TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

March 3, 1982

RECEIVED
MAR 11 1982
U.S. NUCLEAR REGULATORY COMMISSION

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Ms. Adensam:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

Enclosed is additional information concerning power systems at Watts Bar Nuclear Plant. This information, as discussed with the NRC during a meeting on February 17, 1982 should resolve open items 35, 37, 38, 39, 44, 45, and 55 as designated in the draft safety evaluation report (SER).

If you have any questions concerning this matter, please get in touch with D. P. Ormsby at FTS 858-2682.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Sworn to and subscribed before me
this 3rd day of March 1982
Paulette H. White
Notary Public
My Commission Expires 9-5-84

Enclosure
cc: U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

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PDR ADOCK 05000390
E PDR

ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
POWER SYSTEMS

1. SER Section 9.5.4.1 - TVA has redefined "extended period of time" relating to the operation of the diesel generators to be 8 hours instead of the previously specified 24 hours.

2. SER Section 8.3.3.1.1 - Appendix A contains an analysis of the ability of the auxiliary power system to withstand the submergence of electrical components resulting from postulated maximum LOCA flood levels inside containment. Appendix B contains this same type of analysis for the instrumentation and control power.

3. SER Section 8.3.3.3.b - Appendix C contains an analysis of the present routing of the associated circuits to show that they do not degrade the integrity of the Class 1E circuits.

4. SER Section 8.3.3.3.c - Appendix D contains an analysis showing acceptability of the separation distances between Class 1E and non-Class 1E cable trays. TVA will provide further analysis of the present cable tray separations to further demonstrate that the Class 1E circuits are not degraded below an acceptable level before the first refueling outage.

5. SER Section 8.3.1.6 - Appendix E contains additional information describing the degree of compliance with the guidelines of IEEE 387-1977.

6. SER Section 8.3.2.2 - Appendix F contains information describing actions to be taken to meet NRC's concern regarding surveillance of the diesel generator DC power system.

APPENDIX A

WATTS BAR NUCLEAR PLANT

SER SECTION 8.3.3.1.1

SUBMERGENCE OF THE ELECTRICAL EQUIPMENT (DURING POST-LOCA FLOOD)

POWERED FROM THE CLASS 1E AUXILIARY POWER SYSTEM

OUTLINE FOR THE AUXILIARY POWER SYSTEMS SUBMERGENCE ANALYSIS

1. Statement of problem
2. Abstract
3. Purpose
4. Assumptions
5. References
6. Procedure
7. Analysis
8. Conclusions

Appendix A-1 - Short circuit study and the protective device coordination associated with submerged electrical equipment

Appendix A-2 - List of the submerged electrical equipment powered from the Class 1E Auxiliary Power System

Appendix A-2.1 - Sketches showing the typical relationships of the faulted equipment to the Auxiliary Power System

Appendix A-3 - List of the submerged electrical equipment powered from the non-1E Auxiliary Power System

APPENDIX A
Watts Bar Nuclear Plant
Analysis of Submerged Electrical Equipment
(During Post LOCA) Powered from the Class 1E Auxiliary Power System

Purpose

This analysis investigates the response of the Class 1E Auxiliary Power System to the submergence and subsequent fault of electrical equipment inside the containment vessel during post-LOCA flooding. The effect of flooding on the non-Class 1E power system is not analyzed since its failure would not affect the Class 1E power system or any electric equipment required to mitigate the accident.

Assumptions

1. Conductivity of the water used in flooding the containment vessel is high enough to cause the equivalent of bolted 3-phase faults on submerged circuits.
2. Power outlets and receptacle boxes are deenergized.

References

Watts Bar Nuclear Plant Containment Penetration Protection Study DS189RP (EEB 810629 918).

Submergence of Electrical Equipment Powered from the I&C Power System DS101RP (appendix B of this report).

Procedure

The Class 1E loads listed in appendix A-2 were identified as those below the anticipated maximum flood level. These are examined to determine if any of them would be tripped (deenergized) due to the plant's operating mode. The remaining devices will be energized and faulted due to flooding. The effect of submersion on the energized loads is studied as follows:

1. The relationship of the faulted Class 1E equipment to the APS is typically sketched. See appendix A-2.1.
2. The 480V system fault currents are calculated or taken from the referenced Containment Penetration Protection Study. The 120V system fault currents are calculated.
3. These currents are plotted along with the protective devices response curves to show proper coordination. See appendix A-1.

Analysis

Where there is only one submerged component connected to the power system below the 6900-480-volt transformer, the protective relaying will adequately isolate the faulted device from the remainder of the system without loss of the upstream board. See Watts Bar Nuclear Plant Containment Penetration Protection Study DS189RP (EEB 810629 918).

Where there are two submerged components connected to the power system below the 6900-480-volt transformer, the protective relaying will adequately isolate the faulted devices from the remainder of the system without loss of the upstream board. See the coordination curves in this section.

The effect of submerging hand switches, level switches, and annunciation contacts fed from single phase control transformers is not significant. These transformers have fuse protection in their secondary circuits. A short or ground fault of the circuit element fed by these transformers will have no adverse effect on the Auxiliary Power System.

Conclusions

The post-LOCA flood will not cause breakers to trip out of sequence or degrade the 6900V or 480V voltage levels.

APPENDIX A-1

WATTS BAR NUCLEAR PLANT
SHORT CIRCUIT STUDY AND THE PROTECTIVE DEVICE
COORDINATION ASSOCIATED WITH
THE SUBMERGED ELECTRICAL EQUIPMENT

052058.04

The analysis of figures 1 and 2 verifies that the sum of the simultaneous faults (F1, F2) will not trip the supply breaker to the supply breaker to the 480V shutdown boards.

Analysis of Figure 1

Fault currents F1 and F2 are calculted on the attached sheets. These values are plotted along with the response characteristics (curves B, C, D, E, F, and H) of the branch feeder overcurrent devices in coordination figures 1A and 1B of Appendix A.1. These figures show adequate branch feeder protection. Figure 1C of Appendix A.1 details the response characteristic (curve G) of the overcurrent protection associated with the supply breaker to the 480V shutdown board. The sum of F1 and F2 is plotted on this figure to verify that this overcurrent protection will not trip the supply breaker should F1 and F2 become sustained faults.

Analysis of Figure 2

Fault currents F1 and F2 are calculated on the attached sheets. The values are plotted along with the response characteristics (curves A, C, and C1) of the branch feeder overcurrent devices in coordination Figure 2 of Appendix A.1. These curves show adequate branch feeder protection. Curve 4 of Figure 2 in Appendix A.1 detail the response characteristic of the overcurrent protection associated with the supply breaker to the 480V motor control center. The sum of F1 and F2 is plotted on this figure to verify that this overcurrent protection will not trip the supply breaker should F1 and F2 become sustained faults.

TVA 488A (EN DES-3-77)

TENNESSEE VALLEY AUTHORITY

SHEET OF

SUBJECT POST LOCA FLOOD EQUIPMENT SUBMERSION PROJECT WBN DS199RP

STUDY NUMBER D285-DS199RP

COMPUTED BY MLC DATE 10-30-81 CHECKED BY WHJ DATE 17 FEB. '82

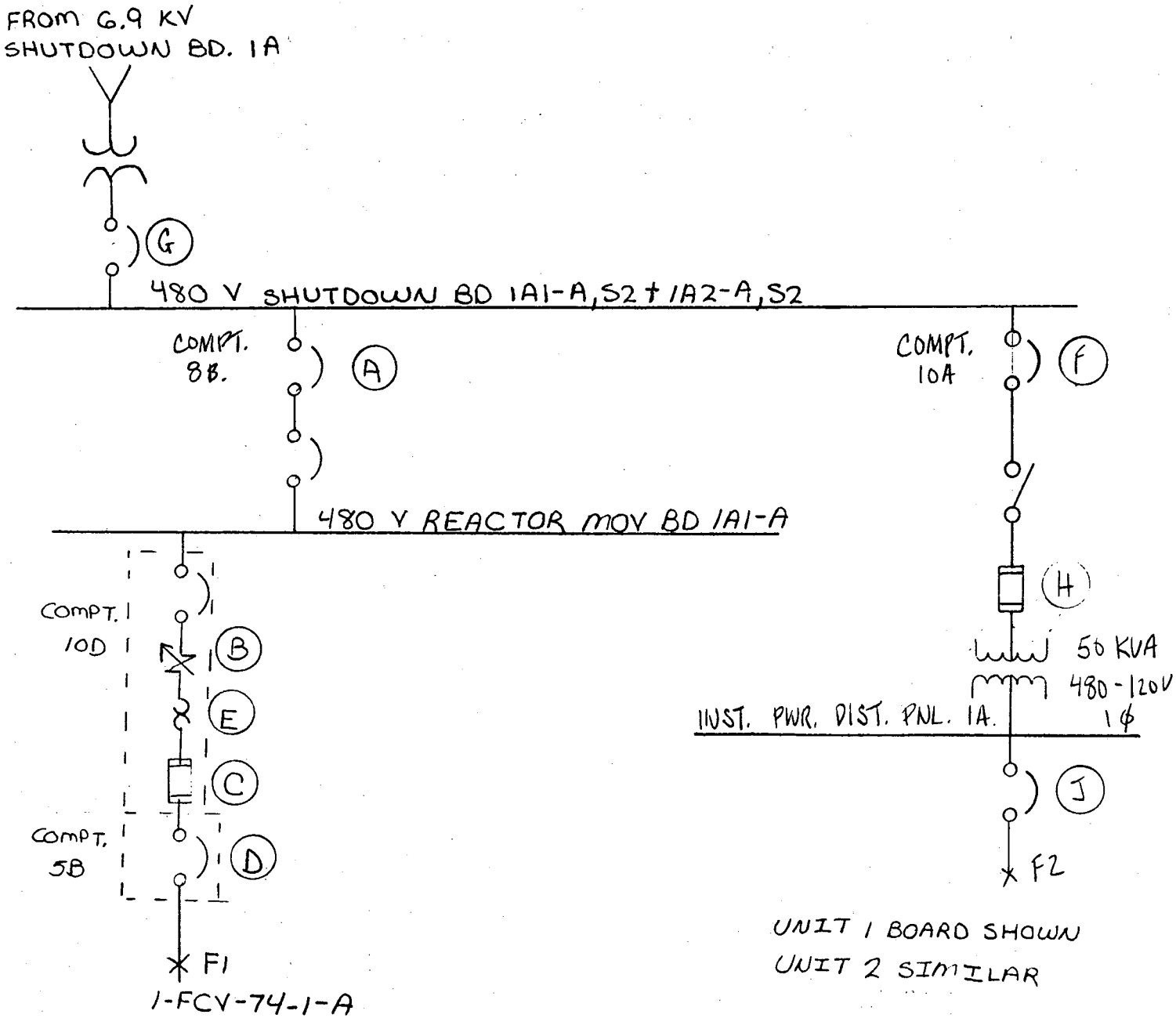


FIGURE 1

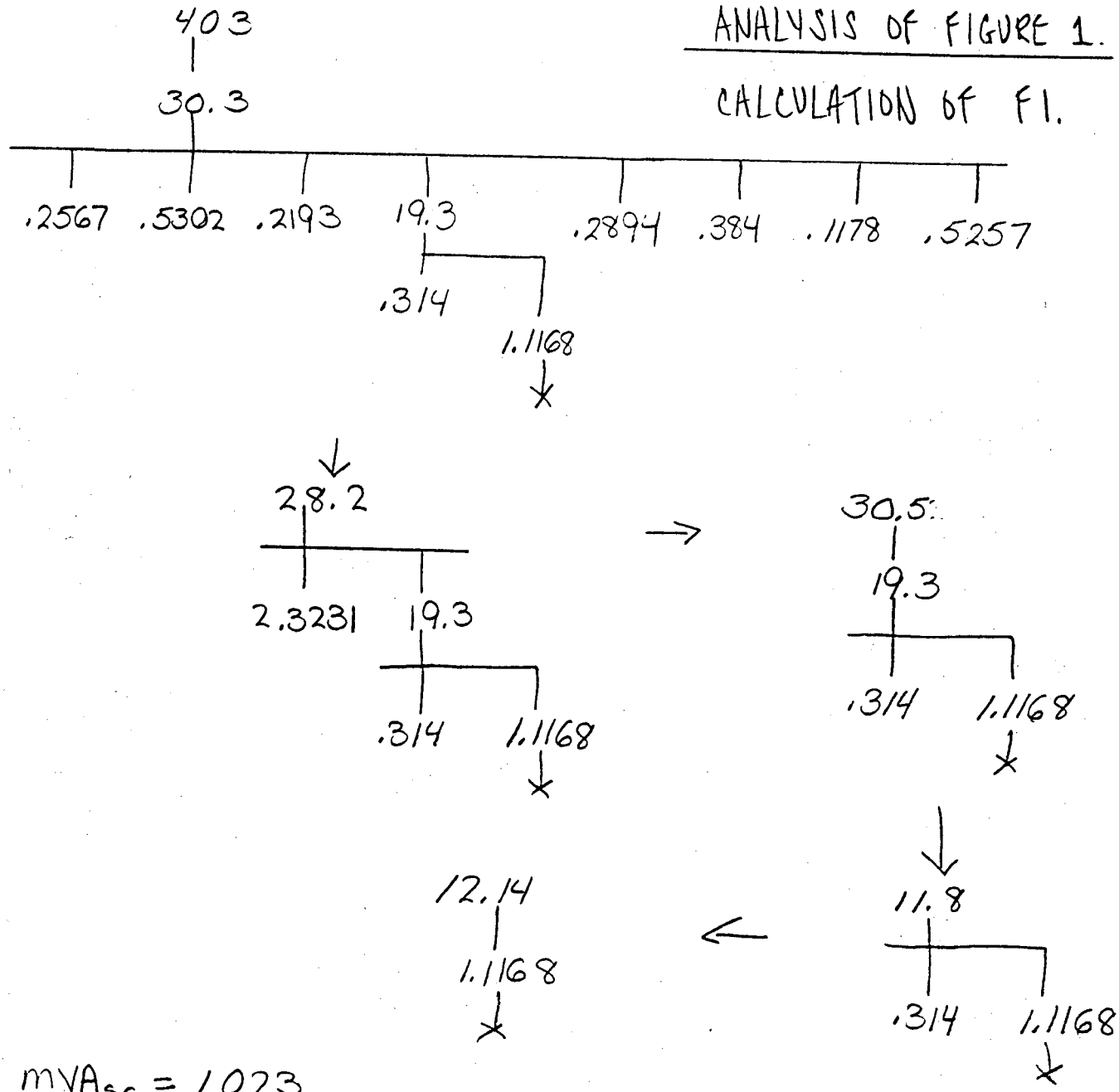
TVA 489H (EN DES-2-78) **TENNESSEE VALLEY AUTHORITY** SHEET OF

SUBJECT POST LOCA FLOOD EQUIPMENT SUPPRESSION PROJECT WBN DS199RP

MLC	11-10-91	WN	17 FEB. '82
COMPUTED BY	DATE	CHECKED BY	DATE

ANALYSIS OF FIGURE 1.

CALCULATION OF FI.



$mVA_{SC} = 1.023$

$FI = 1.023(1000)/\sqrt{3}(0.48)$
$= 1230.5$ AMPS

TVA 489H (EN DES-2-78) TENNESSEE VALLEY AUTHORITY SHEET OF

SUBJECT POST LOCA FLOOD EQUIPMENT SUBMERSSION PROJECT WATTS BAR N.P.

COMPUTED BY DATE CHECKED BY WHJ DATE 28 FEB. '82.

ANALYSIS OF FIGURE 1.

CALCULATION OF F2.

THE CABLE DISTANCE FROM F2 TO THE MCCB. (ITEM J) IS UNKNOWN. THEREFORE, TO BE CONSERVATIVE THE MAXIMUM MCCB WITHSTAND IS ASSUMED TO BE THE FAULT CURRENT AT F2.

$\therefore$ F2 = 25,000 A @ 120 V.

IF WE IGNORE THE IMPEDANCE OF THE DISTRIBUTION TRANSFORMER AND REFLECT F2 ACROSS THE TRANSFORMER

F2 = 25,000 A (0.25) = 6,250 A.

TVA 488A (EN DES-3-77)

TENNESSEE VALLEY AUTHORITY

SHEET OF

SUBJECT POST LOCA FLOOD EQUIPMENT SUBMERGENCE PROJECT WBN DS199RP

STUDY NUMBER D2385-DS199RP

COMPUTED BY MLC DATE 10-19-81 CHECKED BY WN DATE 17 FEB. '82

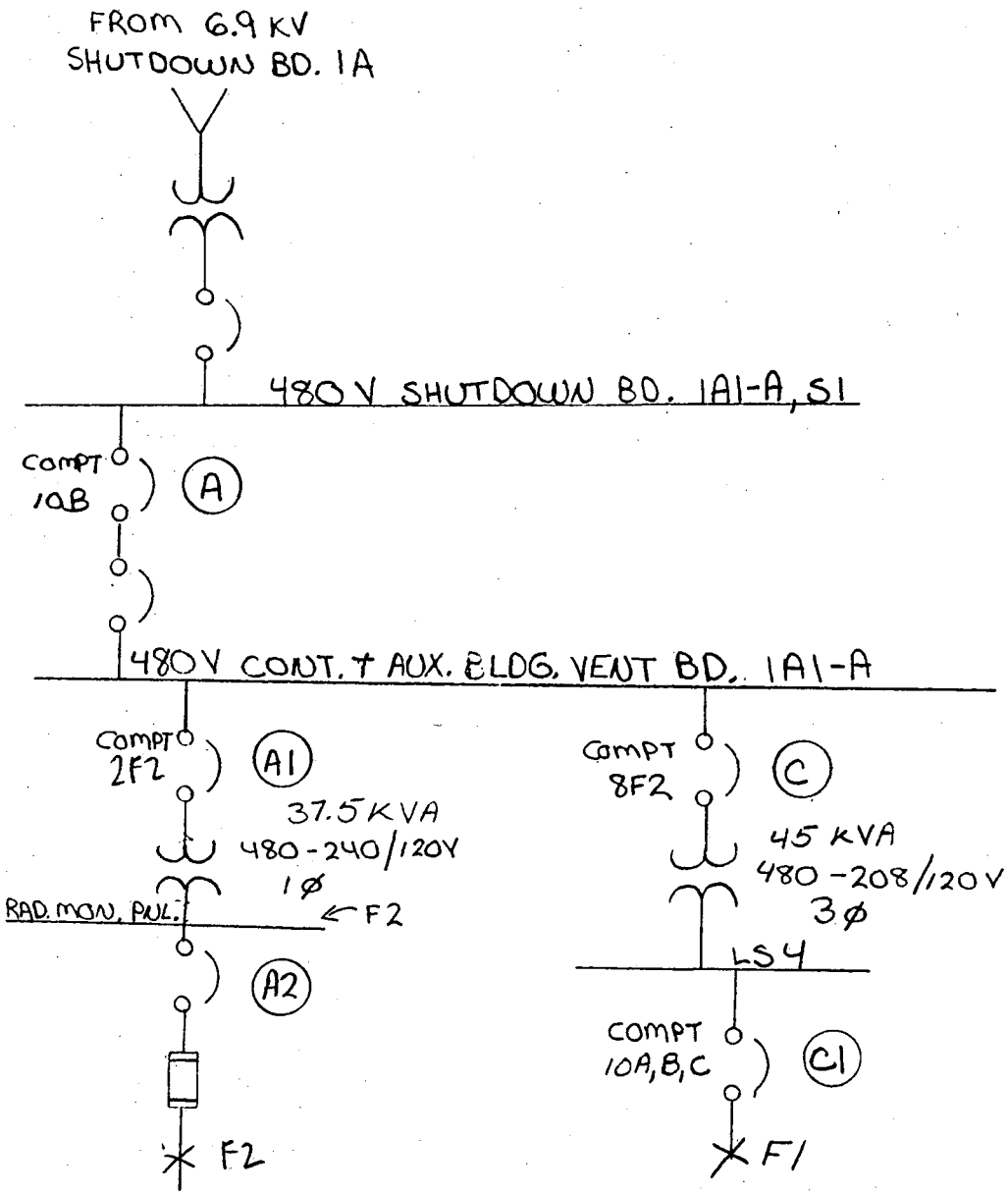


FIGURE 2

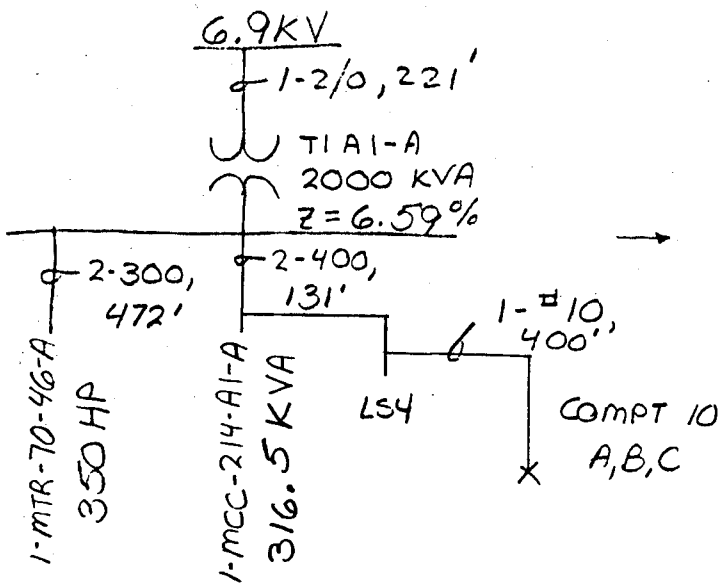
TVA 489H (EN DES-2-78) **TENNESSEE VALLEY AUTHORITY** SHEET OF

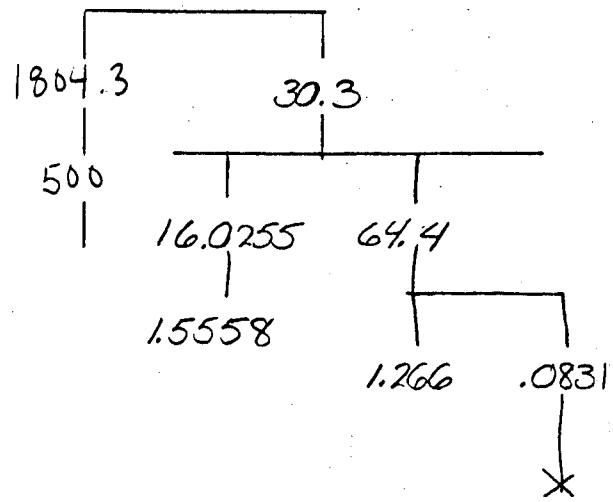
SUBJECT POST LOCA FLOOD EQUIPMENT SUBMERSION PROJECT WBN DS1002

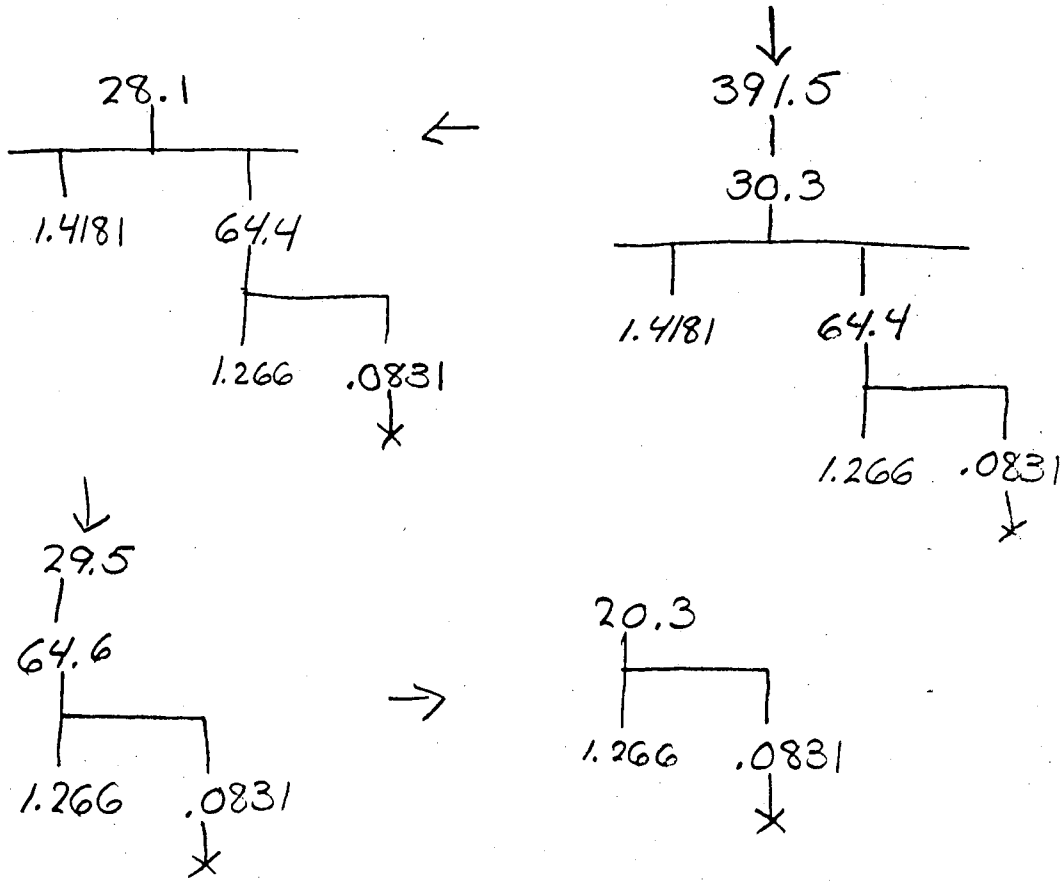
MLC	11-10-81	WHJ	17 FEB. '82
COMPUTED BY	DATE	CHECKED BY	DATE

ANALYSIS OF FIGURE 2

CALCULATION OF F1.







TVA 489H (EN DES-2-78) **TENNESSEE VALLEY AUTHORITY** SHEET OF

SUBJECT POST LOCA FLOOD EQUIPMENT SUBMERSION PROJECT WBN DS199RP

COMPUTED BY	DATE	CHECKED BY	DATE
MLC	11-10-81	WAW	17 FEB. '82

ANALYSIS OF FIGURE 2

21.5
.0831
×

$MVA_{sc} = 0.083$

$FI = 0.083 (1000) / \sqrt{3} (0.208)$

$FI = 230.4$ A.

SUBJECT POST LOCA FLOOD EQUIPMENT SUBMERSSION PROJECT WATTS BAR N.P.

COMPUTED BY DATE CHECKED BY WAN DATE 28 FEB. '82.

ANALYSIS OF FIGURE 2.

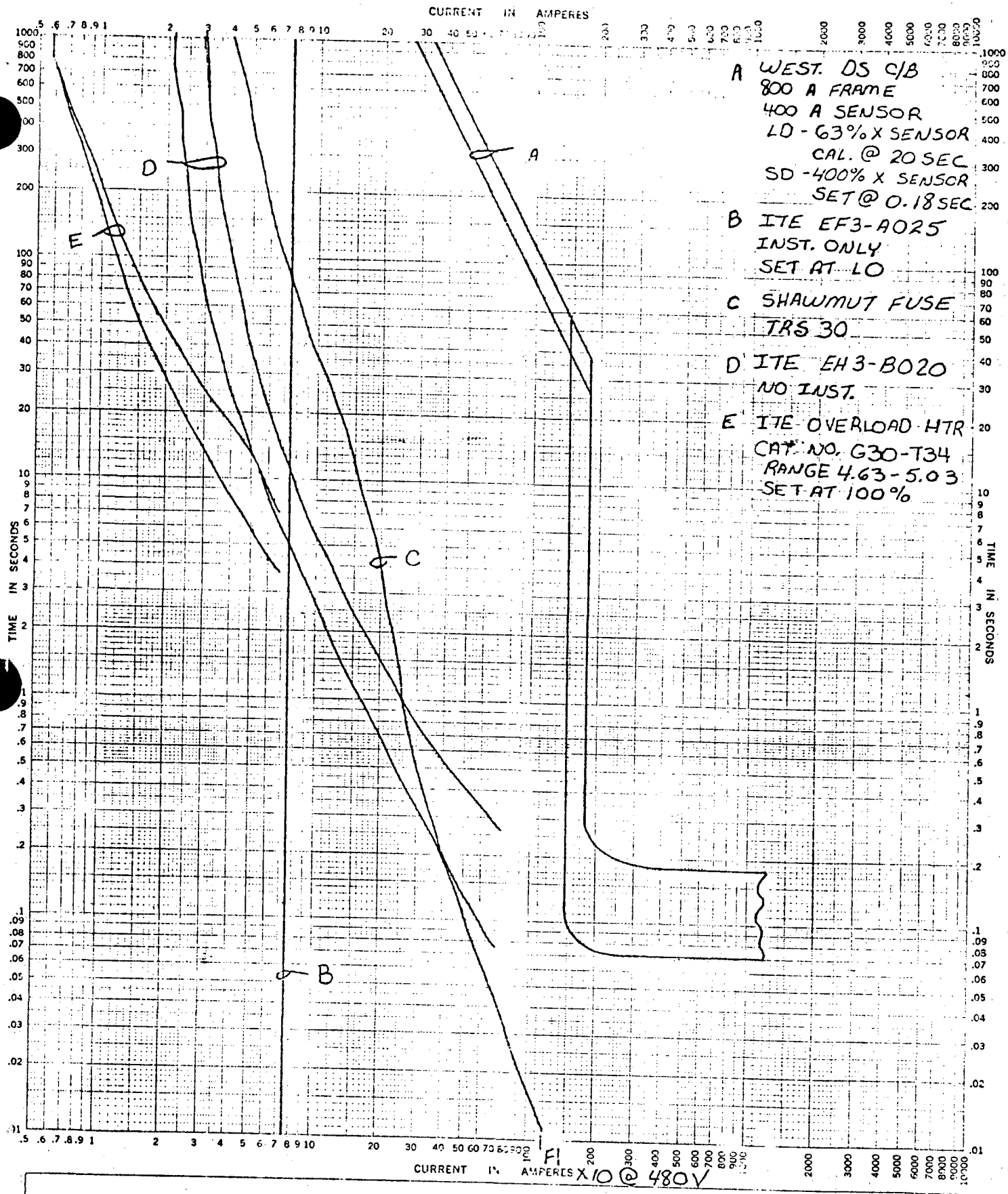
CALCULATION OF F2.

THE CABLE DISTANCE FROM F2 TO THE MCCB (ITEM A2) IS UNKNOWN. TO BE CONSERVATIVE THE MAXIMUM MCCB WITHSTAND IS ASSUMED TO BE THE FAULT CURRENT AT F2.

$\therefore$ F2 = 22,000 A @ 120 V.

IF WE IGNORE THE IMPEDANCE OF THE DISTRIBUTION TRANSFORMER AND REFLECT F2 ACROSS THE TRANSFORMER

F2 = 22,000 A (0.25) = 5500 A.



For ANALYSIS FIG. 1A.

TIME-CURRENT CHARACTERISTIC CURVES

BASIS FOR DATA Standards ..... Dated .....

Fuse Links. In .....

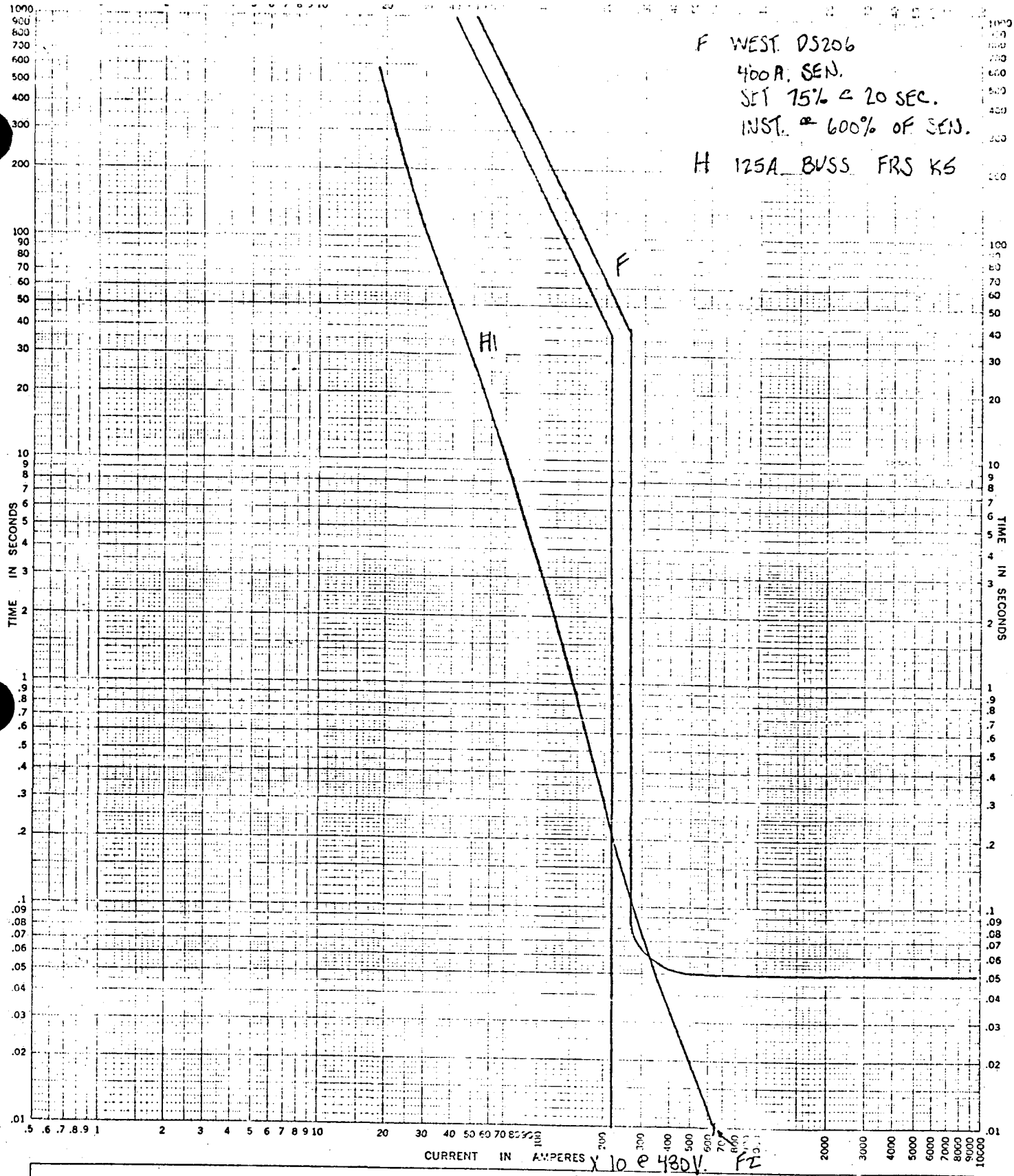
1. Tests made at ..... Volts a-c at ..... pf. starting at 25C with no initial load

2. Curves are plotted to ..... Test points so variation [illegible] and be

No. .....

Date 10-19-81 MLC

TIME-CURRENT CHARACTERISTIC



For ANALYSIS FIG. 1B TIME-CURRENT CHARACTERISTIC CURVES

Fuse Links. In

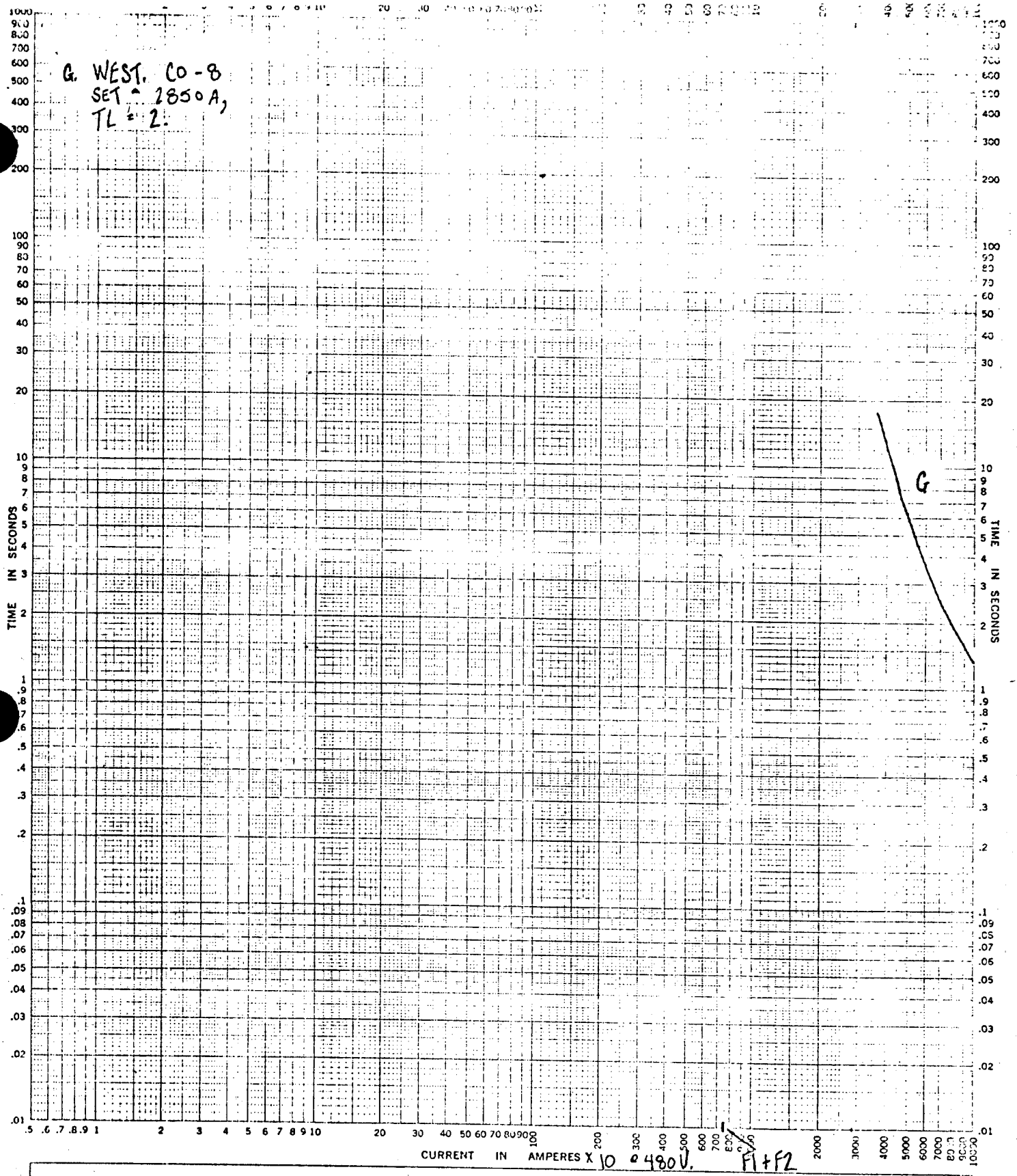
BASIS FOR DATA Standards Dated

1. Tests made at Volts a-c at p.f. starting at 25°C with no initial load
2. Curves are plotted to Test points so variations should be

No. 13 FEB. '82 WN

Date

TIME-CURRENT CHARACTERISTIC 48 5258



For ANALYSIS FIG. 1C. TIME-CURRENT CHARACTERISTIC CURVES

Fuse Links. In

BASIS FOR DATA Standards. Dated

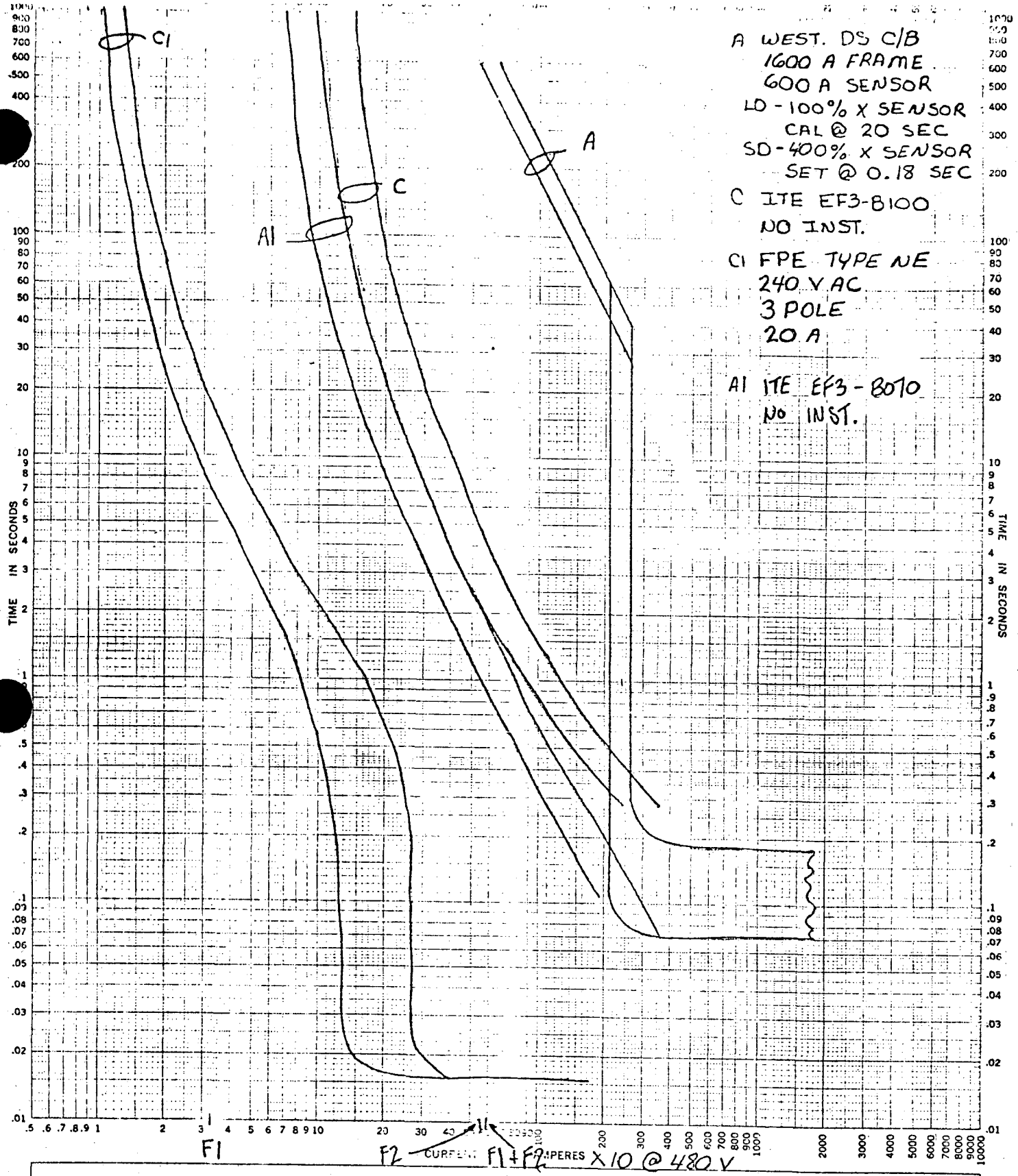
1. Tests made at Volts a-c at p-f., starting at 25C with no initial load

2. Curves are plotted to Test points so variations should be

No.

Date

TIME-CURRENT CHARACTERISTIC 48 5258
KEUFFEL & ESSER CO.



For. FIGURE 2 TIME-CURRENT CHARACTERISTIC CURVES

BASIS FOR DATA Standards Fuse Links. In

Dated

1. Tests made at Volts a.c. at
2. Curves are plotted to Test points so variations show

No.

Date 10-19-81 MLC

TIME-CURRENT CHARACTERISTIC 48 5258
KEUFFEL & ESSER CO. MINNEAPOLIS

APPENDIX A-2

WNBP UNITS 1 & 2

SUBMERGED ELECTRICAL EQUIPMENT

INSIDE CONTAINMENT (DURING

POST LOCA) POWERED FROM

CLASS 1E

AUXILIARY POWER SYSTEM

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS

PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY | DATE | CHECKED BY | DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
1-MTR-30-92/ 1-B	Crdm cooler fan 1B-B, Mtr 1	480	Shtdn bd B1-B	3422	West. DS-416	125A[1] L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-92/ 1-B	Crdm cooler fan 2B-B, Mtr 1	480	Shtdn bd 2B1-B	2527	West. DS-416	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
1-MTR-30-83/ 2-A	Crdm cooler fan 1A-A, Mtr 2	480	Shtdn bd 1A1-A	4181	West. DS-416	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-83/ 2-A	Crdm cooler fan 2A-A, Mtr 2	480	Shtdn bd 2A1-A	4614	West. DS-416	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
1-MTR-30-88/ 1-A	Crdm cooler fan 1A-A, Mtr 1	480	Shtdn bd 1A2-A	3694	West. DS-416	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-88/ 1-A	Crdm cooler fan 1A-A, Mtr 1	480	Shtdn bd 2A2-A	3578	West. DS-416	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-80/ 1-A	Crdm cooler fan 2A-A, Mtr 1	480	Shtdn bd 1B2-B	4740	West. DS-416	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.5

[1] L.I. - Long time overload and instantaneous trip elements

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS

PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY | DATE | CHECKED BY | DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
2-MTR-30-80/ 2-B	Crdm cooler fan 1B-B, Mtr 2	480	Shtdn bd 2B2-B	6494	West. DS-516	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-83/ 2-B	Crdm cooler fan 2B-B, Mtr 2	480	Shtdn bd 1A1-A	4327	West. DS-206	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-83/ 1-A	Crdm cooler fan 1A-A, Mtr 1	480	Shtdn bd 2A1-A	4583	West. DS 206	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-88/ 2-A	Crdm cooler fan 1A-A, Mtr 2	480	Shtdn bd 1A2-A	3781	West. DS 206	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-88/ 2-A	Crdm cooler fan 2A-A, Mtr 2	480	Shtdn bd 2A2-A	3673	West. DS 206	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
1-MTR-30-92/ 2-B	Crdm cooler fan 1B-B, Mtr 2	480	Shtdn bd 1B1-B	3479	West. DS 206	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
2-MTR-30-92/ 2-B	Crdm cooler fan 2B-B, Mtr 2	480	Shtdn bd 2B1-B	2540	West. DS 206	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1
1-MTR-30-80/ 1-B	Crdm Cooler fan 1B-B, Mtr 1	480	Shtdn bd 1B2-B	4544	West. DS 206	125A L.I.	Shawmut Cable Protector	1/0	Tripped by containment isolation signal.	C	A-2.1.1

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS

PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY | DATE | CHECKED BY | DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
2-MTR-30-80/ 1-B	Crdm Cooler fan 2B-B, Mtr 1	480	Shtdn bd 2B2-B	3468	West. DS 206	125A L.I.	Shawmut Cable Protect	1/0	Tripped by containment isolation signal.	C	A-2.1.1
1-MTR-77-4	React cool drain tank pp 1A	480	React vt bd 1A	456	ITE FJ	170A VM[2]	K-5 Fuse	60A	Tripped by containment isolation signal.	C	A-2.1.5

[1]VM - Variable magnetic trip element.

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS

PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY | DATE | CHECKED BY | DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
2-MTR-77-4	React cool drain tank pp 2A	480	React vt bd 2A	579	ITE FJ	170A VM	K-5 Fuse	60A	Tripped by containment isolation signal.	C	A-2.1.5
1-MTR-77-6	React cool drain tank pp 1A	480	React vt bd 2A	992	ITE FJ	170A VM	K-5 Fuse	60A	Tripped by containment isolation signal.	C	A-2.1.5
2-MTR-77-6	React cool drain tank pp 2B	480	React vt bd 2B	1311	ITE FJ	170A VM	K-5 Fuse	60A	Tripped by containment isolation signal.	C	A-2.1.5
1-MTR-77-125	Cntmt floor eqpt drain sump pp 1A	480	React vt bd 1A	449	ITE EF	584 VM	K-5 Fuse	30A	Tripped by containment isolation signal.	C	A-2.1.5
2-MTR-77-125	Cntmt floor eqpt drain sump pp 2A	480	React vt bd 2A	576	ITE EF	584 VM	K-5 Fuse	30A	Tripped by containment isolation signal.	C	A-2.1.5
1-MTR-77-126	Cntmt floor eqpt drain sump pp 1B	480	React vt bd 1B	510	ITE EF	584 VM	K-5 Fuse	30A	Tripped by containment isolation signal.	C	A-2.1.5
2-MTR-77-126	Cntmt floor eqpt drain sump pp 1B	480	React vt bd 2B	331	ITE EF	584 VM	K-5 Fuse	30A	Tripped by containment isolation signal.	C	A-2.1.5
JB 244	HS for 1-MTR-77-125	120	React vt bd 1A						Tripped by containment isolation signal.	C	A-2.1.5

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS

PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY | DATE | CHECKED BY | DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
JB 411	HS for 2-MTR-77-125	120	React vt bd 1A						Tripped by containment isolation signal.	C	A-2.1.5
JB 1326	HS for 1-MTR-77-126	120	React vt bd 1B						Tripped by containment isolation signal.	C	A-2.1.5
JB 1628	HS for 2-MTR-77-126	120	React vt bd 2B						Tripped by containment isolation signal.	C	A-2.1.5
JB 2513	Cable termination 1-MTR-77-4	480	React vt bd 1A	456	1TE FJ	170A VM	K-5 Fuse	60A	Tripped by containment isolation signal.	C	A-2.1.5
JB 1781	Cable termination 2-MTR-77-4	480	React vt bd 2A	579	1TE FJ	170A VM	k-5 Fuse	60A	Tripped by containment isolation signal.	C	A-2.1.5
JB 309	Cable termination 1-MTR-77-6	480	React vt bd 1B	992	1TE FJ	170A VM	k-5 Fuse	60A	Tripped by containment isolation signal.	C	A-2.1.5
JB 414	Cable termination 2-MTR-77-6	480	React vt bd 2B	1311	1TE FJ	170A VM	k-5 Fuse	60A	Tripped by containment isolation signal.	C	A-2.1.5
1-HS-77-4B	HS for 1-MTR-77-4	120	React vt bd 1A						Tripped by containment isolation signal.	C	A-2.1.5
2-HS-77-4B	HS for 2-MTR-77-4	120	React vt bd 2A						Tripped by containment isolation signal.	C	A-2.1.5

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS

PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY | DATE | CHECKED BY | DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
1-HS-77-6B	HS for 1-MTR-77-6	120	React vt bd 1B	230					Tripped by containment isolation signal.	C	A-2.1.5
2-HS-77-6B	HS for 2-MTR-77-6	120	React vt bd 2B	230					Tripped by containment isolation signal.	C	A-2.1.5
LS4	Light fixture	120	C&A bldg vt bd 1B1	230	1TE EF	100A TM[3]			Tripped by containment isolation signal.	C	A-2.1.7
LS2	Light fixture	120	C&A Bldg vt bd 1B1	230	1TE EF	100A TM				C	A-2.1.7
1-HTR-30-74H	React. lower compt unit htr	480	React vt bd 1A	445	ITE EF	20A TM	K-5 fuse	30A	Single device on secondary of transformer.	C	A-2.1.6
2-HTR-30-74H	React. lower compt unit htr	480	React vt bd 2A	515	ITE EF	20A TM	K-5 fuse	30A	Single device on secondary of transformer.	C	A-2.1.6
1-HTR-30-75H	React. lower compt unit htr	480	React vt bd 1B	454	ITE EF	20A TM	K-5 fuse	30A	Single device on secondary of transformer.	C	A-2.1.6
2-HTR-30-75H	React. lower compt unit htr	480	React vt bd 2B	379	ITE EF	20A TM	K-5 fuse	30A	Single device on secondary of transformer.	C	A-2.1.6

[3]TM - Thermo-magnetic trip element.

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS PROJECT WATTS BAR NUCLEAR PLANT COMPUTED BY DATE CHECKED BY DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
1-FCV-74-1-A	RHR sys isol vlv	480	React mov bd 1A1-A	345	ITE EF	75A VM	K-5 fuse	30	Deenergized by administrative instruction.	C	A-2.1.2
2-FCV-74-1-A	RHR sys isol vlv	480	React mov bd 2A1-A	335	ITE EF	75A VM	K-5 fuse	30	Deenergized by administrative instruction.	C	A-2.1.2
1-FCV-74-9-B	RHR sys isol vlv	480	React mov bd 1B1-B	576	ITE EF	75A UM	K-5 Fuse	30	Deenergized by administrative instruction.	C	A-2.1.2
2-FCV-74-9-B	RHR sys isol vlv	480	React mov bd 2B1-B	335	ITE EF	75A VM	K-5 Fuse	30	Deenergized by administrative instruction.	C	A-2.1.2

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS

PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY | DATE | CHECKED BY | DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
Recpt box 236	Power outlets	480	React mov bd 1B1-B	4726	ITE EF	100A TM	Shawmut Cable Protect	2	Deenergized by administrative instruction.	C	A-2.1.2
Recpt box 237	Power outlets	480	React mov bd 1B1-B	2014	ITE EF	100A TM	Shawmut Cable Protect	2	Deenergized by administrative instruction.	C	A-2.1.8
Recpt box 456	Power outlets	480	React mov bd 2B1-B	4541	ITE EF	100A TM	Shawmut Cable Protect	2	Deenergized by administrative instruction.	C	A-2.1.8
Recpt box 457	Power outlets	480	React mov bd 1B1-B	1396	ITE EF	100A TM	Shawmut Cable Protect	2	Deenergized by administrative instruction.	C	A-2.1.8
1-LS-77-129	Level switch in control circuit	120	React mov bd 1A1-A	*					*	C	A-2.1.3
2-LS-77-129	Level switch in control circuit	120	React mov bd 2A1-A	*					*	C	A-2.1.3

*Fed from 100VA single phse control power transformer whose secondary is fuse protected. A short or ground fault of this device will have no adverse affect on the auxiliary power system. Submergence of a switch contact has the same effect as a closure of the contact.

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS PROJECT WATTS BAR NUCLEAR PLANT COMPUTED BY DATE CHECKED BY DATE

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
JB 927	Annunciation cables	120	C&A bldg vt bd 1B1	*					*	C	A-2.1.3
JB 945	Annunciation cables	120	C&A bldg vt bd 2B1	*					*	C	A-2.1.3
1-LS-63-103	Level sw for cntmt sump ann	120	C&A bldg vt bd 1B1	*					*	C	A-2.1.3
1-LS-63-104	Level sw for cntmt sump ann	120	C&A bldg vt bd 1B1	*					*	C	A-2.1.3
1-LS-40-18	Level sw for cntmt sump ann	120	C&A bldg vt bd 1B1	*					*	C	A-2.1.3
1-LS-40-17	Level sw for cntmt sump ann	120	C&A bldg vt bd 1B1	*					*	C	A-2.1.3
2-LS-63-103	Level sw for cntmt sump ann	120	C&A bldg vt bd 2B1	*					*	C	A-2.1.3
2-LS-63-104	Level sw for cntmt sump ann	120	C&A bldg vt bd 2B1	*					*	C	A-2.1.3

*Fed from 100VA single phase control power transformer whose secondary is fuse protected. A short or ground fault of this device will have no adverse affect on the auxiliary power system. Submergence of a switch contact has the same effect as a closure of the contact.

SUBJECT SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM THE CLASS 1E APS

PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING	BACKUP PROT. TYPE	BACKUP PROT. RATING	REMARKS	CATEGORY	APPENDIX A-2.1 TYPICAL FIGURE
2-LS-40-18	Level sw for cntmt sump ann	120	C&A bldg vt bd 2B1	*					*	C	A-2.1.3
2-LS-40-17	Level sw for cntmt sump ann	120	C&A bldg vt bd 2B1	*					*	C	A-2.1.3
1-RE-90-62	Rad monitor	120	C&A bldg vt bd 1A1	5500	ITE EF	10A TM	Shawmut AT-DE10	10A	Fed from 37.5 kVA, 1Ø, transformer	C	A-2.1.4
2-RE-90-62	Rad monitor	120	C&A bldg vt bd 2A1	5500	ITE EF	10A TM	Shawmut AT-DE10	10A	Fed from 37.5 kVA, 1Ø, transformer	C	A-2.1.4
1-HS-74-1B-A	HS for 1-FCV-74-1-A	120	React mov bd 1A1-A	*					*	C	A-2.1.2
2-HS-74-1B-A	HS for 2-FCV-74-1-A	120	React mov bd 2A1-A	*					*	C	A-2.1.2
1-HS-74-9-B	HS for 1-FCV-74-9-B	120	React mov bd 1B1-B	*					*	C	A-2.1.2
2-HS-74-9-B	HS for 2-FCV-74-9-B	120	React mov bd 2B1-B	*					*	C	A-2.1.2

*Fed from 100VA single phase control power transformer whose secondary is fuse protected. A short or ground fault of this device will have no adverse affect on the auxiliary power system. Submergence of a switch contact has the same effect as a closure of the contact.

APPENDIX A-2.1

WATTS BAR NUCLEAR PLANT

Sketches Showing the Typical Relationship

of the Faulted Equipment to the

Auxiliary Power System

062059.01

TVA 469H (EN DES-2-78) TENNESSEE VALLEY AUTHORITY SHEET OF

SUBJECT POST LOCA FLOOD EQUIPMENT SUBMERSSION PROJECT WATTS BAR N.P.

COMPUTED BY DATE CHECKED BY WN DATE 27 FEB.'82

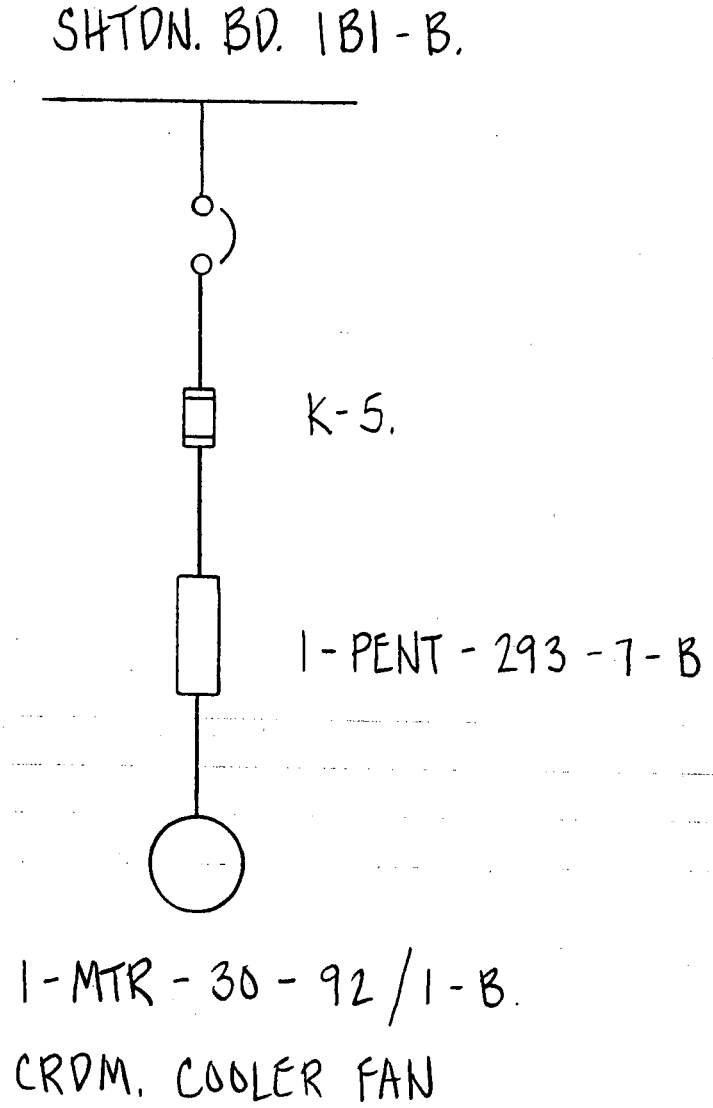
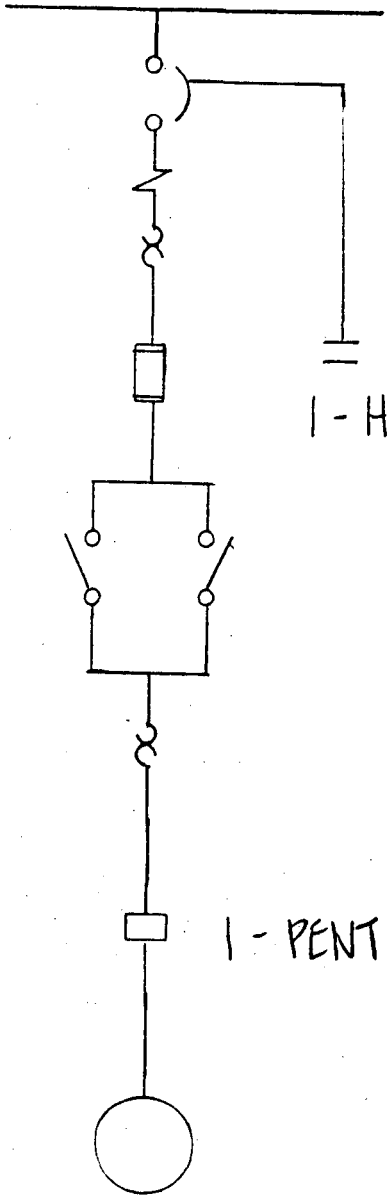


FIGURE A-2.1.1

SUBJECT POST LOCA FLOOD SUBMERSION STUDY PROJECT WATTS BAR N.P.

