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Houston Lighting & Power South Texas Project Electric Generating Station P. O. Box 308 Bay City, Texas 77414

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 205455

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
AMSAC Diversity

REFERENCES: A. Additional information concerning AMSAC, M. R. Wisenburg, HL&P Letter to the NRC; December 22, 1987; ST-HL-AE-2444.

B. Acceptance for Referencing of Licensing Topical Report, Charles E. Rossi, NRC Letter to L. D. Butterfield, WOG; July 7, 1986.

Reference A provided additional information requested by the NRC staff to support review of South Texas Project's AMSAC submittal (FSAR Section 7.8). Subsequent staff review raised additional questions concerning diversity between the Reactor Trip System and AMSAC, as implemented at STP. Specific NRC staff concerns related to (1) the microprocessors used in AMSAC and in the Steam Generator Water Level Compensation System (SGWLCS) portion of the Reactor Trip System (RTS), and (2) the isolation relays used in the actuation circuits. Additional information which is expected to be sufficient to resolve these diversity issues is provided in the Attachments.

FSAR Figure 7.8-2, Composite AMSAC Logic Diagram, which was requested by the NRC staff and provided in draft form by reference A, has been modified to better show the output actuation logic. Copies are provided as Attachment 3.

If you should have any questions on this matter, please contact Mr. A. W. Harrison at (512) 972-7298.

M. A. McBurnett
Manager, Operations Support Licensing

MAM/THC/sls

Attachments: 1. AMSAC/SGWLCS Microprocessor Diversity
2. AMSAC/RTS Isolation Device Diversity
3. Composite AMSAC Logic Diagram, FSAR Figure 7.8-2

B021
1/1

THC001/a

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AMSAC/SGWLCS MICROPROCESSOR DIVERSITY

STP FSAR Section 7.8.1.1.7 indicated that "some microprocessor boards" are common in both AMSAC and SGWLCS. There are actually several Microprocessors in each system. An Intel SBC 8614 board containing an Intel 8086 CPU is utilized for each of the three Actuation Logic Processors (ALP) in AMSAC. As the name would imply, the ALPs are the main processors and they generate the actuation signals. SGWLCS utilizes an Intel SBC 8840 board containing an Intel 8088 CPU as its main processor for Steam Generator water level signals. In addition to the hardware differences, the software for those two systems was developed separately, and is different.

Those Microprocessor Boards which are common between the two systems are peripheral boards which are utilized for testing. There is no potential for common mode failure; operation of these microprocessors does not affect the ability of the main CPUs to perform their actuation signal processing functions.

Therefore, we believe that diversity to the extent reasonable and practical to minimize the potential for common cause failures has been provided as required by the safety evaluation of Reference B.

