

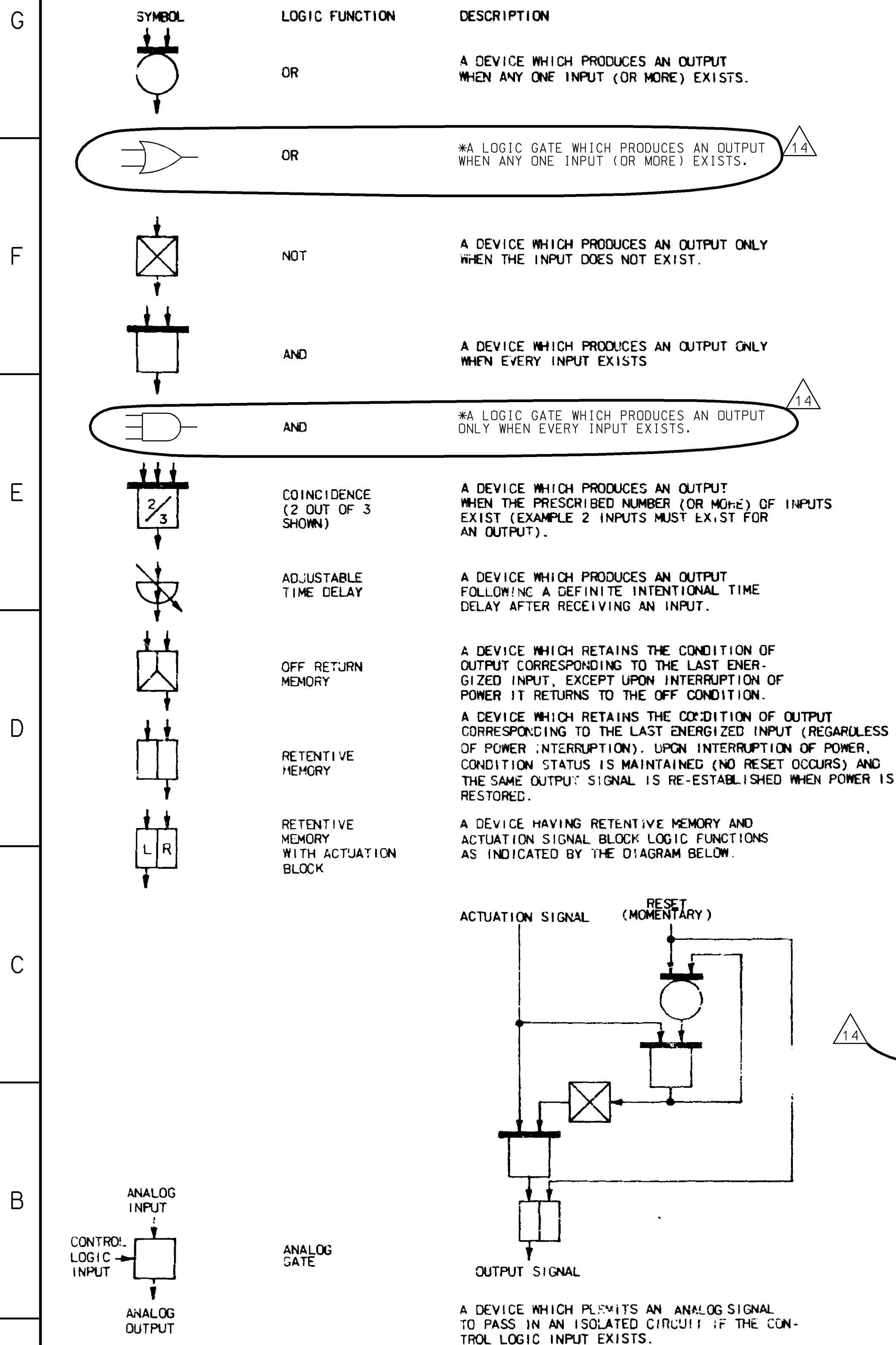
Rev. OL-0
6/86

CALLAWAY PLANT

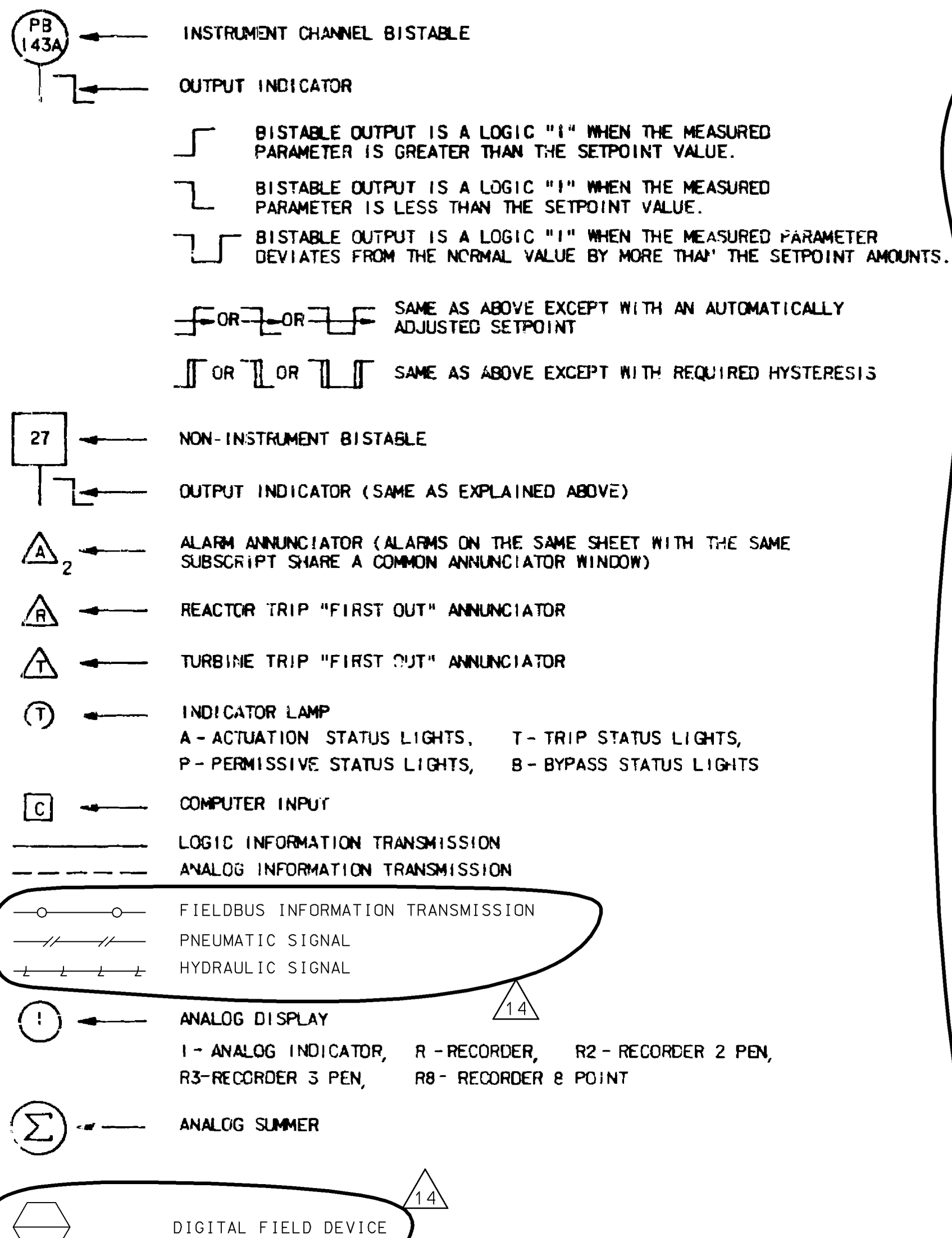
FIGURE 7.1-1

PROTECTION SYSTEM BLOCK DIAGRAM

LOGIC SYMBOLS



ADDITIONAL SYMBOLS



GENERAL NOTES: (FOR ALL SHEETS)

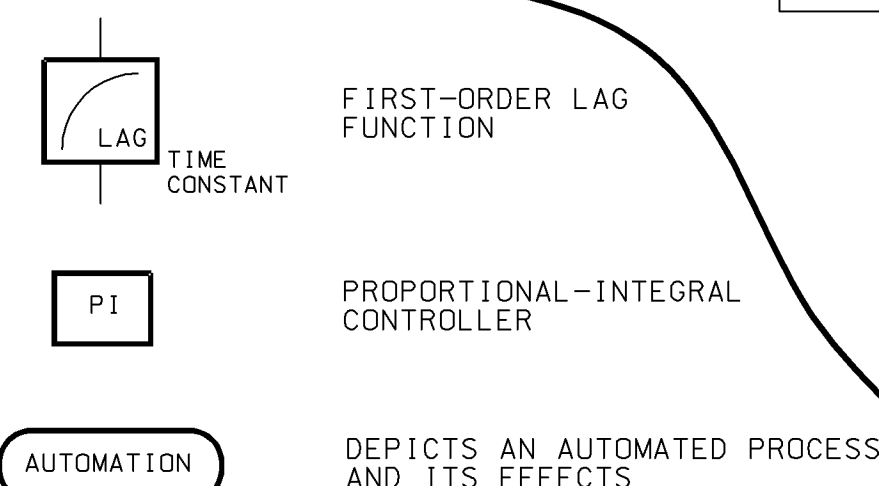
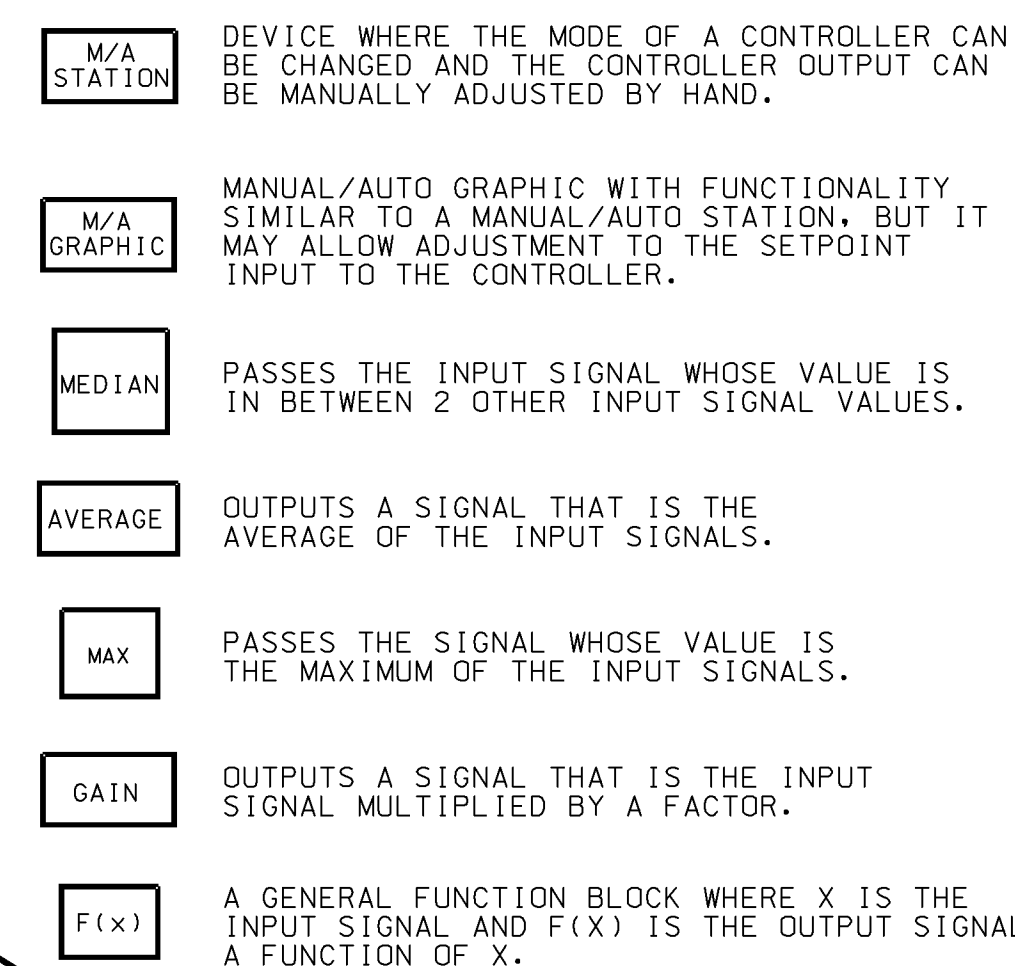
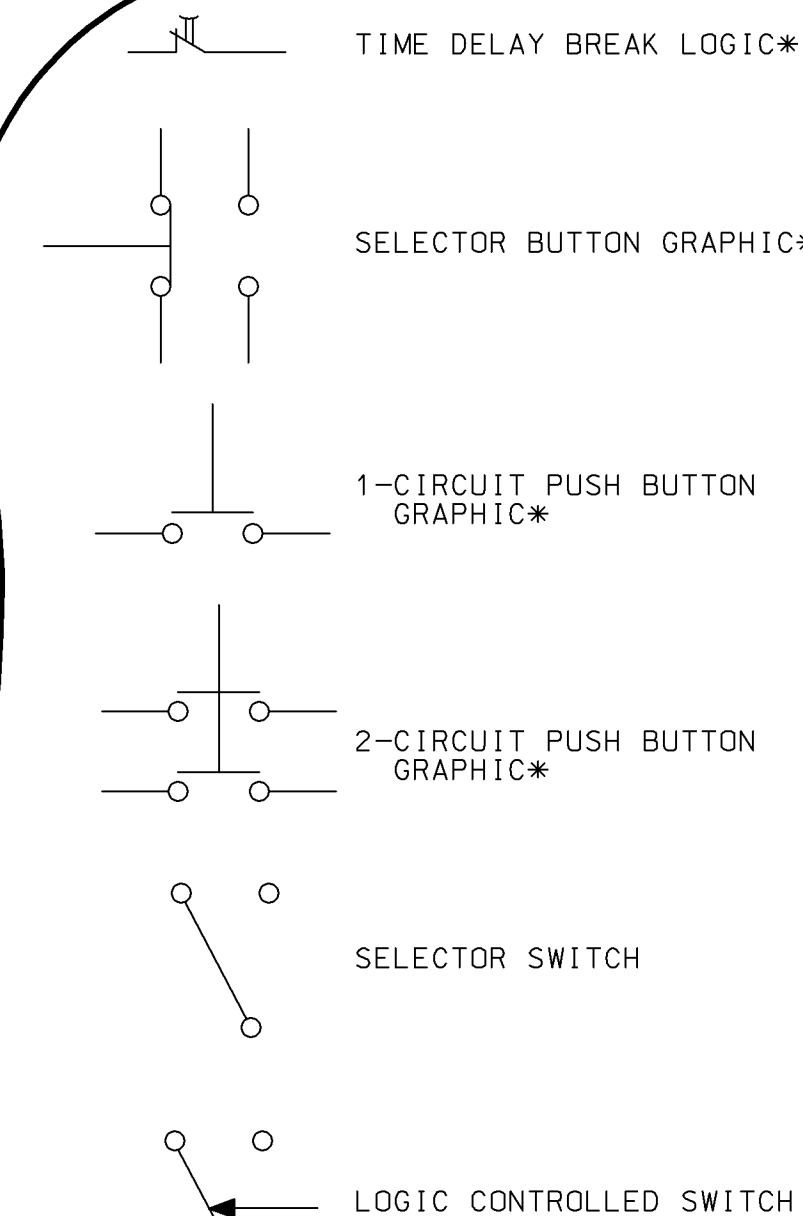
- IN ALL LOGIC CIRCUITS, THE INDICATED ACTUATION OF A SYSTEM OR DEVICE OCCURS WHEN A LOGIC "1" SIGNAL IS PRESENT. EXCEPT WHERE INDICATED OTHERWISE, ALL BISTABLES ARE "DC-ENERGIZE TO ACTUATE" SUCH THAT A LOGIC 1 SIGNAL IS DEFINED TO BE PRESENT WHEN THE BISTABLE OUTPUT VOLTAGE IS OFF.
- EXCEPT IN DIGITAL FEEDWATER CONTROL AND WHERE INDICATED OTHERWISE, THE FOLLOWING IS TRUE: ALL LOGIC CIRCUITS ARE REDUNDANT THAT IS EVERY LOGIC CIRCUIT SHOWN HAS A DUPLICATE LOCATED IN A SEPARATE CABINET. ALL BISTABLES, CIRCUIT BREAKERS, ANNUNCIATORS, COMPUTER INPUTS, AND INDICATOR LAMPS ARE NOT REDUNDANT. MANUAL CONTROLS DO NOT HAVE REDUNDANT ACTUATORS, BUT DO HAVE REDUNDANT CONTACTS WHERE LOGIC IS REDUNDANT. ALL INDICATOR LAMPS, ANNUNCIATORS, AND COMPUTER INPUTS ARE CONNECTED TO BOTH TRAINS (WHERE LOGIC IS REDUNDANT) SO THAT A SIGNAL IN EITHER TRAIN WILL ACTUATE.
- WHENEVER A PROCESS SIGNAL IS USED FOR CONTROL AND IS DERIVED FROM A PROTECTION CHANNEL, ISOLATION MUST BE PROVIDED.
- THIS SET OF DRAWINGS ILLUSTRATES THE FUNCTIONAL REQUIREMENTS OF THE REACTOR CONTROL AND PROTECTION SYSTEM, INCLUDING ENGINEERED SAFEGUARDS. THESE DRAWINGS DO NOT REPRESENT ACTUAL HARDWARE IMPLEMENTATION. FOR HARDWARE IMPLEMENTATION, REFER TO THE FOLLOWING LIST:
FUNCTIONAL DIAGRAM
REACTOR PROTECTION SYSTEM (SHEETS 1 TO 6 AND 15 TO 16)
REACTOR CONTROL SYSTEM (SHEETS 9 TO 14 AND 17 TO 18)
BLOCK OR WIRING DIAGRAM
DRAWING NUMBERS: 5655D49, 5655D50, 5655D51, 8756D37, 1189E15, 271C335, 7243D59, 1084H37
DRAWING NUMBERS: 5655D52, 271C335, 8756D37
- FOR THIS SET OF DRAWINGS ALL SWITCHES, PUSHBUTTONS, ANNUNCIATORS, AND INDICATORS (EXCEPT FOR THE M.E.S. PROCESS SYSTEMS INDICATORS, CONTROLLERS, AND MANUAL-AUTO STATIONS) WHICH ARE MOUNTED ON THE MAIN CONTROL BOARD ARE SUPPLIED BY OTHERS. IN ADDITION TO THE ABOVE, SCOPE BY OTHERS IS ALSO INDICATED DIRECTLY ON SHEETS WITHIN THIS SET.

DEVICE FUNCTION LETTERS AND NUMBERS

FB	FLOW CHANNEL
LB	LEVEL CHANNEL
NC	NUCLEAR CHANNEL
PB	PRESSURE CHANNEL
RC	RADIATION CHANNEL
SB	SPEED CHANNEL
TB	TEMPERATURE CHANNEL
ZB	POSITION CHANNEL
20	ELECTRIC OPERATED VALVE
27	UNDERVOLTAGE RELAY
33	POSITION SWITCH
52	AC CIRCUIT BREAKER
63	PRESSURE SWITCH
71	LEVEL SWITCH
80	FLOW SWITCH
81	UNDERFREQUENCY RELAY
ZC	POSITION CONTROLLER

REV.	DATE
10	111303
DRAWN CHKD. SUPV.	
MAL EWM TWS	
REFLECTS TURNOVER TO U.E.	
REV.	DATE
11	121205
DRAWN CHKD. SUPV.	
JHK MAL TWS	
INCORPORATE	
MP 04-1004.	
REV.	DATE
12	062206
DRAWN CHKD. SUPV.	
RLW EWM TWS	
INCORPORATE	
AC 06-000073, CAR 200603300.	
DELETED SUBMITTAL STATUS FROM TABLE.	
REV.	DATE
13	092806
DRAWN CHKD. SUPV.	
RLW EWM TWS	
INCORPORATE	
MP 03-1002	
FCN-10 PER ENGINEER DIRECTION.*	

REV.	DATE
14	112013
DRAWN CHKD. SUPV.	
RLW MAL LMP	
INCORPORATE	
MP 03-1002	
FCN-10 PER ENGINEER DIRECTION.*	



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TITLE	SH. NO.
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PRIMARY COOLANT SYSTEM TRIP SIGNALS	5
PRESSURIZER TRIP SIGNALS	6
STEAM GENERATOR TRIP SIGNALS	7
SAFEGUARDS ACTUATION SIGNALS	8
ROD CONTROLS & ROD BLOCKS	9
STEAM DUMP CONTROL	10
PRESSURIZER PRESSURE & LEVEL CONTROL	11
PRESSURIZER HEATER CONTROL	12
FEEDWATER CONTROL & ISOLATION	13
FEEDWATER CONTROL & ISOLATION	14
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STANDARDIZED NUCLEAR UNIT POWER
PLANT SYSTEM PROJECTS

UNIT: SCP S.O.: 300
STATUS: TURNED OVER TO U.E.
SPIN: AASFED

DRAWING NO. REV.
7250D64-S001 014

DATE: 9-27-88	BY: [Signature]	CHKD: [Signature]	DATE: 9-27-88
DES. ENG. [Signature]	DATE: 9-27-88	DATE: 9-27-88	DATE: 9-27-88
APP. [Signature]	DATE: 9-27-88	DATE: 9-27-88	DATE: 9-27-88
DATE: 9-27-88	DATE: 9-27-88	DATE: 9-27-88	DATE: 9-27-88
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DATE: 9-27-88	DATE: 9-27-88	DATE: 9-27-88	DATE: 9-27-88

Westinghouse Electric Corporation
NUCLEAR ENERGY SYSTEMS, PITTSBURGH, PA., U.S.A.

SHUPPS PROJECTS
FUNCTIONAL DIAGRAM
INDEX AND SYMBOLS

7250D64

SHEET 1

SCALE

DIMENSIONS IN INCHES

DO NOT SCALE

3-12

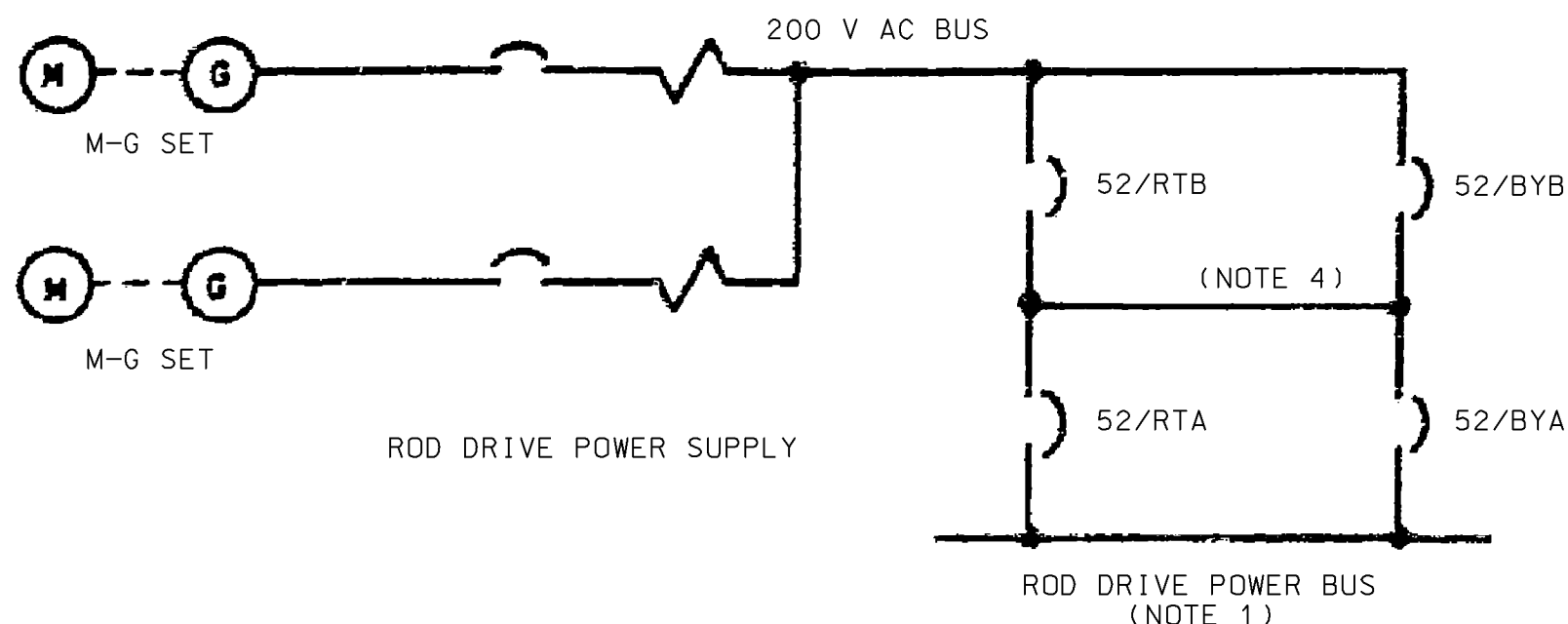
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3-12

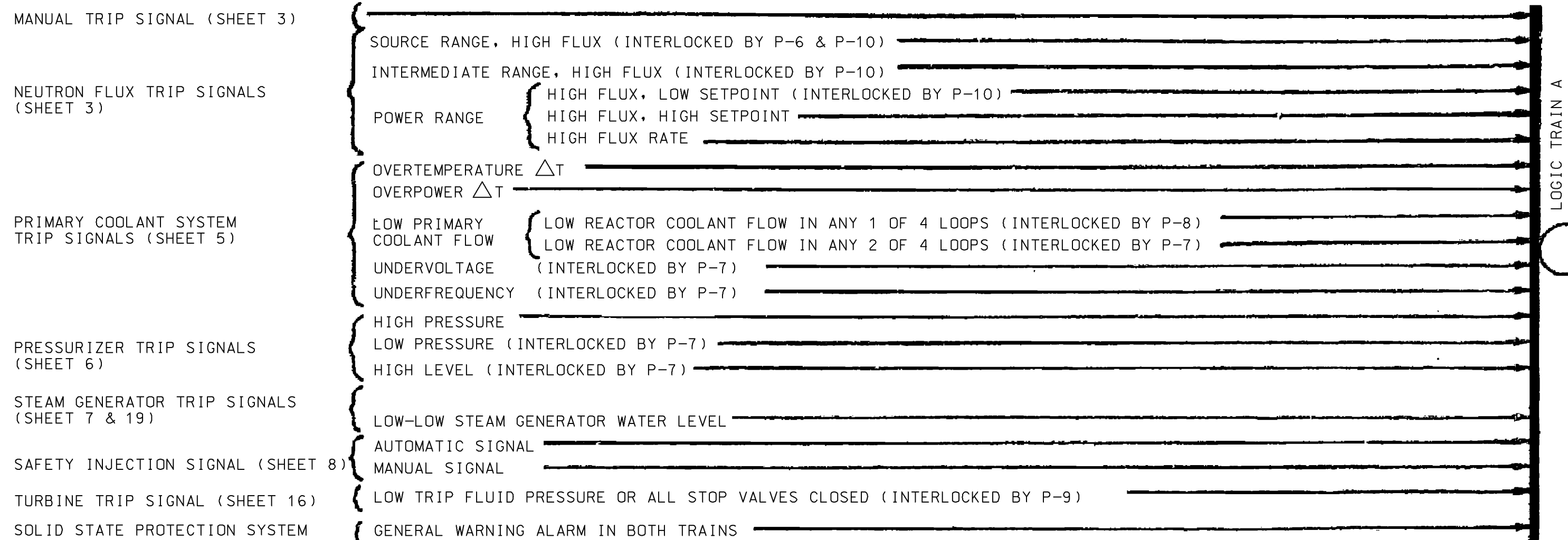
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3-12

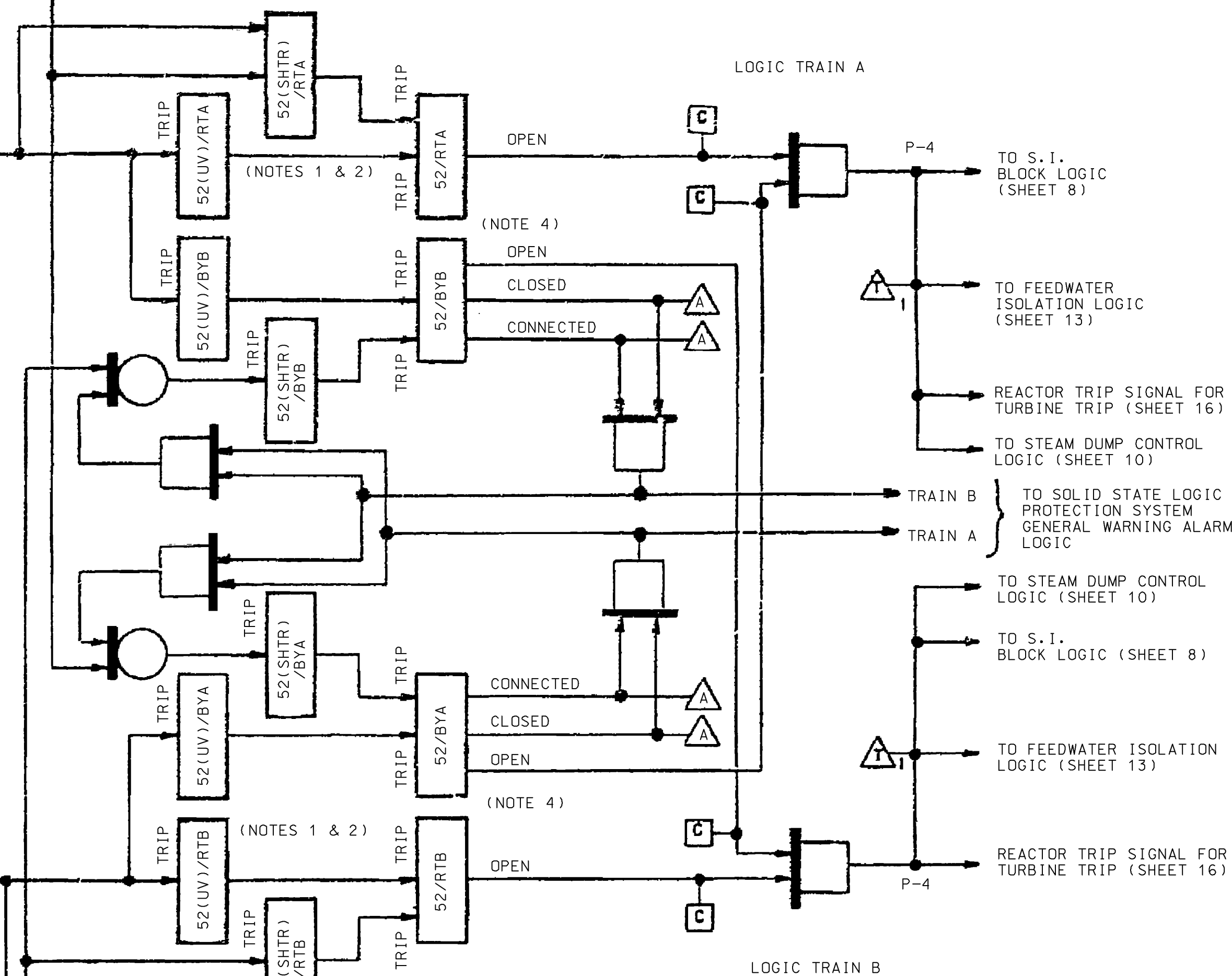
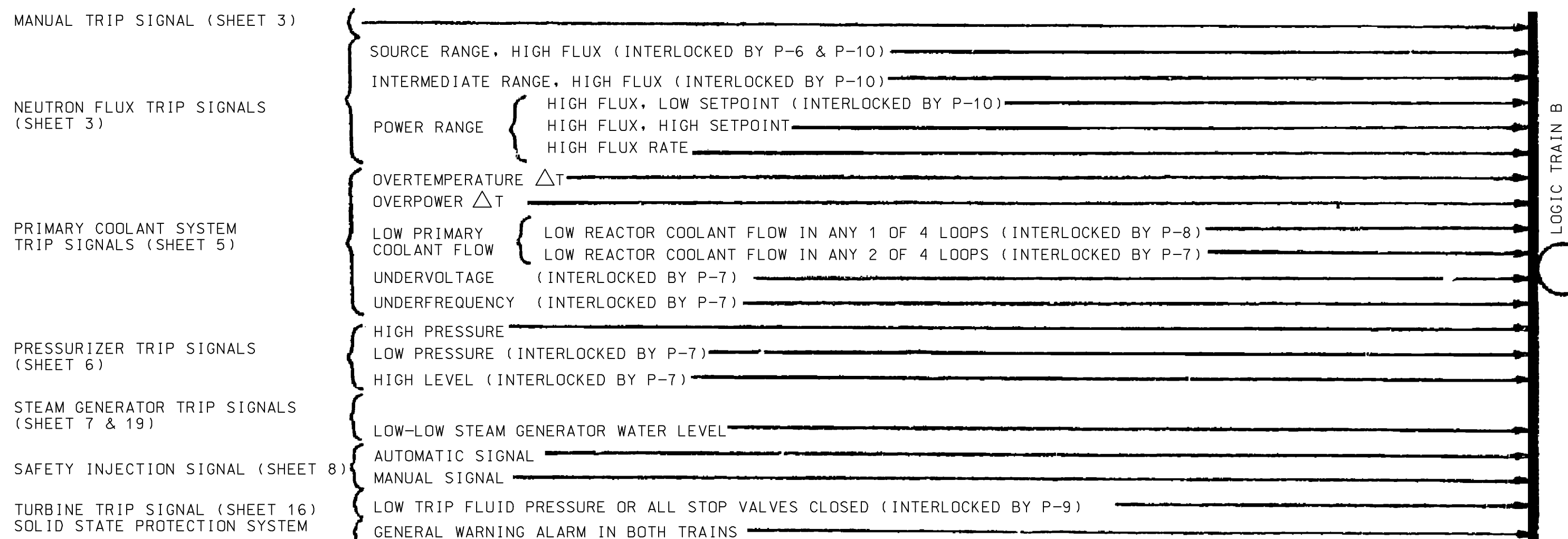
ROD DRIVE SUPPLY ONE LINE DIAGRAM

REACTOR TRIP
SWITCHGEAR

MANUAL REACTOR TRIP SIGNAL (SHEET 3) ~~_____~~
MANUAL SAFETY INJECTION SIGNAL (SHEET 8)





TRAIN 8 REACTOR SHUNT TRIP SIGNALS



1. TRIPPING THE REACTOR TRIP BREAKERS 52/RTA AND 52/RTB REDUNDANTLY DE-ENERGIZES THE ROD DRIVES. ALL FULL LENGTH CONTROL RODS AND SHUTDOWN RODS ARE THEREBY RELEASED FOR GRAVITY INSERTION INTO THE REACTOR CORE.
2. NORMAL REACTOR OPERATION IS TO BE WITH REACTOR TRIP BREAKERS 52/RTA AND 52/RTB IN SERVICE AND BY-PASS BREAKERS 52/BYA AND 52/BYB WITH TRAIN. DURING TEST, ONE BY-PASS BREAKER IS TO BE PUT IN SERVICE AND THEN THE RESPECTIVE REACTOR TRIP BREAKER IS OPERATED USING A SIMULATED REACTOR TRIP SIGNAL IN THE TRAIN UNDER TEST. THE REACTOR WILL NOT BE TRIPPED BY THE SIMULATED SIGNAL SINCE THE BY-PASS BREAKER IS CONTROLLED FROM THE OTHER TRAIN. ONLY ONE REACTOR TRIP BREAKER IS TO BE TESTED AT A TIME.
3. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT BECAUSE BOTH TRAINS ARE SHOWN.
4. OPEN/CLOSED INDICATION FOR EACH TRIP BREAKER AND EACH BYPASS BREAKER IN CONTROL ROOM.
5. DELETED.

DRAWING NO.	REV.
7250D64-S002	006

DESK ASBY DES DING	DFTM		Westinghouse Electric Corporation 	
	CHA		NUCLEAR ENERGY SYSTEMS PITTSBURGH PA U S A	
	DES ENG		TITLE	
	WFG ENG		SNUPPS PROJECT'S	
	WTLG ENG		FUNCTIONAL DIAGRAM	
	APP		REACTOR TRIP SIGNALS	
	APP		SCALE	7250D64
	DTG SUPV		DIMENSIONS IN INCHES	SHEET 2
	DO NOT SCALE	SUB 345		

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS	
UNIT: SCP	S.O.: 300
STATUS: TURNED OVER TO UE	
SPIN: AASFED	

MANUAL REACTOR TRIP SIGNAL (SHEET 3) —
MANUAL SAFETY INJECTION SIGNAL (SHEET 8)

7250D64 S003

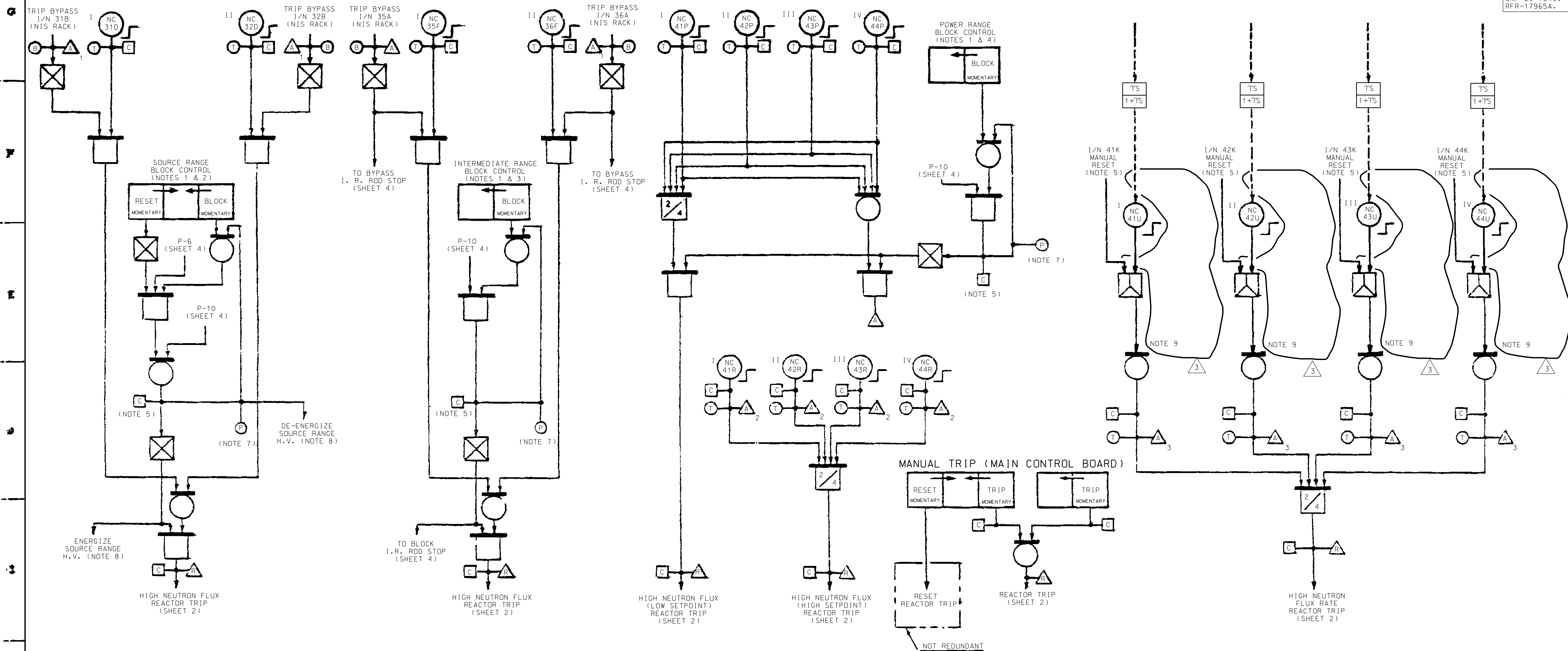
REV.	DATE	DRAWN
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CHKD.	SUPV.	APPD.
DLBT	LAMR	IN/A
REFLECTS TURN OVER TO U.E.		
INCORP.		
CMP 89-1049.		
RFR-17965A.		

