1-A		600	1.10	6	6	0.18		2PL4957A	#400*	PASS	2 COND/PHASE
1[illegible]	[illegible]CC-214-A2/A		600	0.60	8	6	0.18		2PL4962A	#400	PASS	
8B	2-MCC-213-A1-A		600	1.10	6	6	0.18		2PL4935A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									2PL4936A	#300		
9B	2-MCC-232-A-A		600	1.10	6	6	0.18		2PL4950A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
**	480V SHDN BD 2A2-A											
4D	2-MTR-26-9-A		600	1.25	4			6	2PL5004A	#500	PASS	
									2PL5003A	#500		
	2-MCC-215-A2-A		600	0.75	6	4	0.18		2PL4978A	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									2PL4979A	#400		
10A	2-MCC-232-A-A		300	0.70	6	8	0.18		2PL4951A	#400	PASS	
8B	2-MCC-213-A2-A		600	1.10	6	6	0.18		2PL4938A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									2PL4939A	#300		
9A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 9AA, 9AB, 9AC, AND 9AD
9AA	0-CHGR-236-4-G								2PL4913A	#400	PASS	SEE COMPT 9A
									2PL4920S	#1/0		
9AB	1-INV-235-4-G								2PL4913A	#400	PASS	SEE COMPT 9A
									2PL4921S	#1/0		
9AC	2-INV-235-4-G								2PL4913A	#400	PASS	SEE COMPT 9A
									2PL4922S	#1/0		
9AD	2-DXF-237-B								2PL4913A	#400	PASS	SEE COMPT 9A
									2PL17,18	#1/0		
9B	2-MCC-214-A1-A		600	1.00	8	6	0.18		2PL4958A	#400*	PASS	* 2 COND/PHASE
9[illegible]	[illegible]CC-214-A2-A		600	1.10	6	6	0.18		2PL4961A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
9D	0-MTR-78-12-A		200	0.80	4			7	2PL4895A	#4/0	PASS	

TABLE C)

SECTION C
ATTACHMENT NO. M12212
WBN EEB-MS-TI08-0008, R10
480V SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	CABLE NO	CABLE SZ	CABLE PROT	NOTES
**	480V SHDN BD 2B1-B											
	2-MCC-215-B1-B		600	0.75	6	4	0.18		2PL4982B	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR
									2PL4983B	#400		AMPACITY
10A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-3-F								2PL4901B	#400	PASS	SEE COMPT 10A
									2PL4909S	#1/0		
10AB	1-INV-235-3-F								2PL4901B	#400	PASS	SEE COMPT 10A
									2PL4908S	#1/0		
10AC	2-INV-235-3-F								2PL4901B	#400	PASS	SEE COMPT 10A
									2PL4907S	#1/0		
10AD	2-DXF-237-A								2PL4901B	#400	PASS	SEE COMPT 10A
									2PL04,05	#1/0		
10B	2-MCC-214-B1-B		600	1.10	6	6	0.18		2PL4965B	#400*	PASS	* 2 COND/PHASE
7B	0-MTR-70-35-S		200	0.80	4			7	2PL4540B	#1/0	PASS	
									1PL4541S	#1/0		
8B	[illegible]C-213-B1-B		600	1.10	6	6	0.18		2PL4942B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR
									2PL4943B	#300		AMPACITY
9A	2-MCC-214-B2-B		600	0.60	8	6	0.18		2PL4970B	#400	PASS	
9B	2-MCC-232-B-B		600	1.10	6	6	0.18		2PL4953B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
**	480V SHDN BD 2B2-B											
4D	2-MTR-26-11-B		600	1.25	4			6	2PL5018B	#500	PASS	
									2PL5017B	#500		
	2-MCC-215-B2-B		600	0.75	6	4	0.18		2PL4985B	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR
									2PL4986B	#400		AMPACITY
10A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-4-G								2PL4914B	#400	PASS	SEE COMPT 10A
									2PL4920S	#1/0		
10AB	1-INV-235-4-G								2PL4914B	#400	PASS	SEE COMPT 10A
									2PL4921S	#1/0		
10AC	2-INV-235-4-G								2PL4914B	#400	PASS	SEE COMPT 10A
									2PL4922S	#1/0		
10AD	1-DXF-237-B								2PL4914B	#400	PASS	SEE COMPT 10A
									2PL17,18	#1/0		
10B	2-MCC-214-B2-B		600	1.10	6	6	0.18		2PL4969B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
8B	2-MCC-213-B2-B		600	1.10	6	6	0.18		2PL4945B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR
									2PL4946B	#300		AMPACITY
9A	[illegible]C-232-B-B		300	0.70	6	8	0.18		2PL4954B	#400	PASS	
9B	[illegible]C-214-B1-B		600	1.00	8	6	0.18		2PL4966B	#400*	PASS	* 2 COND/PHASE

J. Dehoo 12-28-89 / B S Ahuja 1-5-90 / D Bates 1-21-90

Prepared _____ Date _____

Verified R.H. Burchett / Date _____ 1-17-90 / T.M.R.S Cawley 1/25/90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBNEEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No. _____
Sheet _____ of _____

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-215-B2-B														
6A	DIESEL GEN. 1B-B MUFFLER RM. EXH. FAN	1.5 HP		2.65	20	1	T26	2.54	N	1TE-EF3A005	5	18	2	N	Change heater to T28, Breaker to pos HI
1A1	NOR. FDR. FM. 480V SHTDN. BD. 1B1-B									EXS-KM3SB00D2	800				
1A2	ALT. FDR. FM. 480V SHTDN. BD. 1B2-B									EXS-KM3SB00D2	800				
2E1	SPARE														
2E2	SPARE														
2F2	SPARE														
3B	SPARE														
3E	SPARE														
3F1	SPARE														
3F2	SPARE														
4A	SPARE														
4B	DG. 1B-B AUX. LUBE OIL CIRC. PUMP A	3/4 HP	1.0	1.5	8.46	1	T23	1.94	Y	EF3-A003	3	16	4	Y	
4F2	FUTURE														
5B	CONT. XFMR. (1 PHASE)	1.50KVA		3.14											
5E	SPARE														
5F2	SPARE														
6B	FUTURE														
6C	FUTURE														
6D	FUTURE														
6E1	SPARE														
6E2	SPARE														

Page No.
01/19/90

Prepared J. DeRoo 12-28-89 / R.S. Bhatia 1-5-90 / D Bates 1-21-90 Date

Verified R.H. Buchatz 1-17-90 / T.M. McCauley 1/25/90 Date

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN EEB-MS-TI08-0008 R0

Attachment No. 1
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	HTR. TRIP POINT	HTR SIZE ACCEPTABLE	BREAKER TYPE	BREAKER CONT. CURR. SETTING	BKR. INST. SETTING	SET POS	ACCEPT?	REMARKS
	1-MCC-215-B2-B														
6F1	SPARE														
6F2	SPARE														

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TABLE C2

SECTION C
ATTACHMENT NO. M12212
WBN EEB-MS-T100-0000, R10
480V MCC CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	NOTES
** C&A VENT BD*1A1-A									
12F1	1-Re-90-130-A	EF3-B020				1PL3780A	#10	PASS	
6F1	1-RE-90-106-A	EF3-B020				1PL3504A	#10	PASS	
7C	0-MTR-26-7-A	EF3-A005	2			1PL3800A	#10	PASS	#8 IN DUCT BANK
9E	1-DXF-268-1-A	EF3-B070				1M3376A	#4/0	PASS	
						1M3382A	#6		
9F1	0-RE-90-205-A	EF3-B020				1PL3260A	#10	PASS	
** C&A VENT BD 1B1-B									
10F1	0-RE-90-206-B	EF3-B020				1PL3263B	#10	PASS	
12C	1-DXF-268-2-B	EF3-B070				1M3383B	#6	PASS	
						1M3378B	#4/0		
3F1	1-RE-90-112-B	EF3-B020				1PL3587B	#10	PASS	
4F1	1-RE-90-131-B	EF3-B020				1PL3877B	#10	PASS	
7C	0-MTR-26-14-B	EF3-A005	2			1PL3810B	#10	PASS	#8 IN DUCT BANK
** C&A VENT BD 2A1-A									
9[illegible]	[illegible]-RE-90-125-A	EF3-B020				2PL3818A	#10	PASS	
** C&A VENT BD 2B1-B									
10F1	0-RE-90-126-B	EF3-B020				2PL3819B	#10	PASS	
3F1	2-RE-90-112-B	EF3-B020				2PL3587B	#10	PASS	
** DSL AUX BD 1A1-A									
2C	1-MTR-82-A1-A	EF3-B030				PL2746A	#10	PASS	CABLE TO BE REPLACED WITH #8 MIN FOR AMPACITY
2D	1-MTR-82-A1-A	EF3-A005	2			PL2735A	#12	PASS	
2F1	1-CHGR-215-A-A	EF3-B020				PL2510A	#10	PASS	
						PL2511A	#12		
3D	1-MTR-18-55-A	EF3-A003	HI			PL2714A	#12	PASS	
4B	1-MTR-82-AOPA-A	EF3-A003	4			PL3320A	#12	PASS	
4F1	1-DXF-215-A-A	EF3-B100				PL2500A	#2	PASS	
** DSL AUX BD 1A2-A									
2A	1-MTR-82-AOPB-A	EF3-A003	4			PL3321A	#12	PASS	
2C	1-MTR-82-A2-A	EF3-B030				PL2752A	#8	PASS	
2D	1-MTR-82-A2-A	EF3-A005	4			PL2736A	#12	PASS	
2F1	1-CHGR-215-A-A	EF3-B020				PL2509A	#10	PASS	
						PL2511A	#12		
3D	1-MTR-18-54-A	EF3-A003	HI			PL2717A	#12	PASS	
** DSL AUX BD 1B1-B									
2C	1-MTR-82-B1-B	EF3-B030				PL2758B	#10	PASS	CABLE TO BE REPLACED WITH #8 MIN FOR AMPACITY
2[illegible]	[illegible]-MTR-82-B1-B	EF3-A005	3			PL2740B	#12	PASS	
2F[illegible]	[illegible]1-CHGR-215-B-B	EF3-B020				PL2562B	#10	PASS	
						PL2563B	#12		

TABLE C2

SECTION C
ATTACHMENT NO. M12212
WBN EEB-MS-TI08-0008, R10
480V MCC CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	NOTES
3D	1-MTR-18-55-B	EF3-A003	3			PL2725B	#12	PASS	
4B	1-MTR-82-AOPA-B	EF3-A003	4			PL3322B	#12	PASS	
4F1	1-DXF-215-B-B	EF3-B100				PL2502B	#2	PASS	
** DSL AUX BD 1B2-B									
2A	1-MTR-82-AOPB-B	EF3-A005	2			PL3323B	#12	PASS	
2C	1-MTR-82-B2-B	EF3-B030				PL2706B	#10	PASS	CABLE TO BE REPLACED WITH #8 MIN FOR AMPACITY
2D	1-MTR-82-B2-B	EF3-A005	3			PL2741B	#12	PASS	
2F1	1-CHGR-215-B-B	EF3-B020				PL2561B	#10	PASS	
						PL2563B	#12		
3D	1-MTR-18-54-B	EF3-A003	HI			PL2727B	#12	PASS	
** DSL AUX BD 2A1-A									
2C	2-MTR-82-A1-A	EF3-B030				PL2750A	#10	PASS	CABLE TO BE REPLACED WITH #8 MIN FOR AMPACITY
2D	2-MTR-82-A1-A	EF3-A005	4			PL2737A	#12	PASS	
2F1	2-CHGR-215-A-A	EF3-B020				PL2515A	#10	PASS	
						PL2516A	#12		
3D	2-MTR-18-55-A	EF3-A003	HI			PL2720A	#12	PASS	
4B	2-MTR-82-AOPA-A	EF3-A003	4			PL3324A	#12	PASS	
4F1	2-DXF-215-A-A	EF3-B100				PL2501A	#2	PASS	
** DSL AUX BD 2A2-A									
2A	2-MTR-82-AOPB-A	EF3-A005	2			PL3325A	#12	PASS	
2C	2-MTR-82-A2-A	EF3-B030				PL2755A	#8	PASS	
2D	2-MTR-82-A2-A	EF3-A005	4			PL2738A	#12	PASS	
2F1	2-CHGR-215-A-A	EF3-B020				PL2514A	#10	PASS	
						PL2516A	#12		
3D	2-MTR-18-54-A	EF3-A003	HI			PL2722A	#12	PASS	
** DSL AUX BD 2B1-B									
2C	2-MTR-82-B1-B	EF3-B030				PL2761B	#10	PASS	CABLE TO BE REPLACED WITH #8 MIN FOR AMPACITY
2D	2-MTR-82-B1-B	EF3-A005	2			PL2742B	#12	PASS	
2F1	2-CHGR-215-B-B	EF3-B020				PL2567B	#10	PASS	
						PL2568B	#12		
3D	2-MTR-18-55-B	EF3-A003	HI			PL2730B	#12	PASS	
4B	2-MTR-82-AOPA-B	EF3-A003	4			PL3326B	#12	PASS	
4F1	2-DXF-215-B-B	EF3-B100				PL2503B	#2	PASS	
** DSL AUX BD 2B2-B									
2A	2-MTR-82-AOPB-B	EF3-A005	2			PL3327B	#12	PASS	
2C	2-MTR-82-B2-B	EF3-B030				PL2796B	#10	PASS	CABLE TO BE REPLACED WITH #8 MIN FOR AMPACITY
2D	2-MTR-82-B2-B	EF3-A005	3			PL2743B	#12	PASS	
2F1	2-CHGR-215-B-B	EF3-B020				PL2566B	#10	PASS	
						PL2568B	#12		

TABLE C2

SECTION C
ATTACHMENT NO. M12212
WBN EEB-MS-TI08-0008, R10
480V MCC CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	NOTES
3D	2-MTR-18-54-B	EF3-A003	HI			PL2732B	#12	PASS	
** DSL AUX BD C1-S									
CU	0-CHGR-215-C-S			A4J20	20A	PL3292S	#10	PASS	BOUNDED BY A4J30 FUSE CURVE
EA	0-MTR-18-108A-S			TRS2.5	2.5A	PL3258S	#12	PASS	BOUNDED BY TRS25 FUSE CURVE
EE	0-MTR-18-108B-S			TRS2.5	2.5A	PL3261S	#12	PASS	BOUNDED BY TRS25 FUSE CURVE
** DSL AUX BD C2-S									
BA	0-MTR-82-C1-S			TRS5A	5A	PL3257S	#12	PASS	BOUNDED BY TRS25 FUSE CURVE
BE	0-MTR-82-C2-S			TRS5A	5A	PL3260S	#12	PASS	BOUNDED BY TRS25 FUSE CURVE
CC	0-MTR-82-CA-S			TRS25R	25A	PL3256S	#8	PASS	
CJ	0-MTR-82-CB-S			TRS25R	25A	PL3259S	#8	PASS	
** RMOV BD 1A1-A									
16D	0-FCV-26-141-A	EF3-A003	3			V1980A	#12	PASS	#4 IN DUCT BANK
16E	0-FCV-26-7-A	EF3-A003	3			V1987A	#12	PASS	#4 IN DUCT BANK
17B	1-FCV-26-240-A	EF3-A005	3			1V9147A	#12	PASS	
17C	1-FCV-26-242-A	EF3-A005	3			1V9360A	#12	PASS	
18A	0-MTR-78-19-A	EF3-L050	4			1PL6385A	#8	PASS	
18E	1-FCV-26-243-A	EF3-A005	3			1V9165A	#12	PASS	
5A	0-FCV-26-3-A	EF3-A003	LO			1V1826A	#12	PASS	#8 IN DUCT BANK
5E	0-FCV-26-6-A	EF3-A003	3			1V2224A	#12	PASS	#10 IN DUCT BANK
6D	1-FCV-68-333-A	EF3-A010	4			1V2451A	#12	PASS	
						1V2452A	#12		
6F	0-FCV-26-126-A	EF3-A003	3			1V3348A	#12	PASS	
9D	1-FCV-70-100-A	EF3-A005	LO			1V8164A	#10	PASS	
						1V8174A	#10	PASS	
** RMOV BD 1A2-A									
	0-DXF-228-2-A	ED63B100				1PL3710A	#2	PASS	CABLE TO BE REPLACED WITH #4 MIN FOR AMPACITY
	0CHGR-236-1AC-S	EF3-B070				1PL3170A	#4	PASS	CABLE 1PL3170A TO BE REPLACED WITH #6 MIN FOR AMPACITY
						1PL4928S	#6		
13E	1-FCV-26-245-A	EF3-A003	2			1V9175A	#12	PASS	
2D	1-FCV-1-15-A	EF3-A010	2			1V1830A	#12	PASS	
2E	1-FCV-1-17-A	EF3-A010	2			1V2620A	#12	PASS	
6A	1-FCV-1-16-A	EF3-A010	2			1V1820A	#12	PASS	
** RMOV BD 1B1-B									
17B	1-FCV-26-241-B	EF3-A003	2			1V9155B	#12	PASS	
18A	0-MTR-78-20-B	EF3-L050	4			1PL6380B	#8	PASS	
18E	0-FCV-26-142-B	EF3-A003	3			V1995B	#12	PASS	#4 IN DUCT BANK
18F	0-FCV-26-14-B	EF3-A003	3			V2005B	#12	PASS	#4 IN DUCT BANK
4F	0-FCV-26-127-B	EF3-A003	3			1V3320B	#12	PASS	
5E	1-FCV-68-332-B	EF3-A010	4			1V2445B	#12	PASS	
						1V2446B	#12		

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TABLE C2

SECTION C
ATTACHMENT NO. M12212
WBN EEB-MS-TI00-0000, R10
480V MCC CLASS 1E CABLE PROTECTION

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	NOTES
** RMOV BD 1B2-B									
	0-DXF-228-1-B	ED63B100				1PL3716B	#2	PASS	CABLE TO BE REPLACED WITH #4 MIN FOR AMPACITY
	0CHGR-236-1AC-S	EF3-B070				1PL3171B 1PL4920S	#4 #6	PASS	CABLE 1PL3171B TO BE REPLACED WITH #6 MIN FOR AMPACITY
12F	1-FCV-26-244-B	EF3-A003	2			1V9170B	#12	PASS	
2E	1-FCV-1-18-B	EF3-A010	2			1V2630B	#12	PASS	
5A	0-FCV-26-17-B	EF3-A003	3			1V3330B	#10	PASS	#8 IN DUCT BANK
** RMOV BD 2A1-A									
17D	2-FCV-26-248-A	EF3-A010	2			2V9147A	#12	PASS	
17C	2-FCV-26-242-A	EF3-A010	2			2V9360A	#12	PASS	
18E	2-FCV-26-243-A	EF3-A010	2			2V9165A	#12	PASS	
** RMOV BD 2A2-A									
	0CHGR-236-2AC-S	EF3-B070				2PL3170A 2PL4920S	#4 #6	PASS	CABLE 2PL3170A TO BE REPLACED WITH #6 MIN FOR AMPACITY
13E	2-FCV-26-245-A	EF3-A010	2			2V9175A	#12	PASS	
** RMOV BD 2B1-B									
17B	2-FCV-26-241-B	EF3-A010	2			2V9155B	#12	PASS	
5A	0-FCV-26-8-B	EF3-A003	LO			2V1826B	#12	PASS	#10 IN DUCT BANK
** RMOV BD 2B2-B									
	0CHGR-236-2AC-S	EF3-B070				2PL3171B 2PL4920S	#4 #6	PASS	CABLE 2PL3171B TO BE REPLACED WITH #6 MIN FOR AMPACITY
11F	0-FCV-26-13-B	EF3-A003	3			2V2224B	#12	PASS	#8 IN DUCT BANK
12F	2-FCV-26-244-B	EF3-A010	2			2V9170B	#14	PASS	
** RX VENT BD 1A-A									
2D	1-HTR-83-1-A	FJ3-B125	LO			1PL1060A	#2/0	PASS	CURVE NO. FJ3-B125 (ATTACHMENT NO. M10448A, REV. 4)
** RX VENT BD 1B-B									
2D	1-HTR-83-2-B	FJ3-B125	LO			1PL1080B	#2/0	PASS	CURVE NO. FJ3-B125 (ATTACHMENT NO. M10448A, REV. 4)

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REFERENCE WBN-EEB-MS-TI06-0010 R0

BOARD	Isc	X/R RATIO	X/R MULT	I (int)	I (rated)	
480V SHDN BD 1A1-A 3200A	43173.6	7.2	1.014	43778.0	50000.0	
480V SHDN BD 1A1-A 1600A	23228.6	11	1.082	25133.3	30000.0	
RMOV BD 1A1-A	18615.5	5.4	1	18615.5	22000.0	
DSL AUX BD 1A1-A	9862.9	1.5	1	9862.9	14000.0	
C & A VENT BD 1A1-A	19279.7	7.5	1.021	19684.6	22000.0	
RX VENT 1A-A	19194.4	7.5	1.02	19578.3	22000.0	
480V SHDN BD 1A2-A 3200A	43300.1	7.2	1.014	43906.3	50000.0	
480V SHDN BD 1A2-A 1600A	22053.9	12.7	1.097	24193.1	30000.0	
RMOV BD 1A2-A	18405.4	7.9	1.031	18976.0	22000.0	
C & A VENT BD 1A2-A	18441.3	7.9	1.031	19013.0	22000.0	
DSL AUX BD 1A2-A	8109.8	1.4	1	8109.8	14000.0	
480V SHDN BD 1B1-B 3200A	43692.8	6.9	1.007	43998.6	50000.0	
480V SHDN BD 1B1-B 1600A	23025.8	11	1.082	24913.9	30000.0	
RMOV BD 1B1-B	19029.1	7.2	1.014	19295.5	22000.0	
DSL AUX BD 1B1-B	7502.3	1.4	1	7502.3	14000.0	
C & A VENT BD 1B1-B	19467.3	7.4	1.019	19837.2	22000.0	
RX VENT 1B-B	19296.0	7.3	1.017	19624.0	22000.0	
480V SHDN BD 1B2-B 3200A	42405.3	7.3	1.016	43083.8	50000.0	
480V SHDN BD 1B2-B 1600A	21915.6	12.4	1.095	23997.6	30000.0	
RMOV BD 1B2-B	18340.7	7.8	1.029	18872.6	22000.0	
C & A VENT BD 1B2-B	18334.6	7.8	1.029	18866.3	22000.0	R18
DSL AUX BD 1B2-B	7459.6	1.4	1	7459.6	14000.0	
480V SHDN BD 2A1-A 3200A	42428.4	7.2	1.014	43022.4	50000.0	
480V SHDN BD 2A1-A 1600A	22411.8	11.8	1.091	24451.3	30000.0	
RMOV BD 2A1-A	18590.4	7.5	1.022	18999.4	22000.0	
DSL AUX BD 2A1-A	8316.5	1.5	1	8316.5	14000.0	
C & A VENT BD 2A1-A	18932.6	7.7	1.027	19443.8	22000.0	
RX VENT 2A-A	18910.6	7.7	1.026	19402.3	22000.0	
480V SHDN BD 2A2-A 3200A	42009.3	7.4	1.018	42765.5	50000.0	
480V SHDN BD 2A2-A 1600A	22037.1	12.3	1.094	24108.6	30000.0	
RMOV BD 2A2-A	18362.0	7.7	1.026	18839.4	22000.0	
C & A VENT BD 2A2-A	18403.6	7.7	1.027	18900.5	22000.0	
DSL AUX BD 2A2-A	8369.7	1.5	1	8369.7	14000.0	
480V SHDN BD 2B1-B 3200A	43264.7	7.3	1.016	43956.9	50000.0	

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REFERENCE WBN-EEB-MS-TI06-0010 R0

BOARD	Isc	X/R RATIO	X/R MULT	I (int)	I (rated)	
480V SHDN BD 2B1-B 1600A	22834.4	11.5	1.087	24821.0	30000.0	
RMOV BD 2B1-B	18868.6	7.3	1.017	19189.4	22000.0	
DSL AUX BD 2B1-B	10500.6	1.5	1	10500.6	14000.0	
C & A VENT BD 2B1-B	19186.8	7.5	1.021	19589.7	22000.0	
RX VENT 2B-B	19172.7	7.5	1.021	19575.3	22000.0	
480V SHDN BD 2B2-B 3200A	42166.4	7.2	1.015	42798.9	50000.0	
480V SHDN BD 2B2-B 1600A	21756.5	12.4	1.095	23823.4	30000.0	
RMOV BD 2B2-B	18222.8	7.8	1.03	18769.5	22000.0	R18
C & A VENT BD 2B2-B	18226.8	7.8	1.03	18773.6	22000.0	
DSL AUX BD 2B2-B	10333.4	1.5	1	10333.4	14000.0	

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R18

PREPARED WTH DATE 4/13/92

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APP R KEY NO	GP	ENG TITLE	NODE NO.	BOARD	COMPT NO	EQUIPID_NO	REV
38	4	DSL GEN 1A				1-DG-82-A-A	
38	4	DSL GEN 1B				1-DG-82-B-B	
38	4	DSL GEN 2A				2-DG-82-A-A	
38	4	DSL GEN 2B				2-DG-82-B-B	
38	4	6.9KV SHDN BD 1A-A				1-BD-211-A-A	
38	4	6.9KV SHDN BD 1B-B				1-BD-211-B-B	
38	4	6.9KV SHDN BD 2A-A				2-BD-211-A-A	
38	4	6.9KV SHDN BD 2B-B				2-BD-211-B-B	
11	2B	AFW PUMP 1A-A	12	6.9KV SHDN BD 1A-A	10	1-MTR-3-118-A	
31	2B	RHR PUMP 1A-A	12	6.9KV SHDN BD 1A-A	14	1-MTR-74-10-A	
1A	2B	CCP 1A-A	12	6.9KV SHDN BD 1A-A	18	1-MTR-62-108-A	
28	4	PZR HTR GP 1A-A	12	6.9KV SHDN BD 1A-A	20	1-OXF-68-341A-A	
38	4	480V SHUTDOWN BOARD 1A1-A	12	6.9KV SHDN BD 1A-A	3	1-BD-212-A1-A	
38	4	480V SHUTDOWN BOARD 1A2-A	12	6.9KV SHDN BD 1A-A	4	1-BD-212-A2-A	
1C	1	ERCW PUMP A-A	12	6.9KV SHDN BD 1A-A	8	0-MTR-67-28-A	
1C	1	ERCW PUMP B-A	12	6.9KV SHDN BD 1A-A	9	0-MTR-67-32-A	
11	2B	AFW PUMP 1B-B	13	6.9KV SHDN BD 1B-B	10	1-MTR-3-128-B	
31	2B	RHR PUMP 1B-B	13	6.9KV SHDN BD 1B-B	14	1-MTR-74-20-B	
1A	2B	CCP 1B-B	13	6.9KV SHDN BD 1B-B	18	1-MTR-62-104-B	
28	4	PZR HTR GP 1B-B	13	6.9KV SHDN BD 1B-B	20	1-OXF-68-341D-B	
38	4	480V SHUTDOWN BOARD 1B1-B	13	6.9KV SHDN BD 1B-B	3	1-BD-212-B1-B	
38	4	480V SHUTDOWN BOARD 1B2-B	13	6.9KV SHDN BD 1B-B	4	1-BD-212-B2-B	
1C	1	ERCW PUMP F-B	13	6.9KV SHDN BD 1B-B	8	0-MTR-67-51-B	
1C	1	ERCW PUMP E-B	13	6.9KV SHDN BD 1B-B	9	0-MTR-67-47-B	
38	4	480V SHUTDOWN BOARD 2A1-A	14	6.9KV SHDN BD 2A-A	3	2-BD-212-A1-A	
38	4	480V SHUTDOWN BOARD 2A2-A	14	6.9KV SHDN BD 2A-A	4	2-BD-212-A2-A	
1C	1	ERCW PUMP D-A	14	6.9KV SHDN BD 2A-A	8	0-MTR-67-40-A	
1C	1	ERCW PUMP C-A	14	6.9KV SHDN BD 2A-A	9	0-MTR-67-36-A	
38	4	480V SHUTDOWN BOARD 2B1-B	15	6.9KV SHDN BD 2B-B	3	2-BD-212-B1-B	
38	4	480V SHUTDOWN BOARD 2B2-B	15	6.9KV SHDN BD 2B-B	4	2-BD-212-B2-B	
1C	1	ERCW PUMP H-B	15	6.9KV SHDN BD 2B-B	8	0-MTR-67-59-B	
1C	1	ERCW PUMP G-B	15	6.9KV SHDN BD 2B-B	9	0-MTR-67-55-B	
1	1	COMPONENT COOL SYS PUMP 1A-A	125	480V SHDN BD 1A1-A	3B	1-MTR-70-46-A	
37J	2A	CRDM Clr Fan 1A-A Mtr 1	126	480V SHDN BD 1A1-A	7B	1-MTR-30-83/1-A	
37J	2A	Reac Lwr Compt Clr Fan 1A-A	126	480V SHDN BD 1A1-A	7C	1-MTR-30-74-A	
37J	2A	CRDM Clr Fan 1A-A Mtr 2	126	480V SHDN BD 1A1-A	7D	1-MTR-30-83/2-A	
38	4	RMOV BD 1A1-A	126	480V SHDN BD 1A1-A	8B	1-MCC-213-A1-A	
38	4	Dsl Aux Bd 1A1-A	126	480V SHDN BD 1A1-A	8D	1-MCC-215-A1-A	
39	4	NOR FDR 125V VITAL BTRY CHGR 1	127	480V SHDN BD 1A2-A	9AA	0-CHGR-236-1-D	!R18
39	4	NOR FDR 120VAC VITAL INV 1-I	127	480V SHDN BD 1A2-A	9AB	1-INV-235-1-D	!R18
39	4	NOR FDR 120VAC VITAL INV 2-I	127	480V SHDN BD 1A2-A	9AC	2-INV-235-1D	!R18
38	4	C&A Bldg Vent Bd 1A1-A	127	480V SHDN BD 1A2-A	10B	1-MCC-214-A1-A	
37A	2A	CONT RM A/C A-A CPRSR	127	480V SHDN BD 1A2-A	2C	0-MTR-31-80/2-A	
1	1	COMPONENT COOL SYS PUMP C-S	127	480V SHDN BD 1A2-A	3B	0-MTR-70-51-S	
37J	2A	CRD Mech Clr Fan 1C-A Mtr 1	128	480V SHDN BD 1A2-A	7A	1-MTR-30-88/1-A	
37J	2A	Reac Lwr Compt Clr Fan 1C-A	128	480V SHDN BD 1A2-A	7D	1-MTR-30-77-A	
37J	2A	CRD Mech Clr Fan 1C-A Mtr 2	128	480V SHDN BD 1A2-A	8A	1-MTR-30-88/2-A	

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APP R KEY NO	GP	ENG TITLE	NODE NO.	BOARD	COMPT NO	EQUIPID_NO	REV
38	4	RMOV BD 1A2-A	128	480V SHDN BD 1A2-A	8B	1-MCC-213-A2-A	
38	4	DSL AUX BD 1A2-A	128	480V SHDN BD 1A2-A	8C	1-MCC-215-A2-A	
1	1	COMPONENT COOL SYS PUMP 1B-B	129	480V SHDN BD 1B1-B	3C	1-MTR-70-38-B	
37J	2A	CRD Mech Clr Fan 1B-B Mtr 1	130	480V SHDN BD 1B1-B	7C	1-MTR-30-92/1-B	
37J	2A	Reac Lwr Compt Clr Fan 1B-B	130	480V SHDN BD 1B1-B	7D	1-MTR-30-75-B	
38	4	RMOV BD 1B1-B	130	480V SHDN BD 1B1-B	8B	1-MCC-213-B1-B	
38	4	Dsl Aux Bd 1B1-B	130	480V SHDN BD 1B1-B	8D	1-MCC-215-B1-B	
38	4	C&A Bldg Vent Bd 1B1-B	130	480V SHDN BD 1B1-B	10B	1-MCC-214-B1-B	
37J	2A	CRD Mech Clr Fan 1B-B Mtr 2	130	480V SHDN BD 1B1-B	10D	1-MTR-30-92/2-B	
37A	2A	CONT RM A/C B-B CPRSR	131	480V SHDN BD 1B2-B	2B	0-MTR-31-96/2-B	
37J	2A	CRD Mech Clr Fan 1D-B Mtr 1	132	480V SHDN BD 1B2-B	7B	1-MTR-30-80/1-B	
37J	2A	Reac Lwr Compt Clr Fan 1D-B	132	480V SHDN BD 1B2-B	7D	1-MTR-30-78-B	
38	4	RMOV BD 1B2-B	132	480V SHDN BD 1B2-B	8B	1-MCC-213-B2-B	
38	4	DSL AUX BD 1B2-B	132	480V SHDN BD 1B2-B	8D	1-MCC-215-B2-B	
39	4	NOR FDR 125V VTL BTRY CHGR 2	132	480V SHDN BD 1B2-B	10AA	0-CHGR-236-2-E	
39	4	NOR FDR 120VAC VITAL INV 1-II	132	480V SHDN BD 1B2-B	10AB	1-INV-235-2-E	
39	4	NOR FDR 120VAC VITAL INV 2-II	132	480V SHDN BD 1B2-B	10AC	2-INV-235-2E	
37J	2A	CRD Mech Clr Fan 1D-B Mtr 2	132	480V SHDN BD 1B2-B	10C	1-MTR-30-80/2-B	
38	4	Fdr.From XFMR 2A1-A	133	480V SHDN BD 2A1-A	1B	2-0XF-212-A1-A	
38	4	RMOV BD 2A1-A	134	480V SHDN BD 2A1-A	8B	2-MCC-213-A1-A	
38	4	Dsl Aux Bd 2A1-A	134	480V SHDN BD 2A1-A	8D	2-MCC-215-A1-A	
39	4	NOR FDR 125V VTL BTRY CHGR III	134	480V SHDN BD 2A2-A	9AA	0-CHGR-236-3-F	|R18
39	4	NOR FDR 120VAC VITAL INV 1-III	134	480V SHDN BD 2A2-A	9AB	1-INV-235-3-F	|R18
39	4	NOR FDR 120VAC VITAL INV 2-III	134	480V SHDN BD 2A2-A	9AC	2-INV-235-3F	|R18
38	4	C&A Bldg Vent Bd 2A1-A	134	480V SHDN BD 2A2-A	10B	2-MCC-214-A1-A	
38	4	RMOV BD 2A2-A	136	480V SHDN BD 2A2-A	8B	2-MCC-213-A2-A	
38	4	DSL AUX BD 2A2-A	136	480V SHDN BD 2A2-A	8C	2-MCC-215-A2-A	
38	4	RMOV BD 2B1-B	138	480V SHDN BD 2B1-B	8B	2-MCC-213-B1-B	
38	4	DSL AUX BD 2B1-B	138	480V SHDN BD 2B1-B	8D	2-MCC-215-B1-B	
38	4	C&A Bldg Vent Bd 2B1-B	138	480V SHDN BD 2B1-B	10B	2-MCC-214-B1-B	
1	1	COMPONENT COOL SYS PUMP C-S	139	480V SHDN BD 2B2-B	2D	0-MTR-70-51-S	
39	4	NOR FDR 120VAC VITAL INV 1-IV	140	480V SHDN BD 2B2-B	10AB	1-INV-235-4-G	
38	4	RMOV BD 2B2-B	140	480V SHDN BD 2B2-B	8B	2-MCC-213-B2-B	
39	4	NOR FDR 125V VTL BTRY CHGR IV	140	480V SHDN BD 2B2-B	10AA	0-CHGR-236-4-G	
38	4	Dsl Aux Bd 2B2-B	140	480V SHDN BD 2B2-B	8D	2-MCC-215-B2-B	
39	4	NOR FDR 120VAC VITAL INV 2-IV	140	480V SHDN BD 2B2-B	10AC	2-INV-235-4-G	
1	1	ERCW Str 1A-A Backwash Vlv	203	C&A VENT BD 1A1-A	4E	1-FCV-67-9A-A	
37O	2A	CCS & AFW PMPS SP CLR FAN A-A	203	C&A VENT BD 1A1-A	5E	1-MTR-30-190-A	
1	1	ERCW STRAINER 1A-A	203	C&A VENT BD 1A1-A	6B	1-MTR-67-9A-A	
1	1	Traveling Scrn 1A-A	203	C&A VENT BD 1A1-A	6C	1-MTR-67-434-A	
31	1	ERCW Str 1A-A Flush Vlv	203	C&A VENT BD 1A1-A	6E	1-FCV-67-9B-A	
37A	2A	Cont Rm A/C Sys Oil Pmp	203	C&A VENT BD 1A1-A	8F1	0-MTR-31-80/3-A	|R18
40	2A	RHR Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	9A	1-MTR-30-175-A	
37A	2A	Cont Rm A/C Circ Pmp A-A	203	C&A VENT BD 1A1-A	9B	0-MTR-31-80/1-A	
1	2A	Cntfg Chrg Pmp 1A-A Rm Clr Fan	203	C&A VENT BD 1A1-A	10A	1-MTR-30-183-A	
37A	2A	Cont Rm Ahu A-A	203	C&A VENT BD 1A1-A	11D	0-MTR-31-12-A	
1	1	ERCW Scrn Wash Pmp 1A-A	203	C&A VENT BD 1A1-A	13D	1-MTR-67-431-A	

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APP R KEY	GP	ENG TITLE	NODE NO.	BOARD	COMPT NO	EQUIPID_NO	REV
1	1	ERCW Str 1B-B Backwash Vlv	205	C&A VENT BD 1B1-B	4E	1-FCV-67-10A-B	
370	2A	CCS & AFW Pumps Sp Clr Fan B-B	205	C&A VENT BD 1B1-B	5E	1-MTR-30-191-B	
1	1	ERCW STRAINER 1B-B	205	C&A VENT BD 1B1-B	6B	1-MTR-67-10B-B	
1	1	Traveling Scrn 1B-B	205	C&A VENT BD 1B1-B	6C	1-MTR-67-445-B	
31	1	ERCW Str 1B-B Flush Vlv	205	C&A VENT BD 1B1 B	6E	1-FCV-67-10B-B	
37A	2A	Cont Rm A/C Cir Pmp B-B	205	C&A VENT BD 1B1-B	8E	0-MTR-31-96/1-B	
37A	2A	Cont Rm A/C Sys Oil Pmp	205	C&A VENT BD 1B1-B	8F1	0-MTR-31-96/3-A	R18
40	2A	RHR Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	9A	1-MTR-30-176-B	
1	2A	Cntfg Chrg Pmp 1B-B Rm Clr Fan	205	C&A VENT BD 1B1-B	10A	1-MTR-30-182-B	
37A	2A	Cont Rm Ahu B-B	205	C&A VENT BD 1B1-B	11D	0-MTR-31-11-B	
1	1	ERCW SCREEN WASH PUMP 1B-B	205	C&A VENT BD 1B1-B	13D	1-MTR-67-440-B	
1	1	ERCW Str 2A-A Backwash Vlv	207	C&A VENT BD 2A1-A	4E	2-FCV-67-9A-A	
370	2A	AFW & BA XFR SPACE CLR FAN A-A	207	C&A VENT BD 2A1-A	5E	2-MTR-30-184-A	
1	1	ERCW STRAINER 2A-A	207	C&A VENT BD 2A1-A	6B	2-MTR-67-9A-A	
1	1	Traveling Scrn 2A-A	207	C&A VENT BD 2A1-A	6C	2-MTR-67-439-A	
1	1	ERCW SCREEN WASH PUMP 2A-A	207	C&A VENT BD 2A1-A	13D	2-MTR-67-437-A	
[illegible]	1	ERCW Str 2B-B Backwash Vlv	209	C&A VENT BD 2B1-B	4E	2-FCV-67-10A-B	
[illegible]0	2A	AFWP&BA XFR PMP SP CLR FAN B-B	209	C&A VENT BD 2B1-B	5E	2-MTR-30-185-B	
1	1	ERCW STRAINER	209	C&A VENT BD 2B1-B	6B	2-MTR-67-10B-B	
1	1	Traveling Scrn 2B-B	209	C&A VENT BD 2B1-B	6C	2-MTR-67-451-B	
1	1	ERCW Scrn Wash Pmp 2B-B	209	C&A VENT BD 2B1-B	13D	2-MTR-67-447-B	
37C	2A	DG 1A-A RM EXH FAN 1-A	217	DSL AUX BD 1A1-A	2B	1-MTR-30-447-A	
1	1	EM DG HX 1A1 & 1A2 SPLY VLV	217	DSL AUX BD 1A1-A	3A	1-FCV-67-66-A	
37C	2A	Dg Rm 1A-A Pnl Vent Fan	217	DSL AUX BD 1A1-A	4D	1-MTR-30-491-A	
37C	2A	Dg 1A-A 480V Elec Bd Rm Ex Fan	217	DSL AUX BD 1A1-A	4E	1-MTR-30-459-A	
37C	2A	DG 1A-A RM EXH FAN 2-A	218	DSL AUX BD 1A2-A	2B	1-MTR-30-451-A	
37C	2A	DG 1B-B RM EXH FAN 1-B	219	DSL AUX BD 1B1-B	2B	1-MTR-30-449-B	
1	1	EM DG ENG HX SUP VLV FM HDR 1B	219	DSL AUX BD 1B1-B	3A	1-FCV-67-67-B	
37C	2A	Dg Rm 1B-B Pnl Vent Fan	219	DSL AUX BD 1B1-B	4D	1-MTR-30-493-B	
37C	2A	DG 1B-B 480V ELEC BD RM EX FAN	219	DSL AUX BD 1B1-B	4E	1-MTR-30-461-B	
37C	2A	Dg 1B-B Rm Exh Fan 2-B	220	DSL AUX BD 1B2-B	2B	1-MTR-30-453-B	
37C	2A	DG 2A-A RM EXH FAN 1-A	221	DSL AUX BD 2A1-A	2B	2-MTR-30-448-A	
1	1	EM DG ENG HX 2A1 & 2A2 SUP VLV	221	DSL AUX BD 2A1-A	3A	2-FCV-67-66-A	
37C	2A	Dg Rm 2A-A Pnl Vent Fan	221	DSL AUX BD 2A1-A	4D	2-MTR-30-492-A	
37C	2A	2A-A 480V ELEC BD RM EX FAN	221	DSL AUX BD 2A1-A	4E	2-MTR-30-460-A	
37C	2A	DG 2A-A RM EXH FAN 2-A	222	DSL AUX BD 2A2-A	2B	2-MTR-30-452-A	
37C	2A	DG 2B-B RM EXH FAN 1B	223	DSL AUX BD 2B1-B	2B	2-MTR-30-450-B	
1	1	EM DG ENG SUP VLV FROM HDR 1B	223	DSL AUX BD 2B1-B	3A	2-FCV-67-67-B	
37C	2A	Dg Rm 2B-B Pnl Vent Fan	223	DSL AUX BD 2B1-B	4D	2-MTR-30-494-B	
37C	2A	Dg 2B-B 480V Elec Bd Rm Ex Fan	223	DSL AUX BD 2B1-B	4E	2-MTR-30-462-B	
37C	2A	DG 2B-B RM EXH FAN 2-B	224	DSL AUX BD 2B2-B	2B	2-MTR-30-454-B	
1	1	ERCW TO DSL GEN OC-S HTX VLV	225	DSL AUX BD C1-S	DE	1-FCV-67-72-S	
[illegible]	2B	CNTFGL CHARG PMP 1A-A AOP	235	RMOV BD 1A1-A	3E	1-MTR-62-AOP-A	
[illegible]	2B	SIS Accum Tank 1 Flow Isol Vlv	235	RMOV BD 1A1-A	3F2	1-FCV-63-118-A	
[illegible]1	2B	AFW Pmp A-A Lube Oil Pmp A-A	235	RMOV BD 1A1-A	4E	1-MTR-3-118D-A	
30	2B	RHR Sys Isln Vlv	235	RMOV BD 1A1-A	5B	1-FCV-74-1-A	
37J	1	Lwr Cntmt 1D Clrs Isln Vlv	235	RMOV BD 1A1-A	5C	1-FCV-67-97-A	R18

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APP R KEY NO	GP	ENG TITLE	NODE NO.	BOARD	COMPT NO	EQUIPID_NO	REV
28	4	RCS Press Relief FCV	235	RMOV BD 1A1-A	6D	1-FCV-68-333-A	
2	2B	CHARGING FLOW ISLN VLV	235	RMOV BD 1A1-A	7B	1-FCV-62-90-A	
36	2B	SIS Accum Tank 3 Flow Isol Vlv	235	RMOV BD 1A1-A	7D	1-FCV-63-80-A	
1	2B	CHARG PMP 1A-A MIN FLOW	235	RMOV BD 1A1-A	8A	1-FCV-62-98-A	
4	2B	Vol Cont Tank Outlet Isln Vlv	235	RMOV BD 1A1-A	8B	1-LCV-62-132-A	
5	2B	RWST To Charging Pmp Vlv Cont	235	RMOV BD 1A1-A	9A	1-LCV-62-135-A	
5	2B	SIS PMP INLET TO CVCS CHG PMP	235	RMOV BD 1A1-A	9B	1-FCV-63-177-A	
2	2B	RWST TO SPRAY HDR 1A FCV	235	RMOV BD 1A1-A	9F	1-FCV-72-22-A	
5	2B	SIS Pmp Inlet To CVCS Chrg Pmp	235	RMOV BD 1A1-A	11A	1-FCV-63-7-A	
1	2B	SIS BORON INJ TANK SHUTOFF VLV	235	RMOV BD 1A1-A	11D	1-FCV-63-26-A	
1	2B	SIS BIT INLET SHUTOFF VLV	235	RMOV BD 1A1-A	11E	1-FCV-63-39-A	
5	2B	SIS Pmp 1A-A Inlet Vlv	235	RMOV BD 1A1-A	12A	1-FCV-63-47-A	
30	2B	SIS To RCS Loops 2&3 FCV	235	RMOV BD 1A1-A	12D	1-FCV-63-93-A	
5	2B	Cntmt Spray Hdr 1A Isln Vlv	235	RMOV BD 1A1-A	13E	1-FCV-72-39-A	
5	2B	RHR Spray Hdr 1A Isln Vlv	235	RMOV BD 1A1-A	14A	1-FCV-72-40-A	
30	2B	RHR Pmp 1A-A Inlet FCV	235	RMOV BD 1A1-A	14B	1-FCV-74-3-A	
[illegible]	2B	RHR Pmp 1A-A Min Flow Vlv	235	RMOV BD 1A1-A	14D	1-FCV-74-12-A	
[illegible]	2B	RHR Hx 1A Bypass Vlv	235	RMOV BD 1A1-A	14E	1-FCV-74-33-A	
37J	1	Lwr Cntmt 1D Clrs Isln Vlv	235	RMOV BD 1A1-A	15D	1-FCV-67-89-A	|R18
19	2B	ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	2A	1-FCV-3-116A-A	
19	2B	ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	2B	1-FCV-3-116B-A	
14	6	AFWP Turb Stm Sup Fm Stm Gen 1	236	RMOV BD 1A2-A	2D	1-FCV-1-15-A	
14	6	St Flow To AFWP Turb Isln Vlv	236	RMOV BD 1A2-A	2E	1-FCV-1-17-A	
19	2B	ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	3A	1-FCV-3-136A-A	
19	2B	ERCW Hdr A Isln Vlv	236	RMOV BD 1A2-A	3B	1-FCV-3-136B-A	
22	2C	St Gen No 1 FW Isln Vlv	236	RMOV BD 1A2-A	3D	1-FCV-3-33-A	
22	2C	St Gen No 3 FW Isln Vlv	236	RMOV BD 1A2-A	4D	1-FCV-3-87-A	
1	1	Sply Hdr 1A To Hdr 2B Isln Vlv	236	RMOV BD 1A2-A	5B	1-FCV-67-147-A	
14	6	AFWP Turb St Sply Frm St gen 4	236	RMOV BD 1A2-A	6A	1-FCV-1-16-A	
30	2B	RHR Sys Isln Bypass Vlv	236	RMOV BD 1A2-A	6D	1-FCV-74-8-A	
1	1	ERCW Hdr 1A Iso Vlv Before Str	236	RMOV BD 1A2-A	7B	1-FCV-67-22-A	
37J	1	Lwr Cntmt Clr 1A Disch Iso Vlv	236	RMOV BD 1A2-A	7D	1-FCV-67-87-A	
1	1	A.Bldg ERCW Sup Hdr 1A Iso Vlv	236	RMOV BD 1A2-A	8A	1-FCV-67-81-A	
37J	1	Lwr Cntmt 1A Clr Sply Isln Vlv	236	RMOV BD 1A2-A	8B	1-FCV-67-83-A	
37J	1	Lwr Cntmt 1C Clr Disch Iso Vlv	236	RMOV BD 1A2-A	8D	1-FCV-67-95-A	
37J	1	Lwr Cntmt 1C Clr Sply Isln Vlv	236	RMOV BD 1A2-A	9A	1-FCV-67-91-A	
37J	1	LWR CNTMT 1B CLR DISCH ISO VLV	236	RMOV BD 1A2-A	9B	1-FCV-67-104-A	
37J	1	Lwr Cntmt 1D Clr Disch Iso Vlv	236	RMOV BD 1A2-A	10A	1-FCV-67-112-A	
1	1	A.Bldg AirClr Sup Hdr 1A Iso V	236	RMOV BD 1A2-A	10B	1-FCV-67-127-A	
1	1	Cmpnt Clg Hx A Disch Cont Vlv	236	RMOV BD 1A2-A	11A	1-FCV-67-146-A	
1	1	Cmpt Clg Hx C Dish Vl To Hdr A	236	RMOV BD 1A2-A	12A	0-FCV-67-151-A	
1	1	RHR Hx A Hdr Inlet Vlv	236	RMOV BD 1A2-A	14A	1-FCV-70-2-A	
[illegible]	1	CCS Hx A Outlet Vlv	236	RMOV BD 1A2-A	14D	1-FCV-70-8-A	
[illegible]	1	CCS Hx A & C Outlet Isln Vlv	236	RMOV BD 1A2-A	14E	1-FCV-70-10-A	
[illegible]	1	CCS Hx Disch Bypass Cont Vlv	236	RMOV BD 1A2-A	15A	1-FCV-67-143-A	|R18
1	1	CCS Hx A & C Inlet Isln Vlv	236	RMOV BD 1A2-A	15B	1-FCV-70-23-A	
1	1	CCS Hx A Inlet Vlv	236	RMOV BD 1A2-A	15D	1-FCV-70-25-A	

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APP R KEY NO	GP	ENG TITLE	NODE NO.	BOARD	COMPT NO	EQUIPID_NO	REV
1	1	ERCW To Cmpnt Clg Hx A	236	RMOV BD 1A2-A	15E	1-FCV-67-458-A	
1	1	RHR Hx A-A Outlet Vlv	236	RMOV BD 1A2-A	16E	1-FCV-70-156-A	
31	1	SFPCS Hx Sply Hdr Isln Vlv	236	RMOV BD 1A2-A	17B	0-FCV-70-197-A	
31	1	CDWE Bldg Supply Valve	237	RMOV BD 1B1-B	3E	1-FCV-70-207-B	
36	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	3F2	1-FCV-63-98-B	
7	2B	RHR Sys Isln Vlv	237	RMOV BD 1B1-B	5B	1-FCV-74-2-B	
30	2B	RHR Sys Isln Bypass Vlv	237	RMOV BD 1B1-B	5C	1-FCV-74-9-B	
28	4	RCS Press Relief Flow Cont Vlv	237	RMOV BD 1B1-B	5E	1-FCV-68-332-B	
2	2B	CHRG FLOW ISLN VLV	237	RMOV BD 1B1-B	7A	1-FCV-62-91-B	
1	2B	CHRG PMP 1A-A MIN FLOW	237	RMOV BD 1B1-B	7B	1-FCV-62-99-B	
4	2B	Vol Cont Tank Outlet Isln Vlv	237	RMOV BD 1B1-B	8A	1-LCV-62-133-B	
5	2B	RWST To Charging Pmp Vlv Cont	237	RMOV BD 1B1-B	8B	1-LCV-62-136-B	
30	2B	RHR To RCS H.L. 1&3 Flow Iso V	237	RMOV BD 1B1-B	9B	1-FCV-63-172-B	
5	2B	RWST To SIS Pump Flow Cont Vlv	237	RMOV BD 1B1-B	10B	1-FCV-63-5-B	
7	2B	RHR Sys Isln Vlv	237	RMOV BD 1B1-B	10D	1-FCV-74-2-B	
2	2B	RWST TO SPRAY HDR 1B FCV	237	RMOV BD 1B1-B	10F	1-FCV-72-21-B	
	2B	SIS PMP INLT TO CVCS CHRG PMP	237	RMOV BD 1B1-B	11A	1-FCV-63-6-B	
	2B	SIS BORON INJ TANK SHUTOFF VLV	237	RMOV BD 1B1-B	11E	1-FCV-63-25-B	
1	2B	SIS BIT UNLET SHUTOFF VLV	237	RMOV BD 1B1-B	12A	1-FCV-63-40-B	
30	2B	SIS To RCS Loops 1&4 FCV	237	RMOV BD 1B1-B	12E	1-FCV-63-94-B	
5	2B	Cntmt Spray Hdr 1B Isln Vlv	237	RMOV BD 1B1-B	14A	1-FCV-72-2-B	
5	2B	RHR Spray Hdr 1B Isln Vlv	237	RMOV BD 1B1-B	14D	1-FCV-72-41-B	
30	2B	RHR Pmp 1B-B Inlet FCV	237	RMOV BD 1B1-B	15A	1-FCV-74-21-B	
5	2B	RHR Pmp 1B-B Min Flow Vlv	237	RMOV BD 1B1-B	15B	1-FCV-74-24-B	
30	2B	RHR Hx 1B Bypass Vlv	237	RMOV BD 1B1-B	15D	1-FCV-74-35-B	
36	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	16F2	1-FCV-63-67-B	
11	2B	AFW Pmp B-B Lube Oil Pmp B-B	237	RMOV BD 1B1-B	17D	1-MTR-3-128D-B	
19	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	2A	1-FCV-3-126A-B	
19	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	2B	1-FCV-3-126B-B	
14	6	St Flow To AFWP Turb Isln Vlv	238	RMOV BD 1B2-B	2E	1-FCV-1-18-B	
19	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	3A	1-FCV-3-179A-B	
19	2B	ERCW Hdr B Isln Vlv	238	RMOV BD 1B2-B	3B	1-FCV-3-179B-B	
22	2C	ST GEN NO 2 FW ISLN VLV	238	RMOV BD 1B2-B	3D	1-FCV-3-47-B	
22	2C	St Gen No 4 FW Isln Vlv	238	RMOV BD 1B2-B	4D	1-FCV-3-100-B	
37J	1	Lwr Cntmt 1A Clr Isln Vlv	238	RMOV BD 1B2-B	5C	1-FCV-67-113-B	|R18
37J	1	Lwr Cntmt 1B Clr Dish Iso Vlv	238	RMOV BD 1B2-B	7D	1-FCV-67-103-B	
1	1	ERCW Hdr 1B Iso Vlv Before Str	238	RMOV BD 1B2-B	8A	1-FCV-67-24-B	
1	1	A.Bldg ERCW Sup Hdr 1B Iso Vlv	238	RMOV BD 1B2-B	8B	1-FCV-67-82-B	
37J	1	Lwr Cntmt 1D Clr Dish Iso Vlv	238	RMOV BD 1B2-B	8D	1-FCV-67-111-B	
37J	1	Lwr Cntmt 1A Clr Dish Iso Vlv	238	RMOV BD 1B2-B	9A	1-FCV-67-88-B	
37J	1	Lwr Cntmt 1C Clr Dish Iso Vlv	238	RMOV BD 1B2-B	9B	1-FCV-67-96-B	
37J	1	Lwr Cntmt 1B Clr Sply Isln Vlv	238	RMOV BD 1B2-B	10A	1-FCV-67-99-B	
[illegible]	1	Lwr Cntmt 1D Clr Sply Isln Vlv	238	RMOV BD 1B2-B	10B	1-FCV-67-107-B	
	1	A.Bldg AirClr Sup Hdr 1B Iso V	238	RMOV BD 1B2-B	11A	1-FCV-67-128-B	
[illegible]	1	Lwr Compt 1C Clrs Isln Vlv	238	RMOV BD 1B2-B	11D	1-FCV-67-105-B	|R18
1	1	ERCW To Cmpnt Clg Hx A	238	RMOV BD 1B2-B	12B	1-FCV-67-478-B	
1	1	CCS Hx A & C Inlet Isln Vlv	238	RMOV BD 1B2-B	13B	1-FCV-70-13-B	

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APP R KEY NO	GP	ENG TITLE	NODE NO.	BOARD	COMPT NO	EQUIPID_NO	REV
1	1	CCS Hx C Outlet Vlv	238	RMOV BD 1B2-B	14A	0-FCV-70-12-B	
1	1	RHR Hx B Hdr Inlet Vlv	238	RMOV BD 1B2-B	14B	1-FCV-70-3-B	
1	1	CCSP 1AA&1BB To C-S Outl Iso V	238	RMOV BD 1B2-B	14D	1-FCV-70-26-B	
1	1	CCS Pmps 1A-A To 1B-B Isln Vlv	238	RMOV BD 1B2-B	14E	1-FCV-70-34-B	
1	1	RHR Hx B Rtn Hdr Isln Vlv	238	RMOV BD 1B2-B	15A	1-FCV-70-75-B	
1	1	CCS Hx A & C Outlet Isln Vlv	238	RMOV BD 1B2-B	15B	1-FCV-70-9-B	
1	1	CCSP 1AA&1BB To C-S Inl Iso Vl	238	RMOV BD 1B2-B	15D	1-FCV-70-64-B	
1	1	RHR Hx B-B Outlet Vlv	238	RMOV BD 1B2-B	15E	1-FCV-70-153-B	
1	1	CCSP 1AA&1BB To C-S Inl Iso Vl	238	RMOV BD 1B2-B	16A	1-FCV-70-74-B	
1	1	CCS Hx C Inlet Vlv	238	RMOV BD 1B2-B	16E	0-FCV-70-22-B	
1	1	CCSP 1AA&1BB To C-S Outl Iso V	238	RMOV BD 1B2-B	17B	1-FCV-70-27-B	
37J	1	CCS Hx C Disch Bypass Cont Vlv	238	RMOV BD 1B2-B	11D	0-FCV-67-144-B	|R18
1	1	ERCW Hdr 2A Iso Vlv Before Str	240	RMOV BD 2A2-A	7B	2-FCV-67-22-A	
1	1	A.Bldg ERCW Sup Hdr 2A Iso Vlv	240	RMOV BD 2A2-A	8A	2-FCV-67-81-A	
40	1	A.Bldg AirClr Sup Hdr 2A Iso V	240	RMOV BD 2A2-A	10B	2-FCV-67-127-A	
1	1	CCS HX A DISCH CONT VLV	240	RMOV BD 2A2-A	11A	2-FCV-67-146-A	
1	1	SPLY HDR 2A TO HDR 1B ISLN VLV	240	RMOV BD 2A2-A	13A	2-FCV-67-223-A	
1	1	CCS HX B & C OUTLET ISLN VLV	240	RMOV BD 2A2-A	14E	2-FCV-70-195-A	
1	1	CCS Hx B & C Inlet Isln Vlv	240	RMOV BD 2A2-A	15B	2-FCV-70-18-A	
31	1	CDWE Bldg Supply Valve	241	RMOV BD 2B1-B	3E	2-FCV-70-207-B	
1	1	ERCW Hdr 2B Iso Vlv Before Str	242	RMOV BD 2B2-B	8A	2-FCV-67-24-B	
1	1	A.Bldg ERCW Sup Hdr 2B Iso Vlv	242	RMOV BD 2B2-B	8B	2-FCV-67-82-B	
40	1	A.Bldg AirClr Sup Hdr 2B Iso V	242	RMOV BD 2B2-B	11A	2-FCV-67-128-B	
1	1	CCS Hx C Disch Vlv To Hdr B	242	RMOV BD 2B2-B	12B	0-FCV-67-152-B	
1	1	Sply Hdr 2B To Hdr 1A Isln Vlv	242	RMOV BD 2B2-B	13A	2-FCV-67-147-B	
1	1	CCS Hx B & C Inlet Isln Vlv	242	RMOV BD 2B2-B	13B	2-FCV-70-14-B	
31	1	RHR Hx B Hdr Inlet Vlv	242	RMOV BD 2B2-B	14B	2-FCV-70-3-B	
1	1	CCSP 2AA&2BB To C-S Outl Iso V	242	RMOV BD 2B2-B	14D	2-FCV-70-28-B	
1	1	CCS Hx B & C Outlet Isln Vlv	242	RMOV BD 2B2-B	15B	2-FCV-70-196-B	
1	1	CCSP 2AA&2BB To C-S Inlt Iso V	242	RMOV BD 2B2-B	15D	2-FCV-70-78-B	
1	1	RHR Hx B-B Outlet Vlv	242	RMOV BD 2B2-B	15E	2-FCV-70-153-B	
1	1	CCSP 2AA&2BB To C-S Inlt Iso V	242	RMOV BD 2B2-B	16A	2-FCV-70-76-B	
1	1	CCSP 2AA&2BB To C-S Outl Iso V	242	RMOV BD 2B2-B	17B	2-FCV-70-29-B	

WBN-EEB-MS-TI008-0008 Rev 18
C & A VENT BOARD 1A1-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
203	C&A VENT BD 1A1-A	2A	0-MTR-31-8-A	10.00	12.20	110.0	T43	EF3-L050	210	2		O	0.00	XS	12.20	XS	12.20		
203	C&A VENT BD 1A1-A	2B	0-MTR-31-493A-A	1.50	2.50	15.0	T28	EF3-A010	36	2		XR	2.50	XR	2.50	XR	2.50		
203	C&A VENT BD 1A1-A	2C	1-MTR-30-186-A	3.00	4.00	25.0	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
203	C&A VENT BD 1A1-A	2D	1-MTR-81-3	30.00	36.10	236.8	T52	EF3-H050	475	3		XR	36.10	XR	36.10	XR	36.10		
203	C&A VENT BD 1A1-A	2F1	0DXF-234-A1/SIS	9.00	10.83			EF3-B020				XR	10.83	XR	10.83	XR	10.83		
203	C&A VENT BD 1A1-A	2F2	1-DXF-242-1	37.50	78.20			FXD63B125	1200	5		XR	137.50	XR	137.50	XR	137.50	LOAD ANALYZED	
203	C&A VENT BD 1A1-A	3C	1-MTR-30-177-A	7.50	9.00	62.0	T40	EF3-A025Z	125	3		O	0.00	O	0.00	XS	9.00		
203	C&A VENT BD 1A1-A	3F1	1-RE-90-119	0.75	1.40	12.5		EF3-B020				XR	1.40	XR	1.40	XR	1.40		
203	C&A VENT BD 1A1-A	3F2	1-MTR-40-3A	1.50	2.65	20.0		EF3-B020				XR	2.65	XR	2.65	XR	2.65		
203	C&A VENT BD 1A1-A	4A	0-MTR-31-28-A	1.00	2.20	19.5	T27	EF3-A010	45	3		XR	2.20	XR	2.20	XR	2.20		
203	C&A VENT BD 1A1-A	4B	0-MTR-31-493B-A	1.50	2.50	14.5	T28	EF3-A005	29	4		XR	2.50	XR	2.50	XR	2.50		
203	C&A VENT BD 1A1-A	4D	0-MTR-65-23-A	20.00	25.00	132.0	T50	EF3-L050	260	3		O	0.00	XS	25.00	XS	25.00		
203	C&A VENT BD 1A1-A	4E	1-FCV-67-9A-A	0.33	0.75	5.8	T14	EF3-A003	12	3	1	XS	0.00	XS	0.00	XS	0.00		
203	C&A VENT BD 1A1-A	5A	0-MTR-30-192-A	7.50	9.00	62.0	T40	EF3-A025Z	125	3		XR	9.00	XS	9.00	XS	9.00		
203	C&A VENT BD 1A1-A	5B		1.50	3.13			EF3-B020				XR	3.13	XR	3.13	XR	3.13		
203	C&A VENT BD 1A1-A	5E	1-MTR-30-190-A	20.00	24.50	139.9	T50	EF3-L050	260	3	370	XR	24.50	XS	24.50	XS	24.50		
203	C&A VENT BD 1A1-A	5F1	0-RE-90-132	3.00	4.60	32.0		EF3-B020				XR	4.60	XR	4.60	XR	4.60		
203	C&A VENT BD 1A1-A	6A	0-MTR-31-64-A	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	OT	0.00	OT	0.00		
203	C&A VENT BD 1A1-A	6B	1-MTR-67-9A-A	3.00	6.00	30.1	T36	EF3-A010	58	4	1	XR	6.00	XR	6.00	XR	6.00		
203	C&A VENT BD 1A1-A	6C	1-MTR-67-434-A	5.00	6.80	41.1	T38	EF3-A025	105	2	1	XR	6.80	XR	6.80	XR	6.80		
203	C&A VENT BD 1A1-A	6D	0-MTR-65-17-A	20.00	24.06		T50	EF3-B030				O	0.00	XR	24.06	XR	24.06		
203	C&A VENT BD 1A1-A	6E	1-FCV-67-9B-A	0.33	0.75	5.8	T14	EF3-A003	12	3	31	XR	0.00	XR	0.00	XR	0.00		
203	C&A VENT BD 1A1-A	6F1	1-RE-90-106-A	3.00	4.60	32.0		EF3-B020				XR	4.60	XR	4.60	XR	4.60		
203	C&A VENT BD 1A1-A	7B	1-MTR-31-287-A	0.33	0.80	5.2	T17	EF3-A003	12	3		XR	0.80	XR	0.80	XR	0.80		
203	C&A VENT BD 1A1-A	7C	0-MTR-26-7-A	0.75	2.05	8.5	T26	EF3-A005	18	2		XR	2.05	XR	2.05	XR	2.05		
203	C&A VENT BD 1A1-A	7D	1-FCV-74-3-A	10.50	13.80	118.5	T42	EF3-L050	260	3	30	O	0.00	O	0.00	O	0.00		
203	C&A VENT BD 1A1-A	7E	1-FCV-72-22-A	3.20	5.20	36.0	T32	EF3-A010	84	HI	2	O	0.00	O	0.00	O	0.00		
203	C&A VENT BD 1A1-A	8A	1-MTR-30-180-A	5.00	6.10	45.0	T37	EF3-A025Z	105	2		O	0.00	XS	6.10	XS	6.10		
203	C&A VENT BD 1A1-A	8B	1-MTR-30-194-A	3.00	4.00	25.3	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
203	C&A VENT BD 1A1-A	8C	1-MTR-30-244G-A	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
203	C&A VENT BD 1A1-A	8D	1-MTR-30-244H-A	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
203	C&A VENT BD 1A1-A	8F1	0-MTR-31-80/3-A	3.11	3.90	31.0		EF3-B020			37A	XR	3.90	XR	3.90	XR	3.90		IR18
203	C&A VENT BD 1A1-A	9A	1-MTR-30-175-A	5.00	6.10	45.0	T37	EF3-A025Z	105	2	40	XS	6.10	XS	6.10	XS	6.10		
203	C&A VENT BD 1A1-A	9B	0-MTR-31-80/1-A	15.00	20.00	118.4	T49	EF3-L050	260	3	37A	XR	20.00	XR	20.00	XR	20.00		
203	C&A VENT BD 1A1-A	9C	1-MTR-31-462-A	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
203	C&A VENT BD 1A1-A	9D	1-MTR-30-244F-A	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
203	C&A VENT BD 1A1-A	9E	1-DXF-268-1-A	35.75	43.00		T56	EF3-B070				O	0.00	O	0.00	O	0.00		
203	C&A VENT BD 1A1-A	9F1	0-RE-90-205-A	0.75	1.40	12.5		EF3-B020				XR	1.40	XR	1.40	XR	1.40		
203	C&A VENT BD 1A1-A	10A	1-MTR-30-183-A	5.00	6.10	45.0	T37	EF3-A025Z	105	2	1	XR	6.10	XR	6.10	XR	6.10		
203	C&A VENT BD 1A1-A	10B	1-MTR-30-196-A	3.00	4.00	26.0	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
203	C&A VENT BD 1A1-A	10C	1-MTR-30-201-A	3.00	4.00	25.2	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
203	C&A VENT BD 1A1-A	10F1	0-RE-90-101	3.00	4.60	32.0		EF3-B020				XR	4.60	XR	4.60	XR	4.60		
203	C&A VENT BD 1A1-A	11A	1-MTR-31-478-A	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		

