HITACHI

GE Hitachi Nuclear Energy

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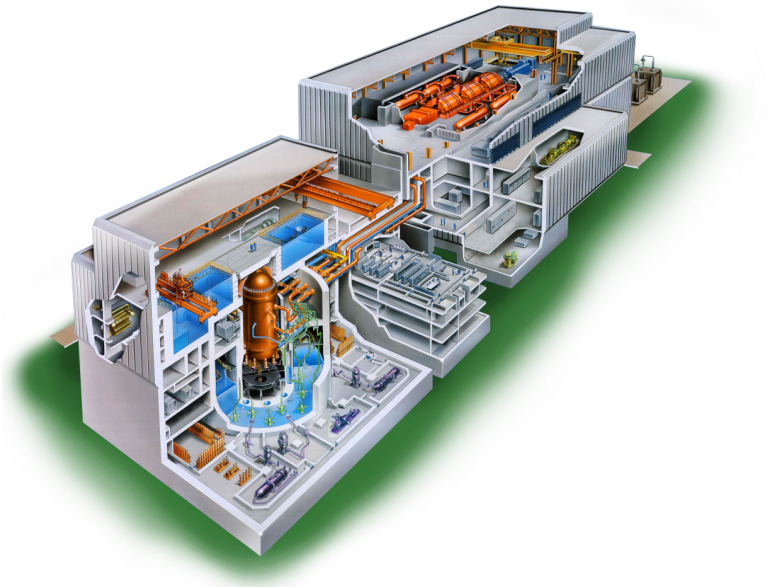
Design Control Document
Tier 2



Chapter 21

Volume 2

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List of Figures

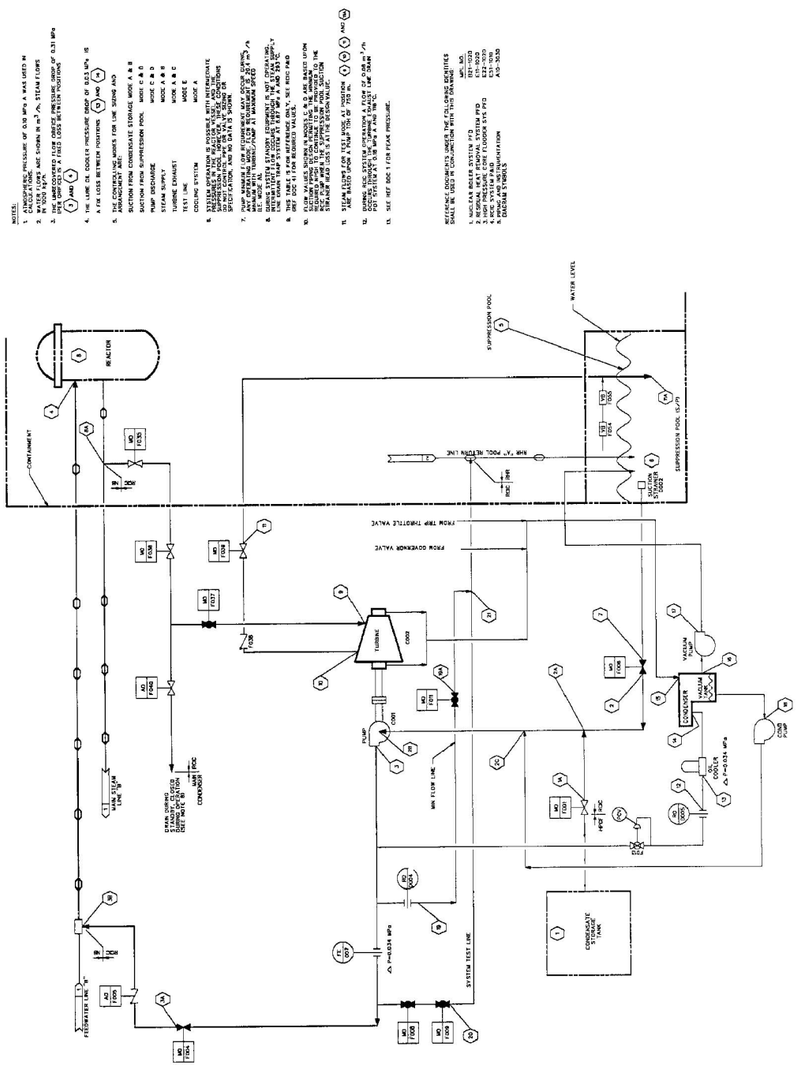


Figure 5.4-9 Reactor Core Isolation Cooling System PFD (Sheet 1 of 2)

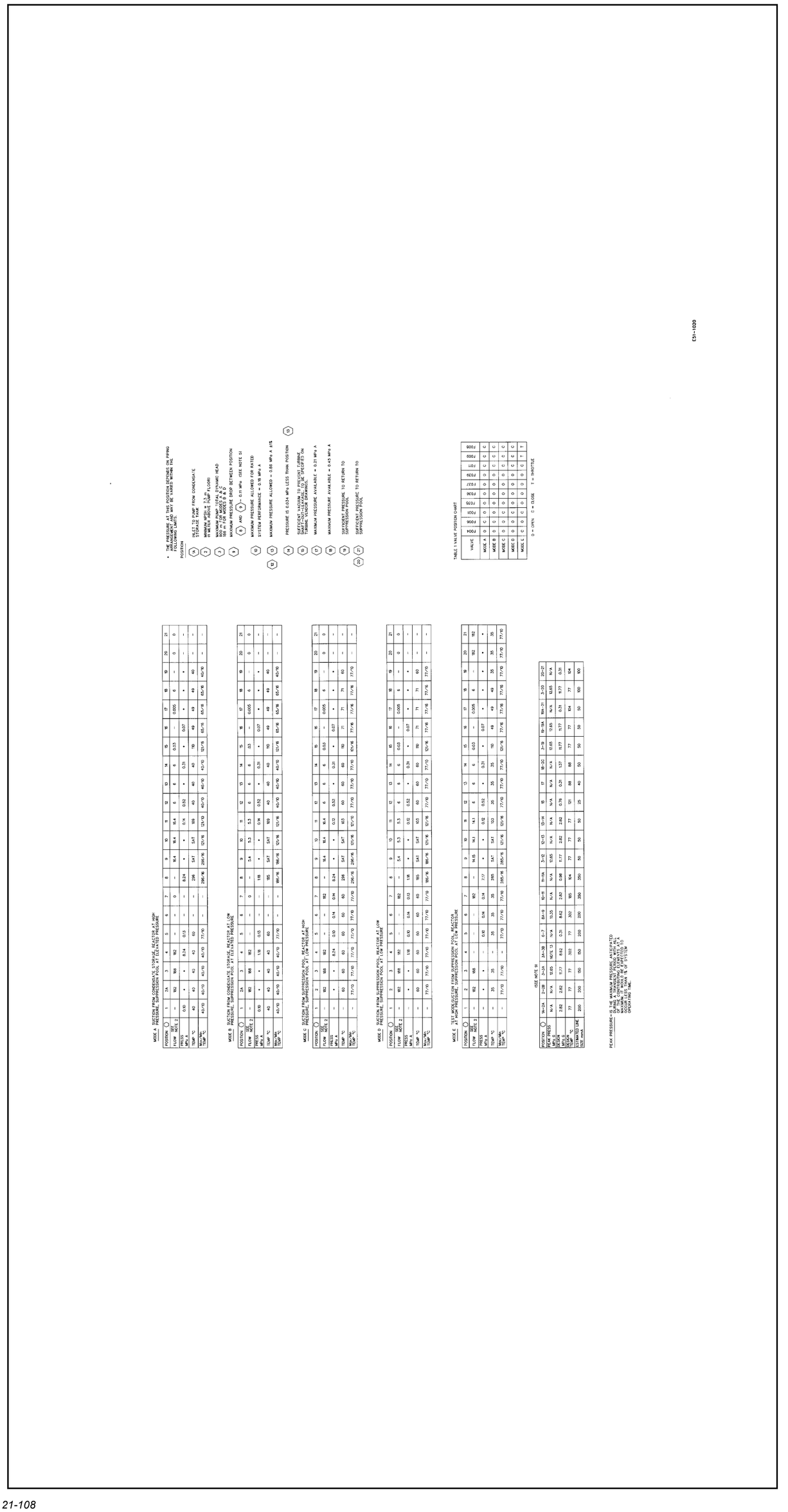


Figure 5.4-9 Reactor Core Isolation Cooling System PFD (Sheet 2 of 2)

NOTES:

1. PIPING HIGH POINT VENTS AND LOW POINT DRAINS ARE TO BE ADDED AS NECESSARY.
2. INSTRUMENT LINE DESIGN AND VALVING SHALL BE IN ACCORDANCE WITH INSTRUMENT PIPING SPECIFICATION. A11-3030
3. VALVE F028 IS REQUIRED IF THERE IS POTENTIAL FOR OVERPRESSURE.
4. FOR ADDITIONAL CONTROL ROOM LIGHTS, SYSTEM ALARMS AND REMOTE MANUAL SWITCHES, SEE THE RHR IBD E11-1030.
5. PROVISIONS FOR CONTAINMENT ISOLATION SHALL BE IN ACCORDANCE WITH CURRENT LICENSING REQUIREMENTS.
6. VALVE F002 SHALL BE LOCATED AT AN ELEVATION LOWER THAN THE SUPPRESSION POOL MINIMUM WATER LEVEL.
7. PUMP C001 COOLING WATER, IF REQUIRED, IS SPECIFIED IN P21-1010.
8. ALL PRIMARY CONTAINMENT ISOLATION VALVES SHALL BE LOCATED AS CLOSE AS POSSIBLE TO THE CONTAINMENT PENETRATION.
9. ALL MOTOR OPERATED VALVES ARE AC OPERATED UNLESS OTHERWISE NOTED.
10. EQUIPMENT IN SUBSYSTEMS A, B AND C SHALL HAVE THE SUFFIX LETTER A, B AND C RESPECTIVELY AFTER THE EQUIPMENT NUMBER.
11. FLUSHING CONNECTIONS AND TEMPORARY STRAINER SCREENS ON THE SUCTION SIDE OF ALL PUMPS SHALL BE PROVIDED.
12. DRYWELL PIPING RUNS SHALL BE HORIZONTAL OR VERTICAL UPWARDS FROM THE DRYWELL WALL TO THE POINT OF ATTACHMENT WITH THE REACTOR VESSEL.
13. THIS HIGH POINT VENT SHALL BE LOCATED AT THE HIGHEST POINT IN THE PIPING OUTSIDE THE DRYWELL BETWEEN VALVES F017 AND F018.
14. SUBSYSTEM "A" RETURNS TO RPV THROUGH FEEDWATER LINE "A".
15. DISCHARGE LINES FOR COOLING WATER TO BE ROUTED UPSTREAM OF SERVICE WATER RADIATION MONITORS.
16. VALVE F014 SHALL BE AS CLOSE AS POSSIBLE TO THE CONNECTIONS TO THE MAIN LINE.
17. DESIGN LINE SIZE WILL BE FINALIZED AT THE DETAILED DESIGN PHASE. ACTUAL LINE SIZES DETERMINED BY THE PIPING DESIGNER SHALL MEET THE PROCESS DATA HYDRAULIC REQUIREMENTS.
18. CHECK VALVE F006B(C) SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE REACTOR VESSEL NOZZLE.
19. VALVES F011A, F011B AND F011C ARE IN ELECTRICAL DIVISIONS 2, 3 AND 1 RESPECTIVELY. THE MANUAL CONTROL SWITCHES FOR VALVES F011A, F011B AND F011C ARE IN ELECTRICAL DIVISIONS 1, 2 AND 3 RESPECTIVELY.
20. PIPING DESIGN SPECIFICATIONS ARE AS FOLLOWS:
    A. MAXIMUM OPERATING PRESSURE – SEE SPECIFIC BOUNDARY SYMBOL
    B. MAXIMUM OPERATING TEMPERATURE – SEE SPECIFIC BOUNDARY SYMBOL
    C. MATERIAL – CARBON STEEL
    D. PIPING SCHEDULE – INTERFACE
    E. DESIGN CLASS – SEE SPECIFIC BOUNDARY SYMBOL
    F. QC CLASS – SEE SPECIFIC BOUNDARY SYMBOL
    G. SEISMIC CLASS – RHR – As
    H. FLUID – WATER
21. AIR SUPPLY IS FROM INSTRUMENT AIR SYSTEM, SUPPL DOC 15. NITROGEN SUPPLY IS FROM HIGH PRESSURE NITROGEN GAS SUPPLY SYSTEM, SUPPL DOC 4.
22. STRAINER TYPE AS SUPPLIED WITH PUMP C002.
23. FLANGE CONNECTION USED FOR OCCASSIONAL SUPPRESSION POOL DRAINING.
24. DRAIN AND VENT PIPING DESIGN CONDITIONS ARE:
    MAXIMUM OPERATING PRESSURE – SAME AS MAIN LINE UPSTREAM OF VALVE (ATMOSPHERIC PRESSURE FROM LAST VALVE TO FUNNEL).
    MAXIMUM OPERATING TEMPERATURE – SAME AS MAIN LINE UPSTREAM OF VALVE (66°C FROM LAST VALVE TO FUNNEL)
25. UNIQUE PIPE NUMBERS ARE ASSIGNED SEQUENTIALLY FOR EACH RHR LOOP. RANGES OF NUMBERS ARE ALLOCATED FOR EACH LOOP AND TYPE OF PIPE AS FOLLOWS:

	LOOP A	LOOP B	LOOP C
PROCESS PIPING	001–100	101–200	201–300
DRAIN AND VENT PIPING	500–529	530–559	560–589
INSTRUMENT PIPING	700–729	730–759	760–789