SOURCE RANGE REACTOR TRIP

INTERMEDIATE RANGE REACTOR TRIP

POWER RANGE REACTOR TRIP

POWER RANGE HIGH NEUTRON FLUX RATE REACTOR TRIP



NOTES:

1. THE REDUNDANT MANUAL BLOCK CONTROLS CONSIST OF TWO CONTROLS ON THE CONTROL BOARD FOR EACH RANGE, ONE FOR EACH TRAIN.
2. I/N 33A IS IN LOGIC TRAIN A.
I/N 33B IS IN LOGIC TRAIN B.
3. I/N 38A IS IN LOGIC TRAIN A.
I/N 38B IS IN LOGIC TRAIN B.
4. I/N 47A IS IN LOGIC TRAIN A.
I/N 47B IS IN LOGIC TRAIN B.
5. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.
6. MANUAL RESET CONTROLS CONSIST OF FOUR MOMENTARY CONTROLS IN THE CONTROL ROOM, ONE CONTROL FOR EACH INSTRUMENT CHANNEL.
7. TWO PERMISSIVE STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.
8. EACH SOURCE RANGE FLUX DETECTOR IS ENERGIZED AND DE-ENERGIZED BY LOGIC OUTPUT FROM A SINGLE TRAIN. THE TWO SOURCE RANGE FLUX DETECTORS (N-31 AND N-32) ARE ON SEPARATE TRAINS.
9. NEGATIVE RATE TRIP BISTABLES ARE ABANDONED IN PLACE AND CAN BE FOUND ON DWG. 6079D29, SHT. 4.
10. ANY INSTRUMENT NUMBER WITH A FUNCTION CODE OF NC IS EQUIVALENT TO THE SAME NUMBER WITH A FUNCTION CODE OF NB.

Westinghouse Electric Corporation	
NUCLEAR ENERGY SYSTEMS, PITTSBURGH, PA., U.S.A.	
SNUPPS PROJECT	
FUNCTIONAL DIAGRAM	
NUCLEAR INSTR. & MANUAL TRIP SIGNALS	
7250D64	
SCALE	
DIMENSIONS IN INCHES	
DO NOT SCALE	

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS	
UNIT: SCP	SPIN: AASFED
STATUS: TURNED OVER TO U.E.	ITEM-9-1
S.O.: 300	

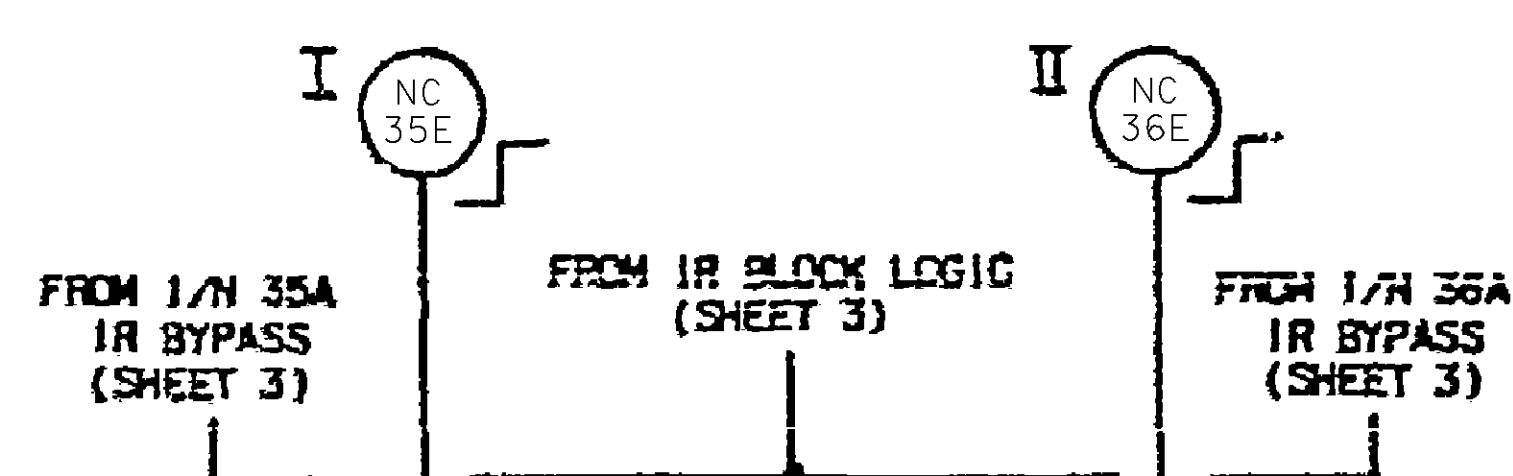
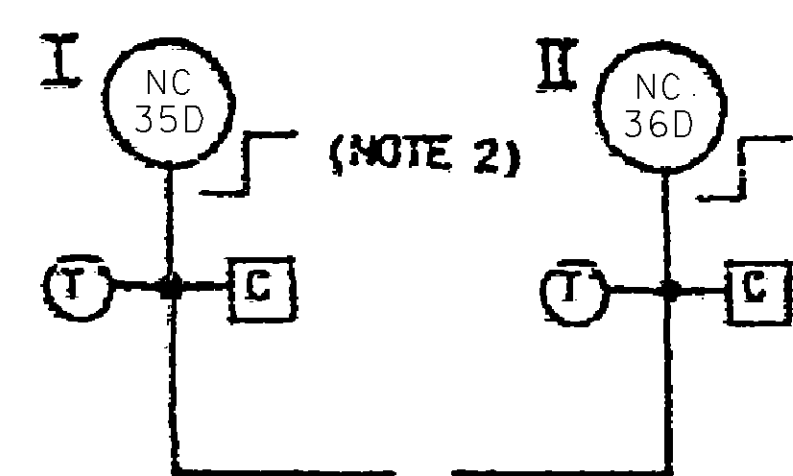
7250D64 S003

3

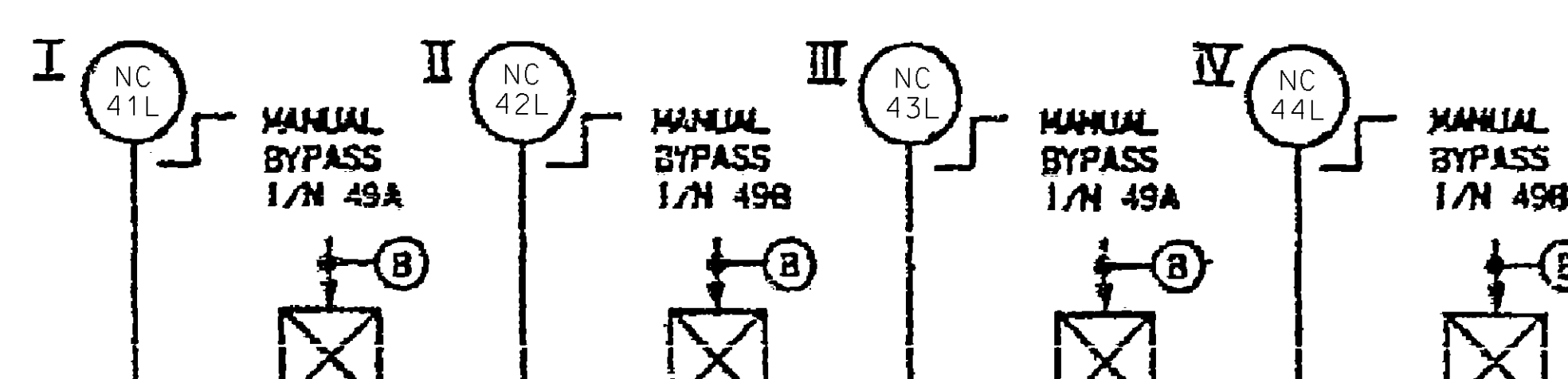
7250D64 S004

INTERMEDIATE RANGE

POWER RANGE

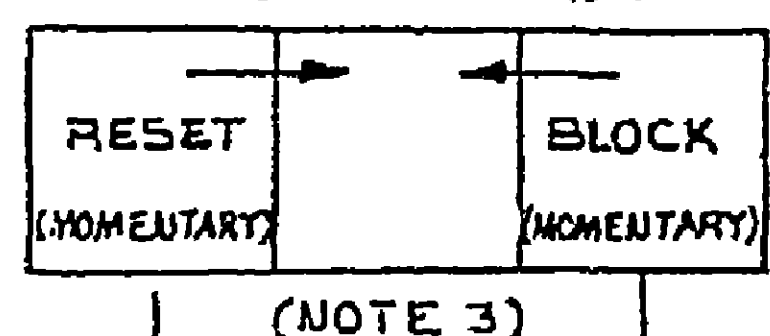
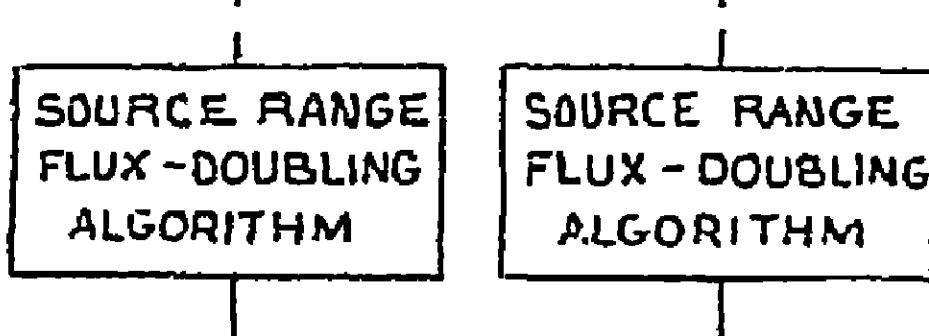
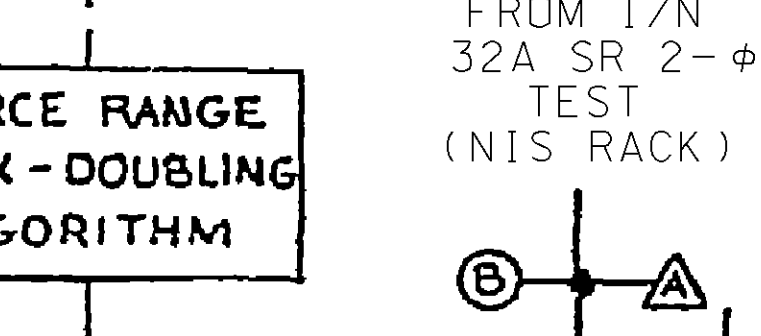


NOT REDUNDANT

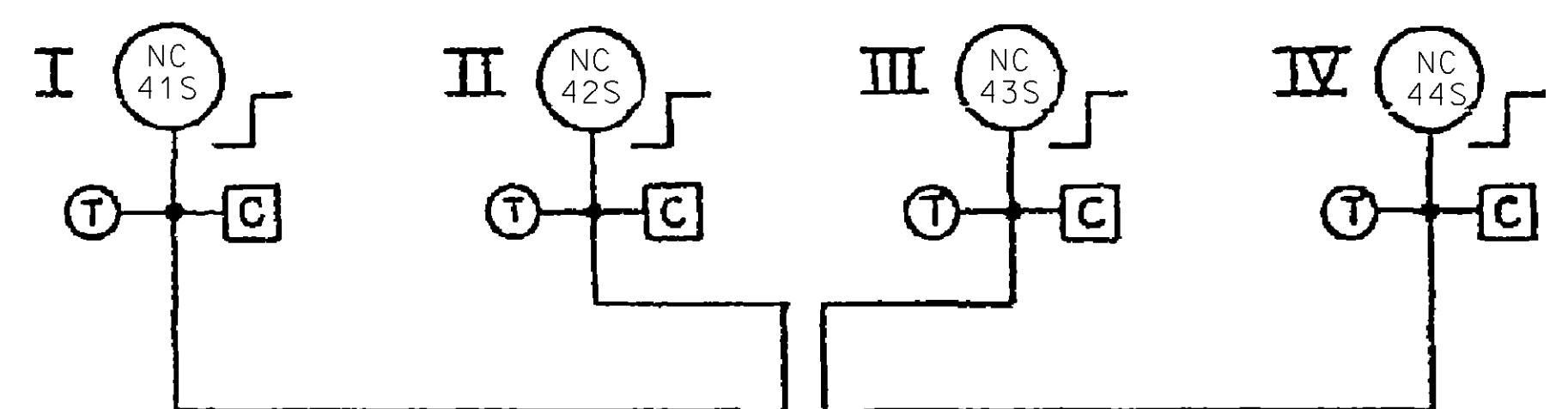
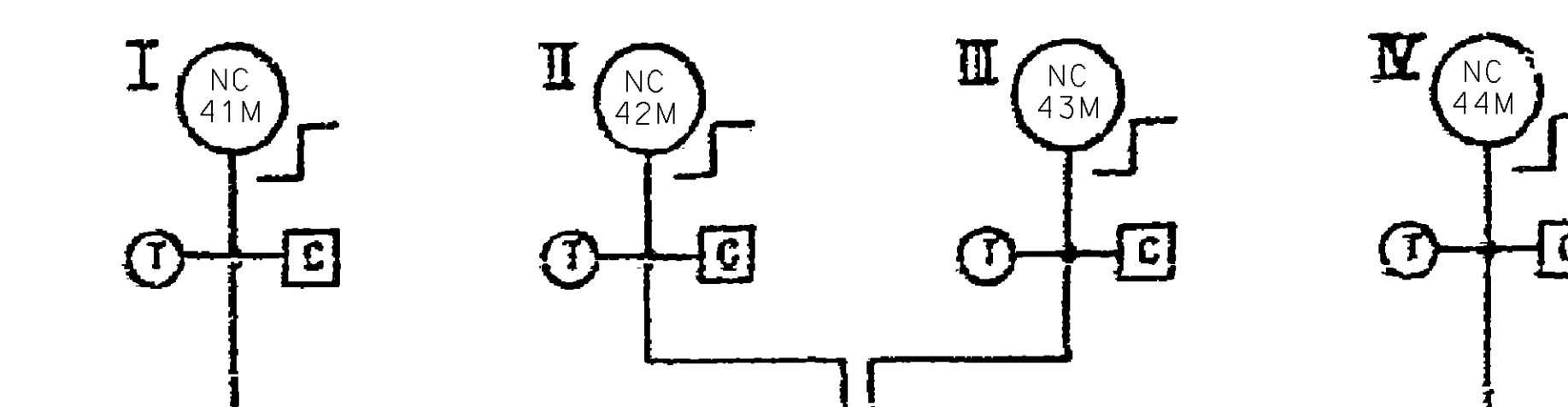
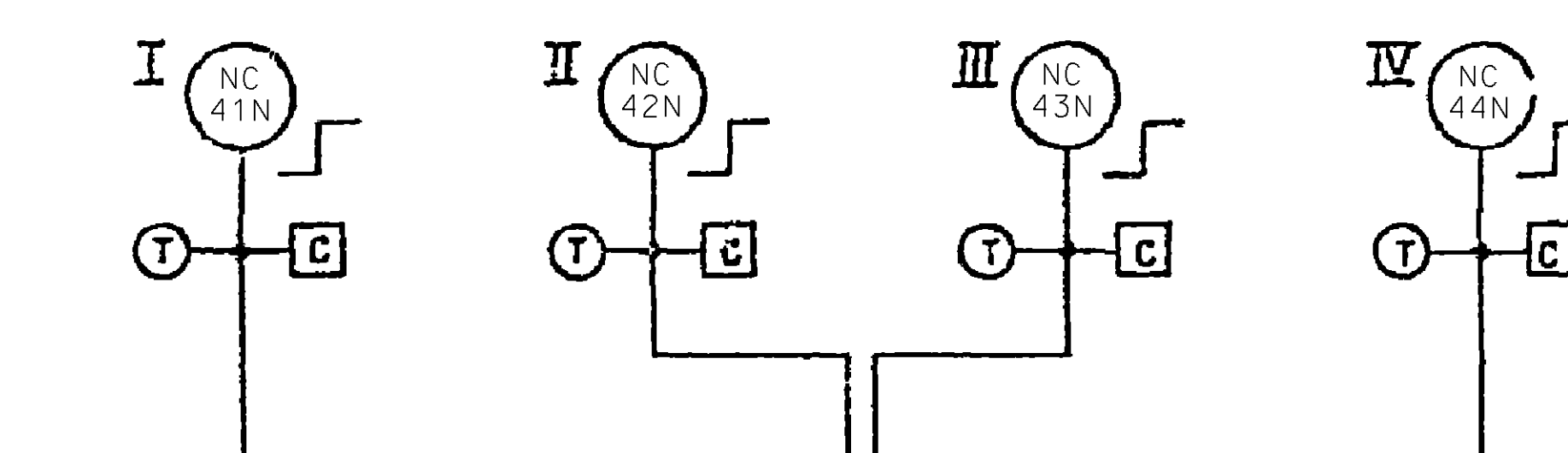
OVERPOWER ROD STOP
BLOCK AUTOMATIC (NOT USED) & MANUAL
ROD WITHDRAWAL (SHEET 9)HIGH NEUTRON FLUX ROD STOP
BLOCK AUTOMATIC (NOT USED) & MANUAL
ROD WITHDRAWAL (SHEET 9)

NOT REDUNDANT

NOT REDUNDANT

SOURCE RANGE
FLUX DOUBLING
BLOCK CONTROLFROM 1/N
31A SR 2-φ
TEST
(NIS RACK)SOURCE RANGE
NEUTRON FLUX
N-31FROM 1/N
32A SR 2-φ
TEST
(NIS RACK)SOURCE RANGE
NEUTRON FLUX
N-32OPEN LCV-112D AND LCV-112E
CLOSE LCV-112B AND LCV-112C
(NOTE 4)

POWER RANGE

P-9
(SHEET 16)P-13
TURBINE IMPULSE
CHAMBER PRESSURE
(SHEET 16)P-7
(SHEETS 3 & 4)P-10
(SHEET 3)P-8
(SHEET 5)

NOTES:

1. THE BYPASS SIGNALS ARE MADE UP BY MEANS OF TWO THREE-POSITION SWITCHES ON A NIS RACK. SWITCH 1/N 49A BYPASSES EITHER NC-41L OR NC-43L. SWITCH 1/N 49B BYPASSES EITHER NC-42L OR NC-44L.
2. THE TWO P-6 BISTABLES NO. NC-35D AND NC-36D ARE "ENERGIZED TO ACTUATE" SUCH THAT A LOGIC 1 SIGNAL IS DEFINED TO BE PRESENT WHEN THE BISTABLE OUTPUT VOLTAGE IS ON.
3. THE REDUNDANT MANUAL BLOCK CONTROL CONSISTS OF TWO CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN, SUPPLIED BY OTHERS.
4. LCV-112 D & E ARE IN PARALLEL FLOW PATHS, EACH VALVE RECEIVES AN ACTUATION SIGNAL FROM A SEPARATE TRAIN. LCV-112 B & C ARE IN SERIES IN THE SAME FLOW PATH, EACH VALVE RECEIVES AN ACTUATION SIGNAL FROM A SEPARATE TRAIN.
5. ANY INSTRUMENT NUMBER WITH A FUNCTION CODE OF NC IS EQUIVALENT TO THE SAME NUMBER WITH A FUNCTION CODE OF NB.

Westinghouse Electric Corporation	
Nuclear "Force" System, Pittsburgh, Pa., U.S.A.	
TITLE: SNUPPS PROJECTS	
FUNCTIONAL DIAGRAM	
NUCLEAR INSTR. PERMISSIVES & BLOCKS	
DRAWING NO.	REV.
7250D64 S004	8
SCALE: N.T.S.	DO NOT SCALE
DIMENSIONS IN INCHES	12 1/2

11

10

9

8

7

6

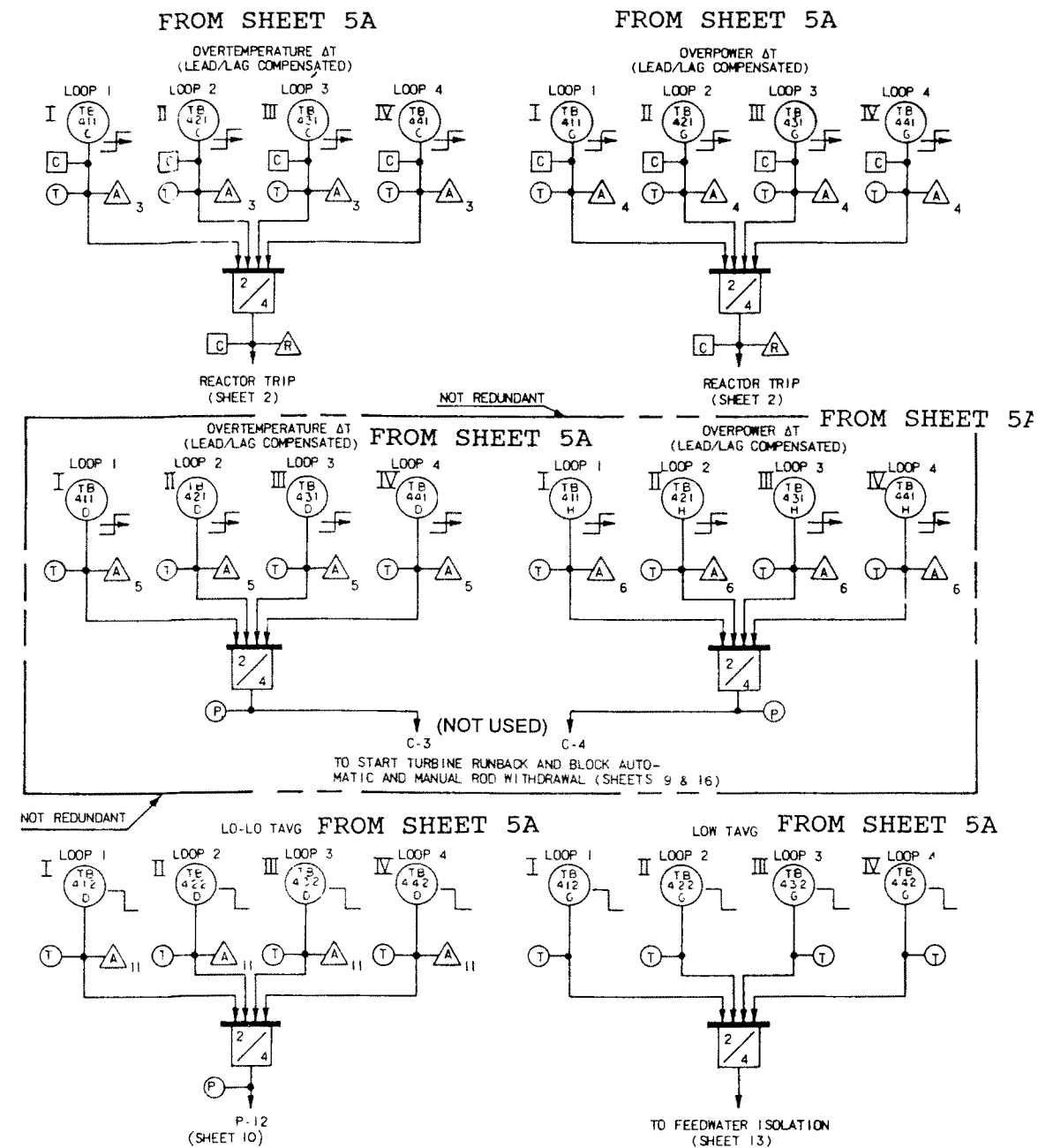
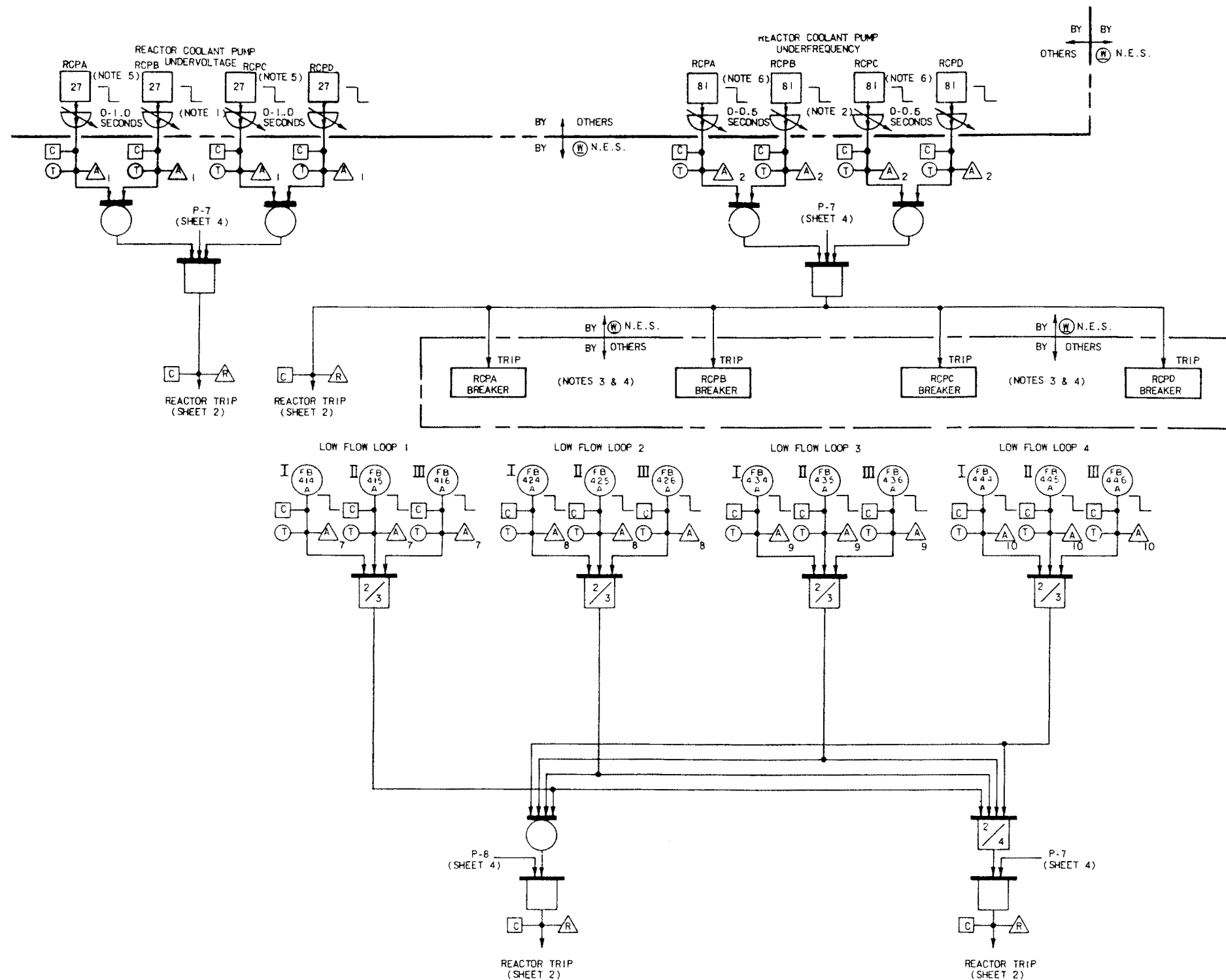
5

4

3

2

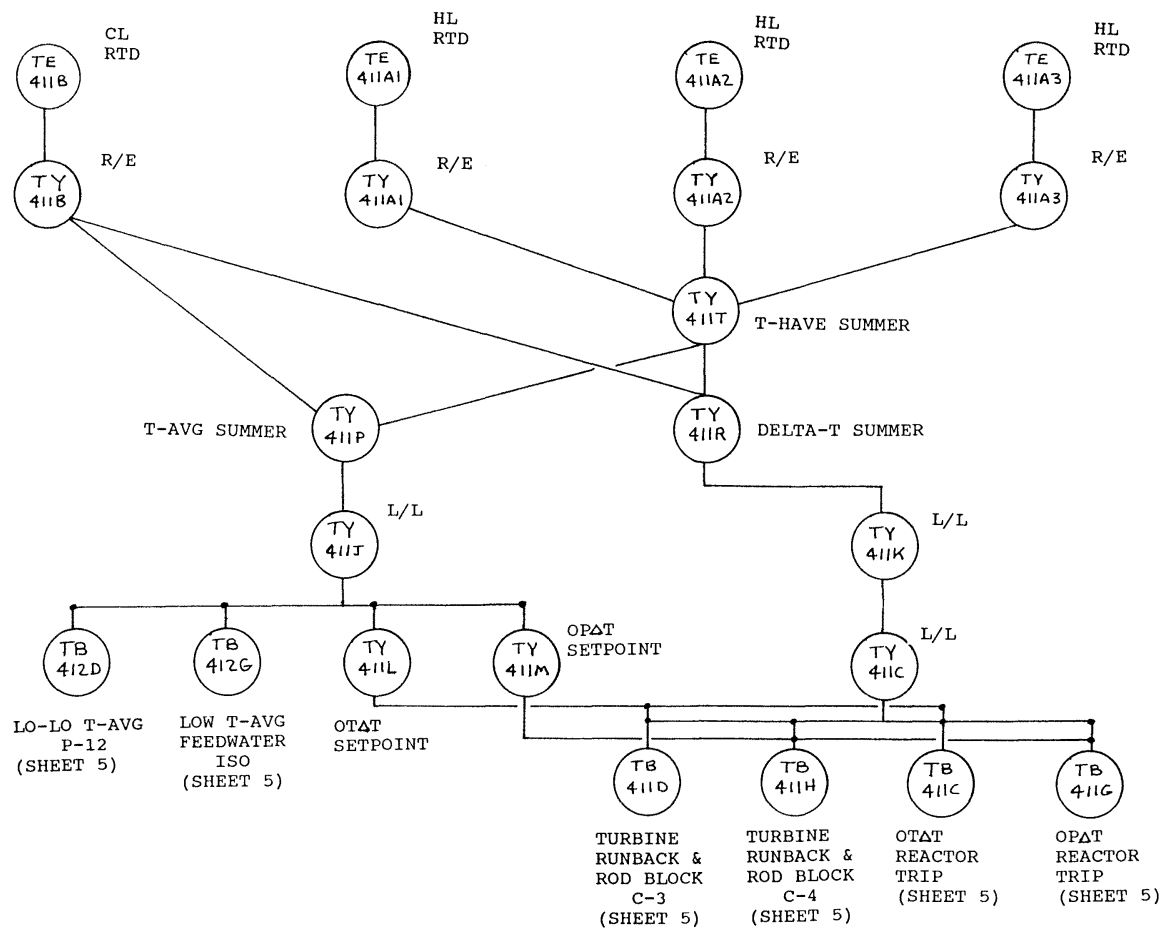
1



- NOTES:**
1. THE SETPOINT OF THE UNDERVOLTAGE RELAYS SHOULD BE ADJUSTABLE BETWEEN 60% AND 80% OF NOMINAL VOLTAGE. WITH THE ADJUSTABLE TIME DELAY SET TO ITS MINIMUM VALUE, THE UNDERVOLTAGE DETECTOR SHOULD HAVE A TIME RESPONSE OF LESS THAN 0.2 SECOND. THE ADJUSTABLE DELAY SHOULD ALLOW AN ADDITIONAL INTENTIONAL DELAY BETWEEN 0 AND 1.0 SECOND.
 2. THE SETPOINT OF THE UNDER FREQUENCY RELAYS SHOULD BE ADJUSTABLE BETWEEN 54 Hz AND 60 Hz. WITH THE ADJUSTABLE TIME DELAY SET TO ITS MINIMUM VALUE, THE UNDERFREQUENCY DETECTOR HAS A TIME RESPONSE OF LESS THAN 0.2 SECOND. THE ADJUSTABLE DELAY SHOULD ALLOW AN ADDITIONAL INTENTIONAL DELAY BETWEEN 0 TO 0.5 SECOND
 3. THE MAXIMUM ALLOWABLE RCP BREAKER TRIP TIME DELAY IS 0.1 SECOND.
 4. REACTOR COOLANT PUMPS NUMBER A AND B ARE ON SWGR PA01.
REACTOR COOLANT PUMPS NUMBER C AND D ARE ON SWGR PA02.
 5. THE UNDERVOLTAGE SENSORS (POTENT TRANSFORMERS) ARE LOCATED ON THE MOTOR SIDE OF THE RCP CIRCUIT BREAKERS IN ADDITION TO SWGR UNDERVOLTAGE.
 6. THE UNDERFREQUENCY SENSORS ARE LOCATED ON THE MOTOR SIDE OF THE RCP CIRCUIT BREAKERS

CALLAWAY PLANT

FIGURE 7.2-1
FUNCTIONAL DIAGRAMS
(PRIMARY COOLANT SYSTEM
TRIP SIGNALS)
CONTINUED ON SHEET 5A



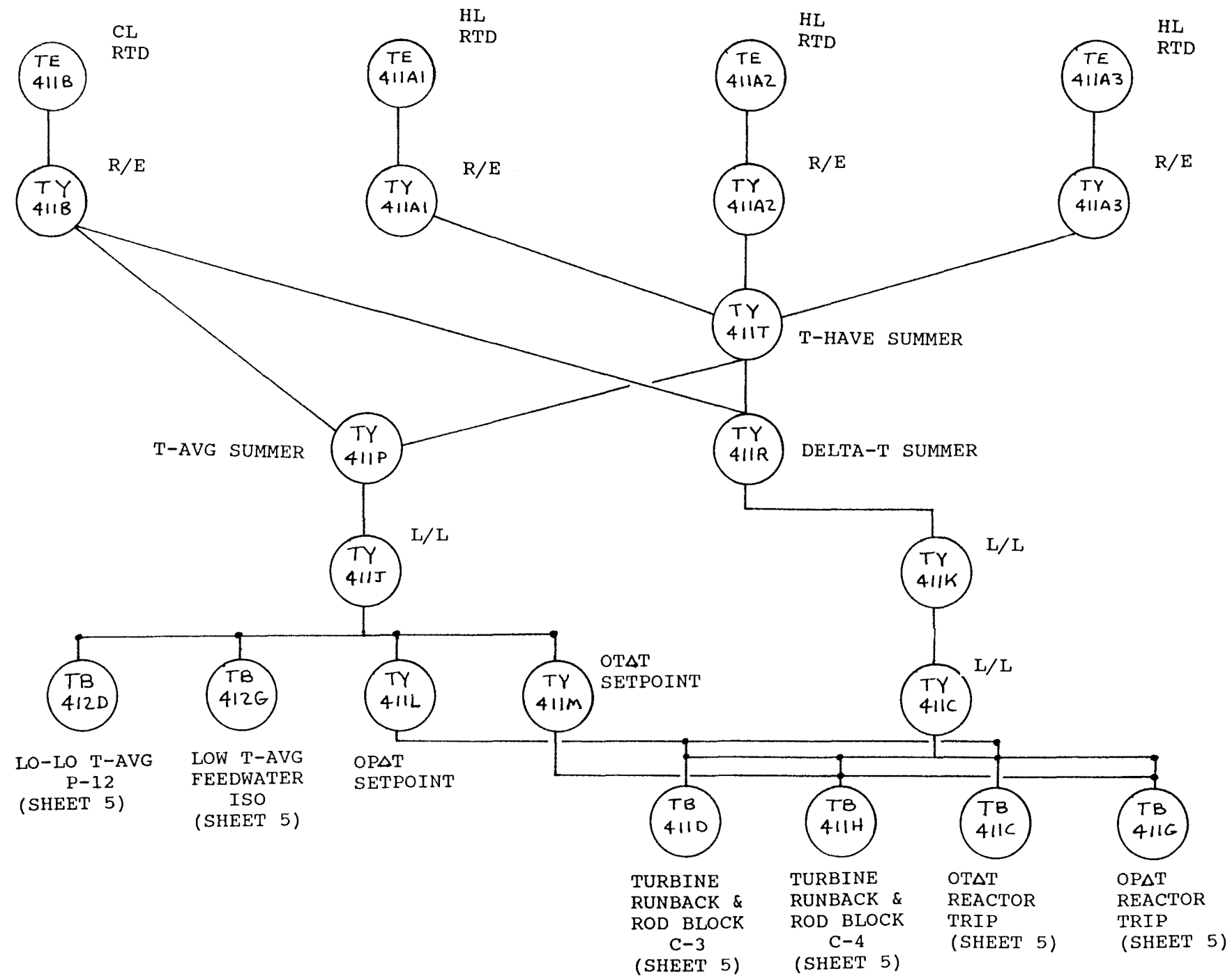
NOTES:

1. Typical for Loop 1, Protection Set I. Other loops are configured in the same manner, with the second digit in the instrument circuit identification corresponding to the RCS loop.
2. For further details of test points, computer inputs, indicators, annunciators, and control circuit interfaces, see drawing 8756D37 sheets 7-10.

CALLAWAY PLANT

FIGURE 7.2-1
FUNCTIONAL DIAGRAMS
(PRIMARY COOLANT SYSTEM
TRIP SIGNALS)

REV. 16 5/12 (SHEET 5A)



NOTES:

1. Typical for Loop 1, Protection Set I. Other loops are configured in the same manner, with the second digit in the instrument circuit identification corresponding to the RCS loop.
2. For further details of test points, computer inputs, indicators, annunciators, and control circuit interfaces, see drawing 8756D37 sheets 7-10.