Preparer CWN Date 4/13/92
Check EH Date 4/13/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
C & A VENT BOARD 1A1-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
203	C&A VENT BD 1A1-A	11C	1-MTR-31-461-A	10.00	12.00	78.9	T44	EF3-A025%	170	4		XR	12.00	XR	12.00	XR	12.00		
203	C&A VENT BD 1A1-A	11D	0-MTR-31-12-A	60.00	72.00	413.0	T59	EF3-A100	930	4	37A	XR	72.00	XR	72.00	XR	72.00		
203	C&A VENT BD 1A1-A	12A	1-MTR-31-285-A	0.33	0.80	5.2	T20	EF3-A003	10	2		XR	0.80	XR	0.80	XR	0.80		
203	C&A VENT BD 1A1-A	12B	0-MTR-31-6-A	1.00	1.70	15.0	T25	EF3-A005	29	4		O	0.00	XR	1.70	XR	1.70		
203	C&A VENT BD 1A1-A	12C	1-MTR-31-290-A	15.00	21.00	111.0	T49	EF3-L050	260	3		XR	21.00	XR	21.00	XR	21.00		
203	C&A VENT BD 1A1-A	12D	0-MTR-31-1-A	2.00	3.65	27.0	T31	EF3-A010	58	4		XR	3.65	XR	3.65	XR	3.65		
203	C&A VENT BD 1A1-A	12E1	1-PNL-90-L398	5.00	7.25	46.0		EF3-B020				XR	7.25	XR	7.25	XR	7.25		
203	C&A VENT BD 1A1-A	12F1	1-RE-90-130-A	0.75	1.40	12.5		EF3-B020				XR	1.40	XR	1.40	XR	1.40		
203	C&A VENT BD 1A1-A	13A	1-MTR-84-16	1.00	1.80	12.5	T25	EF3-A005	29	4		O	0.00	O	0.00	O	0.00		
203	C&A VENT BD 1A1-A	13B	0-MTR-84-6	1.00	1.80	11.3	T25	EF3-A005	22	3		O	0.00	O	0.00	O	0.00		
203	C&A VENT BD 1A1-A	13C	1-MTR-65-77	5.00	7.25	46.0	T38	EF3-A025%	105	2		XR	7.25	O	7.25	O	7.25		
203	C&A VENT BD 1A1-A	13D	1-MTR-67-431-A	40.00	49.80	315.8	T54	EF3-A100	630	2	1	XR	49.80	XR	49.80	XR	49.80		
203	C&A VENT BD 1A1-A		TOTALS		603.27	2829.9							517.41		581.87		590.87		IR18

APPENDIX R LOADING WITH A HIGH IMPEDANCE FAULT

Date 11-Apr-92

Preparer WTH Date 4/9/92
Check EH Date 4/9/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
C & A VENT BOARD 1A2-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
204	C&A VENT BD 1A2-A	2A	0-MTR-31-339	0.75	1.20	12.5	T20	EF3-A005	29	4		XR	1.20	XR	1.20	XR	1.20		
204	C&A VENT BD 1A2-A	2D1	1-HTR-30-A1A	10.00	12.30			EF3-B020				XR	12.30	XR	12.30	XR	12.30		IR18
204	C&A VENT BD 1A2-A	2D2	0-PO-214-1 To 4	0.00	0.00			EF3-B100				O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	2E1	1-HTR-30-B1A	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	2E2	0-HTR-31-493	32.00	38.50			EF3-B050%				XR	38.50	XR	38.50	XR	38.50		IR18
204	C&A VENT BD 1A2-A	2F2	0-PO-214-7,8	0.00	0.00			EF3-B100				O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	3A	1-MTR-30-25	3.00	4.60	32.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
204	C&A VENT BD 1A2-A	3D1	1-HTR-30-ACRD	10.00	12.30			EF3-B020				XR	12.30	XR	12.30	XR	12.30		IR18
204	C&A VENT BD 1A2-A	3D2	0-PO-214-5,6	0.00	0.00			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	IR18
204	C&A VENT BD 1A2-A	3E1	1-HTR-30-C1A	7.50	9.03			EF3-B020				O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	3E2	1-HTR-31-D1A	30.00	36.09			EF3-B050%				XR	36.90	XR	36.90	XR	36.90		IR18
204	C&A VENT BD 1A2-A	3F1	0-HTR-31-97	10.00	12.03			EF3-B020				XR	12.03	XR	12.03	XR	12.03		IR18
204	C&A VENT BD 1A2-A	3F2	1-HTR-30-1A1	3.00	3.70			EF3-B020				XR	3.70	XR	3.70	XR	3.70		IR18
204	C&A VENT BD 1A2-A	4A	1-MTR-30-283	1.00	1.70	15.0	T24	EF3-A005	29	4		XR	1.70	XR	1.70	XR	1.70		
204	C&A VENT BD 1A2-A	4B	0MTR-31-203/204	7.50	9.70	63.5	T41	EF3-A025%	125	3		O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	4E1	1-HTR-30-BCRD	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	4F1	1-HTR-30-CCRD	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	5A	1-MTR-30-301	3.00	4.60	32.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
204	C&A VENT BD 1A2-A	5E1	0-HTR-31-83	20.00	24.06			EF3-B030				XR	24.06	XR	24.06	XR	24.06		IR18
204	C&A VENT BD 1A2-A	5F1	1-HTR-30-XM1A	10.00	12.30			EF3-B020				XR	12.30	XR	12.30	XR	12.30		IR18
204	C&A VENT BD 1A2-A	5F2	1-HTR-30-AB1	5.00	6.10			EF3-B020				XR	6.10	XR	6.10	XR	6.10		IR18
204	C&A VENT BD 1A2-A	6E1	1-HTR-30-SMS	20.00	24.06			EF3-B030				O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	6E2	1-HTR-30-MM1	30.00	36.10			EF3-B050				O	0.00	O	0.00	O	0.00		
204	C&A VENT BD 1A2-A	6F2	0-HTR-30-RMI	5.00	6.10			EF3-B020				XR	6.10	XR	6.10	XR	6.10		IR18
204	C&A VENT BD 1A2-A	7D2	0-HTR-30-AFH	25.00	30.10			EF3-B040				XR	30.10	XR	30.10	XR	30.10		IR18
204	C&A VENT BD 1A2-A	7E1	1-HTR-30-U1A	3.00	3.70			EF3-B020				XR	3.70	XR	3.70	XR	3.70		IR18
204	C&A VENT BD 1A2-A	7E2	0-HTR-30-BFH	25.00	30.10			EF3-B040				XR	30.10	XR	30.10	XR	30.10		IR18
204	C&A VENT BD 1A2-A	7F2	0-HTR-30-CFH	25.00	30.10			EF3-B040				XP	30.10	XR	30.10	XR	30.10		IR18
204	C&A VENT BD 1A2-A	8A	1-MTR-30-CRD	47.50	78.40	378.5		FXD63B125	800	LO		XR	78.40	XR	78.40	XR	78.40		IR18
204	C&A VENT BD 1A2-A	8B	1-HTR-1-CBS	75.00	90.22			FXD63B125	800	LO		XR	90.22	XR	90.22	XR	90.22		IR18
204	C&A VENT BD 1A2-A		TOTALS		553.99	533.5							549.01		549.01		549.01		IR18

Preparer WTH Date 4/13/92
Check EH Date 4/13/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
C & A VENT BOARD 1B1-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER?	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
205	C&A VENT BD 1B1-B	2A	0-MTR-31-7-B	10.00	12.20	110.0	T43	EF3-A025Z	210	HI		O	0.00	XS	12.20	XS	12.20		
205	C&A VENT BD 1B1-B	2C	1-MTR-30-197-B	3.00	4.00	26.0	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
205	C&A VENT BD 1B1-B	2D	1-MTR-81-7	30.00	36.00	236.8	T52	EF3-H050	475	3		XR	36.00	XR	36.00	XR	36.00		
205	C&A VENT BD 1B1-B	2F1	0DXF-234-B1/SIS	9.00	10.83			EF3-B020				XR	10.83	XR	10.83	XR	10.83		
205	C&A VENT BD 1B1-B	2F2	1-MTR-40-66A	1.50	2.65	20.0		EF3-B020				XR	2.65	XR	2.65	XR	2.65		
205	C&A VENT BD 1B1-B	3A	0-MTR-31-49/1-B	25.00	31.00	197.4	T53	EF3-L050	470	HI		XR	31.00	XR	31.00	XR	31.00		
205	C&A VENT BD 1B1-B	3B	1-MTR-30-202-B	3.00	4.00	25.2	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
205	C&A VENT BD 1B1-B	3C	1-MTR-30-178-B	7.50	9.00	62.0	T40	EF3-A025Z	125	3		O	0.00	O	0.00	XS	9.00		
205	C&A VENT BD 1B1-B	3F1	1-RE-90-112-B	3.00	4.60	32.0		EF3-B020				XR	4.60	XR	4.60	XR	4.60		
205	C&A VENT BD 1B1-B	4A	0-MTR-31-29-B	1.00	2.20	19.5	T27	EF3-A010	36	2		XR	2.20	XR	2.20	XR	2.20		
205	C&A VENT BD 1B1-B	4D	0-MTR-65-42-B	20.00	25.00	132.0	T50	EF3-L050	260	3		OT	0.00	XS	25.00	XS	25.00		
205	C&A VENT BD 1B1-B	4E	1-FCV-67-10A-B	0.33	0.75	5.8	T14	EF3-A003	12	3	1	XS	0.00	XS	0.00	XS	0.00		
205	C&A VENT BD 1B1-B	4F1	1-RE-90-131-B	0.75	1.40	12.5		EF3-B020				XR	22.00	XR	22.00	XR	22.00	LOAD ANALYZED	
205	C&A VENT BD 1B1-B	5A	0-MTR-30-193-B	7.50	9.00	62.0	T40	EF3-A025Z	125	3		XR	9.00	XS	9.00	XS	9.00		
205	C&A VENT BD 1B1-B	5B		1.50	3.13			EF3-B020				XR	3.13	XR	3.13	XR	3.13		
205	C&A VENT BD 1B1-B	5E	1-MTR-30-191-B	20.00	24.50	139.9	T50	EF3-L050	330	4	370	XR	24.50	XS	24.50	XS	24.50		
205	C&A VENT BD 1B1-B	6A	0-MTR-31-67-B	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	OT	0.00	OT	0.00		
205	C&A VENT BD 1B1-B	6B	1-MTR-67-10B-B	3.00	6.00	30.1	T36	EF3-A010	58	4	1	XR	6.00	XR	6.00	XR	6.00		
205	C&A VENT BD 1B1-B	6C	1-MTR-67-445-B	5.00	6.80	41.1	T38	EF3-A025	105	2	1	XR	6.80	XR	6.80	XR	6.80		
205	C&A VENT BD 1B1-B	6D	0-MTR-65-37-B	20.00	24.06		T50	EF3-B040				OT	0.00	XR	24.06	XR	24.06		
205	C&A VENT BD 1B1-B	6E	1-FCV-67-10B-B	0.33	0.75	5.8	T14	EF3-A003	12	3	31	XS	0.00	XS	0.00	XS	0.00		
205	C&A VENT BD 1B1-B	7A	0-MTR-31-496A-B	1.50	2.50	14.5	T28	EF3-A005	29	4		XR	2.50	XR	2.50	XR	2.50		
205	C&A VENT BD 1B1-B	7B	1-MTR-31-288-B	0.33	0.80	5.2	T20	EF3-A003	10	2		XR	0.80	XR	0.80	XR	0.80		
205	C&A VENT BD 1B1-B	7C	0-MTR-26-14-B	0.75	2.05	8.5	T26	EF3-A005	18	2		XS	2.05	XS	2.05	XS	2.05		
205	C&A VENT BD 1B1-B	7D	1-FCV-74-21-B	10.50	13.80	118.5	T42	EF3-L050	260	3	30	O	0.00	O	0.00	O	0.00		
205	C&A VENT BD 1B1-B	7E	1-FCV-72-21-B	3.20	5.20	36.0	T32	EF3-A010	84	HI	2	O	0.00	O	0.00	O	0.00		
205	C&A VENT BD 1B1-B	8A	1-MTR-30-179-B	5.00	6.10	50.1	T37	EF3-A025Z	105	2		O	0.00	XS	6.10	XS	6.10		
205	C&A VENT BD 1B1-B	8B	1-MTR-30-187-B	3.00	4.00	25.0	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
205	C&A VENT BD 1B1-B	8C	1-MTR-30-248F-B	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
205	C&A VENT BD 1B1-B	8D	1-MTR-30-248G-B	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
205	C&A VENT BD 1B1-B	8E	0-MTR-31-96/1-B	15.00	20.00	118.4	T49	EF3-L050	260	3	37A	XR	20.00	XR	20.00	XR	20.00		
205	C&A VENT BD 1B1-B	8F1	0-MTR-31-96/3-B	3.00	4.60	32.0		EF3-B020			37A	XR	4.60	XR	4.60	XR	4.60		IR18
205	C&A VENT BD 1B1-B	9A	1-MTR-30-176-B	5.00	6.10	45.0	T37	EF3-A025Z	105	2	40	XR	6.10	XS	6.10	XS	6.10		
205	C&A VENT BD 1B1-B	9B	0-MTR-31-496B-B	1.50	2.50	14.5	T28	EF3-A005	29	4		XR	2.50	XR	2.50	XR	2.50		
205	C&A VENT BD 1B1-B	9C	1-MTR-31-463-B	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
205	C&A VENT BD 1B1-B	9D	1-MTR-30-248E-B	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
205	C&A VENT BD 1B1-B	9E	1-MTR-30-195-B	3.00	4.00	25.3	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
205	C&A VENT BD 1B1-B	9F1	1-XFMR-290-236	6.95	8.36			EF3-B020				XR	8.36	XR	8.36	XR	8.36		
205	C&A VENT BD 1B1-B	10A	1-MTR-30-182-B	5.00	6.10	45.0	T37	EF3-A025Z	105	2	1	XR	6.10	XS	6.10	XS	6.10		
205	C&A VENT BD 1B1-B	10B	1-MTR-31-477-B	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
205	C&A VENT BD 1B1-B	10C	1-MTR-31-286-B	0.33	0.80	5.2	T20	EF3-A003	10	2		XR	0.80	XR	0.80	XR	0.80		
205	C&A VENT BD 1B1-B	10F1	0-RE-90-206-B	0.75	1.40	12.5		EF3-B020				XR	1.40	XR	1.40	XR	1.40		
205	C&A VENT BD 1B1-B	11A	0-MTR-31-5-B	1.00	1.70	15.0	T25	EF3-A005	29	4		OT	0.00	XS	1.70	XS	1.70		

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C & A VENT BOARD 1B1-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
205	C&A VENT BD 1B1-B	11B	1-MTR-31-475-B	20.00	25.00	142.0	T51	EF3-M050	320	LO		XR	25.00	XR	25.00	XR	25.00		
205	C&A VENT BD 1B1-B	11C	1-MTR-31-209-B	20.00	25.00	142.0	T51	EF3-M050	320	LO		XR	25.00	XR	25.00	XR	25.00		
205	C&A VENT BD 1B1-B	11D	0-MTR-31-11-B	60.00	72.00	413.0	T58	EF3-A100	930	4	37A	XR	72.00	XR	72.00	XR	72.00		
205	C&A VENT BD 1B1-B	12A	1-MTR-30-181	3.00	4.30	26.7	T33	EF3-A010	58	4		XR	4.30	XR	4.30	XR	4.30		
205	C&A VENT BD 1B1-B	12C	1-DXF-268-2-B	35.75	43.00		T56	EF3-B070				O	0.00	O	0.00	O	0.00		
205	C&A VENT BD 1B1-B	12D	0-MTR-31-2-B	2.00	3.65	27.0	T31	EF3-A010	58	4		XR	3.65	XR	3.65	XR	3.65		
205	C&A VENT BD 1B1-B	12E1	0-PNL-90-L397	5.00	7.10	44.5		EF3-B020				XR	7.10	XR	7.10	XR	7.10		
205	C&A VENT BD 1B1-B	12F1	1-RE-90-99	0.75	1.40	12.5		EF3-B020				XR	1.40	XR	1.40	XR	1.40		
205	C&A VENT BD 1B1-B	13A	1-MTR-84-21	1.00	1.80	12.5	T25	EF3-A005	29	4		OT	0.00	OT	0.00	OT	0.00		
205	C&A VENT BD 1B1-B	13B	0-MTR-84-11	1.00	1.80	11.3	T25	EF3-A005	22	3		OT	0.00	OT	0.00	OT	0.00		
205	C&A VENT BD 1B1-B	13C	1-MTR-65-74	5.00	6.80	50.1	T38	EF3-A025Z	105	2		XR	6.80	OT	0.00	OT	0.00		
205	C&A VENT BD 1B1-B	13D	1-MTR-67-440-B	40.00	49.80	315.8	T54	EF3-A100	630	2	1	XR	49.80	XR	49.80	XR	49.80		
205	C&A VENT BD 1B1-B	13F1	0DXF234-B4/CVCS	9.00	10.83			EF3-B020				XR	10.83	XR	10.83	XR	10.83		
205	C&A VENT BD 1B1-B	13F2	0-MTR-31-49/3-B	2.00	4.18			EF3-B020				XR	4.18	XR	4.18	XR	4.18		
205	C&A VENT BD 1B1-B		TOTALS		591.54	3092.4							466.98		524.64		533.64		1R18

Preparer WTH Date 4/13/92
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C & A VENT BOARD 1B2-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
206	C&A VENT BD 1B2-B	2B	0-MTR-31-418	0.33	1.00	10.0	T18	EF3-A005	22	3		XR	1.00	XR	1.00	XR	1.00		IR18
206	C&A VENT BD 1B2-B	2E1	1-MTR-30-A1B	10.00	12.30			EF3-B020				XR	12.30	XR	12.30	XR	12.30		IR18
206	C&A VENT BD 1B2-B	2E2	0-MTR-30-GFA	25.00	30.10			EF3-B040				XR	30.10	XR	30.10	XR	30.10		IR18
206	C&A VENT BD 1B2-B	2F1	1-MTR-30-B1B	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
206	C&A VENT BD 1B2-B	2F2	1-MTR-31-BRB	30.00	36.09			EF3-B050				XR	36.09	XR	36.09	XR	36.09		IR18
206	C&A VENT BD 1B2-B	3B	1-MTR-30-284	1.00	1.70	15.0	T24	EF3-A005	29	4		XR	1.70	XR	1.70	XR	1.70		
206	C&A VENT BD 1B2-B	3C	1-MTR-30-66	1.00	1.70	15.0	T24	EF3-A005	29	4		XR	1.70	XR	1.70	XR	1.70		
206	C&A VENT BD 1B2-B	3E1	1-MTR-30-C1B	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
206	C&A VENT BD 1B2-B	3E2	0-MTR-30-HFA	25.00	30.10			EF3-B040				XR	30.10	XR	30.10	XR	30.10		IR18
206	C&A VENT BD 1B2-B	3F1	1-MTR-30-PRX	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
206	C&A VENT BD 1B2-B	4B	1-MTR-30-302	3.00	4.60	32.0	T33	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
206	C&A VENT BD 1B2-B	4E1	0-MTR-31-95	5.00	6.02			EF3-B020				O	0.00	O	0.00	O	0.00		
206	C&A VENT BD 1B2-B	4E2	0-MTR-30-NFA	25.00	30.08			EF3-B040				XR	30.08	XR	30.08	XR	30.08		IR18
206	C&A VENT BD 1B2-B	4F1	1-MTR-30-SBU	3.00	3.61			EF3-B020				XR	3.61	XR	3.61	XR	3.61		IR18
206	C&A VENT BD 1B2-B	4F2	1-MTR-30-U113	3.00	3.70			EF3-B020				XR	3.70	XR	3.70	XR	3.70		IR18
206	C&A VENT BD 1B2-B	5E1	1-MTR-31-87	10.00	12.03			EF3-B020				XR	12.03	XR	12.03	XR	12.03		IR18
206	C&A VENT BD 1B2-B	5F1	0-MTR-30-RM2	5.00	6.10			EF3-B020				XR	6.10	XR	6.10	XR	6.10		IR18
206	C&A VENT BD 1B2-B	6B	1-MTR-30-26	3.00	4.60	32.0	T33	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
206	C&A VENT BD 1B2-B	6E1	1-MTR-30-AB7	5.00	7.00			EF3-B020				O	0.00	O	0.00	O	0.00		
206	C&A VENT BD 1B2-B	6F1	1-MTR-30-T1B	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
206	C&A VENT BD 1B2-B	7C	0-MTR-31-421	144.00	173.22			FXD63B225	1500	3		XR	173.22	XR	173.22	XR	173.22		IR18
206	C&A VENT BD 1B2-B	7E2	0-MTR-31-72	20.00	24.06			EF3-B030				XR	24.06	XR	24.06	XR	24.06		IR18
206	C&A VENT BD 1B2-B	7F1	1-MTR-30-NM2	30.00	36.09			EF3-B050X				O	0.00	O	0.00	O	0.00		
206	C&A VENT BD 1B2-B	8F1	0-MTR-31-494	32.00	38.50			EF3-B050				XR	38.50	XR	38.50	XR	38.50		IR18
206	C&A VENT BD 1B2-B	8F2	1-PO-214-10to12	0.00	0.00			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	IR18
206	C&A VENT BD 1B2-B	9A	1-MTR-30-CRB	47.50	78.40	378.5		FXD63B125	800	LO		XR	78.40	XR	78.40	XR	78.40		IR18
206	C&A VENT BD 1B2-B		TOTALS		590.2	482.5							601.89		601.89		601.89		IR18

Preparer GMH Date 4/13/92
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C & A VENT BOARD 2A1-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
207	C&A VENT BD 2A1-A	2A	0-MTR-32-60-A	20.00	26.00	157.9	T51	EF3-L050	330	4		O	0.00	XR	26.00	XR	26.00		
207	C&A VENT BD 2A1-A	2F1	0DXF-234-A2/SIS	9.00	10.84			EF3-B020				XR	10.84	XR	10.84	XR	10.84		
207	C&A VENT BD 2A1-A	2F2	2-DXF-242-1	37.50	78.20			EF3-B090				XR	99.00	XR	99.00	XR	99.00	ANALYZED LOAD	IR18
207	C&A VENT BD 2A1-A	3A	0-MTR-31-36/1-A	25.00	31.00	197.4	T53	EF3-L050	470	HI		XR	31.00	XR	31.00	XR	31.00		
207	C&A VENT BD 2A1-A	3D	2-MTR-30-146-A	50.00	62.00	304.0	T56	EF3-A100	630	2		O	0.00	XS	62.00	YS	62.00		
207	C&A VENT BD 2A1-A	4A	2-MTR-30-200-A	3.00	4.10	27.0	T32	EF3-A010	58	4		O	0.00	XS	4.10	XS	4.10		
207	C&A VENT BD 2A1-A	4E	2-PCV-67-9A-A	0.33	0.75	5.8	T14	EF3-A003	12	3	1	XS	0.00	XS	0.00	XS	0.00		
207	C&A VENT BD 2A1-A	4F2	0DXF234-A4/CVCS	9.00	10.84			EF3-B020				XR	10.84	XR	10.84	XR	10.84		
207	C&A VENT BD 2A1-A	5E	2-MTR-30-184-A	15.00	20.20	105.2	T48	EF3-L050	210	2	370	XR	20.20	XS	20.20	XS	20.20		
207	C&A VENT BD 2A1-A	6A	0-MTR-31-62-A	3.00	4.60	28.0	T33	EF3-A010	58	4		XR	4.60	OT	0.00	OT	0.00		
207	C&A VENT BD 2A1-A	6B	2-MTR-67-9A-A	3.00	6.00	30.1	T36	EF3-A010	58	4	1	XR	6.00	XR	6.00	XR	6.00		
207	C&A VENT BD 2A1-A	6C	2-MTR-67-439-A	5.00	6.80	41.1	T38	EF3-A025	105	2	1	XR	6.80	XR	6.80	XR	6.80		
207	C&A VENT BD 2A1-A	6E	2-PCV-67-9B-A	0.33	0.75	5.8	T14	EF3-A003	12	3	1	XS	0.00	XS	0.00	XS	0.00		
207	C&A VENT BD 2A1-A	7B	2-MTR-31-287-A	0.33	0.80	5.2	T17	EF3-A005	12	3		XR	0.80	XR	0.80	XR	0.80		
207	C&A VENT BD 2A1-A	8B	2-MTR-30-194-A	3.00	4.00	25.5	T32	EF3-A010	58	4		XR	4.00	XS	4.00	XS	4.00		
207	C&A VENT BD 2A1-A	8C	2-MTR-30-250F-A	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
207	C&A VENT BD 2A1-A	8D	2-MTR-30-250G-A	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
207	C&A VENT BD 2A1-A	8F1	0MTR-31-128/5-A	3.11	3.90			EF3-B020				XR	3.90	XR	3.90	XR	3.90		
207	C&A VENT BD 2A1-A	9B	0MTR-31-128/1-A	20.00	25.00	157.9	T51	EF3-L050	330	4		XR	25.00	XR	25.00	XR	25.00		
207	C&A VENT BD 2A1-A	9C	2-MTR-31-462-A	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
207	C&A VENT BD 2A1-A	9D	2-MTR-30-250E-A	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
207	C&A VENT BD 2A1-A	9F1	0-RE-90-125-A	0.75	1.40	12.5		EF3-B020				XR	1.40	XR	1.40	XR	1.40		IR18
207	C&A VENT BD 2A1-A	10D	0-MTR-30-147-A	50.00	60.15		T56	EF3-B100				O	0.00	XR	60.15	XR	60.15		
207	C&A VENT BD 2A1-A	11A	2-MTR-31-478-A	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
207	C&A VENT BD 2A1-A	11C	2-MTR-31-461-A	10.00	12.00	78.9	T44	EF3-A025Z	170	4		XR	12.00	XR	12.00	XR	12.00		
207	C&A VENT BD 2A1-A	12A	2-MTR-31-285-A	0.33	0.80	5.2	T17	EF3-A003	12	3		XR	0.80	XR	0.80	XR	0.80		
207	C&A VENT BD 2A1-A	12C	2-MTR-31-290-A	15.00	21.00	111.0	T49	EF3-L050	260	3		XR	21.00	XR	21.00	XR	21.00		
207	C&A VENT BD 2A1-A	12E1	2-PNL-90-L398	5.00	7.25	46.0		EF3-B020Z				XR	7.25	XR	7.25	XR	7.25		
207	C&A VENT BD 2A1-A	13D	2-MTR-67-437-A	40.00	49.80	315.8	T54	EF3-A100	630	2	1	XR	49.80	XR	49.80	XR	49.80		
207	C&A VENT BD 2A1-A	13F1	0-MTR-31-36/3-A	2.00	4.17			EF3-B020				XR	4.17	XR	4.17	XR	4.17		
207	C&A VENT BD 2A1-A		TOTALS		474.75	1798.5						XR	341.80	XR	489.45	XR	489.45		IR18

Preparer WTH Date 4/13/92
Check EJJ Date 4/13/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
C & A VENT BOARD 2A2-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
208	C&A VENT BD 2A2-A	2D1	2-HTR-30-A1A	10.00	12.30			EF3-B020				XR	12.30	XR	12.30	XR	12.30		IR18
208	C&A VENT BD 2A2-A	2E1	2-HTR-30-B1A	5.00	6.10			EF3-B020				O	0.00	O	0.00	O	0.00		
208	C&A VENT BD 2A2-A	3E1	2-HTR-30-C1A	7.50	9.03			EF3-B020				O	0.00	O	0.00	O	0.00		
208	C&A VENT BD 2A2-A	3E2	2-HTR-31-D1A	30.00	36.09			EF3-B050				XR	36.09	XR	36.09	XR	36.09		IR18
208	C&A VENT BD 2A2-A	3F1	0-HTR-31-91	10.00	12.03			EF3-B020				XR	12.03	XR	12.03	XR	12.03		IR18
208	C&A VENT BD 2A2-A	3F2	2-HTR-30-1A1	3.00	3.70			EF3-B020				O	0.00	O	0.00	O	0.00		
208	C&A VENT BD 2A2-A	4A	2-HTR-30-67	1.50	2.65	20.0	T29	EF3-A005	41	MI		XR	2.65	XR	2.65	XR	2.65		IR18
208	C&A VENT BD 2A2-A	5E1	0-HTR-31-71	20.00	24.06			EF3-B030				XR	24.06	XR	24.06	XR	24.06		IR18
208	C&A VENT BD 2A2-A	5F1	2-HTR-30-XM1A	10.00	12.03			EF3-B020				O	0.00	O	0.00	O	0.00		
208	C&A VENT BD 2A2-A	5F2	2-HTR-30-AB1	5.00	7.00			EF3-B020				O	0.00	O	0.00	O	0.00		
208	C&A VENT BD 2A2-A	6D1	0-HTR-30-AB1	5.00	7.00			EF3-B020				O	0.00	O	0.00	O	0.00		
208	C&A VENT BD 2A2-A	6F1	0-HTR-31-339	5.00	6.10			EF3-B020				XR	6.10	XR	6.10	XR	6.10		IR18
208	C&A VENT BD 2A2-A	6F2	0-HTR-30-RM3	5.00	6.10			EF3-B020				XR	6.10	XR	6.10	XR	6.10		IR18
208	C&A VENT BD 2A2-A	7D1	0-HTR-30-AB2	10.00	13.00			EF3-B020				O	0.00	O	0.00	O	0.00		
208	C&A VENT BD 2A2-A	7D2	0-HTR-30-DFW	25.00	30.00			EF3-B040				XR	30.00	XR	30.00	XR	30.00		IR18
208	C&A VENT BD 2A2-A	7E1	2-HTR-30-U1A	3.00	3.70			EF3-B020				XR	3.70	XR	3.70	XR	3.70		IR18
208	C&A VENT BD 2A2-A	7E2	0-HTR-30-EFW	25.00	30.00			EF3-B040				XR	30.00	XR	30.00	XR	30.00		IR18
208	C&A VENT BD 2A2-A	7F2	0-HTR-30-FFW	25.00	30.00			EF3-B040				XR	30.00	XR	30.00	XR	30.00		IR18
208	C&A VENT BD 2A2-A	8A	2-HTR-30-CRA	47.50	78.40	378.5		FXD63B125	800	LO		O	0.00	O	0.00	O	0.00		
208	C&A VENT BD 2A2-A	8B	2-HTR-1-CBS	75.00	90.22			FXD63B125	800	LO		OTW	137.50	OTW	137.50	OTW	137.50	ANALYZED LOAD	
208	C&A VENT BD 2A2-A		TOTALS		419.51	398.5							330.53		330.53		330.53		IR18

Preparer GTH Date 4/13/92
Check EH Date 4/13/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
C & A VENT BOARD 2B1-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPEN	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
209	C&A VENT BD 2B1-B	2A	0-MTR-32-86-B	20.00	27.00	157.9	T51	EF3-L050	330	4		O	0.00	XR	27.00	XR	27.00		
209	C&A VENT BD 2B1-B	3D	2-MTR-30-157-B	50.00	62.00	304.0	T56	EF3-A100	630	2		O	0.00	XS	62.00	XS	62.00		
209	C&A VENT BD 2B1-B	3F1	2-RE-90-112-B	3.00	4.60			EF3-B020				XR	4.60	XR	4.60	XR	4.60		
209	C&A VENT BD 2B1-B	3F2	0DXF-234-B2/SIS	9.00	10.84			EF3-B020				XR	10.84	XR	10.84	XR	10.84		
209	C&A VENT BD 2B1-B	4A	0-MTR-31-27-B	1.50	3.30	27.1	T30	EF3-A010	58	4		XR	3.30	XR	3.30	XR	3.30		
209	C&A VENT BD 2B1-B	4E	2-PCV-67-10A-B	0.33	0.75	5.8	T14	EF3-A003	12	3	1	XS	0.00	XS	0.00	XS	0.00		
209	C&A VENT BD 2B1-B	5E	2-MTR-30-185-B	15.00	19.00	133.5	T49	EF3-L050	260	3	370	XR	19.00	XS	19.00	XS	19.00		
209	C&A VENT BD 2B1-B	6A	0-MTR-31-68-B	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
209	C&A VENT BD 2B1-B	6B	2-MTR-67-10B-B	3.00	6.00	30.0	T36	EF3-A010	58	4	1	XR	6.00	XR	6.00	XR	6.00		
209	C&A VENT BD 2B1-B	6C	2-MTR-67-451-B	5.00	6.80	41.1	T38	EF3-A025	105	2	1	XR	6.80	XR	6.80	XR	6.80		
209	C&A VENT BD 2B1-B	6E	2-PCV-67-10B-B	0.33	0.75	5.8	T14	EF3-A003	12	3	1	XS	0.00	XS	0.00	XS	0.00		
209	C&A VENT BD 2B1-B	7B	2-MTR-31-288-B	0.33	0.80	5.2	T17	EF3-A005	12	3		XR	0.80	XR	0.80	XR	0.80		
209	C&A VENT BD 2B1-B	8C	2-MTR-30-246G-B	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
209	C&A VENT BD 2B1-B	8D	2-MTR-30-246H-B	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
209	C&A VENT BD 2B1-B	8E	0MTR-31-129/1-B	20.00	25.00	157.9	T51	EF3-L050	330	4		XR	25.00	XR	25.00	XR	25.00		
209	C&A VENT BD 2B1-B	8F1	0MTR-31-129/3-B	3.00	3.90			EF3-B020				XR	3.90	XR	3.90	XR	3.90		
209	C&A VENT BD 2B1-B	9C	2-MTR-31-463-B	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
209	C&A VENT BD 2B1-B	9D	2-MTR-30-246F-B	3.00	4.40	27.4	T34	EF3-A010	58	4		XR	4.40	XR	4.40	XR	4.40		IR14
209	C&A VENT BD 2B1-B	9E	2-MTR-30-195-B	3.00	4.00	24.6	T32	EF3-A010	45	3		XR	4.00	XS	4.00	XS	4.00		
209	C&A VENT BD 2B1-B	9F1	2-XFMR-290-236	5.00	6.02			EF3-B020				XR	6.02	XR	6.02	XR	6.02		
209	C&A VENT BD 2B1-B	10B	2-MTR-31-477-B	3.00	4.60	28.0	T34	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
209	C&A VENT BD 2B1-B	10C	2-MTR-31-286-B	0.33	0.80	5.2	T17	EF3-A003	12	3		XR	0.80	XR	0.80	XR	0.80		
209	C&A VENT BD 2B1-B	10D	0-MTR-30-156-B	50.00	60.15		T56	EF3-B100				O	0.00	XR	60.15	XR	60.15		
209	C&A VENT BD 2B1-B	10F1	0-RE-90-126-B	0.75	1.40	12.5		EF3-B020				XR	22.00	XR	22.00	XR	22.00	ANALYZED LOAD	
209	C&A VENT BD 2B1-B	11B	2-MTR-31-475-B	20.00	25.00	142.0	T51	EF3-L050	330	4		XR	25.00	XR	25.00	XR	25.00		
209	C&A VENT BD 2B1-B	11C	2-MTR-31-289-B	20.00	25.00	142.0	T51	EF3-H050	320	LO		XR	25.00	XR	25.00	XR	25.00		
209	C&A VENT BD 2B1-B	12B	2-MTR-30-207-B	3.00	4.10	27.0	T32	EF3-A010	58	4		XR	4.10	XS	4.10	XS	4.10		
209	C&A VENT BD 2B1-B	13D	2-MTR-67-447-B	40.00	49.80	315.8	T54	EF3-A100	630	2	1	XR	49.80	XR	49.80	XR	49.80		
209	C&A VENT BD 2B1-B				374.01	1703.5							243.96		393.11		393.11		IR18

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C & A VENT BOARD 2B2-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
210	C&A VENT BD 2B2-B	2B	0-MTR-30-27	1.50	2.65	20.0	T28	EF3-A005	41	HI		XR	2.65	XR	2.65	XR	2.65		
210	C&A VENT BD 2B2-B	2E1	2-MTR-30-A1B	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	2E2	0-MTR-30-KFA	25.00	30.10			EF3-B040				XR	30.10	XR	30.10	XR	30.10		IR18
210	C&A VENT BD 2B2-B	2F1	2-MTR-30-B1B	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	2F2	2-MTR-31-BRB	30.00	36.09			EF3-B050				XR	36.09	XR	36.09	XR	36.09		IR18
210	C&A VENT BD 2B2-B	3B	2-MTR-30-285	1.50	3.00	16.9	T30	EF3-A005	41	HI		XR	3.00	XR	3.00	XR	3.00		
210	C&A VENT BD 2B2-B	3E1	2-MTR-30-C1B	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	3E2	0-MTR-30-LFA	25.00	30.08			EF3-B040				XR	30.08	XR	30.08	XR	30.08		IR18
210	C&A VENT BD 2B2-B	3F1	2-MTR-30-PRX	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	3F2	0-MTR-31-93	25.00	30.08			EF3-B040				XR	30.08	XR	30.08	XR	30.08		IR18
210	C&A VENT BD 2B2-B	4B	2-MTR-30-302	3.00	4.60	32.0	T33	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
210	C&A VENT BD 2B2-B	4E1	0-MTR-31-85	10.00	12.03			EF3-B020				XR	12.03	XR	12.03	XR	12.03		IR18
210	C&A VENT BD 2B2-B	4E2	0-MTR-30-PFA	25.00	30.10			EF3-B040				XR	30.10	XR	30.10	XR	30.10		IR18
210	C&A VENT BD 2B2-B	4F1	2-MTR-30-SBU	3.00	3.70			EF3-B020				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	4F2	2-MTR-30-U113	3.00	3.70			EF3-B020				XR	3.70	XR	3.70	XR	3.70		IR18
210	C&A VENT BD 2B2-B	5E1	2-MTR-31-89	10.00	12.03			EF3-B020				XR	12.03	XR	12.03	XR	12.03		IR18
210	C&A VENT BD 2B2-B	5F1	0-MTR-30-RM4	5.00	6.10			EF3-B020				XR	6.10	XR	6.10	XR	6.10		IR18
210	C&A VENT BD 2B2-B	5F2	0-MTR-30-U1	3.00	3.70			EF3-B020				XR	3.70	XR	3.70	XR	3.70		IR18
210	C&A VENT BD 2B2-B	6B	2-MTR-30-26	3.00	4.60	32.0	T33	EF3-A010	58	4		XR	4.60	XR	4.60	XR	4.60		
210	C&A VENT BD 2B2-B	6E1	2-MTR-30-AB7	5.00	7.00			EF3-B020				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	6F1	2-MTR-30-T1B	10.00	12.30			EF3-B020				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	7E1	0-MTR-31-99	5.00	6.02			EF3-B020				XR	6.02	XR	6.02	XR	6.02		IR18
210	C&A VENT BD 2B2-B	7F1	2-MTR-30-MM2	30.00	36.09			EF3-B050				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	8E2	0-MTR-30-A14	5.00	7.00			EF3-B020				O	0.00	O	0.00	O	0.00		
210	C&A VENT BD 2B2-B	8F2	2-PO-214-10to12	0.00	0.00			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	IR18
210	C&A VENT BD 2B2-B	9A	2-MTR-30-CRB	47.50	78.40	378.5		FXD63B125	800	LO		XR	78.40	XR	78.40	XR	78.40		IR18
210	C&A VENT BD 2B2-B	9D	2-TB-214-15,16	1.50	1.81			EF3-B020				XR	1.81	XR	1.81	XR	1.81		
210	C&A VENT BD 2B2-B		TOTALS		410.38	479.42							405.09		405.09		405.09		IR18

WBN-EEB-MS-TI008-0008 Rev 18
DSL AUX BOARD 1A1-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	MOR OPER	MOR OPER	SI A	SI A	TI A & B	SI A & B	REMARKS	REV
217	DSL AUX BD 1A1-A	2A	1-MTR-30-455-A	0.33	1.00	10.0	T19	EF3-A005	22	3		XF	1.00	XR	1.00	XR	1.00		
217	DSL AUX BD 1A1-A	2B	1-MTR-30-447-A	15.00	19.50	118.4	T49	EF3-L050	260	3	37C	XS	19.50	XS	19.50	XS	19.50		
217	DSL AUX BD 1A1-A	2C	1-MTR-82-A1-A	15.00	18.05			EF3-B030				XJ	18.05	OT	0.00	OT	0.00		|R18
217	DSL AUX BD 1A1-A	2D	1-MTR-82-A1-A	1.00	1.95	8.3	T26	EF3-A005	18	2		XP	1.95	XR	1.95	XR	1.95		
217	DSL AUX BD 1A1-A	2F1	1-CHGR-215-A-A	4.16	5.00			EF3-B020				O	0.00	O	0.00	O	0.00		
217	DSL AUX BD 1A1-A	3A	1-FCV-67-66-A	0.13	0.39	2.6	T8	EF3-A003	7	LO	1	XS	0.00	XS	0.00	XS	0.00		
217	DSL AUX BD 1A1-A	3D	1-MTR-18-55-A	1.00	1.85	11.3	T26	EF3-A003	21	HI		O	0.00	XR	1.85	XR	1.85		
217	DSL AUX BD 1A1-A	4B	1-MTR-82-AOPA-A	0.75	1.50	8.5	T23	EF3-A003	16	4		XP	1.50	XR	1.50	XR	1.50		
217	DSL AUX BD 1A1-A	4D	1-MTR-30-491-A	15.00	20.00	118.4	T48	EF3-L050	260	3	37C	XP	20.00	XS	20.00	XS	20.00		
217	DSL AUX BD 1A1-A	4E	1-MTR-30-459-A	2.00	2.70	22.6	T29	EF3-A010	45	3	37C	XR	2.70	XR	2.70	XR	2.70		
217	DSL AUX BD 1A1-A	4F1	1-DXF-215-A-A	45.00	54.14			EF3-B100				XS	54.14	XR	54.14	XR	54.14		|R18
217	DSL AUX BD 1A1-A	5A	1-MTR-82-181	5.00	7.10	44.5	T39	EF3-A025	105	2		XP	7.10	XS	7.10	XS	7.10		
217	DSL AUX BD 1A1-A	5F1	0-MTR-30-479	7.50	9.03			EF3-B020				XR	9.03	XR	9.03	XR	9.03		|R18
217	DSL AUX BD 1A1-A	5F2	1-PO-215-1,2,3	0.00	0.00			EF3-B100				XI	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	|R18
217	DSL AUX BD 1A1-A	6A	1-MTR-30-463	1.50	2.65	20.0	T28	EF3-A005	41	HI		O	0.00	XS	2.65	XS	2.65		
217	DSL AUX BD 1A1-A	6F1	0-MTR-30-483	10.00	12.30			EF3-B020				XR	12.30	XR	12.30	XR	12.30		|R18
217	DSL AUX BD 1A1-A		TOTALS		157.16	364.48							257.27		243.72		243.72		|R18

Preparer CWH Date 4/13/92
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Rev 18

VBN-EEB-MS-TI008-0008 Rev 18
D3L AUX BOARD 1A2-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOM OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
218	DSL AUX BD 1A2-A	2A	1-MTR-82-AOPB-A	0.75	1.50	8.5	T23	EF3-A003	16	4		XR	1.50	XR	1.50	XR	1.50		
218	DSL AUX BD 1A2-A	2B	1-MTR-30-451-A	15.00	19.50	118.4	T49	EF3-L050	260	3	37C	XR	19.50	XR	19.50	XR	19.50		
218	DSL AUX BD 1A2-A	2C	1-MTR-82-A2-A	15.00	18.05			EF3-B030				XR	18.05	OT	0.00	OT	0.00		
218	DSL AUX BD 1A2-A	2D	1-MTR-82-A2-A	1.00	1.70	15.0	T24	EF3-A005	29	4		XR	1.70	XR	1.70	XR	1.70		
218	DSL AUX BD 1A2-A	2E2	0-HTR-30-484	25.00	30.10			EF3-B040				OTH	44.00	OTH	44.00	OTH	44.00	ANALYZED LOAD	
218	DSL AUX BD 1A2-A	2F1	1-CHGR-215-A-A	4.16	5.00			EF3-B020				XR	5.00	XR	5.00	XR	5.00		
218	DSL AUX BD 1A2-A	3A	1-PCV-67-68-A	0.13	0.39	2.6	T8	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
218	DSL AUX BD 1A2-A	3D	1-MTR-18-54-A	1.00	1.85	11.3	T26	EF3-A003	21	HI		O	0.00	XS	1.85	XS	1.85		
218	DSL AUX BD 1A2-A	3E1	1-MTR-30-487	7.50	9.30			EF3-B020				XR	9.30	XR	9.30	XR	9.30		IR18
218	DSL AUX BD 1A2-A	3F1	1-MTR-30-471	15.00	18.05			EF3-B030				XR	18.05	XR	18.05	XR	18.05		IR18
218	DSL AUX BD 1A2-A	3F2	1-MTR-30-472	15.00	18.05			EF3-B030				XR	18.05	XR	18.05	XR	18.05		IR18
218	DSL AUX BD 1A2-A	5A	1-MTR-82-180	5.00	7.10	44.5	T39	EF3-A025Z	105	2		XR	7.10	XR	7.10	XR	7.10		
218	DSL AUX BD 1A2-A	5E1	0-MTR-30-485	15.00	18.60			EF3-B030				XR	18.50	XR	18.60	XR	18.60		IR18
218	DSL AUX BD 1A2-A	5F1	0-PKG-39-37	2.00	3.10	25.0		EF3-B020				XR	3.10	XR	3.10	XR	3.10		
218	DSL AUX BD 1A2-A	6A	0-MTR-30-470	0.75	1.40	12.5	T22	EF3-A005	29	4		XR	1.40	XR	1.40	XR	1.40		
218	DSL AUX BD 1A2-A	6D	1-MTR-82-100	4.50	5.42			EF3-B020				XR	5.42	OT	0.00	OT	0.00		IR18
218	DSL AUX BD 1A2-A		TOTALS		159.11	237.73							170.77		149.15		149.15		IR18

Preparer CWM Date 4/8/92
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Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
DSL AUX BOARD 1B1-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
219	DSL AUX BD 1B1-B	2A	1-MTR-30-457-B	0.33	1.00	10.0	T18	EF3-A005	22	3		XR	1.00	XR	1.00	XR	1.00		
219	DSL AUX BD 1B1-B	2B	1-MTR-30-449-B	15.00	19.50	118.4	T49	EF3-L050	260	3	37C	XR	19.50	XS	19.50	XS	19.50		
219	DSL AUX BD 1B1-B	2C	1-MTR-82-B1-B	15.00	18.05			EF3-B030				XR	18.05	OT	0.00	OT	0.00		
219	DSL AUX BD 1B1-B	2D	1-MTR-82-B1-B	1.00	2.05	11.3	T26	EF3-A005	22	3		XR	2.05	XR	2.05	XR	2.05		
219	DSL AUX BD 1B1-B	2F1	1-CHGR-215-B-B	4.16	5.00			EF3-B020				OT	0.00	OT	0.00	OT	0.00		
219	DSL AUX BD 1B1-B	3A	1-FCV-67-67-B	0.13	0.39	2.6	T8	EF3-A003	7	LO	1	XS	0.39	XS	0.39	XS	0.39		
219	DSL AUX BD 1B1-B	3D	1-MTR-10-55-B	1.00	1.85	11.3	T26	EF3-A005	22	3		O	0.00	XS	1.85	XS	1.85		
219	DSL AUX BD 1B1-B	4B	1-MTR-82-AOPA-B	0.75	1.50	8.5	T23	EF3-A003	16	4		XR	1.50	XR	1.50	XR	1.50		
219	DSL AUX BD 1B1-B	4D	1-MTR-30-493-B	15.00	20.00	118.4	T48	EF3-L050	260	3	37C	XR	20.00	XS	20.00	XS	20.00		
219	DSL AUX BD 1B1-B	4E	1-MTR-30-461-B	2.00	2.75	22.6	T29	EF3-A010	45	3	37C	XR	2.75	XR	2.75	XR	2.75		
219	DSL AUX BD 1B1-B	4F1	1-DXF-215-B-B	45.00	54.14			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	
219	DSL AUX BD 1B1-B	5A	1-MTR-82-211	5.00	7.10	44.5	T39	EF3-A025X	105	2		XR	7.10	XS	7.10	XS	7.10		
219	DSL AUX BD 1B1-B	5F1	0-MTR-30-481	7.50	9.30			EF3-B020				XR	9.30	XR	9.30	XR	9.30		IR18
219	DSL AUX BD 1B1-B	6A	1-MTR-30-465	1.50	2.65	20.0	T28	EF3-A005	41	HI		O	0.00	XS	2.65	XS	2.65		IR18
219	DSL AUX BD 1B1-B		TOTALS		145.28	367.52							191.64		178.09		178.09		IR18

Preparer [illegible] Date 4/9/92
Check [illegible] Date 4/9/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
DSL AUX BOARD 1B2-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
220	DSL AUX BD 1B2-B	2A	1-MTR-82-AOPB-B	0.75	1.50	8.5	T23	EF3-A005	18	2		XR	1.50	XR	1.50	XR	1.50		
220	DSL AUX BD 1B2-B	2B	1-MTR-30-453-B	15.00	19.50	118.4	T49	EF3-L050	260	3	37C	XR	19.50	XS	19.50	XS	19.50		
220	DSL AUX BD 1B2-B	2C	1-MTR-82-B2-B	15.00	18.05			EF3-B030				XR	18.05	OT	0.00	OT	0.00		
220	DSL AUX BD 1B2-B	2D	1-MTR-82-B2-B	1.00	2.05	11.3	T26	EF3-A005	22	3		XR	2.05	XR	2.05	XR	2.05		
220	DSL AUX BD 1B2-B	2F1	1-CHGR-215-B-B	4.16	5.00			EF3-B020				XR	5.00	XR	5.00	XR	5.00		
220	DSL AUX BD 1B2-B	3A	1-FCV-67-65-B	0.13	0.39	2.6	T8	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
220	DSL AUX BD 1B2-B	3D	1-MTR-18-54-B	1.00	1.85	11.3	T26	EF3-A003	21	HI		O	0.00	XS	1.85	XS	1.85		
220	DSL AUX BD 1B2-B	3E1	1-MTR-30-489	7.50	9.30			EF3-B020				XR	9.30	XR	9.30	XR	9.30		R18
220	DSL AUX BD 1B2-B	3F1	1-MTR-30-473	15.00	18.60			EF3-B030				OTN	18.60	OTN	18.60	OTN	18.60		R18
220	DSL AUX BD 1B2-B	3F2	1-MTR-30-474	15.00	18.05			EF3-B030				XR	18.05	XR	18.05	XR	18.05		R18
220	DSL AUX BD 1B2-B	5A	1-MTR-82-210	5.00	7.10	44.5	T39	EF3-A025Z	105	2		O	0.00	XS	7.10	XS	7.10		
220	DSL AUX BD 1B2-B	5F2	1-PO-215-4,5,6	0.00	0.00			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	R18
220	DSL AUX BD 1B2-B	6D	1-MTR-82-200	4.50	5.42			EF3-B020				XR	5.42	O	0.00	O	0.00		R18
220	DSL AUX BD 1B2-B		TOTALS		106.81	196.52							207.47		192.95		192.95		R18

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Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
DSL AUX BOARD 2A1-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
221	DSL AUX BD 2A1-A	2A	2-MTR-30-456-A	0.33	2.20	9.3	T28	EF3-A005	18	2		XR	2.20	XR	2.20	XR	2.20		
221	DSL AUX BD 2A1-A	2B	2-MTR-30-448-A	15.00	19.50	118.4	T49	EF3-L050	260	3	37C	XR	19.50	XS	19.50	XS	19.50		
221	DSL AUX BD 2A1-A	2C	2-MTR-82-A1-A	15.00	18.05			EF3-B030				XR	18.05	O	0.00	O	0.00		
221	DSL AUX BD 2A1-A	2D	2-MTR-82-A1-A	1.00	1.70	15.0	T24	EF3-A005	29	4		XR	1.70	XR	1.70	XR	1.70		
221	DSL AUX BD 2A1-A	2F1	2-CHGR-215-A-A	4.16	5.00			EF3-B020				OT	0.00	OT	0.00	OT	0.00		
221	DSL AUX BD 2A1-A	3A	2-PCV-67-66-A	0.13	0.39	2.6	T8	EF3-A003	7	LO	1	XS	0.39	XS	0.39	XS	0.39		
221	DSL AUX BD 2A1-A	3D	2-MTR-18-55-A	1.00	1.85	11.3	T26	EF3-A003	21	HI		O	0.00	XS	1.85	XS	1.85		
221	DSL AUX BD 2A1-A	4B	2-MTR-82-AOPA-A	0.75	1.50	8.5	T23	EF3-A003	16	4		XR	1.50	XR	1.50	XR	1.50		
221	DSL AUX BD 2A1-A	4D	2-MTR-30-492-A	15.00	20.00	118.4	T48	EF3-L050	260	3	37C	XR	20.00	XS	20.00	XS	20.00		
221	DSL AUX BD 2A1-A	4E	2-MTR-30-460-A	2.00	2.70	22.6	T29	EF3-A010	45	3	37C	XR	2.70	XR	2.70	XR	2.70		
221	DSL AUX BD 2A1-A	4F1	2-DXF-215-A-A	45.00	54.14			EF3-B100				XR	54.14	XR	54.14	XR	54.14		IR18
221	DSL AUX BD 2A1-A	5A	2-MTR-82-241	5.00	7.10	44.5	T39	EF3-A025Z	105	2		O	0.00	XS	7.10	XS	7.10		
221	DSL AUX BD 2A1-A	5F1	0-MTR-30-480	7.50	9.30			EF3-B020				XR	9.30	XR	9.30	XR	9.30		IR18
221	DSL AUX BD 2A1-A	5F2	2-PO-215-1,2,3	0.00	0.00			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	IR18
221	DSL AUX BD 2A1-A	6A	2-MTR-30-464	1.50	2.65	20.0	T28	EF3-A005	41	HI		O	0.00	XS	2.65	XS	2.65		
221	DSL AUX BD 2A1-A		TOTALS		146.08	370.46							239.48		233.03		233.03		IR18

VEN-EEB-MS-T1008-0008 Rev 18
DSL AUX BOARD 2A2-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
222	DSL AUX BD 2A2-A	2A	2-MTR-82-AOPB-A	0.75	1.50	8.5	T23	EF3-A005	18	2		XE	1.50	XR	1.50	XR	1.50		
222	DSL AUX BD 2A2-A	2B	2-MTR-30-452-A	15.00	19.50	118.4	T49	EF3-L050	260	3	37C	XE	19.50	XE	19.50	XE	19.50		
222	DSL AUX BD 2A2-A	2C	2-MTR-82-A2-A	15.00	18.05			EF3-B030				XR	18.05	O	0.00	O	0.00		
222	DSL AUX BD 2A2-A	2D	2-MTR-82-A2-A	1.00	2.05	12.5	T26	EF3-A005	29	4		XE	2.05	XR	2.05	XR	2.05		
222	DSL AUX BD 2A2-A	2F1	2-CHGR-215-A-A	4.16	5.00			EF3-B020				XE	5.00	XR	5.00	XR	5.00		
222	DSL AUX BD 2A2-A	3A	2-FCV-67-68-A	0.13	0.39	2.6	T8	EF3-A003	7	LO		XE	0.39	XE	0.39	XE	0.39		
222	DSL AUX BD 2A2-A	3D	2-MTR-18-54-A	1.00	1.85	11.3	T26	EF3-A003	21	HI		O	0.00	XE	1.85	XE	1.85		
222	DSL AUX BD 2A2-A	3E1	2-MTR-30-488	7.50	9.30			EF3-B020				XE	9.30	XR	9.30	XR	9.30		IR18
222	DSL AUX BD 2A2-A	3F1	2-MTR-30-475	15.00	18.30			EF3-B030				OTH	18.30	OTH	18.30	OTH	18.30		IR18
222	DSL AUX BD 2A2-A	3F2	2-MTR-30-476	15.00	18.05			EF3-B030				XE	33.00	XR	33.00	XR	33.00	ANALYZED LOAD	IR18
222	DSL AUX BD 2A2-A	5A	2-MTR-82-240	5.00	7.25	46.0	T38	EF3-A025I	105	2		O	0.00	XE	7.25	XE	7.25		
222	DSL AUX BD 2A2-A	6D	2-MTR-82-100	4.50	5.42			EF3-B020				XE	5.42	O	0.00	O	0.00		
222	DSL AUX BD 2A2-A		TOTALS		106.66	199.27							112.51		98.14		98.14		IR18

Preparer GWTH Date 4/13/92
Check RSS Date 4/13/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
DSL AUX BOARD 2B1-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
223	DSL AUX BD 2B1-B	2A	2-MTR-30-458-B	0.33	1.00	10.0	T18	EF3-A005	22	3		XR	1.00	XR	1.00	XR	1.00		
223	DSL AUX BD 2B1-B	2B	2-MTR-30-450-B	15.00	19.50	118.4	T49	EF3-L050	260	3	37C	XR	19.50	XS	19.50	XS	19.50		
223	DSL AUX BD 2B1-B	2C	2-MTR-82-B1-B	15.00	18.05			EF3-B030				XR	18.05	O	0.00	O	0.00		
223	DSL AUX BD 2B1-B	2D	2-MTR-82-B1-B	1.00	1.95	7.9	T26	EF3-A005	18	2		XR	1.95	XR	1.95	XR	1.95		
223	DSL AUX BD 2B1-B	2F1	2-CHGR-215-B-B	4.16	5.00			EF3-B020				O	0.00	O	0.00	O	0.00		
223	DSL AUX BD 2B1-B	3A	2-PCV-67-67-B	0.13	0.39	2.6	T8	EF3-A003	7	LO	1	XS	0.39	XS	0.39	XS	0.39		
223	DSL AUX BD 2B1-B	3D	2-MTR-18-55-B	1.00	1.85	11.3	T26	EF3-A003	21	HI		O	0.00	XS	1.85	XS	1.85		
223	DSL AUX BD 2B1-B	4B	2-MTR-82-AOPA-B	0.75	1.15	8.5	T20	EF3-A003	16	4		XR	1.15	XR	1.15	XR	1.15		
223	DSL AUX BD 2B1-B	4D	2-MTR-30-494-B	15.00	20.00	118.4	T48	EF3-L050	260	3	37C	XR	20.00	XS	20.00	XS	20.00		
223	DSL AUX BD 2B1-B	4E	2-MTR-30-462-B	2.00	2.70	22.6	T29	EF3-A010	45	3	37C	XR	2.70	XR	2.70	XR	2.70		
223	DSL AUX BD 2B1-B	4F1	2-DXF-215-B-B	45.00	54.10			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	
223	DSL AUX BD 2B1-B	5A	2-MTR-82-271	5.00	7.10	44.5	T39	EF3-A025Z	105	2		XR	7.10	XS	7.10	XS	7.10		
223	DSL AUX BD 2B1-B	5F1	0-MTR-30-482	7.50	9.30			EF3-B020				XR	9.30	XR	9.30	XR	9.30		R18
223	DSL AUX BD 2B1-B	6A	2-MTR-30-466	1.50	2.65	20.0	T29	EF3-A005	41	HI		O	0.00	XS	2.65	XS	2.65		
223	DSL AUX BD 2B1-B		TOTALS		144.74	364.09							191.14		177.59		177.59		R18

APPENDIX R LOADING WITH A HIGH IMPEDANCE FAULT

Date 11-Apr-92

Preparer GTH Date 4/13/92
Check EJJ Date 4/13/92
Rev 18

WBN-EEB-MS-T1008-0008 Rev 18
DSL AUX BOARD 2B2-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
224	DSL AUX BD 2B2-B	2A	2-MTR-82-AOPB-B	0.75	1.60	8.5	T24	EF3-A005	18	2		XR	1.60	XR	1.60	XR	1.60		
224	DSL AUX BD 2B2-B	2B	2-MTR-30-454-B	15.00	19.50	118.4	T49	EF3-L050	260	3	37C	XR	19.50	XS	19.50	XS	19.50		
224	DSL AUX BD 2B2-B	2C	2-MTR-82-B2-B	15.00	18.05			EF3-B030				XR	18.05	O	0.00	O	0.00		
224	DSL AUX BD 2B2-B	2D	2-MTR-82-B2-B	1.00	2.05	11.3	T26	EF3-A005	22	3		XR	2.05	XR	2.05	XR	2.05		
224	DSL AUX BD 2B2-B	2F1	2-CHGR-215-B-B	4.16	5.00			EF3-B020				XR	5.00	XR	5.00	XR	5.00		
224	DSL AUX BD 2B2-B	3A	2-FCV-67-65-B	0.13	0.39	2.6	T8	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
224	DSL AUX BD 2B2-B	3D	2-MTR-18-54-B	1.00	1.85	11.3	T26	EF3-A003	21	HI		O	0.00	XS	1.85	XS	1.85		
224	DSL AUX BD 2B2-B	3E1	2-MTR-30-490	7.50	9.30			EF3-B020				XR	9.30	XR	22.00	XR	22.00	ANALYZED LOAD	|R18
224	DSL AUX BD 2B2-B	3F1	2-MTR-30-477	20.00	24.70			EF3-B030				XR	24.70	XR	24.70	XR	24.70		|R18
224	DSL AUX BD 2B2-B	3F2	2-MTR-30-478	20.00	24.70			EF3-B030				XR	24.70	XR	24.70	XR	24.70		|R18
224	DSL AUX BD 2B2-B	4B	0-MTR-18-9B	7.50	11.00	63.5	T42	EF3-A025Z	125	3	38	XR	11.00	XR	11.00	XR	11.00		
224	DSL AUX BD 2B2-B	5A	2-MTR-82-270	5.00	7.25	44.5	T39	EF3-A025	105	2		O	0.60	XS	7.25	XS	7.25		
224	DSL AUX BD 2B2-B	6D	2-MTR-82-200	4.50	5.42			EF3-B020				XR	22.00	O	0.00	O	0.00	ANALYZED LOAD	|R18
224	DSL AUX BD 2B2-B		TOTALS		130.81	260.02							137.9		119.65		119.65		|R18