26. THE VALVE TYPE FOR F043 AND F044 WILL BE DECIDED IN THE FINAL DESIGN.
27. THE RECORDING FUNCTION IS ACCOMPLISHED THROUGH MICROPROCESSOR CHANNEL OUTPUT TO PRINTER.
28. TWO ROOT VALVES CAN BE PROVIDED AT THE SUPPLIERS OPTION ON HIGH RADIATION/LOW PRESSURE DRAIN AND VENT LINES.
29. BYPASS VALVES F036A,B,C SHALL BE UTILIZED FOR WARMING UP THE RHR PIPING SYSTEM. THE FLOW WILL BE FROM THE REACTOR SIDE. THESE VALVES ARE ALSO USED DURING OPERABILITY TESTING OF TESTABLE CHECK VALVE F006.
30. PIPE WITH A DESIGN PRESSURE OF 2.82 MPa OR GREATER SHALL HAVE ITS MINIMUM WALL THICKNESS NO LESS THAN THAT OF A STANDARD WEIGHT PIPE. THICKER THAN STANDARD WEIGHT PIPE SHALL BE USED IF REQUIRED BY THE DESIGN PRESSURE OR OTHER REQUIREMENTS.
31. VALVES WITH A DESIGN PRESSURE OF 2.82 MPa OR GREATER SHALL BE A MINIMUM OF CLASS 300, OR OF A HIGHER CLASS IF REQUIRED BY THE DESIGN PRESSURE.
32. LOCATE THE GATE VALVE OF THIS PIPING SECTION AT A DISTANCE GREATER THAN OR EQUAL TO 25 PIPE DIAMETERS FROM THE RPV NOZZLE. OTHERWISE, PERFORM STRESS ANALYSIS TO SHOW THAT STRESSES AND FATIGUE ARE ACCEPTABLE PER THE ASME CODE FROM THE CONCERN OF NRC BULLETIN 88-08, SUPPLEMENT 3 (APRIL 11, 1989) ON POTENTIAL THERMAL STRATIFICATION AND STRIPING DUE TO PERIODIC EXTERNAL LEAKAGE OF THE GATE VALVE.
33. THE THREE RETURN LINES BRINGING FLOW INTO THE SUPPRESSION POOL (S/P) SHALL HAVE AN EXIT DESIGN THAT PROMOTES S/P CIRCULATION AND MIXING FOR EFFECIENT COOLING. CONSIDERATIONS SHALL INCLUDE: (1) DIRECTING THE FLOW HORIZONTALLY WITH THE THREE LINES WORKING TOGETHER TO ACHIEVE CIRCULATION AROUND THE S/P'S ANNULAR SHAPE, (2) DIRECTING THE RETURN FLOW TO AVOID DIRECTLY ENTERING A SUCTION INLET, AND (3) SEPARATE THE RETURN LINES FROM THE SUCTION STRAINERS IN THE ELEVATION PLANE TO THE GREATEST EXTENT PRACTICAL, WITH THE RETURN LINES LOCATED NEAR THE S/P TOP AND THE SUCTION STRAINERS NEAR THE S/P BOTTOM.
34. VALVE TO HAVE MANUAL HAND WHEEL OPERABLE AT LOW DELTA PRESSURE FOR POTENTIAL NLEO DURING FIRE WATER ADDITION MODE. (NOTE VALVES F005C, F017C, AND F018C).
35. VALVE F005A SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE STEAM TUNNEL WALL.

SUPPLEMENTAL DOCUMENTS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING.

	MPL NO.
1. RESIDUAL HEAT REMOVAL SYSTEM PFD	E11-1020
2. RESIDUAL HEAT REMOVAL SYSTEM IBD	E11-1030
3. SAMPLING SYSTEM P&ID	P91-1010
4. HIGH PRESSURE NITROGEN GAS SUPPLY SYSTEM P&ID	P54-1010
5. REACTOR WATER CLEANUP SYSTEM P&ID	G31-1010
6. FUEL POOL COOLING AND CLEANUP SYSTEM P&ID	G41-1010
7. VALVE GLAND LEAKAGE TREATMENT, RADWASTE SYSTEM P&ID	K17-1010
8. MAKE-UP WATER SYSTEM (CONDENSATE) P&ID	P13-1010
9. REMOTE SHUTDOWN SYSTEM IED	C61-1040
10. HIGH PRESSURE CORE FLOODER P&ID	E22-1010
11. REACTOR CORE ISOLATION COOLING SYSTEM P&ID	E51-1010
12. NUCLEAR BOILER SYSTEM P&ID	B21-1010
13. HIGH CONDUCTIVITY WASTE, RADWASTE SYSTEM P&ID	K17-1010
14. REACTOR BUILDING COOLING WATER SYSTEM P&ID	P21-1010
15. INSTRUMENT AIR SYSTEM P&ID	P52-1010
16. FLAMMABILITY CONTROL SYSTEM P&ID	T49-1010
17. NUCLEAR BOILER SYSTEM IBD	B21-1030
18. SAMPLING SYSTEM P&ID (INCLUDES PASS)	P91-1010
19. FIRE PROTECTION SYSTEM P&ID	U43-1010
20. LOW CONDUCTIVITY WASTE, RADWASTE SYSTEM P&ID	K17-1010
21. REACTOR ICD	B11-2020

SUPPORTING DOCUMENTS

1. PIPING AND INSTRUMENT SYMBOLS	A10-3030

LEGEND:

LEAK TESTABLE DOUBLE DISC GATE VALVE

MPL NO. E11-1010

Figure 5.4-10 Residual Heat Removal System P&ID (Sheet 1 of 7)

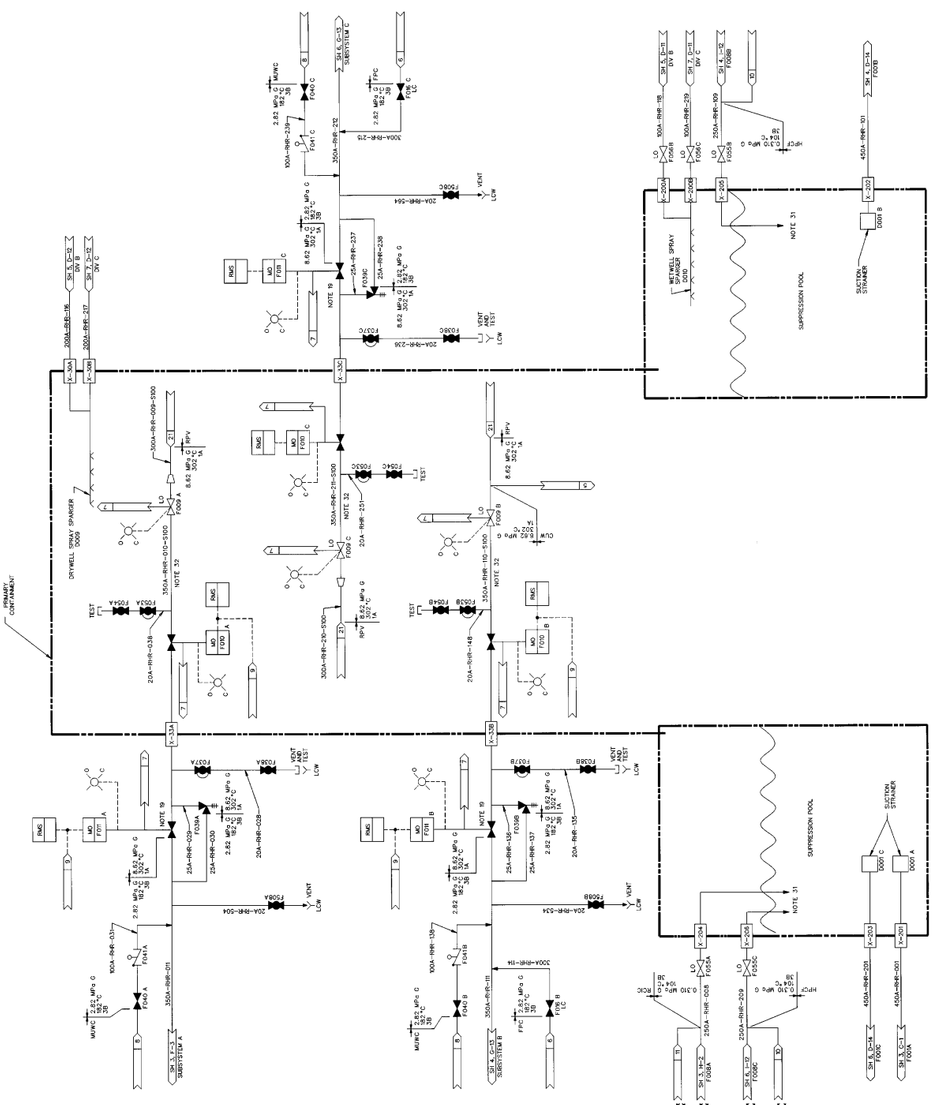


Figure 5.4-10 Residual Heat Removal System P&ID (Sheet 2 of 7)

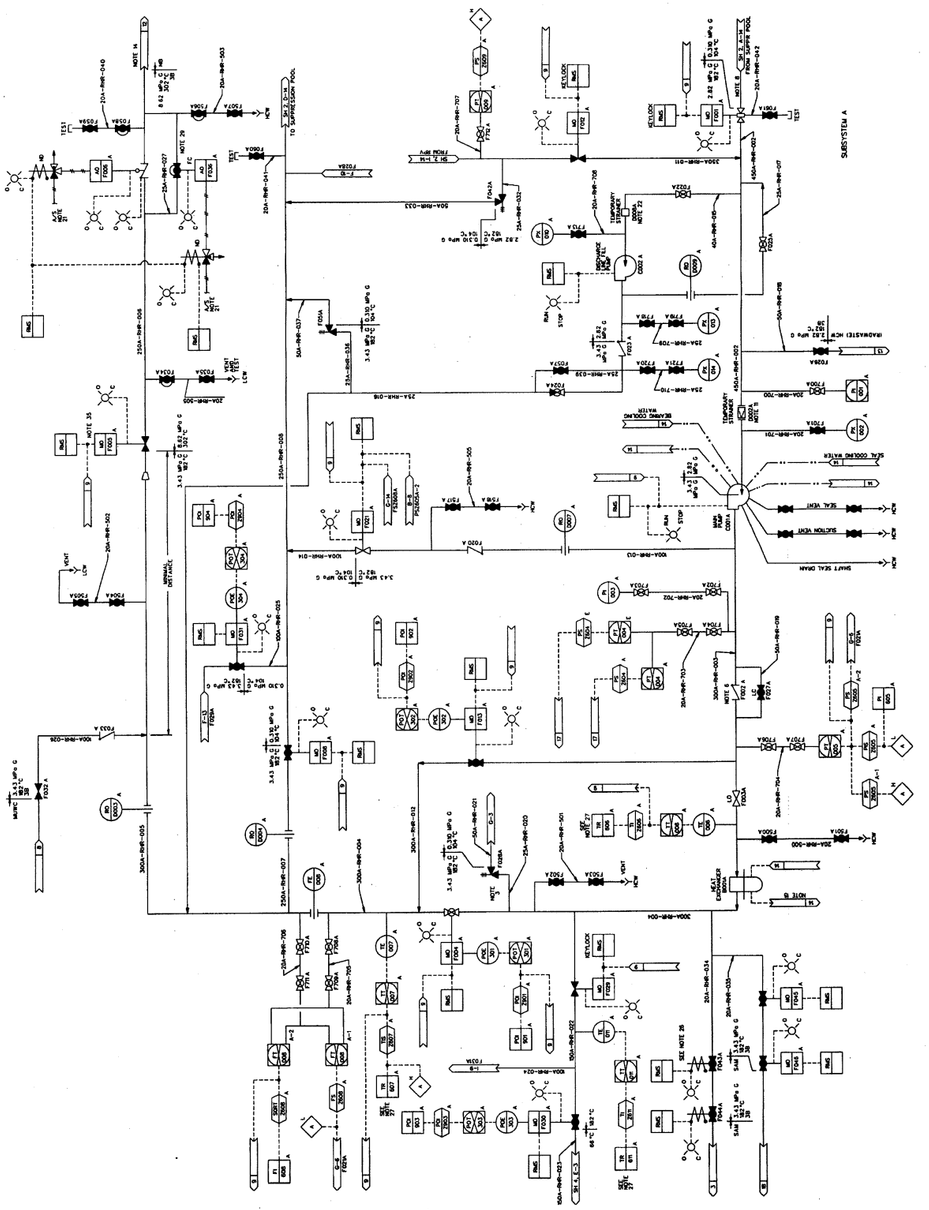


Figure 5.4-10 Residual Heat Removal System P&ID (Sheet 3 of 7)

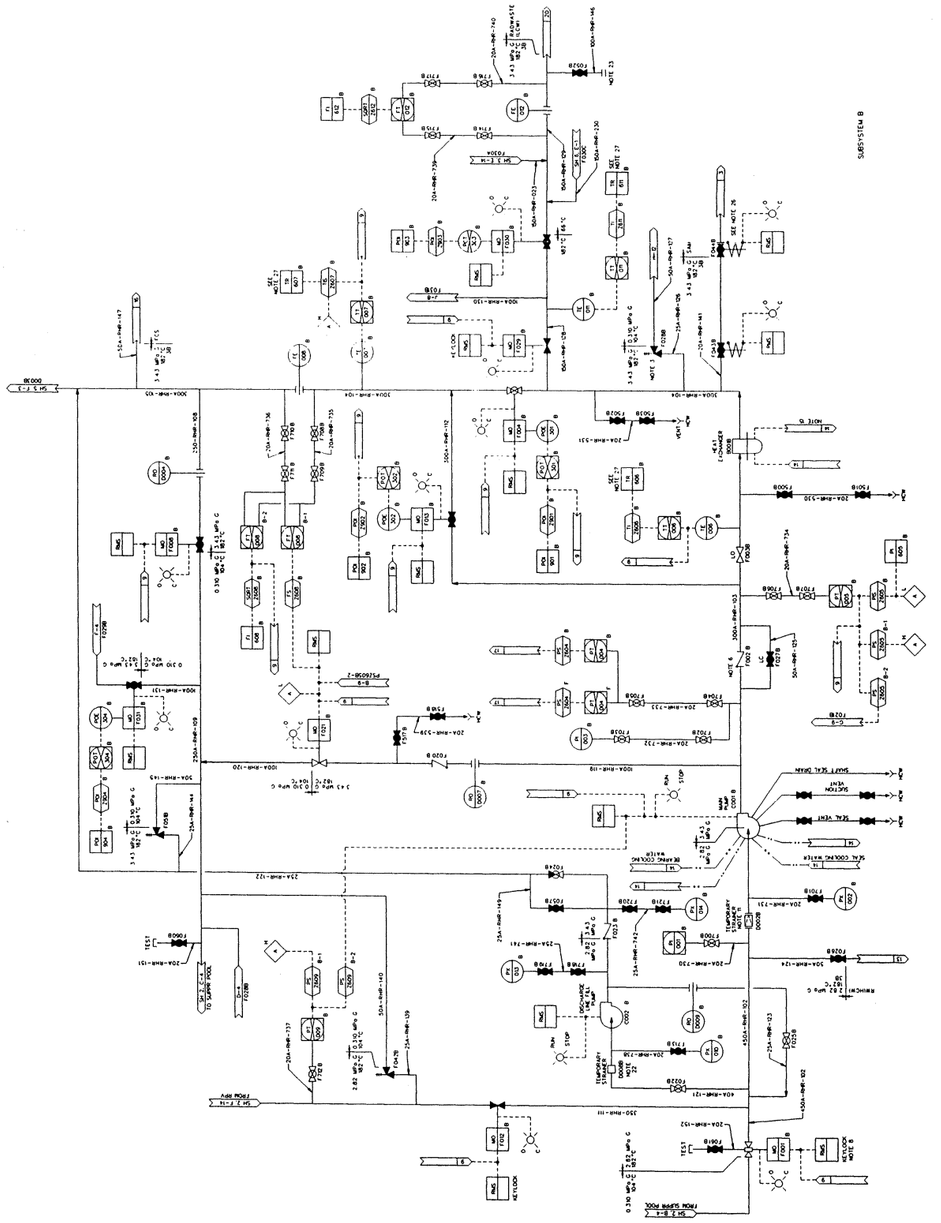


Figure 5.4-10 Residual Heat Removal System P&ID (Sheet 4 of 7)