REV. OL-15
5/06

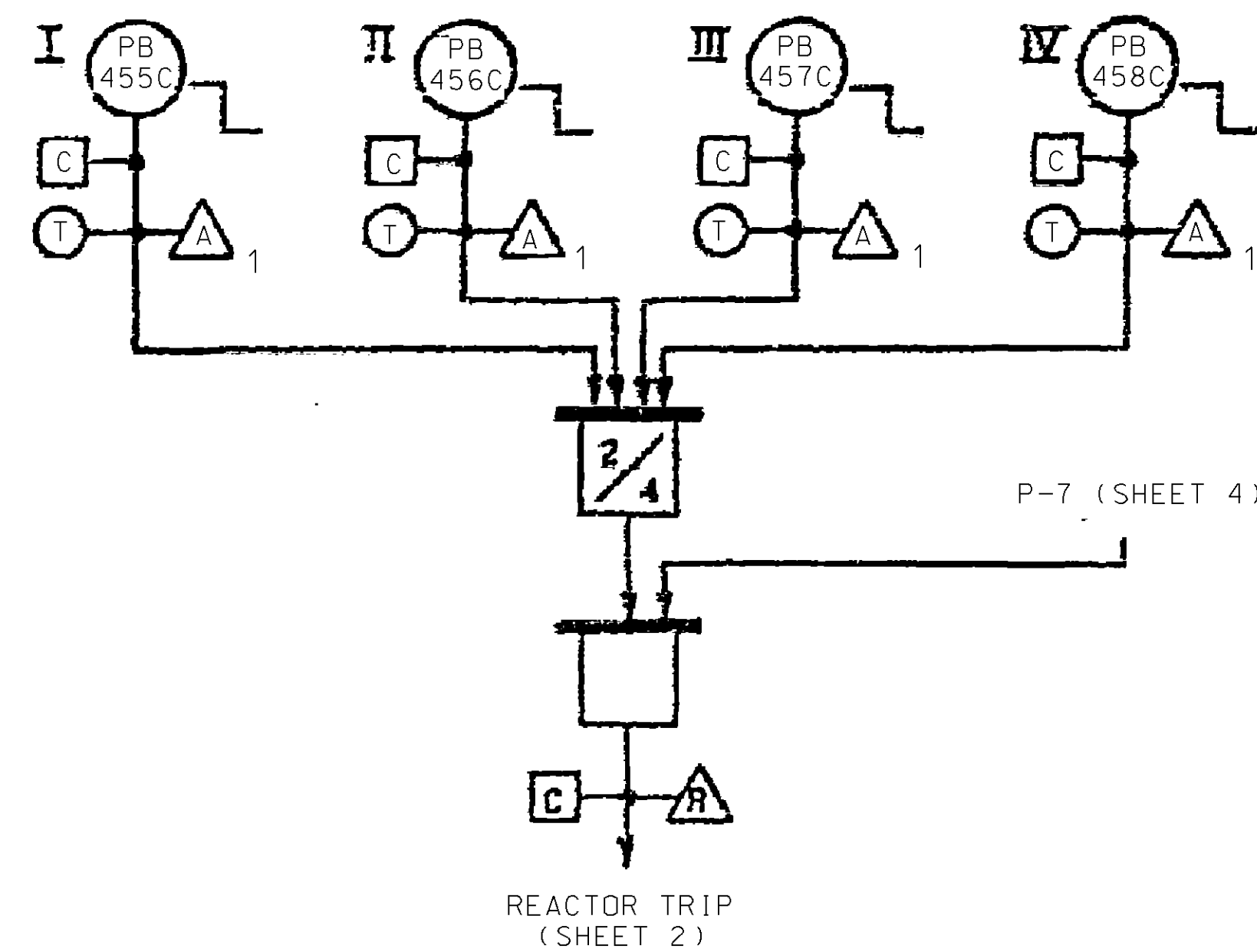
CALLAWAY PLANT

FIGURE 7.2-1
FUNCTIONAL DIAGRAMS
(PRIMARY COOLANT SYSTEM
TRIP SIGNALS)

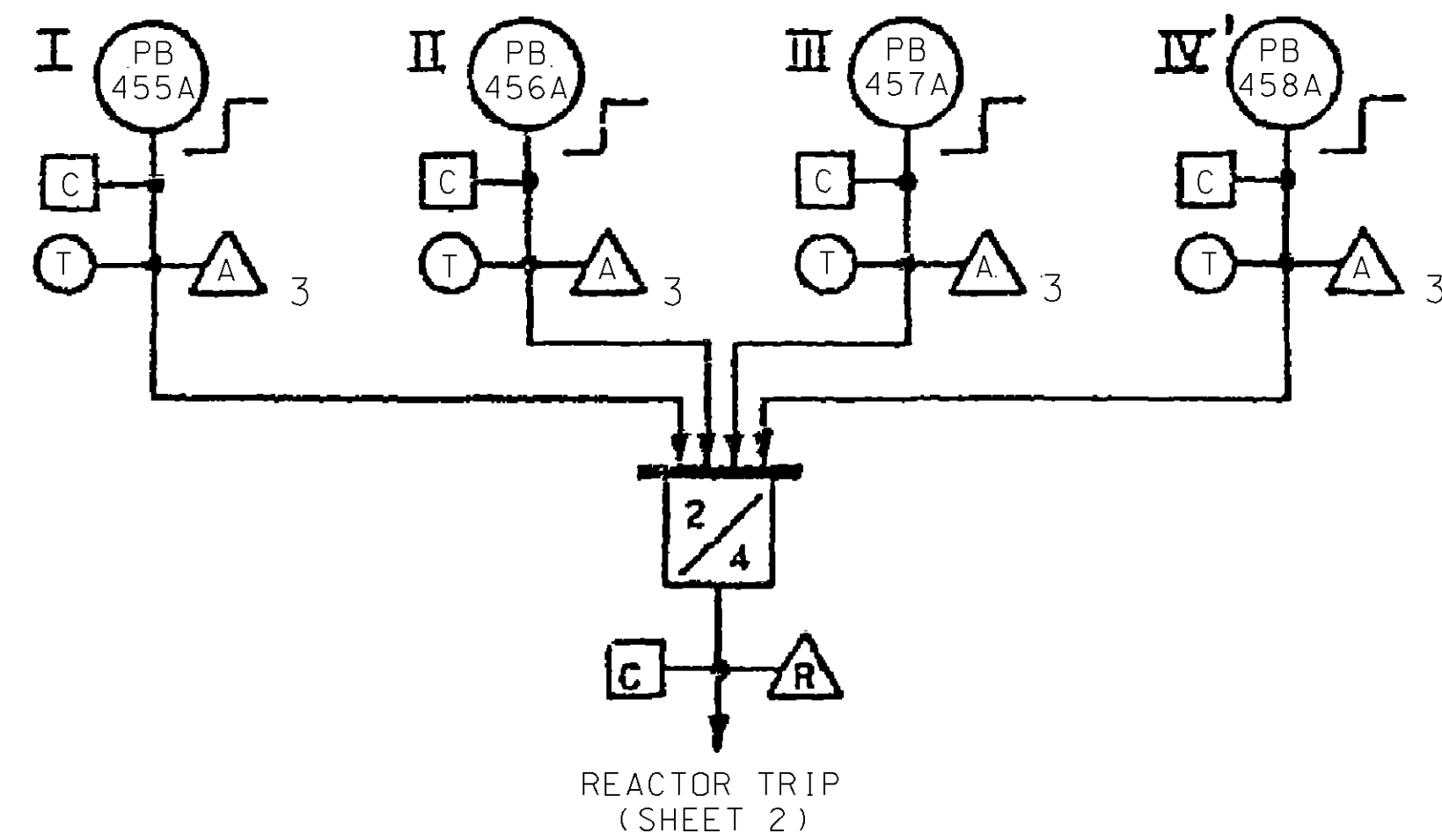
(SHEET 5A)

REV. 6	DATE 03/4/03	REV. 5	DATE 05/11/01	DRAWN 4	DATE 06/22/00	MAL
DRAWN JHK	CHKD. MAL	SUPV. TWS	CHKD. SUPV. MAL	APPD. N/A	SUPV. SKC	APPD. N/A
INCDRP. DEC-1871.		INCDRP. MP 00-1005A		REFLECTS TURNOVER TO U.E.		

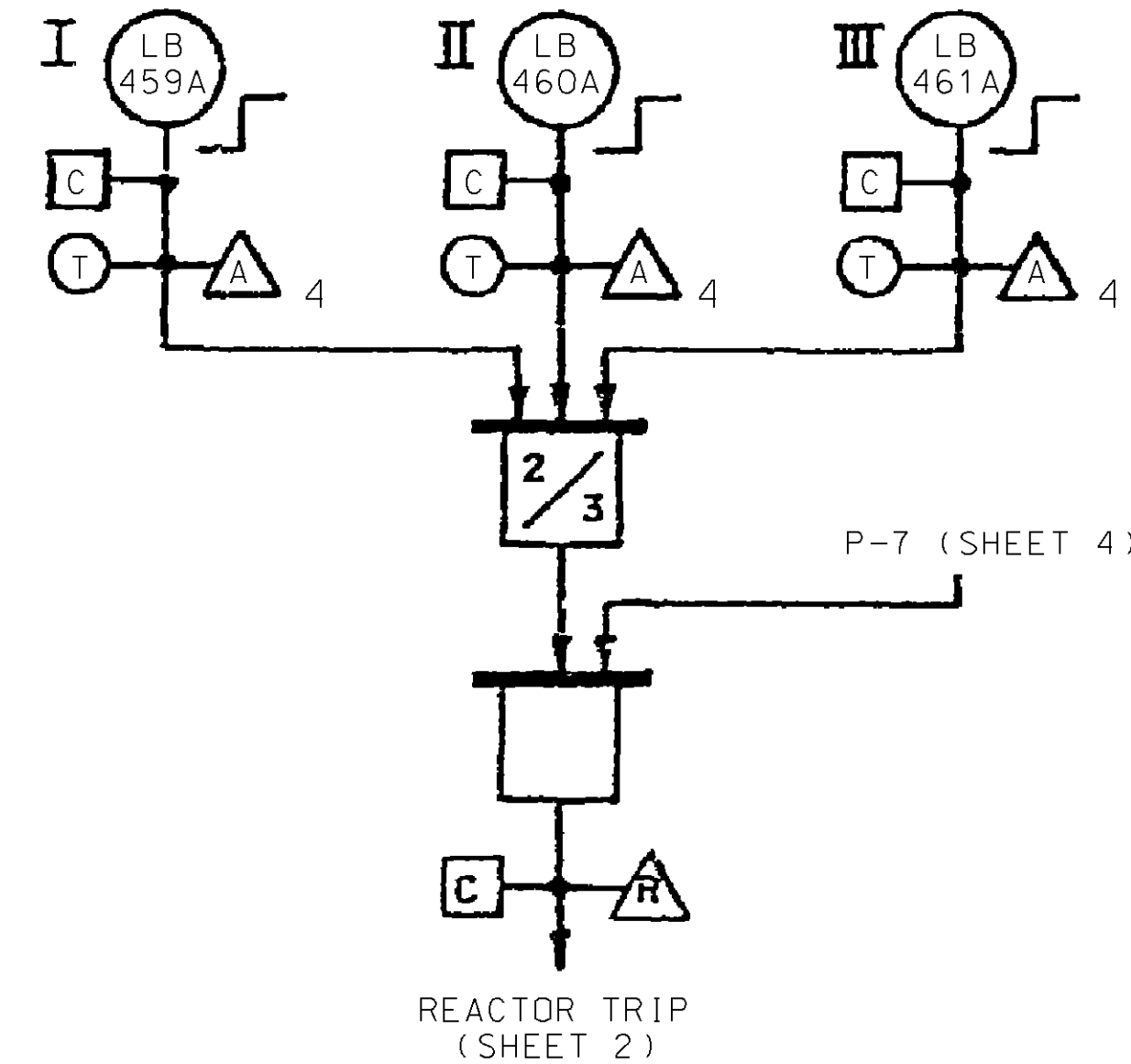
PRESSURIZER LOW PRESSURE (LEAD/LAG COMPENSATED)



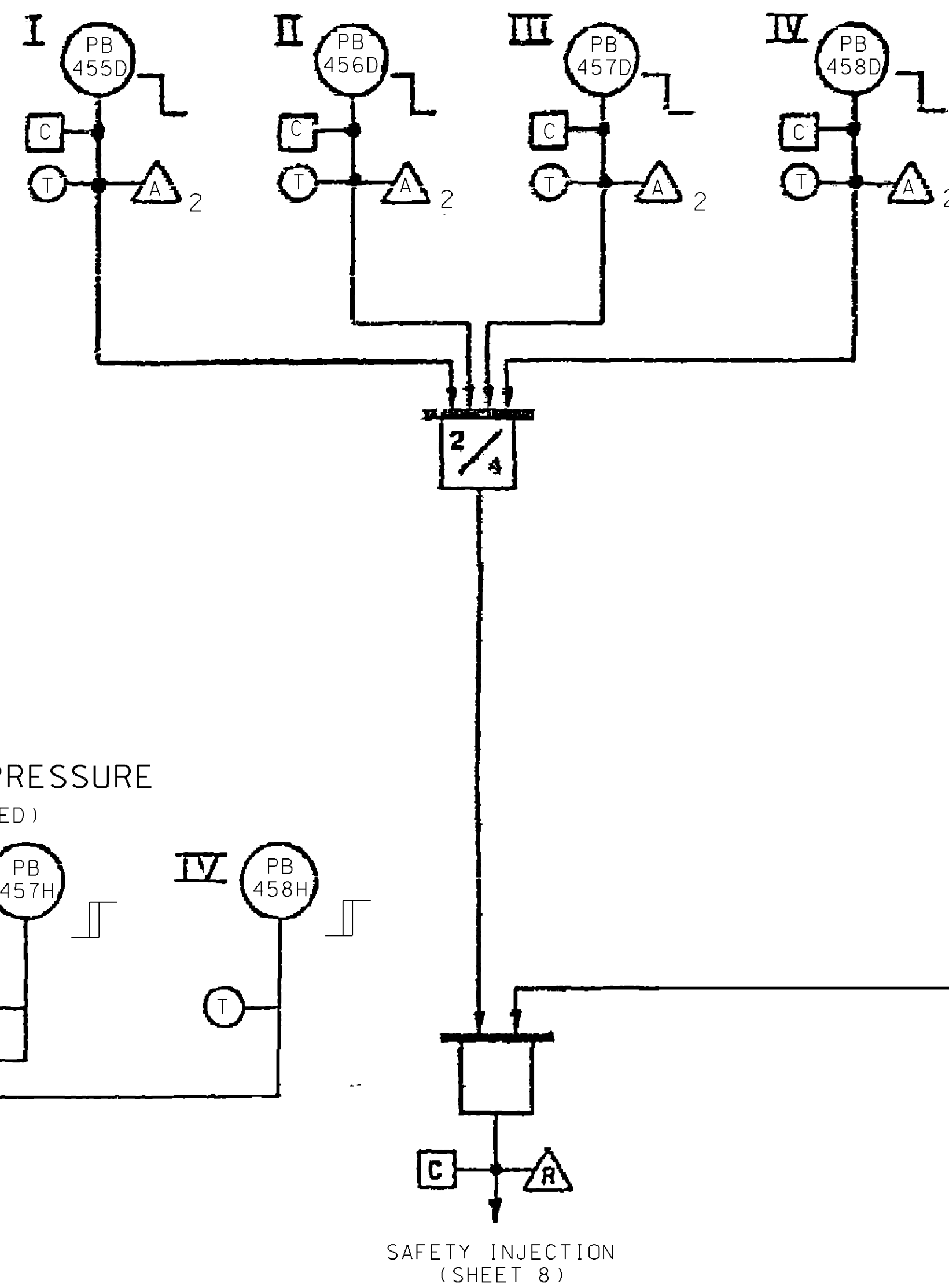
PRESSURIZER HIGH PRESSURE (LEAD/LAG COMPENSATED)



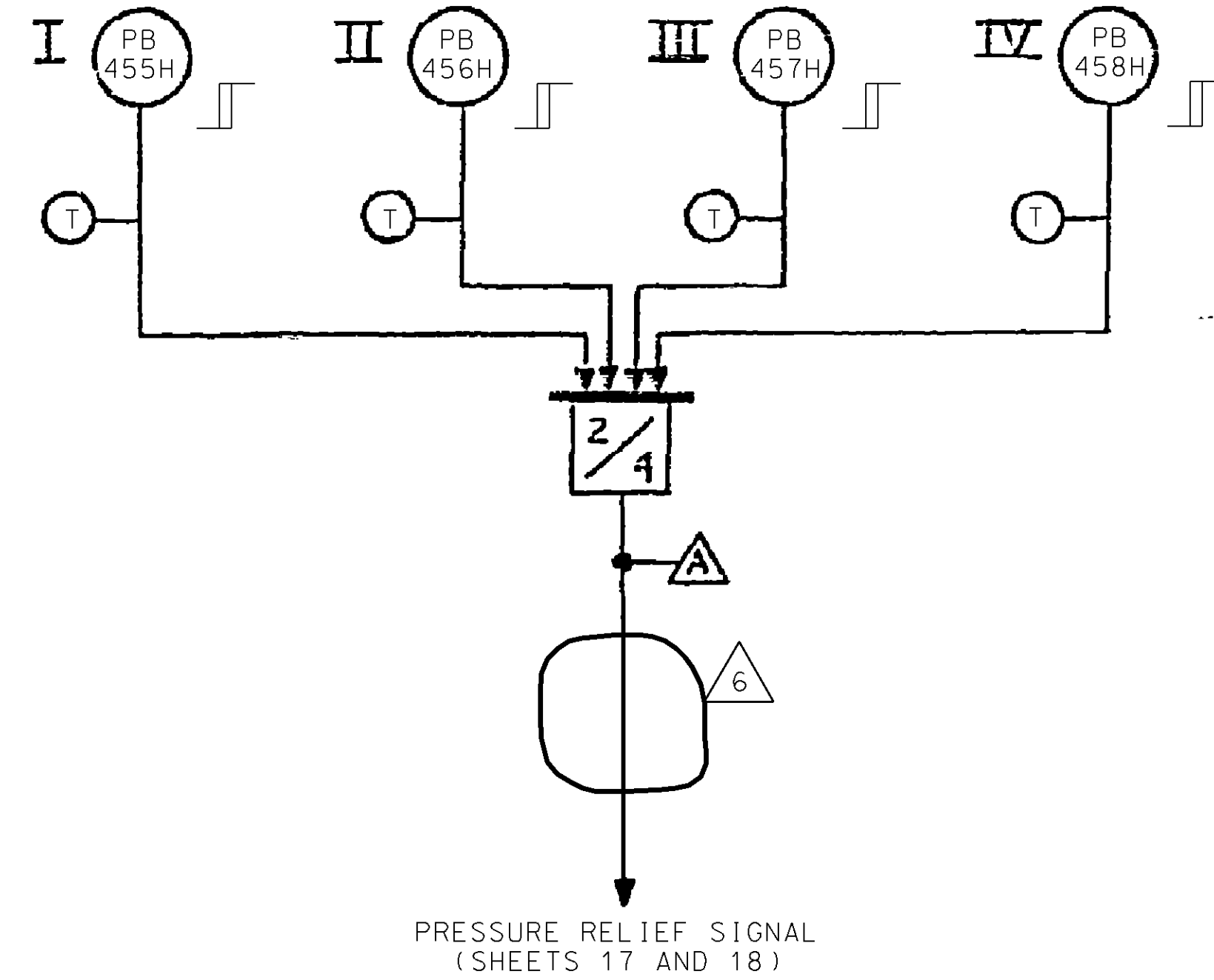
PRESSURIZER HIGH WATER LEVEL



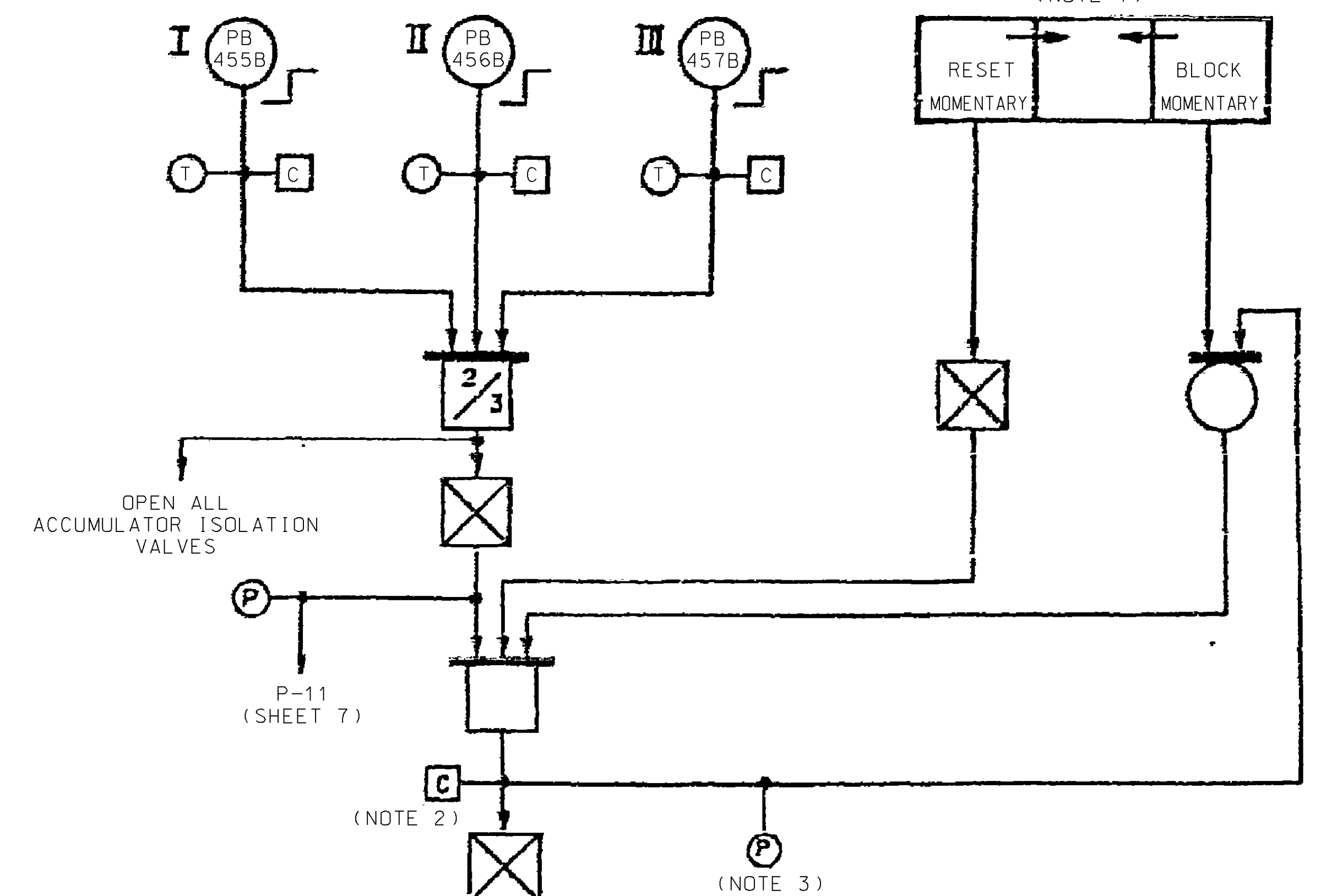
PRESSURIZER LOW PRESSURE



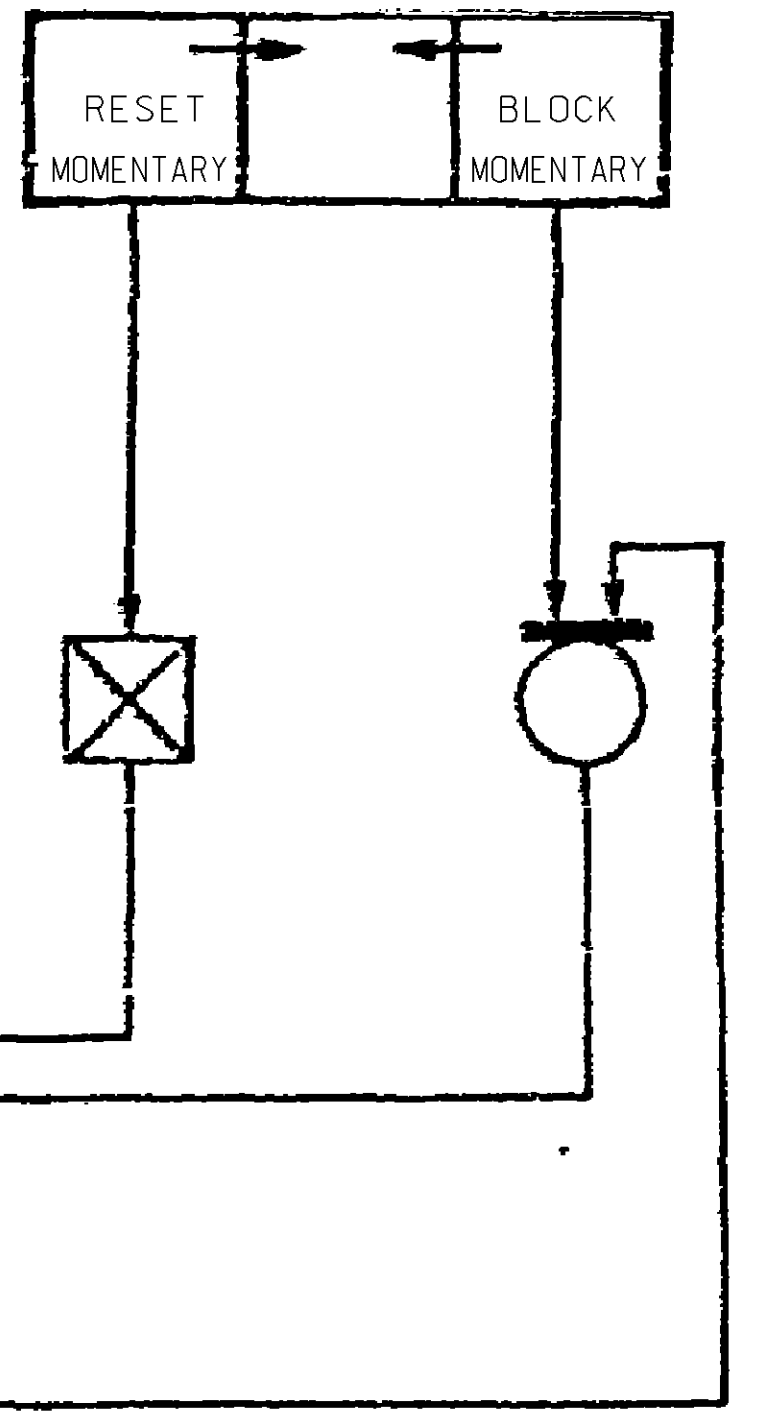
PRESSURIZER HIGH PRESSURE (LEAD/LAG COMPENSATED)



PRESSURIZER PRESSURE



PRESSURIZER S.I. BLOCK CONTROL (NOTE 1)



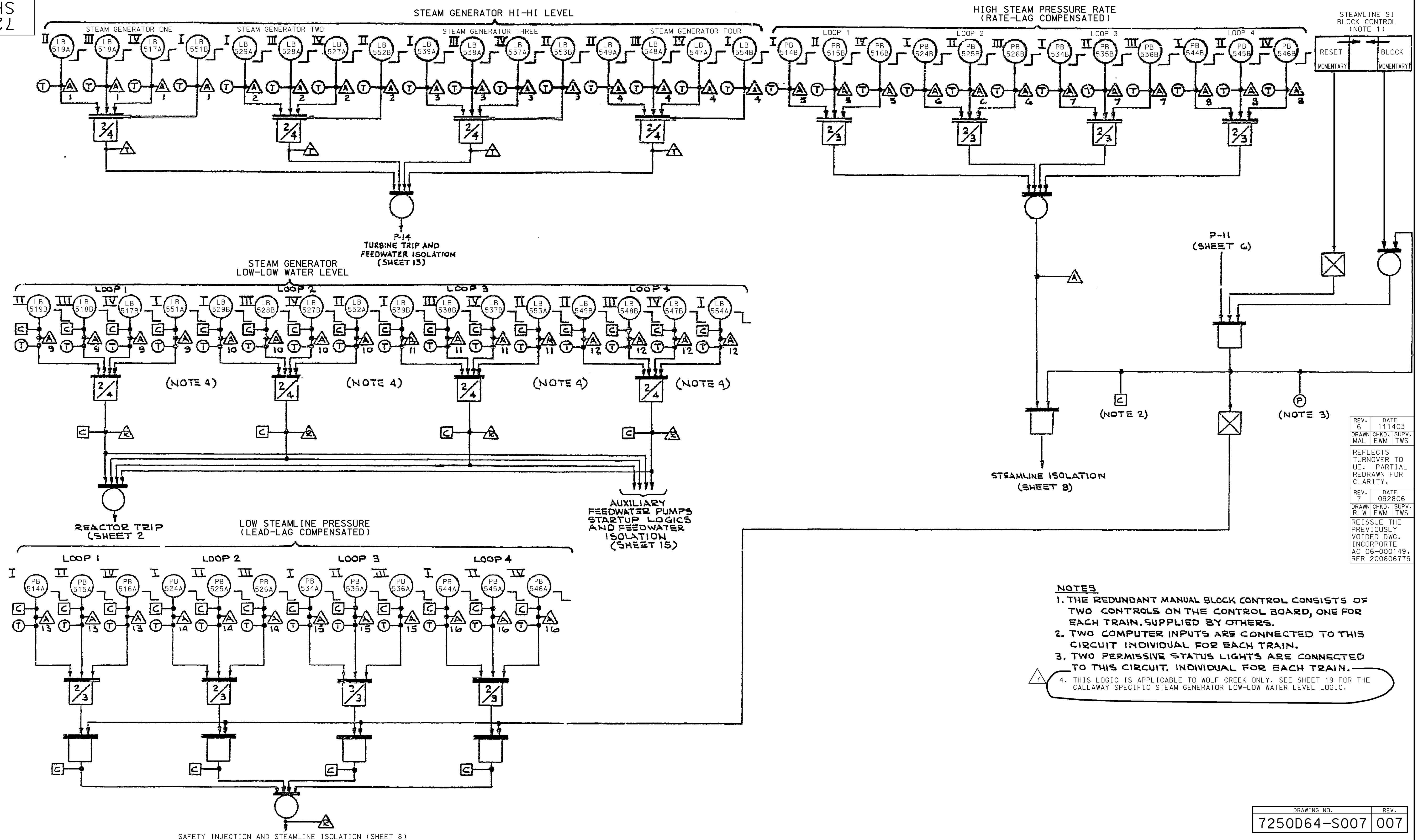
NOTES:

1. THE REDUNDANT MANUAL BLOCK CONTROL CONSISTS OF TWO CONTROLS ON THE CONTROL BOARD; ONE FOR EACH TRAIN.
2. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT; INDIVIDUAL FOR EACH TRAIN.
3. TWO PERMISSIVE STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT; INDIVIDUAL FOR EACH TRAIN.

REFERENCE DWG:
WESTINGHOUSE ELECTRIC CORP.
DWG. NO. M-744-00023

STANDARDIZED NUCLEAR UNIT POWER
PLANT SYSTEM PROJECTS
UNIT: SCP SPIN: AASFED-04
STATUS: TURNED OVER TO U.E.
SHOP ORDER: 300

DRAWN (DATE) N/A	FUNCTIONAL DIAGRAM PRESSURIZER TRIP SIGNALS		
CHKD. (DATE) N/A			
SUPV. (DATE) N/A			
APPD. (DATE) N/A	LOCATION	CALLAWAY PLANT	CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO.		7250D64-S006	REV. 6




REV. 6	DATE 111403		
DRAWN MAL	CHKD. EWM	SUPV. TWS	
REFLECTS TURNOVER TO JE. PARTIAL REDRAWN FOR CLARITY.			
REV. 7	DATE 092806		
DRAWN RLW	CHKD. EWM	SUPV. TWS	
EISSUE THE REVIOUSLY OIDED DWG. NCORPORTE C 06-000149, FR 200606779			

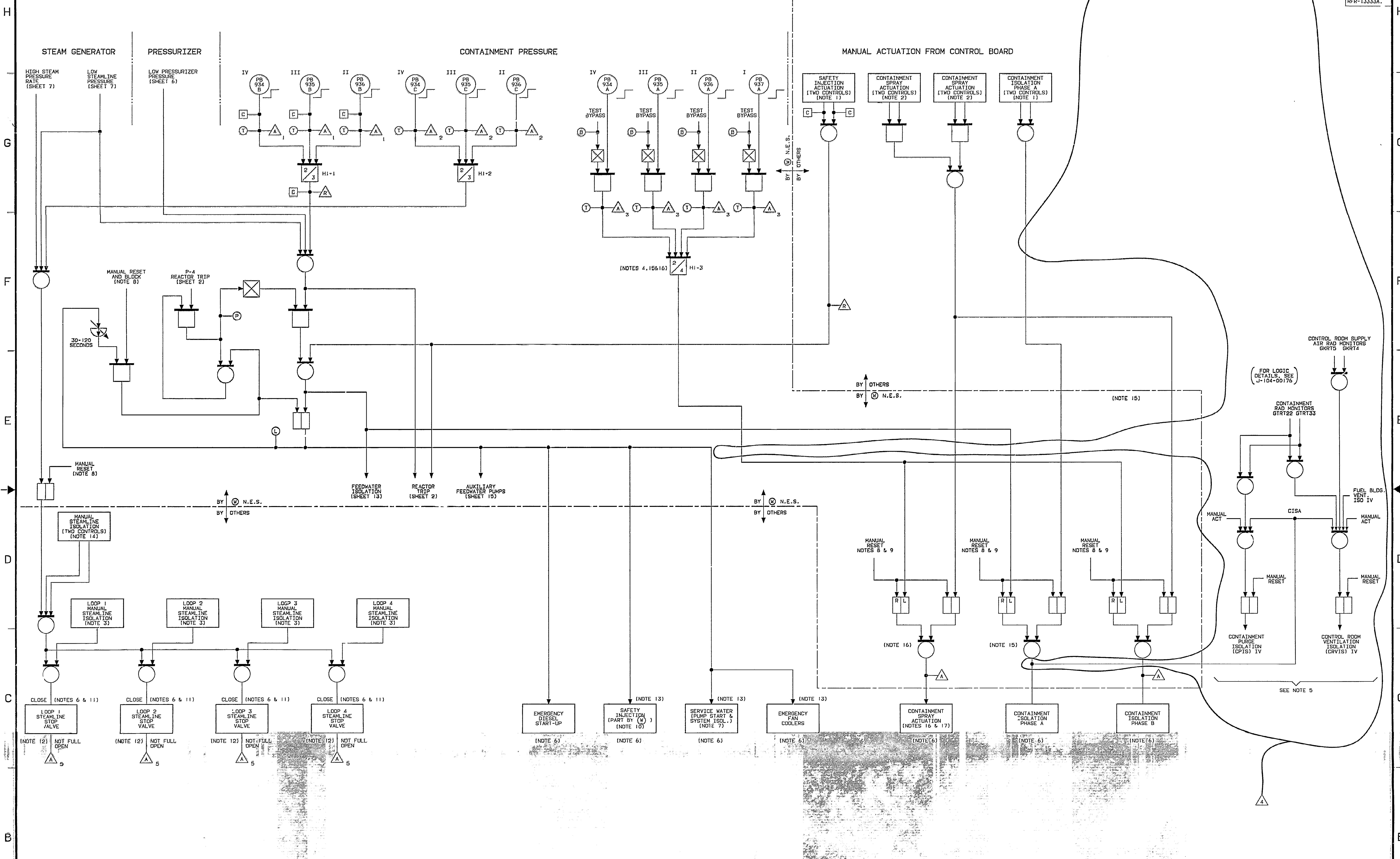
- NOTES**
1. THE REDUNDANT MANUAL BLOCK CONTROL CONSISTS OF TWO CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN. SUPPLIED BY OTHERS.
 2. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT INDIVIDUAL FOR EACH TRAIN.
 3. TWO PERMISSIVE STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT. INDIVIDUAL FOR EACH TRAIN.
 4. THIS LOGIC IS APPLICABLE TO WOLF CREEK ONLY. SEE SHEET 19 FOR THE CALLAWAY SPECIFIC STEAM GENERATOR LOW-LOW WATER LEVEL LOGIC.

DRAWING NO.	REV.
7250D64-S007	007

[illegible]

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS
UNIT: SCP S.O.: 300 STATUS: TURNED OVER TO UE SPIN: AASFED

<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>DATE: 10/1/78</p> <p>BY: J. R. RAY</p> </div> <div style="width: 60%; text-align: right;"> <p>WHEELINGHOUSE Electric Corporation</p> <p>NUCLEAR ENERGY SYSTEM, PITTSBURGH, PA., U.S.A.</p> </div> </div>	
<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>DES. 2750</p> <p>REF. 2000</p> <p>WFLS. 0000</p> <p>APP.</p> <p>APP.</p> <p>APP.</p> <p>DATE: 10/1/78</p> </div> <div style="width: 60%;"> <p>TITLE: SNUPPS PROJECTS FUNCTIONAL DIAGRAM STEAM GENERATOR TRIP SIGNALS</p> </div> </div>	
<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>SCALE</p> <p>DISCREPANCIES IN INCHES</p> <p>DO NOT SCALE</p> </div> <div style="width: 60%; text-align: right;"> <p>7250D64</p> <p>SHEET 7</p> <p>REV. 1-1-78</p> </div> </div>	



NOTES:

1. TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, OPERATING EITHER CONTROL WILL ACTUATE.
2. THE MANUAL SPRAY ACTUATION CONSISTS OF FOUR MOMENTARY CONTROLS. ACTUATION WILL OCCUR ONLY IF TWO ASSOCIATED CONTROLS ARE OPERATED SIMULTANEOUSLY.
3. TWO CONTROLS PER VALVE ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
4. CONTAINMENT PRESSURE BISTABLES FOR SPRAY ACTUATION ARE ENERGIZE TO ACTUATE (OTHER BISTABLES ARE DE-ENERGIZE TO ACTUATE).
5. ENCLOSED CIRCUITRY IS NOT PART OF THE (N.E.S.) SAFEGUARDS SYSTEM.
6. COMPONENTS ARE ALL INDIVIDUALLY SEALED IN (LATCHED), SO THAT LOSS OF THE ACTUATION SIGNAL WILL NOT CAUSE THESE COMPONENTS TO RETURN TO THE CONDITION HELD PRIOR TO THE ADVENT OF THE ACTUATION SIGNAL.
7. SERVICE WATER ISOLATION IS USED ONLY IF REQUIRED.
8. THE REDUNDANT MANUAL RESET CONSISTS OF TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
9. SUPPLIED BY OTHERS.
10. SAFETY INJECTION SEQUENCE REQUIREMENTS (IF SEQUENCING IS NECESSARY) ARE SPECIFIED BY (N) NUCLEAR ENERGY SYSTEMS.
11. ALSO CLOSING THE BYPASS VALVE IN PARALLEL WITH THE ASSOCIATED STEAM LINE STOP VALVE.
12. LIGHTS SHOULD BE PROVIDED IN THE CONTROL ROOM FOR EACH STEAM LINE STOP VALVE TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
13. THE ACTUATION MAY BE DELAYED AND SEQUENCED IF THE EMERGENCY DIESEL POWER CAPABILITY IS LESS THAN THE TOTAL LOAD WITH ALL SYSTEMS STARTING. THE TIME DELAY(S), IF USED, MAY NOT EXCEED THE MAXIMUM STARTING TIME REQUIREMENTS FOR EACH SYSTEM.
14. TWO CONTROLS ON THE CONTROL BOARD, OPERATING EITHER CONTROL WILL ACTUATE.
15. SOME ENGINEERED SAFEGUARDS FUNCTIONS ARE NOT WITHIN THE FUNCTIONAL DESIGN SCOPE OF (N) NUCLEAR ENERGY SYSTEMS BUT ONLY SHOWN ON THIS SHEET AS THE FUNCTIONS ARE BUILT IN THE (N) SUPPLIED EQUIPMENT.
16. THE 2 OUT OF 4 COINCIDENCE, MEMORY, AND "OR" LOGIC ARE DUPLICATED WITHIN EACH TRAIN. SEPARATE OUTPUT RELAYS ARE ALSO PROVIDED IN EACH TRAIN. TO MINIMIZE FALSE CONTAINMENT SPRAY, ONE OUTPUT RELAY SHOULD START THE PUMPS WHILE ANOTHER SHOULD OPEN THE SYSTEM VALVES.
17. THE CONTAINMENT SPRAY SYSTEM SHOULD BE INDEPENDENT OF THE SAFETY INJECTION SYSTEM. IF THE CONDITIONS OF NOTE 13 APPLY, THE SEQUENCE INTERLOCK SHOULD BE SUCH THAT SPRAY WILL START WITHIN THE REQUIRED TIME INDEPENDENT OF THE SAFETY INJECTION SIGNAL STATUS.

STANDARDIZED NUCLEAR UNIT POWER
PLANT SYSTEM PROJECTS
UNIT: SCP
STATUS: TURNED OVER TO UE
CERTIFICATION LTR. NO. SCP-88-309
AUTHORITY: M.J. PARVIN
ENGR. LTR. NO. 1RST-7108

I CERTIFY THAT THE IMAGE CONTAINED ON THIS FRAME WAS MADE IN THE NORMAL AND REGULAR COURSE OF BUSINESS, ON THE DATE STATED BELOW AND THAT IT IS AN ACCURATE REPRODUCTION OF THE DOCUMENT(S) SUBMITTED TO MICROGRAPHICS.

DATE: 5-20-93 OPERATOR: P. Powell SUPERVISOR: Grace Chantley

30X

DRAWN	N/A	DATE	
CHKD.	N/A	DATE	
SUPV.	N/A	DATE	
APPD.	N/A	DATE	
LOCATION	CALLAWAY PLANT		
UNION ELECTRIC COMPANY ST. LOUIS, MO			7250D64 S008
			REV. 4

FUNCTIONAL DIAGRAM
SAFEGUARDS
ACTUATION SIGNALS



1. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT.
2. KOT MAY VARY INVERSELY PROPORTIONAL TO LOAD WITH A FIXED LIMIT OR MAY VARY IN TWO DISCRETE STEPS WITH BREAK POINTS AT 30 TO 50% AND 60 TO 80% TURBINE LOAD.
3. THE SUMMER OUTPUTS HAVE FIXED MANUALLY ADJUSTABLE UPPER LIMITS.
4. THE ROD DIRECTION BISTABLES NO. SB-412A AND SB-412B ARE "ENERGIZED TO ACTUATE".
5. ALARM 1, ALARM 2, ALARM 3, AND ALARM 4 MUST HAVE REFASH CAPABILITY.