WBN-EEB-MS-TI008-0008 Rev 10
DSL AUX BOARD C1-S

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPEN	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS
225	DSL AUX BD C1-S	BN	0-MTR-30-332-S	15.00	18.00	105.2	C228TRS25R					XR	18.00	XR	18.00	XR	18.00	
225	DSL AUX BD C1-S	BS	0-MTR-30-334-S	15.00	18.00	105.2	C228TRS25R					XR	18.00	XR	18.00	XR	18.00	
225	DSL AUX BD C1-S	CA	0-MTR-30-331-S	1.50	1.95	13.4	C268TRS3R					XR	1.95	XR	1.95	XR	1.95	
225	DSL AUX BD C1-S	CE	0-MTR-30-330-S	10.00	12.00	78.9	C16.TRS20R					XR	12.00	XR	12.00	XR	12.00	
225	DSL AUX BD C1-S	CU	0-CHGR-215-C-S	10.80	13.00		A4J20					XR	13.00	XR	13.00	XR	13.00	
225	DSL AUX BD C1-S	DA	2-FCV-67-73-S	0.13	0.60	2.6	C066TRS1A					O	0.00	O	0.00	O	0.00	
225	DSL AUX BD C1-S	DE	1-FCV-67-72-S	0.13	0.60	2.6	C066TRS1A				1	O	0.00	XS	0.00	XS	0.00	
225	DSL AUX BD C1-S	EA	0-MTR-18-108A-S	1.00	2.00	10.0	C268TRS2.5					O	0.00	XS	2.00	XS	2.00	
225	DSL AUX BD C1-S	EE	0-MTR-18-108B-S	1.00	2.00	10.0	C268TRS2.5					O	0.00	XS	2.00	XS	2.00	
225	DSL AUX BD C1-S	GK	0-LAC-215-49	45.00	54.00		A4J70					XR	77.00	XR	77.00	XR	77.00	ANALYZED LOAD
225	DSL AUX BD C1-S		TOTALS		122.15	327.99							139.95		143.95		143.95	

WEN-EEB-MS-TI008-0008 Rev 18
DSL AUX BOARD C2-S

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
226	DSL AUX BD C2-S	BA	0-MTR-82-C1-S	2.00	3.50	22.6	C419ATRS5A					XR	3.50	XR	3.50	XR	3.50		
226	DSL AUX BD C2-S	BE	0-MTR-82-C2-S	2.00	3.50	22.6	C419ATRS5A					XR	3.50	XR	3.50	XR	3.50		
226	DSL AUX BD C2-S	BM	0-MTR-30-321	7.50	9.03		A4J15					XR	9.03	O	0.00	O	0.00		IR18
226	DSL AUX BD C2-S	BR	0-MTR-30-319	7.50	9.03		A4J15					XR	9.03	O	0.00	O	0.00		IR18
226	DSL AUX BD C2-S	CA	0-MTR-30-329	0.50	1.00	10.0	C118ATRS1.6R					XR	1.00	XR	1.00	YR	1.00		
226	DSL AUX BD C2-S	CE	0-MTR-82-CA-S	15.00	18.05		C228BTRS25R					XR	18.05	O	0.00	O	0.00		IR18
226	DSL AUX BD C2-S	CJ	0-MTR-82-CB-S	15.00	18.05		C228BTRS25R					XR	18.05	O	0.00	O	0.00		IR18
226	DSL AUX BD C2-S	CM	0-MTR-30-317	20.00	26.25		A4J30					OTH	26.25	OTH	26.25	OTH	26.25		IR18
226	DSL AUX BD C2-S	CR	0-MTR-30-322	20.00	24.06		A4J30					XR	24.06	XR	24.06	XR	24.06		IR18
226	DSL AUX BD C2-S	CU	0-MTR-30-325	7.50	9.03		A4J15					XR	9.03	XR	9.03	XR	9.03		IR18
226	DSL AUX BD C2-S	CX	0-MTR-30-324	7.50	9.03		A4J15					XR	9.03	XR	9.03	XR	9.03		IR18
226	DSL AUX BD C2-S	DM	0-MTR-18-110	10.00	13.00	100.3	C163BTRS20R					O	0.00	O	0.00	O	0.00		
226	DSL AUX BD C2-S	DR	0-MTR-82-320	5.00	7.10	44.5	C955ATRS12R					O	0.00	XS	7.10	XS	7.10		
226	DSL AUX BD C2-S	DU	0-MTR-82-321	5.00	7.10	44.5	C955ATRS12R					O	0.00	XS	7.10	XS	7.10		
226	DSL AUX BD C2-S	EA	0-MTR-30-327	1.50	1.95	12.5	C268ATRS3R					O	0.00	XS	1.95	XS	1.95		
226	DSL AUX BD C2-S	EE	0-MTR-82-C-S	4.50	5.42		C695ATRS10R					XR	5.42	O	0.00	O	0.00		IR18
226	DSL AUX BD C2-S	FS	0-PO-215-12	0.00	0.00		A4J60					XR	66.00	XR	66.00	XR	66.00	ANALYZED LOAD	IR18
226	DSL AUX BD C2-S	FW	0-PO-215-13	0.00	0.00		A4J60					O	0.00	O	0.00	O	0.00		
226	DSL AUX BD C2-S	GA	0-MTR-30-318	7.50	9.03		A4J15					XR	9.03	XR	9.03	XR	9.03		IR18
226	DSL AUX BD C2-S	GD	0-MTR-30-320	7.50	9.03		A4J15					XR	9.03	XR	9.03	XR	9.03		IR18
226	DSL AUX BD C2-S	GG	0-MTR-30-323	7.50	9.03		A4J15					XR	9.03	XR	9.03	XR	9.03		IR18
226	DSL AUX BD C2-S	GK	0-PO-215-8-11	0.00	0.00		A4J90					O	0.00	O	0.00	O	0.00		
226	DSL AUX BD C2-S	GR	0-MTR-30-326	7.50	9.03		A4J15					XR	9.03	O	0.00	O	0.00		IR18
226	DSL AUX BD C2-S		TOTALS		201.22	256.9							238.07		185.61		185.61		IR18

VBN-ERB-MS-TI008-0008 Rev 18
RMOV BOARD 1A1-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI B & B	SI A & B	REMARKS	REV
235	RMOV BD 1A1-A	2A	1-MTR-62-239-A	9.00	10.83			EF3-B020				XR	10.83	XR	10.83	XR	10.83		
235	RMOV BD 1A1-A	2B	1-MTR-62-230-A	7.50	13.00		T43	EF3-L050	210	2		XR	13.00	XR	13.00	XR	13.00		IR18
235	RMOV BD 1A1-A	2B	1-MTR-62-230-A	15.00	18.00	105.2	T48	EF3-L050	210	2		O	0.00	O	0.00	O	0.00		IR18
235	RMOV BD 1A1-A	2C	1-MTR-70-131-A	10.00	14.00	70.2	T44	EF3-L050	160	LO		XR	14.00	XR	14.00	O	0.00		
235	RMOV BD 1A1-A	2E1	1-FCV-63-1-A	10.50	13.80	118.5		EF3-B040				O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	3A	0-MTR-62-243-A	9.00	10.83			ED63B020				XR	10.83	XR	10.83	XR	10.83		
235	RMOV BD 1A1-A	3E	1-MTR-62-AOP-A	2.00	3.10	22.6	T31	EF3-A010	45	3	1	XR	3.10	XR	3.10	XR	3.10		
235	RMOV BD 1A1-A	3F2	1-FCV-63-118-A	19.50	25.20	220.0		EF3-H050	400	2	36	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	4A	1-MTR-63-37-A	6.00	7.22			EF3-B020				XR	7.22	XR	7.22	XR	7.22		IR18
235	RMOV BD 1A1-A	4E	1-MTR-3-118D-A	0.25	0.56	3.5	T13	EF3-A003	7	LO	11	XR	0.56	XR	0.56	XR	0.56		
235	RMOV BD 1A1-A	5A	0-FCV-26-3-A	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	5B	1-FCV-74-1-A	2.60	4.73	38.0		EF3-B020			30	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	5C	1-FCV-67-97-A	0.13	0.60	3.5	T11	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	5E	0-FCV-26-6-A	0.33	0.75	5.7	T14	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	5F	1-FCV-62-275-A	0.70	2.30	16.0	T26	EF3-A010	36	2		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	6D	1-FCV-68-333-A	1.90	3.50	26.0	T29	EF3-A010	58	4	28	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	6F	0-FCV-26-126-A	0.33	0.75	5.7	T13	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	7A	1-FCV-62-63-A	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	ECL	0.00	ECL	0.00		
235	RMOV BD 1A1-A	7B	1-FCV-62-90-A	1.90	3.50	26.0	T29	EF3-A010	58	4	2	O	0.00	ECL	0.00	ECL	0.00		
235	RMOV BD 1A1-A	7D	1-FCV-63-80-A	19.50	25.20	220.0	T49	EF3-L050	470	HI	36	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	8A	1-FCV-62-98-A	0.66	2.30	12.0	T22	EF3-A010	27	LO	1	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	8B	1-LCV-62-132-A	1.90	3.50	26.0	T29	EF3-A010	58	4	4	O	0.00	ECL	0.00	ECL	0.00		
235	RMOV BD 1A1-A	8D	1-FCV-63-118-A	19.50	25.20	220.0	T49	EF3-B060				O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	9A	1-LCV-62-135-A	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	EOP	0.00	EOP	0.00		
235	RMOV BD 1A1-A	9B	1-FCV-63-177-A	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	10A	1-FCV-63-1-A	10.50	15.10	116.4	T42	EF3-L050	260	3		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	10B	1-FCV-63-3-A	0.70	2.30	12.0	T22	EF3-A010	27	LO		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	10D	1-FCV-74-1-A	2.60	4.73	38.0	T33	EF3-A010	84	HI		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	10F	1-FCV-72-34-A	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	11A	1-FCV-63-7-A	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	11B	1-FCV-63-8-A	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	11D	1-FCV-63-26-A	1.90	3.50	26.0	T29	EF3-A010	58	4	1	O	0.00	EOP	0.00	EOP	0.00		
235	RMOV BD 1A1-A	11E	1-FCV-63-39-A	1.90	3.50	26.0	T29	EF3-A010	58	4	1	O	0.00	EOP	0.00	EOP	0.00		
235	RMOV BD 1A1-A	12A	1-FCV-63-47-A	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	12B	1-FCV-63-72-A	12.80	18.10	144.4	T45	EF3-L050	330	4	5	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	12D	1-FCV-63-93-A	10.30	15.10	116.4	T45	EF3-L050	260	3	30	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	12E	1-FCV-63-152-A	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	13A	1-FCV-63-156-A	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	13B	1-FCV-72-44-A	3.20	5.20	36.0	T32	EF3-A010	84	HI	5	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	13E	1-FCV-72-39-A	3.20	5.20	36.0	T32	EF3-A010	84	HI	5	O	0.00	O	0.00	EOP	0.00		
235	RMOV BD 1A1-A	14A	1-FCV-72-40-A	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	14D	1-FCV-74-12-A	0.13	0.45	2.6	T9	EF3-A003	7	LO	5	O	0.00	EOP	0.00	EOP	0.00		
235	RMOV BD 1A1-A	14E	1-FCV-74-33-A	1.90	3.50	26.0	T29	EF3-A010	58	4	30	O	0.00	O	0.00	O	0.00		

WBN-EEB-MS-TI008-0008 Rev 18
RMOV BOARD 1A1-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI B & B	SI A & B	REMARKS	REV
235	RMOV BD 1A1-A	15D	1-FCV-67-89-A	0.13	0.60	3.5	T11	EF3-A003	7	LO		O	0.00	O	0	O	0.00		
235	RMOV BD 1A1-A	16A	1-MTR-31-265	3.00	4.30	26.7	T33	EF3-A010	58	4		XR	4.30	O	0.00	O	0.00		
235	RMOV BD 1A1-A	16B	1-MTR-77-129	1.50	2.40	16.9	T27	EF3-A010	36	2		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	16D	0-FCV-26-141-A	0.26	0.55	5.7	T12	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	16E	0-FCV-26-7-A	0.26	0.55	5.7	T12	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	16F1	0-CHGR-252-1	7.57	17.00			ED63B030				XR	17.00	XR	17.00	XR	17.00		
235	RMOV BD 1A1-A	16F2	1-MTR-31-303/2	3.00	4.60	32.0		ED63B020				XR	4.60	O	4.60	O	4.60		IR18
235	RMOV BD 1A1-A	17A	1-MTR-62-228/2	22.50	27.07			EF3-B040				XR	27.07	XR	27.07	XR	27.07		IR18
235	RMOV BD 1A1-A	17B	1-FCV-26-240-A	0.67	2.10	10.5	T21	EF3-A005	22	3		O	0.00	ECL	0.00	ECL	0.00		
235	RMOV BD 1A1-A	17C	1-FCV-26-242-A	0.67	2.10	10.5	T21	EF3-A005	22	3		O	0.00	ECL	0.00	ECL	0.00		
235	RMOV BD 1A1-A	17E	1-PO-213-A1/1-5	0.00	0.00			EF3-B100				O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	17F1	0-CHGR-240-8	7.50	15.00			ED63B020				O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	17F2	1-FCV-63-80-A	19.50	25.20	208.0		EF3-B050				O	0.00	EOP	0.00	EOP	0.00		
235	RMOV BD 1A1-A	18A	0-MTR-78-19-A	20.00	26.00	145.0	T51	EF3-L050	330	4		XR	26.00	O	0.00	O	0.00		IR18
235	RMOV BD 1A1-A	18C	1-MTR-31-303/1	3.00	4.20	30.1	T33	EF3-A010	58	4		XR	4.20	O	0.00	O	0.00		
235	RMOV BD 1A1-A	18D	0-MTR-62-226	1.00	2.05	12.5	T26	EF3-A005	29	4		O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	18E	1-FCV-26-243-A	0.67	2.10	10.5	T21	EF3-A005	22	3		O	0.00	ECL	0.00	ECL	0.00		
235	RMOV BD 1A1-A	18F1	0-CHGR-250-1	7.50	15.00			ED63B020				O	0.00	O	0.00	O	0.00		
235	RMOV BD 1A1-A	18F2	1PO-213-A1/6-10	0.00	0.00			ED63B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	IR18
235	RMOV BD 1A1-A		TOTALS		448.77	2476.1							252.71		218.21		204.21		IR18

WBN-EEB-MS-TI008-0008 Rev 10
RMOV BOARD 1A2-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPIR	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS
236	RMOV BD 1A2-A		OCHGR-236-1AC-S	25.60	53.00			EF3-B070				XR	53.00	XR	53.00	XR	53.00	
236	RMOV BD 1A2-A		0-DXF-228-2-A	45.00	54.10			ED63B100				XR	54.10	XR	54.10	XR	54.10	
236	RMOV BD 1A2-A		1-H2AN-43-200	4.16	5.22			EF3-B020				XR	9.63	XR	9.63	XR	9.63	
236	RMOV BD 1A2-A	2A	1-FCV-3-116A-A	0.13	0.45	2.6	T9	EF3-A003	7	LO	19	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	2B	1-FCV-3-116B-A	0.13	0.45	2.6	T9	EF3-A003	7	LO	19	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	2D	1-FCV-1-15-A	1.00	2.80	16.0	T24	EF3-A010	36	2	14	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	2E	1-FCV-1-17-A	1.00	2.80	16.0	T24	EF3-A010	36	2	14	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	3A	1-FCV-3-136A-A	0.33	0.75	5.7	T13	EF3-A003	12	3	19	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	3B	1-FCV-3-136B-A	0.33	0.75	5.7	T13	EF3-A003	12	3	19	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	3D	1-FCV-3-33-A	39.40	48.10	494.0	T53	EF3-A100	930	4	22	O	0.00	ECL	0.00	ECL	0.00	
236	RMOV BD 1A2-A	4A	1-FCV-3-191	1.60	4.00	25.0	T28	EF3-A010	58	4		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	4B	1-FCV-3-192	1.60	4.00	25.0	T28	EF3-A010	58	4		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	4D	1-FCV-3-87-A	39.40	48.10	494.0	T53	EF3-A100	930	4	22	O	0.00	ECL	0.00	ECL	0.00	
236	RMOV BD 1A2-A	5A	1-FCV-70-215-A	0.24	1.00	5.7	T13	EF3-A003	12	3		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	5B	1-FCV-67-147-A	0.70				EF3-B020			1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	5E	1-FCV-67-125-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	5F	1-FCV-67-126-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	6A	1-FCV-1-16-A	1.00	2.80	16.0	T24	EF3-A010	36	2	14	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	6D	1-FCV-74-8-A	1.60	4.00	25.0	T31	EF3-A010	58	4	30	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	7B	1-FCV-67-22-A	0.33	0.95	5.7	T17	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	7D	1-FCV-67-87-A	0.13	0.60	3.5	T12	EF3-A003	7	LO	37J	O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	7F	1-FCV-67-130-A	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	8A	1-FCV-67-81-A	0.67	2.30	12.0	T24	EF3-A005	14	LO	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	8B	1-FCV-67-107-A	0.33	0.95	5.7	T15	EF3-A003	12	3	37J	O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	8D	1-FCV-67-95-A	0.13	0.60	3.5	T12	EF3-A003	7	LO	37J	O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	8F	1-FCV-67-133-A	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	9A	1-FCV-67-99-A	0.33	0.95	5.7	T15	EF3-A003	12	3	37J	O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	9B	1-FCV-67-104-A	0.33	0.95	5.7	T15	EF3-A003	12	3	37J	O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	9D	1-FCV-67-295-A	0.13	0.45	3.1	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	9F	1-FCV-67-139-A	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	10A	1-FCV-67-112-A	0.33	0.95	5.7	T15	EF3-A003	12	3	37J	O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	10B	1-FCV-67-127-A	0.33	0.95	5.7	T14	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	10D	1-FCV-67-296-A	0.13	0.45	3.1	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	10F	1-FCV-67-142-A	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	11A	1-FCV-67-146-A	0.33	0.83	5.7	T15	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	11B	1-FCV-67-147-A	0.70	2.30	12.0	T26	EF3-A005	29	4		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	11D	1-FCV-70-90-A	0.70								O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	11E	TO COMPT 16B	0.13								O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	12A	0-FCV-67-151-A	0.67	1.90	7.6	T24	EF3-A005	14	LO	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	12B	0-FCV-67-205-A	0.33	0.95	5.7	T15	EF3-A003	12	3		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	12D	1-FCV-70-92-A	0.13	0.60	3.2	T12	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	12E	0-FCV-70-111-A	0.13	0.60	3.2	T12	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	12F	1-FCV-70-139-A	0.33	0.95	5.7	T14	EF3-A003	12	3		O	0.00	O	0.00	ECL	0.00	
236	RMOV BD 1A2-A	13A	1-FCV-67-223-A	0.66	2.30	12.0	T26	EF3-A005	29	4	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	13D	1-FCV-70-168-A	0.33	0.95	5.7	T15	EF3-A003	12	3		O	0.00	O	0.00	O	0.00	

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RMOV BOARD 1A2-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS
236	RMOV BD 1A2-A	13E	1-FCV-26-245-A	0.67	2.10	5.0	T19	EF3-A003	10	2		O	0.00	ECL	0.00	ECL	0.00	
236	RMOV BD 1A2-A	14A	1-FCV-70-2-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	14B	1-FCV-70-4-A	0.33	0.75	5.8	T14	EF3-A003	12	3		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	14D	1-FCV-70-8-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	14E	1-FCV-70-10-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	15A	1-FCV-67-143-A	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	15B	1-FCV-70-23-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	15D	1-FCV-70-25-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	15E	1-FCV-67-458-A	0.67	1.90	7.6	T24	EF3-A005	14	LO	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	16A	TO COMPT 11D	0.70	2.30	12.0	T24	EF3-A005	29	4		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	16B	1-FCV-70-133-A	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	16D	1-FCV-70-143-A	0.33	0.95	5.7	T15	EF3-A003	12	3		O	0.00	ECL	0.00	ECL	0.00	
236	RMOV BD 1A2-A	16E	1-FCV-70-156-A	0.33	0.83	5.0	T15	EF3-A003	10	2	1	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	17A	1-FCV-70-183-A	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	17B	0-FCV-70-197-A	0.33	0.95	5.7	T16	EF3-A003	12	3	31	O	0.00	O	0.00	O	0.00	
236	RMOV BD 1A2-A	17E	1-MTR-31-465-A	50.00	57.00	350.8		FXD63B125	800	LO		XR	137.50	XR	137.50	XR	137.50	LOAD ANALYZED
236	RMOV BD 1A2-A		TOTALS		330.38	1711.8							254.23		254.23		254.23	

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RMOV BOARD 1B1-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
237	RMOV BD 1B1-B	2A	1-MTR-62-245-B	9.00	10.83			EF3-B020				XR	10.83	XR	10.83	XR	10.83		
237	RMOV BD 1B1-B	2B	1-MTR-62-232-B	15.00	18.00	105.2	T48	EF3-L050	210	2		XR	18.00	XR	18.00	XR	18.00		
237	RMOV BD 1B1-B	2B	1-MTR-62-232-B	7.50	13.00		T43	EF3-L050	210	2		XR	13.00	XR	13.00	O	0.00		
237	RMOV BD 1B1-B	2C	1-MTR-70-130-B	10.00	13.00	70.2													
237	RMOV BD 1B1-B	2F2	1-FCV-63-22-B	1.90	3.50	26.0		EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	3A	0-MTR-62-246-B	9.00	10.83			EF3-B020				XR	10.83	XR	10.83	XR	10.83		
237	RMOV BD 1B1-B	3E	1-FCV-70-207-B	0.13	0.45	3.1	T9	EF3-A003	7	LO	31	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	3F1	0-CHGR-252-2	7.57	17.00			ED63B030				XR	17.00	XR	17.00	XR	17.00		
237	RMOV BD 1B1-B	3F2	1-FCV-63-98-B	19.50	25.20	220.0		EF3-M050	400	2	36	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	4A	1-MTR-63-36-B	6.00	7.22			EF3-B020				XR	7.22	XR	7.22	XR	7.22		IR18
237	RMOV BD 1B1-B	4D	1-MTR-62-AOP-B	2.00	3.10	22.6	T31	EF3-A010	45	3		O	0.00	XS	3.10	XS	3.10		
237	RMOV BD 1B1-B	4F	0-FCV-26-127-B	0.33	0.75	5.7	T13	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	5B	1-FCV-74-2-B	2.60	4.73	38.0		EF3-B020			7	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	5C	1-FCV-74-9-B	1.60	4.00	25.0	T31	EF3-A010	58	4	30	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	5E	1-FCV-68-332-B	1.90	3.50	26.0	T29	EF3-A010	58	4	28	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	6D	1-FCV-62-61-B	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	ECL	0.00	ECL	0.00		IR18
237	RMOV BD 1B1-B	7A	1-FCV-62-91-B	1.90	3.50	26.0	T29	EF3-A010	58	4	2	O	0.00	ECL	0.00	ECL	0.00		
237	RMOV BD 1B1-B	7B	1-FCV-62-99-B	0.66	2.30	12.0	T20	EF3-A010	27	LO	1	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	7D	1-FCV-63-67-B	19.50	25.20	220.0	T49	EF3-M050	400	2		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	8A	1-LCV-62-133-B	1.90	3.50	26.0	T29	EF3-A010	58	4	4	O	0.00	ECL	0.00	ECL	0.00		
237	RMOV BD 1B1-B	8B	1-LCV-62-136-B	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	EOP	0.00	EOP	0.00		
237	RMOV BD 1B1-B	8D	1-FCV-63-98-B	19.50	25.20	220.0	T49	EF3-B060				O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	9A	1-FCV-62-138-B	1.30	2.40	16.0	T24	EF3-A010	36	2		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	9B	1-FCV-63-172-B	2.60	4.73	38.0	T33	EF3-A010	84	HI	30	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	9F	1-FCV-72-13-B	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	10A	1-FCV-63-4-B	0.70	2.80	16.0	T24	EF3-A010	36	2		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	10B	1-FCV-63-5-B	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	10D	1-FCV-74-2-B	2.60	4.73	38.0	T33	EF3-A010	84	HI	7	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	11A	1-FCV-63-6-B	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	11B	1-FCV-63-11-B	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	11D	1-FCV-63-22-B	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	11E	1-FCV-63-25-B	1.90	3.50	26.0	T29	EF3-A010	58	4	1	O	0.00	EOP	0.00	EOP	0.00		
237	RMOV BD 1B1-B	12A	1-FCV-63-40-B	1.90	3.50	26.0	T29	EF3-A010	58	4	1	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	12B	1-FCV-63-48-B	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	12D	1-FCV-63-73-B	12.80	18.10	144.9	T45	EF3-L050	330	4	5	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	12E	1-FCV-63-94-B	10.30	15.10	116.4	T45	EF3-L050	260	3	30	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	13A	1-FCV-63-153-B	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	13B	1-FCV-63-157-B	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	13D	1-FCV-63-175-B	0.70	2.30	16.0	T24	EF3-A010	36	2		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	14A	1-FCV-72-2-B	3.20	5.20	36.0	T32	EF3-A010	84	HI	5	O	0.00	O	0.00	EOP	0.00		
237	RMOV BD 1B1-B	14D	1-FCV-72-41-B	1.90	3.50	26.0	T29	EF3-A010	58	4	5	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	14E	1-FCV-72-45-B	3.20	5.20	36.0	T32	EF3-A010	84	HI	5	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	15B	1-FCV-74-24-B	0.13	0.45	3.2	T9	EF3-A003	7	LO	5	O	0.00	EOP	0.00	EOP	0.00		

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RMOV BOARD 1B1-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOP OPER	NOR OPER	SI A	SI A	II A & B	SI A & B	REMARKS	REV
237	RMOV BD 1B1-B	15D	1-FCV-74-35-B	1.90	3.50	26.0	T29	EF3-A010	58	4	30	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	16A	1-MTR-31-266	3.00	4.30	26.7	T33	EF3-A010	58	4		XS	4.30	O	0.00	O	0.00		
237	RMOV BD 1B1-B	16E	1-PO-213-B1/1-5	0.00	0.00			EF3-B100				O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	16F1	0-CHGR-240-S	7.50	15.00			ED63B020				O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	16F2	1-FCV-63-67-B	19.50	25.20	208.0		EF3-B050Z			36	O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	17A	1-MTR-62-228/1	22.50	27.07			EF3-B040				XR	27.07	XR	27.07	XR	27.07		
237	RMOV BD 1B1-B	17B	1-FCV-26-241-B	0.67	2.10	5.0	T19	EF3-A003	10	2		O	0.00	BCL	0.00	BCL	0.00		
237	RMOV BD 1B1-B	17D	1-MTR-3-128D-B	0.25	0.56	3.5	T13	EF3-A003	7	LO	11	XR	0.56	XR	0.56	XR	0.56		
237	RMOV BD 1B1-B	17E	1PO-213-B1/6-10	0.00	0.00			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	IR18
237	RMOV BD 1B1-B	17F1	0-CHGR-240-1	7.50	15.00			ED63B020				O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	17F2	1-MTR-31-324/2	3.00	4.60	95.0		ED63B020				XR	4.60	O	0.00	O	0.00		IR18
237	RMOV BD 1B1-B	18A	0-MTR-78-20-B	20.00	26.00	145.0	T51	EF3-L050	330	4		XR	26.00	XR	26.00	XR	26.00		
237	RMOV BD 1B1-B	18C	1-MTR-31-324/1	3.00	4.20	30.1	T33	EF3-A010	58	4		XR	4.20	O	0.00	O	0.00		
237	RMOV BD 1B1-B	18D	0-MTR-84-2	1.00	2.20	12.5	T26	EF3-A005	29	4		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	18E	0-FCV-26-142-B	0.26	0.55	5.7	T12	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B	18F	0-FCV-26-14-B	0.26	0.55	5.7	T12	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
237	RMOV BD 1B1-B		TOTALS		429.1	2384.1							253.61		243.61		230.61		IR18

WBN-EEB-MS-TI008-0008 Rev 10
RMOV BOARD 1B2-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS
238	RMOV BD 1B2-B		OCHGR-236-1AC-S	28.60	53.00			EF3-B070				XR	53.00	XR	53.00	XR	53.00	
238	RMOV BD 1B2-B		0-DXF-228-1-B	45.00	54.14			ED63B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD
238	RMOV BD 1B2-B		1-H2AN-43-210	4.16	5.22			EF3-B020				XR	9.63	XR	9.63	XR	9.63	
238	RMOV BD 1B2-B	2A	1-FCV-3-126A-B	0.13	0.45	2.6	T9	EF3-A003	7	LO	19	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	2B	1-FCV-3-126B-B	0.13	0.45	2.6	T9	EF3-A003	7	LO	19	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	2E	1-FCV-1-18-B	1.00	2.80	16.0	T24	EF3-A010	36	2	14	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	3A	1-FCV-3-179A-B	0.33	0.75	5.7	T13	EF3-A003	12	3	19	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	3B	1-FCV-3-179B-B	0.33	0.75	5.7	T13	EF3-A003	12	3	19	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	3D	1-FCV-3-47-B	39.40	48.10	494.0	T53	EF3-A100	930	4	22	O	0.00	ECL	0.00	ECL	0.00	
238	RMOV BD 1B2-B	4A	1-FCV-3-193	1.60	4.00	25.0	T28	EF3-A010	58	4		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	4B	1-FCV-3-194	1.60	4.00	25.0	T28	EF3-A010	58	4		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	4D	1-FCV-3-100-B	39.40	48.10	494.0	T53	EF3-A100	930	4	22	O	0.00	ECL	0.00	ECL	0.00	
238	RMOV BD 1B2-B	5A	0-FCV-26-17-B	0.33	0.75	5.7	T14	EF3-A003	12	3		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	5B	0-FCV-70-206-B	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	5C	1-FCV-67-89-B	0.13	0.6	3.5	T11	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	5E	1-FCV-67-123-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	5F	1-FCV-67-124-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	6D	1-FCV-70-87-B					EF3-B020				O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	7D	1-FCV-67-103-B	0.13	0.60	3.5	T12	EF3-A003	7	LO	37J	O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	7F	1-FCV-67-131-B	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	8A	1-FCV-67-24-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	8B	1-FCV-67-82-B	0.67	1.90	7.6	T24	EF3-A005	14	LO	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	8D	1-FCV-67-111-B	0.13	0.60	3.5	T12	EF3-A003	7	LO	37J	O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	8F	1-FCV-67-134-B	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	9A	1-FCV-67-88-B	0.33	0.95	5.7	T15	EF3-A003	12	3	37J	O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	9B	1-FCV-67-96-B	0.33	0.95	5.7	T15	EF3-A003	12	3	37J	O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	9D	1-FCV-67-297-B	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	9F	1-FCV-67-138-B	0.13	0.45	3.1	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	10A	1-FCV-67-91-B	0.33	0.95	5.7	T15	EF3-A003	12	3	37J	O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	10B	1-FCV-67-83-B	0.33	0.95	5.7	T15	EF3-A003	12	3	37J	O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	10D	1-FCV-67-298-B	0.13	0.45	3.1	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	10F	1-FCV-67-141-B	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	11A	1-FCV-67-128-B	0.33	0.95	5.7	T14	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	11B	0-FCV-67-208-B	0.33	0.95	5.7	T15	EF3-A003	12	3		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	11D	1-FCV-67-97-B	0.13	0.6	3.5	T11	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	12A	0-FCV-67-362	1.00	2.80	16.0	T29	EF3-A010	36	2		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	12B	1-FCV-67-478-B	0.70	2.30	12.0	T26	EF3-A010	27	LO	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	12D	1-FCV-70-87-B	0.70	2.30	12.0	T24	EF3-A010	27	LO		O	0.00	O	0.90	ECL	0.00	
238	RMOV BD 1B2-B	12F	1-FCV-26-244-B	0.67	2.10	5.0	T19	EF3-A003	10	2		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	13B	1-FCV-70-13-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	13D	1-FCV-70-89-B	0.13	0.60	3.5	T12	EF3-A003	7	LO		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	13F	1-FCV-70-140-B	0.33	0.95	5.7	T15	EF3-A003	12	3		O	0.00	O	0.00	ECL	0.00	
238	RMOV BD 1B2-B	14A	0-FCV-70-12-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	14B	1-FCV-70-3-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	14D	1-FCV-70-26-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	

WBN-EEB-MS-TI008-0008 Rev 10
RMOV BOARD 1B2-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS
238	RMOV BD 1B2-B	14E	1-FCV-70-34-B	0.67	1.90	7.6	T24	EF3-A005	14	LO	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	15A	1-FCV-70-75-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	15B	1-FCV-70-9-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	15D	1-FCV-70-64-B	0.67	1.90	16.0	T24	EF3-A010	36	2	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	15E	1-FCV-70-153-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	16A	1-FCV-70-74-B	0.67	1.90	7.6	T24	EF3-A005	14	LO	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	16B	1-FCV-70-134-B	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	16E	0-FCV-70-22-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	17B	1-FCV-70-27-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	17D	0-FCV-67-144-B	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
238	RMOV BD 1B2-B	18D	1-MTR-31-447-B	75.00	91.50	542.5		FXD63B125	1200	5		XR	91.50	XR	91.50	XR	91.50	
238	RMOV BD 1B2-B		TOTALS		356.21	1855							264.13		264.13		264.13	

Preparer WTH Date 4/13/92
Check EJJ Date 4/13/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
RMOV BOARD 2A1-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
239	RMOV BD 2A1-A	2A	2-MTR-62-239-A	9.00	10.83			EF3-B020				XR	10.83	XR	10.83	XR	10.83		
239	RMOV BD 2A1-A	2B	2-MTR-62-230-A	7.50	13.00		T43	EF3-L050	210	2		O	0.00	O	0.00	O	0.00		
239	RMOV BD 2A1-A	2B	2-MTR-62-230-A	15.00	18.00	105.2	T48	EF3-L050	210	2		XR	0.00	XR	0.00	XR	0.00		
239	RMOV BD 2A1-A	8B	2-LCV-62-132-A	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	BCL	0.00	BCL	0.00		
239	RMOV BD 2A1-A	16F1	0-CHGR-252-1	7.57	17.00			ED63B030				O	0.00	O	0.00	O	0.00		
239	RMOV BD 2A1-A	17A	2-MTR-62-228/4	22.50	27.07			ED63B040				XR	27.07	XR	27.07	XR	27.07		1R18
239	RMOV BD 2A1-A	17B	2-FCV-26-240-A	0.67	2.80	16.0	T24	EF3-A010	36	2		O	0.00	BCL	0.00	BCL	0.00		
239	RMOV BD 2A1-A	17C	2-FCV-26-242-A	0.67	2.80	16.0	T24	EF3-A010	36	2		O	0.00	BCL	0.00	BCL	0.00		
239	RMOV BD 2A1-A	17E	2-PO-213-A1/1-5	0.00	0.00			ED63B100				O	0.00	O	0.00	O	0.00		
239	RMOV BD 2A1-A	18E	2-FCV-26-243-A	0.67	2.80	16.0	T24	EF3-A010	36	2		O	0.00	BCL	0.00	BCL	0.00		
239	RMOV BD 2A1-A	18F1	0-CHGR-253-1	3.54	7.00			ED63B020				O	0.00	O	0.00	O	0.00		
239	RMOV BD 2A1-A	18F2	2-PO-213-A1/6-1	0.00	0.00			ED63B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	
239	RMOV BD 2A1-A		TOTALS		104.8	179.2							147.90		147.90		147.90		1R18

WBN-EEB-MS-TI008-0008 Rev 18
RMOV BOARD 2A2-A

MODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
240	RMOV BD 2A2-A		OCHOR-236-2AC-S	28.60	53.00			EF3-B070				XR	53.00	XR	53.00	XR	53.00		1R18
240	RMOV BD 2A2-A		ODXF234-A1/CVCS	75.00	90.22			FXD63B125	1200	5		XR	137.50	XR	137.50	XR	137.50	ANALYZED LOAD	
240	RMOV BD 2A2-A		0-DXF-227-1	30.00	36.09			ED63B060				XR	36.09	XR	36.09	XR	36.09		
240	RMOV BD 2A2-A	5E	2-FCV-67-125-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	7B	2-FCV-67-22-A	0.33	0.95	5.7	T17	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	8A	2-FCV-67-81-A	0.67	1.90	7.6	T24	EF3-A005	14	LO	1	O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	10B	2-FCV-67-127-A	0.33	0.95	5.7	T14	EF3-A003	12	3	40	O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	11A	2-FCV-67-146-A	0.67	1.90	7.6	T24	EF3-A010	36	2	1	O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	11F	0-FCV-70-208-A	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	12D	2-FCV-70-92-A	0.33	0.95	5.7	T15	EF3-A003	12	3		O	0.00	O	0.00	ECL	0.00		
240	RMOV BD 2A2-A	13A	2-FCV-67-223-A	0.67	1.90	12.0	T24	EF3-A005	29	4	1	O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	13B	0-FCV-67-360	1.00	2.80	16.0	T29	EF3-A010	36	2		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	13D	2-FCV-70-168-A	0.33	0.95	5.7	T15	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	13E	2-FCV-26-245-A	0.67	2.80	16.0	T24	EF3-A010	36	2		O	0.00	ELC	0.00	ECL	0.00		
240	RMOV BD 2A2-A	14A	2-FCV-70-2-A	0.33	0.95	5.7	T16	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	14B	2-FCV-70-4-A	0.33	0.95	5.7	T16	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	14D	2-FCV-70-15-A	0.33	0.95	5.7	T16	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	14E	2-FCV-70-195-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	15A	2-FCV-67-143-A	0.13	0.45	3.2	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	15B	2-FCV-70-18-A	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	15D	2-FCV-70-16-A	0.33	0.95	5.7	T16	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	16E	2-FCV-70-156-A	0.33	0.95	5.7	T16	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
240	RMOV BD 2A2-A	17E	2-MTR-31-465-A	50.00	57.00	350.8		FXD63B080	770	5		O	57.00	O	57.00	O	57.00		
240	RMOV BD 2A2-A		TOTALS		259.91	484.11							283.59		283.59		283.59		1R18

WBN-EEB-MS-T1008-0008 Rev 10
RMOV BOARD 2B1-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS
241	RMOV BD 2B1-B	2B	2-MTR-62-232-B	7.50	13.00		T43	EF3-L050	210	2		O	0.00	O	0.00	O	0.00	
241	RMOV BD 2B1-B	2B	2-MTR-62-232-B	15.00	18.00	105.2	T48	EF3-L050	210	2		XR	18.00	XR	18.00	XR	18.00	
241	RMOV BD 2B1-B	3A	2-MTR-62-245-B	9.00	10.83			EF3-B020				XR	10.83	XR	10.83	XR	10.83	
241	RMOV BD 2B1-B	3E	2-FCV-70-207-B	0.13	0.45	2.6	T9	EF3-A003	7	LO	31	O	0.00	O	0.00	O	0.00	
241	RMOV BD 2B1-B	3F1	0-CHGR-252-2	7.57	17.00			ED63B030				O	0.00	O	0.00	O	0.00	
241	RMOV BD 2B1-B	5A	0-FCV-26-8-B	0.13	0.45	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00	
241	RMOV BD 2B1-B	8A	2-LCV-62-133-B	1.90	3.50	26.0	T29	EF3-A010	58	4		O	0.00	ECL	0.00	ECL	0.00	
241	RMOV BD 2B1-B	16E	2-PO-213-B1/1-5	0.00	0.00			ED63B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD
241	RMOV BD 2B1-B	17A	2-MTR-62-228/3	22.50	27.07			EF3-B040				XR	27.07	XR	27.07	XR	27.07	
241	RMOV BD 2B1-B	17B	2-FCV-26-241-B	0.67	2.80	16.0	T24	EF3-A010	36	2		O	0.00	ECL	0.00	ECL	0.00	
241	RMOV BD 2B1-B	17E	2-PO-213-B1/6-1	0.00	0.00			ED63B100				XR	0.00	XR	0.00	XR	0.00	
241	RMOV BD 2B1-B	17F1	0-CHGR-253-2	3.54	7.00			EF3-B020				O	0.00	O	0.00	O	0.00	
241	RMOV BD 2B1-B		TOTALS		100.1	152.4							165.9		165.9		165.9	

Preparer BTN Date 4/13/92
Check EH Date 4/13/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
RMOV BOARD 2B2-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPIR	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
242	RMOV BD 2B2-B		OCHOR-236-2AC-S	28.60	53.00			EF3-B070				XS	53.00	XR	53.00	XR	53.00		1R18
242	RMOV BD 2B2-B		ODXF234-B1/CVCS	75.00	90.22			FXD63B125	1200	5		XS	90.22	XR	90.22	XR	90.22		
242	RMOV BD 2B2-B		0-DXF-227-2	30.00	36.10			ED63B060				XS	36.10	XR	36.10	XR	36.10		
242	RMOV BD 2B2-B	5A	0-FCV-26-15	0.07	0.60	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	5B	0-FCV-26-16	0.07	0.60	2.6	T9	EF3-A003	7	LO		O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	5E	2-FCV-67-123-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	5F	2-FCV-67-124-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	8A	2-FCV-67-24-B	0.33	0.95	5.7	T17	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	8B	2-FCV-67-82-B	0.67	1.90	7.6	T24	EF3-A005	41	HI	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	11A	2-FCV-67-128-B	0.33	0.95	5.7	T14	EF3-A003	12	3	40	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	11F	0-FCV-26-13-B	0.33	0.75	5.7	T13	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	12B	0-FCV-67-152-B	0.67	1.90	7.6	T24	EF3-A005	14	LO	1	O	0.00	EOP	0.00	EOP	0.00		
242	RMOV BD 2B2-B	12F	2-FCV-26-244-B	0.67	2.80	16.0	T24	EF3-A010	36	2		O	0.00	ECL	0.00	ECL	0.00		
242	RMOV BD 2B2-B	13A	2-FCV-67-147-B	0.70	2.30	12.0	T26	EF3-A005	29	4	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	13B	2-FCV-70-14-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	14B	2-FCV-70-3-B	0.33	0.95	5.7	T16	EF3-A003	12	3	31	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	14D	2-FCV-70-28-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	14E	2-FCV-70-39-B	0.67	1.90	16.0	T24	EF3-A005	41	HI		O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	15A	2-FCV-70-75-B	0.33	0.75	5.7	T14	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	15B	2-FCV-70-196-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	15D	2-FCV-70-78-B	0.67	1.90	16.0	T24	EF3-A005	41	HI	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	15E	2-FCV-70-153-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	16A	2-FCV-70-76-B	0.67	1.90	16.0	T24	EF3-A005	41	HI	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	17A	0-FCV-70-194-B	0.33	0.95	5.7	T16	EF3-A003	12	3		O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	17B	2-FCV-70-29-B	0.33	0.95	5.7	T16	EF3-A003	12	3	1	O	0.00	O	0.00	O	0.00		
242	RMOV BD 2B2-B	18D	2-MTR-31-447-B	75.00	90.00	526.2		FXD63B175	1210	3		XP	192.50	XR	192.50	XR	192.50	ANALYZED LOAD	
242	RMOV BD 2B2-B		TOTALS		297.07	696.66							371.82		371.82		371.82		1R18

Preparer WTH Date 4/13/92
Check EBI Date 4/13/92
Rev 18

WBN-EEB-MS-TI008-0008 Rev 18
REACTOR VENT BOARD 1A-A

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOR OPER	NOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
243	RX VENT BD 1A-A	2A	1-MTR-77-125A	3.00	4.60	33.9	T35	EF3-A010	58	4		XR	4.60	O	0.00	O	0.00		
243	RX VENT BD 1A-A	2D	1-MTR-83-1-A	75.00	90.22			FJ3-B125	750	LO		O	0.00	DM	90.22	DM	90.22		IR18
243	RX VENT BD 1A-A	3A	1-MTR-94-1D	3.42	7.25			EF3-B020				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	3B	1-MTR-94-1E	3.42	7.25			EF3-B020				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	3C	1-MTR-94-1F	3.42	7.25			EF3-B020				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	4D	1-MTR-61-51	22.79	27.80	222.5	T51	EF3-L050	470	HI		XR	27.80	XR	27.80	XR	27.80		
243	RX VENT BD 1A-A	4E	1-MTR-61-92	30.00	36.09		T54	EF3-B050				XR	36.09	XR	36.09	XR	36.09		
243	RX VENT BD 1A-A	5A	0-MTR-31-406	0.25	1.00	10.0	T18	EF3-A005	22	3		XR	1.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	6A	0-MTR-31-25	3.00	4.60	32.0	T34	EF3-A010	58	4		XR	4.60	O	0.00	O	0.00		
243	RX VENT BD 1A-A	6C	0-MTR-77-91	25.00	30.00	197.4	T53	EF3-H050	400	2		XR	30.00	XR	30.00	XR	30.00		
243	RX VENT BD 1A-A	6F1	0-DXF-234-A/IPS	20.00	24.07			EF3-B040				XR	24.07	XR	24.07	XR	24.07		IR18
243	RX VENT BD 1A-A	7B	1-MTR-68-8AA	2.75	3.46		T31	EF3-A010	27	LO		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	7D	1-MTR-68-84	10.00	13.60	81.0	T45	EF3-A025	170	4		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	7F2	1-PO-232-9 - 11	0.00	0.00			EF3-B100				XR	110.00	XR	110.00	XR	110.00	ANALYZED LOAD	IR18
243	RX VENT BD 1A-A	8B	1-MTR-68-50AA	2.75	3.46		T31	EF3-A010	27	LO		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	8D	1-MTR-68-86	10.00	13.60	81.0	T45	EF3-A025	170	4		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	8F2	1-PO-232-1,2,3	0.00	0.00			EF3-B100				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	9B	1-MTR-30-95	5.00	9.10	39.5	T40	EF3-A025	75	LO		XR	9.10	XR	9.10	O	0.00		
243	RX VENT BD 1A-A	9F2	1-PO-232-5thur8	0.00	0.00			EF3-B100				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	10B	1-MTR-30-99	5.00	9.10	39.5	T40	EF3-A025	75	LO		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	10F	1HST-78-ST1,2,3	0.00	0.00			EF3-B020				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	11B	0-MTR-31-497	7.50	9.60	60.0	T41	EF3-A025	125	3		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	11D	1-MTR-77-4	7.50	9.50	66.7	T40	EF3-A025	125	3		XR	9.50	XR	9.50	XR	9.50		
243	RX VENT BD 1A-A	11F	1-MTR-30-74H	10.00	12.03			EF3-B020				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	12F	1-MTR-30-11H	5.00	6.02			EF3-B020				XR	6.02	XR	6.02	XR	6.02		IR18
243	RX VENT BD 1A-A	13A	1-CRM-78-1M	8.00	13.60			EF3-B040				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	13D	1-AHU-61-1T028	89.00	119.50	320.0		FJ3-B175	750	LO		XR	119.50	XR	119.50	XR	119.50		IR18
243	RX VENT BD 1A-A	14B	1-MTR-61-280A	2.00	2.90	25.0	T30	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	14D	1-AHU-61-3T027	78.00	104.50	280.0		FJ3-B150	750	LO		XR	104.50	XR	104.50	XR	104.50		
243	RX VENT BD 1A-A	15A	1-MTR-30-35H	50.00	60.20			EF3-B070				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	15D	1-MTR-30-1	50.00	62.00	350.0	T56	EF3-A100	750	3		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	16A	1-MTR-30-33H	50.00	60.20			EF3-B070				O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A	16D	1-MTR-30-1E	50.00	62.00	312.0	T56	EF3-A100	630	2		O	0.00	O	0.00	O	0.00		
243	RX VENT BD 1A-A		TOTALS		814.5	2150.4						O	486.78	O	566.8	O	557.7		IR18

Preparer WTH Date 4/13/92
Check EJJ Date 4/13/92
Rev 18

W3N-EEB-MS-T1008-0008 Rev 18
REACTOR VENT BOARD 1B-B

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	BKR	BKR INST	SET POSIT	APPR KEY NO.	NOM OPER	MOR OPER	SI A	SI A	SI A & B	SI A & B	REMARKS	REV
244	RX VENT BD 1B-B	2A	1-MTR-77-125B	3.00	4.30	33.9	T33	EF3-A010	58	4		XR	4.30	O	0.00	O	0.00		
244	RX VENT BD 1B-B	2D	1-MTR-83-2-B	75.00	90.22			FJ3-B125	750	LO		O	0.00	DM	75.00	DM	75.00		IR18
244	RX VENT BD 1B-B	3A	1-MTR-94-1A	3.42	7.25			EF3-B020				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	3B	1-MTR-94-1B	3.42	7.25			EF3-B020				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	3C	1-MTR-94-1C	3.42	7.25			EF3-B020				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	5E	1-MTR-30-11	0.25	1.00	10.0	T18	EF3-A003	21	HI		XR	1.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	6A	0-MTR-31-26	3.00	4.60	32.0	T34	EF3-A010	58	4		XR	4.60	O	0.00	O	0.00		
244	RX VENT BD 1B-B	6C	1-MTR-61-61	25.00	27.80	182.5	T51	EF3-L050	330	4		XR	27.80	XR	27.80	XR	27.80		
244	RX VENT BD 1B-B	6D	1-MTR-61-93	30.00	36.09		T54	EF3-B050Z				XR	36.09	XR	36.09	XR	36.09		
244	RX VENT BD 1B-B	6E	1-MTR-30-11E	0.33	1.00	10.0	T18	EF3-A003	21	HI		XR	1.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	6F1	1-MTR-40-2	5.00	7.25	46.0		EF3-B020				XR	7.25	XR	7.25	XR	7.25		
244	RX VENT BD 1B-B	7B	1-MTR-68-31AA	2.75	3.46		T31	EF3-A010	27	LO		O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	7D	1-MTR-68-85	10.00	13.50	79.0	T45	EF3-A025	170	4		O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	8B	1-MTR-68-73AA	2.75	3.46		T31	EF3-A010	27	LO		O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	8D	1-MTR-68-87	10.00	13.60	81.0	T45	EF3-A025	170	4		O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	8F1	0-DXF-234-B/IPS	20.00	24.07			EF3-B030				XR	24.07	XR	24.07	XR	24.07		IR18
244	RX VENT BD 1B-B	9B	1-MTR-30-97	5.00	9.10	39.5	T40	EF3-A025	75	LO		XR	9.10	XR	9.10	O	9.10		
244	RX VENT BD 1B-B	10B	1-MTR-30-100	5.00	9.10	39.5	T40	EF3-A025	75	LO		XR	9.10	XR	9.10	O	9.10		
244	RX VENT BD 1B-B	10F	1-CRM-78-15	5.00	7.25	46.0		EF3-B020				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	11D	1-MTR-77-6	15.00	18.20	118.4	T48	EF3-L050	260	3		XR	18.20	O	18.20	O	18.20		
244	RX VENT BD 1B-B	11F	1-MTR-30-75H	10.00	12.60			EF3-B020				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	12F	1-MTR-30-12H	5.00	6.02			EF3-B020				XR	6.02	XR	6.02	XR	6.02		IR18
244	RX VENT BD 1B-B	13B	1-MTR-61-280B	2.00	2.90	25.0	T30	EF3-A010	58	4		O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	13D	1-AHU-61-2TO30	89.00	119.50	320.0		FJ3-B175	750	LO		XR	192.50	XR	192.50	XR	192.50	ANALYZED LOAD	
244	RX VENT BD 1B-B	13F	1-CRM-61-1BC	10.00	13.30			EF3-B030				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	14B	1-CRM-78-1RCC	0.33	1.00	10.0	T18	EF3-A003	21	HI		O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	14D	1-AHU-61-5TO29	78.00	104.50	280.0		FJ3-B150	750	LO		XR	104.50	XR	104.50	XR	104.50		
244	RX VENT BD 1B-B	14F	1-CRM-78-1EH	10.00	14.50	100.3		EF3-B030				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	15A	1-MTR-30-37H	50.00	60.20			EF3-B070				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	15D	1-MTR-30-4	50.00	62.00	350.0	T56	EF3-A100	750	3		O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	16A	1-MTR-30-100H	50.00	60.15			EF3-B070				O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B	16D	1-MTR-30-4E	50.00	62.00	312.0	T56	EF3-A100	630	2		O	0.00	O	0.00	O	0.00		
244	RX VENT BD 1B-B		TOTALS		814.42	2115.0							445.53		509.63		509.63		IR18

MCC ATIONAL LOAD CURRENT SUMMARY FOR UNIT 1 OPERATION

Preparer GWH Date 4/18/92
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MCC	NORMAL OPERATION	SI A	SI B	BREAKER SETTING NOR FDR	WITH HIGH IMPEDANCE FAULT: NORMAL OPERATION	SI A	SI B	FAULT	NORMAL	REV
C & A VENT BD 1A1-A	458.1	522.6	531.6	660.0	517.41	581.87	590.87	137.50	78.20	
C & A VENT BD 1B1-B	446.4	504.0	513.0	660.0	466.98	524.64	533.64	22.00	1.40	
C & A VENT BD 1A2-A	439.0	439.0	439.0	660.0	549.01	549.01	549.01	110.00	0.00	
C & A VENT BD 1B2-B	491.9	491.9	491.9	660.0	601.89	601.89	601.89	110.00	0.00	
C & A VENT BD 2A1-A	321.0	468.7	468.7	660.0	341.80	489.45	489.45	99.00	78.20	
C & A VENT BD 2B1-B	223.4	372.5	372.5	660.0	243.96	393.11	393.11	22.00	1.40	
C & A VENT BD 2A2-A	283.3	283.3	283.3	660.0	330.53	330.53	330.53	137.50	90.22	
C & A VENT BD 2B2-B	295.1	295.1	295.1	660.0	405.09	405.09	405.09	110.00	0.00	
DSL AUX BD 1A1-A	147.3	133.7	133.7	450.0	257.27	243.72	243.72	110.00	0.00	
DSL AUX BD 1B1-B	135.8	122.2	122.2	450.0	191.64	178.09	178.09	110.00	54.14	
DSL AUX BD 1A2-A	156.9	135.3	135.3	450.0	170.77	149.15	149.15	44.00	30.10	
DSL AUX BD 1B2-B	97.5	82.9	82.9	450.0	207.47	192.95	192.95	110.00	0.00	
DSL AUX BD 2A1-A	129.5	123.0	123.0	450.0	239.48	233.03	233.03	110.00	0.00	
DSL AUX BD 2B1-B	135.2	121.7	121.7	450.0	191.14	177.59	177.59	110.00	54.10	
DSL AUX BD 2A2-A	97.6	83.2	83.2	450.0	112.51	98.14	98.14	33.00	18.05	
DSL AUX BD 2B2-B	121.3	107.0	107.0	450.0	137.90	119.65	119.65	22.00	5.42	
DSL AUX BD C1-S	117.0	121.0	121.0	247.5	140.00	144.00	144.00	77.00	54.00	
DSL AUX BD C2-S	172.1	119.6	119.6	247.5	238.07	185.61	185.61	66.00	0.00	
										R1*
RMOV BD 1A1-A	142.7	108.2	94.2	660.0	252.71	218.21	204.21	110.00	0.00	
RMOV BD 1B1-B	143.6	133.6	120.6	660.0	253.61	243.61	230.61	110.00	0.00	
RMOV BD 1A2-A	173.7	173.7	173.7	660.0	254.23	254.23	254.23	137.50	57.00	
RMOV BD 1B2-B	208.3	208.3	208.3	660.0	264.13	264.13	264.13	110.00	54.14	
RMOV BD 2A1-A	37.9	37.9	37.9	660.0	147.90	147.90	147.90	110.00	0.00	
RMOV BD 2B1-B	55.9	55.9	55.9	660.0	165.90	165.90	165.90	110.00	0.00	
RMOV BD 2A2-A	236.3	236.3	236.3	660.0	283.59	283.59	283.59	137.50	90.22	
RMOV BD 2B2-B	269.3	269.3	269.3	660.0	371.82	371.82	371.82	192.50	90.00	
RX VENT 1A-A	376.8	456.8	447.7	660.0	486.78	566.80	557.70	110.00	0.00	
RX VENT 1B-B	372.5	436.6	436.6	660.0	445.53	509.63	509.63	192.50	119.50	

ALTERNATE FEEDERS WILL BE TRIPPED WHEN NOT IN USE.
WHEN ALTERNATE FEEDERS ARE USED, AN LCO SHOULD EXIST
DUE TO APPENDIX R, BOARD LOADING & CABLE FEEDER
AMPACITY LIMITATIONS.

ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	LOAD	FLI	SEN-SOR	LONG TIME set.	I (PU)	APP R	NOR OPER	NOR OPER	SI A	SI A	SI B	SI B		
Spent Fuel Pit Pmp C-S (SPARE)	480V SHDN BD 1A1-A	7A	0-MTR-78-35-S	100.0	115.0	200	0.80	160.0		X	176.0	X	176.0	X	176.0	ANALYZED LOAD	IR18
CRDM Clr Fan 1A-A Mtr 1	480V SHDN BD 1A1-A	7B	1-MTR-30-83/1-A	75.0	97.0	150	0.95	142.5	37J	X	97.0	X	97.0	O	0.0		
Reac Lwr Compt Clr Fan 1A-A	480V SHDN BD 1A1-A	7C	1-MTR-30-74-A	60.0	73.8	100	0.95	95.0	37J	X	73.8	X	73.8	O	0.0		
CRDM Clr Fan 1A-A Mtr 2	480V SHDN BD 1A1-A	7D	1-MTR-30-83/2-A	75.0	97.0	150	0.95	142.5	37J	X	97.0	X	97.0	O	0.0		
ALT FDR 250V BTRY CHGR NO 1	480V SHDN BD 1A1-A	8A	0-CHGR-239-1	82.6	150.0	300	0.70	210.0		O	0.0	O	0.0	O	0.0		
RMOV Bd 1A1	480V SHDN BD 1A1-A	8B	1-MCC-213-A1-A	400.0	480.0	400	1.25	500.0	38	X	142.7	X	108.2	X	94.2		IR18
Reac Vent Bd 1A-A	480V SHDN BD 1A1-A	9B	1-MCC-232-A-A	500.0	600.0	600	1.10	660.0	38	X	376.8	X	456.8	X	447.7		IR18
Elec Bd Rm AHU A-A	480V SHDN BD 1A1-A	9C	0-MTR-31-30B-A	50.0	56.5	150	0.55	82.5		X	56.5	X	56.5	X	56.5		IR18
ALT FDR CHANNEL II	480V SHDN BD 1A1-A	10A		200.0		400	0.85	340.0		O	0.0	O	0.0	O	0.0		IR18
ALT FDR 125V VITAL BTRY CHGR 2	480V SHDN BD 1A1-A	10AA	0-CHGR-236-E	25.6	53.0	N/A				O	0.0	O	0.0	O	0.0		IR18
ALT FDR 120VAC VITAL INV 1-II	480V SHDN BD 1A1-A	10AB	1-INV-235-2E	0.0	42.0	N/A				O	0.0	O	0.0	O	0.0		IR18
ALT FDR 120VAC VITAL INV 2-II	480V SHDN BD 1A1-A	10AC	2-INV-235-2E	0.0	42.0	N/A				O	0.0	O	0.0	O	0.0		IR18
ALT FDR INST PWR DIST PANEL 1B	480V SHDN BD 1A1-A	10AD	1-DWP-237-B	0.0	104.2	N/A				O	0.0	O	0.0	O	0.0		IR18
C&A Bldg Vent Bd 1A1-A	480V SHDN BD 1A1-A	10B	1-MCC-214-A1-A	500.0	600.0	600	1.10	660.0	38	X	458.1	X	522.6	X	531.6		IR18
Cntmt Air Rtn Fan 1A-A	480V SHDN BD 1A1-A	10C	1-MTR-30-38-A	100.0	115.0	200	0.75	150.0	10	O	0.0	O	0.0	X	115.0		
Alt Fdr C&A Bldg Vent Bd 1A2-A	480V SHDN BD 1A1-A	10D	1-MCC-214-A2-A	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
					3110.4						1477.9		1587.9		1421.0		IR18
Dsl Aux Bd 1A1-A	480V SHDN BD 1A1-A		1-MCC-215-A1-A	250.0	300.0	300	1.25	375.0	38	X	147.3	X	133.7	X	133.7		IR18
Aux Bldg Gen Sply Fan 1A	480V SHDN BD 1A1-A	2C	1-MTR-30-103	100.0	120.0	200	0.90	180.0		X	120.0	O	0.0	O	0.0		IR18
COMPONENT COOL SYS PUMP 1A-A	480V SHDN BD 1A1-A	3B	1-MTR-70-46-A	350.0	389.0	600	0.95	570.0	1	X	389.0	X	389.0	X	389.0		
480V SHUTDOWN BOARD 1A1-A	480V SHDN BD 1A1-A		TOTAL		3919.5				38		2134.2		2110.6		1943.7		IR18

Preparer WTH Date 4/13/92
Check EH Date 4/14/92
Rev 18

ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	LOAD	FLI	SEN-SOR	LONG TIME set.	I (PU)	APP R	NOR OPER	NOR OPER	SI A	SI A	SI B	SI B		
CRD Mech Clr Fan 1C-A Mtr 1	480V SHDW BD 1A2-A	7A	1-MTR-30-88/1-A	75.0	97.0	150	0.95	142.5	37J	X	97.0	X	97.0	O	0.0		
Aux Bldg Gen Exhaust Fan 1A	480V SHDW BD 1A2-A	7B	1-MTR-30-159	125.0	147.0	300	0.70	210.0		X	147.0	O	0.0	O	0.0		
Reac Lwr Compt Clr Fan 1C-A	480V SHDW BD 1A2-A	7D	1-MTR-30-77-A	60.0	73.8	100	0.95	95.0	37J	X	73.8	X	73.8	O	0.0		
CRD Mech Clr Fan 1C-A Mtr 2	480V SHDW BD 1A2-A	8A	1-MTR-30-88/2-A	75.0	97.0	150	0.95	142.5	37J	X	97.0	X	97.0	O	0.0		
RMOV BD 1A2-A	480V SHDW BD 1A2-A	8B	1-MCC-213-A2-A	400.0	480.0	400	1.25	500.0	38	X	173.7	X	173.7	X	173.7		IR18
NOR FDR CHANNEL I	480V SHDW BD 1A2-A	9A		200.0	240.0	400	0.85	340.0	39	X		X		X			IR18
NOR FDR 125V VITAL BTRY CHGR 1	480V SHDW BD 1A2-A	9AA	0-CHGR-236-1-D	25.6	53.0	N/A			39	X	53.0	X	53.0	X	53.0		IR18
NOR FDR 120VAC VITAL INV 1-I	480V SHDW BD 1A2-A	9AB	1-INV-235-1-D	0.0	42.0	N/A			39	X	42.0	X	42.0	X	42.0		IR18
NOR FDR 120VAC VITAL INV 2-I	480V SHDW BD 1A2-A	9AC	2-INV-235-1D	0.0	42.0	N/A			39	X	42.0	X	42.0	X	42.0		IR18
INST PWR DIST PANEL 1A	480V SHDW BD 1A2-A	9AD	1-DWP-237-A	0.0	104.2	N/A				X	104.2	X	104.2	X	104.2		IR18
Alt Fdr C&A Bldg Vent Bd 1A1-A	480V SHDW BD 1A2-A	9B	1-MCC-214-A1-A	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
C&A Bldg Vent Bd 1A2-A	480V SHDW BD 1A2-A	9C	1-MCC-214-A2-A	500.0	600.0	600	1.10	660.0	38	X	439.0	X	439.0	X	439.0		IR18
480V Shutdown Bd Rm AHU A-A	480V SHDW BD 1A2-A	9D	0-MTR-31-45-A	75.0	92.0	150	0.90	135.0		X	92.0	X	92.0	X	92.0		
Altn Fdr Reactor Vent Bd 1A-A	480V SHDW BD 1A2-A	10A	1-MCC-232-A-A	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
					3267.9						1360.7		1213.7		945.9		IR18
DSL AUX BD 1A2-A	480V SHDW BD 1A2-A		1-MCC-215-A2-A	250.0	300.0	300	1.25	375.0	38	X	156.9	X	135.3	X	135.3		IR18
CONT RM A/C A-A CPRSR	480V SHDW BD 1A2-A	2C	0-MTR-31-80/2-A	250.0	275.0	600	0.70	420.0	37A	X	275.0	X	275.0	X	275.0		
COMPONENT COOL SYS PUMP C-S	480V SHDW BD 1A2-A	3B	0-MTR-70-51-S	350.0	389.0	600	0.95	570.0	1	X	389.0	X	389.0	X	389.0		
CONT & SERV AIR CPRSR A	480V SHDW BD 1A2-A	3D	0-MTR-32-25	125.0	162.0	300	0.76	228.0		X	250.8	X	250.8	X	250.8	ANALYZED LOAD	
Station Fire Pmp 1A-A	480V SHDW BD 1A2-A	4D	1-MTR-26-1-A	200.0	230.0	600	1.25	750.0	0	X	230.0	X	230.0	X	230.0		
480V SHUTDOWN BOARD 1A2-A	480V SHDW BD 1A2-A		TOTAL		4623.9						2662.4		2493.8		2226.0		IR18