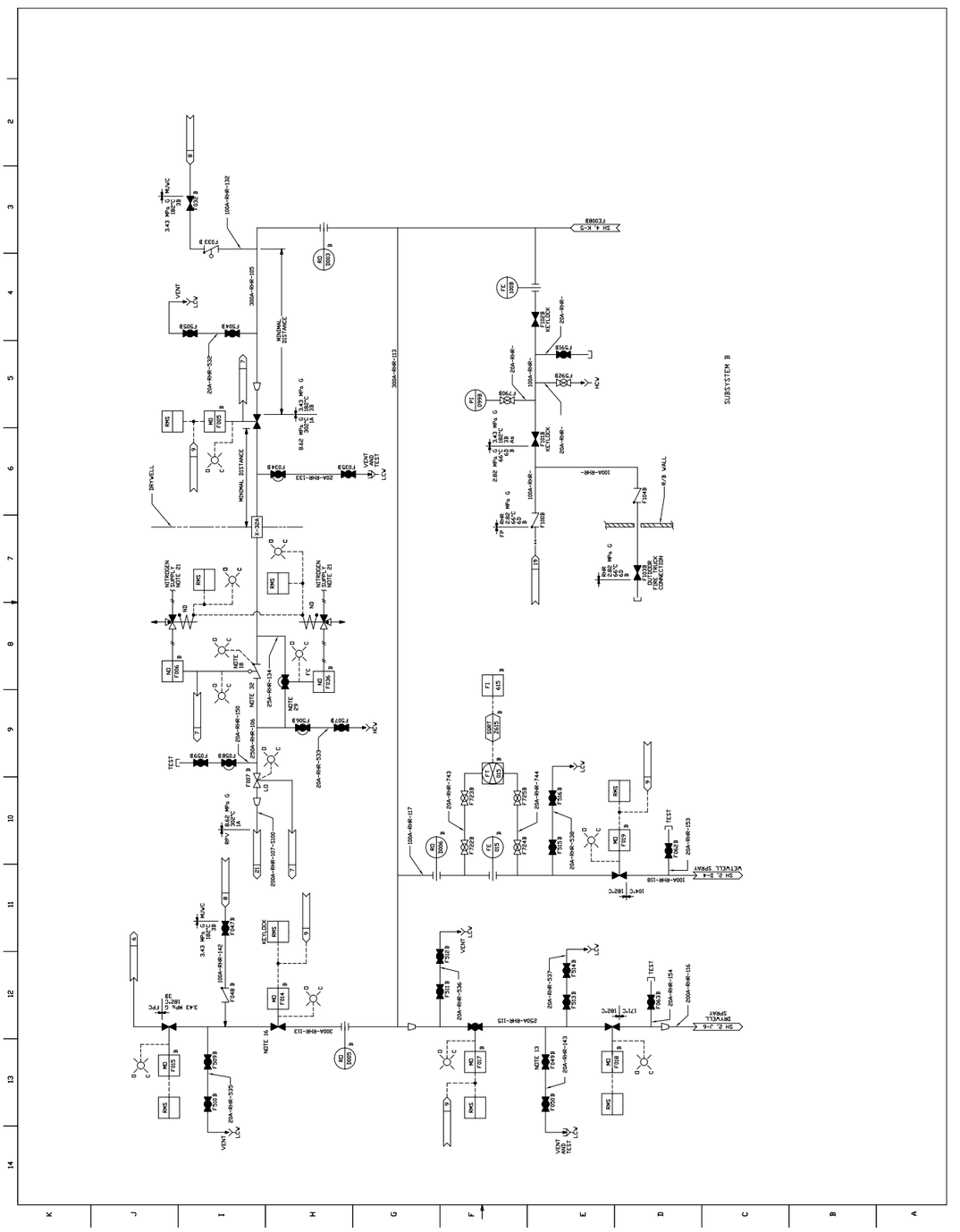


Figure 5.4-10 Residual Heat Removal System P&ID (Sheet 5 of 7)

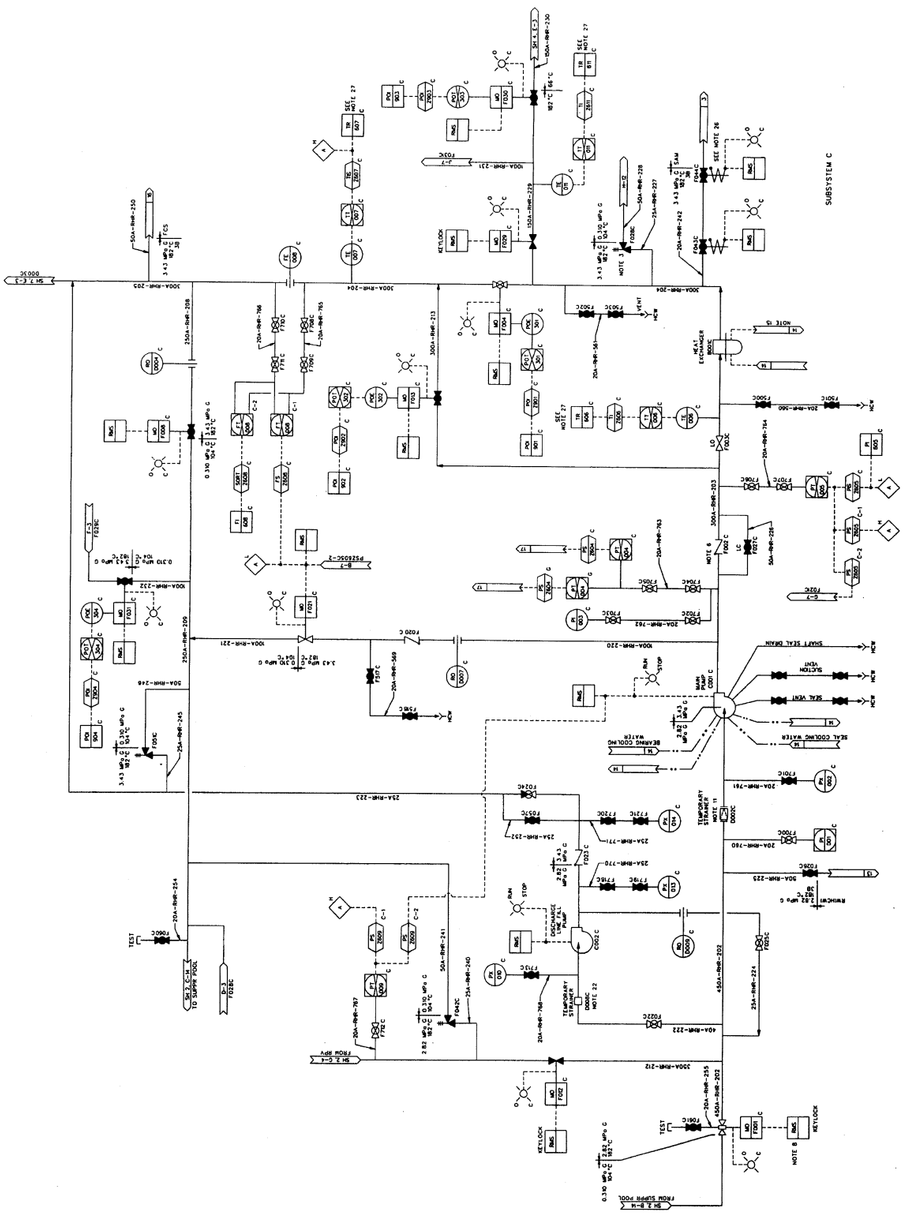


Figure 5.4-10 Residual Heat Removal System P&ID (Sheet 6 of 7)

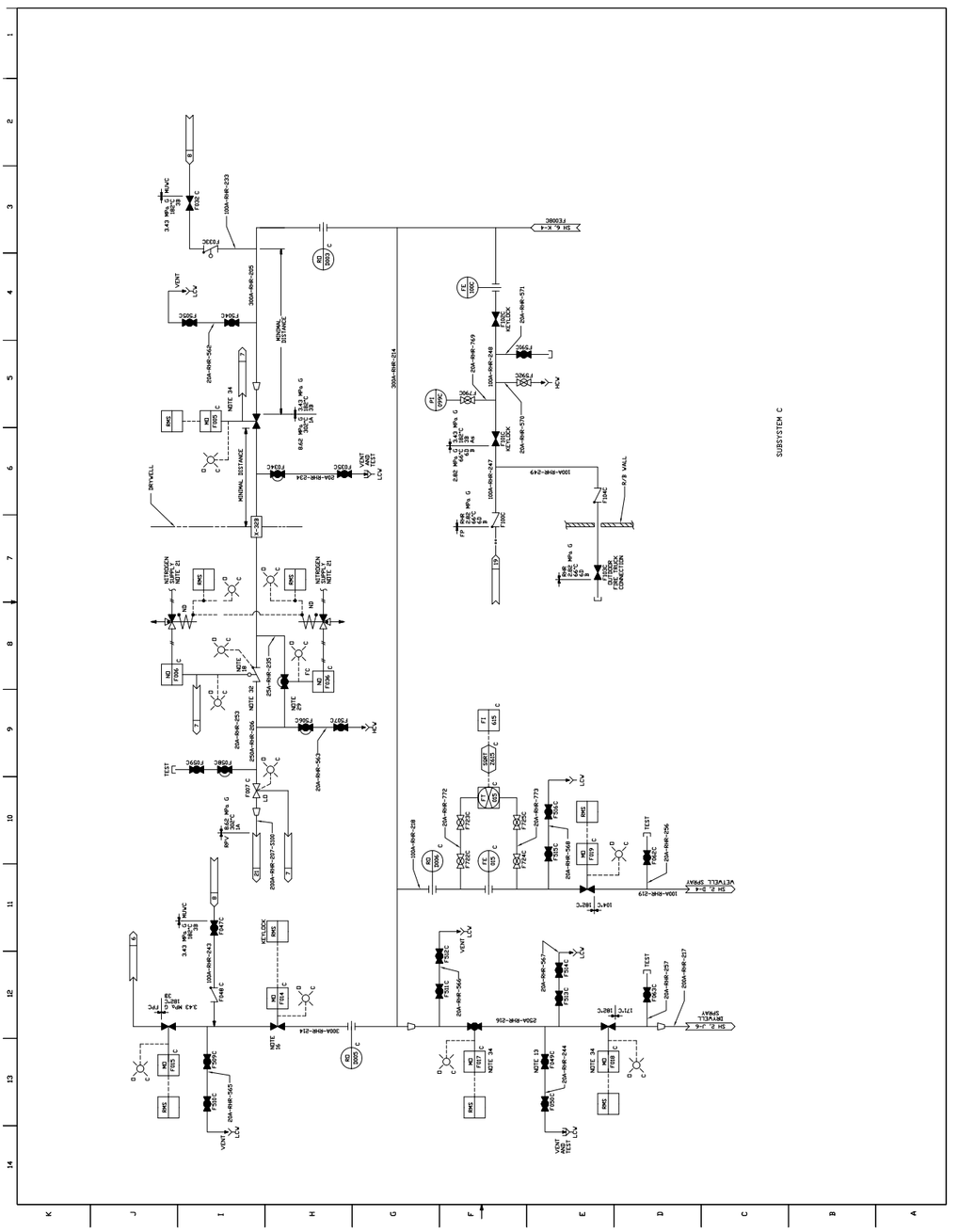
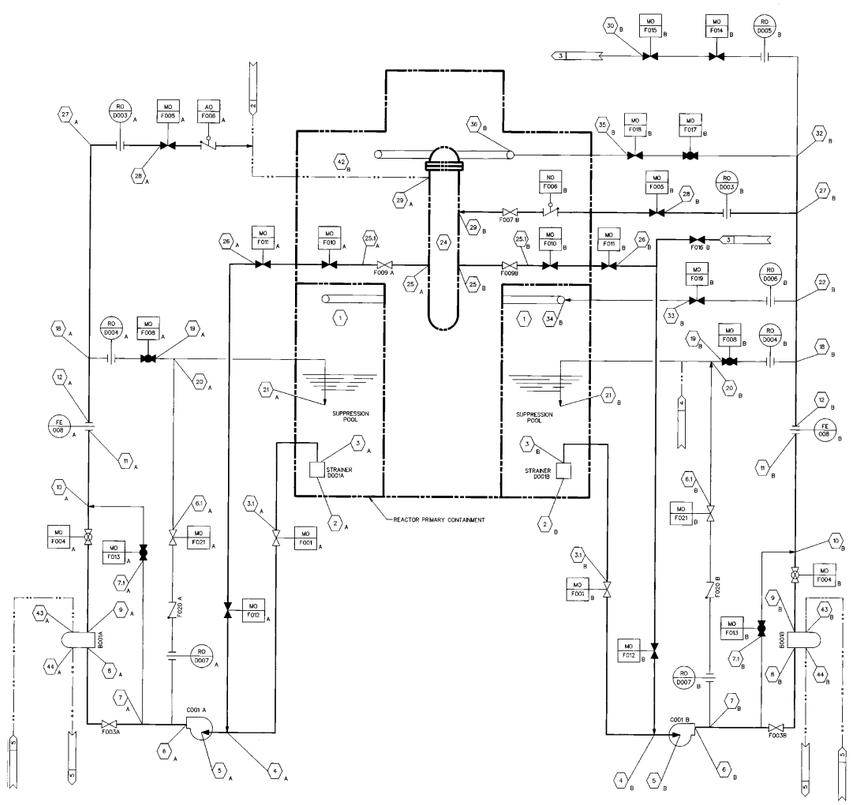


Figure 5.4-10 Residual Heat Removal System P&ID (Sheet 7 of 7)



NOTES:

1. SHOWN AS TYPICAL FOR ONE SUBSYSTEM. IF SUBSYSTEMS ARE NOT SYMETRICALLY ARRANGED, VALUES FOR EACH SUBSYSTEM SHALL BE SUBMITTED.
2. PIPING BETWEEN POINTS WITH EMPTY DATA BLANKS TO BE SIZED BY OTHERS BASED ON SPECIFIED OPERATING CONDITIONS. EMPTY DATA BLANKS CAN BE FILLED IN BASED ON ACTUAL ARRANGEMENT OR EQUIVALENT HYDRAULIC DATA.

