APERTURE CARDS 07-53-91

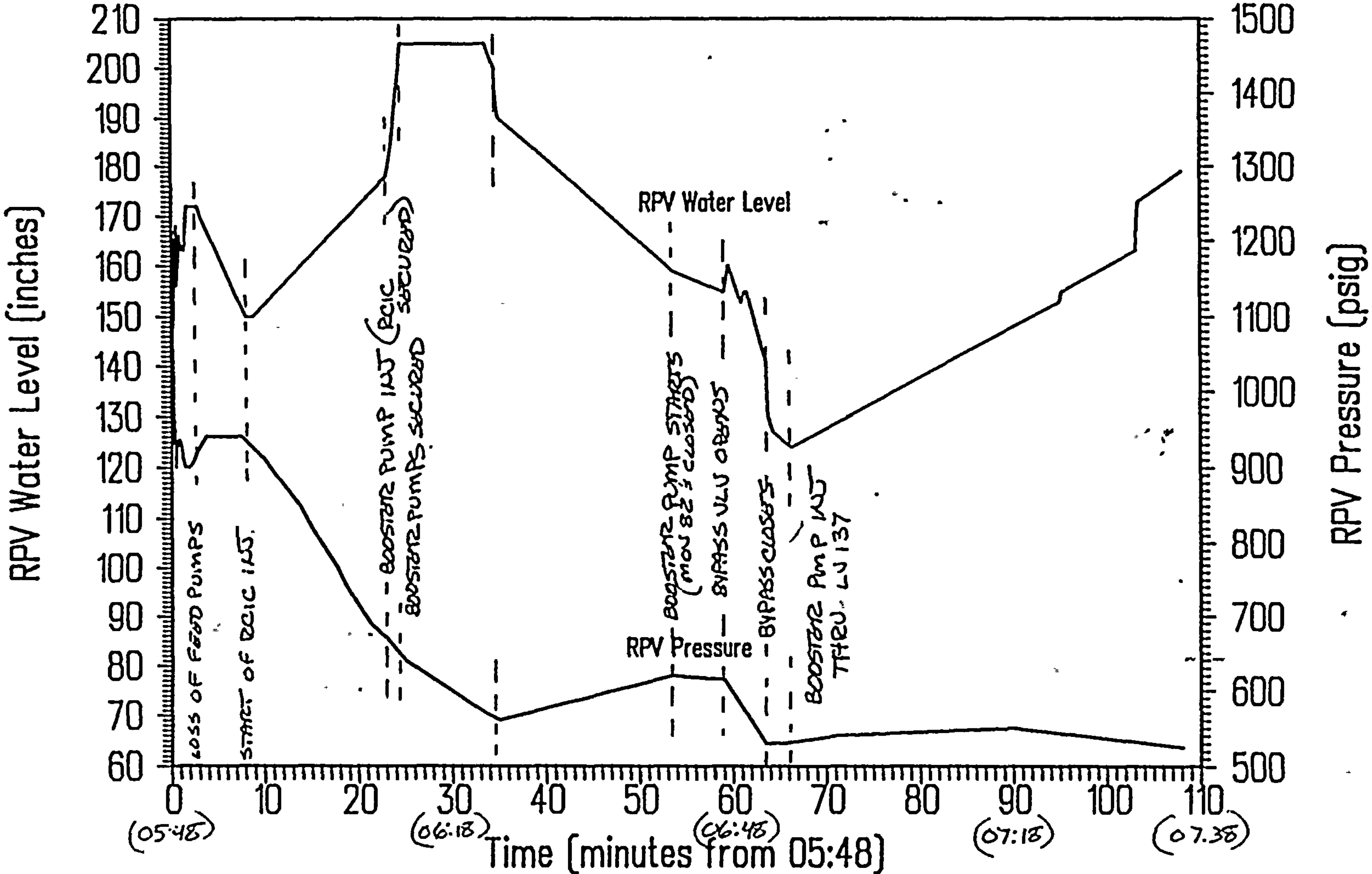
RECORDER B22 - R623B
PAM - POST ACCIDENT MONITORING
8/02/91 - 8/13/91

REACTOR PRESSURE AND LEVEL

1 OF 37 AND 1 OF 41

AVAILABLE AT THE PUBLIC DOCUMENT ROOM

Nine Mile Point Unit 2
Reactor Pressure and Water Level vs Time



Data from August 13, 1991 Site Area Emergency

MARK DAVIS

07-30-91

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

PAGE 1

Comments:

Approximately 0548 heard a big pop in back of control room from relays, All annunciators
and the computers went off line. There were a few annunciators (≈ 3 or 4) on Pnl 601, 100 box
in left center that flashed without sound. Control Room was very quiet (usual noise of fans gone)
All pnl 603 recorders were frozen at normal operating values, and many of the indicators
were downscale. Others provided readings, but was difficult to assess their accuracy. Noted
feed pumps had tripped, but condensate was still running. Mike Conway pointed out RCS downshift
at the same time. Unable to determine power, so Mike Ercon went to go back panel and reported
APRMs downscale. Mode switch was placed in shutdown within one minute of event start. PAMS
still operating, and as Rx level lowered, manually initiated RCIC with pushbutton. RCIC started, but
fluctuated wildly in Auto, took control in manual. Rx Level 3 shortly after RCIC initiated
(Gaitronics did not operate and was unable to notify other operators immediately after mode switch to S/D, had to
wait for them to come into Control Room) There was no indication of rod position available, so EOPs
were entered into RPV + CS. SAE declared @ 0600, had Unit 1 announce SAE there, no broadcast @ Unit 2.
Dispatched operator to UPS area to check status, reported back that UPS 1 series were tripped and locked out. (See
attached) In plant phones were not all working (some did), loss of radio links were also hampered communications.
Dave Hanczyk + Mike Garber were sent down to UPS's to join Phil McEwen + Jim Sturms. UPS power restored on maintenance
@ ≈ 0622.

SEE PAGE 2

(Use additional sheets if necessary)

E.M. Dave 8-14-91 / 0500

Signature Date Time

CSO

Position

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

PAGE 2

Comments:

Very early in Event (probably before 0600, called Power Control to check for unusual problems in grid.
about an hour later received call from Tom Flynn Regional Control stating that 345 Scriba/Volney
20 line " line protection A package Relay 46PTA line 20" was tripped, and had loss of Guard Tone. was
unsure at that point whether that had caused trip, or our trip had caused his. Report on Main Transf
B oil "leak" came through around that time. (see attached)

Other problems - inplant operators complained about lack of procedural guidance for UPS restoration
to maintenance from deenergized condition found.

From my viewpoint as Duty CSO: (1) Communications Systems were gone until power restored. (2) Once power was back,
the SAE prevented immediate assistance from Computer Dept for Computer restart (A tech that reports to Control Room
for Accountability might be considered). (3) Phone # PL2TSC should be removed from CSC console telephone, people that
picked up that line at CSO ~~phn~~ desk prevented operators from answering x2168. (4) By the time the CSC was
manned, RP had already reported no radiation in RB, & TB was close to this time frame, and a "Normal"
scram recovery was in progress. Having to dispatch operators to CSC greatly hampered recovery effort. (5) I don't
remember the time, but it was quite awhile after SAE announced that Regional Control called & complained that they
had heard of SAE from Rochester. (6) Very difficult time getting turbine in gear. (7) UPS loss ~~xxxx~~ caused CWS & MCGS.
(bypass valves) to open which overflowed the basin. (8) It is fortunate that this event happened just before Turnover
INSTEAD of a couple of hours earlier, 2 E's on shift is not enough to cover any major event.

(Use additional sheets if necessary)

E. M. Dave 8-14-91, 0550

Signature Date Time

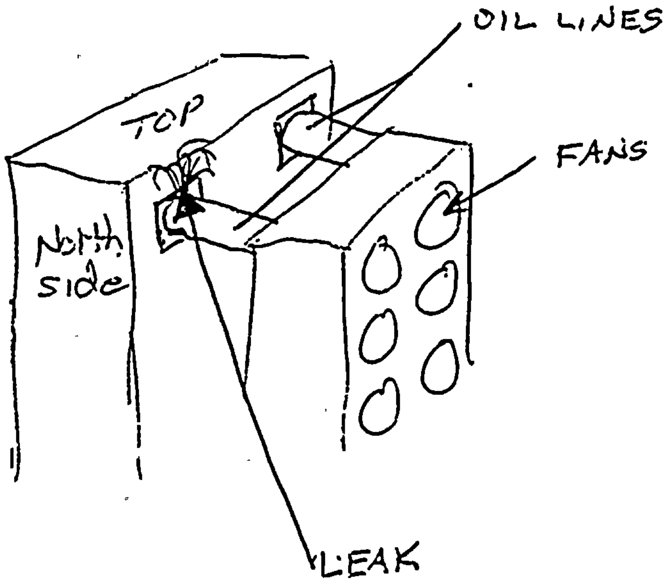
CSO

Position

[illegible]

UPS 1's found in condition as ind. above, placed toggle sw for CB 3 to open & manually closed CB 4 (maint sply) which restored all your noise.

Mn Xfmr 1B, noticed oil on wall, verified leak on Xfmr, placed fan/pumps switches in off.



From Mike Garbus

0548 Event start

Manually RCIC

0600 SAE Rx Scram + ~~loss of over~~ loss of ann.

0617 Level 8

0613 shutdown booster pump. CNM

UPS pwr.

0627 ~~[illegible]~~ Restored manually ~~closed~~ closed CB4 [illegible]

RPS jumpers installed

0653 Scram Reset.

0655 RP no abnormal ~~[illegible]~~ conditions in RB.

Tom Flynn

Regional Center 345 switchyard 20 line 1 in prot. A package Relay 46PT

line 20 tripped. Loss of Guard tone.

XCB4 — MA10
fan switches in off

0700 - STARTED HPU B SUBLOOP A, [redacted]
0722 Secured mn. stm to Clean stm reboiler
RBS-AOV145 wouldn't open reestablished Mn stm
0728 ACU4A in service
0729 Start LARC P1A
0730 " " P1B
0732 RCS V145 open
0738 Started RCW P1B
Conway relieved by McCormick. SED
0740 RCIC shutdown to stby.
0742 LARC-V36 Remote oper broke, preventing closing
0746 Established Aux Blr stm to Reboilers AOV145 pinned open
0750 SPDS rtn to service
0755 Reopening RCS FCVs low speed pumps
0758 Off Gas secured in accord w/ OP 42
0804 EOF STAFFED
0805 Stack Gems inop
0806 RCS FCV'S AT 100% OPEN.
0820 Mode sw. locked in S/D
0821 ADS inhibit sw rtn to norm.
RPS jumpers removed.
0831 RP completed T.B. surveys OK for norm. access.
0847 Stack Gems operable
0850 RHR C in stby.
0853 RMS operating properly & Data Bases verified
0907 UPS 1C on normal power supply
0915 UPS 1D on norm sply

~~0922~~

0936 UPS 1B output bkr will not close (CB-3) still on maint sply.

0937 RCIC outbd check valve (40V156) has packing leak MOV126 deenergized closed.

MARK DAVIS 07-~~24~~ 30-91

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

PAGE 1

Comments:

Approximately 0548 heard a big pop in back of control room from relays, All annunciators and the computers went off line. There were a few annunciators (0 3 [illegible]) on Pnl 601, 100 [illegible] in left center that flashed without sound. Control Room was very quiet (usual noise of fans gone) All pnl 603 recorders were frozen at normal operating values, and many of the indicators were downscale. Others provided readings, but was difficult to assess their accuracy. Noted Mike Conway pointed out RCS downshift feed pumps had tripped, but condensate was still running. Unable to determine power, so Mike Errin went to go back panel and reported at the same time. PAMS APRMs downscale. Mode switch was placed in shutdown within one minute of event start. RCIC started, and still operating, and as Rx level lowered, manually initiated RCIC with pushbutton. RCIC started, but fluctuated wildly in Auto, took control in manual. Rx Level 3 shortly after RCIC initiated (Gaitronics did not operate and was unable to notify other operators immediately after mode switch to S/D, had to wait for them to come into Control Room) There was no indication of rod [illegible] position available, so EOPs were entered into RPV + CS. SAE declared @ 0600, had Unit 1 announce SAE there, no broadcast @ Unit 2 Dispatched operators to UPS area to check status, reported back that UPS 1 series were tripped and locked out. (is attached) In plant phones were not all working (some did), loss of radio [illegible] were also hampered communications. Dave Hrenczyk + Mike Garber were sent down to UPS's to join Phil McEwen + Jim Sterns. UPS power restored on maintenance @ ≈ 0622.

SEE PAGE 2

(Use additional sheets if necessary)

E. M. Dunn 8-14-91 / 0500

Signature Date Time

CSO

Position

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

PAGE 2

Comments:

Very early in Event (probably before 0600, called Power Control to check for unusual problems in grid about an hour later received call from Tom Flynn Regional Control stating that 345 Scriba/Volney 20 line "line protection A package Relay 46 PTA line 20" was tripped, and had loss of Guard Tone. We unsure at that point whether that had caused trip, or our trip had caused his. Report on Main Trans B oil 'leak' came through around that time. (see attached)

Other problems - Inplant operators complained about lack of procedural guidance for UPS restoration ~~to~~ maintenance from deenergized condition found.

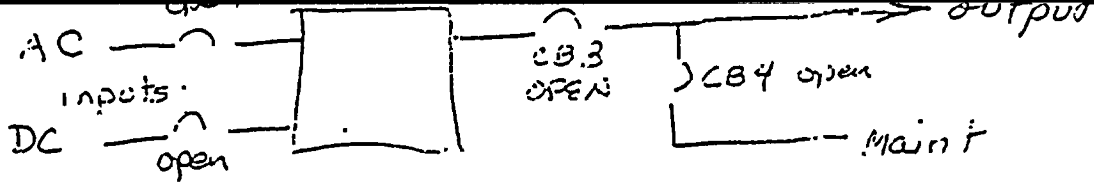
From my viewpoint as Duty CSO: ① Communications systems were gone until power restored. ② Once power was back, the SAE provided immediate assistance from Computer Dep't for Computer restart (A team that reports to Control Room for Accountability might be considered). ③ Phone # PL2TSC should be removed from CSO console telephone, people that picked up that line at CSO ~~desk~~ desk prevented operators from answering x 2165. ④ By the time the CSO was manned, RP had already reported no radiation in RB, - TB was close to this time frame, and a "Normal" scram recovery was in progress. Having to dispatch operators to CSO greatly hampered recovery effort. ⑤ I don't remember the time, but it was quite a while after SAE announced that Regional Control called + explained that they had heard of SAE from Rochester. ⑥ Very difficult time getting turbine on gear. ⑦ UPS loss ~~___~~ caused CWS + MSC (bypass valves) to open which overflowed the basin. ⑧ It is fortunate that this event happened just before Turnover ✗ INSTEAD of a couple of hours earlier, 2 E's on shift is not enough to cover any major event.

(Use additional sheets if necessary) E. M. Dave 8-14-91, 0550

Signature Date Time

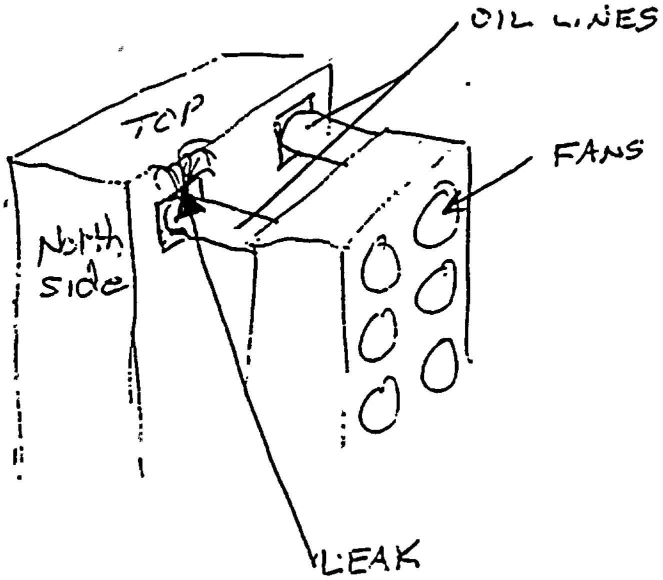
CSO

Position



UPS 1's found in condition as ind. above, placed toggle sw for CB 3 to open & manually closed CB 4 (maint sply) which restored all your noise.

Mr Xfmr 1B noticed oil on wall, verified leak on Xfmr, placed fan/pumps switches in off.



From Mike Garbus

0548 Event start

Manually RCIC

0600 SAE Rx Scram & ~~Loss of ...~~ loss of ann.

0612 Level 8

0613 shutdown booster pump. CNM

UPS power

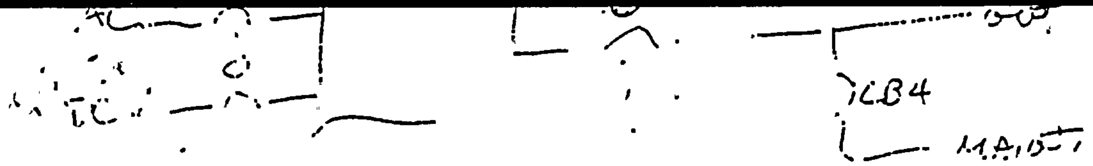
0627 ~~...~~ Restored manually closed ~~...~~ CB 4 pt

RPS jumpers installed

0653 Scram Reset.

0655 RP no abnormal conditions ~~...~~ in RB.

Tom Flynn
Regional Center 345 switchyard 20 line 1 in prot. A package Relay 46P
1 in 20 Tripped. Loss of Guard tone



Main Xfmr TB
fan switches m

0700 - STARTED HPU B SUBLOOP A, [redacted]
C722 Secured mn. stm to Cnsm stm reboiler
XS-AOV145 wouldn't open reestablished mn stm.
0728 HCU4A in service
C729 Start SARC P1A
0730 " " P1B
0732 RCS V145 open
0738 Started RCU P1B
Conway relieved by McCormick SED
0740 RCIC shutdown to stby
0742 ZARC-V36 Remote oper broke, prevents closing
0746 Established Aux Blr stm to Reboilers AOV145 open
0750 SPDS rtn to service
0755 Reopening RCS FCVs low speed pumps
0758 Offgas secured in accord w/ OP 40
0804 ECF STAFFED
Stack Gems incap
0806 RCS FCVs AT 100% OPEN.
0820 Mode sw. locked in S/D
0821 ADS inhibit sw rtn to norm.
RPS jumpers removed.
0831 RP completed T.B. surveys OK for norm. access.
0847 Stack Gems operable
0850 RHR C in stby
0853 RMS operating properly & Data Bases verific
0907 UPS 1C on normal power supply
0915 UPS1D on norm sply

~~0922~~

0936 UPS 1B output bkr will not close (CB-3) still on maint sply.

0937 RCIC outbd check valve (40V156) has packing leak. MOV126 de-energized closed.

ALFRED T. DENNY 07-[illegible]-91

30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments:

The first indication of trouble was a sharp drop and recovery in the Control Room Light Level. The CSO (?) said we have Lost all annunciators. Tom Tuttle and I were starting our Turn over. We walked away from the SEPC/STA desk (around behind the fire panel) and Truely there were no annunciators, No full core display, No indication of the status of RPS. The PAM Recorders indicated Normal Water Level & pressure.

Mike Conway ordered the mode switch placed in shut down and entered the EOP'S. He also had an operator Monitoring Reactor Water Level & Reactor pressure on the PAM Recorders.

I got out the Classification Chart (EAP-2) and suggested 2 possible Classifications to Don Bosnic. He was inclined to go with the Site Area Emergency because of the Loss of all annunciators and a transie (Reactor Scram), I subsequently made this suggestion to Mike Conway and he declared a "Site Area Emergency" at 0600.

When the notification was finished (6:06) on the RECS Line by Krukows (a Rad Waste Operator) a Notification to the NRC was started (Contd on ba

(Use additional sheets if necessary) Alfred T. Denny 8-13-91 10:37

Signature Date Time

SEPC

Position

DON BOSNIC 07-~~28~~-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments:

SEE ATTACHED

(Use additional sheets if necessary)

D Bosnic 8-13-91 / 1525
Signature Date Time

ONCOMING ASSS
Position

~0550 I ENTERED THE PLANT THRU SECURITY & AS I WALKED BETWEEN SECURITY & THE PLANT I HEARD A LOUD BANG (SOUNDED LIKE A LARGE DOOR SLAMMED SHUT). AT THE SAME TIME MANY OF THE OUTDOOR LIGHTS WENT OUT. AS I ENTERED THE PLANT I ALSO NOTICED MANY LIGHTS WERE OUT (INSIDE THE CONTROL BUILDING)

0553 I ENTERED THE CONTROL ROOM EXPECTING ALOT OF ANNUNCIATOR ALARMS BUT IT WAS QUIET. THE ANNUNCIATOR BOARDS WERE BLACK. THE INDICATOR LIGHTS WERE STILL ON FOR THE CONTROL PANEL EQUIPMENT. 603 FULL CORE DISPLAY WAS BLANK. SCRAM SOLENOID LIGHTS WERE OUT. ~~A COUPLE OF~~ "A" NARROW RANGE LEVEL INSTRUMENT READ DOWNSCALE, "B" & "C" INDICATED NORMAL BAND. MODE SWITCH WAS IN SHUTDOWN. 601 INDICATORS (QUICK SCAN) LOOKED NORMAL. PAM RECORDERS WERE TRENDING & WERE BEING USED FOR LEVEL & PRESSURE INDICATION.
EOC RPT BKRS WERE OPEN (NO INDICATION OF RECIRC PUMP SPEED) - 1 & 2 BKRS WERE CLOSED WHICH MEANT RCS WAS PROBABLY IN SLOW SPEED

0553 M. ERON ASKED ME TO CALL FOR THE COMMUNICATION AID & I DID THAT - COMM. AID SHOWED UP AT ABOUT 0602

I HEARD MARK BODAH GIVING LEVEL READS. LEVEL DROPPING 165 ↓. ~~BRIAN HILLIKER~~ SOMEONE WAS TOLD TO ~~RCF~~ INITIATE ICS. THERE APPEARED TO BE A PROBLEM INITIATING ICS MANUALLY BUT WITHIN A COUPLE OF MINUTE ICS WAS RUNNING BEING CONTROLLED MANUALLY BY BRIAN HILLIKER. ~~LEVEL~~

0556 LEVEL ↓ TO L3. MIKE CONWAY ENTERED RPV CONTROL EOP AND SINCE NO ROD INDICATION ENTERED C5.

TB

~0602 LEVEL BEING RESTORED BY ICS > 159 RISING.

BETWEEN 0602 & 0700 LEVEL ROSE TO L8 & TRIPPED ICS. LEVEL ~~CONTROL WAS TRANSFERRED TO CONDENSATE~~ DROPPED TO ABOUT 140 BEFORE LEVEL CONTROL WAS REGAINED USING CONDENSATE SYSTEM.

0622 ANNUNCIATOR POWER CAME BACK ON (MIKE CONWAY HAD SENT DAVE MARCZYK TO RESTORE POWER TO UPS (1 SERIES) LOADS WHICH BROUGHT BACK THE ANNUNCIATORS & BEGAN THE RESTORATION OF THE COMPUTER SYSTEMS). UPS WERE NOW ON MAINT. SUPPLY

~0625 I TOOK OVER PHONE COMMUNICATIONS WITH THE NRC CONTROL CENTER AND ~~WAS~~ LOST TRACK OF PLANT SPECIFICS BUT KEPT A GENERAL OVERVIEW

I DID THE LOG RECONSTRUCTION FROM NOTES TAKEN DURING THE EVENT BY SEVERAL INDIVIDUALS

TOM TUTTLE 07-~~23~~ 30-91

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments:

-ARRIVED IN CONTROL ROOM AT ≈ 5:45 AM AND BEGAN TURNOVER WITH AL DENNY (OFF GOING STA-SEPC)
- FEW MINUTES LATER, CONTROL ROOM LIGHTS FLICKERED AND WE WENT OUT TO MAIN AREA AND FOUND NO ANNUNICATOR WINDOWS LIT AND THE PROCESS & RAD WASTE COMPUTER SCREENS BLANK - ALSO, RECORDERS WERE NOT WORKING
- IMMEDIATELY CHECKED 3D MONICORE TERMINAL AND FOUND IT DOWN ALSO
- ASSISTED IN TRYING TO FIND GOOD INDICATIONS OF Rx PARAMETERS & ROD POSITIONS - COULD NOT DO SO
- OPERATORS DID ~~SEE THAT~~ THE RECIRC PUMPS HAD TRIPPED
- SSS TOLD OPERATOR TO PUT MODE SWITCH IN S/D
- DID HAVE INDICATION OF ERCS "RUBICS CUBE" ARI INITIATION
- ASSISTED AL DENNY WITH SEPC DUTIES/EVENT CLASSIFICATION.
- NOTIFIED 1st C, DAVE SKINNER, T. TOMLINSON
- ASSISTED IN ANSWERING PHONES & COMMUNICATING PARAMETERS TO PSC
- NOTICED SRU TAILPIECE TEMP RECORDER - WHEN IT REGAINED POWER, PSU 133 & 128 WHERE AT HIGHER TEMPS THAN BEFORE THE SCRAM - ALL OTHER PSU'S WERE EQUAL TO OR LOWER THAN BEFORE THE SCRAM

(Use additional sheets if necessary) Thomas Tuttle / 8/13/91 10:30

Signature Date Time

~~SSS~~ ONCOMING STA-SEPC

Position

07-~~[illegible]~~-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments: ~~A~~ Responded to the Control Room after plant SCRAM. Immediately went to the relay room to investigate possible cause for the SCRAM. Noted Mn Generator 86's tripped for both primary & backup protection. Also noted generator differential overcurrent flagged. Returned to the Control Rm to inform SSS and assist in SCRAM recovery. Stationed @ PNL 603. Carried out SCRAM actions & noted IRM's downscale on range 10. Attempted to determine rod position & vessel level. Followed SSS's direction in EOP's. After pwr was restored, monitored level while continuing to determine rod position & Rx pwr. Informed SSS of highest reading SRM "C" @ ≈ 10⁷ + CPS & spurious short period on SRM "C". Feed restored to vessel via RCIC. Noted 6 rods w/ no position indication & informed SSS. Inconsistent indications between RSCS, RWM, Full Core Display & 4 rod display. Finally able to verify all rods FULL IN on RSCS & RWM. ~~Er~~ Informed SSS & continued to monitor vessel level on WIDE RANGE level indication until level was restored on NARROW RANGE. Investigated DIV. II high O_2 concentration.

(Use additional sheets if necessary) Mark A. Bodoh 8/13/91 / 0915

Signature Date Time

NASE

Position

07-~~126~~ 30-91

<u>PLANT PERSONNEL STATEMENTS</u>

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments:

2VBB-UPS1A HAS AN INTERNAL FAULT. CB-1 (AC BKR) TRIPS AND BKR 1 IN PNL301 TRIPS WHEN TRYING TO RESTART UPS1A.

2VBB-UPS1B - CB3 WILL NOT CLOSE

2VBB-UPS1G - CB1 TRIPPED AND BKR 7 TRIPPED IN PNL 301 ON 1ST ATTEMPT. RESET BKR 7 IN PNL301 AND CB-1 ON UPS1G. UPS1G THEN RESTARTED

2VBB-UPS1 C&D RESTARTED WITH NO PROBLEMS

(Use additional sheets if necessary) Robert Bergunstr 8/1/91 1045

Signature Date Time

N.A.O.E.

Position

07-~~[illegible]~~30-91

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments:
When I WENT DOWN TO THE ~~UPS~~ 2VBB-UPS 1A, 1B, 1C, 1D, 1G
THE OV/UV Light WAS ~~LIT~~ OFF 8/13/91 AND Volt Off Light WAS LIT.
THE CB1, CB2 WERE IN TRIP CONDITIONS CB3 ?
CB4 WERE OPEN ALSO TRIP Light WAS LIT.
~~Try~~ ATTEMPTED TO RESTART THE 2VBB-UPS 1D
By THE PROCEDURE BUT IT ~~[illegible]~~ OH 8/13/91 called for
CB4 TO BE CLOSED which IT WAS NOT
SO I show THE OTHER OPERATORS WITH ME
How TO OPEN CB-4 Breaker OPERATOR THEN
WE CLOSED IN THE CB-4 BKRS ON All of.
THE UPS'S AND RETURNED TO THE CONTROL ROOM!
(CB-4 BKRS WERE NOT TRIP FREE)

(Use additional sheets if necessary)

[signature] 8/13/91 1100
Signature Date Time

In Plant E NHOE
Position

07-~~[illegible]~~-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments:

I WAS IN THE REACTOR BUILDING 215' ELE. HANGING A MARKUP ON THE RHS SYSTEM. AT APPROX 0550 THE LIGHTS WENT OUT AT WHICH TIME I EXITED THE REACTOR BUILDING AND WENT TO THE CONTROL ROOM. I WAS THEN SENT ON VARIOUS JOBS PER THE CSO.

(Use additional sheets if necessary) Philip R Nichols 8-13-91 / 0841

Signature Date Time

AUX OP "B"

Position

07-~~1829~~-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments: At approximately ~~0550~~ 0550 7/23, I was in the hallway outside the control room when I saw the lights go out, then back on. Following this there was a loud humming sound(diesels?) and then I heard the fire panel on 306' (by elevator) alarming. I re-entered the control room and, on reaching front panels, noticed all annunciators, core display, and digital readouts were blank. (All were off). I was then sent out on various jobs as directed.

(Use additional sheets if necessary) Thomas [illegible], 0545
Signature Date Time

Aux. Opr. "B"
Position

07-~~30~~-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments: Arrived @ 06:00; Mode sw had been placed in S/D, no annunciators normal level & pressure ind. not availible feed pumps not running, RCIC in service. Went to UPS's, found AC & DC inputs & UPS output bkrs tripped open
Closed CB 4 (Maint Supply) restored UPS 1's which restored annunciators & indication
Checked switchyard noted Mn Xfmr 1B (center phase) covered with oil, placed both fan/pump switches in off. Returned to Control Rm to help with shutdown

(Use additional sheets if necessary) W Harbus 8/13/91 0900
Signature Date Time

sitting
Position

07-~~31~~-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. *

Comments: I was riding down the Control Building elevator when all lights were lost in the cab. I then responded to the Control room where upon entering I noticed no core indication and loss of indication of most Annunciators and meters. ~~when~~ After noticing lack of indication the S.S.S instructed me to watch ~~the~~ Reactor ~~Pressure~~ vessel pressure and Reactor water level. Pressure started out @ 940 # and vessel level was @ 180" Pressure level was decreasing @ a steady rate THE SSS instructed me to relay vessel level and pressure level as they either rose or dropped on the wide range meters. Level steadily decreased until we reached 159" where upon the SSS instructed the License operator to start injecting RCIC to raise level. The License attempted to raise level w/ RCIC in Auto but had trouble in Auto so switched to manual. Level eventually started to increase and pressure started to decrease. ~~In About 10 min we~~ the Licensed operator then started to back off of RCIC flow due to level increase. THE Level ended up exceeding the wide band limits w/ the RCIC shutdown. THE S.S.S. then placed an E operator on the panel and thus relieved me of my duties in the control room and placed me in the [illegible]

(Use additional sheets if necessary)

Signature: [signature] Date Time: 8-13-91 / 0856

Position: NAOC

07-~~13~~ 30-91

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments: I WAS ON ~~?~~ MY WAY TO THE LOCKER ROOM AND THE LIGHTS WENT OUT. WENT BACK TO THE CONTROL ROOM TO SEE WHAT HAPPENED. CSO SAID WE SCRAM AND SENT US NLOT OUT ON JOBS IN THE PLANTS.

(Use additional sheets if necessary) Todd M Kelly 8-13-91 0841

Signature Date Time

AUX OP "B"

Position

07-~~[illegible]~~-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. *

See SSS Log For Exact Times

Comments:

HEARD NOISE
~~OBSERVED~~ LOSS of ANNUNCIATOR EXCEPT for "LOSS of ANNUNCIATOR power ALARMS" on CEC
~~Verif~~ TRIED to EVALUATE PLANT STATUS
Recommended to SSS PLACE MODE SWITCH in SHUT DOWN ⇒ PLACE Rx Mode Switch to SHUT DOWN. Verify House Loads ~~[illegible]~~ XFER'd
~~[illegible]~~ Verified DC Power AVAILABLE
Observed Drywell unit Coolers Tripped
ATTEMPTED to RESTART
During This Time WL & Pressure were Being verified on P601 PA-RECORDERS
RCIC was INITIATED
RHR placed in SUPP pool Cooling
Power Unknown at this time
Verify SDV was full

RCS Pumps Downshifted (EOC-RPT) and (on) Hi Press ARE initiated

(Use additional sheets if necessary)

[signature] 8/14/91 1000
Signature Date Time

ASSS/STA
Position

— Pressure was under control

— Cooldown was a concern
Secure
Condensate boosters at Lvl 8

— BOP of Plant

→ Aux Boilers
→ Steam Condensing
→ ...Vacuum

- Contingency
→ HPCS
→ Restore RHR B & C

Very Very Concerned w/
→ Position of Rods
→ Loss of Drywell Cooling (Containment)
→ Level & Pressure

0109 (cont.) Repairs to the NSS tap changer completed — brake circuit relay replaced.

0247 N2-OSP-LOG-W@001 completed, SAT

0404 Note ESL 91-459 for RHS * P1B and RHS + P1C which are both INOP to perform maintenance; both Div I and III ECCS have been verified operable; per T.S. 3.5.1 restore at least one Div II ECCS pump to operable within 72 ~~hours~~ Hours [illegible] or be in hot shutdown within next 12 hours. In addition, Div II suppression pool spray loop will be out of service for maintenance which is a 7 day LCO per T.S. 3.6.2.2. And Div II supp. pool cooling loop will be INOP for work on the RHS 'B' Hx bypass valve which is also a 72 hour LCO.

0531 N2-OSP-LOG-S001 completed SAT for midshift.

0548 Lost control room annunciators ~~and~~ [illegible] process computer and balance of plant indication.

0549 Placed mode switch in shutdown to manually scram the Rx.

0555 Initiated ICS for level control

0556 Rx level < 159.3. Entered EOP RPV control and C5 (no indication of control rod position on P603)

0600 Declared site area emergency

0607 Per N2-OSP-RES@001, commenced OP 101D shutdown procedure

0608 State and local agencies notified of SAE

0612 NRC notified (completed at 0640)

~~0620~~ 0615 Shutdown condensate booster pumps

0620 Shutdown condensate pumps except for CNM-P1A

0622 Annunciator power returned when UPS1A-D, G were placed

0200 - 0630 SSS LOG 8-13-91 CONWAY / GREEN / DENNY 11556

ON MAINTENANCE POWER SUPPLY

0630 ALL RODS INDICATE FULL IN EXCEPT FOR 6 RODS WHICH HAVE NO INDICATION

0640 STARTED "A" CONDENSATE BOOSTER PUMP

0650 RPS JUMPERS INSTALLED PER EOP 6 ATT 14

0653 SCRAM RESET

0700 ALL RODS INDICATE FULL IN

0711 PROCESS COMPUTER RETURNED TO SERVICE

0729 STARTED ARC - P1A & B

0738 STARTED CNM - P1B

0738 M. McCORMICK RELIEVED M. CONWAY AS SE.D.

0740 ICS SHUTDOWN TO STANDBY. CONTROLLING LEVEL WITH CONDENSATE SYSTEM USING CNM-FV137

0750 SPDS RETURNED TO SERVICE

0758 OFF GAS SECURED

0805 STACK CEMS INOP

0806 OPENED RCS FLOW CONTROL VALVE FULLY DUE TO SLOW SPEED RCS PUMP OPERATION

0821 ADS INHIBIT SWITCHES RETURNED TO NORMAL. RPS JUMPERS REMOVED

0847 STACK CEMS RETURNED TO OPERABLE

0850 PTP N2-OOP-LOG-@ ALL

0937 ICS INOP DUE TO 2ICS*AOV156 INDICATING FULL OPEN. PER T.S 3.6.3 ISOLATED THE PENETRATION BY DEENERGIZING 2ICS*MOV126 IN THE CLOSED POSITION. CSH IS OPERABLE. PER T.S. 3.7.4 WITH CSH OPERABLE, RESTORE WITHIN 14 DAYS OR BE IN HOT SHUTDOWN IN FOLLOWING 12 HOURS. NOTED ESL 91-460

2230 - 0630 SSS LOG 8-13-91 CONWAY / GREEN / TUTTLE

1006 PTP N2-OSP-18C-M@002

1030 NOTIFIED BY CHEMISTRY THAT SERVICE WATER ACTIVITY FOR SERV DISCH HDR A & B SHOWED NO ACTIVITY

1031 RESET PRIM. CONT. ISOL SYSTEM GP9 ON PANEL 602 CAUSED BY LOSS OF POWER TO GTS *RR/05

"The above is a true record of events on the preceding shift ______ SSS.

"I have read and understand the events recorded in this log since I was last on shift ______ SSS.

0630 - 1430 SSS LOG 8-13-91 MOYER / BOONE / TUTTLE

RX MODE : 3 PRESSURE : 165 LEVEL : 183 POWER : 0

MW_{TH} : 0 MW_E : 0

F SHIFT ON : RATHBUN, EMERY, LAWRENCE, DELONG, MCEWEN, BROCKWELL, HINCKLEY, BOTTRAFF, GREER

SURVEILLANCE SHIFT ON : SPOONER, MOORE, BERGENSTOCK, SMITH M, LEMAY, PELLIGRINO

TRAINING SHIFT ON : BRENNAN, HOLT, LANGLEY, RICHARDSON, HAROLD, HERMAN, DARLING

PLANT COOLDOWN IN PROGRESS

1056 WCS ISOLATED ON HIGH ΔFLOW WHILE ATTEMPTING TO PLACE WCS IN OPERATION FOLLOWING THE SCRAM. 4 HOUR NOTIFICATION REQUIRED DUE TO ESF ACTUATION.

1118 NRC NOTIFIED OF WCS ESF ACTUATION, DER WRITTEN

1136 PTP N2-ISP-NMS-W@009 (SC 8-13-91 IRM CHANNEL CHECK)

1149 CLEARED EX 91-459, RHR B AND RHR C OPERABLE, EXITED T.S. 3.5.1, 3.6.2.2, 3.6.2.3 ACTION STATEMENT.

1155 ICS * AOV 156 DETERMINED TO BE CLOSED BY VISUAL INDICATION OF A TSC DAMAGE CONTROL TEAM

0630 - 1430 SSS LOG 8-13-91 MOWER / BOSNIC / TUTTLE 277558

LE 1137 PTP N2-ESP-BYS-W675 (DIV 1 BATTERY)

1157 PTP N2-OSP-RHS-CS001 AS PMT OF RHS*MOV 40A

LE 1150 RX PRESSURE 150 #. EXITED 14 DAY LCO OF TS 3.7.4 FOR ICS BEING INOP. ICS IS NOW A MODE RESTRAINT PER T.S 3.7.4

1219 N2-OSP-ISC-M@002 COMPLETED SAT

LE 1217 ~~1222~~ B3.13.4 SHUTDOWN COOLING PRESSURE INTERLOCKS CLEARED. PER T.S 3.4.9 WITH < 2 LOOPS OF SHUTDOWN COOLING OPERABLE, WITHIN 1 HOUR DEMONSTRATE THE OPERABILITY OF AT LEAST ONE OTHER ALTERNATE METHOD OF DECAY HEAT REMOVAL.

1230 CLEARED INTERLOCK & ENERGIZED RHS*MOV 40A IN ORDER TO PROVE OPERABILITY UNDER ADMINISTRATIVE CONTROL REQUIRED BY T.S 3.6.3

1301 NOTED ESL 91-461 FOR A MODE RESTRAINT PER T.S. 3.5.1 DUE TO RHS*MOV 4B. DEENERGIZED SHUT FOR SHUTDOWN COOLING OPERATION

1314 CLEARED ESL 91-278 DECLARED 2RHS*MOV 40A OPERABLE. EXITED T.S. 3.6.3 LCO. DIV 1 LOOP OF SHUTDOWN COOLING IS NOW OPERABLE, EXITED 1 HOUR REQUIREMENT OF T.S 3.4.9

N2-OSP-RHS CS001 (PMT OF RHS*MOV 40A) COMPLETED SAT

1320 N2-ISP-NMS-W@009 (ALL ATTACHMENTS) COMPLETED SAT

LE 1303 N2-ESP-BYS-W675 (DIV 1) COMPLETE PTP DIV 2 BATTERY

1355 PTP N2-ISP-NMS-~~W~~ 8-13-91 M@008

1415 N2-ESP-BYS-W675 (DIV 2) COMPLETE PTP DIV 3 BATTERY

"I have read and understand the events recorded in this log since I was last on shift [signature] SSS.

"The above is a true record of events on the preceding shift [signature] SSS.

1430-2230 SSS Log 8/13/91 Pitts/Dragomer/Tuttle 1559

1430 Shift T/O Complete, "D" Shift on: ~~Burr~~ Rathbun (for Burr) Bullock Smith C., Merihew, Teifke, Farnett, Kott A, Kott C., Van Allen. Also extra; Spooner, Burr, Conaway, Brockwell, Emery, Moore,

NMP2 is in an SAE due to loss of Annunciation and load reject. Currently placing RHS "B" in SDC. RWCU is isolated and RPV being fed via CNM-P1A, P1B, P2A.

1434 N2-OSP-LOG-W001 completed - SAT

1435 N2-OSP-LOG-S001 Completed - SAT

L.E. 1420 While performing N2-ISP-NMS-M@08, it was noted that SRM C reading uncharacteristically high. Declared SRM C inop, Enter T.S. 3.3.7.6 (A already inop and B, D will become inop one at a time for Surveillance) action b. All rods verified inserted and the Mode switch is locked in S/D. Note ESC # 91-462.

1445 ATP N2-OSP-LOG-S@ALL

L.E. 1440 N2-ESP-BYS-W675 completed - SAT, all att's

1455 P. Bright (Fire Chief) and "B" Shift Fire Dept. on.

1457 2RCS*P1B Shutdown

1510 2RHS*P1B S/U in SDC

1430-2230 SSS LOG 8-13-91 PITTS/DRAGOMER/TUTTLE 550

1520 Rx @ 75psig, RCIC Isolation on Rx pressure as expected.

1521 Secured CNM-P2A and CNM-P1A to control vessel level by reducing FWS valve leakthrough.

1538 Main Turbine is now turning on the turning gear with normal, stable running current for the turning gear. Note that a turbine inspection should be done prior to turbine s/u.

1539 Informed that engineering walkdown of RHS piping which experienced "water hammer" during RHS heatup for shutdown cooling (reject to radwaste) has been completed with no abnormalities found.

1543 APRM "D" upscale trip (½ scram on RPS "B"). Noted APRM "D" drifting upscale slowly. All other APRMs still downscale. Directed D APRM bypassed - declared it inoperable - and reset ½ scram. Problem appears to be two LPRM inputs failing upscale.

1609 PTP N2-PM-@07 to bypass LPRM's 16-25D and 16-41B for APRM "D".

1615 Notified by chemistry (Leon Albrecht) that we have entered an action level 2 per NDD-CHE based on high sulfates of 112 ppb (100 ppb limit) and conductivity of 1.01 umho/cm (1.0 umho/cm limit.) Action required is to be in Cold shutdown within 24 hours.

1633 Directed Holdout placed on 2RCS-V145 (open) for continuous conductivity monitoring (RWCU isolated).

1643 SRM C passed N2-ISP-NMS-M@008. Although still reading high, it is considered operable. Exit T.S. 3.3.7.6

1705 Held Shift brief. Covered NRC's Confirmatory Action Letter requirements. Specifically do not change plant configuration w/o verifying it is thouroughly documented.

1718 Note ESL's 91-463 on APRM D (Info Only), 2 LPRM's bypassed and gains need adjusted.
Note ESL 91-464, WCS System Transient requiring Engineering Eval. prior to restoring to service.

1720 Notified by TSC (John Conway) that the following conditions/requirements will be maintained until further notice:
1. Maintain both Line #5 and #6 operable and electrically seperated including the emerg. switchgear
2. Maintain all functions of RHS-A and -B loops operable.
The above requirements are from SORC for coming out of the SAE pending further investigation and understanding of the S/D event.

1744 PTP N2-CSP-78V and -7V for Containment Sampling for Purge / Vent

1745 PTP N2-OSP-MSS-CS001

1747 PTP N2-CSP-78V and CSP-7V To obtain containment samples for vent/purge in preparation for de-inerting

07-~~134~~-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. |*

Comments:

I was the reactor operator tasked with placing reactor water cleanup system into full reject. ~~Ay~~ I was located at the pump control switch at Panel 602 in the main control room.

I suggested to SSS Conway to put cleanup into full reject as it was one of the post scram actions and I felt that it would assist in level control with shut down cooling on line.

As an immediate scram action, the 602 panel operator tripped the running cleanup pump (WCS-P1B.)

I Realized that normal entering into full reject could not be accomplished since pump was tripped. I utilized E.4.0 of OP 37 to support the pump start. What I did not realize was that E.4.0 was written for cold conditions. (There was a note prior to E.1.0 cautioning that it was for startup conditions.)

Following the steps in E.4.0, I started 2WCS-P1B (The fact that temperature of water ~~water~~ was some 360° did not concern me as I knew that we could enter full reject with water temperature at 500+°.)

Following the pump start, within a few seconds, the Δ flow timers initiated. I did not expect to see this occur because I did not anticipate flow to be greater than 100 gpm. In response to the Δ flow timers, I shut 2WCS-MOV110. System flow was noted at being ≈800gpm. -over-

(Use additional sheets if necessary) James F. Emery 8-14-91 1055
Signature Date Time

NAOE
Position

[illegible]

pump room was that the pump seals looked good and that by the time the ~~discharge valve~~ transient occurred, the discharge valve was ≈ 50% open. Discharge valve was subsequently shut with a holdout placed on the pump control switch for P1B.)

Report was then received that serious water hammer was occurring in the WCS heat exchanger room. In response to this, 2WCS-MOV107, 110 + FV135 were shut. The piping with FV135 was verified to be "moving."

≈15 minutes later, report came from the heat exchanger room that the water hammer was subsiding.

Team that was backwashing 2WCS-F/D A reported that 2WCS-AOV27A (isolation valve downstream of 2WCS-FV16A) opened during the water hammer transient. A holdout was ~~also~~ to be placed on 2WCS-V70A but as of 8-13-91 @ 1830, holdout was not in place because operator did not know if V70A fully shut. (2WCS-AOV27A was WR'd.) V70A is manual isolation for AOV27A.

Causes of Actuation - in my opinion:

- I thought that a sense of urgency existed. I knew that our conditions required us to be in full reject. The system had been shut down for several hours, so I thought that we were already tardy in placing it in reject. Also felt that it would assist in level control.
- I misused the procedure as the section in the startup section didn't cover the conditions that we were in - this was unintentional.
- Procedural inadequacy in that the warning not to perform section E.4.0 was in front of E.1.0. Also, the procedure needs specific guidance for covering placing us in full reject in the conditions that we were in, i.e., no pump, no filters and hot or a caution warning not to use full reject if those conditions exist. (Al DeGracia's group is supposedly correcting the procedure)
- I did not hold an adequate prejob brief, I was working with 3 other RO's and we should have sat down and verified that our actions were correct.
- Finally SSS Conway originally ordered this task. However, by the time that we were ready to start the pump, SSS Moyer was in charge. I did not inform him of this evolution (At the time, many such auxiliary evolutions were in progress. ~~and he~~)

Initials/Date

"OFF Normal Procedure"

1.8 Verify that the house loads have transferred to reserve power.

1.9 Verify that scram discharge volume vent and drain valves are shut on P603.

Rx Scram

1.10 Verify Reactor Recirculation Pumps have auto transferred to LFMG sets.

Chemistry reasons they were restoring

1.11 Transfer RWCU to full reject to main condenser per N2-OP-37, Section F.6.0 or manually trip the RWCU pumps.

This step was being performed when the RWCU system isolated inadvertently

2.0 Post Scram Recovery

NOTE: Within one hour after scram, maintain reactor pressure at or above 400 psig to assure excessive cooldown is not occurring.

NOTE: Scram discharge volume high level switches must be placed in "BYPASS" prior to resetting any scram.

NOTE: Update SPDS in accordance with N2-OP-91B. |TCN-44

2.1 Place the scram discharge volume high level switches on P603 to "BYPASS." ______/______

2.2 If an ARI has been initiated by RRCS, reset the ARI per N2-OP-36B prior to resetting the scram. ______/______

2.3 Reset the scram using the Scram Reset Switches on P603 and verify eight RPS scram pilot valve solenoids white lights are illuminated on P603. ______/______

2.4 Verify scram discharge volume vent and drain valves indicate open on P603. ______/______

2.5 Verify the following alarms clear on P603:

a. "RPS A(B) DISCH VOLUME HIGH LEVEL TRIP" window 603109 (603409).
b. "SDV LEVEL HIGH" window 603130. ______/______

* *

CAUTION

The scram discharge volume high level trip alarms may not be actuated following a reactor scram at low reactor pressure or with control rods fully inserted prior to scram.
Steps 2.4 and 2.5 must be verified prior to performing Step 2.6

* *

2.6 Place scram discharge volume high level switches to "NORMAL" at P603. ______/______

07-185-91
30

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments: ARRIVED TO WORK @ ~ 0600 8/13/91

ARRIVED IN CONTROL ROOM SHORTLY AFTER ARRIVAL AT WORK, MONITORED CONTROL ROOM ACTIVITIES & DISCUSSED PLANT CONDITIONS FOR SEVERAL MINUTES.

MYSELF & M. GARBUS PROCEEDED TO 237' NORMAL SWGR TO DETERMINE UPS 1'S STATUS. SEVERAL OPERATORS IN THE AREA (D. HANCZYK, ETC). INFORMED BY DAVE HANCZYK THAT THEY HAD ATTEMPTED TO RE-START THE TRIPPED UPS'S & WERE UNSUCCESSFUL. I RECOMENDED THAT WE DIVERT OUR EFFORTS TO BYPASSING THE UPS'S & RE-ENERGIZED DOWNSTREAM LOADS. (KNOWING THAT THE CONTROL ROOM NEEDED MORE INDICATORS).

— OVER —

(Use additional sheets if necessary)

[signature] 8/13/91 1045

Signature Date Time

CSO => SURVIELLANCE (EXTRA)

Position

0000-0630 (CONT.) SSS LOG 8-13-91 CONWAY / ERON / DANNY (EAC) (07-~~BBS~~-91) 277555

(31)

0109 (CONT.) REPAIRS TO THE NSS TAP CHANGER COMPLETED — BRAKE CIRCUIT RELAY REPLACED.

0247 N2-OSP-LOG-W@001 COMPLETED, SAT

0404 ENTER ESL 91-459 FOR RHS P1B AND RHS P1C WHICH ARE BOTH INOP TO PERFORM MAINTENANCE; BOTH DIV I AND III ECCS HAVE BEEN VERIFIED OPERABLE; PER T.S. 3.5.1 RESTORE AT LEAST ONE DIV II ECCS PUMP TO OPERABLE WITHIN 72 HOURS OR BE IN HOT SHUTDOWN WITHIN NEXT 12 HOURS. IN ADDITION, DIV II SUPPRESSION POOL SPRAY LOOP WILL BE OUT OF SERVICE FOR MAINTENANCE WHICH IS A 7 DAY LCO PER T.S. 3.6.2.2. AND DIV II SUPP. POOL COOLING LOOP WILL BE INOP FOR WORK ON THE RHS 'B' HX BYPASS VALVE WHICH IS ALSO A 72 HOUR LCO.

0531 N2-OSP-LOG-S001 COMPLETED SAT FOR MIDSHIFT.

0548 LOST CONTROL ROOM ANNUNCIATORS ~~AND~~ PROCESS COMPUTER AND BALANCE OF PLANT INDICATION.

0549 PLACED MODE SWITCH IN SHUTDOWN TO MANUALLY SCRAM THE RX.

0555 INITIATED ICS FOR LEVEL CONTROL

0556 RX LEVEL <159.3. ENTERED EOP RPV CONTROL AND C5 (NO INDICATION OF CONTROL ROD POSITION ON P603)

0600 DECLARED SITE AREA EMERGENCY

0607 PER N2-OSP-RES-@001, COMMENCED OP 101D SHUTDOWN PROCEDURE.

0608 STATE AND LOCAL AGENCIES NOTIFIED OF SAE

0612 NRC NOTIFIED (COMPLETED AT 0640)

~~0620~~ 0615 SHUTDOWN CONDENSATE BOOSTER PUMPS

0620 SHUTDOWN CONDENSATE PUMPS EXCEPT FOR CNM-P1A

0622 ANNUNCIATOR POWER RETURNED WHEN UPS1A-D, G WERE PLACED

2200 - 0630 SSS LOG 8-13-91 CONWAY / CREN / BENNY 277556

ON MAINTENANCE POWER SUPPLY

0630 ALL RODS INDICATE FULL IN EXCEPT FOR 6 RODS WHICH HAVE NO INDICATION

0640 STARTED "A" CONDENSATE BOOSTER PUMP

0650 RPS JUMPERS INSTALLED PER EOP 6 ATT 14

0653 SCRAM RESET

0700 ALL RODS INDICATE FULL IN

0711 PROCESS COMPUTER RETURNED TO SERVICE

0729 STARTED ARC - P1A & B (mech vac pmps)

0738 STARTED CNM - P1B

0738 M. McCORMICK RELIEVED M. CONWAY AS S.E.D.

0740 ICS SHUTDOWN TO STANDBY. CONTROLLING LEVEL WITH CONDENSATE SYSTEM USING CNM-FV137

0750 SPDS RETURNED TO SERVICE

0758 OFFGAS SECURED

0805 STACK CEMS INOP

0806 OPENED RCS FLOW CONTROL VALVE FULLY DUE TO SLOW SPEED RCS PUMP OPERATION

0821 ADS INHIBIT SWITCHES RETURNED TO NORMAL. RPS JUMPERS REMOVED

0847 STACK CEMS RETURNED TO OPERABLE

0850 PNP N2-OSP-LOG-@ ALL

0937 ICS INOP DUE TO 2ICS*AOV156 INDICATING FULL OPEN. PER T.S 3.6.3 ISOLATED THE PENETRATION BY DEENERGIZING 2ICS*MOV126 IN THE CLOSED POSITION. CSH IS OPERABLE. PER T.S. 3.7.4 WITH CSH OPERABLE, RESTORE WITHIN 14 DAYS OR BE IN HOT SHUTDOWN IN FOLLOWING 12 HOURS. NOTED ESL 91-460

2230 - 0630 SSS LOG 8-13-91 CONWAY / GREEN / TUTTLE 277557

1006 PTP N2-OSP-ISC-M@002

1030 NOTIFIED by CHEMISTRY THAT SERVICE WATER ACTIVITY for SERV DISCH HDR A & B "SHOWED NO" ACTIVITY

1031 RESET PRIM. CONT. ISOL SYSTEM GP9 on PANEL 602 CAUSED By loss of power to GTJ #RL/05

"The above is a true record of events on the preceding shift _______ SSS.

"I have read and understand the events recorded in this log since I was last on shift _______ SSS.

0630 - 1430 SSS LOG 8-13-91 MOYER / BOONE / TUTTLE

RX MODE : 3 PRESSURE : 165 LEVEL : 183 POWER : 0

MW_{TH} : 0 MW_e : 0

F SHIFT ON : RATHBUN, EMERY, LAWRENCE, DELONG, MCEWEN, BROCKWELL, HINCKLEY, BOITRAFF, GREER

SURVEILLANCE SHIFT ON: SPOONER, MCGRE, BERGENSTOCK, SMITH M, LEMAY, PELLIGRINO

TRAINING SHIFT ON: BRENNAN, HOLT, LONGLEY, RICHARDSON, HANFORD, HEENAN, DARLING

PLANT COOLDOWN IN PROGRESS

1056 WCS ISOLATED ON HIGH ΔFLOW WHILE ATTEMPTING TO PLACE WCS IN OPERATION FOLLOWING THE SCRAM. 4 HOUR NOTIFICATION REQUIRED DUE TO ESF ACTUATION.

1118 NRC NOTIFIED OF WCS ESF ACTUATION, DER WRITTEN

1136 PTP N2-ISP-NMS-W@009 (SRM 8-13-91 IRM CHANNEL CHECK)

1149 CLEARED EX 91-457, RHR B AND RHR C OPERABLE. EXITED T.S. 3.5.1, 3.6.2.2, 3.6.2.3 ACTION STATEMENT.

1155 ICS * AOV 156 DETERMINED TO BE CLOSED BY VISUAL INDICATION OF A TSC DAMAGE CONTROL TEAM

0630 - 1430 SSS LOG 8-13-91 MOHECK / BOSNIC / TUTTLE 277558

LE 1137 PTP N2-ESP-BYS-W675 (DIV 1 BATTERY)

1157 PTP N2-OSP-RHS-CS001 AS PMT OF RHS*MOV 40A

LE 1150 RX PRESSURE 150 #, EXITED 14 DAY LCO OF TS 3.7.4 FOR
ICS BEING INOP. ICS IS NOW A MODE RESTRAINT PER T.S 3.7.4

1219 N2-OSP-ISC-M@002 COMPLETED SAT

LE 1217 ~~1222~~ SHUTDOWN COOLING PRESSURE INTERLOCK CLEARED. PER T.S 3.4.9
WITH < 2 LOOPS OF SHUTDOWN COOLING OPERABLE, WITHIN 1 HOUR
DEMONSTRATE THE OPERABILITY OF AT LEAST ONE OTHER ALTERNATE
METHOD OF DECAY HEAT REMOVAL.

1230 CLEARED INTERLOCK & ENERGIZED RHS*MOV 40A IN ORDER TO PROVE
OPERABILITY UNDER ADMINISTRATIVE CONTROL REQUIRED BY T.S 3.6.3

1301 NOTED ESL 91-461 FOR A MODE RESTRAINT PER T.S. 3.5.1 DUE TO
RHS*MOV 4B DEENERGIZED SHUT FOR SHUTDOWN COOLING OPERATION

1314 CLEARED ESL 91-278 DECLARED 2RHS*MOV 40A OPERABLE.
EXITED T.S. 3.6.3 LCO. DIV 1 LOOP OF SHUTDOWN COOLING IS NOW
OPERABLE, EXITED 1 HOUR REQUIREMENT OF T.S 3.4.9
N2-OSP-RHS-CS001 (PMT OF RHS*MOV 40A) COMPLETED SAT

1320 N2-ISP-NMS-W@009 (ALL ATTACHMENTS) COMPLETED SAT

LE 1303 N2-ESP-BYS-W675 (DIV 1) COMPLETE PTP DIV 2 BATTERY

1355 PTP N2-ISP-NMS-~~W~~ M@008

1415 N2-ESP-BYS-W675 (DIV 2) COMPLETE PTP DIV 3 BATTERY

"I have read and understand the events recorded in this log since I was last on shift [signature] SSS.

"The above is a true record of events on the preceding shift [signature] SSS.

1430-2230 SSS Log 8/13/91 Pitts/Dragomer/Tuttle 277559

1430 Shift T/O Complete, "D" Shift on: ~~Burr~~ Rathbun (for Burr) Bullock Smith C., Merihew, Teifke, Farnett, Kott A, Kott C., Van Allen. Also extra; Spooner, Burr, Conaway, Brockwell Emery, Moore,

NMP2 is in an SAE due to loss of Annunciation and load reject. Currently placing RHS "B" in SDC. RWCU is isolated and RPV being fed via CNM-P1A, P1B, P2A.

1434 N2-OSP-LOG-W001 completed - SAT
~~0~~1435 N2-OSP-LOG-S001 Completed-SAT
L.E. 1420 While performing N2-ISP-NMS-M@08, it was noted that SRM C reading uncharacteristically high. Declared SRM C inop, Enter T.S 3.3.7.6 (A already inop and B, D will become inop one at a time for Surveillance) action b. All rods verified inserted and the Mode switch is locked in S/D. Note ESL #91-462.
1445 AP N2-OSP-LOG-S@ALL
L.E. 1440 N2-ESP-BYS-W675 Completed - SAT, all att's.
1455 P. Bright (Fire Chief) and "B" Shift Fire Dept. - on.
1457 2RCS*P1B Shutdown
1510 2RHS*P1B S/U in SDC

1430-2230 SSS LOG 8-13-91 PITTS/DRAGOMER/TUTTLE 277560

1520 Rx @ 75psig, RCIC Isolation on Rx pressure as expected.

1521 Secured CNM-P2A and CNM-P1A to control vessel level by reducing FWS valve leak through.

1538 Main Turbine is now turning on the turning gear with normal, stable running current for the turning gear. Note that a turbine inspection should be done prior to turbine S/U.

1539 Informed that engineering walkdown of RHS piping which experienced "water hammer" during RHS heatup for shutdown cooling (reject to radwaste) has been completed with no abnormalities found.

1543 APRM "D" upscale trip (½ scram on RPS "B"). Noted APRM "D" drifting upscale slowly. All other APRMs still downscale. Directed D APRM bypassed - declared it inoperable - and reset ½ scram. Problem appears to be two LPRM inputs failing upscale.

1609 PTP N2-PM-@07 to bypass LPRM's 16-25D and 16-41B for APRM "D".

1615 Notified by chemistry (Leon Albrecht) that we have entered an action level 2 per NDD-CHE based on high sulfates of 112 ppb (100 ppb limit) and conductivity of 1.01 umho/cm (1.0 umho/cm limit.) Action required is to be in Cold shutdown within 24 hours.

1633 Directed Holdout placed on 2RCS-V145 (open) for continuous Conductivity monitoring (RWCU isolated).

1643 SRM C passed N2-ISP-NMS-M@008. Although still reading high, it is considered operable. Exit T.S. 3.3.7.6

1705 Held Shift brief. Covered NRC's Confirmatory Action Letter requirements. Specifically do not Change plant Configuration w/o verifying it it thourorughly documented.

1718 Note ESL's 91-463 on APRM D (Info only), 2 LPRM's bypassed and gains need adjusted.
Note ESL 91-464, WCS System Transient requiring Engineering Eval. prior to restoring to Service.

1720 Notified by TSC (John Conway) that the following conditions/requirements will be maintained until further notice:

1. Maintain both Line #5 and #6 operable and electrically seperated including the emerg. switchgear
2. Maintain all functions of RHS-A and -B loops operable.

The above requirements are from SORC for coming out of the SAE pending further investigation and understanding of the S/D event.

1744 PTP N2-CSP-78V and -7V for Containment Sampling for Purge/Vent

1745 PTP N2-OSP-MSS-CS001.

1747 PTP N2-CSP-78V and CSP-7V To obtain containment samples for vent/purge in preparation for de-inerting

1430-2230 SSS LOG 8-13-91 PITTS/DRAGOMER/TUTTLE 277562

1754 PTP N2-OSP-LOG-D001.

1802 Directed 2FWS-MOV21A/B closed to facilitate RPV level control via RDS and RHS.

1846 Rx is in Mode 4, RCS Suction temp. 199°F

1854 During performance of N2-OSP-MSS-CS001, MSIV 6D did not indicate fully closed (i.e. red/green light indication - red never extinguished)

1858 MSIV's are closed except as noted in 1854 entry.

1943 Terminated Site Area Emergency (SORC approved) with stipulations as addressed in 1720 entry.

2030 2RHS*MOV142 will not stroke with switch in Control Room.

2043 Operator at 2RHS*MOV142 can open manually, Valve can stroke closed from Cont. Rm but not open. Elect investigating

2100 M. Heenan back problems, will not be at work (Doctors orders - 3 days).

2106 ESL #91-466 on 2RHS*MOV142 initiated (won't close from Control Room.)

2120 ESL #91-462 cleared, SRM C operable (see 1643 entry)

2123 D. Crager off, E. Dragomer on as SEPC.

L.E. 0600 Using conservative power of 3323 MWth for the 0600 CTP, the shift avg. CTP for Mids was 3322.75 MWth.

2137 ESL #91-464 on RWCU cleared. WCS is available.

Note: due to Carbon misplaced logs continued on Pg. 277564 and 277563 is not used.

~~277563~~ [initials]

THIS PAGE LEFT INTENTIONALLY BLANK

(CARBON MISPLACED) [initials] 8/13/91

~~277562~~ dcd 8/13/91

THIS PAGE INTENTIONALLY BLANK

(CARBON MISPLACED) dcd 8/13/91

1754 OTP N2-OSP-LCG-DC01.

1802 Directed 2FWS-MOV21A/B closed to facilitate RPV level control via RDS and RHS.

1846 Rx is in Mode 4, RCS Suction temp. 199°F

1854 During performance of N2-OSP-MSS-R@001, MSIV LTD did not indicate fully closed (ie red/green light indication - and [illegible] evaluated)

1858 MSIV's are closed except as noted in 1854 entry.

1943 Terminated Site Area Emergency (SERC approved) with stipulations as addressed in 1720 entry.

2030 2RHS*MOV142 will not stroke with switch in Control Room

2043 Operator at 2RHS*MOV142 can open manually. Valve can stroke closed from Cont Rm but not open. Elect investigating.

2100 M. Hessian back problems, will not be at work (Doctor's orders - 3 days).

2106 ESL #91-466 on 2RHS*MOV142 initiated (won't close from Control Room.)

2120 ESL #91-462 closed SPM (operable (see 1643 entry)

2123 T. Grow all E Diagonal on an SEPC.

L.E. 0600 Using conservative curve of 3373 MWth for the 0600 CTP the shift avg CTP for Mids was 3322.75 MWth.

2137 ESL #91-464 on RWCU closed. WCS is available.

Note: due to carbon misplaced, logs continued on pg. 277564 and 277563 is not used.

1930-2230 (cont.) SSS Log 8/13/91 Pitts/Dragomer 277564

2143 PTP N2-ISP-CNT-R@001, Penetration Leak Rate testing.
2212 Note that Action Level 2 requirements from SGO 89-07 were exited when Mode 4 was entered @ 1846.
2220 All T.S. req'd. Chem. surveillances complete (Eves.)
2225 Shift average CTP = 0 MWth

"The above is a true record of events on the preceding shift. SSS."

"I have read and understand the events recorded in this log since I was last on shift. SSS."

2230 - 2400 SSS LOG 8-13-91 CONWAY / FERON

Rx MODE 4 Rx LVL 186.5" Rx PRESS 3.75# Rx TEMP. 135°F
RHS "B" IN SHUTDOWN COOLING REJECTING TO RADWASTE, Rx VESSEL NATURALLY VIA RDS.

2300 SHIFT TURNOVER COMPLETE, "A" SHIFT ON: DAVIS, HANCZYK, BODOH, ARMSTRONG, KELLY, NICHOLS, RESTUCCIA FOR VULCANO (VAC.), HOFFMAN FOR D. MORGAN (VAC.)
2310 HELD SHIFT BRIEF; P. BRIGHT AND "D" SHIFT ON AS FIRE BRIGADE, Mc YOUNG AND "D" SHIFT ON FOR RAD PROT. COVERAGE
2350 PTP N2-OSP-CPS-@001
2355 PTP N2-OSP-LOG-S004/5
2359 NOTIFIED POWER CONTROL THAT ACCESS TO THE SCRIBA [illegible] SWITCHYARD IS RESTRICTED

0000 - 0630 SSS LOG 8-14-91 Conway / EB 277565

PLANT STATUS CHECKSHEET

MW 0 BL 1855 SPL 200.2 RB 0.75 MODE 4 Shift D 3 (M)

MWE 0 RQ 0 SPT 76 OFG 0 : 0 RHB + PIB in Shutdown Cooling

CORE FL. 6.12 RP 3.3 PCP 14.4 VAC 0 0 0

~~DWT~~ 97

Operable ECCS | SWP A C E B D F | FWS A B

CSL CSH | WCS A B F/D A B C D | COND BOOST. A B C

~~LPCI A B C~~ | RCS A B FS SS | COND A B C

Surveillances / Work in Progress:

Surveillances in progress: N2-OSP-LOG-S004/5, N2-OSP-CPS-@001, N2-ISP-CNT-R@001 for LLRT's, N2-OSP-MSS-CS001, N2-CSP-78V and CSP-7V for containment purge samples

Active LCO's: (1) SWP * CAB 146 A and B ⇒ sample pumps tripped, can't restart; T.S. 3.3.7.9 requires 12 hr grab samples

(2) SWP * CAB 23A ⇒ sample pump tripped, can't restart; per T.S. 3.3.7.5 alternate sample plan in use (info only in mode 4)

(3) HVC * CAB 18A ⇒ monitor tripped off, can't restart; per T.S. 3.3.7.1 monitor placed in tripped condition w/i 8 hrs

(4) RMS * CAB 180 ⇒ Vent GRMS inop during CSP-RMS-~~B6~~ R316; per T.S. 3.3.7.10 aux equip for sampling in use, 4 hr flow estimates, 12 hr grab samples

0015 N2-ISP-CNT-R@001 for penetration Z74 completed, SAT

0020 N2 CSP-78V & CSP-7V completed, purge rate is unlimited for primary containment purge

0030 PTP N2-ISP-CNT-R@001 on Supp. Chamber North Hatch 40" test

0047 PTP N2-EPM-GEN-R696 ISOL phase bus P.M. for removal main generator links

0050 PTP N2-ISP-CNT-R@001 for Supp. Chamber South Hatch 40" test

0056 N2-OSP-CPS-@001 closed out, not required in mode 4

1430-2230 SSS LOG 8-13-91 PITTS/DRAGOMER/[illegible] 07-~~137~~-91 31

1754 PTP N2-OSP-LOG-D001.

1802 Directed 2FWS-MOV21A/B closed to facilitate RPV level control via RDS and RHS.

1846 Rx is in Mode 4, RCS Suction temp. 199°F

1854 During performance of N2-OSP-MSS-CS001, MSIV 6D did not indicate fully closed (i.e. red/green light indication - red never extinguished)

1858 MSIV's are closed except as noted in 1854 entry.

1943 Terminated Site Area Emergency (SORC approved) with stipulations as addressed in 1720 entry.

2030 2RHS*MOV142 will not stroke with switch in Control Room.

2043 Operator at 2RHS*MOV142 can open manually, Valve can stroke Closed from Cont. Rm but not open. Elect investigating

2100 M. Heiman back problems, will not be at work (Doctors orders - 3 days).

2106 ESL #91-466 on 2RHS*MOV142 initiated (won't close from Control Room.)

2120 ESL #91-462 Cleared, SRM C operable (see 1643 entry)

2123 D. Crager off, E. Dragomer on as SEPC.

L.E. 0600 Using conservative power of 3323 MWth for the 0600 CTP, the Shift avg. CTP for Mids was 3322.75 MWth

2137 ESL #91-464 on RWCU Cleared. WCS is available.

Note: due to Carbon misplaced logs continued on Pg. 277564 and 277563 is not used.

12 August 91 to
13 August 1991 (Tues) CSO 2230-0630 E. Davis/M. Badah 277776

07-[illegible]-91
33

CSO LOG PLANT STATUS CHECKLIST

~~MODE SW POS.~~	RUN	~~SUPPPOOL LVL (FT)~~	200.17
~~Rx POWER %.~~	100	~~SUPPPOOL AVG TEMP~~	77
~~Rx PRESS.~~	1004	~~Rx BLDG ΔP (H2O)~~	-.65
~~Rx Temp °F.~~	530	~~CST LEVEL (FT)~~	39.3
~~Rx LVL (INCHES)~~	183.1	[illegible]	72.9
~~MW THERMAL~~	3323	[illegible]	87.5
~~MW ELECT.~~	1122	[illegible] GPM	2.10
~~Rx ROD LINE~~	101.162	[illegible] GPM	.67

A Shift on

2349 CCP Feed and bleed stopped

2353 P-T-P N2-OSP-LOG-W001

0010 P-T-P N2-OSP-LOG-W@001

0027 When the annunciator test was preformed at Div I Diesel Control Panel (local) computer point EGPUC11 - EDG1 OVERSPEED TRIP - alarmed and would not clear. No annunciators remained alarmed, and an inspection of the overspeed trip switches indicated no problems. Verified that there is no impact on Diesel operability, computer pt is bad. Wi

0109 House loads have been shifted to the Normal Station Service Transformer

0144 N2-OSP-LOG-W@001 complete

0202 RHS*P1A started for Sup. Chamber spray

0244 RHS*P1A stopped

0321 D. Hanczyk "A.T.C"

0359 E. Davis "A.T.C"

0404 RHS B and C loops INOP for EPMs and repairs

0548 Lost Control Room Annunciators, process computer and BOP indication

MY OBSERVATIONS ON 8/13/91 @ 0548 AND SHORTLY THEREAFT.

HEARD NOISE POPP SOUND | 07-[illegible]-91 |

REALIZED LOST ANNUNCIATORS & SEVERAL METERS

WENT TO BACK PANEL APRM'S DOWNSCALE
→ RCS Pump Down Shifted
RECOMMENDED TO SSS PLACE MODE SWITCH IN SHUTDOWN

MODE SWITCH WAS PLACED IN SHUTDOWN
→ CALLED UNIT 1 to make ~~[illegible]~~ Announcements ops to contr.
→ CALLED UNIT 1 DECLARE SAE.
USED INDICATIONS ON P601 TO MONITOR Rx Pressure & Level

Verified HOUSE LOADS Transferred

Verified DC Power was AVAILABLE

KNEW THERE WAS A PROBLEM WITH UPS 1 SERIES 'OPERATORS were DISPATCHED INITIAL COULD NOT RESTORE reported all UPS ⇒ MIKE GARBUS EVENTUALLY RESTORED

OBSERVED Drywell Unit Coolers Tripped
Very concerned WITH This
ATTempt overrides w/ Drywell Temperature Ranging from 120 → 165

Verified SDV was full & (I Think) VALVES INDICATED CLOSED

RCIC WAS INITIATED

(Power) or Rod Position were not Known

13 August 1991 (Tues) CSO 2230-0630 E. Davis/M. Bodoh 277777

0549	Mode Switch placed in shutdown
0555	Manually initiated RCIC
0556	Rx Level < 159.3", entered EOP's RPV and CS (no indication of rod position)
0600	Declared Site Area Emergency
0607	P-T-P N2-OSP-RCS-@001
0615	Shutdown Condensate Booster pumps
0620	Shutdown CNM-P1C, CNM-P1B.
0622	Annunciator power and other indicators restored when the UPS 1A-D,G were placed on maintenance power
0630	All rods indicate full in except 6 with no indication
0640	CNM-P2A started
0650	RPS jumpers installed per EOP 6 Att 14
0653	Scram Reset
0700	All rods full in
0711	process computer restored
0729	ARC-P1A + P1B started. RCS-V145 IS OPEN
0738	CNM-P1B started
0740	RCIC shutdown to standby, Level via CNM-FV137
0750	SPDS restored
0758	OFG secured
0806	RCS flow control valves opened fully
0821	ADS inhibit switches returned to normal, RPS jumpers removed
0937	ICS INOP, *AOV156 did not shut on RCIC shutdown, ICS*MOV126 deenergized shut.
0950	Attempting to restore UPS's to normal power. UPS 1C+D restored, problems with UPS 1A+B required leaving them on ~~main~~ maintenance.

"I have read and understand the events recorded in this log since I was last on shift D. Fallon SSS

The Above Is A True Record Of Events On The Preceding E. M. Davis CSO

CSO

8/13/91 0630 - 1830 Rathbun/Emery 277778

CSO LOG PLANT STATUS CHECKLIST

~~MODE SW POS:~~	S/D	~~SUPPPOOL LVL (FT)~~	200.16
~~Rx POWER %:~~	0	~~SUPPPOOL AVG TEMP~~	76.8
~~Rx PRESS:~~	235	~~Rx BLDG ΔP (H_2O)~~	-0.46
~~Rx Temp °F:~~	429	~~CST LEVEL (FT)~~	38.6
~~Rx LVL (INCHES)~~	183	~~SWP TEMP °F~~	72.5
~~MW THERMAL~~	—	~~CWS FLUME TEMP~~	74.8
~~MW ELECT~~	—	~~DER LEAK RATE GPM~~	1.02
~~Rx ROD LINE~~	—	~~DFR LEAK RATE GPM~~	0.32

1017 D. Rathbun relieved M. Davis as CSO, F-shift on.
1020 UPS1G placed on normal power supply
1031 Group Nine Isolation Reset
1035 Accum 26-31 charged (T.W.# 7219 due 12/4/91)
1052 Regional Control closed R925 and R230
1055 Started 2WCS-P1B for full reject mode.
1056 2WCS-P1B tripped due to delta-flow timers, cleanup isolated.
1119 P.T.P. N2-OSP-ISC-M@002
1137 PTP N2-ISP-NMS-W@009
1140 PTP N2-ESP-BYS-W675 (Div I)
1159 PTP N2-OSP-RHS-CS001
1200 Secured 2RHS*P1A
1213 N2-OSP-ISC-M@002 complete
1217 Reset Shutdown Cooling and Cleanup Isolations
1303 N2-ESP-BYS-W675 (DIV I complete, starting Div II)
1315 N2-OSP-RHS-CS001 Complete
1319 N2-ISP-NMS-W@009 Complete

1358 PTP N2-ISP-NMS-M@008
1414 N2-ESP-BYS-W675 (Div II complete, starting Div III)
1415 Shut 2CNM-AOV109 (CND Bypass)
1437 N2-ESP-BYS-W675 Complete
1458 Shutdown 2RCS-P1B (for SDC)
1508 Started 2RHS*P1B in Shutdown Cooling Mode
1519 Shutdown 2CNM-P2A
1520 Shutdown 2CNM-P1A
1708 Requested that Chemistry perform N2-CSP-78V in preparation for Primary Containment Purging (Contact: Kent Stoffle)
1807 Shut 2FWS*MOV21A + 21B
1850 PTP N2-OSP-MSS-CS001

"I have read and understand the events recorded in this log since I was last on shift ______, CSO"

The Above Is A True Record Of Events On The Preceding Shift ______ CSO"

1846 Rx in cold shutdown
1858 MSIV's closed per N2-OSP-MSS-CS001
except AOV6D has dual indication
1914 Secured 2ARC P1A/B
1916 Opened condenser Vacuum breakers
1920 Secured sealing steam
1930 Shutdown Clean steam reboilers

[illegible]
Shift ______ CSO"

"I have read and understand the events recorded in this log since I was last on shift E. M. Davis SSS, CSO"

07-139-91

~~XFMR~~ Ray main 07-~~[illegible]~~ 34 -91 8/16/91

Plan for 8/16/91

- Open B phase transformer and have the confined space entered once there is a approval for entry (AP).

- Inspect the interior of the transformer
  NRC wants to see the interior

- Remove links on phase A & C MAIN, house service transformer

- Test phases A & C plus complete testing on phase B possibly house service transformer (Doble & TR & Megger)

- Station maintenance to assess the work to be done on phase B auxillary equip. removal

- prepare to megger the generator (staging)

- after testing completed, reconnect bus bar.

- Remove the Fire system piping From phase B (Mechanical)

Completed on 8/15/91 ← Notes by J. LARA.

- 'B'Φ Test results
- Oil Analysis on 'B'Φ

- XFMR Specialist from GE
- Cooper (M.E.) Rep.
- NM XFMR (In-house) personnel

OIL [ ]
ASKAREL [ ]
AIR [ ]
GAS [ ]

DOBLE INSULATION TESTS

TWO-WINDING TRANSFORMERS B

DOBLE ENGINEERING COMPANY
WATERTOWN, MASS.
FORM MH-2W7701

COMPANY DIVISION Central DATE 9-5-91
LOCATION OF TESTS Nine Mile Pt. #2 AIR TEMP. TOP OIL TEMP.
TRANSFORMER NM #2 Step up 2MTX-XM1B WEATHER Cloudy % HUMIDITY
MFR. M.G. Ed. SERIAL NO. C-06607-5-2 AGE 1985 TYPE/CLASS FOA KVA 408000/[illegible]760
FREE BREATHING [ ] SEALED [X] GAS BLANKETED [X] CONSERVATOR [X] GALLONS OF OIL [illegible]

		BUSHINGS MFR.	TYPE	CLASS	DWG. NO.	CAT. NO.	KV	YEAR
HIGH SIDE KV	345 Y[X] Δ[ ]	M.G. Ed.						
LOW SIDE KV	24.3 Y[X] Δ[ ]	[illegible]						
NEUTRAL		M.G. Ed						

DATE LAST TEST 6-21-85
COPIES TO LAST SHEET NO.