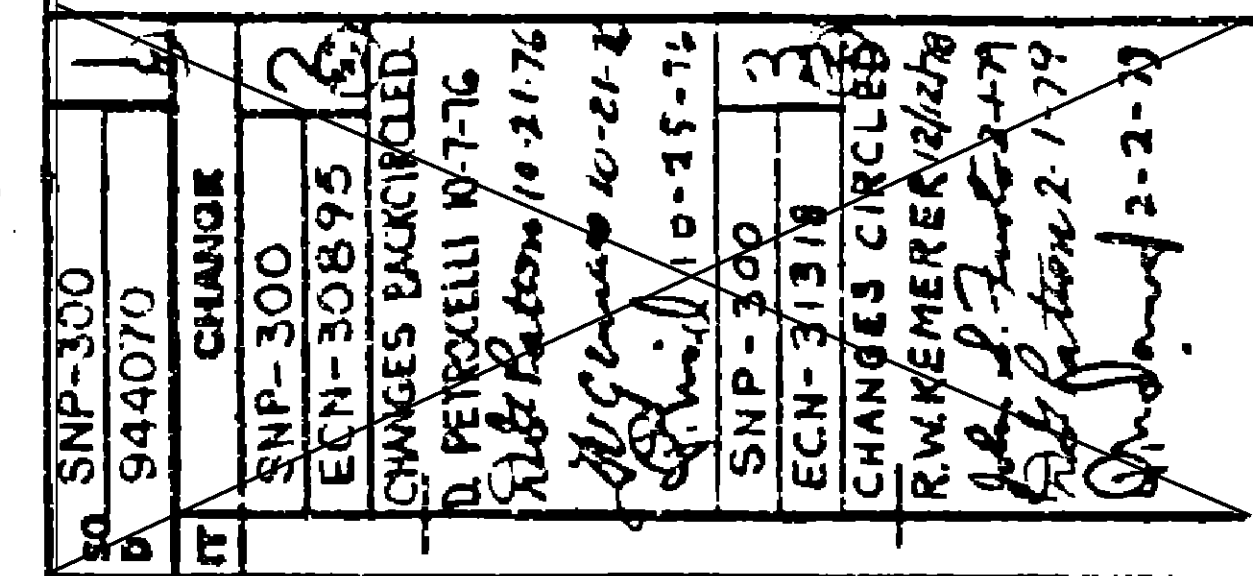
STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS		
UNIT: SCP	S.O.: 300	TAB: 9-
STATUS: TURNED OVER TO U.E.		

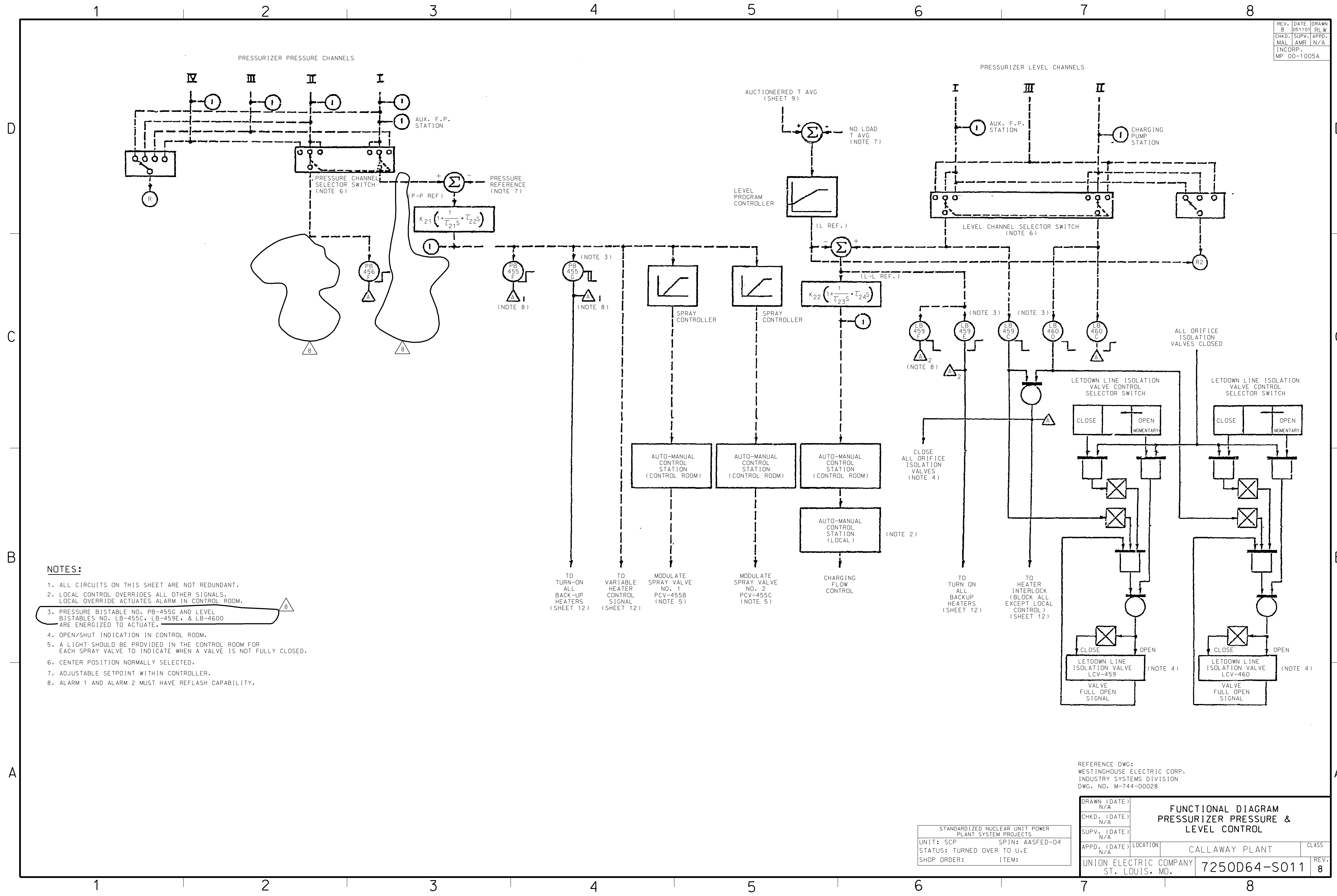
Westinghouse Electric Corporation
NUCLEAR ENERGY DIVISION, PITTSBURGH, PA. U.S.A.

TITLE SNUPPS PROJECTS
FUNCTIONAL DIAGRAM
ROD CONTROLS & ROD BLOCKS

SCALE N.T.S. ~~7250D64~~
DIMENSIONING
IN INCHES ~~SHEET 9~~
DO NOT SCALE ~~SUB 3 4 5~~

DRAWING NO.	REV.
7250D64 S009	10





- NOTES:**
1. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT.
 2. LOCAL CONTROL OVERRIDES ALL OTHER SIGNALS. LOCAL OVERRIDE ACTUATES ALARM IN CONTROL ROOM.
 3. PRESSURE BISTABLE NO. PB-455C AND LEVEL BISTABLES NO. LB-455C, LB-459E, & LB-4600 ARE ENERGIZED TO ACTUATE.
 4. OPEN/SHUT INDICATION IN CONTROL ROOM.
 5. A LIGHT SHOULD BE PROVIDED IN THE CONTROL ROOM FOR EACH SPRAY VALVE TO INDICATE WHEN A VALVE IS NOT FULLY CLOSED.
 6. CENTER POSITION NORMALLY SELECTED.
 7. ADJUSTABLE SETPOINT WITHIN CONTROLLER.
 8. ALARM 1 AND ALARM 2 MUST HAVE REFLASH CAPABILITY.

REFERENCE DWG:
WESTINGHOUSE ELECTRIC CORP.
INDUSTRY SYSTEMS DIVISION
DWG. NO. M-744-00028

DRAWN (DATE) N/A		FUNCTIONAL DIAGRAM PRESSURIZER PRESSURE & LEVEL CONTROL		CLASS
CHKD. (DATE) N/A				
SUPV. (DATE) N/A				
APPD. (DATE) N/A				
STATUS: TURNED OVER TO U.E.		LOCATION	CALLAWAY PLANT	
SHOP ORDER:		UNION ELECTRIC COMPANY ST. LOUIS, MO.		REV. 8

7250D64
SHEET 3

G
F
E
D
C
B
A

REMOTE CONTROL STATION
FOR GROUP A HEATERS
(CONTROL BOARD)
(SELECTOR SWITCH)

REMOTE CONTROL STATION
FOR GROUP B HEATERS
(CONTROL BOARD)
(SELECTOR SWITCH)

VARIABLE HEATER
ON-OFF STATION
(CONTROL BOARD)
(SELECTOR SWITCH)

(NOTE 2)

BY OTHERS
BY (W) N.E.S.

BY OTHERS
BY (W) N.E.S.

AUTOMATIC HEATER TURN-ON
LOW PRESSURE FROM PB455G (SHEET 11)
HIGH LEVEL DEVIATION FROM LB459E (SHEET 11)

HEATER INTERLOCK
LOW LEVEL FROM LB 459C & LB 460D (SHEET 11)

COMPENSATED
PRESSURE
DEVIATION
FROM
(SHEET 11)

REV. 3 DATE 111303
DRAWN CHKD. SUPV. MAL EWM TWS
REFLECTS
TURNOVER TO
UE. PARTIAL
REDRAWN FOR
CLARITY.

BY OTHERS
BY (W) N.E.S.

BY OTHERS
BY (W) N.E.S.

BY OTHERS
BY (W) N.E.S.

(NOTE 2)
LOCAL CONTROL STATION
FOR GROUP A HEATERS
(SELECTOR SWITCH)

(NOTE 2)
LOCAL CONTROL STATION
FOR GROUP B HEATERS
(SELECTOR SWITCH)

REMOTE LOCAL ON OFF
(NOTE 3)

REMOTE LOCAL ON OFF
(NOTE 3)

TURN-OFF
GROUP A
HEATERS
(NOTE 2)
(NOTE 4)

TURN-ON
GROUP A
HEATERS

TURN-OFF
GROUP B
HEATERS
(NOTE 2)
(NOTE 4)

TURN-ON
GROUP B
HEATERS

TURN-OFF
GROUP C
HEATERS

TURN-ON
GROUP C
HEATERS

VARIABLE
CONTROL
SIGNAL
FOR GROUP C
HEATERS

- NOTES:
1. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT.
 2. GROUP A AND GROUP B HEATERS MUST BE ON SEPARATE VITAL POWER SUPPLIES WITH THE LOCAL CONTROL SEPARATED SO THAT ANY SINGLE FAILURE DOES NOT DEFEAT BOTH.
 3. PRECAUTIONS SHOULD BE TAKEN TO AVOID MANUAL HEATER OPERATION, WHICH WOULD CAUSE HEATER DAMAGE, IF THE WATER LEVEL UNCOVERS THE HEATERS.
 4. BACK-UP HEATER STATUS INDICATION IN CONTROL ROOM.

DRAWING NO. 7250D64-S012 REV. 003

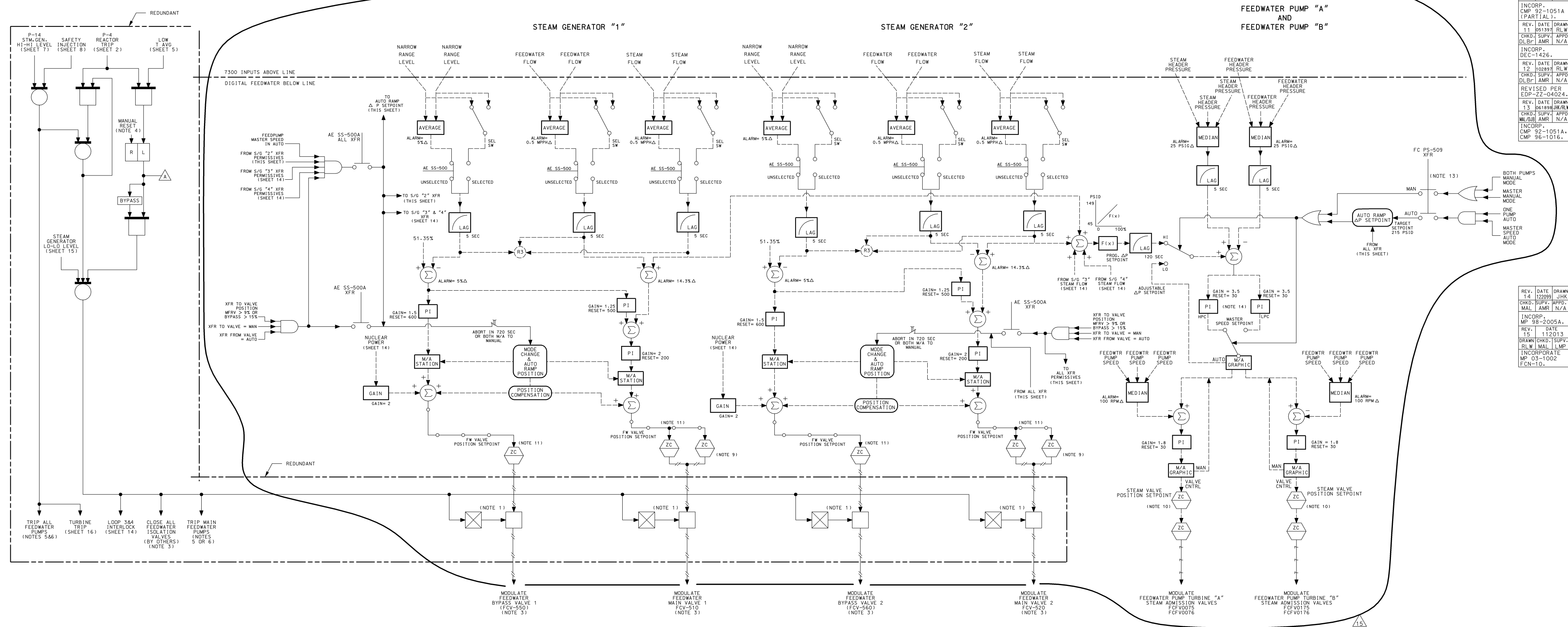
SNP-300
544070
SNP-300
544070
ECN-30895
CHANGES CIRCLED
D. PETROVSKI 10-5-76
J. G. Patton 10-21-76
J. G. Patton 10-21-76
J. G. Patton 10-21-76

STANDARDIZED NUCLEAR UNIT POWER
PLANT SYSTEM PROJECTS
UNIT: SCP S.O.: 300
STATUS: TURNED OVER TO UE
SPIN: AASFD

WESTINGHOUSE Electric Corporation	
NUCLEAR CIRCUT SYSTEMS, PITTSBURGH, PA., U.S.A.	
TITLE: JNPPS PROJECTS FUNCTIONAL DIAGRAM PRESSURIZER HEATER CONTROL	
DRAWING NO. 7250D64-S012	
REV. 003	
SCALE: DO NOT SCALE	
SHEET 12	

11 10 9 8 7 6 5 4 3 2 1

REV.	DATE	DRAWN
6	031793	MAL
CHKD.	SUPV.	APPD.
ODC	TJM	N/A
REDRAWN FOR CLARITY. REFLECTS TURN-OVER TO U.E. ISSUE PER EDP-ZZ-04024.		
REV.	DATE	DRAWN
7	111593	ODC
CHKD.	SUPV.	APPD.
HLP	TJM	N/A
INCORP. CMP 92-1009 A.		
REV.	DATE	DRAWN
8	010794	MAL
CHKD.	SUPV.	APPD.
ODC	TJM	N/A
INCORP. CMP 92-2007A.		
REV.	DATE	DRAWN
9	021796	JHK
CHKD.	SUPV.	APPD.
ELW	AMR	N/A
ISSUE PER EDP-ZZ-04024.		
REV.	DATE	DRAWN
10	120296	JHK
CHKD.	SUPV.	APPD.
MAL	AMR	N/A
INCORP. CMP 92-1051A (PARTIAL).		
REV.	DATE	DRAWN
11	051397	RLW
CHKD.	SUPV.	APPD.
DLB	AMR	N/A
INCORP. CMP 92-1051A.		
REV.	DATE	DRAWN
12	100898	RLW
CHKD.	SUPV.	APPD.
DLB	AMR	N/A
REVISED PER EDP-ZZ-04024.		
REV.	DATE	DRAWN
13	061699	JHK/RLW
CHKD.	SUPV.	APPD.
ML/BL	AMR	N/A
INCORP. CMP 92-1051A.		
REV.	DATE	DRAWN
14	122099	JHK
CHKD.	SUPV.	APPD.
MAL	AMR	N/A
INCORP. MP 98-2005A.		
REV.	DATE	DRAWN
15	112013	JHK
CHKD.	SUPV.	APPD.
RLW	MAL	LAMP
INCORPORATE MP 03-1002 FCN-10.		



NOTES:

- ANALOG GATE CONSISTS OF TWO SOLENOID VENT VALVES IN PARALLEL TO REDUNDANTLY INTERLOCK THE AIR LINE SUPPLYING EACH VALVE'S POSITIONER. THE SOLENOID VALVES ARE DE-ENERGIZED TO VENT, CAUSING EACH FEEDWATER VALVE TO CLOSE IN FIVE SECONDS. BOTH REDUNDANT BLOCK SIGNALS ARE REQUIRED IN ORDER TO CLOSE THE ASSOCIATED VALVE.
- ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT, EXCEPT WHERE INDICATED REDUNDANT.
- OPEN/CLOSE CONTROL AND INDICATION FOR EACH FEEDWATER VALVE IS IN CONTROL ROOM.
- THE REDUNDANT MANUAL RESET CONSISTS OF TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
- TRIPPING OF FEEDWATER PUMPS CAUSES CLOSURE OF ASSOCIATED PUMP DISCHARGE VALVES.
- THE FEEDWATER PUMPS AND PUMP DISCHARGE VALVES ARE SUPPLIED BY OTHERS.
- DELETED.
- DELETED.
- MAIN FEEDWATER REGULATING VALVES HAVE DUAL POSITIONERS IN MASTER/STANDBY CONFIGURATION; FAILOVER OPERATION REQUIRES MANUAL ISOLATION OF AIR LINES.
- OPERATING CYLINDER SERVO POSITION CONTROLLER REMOTE SHUTDOWN COMMAND SHUTS DOWN POSITIONER WHEN PUMP IS TRIPPED TO PREVENT WIND-UP. REFER TO J-2017 VENDOR DRAWINGS FOR DETAILS.
- CIRCUITS TO THE FEEDWATER VALVE POSITIONERS ARE FOR POWERING AND CONTROLLING. THE PROTOCOL IS PROFIBUS PA. REFER TO J-2017 VENDOR DRAWINGS FOR DETAILS.
- AN OVERVIEW OF LOGIC IS SHOWN FOR FEEDWATER CONTROL. REFER TO J-2017 VENDOR SOFTWARE DESIGN DESCRIPTION (SDD) FOR DETAILS.
- FC PS-509 XFR BUTTON INITIATES EITHER A MANUAL TRANSFER OR AUTOMATIC TRANSFER DEPENDING ON THE PERMISSIVES.
- MASTER SPEED HIGH POWER CONTROLLER AND MASTER SPEED LOW POWER CONTROLLER.

STANDARDIZED NUCLEAR UNIT POWER
PLANT SYSTEM PROJECTS
UNIT: SCP SPIN: AASFED
STATUS: TURNED OVER TO U.E
S.O.: 300 ITEM:9-1

DRAWN	DATE	10/1/01
CHKD.	DATE	10/1/01
SUPV.	DATE	10/1/01
APPD.	DATE	10/1/01
LOCATION	DATE	10/1/01
CLASS	DATE	10/1/01
UNIT	DATE	10/1/01
STATUS	DATE	10/1/01
S.O.	DATE	10/1/01
ITEM	DATE	10/1/01

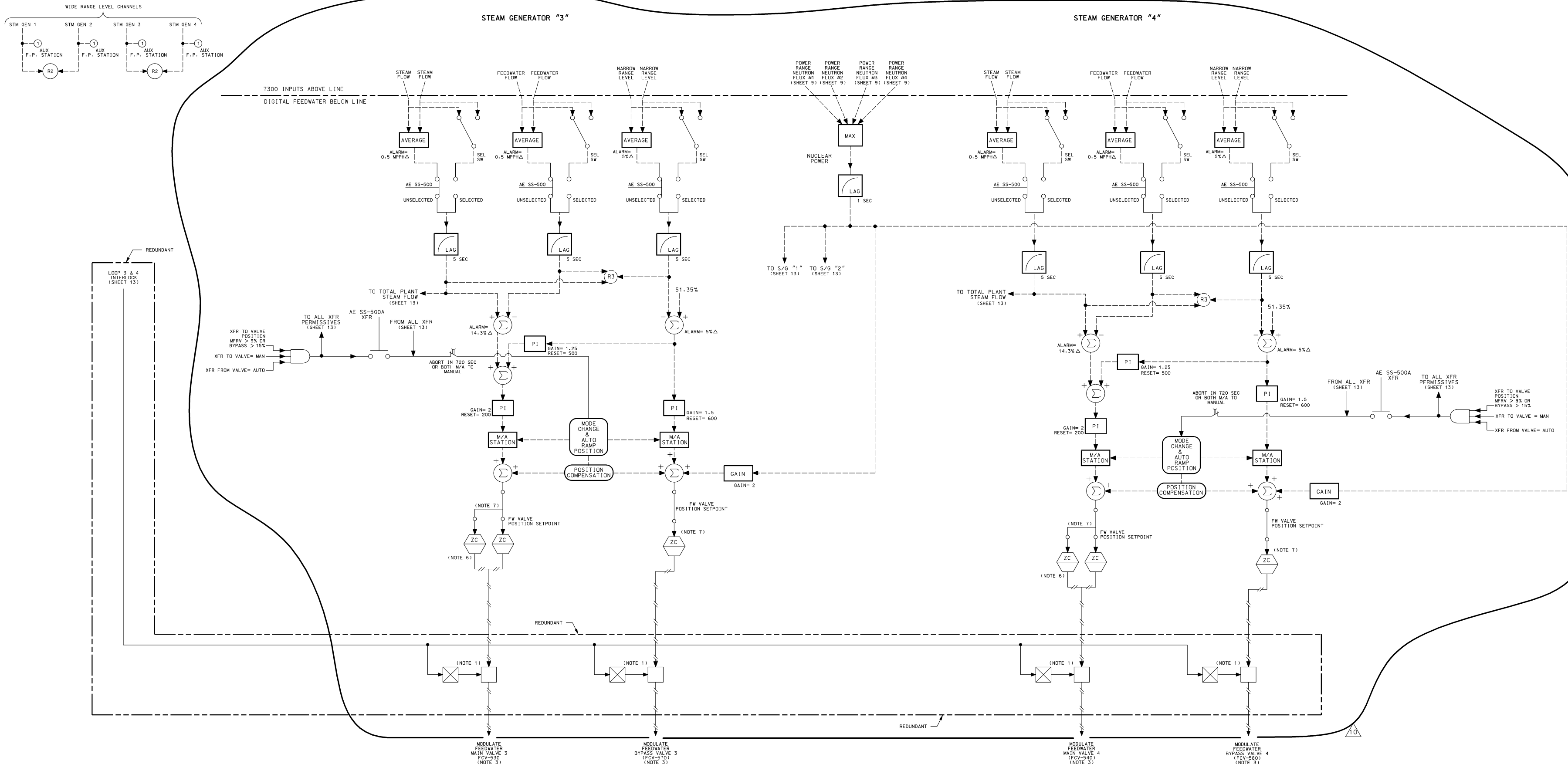
FUNCTIONAL DIAGRAM
FEEDWATER CONTROL
& ISOLATION

CALLAWAY ENERGY CENTER

7250D64 S013

REV. 15

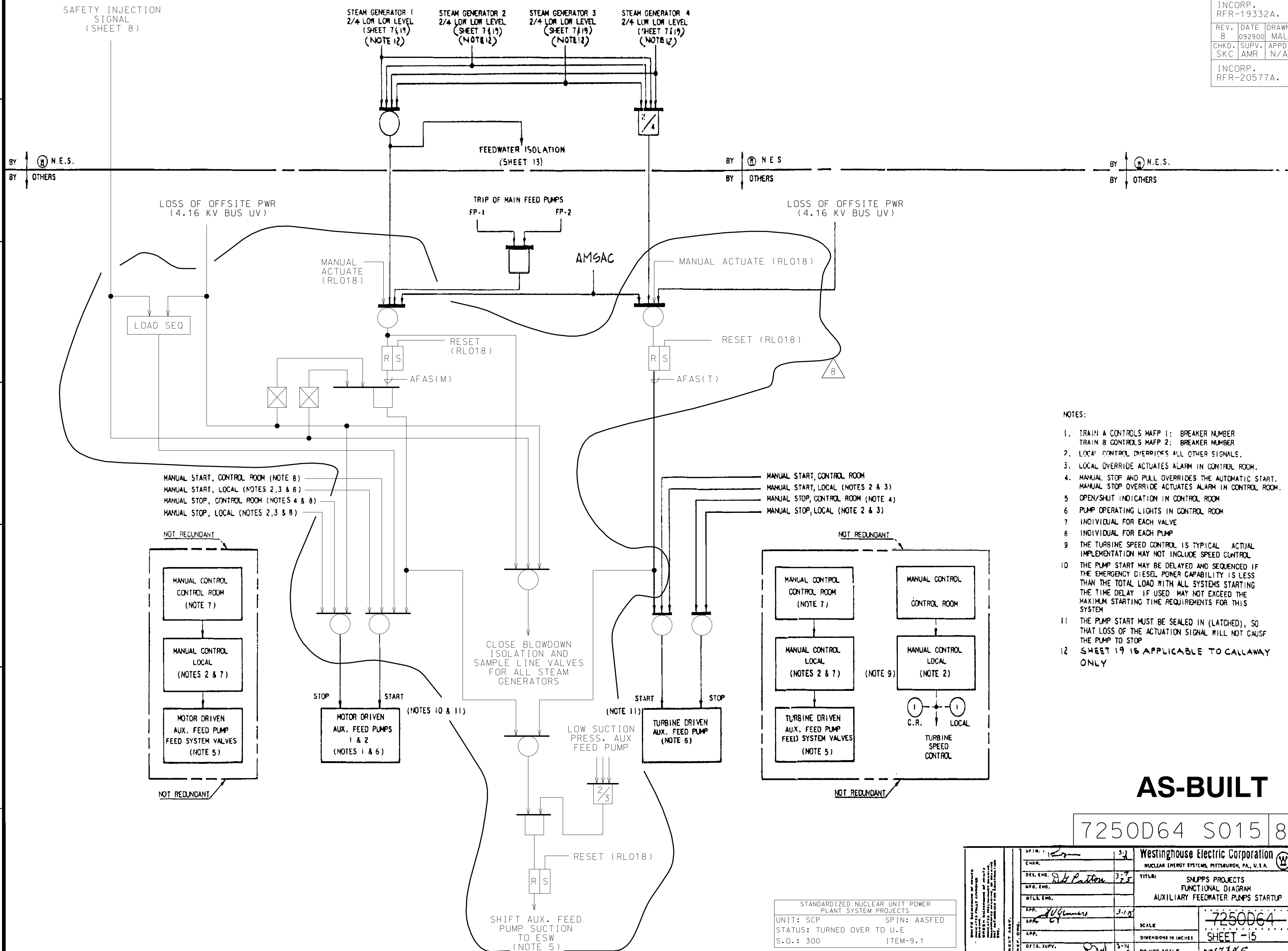
REV.	DATE	DRAWN
5	091596	JHK
CHKD.	SUPV.	APPD.
EW	AMR	N/A
REDRAWN FOR CLARITY. REFLECTS TURN-OVER TO UE.		
REV.	DATE	DRAWN
6	021796	JHK
CHKD.	SUPV.	APPD.
EW	AMR	N/A
ISSUE PER EOP-22-04024.		
REV.	DATE	DRAWN
7	120296	JHK
CHKD.	SUPV.	APPD.
MAL	AMR	N/A
INCORP. CMP 92-1051A (PARTIAL).		
REV.	DATE	DRAWN
8	061898	JHK
CHKD.	SUPV.	APPD.
MAL	AMR	N/A
INCORP. CMP 92-1051A (PARTIAL).		
REV.	DATE	DRAWN
9	122098	JHK
CHKD.	SUPV.	APPD.
MAL	AMR	N/A
INCORP. MP 98-2005A.		
REV.	DATE	DRAWN
10	112013	JHK
DRAWN	CHKD.	SUPV.
RLW	MAL	LMP
INCORPORATE MP 03-1002 FCN-10.		



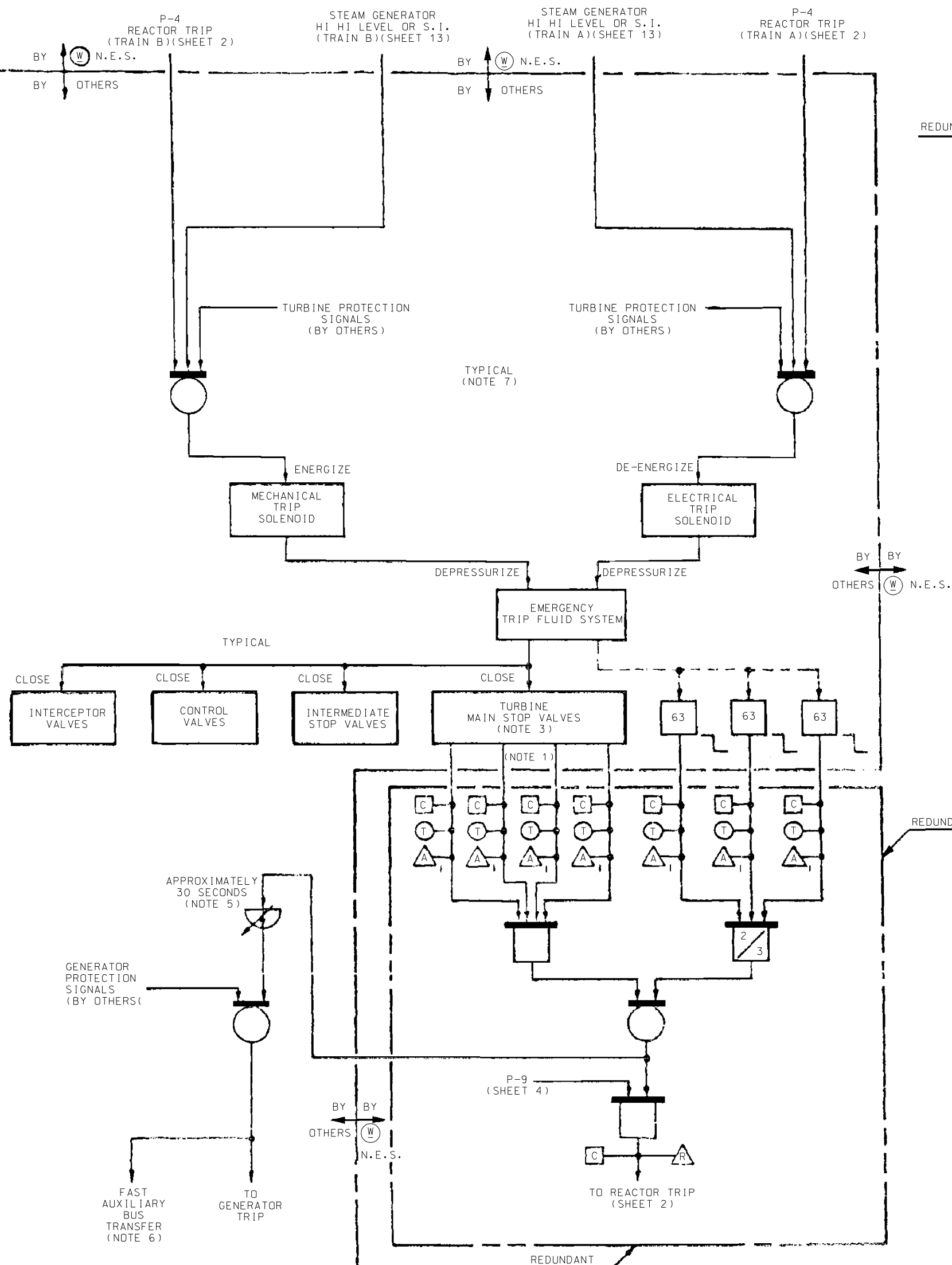
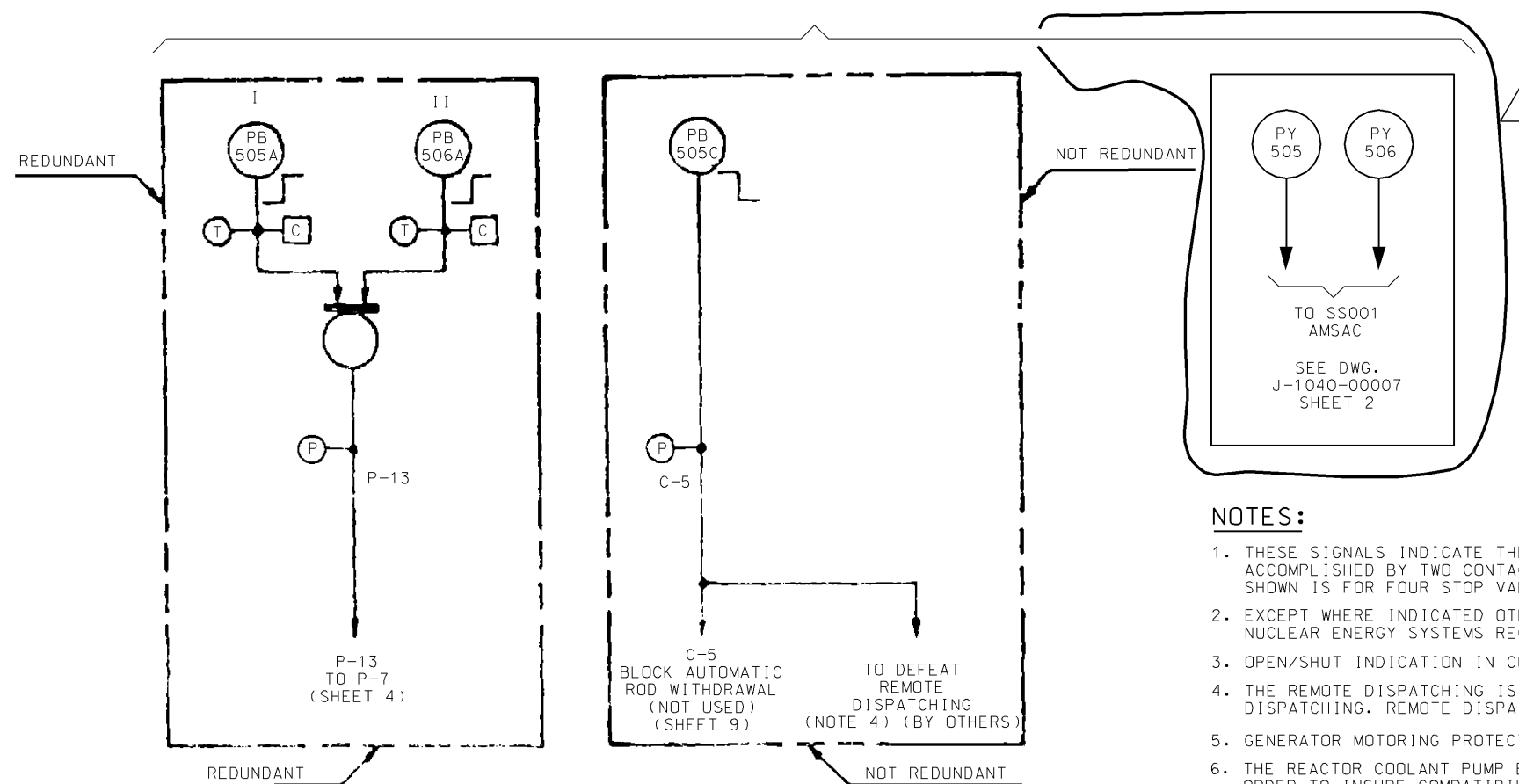
NOTES:

- ANALOG GATE CONSISTS OF TWO SOLENOID VENT VALVES IN PARALLEL TO REDUNDANTLY INTERLOCK THE AIR LINE SUPPLYING EACH VALVE'S POSITIONER. THE SOLENOID VALVES ARE DE-ENERGIZED TO VENT, CAUSING EACH FEEDWATER VALVE TO CLOSE IN FIVE SECONDS. BOTH REDUNDANT BLOCK SIGNALS ARE REQUIRED IN ORDER TO CLOSE THE ASSOCIATED VALVE.
- DELETED.
- OPEN/CLOSE CONTROL AND INDICATION FOR EACH FEEDWATER VALVE IS IN CONTROL ROOM.
- SWITCHING BETWEEN TWO PRESSURE SIGNALS IS PROVIDED ON THE CONTROL BOARD.
- DELETED.
- MAIN FEEDWATER REGULATING VALVES HAVE DUAL POSITIONERS IN MASTER/STANDBY CONFIGURATION. FAILOVER OPERATION REQUIRES MANUAL ISOLATION OF AIR LINES.
- CIRCUITS TO THE FEEDWATER VALVE POSITIONERS ARE FOR POWERING AND CONTROLLING. THE PROTOCOL IS PROFIBUS PA. REFER TO J-2017 VENDOR DRAWINGS FOR DETAILS.
- AN OVERVIEW OF LOGIC IS SHOWN FOR FEEDWATER CONTROL. REFER TO J-2017 VENDOR SOFTWARE DESIGN DESCRIPTION (SDD) FOR DETAILS.