   [ ] ---- INDICATES THE DATA IS NOT SIGNIFICANT.
3. MODE R1 IS THE LIMITING MODE FOR HEAT LOAD. HEAT CAPACITY BASED ON K =370.54 kJ/°C a.
4. [X / Y] ---- INDICATES MAXIMUM (X) AND MINIMUM (Y) VALUES FOR THE MODE SPECIFIED.
5. DASHED LINES INDICATE FLOW DOES NOT PASS THROUGH THESE POINTS.
6. TYPICAL VALUES FOR MAXIMUM SUPPRESSION POOL TEMPERATURE SHOWN. FINAL TEMPERATURE DEPENDS ON INITIAL POOL WATER TEMPERATURE AND POOL WATER VOLUME.
7. THE NPSH AVAILABLE IN MODES A AND C-1, AT A REFERENCE LOCATION 1 METER ABOVE THE PUMP MOUNTING FLOOR MUST EQUAL OR EXCEED 2.4 METERS ASSUMING SATURATION TEMPERATURES OF 100°C AND 180°C RESPECTIVELY. THE NPSH AVAILABLE IN MODE C-2 MUST EQUAL OR EXCEED 1.0 M OR EXCEED THIS VALUE PLUS THE DIFFERENCE IN ELEVATION BETWEEN THE REFERENCE LOCATION AND THE CENTERLINE OF THE PUMP SUCTION NOZZLE.
8. TABLE 1 INDICATES VALVE POSITIONS DURING VARIOUS MODES OF OPERATION.
9. THIS TABLE IS FOR REFERENCE ONLY; SEE P&ID, FOR REQUIRED VALUES.
10. THE WEIGHT OF WATER IN THE SHUTDOWN COOLING SUBSYSTEM PIPING, INCLUDING THE HEAT EXCHANGERS AND PUMPS SHALL NOT EXCEED THE VALUE SPECIFIED C41-4010 IN ORDER TO PREVENT DILUTION OF STANDBY LIQUID CONTROL NEUTRON ABSORBER BELOW MINIMUM REQUIREMENTS.
11. HEAT EXCHANGER HEAT REMOVAL AND SPRAY BASED UPON 954 m^3/h TUBE SIDE FLOW.
12. 501 + 195 METERS REQUIRED MINIMUM AND 220 METERS MAXIMUM.
13. MAXIMUM TUBE SIDE FLOW RATE IS 1130 m^3/h WHICH IS MAXIMUM PUMP RUNOUT FLOW.
14. HEAT EXCHANGER HEAT REMOVAL SHOWN FOR FULL FLOW AND MAXIMUM TEMPERATURE DIFFERENCE.
15. ONLY TWO SUBSYSTEMS ARE REQUIRED AT THIS STAGE OF SHUTDOWN.
16. LOCATIONS 19,20,21 AND 22,33,34 SHOW THE FLOW SPLIT ON LOOPS A AND C WHEN THE WETWELL SPRAY FUNCTION IS MANUALLY INITIATED.
17. ONLY ONE SUBSYSTEM IS REQUIRED FOR THIS MODE OF OPERATION, EITHER SUBSYSTEM B OR SUBSYSTEM C.
18. THESE TEMPERATURE VALUES HAVE BEEN CALCULATED UNDER NOMINAL CONDITIONS, I.E., WITH AN ULTIMATE HEAT SINK TEMPERATURE OF 30°C.

SUPPLEMENTAL DOCUMENTS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING.

	MPL NO.
1. RESIDUAL HEAT REMOVAL SYSTEM P&ID	E11-1010
2. NUCLEAR BOILER SYSTEM PFD	B21-1020
3. FUEL POOL COOLING & CLEANUP SYS PFD	G41-1020
4. HIGH PRESSURE CORE FLOODER SYS PFD	E22-1020
5. REACTOR BUILDING COOLING WATER SYSTEM PFD	P21-1020

SUPPORTING DOCUMENTS

	MPL NO.
1. PIPING AND INSTRUMENT DIAGRAM SYMBOLS	A10-3030

MPL NO. E11-1020

Figure 5.4-11 Residual Heat Removal System PFD (Sheet 1 of 2)

MODE A POST ACCIDENT CORE COOLING WITH STRAINER HEAD LOSS AT DESIGN VALUE (SEE NOTE 1)

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	27	28	29	24	43	44
FLOW m^3/h	–	954	←												954	–		
TEMP °C	–	97/35	←				→	97/35								–		
PRESS MPa A	0.41/0.10	–	–	–	–											0.41/0.10		
Max PRESS DIFF–METERS	←				Δ TDH = 125		–	ΔH = 7.0		–	ΔH = 6.1		–	–	→		Δ H = 7.0	

HEAT REMOVAL CAPACITY PER HX LOOP = 82.48 X 10^6 kJ/h — ALL SUBSYSTEMS

MODE B1 POST ACCIDENT SUPPRESSION POOL COOLING WITH STRAINER HEAD LOSS AT DESIGN VALUE (SEE NOTES 8 & 16)

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	18	18B&C	20B&C	21B&C	1	22B&C	33B&C	34B&C	1	19A	20A	21A	1	43	44
FLOW m^3/h	–	954	←									→	954	840	840	840	–	114	114	114	–	954	954	954	–		
TEMP °C	–	97	←				→	97									–				–				–		
PRESS MPa A	0.41/0.10	–	–	–	–												0.41/0.10				0.41/0.10				0.41/0.10		
Max PRESS DIFF–METERS	←				Δ TDH = 125			ΔH = 7.0			Δ H = 6.1						→								→	Δ H = 7.0	

HEAT REMOVAL CAPACITY PER HX LOOP = 82.48 X 10^6 kJ/h (3 HX'S OPERATING) (SEE NOTE 3)

SUBSYSTEM B & C — SEE NOTE 5 TYP ALL TABLES — SUBSYSTEM A

MODE B2 SUPPRESSION POOL COOLING DURING REACTOR HOT STANDBY OPERATION

POSITION	1	2	3	4	5	6	8	9	11	12	18	19	20	21	1	43	44
FLOW m^3/h	–	954	←											954	–		
TEMP °C	–	49	←				→	49							–		
PRESS MPa A	0.10	–	–	–	–										0.10		
Max PRESS DIFF–METERS	←				Δ TDH = 125		ΔH = 7.0		ΔH = 6.1					→		Δ H = 7.0	

HEAT REMOVAL CAPACITY PER HX LOOP = 18.67 X 10^6 kJ/h — SUBSYSTEM B & C

MODE C1 INITIATION OF SHUTDOWN COOLING AFTER BLOWDOWN TO MAIN CONDENSER AT 4 HOURS RX PRESS =1.03 MPa A (SEE NOTES 18&13)

POSITION	24	25	4	5	6	7	8	9	10	11	12	27	28	29	24	43	44
FLOW m^3/h	–	954	←											954	–		
TEMP °C	–	182	←				→	182							–		
PRESS MPa A	1.03	–	–	–											1.03		
Max PRESS DIFF–METERS	←				Δ TDH = 125			ΔH = 7.0			ΔH = 6.1			→		Δ H = 7.0	

HEAT REMOVAL CAPACITY PER HX LOOP = 195.94 X 10^6 kJ/h — ALL SUBSYSTEMS (3 HX'S OPERATING)

MODE C2 CONTINUATION OF SHUTDOWN COOLING AT 20 HOURS RX PRESS = 0 MPa

POSITION	24	25	4	5	6	7	8	9	10	11	12	27	28	29	24	43	44
FLOW m^3/h	–	954	←											954	–		
TEMP °C	–	≤52	←				→	≤52							–		
PRESS MPa A	0.10	–	–	–											0.10		
Max PRESS DIFF–METERS	←				Δ TDH = 125			ΔH = 7.0			ΔH = 6.1			→		ΔH = 7.0	

HEAT REMOVAL CAPACITY PER HX LOOP = 22.65 X 10^6 kJ/h — ALL SUBSYSTEMS (3 HX'S OPERATING) (SEE NOTE 15)

MODE C3 CONTINUATION OF SHUTDOWN COOLING WITH RETURN TO UPPER CONTAINMENT POOL AT GREATER 20 HOURS RX PRESS =0 MPa

POSITION	24	25	4	5	6	7	8	9	10	11	12	27	30	43	44
FLOW m^3/h	–	954	←									→	954		
TEMP °C	–	≤52	←				→	≤52							
PRESS MPa A	0.10														
Max PRESS DIFF–METERS	←				Δ TDH = 125			ΔH = 7.0			Δ H =6.1			ΔH = 7.0	

HEAT REMOVAL CAPACITY PER HX LOOP = 22.65 X 10^6 kJ/h — SUBSYSTEM B & C (2 HX'S OPERATING) (SEE NOTE 15)

MODE C4 FUEL POOL COOLING – CLOSED LOOP WITH FUEL POOL (SEE NOTE 17)

POSITION	4	5	6	7	8	9	10	11	12	27	30	43	44
FLOW m^3/h	350	←								→	350		
TEMP °C	≤52	←			→	≤52							
PRESS MPa A													
Max PRESS DIFF–METERS	←									→		ΔH = 7.0	

SUBSYSTEM B OR C

MODE D RHR TEST DURING PLANT OPERATION

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	18	19	20	21	1	43	44
FLOW m^3/h	–	954	←													→	–		
TEMP °C	–	35/10	←													→	–		
PRESS MPa A	0.10																0.10		
Max PRESS DIFF–METERS	←				Δ TDH = 125			ΔH = 7.0			ΔH = 6.1						→		ΔH = 7.0

ALL SUBSYSTEMS

MODE E POST ACCIDENT CONTAINMENT SPRAY WITH HEAT REMOVAL AND STRAINER HEAD LOSS AT DESIGN VALUE

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	22	33	34	1	32	35	36	42	43	44
FLOW m^3/h	–	954	←									→	954	114	114	–	840	840	840	–		
TEMP °C	–	97/52	←				→	97/52								–				–		
PRESS MPa A	0.41/0.10	–	–	–	–											0.41/0.10				0.41/0.10		
Max PRESS DIFF–METERS	←				Δ TDH = 125			ΔH = 7.0			ΔH = 6.1					Δ H = 28			Δ H = 28		Δ H = 7.0	

HEAT REMOVAL CAPACITY PER HX LOOP = 82.48 X 10^6 kJ/h — SUBSYSTEM B & C (2 HX'S OPERATING) (SEE NOTE 19)

MODES

A POST ACCIDENT CORE COOLING WITH STRAINER **HEAD LOSS AT DESIGN VALUE.**

B–1 POST ACCIDENT SUPPRESSION POOL COOLING WITH STRAINER **HEAD LOSS AT DESIGN VALUE.**

B–2 SUPPRESSION POOL COOLING DURING HOT STANDBY OPERATION.

C–1 INITIATION OF SHUTDOWN COOLING AFTER BLOWDOWN TO MAIN CONDENSER AT FOUR HOURS

C–2 CONTINUATION OF SHUTDOWN COOLING AT 20 HOURS.

C–3 CONTINUATION OF SHUTDOWN COOLING WITH RETURN TO UPPER CONTAINMENT POOL AT GREATER THAN 20 HOURS.