Preparer LWTN Date 4/13/92
Check EJJ Date 4/13/92
Rev 18

ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	LOAD	FLI	SEN-SOR	LONG TIME set.	I (PO)	APP R	NOR OPER	NOR OPER	SI A	SI A	SI B	SI B		
Elec Bd Rm AHU C-B	480V SHDW BD 1B1-B	7A	0-MTR-31-31B-B	50.0	62.5	100	0.90	90.0		X	62.5	X	62.5	X	62.5		
CRD Mech Clr Fan 1B-B Mtr 1	480V SHDW BD 1B1-B	7C	1-MTR-30-92/1-B	75.0	97.0	150	0.95	142.5	37J	X	97.0	X	97.0	O	0.0		
Reac Lwr Compt Clr Fan 1B-B	480V SHDW BD 1B1-B	7D	1-MTR-30-75-B	60.0	73.8	100	0.95	95.0	37J	X	73.8	X	73.8	O	0.0		
RMOV Bd 1B1-B	480V SHDW BD 1B1-B	8B	1-MCC-213-B1/B	400.0	480.0	400	1.25	500.0	38	X	143.6	X	133.6	X	120.6		IR18
Alt Fdr C&A Bldg Vt Bd 1B2-B	480V SHDW BD 1B1-B	9A	1-MCC-214-B2-B	500.0	600.0	800	0.80	640.0		O	0.0	O	0.0	O	0.0		
Reac Vent Bd 1B-B	480V SHDW BD 1B1-B	9B	1-MCC-232-B-B	500.0	600.0	600	1.10	660.0	38	X	372.5	X	436.6	X	436.6		IR18
ALT FDR CHANNEL I		10A		200.0		400	0.85	340.0		O	0.0	O	0.0	O	0.0		
ALT FDR 125V VITAL BTRY CHGR 1	480V SHDW BD 1B1-B	10AA0	-CHGR-236-1-D	25.6	53.0	N/A				O	0.0	O	0.0	O	0.0		
ALT FDR 120VAC VITAL INV 1-I	480V SHDW BD 1B1-B	10AB1	-INV-235-1-D	0.0	42.0	N/A				O	0.0	O	0.0	O	0.0		
ALT FDR 120VAC VITAL INV 2-I	480V SHDW BD 1B1-B	10AC2	-INV-235-2D	0.0	42.0	N/A				O	0.0	O	0.0	O	0.0		
ALT FDR INST PWR DIST PANEL 1A	480V SHDW BD 1B1-B	10AD1	-DWP-237-A	0.0	104.2	N/A				O	0.0	O	0.0	O	0.0		
C&A Bldg Vent Bd 1B1-B	480V SHDW BD 1B1-B	10B	1-MCC-214-B1-B	500.0	600.0	600	1.10	660.0	38	X	446.4	X	584.0	X	513.0		IR18
CRD Mech Clr Fan 1B-B Mtr 2	480V SHDW BD 1B1-B	10D	1-MTR-30-92/2-B	75.0	97.0	150	0.95	142.5	37J	X	97.0	X	97.0	O	0.0		
					2851.4						1292.8		1404.5		1132.7		IR18
Dsl Aux Bd 1B1-B	480V SHDW BD 1B1-B		1-MCC-215-B1-B	250.0	300.0	300	1.25	375.0	38	X	135.8	X	122.2	X	122.2		IR18
Aux Bldg Gen Sply Fan 1B	480V SHDW BD 1B1-B	2B	1-MTR-30-102	100.0	120.0	200	0.90	180.0		X	120.0	O	0.0	O	0.0		
COMPONENT COOL SYS PUMP 1B-B	480V SHDW BD 1B1-B	3C	1-MTR-70-38-B	350.0	389.0	600	0.95	570.0	1	X	389.0	X	389.0	X	389.0		
RECIPROCATING CHARGING PUMP	480V SHDW BD 1B1-B	3B	1-MTR-62-101	200.0	221.0	400	0.80	320.0		X	352.0	O	0.0	O	0.0	ANALYZED LOAD	NOR
CONT & SERV AIR CPRSR B	480V SHDW BD 1B1-B	3D	0-MTR-32-26	125.0	162.0	300	0.76	228.0		X	162.0	X	250.8	X	250.8	ANALYZED LOAD	SI
480V SHUTDOWN BOARD 1B1-B	480V SHDW BD 1B1-B		TOTAL		4043.5						2451.6		2166.5		1894.7		IR18

Preparer GWN Date 4/18/92
Check EJJ Date 4/13/92
Rev 18

ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	LOAD	FLI	SEN-SOR	LONG TIME set.	I (PU)	APP R	NOR OPER	NOR OPER	SI A	SI A	SI B	SI B		
Aux Bldg Gen Exhaust Fan 1B	480V SHDW BD 1B2-B	7A	1-MTR-30-162	125.0	147.0	300	0.65	195.0		X	147.0	O	0.0	O	0.0		
CRD Mech Clr Fan 1D-B Mtr 1	480V SHDW BD 1B2-B	7B	1-MTR-30-80/1-B	75.0	97.0	150	0.95	142.5	37J	X	97.0	X	97.0	O	0.0		
Reac Lwr Compt Clr Fan 1D-B	480V SHDW BD 1B2-B	7D	1-MTR-30-78-B	60.0	73.8	100	0.95	95.0	37J	X	73.8	X	73.8	O	0.0		
ALT FDR 250V SPARE BTRY CHGR	480V SHDW BD 1B2-B	8A	0-CHGR-239-S	82.9	150.0	300	0.70	210.0		O	0.0	O	0.0	O	0.0		
RMOV BD 1B2-B	480V SHDW BD 1B2-B	8B	1-MCC-213-B2-B	400.0	480.0	400	1.25	500.0	38	X	208.2	X	208.2	X	208.2		|R18
Cntmt Air Rtn Fan 1B-B	480V SHDW BD 1B2-B	9C	1-MTR-30-39-B	100.0	115.0	200	0.75	150.0	10	X	0.0	X	115.0	X	115.0		|R18
Spent Fuel Pit Pmp B-B	480V SHDW BD 1B2-B	9A	0-MTR-78-9-B	100.0	115.0	200	0.80	160.0		X	115.0	X	115.0	X	115.0		
Alt Fdr C&A Bldg Vent Bd 1B1-B	480V SHDW BD 1B2-B	9B	1-MCC-214-B1-B	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
480V Shutdown Bd Rm AHU C-B	480V SHDW BD 1B2-B	9D	0-MTR-31-55-B	75.0	92.0	150	0.90	135.0		X	92.0	X	92.0	X	92.0		
NOR FDR CHANNEL II		10A		200.0	240.0	400	0.85	340.0	39	X	0.0	X	0.0	X	0.0		
NOR FDR 125V VTL BTRY CHGR 2	480V SHDW BD 1B2-B	10AA	0-CHGR-236-2-E	25.6	53.0	N/A			39	X	53.0	X	53.0	X	53.0		
NOR FDR 120VAC VITAL INV 1-II	480V SHDW BD 1B2-B	10AB	1-INV-235-2-E	0.0	42.0	N/A			39	X	42.0	X	42.0	X	42.0		
NOR FDR 120VAC VITAL INV 2-II	480V SHDW BD 1B2-B	10AC	2-INV-235-2E	0.0	42.0	N/A			39	X	42.0	X	42.0	X	42.0		
NOR INST PWR DIST PANEL 1B	480V SHDW BD 1B2-B	10AD	1-DWP-237-B	0.0	104.2	N/A				X	104.2	X	104.2	X	104.2		
C&A Bldg Vent Bd 1B2-B	480V SHDW BD 1B2-B	10B	1-MCC-214-B2-B	500.0	600.0	600	1.10	660.0	38	X	481.7	X	481.7	X	481.7		|R18
CRD Mech Clr Fan 1D-B Mtr 2	480V SHDW BD 1B2-B	10C	1-MTR-30-80/2-B	75.0	97.0	150	0.95	142.5	37J	X	97.0	X	97.0	O	0.0		
Altn Fdr Reactor Vent Bd 1B-E	480V SHDW BD 1B2-B	10D	1-MCC-232-B-B	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
					3647.9						1552.8		1520.8		1253.0		|R18
DSL AUX BD 1B2-B	480V SHDW BD 1B2-B		1-MCC-215-B2-B	250.0	300.0	300	1.25	375.0	38	X	97.5	X	82.9	X	82.9		|R18
CONT RM A/C B-B CPRSR	480V SHDW BD 1B2-B	2B	0-MTR-31-96/2-B	250.0	275.0	600	0.70	420.0	37A	X	275.0	X	275.0	X	275.0		
Unit 1 Reac Bldg Crane	480V SHDW BD 1B2-B	3B	1-CRN-271-R1	0.0	228.8	300	1.00	300.0		O	0.0	O	0.0	O	0.0		
480V Shdn Bd Rm Chler B-B	480V SHDW BD 1B2-B	3C	0-MTR-31-49/2-B	240.0	247.0	400	0.88	352.0		X	387.2	X	387.2	X	387.2	ANALYZED LOAD	
Station Fire Pmp 1B-B	480V SHDW BD 1B2-B	4D	1-MTR-26-4-B	200.0	230.0	600	1.25	750.0	0	X	230.0	X	230.0	X	230.0		
480V SHUTDOWN BOARD 1B2-B	480V SHDW BD 1B2-B		TOTAL		4928.8						2542.6		2496.0		2228.2		|R18

Preparer GTH Date 4/13/92
Check EJJ Date 4/13/92
Rev 18

ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	LOAD	FLI	SEN-SOR	LONG TIME set.	I (PU)	APP R	NOR OPER	NOR OPER	SI A	SI A	SI B	SI B		
CRD Mech Clr Fan 2A-A Mtr 1	480V SHDN BD 2A1-A	7B	2-MTR-30-83/1-A	75.0	97.0					X	97.0	X	97.0	O	0.0		IR18
Reac Lwr Compt Clr Fan 2A-A	480V SHDN BD 2A1-A	7C	2-MTR-30-74-A	40.0	47.0					X	47.0	X	47.0	O	0.0		IR18
CRD Mech Clr Fan 2A-A Mtr 2	480V SHDN BD 2A1-A	7D	2-MTR-30-83/2-A	75.0	97.0					X	97.0	X	97.0	O	0.0		IR18
ALT FDR 250V BTRY CHGR NO 2	480V SHDN BD 2A1-A	8A	0-CHGR-239-2	83.8	150.0	300	0.70	210.0		O	0.0	O	0.0	O	0.0		
RMOV BD 2A1-A	480V SHDN BD 2A1-A	8B	2-MCC-213-A1-A	400.0	480.0	400	1.25	500.0	38	X	125.0	X	125.0	X	125.0		
Reac Vent Bd 2A-A	480V SHDN BD 2A1-A	9B	2-MCC-232-A-A	500.0	600.0	600	1.10	660.0	38	X	400.0	X	400.0	X	400.0		
Elec Bd Rm AHU B-A	480V SHDN BD 2A1-A	9C	0-MTR-31-30D-A	50.0	56.5	150	0.55	82.5		X	56.5	X	90.8	X	90.8	ANALYZED LOAD SI	
ALT FDR CHANNEL IV		10A		200.0	240.0	400	0.85	340.0		O	0.0	O	0.0	O	0.0		IR18
ALT FDR 125V VTL BTRY CHGR IV	480V SHDN BD 2A1-A	10AA	0-CHGR-236-4-G	25.6	53.0	N/A				O	0.0	O	0.0	O	0.0		IR18
ALT FDR 120VAC VITAL INV 1-IV	480V SHDN BD 2A1-A	10AB	1-INV-235-4-G	0.0	42.0	N/A				O	0.0	O	0.0	O	0.0		IR18
ALT FDR INST PWR DIST PANEL 2B	480V SHDN BD 2A1-A	10AC	2-DXP-237-B	0.0	104.2	N/A				O	0.0	O	0.0	O	0.0		IR18
ALT FDR 120VAC VITAL INV 2-IV	480V SHDN BD 2A1-A	10AD	2-INV-235-4-G	0.0	42.0	N/A				O	0.0	O	0.0	O	0.0		IR18
C&A Bldg Vent Bd 2A1-A	480V SHDN BD 2A1-A	10B	2-MCC-214-A1-A	500.0	600.0	600	1.10	660.0	38	X	321.0	X	468.7	X	468.7		IR18
Cntmt Air Rtn Fan 2A-A	480V SHDN BD 2A1-A	10C	2-MTR-30-38-A	100.0	115.0					O	0.0	O	0.0	X	115.0		IR18
Alt Fdr C&A Bldg Vent Bd 2A2-A	480V SHDN BD 2A1-A	10D	2-MCC-214-A2/A	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
					3323.6						1143.5		1325.4		1199.4		IR18
Dsl Aux Bd 2A1-A	480V SHDN BD 2A1-A		2-MCC-215-A1-A	250.0	300.0	300	1.25	375.0	38	X	129.5	X	123.0	X	123.0		IR18
Aux Bldg Gen Sply Fan 2A	480V SHDN BD 2A1-A	2C	2-MTR-30-104	100.0	120.0	200	0.90	180.0		X	198.0	O	0.0	O	0.0	ANALYZED LOAD NOR	
COMPONENT COOL SYS PUMP 2A-A	480V SHDN BD 2A1-A	3B	2-MTR-70-59-A	350.0	389.0	600	0.95	570.0	1	X	389.0	X	389.0	X	389.0		
480V SHUTDOWN BOARD 2A1-A	480V SHDN BD 2A1-A		TOTAL		4132.7						1860.0		1837.5		1711.5		IR18

Preparer JTN Date 4/18/92
Check EJJ Date 4/19/92
Rev 18

ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	LOAD	FLI	SEN-SOR	LONG TIME set.	I (PU)	APP R	NOR OPER	NOR OPER	SI A	SI A	SI B	SI B		
CRD MECH CLR FAN C-A MTR 1	480V SHDN BD 2A2-A	7A	2-MTR-30-88/1-A	75.0	97.0					X	97.0	X	97.0	O	0.0		IR18
Aux Bldg Gen Exhaust Fan 2A	480V SHDN BD 2A2-A	7B	2-MTR-30-274	125.0	147.0	300	0.65	195.0		X	147.0	O	0.0	O	0.0		
Fuel Handling Exhaust Fan A	480V SHDN BD 2A2-A	7C	0-MTR-30-136	100.0	120.0	200	0.90	180.0		X	120.0	O	0.0	O	0.0		
REAC LWR COMPT CLR FAN 2C-A	480V SHDN BD 2A2-A	7D	2-MTR-30-77-A	40.0	54.0					X	54.0	X	54.0	O	0.0		IR18
CRD Mech Clr Fan 2C-A Mtr 2	480V SHDN BD 2A2-A	8A	2-MTR-30-88/2-A	75.0	97.0					X	97.0	X	97.0	O	0.0		IR18
RHOV BD 2A2-A	480V SHDN BD 2A2-A	8B	2-MCC-213-A2-A	400.0	480.0	400	1.25	500.0	38	X	236.3	X	236.3	X	236.3		IR18
480V SHUTDOWN BD RM AHU B-A	480V SHDN BD 2A2-A	8D	0-MTR-31-44-A	75.0	92.0	150	0.90	135.0		X	92.0	X	92.0	X	92.0		
NOR FDR CHANNEL III	480V SHDN BD 2A2-A	9A		200.0		400	0.85	340.0	39	X		X		X			IR18
NOR FDR VTL BTRY CHGR III	480V SHDN BD 2A2-A	9AA	0-CHGR-236-3-F	25.6	53.0	N/A			39	X	53.0	X	53.0	X	53.0		IR18
NOR FDR 120VAC VITAL INV 1-III	480V SHDN BD 2A2-A	9AB	1-INV-235-3-F	0.0	42.0	N/A			39	X	42.0	X	42.0	X	42.0		IR18
NOR FDR 120VAC VITAL INV 2-III	480V SHDN BD 2A2-A	9AD	2-INV-235-3F	0.0	42.0	N/A			39	X	42.0	X	2.0	X	42.0		IR18
NOR FDR INST PWR DIST PANEL 2A	480V SHDN BD 2A2-A	9AC	2-DXF-237-A	0.0	104.2	N/A				X	104.2	X	104.2	X	104.2		IR18
Alt Fdr C&A Bldg Vent Bd 2A1-A	480V SHDN BD 2A2-A	9B	2-MCC-214-A1-A	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
C&A Bldg Vent Bd 2A2-A	480V SHDN BD 2A2-A	9C	2-MCC-214-A2-A	500.0	600.0	600	1.10	660.0		X	283.3	X	283.3	X	283.3		IR18
Spent Fuel Pit Pmp A-A	480V SHDN BD 2A2-A	9D	0-MTR-78-12-A	100.0	113.8	200	0.80	160.0		X	113.8	X	113.8	X	113.8		
Alt Fdr Reactor Vent Bd 2A-A	480V SHDN BD 2A2-A	10A	2-MCC-232-A-A	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
					3241.9						1481.5		1214.5		966.59		IR18
DSL AUX BD 2A2-A	480V SHDN BD 2A2-A		2-MCC-215-A2-A	250.0	300.0	300	1.25	375.0	38	X	97.6	X	83.2	X	83.2		IR18
Elec Bd Rm A/C A-A Cprsr	480V SHDN BD 2A2-A	2C	0MTR-31-128/2-A	250.0	275.0	600	0.70	420.0		X	462.0	X	462.0	X	462.0	ANALYZED LOAD	
480V Shdn Bd Rm Chlr A-A	480V SHDN BD 2A2-A	3C	0-MTR-31-36/2-A	240.0	247.0	400	0.88	352.0		X	247.0	X	247.0	X	247.0		
Station Fire Pmp 2A-A	480V SHDN BD 2A2-A	4D	2-MTR-26-9-A	200.0	230.0	600	1.25	750.0	0	X	230.0	X	230.0	X	230.0		
480V SHUTDOWN BOARD 2A2-A	480V SHDN BD 2A2-A		TOTAL		4293.9						2518.1		2236.7		1988.7		IR18

Preparer MTH Date 4/13/92
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ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	LOAD	FLI	SEN-SOR	LONG TIME set.	I (PU)	APP R	NOR OPER	NOR OPER	SI A	SI A	SI B	SI B	
Elec Bd Rm AHU D-B	480V SHDN BD 2B1-B	7A	0-MTR-31-31D-B	50.0	62.5	100	0.90	90.0		X	62.5	X	62.5	X	62.5	
Spent Fuel Pit Pmp C-S ALT FDR	480V SHDN BD 2B1-B	7B	0-MTR-78-35-S	100.0	115.0	200	0.80	160.0		X	115.0	X	176.0	X	176.0	ANALYZED LOAD IR18
CRD Mech Clr Fan 2B-B Mtr 1	480V SHDN BD 2B1-B	7C	2-MTR-30-92/1-B	75.0	97.0					X	97.0	X	97.0	O	0.0	IR18
Reac Lwr Compt Clr Fan 2B-B	480V SHDN BD 2B1-B	7D	2-MTR-30-75-B	40.0	54.0					X	54.0	X	54.0	O	0.0	IR18
RMOV BD 2B1-B	480V SHDN BD 2B1-B	8B	2-MCC-213-B1-B	400.0	480.0	400	1.25	500.0	38	X	150.0	X	150.0	X	150.0	
Alt Fdr C&A Bldg Vent Bd 2B2-B	480V SHDN BD 2B1-B	9A	2-MCC-214-B2-B	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0	
Reac Vent Bd 2B-B	480V SHDN BD 2B1-B	9B	2-MCC-232-B-B	500.0	600.0	600	1.10	660.0		X	400.0	X	400.0	X	400.0	
ALT FDR CHANNEL III	480V SHDN BD 2B1-B	10A		200.0		400	0.85	340.0		O	0.0	O	0.0	O	0.0	
ALT FDR 125V VIT BTRY CHGR III	480V SHDN BD 2B1-B	10AA0	-CHGR-236-3-F	25.6	53.0	N/A				O	0.0	O	0.0	O	0.0	
ALT FDR 120VAC VITAL INV 1-III	480V SHDN BD 2B1-B	10AB1	-INV-235-3-F	0.0	42.0	N/A				O	0.0	O	0.0	O	0.0	
ALT FDR 120VAC VITAL INV 2-III	480V SHDN BD 2B1-B	10AC2	-INV-235-3-F	0.0	42.0	N/A				O	0.0	O	0.0	O	0.0	
ALT FDR INST PWR DIST PANEL 2A	480V SHDN BD 2B1-B	10AD2	-DXF-237-A	0.0	104.2	N/A				O	0.0	O	0.0	O	0.0	
C&A Bldg Vent Bd 2B1-B	480V SHDN BD 2B1-B	10B	2-MCC-214-B1-B	500.0	600.0	600	1.10	660.0	38	X	550.0	X	550.0	X	550.0	
CRD MECH CIR FAN 2B-B MTR 2	480V SHDN BD 2B1-B	10D	2-MTR-30-92/2	75.0	97.0					O	0.0	O	0.0	O	0.0	
					2946.6						1428.5		1489.5		1338.5	IR18
DSL AUX BD 2B1-B	480V SHDN BD 2B1-B		2-MCC-215-B1-B	250.0	300.0	300	1.25	375.0	38	X	135.2	X	121.7	X	121.7	IR18
Aux Bldg Gen Sply Fan 2B	480V SHDN BD 2B1-B	2B	2-MTR-30-105	100.0	120.0	200	0.90	180.0		X	198.0	O	0.0	O	0.0	ANALYZED LOAD NOR
Reciprocating Charging Pmp	480V SHDN BD 2B1-B	3B	2-MTR-62-101	200.0	221.0					O	221.0	O	0.0	O	0.0	IR18
COMPONENT COOL SYS PUMP 2B-B	480V SHDN BD 2B1-B	3C	2-MTR-70-33-B	350.0	389.0	600	0.95	570.0	1	X	389.0	X	389.0	X	389.0	
480V SHUTDOWN BOARD 2B1-B	480V SHDN BD 2B1-B		TOTAL		3976.6						2371.7		2000.2		1849.2	IR18

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ENG_TITLE	BOARD	COMP NO.	EQUIPID_NO	LOAD	FLI	SEN-SOR	LONG TIME set.	I (PU)	APP R	NOR OPER	NOR OPER	SI A	SI A	SI B	SI B		
Aux Bldg Gen Exhaust Fan 2B	480V SHDN BD 2B2-B	7A	2-MTR-30-278	125.0	147.0	300	0.65	195.0		X	147.0	O	0.0	O	0.0		
CRD Mech Clr Fan 2D-B Mtr 1	480V SHDN BD 2B2-B	7B	2-MTR-30-80/1-B	75.0	97.0					X	97.0	X	97.0	O	0.0		IR18
Fuel Handling Exhaust Fan B	480V SHDN BD 2B2-B	7C	0-MTR-30-139	100.0	120.0	200	0.90	180.0		X	120.0	O	0.0	O	0.0		
Reac Lwr Compt Clr Fan 2D-B	480V SHDN BD 2B2-B	7D	2-MTR-30-78-B	40.0	54.0					X	54.0	X	54.0	O	0.0		IR18
RMOV BD 2B2-B	480V SHDN BD 2B2-B	8B	2-MCC-213-B2-B	400.0	480.0	400	1.25	500.0	38	X	269.3	X	269.3	X	269.3		IR18
Alt Fdr Reactor Vent Bd 2B-B	480V SHDN BD 2B2-B	9A	2-MCC-232-B-B	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
Alt Fdr C&A Bldg Vent Bd 2B1-B	480V SHDN BD 2B2-B	9B	2-MCC-214-B1-B	500.0	600.0	600	1.10	660.0		O	0.0	O	0.0	O	0.0		
Cntmt Air Rtn Fan 2B-B	480V SHDN BD 2B2-B	9C	2-MTR-30-39-B	100.0	115.0					O	0.0	O	0.0	O	115.0		IR18
480V Shutdown Bd Rm AHU D-B	480V SHDN BD 2B2-B	9D	0-MTR-31-61-B	75.0	92.0	150	0.90	135.0		X	92.0	X	92.0	X	92.0		
NOR FDR CHANNEL IV	480V SHDN BD 2B2-B	10A		200.0		400	0.85	340.0		X		X		X			
NOR FDR 120VAC VITAL INV 1-IV	480V SHDN BD 2B2-B	10AB1	-INV-235-4-G	0.0	42.0	N/A			39	X	42.0	X	42.0	X	42.0		
NOR FDR 125V VTL BTRY CHGR IV	480V SHDN BD 2B2-B	10AA0	-CHGR-236-4-G	25.6	53.0	N/A			39	X	53.0	X	53.0	X	53.0		
NOR FDR 120VAC VITAL INV 2-IV	480V SHDN BD 2B2-B	10AC2	-INV-235-4-G	0.0	42.0	N/A			39	X	42.0	X	42.0	X	42.0		
NOR FDR INST PWR DIST PANEL 2B	480V SHDN BD 2B2-B	10AD1	-DXF-237-B	0.0	104.2	N/A				X	104.2	X	104.2	X	104.2		
C&A Bldg Vent Bd 2B2-B	480V SHDN BD 2B2-B	10B	2-MCC-214-B2-B	500.0	600.0	600	1.10	660.0	38	X	295.1	X	295.1	X	295.1		IR18
CRD Mech Clr Fan 2D-B Mtr 2	480V SHDN BD 2B2-B	10C	2-MTR-30-80/2-B	75.0	97.0					X	97.0	X	97.0	O	0.0		
					3243.2						1412.6		1145.6		1012.6		IR18
Dsl Aux Bd 2B2-B	480V SHDN BD 2B2-B		2-MCC-215-B2-B	250.0	300.0	300	1.25	375.0	38	X	121.3	X	107.0	X	107.0		IR18
Elec Bd Rm A/C B-B Cprsr	480V SHDN BD 2B2-B	2B	0MTR-31-129/2-B	250.0	275.0	600	0.70	420.0		X	462.0	X	462.0	X	462.0	ANALYZED LOAD	
COMPONENT COOL SYS PUMP C-S	480V SHDN BD 2B2-B	2D	0-MTR-70-51-S	350.0	389.0	600	0.95	570.0	1	X	389.0	X	389.0	X	389.0		
UNIT 2 REAC BLDG CRANE	480V SHDN BD 2B2-B	3B	2-CRN-271-R1	0.0	228.8					O	0.0	O	0.0	O	0.0		
Station Fire Pmp 2B-B	480V SHDN BD 2B2-B	4D	2-MTR-26-11-B	200.0	230.0	600	1.25	750.0		X	230.0	X	230.0	X	230.0		
480V SHUTDOWN BOARD 2B2-B	480V SHDN BD 2B2-B		TOTAL		4666.0						2614.9		2333.6		2200.6		IR18

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Rev 10

LVSG OPERATIONAL LOAD CURRENT SUMMARY FOR UNIT 1 OPERATION

Preparer WTH Date 4/13/88
Check EJJ Date 4/13/87
Rev 18

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LVSG	NORMAL OPERATION	SI A	SI B	BREAKER SETTING NOR FDR	WITH HIGH IMPEDANCE FAULT: NORMAL OPERATION	SI A	SI B	FAULT	NORMAL
480V SHDN BOARD 1A1-A	2073.20	2049.60	1882.70	2850	2134.20	2110.60	1943.70	176.00	115.00
480V SHDN BOARD 1A2-A	2573.60	2405.00	2137.20	2850	2662.40	2493.80	2226.00	250.00	162.00
480V SHDN BOARD 1B1-B	2320.60	2077.70	1805.90	2850	2451.60	2166.50	1894.70	352.00	221.00
480V SHDN BOARD 1B2-B	2402.40	2355.80	2088.00	2850	2542.60	2496.00	2228.20	387.20	247.00
480V SHDN BOARD 2A1-A	1782.00	1803.20	1677.20	2850	1860.00	1837.50	1711.50	198.00	120.00
480V SHDN BOARD 2A2-A	2331.10	2049.70	1801.70	2850	2518.10	2236.70	1988.70	462.00	275.00
480V SHDN BOARD 2B1-B	2293.70	1939.20	1788.20	2850	2371.70	2000.20	1849.20	198.00	120.00
480V SHDN BOARD 2B2-B	2427.90	2146.60	2013.60	2850	2614.90	2333.60	2200.60	462.00	275.00

R1

Telemecanique

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615-365-1521

Number of Pages 2

To: W. T. HOLBER

Date: 8/27/90

From: JACK RICHARDS
Telecopy No. (301) 857-7577

Subject:

SEE ATTACHED.

Jack

TELEMECANIQUE INC., 2002 BETHEL ROAD, WESTMINSTER, MD 21157, (301) 876-2214

TELEMECANIQUE INC
Application and Systems
2002 Bethel Road
Westminster, MD 21157
(301)876 2214

August 27, 1990

T W. T. Holbert
Jack Richards
CT: TVA/ tts B Nuclear Plant
Interrupting Capacity of Combination Starte

Mr. Holbert:

e to our telephone conversation of 8 27
ker type combination starter, sizes 1
asted for 22kA short circuit inter
e tests were run in August 1979 i
ion of UL 845 in effect at that ti
tests were found to be within the
e as outlined in UL 845.

Sincer

Jack R
Projec

WBN-EEB-MS-TI08-0008

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10121/8-87

EBASCO SERVICES INCORPORATED

This sheet added by R16

SPEED LETTER

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MESSAGE

TO L W Ackley

FROM D Vaccaro

SUBJECT WBN-EEB-MS-T108-0008 480VAC IE Coordination/Protection

DATE Sept. 17 19 9

FOLD

Per your request we have reviewed our records and we know of no Mini-Calculation still required to be rolled up into the subject calculation.

D M Vaccaro

9/17/91

SIGNED

FOLD

REPLY

DATE 19

SIGNED

PURPOSE

The purpose of this Attachment is to evaluate additional data received on valve motors and to support modifications to be implemented under DCN F-13942-A. The modifications involve breaker and/or breaker setting and overload heater changes.

The following baseline calculations evaluate the DCN(s) for their impact if required. The evaluations for these modifications may be identified by "Attachment No. F13942A" or the calculation will otherwise identify the DCN(S) and the revision in which the modifications are evaluated.

BASELINE CALCULATION	CALCULATION NO.
TELAS	WBN-EEB-MS-TI05-0001
AUXILIARY POWER SYSTEM ANALYSES	WBN-EEB-MS-TI06-0002
480V 1E COORDINATION/PROTECTION	WBN-EEB-MS-TI08-0008
CONTAINMENT PENETRATION PROTECTION STUDY, VOLTAGE LEVEL 4 AND 5	EEB-MS-TI08-0015

ATTACHMENT NO. F13942A
WBN-EEB-MS-TI08-0008 Rev 11

1.0 SCOPE

THIS REVISION EVALUATES THE BREAKERS, BREAKER SETTINGS AND OVERLOADS FOR THE VALVES IN THE ATTACHED TABLE. ADDITIONAL DATA HAS BEEN OBTAINED ON THESE VALVE'S MOTORS, AND THE DATA IS DOCUMENTED IN REFERENCE 3.1

2.0 ASSUMPTIONS

SEE ASSUMPTIONS IDENTIFIED IN THE BASE CALCULATION (SECTION 2.0).

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TELAS WBN EEB-MS-TI06-001

3.2 PM86-18 R2 - MOTOR OVERLOAD HEATER SELECTION

4.0 DESIGN INPUT DATA

4.1 VALVE MOTOR DATA DOCUMENTED IN REFERENCE 3.1.

4.2 PROTECTIVE DEVICE DATA DOCUMENTED IN THE BASE CALCULATION.

5.0 JUSTIFICATION OF ASSUMPTIONS

SEE JUSTIFICATION OF ASSUMPTIONS IN BASE CALCULATION (SECTION 5.0).

6.0 METHODOLOGY

THE BREAKER SIZES, SETTINGS, AND OVERLOAD HEATERS WERE EVALUATED PER THE CRITERIA FORMULATED IN PM86-18 (REF 3.2) AND THE BASE CALCULATION.

THE FOLLOWING CODES HAVE BEEN USED IN THE ATTACHED TABLE TO IDENTIFY THE PROTECTIVE DEVICE MODIFICATIONS:

COLUMN 'H' (OVERLOAD HEATERS)
'N'= NO CHANGE
'Y'= REPLACE OVERLOAD HEATER WITH THAT SPECIFIED IN COLUMN 'OVLD SIZE'

ATTACHMENT NO. F13942A
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COLUMN 'B' (CIRCUIT BREAKER)
'N'= NO CHANGE
'Y'= RESET BREAKER AS SHOWN IN COLUMN 'SET POSIT'
'R'= REPLACE & SET BREAKER AS SHOWN IN COLUMNS 'BKR 'SET POSIT'
'F'= REPLACE POWER FUSES WITH THAT SHOWN IN COLUMN 'BKR'

7.0 GRAPHICS

NONE

8.0 SUMMARY OF RESULTS

THE RESULTS OF THIS ANALYSIS ARE TABULATED IN THE ATTACHED TABLE.

9.0 CONCLUSION

THE ADDITIONAL VALVE MOTOR DATA REQUIRES CHANGES TO SOME OF BREAKER SETTINGS, OVERLOAD HEATER SIZES AND ONE BREAKER REPLACEMENT.THESE CHANGES ARE IDENTIFIED IN THE ATTACHED TABLE.

10.0 SECTION REFERENCES

SECTION A - TABLE F13942A

* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CN	REV
N	N	1	ERCW Str 1A-A Backwash Vlv	203	C&A VENT BD 1A1-A	4E	1	1-FCV-67-9A-A	0.33	0.75	5.8		T14	20	EF3-A003	12	3	M-08663-A	Y	R11
N	N	1	ERCW Str 1A-A Flush Vlv	203	C&A VENT BD 1A1-A	6E	1	1-FCV-67-9B-A	0.33	0.75	5.8		T14	20	EF3-A003	12	3	M-08663-A	Y	R11
N	N	1	ERCW Str 1B-B Backwash Vlv	205	C&A VENT BD 1B1-B	4E	1	1-FCV-67-10A-B	0.33	0.75	5.8		T14	20	EF3-A003	12	3	M-08663-A	Y	R11
N	N	1	ERCW Str 1B-B Flush Vlv	205	C&A VENT BD 1B1-B	6E	1	1-FCV-67-10B-B	0.33	0.75	5.8		T14	20	EF3-A003	12	3	M-08663-A	Y	R11
N	N	1	ERCW Str 2B-B Flush Vlv	209	C&A VENT BD 2B1-B	6E	1	2-FCV-67-10B-B	0.33	0.75	5.8		T14	20	EF3-A003	12	3	M-08663-A	Y	R11
N	N	1	EM DG HX 1A1 & 1A2 SPLY VLV	217	DSL AUX BD 1A1-A	3A	1	1-FCV-67-66-A	0.13	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A	Y	R11
N	N	1	EM DG ENG HX SUP VLV FM HDR 1B	219	DSL AUX BD 1B1-B	3A	1	1-FCV-67-67-B	0.13	0.39	2.6		T8	90	EF3-A003	7	LO	M-08663-A	Y	R11
Y	N	1	ERCW TO DSL GEN OC-S HTX VLV	225	DSL AUX BD C1-S	DA	1	2-FCV-67-73-S	0.13	0.45	3.3		C054A	90	TRS1A			M-08663-A	N	R11
Y	N	1	ERCW TO DSL GEN OC-S HTX VLV	225	DSL AUX BD C1-S	DE	1	1-FCV-67-72-S	0.13	0.45	3.3		C054A	90	TRS1A			M-08663-A	N	R11
N	Y	2B	SIS Accum Tank 1 Flow Isol Vlv	235	RMOV BD 1A1-A	3F2		1-FCV-63-118-A	19.50	25.20	220.0				EF3-H050	475	3		N	R11
N	N	4	HPFP Sys Low Level Intake Vlv	235	RMOV BD 1A1-A	5A	1	0-FCV-26-3-A	0.13	0.45	3.2		T9	90	EF3-A003	7	LO		N	R11
Y	N	2B	SIS Accum Tank 3 Flow Isol Vlv	235	RMOV BD 1A1-A	7D	2	1-FCV-63-80-A	19.50	25.20	220.0		T49	15	EF3-G050	470	HI	M-10522-A	N	R11
Y	N	2B	SIS Accum Tank 1 Flow Isol Vlv	235	RMOV BD 1A1-A	8D	2	1-FCV-63-118-A	19.50	25.20	220.0		T49	15	EF3-B060			M-10522-A	Y	R11
N	Y	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	3F2		1-FCV-63-98-B	19.50	25.20	220.0				EF3-H050	475	3		N	R11
Y	Y	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	7D	2	1-FCV-63-67-B	19.50	25.20	220.0		T49		EF3-H050	475	3	M-10522-A	N	R11
Y	N	2B	SIS ACCUM TANK FLOW ISOL VLV	237	RMOV BD 1B1-B	8D	2	1-FCV-63-98-B	19.50	25.20	220.0		T49		EF3-B060			M-10522-A	N	R11
N	R	1	Cmpnt Clg Hx A Disch Cont Vlv	240	RMOV BD 2A2-A	11A	1	2-FCV-67-146-A	0.67	1.90	7.6		T24	120	EF3-A003	16	4	F-13942-A	Y	R11
N	N	4	HPFP Sys Low Level Intake Vlv	241	RMOV BD 2B1-B	5A	1	0-FCV-26-8-B	0.13	0.45	3.2		T9	90	EF3-A003	7	LO	M-12212-A	N	R11
N	Y	1	A.Bldg ERCW Sup Hdr 2B Iso Vlv	242	RMOV BD 2B2-B	8B	1	2-FCV-67-82-B	0.67	1.90	7.6		T24	120	EF3-A005	14	LO	M-08663-A	Y	R11

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ATTACHMENT [illegible]942A DATE 19-Oct-90 MBM-EEB-MS-T108-0008

NODE_NO	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	Imin OVLD	LRA/ Imin OVLD (%)	LRA CRIT MET	1.414*FLI (Amps)	1.414*FLI/ Imin OVLD (%)	STROKE TIME (sec)	DUTY CYC (sec)	%FLI at DUTY CYC (sec)	DUTY CYC	Main	DATE
203	C&A VENT BD 1A1-A	4E	1-FCV-67-9A-A	0.33	0.75	5.79	T14	0.64	905	YES	1.0575	165	20	40	300	YES	YES	10/15/90
203	C&A VENT BD 1A1-A	6E	1-FCV-67-9B-A	0.33	0.75	5.79	T14	0.64	905	YES	1.0575	165	20	40	300	YES	YES	10/15/90
205	C&A VENT BD 1B1-B	4E	1-FCV-67-10A-B	0.33	0.75	5.79	T14	0.64	905	YES	1.0575	165	20	40	300	YES	YES	10/15/90
205	C&A VENT BD 1B1-B	6E	1-FCV-67-10B-B	0.33	0.75	5.79	T14	0.64	905	YES	1.0575	165	20	40	300	YES	YES	10/15/90
209	C&A VENT BD 2B1-B	6E	2-FCV-67-10B-B	0.33	0.75	5.79	T14	0.64	905	YES	1.0575	165	20	40	300	YES	YES	10/15/90
217	DSL AUX BD 1A1-A	3A	1-FCV-67-66-A	0.13	0.39	2.60	T8	0.35	743	YES	0.5499	157	90	180	185	YES	YES	10/15/90
219	DSL AUX BD 1B1-B	3A	1-FCV-67-67-B	0.13	0.39	2.60	T8	0.35	743	YES	0.5499	157	90	180	185	YES	YES	10/15/90
225	DSL AUX BD C1-S	DA	2-FCV-67-73-S	0.13	0.45	3.26	C054A	0.44	741	YES	0.6345	114	90	180	450	YES	YES	10/15/90
225	DSL AUX BD C1-S	DE	1-FCV-67-72-S	0.13	0.45	3.26	C054A	0.44	741	YES	0.6345	114	90	180	450	YES	YES	10/15/90
235	RHOV BD 1A1-A	5A	0-FCV-26-3-A	0.13	0.45	3.15	T9	0.38	829	YES	0.6345	167	90	180	185	YES	YES	10/15/90
235	RHOV BD 1A1-A	7D	1-FCV-63-80-A	19.50	25.20	220.03	T49	21.4	1028	YES	35.532	166	15	30	400	YES	YES	10/15/90
235	RHOV BD 1A1-A	8D	1-FCV-63-118-A	19.50	25.20	220.03	T49	21.4	1028	YES	35.532	166	15	30	400	YES	YES	10/15/90
237	RHOV BD 1B1-B	7D	1-FCV-63-67-B	19.50	25.20	220.03	T49	21.4	1028	YES	35.532	166	15	30	400	YES	YES	10/15/90
237	RHOV BD 1B1-B	8D	1-FCV-63-98-B	19.50	25.20	220.03	T49	21.4	1028	YES	35.532	166	15	30	400	YES	YES	10/15/90
240	RHOV BD 2A2-A	11A	2-FCV-67-146-A	0.67	1.90	7.56	T24	1.63	464	YES	2.679	164	120	240	170	YES	YES	10/15/90
241	RHOV BD 2B1-B	5A	0-FCV-26-8-B	0.13	0.45	3.15	T9	0.38	829	YES	0.6345	167	90	180	185	YES	YES	10/15/90
242	RHOV BD 2B2-B	8B	2-FCV-67-82-B	0.67	1.90	7.56	T24	1.63	464	YES	2.679	164	120	240	170	YES	YES	10/15/90

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ATTACHMENT NO. 005146A
CALC NO.WBN EEB-MS-TI08-0008

PREPARED: B.A. DATE: 11/2/90
VERIFIED: [illegible] DATE: 11-02-90

PURPOSE

THE PURPOSE OF THIS ATTACHMENT IS TO EVALUATE AND SUPPORT MODIFICATIONS TO BE IMPLEMENTED UNDER DCN O-05146-A.

THE MODIFICATIONS INVOLVE THE REPLACEMENT OF THE DIESEL GENERATOR AUXILIARY LUBE OIL PUMP MOTORS.

THE FOLLOWING BASELINE CALCULATIONS EVALUATE THE DCN MODIFICATIONS FOR THEIR IMPACT. THESE EVALUATIONS ARE IDENTIFIED BY THE ATTACHMENT NO. 005146A AND ARE INCLUDED IN THE CALCULATION NOTED.

BASELINE CALCULATION	CALCULATION NO.
480VAC 1E COORDINATION/PROTECTION.....	WBN EEB-MS-TI08-0008
AUXILIARY POWER SYSTEM ANALYSIS.....	WBN EEB-MS-TI06-0002
TELAS.....	WBN EEB-MS-TI05-0001
DIESEL GENERATOR LOADING ANALYSIS.....	WBN EEB-MS-TI03-0012

PREPARED: B. A. DATE: 11/2/90
VERIFIED: [illegible] DATE: 11-02-90

1.0 SCOPE

THIS ATTACHMENT EVALUATES AND VERIFIES THAT THE PROPOSED DESIGN IS ADEQUATE AND MEETS THE GUIDELINES APPLICABLE TO THE BASELINE CALCULATION.

THE LOADS ARE FED FROM 480V DIESEL AUX. BOARDS 1A1-A COMPT.4B, 1A2-A COMPT. 2A, 1B1-B COMPT. 4B, 1B2-B COMPT. 2A, 2A1-A COMPT. 4B, 2A2-A COMPT. 2A, 2B1-B COMPT.4B AND 2B2-B COMPT. 2A.

2.0 ASSUMPTIONS

SEE "ASSUMPTIONS" IDENTIFIED IN THE BASE CALCULATION (SECTION 2.0)

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TELAS, WBN EEB-MS-TI06-0001

3.2 DCN 0-05146-A

3.3 PR NUMBER W-6635 R1 RIMS B26 '90 1016 901

4.0 DESIGN INPUT DATA

MOTOR DATA (DOCUMENTED IN REF. 3.2) IS AS FOLLOWS:

HP: 0.75	FLI: 1.27A	SERVICE FACTOR: 1.25
RPM: 1750	LRI: 11.5A	CONTINUOUS DUTY
VOLTS: 460V	3 PHASE	

5.0 JUSTIFICATION OF ASSUMPTIONS

SEE "DOCUMENTATION OF ASSUMPTIONS" IN BASE CALCULATION (SECTION 5.0).

6.0 METHODOLOGY

THE METHODOLOGY FOR THIS ATTACHMENT IS SIMILAR TO THAT USED IN THE BASE CALCULATION TO VERIFY THE PROPER BREAKER, OVERLOAD HEATER, DEVICE COORDINATION AND CABLE PROTECTION.

PREPARED B. J. DATE 11/2/9
VERIFIED [illegible] DATE 11-02-90

7.0 GRAPHICS

NOT APPLICABLE.

8.0 SUMMARY OF RESULTS

THE RESULTS OF THIS ANALYSIS ARE SHOWN ON THE ACCOMPANYING SHEET DOCUMENTING CIRCUIT BREAKER SIZE, SETTINGS AND OVERLOAD HEATER SELECTION.

9.0 CONCLUSIONS

PROPER LOAD PROTECTION IS ENSURED WITH THE FOLLOWING PROTECTIVE DEVICE(S):

THREE OF THE EXISTING CIRCUIT BEAKERS (ITE MODEL EF3-A005) ARE OF ADEQUATE SIZE AND SHOULD BE SET AT 3 (22 AMPS). THESE BREAKERS ARE IN THE FOLLOWING COMPARTMENTS:

BOARD 1B2-B COMPT. 2A
BOARD 2A2-A COMPT. 2A
BOARD 2B2-B COMPT. 2A

THE OTHER FIVE BREAKERS ARE TOO SMALL AND MUST BE REPLACED WITH EF3-A005 BREAKERS SET ON 3. THESE BREAKERS ARE IN THE FOLLOWING COMPARTMENTS:

BOARD 1A1-A COMPT. 4B
BOARD 1A2-A COMPT. 2A
BOARD 1B1-B COMPT. 4B
BOARD 2A1-A COMPT. 4B
BOARD 2B1-B COMPT. 4B

SIX OF THE OVERLOAD HEATERS ARE ITE CATALOG NO. G30T23 AND ARE ADEQUATELY SIZED.

TWO OF THE OVERLOAD HEATERS,THOSE IN COMPT. 4B OF BOARD 2B1-B AND COMPT. 2A OF BOARD 2B2-B ARE G30T20 AND G30T24, RESPECTIVELY AND MUST BE REPLACED WITH G30T23 HEATERS.

PER THE COORDINATION CURVES FOR THE DIESEL AUX. BOARDS IN FIGURE 3 OF SECTION 9 OF THE BASE CALCULATION, THE EF3-A005 BREAKERS ARE BOUNDED BY THE CURVES SHOWN, AND THEREFORE WILL COORDINATE WITH ALL UPSTREAM DEVICES.

CABLE PROTECTION EVALUATION IN BASE CALCULATION IS STILL VALID FOR THE FOLLOWING REASONS:

PREPARED B.G. DATE 11/2/90
VERIFIED [illegible] DATE 11-02-90

THE SIZE AND LENGTH OF THE CABLES DO NOT CHANGE AND #12 FEEDER CABLES ARE ADEQUATELY PROTECTED FOR SHORT CIRCUIT CURRENTS BY EF3-A005 CIRCUIT BREAKERS.(REFERENCE ATTACHMENT M08663A, SECTION C, PAGE 24).

ATTACHMENT NO. 005146A
CALC NO.WBN EEB-MS-TI08-0008

PREPARED B.A. DATE 11/2/90
VERIFIED [illegible] DATE 11.02.90

OVERLOAD HEATER SIZING

SINCE THE FULL LOAD CURRENT IS DECREASED, THE HEATER SIZE SHALL BE RE-EVALUATED. FROM PROCEDURE METHOD 86-18 R2, OVERLOAD TRIP SETTING SHALL BE BETWEEN 135 AND 150 PERCENT OF THE FULL LOAD CURRENT, FOR SERVICE FACTOR=1.25.

FOR ITE CATALOG G30T23 HEATERS, TRIP RATING IS

$$\frac{1.47 \times 1.25 \times 100}{1.27} = 145\%$$

SINCE THIS IS WITHIN THE PRESCRIBED LIMITS, THE ABOVE OVERLOAD HEATER SIZE IS ADEQUATE.

CIRCUIT BREAKER SIZING

MAGNETIC ONLY CIRCUIT BREAKERS SHALL BE SET AT A TRIP CURRENT BETWEEN 185% AND 235% OF LOCKED ROTOR CURRENT.

SINCE LRI=11.5A,

BREAKER SETTING SHALL BE BETWEEN 21.3 AND 27A. THIS CORRESPONDS TO SETTING "3" ON EF3-A005 BREAKERS. THE MOTORS PROTECTED BY EF3-A003 BREAKERS MUST HAVE THEIR BREAKERS REPLACED WITH EF3-A005 BREAKERS.

PURPOSE

THE PURPOSE OF THIS ATTACHMENT IS TO SUPPORT THE MODIFICATIONS PROPOSED IN DCN's F-12463-A, F-12550-A, F-12656-A, F-12766-A, F-12813-A, M-044277-C, M-12070-A, M-13725-A, P-04468-A, F-14470-A & F-14471-A.

THE FOLLOWING BASELINE CALCULATIONS EVALUATE THE PROPOSED MODIFICATIONS IN THE ABOVE DCNs. THE EVALUATIONS FOR THESE MODIFICATIONS MAY BE IDENTIFIED BY "ATTACHMENT NO. GR12DCNS" OR THE CALCULATION WILL OTHERWISE IDENTIFY THE DCN(s) AND THE REVISION IN WHICH THE MODIFICATIONS ARE EVALUATED.

BASELINE CALCULATION	CALCULATION NO.
TELAS	WBN-EEB-MS-TI05-0001
AUXILIARY POWER SYSTEM ANALYSES	WBN-EEB-MS-TI06-0002
480V 1E COORDINATION/PROTECTION	WBN-EEB-MS-TI08-0008
CONTAINMENT PENETRATION PROTECTION STUDY,VOLTAGE LEVEL V4 & V5	WBN-EEB-MS-TI08-0015
CABLE AMPACITY - NV4 AND NV5 CABLES IN CLASS 1E RACEWAYS	WBPEVAR8909010

ATTACHMENT NO. GR12DCNS
WBN-EEB-MS-TI08-0008 Rev 13

1.0 SCOPE

THIS REVISION EVALUATES THE BREAKERS, BREAKER SETTINGS, OVERLOADS AND CABLES ASSOCIATED WITH THE CHANGES IN THE FOLLOWING DCN's:

F-12463-A
F-12550-A
F-12656-A
F-12766-A
F-12813-A
F-14470-A
F-14471-A
M-04277-C
M-12070-A
M-13725-A
P-04468-A

SEVERAL OF THE "F" DCN's ADD PIGTAILS TO THE CABLE IN ORDER TO TERMINATE AT THE MCC's OR MOTOR. DCN M-04277-C DELETES TWO HEATERS, AND DCN M-13725-A CHANGES THE POWER SOURCES TO FOUR VALVES. DCN P-04468-A REPLACES THE FAN MOTORS.

2.0 ASSUMPTIONS

SEE ASSUMPTIONS IDENTIFIED IN THE BASE CALCULATION (SECTION 2.0).

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TELAS WBN EEB-MS-TI05-0001

3.2 PM86-18 R2 - MOTOR OVERLOAD HEATER SELECTION

3.3 DCN's LISTED ABOVE IN PARAGRAPH 1.0.

4.0 DESIGN INPUT DATA

4.1 FAN MOTOR DATA DOCUMENTED IN REFERENCE 3.1.

4.2 PROTECTIVE DEVICE DATA DOCUMENTED IN THE BASE CALCULATION.

4.3 PIGTAIL SIZE DOCUMENTED IN THE DCN's.

5.0 JUSTIFICATION OF ASSUMPTIONS

SEE JUSTIFICATION OF ASSUMPTIONS IN BASE CALCULATION (SECTION 5.0).

6.0 METHODOLOGY

THE BREAKER SIZES, SETTINGS, AND OVERLOAD HEATERS WERE EVALUATED PER THE CRITERIA FORMULATED IN PM86-18 (REF 3.2) AND THE BASE CALCULATION.

THE FOLLOWING CODES HAVE BEEN USED IN TABLE I TO IDENTIFY THE PROTECTIVE DEVICE MODIFICATIONS:

COLUMN 'H' (OVERLOAD HEATERS)
'N'= NO CHANGE
'Y'= REPLACE OVERLOAD HEATER WITH THAT SPECIFIED IN COLUMN 'OVLD SIZE'

COLUMN 'B' (CIRCUIT BREAKER)
'N'= NO CHANGE
'Y'= RESET BREAKER AS SHOWN IN COLUMN 'SET POSIT'
'R'= REPLACE & SET BREAKER AS SHOWN IN COLUMNS 'BKR 'SET POSIT'

CABLES/PIGTAILS WERE REVIEWED FOR SHORT CIRCUIT PROTECTION.

7.0 GRAPHICS

NONE

8.0 SUMMARY OF RESULTS

THE RESULTS OF THIS ANALYSIS ARE TABULATED IN THE ATTACHED TABLES.

9.0 CONCLUSION

THE NEW FAN MOTORS REQUIRES CHANGES TO THE BREAKER SETTINGS, OVERLOAD HEATER SIZES AND TWO BREAKER REPLACEMENTS. THESE CHANGES ARE IDENTIFIED IN TABLE I IN ACCORDANCE WITH THE CODE DEFINDED IN PARAGRAPH 6.0 ABOVE.

10.0 SECTION REFERENCES

SECTION A - TABLE I MCC CHANGES
TABLE II MCC CABLE PROTECTION
TABLE III LVSG CABLE PROTECTION

ATTACHMENT GR12DCNS WBN-EEB-MS-TI08-0008 Rev 13 TABLE I MCC CHANGES DATE 14-Nov-90

* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
Y	Y	2A	125V Vtl Bat Rm I ExhFan 1A1-A	203	C&A VENT BD 1A1-A	7B	1	1-MTR-31-287-A	0.33	0.80	5.2	1.15	T17		EF3-A003	12	3	P-04468-A	Y	R13
N	N	2B	RHR Pmp 1A-A Inlet FCV	203	C&A VENT BD 1A1-A	7D	1	1-FCV-74-3-A	10.50	13.80	118.5	1.00	T42	20	EF3-L050	260	3	M-13725-A	N	R13
N	N	2B	RWST To Spray Hdr 1A FCV	203	C&A VENT BD 1A1-A	7E	1	1-FCV-72-22-A	3.20	5.20	36.0		T32	20	EF3-A010	84	HI	M-13725-A	N	R13
Y	Y	2A	125V Vtl Bat Rm II ExFan 1B1-A	203	C&A VENT BD 1A1-A	12A	1	1-MTR-31-285-A	0.33	0.80	5.2	1.15	T17		EF3-A003	12	3	P-04468-A	Y	R13
Y	Y	2A	125V Vtl Bat Rm I Ex Fan 1A2-B	205	C&A VENT BD 1B1-B	7B	1	1-MTR-31-288-B	0.33	0.80	5.2	1.15	T17		EF3-A003	12	3	P-04468-A	Y	R13
N	N	2B	RHR Pmp 1B-B Inlet FCV	205	C&A VENT BD 1B1-B	7D	1	1-FCV-74-21-B	10.50	13.80	118.5	1.00	T42	20	EF3-L050	260	3	M-13725-A	N	R13
N	N	2B	RWST To Spray Hdr 1B FCV	205	C&A VENT BD 1B1-B	7E	1	1-FCV-72-21-B	3.20	5.20	36.0		T32	20	EF3-A010	84	HI	M-13725-A	N	R13
Y	Y	2A	125V VTL BAT RM II EXFAN 1B2-B	205	C&A VENT BD 1B1-B	10C	1	1-MTR-31-286-B	0.33	0.80	5.2	1.15	T17		EF3-A003	12	3	P-04468-A	Y	R13
Y	R	2A	125V VIT BAT RM IV EXFAN 2A1-A	207	C&A VENT BD 2A1-A	7B	1	2-MTR-31-287-A	0.33	0.80	5.2	1.15	T17		EF3-A003	12	3	P-04468-A	Y	R13
Y	Y	2A	125V VitBatRm III Ex Fan 2B1-A	207	C&A VENT BD 2A1-A	12A	1	2-MTR-31-285-A	0.33	0.80	5.2	1.15	T17		EF3-A003	12	3	P-04468-A	Y	R13
Y	R	2A	125V Vit Bat Rm IV ExFan 2A2-B	209	C&A VENT BD 2B1-B	7B	1	2-MTR-31-288-B	0.33	0.80	5.2	1.15	T17		EF3-A003	12	3	P-04468-A	Y	R13
Y	Y	2A	125V Vit BatRm III ExFan 2B2-B	209	C&A VENT BD 2B1-B	10C	1	2-MTR-31-286-B	0.33	0.80	5.2	1.15	T17		EF3-A003	12	3	P-04468-A	Y	R13
N	N	2B	SPARE	235	RMOV BD 1A1-A	4A									EF3-B020	.		M-04277-C	N	R13
N	N	2B	SPARE	237	RMOV BD 1B1-B	4A									EF3-B020			M-04277-C	N	R13

ATTACHMENT GR12DCNS CALCULATION WBN-EEB-ME-TI08-0008 Rev 13 TABLE II MCC CABLE PROTECTION

BOARD	COMPT NO.	EQUIPID_NO	BKR TYPE	BKR STG	FUSE TYPE	FUSE RATING	CABLE NO.	CABLE SIZE	CABLENOTES PROT	REV
480V C&A VT BD 1A1-A	11C	1-MTR-31-461-A	EF3-A025Z	4			1PL4060A	#4	PASS CABLE REPLACED (DCN M-09612-A) #5 & #10 PIGTAILS (F-12656-A)	R13
480V C&A VT BD 1A1-A	4D	0-MTR-65-23-A	EF3-L050	3			1PL3520A	#2	PASS #8 PIGTAIL. CABLE REPLACED DCN M-09608-A #4 PIGTAIL (F-12550-A)	R13
480V C&A VT BD 1A1-A	6D	0-MTR-65-17-A	EF3-B030				1PL3540A	#2	PASS CABLE REPLACED (DCN M-09608-A) #4 & 18 PIGTAILS (F-12550-A)	R13
480V C&A VT BD 1A1-A	7D	1-FCV-74-3-A	EF3-L050	3			1V1920A	#2	PASS CABLE REPLACED (M13725A) #8 PIGTAIL (F-14471-A)	R13
480V C&A VT BD 1A1-A	7E	1-FCV-72-22-A	EF3-A010	HI			1V1870A	#10	PASS #10 PIGTAIL (M-13725-A)	R13
480V C&A VT BD 1B1-B	4D	0-MTR-65-42-B	EF3-L050	3			1PL3530B	#2	PASS #8 PIGTAIL CABLE REP (DCN M-09608-A) #4 PIGTAIL (F-12550-A)	R13
480V C&A VT BD 1B1-B	6D	0-MTR-65-37-B	EF3-B040				1PL3550B	#2	PASS #4 & 8 8 PIGTAILS (F-12550-A)	R13
480V C&A VT BD 1B1-B	7E	1-FCV-72-21-B	EF3-A010	HI			1V1850B	#8	PASS #10 PIGTAIL (M-13725-A)	R13
480V C&A VT BD 1B1-B	7D	1-FCV-74-21-B	EF3-L050	3			1V1900B	#2	PASS CABLE REPLACED (M-13725-A) #8 PIGTAIL (F-14470-A)	R13
480V C&A VT BD 2A1-A	9B	0MTR-31-128/1-A	EF3-L050	4			2PL4000A	#2	PASS CABLE REPLACED (DCN M-09701-A) #8 PIGTAIL (F-12766-A)	R13
480V C&A VT BD 2B1-B	8E	0MTR-31-129/1-B	EF3-L050	4			2PL3980B	#2	PASS CABLE REPLACED (DCN M-09700-A) #8 PIGTAIL (F-12463-A)	R13
480V RX MOV BD 1A1-A	5B	1-FCV-74-1-A	EF3-B020				1V2780A	#8	PASS M-12070-A	R13
480V RX MOV BD 1A1-A	5B						1V2781A	#8	PASS M-12070-A	R13
480V RX MOV BD 1B1-B	5C	1-FCV-74-9-B	EF3-A010	4			1V2150B	#8	PASS M-12070-A	R13
480V RX MOV BD 1B1-B	5C						1V2151B	#8	PASS M-12070-A	R13

BOARD	COMPT NO.	EQUIPID_NO	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	CABLE NO.	CABLE SIZE	CABLE PROT	NOTES	
480V SHDN BD 1B2-B	9C	1-MTR-30-39-B		200	0.75	10			10	1PL4885B	500MCM	PASS		R13
480V SHDN BD 1B2-B	9C									1PL4886B	250MCM	PASS	2/0 PIGTAIL (F-12813-A)	R13

ATTACHMENT NO. M09494A
WBN-EEB-MS-TI08-0008 Rev 14

PURPOSE

THE PURPOSE OF THIS ATTACHMENT IS TO SUPPORT THE MODIFICATIONS PROPOSED IN THE FOLLOWING DCN's:

A-06555-A
M-09494-A
M-10669-A
M-12809-A
M-13273-A
F-15056-A

SINCE DIFFERENT ASPECTS OF A DESIGN MODIFICATION ARE EVALUATED OR DETERMINED IN VARIOUS CALCULATIONS, OTHER CALCULATIONS MAY HAVE ALSO BEEN ISSUED TO EVALUATE/SUPPORT A PARTICULAR FEATURE. FOR IDENTIFICATION OF ALL CALCULATIONS AND REVISIONS ISSUED TO SUPPORT THE ABOVE DCN's, SEE THE APPLICABLE DCN PACKAGE.

ATTACHMENT NO. M09494A
WBN-EEB-MS-TI08-0008 Rev 14

1.0 SCOPE

THIS REVISION EVALUATES THE BREAKERS, BREAKER SETTINGS, OVERLOADS AND CABLES ASSOCIATED WITH THE CHANGES IN THE FOLLOWING DCN's:

A-06555-A
M-09494-A
M-10669-A
M-12809-A
M-13273-A
F-15056-A

DCN M-09494-A CHANGES THE COMPARTMENT LOCATION FROM 7D TO 7C FOR CONTROL BUILDING FRESH AIR HEATER 0-HTR-31-41. DCN M-12809-A ADDS A VALVE (1-FCV-062-275-A) TO MOTOR CONTROL CENTER 1-MCC-213-A1-A. DCN M-13273-A REPLACES THE TRANSFORMER ROOMS EXHAUST FANS' MOTORS (14 TOTAL), AND DCN A-06555-A REPLACES THE MOTOR ON VALVE 1-FCV-63-1-A. DCN M-10669-A REPLACES THE UNQUALIFIED CABLE IN THE ABGTS HEATERS WITH QUALIFIED CABLE (MARK NO.WWW). F-15056-A ADDS A #2 AWG PIGTAIL TO CABLES 1PL5520B & 2PL5520B IN ORDER TO BE ABLE TO SPLICE IN THE MOTOR SPLICE BOX TO THE MOTOR LEADS.

2.0 ASSUMPTIONS

SEE ASSUMPTIONS IDENTIFIED IN THE BASE CALCULATION (SECTION 2.0).

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 TELAS WBN EEB-MS-TI05-0001

3.2 PM86-18 R2 MOTOR OVERLOAD HEATER SELECTION

3.3 DCN's LISTED ABOVE IN PARAGRAPH 1.0.

4.0 DESIGN INPUT DATA

4.1 FAN & VALVE MOTOR DATA DOCUMENTED IN REFERENCE 3.1.

4.2 PROTECTIVE DEVICE DATA DOCUMENTED IN THE BASE CALCULATION.

4.3 CABLE SIZE DOCUMENTED IN THE DCN's.

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5.0 JUSTIFICATION OF ASSUMPTIONS

SEE JUSTIFICATION OF ASSUMPTIONS IN BASE CALCULATION (SECTION 5.0).

6.0 METHODOLOGY

THE BREAKER SIZES, SETTINGS, AND OVERLOAD HEATERS WERE EVALUATED PER THE CRITERIA FORMULATED IN PM86-18 (REF 3.2) AND THE BASE CALCULATION.

THE FOLLOWING CODES HAVE BEEN USED IN TABLE I TO IDENTIFY THE PROTECTIVE DEVICE MODIFICATIONS:

COLUMN 'H' (OVERLOAD HEATERS)
'N'= NO CHANGE
'Y'= REPLACE OVERLOAD HEATER WITH THAT SPECIFIED IN COLUMN 'OVLD SIZE'

COLUMN 'B' (CIRCUIT BREAKER)
'N'= NO CHANGE
'Y'= RESET BREAKER AS SHOWN IN COLUMN 'SET POSIT'
'R'= REPLACE & SET BREAKER AS SHOWN IN COLUMNS 'BKR' 'SET POSIT'

CABLES WERE REVIEWED FOR SHORT CIRCUIT PROTECTION.

ALSO, TWO OF THE 14 TRANSFORMER ROOM EXHAUST FANS BEING REPLACED BY DCN M-13273-A ARE NON-1E FEED FROM A NON-1E MCC. TABLE IV LISTS THESE TWO EXHAUST FANS WITH THE APPROPRIATE BREAKER SIZE AND SETTING AND OVERLOAD HEATER. WHENEVER CALCULATIONS ARE PERFORMED ON 480V AB COM MCC A, THIS TABLE WILL BE DELETED FROM THIS CALCULATION.

7.0 GRAPHICS

NONE

8.0 SUMMARY OF RESULTS

THE RESULTS OF THIS ANALYSIS ARE TABULATED IN THE ATTACHED TABLES.

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9.0 CONCLUSION

THE NEW MOTORS FOR THE 1E TRANSFORMER ROOM EXHAUST FANS AND VALVE 1-FCV-63-1-A DO NOT REQUIRE ANY CHANGES IN THE OVER-LOADS OR BREAKER SETTINGS. OVERLOAD AND BREAKER SETTING CHANGES ARE REQUIRED FOR VALVE 1-FCV-62-275-A (DCN M-12809-A).

THE NON-1E TRANSFORMER ROOM EXHAUST FANS SHOULD HAVE THE SAME BREAKER, BREAKER SETTING, AND OVERLOAD HEATER SIZE AS THE 1E.