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS		FUNCTIONAL DIAGRAM FEEDWATER CONTROL & ISOLATION	
UNIT: SCP	TURNED OVER TO UE	APPROVED BY W	NO. SCP-88-509
CERTIFICATION LTR.	ENGR. LTR. NO. 1RST-7108	AUTHORITY: M.J. PARVIN	ENGR. LTR. NO. 1RST-7108
UNION ELECTRIC COMPANY	ST. LOUIS, MO	CALLAWAY ENERGY CENTER	7250D64 S014

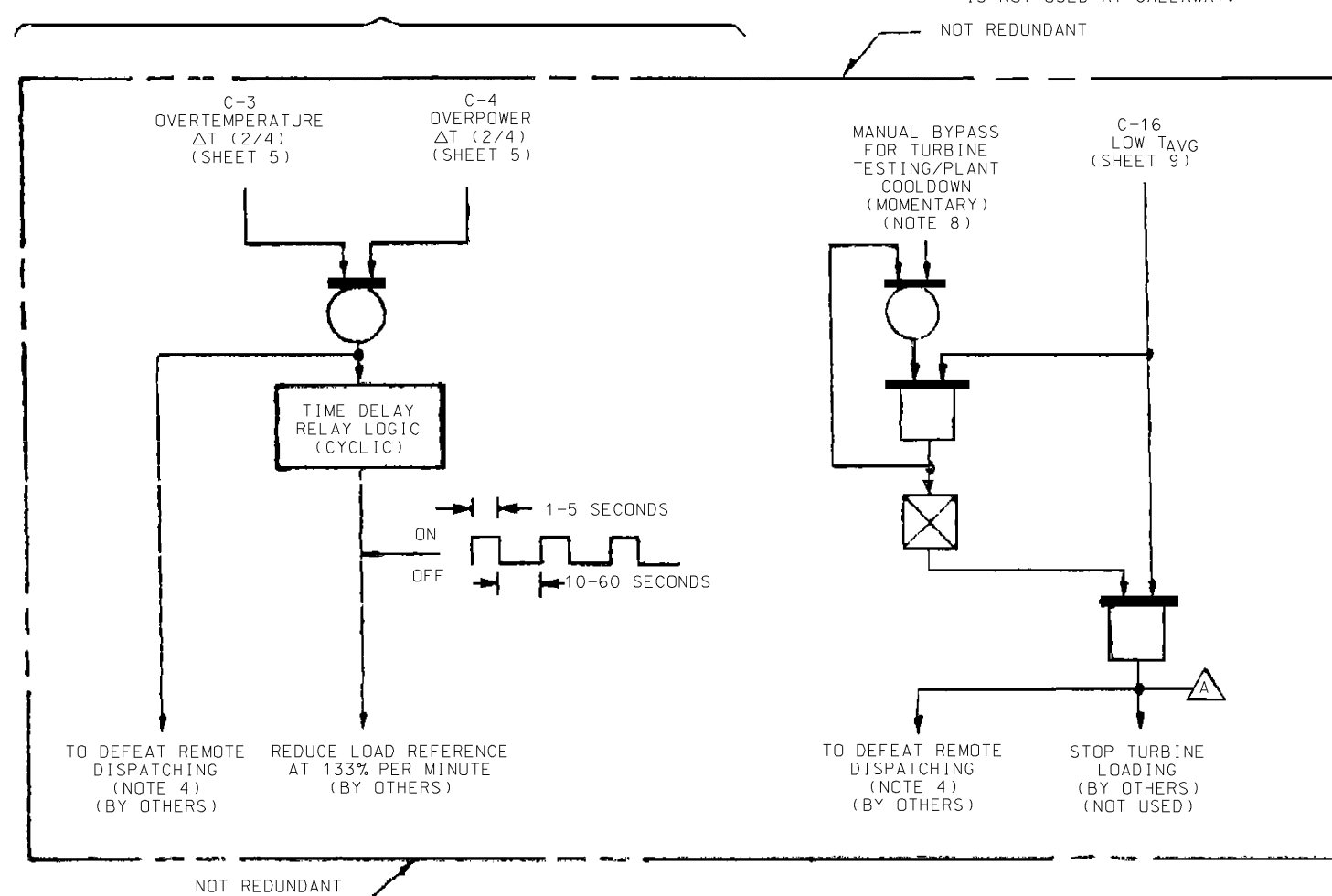


7250D64 S016

TURBINE POWER
(TURBINE IMPULSE CHAMBER PRESSURE)

NOTES:

1. THESE SIGNALS INDICATE THE CLOSING OF THE STOP VALVES. POSITION DETECTION IS ACCOMPLISHED BY TWO CONTACTS PER STOP VALVE, ONE FOR EACH TRAIN. THE LOGIC SHOWN IS FOR FOUR STOP VALVES.
2. EXCEPT WHERE INDICATED OTHERWISE, REDUNDANCY IS INDICATED IN REGARDS TO (W) NUCLEAR ENERGY SYSTEMS REQUIREMENTS ONLY.
3. OPEN/SHUT INDICATION IN CONTROL ROOM FOR EACH STOP VALVE.
4. THE REMOTE DISPATCHING IS TYPICAL. ACTUAL IMPLEMENTATION MAY NOT INCLUDE REMOTE DISPATCHING. REMOTE DISPATCHING IS NOT USED AT CALLAWAY.
5. GENERATOR MOTORING PROTECTION SHOULD NOT DEFEAT THE THIRTY SECOND DELAY.
6. THE REACTOR COOLANT PUMP BUS TRANSFER SHOULD BE COMPLETED WITHIN SIX CYCLES IN ORDER TO INSURE COMPATIBILITY WITH THE UNDERFREQUENCY TRIP OF THE REACTOR COOLANT PUMP CIRCUIT BREAKERS. THE TRANSFER TIME LIMIT MAY BE EXTENDED ANOTHER 4 CYCLES TO A TOTAL OF NOT GREATER THAN 10 CYCLES. IF THE SYSTEM DYNAMICS ARE SUCH THAT A RCP TRIP DOES NOT OCCUR, THE 10 CYCLE LIMIT IS FOR PUMP MOTOR PROTECTION.
7. THE TURBINE-GENERATOR PROTECTION LOGIC IS ONLY TYPICAL OF THE ACTUAL HARDWARE DESIGN. SEE BECHTEL DRAWINGS FOR DETAILS.
8. THIS FUNCTION IS USED TO BYPASS THE REDUCED TEMPERATURE RETURN TO POWER CONTROL CIRCUITRY TO ALLOW TURBINE TESTING AND/OR TO DEFEAT THE C-16 ANNUNCIATOR SUCH AS WOULD BE REQUIRED DURING A PLANT COOLDOWN. THIS FUNCTION IS NOT USED AT CALLAWAY.

TURBINE RUNBACK
VIA LOAD REFERENCE

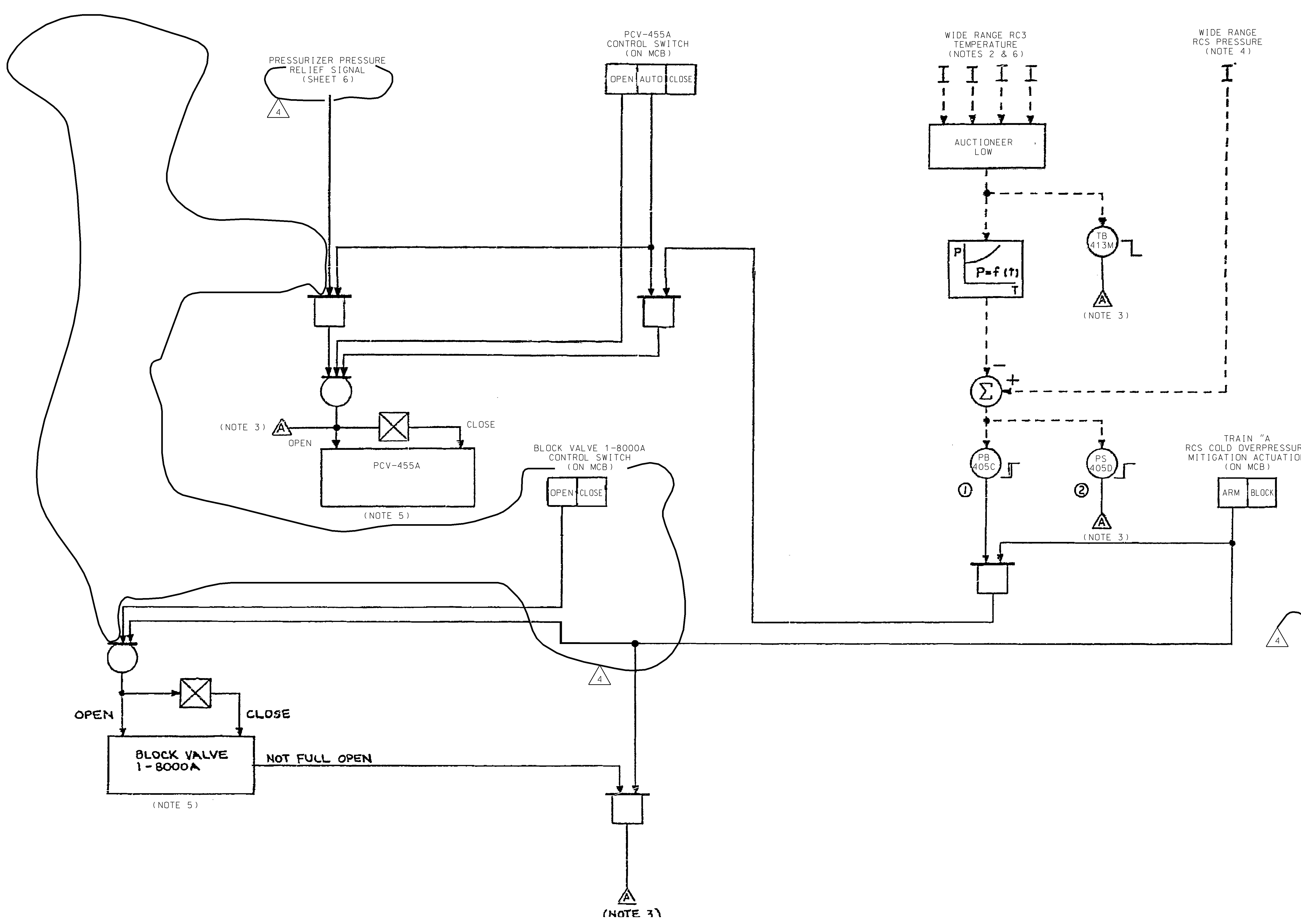
REV	DATE	DRAWN
B	7/27/94	MAL
CHECKED	SUPV	APPD
7/27/94	7/27/94	NA
REFLECTS TURNOVER TO U.E. INCORP. RFR-14851A.		
REV.	DATE	DRAWN
6	12/20/99	RLW
CHKD.	SUPV.	APPD.
DJB	AMR	N/A
INCORP. MP 95-1008.		
REV.	DATE	
7	11/27/02	
DRAWN	CHKD.	SUPV.
RLW	MAL	TWS
INCORPORATE RFR-21998A		

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS	
UNIT: SCP	SPIN: AASFED
STATUS: TURNED OVER TO U.E	
S.O.: 300	TAB 9-1

Westinghouse Electric Corporation	
NUCLEAR ENERGY DIVISION, PITTSBURGH, PA., U.S.A.	
TITLE	
SNUPPS PROJECT	
FUNCTIONAL DIAGRAM	
TURBINE TRIP, RUNBACKS, AND OTHER SIGNALS (W REQUIREMENTS)	

DRAWING NO.	REV.
7250D64 S016	7

DIMENSIONS IN INCHES	7250064
DO NOT SCALE	SHEET 16
	REV 1234



1. DELETED.
2. PROTECTION GRADE WIDE RANGE RCS TEMPERATURE SIGNALS FROM TRAIN "A" RELATED PROTECTION SETS.
3. ANNUNCIATION IN THE MAIN CONTROL ROOM IS REQUIRED TO BE VISIBLE TO THE OPERATOR AT THE MAIN CONTROL ROOM.
4. PROTECTION GRADE WIDE RANGE RCS PRESSURE SIGNAL FROM A TRAIN "A" RELATED PROTECTION SET.
5. STATUS LIGHTS MUST BE PROVIDED FOR EACH PORV AND EACH PORV BLOCK VALVE AT THE MAIN CONTROL BOARD TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
6. THE RCS LOOP AND HOT LEG OR COLD LEG ASSIGNMENTS FOR THE WIDE RANGE RCS TEMPERATURE SIGNALS MUST BE CONSISTENT WITH THE REQUIREMENTS FOR RVLIS AND PAMS.

DRAWN (DATE) N/A	FUNCTIONAL DIAGRAM			
CHKD. (DATE) N/A	PRESSURIZER PRESSURE RELIEF			
SUPV. (DATE) N/A	SYSTEM (TRAIN A)			
APPD. (DATE) N/A	LOCATION	CALLAWAY PLANT		CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO.		7250D64-S017		REV 4

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS	
UNIT: SCP	SPIN: AASFED-04
STATUS: TURNED OVER TO U.E	
SHOP ORDER: 300	ITEM: 9-1

D

C

B

A

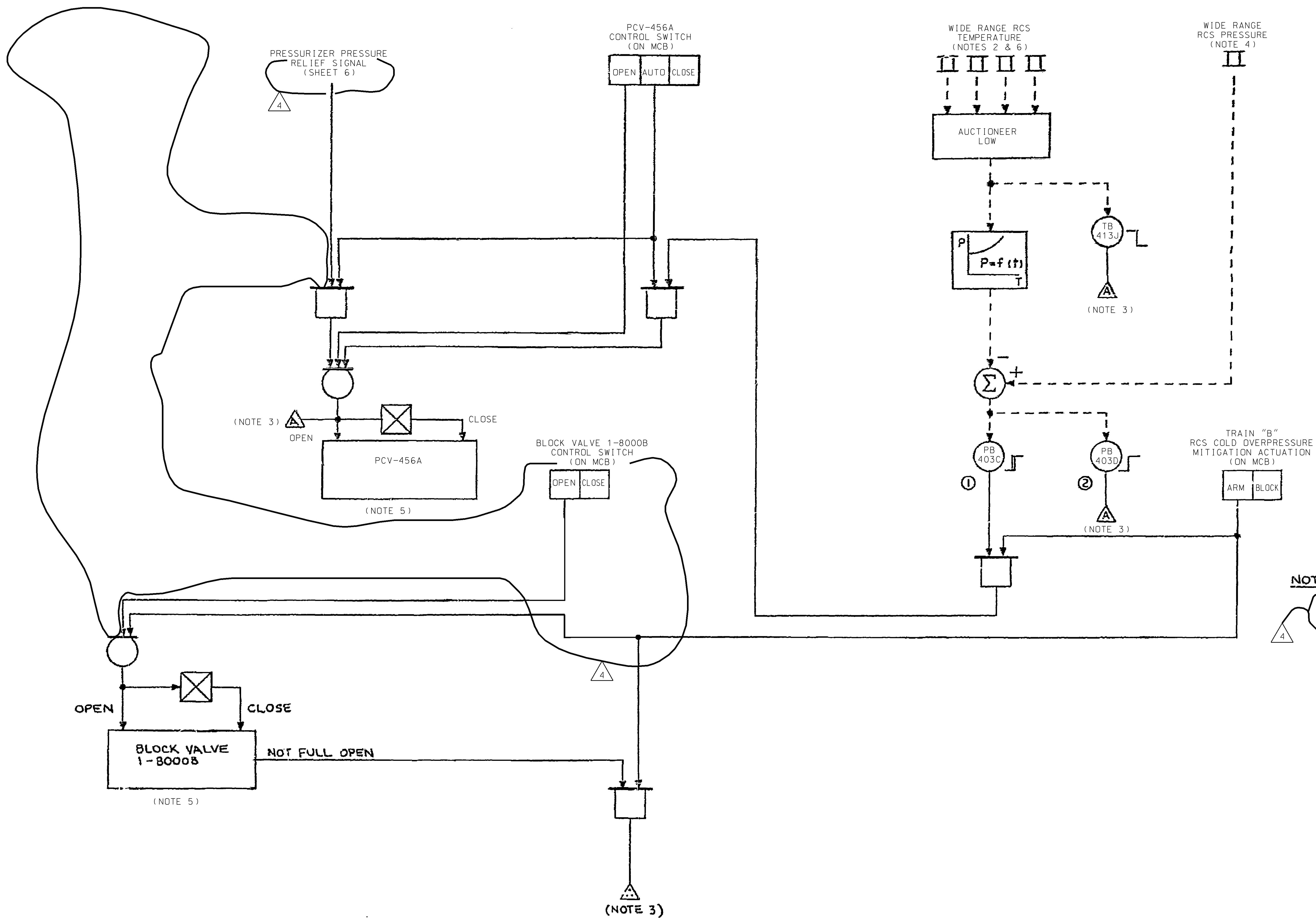
REV.	DATE	DRAWN
3	062200	MAL
CHKD.	SUPV.	APPD.
SKC	AMR	N/A
REFLECTS TURNOVER TO U.E.		
REV.	DATE	DRAWN
4	051101	RLW
CHKD.	SUPV.	APPD.
MAL	AMR	N/A
INCORP. MP: 00-1005A		

D

C

B

A



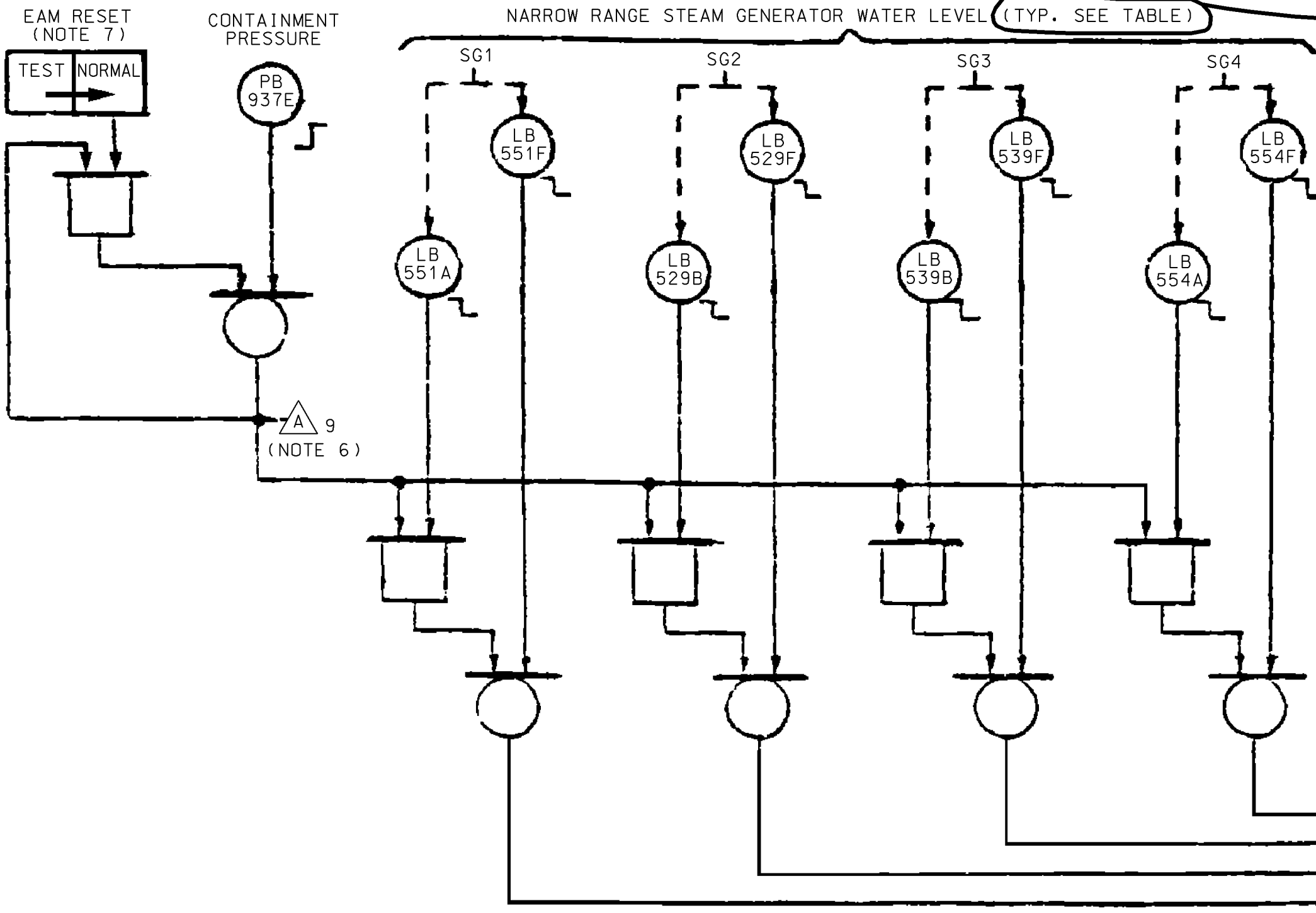
NOTES:

1. DELETED.
2. PROTECTION GRADE WIDE RANGE RCS TEMPERATURE SIGNALS FROM TRAIN "B" RELATED PROTECTION SETS.
3. ANNUNCIATION IN THE MAIN CONTROL ROOM IS REQUIRED TO BE VISIBLE TO THE OPERATOR AT THE MAIN CONTROL ROOM.
4. PROTECTION GRADE WIDE RANGE RCS PRESSURE SIGNAL FROM A TRAIN "B" RELATED PROTECTION SET.
5. STATUS LIGHTS MUST BE PROVIDED FOR EACH PORV AND EACH PORV BLOCK VALVE AT THE MAIN CONTROL BOARD TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
6. THE RCS LOOP AND HOT LEG OR COLD LEG ASSIGNMENTS FOR THE WIDE RANGE RCS TEMPERATURE SIGNALS MUST BE CONSISTENT WITH THE REQUIREMENTS FOR RVLIS AND PAMS.

REFERENCE DWG:
WESTINGHOUSE ELECTRIC CORP.
DWG. NO. 7250D64 SHEET 18

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS	
UNIT: SCP	SPIN: AASFED-04
STATUS: TURNED OVER TO U.E	
SHOP ORDER: 300	ITEM: 9-1

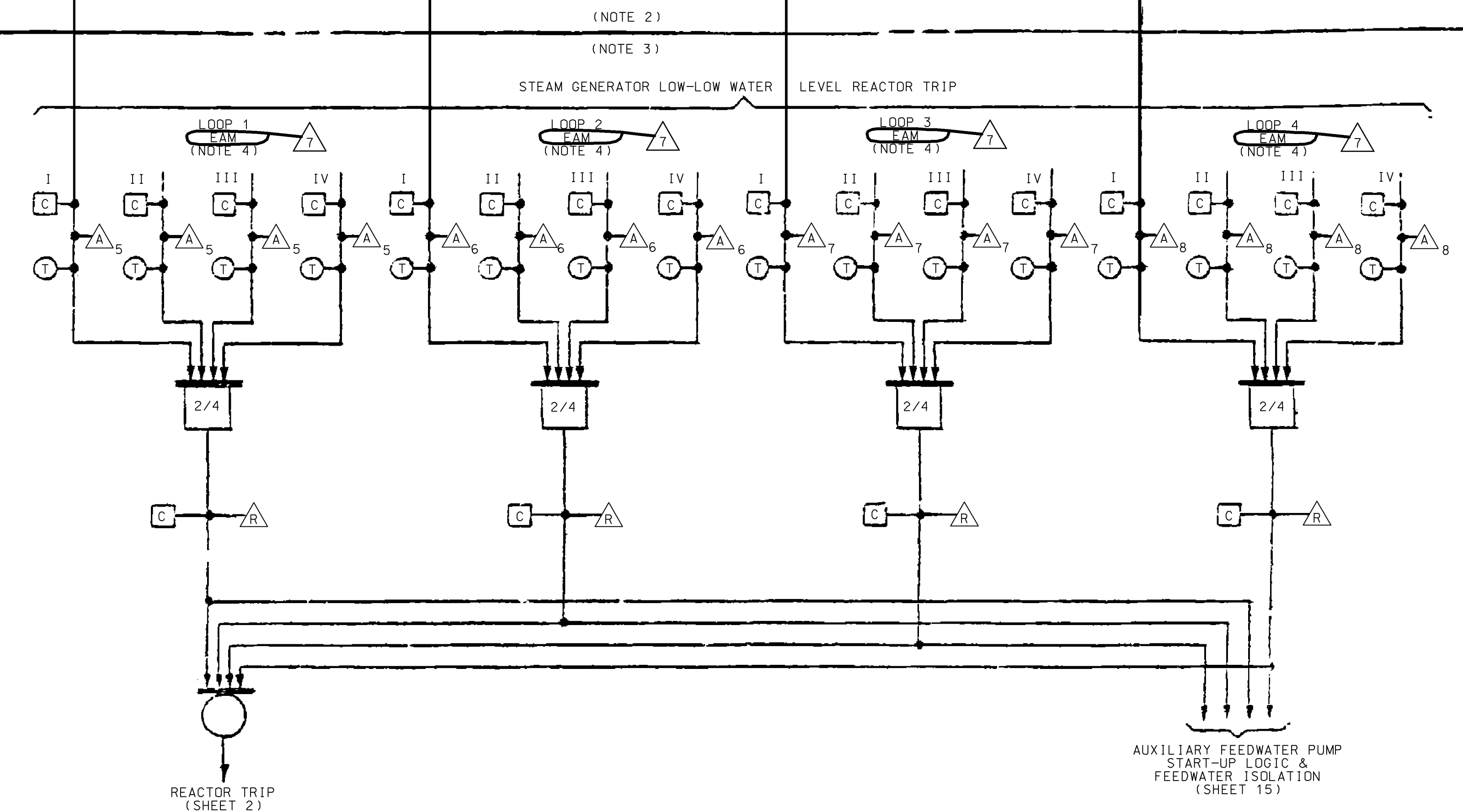
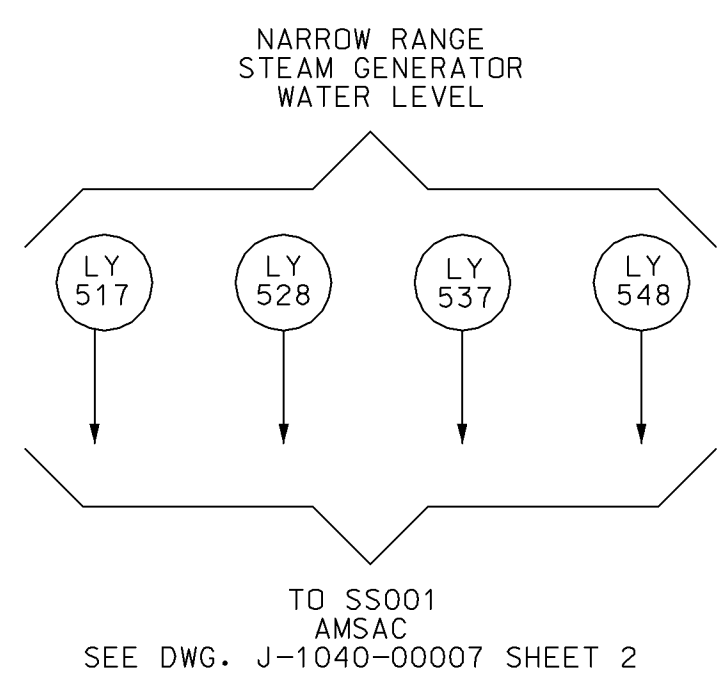
DRAWN (DATE) N/A	FUNCTIONAL DIAGRAM PRESSURIZER PRESSURE RELIEF SYSTEM (TRAIN B)		
CHKD. (DATE) N/A			
SUPV. (DATE) N/A	CALLAWAY PLANT		
APPD. (DATE) N/A	LOCATION	CLASS	REV.
UNION ELECTRIC COMPANY ST. LOUIS, MO.		7250D64-S018	4



PROTECTION CABINET								
S/G	1		2		3		4	
	NORM	ADV	NORM	ADV	NORM	ADV	NORM	ADV
1	LB-551F	LB-551A	LB-519F	LB-519B	LB-518F	LB-518B	LB-517F	LB-517B
2	LB-529F	LB-529B	LB-552F	LB-552A	LB-528F	LB-528B	LB-527F	LB-527B
3	LB-539F	LB-539B	LB-553F	LB-553A	LB-538F	LB-538B	LB-537F	LB-537B
4	LB-554F	LB-554A	LB-549F	LB-549B	LB-548F	LB-548B	LB-547F	LB-547B
CTMT PRESS	PB937E		PB936E		PB935E		PB934E	

REV. 3	DATE 11/19/88	DRWN RLW	CHKD JHM	SUPV NA
REFLECTS TURNOVER TO U.E. INCORP. RFR-06710A & ISSUE PER EDP-22-04024				
REV. 4	DATE 12/29/88	DRWN RLW	CHKD JHM	SUPV NA
INCORP. CMP 91-1008.				
REV. 5	DATE 12/02/02	DRWN RLW	CHKD JHM	SUPV NA
INCORPORATE RFR-21998A				
REV. 6	DATE 01/03/06	DRWN JHK	CHKD JHM	SUPV NA
INCORP. MP 04-1004.				
REV. 7	DATE 09/28/06	DRWN JHK	CHKD JHM	SUPV NA
INCORPORATE AC 06-000149, RFR 200606779				

- NOTES:**
1. THE ENVIRONMENTAL ALLOWANCE MODIFIER ON THIS SHEET IS APPLICABLE TO CALLAWAY UNIT 1 ONLY. SEE SHEET 7 FOR THE STEAM GENERATOR LOW-LOW WATER LEVEL REACTOR TRIP LOGIC APPLICABLE TO WOLF CREEK UNIT 1.
 2. THIS LOGIC IS SPECIFIC FOR PROTECTION SET I. IT IS TYPICAL OF THE LOGIC IN PROTECTION SETS II, III, AND IV. BISTABLE TAG NUMBERS ARE FOR PROTECTION SET I ONLY.
 3. THIS LOGIC IS REDUNDANT AND IS PERFORMED IN THE SSPS.
 4. LOGIC INPUT COMES FROM THE EAM LOGIC IN THE OTHER PROTECTION SETS.
 5. ONE COMMON ANNUNCIATOR WINDOW FOR EACH STEAM GENERATOR IS SHARED WITH ALARMS GENERATED IN THE OTHER PROTECTION SETS.
 6. ONE COMMON ANNUNCIATOR WINDOW IS SHARED WITH ALARM GENERATED IN THE OTHER PROTECTION SETS.
 7. THE EAM RESET CONSISTS OF FOUR SWITCHES LOCATED IN THE PROCESS CABINETS. ONE PER PROTECTION SET. MOMENTARY ACTUATION MAY BE REMOVED PROVIDED THE ADVERSE ENVIRONMENT STEAM GENERATOR LOW-LOW WATER LEVEL SETPOINT IS ENABLED WHENEVER THE SWITCH IS IN THE TEST POSITION.



AUXILIARY FEEDWATER PUMP START-UP LOGIC & FEEDWATER ISOLATION (SHEET 15)

WESTINGHOUSE PROPRIETARY DATA
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF THE WESTINGHOUSE ELECTRIC CORPORATION WATER REACTOR DIVISIONS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND IS TO BE RETURNED UPON REQUEST. ITS CONTENTS MAY NOT BE DISCLOSED IN WHOLE OR IN PART TO OTHERS OR USED FOR OTHER THAN THE PURPOSE FOR WHICH TRANSMITTED WITHOUT THE PRIOR WRITTEN PERMISSION OF THE WESTINGHOUSE WATER REACTOR DIVISIONS.

TOLERANCE & MACHINE NOTES
(UNLESS OTHERWISE SPECIFIED)
DRAWING PRACTICE, CHAINING SYMBOLS, DIMENSIONING, TOLERANCING & INTERPRETATION BASED ON ASME Y14 SERIES STANDARD & PS 295126
DIMENSIONS ON PHOTOS BASED ON APPROPRIATE SCALE
SCALE: 1/4" = 1" (UNLESS OTHERWISE SPECIFIED)
FILLET RADIUS: 0.031" (UNLESS OTHERWISE SPECIFIED)
ANGLE: 45° (UNLESS OTHERWISE SPECIFIED)
MAXIMUM SURFACE ROUGHNESS: 250 INCHES (UNLESS OTHERWISE SPECIFIED)

THIRD ANGLE PROJECTION

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM PROJECTS
UNIT: SCP S.O.: 300 SPIN: AASFED
STATUS: TURNED OVER TO U.E.

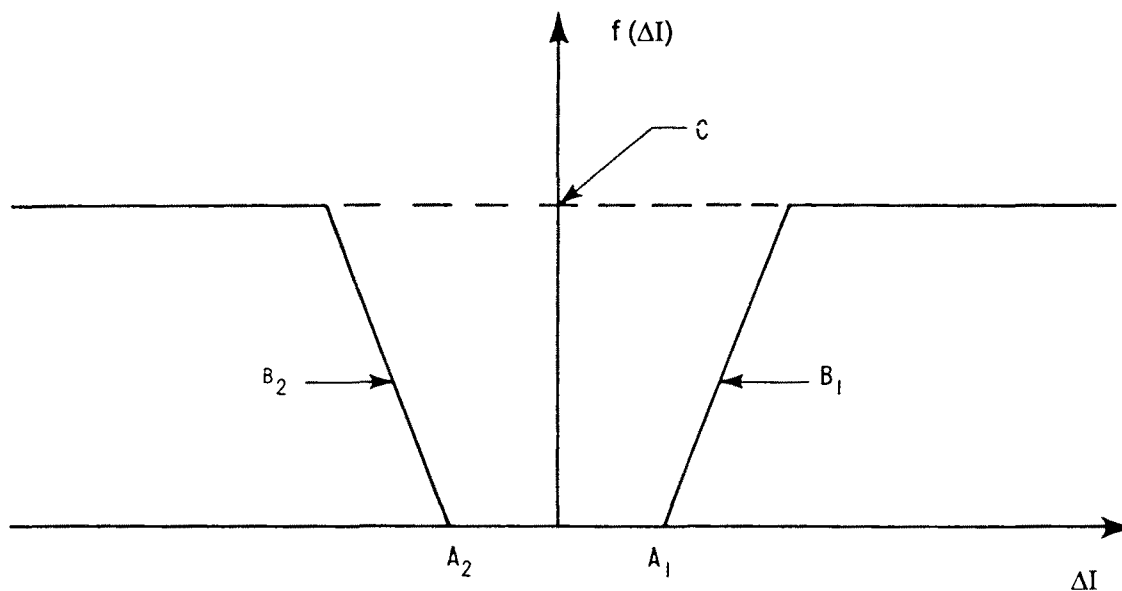
DRAWING NO. 7250D64 S019
REV. 7

Westinghouse Electric Corporation
WATER REACTOR DIVISIONS - MONROEVILLE PA. U.S.A.

TITLE: SNUPPS PROJECTS
FUNCTIONAL DIAGRAM
ENVIRONMENTAL ALLOWANCE MODIFIER

SIZE: D SCALE: NTS
DIMENSIONS IN INCHES

DRAWING NUMBER: 7250D64-2
REV. SHEET: SHEET 19



- ΔI - NEUTRON FLUX DIFFERENCE BETWEEN UPPER AND LOWER LONG ION CHAMBERS
- A_1, A_2 - LIMIT OF $f(\Delta I)$ DEADBAND
- B_1, B_2 - SLOPE OF RAMP; DETERMINES RATE AT WHICH FUNCTION REACHES IT'S MAXIMUM VALUE ONCE DEADBAND IS EXCEEDED
- C - MAGNITUDE OF MAXIMUM VALUE THE FUNCTION MAY ATTAIN

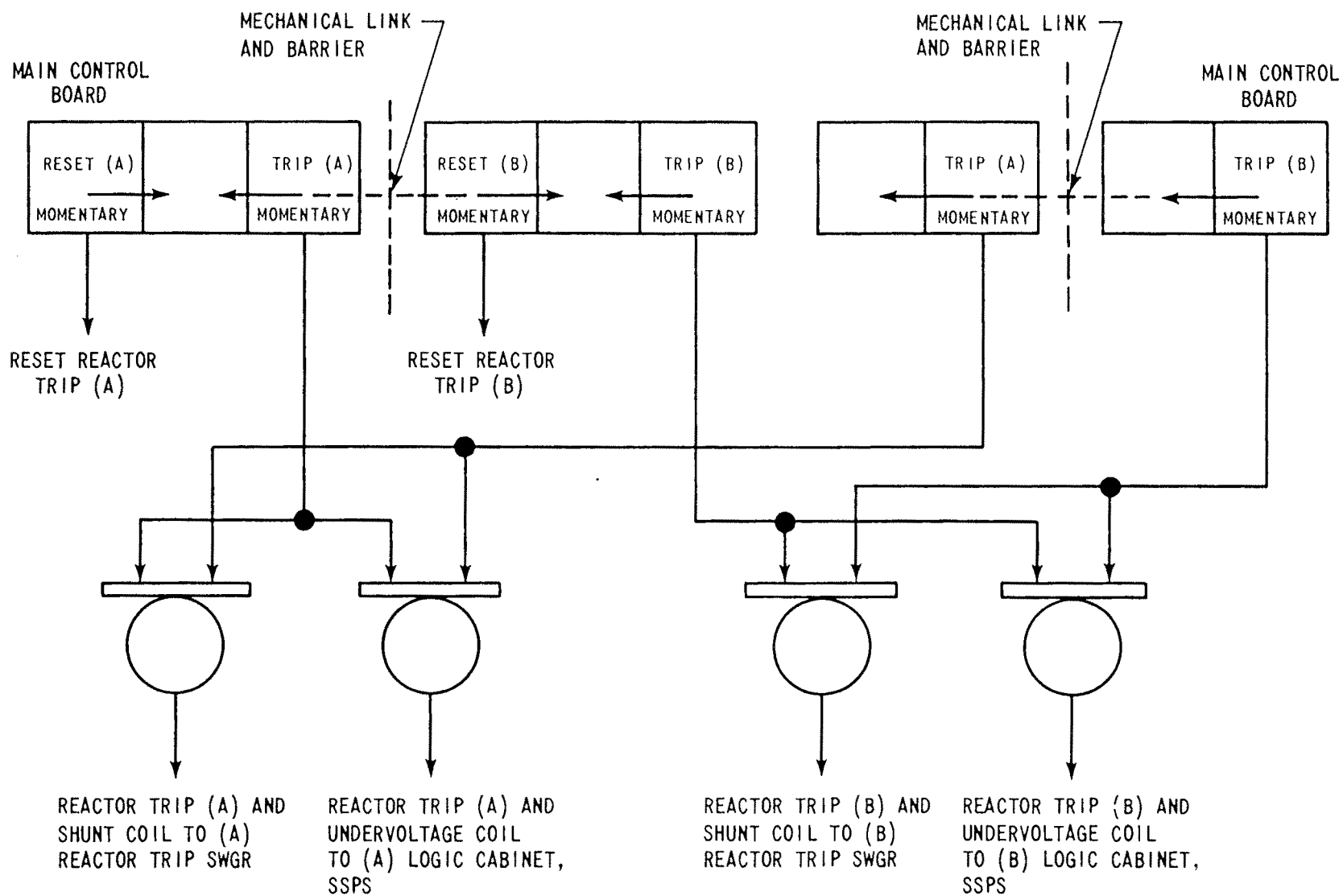
NOTE: $f(\Delta I) = 0$ FOR OPDT FOR ALL INPUT VALUES.

REV OL-12
11/01

CALLAWAY PLANT

FIGURE 7.2-2

SETPOINT REDUCTION FUNCTION
FOR OVERPOWER AND OVERTEMPERA-
TURE ΔT TRIPS



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6/86

CALLAWAY PLANT

FIGURE 7.2-3

REACTOR TRIP/ENGINEERED SAFETY
FEATURES ACTUATION MECHANICAL
LINKAGE

Definition	Function	Symbol
Hand Switch input to logic	MANUAL INPUT	
Process Switch input to logic	PROCESS INPUT	
Output exists only when all inputs are present	AND	
Output exists only when one or more inputs are present	OR	
Output exists only when input is not present	NOT	
Output exists only when input has been continuously present for a preset time and remains present	ON DELAY	
Output exists only when input is present and for a preset time after the input is not present	OFF DELAY (TIMED MEMORY)	
Set output exists when set input is present & continues until the reset input is present. Reset output exists only when set output is not present.	MEMORY	
Output exists only when at least A out of B inputs are present	COINCIDENCE MATRIX	
Output exists under special conditions not otherwise noted.	SPECIAL	
Digital output exists only when input is lower than setpoint	LOW BISTABLE	
Digital output exists only when input is higher than setpoint	HIGH BISTABLE	
Output is electrically isolated from input	ISOLATION	
Test signal can be inserted manually in place of normal signal	TEST DEVICE	
RED (R) - Operating GREEN (G) - Not operating AMBER (A) - Warning, take note WHITE (W) - Advisory information	LIGHT	
Input to annunciator	ANNUNCIATOR	
Input to computer	COMPUTER	
Resultant action initiated by logic	OUTPUT ACTION	
Logic continuation	CONTINUATION	

ref. J-0601

DRAWING NUMBERING

Numbering conforms to Bechtel Engineering Procedure 6-6. Sheet numbers correspond to instrument loop numbers.

General Notes

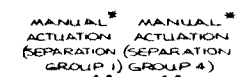
- Logic symbols represent system functions and do not necessarily duplicate circuit arrangement or devices. Logic diagrams do not inherently imply energized, de-energized, or other circuit operation states.
- Process equipment will change state when a change is initiated, and will remain in this state until a change to another state is initiated.
- Process equipment will remain in, or return to, the original state after a loss and restoration of power, unless otherwise noted.
- Inherent equipment interlocks such as circuit breaker trip free and reversing starting cross interlocks are not shown.
- Some protection actions are shown also as start premissives. Trip-free design prevents equipment operation when a protection action exists, even if a start permissive is not provided.
- Final instrument setpoints are shown elsewhere. Setpoints shown on control logic diagrams are approximate.
- See electrical drawings for details of equipment electrical overcurrent, short circuit, and differential protection and space heaters.
- The memory, reset, and start premissive logic associated with the operation of electrical protection devices is not shown. Electrical auxiliary system breakers are reset by operation of the control room switch to trip. Mechanical auxiliary system circuits are reset by operation of a switch at the switchgear or motor control center.
- The test control switches at the switchgear which function only when a circuit breaker is in the test position are not shown.
- All circuit controls, except interlocks with other equipment, function when a circuit breaker is in the test position to allow circuit testing.
- The logic to show that valve and damper position lights are both on when the equipment is in an intermediate position is not shown.
- Limit and torque switches to stop valve and damper motor actuators at the end of travel are not shown on the logic. The valve type and required actions will be noted on the diagram when available.
- Solenoid pilot operated valves are held in position by limit switches (or relays) unless otherwise noted.