C–4 FUEL POOL COOLING – CLOSED LOOP WITH FUEL POOL

D. RHR TEST DURING PLANT OPERATION.

E. POST ACCIDENT CONTAINMENT SPRAY WITH HEAT REJECTION AND **STRAINER HEAD LOSS AT DESIGN VALUE.**

F. MINIMUM FLOW BYPASS MODE.

S. SYSTEM ON STANDBY DUTY.

MODE S STANDBY DUTY

POSITION	1	2	3	4	5	6	8	9	11	12	19	26	28	32	33B&C
FLOW m^3/h	N/A	←												→	N/A
TEMP °C	–	35/10	←								→	AMBIENT	35/10	35/10	35/10
PRESS MPa A														→	
Max PRESS DIFF–METERS	—	—	—	—	TDH = 0	—	—	—	—	—	—	—	—	—	—

TABLE 1 VALVE POSITION CHART (SEE NOTE 8)

MODE	F001	F004	F005	F008	F010	F011	F012	F013	F014	F015	F016	F017	F018	F019	F021	STRAINER
A	O	O	O													*
B–1	O	O		O										O		*
B–2	O	O		O												*
C–1		O–T	O		O	O	O	T–C								CLEAR
C–2		O–T	O		O	O	O	T–C								CLEAR
C–3		O–T			O	O	O	T–C	O	O						CLEAR
C–4		O–T					O	T–C	O	O	O					CLEAR
D	O	O		O–T												CLEAR
E	O	O									T	O	O			*
F – POOL	O	O–T												O		CLEAR
S	O	O												O		CLEAR

O = VALVE OPEN
T = VALVE THROTTLED
T–C = VALVE THROTTLED OR CLOSED
O–T = VALVE OPEN OR THROTTLED
P = STRAINER PLUGGED
BLANK SPACE INDICATE VALVE IS CLOSED
* STRAINER HEAD LOSS AT DESIGN VALUE

LEGEND

RX PRESS ——— REACTOR VESSEL PRESSURE
TDH ——— TOTAL DYNAMIC HEAD
SOH ——— SHUTOFF HEAD
ΔH ——— HEAD LOSS

MODE F MINIMUM FLOW BYPASS MODE

POSITION	1	2	3	4	5	6	6.1	20	21	1
FLOW m^3/h	–	148	←						148	–
TEMP °C	–	35/10	←						35/10	–
PRESS MPa A	0.10									0.10
Max PRESS DIFF–METERS	←					SEE NOTE 12			→	

ALL SUB SYSTEMS

DESIGN PRESSURE AND TEMPERATURE TABLE (SEE NOTE 9)

POSITION	3	3.1	4	5	6	7	7	8	9	10	7	7.1	10	10	11	12	12	18	22 B & C	27	28	29 B & C	29A	12 B & C	18	19	21	12 B & C	18 B & C	22 B & C	33 B & C	34 B & C	25	25.1	26	4	18	27	28	29 B & C	29A	27	30		6	6.1	20	32	35	36
DESIGN PRESS MPa G	0.31	2.82			RHR PUMP	3.43	3.43	RHR HX	3.43	3.43	3.43	3.43	3.43	3.43	8.62	SEE B21–1020	3.43	0.31	3.43	3.43	8.62	3.43	3.43	8.62	2.82	3.43	8.62	SEE B21–1020	3.43	SEE G41–1020	3.43	0.31	3.43	3.43
DESIGN TEMP °C	104	182				182	182		182	182	182	182	182	182	302		182	104	182	104	302	182	302		182	104	182	171
EST. LINE SIZE mm	450A					300A	300A		300A	300A	300A	300A	FLOW ELEM	300A	250A		300A	250A	300A	100A	350A	350A	300A	250A		100A	250A	200A
	POOL TO PUMP				PUMP TO HX BYPASS LINE	HEAT EXCHANGER LINE			HX BYPASS LINE		HX TO FLOW ELEMENT				FLOW ELEMENT TO RX VESSEL		FLOW ELEMENT TO SUPPRESSION POOL			FLOW ELEMENT TO WETWELL SPRAY			SHUTDOWN SUCTION		SHUTDOWN RETURN TO RX VESSEL								SHUTDOWN RETURN TO UPPER POOL			MINIMUM FLOW BYPASS		FLOW TO DRYWELL SPRAY	

Figure 5.4-11 Residual Heat Removal System PFD (Sheet 2 of 2)

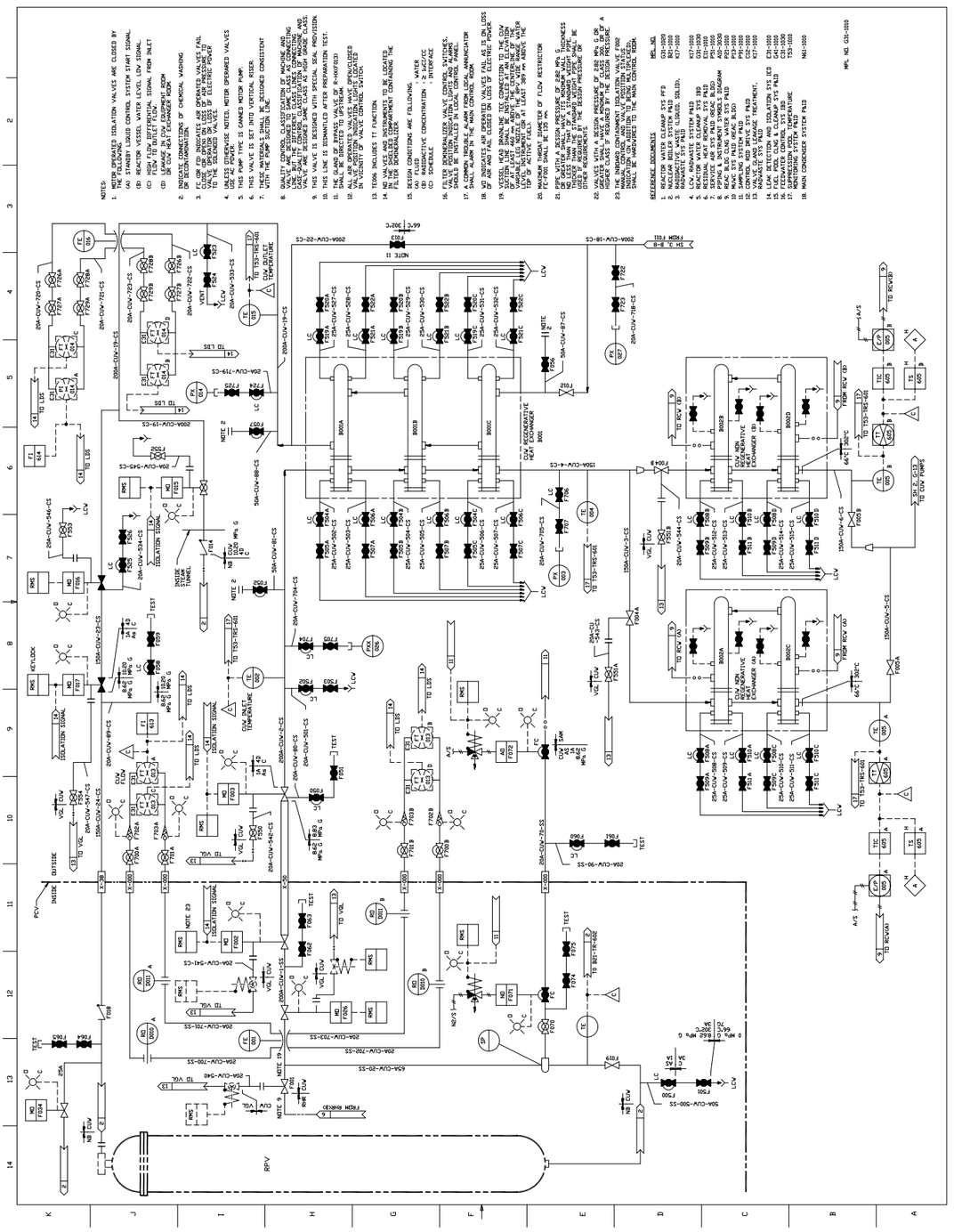


Figure 5.4-12 Reactor Water Cleanup System P&ID (Sheet 1 of 4)

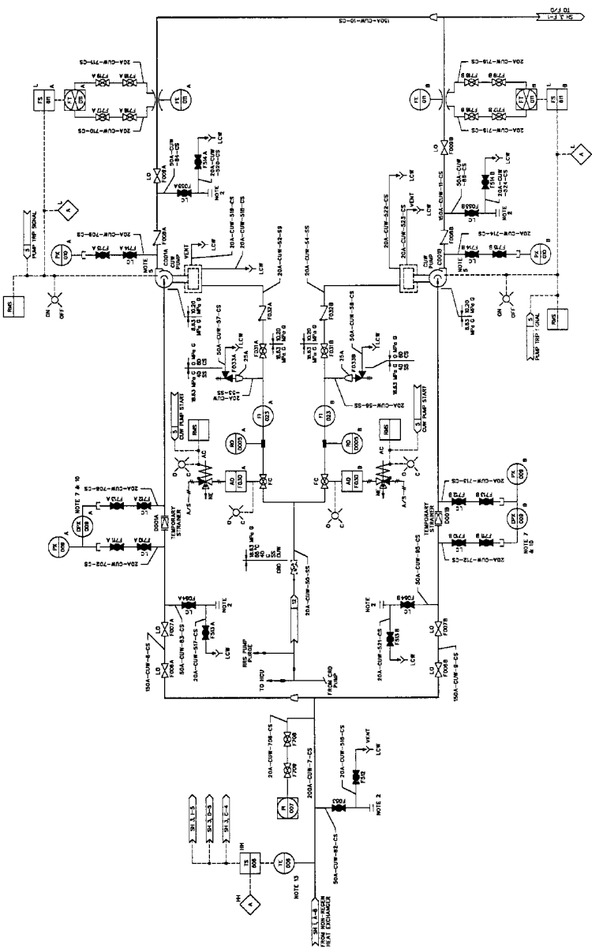


Figure 5.4-12 Reactor Water Cleanup System P&ID (Sheet 2 of 4)

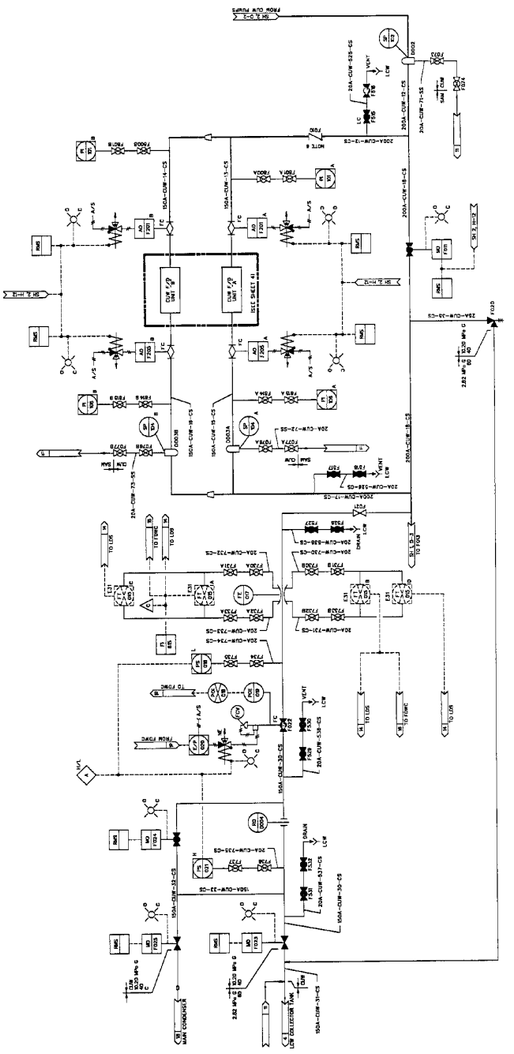


Figure 5.4-12 Reactor Water Cleanup System P&ID (Sheet 3 of 4)

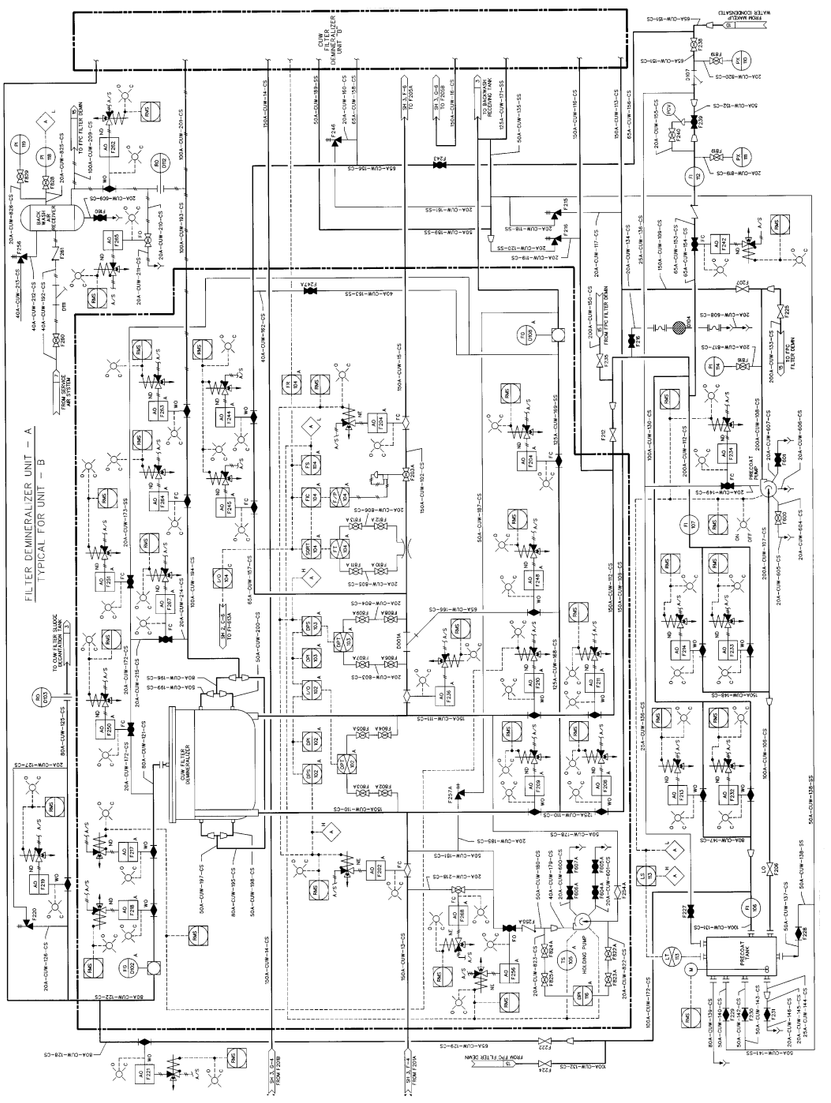
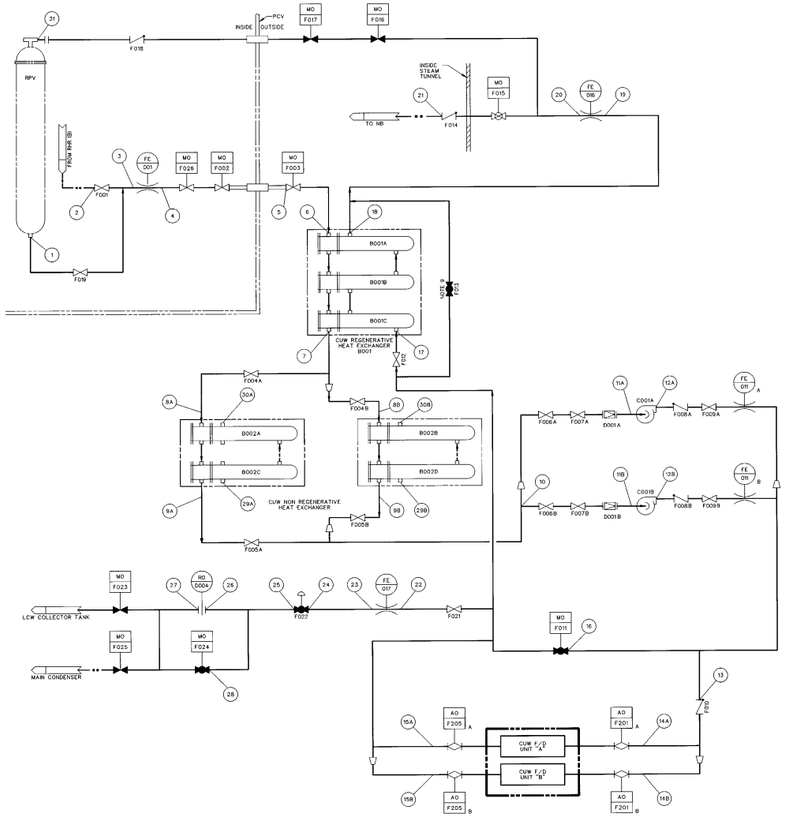