OVER-ALL TESTS

TEST	WINDING ENERGIZED	WINDING GROUNDED	WINDING GUARDED	TEST KV	MILLIAMPERES METER READING	MULTIPLIER	MILLIAMPERES	WATTS METER READING	MULTIPLIER	WATTS	% P.F. MEASURED	COR. 20°C	KEY TO INSULATION RATING	INSULATION RATING
24800 1	HIGH	LOW		10	46.8	2.0	93.6	12.6	1.0	12.6	— —	— —	G = GOOD	
5300 2	HIGH		LOW	10	19.9	1.0	19.9	6.6	.2	1.32	.66		C_H D = DETERIORATED	
3	LOW	HIGH									— —	— —	I = INVESTIGATE	
4	LOW		HIGH										C_L B = BAD (REMOVE OR RECONDITION)	
CALCULATED RESULTS					—	— —	73.7	— —	— —	11.28	1.53		C_{HL} (TEST 1 MINUS TEST 2)	
					— —	— —		— —	— —		— —	— —	(TEST 3 MINUS TEST 4)*	— —

19500

73.6 X 1.0 = 73.6 BUSHING TESTS 59.5 X 0.2 = 11.90 *CURRENT AND WATTS SHOULD COMPARE WITH THOSE FOR C_{HL} 1.62

BUSHING TESTS

	LINE NO.	BUSH NO.	PHASE	BUSHING SERIAL NO.	TEST KV	MICROAMPERES METER READING	MULTIPLIER	MICROAMPERES	WATTS METER READING	MULTIPLIER	WATTS	% P.F. MEASURED	COR. 20°C	COLLAR TESTS (WATTS/CURRENT) TOP		INSULATION RATING
HIGH SIDE	1															
	2					Could NOT Energize L.V. wdg										
	3															
	4	N				Tripped Set Out										
LOW SIDE	5															
	6					Core Megger Test										
	7															
	8	N														
	9															
	10					H.V. wdg Core 20 M[illegible] to Grnd										
	11															
	12					LV wdg Core Shorted to Grnd										
	13															
	14															
	15					H.V. wdg Tests Checks L.V. wdg Problem										
	16															
	17															
	18															
	19	OIL SAMPLE												OIL TEMP. °C		

N = NEUTRAL

DIAGRAM

REMARKS:

R.C. Cody
TEST SET NO. 1107/175 TEST BY K.R. Gordner CHECKED BY Retest Test SHEET NO. S-X21A

~~FitzPatrick~~ SS Log 07-~~[illegible]~~-91 .35 № 096

August 13, 1991 23-07 D Squires / R. Make

Kramer, Welles, Cunningham, Scaggs, Fox, Hershemer

The plant in shutdown in the Cold Condition mode switch in "REFUEL" B RHR system in SDC, A RHR system OOS for Maint. A Core Spray A & C EDGs are dedicated to ECCS. Equipment inop. listed as follows 12MOV-80, 02MOV-39/40, 01-107-FIB, 66FN-13B, Rx Bldg fire barrier NW Stairwell, Fire station # 309 (DW Entrance), 17RM-463B, 17RM-434B, Stack Purge Blding CO_2, 76WV-1, 27PCX-101B, EIRM, 10MOV-25A, 66WC-22K, Vacuum Breakers

2300 - D. Squires / R Make relieved the watch.
Completed review of ST-13A SAT

2342 - Informed ANI that the electric fire pump (76P-2) out of service for maint.

0100 - Changed the main generator to 40 psig

0300 - Completed post work testing on 76P-2 (PMWR 50 1229) SAT 76P-2 is operable, ANI informed

0401 - Completed review of ST-5N SAT

0406 - Completed review of ST-40D SAT

0451 - Completed review of ST-1G SAT

~~0519 - Received spurious alarms 10500 and 10600 bus degraded voltage, Nine Mile II tripped.~~

0608 - Nine mile II in E-Plan at the site area emergency level - Loss of ... vital ... [illegible]

(120)(100) = 12 K
(124)(50) = 6.2 K
(122)(80) = 9.76 K

27.96

124
x50
6200

122
x80
9760

9.76
12
21.76
6.2
27.96

TABLE 3.3.3-2 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION SETPOINTS

TRIP FUNCTION		TRIP SETPOINT	ALLOWABLE VALUE
C. Division III Trip System			
1. HPCS System			
a. Reactor Vessel Water Level - Low, Low, Level 2		≥108.8 in.*	≥101.8 in.
b. Drywell Pressure - High		≤1.68 psig	≤1.88 psig
c. Reactor Vessel Water Level - High, Level 8		≤202.3 in.*	≤209.3 in.
d. Condensate Storage Tank Level - Low		≥12.5 ft.**	≥12.25 ft.**
e. Suppression Pool Water Level - High		≤201.0 ft. el	≤201.1 ft. el
f. HPCS System Flow Rate - Low (Bypass)		≥825 gpm	≥750 gpm
g. Pump Discharge Pressure - High (Bypass)		≥240 psig	≥220 psig
h. Manual Initiation		NA	NA
D. Loss of Power (Divisions I & II)			
1. 4.16-kV Emergency Bus Undervoltage - Loss of Voltage	76%	a. 4.16-kV basis - ≥3148	≥3051 volts
		b. ≤3.06-sec time delay	≤3.12-sec time delay
2. 4.16-kV Emergency Bus Undervoltage - Degraded Voltage	92%	a. 4.16-kV basis - ≥3847 volts	≥3770 volts
		b. ≤8.16-sec time delay†	≤8.32-sec time delay†
		c. ≤30.6-sec time delay	≤31.2-sec time delay

07-36-91

TABLE 3.3.3-2 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
E. Loss of Power (Division III)		
1. 4.16-kV Emergency Bus Undervoltage - Loss of Voltage	a. 4.16-kV basis - $\geq$3148 volts	$\geq$3051 volts
	b. $\leq$3.06-sec time delay	$\leq$3.12-sec time delay
2. 4.16-kV Emergency Bus Undervoltage - Degraded Voltage	a. 4.16-kV basis - $\geq$3847 volts	$\geq$3770 volts
	b. $\leq$12.24-sec time delay	$\leq$12.48-sec time delay

---

* See Bases Figure B3/4 3-1.

** Reference zero point for the CST is the bottom of the CST (el. 251 ft 0 in.)

† Alarm only without LOCA signal present; Alarm and trip with LOCA signal present.

07-31-91

NIAGARA MOHAWK NUCLEAR DIVISION — DEVIATION / EVENT REPORT

DER 2-91-Q-0011

Part 1 INITIATION (Initiator/Supervisor)

Page 1 of 31

Problem: NO SETPOINT PM'S FOR UPS — Radiological Problem ☐ Yes ☒ No

A - Discovery Date 4/2/91 Time (24 Hr.) 12:00
Event Date ____ Time (24 Hr.) ____

B - Applicability ☐ Unit 1 ☒ Unit 2 ☐ Common

C - DER Category ☒ Process ☐ Hardware ☐ Personnel

D - Component No. (EPN/EIN): MULTIPLE (SEE M)

E - Location (Bldg./Elev./Area): MULTIPLE (SEE M)

Code: ____

F - Drawing No./Rev.: ____

G - System/Equipment Title: UNINTERRUPTIBLE POWER SUPPLIES

H - System Code/Number: VBA/VBB

I - Spec./P.O. No./Rev: E035A

J - Vendor (Name and Code No.): EXIDE, ELGAR

K - Detected during: ☐ Operational Abnormality ☐ OEA Investigation ☒ Other (Explain) SYSTEM ANALYSIS
☐ Prev. Maint ☐ Alarm ☐ QA Inspection ☐ QA Surveillance ☐ QA Audit ☐ NRC Action
☐ Correct Maint. ☐ ISI/IST ☐ Special Inspection ☐ Surveillance Test ☐ Observation ☐ INPO Action

Source Code: IND

L - Associated References (Title, Document No., Rev., Date, Section, etc. of the documents used as basis for identifying the Dev/Event)
☐ Tech. spec ____ Section ____ ☐ CFR ____
☐ Procedure No. ____ Sect/Step ____ ☒ Other ____

M - Description of Deviation/Event, Potential Impact, Basis for Determination, and Immediate Actions Taken.

FOR EQUIPMENT LIST, SEE ATTACHED.
- THESE LISTED UPS' DO NOT HAVE PM'S FOR SETPOINT VERIFICATION
- THIS COULD CAUSE LOSS OF UPS DUE TO DRIFTED UNDERVOLTAGE SETPOINT, OVERLOAD TRIP, ETC.
- THREE SEPERATE PM'S ARE REQUIRED FOR THIS VERIFICATION

N - ☐ WR Initiated; WR No(s). ____ ☒ N/A ☒ See Attached

O - Initiator (Print) (x 4640) ROBERT J CRANDALL — Date 4/2/91 ☒ Copy

P - * Supervisor (Sign) [signature] — Date 4-3-91 — Phone Ext. 4239 — Orgcode 2661

Part 2 INITIAL REPORTABILITY / OPERABILITY REVIEW (SSS / SRC)

A - Plant Condition ☒ N/A — Operating Condition (Circle One) 1 2 3 4 5 6 — Rx Power (MWe) ____ (MWt) ____
Rx Temp ____ Rx Pressure ____ Rx Level ____ Core Flow ____
Activity in Progress ____

B - LCO Entry ____ ☒ N/A — Mode Change Restraint ☐ Yes ☒ No

C. - Operability Determination Required ☐ Yes ☒ No

D - Reportability Determination ☒ N/A — S R DORT (Print Name) — 4/4/91 (Date)

20.402	☐ No	☐ Immediate		
20.403	☐ No	☐ Immediate	☐ 24 Hr	LER # ____
20.405	☐ No	☐ 30 Days		
26.73	☐ No	☐ 24 Hr	☐ Other ____	

50.72	☐ No	☐ 1 Hr	☐ 4 Hr
50.73	☐ No	☐ Yes	
73.71	☐ No	☐ 1 Hr	☐ 24 Hr
40CFR302	☐ No	☐ Immediate	

Part 21 Review Required ☐ No ☐ Yes

NRC Notified ☐ N/A ☐ Person Contacted ____ Date/Time /

Person notifying NRC ____ (Print Name) ____ (Sign)

E - SSS/ASSS ____ (Print Name) ____ (Sign) Date ____

F - SRC agrees with classification ☒ Yes ☐ No — SR DORT (Print Name) — SR Dort (Sign) — 4/4/91 (Date)

NIAGARA MOHAWK NUCLEAR DIVISION

DEVIATION / EVENT REPORT

DER 2-91-Q-0011

Part 3 ACTION ASSIGNMENT (Plant Manager)

A - Responsible Organization Technical Unit Org Code 2661 **Priority B Disposition Due 4/18/91

B - Prepare Regulatory Report ______ Org Code ______ Priority ______ Report Due ______

C - SORC Review Required ☐ Yes ☒ No D - Plant Manager* (or Designee) M. McCormick Date 4/4/91

Part 4 EVALUATION AND DISPOSITION (Responsible Organization)

A - Evaluation and Problem Description ☐ See Attached

4 PROCEDURES ARE NEEDED - 1 E.P.M. PROCEDURE EACH FOR 2VBS-UPS1-SERIES, 2VBB-UPS1-SERIES, 2VBB-UPS1A; AND 1 ESP NEEDS TO BE WRITTEN FOR 2VBA & UPS2A/2B

B - Hardware ☐ N/A
- ☐ Rework
- ¤ ☐ Use-as-is
- ¤ ☐ Repair
- ☐ Reject

¤ = Technical Justification Required (attach supporting documentation)

C - Classification ☐ N/A
- ☒ Safety Related
- ☒ Non Safety Related
- ☐ Fire Protection (Unit 1)
- ☐ EQ ☐ Q ☐ ASME

D - 10CFR50.59 Review Required ☐ Yes ☒ No

E - Significant Condition Adverse to Quality ☐ Yes ☒ No

F - Reportability Review Required ☐ Yes ☒ No

G - Root Cause Analysis Required ☐ Yes ☒ No

H - Description of Root Cause ☒ N/A ☐ See Attached

I - Organization Causing the Deviation / Event N/A Orgcode ______

J - Disposition(s) (including Corrective/Preventive Action) and target completion date. ☒ See Attached

K - Priority (IPS) 3-200 L - Concurrence [signature] for J. Kirkpatrick per Telecon (Maintenance) Date 7/19/91

M - Evaluator [signature] Date 7/17/91 N - Supervisor [signature] Date 7/19/91

O - QA ☒ N/A ______ Date ______ P - Trend Code ______

Q - Plant Manager/designee* M. J. McCormick Date 7/23/91 R - SORC meeting # N/A

Part 5 IMPLEMENTATION (RESPONSIBLE ORGANIZATION)

A - Corrective/Preventive Action(s) Completed (LIST SUPPORTING DOCUMENTATION AND ATTACH ANY NON-RETRIEVABLE RECORDS)

B - Completed by ______ Date ______ C - Supervisor* ______ Date ______

Part 6 CLOSURE (PM/QA/RP/Responsible Organization)

A - RP Review/Void ______ Date ______

B - Closed by ______ Date ______

* = Provide copy of DER to DER Coordinator (Q = Quality Assurance L = Nuclear Licensing S = Executive Staff)
** = Priority / A - 24 Hours; B - 10 Working Days; C - 30 Calendar Days; D - Other (Specify <30 days).

Rev. 2

NIAGARA MOHAWK NUCLEAR DIVISION	DEVIATION / EVENT REPORT	DER 2-91-Q-0011
	CONTINUATION	Page 3 of 34

NOTE SECTION TO WHICH ADDITIONAL INFORMATION APPLIES

SECTION III – (CONT.)

Component	Location	Code
2UBA * UPS2A	CSA/261/	CSA
2UBA * UPS2B	CSB/261/	CSB
2VBB – UPS1A	NS/237/	NS
2VBB – UPS1B	NS/237/	NS
2VBB – UPS1C	NS/237/	NS
2VBB – UPS1D	NS/237/	NS
2VBB – UPS1G	CB/214/	CB
2VBB – UPS1H	NS/261/	NS
2VBB – UPS3A	NS/237/	NS
2VBB – UPS3B	NS/237/	NS

– THE NEW PM – PROCEDURES SHOULD INCLUDE, AS A MINIMUM:

- VERIFY DC LINK VOLTAGE (140.5 VDC)
- VERIFY AC UNDERVOLTAGE TRIP SETPOINT
- VERIFY UPS AC OUTPUT VOLTAGE 120 ± 2%
- VERIFY MAINTENANCE AC OUTPUT VOLTAGE 120 ± 2%
- VERIFY FORWARD/REVERSE TRANSFER TIME < 1/4 CYCLE (4 MSEC)
- VERIFY OVERLOAD SETPOINTS
- VERIFY UPS OUTPUT UNDERVOLTAGE SETPOINTS
- VERIFY "ON BATTERY POWER" ALARM
- VERIFY UPS TO MAINTENANCE ZERO CROSSING (SYNC.)

Rev. 2

ENFORCEMENT ACTIONS

SALP FUNCTIONAL AREA: MAINTENANCE/SURVEILLANCE

FUNCTIONAL AREA: SURVEILLANCE

POINT BEACH
Inspection No: 90-201 Report Date: 06/01/90
Region: 3 Severity Level: 4

Violation Description:

TECHNICAL SPECIFICATION 15.6.8 "PLANT OPERATING PROCEDURES," REQUIRES IN PART THAT THE PLANT BE OPERATED AND MAINTAINED IN ACCORDANCE WITH APPROVED PROCEDURES OF A TYPE USED FOR SURVEILLANCE AND TESTING OF SAFETY-RELATED EQUIPMENT.

10 CFR PART 50, APPENDIX B, CRITERION V REQUIRES, IN PART, THAT ACTIVITIES AFFECTING QUALITY BE PRESCRIBED BY DOCUMENTED INSTRUCTIONS, PROCEDURES, OR DRAWINGS OF A TYPE APPROPRIATE TO THE CIRCUMSTANCES AND ACCOMPLISHED IN ACCORDANCE WITH THESE INSTRUCTIONS, PROCEDURES, OR DRAWINGS.

CONTRARY TO THE ABOVE, SINCE INSTALLATION OF THE INVERTERS IN 1988 UNTIL APRIL 1990 THE LICENSEE FAILED TO INCLUDE IN AN APPROVED PROCEDURE THE CALIBRATION OF THE ELGAR INVERTER UNDERVOLTAGE TRIP FUNCTION. THIS HAD THE POTENTIAL FOR TRIPPING THE INVERTERS WHEN THEY WERE RECEIVING POWER FROM ONLY THEIR BATTERY SOURCE.

DER 2-91-Q-0011, Part 4, section J, Disposition -

1.) Write a PCE requesting an electrical quarterly PM procedure (N2-EPM-VBA-Qxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:
   a.) check cleanliness
   b.) check filters, change as neeeded
   c.) record trending data - all voltages, input and output, and currents.

2.) Write a PCE requesting an electrical quarterly PM procedure (N2-EPM-VBB-Qxxx) for: 2VBB-UPS3A, 2VBB-UPS3B, 2VBB-UPS1A, -1B, -1C, -1D, -1G to:
   a.) check cleanliness
   b.) check filters, change as neeeded
   c.) record trending data - all voltages, input and output, and currents.

3.) Write a PCE requesting an electrical **refuel** PM procedure (N2-EPM-VBA-Rxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:
   a.) change all cooling fans
   b.) verify wiring connection integrity
   c.) clean entire unit
   d.) verify all setpoints (per system engineer)
   e.) load test unit for 1 hour
   f.) verify automatic and manual transfers
   g.) verify voltage regulation

4.) Write a PCE requesting an electrical **refuel** PM procedure (N2-EPM-VBB-Rxxx) for 2VBB-UPS3A and 2VBB-UPS3B to:
   a.) verify wiring connection integrity
   b.) clean entire unit
   c.) verify all setpoints (per system engineer)
   d.) load test unit for 1 hour
   e.) verify automatic and manual transfers
   f.) verify voltage regulation

5.) Write a PCE requesting an electrical ~~2~~ 5 year PM procedure (N2-EPM-VBB-5Yxxx) for 2VBB-UPS1A, -1B, -1C, -1D and -1G to:
   a.) replace internal control batteries
   b.) change all cooling fans
   c.) verify wiring connection integrity
   d.) clean entire unit
   e.) verify all setpoints (per system engineer)
   f.) load test unit for 1 hour
   g.) verify automatic and manual transfers
   h.) verify voltage regulation

6.) Write a MSRF requesting the board level bench calibration procedures from Elgar Corporation for 2VBA*UPS2A/B and 2VBB-UPS3A/B.

TARGET DATE: For all of above steps target date is **12/31/91.**

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW PROCEDURE FOR 2VBA + UPS1A + 2VBA + UPS2B PER ATTACHED P. 3. (SHOULD BE QUARTERLY PM)

Reason for Change:

☐ NCTS No. ________ ☒ DER No. 2-91-Q-0811 ☐ Mod/SDC No. ________

☒ Other (Explain): TO ENSURE SYSTEM RELIABILITY

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) | Date

RPO App'l: (Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ________ Date: ________

Safety Review Req'd ☐ Yes TSR or Temp Alteration
☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature | Date

Signature (Site Only) | Date

☒ Future Change

Initiator (Print): ROBERT J. GRANDAL

Mail Location	Phone	Date
T-92, UNIT #2	4640	7/16/91

Disposition

RPO Name ________ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval | Date

Implementation

☐ Incorp'd Rev. ________, Proc No.: ________

☐ Cancel, ☐ Transfer to Proc. No.: ________

PPU Closeout | Date

Write an electrical quarterly PM procedure (N2-EPM-VBA-Qxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:

a.) check cleanliness

b.) check filters, change as neeeded

c.) record trending data - all voltages, input and output, and currents.

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW QUARTERLY PM PROCEDURE FOR 2UBB-UPS2A -UPS3B AND 2UBB-UPS1A, 1B, -1C, -1D & -1G PER ATTACHED P2

Reason for Change:

☐ NCTS No.
☒ DER No. 2-91-Q-0011
☐ Mod/SDC No.
☒ Other (Explain): TO ENSURE SYSTEM RELIABILITY

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure
☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) | Date

RPO App'l: (Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: | Date:

Safety Review Req'd ☐ Yes TSR or Temp Alteration
☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature | Date

Signature (Site Only) | Date

☒ Future Change

Initiator (Print): ROBERT J CRANDALL

Mail Location	Phone	Date
T-82 UNIT #2	4640	7/16/91

Disposition

RPO Name | PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval | Date

Implementation

☐ Incorp'd Rev. ____, Proc No.: ____

☐ Cancel, ☐ Transfer to Proc. No.: ____

PPU Closeout | Date

Write an electrical quarterly PM procedure (N2-EPM-VBB-Qxxx) for: 2VBB-UPS3A, 2VBB-UPS3B, 2VBB-UPS1A, -1B, -1C, -1D, -1G to:

a.) check cleanliness

b.) check filters, change as neeeded

c.) record trending data - all voltages, input and output, and currents.

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW REFUEL PM PROCEDURE FOR 2UBA*UPS2A & 2UBA*UPS2B PER ATTACHED p.2

Reason for Change:

☐ NCTS No. ______ ☒ OER No. 2-91-Q-0011 ☐ Mod/SDC No. ______

☒ Other (Explain): TO VERIFY SETPOINTS, EQUIPMENT QUALIFICATION

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) Date

RPO App'l: (Both 2 Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ______ Date: ______

Safety Review Req'd ☐ Yes TSR or Temp Alteration
☐ No. NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature Date

Signature (Site Only) Date

☒ Future Change

Initiator (Print): ROBERT J. GRANDALL

Mail Location	Phone	Date
T-22 UNIT #2	4640	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout Date

Write an electrical refuel PM procedure (N2-EPM-VBA-Rxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:

- a.) change all cooling fans
- b.) verify wiring connection integrity
- c.) clean entire unit
- d.) verify all setpoints (per system engineer)
- e.) load test unit for 1 hour
- f.) verify automatic and manual transfers
- g.) verify voltage regulation

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW REFUEL PM PROCEDURE FOR 2UBB-UPS 1A AND 2UBB-UPS 3B PER ATTACHED P. 2

Reason for Change:

☐ NCTS No.

☒ DER No. 2-91-Q-0011

☐ Mod/SDC No.

☐ Other (Explain): TO VERIFY SETPOINTS & ENSURE PARTS REPLACEMENTS BEFORE FAILURE.

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure

☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial)... Date

RPO App'l:(Both if Site) ☐ Accept. ☐ Reject ☐ Redirect to Future

Date: Date:

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No. NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept. ☐ Reject. ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature Date

Signature (Site Only) Date

☒ Future Change

Initiator (Print): ROBERT J CRANDALL

Mail Location	Phone	Date
T-82, UNIT #2	4640	7/16/91

Disposition

RPO Name

PPU

☐ Redirect to IMMEDIATE Change (To RPO)

☐ Inactivate Procedure (To PPU)

☐ Future Revision or New Procedure (To PPU)

☐ Reject (To PPU)

PPU

RPO Approval Date

Implementation

☐ Incorp'd Rev.: ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout Date

Write an electrical refuel PM procedure (N2-EPM-VBB-Rxxx) for 2VBB-UPS3A and 2VBB-UPS3B to:

a.) verify wiring connection integrity

b.) clean entire unit

c.) verify all setpoints (per system engineer)

d.) load test unit for 1 hour

e.) verify automatic and manual transfers

f.) verify voltage regulation

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW 5-YEAR FREQUENCY PM PROCEDURE FOR LUCB-UPS1A, 1B 1C, 1D, 1G PER ATTACHED P. 2

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-2011 ☐ Mod/SDC No. ______

☐ Other (Explain): TO VERIFY SETPOINTS, REPLACE PARTS PER VENDOR RECOMMENDATIONS

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial)	Date

RPO App'l:(Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ______ Date: ______

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature	Date
Signature (Site Only)	Date

☒ Future Change

Initiator (Print): ROBERT J. GRANDALL

Mail Location	Phone	Date
T-92	4660	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval	Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout	Date

Write an electrical 5 year PM procedure (N2-EPM-VBB-5Yxxx) for 2VBB-UPS1A, -1B, -1C, -1D and -1G to:

a.) replace internal control batteries

b.) change all cooling fans

c.) verify wiring connection integrity

d.) clean entire unit

e.) verify all setpoints (per system engineer)

f.) load test unit for 1 hour

g.) verify automatic and manual transfers

h.) verify voltage regulation

Unit ONE ☐ TWO ☒ SITE ☐ Nine Mile Point Nuclear Station

Page 1 of 1

MATERIAL/SERVICES REQUEST FORM

NIAGARA MOHAWK

№ 107761

Should this Material Be Reserved ? ____ YES X NO

ORIGINATOR Robert J. Crandall (PLEASE PRINT)

Phone 4640

Location T-82 Unit #2

PRIORITY 3-200

Approval ____ (SIGN LEGIBLY) Date ____

DAL-2-91-Q-0011

WR No. ____ MWR No. ____ MOD No. ____ N/A ☐

Date Required 11/1/91

System Code VBB/VBA

Component No. 2VBA*UPS2A/2B

Permanent Plant X YES ____ NO

Component Safety Class ☒ SR ☒ Q ☐ NSR

EQ ☒ YES ☐ NO

Where Used 237 Normal Switchgear 261 Control Bldg

Suggested Supplier SOLE SOURCE — ELGAR CORPORATION

ACCOUNT NUMBER	NUMBER	SUB LEDGER	ACTIVITY/ORDER	COST CENTER	BUD CAT	COST COMP	LOCATION	SUB ACCT	Proj Cost Acct No

Reserve QTY	QTY	U/I	Safety Class	DESCRIPTION (Include PARTNO, Drawings, etc.	SYMBOL	ROP ROQ	STATUS	REMARKS
	1	ea	NSR	BOARD BENCH CALIBRATION				
				PROCEDURE FOR UPS MODEL				
				#103-1-176				
	1	ea	SR	BOARD BENCH CALIBRATION				
				PROCEDURE FOR UPS MODEL				
				253-1-106				

9/89

07-143-91

NIAGARA MOHAWK NUCLEAR DIVISION — **DEVIATION / EVENT REPORT** — P DER 2-91-Q-0011

Part 1 INITIATION (Initiator/Supervisor)

Page 1 of 3 ~~4~~

Problem: NO SETPOINT PM'S FOR UPS — Radiological Problem ☐ Yes ☒ No

A - Discovery Date 4/2/91 Time (24 Hr.) 12:00
Event Date ____ Time (24 Hr.) ____

B - Applicability ☐ Unit 1 ☒ Unit 2 ☐ Common

C - DER Category ☒ Process ☐ Hardware ☐ Personnel

D - Component No. (EPN/EIN): MULTIPLE (SEE M)

E - Location (Bldg./Elev./Area): MULTIPLE (SEE M) Code: CTD

F - Drawing No./Rev.

G - System/Equipment Title: UNINTERRUPTIBLE POWER SUPPLIES

H - System Code/Number: VBA/VBB

I - Spec./P.O. No./Rev: E035A

J - Vendor (Name and Code No.): EXIDE, ELGAR

K - Detected during: ☐ Operational Abnormality ☐ OEA Investigation ☒ Other (Explain) SYSTEM ANALYSIS
☐ Prev. Maint ☐ Alarm ☐ QA Inspection ☐ QA Surveillance ☐ QA Audit ☐ NRC Action
☐ Correct Maint. ☐ ISI/IST ☐ Special Inspection ☐ Surveillance Test ☐ Observation ☐ INPO Action
Source Code: IND

L - Associated References (Title, Document No., Rev., Date, Section, etc. of the documents used as basis for identifying the Dev/Event)
☐ Tech. spec ____ Section ____ ☐ CFR ____
☐ Procedure No. ____ Sect/Step ____ ☒ Other ____

M - Description of Deviation/Event, Potential Impact, Basis for Determination, and Immediate Actions Taken.

FOR EQUIPMENT LIST, SEE ATTACHED.
THESE LISTED UPS' DO NOT HAVE PM'S FOR SETPOINT VERIFICATION
- THIS COULD CAUSE LOSS OF UPS DUE TO DRIFTED UNDERVOLTAGE SETPOINT, OVERLOAD TRIP, ETC.
- THREE SEPERATE PM'S ARE REQUIRED FOR THIS VERIFICATION

N - ☐ WR Initiated; WR No(s). ____ ☒ N/A ☒ See Attached

O - Initiator (Print) (x 4640) ROBERT J CRANDALL Date 4/2/91 ☒ Copy

P - * Supervisor (Sign) [signature] Date 4-3-91 Phone Ext. 4239 Orgcode 2661

Part 2 INITIAL REPORTABILITY / OPERABILITY REVIEW (SSS / SRC)

A - Plant Condition ☒ N/A Operating Condition (Circle One) 1 2 3 4 5 6 Rx Power (MWe) ____ (MWt) ____
Rx Temp ____ Rx Pressure ____ Rx Level ____ Core Flow ____
Activity in Progress ____

B - LCO Entry ____ ☒ N/A Mode Change Restraint ☐ Yes ☒ No

C - Operability Determination Required ☐ Yes ☒ No

D - Reportability Determination ☒ N/A S R DORT (Print Name) 4/4/91 (Date)

20.402	☐ No	☐ Immediate		50.72	☐ No	☐ 1 Hr	☐ 4 Hr
20.403	☐ No	☐ Immediate	☐ 24 Hr	50.73	☐ No	☐ Yes	
20.405	☐ No	☐ 30 Days	LER # ____	73.71	☐ No	☐ 1 Hr	☐ 24 Hr
26.73	☐ No	☐ 24 Hr	☐ Other ____	40CFR302	☐ No	☐ Immediate	

Part 21 Review Required ☐ No ☐ Yes
NRC Notified ☐ N/A ☐ Person Contacted ____ Date/Time ____ / ____
Person notifying NRC ____ (Print Name) ____ (Sign)

E - SSS/ASSS ____ (Print Name) ____ (Sign) Date ____

F - SRC agrees with classification ☒ Yes ☐ No SR DORT (Print Name) SR Dort (Sign) 4/4/91 (Date)

NIAGARA MOHAWK NUCLEAR DIVISION — **DEVIATION / EVENT REPORT** — DER 2-91-Q-0011

Part 3 ACTION ASSIGNMENT (Plant Manager) — Page 2 of 34

A - Responsible Organization: Technical Support Org Code 2661** Priority B Disposition Due 4/18/91

B - Prepare Regulatory Report ______ Org Code ______ Priority ______ Report Due ______

C - SORC Review Required ☐ Yes ☒ No D - Plant Manager* (or Designee) M. J. McCormick Date 4/4/91

Part 4 EVALUATION AND DISPOSITION (Responsible Organization)

A - Evaluation and Problem Description ☐ See Attached

4 PROCEDURES ARE NEEDED - 1 EPM PROCEDURE EACH FOR 2VBB-UPS1 - SERIES, 2VBB-UPS1 - SERIES, 2VBB-UPS1A ; AND 1 ESP NEEDS TO BE WRITTEN FOR 2VBA x UPS2A/2B

B - Hardware ☐ N/A
- ☐ Rework
- ¤ ☐ Use-as-is
- ¤ ☐ Repair
- ☐ Reject

¤ = Technical Justification Required (attach supporting documentation)

C - Classification ☐ N/A
- ☒ Safety Related
- ☒ Non Safety Related
- ☐ Fire Protection (Unit 1)
- ☐ EQ ☐ Q ☐ ASME

D - 10CFR50.59 Review Required ☐ Yes ☒ No

E - Significant Condition Adverse to Quality ☐ Yes ☒ No

F - Reportability Review Required ☐ Yes ☒ No

G - Root Cause Analysis Required ☐ Yes ☒ No

H - Description of Root Cause ☒ N/A ☐ See Attached

I - Organization Causing the Deviation / Event N/A Orgcode ______

J - Disposition(s) (Including Corrective/Preventive Action) and target completion date. ☒ See Attached

K - Priority (IPS) 3 - 200 L - Concurrence [signature] for T. KIRKPATRICK PER TELECON (Maintenance) Date 7/19/91

M - Evaluator [signature] Date 7/17/91 N - Supervisor [signature] Date 7/19/91

O - QA ☒ N/A ______ Date ______ P - Trend Code ______

Q - Plant Manager/designee* M J McCormick Date 7/23/91 R - SORC meeting # N/A

Part 5 IMPLEMENTATION (RESPONSIBLE ORGANIZATION)

A - Corrective/Preventive Action(s) Completed (LIST SUPPORTING DOCUMENTATION AND ATTACH ANY NON-RETRIEVABLE RECORDS)

B - Completed by ______ Date ______ C - Supervisor* ______ Date ______

Part 6 CLOSURE (PM/QA/RP/Responsible Organization)

A - RP Review/Void ______ Date ______

B - Closed by ______ Date ______

* = Provide copy of DER to DER Coordinator (Q = Quality Assurance L = Nuclear Licensing S = Executive Staff)
** = Priority / A - 24 Hours; B - 10 Working Days; C - 30 Calendar Days; D - Other (Specify <30 days).

Rev. 2

NIAGARA MOHAWK NUCLEAR DIVISION

DEVIATION / EVENT REPORT

DER 2-91-Q-0011

CONTINUATION

NOTE SECTION TO WHICH ADDITIONAL INFORMATION APPLIES

SECTION III - (CONT.)

COMPONENT	LOCATION	CODE
2UBA + UPS2A	CSA/261/	CSA
2UBA + UPS2B	CSB/261/	CSB
2VBB - UPS1A	NS/237/	NS
2VBB - UPS1B	NS/237/	NS
2VBB - UPS1C	NS/237/	NS
2VBB - UPS1D	NS/237/	NS
2VBB - UPS1G	CB/214/	CB
2VBB - UPS1H	HS/261/	HS
2VBB - UPS3A	NS/237/	NS
2VBB - UPS3B	NS/237/	NS

- THE NEW PM PROCEDURES SHOULD INCLUDE, AS A MINIMUM:
  - VERIFY DC LINK VOLTAGE (140.5 VDC)
  - VERIFY AC UNDERVOLTAGE TRIP SETPOINT
  - VERIFY UPS AC OUTPUT VOLTAGE 120 ± 2%
  - VERIFY MAINTENANCE AC OUTPUT VOLTAGE 120 ± 2%
  - VERIFY FORWARD/REVERSE TRANSFER TIME < 1/4 CYCLE (4 MSEC.)
  - VERIFY OVERLOAD SETPOINTS
  - VERIFY UPS OUTPUT UNDERVOLTAGE SETPOINTS
  - VERIFY "ON BATTERY POWER" ALARM
  - VERIFY UPS TO MAINTENANCE ZERO CROSSING (SYNC.)

ENFORCEMENT ACTIONS

SALP FUNCTIONAL AREA: MAINTENANCE/SURVEILLANCE

FUNCTIONAL AREA: SURVEILLANCE

POINT BEACH
Inspection No: 90-201 Report Date: 06/01/90
Region: 3 Severity Level: 4

Violation Description:

TECHNICAL SPECIFICATION 15.6.8 "PLANT OPERATING PROCEDURES," REQUIRES IN PART THAT THE PLANT BE OPERATED AND MAINTAINED IN ACCORDANCE WITH APPROVED PROCEDURES OF A TYPE USED FOR SURVEILLANCE AND TESTING OF SAFETY-RELATED EQUIPMENT.

10 CFR PART 50, APPENDIX B, CRITERION V REQUIRES, IN PART, THAT ACTIVITIES AFFECTING QUALITY BE PRESCRIBED BY DOCUMENTED INSTRUCTIONS, PROCEDURES, OR DRAWINGS OF A TYPE APPROPRIATE TO THE CIRCUMSTANCES AND ACCOMPLISHED IN ACCORDANCE WITH THESE INSTRUCTIONS, PROCEDURES, OR DRAWINGS.

CONTRARY TO THE ABOVE, SINCE INSTALLATION OF THE INVERTERS IN 1988 UNTIL APRIL 1990 THE LICENSEE FAILED TO INCLUDE IN AN APPROVED PROCEDURE THE CALIBRATION OF THE ELGAR INVERTER UNDERVOLTAGE TRIP FUNCTION. THIS HAD THE POTENTIAL FOR TRIPPING THE INVERTERS WHEN THEY WERE RECEIVING POWER FROM ONLY THEIR BATTERY SOURCE.

DER 2-91-Q-0011, Part 4, section J, Disposition -

1.) Write a PCE requesting an electrical quarterly PM procedure (N2-EPM-VBA-Qxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:
   a.) check cleanliness
   b.) check filters, change as neeeded
   c.) record trending data - all voltages, input and output, and currents.

2.) Write a PCE requesting an electrical quarterly PM procedure (N2-EPM-VBB-Qxxx) for: 2VBB-UPS3A, 2VBB-UPS3B, 2VBB-UPS1A, -1B, -1C, -1D, -1G to:
   a.) check cleanliness
   b.) check filters, change as neeeded
   c.) record trending data - all voltages, input and output, and currents.

3.) Write a PCE requesting an electrical refuel PM procedure (N2-EPM-VBA-Rxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:
   a.) change all cooling fans
   b.) verify wiring connection integrity
   c.) clean entire unit
   d.) verify all setpoints (per system engineer)
   e.) load test unit for 1 hour
   f.) verify automatic and manual transfers
   g.) verify voltage regulation

4.) Write a PCE requesting an electrical refuel PM procedure (N2-EPM-VBB-Rxxx) for 2VBB-UPS3A and 2VBB-UPS3B to:
   a.) verify wiring connection integrity
   b.) clean entire unit
   c.) verify all setpoints (per system engineer).
   d.) load test unit for 1 hour
   e.) verify automatic and manual transfers
   f.) verify voltage regulation

5.) Write a PCE requesting an electrical ~~2~~ 5 year PM procedure (N2-EPM-VBB-5Yxxx) for 2VBB-UPS1A, -1B, -1C, -1D and -1G to:
   a.) replace internal control batteries
   b.) change all cooling fans
   c.) verify wiring connection integrity
   d.) clean entire unit
   e.) verify all setpoints (per system engineer)
   f.) load test unit for 1 hour
   g.) verify automatic and manual transfers
   h.) verify voltage regulation

6.) Write a MSRF requesting the board level bench calibration procedures from Elgar Corporation for 2VBA*UPS2A/B and 2VBB-UPS3A/B.

TARGET DATE: For all of above steps target date is 12/31/91.

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW PROCEDURE FOR 2VBA + UPS1A + 2VBA + UPS2B PER ATTACHED p. 3. (SHOULD BE QUARTERLY PM)

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-0011 ☐ Mod/SDC No. ______

☒ Other (Explain): TO ENSURE SYSTEM RELIABILITY

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) | Date

RPO App'l:(Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date:______ Date:______

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A | Date

SRO: ☐ Accept ☐ Reject | Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A | Date

Plant Manager (Technical TSR Changes Only)

Signature | Date

Signature (Site Only) | Date

☒ Future Change

Initiator (Print): ROBERT J. GRANDALL

Mail Location	Phone	Date
T-92, UNIT #2	4640	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval | Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout | Date

Write an electrical quarterly PM procedure (N2-EPM-VBA-Qxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:

a.) check cleanliness

b.) check filters, change as neeeded

c.) record trending data - all voltages, input and output, and currents.

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW QUARTERLY PM PROCEDURE FOR 2UBB-UPS2A -UPS3B AND 2UBB-UPS1A, 1B, -1C, -1D & -1G PER ATTACHED P2

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-0011 ☐ Mod/SDC No. ______

☒ Other (Explain): TO ENSURE SYSTEM RELIABILITY

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) | Date

RPO App'l: (Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ______ Date: ______

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature | Date

Signature (Site Only) | Date

☒ Future Change

Initiator (Print): ROBERT J CRANDALL

Mail Location	Phone	Date
T-82 UNIT #2	4640	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval | Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout | Date

Write an electrical quarterly PM procedure (N2-EPM-VBB-Qxxx) for: 2VBB-UPS3A, 2VBB-UPS3B, 2VBB-UPS1A, -1B, -1C, -1D, -1G to:

a.) check cleanliness

b.) check filters, change as neeeded

c.) record trending data - all voltages, input and output, and currents.

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW REFUEL PM PROCEDURE FOR 2UBA*UPS2A + 2UBA*UPS2B PER ATTACHED p. 2

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-0011 ☐ Mod/SDC No. ______

☒ Other (Explain): TO VERIFY SETPOINTS, EQUIPMENT QUALIFICATION

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) Date

RPO App'l:(Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: Date:

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature Date

Signature (Site Only) Date

☒ Future Change

Initiator (Print): ROBERT J. GRANDALL

Mail Location	Phone	Date
T-22 UNIT #2	4640	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout Date

Write an electrical refuel PM procedure (N2-EPM-VBA-Rxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:

a.) change all cooling fans

b.) verify wiring connection integrity

c.) clean entire unit

d.) verify all setpoints (per system engineer)

e.) load test unit for 1 hour

f.) verify automatic and manual transfers

g.) verify voltage regulation

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW REFUEL PM PROCEDURE FOR 2UBB-UPS 1A AND 2UBB-UPS 3B PER ATTACHED P. 2

Reason for Change:

☐ NCTS No. ____ ☒ DER No. 2-91-Q-0011 ☐ Mod/SDC No. ____

☐ Other (Explain): TO VERIFY SETPOINTS & ENSURE PARTS REPLACEMENTS BEFORE FAILURE.

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) | Date

RPO App'l:(Both if Site) ☐ Accept. ☐ Reject ☐ Redirect to Future

Date: ____ Date: ____

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No. NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept. ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature | Date

Signature (Site Only) | Date

☒ Future Change

Initiator (Print): ROBERT J CRANDALL

Mail Location	Phone	Date
T-82, UNIT #2	4640	7/16/91

Disposition

RPO Name ____ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval | Date

Implementation

☐ Incorp'd Rev. ____, Proc No.: ____

☐ Cancel, ☐ Transfer to Proc. No.: ____

PPU Closeout | Date

Write an electrical refuel PM procedure (N2-EPM-VBB-Rxxx) for 2VBB-UPS3A and 2VBB-UPS3B to:

a.) verify wiring connection integrity

b.) clean entire unit

c.) verify all setpoints (per system engineer)

d.) load test unit for 1 hour

e.) verify automatic and manual transfers

f.) verify voltage regulation

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW 5-YEAR FREQUENCY PM PROCEDURE FOR 2VBB-UPS1A, 1B 1C, 1D, 1G PER ATTACHED P. 2

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-0011 ☐ Mod/SDC No. ______

☐ Other (Explain): TO VERIFY SETPOINTS, REPLACE PARTS PER VENDOR RECOMMENDATIONS

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) Date

RPO App'l: (Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ______ Date: ______

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature Date

Signature (Site Only): Date

☒ Future Change

Initiator (Print): ROBERT J. CRANDALL

Mail Location	Phone	Date
T-92	4640	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout Date

Write an electrical 5 year PM procedure (N2-EPM-VBB-5Yxxx) for 2VBB-UPS1A, -1B, -1C, -1D and -1G to:

a.) replace internal control batteries

b.) change all cooling fans

c.) verify wiring connection integrity

d.) clean entire unit

e.) verify all setpoints (per system engineer)

f.) load test unit for 1 hour

g.) verify automatic and manual transfers

h.) verify voltage regulation

Unit ONE ☐ TWO ☒ SITE ☐ Nine Mile Point Nuclear Station

Page 1 of 1

MATERIAL/SERVICES REQUEST FORM

NIAGARA MOHAWK

№ 107761

Should this Material Be Reserved ? ____ YES X NO

ORIGINATOR Robert J. Crandall (PLEASE PRINT)

Phone 4640

Location T-82 Unit #2

PRIORITY 3 - 200

Approval ____ (SIGN LEGIBLY) Date ____

WR No. DQL-2-91-Q-0011 MWR No. ____ MOD No. ____ N/A ☐

Date Required 11/1/91

System Code VBB/VBA Component No. 2VBB-UPS2A/2B

Permanent Plant X YES ____ NO

Component Safety Class ☒ SR ☒ Q ☐ NSR

EQ ☒ YES ☐ NO

Where Used 237 Normal Switchgear 261 Control Bldg

Suggested Supplier SOLE SOURCE — ELGAR CORPORATION

ACCOUNT NUMBER	NUMBER	SUB LEDGER	ACTIVITY/ORDER	COST CENTER	BUD CAT	COST COMP	LOCATION	SUB ACCT	Proj Cost Acct No

Reserve QTY	QTY	U/I	Safety Class	DESCRIPTION (Include PARTNO,Drawings, etc.	SYMBOL	ROP ROQ	STATUS	REMARKS
	1	ea	NSR	BOARD BENCH CALIBRATION				
				PROCEDURES FOR UPS MODEL				
				#103-1-176				
	1	ea	SR	BOARD BENCH CALIBRATION				
				PROCEDURES FOR UPS MODEL				
				253-1-106				

9/89

07-1391-91

NIAGARA MOHAWK NUCLEAR DIVISION

DEVIATION / EVENT REPORT

P DER 2-91-Q-0011

Part 1 INITIATION (Initiator/Supervisor)

Page 1 of 34

Problem: NO SETPOINT PM'S FOR UPS — Radiological Problem ☐ Yes ☒ No

A - Discovery Date 4/2/91 Time (24 Hr.) 16:00
Event Date ____ Time (24 Hr.) ____

B - Applicability ☐ Unit 1 ☒ Unit 2 ☐ Common

C - DER Category ☒ Process ☐ Hardware ☐ Personnel

D - Component No. (EPN/EIN): MULTIPLE (SEE ...)

E - Location (Bldg./Elev./Area): MULTIPLE (SEE ...) — Code: ____

F - Drawing No./Rev.: ____

G - System/Equipment Title: UNINTERRUPTIBLE POWER SUPPLIES

H - System Code/Number: VBA / VBB

I - Spec./P.O. No./Rev: E035A

J - Vendor (Name and Code No.): EXIDE, ELGAR

K - Detected during: ☐ Operational Abnormality ☐ OEA Investigation ☒ Other (Explain) SYSTEM ANALYSIS
☐ Prev. Maint ☐ Alarm ☐ QA Inspection ☐ QA Surveillance ☐ QA Audit ☐ NRC Action
☐ Correct Maint. ☐ ISI/IST ☐ Special Inspection ☐ Surveillance Test ☐ Observation ☐ INPO Action
Source Code: IND

L - Associated References (Title, Document No., Rev., Date, Section, etc. of the documents used as basis for identifying the Dev/Event)
☐ Tech. spec ____ Section ____ ☐ CFR ____
☐ Procedure No. ____ Sect/Step ____ ☒ Other ____

M - Description of Deviation/Event, Potential Impact, Basis for Determination, and Immediate Actions Taken.

FOR EQUIPMENT LIST, SEE ATTACHED.
THESE LISTED UPS' DO NOT HAVE PM'S FOR SETPOINT VERIFICATION
- THIS COULD CAUSE LOSS OF UPS DUE TO DRIFTED UNDERVOLTAGE SETPOINT, OVERLOAD TRIP, ETC.
- THREE SEPERATE PM'S ARE REQUIRED FOR THIS VERIFICATION

N - ☐ WR Initiated; WR No(s). ____ ☒ N/A ☒ See Attached

O - Initiator (Print) (x 4640) Date 4/2/91: ROBERT J CRANDALL ☒ Copy

P - * Supervisor (Sign): [signature] — Date 4-3-91 — Phone Ext. 4239 — Orgcode 2661

Part 2 INITIAL REPORTABILITY / OPERABILITY REVIEW (SSS / SRC)

A - Plant Condition ☒ N/A Operating Condition (Circle One) 1 2 3 4 5 6 Rx Power (MWe) ____ (MWt) ____
Rx Temp ____ Rx Pressure ____ Rx Level ____ Core Flow ____
Activity in Progress ____

B - LCO Entry ____ ☒ N/A Mode Change Restraint ☐ Yes ☒ No

C - Operability Determination Required ☐ Yes ☒ No

D - Reportability Determination ☒ N/A — S R DORT (Print Name) — 4/4/91 (Date)

20.402	☐ No	☐ Immediate		50.72	☐ No	☐ 1 Hr	☐ 4 Hr
20.403	☐ No	☐ Immediate	☐ 24 Hr	50.73	☐ No	☐ Yes	
20.405	☐ No	☐ 30 Days	LER # ____	73.71	☐ No	☐ 1 Hr	☐ 24 Hr
26.73	☐ No	☐ 24 Hr	☐ Other	40CFR302	☐ No	☐ Immediate	

Part 21 Review Required ☐ No ☐ Yes
NRC Notified ☐ N/A ☐ Person Contacted ____ Date/Time ____
Person notifying NRC ____ (Print Name) ____ (Sign)

E - SSS/ASSS ____ (Print Name) ____ (Sign) Date ____

F - SRC agrees with classification ☒ Yes ☐ No — SR DORT (Print Name) — [signature] SR Dort (Sign) — 4/4/91 (Date)

* = Provide copy of DER to DER Coordinator (Q = Quality Assurance L = Nuclear Licensing S = Executive Staff) Rev. 2

NIAGARA MOHAWK NUCLEAR DIVISION

DEVIATION / EVENT REPORT

DER 2-91-Q-0011

Part 3: ACTION ASSIGNMENT (Plant Manager)

Page 2 of 34

A - Responsible Organization Technical Unit Org Code 2661 ** Priority B Disposition Due 4/18/91

B - Prepare Regulatory Report ____ Org Code ____ Priority ____ Report Due ____

C - SORC Review Required - ☐ Yes ☒ No D - Plant Manager* (or Designee) Tom McCormick Date 4/4/91

Part 4 EVALUATION AND DISPOSITION (Responsible Organization)

A - Evaluation and Problem Description ☐ See Attached

4 PROCEDURES ARE NEEDED - 1 EPM PROCEDURE EACH FOR 2VBB-UPS1 - SERIES 2VBB-UPS - SERIES, 2VBB-UPS1A; AND 1 ESP NEEDS TO BE WRITTEN FOR 2VBA & UPS2A/2B

B - Hardware ☐ N/A
- ☐ Rework
- ¤ ☐ Use-as-is
- ¤ ☐ Repair
- ☐ Reject

¤ = Technical Justification Required (attach supporting documentation)

C - Classification ☐ N/A
- ☒ Safety Related
- ☒ Non Safety Related
- ☐ Fire Protection (Unit 1)
- ☐ EQ ☐ Q ☐ ASME

D - 10CFR50.59 Review Required ☐ Yes ☒ No

E - Significant Condition Adverse to Quality ☐ Yes ☒ No

F - Reportability Review Required ☐ Yes ☒ No

G - Root Cause Analysis Required ☐ Yes ☒ No

H - Description of Root Cause ☒ N/A ☐ See Attached

I - Organization Causing the Deviation / Event N/A Orgcode ____

J - Disposition(s) (including Corrective/Preventive Action) and target completion date. ☒ See Attached

K - Priority (IPS) 3-200 L - Concurrence [signature] for J. Kirkpatrick (Maintenance) for Telecom Date 7/19/91

M - Evaluator [signature] Date 7/17/91 N - Supervisor [signature] Date 7/19/91

O - QA ☒ N/A ____ Date ____ P - Trend Code ____

Q - Plant Manager/designee* [signature] Date 7/23/91 R - SORC meeting # N/A

Part 5 IMPLEMENTATION (RESPONSIBLE ORGANIZATION)

A - Corrective/Preventive Action(s) Completed (LIST SUPPORTING DOCUMENTATION AND ATTACH ANY NON-RETRIEVABLE RECORDS)

B - Completed by ____ Date ____ C - Supervisor* ____ Date ____

Part 6 CLOSURE (PM/QA/RP/Responsible Organization)

A - RP Review/Void ____ Date ____

B - Closed by ____ Date ____

* = Provide copy of DER to DER Coordinator (Q = Quality Assurance L = Nuclear Licensing S = Executive Staff)
** = Priority / A - 24 Hours; B - 10 Working Days; C - 30 Calendar Days; D - Other (Specify <30 days).

Rev. 2

NIAGARA MOHAWK NUCLEAR DIVISION	DEVIATION / EVENT REPORT	DER 2-91-Q-0611
	CONTINUATION	Page 3 of 34

NOTE SECTION TO WHICH ADDITIONAL INFORMATION APPLIES

SECTION III - (CONT.)

COMPONENT	LOCATION	CODE
2UBA*-UPS2A	CSA/261/	CSA
2UBA*-UPS2B	CSB/261/	CSB
2VBB-UPS1A	NS/237/	NS
2VBB-UPS1B	NS/237/	NS
2VBB-UPS1C	NS/237/	NS
2VBB-UPS1D	NS/237/	NS
2VBB-UPS1G	CB/214/	CB
2VBB-UPS1H	NS/261/	NS
2VBB-UPS3A	NS/237/	NS
2VBB-UPS3B	NS/237/	NS

- THE NEW PM PROCEDURES SHOULD INCLUDE, AS A MINIMUM:
  - VERIFY DC LINK VOLTAGE (140.5 VDC)
  - VERIFY DC UNDERVOLTAGE TRIP SETPOINT
  - VERIFY UPS AC OUTPUT VOLTAGE 120 ± 2%
  - VERIFY MAINTENANCE AC OUTPUT VOLTAGE 120 ± 2%
  - VERIFY FORWARD/REVERSE TRANSFER TIME < 1/4 CYCLE (4 MSEC.)
  - VERIFY OVERLOAD SETPOINTS
  - VERIFY UPS OUTPUT UNDERVOLTAGE SETPOINTS
  - VERIFY "ON BATTERY POWER" ALARM
  - VERIFY UPS TO MAINTENANCE ZERO CROSSING ("SYNC.")

Rev. 2

ENFORCEMENT ACTIONS

SALP FUNCTIONAL AREA: MAINTENANCE/SURVEILLANCE

FUNCTIONAL AREA: SURVEILLANCE

POINT BEACH
Inspection No: 90-201 Report Date: 06/01/90
Region: 3 Severity Level: 4

Violation Description:

TECHNICAL SPECIFICATION 15.6.8 "PLANT OPERATING PROCEDURES," REQUIRES IN PART THAT THE PLANT BE OPERATED AND MAINTAINED IN ACCORDANCE WITH APPROVED PROCEDURES OF A TYPE USED FOR SURVEILLANCE AND TESTING OF SAFETY-RELATED EQUIPMENT.

10 CFR PART 50, APPENDIX B, CRITERION V REQUIRES, IN PART, THAT ACTIVITIES AFFECTING QUALITY BE PRESCRIBED BY DOCUMENTED INSTRUCTIONS, PROCEDURES, OR DRAWINGS OF A TYPE APPROPRIATE TO THE CIRCUMSTANCES AND ACCOMPLISHED IN ACCORDANCE WITH THESE INSTRUCTIONS, PROCEDURES, OR DRAWINGS.

CONTRARY TO THE ABOVE, SINCE INSTALLATION OF THE INVERTERS IN 1988 UNTIL APRIL 1990 THE LICENSEE FAILED TO INCLUDE IN AN APPROVED PROCEDURE THE CALIBRATION OF THE ELGAR INVERTER UNDERVOLTAGE TRIP FUNCTION. THIS HAD THE POTENTIAL FOR TRIPPING THE INVERTERS WHEN THEY WERE RECEIVING POWER FROM ONLY THEIR BATTERY SOURCE.

DER 2-91-Q-0011, Part 4, section J, Disposition -

1.) Write a PCE requesting an electrical quarterly PM procedure (N2-EPM-VBA-Qxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:
    a.) check cleanliness
    b.) check filters, change as neeeded
    c.) record trending data - all voltages, input and output, and currents.

2.) Write a PCE requesting an electrical quarterly PM procedure (N2-EPM-VBB-Qxxx) for: 2VBB-UPS3A, 2VBB-UPS3B, 2VBB-UPS1A, -1B, -1C, -1D, -1G to:
    a.) check cleanliness
    b.) check filters, change as neeeded
    c.) record trending data - all voltages, input and output, and currents.

3.) Write a PCE requesting an electrical refuel PM procedure (N2-EPM-VBA-Rxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:
    a.) change all cooling fans
    b.) verify wiring connection integrity
    c.) clean entire unit
    d.) verify all setpoints (per system engineer)
    e.) load test unit for 1 hour
    f.) verify automatic and manual transfers
    g.) verify voltage regulation

4.) Write a PCE requesting an electrical refuel PM procedure (N2-EPM-VBB-Rxxx) for 2VBB-UPS3A and 2VBB-UPS3B to:
    a.) verify wiring connection integrity
    b.) clean entire unit
    c.) verify all setpoints (per system engineer)
    d.) load test unit for 1 hour
    e.) verify automatic and manual transfers
    f.) verify voltage regulation

5.) Write a PCE requesting an electrical ~~2~~ 5 year PM procedure (N2-EPM-VBB-5Yxxx) for 2VBB-UPS1A, -1B, -1C, -1D and -1G to: 7/16/91
    a.) replace internal control batteries
    b.) change all cooling fans
    c.) verify wiring connection integrity
    d.) clean entire unit
    e.) verify all setpoints (per system engineer)
    f.) load test unit for 1 hour
    g.) verify automatic and manual transfers
    h.) verify voltage regulation

6.) Write a MSRF requesting the board level bench calibration procedures from Elgar Corporation for 2VBA*UPS2A/B and 2VBB-UPS3A/B.

TARGET DATE: For all of above steps target date is **12/31/91.**

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW PROCEDURE FOR 2VBA + UPS1A + 2VBA + UPS2B PER ATTACHED p. 3. (SHOULD BE QUARTERLY PM)

Reason for Change:

☐ NCTS No. ____ ☒ DER No. 2-91-Q-0811 ☐ Mod/SDC No. ____

☒ Other (Explain): TO ENSURE SYSTEM RELIABILITY

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) Date

RPO App'l: (Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ____ Date: ____

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature Date

Signature (Site Only) Date

☒ Future Change

Initiator (Print) ROBERT J. GRANDAL

Mail Location	Phone	Date
T-92 UNIT #2	4640	7/16/91

Disposition

RPO Name ____ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval Date

Implementation

☐ Incorp'd Rev. ____, Proc No.: ____

☐ Cancel, ☐ Transfer to Proc. No.: ____

PPU Closeout Date

Write an electrical quarterly PM procedure (N2-EPM-VBA-Qxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:

a.) check cleanliness

b.) check filters, change as neeeded

c.) record trending data - all voltages, input and output, and currents.

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW QUARTERLY PM PROCEDURE FOR 2UBB-UPS2A -UPS3B AND 2UBB-UPS1A, 1B, -1C, -1D & -1G PER ATTACHED #2

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-0811 ☐ Mod/SDC No. ______

☒ Other (Explain): TO ENSURE SYSTEM RELIABILITY

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) | Date

RPO App'l:(Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ______ Date: ______

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature | Date

Signature (Site Only) | Date

☒ Future Change

Initiator (Print): ROBERT J CRANDALL

Mail Location	Phone	Date
T-82 UNIT #2	4640	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval | Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout | Date

Write an electrical quarterly PM procedure (N2-EPM-VBB-Qxxx) for: 2VBB-UPS3A, 2VBB-UPS3B, 2VBB-UPS1A, -1B, -1C, -1D, -1G to:

a.) check cleanliness

b.) check filters, change as neeeded

c.) record trending data - all voltages, input and output, and currents.

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW REFUEL PM PROCEDURE FOR 2UBA*UPS2A & 2UBA*UPS2B PER ATTACHED p.2

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-0011 ☐ Mod/SDC No. ______

☒ Other (Explain): TO VERIFY SETPOINTS, EQUIPMENT QUALIFICATION

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) Date

RPO App'l:(Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ______ Date: ______

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No. NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature Date

Signature (Site Only) Date

☒ Future Change

Initiator (Print) ROBERT J. CRANDALL

Mail Location	Phone	Date
T-82 UNIT #2	4640	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout Date

Write an electrical refuel PM procedure (N2-EPM-VBA-Rxxx) for 2VBA*UPS2A and 2VBA*UPS2B to:

a.) change all cooling fans

b.) verify wiring connection integrity

c.) clean entire unit

d.) verify all setpoints (per system engineer)

e.) load test unit for 1 hour

f.) verify automatic and manual transfers

g.) verify voltage regulation

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW REFUEL PM PROCEDURE FOR 2UBB-UPS 3A AND 2UBB-UPS 3B PER ATTACHED P. 2

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-0011 ☐ Mod/SDC No. ______

☐ Other (Explain): TO VERIFY SETPOINTS & ENSURE PARTS REPLACEMENTS BEFORE FAILURE.

2. Method of Change

☐ Immediate Change

Change to: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial)... Date

RPO App'l:(Both if Site) ☐ Accept. ☐ Reject ☐ Redirect to Future

Date:______ Date:______

Safety Review Req'd ☐ Yes TSR or Temp Alteration
☐ No. NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature Date

Signature (Site Only) Date

☒ Future Change

Initiator (Print): ROBERT J CRANDALL

Mail Location	Phone	Date
T-82 UNIT #2	4640	7/16/91

Disposition

RPO Name______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)
☐ Inactivate Procedure (To PPU)
☐ Future Revision or New Procedure (To PPU)
☐ Reject (To PPU)

PPU

RPO Approval Date

Implementation

☐ Incorp'd Rev.______, Proc No.:______

☐ Cancel, ☐ Transfer to Proc. No.:______

PPU Closeout Date

Write an electrical refuel PM procedure (N2-EPM-VBB-Rxxx) for 2VBB-UPS3A and 2VBB-UPS3B to:

a.) verify wiring connection integrity

b.) clean entire unit

c.) verify all setpoints (per system engineer)

d.) load test unit for 1 hour

e.) verify automatic and manual transfers

f.) verify voltage regulation

NIAGARA MOHAWK

PROCEDURE CHANGE EVALUATION (PCE)

PCE No.

1. Initiation

Procedure No.	Rev. No.	Title

Describe Change: CREATE A NEW 5-YEAR FREQUENCY PM PROCEDURE FOR 2VBB-UPS1A, 1B 1C, 1D, 1G PER ATTACHED p. 2

Reason for Change:

☐ NCTS No. ______ ☒ DER No. 2-91-Q-8011 ☐ Mod/SDC No. ______

☐ Other (Explain): TO VERIFY SETPOINTS, REPLACE PARTS PER VENDOR RECOMMENDATIONS

2. Method of Change

☐ Immediate Change

Change is: ☐ Permanent ☐ One Time Only

☐ Technical Change to TSR Procedure ☐ NTSR Procedure OR Editorial Change

Pages Affected:

Initiator (Print & Initial) Date

RPO App'l:(Both if Site) ☐ Accept ☐ Reject ☐ Redirect to Future

Date: ______ Date: ______

Safety Review Req'd ☐ Yes TSR or Temp Alteration ☐ No NTSR or Editorial

Interim Approval (Technical TSR Changes Only)

Add'l Technical Review: ☐ Accept ☐ Reject ☐ N/A

Date

SRO: ☐ Accept ☐ Reject

Date

SRO (Site Only): ☐ Accept ☐ Reject ☐ N/A

Date

Plant Manager (Technical TSR Changes Only)

Signature Date

Signature (Site Only): Date

☒ Future Change

Initiator (Print): ROBERT J. GRANDALL

Mail Location	Phone	Date
T-92	4660	7/16/91

Disposition

RPO Name ______ PPU

☐ Redirect to IMMEDIATE Change (To RPO)

☐ Inactivate Procedure (To PPU)

☐ Future Revision or New Procedure (To PPU)

☐ Reject (To PPU)

PPU

RPO Approval Date

Implementation

☐ Incorp'd Rev. ______, Proc No.: ______

☐ Cancel, ☐ Transfer to Proc. No.: ______

PPU Closeout Date

Write an electrical 5 year PM procedure (N2-EPM-VBB-5Yxxx) for 2VBB-UPS1A, -1B, -1C, -1D and -1G to:

a.) replace internal control batteries

b.) change all cooling fans

c.) verify wiring connection integrity

d.) clean entire unit

e.) verify all setpoints (per system engineer)

f.) load test unit for 1 hour

g.) verify automatic and manual transfers

h.) verify voltage regulation

Unit ONE ☐ TWO ☒ SITE ☐ Nine Mile Point Nuclear Station

MATERIAL/SERVICES REQUEST FORM

NIAGARA MOHAWK

Page 1 of 1

№ 107761

Should this Material Be Reserved ? ____ YES _X_ NO

ORIGINATOR Robert J. Crandall (PLEASE PRINT)

Phone 4640

T-82

Location Unit #2

PRIORITY 3 - 200

Approval ________ (SIGN LEGIBLY) Date ________

DAL-2-91-Q-0411

WR No. ________ MWR No. ________ MOD No. ________ N/A ☐

Date Required 11/1/91

System Code VBB/VBA Component No. 2VBA-UPS1A/1B (2VBA*UPS2A/2B)

Permanent Plant _X_ YES ____ NO

Component Safety Class ☒ SR ☒ Q ☐ NSR

EQ ☒ YES ☐ NO

Where Used: 237 Normal Switchgear, 261 Control Bldg

Suggested Supplier: SOLE SOURCE — ELGAR CORPORATION

ACCOUNT NUMBER	NUMBER	SUB LEDGER	ACTIVITY/ORDER	COST CENTER	BUD CAT	COST COMP	LOCATION	SUB ACCT	Proj Cost Acct No

Reserve QTY	QTY	U/I	Safety Class	DESCRIPTION (Include PARTNO,Drawings, etc.	SYMBOL	ROP ROQ	STATUS	REMARKS
	1	ea	NSR	BURN BENCH CALIBRATION				
				PROCEDURES FOR UPS MODEL				
				#103-1-176				
	1	ea	SR	BURN BENCH CALIBRATION				
				PROCEDURES FOR UPS MODEL				
				253-1-106				

9/89

6

07-~~1991~~-91
38

Display of Work Item Data
SEEK Strategy. COMPID=2VBB-UPS1
. AND COMPID#2VBB-UPS1H. AND LEADFLG=L   Sort fields: COMPID. APPRDATE

HIT	Component No	Work No	Approval date	Work Item Description	Corrective Action.........................
1	2VBB-UPS1A	W007758	860225	UNINTERRUPTIBLE POWER SUPPLY - 1A. UNIT TRANSFERRED TO BYPASS. TRIED TO RESTART AND RETRANSFER AND BLEW LEG FUSES. TROUBLESHOOT AND REPAIR	NO CORRECTIVE ACTION REQUIRED. 2VBB-UPS1A WORKING PROPERLY UPON INSPECTION
2	2VBB-UPS1A	W120764	870523	BLOWN FUSE IN CHANGER SECTION OF UPS MODULE. REPLACE FUSE. LOCATED NORMAL SWITCHGEAR EL 237	ADJUST. ADJUSTED I&C SCR FIRING BOARD TO COMPENSATE FOR INBALANCE IN AMPERAGE. REPLACED BLOWN FUSES. F8 AND F28. AND F7 AND F26
3	2VBB-UPS1A	W130867	880110	REPEATED FAN FAILURE ALARMS SOMETIMES WITH CARD-LEAD A7 INDICATION. ALARM CLEARS ITSELF. TROUBLESHOOT AND REPAIR	REPLACED FAN IN LEG A7
4	2VBB-UPS1A	W127824	880212	UNINTERRUPTABLE POWER SUPPLY VBB-UPS1A. MEASURE AND RECORD ALL CIRCUIT LOADS IN PANELS 2VBS-PNLA107. 2VBS-PNLA102 AND 2VBS-PNLA101 SEND COPY OF INFORMATION TO S GLOVER SWEC ENGINEERING ALSO RECORD VBA POWER FACTOR (M&T)	TOOK AMPERAGE READINGS (CRANDALL 1281 HAS THEM). CK CONN. AT BKER 36 IN PNL 2VBS-PNLA101.JB401 IN PNL 2CEC*PNL709.PNL H13-616 ALL WERE TIGHT.
5	2VBB-UPS1A	W137500	880312	UPS1A HAS VOLTAGE OUTPUT IMBALANCE. REVERIFY SETTINGS ON UPS. ADJUST AS REQD	VOLTAGES-OA-117 OB-124 OC-121 VAC VOLTAGES ARE DIFF DUE TO DIFF AMPS ON EACH PHASE
6	2VBB-UPS1A	W138017	880314	TROUBLESHOOT OPERATION OF UPS. O LOADING IMBALANCE CAUSING MISOPERATION AND DISTURBANCE IN RDCS	CHECKED BALANCE OF UPS. SIMULATED IMBALANCE ON OC OF 37 AMPS AND DID NOT AFFECT UNITS
7	2VBB-UPS1A	W145893	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM. APPLY HEAT SINK GREASE AS REQD. REF IE 87-24 REQD UNIT ON MAINT POWER. WIP	WORK COMPOLETED ON WR189497
8	2VBB-UPS1A	W157612	890218	OV/UV TRANSFER ALARM LIGHT LITE UPS1A BREAKER CB1 2 3 OPEN CB4 CLOSE SCR SHORT LIGHT IN	WORK COMPLETED ON SUPPORT COPY
9	2VBB-UPS1A	W149263	890227	2VBB-UPS1A. REPAIR BROKEN HINGES ON CABINET DOOR	NO REPAIR NECESSARY FUNCTIONS AS PER DESIGN
10	2VBB-UPS1A	W161031	890415	2VBB-UPS1A UNINTERRUPTABLE POWER SUPPLY 1A. AC OUTPUT VOLTMETER INDICATES 124.1 VAC (HIGHER THAN EXPECTED). VERIFY CORRECT-ADJUST AS NEC. LOCATION-EL 237 SWITCHGEAR BLDG	TOOK VOLTAGE READINGS OK METER RECALIBRATED BY M&T DEPT
11	2VBB-UPS1A	W162010	890505	UNINTERRUPTIBLE POWER SUPPLY. BREAKER TRIPPED CB-1 AND CB-2 TRIPPED. ALARM OV-UV	I&C REPLACED CHIP. WORK PERFORMED BY SUPPORT DEPARTMENT

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No.	Work No.	Approval date	Work Item Description......................	Corrective Action..........................
				TRANSFER, CB1 WILL NOT RECLOSE AFTER RESETTING-TRIP IN ON UNIT, TROUBLESHOOT AND REPAIR AS NEC	
12	2VBB-UPS1A	W161451	890515	HAS TRIPPED TO MAINT MODE TWO TIMES IN 12 HRS, TROUBLESHOOT AS NEC	CORRECTIVE ACTION PERFORMED BY I&C REPLACE CARD A8
13	2VBB-UPS1A	W160837	890515	REPLACE RIBBON WIRE INSIDE UPS, WIP	WORK COMPLETED UNDER WR189497
14	2VBB-UPS1A	W160839	890519	TROUBLESHOOT AND REPAIR A13A1 CARD IN I AND C VIDMAR A-5	CARD RETURNED TO MFGR (EXIDE ELECTRONICS) ON RETURN # 007079 7/24/89 SYMBOL 93-53-867 P/N 101072370 NO WORK PERFORMED MRF 32129
15	2VBB-UPS1A	W164090	890726	GROUND FAULT ON BATTERY CAME IN CLEARED CAME IN AGAIN BUT DID NOT CLEAR WINDOW 852503 ALARMED AND INDICATOR LIGHT FOR BATTERY GROUND IS AT VBB-UPS1A TROUBLESHOOT	WORKED PERFORMED UNDER WR 164092
16	2VBB-UPS1A	W154948	890824	2VBB-UPS1A HAS A BATTERY GROUND ALARM-HAS BEEN RESET BUT CAME BACK IN- INVESTIGATE REASON FOR ALARM AND REPAIR AS NECESSARY	NO PROBLEM FOUND
17	2VBB-UPS1A	W164138	891002	CORRECT BATTERY GROUND ALARM PROBLEM ON UPS1A BY FIXING CIRCUIT CARD A13A1 PER EDC 2E10075 ATTACHED THIS WILL CORRECT NUISSANCE ANNUNCIATOR, ANNUN	PERFORMED EDC 2E10075 VERIFIED DOING GROUND CHECK ON DN 2BYS-BAT1A WOULD NOT GIVE 2VBB-UPS1A GROUND ALARM
18	2VBB-UPS1A	W180623	900701	UPS1A IS ON MAINTENANCE SUPPLY. ALARMS IN-INVERTER FUSE A1 ALARM LIGHT- LEG FUSE LIGHT-TRIP LIGHT- SCR SHORT- LEG FANS 1-6 OFF. (PRIOR TO X-FER TO MAINT. LEG FAN 4 OFF LIGHT CAME IN FOR APPROX 5 MIN ON A 20 MIN. CYCLE. CEC-PNL852/UPS1A	REPLACE LEG 3 FUSE (A70P400) AND REPLACED LEG 4 COOLING FAN;(FRONT) - REPLACED LEG 1 FAN B
19	2VBB-UPS1A	W189497	900921	UNIT HAS TRIPPED DUE TO A BLOWN LEG FUSE AND IS CURRENTLY ON MAINTENANCE POWER SUPPLY. TROUBLESHOOT AND REPAIR. LOCATION NORM SWGR ELEV 237. TAG ON DOOR	REPLACE FUSE AND COOLING FAN REPLACED BLOWN LEG FUSE LEG 5-REPLACED COOLING FAN TO A16 CAPACITOR BANK-APPLIED HEAT SINK GREASE TO ALL LEG SCR-DIODC. THIS WORK CLOSES WRS 189472, 145893, 160837
20	2VBB-UPS1A	W189472	900921	INTERMITTENT SCR SHORT ALARM-WILL RESET (SWG 240). HUNG ON UPS-1A	NONE NO WORK TO BE PERFORMED ON THIS WR. WORK PERFORMED ON WR189497
21	2VBB-UPS1A	W154535	910513	BLOCKING DIODE RELAY PICKING UP/DROPPING OUT- DC LINK VOLTAGE DRIFTING LOW. VERIFY CIRCUIT BOARD FOR DC LINK NOT DETERIORATING TAG ON FRONT OF UNIT	

Display of Work Item Data
SEEK Strategy COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L Sort fields, COMPID, APPRDATE

HIT	Component No	Work No	Approval date	Work Item Description	Corrective Action
22	2VBB-UPS1A	W162319	910813	WHEN RESTARTING UNIT BREAKER 1 ON PANEL 301 TRIPS POSSIBLE FAULT IN RECTIFIER SECTION. TROUBLESHOOT	
23	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1D, 2VBB-UPS1G	W130937	880113	2VBB-UPS1A, 1B, 1C, 1D AND 1G, UPS NEED TO HAVE DUST BLOWN OUT	AIR CLEANED 2VBS-UPS 1A,1B,1C,1D AND 1G.
24	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1D, 2VBB-UPS1G	W137481	880223	INCORPORATE CHANGES PER PR 7680 ATTACHED, ADD LABELS (2 EACH) FILTERS TO BASE OF UNITS WITH AROUND DOWN(IF POSSIBLE), CONTACT BOB CRANDALL X1281 FOR CLARIFICATION	MADE TAGS AND INSTALLED AS DIRECTED.
25	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1G, 2VBB-UPS1D	W107670	861017	UNINTERRUPTIBLE POWER SUPPLIES 2VBB-UPS1A, B, C AND G, TAKE AND RECORD BASELINE DATA FOR UPS1A, C AND D, UTILIZING THE EXIDE UNIT ADJUST PROCEDURE	TOOK BASE LINE DATA ATTACHED TO BACK OF WR
26	2VBB-UPS1B	W012787	860510	2VBB-UPS1B, STATIC SWITCH UNPLUGGED, LIGHT ILLUMINATED WON'T RESET, PROBABLE FAILED STATIC SWITCH POSITION SWITCH, NORMAL SWITCH GEAR BUILDING 237 EL.	CORRECTIVE ACTION COMPLETED BY SUPPORT GROUP
27	2VBB-UPS1B	W102235	860623	2VBB-UPS1B, 2VBB-UPS1B STATIC SWITCH UNPLUGGED LIGHT FLICKERS ON AND OFF	CLEAN OUT DIRT FROM SENSOR AND REPLACED REFLECTIVE TAPE.
28	2VBB-UPS1B	W120153	870531	STATIC SWITCH UNPLUGGED ALARM LIGHT LITE, TROUBLESHOOT AND REPAIR AS NEEDED, 2VBB-UPS1B LOCATED IN NORM SWGR ELEV 237E	REPLACED WHITE BACKGROUND FOR PHOTO TRANSISTOR ASSOCIATED WITH STATIC SWITCH , UNPLUGGED ALARM LIGHT
29	2VBB-UPS1B	W125743	870924	CLOGGED FURNACE FILTERS UNDER UNITS (2 EACH, HELD IN WITH THUMB SCREWS), ARE RESTRICTING AIR FLOW TO UNITS AND CONTRIBUTING TO HEAT BUILDUP IN UNIT-REPLACE FILTERS (SHOULD BE DONE ONCE PER MONTH)	REPLACE OLD DIRTY FILTERS WITH NEW CLEAN FILTERS
30	2VBB-UPS1B	W138173	880223	CB-3 GETS A TRIP SIGNAL IN ADDITION TO OFF SIGNAL, IT IS ONLY SUPPOSE TO GET AN OFF SIGNAL	NO WORK REQUIRED ON THIS WR REFERENCE WR 169147
31	2VBB-UPS1B	W145894	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD, THIS REQUIRES UNIT TO BE ON	REGREASED SCR'S ON ALL UPS LOGS

Display of Work Item.Data
SEEK Strategy COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No	Work No	Approval date	Work Item Description	Corrective Action
				MAINT POWER, REF IE 87-24, WIP	
32	2VBB-UPS1B	W147325	881101	THE OPERATOR ON THE NORMAL AC INPUT BREAKER DOES NOT CLOSE THE BREAKER. TROUBLESHOOT	VOID WR 138173 ADDRESS THE PROBLEM - WILL DO CORRECTIVE ACTION ON THAT WR.
33	2VBB-UPS1B	W164699	890908	UPS-1B BATTERY AMMETER READS OFFSCALE LOW. TROUBLESHOOT AND CORRECT. CB237	REPLACED BATTERY INPUT AMMETER
34	2VBB-UPS1B	W169147	891203	REPLACE CB-3 MOLDED CASE SWITCH ON 2VBB-UPS1B. THIS WILL COMPLETE WORK STARTED ON WR 138173	
35	2VBB-UPS1B, 2VBB-UPS1D	W107684	861217	2VBB-UPS1B, &1D, TAKE WAVE FORM, PRINTOUTS OF THE OUTPUT OF 2VBB-UPS1B WITH FEEDER BKR FOR 2LAC-PNLV04 CLOSED AND OPEN, BKR LOCATED IN 2VBS-PNL B111, ALSO TAKE WAVE FORM, PRINTOUT OF 2VBB-UPS1D	TOOK WAVE FORM/PICTURES OF ABOVE. SEE ATTACHED SHEETS M&TE 3202-7623A0-SCOPE DUE 9/8/87.
36	2VBB-UPS1C	P12977			
37	2VBB-UPS1C	W012466	860310	2VBB-UPS1C, 2VBB-UPS1C HAS BLOWN FUSE CAUSING UPS TO TRIP, REPLACE BLOWN FUSE AND INVESTIGATE CAUSE OF FUSE BLOWING	REPLACED FUSE F-5. CAT A70P400 TYPE 4. 400 AMP 700V SPEC E035A
38	2VBB-UPS1C	W102237	860625	2VBB-UPS1C, TRIPPED OFF, BOTH NORMAL AC AND DC INPUTS, AND DID NOT SHIFT TO BYPASS AUTOMATICALLY, UPS WOULD NOT RESTART. MANUALLY PLACED IN BYPASS	LEG FUSE REPLACED, MRR 86-05653
39	2VBB-UPS1C	W101235	860717	2VBB-UPS1C, 2VBB-UPS1C IS ON BYPASS AND HAS BLOWN LEG FUSE	REPLACE 400 AMP FUSE(F4)
40	2VBB-UPS1C	W129243	871106	SRC SHORT CIRCUIT IN, WILL NOT CLEAR SG 237	NONE -PRESSED LAMP TEST BUTTON -ALL LAMPS WORKED
41	2VBB-UPS1C	W138108	880217	IF FRONT DOORS ON UPS1C ARE CLOSED, AN SCR SHORT COMES IN AND A FAN HIGH TEMP	WORK DONE ON WR 147313- VOID
42	2VBB-UPS1C	W130139	880222	REPLACE BAD FAN IN UPS	REPLACED FAN IN CHARGER SECTION
43	2VBB-UPS1C	W145895	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD, THIS REQUIRES UNIT TO BE ON MAINT POWER, REF IE 87-24	WORK DONE ON WR 147313- VOID
44	2VBB-UPS1C	W147313	881106	FANS FAIL TO RUN WITH INVERTER ON	REGREASED LEG NUMBER 5 AND ALL SCR'S CHECKED OK 1-15-89. REPLACED DC SWITCH. REGREASED ALL SCR'S AND CHECKED FANS.