LOCATION ABBREVIATIONS	000	- Local in main control room
	001-099	- Main control room panel (ref. dwg. 10466-J-0J3621)
	100	- Local in field
	101-899	- Field control panel (ref. dwg. 10466-J-0650)
	900-999	- Plant computer
	LC	- 480 V Load center
	MCC	- Motor control center
	SWGR	- Switchgear

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CALLAWAY PLANT

FIGURE 7.3-1
ENGINEERED SAFETY FEATURES
ACTUATION SYSTEM (BOP)
(SHEET 1)

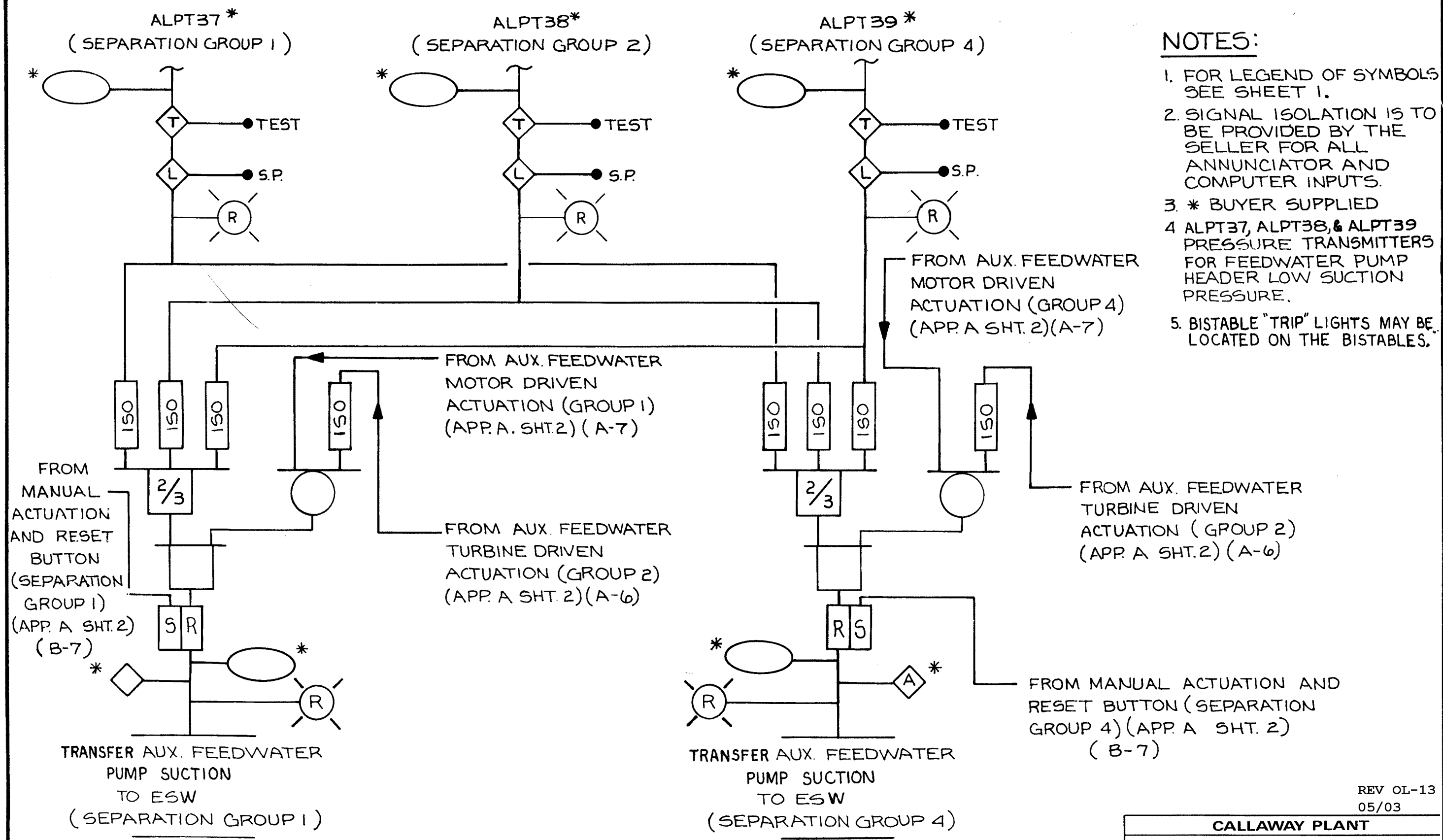


NOTES:

1. FOR LEGEND OF SYMBOLS, SEE SHEET 1.
2. SIGNAL ISOLATION IS TO BE PROVIDED BY THE SELLER FOR ALL ANNUNCIATOR AND COMPUTER INPUTS.
3. B. BUYER SUPPLIED
4. GTR8 CONTAINMENT ATMOSPHERE RADIATION MONITOR (A)
5. GTR9 CONTAINMENT ATMOSPHERE RADIATION MONITOR (B)
6. GTR122 CONTAINMENT PURGE RADIATION MONITOR (EXHAUST DISCHARGE)
7. GTR123 CONTAINMENT PURGE RADIATION MONITOR (EXHAUST DISCHARGE)
8. GTR15 CONTROL ROOM AIR INTAKE GASEOUS RADIOACTIVE MONITOR (A)
9. GTR16 CONTROL ROOM AIR INTAKE GASEOUS RADIOACTIVE MONITOR (B)
10. KPL25 PRESSURE SWITCH FOR TRIP OF MAIN FEED PUMP (A)
11. KPL26 PRESSURE SWITCH FOR TRIP OF MAIN FEED PUMP (B)
12. KPL25 PRESSURE SWITCH FOR TRIP OF MAIN FEED PUMP (A)
13. KPL26 PRESSURE SWITCH FOR TRIP OF MAIN FEED PUMP (B)
14. SAL2 STEAM GENERATOR LOW-LOW LEVEL SIGNAL
15. SAL5 STEAM GENERATOR LOW-LOW LEVEL SIGNAL
16. SAL55 STEAM GENERATOR LOW-LOW LEVEL SIGNAL IN TWO STEAM GENERATORS
17. SAL54 STEAM GENERATOR LOW-LOW LEVEL SIGNAL IN TWO STEAM GENERATORS
18. SAT1 LOSS OF POWER SIGNAL
19. SAT12 LOSS OF POWER SIGNAL
20. KGR12 FUEL BUILDING RADIATION MONITOR (A)
21. KGR13 FUEL BUILDING RADIATION MONITOR (B)
22. CH5A IS CONTAINMENT ISOLATION SIGNAL, PHASE A
23. CRV15 IS CONTROL ROOM VENTILATION ISOLATION SIGNAL
24. SH12 HEARTY INJECTION SIGNAL
25. BY SYMBOL "TRIP" LIGHTS MAY BE LOCATED ON THE INSTRUMENTS.
26. AMSAC INPUTS ARE ISOLATED BY RELAYS
27. CPIS actuation logic shown maybe blocked during CORE ALTERATIONS or movement of irradiated fuel assemblies within containment.

CALLAWAY PLANT

FIGURE 7.3-1
LOGIC DIAGRAM
ENGINEERED SAFETY
FEATURES ACTUATION
SYSTEM (BOP)
(SHEET 2)
REV. 14 5/12

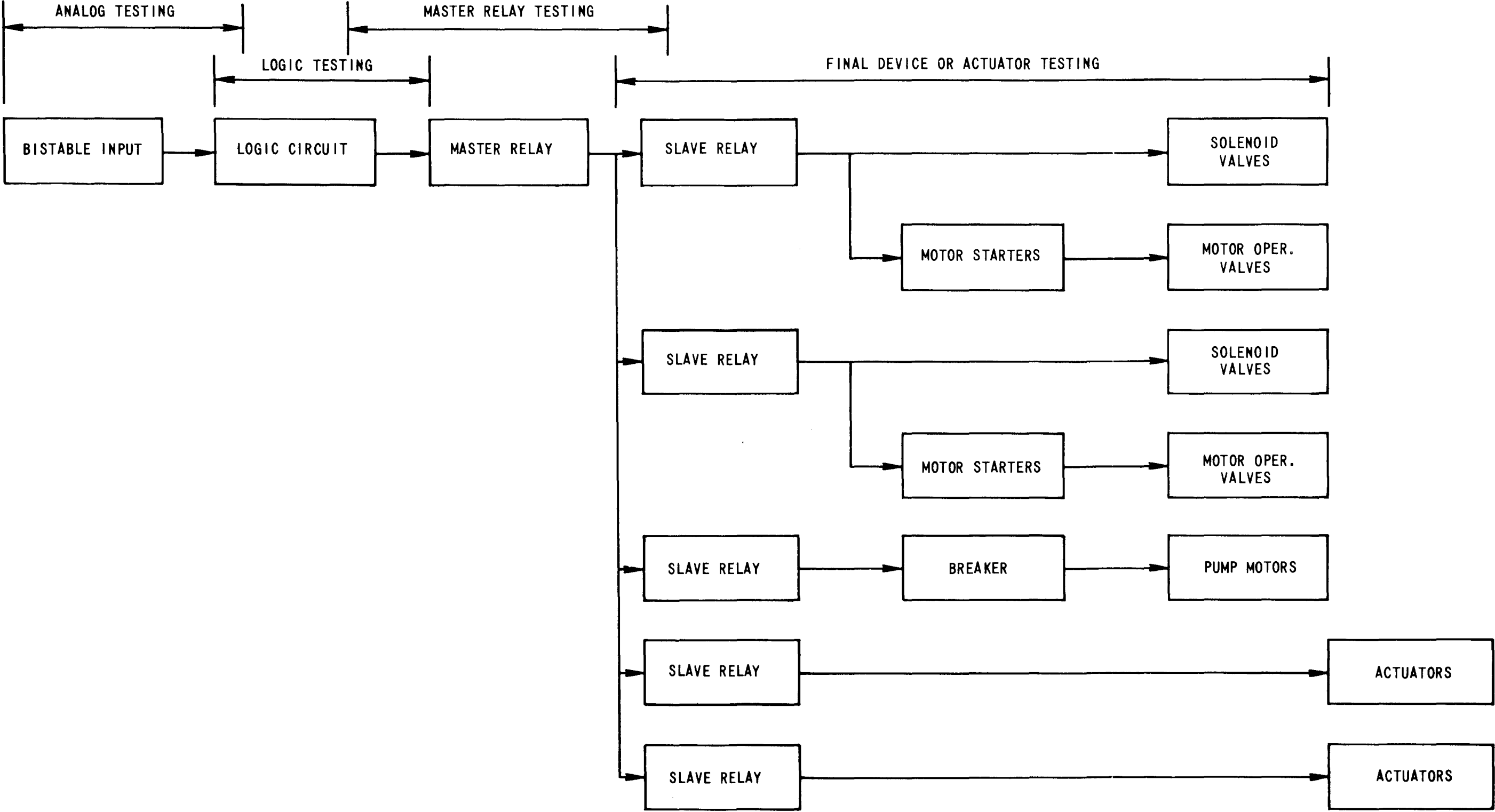


CLB

REV OL-13
05/03

CALLAWAY PLANT

FIGURE 7.3-1
LOGIC DIAGRAM
ENGINEERED SAFETY
FEATURES ACTUATION
SYSTEM (BOP)
(SHEET 3)

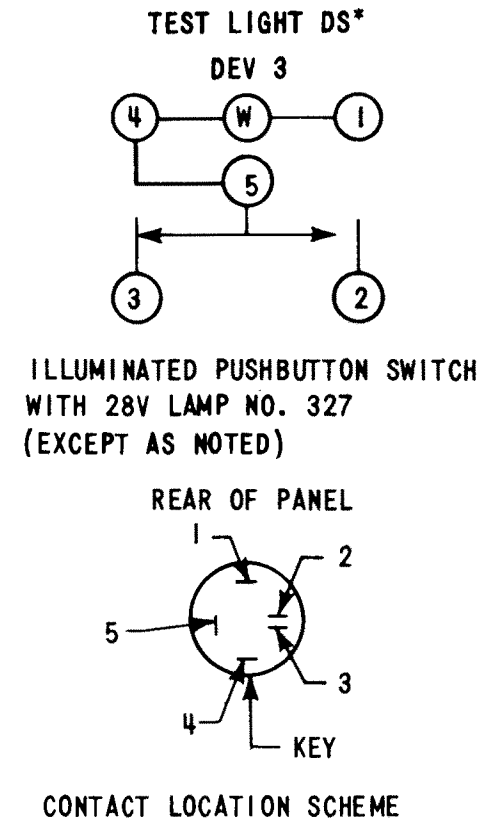


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CALLAWAY PLANT

FIGURE 7.3-2

TYPICAL ENGINEERED SAFETY
FEATURES TEST CIRCUITS

**GENERAL NOTES: ***

1. CIRCUITRY AND HARDWARE FOR REDUNDANT PROTECTION TRAINS "A" AND "B" TEST CABINETS ARE DUPLICATE EXCEPT AS NOTED
A - TRAIN "A" ONLY
B - TRAIN "B" ONLY

2. IN DETAILS A & B THE SYMBOL * REPRESENTS THE SUFFIX NUMBERS OF THE DEVICE REFERENCED.

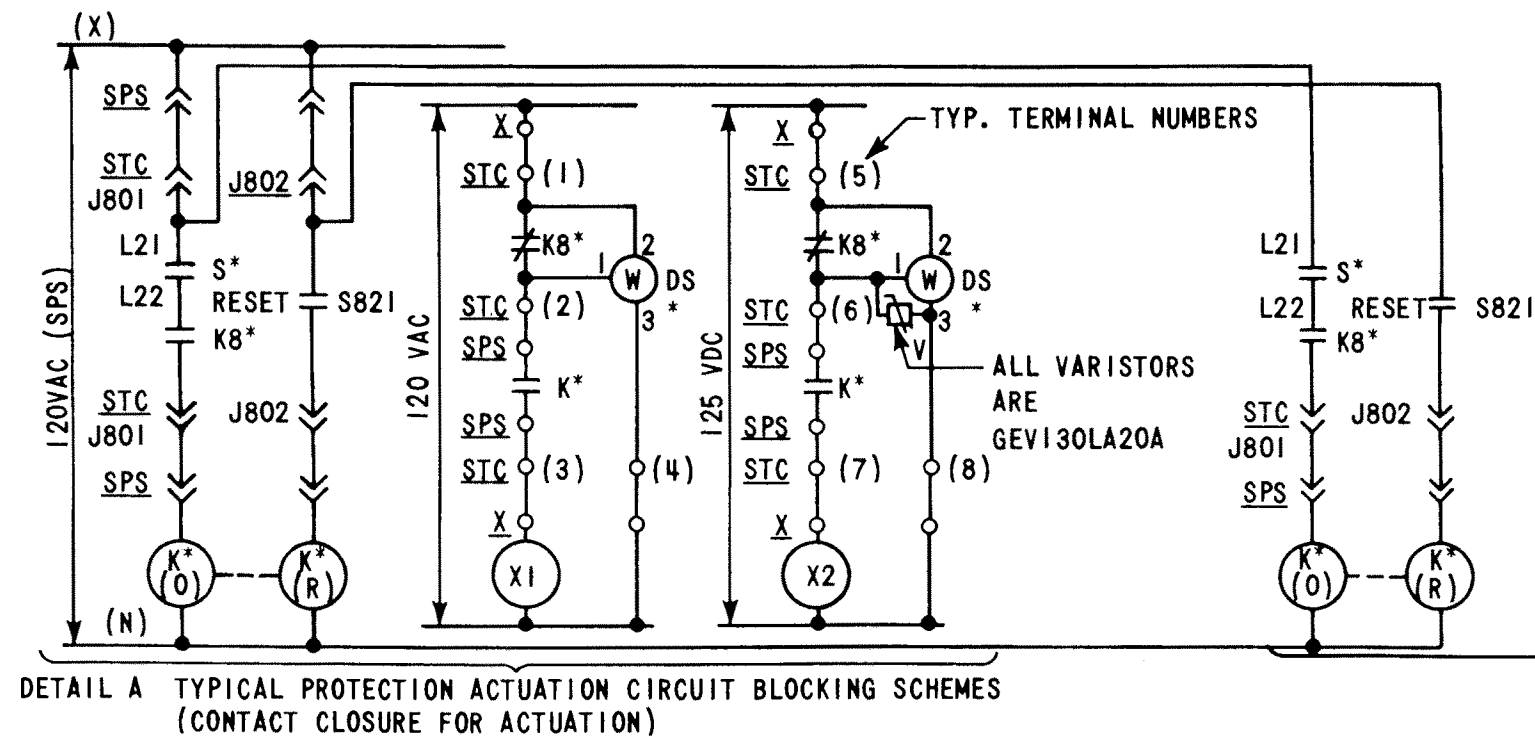
EXAMPLE:

K* - SPS RELAY, K601, K602, ETC.
K(O) - OPERATING COIL
K(R) - RESET COIL
S* - STC TEST SWITCH, S802, S834 ETC.
K8* - STC RELAY, K811, K817, ETC.
DS* - STC LIGHT, DS8009, DS8077, ETC.

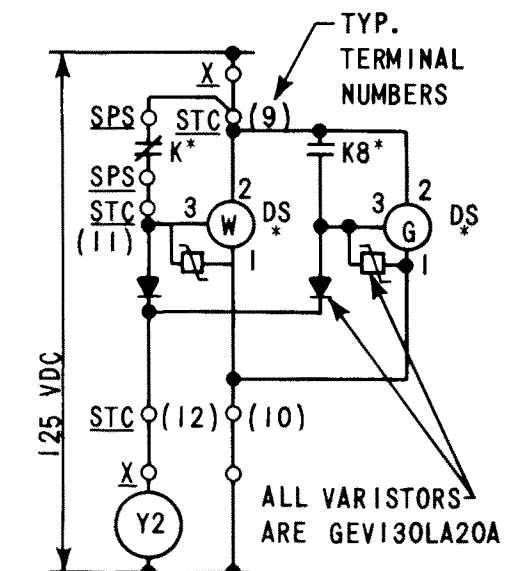
3. "DETAIL A" & "B" TYPE CIRCUITS ARE DETAILED ON THE SCHEMATICS. "DETAIL B" CIRCUITS WILL BE SUBSTITUTED FOR "DETAIL A" CIRCUITS WHERE REQUIRED.

LOCATION LEGEND

SPS - SOLID STATE PROTECTION SYSTEM
STC - SAFEGUARDS TEST CABINET
X - SWGR, MCC, AUXILIARY RELAY RACK, ETC.
ASC - AUXILIARY SAFEGUARDS CABINET



DETAIL B TYPICAL PROTECTION ACTUATION CIRCUIT BLOCKING SCHEMES
(CONTACT OPENING FOR ACTUATION)



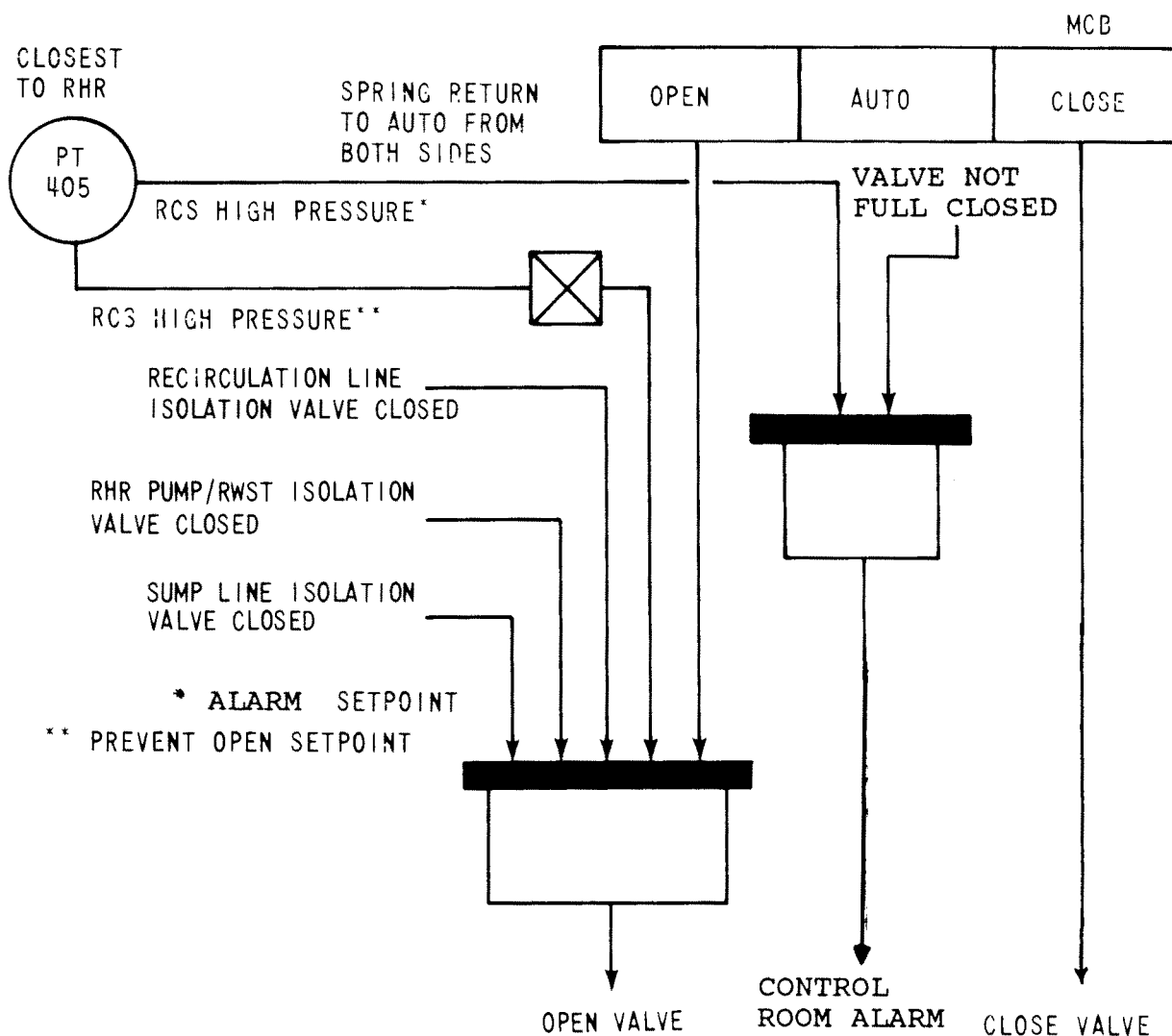
* DETAILS A AND B OF THIS FIGURE ARE NOT TO BE CONFUSED WITH ALPHA DESIGNATION OF LOGIC TRAINS A AND B.

CALLAWAY PLANT

FIGURE 7.3-3

ENGINEERED SAFEGUARDS TEST
CABINET (INDEX, NOTES AND
LEGEND)

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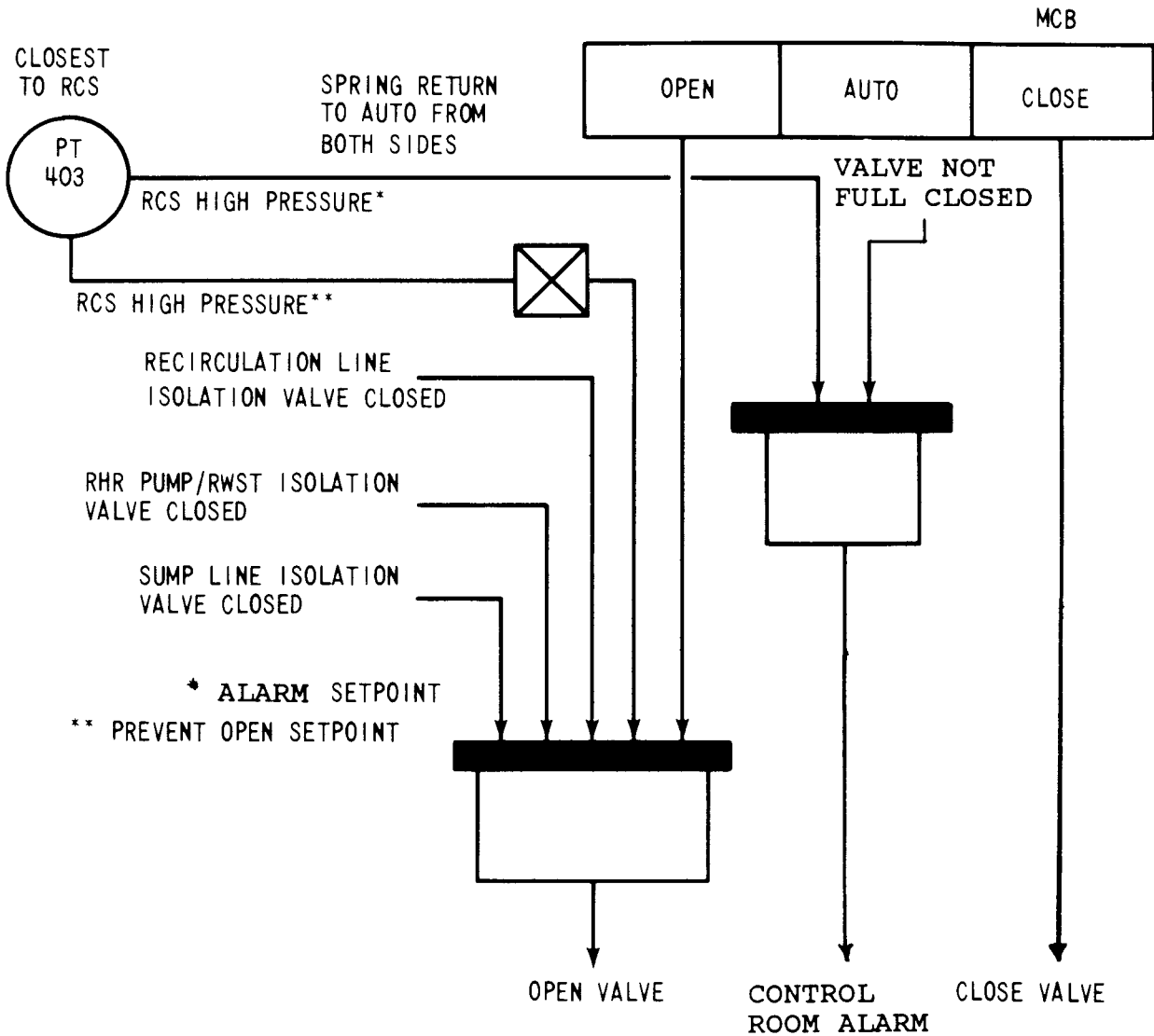
NOTE: LOGIC FOR VALVES IN EACH FLUID SYSTEM TRAIN IS IDENTICAL

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6/90

CALLAWAY PLANT

FIGURE 7.6-1 (SHEET 1)

LOGIC DIAGRAM FOR OUTER
RHRS ISOLATION VALVE



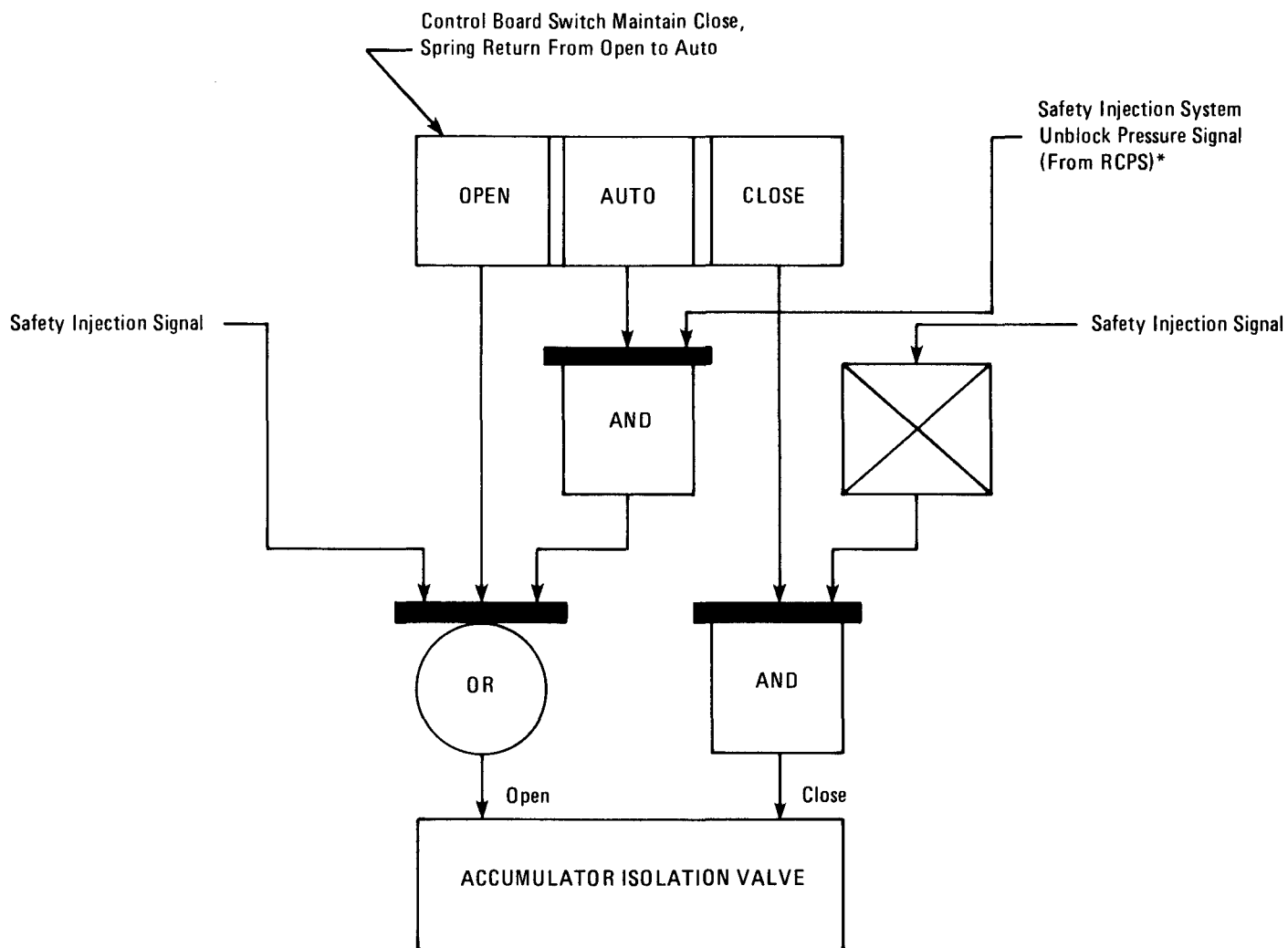
NOTE: LOGIC FOR VALVES IN EACH FLUID SYSTEM TRAIN IS IDENTICAL

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6/90

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FIGURE 7.6-1 (SHEET 2)

LOGIC DIAGRAM FOR INNER
RHRS ISOLATION VALVE



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6/86

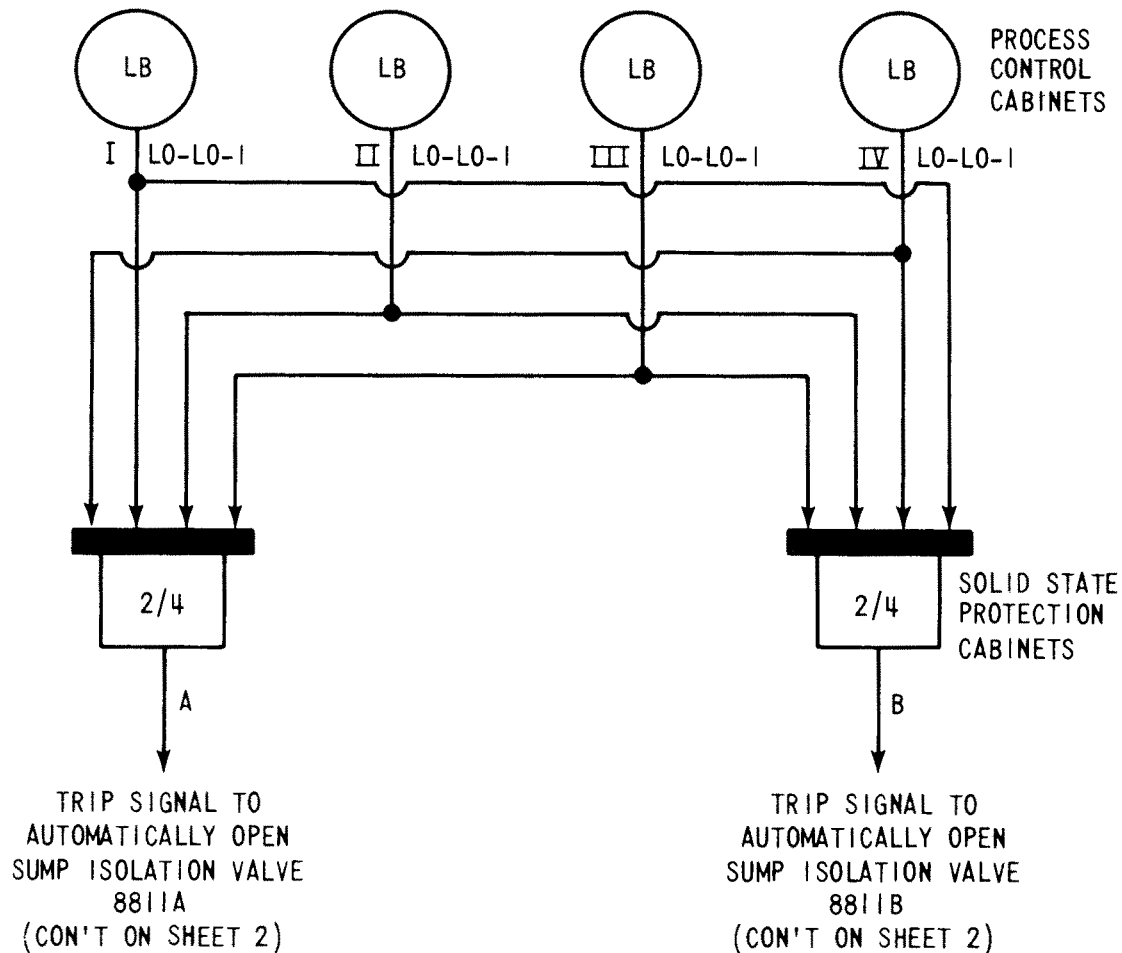
*This interlock indicates the method of applying automatic opening of the valve, whenever the RCS pressure exceeds a limit. This signal automatically occurs at RCS pressures above the SI unblock pressure used to derive P-11.

CALLAWAY PLANT

FIGURE 7.6-2
FUNCTIONAL BLOCK DIAGRAM
OF ACCUMULATOR ISOLATION VALVE

RWST LEVEL CHANNEL BISTABLES

- 1) NORMALLY DE-ENERGIZED
- 2) DE-ENERGIZED ON LOSS OF POWER
- 3) TRIP SIGNAL PROVIDED WHEN ENERGIZED
- 4) ENERGIZED ON LO-LO-1 SETPOINT



NOTE: WHEN 8811A IS FULL OPEN, RWST VALVE (TO RHR PUMP) 8812A WILL CLOSE (SEE SHEET 3)

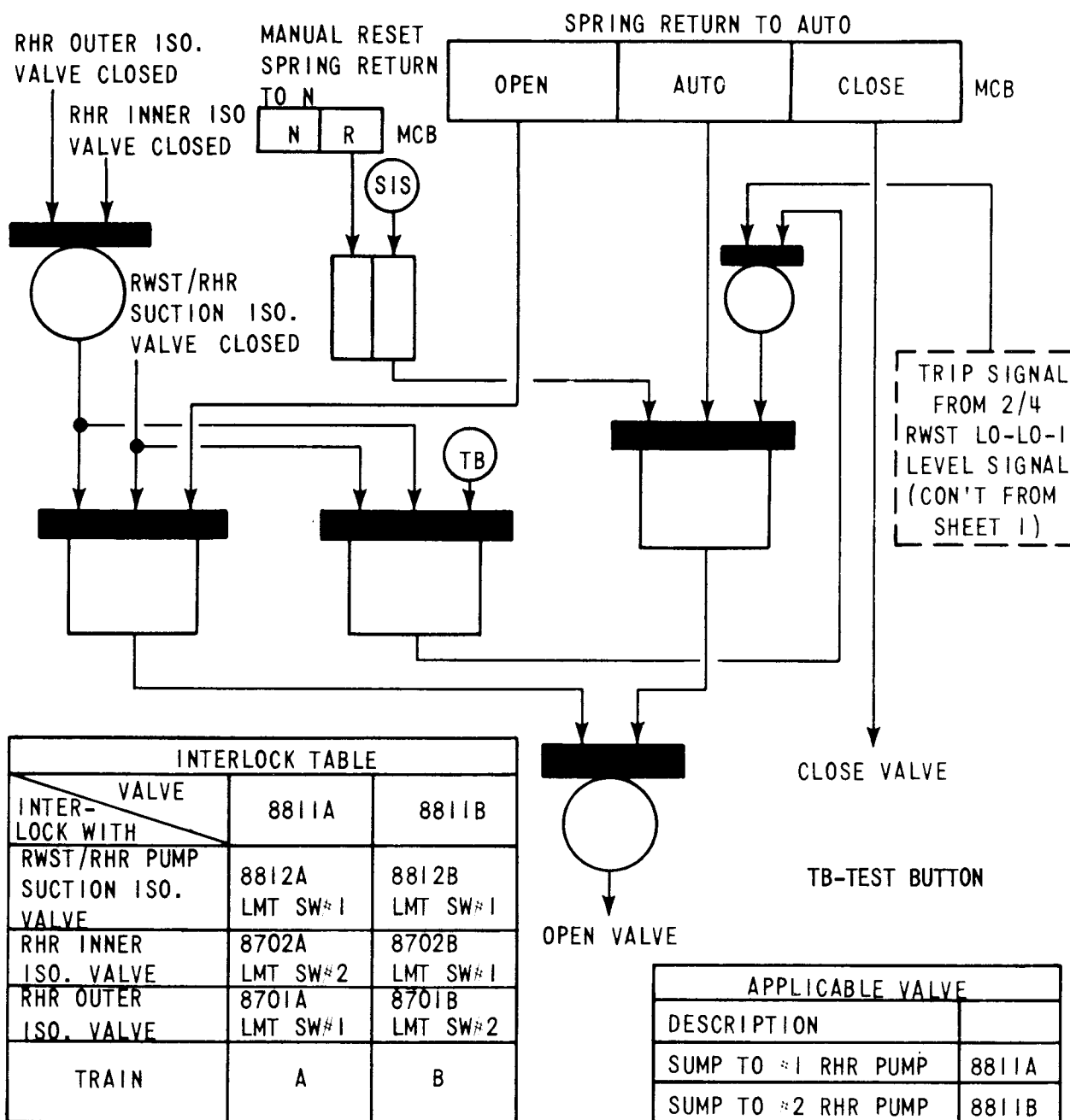
NOTE: WHEN 8811B IS FULL OPEN, RWST VALVE (TO RHR PUMP) 8812B WILL CLOSE (SEE SHEET 3)

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6/86

CALLAWAY PLANT

FIGURE 7.6-3 (SHEET 1)

SAFETY INJECTION SYSTEM RECIRCULATION SUMP AND RHR SUCTION ISOLATION VALVES



LIMIT SWITCH #1 IS THE NORMAL POSITION SIGNAL AND IS USED FOR POSITION SIGNALS BETWEEN VALVES ASSIGNED TO THE SAME TRAIN.