10.0 SECTION REFERENCES

SECTION A - TABLE I MCC CHANGES
TABLE II MCC CABLE PROTECTION
TABLE III LVSG CABLE PROTECTION
TABLE IV MOV OVERLOAD SELECTION
TABLE V NON-1E TRANSFORMER ROOM EXHAUST FANS

* H	* B	GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	CALC CH	REV
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A2-A	203	C&A VENT BD 1A1-A	8C	1	1-MTR-30-244G-A	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A3-A	203	C&A VENT BD 1A1-A	8D	1	1-MTR-30-244H-A	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	480V Xfmr Rm 1A Exh Fan 1A1-A	203	C&A VENT BD 1A1-A	9D	1	1-MTR-30-244F-A	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B2-B	205	C&A VENT BD 1B1-B	8C	1	1-MTR-30-248F-B	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B3-B	205	C&A VENT BD 1B1-B	8D	1	1-MTR-30-248G-B	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	Shtdn Xfmr Rm 1B Exh Fan 1B1-B	205	C&A VENT BD 1B1-B	9D	1	1-MTR-30-248E-B	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	Cont Bldg Fresh Air Htr	206	C&A VENT BD 1B2-B	7C		0-MTR-31-421	144.00	173.22					FXD63B225	1500	3	M-09494-A	Y	R14
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A2-A	207	C&A VENT BD 2A1-A	8C	1	2-MTR-30-250F-A	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A3-A	207	C&A VENT BD 2A1-A	8D	1	2-MTR-30-250G-A	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	480V Xfmr Rm 2A Exh Fan 2A1-A	207	C&A VENT BD 2A1-A	9D	1	2-MTR-30-250E-A	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B2-B	209	C&A VENT BD 2B1-B	8C	1	2-MTR-30-246G-B	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B3-B	209	C&A VENT BD 2B1-B	8D	1	2-MTR-30-246H-B	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
N	N	2A	Shtdn Xfmr Rm 2B Exh Fan 2B1-B	209	C&A VENT BD 2B1-B	9D	1	2-MTR-30-246F-B	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	N	R14
Y	Y	2B	POSIT DISPLMNT PMP RECIRC VLV	235	RMOV BD 1A1-A	5F	1	1-FCV-62-275-A	0.70	2.30	16.0		T26	10	EF3-A010	36	2	M-12809-A	Y	R14
N	N	2B	RWST To RHR Pmp Flow Cont Vlv	235	RMOV BD 1A1-A	10A	1	1-FCV-63-1-A	10.30	15.10	116.4		T42	20	EF3-L050	260	3	A-06555-A	N	R14

NODE NO.	BOARD	COMPT NO.	EQUIPID_NO	BKR TYPE	BKR STG	FUSE TYPE	FUSE RATING	CABLE NO.	CABLE SIZE	CABLE PROT	CABLENOTES	REV
207	480V C&A VT BD 2A1-A	10D	0-HTR-30-147-A	EF3-B100				2PL3697A	#2	PASS		R14
207	480V C&A VT BD 2A1-A	10D							#6	PASS	DCN M-10669-A REPLACES CABLE AT HEATER (WWW #6 250C)	R14
209	480V C&A VT BD 2B1-B	10D	0-HTR-30-156-B	EF3-B100				2PL3868B	#2	PASS		R14
209	480V C&A VT BD 2B1-B	10D							#6	PASS	DCN M-10669-A REPLACES CABLE AT HEATER (WWW #6 250C)	R14
235	480V RX MOV BD 1A1-A	5F	1-FCV-62-275-A	EF3-A010	2			1V3300A	#12	PASS	DCN M-12809-A	R14

BOARD	COMPT NO.	EQUIPID_NO	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	CABLE NO.	CABLE SIZE	CABLE PROT	NOTES	
480V SHDN BD 1B2-B	9D	0-MTR-31-55-B		150	0.90	8			9	1PL5520B	4/0	PASS	CABLE REPLACED	R14
480V SHDN BD 1B2-B	9D										#2	PASS	PIGTAIL ADDED DCN F-15056-A	R14
480V SHDN BD 2B2-B	9D	0-MTR-31-61-B		150	0.90	8			9	2PL5520B	4/0	PASS	CABLE REPLACED	R14
480V SHDN BD 2B2-B	9D										#2	PASS	PIGTAIL ADDED F-15056-A	R14

NODE NO.	BOARD	COMPT NO	EQUIPID_NO	LOAD	FLI	LRA	OVLD SIZE	Imin OVLD	LRA/ Imin OVLD (%)	LRA CRIT MET	1.41*FLI (amps)	1.41*FLI/ Imin OVLD (%)	STROKE TIME (sec)	DUTY CYC (sec)	%FLI at DUTY CYC (sec)	TRIP > DUTY CYC	TRIP IN < 8min	DCN	REV
235	RMOV BD 1A1-A	5F	1-FCV-62-275-A	0.70	2.30	16.00	T26	2.03	788	YES	3.243	160	10	20	400	YES	YES	M-12809-A	R14
235	RMOV BD 1A1-A	10A	1-FCV-63-1-A	10.30	15.10	116.40	T42	11.0	1058	YES	21.291	194	20	40	300	YES	YES	A-06555-A	R14

GP	ENG_TITLE	NODE NO.	BOARD	COMPT NO	ST SIZE	EQUIPID_NO	LOAD	FLI	LRA	SF	OVLD SIZE	STROK TIME	BKR	BKR INST	SET POSIT	DCN	REV
2A	480V Xfmr Rm 1A Exh Fan 1A4	200	480V AB COM MCC A	4A	1	0-MTR-30-244J	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	R14
2A	480V Xfmr Rm 2B Exh Fan 2B4	200	480V AB COM MCC A	4B	1	0-MTR-30-246J	3.00	4.40	27.4	1.15	T34		EF3-A010	58	4	M-13273-A	R14

1.0 SCOPE

THE PURPOSE OF THIS REVISION IS TO:

1.1 REMOVE THE UNVERIFIED ASSUMPTIONS IN REVISION 0 OF THIS CALCULATION. THERE ARE FIVE UNVERIFIED ASSUMPTIONS (UVA's). THE ASSUMPTIONS ARE IDENTIFIED AND STATED IN SECTION 2.0.

1.2 DOCUMENT MOTOR OVERLOAD SELECTION TABLES FOR CONTINUOUS DUTY MOTORS WITH A SERVICE FACTOR OF 1.0 OR 1.15.

2.0 UNVERIFIED ASSUMPTIONS IN REVISION 0

2.5 THE THERMAL OVERLOAD RELAY KNOBS ARE ALL SET ON THE 100% MARK.

2.6 ALL MOTORS AT WATTS BAR HAVE STANDARD EFFICIENCIES.

2.8 IN MOST CASES, THE VENDOR CERTIFIED CURVES ARE NOT AVAILABLE FOR WATTS BAR NUCLEAR PLANT. IN ORDER TO BE CONSISTENT WITH TVA CALCULATION PRACTICES, THE TRIPPING CHARACTERISTICS OF THE PROTECTION DEVICES, WITH THE FOLLOWING EXCEPTIONS, HAVE BEEN TAKEN FROM MEDIUM AND LOW VOLTAGE PENETRATION CALCULATION EEB-MS-TI08-0015, AND APPENDIX R CALCULATION DS 0684E2, REV. 1.

THE FOLLOWING VENDOR PUBLISHED CURVES WHICH ARE NOT PART OF THE ABOVE MENTIONED CALCULATION HAVE BEEN USED IN THIS CALCULATION:

WESTINGHOUSE DS-BREAKER CURVE 1
WESTINGHOUSE DSL-416 LIMITER CURVE 639431
WESTINGHOUSE CO-8 RELAY CURVE 418265
GE IAC51 RELAY CURVE GES-7001B
GE IFC53 RELAY CURVE GES-7015A
GE E150 LINE (TED 1364T 150) CURVE GES-6121B
GE J600 LINE CURVE GES-5104C FOR TJK BREAKER
GOULD SHAWMUT CP CABLE PROTECTOR CURVE 1698E
GOULD SHAWMUT TRS15R, TRS30R FUSE CURVES
ITE GOULD CURVE TD-9002, REV. 1 FOR SS4
ITE BREAKER CURVE FOR ITE-EF3 BREAKERS
ITE BREAKER CURVE FOR ITE-FJ3 BREAKERS

THE TRIPPING CHARACTERISTIC OF THESE DEVICES ARE ASSUMED TO BE APPLICABLE FOR WATTS BAR.

2.10 VENDOR INFORMATION SUPPLIED TO SARGENT & LUNDY NECESSARY TO SIZE GENERAL ELECTRIC THERMAL OVERLOAD HEATERS, FOR MOV's, CANNOT UNQUESTIONABLY BE TIED BACK TO THE MODEL NUMBER OF THE STARTER THAT IS INSTALLED AT WATTS BAR IN 0-MCC-215-C1-S. IT IS ASSUMED, THAT IT IS THE CORRECT DOCUMENTATION.

2.11 THE RANGE USED IN THE CALCULATION FOR MAGNETIC ONLY MOLDED CASE CIRCUIT BREAKER TRIP SETTINGS DIFFERS FROM THE RANGE SHOWN IN TI-8.

3.0 SOURCES OF DESIGN INPUT / REFERENCES

3.1 WESTINGHOUSE "INSTRUCTION BOOK FOR INDOOR LOW VOLTAGE METAL-ENCLOSED SWITCHGEAR FOR WATTS BAR NUCLEAR PLANT" CONTRACT 74C-84647

3.2 WESTINGHOUSE CONTRACT 74C2-84647 COORDINATION DRAWINGS 666924 THRU 666971

3.3 WESTINGHOUSE DESCRIPTIVE BULLETIN 32-850 "POWER CENTERS INCLUDING TYPE DS SWITCHGEAR"

3.4 GE TECHNICAL DATA GET-7215B "TYPE IAC TIME OVERCURRENT SWITCHGEAR PROTECTIVE RELAYS"

3.5 VENDOR TECHNICAL MANUAL FOR GE 6900 VOLT SHUTDOWN BOARDS (WBN-VTM-G080-0100 -PRELIMINARY)

3.6 GE INSTRUCTION MANUAL GEK-34053A TIME OVERCURRENT RELAYS IAC51A etc

3.7 GE INSTRUCTION MANUAL GEH-1753 TIME OVERCURRENT RELAYS TYPE IAC

3.8 GE INSTRUCTION MANUAL GEK-45375E TIME OVERCURRENT RELAYS TYPE IFC53A

3.9 VENDOR TECHNICAL MANUAL FOR GENERAL ELECTRIC 7700 LINE MOTOR CONTROL CENTER (WBN-VTM-GE08-0050)

3.10 VENDOR TECHNICAL MANUAL FOR BROWN BOVERI LOW VOLTAGE SWITCHGEAR FOR 5TH DIESEL (WBN-VTM-AS04-0030)

3.11 VENDOR TECHNICAL MANUAL FOR WESTINGHOUSE DS 480 VOLT SWITCHGEAR (WBN-VTM-W120-0160)

3.12 LETTER FROM WESTINGHOUSE TO TVA SUBJECT "DLS CURRENT LIMITERS WBNP 480 VOLT SWITCHGEAR CONTRACT 74C2-84647" RIMS (B43860528006)

3.13 GE INSTRUCTION MANUAL GEK-34054A TIME OVERCURRENT RELAYS TYPE IAC53

3.14 GOULD SHAWMUT TRI-ONIC FUSE BULLETIN TR606R

3.15 GE CONTROL CATALOG GEP-1260C

3.16 SHAWMUT AMP-TRAP CABLE PROTECTOR BULLETIN A-T621 REVISED DECEMBER, 1973

3.17 CHASE-SHAWMUT TRI-ONIC FUSE BULLETIN TR-606

3.18 GOULD ITE ELECTRICAL PRODUCTS SPEEDFAX OCT 1977

3.19 VENDOR TECHNICAL MANUAL FOR ITE MOTOR CONTROL CENTERS WBN-VTM-AS04-0010

3.20 TVA CALCULATION WBN-EEB-MS-TI05-0001 AUXILIARY POWER SYSTEM DATA BASE (TELAS)

3.21 ELECTRICAL DESIGN GUIDE DG-E2.4.6 AC AUXILIARY POWER SYSTEM DESIGN EQUIPMENT TYPICAL DATA

3.22 TVA CALCULATION WBN EEB-MS-TI08-0015 PENETRATION PROTECTION

3.23 GOULD ITE ELECTRICAL DISTRIBUTION EQUIPMENT 1982 SPEEDFAX

3.24 ITE CURVES TD-4948 REV 1 DATED DEC 9, 1976, AND TD-8087 REV 1 DATED NOV 22, 1976

3.25 PM86-18 R2 MOTOR OVERLOAD HEATER SELECTION

4.0 DESIGN INPUT DATA

4.1 WESTINGHOUSE DS-BREAKER CURVE 1 (REFERENCE 3.1)

4.2 WESTINGHOUSE AMPTECTOR I-A CURVE 705501 (REFERENCE 3.11)

4.3 WESTINGHOUSE CO-8 RELAY CURVE 418248 (REFERENCE 3.1)

4.4 WESTINGHOUSE CO-8 RELAY CURVE 418265

4.5 TIME CURRENT CURVES FOR DSL-416 LIMITERS (REFERENCE 3.3)

4.6 TIME-CURRENT LET-THROUGH CURVES FOR DSL-416 LIMITERS (REFERENCE 3.12)

4.7 LOW VOLTAGE SWITCHGEAR COORDINATION CURVES (REFERENCE 3.2)

4.8 GE TIME-CURRENT CURVES OF TYPE IAC RELAYS WITH INVERSE TIME CHARACTERISTICS

GES-7001	(REFERENCE 3.4)
FIGURE 2 FROM GEH-1753	(REFERENCE 3.7)
FIGURE 9 FROM GEK-34053	(REFERENCE 3.6)
FIGURE 9 FROM GEK-34054	(REFERENCE 3.13)

4.9 GE TIME-CURRENT CURVES OF TYPES IFC53A AND IFC53B FIGURE 7 FROM GEK-45375 (REFERENCE 3.8)

4.10 BBC POWER SHIELD TIME-CURRENT CHARACTERISTICS FOR SS4 CURVE TD-9002 (REFERENCE 3.10)

4.11 TRI-ONIC CHARACTERISTIC MELTING TIME-CURRENT CURVE 36817-E (REFERENCE 3.17)

4.12 TRI-ONIC FUSE MELTING TIME-CURRENT DATA 15-600 AMPS, 600 VOLTS CAT. NO. TRS(AMP RATING)R (REFERENCE 3.14)

4.13 GE OVERLOAD DATA FOR 200-LINE FULL VOLTAGE MAGNETIC STARTERS (REFERENCE 3.9)

4.14 SHAWMUT CABLE PROTECTORS CHARACTERISTIC CURVES FOR COPPER CABLES CP6 & CP6A (REFERENCE 3.16)

4.15 GE E150 LINE TIME-CURRENT CURVES FOR BREAKER TYPES TED GES-6121B (REFERENCE 3.9)

4.16 GE J600 LINE TIME-CURRENT CURVES FOR BREAKER TYPES TED GES-6104C (REFERENCE 3.9)

4.17 MOTOR EFFICIENCIES (REFERENCES 3.20 & 3.21)

4.18 ITE OVERLOAD DATA FOR SERIES 5600 MOTOR CONTROL CENTERS (REFERENCE 3.19)

5.0 JUSTIFICATION OF ASSUMPTIONS

5.5 THE THERMAL OVERLOAD RELAY KNOBS ARE ALL SET ON THE 100% MARK-- ASSUMPTION 2.5.

RESOLUTION
==========
DCN M-14890-A HAS BEEN INITIATED TO ENSURE THAT THE OVERLOAD RELAY KNOBS ARE SET AT THE 100% MARK.

5.6 ALL MOTORS AT WATTS BAR HAVE STANDARD EFFICIENCIES-- ASSUMPTION 2.6.

RESOLUTION
==========
A REVIEW OF THE TELAS DATA BASE (REFERENCE 3.20 WHICH IS BASED ON WALKDOWN DATA, TEST REPORTS ETC.) DID NOT REVEAL ANY MOTORS WITH EITHER UNUSUALLY HIGH OR LOW EFFICIENCIES. THE MOTOR EFFICIENCIES ARE WITHIN THE RANGES DEFINED IN ELECTRICAL DESIGN GUIDE DG-E2.4.6 (REFERENCE 3.21).

5.8 IN MOST CASES, THE VENDOR CERTIFIED CURVES ARE NOT AVAILABLE FOR WATTS BAR NUCLEAR PLANT--ASSUMPTION 2.8.

RESOLUTION
==========

5.8.1 WESTINGHOUSE DS-BREAKER CURVE 1

COORDINATION CURVES FOR THE 480V LOW VOLTAGE SWITCHGEAR WERE PROVIDED BY THE LOW VOLTAGE SWITCHGEAR CONTRACT. THE BREAKER'S TIME-CURRENT CHARACTERISTICS ON THE COORDINATION CURVES AGREE WITH THE W DS-BREAKER CURVE 1 PROVIDED IN THE LOW VOLTAGE SWITCHGEAR INSTRUCTION BOOK. ALSO, A COMPARISON OF CURVE 1 AND CURVE NO. 705501 ON THE AMPTECTOR I-A DISCLOSED THAT THE ONLY DIFFERENCE BETWEEN THE TWO CURVES IS THAT CURVE 1 CLAIMS MORE CALIBRATION POINTS FOR THE LONG DELAY PICKUP AND LONG DELAY TIME. CURVE 705501 FOR THE AMPTECTOR I-A IS PROVIDED IN THE VENDOR TECHNICAL MANUAL FOR WESTINGHOUSE DS 480 VOLT SWITCHGEAR (REFERENCE 3.11).

5.8.2 WESTINGHOUSE CO-8 RELAY CURVE 418265

SOME OF THE COORDINATION CURVES PROVIDED BY WESTINGHOUSE SHOW THE COORDINATION OF THE MAIN BREAKER WITH THE LOAD BREAKERS. THE TIME-CURRENT CHARACTERISTICS OF THE CO-8

RELAY USED BY WESTINGHOUSE IN THEIR COORDINATION CURVES AGREE WITH THE CO-8 RELAY CURVE 418265. ALSO, COMPARISON OF THE CO-8 RELAY CURVE 418248 PROVIDED IN REFERENCE 3.1 SHOWS THAT CURVE 418248 IS A BLOWN-UP SECTION OF CURVE 418265 WHICH WAS USED IN THE CALCULATION.

5.8.3 WESTINGHOUSE DSL-416 LIMITER CURVE 639431

CURVE 639431 AGREES WITH THE TIME-CURRENT CURVES PROVIDED FOR THE DSL-416 LIMITERS IN REFERENCE 3.3. ALSO, WESTINGHOUSE IN A LETTER TO TVA (RIMS B43 8605 28006) PROVIDES CURVE 639432 WHICH SHOWS THE LET-THROUGH CHARACTERISTICS OF THE DSL-416 LIMITERS. THIS CURVE IS ALSO A PART OF REFERENCE 3.3.

5.8.4 GE IAC51 RELAY CURVE GES-7001B

A COMPARISON OF RELAY CURVE GES-7001B AND THE TIME-CURRENT CURVE PROVIDED IN THE INSTRUCTION BOOK WITH THE HARDWARE (REFERENCE 3.7) REVEALED THAT THE TWO CURVES AGREE.

5.8.5 GE IFC53 RELAY CURVE GES-7015A

A COMPARISON OF RELAY CURVE GES-7015A AND THE TIME-CURRENT CURVE PROVIDED IN THE INSTRUCTION BOOK WITH THE HARDWARE (REFERENCE 3.8) REVEALED THAT THE TWO CURVES AGREE.

5.8.6 GE E150 LINE (TED1364T150) CURVE GES-6121B

CURVE GES-6121B IS ONE OF THE CURVES PROVIDED IN REFERENCE 3.9 "VENDOR TECHNICAL MANUAL FOR GE 7700 LINE MOTOR CONTROL CENTER".

5.8.7 GE J600 LINE CURVE GES-6104C FOR TJK BREAKER

CURVE GES-6104C IS ONE OF THE CURVES PROVIDED IN REFERENCE 3.9 "VENDOR TECHNICAL MANUAL FOR GE 7700 LINE MOTOR CONTROL CENTER".

5.8.8 GOULD SHAWMUT TRS15R, TRS30R FUSE

CURVE 36817-E IS PROVIDED IN REFERENCE 3.9 FOR THE TIME-CURRENT CHARACTERISTICS OF THE TRS30R FUSE. A COMPARISON BETWEEN THE TIME-CURRENT CURVES USED IN THE CALCULATION FOR THE TRS30R AND CURVE 36817-E REVEALED THAT THERE ARE

BASICALLY NO DIFFERENCES.

5.8.9 ITE GOULD CURVE TD-9002, REV. 1 FOR SS4

CURVE TD-9002 IS ONE OF THE CURVES PROVIDED IN REFERENCE 3.10 "VENDOR TECHNICAL MANUAL FOR BROWN BOVERI LOW VOLTAGE SWITCHGEAR FOR 5TH DIESEL.

5.8.10 GOULD SHAWMUT CP CABLE PROTECTOR CURVE

SOME DIFFERENCES EXIST IN THE CURVES AVAILABLE FOR THE CABLE PROTECTORS. THE CABLE PROTECTORS IN CIRCUITS THAT HAVE PROTECTIVE DEVICES DOWNSTREAM THAT MUST COORDINATE WITH THE LVSG BREAKERS ARE BEING REMOVED BY DCN M-12064-A. THIS INCLUDES ALL CLASS 1E MCC AND CONTROL POWER FEEDERS. CABLE PROTECTORS THAT ARE BEING RETAINED ARE ONLY IN MOTOR CIRCUITS AND PACKAGE LOAD TYPE CIRCUITS AND ARE REDUNDANT TO THE LOAD BREAKER FOR FAULTS LESS THAN THE BREAKER's RATINGS. FOR ANY DIFFERENCES IN THE TIME-CURRENT CHARACTERISTICS OF THE CABLE PROTECTORS, ONLY THE PROTECTION OF THE CONDUCTORS IN THE ELECTRICAL PENETRATIONS NEEDS TO BE VERIFIED.
COMPARISON OF THE CP6 & CP6A CABLE PROTECTORS' TIME -CURRENT CHARACTERISTICS DISCLOSE THAT THE CP6A CABLE PROTECTORS PROVIDE THE MINIMUM PROTECTION OF THE TWO. FIGURES 7.2-7.4 IN SECTION 7.0 SHOW THE THERMAL CAPABILITY OF 2/0, 250MCM AND 350 MCM PENETRATION CONDUCTORS WITH THE TIME-CURRENT CHARACTERISTICS OF THE LARGEST SIZE CABLE PROTECTOR (CP6A TYPE) FOR EACH CONDUCTOR SIZE. THE THREE FIGURES SHOW THAT THE PENETRATIONS ARE PROTECTED WHEN THE TIME-CURRENT CHARACTERISTICS OF THE CP6A (LEAST CONSERVATIVE) ARE USED.

5.8.11 ITE BREAKER CURVE FOR ITE-EF3 BREAKERS

A SLIGHT DIFFERENCE BETWEEN CURVE TD8087 AND CURVE (E),(EH),(EF)-1A WAS OBSERVED IN THE INSTANTANEOUS REGION. THE FOLLOWING TABLE SHOWS THE DIFFERENCE BETWEEN TWO CURVES OBTAINED FOR THE ITE-EF3 BREAKERS:

EF BREAKER FRAME SIZE (amps)	CURVE #1 TD8087 (amps)	CURVE #2 (E),(EH),(EF)-1A (amps)
15-40	400-700	450-550
50-100	600-1000	1000-1200

CURVE #2 WAS USED IN THE CALCULATION AND IT IS THE WORST

CASE FOR BOTH PROTECTION AND COORDINATION FOR BREAKERS IN THE 50-100 AMP FRAME SIZE. HOWEVER, CURVE #1 IS THE WORST CASE FOR CABLE PROTECTION FOR 15-40 AMP FRAME SIZE. COORDINATION OF A 100 AMP BREAKER WITH THE DIESEL AUXILIARY BOARD IS SHOWN IN FIGURE 7.5. DRAWINGS FOR 20-40 AMP HAVE BEEN REVISED TO REFLECT THE HIGHER MAXIMUM INSTANTANEOUS CURRENT (FIGURES 7.6-7.10 RESPECTIVELY). REVIEW OF THE CABLE PROTECTION TABLES SHOW THAT ~~ALL CABLES ARE STILL PROTECTED USING THE WORST CASE VALUES.~~ THE CABLE PROTECTION IS STILL CONSISTENT WITH THE INITIAL EVALUATION. 6/12/20/90

5.8.12 ITE BREAKER CURVE FOR ITE-FJ3 BREAKERS

A SLIGHT DIFFERENCE BETWEEN CURVE TD4948 AND CURVE FJ-1A WAS OBSERVED IN THE INSTANTANEOUS REGION. THE FOLLOWING TABLE SHOWS THE DIFFERENCE BETWEEN TWO CURVES OBTAINED FOR THE ITE-FJ BREAKERS:

FJ BREAKER FRAME SIZE (amps)	CURVE #1 TD4948 (amps)	CURVE #2 FJ-1 (amps)
70-125	750-1600	750-1600
150-175	960-2000	750-1600
200-225	960-2000	960-2000

CURVE #2 WAS USED IN THE CALCULATION AND REFERENCE 3.18 STATES THAT THE MAXIMUM SETTING FOR A FJ3 BREAKER CORRESPONDS TO 1600 AMPS FOR A 70 TO 175 AMP BREAKER. REFERENCE 3.23 STATES A FJ6 BREAKER HAS THREE MORE ADDITIONAL SETTINGS WITH 2000 AMPS CORRESPONDING TO THE MAXIMUM SETTING. WALKDOWN DATA CONFIRMS THAT THE MAXIMUM INSTANTANEOUS SETTING IS 1600 AMPS FOR A 175 AMP BREAKER. HOWEVER, INSPECTION OF FIGURES 7.11-7.12 REVEALS THAT IF THE 175 AMP FJ3 BREAKER COULD BE SET AT 2000 AMPS, COORDINATION WOULD STILL EXIST. ALSO, REVIEW OF CABLE PROTECTION REVEALS THAT THE CABLES WOULD BE PROTECTED AT THE 2000 AMP SETTING.

5.10 VENDOR INFORMATION SUPPLIED BY TVA TO S&L TO SIZE GE THERMAL OVERLOAD HEATERS FOR MOV's CANNOT UNQUESTIONABLY BE TIED BACK TO THE MODEL NUMBER OF THE STARTER.

RESOLUTION
==========

THERE ARE TWO MOV's ON GE MCC's AND THESE MOV's HAVE THEIR OVERLOADS BYPASSED FOR AN ACCIDENT IN ACCORDANCE WITH RG 1.106. THE THERMAL OVERLOAD HEATER CURVES PROVIDED TO S&L BY TVA WERE CURVES THAT TVA HAD COORDINATED WITH GE

FOR THE CR123 TYPE OVERLOAD. THESE CURVES ARE FOR THE CR123 THERMAL OVERLOAD IN ANY STARTER.

5.11 THE RANGE USED IN THE CALCULATION FOR MAGNETIC ONLY MOLDED CASE CIRCUIT BREAKER TRIP SETTINGS DIFFERS FROM THE RANGE SHOWN IN TI-8.

RESOLUTION
==========

THE RANGE STATED IN TI-8 (PARAGRAPH 7.3.3) IS 10 TO 12 TIMES THE FULL LOAD CURRENT FOR MAGNETIC ONLY MOLDED CASE CIRCUIT BREAKERS. THE RANGE USED IN THIS CALCULATION IS 185% TO 235% OF LOCKED ROTOR CURRENT OR FOR VERY SMALL MOTORS WHERE THE STATED RANGE CANNOT BE ACHEIVED, THE MINIMUM SETTING ON THE SMALLEST BREAKER. THE SMALLEST BREAKER USED IS A EF3-A003 WITH A MINIMUM SETTING OF 7 AMPS. SECTION 6.3 IN REV 0 PROVIDES THE BASIS FOR THE TWO VALUES (LOWER 185% AND UPPER 235%) USED, AND SECTION 6.2.1 PROVIDES THE JUSTIFICATION.
THE BASIS AND JUSTIFICATION STATED IN SECTIONS 6.3 AND 6.2.1 RESPECTIVELY ARE ACCEPTABLE TO WBNP/TVA. ~~NO DEVIATION TO TI-8 WILL BE GENERATED AS SUGGESTED IN SECTION 5 SINCE TI-8 WILL BE SUPERSEDED IN THE NEAR FUTURE BY A REPLACEMENT DOCUMENT THAT IS BEING GENERATED BY TVA FOR BOTH TVA AND CONTRACTOR USE. TI-8 WAS PURCHASED FROM A CONTRACTOR AND IS LIMITED BY CONTRACT TO TVA PERSONNEL USE ONLY.~~ 12/20/90

6.0 METHODOLOGY

6.1 UNVERIFIED ASSUMPTIONS (UVA)

THE METHODOLOGY USED IN REMOVING THE UVA's WAS TO REVIEW THE UVA AND DETERMINE THE NECESSARY ACTION(s) NEEDED TO RESOLVE IT. IN RESOLVING THE UVA ON VENDOR's CERTIFIED TIME-CURRENT CURVES NOT BEING AVAILABLE, A LITERATURE TYPE SEARCH WAS PERFORMED FOR COPIES OF TIME-CURRENT CURVES IN THE TIME PERIOD WHEN THE EQUIPMENT WAS ORDERED/PURCHASED AND FOR THE LATEST AVAILABLE TIME-CURRENT CURVES. THE TIME-CURRENT CURVES WERE COMPARED AND DIFFERENCES WERE NOTED, AND IN MOST CASES, THE DIFFERENCES WERE NEGLIGIBLE. WHERE THE DIFFERENCES WERE NOT NEGLIGIBLE, TIME-CURRENT PLOTS WERE CREATED (SECTION 7.0) TO SHOW THAT COORDINATION/PROTECTION EXISTS WITH THE WORST CASE TIME-CURRENT CHARACTERISTIC.

6.2 OVERLOAD HEATER SELECTION TABLES FOR CONTINUOUS DUTY MOTORS

ITE AND GE OVERLOAD HEATERS FOR CONTINUOUS DUTY MOTORS ARE TABULATED IN TABLES I & II BASED ON THE CRITERIA IN PM86-18 AND THE FOLLOWING CALCULATION:

6.2 (CONT)

FROM PM86-18 REFERENCE 3.25

MOTOR SERVICE FACTOR	MINIMUM	MAXIMUM
1.0	$\geq$115%	$\leq$130%
1.15	$\geq$125%	$\leq$140%

TYPICAL CALCULATION ITE OVERLOAD G30T6 SIZE 1 STARTER

FOR SF=1.0

$$Iol := 0.29$$

$$Imax := 1.25 \cdot \frac{Iol}{1.15} \qquad Imin := 1.25 \cdot \frac{Iol}{1.30}$$

$$Imax = 0.32 \qquad Imin = 0.28$$

FOR SF=1.15

$$Imax := 1.25 \cdot \frac{Iol}{1.25} \qquad Imin := 1.25 \cdot \frac{Iol}{1.4}$$

$$Imax = 0.29 \qquad Imin = 0.26$$

TABLES I & II WERE CALCULATED USING THE CRITERIA IN PM86-18, ABOVE CALCULATION AND LOTUS 123.

TABLE I ITE OVERLOAD HEATER SELECTION TABLE FOR CONTINUOUS DUTY MOTORS

NEMA SIZE 1 STARTERS FVNR

		SERVICE FACTOR 1.0		SERVICE FACTOR 1.15	
	OVERLOAD I (min)	MOTOR FLI (min)	MOTOR FLI (max)	MOTOR FLI (min)	MOTOR FLI (max)
G30T6	0.29	0.28	0.32	0.26	0.29
G30T7	0.32	0.31	0.35	0.29	0.32
G30T8	0.35	0.34	0.38	0.31	0.35
G30T9	0.38	0.37	0.41	0.34	0.38
G30T10	0.42	0.40	0.46	0.38	0.42
G30T11	0.46	0.44	0.50	0.41	0.46
G30T12	0.51	0.49	0.55	0.46	0.51
G30T13	0.57	0.55	0.62	0.51	0.57
G30T14	0.64	0.62	0.70	0.57	0.64
G30T15	0.71	0.68	0.77	0.63	0.71
G30T16	0.79	0.76	0.86	0.71	0.79
G30T17	0.88	0.85	0.96	0.79	0.88
G30T18	0.97	0.93	1.05	0.87	0.97
G30T19	1.05	1.01	1.14	0.94	1.05
G30T20	1.12	1.08	1.22	1.00	1.12
G30T21	1.25	1.20	1.36	1.12	1.25
G30T22	1.36	1.31	1.48	1.21	1.36
G30T23	1.47	1.41	1.60	1.31	1.47
G30T24	1.63	1.57	1.77	1.46	1.63
G30T25	1.84	1.77	2.00	1.64	1.84
G30T26	2.03	1.95	2.21	1.81	2.03
G30T27	2.21	2.13	2.40	1.97	2.21
G30T28	2.45	2.36	2.66	2.19	2.45
G30T29	2.75	2.64	2.99	2.46	2.75
G30T30	3.06	2.94	3.33	2.73	3.06
G30T31	3.48	3.35	3.78	3.11	3.48
G30T32	3.90	3.75	4.24	3.48	3.90
G30T33	4.34	4.17	4.72	3.88	4.34
G30T34	4.63	4.45	5.03	4.13	4.63
G30T35	5.04	4.85	5.48	4.50	5.04
G30T36	5.55	5.34	6.03	4.96	5.55
G30T37	6.30	6.06	6.85	5.63	6.30
G30T38	7.05	6.78	7.66	6.29	7.05
G30T39	7.86	7.56	8.54	7.02	7.86
G30T40	8.82	8.48	9.59	7.88	8.82
G30T41	9.85	9.47	10.71	8.79	9.85
G30T42	11.0	10.58	11.96	9.82	11.00
G30T43	11.7	11.25	12.72	10.45	11.70
G30T44	12.4	11.92	13.48	11.07	12.40
G30T45	13.7	13.17	14.89	12.23	13.70
G30T46	14.8	14.23	16.09	13.21	14.80
G30T47	16.8	16.15	18.26	15.00	16.80
G30T48	18.1	17.40	19.67	16.16	18.10
G30T49	19.5	18.75	21.20	17.41	19.50
G30T50	21.7	20.87	23.59	19.38	21.70
G30T51	24.4	23.46	26.52	21.79	24.40

TABLE I ITE OVERLOAD HEATER SELECTION TABLE FOR CONTINUOUS DUTY MOTORS

NEMA SIZE 2 STARTERS FVNR

		SERVICE FACTOR 1.0		SERVICE FACTOR 1.15	
	OVERLOAD I (min)	MOTOR FLI (min)	MOTOR FLI (max)	MOTOR FLI (min)	MOTOR FLI (max)
G30T36	6.16	5.92	6.70	5.50	6.16
G30T37	6.95	6.68	7.55	6.21	6.95
G30T38	7.57	7.28	8.23	6.76	7.57
G30T39	8.56	8.23	9.30	7.64	8.56
G30T40	9.72	9.35	10.57	8.68	9.72
G30T41	10.7	10.29	11.63	9.55	10.70
G30T42	12.0	11.54	13.04	10.71	12.00
G30T43	13.1	12.60	14.24	11.70	13.10
G30T44	14.1	13.56	15.33	12.59	14.10
G30T45	14.8	14.23	16.09	13.21	14.80
G30T46	16.1	15.48	17.50	14.38	16.10
G30T47	17.8	17.12	19.35	15.89	17.80
G30T48	18.5	17.79	20.11	16.52	18.50
G30T49	21.4	20.58	23.26	19.11	21.40
G30T50	24.3	23.37	26.41	21.70	24.30
G30T51	27.2	26.15	29.57	24.29	27.20
G30T52	29.2	28.08	31.74	26.07	29.20
G30T53	32.5	31.25	35.33	29.02	32.50
G30T54	36.3	34.90	39.46	32.41	36.30
G30T55	39.5	37.98	42.93	35.27	39.50
G30T56	45.2	43.46	49.13	40.36	45.20

TABLE I ITE OVERLOAD HEATER SELECTION TABLE FOR CONTINUOUS DUTY MOTORS

NEMA SIZE 3 STARTERS FVNR

	OVERLOAD I (min)	SERVICE FACTOR 1.0 MOTOR FLI (min)	SERVICE FACTOR 1.0 MOTOR FLI (max)	SERVICE FACTOR 1.15 MOTOR FLI (min)	SERVICE FACTOR 1.15 MOTOR FLI (max)
G30T46	19.2	18.46	20.87	17.14	19.20
G30T47	21.6	20.77	23.48	19.29	21.60
G30T48	24.8	23.85	26.96	22.14	24.80
G30T49	25.4	24.42	27.61	22.68	25.40
G30T50	30.4	29.23	33.04	27.14	30.40
G30T51	32.8	31.54	35.65	29.29	32.80
G30T52	37.7	36.25	40.98	33.66	37.70
G30T53	40.8	39.23	44.35	36.43	40.80
G30T54	46.5	44.71	50.54	41.52	46.50
G30T55	51.1	49.13	55.54	45.63	51.10
G30T56	59.1	56.83	64.24	52.77	59.10
G30T57	64.0	61.54	69.57	57.14	64.00
G30T58	70.5	67.79	76.63	62.95	70.50
G30T59	78.5	75.48	85.33	70.09	78.50
G30T60	85.6	82.31	93.04	76.43	85.60
G30T61	95.2	91.54	103.48	85.00	95.20

NEMA SIZE 4 STARTERS FVNR

	OVERLOAD I (min)	SERVICE FACTOR 1.0 MOTOR FLI (min)	SERVICE FACTOR 1.0 MOTOR FLI (max)	SERVICE FACTOR 1.15 MOTOR FLI (min)	SERVICE FACTOR 1.15 MOTOR FLI (max)
G30T51	32.8	31.54	35.65	29.29	32.80
G30T52	37.7	36.25	40.98	33.66	37.70
G30T53	40.8	39.23	44.35	36.43	40.80
G30T54	46.5	44.71	50.54	41.52	46.50
G30T55	49.7	47.79	54.02	44.38	49.70
G30T56	57.5	55.29	62.50	51.34	57.50
G30T57	64.8	62.31	70.43	57.86	64.80
G30T58	71.2	68.46	77.39	63.57	71.20
G30T59	80.0	76.92	86.96	71.43	80.00
G30T60	85.6	82.31	93.04	76.43	85.60
G30T61	95.3	91.63	103.59	85.09	95.30
G30T62	104.0	100.00	113.04	92.86	104.00
G30T63	115.0	110.58	125.00	102.68	115.00
G30T64	130.0	125.00	141.30	116.07	130.00
G30T65	134.0	128.85	145.65	119.64	134.00

TABLE II GE OVERLOAD HEATER SELECTION TABLE FOR CONTINUOUS DUTY MOTORS

NEMA SIZE 1 STARTERS FVNR

		SERVICE FACTOR 1.0		SERVICE FACTOR 1.15	
	OVERLOAD I (min)	MOTOR FLI (min)	MOTOR FLI (max)	MOTOR FLI (min)	MOTOR FLI (max)
1230054A	0.42	0.40	0.46	0.38	0.42
1230060A	0.46	0.44	0.50	0.41	0.46
1230066A	0.50	0.48	0.54	0.45	0.50
1230071A	0.54	0.52	0.59	0.48	0.54
1230078A	0.60	0.58	0.65	0.54	0.60
1230087A	0.66	0.63	0.72	0.59	0.66
1230097A	0.77	0.74	0.84	0.69	0.77
1230105A	0.85	0.82	0.92	0.76	0.85
1230118A	0.94	0.90	1.02	0.84	0.94
1230131A	1.05	1.01	1.14	0.94	1.05
1230148A	1.16	1.12	1.26	1.04	1.16
1230163A	1.28	1.23	1.39	1.14	1.28
1230184A	1.40	1.35	1.52	1.25	1.40
1230196A	1.56	1.50	1.70	1.39	1.56
1230220A	1.74	1.67	1.89	1.55	1.74
1230239A	1.90	1.83	2.07	1.70	1.90
1230268A	2.06	1.98	2.24	1.84	2.06
1230301A	2.29	2.20	2.49	2.04	2.29
1230326A	2.48	2.38	2.70	2.21	2.48
1230356A	2.80	2.69	3.04	2.50	2.80
1230377A	3.32	3.19	3.61	2.96	3.32
1230419A	3.71	3.57	4.03	3.31	3.71
1230466A	4.07	3.91	4.42	3.63	4.07
1230526A	4.48	4.31	4.87	4.00	4.48
1230592A	4.96	4.77	5.39	4.43	4.96
1230630A	5.50	5.29	5.98	4.91	5.50
1230695A	5.92	5.69	6.43	5.29	5.92
1230778A	6.48	6.23	7.04	5.79	6.48
1230867A	7.21	6.93	7.84	6.44	7.21
1230955A	8.23	7.91	8.95	7.35	8.23
1230104B	8.73	8.39	9.49	7.79	8.73
1230113B	9.68	9.31	10.52	8.64	9.68
1230125B	10.5	10.10	11.41	9.38	10.50
1230137B	11.1	10.67	12.07	9.91	11.10
1230151B	12.5	12.02	13.59	11.16	12.50
1230163B	13.3	12.79	14.46	11.88	13.30
1230180B	15.5	14.90	16.85	13.84	15.50
1230198B	17.2	16.54	18.70	15.36	17.20
1230214B	18.2	17.50	19.78	16.25	18.20
1230228B	20.1	19.33	21.85	17.95	20.10
1230250B	21.6	20.77	23.48	19.29	21.60
1230273B	22.6	21.73	24.57	20.18	22.60
1230303B	24.0	23.08	26.09	21.43	24.00
1230330B	26.4	25.38	28.70	23.57	26.40

E II GE OVERLOAD HEATER SELECTION TABLE FOR CONTINUOUS DUTY MOTORS

NEMA SIZE 2 STARTERS FVNR

	OVERLOAD I (min)	SERVICE FACTOR 1.0 MOTOR FLI (min)	SERVICE FACTOR 1.0 MOTOR FLI (max)	SERVICE FACTOR 1.15 MOTOR FLI (min)	SERVICE FACTOR 1.15 MOTOR FLI (max)
123C695A	5.86	5.63	6.37	5.23	5.86
123C778A	6.48	6.23	7.04	5.79	6.48
123C867A	7.36	7.08	8.00	6.57	7.36
123C955A	8.07	7.76	8.77	7.21	8.07
123C104B	9.04	8.69	9.83	8.07	9.04
123C113B	9.62	9.25	10.46	8.59	9.62
123C125B	10.6	10.19	11.52	9.46	10.60
123C137B	11.7	11.25	12.72	10.45	11.70
123C151B	12.6	12.12	13.70	11.25	12.60
123C163B	13.7	13.17	14.89	12.23	13.70
123C180B	16.8	16.15	18.26	15.00	16.80
123C198B	18.0	17.31	19.57	16.07	18.00
123C214B	18.8	18.08	20.43	16.79	18.80
123C228B	20.5	19.71	22.28	18.30	20.50
123C250B	22.8	21.92	24.78	20.36	22.80
123C273B	24.8	23.85	26.96	22.14	24.80
123C303B	26.4	25.38	28.70	23.57	26.40
123C330B	29.6	28.46	32.17	26.43	29.60
123C366B	33.6	32.31	36.52	30.00	33.60
123C400B	37.9	36.44	41.20	33.84	37.90
123C440B	42.0	40.38	45.65	37.50	42.00
123C460B	43.3	41.63	47.07	38.66	43.30