Figure 5.4-12 Reactor Water Cleanup System P&ID (Sheet 4 of 4)



GENERAL NOTES:

1. — SHOWS THE PART WHERE THE FLUID DOES NOT FLOW.
   ⋈ OMITS THE VALVE NOT NEEDED FOR THE DESIGNATED MODE OF THIS SYSTEM.
2. CUW PUMP, CUW NON-REGENERATIVE HEAT EXCHANGER, CUW REGENERATIVE HEAT EXCHANGER SHALL BE INSTALLED TO HAVE ADEQUATE STATIC PRESSURE. THE MOST SEVERE OPERATING MODE IS OFF GAS OPERATING MODE AT START-UP OPERATION WHEN REACTOR PRESSURE IS 0 MPa.
3. MODE A IS THE BASIC DESIGN CONDITION OF HEAT EXCHANGER (REGENERATIVE HEAT EXCHANGER AND NON-REGENERATIVE HEAT EXCHANGER).
4. DURING A STARTUP OPERATION F/D MAY BE BYPASSED WHEN F/D IS OUT OF SERVICE.
5. AT MODE B AND MODE F THE VALVE (F022, F023, F024) SHALL BE OPEN AND THEN, THE FLUID IS TRANSFERED TO THE LOW CONDUCTIVITY COLLECTOR TANK.
6. THE TOTAL PRESSURE LOSS OF REGENERATIVE HEAT EXCHANGER (SHELL SIDE AND TUBE SIDE) AND NON-REGENERATIVE HEAT EXCHANGER (TUBE SIDE) IS UNDER 0.21 MPa.
7. ALL OF THE SYSTEM FLOW IS SPRAYED FROM RPV SPRAY HEADER AT THE RPV SPRAY MODE.
8. THE TOTAL FLOW RATE FROM RHR AND FROM RPV BOTTOM HEAD DRAIN LINE IS 152.5X103 kg/h.
9. THIS BYPASS LINE MAYBE APPLIED WITH F013 OPENED AND F012 CLOSED CONDITION SO THAT THE DECAY HEAT IS REMOVED BY NON REGENERATIVE HEAT EXCHANGER DURING REFUELING OUTAGE IF REQUIRED.

SPL NO. C31-1020

Figure 5.4-13 Reactor Water Cleanup System PFD (Sheet 1 of 2)

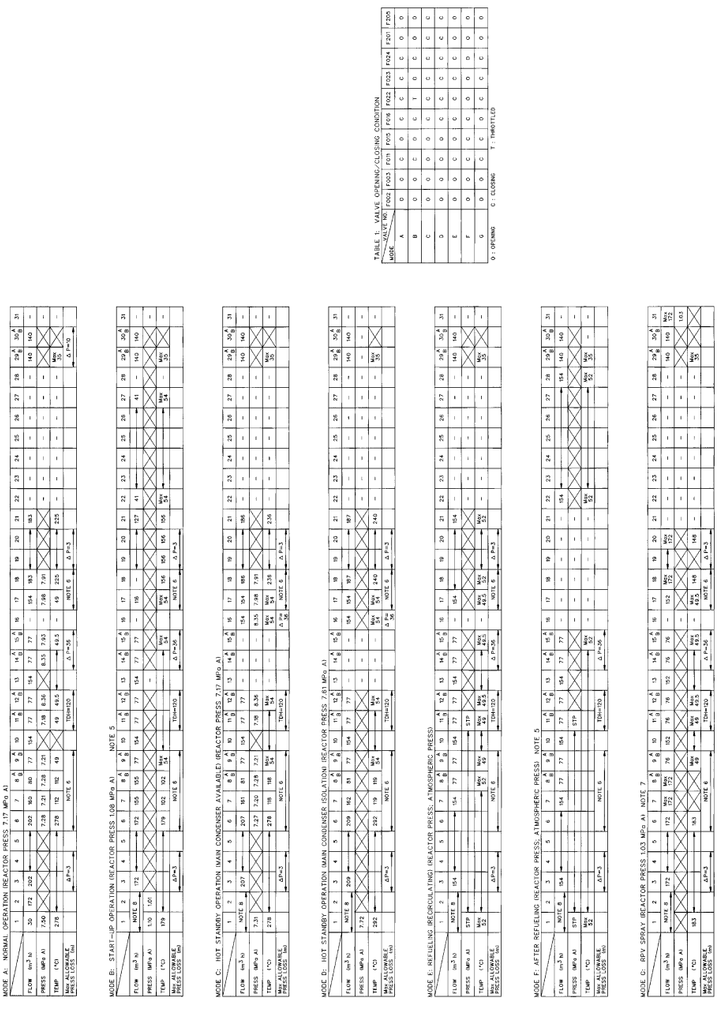


Figure 5.4-13 Reactor Water Cleanup System PFD (Sheet 2 of 2)

NOTES:

1. ALL EQUIPMENT IS PREFIXED BY SYSTEM MPL NO. G31 UNLESS OTHERWISE NOTED.
2. ALL EQUIPMENT IS NON IE EXCEPT PRIMARY CONTAINMENT ISOLATION VALVES AND CUW INJECTION VALVE.
3. CUW CONTAINMENT ISOLATION VALVE F002 MANUAL CONTROL AND STATUS LIGHTS (IN ADDITION TO BEING MULTIPLEXED) SHALL BE HARDWIRED TO THE MAIN CONTROL ROOM.

SUPPLEMENTAL DOCUMENT UNDER THE FOLLOWING IDENTITIES SHALL BE USED IN CONJUNCTION WITH THIS DRAWING:

	REFERENCE DESIGNATOR
1. CUW SYSTEM P&ID	G31-1010
2. CUW SYSTEM PFD	G31-1020
3. LEAK DETECTION AND ISOLATION SYSTEM IBD	E31-1030
4. FEEDWATER CONTROL SYSTEM IBD	C31-1030

SUPPORTING DOCUMENTS:

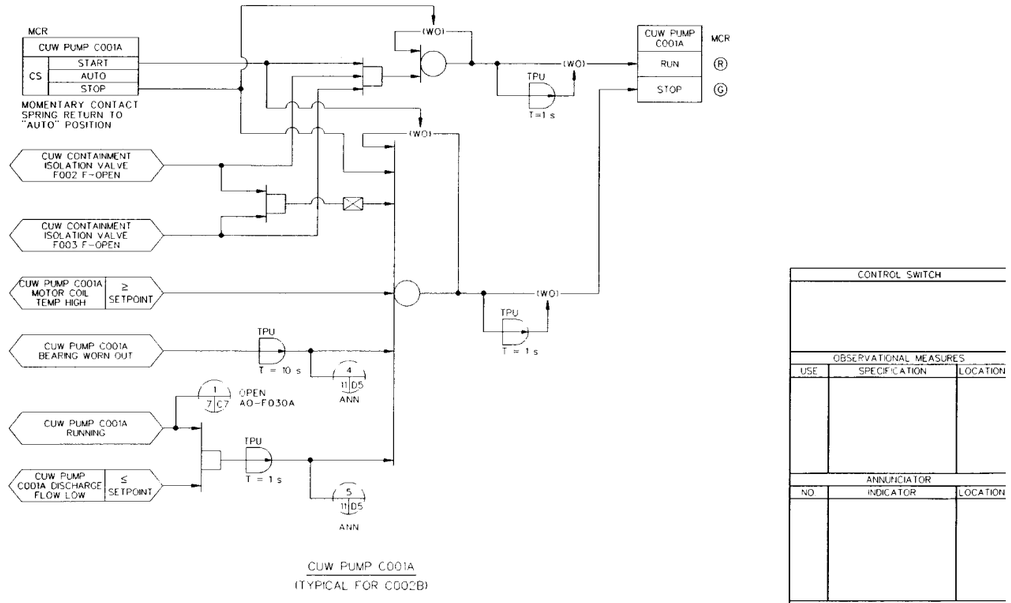
1. 23A5791 – INTERLOCK BLOCK DIAGRAM (IBD) STANDARDS

TABLE OF CONTENTS

MPL NO. G31-1030

TITLE, NOTES AND REFERENCE DOCUMENTS

Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 1 of 11)



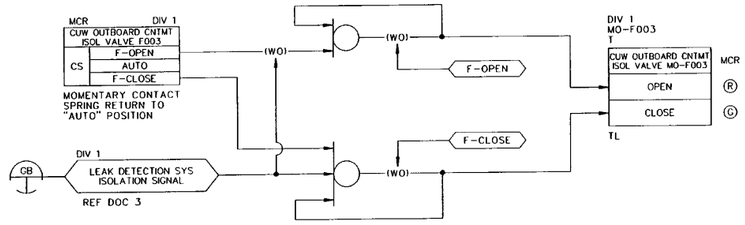
CONTROL SWITCH		

OBSERVATIONAL MEASURES		
USE	SPECIFICATION	LOCATION

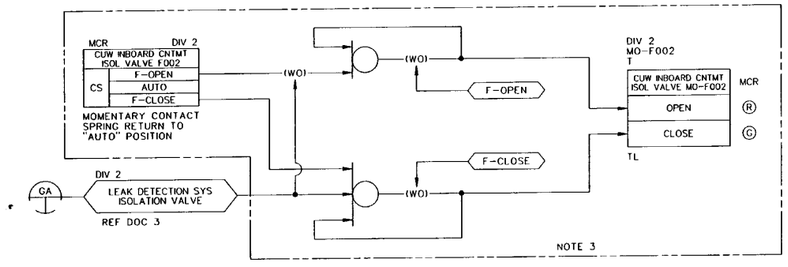
ANNUNCIATOR		
NO	INDICATOR	LOCATION

OTHERS

Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 2 of 11)



CUW OUTBOARD CONTAINMENT ISOLATION VALVE MO-F003



CUW INBOARD CONTAINMENT ISOLATION VALVE MO-F002

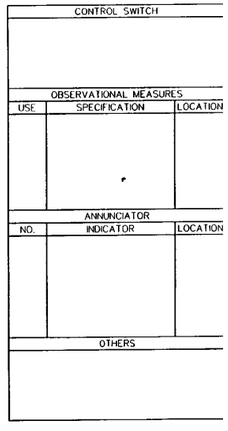
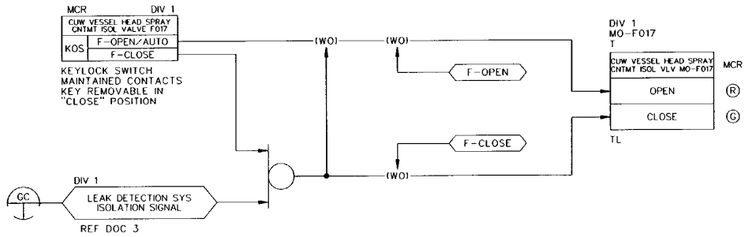
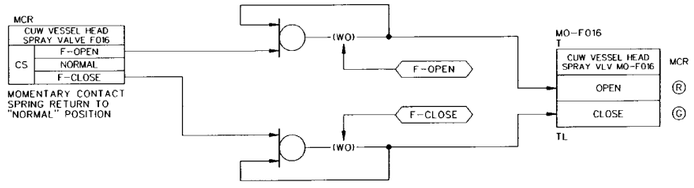


Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 3 of 11)



CUW VESSEL HEAD SPRAY CONTAINMENT ISOLATION VALVE MO-F017



CUW VESSEL HEAD SPRAY VALVE MO-F016

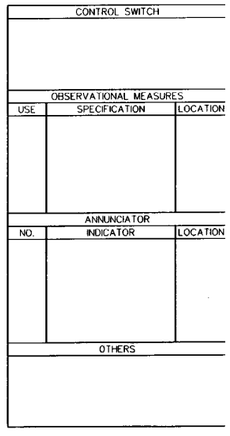
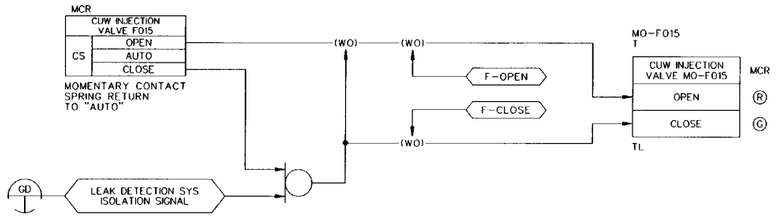
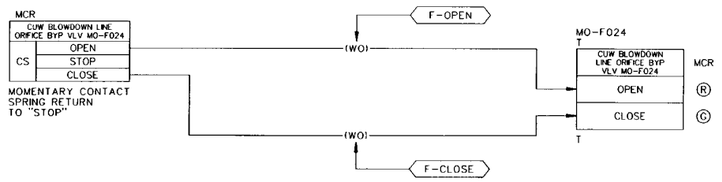


Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 4 of 11)



CUW INJECTION VALVE MO-F015



CUW BLOWDOWN LINE ORIFICE BYPASS VALVE MO-F024

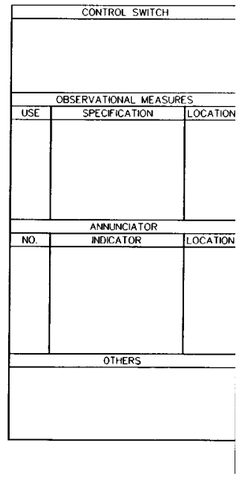
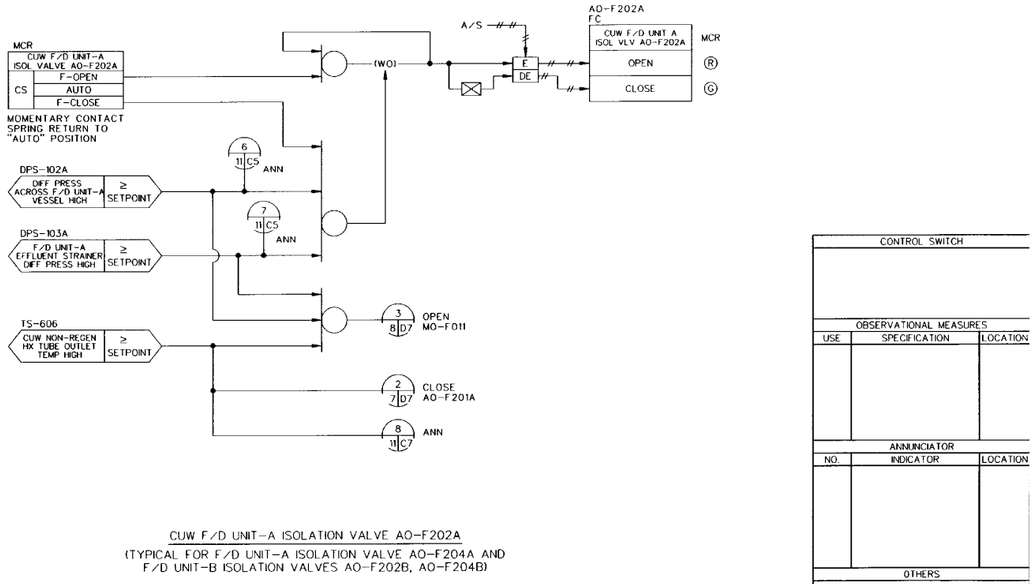


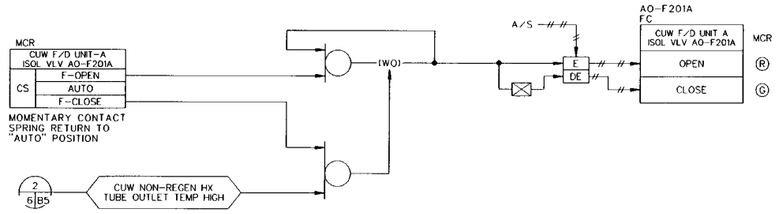
Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 5 of 11)



CUW F/D UNIT-A ISOLATION VALVE AO-F202A

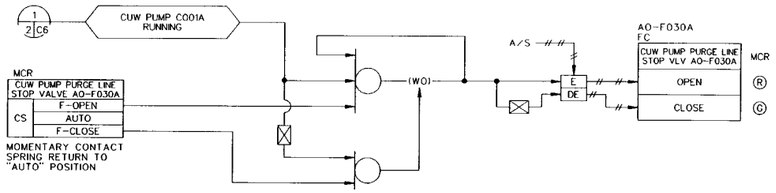
(TYPICAL FOR F/D UNIT-A ISOLATION VALVE AO-F204A AND F/D UNIT-B ISOLATION VALVES AO-F202B, AO-F204B)

Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 6 of 11)



CUW F/D UNIT-A ISOLATION VALVE AO-F201A

(TYPICAL FOR F/D UNIT-A ISOLATION VALVE AO-F205A AND F/D UNIT-B ISOLATION VALVES AO-F201B, AO-F205B)

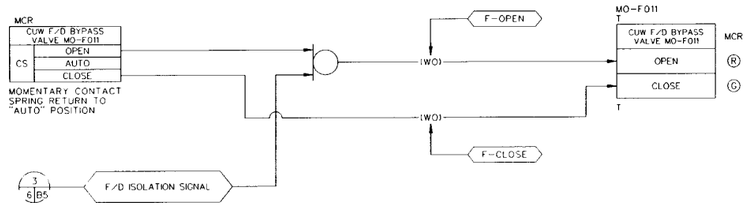


CUW PUMP PURGE LINE STOP VALVE AO-F030A

(TYPICAL FOR AO-F030B)

CONTROL SWITCH		
OBSERVATIONAL MEASURES		
USE	SPECIFICATION	LOCATION
ANNUNCIATOR		
NO.	INDICATOR	LOCATION
OTHERS		

Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 7 of 11)



CUW FILTER DEMIN BYPASS VALVE MO-F011

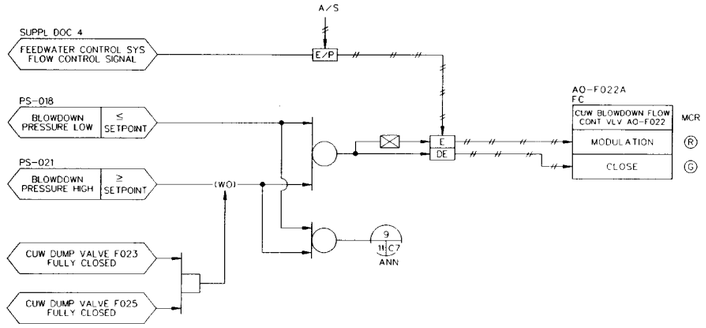
CONTROL SWITCH

OBSERVATIONAL MEASURES		
USE	SPECIFICATION	LOCATION

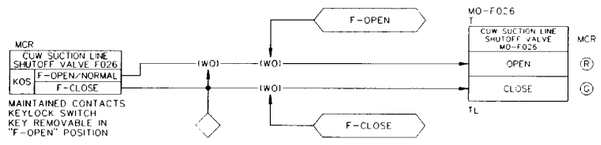
ANNUNCIATOR		
NO.	INDICATOR	LOCATION

OTHERS

Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 8 of 11)



CUW BLOWDOWN FLOW CONTROL VALVE AO-F022



CUW SUCTION LINE SHUTOFF VALVE MO-F026

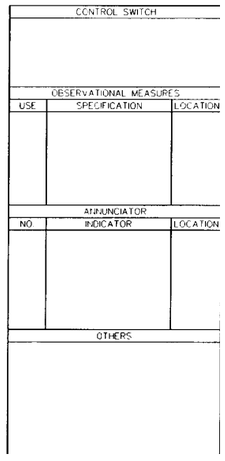
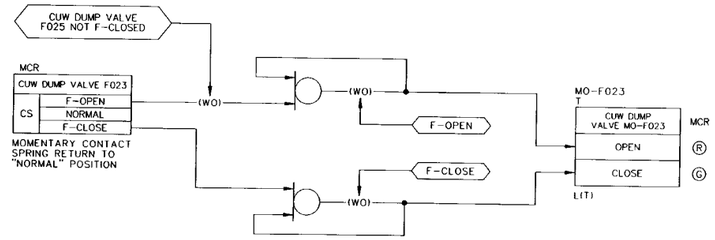
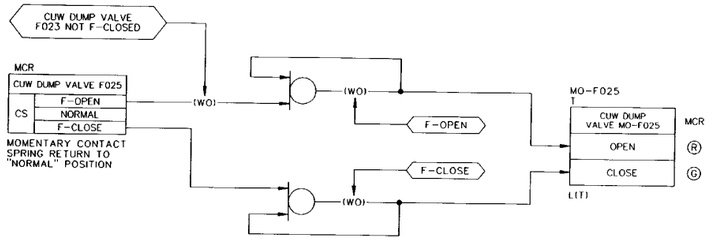


Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 9 of 11)



CUW DUMP VALVE MO-F023



CUW DUMP VALVE MO-F025

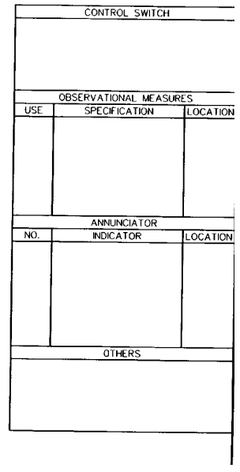
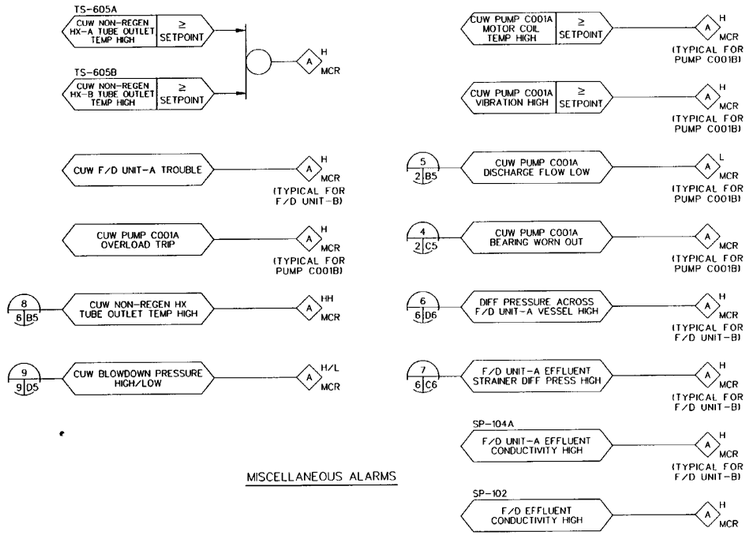


Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 10 of 11)



CONTROL SWITCH		

OBSERVATIONAL MEASURES		
USE	SPECIFICATION	LOCATION

ANNUNCIATOR		
NO.	INDICATOR	LOCATION

OTHERS

Figure 5.4-14 Reactor Water Cleanup System IBD (Sheet 11 of 11)

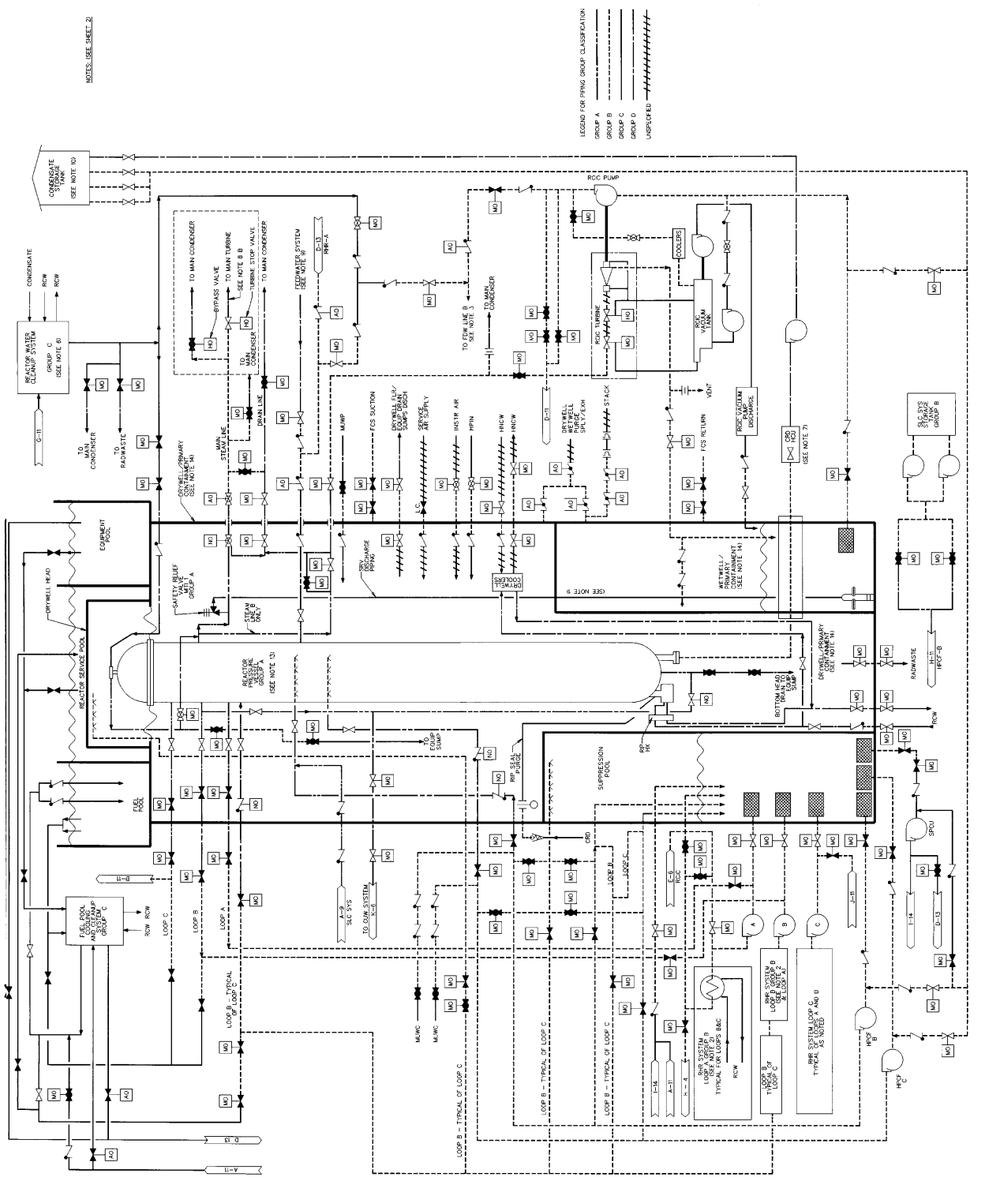


Figure 6.2-38 Group Classification and Containment Isolation Diagram (Sheet 1 of 2)

NOTES.

1. A SEPARATE LINE IS TO BE PROVIDED FOR EACH SAFETY/RELIEF VALVE.

2. RESIDUAL HEAT REMOVAL SYSTEM LOOPS (SUBSYSTEMS) A AND B ONLY ARE REPRESENTED AS TYPICAL LOOPS. LOOP C IS SIMILAR TO LOOP B.