COMPUTED BY DATE CHECKED BY MLC DATE 2-19-82

REACT. MOV. BD. 1B1-B.



1-HS-74-9-B.

HAND SWITCH CONTROLLING 1-FCV-74-9-B.

1-PENT-293-9-B.

1-FCV-74-9-B.

RHR SYSTEM ISOLATION VALVE.

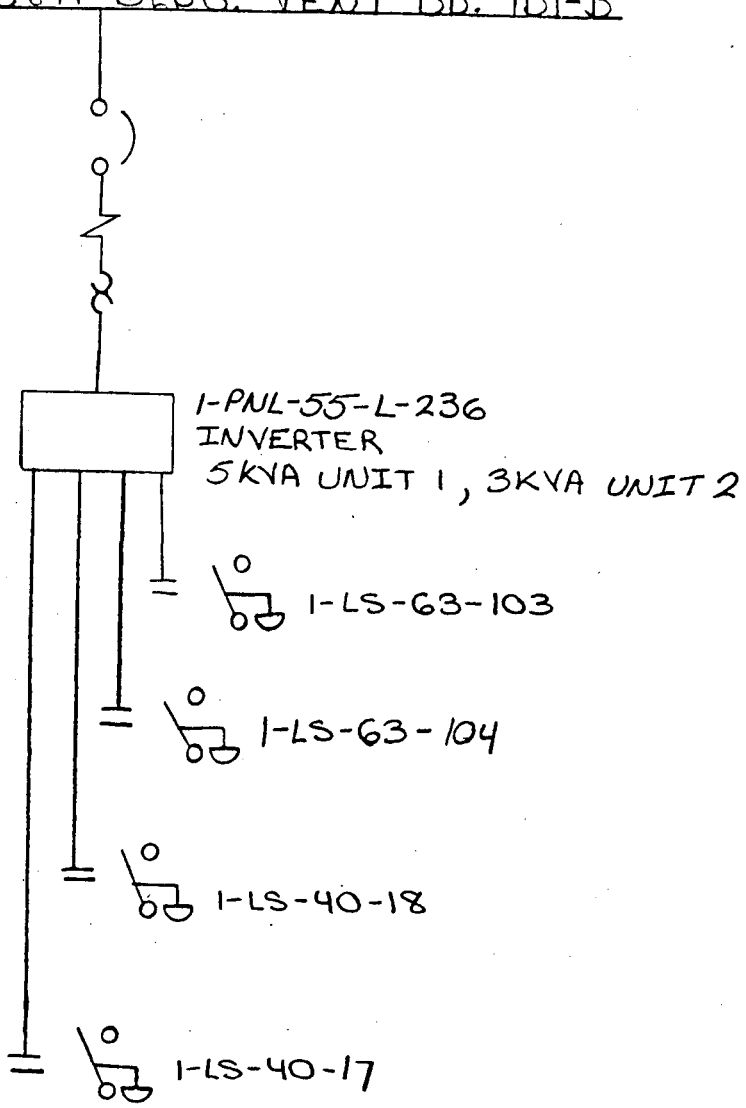
FIGURE A-2.1.2

TVA 489H (EN DES-2-78) TENNESSEE VALLEY AUTHORITY SHEET OF

SUBJECT POST LOCA FLOOD SUBMERSION STUDY PROJECT WATTS BAR N.P.

COMPUTED BY DATE CHECKED BY MLC DATE 2-26-82

480 V. C&A BLDG. VENT BD. 1B1-B



LEVEL SWITCHES FOR CONTAINMENT SUMP ANNUNCIATION.

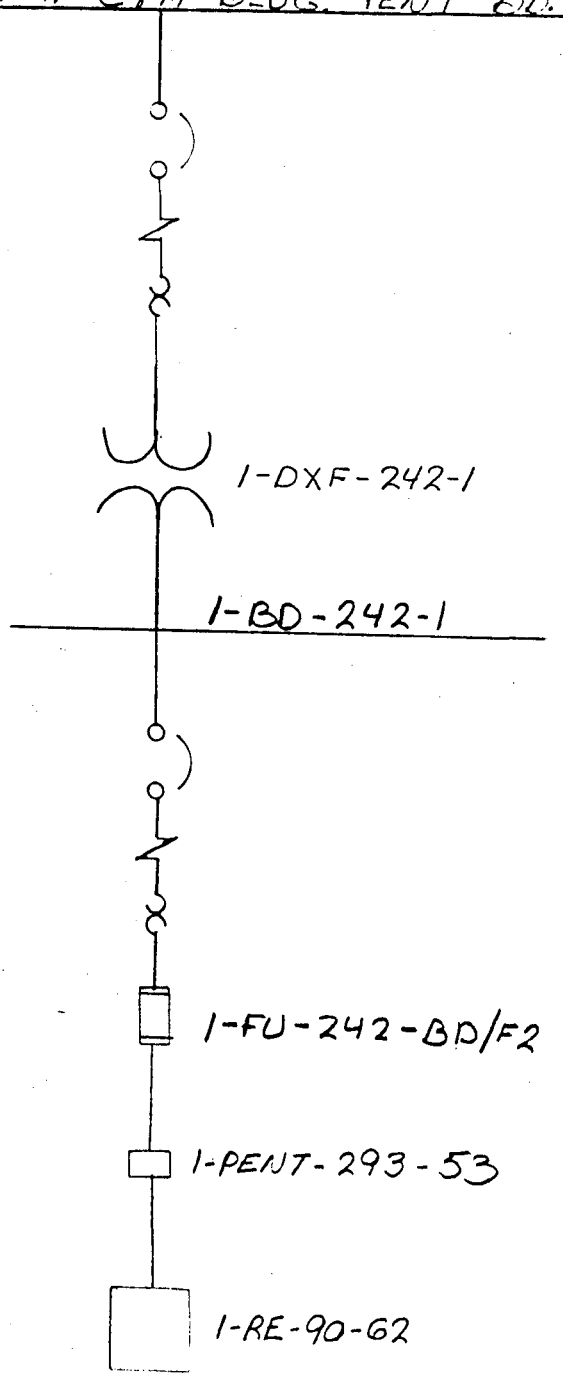
FIGURE A-2.1.3

TVA 489H (EN DES-2-78) TENNESSEE VALLEY AUTHORITY SHEET OF

SUBJECT Post LOCA Flood Submersion Study PROJECT Watts Bar N.P.

COMPUTED BY DATE CHECKED BY MLC DATE 2-22-82

480 V. C&A BLDG. VENT BD. 1A1-A



RADIATION MONITOR

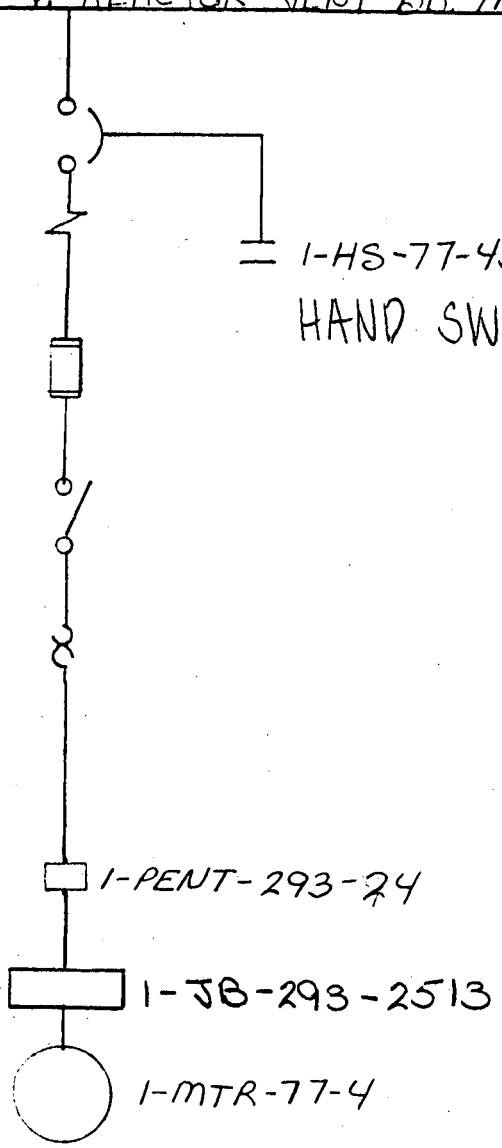
FIGURE A-2.1.4

TVA 489H (EN DES-2-78) TENNESSEE VALLEY AUTHORITY SHEET OF

SUBJECT POST LOCA FLOOD SUBMERGENCE STUDY PROJECT WATTS BAR N.P.

COMPUTED BY DATE CHECKED BY MLC DATE 2-19-82

480 V. REACTOR VENT BD. 1A-A



HAND SWITCH CONTROLLING 1-MTR-77-4.

REACTOR COOLANT DRAIN TANK PP.

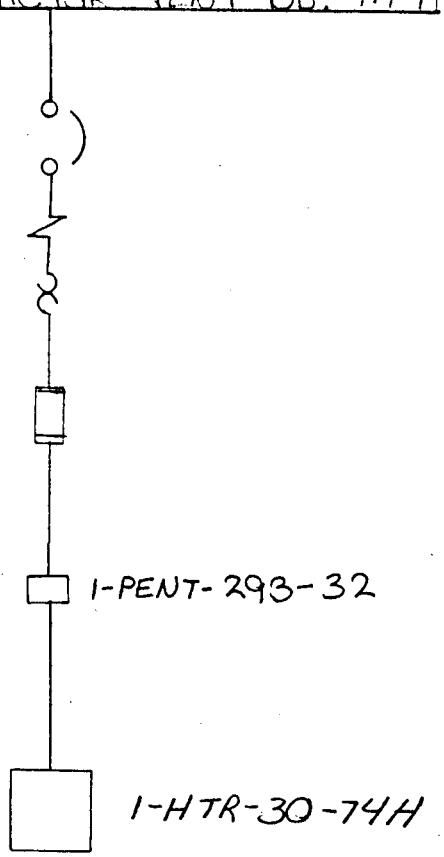
FIGURE A-2.1.5

TVA 489H (EN DES-2-78) TENNESSEE VALLEY AUTHORITY SHEET OF

SUBJECT Post LOCA Flood Submersion Study PROJECT Watts Bar N.P.

COMPUTED BY DATE CHECKED BY MLC DATE 2-19-82

480 V. Reactor Vent Bd. 1A-A



REACTOR LOWER COMPARTMENT UNIT HTR.

FIGURE A-2.1.6

TVA 489H (EN DES-2-78) **TENNESSEE VALLEY AUTHORITY** SHEET OF

SUBJECT Post LOCA Flood Submergence Study PROJECT Watts Bar N.P.

COMPUTED BY DATE CHECKED BY MLC DATE 2-19-82

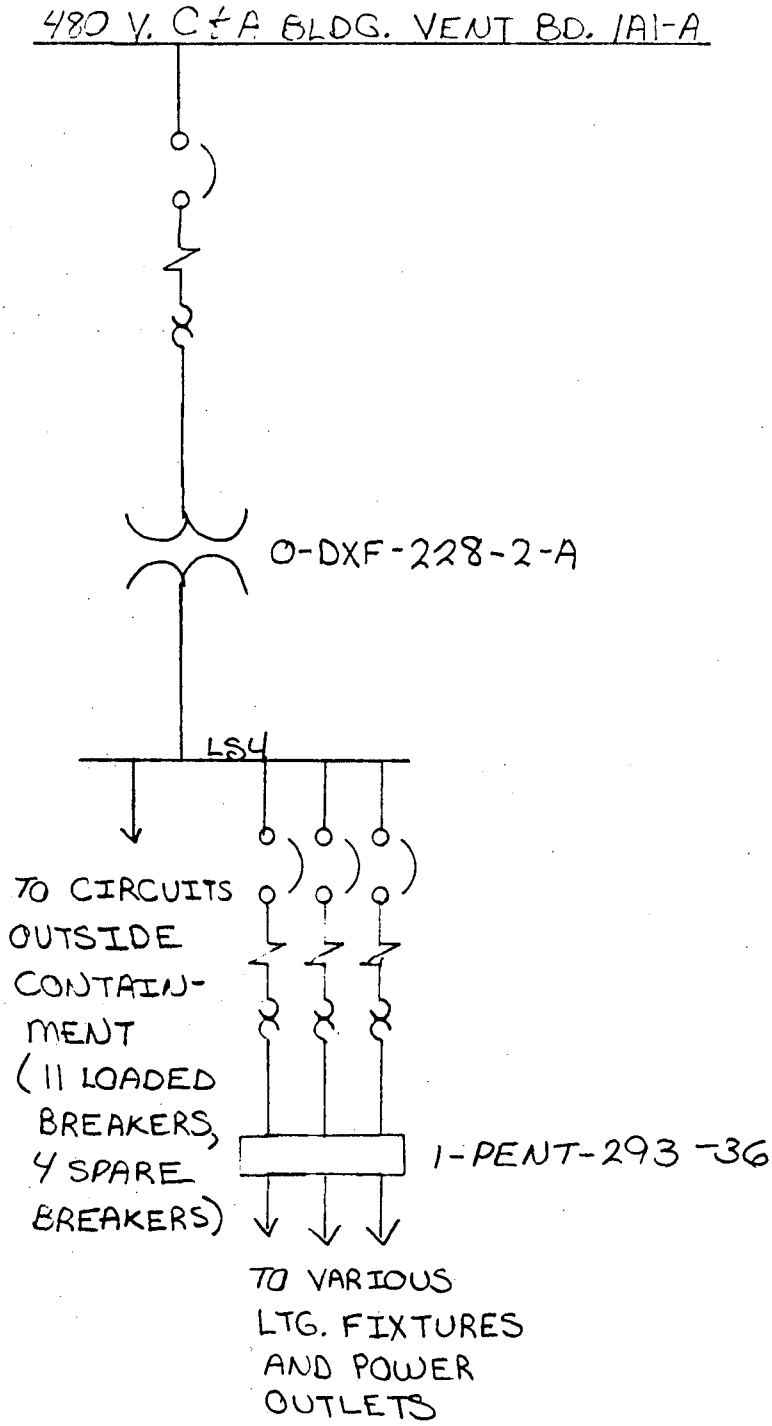


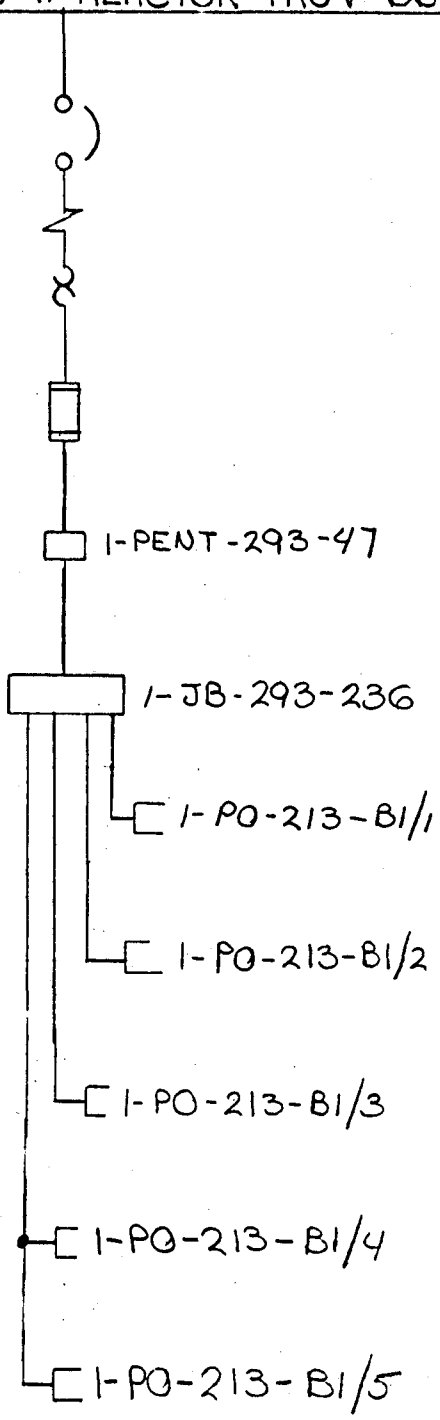
FIGURE A-2.1.7

TVA 489H (EN DES-2-78) TENNESSEE VALLEY AUTHORITY SHEET OF

SUBJECT POST LOCA FLOOD SUBMERSION STUDY PROJECT WATTS BAR N.P.

COMPUTED BY DATE CHECKED BY MLC DATE 2-18-82

480 V. REACTOR MOV BD. 1B1-B



POWER OUTLETS.

FIGURE A - 2.1.8

APPENDIX A-3

WATTS BAR NUCLEAR PLANT
LIST OF THE SUBMERGED ELECTRICAL EQUIPMENT
POWERED FROM THE NON 1E AUXILIARY POWER SYSTEM

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TENNESSEE VALLEY AUTHORITY

APPENDIX
SHEET 1 OF ___

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E AUXILIARY SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 1 COMPUTED BY DATE CHECKED BY D

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CABLE NO.	REF DWG
JB-293-8391	Cable Termination RCP 1A	6900	RCP 1A								
JB-293-8444	Cable Termination RCP 2A	6900	RCP 2A								
JB-293-8392	Cable Termination RCP 1B	6900	RCP 1B								
JB-293-8445	Cable Termination RCP 2B	6900	RCP 2B								
JB-293-8393	Cable Termination RCP 1C	6900	RCP 1C								
JB-293-8446	Cable Termination RCP 2C	6900	RCP 2C								
JB-293-8394	Cable Termination RCP 1D	6900	RCP 1D								
JB-293-8447	Cable Termination RCP 2D	6900	RCP 2D								
1-MTR-77-410	React. bldg aux floor and equipment sump pump 1A	480	Aux bldg MCC A								
1-MTR-77-411	React. bldg aux floor and equipment sump pump 1B	480	Aux bldg MCC A								

TENNESSEE VALLEY AUTHORITY

APPENDIX
SHEET 2 OF ___

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E AUXILIARY SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 1 COMPUTED BY ___ DATE ___ CHECKED BY ___ DA

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CABLE NO.	REF DWG
1-PO-213-B1	Various power outlets	480	Aux bldg MCC A								
2-PO-213-B1	Various power outlets	480	Aux bldg MCC A								
LC180	Various ltg circuits	208/ 120	Aux bldg ltg 1								
LC280	Various ltg circuits	208/ 120	Aux bldg ltg 2								
1-L-181	RCS system panel	120	1-DXF-235 -A								
2-L-181	RCJ system panel	120	2-DXF-235 -A								
Box 1741	120V Control power	120	1-DXF-235 -A								
Box 1743	120V Control power	120	2-DXF-235 -A								
JB 3131	Control Cable termination	120	1-DXF-235 -B								
JB 3132	Control Cable termination	120	1-DXF-235 -B								

APPENDIX B

WATTS BAR NUCLEAR PLANT
SER SECTION 8.3.3.1.1
SUBMERGENCE OF ELECTRICAL EQUIPMENT (DURING POST-LOCA FLOOD) POWERED FROM I&C POWER SYSTEM

OUTLINE FOR THE I&C POWER SYSTEM SUBMERGENCE ANALYSIS

Appendix B - Analysis of Submerged Electrical Equipment (During Post-LOCA Flood) Powered from I&C Power System

Purpose

Assumptions

Method of Analysis

Conclusions

Appendix B-1	List of Submerged Electrical Equipment Grouped by Component Type and Associated Typical Figures (Nos. B-1.1 thru 5).
Appendix B-2	List of Submerged Electrical Equipment Grouped by Source of I&C Power.
Appendix B-2.1	List of Submerged Electrical Components Powered from Class 1E 125-volt DC System.
Appendix B-2.2	List of Submerged Electrical Components Powered from Class 1E 120-volt AC System.
Appendix B-2.3	List of Submerged Electrical Components Powered from Non-Class 1E I&C Power System.
Appendix B-3	Summary of Class 1E I&C Power System Evaluation.
Appendix B-3.1	Evaluation of Protective Devices for Submerged Electrical Components.
Appendix B-3.2	Evaluation of Class 1E I&C Power System (AC and DC) Capacity Due to Submergence of Electrical Components.
Appendix B-4	Manufacturer's Time-Current Curves for Protection Devices.

052058.03

APPENDIX B
Watts Bar Nuclear Plant SER
Analysis of Submerged Electrical Equipment
(During Post LOCA) Powered from
Instrumentation and Control
Power System

Purpose

The purpose of this analysis is to evaluate the response of the Class 1E instrument and control (I&C) power system (125 volts dc and 120 volts ac) to the submergence and subsequent fault of certain electrical equipment inside containment during post-LOCA flooding.

Assumptions

1. The conductivity of the post-LOCA flood water is high enough to assume a zero impedance ground fault.

2. All components are submerged at the same time; therefore, the worst case condition will be imposed on the I&C power system.

3. A loss of offsite power condition is assumed, therefore, all submerged electrical components powered from the Class 1E I&C power system will be supplied from the DC power systems.

4. Only the submerged I&C components powered from the Class 1E I&C power system were evaluated.

5. The fault current (I_{SC}) for the components powered from the 125-volt vital dc power system was calculated at 120 volts dc (initial battery voltage upon loss of ac power), this will impose the worst case condition on the batteries.

6. The fault current (I_{SC}) for the components powered from the 120-volt vital ac power system was calculated at 120 volts ac (nominal output voltage of UPS), this will impose the worst case conditions on the UPS.

Method of Analysis

The loads listed in Appendix B-2 were identified as those below the anticipated maximum flood level at Watts Bar Nuclear Plant (Units 1 and 2) and powered from the I&C power system. Appendixes B-2.1 and B-2.2 identify the submerged I&C components powered from the Class 1E vital 125-volt dc power system and Class 1E vital 120-volt ac power system, respectively. Appendix B-2.3 identifies the submerged I&C components powered from the non-Class 1E I&C power system; these components were not evaluated. Also, all components powered from the Class 1E system were categorized into three groups (see Figure B):

A. Equipment that must operate for accident mitigation. (This equipment will be relocated above the flood level or environmentally qualified for this condition. Final response, for this equipment, will be provided in TVA's analysis of NUREG 0588 for WBNP.)

B. Equipment not required to operate for accident mitigation but must not fail in a critical mode.

C. Equipment not required to operate for accident mitigation and whose failure is not critical to plant safety or accident mitigation.

Each submerged component listed in Appendixes B-2.1 and B-2.2 was evaluated in the following manner (except the solenoid valves that are deenergized upon a loss of coolant accident or a safety injection signal and junction boxes associated with response time testing which are not energized during unit operation):

1. For each submerged component identified in Appendix B-1, sheets 1-6, equivalent electrical models (Figures B-1.1 through B-1.5.2) were constructed from TVA schematic and connection diagrams identifying the circuit power source; primary and secondary (if applicable) protective devices; and intermediate cables, if any, from power source to the submerged component, point of fault.

2. The components identified as elements of instrument loops, temperature sensors, neutron monitoring circuits, radiation monitoring circuits and loose parts monitoring circuits were evaluated and found (because of the circuit design) to contribute no fault current to the Class 1E I&C power system (see remarks on Appendixes B-2.1 and B-2.2).

3. For the remaining components, conductor sizes and cable lengths were obtained from appropriate cable routing schedules. Assuming a conductor-to-conductor fault for ungrounded systems and a conductor-to-ground fault for grounded systems, the fault current for each of these components was calculated as the ratio of power source voltage to the sum of cable resistances from power source to the point of fault. Mathematically,

$$I_{SC} = \frac{V_{source}}{\Sigma R_{cables}}$$

Results of these calculations were compiled and appear in Appendixes B-2.1 and B-2.2.

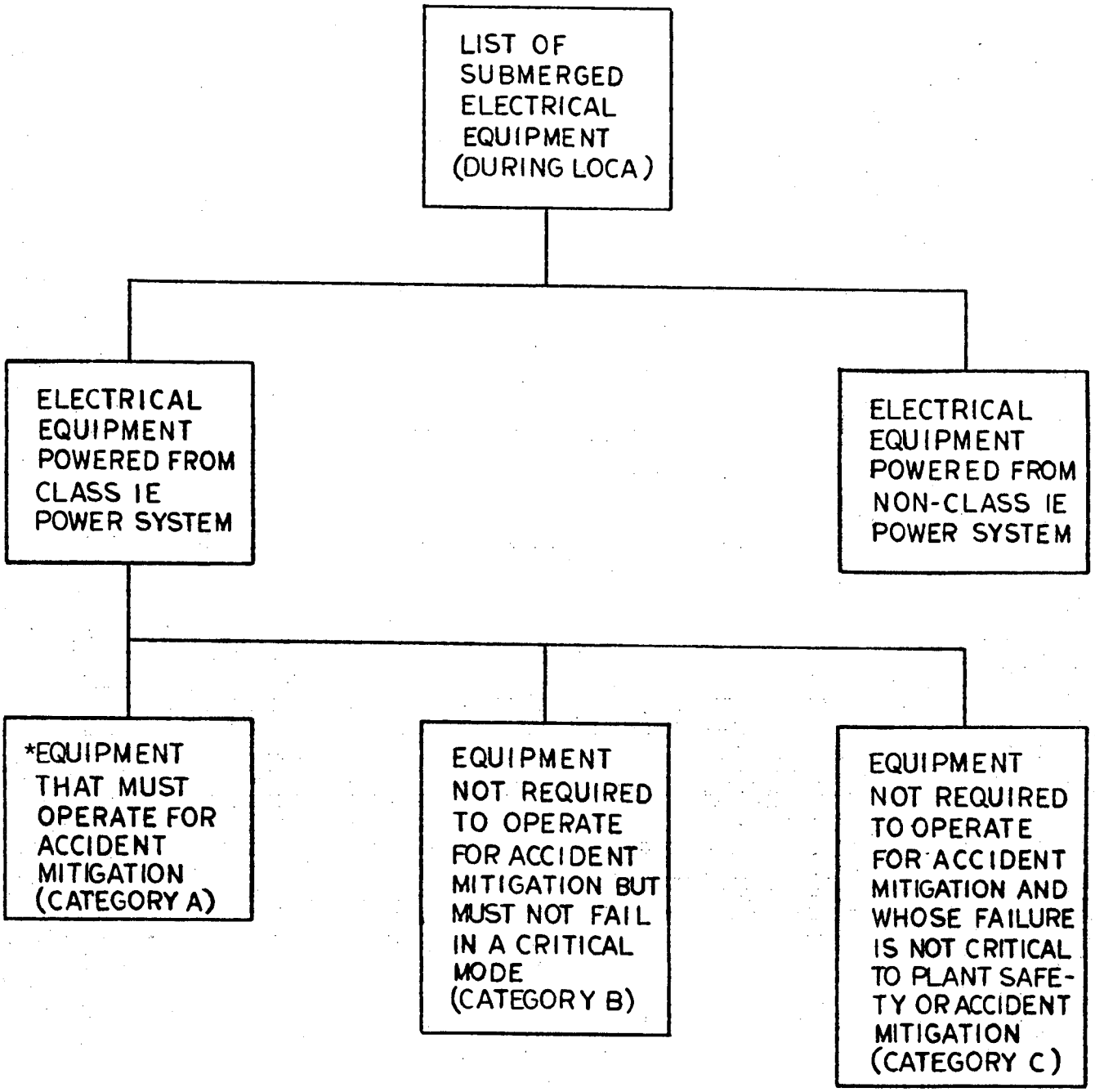
4. For each value of fault current computed, a protective device clearing time was determined from manufacturer's time-current curves. The protective devices (primary and backup) were then evaluated to verify they would clear before the main breaker on the associated distribution panel tripped. This evaluation is shown in Appendix B-3.1. (Note: The time-current curve for each protective device evaluated is provided in Appendix B-4.)

5. The effect of the submerged components' fault current on the power system was also evaluated to verify the combined fault currents would not exceed the capacity for the Class 1E I&C power system during this condition. (Where two or more submerged components are powered from the same system; it was assumed all shorts occurred at the same time.) A summary of this evaluation is included in Appendix B-3.2.

Conclusion

The results of this analysis show that the submergence of the electrical components listed in Appendix B-2 will not prevent the Class 1E 120-volt ac and 125-volt dc I&C power systems from performing their intended safety functions. All faulted components (where applicable) will be isolated by their primary or backup protective devices without tripping the main breaker on the associated distribution panel. In addition, the submergence of multiple components from the same power system will not exceed the Class 1E I&C power system's capacity rating (see Appendix B-3).

SUBMERGED ELECTRICAL EQUIPMENT BLOCK DIAGRAM



*This equipment will be relocated above the flood level or environmentally qualified for this condition. Final response, for this equipment, will be provided in TVA's analysis of NUREG 0588 for WBNP.

FIGURE B

APPENDIX B-1

LIST OF SUBMERGED ELECTRICAL EQUIPMENT GROUPED BY COMPONENT TYPE AND ASSOCIATED TYPICAL FIGURES (NOS. B-1.1 THRU 5)

WATTS BAR NUCLEAR PLANT

LIST OF SUBMERGED ELECTRICAL EQUIPMENT
POWERED FROM CLASS 1E I&C POWER SYSTEM
GROUPED BY COMPONENT TYPE

Solenoid Valves

Component	Reference Appendix/Sheet
1-TSV-30-84A	B-2.1/2
1-TSV-30-85A	B-2.1/2
1-TSV-30-89A	B-2.1/2
1-TSV-30-90A	B-2.1/2
1-TSV-30-81B	B-2.1/4
1-TSV-30-82B	B-2.1/4
1-TSV-30-93B	B-2.1/4
1-TSV-30-94B	B-2.1/4
2-TSV-30-84A	B-2.1/6
2-TSV-30-85A	B-2.1/6
2-TSV-30-89A	B-2.1/7
2-TSV-30-90A	B-2.1/7
2-TSV-30-81B	B-2.1/8
2-TSV-30-82B	B-2.1/8
2-TSV-30-93B	B-2.1/8
2-TSV-30-94B	B-2.1/9
1-FSV-62-69A	B-2.1/2
1-FSV-62-72A	B-2.1/2
1-FSV-62-73A	B-2.1/3
1-FSV-62-74A	B-2.1/3
1-FSV-62-76A	B-2.1/3
1-FSV-62-59B	B-2.1/4
2-FSV-62-69A	B-2.1/6
2-FSV-62-72A	B-2.1/6
2-FSV-62-73A	B-2.1/6
2-FSV-62-74A	B-2.1/6
2-FSV-62-76A	B-2.1/7
2-FSV-62-59B	B-2.1/9
1-FSV-62-35	B-2.1/10
1-FSV-62-9	B-2.1/10
1-FSV-62-53	B-2.1/10
1-FSV-62-22	B-2.1/11

Component	Reference Appendix/Sheet
2-FSV-87-8A	B-2.1/7
1-FSV-81-15	B-2.1/10
1-FSV-81-13	B-2.1/10
1-FSV-81-14	B-2.1/11
1-FSV-81-16	B-2.1/12
2-FSV-81-15	B-2.1/13
2-FSV-81-13	B-2.1/13
2-FSV-81-14	B-2.1/14
2-FSV-81-16	B-2.1/15
1-FSV-62-48	B-2.1/12
2-FSV-62-35	B-2.1/13
2-FSV-62-9	B-2.1/13
2-FSV-62-53	B-2.1/13
2-FSV-62-22	B-2.1/14
2-FSV-62-48	B-2.1/15
1-FSV-87-7A	B-2.1/3
1-FSV-87-8A	B-2.1/3
2-FSV-87-7A	B-2.1/7
1-FSV-68-310	B-2.1/11
1-FSV-68-303	B-2.1/11
2-FSV-68-310	B-2.1/13
2-FSV-68-303	B-2.1/14
1-FSV-63-110	B-2.1/11
1-FSV-63-90	B-2.1/11
2-FSV-63-90	B-2.1/14
2-FSV-63-110	B-2.1/15
1-FSV-43-31	B-2.1/11
1-FSV-43-30	B-2.1/12
1-FSV-43-32	B-2.1/12
1-FSV-43-33	B-2.1/12
2-FSV-43-31	B-2.1/15
2-FSV-43-30	B-2.1/15
2-FSV-43-32	B-2.1/15
2-FSV-43-33	B-2.1/15
2-FSV-77-3	B-2.1/14
1-FSV-77-3	B-2.1/16
1-PSV-68-301	B-2.1/13
2-PSV-68-301	B-2.1/10
2-LSV-77-415	B-2.1/14
1-LSV-77-415	B-2.1/16

WATTS BAR NUCLEAR PLANT

LIST OF SUBMERGED ELECTRICAL EQUIPMENT
POWERED FROM CLASS 1E I&C POWER SYSTEM
GROUPED BY COMPONENT TYPE

Temperature Elements

Component	Reference Appendix/Sheet	Component	Reference Appendix/Sheet
1-ITE-68-18-E	B-2.2/5	2-TE-68-18-E	B-2.2/26
1-ITE-68-41-E	B-2.2/5	2-TE-68-41-E	B-2.2/26
1-ITE-68-60-E	B-2.2/6	2-TE-68-60-E	B-2.2/26
1-ITE-68-83-E	B-2.2/6	2-TE-68-83-E	B-2.2/26
1-ITE-68-44A-F	B-2.2/6	2-TE-68-44A-F	B-2.2/26
1-ITE-68-44B-F	B-2.2/6	2-TE-68-44B-F	B-2.2/26
1-ITE-68-2A-D	B-2.2/6	2-TE-68-2A-D	B-2.2/27
1-ITE-68-2B-D	B-2.2/6	2-TE-68-2B-D	B-2.2/27
1-ITE-68-14A-D	B-2.2/6	2-TE-68-14A-D	B-2.2/27
1-ITE-68-14B-D	B-2.2/6	2-TE-68-14B-D	B-2.2/27
1-ITE-68-25A-E	B-2.2/6	2-TE-68-25A-E	B-2.2/27
1-ITE-68-25B-E	B-2.2/6	2-TE-68-25B-E	B-2.2/27
1-ITE-68-37A-E	B-2.2/7	2-TE-68-37A-E	B-2.2/27
1-ITE-68-37B-E	B-2.2/7	2-TE-68-37B-E	B-2.2/27
1-ITE-68-56A-F	B-2.2/7	2-TE-68-56A-F	B-2.2/27
1-ITE-68-56B-F	B-2.2/7	2-TE-68-56B-F	B-2.2/27
1-ITE-68-67A-G	B-2.2/7	2-TE-68-67A-G	B-2.2/28
1-ITE-68-67B-G	B-2.2/7	2-TE-68-67B-G	B-2.2/28
1-ITE-68-79A-G	B-2.2/7	2-TE-68-79A-G	B-2.2/28
1-ITE-68-79B-G	B-2.2/7	2-TE_68-79B-G	B-2.2/28
1-ITE-68-1-D	B-2.2/7	2-TE-68-1-D	B-2.2/28
1-ITE-68-24-D	B-2.2/7	2-TE-68-24-D	B-2.2/28
1-ITE-68-43-D	B-2.2/8	2-TE-68-43-D	B-2.2/28
1-ITE-68-65-D	B-2.2/8	2-TE-68-65-D	B-2.2/28

WATTS BAR NUCLEAR PLANT

LIST OF SUBMERGED ELECTRICAL EQUIPMENT
POWERED FROM CLASS 1E I&C POWER SYSTEM
GROUPED BY COMPONENT TYPE

Instrument Loops

Component	Reference Appendix/Sheet
1-LT-3-172-A	B-2.2/1
1-LT-3-175-A	B-2.2/1
1-LT-3-93-D	B-2.2/1
1-LT-3-51-D	B-2.2/1
1-FT-68-6A-D	B-2.2/1
1-FT-68-48A-D	B-2.2/1
1-FT-68-71A-D	B-2.2/2
1-FT-68-29A-D	B-2.2/2
1-LT-3-173-B	B-2.2/2
1-LT-3-174-B	B-2.2/2
1-FT-1-21B-E	B-2.2/3
1-LT-3-38-E	B-2.2/3
1-LT-3-106-E	B-2.2/3
1-FT-68-6B-E	B-2.2/3
1-FT-68-48B-E	B-2.2/3
1-FT-68-71B-E	B-2.2/3
1-FT-68-29B-E	B-2.2/3
1-LT-3-94-F	B-2.2/4
1-LT-3-107-F	B-2.2/4
1-LT-3-111-F	B-2.2/4
1-FT-68-6D-F	B-2.2/4
1-FT-68-48D-F	B-2.2/4
1-FT-68-29D-F	B-2.2/4
1-FT-68-71D-F	B-2.2/4
1-PT-68-322-G	B-2.2/5
1-LT-3-42-G	B-2.2/5
1-LT-3-55-G	B-2.2/5
1-LT-3-56-G	B-2.2/5
1-PT-68-301	B-2.2/9
1-LT-68-300	B-2.2/9
1-Pdt-62-8	B-2.2/9
1-FIT-62-10	B-2.2/9
1-FIT-62-11	B-2.2/9
1-FIT-62-23	B-2.2/11
1-FIT-62-24	B-2.2/11
2-FT-68-71A-D	B-2.2/20
2-FT-68-29A-D	B-2.2/20
2-FT-1-21B-E	B-2.2/21
2-LT-3-38-E	B-2.2/21
2-LT-3-106-E	B-2.2/22
2-FT-68-6B-E	B-2.2/22
2-FT-68-48B-E	B-2.2/22
2-FT-68-71B-E	B-2.2/22

Component	Reference Appendix/Sheet
1-PdT-62-21	B-2.2/13
1-PT-68-311-C	B-2.2/13
1-LT-77-125	B-2.2/13
1-LT-77-126	B-2.2/13
1-FT-70-115	B-2.2/14
1-FT-70-119	B-2.2/14
1-FT-70-116	B-2.2/14
1-FIT-62-36	B-2.2/14
1-FIT-62-37	B-2.2/14
1-PdT-70-104	B-2.2/14
1-FT-70-105	B-2.2/14
1-FT-70-106	B-2.2/15
1-PT-63-62	B-2.2/15
1-PT-3-37	B-2.2/15
1-LT-63-82	B-2.2/15
1-MT-30-241	B-2.2/15
1-PdT-70-126	B-2.2/15
1-FT-70-108	B-2.2/15
1-PT-63-83C	B-2.2/16
1-FT-70-96	B-2.2/16
1-FT-70-98	B-2.2/16
1-PT-3-92	B-2.2/16
1-LT-77-410	B-2.2/16
1-LT-77-411	B-2.2/16
1-LT-68-312C	B-2.2/16
1-FIT-62-49	B-2.2/17
1-FIT-62-50	B-2.2/17
1-LT-63-60	B-2.2/17
1-PT-63-61	B-2.2/17
1-PT-63-86	B-2.2/18
1-Pdt-62-47	B-2.2/18
2-LT-3-93-D	B-2.2/19
2-LT-3-51-D	B-2.2/19
2-FT-68-6A-D	B-2.2/19
2-FT-68-48A-D	B-2.2/19
2-FIT-62-49	B-2.2/30
2-LT-77-125	B-2.2/30
2-LT-77-126	B-2.2/31
2-MT-30-241	B-2.2/31
2-PdT-70-104	B-2.2/31
2-PdT-62-8	B-2.2/31
2-PT-68-301	B-2.2/31
2-LT-68-300	B-2.2/31

WATTS BAR NUCLEAR PLANT

LIST OF SUBMERGED ELECTRICAL EQUIPMENT
POWERED FROM CLASS 1E I&C POWER SYSTEM
GROUPED BY COMPONENT TYPE

Instrument Loops (Continued)

Component	Reference Appendix/Sheet
2-FT-68-29B-E	B-2.2/22
2-LT-3-172-A	B-2.2/22
2-LT-3-175-A	B-2.2/23
2-LT-3-94-F	B-2.2/23
2-LT-3-107-F	B-2.2/23
2-LT-3-111-F	B-2.2/24
2-FT-68-6D-F	B-2.2/24
2-FT-68-48D-F	B-2.2/24
2-FT-68-29D-F	B-2.2/24
2-LT-68-71D-F	B-2.2/24
2-LT-3-173-B	B-2.2/24
2-LT-3-174-B	B-2.2/25
2-PT-68-322-G	B-2.2/25
2-LT-3-42-G	B-2.2/25
2-LT-3-55-G	B-2.2/26
2-LT-3-56-G	B-2.2/26
2-FT-70-116	B-2.2/29
2-FT-70-119	B-2.2/29
2-LT-68-312C	B-2.2/29
2-LT-77-410	B-2.2/29
2-LT-77-411	B-2.2/29
2-LT-63-60	B-2.2/29
2-LT-63-82	B-2.2/30
2-FIT-62-23	B-2.2/30
2-FIT-62-24	B-2.2/30
2-FIT-62-36	B-2.2/30
2-FIT-62-37	B-2.2/30
1-XT-52-104	B-2.2/10
1-XT-52-108	B-2.2/10
1-XT-52-109	B-2.2/10
1-XT-52-105	B-2.2/10
1-XT-52-102	B-2.2/10
1-XT-52-106	B-2.2/10
1-XT-52-103	B-2.2/10
1-XT-52-107	B-2.2/11
1-XT-52-111	B-2.2/11
1-XT-52-101	B-2.2/11
2-XT-52-104	B-2.2/11
2-XT-52-108	B-2.2/12
2-XT-52-109	B-2.2/11
2-XT-52-105	B-2.2/12
2-XT-52-102	B-2.2/12
2-XT-52-106	B-2.2/12
2-XT-52-103	B-2.2/12
2-XT-52-107	B-2.2/12
2-XT-52-111	B-2.2/13
2-XT-52-101	B-2.2/13
2-FT-70-96	B-2.2/32
2-FT-70-98	B-2.2/32
2-FT-70-105	B-2.2/32
2-FT-70-106	B-2.2/33
2-FT-70-108	B-2.2/33
2-FT-70-115	B-2.2/33
2-FIT-62-10	B-2.2/33
2-FIT-62-11	B-2.2/33
2-PT-3-37	B-2.2/33
2-PT-3-92	B-2.2/33
2-PdT-70-126	B-2.2/34
2-PT-68-311C	B-2.2/34
2-FIT-62-50	B-2.2/34
2-PT-63-61	B-2.2/34
2-PT-63-83C	B-2.2/34
2-PT-63-86	B-2.2/34
2-PdT-62-21	B-2.2/35
2-PT-63-62	B-2.2/35
1-FM-63-65	B-2.2/9
1-PM-68-340H	B-2.2/9
2-FM-63-65	B-2.2/31
2-PM-68-340H	B-2.2/32
2-PdT-62-47	B-2.2/34

WATTS BAR NUCLEAR PLANT

LIST OF SUBMERGED ELECTRICAL EQUIPMENT
POWERED FROM CLASS 1E I&C POWER SYSTEM
GROUPED BY COMPONENT TYPE

Radiation Monitors

Component	Reference Appendix/Sheet
1-RE-90-273A	B-2.2/1
1-RE-90-274B	B-2.2/3
2-RE-90-273A	B-2.2/23
2-RE-90-274B	B-2.2/25
1-RM-90-210	B-2.2/13
2-RM-90-210	B-2.2/32

Neutron Monitors

Component	Reference Appendix/Sheet
1-NMD-92-NE31-D	B-2.2/1
1-NMD-92-NE41A-D	B-2.2/1
1-NMD-92-NE35-D	B-2.2/2
1-NMD-92-NE32-E	B-2.2/2
1-NMD-92-NE36-E	B-2.2/2
1-NMD-92-NE42A-E	B-2.2/2
1-NMD-92-NE43A-F	B-2.2/4
1-NMD-92-NE44A-G	B-2.2/5
2-NMD-92-NE31-D	B-2.2/18
2-NMD-92-NE35-D	B-2.2/18
2-NMD-92-NE41A-D	B-2.2/19
2-NMD-92-NE32-E	B-2.2/20
2-NMD-92-NE36-E	B-2.2/20
2-NMD-92-NE42A-E	B-2.2/21
2-NMD-92-NE43A-F	B-2.2/23
2-NMD-92-NE44A-G	B-2.2/25

WATTS BAR NUCLEAR PLANT

LIST OF SUBMERGED ELECTRICAL EQUIPMENT
POWERED FROM CLASS 1E I&C POWER SYSTEM
GROUPED BY COMPONENT TYPE

Flow, Temperature, and Hand Switches Powered from DC Source

Component	Reference Appendix/Sheet	Component	Reference Appendix/Sheet
1-TS-30-92B-B	B-2.1/4	2-TS-30-88B-A	B-2.1/8
1-FS-30-88B/A-B	B-2.1/4	2-FS-30-92B/A-A	B-2.1/8
1-HS-30-92B	B-2.1/4	2-HS-30-88B	B-2.1/8
1-TS-30-80B-B	B-2.1/5	2-TS-30-83B-A	B-2.1/8
1-FS-30-83B/A-B	B-2.1/5	2-FS-30-80B/A-A	B-2.1/8
1-HS-30-80B	B-2.1/5	2-HS-30-83B	B-2.1/8
1-TS-30-88B-A	B-2.1/5	2-TS-30-92B-B	B-2.1/9
1-FS-30-92B/A-A	B-2.1/5	2-FS-30-88B/A-B	B-2.1/9
1-HS-30-88B	B-2.1/5	2-HS-30-92B	B-2.1/9
1-TS-30-83B-A	B-2.1/3	2-TS-30-80B-B	B-2.1/9
1-FS-30-80B/A-A	B-2.1/3	2-FS-30-83B/A-B	B-2.1/9
1-HS-30-83B	B-2.1/3	2-HS-30-80B	B-2.1/9

Flow Switches Powered from AC Source

Component	Reference Appendix/Sheet
1-FS-30-80A/B-A	B-2.2/3
1-FS-30-92A/B-A	B-2.2/4
1-FS-30-88A/B-B	B-2.2/5
1-FS-30-83A/B-B	B-2.2/5
2-FS-30-80A/B-A	B-2.2/18
2-FS-30-92A/B-A	B-2.2/20
2-FS-30-88A/B-B	B-2.2/21
2-FS-30-83A/B-B	B-2.2/21

TYPICAL SOLENOID VALVE CIRCUITS

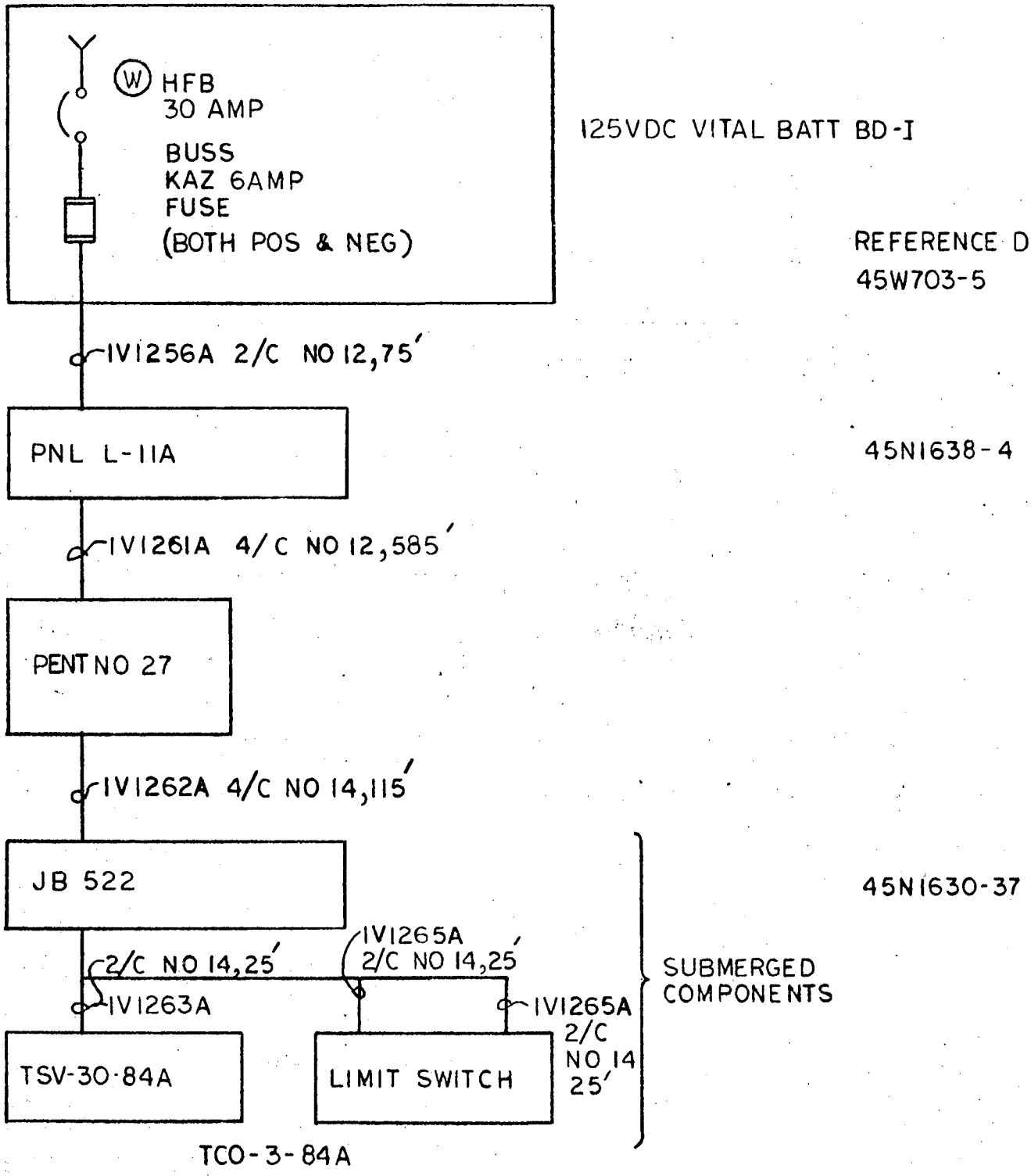
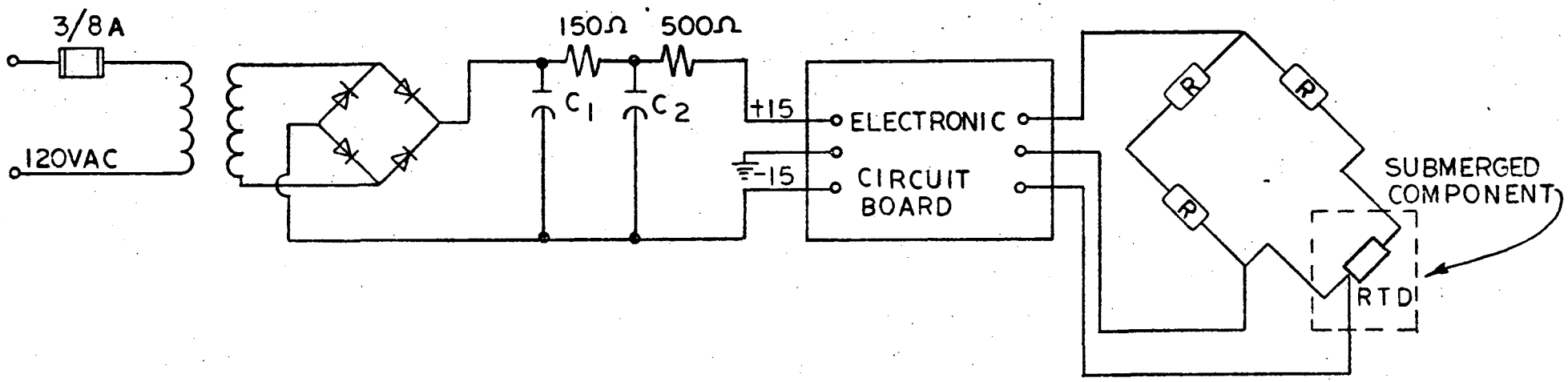