7.0 SUPPORTING GRAPHICS

FIG 7.1 PENETRATION CONDUCTORS' THERMAL CAPABILITY CURVE

FIG 7.2 TIME-CURRENT PLOT OF 2/0 PENETRATION CONDUCTOR

FIG 7.3 TIME-CURRENT PLOT OF 250 MCM PENETRATION CONDUCTOR

FIG 7.4 TIME-CURRENT PLOT OF 350 MCM PENETRATION CONDUCTOR

FIG 7.5 COORDINATION OF EF3-B100 WITH FEEDER BREAKER HAVING THE MINIMUM SETTING

FIG 7.6 EF3-B020 CABLE PROTECTION

FIG 7.7 EF3-B025 CABLE PROTECTION

FIG 7.8 EF3-B030 CABLE PROTECTION

FIG 7.9 EF3-B035 CABLE PROTECTION

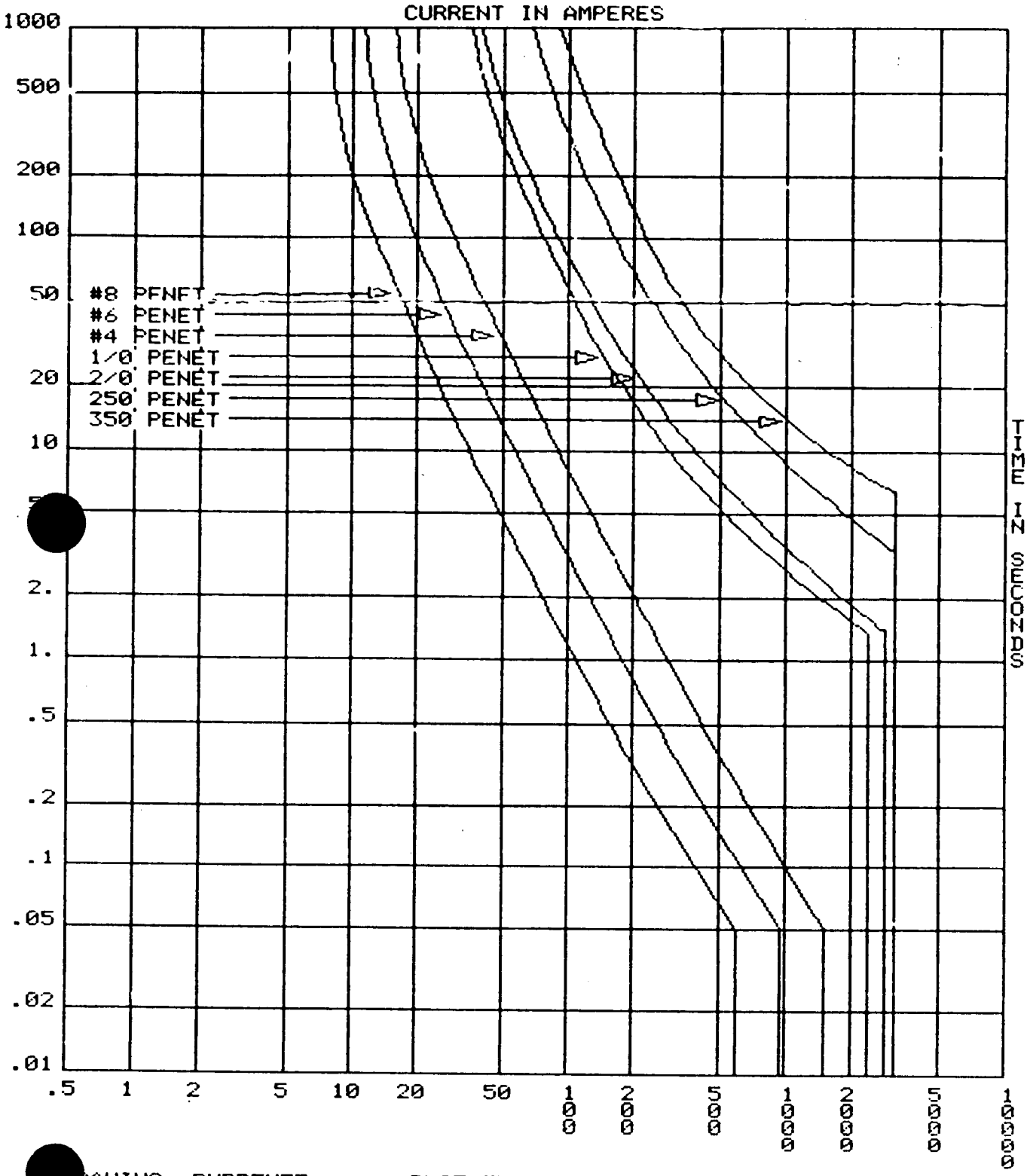
FIG 7.10 EF3-B040 CABLE PROTECTION

FIG 7.11 COORDINATION OF FJ3-B175 WITH MCC FEEDER BREAKER

FIG 7.12 COORDINATION OF FJ3-B175 WITH ALTERNATE MCC FEEDER BREAKER

WBN-EEB-MS-TI08-0008 R15

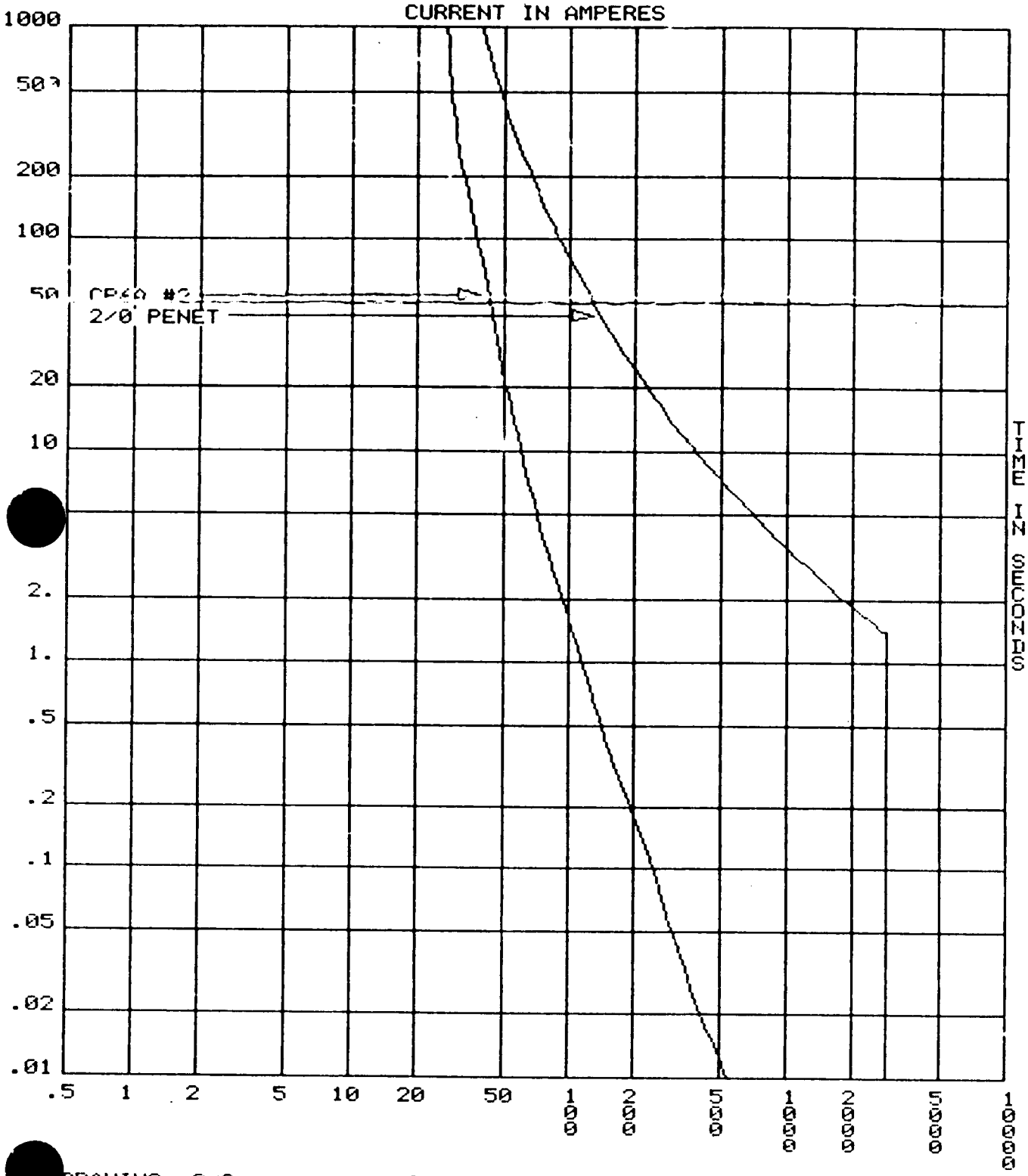
Figure 7.1



DRAWING PWRPENET PLOT ELL: 480 SCALE: 10^1

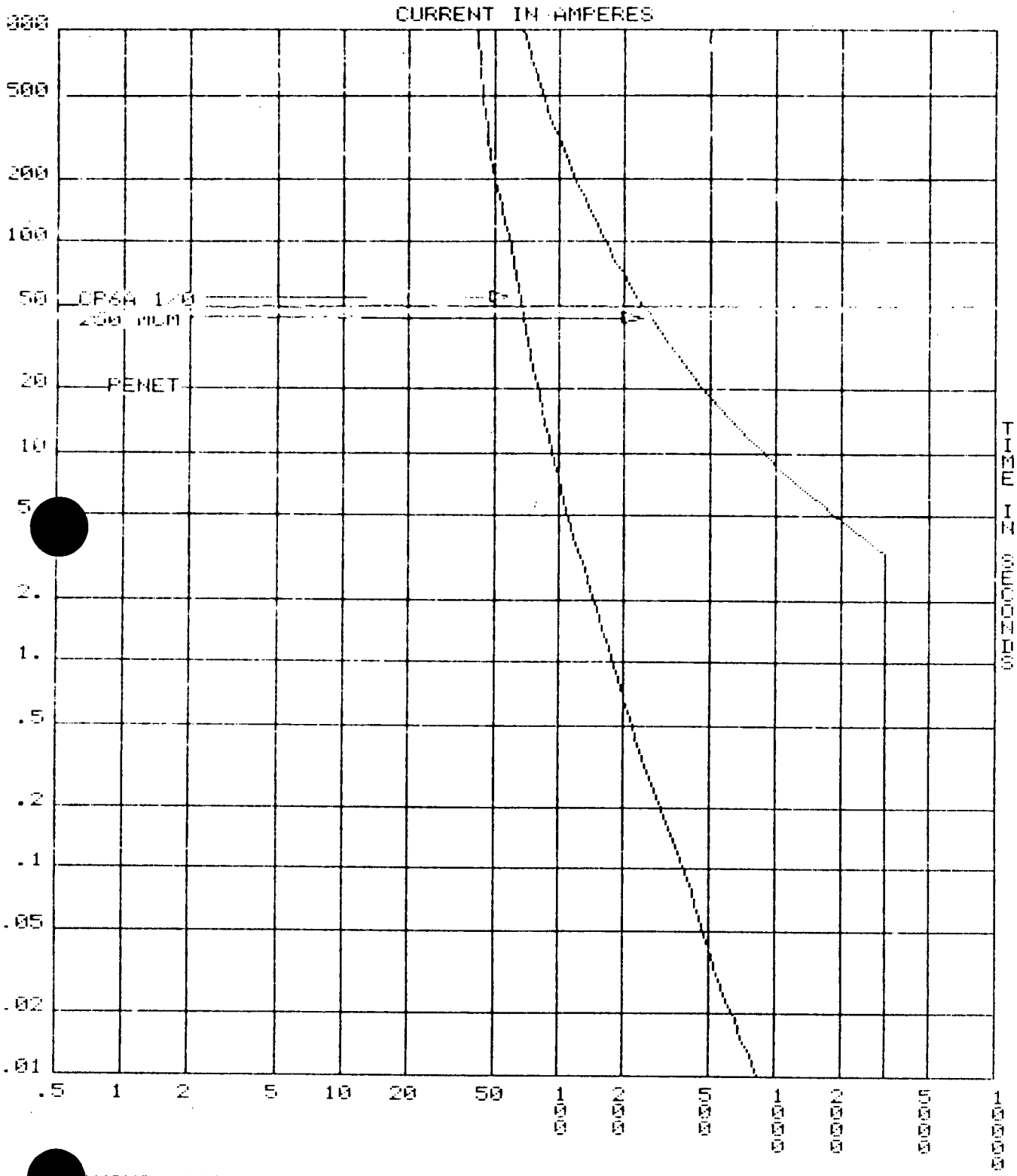
WBN-EEB-MS-TI08-0008 R15

Figure 7.2



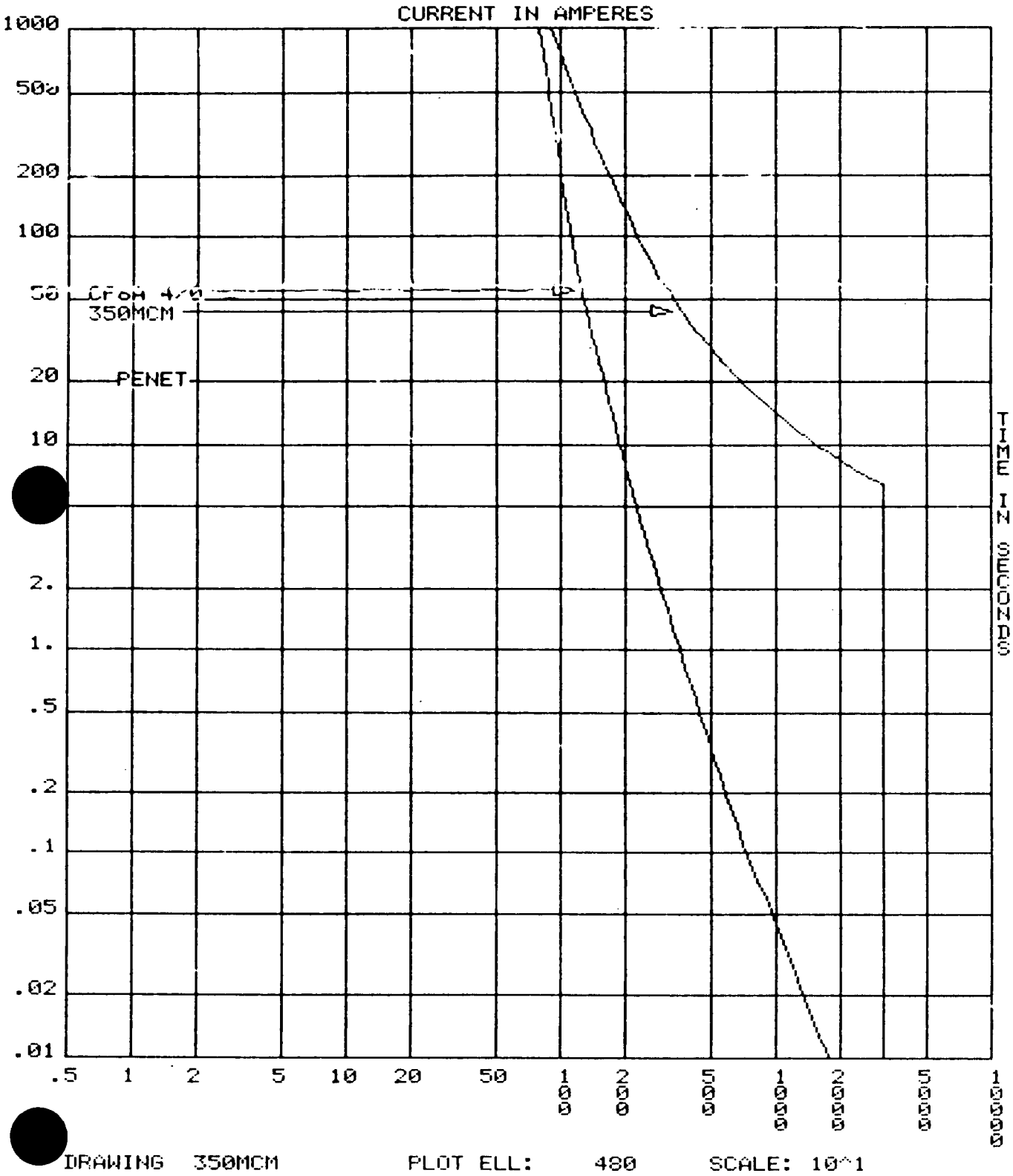
WBN-EEB-MS-TI08-0008 R15

Figure 7.3



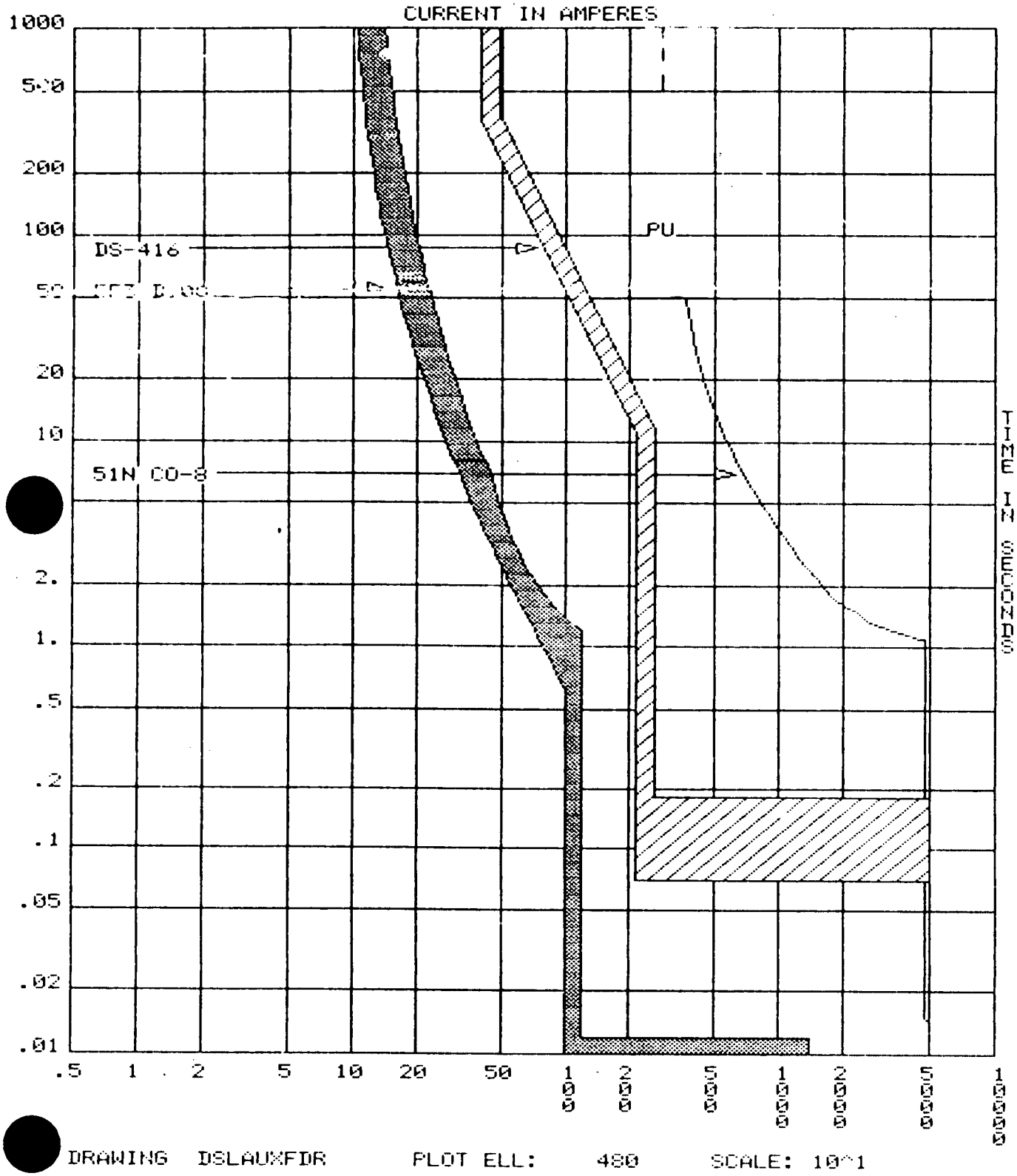
WBN-EEB-MS-TI08-0008 R15

Figure 7.4



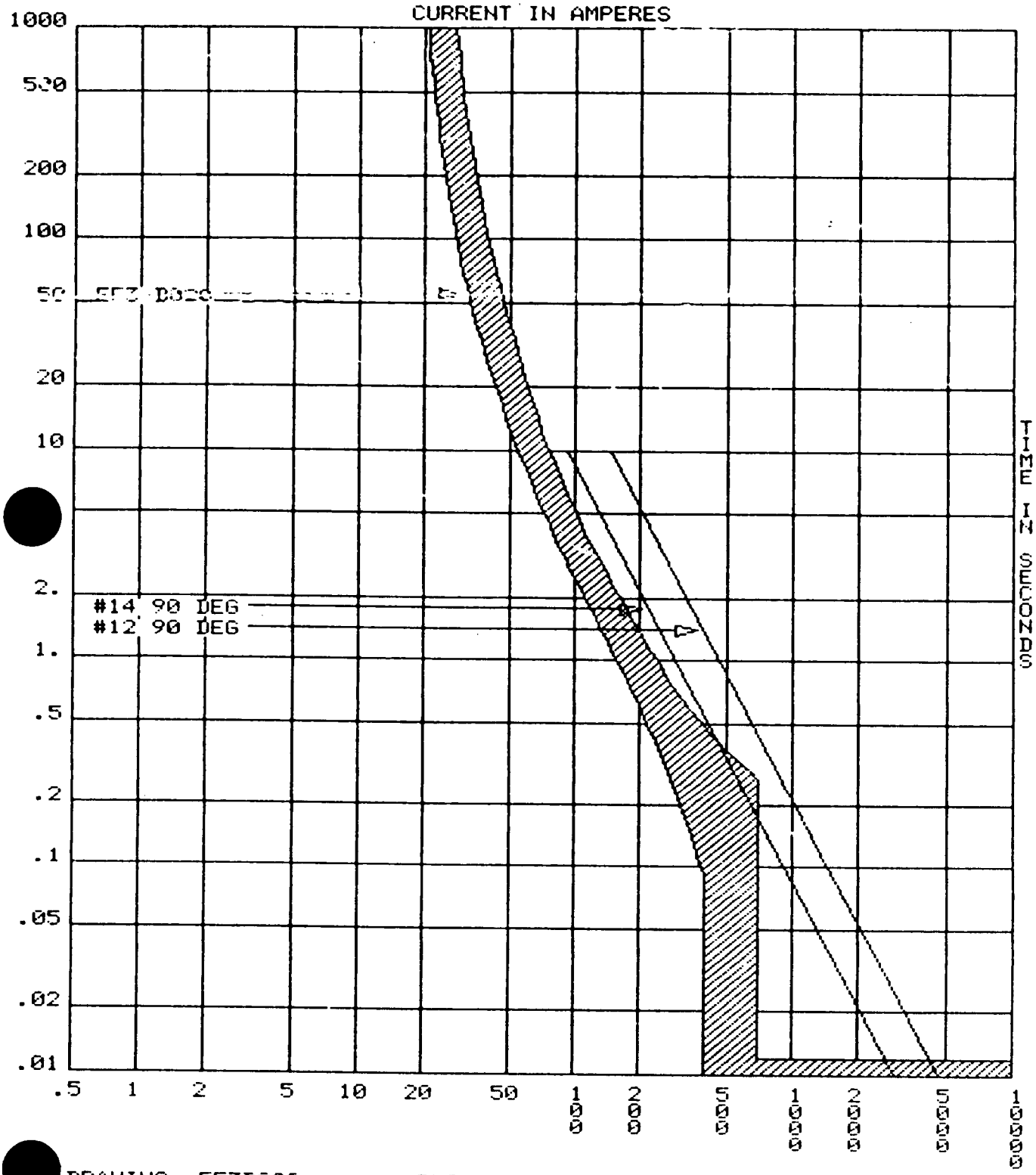
WBN-EEB-MS-TI08-0008 R15

Figure 7.5



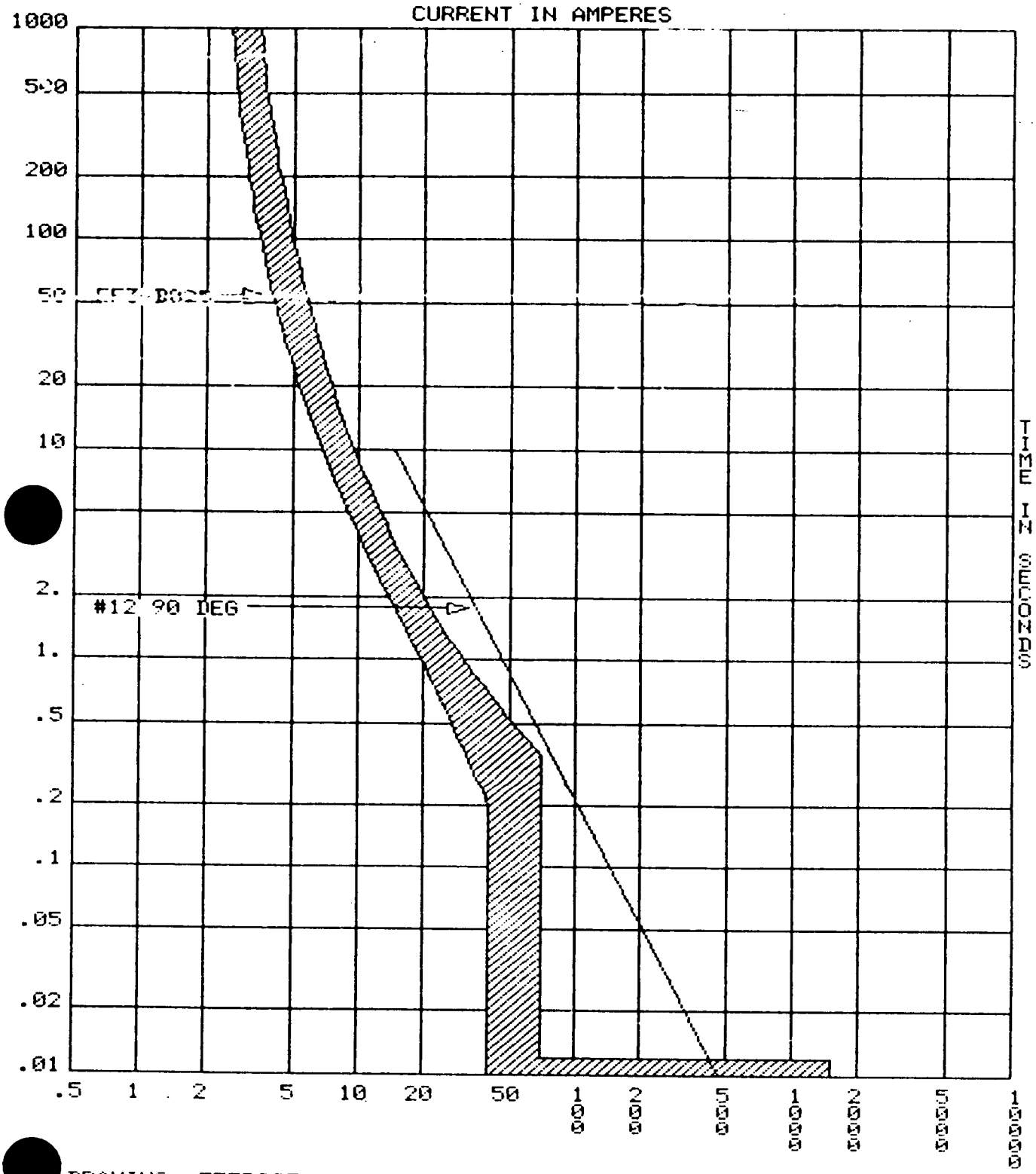
WBN-EEB-MS-TI08-0008 R15

Figure 7.6



WBN-EEB-MS-TI08-0008 R15

Figure 7.7



WBN-EEB-MS-TI08-0008 R15

Figure 7.8

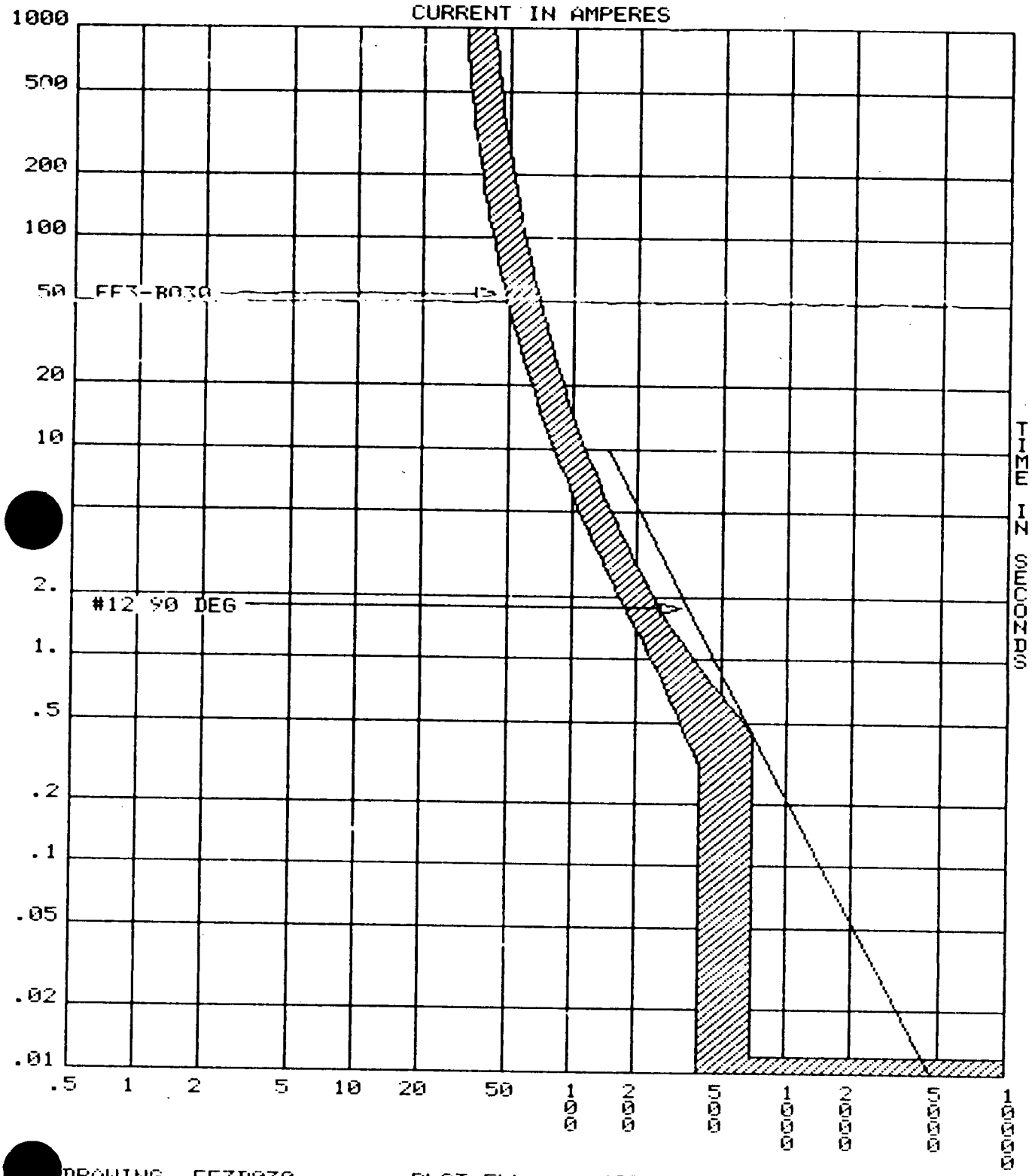
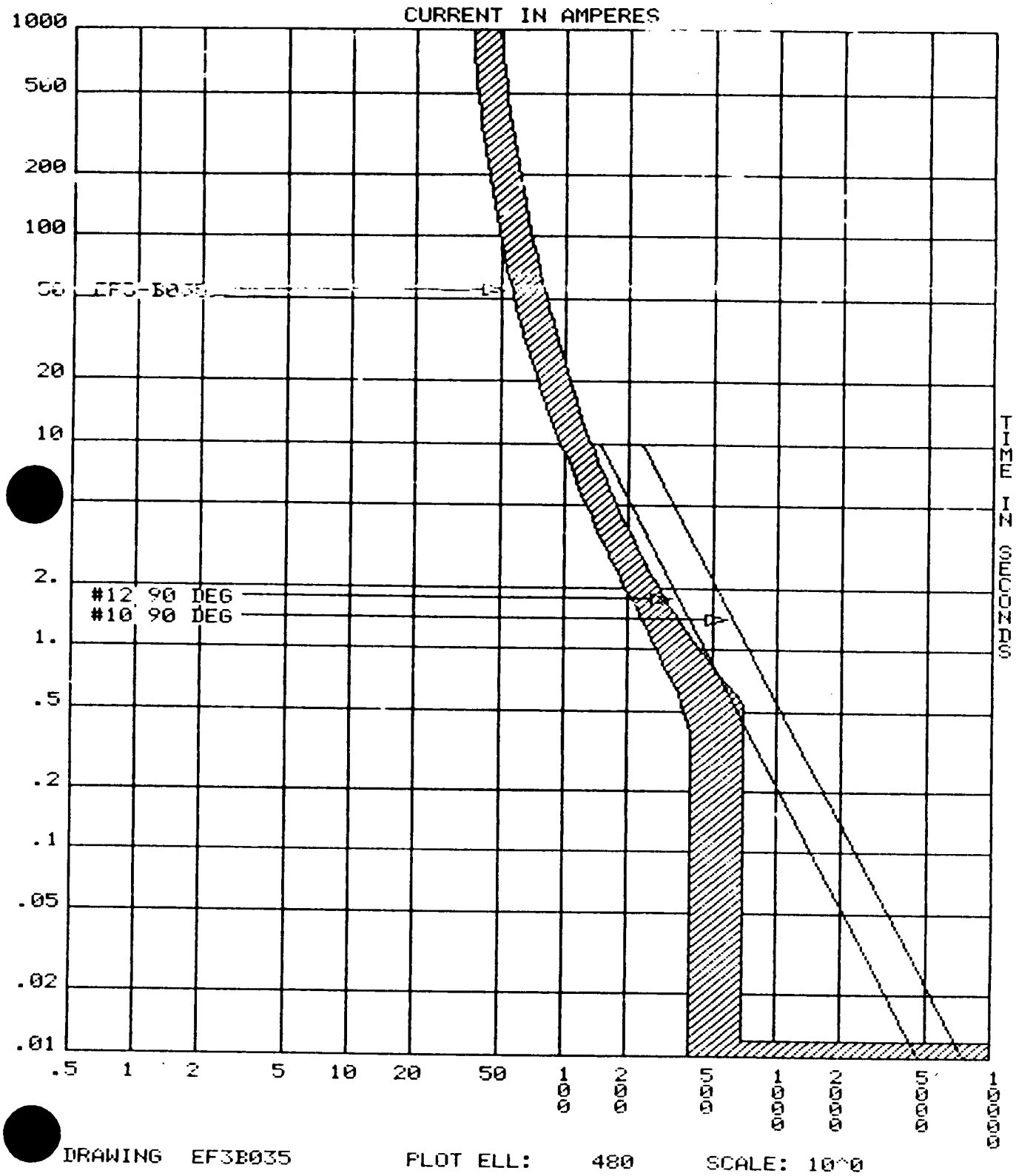


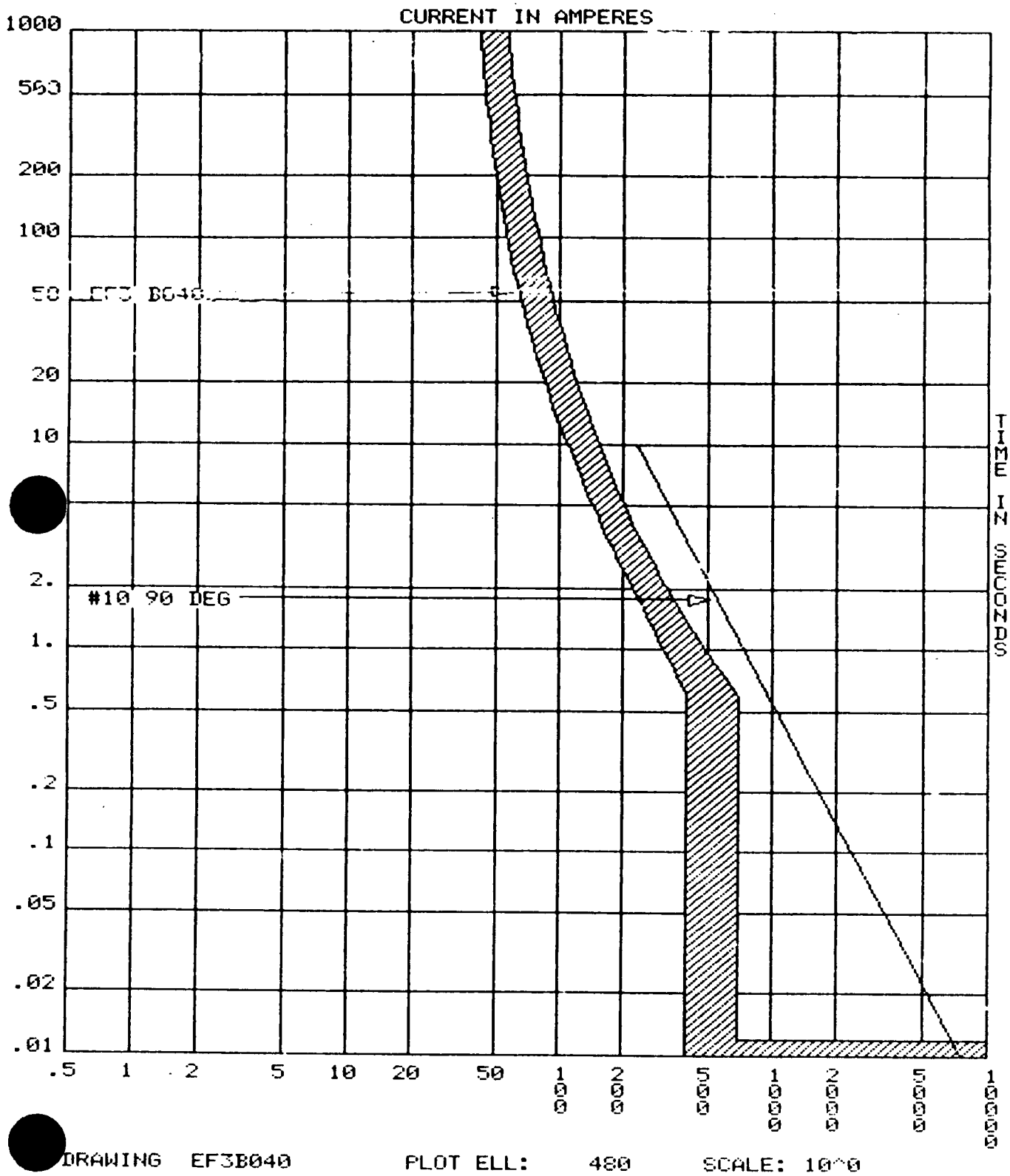
Figure 7.9



DRAWING EF3B035 PLOT ELL: 480 SCALE: 10^0

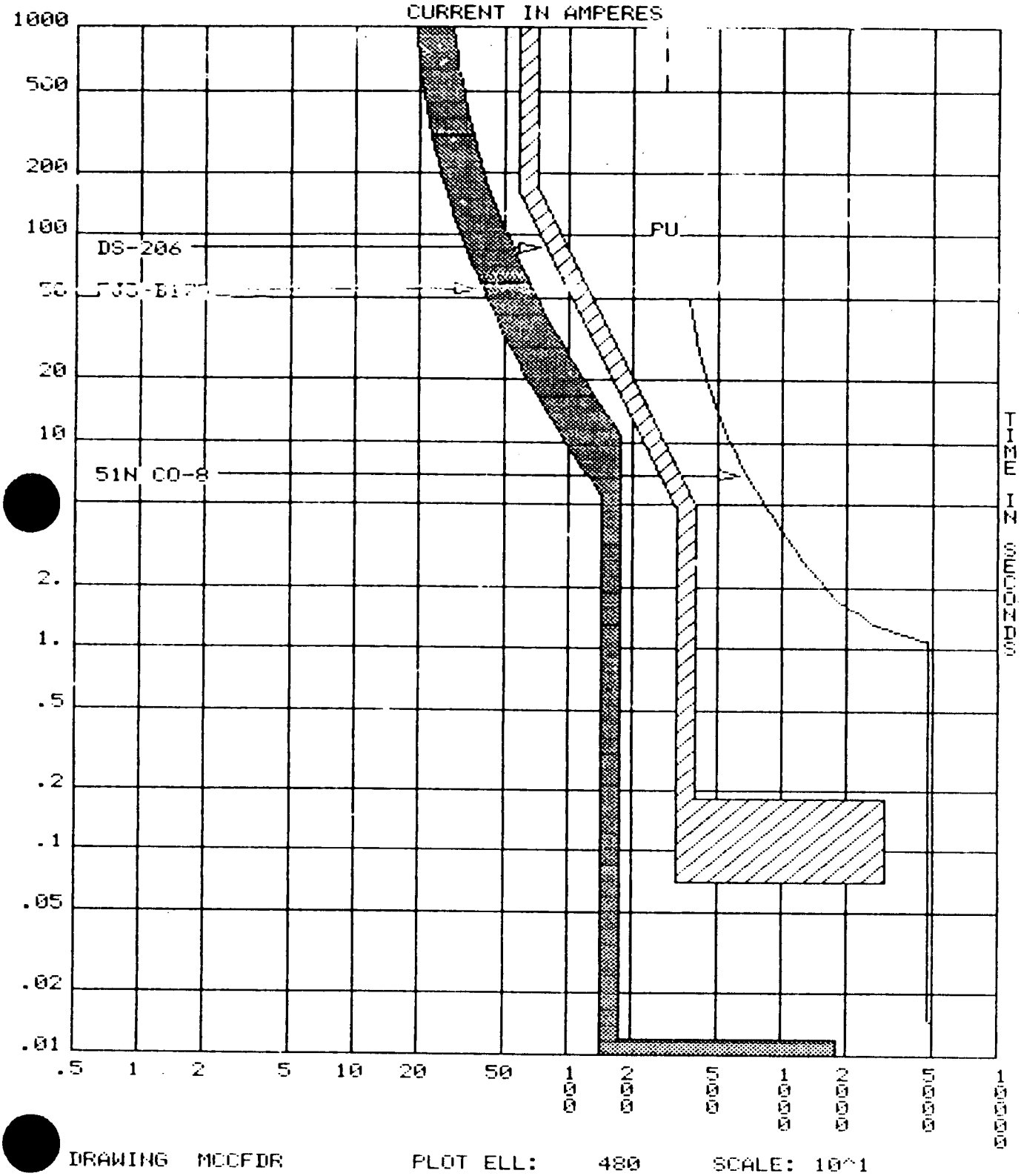
WBN-EEB-MS-TI08-0008 R15

Figure 7.10



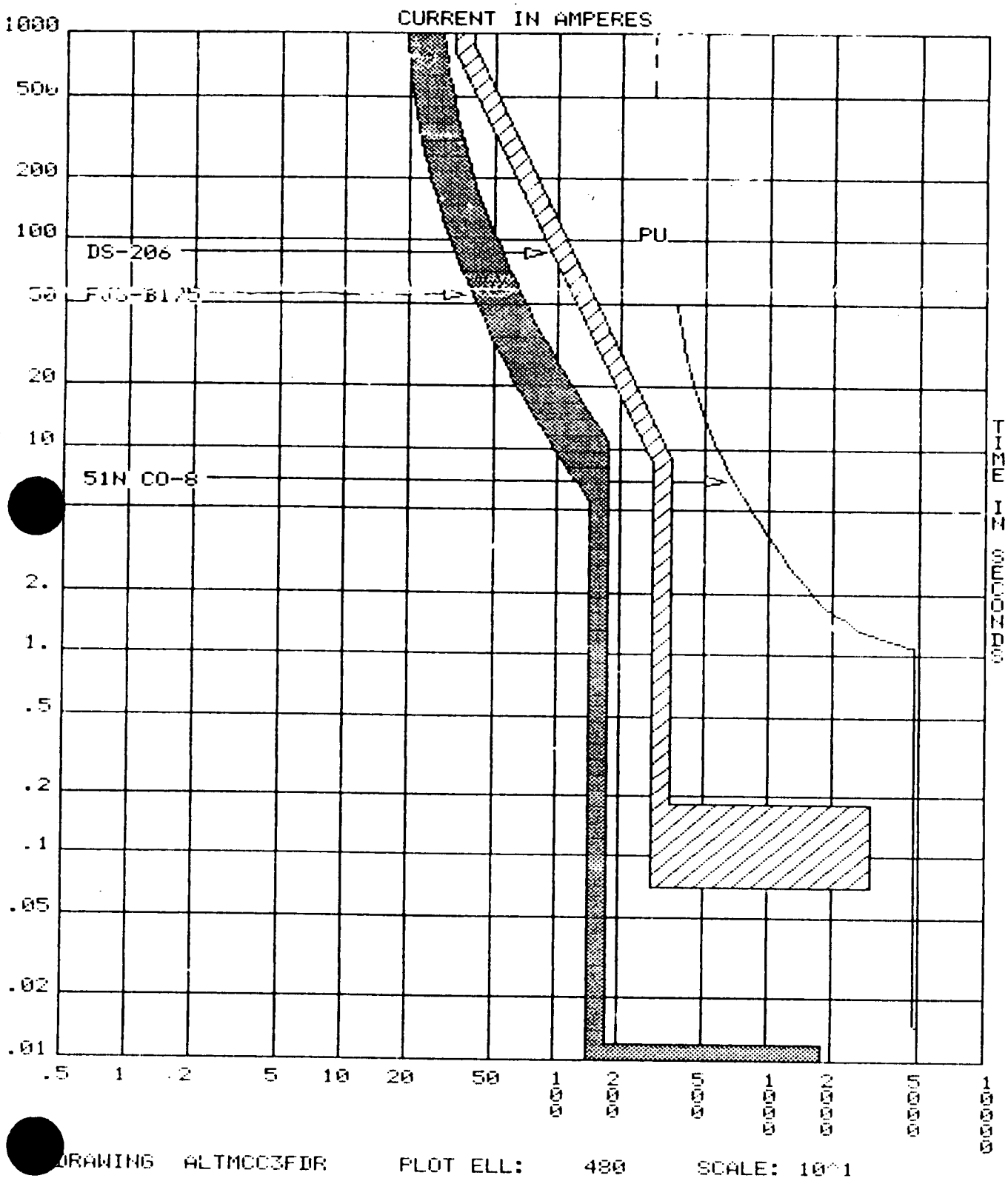
WBN-EEB-MS-TI08-0008 R15

Figure 7.11



WBN-EEB-MS-TI08-0008 R15

Figure 7.12



8.0 SUMMARY OF RESULTS

8.1 DCN M-14890-A WILL ENSURE THE OVERLOAD RELAY KNOBS ARE SET AT THE 100% MARK.

8.2 REVIEW OF THE TELAS DATA BASE REVEALED THAT MOTOR EFFICIENCIES ARE WITHIN THE RANGES IN DG-E2.4.6.

8.3 THE FOLLOWING CURVES SHOULD BE USED FOR THE TIME-CURRENT CHARACTERISTICS OF THE LISTED PROTECTIVE DEVICES:

CURVE	PROTECTIVE DEVICE
705501	WESTINGHOUSE LVSG BREAKER'S AMPTECTOR I-A
639431 639432	WESTINGHOUSE DS-416 LIMITERS
GES-7001B	GE IAC51
GES-7015A	GE IFC53
GE TED 150	GES-6121B
GE TJK	GES-6104C
TRS15R TRS30R	TRI-ONIC FUSE MELTING TIME-CURRENT BULLETIN TR606R
ITE SS-4	TD-9002
ITE EF3 (15-40) ITE EF3 (50-100)	(E),(EH),(EF)-1A TD8078
ITE FJ3	FJ-1
CP6A	CP6A CURVE (REFERENCE 3.16)

9.0 CONCLUSION

DCN M-14890-A HAS BEEN INITIATED TO REMOVE THE UVA ON OVER-LOAD RELAY KNOB SETTING. THIS DCN NEEDS TO BE IMPLEMENTED TO ENSURE ACCURATE OPERATION OF THE OVERLOADS AND PREVENT ERRONEOUS OVERLOAD OPERATION.

IN THE ABOVE SUMMARY OF RESULTS, TIME-CURRENT CURVES HAVE BEEN IDENTIFIED FOR USE IN CALCULATIONS FOR COORDINATION AND PROTECTION.

THE REMAINING THREE UVA's WERE RESEARCHED AND JUSTIFICATIONS WERE PROVIDED TO REMOVE THE UVAs.

TABLES I AND II PROVIDE A LISTING OF MOTOR FULL LOAD CURRENTS AND ITE AND GE OVERLOADS SIZES RESPECTIVELY. THE TABLES MAY BE USED TO SELECT AN OVERLOAD FOR A CONTINUOUS DUTY MOTOR BY LOCATING THE RANGE THAT THE MOTOR's FLI IS IN FOR THE APPROPRIATE SERVICE FACTOR AND SELECTING THE CORRESPONDING OVERLOAD.

ATTACHMENT A

WESTINGHOUSE CURVES/DATA

A.1 WESTINGHOUSE CURVE NO. 1

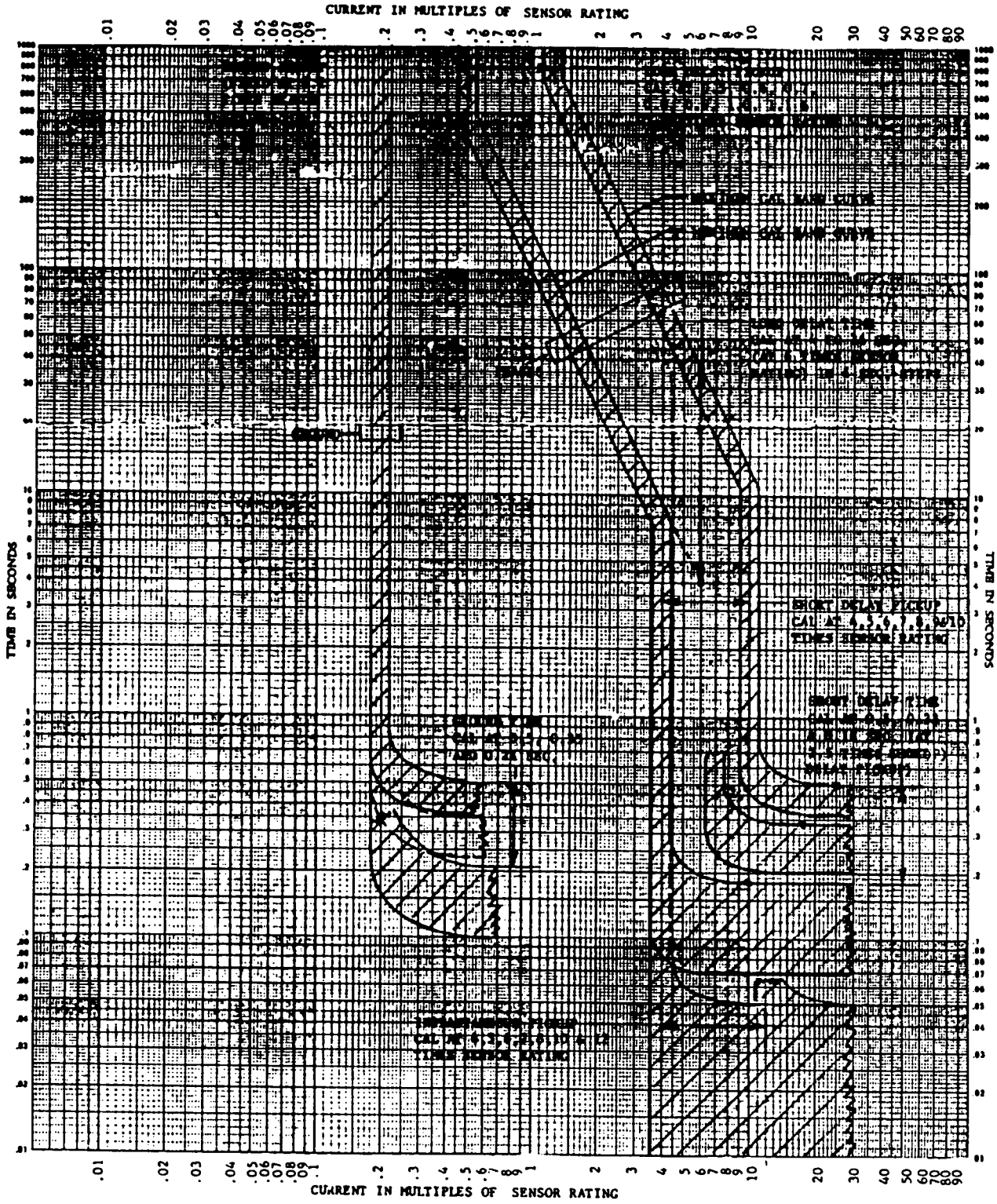
A.2 WESTINGHOUSE AMPTECTOR I-A CURVE NO. 705501

A.3 WESTINGHOUSE CO-8 TIME-CURRENT CURVE NO. 418210

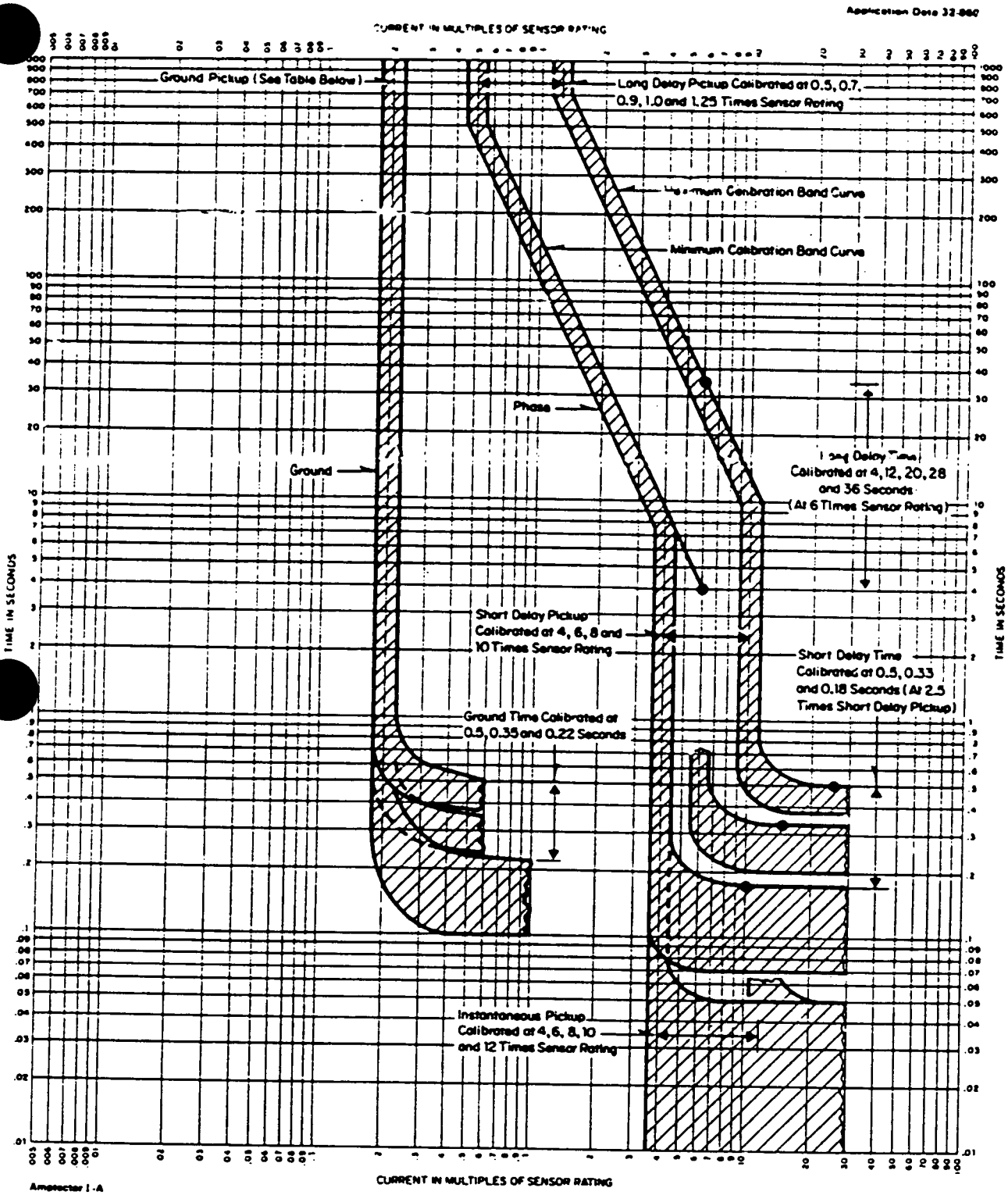
A.4 WESTINGHOUSE CO-8 TIME-CURRENT CURVE NO. 418265

A.5 WESTINGHOUSE DSL CURRENT LIMITERS TIME-CURRENT CURVES

A.6 WESTINGHOUSE LETTER TO TVA "DSL-416 CURRENT LIMITERS" REFERENCE 3.12


CURRENT IN MULTIPLES OF SENSOR RATING
TIME IN SECONDS
SHORT DELAY PICKUP
TIMES SENSOR RATING
CURRENT IN MULTIPLES OF SENSOR RATING

Curve No. 1



Amptector I-A

Ground Pick-up Value—Amperes

Dial Setting	Sensor Rating 50	100	150	200	300	400	600	800	1200	1600	2000	2400	3200	4000	Secondary Current*
A	13	57	60	65	80	110	145	180	280	330	400	530	640	800	1.0
B	18	67	75	85	110	150	205	280	385	505	600	770	1000	1200	1.5
C	22	75	85	100	130	185	250	325	480	625	760	960	1200	N.A.	1.9
D	33	100	120	145	200	270	385	500	730	970	1200	N.A.	N.A.	N.A.	3.0

All pick up values may vary ± 10%

* Current at this value from the secondary of an external ground transformer will cause the ground element to function. Ground element pick-up can also be tested using this value. All sensors must be disconnected during test.

Amptector I-A
Time - Current Characteristics

Curve No. 2

Curve No. 705501
Non-Automation
November 1978

CAUTION Discriminator Circuits have been bypassed for all DS-206 Breakers with LS Trip Unit. Breakers will not trip instantaneously for a Close-in fault.

R18

WTH 4/13/92
EJJ 4/13/92

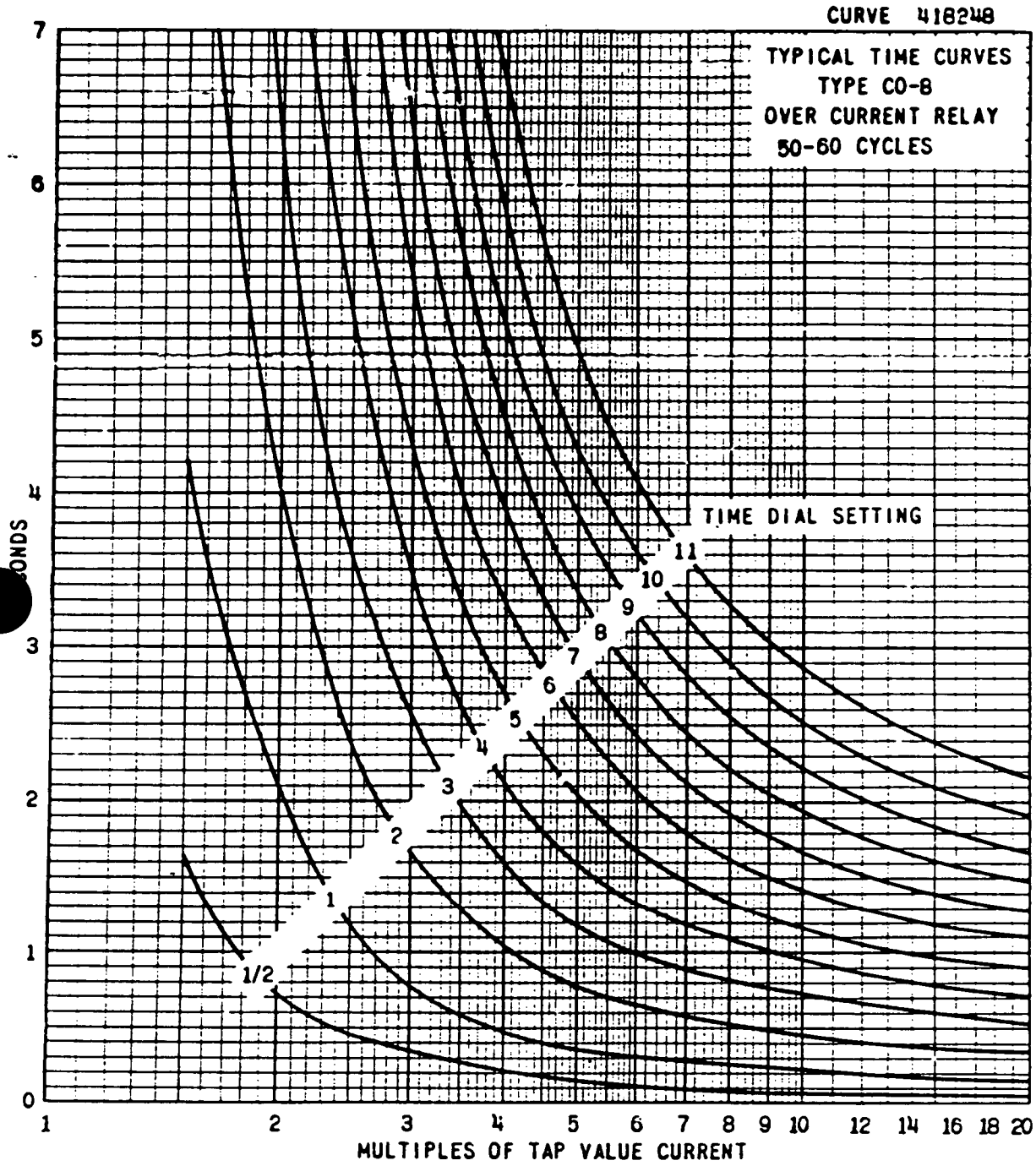
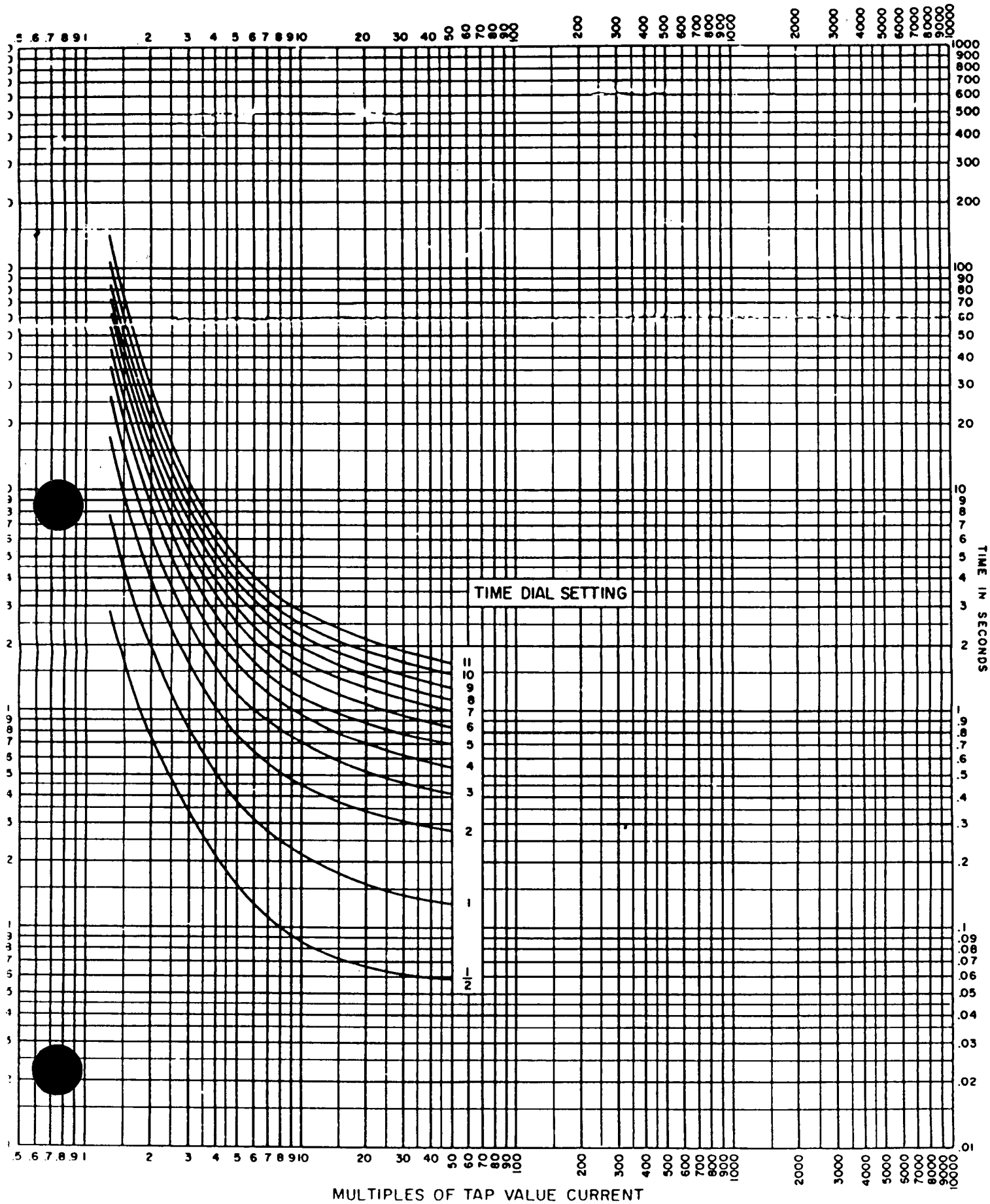


Fig. 11. Typical Time Curves of the Type CO-8 Relay.

TYPE CO-8 INVERSE TIME OVERCURRENT RELAY

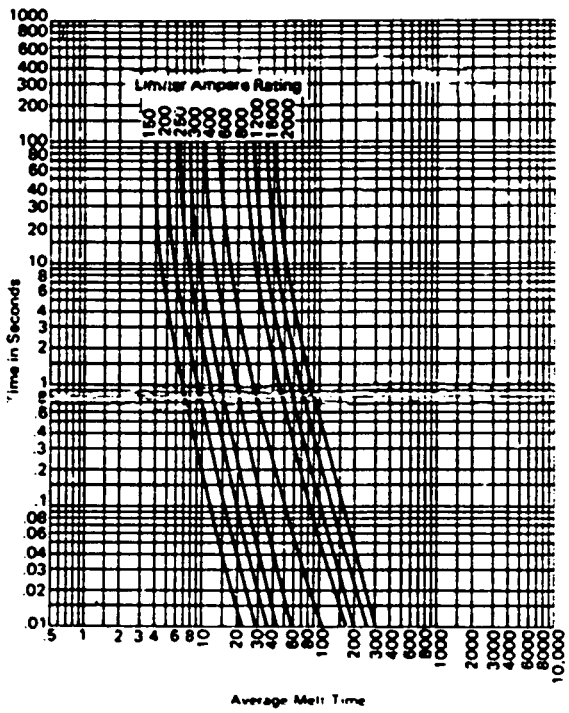
TYPICAL 50/60 CYCLE CURRENT TIME CURVES

WESTINGHOUSE ELECTRIC CORPORATION NEWARK, N.J., U.S.A. CURVE # 418265



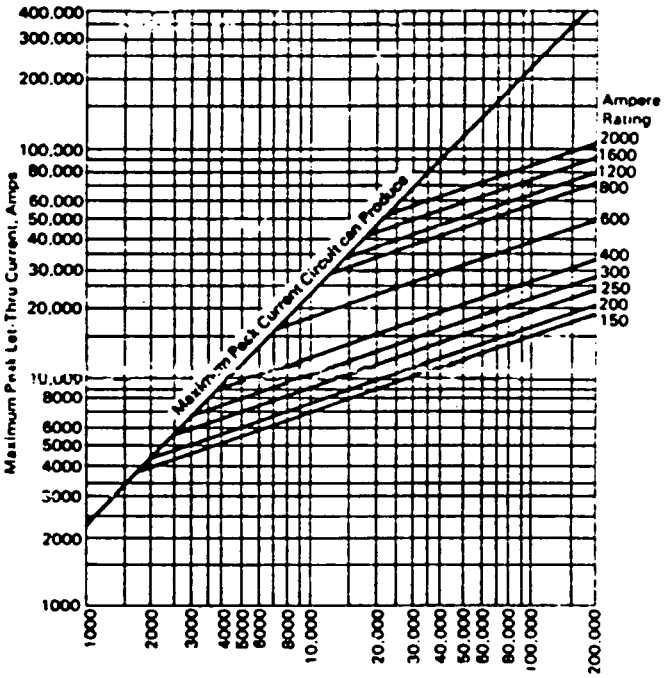
Calc WBN-EEB-MS-TI08-0008 R15
Attachment A.5
from Ref. 3.3

Limiter Ratings and Characteristics



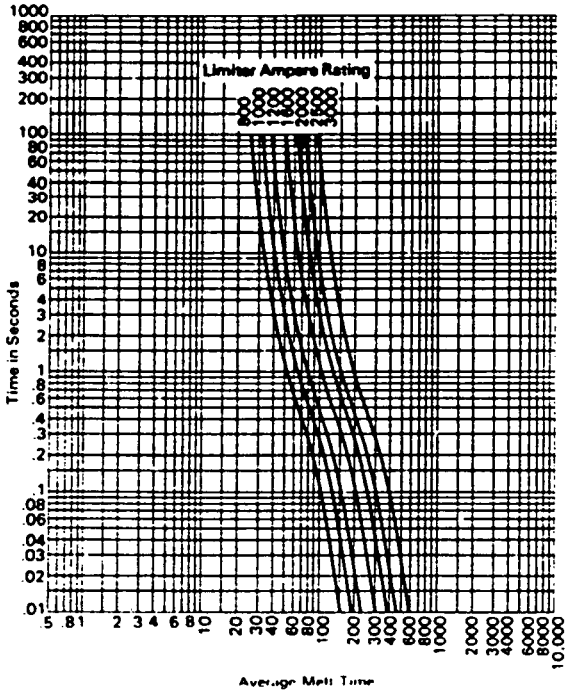
Scale x 100 = Current in Amperes
Limiter Time-Current Characteristic Curves
For DSL-206 Breaker

Curve 1



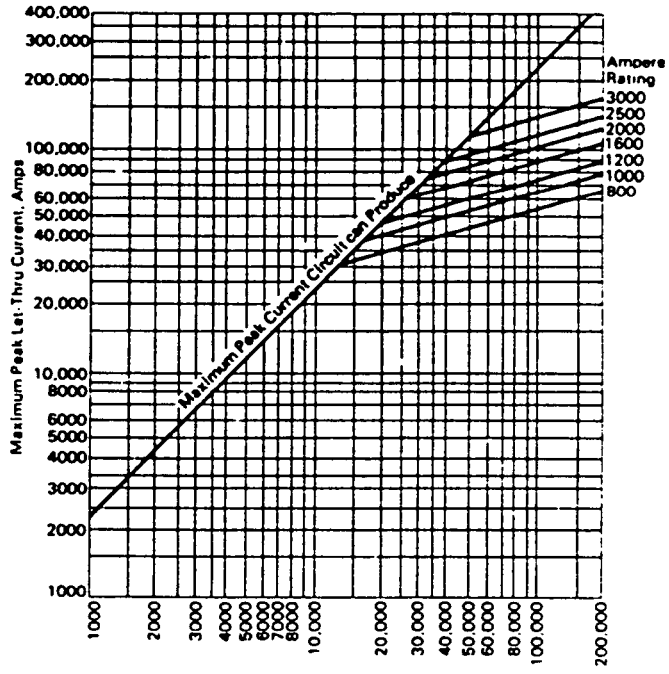
Maximum Peak Let-Through Current Curves
For DSL-206 Breaker

Curve 2



Scale x 100 = Current in Amperes
Limiter Time Current Characteristic Curves
For DSL-416 Breaker

Curve 3



Maximum Peak Let Through Current Curves
For DSL-416 Breaker

Curve 4

Calc WBN-EEB-MS-TI08-0008 R15
Attachment A.6
Reference 3.12

Page 15-3b

ELEC ENGR BRANCH
MAY 29 '86

Westinghouse Electric Corporation

Building 0-3
9217 Park West Boulevard
Box 22550
Knoxville Tennessee 37933

B43 '86 0528 006

QA Record

Mr. E. Chitwood, W8C126
Acting Chief Electrical Engineer
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

Subject: DLS-416 CURRENT LIMITERS
WATTS BAR NUCLEAR PLANT
480 VOLT SWITCHGEAR
CONTRACT 74C2-84647

Dear Mr. Chitwood:

With reference to your letter of April 4, 1986, there is no curve available for the DSL-416 limiter for other power factors. Curve No. 639432 was produced from tests made at our East Pittsburgh, Pa., plant. The power factor of these tests was approximately that of X/R of 6.6.

ANSI C37.13, table 3 (copy attached) indicates that for lower power factors you have a multiplying factor that increases as the X/R ratio increases (power factor gets smaller). This multiplying factor goes from X/R of 6.6 of 1.07 to X/R of 8.27 of 1.11. Using a X/R of 7.35, the approximate multiplying factor would be 1.09. When brought back to the X/R of 6.6 base, the multiplying factor would be 1.09 divided by 1.07 or 1.02. This is too accurate a number to be read from a curve.

Since the multiplying factor is used to increase the available current of the fault, this curve should be read with conservative bias as if the faults were larger.

If you have any further comments on this matter, please do not hesitate to let us know.

Yours very truly,

J. P. Boyd

/dh

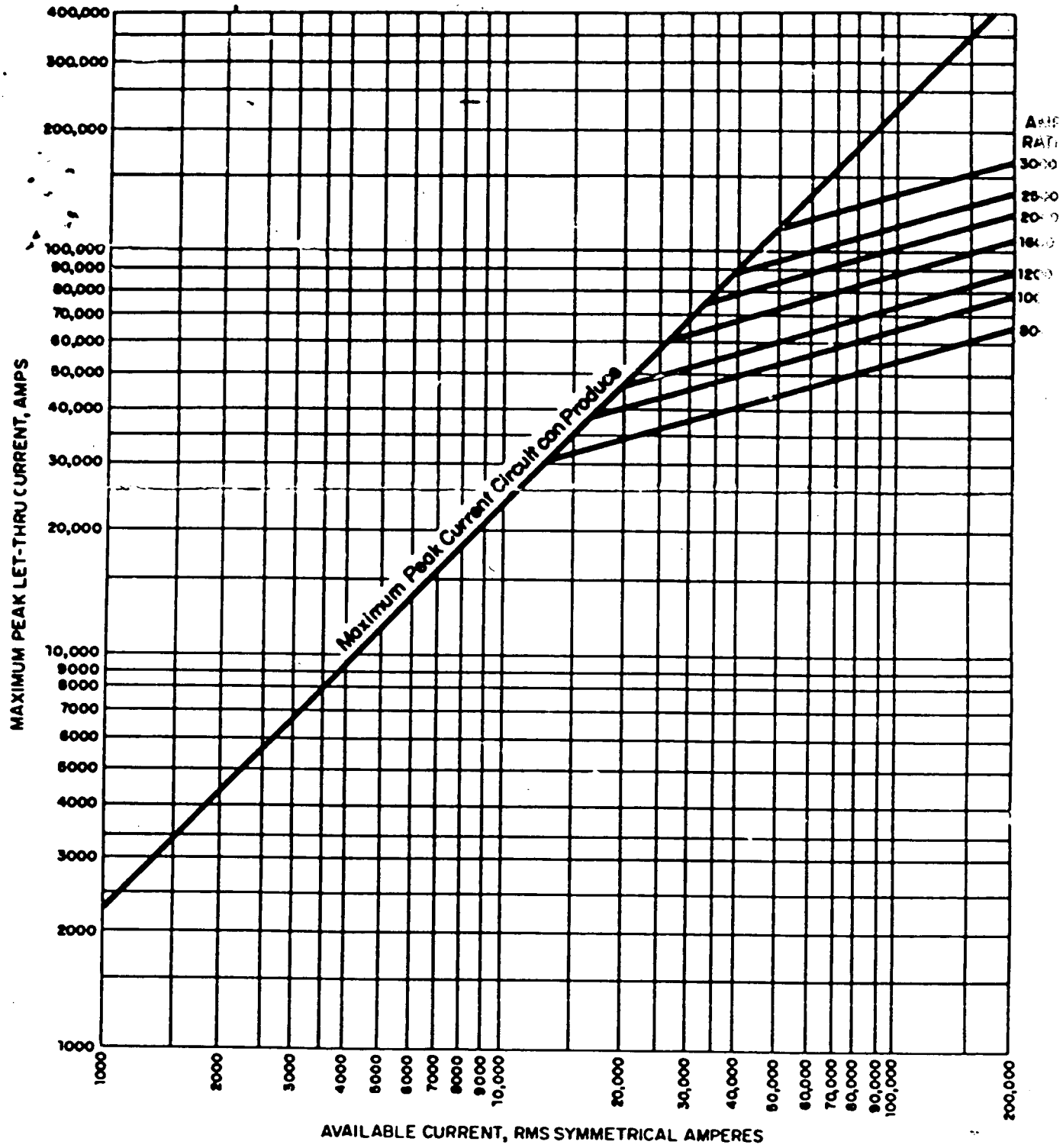
5/28/86 - WSR:PJL
cc: RIMS, SL 26 C-K, w/attachments

WESTINGHOUSE CENTENNIAL 1886-1986

5 5:9

Calculation WBN-EEB-MS-TI08-0008 R15
Attachment A.6 Reference 3.12

Application Data 38-783



Type DSL-416 Limiters
Let-Through Characteristics

Watts Bar
74-84647

Westinghouse Electric Corporation
Switchgear Division, East Pittsburgh, Pa. 1511
Printed in USA

ACCEPTED FOR USE
TENNESSEE VALLEY AUTHORITY
DATE JUN 18 1986
(Elect Engg Br) By: W. S. Raughley

Curve No. 6
New Info
Ap

10.1.4.2 Motor Contribution. The part of the symmetrical short-circuit current due to motor contributions should be calculated as follows: Induction and synchronous motors, connected to the bus, act as generators, and at ½ cycle after the short-circuit occurs, contribute current that may be calculated from the subtransient reactance of the motor plus the impedance of the interconnecting cable. Where the impedances for the installation are not known, it should be assumed that the induction motors contribute 3.6 times their full-load current and that synchronous motors contribute 4.6 times their full-load current.

When the motor load of the installation is not known, the following assumptions should be made.

(1) For nominal system voltages of 120 V and 208Y/120 V, it should be assumed that the connected load is 50% lighting and 50% motor load. This corresponds to an equivalent symmetrical contribution of approximately twice the full-load current.

(2) For nominal system voltages of 240 V to 600 V, it should be assumed that the load is 100% motor load and, in the absence of exact information, that 25% of the motors are synchronous and 75% induction. This corresponds to an equivalent symmetrical contribution of approximately four times the full-load current.