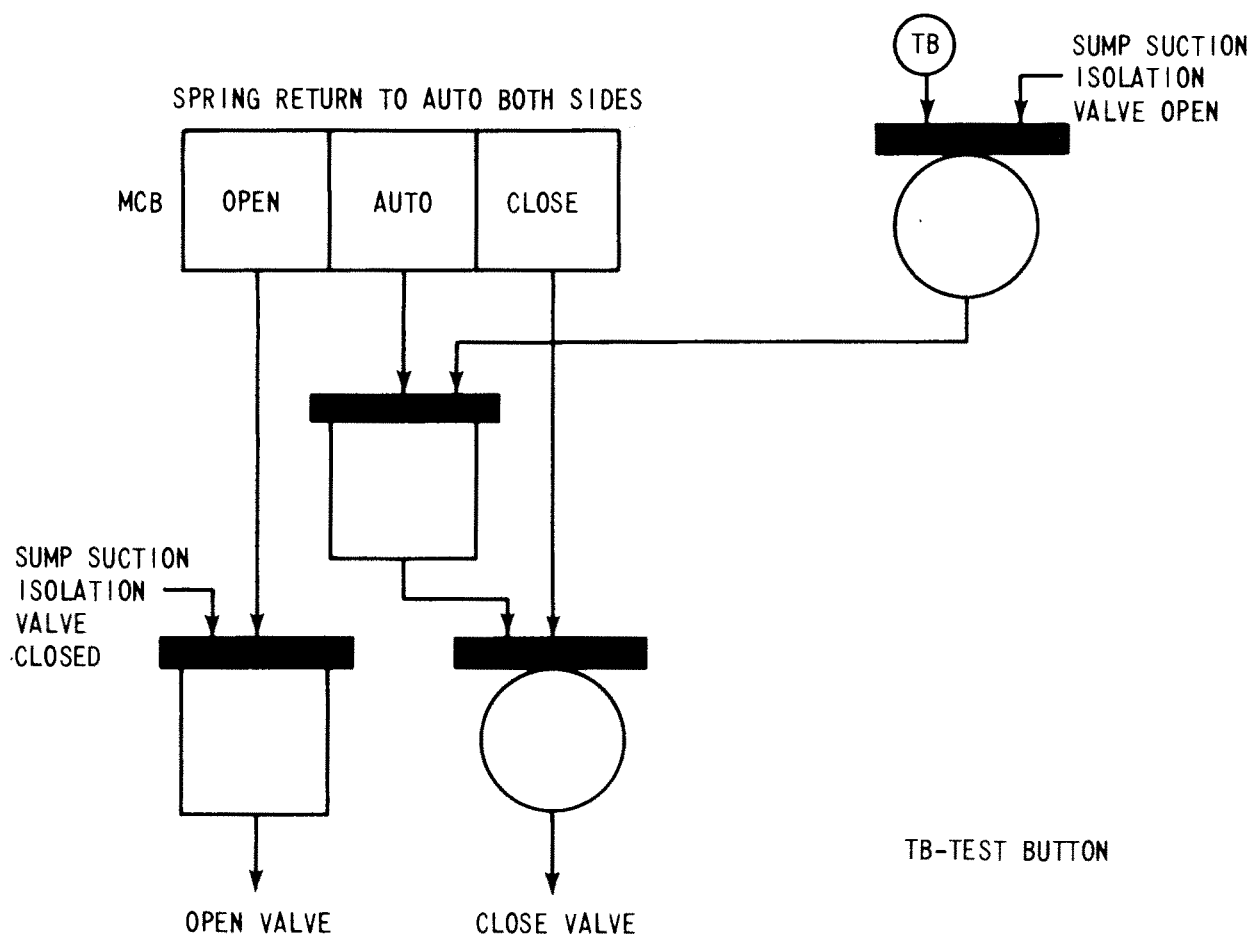
LIMIT SWITCH #2 IS THE STEM MOUNTED POSITION SWITCH AND IT IS USED FOR POSITION SIGNALS BETWEEN VALVES ASSIGNED TO OPPOSITE TRAINS.

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6/86

CALLAWAY PLANT

FIGURE 7.6-3 (SHEET 2)

SAFETY INJECTION SYSTEM RECIRCULATION SUMP AND RHR SUCTION ISOLATION VALVES



INTERLOCK TABLE		
VALVE INTER- LOCK WITH	8812A	8812B
SUMP ISOL. VAL.	8811A LMT SW #1	8811B LMT SW #1
TRAIN	A	B

APPLICABLE VALVE	
DESCRIPTION	
RWST TO #1 RHR PUMP	8812A
RWST TO #2 RHR PUMP	8812B

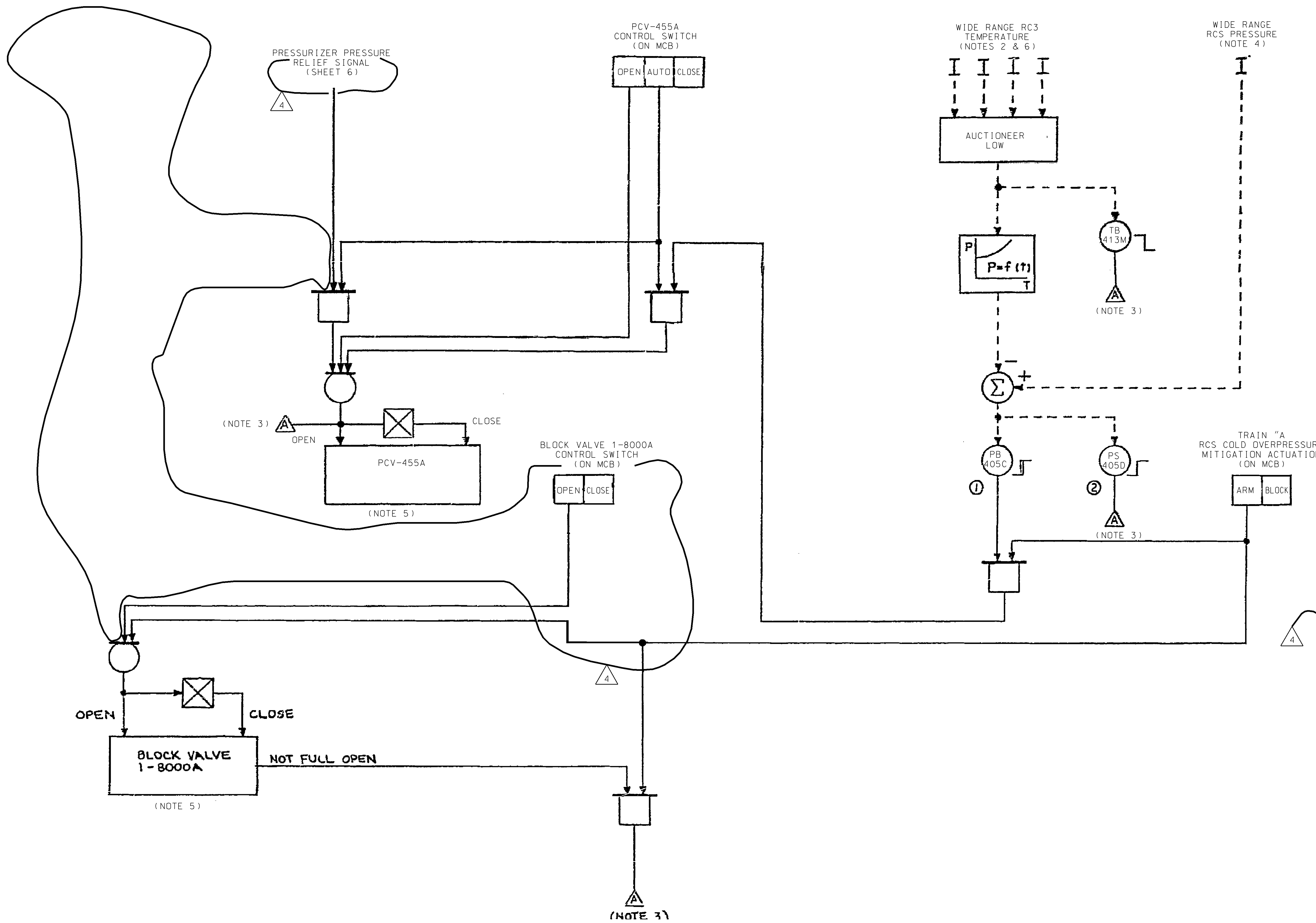
LIMIT SWITCH #1 IS THE NORMAL POSITION SIGNAL AND IS USED FOR POSITION SIGNALS BETWEEN VALVES ASSIGNED TO THE SAME TRAIN.

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6/86

CALLAWAY PLANT

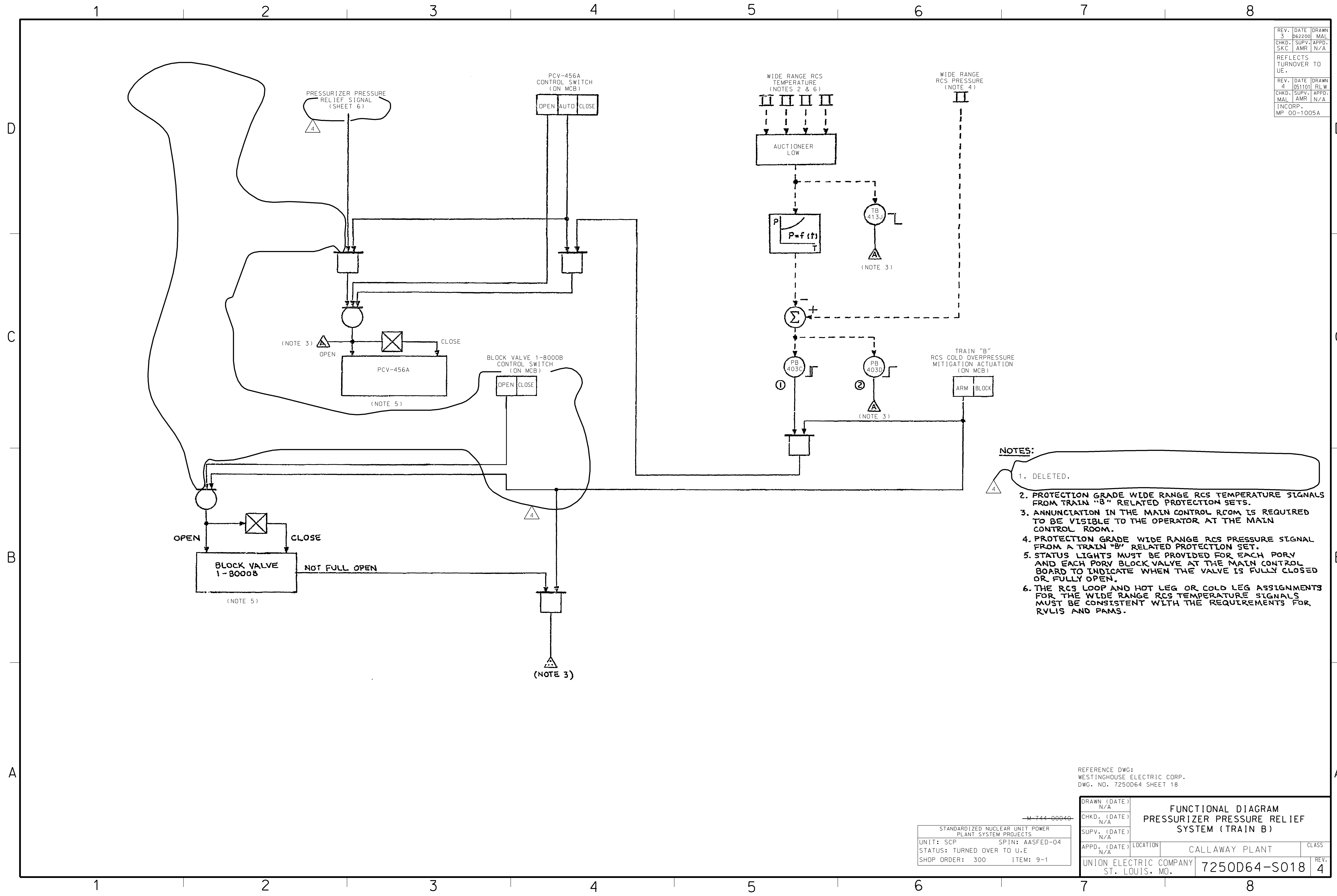
FIGURE 7.6-3 (SHEET 3)

SAFETY INJECTION SYSTEM RECIR-
CULATION SUMP AND RHR SUCTION
ISOLATION VALVES



1. DELETED.
2. PROTECTION GRADE WIDE RANGE RCS TEMPERATURE SIGNALS FROM TRAIN "A" RELATED PROTECTION SETS.
3. ANNUNCIATION IN THE MAIN CONTROL ROOM IS REQUIRED TO BE VISIBLE TO THE OPERATOR AT THE MAIN CONTROL ROOM.
4. PROTECTION GRADE WIDE RANGE RCS PRESSURE SIGNAL FROM A TRAIN "A" RELATED PROTECTION SET.
5. STATUS LIGHTS MUST BE PROVIDED FOR EACH PORV AND EACH PORV BLOCK VALVE AT THE MAIN CONTROL BOARD TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
6. THE RCS LOOP AND HOT LEG OR COLD LEG ASSIGNMENTS FOR THE WIDE RANGE RCS TEMPERATURE SIGNALS MUST BE CONSISTENT WITH THE REQUIREMENTS FOR RVLIS AND PAMS.

DRAWN (DATE) N/A	FUNCTIONAL DIAGRAM		
CHKD (DATE) N/A	PRESSURIZER PRESSURE RELIEF		
SUPV. (DATE) N/A	SYSTEM (TRAIN A)		
APPD. (DATE) N/A	LOCATION	CALLAWAY PLANT	CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO.		7250D64-S017	REV. 4



REV.	DATE	DRAWN
3	062200	MAL
CHKD.	SUPV.	APPD.
SKC	AMR	N/A
REFLECTS TURNOVER TO UE.		
REV.	DATE	DRAWN
4	051101	RLW
CHKD.	SUPV.	APPD.
MAL	AMR	N/A
INCORP. MP 00-1005A		

- NOTES:**
1. DELETED.
 2. PROTECTION GRADE WIDE RANGE RCS TEMPERATURE SIGNALS FROM TRAIN "B" RELATED PROTECTION SETS.
 3. ANNUNCIATION IN THE MAIN CONTROL ROOM IS REQUIRED TO BE VISIBLE TO THE OPERATOR AT THE MAIN CONTROL ROOM.
 4. PROTECTION GRADE WIDE RANGE RCS PRESSURE SIGNAL FROM A TRAIN "B" RELATED PROTECTION SET.
 5. STATUS LIGHTS MUST BE PROVIDED FOR EACH PORV AND EACH PORV BLOCK VALVE AT THE MAIN CONTROL BOARD TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
 6. THE RCS LOOP AND HOT LEG OR COLD LEG ASSIGNMENTS FOR THE WIDE RANGE RCS TEMPERATURE SIGNALS MUST BE CONSISTENT WITH THE REQUIREMENTS FOR RVLIS AND PAMS.

REFERENCE DWG:
WESTINGHOUSE ELECTRIC CORP.
DWG. NO. 7250D64 SHEET 18

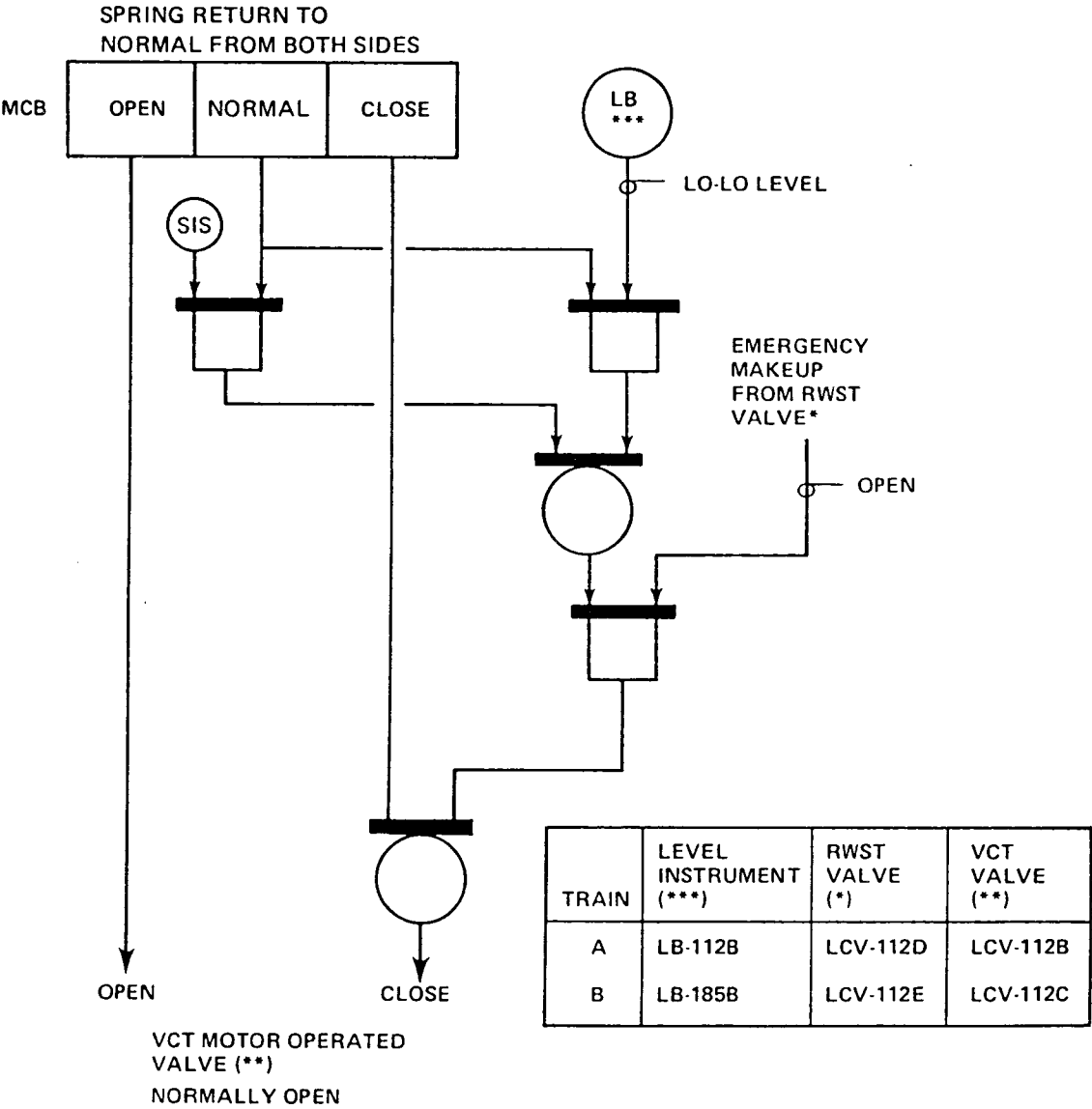
STANDARDIZED NUCLEAR UNIT POWER
PLANT SYSTEM PROJECTS
UNIT: SCP SPIN: AASFED-04
STATUS: TURNED OVER TO U.E
SHOP ORDER: 300 ITEM: 9-1

DRAWN (DATE)	N/A	FUNCTIONAL DIAGRAM PRESSURIZER PRESSURE RELIEF SYSTEM (TRAIN B)	
CHKD. (DATE)	N/A		
SUPV. (DATE)	N/A		
APPD. (DATE)	N/A		
LOCATION	CALLAWAY PLANT	CLASS	
UNION ELECTRIC COMPANY ST. LOUIS, MO.		7250D64-S018	REV. 4

CALLAWAY-SP

FIGURE 7.6-4 SHEET 3 HAS BEEN DELETED

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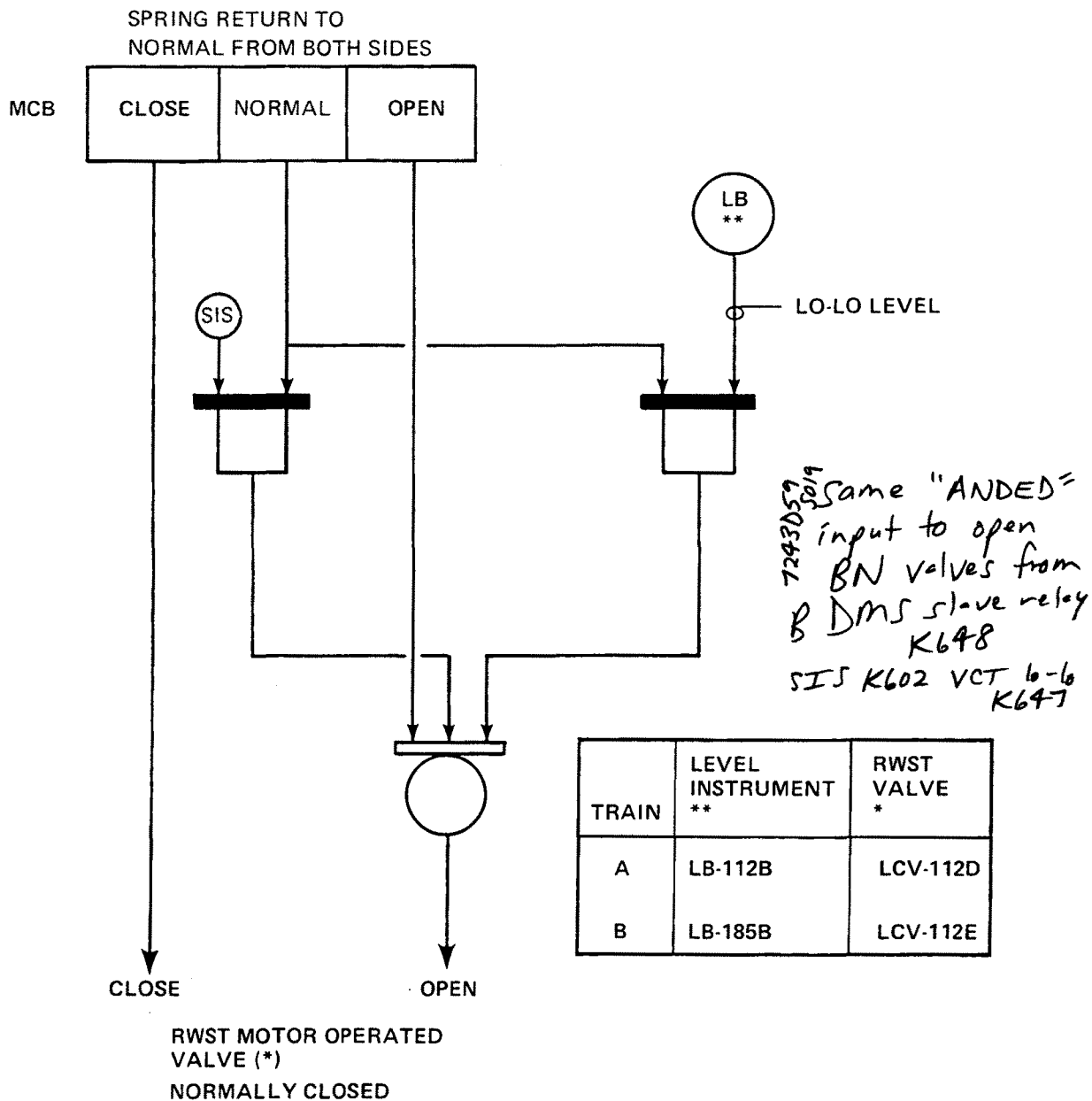


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CALLAWAY PLANT

Figure 7.6-5

Logic Diagram for VCT Outlet
Isolation Valves Interlocks on Switchover to RWST
(Sheet 1 of 2)



Rev. OL-0
6/86

CALLAWAY PLANT

Figure 7.6-5
Logic Diagram for RWST Valves
Interlocks on Switchover to RWST
(Sheet 2 of 2)

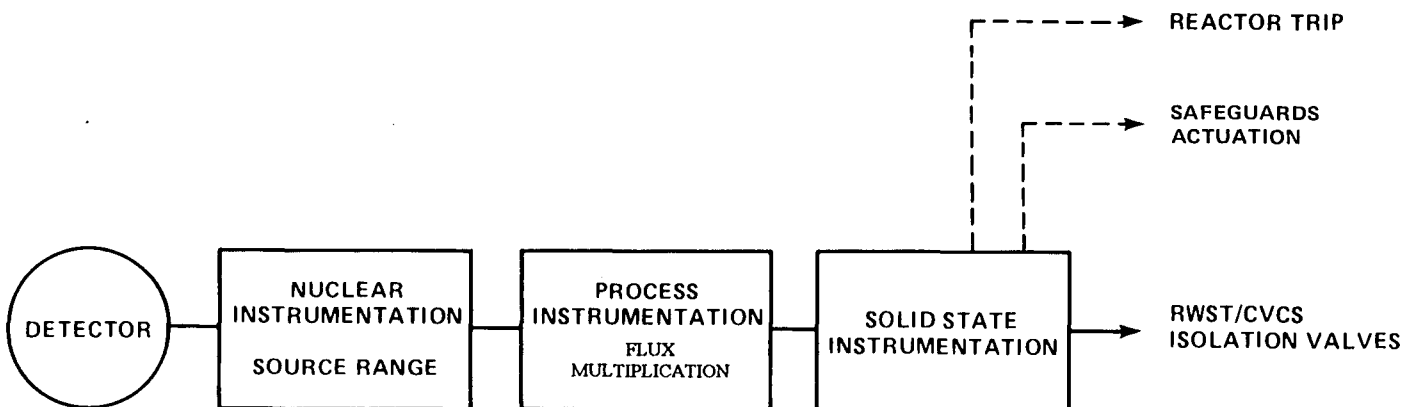
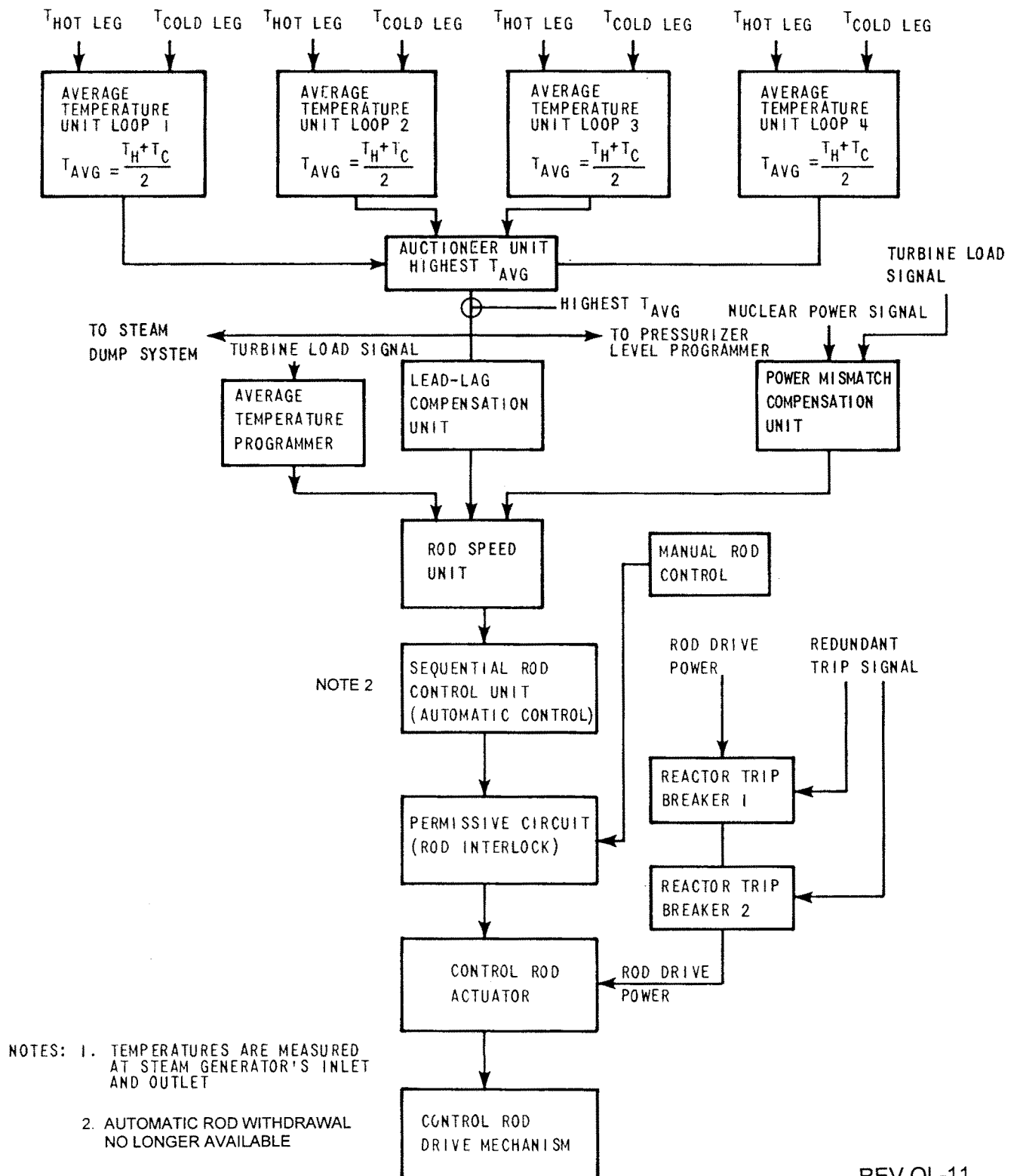
**CALLAWAY PLANT**

FIGURE 7.6-6
INSTRUMENTATION FOR PROTECTION
AGAINST INADVERTENT BORON
DILUTION

REV. OL-7
5/94

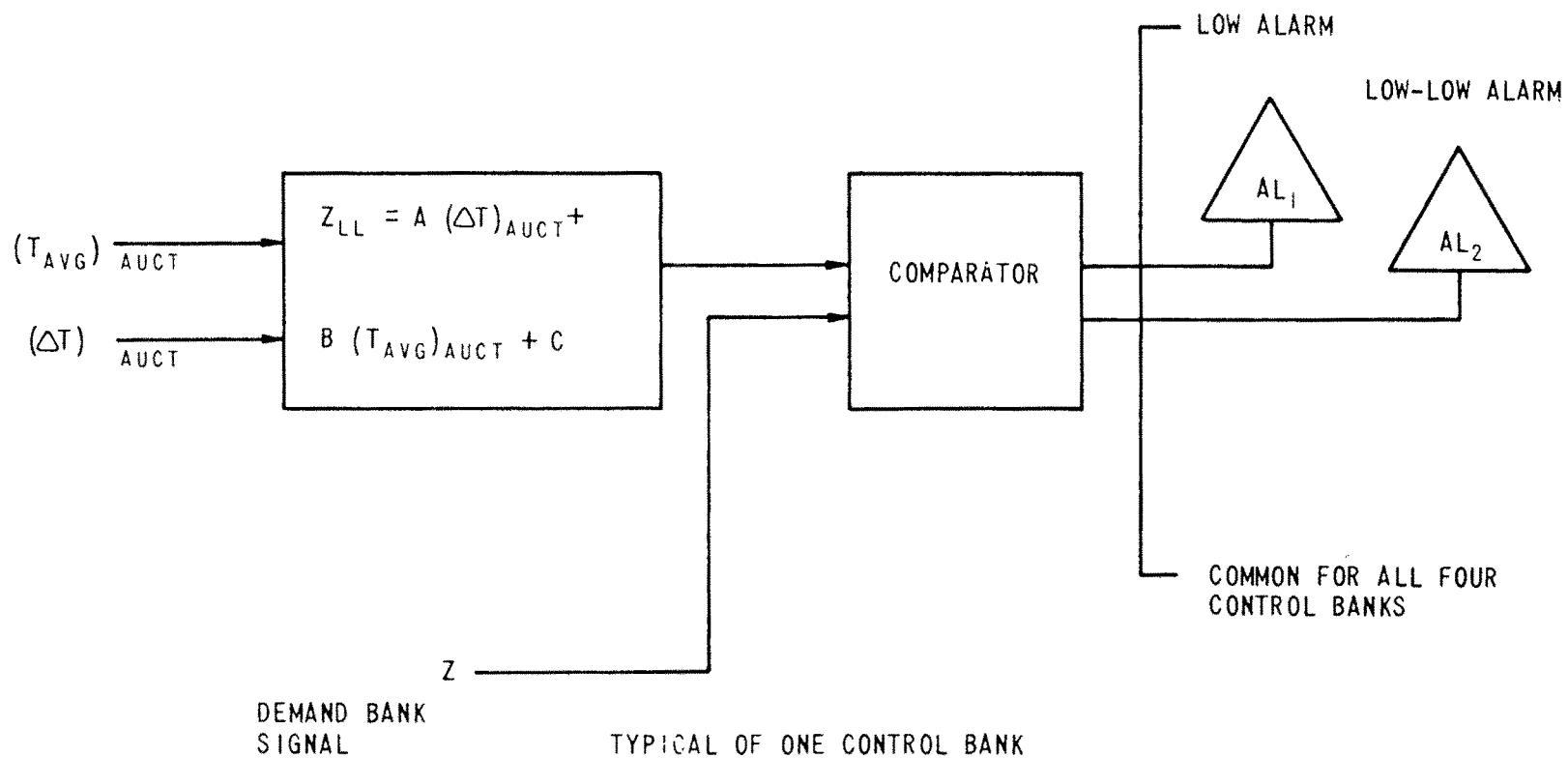


REV OL-11
5/00

CALLAWAY PLANT

FIGURE 7.7-1

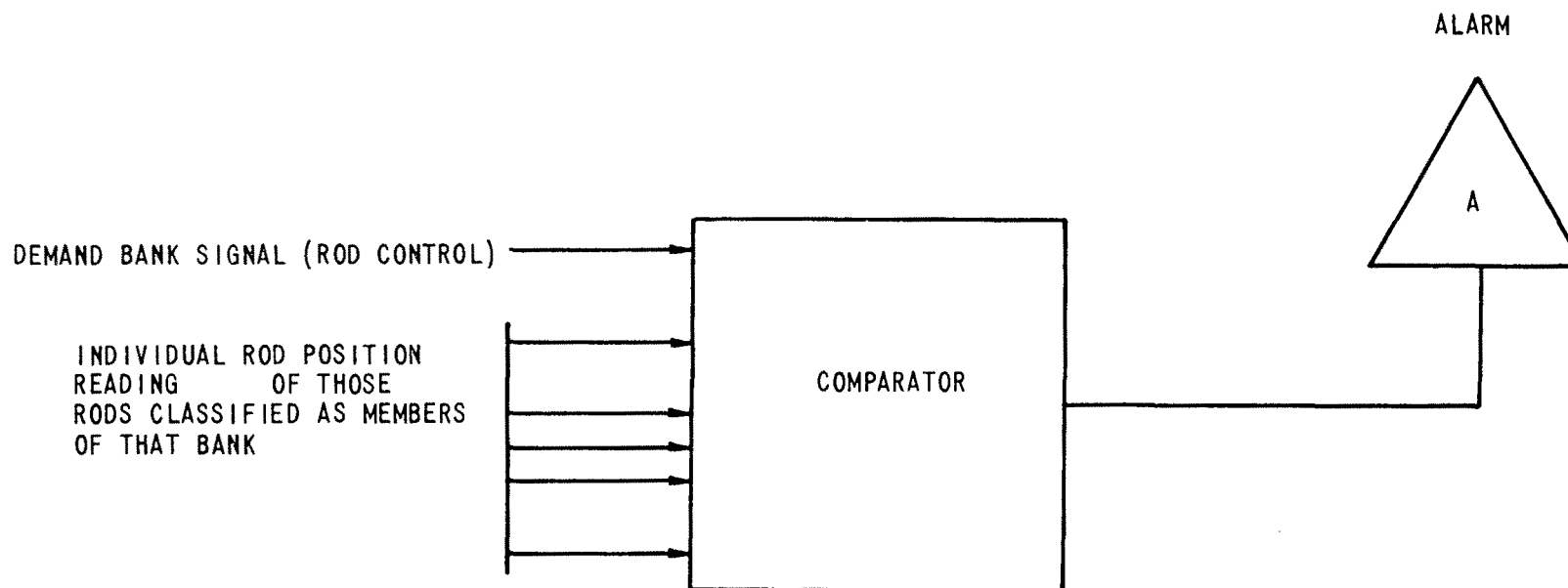
SIMPLIFIED BLOCK DIAGRAM OF
REACTOR CONTROL SYSTEM



- NOTE: 1. ANALOG CIRCUITRY IS USED FOR THE COMPARATOR NETWORK
 2. COMPARISON IS DONE FOR ALL CONTROL BANKS

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FIGURE 7.7-2
CONTROL BANK ROD INSERTION MONITOR

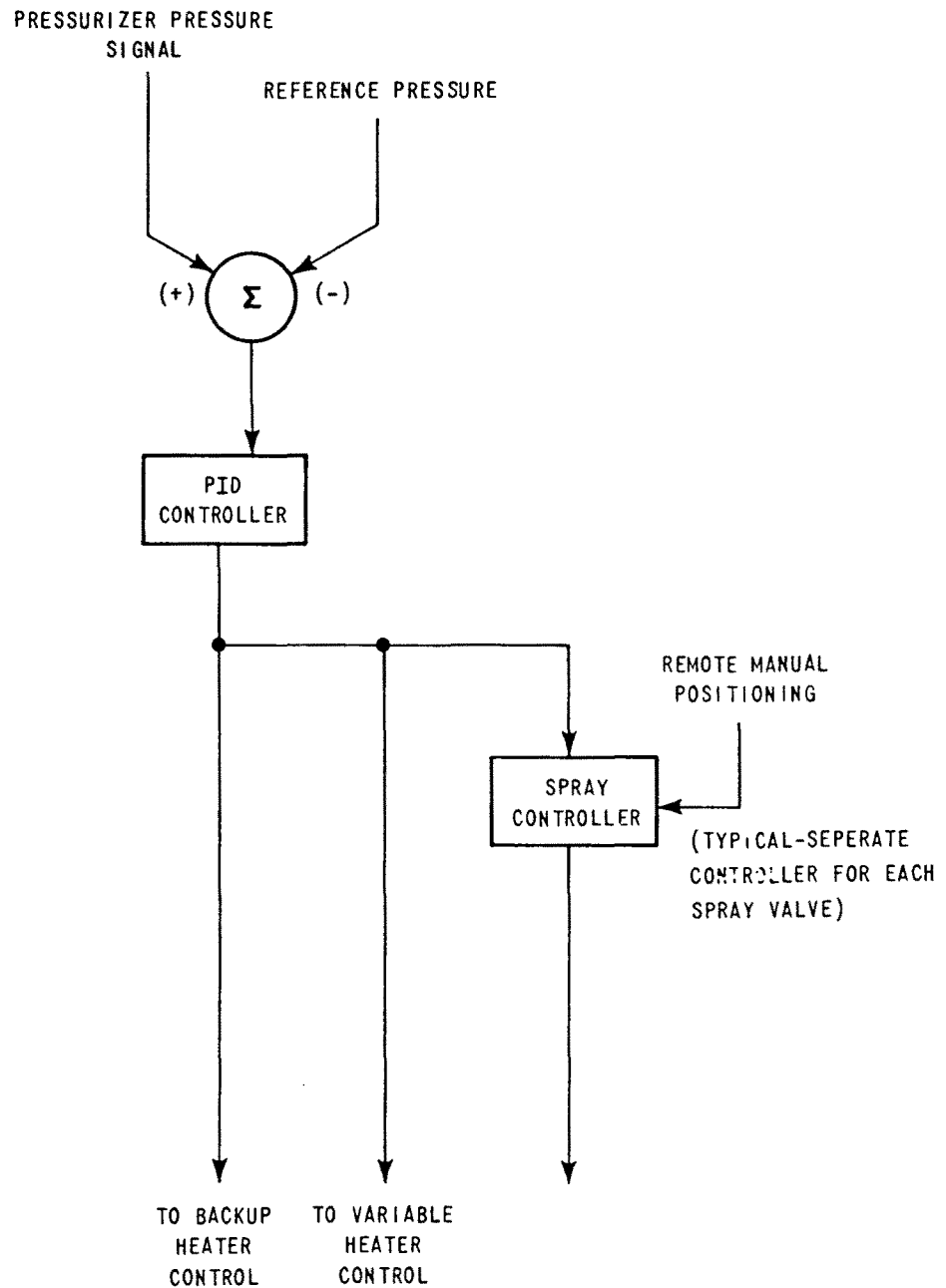


- NOTE:
1. DIGITAL OR ANALOG SIGNALS MAY BE USED FOR THE COMPARATOR COMPUTER INPUTS.
 2. THE COMPARATOR WILL ENERGIZE THE ALARM IF THERE EXISTS A POSITION DIFFERENCE GREATER THAN A PRESET LIMIT BETWEEN ANY INDIVIDUAL ROD AND THE DEMAND BANK SIGNAL.
 3. COMPARISON IS INDIVIDUALLY DONE FOR ALL CONTROL BANKS.