FIGURE B-1.1



TYPICAL TEMPERATURE ELEMENT CIRCUIT

FIGURE B-1.2

TYPICAL FOXBORO INSTRUMENT LOOP

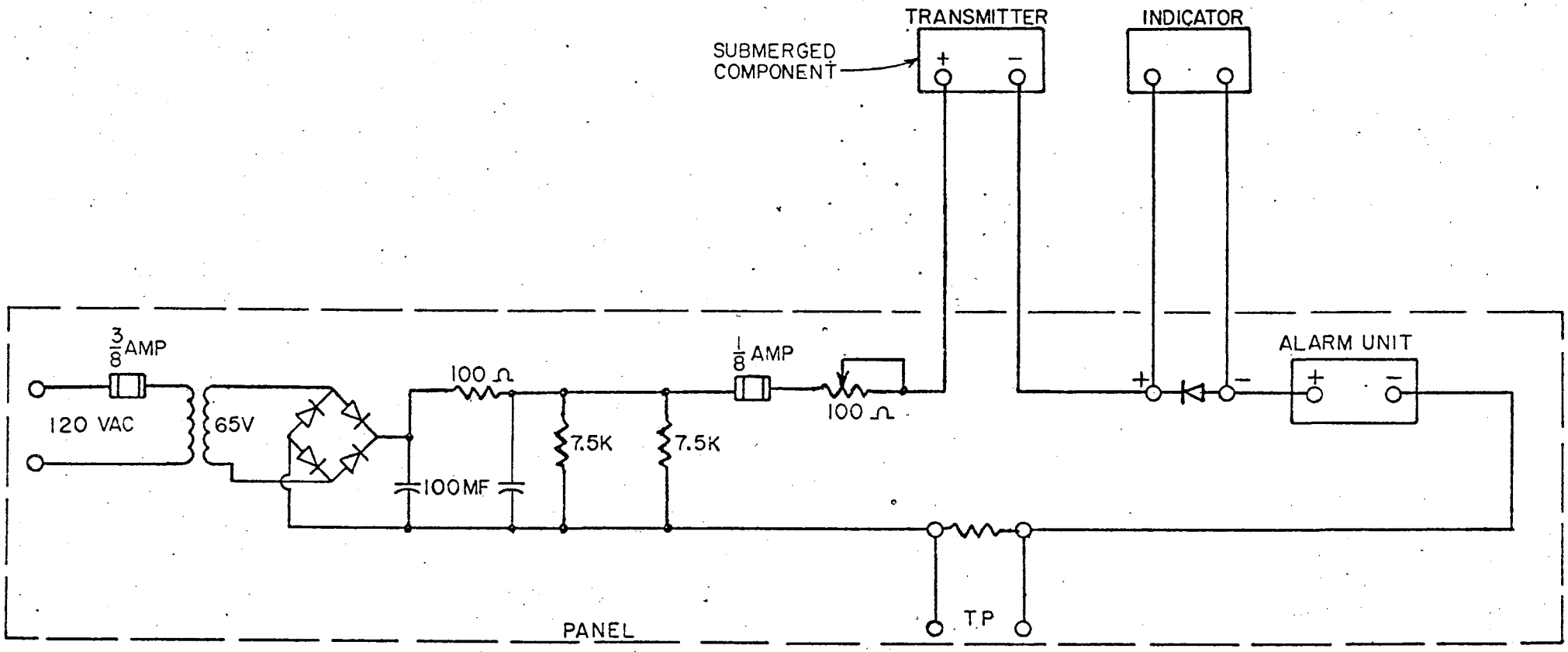


FIGURE B-1.3.1

TYPICAL ROBERTSHAW INSTRUMENT LOOP

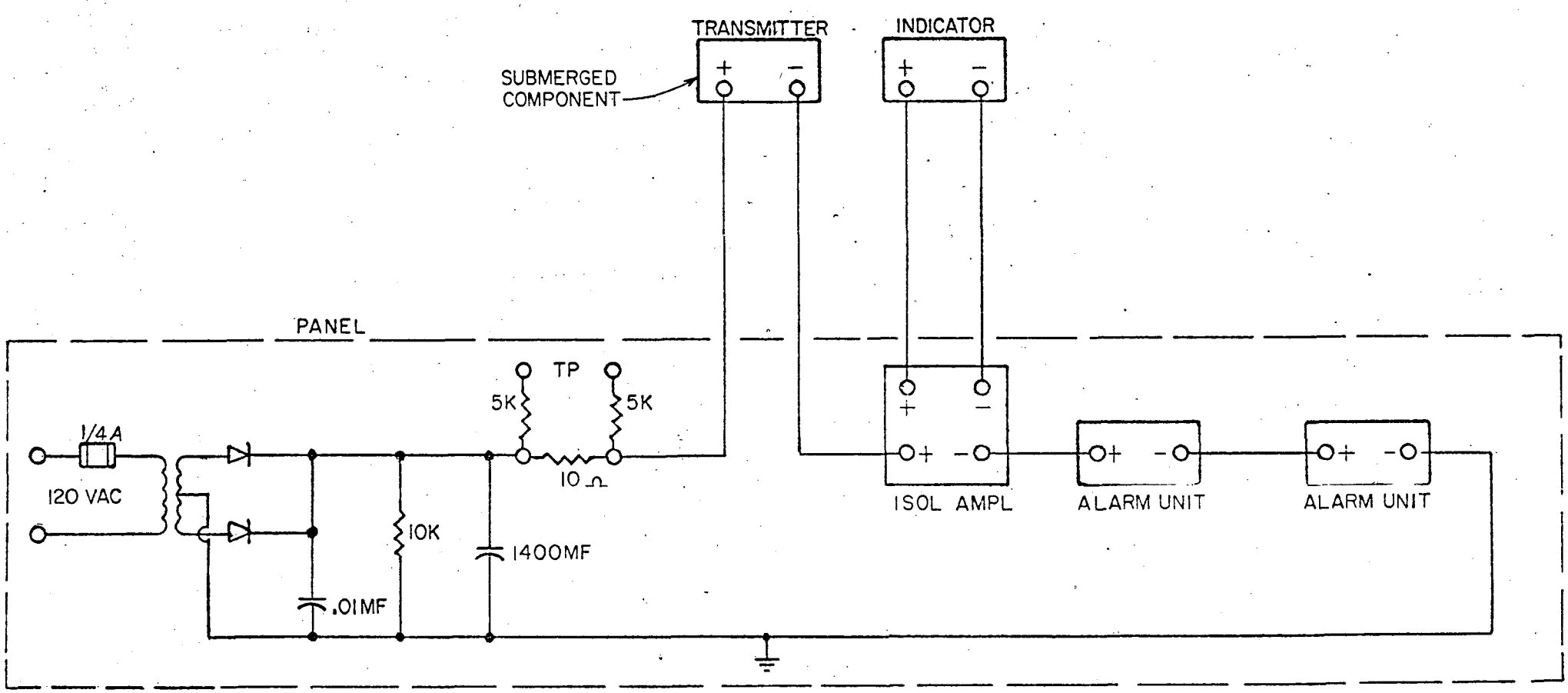


FIGURE B-1.3.2

TYPICAL BAILEY INSTRUMENT LOOP

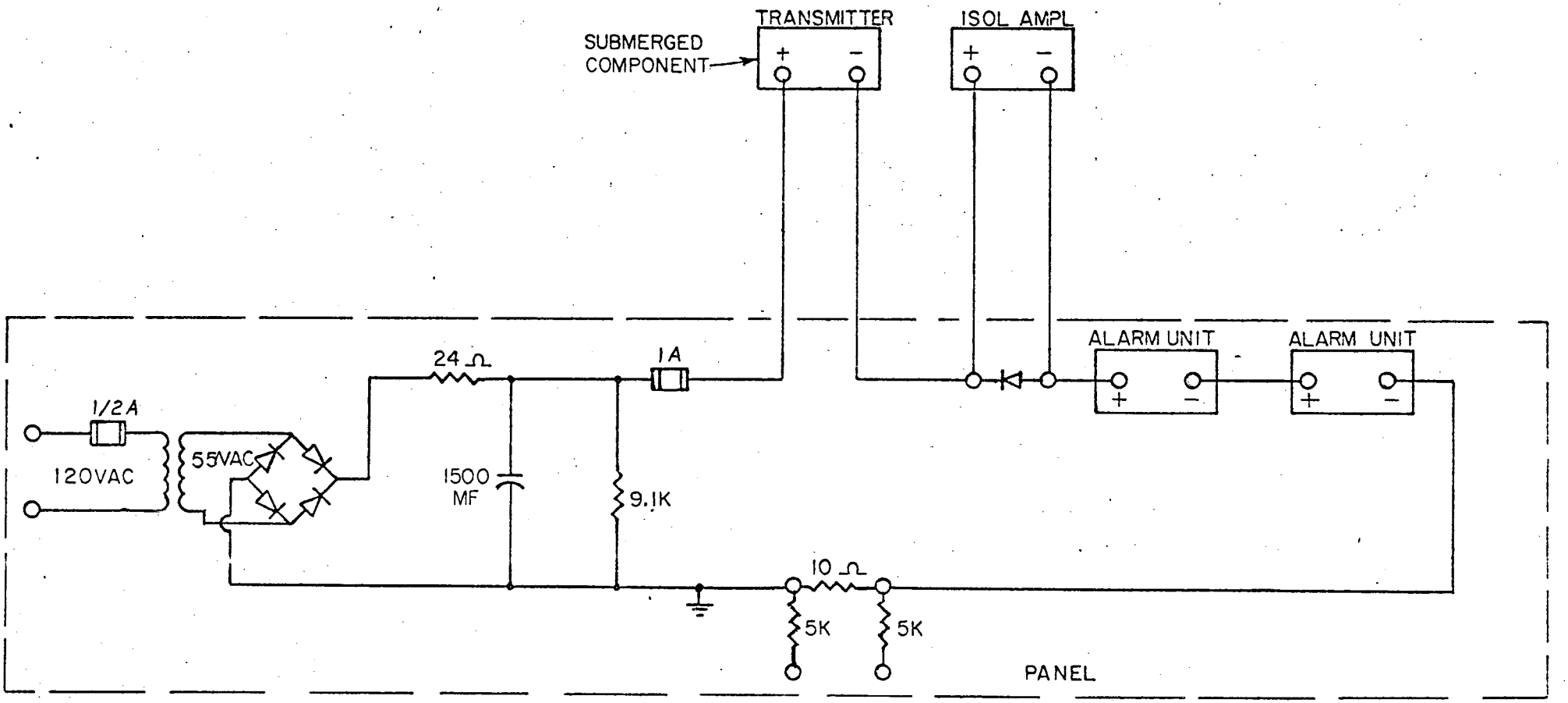
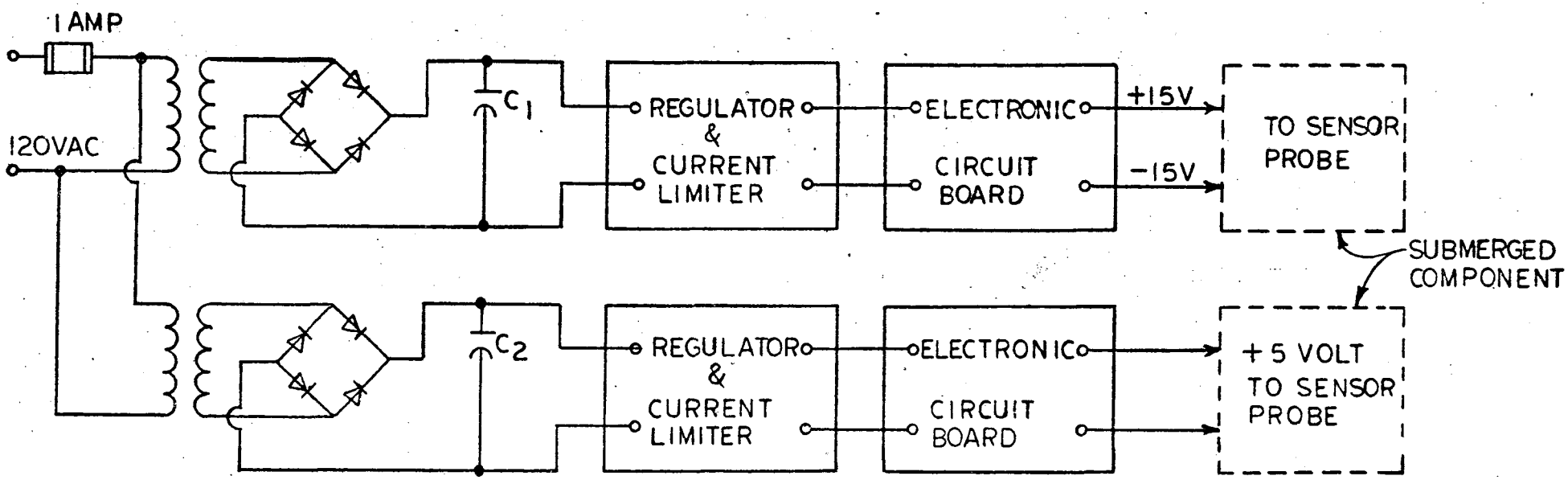
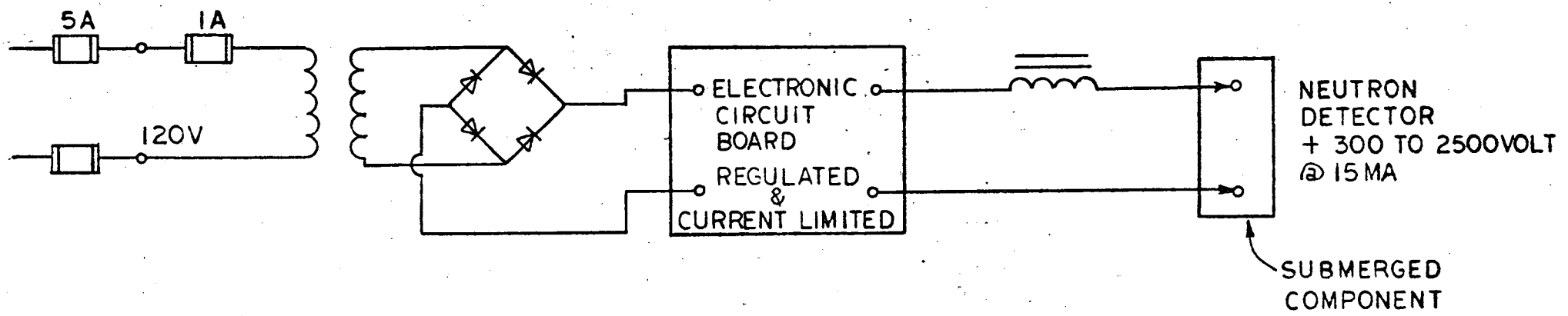


FIGURE B-1.3.3



TYPICAL LOOSE PARTS MONITORING CIRCUITS

FIGURE B-1.3.4



TYPICAL NEUTRON MONITOR & RADIATION MONITOR CIRCUIT

FIGURE B-1.4

TYPICAL DC POWERED FLOW SWITCH, TEMPERATURE SWITCH AND HAND SWITCH CIRCUIT

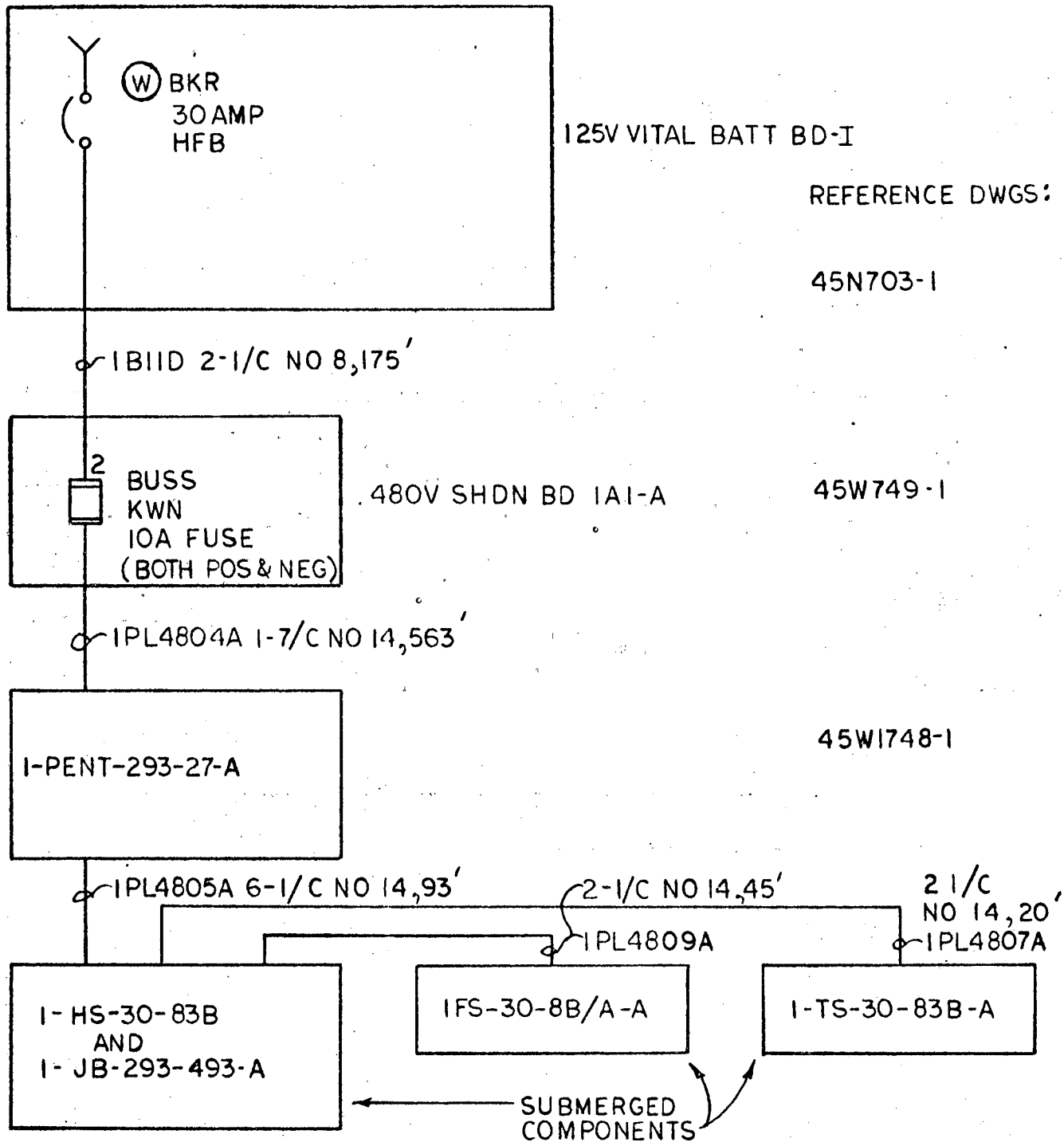


FIGURE B-1.5.1

TYPICAL AC POWERED FLOW SWITCHES

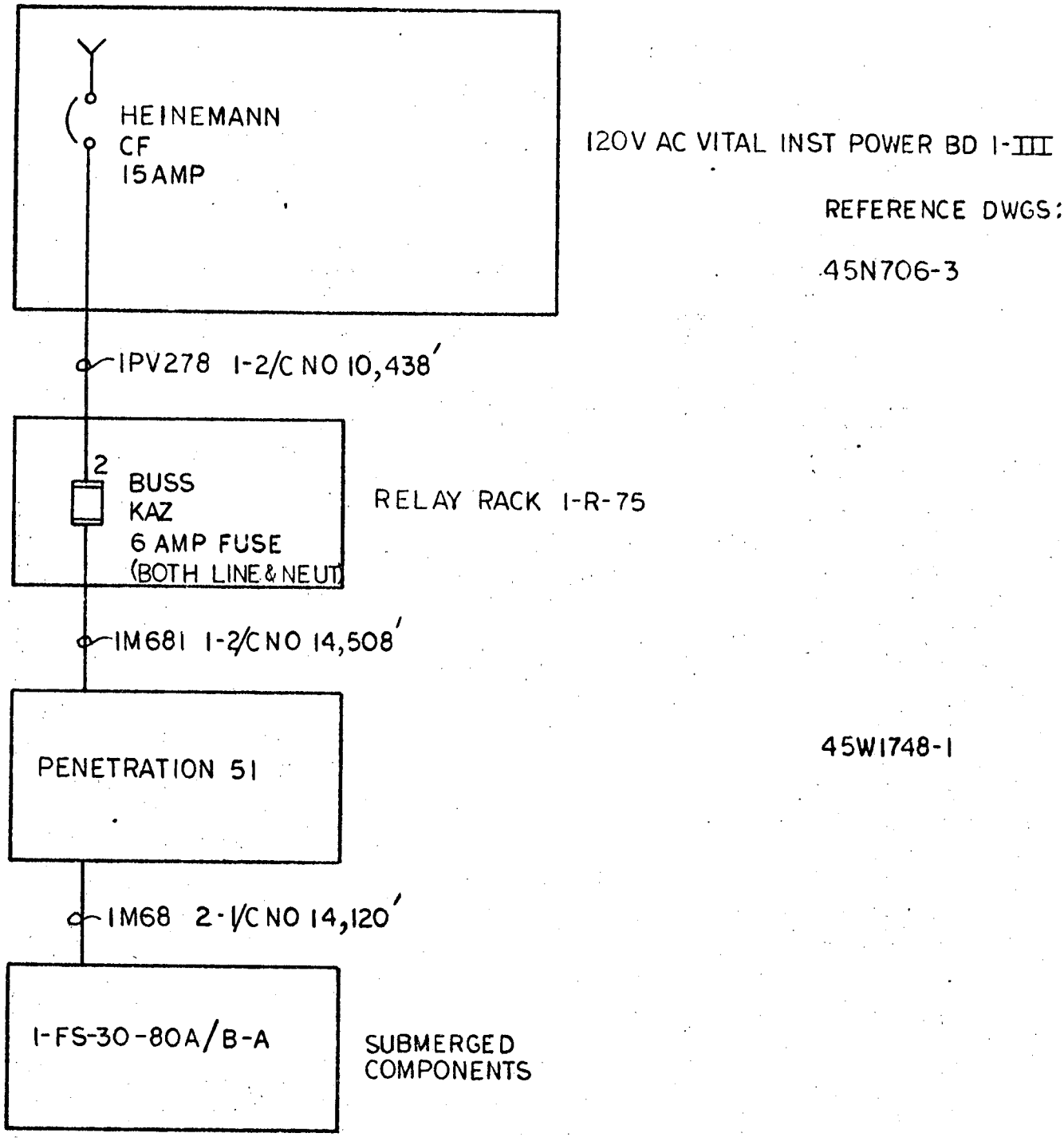


FIGURE B-1.5.2

APPENDIX B-2

LIST OF SUBMERGED ELECTRICAL EQUIPMENT GROUPED BY SOURCE OF I&C POWER

APPENDIX B-2.1

WBNP UNITS 1 AND 2

SUBMERGED ELECTRICAL COMPONENTS

INSIDE CONTAINMENT (DURING POST-LOCA)

POWERED FROM CLASS 1E 125-VOLT DC

VITAL I&C POWER SYSTEM

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

R. L. LEE COMPUTED BY 2/13/82 DATE CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-TSV-30-84A Limit switch for 1-TCO-30-84A, JB-522	CRD cool unit A-A suct dmpr	125 dc	Vital I	42	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-TSV-30-85A Limit switch for 1-TCO-30-85A, JB-522	CRD cool unit A-A rm div dmpr	125 dc	Vital I	43	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-TSV-30-89A Limit switch for 1-TCO-30-89A, JB-526	CRD cool unit C-A suct dmpr	125 dc	Vital I	43.6	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-TSV-30-90A Limit switch for 1-TCO-30-90A, JB-526	CRD cool unit C-A suct dmpr	125 dc	Vital I	41.5	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-62-69A Limit switch for 1-FCV-62-69A, JB 656	R.C. Loop 3 letdown flow ctl	125 dc	Vital I	28.7	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-62-72A Limit switch for 1-FCV-62-72A, JB 394	Regen ht exch letdown isol vlv A	125 dc	Vital I	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1

*Not applicable. Refer to Remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

R. L. LEE COMPUTED BY 2/13/82 DATE CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-FSV-62-73A Limit switch for 1-FCV-62-73A, JB 394	Regen ht exch letdown isol vlv B	125 dc	Vital I	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1
1-FSV-62-74A Limit switch for 1-FCV-62-74A, JB 394	Regen ht exch letdown isol vlv C	125 dc	Vital I	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1
1-FSV-62-76A Limit switch for 1-FCV-62-76A, JB 394	Regen ht exch letdown isol vlv	125 dc	Vital I	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	C	Fig. B-1.1
1-FSV-87-7A Limit switch for 1-FCV-87-7A, JB 691	Test line isol vlv flow control	125 dc	Vital I	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1
1-FSV-87-8A Limit switch for 1-FCV-87-8A, JB 691	Test line isol vlv flow control	125 dc	Vital I	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1
1-TS-30-83B-A 1-FS-30-80B /A-A 1-HS-30-83B, JB 493	CRD cool unit temperature, flow and fan control	125 dc	Vital I	32.5	Fuse Buss KWN	10	Fuse Buss KWN	10	See note 2, sheet 17	C	Fig. B-5.1

*Not applicable. Refer to Remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY Wm. Hertzell DATE 2/13/82 CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-TSV-30-81B Limit switch for 1-TCO-30-81B, JB 528	CRD cool unit D-B rm div dmpr	125 dc	Vital II	37.9	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-TSV-30-82B Limit switch for 1-TCO-30-82B, JB 528	CRD cool unit D-B rm div dmpr	125 dc	Vital II	37.9	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-TSV-30-93B Limit switch for 1-TCO-30-93B, JB 524	CRD cool unit D-B suct dmpr	125 dc	Vital II	32.2	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-TSV-30-94B Limit switch for 1-TCO-30-94B, JB 524	CRD cool unit B-B rm div dmpr	125 dc	Vital II	32.2	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-62-59B Limit switch for 1-FCV-62-59B, JB 56	Excess letdown div flow control	125 dc	Vital II	21.7	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-TS-30-92B-B 1-FS-30-88B/A -B 1-HS-30-92B, JB 495	CRD cool unit temperature, flow and fan control	125 dc	Vital II	32.5	Fuse Buss KWN	10	Fuse Buss KWN	10	See note 2, sheet 17	C	Fig. B-1.5.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY Wm Hartwell DATE 2/13/82

CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2 1-TS-30-80B-B 1-FS-30-83 B/A-B 1-HS-30-80B JB 520	CRD cool unit temperature, flow and fan control	125 dc	Vital II	44.2	Fuse Buss KWN	10	Fuse Buss KWN	10	See note 2, sheet 17	C	Fig. B-1.5.1
1-TS-30-88B-A 1-FS-30-92 B/A-B 1-HS-30-88B JB 518	CRD cool unit temperature, flow and fan control	125 dc	Vital I	35.3	Fuse Buss KWN	10	Fuse Buss KWN	10	See note 2, sheet 17	C	Fig. B-1.5.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 2 COMPUTED BY Wm Hartzell DATE 2/13/82 CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-TSV-30-84A 2-TCO-30-84A JB 523	CRD cool unit A-A suct dmpr	125 dc	Vital III	40.47	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-TSV-30-85A 2-TCO-30-85A JB 523	CRD cool unit A-A rm div dmpr	125 dc	Vital III	40.47	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-62-69A 2-FCV-62-69A JB 657	RC loop 3 letdown flow	125 dc	Vital III	26.37	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-62-72A 2-FCV-62-72A JB 395	Regen ht exch letdown isol vlv A	125 dc	Vital III	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1
2-FSV-62-73A 2-FCV-62-73A JB 395	Regen ht exch letdown isol vlv B	125 dc	Vital III	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1
2-FSV-62-74A 2-FCV-62-74A JB 395	Regen ht exch letdown isol vlv C	125 dc	Vital III	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1

*Not applicable. Refer to Remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 2

COMPUTED BY Wm Hartwell DATE 2/3/82

CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-FSV-62-76A 2-FCV-62-76A JB 395	Regen ht exch letdown isol vlv	125 dc	Vital III	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	C	Fig. B-1.1
2-FSV-87-7A 2-FCV-87-7A JB 692	Test line isol vlv flow control	125 dc	Vital III	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1
2-FSV-87-8A 2-FCV-87-8A JB 692	Test line isol vlv flow control	125 dc	Vital III	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 17	B	Fig. B-1.1
2-TSV-30-89A 2-TCO-30-89A JB 527	CRD cool unit C-A suct dmpr	125 dc	Vital III	40.8	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-TSV-30-90A 2-TCO-30-90A JB 527	CRD cool unit C-A rm div dmpr	125 dc	Vital III	41.37	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1

*Not applicable. Refer to Remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 2

Wm Hartwell — COMPUTED BY — 2/13/82 — DATE — CHECKED BY — DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
JB 519 2-TS-30-88B-A 2-FS-30-92B/A -A 2-HS-30-88B	CRD cool unit temp cont CRD cool unit B-B flow CRD cool unit C-A fan cntl	125 dc	Vital III	39.4	Fuse Buss KWN	10	Fuse Buss KWN	10	See note 2, sheet 17	C	Fig. B-1.5.1
JB 494 2-TS-30-83B-A 2-FS-30-80B/A -A 2-HS-30-83B	CRD cool unit temp cont CRD cool unit D-B flow CRD cool unit A-A fan cntl	125 dc	Vital III	36.6	Fuse Buss KWN	10	Fuse Buss KWN	10	See note 2, sheet 17	C	Fig. B-1.5.1
2-TSV-30-81B 2-TCO-30-81B JB 529	CRD cool unit D-B suct dmpr	125 dc	Vital IV	66.88	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-TSV-30-82B 2-TCO-30-82B JB 592	CRD cool unit D-B rm div dmpr	125 dc	Vital IV	66.88	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-TSV-30-93B 2-TCO-30-93B JB 525	CRD cool unit B-B suct dmpr	125 dc	Vital IV	51.28	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 2

COMPUTED BY Wm Hartsell DATE 2/13/82

CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-TSV-30-94B 2-TCO-30-94B JB 525	CRD cool unit B-B rm div dmpr	125 dc	Vital IV	51.28	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-62-59B 2-FCV-62-59B JB 59	Excess letdown div flow cont	125 dc	Vital IV	35.22	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-TS-30-92B-B 2-FS-30-88B/A -B 2-HS-30-92B JB 517	CRD cool unit temp cont CRD cool unit C-A flow CRD cool unit B-B fan cntl	125 dc	Vital IV	43.4	Fuse Buss KWN	10	Fuse Buss KWN	1	See note 2, sheet 17	C	Fig. B-1.5.1
2-TS-30-80B-B 2-FS-30-83B/A -B 2-HS-30-80B JB 521	CRD cool unit temp cont CRD cool unit A-A flow CRD cool unit D-B fan cntl	125 dc	Vital IV	65.3	Fuse Buss KWN	10	Fuse Buss KWN	10	See note 2, sheet 17	C	Fig. B-1.5.1

*Not applicable. Refer to Remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY J.D. Reed DATE 2/13/82

CHECKED BY DATE

NON CLASS-1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-FSV-62-35 1-FCV-62-35 Limit switches JB 687	RCP 3 seal return flow control	125 dc	Vital I	36.2	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-81-15 1-FCV-81-15 Limit switches JB 687	RCP 3 standpipe makeup water	125 dc	Vital I	35.3	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-62-9 1-FCV-62-9 Limit switches	RCP 1 seal return flow control	125 dc	Vital I	33.9	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-81-13 1-FCV-81-13 Limit switches	RCP 1 standpipe makeup water	125 dc	Vital I	30.1	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-PSV-68-301 1-PCV-68-301 Limit switches JB 2145	RC pressurizer relief tank	125 dc	Vital I	30.6	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-62-53 1-FCV-62-53 Limit switches JB 668	No. 1 seal bypass flow control	125 dc	Vital I	36.7	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY J.D. REED CD DATE 2/13/82 CHECKED BY DATE

NON CLASS-1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-FSV-68-310 1-FCV-68-310 Limit switches JB 2145	RCS flow cntl PRT to WDS RCDT	125 dc	Vital I	30.0	Fuse Buss KAZ	6	Fuse Buss KAZ	6A	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-63-110 1-FCV-63-110 Limit switches	SIS accum tk 2 drain vlv	125 dc	Vital II	27.2	Fuse Buss KAZ	6	Fuse Buss KAZ	6A	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-62-22 1-FCV-62-22 Limit switches	RCP 2 seal return flow cont	125 dc	Vital II	30.0	Fuse Buss KAZ	6	Fuse Buss KAZ	6A	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-68-303 1-FCV-68-303 Limit switches WTR to PRT JB 2143	RCS flow cntl vlv-pr:	125 dc	Vital II	27.5	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-63-90 1-FSV-63-90 Limit switches	SIS accum tk 3 drain vlv	125 dc	Vital II	34.6	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-81-14 1-FCV-81-14 Limit switches JB 61	RCP 2 standpipe makeup water	125 dc	Vital II	30.2	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-43-31 1-FCV-43-31 Limit switches	Accum tk No. 2 isol	125 dc	Vital II	12.2	Fuse Buss KAZ	6	Fuse buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM — PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

J.D. Reed GS — COMPUTED BY — 2/13/82 DATE — CHECKED BY — DATE

NON CLASS-1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-FSV-62-48 1-FCV-62-48 Limit switches JB 671	RCP 4 seal return flow control	125 dc	Vital II	29.1	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-81-16 1-FCV-81-16 Limit switches	RCP 4 standpipe makeup water	125 dc	Vital II	33.8	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-43-30 1-FCV-43-30 Limit switches	Accum tk No.1 isol vlv	125 dc	Vital II	14.0	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-43-32 1-FCV-43-32 Limit switches	Accum tk No. 3 isol vlv	125 dc	Vital II	15.7	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
1-FSV-43-33 1-FCV-43-33 Limit switches	Accum tk No. 4 isol vlv	125 dc	Vital II	12.5	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 2

COMPUTED BY Wm Hartsell DATE 2/13/82 CHECKED BY DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-FSV-62-35 2-FCV-62-35 Limit switches	RCP No. 3 seal return flow cont	125 dc	Vital III	29.1	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-81-15 2-FCV-81-15 Limit switches JB 688	RCP No. 3 standpipe makeup water	125 dc	Vital III	35.6	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-62-9 2-FCV-62-9 Limit switches	RCP No. 1 seal return flow cont	125 dc	Vital III	27.4	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-81-13 2-FCV-81-13 Limit switches	RCP No. 1 standpipe makeup water	125 dc	Vital III	36.0	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-PSV-68-301 2-PCV-68-301	RC pressurizer relief tank	125 dc	Vital III	25.6	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-62-53 2-FCV-62-53 Limit switches JB 669	No. 1 seal bypass flow cont	125 dc	Vital III	28.3	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-68-310 2-FCV-68-310 Limit switches JB 1246	RCS flow cntl PRT to WDS RCDT	125 dc	Vital III	25.2	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 2

COMPUTED BY Wm Hartnell DATE 2/13/92 CHECKED BY DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-FSV-77-3 2-FCV-77-3 (JB 1662)	RCDT drain vlv flow control	125 dc	Vital III	19.7	Fuse Buss FNM	3	Fuse Buss FNM	3	See note 2, sheet 17	C	Fig. B-1.1
2-LSV-77-415 2-LCV-77-415	RCDT drain vlv flow control	125 dc	Vital III	23.2	Fuse Buss FNM	3	Fuse Buss FNM	3	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-62-22 2-FCV-62-22 Limit switches	RCP 2 seal return flow cont	125 dc	Vital IV	31.4	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-68-303 2-FCV-68-303 Limit switches	RCS flow cntl vlv primary water to PRT	125 dc	Vital IV	29.2	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-63-90 2-FCV-63-90 Limit switches	SIS accum tk 3 drain vlv	125 dc	Vital IV	26.8	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-81-14 2-FCV-81-14 Limit switches JB 655	RCP No. 2 stand pipe makeup water	125 dc	Vital IV	35.4	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 2

COMPUTED BY Wm Hartzell DATE 2/13/92 CHECKED BY DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-FSV-43-31 2-FCV-43-31 Limit switches	Accum tk No. 2 isol vlv	125 dc	Vital IV	14.5	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-62-48 2-FCV-62-48 Limit switches JB 672	RCP No. 4 seal return flow cont	125 dc	Vital IV	45.6	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-81-16 2-FCV-81-16 Limit switches	RCP No. 4 standpipe makeup water	125 dc	Vital IV	33.4	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-43-30 2-FCV-43-30 Limit switches	Accum tk No. 1 isol vlv	125 dc	Vital IV	13.7	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-43-32 2-FCV-43-32 Limit switches	Accum tk No. 3 isol vlv	125 dc	Vital IV	15.4	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-43-33 2-FCV-43-33 Limit switches	Accum tk No. 4 isol vlv	125 dc	Vital IV	14.3	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1
2-FSV-63-110 2-FCV-63-110 Limit switches	SIS accum tk 2 drain vlv	125 dc	Vital IV	29.0	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 2, sheet 17	C	Fig. B-1.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 2 Wm. Hartzell COMPUTED BY 2/13/82 DATE CHECKED BY DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-FSV-77-3 1-FCV-77-3 JB 1661	RCDT drain vlv flow control	125 dc	Vital III	20.3	Fuse Buss FNM	3	Fuse Buss FNM	3	See note 2, sheet 17	C	Fig. B-1.1
1-LSV-77-415 1-LCV-77-415	RCDT drain vlv flow control	125 dc	Vital III	20.6	Fuse Buss FNM	3	Fuse Buss FNM	3	See note 2, sheet 17	C	Fig. B-1.1
JB 4104	Cable termination	*	*	*	*	*	*	*	See note 3, sheet 17	C	*
JB 4105	Cable termination	*	*	*	*	*	*	*	See note 3, sheet 17	C	*
JB 4106	Cable termination	*	*	*	*	*	*	*	See note 3, sheet 17	C	*
JB 4107	Cable termination	*	*	*	*	*	*	*	See note 3, sheet 17	C	*

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNITS 1&2

J. D. Hutson 2/16/82
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The following notes are applicable to the previous sheets:

Notes:

1. This component will be deenergized from the Class 1E I&C power system upon a loss of coolant accident or a safety injection signal.

2. This component is powered from the same circuit on the Class 1E I&C power system with two associated components; therefore, only one short-circuit current was calculated, using the component with the shortest cable. The two associated components are included in this list.

3. This component is associated with the response time testing equipment and is not energized during unit operation. Therefore, submergence of this equipment will not reflect a short-circuit condition on the Class 1E I&C power system.

APPENDIX B-2.2

WBNP UNITS 1 & 2

SUBMERGED ELECTRICAL COMPONENTS

INSIDE CONTAINMENT (DURING

POST LOCA) POWERED FROM

CLASS 1E 120-VOLT AC VITAL

I&C POWER SYSTEM

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

J.W. Lenoce COMPUTED BY 2-13-82 DATE CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (APPENDIX B-1)
1-LT-3-172-A	SG 3 level transmitter	120 ac	vital 1-I	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	A	Fig. B-1.3.3
1-LT-3-175-A	SG 4 level transmitter	120 ac	vital 1-I	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	A	Fig. B-1.3.3
1-NMD-92-NE31-D	Neutron monitoring detector & triax connectors	120 ac	vital 1-I	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.4
1-NMD-92-NE41A-D	Neutron monitoring detector & triax connectors	120 ac	vital 1-I	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.4
1-RE-90-273-A	LWR ins cntmt post accident area monitor	120 ac	vital 1-I	*	Fuse Littlefuse	1	*	*	See notes 4&7, sheet 36	A	Fig. B-1.4
1-LT-3-93-D	Stm gen No. 3 level xmtr	120 ac	vital 1-I	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-LT-3-51-D	Stm gen No. 2 level xmtr	120 ac	vital 1-I	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-FT-68-6A-D	RCS loop 1 coolant flow	120 ac	vital 1-I	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FT-68-48A-D	RCS loop 3 coolant flow	120 ac	vital 1-I	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY J.W. Lemoce DATE 2-13-82

CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (APPENDIX B-1)
1-FT-68-71A-D	RCS loop 4 coolant flow	120 ac	vital 1-I	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FT-68-29A-D	RCS loop 2 coolant flow	120 ac	vital 1-I	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-NMD-92-NE35-D	Neutron monitoring detector & triax connectors	120 ac	vital 1-I	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.4
1-LT-3-173-B	Stm gen No. 2 level xmtr	120 ac	vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	A	Fig. B-1.3.3
1-LT-3-174-B	Stm gen No. 1 level xmtr	120 ac	vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	A	Fig. B-1.3.3
1-NMD-92-NE32-E	Neutron monitoring detector & triax connectors	120 ac	vital 1-II	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.4
1-NMD-92-NE36-E	Neutron monitoring detector & triax connectors	120 ac	vital 1-II	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.4
1-NMD-92-NE42A-E	Neutron monitoring detector & triax connectors	120 ac	vital 1-II	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.4

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY J.W. Fenoce DATE 2-13-82 CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (APPENDIX B-1)
1-RE-90-274-B	LWR ins cntmt post accident area monitor	120 ac	vital 1-II	*	Fuse Littlefuse	1	*	*	See notes 2&7, sheet 36	A	Fig. B-1.4
1-FT-1-21B-E	SG 3 main stm HDR flow chan 2	120 ac	vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-LT-3-38-E	Stm gen No. 1 level xmtr	120 ac	vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-LT-3-106-E	Stm gen No. 4 level xmtr	120 ac	vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-FT-68-6B-E	RCS loop 1 coolant flow	120 ac	vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FT-68-48B-E	RCS loop 3 coolant flow	120 ac	vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FT-68-71B-E	RCS loop 4 coolant flow	120 ac	vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FT-68-29B-E	RCS loop 2 coolant flow	120 ac	vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FS-30-80 A/B-A	CRD cool unit D-B flow alarm	120 ac	vital 1-III	55.9	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 36	C	Fig. B-1.5.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY JW Lemoca DATE 2-13-82

CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (APPENDIX B-1)
1-FS-30-92 A/B-A	CRD cool unit B-B flow alarm	120 ac	vital 1-III	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 36	C	Fig. B-1.5.2
1-NMD-92-NE43A-F	Neutron monitoring detector & triax connectors	120 ac	vital 1-III	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.4
1-LT-3-94-F	Stm gen No. 3 level xmtr	120 ac	vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-LT-3-107-F	Stm gen No. 4 level xmtr	120 ac	vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-LT-3-111-F	Stm gen No. 4 level xmtr	120 ac	vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-FT-68-6D-F	RCS loop 1 coolant flow	120 ac	vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FT-68-48D-F	RCS loop 3 coolant flow	120 ac	vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FT-68-29D-F	RCS loop 2 coolant flow	120 ac	vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FT-68-71D-F	RCS loop 4 coolant flow	120 ac	vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

J.W. Lemore COMPUTED BY 2-13-82 DATE CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (APPENDIX B-1)
1-FS-30-88 A/B-B	CRD cool unit C-A flow alarm	120 ac	vital 1-IV	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 36	C	Fig. B-1.5.2
1-FS-30-83 A/B-B	CRD cool unit A-A flow alarm	120 ac	vital 1-IV	55.4	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See note 1, sheet 36	C	Fig. B-1.5.2
1-PT-68-322G	RCS Przr pressure	120 ac	vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-NMD-92-NE44A-G	Neutron monitoring detector & triax connectors	120 ac	vital 1-IV	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.4
1-LT-3-42-G	Stm gen No. 1 level xmtr	120 ac	vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-LT-3-55-G	Stm gen No. 2 level xmtr	120 ac	vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-LT-3-56-G	Stm gen No. 2 level xmtr	120 ac	vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	A	Fig. B-1.3.1
1-TE-68-18-E	RCS loop 1 cold leg temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	A	Fig. B-1.2
1-TE-68-41-E	RCS loop 2 cold leg temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	A	Fig. B-1.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

J. W. Lemoce COMPUTED BY 2-13-82 DATE CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (APPENDIX B-1)
1-TE-68-60-E	RCS loop 3 cold leg temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	A	Fig. B-1.2
1-TE-68-83-E	RCS loop 4 cold leg temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	A	Fig. B-1.2
1-TE-68-44A-F	RCS LP 3 HL RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-44B-F	RCS LP 3 HL RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-2A-D	RCS LP 1 HL RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-2B-D	RCS LP 1 HL RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-14A-D	RCS LP 1 cold leg RTD man	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-14B-D	RCS LP 1 cold leg RTD man	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-25A-E	RCS LP 2 HL RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-25B-E	RCS LP 2 HL RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

J. W. Senore — COMPUTED BY — DATE 2-13-82 — CHECKED BY — DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (APPENDIX B-1)
1-TE-68-37A-E	RCS LP 2 cold leg RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-37B-E	RCS LP 2 cold leg RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-56A-F	RCS LP 3 cold leg RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-56B-F	RCS LP 3 cold leg RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-67A-G	RCS loop 4 HL RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-67B-G	RCS loop 4 HL RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-79A-G	RCS loop 4 cold leg RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-79B-G	RCS loop 4 cold leg RTD man temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	C	Fig. B-1.2
1-TE-68-1-D	RCS loop 1 hot leg temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	A	Fig. B-1.2
1-TE-68-24-D	RCS loop 2 hot leg temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	A	Fig. B-1.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

J W Lemoine COMPUTED BY 2-13-82 DATE CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (APPENDIX B-1)
1-TE-68-43-D	RCS loop 3 hot leg temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	A	Fig. B-1.2
1-TE-68-65-D	RCS loop 4 hot leg temp	*	*	*	*	*	*	*	See notes 6&7, sheet 36	A	Fig. B-1.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 1 COMPUTED BY Wm Hartwell DATE 2/15/82 CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-XT-52-104	Loose parts monitoring charge converter SG 3	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-XT-52-108	Loose parts monitoring charge converter SG 3	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-XT-52-109	Loose parts monitoring charge converter SG 4	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-XT-52-105	Loose parts monitoring charge converter SG 4	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-XT-52-102	Loose parts monitoring charge converter SG 1	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-XT-52-106	Loose parts monitoring charge converter SG 1	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-XT-52-103	Loose parts monitoring charge converter SG 2	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

Wm Hartsell COMPUTED BY 2/15/82 DATE CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-XT-52-107	Loose parts monitoring charge converter SG 2	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-XT-52-111	Loose parts monitoring charge converter	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-XT-52-101	Loose parts monitoring charge converter	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-FIT-62-23 (L-559)	RCP 2 low range return flow	120 ac	Vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FIT-62-24	RCP 2 high range return flow	120 ac	Vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FE-62-23	RCP 2 low range return flow	120 ac	Vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
2-XT-52-104	Loose parts monitoring charge converter SG 3	120 ac	Vital 1-II	*	Fuse Buss AGC	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

Wm Hartzell COMPUTED BY 2/15/82 DATE CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-XT-52-108	Loose parts monitoring charge converter SG 3	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
2-XT-52-109	Loose parts monitoring charge converter SG 4	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
2-XT-52-105	Loose parts monitoring charge converter SG 4	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
2-XT-52-102	Loose parts monitoring charge converter SG 1	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
2-XT-52-106	Loose parts monitoring charge converter SG 1	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
2-XT-52-103	Loose parts monitoring charge converter SG 2	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
2-XT-52-107	Loose parts monitoring charge converter SG 2	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

W. Hartsell COMPUTED BY 2/15/82 DATE CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-XT-52-111	Loose parts monitoring charge converter	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
2-XT-52-101	Loose parts monitoring charge converter	120 ac	Vital 1-II	*	Fuse Buss MDL	1	*	*	See notes 5&7, sheet 36	C	Fig. B-1.3.4
1-PDT-62-21 (1-L-182)	RCP 2 DP across No. 1 seal	120 ac	Vital 1-II	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-RM-90-210	NIS source range detector 1 triax connectors	120 ac	Vital 1-III	*	Fuse Buss MTH	5	*	*	See notes 4&7, sheet 36	C	Fig. B-1.3.4
1-PT-68-311C	RCS PRT press	120 ac	Vital 1-III	*	Fuse Buss Slo-Blo	1/4	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.2
1-LT-77-125	Reac bldg FL + EG DR smp level xmtr	120 ac	Vital 1-III	*	Fuse Buss Slo-Blo	1/4	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.2
1-LT-77-126	Reac bldg FL + EG DR smp level xmtr	120 ac	Vital 1-III	*	Fuse Buss Slo-Blo	1/4	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

Wm Hartrell COMPUTED BY 2/15/82 DATE CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-FT-70-115 (L-351B)	RC pmp 1 thrm bar outlet flow xmtr	120 ac	Vital 1-III	*	Fuse Buss Slo-Blo	1/4	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.2
1-FT-70-119 (L-351B)	RC pmp 1 LWR oil CLR outlet flow xmtr	120 ac	Vital 1-III	*	Fuse Buss Slo-Blo	1/4	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.2
1-FT-70-116 (L-351B)	RC pmp 1 UPR oil CLR outlet flow xmtr	120 ac	Vital 1-III	*	Fuse Buss Slo-Blo	1/4	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.2
1-FIT-62-36 1-FE-62-36	RCP 3 low range return flow	120 ac	Vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FIT-62-37	RCP 3 high range return flow	120 ac	Vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-PDT-70-104	RCP PMP 2 thrm bar diff press xmtr	120 ac	Vital 1-III	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.3
1-FT-70-105	RCP PMP 2 thrm bar outlet press xmtr	120 ac	Vital 1-III	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.3

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY Wm Hartsell DATE 2/15/82 CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-FT-70-106	RCP PMP 2 oil clr outlet flow xmtr	120 ac	Vital 1-III	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.3
1-PT-63-62	SIS accmum tank 4 pressure xmtr	120 ac	Vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-LT-63-82	SIS accmum tank 4 level xmtr	120 ac	Vital 1-III	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-PT-3-37 (1-L-183)	Stm gen 1 FW sup press xmtr	120 ac	Vital 1-III	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.3
1-MT-30-241 (1-L-185)	Lower compt mstre loop mstre xmtr	120 ac	Vital 1-III	*	Fuse Buss Slo-Blo	1/4	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.2
1-PDT-70-126 (1-L-185)	RC PMP 4 thrm bar diff press	120 ac	Vital 1-III	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.3
1-FT-70-108	RC PMP 2 LWR oil clr outlet flow xmtr	120 ac	Vital 1-III	*	Fuse Buss MDL	1	*	*	See notes 2&7, sheet 36	C	Fig. B-1.3.3

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

Wm Hartsell COMPUTED BY 2/15/82 DATE CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
1-FIT-62-49 (L-561)	RCP 4 low range return flow	120 ac	Vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-FIT-62-50	RCP 4 high range return flow	120 ac	Vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-LT-63-60 (L-177)	SIS accum tank 4 level xmtr	120 ac	Vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-PT-63-61	SIS accum tank 4 pressure xmtr	120 ac	Vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See notes 3&7, sheet 36	C	Fig. B-1.3.1
1-PT-63-86	SIS accum tank 3 press XMTR	120 ac	Vital 1-IV	*	Fuse Buss slo-blo	1/4	*	*	See Note 2, 7, sh 36	C	Fig. B-1.3.2
1-PDT-62-47	RCP 4 press DP No. 1 seal	120 ac	Vital 1-IV	*	Fuse Buss AGC	1/8	*	*	See Note 3, 7, sh 36	C	Fig. B-1.3.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 1 COMPUTED BY D D WRIGHT DATE 2-15-82 CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1
2-FS-30-80A/B-A	CRD cool unit D-B	120 ac	vital 2-I	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See Note 1, sh 36	C	Fig. B-1.5.
2-NMD-92-NE31-D	Neutron monitoring detector & triax connectors	120 ac	vital 2-I	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4
2-NMD-92-NE35-D	Neutron monitoring detector & triax connectors	120 ac	vital 2-I	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

D.A. Wright/jwf — COMPUTED BY — 2-15-82 — DATE — CHECKED BY — DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-NMD-92-NE41A-D	Neutron monitoring detector & triax connectors	120 ac	vital 2-I	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4
2-LT-3-93-D	Steam generator No. 3 level transmitter	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.1
2-LT-3-51-D	Steam generator No. 2 level transmitter	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.1
2-FT-68-6A-D	RCS loop 1 coolant flow	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FT-68-48A-D	RCS loop 3 coolant flow	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

DDWRIGHT 2-15-82 COMPUTED BY DATE

CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-FT-68-71A-D	RCS loop 4 coolant flow	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FT-68-29A-D	RCS loop 2 coolant flow	120 ac	vital 2-I		Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.2
2-FS-30-92A/B-A	CRD cool unit B-B flow alarm	120 ac	vital 2-I	45.9	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See Note 1, sh 36	C	Fig. B-1.5.2
2-NMD-92-NE32-E	Neutron monitoring detector & triax connectors	120 ac	vital 2-II	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4
2-NMD-92-NE36-E	Neutron monitoring detector & triax connectors	120 ac	vital 2-II	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4

*Not applicable; refer to remarks

SUBJECT: LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT: WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY: D.D. WRIGHT/gwf DATE: 2-15-82

CHECKED BY: DATE:

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-NMD-92-NE42A-E	Neutron monitoring detector & triax connectors	120 ac	vital 2-II	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4
2-FS-30-88A/B-B	CRD cool unit C-A flow alarm	120 ac	vital 2-II	*	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See Note 1, sh 36	C	Fig. B-1.5.2
2-FS-30-83A/B-B	CRD cool unit A-A flow alarm	120 ac	vital 2-II	45.8	Fuse Buss KAZ	6	Fuse Buss KAZ	6	See Note 1, sh 36	C	Fig. B-1.5.2
2-FT-1-21B-E	SG_3 main steam HDR flow-chan 2	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-LT-3-38-E	Steam generator No. 1 level transmitter	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.1

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

D.D. WRIGHT/JW 2-15-82
COMPUTED BY DATE

CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-LT-3-106-E	Steam generator No. 4 level transmitter	120 ac	vital 2-II	*	Fuse buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.1
2-FT-68-6B-E	RCS loop 1 coolant flow	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FT-68-48B-E	RCS loop 3 coolant flow	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FT-68-71B-E	RCS loop 4 coolant flow	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FT-68-29B-E	RCS loop 2 coolant flow	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-LT-3-172-A	Steam generator No. 3 level transmitter	120 ac	vital 2-III	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	A	Fig. B-1.3.3

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

D. D. WRIGHT/gwf — COMPUTED BY; 2-15-82 — DATE; CHECKED BY; DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-LT-3-175-A	Steam generator No. 4 level transmitter	120 ac	vital 2-III	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	A	Fig. B-1.3.3
2-NMD-92-NE43A-F	Neutron monitoring detector & triax connectors	120 ac	vital 2-III	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	A	Fig. B-1.4
2-RE-90-273-A	Lower inside cntmt post acd area monitor	120 ac	vital 2-III	*	Fuse Little-fuse	1	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4
2-LT-3-94-F	Steam generator No. 3 level transmitter	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.1
2-LT-3-107-F	Steam generator No. 4 level transmitter.	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.1

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

D D WRIGHT / DDW — COMPUTED BY — DATE 2-15-82 — CHECKED BY — DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-LT-3-111-F	Steam generator No. 4 level transmitter	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.1
2-FT-6[illegible]-6D-F	RCS loop 1 coolant flow	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FT-79-48D-F	RCS loop 3 coolant flow	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FT-68-29D-F	RCS loop 2 coolant flow	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FT-68-71D-F	RCS loop 4 coolant flow	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-LT-3-173-B	Steam generator No. 2 level transmitter	120 ac	vital 2-IV	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	A	Fig. B-1.3.3

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

D.D. WRIGHT/WJ COMPUTED BY 2-15-82 DATE CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-LT-3-174-B	Steam generator No. 1 level transmitter	120 ac	vital 2-IV	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	A	Fig. B-1.3.3
2-PT-68-322-G	RCS PRZR pressure	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 2, 7, sh 36	A	Fig. B-1.3.1
2-NMD-92-NE44A-G	Neutron monitoring detector & triax connectors	120 ac	vital 2-IV	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4
2-RE-90-274-B	Lower inside cntmt post acd area monitor	120 ac	vital 2-IV	*	Fuse Little-fuse	1	*	*	See Notes 4, 7, sh 36	A	Fig. B-1.4
2-LT-3-42-G	Steam generator No. 1 level transmitter	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.2

*Not applicable; refer to remarks

SUBJECT: LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT: WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY: D.D. WRIGHT/JW DATE: 2-15-82

CHECKED BY: DATE:

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-LT-3-55-G	Steam generator No. 2 level transmitter	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.2
2-LT-3-56-G	Steam generator No. 2 level transmitter	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	A	Fig. B-1.3.2
2-TE-68-13-E	RCS loop 1 cold leg temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	A	Fig. B-1.2
2-TE-68-41-E	RCS loop 2 cold leg temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	A	Fig. B-1.2
2-TE-68-60-E	RCS loop 3 cold leg temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	A	Fig. B-1.2
2-TE-68-88-E	RCS loop 4 cold leg temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	A	Fig. B-1.2
2-TE-68-44A-F	RCS loop 3 HL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-44B-F	RCS loop 3 HL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

DD WRIGHT/JGH COMPUTED BY 2-15-82 DATE CHECKED BY DATE

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1
2-TE-68-2A-D	RCS LP1 HL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-2B-D	RCS LP1 HL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-14A-D	TCS LP1 cold leg RTD man	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-14B-D	RCS LP1 cold leg RTD man	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-25A-E	RCS LP 2 HL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-25B-E	RCS LP 1 HL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-37A-E	RCS loop 2 cold leg man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-37B-E	RCS loop 2 cold leg man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-56A-F	RCS loop 3 CL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-56B-F	RCS loop 3 CL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2

*Not applicable; refer to remarks

SUBJECT: LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT: WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY: D.D. WRIGHT / DATE: 2-15-82 CHECKED BY: DATE:

CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-TE-68-67A-G	RCS LP4 HL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-67B-G	RCS LP4 HL RTD man temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-79A-G	RCS LP4 cold Leg RTD man	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-79B-G	RCS LP4 cold leg RTD man	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	C	Fig. B-1.2
2-TE-68-1-D	RCS loop 1 hot leg temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	A	Fig. B-1.2
2-TE-68-24-D	RCS loop 2 hot leg temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	A	Fig. B-1.2
2-TE-68-43-D	RCS loop 3 hot leg temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	A	Fig. B-1.2
2-TE-68-65-D	RCS loop 4 hot leg temp	*	*	*	*	*	*	*	See Notes 6, 7, sh 36	A	Fig. B-1.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

RL Lee / JWH — COMPUTED BY — 2-14-82 — DATE — CHECKED BY — DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-FT-70-116	RC pmp 1 upr oil clr outlet flow transmitter	120 ac	vital 2-III	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-FT-70-119	Rc pmp 1 lwr oil clr outlet flow transmitter	120 ac	vital 2-III	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-LT-68-312C (L-134)	RCS PRT level	120 ac	vital 2-II	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-LT-77-410	React bld aux fl & eq dr sump level indicator	120 ac	vital 2-II	*	Fuse Buss slo-blo	1/4	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.2
2-LT-77-411	React bld aux fl & eq dr sump xmtr	120 ac	vital 2-II	*	Fuse Buss slo-blo	1/4	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.2
2-LT-63-60	Sis accum tank 4 level xmtr	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

RL Lee/gwd — COMPUTED BY — DATE 2-11-82 — CHECKED BY — DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-LT-63-82	Sis accum tank 4 level xmtr	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FIT-62-23 2-FE-62-23 (L-559)	Rcp 2 low range return flow	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FIT-62-24 2-FE-62-24	Rcp 2 high range return flow	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FIT-62-36 2-FE-62-36	Rcp 3 low range return flow	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FIT-62-37	Rcp 3 high range return flow	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FIT-62-49 (L-561)	Rcp 4 low range return flow	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-LT-77-125	Reac bldg fl & eg DR smp lvl transmitter	120 ac	vital 2-I	*	Fuse Buss slo-blo	1/4	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.2

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

RL Lee/GWH — COMPUTED BY — 2-14-82 — DATE — CHECKED BY — DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-LT-77-126	Reac bldg fl & eg DR smp lvl transmitter	120 ac	vital 2-I	*	Fuse Buss slo-blo	1/4	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.2
2-FM-63-65 (L-190)	Sis accum tank 2 hdr vent vlv I/P	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-MT-30-241 (L-185)	Lower compt mstre transmitter	120 ac	vital 2-I	*	Fuse Buss slo-blo	1/4	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.2
2-PDT-70-104	RC PMP2 thrm bar diff press xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-PDT-62-8 (L-183)	RCP 1 DP - Seal 1	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-PT-68-301	RCS PRT Press	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-LT-68-300	RC pressurizer relief tank	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

RL Lee/JWJ COMPUTED BY 2-14-82 DATE CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-PM-68-340H	RCS pressurizer press	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-RM-90-210	NIS source range detector	120 ac	vital 2-I	*	Fuse Buss MTH	5	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.4
2-FT-70-96	RC pmp 3 oil flow xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 4, 7, sh 36	C	Fig. B-1.3.3
2-FT-70-98	RC pmp 3 oil flow xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-FT-70-105	RC pmp 2 thrm flow xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

RL Lee/gwf — COMPUTED BY — 2-14-82 — DATE — CHECKED BY — DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-FT-70-106	RC pmp 2 oil flow xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-FT-70-108	RC pmp 2 oil flow xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-FT-70-115	RC pmp 1 thrm flow xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-FIT-62-10	RC pmp 1 low return flow	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-FIT-62-11	RC pmp 1 low return flow	120 ac	vital 2-I	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-PT-3-37	Stm gen 1 fw sup press xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2-PT-3-92	Stm gen 3 fw sup press xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3

*Not applicable; refer to remarks

SUBJECT: LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT: WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY: RL Lee | DATE: 2-14-82 | CHECKED BY: | DATE:

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-PDT-70-126	Stm gen 4 press xmtr	120 ac	vital 2-I	*	Fuse Buss MDL	1	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.3
2PT-68-311C	RCS pr press	120 ac	vital 2-I	*	Fuse Buss slo-blo	1/4	*	*	See Notes 2, 7, sh 36	C	Fig. B-1.3.2
2-FIT-62-50	RCP 4 high range return flow	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-PT-63-61 2-Pdt-62-47 (L-185)	SIS accum tank 4 pressure xmtr	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-PT-63-83C	SIS accum tank 3 pressure xmtr	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-PT-63-86	SIS accum tank 3 pressure xmtr	120 ac	vital 2-IV	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1

*Not applicable; refer to remarks

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1

COMPUTED BY R L Lee/gwd DATE 2-14-82 CHECKED BY DATE

NONCLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS	CATEGORY	TYPICAL CIRCUIT (Appendix B-1)
2-Pdt-62-21 (L-182)	RCP2 DP seal No. 1	120 ac	vital 2-II	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1
2-PT-63-62	Sis accum tank 4 pressure xmtr	120 ac	vital 2-III	*	Fuse Buss AGC	1/8	*	*	See Notes 3, 7, sh 36	C	Fig. B-1.3.1

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM CLASS 1E I&C POWER SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 1 COMPUTED BY J.D. Hutson DATE 2/15/82 CHECKED BY DATE

The following notes are applicable to the previous sheets:

Notes:

1. Due to the configuration of the circuit in which this component is connected, its submergence merely produces full load current, resulting only in the spurious operation of an annunciator relay. Thus, no I_{SC} is tabulated.
2. The instrument loop power supply (Bailey and Robertshaw type) for this component is grounded, therefore, the instrument loop will be short circuited. However, the power supply will current limit and will not reflect a short-circuit condition on the Class 1E I&C power system.
3. The instrument loop power supply (Foxboro type) for this component is ungrounded, therefore, submergence of this component will not cause a short-circuit condition on this power supply.
4. This component is powered from a high voltage/low current dc power supply, which will current limit at 13 mA. Therefore, submergence of this component will not cause a short circuit condition on this power supply.
5. This component is powered from a regulated current limiting power supply, therefore, submergence of this component will not reflect a short-circuit condition on the Class 1E I&C power system.
6. This component is part of a resistance bridge on a low voltage instrumentation circuit; therefore, submergence of this component will not cause a short circuit condition on the Class 1E I&C power system.
7. The cable supplying this component is classified as a medium level signal cable; therefore, backup protection is not required.