AMSAC/RTS ISOLATION DEVICE DIVERSITY

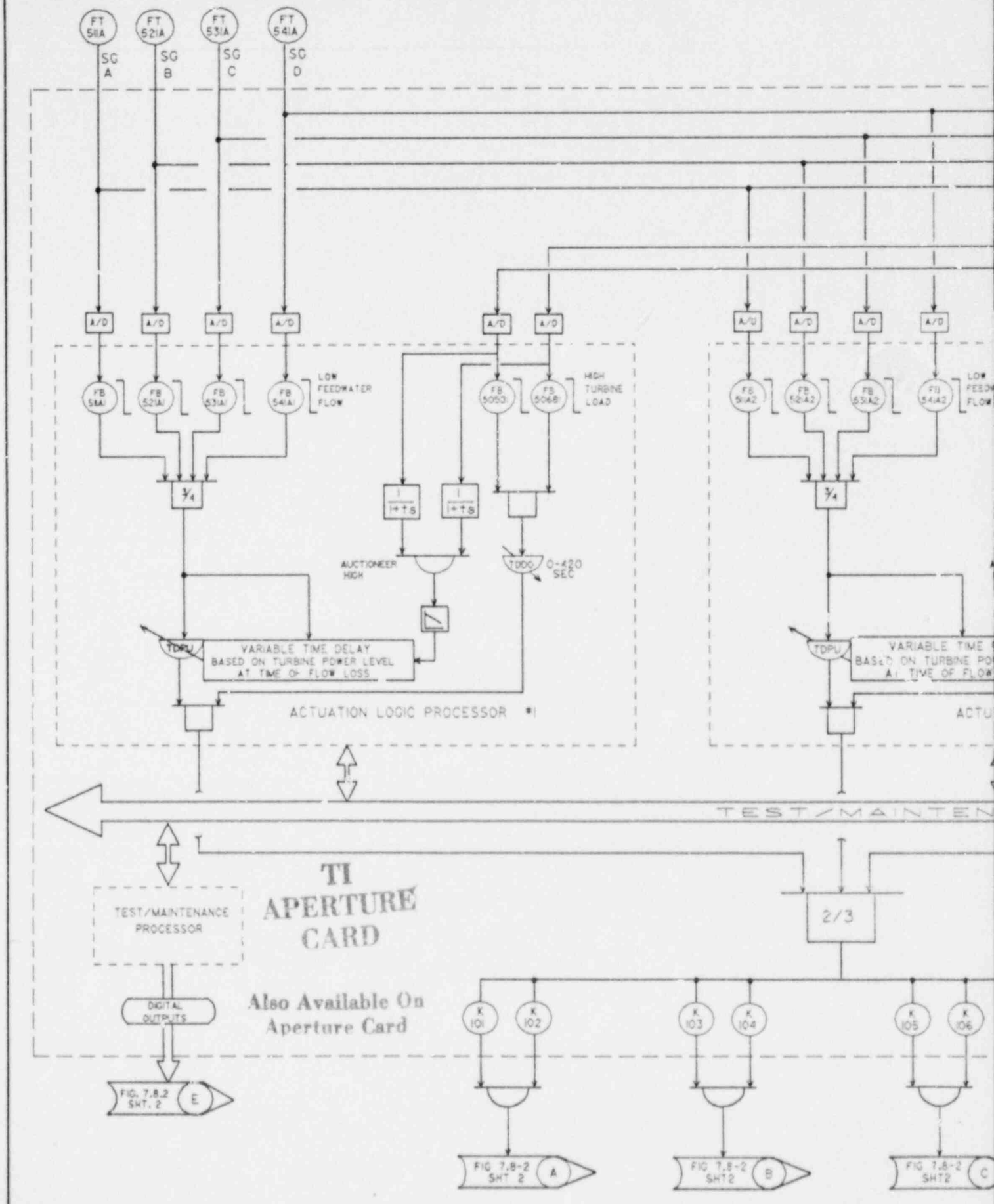
Potter and Brumfield MDR Relays are used as isolation devices between AMSAC and the Reactor Trip System (RTS) and Engineered Safeguards Features Actuation System (ESFAS) as discussed in FSAR Section 7.8.1.1.6.

These relays have a large installed industrial base with a long history of demonstrated reliability. This reliability includes both circuit operability and maintenance of the isolation barrier. MDR relays have been utilized in many nuclear power plants as isolation devices and have been previously accepted by the NRC staff for this application at STP.

The safety evaluation of Reference B recognizes that the probabilities of RTS unavailability with AMSAC availability are similar with or without addition of diverse isolators. With the addition of a diverse isolator, the probability of not getting a reactor trip signal or AMSAC signal would be increased somewhat by the failure rate of the diverse isolator. For these reasons, use of existing isolators is deemed acceptable. The acceptability of these isolators is stated in the plant specific information section of the safety evaluation under "Electrical independence from existing reactor protection system" (pg. 15).

It should also be noted that MDR relays are used as isolation devices in the ESFAS but not the RTS. That is, MDR relays exist in the signal path to actuate Auxiliary Feedwater (AFW) through either AMSAC or ESFAS, but they do not exist in the RTS signal path to trip the reactor. Should a common mode failure of MDR relays be postulated during an event, the reactor trip would function and no Anticipated Transient Without Scram (ATWS) would occur; therefore, AMSAC would not be required to function.