10.1.4.3 Power Factor Considerations. Normally the short-circuit power factor (X/R) of a system need not be considered in applying circuit breakers. This is based on the fact that the power factors on which the ratings of the circuit breakers in this standard have been established, amply cover most applications. For unfused circuit breakers this power factor is 15% (X/R ratio of 6.6). For fused circuit breakers the power factor is 20% (X/R ratio of 4.9), which is consistent with the standards established for fuses. The high short-circuit current rating of fused circuit breakers makes the need to consider power factor even more unlikely. There are, however, some specific applications when the available short-circuit current approaches 80% of the circuit breaker short-circuit current rating, which may require additional consideration because of lower short-circuit power factors. These considerations are:

(1) Local generation at circuit-breaker voltage in unit sizes greater than 500 kVA

(2) Gas-filled and dry-type transformers in sizes 1000 kVA and above. All types 2500 kVA and above

(3) Network systems

(4) Transformers with impedances higher than those specified in the ANSI C57 standards series

(5) Current-limiting reactors at circuit breaker voltage in source circuits

(6) Current-limiting busway at circuit breaker voltage in source circuits

To determine the short-circuit current rating of the circuit breaker required for these applications, two approaches are possible:

(1) If the short-circuit X/R ratio of the power system is known, the appropriate multiplying factor can be selected from Table 3

(2) If the short-circuit X/R ratio of the power system has not been determined, a ratio of 20 should be assumed and the appropriate multiplying factor selected from Table 3

Bus - X/R = 6.6 - peak is 2.3
Mult. Factors is ratio of PEAKS
X/R = 20 - Peak is 2.62
Ratio = 2.62 / 2.3 = 1.145

Table 3
Selection of Multiplying Factor

System Short-Circuit Power Factor %	System X/R Ratio	Multiplying Factor for Calculated Short-Circuit Current (1)	(2)
20	4.9	1.00	1.00
15	6.6	1.00	1.07
12	8.27	1.04	1.11
10	9.95	1.07	1.15
8.5	11.72	1.09	1.18
7	14.25	1.11	1.21
5	20.0	1.15	1.26

(1) Factors for unfused circuit breakers - X/R = 6.6
(2) Factors for fused circuit breakers - X/R = 4.9

$$I_{PEAK} = I_{Sym.}(\sqrt{2})\left[1 + 1\left(e^{-\pi/\frac{X}{R}}\right)\right]$$

ATTACHMENT B

GE CURVES/DATA

B.1 IAC TIME-CHARACTERISTIC CURVE FROM GEH-1753

B.2 IAC TIME-CHARACTERISTIC CURVE GES-7001

B.3 IAC51 & IAC52 TIME-CURRENT CHARACTERISTIC CURVES GEK-34053

B.4 IAC53 & IAC54 TIME-CURRENT CHARACTERISTIC CURVES GEK-34054

B.5 IFC53 & IFC54 TIME-CURRENT CHARACTERISTIC CURVES GEK-45375

B.6 GE BREAKERS TED & TFJ TIME-CURRENT CHARACTERISTICS CURVES GES-6121B & GES-6103E RESPECTIVELY

B.7 GE TJK BREAKER TIME-CURRENT CURVES GES-6104C

B.8 GE TIME-CURRENT CURVES INDEX FROM REFERENCE 3.9

B.9 GE APPLICATION TIPS DATED 3/11/83 NO. 001

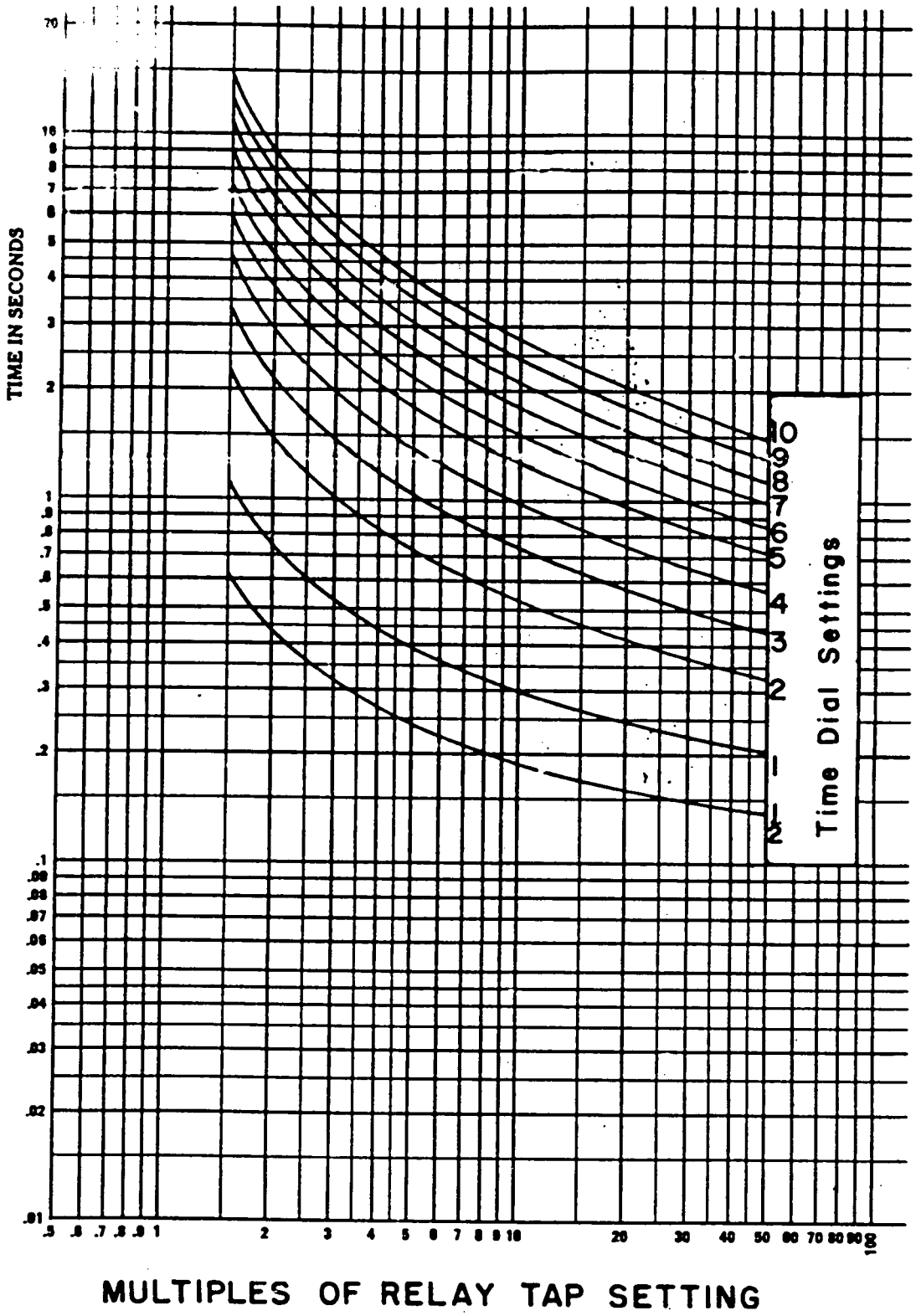


Fig. 2 Time-current Curves of Type IAC Relays with Inverse-time Characteristics

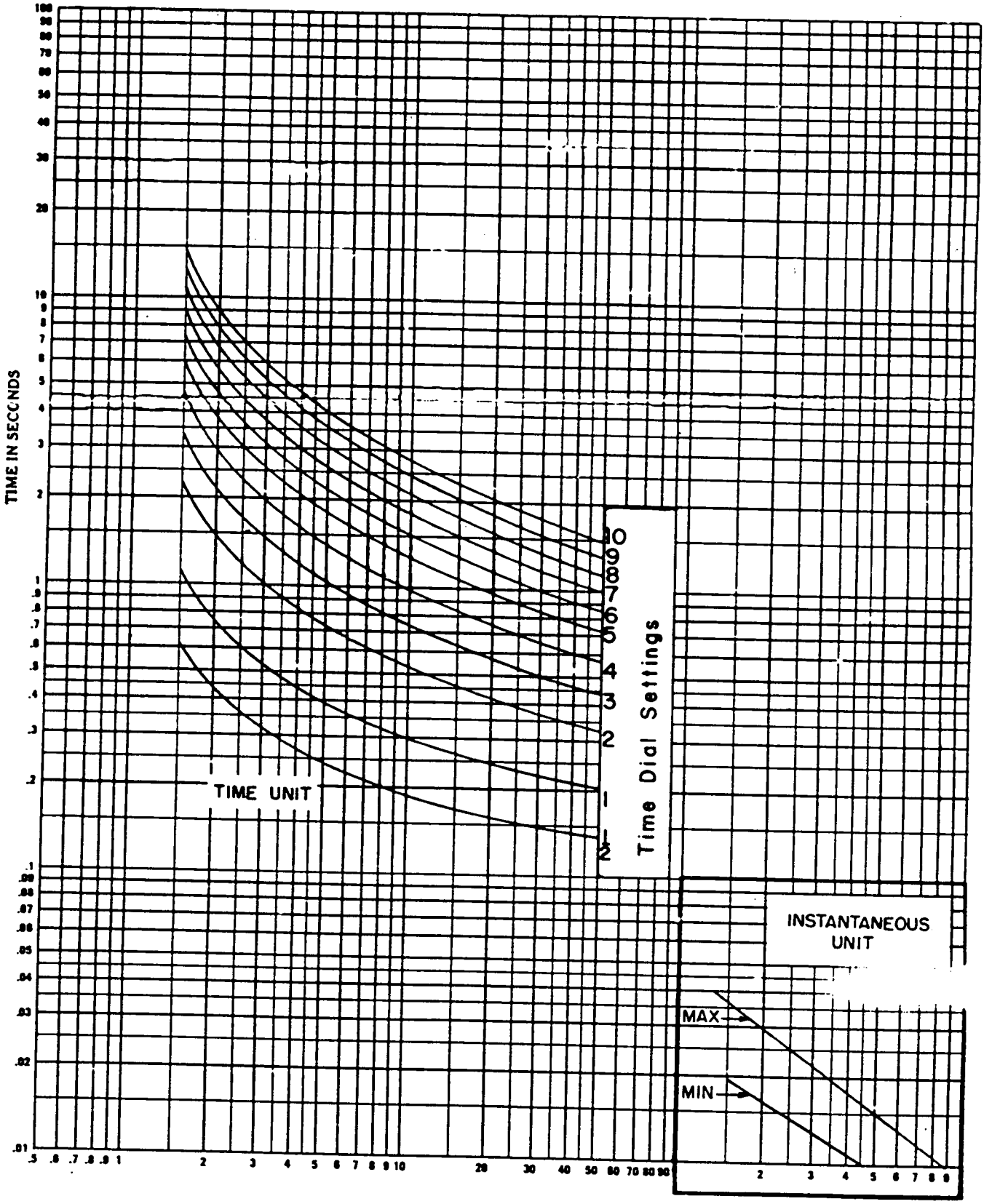


Fig. 13. Type IAC relays, Inverse Time-characteristic Curve (GES-7001)

Calc WBN-EEB-MS-TI08-0008 R15
Attachment B.3

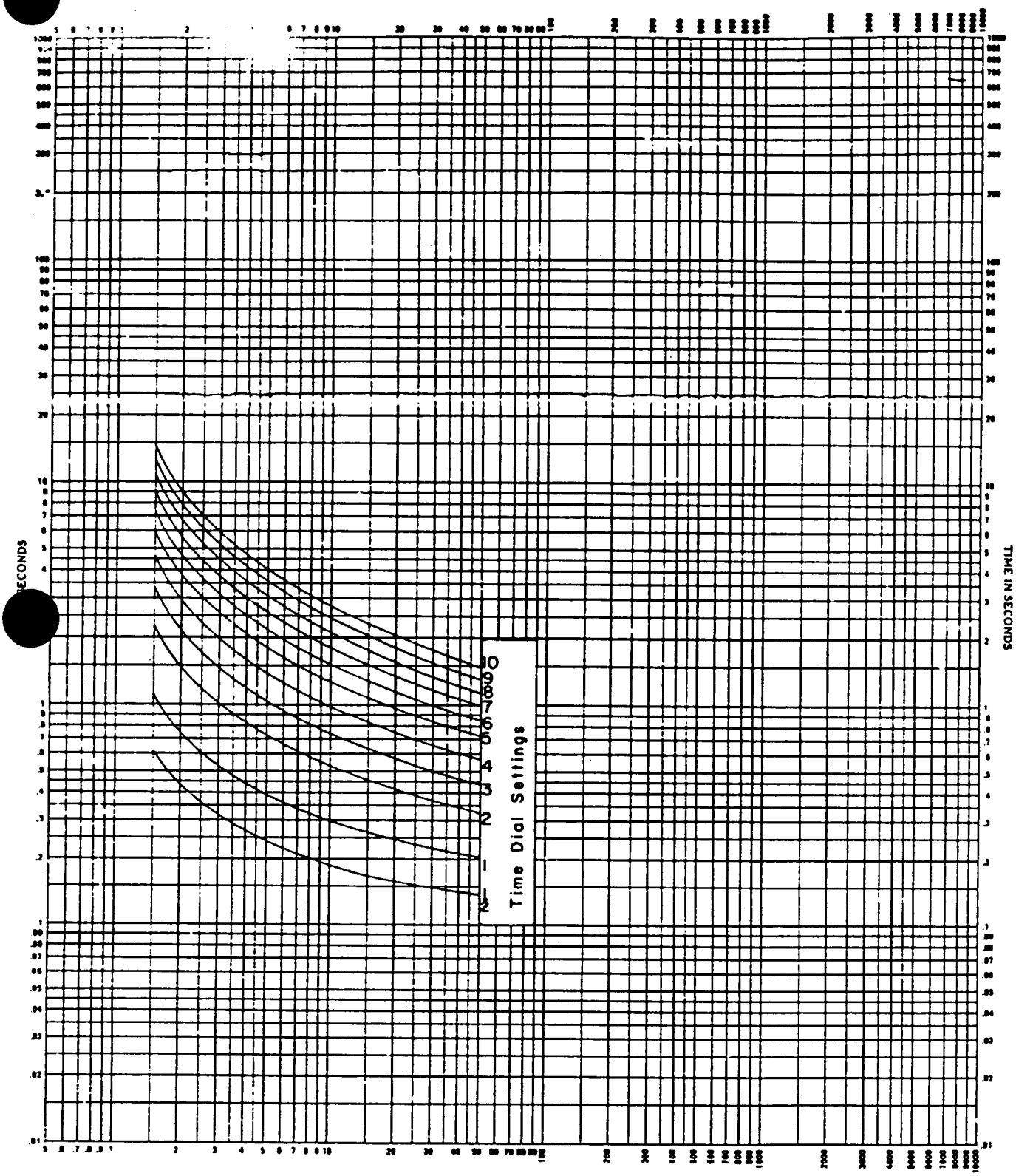


FIG. 9 (0888B0269-1) Time-Current Characteristics For The Types IAC51 And IAC52 Relays

Calc WBN-EEB-MS-TI08-0008 R15
Attachment B.4

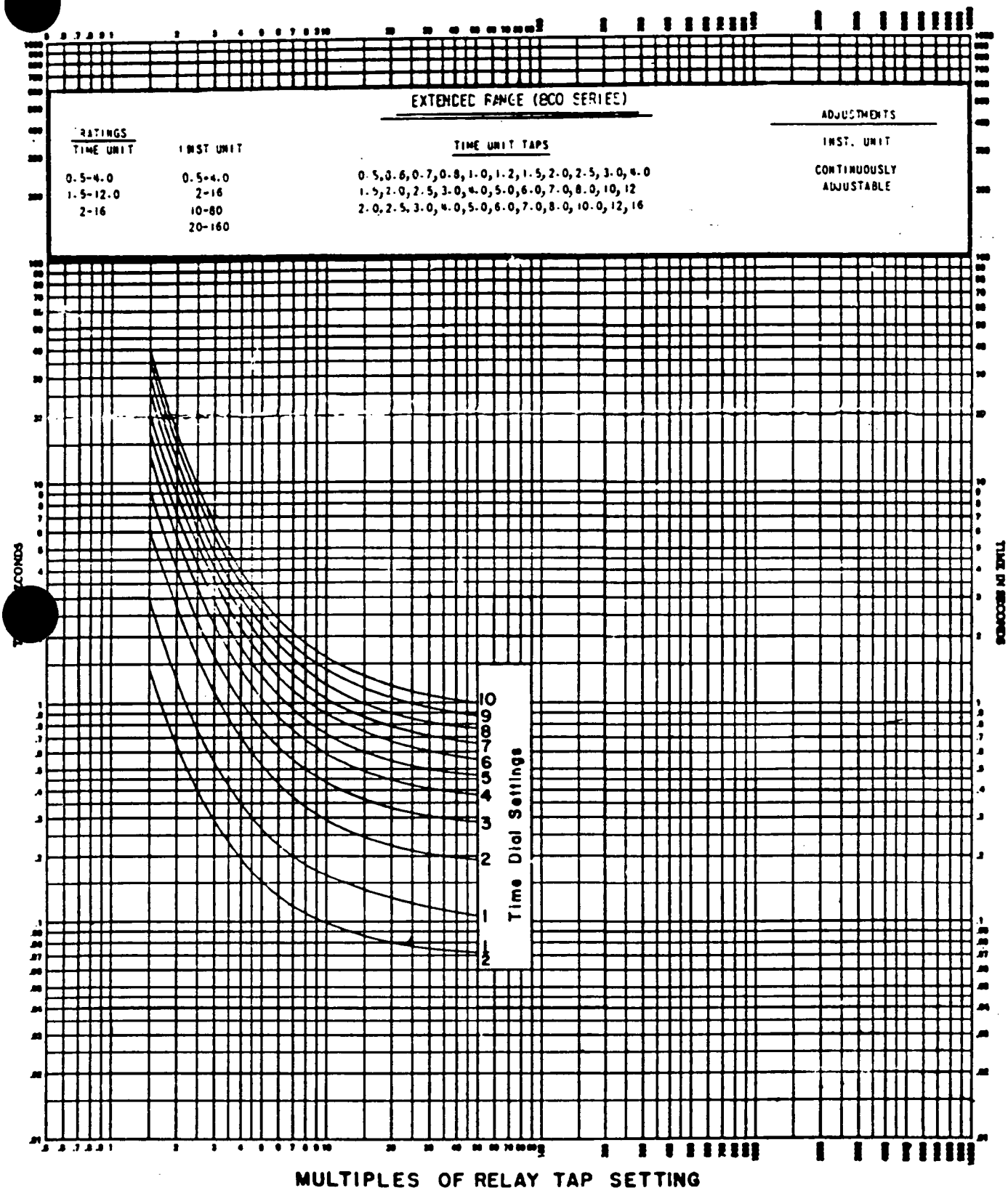
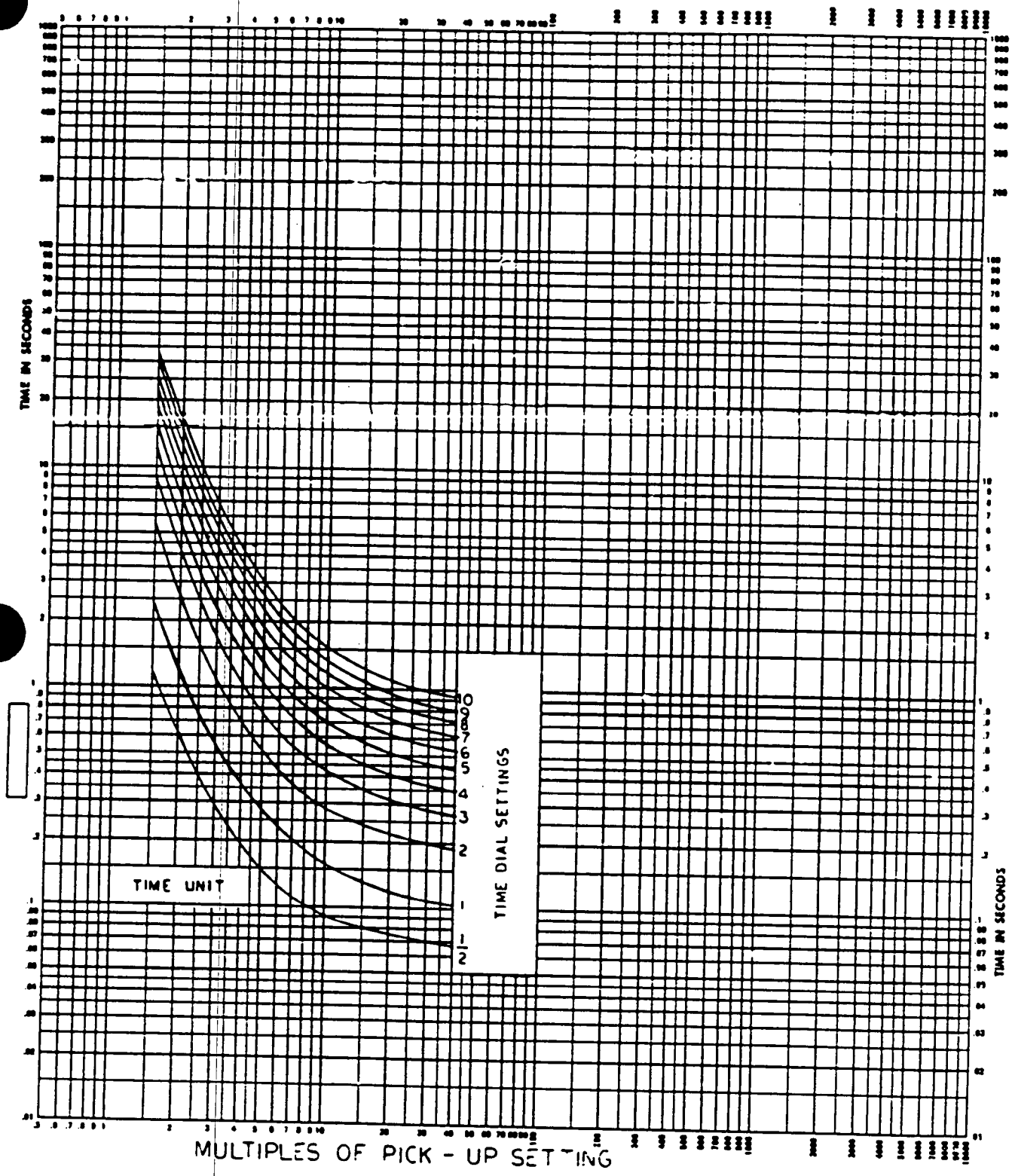


FIG. 9 (0888B0270-2) Time Current Characteristics For The Types IAC53 And IAC54 Relays



WBN REV 0
WBN PAGE 23

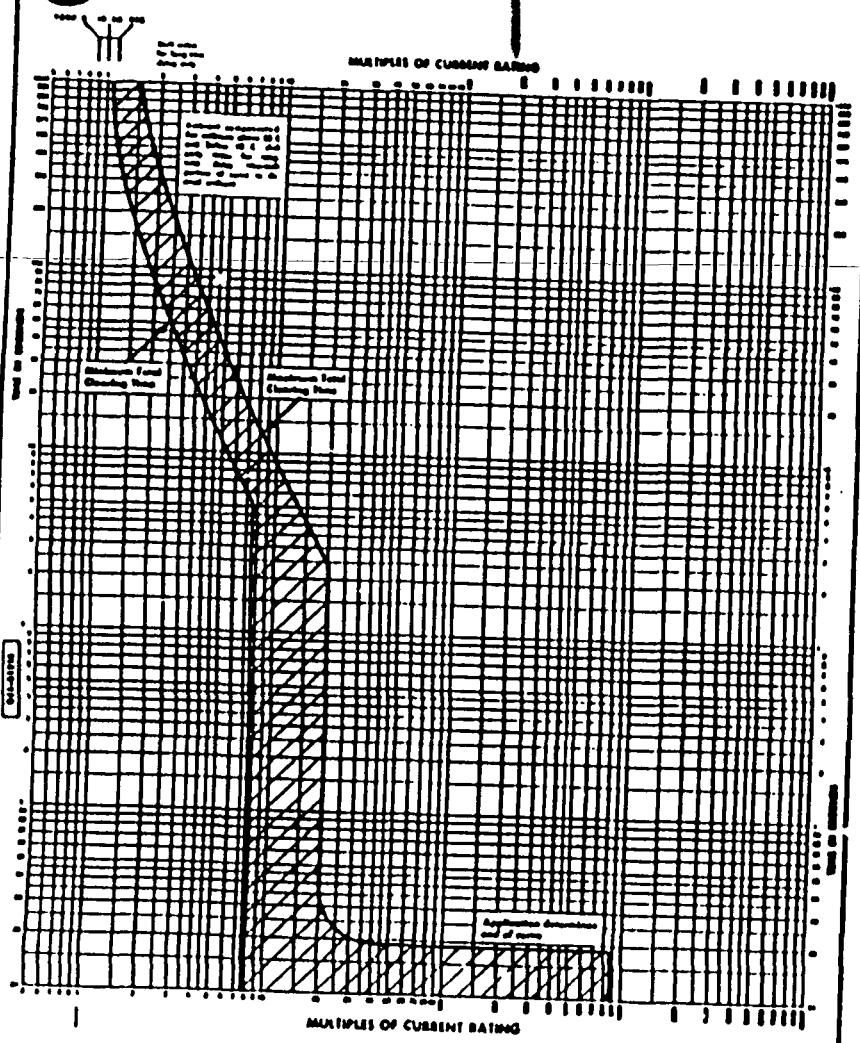
FIGURE 7 (010B8944-1) 60 HERTZ TIME-CURRENT CHARACTERISTICS FOR RELAY TYPES IFC53A AND IFC53B

Time Current Curves

Attachment B.6

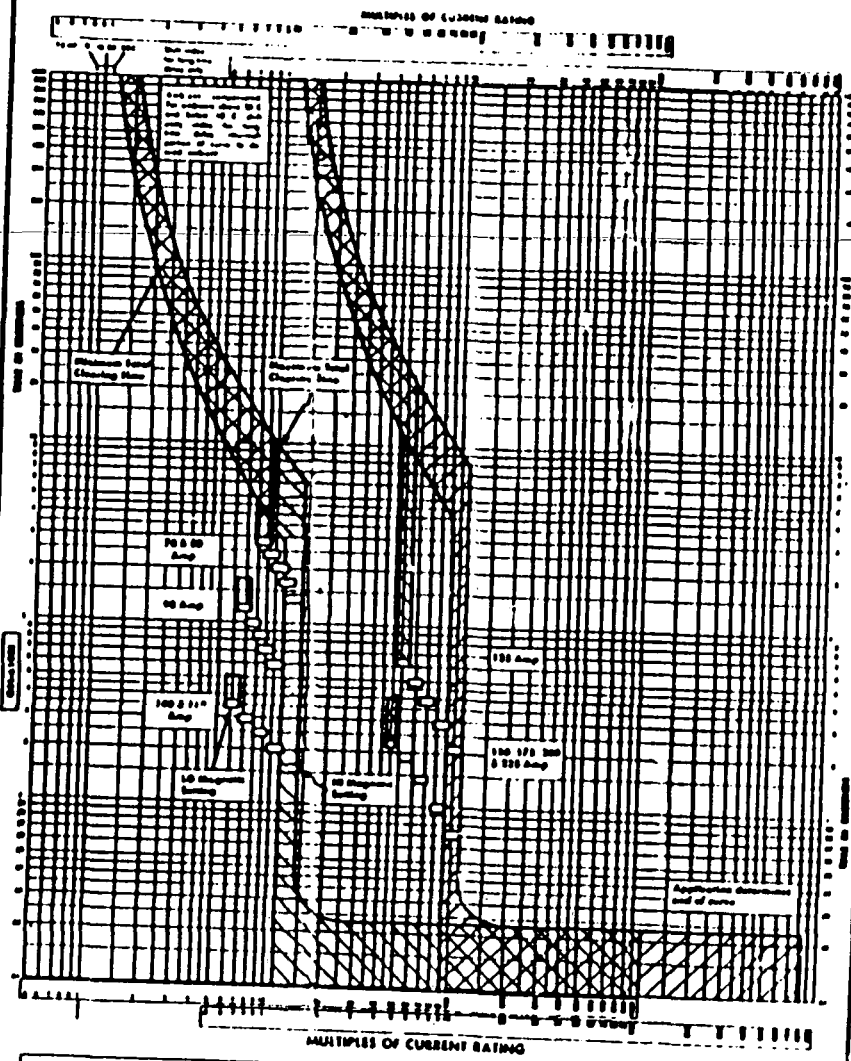
~~WBN-VTD-C080-010~~

150 Line



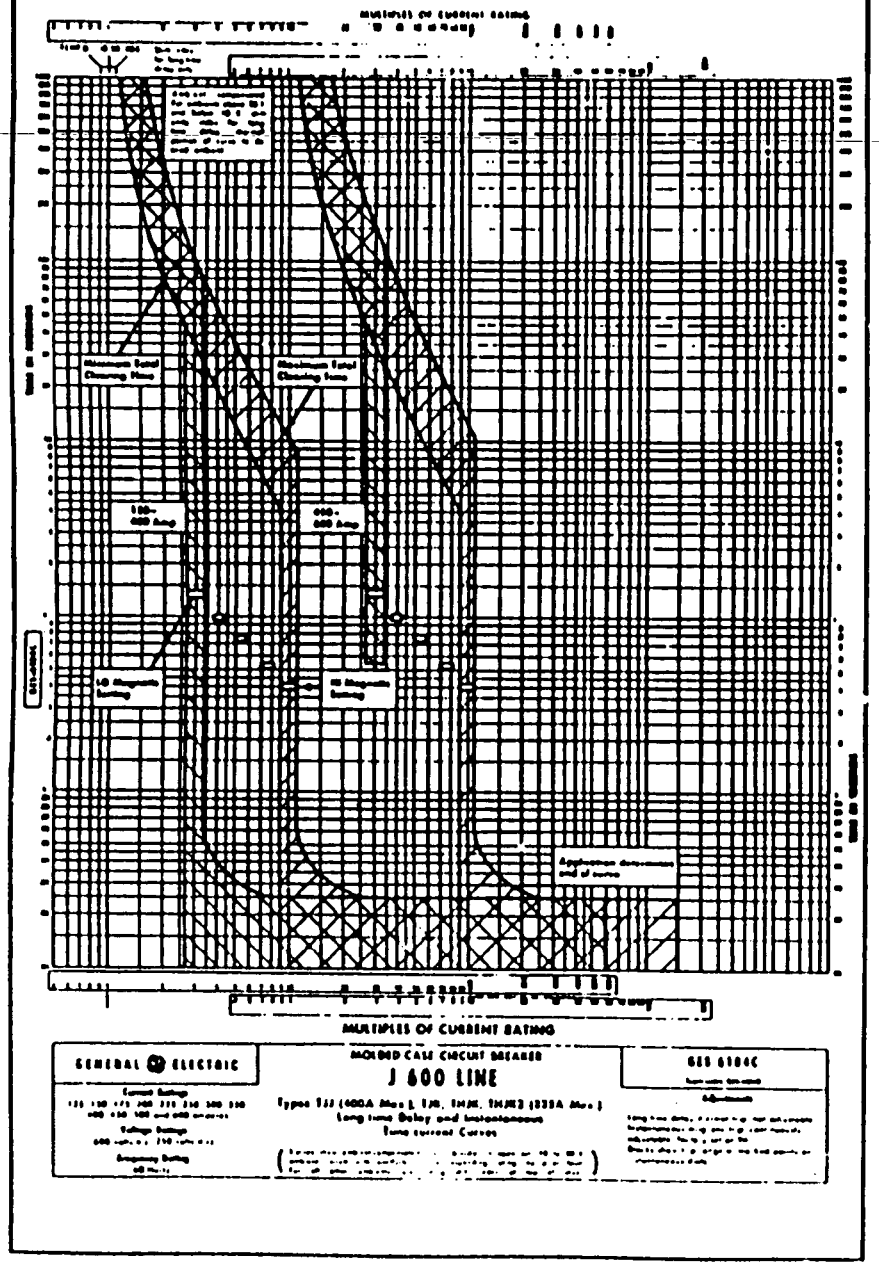
GENERAL ELECTRIC
MOLDED-CASE CIRCUIT BREAKER
E 150 LINE
Types TED and THED, 90 - 150 amperes
Ambient Compensated
Long-time Delay and Instantaneous Time-current Curves

F225 Line

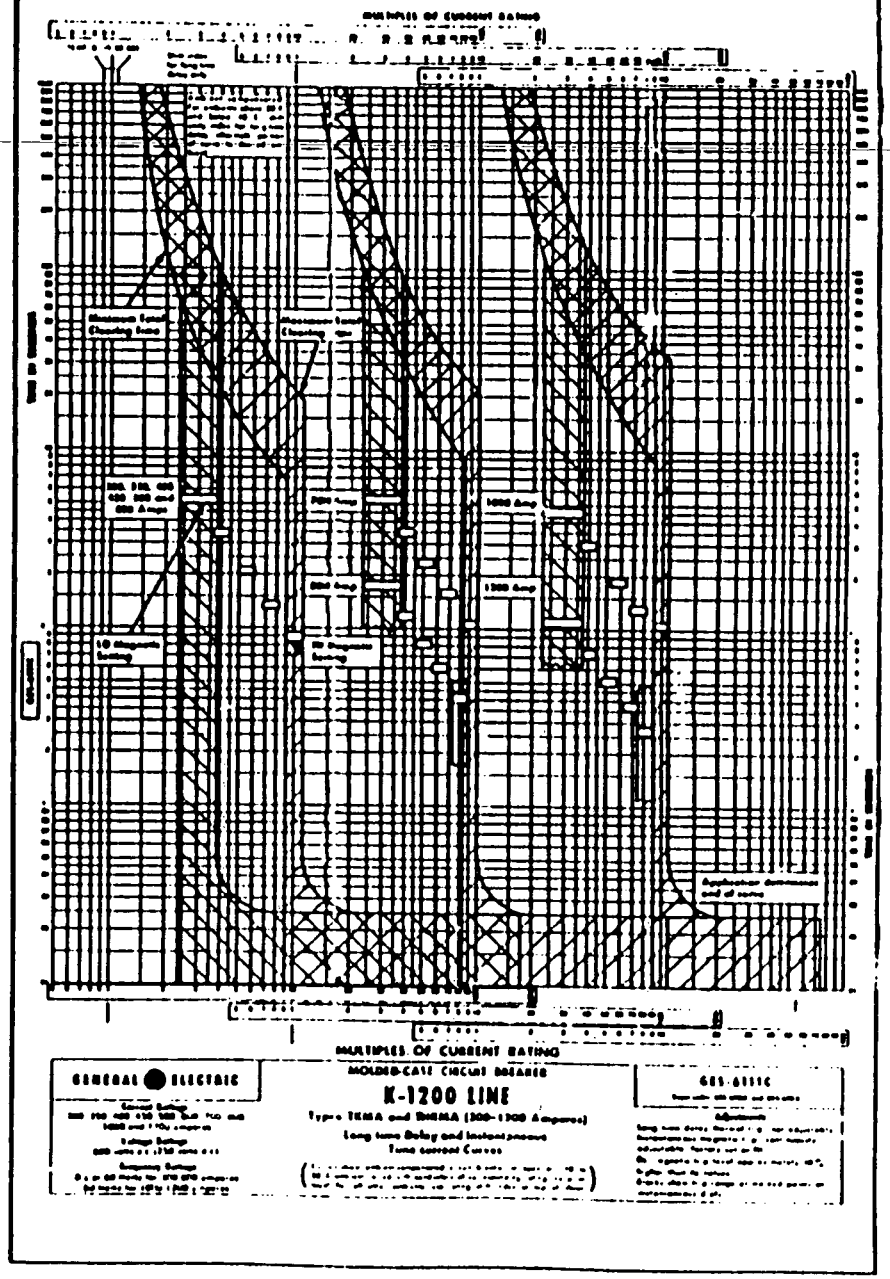


GENERAL ELECTRIC
MOLDED-CASE CIRCUIT BREAKER
F 225 LINE
Types TFJ, TFK, THFK
Ambient Compensated
Long-time Delay and Instantaneous Time-current Curves

J600 Line



K1200 Line



Application Data— Time Current Tripping Characteristics

Molded case circuit breaker time current curves are the engineering documents which define technical performance characteristics of the devices. The test parameters for the generation of these curves are as follows:

A. Circuit breaker connected with a minimum of four feet of rated conductor per terminal.

B. Circuit breaker in open air at ambient temperature indicated.

C. All tests initiated from the no current condition (cold start).

Information provided on the time current curve includes the following:

1. Product family type
2. Specific device type
3. Ampere ratings covered on curve
4. Overcurrent characteristics — long-time, short-time, instantaneous, etc.
5. Maximum total clearing time
6. Maximum and minimum temperature limits
7. Frequency ratings
8. Voltage ratings
9. Specific trip unit ratings
10. Trip unit adjustment ranges
11. Tolerances

Multiples of circuit breaker trip rating are shown on the top and bottom horizontal axis, with time in seconds on the vertical axis. Approximate minimum and maximum clearing time is readily determined from the characteristics curves. For example, a TED134100WL 100 ampere, 3 phase, 480 volt breaker, (reference curve GES-6115B, page 54), under a sustained overload of 200 amperes (2 times trip rating) reading up to curve from the horizontal axis, will clear within 80 to 350 seconds. Curve also shows that this breaker will trip instantaneously at current values within a band ranging from 7.5 to 20 times breaker trip rating. This instantaneous clearing time with no intentionally introduced time delay, ranges up to 0.018 seconds as shown on curve.

Tripping characteristics meet National Electrical Manufacturers Association and Underwriters' Laboratories, Inc. standards for rating and calibration.

Time Current Curves—Index

BREAKER TYPE	TIME CURRENT CURVE NUMBER	PAGE
TEB 15-50	GES-6122B	52
TEB 60-80	GES-6123B	52
TEB 90 & 100	GES-6124A	53
TED 15-50	GES-6113C	53
TED 60-80	GES-6114C	54
TED 90 & 100	GES-6115B	54
TED & THED 15-50	GES-6119C	55
TED & THED 60-80	GES-6120C	55
TED & THED 90-150	GES-6121B	56
TFJ, TFK & THFK	GES-6103E	56
TJJ, TJK, THJK, & THJK2	GES-6104C	57
TKMA & THKMA	GES-6111C	57
AKR; TPV & THPV; TJ9V, THJ9V, & THK9V	GES-6195B(Ground Fault)	58
TJ4V, TK4V, TP4V, THP4V	GES-6198C	58
AKR; TPV & THPV; TJ9V, THJ9V, TK9V & THK9V	GES-6199C	59
TEC	GES-9600	59
TEC	GES-9601	60
TJC 400	GES-6141	60
TJC 600	GES-6142	61
TKC 800	GES-6146	61
TKC 1200	GES-6147	62

Application Tips

Page 15-50

General Purpose Control Department
P. O. Box 2913, Bloomington, IL 61701
Gordon Kaberg-Marketing Application Engineer

Date 3/11/83 No. 001

The relationship of GES-7202 (see back) to our overload relays seems to be misunderstood by many salesmen and their customers. The curves are plotted such that 1.0 current on GES-7202 is 1.25 times the minimum motor current for a heater.

Referring to page 495 of the control catalog, we see 4 columns of Maximum Motor Full-load Amps (A, B, C, D) and a fifth column called Heater Catalog Number. Columns A and B are used for selecting heaters for single-phase motors. Column C is for open starters and some starters with ambient compensated relays. Column D is for 3 phase, 3 leg standard overload relays in an enclosed starter.

Duplicating a portion of the table.

Maximum Motor Full-load Amps C	D	Heater Catalog Number
	8.47	CR123C955A
	9.19	CR123C1048
max rating	10.0	CR123C113B
min rating → 9.20	10.7	CR123C125B

The number beside the catalog number is the maximum motor rated amps for that heater. Its minimum rating is implied to be the next ampere rating above the maximum of the preceding heater. Thus the CR123C1048 covers a range of motors with full load currents from 8.48 to 9.19 amps. CR123C113B covers motors from 9.20 to 10.0 amps. CR123C125B covers motors from 10.1 to 10.7 amps.

The minimum motor rated current for each heater times 1.25 is 1.0 for the GES-7202.

As an example, a 7.5 horsepower, open dripproof motor for 460 volts, 3 phase, 60 hertz, 1.15 service factor has a full-load current rating of 9.38 amps and a locked rotor current of 56.3 amps. Using a CR206C104 starter results in using Column D of the heater table. Thus the heater selection calls for 3 heaters, CR123C113B for this starter. The minimum current, 9.20 amps times 1.25 equals 11.5 amps which is 1.0 for the GES-7202. Now, to check the time of trip with locked rotor current applied to the motor, divide 56.3 amps by 11.5 which tells us that this is 4.9 times the relay trip current. 4.9 times current intersects the curve at two points indicating the relay may trip in 12 seconds and will trip in 19 seconds or less.

GES-7202 can be obtained from Distribution Services, 705 Corporations Park, Scotia, N.Y. 12302. It will come as a transparency on the standard 11" x 14" fuse and relay coordination paper so that overlays can be easily traced to show coordination and setting of the upstream protective devices.

Distribution:
- All Field Sales
- GPC Field Sales Personnel
- GPC Marketing
- Internal Tab 28
- International List 7A, 7C

ATTACHMENT C

ITE CURVES/DATA

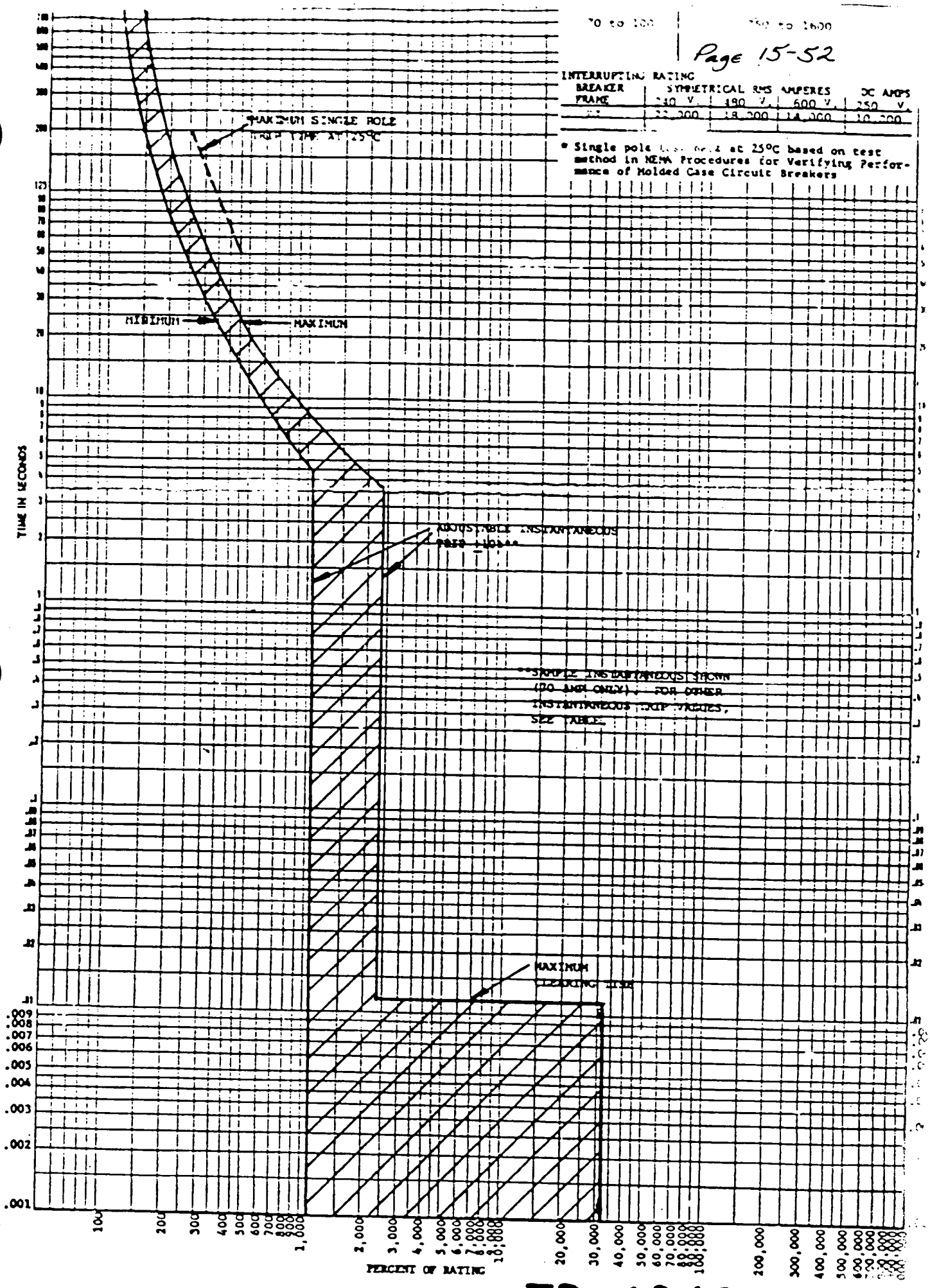
C.1 ITE FJ BREAKER TIME-CURRENT CURVE TD-4948 REV 1

C.2 ITE EF & EH BREAKERS TIME-CURRENT CURVE TD-8087 REV 1

C.3 ITE SS-4 TIME-CURRENT CURVES TD-9002 FROM REFERENCE 3.10

C.4 ITE MOLDED CASE CIRCUIT BREAKERS SELECTION & APPLICATION FROM REFERENCE 3.18

Page 15-52



INTERRUPTING RATING

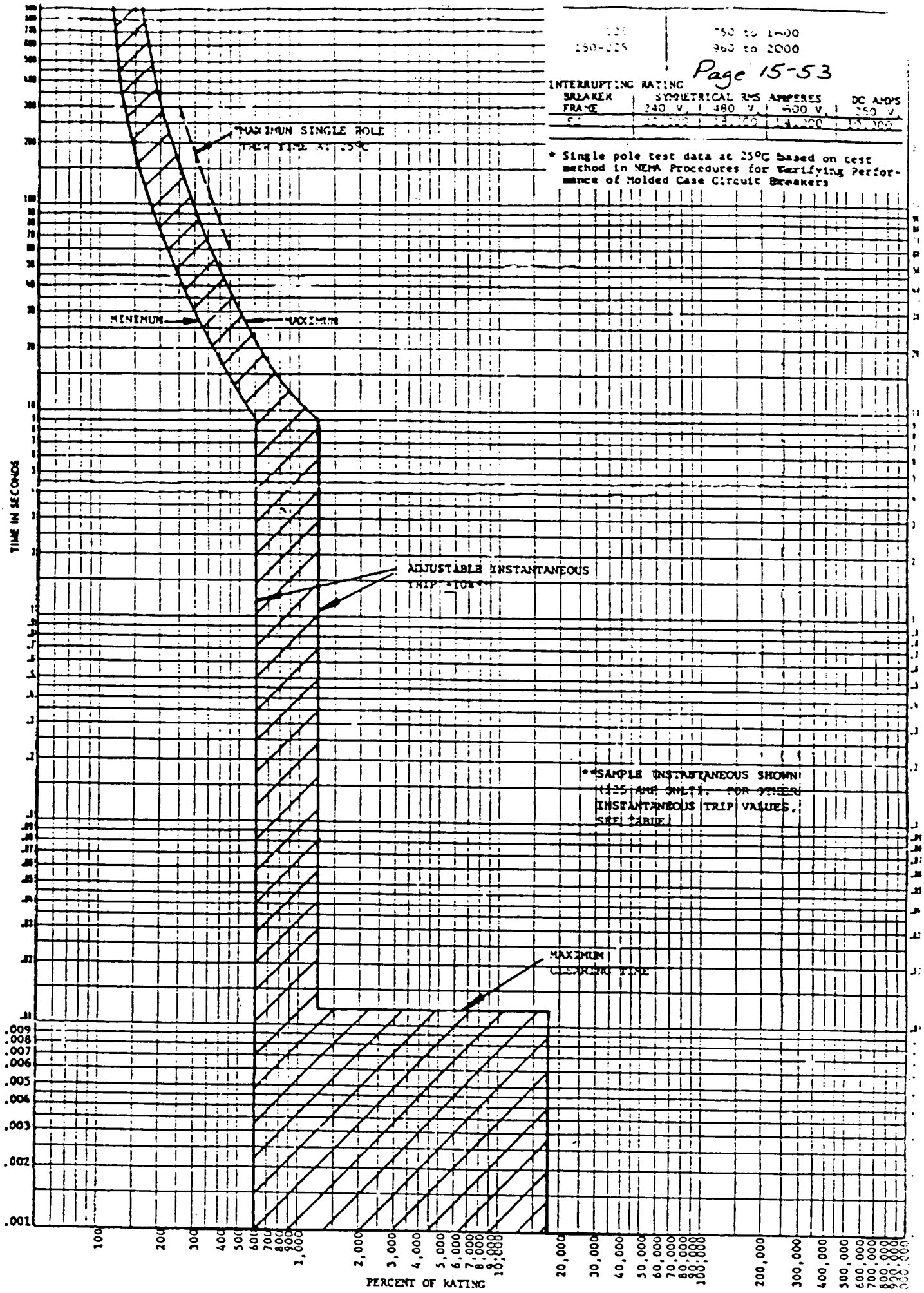
BREAKER FRAME	SYMMETRICAL RMS AMPERES 240 V.	480 V.	600 V.	DC AMPS 250 V.
[illegible]	22,000	18,000	14,000	10,000

* Single pole [illegible] at 25°C based on test method in NEMA Procedures for Verifying Performance of Molded Case Circuit Breakers

Calc WBN-EEB-MS-TI08-08 R15 Attachment C.1

TD-4948 REV. 1
SHEET 1 OF 2
DEC. 9, 1976

Calc WBN-EEB-MS-[illegible]3-0008 R15 Attachment C.1



125	750 to 1400
150-225	960 to 2000

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INTERRUPTING RATING

BREAKER FRAME	SYMMETRICAL RMS AMPERES 240 V	480 V	600 V	DC AMPS 250 V
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* Single pole test data at 25°C based on test method in NEMA Procedures for Verifying Performance of Molded Case Circuit Breakers

TD-4948 REV. 1

SHEET 2 OF 2

DEC 0 [illegible]

Calc WBN-EEB-MS-TI08-0008 R15 Attachment C.2

GOULD INC.
CIRCUIT PROTECTION DIV.

For application and coordination purposes only. Based on 40°C ambient cold start. Connected with 4 feet of rated wire (60°C) per terminal. Tested in open air with current in all poles.

EH FRAME: 480 VOLTS, 60 HZ., 250 VOLTS DC.
EF FRAME: 600 VOLTS, 60 HZ., 250 VOLTS DC.
FRAME: VOLTS, HZ., VOLTS DC.

INSTANTANEOUS TRIP

RATING IN AMPERES	FIXED INSTANTANEOUS TRIP, AMPERES
15 - 40	400 - 700

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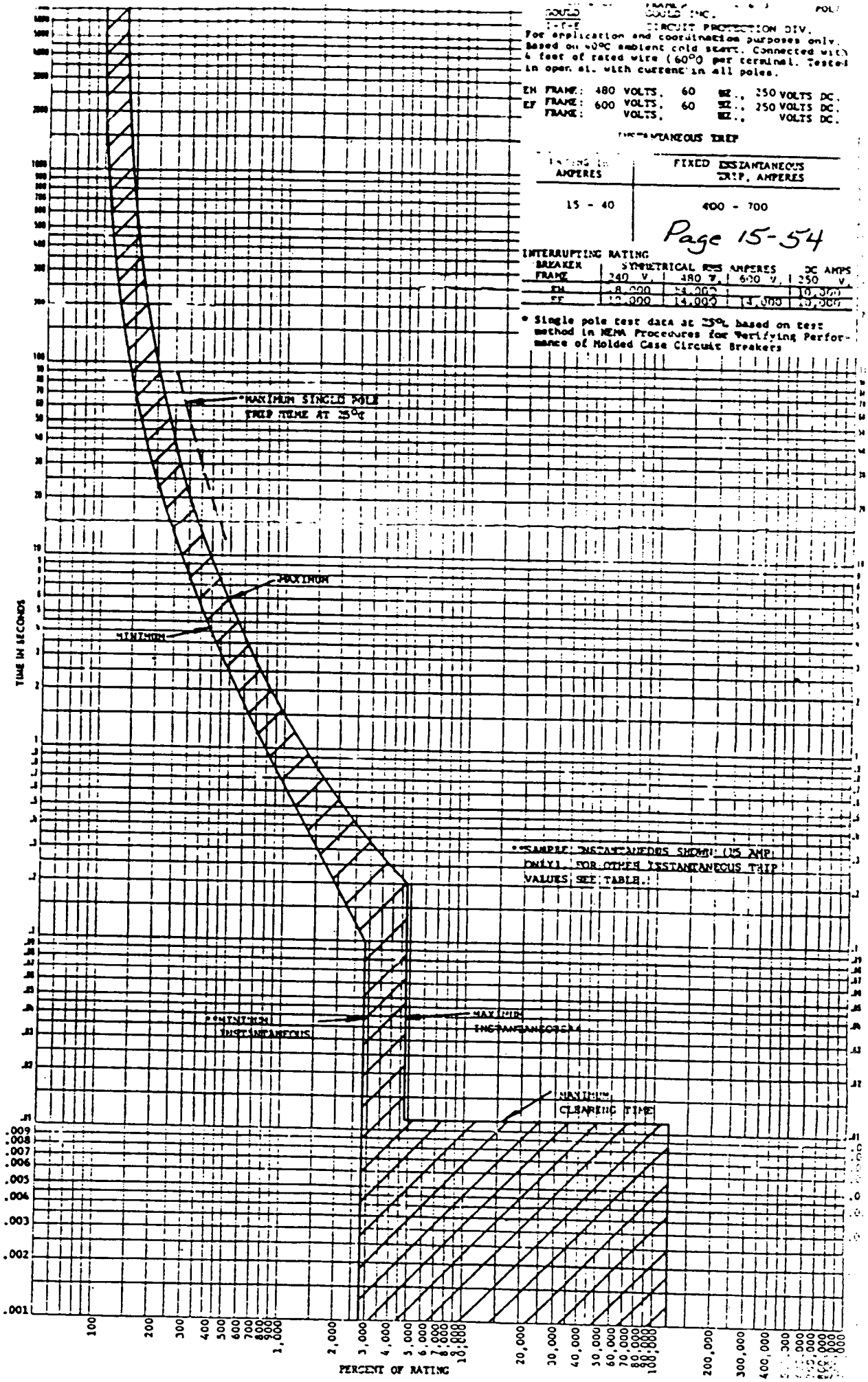
INTERRUPTING RATING

BREAKER FRAME	SYMMETRICAL RMS AMPERES 240 V.	480 V.	600 V.	DC AMPS 250 V.
EH	18,000	14,000		10,000
EF	18,000	14,000	14,000	10,000

* Single pole test data at 25°C based on test method in NEMA Procedures for Verifying Performance of Molded Case Circuit Breakers



TD-8087
SHEET 1 OF 3
NOV. 22, 1976

Calc WBN-EEB-MS-TI08-0008 R15 Attachment C.2

EH & EF FRAMES 2 & 3 PC

GOULD

GOULD INC.
CIRCUIT PROTECTION DIV.

For application and coordination purposes only. Based on 40°C ambient cold start. Connected with 4 feet of rated wire (60°C) per terminal. Tested in open air with current in all poles.

EH FRAME:	480 VOLTS,	60	HZ.,	250	VOLTS DC.
EF FRAME:	600 VOLTS,	60	HZ.,	250	VOLTS DC.
FRAME:	VOLTS,		HZ.,		VOLTS DC.

INSTANTANEOUS TRIP

RATING IN AMPERES	FIXED INSTANTANEOUS TRIP, AMPERES
50-100	600 - 1000

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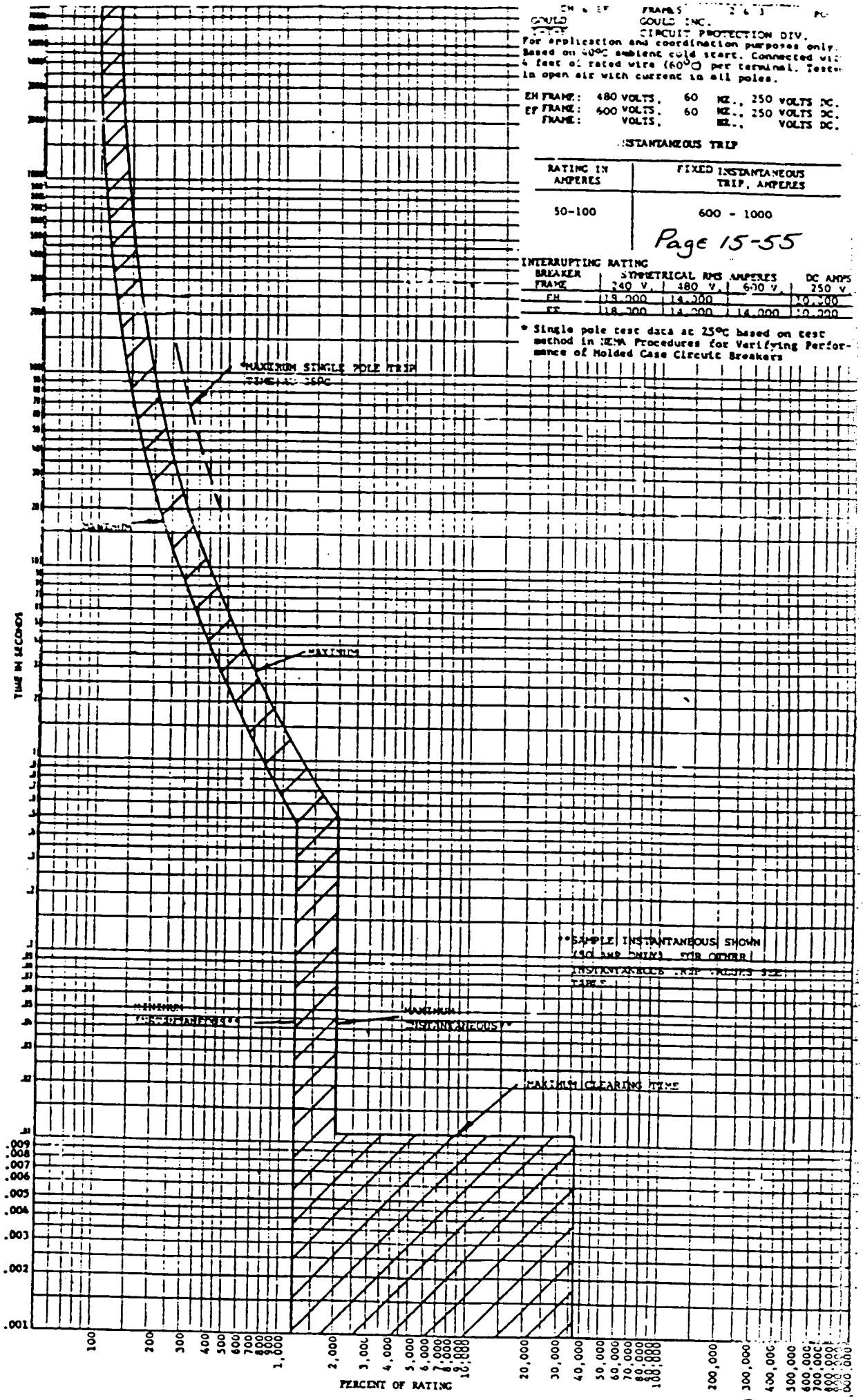
INTERRUPTING RATING

BREAKER FRAME	SYMMETRICAL RMS AMPERES 240 V.	480 V.	600 V.	DC AMPS 250 V.
EH	19,000	14,000		10,000
EF	18,000	14,000	14,000	10,000

* Single pole test data at 25°C based on test method in NEMA Procedures for Verifying Performance of Molded Case Circuit Breakers



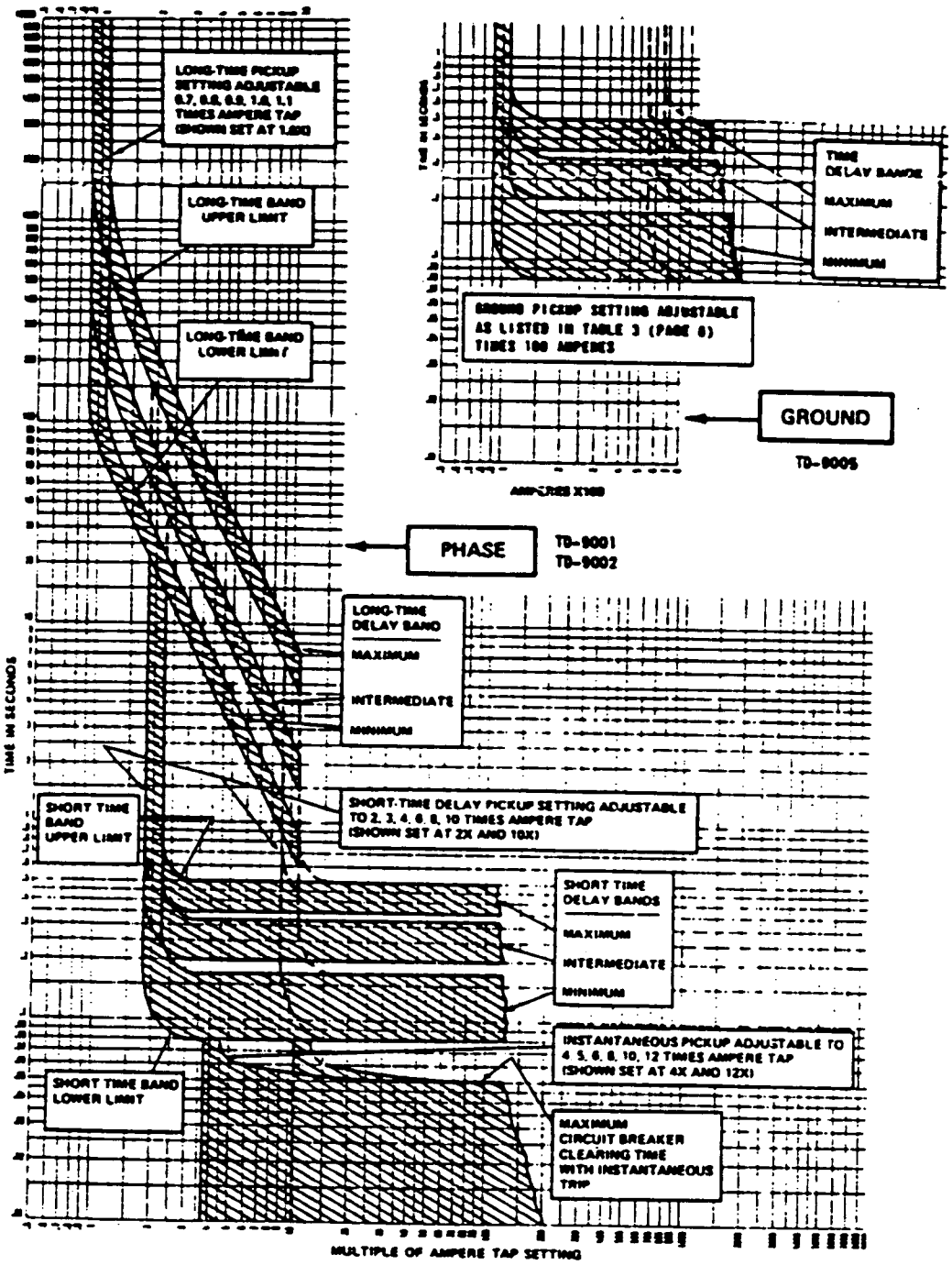
TD-8087
SHEET 2 OF 3
NOV. 2, 1976

BBC
BROWN BOVERI

Brown Boveri Electric, Inc.
Distribution Apparatus Division
Spring House, PA 19477

Issue C Supersedes Issue B
Printed in U.S.A. 15C CMC 381

POWER SHIELD TIME-CURRENT CHARACTERISTICS



Calc WBN-EEB-MS-TI08-0008 R15
Attachment C.4
from Ref 3.18

SELECTION AND APPLICATION

PROTECTION OF CONDUCTORS—EXCEPT MOTOR CIRCUITS

Match the current rating of the circuit breaker to the ampacity of the conductor. See Table 1 on page 223 for conductor ratings. If ampacity of conductor falls between standard breaker ratings, select the higher breaker-current rating.

Check voltage and interrupt[illegible] to assure that they are adequate for the electrical system.

PROTECTION OF MOTOR CIRCUITS

General

Molded Case circuit breakers are used in motor circuits as a disconnecting means and for short circuit protection, and should be used in conjunction with motor-running over-current-protection devices. The circuit breaker should have a continuous-current rating of not less than 115% of the motor full-load current, and its characteristics should permit the motor to start without nuisance tripping from motor-inrush current.

When Breaker is Mounted Immediately Ahead of Motor Starter

ETI instantaneous-trip circuit breakers are recommended for use in combination motor starters to provide selective short-circuit protection for the motor branch circuit. The adjustable instantaneous-trip feature of the ETI circuit breaker provides for a trip setting slightly above the peak [illegible] rush current. With this setting, no delay is introduced in opening the circuit when a fault occurs. This circuit breaker has no time-delay trip element and therefore must be used in conjunction with, and immediately ahead of, the motor-running overcurrent protective device.

[illegible]T 1—ETI CIRCUIT BREAKERS (instantaneous trip only) for branch-circuit use with alternating-current combination full voltage motor starters.

3-PHASE INDUCTION-TYPE MOTORS

Horsepower Rating of Motor					Circuit Breaker Data			Adjustable Trip Range					Trip Setting Position				
115 Volts	200 Volts	230 Volts	460 Volts	575 Volts	Breaker Frame	Catalog Number	Continuous Amperes	Lo	2	3	4	Hi	115 Volts	200 Volts	230 Volts	460 Volts	575 Volts
	—	—	½	½		EF3-A003	3	7	10	12	16	21		—	—	3	2
	—	—	¾	¾		EF3-A003	3	7	10	12	16	21		—	—	4	3
—	—	—	—	1	EF	EF3-A003	3	7	10	12	16	21	—	—	—	—	4
	½	½	1	1½		EF3-A005	5	14	18	22	29	41		4	3	3	3
	—	—	1½	2		EF3-A005	5	14	18	22	29	41		—	—	4	4
½	¾	¾	2	3		EF3-A010	10	27	36	45	58	84	3	3	2	2	3
¾	1	1	3	—		EF3-A010	10	27	36	45	58	84	Hi	4	3	4	—
—	1½	1½	—	—	EF	EF3-A010	10	27	36	45	58	84	—	Hi	4	—	—
1	2	2	—	5		EF3-A010	10	27	36	45	58	84	Hi	Hi	Hi	—	Hi
—	—	—	5	—		EF3-A025	25	75	105	125	170	210	—	—	—	2	—
1½	3	3	7½	7½		EF3-A025	25	75	105	125	170	210	2	3	2	3	2
2	5	5	10	10		EF3-A025	25	75	105	125	170	210	4	Hi	4	4	3
—	—	—	—	15	EF	EF3-A025	25	75	105	125	170	210	—	—	—	—	Hi
—	7½	7½	15	20		EF3-L050	50	160	210	260	330	470	—	4	3	3	3
—	10	10	20	25		EF3-L050	50	160	210	260	330	470	—	Hi	4	4	4
	15	15	25	30		EF3-H050	50	320	400	475	565	670		4	3	2	2
	—	—	30	40		EF3-H050	50	320	400	475	565	670		—	—	3	3
—	20	20	40	50	EF	EF3-A100	100	475	630	750	930	1125	—	3	2	2	2
	25	25	50	60		EF3-A100	100	475	630	750	930	1125		4	3	3	3
	30	30	60	75		EF3-A100	100	475	630	750	930	1125		Hi	4	4	4
	40	40	75	100	EF, FJ	EF3-H150	150	960	1200	1400	1700	2000		3	2	2	2
—	50	50	100	125	or	FJ3-A225	225	960	1200	1550	1850	2000	—	3	3	3	3
	60	60	125	150	JL	JL3-A225	225	960	1200	1450	1800	2000		3	3	3	3
	—	75	150	200		JL3-L400	400	1900	2300	2700	3100	3500		Lo	Lo	Lo	Lo
—	100	100	200	250		JL3-L400	400	1900	2300	2700	3100	3500	—	3	2	2	2
	125	125	250	300	JL	JL3-L400	400	1900	2300	2700	3100	3500		Hi	4	3	3
	125	150	300	400		JL3-H400	400	3200	3600	4100	5100	5600		Lo	2	Lo	2
	150	150	300	400		KM3-L800	800	3200	3600	4100	5100	5600		3	Lo	Lo	2
—	—	200	400	500	KM	KM3-L800	800	3200	3600	4100	5100	5600	—	—	4	3	3
	—	250	500	—		KM3-H800	800	5000	6100	6700	7400	8000		—	2	2	—

GOULD I-T-E CIRCUIT BREAKER MOLDED CAS

Calc WBN-EEB-MS-TI08-0008 R15
Attachment C.4
from Ref 3.18

SELECTION AND APPLICATIO

The recommended ETI circuit breakers listed in Chart 1 have continuous-current ratings of at least 115% of motor full-load currents, and the trip-setting positions are approximately 11 times motor full-load currents.

Note: For all applications check interrupting rating of circuit breaker to assure that it is at least equal to available fault current.

When Breaker Is Mounted At A Distance From Motor Starter

ET thermal-magnetic circuit breakers conform to the National Electrical Code requirements for motor branch and feeder circuit protection when properly applied in conjunction with motor-running overcurrent protective devices. The recommended circuit-breaker ratings in Chart 2 provide adequate time delay for starting the majority of three-phase induction motors.

Motor Feeder Circuit Protection

To determine the ampere rating of the ET breaker protect a motor feeder, add the rating of the ET break used to protect the largest motor branch circuit in th group to the full-load currents of the remaining motors the group.

Interrupting Ratings

For normal commercial purposes, available fault current can conveniently be obtained from Table 5 on page 22 Interrupting ratings of all breakers are listed in the selec tion guide on pages 20–23. All breakers selected for system should have an interrupting rating at least equal t the available fault current at the point of application.

CHART 2—EQ AND ET CIRCUIT BREAKERS (thermal-magnetic trip) for branch breaker use with alternating-currer combination motor starters.

3-PHASE INDUCTION-TYPE MOTORS

Motor Horsepower Rating	200 and 208 V Motors			230 V Motors			460 V Motors			575 V Motors		
	240 V Circuit Breaker Data‡			240 V Circuit Breaker Data‡			480 V Circuit Breaker Data‡			600 V Circuit Breaker Data‡		
	Breaker Frame	Catalog Number	Rating Amperes	Breaker Frame	Catalog Number	Rating Amperes	Breaker Frame	Catalog Number	Rating Amperes	Breaker Frame	Catalog Number	Rating Amperes
½	QP*	QP3-B015	15	QP*	QP3-B015	15	EH	EH3-B015	15	EF	EF3-B015	15
¾		QP3-B015	15		QP3-B015	15		EH3-B015	15		EF3-B015	15
1		QP3-B015	15		QP3-B015	15		EH3-B015	15		EF3-B015	15
1½		QP3-B015	15		QP3-B015	15		EH3-B015	15		EF3-B015	15
2		QP3-B020	20		QP3-B015	15		EH3-B015	15		EF3-B015	15
3		QP3-B030	30		QP3-B020	20		EH3-B015	15		EF3-B015	15
5	QP*	QP3-B040	40	QP*	QP3-B030	30	EH	EH3-B015	15	EF	EF3-B015	15
7½		QP3-B060	60		QP3-B050	50		EH3-B030	30		EF3-B020	20
10		QP3-B070	70		QP3-B070	70		EH3-B030	30		EF3-B030	30
15		QP3-B100	100		QP3-B090	90		EH3-B040	40		EF3-B035	35
20		QJ3-B125	125		QP3-B100	100		EH3-B050	50		EF3-B050	50
25	QJ	QJ3-B150	150	QJ	QJ3-B125	125	EH	EH3-B070	70	EF	EF3-B060	60
30		QJ3-B175	150		QJ3-B150	150		EH3-B090	90		EF3-B070	70
40		QJ3-B200	200		QJ3-B175	175		EH3-B100	100		EF3-B090	90
50		QJ3-B225	225		QJ3-B200	200		EH3-B100	100		EF3-B100	100
60	JD	JD3-B300	300	QJ	QJ3-B225	225	EH, FJ or JL†	EH3-B125 FJ3-B125 JL3-B125	125	EF	EF3-B100	100
75	JD	JD3-B400	400	JD	JD3-B350	350	FJ or JL†	FJ3-B175 JL3-B175	175 175	FJ or JL†	FJ3-B125 JL3-B125	125 125
100	JD	JD3-B400	400	JD	JD3-B400	400	JL†	FJ3-B200 JL3-B200	200 200	FJ or JL†	FJ3-B175 JL3-B175	175 175
125	LL or KM	LL3-B600 KM3-B600	600	LL or KM	LL3-[illegible] KM3-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	FJ or JL†	FJ3-B200 JL3-B200	[illegible]
150	LL or KM	LL3-B600 or KM3-B600	600	KM	LL3-B600 or KM3-B600	600	JL†	JL3-B300	300	JL†	FJ3-B225 JL3-B225	225 225
200	KM	KM3-B800	800	KM	KM3-B800	800	JL†	JL3-B350	350	JL†	JL3-B300	300
250	—	—	—	—	—	—	JL†	JL3-B400	400	JL†	JL3-B400	400
300	—	—	—	—	—	—	LL or KM	LL3-B600 or KM3-B600	600	JL†	JL3-B400	400
350	—	—	—	—	—	—	KM	KM3-B700	700	LL or KM	LL3-B500 or KM3-B500	500
400	—	—	—	—	—	—	KM	KM3-B800	800	LL or KM	LL3-B600 or KM3-B600	600
500	—	—	—	—	—	—	—	—	—	KM	KM3-B800	800

‡**Notes:** The selection of breakers for this table is in accordance with Article 430, 1975 National Electric Code.

Recommended circuit breakers are for full voltage starting and special consideration is necessary for reduced voltage starting.

For recommended instantaneous trip settings of FJ, JJ, JL and KM frame breakers, see Table ETI breakers on opposite page.

*For bolted applications, substitute the BQ breaker for the QP, or an E frame breaker can be substituted.

†For non-interchangeable trip applications, substitute the JJ breaker for the JL.

I-T-E CIRCUIT BREAKERS

GOULD

MOLDED CASE

page 15-5

Calc WBN-EEB-MS-TI08-0008 R15
Attachment C.4
from Ref 3.18

ADJUSTABLE ET AND ETI DATA

The nominal ac instantaneous trip points are given in the table below. For dc instantaneous trip points add 15% to nominal values given in table.

Tolerances on all settings are plus or minus 10%.

To change instantaneous trip point, depress indicating knob, then rotate to desired position.