BROWN

APPENDIX B-2.3

WBNP UNITS 1 & 2

SUBMERGED ELECTRICAL COMPONENTS

INSIDE CONTAINMENT (DURING

POST LOCA) POWERED FROM

NON-CLASS 1E

I&C POWER SYSTEM

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2

C. JACKSON — COMPUTED BY | 2/15/82 — DATE | CHECKED BY | DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
HS-26-227E	RB cntmt hose sta control	*	*	*	*	*	*	*	See note 1, sheet 10
HS-26-227F	RB cntmt hose sta control	*	*	*	*	*	*	*	See note 1, sheet 10
HS-26-227D	RB cntmt hose sta control	*	*	*	*	*	*	*	See note 1, sheet 10
HS-26-227G	RB cntmt hose sta control	*	*	*	*	*	*	*	See note 1, sheet 10
HS-26-227H	RB cntmt hose sta control	*	*	*	*	*	*	*	See note 1, sheet 10
HS-26-227J	RB cntmt hose sta control	*	*	*	*	*	*	*	See note 1, sheet 10
JB 3131	Cable termination	*	*	*	*	*	*	*	See note 1, sheet 10
LT-77-1	RC DR TK lvl xmtr	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
PT-77-2	Reac coolant DR TK pressure xmtr	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2

C. Jackson COMPUTED BY 2/15/82 DATE CHECKED BY DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
L-181	RCB system pnl	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TM-68-1C	RCS loop 1 hot leg temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TM-68-24C	RCS loop 2 hot leg temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TM-68-43C	RCS loop 3 hot leg temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TM-68-65C	RCS loop 4 hot leg temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
JB 1742	Cable Termination	*	*	*	*	*	*	*	See note 1, sheet 10
ANWT-250-54	Wall mtd telephone	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
ANWT-250-55	Wall mtd telephone	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
ANWT-250-56	Telephone	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
ANWT-250-57	Telephone	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
ANWT-250-58	Telephone	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
CSPR-252-28	Code call & paging	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
CSPR-252-29	Code call & paging	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2

C. JACKSON — COMPUTED BY

2/15/82 — DATE

CHECKED BY

DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
CSPR-252-30	Code call & paging	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
CSPR-252-31	Code call & paging	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
SP1J-251-16	Telephone jack	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
SP1J-251-17	Telephone jack	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
SP1J-251-18	Telephone jack	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
SP1J-251-19	Telephone jack	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
SP4J-251-18	Telephone jack	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
SP4J-251-19	Telephone jack	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TELJ-250-188	Telephone jack	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TELJ-250-189	Telephone jack	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
JB 2518	Cable termination	*	*	*	*	*	*	*	See note 1, sheet 10
JB 2696	Cable termination	*	*	*	*	*	*	*	See note 1, sheet 10
JB 2517	Cable termination	*	*	*	*	*	*	*	See note 1, sheet 10
JB 2695	Cable termination	*	*	*	*	*	*	*	See note 1, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2 COMPUTED BY C. JACKSON DATE 2/15/82 CHECKED BY DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
JB 2516	Cable termination	*	*	*	*	*	*	*	See note 1, sheet 10
JB 2693	Cable termination	*	*	*	*	*	*	*	See note 1, sheet 10
JB 2312	Cable termination	*	*	*	*	*	*	*	See note 1, sheet 10
FIS-62-12	RCP 1 No. 1 seal bypass flow alm	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
FIS-62-25	RCP 2 No. 1 seal bypass flow alm	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
FIS-62-38	RCP 3 No. 1 seal bypass flow alm	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
FIS-62-51	RCP 4 No. 1 seal bypass flow alm	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
LS-63-103	Cntmt sump level SW	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
LS-63-104	Cntmt sump level SW	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-3-113	SG 2 lower tap water temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-3-115	SG 4 lower tap water temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2

C. JACKSON — COMPUTED BY — DATE 2/15/82 — CHECKED BY — DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
TE-30-210B	Cntmt air mass temp sensor: comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210E	Cntmt air mass temp sensor: comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210F	Cntmt air mass temp sensor: comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210G	Reac vess sup temp comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210H	Reac vess sup temp comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210I	Cntmt air mass temp sensor: recorder pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210J	Reac vess sup temp comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210K	Cntmt air mass temp sensor: comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210L	Cntmt air mass temp sensor: comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2 COMPUTED BY C. JACKSON DATE 2/15/82 CHECKED BY DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
TE-30-210M	Cntmt air mass temp sensor: comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210N	Cntmt air mass temp sensor: comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210P	Cntmt air mass temp sensor: comp input pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-210AA	Cntmt air mass temp sensor: Recorder pt	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-211A	Crdm cool unit A-A intake temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-211B	Crdm cool unit B-B intake temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-211C	Crdm cool unit C-A intake temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-211D	Crdm cool unit D-B intake temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-30-211E	Crdm cool unit C-A B-B intake temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2

C. JACKSON — COMPUTED BY

2/15/82 — DATE

CHECKED BY

DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
TE-30-211F	Crdm cool unit A-A D-B intake temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-62-3	RCP No. 1 lower BRG temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-4	RCP No. 1, No. 1 seal outlet temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-16	RCP No. 2 lower BRG temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-17	RCP No. 1 seal out temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-29	RCP 3 lower BRG temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-30	RCP 3 No. 1 seal outlet temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-42	RCP 4 lower BRG temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-43	RCP 4 No. 1 seal outlet temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-58	Excess letdown temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2 C. Jackson COMPUTED BY 2/15/82 DATE CHECKED BY DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
TE-62-71	Regen ht exch letdown temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-62-75	Letdown relief temp to RCS Prt	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-67-85	Control rod drive vent clr A temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-67-93	Control rod drive vent clr C temp cont vlv	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-67-101	Control rod drive vent clr B temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-67-109	Control rod drive vent clr D temp	*	*	*	*	*	*	*	See notes 2 & 3, sheet 10
TE-68-1C	RCS loop 1 hot leg temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-68-24C	RCS loop 2 hot leg temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-68-43C	RC loop 3 hot leg temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2

C. Jackson — COMPUTED BY — 2/15/82 — DATE — CHECKED BY — DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS
TE-68-65C	RCS loop 4 hot leg temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-68-309	RCS PRT temp	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10
TE-77-21	RCDT temp element	*	*	*	*	*	*	*	See notes 1 & 3, sheet 10

*Not applicable; refer to remarks.

SUBJECT LOCA SUBMERGED ELECTRICAL EQUIPMENT POWERED FROM NON-CLASS 1E I&C POWER SYSTEM

PROJECT WATTS BAR NUCLEAR PLANT UNIT 1&2

C. Jackson — COMPUTED BY — 2/15/82 — DATE — CHECKED BY — DATE

NON CLASS 1E COMPONENT	FUNCTION	POWER SOURCE VOLT.	POWER SOURCE BOARD	I_{SC} (AMP)	PRIMARY PROT. TYPE	PRIMARY PROT. RATING (AMP)	BACKUP PROT. TYPE	BACKUP PROT. RATING (AMP)	REMARKS

The following notes are applicable to the previous sheets:

Notes:

1. This component is powered from a non-Class 1E I&C power system, therefore, its submergence will not affect the Class 1E I&C power system. However, there is adequate circuit protection provided to isolate the submerged component.

2. This component is part of a resistance bridge on a low voltage instrumentation circuit, therefore, submergence of this component will not cause a short circuit condition on the Class 1E I&C power system.

3. The cable supplying this component is classified as a medium level signal cable, therefore, backup protection is not required.

Appendix B-3

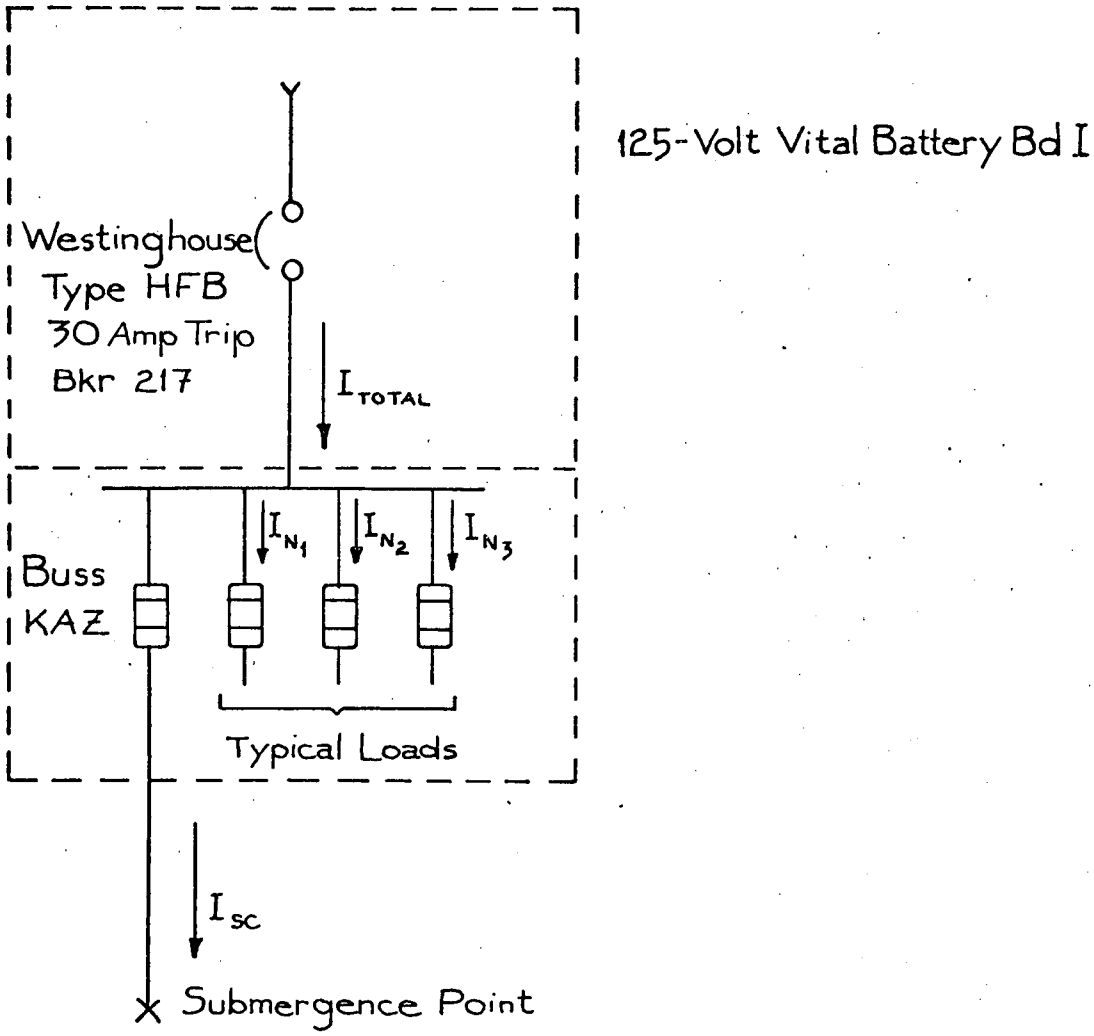
Summary of Class 1E I&C Power System Evaluation

PHC.4

SUBJECT Protective Device Coordination Summary PROJECT WBN

COMPUTED BY DATE CHECKED BY DATE

APPENDIX B-3.1



APPENDIX B-3.1: PROTECTIVE DEVICE COORDINATION SUMMARY

In order to evaluate protective device coordination, having determined I_{SC} and the associated secondary protective device clearing time, t_{c_s}, the total current through the primary protective device, I_{total}, is calculated as the sum of I_{SC} and the normal circuit load current, I_{normal}; that is,

$$I_{total} = I_{SC} + \sum_{i=1}^{x} I_{N_i}$$, where x = number of loads on the primary protective device.

Thus,

$$I_{total} = I_{SC} + I_{normal}$$

For this current value a primary protective device clearing time, t_{c_p}, is determined and is compared to t_{c_s}. For $t_{c_p} > t_{c_s}$, coordination is assured.

Example: 125-Volt Vital Battery Board I, Breaker 217

I_{SC} = 161.3 amps

For this current, t_{c_s} = 1.5 seconds

I_{normal} = 7.0 amps

I_{total} = (161.3 + 7.0) amps
= 168.3 amps

For this current, t_{c_p} = 1000.0 seconds

Since t_{c_p} (1000.0 sec) $>$ t_{c_s} (1.5 sec), coordination is assured.

APPENDIX B-3.1

PROTECTIVE DEVICE EVALUATION
OF SUBMERGED ELECTRICAL COMPONENTS

125-Volt Vital Battery Board I

FSAR(1) Load	Board Breaker No. (Type W HFB)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_{Total}	Bkr Time to Clear	Fuse Time to Clear
480V, Shut-down Bd 1A1-A Nor. Bus Nor Fdr.	202	30	KWN 10	3	32.5	35.5	1000 sec	2 sec
480V, Shut-down Bd 1A2-A Nor. Bus Nor Fdr.	203	30	KWN 10	3	35.3	38.5	1000 sec	1.5 sec
Fuse Asmbly Col D	217	30	KAZ 6	7	161.3	168.3	1.7 sec	.01 sec
Fuse Asmbly Col E	218	30	KAZ 6	7	71.5	78.5	18 sec	.017 sec
Fuse Asmbly Col A	310	30	KAZ 6	7	198.8	205.8	1.3 sec	.01 sec

(1)FSAR Table 8.3-19.

125-Volt Vital Battery Board II

FSAR(1) Load	Board Breaker No. (Type W HFB)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_T	Bkr Time to Clear	Fuse Time to Clear
480V, Shut-down Bd 1B1-B Nor. Bus Nor Fdr.	202	30	KWN 10	3	32.5	35.5	1000 sec	2 sec
480V, Shut-down Bd 1B2-B Nor. Bus Nor Fdr.	203	30	KWN 10	3	44.2	47.2	125 sec	35 sec
Fuse Asmbly Col D	217	30	KAZ 6	7	203.1	210.1	1.3 sec	.01 sec

APPENDIX B-3.1

PROTECTIVE DEVICE EVALUATION
OF SUBMERGED ELECTRICAL COMPONENTS

125-Volt Vital Battery Board II (Continued)

FSAR[1] Load	Board Breaker No. (Type W HFB)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_{Total}	Bkr Time to Clear	Fuse Time to Clear
Fuse As'mbly Col E	218	30	KAZ 6	7	63.7	70.7	17 sec	.02 sec
Fuse As'mbly Col A	310	30	KAZ 6	7	161.81	168.81	1.7 sec	.01 sec

(1)FSAR Table 8.3-20.

125-Volt Vital Battery Board III

FSAR[1] Load	Board Breaker No. (Type W HFB)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_{Total}	Bkr Time to Clear	Fuse Time to Clear
480V, Shut-down Bd 2A1-A Nor. Bus Nor Fdr.	302	30	KWN 10	3	36.6	39.6	1000 sec	.9 sec
480V, Shut-down Bd 2A2-A Nor. Bus Nor Fdr.	303	30	KWN 10	3	39.4	42.4	300 sec	.8 sec
Waste Dis-posal Pnl O-L-2A	214	30	FNM 3	5 5	47.9(2) 45.9(3)	88.93 45.9(3)	9 sec 110 sec	.65 sec .70 sec
Fuse Asmbly Col D	217	30	KAZ 6	7	171.6	178.6	1.5 sec	.01 sec
Fuse Asmbly Col E	218	30	KAZ 6	7	35.6	42.6	200 sec	.05 sec
Fuse Asmbly Col A	310	30	KAZ 6	7	189.48	196.48	1.4 sec	.01 sec

(1)FSAR Table 8.3-21.
(2)Loads due to Unit 2 submergence.
(3)Loads due to Unit 1 submergence.

APPENDIX B-3.1

PROTECTIVE DEVICE EVALUATION
OF SUBMERGED ELECTRICAL COMPONENTS

125-Volt Vital Battery Board IV

FSAR(1) Load	Board Breaker No. (Type W HFB)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_{Total}	Bkr Time to Clear	Fuse Time to Clear
480V, Shut-down Bd 2B1-B Nor. Bus Nor Fdr.	302	30	KWN 10	3	43.4	46.4	100 sec	.4 sec
480V, Shut-down Bd 2B2-B Nor. Bus Nor Fdr.	303	30	KWN 10	3	65.3	68.3	20 sec	.05 sec
Fuse As'mbly Col D	217	30	KAZ 6	7	243.1	250.1	1.5 sec	.01 sec
Fuse As'mbly Col E	218	30	KAZ 6	7	45.6	52.6	70 sec	.035 sec
Fuse As'mbly Col A	310	30	KAZ 6	7	271.5	278.5	.5 sec	.01 sec

(1) FSAR Table 8.3-22.

120-Volt AC Vital Board 1-I

No I_{SC} due to submergence

120-Volt AC Vital Board 1-II

No I_{SC} due to submergence

APPENDIX B-3.1

PROTECTIVE DEVICE EVALUATION
OF SUBMERGED ELECTRICAL COMPONENTS

120-Volt AC Vital Board 1-III

FSAR(1) Load	Board Bkr No. (Heineman Type CF, Curve 3)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_{Total}	Bkr Time to Clear	Fuse Time to Clear
BOP Process Inst Cont Rack	11	15	KAZ 6	5	55.9	60.9	.03 sec	.026 sec

(1)From FSAR Table 8.1-13.

120-Volt AC Vital Board 1-IV

FSAR(1) Load	Board Bkr No. (Heineman Type CF, Curve 3)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_{Total}	Bkr Time to Clear	Fuse Time to Clear
Pnl 1-R-75 Misc Relay Rack B' Bus	8	15	KAZ 6	4	55.4	59.4	.03 sec	.026 sec

(1)From FSAR Table 8.1-14.

120-Volt AC Vital Board 2-I

FSAR(1) Load	Board Bkr No. (Heineman Type CF, Curve 3)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_{Total}	Bkr Time to Clear	Fuse Time to Clear
Pnl 2-R-75 Misc Relay Rack A' Bus	11	15	KAZ 6	5	45.9	50.9	.04 sec	.036 sec

(1)From FSAR Table 8.1-15.

APPENDIX B-3.1

PROTECTIVE DEVICE EVALUATION
OF SUBMERGED ELECTRICAL COMPONENTS

120-Volt AC Vital Board 2-II

FSAR(1) Load	Board Bkr No. (Heineman Type CF, Curve 3)	Bkr Trip Rating	Fuse Type Rating	(1) I_{Normal}	I_{SC}	I_{Total}	Bkr Time to Clear	Fuse Time to Clear
Pnl 2-R-75 Misc Relay Rack B' Bus	9	15	KAZ 6	4	45.8	49.8	.04 sec	.038 sec

(1)From FSAR Table 8.1-14.

120-Volt AC Vital Board 2-III

No I_{SC} due to submergence

120-Volt AC Vital Board 2-IV

No I_{SC} due to submergence

APPENDIX B-3.2
CLASS 1E I&C POWER
SYSTEM (AC AND DC) CAPACITY
EVALUATION DUE TO SUBMERGENCE OF
ELECTRICAL COMPONENTS

The vital 125-volt dc I&C power system was evaluated based on the following:

A. The 0-1 minute rate for the vital batteries (Gould NCX-2250) is 1739A (includes temperature [60°F] and 20 years aging factors).

B. Normal emergency dc loads for each battery for the 0-1 minute rate are the 105-volt loads tabulated in Tables 8.3-23 through -26 of section 8.3, WBNP FSAR. This will impose the worst case loads on the battery systems during the 0-1 minute duty cycle.

C. All loads imposed on the vital batteries, from the submerged electrical components, will be removed in the 0-1 minute duty cycle by its associated protective device. For the duty cycle of 1-120 minutes the duty cycle on the batteries will be as identified in the above FSAR tables.

Battery Board I

Load (0-1 Minute)	Current (A)
I_{sc} (1) Submerged Non-1E [unit 1]	232.8
I_{sc} (1) Submerged 1E [unit 1]	266.6
$I_{normal\ emergency}$ (FSAR table 8.3-23)	559.5
I_{total} (2)	1058.9

Battery Board II

Load (0-1 Minute)	Current (A)
I_{sc} (1) Submerged non-1E [unit 1]	266.8
I_{sc} (1) Submerged 1E [unit 1]	238.6
$I_{normal\ emergency}$ (FSAR Table 8.3-24)	561.4
I_{total} (2)	1066.8

APPENDIX B-3.2

Battery Board III

Load (0-1 Minute)	Current (A)
I_{sc} (1) Submerged non-1E [unit 2]	250.1
I_{sc} (1) Submerged 1E [unit 2]	265.5
$I_{normal\ emergency}$ (FSAR Table 8.3-25)	598.1
I_{total} (2)	1113.7

Battery Board IV

Load (0-1 Minute)	Current (A)
I_{sc} (1) Submerged non-1E [unit 2]	288.7
I_{sc} (1) Submerged 1E [unit 2]	380.2
$I_{normal\ emergency}$ (FSAR Table 8.3-26)	553.4
I_{total} (2)	1222.3

The vital 120-volt ac I&C power system was evaluated based on the following:

A. The uninterruptible power supplies providing power for this system will current limit at 150 percent of rated capacity (20 kVA) and still maintain 120-volt ac nominal.

B. All loads imposed on the vital UPS' will be removed by its associated protective device.

Vital AC Board 1-III

Load	Current (A)
I_{sc} (3) Submerged 1E [unit 1]	55.9
$I_{normal\ emergency}$ (FSAR Table 8.3-13)	113.6
I_{total} (4)	169.5

APPENDIX B-3.2

Vital AC Board 1-IV

Load	Current (A)
I_{sc} (3) Submerged 1E [unit 1]	55.4
$I_{normal\ emergency}$ (FSAR Table 8.3-14)	124.5
I_{total} (4)	179.9

Vital AC Board 2-I

Load	Current (A)
I_{sc} (3) Submerged 1E [unit 2]	45.9
$I_{normal\ emergency}$ (FSAR Table 8.3-15)	114.2
I_{total} (4)	160.1

Vital AC Board 2-II

Load	Current (A)
I_{sc} (3) Submerged 1E [unit 2]	45.8
$I_{normal\ emergency}$ (FSAR Table 8.3-16)	102.6
I_{total} (4)	148.4

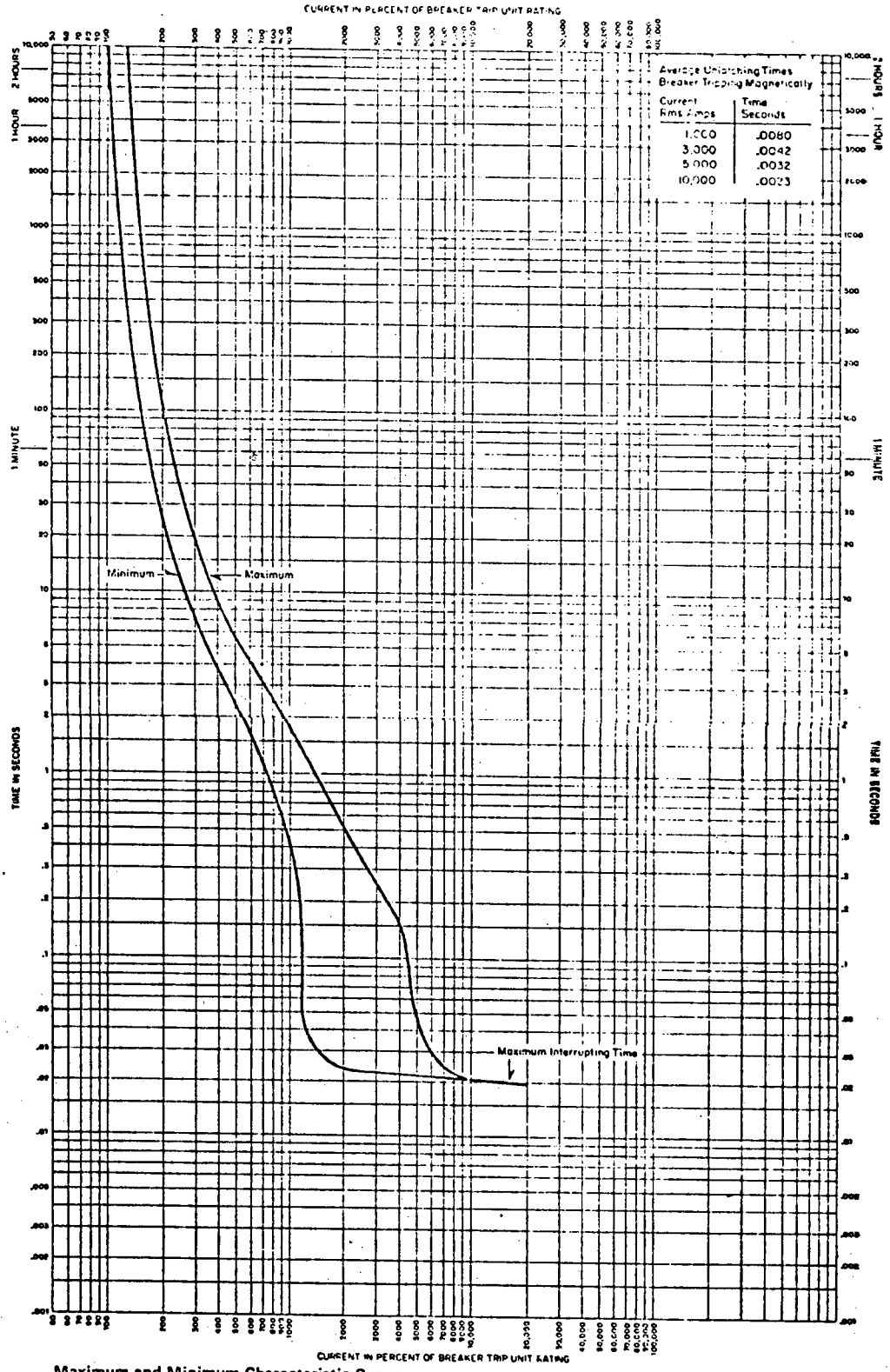
(1.) See appendix B-2.1 for individual load current.
(2.) Total is less than 0-1 minute rate of 1739A (battery rating).
(3.) See appendix B-2.2 for individual load current.
(4.) Total is less than current limit rating (250A) of UPS.

APPENDIX B-4
MANUFACTURER'S TIME-CURRENT CURVES FOR PROTECTION DEVICES

AB DE-ION® CIRCUIT BREAKERS

Types EB, EHB, MARK 75 Type HFB

Type EB: 15-40 Amperes, 1 Pole, 120 Volts Ac Max.
Type EHB: 15-40 Amperes, 1 Pole, 277 Volts Ac Max.
Type HFB: 15-40 Amperes, 1 Pole, 277 Volts Ac Max.



Maximum and Minimum Characteristic Curves
40°C Ambient, Cold Start • Thermal Magnetic

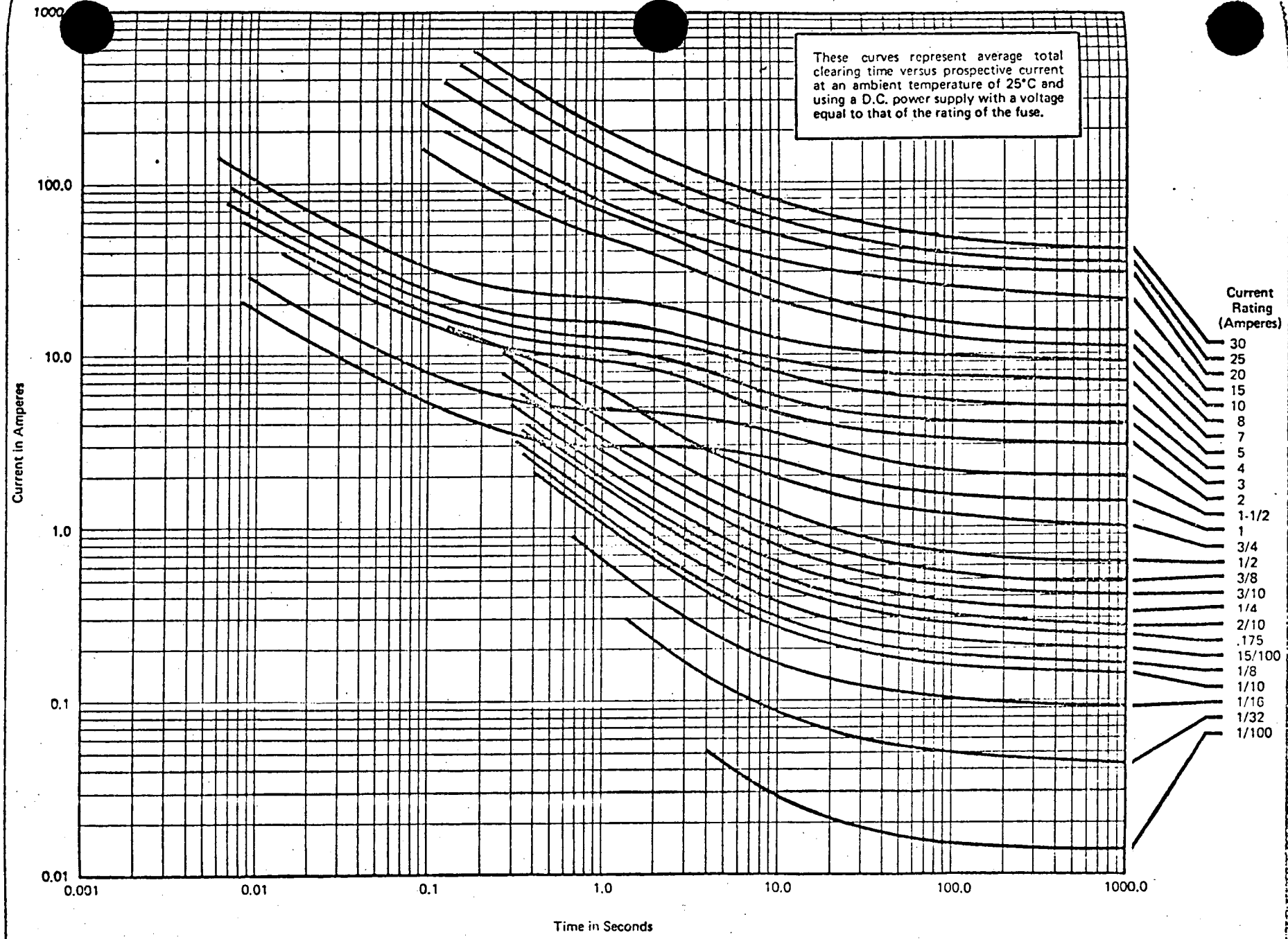
Interrupting Capacity (Symmetrical Amperes)
Type EB: 10,000
Type EHB: 14,000
Type HFB: 15-30 amps., 65,000; 40 amp., 25,000

Curve No. SC-337-70
January, 1971

Westinghouse Electric Corporation
Low Voltage Breaker Division, Beaver, Pa.

TIME-CURRENT CHARACTERISTICS

Littelfuse 313- and 315 000 Series Fuses



"SLO-BLO" GLASS TUBE FUSES

Littelfuse Types
3AG, 4AG, 5AG

3AG "Slo-Blo" Fuses

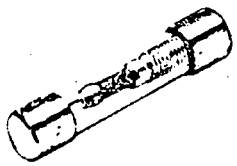
Electrical Characteristics

Rating	Blow Time
110%	4 hours, Minimum
135%	1 hour, Maximum
200%	5 seconds, Minimum

For Time-Current Blowing Chart, see page 49.

125 Volt Fuses Listed by Underwriters' Laboratories through 7 amperes.

Dimensions of Fuse:
Diameter, 1/4 inch,
Length, 1-1/4 inches.



Catalog Number	Ampere Rating	Voltage Rating	Catalog Number	Ampere Rating	Voltage Rating
313 .010	1/100	125	313 01.2	1-2/10	125
313 .031	1/32	125	313 1.25	1-1/4	125
313 .040	4/100	125	313 01.5	1-1/2	125
313 .062	1/16	125*	313 01.6	1-6/10	125
313 .100	1/10	125*	313 01.8	1-8/10	125
313 .125	1/8	125*	313 002	2	125
313 .150	15/100	125*	313 2.25	2-1/4	125
313 .175	.175	125*	313 02.5	2-1/2	125
313 .187	3/16	125*	313 02.8	2-8/10	125
313 .200	2/10	125*	313 003	3	125
313 .250	1/4	125*	313 03.2	3-2/10	125
313 .300	3/10	125*	313 004	4	125
313 .375	3/8	125*	313 005	5	125
313 .400	4/10	125*	313 6.25	6-1/4	125
313 .500	1/2	125*	313 007	7	125
313 .600	6/10	125*	313 008	8	32
313 .700	7/10	125*	313 010	10	32
313 .750	3/4	125*	313 015	15	32
313 .800	8/10	125*	313 020	20	32
313 001	1	125*	313 025	25	32
			313 030	30	32

* For 250 volt ratings add suffix /s to catalog number. 250 volt fuses listed by Underwriters' Laboratories from 1/16 ampere through 1 ampere.

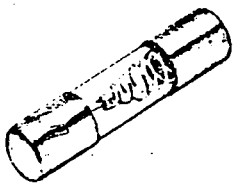
Littelfuse 313 000 Series Fuses—These fuses are of the "slo-blo" or time-lag type, designed to withstand momentary high-current surges but still blow quickly on shorts. They provide protection for equipment having high reactive current surges or heavy starting currents—a common characteristic of magnets, solenoids, motors and lamp circuits. "Pioneered By Littelfuse."

4AG "Slo-Blo" Fuses

Electrical Characteristics

Rating	Blow Time
[illegible]%	4 hours, Minimum
[illegible]	1 hour, Maximum
[illegible]%	5 seconds, Minimum

Dimensions of Fuse:
Diameter, 9/32 inch,
Length, 1-1/4 inches.



Catalog Number	Ampere Rating	Voltage Rating	Catalog Number	Ampere Rating	Voltage Rating
413 .062	1/16	125	413 01.6	1-6/10	125
413 .100	1/10	125	413 002	2	125
413 .125	1/8	125	413 02.5	2-1/2	125
413 .150	15/100	125	413 003	3	125
413 .200	2/10	125	413 03.2	3-2/10	125
413 .250	1/4	125	413 004	4	125
413 .300	3/10	125	413 005	5	125
413 .400	4/10	125	413 6.25	6-1/4	125
413 .500	1/2	125	413 008	8	32
413 .600	6/10	125	413 010	10	32
413 .750	3/4	125	413 015	15	32
413 .800	8/10	125	413 020	20	32
413 001	1	125	413 025	25	32
413 1.25	1-1/4	125	413 030	30	32
413 01.5	1-1/2	125			

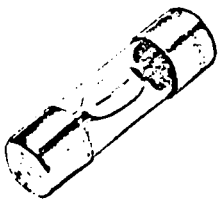
Littelfuse 413 000 Series Fuses—Developed for aircraft use with long time-lag to withstand heavy surges. Offers greater protection by permitting lower amperage-rated fuses to be used on inductive loads. Spring-and-link element structure of these fuses takes up thermal expansion and contraction and reduces cyclic fatigue, crystallization of the fuse link. When the compound-element temperature reaches the melting point of the alloy, spring pulls away from the link. On short-circuits the link blows instantly. "Pioneered By Littelfuse."

5AG "Slo-Blo" Fuses

Electrical Characteristics

Rating	Blow Time
110%	4 hours, Minimum
135%	1 hour, Maximum
200%	5 seconds, Minimum

Dimensions of Fuse:
Diameter, 13/32 inch,
Length, 1-1/2 inch.

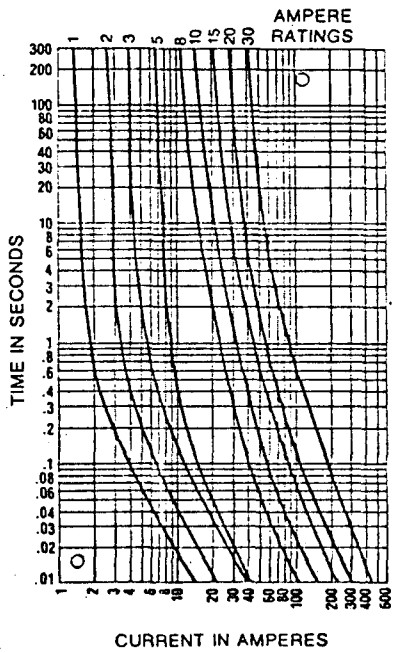


Catalog Number	Ampere Rating	Voltage Rating
513 .500	1/2	250
513 001	1	250
513 002	2	250
513 003	3	250
513 004	4	250
513 005	5	125
513 010	10	32
513 015	15	32
513 020	20	32
513 025	25	32
513 030	30	32

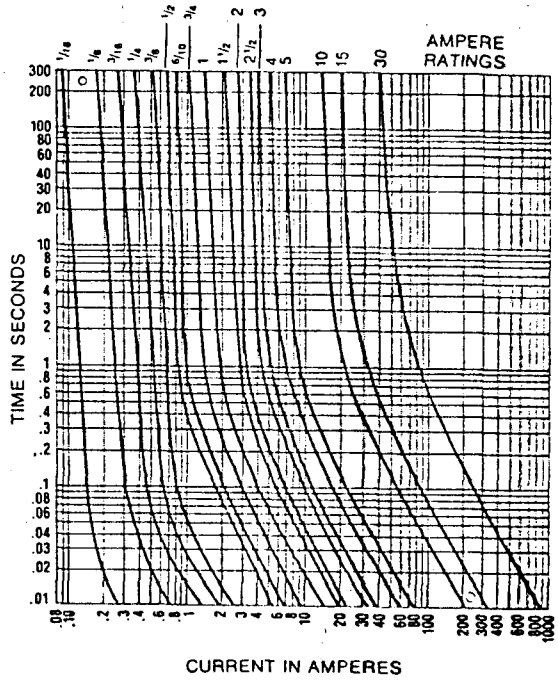
Littelfuse 513 000 Series Fuses—These fuses are larger than the 3AG and 4AG versions – with long time-lag to withstand heavy surges. Recommended for aircraft equipment, motors, relays and industrial applications in which factors of long time-lag coupled with sustained overload and short-circuit protection are desirable.

:e-Current
:ristic Curves
perature

Type ABC Fuses, ¼" x 1¼"
(6.4mm x 31.8mm)



Type AGC Fuses, ¼" x 1¼"
(6.4mm x 31.8mm)

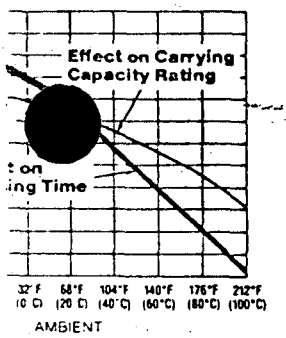


bient Temperatures

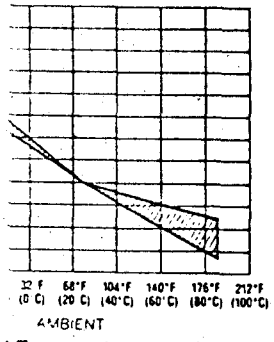
acteristics of fuses are based
ent temperature level. Higher
me extent, reduce the current
and the fuse opening time.
ambients result in a somewhat
carrying capacity and opening

Fusetron graph below, for
nt of 100°F (40°C) reduces
capacity of this type of fuse

show the effects of ambient
usetron and "Non-Time-

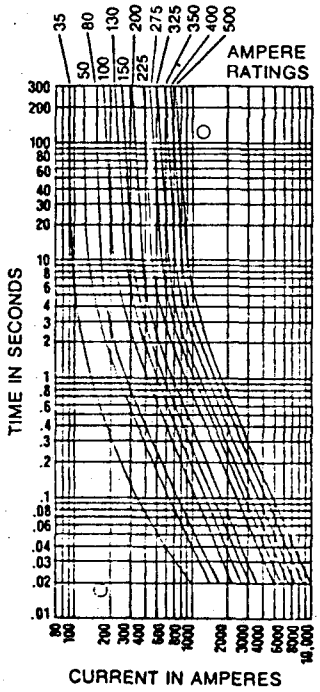


t Temperature on the Oper-
tics of Fusetron Dual-
ominal Fuse Ratings Based
eratures in the Range of
80°F (26.7°C). Change in
curs with Loads of 500% (or
al Current Rating of the

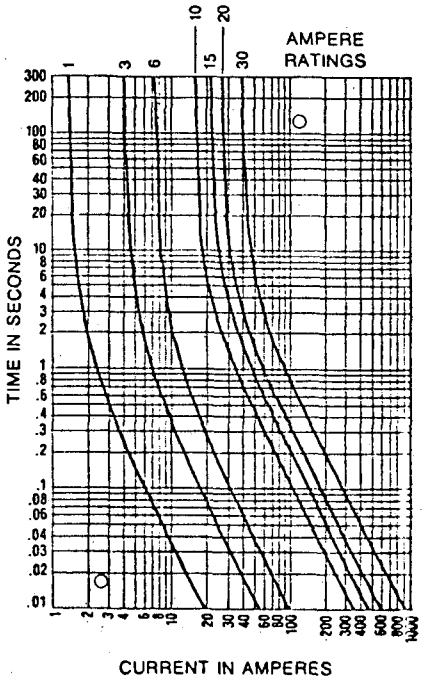


t Temperatures on the Oper-
ic -Time-Delay
ects the Effects
both the Current
and Opening Time Relative
n a Nominal 75.2°F (24°C)

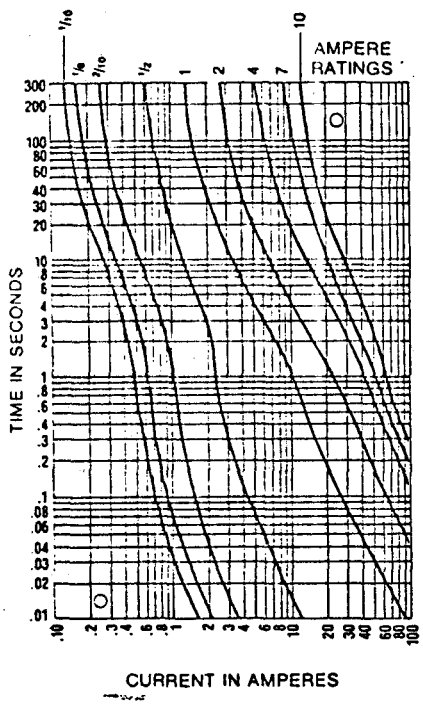
Type ANL Limiters



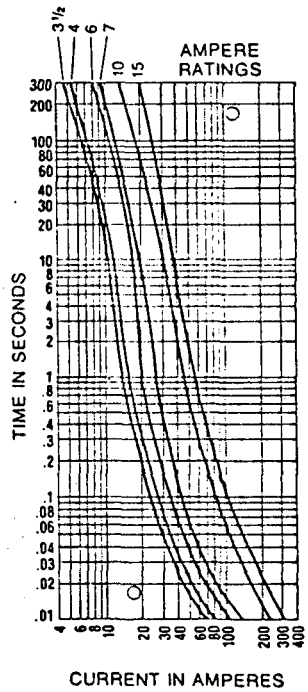
Type BAF, BAN Fuses, 13/32" x 1½"
(10.3mm x 38.1mm)



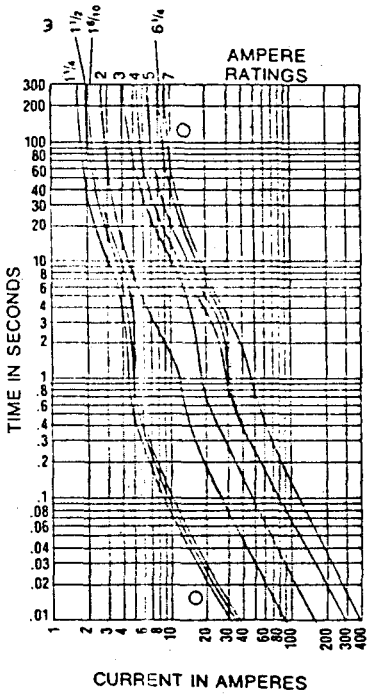
Fusetron FNA Dual-Element, Indicating Fuses, 13/32" x 1 1/2" (10.3mm x 38.1mm)



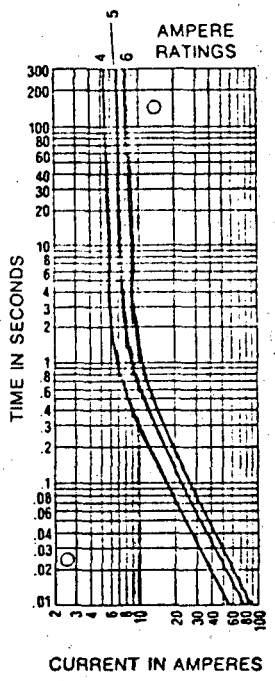
Type FNQ Time-Delay Fuses, 13/32" x 1 1/2" (10.3mm x 38.1mm)



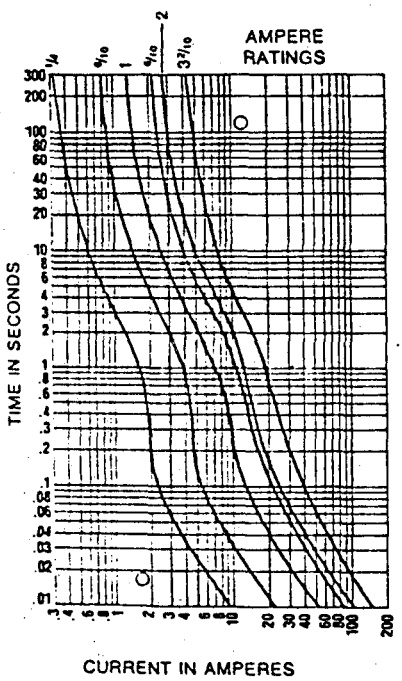
Fusetron MDX Dual-Element Fuses, 1/4" x 1 1/4" (6.4mm x 31.8)



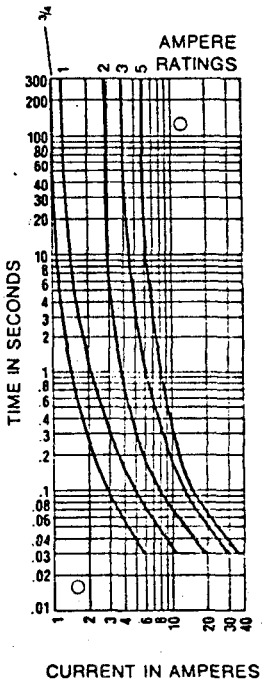
Type MTH Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)



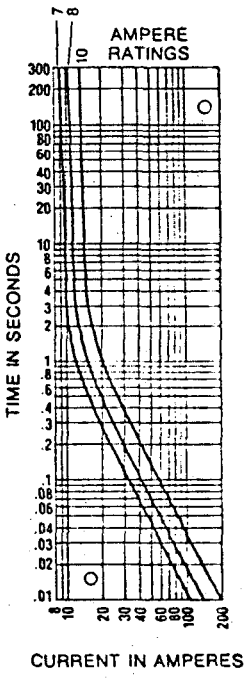
Fusetron FNQ Dual-Element Fuses, 13/32" x 1 1/2" (10.3mm x 38.1mm)



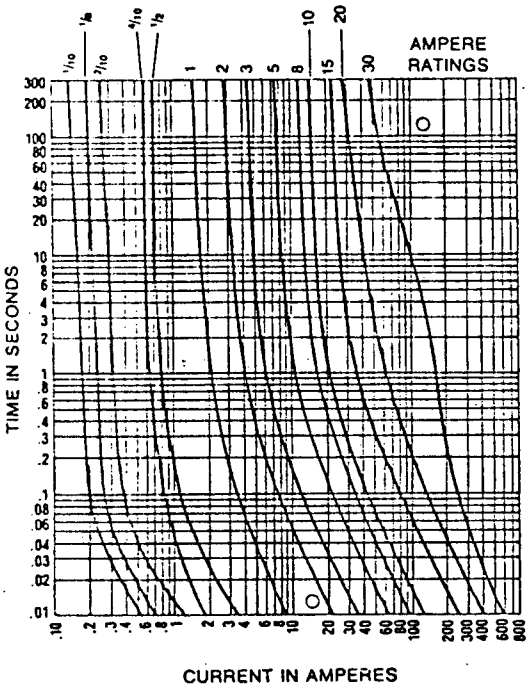
Type GBA, GLD Indicating Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)



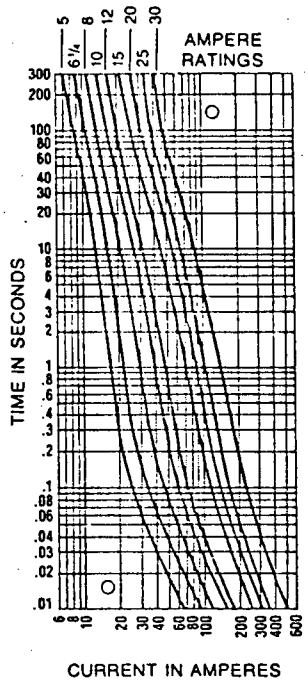
Type GLH Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)



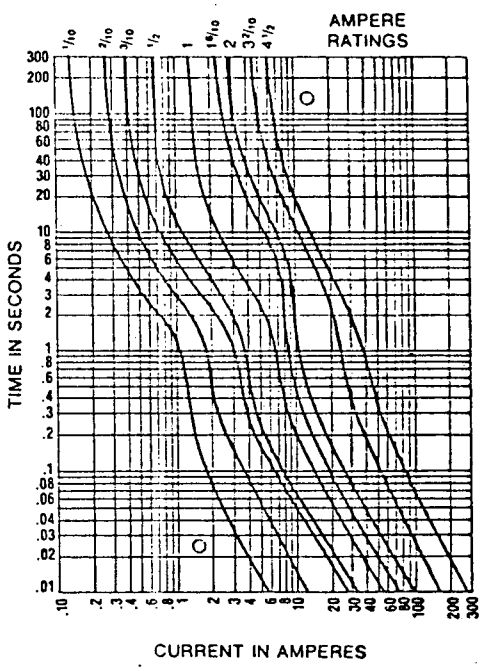
Fast-Acting KLM, KTK Fuses, 1/2" (10.3mm x 38.1mm)



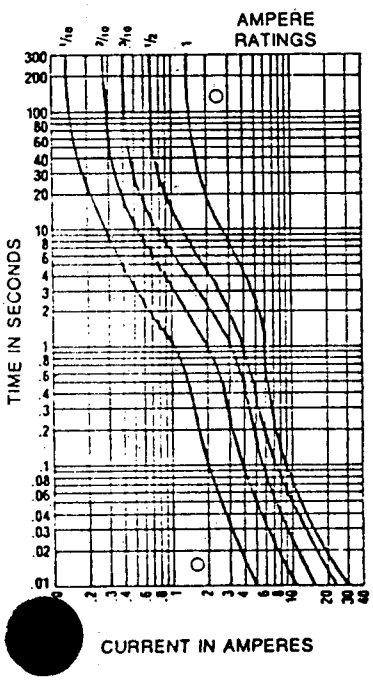
Type MDA Time-Delay Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm).



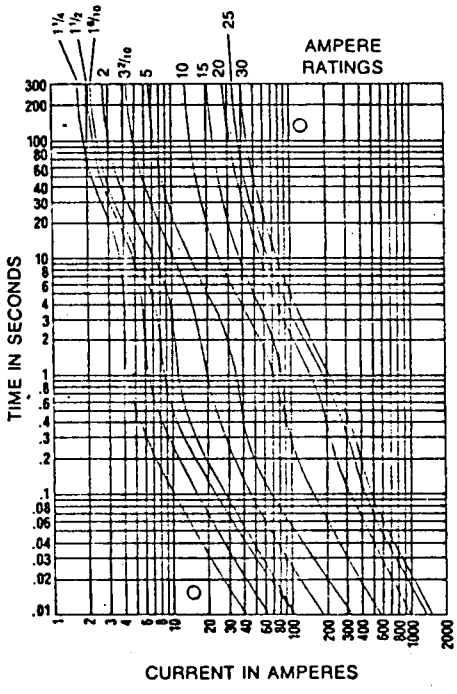
Fusetron MDA Dual-Element Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)



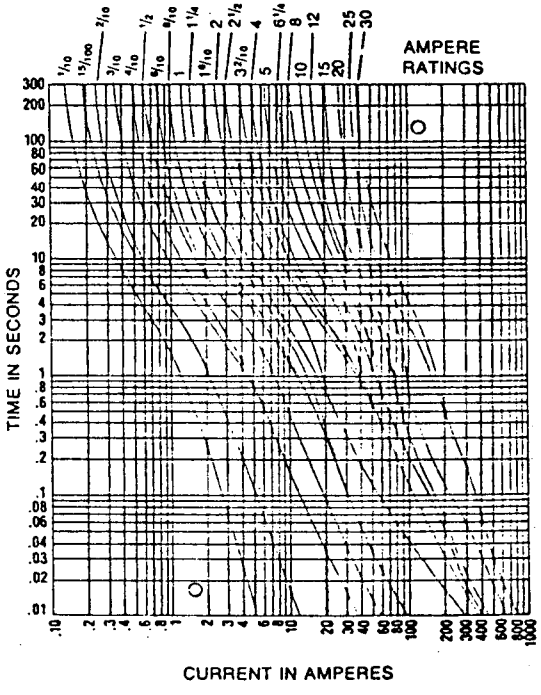
Fusetron MDL, MDV Dual-Element Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)

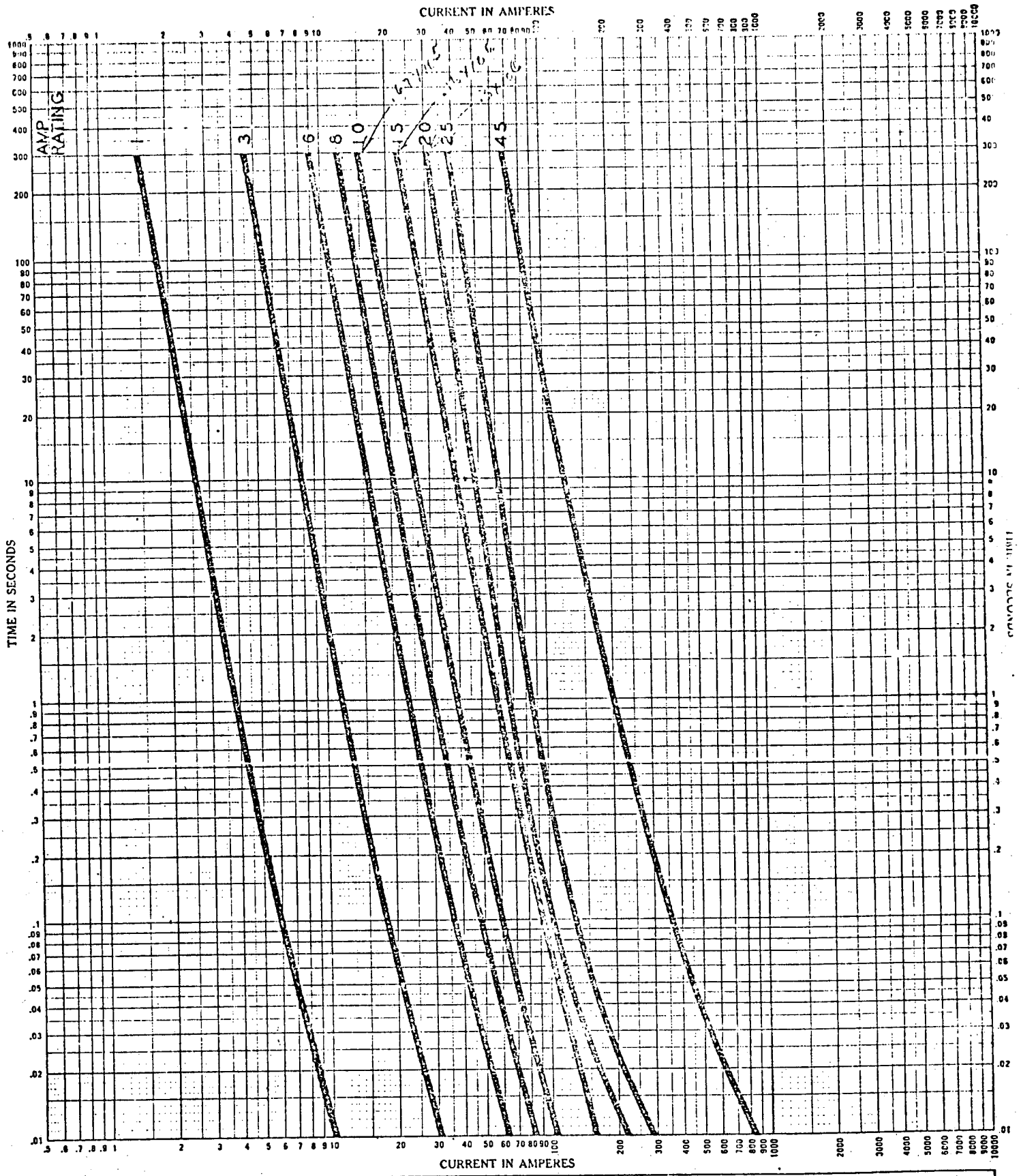


Fusetron MDL, MDV Dual-Element Fuses, 1/4" x 1 1/4" (6.4mm x 31.8mm)



Fusetron FNM Dual-Element Fuses, 13/32" x 1 1/2" (10.3mm x 38.1mm)





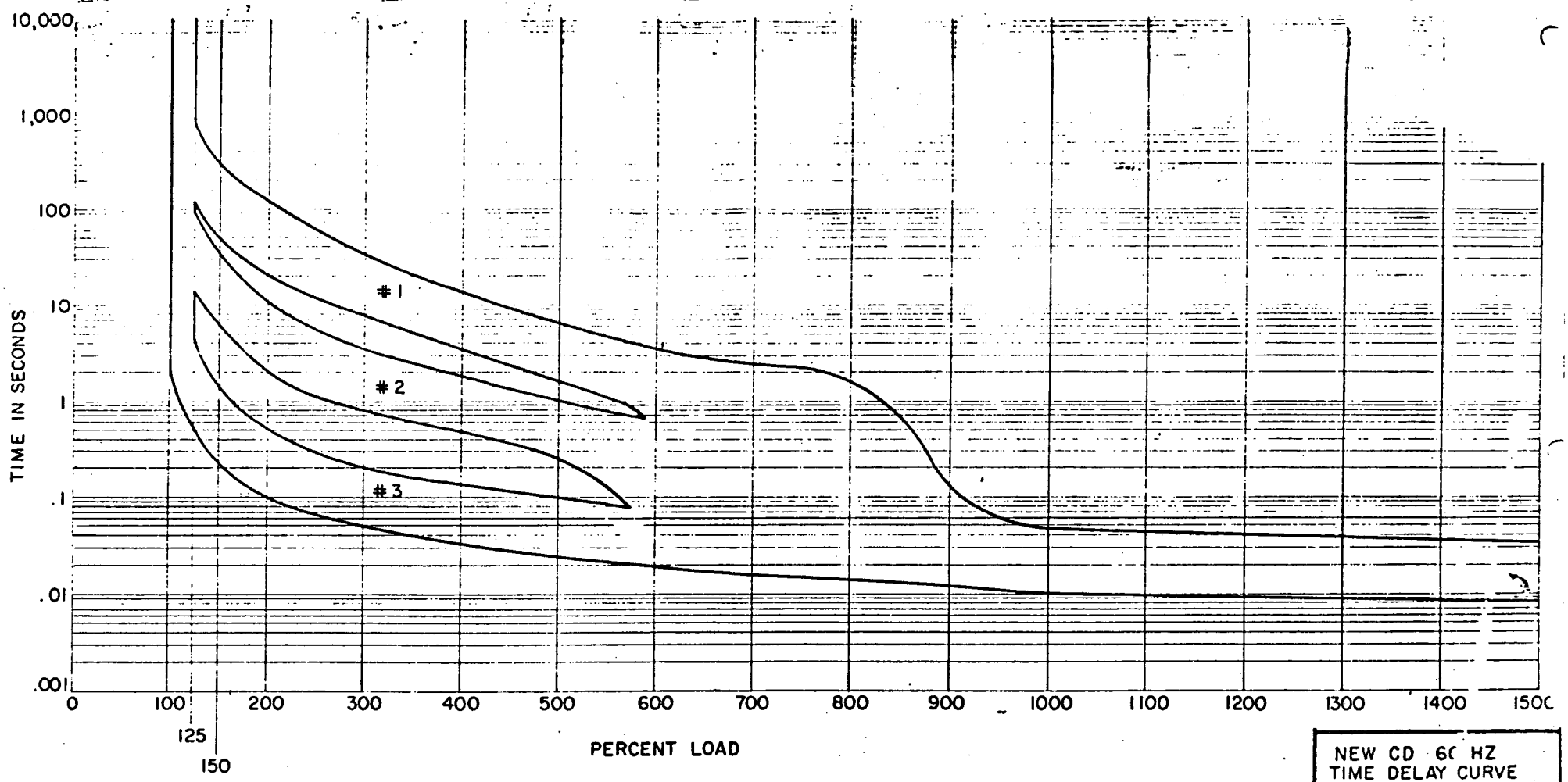
TOTAL CLEARING ..... TIME-CURRENT CHARACTERISTIC CURVES BUSSMANN MFG. DIVISION

For KTN, KTS, KWN & KWS LIMITRON FAST-ACTING FUSES McGraw-Edison Co. St. Louis 7, Mo.