Display of Work Item Data
SEEK Strategy COMPID=2VBB-UPS1
. AND COMPID#2VBB-UPS1H. AND LEADFLG=L Sort fields: COMPID, APPRDATE

HIT	Component No	Work No	Approval date	Work Item Description	Corrective Action
45	2VBB-UPS1C	W149132	890109	REPLACE INVERTER LEGS IN UPS1C WITH ONES FROM UPS1D SPARE SCRS ARRIVE. RUN UPS1D IN MAINT. UPS1C NORMAL. WHEN SPARE SCRS ARRIVE REPLACE BAD SCRS AND REINSTALL INTO UPS1C. NO TEMP MOD REQD. SAME FIT FORM FITNESS. REPAIR ONLY NO CHANGE	NO WORK DONE THIS WR. PARTS REPAIRED UNDER WR 147313
46	2VBB-UPS1C	W164135	890922	USING PORTABLE TEST EQUIPMENT RECORD UPS OUT PUT VOLTS AMPS AND PHASE ANGLE	INFORMATIONAL READINGS TAKEN. ATTACHED TO WR
47	2VBB-UPS1C	W164134	890922	VERIFY THE OVERLOAD SETPOINT ALARM	WORK DONE ON WR SUPPORT
48	2VBB-UPS1C	W170627	900112	UNIT FAILED TO TRANSFER TO MAINTENANCE DURING WSS OF NORMAL AC. ALARMS IN SHOWN ON PAGE ATTACHED. BELIEVED THAT INVERTER FUSE BLEW. DEFICIENCY TAG 17134	REPLACED FUSE IN INVERTER
49	2VBB-UPS1C	W169373	900120	2VBB-UPS1C HAS A LOGIC INVERTER LIGHT LITE AND WILL NOT RESET. TROUBLESHOOT AS NEEDED	SEE SUPPORT NO LITE LIT
50	2VBB-UPS1C	W189544	901022	2VBB-UPS-1C HAS A BLOWN LEG FUSE. PLEASE REPLACE. LOCATED EL 237 NORMAL SWITCHGEAR. TAG HUNG ON UPS-1C	CHANGED BLOWN LEG FUSE F4
51	2VBB-UPS1C	W191924	901224	DURING TRANSFER OF 2NJS-V55 UNIT HAD FAILURE. AND SUBSEQUENTLY EVEN UPS OUTPUT FUSE.	REPLACED CB1. FUSE F33 AND FUSE F44
52	2VBB-UPS1C	W184517	910307	UNIT OVERHEATING- MAKE REPAIRS REPLACE FANS; FILTERS; INVERTED GATE CARD (SEE ATTACHED MAINT. INSTRUCTIONS). TAG ON FRONT OF UPS1C	REPLACED GATE FILTERS AND FANS CLEANED UNIT WITH SERVICE AIR CHECKED FUSES CABLING AND CONNECTIONS
53	2VBB-UPS1C	W184809	910520	FAN 4 FAILURE ALARM IN REPAIR FAN 4. NORMAL SWG BLDG ELEVATION 237	CLEANED AS NECESSARY; TESTED SYSTEM AND ALARMS ALL CLEARED
54	2VBB-UPS1C	W184849	910529	FAN FAILURE LED IS IN. TROUBLESHOOT AND REPAIR LOCATED IN NORMAL SWGR BLDG ELEVATION 237	CLEANED CARD CONNECTORS FOR ALL SIX INVERTER LEGS. ALL SO REPLACED 400 AMP LEG FUSE FOR LEG 1
55	2VBB-UPS1C	W192926	910617	LOGIC ALARM LIGHT WILL NOT CLEAR- CB1 TRIPS- TROUBLESHOOT. REPAIR LOGIC CARD; SWG BLDG EL 237 AND REPAIR. TAG ON UPS-1C CAB	REPLACED - A13A20-4 A13A21-24 LEG 4 FUSE AND 5 ON LEG 4 BOARD
56	2VBB-UPS1D	W012583	860321	2VBB-UPS1D - UPS1D TURN ON BUT DOES NOT TRANSFER - NO SYNC TO BYPASS	VOID. CORRECTIVE ACTION PERFORMED REF. WR NO. 12740-4/4/86

Display of Work Item Data
SEEK Strategy· COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No	Work No.	Approval date	Work Item Description	Corrective Action........................
57	2VBB-UPS1D	W012740	860327	UPS1D FAIL TO SYNC, UNIT WILL NOT SYNC TO BYPASS, PHASE A-A=17.5V, B-B=18V, C-C=16.0V, UNIT WILL ALSO NOT AUTO RESTART	REALIGNED A13 A20 BOARD AND REPLACED A13 A34.
58	2VBB-UPS1D	W100801	860611	2VBB-UPS1D, HAS A SCR SHORT IN ON IT, IT WILL NOT RESTART AND RESET, HAVE ELECTRICAL MAINTENANCE TROUBLESHOOT AND REPAIR AS NECESSARY	TROUBLE SHOOT, INSPECT, CLEAN AND TEST SYSTEM - CHECKS OK
59	2VBB-UPS1D	W102239	860623	2VBB-UPS1D, TRIPPED OFF, AND IS ON BYPASS POWER, WILL NOT RESTART, LEG FUSE BLOWN ON 860620	LEG FUSE REPLACED
60	2VBB-UPS1D	W106529	861013	UNINTERRUPTIBLE POWER SUPPLY, UNIT DOES NOT AUTO RESTART ON A TRANSFER TO BYPASS POWER SUPPLY, IT DOES ATTEMPT TO DO SO BUT ENDS UP RETURNING TO BYPASS, THE UNIT IS ALSO AT CLOSE TO MAX AMPS WHICH MAY EXPLAIN SHIFT TO BYPASS, LOCATION, NORMAL SWGR ELEV 237 SCR SHORTED LIGHT	REALIGNED UNIT
61	2VBB-UPS1D	W109638	870126	2VBB-UPS1D, BLOWN FUSE, 2VBB-UPS1D HAS A BLOWN LEG FUSE, AND INVERTER FUSE LIGHT IS LIT, CB-1, 2 AND 3 ARE TRIPPED, ON BYPASS	REPLACED FURS #4 AND FUSE #5
62	2VBB-UPS1D	W109673	870202	UNINTERREPTABLE POWER SOURCE 1D, ERRATIC OUTPUT, NS EL 237, BATTER AMMETER CYCLICALLY DEFLECTING -0, INVESTIGATE AND CORRECT AS NECESSARY, NO ALARMS SHOWING ON UPS, NONE IN CONTROL ROOM, ALL OTHER INDICATIONS APPEAR NORMAL	NO CORRECTIVE ACTION NEEDED METER OPERATES PROPERLY WHEN IN USE
63	2VBB-UPS1D	W125732	870924	DURING LOSS OF POWER TEST ANNUN NO 852531 -UPS1D SYSTEM TROUBLE DID NOT ANNUNCIATE THOUGH UNIT WAS ON BATT POWER (THAT ANNUN DID COME IN)	OPENED AS SUPPLY BREAK TO UPS1D TWICE, BOTH TIMES WINDOWN 852531 CAME IN, NO CORRECTIVE ACTION REQUIRED
64	2VBB-UPS1D	W125594	871007	DC LINE OUT OF SPEC, THE DC LINE VOLTAGE IN 2VBB-UPS1D IS VARYING A ONE HALF VOLT CAUSING (ON DAMPER POWER) ALARM TO COME IN WHEN CHARGER 1B IS ON EQUALIZE	WHEN WR 130860 WAS COMPLETED VOLTAGE WAS STABLE AT 140.5 VDC, PROBLEM CORRECTED ON WR 130860
65	2VBB-UPS1D	W125882	871014	ANNUN NO 852534 DID NOT ENERGIZE EVEN THOUGH UPS WAS ON BATTERY POWER, INVESTIGATE-REPAIR BY OPEN AC FEED TO UNIT, IF PROBLEM IS NOT FOUND NOTIFY B CRANDALL	REPLACED K3 RELAY, VERIFIED OPERATION BY OPENING AC SUPPLY BRK ON MCC 6
66	2VBB-UPS1D	W128226	871101	METER IS FLUCTUATING ABOUT 20 AMPS FROM 0	NO CORRECTIVE ACTION TAKEN. THE SAME

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description....................	Corrective Action.........................
				TO DOWNSCALE, ALSO METER GOES DOWNSCALE WHEN TEST LAMP BUTTON IS PUSHED, TROUBLESHOOT AND CORRECT, LOCATED EL 237 SWITCHGEAR	PROBLEM WAS ADDRESSED ON WR 109673 (ATTAACHED) NO ALARMS SHOWING IN CONTROL ROOM OR ON UPS
67	2VBB-UPS1D	W129224	871106	UPS OUTPUT READ 117 VAC, SHOULD BE 120 VAC +-2%. REPAIR AND OR ADJUST AS NECESSARY	REPLACED AC OUTPUT VOLTMETER
68	2VBB-UPS1D	W130860	880109	UPS 1D REPEAT VARIOUS ALARMS PRESENTLY SCR SHORT, INVERTER FUSE BLOWN LOSS OF AC AND DC POWER BRKS TRPPED, NOW ON BYPASS POWER	REPLACED DIODE ON INVERTER LEG A1 AND FUSES ON LEGS A1 AND A2
69	2VBB-UPS1D	W137315	880207	PHYSICAL FAULT, 2VBB-UPS1D SCR SHORT ALARM KEEPS COMING IN FOR NO APPARENT REASON	CORRECTIVE ACTION COMPLETED WITH WR 137619 BY REPLACEING FANS IN CAB TO PREVENT OVER HEATING.
70	2VBB-UPS1D	W120036	880210	HIGH TEMP, REMOVE EACH LEG OF UPS1D, NOTE ORIENTATION (CATWODE) OF EACH DIODE/SCR, REMOVE EACH DIODE/SCR AND REINSTALL WITH HEAT SINK GREASE ON EACH, PLEASE NOTE IF LEGS RUN COOLER, SUSPECTED CAUSE OF HEATING IN UNIT IS POOR HEAT CONDUCJION FROM DIODES/SCRS TO HEAT SINKS	INSTALLED HEAT SINK GREASE AS PER WR 120036.
71	2VBB-UPS1D	W137378	880216	PHYSICAL FAULT, NO 3 SCR IS EXPERIENCING OVERHEATING CONDITION (FAN FAILURE ALARM COMES IN), UNIT THEN TRIPPED CB-1-CB-2 WITH FOLLOWING ALARMS- OUTPUT OV-UV, LEG FUSE (POSSIBLY NO 3) INVERTER LOGIC TRIP VOLTAGE DIFFERENCE-REPLACE BLOWN FUSE-TROUBLSHOOT - REPAIR LEG, GREASE ALL LEG SCRS DIODES PER WR 120036 (CB-4 PLUG PULLED)	REPLACED (2) 400 AMP LEG FUSES. REPLACED (1) FAN UNIT. TROUBLE SHOT STATIC BYPASS SWITCH FOUND PROTECTIVE THERMAL SWITCH TRIPPED, RESET AND TESTED CIRCUIT.
72	2VBB-UPS1D	W130137	880222	REPLACE DEFECTIVE SCRS IN UPS1D	VOID-UNIT RUNNING FOR LAST 2 YEARS. SCR'S EVIDENTLY OK. UNKNOWN WHAT DOCUMENT REPAIRED THEM IF THEY WERE REPLACED
73	2VBB-UPS1D	W130138	880222	CB4 DOES NOT ALWAYS CLOSE-STATIC SWITCH PICKUP LOAD	NO WORK REQD. PROBLEM HAS NOT BEEN EXPERIENCED SINCE THIS WR WAS WRITTEN. PROBLEM APPEARS TO BE GONE AWAY
74	2VBB-UPS1D	W137618	880304	UNINTERRUPTABLE POWER SOURCE 1D, SCR SHORT ALARM COMING IN PERSISTENTLY (APPROX 1X PER HR.) TROUBLESHOOT ONLY	CORRECTIVE ACTION COMPLETED WITH WR 137619 BY REPLACEING FANS IN CAB TO PROEVENT OVER HEATING.
75	2VBB-UPS1D	W137622	880304	INVERTOR FUSE BLOWN REPLACE, CB4 HANGING UP CHECK OPERATION AND CLEAN OR REPAIR TO CORRECT OPERATION	REPLACED FUSES F1 F2 F3 F4 F5 TRIGGER FUSE F32 AND 33 AND FUSES F32 AND 33 CB 4 OPERATION TO BE WORKED UNDER WR 130138

Display of Work Item Data
SEEK Strategy COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L Sort fields: COMPID, APPRDATE

HIT	Component No.	Work No.	Approval date	Work Item Description....	Corrective Action.........................
76	2VBB-UPS1D	W137619	880304	REPLACE ALL ORIGINAL FANS IN UNIT	REPLACED 11 COOLING FANS IN UPS ID. REINSTALLED UNITS AND TESTED. ALL FANS ARE NOW WORKING. UNIT PLACE BACK IN SERVICE.
77	2VBB-UPS1D	W135928	880405	REPLACE LEAKY CAPACITORS IN DC FILTER BANK	REPLACED 2 CAPACITORS THAT WERE LEAKING
78	2VBB-UPS1D	W146623	881002	WHEN NORMAL AC BREAKER IS CLOSED AND INVERTER IS CHARGING THE SYSTEM LOAD, 10 MINUTE OVERLOAD LED LIT AND AC BREAKER TRIPS	REALIGNED UPS
79	2VBB-UPS1D	W146621	881002	CB4 FAILS TO CLOSE COMPLETELY AND PICKUP LIMIT SWITCHES	REPLACED MOTOR ACTUATOR ASSEMBLY THAT OPERATES BREAKER CB-4 WITH ONE SPARE FROM ELEC. SHOP TAKEN FROM UPS-1B, EVERYTHING WORKS FINE NOW.
80	2VBB-UPS1D	W146620	881002	CB-2 WILL NOT RESET (TRIPPED AFTER NNS-SWG015 WAS DEAD BUSSED)	ADJUSTED TRIP LATCH AND BLEW OUT DIRT.
81	2VBB-UPS1D	W148953	881228	UPS1D DID NOT AUTO XFER TO MAINT ON UV, EVERYTHING (CB-1, 2, 34) FOUND OPEN AND CRITICAL BUS DEENERGIZED ALARMS WERE INVERTER LOGIC AND TRIP ON THE MODULE AND ALSO POWER SUPPLY FAILURE AND UV/OV, CLOSED IN MAINT SUPPLY MANUALLY, TROUBLESHOOT AND REPAIR AS NECESSARY	MANUALLY CLOSED CBS AND STARTED UNIT
82	2VBB-UPS1D	W161033	890415	UNINTERUPTIBLE POWER SUPPLY, WHEN UNIT TRANSFERED TO MAINT POWER SUPPLY WITH BATTERY INPUT BREAKER FOUND IN TRIPPED FREE CONDITIONS, ONLY ALARM FOUND ON UNIT WAS LOGIC ALARM UNDER BATTERY COLOMN, TROUBLESHOOT AND REPAIR	NO ACTION TAKEN - NORMAL OP PER BOB CRANDALL-ENG BREAKER WILL OPEN AS A RESULT OF OVERLOAD DURING SCRAM
83	2VBB-UPS1D	W164698	890908	UPS-1D BATTERY AMMETER READS OFFSCALE LOW, TROUBLESHOOT AND CORRECT. CB 237	
84	2VBB-UPS1D	W164136	890922	USING PORTABLE TEST EQUIPMENT RECORD UPS OUT PUT VOLTS AMPS PHASE ANDLE	INFORMATIONAL READINGS TAKEN ATTACHED TO WR
85	2VBB-UPS1D	W164118	890922	UNIT IS RUNNING HOT CRACK AND RECONE SURFACE TEMP PEROMETER OF CHARGER OF EACH LEG COMPARE TEMP READINGS TO UPS 1C	ALL TEMPERATURES TAKEN AND RECORDED
86	2VBB-UPS1D	W184516	901113	UNIT TRIPPED WITH ALARM INDICATION AS LISTED ON PAGE ATTACHED-TROUBLESHOOT-REPAIR AS REGD. TAG ON FRONT	REPLACED FAULTY CB-1 REPLACED LEG 2 AND 3 FUSES

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No	Approval date	Work Item Description	Corrective Action
				OF UNIT	
87	2VBB-UPS1G	W100926	860611	WITH UNIT ON BATTERY POWER ALARM RELAY IN UNIT DOES NOT PICK UP, POSSIBLE ALARM RELAY FAILURE OR CFR1/2 FAILURE	MAJOR VACUUM & CLEANING
88	2VBB-UPS1G	W114689	861103	2VBB-UPS1G, (UPS LOCATED AT 214 EL CONTROL BLDG), LED FOR AC OVERVOLTAGE DOES NOT LIGHT, APPEARS TO NEED RESOLDERING WHEN TOUCHED IT LIT	NO CORRECTIVE ACTION REQUIRED, FOUND LED TO OPERATE DURING LAMP TEST FUNCTION
89	2VBB-UPS1G	W125731	870924	ON 2VBB-UPS1G, THE DC BATTERY AMMETER DID NOT REGISTER ANY CURRENT THOUGH IT WAS KNOWN TO BE DRAWING APPROX 400 AMPS DC	PUT 2BYS-CHGR1C1 ON EQUALIZE,LOWER DC LINKS VOLTAGE ON UPS BELOW BATTERY VOLTS. DC AMMETER RESPONDED AS DESIGNED-NO WORK REQUIRED.
90	2VBB-UPS1G	W125734	870924	PHYSICAL FAULT, 2VBB-UPS1G HAS SCR SHORT ALARM IN	HIT RESET SW FOR INDICATING LIGHTS TO VERIFY LIGHT OPERABLE AND WOULD SET
91	2VBB-UPS1G	W129816	871116	INVERTER LEG A-7 LIGHT, FAN FAILURE LIGHT COMES IN AND THEN WILL CLEAR ON ITS OWN, TROUBLESHOOT AND CORRECT, LOCATED CB EL 214 ATTN P BERTCH	REPLACED FAN IN INVERTER BY A-7
92	2VBB-UPS1G	W129983	871117	TROUBLESHOOT WHY UNIT WILL NOT SYNC TO BYPASS AND REPAIR	REALIGNED UPS
93	2VBB-UPS1G	W129320	871201	CB-3 ACTUATOR OPERATES BUT DOES NOT CLOSE BRK, TROUBLESHOOT AND REPAIR	CLEANED AND CYCLED CIRCUIT BREAKER OPERATING MECHANISM. THIS UNIT APPEARS TO OPERATE OK
94	2VBB-UPS1G	W145896	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD, THIS REQUIRES UNIT TO BE ON MAINT, REF IE 87-24, WIP	REPLACE COOLING FANS AS REQUIRED. REPALCE LEG SCR'S AS REQUIRED. SUPPORTED I&C BY LIFTING LEADS AS NECESSARY FOR THEM TO PERFORM TASKS
95	2VBB-UPS1G	W147324	881101	THE OPERATOR ON THE NORMAL AC INPUT BREAKER DOES NOT CLOSE THE BREAKER, TROUBLESHOOT	REPLACED CB 3 MOTOR ACTUATOR ON UPS-1G.
96	2VBB-UPS1G	W148333	881221	REPLACE BAD FAN IN UPS1G	REPLACED BOTH BAD FANS WITH NEW. TESTED AND WORKED SAT.
97	2VBB-UPS1G	W148563	881226	THE FAN IS STARTING AND STOPPING INTERMITTENTLY, INVESTIGATE AND REPAIR	REPLACED DEFECTIVE FANS.
98	2VBB-UPS1G	W149187	890214	SUPPORT VENDOR REPRESENTATIVE TROUBLESHOOT AND CALIBRATE 2VBB-UPS1G DUE ON SITE 890216	SUPPORTED VENDOR AS REQD

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No.	Work No.	Approval date	Work Item Description...	Corrective Action.........................
99	2VBB-UPS1G	W161005	890414	2VBB-UPS1G, SCR SHORT LIGHT ILLUMINATED - TROUBLESHOOT	NO ACTION REQD, LAMP ILLUMINATED PER ENG DURING A TRANSIENT, NO ACTUAL SCR SHORT, LIGHT IS NOT ILLUMINATED AT THIS TIME
100	2VBB-UPS1G	W164078	890722	UPS HAS A SCR SHORT AND FAN FAILURE-WHEN FAN FAILURE ALARM SILENCER KEEPS COMING BACK IN EVERY MINUTE OR SO UPS HAS AUTOMATICALLY SHIFTED OVER TO THE MAINTENANCE MODE	REPLACED COOLING FAN UNIT TURNED ON AND FAN OPERATED CORRECTLY
101	2VBB-UPS1G	W164079	890723	2VBB-UPS1G HAS AN SCR SHORT AND HAS SHIFTED TO MAINTENANCE MODE	REPLACED FUSE F3 AND F13 AND FAN FOR LEG 3
102	2VBB-UPS1G	W170530	891201	2VBB-UPS1G AC OUTPUT VOLTAGE IS READING LOW 115.5V. PROCEDURES STATE THAT IT SHOULD READ 120V PLUS-MINUS 2 PERCENT (117.6-122.4) LOCATION (CONTROL BLDG 214). DEF TAG NO. 20234	SEE SUPPORT FOR WORK
103	2VBB-UPS1G	W175948	910225	2VBB-UPS1G HAS UV/OV TRANSFER ALARM AND SCR SHORT ALARM IN. PLEASE TROUBLESHOOT. 2VBB-UPS1G IS IN MAINTENANCE SUPPLY. TAG LOCATED ON UPS 1G EL 237 CB	REPLACED 2 WHISPER FANS INSIDE UPS AND CLEAN OUT AS MUCH DUST AS POSSIBLE WITH VACUUM CLEANER
104	2VBB-UPS1G	W162320	910813	LIGHT FAILURE A13 AND A21 ALARM CARD AC OVERVOLTAGE LIGHT NOT WORKING	

[2J
[1;1H

07-~~[illegible]~~-91
38

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
. AND COMPID#2VBB-UPS1H. AND LEADFLG=L   Sort fields: COMPID. APPRDATE

HIT	Component No	Work No	Approval date	Work Item Description.	Corrective Action.
1	2VBB-UPS1A	W007758	860225	UNINTERRUPTIBLE POWER SUPPLY - 1A. UNIT TRANSFERRED TO BYPASS. TRIED TO RESTART AND RETRANSFER AND BLEW LEG FUSES. TROUBLESHOOT AND REPAIR	NO CORRECTIVE ACTION REQUIRED. 2VBB-UPS1A WORKING PROPERLY UPON INSPECTION
2	2VBB-UPS1A	W120764	870523	BLOWN FUSE IN CHANGER SECTION OF UPS MODULE. REPLACE FUSE. LOCATED NORMAL SWITCHGEAR EL 237	ADJUST. ADJUSTED I&C SCR FIRING BOARD TO COMPENSATE FOR INBALANCE IN AMPERAGE. REPLACED BLOWN FUSES. F8 AND F28. AND F7 AND F26
3	2VBB-UPS1A	W130867	880110	REPEATED FAN FAILURE ALARMS SOMETIMES WITH CARD-LEAD A7 INDICATION. ALARM CLEARS ITSELF. TROUBLESHOOT AND REPAIR	REPLACED FAN IN LEG A7
4	2VBB-UPS1A	W127824	880212	UNINTERRUPTABLE POWER SUPPLY VBB-UPS1A. MEASURE AND RECORD ALL CIRCUIT LOADS IN PANELS 2VBS-PNLA107. 2VBS-PNLA102 AND 2VBS-PNLA101 SEND COPY OF INFORMATION TO S GLOVER SWEC ENGINEERING ALSO RECORD VBA POWER FACTOR (M&T)	TOOK AMPERAGE READINGS (CRANDALL 1281 HAS THEM). CK CONN. AT BKER 36 IN PNL 2VBS-PNLA101.JB401 IN PNL 2CEC*PNL709.PNL H13-616 ALL WERE TIGHT.
5	2VBB-UPS1A	W137500	880312	UPS1A HAS VOLTAGE OUTPUT IMBALANCE. REVERIFY SETTINGS ON UPS. ADJUST AS REQD	VOLTAGES-0A-117 0B-124 0C-121 VAC VOLTAGES ARE DIFF DUE TO DIFF AMPS ON EACH PHASE
6	2VBB-UPS1A	W138017	880314	TROUBLESHOOT OPERATION OF UPS. 0 LOADING IMBALANCE CAUSING MISOPERATION AND DISTURBANCE IN RDCS	CHECKED BALANCE OF UPS. SIMULATED IMBALANCE ON 0C OF 37 AMPS AND DID NOT AFFECT UNITS
7	2VBB-UPS1A	W145893	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM. APPLY HEAT SINK GREASE AS REQD. REF IE 87-24 REQD UNIT ON MAINT POWER. WIP	WORK COMPOLETED ON WR189497
8	2VBB-UPS1A	W157612	890218	OV/UV TRANSFER ALARM LIGHT LITE UPS1A BREAKER CB1 2 3 OPEN CB4 CLOSE SCR SHORT LIGHT IN	WORK COMPLETED ON SUPPORT COPY
9	2VBB-UPS1A	W149263	890227	2VBB-UPS1A. REPAIR BROKEN HINGES ON CABINET DOOR	NO REPAIR NECESSARY FUNCTIONS AS PER DESIGN
10	2VBB-UPS1A	W161031	890415	2VBB-UPS1A UNINTERRUPTABLE POWER SUPPLY 1A. AC OUTPUT VOLTMETER INDICATES 124.1 VAC (HIGHER THAN EXPECTED). VERIFY CORRECT-ADJUST AS NEC. LOCATION-EL 237 SWITCHGEAR BLDG	TOOK VOLTAGE READINGS OK METER RECALIBRATED BY M&T DEPT
11	2VBB-UPS1A	W162010	890505	UNINTERRUPTIBLE POWER SUPPLY. BREAKER TRIPPED CB-1 AND CB-2 TRIPPED. ALARM OV-UV	I&C REPLACED CHIP. WORK PERFORMED BY SUPPORT DEPARTMENT

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No.	Work No.	Approval date	Work Item Description	Corrective Action
				TRANSFER, CB1 WILL NOT RECLOSE AFTER RESETTING-TRIP IN ON UNIT, TROUBLESHOOT AND REPAIR AS NEC	
12	2VBB-UPS1A	W161451	890515	HAS TRIPPED TO MAINT MODE TWO TIMES IN 12 HRS, TROUBLESHOOT AS NEC	CORRECTIVE ACTION PERFORMED BY I&C REPLACE CARD A8
13	2VBB-UPS1A	W160837	890515	REPLACE RIBBON WIRE INSIDE UPS, WIP	WORK COMPLETED UNDER WR189497
14	2VBB-UPS1A	W160839	890519	TROUBLESHOOT AND REPAIR A13A1 CARD IN I AND C VIDMAR A-5	CARD RETURNED TO MFGR (EXIDE ELECTRONICS) ON RETURN # 007079 7/24/89 SYMBOL 93-53-867 P/N 101072370 NO WORK PERFORMED MRF 32129
15	2VBB-UPS1A	W164090	890726	GROUND FAULT ON BATTERY CAME IN CLEARED CAME IN AGAIN BUT DID NOT CLEAR WINDOW 852503 ALARMED AND INDICATOR LIGHT FOR BATTERY GROUND IS AT VBB-UPS1A TROUBLESHOOT	WORKED PERFORMED UNDER WR 164092
16	2VBB-UPS1A	W154948	890824	2VBB-UPS1A HAS A BATTERY GROUND ALARM-HAS BEEN RESET BUT CAME BACK IN- INVESTIGATE REASON FOR ALARM AND REPAIR AS NECESSARY	NO PROBLEM FOUND
17	2VBB-UPS1A	W164138	891002	CORRECT BATTERY GROUND ALARM PROBLEM ON UPS1A BY FIXING CIRCUIT CARD A13A1 PER EDC 2E10075 ATTACHED THIS WILL CORRECT NUISSANCE ANNUNCIATOR, ANNUN	PERFORMED EDC 2E10075 VERIFIED DOING GROUND CHECK ON DN 2BYS-BAT1A WOULD NOT GIVE 2VBB-UPS1A GROUND ALARM
18	2VBB-UPS1A	W180623	900701	UPS1A IS ON MAINTENANCE SUPPLY. ALARMS IN-INVERTER FUSE A1 ALARM LIGHT- LEG FUSE LIGHT-TRIP LIGHT- SCR SHORT- LEG FANS 1-6 OFF. (PRIOR TO X-FER TO MAINT. LEG FAN 4 OFF LIGHT CAME IN FOR APPROX 5 MIN ON A 20 MIN. CYCLE. CEC-PNL852/UPS1A	REPLACE LEG 3 FUSE (A70P400) AND REPLACED LEG 4 COOLING FAN:(FRONT) - REPLACED LEG 1 FAN B
19	2VBB-UPS1A	W189497	900921	UNIT HAS TRIPPED DUE TO A BLOWN LEG FUSE AND IS CURRENTLY ON MAINTENANCE POWER SUPPLY. TROUBLESHOOT AND REPAIR. LOCATION NORM SWGR ELEV 237. TAG ON DOOR	REPLACE FUSE AND COOLING FAN REPLACED BLOWN LEG FUSE LEG 5-REPLACED COOLING FAN TO A16 CAPACITOR BANK-APPLIED HEAT SINK GREASE TO ALL LEG SCR-DIODC. THIS WORK CLOSES WRS 189472, 145893, 160837
20	2VBB-UPS1A	W189472	900921	INTERMITTENT SCR SHORT ALARM-WILL RESET (SWG 240). HUNG ON UPS-1A	NONE NO WORK TO BE PERFORMED ON THIS WR. WORK PERFORMED ON WR189497
21	2VBB-UPS1A	W154535	910513	BLOCKING DIODE RELAY PICKING UP/DROPPING OUT- DC LINK VOLTAGE DRIFTING LOW. VERIFY CIRCUIT BOARD FOR DC LINK NOT DETERIORATING. TAG ON FRONT OF UNIT	

Display of Work Item Data
SEEK Strategy COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No	Work No	Approval date	Work Item Description............	Corrective Action..........................
22	2VBB-UPS1A	W162319	910813	WHEN RESTARTING UNIT BREAKER 1 ON PANEL 301 TRIPS. POSSIBLE FAULT IN RECTIFIER SECTION. TROUBLESHOOT	
23	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1D, 2VBB-UPS1G	W130937	880113	2VBB-UPS1A, 1B, 1C, 1D AND 1G, UPS NEED TO HAVE DUST BLOWN OUT	AIR CLEANED 2VBS-UPS 1A, 1B, 1C, 1D AND 1G.
24	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1D, 2VBB-UPS1G	W137481	880223	INCORPORATE CHANGES PER PR 7680 ATTACHED, ADD LABELS (2 EACH) FILTERS TO BASE OF UNITS WITH AROUND DOWN(IF POSSIBLE), CONTACT BOB CRANDALL X1281 FOR CLARIFICATION	MADE TAGS AND INSTALLED AS DIRECTED.
25	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1G, 2VBB-UPS1D	W107670	861017	UNINTERRUPTIBLE POWER SUPPLIES 2VBB-UPS1A, B, C AND G, TAKE AND RECORD BASELINE DATA FOR UPS1A, C AND D, UTILIZING THE EXIDE UNIT ADJUST PROCEDURE	TOOK BASE LINE DATA ATTACHED TO BACK OF WR
26	2VBB-UPS1B	W012787	860510	2VBB-UPS1B, STATIC SWITCH UNPLUGGED, LIGHT ILLUMINATED WON'T RESET, PROBABLE FAILED STATIC SWITCH POSITION SWITCH, NORMAL SWITCH GEAR BUILDING 237 EL.	CORRECTIVE ACTION COMPLETED BY SUPPORT GROUP
27	2VBB-UPS1B	W102235	860623	2VBB-UPS1B, 2VBB-UPS1B STATIC SWITCH UNPLUGGED LIGHT FLICKERS ON AND OFF	CLEAN OUT DIRT FROM SENSOR AND REPLACED REFLECTIVE TAPE.
28	2VBB-UPS1B	W120153	870531	STATIC SWITCH UNPLUGGED ALARM LIGHT LITE, TROUBLESHOOT AND REPAIR AS NEEDED, 2VBB-UPS1B LOCATED IN NORM SWGR ELEV 237E	REPLACED WHITE BACKGROUND FOR PHOTO TRANSISTOR ASSOCIATED WITH STATIC SWITCH , UNPLUGGED ALARM LIGHT
29	2VBB-UPS1B	W125743	870924	CLOGGED FURNACE FILTERS UNDER UNITS (2 EACH, HELD IN WITH THUMB SCREWS), ARE RESTRICTING AIR FLOW TO UNITS AND CONTRIBUTING TO HEAT BUILDUP IN UNIT-REPLACE FILTERS (SHOULD BE DONE ONCE PER MONTH)	REPLACE OLD DIRTY FILTERS WITH NEW CLEAN FILTERS
30	2VBB-UPS1B	W138173	880223	CB-3 GETS A TRIP SIGNAL IN ADDITION TO OFF SIGNAL, IT IS ONLY SUPPOSE TO GET AN OFF SIGNAL	NO WORK REQUIRED ON THIS WR REFERENCE WR 169147
31	2VBB-UPS1B	W145894	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM. APPLY HEAT SINK GREASE AS REQD. THIS REQUIRES UNIT TO BE ON	REGREASED SCR'S ON ALL UPS LOGS

Display of Work Item Data
SEEK Strategy COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L Sort fields: COMPID, APPRDATE

HIT	Component No	Work No	Approval date	Work Item Description	Corrective Action
				MAINT POWER, REF IE 87-24, WIP	
32	2VBB-UPS1B	W147325	881101	THE OPERATOR ON THE NORMAL AC INPUT BREAKER DOES NOT CLOSE THE BREAKER, TROUBLESHOOT	VOID WR 138173 ADDRESS THE PROBLEM - WILL DO CORRECTIVE ACTION ON THAT WR.
33	2VBB-UPS1B	W164699	890908	UPS-1B BATTERY AMMETER READS OFFSCALE LOW. TROUBLESHOOT AND CORRECT. CB237	REPLACED BATTERY INPUT AMMETER
34	2VBB-UPS1B	W169147	891203	REPLACE CB-3 MOLDED CASE SWITCH ON 2VBB-UPS1B. THIS WILL COMPLETE WORK STARTED ON WR 138173	
35	2VBB-UPS1B, 2VBB-UPS1D	W107684	861217	2VBB-UPS1B, &1D, TAKE WAVE FORM, PRINTOUTS OF THE OUTPUT OF 2VBB-UPS1B WITH FEEDER BKR FOR 2LAC-PNLV04 CLOSED AND OPEN, BKR LOCATED IN 2VBS-PNL B111, ALSO TAKE WAVE FORM, PRINTOUT OF 2VBB-UPS1D	TOOK WAVE FORM/PICTURES OF ABOVE. SEE ATTACHED SHEETS M&TE 3202-7623A0-SCOPE DUE 9/8/87.
36	2VBB-UPS1C	P12977			
37	2VBB-UPS1C	W012466	860310	2VBB-UPS1C, 2VBB-UPS1C HAS BLOWN FUSE CAUSING UPS TO TRIP, REPLACE BLOWN FUSE AND INVESTIGATE CAUSE OF FUSE BLOWING	REPLACED FUSE F-5, CAT A70P400 TYPE 4, 400 AMP 700V SPEC E035A
38	2VBB-UPS1C	W102237	860625	2VBB-UPS1C, TRIPPED OFF, BOTH NORMAL AC AND DC INPUTS, AND DID NOT SHIFT TO BYPASS AUTOMATICALLY UPS WOULD NOT RESTART, MANUALLY PLACED IN BYPASS	LEG FUSE REPLACED, MRR 86-05653
39	2VBB-UPS1C	W101235	860717	2VBB-UPS1C, 2VBB-UPS1C IS ON BYPASS AND HAS BLOWN LEG FUSE	REPLACE 400 AMP FUSE(F4)
40	2VBB-UPS1C	W129243	871106	SRC SHORT CIRCUIT IN, WILL NOT CLEAR SG 237	NONE -PRESSED LAMP TEST BUTTON -ALL LAMPS WORKED
41	2VBB-UPS1C	W138108	880217	IF FRONT DOORS ON UPS1C ARE CLOSED, AN SCR SHORT COMES IN AND A FAN HIGH TEMP	WORK DONE ON WR 147313- VOID
42	2VBB-UPS1C	W130139	880222	REPLACE BAD FAN IN UPS	REPLACED FAN IN CHARGER SECTION
43	2VBB-UPS1C	W145895	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD, THIS REQUIRES UNIT TO BE ON MAINT POWER, REF IE 87-24	WORK DONE ON WR 147313- VOID
44	2VBB-UPS1C	W147313	881106	FANS FAIL TO RUN WITH INVERTER ON	REGREASED LEG NUMBER 5 AND ALL SCR'S CHECKED OK 1-15-89. REPLACED DC SWITCH. REGREASED ALL SCR'S AND CHECKED FANS.

Display of Work Item Data
SEEK Strategy. COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No.	Work No	Approval date	Work Item Description.	Corrective Action..........................
45	2VBB-UPS1C	W149132	890109	REPLACE INVERTER LEGS IN UPS1C WITH ONES FROM UPS1D SPARE SCRS ARRIVE, RUN UPS1D IN MAINT, UPS1C NORMAL, WHEN SPARE SCRS ARRIVE REPLACE BAD SCRS AND REINSTALL INTO UPS1C, NO TEMP MOD REQD, SAME FIT FORM FITNESS, REPAIR ONLY NO CHANGE	NO WORK DONE THIS WR, PARTS REPAIRED UNDER WR 147313
46	2VBB-UPS1C	W164135	890922	USING PORTABLE TEST EQUIPMENT RECORD UPS OUT PUT VOLTS AMPS AND PHASE ANGLE	INFORMATIONAL READINGS TAKEN. ATTACHED TO WR
47	2VBB-UPS1C	W164134	890922	VERIFY THE OVERLOAD SETPOINT ALARM	WORK DONE ON WR SUPPORT
48	2VBB-UPS1C	W170627	900112	UNIT FAILED TO TRANSFER TO MAINTENANCE DURING WSS OF NORMAL AC. ALARMS IN SHOWN ON PAGE ATTACHED. BELIEVED THAT INVERTER FUSE BLEW. DEFICIENCY TAG 17134	REPLACED FUSE IN INVERTER
49	2VBB-UPS1C	W169373	900120	2VBB-UPS1C HAS A LOGIC INVERTER LIGHT LITE AND WILL NOT RESET. TROUBLESHOOT AS NEEDED	SEE SUPPORT NO LITE LIT
50	2VBB-UPS1C	W189544	901022	2VBB-UPS-1C HAS A BLOWN LEG FUSE. PLEASE REPLACE. LOCATED EL 237 NORMAL SWITCHGEAR. TAG HUNG ON UPS-1C	CHANGED BLOWN LEG FUSE F4
51	2VBB-UPS1C	W191924	901224	DURING TRANSFER OF 2NJS-V55 UNIT HAD FAILURE. AND SUBSEQUENTLY EVEN UPS OUTPUT FUSE.	REPLACED CB1. FUSE F33 AND FUSE F44
52	2VBB-UPS1C	W184517	910307	UNIT OVERHEATING- MAKE REPAIRS REPLACE FANS; FILTERS; INVERTED GATE CARD (SEE ATTACHED MAINT. INSTRUCTIONS). TAG ON FRONT OF UPS1C	REPLACED GATE FILTERS AND FANS CLEANED UNIT WITH SERVICE AIR CHECKED FUSES CABLING AND CONNECTIONS
53	2VBB-UPS1C	W184809	910520	FAN 4 FAILURE ALARM IN REPAIR FAN 4. NORMAL SWG BLDG ELEVATION 237	CLEANED AS NECESSARY; TESTED SYSTEM AND ALARMS ALL CLEARED
54	2VBB-UPS1C	W184849	910529	FAN FAILURE LED IS IN. TROUBLESHOOT AND REPAIR LOCATED IN NORMAL SWGR BLDG ELEVATION 237	CLEANED CARD CONNECTORS FOR ALL SIX INVERTER LEGS. ALL SO REPLACED 400 AMP LEG FUSE FOR LEG 1
55	2VBB-UPS1C	W192926	910617	LOGIC ALARM LIGHT WILL NOT CLEAR- CB1 TRIPS- TROUBLESHOOT. REPAIR LOGIC CARD; SWG BLDG EL 237 AND REPAIR. TAG ON UPS-1C CAB	REPLACED - A13A20-4 A13A21-24 LEG 4 FUSE AND 5 ON LEG 4 BOARD
56	2VBB-UPS1D	W012583	860321	2VBB-UPS1D - UPS1D TURN ON BUT DOES NOT TRANSFER - NO SYNC TO BYPASS	VOID. CORRECTIVE ACTION PERFORMED REF. WR NO. 12740-4/4/86

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No.	Work No.	Approval date	Work Item Description.....	Corrective Action........................
57	2VBB-UPS1D	W012740	860327	UPS1D FAIL TO SYNC, UNIT WILL NOT SYNC TO BYPASS, PHASE A-A=17.5V, B-B=18V, C-C=16.0V, UNIT WILL ALSO NOT AUTO RESTART	REALIGNED A13 A20 BOARD AND REPLACED A13 A34.
58	2VBB-UPS1D	W100801	860611	2VBB-UPS1D, HAS A SCR SHORT IN ON IT, IT WILL NOT RESTART AND RESET, HAVE ELECTRICAL MAINTENANCE TROUBLESHOOT AND REPAIR AS NECESSARY	TROUBLE SHOOT, INSPECT, CLEAN AND TEST SYSTEM - CHECKS OK
59	2VBB-UPS1D	W102239	860623	2VBB-UPS1D, TRIPPED OFF, AND IS ON BYPASS POWER, WILL NOT RESTART, LEG FUSE BLOWN ON 860620	LEG FUSE REPLACED
60	2VBB-UPS1D	W106529	861013	UNINTERRUPTIBLE POWER SUPPLY, UNIT DOES NOT AUTO RESTART ON A TRANSFER TO BYPASS POWER SUPPLY, IT DOES ATTEMPT TO DO SO BUT ENDS UP RETURNING TO BYPASS, THE UNIT IS ALSO AT CLOSE TO MAX AMPS WHICH MAY EXPLAIN SHIFT TO BYPASS, LOCATION, NORMAL SWGR ELEV 237 SCR SHORTED LIGHT	REALIGNED UNIT·
61	2VBB-UPS1D	W109638	870126	2VBB-UPS1D, BLOWN FUSE, 2VBB-UPS1D HAS A BLOWN LEG FUSE, AND INVERTER FUSE LIGHT IS LIT, CB-1, 2 AND 3 ARE TRIPPED, ON BYPASS	REPLACED FURS #4 AND FUSE #5
62	2VBB-UPS1D	W109673	870202	UNINTERREPTABLE POWER SOURCE 1D, ERRATIC OUTPUT, NS EL 237, BATTER AMMETER CYCLICALLY DEFLECTING -0, INVESTIGATE AND CORRECT AS NECESSARY, NO ALARMS SHOWING ON UPS, NONE IN CONTROL ROOM, ALL OTHER INDICATIONS APPEAR NORMAL	NO CORRECTIVE ACTION NEEDED METER OPERATES PROPERLY WHEN IN USE
63	2VBB-UPS1D	W125732	870924	DURING LOSS OF POWER TEST ANNUN NO 852531 -UPS1D SYSTEM TROUBLE DID NOT ANNUNCIATE THOUGH UNIT WAS ON BATT POWER (THAT ANNUN DID COME IN)	OPENED AS SUPPLY BREAK TO UPS1D TWICE, BOTH TIMES WINDOWN 852531 CAME IN, NO CORRECTIVE ACTION REQUIRED
64	2VBB-UPS1D	W125594	871007	DC LINE OUT OF SPEC, THE DC LINE VOLTAGE IN 2VBB-UPS1D IS VARYING A ONE HALF VOLT CAUSING (ON DAMPER POWER) ALARM TO COME IN WHEN CHARGER 1B IS ON EQUALIZE	WHEN WR 130860 WAS COMPLETED VOLTAGE WAS STABLE AT 140.5 VDC, PROBLEM CORRECTED ON WR 130860
65	2VBB-UPS1D	W125882	871014	ANNUN NO 852534 DID NOT ENERGIZE EVEN THOUGH UPS WAS ON BATTERY POWER, INVESTIGATE-REPAIR BY OPEN AC FEED TO UNIT, IF PROBLEM IS NOT FOUND NOTIFY B CRANDALL	REPLACED K3 RELAY, VERIFIED OPERATION BY OPENING AC SUPPLY BRK ON MCC 6
66	2VBB-UPS1D	W128226	871101	METER IS FLUCTUATING ABOUT 20 AMPS FROM 0	NO CORRECTIVE ACTION TAKEN. THE SAME

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No:	Work No.	Approval date	Work Item Description......................	Corrective Action..........................
				TO DOWNSCALE, ALSO METER GOES DOWNSCALE WHEN TEST LAMP BUTTON IS PUSHED, TROUBLESHOOT AND CORRECT, LOCATED EL 237 SWITCHGEAR	PROBLEM WAS ADDRESSED ON WR 109673 (ATTAACHED) NO ALARMS SHOWING IN CONTROL ROOM OR ON UPS
67	2VBB-UPS1D	W129224	871106	UPS OUTPUT READ 117 VAC, SHOULD BE 120 VAC +-2%. REPAIR AND OR ADJUST AS NECESSARY	REPLACED AC OUTPUT VOLTMETER
68	2VBB-UPS1D	W130860	880109	UPS 1D REPEAT VARIOUS ALARMS PRESENTLY SCR SHORT, INVERTER FUSE BLOWN LOSS OF AC AND DC POWER BRKS TRPPED, NOW ON BYPASS POWER	REPLACED DIODE ON INVERTER LEG A1 AND FUSES ON LEGS A1 AND A2
69	2VBB-UPS1D	W137315	880207	PHYSICAL FAULT, 2VBB-UPS1D SCR SHORT ALARM KEEPS COMING IN FOR NO APPARENT REASON	CORRECTIVE ACTION COMPLETED WITH WR 137619 BY REPLACEING FANS IN CAB TO PREVENT OVER HEATING.
70	2VBB-UPS1D	W120036	880210	HIGH TEMP, REMOVE EACH LEG OF UPS1D, NOTE ORIENTATION (CATWODE) OF EACH DIODE/SCR, REMOVE EACH DIODE/SCR AND REINSTALL WITH HEAT SINK GREASE ON EACH, PLEASE NOTE IF LEGS RUN COOLER, SUSPECTED CAUSE OF HEATING IN UNIT IS POOR HEAT CONDUCJION FROM DIODES/SCRS TO HEAT SINKS	INSTALLED HEAT SINK GREASE AS PER WR 120036.
71	2VBB-UPS1D	W137378	880216	PHYSICAL FAULT, NO 3 SCR IS EXPERIENCING OVERHEATING CONDITION (FAN FAILURE ALARM COMES IN), UNIT THEN TRIPPED CB-1-CB-2 WITH FOLLOWING ALARMS- OUTPUT OV-UV, LEG FUSE (POSSIBLY NO 3) INVERTER LOGIC TRIP VOLTAGE DIFFERENCE-REPLACE BLOWN FUSE-TROUBLSHOOT - REPAIR LEG, GREASE ALL LEG SCRS DIODES PER WR 120036 (CB-4 PLUG PULLED)	REPLACED (2) 400 AMP LEG FUSES. REPLACED (1) FAN UNIT. TROUBLE SHOT STATIC BYPASS SWITCH FOUND PROTECTIVE THERMAL SWITCH TRIPPED, RESET AND TESTED CIRCUIT.
72	2VBB-UPS1D	W130137	880222	REPLACE DEFECTIVE SCRS IN UPS1D	VOID-UNIT RUNNING FOR LAST 2 YEARS. SCR'S EVIDENTLY OK. UNKNOWN WHAT DOCUMENT REPAIRED THEM IF THEY WERE REPLACED
73	2VBB-UPS1D	W130138	880222	CB4 DOES NOT ALWAYS CLOSE-STATIC SWITCH PICKUP LOAD	NO WORK REQD. PROBLEM HAS NOT BEEN EXPERIENCED SINCE THIS WR WAS WRITTEN. PROBLEM APPEARS TO BE GONE AWAY
74	2VBB-UPS1D	W137618	880304	UNINTERRUPTABLE POWER SOURCE 1D, SCR SHORT ALARM COMING IN PERSISTENTLY (APPROX 1X PER HR.) TROUBLESHOOT ONLY	CORRECTIVE ACTION COMPLETED WITH WR 137619 BY REPLACEING FANS IN CAB TO PROEVENT OVER HEATING.
75	2VBB-UPS1D	W137622	880304	INVERTOR FUSE BLOWN REPLACE, CB4 HANGING UP CHECK OPERATION AND CLEAN OR REPAIR TO CORRECT OPERATION	REPLACED FUSES F1 F2 F3 F4 F5 TRIGGER FUSE F32 AND 33 AND FUSES F32 AND 33 CB 4 OPERATION TO BE WORKED UNDER WR 130138

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description....	Corrective Action........................
76	2VBB-UPS1D	W137619	880304	REPLACE ALL ORIGINAL FANS IN UNIT	REPLACED 11 COOLING FANS IN UPS ID. REINSTALLED UNITS AND TESTED. ALL FANS ARE NOW WORKING. UNIT PLACE BACK IN SERVICE.
77	2VBB-UPS1D	W135928	880405	REPLACE LEAKY CAPACITORS IN DC FILTER BANK	REPLACED 2 CAPACITORS THAT WERE LEAKING
78	2VBB-UPS1D	W146623	881002	WHEN NORMAL AC BREAKER IS CLOSED AND INVERTER IS CHARGING THE SYSTEM LOAD, 10 MINUTE OVERLOAD LED LIT AND AC BREAKER TRIPS	REALIGNED UPS
79	2VBB-UPS1D	W146621	881002	CB4 FAILS TO CLOSE COMPLETELY AND PICKUP LIMIT SWITCHES	REPLACED MOTOR ACTUATOR ASSEMBLY THAT OPERATES BREAKER CB-4 WITH ONE SPARE FROM ELEC. SHOP TAKEN FROM UPS-1B, EVERYTHING WORKS FINE NOW.
80	2VBB-UPS1D	W146620	881002	CB-2 WILL NOT RESET (TRIPPED AFTER NNS-SWG015 WAS DEAD BUSSED)	ADJUSTED TRIP LATCH AND BLEW OUT DIRT.
81	2VBB-UPS1D	W148953	881228	UPS1D DID NOT AUTO XFER TO MAINT ON UV, EVERYTHING (CB-1, 2, 34) FOUND OPEN AND CRITICAL BUS DEENERGIZED ALARMS WERE INVERTER LOGIC AND TRIP ON THE MODULE AND ALSO POWER SUPPLY FAILURE AND UV/OV, CLOSED IN MAINT SUPPLY MANUALLY, TROUBLESHOOT AND REPAIR AS NECESSARY	MANUALLY CLOSED CBS AND STARTED UNIT
82	2VBB-UPS1D	W161033	890415	UNINTERUPTIBLE POWER SUPPLY, WHEN UNIT TRANSFERED TO MAINT POWER SUPPLY WITH BATTERY INPUT BREAKER FOUND IN TRIPPED FREE CONDITIONS, ONLY ALARM FOUND ON UNIT WAS LOGIC ALARM UNDER BATTERY COLOMN, TROUBLESHOOT AND REPAIR	NO ACTION TAKEN - NORMAL OP PER BOB CRANDALL-ENG BREAKER WILL OPEN AS A RESULT OF OVERLOAD DURING SCRAM
83	2VBB-UPS1D	W164698	890908	UPS-1D BATTERY AMMETER READS OFFSCALE LOW. TROUBLESHOOT AND CORRECT. CB 237	
84	2VBB-UPS1D	W164136	890922	USING PORTABLE TEST EQUIPMENT RECORD UPS OUT PUT VOLTS AMPS PHASE ANDLE	INFORMATIONAL READINGS TAKEN ATTACHED TO WR
85	2VBB-UPS1D	W164118	890922	UNIT IS RUNNING HOT CRACK AND RECONE SURFACE TEMP PEROMETER OF CHARGER OF EACH LEG COMPARE TEMP READINGS TO UPS 1C	ALL TEMPERATURES TAKEN AND RECORDED
86	2VBB-UPS1D	W184516	901113	UNIT TRIPPED WITH ALARM INDICATION AS LISTED ON PAGE ATTACHED-TROUBLESHOOT-REPAIR AS REQD. TAG ON FRONT	REPLACED FAULTY CB-1 REPLACED LEG 2 AND 3 FUSES

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description........................	Corrective Action........................
				OF UNIT	
87	2VBB-UPS1G	W100926	860611	WITH UNIT ON BATTERY POWER ALARM RELAY IN UNIT DOES NOT PICK UP, POSSIBLE ALARM RELAY FAILURE OR CFR1/2 FAILURE	MAJOR VACUUM & CLEANING
88	2VBB-UPS1G	W114689	861103	2VBB-UPS1G, (UPS LOCATED AT 214 EL CONTROL BLDG), LED FOR AC OVERVOLTAGE DOES NOT LIGHT, APPEARS TO NEED RESOLDERING WHEN TOUCHED IT LIT	NO CORRECTIVE ACTION REQUIRED, FOUND LED TO OPERATE DURING LAMP TEST FUNCTION
89	2VBB-UPS1G	W125731	870924	ON 2VBB-UPS1G; THE DC BATTERY AMMETER DID NOT REGISTER ANY CURRENT THOUGH IT WAS KNOWN TO BE DRAWING APPROX 400 AMPS DC	PUT 2BYS-CHGR1C1 ON EQUALIZE,LOWER DC LINKS VOLTAGE ON UPS BELOW BATTERY VOLTS. DC AMMETER RESPONDED AS DESIGNED-NO WORK REQUIRED.
90	2VBB-UPS1G	W125734	870924	PHYSICAL FAULT, 2VBB-UPS1G HAS SCR SHORT ALARM IN	HIT RESET SW FOR INDICATING LIGHTS TO VERIFY LIGHT OPERABLE AND WOULD SET
91	2VBB-UPS1G	W129816	871116	INVERTER LEG A-7 LIGHT, FAN FAILURE LIGHT COMES IN AND THEN WILL CLEAR ON ITS OWN, TROUBLESHOOT AND CORRECT, LOCATED CB EL 214 ATTN P BERTCH	REPLACED FAN IN INVERTER BY A-7
92	2VBB-UPS1G	W129983	871117	TROUBLESHOOT WHY UNIT WILL NOT SYNC TO BYPASS AND REPAIR	REALIGNED UPS
93	2VBB-UPS1G	W129320	871201	CB-3 ACTUATOR OPERATES BUT DOES NOT CLOSE BRK, TROUBLESHOOT AND REPAIR	CLEANED AND CYCLED CIRCUIT BREAKER OPERATING MECHANISM. THIS UNIT APPEARS TO OPERATE OK
94	2VBB-UPS1G	W145896	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD, THIS REQUIRES UNIT TO BE ON MAINT, REF IE 87-24, WIP	REPLACE COOLING FANS AS REQUIRED. REPALCE LEG SCR'S AS REQUIRED. SUPPORTED I&C BY LIFTING LEADS AS NECESSARY FOR THEM TO PERFORM TASKS
95	2VBB-UPS1G	W147324	881101	THE OPERATOR ON THE NORMAL AC INPUT BREAKER DOES NOT CLOSE THE BREAKER, TROUBLESHOOT	REPLACED CB 3 MOTOR ACTUATOR ON UPS-1G.
96	2VBB-UPS1G	W148333	881221	REPLACE BAD FAN IN UPS1G	REPLACED BOTH BAD FANS WITH NEW. TESTED AND WORKED SAT.
97	2VBB-UPS1G	W148563	881226	THE FAN IS STARTING AND STOPPING INTERMITTENTLY, INVESTIGATE AND REPAIR	REPLACED DEFECTIVE FANS.
98	2VBB-UPS1G	W149187	890214	SUPPORT VENDOR REPRESENTATIVE TROUBLESHOOT AND CALIBRATE 2VBB-UPS1G DUE ON SITE 890216	SUPPORTED VENDOR AS REQD

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT	Component No.	Work No.	Approval date	Work Item Description...	Corrective Action...
99	2VBB-UPS1G	W161005	890414	2VBB-UPS1G, SCR SHORT LIGHT ILLUMINATED - TROUBLESHOOT	NO ACTION REQD, LAMP ILLUMINATED PER ENG DURING A TRANSIENT, NO ACTUAL SCR SHORT, LIGHT IS NOT ILLUMINATED AT THIS TIME
100	2VBB-UPS1G	W164078	890722	UPS HAS A SCR SHORT AND FAN FAILURE-WHEN FAN FAILURE ALARM SILENCER KEEPS COMING BACK IN EVERY MINUTE OR SO UPS HAS AUTOMATICALLY SHIFTED OVER TO THE MAINTENANCE MODE	REPLACED COOLING FAN UNIT TURNED ON AND FAN OPERATED CORRECTLY
101	2VBB-UPS1G	W164079	890723	2VBB-UPS1G HAS AN SCR SHORT AND HAS SHIFTED TO MAINTENANCE MODE	REPLACED FUSE F3 AND F13 AND FAN FOR LEG 3
102	2VBB-UPS1G	W170530	891201	2VBB-UPS1G AC OUTPUT VOLTAGE IS READING LOW 115.5V. PROCEDURES STATE THAT IT SHOULD READ 120V PLUS-MINUS 2 PERCENT (117.6-122.4) LOCATION (CONTROL BLDG 214). DEF TAG NO. 20234	SEE SUPPORT FOR WORK
103	2VBB-UPS1G	W175948	910225	2VBB-UPS1G HAS UV/OV TRANSFER ALARM AND SCR SHORT ALARM IN. PLEASE TROUBLESHOOT. 2VBB-UPS1G IS IN MAINTENANCE SUPPLY. TAG LOCATED ON UPS 1G EL 237 CB	REPLACED 2 WHISPER FANS INSIDE UPS AND CLEAN OUT AS MUCH DUST AS POSSIBLE WITH VACUUM CLEANER
104	2VBB-UPS1G	W162320	910813	LIGHT FAILURE A13 AND A21 ALARM CARD AC OVERVOLTAGE LIGHT NOT WORKING	

[2J
[1;1H

07-~~37~~-91
38

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No	Approval date	Work Item Description..	Corrective Action........................
1	2VBB-UPS1A	W007758	860225	UNINTERRUPTIBLE POWER SUPPLY - 1A, UNIT TRANSFERRED TO BYPASS, TRIED TO RESTART AND RETRANSFER AND BLEW LEG FUSES, TROUBLESHOOT AND REPAIR	NO CORRECTIVE ACTION REQUIRED. 2VBB-UPS1A WORKING PROPERLY UPON INSPECTION
2	2VBB-UPS1A	W120764	870523	BLOWN FUSE IN CHANGER SECTION OF UPS MODULE, REPLACE FUSE, LOCATED NORMAL SWITCHGEAR EL 237	ADJUST, ADJUSTED I&C SCR FIRING BOARD TO COMPENSATE FOR INBALANCE IN AMPERAGE, REPLACED BLOWN FUSES, F8 AND F28, AND F7 AND F26
3	2VBB-UPS1A	W130867	880110	REPEATED FAN FAILURE ALARMS SOMETIMES WITH CARD-LEAD A7 INDICATION, ALARM CLEARS ITSELF, TROUBLESHOOT AND REPAIR	REPLACED FAN IN LEG A7
4	2VBB-UPS1A	W127824	880212	UNINTERRUPTABLE POWER SUPPLY VBB-UPS1A, MEASURE AND RECORD ALL CIRCUIT LOADS IN PANELS 2VBS-PNLA107, 2VBS-PNLA102 AND 2VBS-PNLA101 SEND COPY OF INFORMATION TO S GLOVER SWEC ENGINEERING ALSO RECORD VBA POWER FACTOR (M&T)	TOOK AMPERAGE READINGS (CRANDALL 1281 HAS THEM). CK CONN. AT BKER 36 IN PNL 2VBS-PNLA101,JB401 IN PNL 2CEC*PNL709,PNL H13-616 ALL WERE TIGHT.
5	2VBB-UPS1A	W137500	880312	UPS1A HAS VOLTAGE OUTPUT IMBALANCE, REVERIFY SETTINGS ON UPS, ADJUST AS REQD	VOLTAGES-OA-117 OB-124 OC-121 VAC VOLTAGES ARE DIFF DUE TO DIFF AMPS ON EACH PHASE
6	2VBB-UPS1A	W138017	880314	TROUBLESHOOT OPERATION OF UPS, 0 LOADING IMBALANCE CAUSING MISOPERATION AND DISTURBANCE IN RDCS	CHECKED BALANCE OF UPS, SIMULATED IMBALANCE ON OC OF 37 AMPS AND DID NOT AFFECT UNITS
7	2VBB-UPS1A	W145893	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD, REF IE 87-24 REQD UNIT ON MAINT POWER, WIP	WORK COMPOLETED ON WR189497
8	2VBB-UPS1A	W157612	890218	OV/UV TRANSFER ALARM LIGHT LITE UPS1A BREAKER CB1 2 3 OPEN CB4 CLOSE SCR SHORT LIGHT IN	WORK COMPLETED ON SUPPORT COPY
9	2VBB-UPS1A	W149263	890227	2VBB-UPS1A, REPAIR BROKEN HINGES ON CABINET DOOR	NO REPAIR NECESSARY FUNCTIONS AS PER DESIGN
10	2VBB-UPS1A	W161031	890415	2VBB-UPS1A UNINTERRUPTABLE POWER SUPPLY 1A, AC OUTPUT VOLTMETER INDICATES 124.1 VAC (HIGHER THAN EXPECTED), VERIFY CORRECT-ADJUST AS NEC, LOCATION-EL 237 SWITCHGEAR BLDG	TOOK VOLTAGE READINGS OK METER RECALIBRATED BY M&T DEPT
11	2VBB-UPS1A	W162010	890505	UNINTERRUPTIBLE POWER SUPPLY, BREAKER TRIPPED CB-1 AND CB-2 TRIPPED, ALARM OV-UV	I&C REPLACED CHIP, WORK PERFORMED BY SUPPORT DEPARTMENT

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work.No.	Approval date	Work Item Description	Corrective Action
				TRANSFER, CB1 WILL NOT RECLOSE AFTER RESETTING-TRIP IN ON UNIT, TROUBLESHOOT AND REPAIR AS NEC	
12	2VBB-UPS1A	W161451	890515	HAS TRIPPED TO MAINT MODE TWO TIMES IN 12 HRS, TROUBLESHOOT AS NEC	CORRECTIVE ACTION PERFORMED BY I&C REPLACE CARD A8
13	2VBB-UPS1A	W160837	890515	REPLACE RIBBON WIRE INSIDE UPS, WIP	WORK COMPLETED UNDER WR189497
14	2VBB-UPS1A	W160839	890519	TROUBLESHOOT AND REPAIR A13A1 CARD IN I AND C VIDMAR A-5	CARD RETURNED TO MFGR (EXIDE ELECTRONICS) ON RETURN # 007079 7/24/89 SYMBOL 93-53-867 P/N 101072370 NO WORK PERFORMED MRF 32129
15	2VBB-UPS1A	W164090	890726	GROUND FAULT ON BATTERY CAME IN CLEARED CAME IN AGAIN BUT DID NOT CLEAR WINDOW 852503 ALARMED AND INDICATOR LIGHT FOR BATTERY GROUND IS AT VBB-UPS1A TROUBLESHOOT	WORKED PERFORMED UNDER WR 164092
16	2VBB-UPS1A	W154948	890824	2VBB-UPS1A HAS A BATTERY GROUND ALARM-HAS BEEN RESET BUT CAME BACK IN- INVESTIGATE REASON FOR ALARM AND REPAIR AS NECESSARY	NO PROBLEM FOUND
17	2VBB-UPS1A	W164138	891002	CORRECT BATTERY GROUND ALARM PROBLEM ON UPS1A BY FIXING CIRCUIT CARD A13A1 PER EDC 2E10075 ATTACHED THIS WILL CORRECT NUISSANCE ANNUNCIATOR, ANNUN	PERFORMED EDC 2E10075 VERIFIED DOING GROUND CHECK ON DN 2BYS-BAT1A WOULD NOT GIVE 2VBB-UPS1A GROUND ALARM
18	2VBB-UPS1A	W180623	900701	UPS1A IS ON MAINTENANCE SUPPLY. ALARMS IN-INVERTER FUSE A1 ALARM LIGHT- LEG FUSE LIGHT-TRIP LIGHT- SCR SHORT- LEG FANS 1-6 OFF. (PRIOR TO X-FER TO MAINT. LEG FAN 4 OFF LIGHT CAME IN FOR APPROX 5 MIN ON A 20 MIN. CYCLE. CEC-PNL852/UPS1A	REPLACE LEG 3 FUSE (A70P400) AND REPLACED LEG 4 COOLING FAN (FRONT) - REPLACED LEG 1 FAN B
19	2VBB-UPS1A	W189497	900921	UNIT HAS TRIPPED DUE TO A BLOWN LEG FUSE AND IS CURRENTLY ON MAINTENANCE POWER SUPPLY. TROUBLESHOOT AND REPAIR. LOCATION NORM SWGR ELEV 237. TAG ON DOOR	REPLACE FUSE AND COOLING FAN REPLACED BLOWN LEG FUSE LEG 5-REPLACED COOLING FAN TO A16 CAPACITOR BANK-APPLIED HEAT SINK GREASE TO ALL LEG SCR-DIODC. THIS WORK CLOSES WRS 189472, 145893, 160837
20	2VBB-UPS1A	W189472	900921	INTERMITTENT SCR SHORT ALARM-WILL RESET (SWG 240). HUNG ON UPS-1A	NONE NO WORK TO BE PERFORMED ON THIS WR. WORK PERFORMED ON WR189497
21	2VBB-UPS1A	W154535	910513	BLOCKING DIODE RELAY PICKING UP/DROPPING OUT- DC LINK VOLTAGE DRIFTING LOW. VERIFY CIRCUIT BOARD FOR DC LINK NOT DETERIORATING. TAG ON FRONT OF UNIT	

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No	Work No	Approval date	Work Item Description	Corrective Action
22	2VBB-UPS1A	W162319	910813	WHEN RESTARTING UNIT BREAKER 1 ON PANEL 301 TRIPS. POSSIBLE FAULT IN RECTIFIER SECTION. TROUBLESHOOT	
23	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1D, 2VBB-UPS1G	W130937	880113	2VBB-UPS1A, 1B, 1C, 1D AND 1G, UPS NEED TO HAVE DUST BLOWN OUT	AIR CLEANED 2VBS-UPS 1A,1B,1C,1D AND 1G.
24	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1D, 2VBB-UPS1G	W137481	880223	INCORPORATE CHANGES PER PR 7680 ATTACHED, ADD LABELS (2 EACH) FILTERS TO BASE OF UNITS WITH AROUND DOWN(IF POSSIBLE), CONTACT BOB CRANDALL X1281 FOR CLARIFICATION	MADE TAGS AND INSTALLED AS DIRECTED.
25	2VBB-UPS1A, 2VBB-UPS1B, 2VBB-UPS1C, 2VBB-UPS1G, 2VBB-UPS1D	W107670	861017	UNINTERRUPTIBLE POWER SUPPLIES 2VBB-UPS1A, B, C AND G, TAKE AND RECORD BASELINE DATA FOR UPS1A, C AND D, UTILIZING THE EXIDE UNIT ADJUST PROCEDURE	TOOK BASE LINE DATA ATTACHED TO BACK OF WR
26	2VBB-UPS1B	W012787	860510	2VBB-UPS1B, STATIC SWITCH UNPLUGGED, LIGHT ILLUMINATED WON'T RESET, PROBABLE FAILED STATIC SWITCH POSITION SWITCH, NORMAL SWITCH GEAR BUILDING 237 EL.	CORRECTIVE ACTION COMPLETED BY SUPPORT GROUP
27	2VBB-UPS1B	W102235	860623	2VBB-UPS1B, 2VBB-UPS1B STATIC SWITCH UNPLUGGED LIGHT FLICKERS ON AND OFF	CLEAN OUT DIRT FROM SENSOR AND REPLACED REFLECTIVE TAPE.
28	2VBB-UPS1B	W120153	870531	STATIC SWITCH UNPLUGGED ALARM LIGHT LITE, TROUBLESHOOT AND REPAIR AS NEEDED, 2VBB-UPS1B LOCATED IN NORM SWGR ELEV 237E	REPLACED WHITE BACKGROUND FOR PHOTO TRANSISTOR ASSOCIATED WITH STATIC SWITCH , UNPLUGGED ALARM LIGHT
29	2VBB-UPS1B	W125743	870924	CLOGGED FURNACE FILTERS UNDER UNITS (2 EACH, HELD IN WITH THUMB SCREWS), ARE RESTRICTING AIR FLOW TO UNITS AND CONTRIBUTING TO HEAT BUILDUP IN UNIT-REPLACE FILTERS (SHOULD BE DONE ONCE PER MONTH)	REPLACE OLD DIRTY FILTERS WITH NEW CLEAN FILTERS
30	2VBB-UPS1B	W138173	880223	CB-3 GETS A TRIP SIGNAL IN ADDITION TO OFF SIGNAL, IT IS ONLY SUPPOSE TO GET AN OFF SIGNAL	NO WORK REQUIRED ON THIS WR REFERENCE WR 169147
31	2VBB-UPS1B	W145894	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD, THIS REQUIRES UNIT TO BE ON	REGREASED SCR'S ON ALL UPS LOGS

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description	Corrective Action
				MAINT POWER, REF IE 87-24, WIP	
32	2VBB-UPS1B	W147325	881101	THE OPERATOR ON THE NORMAL AC INPUT BREAKER DOES NOT CLOSE THE BREAKER, TROUBLESHOOT	VOID WR 138173 ADDRESS THE PROBLEM - WILL DO CORRECTIVE ACTION ON THAT WR.
33	2VBB-UPS1B	W164699	890908	UPS-1B BATTERY AMMETER READS OFFSCALE LOW. TROUBLESHOOT AND CORRECT. CB237	REPLACED BATTERY INPUT AMMETER
34	2VBB-UPS1B	W169147	891203	REPLACE CB-3 MOLDED CASE SWITCH ON 2VBB-UPS1B. THIS WILL COMPLETE WORK STARTED ON WR 138173	
35	2VBB-UPS1B, 2VBB-UPS1D	W107684	861217	2VBB-UPS1B, &1D, TAKE WAVE FORM, PRINTOUTS OF THE OUTPUT OF 2VBB-UPS1B WITH FEEDER BKR FOR 2LAC-PNLV04 CLOSED AND OPEN, BKR LOCATED IN 2VBS-PNL B111, ALSO TAKE WAVE FORM, PRINTOUT OF 2VBB-UPS1D	TOOK WAVE FORM/PICTURES OF ABOVE. SEE ATTACHED SHEETS M&TE 3202-7623A0-SCOPE DUE 9/8/87.
36	2VBB-UPS1C	P12977			
37	2VBB-UPS1C	W012466	860310	2VBB-UPS1C, 2VBB-UPS1C HAS BLOWN FUSE CAUSING UPS TO TRIP, REPLACE BLOWN FUSE AND INVESTIGATE CAUSE OF FUSE BLOWING	REPLACED FUSE F-5. CAT A70P400 TYPE 4. 400 AMP 700V SPEC E035A
38	2VBB-UPS1C	W102237	860625	2VBB-UPS1C, TRIPPED OFF, BOTH NORMAL AC AND DC INPUTS, AND DID NOT SHIFT TO BYPASS AUTOMATICALLY UPS WOULD NOT RESTART, MANUALLY PLACED IN BYPASS	LEG FUSE REPLACED, MRR 86-05653
39	2VBB-UPS1C	W101235	860717	2VBB-UPS1C, 2VBB-UPS1C IS ON BYPASS AND HAS BLOWN LEG FUSE	REPLACE 400 AMP FUSE(F4)
40	2VBB-UPS1C	W129243	871106	SRC SHORT CIRCUIT IN, WILL NOT CLEAR SG 237	NONE -PRESSED LAMP TEST BUTTON -ALL LAMPS WORKED
41	2VBB-UPS1C	W138108	880217	IF FRONT DOORS ON UPS1C ARE CLOSED, AN SCR SHORT COMES IN AND A FAN HIGH TEMP	WORK DONE ON WR 147313- VOID
42	2VBB-UPS1C	W130139	880222	REPLACE BAD FAN IN UPS	REPLACED FAN IN CHARGER SECTION
43	2VBB-UPS1C	W145895	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD, THIS REQUIRES UNIT TO BE ON MAINT POWER, REF IE 87-24	WORK DONE ON WR 147313- VOID
44	2VBB-UPS1C	W147313	881106	FANS FAIL TO RUN WITH INVERTER ON	REGREASED LEG NUMBER 5 AND ALL SCR'S CHECKED OK 1-15-89. REPLACED DC SWITCH. REGREASED ALL SCR'S AND CHECKED FANS.