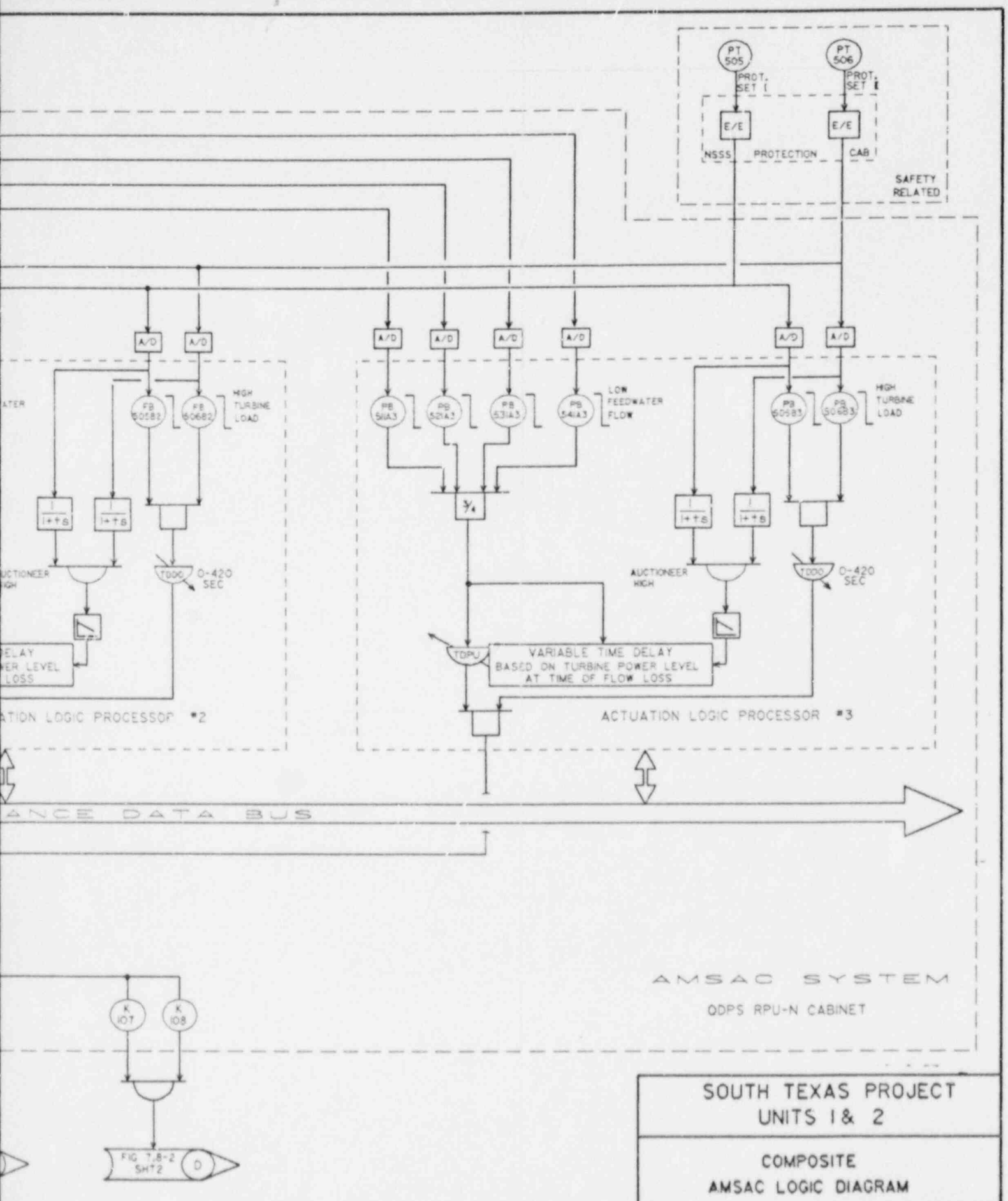
We believe that, in the case of isolation devices, diversity to the extent reasonable and practical to minimize the potential for common cause failures has been provided as required by the safety evaluation of Reference B.