BASIS FOR DATA Standards ..... KLC ..... 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 varintions should be .....

No. 50549
Date 8-22-74



NOTES:

1. DATA BASED ON 15, 40, 60, 100 AMP. BREAKERS, SEE I/T #20, 5114 AND DWG. 5114-004
2. ARMATURE RESPONSE SETTINGS 102% & 123%.
3. CURVE # 2 ADJUSTED DOWNWARD FROM ACTUAL RESULTS.
4. MUST HOLD 100% – MUST TRIP 125%.

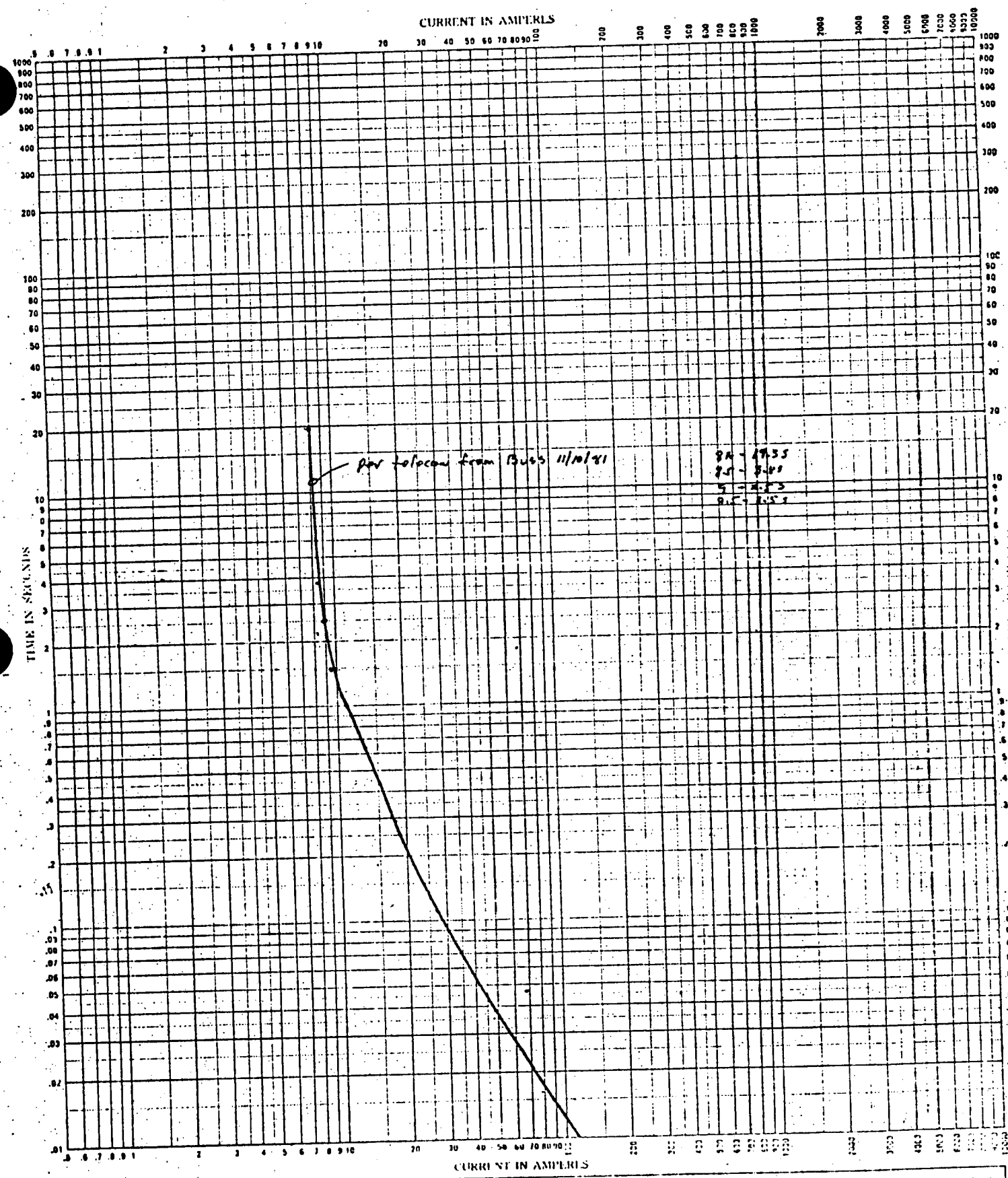
NEW CD 60 HZ
TIME DELAY CURVE
(PRELIMINARY)

DRAWN BY A.T.D.	SCALE ———
	DATE 1-8-71

DO NOT SCALE DRAWING

HEINEMANN
ELECTRIC COMPANY
TRENTON, NEW JERSEY

005-10098



OPENING TIME-CURRENT CHARACTERISTIC CURVES

BUSSMANN MFG. DIVISION
McGraw-Edison Co. St. Louis, Mo 63107

For KAZ ACTUATOR In

Dated

BASIS FOR DATA Standards

1. Tests made at
2. Curves are plotted to

Volts a-c at p.f. Starting at 25C with no initial load

Test points so variations should be

No. 50744
3-9-72

APPENDIX C

WATTS BAR NUCLEAR PLANT
SER SECTION 8.3.3.3(b)
ASSOCIATED CIRCUITS

OUTLINE FOR ASSOCIATED CIRCUIT ANALYSIS

Appendix C - Summary of Associated Circuit Analysis

Appendix C-1 - Associated Cable Groupings

Appendix C-2 - Block Diagram for Analysis of Associated Cables by Grouping and Voltage Level

Appendix C-3 - Identification of Associated Cables

Appendix C-4 - Fault Analysis of Associated Cables

Appendix C
Watts Bar Nuclear Plant SER
Summary of Associated Circuit Analysis

Nondivisional cables that are routed in cable trays designated for Class 1E cables have been treated the same as the Class 1E cables. The nondivisional cables are subject to the same environmental qualification, flame retardance, cable derating, splicing restrictions, and cable tray fill as the Class 1E cables. Also, the nondivisional cables have the same circuit protection and short circuit rating as divisional cables.

The divisional cable tray systems are divided into separate networks (e.g., train A network is separate from train B network) by voltage level, such as V5 for 6.9 kV power cables, V4 for 480V power cables, and V3 for control cables including 250V dc, 125V dc, 120V ac, and communciation cables such as telephone and paging. The voltage level V2 channelized cable trays are divided into four separate networks, channel D, E, F, and G. The V2 medium-level signal trays contain signal cables for inputs to and outputs from the computer other than thermocouples; instrument transmitters, recorders, RTD's greater than 100 millivolts, tachometers, and indicators; rotor eccentricity and vibration detectors; and shielded annunciator cables used with solid-state equipment. The computerized cable routing program ensures that once a nondivisional cable is routed in a divisional tray, that associated cable is not subsequently routed onto a tray containing redundant cables. The voltage level V1 cable trays are nondivisional. The V1 trays contain signal cables for thermocouples, strain gauges, thermal converters, and RTD's that are 100 millivolts or less.

Section 4.6.2 of IEEE 384-1974 does not require non-Class 1E instrumentation and control circuits to be separated from associated circuits. However, regulatory position C.7 of RG 1.75 requires exceptions to be justified by analysis.

From the Watts Bar computer cable routing program, TVA has identified 330 associated cables that are routed in divisional cable trays. Appendix C-1 is a tabulation of these associated cables by their routing groupings. The 44 cables in the first group (Table C-2-1) are routed in train A or B cable trays with two or more of these cables sharing a common segment(s) of nondivisional tray. For example, cable FE 733 shares nondivisional tray segments between nodes 2153 and 2157 with cables T4043, T4047, T4051, and T4055 as shown in Figure C-2-1.

The second group (Table C-2-2) has 24 associated cables that are routed in train A or B trays with subsequent routing in different segments of nondivisional trays. The 92 cables in groups three and four (Tables C-2-3 and C-2-4, respectively) are routed in divisional trays within the control building with subsequent routing in conduit by divisional grouping within the nonseismic turbine building.

These 160 associated cables that have been analyzed are identified in Table C-3, with a listing of termination points and distances of each itemized cable. Each of the 160 associated cables was analyzed to verify that a postulated fault condition would be electrically isolated by its protective device before the cable's thermal energy (I^2t) rating was exceeded.

Appendix C
Watts Bar Nuclear Plant SER
Summary of Associated Circuit Analysis

Appendix C-4 documents the fault analysis of these 160 cables. Table C-4 identifies, in the "remarks" column, any circuit modifications to be made for improved plant operation. The remaining 170 associated cables (Table C-2-5) require no analysis because they are routed only with Class 1E cables in train A or B trays within Category I structures.

Based on the results of the analysis of associated circuits, TVA has demonstrated that Class 1E circuits are not degraded. Therefore, associated circuits at Watts Bar Nuclear Plant meet the requirements of IEEE 384-1974 and RG 1.75.

Appendix C-1

Associated Cable Groupings*

Routing	No. of Cables
Total Cables Routed in Divisional or Portions of Divisional Cable Trays	330
Cables Routed in Train A or B Cable Tray with two or more Cables Subsequently Routed in a Common Segment(s) of Nondivisional Tray within Category I Structures (Table C-2-1)	44**
Cables Routed in Train A or B Cable Tray with Subsequent Routing in Different Segments of Nondivisional Tray within Category I Structures (Table C-2-2)	24
Cables Routed Only in Train A or B Tray in Control Building with Subsequent Routing in Conduit In Nonseismic Turbine Building (Table C-2-3)	62
Cables Routed Only in Channel D, E, F, or G Tray in Control Building with Subsequent Routing in Conduit in Turbine Building (Table C-2-4)	30
Cables Routed Only in Train A or B Tray within Category I Structures (Table C-2-5)	170

*See appendix C-2 for block diagram for analysis of associated cables by grouping and voltage level.

**Seven of these cables are routed into nonseismic areas. These seven cables operate at 6 volts dc, 600 micro amps and pose no threat to Class 1E cables.

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APPENDIX C-2

BLOCK DIAGRAM

FOR ANALYSES OF ASSOCIATED CABLES BY GROUPING AND VOLTAGE LEVEL

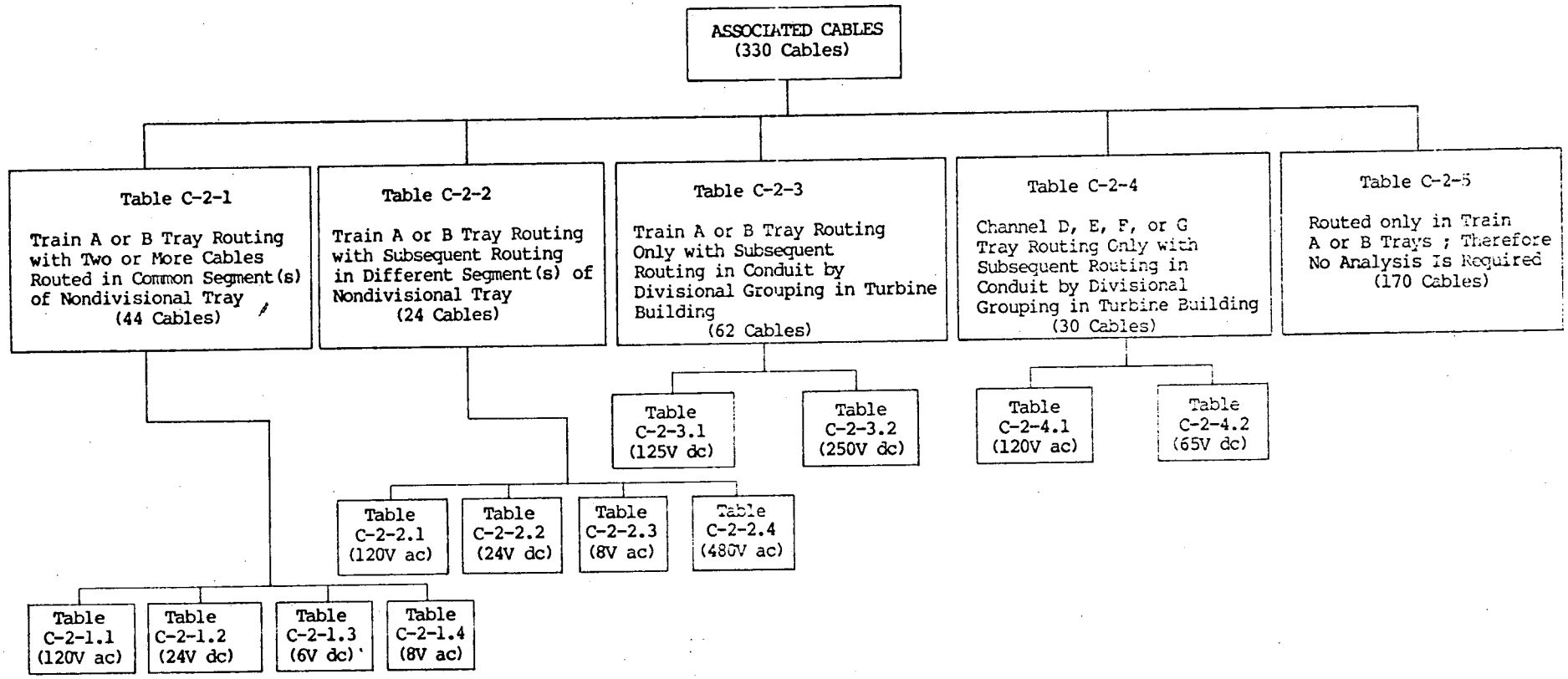
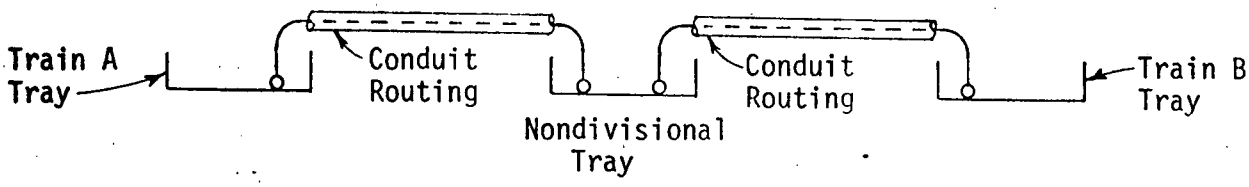


Table C-2-1
Forty-four Cables Routed in Voltage Level V3 Train A or B Tray
With Two or More Cables Subsequently Routed in Common Segment(s) of
Nondivisional V3 Tray



Item	Cable	Item	Cable
2	FE519	6	FE733
3	FE560		
9	FE1446		
10	FE1451		
11	FE1455		
13	LTA940	15	LTA944
14	LTA941	21	LTA956
17	LTA948	22	LTA957
18	LTA949		
23	LTA960		
24	LTA961		
		25	PL2463
		27	PL2483
29	PP326	31	PP566
33	T1180*		
35	T1336*		
37	T1910	38	T1916
39	T2360	41	T2371
40	T2361	42	T2372
43	T4042		
44	T4043		
45	T4046		
46	T4047		
47	T4050		
48	T4051		
49	T4054		
50	T4055		
		51	V1085
56	1SR880	58	1SR884
57	1SR882	59	1SR886
64	2SR880	66	2SR884
65	2SR882	67	2SR886

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*Sound powered telephone circuit, no analysis required.

TABLE C-2-1.1

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-1 POWERED FROM
120-VOLT AC POWER SUPPLY

Item No.	Cable No.
2	FE 519*
3	FE 560*
6	FE 733*
9	FE 1446**
10	FE 1451**
11	FE1455**
25	PL2463**
27	PL2483**
29	PP326**
31	PP566**
37	T1910**
38	T1916**
51	V1085**
56	1SR880**
57	1SR882**
58	1SR884**
59	1SR886**
64	2SR880**
65	2SR882**
66	2SR884**
67	2SR886**

*This cable is powered from an ungrounded 120-volt AC supply.

**This cable is powered from a grounded 120-volt AC supply

TABLE C-2-1.2

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-1 POWERED FROM
24-VOLT DC POWERED SUPPLY (GROUNDED)

Item No.	Cable No.
14	LTA 941
18	LTA 949
22	LTA 957
24	LTA 961

TABLE C-2-1.3

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-1 POWERED FROM
6-VOLT DC POWER SUPPLY (GROUNDED)

Item No.	Cable No.
39	T2360
40	T2361
41	T2371
42	T2372
43	T4042
44	T4043
45	T4046
46	T4047
47	T4050
48	T4051
49	T4054
50	T4055

TABLE C-2-1.4

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-1 POWERED FROM
8-VOLT AC POWER SUPPLY (GROUNDED)

Item No.	Cable No.
13	LTA 940
15	LTA 944
17	LTA 948
21	LTA 956
23	LTA 960

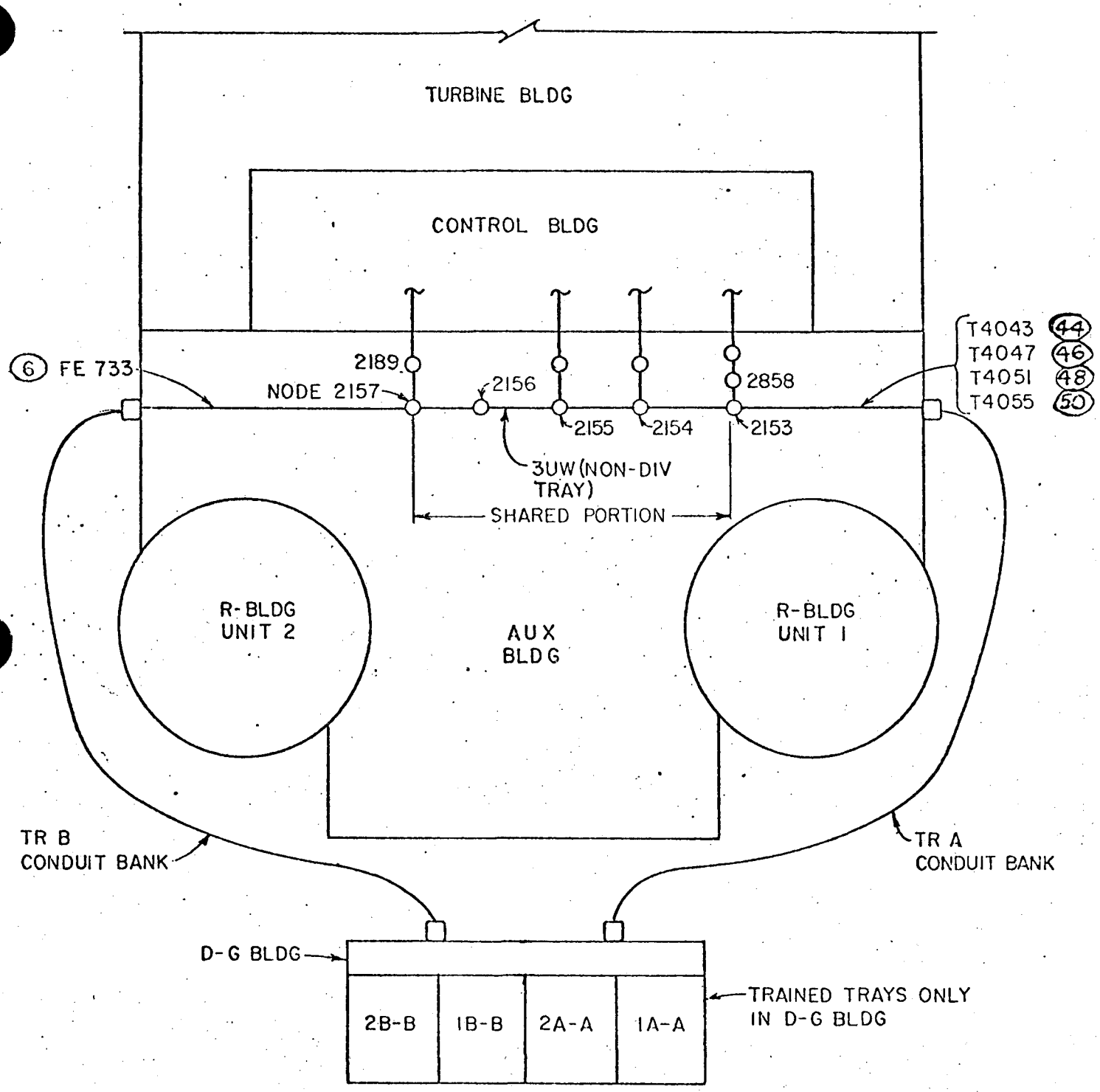
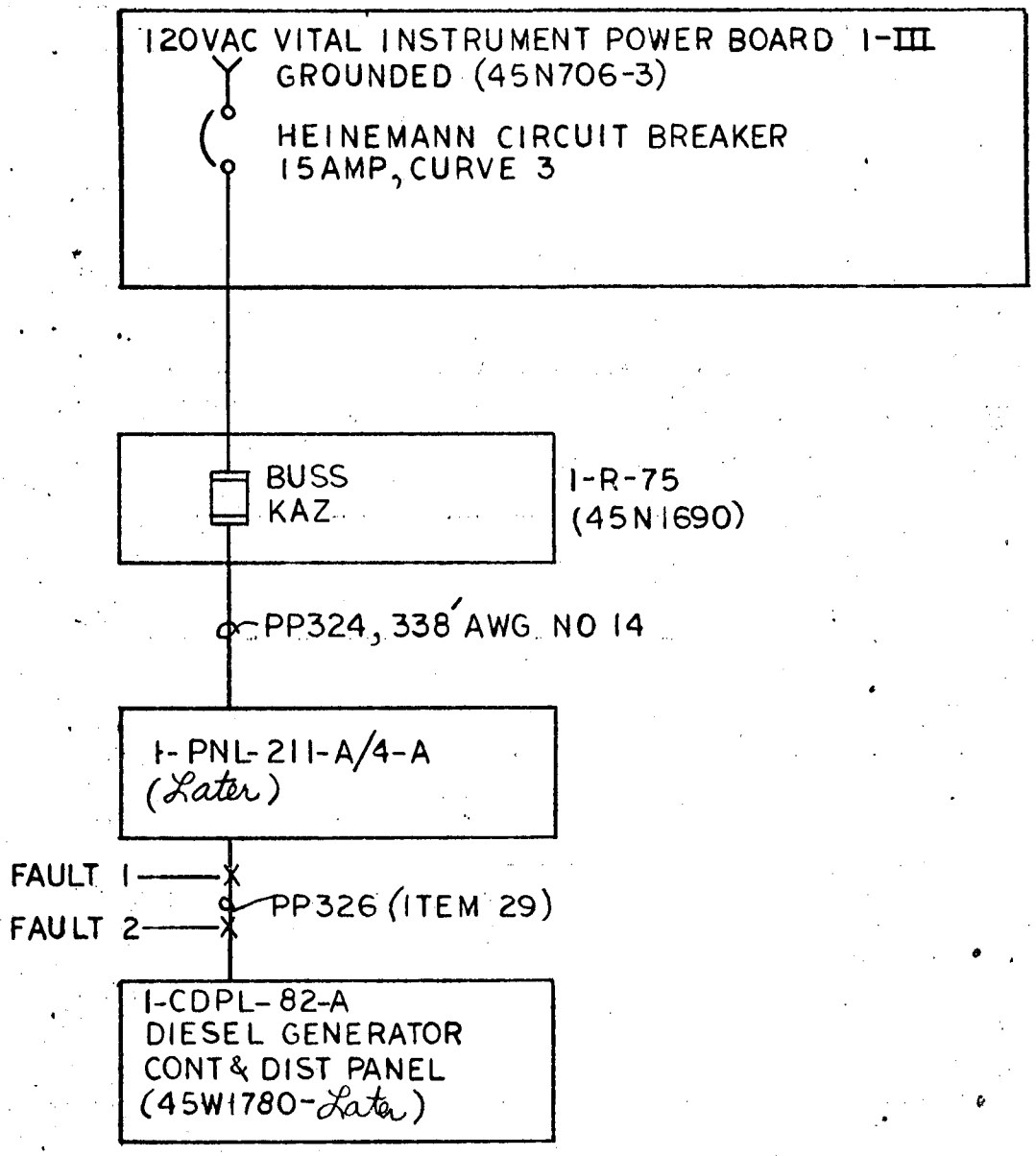


FIGURE C-2-1
"ASSOCIATED CIRCUITS"
SHARING OF COMMON RACEWAY

TYPICAL ASSOCIATED CABLE POWERED FROM 120VAC POWER SUPPLY (GROUNDED)



NEW MODIFICATION—DRAWINGS NOT ISSUED

FIGURE C-2-1.1A

TYPICAL ASSOCIATED CABLE POWERED FROM 120VAC POWER SUPPLY (UNGROUNDED)

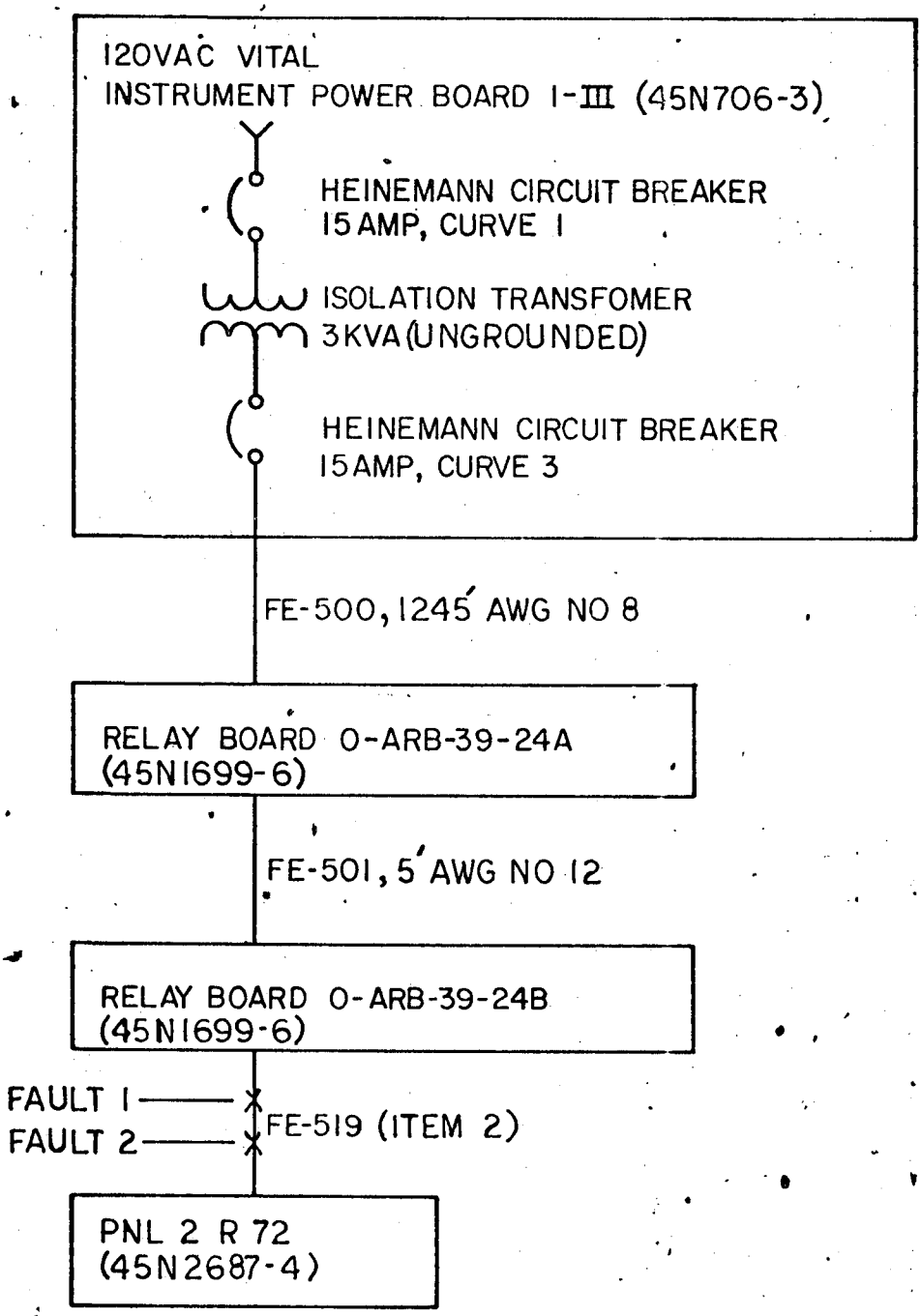


FIGURE C-2-1.1B

TYPICAL ASSOCIATED CABLE POWERED FROM 24VDC POWER SUPPLY (GROUNDED)

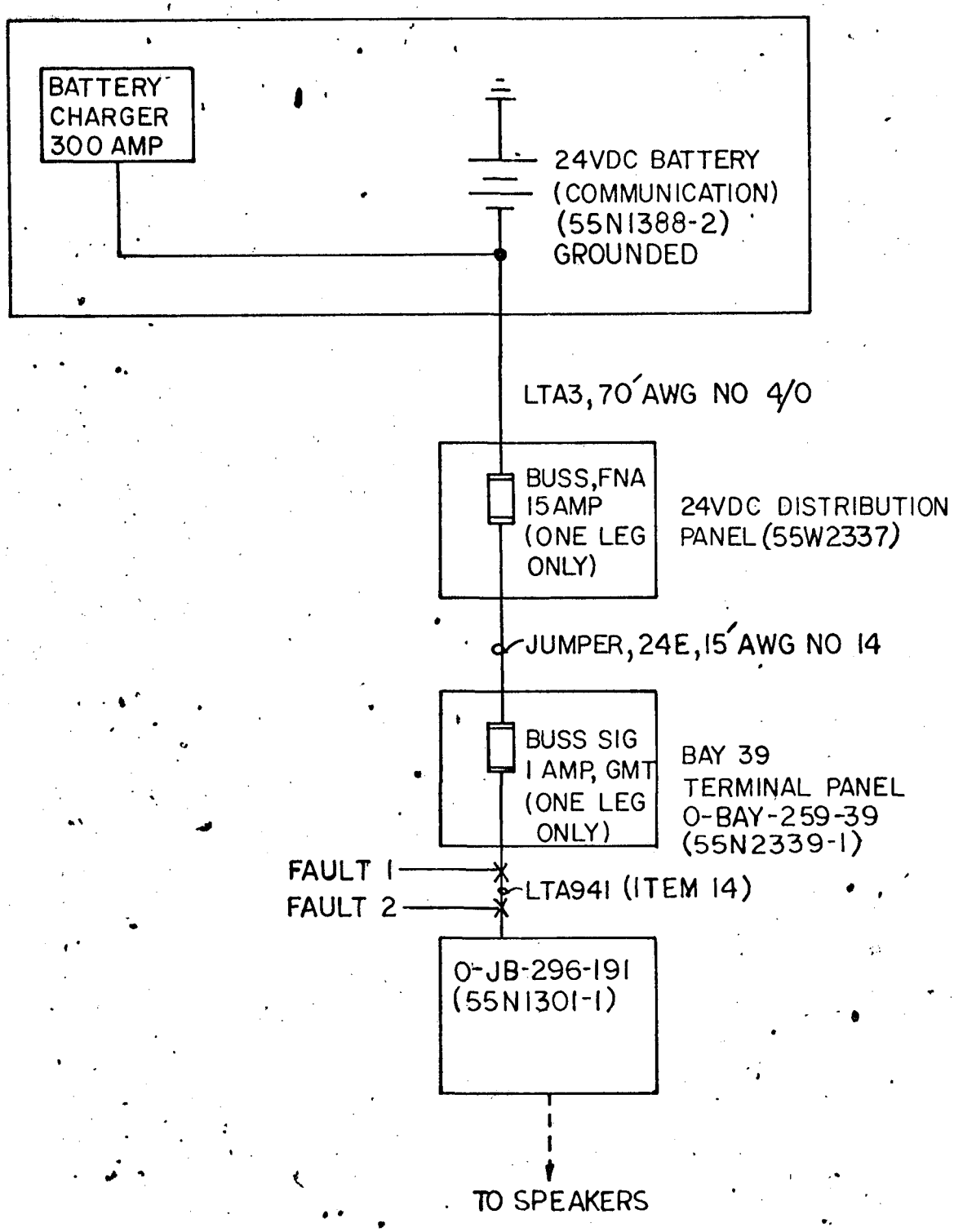


FIGURE C-2-1.2

TYPICAL ASSOCIATED CABLE POWERED FROM 6VDC POWER SUPPLY (GROUNDED)

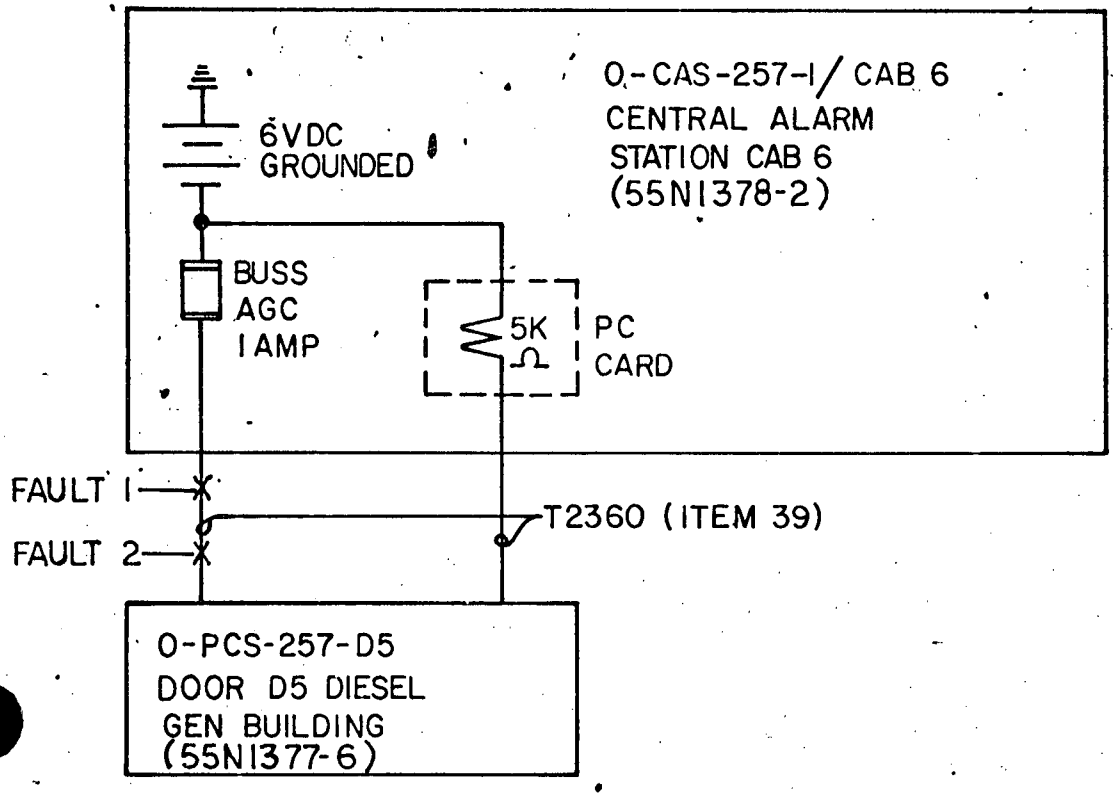


FIGURE C-2-1.3

TYPICAL ASSOCIATED CABLE POWERED FROM 8VAC POWER SUPPLY (GROUNDED)

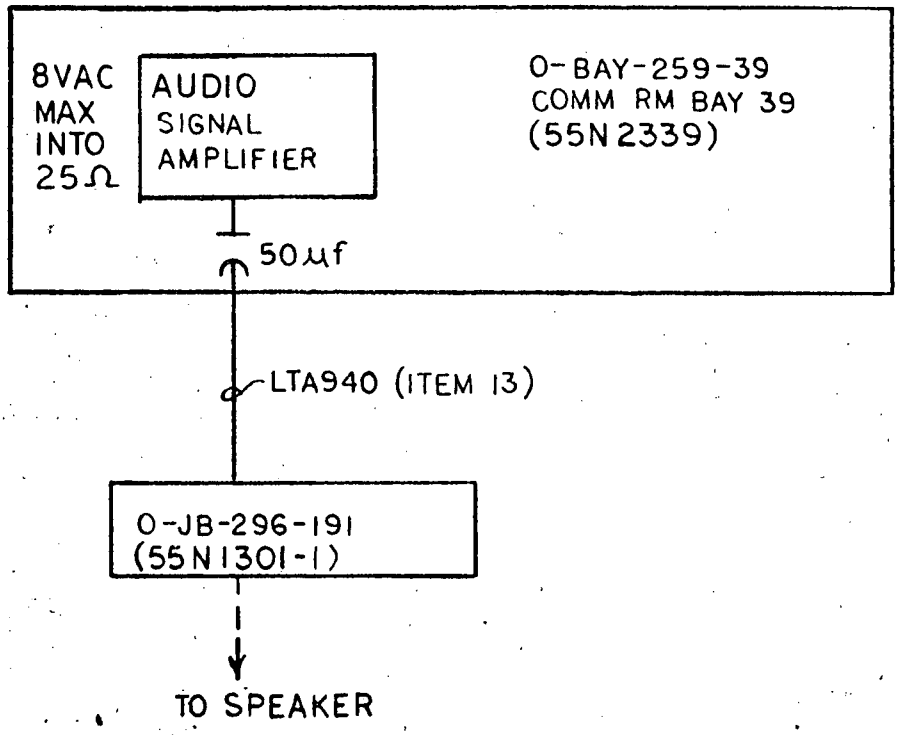
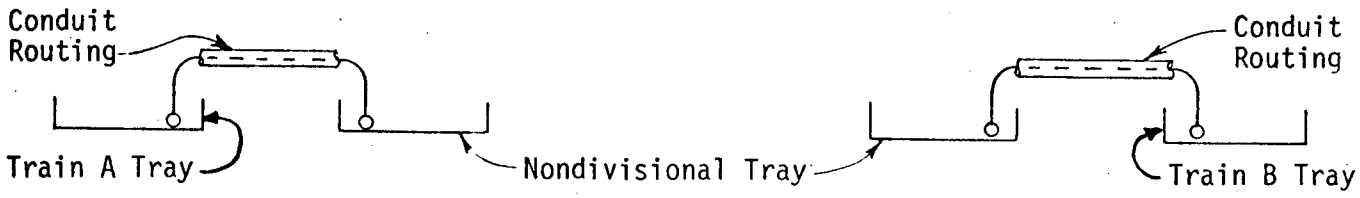


FIGURE C-2-1.4

Table C-2-2

Twenty-four Cables Routed in Train A or B
Tray With Subsequent Routing In Different Segment(s)
of Nondivisional Tray*



Item	Cable	Item	Cable
1	FE500	8	FE1441
4	FE668		
5	FE688		
7	FE840		
12	FE1510		
68	FE1556		
		16	LTA945
		19	LTA952
		20	LTA953
		26	PL2482
		28	PLR555
30	PP446	32	PP686
		34	T1300**
		36	T1340**
52	1SR1	54	1SR500
53	1SR10	55	1SR506
60	2SR1	61	2SR500
61	2SR10	63	2AE405

*All of these cables are routed in voltage level V3 tray, except PLR555 (Item 28) which is routed in V4 (480V) tray.

**Sound powered telephone circuit, to analysis required.

062055.09

TABLE C-2-2.1

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-2 POWERED FROM
120-VOLT AC POWER SUPPLY

Item No.	Cable No.
1	FE500*
4	FE668*
5	FE688*
7	FE840*
8	FE1441**
12	FE1510**
26	PL2482**
30	PP446**
32	PP686**
52	1SR1**
53	1SR10**
54	1SR500**
55	1SR506**
60	2SR1**
61	2SR10**
62	2SR500**
63	2SR506**
68	FE1556**

*This cable is powered from an ungrounded 120-volt AC supply.

**This cable is powered from a grounded 120-volt AC supply.

TABLE C-2-2.2

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-2 POWERED FROM
24-VOLT DC POWER SUPPLY (GROUNDED)

Item No.	Cable No.
16	LTA 945
20	LTA 953

TABLE C-2-2.3

ASSOCIATED CABLE IDENTIFIED
IN TABLE C-2-2 POWERED FROM
8-VOLT AC POWER SUPPLY (GROUNDED)

Item No.	Cable No.
19	LTA 952

TABLE C-2-2.4

ASSOCIATED CABLE IDENTIFIED
IN TABLE C-2-2 POWERED FROM
480-VOLT AC POWER SUPPLY

Item No.	Cable No.
28	PLR 555

TYPICAL ASSOCIATED CABLE POWERED FROM 120VAC POWER SUPPLY (UNGROUNDED)

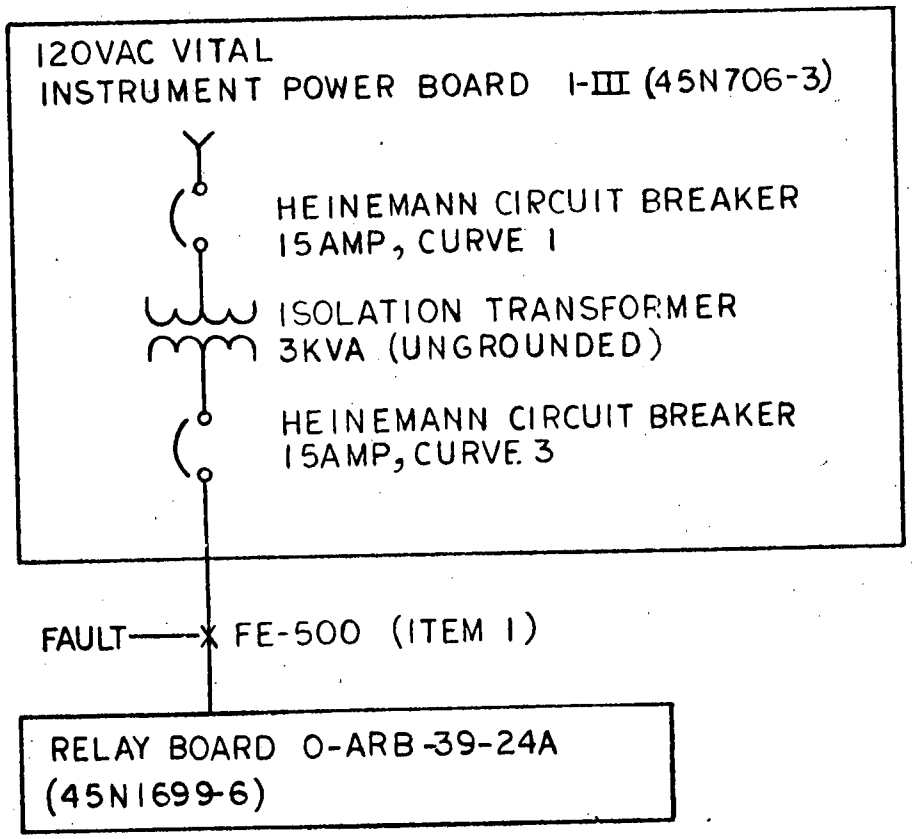


FIGURE C-2-2.1A

TYPICAL ASSOCIATED CABLE POWERED FROM 120VAC POWER SUPPLY (GROUNDED)

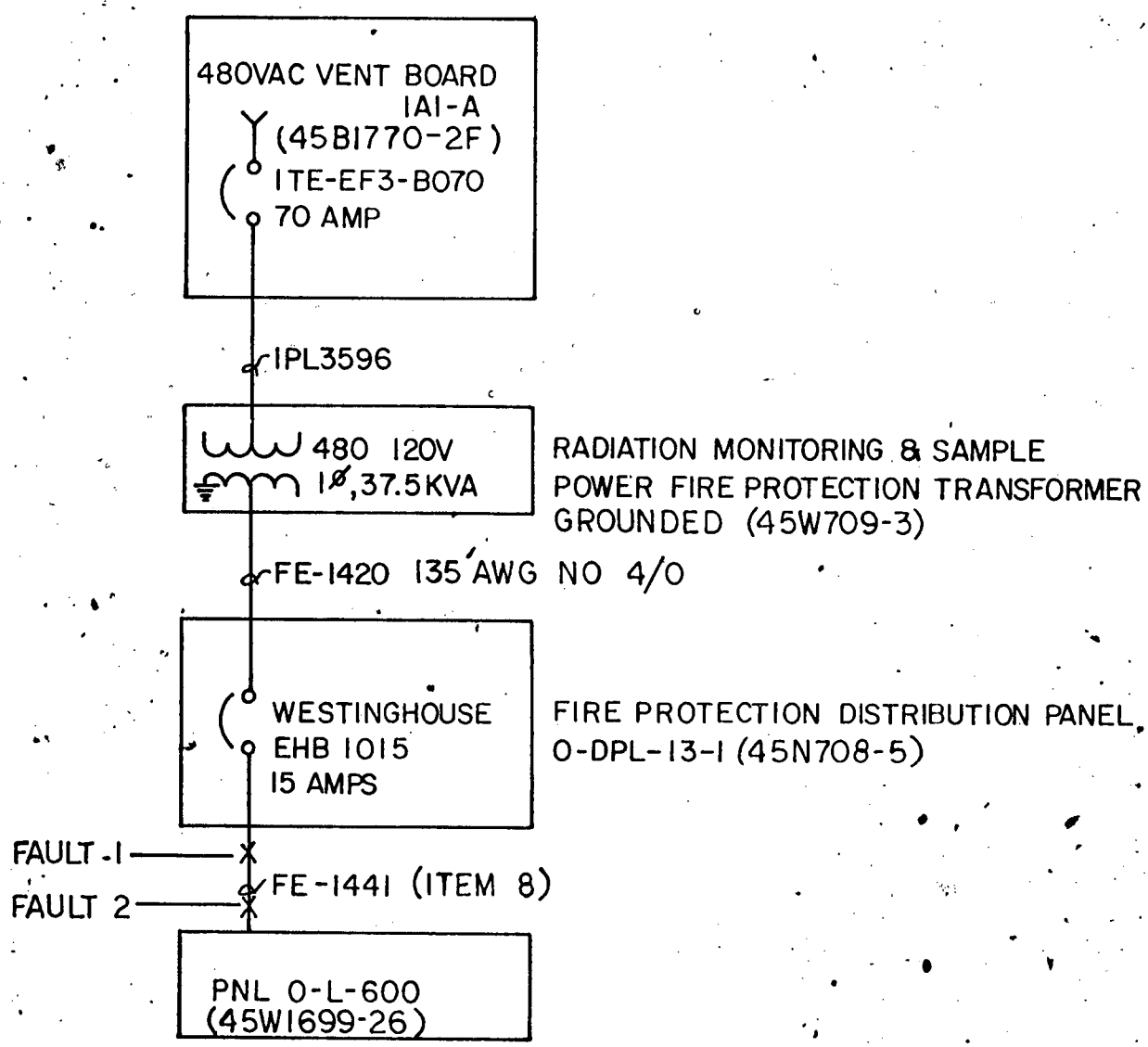


FIGURE C-2-2.1B

TYPICAL ASSOCIATED CABLE POWERED FROM 24VDC POWER SUPPLY (GROUNDED)

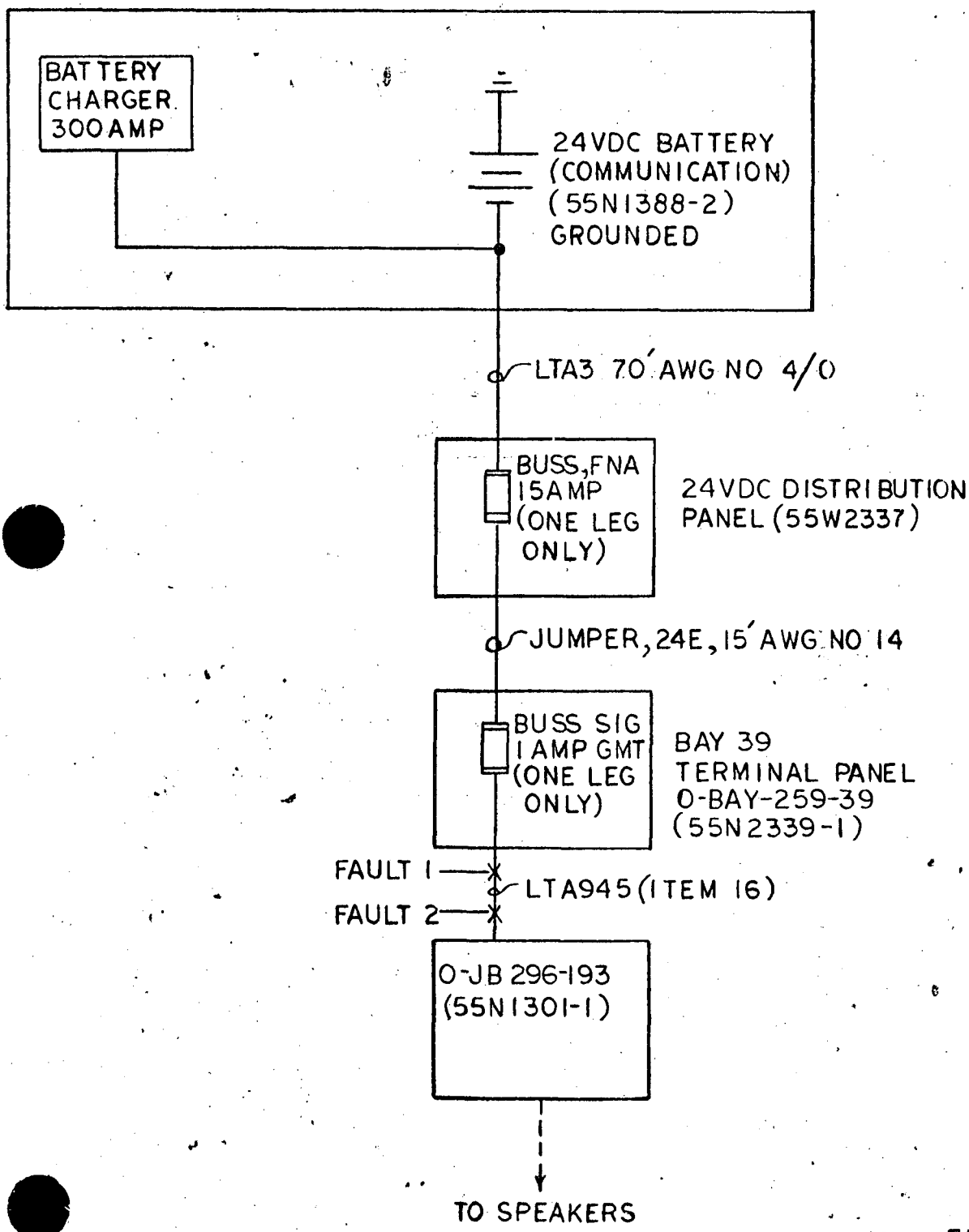


FIGURE C-2-2.2

TYPICAL ASSOCIATED CABLE POWERED FROM 8VAC POWER SUPPLY (GROUNDED)

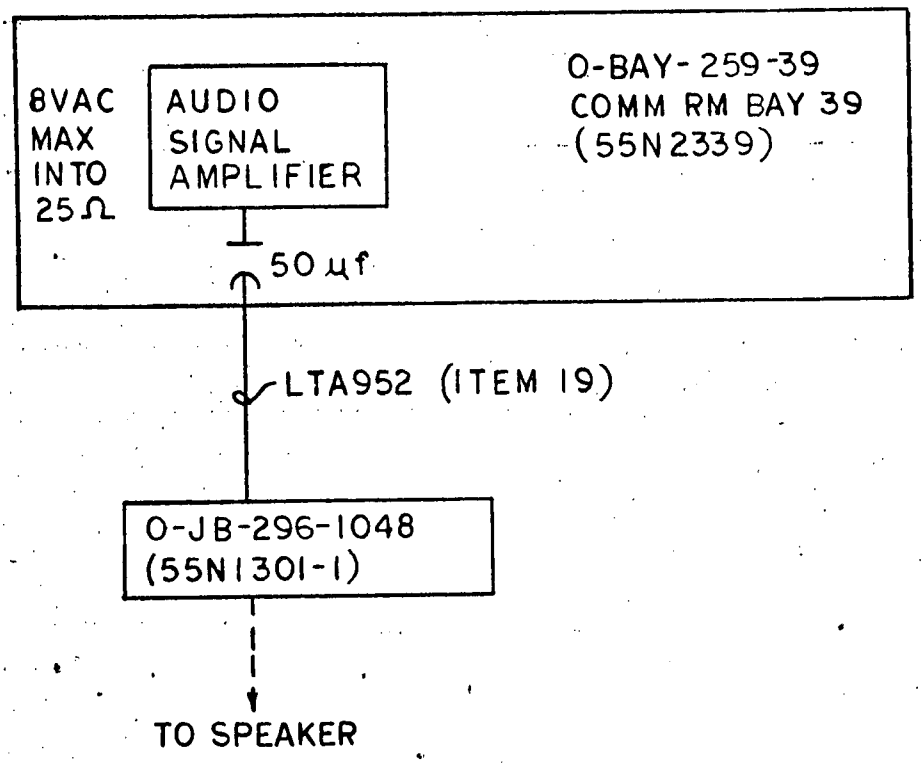


FIGURE C-2-2.3

TYPICAL CIRCUIT FOR ASSOCIATED CABLE POWERED FROM 480-VOLT AC POWER SUPPLY

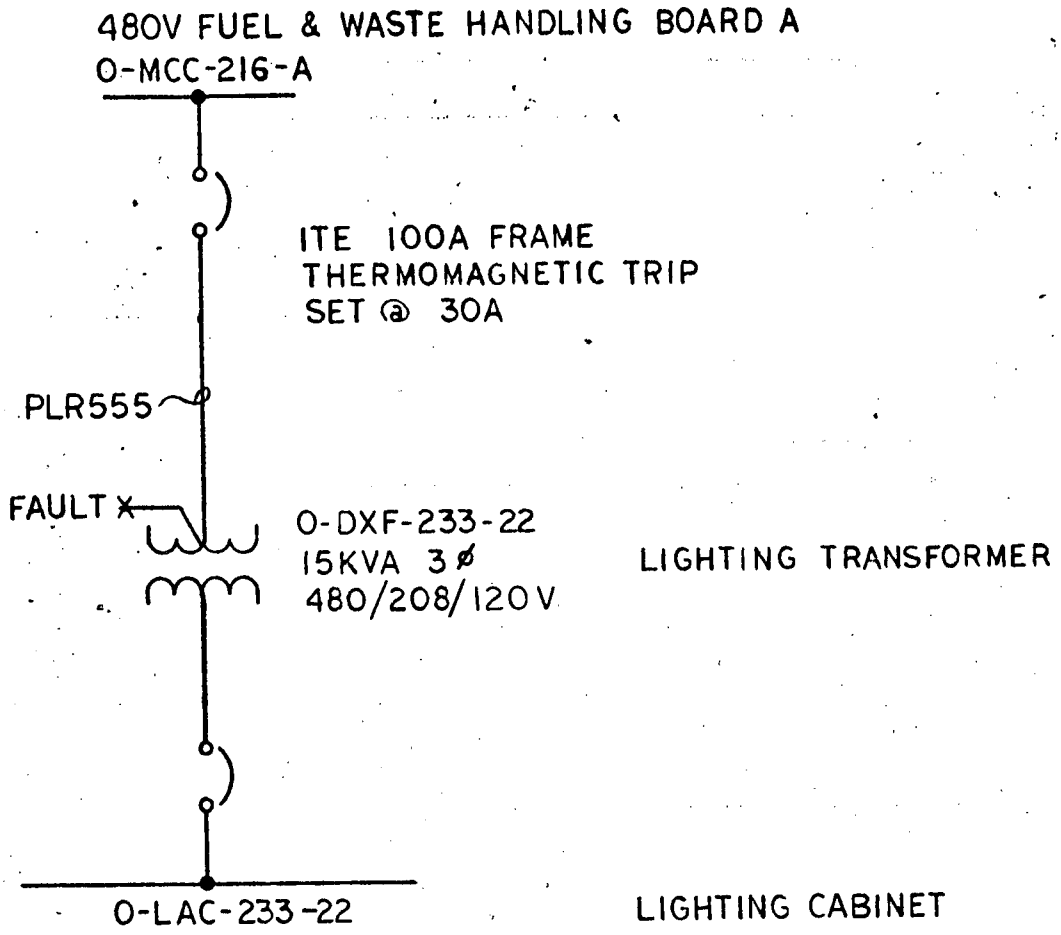
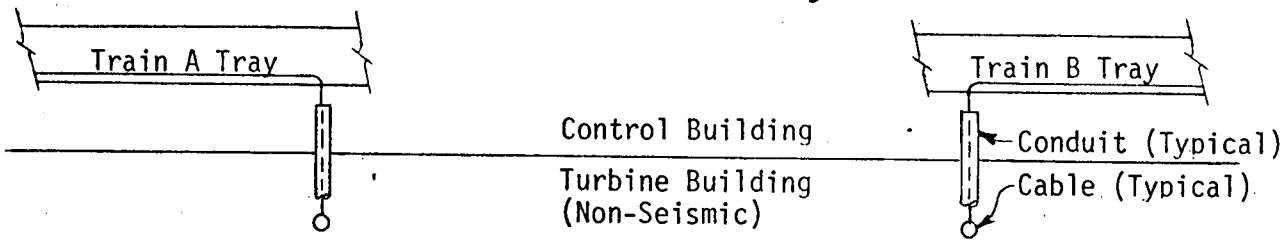


FIGURE C-2-2.4

Table C-2-3

Sixty-two Cables Routed Only In Voltage Level V3 Train A or B Tray
In Control Building With Subsequent Routing In Conduit
In Turbine Building



Item	Cable	Item	Cable
69	1G227		
70	1G235		
71	1V7740	72	1V7742
73	1V7751	74	1V7754
75	1V7765	76	1V7768
77	1V7777	78	1V7780
79	1V7815	80	1V7818
81	1V7828	82	1V7831
83	1V7840	84	1V7843
85	1V7853	86	1V7856
87	1V7885	88	1V7888
89	1V7898	90	1V7901
91	1V7912	92	1V7916
93	1V7925	94	1V7928
95	1SG82	96	1SG87
97	1SG92	98	1SG97
		159	1G204
99	2SG82	100	2SG87
101	2SG92	102	2SG97
103	2G227	160	2G204
104	2G235		
105	2V7740	106	2V7742
107	2V7751	108	2V7754
109	2V7765	110	2V7768
111	2V7777	112	2V7780
113	2V7815	114	2V7818
115	2V7828	116	2V7831
117	2V7840	118	2V7843
119	2V7853	120	2V7856
121	2V7885	122	2V7888
123	2V7898	124	2V7901
125	2V7912	126	2V7916
127	2V7925	128	2V7928

062055.11

TABLE C-2-3.1

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-3 POWERED FROM
125-VOLT DC POWER SUPPLY (UNGROUNDED)

Item No.	Cable No.
71	1V7740
72	1V7742
73	1V7751
74	1V7754
75	1V7765
76	1V7768
77	1V7777
78	1V7780
79	1V7815
80	1V7818
81	1V7828
82	1V7831
83	1V7840
84	1V7843
85	1V7853
86	1V7856
87	1V7885
88	1V7888
89	1V7898
90	1V7901
91	1V7912
92	1V7916
93	1V7925
94	1V7928
95	1SG82
96	1SG87
97	1SG92
98	1SG97
99	2SG82
100	2SG87
101	2SG92
102	2SG97
105	2V7740
106	2V7742
107	2V7751
108	2V7754
109	2V7765
110	2V7768