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description.	Corrective Action.
45	2VBB-UPS1C	W149132	890109	REPLACE INVERTER LEGS IN UPS1C WITH ONES FROM UPS1D SPARE SCRS ARRIVE, RUN UPS1D IN MAINT, UPS1C NORMAL, WHEN SPARE SCRS ARRIVE REPLACE BAD SCRS AND REINSTALL INTO UPS1C, NO TEMP MOD REQD, SAME FIT FORM FITNESS, REPAIR ONLY NO CHANGE	NO WORK DONE THIS WR, PARTS REPAIRED UNDER WR 147313
46	2VBB-UPS1C	W164135	890922	USING PORTABLE TEST EQUIPMENT RECORD UPS OUT PUT VOLTS AMPS AND PHASE ANGLE	INFORMATIONAL READINGS TAKEN. ATTACHED TO WR
47	2VBB-UPS1C	W164134	890922	VERIFY THE OVERLOAD SETPOINT ALARM	WORK DONE ON WR SUPPORT
48	2VBB-UPS1C	W170627	900112	UNIT FAILED TO TRANSFER TO MAINTENANCE DURING WSS OF NORMAL AC. ALARMS IN SHOWN ON PAGE ATTACHED. BELIEVED THAT INVERTER FUSE BLEW. DEFICIENCY TAG 17134	REPLACED FUSE IN INVERTER
49	2VBB-UPS1C	W169373	900120	2VBB-UPS1C HAS A LOGIC INVERTER LIGHT LITE AND WILL NOT RESET. TROUBLESHOOT AS NEEDED	SEE SUPPORT NO LITE LIT
50	2VBB-UPS1C	W189544	901022	2VBB-UPS-1C HAS A BLOWN LEG FUSE. PLEASE REPLACE. LOCATED EL 237 NORMAL SWITCHGEAR. TAG HUNG ON UPS-1C	CHANGED BLOWN LEG FUSE F4
51	2VBB-UPS1C	W191924	901224	DURING TRANSFER OF 2NJS-V55 UNIT HAD FAILURE. AND SUBSEQUENTLY EVEN UPS OUTPUT FUSE.	REPLACED CB1. FUSE F33 AND FUSE F44
52	2VBB-UPS1C	W184517	910307	UNIT OVERHEATING- MAKE REPAIRS REPLACE FANS; FILTERS; INVERTED GATE CARD (SEE ATTACHED MAINT. INSTRUCTIONS). TAG ON FRONT OF UPS1C	REPLACED GATE FILTERS AND FANS CLEANED UNIT WITH SERVICE AIR CHECKED FUSES CABLING AND CONNECTIONS
53	2VBB-UPS1C	W184809	910520	FAN 4 FAILURE ALARM IN REPAIR FAN 4. NORMAL SWG BLDG ELEVATION 237	CLEANED AS NECESSARY; TESTED SYSTEM AND ALARMS ALL CLEARED
54	2VBB-UPS1C	W184849	910529	FAN FAILURE LED IS IN. TROUBLESHOOT AND REPAIR LOCATED IN NORMAL SWGR BLDG ELEVATION 237	CLEANED CARD CONNECTORS FOR ALL SIX INVERTER LEGS. ALL SO REPLACED 400 AMP LEG FUSE FOR LEG 1
55	2VBB-UPS1C	W192926	910617	LOGIC ALARM LIGHT WILL NOT CLEAR- CB1 TRIPS- TROUBLESHOOT. REPAIR LOGIC CARD; SWG BLDG EL 237 AND REPAIR. TAG ON UPS-1C CAB	REPLACED - A13A20-4 A13A21-24 LEG 4 FUSE AND 5 ON LEG 4 BOARD
56	2VBB-UPS1D	W012583	860321	2VBB-UPS1D - UPS1D TURN ON BUT DOES NOT TRANSFER - NO SYNC TO BYPASS	VOID. CORRECTIVE ACTION PERFORMED REF. WR NO. 12740-4/4/86

...PS1H, AND LEADFLG=L Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description....	Corrective Action........................
57	2VBB-UPS1D	W012740	860327	UPS1D FAIL TO SYNC, UNIT WILL NOT SYNC TO BYPASS, PHASE A-A=17.5V, B-B=18V, C-C=16.0V, UNIT WILL ALSO NOT AUTO RESTART	REALIGNED A13 A20 BOARD AND REPLACED A13 A34.
58	2VBB-UPS1D	W100801	860611	2VBB-UPS1D, HAS A SCR SHORT IN ON IT, IT WILL NOT RESTART AND RESET, HAVE ELECTRICAL MAINTENANCE TROUBLESHOOT AND REPAIR AS NECESSARY	TROUBLE SHOOT, INSPECT, CLEAN AND TEST SYSTEM - CHECKS OK
59	2VBB-UPS1D	W102239	860623	2VBB-UPS1D, TRIPPED OFF, AND IS ON BYPASS POWER, WILL NOT RESTART, LEG FUSE BLOWN ON 860620	LEG FUSE REPLACED
60	2VBB-UPS1D	W106529	861013	UNINTERRUPTIBLE POWER SUPPLY, UNIT DOES NOT AUTO RESTART ON A TRANSFER TO BYPASS POWER SUPPLY, IT DOES ATTEMPT TO DO SO BUT ENDS UP RETURNING TO BYPASS, THE UNIT IS ALSO AT CLOSE TO MAX AMPS WHICH MAY EXPLAIN SHIFT TO BYPASS, LOCATION, NORMAL SWGR ELEV 237 SCR SHORTED LIGHT	REALIGNED UNIT
61	2VBB-UPS1D	W109638	870126	2VBB-UPS1D, BLOWN FUSE, 2VBB-UPS1D HAS A BLOWN LEG FUSE, AND INVERTER FUSE LIGHT IS LIT, CB-1, 2 AND 3 ARE TRIPPED, ON BYPASS	REPLACED FURS #4 AND FUSE #5
62	2VBB-UPS1D	W109673	870202	UNINTERREPTABLE POWER SOURCE 1D, ERRATIC OUTPUT, NS EL 237, BATTER AMMETER CYCLICALLY DEFLECTING -0, INVESTIGATE AND CORRECT AS NECESSARY, NO ALARMS SHOWING ON UPS, NONE IN CONTROL ROOM, ALL OTHER INDICATIONS APPEAR NORMAL	NO CORRECTIVE ACTION NEEDED METER OPERATES PROPERLY WHEN IN USE
		W125732	870924	DURING LOSS OF POWER TEST ANNUN NO 852531 -UPS1D SYSTEM TROUBLE DID NOT ANNUNCIATE THOUGH UNIT WAS ON BATT POWER (THAT ANNUN DID COME IN)	OPENED AS SUPPLY BREAK TO UPS1D TWICE, BOTH TIMES WINDOWN 852531 CAME IN, NO CORRECTIVE ACTION REQUIRED
		$	871007	DC LINE OUT OF SPEC, THE DC LINE VOLTAGE IN 2VBB-UPS1D IS VARYING A ONE HALF VOLT CAUSING (ON DAMPER POWER) ALARM TO COME IN WHEN CHARGER 1B IS ON EQUALIZE	WHEN WR 130860 WAS COMPLETED VOLTAGE WAS STABLE AT 140.5 VDC, PROBLEM CORRECTED ON WR 130860
			14	ANNUN NO 852534 DID NOT ENERGIZE EVEN THOUGH UPS WAS ON BATTERY POWER, INVESTIGATE-REPAIR BY OPEN AC FEED TO UNIT, IF PROBLEM IS NOT FOUND NOTIFY B CRANDALL	REPLACED K3 RELAY, VERIFIED OPERATION BY OPENING AC SUPPLY BRK ON MCC 6
				METER IS FLUCTUATING ABOUT 20 AMPS FROM 0	NO CORRECTIVE ACTION TAKEN. THE SAME

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description......................	Corrective Action..........................
				TO DOWNSCALE, ALSO METER GOES DOWNSCALE WHEN TEST LAMP BUTTON IS PUSHED, TROUBLESHOOT AND CORRECT, LOCATED EL 237 SWITCHGEAR	PROBLEM WAS ADDRESSED ON WR 109673 (ATTAACHED) NO ALARMS SHOWING IN CONTROL ROOM OR ON UPS
67	2VBB-UPS1D	W129224	871106	UPS OUTPUT READ 117 VAC, SHOULD BE 120 VAC +-2%. REPAIR AND OR ADJUST AS NECESSARY	REPLACED AC OUTPUT VOLTMETER
68	2VBB-UPS1D	W130860	880109	UPS 1D REPEAT VARIOUS ALARMS PRESENTLY SCR SHORT, INVERTER FUSE BLOWN LOSS OF AC AND DC POWER BRKS TRPPED, NOW ON BYPASS POWER	REPLACED DIODE ON INVERTER LEG A1 AND FUSES ON LEGS A1 AND A2
69	2VBB-UPS1D	W137315	880207	PHYSICAL FAULT, 2VBB-UPS1D SCR SHORT ALARM KEEPS COMING IN FOR NO APPARENT REASON	CORRECTIVE ACTION COMPLETED WITH WR 137619 BY REPLACEING FANS IN CAB TO PREVENT OVER HEATING.
70	2VBB-UPS1D	W120036	880210	HIGH TEMP, REMOVE EACH LEG OF UPS1D, NOTE ORIENTATION (CATWODE) OF EACH DIODE/SCR. REMOVE EACH DIODE/SCR AND REINSTALL WITH HEAT SINK GREASE ON EACH, PLEASE NOTE IF LEGS RUN COOLER, SUSPECTED CAUSE OF HEATING IN UNIT IS POOR HEAT CONDUCJION FROM DIODES/SCRS TO HEAT SINKS	INSTALLED HEAT SINK GREASE AS PER WR 120036.
71	2VBB-UPS1D	W137378	880216	PHYSICAL FAULT, NO 3 SCR IS EXPERIENCING OVERHEATING CONDITION (FAN FAILURE ALARM COMES IN), UNIT THEN TRIPPED CB-1-CB-2 WITH FOLLOWING ALARMS- OUTPUT OV-UV, LEG FUSE (POSSIBLY NO 3) INVERTER LOGIC TRIP VOLTAGE DIFFERENCE-REPLACE BLOWN FUSE-TROUBLSHOOT - REPAIR LEG, GREASE ALL LEG SCRS DIODES PER WR 120036 (CB-4 PLUG PULLED)	REPLACED (2) 400 AMP LEG FUSES. REPLACED (1) FAN UNIT. TROUBLE SHOT STATIC BYPASS SWITCH FOUND PROTECTIVE THERMAL SWITCH TRIPPED, RESET AND TESTED CIRCUIT.
72	2VBB-UPS1D	W130137	880222	REPLACE DEFECTIVE SCRS IN UPS1D	VOID-UNIT RUNNING FOR LAST 2 YEARS. SCR'S EVIDENTLY OK. UNKNOWN WHAT DOCUMENT REPAIRED THEM IF THEY WERE REPLACED
73	2VBB-UPS1D	W130138	880222	CB4 DOES NOT ALWAYS CLOSE-STATIC SWITCH PICKUP LOAD	NO WORK REQD. PROBLEM HAS NOT BEEN EXPERIENCED SINCE THIS WR WAS WRITTEN. PROBLEM APPEARS TO BE GONE AWAY
74	2VBB-UPS1D	W137618	880304	UNINTERRUPTABLE POWER SOURCE 1D, SCR SHORT ALARM COMING IN PERSISTENTLY (APPROX 1X PER HR.) TROUBLESHOOT ONLY	CORRECTIVE ACTION COMPLETED WITH WR 137619 BY REPLACEING FANS IN CAB TO PROEVENT OVER HEATING.
75	2VBB-UPS1D	W137622	880304	INVERTOR FUSE BLOWN REPLACE, CB4 HANGING UP CHECK OPERATION AND CLEAN OR REPAIR TO CORRECT OPERATION	REPLACED FUSES F1 F2 F3 F4 F5 TRIGGER FUSE F32 AND 33 AND FUSES F32 AND 33 CB 4 OPERATION TO BE WORKED UNDER WR 130138

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description	Corrective Action
76	2VBB-UPS1D	W137619	880304	REPLACE ALL ORIGINAL FANS IN UNIT	REPLACED 11 COOLING FANS IN UPS ID. REINSTALLED UNITS AND TESTED. ALL FANS ARE NOW WORKING. UNIT PLACE BACK IN SERVICE.
77	2VBB-UPS1D	W135928	880405	REPLACE LEAKY CAPACITORS IN DC FILTER BANK	REPLACED 2 CAPACITORS THAT WERE LEAKING
78	2VBB-UPS1D	W146623	881002	WHEN NORMAL AC BREAKER IS CLOSED AND INVERTER IS CHARGING THE SYSTEM LOAD, 10 MINUTE OVERLOAD LED LIT AND AC BREAKER TRIPS	REALIGNED UPS
79	2VBB-UPS1D	W146621	881002	CB4 FAILS TO CLOSE COMPLETELY AND PICKUP LIMIT SWITCHES	REPLACED MOTOR ACTUATOR ASSEMBLY THAT OPERATES BREAKER CB-4 WITH ONE SPARE FROM ELEC. SHOP TAKEN FROM UPS-1B, EVERYTHING WORKS FINE NOW.
80	2VBB-UPS1D	W146620	881002	CB-2 WILL NOT RESET (TRIPPED AFTER NNS-SWG015 WAS DEAD BUSSED)	ADJUSTED TRIP LATCH AND BLEW OUT DIRT.
81	2VBB-UPS1D	W148953	881228	UPS1D DID NOT AUTO XFER TO MAINT ON UV, EVERYTHING (CB-1, 2, 34) FOUND OPEN AND CRITICAL BUS DEENERGIZED ALARMS WERE INVERTER LOGIC AND TRIP ON THE MODULE AND ALSO POWER SUPPLY FAILURE AND UV/OV, CLOSED IN MAINT SUPPLY MANUALLY, TROUBLESHOOT AND REPAIR AS NECESSARY	MANUALLY CLOSED CBS AND STARTED UNIT
82	2VBB-UPS1D	W161033	890415	UNINTERUPTIBLE POWER SUPPLY, WHEN UNIT TRANSFERED TO MAINT POWER SUPPLY WITH BATTERY INPUT BREAKER FOUND IN TRIPPED FREE CONDITIONS, ONLY ALARM FOUND ON UNIT WAS LOGIC ALARM UNDER BATTERY COLOMN, TROUBLESHOOT AND REPAIR	NO ACTION TAKEN - NORMAL OP PER BOB CRANDALL-ENG BREAKER WILL OPEN AS A RESULT OF OVERLOAD DURING SCRAM
83	2VBB-UPS1D	W164698	890908	UPS-1D BATTERY AMMETER READS OFFSCALE LOW. TROUBLESHOOT AND CORRECT. CB 237	
84	2VBB-UPS1D	W164136	890922	USING PORTABLE TEST EQUIPMENT RECORD UPS OUT PUT VOLTS AMPS PHASE ANDLE	INFORMATIONAL READINGS TAKEN ATTACHED TO WR
85	2VBB-UPS1D	W164118	890922	UNIT IS RUNNING HOT CRACK AND RECONE SURFACE TEMP PEROMETER OF CHARGER OF EACH LEG COMPARE TEMP READINGS TO UPS 1C	ALL TEMPERATURES TAKEN AND RECORDED
86	2VBB-UPS1D	W184516	901113	UNIT TRIPPED WITH ALARM INDICATION AS LISTED ON PAGE ATTACHED-TROUBLESHOOT-REPAIR AS REQD. TAG ON FRONT	REPLACED FAULTY CB-1 REPLACED LEG 2 AND 3 FUSES

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
. AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description....................	Corrective Action.........................
				OF UNIT	
87	2VBB-UPS1G	W100926.	860611	WITH UNIT ON BATTERY POWER ALARM RELAY IN UNIT DOES NOT PICK UP, POSSIBLE ALARM RELAY FAILURE OR CFR1/2 FAILURE	MAJOR VACUUM & CLEANING
88	2VBB-UPS1G	W114689	861103	2VBB-UPS1G, (UPS LOCATED AT 214 EL CONTROL BLDG), LED FOR AC OVERVOLTAGE DOES NOT LIGHT, APPEARS TO NEED RESOLDERING WHEN TOUCHED IT LIT	NO CORRECTIVE ACTION REQUIRED, FOUND LED TO OPERATE DURING LAMP TEST FUNCTION
89	2VBB-UPS1G	W125731	870924	ON 2VBB-UPS1G, THE DC BATTERY AMMETER DID NOT REGISTER ANY CURRENT THOUGH IT WAS KNOWN TO BE DRAWING APPROX 400 AMPS DC	PUT 2BYS-CHGR1C1 ON EQUALIZE,LOWER DC LINKS VOLTAGE ON UPS BELOW BATTERY VOLTS. DC AMMETER RESPONDED AS DESIGNED-NO WORK REQUIRED.
90	2VBB-UPS1G	W125734	870924	PHYSICAL FAULT, 2VBB-UPS1G HAS SCR SHORT ALARM IN	HIT RESET SW FOR INDICATING LIGHTS TO VERIFY LIGHT OPERABLE AND WOULD SET
91	2VBB-UPS1G	W129816	871116	INVERTER LEG A-7 LIGHT, FAN FAILURE LIGHT COMES IN AND THEN WILL CLEAR ON ITS OWN, TROUBLESHOOT AND CORRECT, LOCATED CB EL 214 ATTN P BERTCH	REPLACED FAN IN INVERTER BY A-7
92	2VBB-UPS1G	W129983	871117	TROUBLESHOOT WHY UNIT WILL NOT SYNC TO BYPASS AND REPAIR	REALIGNED UPS
93	2VBB-UPS1G	W129320	871201	CB-3 ACTUATOR OPERATES BUT DOES NOT CLOSE BRK, TROUBLESHOOT AND REPAIR	CLEANED AND CYCLED CIRCUIT BREAKER OPERATING MECHANISM. THIS UNIT APPEARS TO OPERATE OK
94	2VBB-UPS1G	W145896	880916	VERIFY ALL INVERTER LEG SCRS HAVE HEAT SINK GREASE APPLIED TO THEM, APPLY HEAT SINK GREASE AS REQD. THIS REQUIRES UNIT TO BE ON MAINT. REF IE 87-24, WIP	REPLACE COOLING FANS AS REQUIRED. REPALCE LEG SCR'S AS REQUIRED. SUPPORTED I&C BY LIFTING LEADS AS NECESSARY FOR THEM TO PERFORM TASKS
95	2VBB-UPS1G	W147324	881101	THE OPERATOR ON THE NORMAL AC INPUT BREAKER DOES NOT CLOSE THE BREAKER, TROUBLESHOOT	REPLACED CB 3 MOTOR ACTUATOR ON UPS-1G.
96	2VBB-UPS1G	W148333	881221	REPLACE BAD FAN IN UPS1G	REPLACED BOTH BAD FANS WITH NEW. TESTED AND WORKED SAT.
97	2VBB-UPS1G	W148563	881226	THE FAN IS STARTING AND STOPPING INTERMITTENTLY, INVESTIGATE AND REPAIR	REPLACED DEFECTIVE FANS.
98	2VBB-UPS1G	W149187	890214	SUPPORT VENDOR REPRESENTATIVE TROUBLESHOOT AND CALIBRATE 2VBB-UPS1G DUE ON SITE 890216	SUPPORTED VENDOR AS REQD

Display of Work Item Data
SEEK Strategy: COMPID=2VBB-UPS1
, AND COMPID#2VBB-UPS1H, AND LEADFLG=L   Sort fields: COMPID, APPRDATE

HIT.	Component No.	Work No.	Approval date	Work Item Description......................	Corrective Action...........................
99	2VBB-UPS1G	W161005	890414	2VBB-UPS1G, SCR SHORT LIGHT ILLUMINATED - TROUBLESHOOT	NO ACTION REQD, LAMP ILLUMINATED PER ENG DURING A TRANSIENT, NO ACTUAL SCR SHORT, LIGHT IS NOT ILLUMINATED AT THIS TIME
100	2VBB-UPS1G	W164078	890722	UPS HAS A SCR SHORT AND FAN FAILURE-WHEN FAN FAILURE ALARM SILENCER KEEPS COMING BACK IN EVERY MINUTE OR SO UPS HAS AUTOMATICALLY SHIFTED OVER TO THE MAINTENANCE MODE	REPLACED COOLING FAN UNIT TURNED ON AND FAN OPERATED CORRECTLY
101	2VBB-UPS1G	W164079	890723	2VBB-UPS1G HAS AN SCR SHORT AND HAS SHIFTED TO MAINTENANCE MODE	REPLACED FUSE F3 AND F13 AND FAN FOR LEG 3
102	2VBB-UPS1G	W170530	891201	2VBB-UPS1G AC OUTPUT VOLTAGE IS READING LOW 115.5V. PROCEDURES STATE THAT IT SHOULD READ 120V PLUS-MINUS 2 PERCENT (117.6-122.4) LOCATION (CONTROL BLDG 214). DEF TAG NO. 20234	SEE SUPPORT FOR WORK
103	2VBB-UPS1G	W175948	910225	2VBB-UPS1G HAS UV/OV TRANSFER ALARM AND SCR SHORT ALARM IN. PLEASE TROUBLESHOOT. 2VBB-UPS1G IS IN MAINTENANCE SUPPLY. TAG LOCATED ON UPS 1G EL 237 CB	REPLACED 2 WHISPER FANS INSIDE UPS AND CLEAN OUT AS MUCH DUST AS POSSIBLE WITH VACUUM CLEANER
104	2VBB-UPS1G	W162320	910813	LIGHT FAILURE A13 AND A21 ALARM CARD AC OVERVOLTAGE LIGHT NOT WORKING	

[2J
[1;1H

07-~~FEB~~-91
39

TOPIC: NRC/NIMO Information Exchange Meeting

DATE: August 18, 1991

LOCATION/TIME: "P" Building / 8:00 AM / Conference Room A

PURPOSE:

a. Exchange information relative to the Uninterruptable Power Supplies and Related Components such as Main Transformer and Reserve Transformers.

b. Present a Troubleshooting plan for NRC concurrence and obtain approval to implement the plan.

c. Provide data exchanger on the lighting design for normal, essential, emergency and egress lighting fed from the UPS sources.

d. Clarify contact interfaces to schedule interviews and data exchange relative to the Main transformer failure analysis and the UPS component load list.

TOPIC		PRESENTER
1.	Discussion of on and offsite sources of power to the UPS Busses - Safety Related and Non-Safety Related	Anil Julka
2.	Discussion of sources to each UPS and category of loading on each UPS unit.	
3.	UPS design - Excide/ALGAR Control Logic Operability History, Maintenance History	Excide Specialists Bob Crandall, NIMO
4.	Maintenance Procedures and Practices Class 1E Class Non 1E a) P.M. b) C.M. c) Routine Shift Monitoring d) Operating Procedures	Bob Crandall
5.	Troubleshooting Plan	Bob Crandall
6.	Discussion of formal reports from Excide on their conclusions relative to common mod failures	J. Rosenthal M. J. McCormick Excide Specialist

7. Discussion of schedule for subsequent Data Exchange and Interviews: — J. Rosenthal, M. J. McCormick

- Main transformer
- AC/DC Relaying
- Photographs of Transformer 1B
- Plant lighting
- UPS Component Loading
- Sequence of Events
- Decision Making on Restoration of Equipment

07-~~[illegible]~~-91
39

TOPIC: NRC/NIMO Information Exchange Meeting

DATE: August 18, 1991

LOCATION/TIME: "P" Building / 8:00 AM / Conference Room A

<u>PURPOSE</u>:

a. Exchange information relative to the Uninterruptable Power Supplies and Related Components such as Main Transformer and Reserve Transformers.

b. Present a Troubleshooting plan for NRC concurrence and obtain approval to implement the plan.

c. Provide data exchanger on the lighting design for normal, essential, emergency and egress lighting fed from the UPS sources.

d. Clarify contact interfaces to schedule interviews and data exchange relative to the Main transformer failure analysis and the UPS component load list.

<u>TOPIC</u>		<u>PRESENTER</u>
1.	Discussion of on and offsite sources of power to the UPS Busses - Safety Related and Non-Safety Related	Anil Julka
2.	Discussion of sources to each UPS and category of loading on each UPS unit.	
3.	UPS design - Excide/ALGAR Control Logic Operability History, Maintenance History	Excide Specialists Bob Crandall, NIMO
4.	Maintenance Procedures and Practices Class 1E Class Non 1E a) P.M. b) C.M. c) Routine Shift Monitoring d) Operating Procedures	Bob Crandall
5.	Troubleshooting Plan	Bob Crandall
6.	Discussion of formal reports from Excide on their conclusions relative to common mod failures	J. Rosenthal M. J. McCormick Excide Specialist

7. Discussion of schedule for subsequent Data Exchange and Interviews: — J. Rosenthal, M. J. McCormick

- Main transformer
- AC/DC Relaying
- Photographs of Transformer 1B
- Plant lighting
- UPS Component Loading
- Sequence of Events
- Decision Making on Restoration of Equipment

07-39-91

TOPIC: NRC/NIMO Information Exchange Meeting

DATE: August 18, 1991

LOCATION/TIME: "P" Building / 8:00 AM / Conference Room A

PURPOSE:

a. Exchange information relative to the Uninterruptable Power Supplies and Related Components such as Main Transformer and Reserve Transformers.

b. Present a Troubleshooting plan for NRC concurrence and obtain approval to implement the plan.

c. Provide data exchanger on the lighting design for normal, essential, emergency and egress lighting fed from the UPS sources.

d. Clarify contact interfaces to schedule interviews and data exchange relative to the Main transformer failure analysis and the UPS component load list.

TOPIC		PRESENTER
1.	Discussion of on and offsite sources of power to the UPS Busses - Safety Related and Non-Safety Related	Anil Julka
2.	Discussion of sources to each UPS and category of loading on each UPS unit.	
3.	UPS design - Excide/ALGAR Control Logic Operability History, Maintenance History	Excide Specialists Bob Crandall, NIMO
later 4.	Maintenance Procedures and Practices Class 1E Class Non 1E a) P.M. b) C.M. c) Routine Shift Monitoring d) Operating Procedures	Bob Crandall
5.	Troubleshooting Plan	Bob Crandall
6.	Discussion of formal reports from Excide on their conclusions relative to common mod failures	J. Rosenthal M. J. McCormick Excide Specialist

[illegible]

TOPIC: NRC/NIMO Information Exchange Meeting
DATE: August 18, 1991
LOCATION/TIME: "P" Building / 8:00 AM / Conference Room A

7. Discussion of schedule for subsequent Data Exchange and Interviews: — J. Rosenthal, M. J. McCormick

- Main transformer
- AC/DC Relaying
- Photographs of Transformer 1B
- Plant lighting
- UPS Component Loading
- Sequence of Events
- Decision Making on Restoration of Equipment

[illegible]

07-~~1336~~-91
40

PRELIMINARY

UPS FAILURE REPORT

Nine Mile Point #2

8/18/91
8:00 A.M.

Bob Crandall

At approximately 05:48 A.M. on 8/13/91 there was a simultaneous loss of the Gaitronics paging system, control room annunciation, full core display, essential lights, plant process computer, DRMS computer, fire computer, radwaste computer, leaky wire radio system and BOP control room instrumentation. This was caused by simultaneous loss of 2VBB-UPS1A, -1B, -1C, -1D, -1G.

Operations personnel responded to the UPS in order to restore power to the UPS. Attachment 1 and 2 outline the indications that the operators found when first arriving at the UPS. The operators referred to the operating procedure (N2-OP-71) to try and restart UPS1D. The procedure called out verifying that CB-4 was closed but it was open. The operators made a decision to energize the UPS loads by lifting the motor operator off of breaker CB-4 and then manually closing CB-4. This was done at approximately 6:22 A. M. and it restored power to the critical loads fed by UPS1D. They then proceeded to restore the other UPS in that same manner by approximtely 6:22 A.M.

At approximately 0830 the system engineer (Bob Crandall) went down with damage control team #3 (operators Dave Hanczyk and Bob Bergenstock, electrician Jeff Poor, I/C technician Perry Bertsch and a Radiation Protection technician, Vern Cericka) to restore each UPS. An initial inspection was done of each unit to determine if any obvious damage had occurred and none was found. A restoration sequence was established and the units were restored (see Attachment 3) in the following order:

1.) 2VBB-UPS1C
2.) 2VBB-UPS1D
3.) 2VBB-UPS1A
4.) 2VBB-UPS1B
5.) 2VBB-UPS1G

From analysis of the alarms shown on the UPS' it was determined that each unit received a MODULE TRIP that caused CB-1, CB-2 to trip and CB-3 to OPEN. (Note: it was not be verified that UPS 1D had a MODULE TRIP at the time the operators arrived. The operators could not recall if it had it but some operators thought it may have been there and was reset without them making a note of it). A MODULE TRIP signal is generated by the A13A1 circuit board of the UPS. It's initiation comes from a signal from the A13A21 circuit board. Various UPS output parameters (see ATTACHMENT #6) are monitored by the A13A21 board which, when those parameters are out of their limits, will light an alarm light on the A13A21 and generate a trip signal to the A13A1. There were no alarm lights on the A13A21 of any of the five UPS. The only alarms generated were an OV/UV and voltage difference alarm. Neither alarm would be indicative of a UPS trip. The

voltage difference alarm is locked in when the maintenance supply falls out of sync with the UPS. It is locked in for 10 - 15 seconds after the condition clears. The OV/UV alarm is generated as a result of the critical bus going low or high in voltage (this was generated by the loss of the output).

On 8/15/91, troubleshooting was done on 2VBB-UPS1C as follows:

a.) With the unit on normal AC with DC and maintenance available an OV/UV signal was generated by opening the CB-3 toggle switch. The unit transferred to maintenance without generating a trip signal. This verifies that an output OV/UV will not cause a trip signal to be generated.

b.) With UPS1C on maintenance A27-S1 was opened with A27-CB1 closed. The logic power for the UPS went dead and it shouldn't have. This is evidence that the UPS internal batteries are dead.
When the UPS is down the internal logic is fed by an internal power supply with internal battery backup. When the is UPS on line an auctioneering circuit should power the logic.
This auctioneering circuit was verified to be working by de-energizing the maintenance supply with the UPS running. When this was done the logic remained powered up.
Although this is a deficiency it would not have contributed to the incident because the auctioneering circuit is working. (WR's are written to replace all UPS internal batteries).

c.) With all power sources available the maintenance supply feed was opened to verify the sync monitor circuit to the UPS. When the breaker was opened the voltage difference alarm came in and the unit sync indication went out. On reclosing the maintenance feed it took 10-15 seconds for the UPS to re-sync to the maintenance supply.

d.) With the load on UPS with the UPS running on normal AC and the DC breaker closed the maintenance supply feed was de-energized. The normal AC was feed was opened. The unit ran at full load off DC (500 amps) for 10-15 minutes with no alarms and no trips.

e.) Put unit on maintenance supply with UPS running off normal AC and CB-2 (DC) open. Opened the logic power and verified that CB-1 will trip.

f.) Put output on maintenance supply. With unit on normal AC and with DC breaker available, the AC output was lowered on the UPS. The AC undervoltage (ACUV) alarm signal was generated at 182 vac and after approximately 10 seconds the unit tripped.

g.) Restored unit to normal AC with DC available, load on maintenance. Raised output voltage to 220 vac and the AC overvoltage (ACOV) trip occurred.

h.) Unit was again restored with unit on normal AC and DC available, load on maintenance supply. Lowered the DC undervoltage (DCUV) caused a trip at 93 vdc.

i.) Due to the possibility of damage to the unit the DCOV (DC overvoltage was not verified. It was determined also that this condition was very unlikely to have occurred.

j.) The UPS was in its normal configuration on normal AC with DC and maintenance available. The upstream AC input breaker was opened and closed three times as rapidly as possible. This caused an audible "bump" to the input transformer on inrush current but the unit did not transfer to DC nor did it transfer to maintenance. This verifies that unit can maintain the load under input transients. This does not necessarily simulate the actual transient the unit had seen.

WR #190938, troubleshooting plan results, ~~p 3.~~

1.) UPS1C visually inspected.
2.) With the unit running on normal power the K-5 (logic power supply input) relay is energized.
3.) Opened the maintenance supply feed to UPS1C (CB-1, 2VBB-XD501). K-5 relay de-energized. This was verified by opening and closing CB-1 on 2VBB-XD501 while watching the K-5 relay. Read the output paramaters with UPS1C maintenance supply open:

Voltage:	Phase 1 to GND:	118.5 vac
	Phase 2 to GND:	119.5 vac
	Phase 3 to GND:	121.4 vac
Frequency:		59.91 cycles
DC Link Voltage:		140.08 vdc

4.) Reclosed the maintenance supply and the K-5 relay re-energized. This is verification that K-5 prefers to be powered from the maintenance supply feed any time that power source is available to the unit.
The SCR short light illuminated when the maintenance feed was restored to UPS1C.

5.) After a short duration with the unit running normally and no test evolutions being done, the unit tripped (CB-1 trip, CB-2 trip, CB-3 opened) and the unit transferred to maintenance. The following alarms were indicated:
    1.) FREQUENCY FAIL (on A13A21)
    2.) MODULE TRIP
    3.) INVERTER OVERTEMP
    4.) INVERTER LOGIC
    5.) SCR SHORT

NOTE: This trip, though, not purposely initiated at this time, is indication that a trip signal to the A13A21 card will initiate a logic trip and transfer the unit to maintenance successfully.

6.) Pushed the reset on the A13A21 card, SCR short cleared but no other alarms.
7.) Opened the P6 plug on CB-4
8.) Turned off A27-CB1 and A27-S1 killing logic power.
9.) Turned on A27-CB1 and A27-S1 (This was done to attempt to reset the logic.)
10.) The following alarms came back in:
    1.) FREQUENCY FAIL (A13A21)
    2.) MODULE TRIP
    3.) INVERTER OVERTEMP
    4.) INVERTER LOGIC

NOTE: The fact that the alarms were reinitiated when the logic was re-energized is indication the trip stays latched in even if logic power is lost.

11.) Unlatched the motor operator off CB-$.
12.) Re-installed the P6 plug to CB-4. The operator did not

reposition itself.

13.) Reset the motor operator back on CB-4

ATTACHMENT 1

Initial UPS conditions found by operation personnel responding the UPS:

Note: The following is based on interviews done on 8/13/91 and 8/14/91 with the following operators: Bob Bergenstock, Dave Hanczyk, Phil MacEwan, Jim Stevens and Aaron Armstrong). The operators were asked to describe what they saw. Each stated that the information was to the best of their knowledge but it was possible that they did not remember everything. They were each asked if any alarms existed on the A13A21 Card, the alarm board, and each thought that none were there but were not absolutely positive. On UPS1D they thought the Module trip and Inverter logic alarms were not in but it was not concrete that no one reset them. Each operator stated that absolutely no alarms had been reset on UPS1G so initial alarms would match those found by the system engineer.

1.) UPS1A:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

2.) UPS1B:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

3.) UPS1C:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm
i.) OV/UV

4.) UPS1D:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
h.) No module TRIP
i.) No Logic TRIP
j.) OV/UV
k.) OV/UV Transfer
l.) Voltage Difference

5.) UPS1G:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Voltage Difference
i.) OV/UV

(At some time 2VBA*UPS2A and 2VBA*UPS2B had a "sync loss" alarm. These were reset at some unknown time after the event.)

ATTACHMENT 2:

The operators did the following manipulations in attempting to restore the UPS':

1.) UPS1A:

a.) Placed restart switch to MANUAL
b.) Placed the CB-3 toggle switch to OPEN position.
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

2.) UPS1B:

a.) Closed CB-1
b.) Closed CB-2
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

3.) UPS1C:

a.) Placed restart switch to MANUAL
b.) Placed CB-3 toggle switch to OPEN position
c.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

4.) UPS1D:

a.) Closed CB-1
b.) Closed CB-2
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

5.) UPS1G:

a.) Placed CB-3 toggle switch to OPEN position.
b.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

* NOTE: When a trip signal is generated within the UPS it sends a shunt trip signal to both CB-1 and CB-2. It also sends an OFF signal to CB-3 and an ON signal to CB-4. A voltage difference alarm will inhibit a closure of CB-4.

ATTACHMENT 3:

System engineer supported recovery of the UPS:

UPS1C: Found CB-1, CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in the OFF position) was lifted off breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Reset all alarms. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred the load to UPS power and put transfer switch in AUTO position.

UPS1D: Found CB-1, CB-2 closed and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in tripped position. CB-3 was reset, the motor operator was restored and the unit transferred to UPS power. Put the transfer switch in AUTO position.

UPS1A: Found CB-1 and CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed the P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Closed CB-1 and attempted to restart the unit. Closing CB-1 caused an inrush to the UPS and tripped the upstream breaker, 2VBB-PNL301, breaker #1. Reset breaker in 2VBB-PNL301 and reclosed CB-1 on UPS1A. Upstream breaker tripped again. Wrote WR (WR # 162319) and Deficiency tag to repair Rectifier section of UPS1A. Unit left with CB-4 closed.

UPS1B: Found CB-1, CB-2 closed and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from the motor operator and aligned motor operator to ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in the tripped position. CB-3 was reset, the motor operator was restored and attempted to transfer load to UPS power but CB-3 again would not close. CB-3 cannot be reset due to a previously identified problem. Unit left with CB-4 closed - on Maintenance supply power.
Note: WR# 138173 exists to replace CB-3.

UPS1G: Found CB-1, CB-2 tripped and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from motor operator and aligned motor operator to ON position. Reset all alarms. Noted 575 vac input to UPS. Closed CB-1. When CB-1 was closed it tripped its upstream breaker in 2VBB-PNL301. Breaker #7 in 2VBB-PNL301 was reset and CB-1 reclosed (successfully). The unit was restarted. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug. When restoring the P6 block the CB-4 motor operator went to the OFF position. Opened CB-2 and CB-1 and removed logic power from unit to reset all logic. Reset motor operator on CB-4 to ON position. Reclosed logic power, closed CB-1 and restarted UPS. Unit started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred load to UPS power and put transfer switch in the AUTO position.

ATTACHMENT 4:

UPS ALIGNMENT AT TIME OF EVENT:

	-SWG001	-SWG003	BAT1A	BAT1B	BAT1C
UPS1A Normal AC (US3-B)		X			
UPS1A Maint. Supply (US5)	X				
UPS1A Battery Supply			X		
UPS1B Normal AC (US3-B)		X			
UPS1B Maint. Supply (US6)		X			
UPS1B Battery Supply					X
UPS1C Normal AC (US3-B)		X			
UPS1C Maint. Supply (US5)	X				
UPS1C Battery Supply			X		
UPS1D Normal AC (US3-A)	X				
UPS1D Maint. Supply (US6)		X			
UPS1D Battery Supply				X	
UPS1G Normal AC (US3-B)		X			
UPS1G Maint. Supply (US6)		X			
UPS1G Battery Supply					X

ATTACHMENT 5:

DER's, PR's, WR's:

OPEN WR's:	1.) #169147, Bad breaker on UPS1B
OPEN DER's:	None
OPEN PR's:	None
OPEN MOD's:	89-042, Replace 2VBB-UPS1C, 2VBB-UPS1D.
Closed WR's:	104 total

ATTACHMENT 6:

A12A21 TRIP Alarms:

a.) DC Undervoltage (DCUV)

b.) DC Overvoltage (DCOV)

c.) Inverter Leg Fuse Blown

d.) AC Undervoltage (ACUV)

e.) AC Overvoltage (ACOV)

f.) Frequency Failure

g.) Logic Failure

h.) Clock Failed

i.) Logic Power Supply Failure

j.) Overload (10 minute delay)

07-~~146~~-91
40

PRELIMINARY

UPS FAILURE REPORT

Nine Mile Point #2

8/18/91
8:00 A.M.

Bob Crandall

At approximately 05:48 A.M. on 8/13/91 there was a simultaneous loss of the Gaitronics paging system, control room annunciation, full core display, essential lights, plant process computer, DRMS computer, fire computer, radwaste computer, leaky wire radio system and BOP control room instrumentation. This was caused by simultaneous loss of 2VBB-UPS1A, -1B, -1C, -1D, -1G.

Operations personnel responded to the UPS in order to restore power to the UPS. Attachment 1 and 2 outline the indications that the operators found when first arriving at the UPS. The operators referred to the operating procedure (N2-OP-71) to try and restart UPS1D. The procedure called out verifying that CB-4 was closed but it was open. The operators made a decision to energize the UPS loads by lifting the motor operator off of breaker CB-4 and then manually closing CB-4. This was done at approximately 6:22 A. M. and it restored power to the critical loads fed by UPS1D. They then proceeded to restore the other UPS in that same manner by approximtely 6:22 A.M.

At approximately 0830 the system engineer (Bob Crandall) went down with damage control team #3 (operators Dave Hanczyk and Bob Bergenstock, electrician Jeff Poor, I/C technician Perry Bertsch and a Radiation Protection technician, Vern Cericka) to restore each UPS. An initial inspection was done of each unit to determine if any obvious damage had occurred and none was found. A restoration sequence was established and the units were restored (see Attachment 3) in the following order:

1.) 2VBB-UPS1C
2.) 2VBB-UPS1D
3.) 2VBB-UPS1A
4.) 2VBB-UPS1B
5.) 2VBB-UPS1G

From analysis of the alarms shown on the UPS' it was determined that each unit received a MODULE TRIP that caused CB-1, CB-2 to trip and CB-3 to OPEN. (Note: it was not be verified that UPS 1D had a MODULE TRIP at the time the operators arrived. The operators could not recall if it had it but some operators thought it may have been there and was reset without them making a note of it). A MODULE TRIP signal is generated by the A13A1 circuit board of the UPS. It's initiation comes from a signal from the A13A21 circuit board. Various UPS output parameters (see ATTACHMENT #6) are monitored by the A13A21 board which, when those parameters are out of their limits, will light an alarm light on the A13A21 and generate a trip signal to the A13A1. There were no alarm lights on the A13A21 of any of the five UPS. The only alarms generated were an OV/UV and voltage difference alarm. Neither alarm would be indicative of a UPS trip. The

voltage difference alarm is locked in when the maintenance supply falls out of sync with the UPS. It is locked in for 10 - 15 seconds after the condition clears. The OV/UV alarm is generated as a result of the critical bus going low or high in voltage (this was generated by the loss of the output).

On 8/15/91, troubleshooting was done on 2VBB-UPS1C as follows:

a.) With the unit on normal AC with DC and maintenance available an OV/UV signal was generated by opening the CB-3 toggle switch. The unit transferred to maintenance without generating a trip signal. This verifies that an output OV/UV will not cause a trip signal to be generated.

b.) With UPS1C on maintenance A27-S1 was opened with A27-CB1 closed. The logic power for the UPS went dead and it shouldn't have. This is evidence that the UPS internal batteries are dead.
When the UPS is down the internal logic is fed by an internal power supply with internal battery backup. When the is UPS on line an auctioneering circuit should power the logic.
This auctioneering circuit was verified to be working by de-energizing the maintenance supply with the UPS running. When this was done the logic remained powered up.
Although this is a deficiency it would not have contributed to the incident because the auctioneering circuit is working. (WR's are written to replace all UPS internal batteries).

c.) With all power sources available the maintenance supply feed was opened to verify the sync monitor circuit to the UPS. When the breaker was opened the voltage difference alarm came in and the unit sync indication went out. On reclosing the maintenance feed it took 10-15 seconds for the UPS to re-sync to the maintenance supply.

d.) With the load on UPS with the UPS running on normal AC and the DC breaker closed the maintenance supply feed was de-energized. The normal AC was feed was opened. The unit ran at full load off DC (500 amps) for 10-15 minutes with no alarms and no trips.

e.) Put unit on maintenance supply with UPS running off normal AC and CB-2 (DC) open. Opened the logic power and verified that CB-1 will trip.

f.) Put output on maintenance supply. With unit on normal AC and with DC breaker available, the AC output was lowered on the UPS. The AC undervoltage (ACUV) alarm signal was generated at 182 vac and after approximately 10 seconds the unit tripped.

g.) Restored unit to normal AC with DC available, load on maintenance. Raised output voltage to 220 vac and the AC overvoltage (ACOV) trip occurred.

h.) Unit was again restored with unit on normal AC and DC available, load on maintenance supply. Lowered the DC undervoltage (DCUV) caused a trip at 93 vdc.

i.) Due to the possibility of damage to the unit the DCOV (DC overvoltage was not verified. It was determined also that this condition was very unlikely to have occurred.

j.) The UPS was in its normal configuration on normal AC with DC and maintenance available. The upstream AC input breaker was opened and closed three times as rapidly as possible. This caused an audible "bump" to the input transformer on inrush current but the unit did not transfer to DC nor did it transfer to maintenance. This verifies that unit can maintain the load under input transients. This does not necessarily simulate the actual transient the unit had seen.

WR #190938, troubleshooting plan results, ~~p 3.~~

1.) UPS1C visually inspected.
2.) With the unit running on normal power the K-5 (logic power supply input) relay is energized.
3.) Opened the maintenance supply feed to UPS1C (CB-1, 2VBB-XD501). K-5 relay de-energized. This was verified by opening and closing CB-1 on 2VBB-XD501 while watching the K-5 relay. Read the output paramaters with UPS1C maintenance supply open:

    Voltage: Phase 1 to GND: 118.5 vac
    Phase 2 to GND: 119.5 vac
    Phase 3 to GND: 121.4 vac

    Frequency: 59.91 cycles
    DC Link Voltage: 140.08 vdc

4.) Reclosed the maintenance supply and the K-5 relay re-energized. This is verification that K-5 prefers to be powered from the maintenance supply feed any time that power source is available to the unit.
    The SCR short light illuminated when the maintenance feed was restored to UPS1C.

5.) After a short duration with the unit running normally and no test evolutions being done the unit tripped (CB-1 trip, CB-2 trip, CB-3 opened) and the unit transferred to maintenance. The following alarms were indicated:
    1.) FREQUENCY FAIL (on A13A21)
    2.) MODULE TRIP
    3.) INVERTER OVERTEMP
    4.) INVERTER LOGIC
    5.) SCR SHORT

    NOTE: This trip, though, not purposely initiated at this time, is indication that a trip signal to the A13A21 card will initiate a logic trip and transfer the unit to maintenance successfully.

6.) Pushed the reset on the A13A21 card, SCR short cleared but no other alarms.
7.) Opened the P6 plug on CB-4
8.) Turned off A27-CB1 and A27-S1 killing logic power.
9.) Turned on A27-CB1 and A27-S1 (This was done to attempt to reset the logic.)
10.) The following alarms came back in:
    1.) FREQUENCY FAIL (A13A21)
    2.) MODULE TRIP
    3.) INVERTER OVERTEMP
    4.) INVERTER LOGIC

    NOTE: The fact that the alarms were reinitiated when the logic was re-energized is indication the trip stays latched in even if logic power is lost.
11.) Unlatched the motor operator off CB-$.
12.) Re-installed the P6 plug to CB-4. The operator did not

reposition itself.

13.) Reset the motor operator back on CB-4

ATTACHMENT 1

Initial UPS conditions found by operation personnel responding the UPS:

Note: The following is based on interviews done on 8/13/91 and 8/14/91 with the following operators: Bob Bergenstock, Dave Hanczyk, Phil MacEwan, Jim Stevens and Aaron Armstrong). The operators were asked to describe what they saw. Each stated that the information was to the best of their knowledge but it was possible that they did not remember everything. They were each asked if any alarms existed on the A13A21 Card, the alarm board, and each thought that none were there but were not absolutely positive. On UPS1D they thought the Module trip and Inverter logic alarms were not in but it was not concrete that no one reset them. Each operator stated that absolutely no alarms had been reset on UPS1G so initial alarms would match those found by the system engineer.

1.) UPS1A:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

2.) UPS1B:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

3.) UPS1C:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm
i.) OV/UV

4.) <u>UPS1D:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
h.) No module TRIP
i.) No Logic TRIP
j.) OV/UV
k.) OV/UV Transfer
l.) Voltage Difference

5.) <u>UPS1G:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Voltage Difference
i.) OV/UV

(At some time 2VBA*UPS2A and 2VBA*UPS2B had a "sync loss" alarm. These were reset at some unknown time after the event.)

ATTACHMENT 2:

The operators did the following manipulations in attempting to restore the UPS':

1.) UPS1A:

   a.) Placed restart switch to MANUAL
   b.) Placed the CB-3 toggle switch to OPEN position.
   c.) Reset the alarms
   d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

2.) UPS1B:

   a.) Closed CB-1
   b.) Closed CB-2
   c.) Reset the alarms
   d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

3.) UPS1C:

   a.) Placed restart switch to MANUAL
   b.) Placed CB-3 toggle switch to OPEN position
   c.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

4.) UPS1D:

   a.) Closed CB-1
   b.) Closed CB-2
   c.) Reset the alarms
   d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

5.) UPS1G:

   a.) Placed CB-3 toggle switch to OPEN position.
   b.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

* NOTE: When a trip signal is generated within the UPS it sends a shunt trip signal to both CB-1 and CB-2. It also sends an OFF signal to CB-3 and an ON signal to CB-4. A voltage difference alarm will inhibit a closure of CB-4.

ATTACHMENT 3:

System engineer supported recovery of the UPS:

UPS1C: Found CB-1, CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in the OFF position) was lifted off breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Reset all alarms. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred the load to UPS power and put transfer switch in AUTO position.

UPS1D: Found CB-1, CB-2 closed and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in tripped position. CB-3 was reset, the motor operator was restored and the unit transferred to UPS power. Put the transfer switch in AUTO position.

UPS1A: Found CB-1 and CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed the P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Closed CB-1 and attempted to restart the unit. Closing CB-1 caused an inrush to the UPS and tripped the upstream breaker, 2VBB-PNL301, breaker #1. Reset breaker in 2VBB-PNL301 and reclosed CB-1 on UPS1A. Upstream breaker tripped again. Wrote WR (WR # 162319) and Deficiency tag to repair Rectifier section of UPS1A. Unit left with CB-4 closed.

UPS1B: Found CB-1, CB-2 closed and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from the motor operator and aligned motor operator to ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in the tripped position. CB-3 was reset, the motor operator was restored and attempted to transfer load to UPS power but CB-3 again would not close. CB-3 cannot be reset due to a previously identified problem. Unit left with CB-4 closed - on Maintenance supply power.
Note: WR# 138173 exists to replace CB-3.

UPS1G: Found CB-1, CB-2 tripped and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from motor operator and aligned motor operator to ON position. Reset all alarms. Noted 575 vac input to UPS. Closed CB-1. When CB-1 was closed it tripped its upstream breaker in 2VBB-PNL301. Breaker #7 in 2VBB-PNL301 was reset and CB-1 reclosed (successfully). The unit was restarted. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug. When restoring the P6 block the CB-4 motor operator went to the OFF position. Opened CB-2 and CB-1 and removed logic power from unit to reset all logic. Reset motor operator on CB-4 to ON position. Reclosed logic power, closed CB-1 and restarted UPS. Unit started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred load to UPS power and put transfer switch in the AUTO position.

ATTACHMENT 4:

UPS ALIGNMENT AT TIME OF EVENT:

		-SWG001	-SWG003	BAT1A	BAT1B	BAT1C
UPS1A Normal AC	(US3-B)		X			
UPS1A Maint. Supply	(US5)	X				
UPS1A Battery Supply				X		
UPS1B Normal AC	(US3-B)		X			
UPS1B Maint. Supply	(US6)		X			
UPS1B Battery Supply						X
UPS1C Normal AC	(US3-B)		X			
UPS1C Maint. Supply	(US5)	X				
UPS1C Battery Supply				X		
UPS1D Normal AC	(US3-A)	X				
UPS1D Maint. Supply	(US6)		X			
UPS1D Battery Supply					X	
UPS1G Normal AC	(US3-B)		X			
UPS1G Maint. Supply	(US6)		X			
UPS1G Battery Supply						X

ATTACHMENT 5:

DER's, PR's, WR's:

OPEN WR's:	1.) #169147, Bad breaker on UPS1B
OPEN DER's:	None
OPEN PR's:	None
OPEN MOD's:	89-042, Replace 2VBB-UPS1C, 2VBB-UPS1D.
Closed WR's:	104 total

ATTACHMENT 6:

A12A21 TRIP Alarms:

a.) DC Undervoltage (DCUV)

b.) DC Overvoltage (DCOV)

c.) Inverter Leg Fuse Blown

d.) AC Undervoltage (ACUV)

e.) AC Overvoltage (ACOV)

f.) Frequency Failure

g.) Logic Failure

h.) Clock Failed

i.) Logic Power Supply Failure

j.) Overload (10 minute delay)

07-~~##~~6-91
40

PRELIMINARY

UPS FAILURE REPORT

Nine Mile Point #2

8/18/91
8:00 A.M.

Bob Crandall

At approximately 05:48 A.M. on 8/13/91 there was a simultaneous loss of the Gaitronics paging system, control room annunciation, full core display, essential lights, plant process computer, DRMS computer, fire computer, radwaste computer, leaky wire radio system and BOP control room instrumentation. This was caused by simultaneous loss of 2VBB-UPS1A, -1B, -1C, -1D, -1G.

Operations personnel responded to the UPS in order to restore power to the UPS. Attachment 1 and 2 outline the indications that the operators found when first arriving at the UPS. The operators referred to the operating procedure (N2-OP-71) to try and restart UPS1D. The procedure called out verifying that CB-4 was closed but it was open. The operators made a decision to energize the UPS loads by lifting the motor operator off of breaker CB-4 and then manually closing CB-4. This was done at approximately 6:22 A. M. and it restored power to the critical loads fed by UPS1D. They then proceeded to restore the other UPS in that same manner by approximtely 6:22 A.M.

At approximately 0830 the system engineer (Bob Crandall) went down with damage control team #3 (operators Dave Hanczyk and Bob Bergenstock, electrician Jeff Poor, I/C technician Perry Bertsch and a Radiation Protection technician, Vern Cericka) to restore each UPS. An initial inspection was done of each unit to determine if any obvious damage had occurred and none was found. A restoration sequence was established and the units were restored (see Attachment 3) in the following order:

1.) 2VBB-UPS1C
2.) 2VBB-UPS1D
3.) 2VBB-UPS1A
4.) 2VBB-UPS1B
5.) 2VBB-UPS1G

From analysis of the alarms shown on the UPS' it was determined that each unit received a MODULE TRIP that caused CB-1, CB-2 to trip and CB-3 to OPEN. (Note: it was not be verified that UPS 1D had a MODULE TRIP at the time the operators arrived. The operators could not recall if it had it but some operators thought it may have been there and was reset without them making a note of it). A MODULE TRIP signal is generated by the A13A1 circuit board of the UPS. It's initiation comes from a signal from the A13A21 circuit board. Various UPS output parameters (see ATTACHMENT #6) are monitored by the A13A21 board which, when those parameters are out of their limits, will light an alarm light on the A13A21 and generate a trip signal to the A13A1. There were no alarm lights on the A13A21 of any of the five UPS. The only alarms generated were an OV/UV and voltage difference alarm. Neither alarm would be indicative of a UPS trip. The

voltage difference alarm is locked in when the maintenance supply falls out of sync with the UPS. It is locked in for 10 - 15 seconds after the condition clears. The OV/UV alarm is generated as a result of the critical bus going low or high in voltage (this was generated by the loss of the output).

On 8/15/91, troubleshooting was done on 2VBB-UPS1C as follows:

a.) With the unit on normal AC with DC and maintenance available an OV/UV signal was generated by opening the CB-3 toggle switch. The unit transferred to maintenance without generating a trip signal. This verifies that an output OV/UV will not cause a trip signal to be generated.

b.) With UPS1C on maintenance A27-S1 was opened with A27-CB1 closed. The logic power for the UPS went dead and it shouldn't have. This is evidence that the UPS internal batteries are dead.
When the UPS is down the internal logic is fed by an internal power supply with internal battery backup. When the is UPS on line an auctioneering circuit should power the logic.
This auctioneering circuit was verified to be working by de-energizing the maintenance supply with the UPS running. When this was done the logic remained powered up.
Although this is a deficiency it would not have contributed to the incident because the auctioneering circuit is working. (WR's are written to replace all UPS internal batteries).

c.) With all power sources available the maintenance supply feed was opened to verify the sync monitor circuit to the UPS. When the breaker was opened the voltage difference alarm came in and the unit sync indication went out. On reclosing the maintenance feed it took 10-15 seconds for the UPS to re-sync to the maintenance supply.

d.) With the load on UPS with the UPS running on normal AC and the DC breaker closed the maintenance supply feed was de-energized. The normal AC was feed was opened. The unit ran at full load off DC (500 amps) for 10-15 minutes with no alarms and no trips.

e.) Put unit on maintenance supply with UPS running off normal AC and CB-2 (DC) open. Opened the logic power and verified that CB-1 will trip.

f.) Put output on maintenance supply. With unit on normal AC and with DC breaker available, the AC output was lowered on the UPS. The AC undervoltage (ACUV) alarm signal was generated at 182 vac and after approximately 10 seconds the unit tripped.

g.) Restored unit to normal AC with DC available, load on maintenance. Raised output voltage to 220 vac and the AC overvoltage (ACOV) trip occurred.

h.) Unit was again restored with unit on normal AC and DC available, load on maintenance supply. Lowered the DC undervoltage (DCUV) caused a trip at 93 vdc.

i.) Due to the possibility of damage to the unit the DCOV (DC overvoltage was not verified. It was determined also that this condition was very unlikely to have occurred.

j.) The UPS was in its normal configuration on normal AC with DC and maintenance available. The upstream AC input breaker was opened and closed three times as rapidly as possible. This caused an audible "bump" to the input transformer on inrush current but the unit did not transfer to DC nor did it transfer to maintenance. This verifies that unit can maintain the load under input transients. This does not necessarily simulate the actual transient the unit had seen.

WR #190938, troubleshooting plan results, ~~p 3.~~

1.) UPS1C visually inspected.
2.) With the unit running on normal power the K-5 (logic power supply input) relay is energized.
3.) Opened the maintenance supply feed to UPS1C (CB-1, 2VBB-XD501). K-5 relay de-energized. This was verified by opening and closing CB-1 on 2VBB-XD501 while watching the K-5 relay. Read the output paramaters with UPS1C maintenance supply open:

Voltage:	Phase 1 to GND:	118.5 vac
	Phase 2 to GND:	119.5 vac
	Phase 3 to GND:	121.4 vac
Frequency:		59.91 cycles
DC Link Voltage:		140.08 vdc

4.) Reclosed the maintenance supply and the K-5 relay re-energized. This is verification that K-5 prefers to be powered from the maintenance supply feed any time that power source is available to the unit.
The SCR short light illuminated when the maintenance feed was restored to UPS1C.

5.) After a short duration with the unit running normally and no test evolutions being done the unit tripped (CB-1 trip, CB-2 trip, CB-3 opened) and the unit transferred to maintenance. The following alarms were indicated:
    1.) FREQUENCY FAIL (on A13A21)
    2.) MODULE TRIP
    3.) INVERTER OVERTEMP
    4.) INVERTER LOGIC
    5.) SCR SHORT

NOTE: This trip, though, not purposely initiated at this time, is indication that a trip signal to the A13A21 card will initiate a logic trip and transfer the unit to maintenance successfully.

6.) Pushed the reset on the A13A21 card, SCR short cleared but no other alarms.
7.) Opened the P6 plug on CB-4
8.) Turned off A27-CB1 and A27-S1 killing logic power.
9.) Turned on A27-CB1 and A27-S1 (This was done to attempt to reset the logic.)
10.) The following alarms came back in:
    1.) FREQUENCY FAIL (A13A21)
    2.) MODULE TRIP
    3.) INVERTER OVERTEMP
    4.) INVERTER LOGIC

NOTE: The fact that the alarms were reinitiated when the logic was re-energized is indication the trip stays latched in even if logic power is lost.

11.) Unlatched the motor operator off CB-$.
12.) Re-installed the P6 plug to CB-4. The operator did not

reposition itself.

13.) Reset the motor operator back on CB-4

ATTACHMENT 1

Initial UPS conditions found by operation personnel responding the UPS:

Note: The following is based on interviews done on 8/13/91 and 8/14/91 with the following operators: Bob Bergenstock, Dave Hanczyk, Phil MacEwan, Jim Stevens and Aaron Armstrong). The operators were asked to describe what they saw. Each stated that the information was to the best of their knowledge but it was possible that they did not remember everything. They were each asked if any alarms existed on the A13A21 Card, the alarm board, and each thought that none were there but were not absolutely positive. On UPS1D they thought the Module trip and Inverter logic alarms were not in but it was not concrete that no one reset them. Each operator stated that absolutely no alarms had been reset on UPS1G so initial alarms would match those found by the system engineer.

1.) UPS1A:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

2.) UPS1B:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

3.) UPS1C:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm
i.) OV/UV

4.) <u>UPS1D:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
h.) No module TRIP
i.) No Logic TRIP
j.) OV/UV
k.) OV/UV Transfer
l.) Voltage Difference

5.) <u>UPS1G:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Voltage Difference
i.) OV/UV

(At some time 2VBA*UPS2A and 2VBA*UPS2B had a "sync loss" alarm. These were reset at some unknown time after the event.)

ATTACHMENT 2:

The operators did the following manipulations in attempting to restore the UPS':

1.) UPS1A:

   a.) Placed restart switch to MANUAL
   b.) Placed the CB-3 toggle switch to OPEN position.
   c.) Reset the alarms
   d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

2.) UPS1B:

   a.) Closed CB-1
   b.) Closed CB-2
   c.) Reset the alarms
   d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

3.) UPS1C:

   a.) Placed restart switch to MANUAL
   b.) Placed CB-3 toggle switch to OPEN position
   c.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

4.) UPS1D:

   a.) Closed CB-1
   b.) Closed CB-2
   c.) Reset the alarms
   d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

5.) UPS1G:

   a.) Placed CB-3 toggle switch to OPEN position.
   b.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

* NOTE: When a trip signal is generated within the UPS it sends a shunt trip signal to both CB-1 and CB-2. It also sends an OFF signal to CB-3 and an ON signal to CB-4. A voltage difference alarm will inhibit a closure of CB-4.

ATTACHMENT 3:

System engineer supported recovery of the UPS:

UPS1C: Found CB-1, CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in the OFF position) was lifted off breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Reset all alarms. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred the load to UPS power and put transfer switch in AUTO position.

UPS1D: Found CB-1, CB-2 closed and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in tripped position. CB-3 was reset, the motor operator was restored and the unit transferred to UPS power. Put the transfer switch in AUTO position.

UPS1A: Found CB-1 and CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed the P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Closed CB-1 and attempted to restart the unit. Closing CB-1 caused an inrush to the UPS and tripped the upstream breaker, 2VBB-PNL301, breaker #1. Reset breaker in 2VBB-PNL301 and reclosed CB-1 on UPS1A. Upstream breaker tripped again. Wrote WR (WR # 162319) and Deficiency tag to repair Rectifier section of UPS1A. Unit left with CB-4 closed.

UPS1B: Found CB-1, CB-2 closed and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from the motor operator and aligned motor operator to ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in the tripped position. CB-3 was reset, the motor operator was restored and attempted to transfer load to UPS power but CB-3 again would not close. CB-3 cannot be reset due to a previously identified problem. Unit left with CB-4 closed - on Maintenance supply power.
Note: WR# 138173 exists to replace CB-3.

UPS1G: Found CB-1, CB-2 tripped and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from motor operator and aligned motor operator to ON position. Reset all alarms. Noted 575 vac input to UPS. Closed CB-1. When CB-1 was closed it tripped its upstream breaker in 2VBB-PNL301. Breaker #7 in 2VBB-PNL301 was reset and CB-1 reclosed (successfully). The unit was restarted. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug. When restoring the P6 block the CB-4 motor operator went to the OFF position. Opened CB-2 and CB-1 and removed logic power from unit to reset all logic. Reset motor operator on CB-4 to ON position. Reclosed logic power, closed CB-1 and restarted UPS. Unit started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred load to UPS power and put transfer switch in the AUTO position.

ATTACHMENT 4:

UPS ALIGNMENT AT TIME OF EVENT:

		-SWG001	-SWG003	BAT1A	BAT1B	BAT1C
UPS1A Normal AC	(US3-B)		X			
UPS1A Maint. Supply	(US5)	X				
UPS1A Battery Supply				X		
UPS1B Normal AC	(US3-B)		X			
UPS1B Maint. Supply	(US6)		X			
UPS1B Battery Supply						X
UPS1C Normal AC	(US3-B)		X			
UPS1C Maint. Supply	(US5)	X				
UPS1C Battery Supply				X		
UPS1D Normal AC	(US3-A)	X				
UPS1D Maint. Supply	(US6)		X			
UPS1D Battery Supply					X	
UPS1G Normal AC	(US3-B)		X			
UPS1G Maint. Supply	(US6)		X			
UPS1G Battery Supply						X

ATTACHMENT 5:

DER's, PR's, WR's:

OPEN WR's: 1.) #169147, Bad breaker on UPS1B

OPEN DER's: None

OPEN PR's: None

OPEN MOD's: 89-042, Replace 2VBB-UPS1C, 2VBB-UPS1D.

Closed WR's: 104 total

ATTACHMENT 6:

A12A21 TRIP Alarms:

a.) DC Undervoltage (DCUV)

b.) DC Overvoltage (DCOV)

c.) Inverter Leg Fuse Blown

d.) AC Undervoltage (ACUV)

e.) AC Overvoltage (ACOV)

f.) Frequency Failure

g.) Logic Failure

h.) Clock Failed

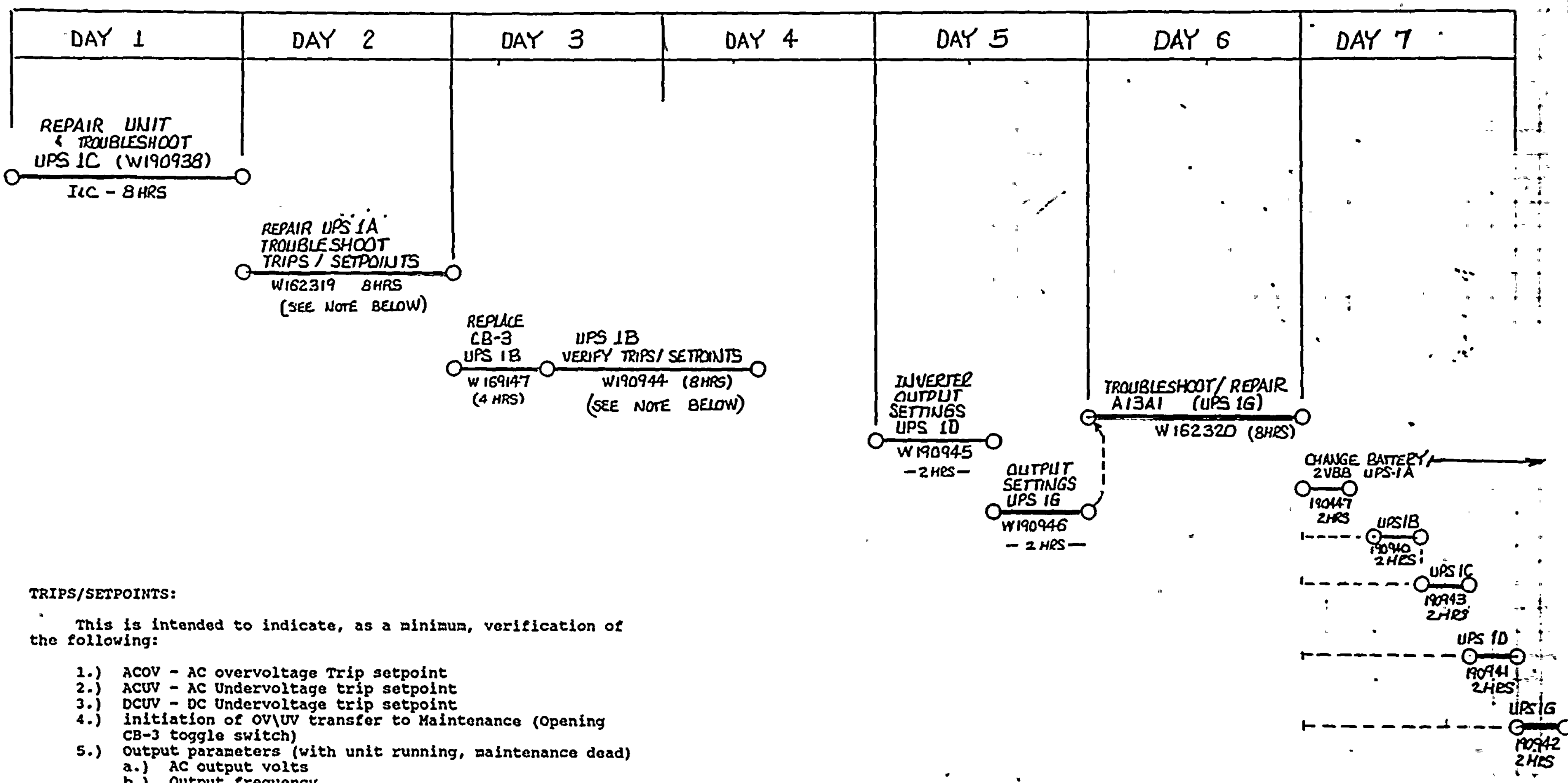
i.) Logic Power Supply Failure

j.) Overload (10 minute delay)

07-41-91

UPS TROUBLESHOOT PLAN

TASK COORD: BOB CRANDALL (x 4640)
WORK COORD: PERRY BERTSCH (I&C)



TRIPS/SETPOINTS:

This is intended to indicate, as a minimum, verification of the following:

1.) ACOV - AC overvoltage Trip setpoint
2.) ACUV - AC Undervoltage trip setpoint
3.) DCUV - DC Undervoltage trip setpoint
4.) initiation of OV\UV transfer to Maintenance (Opening CB-3 toggle switch)
5.) Output parameters (with unit running, maintenance dead)
   a.) AC output volts
   b.) Output frequency
   c.) DC link voltage (UPS generated DC bus voltage)

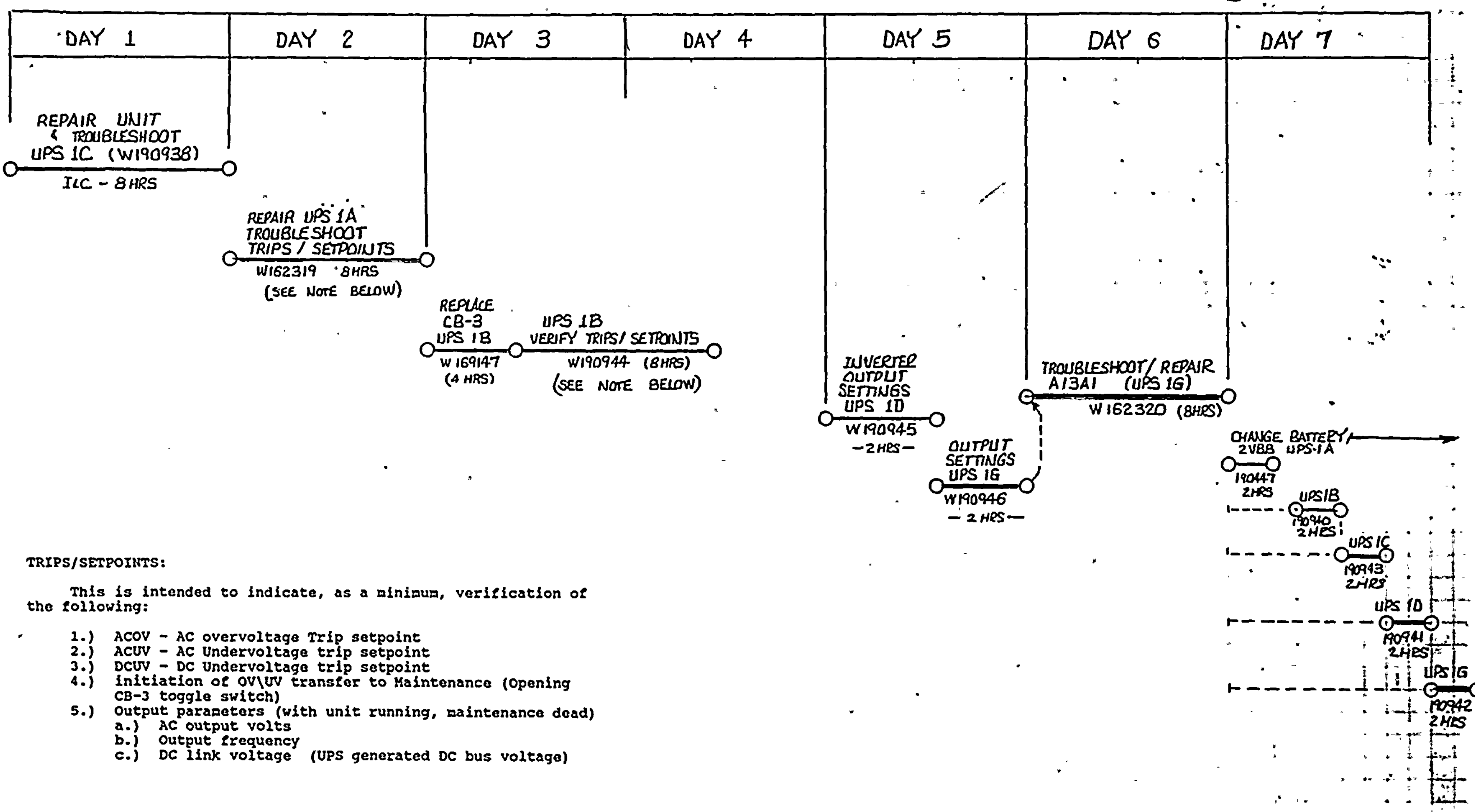
UPS TASK FORCE RECOMMENDED PRIORITY LIST

PRIORITIES	WR	UPS	PROBLEM
1	190938	2VBB-UPS1C	Troubleshoot/Check Voltage
2	162319	2VBB-UPS1A	Troubleshoot Breaker Tripping
3	169147	2VBB-UPS1B	CB-3 Replace Breaker
	190944	2VBB-UPS1B	Check Trip Points & Record Voltages
4	190945	2VBB-UPS1D	Record Voltages
	190946	2VBB-UPS1G	Record Voltages
5	162320	2VBB-UPS1G	Troubleshoot Dim LED
6	190942	2VBB-UPS1G	Replace Battery
	190943	2VBB-UPS1C	Replace Battery
	190940	2VBB-UPS1B	Replace Battery
	190941	2VBB-UPS1D	Replace Battery
	190447	2VBB-UPS1A	Replace Battery

07-~~[illegible]~~ 41-91

UPS TROUBLESHOOT PLAN

TASK COORD: BOB CRANDALL (x 4640)
WORK COORD: PERRY BERTSCH (I&C)



TRIPS/SETPOINTS:

This is intended to indicate, as a minimum, verification of the following:

1.) ACOV - AC overvoltage Trip setpoint
2.) ACUV - AC Undervoltage trip setpoint
3.) DCUV - DC Undervoltage trip setpoint
4.) Initiation of OV\UV transfer to Maintenance (Opening CB-3 toggle switch)
5.) Output parameters (with unit running, maintenance dead)
    a.) AC output volts
    b.) Output frequency
    c.) DC link voltage (UPS generated DC bus voltage)

UPS TASK FORCE RECOMMENDED PRIORITY LIST

PRIORITIES	WR	UPS	PROBLEM
1	190938	2VBB-UPS1C	Troubleshoot/Check Voltage
2	162319	2VBB-UPS1A	Troubleshoot Breaker Tripping
3	169147	2VBB-UPS1B	CB-3 Replace Breaker
	190944	2VBB-UPS1B	Check Trip Points & Record Voltages
4	190945	2VBB-UPS1D	Record Voltages
	190946	2VBB-UPS1G	Record Voltages
5	162320	2VBB-UPS1G	Troubleshoot Dim LED
6	190942	2VBB-UPS1G	Replace Battery
	190943	2VBB-UPS1C	Replace Battery
	190940	2VBB-UPS1B	Replace Battery
	190941	2VBB-UPS1D	Replace Battery
	190447	2VBB-UPS1A	Replace Battery

8/14/91, 6:45 p.m.

07-~~[illegible]~~ 42 -91

8/13/91, UPS failure to transfer on transient on AC input:

A.) Operators responded to 2VBB-UPS1A, 1B, 1C, 1D, 1G and found the following:

1.) <u>UPS1A:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

2.) <u>UPS1B:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

3.) <u>UPS1C:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm
i.) OV/UV

4.) <u>UPS1D:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
h.) No module TRIP
i.) No Logic TRIP
j.) OV/UV
k.) OV/UV Transfer
l.) Voltage Difference

5.) <u>UPS1G:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Voltage Difference
i.) OV/UV

(At some time 2VBA*UPS2A and 2VBA*UPS2B had a "sync loss" alarm. These were reset at some unknown time after the event.)

B.) The operators did the following manipulations in attempting to restore the UPS':

1.) <u>UPS1A:</u>

a.) Placed restart switch to MANUAL
b.) Placed the CB-3 toggle switch to OPEN position.
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

2.) <u>UPS1B:</u>

a.) Closed CB-1
b.) Closed CB-2
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

3.) <u>UPS1C:</u>

a.) Placed restart switch to MANUAL
b.) Placed CB-3 toggle switch to OPEN position
c.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

4.) <u>UPS1D:</u>

a.) Closed CB-1
b.) Closed CB-2
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

5.) <u>UPS1G:</u>

a.) Placed CB-3 toggle switch to OPEN position.
b.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

* NOTE: When the operators tried to restart UPS1D the procedure called out verifying that CB-4 was closed but it was open. The operators made a decision to energize the UPS loads by going outside of the procedure and manually closing CB-4 by first lifting the motor operator off of the breaker. They restored each UPS in that same manner.

C.) At approximately 0830 the system engineer went down with damage control team #3 (operators, electricians and I/C technician) to restore each UPS.

UPS1C: Found CB-1, CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in the OFF position) was lifted off breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Reset all alarms. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred the load to UPS power and put transfer switch in AUTO position.

UPS1D: Found CB-1, CB-2 closed and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in tripped position. CB-3 was reset, the motor operator was restored and the unit transferred to UPS power. Put the transfer switch in AUTO position.

UPS1A: Found CB-1 and CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed the P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Closed CB-1 and attempted to restart the unit. Closing CB-1 caused an inrush to the UPS and tripped the upstream breaker, 2VBB-PNL301, breaker #1. Reset breaker in 2VBB-PNL301 and reclosed CB-1 on UPS1A. Upstream breaker tripped again. Wrote WR (WR # 162319) and Deficiency tag to repair Rectifier section of UPS1A. Unit left with CB-4 closed.

UPS1B: Found CB-1, CB-2 closed and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from the motor operator and aligned motor operator to ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in the tripped position. CB-3 was reset, the motor operator was restored and attempted to transfer load to UPS power but CB-3 again would not close. CB-3 cannot be reset due to a previously identified problem. Unit left with CB-4 closed - on Maintenance supply power.
Note: WR# 138173 exists to replace CB-3.

UPS1G: Found CB-1, CB-2 tripped and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from motor operator and aligned motor operator to ON position. Reset all alarms. Noted 575vac input to UPS. Closed CB-1. When CB-1 was closed it tripped its upstream breaker in 2VBB-PNL301. Breaker #7 in 2VBB-PNL301 was reset and CB-1 reclosed (successfully). The unit was restarted. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug. When restoring the P6 block the CB-4 motor operator went to the OFF position. Opened CB-2 and CB-1 and removed logic power from unit to reset all logic. Reset motor operator on CB-4 to ON position. Reclosed logic power, closed CB-1 and restarted UPS. Unit started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred load to UPS power and put transfer switch in the AUTO position.

NOTE: When a trip signal is generated within the UPS it sends a shunt trip signal to both CB-1 and CB-2. It also sends an OFF signal to CB-3 and an ON signal to CB-4. A voltage difference alarm will inhibit a closure of CB-4.

<u>UPS ALLIGNMENT AT TIME OF EVENT:</u>

		2NPS-SWG001	2NPS-SWG003
UPS1A Normal AC	(US3-B)		X
UPS1A Maint. Supply	(US5)	X	
UPS1B Normal AC	(US3-B)		X
UPS1B Maint. Supply	(US6)		X
UPS1C Normal AC	(US3-B)		X
UPS1C Maint. Supply	(US5)	X	
UPS1D Normal AC	(US3-A)	X	
UPS1D Maint. Supply	(US6)		X
UPS1G Normal AC	(US3-B)		X
UPS1G Maint. Supply	(US6)		X

DER's, PR's, WR's:

OPEN WR's:	1.) W169147, Bad breaker on UPS1B
OPEN DER's:	None
OPEN PR's:	None
OPEN MOD's:	89-042, Replace 2VBB-UPS1C, 2VBB-UPS1D.
Closed WR's:	119 total

8/14/91, 6:45 P.M.

07-42-91

8/13/91, UPS failure to transfer on transient on AC input:

A.) Operators responded to 2VBB-UPS1A, 1B, 1C, 1D, 1G and found the following:

1.) UPS1A:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

2.) UPS1B:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm

3.) UPS1C:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Inverter Logic Alarm
i.) OV/UV

4.) UPS1D:

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
h.) No module TRIP
i.) No Logic TRIP
j.) OV/UV
k.) OV/UV Transfer
l.) Voltage Difference

5.) <u>UPS1G:</u>

a.) CB-1 tripped
b.) CB-2 tripped
c.) CB-3 OPEN
d.) CB-4 OPEN
e.) AUTO restart
f.) CB-3 switch closed
g.) Module TRIP
h.) Voltage Difference
i.) OV/UV

(At some time 2VBA*UPS2A and 2VBA*UPS2B had a "sync loss" alarm. These were reset at some unknown time after the event.)

B.) The operators did the following manipulations in attempting to restore the UPS':

1.) <u>UPS1A:</u>

a.) Placed restart switch to MANUAL
b.) Placed the CB-3 toggle switch to OPEN position.
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

2.) <u>UPS1B:</u>

a.) Closed CB-1
b.) Closed CB-2
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

3.) <u>UPS1C:</u>

a.) Placed restart switch to MANUAL
b.) Placed CB-3 toggle switch to OPEN position
c.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

4.) <u>UPS1D:</u>

a.) Closed CB-1
b.) Closed CB-2
c.) Reset the alarms
d.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

5.) UPS1G:

a.) Placed CB-3 toggle switch to OPEN position.
b.) LIFTED CB-4 MOTOR OPERATOR AND MANUALLY CLOSED CB-4. * see note

* NOTE: When the operators tried to restart UPS1D the procedure called out verifying that CB-4 was closed but it was open. The operators made a decision to energize the UPS loads by going outside of the procedure and manually closing CB-4 by first lifting the motor operator off of the breaker. They restored each UPS in that same manner.

C.) At approximately 0830 the system engineer went down with damage control team #3 (operators, electricians and I/C technician) to restore each UPS.

UPS1C: Found CB-1, CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in the OFF position) was lifted off breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Reset all alarms. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred the load to UPS power and put transfer switch in AUTO position.

UPS1D: Found CB-1, CB-2 closed and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted the unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in tripped position. CB-3 was reset, the motor operator was restored and the unit transferred to UPS power. Put the transfer switch in AUTO position.

UPS1A: Found CB-1 and CB-2 tripped and CB-3 was open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off the breaker. Removed the P6 plug from the CB-4 motor operator and aligned the motor operator to the ON position. Closed CB-1 and attempted to restart the unit. Closing CB-1 caused an inrush to the UPS and tripped the upstream breaker, 2VBB-PNL301, breaker #1. Reset breaker in 2VBB-PNL301 and reclosed CB-1 on UPS1A. Upstream breaker tripped again. Wrote WR (WR # 162319) and Deficiency tag to repair Rectifier section of UPS1A. Unit left with CB-4 closed.

UPS1B: Found CB-1, CB-2 closed and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from the motor operator and aligned motor operator to ON position. Opened CB-1 and CB-2. Closed CB-1 and restarted unit. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled motor operator for CB-4 back on breaker. Attempted to transfer load to UPS power but CB-3 would not close. It was found in the tripped position. CB-3 was reset, the motor operator was restored and attempted to transfer load to UPS power but CB-3 again would not close. CB-3 cannot be reset due to a previously identified problem. Unit left with CB-4 closed - on Maintenance supply power.
Note: WR# 138173 exists to replace CB-3.

UPS1G: Found CB-1, CB-2 tripped and CB-3 open. CB-4 was closed and the CB-4 motor operator (in OFF position) was lifted off breaker. Removed P6 plug from motor operator and aligned motor operator to ON position. Reset all alarms. Noted 575vac input to UPS. Closed CB-1. When CB-1 was closed it tripped its upstream breaker in 2VBB-PNL301. Breaker #7 in 2VBB-PNL301 was reset and CB-1 reclosed (successfully). The unit was restarted. It started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug. When restoring the P6 block the CB-4 motor operator went to the OFF position. Opened CB-2 and CB-1 and removed logic power from unit to reset all logic. Reset motor operator on CB-4 to ON position. Reclosed logic power, closed CB-1 and restarted UPS. Unit started up and "synced" to the maintenance supply. Closed CB-2, restored P6 plug and reinstalled the motor operator for CB-4 back on the breaker. Transferred load to UPS power and put transfer switch in the AUTO position.

NOTE: When a trip signal is generated within the UPS it sends a shunt trip signal to both CB-1 and CB-2. It also sends an OFF signal to CB-3 and an ON signal to CB-4. A voltage difference alarm will inhibit a closure of CB-4.