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FIGURE 7.7-3
ROD DEVIATION COMPARATOR

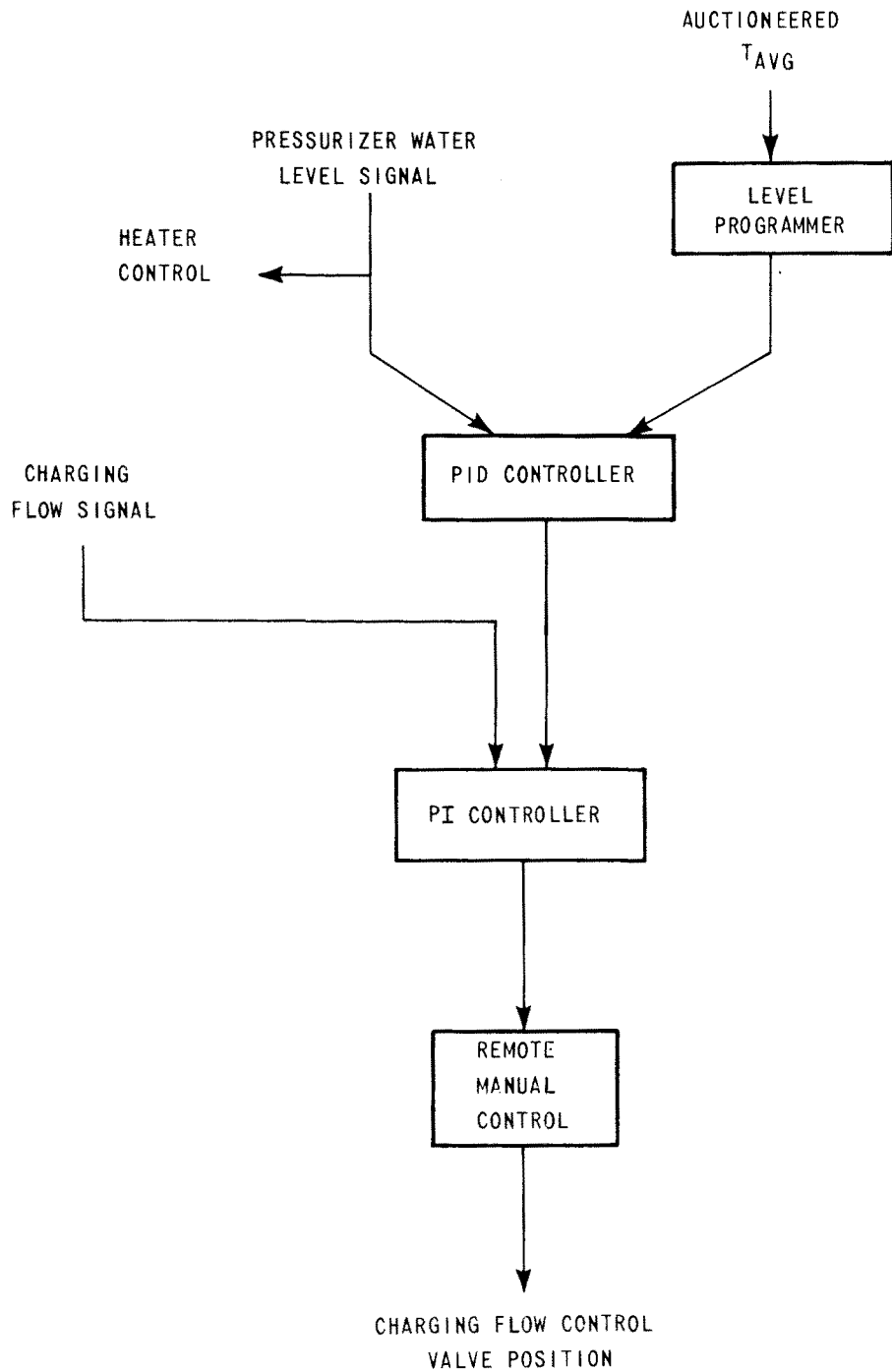


PID - PROPORTIONAL + INTEGRAL + DERIVATIVE

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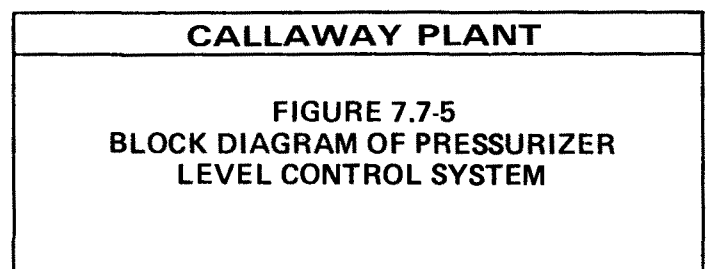
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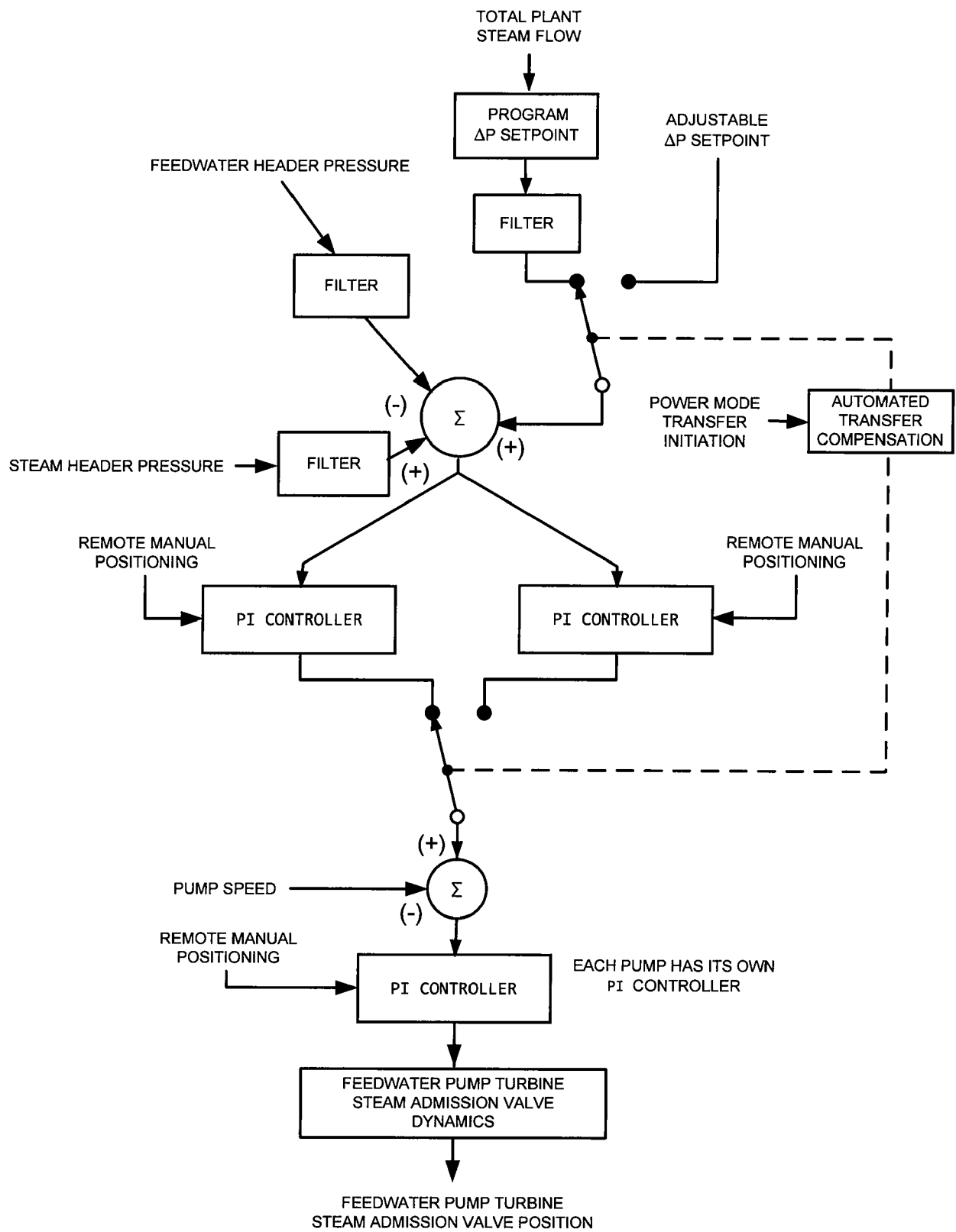
FIGURE 7.7-4
BLOCK DIAGRAM OF PRESSURIZER
PRESSURE CONTROL SYSTEM



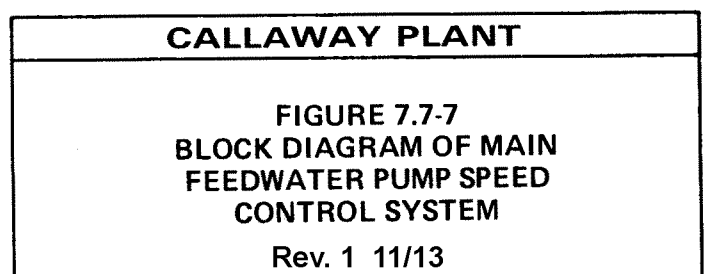
PID - SEE FIG. 7.7-4

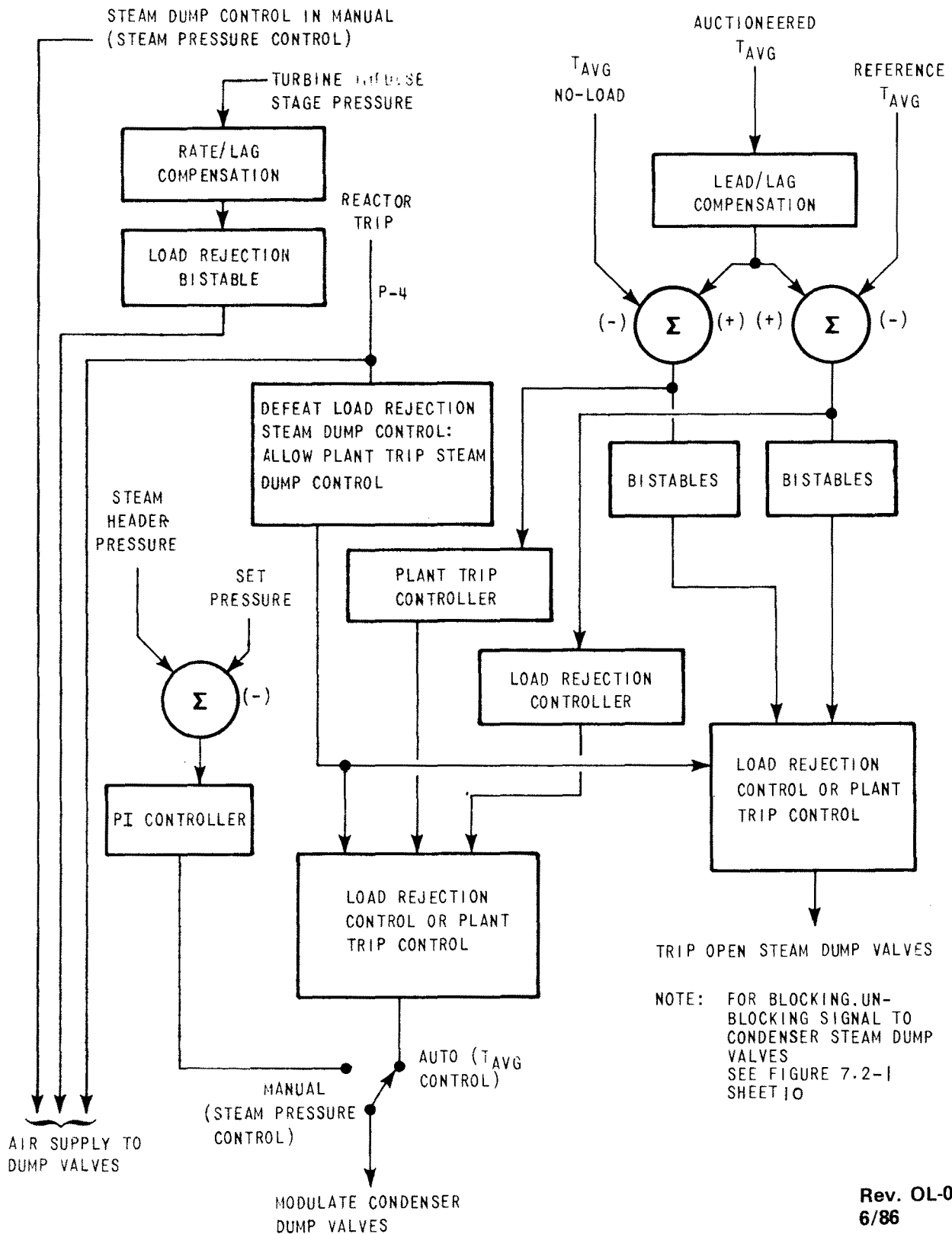
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PI - SEE FIG. 7.7-6

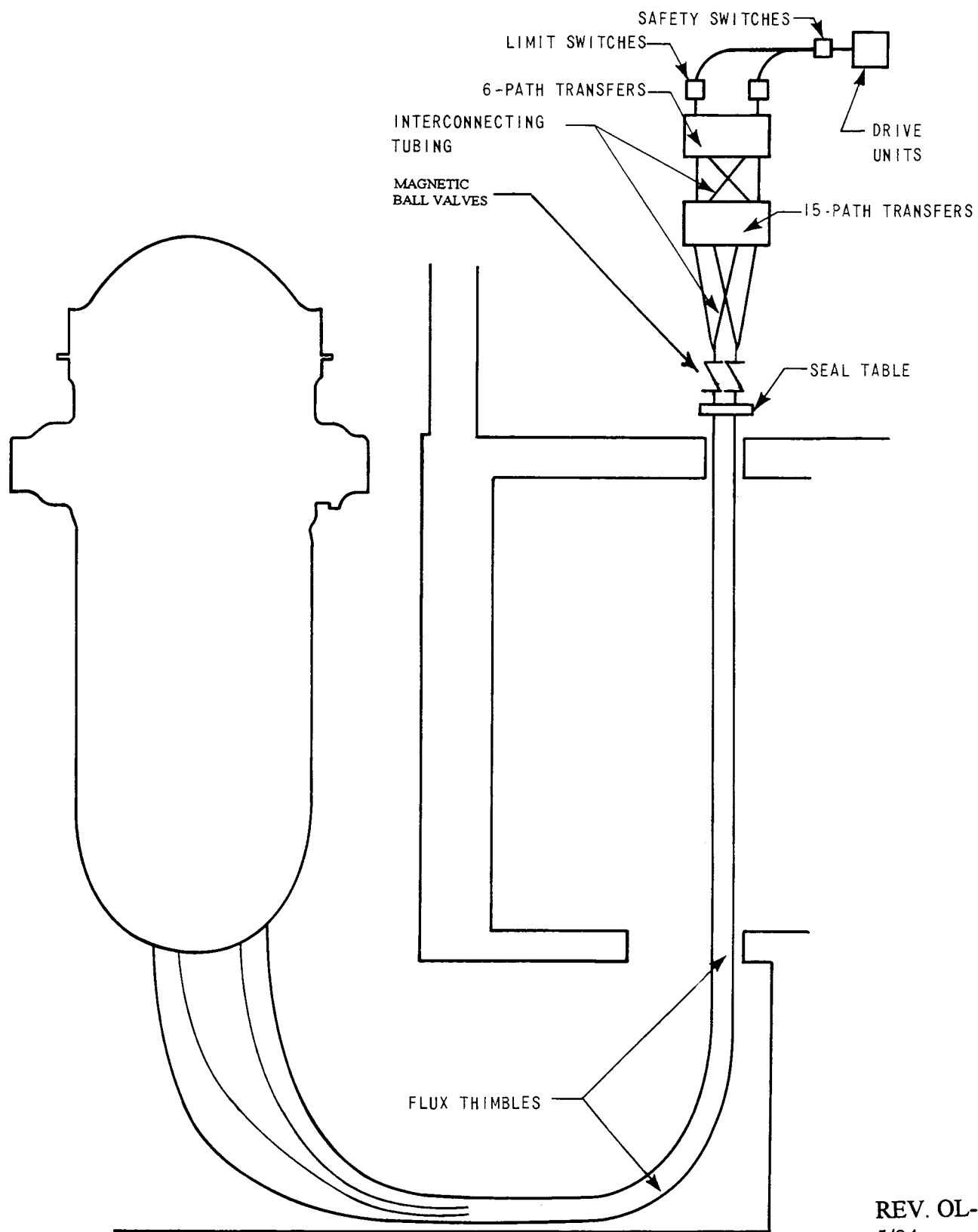




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FIGURE 7.7-8

BLOCK DIAGRAM OF STEAM DUMP
CONTROL SYSTEM



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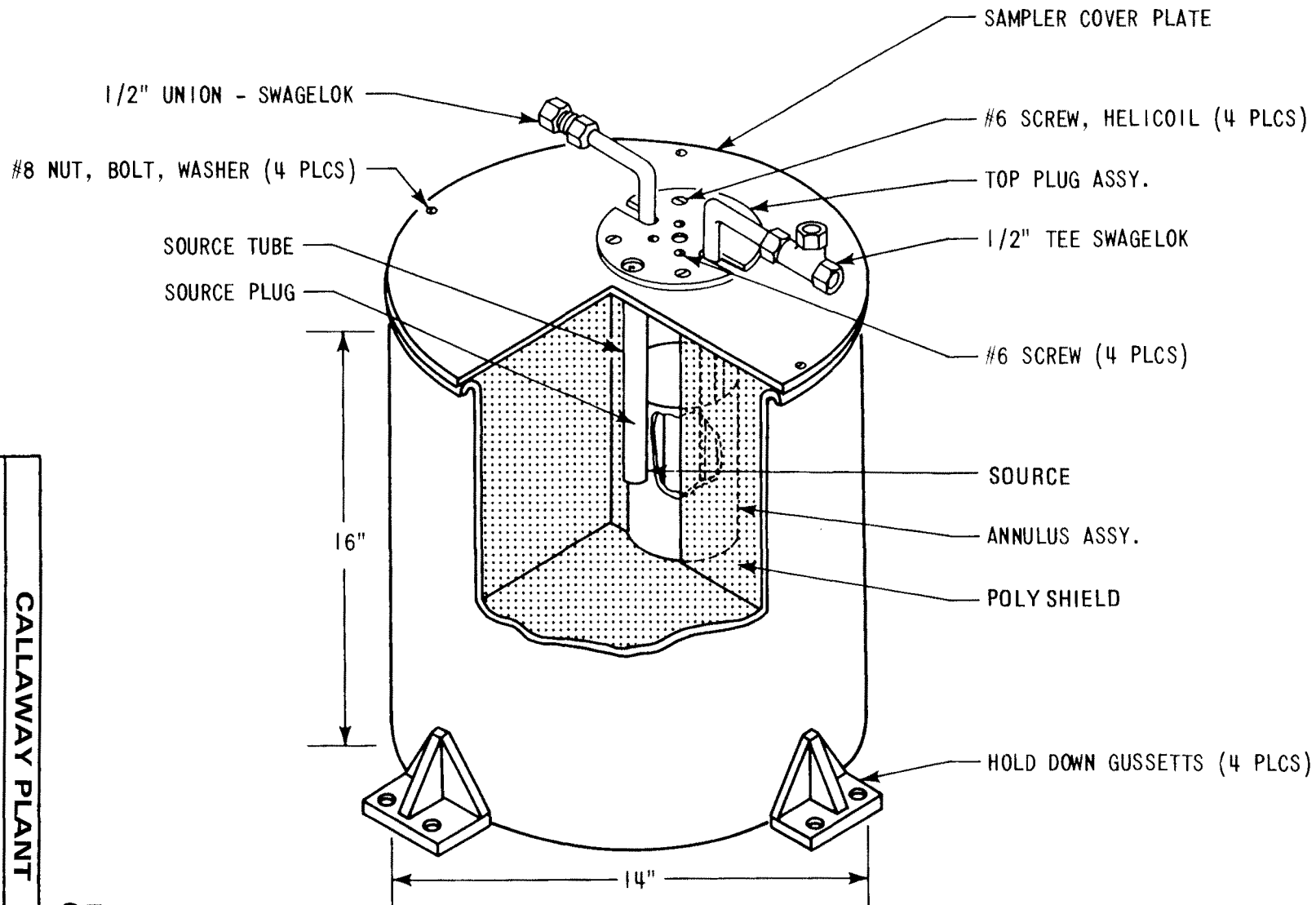
FIGURE 7.7-9

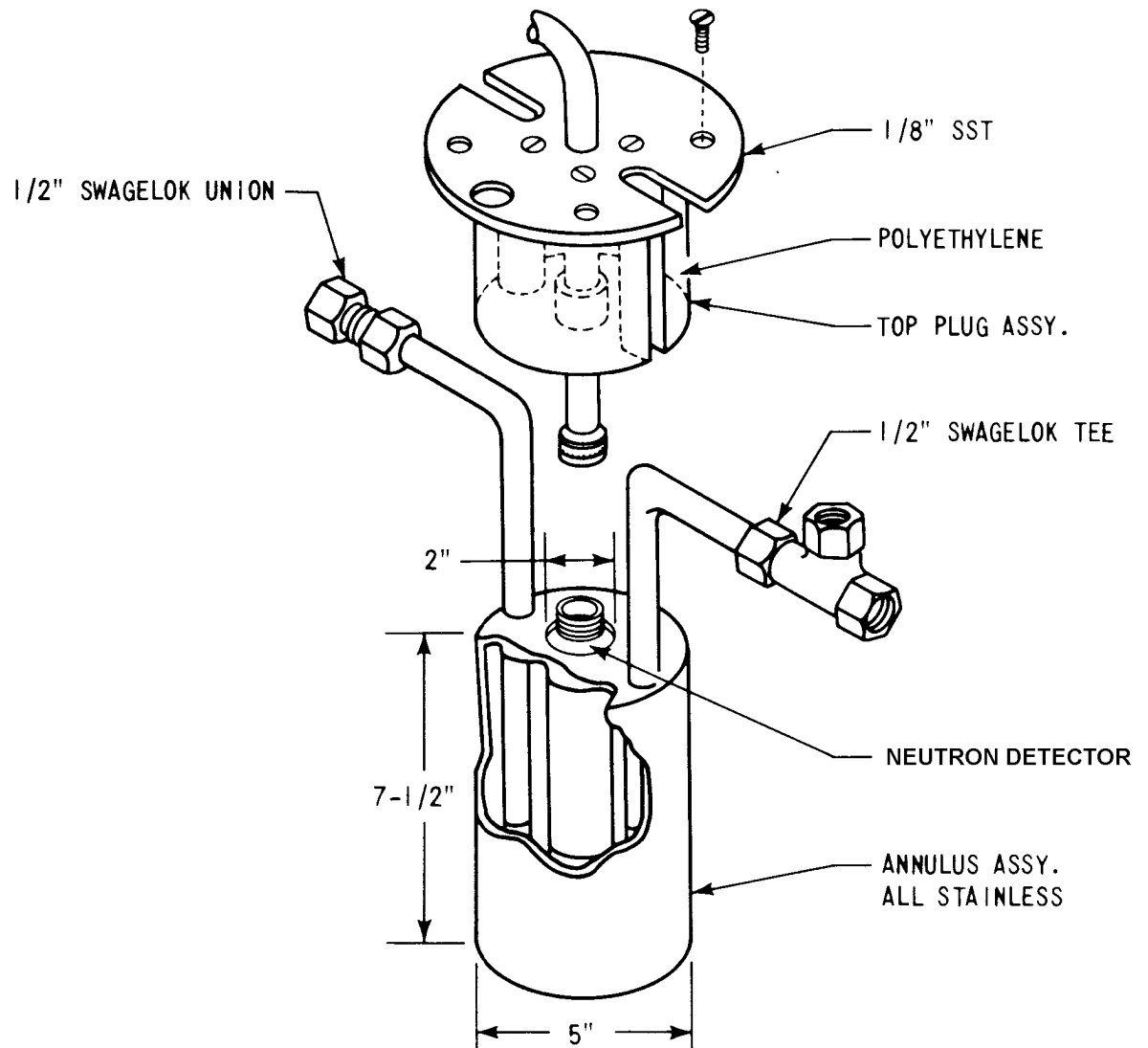
BASIC FLUX-MAPPING SYSTEM

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FIGURE 7.7-10
SAMPLER ASSEMBLY

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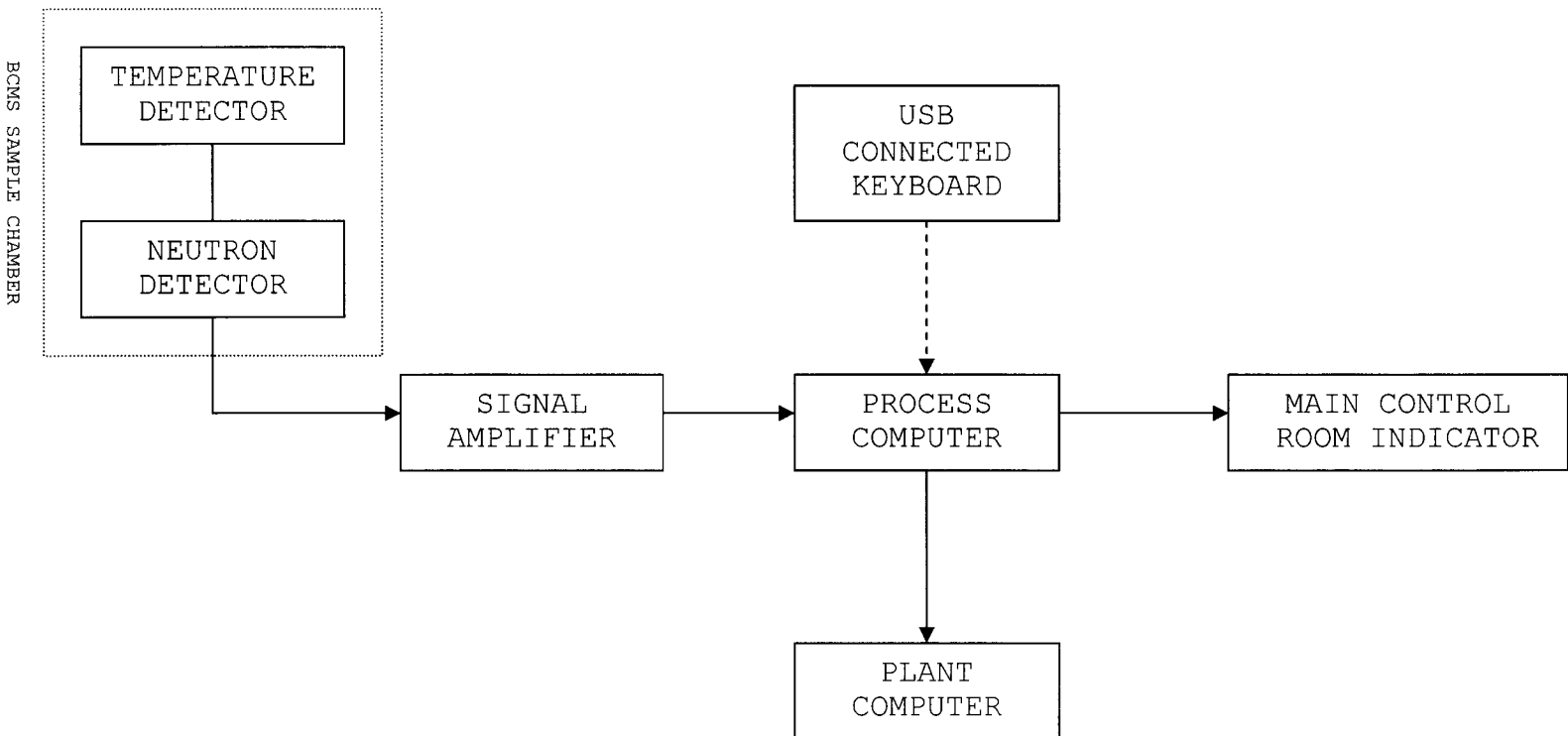


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FIGURE 7.7-11

SAMPLER SUBASSEMBLY



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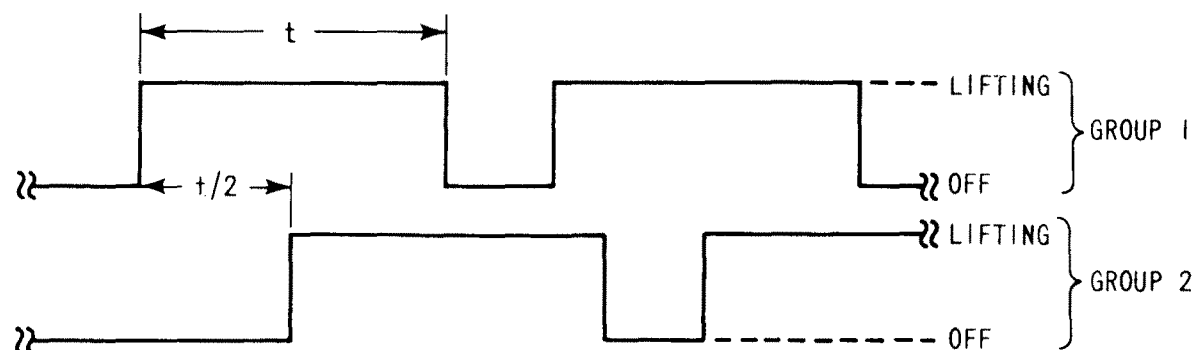
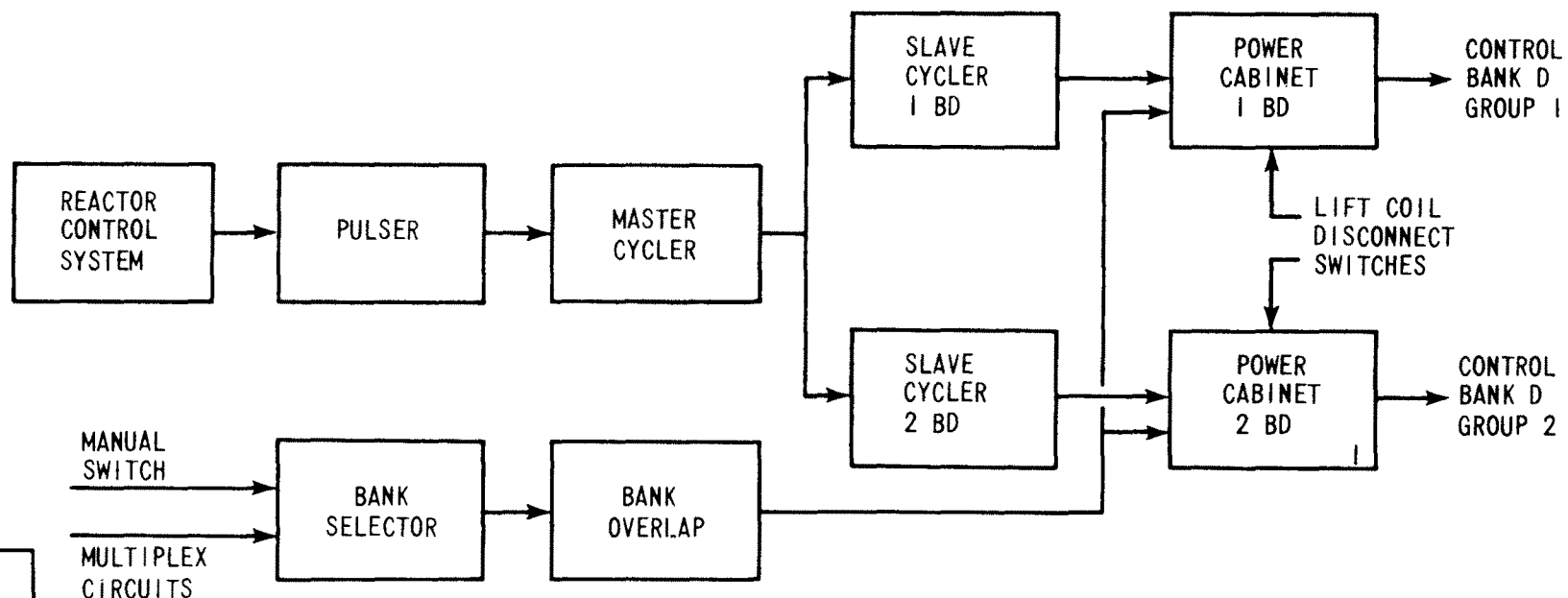
FIGURE 7.7-12

PROCESS ASSEMBLY BLOCK DIAGRAM

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FIGURE 7.7-13 HAS BEEN DELETED (OL-14)



NORMAL SEQUENCING OF GROUPS WITHIN BANK

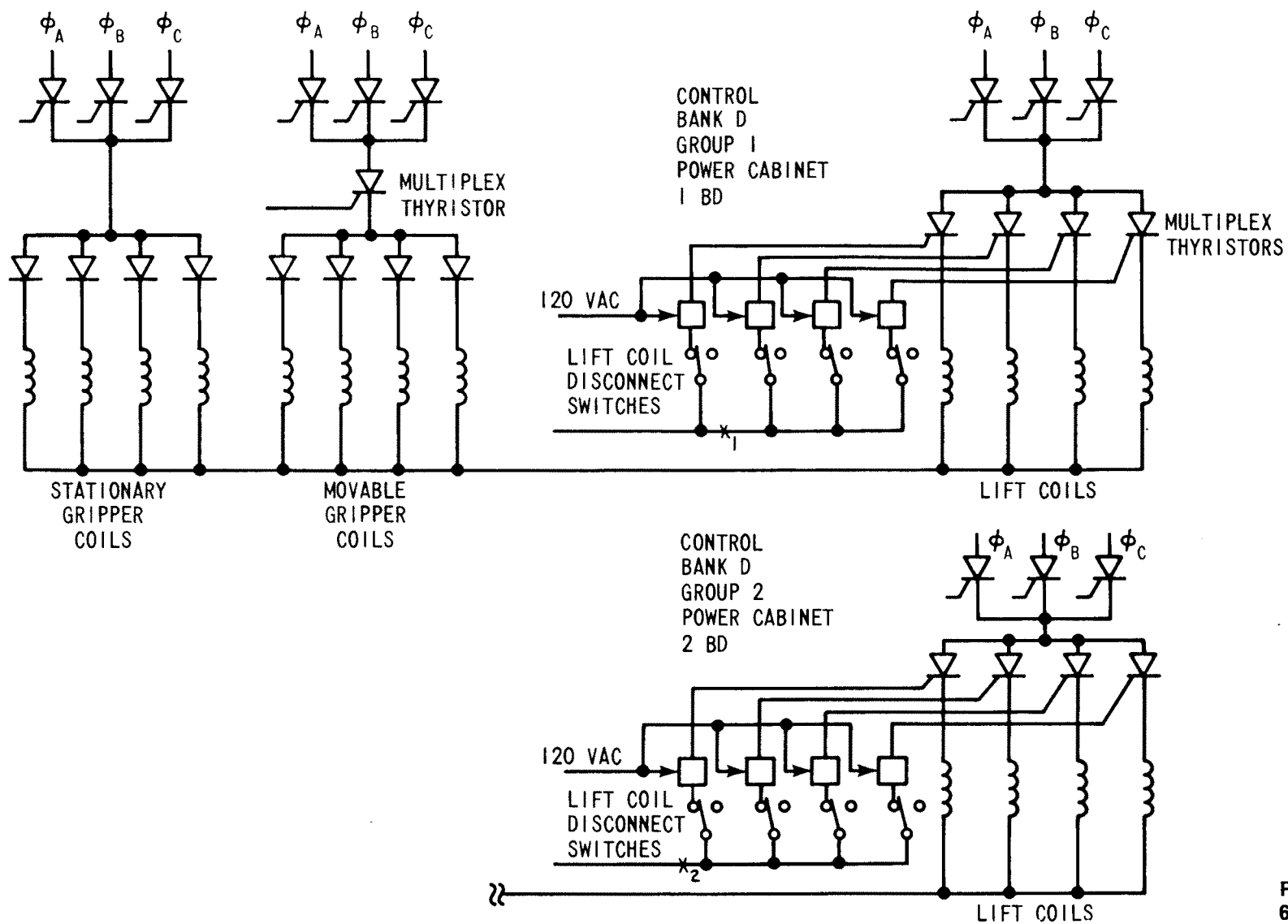
NOTE: ONLY CABINETS 1BD AND 2BD SHOWN. FOR MORE COMPLETE DIAGRAM INCLUDING POWER CABINETS 1AC, 2AC, SCDE, AND DC HOLD SCD, SEE REF. 1 IN SECTION 7.7.3

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FIGURE 7.7-14

SIMPLIFIED BLOCK DIAGRAM
OF ROD CONTROL SYSTEM

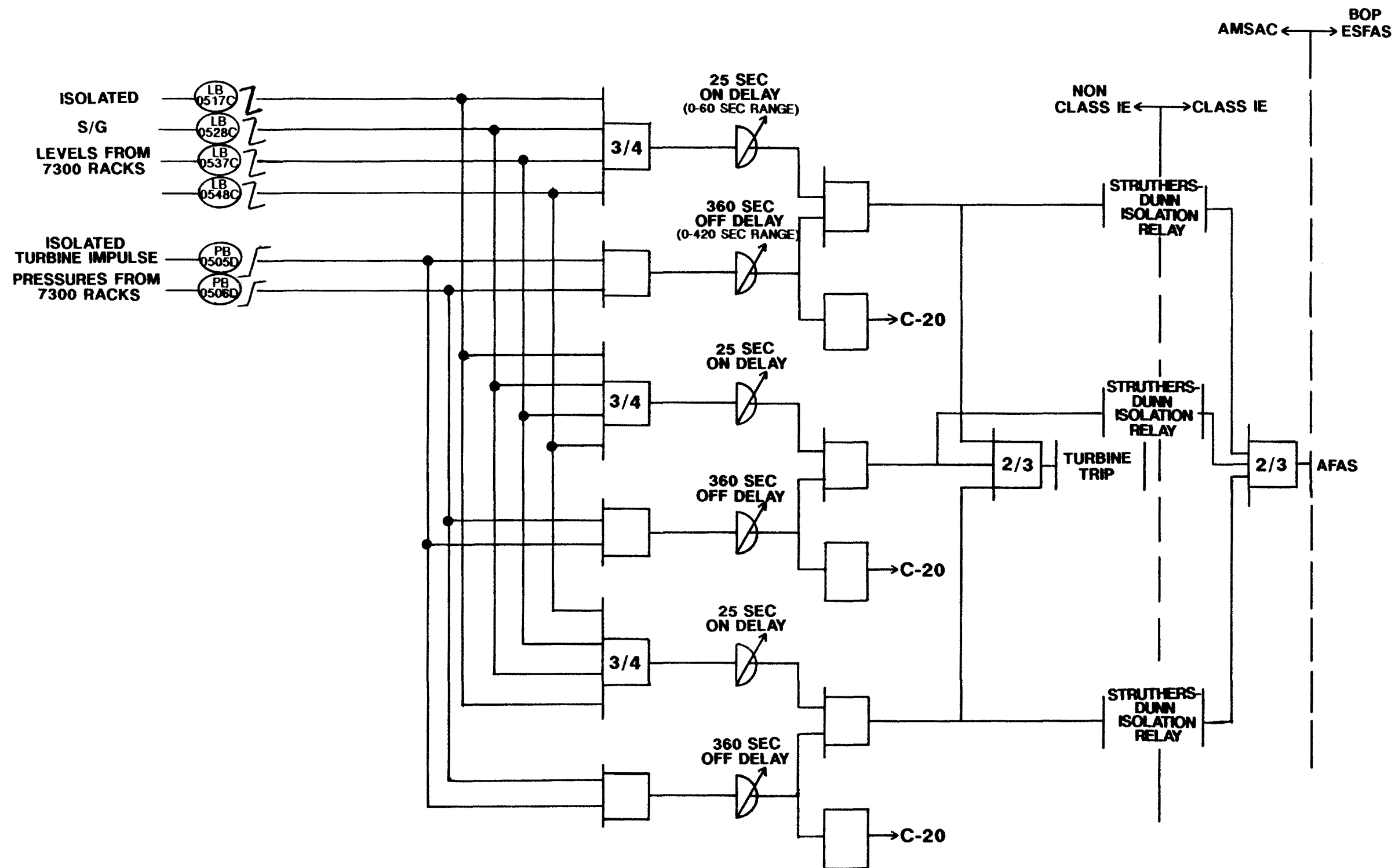


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FIGURE 7.7-15

CONTROL BANK D PARTIAL SIMPLI-
FIED SCHEMATIC DIAGRAM OF
POWER CABINETS 1BD AND 2BD



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FIGURE 7.7-16

AMSAC LOGIC DIAGRAM