TABLE C-2-3.1 (continued)

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-3 POWERED FROM
125V DC POWER SUPPLY (UNGROUNDED)

Item No.	Cable No.
111	2V7777
112	2V7780
113	2V7815
114	2V7818
115	2V7828
116	2V7831
117	2V7840
118	2V7843
119	2V7853
120	2V7856
121	2V7885
122	2V7888
123	2V7898
124	2V7901
125	2V7912
126	2V7916
127	2V7925
128	2V7928

TABLE C-2-3.2

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-3 POWERED FROM
250V DC POWER SUPPLY (UNGROUNDED)

Item No.	Cable No.
69	1G227
70	1G235
103	2G227
104	2G235
159	1G204
160	2G204

TYPICAL ASSOCIATED CABLE POWERED FROM 125VDC POWER SUPPLY (UNGROUNDED)

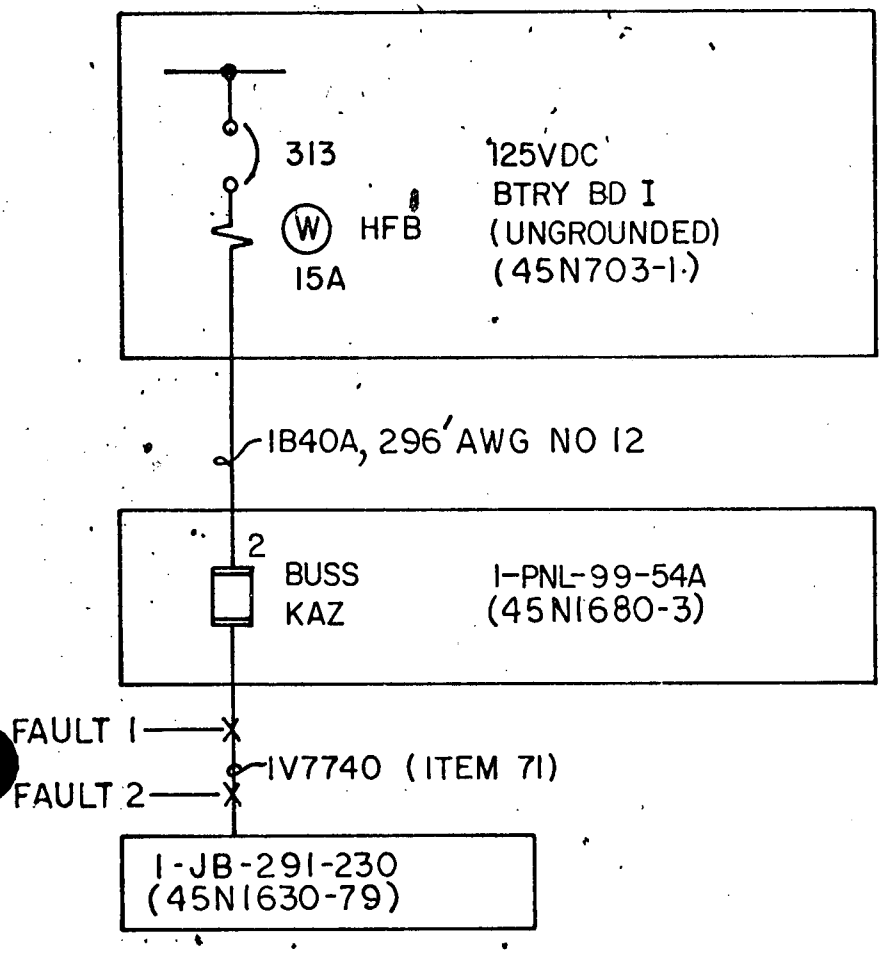
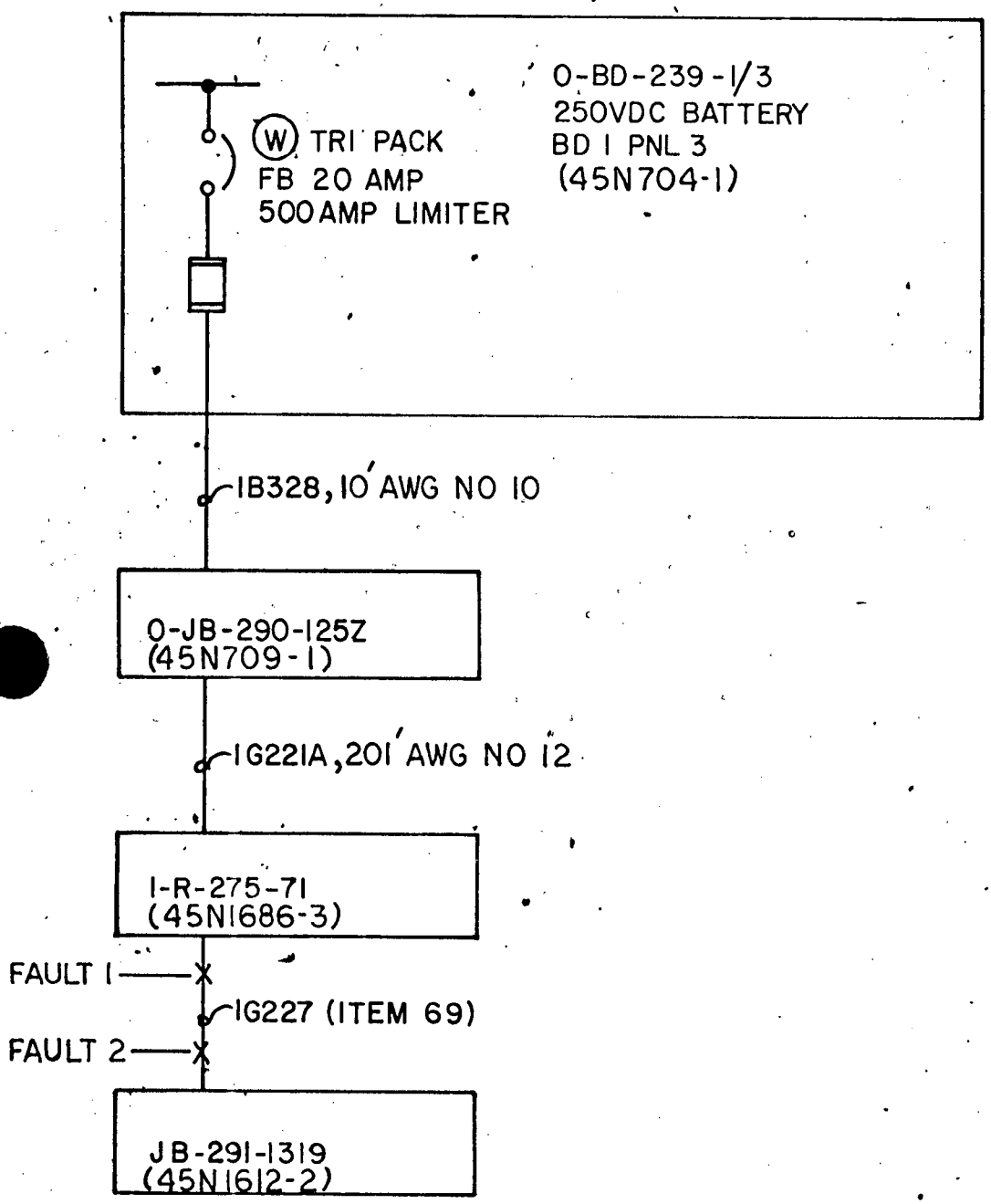


FIGURE C-2-3.1

TYPICAL ASSOCIATED CABLE POWERED FROM 250VDC POWER SUPPLY (UNGROUNDED)

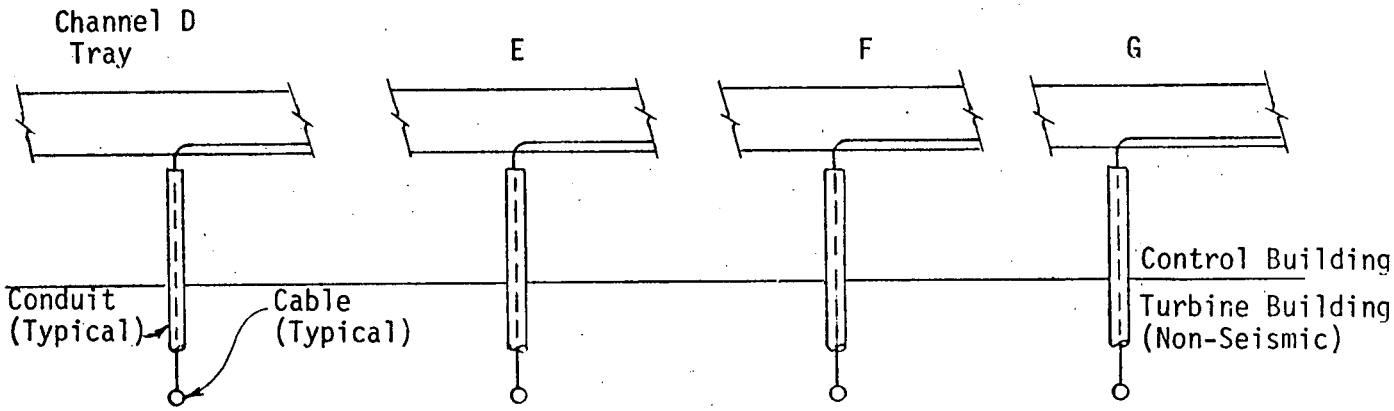


(NEW MODIFICATION DRAWINGS NOT YET ISSUED)

FIGURE C-2-3.2

Table C-2-4

Thirty Cables Routed Only In Voltage Level V2* Channel D, E, F, or G Tray
In Control Building With Subsequent Routing
In Turbine Building



D		E		F		G	
Item	Cable	Item	Cable	Item	Cable	Item	Cable
129	1PS3D	131	1PS23E	133	1PS43F	135	1PS63G
130	1PS4D	132	1PS24E	134	1PS44F	136	1PS64G
137	1PS241D	139	1PS246E	141	1PS251F		
138	1PS243D	140	1PS248E	142	1PS253F		
		143	1PM2040E				
144	2PS3D	146	2PS23E	148	2PS43F	150	2PS63G
145	2PS4D	147	2PS24E	149	2PS44F	151	2PS64G
152	2PS241D	154	2PS246E	156	2PS251F		
153	2PS243D	155	2PS248E	157	2PS253F		
		158	2PM2040E				

*Voltage level:

V2 - Medium level signal cables

TABLE C-2-4.1

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-4 POWERED FROM
120V AC POWER SUPPLY (GROUNDED)

Item No.	Cable No.
129	1PS3D
130	1PS4D
131	1PS23E
132	1PS24E
133	1PS43F
134	1PS44F
135	1PS63G
136	1PS64G
137	1PS241D
138	1PS243D
139	1PS246E
140	1PS248E
141	1PS251F
142	1PS253F
144	2PS3D
145	2PS4D
146	2PS23E
147	2PS24E
148	2PS43F
149	2PS44F
150	2PS63G
151	2PS64G
152	2PS241D
153	2PS243D
154	2PS246E
155	2PS248E
156	2PS251F
157	2PS253F

TABLE C-2-4.2

ASSOCIATED CABLES IDENTIFIED
IN TABLE C-2-4 POWERED FROM
65-VOLT DC POWER SUPPLY (UNGROUNDED)

Item No.	Cable No.
143	1PM 2040E
158	2PM 2040E

TYPICAL ASSOCIATED CABLE POWERED FROM 120VAC POWER SUPPLY (GROUNDED)

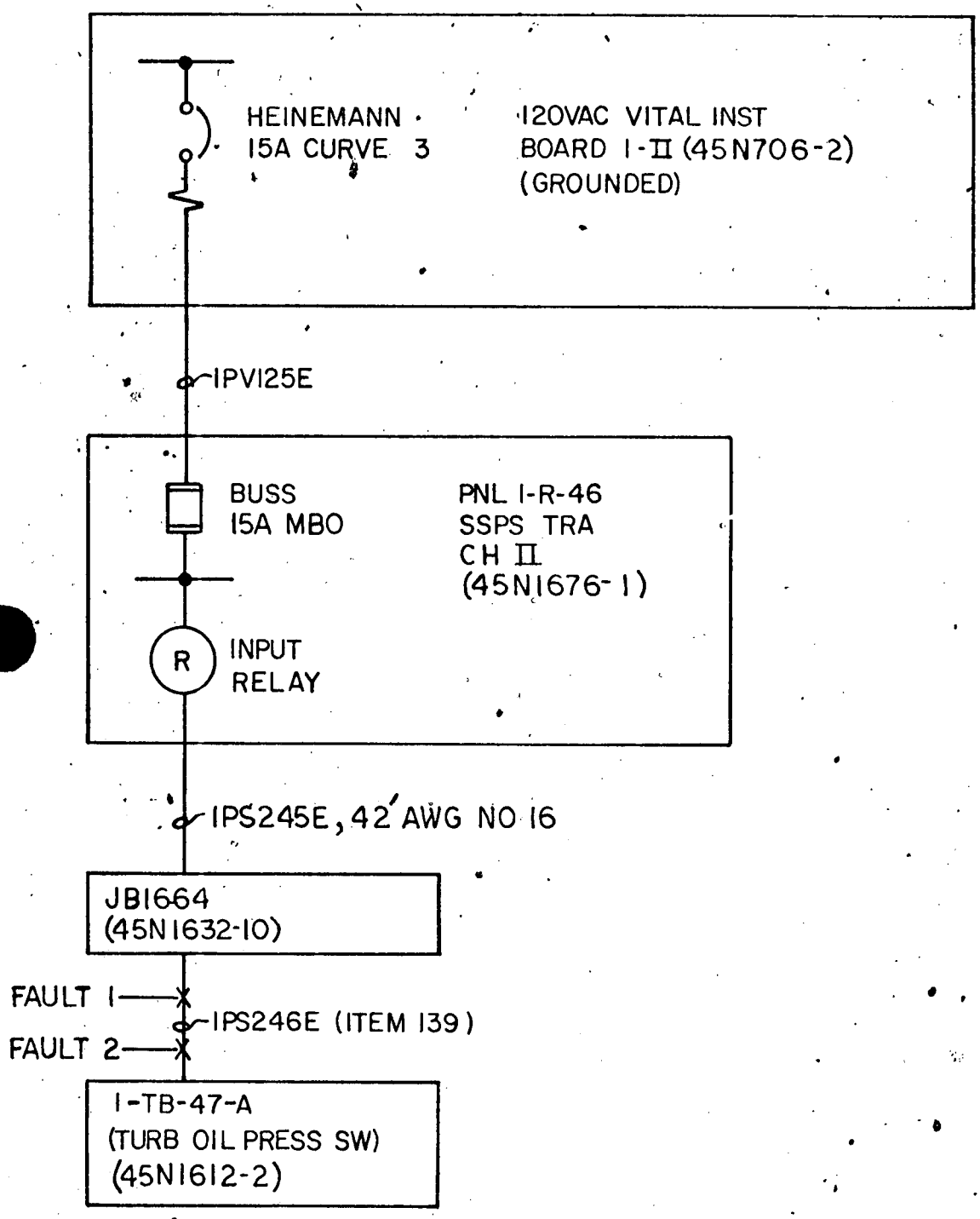


FIGURE C-2-4.1

TYPICAL ASSOCIATED CABLE POWERED FROM 65VDC POWER SUPPLY (UNGROUNDED)

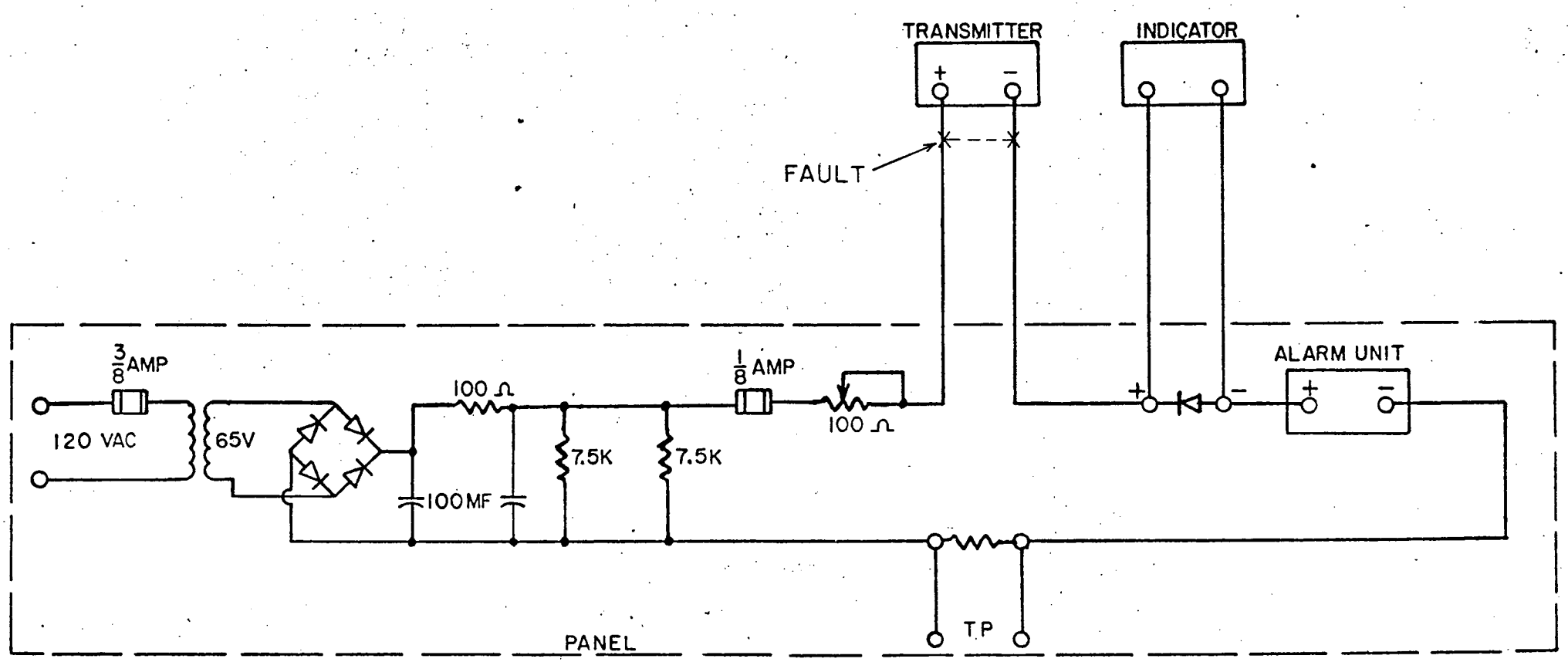


Table C-2-5

One Hundred Seventy Cables Routed Only
In Train A or B Tray Within Category I
Structures

	Train A Tray	Train B Tray
Voltage Level*	No. of Cables	No. of Cables
V5	2	2
V4	42	36
V3	50	38

*Voltage level:

V5 - 6.9 kV medium-voltage power cables
V4 - 480V low-voltage power cables
V3 - control cables

APPENDIX C-3

Identification of Associated Cables

Table C-3 is a listing of the 160 associated cables identified for analysis that have also been tabulated in Tables C-2-1, C-2-2, C-2-3, and C-2-4 according to their routing groupings.

For each cable number in Table C-3, an item number was assigned for cross-reference to Table C-4. Also, Table C-3 gives the origin and destination of each cable and the cable lengths (with identifying sketches for each cable routing) necessary to perform the fault analysis in Appendix C-4.

All information in Table C-3 was obtained from TVA cable schedules and TVA cable tray node diagrams. For example, the exact locatons and length of interaction areas were determined by an analysis of the cable routing of each associated cable in conjunction with the routing of the other 159 associated cables.

TENNESSEE VALLEY AUTHORITY

COMPUTED BY Ralph Swallow 2/8/82 DATE CHECKED 2-13-82 DATE

PROJECT WATTS BAR NUCLEAR PLANT

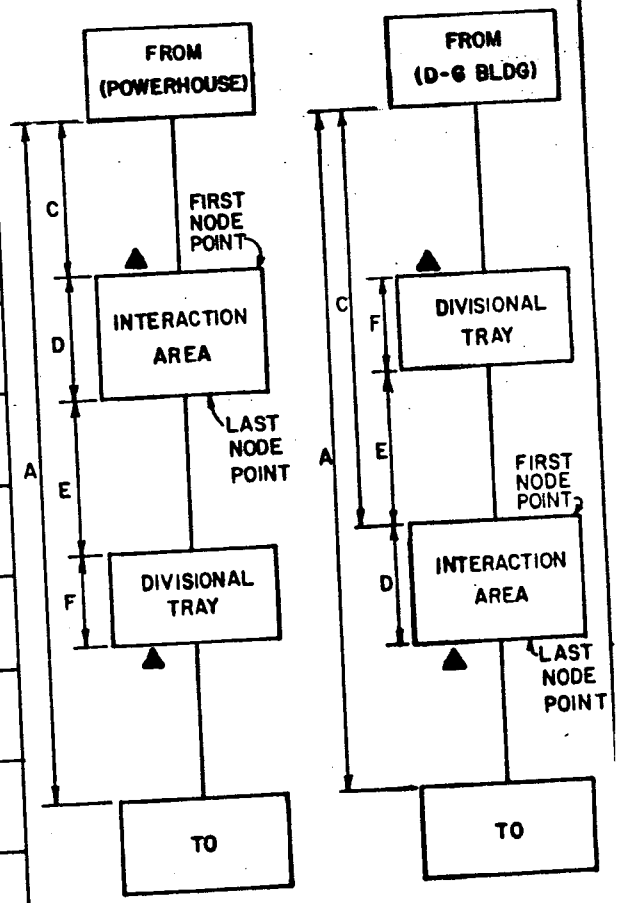
SUBJECT TABLE C-3

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TERMINATION POINTS TO	A (FEET)	B**	C	D	E	F
					DISTANCES (FEET)				
1	FE 500	0-ARB-39-24A D-PGCR/742	*1-BD-235-3-F A11R/757	1245	0	N/A	N/A	N/A	30
2	FE519	*0-ARB-39-24B D-PGCR/742	2-PNL-275-R72 C11P/708	1253	1250	996	44	941	30
3	FE560	*0-ARB-39-23B D-PGCR/742	1-PNL-275-R72 C3P/708	1030	1300	1003	27	957	30
4	FE668	*1-BD-235-4-G A12R/757	0-JB-296-1144 D-PGCR/742	1288	0	N/A	N/A	N/A	15
5	FE688	*0-ARB-39-26B D-PGCR/742	2-PNL-275-R72 C11P/708	1225	1303	N/A	N/A	N/A	30
6	FE 733	*0-ARB-39-25B D-PGCR/742	1-PNL-275-P72 C3P/708	1256	1353	1229 1043	27 74	1163 977	30
7	FE840	*0-JB-292-2032 A8S/737	0-HS-26-247F D-CR/760	1186	410	N/A	N/A	N/A	121
8	FE1441	*0-DPL-13-1 A8T/757	0-PNL-13-L619 D-PGCR/742	1296	135	N/A	N/A	N/A	15
9	FE1446	*0-DPL-13-1 A8T/757	0-PNL-13-L620 D-PGCR/742	1489	135	50 350	51 22	1288 1017	65
10	FE1451	*0-DPL-13-1 A8T/757	0-PNL-13-L621 D-MR2A/760	1554	135	50 350	51 22	1278 1007	130
11	FE1455	* "	0-PNL-13-L622 D-PGCR/742	1489	135	50 350	51 22	1278 1007	65
12	FE1510	* "	0-PNL-13-L619 D-PGCR/742	1311	135	N/A	N/A	N/A	30

*....TERMINATION POINT NEAREST POWER SOURCE.

**..ADDITIONAL DISTANCE FROM TERMINATION POINT TO POWER SOURCE.

▲..POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.



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SUBJECT TABLE C-3 PROJECT WATTS BAR NUCLEAR PLANT

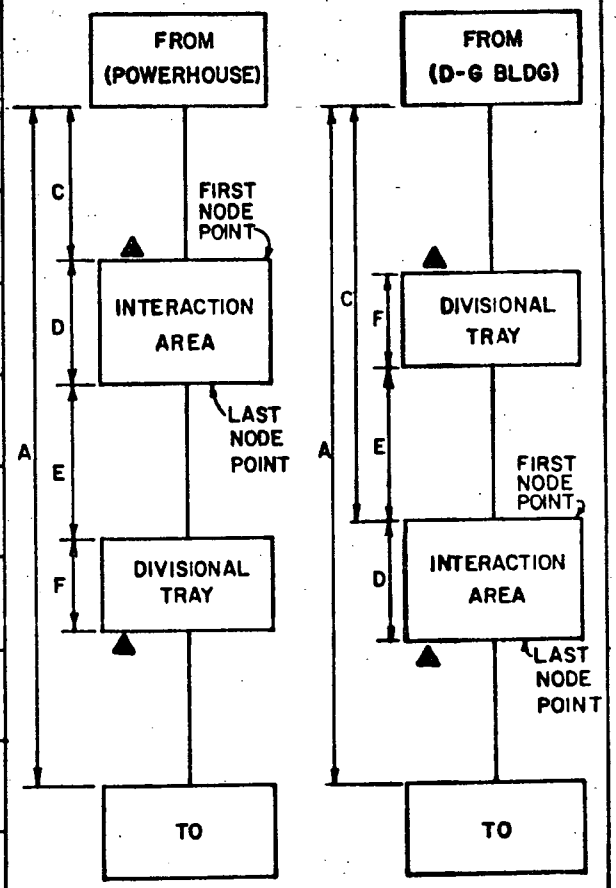
Ralph Swallows 2/13/82 COMPUTED BY DATE [illegible] 2-13-82 CHECKED BY DATE

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	DISTANCES (FEET) B**	C	D	E	F
25	PL2463	*0-JB-296-1336 D-FOTR/742	0-PNL-275-R144 C4P/708	1370	92	1308	16	1202	56
26	PL2482	*0-MCC-218-1/6C T16J/708	0-JB-296-1336 D-FOTR/742	1188	0	N/A	N/A	N/A	43
27	PL2483	*0-JB-296-1336 D-FOTR/742	0-PNL-275-R144 C4Q/708	1370	1188	1308	16	1202	56
28	PLR555	*0-MCC-216-A/6F1 A8S/713	0-DXF-233-22 D-PGCR/742	1215	0	N/A	N/A	N/A	40
29	PP326	*1-PNL-211-A/4-A A5T/757	1-CDPL-82-A/F-A D-BR1A/760	1258	403	203	17	956	74
30	PP446	*2-PNL-211-A/4-A A5S/757	2-CDPL-82-A/F-A D-BR2A/760	1300	403	N/A	N/A	N/A	107
31	PP566	*1-PNL-211-B/4-B A11R/757	1-CDPL-82-B/F-B D-BR1B/760	1202	403	31	51	1039	74
32	PP686	*2-PNL-211-B/4-B A11T/757	2-CDPL-82-B/F-B D-BR2B/760	1134	403	N/A	N/A	N/A	100
33	T1180	*1-JB-292-720 A3S/757	0-JB-296-749 D-PGCR/742	1432	0	194	38	1149	30
34	T1300	*0-JB-292-1485 A14S/757	0-JB-296-1115 D-PGCR/742	1316	0	N/A	N/A	N/A	30
35	T1336	*1-JB-290-1272 C2N/755	1-SPWT-251-2 D-LOSR/763	1467	0	288	10	959	30
36	T1340	*0-JB-292-1490 A2S/757	0-JB-296-1119 D-PGCR/742	1109	0	N/A	N/A	N/A	65

*....TERMINATION POINT NEAREST POWER SOURCE.

**. ADDITIONAL DISTANCE FROM TERMINATION POINT TO POWER SOURCE.

▲.. POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.



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SH 2 OF 6

SUBJECT TABLE C-3 PROJECT WATTS BAR NUCLEAR PLANT

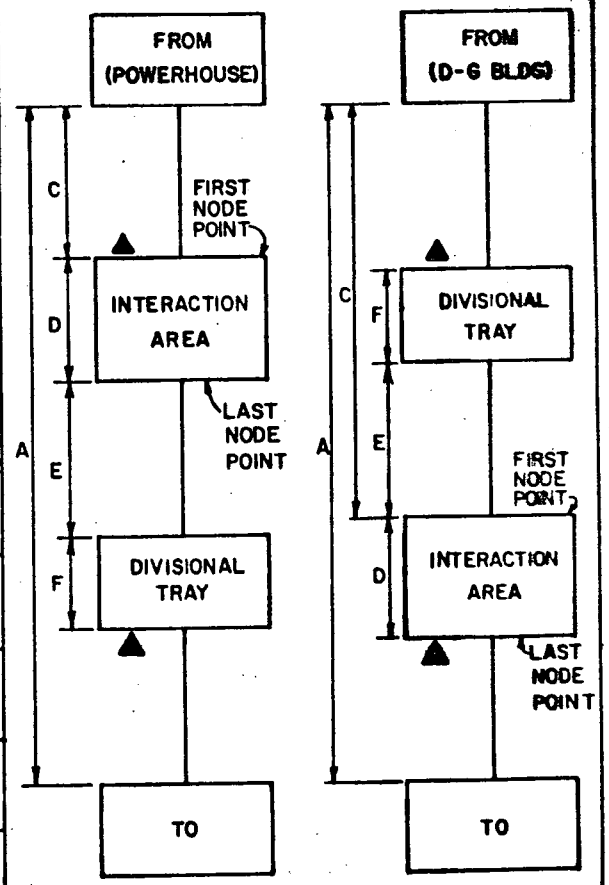
COMPUTED BY Ralph Sullano DATE 2/13/82 CHECKED BY [illegible] DATE 2-13-82

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	DISTANCES (FEET) B**	C	D	E	F
13	LTA940	*0-BAY-259-39 C10Q/692	0-JB-296-191 D-GR1A/742	1275	0	60 228	28 28	1117 949	40
14	LTA941	*0-BAY-259-39 C10Q/692	0-JB-296-191 D-GR1A/742	1236	35	60 228	28 28	1087 919	40
15	LTA944	* "	0-JB-296-193 D-GR1B/742	1264	0	60	28	1096	40
16	LTA945	*0-BAY-259-39 C10Q/692	0-JB-296-193 D-GR1B/742	1254	35	N/A	N/A	N/A	40
17	LTA948	* "	0-JB-296-199 D-PGCR/742	1290	0	60 228	28 28	1117 949	30
18	LTA949	* "	"	1260	35	60 228	28 28	1087 919	30
19	LTA952	* "	0-JB-296-1048 D-BR1B/760	1327	0	N/A	N/A	N/A	122
20	LTA953	* "	"	1317	35	N/A	N/A	N/A	122
21	LTA956	* "	0-JB-296-1047 D-BR2B/760	1300	0	60	59	1046	110
22	LTA957	* "	"	1290	35	60	59	1036	110
23	LTA960	* "	0-JB-296-1051 D-RSR/760	1292	0	60 228	28 28	1073 905	76
24	LTA961	* "	"	1306	35	60 228	28 28	1087 919	76

*....TERMINATION POINT NEAREST POWER SOURCE.

**..ADDITIONAL DISTANCE FROM TERMINATION POINT TO POWER SOURCE.

▲..POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.



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SH4 OF [illegible]

SUBJECT TABLE C-3 PROJECT WATTS BAR NUCLEAR PLANT

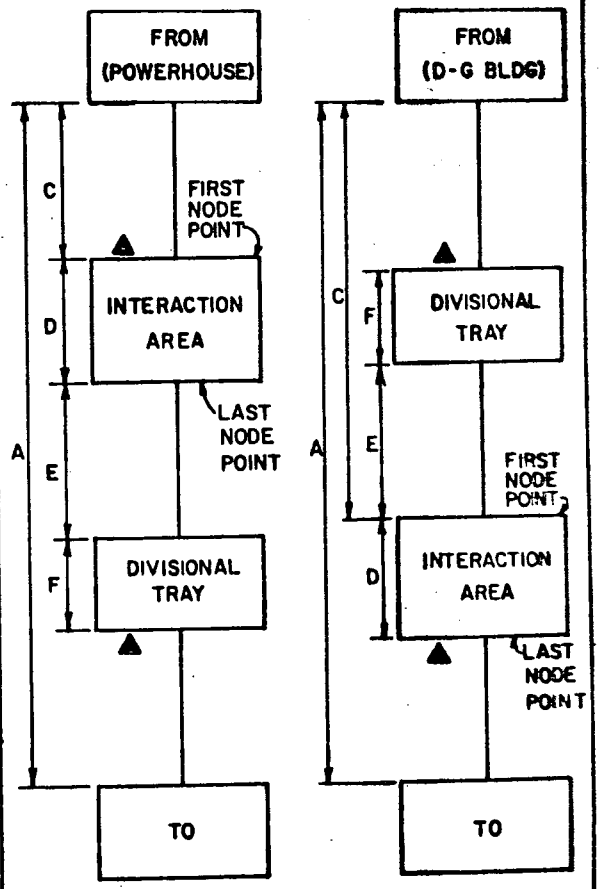
COMPUTED BY [illegible] DATE 2/13/82 CHECKED BY [illegible] DATE 2-13-82

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	DISTANCES (FEET) B**	C	D	E	F
37	T1910	*0-BAY-259-35 C100/692	0-JB-296-260 D-C02R/742	1301	685	25 228	28 28	1117 914	81
38	T1916	* "	0-JB-296-263 D-MR2B/760	1254	685	55	59	1034	91
39	T2360	0-PCS-257-D5 D-C02R/742	*0-CAS-257-1/CAB6 Y-CAS/728	1745	0	1029	431	1594	81
40	T2361	"	*0-SAS-257-1/CAB6 C9P/692	1338	0	1151	84	1202	65
41	T2371	0-PCS-257-D33 D-MR2B/760	*0-CAS-257-1/CAB6 Y-CAS/728	1886	0	1175	431	1780	76
42	T2372	"	*0-SAS-257-1/CAB6 C9P/692	1217	0	1100	56	1075	107
43	T4042	*0-CAS-257-1/CAB7 Y-CAS/728	0-PCS3-257-D15 D-GR2B/742	1887	0	285	374	1001	107
44	T4043	*0-SAS-257-1/CAB7 C9P/692	0-PCS3-257-D15 D-GR2B/742	1432	0	51 144	56 119	1098 942	107
45	T4046	*0-CAS-257-1/CAB7 Y-CAS/728	0-PCS3-257-D16 D-GR1B/742	1831	0	280	374	990	107
46	T4047	*0-SAS-257-1/CAB7 C9P/692	"	1392	0	51 144	56 119	1098 942	107
47	T4050	*0-CAS-257-1/CAB7 Y-CAS/728	0-PCS3-257-D17 D-GR2A/742	1846	0	280	374	990	107
48	T4051	*0-SAS-257-1/CAB7 C9P/692	"	1407	0	51 144	56 119	1098 942	107

*....TERMINATION POINT NEAREST POWER SOURCE.

**. ADDITIONAL DISTANCE FROM TERMINATION POINT TO POWER SOURCE.

▲.. POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.



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SUBJECT TABLE C-3 PROJECT WATTS BAR NUCLEAR PLANT

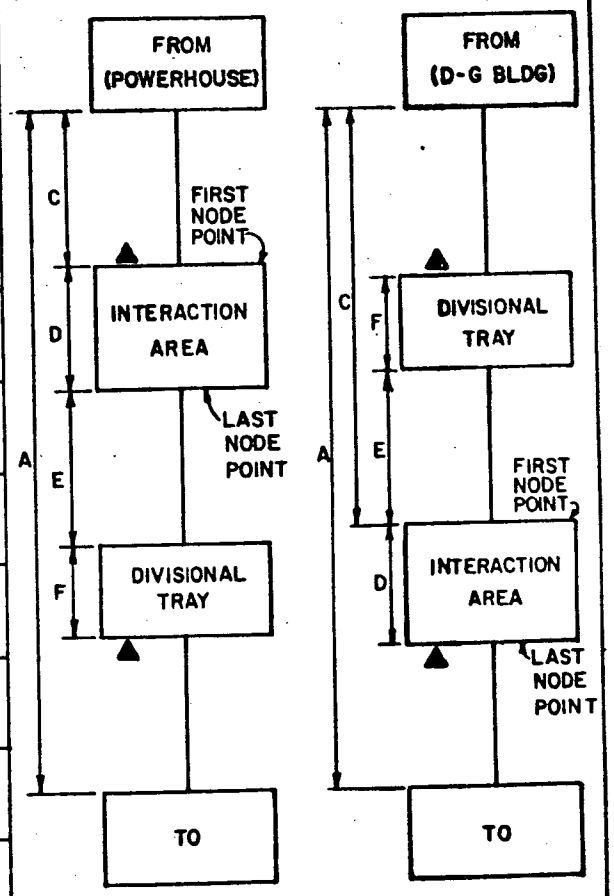
COMPUTED BY Ralph Swallow 2/13/82 DATE CHECKED BY [illegible] 2-13-82 DATE

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	DISTANCES (FEET) B**	C	D	E	F
49	T4054	*0-CAS-257-1/CAB7 Y-CAS/728	0-PCS3-257-D18 D-GRIA/742	1856	0	280	382	982	107
50	T4055	*0-SAS-257-1/CAB7 CGP/692	"	1417	0	51 144	56 119	1098 942	107
51	V1085	0-JB-296-3216 D-PGCR/742	*1-PNL-275-R72 C3P/708	1284	67	1098	17	1032	30
52	1SR1	*1-CMPT-263-A1 A5S/772	1-MCC-215-A1/3A-A D-BRIA/760	1233	123	N/A	N/A	N/A	129
53	1SR10	* "	1-MCC-215-A2/3A-A D-BRIA/760	1221	123	N/A	N/A	N/A	109
54	1SR500	*1-CMPT-263-B1 A8S/772	1-MCC-215-B1/3A-B D-BRIB/760	1493	92	N/A	N/A	N/A	118
55	1SR506	* "	1-MCC-215-B2/3A-B D-BRIB/760	1485	92	N/A	N/A	N/A	110
56	1SR880	*1-CMPT-263-R133 C4P/708	1-MCC-215-A1/2B-A D-BRIA/742	1169	452	11	9	1000	129
57	1SR882	* "	1-MCC-215-A2/2B-A D-BRIA/742	1149	452	11	9	1000	109
58	1SR884	*1-CMPT-263-R134 C4P/708	1-MCC-215-B1/2B-B D-BRIB/742	1319	465	11 62 177	9 68 45	1149 1039 947	130
59	1SR886	* "	1-MCC-215-B2/2B-B D-BRIB/742	1299	465	11 62 177	9 68 45	1149 1039 947	110
60	2SR1	*2-CMPT-263-A1 A8S/772	2-MCC-215-A1/3A-A D-BR2A/760	1309	389	N/A	N/A	N/A	118

*....TERMINATION POINT NEAREST POWER SOURCE.

**..ADDITIONAL DISTANCE FROM TERMINATION POINT TO POWER SOURCE.

▲..POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.



SUBJECT TABLE C-3 PROJECT WATTS BAR NUCLEAR PLANT

Ralph Swallow 2/13/82 COMPUTED BY DATE

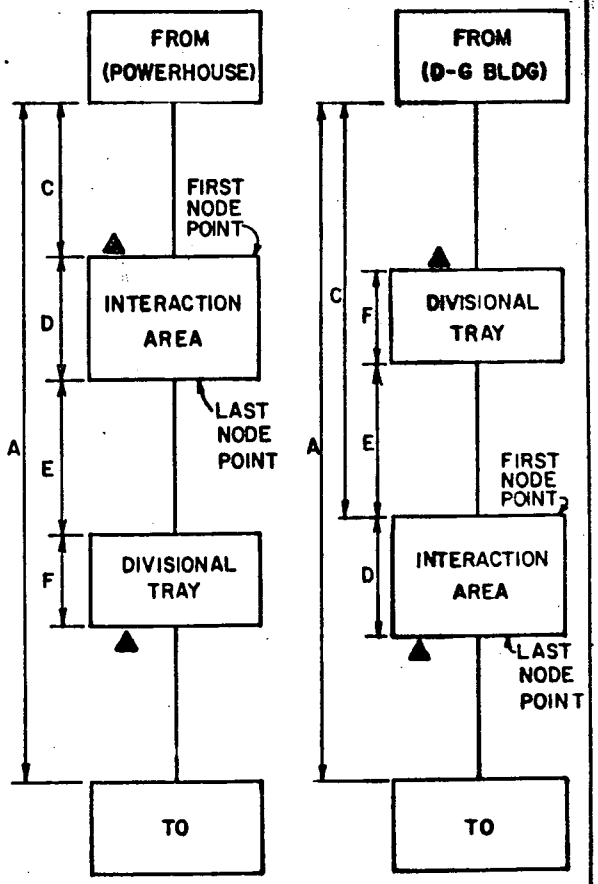
[illegible] 2-13-82 CHECKED BY DATE

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	DISTANCES (FEET) B**	C	D	E	F
61	2SR10	*2-CMPT-263-A1 A8S/772	2-MCC-215-A2/3A-A D-BR2A/760	1312	389	N/A	N/A	N/A	122
62	2SR500	*2-CMPT-263-B1 A11S/772	2-MCC-215-B1/3A-B D-BR2B/760	1328	501	N/A	N/A	N/A	118
63	2SR506	*2-CMPT-263-B1 A11S/772	2-MCC-215-B2/3A-B D-BR2B/760	1320	501	N/A	N/A	N/A	110
64	2SR880	*2-CMPT-263-R133 C10P/708	2-MCC-215-A1/2B-A D-BR2A/760	1322	441	11	87	1098	106
65	2SR882	*2-CMPT-263-R133 C10P/708	2-MCC-215-A2/2B-A D-BR2A/760	1343	441	211	44	946	122
66	2SR884	*2-CMPT-263-R134 C10P/708	2-MCC-215-B1/2B-B D-BR2B/760	1238	370	11	56	1045	106
67	2SR886	*2-CMPT-263-R134 C10P/708	2-MCC-215-B2/2B-B D-BR1B/742	1255	370	11	56	1045	122
68	FE1556	*0-PNL-13-L610 A3V/782	0-PNL-13-L622 D-PGCR/742	1353	690	N/A	N/A	N/A	65

*....TERMINATION POINT NEAREST POWER SOURCE.

**. ADDITIONAL DISTANCE FROM TERMINATION POINT TO POWER SOURCE.

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.



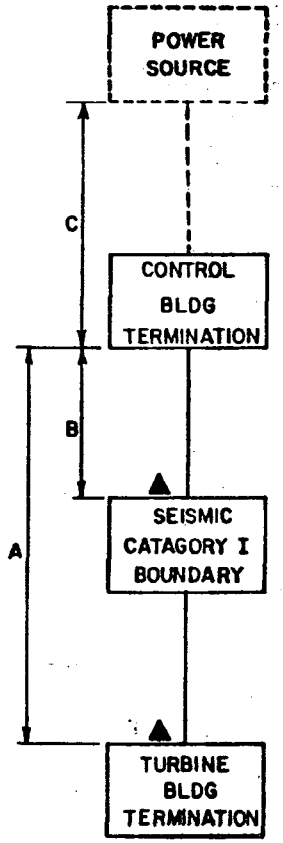
SUBJECT TABLE C-3 PROJECT Watts Bar Nuclear Plant

Ralph Swallows 2/13/82 COMPUTED BY DATE — CHECKED BY 2-13 DATE

▲..POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	B (FEET)	C (FEET)
69	1G227	*1-PNL-275-R71 C3Q/708	1-JB-291-1319 T5J/755	276	156	211
70	1G235	* "	1-JB-291-1500 T4J/755	271	156	432
71	1V7740	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7M/708	277	112	296
72	1V7742	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7M/708	325	120	513
73	1V7751	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7M/708	277	112	296
74	1V7754	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7M/708	325	120	513
75	1V7765	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7M/708	277	112	296
76	1V7768	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7M/708	355	120	513
77	1V7777	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7M/708	277	112	296
78	1V7780	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7H/708	325	120	513
79	1V7815	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7H/708	277	112	296
80	1V7818	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7H/708	325	120	513



TENNESSEE [illegible]EY AUTHORITY

SH 8 OF 16

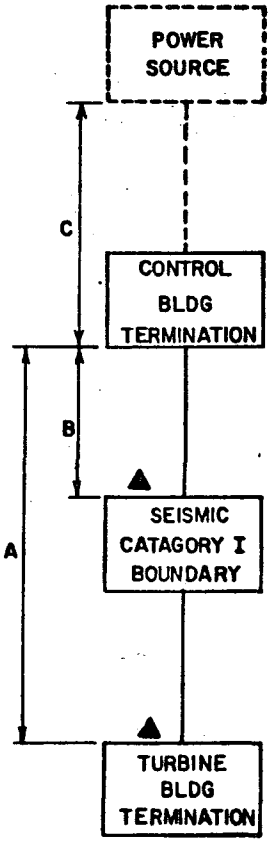
SUBJECT TABLE C-3 PROJECT Watts Bar Nuclear Plant

Ralph Swallows 2/13/82 COMPUTED BY DATE — CHECKED BY DATE 2-17-8

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	B (FEET)	C (FEET)
81	1V7828	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7H/708	287	112	296
82	1V7831	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7H/708	325	120	513
83	1V7840	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7H/708	312	112	296
84	1V7843	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7H/708	325	120	513
85	1V7853	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7H/708	287	112	296
86	1V7856	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7H/708	325	120	513
87	1V7885	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7H/708	287	112	296
88	1V7888	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7H/708	325	120	513
89	1V7898	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7M/708	287	112	296
90	1V7901	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7M/708	325	120	513
91	1V7912	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7H/708	287	112	296
92	1V7916	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7H/708	325	120	513

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.



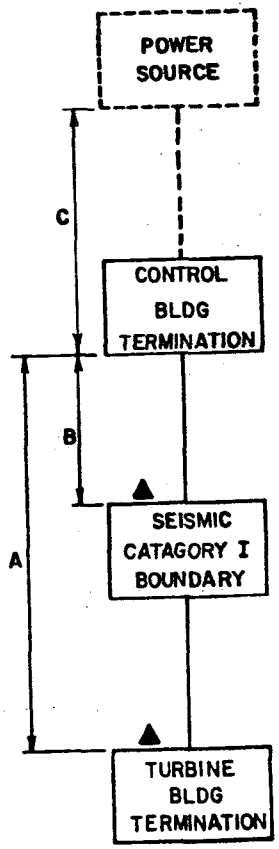
SUBJECT TABLE C-3 PROJECT Watts Bar Nuclear Plant

Ralph Swallows 2/13/82 COMPUTED BY DATE [illegible] 2-13-8 CHECKED BY DATE

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TERMINATION POINTS TO	A (FEET)	B (FEET)	C (FEET)
93	1V7925	*1-PNL-99-R54-A C6P/708	1-JB-291-230 T7H/708	287	112	296
94	1V7928	*1-PNL-99-R55-B C6P/708	1-JB-291-231 T7H/708	325	120	513
95	1SG82	*1-PNL-99-R52-A C6P/708	1-JB-291-1929 T1J/729	308	123	307
96	1SG87	*1-PNL-99-R53-B C6P/708	1-JB-291-1930 T1H/729	331	131	519
97	1SG92	*1-PNL-99-R52-A C6P/708	1-JB-291-1929 T1J/729	308	123	307
98	1SG97	*1-PNL-99-R53-B C6P/708	1-JB-291-1930 T1H/729	331	131	519
99	2SG82	*2-PNL-99-R52-A C8P/708	2-JB-291-1996 T16J/729	313	120	443
100	2SG87	*2-PNL-99-R53-B C8P/708	2-JB-291-1995 T16H/729	325	138	151
101	2SG92	*2-PNL-99-R52-A C8P/708	2-JB-291-1996 T16J/729	313	120	433
102	2SG97	*2-PNL-99-R53-B C8P/708	2-JB-291-1995 T16H/729	325	138	151
103	2G227	*2-PNL-275-R71 C11Q/708	2-JB-291-1321 T13J/755	276	145	221
104	2G235	*2-PNL-275-R71 C11Q/708	2-JB-291-1501 T12J/755	271	145	497



TENNESSEE VALLEY AUTHORITY

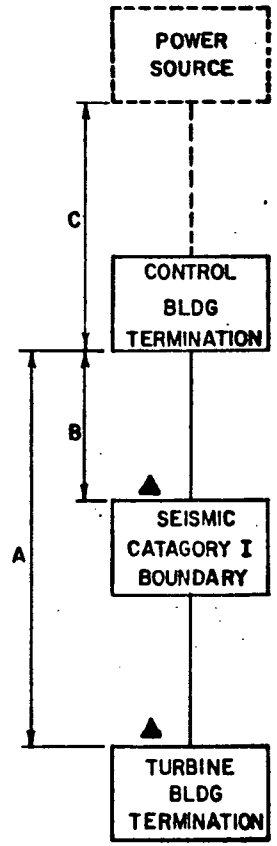
SUBJECT TABLE C-3 PROJECT Watts Bar Nuclear Plant

COMPUTED BY Ralph Swallows DATE 2/13/82 CHECKED BY [illegible] DATE 2-13-82

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TERMINATION POINTS TO	A (FEET)	B (FEET)	C (FEET)
105	2V7740	*2-PNL-99-R54-A C8P/708	2-JB-291-1064 T10H/708	282	108	128
106	2V7742	*2-PNL-99-R55-B C8P/708	2-JB-291-1063 T10H/708	319	126	473
107	2V7751	*2-PNL-99-R54-A C8P/708	2-JB-291-1064 T10H/708	282	108	128
108	2V7754	*2-PNL-99-R55-B C8P/708	2-JB-291-1063 T10H/708	319	126	473
109	2V7765	*2-PNL-99-R54-A C8P/708	2-JB-291-1064 T10H/708	282	108	128
110	2V7768	*2-PNL-99-R55-B C8P/708	2-JB-291-1063 T10H/708	349	126	473
111	2V7777	*2-PNL-99-R54-A C8P/708	2-JB-291-1064 T10H/708	282	108	128
112	2V7780	*2-PNL-99-R55-B C8P/708	2-JB-291-1063 T10H/708	319	126	473
113	2V7815	*2-PNL-99-R54-A C8P/708	2-JB-291-1064 T10H/708	292	108	128
114	2V7818	*2-PNL-99-R55-B C8P/708	2-JB-291-1063 T10H/708	319	126	473
115	2V7828	*2-PNL-99-R54-A C8P/708	2-JB-291-1064 T10H/708	292	108	128
116	2V7831	*2-PNL-99-R55-B C8P/708	2-JB-291-1063 T10H/708	319	126	473

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.



SUBJECT TABLE C-3

PROJECT Watts Bar Nuclear Plant

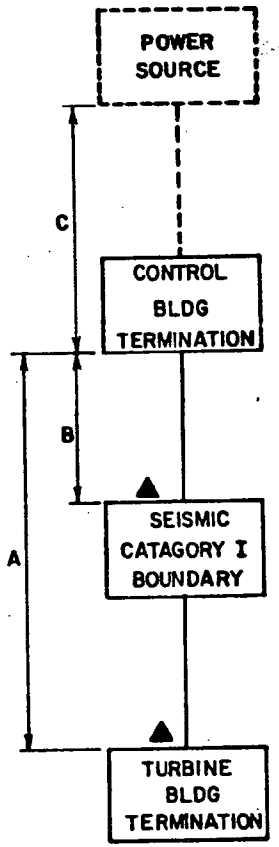
Ralph Swallows 2/13/82 — COMPUTED BY DATE

CHECKED BY DATE 2-13-82

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TERMINATION POINTS TO	A (FEET)	B (FEET)	C (FEET)
117	2V7840	*2-PNL-99-RS4-A C8P/708	2-JB-291-1064 T10H/708	292	108	128
118	2V7843	*2-PNL-99-RS5-B C10P/708	2-JB-291-1063 T10H/708	319	126	473
119	2V7853	*2-PNL-99-RS4-A C8P/708	2-JB-291-1064 T10H/708	292	108	128
120	2V7856	*2-PNL-99-RS5-B C8P/708	2-JB-291-1063 T10H/708	319	126	473
121	2V7885	*2-PNL-99-RS4-A C8P/708	2-JB-291-1064 T10H/708	305	108	128
122	2V7888	*2-PNL-99-RS5-B C8P/708	2-JB-291-1063 T10H/708	319	126	473
123	2V7898	*2-PNL-99-RS4-A C8P/708	2-JB-291-1064 T10H/708	292	108	128
124	2V7901	*2-PNL-99-RS5-B C8P/708	2-JB-291-1063 T10H/708	319	126	473
125	2V7912	*2-PNL-99-RS4-A C8P/708	2-JB-291-1064 T10H/708	292	108	128
126	2V7916	*2-PNL-99-RS5-B C8P/708	2-JB-291-1063 T10H/708	319	126	473
127	2V7925	*2-PNL-99-RS4-A C8P/708	2-JB-291-1064 T10H/708	292	108	128
128	2V7928	*2-PNL-99-RS5-B C8P/708	2-JB-291-1063 T10H/708	319	126	473

▲..POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.



TENNESSEE VA[illegible] AUTHORITY

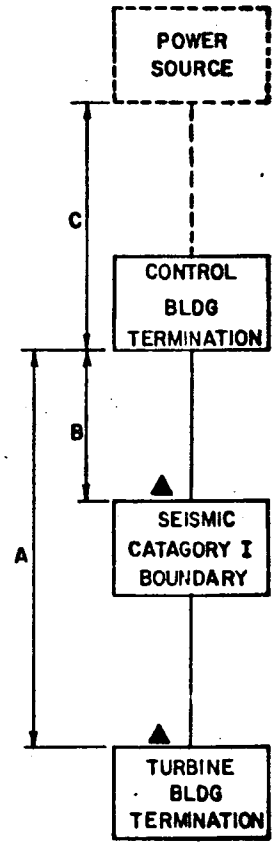
SUBJECT TABLE C-3 PROJECT Watts Bar Nuclear Plant

N.C. Clift 2-13-82 COMPUTED BY DATE — R.R. [illegible] 2-13-82 CHECKED BY DATE

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TERMINATION POINTS TO	A (FEET)	B (FEET)	C (FEET)
129	1PS3D	1-ZS-47-28 T5H/755	1-PNL-99-R46-A C6P/708	185	73	200
130	1PS4D	1-ZS-47-28 T5H/755	*1-PNL-99-R49-B C5P/708	178	67	180
131	1PS23E	1-ZS-47-30 T3J/755	*1-PNL-99-R46-A C6P/708	242	75	145
132	1PS24E	1-ZS-47-30 T3J/755	*1-PNL-99-R49-B C5P/708	236	69	180
133	1PS43F	1-ZS-47-32 T6H/755	*1-PNL-99-R46-A C6P/708	188	76	120
134	1PS44F	1-ZS-47-32 T6H/755	*1-PNL-99-R49-B C5P/708	181	69	160
135	1PS63G	1-ZS-47-34 T3H/755	*1-PNL-99-R46-A C6P/708	245	78'	135
136	1PS64G	1-ZS-47-34 T3H/755	*1-PNL-99-R49-B C5P/708	239	72	130
137	1PS241D	*1-JB-290-1663-D C6N/708	1-TB-47-A T5J/755	203	91	235
138	1PS243D	*1-JB-290-1663-D C6N/708	1-TB-67-A T5J/755	203	91	208
139	1PS246E	*1-JB-290-1664-E C6N/708	1-TB-47-A T5J/755	207	95	187
140	1PS248E	*1-JB-290-1664-E C6N/708	1-TB-47-A T5J/755	207	95	216

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.



TENNESSEE VALLEY AUTHORITY

SH 13 OF 16

SUBJECT TABLE C-3 PROJECT Watts Bar Nuclear Plant

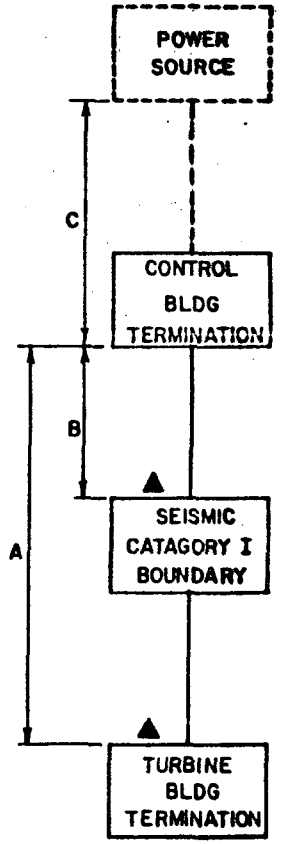
W. S. Clift 2-13-82 COMPUTED BY DATE

[illegible] 2-13-82 CHECKED BY DATE

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	B (FEET)	C (FEET)
141	1PS251F	*1-JB-290-1665-F CGN/708	1-TB-47-A T5J/755	204	87	162
142	1PS253F	*1-JB/290-1665-F CGN/708	1-TB-47-A T5J/755	204	87	191
143	1PM2040E	1-PNL-1-L709-E T6J/729	*1-PNL-99-R8 C5Q/708	239	117	0
144	2PS3D	2-ZS-47-28 T14H/755	*2-PNL-99-R46-A C8P/708	186	84	150
145	2PS4D	2-ZS-47-28 T14H/755	*2-PNL-99-R49-B C9P/708	186	84	135
146	2PS23E	2-ZS-47-30 T11J/755	*2-PNL-99-R46-A C8P/708	243	80	145
147	2PS24E	2-ZS-47-30 T11J/755	*2-PNL-99-R49-B C9P/708	243	80	140
148	2PS43F	2-ZS-47-32 T14H/755	*2-PNL-99-R46-A C8P/708	189	87	170
149	2PS44F	2-ZS-47-32 T14H/755	*2-PNL-99-R49-B C9P/708	189	87	160
150	2PS63G	2-ZS-47-34 T11H/755	*2-PNL-99-R46-A C8P/708	246	84	145
151	2PS64G	2-ZS-47-34 T11H/755	*2-PNL-99-R49-B C9P-708	246	84	135
152	2PS241D	*2-JB-290-1666-D C8N/708	2-TB-47-A T13J/755	184	97	185



TENNESSEE VALLEY AUTHORITY

SH 14 OF 16

SUBJECT TABLE C-3 PROJECT Watts Bar Nuclear Plant

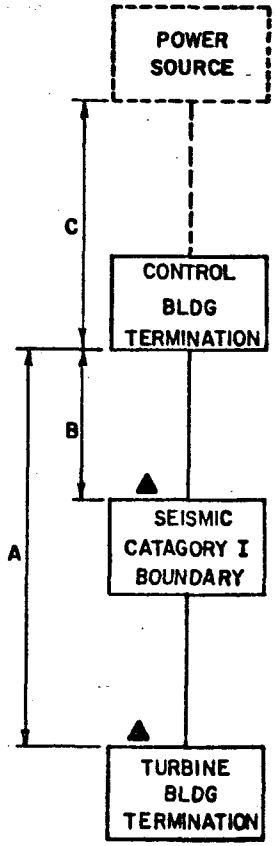
W.E. Cliff 2-13-82 COMPUTED BY DATE

R.R. Rau 2-17-82 CHECKED BY DATE

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	B (FEET)	C (FEET)
153	2PS243D	*2-JB-290-1666-D CBN/708	2-TB-47-A T13J/755	184	97	182
154	2PS246E	*2-JB-290-1669-E CBN/708	2-TB-47-A T13J/755	202	100	198
155	2PS248E	*2-JB-290-1669-E CBN/708	2-TB-47-A T13J/755	202	100	186
156	2PS251F	*2-JB-290-1668-F CBN/708	2-TB-47-A T13J/755	189	97	219
157	2PS253F	*2-JB-290-1668-F CBN/708	2-TB-47-A T13J/755	189	97	191
158	2PM2040E	2-PNL-1-L109-E T11J/729	*2-PNL-99-R8 C9Q/708	209	115	0
159	1G204	*1-PNL-275-R70	1-JB-291-1320	312	170	383
160	2G204	*2-PNL-275-R70	2-JB-291-1322	267	141	266

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.