UPS ALLIGNMENT AT TIME OF EVENT:

		2NPS-SWG001	2NPS-SWG003
UPS1A Normal AC	(US3-B)		X
UPS1A Maint. Supply	(US5)	X	
UPS1B Normal AC	(US3-B)		X
UPS1B Maint. Supply	(US6)		X
UPS1C Normal AC	(US3-B)		X
UPS1C Maint. Supply	(US5)	X	
UPS1D Normal AC	(US3-A)	X	
UPS1D Maint. Supply	(US6)		X
UPS1G Normal AC	(US3-B)		X
UPS1G Maint. Supply	(US6)		X

DER’s, PR’s, WR’s:

OPEN WR’s:	1.) W169147, Bad breaker on UPS1B
OPEN DER’s:	None
OPEN PR’s:	None
OPEN MOD’s:	89-042, Replace 2VBB-UPS1C, 2VBB-UPS1D.
Closed WR’s:	119 total

07-~~[illegible]~~ 42-91

2VBB-UPS1A, 1B, 1C, 1D, 1G:

Safety Class:	Non-safety related
Manufacturer:	Exide Electronics
Model:	575-60T3-120/208
Size:	75 KVA, 60 KW
Input:	575 vac, 3-phase, delta, non-safety
DC Input:	Non-dedicated non-safety related battery. 135 vdc plant battery system.
Output:	120/208 vac, 3 phase, Y - grounded
Ground -	At output Y of maintenance supply step down transformer. UPS output Y, maint. regulator output Y and maint. step down transformer directly electrically connected.
Inverter control:	Step wave
DC Logic power:	AC input from B-phase of maint. supply to DC power supplies with internal battery backup. Powered from UPS output when maint. power is lost.
Output transfer:	Transfer by breaker closure (CB-3/CB-4) with static switch for "bumpless" transfer transition
Maintenance Supply:	Provided by 575/208 step down transformer with saturable reactor voltage regulator
Location:	4 on 261 el. normal switchgear bldg. UPS1G on 214 el. control bldg.

2VBB-UPS3A, 3B:

Safety Class:	Non-Safety related
Manufacturer:	Elgar Corporation
Model:	103-1-176
Size:	10 KVA, 8 KW
Input:	575 vac, 3-phase, Y, ungrounded
DC Input:	Non-dedicated non-safety related battery. 135 vdc plant battery system.
Output:	120 vac, 1-phase, grounded
Ground:	At maintenance supply output power line conditioner. UPS output neutral and maintenance output neutral directly electrically connected.
Inverter control:	Pulse Width Modulation
DC Logic power:	Derived from a DC-DC converter fed by the UPS internal charger generated DC bus. Rectifier logic power from AC input power.
Output transfers:	Static switch transfer with no breaker action required. Manual transfer possible with manual make-before-break manual transfer switch.
Maintenance Supply:	Power line conditioner utiltizing two in-series tapping transformers.
Location:	237 el. normal switchgear

A ~~8~~ 8/20/91
2VBB~~*~~UPS2A, 2B:

Safety Class:	Safety related
Manufacturer:	Elgar Corporation
Model:	253-1-106
Size:	25 KVA, 20 KW
Input:	575 vac, 3-phase, Y, ungrounded
DC Input:	Non-dedicated safety related battery. 135 vdc plant battery system.
Output:	120 vac, 1-phase, grounded
Ground:	At UPS output. UPS output neutral and maintenance output neutral directly electrically connected.
Inverter control:	Pulse Width Modulation
DC Logic power:	Derived from a DC-DC converter fed by the UPS internal charger generated DC bus. Rectifier logic power from AC input power.
Output transfers:	Static switch transfer with no breaker action required. Manual transfer possible with make-before-break manual switch
Maintenance Supply:	Power line conditioner utiltizing two in-series tapping transformers.
Location:	261 el. Emergency Switchgear Rooms Physical divisional seperation

2VBB-UPS1H:

Safety Class:	Non-safety related
Manufacturer:	Exide Electronics
Model:	1105
Size:	5 KVA, 4 KW
Input:	120 vac, 1-phase, non-safety
DC input:	Dedicated 120 vdc battery (125-140 vdc)
Output:	120 vac, 1-phase, grounded
Ground -	At output of UPS. No seperately derived maintenance supply.
Inverter control:	Pulse Width Modulation with microprocessor controlled output voltage
DC Logic power:	UPS battery supplied logic power. On loss of UPS power up is by battery or, manually, off AC input.
Output transfer:	Transfer by contactor dropout with static switch for "bumpless" transfer transition
Maintenance Supply:	Provided by normal AC input loosely coupled to the load winding of transformer.
Location:	261 el. Main Stack

07-~~150~~ 42 -91

<u>2VBB-UPS1A, 1B, 1C, 1D, 1G:</u>

Ground -	At output Y of maintenance supply step down transformer. UPS output Y, maint. regulator output Y and maint. step down transformer directly electrically connected.

<u>2VBB-UPS3A, 3B:</u>

Ground:	At maintenance supply output power line conditioner. UPS output neutral and maintenance output neutral directly electrically connected.

<u>2VBB-UPS2A, 2B:</u>

Ground:	At UPS output. UPS output neutral and maintenance output neutral directly electrically connected.

<u>2VBB-UPS1H:</u>

Ground -	At output of UPS. No seperately derived maintenance supply.

07-~~41~~ 42-91

Operability History

UPS1's: Manufactured around 1981. Started up in 5/85.

Extensive startup test (Give Copy)

Some early board failures, fuses blown
One DC filter bank failure during initial start

Over last five years have had fan failures (alarmed/ replaced)
UPS1D has been the least reliable unit.

UPS2's: Safety Related
Manufactured about 1982, Started up around 4/85

Primary problem maintenance supply fuse blowing

Some fan failures

UPS3's: Non-safety related-

Simliar problems as 2's

UPS1H: Non-safety

manufactured about 1/85. Installed 12/85

Different unit

* HAND OUT WR LIST (COPY)

MAINTENANCE/PM:

Maintenance procedures:

N2-EPM-GEN-RF635, UPS Inverter clean/Insp. (S-R)

N2-EPM-GEN-W665, DC\UPS weekly checks

N2-EPM-GEN-9Y638, UPS 9 year Capacitor replacement

N2-EMP-GEN-624, UPS inverter function/operational check

N2-EPM-GEN-Q575, Quarterly P.M. (readings) (COPY)

Initiated a DER to formalize our PM better (COPY)

* Some preventive maintenance has been done by WR - identified and done as corrective action

ROUTINE SHIFT CHECKS:

Each shift (every eight hours), each unit is checked for local alarms. Any new ones found, a WR is written.

Alarms in control room 1.) Any off-normal condition
2.) On battery power

Operating Procedures:

Safety related: N2-OP-72

Non-safety: N2-OP-71

SATELLITE MASTERS

TROUBLESHOOTING:

HANDOUT BUBBLE CHART

Best plan for now, may change as we go

May request sequence change - avail of parts, etc.

May modify individual plan
- while get that individually approved by Frank

07-43-91

Doc # = 101 710 343-77223

NMP2 VENDOR MANUAL DISCREPANCY SHEET

RESPONSIBLE NMPC LEAD ENGINEER James Bunyan

VMRP NO. 0238

NMPC NO. N2E35600I PWSUP001

INITIALS LB

FILE SEQUENCE NO. N20691

PROBLEMS IDENTIFIED: General Physics has determined this manual has drawings that are illegible please resubmit to Vendor

RESOLUTION:

NOTE: All problems described on this sheet have been identified by SSDC personnel as those which require Engineering Resolution.

Submitted by: Lola M. Barber Date 6-21-88

SITE SERVICES DOCUMENT CONTROL

Continued on attachments: ____ Yes ✓ No

Page 1 of 1

RECORD OF REVISIONS

DOCUMENT TITLE: System Handbook for Uninterruptible Power System

NMPC FILE NUMBER: N2E35600IPWSUP001 FILE SEQUENCE NUMBER: N20691

REV. NO.	REVISION SUMMARY/REMARKS	REISSUE	INSERT	SUPERSEDES	ISSUE DATE	INIT.
00	NEW ISSUE			0156050048 A	11-25-86	LB

RECEIVED
JO NO. 12187

APR 21 1987

CAUTION: WHEN USING SPARE PARTS LISTS, CHECK WITH VENDOR PRIOR TO ORDERING TO VERIFY PART NUMBERS.

DOCUMENT USER: CONSULT DCIS TO OBTAIN LATEST APPLICABLE DOCUMENT INFORMATION.

VENDOR DRAWINGS CONTAINED WITHIN THIS DOCUMENT ARE CONSIDERED FOR INFORMATION ONLY. DOCUMENT USER MUST CONSULT THE DOCUMENT CONTROL SYSTEM TO OBTAIN LATEST DOCUMENT INFORMATION.

MANUAL APPLICABILITY CHECKLIST

VMRP 0238

N2 VENDOR CODE E35600 COMPONENT CAT. IPWSVP

VENDOR NAME Exide Electronics

MANUAL TITLE System Handbook for Uninterruptible Power System

MANUAL NUMBER 101 710 343-77223 REVISION

P.O. NUMBER E0357A PARENT MANUAL NUMBER

MODEL NUMBERS

575-60T3-120/208, 60 Hz

APPLICABLE COMPIDS

2VBB-UPS1A 2VBB-UPS1D
2VBB-UPS1B 2VBB-UPS1G
2VBB-UPS1C

REFERENCE DRAWINGS (FILE NO/DWG NO/REV/SHEET)

1560229005/C110714010/C/ /C110 611 321/
1560229008/D110711102/ /D110 615 249/
1560229004/CRC 77223-10/ /D110 611 336/
/D110715156/ /A110 611 324/
/D110 601 068 /C110 611 301/ (cont.)

SECTIONS NOT APPLICABLE None

LEGIBLE: YES ( ) NO (X) CONTINUATION SHEET: YES (X) NO ( )

COMMENTS Vendor code in venman is incorrectly listed
Legibility of drawings in manual is questionable F. Reeve
DCIS Rev B has been inserted into this manual -
There is no impact on the Applicability Review F. Reeve 4/20/87

COMPLETED BY Larry Thompson DATE 11/24/86
Responsible Engineer

REVIEWED BY Fred Reeve DATE 11/25/86
Engineering Supervisor

MANUAL APPLICABILITY CHECKLIST

CONTINUATION SHEET

VMRP 0238

N2 VENDOR CODE 1335600 COMPONENT CAT.

REF Drawings (Cont.)

/C110 611 334/

/D110 251 140/

/C110 251 156/

/A110 251 187/

/D110 251 269/

8293

PRESS FIRMLY WITH BALL POINT PEN

STONE & WEBSTER ENGINEERING CORPORATION	SUPPLIER'S DOCUMENT DATA FORM
NINE MILE POINT NUCLEAR STATION - UNIT 2 NIAGARA MOHAWK POWER CORPORATION J.O. 12177	RESPONSIBLE ENGINEER (E1): M. SCHILDROTH — RESP DISP (E1) 2(29-32): 5 5 6
SUPERSEDES SWEC FILE NO (E1) — TYPE: N/A — ID NO. — REV	REVIEW REQUIREMENTS (R E1) — REVIEW REQUIRED: X 08508 2363 — REVIEW NOT REQUIRED ☐
REMARKS (E1) (LIMIT TO 30 CHARACTERS & BLANKS) 4(29-58) (CODES OR SPECIAL REQUIREMENTS): —	REVIEWER (E1): E. KURT. — DATE TO REVIEW (C) 3(68-73)(69-74) MON DAY YR
P O NUMBER (C) (LIMIT TO 10 CHARACTERS) 5(29-38): NMP2-E035A	RELEASED FOR (R,E2): RETURN TO SUPPLIER ☐ ENG & DESIGN ☒ FABRICATION ☐ — DIRECTIONS TO SITE (R,E2): FOR CONSTRUCTION ☒ NOT FOR CONSTRUCTION ☐
MFR'S DOC NO (E) (LIMIT TO 14 CHARACTERS & BLANKS) 5(39-52) (INCLUDE DOC REV OR DATE): (UPS) 101 710 343.772 23	DOCUMENT STATUS (R,E2): ✓ APP - APPROVED ACCEPTABLE FOR USE; AAR - APPROVED AS REVISED; UNA - UNACCEPTABLE; BLT - AS-BUILT; FIO - FOR INFORMATION ONLY
MFR'S NAME (C) (LIMIT TO 10 CHARACTERS & BLANKS) 5(53-62): GOULD (EXIDE EL.)	
EQUIPMENT ID NO. (E1) (LIMIT TO 13 CHARACTERS & BLANKS) 5(68-80): 2VBB-UPS1A, 1B, 1C, 1D, 1G	REVIEWER'S DATE STAMP (R) 3(48-53): NOTED JUL 08 1985 E.K. KURT
DATE REC'D (C) MON DAY YR: 6 28 85 — MAX DAYS IN REVIEW: 10	RESPONSIBLE ENGINEER'S DATE STAMP: NOTED 1985 M.T. SCHILDROTH
FUNCTION TITLE (E1) LIMIT TO 37 CHARACTERS & BLANKS 6(29-65): UNINTERRUPTIBLE POWER SYSTEMS	RESUBMITTAL REQ'D (E2): YES (NO) — RESUB REQ DATE (E2) 3(75-80) MON DAY YR: N/A
SWEC FILE NO. (E1) (3-28) — TYPE: INST — ID NO.: 01.560-5004 — (C) REV: A	TRANSMITTAL DATE (C) 2(65-70): 070985 — TRANSMITTAL NUMBER (C) 2(55-64): F-10181

(C) DOCUMENT CONTROL (R) REVIEWER (E1) RESPONSIBLE ENG PRIOR TO REVIEW (E2) RESPONSIBLE ENG AFTER REVIEW

ADDITIONAL REVIEWERS (E1):

REVIEWER'S COMMENTS (R): NONE MJD. 7/9/85

STONE & WEBSTER ENGINEERING CORPORATION

SUPPLIER'S DOCUMENT DATA FORM

NINE MILE POINT NUCLEAR STATION - UNIT 2
NIAGARA MOHAWK POWER CORPORATION
J.O. 12177

RESPONSIBLE ENGINEER (E1) (16) R. SOWERS

RESP DISP (E1) (17) E

SUPERSEDES SWEC FILE NO. (E1) (1) TYPE • ID NO - N/A REV

REVIEW REQUIREMENTS: (R,E1) (18)
REVIEW REQUIRED ☐
REVIEW NOT REQUIRED ☒

REMARKS (E1) (2) (CODES OR SPECIAL REQUIREMENTS) REPLACEMENT PAGES FOR INST 01.560-500AA

REVIEWER (E1) (19) NA

DATE TO REVIEW (C) (20) MON DAY YR N/A

P.O. NUMBER (C) (3) NMP2 - E035A

DOCUMENT TYPE (E1) (4) INST

RELEASED FOR (R,E2) (21)
RETURN TO SUPPLIER ☐
ENG. & DESIGN ☒
FABRICATION ☐

DIRECTIONS TO SITE (R,E2) (22)
FOR CONSTRUCTION ☒
NOT FOR CONSTRUCTION ☐

MFR'S DOC. NO. (E1) (5) (INCLUDE DOC REV OR DATE) 101-710 343-77223

DOCUMENT STATUS (R,E2) (23)

✓	APP — APPROVED/ACCEPTABLE FOR USE
	AAR — APPROVED AS REVISED
	UNA — UNACCEPTABLE
	BLT — AS-BUILT
	FIO — FOR INFORMATION ONLY

MFR'S NAME (C) (6) EXIDE ELECTRONICS

S & W EQUIP. I.D. CODE (E1) (7) 2VBB-UPS1A

COMPONENT TYPE (E1) (8) UPS

MFG EQUIP I.D. (E1) (9) 101-710 343-77223

AREA DESIGNATION (10) CODES (E1) 4

7,8,9 & 10 CONTINUED ON ATTACHMENT(S) YES ☒ NO ☐

MFG. CODE (E1) (11) ~~33822~~ E35600 10/3/86

REVIEWER'S DATE STAMP (R) (24) NA

DATE REC'D (12) MON 11 DAY 08 YR 85

MAX DAYS IN REVIEW (13) 00 10

RESPONSIBLE ENGINEER'S DATE STAMP (E2) (ISSUE DATE) (25) NOTED OCT 0 3 1986 R. E. SOWERS

FUNCTION TITLE (E1) (14) UPDATED PAGES 3-35,36 OF UPS SYSTEM HANDBOOK

RESUBMITTAL REQ'D (E2) (26) YES NO

RESUB. REQ. DATE (E2) (27) MON DAY YR NA

SWEC FILE NO. (E1) (15) TYPE INST ID NO 01.560-5004 REV B (C)

TRANSMITTAL DATE (C) (28) 10 20 86

TRANSMITTAL NUMBER (C) (29) TF-15236

(C) DOCUMENT CONTROL (R) REVIEWER (E1) RESPONSIBLE ENG PRIOR TO REVIEW (E2) RESPONSIBLE ENG. AFTER REVIEW

ADDITIONAL REVIEWERS (E1): (30) NA

Stone & Webster Engineering
J.O. No. 12177
Spec. No. NMP2-E035A
RELEASED FOR: RETURN TO SUPPLIER ☐ ENG. & DESIGN ☒ FABRICATION ☐
DIRECTIONS TO SITE: FOR CONSTRUCTION ☒ NOT FOR CONSTRUCTION ☐
☒ APP Approved Acceptable For Use
☐ AAR Approved As Revised
☐ UNA Unacceptable
☐ BLT As - Built
☐ FIO For Information Only
Date 10/20/86
By

REVIEWER'S COMMENTS (R): (31)

INSERT INSTRUCTIONS:

DOCUMENT CONTROL TO REMOVE PAGE 3-35/3-36 FROM EXIDE VENDOR INSTRUCTION (INST 01.560-500AA) & REPLACE W/ PAGE 3-35/3-36 ATTACHED TO THIS SDDF.

THESE REVISED PAGES UPDATE PART NUMBERS FOR REPLACEMENT/SPARE PARTS.

STONE & WEBSTER ENGINEERING CORPORATION

NINE MILE POINT NUCLEAR STATION - UNIT 2
NIAGARA MOHAWK POWER CORPORATION
J.O. 12177

ATTACHMENT
SUPPLIER'S DOCUMENT DATA FORM

SWEC FILE NO. (E1) (1)
TYPE: INST 011 ● ID NO: 5600 - 5004 REV.: B

S & W EQUIP. I.D. CODE (E1) (7)	COMPONENT TYPE (E1) (8)	MFG. EQUIP. IDENTIFIER (E1) (9)	AREA (E1) (10)
2VBB-UPS1B	UPS	101 710 343-77223	4
2VBB-UPS1C	UPS	101 710 343-77223	4
2VBB-UPS1D	UPS	101 710 343-77223	4
2VBB-UPS1G	UPS	101 710 343-77223	4

ADDITIONAL SUPERSEDES S&W FILE NO.

TYPE	ID NO	REV.	TYPE	ID NO	REV.
●	-		●	-	
●	-		●	-	
●	-		●	-	
●	-		●	-	

CH86

PT 1

07-~~[illegible]~~ 44 -91 (Part I)

CONTROLLED #10111

TABLE OF CONTENTS

08508 2365

PART 1

SECTION 1. INTRODUCTION 1.0
1.0 modified Ground fault modules.
1.1 GENERAL -- 1-1
1.2 EMERGENCY SHUTDOWN PROCEDURES ---------------------------------- 1-5
1.3 EXIDE UPS FIELD SERVICE OFFICES -------------------------------- 1-6
SECTION 2. RECEIVING AND INSTALLATION
2.1 RECEIVING -- 2-1
2.1.1 General -- 2-1
2.1.2 Unpacking and Inspection --------------------------------------- 2-1
2.1.3 Preinstallation Storage -- 2-1
2.2 INSTALLATION --- 2-1
2.2.1 Site Preparation --- 2-1
2.2.2 Positioning and Securing --------------------------------------- 2-1
2.2.3 Electrical Connections --- 2-2
2.2.4 Inspection, Testing, and Initial Startup ------------------------ 2-2
SECTION 3. STARTUP PROCEDURE
3.1 STARTUP AFTER INSTALLATION -------------------------------------- 3-1
3.1.1 Preliminary -- 3-1
3.1.2 Pretransfer Startup Procedures --------------------------------- 3-1
3.1.3 Startup Procedures --- 3-2
3.1.4 Transfer of Load to UPS Module --------------------------------- 3-2
3.2 NORMAL SHUTDOWN -- 3-2
3.2.1 Initial Conditions -- 3-2
3.2.2 UPS Module Shutdown -- 3-3

8508-2366

LIST OF FIGURES

Figure | Page

1-1 A Simplified One-Line Diagram of an UPS System ------------------ 1-2

1-2 UPS Module -- 1-3

APPENDIX

A A41 Blocking Diode -- A-1

B A42 Static Switch SCR Short -------------------------------------- B-1

C A91 Low DC Input Voltage --- C-1

RL 11223

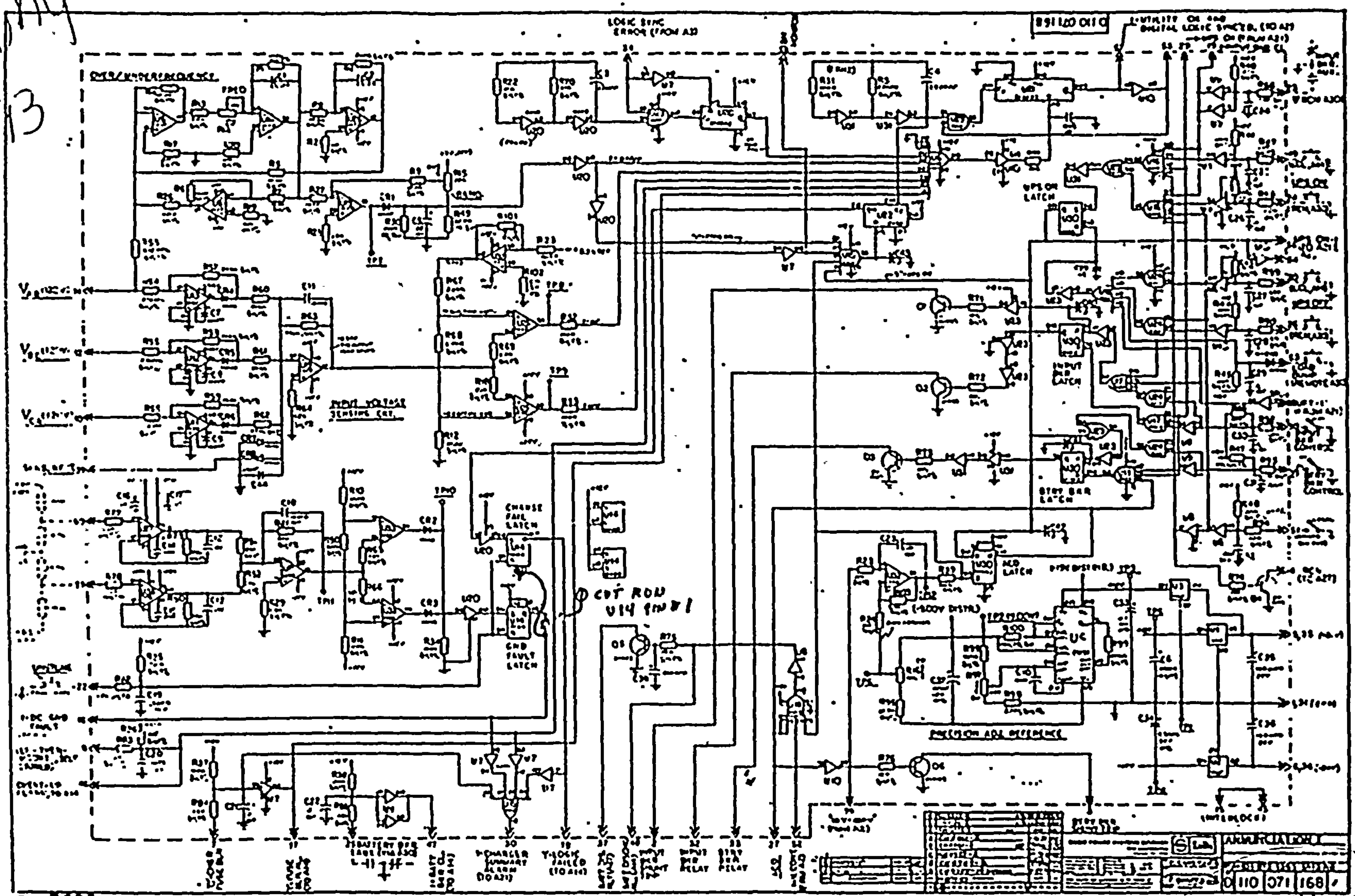
08508 2368

D

9 MILE POINT #2 NUCLEAR STATION
OSWEGO, NY.

MODIFICATION TO DISABLE DC GND FAULT CIRCUIT IN UPS.

Lycoming NY
P063
130913
Attn: Emer. Kurt



(2) JUMPER RUN WHICH HAS BEEN DISCONNECTED FROM U14 PIN #1 TO GND. (U14 PIN #8 OR ANY OTHER CONVENIENT GND).

THOMAS J. MENDEL
5-9-85

New part # will be 101 072 136 - RL77223

~~08508 2296~~

June 28, 1985

08508 2367

Niagara Mohawk
9 Mile Point #2 Nuclear Station
P.O. Box 63
Lycoming, NY . 13093

Attn: Emin Kurt

Dear Mr. Kurt:

Enclosed please find the documentation required to reflect the modification to disable the DC Ground Fault alarm. The modification has already been made, please incorporate this modification in your files. The part number which reflects this modification is 101 072 136-RL77223.

Sincerely,

Salvatore J. Caro

Salvatore J. Caro
Field Engineer

SJC:nm
Enclosure

1.0

Exide Electronics Corporation
100 Ford Rd., Building #3 P.O. Box 575 Denville, NJ 07834 201/625-8844 TWX: 710-986-8515

PART 1

08508 2369

SECTION 1

INTRODUCTION

1.1 GENERAL

The Exide Uninterruptible Power Supply (UPS) protects a critical electrical load by providing emergency backup power for a specified minimum time period whenever utility service is interrupted. The UPS system consists of a solid-state rectifier/charger, a static inverter with internal controls, synchronizing equipment, protective devices, and an industrial-type storage battery as a source of backup power. See Figure 1-1 for a one-line diagram of the UPS system.

The rectifier/charger portion of the UPS module receives 3-phase AC power from the input switchgear and converts it to regulated DC power. This power is then fed simultaneously to the battery disconnect switch (for battery charging) and to the inverter which converts the DC to precise AC which in turn supplies the critical load. See Figure 1-2 for the location of the major UPS components.

Since the battery charger rectifies the incoming AC power, and the critical load is supplied by the inverter, the critical load is isolated from transients which may occur on the utility AC. In the event of incoming AC power failure, the critical load will continue to be powered by the inverter from the battery until the battery is discharged to the point that low DC voltage trips the UPS. If the incoming AC is restored before low DC voltage UPS trip, the charger will restart automatically and recharge the battery (no dedicated battery) while the critical load continues to be supplied from the inverter. If the UPS trips due to the failure, the static switch will transfer the critical load from the inverter to the alternate source (utility). It is then necessary to repair and manually restart the UPS before retransferring the critical load to the inverter.

This Handbook is intended to help the operator and maintenance/troubleshooting personnel understand the functions and operating procedures of the UPS system. Subsequent sections of Part I of the Handbook describe receiving and installation procedures, and how to perform initial startup and normal shutdown procedures. In addition, procedures are given for emergency shutdown.

Part II of the Handbook describes the functions of the various components of the UPS module, how to operate the equipment, and how to perform maintenance and troubleshooting procedures. Equipment layout prints, electrical schematics, parts lists, and trouble isolation charts are provided in the appropriate sections. In addition, a glossary defines a limited number of terms that may be unfamiliar to the reader.

08508 2370

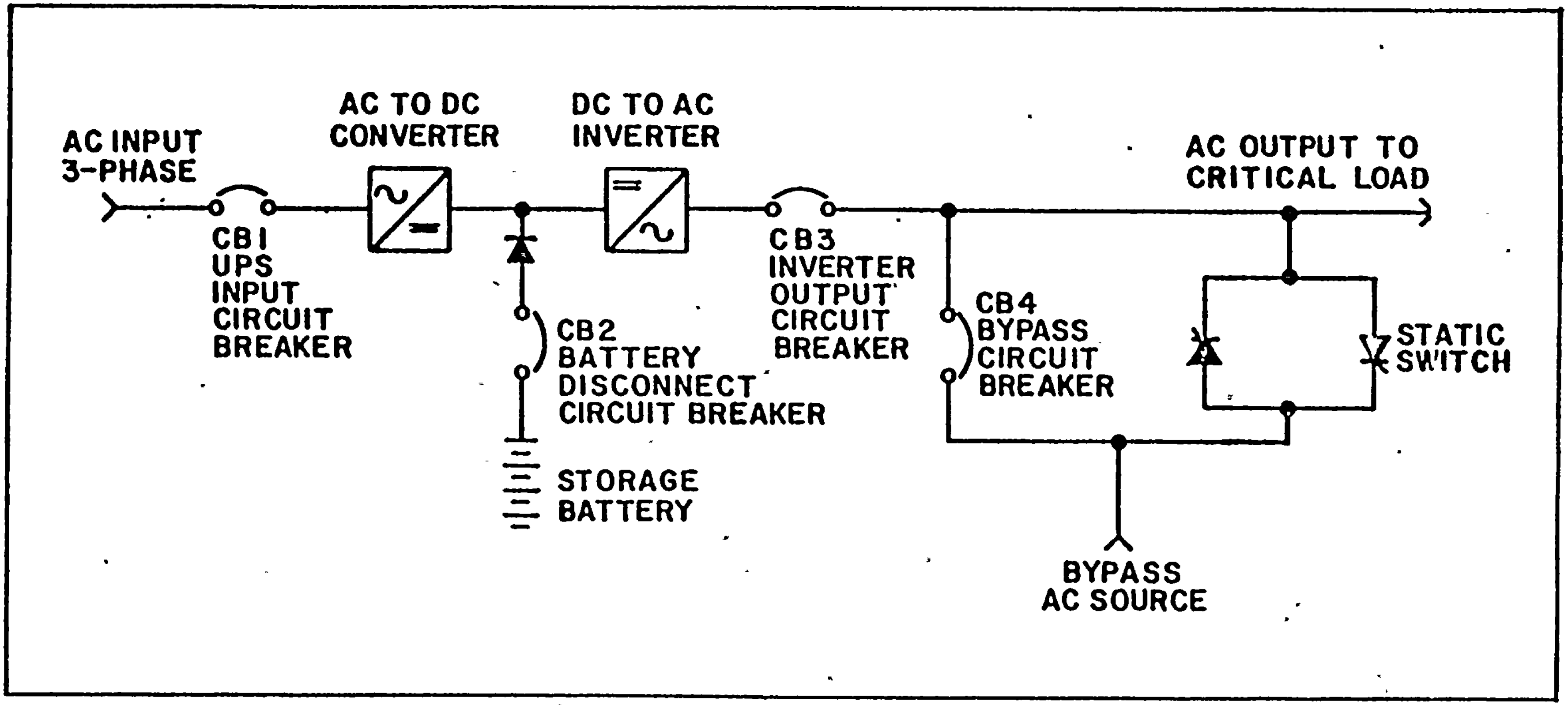


Figure 1-1. A Simplified One-Line Diagram of an UPS System.

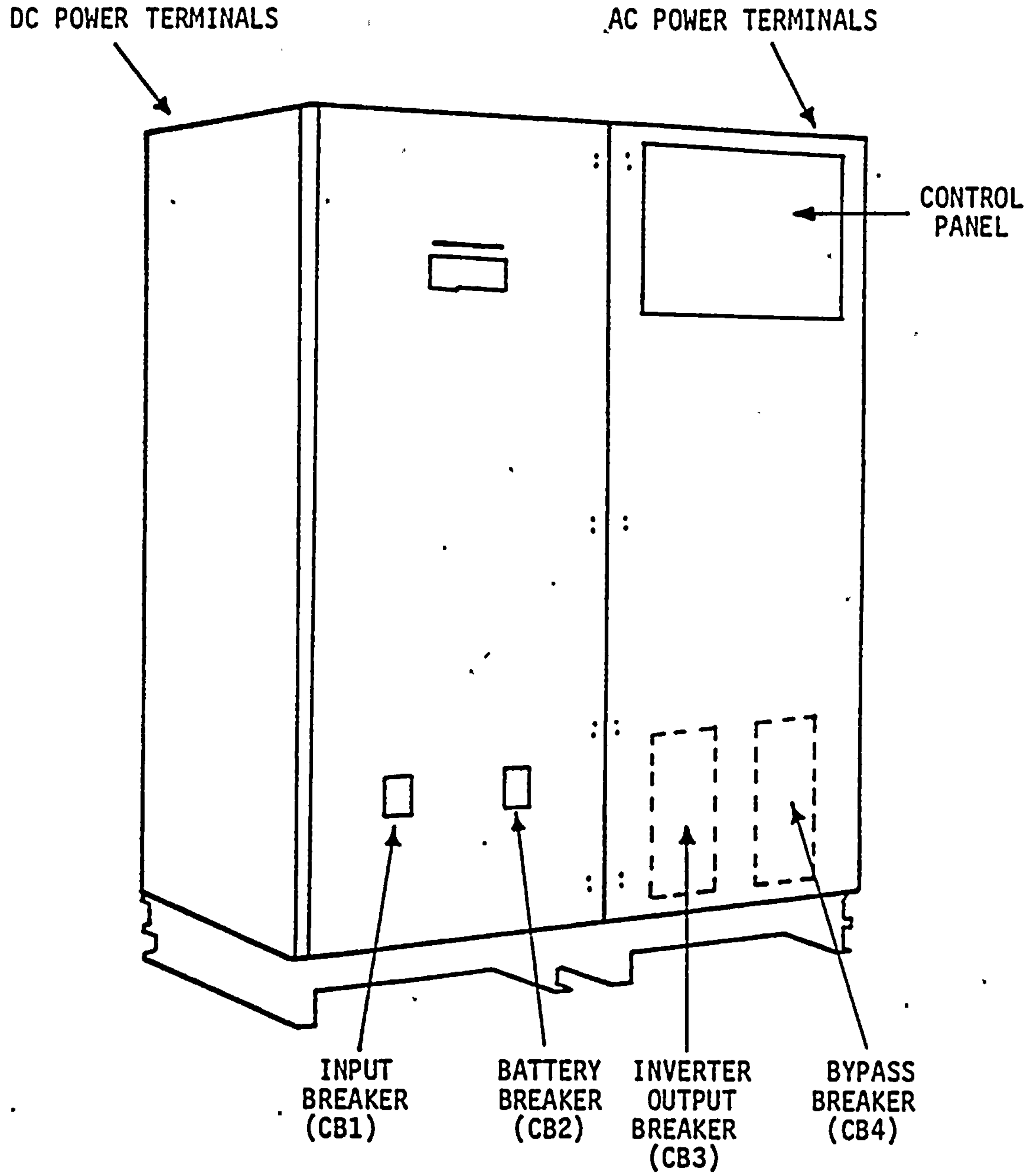


Figure 1-2. UPS Module.

08508 2372

1.2 EMERGENCY SHUTDOWN PROCEDURE

The following Emergency Shutdown procedure is included here and on an enclosed detachable form. This form should be permanently attached to the front of the UPS cabinet for easy reference in case of emergency conditions.

EMERGENCY SHUTDOWN PROCEDURE

The following symptoms may indicate a serious problem with the UPS module:

SMOKE, FIRE, OR FUMES

SOUNDS OF ELECTRICAL ARCING

If any of these symptoms are evident, immediately shutdown the UPS module by performing the following steps in sequence.

PLACE TRANSFER CONTROL IN BYPASS POSITION (THROW SWITCH UP)
OPEN BATTERY BREAKER (CB2)
OPEN AC INPUT BREAKER (CB1)

Perform only these steps. Although it is desirable to prevent the destruction of valuable electrical equipment, be cautious. The primary consideration should be the safety and welfare of the operating personnel.

1.3 EXIDE·UPS FIELD SERVICE OFFICES

08508 2373

The following is a list of Exide UPS Field Service Offices and telephone numbers. Representatives at these locations service UPS units under warranty. This service may be extended through the purchase of a preventive maintenance contract. Service not performed under warranty or a preventive maintenance contract will be billed on a time and materials basis.

EXIDE UPS FIELD SERVICE OFFICES - UNITED STATES

ATLANTA DISTRICT
(404) 768-4195/96
1568 Willingham Drive
Suite 111 B
College Park, Georgia 30337

BALTIMORE/WASHINGTON DISTRICT
(301) 796-8180/8273
Airport Investment Building
793 Elkridge Landing Road
Suite D 109
Linthicum, Maryland 21090

DALLAS DISTRICT
(214) 690-4596
14001 Goldmark
Suite 130
Dallas, Texas, 75240

NEW YORK DISTRICT
(201) 966-1775
33 Kings Road
P.O. Box 128
Madison, New Jersey 07940

SAN FRANCISCO DISTRICT
(415) 348-4989
851 Burlway Road
Suite 310
Burlingame, California 94010

ST. LOUIS DISTRICT
(314) 227-0807
Prospect Center
301 Sovereign Court
Suite 209 B
Manchester, Missouri 63011

LOS ANGELES DISTRICT
(714) 968-5559
20902 South Brookhurst
Suite 110
P.O. Box 5307
Huntington Beach, California 92646

EXIDE UPS FIELD SERVICE OFFICES - OVERSEAS

Saturnia S.A. Sistemas de Energia
Caixa Postal 131
Sao Paulo, Brazil
Phone: 208-1222
Telex: 011-21018

EDCEL Division
Bristol Road
Bridgwater, Somerset
England TA6 4AR
Phone: 44-278-2882-4
Telex: 46415

ESB Incorporated
P.O. Box 175
Greenhills Post Office
San Juan, Metro-Manila
Philippines
Phone: 61-29-78
Telex: ITT 2218 ESBIC PM

Ray-O-Vac Int'l Corporation
Central P.O. Box 972
Tokyo, Japan 100-91
Phone: 402-9541
Telex: J26664

ESBIC Corporation S.A.
Kolokotroni 4
Kifissia Athens,
Greece
Phone: 8011132
Telex: 21-8797 ESBIC GR

ESB Incorporated
Apartado 50027
Caracas 105, Venezuela
Phone: 91-21-75
Telex: 23524 ESB VEN

SECTION 2

RECEIVING AND INSTALLATION

08508 2374

2.1 RECEIVING.

2.1.1 General.

The UPS module(s) normally arrive bolted on wooden pallets with corrugated outer covering and plastic inner covering. The UPS module may be split into two cabinets for shipment.

Fork lift truck (or other such material handling equipment), capable of 4-ton loads, should be available for unloading and positioning. The cabinets should be lifted only by the bottom of their shipping crates or cabinet rails and should not be tipped more than 15 degrees from vertical or their contents jarred.

2.1.2 Unpacking and Inspection.

a. The contents of the shipment should be carefully compared with the bill of lading, and any missing items should be reported to EXIDE immediately.

b. Do not use sharp or pointed instruments to remove outer protective covering of the cabinets; damage to the contents could result.

c. The contents of each crate should be inspected for any evidence of physical damage. Any such damage should be reported to the common carrier and to EXIDE immediately.

2.1.3 Preinstallation Storage.

Prior to installation, the unpacked UPS module cabinets must be protected from moisture, dust, and other harmful contaminants.

2.2 INSTALLATION.

2.2.1 Site Preparation.

The UPS module(s) should be installed in a weathertight structure, compatible with the environmental specifications listed in Section 3, Specifications. They should not be exposed to direct sunlight or other forms of radiant heat.

2.2.2 Positioning and Securing.

a. Before final positioning, remove any shipping straps, blocks, or other such devices that may be difficult to remove after the cabinets are in place.

b. Move the cabinets into the proper position as determined by the equipment layout drawing or the site construction drawings. Insure that servicing clearances shown on these drawings are maintained.

c. If cabinets are shipped separated but they are to be installed together, apply air-sealing tape between each joint, and bolt the sections together.

d. The clearance above the cabinets should be at least 30.5 mm (12 inches) if wire troughs are used for cabling or at least 1.2 m (48 inches) if conduit is used.

e. Lay plastic sheet material across the leg-mounting rails to prevent falling objects from reaching the power transformer, etc., during installation.

f. Be extremely careful not to damage the logic cards and the control panel. These components are fragile.

2.2.3 Electrical Connections.

a. Refer to "System Interconnection Wire Chart" and "Outline Drawing" for point-to-point terminations and to "One-Line Diagram" for voltage/amperage data to use for wire size selection.

b. Interconnection wires and lugs are supplied by EXIDE. They must be installed in accordance with local codes with proper size terminal lugs and crimping tools.

c. On all input and load connections, verify that voltage, phase, and phase rotation requirements are correct. The UPS module requires and supplies A-B-C phase rotation.

NOTE

Before starting the UPS, make certain that both UPS AC source and bypass source are energized.

d. Verify that all circuit breakers are in the open position before making connections to them.

2.2.4 Inspection, Testing, and Initial Startup.

The Exide Factory Representative normally supervises or performs 1) a final inspection which includes physical inspection, interconnection wire checking, and installation test prior to initial startup, and 2) the initial startup.

SECTION 3

08508 2376

STARTUP PROCEDURE

The initial startup/shutdown instructions given in this section are not meant to be complete. For comprehensive startup/shutdown procedures, see Part II, Section 2.

If the UPS module fails during startup, run, or shutdown procedures, record all alarms and switch positions on the UPS module before initiating recovery procedures.

3.1 STARTUP AFTER INSTALLATION

3.1.1 Preliminary.

It is assumed that the EXIDE Field Service Engineer has verified the physical, electrical, and operational integrity of the system.

3.1.2 Pretransfer Startup Procedures

a. It is assumed that the UPS is off.

b. It is assumed that the critical load is being supplied by the utility bypass source via the bypass switchgear and that the UPS module startup is to be performed without interrupting the critical load bus.

Verify that the Bypass circuit breaker (CB4) is closed and then either disconnect the power cable at its plug/socket or manually disengage its motor operator. If a General Electric breaker, this is done by grasping the bar at the bottom of its cover and pulling outward. Block the cover open with any insulated material so that the motor operator will not engage the breaker handle. Leave in this position until after step 3.1.3.c.

c. Verify that card cage cards and all leg connector plugs are seated.

d. Verify/place Bypass breaker switch in the MANUAL RESTART position and the Inverter Output switch in the OPEN position.

e. Verify/insert these fuse pullouts: A18F9-F11 (or A5F9-F11), F34-F36, and F37-F39. Verify that they are inserted properly; they can be inserted upside down so that no contact is made.

f. Verify/place A27CB1, A27CB2, and A27CB3 circuit breakers in the ON position (A27 panel). Some lit status lamps on the control panel (A14) will verify that alternate external control power is available.

3.1.3 Startup Procedures

a. Close the AC INPUT circuit breaker (CB1).

b. Press the MODULE, ON pushbutton.

c. After the MODULE, ON lamp lights, close the BATTERY breaker (CB2).

d. Either reconnect the power cable to the motor operator or remove the block (G.E. breaker) from BYPASS breaker (CB4) and re-engage its motor operator by pushing in sharply. If it does not latch, see Part II, paragraph 2.6.2.3.e for adjusting procedure.

3.1.4 Transfer of Load to UPS Module

a. Move the INVERTER OUTPUT switch to the CLOSED position. When this is done, the following will occur:

1. The INVERTER OUTPUT, CLOSED lamp will light.

2. The inverter will pick up load as will be indicated by increases (amount will depend on load) on the AC OUTPUT AMPS meter, and the BYPASS breaker (CB4) will open.

b. The MAIN BATTERY, CHARGE/DISCHARGE meter indicates a DC current flow in/out of UPS module only.

The UPS module is now in the normal mode of operation with the inverter supplying the critical load bus. Any deviation in lamp or meter status, except for DC and AC current (which will vary with load changes) should be recorded and investigated immediately.

3.2 NORMAL SHUTDOWN

3.2.1 Initial Conditions

a. UPS module is supplying the critical load.

b. Utility bypass source is available at the system switchgear.

3.2.2 UPS Module Shutdown.

G8508 2378

a. Verify that NO-BREAK TRANSFER-TO BYPASS lamp is lit. Transfer critical load to bypass source by placing the TRANSFER CONTROL switch in the BYPASS position. Spring will return switch to the MANUAL RESTART position. (If the switch is not spring loaded, place in the MANUAL RESTART position).

b. Place the INVERTER OUTPUT (CB3) switch in the OPEN position.

c. Push the MODULE, OFF switch.

d. Open BATTERY circuit breaker switch (CB2) (if circuit breaker is motor operated, use switch). The UPS is now in the following condition:

1. The inverter output circuit breaker and the battery disconnect circuit breaker are open.

2. Both rectifier/charger and inverter legs are switched off. All legs remain off until module is restarted.

3. The input circuit breaker remains closed.

4. DC voltage slowly decreases to zero.

5. UPS module logic is still operating.

07-44-91 (Part II)

TABLE OF CONTENTS

PART II 08508 2379

SECTION 1. SPECIFICATIONS

1.1 UPS MODULE INPUT ---------- 1-1

1.2 UPS MODULE OUTPUT ---------- 1-1

1.3 ENVIRONMENT ---------- 1-2

1.4 BATTERY ---------- 1-2

SECTION 2. OPERATION

2.1 GENERAL DESCRIPTION ---------- 2-1

2.2 RECTIFIER/CHARGER ---------- 2-1

2.2.1 Rectifier Legs, A1, etc. ---------- 2-1

2.2.2 Transformer Panel, A18 ---------- 2-3

2.2.3 Choke, L1 ---------- 2-3

2.2.4 Resistors, R1-R4 ---------- 2-3

2.2.5 Shunt, R5 ---------- 2-3

2.2.6 Rectifier Transformer, T3 ---------- 2-3

2.2.7 Interphase Transformer, T4 ---------- 2-3

2.2.8 Current Transformers, T5, T6, T7 (T3, T4, and T5) ---------- 2-3

2.2.9 Charger Related Protection Alarms ---------- 2-4

2.3 INVERTER ---------- 2-5

2.3.1 Inverter Legs, A1, etc. ---------- 2-7

2.3.2 Card Cage, A13 ---------- 2-7

2.3.3 Control Panel, A14 ---------- 2-10

2.3.4 DC Capacitor Module, A15 ---------- 2-10

2.3.5 AC Output Filter Panel, A21 ---------- 2-10

2.3.6 Load Division and Interface Panel, A26 ---------- 2-10

08508 2380

2.3.7 Logic Power and Relay Panel, A27 ------------------------ 2-10

2.3.8 System Terminal Board Panel, A30 ------------------------ 2-11

2.3.9 Remote Alarm, A30A1 ------------------------------------ 2-11

2.3.10 Static Switch Leg, A33 ---------------------------------- 2-11

2.3.11 Static Switch Control Panel, A34 ------------------------ 2-11

2.3.12 AC Output Filter Reactors, L3-L8 ------------------------ 2-11

2.3.13 AC Output Filter Harmonic Reactors, L9-L11 -------------- 2-11

2.3.14 Power Transformers, T1 and T2 --------------------------- 2-12

2.3.15 Transformers, T9 and T16 -------------------------------- 2-12

2.3.16 Bypass Current Transformers, T10-T12 -------------------- 2-12

2.3.17 Ammeter Current Transformers, T13-T15 ------------------- 2-12

2.3.18 Commutation Limit Current Transformers ------------------ 2-12

2.3.19 Load KW Transducer, TD1 --------------------------------- 2-12

2.3.20 Load Dump Circuit (Output Emergency Shutdown) ----------- 2-12

2.3.21 Inverter-Related Protection Alarms ---------------------- 2-13

2.4 BATTERY --- 2-13

2.5 CONTROLS AND INDICATORS -------------------------------------- 2-16

2.6 OPERATING PROCEDURES -- 2-24

2.6.1 Precautionary Notes ------------------------------------- 2-24

2.6.2 Startup After Installation ------------------------------ 2-24

2.6.3 Normal Shutdown --- 2-26

2.6.4 Securing UPS Module after Failure Trip ------------------ 2-28

2.6.5 Restart after Restart Inhibit ---------------------------- 2-28

2.6.6 Emergency Restoration of Critical Load Voltage ---------- 2-29

2.6.7 Load Dump Operation ------------------------------------- 2-30

2.6.8 Static Switch Leg Test ---------------------------------- 2-30

08508 2381

SECTION 3. MAINTENANCE AND TROUBLESHOOTING

3.1 PREVENTIVE MAINTENANCE.---------------------------------- 3-1

3.1.1 General.--- 3-1

3.1.2 Air Filters.--- 3-1

3.1.3 Lamp Test.--- 3-1

3.1.4 Physical Inspection.--------------------------------- 3-1

3.2 TROUBLESHOOTING --- 3-2

3.2.1 General.--- 3-2

3.2.2 Alarm Analysis.-------------------------------------- 3-2

3.2.3 Troubleshooting, Rectifier/Charger.------------------ 3-4

3.2.4 Troubleshooting, Inverter.--------------------------- 3-13

3.2.5 Hints on Other Problem Conditions.------------------- 3-31

APPENDIXES

A Blocking Diode, A41 ------------------------------------- A-1

B Alarm Board, A42 -- B-1

C Low Input DC Voltage Sensor, A91 ------------------------ C-1

08508 2382

LIST OF FIGURES

Figure

2-1 Function Diagram, Rectifier/Charger ---------------------------- 2-2

2-2 Function Diagram, Inverter ------------------------------------- 2-6

2-3 Control Panel (A14) -- 2-15

2-4 Logic and Annunciation Card Cage (A13) ------------------------- 2-20

2-5 Connection Points for Leak and Short Testing of Static Switch SCRs -- 2-31

2-6 UPS Module Components Location --------------------------------- 2-32

LIST OF TABLES

Table

2-1 Charger-Related Protection Alarms ------------------------------ 2-4

2-2 Inverter-Related Protection Alarms ----------------------------- 2-14

2-3 Control Panel Components --------------------------------------- 2-16

2-4 Logic and Annunciation Card Cage Components -------------------- 2-21

3-1 Index of Trip/Alarm Indicator vs. Troubleshooting Routines ---- 3-3

3-2 Fuse Chart --- 3-34

3-3 UPS Module Components --- 3-35

08508 2383

LIST OF DRAWINGS

NUMBER	TITLE	LOCATED IN SECTION
C 110 714 010-77223	Outline, 60 KW	2
C RL-77223-10	One-Line Diagram, 60 KW	2
D 110 715 156-77223	UPS System Interconnection Diagram	2
D 110 711 102-77223	Schematic, 60 KW UPS	3
D 110 601 068	Schematic, Rectifier Leg, A1	3
C 110 611 321	Schematic, Inverter Leg, A2-A7	3
D 110 615 249	Function and Wiring, Card Cage Mother Board, A13A22	3
D 110 611 336-77223	Schematic, Control Panel, A14	3
A 110 611 324	Schematic, DC Capacitor Assembly, A15	3
C 110 611 301-77223	Schematic, Load Division and Interface Panel, A26	3
C 110 611 334	Schematic, Logic Power Supply and Relay Panel, A27	3
D 110 251 140	Schematic, Static Switch Leg, A33	3
C 110 251 156	Schematic, Static Switch Panel, A34	3
A 110 251 187	Schematic, Blocking Diode Leg, A41	3
D 110 251 269	Schematic, Alarm Board, A42	3

PART II

SECTION 1

SPECIFICATIONS

08508 2384

1.1 UPS MODULE INPUT

a. Input Voltage *: 575 VAC +10%, -15%, 3-Phase, 3 Wire

b. Frequency: 60 Hz ±5%.

c. Power Factor: 0.8 lagging at full load, nominal input voltage

d. Total Current Distortion: 12% @ full load, nominal input voltage.

e. Current Limit: Nominal 115%, Adjustable, 95-125% full load current.

f. Current Walk-In: 15 seconds to full current limit.

1.2 UPS MODULE OUTPUT

a. Output Rating: 60 KW/75 KVA @ 0.8 PF

b. Output Voltage: 120/208 VAC (5% Adjustment Range), 3-Phase, 4-Wire

c. Phase Voltage Harmonic Distortion: 5% total, 3% single harmonic.

d. Frequency: (1) Internal oscillator: 60 Hz ±0.1%.
(2) Internal sync: Within $\pm 2^{0}$.
(3) Line sync range: ±0.5 to 1.0 Hz.
(4) Slew rate: 1 Hz/sec.

e. Phase Voltage Unbalance: ±2.5% with 20% load unbalance.

f. Phase Separation: (1) 120^{0} $\pm 1^{0}$ balanced loads.
(2) $\pm 1^{0}$ per each 10% unbalance.

g. Overload Current: 125% for 10 minutes.

h. Current Limit **. 150% for 10 seconds.

i. Fault Current:** Minimum 200% for 10 cycles plus 150% for 10 seconds

---

*Input to charger (static switch input voltage and current must be the same as inverter output).

**Ratings shown for UPS performance without alternate source available. During load faults, static switch normally transfers allowing higher fault currents.

j. Voltage Regulation: ±1% {0-100% load @ 0.8 PF. 0° - 40°C ambient temperature. minimum to maximum volts DC.} 3-Ø average, ±½% combined conditions

k. Voltage Transient Response:
±8% {50% step load change. Transfer of rated load to and from alternate source.
1% {Any individual module failure. Loss or reapplication of AC input.

l. Voltage Transient Recovery: ±2% within 25 milliseconds.
±1% within 50 milliseconds.

m. Load Unbalance: 50% of rating, maximum continuous.

n. System Efficiency: 84% minimum @ rated system load.
82% nominal @ half system load.

1.3 ENVIRONMENT

a. Ambient Temperature: Operating 0° to 40°C.
Non-operating -20 to 70°C.

b. Relative Humidity: Operating: 0 to 95% for ambient temperature of 10° to 50°C.
Nonoperating: 0 to 100%.

c. Barometric Pressure, Operating: Sea Level to 4000 ft, standard.

d. Heat Rejection: 38,900 Btu/hr @ rated module load.

1.4 BATTERY: Number of cells (connected in series) = 60

SECTION 2 08508 2386

OPERATION

2.1 GENERAL DESCRIPTION

The UPS module consists of a rectifier/charger and an inverter with internal controls, synchronizing equipment, and protective devices.

The rectifier/charger portion of the UPS module receives 3-phase AC power from the input switchgear and converts this power to regulated DC. This power is then fed simultaneously to the battery disconnect switch (for battery charging) and to the inverter. The inverter portion converts the DC to precise AC and feeds the AC to the critical load. Figure 2-1 is a function diagram of the rectifier/charger. Figure 2-2 is a function diagram of the inverter. Figure 2-3 shows the control panel layout. Figure 2-4 shows the components of the logic and annunciation card cage (A13). Figure 2-5 shows the connection points for leak and short testing of static switch SCRs. Figure 2-6 shows the location of the UPS components. The schematic diagram (print) of the UPS module is enclosed at the back of Section 3.

2.2 RECTIFIER/CHARGER

With the input switchgear closed, utility AC power is supplied to the main transformer, T3 (1T1 on 300 KW and larger), which has two sets of secondary windings (one delta and one wye) each supplying a 3-phase, full-wave, SCR-controlled bridge circuit. The input breaker (CB1) can be manually opened by moving the trip handle to the OFF position.

The rectifier output of each bridge circuit is connected in parallel through an interphase transformer, T4 (1T2 on 300 KW and larger). The DC output is filtered by a series choke, L1. The charger DC output is then connected directly to the inverter input power terminals and to the battery through fuses (F7 and F8) and battery breaker (CB2). The input breaker and battery breaker are normally mounted inside the UPS module.

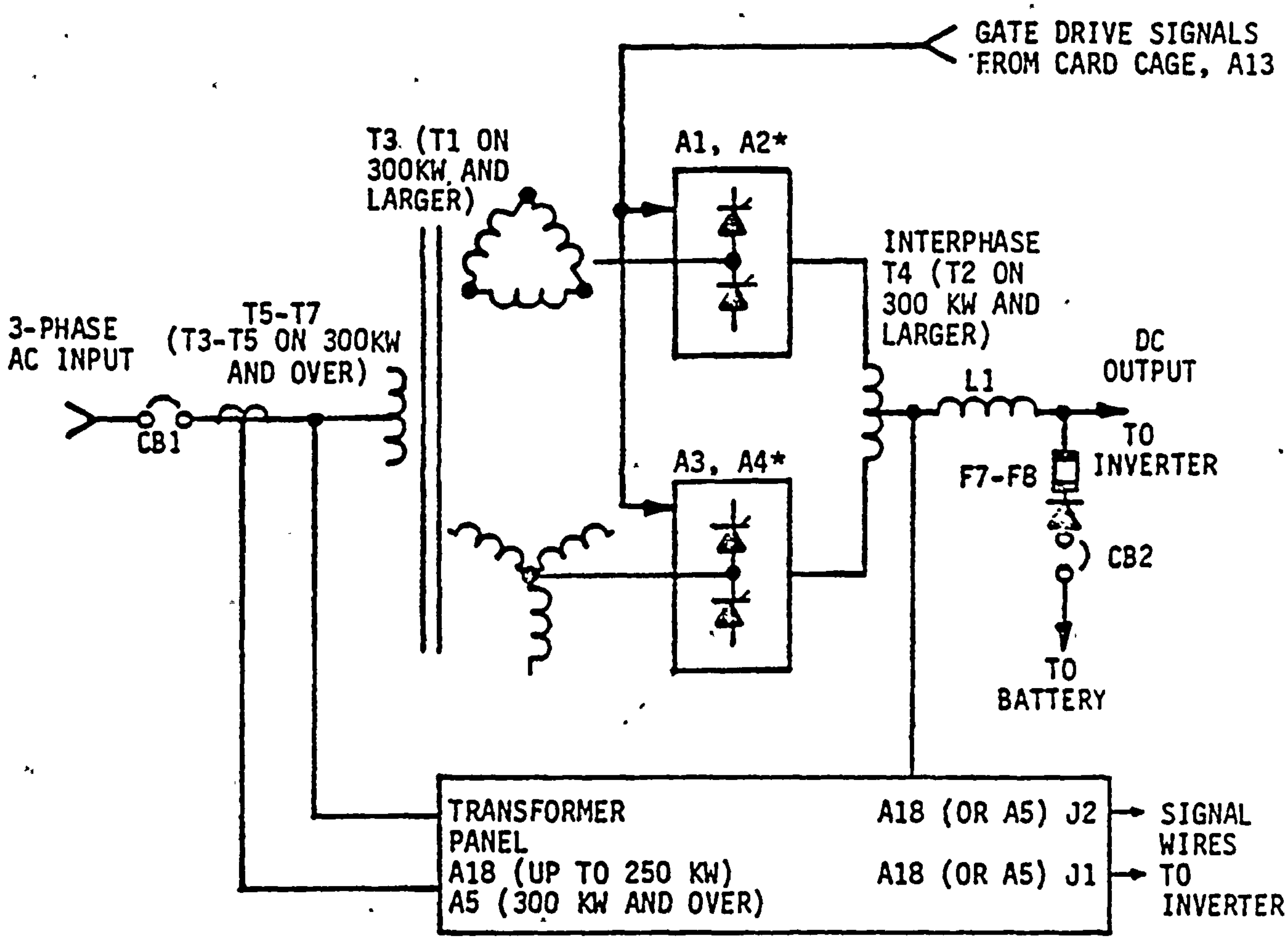
Current-limiting control circuits limit the rectifier/charger output current to a percentage of its full-load rating (nominal, 115%; adjustable, 95-125%). This is sufficient to recharge the battery while supplying the full-rated load requirement of the inverter. A reduced current limit (105%, nominal; adjustable, 95-125%) is available, on external control command, to reduce AC input demand during diesel-generator operation.

The following is a list of rectifier/charger major components and a brief description of their functions. (See Figure 2-6 for location).

2.2.1 <u>Rectifier Leg(s), A1 (30 and 60 KW); A31, A32 (100-250 KW); 1A1-1A4 on 300 KW and Larger.</u>

Each leg includes power SCR(s) Q1, etc., heat sinks, gate drive card A1, snubber circuits, fans, fan failure sensing circuits, and a thermal switch for sensing the temperature of the common main heat sink. (See schematic drawing for number of legs and SCRs.)

08598 2387



*The number of rectifier legs varies with KW rating.
See schematic drawing for number used.

Figure 2-1. Function Diagram, Rectifier/Charger.

Each leg forms a 3-phase bridge rectifier group. Control signals to and from those legs go directly to the card cage, A13.

2.2.2 <u>Transformer Panel, A18 (1A5 on 300 KW and Larger)</u>.

This panel contains the input voltage sensing transformers, T6, T7, and T8, protected by F9, F10, and F11. Input current-sensing burden resistors, R7, R8, and R9 and DC link-sensing resistors, R10 through R13, are also located on this panel. Control signals go to the card cage, A13, via connector J2. Control signals from the logic in the card cage, A13, are returned via connector J1. 08508 2383

2.2.3 <u>Choke, L1</u>.

This iron core reactor filters the DC output to the battery disconnect switchgear and the inverter.

2.2.4 <u>Resistor(s), R1 (30-60 KW); R1-4 (100-250 KW); 1R1-6 (300 KW and Larger)</u>.

This resistor divider across the charger output provides a small load to discharge the DC link filter capacitors after shutdown.

2.2.5 <u>Shunt, R5 (1R7 on 300 KW and Larger)</u>.

This shunt provides DC output current-sensing to the CHARGE/DISCHARGE meter located on the UPS module control panel, A14.

2.2.6 <u>Rectifier Transformer, T3 (1T1 on 300 KW and Larger)</u>.

The main power transformer has a delta-connected primary with delta and wye secondaries. The delta secondary feeds a 3-phase full wave rectifier bridge and the wye secondary feeds another bridge.

2.2.7 <u>Interphase Transformer, T4 (1T2 on 300 KW and Larger)</u>.

This transformer forces instantaneous current balance between the two 3-phase bridge sections. The overlapping conduction results in 120° wide current pulses in each SCR (would be 60° wide without interphase transformer) and improves current form factors in the secondaries of the rectifier transformer, all resulting in reduced losses.

2.2.8 <u>Current Transformers, T5, T6, and T7 (1T3, 1T4, and 1T5 on 300 KW and Larger)</u>.

These transformers are located on the 3-phase AC input. They provide current feedback to the DCVI Control Card, A13A2 and the input ammeter.

08508 2389

2.2.9 Charger-Related Protection Alarms.

There are two classes of charger alarms: Those that cause the charger to trip off and those that do not automatically cause subsequent action but should be immediately investigated and corrected as soon as possible.

The charger trip alarms trip only the charger, causing the inverter to run on the battery. Inverter trip alarms trip the inverter and charger, disconnect the battery, and leave the critical load on bypass.

The CHARGER LOGIC FAIL lamp indicates other alarm conditions on card cage assembly (A13).

See Table 2-1 for charger-related protection alarm tabulation.

TABLE 2-1. CHARGER-RELATED PROTECTION ALARMS.

NAME	TRIP	STORED	SETTING
AC POWER LOSS	No	No	Outside ±15% of nominal voltage, any phase-to-phase ±1.5 Hz
POWER FUSE TRIP	Chgr. Only	Yes	Blown fuse, rect. leg or battery
FAN FAILURE	No	No	Loss of AC current to any one or more fans.
OVERTEMPERATURE TRIP	Chgr. Only	Yes	85°C (Temperature alarm switch on each leg).
DC UNDERVOLTAGE WARNING	No	No	77.8% ± 2% of float voltage
BATTERY DISCHARGE	No	No	Less than set VDC or operating in charger current limit mode. See Section I Specifications.
GROUNDED DC BUS	No	Yes	100K - 350 ohm to ground.
FUSE BLOWN	No	Yes (Trigger Fuse)	Open Fuse
CHARGER-RELATED SUMMARY ALARM	No	N/A	Ground fault, overtemp, logic failure, or blown fuse.

2.3 INVERTER

The rectifier/charger or battery DC output is the inverter input power. This DC voltage is filtered by shunt capacitors contained in DC capacitor assemblies. The quantity of capacitor assemblies required varies with the KW rating of the UPS module, as listed here:

KW Rating	Capacitor Assemblies
30	A15
60	A15, A16
100, 180	A15
250	A15, A16
330	A15, A16, A17
400, 450	A15, A16, A17, A18

DC is converted to AC by SCR switching action of the inverter legs, A1, etc. Each adjacent pair of legs (i.e., A1 and A2, etc.) constitutes a bridge circuit which supplies quasi-square-wave AC to one of the primary windings of the power transformers, T1 or T2. The 30 and 60 KW modules have only one power transformer, T1. Component designators for 300 KW and larger inverters are preceded by the numeral 2; e.g., 2T2. Refer to Figure 2-2.

Secondary windings of T1 and T2 are connected so that the resultant output is a balanced 3-phase voltage. Each line-to-line and line-to-neutral voltage would appear as a near sine wave consisting of 12 steps. This wave form is filtered to provide a good sine wave at the output terminals by the filtering action of AC output filters, A21 (if used, A22 through A24), and by reactors, L3 through L8, connected between adjacent pairs of inverter legs.

The inverter senses its output voltage and regulates within 1% tolerance for a wide variation in load and DC input voltage. Various other sensing circuits provide protection alarm indications. See Tables 2-1 and 2-2 for alarm descriptions.

A redundant logic supply, powered by the inverter output, a separate 120 VAC bypass source, and/or internal rechargeable sealed batteries, allows logic testing with no input power applied and keeps alarms indicating for as long as any source of AC control power is available.

A static interrupter is part of the inverter sensing circuits. Whenever an UPS module trips, it must be disconnected automatically and immediately from the critical load bus. Not providing immediate disconnection could result in out-of-tolerance disturbance of the sensitive critical load. The UPS module provides instantaneous output isolation via internal logic responding to any one of a number of control or protection signals that "programs off" all of the inverter legs. This produces a force-commutated interruption of the inverter output, assuming power continuity at the load.

The following is a list of major inverter components and brief description of their functions.

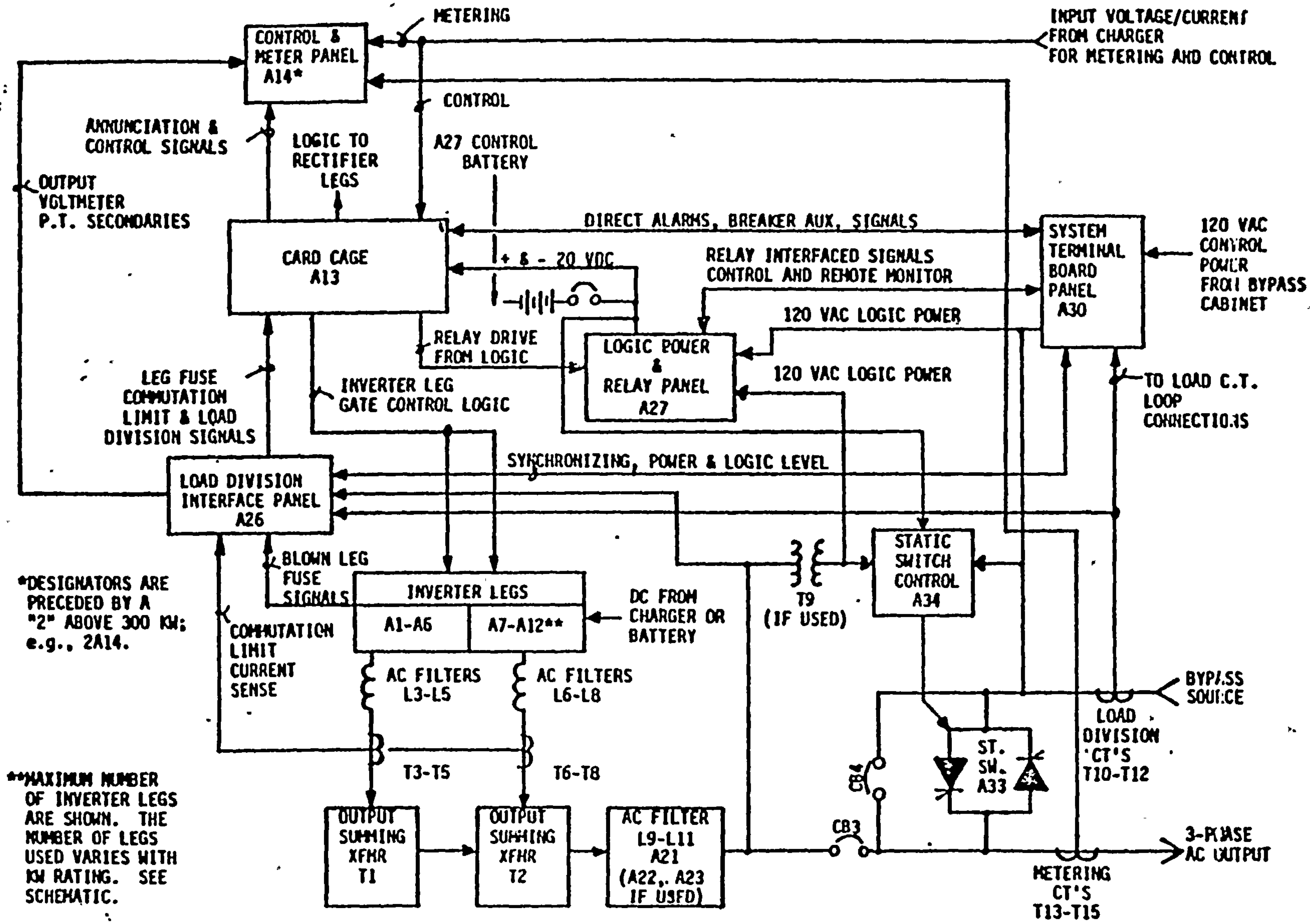


Figure 2-2. Function Diagram, Inverter.

2.3.1 Inverter Legs, A1, etc.

House power and commutating SCRs, gate drive card, commutation circuitry, heat sink overtemperature sensor with NC contacts, individual cooling fan, and fan failure indicator.

2.3.2 Card Cage, A13.

Contains rectifier current limit, rectifier DC link voltage, inverter AC output voltage adjustments, and the following logic cards (left-to-right, viewed from front).

2.3.2.1 Annunciation #1, A13A1.

a. Senses all three AC input phases and inhibits rectifier leg gating unless input voltage and frequency are within acceptable limits.

b. Senses and stores "ground fault". Also responds to "MODULE, ON" and "MODULE, OFF" commands by properly sequencing shunt trip and motor operate commands to the AC input and battery switchgear.

c. Conditions contact position information and provides individual as well as a summary charger alarm to appropriate points elsewhere in the logic.

2.3.2.2 DCVI Control, A13A2.

a. Senses the DC link voltage for voltage regulation, senses the 3-phase AC input currents for current limit operation, and generates the analog command output to control whichever of these two quantities is correct.

b. "ON-OFF" commands are processed to provide smooth rectifier/charger "walk-in", to voltage/current set levels determined by the digital "thumbpots" mounted on the card cage front panel.

c. Controls are provided for optional functions such as automatic equalize battery charging and an auxiliary current limit set level.

2.3.2.3 Sync and Digital Logic, A13A3.

a. Generates a phase-locked 3072-step digital ramp plus a precision 10-bit analog-to-digital conversion of the analog command produced by the DCVI control A13A2. The sum of the digital ramp and digital control command is decoded, and the resulting buffered CMOS signals are fed directly to the gate-firing cards in the rectifier/charger legs.

b. Senses phase-lock error and feeds the results to A13A1 for processing.

c. Responds to inhibit all rectifier/charger legs on command from A13A1.

2.3.2.4 Gate Timing #2, A13A8.

a. Decodes the two 4-bit-wide digital streams to provide the leading and lagging inverter leg position commands.

b. Processes the commutation limit current transformer secondary signals to provide the necessary instantaneous takeover control of the lagging inverter leg logic to limit fault currents while simultaneously generating a hold command for proper ACVI fault control.

c. There are two on-board protection functions: (1) "FR" (clock failure) which signals missing clock pulses and (2) "LF" (logic failure) which signals abnormalities in the sequence of inverter leg logic control commands. These are both trip functions.

2.3.2.5 Gate Timing #1 and Sync, A13A9.

a. Generates the main logic clock (184320 Hz, nominal, for 60 Hz input) (153600 Hz, nominal, for 50 Hz input) and provides two phase discriminators which bias this clock as required for system synchronizing and correct real load current sharing when in parallel.

b. A tracking 10-bit analog-to-digital converter converts the analog command from the ACVI control A13A12, to the digital command inverter output control word.

c. A 3072-bit master digital ramp is generated at 50 Hz or 60 Hz (input) repeating rate to which the digital command is both added (leading logic results) and subtracted (lagging logic results). The resulting two 4-bit-wide digital data streams are then sent to the gate timing #2 card, A13A8, for decoding and generation of the control commands for all leading and lagging legs.

2.3.2.6 ACVI Control, A13A12.

a. Senses the 3-phase inverter output voltage for voltage regulation and 3-phase inverter primary currents for "slow" current limit operation. Generates the analog command output to control the correct inverter output quantity.

b. Sensed inverter current is also used to determine an overload condition, which is signalled to alarm circuitry elsewhere, and to provide a small current-proportional adjustable bias for the output current compensation feature.

c. The "sample/hold" signal, generated on the gate timing #2 card A13A8, is brought in and used to switch ACVI control operation from the normal regulating or "sampling" mode, to a momentary fixed or "hold" mode during the initial few cycles of an AC system output fault.

d. Card-mounted indicator LEDs display the operating mode: (1) green = voltage regulating, (2) = current limiting, and (3) amber = hold. (The 30 and 60 KW modules have no "hold" LED.)

2.3.2.7 AC/DC Protection, A13A18.

a. Inputs include unbiased inverter output voltage and biased inverter output voltage from A13A12, load division current transformer secondary voltages, sync node tertiary voltage, sync bus and utility voltages, and phase C current transformer biased for power sync reference generation.

b. DC link sensing is brought in to produce DC overvoltage alarm, DC undervoltage alarm, and DC undervoltage trip functions. (See Sect. 1, Specifications).

c. Plus and minus 20 VDC logic power is monitored, and a power supply failed signal is generated. (See Sect. 1, Specifications).

d. AC inputs are monitored; abnormal conditions result in outputs for biased overvoltage, undervoltage, and biased undervoltage.

e. The power sync reference is automatically selected, dependent on system configuration and external sync-to-utility command.

2.3.2.8 Output Control, A13A20.

a. Senses inverter output voltage to verify proper frequency and compares inverter with sync bus voltage to determine that synchronizing is suitable and that the voltage difference is not excessive prior to closing the output switchgear.

b. Output switchgear control is performed, and a "leg shutoff" command is generated in response to UPS trip and on/off inputs.

c. Inverter overtemperature and the charger alarm summary signals are also interfaced through this card.

2.3.2.9 Annunciation #2, A13A21.

a. Logically processes all UPS module alarm and status signals, and provides properly timed and sequenced control signal outputs to the control panel, A14, and to any external control to monitor panel.

b. A primary function is the storage, via R-S flip-flops, of most alarms and all trip functions and the display of these conditions on card-mounted LEDs.

2.3.2.10 Static Switch Control, A13A34.

This control determines the condition of the inverter, bypass source, and critical load. It then logically determines whether or not the critical load should be transferred to the bypass source. It also determines whether the UPS can or should be restarted depending on the UPS condition and the critical load bus.

2.3.3 Control Panel, A14

This panel contains control and status display components for the entire UPS module. See Figure 2-3 & Table 2-3 for location and description of each.

2.3.4 DC Capacitor Module, A15 (some modules up to A18, see paragraph 2.3)

Each slide-in module contains DC filter capacitors that are fused in groups of seven capacitors.

2.3.5 AC Output Filter Panel, A21

These Ac capacitors are connected in delta across the inverter output to filter output waveform. The capacitors have integral interrupt overcurrent protection.

2.3.6 Load Division and Interface Panel, A26.

This panel provides interface between the card cage, A13, and the following:

a. Load-division current transformer loop (contains burden resistors and loop-shorting relays.

b. Commutation-limit current transformers (contains burden resistors).

c. Inverter voltage sensing (potential transformers, 3-phase).

d. Signal synchronizing node (mounts sync node transformer).

e. Blown leg fuse sensing (contains optocoupled electrical blown fuse sensing).

2.3.7 Logic Power and Relay Panel, A27.

This panel contains positive and negative 20 VDC power supplies (PS1 and PS2). These power supplies are powered through relay A27K1, which selects inverter output (preferred) or bypass (alternate) source. Positive and negative 18-V sealed batteries (A27BT1-BT6) are mounted on this panel and are kept charged by the power supplies. Circuit breaker A27CB1 disconnects the battery from the logic power bus, and logic power supply switch A27S1 disconnects the power supply's 120 VAC input power. The panel also contains card-mounted (A27A1) relays which interface the A13 controls with external items such as circuit breaker motor operators, shunt trip coils, and remote monitor panel functions. Control battery discharge sensing is located on the A27A1 card. (These batteries should be replaced at 4-year intervals.)

2.3.8 System Terminal Board Panel, A30.

This panel contains terminal boards for all external control connections.

2.3.9 Remote Alarm, A30A1.

The remote alarm panel provides indications of the UPS module status and has no control function. Alarms initiated by the UPS module are as follows:

a. TRANSFERRED TO BYPASS

b. BATTERY DISCHARGE

c. UPS MINOR ALARM

d. UPS MAJOR ALARM

e. DC UNDERVOLTAGE WARNING.

Dry contact relay closure indicates alarm condition. Contact rating is 10 VA max., 100 V max., 0.1 A max., resistive.

2.3.10 Static Switch Leg, A33.

The static switch leg contains static switch power SCRs, SCR gate drivers, and overtemperature sensing circuits. The static switch leg provides an uninterrupted transfer of critical load between the inverter source and the utility bypass source.

2.3.11 Static Switch Control Panel, A34.

This control panel senses critical load and bypass source busses for feeding static switch control card A13A34. Power supplies (PS1 and PS2) produce positive and negative 20 VDC for static switch leg (A33) and remote monitor.

2.3.12 AC Output Filter Reactor, L3-L8.

Each reactor filters the AC output of each inverter leg to power transformer T1 (and T2 when used).

2.3.13 AC Output Filter Harmonic Reactors, L9 through L11.

These reactors (in combination with A21) filter the output waveform.

08508 2397

2.3.14 Power Transformers, T1 and T2.

These transformers sum inverter leg outputs to supply isolated 3-phase AC power to UPS module output.

2.3.15 Control Transformers, T9 and T16.

Used on systems having a bypass source of other than 120 VAC. Required to step down output bypass sources to 120 VAC for cooling fans, logic power supplies, and switchgear motor operators.

2.3.16 Bypass Load Current Transformers, T10, T11, and T12.

These transformers sense bypass load current. Burdens are located on the A26 panel.

2.3.17 Module Load Metering Current Transformers, T13, T14, and T15.

These transformers sense load current for ammeter, load KW meter, and phase A sensing burden on the A34 static switch control module.

WARNING

Connect secure secondary shorting clip-lead to T13-T15 before servicing.

2.3.18 Commutation-Limit Current Transformers, T17-T22 (2T3-2T8 on 300 KW and Above.

Each transformer senses current at the output of each inverter leg for commutation-limit circuit on A13A8. Burden resistors are located on A26 (R1, etc.). (See schematic drawing for number of current transformers.)

2.3.19 Load KW Transducer, TD1 (Optional).

This transducer senses critical load voltage and amperage for driving the TOTAL AC OUTPUT WATTS meter on the UPS control panel (A14).

2.3.20 Load Dump Circuit (Output Emergency Shutdown).

The UPS load dump circuit complies with various code requirements, which include National Electrical Code (NEC) for computer system emergency remote shutdown. The circuit permits complete removal of UPS output power from the critical load terminals when a remote switch is activated. This switch is usually located in the computer room near the exit. See "System Interconnection Wire Chart" in Part II, Section 2 for hookup information.