TI APERTURE CARD

Also Available On Aperture Card

REFER TO SHEET 2 FOR NOTES AND REFERENCES



SOUTH TEXAS PROJECT
UNITS 1 & 2

COMPOSITE
AMSAC LOGIC DIAGRAM

FIGURE 7.8.2 SHEET 1 AMENDMENT

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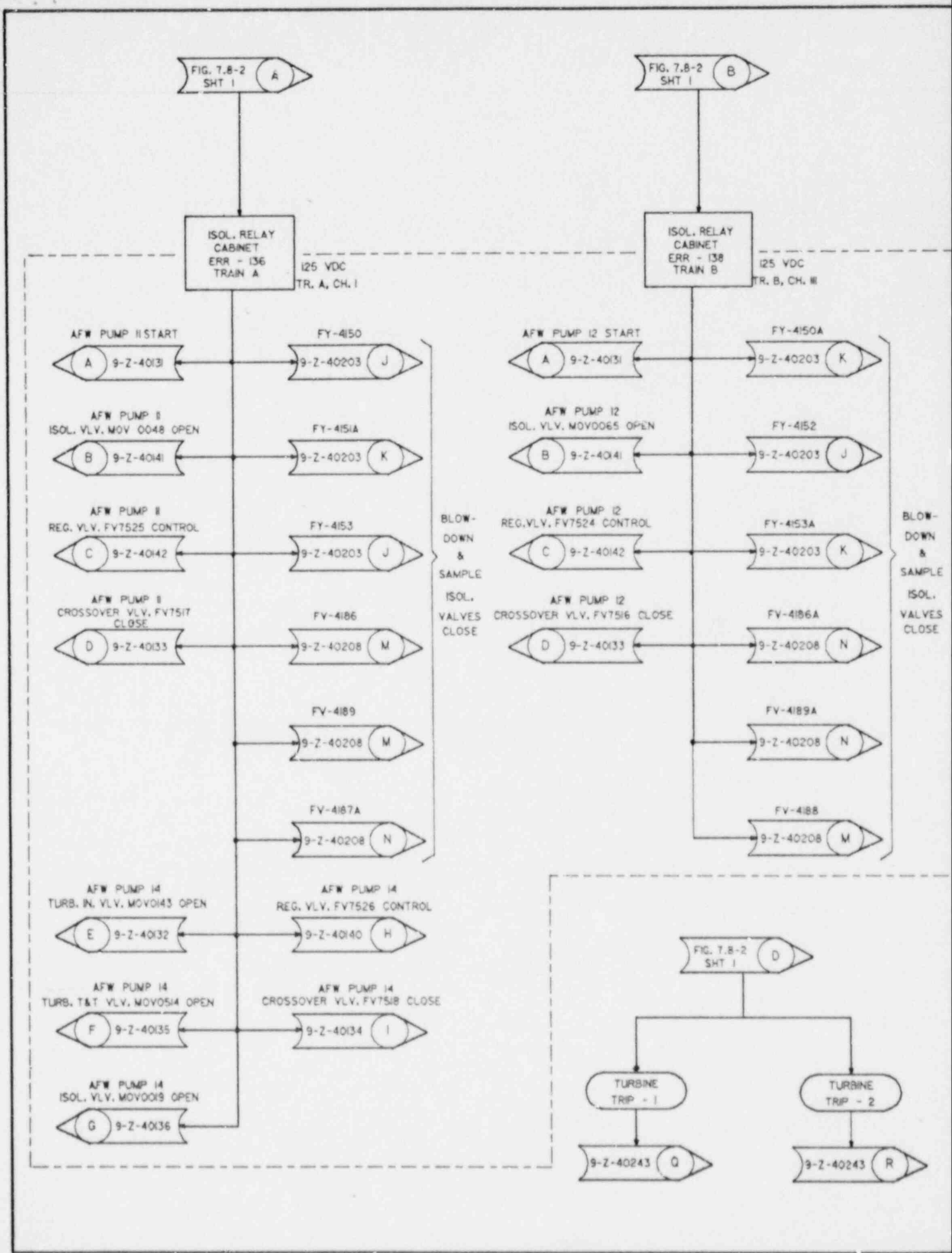
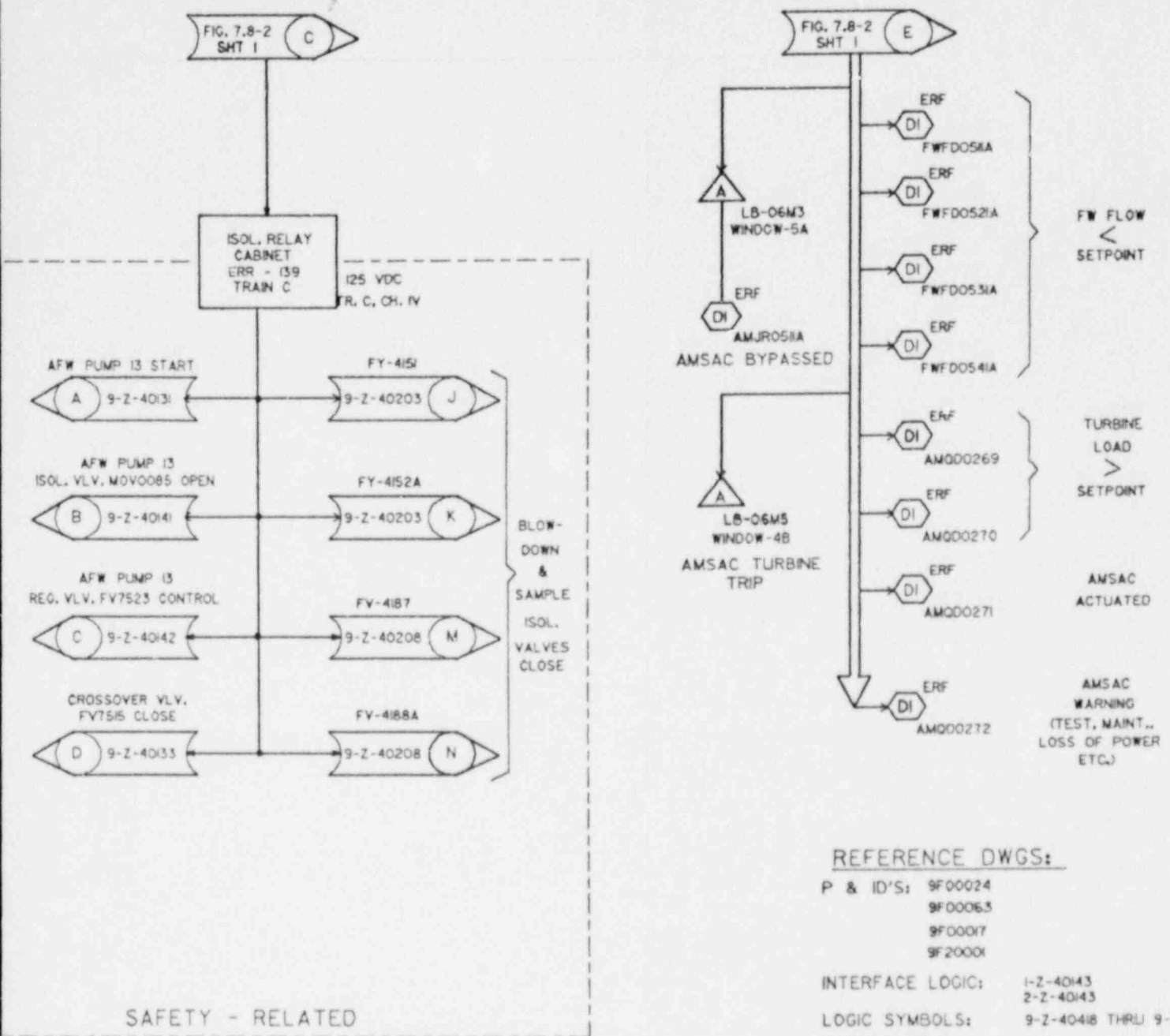