TENNESSEE VALLEY AUTHORITY

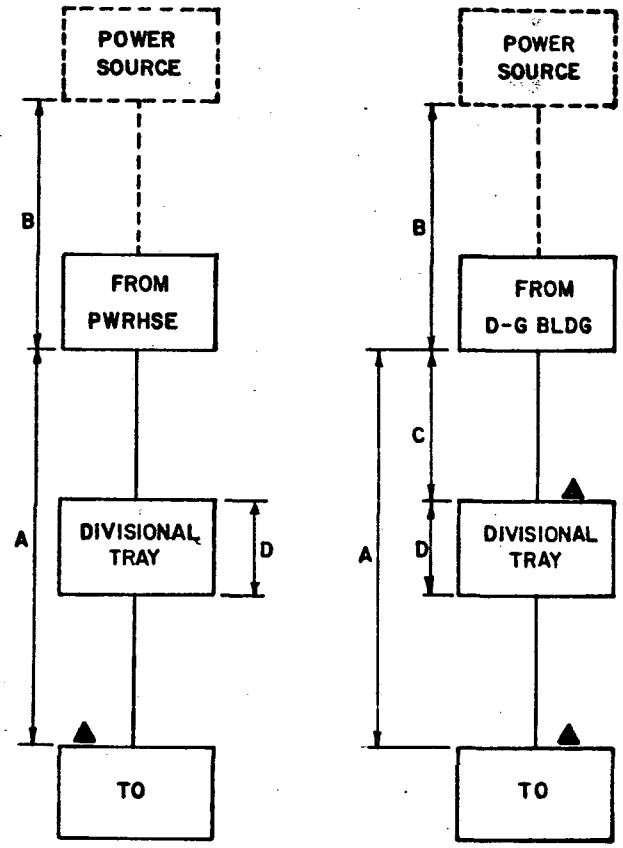
SUBJECT TABLE C-3 PROJECT WATTS BAR NUCLEAR PLANT

Ralph Swallows 2/14/82 COMPUTED BY DATE — Dana Frye 2-14-82 CHECKED BY DATE

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	DISTANCES (FEET) A (FEET)	B	C	D
1	FE500	0-ARB-39-24A D-PGCR/742	*1-BD-235-3-F A11R/757	1245	0	—	30
4	FE668	*1-BD-235-4-G A12R/757	0-JB-296-1144 D-PGCR/742	1288	0	—	15
5	FE688	*0-ARB-39-26B D-PGCR/742	2-PNL-275-R72 C11P/708	1225	1303	—	30
7	FE840	*0-JB-292-2032 A8S/737	0-HS-26-247F D-CR/760	1186	410	—	121
8	FE1441	*0-DPL-13-1 A8T/757	0-PNL-13-L619 D-PGCR/742	1296	135	—	15
12	FE1510	* "	"	1311	135	—	30
16	LTA945	*0-BAY-259-39 C10Q/692	0-JB-296-193 D-GR1B/742	1254	35	—	40
19	LTA952	* "	0-JB-296-1048 D-BR1B/760	1327	0	—	122
20	LTA953	* "	"	1317	35	—	122
26	PL2482	*0-MCC-218-1/6C T16J/708	0-JB-296-1336 D-FOTR/742	1188	0	50	43
28	PLR555	*0-MCC-216-A/6F1 A8S/713	0-DXF-233-22 D-PGCR/742	1215	0	16	40
30	PP446	*2-PNL-211-A/4-A A5S/757	2-CDPL-82-A/F-A D-BR2A/760	1300	403		107

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.



TENNESSEE VALLEY AUTHORITY

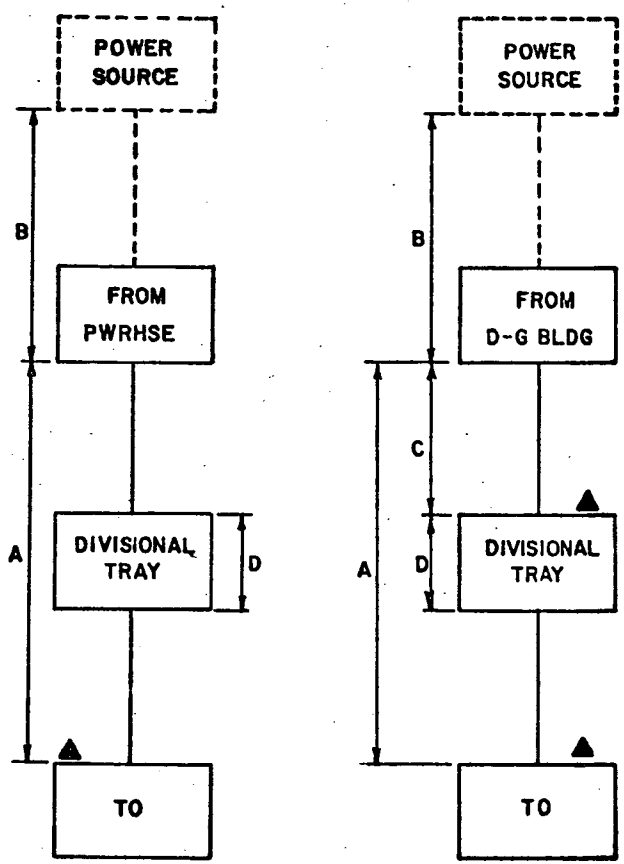
SUBJECT TABLE C-3 PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY Ralph Swallow DATE 2/14/82 CHECKED BY [illegible] DATE 2-16-82

ITEM NO.	CABLE I.D. NO.	TERMINATION POINTS FROM	TO	A (FEET)	DISTANCES (FEET) B	C	D
32	PP686	*2-PNL-211-B/4-B A11T/757	2-CDPL-82-B/F-B D-BR2B/760	1134	403	8	100
34	T1300	*0-JB-292-1485 A14S/757	0-JB-296-1115 D-PGCR/742	1316	0	—	30
36	T1340	*0-JB-292-1490 A2S/757	0-JB-296-1119 D-PGCR/742	1109	0	—	65
52	1SR1	*1-CMPT-263-A1 A5S/772	1-MCC-215-A1/3A-A D-BR1A/760	1233	123	—	129
53	1SR10	* "	1-MCC-215-A2/3A-A D-BR1A/760	1221	123	—	109
54	1SR500	*1-CMPT-263-B1 A8S/772	1-MCC-215-B1/3A-B D-BR1B/760	1493	92	—	118
55	1SR506	* "	1-MCC-215-B2/3A-B D-BR1B/760	1485	92	—	110
60	2SR1	*2-CMPT-263-A1 A8S/772	2-MCC-215-A1/3A-A D-BR2A/760	1309	389	—	118
61	2SR10	*2-CMPT-263-A1 A8S/772	2-MCC-215-A2/3A-A D-BR2A/760	1312	389	—	122
62	2SR500	*2-CMPT-263-B1 A11S/772	2-MCC-215-B1/3A-B D-BR2B/760	1328	501	—	118
63	2SR506	*2-CMPT-263-B1 A11S/772	2-MCC-215-B2/3A-B D-BR2B/760	1320	501	—	110
68	FE1556	*0-PNL-13-L610 A3V/782	0-PNL-13-L622 D-PGCR/742	1353	690	—	65

▲...POINTS WHERE SHORT CIRCUIT CALCULATIONS WERE MADE.

*....TERMINATION POINT NEAREST POWER SOURCE.



Appendix C-4

Fault Anaylsis of Associated Cables

PHC.3

APPENDIX C-4

Fault Analysis of Associated Cables

Purpose

To verify that the electrical faults, caused by the failure of the associated cables, will not compromise the independence of the redundant cable systems.

Method of Analysis

For each associated cable identified in Tables C-2-1, 2, 3, and 4 (Appendix C-2), an equivalent electrical model (block diagram form) was developed from TVA schematic and connection diagrams identifying the circuit power source, applicable protective devices, and intermediate cables, if any, from power source to origin of associated cable. Conductor sizes and cable lengths were obtained from appropriate cable routing schedules.

Assuming a conductor-to-conductor fault for ungrounded systems and a conductor-to-ground fault for grounded systems, the fault current was calculated as the ratio of power source voltage to the sum of cable resistances from power source to the point of fault. Mathematically,

$$I_{SC} = \frac{V_{source}}{\sum R_{cables}}$$

Calculations of this nature were performed at appropriate fault locations, as identified below. In this manner, minimum and maximum fault currents were determined for each circuit; i.e., worst case fault conditions were ascertained.

For each value of fault current computed, a protective device clearing time was determined from manufacturer's time-current curves. The fault condition thermal energy (I^2 t) was calculated and was compared to the associated cable rated I^2t. (A sample calculation appears in Fig. C-4.) Results of these calculations were compiled and appear in Table C-4.

Choice of Fault Location

The associated cable analysis was divided into four major categories (Tables C-2-1, 2, 3, and 4, Appendix C-2) based upon the nature of cable routing. Each major grouping was then subdivided based upon the circuit power source voltage level, with the results tabulated as indicated below. Further, a typical equivalent circuit for each subgrouping was developed and appears in the respective figure indicated.

APPENDIX C-4

Fault Analysis of Associated Circuits (continued)

Grouping (Appendix C-2)	Subgrouping	Equivalent Circuit
Table C-2-1	Tables C-2-1.1,2,3, and 4	Figures C-2-1.1,2,3, and 4
Table C-2-2	Tables C-2-2.1,2,3, and 4	Figures C-2-2.1,2,3, and 4
Table C-2-3	Tables C-2-3.1 and 2	Figures C-2-3.1 and 2
Table C-2-4	Table C-2-4.1	Figure C-2-4.1

The choice of fault locations for each of the above groupings follows:

a) Table C-2-1

This grouping is comprised of associated cables routed in voltage level V3 Train A or B cable trays with two or more cables subsequently routed in a common segment(s) of a nondivisional cable tray. Of concern is the potential, during fault conditions, for destructive cable interaction in the nondivisional cable tray, thus allowing an individual associated cable fault to propagate into cable trays of both divisions. Since the prerequisite for this condition is the close proximity of both Train A And B associated cables, the prime area of interest is the nondivisional cable tray interaction area. Thus, fault locations were chosen in such a manner as to totally encompass the nondivisional cable tray. The first fault was postulated at the entry point of the associated cable into the train cable tray while the second fault was imposed at the exit of the associated cable from the nondivisional cable tray. Since these fault locations do encompass the associated cable interaction area, the fault currents and protective device clearing times calculated represent boundary values; i.e., all values of fault current and clearing time for the interaction area fall between the limits computed (See sketches on page 1, Table C-3 of Appendix C-3).

b. Table C-2-2

This grouping is comprised of associated cables routed in Train A or B cable trays with subsequent routing in different segment(s) of a nondivisional cable tray. Of concern is the potential for damage to divisional cables due to the presence in the divisional cable tray of a faulted associated cable. The only fault offering the possibility of such damage is one on the associated cable at its exit from the divisional cable tray. Since this point is only minimally removed from the load termination of the associated cable, negligible error is introduced by imposing the fault at the load itself. (See Table C-3 of sketches on page 15, Appendix C-3).

APPENDIX C-4

Fault Analysis of Associated Circuits (continued)

c. Table C-2-3

This grouping is comprised of associated cables routed in voltage level V3 Train A or B cable trays in the Control Building (seismic area) with subsequent routing in conduit by divisional grouping in the Turbine Building (nonseismic area). Of concern is the potential for damage to divisional cables due to the presence in the divisional tray of a faulted associated cable. The faults of interest for this grouping are those resulting from a seismic event and are thus imposed at the seismic Category I boundary (Turbine Building/Control Building interface) and at the Turbine Building cable termination point. See sketches on page 7, Table C-3 of Appendix C-3).

d. Table C-2-4

This grouping is comprised of associated cables routed in voltage level V2 Channel D, E, F, or G cable trays in the Control Building (seismic area) with subsequent routing in divisional conduit in the Turbine Building (nonseismic area). Fault locations were chosen per section c, above.

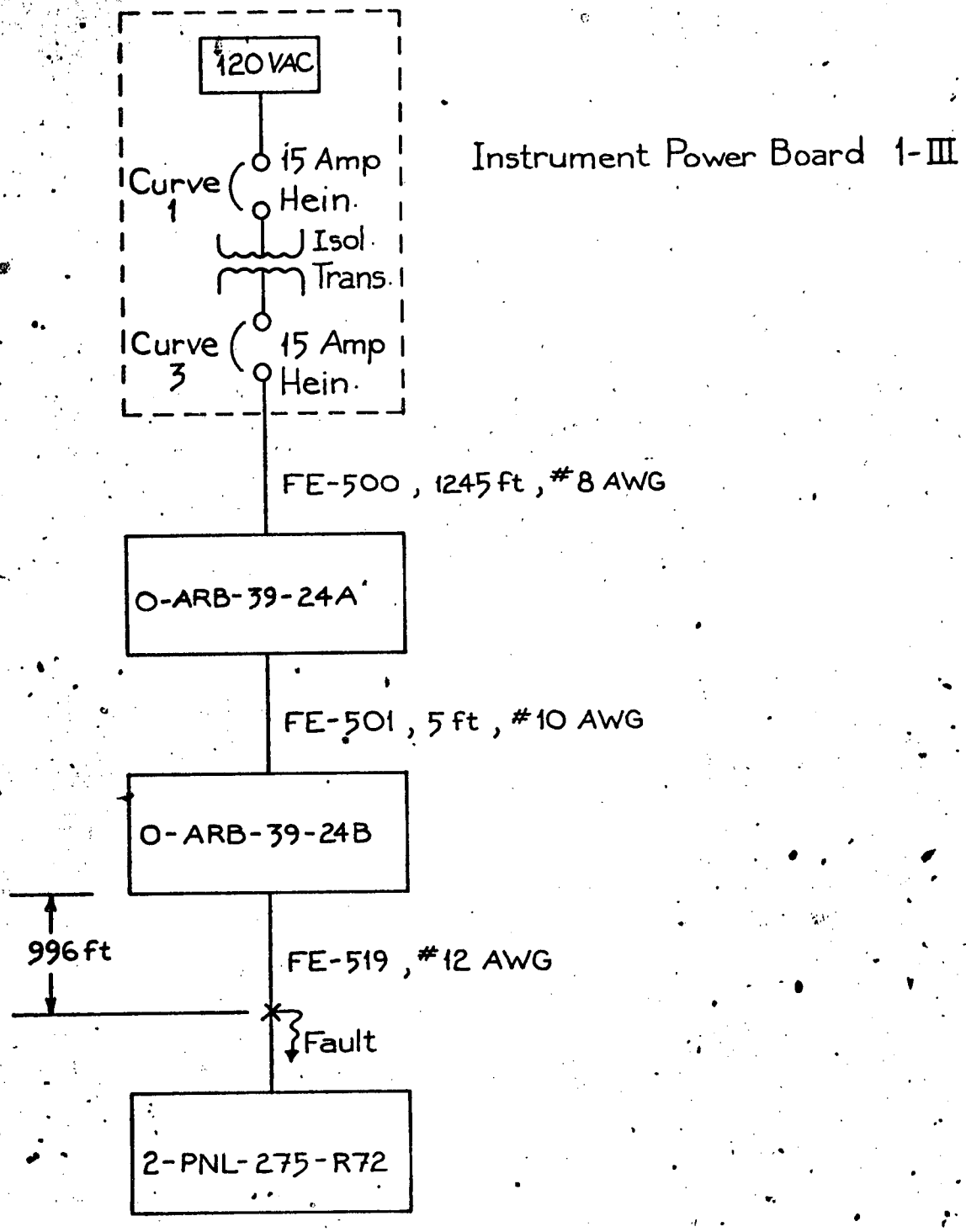
Conclusion

The results of this analysis demonstrate that electrical faults, caused by the failure of the associated cables, will not compromise the independence of the redundant cable systems. This was determined by verifying the cable's associated protective device will clear the imposed fault condition (in an acceptable time period) without exceeding the I^2t rating for this cable. For cables 128-142 and 144-157 (ID Nos.) a protection device modification has been identified in the Remarks column on Table C-4. This modification is required for improved plant operation and not dictated by this analysis.

SUBJECT Associated Cable Analysis: Sample Calculation PROJECT WBN

COMPUTED BY DATE CHECKED BY DATE

FIGURE C-4



SUBJECT Associated Cable Analysis: Sample Calculation PROJECT WBN

COMPUTED BY DATE CHECKED BY DATE

a. Cable FE-500

$R = (\text{Length})(2)(\Omega/\text{ft})$

$\therefore R = (1245\ \text{ft})(2)(0.659 \times 10^{-3}\ \Omega/\text{ft})$

$= 1.6409\ \Omega$

b. Cable FE-501

$R = (\text{Length})(2)(\Omega/\text{ft})$

$\therefore R = (5\ \text{ft})(2)(1.06 \times 10^{-3}\ \Omega/\text{ft})$

$= 1.06 \times 10^{-2}\ \Omega$

c. Cable FE-519

$R = (\text{Distance to Fault})(2)(\Omega/\text{ft})$

$\therefore R = (996\ \text{ft})(2)(1.68 \times 10^{-3}\ \Omega/\text{ft})$

$= 3.3466\ \Omega$

d. Σ Resistances $= 4.9886\ \Omega$

$I_{SC} = \text{Volts}/\Sigma\ \text{Resistances}$

$= 120\ \text{Volts}/4.9886\ \Omega$

$= 24.0548\ \text{Amps}$

From the appropriate breaker time-current curve, the clearing time, t_c, for the given I_{SC} is

$t_c = 0.9$ seconds

Thus,

$I_{SC}^2 t_c = (24.0548\ \text{Amps})^2 (0.9\ \text{seconds})$

$= 0.00052 \times 10^6$

TABLE C-4

FAULT ANALYSIS
OF
ASSOCIATED CABLES

TABLE C-4

TENNESSEE VALLEY AUTHORITY

Don Wright CST

Gene Tuga 2-13-82

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
1	WDD-1 (PXJ)	8	2-1C	1.41	DG rm 2A-A CO2 fire protection	Vital 1-III	120 ac	Bkr Hein curve 3	15	0.1	73.1	.000534	50	--	Fig. C-2-2.1A
2	WGG (PJJ)	12	1-7C	.12	DG rm 2A-A CO2 fire protection	Vital 1-III	120 ac	Bkr Hein curve 3	15	0.11 1.5	68.9 23.2	.000478 .000807	22	--	Fig. C-2-1.1B
3	WGG (PJJ)	12	1-7C	.12	DG rm 1A-A CO2 fire protection	Vital 1-III	120 ac	Bkr Hein curve 3	15	0.1 1.5	66.0 22.9	.000453 .000786	22	--	Fig. C-2-1.1B
4	WDD-1 (PXJ)	8	2-1C	1.41.	DG rm 2B-B CO2 fire protection	Vital 1-IV	120 ac	Bkr Hein curve 3	15	0.11	70.6	.000548	50	--	Fig. C-2-2.1A
5	WGG (PJJ)	12	1-7C	.12	DG rm 2B-B CO2 fire protection	Vital 1-IV	120 ac	Bkr Hein curve 3	15	1.2	20.5	.000504	22	--	Fig. C-2-2.1A
6	WGG (PJJ)	12	1-7C	.12	DG rm 1B-B CO2 fire protection	Vital 1-IV	120 ac	Bkr Hein curve 3	15	0.11 3.0	61.1 19.7	.000410 .001164	22	--	Fig. C-2-1.1B
7	WGB-1 (PXMJ)	12	1-2C	.221	Fire pump start ckt	Inst pwr 1-B	120 ac	Fuse Buss KAZ	6	0.17	22.4	.000085	27.3	--	Fig. C-2-1.1A

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Don Wright COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT)AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
8	WDD-1 (PXJ)	8	2-1C	1.41	120 vac sup	DPL-13-1 fire pro dist pnl	120 ac	W EHB bkr	15	2.0	139	.038	50	--	Fig. C-2-2.1A
9	WDD-1 (PXJ)	8	2-1C	1.41	120 vac sup sup	DPL-13-1 fire pro dist pnl	120 ac	W EHB bkr	15	0.02 2.4	2996 124	.179 .037	50	--	Fig. C-2-1.1A
10	WDD-1 (PXJ)	8	2-1C	1.41	120 vac sup	DPL-13-1 fire pro dist pnl	120 ac	W EHB bkr	15	0.02 2.5	2996 119	.179 .035	50	--	Fig. C-2-1.1A
11	WDD-1 (PXJ)	8	2-1C	1.41	120 vac sup	DPL-13-1 fire pro dist pnl	120 ac	W EHB bkr	15	.02 2.4	2996 125	.179 .037	50	--	Fig. C-2-1.1A
12	WFB (PJJ)	10	1-2C	.302	120 alm sup	DPL-13-1 fire pro dist pnl	120 ac	W EHB bkr	15	4.5	86	.033	30.8	--	Fig. C-2-2.1B
13	WVA (XLPE)	16	1-2C	0.0458	CAP 0-CSPR -252-84	*	*	*	*	*	*	*	16.4	Low level signal cable, no s.c.	Fig. C-2-1.4
14	WTO-2 (XLPE)	16	1-2C	0.0458	CAP 0-CSPR -252-84	Comm rm Bay 39 dist pnl	24 dc	Fuse Buss GMT	1	.01 .08	80.8 4.6	.000065 .000002	16.4	--	Fig. C-2-1.2
15	WVA (XLPE)	16	1-2C	0.0458	CAP 0-CSPR -252-93	*	*	*	*	*	*	*	16.4	See remark on item 13	Fig. C-2-1.4

*Not applicable. Refer to Remarks.

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Don Wright CCO / Dana Fuse COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT)AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
16	WTO-2 (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-93	Comm rm Bay 39 dist pnl	24 dc	Fuse Buss GMT	1	.085	4.4	.000002	16.4	--	Fig. C-2-2.2
17	WVA (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-91	*	*	*	*	*	*	*	16.4	See remark on item 13	Fig. C-2-1.4
18	WTO-2 (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-91	Comm rm Bay 39 dist pnl	24 dc	Fuse Buss GMT	1	.01 .08	80.8 4.6	.000065 .000002	16.4	--	Fig. C-2-1.2
19	WVA (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-88	*	*	*	*	*	*	*	16.4	See remark on item 13	Fig. C-2-2.3
20	WTO-2 (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-88	Comm rm Bay 39 dist pnl	24 dc	Fuse Buss GMT	1	.09	4.2	.000002	16.4	--	Fig. C-2-2.2
21	WVA (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-86	*	*	*	*	*	*	*	16.4	See remark on item 13	Fig. C-2-1.4
22	WTO-2 (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-86	Comm rm Bay 39 dist pnl	24 dc	Fuse Buss GMT	1	.01 .085	80.8 4.4	.000065 .000002	16.4	--	Fig. C-2-1.2
23	WVA (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-85	*	*	*	*	*	*	*	16.4	See remark on item 13	Fig. C-2-1.4

*Not applicable. Refer to Remarks.

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

D.D. WRIGHT / GENE FRYE /MP COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
24	WTO-2 (XLPE)	16	1-2C	0.0458	CAP O-CSPR -252-85	Comm rm Bay 39 dist pnl	24 dc	Fuse Buss GMT	1	.01 .085	80.8 4.4	.000065 .000002	16.4	--	Fig. C-2-1.2
25	WGE (PJJ)	12	1-5C	.12	DGB fuel oil trans pump cont	Diesel aux BD 2B2-B aux pwr xfmr	120 ac	Fuse Chase Shawmut TRM	1.0	.015 .025	33* 24.2	.000017* .000014	22	*Power supply limits to 33 amps, max. Isc & I^2t per this value	Fig. C-2-1.1A
26	WGB-1 (PXMJ)	12	1-2C	.221	Yard fuel oil trans pump cont	Diesel aux BD 2B2-B aux pwr xfmr	120 ac	Fuse Chase Shawmut TRM	1.0	.015 .045	33* 18.8	.000017* .000016	22	*Power supply limits to 33 amps, max. Isc & I^2T per this value	Fig. C-2-2.1B
27	WGE (PJJ)	12	1-5C	.12	Yard fuel oil trans pump cont	Diesel aux BD 2B2-B aux pwr xfmr	120 ac	Fuse Chase Shawmut TRM	1.6	.017 .083	28.8 14.2	.000014 .000017	22	--	Fig. C-2-1.1A
28	WFA-4 (PXMJ)	8	1-3C	1.41	Ltg Cab 22 xfmr sup	Fuel & waste handling Bd A	480 ac	Bkr ITE EF	30	1.5	266.8	.10677	50	--	Fig. C-2-2.4
29	WHB (PJJ)	14	1-2C	.0473	DG 1A-A com start rel ckt	Vital 1-III	120 ac	Fuse Buss KAZ	6	.14 .021	25.6 63.9	.000092 .000085	17.6	--	Fig. C-2-1.1A

*Not applicable. Refer to Remarks.

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

D.D. WRIGHT / GENE FRYE/MP 2-13-82 COMPUTED BY DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
30	WHB (PJJ)	14	1-2C	.0473	DG 2A-A com start rel ckt	Vital 1-III	120 ac	Fuse Buss KAZ	6	.13	24.9	.000081	17.6	--	Fig. C-2-2.1B
31	WHB (PJJ)	14	1-2C	.0473	DG 1B-B com start rel ckt	Vital 1-III	120 ac	Fuse Buss KAZ	6	.017 .12	84.7 26.4	.000122 .000084	17.6	--	Fig. C-2-1.1A
32	WHB (PJJ)	14	1-2C	.0473	DG 2B-B com start rel ckt	Vital 1-III	120 ac	Fuse Buss KAZ	6	.14	27.4	.000105	17.6	--	Fig. C-2-2.1B
33	WTD (PE)	19	1-12P	.0647	Telephone system	*	*	*	*	*	*	*	4	Sound powered communication circuit - No Isc	*
34	WVG (XLPE)	16	2-12C	.0458	Primary system	*	*	*	*	*	*	*	16.4	Sound powered communication circuit - No Isc	*
35	WTO (PE)	18	2-1P	.0102	SP Tel DGB	*	*	*	*	*	*	*	12.7	Sound powered communication circuit - No Isc	*
36	WVG (XLPE)	16	2-12C	.0458	Alternate system	*	*	*	*	*	*	*	16.4	Sound powered communication circuit No Isc	*

*Not applicable. Refer to Remarks.

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

R. L. LEE
GENE FRYE/MP 2-13-82
COMPUTED BY DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
37	WHB-1 (PXMJ)	14	1-2C	.0874	Door D5 xfmr sup	Instr pwr pnl 1A	120 ac	Buss AGC fuse	1	0.01 0.01	333.8 32.9	.001114 .000011	22.8	--	Fig. C-2-1.1A
38	WHB (PJJ)	14	1-2C	.0473	Door D33 xfmr sup	Instr pwr pnl 1A	120 ac	Buss AGC fuse	1	0.01 0.01	272.7 33.2	.00074 .000011	17.6	--	Fig. C-2-1.1A
39	WTG-1 (PE)	19	1-3P	.00647	CAS cont door D5	Central alarm cabinet	6 VDC	Buss AGC fuse	1	* *	0.7 0.2	* *	4	See remark on item No. 2	Fig. C-2-1.3
40	WTG-1 (PE)	19	1-3P	.00647	SAS cont door D5	Central alarm cabinet	6 VDC	Buss AGC fuse	1	* *	0.6 0.2	* *	4	See remark on item No. 2	Fig. C-2-1.3
41	WTG-1 (PE)	19	1-3P	.00647	CAS cont door D33	Central alarm cabinet	6 VDC	Buss AGC fuse	1	* *	0.6 0.2	* *	4	See remark on item No. 2	Fig. C-2-1.3
42	WTG-1 (PE)	19	1-3P	.00647	SAS cont door D33	Central alarm cabinet	6 VDC	Buss AGC fuse	1	* *	0.6 0.3	* *	4	See remark on item No. 2	Fig. C-2-1.3

*Not applicable. Refer to Remarks.

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

R. L. LEE / GENE FRYE COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT)AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
43	WTG-1 (PE)	19	1-3P	.00647	Door D15 status	Central alarm cabinet	6 DC	Buss AGC fuse	1	0.35 *	2.6 0.4	.0000023 *	4	See remark on item No. 2	Fig. C-2-1.3
44	WTG-1 (PE)	19	1-3P	.00647	Door D15 status	Central alarm cabinet	6 DC	Buss AGC fuse	1	0.01 *	14.6 0.5	.0000021 *	4	See remark on item No. 2	Fig. C-2-1.3
45	WTG-1 (PE)	19	1-3P	.00647	Door D16 status	Central alarm cabinet	6 DC	Buss AGC fuse	1	0.35 *	2.6 0.4	.0000023 *	4	See remark on item No. 2	Fig. C-2-1.3
46	WTG-1 (PE)	19	1-3P	.00647	Door D16 status	Central alarm cabinet	6 DC	Buss AGC fuse	1	0.01 *	14.6 0.5	.0000021 *	4	See remark on item No. 2	Fig. C-2-1.3
47	WTG-1 (PE)	19	1-3P	.00647	Door D17 status	Central alarm cabinet	6 DC	Buss AGC fuse	1	0.35 *	2.6 0.4	.0000023 *	4	See remark on item No. 2	Fig. C-2-1.3
48	WTG-1 (PE)	19	1-3P	.00647	Door D17 status	Central alarm cabinet	6 DC	Buss AGC fuse	1	0.01 *	14.1 *	.0000021 *	4	See remark on item No. 2	Fig. C-2-1.3

*Not applicable. Refer to Remarks.

ABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

R.L. LELE / GENE FRYE/MP COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT)AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
49	WTG-1 (PE)	19	1-3P	.00647	Door D18 status	Central alarm station cabinet	6 DC	Fuse Buss AGC	1	0.35 *	2.6 0.4	.0000023 *	4	See remark on item No. 2	Fig. C-2-1.3
50	WTG-1 (PE)	19	1-3P	.00647	Door D18 status	Central alarm station cabinet	6 DC	Fuse Buss AGC	1	0.01 *	14.6 0.5	.0000021 *	4	See remark on item No. 2	Fig. C-2-1.3
51	WHD (PJJ)	14	1-4C	.0473	DG corridor wtr spray cont	Inst pwr 1B	120 ac	Fuse Buss KAZ	6	0.012 0.3	94.8 17.0	.000107 .000086	17.6	--	Fig. C-2-1.1A
52	WHC (PJJ)	14	1-3C	.0473	Power off FCV-67-66-A	Inst pwr 1A	120 ac	Fuse Buss AGC	1	0.015	13.2	.0000026	17.6	--	Fig. C-2-2-1B
53	WHC (PJJ)	14	1-3C	.0473	Power off FCV-67-68-A	Inst pwr 1A	120 ac	Fuse Buss AGC	1	0.015	13.3	.0000026	17.6	--	Fig. C-2-2.1B
54	WHC (PJJ)	14	1-3C	.0473	Power off FCV-67-67-B	Inst pwr 1B	120 ac	Fuse Buss AGC	1	0.017	11.0	.000002	17.6	--	Fig. C-2-2-1B

*Not applicable. Refer to Remarks.

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

R.L. LELE / GENE FRYE/MP COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT)AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
55	WHC (PJJ)	14	1-3C	.0473	Power off FCV-67-65-B	Inst pwr 1B	120 ac	Fuse Buss AGC	1	0.017	11.0	.000002	17.6	--	Fig. C-2-2.1B
56	WHB-1 (PXMJ)	14	1-2C	.0874	HS-30-447C P-Auto	Inst pwr 1A	120 ac	Fuse Buss AGC	1	0.01 0.011	190.0 13.5	.000361 .000002	22.8	--	Fig. C-2-1.1A
57	WHB-1 (PXMJ)	14	1-2C	.0874	HS-30-451C P-Auto	Inst pwr 1A	120 ac	Fuse Buss AGC	1	0.01 0.011	190.0 13.7	.000361 .000002	22.8	--	Fig. C-2-1.1A
58	WHB-1 (PXMJ)	14	1-2C	.0874	HS-30-449C P-Auto	Inst pwr 1B	120 ac	Fuse Buss AGC	1	0.01 0.015	187.0 12.0	.000349 .0000021	22.8	--	Fig. C-2-1.1A
59	WHB-1 (PXMJ)	14	1-2C	.0874	HS-30-453C P-Auto	Inst pwr 1B	120 ac	Fuse Buss AGC	1	0.01 0.015	187.0 12.2	.000349 .0000021	22.8	--	Fig. C-2-1.1A
60	WHC (PJJ)	14	1-3C	.0473	Pwr off FCV-67-66-A	Inst pwr 2A	120 ac	Fuse Buss AGC	1	0.015	12.0	.0000021	17.6	--	Fig. C-2-2.1B
61	WHC (PJJ)	14	1-3C	.0473	Pwr off FCV-67-68-A	Inst pwr 2B	120 ac	Buss AGC fuse	1	0.015	12.0	.000002	17.6	--	Fig. C-2-2.1B

*Not applicable. Refer to Remarks.

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

WM. HARTSELL GENE FRYE/MP COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT)AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
62	WHC (PJJ)	14	1-3C	.0473	Pwr off FCV-67-67-B	Inst pwr 120 ac 2B		Buss AGC fuse	1	0.016	11.7	.000002	17.6	--	Fig. C-2-2.1B
63	WHC (PJJ)	14	1-3C	.0473	Pwr off FCV-67-65-B	Inst pwr 120 ac 2B		Buss AGC fuse	1	0.016	11.8	.000002	17.6	--	Fig. C-2-2.1B
64	WHB-1 (PXMJ)	14	1-2C	.0874	HS-30-448C P-auto	Inst pwr 120 ac 2A		Buss AGC fuse	1	0.015 0.01	12.0 196.0	.000002 .00038	22.8	--	Fig. C-2-1.1A
65	WHB-1 (PXMJ)	14	1-2C	.0874	HS-30-452C P-auto	Inst pwr 120 ac 2A		Buss AGC fuse	1	0.015 0.01	11.8 58.3	.000002 .000033	22.8	--	Fig. C-2-1.1A
66	WHB-1 (PXMJ)	14	1-2C	.0874	HS-30-450C P-auto	Inst pwr 120 ac 2B		Buss AGC fuse	1	0.013 0.01	12.9 229.7	.000002 .00052	22.8	--	Fig. C-2-1.1A
67	WHB-1 (PXMJ)	14	1-2C	.0874	HS-30-454C P-auto	Inst pwr 120 ac 2B		Buss AGC fuse	1	0.013 0.01	12.9 229.7	.000002 .000527	22.8	--	Fig. C-2-1.1A
68	WGB-1 (PXMJ)	12	1-2C	.221	120V alm sup	DPL-13-1 120 ac Fire prot		W EHB BKR	15	35	37.3	.0486	27.35	--	Fig. C-2-1.1B

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

WM HARTSELL / GENE FRYE/MP 2-15-82 COMPUTED BY DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
69	WGB (PJJ)	12	1-2C	.0473	Trip bus A	250V batt Bd 1	250 dc	W BKR Tri-pac FB	20	0.9 1.8	204.7 153.9	.03771 .04266	22.0	--	Fig. C-2-3.2
70	WGB (PJJ)	12	1-2C	.0473	Trip bus A	250V batt Bd 1	250 dc	W BKR Tri-pac FB	20	2.7 3.3	116.3 98.6	.03651 .03211	22.0	--	Fig. C-2-3.2
71	WHB (PJJ)	14	1-2C	.0473	Main stm cool down vlv cont	Battery BD I	125 dc	KAZ Buss	6	0.018 0.035	78.3 50.4	.00011 .000089	17.6	--	Fig. C-2-3.1
72	WHC (PJJ)	14	1-3C	.0473	Main stm cool down vlv cont	Battery BD II	125 dc	KAZ Buss	6	0.034 0.065	52.8 36.0	.000094 .000084	17.6	--	Fig. C-2-3.1

TENNESSEE VALLEY AUTHORITY

Wm. Hertell / Donna Hunge — COMPUTED BY — 2/13/82 DATE — CHECKED BY — DATE

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES — PROJECT WATTS BAR NUCLEAR PLANT

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
73	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .035	78.3 50.4	.00011 .000088	17		Fig. C-2-3.1
74	WHB (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
75	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .035	78.3 50.4	.00011 .000088	17.6		Fig. C-2-3.1
76	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .067	52.8 34.4	.000094 .000079	17.6		Fig. C-2-3.1
77	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .035	78.3 50.4	.00011 .000088	17.6		Fig. C-2-3.1
78	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
79	WHB (PJJ)	14	1-2C	.0473	Main stm cool down vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .035	78.3 50.4	.00011 .000088	17.6		Fig. C-2-3.1

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Wm Hartsell COMPUTED BY 2/13/82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
80	WHC (PJJ)	14	1-3C	.0473	Main stm cool down vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
81	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .036	78.3 49.3	.00011 .000087	17.6		Fig. C-2-3.1
82	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
83	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .04	78.37 46.9	.00011 .000087	17.6		Fig. C-2-3.1
84	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
85	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .036	78.3 49.3	.00011 .000087	17.6		Fig. C-2-3.1
86	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY Wm Hartsell Dan Fuge DATE 2/13/82 CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
87	WHB (PJJ)	14	1-2C	.0473	Main stm cool down vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .036	78.3 49.3	.00011 .000087	17.6		Fig. C-2-3.1
88	WHC (PJJ)	14	1-3C	.0473	Main stm cool down vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
89	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .036	78.4 49.3	.00011 .000087	17.6		Fig. C-2-3.1
90	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
91	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .036	78.3 49.3	.00011 .000087	17.6		Fig. C-2-3.1
92	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
93	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.018 .036	78.3 49.3	.00011 .000087	17.6		Fig. C-2-3.1

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY Wm Hartzell Dave Fryer DATE 2/13/82 CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
94	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.034 .065	52.8 36.0	.000094 .000084	17.6		Fig. C-2-3.1
95	WHB-1 (PXMJ)	14	1-2C	.0874	FSV-46-9A cont	Battery bd I	125 dc	Buss KAZ fuse	6	.031 .06	54.2 37.9	.00009 .00009	22.8		Fig. C-2-3.1
96	WHB-1 (PXMJ)	14	1-2C	.0874	FSV-46-9B cont	Battery bd II	125 dc	Buss KAZ fuse	6	.068 .11	35.8 27.4	.00008 .00008	22.8		Fig. C-2-3.1
97	WHB-1 (PXMJ)	14	1-2C	.0874	FSV-46-36A cont	Battery bd I	125 dc	Buss KAZ fuse	6	.031 .06	54.2 37.9	.00009 .00009	22.8		Fig. C-2-3.1
98	WHB-1 (PXMJ)	14	1-2C	.0874	FSV-46-36B cont	Battery bd II	125 dc	Buss KAZ fuse	6	.065 .11	35.8 27.4	.00008 .00008	22.8		Fig. C-2-3.1
99	WHB-1 (PXMJ)	14	1-2C	.0874	FSV-46-9A cont	Battery bd III	125 dc	Buss KAZ fuse	6	.053 .032	39.8 29.6	.00008 .00003	22.8		Fig. C-2-3.1
100	WHB-1 (PXMJ)	14	1-2C	.0874	FSV-46-9B cont	Battery bd IV	125 dc	Buss KAZ fuse	6	.017 .038	80.6 48.9	.00011 .00009	22.8		Fig. C-3-2.1
101	WHB-1 (PXMJ)	14	1-2C	.0874	FSV-46-36A cont	Battery bd III	125 dc	Buss KAZ fuse	6	.05 .09	42.1 31.26	.00008 .00009	22.8		Fig. C-2-3.1
102	WHB (PJJ)	14	1-2C	.0473	FSV-46-36B cont	Battery bd IV	125 dc	Buss KAZ fuse	6	.017 .038	80.6 48.99	.00011 .00009	17.6		Fig. C-2-3.1

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SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Wm Hartsell / Dana Fryar COMPUTED BY 2/13/82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
103	WGB (PJJ)	12	1-2C	.120	Trip Bus A	Battery bd 2	250 dc	BKR West. Tri-Pac Type FB	20	.42 1.90	206.41 151.39	.01789 .04355	22		Fig. C-2-3.2
104	WHB (PJJ)	12	1-2C	.120	Trip Bus A	Battery bd 2	250 dc	BKR West. Tri-Pac Type FB	20	2.6 3.7	116.9 97.6	.03553 .03523	22		Fig. C-2-3.2
105	WHB (PJJ)	14	1-2C	.0473	Main stm cool down vlv cont	Battery bd III	125 dc	Buss KAZ fuse	6	.01 .025	123.8 64.3	.000153 .000103	17.6		Fig. C-2-3.1
106	WHC (PJJ)	14	1-3C	.0473	Main stm cool down vlv cont	Battery bd IV	125 dc	Buss KAZ fuse	6	.031 .057	55.1 37.8	.000094 .000081	17.6		Fig. C-2-3.1
107	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd III	125 dc	Buss KAZ fuse	6	.01 .022	123.8 64.3	.000153 .00009	17.6		Fig. C-2-3.1
108	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd IV	125 dc	Buss KAZ fuse	6	.031 .057	55.1 37.8	.000094 .000081	17.6		Fig. C-2-3.1
109	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .022	123.8 64.3	.000153 .000090	17.6		Fig. C-2-3.1

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Wm Hartsell / Mary Frye COMPUTED BY 2/13/82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
110	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.031 .051	55.1 36.1	.000094 .000066	17.6		Fig. C-2-3.1
111	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .022	123.8 64.3	.000153 .00009	17.6		Fig. C-2-3.1
112	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.031 .057	55.1 37.8	.000094 .000081	17.6		Fig. C-2-3.1
113	WHB (PJJ)	14	1-2C	.0473	Main stm cool down cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .026	123.8 62.6	.000153 .000101	17.6		Fig. C-2-3.1
114	WHC (PJJ)	14	1-3C	.0473	Main stm cool down cont	Battery bd II	125 dc	Buss KAZ fuse	6	.031 .057	55.1 37.8	.000094 .000081	17.6		Fig. C-2-3.1
115	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .026	123.8 62.6	.000153 .000101	17.6		Fig. C-2-3.1
116	WHC (PJJ)	14	1-3C	.0473	Main stm vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.03 .058	55.1 37.8	.000091 .000083	17.6		Fig. C-2-3.1

TENNESSEE VALLEY AUTHORITY

Wm. Hartnell
Gene Frye / WAH 2/13/82
COMPUTED BY DATE CHECKED BY DATE

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
117	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .026	143.7 62.6	.000206 .000101	17.6		Fig. C-2-3.1
118	WHC (PJJ)	14	1-3C	.0473	Main stm cool down vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.03 .058	55.1 37.9	.000091 .000083	17.6		Fig. C-2-3.1
119	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .026	123.9 62.6	.000153 .000102	17.6		Fig. C-2-3.1
120	WHC (PJJ)	14	1-3C	.0473	Main stm cool down vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.03 .058	55.1 37.9	.000091 .000083	17.6		Fig. C-2-3.1
121	WHB (PJJ)	14	1-2C	.0473	Main stm cool down vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .027	123.9 60.6	.000153 .000099	17.6		Fig. C-2-3.1
122	WHC (PJJ)	14	1-3C	.0473	Main stm cool down vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.03 .058	55.2 37.9	.000091 .000083	17.6		Fig. C-2-3.1
123	WHB (PJJ)	14	1-2C	.0473	Main stm cool down vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .026	123.9 62.6	.000153 .000102	17.6		Fig. C-2-3.1
124	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.03 .058	55.2 37.8	.000091 .000083	17.6		Fig. C-2-3.1

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Wm Hartrell COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
125	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .026	123.9 62.6	.000153 .000102	17.6		Fig. C-2-3.1
126	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.03 .058	55.2 37.8	.000091 .000083	17.6		Fig. C-2-3.1
127	WHB (PJJ)	14	1-2C	.0473	Main stm dump vlv cont	Battery bd I	125 dc	Buss KAZ fuse	6	.01 .026	123.8 62.6	.000153 .000102	17.6		Fig. C-2-3.1
128	WHC (PJJ)	14	1-3C	.0473	Main stm dump vlv cont	Battery bd II	125 dc	Buss KAZ fuse	6	.03 .058	55.1 37.8	.000091 .000083	17.6		Fig. C-2-4.1
129	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 1-I	120 ac	Buss fuse MBO	15	.013 .019	81.7 169	.00009 .00054	12.7	Since 15A fuse supplies PWR to other components in SSPS rack these circuits will be separately fused at 5 amp.	Fig. C-2-4.1
130	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 1-I	120 ac	Buss fuse MBO	15	.110 .016	85.7 185	.00081 .00055	12.7	Same as item 129	Fig. C-2-4.1

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Wm Hartrell / Gene Thyo COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT)AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
131	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 1-II	120 ac	Buss fuse 15 MBO		.24 .017	66.7 181	.00106 .00065	12.7	Same as item 129	Fig. C-2-4.1
132	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 1-II	120 ac	Buss fuse 15 MBO		.24 .017	66.9 182	.00107 .00056	12.7	Same as item 129	Fig. C-2-4.1
133	WVA-3 (XLPE)	18	1-2C	0.0102	Turb steam stop vlv trip	Vital 1-III	120 ac	Buss fuse 15 MBO		.016 .01	186 250	.00056 .00063	12.7	Same as item 129	Fig. C-2-4.1
134	WVA-3 (XLPE)	18	1-2C	0.0102	Turb steam stop vlv trip	Vital 1-III	120 ac	Buss fuse 15 MBO		.09 .016	85 188	.00074 .00057	12.7	Same as item 129	Fig. C-2-4.1
135	WVA-3 (XLPE)	18	1-2C	0.0102	Turb steam stop vlv trip	Vital 1-IV	120 ac	Buss fuse 15 MBO		.25 .018	66 175	.00108 .00055	12.7	Same as item 129	Fig. C-2-4.1
136	WVA-3 (XLPE)	18	1-2C	0.0102	Turb steam stop vlv trip	Vital 1-IV	120 ac	Buss fuse 15 MBO		.2 .015	68.1 191	.00093 .00055	12.7	Same as item 129	Fig. C-2-4.1
137	WVK (XLPE)	16	1-2C	.0458	Reac SSPS sys inputs from turb	Vital 1-I	120 ac	Buss fuse 15 MBO		.08 .02	97.8 160	.00077 .00051	16.4	Same as item 129	Fig. C-2-4.1

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Wm Hartsell COMPUTED BY DATE 2-13-82 CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
138	WVK (XLPE)	16	1-2C	.0458	Reac SSPS sys inputs from turb	Vital 1-I	120 ac	Buss fuse MBO	15	.08 .019	102 171	.00083 .00056	16.4	Same as item 129	Fig. C-2-4.1
139	WVK (XLPE)	16	1-2C	.0458	Reac SSPS sys inputs from turb	Vital 1-II	120 ac	Buss fuse MBO	15	.16 .05	77.5 112	.00096 .00063	16.4	Same as item 129	Fig. C-2-4.1
140	WVK (XLPE)	16	1-2C	.0458	Reac SSPS sys inputs from turb	Vital 1-II	120 ac	Buss fuse MBO	15	.08 .024	97.8 160	.00077 .00062	16.4	Same as item 129	Fig. C-2-4.1
141	WVK (XLPE)	16	1-2C	.0458	Reac SSPS sys inputs from turb	Vital 1-III	120 ac	Buss fuse MBO	15	.08 .02	97.7 164	.00077 .00054	16.4	Same as item 129	Fig. C-2-4.1
142	WVK (XLPE)	16	1-2C	.0458	Reac SSPS sys inputs from turb	Vital 2-I	120 ac	Buss fuse MBO	15	.07 .017	103 178	.00074 .00054	16.4	Same as item 129	Fig. C-2-4.1
143	WVA (XLPE)	16	1-2C	.0458	Inst loop 506	*	*	*	*	*	.65	*	16.4	ISC is limited to 65A by instrument loop power supply (Foxboro)	Fig. C-2-4.2

*Not applicable; refer to Remarks.

TABLE C-4

TENNESSEE VALLEY AUTHORITY

R.L. Lee /WAH 2-13-82

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

COMPUTED BY DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
144	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 2-I	120 ac	Buss fuse 15 MBO		.11 .02	84.4 165	.00078 .00054	12.7	Same as item 129	Fig. C-2-4.1
145	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 2-I	120 ac	Buss fuse 15 MBO		0.019 0.11	168.2 85.3	0.0005 0.0008	12.7	Same as item 129	Fig. C-2-4.1
146	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 2-I	120 ac	Buss fuse 15 MBO		0.019 0.25	172.2 66.5	0.0006 0.001	12.7	Same as item 129	Fig. C-2-4.1
147	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 2-II	120 ac	Buss fuse 15 MBO		0.019 0.25	173.5 66.7	0.0005 0.0011	12.7	Same as item 129	Fig. C-2-4.1
148	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 2-III	120 ac	Buss fuse 15 MBO		0.023 0.12	155.6 81.9	0.0006 0.0008	12.7	Same as item 129	Fig. C-2-4.1
149	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 2-III	120 ac	Buss fuse 15 MBO		0.021 0.12	157.8 82.6	0.0005 0.0008	12.7	Same as item 129	Fig. C-2-4.1
150	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 2-IV	120 ac	Buss fuse 15 MBO		0.02 0.25	165.7 65.8	0.0005 0.0011	12.7	Same as item 129	Fig. C-2-4.1
151	WVA-3 (XLPE)	18	1-2C	.0102	Turb steam stop vlv trip	Vital 2-IV	120 ac	Buss fuse 15 MBO		0.02 0.25	168.2 66.1	0.0006 0.0011	12.7	Same as item 129	Fig. C-2-4.1

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Wm Hartsell / Dana Fizer COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT) AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
152	WVK (XLPE)	16	1-2C	.0458	React SSPS sys inputs from turb	Vital 2-I	120 ac	Buss fuse 15 MBO		0.02 0.06	166.4 109.9	0.0005 0.00072	16.4	Same as item 129	Fig. C-2-4.1
153	WVK (XLPE)	16	1-2C	.0458	React SSPS sys inputs from turb	Vital 2-I	120 ac	Buss fuse 15 MBO		0.021 0.06	158.6 106.4	0.0005 0.0007	16.4	Same as item 129	Fig. C-2-4.1
154	WVK (XLPE)	16	1-2C	.0458	React SSPS sys inputs from turb	Vital 2-II	120 ac	Buss fuse 15 MBO		0.025 0.075	148.9 96.8	0.0005 0.0007	16.4	Same as item 129	Fig. C-2-4.1
155	WVK (XLPE)	16	1-2C	.0458	React SSPS sys inputs from turb	Vital 2-II	120 ac	Buss fuse 15 MBO		0.02 0.06	164.9 103.2	0.0005 0.0006	16.4	Same as item 129	Fig. C-2-4.1
156	WVK (XLPE)	16	1-2C	.0458	React SSPS sys inputs from turb	Vital 2-III	120 ac	Buss fuse 15 MBO		0.025 0.065	149.6 100.5	0.0006 0.0007	16.4	Same as item 129	Fig. C-2-4.1
157	WVK (XLPE)	16	1-2C	.0458	React SSPS sys inputs from turb	Vital 2-III	120 ac	Buss fuse 15 MBO		.06 .024	107.6 151.6	0.0007 0.00055	16.4	Same as item 129	Fig. C-2-4.1

TABLE C-4

TENNESSEE VALLEY AUTHORITY

SUBJECT FAULT ANALYSIS OF ASSOCIATED CABLES PROJECT WATTS BAR NUCLEAR PLANT

Wm Hartsell COMPUTED BY 2-13-82 DATE CHECKED BY DATE

ITEM NO.	CABLE DATA MARK LTR	AWG	NO. OF COND	I^2t x 10^6	FOR	POWER SOURCE BOARD	VOLT.	PROTECTIVE DEVICE TYPE	RATING (AMP)	CLEARING TIME (SEC)	FAULT ANALYSIS I (SHORT CIRCUIT)AMP	I^2t x 10^6	CONDUCTOR CONTINUOUS CURRENT RATING (AMP)	REMARKS	TYPICAL CIRCUIT (APPENDIX C-2)
158	WVA (XLPE)	16	1-2C	.0458	Inst loop 506	*	*	*	*	*	.65 .65	*	16.4	See remark on item No. 143	Fig. C-2-4.2
159	WGC-1 (PXMJ)	12	1-3C	.221	Trip bus B	Battery 2	250 dc	Buss fuse SC	15	.01 .011	135.4 107.6	.00018 .00013	27.3		Fig. C-2-3.2
160	WGC-1 (PXMJ)	12	1-3C	.221	Trip bus B	Battery 2	250 dc	Buss fuse SC	15	.01 .01	185.3 141.0	.00034 .00020	27.3		Fig. C-2-3.2

*Not applicable; refer to Remarks.

APPENDIX C-4-1

TIME CURRENT CURVES

FOR PROTECTION

DEVICES USED

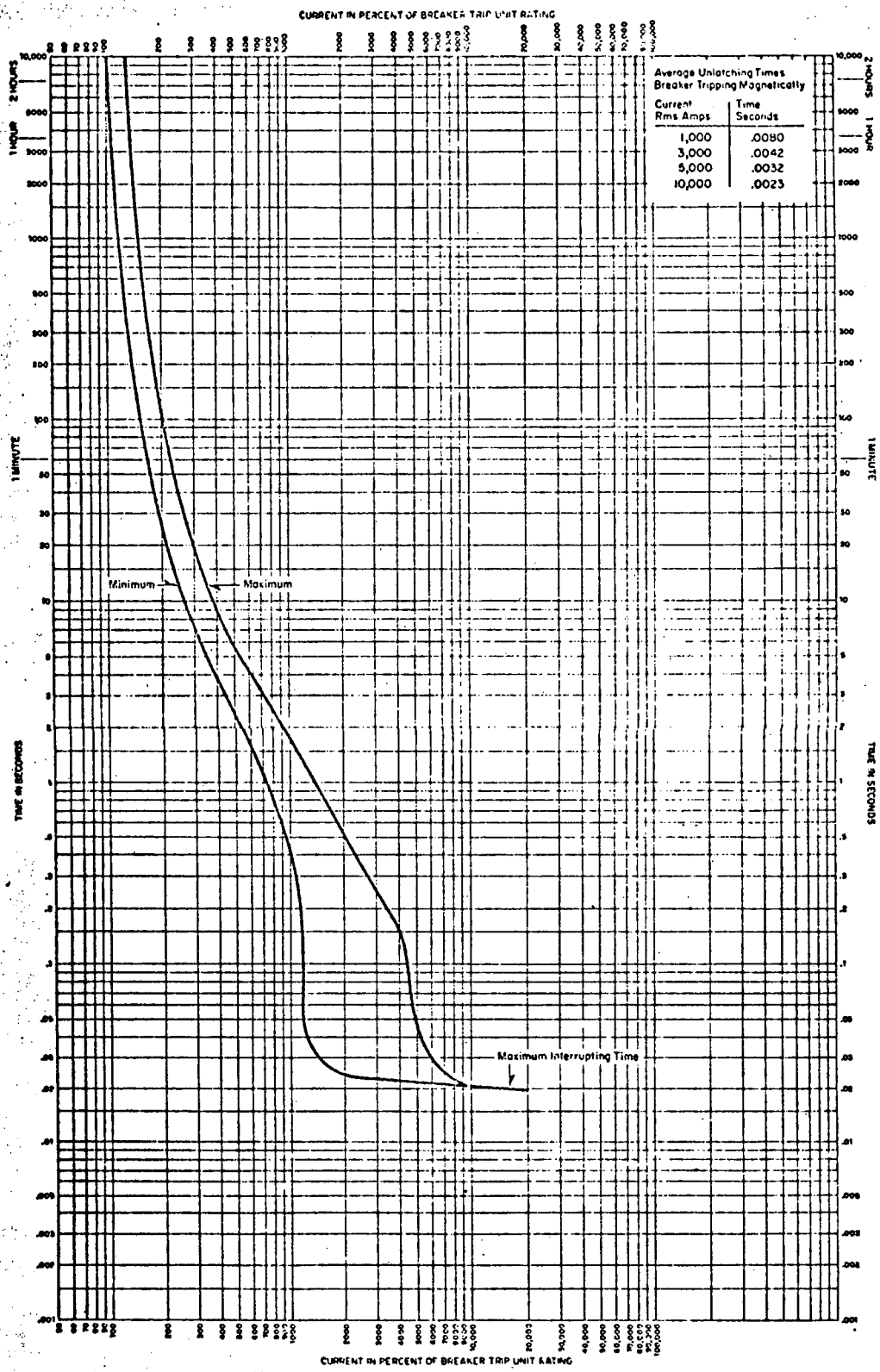
IN ASSOCIATED

CABLE ANALYSIS

AB DE-ION® CIRCUIT BREAKERS

Types EB, EHB, MARK 75 Type HFB

Type EB: 15-40 Amperes, 1 Pole, 120 Volts Ac Max.
Type EHB: 15-40 Amperes, 1 Pole, 277 Volts Ac Max.
Type HFB: 15-40 Amperes, 1 Pole, 277 Volts Ac Max.