2.3.21 Inverter-Related Protection Alarms.

There are two classes of inverter alarms: 1) those that trip off the UPS and/or cause transfer to bypass, and 2) minor alarms that do not cause immediate action but should be investigated quickly and corrected as soon as possible.

Inverter trip alarms force the critical load to bypass and trip both inverter and charger.

The following alarms are on the A13 card cage but do not apply to this system: LOAD DIVISION TROUBLE, POWER SYNC FAILURE, and SIGNAL SYNC FAILURE.

See Table 2-2 for inverter-related protection alarms tabulation.

NOTE: Static-switch-initiated transfers do not "TRIP" the UPS; they simply cause "UPS OFF", and UPS auto restart occurs 20-45 seconds later.

2.4 BATTERY

The battery consists of a specified number of lead-acid battery cells connected in series. The cells are sized to provide the specified system protection time of the inverter supplying full-rated output to the critical load with the utility source missing. The battery is connected to the charger output and the inverter through the circuit breaker (CB2) and power fuses.

The battery is connected to building ground through a high impedance charger ground detection circuit and inverter battery voltage sensing circuits when CB2 is closed.

08568 2399

TABLE 2-2. INVERTER-RELATED PROTECTION ALARMS.

NAME (COMMAND ARBR.)	TRIP	STORED	SETTING
DC UNDERVOLTAGE TRIP (DCUV)	Yes	Yes	Under a set DC voltage, 68.5% ± 2% of float voltage.
DC OVERVOLTAGE TRIP (DCOV)	Yes	Yes	Over a set DC voltage, 111.3% ± 2% of float voltage.
AC VOLTAGE DIFF (ΔV) (A13A34 CARD)	No	No	10% or greater difference, inverter output to sync bus.
INVERTER LEG FUSE BLOWN (FU)	Yes	Yes	Open fuse, electrically sensed.
AC UNDERVOLTAGE TRIP (ACUV-SLOW)	Yes	Yes	92% (slow).
AC OVERVOLTAGE TRIP (ACOV)	Yes	Yes	110%.
FREQUENCY FAILURE (WF)	Yes	Yes	More than ± 0.5 Hz deviation in inv. freq.
LOGIC FAILURE (LF)	Yes	Yes	Improper gating.
CLOCK FAILED (FR)	Yes	Yes	Missing or improper clock pulse.
LOGIC POWER SUPPLY FAILURE (PSF)	Yes	Yes	Approx. 16.5V for positive or negative.
FUSE BLOWN	No	Yes (Trigger Fuse)	Open fuse.
OVERLOAD	Yes after 13.5 minutes	Yes	Above 101%, 13.5 minute digitally timed to trip.
OVERTEMPERATURE	Yes	Yes, by thermostat	85^{o}C (Thermostat on each inverter leg main heat sink).
FAN FAIL	No	No	1. Summed with charger fan fail circuit. 2. A28, A29 fan assemblies

08508 2400

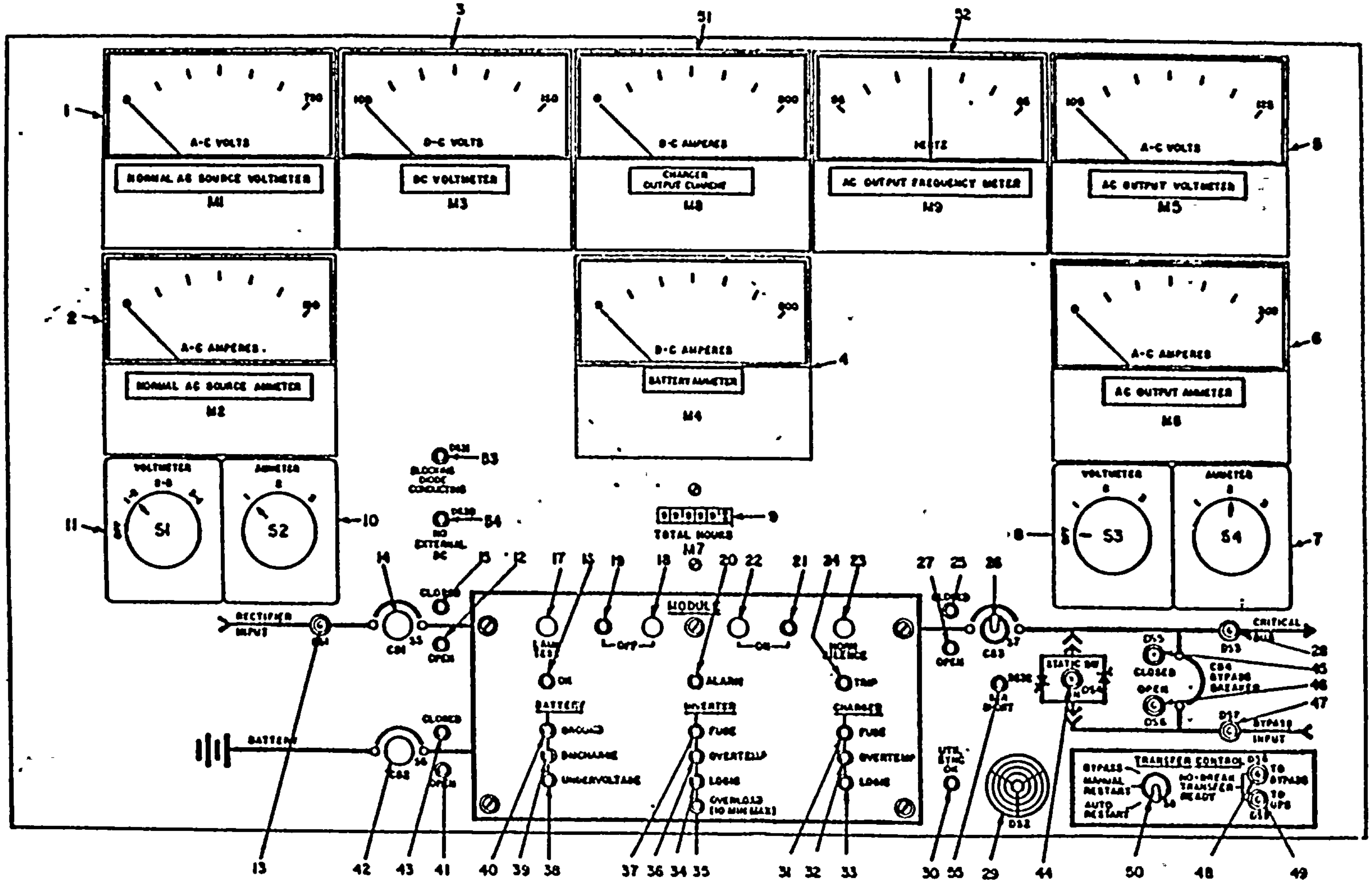


Figure 2-3. Control Panel, A14.

(See Table 2-3 for names and descriptions of components.)

2.5 CONTROLS AND INDICATORS

C8508 2401

The controls and indicators for the module are located on the control panel A14, shown on Figure 2-3, and on the logic and annunciation card cage, A13, shown on Figure 2-4.

TABLE 2-3. CONTROL PANEL COMPONENTS

ITEM	REF. DESIG.	NAME	FUNCTION OR INDICATION
1	A14M1	AC VOLTS (Meter)	Measures each phase of rectifier AC input, selected by Item 11.
2	A14M2	AC AMPERES (Meter)	Measures amperage of each phase of charger input, selected by item 10.
3	A14M3	DC VOLTS (Meter)	Measures inverter input DC voltage.
4	A14M4	BATTERY AMMETER (Meter)	Measures amperage of battery discharge to the inverter.
5	A14M5	AC VOLTS (Meter)	Measures each phase voltage of inverter output, selected by Item 8.
6	A14M6	AC AMPERES	Measures amperage of each phase of inverter output, selected by Item 7.
7	A14S4	AMMETER (Switch)	Selects each phase of inverter output amperage for metering.
8	A14S3	VOLTMETER (Switch)	Selects each phase of inverter output voltage for metering.
9	A14M7	TOTAL HOURS	Displays total hours UPS module has been operating during entire life.
10	A14S2	AMMETER (Switch)	Selects each phase of rectifier input amperage for metering.
11	A14S1	VOLTMETER (Switch)	Selects each phase of rectifier input voltage for metering.
12	A14A1DS2	CB1, OPEN (Lamp)	Lights when rectifier input circuit breaker (CB1) is open.
13	A14DS1	RECTIFIER INPUT (Lamp)	Lights when utility voltage is available to the rectifier input.

TABLE 2-3. (Continued)

ITEM	REF. DESIG.	NAME	FUNCTION OR INDICATION
14	A14S5	CB1, OPEN/CLOSED (Switch)	Controls rectifier input circuit breaker (CB1)
15	A14A1DS1	CB1, CLOSED (Lamp)	Lights when rectifier input circuit breaker (CB1) is closed.
16	A14A1DS6	MODULE, OK (Lamp)	Lights when there are no alarm conditions i.e., normal status, both inverter and charger.
17	A14A1S1	LAMP TEST	Pushbutton, depress manually to light all lamps on control panel. (Does not disturb alarm storage or operation).
18	A14A1S2	MODULE, OFF (Switch)	Depressing pushbutton shuts UPS off, tripping output breaker.
19	A14A1DS5	MODULE, OFF (Lamp)	Lights when UPS is in the OFF condition.
20	A14A1DS10	MODULE, ALARM (Lamp)	Lights when an alarm condition exists, until corrected/unstored, both charger and inverter.
21	A14A1DS15	MODULE ON (Lamp)	Lights when UPS is ON and output voltage is within normal tolerance for the critical load,
22	A14A1S3	MODULE ON (Switch)	Depressing pushbutton initiates rectifier walk-in and normal UPS start-up sequence.
23	A14S4	HORN SILENCE (Switch)	Pushbutton, depress manually to silence horn (horn will sound again on receipt of next alarm).
24	A14A1DS16	MODULE, TRIP (Lamp)	Lights when the UPS module has experienced a trip condition, stays on until corrected/unstored.
25	A14A1DS20	CB3 CLOSED (Lamp)	Lights when inverter output circuit breaker (CB3) is closed.
26	A14S7	CB3, OPEN/CLOSED (Switch)	Controls availability of the UPS module to supply the critical load. Open position trips output breaker (CB3) open.
27	A14A1DS21	CB3 OPEN (Lamp)	Lights when inverter output circuit breaker (CB3) is open.

TABLE 2-3. (Continued)

ITEM	REF. DESIG.	NAME	FUNCTION OR INDICATION
28	A14DS3	CRITICAL BUS (Lamp)	Lights when critical bus is being supplied by inverter output or bypass source.
29	A14DS2	HORN	Sounds audible alarm whenever an alarm occurs, from any source, charger, and/or inverter.
30	A14A1DS22	UTILITY SYNC ON (Lamp)	Lights when utility and inverter frequency are in sync.
31	A14A1DS17	CHARGER, FUSE (Lamp)	Lights when any charger power fuse is blown; sensed by trigger fuses.
32	A14A1DS18	CHARGER, OVERTEMP (Lamp)	Lights when any charger leg temperature sensor trips.
33	A14A1DS19	CHARGER, LOGIC (Lamp)	Lights when charger fails to supply normal output (below 88% of nominal float voltage) when UPS is running.
34	A14A1DS13	INVERTER, LOGIC (Lamp)	Lights when inverter leg firing sequence is faulty.
35	A14A1DS14	INVERTER, OVER-LOAD (10 Min.	Lights when output load exceeds approximately 105%; UPS is automatically tripped if overload continues for 10 minutes.
36	A14A1DS12	INVERTER, OVER-TEMP (Lamp)	Lights when any inverter leg temperature sensor trips.
37	A14A1DS11	INVERTER, FUSE (Lamp)	Lights to indicate open inverter leg fuse or inverter power fuses sensed by trigger fuses.
38	A14A1DS9	BATTERY, UNDER-VOLTAGE (Lamp)	Lights when UPS module is operating on the battery & the battery voltage has discharged down to 77.8% of nominal float voltage.
39	A14A1DS8	BATTERY, DIS-CHARGE (Lamp)	Lights when UPS is operating on the battery only.
40	A14A1DS7	BATTERY, GROUND (Lamp)	Lights when DC link circuit exhibits low resistance to ground.
41	A14A1DS4	CB2, OPEN (Lamp)	Lights to indicate battery breaker in open position.

TABLE 2-3 (Continued) 08508 2404

ITEM	REF.DESIG.	NAME	FUNCTION OR INDICATION
42	A14S6	CB2, OPEN/CLOSED (Switch)	Controls DC battery circuit breaker (CB2).
43	A14A1DS3	CB2, CLOSED	Lights to indicate that battery breaker is in CLOSED position.
44	A14DS4	STATIC SWITCH, ON	Lights when static switch is conducting.
45	A14DS5	BYPASS BREAKER CLOSED (Lamp)	Lights when bypass circuit breaker (CB4) is closed.
46	A14DS6	BYPASS BREAKER OPEN (Lamp)	Lights when bypass circuit breaker (CB4) is open.
47	A14DS7	BYPASS INPUT (Lamp)	Lights when bypass source is available.
48	A14DS8	NO-BREAK TRANSFER READY, TO BYPASS	Lights to indicate that bypass source is available and that conditions are suitable to transfer to bypass.
49	A14DS9	NO-BREAK TRANSFER READY, TO UPS	Lights to indicate that conditions are satisfactory to permit closing CB3 switch, at the operator's discretion, if Transfer Control switch is in the MANUAL RESTART or AUTO RESTART position.
50	A14S8	TRANSFER CONTROL (Switch)	Controls mode of operation of bypass circuit breaker (CB4).
51	A14M8	DC AMMETER	Indicates rectifier DC output current.
52	A14M9	FREQUENCY METER	Indicates AC output frequency.
53	A14DS31	BLOCKING DIODE CONDUCTING (Lamp)	Lights when blocking diode is conducting in forward or reverse direction.
54	A14DS30	NO EXTERNAL DC (Lamp)	Lights when external DC source is lost or drops below 105 VDC.
55	A14DS32	SCR SHORT	Lights when static switch SCR is shorted.

08508 2435

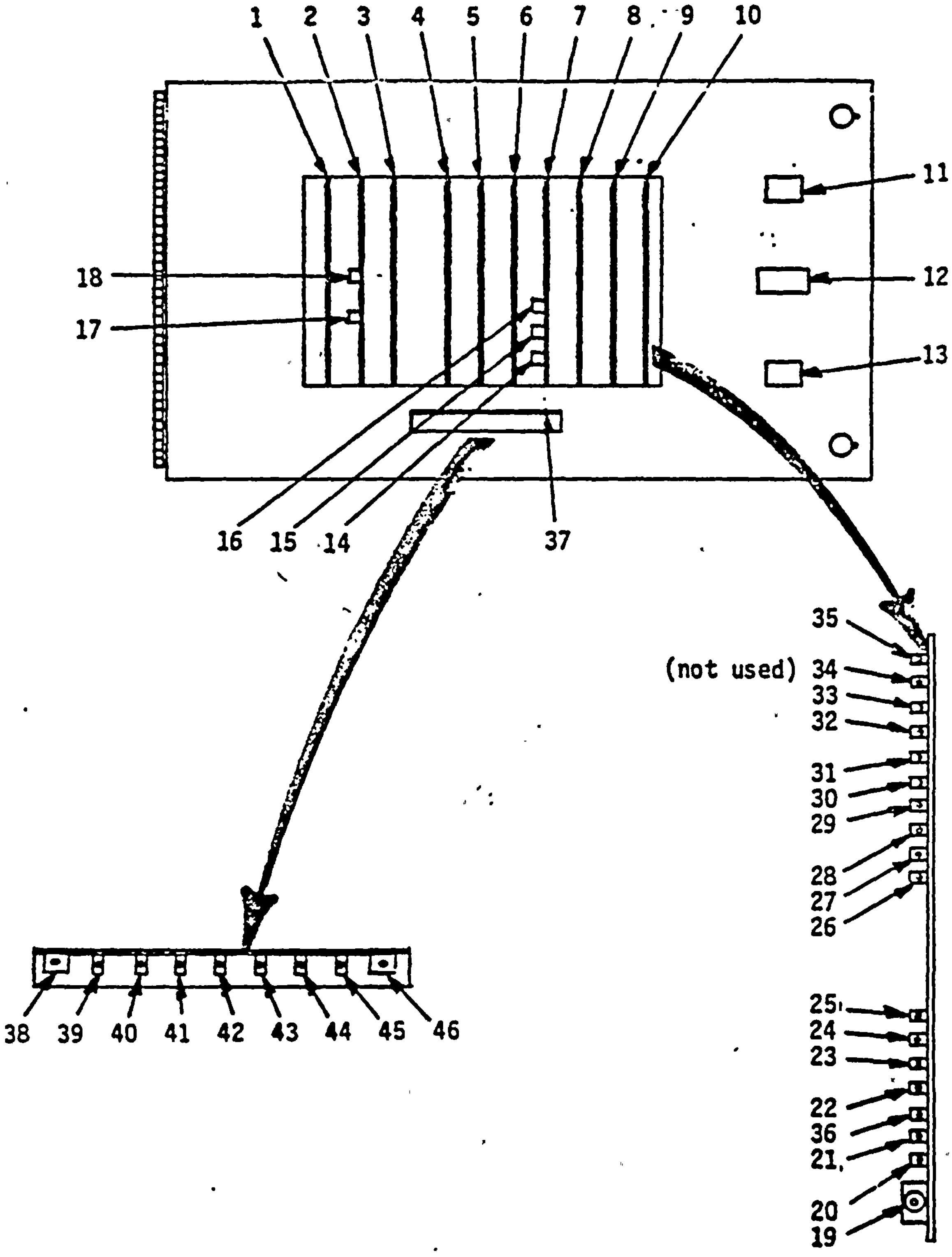


Figure 2-4. Logic and Annunciation Card Cage (A13).

See Table 2-4 for name and description of components.

C85608 2406

TABLE 2-4. LOGIC AND ANNUNCIATION CARD CAGE COMPONENTS

ITEM	REF.DESIG.	NAME	FUNCTION OR INDICATION
1	A13A1	ANNUNCIATION NO. 1 (card)	See paragraph 2.3.2.1.
2	A13A2	DC VI CONTROL (card)	See paragraph 2.3.2.2.
3	A13A3	SYNC & DIGITAL LOGIC (card)	See paragraph 2.3.2.3.
4	A13A5	BITE (card)	If used, see Appendix.
5	A13A8	GATE TIMING NO. 2 (card)	See paragraph 2.3.2.4.
6	A13A9	GATE TIMING NO. 1 & SYNC (card)	See paragraph 2.3.2.5.
7	A13A12	ACVI CONTROL (card)	See paragraph 2.3.2.6.
8	A13A18	AC/DC PROTECTION (card)	See paragraph 2.3.2.7.
9	A13A20	OUTPUT CONTROL (card)	See paragraph 2.3.2.8.
10	A13A21	ANNUNCIATION NO. 2 (card)	See paragraph 2.3.2.9.
11	A13R1	CURRENT LIMIT ADJUST	Sets the DC current limit.
12	A13R3	DC LINK VOLTAGE ADJUST	Sets the DC voltage regulation level.
13	A13R2	AC OUTPUT VOLTAGE ADJUST	Sets the AC output voltage to the critical load.
14	A13A12DS3	CURRENT LIMITING (Red)	Test lamp - indicates inverter is in current limiting mode.
15	A13A12DS2	VOLTAGE REGULATING (Green)	Test lamp - indicates inverter is in normal regulating mode.

TABLE 2-4 (Continued) C8508 2407

ITEM	REF. DESIG.	NAME	FUNCTION OR INDICATION
16	A13A12DS1	HOLD MODE (Yellow)	Test lamp - indicates inverter is in commutation limit mode.
17	A13A2DS2	NORMAL VOLTAGE REGULATING MODE	Test lamp - indicates charger is in normal regulating mode.
18	A13A2DS1	CURRENT LIMIT OPERATING MODE	Test lamp - indicates charger is in current limit mode.
19	A13A21S1	LAMP TEST/ UNSTORE (switch)	Performs lamp test and unstores stored alarms when activated.
20	A13A21DS16	CONTROL BATT. DISCH.	Lights when there is less than 18 V on positive or negative 20 V supply bus.
21	A13A21DS17	SYNC. TO UTILITY	Lights when sync to utility has been commanded.
22	A13A21DS14	SIGNAL SYNC. TRIP	Lights to indicate shorted sync mode.
23	A13A21DS13	PWR. SYNC. TRIP	Lights to indicate open phase C load division current transformer.
24	A12A21DS12	LOAD DIV. TROUBLE	Lights to indicate open or shorted phase A or B load division current transformers.
25	A13A21DS11	FAN FAILED	Lights if any fan in the UPS module fails to operate.
26	A12A21DS10	LEG FUSE	Lights if any fuse supplying DC to inverter leg opens.
27	A12A21DS9	PWR SUPPLY FAILED	Lights when positive or negative 20 V supply drops below 16.5 V.
28	A13A21DS8	LOGIC FAILED	Lights when an improper timing signal is issued from the logic to the power legs.
29	A13A21DS7	FREQ. FAILED	Lights when inverter frequency deviates more than ± 0.5 Hz of nominal.
30	A13A21DS6	CLOCK FAILED	Lights when a missing clock pulse is detected.

TABLE 2-4 (Continued)

ITEM	REF. DESIG.	NAME	FUNCTION OR INDICATION
31	A13A21DS5	DC OVERVOLTAGE	Lights when DC link voltage exceeds 111% of nominal.
32	A13A21DS4	DC UNDERVOLTAGE	Lights when DC link voltage drops below 69% of nominal.
33	A13A21DS3	AC UNDERVOLTAGE	Lights when AC voltage is 88% of nominal.
34	A13A21DS2	ACUV FAST	Not used.
35	A13A21DS1	ACUV SLOW	Lights when AC undervoltage conditions exist for more than 10 seconds.
36	A13A21DS15	STATIC SW FAILED	Not used.
37	A13A34	STATIC SWITCH CONTROL (card)	See paragraph 2.3.2.10
38	A13A34S1	RESET (switch)	Resets alarm indicators on static switch control card when activated.
39	A13A34DS6	OVERLOAD TRANSFER	Lights to indicate critical load has been transferred to bypass source because of an overload condition.
40	A13A34DS7	OV/UV TRANSFER	Lights to indicate the critical load has been transferred to bypass source because of overvoltage or undervoltage.
41	A13A34DS5	TRANSFER LOCKOUT	Lights to indicate lockout to utility, UPS must be restarted and timer reset.
42	A13A34DS4	ST. SW. UNPLUGGED	Lights to indicate the static switch leg is not plugged in.
43	A13A34DS3	OUTPUT OV/UV	Lights if bypass source exhibits over-voltage or undervoltage condition.
44	A13A34DS1	VOLTAGE DIFFERENCE	Lights to indicate difference in voltage between the bypass source and the critical load bus.
45	A13A34DS2	BYPASS OUT OF LIMITS	Lights to indicate an overvoltage, under-voltage or wrong frequency condition exists on the bypass source.
46	A13A34S2	LAMP TEST	Test lamps on static switch control card when activated.

2.6 OPERATING PROCEDURES

08508 2409

2.6.1 Precautionary Notes.

a. Before performing any operations on this system, be certain that you completely understand the consequences of such operations. Should questions or doubts arise concerning the startup and shutdown or troubleshooting of the system, please do not make any assumptions regarding the equipment. First, consult any available local person who is knowledgeable and expert about the operation of the module. If no such person is available, contact Exide following the instructions given in Part I, Section 1.

b. Where safety is concerned, never trust electrical circuits to be in the state that you think they should be. CHECK WITH A VOLTMETER BEFORE YOU ATTEMPT TO DISCONNECT ANYTHING.

c. The following procedures must be adhered to when shutting down the UPS for maintenance or repairs and when restarting the UPS afterwards. Failure to follow these procedures exactly as written, or to observe the precautionary notes, could result in load loss, personal injury, or both. LETHAL VOLTAGES MAY BE PRESENT. NEVER WORK ALONE.

2.6.2 Startup After Installation (See Figures 2-3 and 2-6)

2.6.2.1 Preliminary

It is assumed that the EXIDE Field Service Engineer has verified the physical, electrical, and operational integrity of the system.

2.6.2.2 Pretransfer Startup Procedures

a. It is assumed that the UPS is OFF.

b. It is assumed that the critical load is being supplied by the utility bypass source via the bypass switchgear and that the UPS module startup is to be performed without interrupting the critical load bus.

Verify that the BYPASS circuit breaker (CB4) is closed and then either disconnect its power cable or manually disengage its motor operator. If a General Electric breaker, this is done by grasping the bar at the bottom of its cover and pulling upward. Block the cover open with any insulated material so the the motor operator will not engage the breaker handle. Leave in this position until beginning Startup Procedures, paragraph 2.6.2.3.

c. Verify that card cage cards and all leg connector plugs are seated.

d. Verify/place the BYPASS BREAKER switch in the MAN RESTART position and the INVERTER OUTPUT switch in the OPEN position.

e. Verify/insert fuse pullouts, A5F9-11 (or A18F9-11), F34-36, and F37-39. Verify that they are inserted properly; they can be inserted upside down so that no contact is made.

f. Verify/place A27CB1, A27CB2, and A27CB3 circuit breakers in the ON position (A27 panel). Some lit status lamps on the A14 control panel will verify that alternate external control power is available.

2.6.2.3 Startup Procedures

a. Either reconnect the power cable to the motor operator or remove the block (G.E. breaker) from BYPASS breaker (CB4) and re-engage its motor operator by pushing in sharply. If it does not latch, see paragraph f for adjusting procedures.

b. Verify that all alarms are unstored and audible alarm silenced.

c. In the switchgear structure, close the appropriate UPS module input breaker. This applies input voltage to the rectifier/charger.

d. Manually close the UPS Input breaker (CB1).

e. Start the UPS module by pushing the Module, On switch located in the center of the A14 control panel. When this is done, the following will be noted:

   1. The MODULE, OFF lamp on the A14 control panel will extinghish, indicating that the system has been energized.

   2. The rectifier/charger will begin to "walk up"; i.e., the DC voltage will slowly increase. Both MODULE, ON and MODULE, OFF lamps will remain extinguished during the "walk up".

   3. The next status change will occur when the DC link voltage reaches "holding" or open-circuit voltage (see One-Line Diagram for this value). At this time, the inverter will "phase on"; i.e., the AC OUTPUT VOLTS meter will move from zero to the normal output level. As the voltage approaches steady-state, the MODULE, ON lamp will light, indicating that the inverter is providing nominal output voltage. Also at this time, the NO BREAK TRANSFER RELAY, TO UPS lamp should be lit. This indicates that the inverter and the critical load bus are synchronized and that the voltage difference is acceptably small for output breaker closing.

   4. Close the Battery breaker switch (CB2); the rectifier/charger will continue to "walk up" to "float" voltage (see One-Line Diagram for this value).

f. Verify that the Bypass breaker motor operator (CB4) position indicator is in the closed position; the Bypass breaker should already be closed. If its cover does not close with a positive action of the catch bar at the bottom, it may be necessary to center the motor operator handle-moving mechanism. This can be done by reopening the cover and adjusting the worm shaft with a screwdriver.

2.6.2.4 Transfer of Critical Load to the UPS Module

a. Verify/move the TRANSFER CONTROL switch to the AUTO RESTART position.

CAUTION

Load transfer should not be attempted unless:

1. Main battery is connected to the UPS and the BATTERY circuit breaker (CB2) is closed (otherwise, DC OVER-VOLTAGE trip may occur).

2. The Transfer Control switch is in the AUTO RESTART or MANUAL RESTART position. If cycling of the BYPASS circuit breaker (CB4) should occur, immediately place the TRANSFER CONTROL switch in the AUTO RESTART positon.

b. Verify that the UTILITY SYNC OK lamp is lit.

c. Verify that the NO BREAK TRANSFER READY, TO UPS lamp is lit.

d. Place the INVERTER OUTPUT circuit breaker switch (CB3) in the CLOSED position. When CB3 closes, the following events should occur:

1. The INVERTER OUTPUT, CLOSED lamp should light.

2. The BYPASS BREAKER (CB4), OPEN lamp should light.

3. The inverter will pick up load, as will be indicated by increases (amount will depend on the critical load) on the AC AMPERES input ammeter.

4. The NO BREAK TRANSFER, TO BYPASS lamp should light if the bypass source is acceptable.

e. The DC AMPERES ammeter indicates charge/discharge current flow in/out of the UPS module only. The meter indication should be near zero during steady-state operation with the battery charged.

The UPS module is now in the normal mode of operation with the inverter supplying the critical load bus. Any deviation in lamp or meter status (except for DC and AC current which will vary with load changes) should be recorded and investigated immediately.

2.6.3 Normal Shutdown.

2.6.3.1 Initial Conditions 08508 2412

a. UPS module is supplying the critical load.

b. Utility bypass source is available at the system switchgear.

c. The UPS AC Input breaker (CB1) is closed.

2.6.3.2 UPS Module Shutdown.

a. Verify that the NO-BREAK TRANSFER, TO BYPASS lamp is lit. Transfer the critical load to the bypass source by placing the Transfer Control switch momentarily in the BYPASS position. A spring will return the switch to the MANUAL RESTART position. (If the switch is not spring-loaded, place the switch in the MANUAL RESTART position.)

b. Open the Inverter Output breaker by placing the Inverter Output (CB3) switch in the OPEN position.

c. Push the Module, Off switch.

d. Open the Battery breaker (CB2) switch. The UPS is now in the following condition:

1. Inverter Output breaker and battery breaker are open.

2. Rectifier/charger and inverter legs are switched off. All legs remain off until module is restarted.

3. Input breaker remains closed.

4. DC voltage slowly decreases to zero.

5. UPS module logic is still operating.

2.6.3.3 Further Removal of Power for Servicing.

After steps 2.6.3.1 and 2.6.3.2 are accomplished, perform the following:

a. Manually open AC Input breaker (CB1) (if motor operated, grasp bar at the bottom of the cover and, pulling outward, block cover open with insulated material). Verify that DC bus voltage is below 20 V.

b. Lift motor operator on CB4 (Bypass breaker) and block up or disconnect the breaker motor operator at its plug/socket.

c. Deenergize logic power when DC VOLTS meter indicates below 30 VDC by opening A27CB1, A27CB2, and A27CB3 circuit breakers. Do not remove any printed circuit boards with the logic power on.

d. Remove fuse block on A18 (or A5) pan (F9, F10, and F11) and remove fuse blocks on F34, F35, and F36; also F37, F38, and F39.

e. The UPS module is now deenergized except for the following:

1. Load division current transformer loop currents; no hazard is normally involved. However, if the A18 (or A5) pan needs to be removed, jumper the current transformer loops to insure safety.

NOTE

If unplugging A26J3 becomes necessary, jumper A30TB2-2 to -3, A30TB2-5 to -6, and A30TB2-8 to -9. These jumpers close the CT loop with the other operating UPS modules.

2. Sync node circuitry; no hazard involved.

CAUTION

Proceed with extreme caution, double-checking with a voltmeter to be sure that the equipment is deenergized.

2.6.4 Securing UPS Module after Failure Trip

Verify that the critical load is being powered by the bypass source. Then proceed as follows:

a. Record all alarm and switch positions on the UPS module.

b. Place AC INPUT (CB1), BATTERY (CB2), and INVERTER OUTPUT (CB3) circuit breaker switches in the OPEN position, thus preventing inadvertent switchgear closure.

c. If necessary to repair, proceed to UPS Module Shutdown, paragraph 2.6.3.2.

2.6.5 Restart after Restart Inhibit

There are two methods by which the UPS module can be put in a mode of operation with the bypass source feeding the critical load and the UPS module phased off (MODULE, OFF lamp lit) with no alarm lamps lit:

a. "Three tries out" is an UPS module circuit that allows three sequential automatic transfers of load to the UPS module within an 11-minute period. This operation is designed to prevent cycling, which may be caused by 1) an inverter malfunction that causes its output to go out of limits when load is applied, or by 2) a series of major load steps during this same 11-minute period.

b. "Manual Restart" is a selected mode of operation that precludes any automatic transfer of the load to the UPS after an automatic transfer to the bypass source. The automatic transfer to bypass may have been due to a short overload or a similar occurrence which caused the UPS module to initiate a transfer with no latched inverter alarms. This mode can be selected by returning and leaving the TRANSFER CONTROL switch in MANUAL RESTART (center) position after completing the normal procedure of transferring the load to the UPS.

2.6.5.1 Restart and Retransfer after "Restart Inhibit" Shutdown.

The method of restart varies with the initial position of the TRANSFER CONTROL switch (assuming INVERTER OUTPUT switch is still in the CLOSED position).

a. If the TRANSFER CONTROL switch is in the AUTO RESTART position, move it to MANUAL RESTART position, then back to AUTO RESTART position. After approximately 42 seconds, the UPS will restart and automatically retransfer the load to the UPS.

b. If the TRANSFER CONTROL switch is in the MANUAL RESTART position, move it to the AUTO RESTART position. After approximately 24 seconds, the UPS will restart and automatically retransfer the load to the UPS. If desired, after the load is on the UPS, place the TRANSFER CONTROL switch in the MANUAL RESTART position. This will inhibit automatic UPS restart/retransfer in the event of another automatic transfer of load to utility.

NOTE

If it is desired only to restart the UPS but not to retransfer the load to UPS immediately, move the INVERTER OUTPUT switch from CLOSED to OPEN position before restarting UPS.

2.6.5.2 Restart after Restart Inhibit Shutdown: No Auto Restart.

a. Place INVERTER OUTPUT switch in OPEN position.

b. Press MODULE, ON switch. UPS will restart, but load will remain on bypass source.

c. Place TRANSFER CONTROL switch in MANUAL RESTART position, then to AUTO RESTART position. This resets the "three tries out" circuitry.

d. To transfer load from utility to UPS, verify/place BATTERY DISCONNECT breaker (CB2) switch in CLOSED position and perform 2.6.2.3 f through h.

2.6.6 Emergency Restoration of Critical Load Voltage

2.6.6.1 General

The worst possible condition that could happen is one in which (a) UPS module tripped off the line, (b) the static bypass switch logic fails to gate the SCRs and , (c) the bypass switchgear fails to close.

2.6.6.2 Load Voltage Restoration.

To restore critical load voltage, proceed as follows: C8508 2415

a. Verify that the INVERTER OUTPUT breaker (CB3) is open.

b. Lift the motor operator on BYPASS breaker (CB4) and manually close the bypass switchgear.

c. Leave the motor operator lifted until after repairs are made.

2.6.7 Load-Dump Operation

Closure of the load-dump switch results in the following conditions:

a. The load-dump signal via annunciation card (A13A1) causes the AC INPUT breaker(CB1), DC BATTERY breaker (CB2), and UPS OUTPUT breaker (CB3) to shunt trip in the UPS module.

b. The load-dump signal is simultaneously sent to the static switch control card (A13A34) causing the static switch (A33) to turn off. This is accomplished by commanding the bypass breaker's (CB4) motor operator to open and by removing the static switch SCR gate signals so that the static switch will not conduct.

When the load-dump switch is opened and the bypass source is available, the static switch and the bypass breaker will automatically close, thus providing bypass power to the critical load. The UPS must be manually restarted by moving the tripped circuit breakers (CB1 and CB2) to OFF position and moving the INVERTER OUTPUT switch to OPEN position, then restarting in accordance with paragraph 2.6.2.3.

2.6.8 Static Switch Leg Test

To test static switch leg, proceed as follows:

a. Transfer critical load to bypass source per paragraph 2.6.3.2.

b. Pull out static switch leg(A33) approximately 13 cm (5 in.) to disconnect bypass source and critical load. Keep card connection in place.

c. Verify that STATIC SWITCH UNPLUGGED lamp on card A13A34 is lit.

d. Push GATING switch (S22). Six red LEDs on gate drive card (A33A1) should light; this indicates proper gating of each SCR in the static switch.

e. To test phase A SCRs, connect TP7 to TP5 and TP8 to TP6 with clip leads (see Figure 2-5).

f. Move POLARITY switch (S21) from center position to left position. The green LED on the static switch gate drive card (A33A1) should not light. Move the same switch from left position to center position and then to right position. Again the green LED should not light. If the green LED lights, this indicates leaky or shorted SCRs. Return POLARITY switch to center position before removing clip leads. NOTE: The green LED may "flicker" during change of switch position but should not remain lit.

g. To test phase B SCRs, connect TP7 to TP3 and TP8 to TP4 with clip leads (see Figure 2-5).

h. Perform POLARITY switch operations as in step f.

i. To test phase C SCRs, connect TP7 to TP1 and TP8 to TP2 with clip leads (see Figure 2-5).

j. Perform POLARITY switch operations as in step f. 08508 2416

k. Reinsert static switch leg (A33) to seated position. The STATIC SWITCH UNPLUGGED lamp on static switch control card (A13A34) should extinguish.

l. Retransfer critical load to UPS module in accordance with paragraph 2.6.2.3.

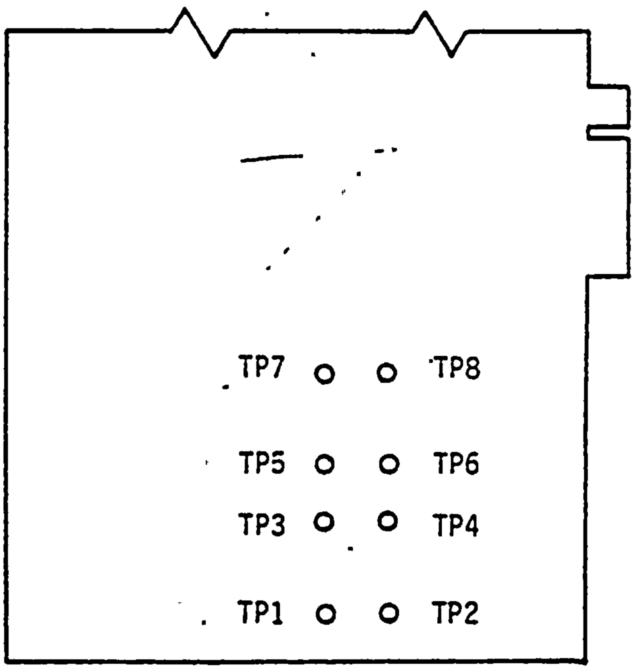
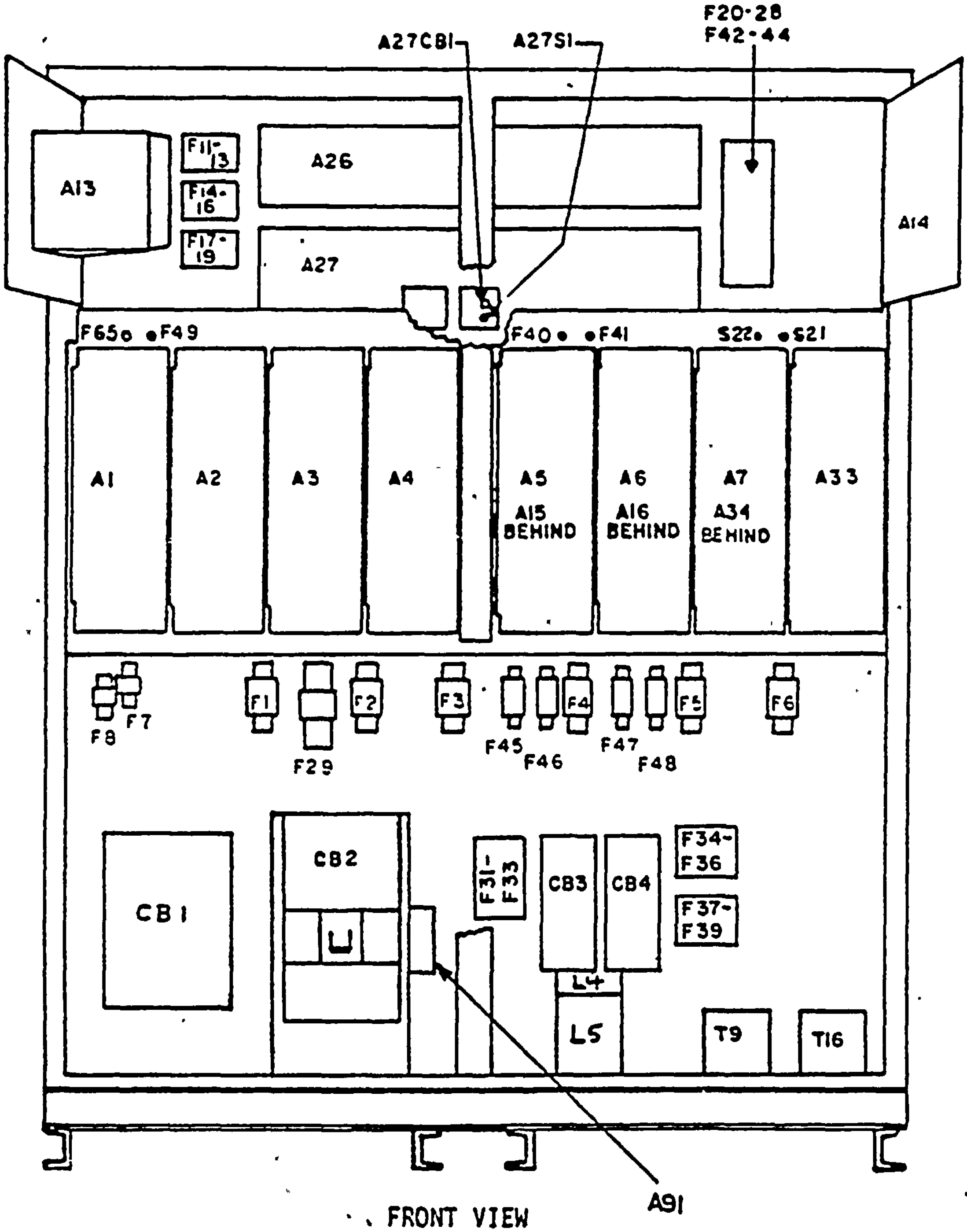


Figure 2-5. Connection Points for Leak and Short Testing of Static Switch SCRs.

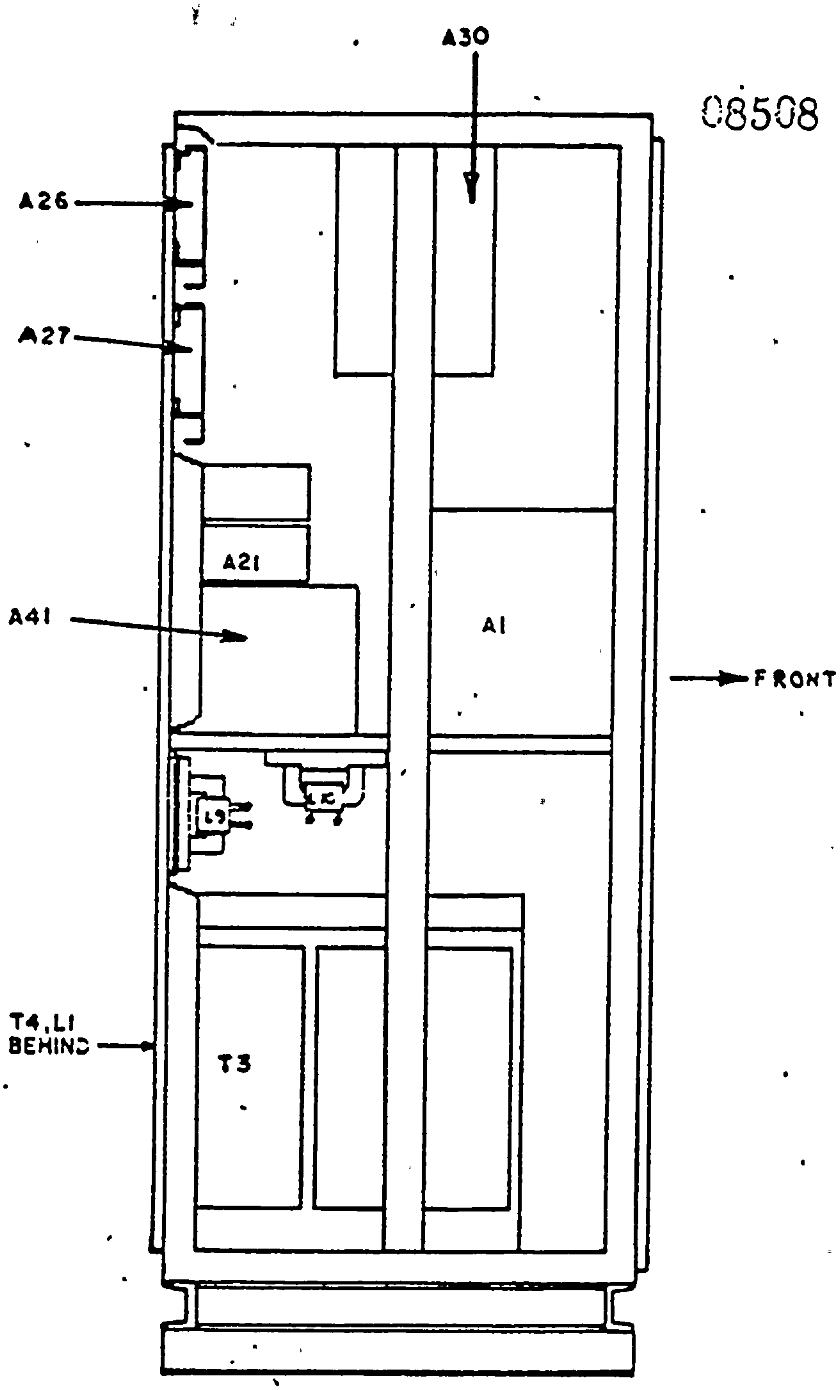
08508 2417



FRONT VIEW

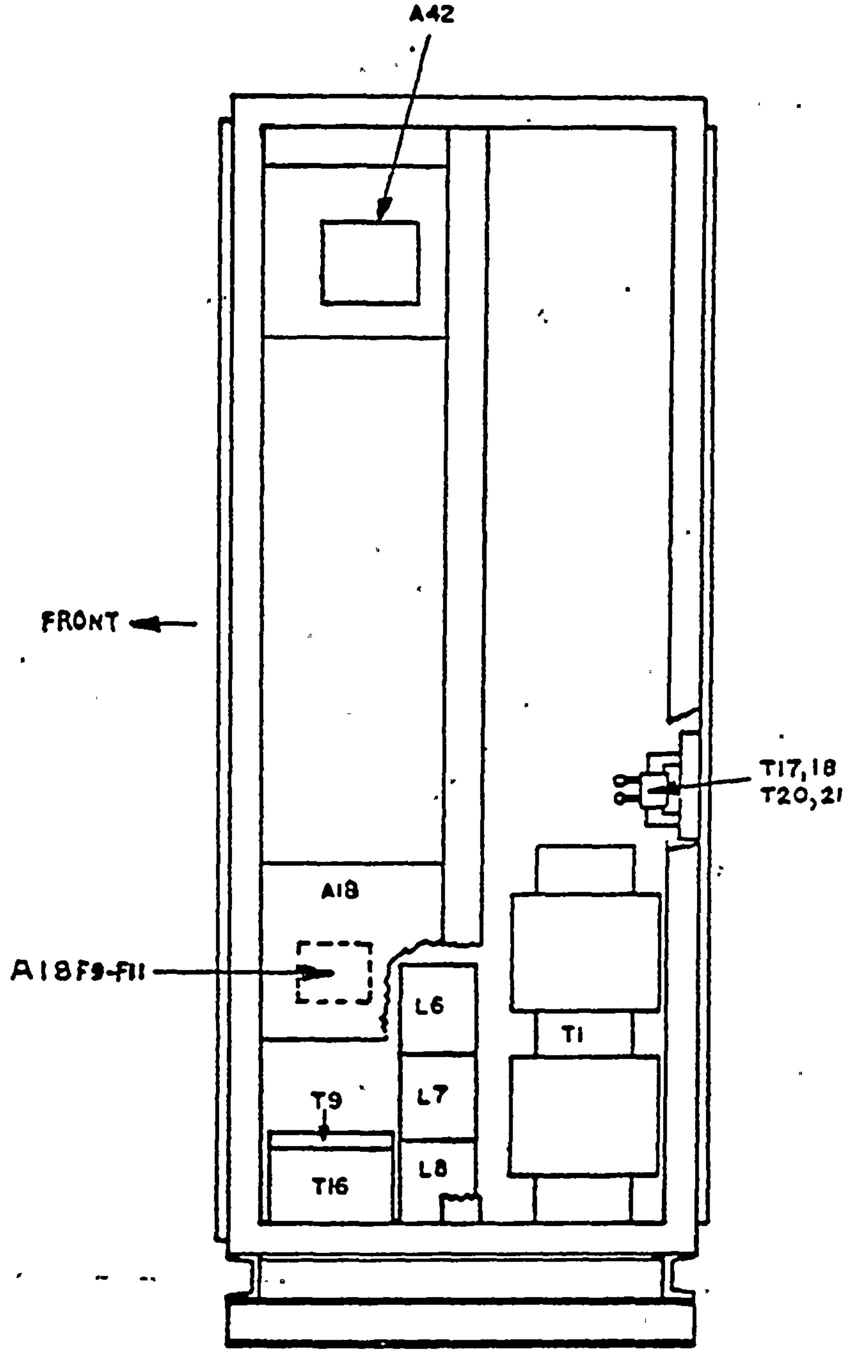
Figure 2-6. UPS Module Components Location.

08508 2418



LEFT END VIEW

Figure 2-6. (Continued).



RIGHT END VIEW

Figure 2-6. (Continued)

SECTION 3

MAINTENANCE AND TROUBLESHOOTING 08508 2420

3.1 PREVENTIVE MAINTENANCE.

3.1.1 General.

A record log should be kept which should include periodic meter readings, maintenance, and any alarms and subsequent actions taken. Early recognition of deteriorating performance is important

DANGER
HIGH VOLTAGE

ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO SERVICE THIS EQUIPMENT.

IF INJURY DOES OCCUR, APPLY STANDARD TREATMENT FOR ELECTRICAL SHOCK.

3.1.2 Air Filters.

The air filters should be changed every 2 months(even more frequently if they are dirty). The filters are commercially available. Filters may be safely replaced while the UPS is operating and without opening the doors. Front filters (if so equipped) are accessible by loosening the two screws at the top corners of the hinged filter housing. The retainer chain allows the filter housing to tilt forward approximately 15 cm (6 inches) for filter removal. Bottom filters are accessible by loosening the wing bolts (two per filter) located on the front channel below the cabinet access doors. When the bolts are loosened (approximately 1.5 cm (½ inch), it may be necessary to reach under and pull the hinged filter door down from the front (there are three magnetic clasps). The filter can now be easily replaced.

3.1.3 Lamp Test.

A lamp test may be performed with UPS operating.

3.1.4 Physical Inspection.

It is recommended that the UPS be inspected annually for tightness of connections and for evidence of component damage or overheating.

C8508 2421

3.2 TROUBLESHOOTING

NOTE

RECORD ALL ALARMS AND SWITCH POSITIONS ENCOUNTERED DURING OPERATION.

3.2.1 General

An index of trip-alarm indicators and troubleshooting routines is given in Table 3-1. Troubleshooting the UPS module is primarily based upon observation of various trip and alarm lamps. These lamps are located on the control panel, A14, and logic and annunciation card cage, A13. Following are examples of the routine established to isolate problems related to the rectifier/ charger and the inverter.

Observing the UPS module status lamps in the lower left portion of the control panel, A14; if ALARM lamp (yellow) or TRIP lamp (red) is lit, then observe the lamps under the heading BATTERY, INVERTER, or CHARGER. Source of problem is indicated by the lamp that is lit.

Examples: (1) TRIP lamp is lit and CHARGER OVERTEMP lamp is lit; turn to "Trip, Charger Overtemp" chart for troubleshooting procedure.

(2) ALARM lamp is lit and BATTERY DISCHARGE lamp is lit; turn to "Alarm, Battery Discharge" chart for trouble-shooting procedure.

If ALARM lamp or TRIP lamp is lit, but no BATTERY, INVERTER, or CHARGER lamp is lit, open door to left of control panel (for left-to-right power flow configuration or door to right of control panel (for right-to-left power flow configuration) to expose the logic and annunciator card cage panel, A13. Determine the problem by observing the lamp (s) lit on the annunciation no. 2 card, A13A21.

Example: ALARM lamp is lit, but no BATTERY, INVERTER, or CHARGER lamp is lit. After opening door to A13 panel, it is observed that FAN FAILURE lamp on A13A21 lamp is lit, turn to Alarm Fan Failure chart for troubleshooting procedure.

3.2.2 Alarm Analysis.

In the event of a unit trip always record the alarm lamps that are lit on both card cage and control panel as well as any abnormal indications on the control panel. It is also wise to check the status of circuits external to the UPS as well as any tests or unusual occurrences that might have taken place and are related to the tripping of the unit.

C8508 2422

TABLE 3-1. INDEX OF TRIP/ALARM INDICATOR VS. TROUBLESHOOTING ROUTINES

TRIP/ALARM INDICATION	TROUBLESHOOTING ROUTINE
Rectifier/Charger-Related	
Alarm, FAN FAILURE lamp lit	Sect. 3.2.3:3.1 Fan Failure
Alarm, trip, CHARGER OVERTEMP lamp lit	Sect. 3.2.3.3.2 Overtemp Trip
Alarm, CHARGER LOGIC lamp lit	Sect. 3.2.3.3.3 Charger Logic Failure
Alarm, BATTERY UNDERVOLTAGE lamp lit	Sect. 3.2.3.3.4 DC Undervoltage Warning
Alarm, BATTERY DISCHARGE lamp lit	Sect. 3.2.3.3.5 Battery Discharge
Alarm, BATTERY GROUND lamp lit	Sect. 3.2.3.3.6 Grounded DC Bus
Alarm, trip, CHARGER FUSE lamp lit	Sect. 3.2.3.3.7 Charger Power Fuse Trip
Inverter-Related	
Alarm, DC UNDERVOLTAGE lamp lit	Sect. 3.2.4.3.1 DC Undervoltage Warning
Alarm, trip, DC UNDERVOLTAGE lamp lit	Sect. 3.2.4.3.2 DC Undervoltage Trip
Alarm, trip, DC OVERVOLTAGE lamp lit	Sect. 3.2.4.3.3 DC Overvoltage
Alarm, trip, LEG FUSE BLOWN lamp lit	Sect. 3.2.4.3.4 Inverter Leg Fuse Blown
Alarm, trip, ACUV SLOW lamp lit	Sect. 3.2.4.3.5 AC Undervoltage Trip
Alarm, trip, AC OVERVOLTAGE lamp lit	Sect. 3.2.4.3.6 AC Overvoltage Trip
Alarm, CLOCK FAILED lamp lit	Sect. 3.2.4.3.7 Clock Failed
Alarm, FREQ. FAILED lamp lit	Sect. 3.2.4.3.8 Frequency Failure
Alarm, trip, INVERTER LOGIC lamp lit	Sect. 3.2.4.3.9 Logic Failure
Alarm, trip, POWER SUPPLY FAILED lamp lit	Sect. 3.2.4.3.10 Logic Power Supply
Alarm, INVERTER FUSE lamp lit	Sect. 3.2.4.3.11 Fuse Blown
Alarm, trip, INVERTER OVERLOAD (10 MIN MAX) lamp lit	Sect. 3.2.4.3.12 Overload
Alarm, trip, INVERTER OVERTEMP lamp lit	Sect. 3.2.4.3.13 Overtemperature Trip
Alarm, FAN FAIL lamp lit	Sect. 3.2.4.3.14 Fan Failure
Alarm, NO BREAK TRANSFER READY lamp lit	Sect. 3.2.4.3.15 No Break Transfer Ready
Alarm, CAPACITOR FUSE lamp lit	Sect. 3.2.4.3.16 Capacitor Fuse Blown
Alarm, ACUV SLOW lamp lit	Sect. 3.2.4.3.17 ACUV Slow
Alarm, CONT BATT DISCHARGE lamp lit	Sect. 3.2.4.3.18 Control Battery Discharge

08508 2423

As an example, let us assume that the unit has tripped and the alarm indication is "DC UNDERVOLTAGE TRIP". At the onset of the investigation it is noted that the battery breaker control switch is in the "OFF" position. It is then found that the batteries were disconnected for cleaning, watering, and connection tightening, as would be the case during periodic maintenance. One would think "but the UPS should run normally with the battery disconnected and the charger supplying DC", so the investigation continues. It is then learned, through questioning of computer operations personnel, that a heavy fault was put on the load bus by an electrician dropping a wrench across the phases while working in the critical distribution panel, or there was a short interruption on the utility AC supply. The data is now starting to make sense; i.e.:

a. The UPS was running with the battery disconnected.

b. The charger has a finite reaction time when an instantaneous load current change is required.

c. The fault on the inverter output without the battery tied in could cause the DC bus to "spike" down to the trip level.

d. A short utility power loss would result in a DCUV TRIP (no battery connected).

If the system were restarted with no observed problems, one could conclude that the reason for the trip on "DC Undervoltage" was as stated above.

The above example was given to point out the value of exploring all possibilities, especially external influences on the UPS, prior to going into the unit for the purpose of troubleshooting the problem.

3.2.3 <u>Troubleshooting, Rectifier/Charger</u>.

3.2.3.1 Storage Alarms, Rectifier/Charger.

Some of the alarms will be stored when the alarm circuits are activated. This means that the alarm lamp will continue to stay lit even if the initial condition that caused the alarm no longer exists. The stored alarms can be cancelled by pushing the UNSTORE ALARMS button. If the alarm condition no longer exists, the lamp will remain off when the button is released, but, should the alarm condition remain, the lamp will immediately light upon releasing the button. Stored alarms are: DC OVERVOLTAGE TRIP, OVERTEMPERATURE TRIP, CHARGER LOGIC FAILURE, GROUNDED DC BUS, FUSE, and LOGIC.

No other charger-related alarms are stored; thus the alarm lamp will go off when the alarm condition no longer exists.

08508 2424

3.2.3.2 Trip Alarm, Rectifier/Charger.*

Alarm conditions that will cause the charger to trip off line are:

A. CHARGER POWER FUSE BLOWN

B. OVERTEMPERATURE

3.2.3.3 Trouble Isolation Charts Using Rectifier/Charger-Related Status Lamps.

The following charts and text are intended to guide the troubleshooter toward the problem area with only the use of basic hand tools and a volt/ohm meter.

For location of components, see Figures 2-3, 2-4, and 2-6.

Each of the charts will be based on the observation of an alarm lamp followed by a brief discussion of the alarm function.

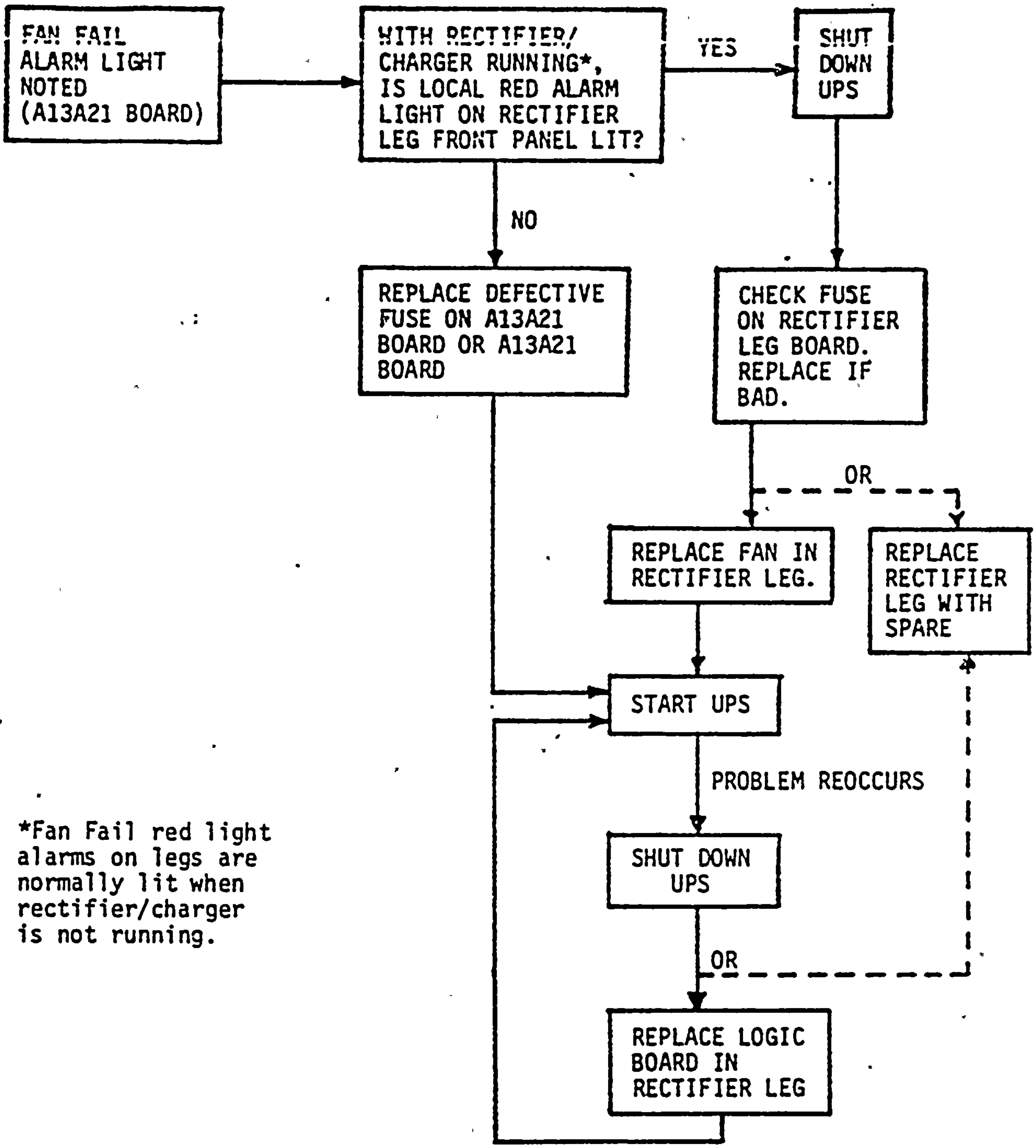
CAUTION

Troubleshooting charts are a guide to show probable causes and most effective cures. IN EACH CASE, IT IS NECESSARY TO PLACE THE CRITICAL LOAD AND THE UPS IN A SAFE CONFIGURATION USING THE OPERATING PROCEDURES OF SECTION 2 BEFORE REMOVING OR REPLACING ANY COMPONENTS OR WORKING IN A HAZARDOUS PORTION OF THE UPS MODULE.

---

*Charger TRIP should not be confused with normal charger phase-off which occurs when AC input is out of limits or transfer to bypass is initiated. In the latter cases, the charger will automatically restart.

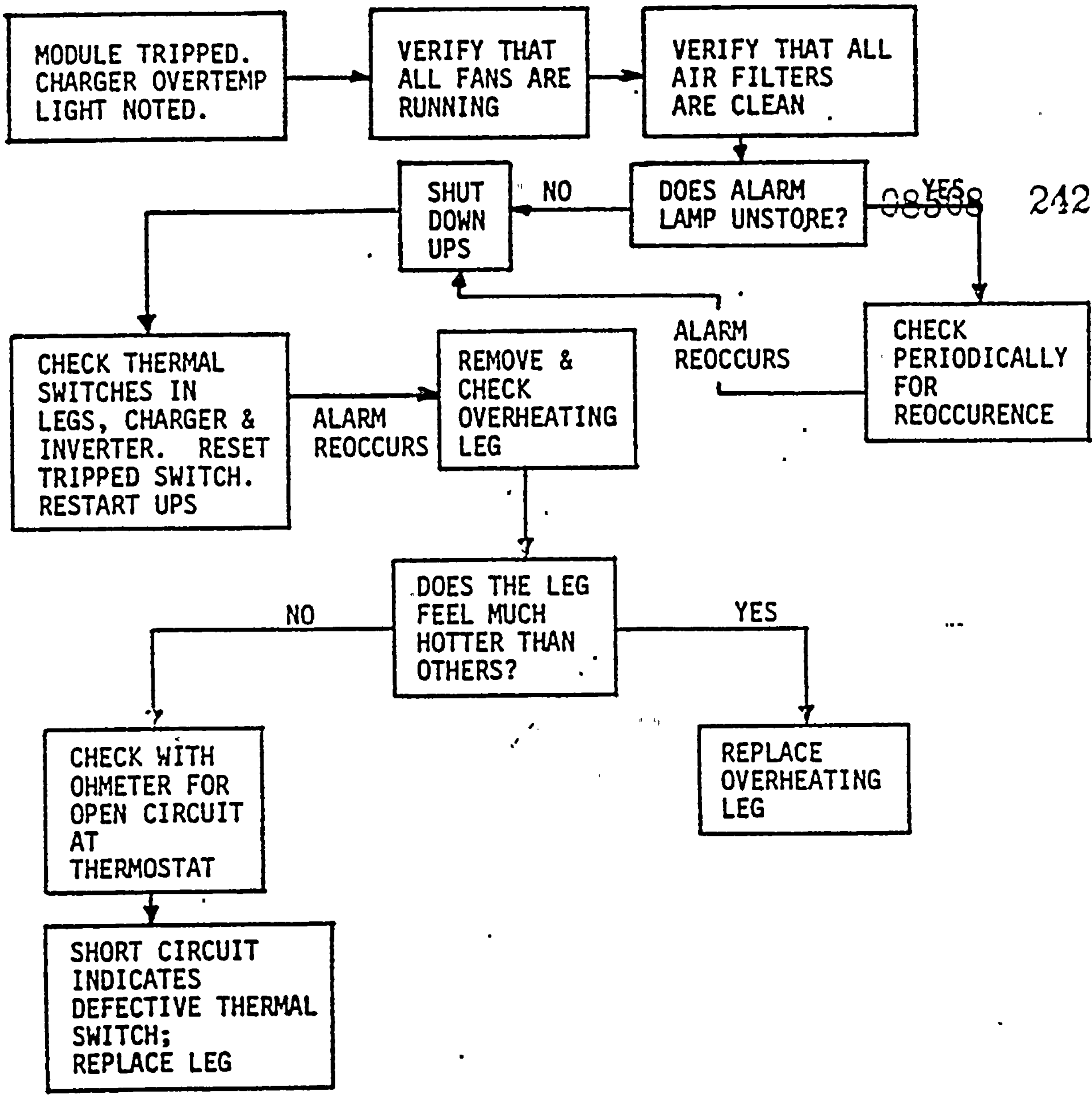
3.2.3.3.1 Fan Failure (Nonstored). See Caution, Section 3.2.3.3.



*Fan Fail red light alarms on legs are normally lit when rectifier/charger is not running.

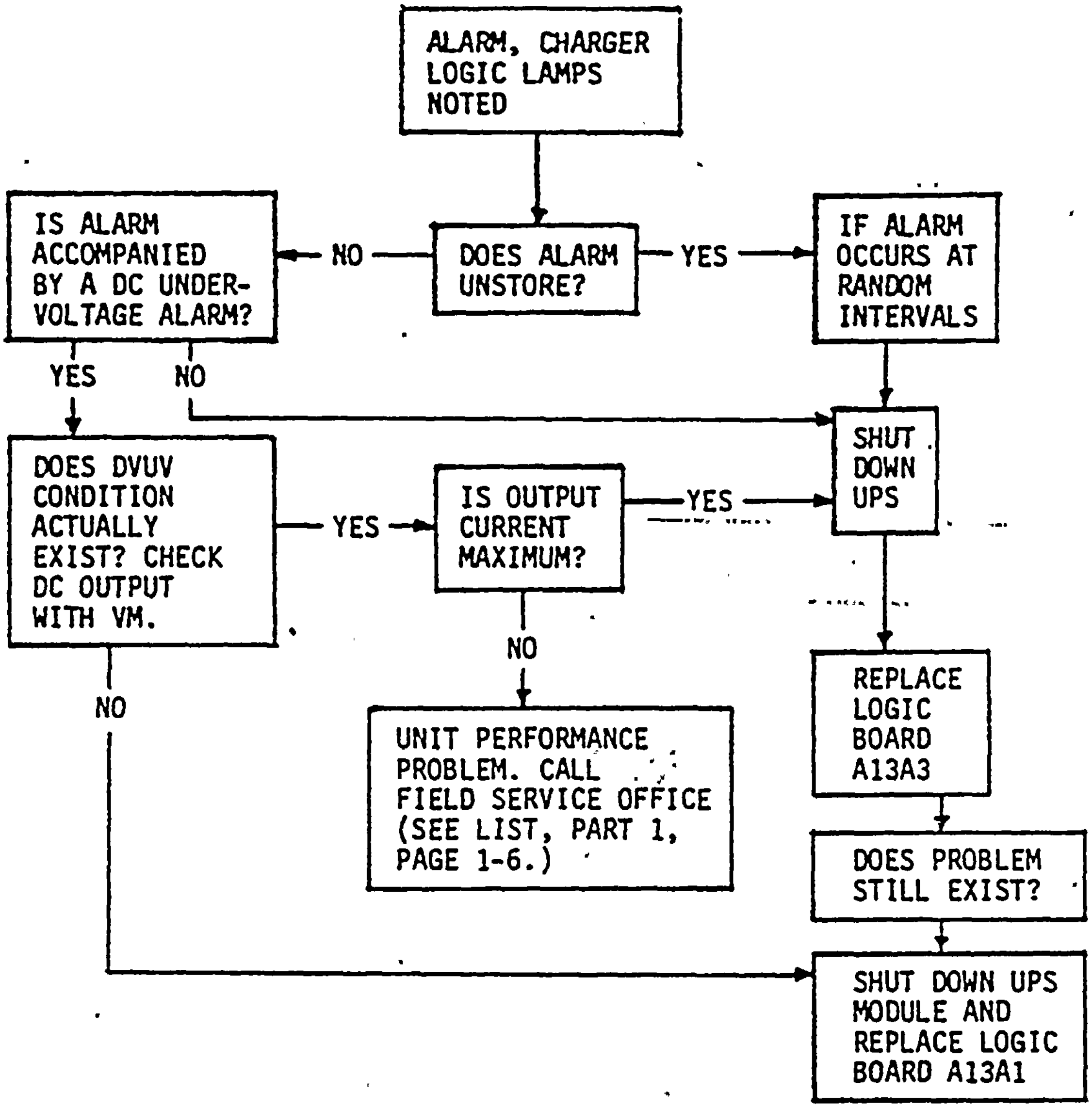
A fan and/or fuse failure activates the fan fail alarm on the A13A21 logic board and activates the summary alarm on the control panel. The summary alarm is inhibited during startup because leg fan fail normally indicates with the rectifier not running. Leg fan fail sensing is in each leg and indicates loss of current caused by power loss, blown fuse, or a fan's internal thermal protection. All fan fail inputs are processed directly by the A13A21 logic board.

3.2.3.3.2 Overtemperature Trip (Storage). See Caution, Section 3.2.3.3.



Normally closed thermal switches (one in each leg) are wired in series. The thermal switch will actuate when the heat sink temperature reaches approximately 85°C. Switches are snap-action and must be manually reclosed by pressin the small button located at the top of the switch.

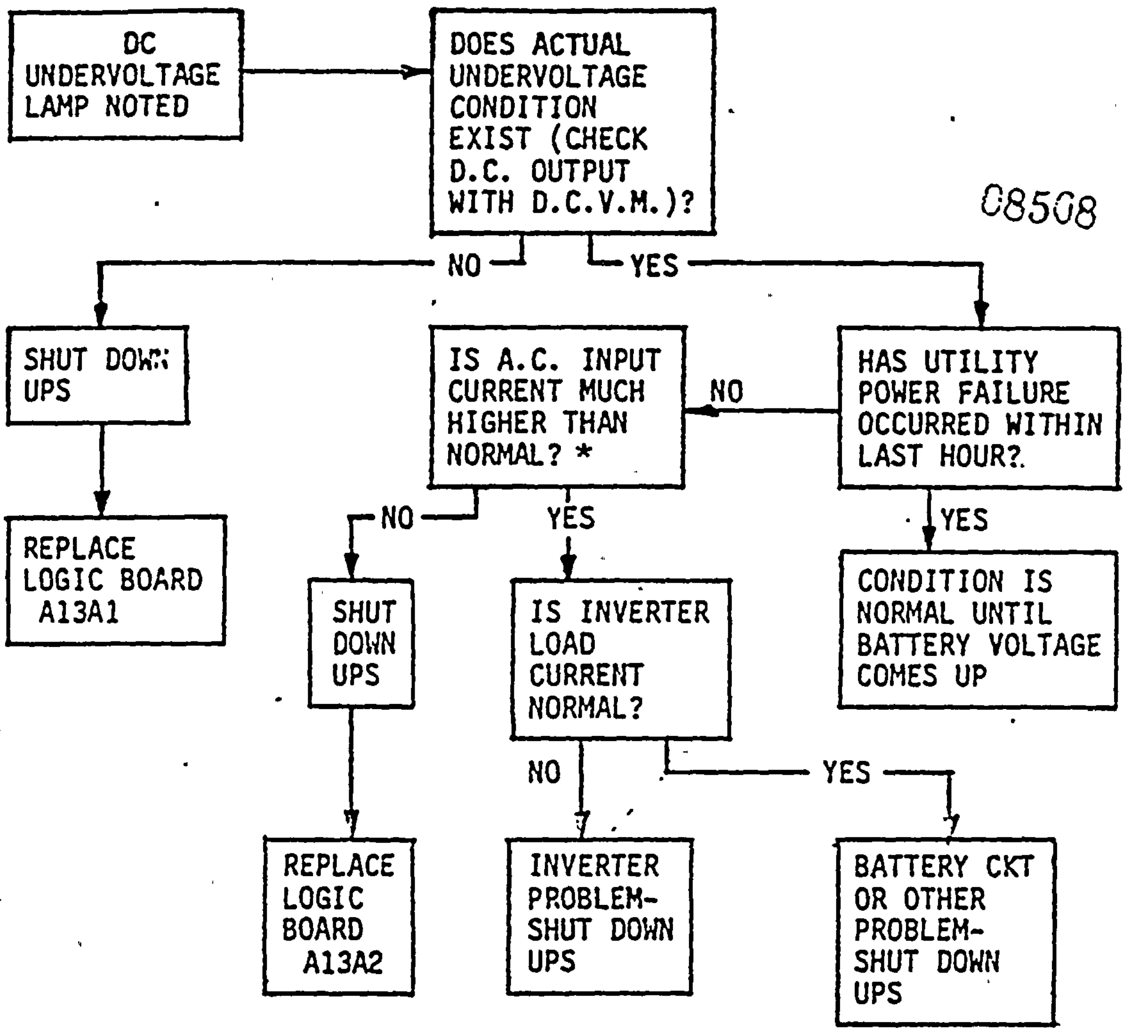
3.2.3.3.3 Charger Logic Failure (Storage). See Caution, Section 3.2.3.3.



On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

The circuit that activates this lamp monitors output voltage and input current. If output voltage is low, as would be the case during the recharge of the battery after a utility power failure, this circuit senses that the current should be maximum. If this condition does not exist, then "Logic Failure" is annunciated.

3.2.3.3.4 DC Undervoltage Warning. See Caution, Section 3.2.3.3



08508 2428

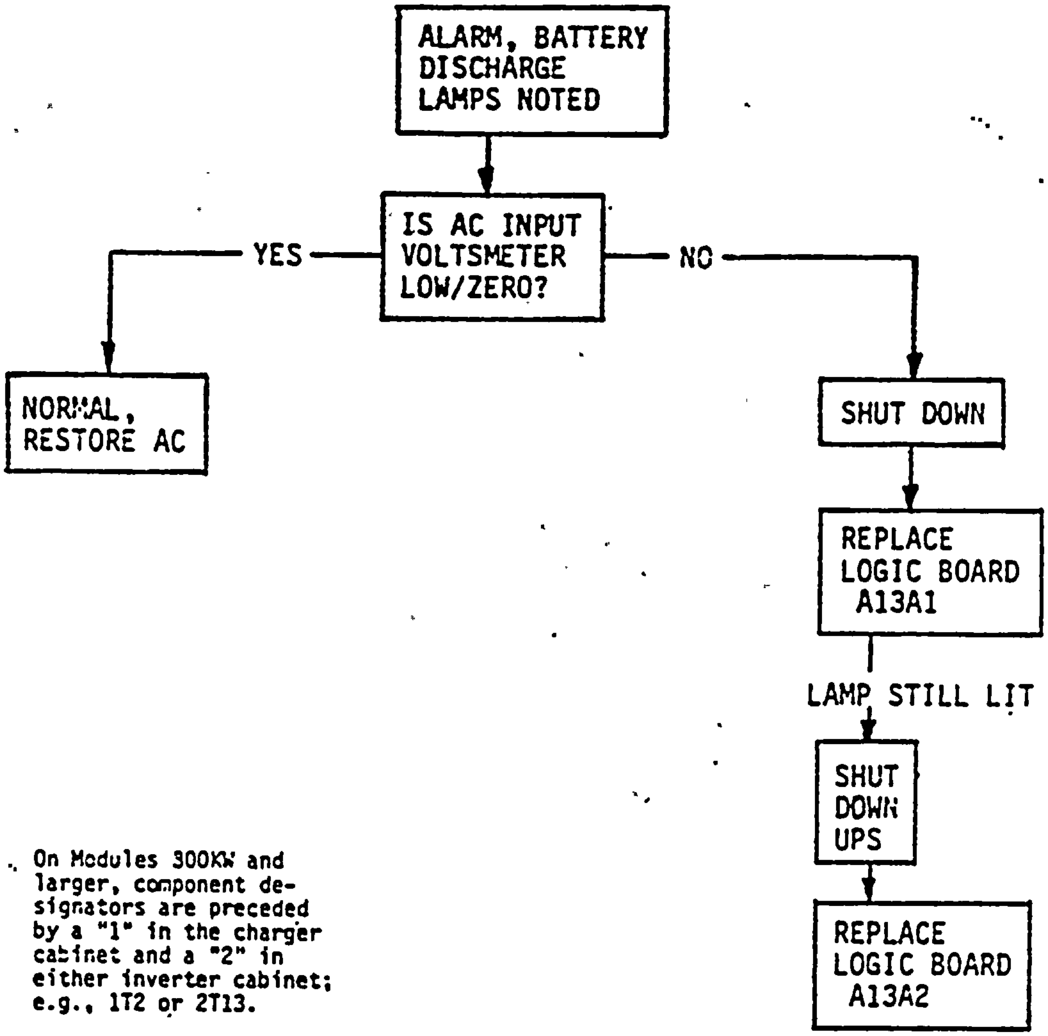
* Check with clip-on ammeter.

On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit will annunciate if the DC output voltage falls below a set value. The DC undervoltage is 77.8% ± 2% of the float voltage.