Instantaneous trip adjustment is made through the breaker cover on all frame breakers.

Frame	Maximum Continuous Amperes	AC Adjustable Trip Range					ETI Catalog Number		ET Catalog Number	
		Low	II	III	IV	High	2-Pole	3-Pole	2-Pole	3-Pole
JD	250	1050	1350	1650	1950	2250	–	–	JD2B250	JD3B250
	300	1050	1350	1650	1950	2250	–	–	JD2B300	JD3B300
	350	1900	2300	2700	3100	3500	–	–	JD2B350	JD3B350
	400	1900	2300	2700	3100	3500	–	–	JD2B400	JD3B400
FJ	70	750	960	1300	1500	1600	–	–	FJ2-B070	FJ3-B070
	80	750	960	1300	1500	1600	–	–	FJ2-B080	FJ3-B080
	90	750	960	1300	1500	1600	–	–	FJ2-B090	FJ3-B090
	100	750	960	1300	1500	1600	–	–	FJ2-B100	FJ3-B100
	110	750	960	1300	1500	1600	–	–	FJ2-B110	FJ3-B110
	125	750	960	1300	1500	1600	–	–	FJ2-B125	FJ3-B125
	150	750	960	1300	1500	1600	–	–	FJ2-B150	FJ3-B150
	175	750	960	1300	1500	1600	–	–	FJ2-B175	FJ3-B175
	200	960	1200	1550	1850	2000	–	–	FJ2-B200	FJ3-B200
	225	960	1200	1550	1850	2000	FJ2-A225	FJ3-A225	FJ2-B225	FJ3-B225
JJ	250	1050	1350	1650	1950	2250	–	–	JJ2-B250	JJ3-B250
	300	1050	1350	1650	1950	2250	–	–	JJ2-B300	JJ3-B300
	350	1900	2300	2700	3100	3500	–	–	JJ2-B350	JJ3-B350
	400	1900	2300	2700	3100	3500	–	–	JJ2-B400	JJ3-B400
JL	70	750	960	1175	1400	1600	–	–	JL2-B070	JL3-B070
	90	750	960	1175	1400	1600	–	–	JL2-B090	JL3-B090
	100	750	960	1175	1400	1600	–	–	JL2-B100	JL3-B100
	125	750	960	1175	1400	1600	–	–	JL2-B125	JL3-B125
	150	750	960	1175	1400	1600	–	–	JL2-B150	JL3-B150
	175	750	960	1175	1400	1600	–	–	JL2-B175	JL3-B175
	200	960	1200	1450	1800	2000	–	–	JL2-B200	JL3-B200
	225	960	1200	1450	1800	2000	JL2-A225	JL3-A225	JL2-B225	JL3-B225
	250	1050	1350	1650	1950	2250	–	–	JL2-B250	JL3-B250
	300	1050	1350	1650	1950	2250	–	–	JL2-B300	JL3-B300
	350	1900	2300	2700	3100	3500	–	–	JL2-B350	JL3-B350
	400	1900	2300	2700	3100	3500	JL2-L400	JL3-L400	JL2-B400	JL3-B400
	400	3200	3600	4100	5100	5600	JL2-H400	JL3-H400	–	–
LL	450	1900	2300	2700	3100	3500	LL2A450	LLA450	LL2B450	LL3B450
	500	1900	2300	2700	3100	3500	–	–	LL2B500	LL3B500
	600	1900	2300	2700	3100	3500	–	–	LL2B600	LL3B600
	600	3200	3600	4100	5100	5600	LL2L600	LL3L600	–	–
	600	5000	6100	6700	7400	8000	LL2H600	LL3H600	–	–
HJ	125	750	960	1175	1400	1600	–	–	–	HJ3-B125
	150	750	960	1175	1400	1600	–	–	–	HJ3-B150
	175	750	960	1175	1400	1600	–	–	–	HJ3-B175
	200	960	1200	1450	1800	2000	–	–	–	HJ3-B200
	225	960	1200	1450	1800	2000	–	–	–	HJ3-B225
	250	1050	1350	1650	1950	2250	–	–	–	HJ3-B250
	300	1050	1350	1650	1950	2250	–	–	–	HJ3-B300
	350	1900	2300	2700	3100	3500	–	–	–	HJ3-B350
	400	1900	2300	2700	3100	3500	–	–	–	HJ3-B400
KM	250	1050	1350	1650	1950	2250	–	–	KM2-B250	KM3-B250
	300	1050	1350	1650	1950	2250	–	–	KM2-B300	KM3-B300
	350	1900	2300	2700	3100	3500	–	–	KM2-B350	KM3-B350
	400	1900	2300	2700	3100	3500	–	–	KM2-B400	KM3-B400
	500	1900	2300	2700	3100	3500	–	–	KM2-B500	KM3-B500
	600	1900	2300	2700	3100	3500	KM2-A600	KM3-A600	KM2-B600	KM3-B600
	700	3200	3600	4100	5100	5600	–	–	KM2-B700	KM3-B700
	800	3200	3600	4100	5100	5600	KM2-L800	KM3-L800	KM2-B800	KM3-B800
	800	5000	6100	6700	7400	8000	KM2-H800	KM3-H800	–	–
KP	600	3200	3600	4100	5100	5600	–	–	KP2-B600	KP3-B600
	800	3200	3600	4100	5100	5600	–	–	KP2-B800	KP3-B800
	1000	4000	5000	6000	7000	8000	–	–	KP2-B100	KP3-B100
	1200	4000	5000	6000	7000	8000	–	–	KP2-B120	KP3-B120

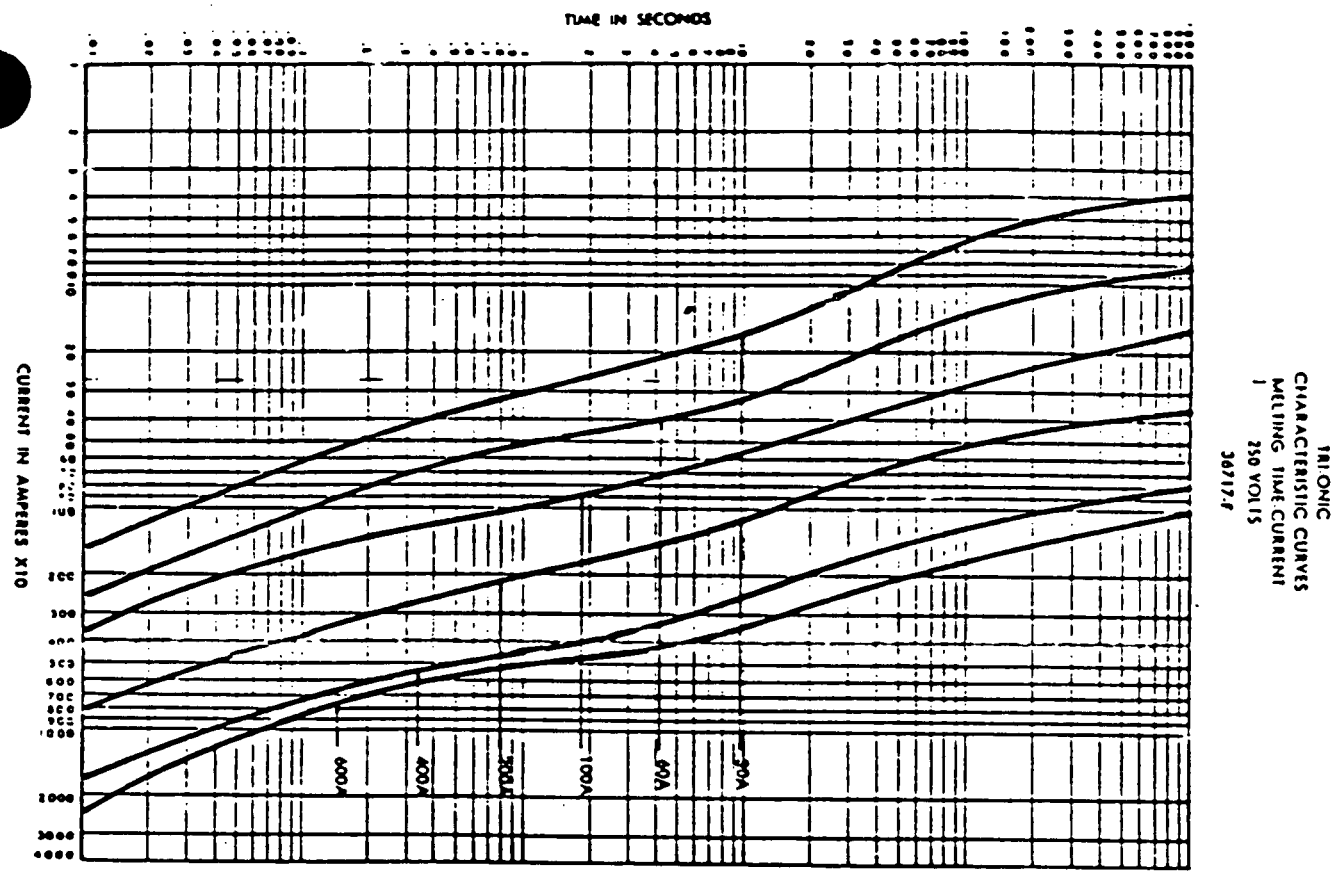
ATTACHMENT D

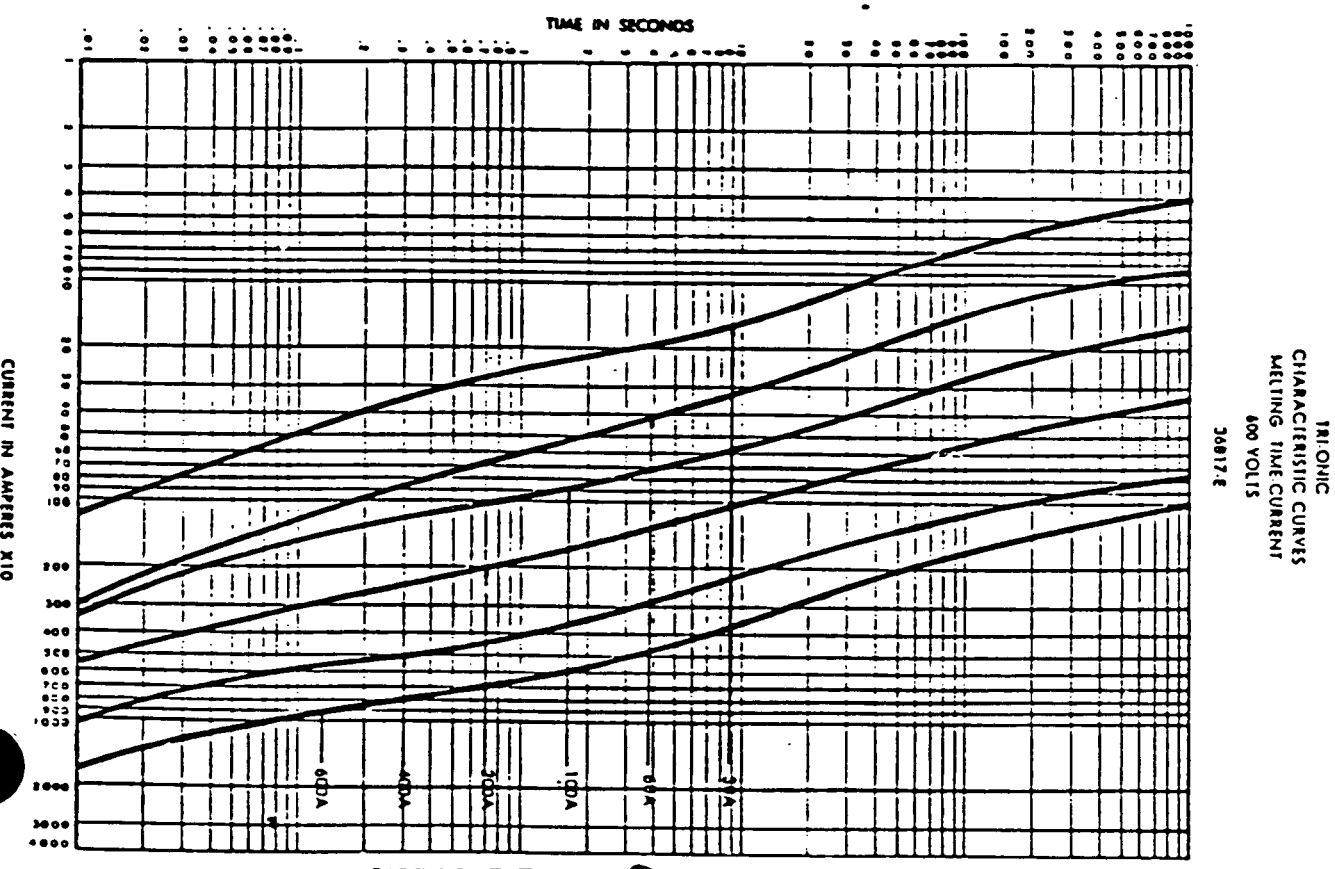
GOULD SHAWMUT CURVES/DATA

D.1 TRIONIC TIME-CURRENT CURVES 36717F & 36817E FROM REFERENCE 3.9

D.2 TRIONIC FUSE MELTING TIME-CURRENT DATA 15-600 AMPS, 600 VOLTS CAT. NO. TRS(AMP RATING)R FROM REFERENCE 3.14

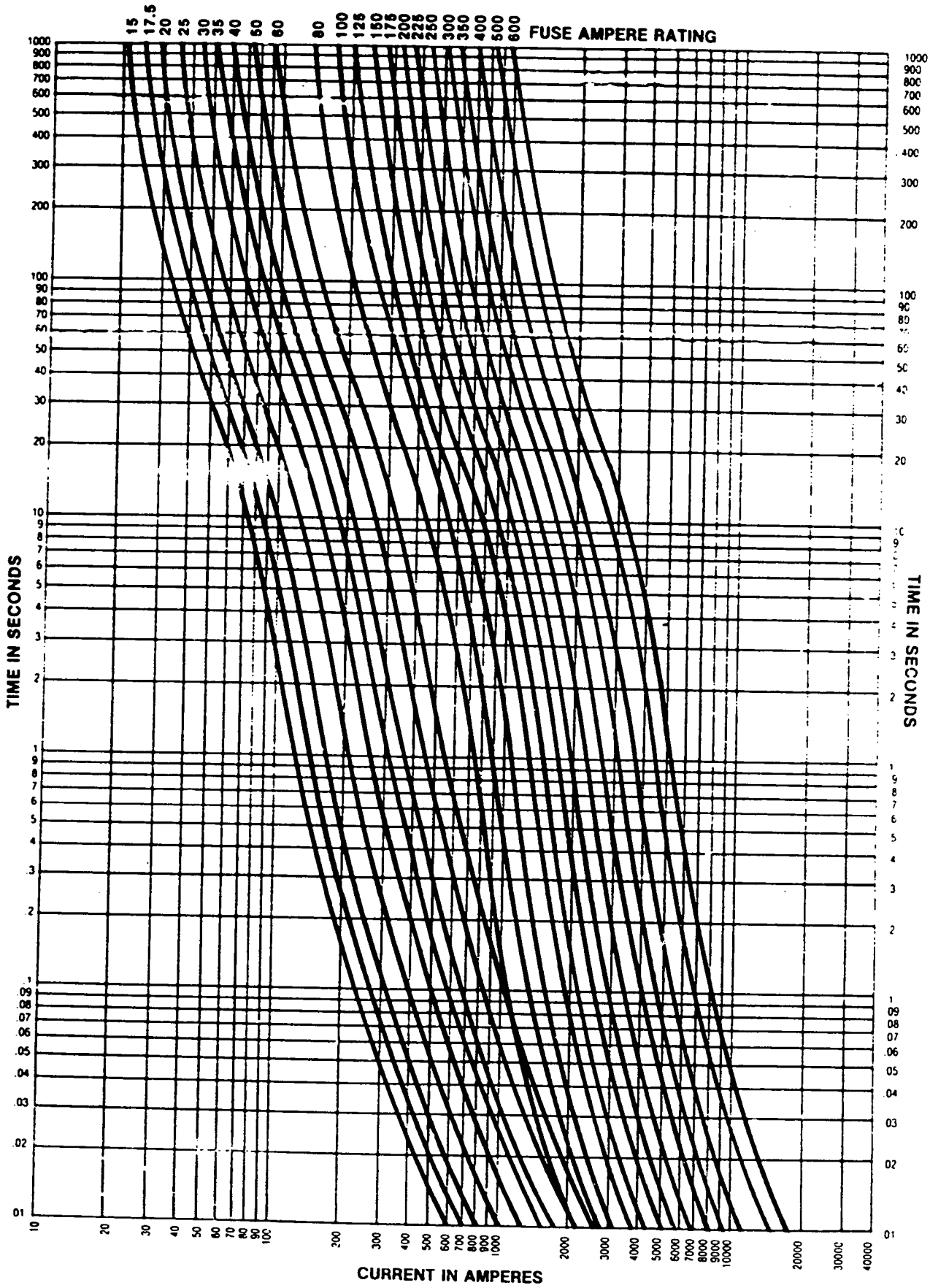
D.3 SHAWMUT CABLE PROTECTORS CHARACTERISTICS CURVES FOR CP6 & CP6A FROM REFERENCE 3.16


TRIONIC
CHARACTERISTIC CURVES
MELTING TIME-CURRENT
250 VOLTS
36717-F
TIME IN SECONDS
CURRENT IN AMPERES X10
600A
400A
300A
100A
60A
30A


TRIONIC
CHARACTERISTIC CURVES
MELTING TIME-CURRENT
600 VOLTS
36817-E
TIME IN SECONDS
CURRENT IN AMPERES X10
600A
400A
300A
100A
60A
30A

Tri-onic' Fuse

Melting Time-Current Data
15-600 Amps, 600 Volts
Cat. No. TRS(Amp. Rating)R

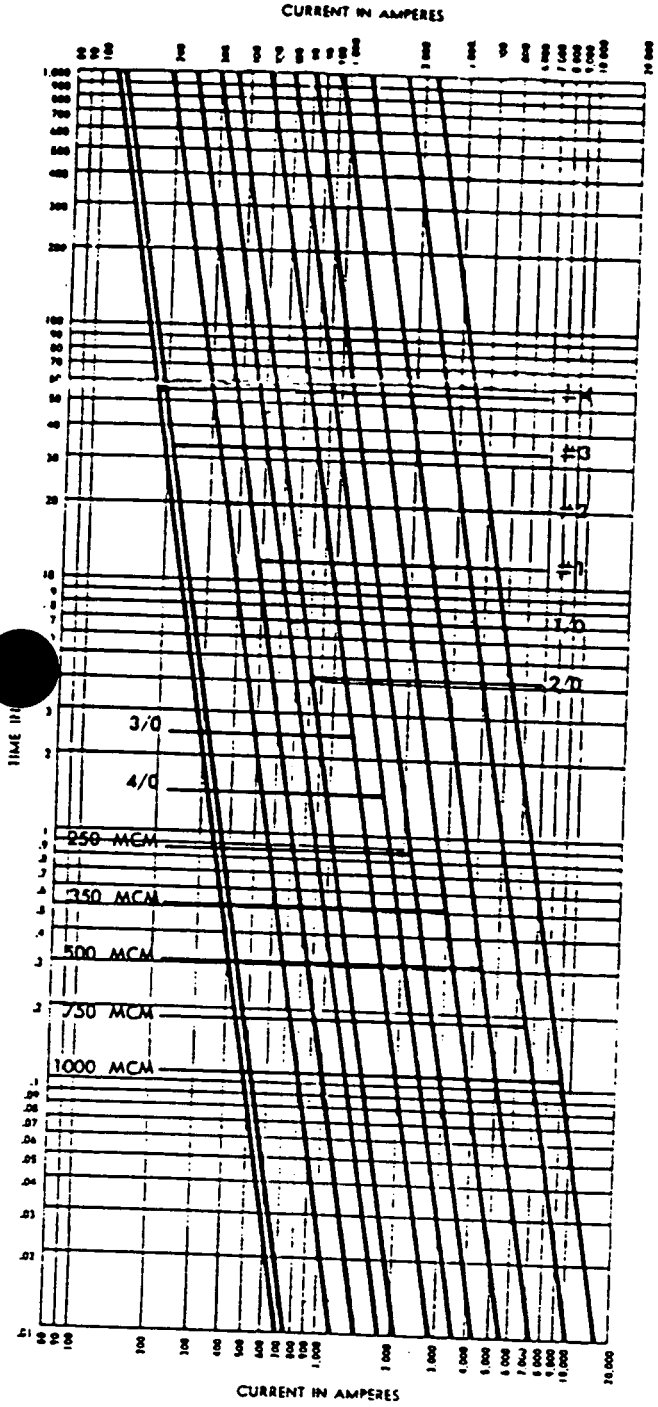


SHAWMUT CABLE PROTECTOR

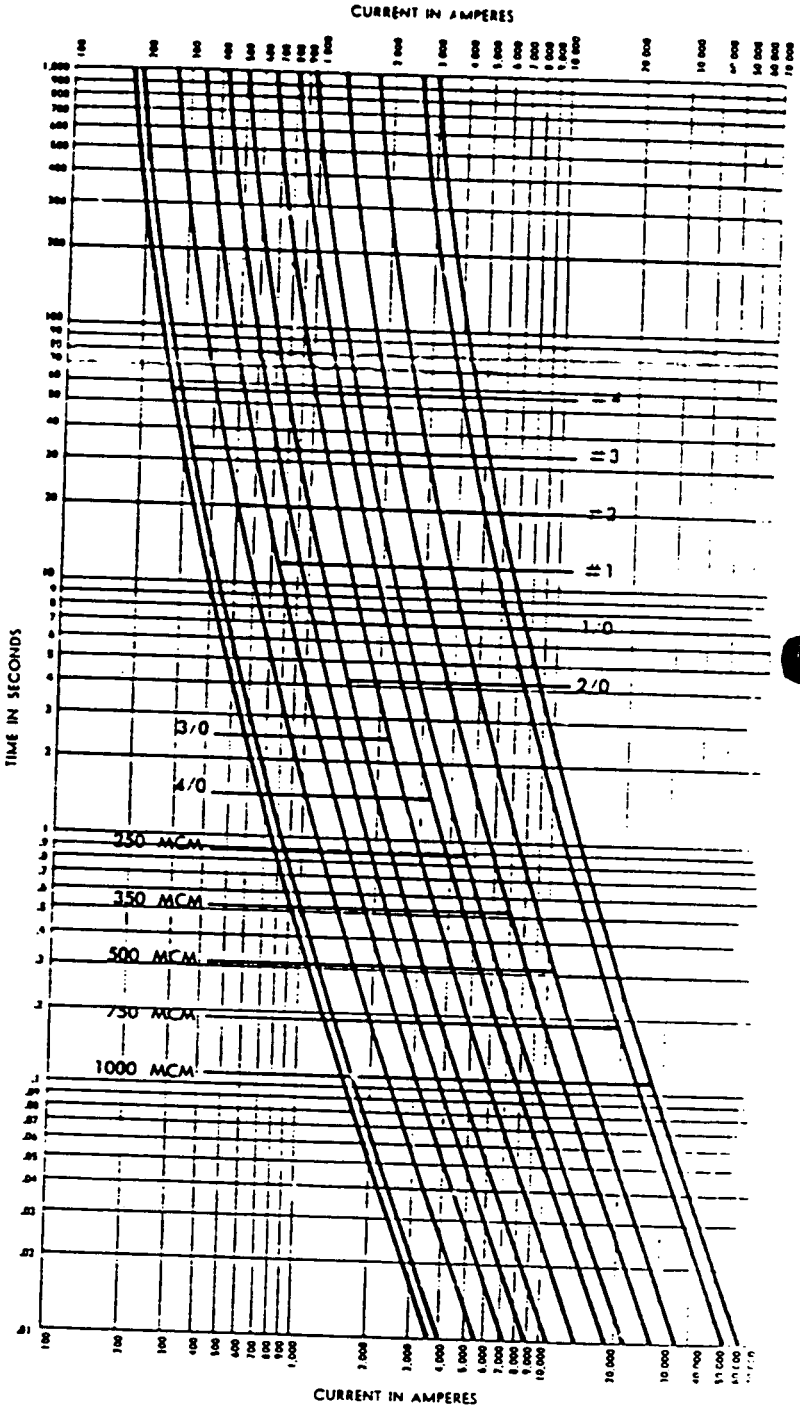
from Ref 3.16

CHARACTERISTIC CURVES
600 V.A.C. or less
(For Copper Cables)

CP6



CP6A



ATTACHMENT NO. P06202B
CALCULATION NO. WBN EEB-MS-TI08-0008

PREPARED BY: [signature] DATE: 10-15-91
CHAECKED BY: [signature] DATE: 10-15-91

SHEET 1

1.0 PURPOSE & SCOPE

1.1 PURPOSE

THE PURPOSE OF THIS ATTACHMENT IS TO EVALUATE AND SUPPORT MODIFICATIONS TO BE IMPLEMENTED UNDER DCN P-06202-B. THE DCN INCLUDES CHANGING MOTOR 0-MTR-31-27-B (BATTERY ROOM, EL. 692, EXHAUST FAN CONTROL BUILDING) FROM A 1.5 HP TO 2.0 HP MOTOR TO CORRECT AIR FLOW PROBLEMS.

THE BASELINE CALCULATIONS SHOWN BELOW EVALUATE THE IMPACT OF THE DCN MODIFICATIONS. THESE EVALUATIONS ARE IDENTIFIED IN EACH BASELINE CALCULATION BY ATTACHMENT NO. P06202B.

BASELINE CALCULATION	CALCULATION NO.
TELAS	WBN EEB-MS-TI05-0001
AUXILIARY POWER SYSTEM ANALYSIS	WBN EEB-MS-TI06-0002
480V AC 1E COORDINATION/PROTECTION	WBN EEB-MS-TI08-0008
DIESEL GENERATOR LOADING ANALYSIS	WBN EEB-MS-TI03-0012
CABLE AMPACITY-NV 4 AND NV 5 CABLE IN CLASS 1E RACEWAYS	WPEVAR89909010

THIS SHEET ADDED BY REV 167 J.I.H. 10-17-91 DPH 10-17-91

PREPARED BY: [signature] DATE: 10-15-91
CHAECKED BY: [signature] DATE: 10-15-91

1.2 SCOPE

THIS ATTACHMENT EVALUATES AND VERIFIES THAT THE PROPOSED MOTOR IS ADEQUATELY PROTECTED AND MEETS THE GUIDELINES APPLICABLE TO THE BASELINE CALCULATION.

2.0 ASSUMPTIONS

SEE "ASSUMPTIONS" IDENTIFIED IN THE BASELINE CALCULATION (SECTION 2.0).

3.0 SOURCES OF DESIGN INPUT/REFERENCES

3.1 DCN P-06202-B

3.2 TVA DWGS. 1-45W756-5-R2, 45E2772-4A-RE

4.0 DESIGN INPUT DATA

4.1 ACCORDING TO APPENDIX A, THE NEW MOTOR CHARACTERISTICS ARE:

3-PHASE, Y-CONNECTED, 60HZ INDUCTION MOTOR
MANUFACTURER: RELIANCE ELECTRIC COMPANY
RATED VOLTAGE, KV RATED: 0.46KV
HORSEPOWER, HP: 2HP
FULL LOAD CURRENT, FLI: 2.7 AMP
FULL LOAD POWER FACTOR, PF = 0.82
EFFICIENCY, EFF: 0.846
SERVICE FACTOR: 1.0
DUTY: CONTINUOUS
AMBIENT: 40°C
LOCKED-ROTOR CURRENT, LRI: 22 AMP
LOCKED-ROTOR POWER FACTOR, LRPF: 0.60
RATED SPEED: 1745 RPM

4.2 STARTER SIZE FOR A 2HP MOTOR: 1 (PAGE 60 OF BASELINE CALCULATION)

4.3 BREAKER DATA (PAGE 83 OF BASELINE CALCULATION AND REF. 3.2)
MANUFACTURER: ITE
FRAME: EF
CATALOG NUMBER: EF3-A010
CONTINUOUS CURRENT: 10A

5.0 DOCUMENTATION OF ASSUMPTIONS

SEE "DOCUMENTATION OF ASSUMPTIONS" IN BASELINE CALCULATION (SECTION 5.0)

THIS SHEET ADDED BY REV 167 J.I.H. 10-17-91 DPH 10-17-91

PREPARED BY: [signature] DATE: 10-10-91
CHAECKED BY: [signature] DATE: 10-15-91

6.0 COMPUTATIONS AND ANALYSIS (METHODOLOGY)

THE METHODOLOGY FOR THIS ATTACHMENT FOLLOWS THAT ESTABLISHED IN ATTACHMENT 2, SECTION 6.1, OF THIS BASELINE CALCULATION. THUS, FOR CONTINUOUS DUTY MOTORS AT MCCs THE 480V LOAD BREAKERS SHOULD BE SET AND THE OVERLOAD HEATERS SHOULD BE SELECTED AS FOLLOWS:

6.1 MAGNETIC PICKUP OF BREAKER SHOULD BE BETWEEN 185% TO 235% OF LOCKED ROTOR CURRENT, THIS IS BETWEEN (1.85 x 22A =) 40.7A AND (2.35 x 22A =) 51.7A. SET POSITION NO. 3 OF THE ITE BREAKER CORRESPONDS TO 45A, WHICH IS WITHIN THE CALCULATED RANGE (PAGE 83 OF BASELINE CALCULATION).

6.2 THERMAL OVERLOAD HEATER TRIP RATING SHOULD BE BETWEEN 115% TO 130% OF MOTOR FULL LOAD CURRENT FOR MOTORS WITH 1.0 SERVICE FACTOR, THIS IS, BETWEEN (1.15 x 2.7A =) 3.11A AND (1.30 x 2.7A =) 3.51A.

6.3 DETERMINE OVERLOAD HEATER USING TABLE VALUES ON PAGE 190 OF BASELINE CALCULATION FOR 3 OVERLOAD HEATERS AND THE PROPER NEMA SIZE STARTER. NEMA SIZE 1 STARTER IS GOOD FOR 2 HP MOTORS (SECTION 4.2). THUS, FOR A MOTOR WITH 3 OVERLOAD RELAYS AND A MINIMUM FULL LOAD CURRENT OF 2.75A (FROM TABLE ON PAGE 190), THE HEATER SHOULD BE G30T29. THE CURRENT AT WHICH HEATER WILL TRIP THE OVERLOAD RELAY WITH THE KNOB AT 100% MARK IN AN ANBIENT OF 40°C IS 1.25 TIMES THE MINIMUM FULL LOAD CURRENT OR (1.25 x 2.75A =) 3.44A. THIS TRIP CURRENT IS WITHIN THE BOUNDARY DETERMINED IN SECTION 6.2.

7.0 GRAPHICS

NOT APPLICABLE

8.0 SUMMARY OF RESULTS

CALCULATION RESULTS ARE SUMMARIZED IN APPENDIX B. NOTE THAT APPENDIX B GIVES VALUES AT WHICH BREAKER SHOULD BE SET AND THE NEW THERMAL OVERLOAD RELAY DISREGARDING EXISTING BREAKER SETTINGS AND THERMAL OVERLOAD RELAY.

9.0 CONCLUSIONS

9.1 EXISTING BREAKER SHOULD HAVE AN INSTANTANEOUS SETTING OF 45A (SET POSITION 3).

9.2 THERMAL OVERLOAD RELAY SHOULD BE G30T29.

10.0 APPENDICES

APPENDIX A - DATA SHEETS FOR NEW MOTOR (6 SHEETS)

APPENDIX B - PAGE 83 OF REVISION 17 OF BASELINE CALCULATION.

THIS SHEET ADDED BY REV 167 A.L.H. 10-17-91 DPH 10-17-91

FOR APPENDIX A (6 sheets) of this Attachment

ATTACHMENT NO. P06202B
CALCULATION WBNEEB-MS-TI08-0008
CKD: DH 10/16/91

APPENDIX A
Sheet 1 of 6

Signature 10/17/91
Date

55 YF-882801
E-1368-A
RE-ISSUED 5/9/

APPROVED
DATE NOV 24 1989
BY CHIEF NUCLEAR ENGINEER

SPECIAL MARKING

CUSTOMER: T.V.A.

CUSTOMER CONTRACT NO: 79K36-825328

TVA ITEM NO: 107,108

TVA MARK NO: NA

TVA UNIT NO: 1VA-MAHU-676, 2VA-MAHU-676

FRAME: 182T

TYPE: P

INSULATION CLASS:

INSULATION TYPE: RH

S.O. NO: 55YF-882801

HP: 2

RPM @ FULL LOAD: 1745

VOLTS: 460

AMPS @ FULL LOAD: 2.7

HZ: 60

SERVICE FACTOR: 1.0

1.15

DESIGN: B

CODE: K

PHASE: 3

DUTY: CONTINUOUS

ENCLOSURE: TEFC-X

FE BEARING: 25BC02X30X26

BE BEARING: 30BC02X30X26

AMBIENT: 40

AMERICAN AIR FILTER PROJECT NO: 91-1348

LOCKED ROTOR AMP: 22.0

LRA - 24

WIRING DIAGRAM: 416820-24

PHASE SEQUENCE: 1,2,3 PHASE ROTATION FOR CCW ROTATION FACING F.E.

MANUFACTURER: RELIANCE ELECTRIC COMPANY

YEAR OF MANUFACTURE: 1980

NBM-109

TVA JUL 16 1980
Yellow Creek
CONTRACT NO: 79K36-825328
TITLE:
CHECKED
Air Handling Units

PROJECT YCN DATE 7-11-80
CONTRACT 79K36-825328 FILE NBM-109
DRAWING NO Special Marking (Item 107, 108)
SHEET ____ REV ____ UNIT ____

THIS SHEET ADDED BY REV 167 J.L.H. 10-17-91
DAH 10-17-91

ATTACHMENT NO. P06202B
CALCULATION WBNEEB-MS-TI08-0008

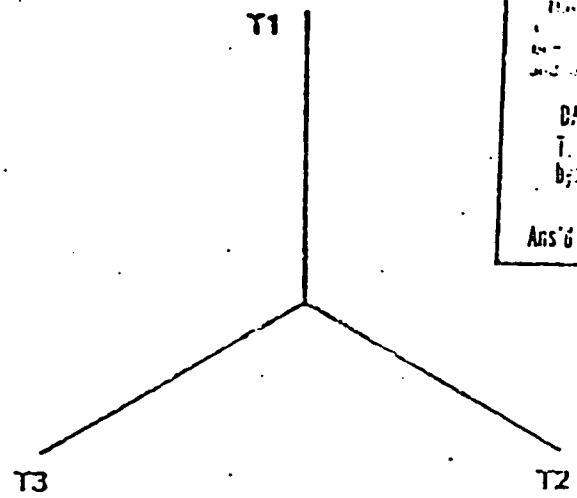
APPENDIX A
Sheet 2 of 6

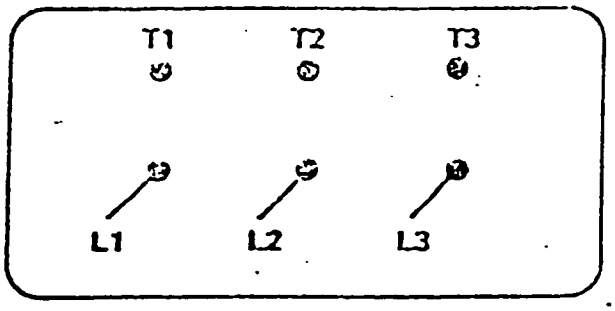
A-C MOTOR

CONNECTION DIAGRAM

STANDARD 3 LEAD — Y CONNECTED

APPROVED
DATE NOV 24 1980
T.V.A. PROJECT CONSTRUCTION
By: CHIEF NUCLEAR ENGINEER
Ass'd by Line _____





(N.P. 1575-8A)

NBM-109

TVA JUL 16 1980
Yellow Creek
CONTRACT NO: 79K36-825328
TITLE:
CHECKED
Air Handling Units

PROJECT YCN DATE 7-11-80
CONTRACT 79K36-825328 FILE NBM-109
DRAWING NO. Connection Diag (Item 107, 108)
SHEET _____ REV _____ UNIT _____

THIS SHEET ADDED BY REV 167 10-17-81 DPH

RELIANCE ELECTRIC COMPANY CLEVELAND, OHIO 44117 U.S.A.	DR. BY NFJ CK. BY GS APP. BY MEJ DATE 10-8-76	CONNECTION DIAGRAM	416820-24 ISSUE DATE OCTOBER 8, 1976

2667000

ATTACHMENT NO. PO 6202B
CALCULATION WBN EEB-MS-TI08-0008

APPENDIX A
Sheet 3 of 6

REL. S.O.	FRAME	HP	TYPE	PHASE/ HERTZ	RPM	VOLTS
-	182T	2	P	3/60	1745	460

AMPS	DUTY	AMB°C/ INSUL.	S.F.	NEMA DESIGN	CODE LETTER	ENCL.
2.7	CONT	40/H	1.0	B	K	TEFC-XT

E/S	ROTOR	TEST S.O.	TEST DATE	STATOR RES. @ 25°C OHMS (BETWEEN LINES)
581656	412012-31-ME	29YF882801	05/05/80	8.14

PERFORMANCE

LOAD	HP	AMPERES	RPM	% POWER FACTOR	% EFFICIENCY
NO LOAD	0	1.35	1800	12.6	0
1/4	.500	1.50	1786	42.7	72.1
2/4	1.00	1.81	1773	63.9	81.2
3/4	1.50	2.23	1760	75.5	84.1
4/4	2.00	2.70	1745	82.0	84.6
5/4	2.50	3.26	1730	85.5	83.8

TVA JUL 16 1980
Yellow Creek
CONTRACT NO: 79K36-825328
TITLE: Air Handling Units
CHECKED

NBM-109

SPEED TORQUE

	RPM	TORQUE % FULL LOAD	TORQUE LB.-FT.	AMPERES
LOCKED ROTOR	0	262	15.8	22.0
PULL UP	0	262	15.8	22.0
BREAKDOWN	1300	375	22.6	13.6
FULL LOAD	1745	100	6.02	2.70

APPROVED
NOV 24 1980
CHIEF NUCLEAR ENGINEER

AMPERES SHOWN ARE FOR 460 VOLT CONNECTION. IF OTHER VOLTAGE CONNECTIONS ARE AVAILABLE, THE AMPERES WILL VARY INVERSELY WITH THE RATED VOLTAGE.

REMARKS:

PROJECT YCN DATE 7-11-80
CONTRACT 79K36-825328 FILE NBM-109
DRAWING NO Performance Data (Item 107, 108)
SHEET ____ REV ____ UNIT ____

RELIANCE ELECTRIC
CLEVELAND, OHIO 44117 U.S.A.

DR. BY TMH
CK. BY MCB
APP. BY CAY
DATE 5/7/80

A-C MOTOR PERFORMANCE DATA

E1368A-A-001

ISSUE DATE 05/07/80

SHEET ADDED BY REV 167 J.H.H. 10-17-91 DPM 10-17-91

C/R 253141

ATTACHMENT No. P06202B
CALCULATION WBNEEB-MS-TI08-0008

APPENDIX A
Sheet 4 of 6

E1368A-A-001

SPECIAL DATA SHEET

a. Manufacturer RELIANCE ELECTRIC COMPANY

b. Complete Name Plate Data and Model Number

SEE SPECIAL MARKINGS TABULATION

c. Full Load Current at 460 Volts

2.7

d. Locked-Rotor Current at 460 Volts

22.0

APPROVED
This approval does not relieve the Contractor from any part of his responsibility for the correctness of design details and dimensions.
DATE NOV 24 1980
T.V.A. NUCLEAR ENG'G BRANCH
By: CHIEF NUCLEAR ENGINEER
Ass'd by LTG

e. Locked-Rotor Withstand Time, In Seconds, Starting from Ambient Temperature.

31 SECONDS

f. Locked-Rotor Withstand Time, In Seconds, Starting from Rated Temperature.

17 SECONDS

g. Service Factor 1.0

h. Space heater wattage, voltage and number of phases if applicable

N/A

i. Efficiency at 100%, 75% and 50% of Rated Horsepower at Full Rated Voltage.

84.6, 84.1, 81.2

j. Power Factor at 100%, 75% and 50% of Rated Horsepower at Full Rated Voltage.

82.0, 75.5, 63.9

k. Rated horsepower (for motors 10 horsepower and less)

2.0

l. AFBMA Numbers BRG; DRIVE END 30BC02X30X26
BRG. OPP DRIVE END 25BC02X30X26

NBM-109

THIS SHEET ADDED BY REV 167 J.H.H. 10-17-91 DPH 10-17-91

PROJECT YCN DATE 7-11-80
CONTRACT 79K36-825328 FILE NBM-109
DRAWING NO. Special Data Sheet (Item 107, 108)
SHEET ____ REV ____ UNIT ____

TVA JUL 16 1980
Yellow Creek
CONTRACT NO: 79K36-825328
TITLE:
CHECKED
Air Handling Units

ATTACHMENT No. P06202B
CALCULATION WBNEEB-MS-TI08-0008

APPENDIX A
Sheet 5 of 6

ADDENDUM # 2

S.O. 55YF-882801

American Air Filter

P.O. 91-1348- 2 & 3

Project Services - RCS - Send the following drawings and data to Customer, Attention: Mr. Phil Reitz, Purchasing Department.

All data to be sent Registered Mail.

All data to show the following special marks:

Customer:- TVA
Customer Contract Number: - 79K36-825328
TVA Item No. - 107, 108
TVA Mark No. N/A
TVA Unit No. - 1VA-MAHU-676, 2VA-MAHU-676

Frame - 182T	Type - P	Ins. Class - H
Ins. Type - RH	S.O. No. - 55YF-882801	
HP - 2	RPM	
Volts - 460	Amps	
Hz - 60	S.F. - 1.0	
Design - B	Code	
Phase - 3	Duty - Continuous	
F.E. Bearing	B.E. Bearing	
Ambient - 40°C		
AAF Project 91-1348		

APPROVED
This approval does not relieve the Contractor from any part of his responsibility for the correctness of design, details and dimensions.
DATE NOV 24 1980
T.V.A. NUCLEAR ENGR BRANCH
By: CHIEF NUCLEAR ENGINEER
Ass'd by Ltr# _____

F - Approval

1. Certified D/S W/Diagram - 12 Copies
2. Performance Data Sheet - 12 copies
3. Special Data Sheet - 12 copies

N8m-109

TVA JUL 16 1980
Yellow Creek
CONTRACT NO: 79K36-825328
TITLE:
CHECKED
Air Handling Units

Final (after shipment) - 12 copies each

1. Instruction Manual
2. Spare Parts List

PROJECT YCN DATE 7-11-80
CONTRACT 79K36-825328 FILE N8m-109
DRAWING NO. Addendum #2 (Item 107,108)
SHEET _____ REV _____ UNIT _____

Send 1 copy of each of the above to Louisville D.O.- S. Schieman, and Atlanta D.O. - T. Dershimer

THIS SHEET ADDED BY REV 167 J.H.H. 10-17-79 DPH 10-17-79

ATTACHMENT No. PO 6202B
CALCULATION WBN EEB-MS-TI08-0008

APPENDIX A
Sheet 6 of 6

Facsimile

RELIANCE ELECTRIC

Date 9/13/91

TO: JOSE HERRERA LOCATION _____

FROM: TOM RODANO/RICH WILSON
PHONE (216) 256-7740
FAX (216) 256-7714

RELIANCE ELECTRIC
24800 TUNGSTEN RD.
CLEVELAND, OH 44117

NUMBER OF PAGES 0 EXCLUDING COVER SHEET

RELIANCE S/O # YF882801, 2 HP, E1368A

LOCKED ROTOR POWER FACTOR = .60

THIS SHEET ADDED BY REV 167 J.L.H. 10-17-91 DPH 10-17-91

ATTACHMENT No. P06202B
CALCULATION WBN EEB-MS-TI08-0008

APPENDIX B
Sheet 1 of 1

Page 83 of 561

Page No. 27
01/19/90

Prepared [illegible] / [illegible] 2/5/90 / [illegible] 2/5/90 Date 1/3/90
Verified [illegible] / [illegible] Date 2/5/90 / 2-5-90

TVA WATTS BAR NUCLEAR PROJECT
FOR INFORMATION ONLY

(TVACABLE.DBF)

WBN EEB-MS-TI08-0008 R0

Attachment No. 3
Calc. No.
Sheet of

COMPT. NO.	SERVICE	RATING HP/KVA	SERV. FACTOR	FLA	LRA	START SIZE	THERMAL O/L RELAY MODEL CAT #	I NTR.	TRIP POINT	NTR SIZE ACCEPTABLE	BREAKER TYPE	BKR. CONT. CURR. SETTING	BKR. INST. SETTING	SET FOR	ACCEPT?	REMARKS
** NODE 209																
* CLASSIFICATION 0 2-GCX-214-01-0																
2A	AUX. CONT. AIR COMP. 0-0 0-NTR-32-06-0	20 HP	1.15	27	157.09	2	T51	34.0		Y	EF3-L030	30 LB	230	4	Y	
1A1	NORM. FDR. 480V CLA VTR. BD. 201-0										ITE KK35-00002 ETS	000			—	
1A2	ALT. FDR. 480V CLA VTR. BD. 201-0										ITE KK35-00002 ETS	000			—	
2B	SPARE															
2C	PENE. RM. EL. 713 CLR. FAN 20-0 2-NTR-30-197-0	3 HP	1.15	4.2	26.69	1	T33	5.43		Y	EF3-A010	10	45	3	N	RESET BKR TO 4
2D	PERM. MAKE-UP NTR. PUMP 20 2-NTR-01-7	30 HP	1.15	36	236.04	3	T51	41.0		N	EF3-A050	30 LE	400	2	N	REPLACE FDR WITH TS2. RESET BKR TO 3
2A	SPARE															
3F1	CONT. BLDG. UPPER COMP'T. AIR HDL. 2-HC-90-112-0	3 HP		4.6	132						EF3-B020	20			BRY BALANCED	
3F1	VLV. & STORE. RM. SUMP 0 PUMP 20 2-NTR-40-56-0	1.5 HP		2.65	20						EF3-B020	20			NOT EVALUATED	
3F2	SPARE															
3B	PIPE CHASE CLR. FAN 20-0 2-NTR-30-202-0	3 HP	1.0	4	25.2	1	T33	5.43		N	EF3-A010	10	45	3	N	REPLACE NTR WITH TS2. RESET BKR TO 1
3C	CONT. SPRAY PUMP 20-0 RM. CLR. FAN 2-NTP-30-170-0	7.5 HP	1.15	9	75.71	1	T41	12.31		Y	EF3-A025	25	125	3	N	RESET BKR TO 4
3D	AUX. BLDG. GAS TRTMT. SYS. FAN 0-0 2-NTR-30-157-0	50 HP	1.0	62	304	3	T56	72.88		Y	EF3-A100	100	760	3	N	RESET BKR TO 2
3F2	SIS HEAT TRACE TRNF. 02 0-BTT-234-02/SIS	9KVA		10.84							EF3-B020	20			Y	
4A	BTTY. RM. EL. 692 EXH. FAN C-0 0-NTR-31-27-0	2HP	1.0	2.7	22	1	T29	3.44		Y	EF3-A010	10	45	3	Y	DCN P-06202-B

THIS SHEET ADDED BY REV 16 10-1-91 JPH

DPH 10/15/91
J.J.H. 10-15-91

ATTACHMENT NO. M15092A
CALCULATION NO. WBN-EEB-MS-TI08-0008
PAGE 1
PREPARED BY: DJK DATE: 12/11/91
REVIEWED BY: [illegible] DATE: 12-12-91

PURPOSE

The purpose of this attachment is to evaluate and support modifications to be implemented under DCN M-15092-A.

The following baseline calculations evaluate the DCN for their impact ,if required. The evaluations for these modifications may be identified by "ATTACHMENT NO. M15092" or the calculation will otherwise identify the DCN and the revision in which the modifications are evaluated.

BASELINE CALCULATION	CALCULATION NO.
AUXILIARY POWER SYSTEM ANALYSIS....	WBN-EEB-MS-TI06-0002
480VAC 1E COORD/PROTECTION.....	WBN-EEB-MS-TI08-0008
480V NON-CLASS 1E POWER CABLE ASSOCIATED CIRCUITS.....	WBN-EEB-MS-TI15-0011
CABLE AMPACITY - NV4 and NV5 CABLES IN CLASS 1E RACEWAYS.....	WBPEVAR8909010

CALCULATION NO. WBN-EEB-MS-TI08-0008
ATTACHMENT M15092
PAGE 2
PREPARED BY: DM DATE: 12/11/91
REVIEWED BY: JFM DATE: 12-12-91

TABLE OF CONTENTS

SECTION		PAGE NO.
1.0	SCOPE	3
2.0	ASSUMPTIONS	3
3.0	SOURCES OF DESIGN INPUT	3
4.0	DESIGN INPUT DATA	4
5.0	JUSTIFICATION OF ASSUMPTIONS	4
6.0	COMPUTATIONS & ANALYSIS	4
7.0	GRAPHICS	4
8.0	SUMMARY OF RESULTS	4
9.0	CONCLUSIONS	4
10.0	ATTACHMENTS	NO. OF PAGES
	APPENDIX A	4

TOTAL NO. OF PAGES = 8

PREPARED BY: DJG DATE: 12/11/91
REVIEWED BY: GJM DATE: 12-12-91

1.0 SCOPE

This revision evaluates the breakers, breaker settings, overloads and cables associated with the changes in DCN M-15092-A

DCN M-15092-A replaces cables which were identified as ampacity failures, in calculation WBPEVAR8909010.

CABLE NO.	OLD CABLE SIZE	NEW CABLE SIZE	REMARKS
1PL1060A	#2/0	#250	
1PL1080B	#2/0	#250	
1PL4895B	#4/0	#400	#4/0 PIGTAIL USED TO FACILITATE TERMINATION
1PL6380B	#8	#2	#8 PIGTAIL USED TO FACILITATE TERMINATION
2PL4540B	#1/0	#4/0	
2PL4895A	#4/0	#400	#4/0 PIGTAIL USED TO FACILITATE TERMINATION
1PL6385A	#8	#2	#8 PIGTAIL USED TO FACILITATE TERMINATION

2.0 ASSUMPTIONS

2.1 An increase in cable size will not impact existing breakers, breaker settings and overloads.

2.2 See assumptions identified in the base calculation (section 2.0).

3.0 SOURCES OF DESIGN INPUT/REFERENCES

3.1 DCN M-15092-A

3.2 TVA calculation CABLE AMPACITY - NV4 AND NV5 CABLES IN CLASS 1E RACEWAYS WBPEVAR8909010 APPENDIX I.

PREPARED BY: DJL DATE: 12/11/91
REVIEWED BY: GJM DATE: 12-17-91

4.0 DESIGN INPUT DATA

4.1 Cable size documented in DCN M-15092-A

4.2 Cable data was taken from calculation WBPEVAR8909010 Appendix I.

5.0 JUSTIFICATION OF ASSUMPTIONS

5.1 The applicable time current curves for each of the associated protective devices provide justification that the increased cable size is adequately protected.

5.2 See JUSTIFICATION OF ASSUMPTIONS identified in the base calculation (section 5.0).

6.0 COMPUTATIONS & ANALYSIS

METHODOLOGY

The cable sizes shown in Appendix A were revised in accordance with DCN M-15092-A and calculation WBPEVAR8909010, Appendix I. If the cable size was larger than the original size shown, then no further evaluation is required.

7.0 GRAPHICS

Not applicable

8.0 SUMMARY OF RESULTS

The results of this analysis is that the protection for the 480V Class 1E cables within the scope previously outlined have been determined to pass as indicated in section 5.1.

9.0 CONCLUSION

All cables within the scope of this attachment are adequately protected.

~~TABLE C1~~
DJC 12.07.91
~~SECTION C~~ APPENDIX A
ATTACHMENT NO. ~~M12212~~ M15092A
WBN EEB-MS-T100-0000, ~~R10~~ R18
480V SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

DJC 12.07.91
~~PAGE 97~~

CMPT	LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	CABLE NO	CABLE SZ	CABLE PROT	NOTES
9A	0-MTR-78-9-B		200	0.80	4			7	1PL4895B	~~#4/0~~ #400 DJC 12.07.91	PASS	R18
9B	1-MCC-214-B1-B		600	1.00	[illegible]	[illegible]	0.18		1PL4966B	#400*	PASS	* 2 COND/PHASE
**	480V SHDN BD 2A1-A											
	2-MCC-215-A1-A		600	0.75	6	4	0.18		2PL4975A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR
									2PL4976A	#400		AMPACITY
10A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-3-F								2PL4900A	#400	PASS	SEE COMPT 10A
									2PL4908S	#1/0		
10AB	1-INV-235-3-F								2PL4900A	#400	PASS	SEE COMPT 10A
									2PL4908S	#1/0		
10AC	2-INV-235-3F								2PL4900A	#400	PASS	SEE COMPT 10A
									2PL4907S	#1/0		
10AD	2-DXF-237-A								2PL4900A	#400	PASS	SEE COMPT 10A
									2PL04,05	#1/0		
10B	2-MCC-214-A1-A		600	1.10	6	6	0.18		2PL4957A	#400*	PASS	2 COND/PHASE
	[illegible]MCC-214-A2/A		600	0.60	8	6	0.18		2PL4962A	#400	PASS	
	[illegible]CC-213-A1-A		600	1.10	6	6	0.18		2PL4935A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR
									2PL4936A	#300		AMPACITY
9B	2-MCC-232-A-A		600	1.10	6	6	0.18		2PL4950A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
**	480V SHDN BD 2A2-A											
4D	2-MTR-26-9-A		600	1.25	4			6	2PL5004A	#500	PASS	
									2PL5003A	#500		
	2-MCC-215-A2-A		600	0.75	6	4	0.18		2PL4978A	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR
									2PL4979A	#400		AMPACITY
10A	2-MCC-232-A-A		300	0.70	6	8	0.18		2PL4951A	#400	PASS	
8B	2-MCC-213-A2-A		600	1.10	6	6	0.18		2PL4938A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR
									2PL4939A	#300		AMPACITY
9A	SEE NOTE		400	0.85	6	8	0.18					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 9AA, 9AB, 9AC, AND 9AD
9AA	0-CHGR-236-4-G								2PL4913A	#400	PASS	SEE COMPT 9A
									2PL4920S	#1/0		
9AB	1-INV-235-4-G								2PL4913A	#400	PASS	SEE COMPT 9A
									2PL4921S	#1/0		
9AC	2-INV-235-4-G								2PL4913A	#400	PASS	SEE COMPT 9A
									2PL4922S	#1/0		
9AD	2-DXF-237-B								2PL4913A	#400	PASS	SEE COMPT 9A
									2PL17,18	#1/0		
[illegible]	2-MCC-214-A1-A		600	1.00	8	6	0.18		2PL4958A	#400*	PASS	* 2 COND/PHASE
	[illegible]-MCC-214-A2-A		600	1.10	6	6	0.18		2PL4961A	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
9D	[illegible]-MTR-78-12-A		200	0.80	4			7	2PL4895A	~~#4/0~~ #400 DJC 12.07.91	PASS	R18

~~TABLE G1~~ DK 12.07.91

DK 12.07.91 ~~PAGE 98~~

~~SECTION C~~ APPENDIX A

ATTACHMENT NO. ~~M12212~~ M15092A

WBN EEB-MS-TI08-0008, ~~R10~~ R18

480V SHUTDOWN BOARD CLASS 1E CABLE PROTECTION

COMPT	LOAD	BKR TYPE	SENSOR	LDPU	LDTD	SDPU	SDTD	INST	CABLE NO	CABLE SZ	CABLE PROT	NOTES
**	480V SHDN BD 2B1-B											
	2-MCC-215-B1-B		600	0.75	6	4	0.10		2PL4982B	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									2PL4983B	#400		
10A	SEE NOTE		400	0.85	6	8	0.10					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-3-F								2PL4901B	#400	PASS	SEE COMPT 10A
									2PL4909S	#1/0		
10AB	1-INV-235-3-F								2PL4901B	#400	PASS	SEE COMPT 10A
									2PL4908S	#1/0		
10AC	2-INV-235-3-F								2PL4901B	#400	PASS	SEE COMPT 10A
									2PL4907S	#1/0		
10AD	2-DXF-237-A								2PL4901B	#400	PASS	SEE COMPT 10A
									2PL04,05	#1/0		
10B	2-MCC-214-B1-B		600	1.10	6	6	0.10		2PL4965B	#400*	PASS	* 2 COND/PHASE
7B	0-MTR-78-35-S		200	0.80	4			7	2PL4540B	~~#1/0~~ #4/0	PASS	R1
									1PL4541S	#1/0 DK		
	2-MCC-213-B1-B		600	1.10	6	6	0.10		2PL4942B	#400* 12.7.91	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									2PL4943B	#300		
	2-MCC-214-B2-B		600	0.60	8	6	0.10		2PL4970B	#400	PASS	
9B	2-MCC-232-B-B		600	1.10	6	6	0.10		2PL4953B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
**	480V SHDN BD 2B2-B											
4D	2-MTR-26-11-B		600	1.25	4			6	2PL5018B	#500	PASS	
									2PL5017B	#500		
	2-MCC-215-B2-B		600	0.75	6	4	0.10		2PL4985B	#500*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									2PL4986B	#400		
10A	SEE NOTE		400	0.85	6	8	0.10					PROT DEVICE FOR PARALLEL LOADS IDENTIFIED AS COMPT 10AA, 10AB, 10AC, AND 10AD
10AA	0-CHGR-236-4-G								2PL4914B	#400	PASS	SEE COMPT 10A
									2PL4920S	#1/0		
10AB	1-INV-235-4-G								2PL4914B	#400	PASS	SEE COMPT 10A
									2PL4921S	#1/0		
10AC	2-INV-235-4-G								2PL4914B	#400	PASS	SEE COMPT 10A
									2PL4922S	#1/0		
10AD	1-DXF-237-B								2PL4914B	#400	PASS	SEE COMPT 10A
									2PL17,18	#1/0		
10B	2-MCC-214-B2-B		600	1.10	6	6	0.10		2PL4969B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
8B	2-MCC-213-B2-B		600	1.10	6	6	0.10		2PL4945B	#400*	PASS	* NEW CABLE SIZE (2/PHASE) FOR AMPACITY
									2PL4946B	#300		
	2-MCC-232-B-B		300	0.70	6	8	0.10		2PL4954B	#400	PASS	
	2-MCC-214-B1-B		600	1.00	8	6	0.10		2PL4966B	#400*	PASS	* 2 COND/PHASE

~~TABLE C2~~
D/C 12-07-91
~~SECTION C~~ APPENDIX A
ATTACHMENT NO. ~~M15011~~ M15092A
WBN EEB-MS-T100-0000, ~~R10~~ R18
480V MCC CLASS 1E CABLE PROTECTION

D/C 12-07-91
~~PAGE 103a~~

CMPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	NOTES
3D	2-MTR-18-54-B	EF3-A003	HI			PL2732B	#12	PASS	
DSL AUX BD C1-S									
CU	0-CHGR-215-C-S			A4J20	20A	PL3297S	#10	PASS	BOUNDED BY A4J30 FUSE CURVE
EA	0-MTR-18-100A-S			TRS2.5	2.5A	PL3258S	#12	PASS	BOUNDED BY TRS25 FUSE CURVE
EE	0-MTR-18-100B-S			TRS2.5	2.5A	PL3261S	#12	PASS	BOUNDED BY TRS25 FUSE CURVE
DSL AUX BD C2-S									
9A	0-MTR-82-C1-S			TRS5A	5A	PL3257S	#12	PASS	BOUNDED BY TRS25 FUSE CURVE
3C	0-MTR-82-C2-S			TRS5A	5A	PL3260S	#12	PASS	BOUNDED BY TRS25 FUSE CURVE
CE	0-MTR-82-CA-S			TRS25R	25A	PL3256S	#8	PASS	
CJ	0-MTR-82-CB-S			TRS25R	25A	PL3259S	#8	PASS	
RMOV BD 1A1-A									
16D	0-FCV-26-141-A	EF3-A003	3			V1988A	#12	PASS	#4 IN DUCT BANK
16E	0-FCV-26-7-A	EF3-A003	3			V1987A	#12	PASS	#4 IN DUCT BANK
79	1-FCV-26-240-A	EF3-A005	3			1V9147A	#12	PASS	
7C	1-FCV-26-242-A	EF3-A005	3			1V9360A	#12	PASS	
[illegible]	[illegible]TR-78-19-A	EF3-L050	4			1PL6385A	~~#6~~ #2	PASS	R18
	[illegible]CV-26-243-A	EF3-A005	3			1V9165A	#12 D/C 12-7-91	PASS	
5A	0-FCV-26-3-A	EF3-A003	LO			1V1826A	#12	PASS	#8 IN DUCT BANK
5E	0-FCV-26-6-A	EF3-A003	3			1V2224A	#12	PASS	#10 IN DUCT BANK
[illegible]	1-FCV-68-333-A	EF3-A010	4			1V2451A	#12	PASS	
						1V2452A	#12		
F	6-FCV-26-126-A	EF3-A003	3			1V3340A	#12	PASS	
RMOV BD 1A2-A									
	0-DXF-228-2-A	ED63B100				1PL3710A	#2	PASS	CABLE TO BE REPLACED WITH #4 MIN FOR AMPACITY
	0CHGR-236-1AC-S	EF3-B070				1PL3170A	#4	PASS	CABLE 1PL3170A TO BE REPLACED
						1PL4920S	#6		WITH #6 MIN FOR AMPACITY
3E	1-FCV-26-245-A	EF3-A003	2			1V9175A	#12	PASS	
D	1-FCV-1-15-A	EF3-A010	2			1V1830A	#12	PASS	
E	1-FCV-1-17-A	EF3-A010	2			1V2620A	#12	PASS	
A	1-FCV-1-16-A	EF3-A010	2			1V1820A	#12	PASS	
RMOV BD 1B1-B									
7B	1-FCV-26-241-B	EF3-A003	2			1V9155B	#12	PASS	
8A	0-MTR-78-20-B	EF3-L050	4			1PL6380B	~~#6~~ #2	PASS	R18
8E	0-FCV-26-142-B	EF3-A003	3			V1995B	#12 D/C 12-7-91	PASS	#4 IN DUCT BANK
8F	0-FCV-26-14-B	EF3-A003	3			V2005B	#12	PASS	#4 IN DUCT BANK
F	0-FCV-26-127-B	EF3-A003	3			1V3320B	#12	PASS	
E	1-FCV-68-332-B	EF3-A010	4			1V2445B	#12	PASS	
						1V2446B	#12		

~~TABLE C2~~

D/C 12-07-91

~~SECTION C~~ APPENDIX A

ATTACHMENT NO. ~~M12212~~ M15092A

WBN EEB-MS-T100-0000, ~~R10~~ REV. 18

480V MCC CLASS 1E CABLE PROTECTION

CIPT	LOAD	BKR TYPE	BREAKER SETTING	FUSE	RTG	CABLE NO	CABLE SZ	CABLE PROT	NOTES
** RMOV BD 1B2-B									
	0-DXF-220-1-B	ED63B100				1PL3716B	#2	PASS	CABLE TO BE REPLACED WITH #4 MIN FOR AMPACITY
	0CHGR-236-1AC-S	EF3-B070				1PL3171B	#4	PASS	CABLE 1PL3171B TO BE REPLACED
						1PL4928S	#6		WITH #6 MIN FOR AMPACITY
12F	1-FCV-26-244-B	EF3-A003	2			1V9170B	#12	PASS	
2C	1-FCV-1-18-B	EF3-A010	2			1V2630B	#12	PASS	
5A	0-FCV-26-17-B	EF3-A003	3			1V3330B	#10	PASS	#8 IN DUCT BANK
** RMOV BD 2A1-A									
17B	2-FCV-26-240-A	EF3-A010	2			2V5147A	#12	PASS	
17C	2-FCV-26-242-A	EF3-A010	2			2V9360A	#12	PASS	
18E	2-FCV-26-243-A	EF3-A010	2			2V9165A	#12	PASS	
** RMOV BD 2A2-A									
	0CHGR-236-2AC-S	EF3-B070				2PL3170A	#4	PASS	CABLE 2PL3170A TO BE REPLACED
						2PL4928S	#6		WITH #6 MIN FOR AMPACITY
13E	2-FCV-26-245-A	EF3-A010	2			2V9175A	#12	PASS	
** RMOV BD 2B1-B									
11[illegible]	2-FCV-26-241-B	EF3-A010	2			2V9155B	#12	PASS	
5A	0-FCV-26-8-B	EF3-A003	LO			2V1826B	#12	PASS	#10 IN DUCT BANK
** RMOV BD 2B2-B									
	0CHGR-236-2AC-S	EF3-B070				2PL3171B	#4	PASS	CABLE 2PL3171B TO BE REPLACED
						2PL4928S	#6		WITH #6 MIN FOR AMPACITY
11F	0-FCV-26-13-B	EF3-A003	3			2V2224B	#12	PASS	#8 IN DUCT BANK
12F	2-FCV-26-244-B	EF3-A010	2			2V9170B	#14	PASS	
** RX VENT BD 1A-A							D/C 12-7-91		
2D	1-HTR-83-1-A	FJ3-B125	LO			1PL1060A	~~#2/0~~ #250	PASS	CURVE NO. FJ3-B125 (ATTACHMENT NO. M10448A, REV. 4)
** RX VENT BD 1B-B							D/C 12-7-91		
2D	1-HTR-83-2-B	FJ3-B125	LO			1PL1080B	~~#2/0~~ #250	PASS	CURVE NO. FJ3-B125 (ATTACHMENT NO. M10448A, REV. 4)

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