FIG. 7.8-2 SHT 1 A
FIG. 7.8-2 SHT 1 B
ISOL. RELAY CABINET ERR - 136 TRAIN A
125 VDC TR. A, CH. 1
ISOL. RELAY CABINET ERR - 138 TRAIN B
125 VDC TR. B, CH. III
AFW PUMP 11 START
A 9-Z-40131
FY-4150
9-Z-40203 J
AFW PUMP 12 START
A 9-Z-40131
FY-4150A
9-Z-40203 K
AFW PUMP 11 ISOL. VLV. MOV 0048 OPEN
B 9-Z-40141
FY-4151A
9-Z-40203 K
AFW PUMP 12 ISOL. VLV. MOV0065 OPEN
B 9-Z-40141
FY-4152
9-Z-40203 J
AFW PUMP 11 REG. VLV. FV7525 CONTROL
C 9-Z-40142
FY-4153
9-Z-40203 J
AFW PUMP 12 REG.VLV. FV7524 CONTROL
C 9-Z-40142
FY-4153A
9-Z-40203 K
BLOW-DOWN & SAMPLE ISOL. VALVES CLOSE
AFW PUMP 11 CROSSOVER VLV. FV7517 CLOSE
D 9-Z-40133
FY-4186
9-Z-40208 M
AFW PUMP 12 CROSSOVER VLV. FV7516 CLOSE
D 9-Z-40133
FY-4186A
9-Z-40208 N
FY-4189
9-Z-40208 M
FY-4189A
9-Z-40208 N
FY-4187A
9-Z-40208 N
FY-4188
9-Z-40208 M
AFW PUMP 14 TURB. IN. VLV. MOV0143 OPEN
E 9-Z-40132
AFW PUMP 14 REG. VLV. FV7526 CONTROL
9-Z-40140 H
AFW PUMP 14 TURB. T&T VLV. MOV0514 OPEN
F 9-Z-40135
AFW PUMP 14 CROSSOVER VLV. FV7518 CLOSE
9-Z-40134 I
AFW PUMP 14 ISOL. VLV. MOV0019 OPEN
G 9-Z-40136
FIG. 7.8-2 SHT 1 D
TURBINE TRIP - 1
TURBINE TRIP - 2
9-Z-40243 Q
9-Z-40243 R



REFERENCE DWGS:

P & ID'S: 9F00024
9F00063
9F00017
9F20001

INTERFACE LOGIC: 1-Z-40143
2-Z-40143

LOGIC SYMBOLS: 9-Z-40418 THRU 9-Z-40421

VENDOR DWGS:

AMSAC TERMINATIONS: 038-(1)-0006/WN
038-(3)-0005/WN

PCC TERMINATIONS: 0320-(1)-00020

ERFDADS TERMINATIONS: 1-Z-47517
2-Z-47517

INTERFACE ELECTRICAL: 1E-AM-14-01
1E-AM-14-02
1E-AM-14-03

NOTES:

1. THIS DWG REPRESENTS FUNCTIONAL REQUIREMENTS ONLY.
2. AMSAC POWER - 120 VAC, 60HZ, 1Ø FROM NON-CLASS 1E UPS.
3. EQUIPMENT SHOWN ON THIS DWG IS NON-SAFETY RELATED, EXCEPT AS OTHERWISE NOTED.

SOUTH TEXAS PROJECT
UNITS 1& 2

COMPOSITE
AMSAC LOGIC DIAGRAM

FIGURE 7.8.2 SHEET 2 AMENDMENT