3.2.3.3.5 Battery Discharge (Nonstorage). See Caution Section 3.2.3.3.

08508 2429



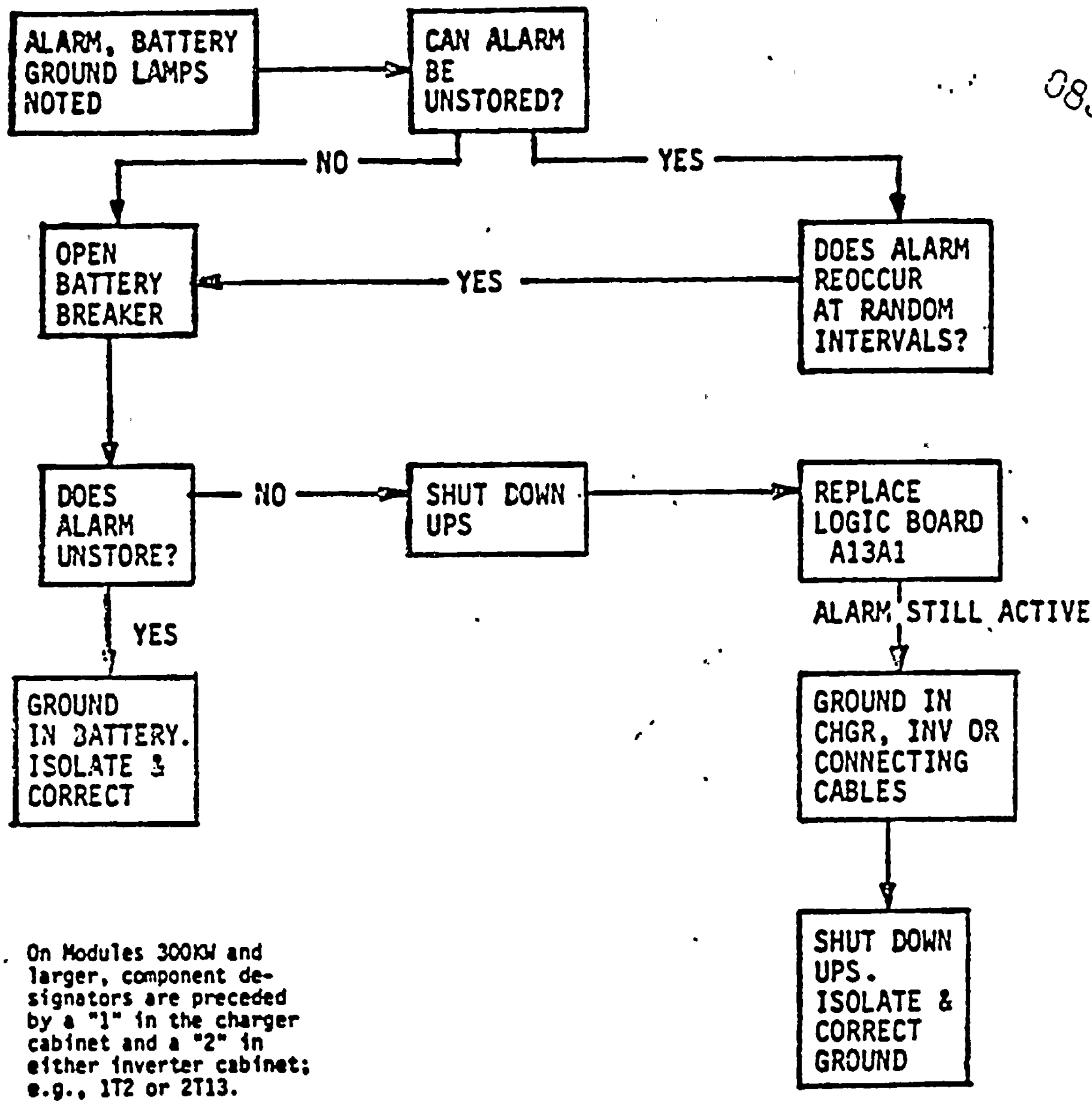
This circuit monitors several conditions to determine whether "Battery Discharge" should be annunciated. Two conditions will cause this circuit to annunciate:

Condition 1: AC power is available, AC input switchgear is closed, and a charge failure condition (low DC output voltage and current) exists.

Condition 2: The UPS is in the "On" mode, and no AC power is available; or the AC switchgear is open.

3.2.3.3.6 Grounded DC Bus (Storage). See Caution Section 3.2.3.3.

08508 2430

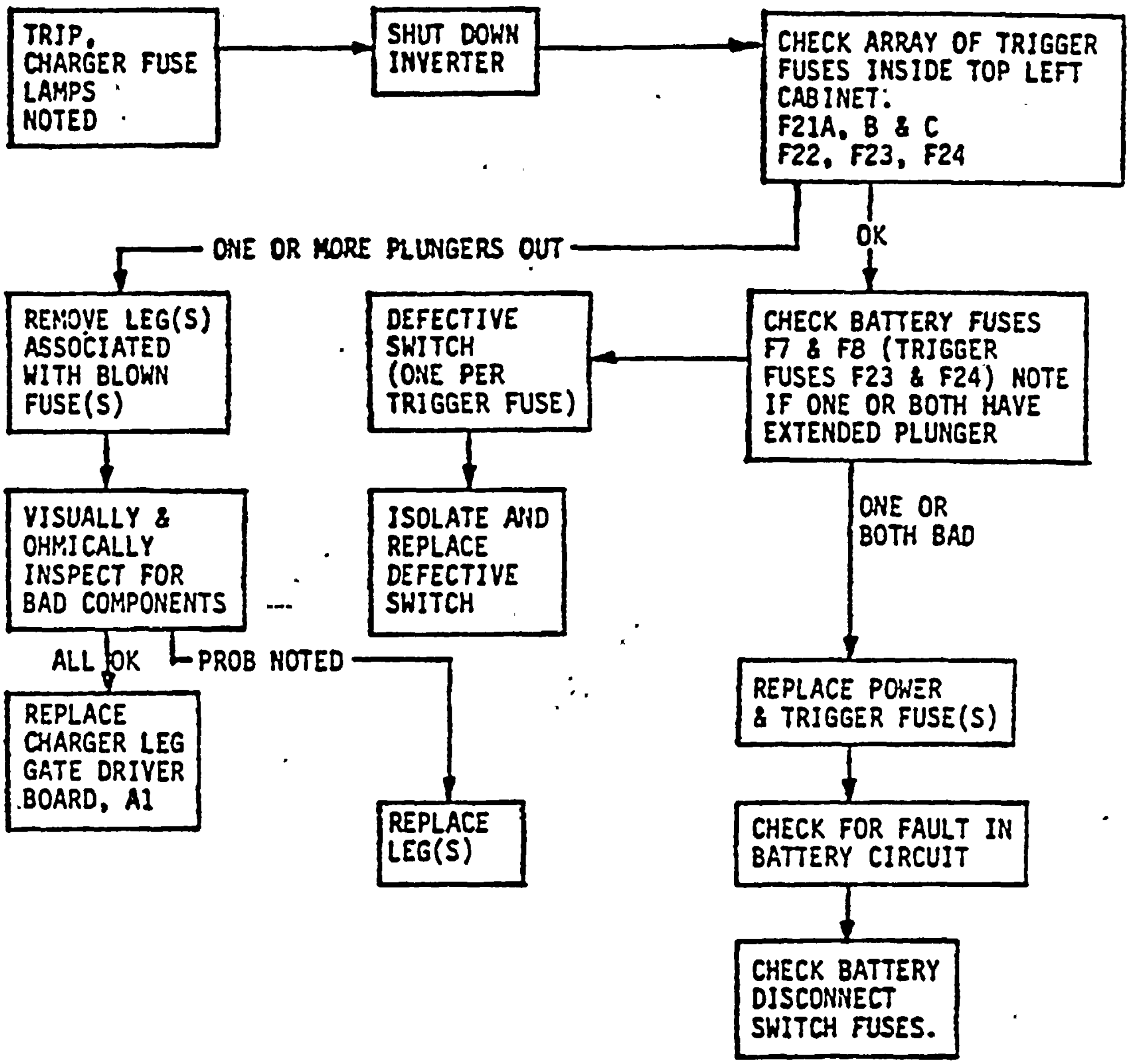


On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors the DC Busses with respect to ground and will annunciate if the resistance falls to approximately 100 K ohms. Buildup of dirt and moisture on the tops of the Battery cells can cause this circuit to annunciate.

08508 2431

3.2.3.3.7 Charger Power Fuse Trip (Storage). See Caution Section 3.2.3.3.



This circuit annunciates the loss of one or more of the power fuses monitored. Since all of the switches (immediately in front of each trigger fuse plunger) are wired in parallel one must visually determine which power fuse or fuses are cleared by noting which trigger fuse or fuses have an extended plunger.

3.2.4 Troubleshooting, Inverter.

3.2.4.1 Storage Alarms, Inverter.

Most of the alarms will be stored when the alarm circuits are activated. This means that the alarm lamp will continue to stay lit even if the initial condition that caused the alarm no longer exists. The stored alarms can be cancelled by pushing the UNSTORE ALARMS button. If the alarm condition no longer exists, the lamp will remain off when the button is released. If the alarm condition remains, the lamp will immediately light upon releasing the UNSTORE button.

Alarms that are stored:

a. DC UNDERVOLTAGE TRIP

b. INVERTER LEG FUSE BLOWN

c. AC UNDERVOLTAGE TRIP (Slow)

d. AC OVERVOLTAGE TRIP

e. LOGIC FAILURE

f. FREQ. CONTROL FAILURE ("CLOCK FAILED") AND "FREQ. FAILED"

g. DC OVERVOLTAGE TRIP 2432

h. OVERTEMPERATURE

i. BATTERY GROUND DETECTION

j. CHARGER LOGIC FAILED

k. LOGIC POWER SUPPLY FAILURE

l. FUSE BLOWN (BY TRIGGER FUSE)

Alarms that are not stored:

a. DC UNDERVOLTAGE WARNING

b. OVERLOAD

C. FAN FAILURE

3.2.4.2 Trip Alarms, Inverter

Alarm circuits that will cause the UPS to trip off:

a. AC OVERVOLTAGE TRIP

b. AC UNDERVOLTAGE TRIP (SLOW) after 10 sec

c. DC UNDERVOLTAGE TRIP

d. FREQ. CONT. FAILURE

e. LOGIC FAILURE

f. INVERTER LEG FUSE BLOWN.

g. LOGIC POWER SUPPLY FAILURE

h. OVERTEMPERATURE

i. OVERLOAD EXCEEDING 13.5 min

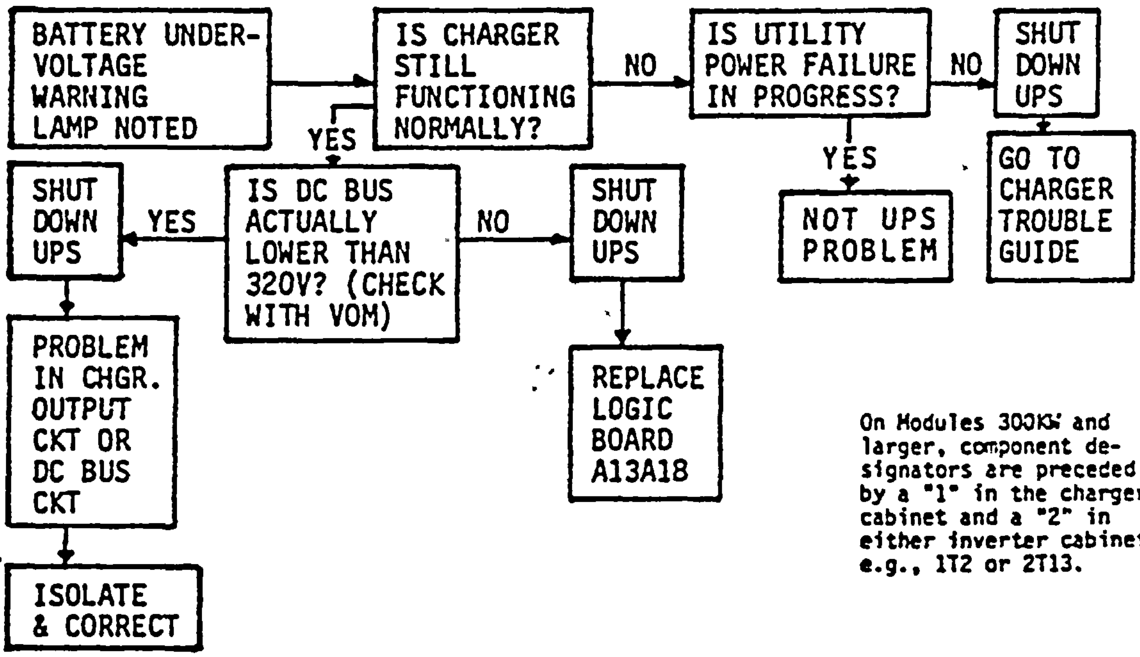
Note that in a few cases a given alarm condition, when initiated, may cause not only its alarm lamp but also others to light. For example, the loss of a leg fuse will light the INVERTER LEG FUSE BLOWN lamp; it usually causes the DC UNDERVOLTAGE and AC UNDERVOLTAGE lamps to light also.

C8508 2433

3.2.4.3. Trouble Isolation Charts Using Inverter-Related Status Lamps

The following charts and tests are intended to guide the troubleshooter toward the problem area with only the use of basic hand tools and a volt-ohm meter. For location of components, see Figures 2-4 thru 2-9. Each of the charts will be based on the observation of an alarm lamp and followed by a brief description of the alarm function. When referring to charts 3.2.4.3.5, 3.2.4.3.6, and 3.2.4.3.15, always shut down the UPS (if not already tripped). Check fuses F1 through F6 prior to beginning to troubleshoot.

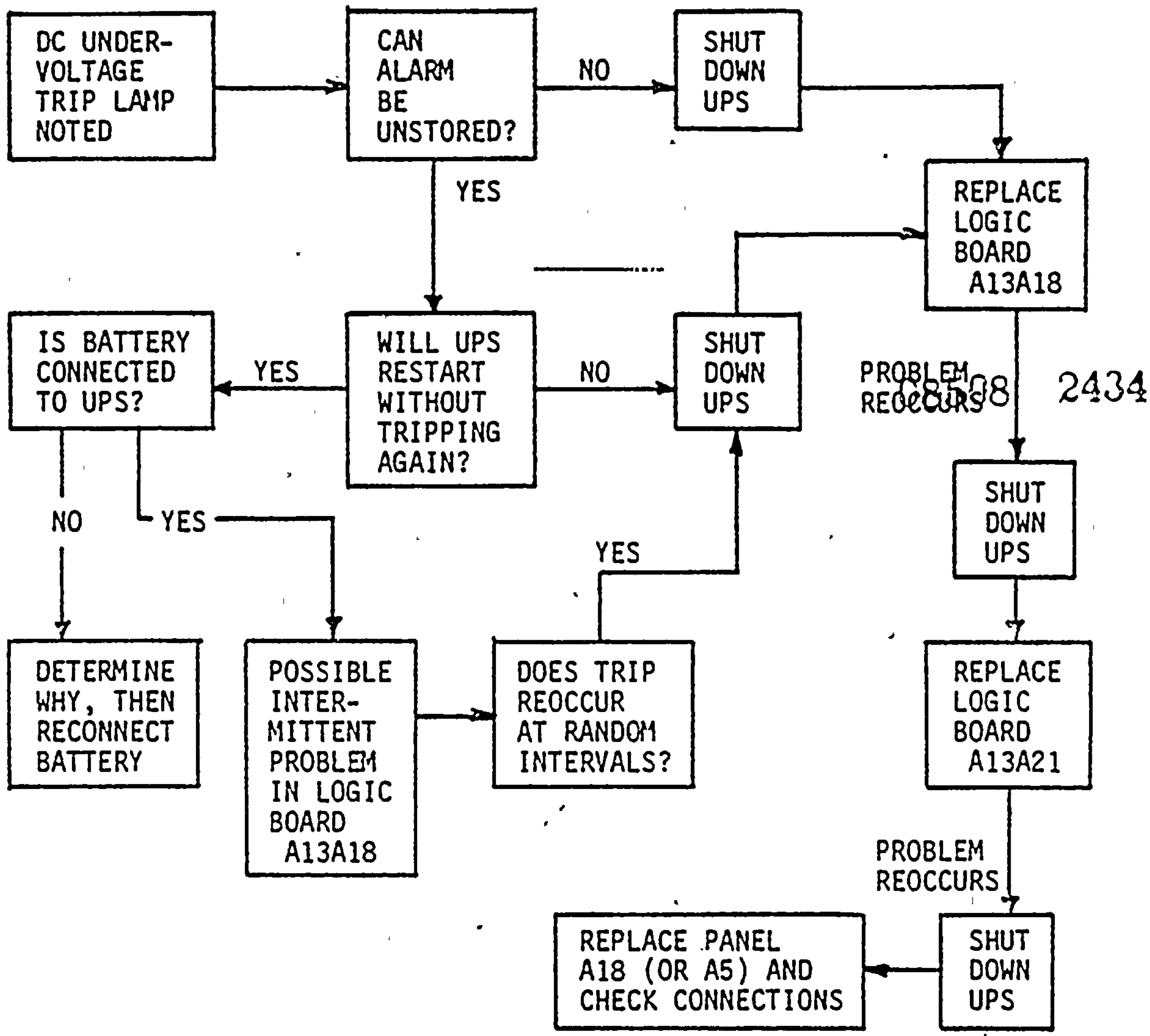
3.2.4.3.1. Battery Undervoltage Warning (Nonstorage)



On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors the same DC reference voltage as the circuits that are incorporated for DC UNDERVOLTAGE and DC OVERVOLTAGE. An alarm is given when the DC bus voltage falls to a set value, which means that the battery will support the load for approximately 5 minutes before reaching the specified limit. The set battery undervoltage is 77.8%±2% of float voltage.

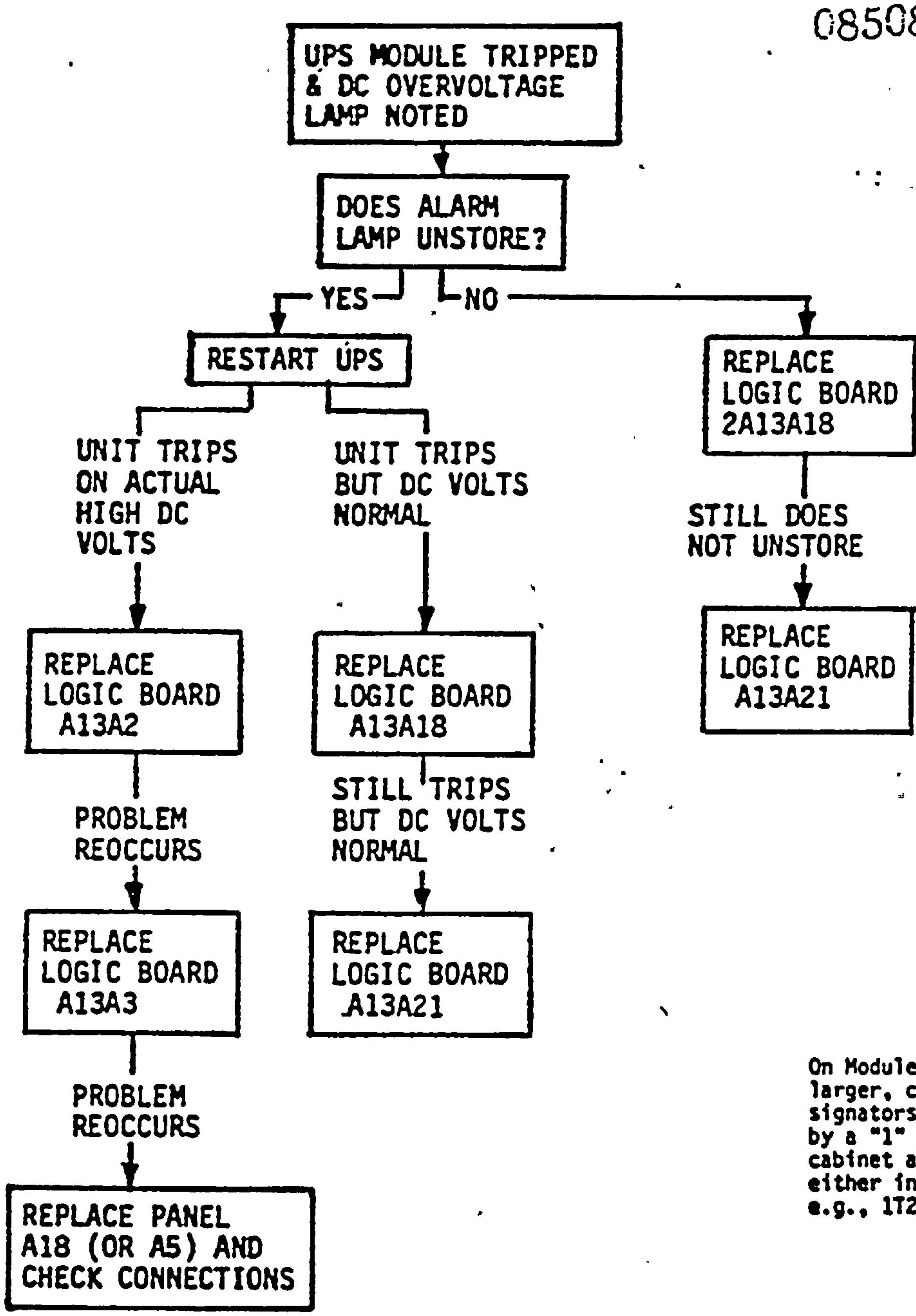
3.2.4.3.2 DC Undervoltage Trip (Storage). See Caution, Section 3.2.3.3.



This circuit monitors the inverter DC input voltage and trips the UPS if the voltage falls to a set value. The UPS must be tripped at this point to prevent fuse losses since input current increases as input voltage decreases. Sensing voltage for operation of this circuit is obtained from a divider network on the A18 pan (or A5 pan), which is supplied from fuse F24. The set DC undervoltage is 68.5% ± 2% of float voltage.

3.2.3.3.3 DC Overvoltage (Storage). See Caution, 3.2.3.3.

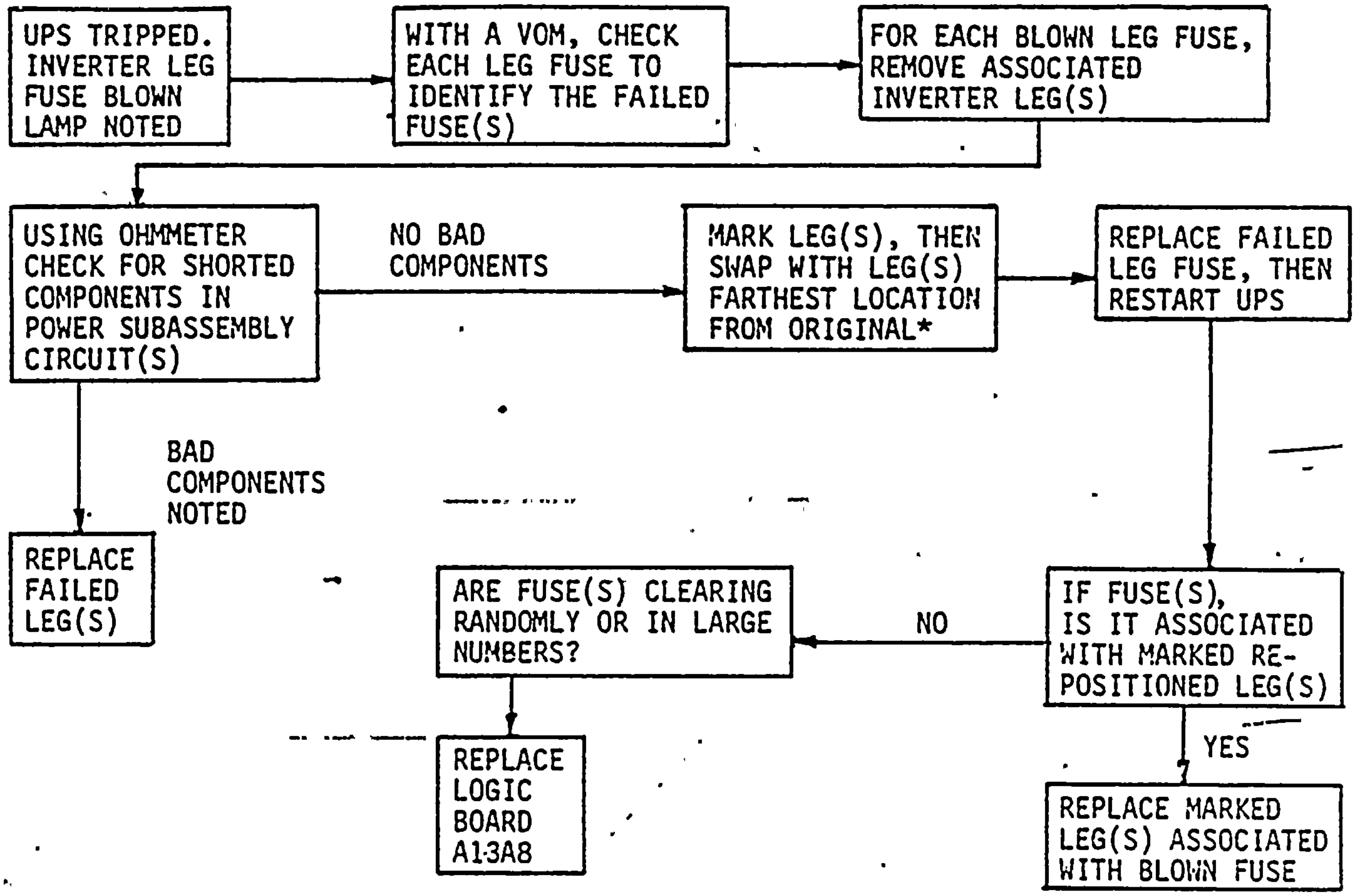
08508 2435



On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors the UPS Module link voltage and trips the unit if the voltage exceeds a set value. Sensing for operation of this circuit is from divider network, A18R10-A18R13 (or A5R10-A5R13). The set DC overvoltage is 111.3%$\pm$2% of float voltage.

3.2.4.3.4 Inverter Leg Fuse Blown (Stored). See Caution, Section 3.2.3.3.

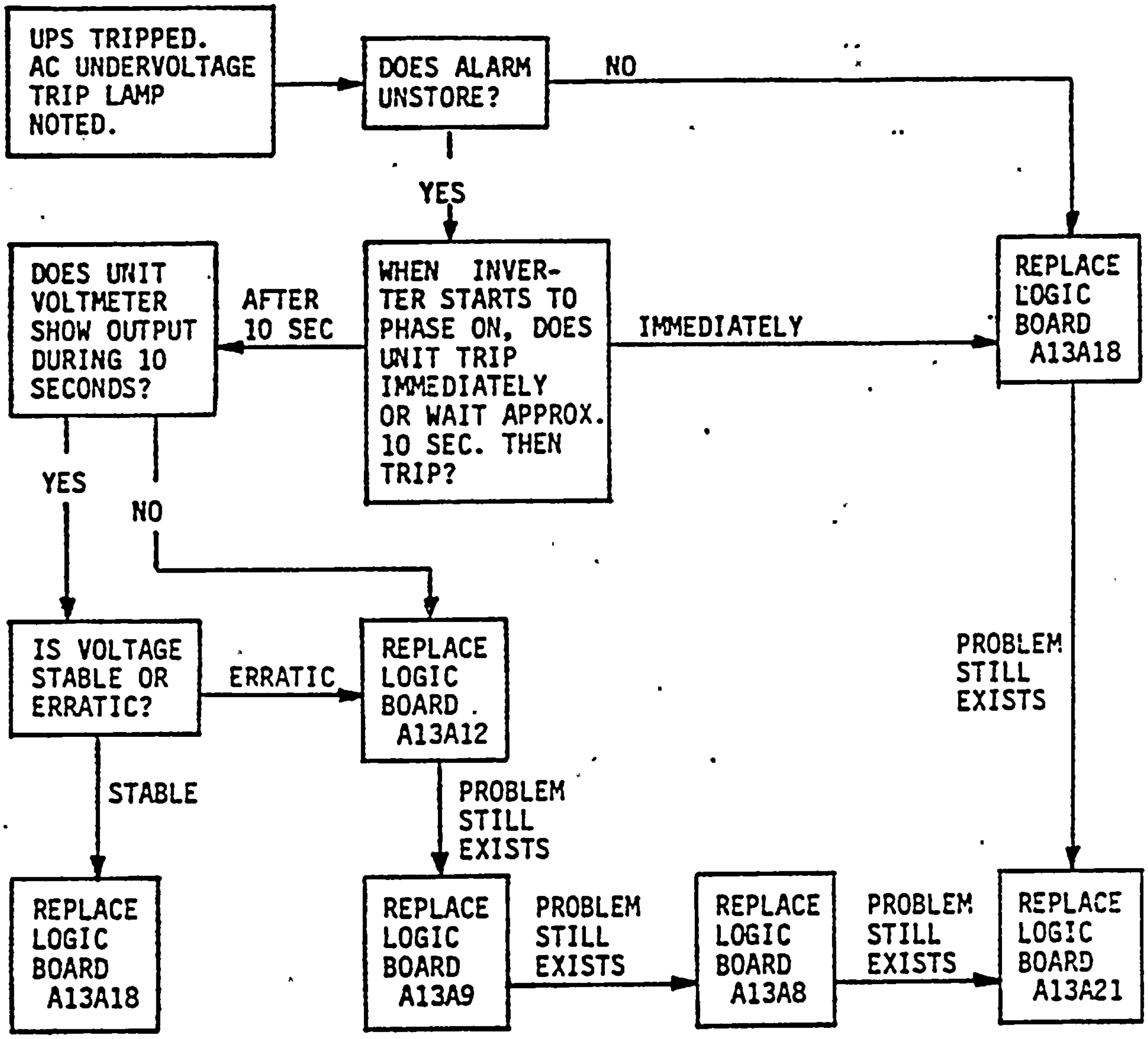


*For modules 100 KW and up, each leg fuse protects a "leg pair." Since each power fuse isolates two legs, it is difficult to tell which leg is at fault if no internal components are obviously defective. One method of isolation is the moving of the legs to different locations. As an example assume that the fuse supplying legs A5 and A6 cleared, and no internal components are found faulty. First mark both legs, then remove legs A1 and A12. Insert leg A5 into position A1 and leg A6 into position A12. Insert leg A1 into position A5 and leg A12 into position A6. Replace fuses and restart the UPS. Now, if the fuse supplying positions A1 and A2 clears, you can conclude that leg A5 is defective and if the fuse supplying positions A11 and A12 clears you can conclude that leg A6 is defective.

This circuit annunciates the loss of one or more leg fuses by sensing abnormal voltage across the fuses, tripping the UPS and storing this alarm if the fuse voltage exceeds 70 V.

08508 2437

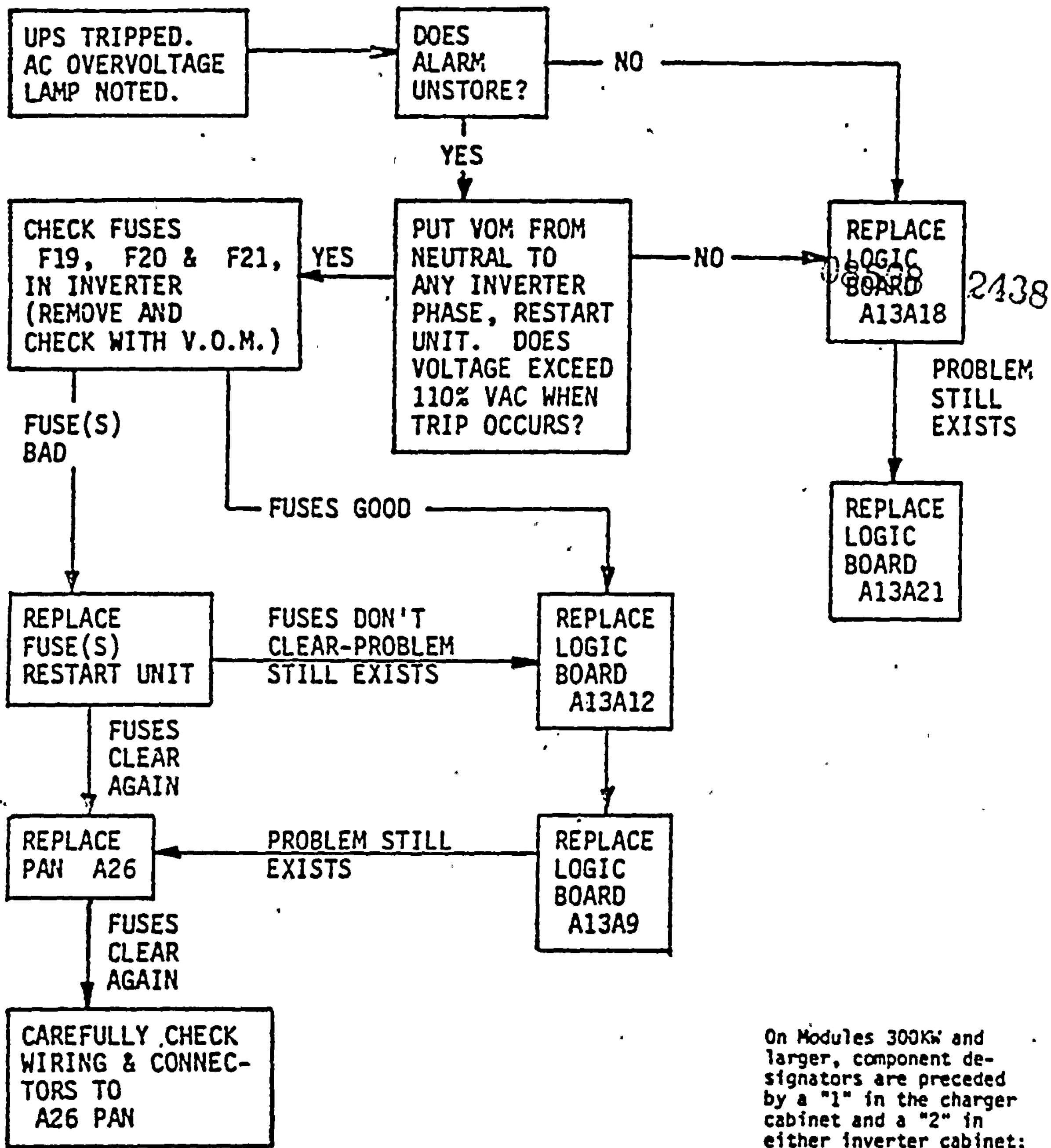
3.2.4.3.5 AC Undervoltage Trip (Stored). See Caution, 3.2.3.3.



On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors unit output voltage and trips the unit if the voltage falls below 92%. Since the unit output is affected by many logic boards, the best method of troubleshooting is direct substitution of logic boards (trial and error method). Also check fuses associated with sensing, F37, F38, and F39.

3.2.4.3.6 AC Overvoltage Trip (Stored). See Caution, 3.2.3.3.

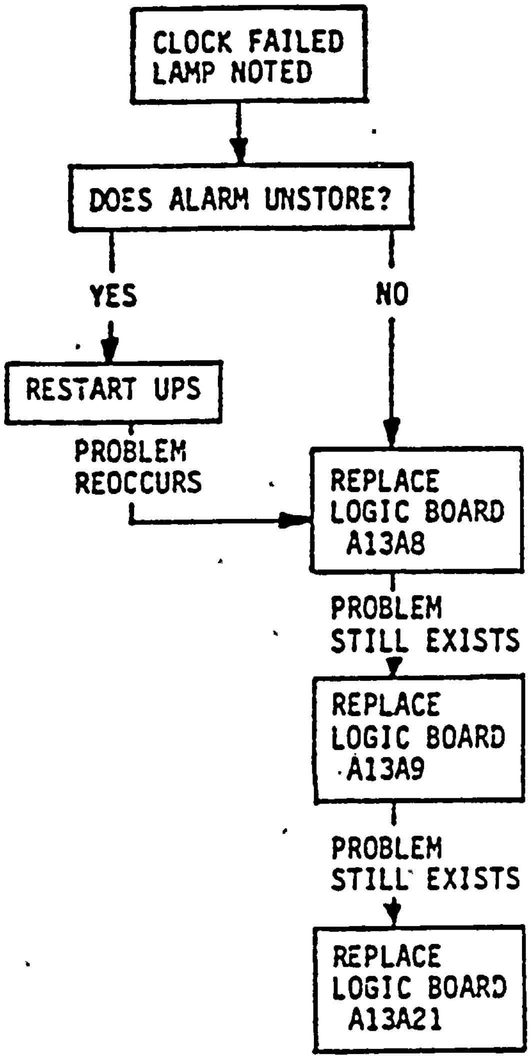


On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors the inverter output voltage and trips the unit if the output voltage exceeds 110%. Output sensing for the VI Control Logic (A13A12) is obtained from the inverter output busses, brought through fuses F19 - 21 and into the A26 pan. The A26 pan interfaces with the card cage to provide sensing voltage required by the A13A12 logic.

3.2.4.3.7 Clock Failed (Stored) . See Caution, 3.2.3.3.

C8508 2430

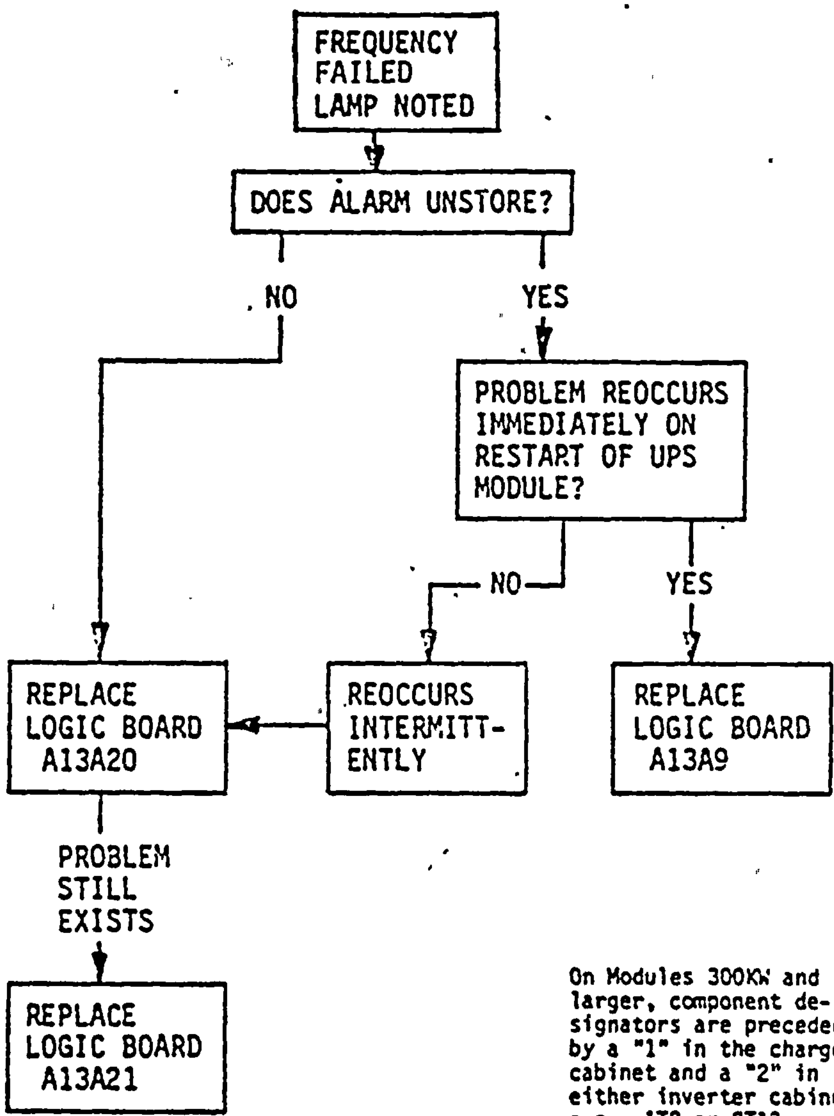


On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors the clock timing signals. Deviation, such as a missing clock pulse, results in an immediate trip signal.

3.2.4.3.8 Frequency Failed (Stored). See Caution, Section 3.2.3.3.

08598 2440

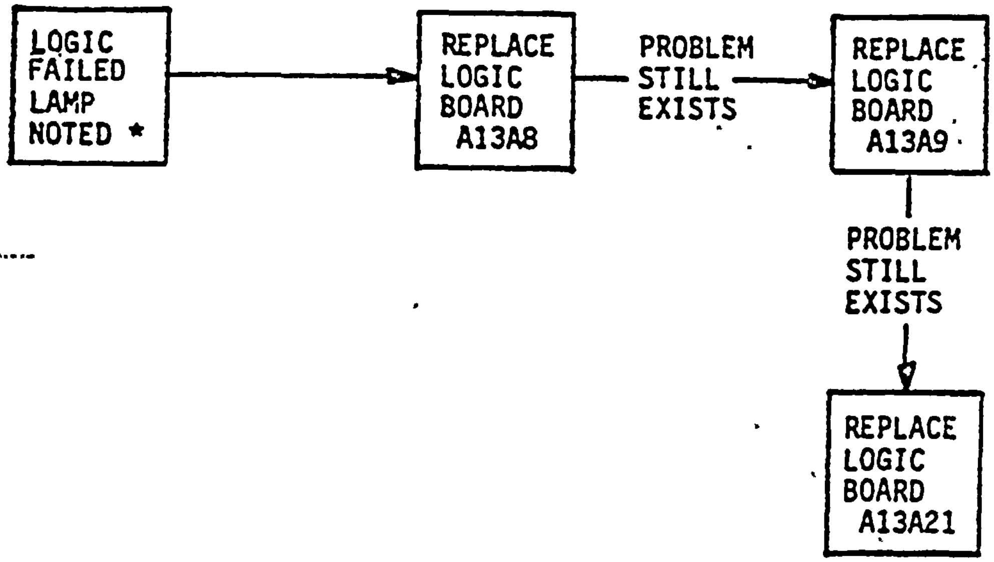


On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors the Inverter output frequency and is active whenever the output voltage is within normal limits. While being adjustable, this circuit is factory set normally to input frequency ± 1.5 Hz.

08508 2441

3.2.4.3.9 Logic Failed (Stored). See Caution, Section 3.2.3.3.

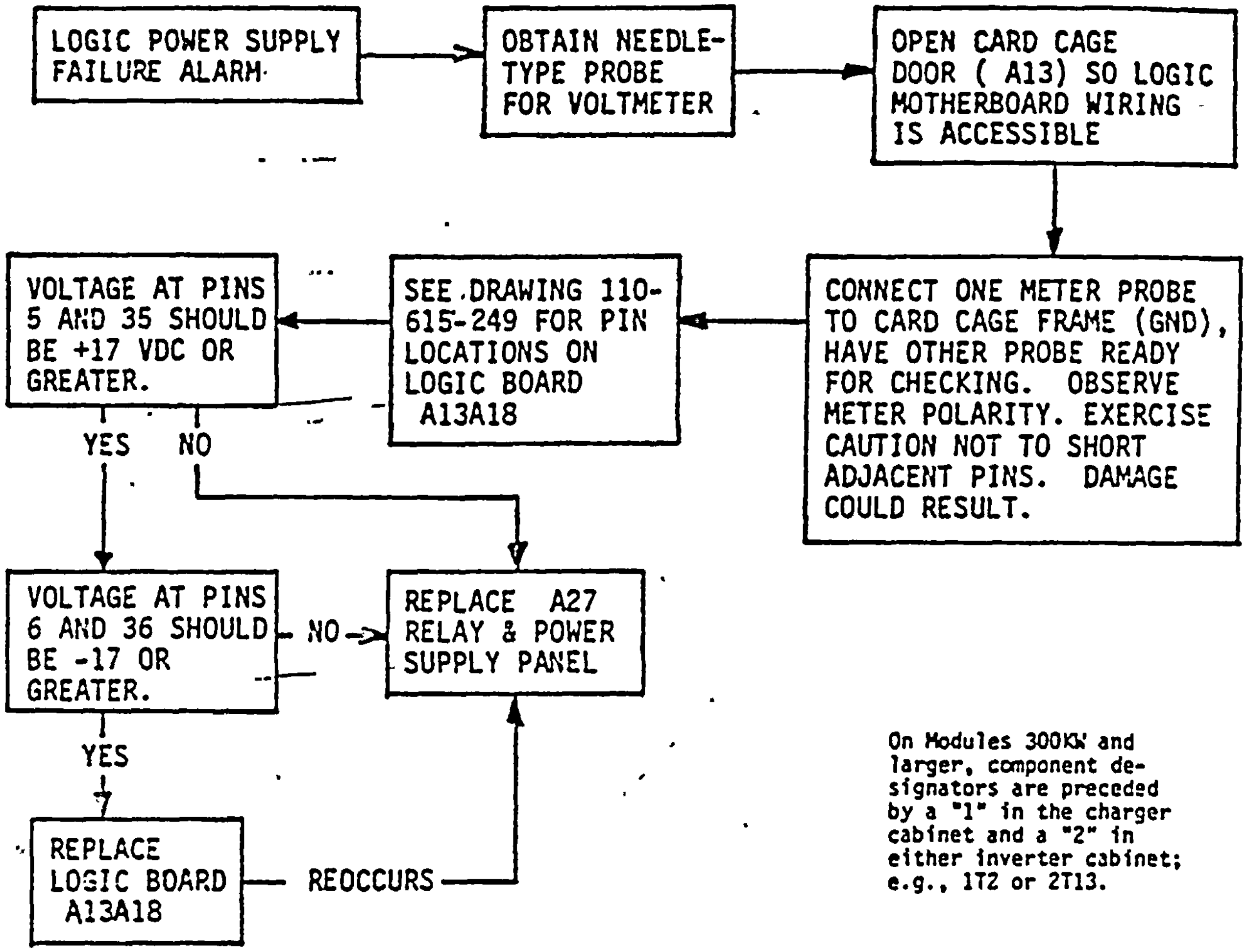


On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

*It is recommended that an oscilloscope be used to view leading and lagging triangle waveforms at A13A5 test points. If waveforms are acceptable, the problem is probably in the A13A8 board. This testing can be performed without the inverter running.

This circuit monitors the timing signals developed in the A13A8 and A9 logic boards as well as the gate drive signals, developed in the A13A8 logic board, that are fed to the inverter leg SCRs. Monitoring is done by the A13A8 logic, and tripping by the A13A21 logic.

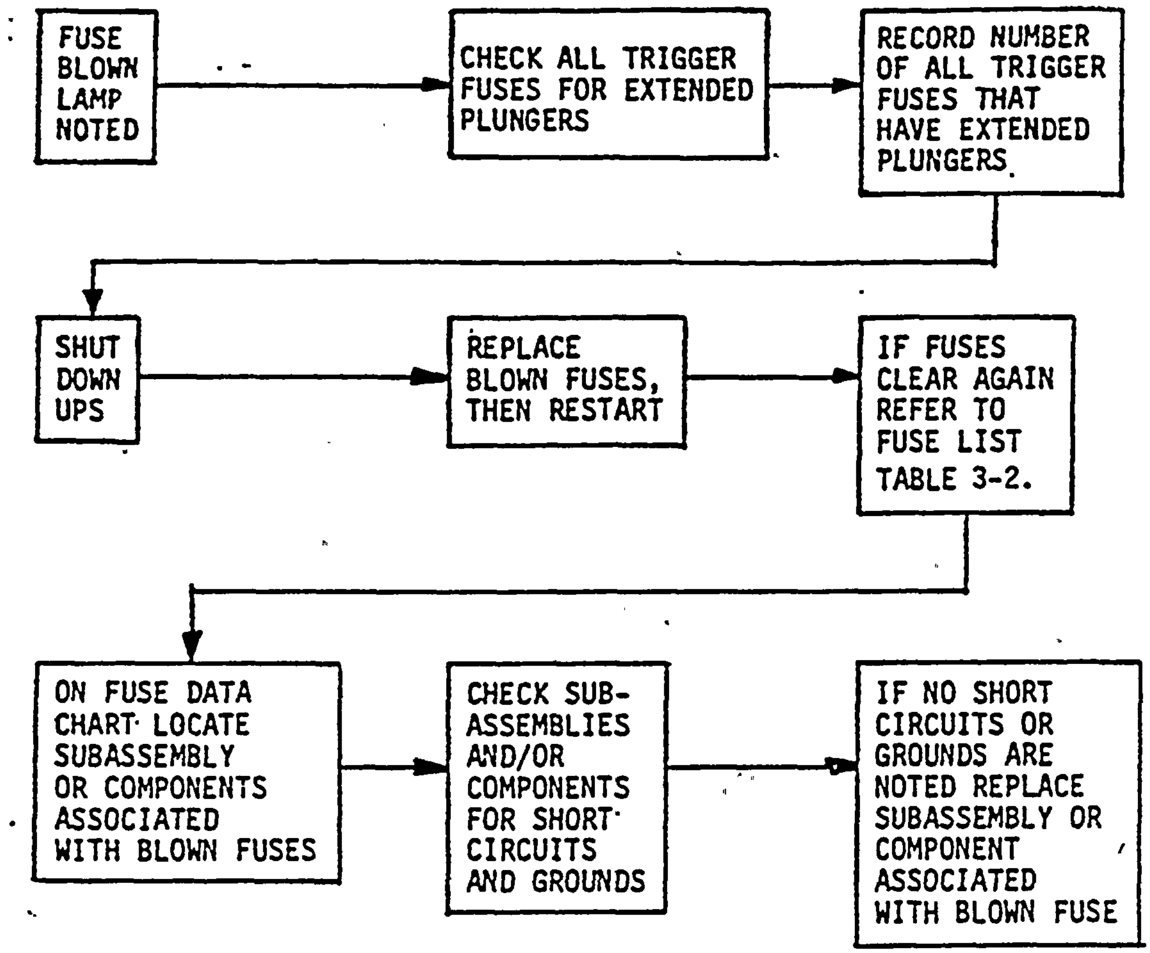
3.2.4.3.10 Logic Power Supply Failure (Nonstored). See Caution, Sect. 3.2.3.3.



On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors the positive and negative 20 VDC power supplies located on the A27 panel. Monitoring and tripping are performed on the A13A18 logic card.

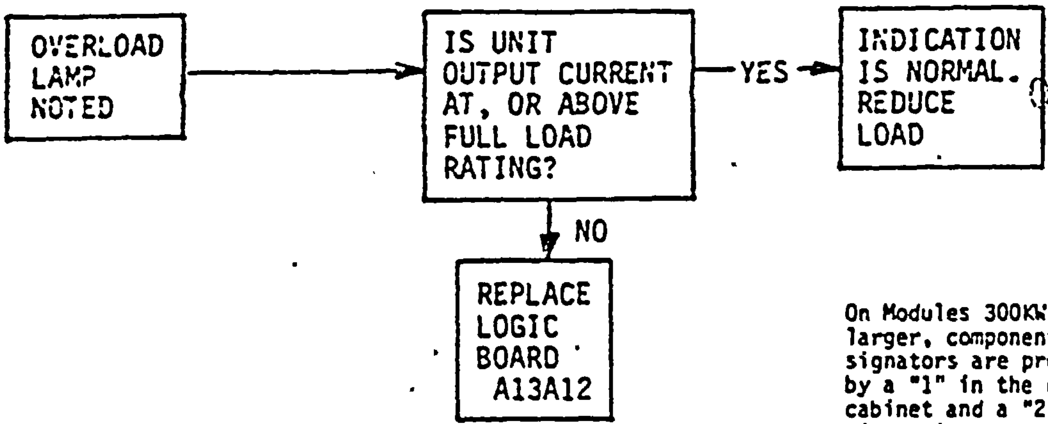
3.2.4.3.11 Fuse Blown (Nonstored). See Caution, Section 3.2.3.3.



On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

All switches used in the "Fuse Blown" annunciation circuit are wired in parallel. The summing points for all are the A13A1 and A13A21 cards; so if this alarm is noted and no blown fuses are found, replacement of the A1 and A21 cards is indicated.

3.2.4.3.12 Overload (Storage). See Caution, Section 3.2.3.3.



08508 2444

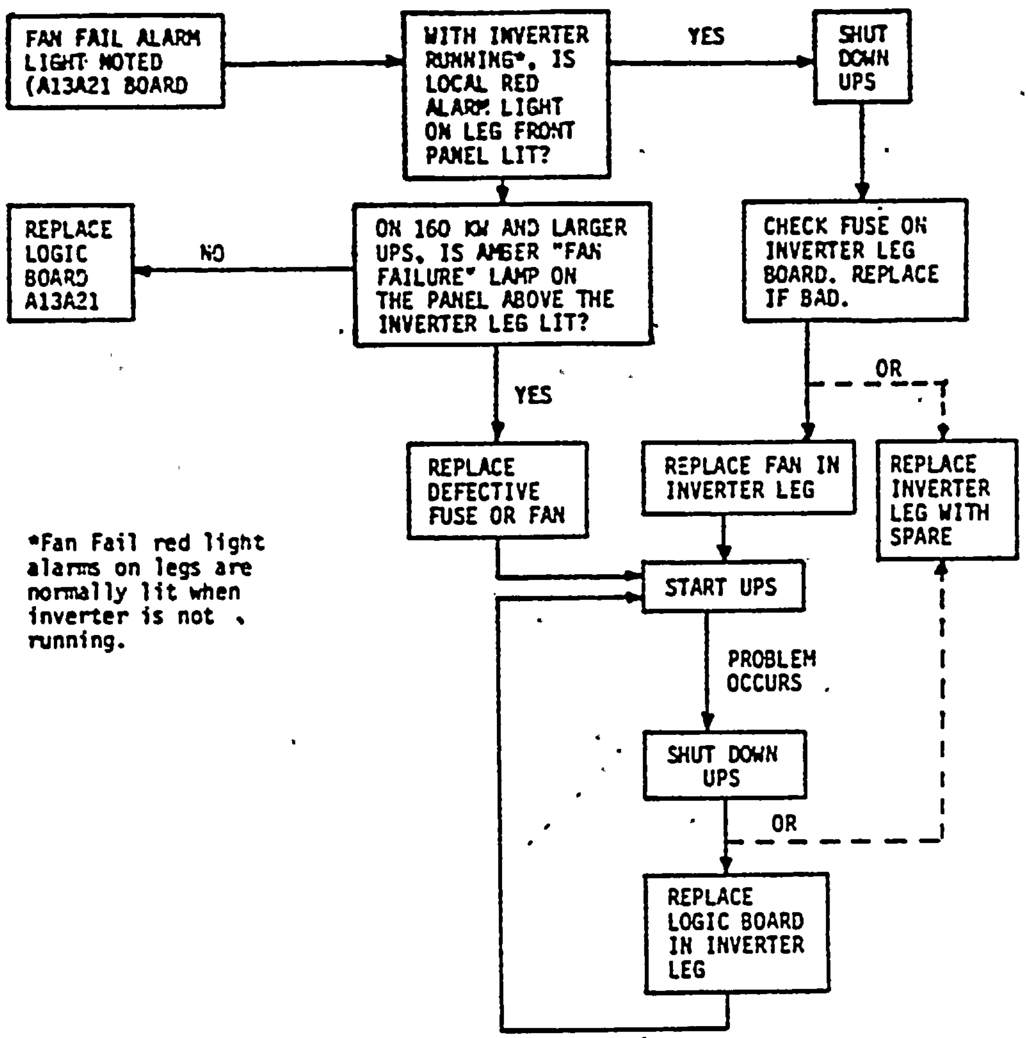
On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors output current via current transformers in the inverter output circuit. The indicator will light if output current rises to a value above full load. The A13A12 logic board monitors and sends out the command to annunciate. Time at overload is monitored by the A13A21 logic board; if this alarm is not corrected, the UPS is tripped in approximately 12 min.

3.2.4.3.13 Overtemperature Trip (Storage). See Caution, Section 3.2.3.3.

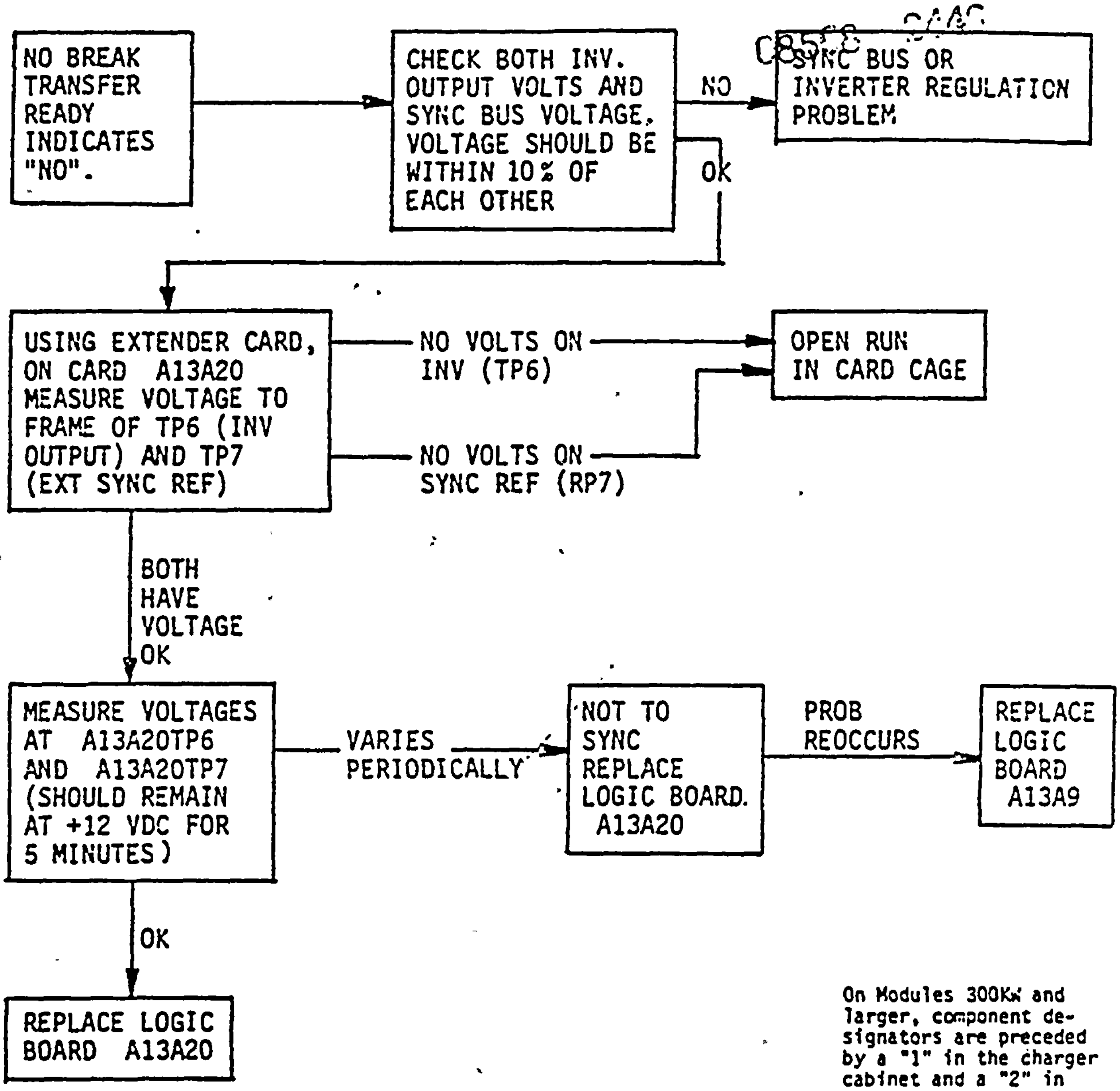
Refer to Section 3.2.3.3.2 for procedure. The entire procedure is applicable to the inverter legs.

3.2.4.3.14 Fan Failure (Nonstored). See Caution, Section 3.2.3.3.



A fan and/or fuse failure activates the fan fail alarm on the A13A21 logic board and activates the summary alarm on the control panel. The summary alarm is inhibited during startup because leg fan fail normally indicates with the rectifier not running. Leg fan fail sensing is in each leg and indicates loss of current caused by power loss, blown fuse, or a fan's internal thermal protection. Failure of the large fans (160 KW and larger) mounted behind the legs are indicated in pairs on the panel above the legs. The large fan fail sensing utilizes comparison of current flow between two fans to initiate alarm. All fan fail inputs are processed directly by the A13A21 logic board.

3.2.4.3.15 NO BREAK TRANSFER READY (Nonstorage). See Caution, Sect. 3.2.3.3.

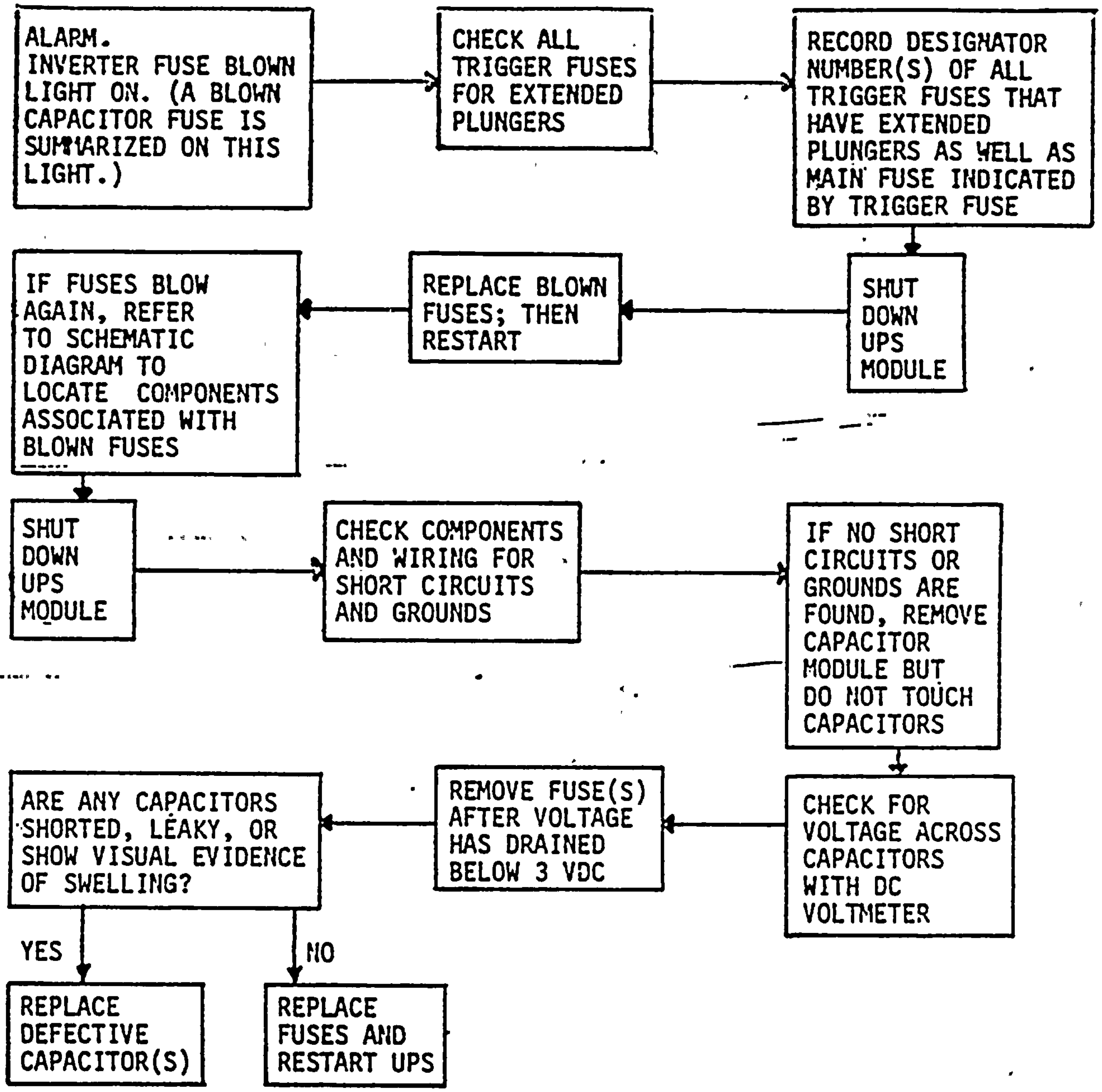


On Modules 300Kw and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

This circuit monitors the sync bus (or critical bus) and inverter sources and indicates when voltage level and phase relationship are within specified limits. Changes in inverter or utility voltage level, inverter or sync bus frequency, and synchronization of inverter to sync bus will cause the lamp to go out. The output breaker will be locked out until this condition is corrected.

C8508 2447

3.2.4.3.16 Capacitor Fuse Blown (Nonstored). See Caution, Section 3.2.3.3.

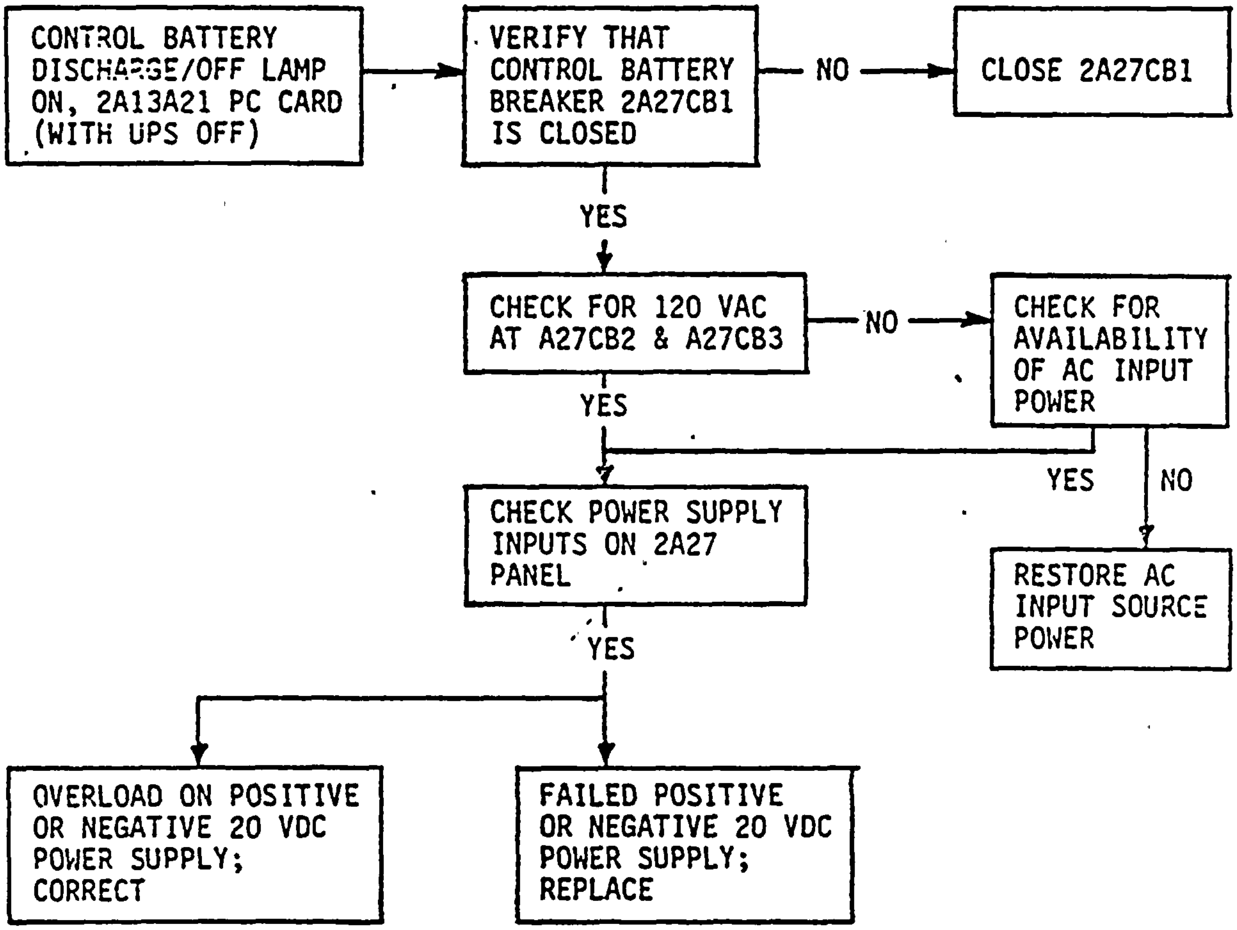


The loss of a capacitor fuse is usually indicative of a shorted or leaky capacitor. This can be isolated with an ohmmeter but will require removal of the cap busses since all caps are connected in parallel.

3.2.4.3.17 ACUV Slow.

This alarm is associated with the AC output of the inverter. The output is monitored and an ACUV command is issued in an undervoltage condition. This circuit is affected by many logic boards and by the sensing fuses F37, F38, and F39. The best method of troubleshooting is direct substitution of logic boards (see troubleshooting tree) and checking the fixes previously mentioned.

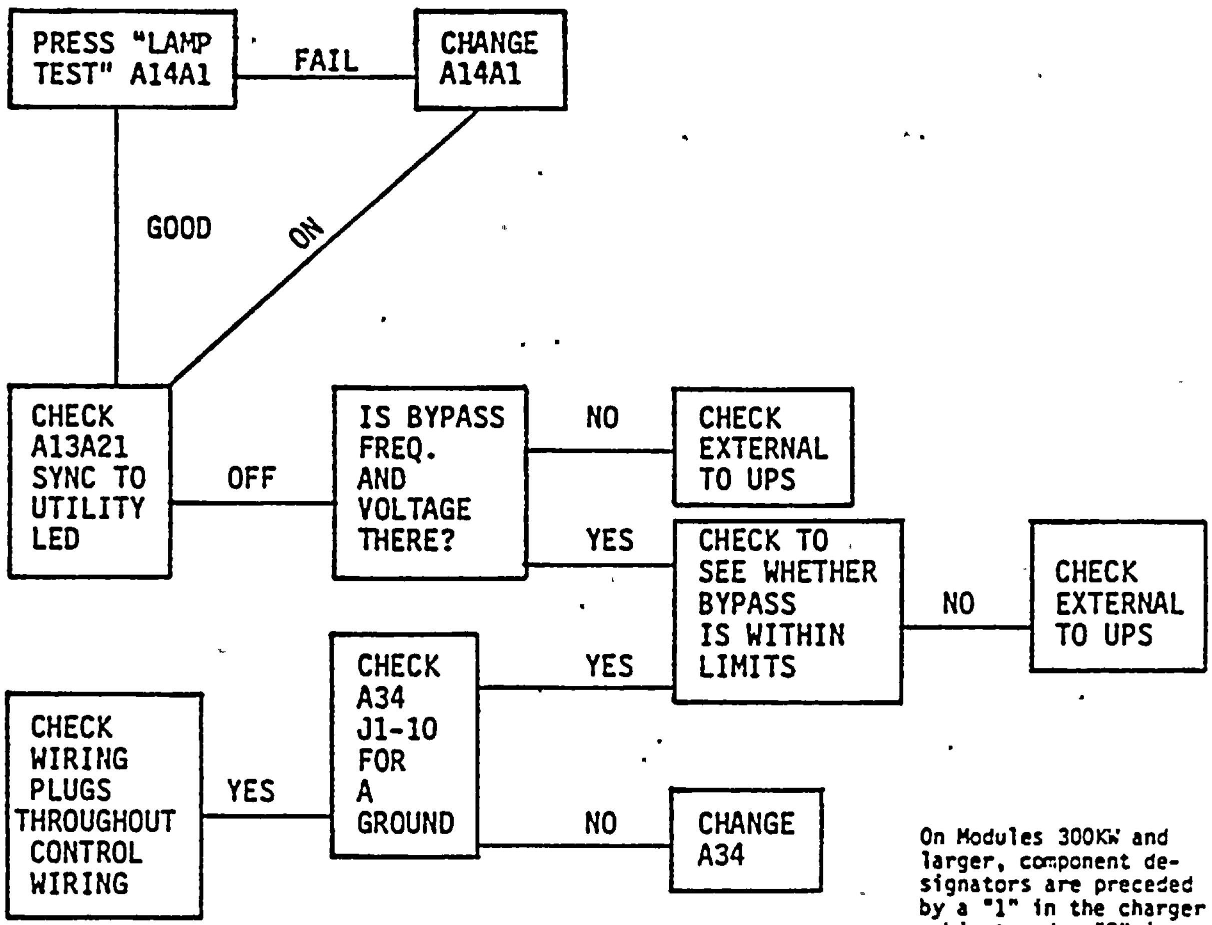
3.2.4.3.18 Control Battery Discharge/Off (nonstored). See Caution, Section 3.2.3.3.



Zener diodes A27A1VR1 and VR2, in series with relay coils A27A1K4 and K8 and fed by the utility or alternate source, monitor the output of power supplies PS3 and PS4. Zener diodes A27A1VR3 and VR4, in series with relay coils A27A1K12 and K14 and fed by the inverter output, monitor power supplies PS1 and PS2. Logic power supply breaker A27CB2 controls the input to PS1 and PS2, and A27CB3 controls the input to PS3 and PS4. Circuit breaker A27CB1 disconnects the battery from the logic power bus. A control battery discharge signal occurs if both A27CB2 and A27CB3 are open or are not supplying power and if A27CB1 control battery breaker is open.

C8508 2440

3.2.4.3.19 Utility Sync OK LED Off



On Modules 300KW and larger, component designators are preceded by a "1" in the charger cabinet and a "2" in either inverter cabinet; e.g., 1T2 or 2T13.

Lamp "ON" indicates that the UPS is receiving a sync-to-utility command. Command exists when the bypass source is within voltage and frequency limits and the critical load bus is within a close phase difference with the bypass source.

3.2.5 Hints On Other Problem Conditions

08508 2450

In some instances an unusual condition arises that may be directly associated with a given alarm lamp. The text that follows may assist the observer or troubleshooter in determining where to start and if the observed problem is, in fact, a problem.

3.2.5.1 Meters

Meters, like other electronic gear, can become faulty. Erratic and jumpy needle movement may be due to a sudden sensitivity to vibration. Try pressing a finger against the meter to lessen vibration or, in the case of voltmeters, put your own VOM across the meter terminals to see whether the VOM needle follows the panel meter needle. Generally speaking, if the meters are accurately following true changes the unit will trip, transfer the load to the utility source, or issue forth the unmistakable audible noises associated with erratic changes in voltage and current.

3.2.5.2 Erratic Inverter Output

Erratic or unstable output voltage can be difficult to isolate. The logic circuitry would be a good starting point when trying to isolate such a problem. Output voltage control is accomplished by varying the phase relationship of the firing of the lagging leg (A2, 4, 6, 8, 10, & 12) SCR's with respect to the firing of the leading leg (A1, 3, 5, 7, 9, & 11) SCR's. The phase relationship is generated in the A13A8 and A13A9 logic boards. The ACVI Control (A13A12) looks at unit output and issues the control commands, in analog form, to the A to D converter logic (A13A9) which, in turn, converts the analog signals to digital signals. The A to D converter then issues control commands, in digital form, to the Gate Timing Logic (A13A9) which controls the phasing via the A13A8 logic board. Output frequency control is accomplished by the circuits included on the A13A9 Timing Logic. Any one of the above logic boards can cause the output to be erratic.

3.2.5.3 UPS Module Will Not Start

Try pushing MODULE, OFF button, then push MODULE, ON button again. Both charger and inverter should be rechecked using the following questions as a guide:

a. Are logic supplies energized?

b. Have all trip alarms been cleared?

c. Are all logic boards seated properly in the connectors? The logic boards are all interlocked so that the unit will not start if one is missing or loose.

d. Are all panel and leg plugs mated properly?

e. Are all switches in the proper position?

f. Is the AC input breaker closed?

g. Are the input AC voltage and frequency OK?

Key things to replace are:

a. The A27 panel in the inverter.

b. The A13A1 logic card in the A13 card cage.

c. The A13A3 logic card in the A13 card cage.

3.2.5.4 Unit Controls

In some instances it is necessary to use the provided card cage door-mounted potentiometers to "touch up" output voltage levels. There are two controls of this nature, one for the charger and one for the inverter.

The one for the charger (A13R3, 3-decade) is used to control the level of the charger DC output voltage. The failure of this potentiometer to change output voltage is usually associated with a problem in the A13A2 logic card. The voltage control potentiometer (A13R2, 2-decade) for the inverter is used to change the level of the inverter AC output voltage. The failure of this potentiometer to control may be the result of a problem in the A13A12, A13A9, or A13A8 logic cards.

Both of the control potentiometers have a very slow reaction time; so, if adjustments are needed, move the potentiometers only a very short distance, then wait (at least 30 seconds) for the unit to react fully.

One more very important note concerns the potentiometers located on the logic cards themselves. These potentiometers should never be touched. The logic cards are set under laboratory and test conditions that cannot be duplicated in the field; attempting to adjust these potentiometers will almost certainly worsen or add to the existing problem. If in doubt about a logic card, replace it.

3.2.5.5 Fuse Loss Annunciation

Critical fuses are either monitored by or are the trigger type. These fuses have plungers which, when extended, depress a normally open switch, which then completes the annunciation circuit and lights the alarm lamp.

If, in the process of troubleshooting a given problem, all gathered data indicate that a fuse has cleared, yet none of the trigger fuses have extended plungers, do not hesitate to check the suspected fuses with an ohmmeter (or voltmeter if the circuit is energized). If the plunger inside a trigger fuse is binding or misaligned, it is possible for the fuse to blow without the plunger extending itself. Although this possibility is quite remote, it is still a possibility.

C8503 2452

3.2.5.6 Erratic Charger Output

Should the charger output become erratic in nature, the first component to suspect would be a control board, A13A2 or A13A3. In some instances an SCR may break over at low voltage without a command from the gate drivers to fire. In other cases a gate driver may begin to issue erratic firing commands.

The SCR that breaks over at low voltage levels or receives an incorrect, or erratic, firing command will usually be indicated by random jumps upward in output voltage and current. In most instances the inverter is not affected since the battery buffers this to a large degree, but it could trip the inverter off line. This condition warrants immediate attention.

The most apparent symptom of this is the audible "thumps" from the Charger accompanied by quick, upward movement of the DC voltmeter and/or ammeter. One method of isolating the problem leg is to obtain a clip-on ammeter and observe the AC input current to each leg.

The cables to be monitored can be identified according to the following module KW rating breakdown:

25, 30, 60, 100, 180, 250 KW
The AC input cables to a rectifier leg are attached to a bus connector which protrudes from the leg; these are the cables that must be monitored.

300, 330, 400, 450, 600 KW
Each rectifier leg has a bus connector (the DC output) and three AC input cables that enter the leg through bushings; these are the cables that must be monitored.

The rectifier leg that houses the problem SCR will exhibit surges in AC current each time the "thump" is heard. The problem leg can cause variation to occur in other legs but to a much lesser degree. The leg should be replaced or repaired.

3.2.5.7 Charger Input Current Unbalance

During periodic recording of meter readings and lamp status one may notice that the AC input current, which was balanced the last time readings were taken, is quite unbalanced now. This is usually a direct indication that one, or more, of the leg SCRs have stopped firing.

Unlike the previous problem no change in output voltage or current is likely to be noted, but the situation warrants immediate attention since the failure of one or more legs to pass current means that the other legs must work much harder to maintain the required voltage and current levels and, under heavy load conditions, could cause fuse clearing in other legs.

AC input currents to the charger should stay relatively balanced (within 15 A) and, again, the clip-on ammeter monitoring the three AC input currents to each leg is a good method for isolating the faulty leg. The faulty leg circuit will pull much less or no AC current when compared with the other legs. As in the previous problem replace the leg.

C8508 2453

TABLE 3-2. FUSE CHART*

REF. DESIG.	VALUE	TYPE	MFR	ESB NO.
F1-6	400A, 700V	A70P400	2	A128 307 016
F7, 8	800A, 130V	A13X800	2	A128 302 028
F11-19	15A, 600V	GF8B15	3	A128 304 012
F20-28, 42-44	5A, 600V	T1-600	2	A128 104 038
F29	800A, 500V	A50P800	2	A128 308 021
F31, F32 & F33	300A, 130V	A13X300	2	A128 302 019
F34-39	15A, 600V	GF8B15	3	A128 304 012
F40, 41	2A, 125V	313002	4	A128 102 004
F45-48	200A, 600V	A60X200	2	A128 304 001
F49, 50	2A, 125V	313002	4	A128 102 004
F65	3A, 125V	313003	4	A128 102 005
A1A1F1, A1A1F2	1A, 250V	GJV-1	1	A128 103 091
A2A1F1-A7A1F1	1A, 250V	GJV-1	1	A128 103 091
A18F9, F10 & F11	15A, 600V	GF8B15	3	A128 304 012
A26F1 & F2	2A, 250V	314002	4	A128 103 083
A27F1-F4	5A, 125V	313005	4	A128 102 007

*All fuses are Category 1, common, available from local sources.

MFGR CODE: 1-BUSSMANN, 2-CHASE SHAWMUT, 3-GENERAL ELECTRIC, 4-LITTELFUSE

E035A/VII/INST 01: 560-5004B

101 710 341-77223
105 710 021

(0238)

TABLE 3-3: UPS MODULE COMPONENTS*

DOCUMENT USER: CONSULT DCIS TO OBTAIN LATEST APPLICABLE DOCUMENT INFORMATION.