Maximum and Minimum Characteristic Curves
40°C Ambient, Cold Start • Thermal Magnetic

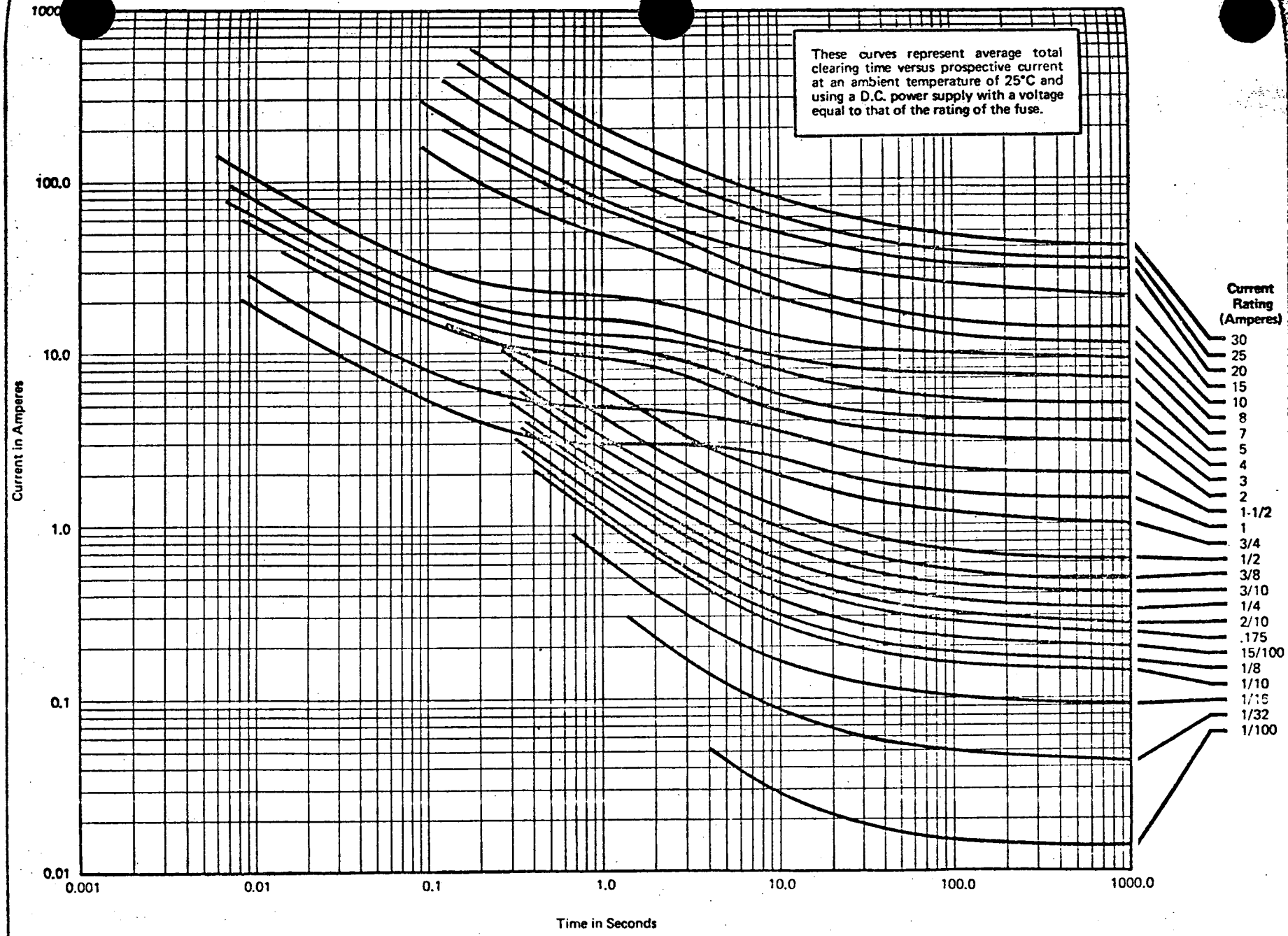
Interrupting Capacity (Symmetrical Amperes)
Type EB: 10,000
Type EHB: 14,000
Type HFB: 15-30 amps., 65,000; 40 amp., 25,000

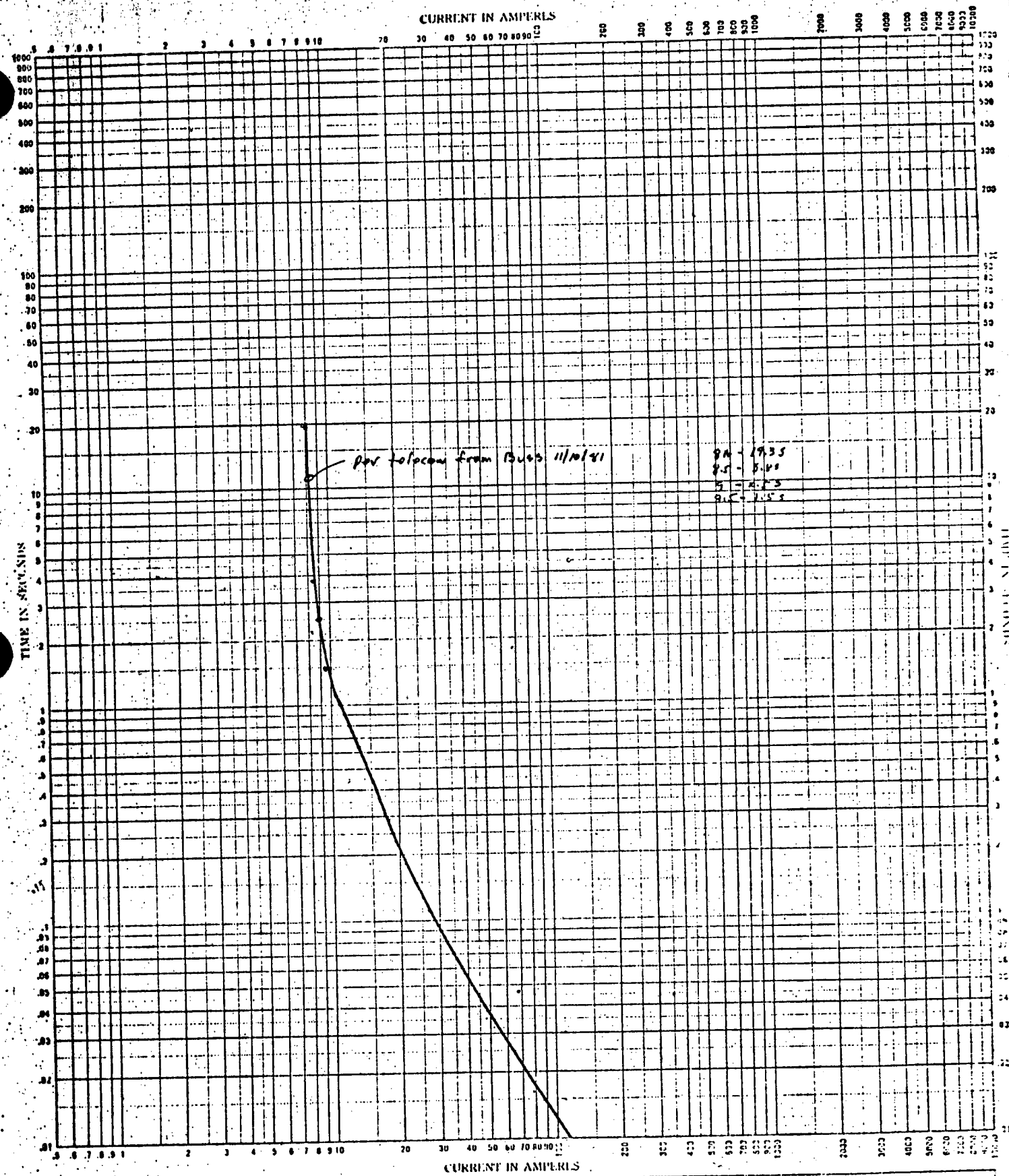
Curve No. SC-337-70
January, 1971

Westinghouse Electric Corporation
Low Voltage Breaker Division, Beaver, Pa.

TIME-CURRENT CHARACTERISTICS

Littelfuse 313- and 315 000 Series Fuses





OPENING TIME-CURRENT CHARACTERISTIC CURVES

BUSSMANN MFG. DIVISION
McGraw-Edison Co St. Louis, Mo 63107

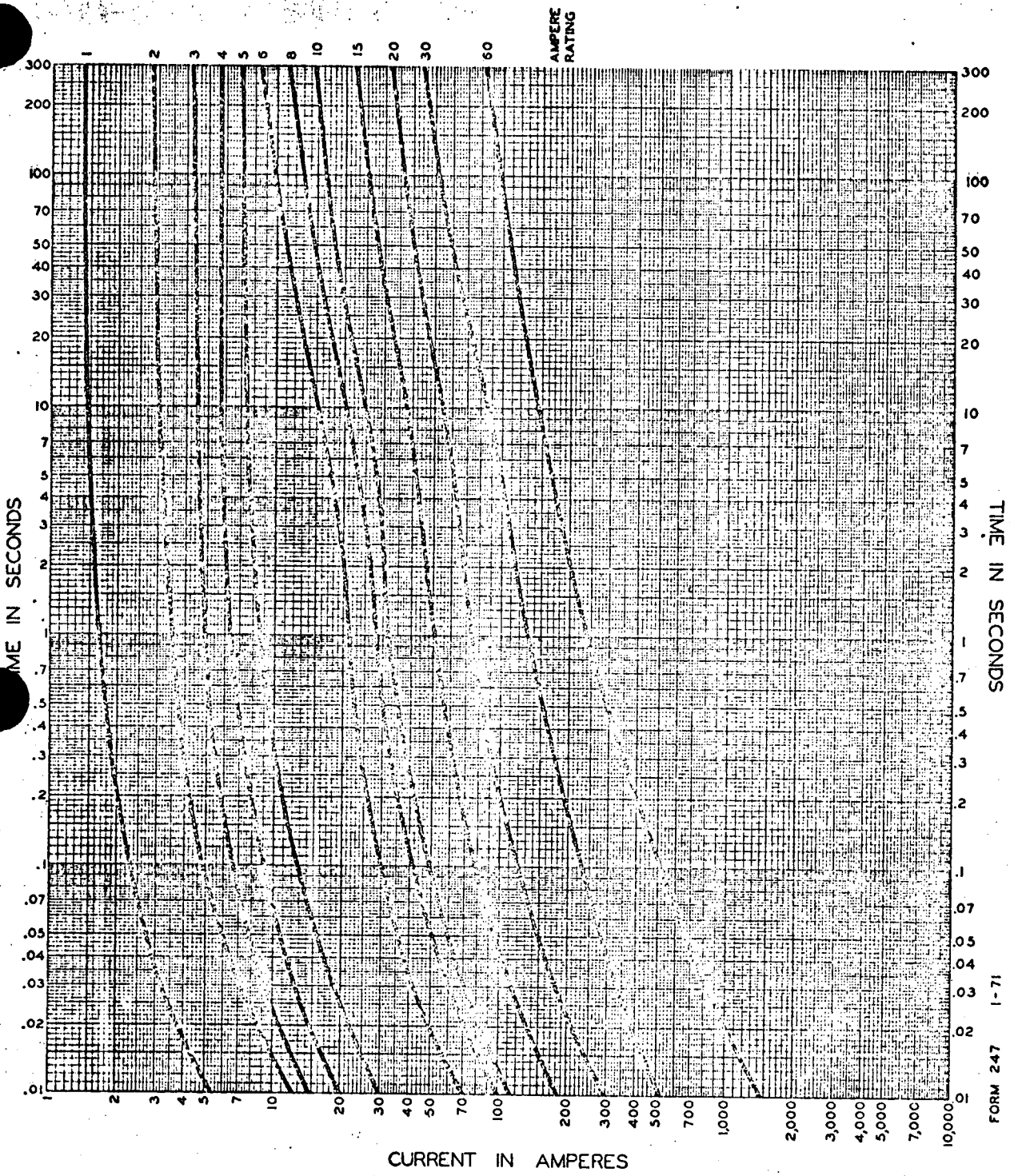
For KAZ ACTUATOR In

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. 50744
Date 3-9-72

Average Total Clearing Time-Current Characteristic Curves BUSS SC Fuses*



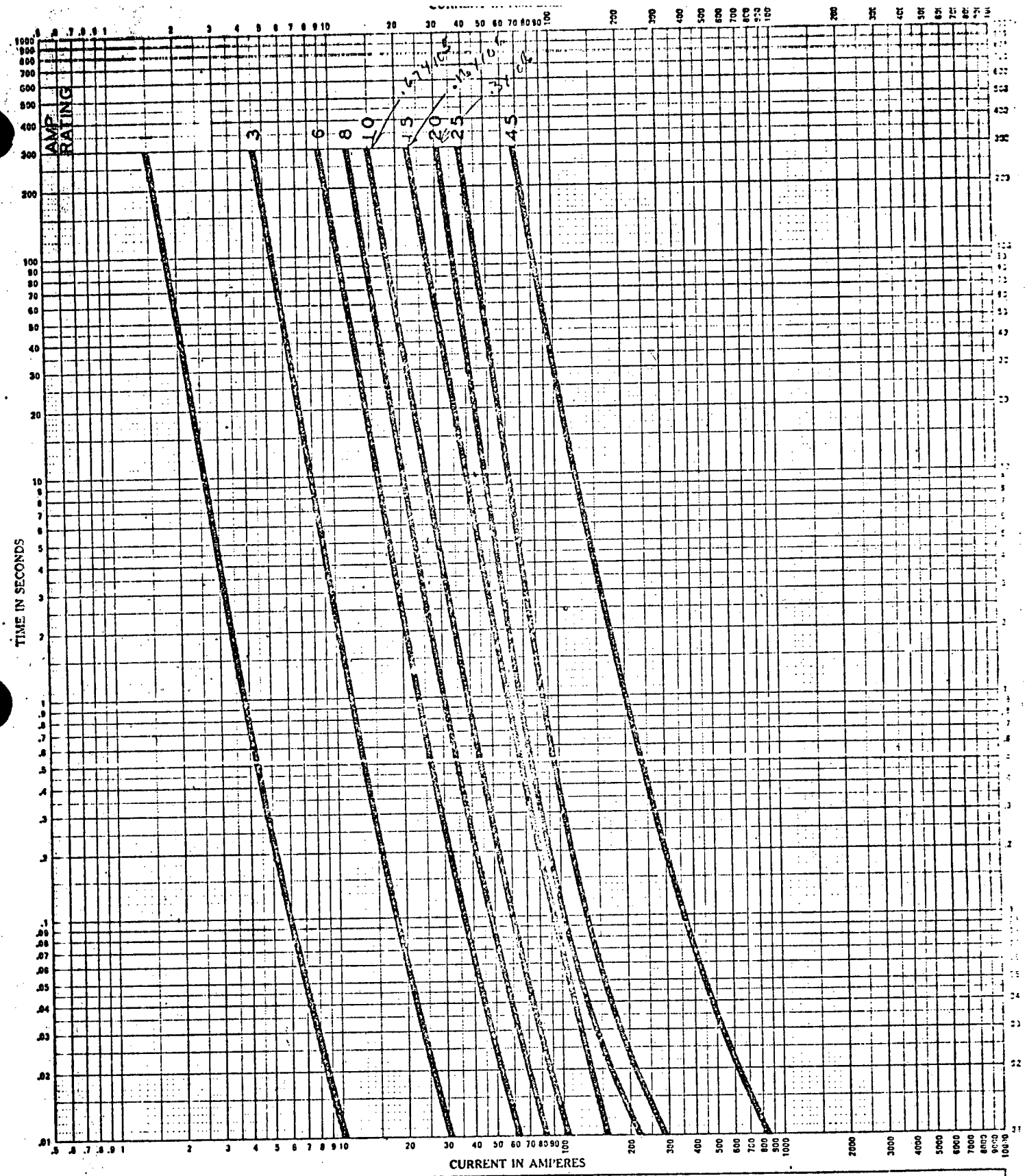
*For reference only.
Contact factory for latest information.

Average Total Clearing Time-Current Characteristic Curves

RMS or Effective Value of Alternating Current: The current indicated by an ammeter under steady-state conditions. The peak current on each half cycle is equal to the rms value multiplied by the square root of 2.

An alternating current of a given rms ampere value will produce the same degree of heating in a circuit as would a direct current of the same ampere value.

When the current is interrupted in less than one cycle (0.016 second) a symmetrical rms ampere value has no meaning, since the cyclical pattern of the current wave is not complete. The effective values of current in this time range have been determined from oscillograms of the actual tests.



TOTAL CLEARING TIME-CURRENT CHARACTERISTIC CURVES BUSSMANN MFG. DIVISION

For KTN, KTS, KWN & KWS LIMITRON FAST-ACTING FUSES McGraw-Edison Co. St. Louis 7, Mo.

BASIS FOR DATA Standards KLC Dated

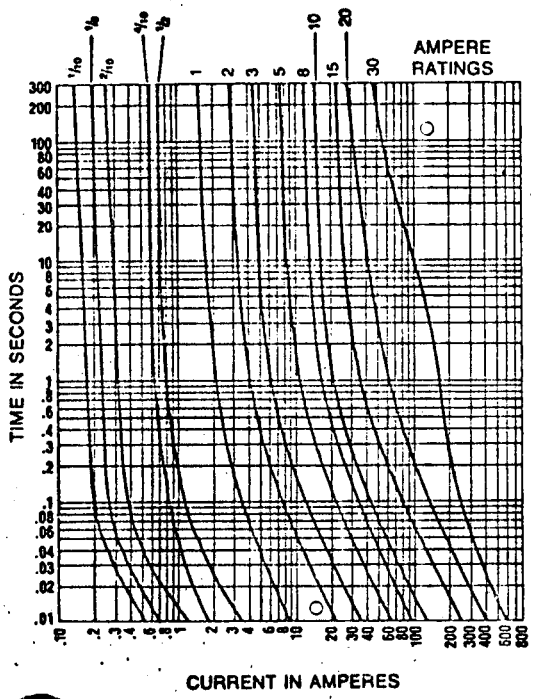
1. Tests made at Volts a-c at p.f., Starting at 25C with no Initial load

2. Curves are plotted to Test points so variations should be

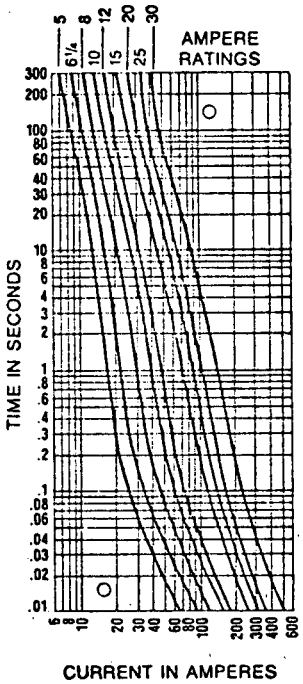
No. 50549

Date 8-22-74

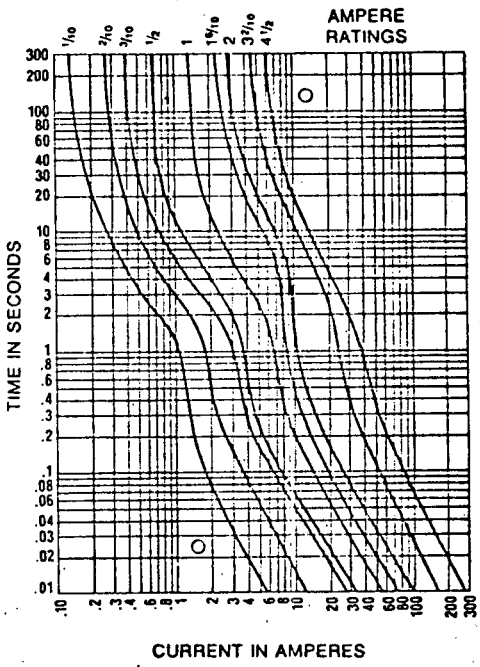
[illegible]on Fast-Acting KLM, KTK Fuses, 13/32" x 1½" (10.3mm x 38.1mm)



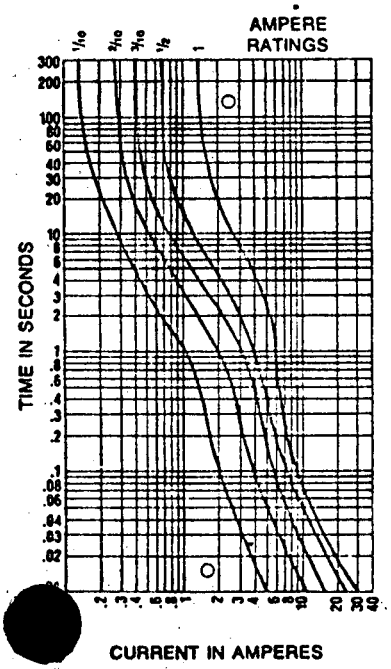
Type MDA Time-Delay Fuses, ¼" x 1¼" (6.4mm x 31.8mm).



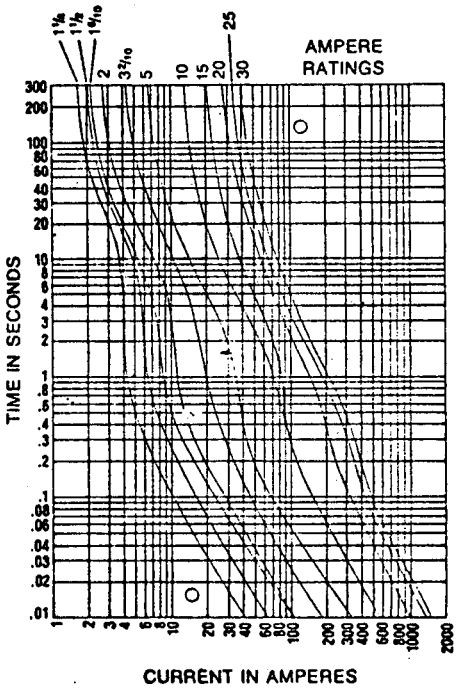
Fusetron MDA Dual-Element Fuses, ¼" x 1¼" (6.4mm x 31.8mm)



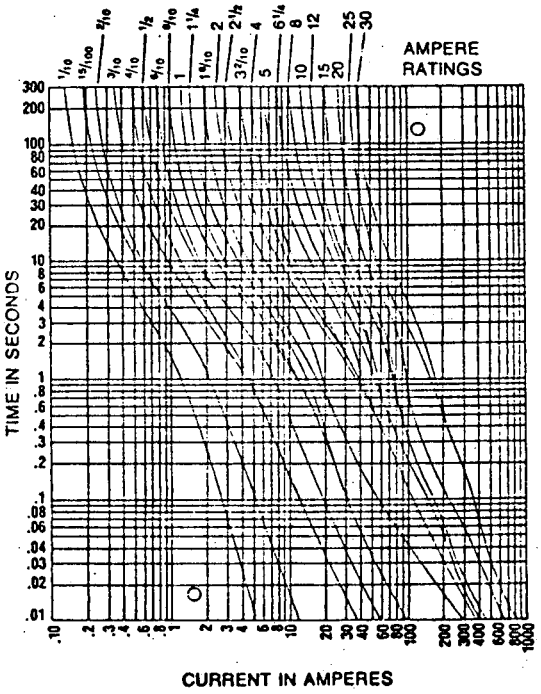
Fusetron MDL, MDV Dual-Element Fuses, ¼" x 1¼" (6.4mm x 31.8mm)



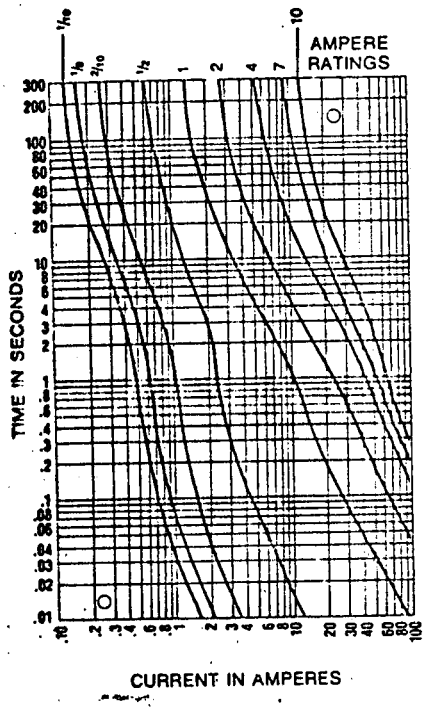
Fusetron MDL, MDV Dual-Element Fuses, ¼" x 1¼" (6.4mm x 31.8mm)



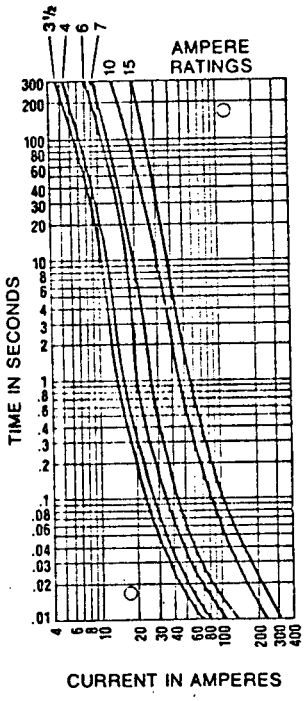
Fusetron FNM Dual-Element Fuses, 13/32" x 1½" (10.3mm x 38.1mm)



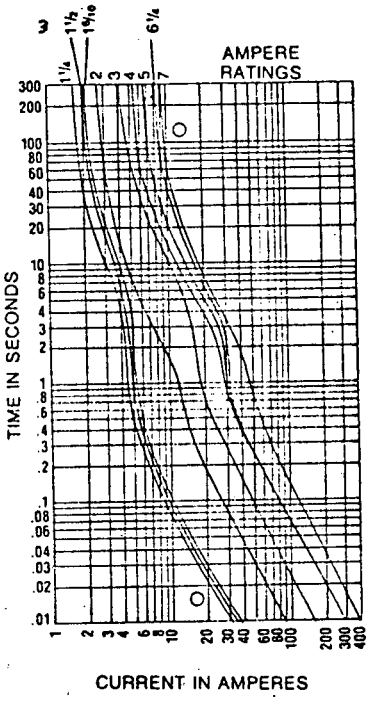
Fusetron FNA Dual-Element, Indicating Fuses, 13/32" x 1½" (10.3mm x 38.1mm)



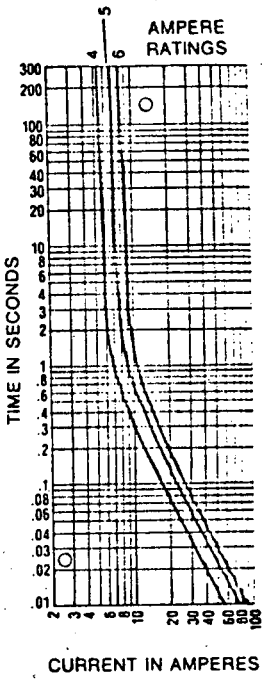
Type FNQ Time-Delay Fuses, 13/32" x 1½" (10.3mm x 38.1mm)



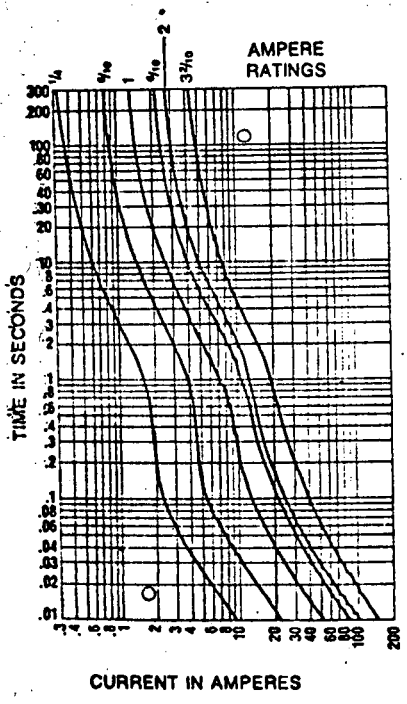
Fusetron MDX Dual-Element Fuses, ¼" x 1¼" (6.4mm x 31.8)



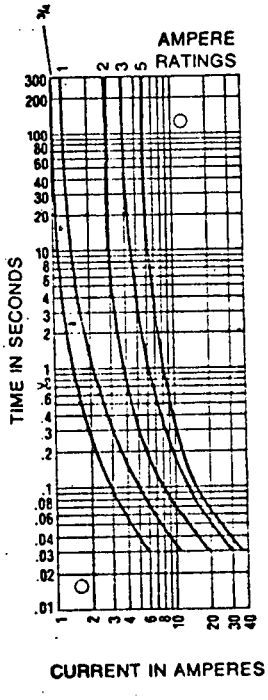
Type MTH Fuses, ¼" x 1¼" (6.4mm x 31.8mm)



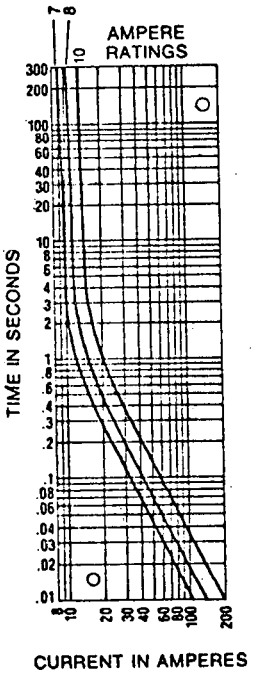
Fusetron FNQ Dual-Element Fuses, 13/32" x 1½" (10.3mm x 38.1mm)



Type GBA, GLD Indicating Fuses, ¼" x 1¼" (6.4mm x 31.8mm)



Type GLH Fuses, ¼" x 1¼" (6.4mm x 31.8mm)



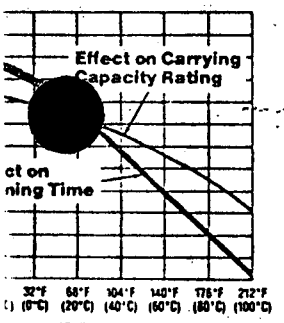
ne-Current eristic Curves ıperature

ıbient Temperatures

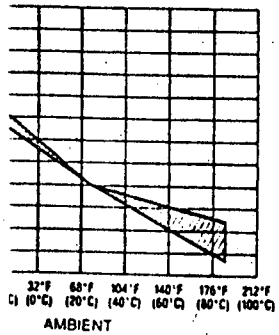
ıracteristics of fuses are based ıient temperature level. Higher ome extent, reduce the current y and the fuse opening time. ambients result in a somewhat carrying capacity and opening

Fusetron graph below, for ıent of 100°F (40°C) reduces ıg capacity of this type of fuse

show the effects of ambient Fusetron and "Non-Time-

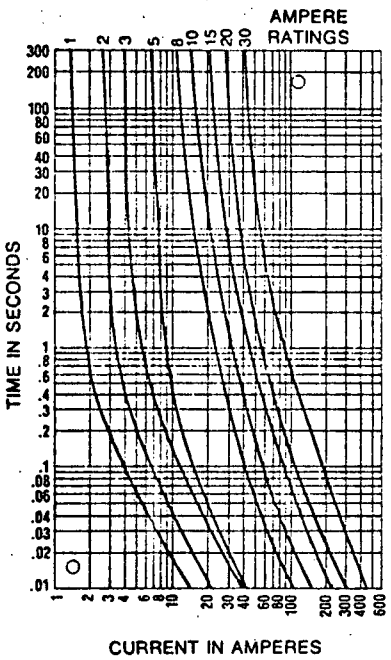


nt Temperature on the Oper- stics of Fusetron Dual- ominal Fuse Ratings Based peratures in the Range of 80°F (26.7°C). Change in curs with Loads of 500% (or ıal Current Rating of the

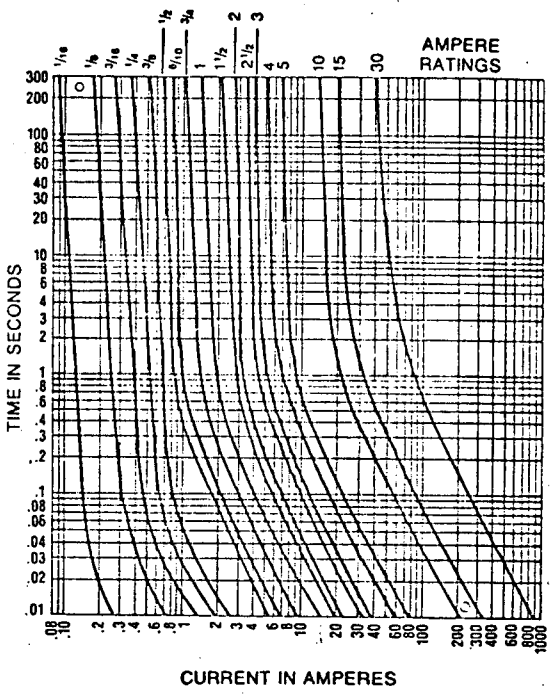


t Temperatures on the Oper- tic -Time-Delay Co lects the Effects ıratu on both the Current and Opening Time Relative on a Nominal 75.2°F (24°C)

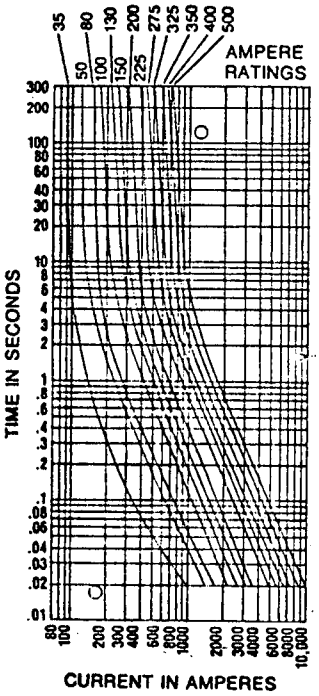
Type ABC Fuses, 1/4" x 1 1/4"
(6.4mm x 31.8mm)



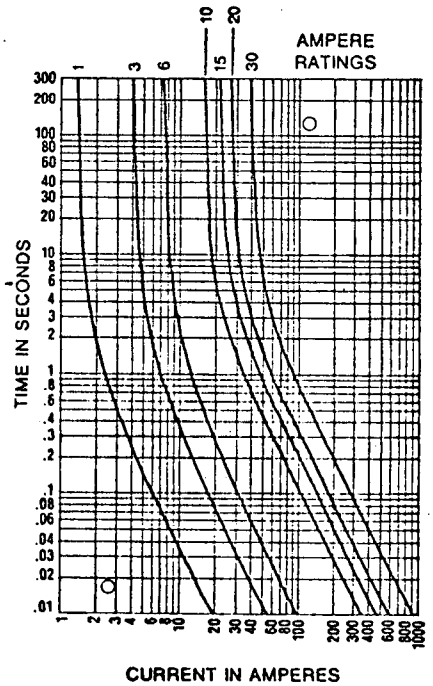
Type AGC Fuses, 1/4" x 1 1/4"
(6.4mm x 31.8mm)

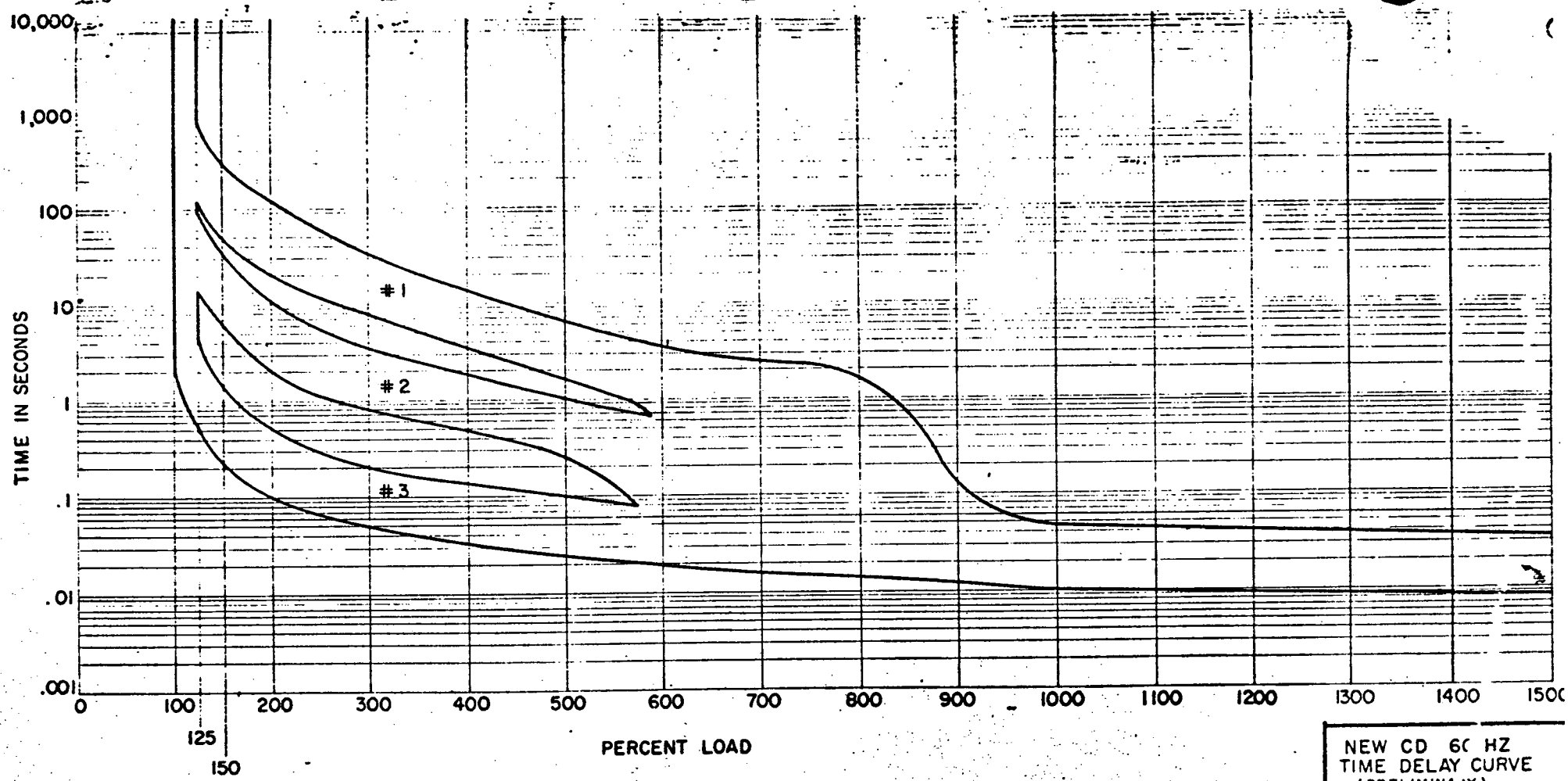


Type ANL Limiters



Type BAF, BAN Fuses, 13/32" x 1 1/2"
(10.3mm x 38.1mm)





NOTES:

1. DATA BASED ON 15, 40, 60, 100 AMP. BREAKERS, SEE I/T #20, 5114 AND DWG. 5114-004
2. ARMATURE RESPONSE SETTINGS 102% & 123%.
3. CURVE # 2 ADJUSTED DOWNWARD FROM ACTUAL RESULTS.
4. MUST HOLD 100% – MUST TRIP 125%.

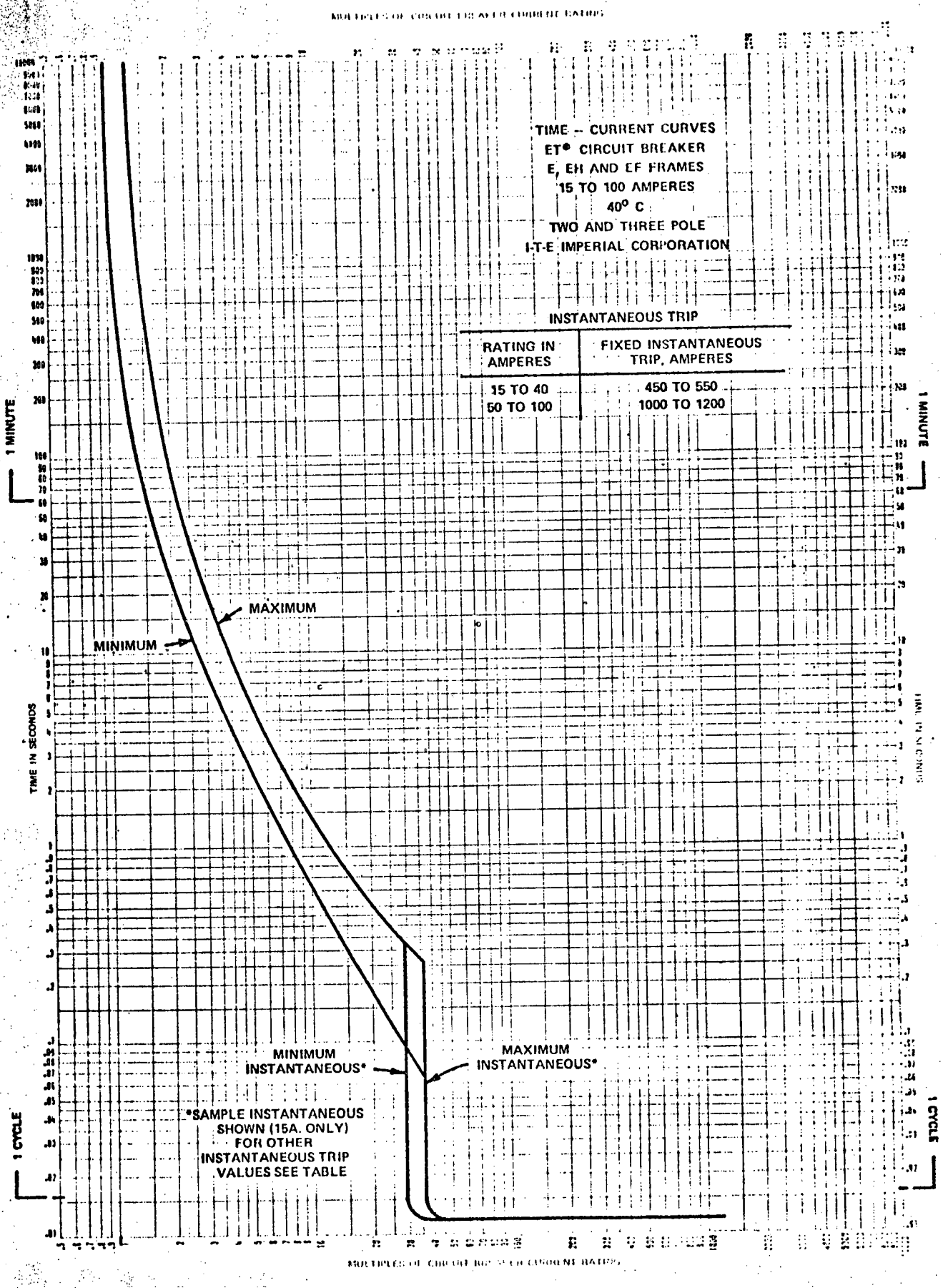
NEW CD 60 HZ
TIME DELAY CURVE
(PRELIMINARY)

DRAWN BY A.T.D. | SCALE ——
DATE 1-8-71

DO NOT SCALE DRAWING

HEINEMANN
ELECTRIC COMPANY
TRENTON, NEW JERSEY

005-10098



FOR APPLICATION AND COORDINATION PURPOSES ONLY. BASED ON 40°C AMBIENT COLD START.
E FRAME: 240 VOLTS, 60 HZ., 125/250 VOLTS DC,
EH FRAME: 480 VOLTS, 60 HZ., 250 VOLTS DC,
EF FRAME: 600 VOLTS, 60 HZ., 250 VOLTS DC.

Appendix D

Watts Bar Nuclear Plant
SER Section 8.3.3.3(c)
Separation Criteria Between Class 1E and Non-Class 1E Circuits

APPENDIX D

WATTS BAR NUCLEAR PLANT SER
SEPARATION CRITERIA BETWEEN CLASS 1E
AND NON-CLASS 1E CIRCUITS
ANALYSIS

The design for separation of circuits for Watts Bar predates IEEE 384-1974 and RG 1.75 in that the construction permit was issued January 23, 1973; whereas, the implementation date for RG 1.75 was February 1, 1974. The criteria used in the design for the separation of redundant cable trays require a minimum of 3 feet horizontally, and a minimum of 5 feet vertically, except where trays containing cables of different division of separation cross. Where redundant cable trays cross, there is a minimum vertical separation of 12 inches (tray top of lower tray to tray bottom of upper tray) with the bottom tray covered with a steel cover and the top tray provided with a steel bottom for minimum distance of three feet on each side of the tray crossing.

Watts Bar has five different voltage level categories of cable tray systems: V5—6900-volt, V4—480-volt, V3—control, V2—medium-level signal, and V1—low-level signal. These categories may be further divided into divisional and/or non-divisional tray systems. The 6900-volt trays contain only 6900-volt cables and are located in the top position of stacked trays. All 480-volt power cables and all AC and DC cables of 250 volts or less that carry 30 amperes or more are routed in 480-volt cable trays. Control trays contain AC and DC cables of 250 volts or less that carry less than 30 amperes and communication cables such as for telephone and paging circuits.

Medium-level signal trays contain signal cables for inputs to and outputs from the computer other than the thermocouples; instrument tramsmitters, recorders, RTD's greater than 100 millivolts, tachometers, and indicators; rotor eccentricity and vibration detectors; and shielded annunciator cables used with solid-state equipment. Signal cables for thermocouples, strain gauges, thermal converters, and RTD's that are 100 millivolts or less are run in low-level signal trays which occupy the lowest level in a stack of trays.

Each cable tray tier (trays sharing a support system) <u>may</u> contain a combination of nondivisional trays together with trays of <u>only</u> one train A or train B division, with power-level trays in the upper level. The tray spacing within a tier is approximately 12 inches tray bottom to tray bottom and 6 inches side by side. In some areas the tray spacing may be reduced to 9 inches tray bottom to tray bottom to avoid interferences such as piping or ventilation duct. Where the tray spacing is less than 12 inches solid bottom trays are used. All cable trays have seismic Category I supports in areas of Category I structures containing safety-related equipment. Conduits are also seismically supported in Category I structures.

Within Category I structures the same cable types are used for both Class 1E and non-Class 1E applications. The non-Class 1E cables are subject to the same environmental qualification, flame retardance, cable derating, splicing restrictions, cable tray fill, voltage level separation, short circuit ratings, and circuit protection as Class 1E cables.

Also, the same vendor is furnishing both the Class 1E and non-Class 1E switchgear provided with circuit breakers that serve as protective devices for the circuits. In addition, in areas outside primary containment containing one or both redundant divisions of cable trays (divisional circuits are routed in conduit within primary containment), exposed surfaces of cables (including nondivisional cables) in horizontal or vertical routings will be coated with a fire-resistant material. After initial cable coating application, TVA has established the criterion to allow ten uncoated cables within a cable tray segment, defined as that portion of the tray between intersections, such as tees and crosses. This number was judged to be acceptable because the cables have some protection from adjacent coated cables.

TVA has analyzed application and protection for power, control and instrumentation cables, and has determined that if a cable fault should occur, protective devices will operate before the cable would be damaged. The fault would be cleared well before ignition temperature of the cable insulation is reached. Table C-4 of Appendix C-4 documents the fault analysis of associated cables, and from the results of that analysis TVA has demonstrated that Class 1E circuits are not degraded.

Cables used for 6900-volt circuits are shielded, 8-kV cables, and are located in top position of the tray tier. The minimum size cable used for these circuits is 2/0 AWG. All 6900-volt cables (voltage level 5) larger than 2/0 AWG are grouped as 3-phase circuits and are separated from other grouped 3-phase circuits by a distance equal to the radius of the larger cable on the bottom surface of the tray. The 6900-volt cables which are 2/0 AWG may be laid without grouping on cable trays but they do not come in contact with the grouped 3-phase circuits except at intersections (such as tees and crosses). The 6900-volt circuits are protected by both phase-to-phase overcurrent and ground fault protective devices. The phase-to-phase fault protection is instantaneous (no intentional delay). The ground fault device is instantaneous in operation and can detect fault currents as low as 15 amperes.

All the 480-volt cables (voltage level 4) are part of the 480-volt ungrounded delta distribution system. Cable loading of 480-volt power trays is restricted to 30 percent fill of the cross-sectional area of the tray. These trays are located at or near the top of the tier and may be intermixed non-divisional with only one division of trays. Protective devices for the smaller cables operate instantaneously to clear faults, while faults to the larger cables are cleared after about 20 cycles. In all cases faults and overloads will be cleared well before the cables reach damaging temperature.

Control cables (voltage level 3) routed in cable trays are located in or near the middle of the tray tier. Cable tray loading of these trays is restricted to 60 percent fill of the cross-sectional area of the tray. These cables are used to provide control power (below 30 amperes), to

convey information, or to intermittently operate devices controlling power switching or conversion equipment. The 250-volt dc control power circuit was determined to have highest potential fault energy. Each polarity of the ungrounded cable is protected by a fuse sized to protect the cable. This ensures that a fault will be cleared before damage occurs to the cable.

Medium- and low-level signal cables (voltage levels 2 and 1, respectively) routed in cable trays are located at or near the bottom of the tray tier. Cable tray loading of these trays is restricted to 60 percent fill of the cross-sectional area of they tray. These cables are used to convey information or to intermittently operate devices controlling power switching or conversion equipment. These type circuits carry a small amount of power. Instrument control loop and associated instrument signal cables operate in a range of 10-50 MA with power supply voltages up to 85V dc. The annunciator circuits operate at approximately 1 MA, 140V dc intermittent duty. The computer cables operate at 160 MV into a high impedance. Thermocouples, strain gauges, accelerometers, and resistance-type temperature detectors are low excitation voltage devices. The associated cables operate at 15 volts and carry negligible current. Thus, energy produced by electrical faults in these cables is considered insignificant.

TVA has evaluated the consequences of fires with regard to plant shutdown capability. Internally initiated cable fires in cable trays are not considered a hazard based on the results of both TVA tests and tests conducted for NRC at Sandia Laboratories. The Sandia tests demonstrated that a fire initiated in a shorted cable will not propagate to cables in adjacent trays, and that cable coatings are effective in restricting fire propagation. TVA tests consisted of a mockup of trays with the same cable types as those installed at Watts Bar.

The results of overcurrent tests on contiguous conductors of a power cable in ladder cable trays are recorded in Sandia Laboratories report No. SAND77-1125C dated July 1977. The spacing of stacked loaded trays for these tests was 10.5 inches vertically, bottom to bottom, and 8 inches horizontally. In all seven full scale tests, all circuits remained functional in trays adjacent to that cable tray in which a fire was electrically initiated. From the report, this functioning was determined by operation of these circuits for some period of time after the test. In addition, samples of the cable insulation at the bottom of the tray over the fire zone were given insulation elongation measurements to determine mechanical change. These measurements showed less than a 10% increase in elongation due to the fire. Quite often this small increase is attributed to a small change in crosslinking due to heat.

TVA performed a test with substantial overcurrent on a 2-conductor, No. 10 AWG cable, rated 90°C, located in a tray and surrounded by other cables. The spacing of two rows of five each of loaded ladder steel trays was 9 inches vertically, bottom to bottom, and 6 inches horizontally. This arrangement is conservatively representative of the Watts Bar design with nondivisional trays in same tier with trays of one division. The purpose of the test of overcurrent on a power cable was to determine if a sustained cable tray fire could be initiated that would propagate to cables in trays

adjacent to the tray containing the test cable. Power was applied to the test cable in steps and resulted in a maximum temperature of 549°F (287°C) which melted both the test cable insulation and jacket. However, auto-ignition of the test cable did not occur and only blistering of other cables in the same tray, with no damage to cables in other adjacent trays. Thus, an electrically initiated fire is only minutely probable to propagate since the fire will not spread over a large enough area to become fully developed. In addition, TVA conducted fire tests, externally initiated, on a full-scale mockup of trays loaded with cables coated with an ablative material. When applying an external propane burner fire source, no self-sustaining fire could be established until the coating was fractured and cables separated.

Following the issuance of Appendix A of NRC BTP 9.5-1, new criteria were developed by TVA to identify and protect redundant circuits, whether installed in conduits and/or cable trays within a 5-foot radius of the point of interaction. Since horizontal cable trays are well above the floor, this distance was established as the most credible zone of influence of an exposure fire threat. Design modifications were made to add cable coatings to exposed surfaces of cables and automatic sprinkler systems for the protection of redundant circuits at interaction points based on the 5-foot criterion. Automatic area sprinkler coverage is also provided for areas containing fixed combustibles including non-Class 1E cables which could impose an exposure fire threat to equipment, components, or circuits necessary to achieve safe plant shutdown.

TVA reevaluated the plant fire protection system based on a 20-foot separation of circuits required to achieve safe shutdown in event of an exposure fire. From the results of this reevaluation, TVA has provided defense-in-depth protection for these circuits with a combination of barriers, wrapping of selective conduits, and rerouting of cables to achieve a 20-foot separation. Refer to TVA Fire Protection Submittal, September 1980.

Although an electrically initiated fire may occur in a cable tray with non-divisional cables, TVA concludes that it is only minutely probable for the fire to propagate enough to challenge cables in adjacent divisional trays because no fire became fully developed from the overcurrent tests described above. Based on analysis of circuit protection, evaluation of results from tests, and defense-in-depth fire protection modifications, TVA judges that the spacing of Class 1E and non-Class 1E cable systems provides adequate separation.

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APPENDIX E

WATTS BAR NUCLEAR PLANT
SER SECTION 8.3.1.6
IEEE STD 387-1977 FOR DIESEL-GENERATING
UNITS APPLIED AS STANDBY POWER
SUPPLIES FOR NUCLEAR POWER GENERATOR
STATIONS

Requirement	Compliance
5.4.1 The effects of aging . . .	C
5.4.2 Major changes to a qualified . . .	C
5.4.3 Modifications . . .	C
5.4.4 Minor changes . . .	C
(a) When replacement does not . . .	C
(b) When replacement alters . . .	C
(c) When replacement degrades . . .	C
5.5 Design and Application Considerations	C
5.6 Design Features	
5.6.1 Mechanical and Electrical Design Features	C
5.6.1.1 Vibration	C
5.6.1.2 Torsional Vibration	C
5.6.1.3 Overspeed, Moving parts shall be designed . . .	C
(1) Full short-time load rejection	C
(2) Margin to allow overspeed	C
(3) As a minimum, the generator, exciter, and flywheel . . .	C
5.6.1.4 Governor Operation	C
5.6.1.5 Voltage Regulator Operation	C
5.6.2 Control	
5.6.2.1 Control Modes	C
5.6.2.2 Automatic Control	C
(1) . . . override all other operating modes . . .	C
(2) . . . shall not override . . . manual . . .	C
5.6.2.3 Control Points	C

APPENDIX E

WATTS BAR NUCLEAR PLANT SER SECTION 8.3.1.6

IEEE STD 387-1977 FOR DIESEL-GENERATING UNITS APPLIED AS STANDBY POWER SUPPLIES FOR NUCLEAR POWER GENERATOR STATIONS

C = full compliance

Requirement	Degree of Compliance
5. Principal Design Criteria	
5.1 Capability	C
5.1.1 General	
5.1.2 Mechanical and Electrical Capabilities	C
(1) Service environment	C
(2) Starting and loading	C
(a) From normal standby condition	C
(b) With no cooling available, . . .	C
(c) On a restart with initial engine temperature . . .	C
(3) Light load or no load operation	C
(4) Design load profile	C
(5) Quality of power	C
5.2 Rating	
5.2.1 General	C
5.2.2 General Application Rules (3.7)	
Rule 1. Inspect and scheduled . . .	C
Rule 2. Unscheduled . . .	C
5.2.3 Operation Application Rule (See 3.7.1 and 3.7.2)	C
5.3 Interactions	C
5.4 Qualification	The NRC-SRP-NUREG-0800, Section 3.11 states that for qualification of mild environment equipment; e.g., diesel generating units, the design/purchase specifications must envelope the normal/abnormal environments. This environmental qualification of the WBNP diesel generating units will be detailed, in accordance with the forementioned requirements, in TVA documentation for Class E equipment in a mild environment.

Requirement	Compliance
5.6.3 Surveillance Systems	
5.6.3.2 Modes Surveyed	C
(1) Unit not running	C
(2) Unit running - not loaded	C
(3) Unit running - loaded	C
(4) Unit out of service	C
5.6.3.3 Surveillance Instructions	C
(1) Starting system	C
(2) Lubricating system	C
(3) Fuel	C
(4) Primary cooling system	C
(5) Secondary cooling system	C
(6) Combustion air system	
(7) Exhaust system	C
(8) Generator system	C
(9) Excitation system	C
(10) Volt regulation system	C
(11) Governor system	C
(12) Auxiliary electric system	C
6. Requirements for Testing and Analyses	
6.1 General	
6.1.1 Implementation	C
6.1.2 Break-in run	C
6.1.3 Service environment	C
6.1.4 Documentation test shall be completely documented	C
Type Qualification Test Shall Contain:	
(1) The equipment performance specifications.	C
(2) Identification of specific features to be demonstrated by test.	C
(3) Test plan	C
(4) Report of test results. The report shall include:	C

Requirement	Compliance
(a) Objective	C
(b) Equipment tested	C
(c) Description of test facility	C
(d) Test procedures	C
(e) Test data and accuracy (results)	C
(f) Summary, conclusions, and recommendations	C
(g) Supporting data	C
(h) Approval signature and date	C
6.1.5 Analyses	C
6.1.6 If type qualification tests are at the engine...	C
6.2 Factory Production Tests	C
(1) Diesel engine	C
(2) Generator	C
(3) Excitation, control and other accessories/auxiliaries	C
6.3 Type qualification testing procedures and methods	C - Except seismic was not done per IEEE 344-1975 Justification: It is TVA's position that the intent of this position has been fully met. Please refer to TVA's response to NRC question 112.22 relating to seismic qualifications of Watts Bar safety-related equipment. In addition, please refer to FSAR Table 3.10.1, sheet 2, for a summary of the seismic qualification of electrical equipment including the diesel generators. Further Table 3.10.3 "Watts Bar Seismic Qualifications," sheets 11 through 20 for tests,

Requirement		Compliance	
			results, and references of the seismic qualification of various components of the diesel generator unit.
6.3.1	Load capability qualification		
	(1) Load...continues...22 hrs	C	
	(2) Then 2-hr rating	C	
	(3) The continuous load rejection...	C	
	(4) Light load equal...	C	
6.3.2	Start and load acceptance qualification 300 valid start...	C	
	The start and load tests shall be conducted as follows:		
	(1) Engine cranking shall begin...	C	
	(2) Immediately following (1),...	C	
	(3) At least 270 of the tests...	C	
	(4) At least 30 of the tests...		All 300 tests required by section 6.3.2 were run from the warm standby temperature. It is TVA's position that starting a diesel generator (DGU) from the warm standby temperature is a more severe test than starting from the normal temperature. This is backed up by statements from a representative of one of the leading manufacturer's of DGUs for nuclear plant service. Their experience has been that there is little or no difference in starting ability. That DGUs have responded well when started from both conditions and that no DGUs have failed the qualification test.

Requirement	Compliance
(5) If these tests are performed on more than one unit...	C
If cause of failure...without penalty...	
(a) Unsuccessful start attempts...	C
(b) A starting or load or both tests...	C
(c) Test performed...trouble shooting...	C
(d) Successful start...	C
(e) Failure of temporary...	C
6.3.3 Margin & Qualification the criteria for the margin qual. are as follows:	
(1) Demonstrate the ability of gen. and excitation system...	C
(2) Demonstrate that there is sufficient engine torque...	C
6.4 Site Test Categories	
6.4.1 Starting Test	C
6.4.2 Load Acceptance Test	C
6.4.3 Rated Load Test	
(1) A load equal to continuous rating... plus 1 hour	C
(2) A load equal to shorttime rating...for 2 hours	C
6.4.4 Design Load Test	C
6.4.5 Load Rejection Test	C
6.4.6 Electrical Test	C
6.4.7 Subsystem Test	
6.5 Site Acceptance Testing	
6.5.1 Test Loads	C

Requirement	Compliance
6.5.2 Test Conduct	C
6.5.3 Tests: The tests to be given to the DGU...:	
(1) Starting test	C
(2) Load acceptance tests	C
(3) Rated load tests	C
(4) Design load tests	C
(5) Load rejection tests	C
(6) Electrical tests	C
(7) Subsystem tests	C
6.6 Periodic Testing	C
6.6.1 Availability Test	C
6.6.2 Operational Test. The DGU . . . one cycle or each . . .	
(1) Starting tests	C
(2) Load acceptance tests	C
(3) Design load tests	C
(4) Load rejection tests	C
(5) Subsystem tests	C
6.7 Preventive Maintenance, Inspection, and Testing	C

APPENDIX F

WATTS BAR NUCLEAR PLANT

SER SECTION 8.3.2.2
D.C. SYSTEM MONITORING AND ANNUNCIATION
DIESEL GENERATOR BATTERY SYSTEM

To provide further assurance that the surveillance requirements of IEEE 308-1974 criteria for "Independence of Class 1E Equipment and Circuits" for direct-current systems are met, TVA will commit to do the following:

1. To replace the present discharge ammeter with a bidirectional ammeter with zero center position to indicate charging current as well as discharge current.

2. To provide blown fuse indication on the battery main fuses. This will be combined with existing "Diesel Generator Control Power Failure" in the main control room.

3. To check diesel generator battery main breaker position once per eight-hour shift do determine if it is closed, tripped or open.

4. To add an over-voltage relay for alarm purposes, this condition will be combined the existing "Diesel Generator Battery Trouble" alarm in the main control room.

5. To check ground detector once per eight-hour shift to determine if a ground exists.

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