NOTE: DOCUMENT APPROVAL IS PER SEDF COVER SHEET.

RECEIVED
J. O. 12187
OCT 20 1986
STONE & WEBSTER
ENG. CORP.
CONTROL LEVEL

REF. DESIGNATION	DESCRIPTION	PART NUMBER
A1	Rectifier Leg Assy	S 101 608 098-77223
A1A1	Gate Drive Card	S 101 072 166
A2 thru A7	Inverter Leg Assy	S 101 618 958-77223
A2A1 thru A7A1	Gate Drive Card	S 101 072 194
A13	Card Cage Assy	S 101 618 122-77223
A13A1	Annunciation #1 Card	S 101 072 136 ** S 101 072 370
A13A2	DCVI Control Card	S 101 072 134 ** S 101 072 371
A13A3	Sync & Digital Control Card	S 101 072 135 ** S 101 072 372
A13A5	BITE Board (if used)	S 101 072 148
A13A8	Gate Timing #1 Card	S 101 072 174 ** S 101 072 373
A13A9	Gate Timing & Sync Osc Card	S 101 072 175-77223
A13A12	ACVI Control Card	S 101 072 193
A13A18	AC/DC Protection Card	S 101 072 212
A13A20	Output Control Card	S 101 072 187
A13A21	Annunciation #2 Card	S 101 072 130
A13A22	Mother Board	S 101 072 211
A13A34	Static Switch Control Card	S 101 072 208 ** S 101 072 381
A14	Control Panel	S 101 618 073-77223
A14A1	LED Driver Card	S 101 072 209
A15, A16	DC Capacitor Module	S 101 618 973
A18	Transformer Panel	S 101 608 105-77223

** - INDICATES PART NUMBER TO BE USED WHEN ORDERING REPLACEMENT COMPONENT.

*All parts listed in Table 3-3 are in Category 2b, engineered parts peculiar, not normally stocked by the seller.

TABLE 3-3 (Continued)

REF.DESIGNATION	DESCRIPTION	PART NUMBER
A21	AC Filter Panel	S 101 618 106-77223
A26	Load Division & Interface Panel	S 101 618 918-77223
A26A1	Component Card	S 101 072 140
A27	Logic Power Supply & Relay Panel	S 101 618 008-77223
A27A1	Component Card	S 101 072 204
#A27BT1-6	Control Battery (6-V units)	S 153 101 003
A30	System Terminal Board Assy	S 101 618 912
A33	Static Switch Leg	S 101 250 424-77223
A33A1	Gate Drive Card	S 101 072 189
A34	Static Switch Control Assy	S 101 250 406-77223
B1	Fan	A 151 101 011
B2	Fan	A 151 101 012
CB1	Circuit Breaker, 150A, Auto	B 122 134 004
CB2	Circuit Breaker, 800A, NA	B 122 136 037
CB3 & CB4	Circuit Breaker, 400A, NA	B 122 135 023
	For Fuses, see Table 3-2	
L1	Reactor , 100 uH	S 121 212 024
L3 thru L8	Reactor, 21 uH	S 121 101 170
L9, L10, & L11	AC Choke, 12th Trap	S 121 111 032
R1A-RIE	Resistor, 250 Ohm, 225 W	A 141 120 021
R5	Shunt	B 136 403 112
RV1 thru RV6	Varistor, 130 VRMS	A 141 923 146
S21	Switch, Toggle	A 145 102 007
S22	Switch, Pushbutton	A 145 302 006

#These batteries should be replaced at 4-year intervals.

TABLE 3-3 (Continued)

C8508 2456

REF.DESIGNATION	DESCRIPTION	PART NUMBER
T1	Transformer, Output Power	D 149 114 146
T3	Transformer, Input Power	S 149 165 085
T4	Transformer, Interphase	S 149 165 088
T5-7, 13, 23-25	Transformer, Current, 300:5	B 149 208 155
T10-12	Transformer, Current, 400:5	B 149 208 150
T14, 15	Transformer, Current, 300:5	B 149 208 149
T17, 18, 20, 21	Transformer, Current, 200:1	B 149 208 144
CFR1-2	Charger Failure Relay	S 101 440 103
A42	Summary Alarm Board	S 101 250 611
A41	Blocking Diode Board	S 101 250 506-77223
CFX1, 2	Charger Faulure Transductor	B 134 230 010
K2, K6	Relay	A 140 103 051
K3, K5	Relay	A 140 104 084
A91	Low Voltage Relay, 105 V	S 101 085 512
R11 A, B, & C	Resistor, 1 ohm, 50 W	A 141 115 085

APPENDIX A

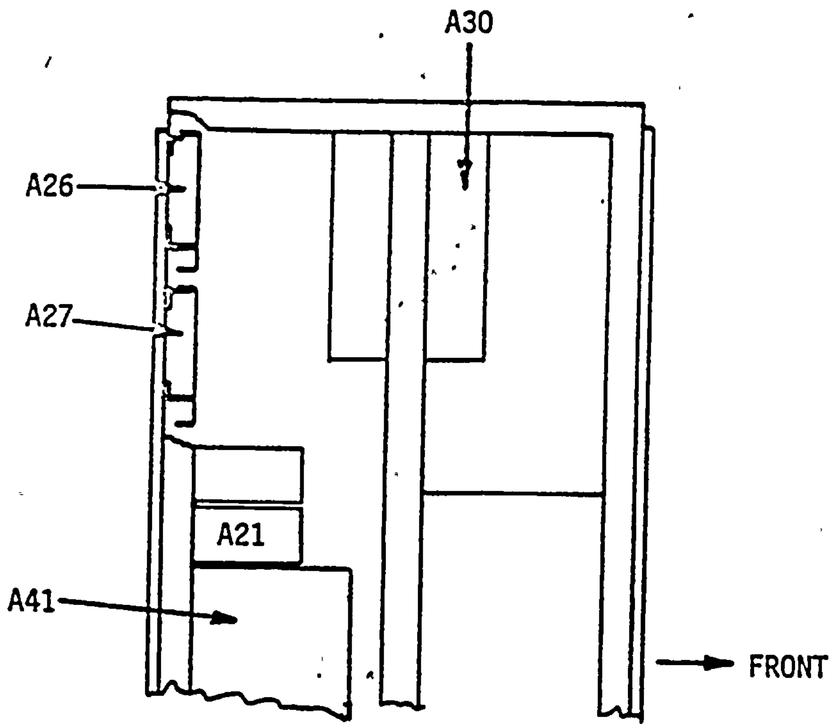
08508 2457

BLOCKING DIODE, A41

The direct current input of the UPS is provided with parallel blocking diodes. These diodes provide isolation of the UPS rectifier circuit from the user's DC supply. Upon loss of normal AC input to the UPS rectifier, DC power will be supplied from the user's DC supply via blocking diodes in the positive DC input circuit of the UPS.

Indication of blocking diode conduction is accomplished by forward and reverse current-sensing relays CFR1 and CFR2. Current in excess of 200 mA in either direction will cause CFR contact operation and annunciation on UPS control panel lamp DS31 (Item 53) along with alarm relay operation by relays K4 (battery operation) and K3 (customer's remote alarm relay).

This alarm condition indicates either 1) Conduction in the forward direction upon loss of UPS AC input (input to inverter supplied by DC source), or 2) Conduction in the reverse direction upon failure of the blocking diode due to a short.



APPENDIX B

ALARM BOARD, A42

08508 2458

1. <u>Static Switch SCR Short</u>

This circuit utilizes three current transformers, one each in series with phase A, B, and C static switch SCR's. If a current signal is sensed, the A42 logic will determine if the signal along with the proper SCR gate signal is a result of normal transfer condition to the alternate source or in absence of the gate signal an SCR short condition. Once the SCR short condition is determined a transfer to the alternate source will be initiated and retransfer to the UPS will be inhibited. This condition will exist until the shorted SCR is replaced or the alarm is reset.

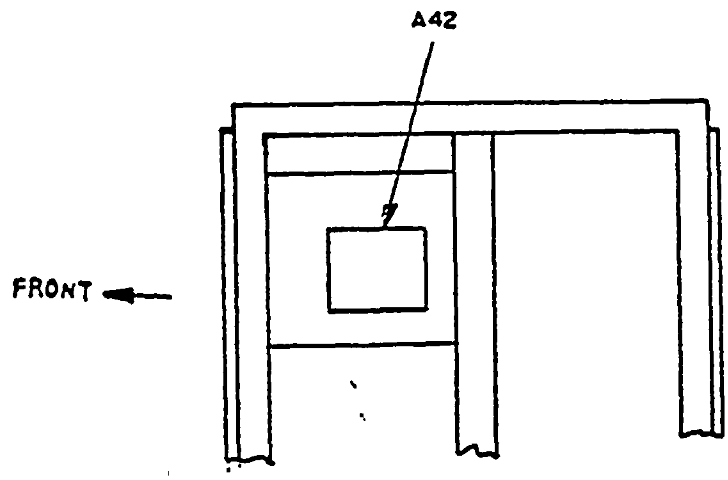
2. <u>UPS Trouble Summary Alarm</u>

Also included on the A42 alarm board is summing circuitry for <u>UPS Trouble Alarm</u>. The following individual alarms constitute an <u>UPS Trouble Summary Alarm</u>:

1. UPS Fail
2. UPS Alarm
3. CB4 Auxiliary Closed (Bypass Breaker Operation)
4. AC Input Not Available
5. DC Input Not Available (< 105 VDC)
6. Low DC Input (Rectifier)
7. Battery Breaker CB2 Open

3. <u>Battery Operation Alarm</u>

A42 alarm board also includes delay and driver circuits for battery operation alarm (relays K2 and K3). Detection of current in either forward or reverse direction will cause alarm operation.

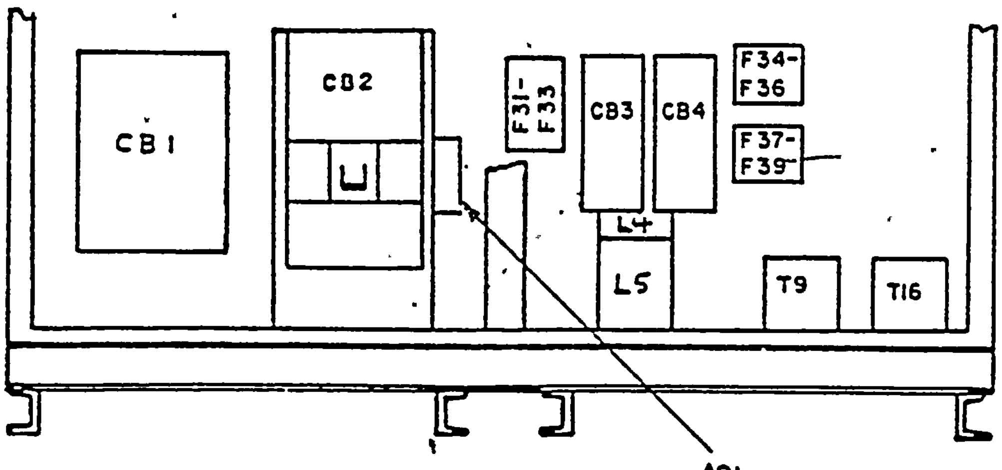


APPENDIX C

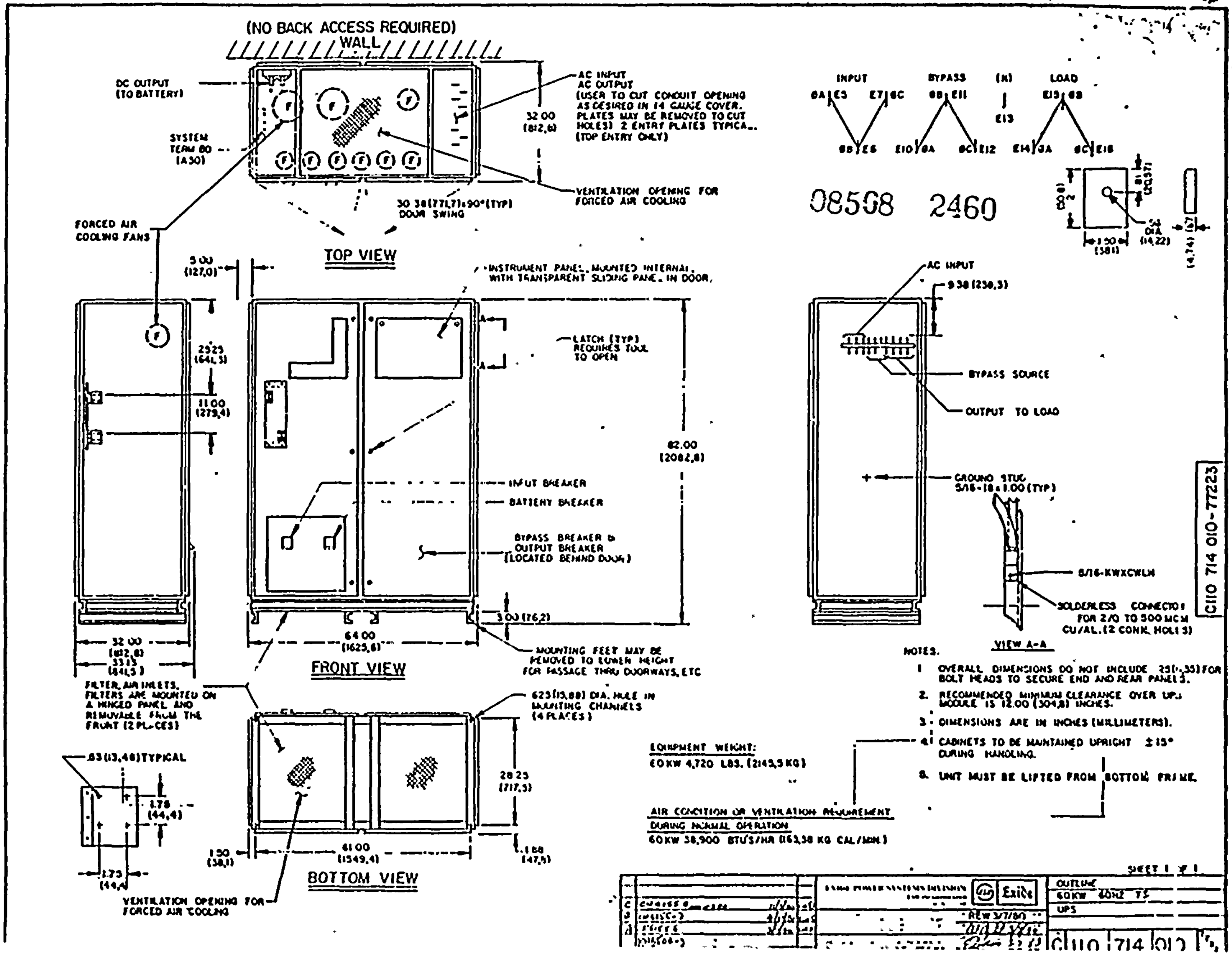
LOW INPUT DC VOLTAGE SENSOR A91

This DC low voltage relay monitors the DC supply voltage on the UPS side of breaker CB2. Contact operation occurs when DC voltage at this point drops below 105 VDC.

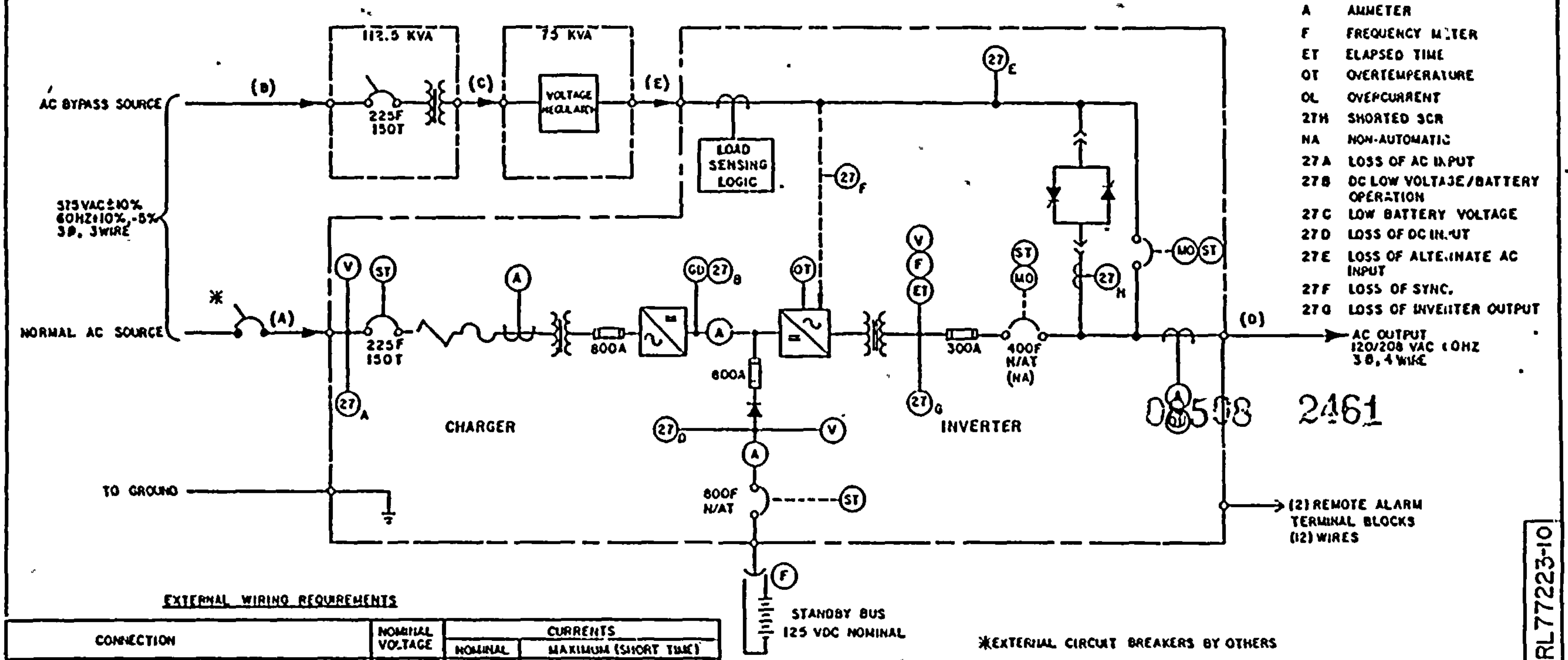
C8508 2459



FRONT VIEW



(NO BACK ACCESS REQUIRED)
WALL
DC OUTPUT (TO BATTERY)
SYSTEM TERM BD (A50)
AC INPUT
AC OUTPUT
(USER TO CUT CONDUIT OPENING AS DESIRED IN 14 GAUGE COVER. PLATES MAY BE REMOVED TO CUT HOLES) 2 ENTRY PLATES TYPICAL (TOP ENTRY ONLY)
32.00 (812,8)
VENTILATION OPENING FOR FORCED AIR COOLING
FORCED AIR COOLING FANS
30.38 (771,7) x 90° (TYP) DOOR SWING
TOP VIEW
INPUT
BYPASS
(N)
LOAD
08508 2460
5.00 (127,0)
INSTRUMENT PANEL, MOUNTED INTERNAL, WITH TRANSPARENT SLIDING PANEL IN DOOR.
LATCH (TYP) REQUIRES TOOL TO OPEN
25.25 (641,3)
11.00 (279,4)
82.00 (2082,8)
INPUT BREAKER
BATTERY BREAKER
BYPASS BREAKER & OUTPUT BREAKER (LOCATED BEHIND DOOR)
3.00 (76,2)
32.00 (812,8)
33.15 (841,5)
64.00 (1625,6)
FRONT VIEW
MOUNTING FEET MAY BE REMOVED TO LOWER HEIGHT FOR PASSAGE THRU DOORWAYS, ETC
FILTER, AIR INLETS. FILTERS ARE MOUNTED ON A HINGED PANEL AND REMOVABLE FROM THE FRONT (2 PLACES)
.625 (15,88) DIA. HOLE IN MOUNTING CHANNELS (4 PLACES)
.53 (13,46) TYPICAL
1.75 (44,4)
28.25 (717,5)
1.50 (38,1)
61.00 (1549,4)
1.88 (47,8)
BOTTOM VIEW
VENTILATION OPENING FOR FORCED AIR COOLING
AC INPUT
9.38 (238,3)
BYPASS SOURCE
OUTPUT TO LOAD
GROUND STUD 5/16-18 x 1.00 (TYP)
5/16-KWXCWLH
SOLDERLESS CONNECTOR FOR 2/0 TO 500 MCM CU/AL. (2 CONN. HOLES)
VIEW A-A
C110 714 010-77223
NOTES.
1 OVERALL DIMENSIONS DO NOT INCLUDE .25 (6,35) FOR BOLT HEADS TO SECURE END AND REAR PANELS.
2. RECOMMENDED MINIMUM CLEARANCE OVER UPS MODULE IS 12.00 (304,8) INCHES.
3. DIMENSIONS ARE IN INCHES (MILLIMETERS).
4. CABINETS TO BE MAINTAINED UPRIGHT ±15° DURING HANDLING.
5. UNIT MUST BE LIFTED FROM BOTTOM FRAME.
EQUIPMENT WEIGHT:
60KW 4,720 LBS. (2145,5 KG)
AIR CONDITION OR VENTILATION REQUIREMENT DURING NORMAL OPERATION
60KW 38,900 BTU/S/HR (163,38 KG CAL/MIN)
SHEET 1 OF 1
Exide
OUTLINE 60KW 60HZ TS UPS
C110 714 010

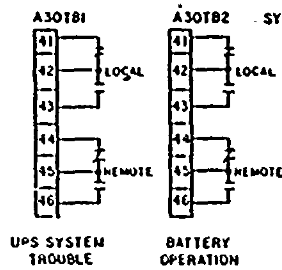


LEGEND

GD	GROUND DETECTION
ST	SHUNT TRIP
V	VOLTMETER
A	AMMETER
F	FREQUENCY METER
ET	ELAPSED TIME
OT	OVERTEMPERATURE
OL	OVERCURRENT
27H	SHORTED SCR
NA	NON-AUTOMATIC
27A	LOSS OF AC INPUT
27B	DC LOW VOLTAGE/BATTERY OPERATION
27C	LOW BATTERY VOLTAGE
27D	LOSS OF DC INPUT
27E	LOSS OF ALTERNATE AC INPUT
27F	LOSS OF SYNC.
27G	LOSS OF INVERTER OUTPUT

EXTERNAL WIRING REQUIREMENTS

CONNECTION	NOMINAL VOLTAGE	CURRENTS	
		NOMINAL	MAXIMUM (SHORT TIME)
(A) AC INPUT TO UPS (3) PHASES (1) GROUND	575	96A/PHASE	120A/Ø @ 575V (BATTERY RECHARGE & OVERLOADS CURRENT LIMIT CONTROLLED
(B) AC ALTERNATE LINE INPUT TO BYPASS SECTION (3) PHASES (1) GROUND	575	100A/PHASE AT CRITICAL LOAD @0.8PF	125 (15 MIN)
(C) AC INPUT TO VOLTAGE REGULATOR (3) PHASES (1) NEUTRAL (1) GROUND	121/210	2 A/Ø AT CRITICAL LOAD @0.8PF	330 (15 MIN)
(D) UPS AC OUTPUT TO CRITICAL LOAD (3) PHASES (1) NEUTRAL (1) GROUND	120/208	208A/PHASE	260A/Ø @ 125% LOAD (10 MINUTE OVERLOAD RATING)
(E) AC ALTERNATE LINE OUTPUT FROM BYPASS SECTION (3) PHASES (1) NEUTRAL (1) GROUND	120/208	208A/PHASE	260A/Ø @125% LOAD (15 MIN. OVERLOAD RATING)
(F) DC LINK CHARGER TO BATTERY (1) POSITIVE (1) NEGATIVE (SEE NOTE 2)	125VDC	565ADC	706 ADC AT END OF BATTERY DISCHARGE (10 SEC)



*EXTERNAL CIRCUIT BREAKERS BY OTHERS

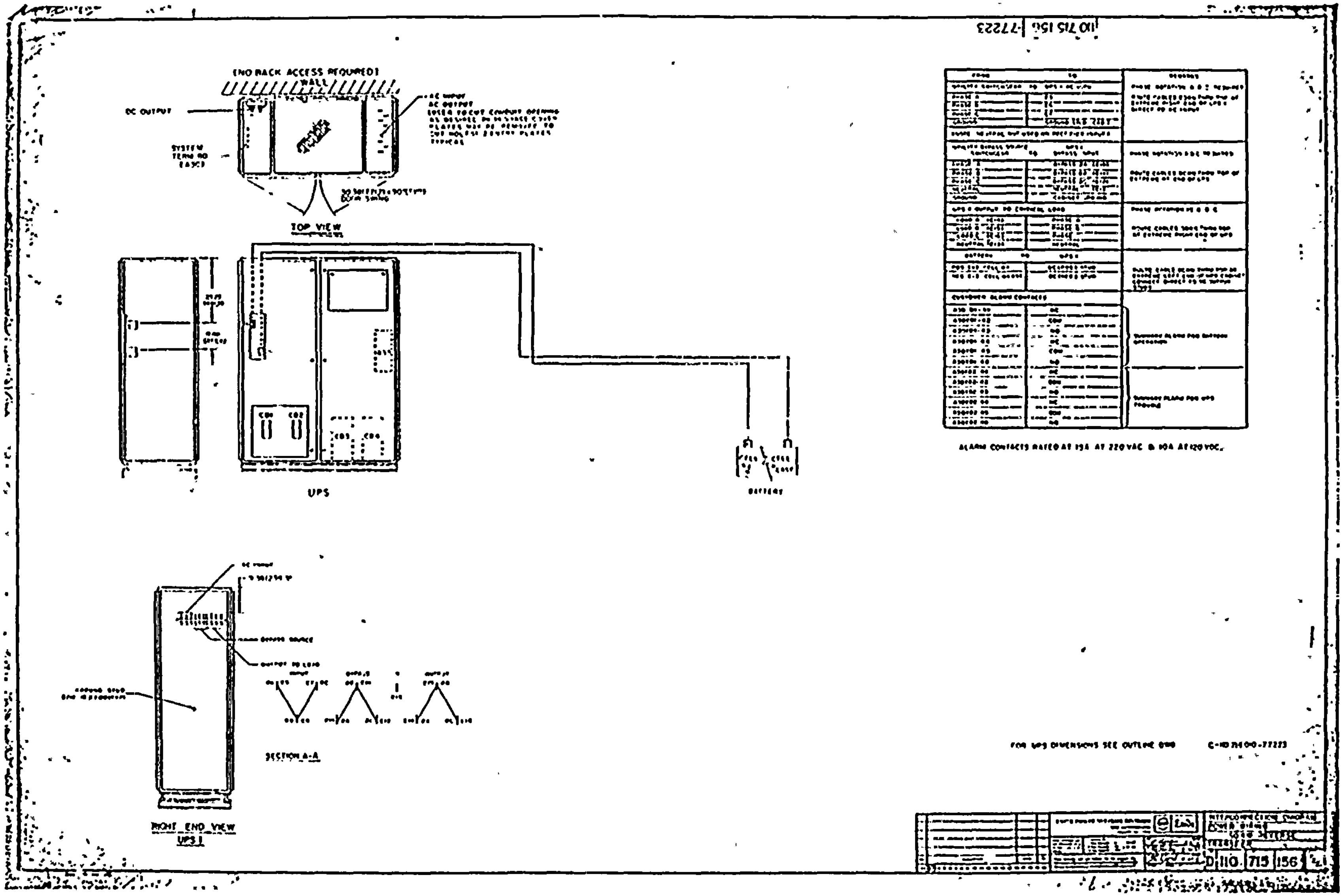
SYSTEM OUTPUT RATING 75 KVA AT 0.8 PF

NOTES:

1. SOURCE PROTECTION FOR INPUT TO UPS SHOULD BE TREATED AS IF SUPPLYING A 3 PHASE XFMR OF 1.4 TIMES UPS KVA RATING OF 75 KVA TO ALLOW FOR TRANSFORMER MAGNETIZATION INRUSH CURRENT.
2. UPS TO BATTERY TO BE SIZED FOR A TOTAL MAXIMUM 2.0 VOLT DROP (TO ASSURE MAX. BATT. PROTECTION TIME).
3. ALL CONNECTIONS LISTED, UNLESS OTHERWISE STATED, ARE NOT PERFORMED BY EXIDE, NOR IS MATERIAL FURNISHED.
4. RUN CONTROL WIRES AND POWER CABLES IN SEPERATE CONDUITS.
5. CRITICAL LOAD CABLES TO BE RUN IN SEPARATE CONDUIT FROM AC SOURCE AND BYPASS SOURCE.

EXIDE POWER SYSTEMS DIVISION Exide

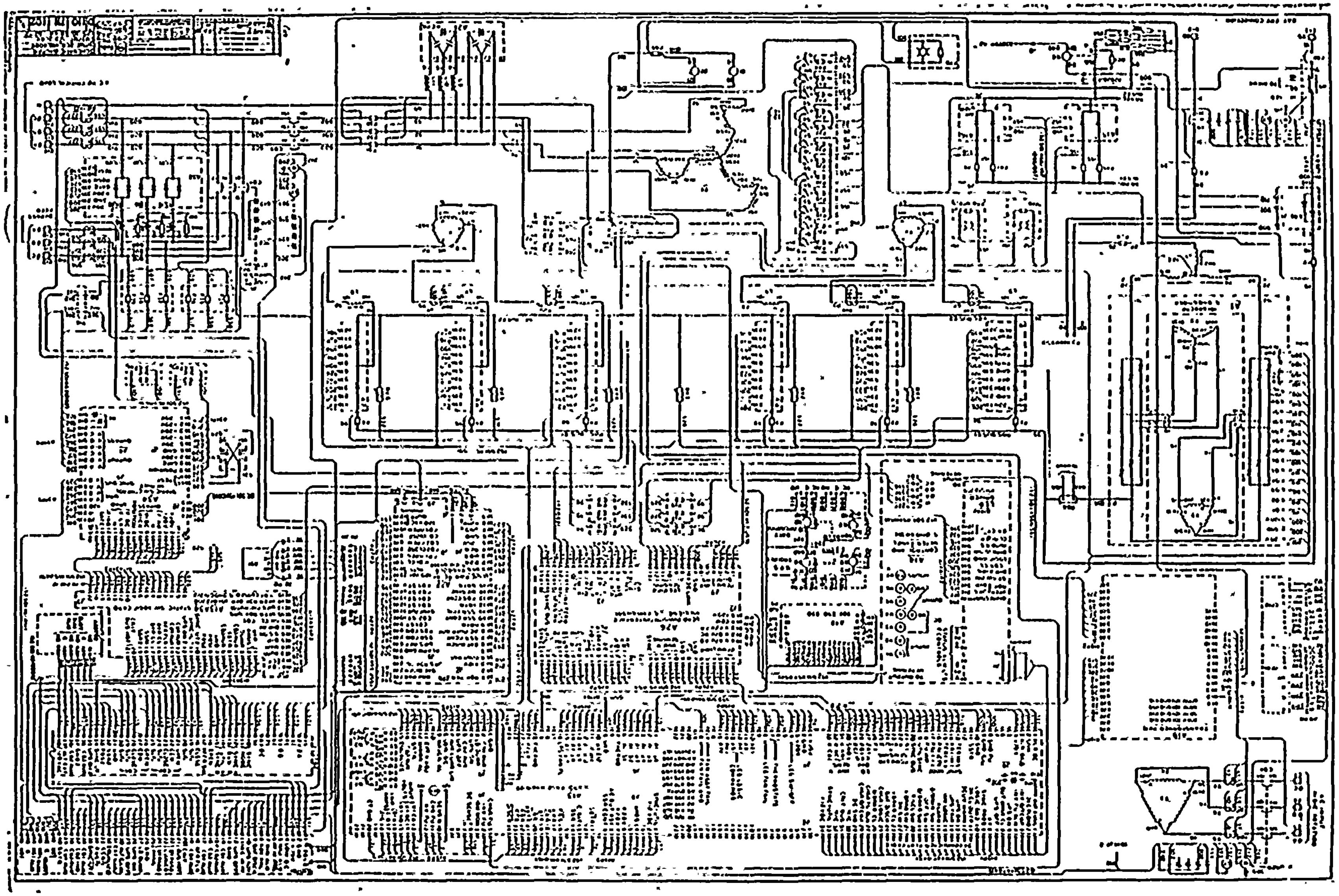
UPS ONE-LINE DIAGRAM
60 KW REVERSE TRANSFER
WITH XFMR/REGULATOR
BYPASS MKII



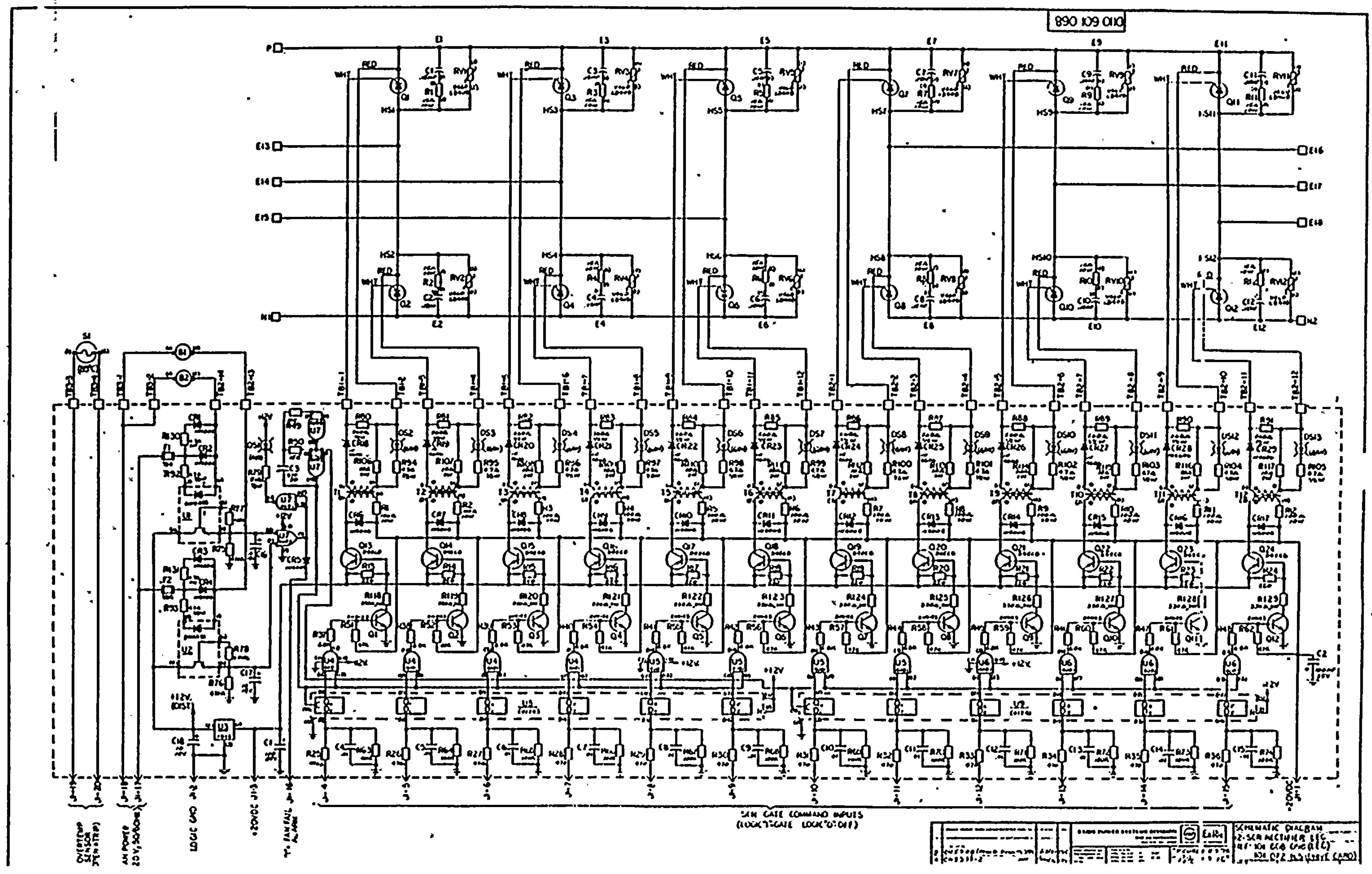
10-26-81

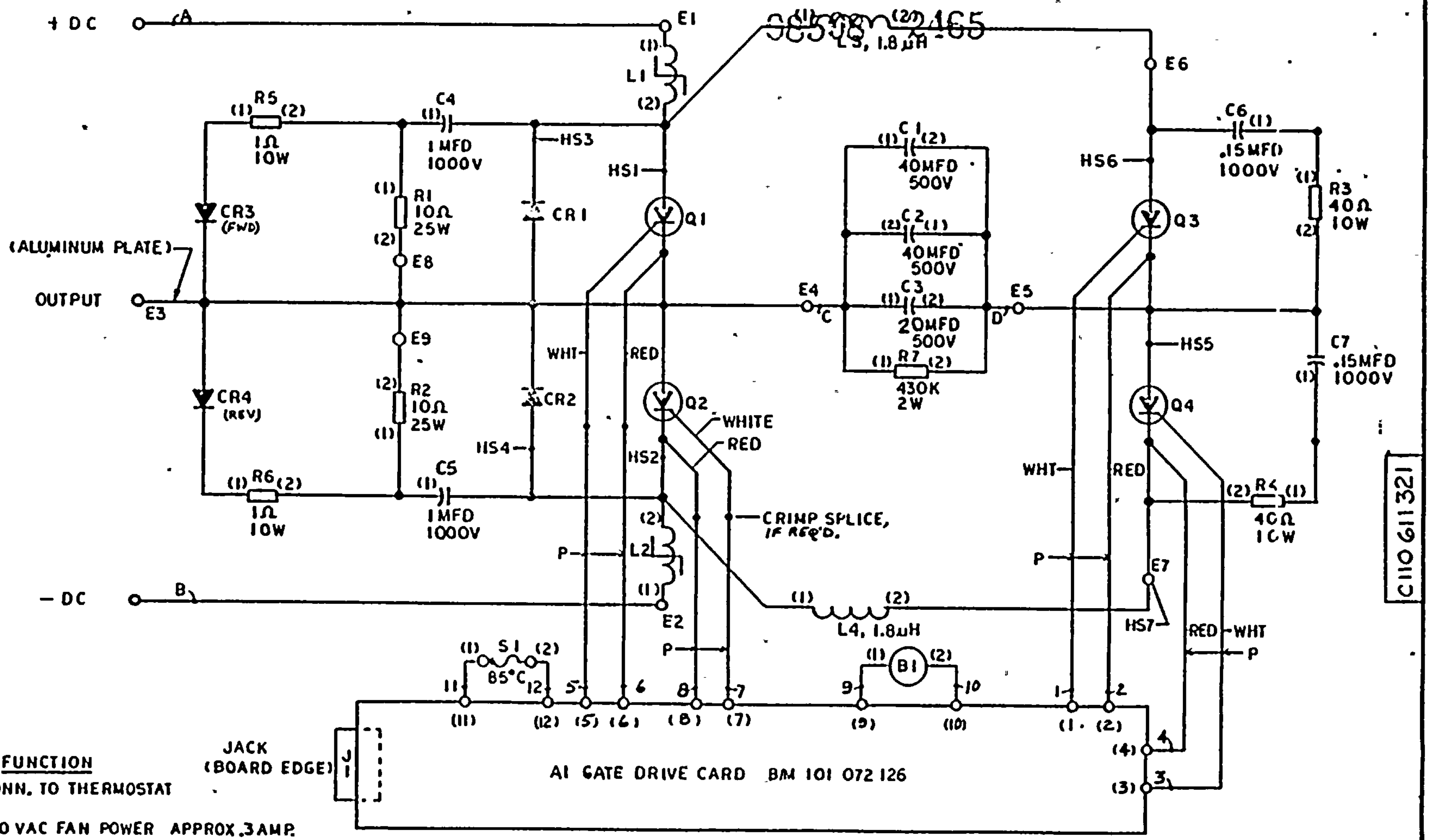
08508 2462

08508 2463



68508 2464





J1 PIN	FUNCTION
12, 11	CONN. TO THERMOSTAT
10, 9	120 VAC FAN POWER APPROX. 3 AMP.
8	FAN FAILED LOGIC OUTPUT (1=FAILED)
7	SPARE
6	LEG COMMAND
5	LEG DISCONNECT
4	SPARE
3	+20VDC
2	LOGIC GROUND
1	−20VDC

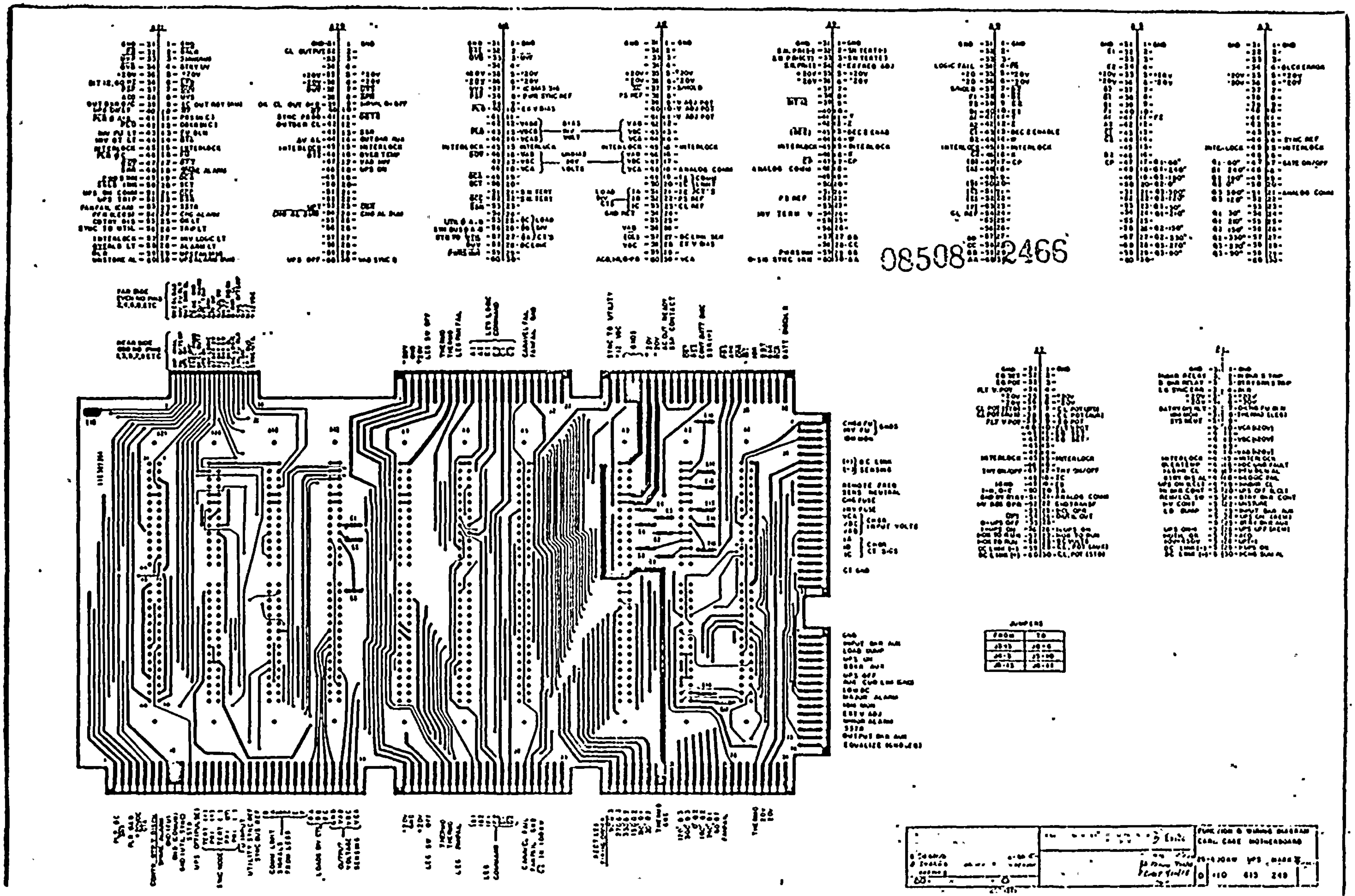
C110 611 321

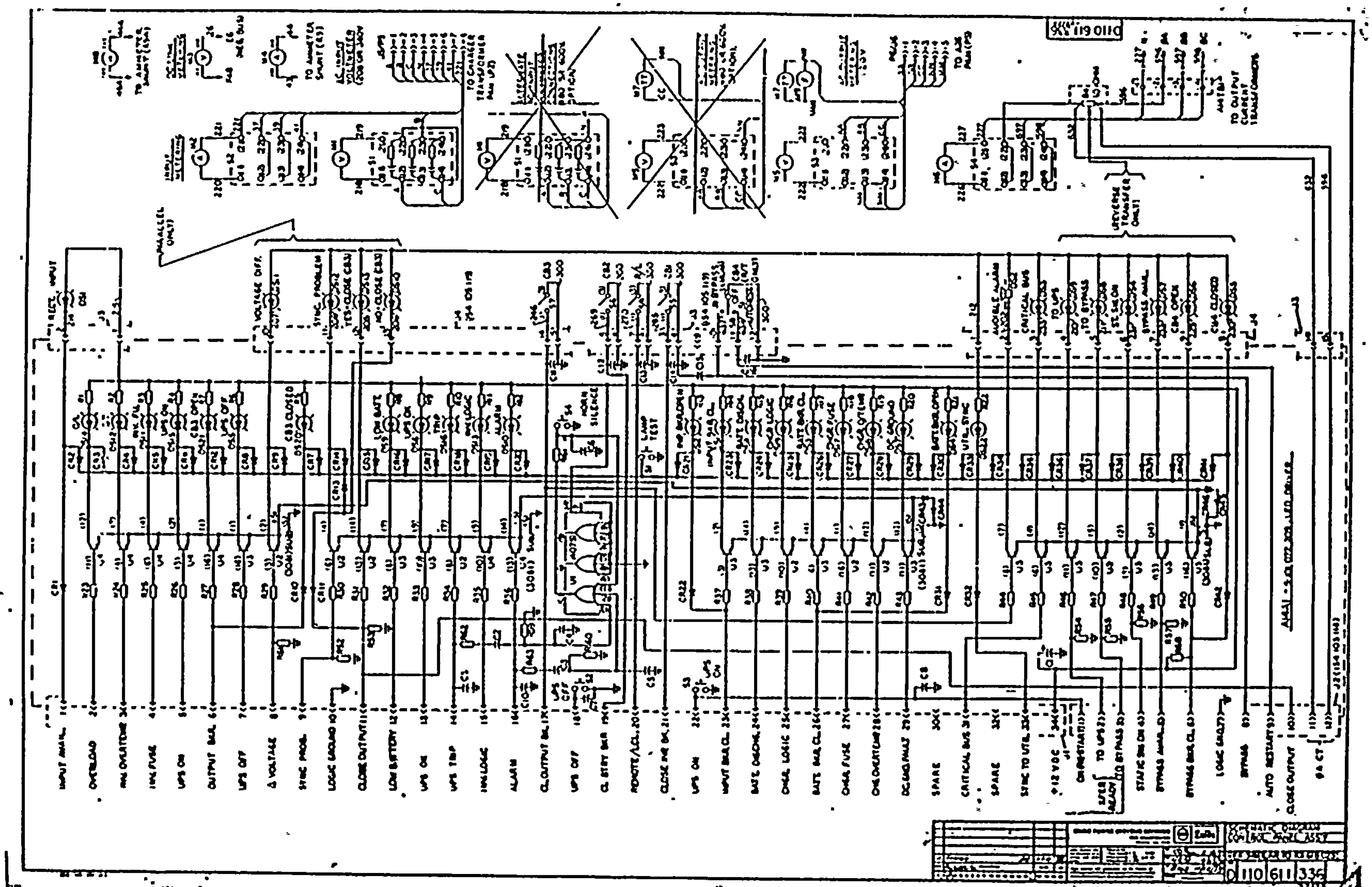
EXIDE POWER SYSTEMS DIVISION

Exide

SCHEMATIC DIAGRAM
A.C.L.-3 /60KW
(B/M 101 618 958)

A CN 5144-Z


08508 2466
FUNCTION & WIRING DIAGRAM
CARD CAGE MOTHERBOARD

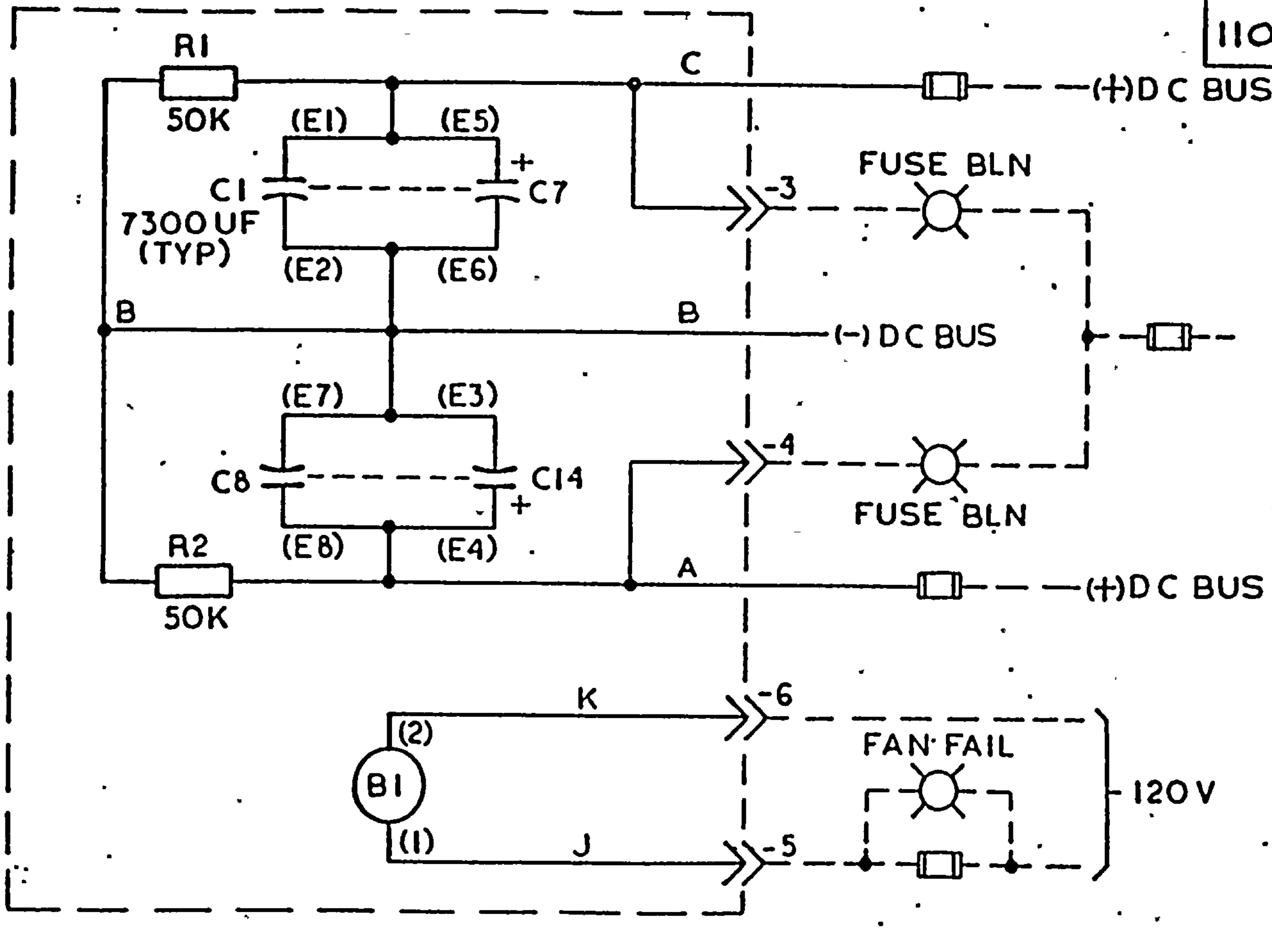


02/02/81

08508 2467

08538 2468

110 611 324



REV.	CN5141-4 DESCRIPTION	DATE	AP.

EXIDE POWER SYSTEMS DIVISION
ESB INCORPORATED
RALEIGH N.C. 27604

Exide

SCHEMATIC DIAGRAM
D.C. CAPACITOR MODULE

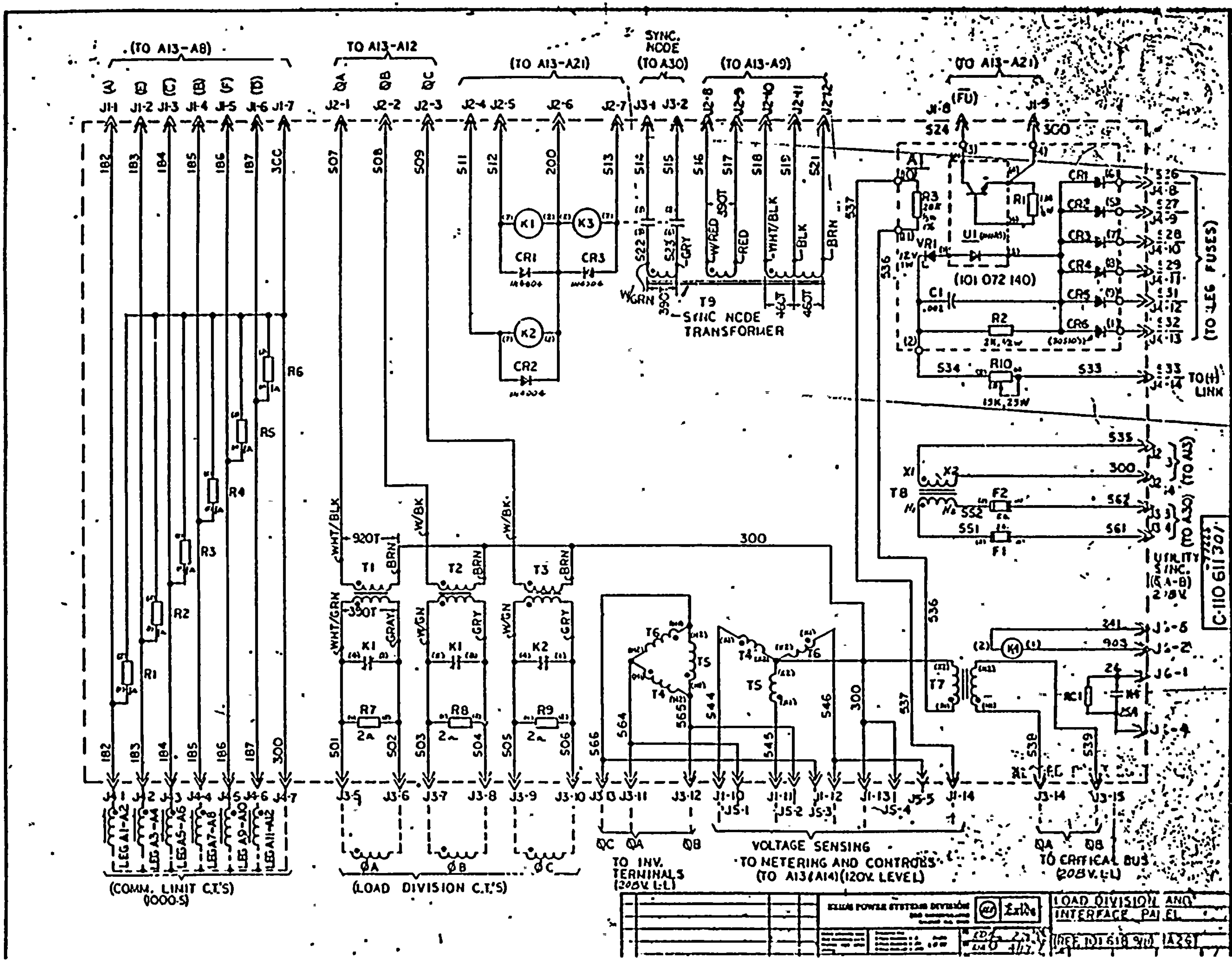
30 & 60 KW

DATE 3/10/77

P. COREY 3/21/77 DATE

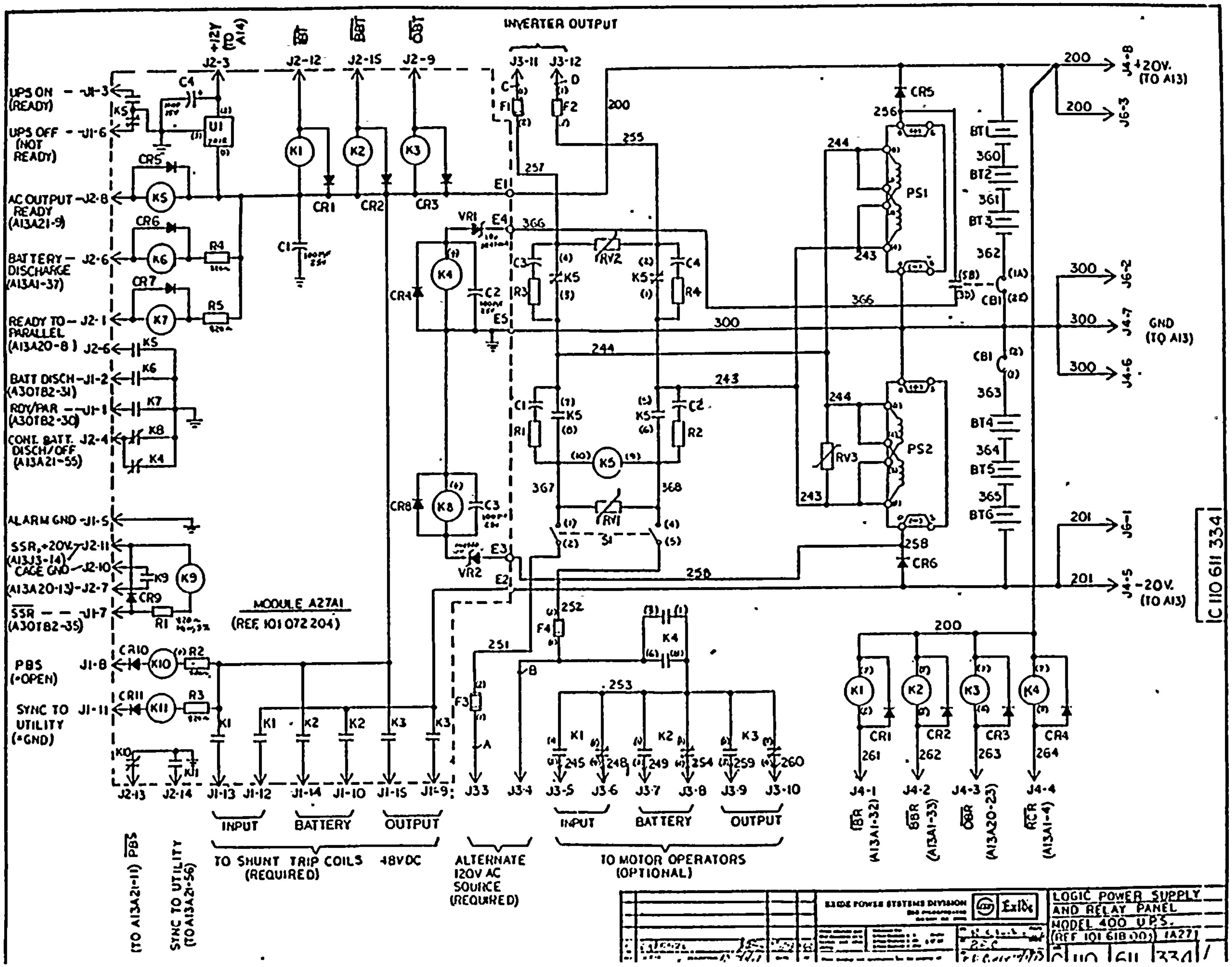
A 110 611 324

08508 2469

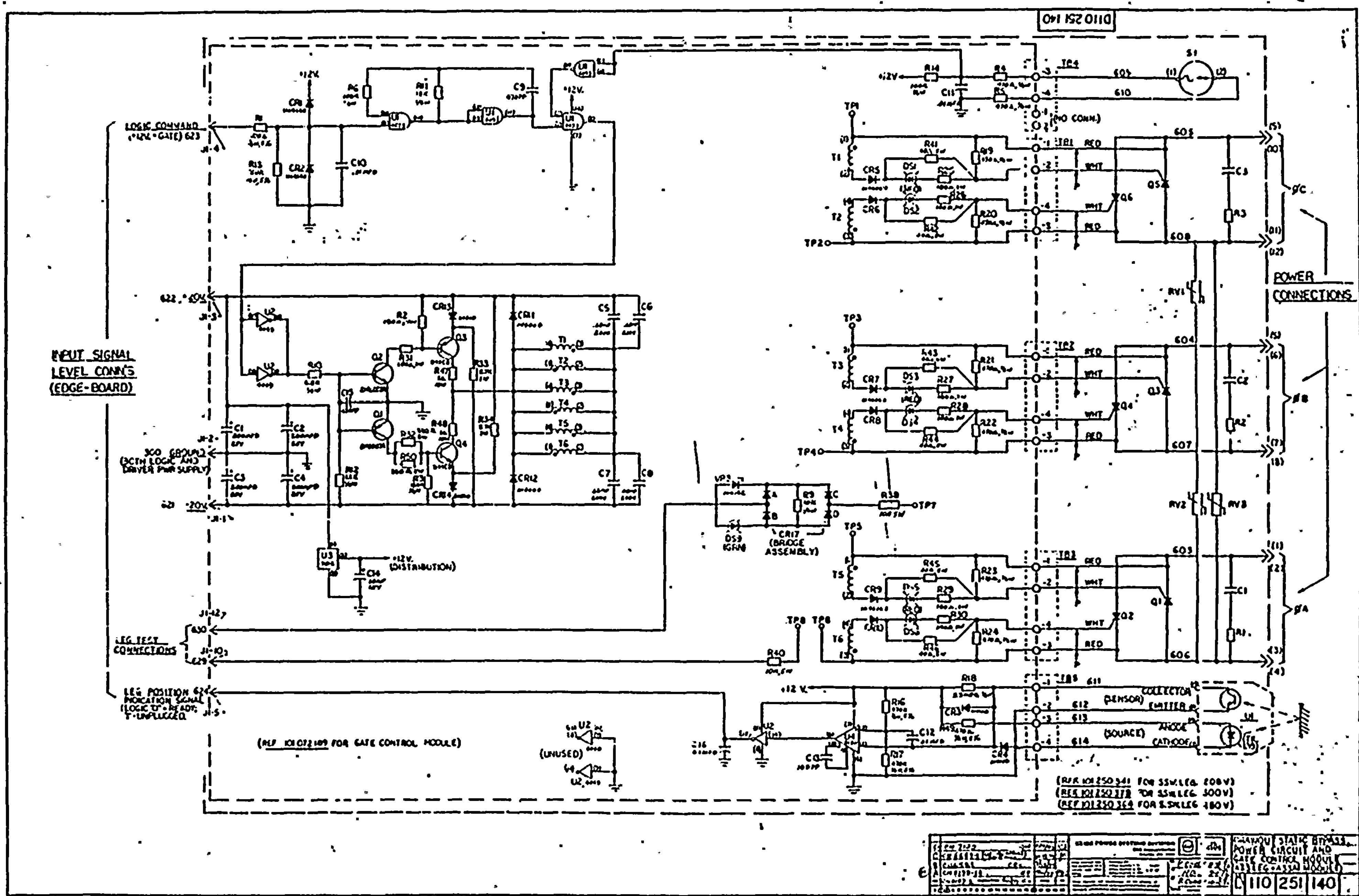


(TO A13-A8)
TO A13-A12
(TO A13-A21)
SYNC. MODE (TO A30)
(TO A13-A9)
(TO A13-A21)
J1-1 J1-2 J1-3 J1-4 J1-5 J1-6 J1-7 J2-1 J2-2 J2-3 J2-4 J2-5 J2-6 J2-7 J3-1 J3-2 J2-8 J2-9 J2-10 J2-11 J2-12
J1-8 (FU) J1-9
T9
SYNC MODE TRANSFORMER
(101 072 140)
(TO LEG FUSES)
TO (+) LINK
(TO A13)
(TO A30)
UTILITY SYNC. (RA-B) 208V.
C-110 611 301
T1 T2 T3 T4 T5 T6 T7 T8
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10
K1 K2 K3
CR1 CR2 CR3 CR4 CR5 CR6
300
(COMM. LIMIT C.T.'S) (1000:5)
(LOAD DIVISION C.T.'S)
TO INV. TERMINALS (208V. L-L)
VOLTAGE SENSING TO METERING AND CONTROLS (TO A13(A14)(120V. LEVEL)
TO CRITICAL BUS (208V. L-L)
LOAD DIVISION AND INTERFACE PANEL

C8508 2470

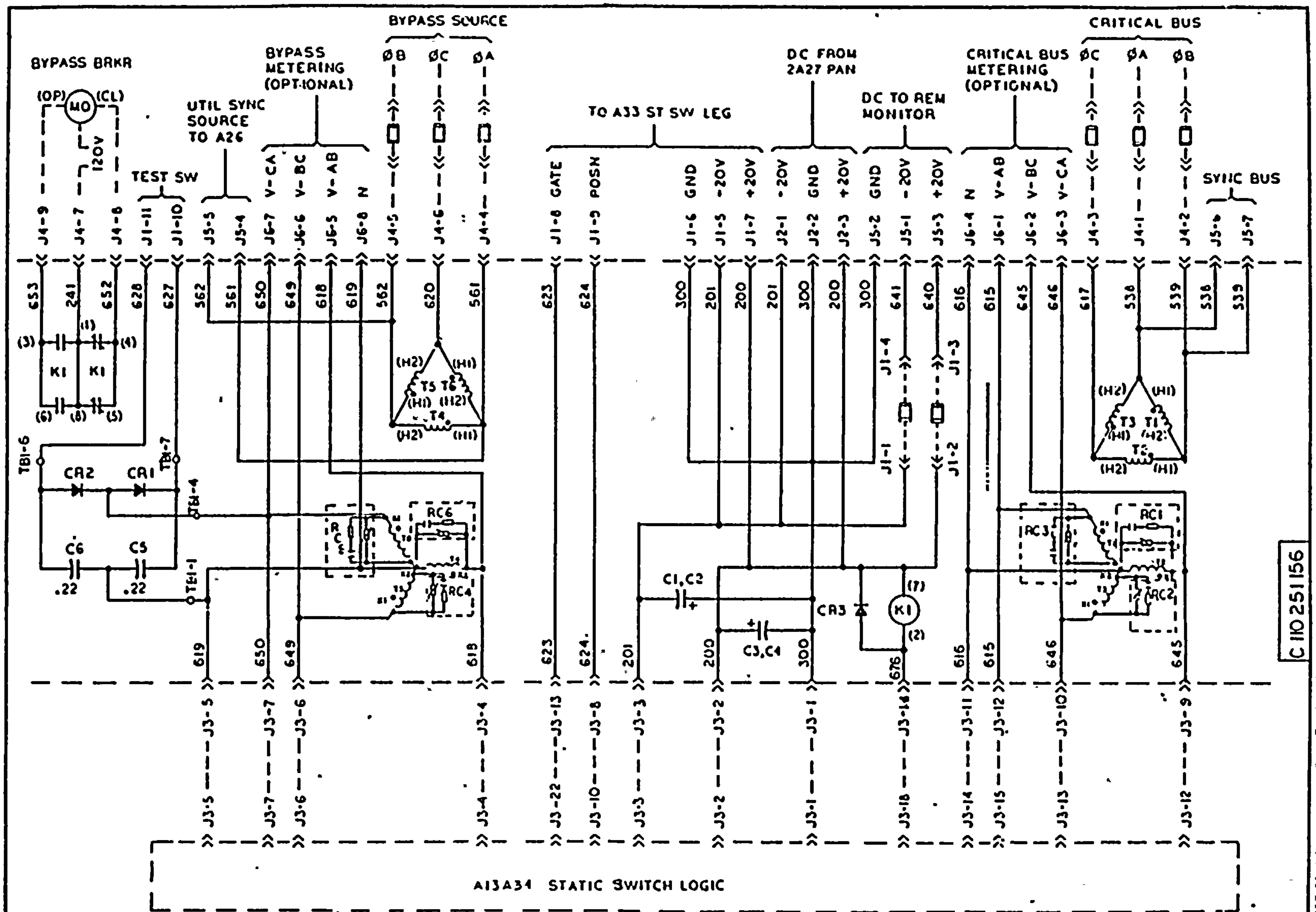

INVERTER OUTPUT
UPS ON (READY)
UPS OFF (NOT READY)
AC OUTPUT READY (A13A21-9)
BATTERY DISCHARGE (A13A1-37)
READY TO PARALLEL (A13A20-8)
BATT DISCH (A30TB2-31)
RDY/PAR (A30TB2-30)
CONT. BATT. DISCH/OFF (A13A21-55)
ALARM GND
SSR, +20V (A13J3-14)
CAGE GND
(A13A20-13)
SSR (A30TB2-35)
PBS (+OPEN)
SYNC TO UTILITY (+GND)
MODULE A27A1
(REF. 101 072 204)
INPUT
BATTERY
OUTPUT
TO SHUNT TRIP COILS 48VDC (REQUIRED)
ALTERNATE 120V AC SOURCE (REQUIRED)
TO MOTOR OPERATORS (OPTIONAL)
(TO A13A21-11) PBS
SYNC TO UTILITY (TO A13A21-56)
+20V. (TO A13)
GND (TO A13)
-20V. (TO A13)
C 110 611 334
LOGIC POWER SUPPLY AND RELAY PANEL
MODEL 400 U.P.S.
(REF. 101 618 001) 1A27
EXIDE POWER SYSTEMS DIVISION
C 110 611 334

08538 2471



D110 251 140
LOGIC COMMAND (+12V=GATE) 623
INPUT SIGNAL LEVEL CONN'S (EDGE-BOARD)
300 GROUND (BOTH LOGIC AND DRIVER PWR SUPPLY)
LEG TEST CONNECTIONS
LEG POSITION INDICATION SIGNAL (LOGIC "0" = READY; "1" = UNPLUGGED)
(REF 101072109 FOR GATE CONTROL MODULE)
(UNUSED)
(DISTRIBUTION)
(BRIDGE ASSEMBLY)
POWER CONNECTIONS
(NO CONN.)
(SENSOR)
(SOURCE)
COLLECTOR
EMITTER
ANODE
CATHODE
(REF 101250341 FOR 5SW LEG 200V)
(REF 101250378 FOR 5SW LEG 300V)
(REF 101250364 FOR 5SW LEG 480V)
STATIC BYPASS POWER CIRCUIT AND GATE CONTROL MODULE
110 251 140

08598 2472



NOTES:

1. 208V SHOWN, USING TERM H2 ON T1 THRU T6 FOR 380V USE TERM H3

EXIDE POWER SYSTEMS DIVISION

Exide

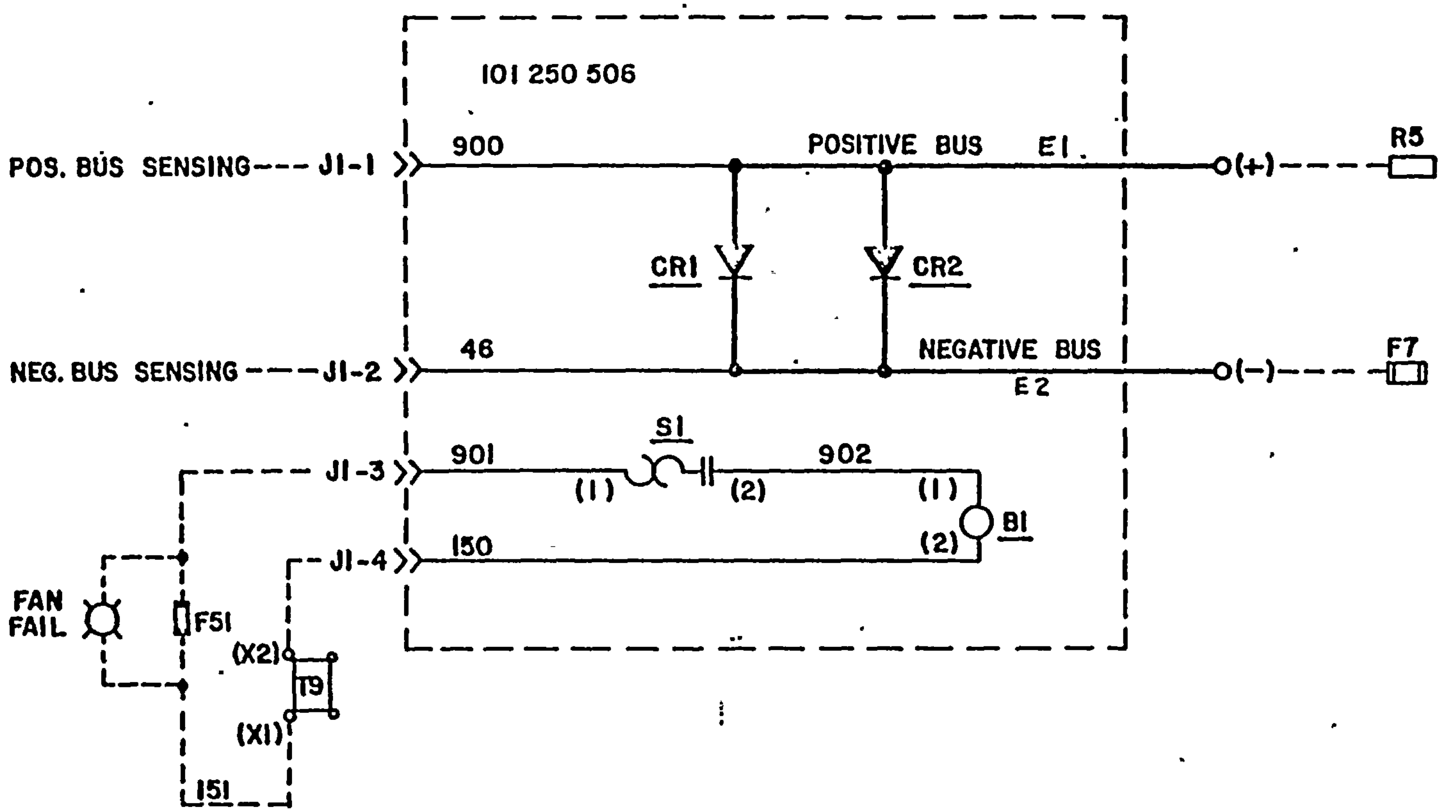
SCHEMATIC DIAGRAM STATIC SWITCH CONTROL MODULE A34 208 & 380V & 415V

C 110 251 156

C 110 251 156

08508 2473

A 110 251 187



EXIDE POWER SYSTEMS DIVISION
ESB INCORPORATED
RALEIGH N.C.

Exide

SCHEMATIC DIAGRAM
BLOCKING DIODE
600A, 800V DC

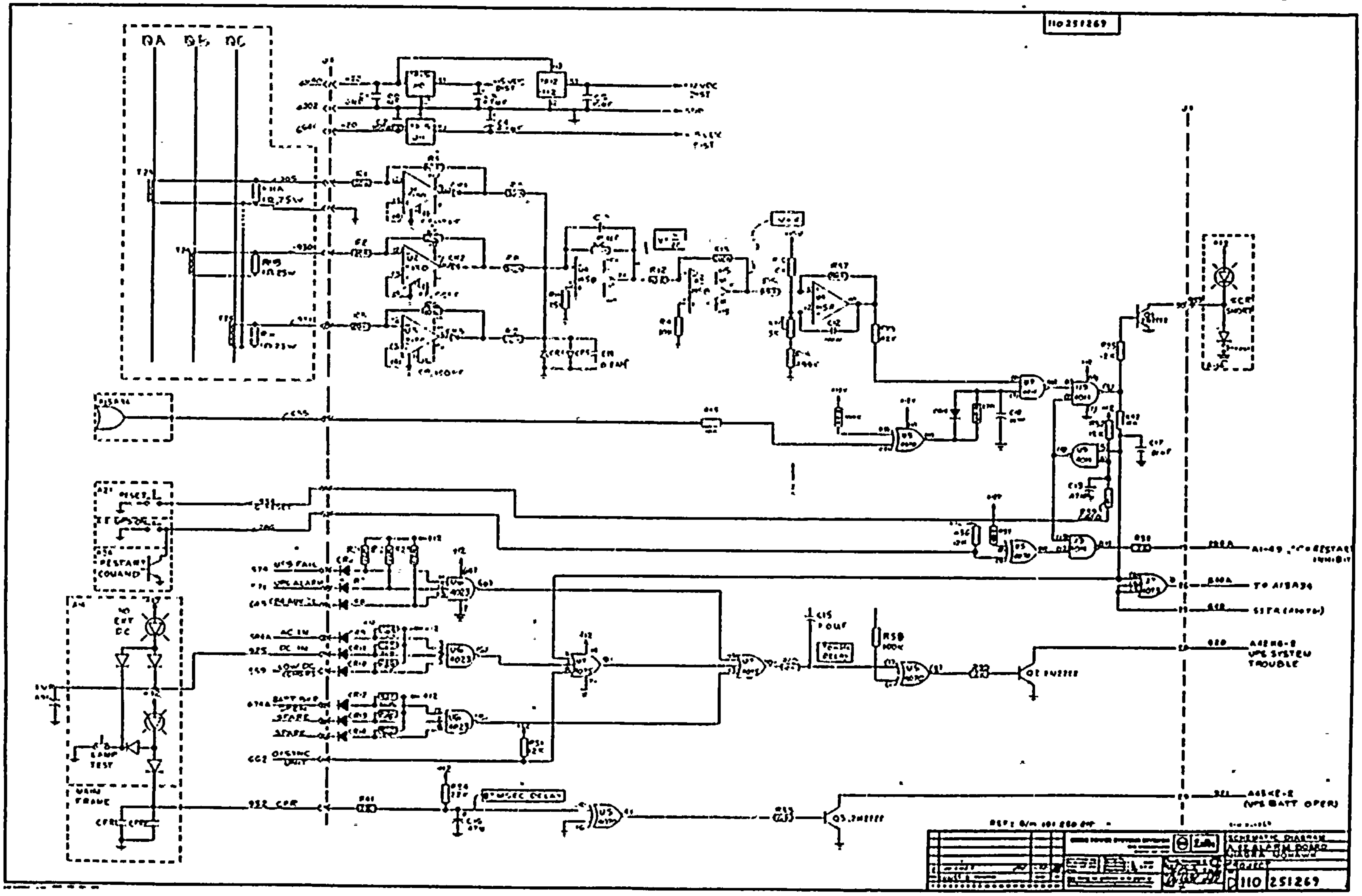
REV.	DESCRIPTION		DATE	AP.
—	CN-C155-9		1-9-81	

1 ② ③ 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

DR KD 10-24-78
CK 11/3/78
AP 11-3-78
SCALE

A 110 251 187

ESB 169 901, 003



02/02/81

08508 2474

[illegible]

Φ7-Φ45-91

8/19/91 - ch2 - is 10x probe but screen shows as 1X - multy x10

W-5 - decay of +20 vdc ps - turning logic power off Inv. off

ch-1 +20 vdc wire 300 common 300
ch-2 - Ac in to pwrsupply - wire 243
W-1 - pwr tool on logic

W-2 with Inverter running

W-3 - Dc down + returned

W-4 UPS tripped on decrease of A maint volt. = decrease of 2.5 vdc

W-5 Same

W-6 - Ac lowered to drop out K5

W-7 - Dc lowered to 18.5 vdc then opened + closed varrac switch

W-8 - Same as W-7 but with 120 VAC and 88 vac