3. RCIC INJECTION VIA FEEDWATER SYSTEM B.

4. TABLE 3.2-1 OF 23A6100 IS CONTROLLING FOR GROUP CLASSIFICATION AND CONTAINMENT ISOLATION REQUIREMENTS. THE PRESSURE INTEGRITY OF NUCLEAR COMPONENTS SPECIFICATION (MPL No. A11-3010) DESCRIBES REQUIREMENTS FOR EACH GROUP CLASSIFICATION. INDIVIDUAL SYSTEMS P&IDS SPECIFY SYSTEM AND COMPONENTS REQUIREMENTS

5. GROUP CLASSIFICATION CHANGES AT VALVE UNLESS OTHERWISE STATED. VALVES SHALL COMPLY TO HIGHEST CLASSIFICATION. INLINE PUMPS SHALL HAVE LINE GROUP CLASSIFICATION.

6. REACTOR WATER CLEANUP SYSTEM

THE FILTER-DEMINERALIZER PRECOAT/BACKWASH PORTION OF THE CUW DOWNSTREAM THE HIGH PRESSURE BLOCK VALVES SHALL BE GROUP D.

7. CONTROL ROD DRIVE-HYDRAULIC CONTROL UNIT

THE PORTION OF THE CRD SYSTEM WHICH IS RELATED TO THE SCRAM FUNCTION IS GROUP B. THE PORTION OF THE CRD SYSTEM WHICH IS NOT RELATED TO THE SCRAM FUNCTION IS GROUP D.

8. MAIN STEAM LINE/TURBINE BYPASS LINE/BRANCH LINES

A. THE MAIN STEAM LINE INSPECTION RECORDS PERTAINING TO THE LINES BETWEEN THE SHUT-OFF VALVE AND TURBINE STOP VALVE SHALL BE MAINTAINED FOR THE LIFE OF THE PLANT. THESE RECORDS SHALL INCLUDE DATA PERTAINING TO QUALIFICATION OF INSPECTION PERSONNEL, EXAMINATION PROCEEDURES, AND EXAMINATION RESULTS.

B. THE MAIN STEAM LINES AND INLINE COMPONENTS UP TO THE TURBINE STOP VALVES SHALL BE GROUP B, BEYOND IS GROUP D

C. BRANCH LINES OF MSL BETWEEN THE EXTERNAL ISOLATION VALVE AND THE TURBINE STOP VALVE SHALL BE GROUP B OUT TO AND INCLUDING THE FIRST VALVE CAPABLE OF TIMELY ACTUATION.

D. BRANCH LINES OF THE TURBINE BYPASS LINE UP TO THE BYPASS VALVE SHALL BE GROUP B OUT TO AND INCLUDING THE FIRST VALVE CAPABLE OF TIMELY ACTUATION.

9. FEEDWATER

BRANCH LINES OF THE FW LINE BETWEEN THE SECOND AND THIRD VALVE OUT TO AND INCLUDING THE FIRST REMOTE ACTUATED VALVE TO BE GROUP B.

10. CONDENSATE STORAGE TANK

THE CONDENSATE STORAGE TANK WILL BE DESIGNED, FABRICATED, AND TESTED TO MEET THE INTENT OF API STANDARD API 650. IN ADDITION, THE SPECIFICATIONS FROM THIS TANK WILL REQUIRE (1) 100 PERCENT SURFACE EXAMINATION OF THE SIDE WALL TO BOTTOM JOINT AND (2) 100 PERCENT VOLUMETRIC EXAMINATION OF THE SIDE WALL WELD JOINTS, GROUP D CLASSIFICATION.

11. PNEUMATIC PIPING, VESSELS & FITTINGS. (FIG III)

PNEUMATIC SYSTEMS ASSOCIATED WITH ACTUATION OF SAFETY RELATED VALVES TO ACCOMPLISH SAFETY FUNCTIONS (E.G. MAIN STEAM SAFETY/RELIEF VALVES) ARE CLASSIFIED GROUP C. THIS CLASSIFICATION IS INTENDED TO APPLY TO COMPONENTS SUCH AS THE AIR PIPING, FITTINGS, AND ACCUMULATOR TANKS. THIS CLASSIFICATION DOES NOT APPLY TO COMPONENTS OF THE SYSTEM SUCH AS AIR CONTROL VALVES, AIR CHECK VALVES, AND CYLINDER (OR DIAPHRAM) AIR ACTUATORS. THESE COMPONENTS ARE CONSIDERED AS "SPECIAL EQUIPMENT" AND ARE SELECTED BASED ON ENGINEERING REVIEWS, OPERATING EXPERIENCE, AND TESTING AS BEING THE MOST SUITABLE FOR THE APPLICATION. SUCH EQUIPMENT IS REQUIRED TO BE QUALIFIED TO DEMONSTRATE OPERABILITY DURING NORMAL AND EMERGENCY AMBIENT CONDITIONS. COMPONENTS NORMALLY FURNISHED WITH THE PROCESS VALVE (E.G. AIR CONTROL VALVES, AIR ACTUATORS) ARE PERFORMANCE TESTED WITH THE VALVE AS PART OF ITS ACCEPTANCE TEST PROCEDURE.

12. INSTRUMENT, SAMPLE & OTHER SMALL LINES (FIG II)

A. VALVE, ORFICE DATA

I VALVES AUTOMATIC, REMOTE OPERABLE, OR EXCESS FLOW CHECK* AUTOMATIC OR MANUAL RESETTING, REMOTE POSITION INDICATION MINIMUM PRACTICAL SPACING FROM CONTAINMENT

II ORFICE/PIPE* SIZED TO LIMIT FLOW PER NRC REGULATORY GUIDE 1.11.

III VALVE: LOCKED CLOSED, AUTOMATIC, OR II ABOVE.

IV VALVE: SAME AS I IF III IS II ; OR LOCKED CLOSED AUTOMATIC (NON-CHECK)

V VALVE-PROCESS SHUTOFF.

VI 6.4mm ORIFICE* LOCATED AS CLOSE AS PRACTICAL TO THE PROCESS TO PERMIT OPTIMUM VENTING OF NON-CONDENSIBLES.

* VALVES AND ORIFICES IN THE LINES SHOULD NOT BE SO RESTRICTIVE AS TO DIMINISH THE SAFETY FUNCTION OF THE LINE.

B. GROUP CLASSIFICATION OF SMALL DIAMETER LINES.

PROCESS SYSTEM TO WHICH ALL LINES ARE CONNECTED-GROUP CLASSIFICATION	GROUP CLASSIFICATION OF LINES UP TO AND THRU ROOT OR ISOLATION VALVES		CLASSIFICATION OF LINES BEYOND ROOT OR ISOLATION VALVES	
	LINES OVER 25A: WATER 50A: STEAM	LINES 25A: WATER 50A: STEAM AND SMALLER	SAFETY RELATED SYSTEMS (2)	NON-SAFETY RELATED SYSTEMS
A	A	B (1)	B	D
B	B	B	B	D
C	C (2)	C (2)	C	D
D	D (2)	D (2)	N/A	D

(1) GROUP CLASSIFICATION AND CODE REQUIREMENTS ARE BASED ON CURRENT NRC GUIDELINES; HOWEVER, EACH PROJECT SHALL VERIFY WITH STATE JURISDICTIONAL AUTHORITIES TO AVOID MISUNDERSTANDINGS AND POSSIBLE RETROFITS.

(2) SAFETY RELATED SYSTEMS ARE THOSE SYSTEMS WHOSE ACTIONS ARE ESSENTIAL TO BOTH OF THE FOLLOWING:

A. AVOIDING THE UNACCEPTABLE RESULTS FOR ABNORMAL OPERATIONAL TRANSIENTS, ACCIDENTS, AND SPECIAL EVENTS BY CONTRIBUTING TO THE ACCOMPLISHMENT OF ESSENTIAL SAFETY ACTIONS.

B. SATISFYING THE SINGLE FAILURE CRITERION (WHERE APPLICABLE).

13. THE REACTOR COOLANT PRESSURE BOUNDARY INCLUDES THE REACTOR VESSEL AND CONNECTING PIPING, PUMPS AND VALVES, AND EXTENDS TO AND INCLUDES THE OUTERMOST PRIMARY CONTAINMENT ISOLATION VALVE(S) OF THE SYSTEM OR COMPONENT INDICATED

14. THE CONTAINMENT IS DESIGNED AND CONSTRUCTED TO THE REQUIREMENTS OF THE ASME CODE FOR REINFORCED CONCRETE CONTAINMENT COMPONENTS WHICH FORM AN EXTENSION OF CONTAINMENT ARE DEFINED AS PRESSURE-RETAINING COMPONENTS, PARTS, MATERIALS OR APPURTENANCES IN THE PORTION OF THE SYSTEM WHICH EXTENDS FROM THE CONTAINMENT TO AND INCLUDING THE OUTERMOST ISOLATION VALVE LOCATED OUTSIDE OF THE CONTAINMENT WHICH IS CAPABLE OF AUTOMATIC ACTUATION GROUP B.

FIG II

INSTRUMENTATION SAMPLE, & OTHER SMALL LINES (SEE NOTE 12)
TYPICAL

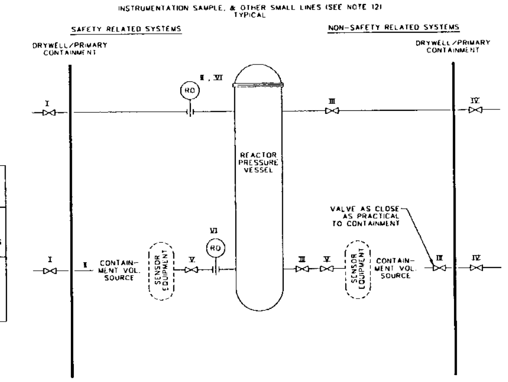


FIG III

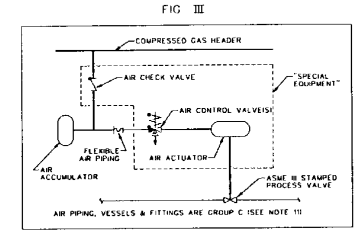
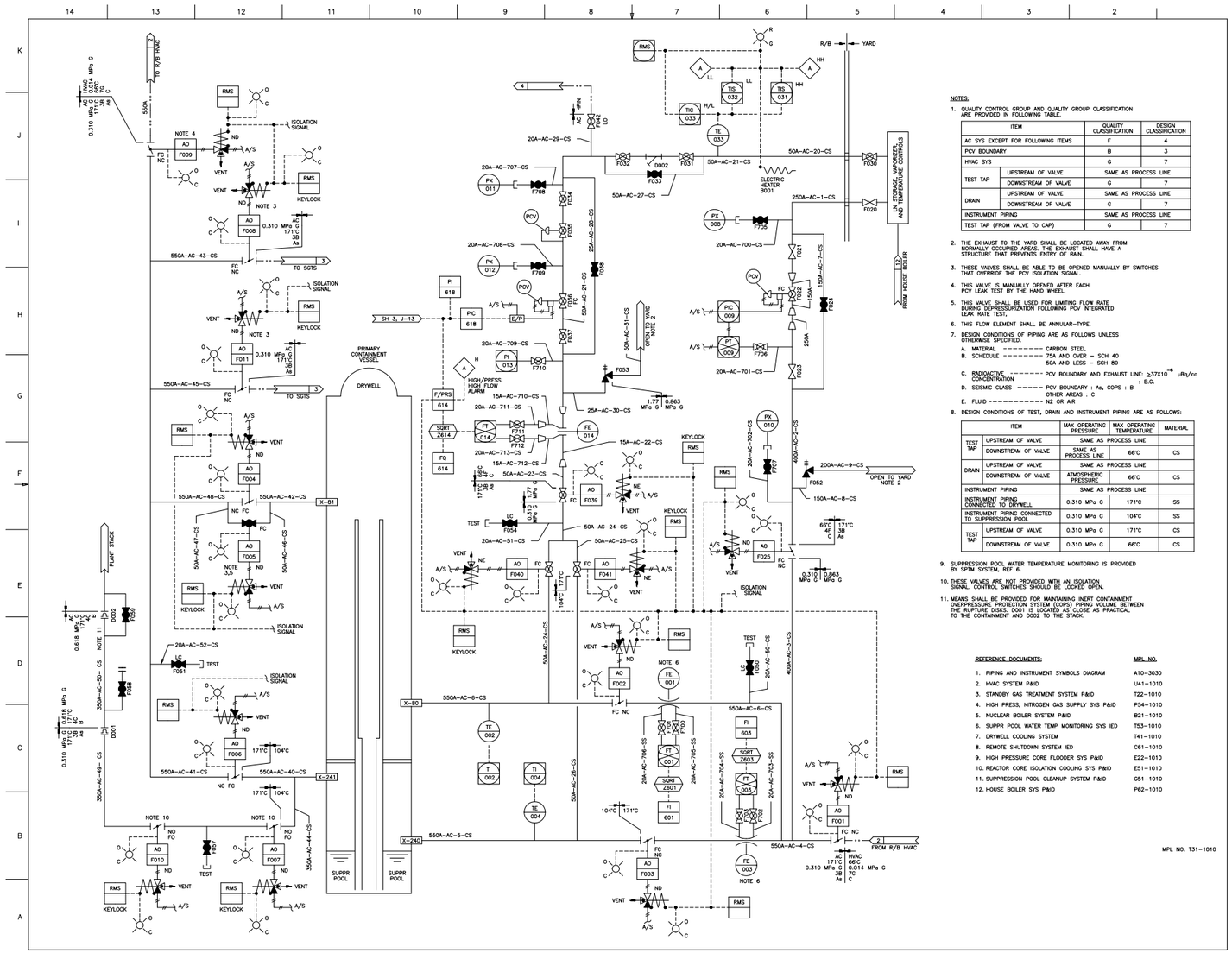


Figure 6.2-38 Group Classification and Containment Isolation Diagram (Sheet 2 of 2)



NOTES:

1. QUALITY CONTROL GROUP AND QUALITY GROUP CLASSIFICATION ARE PROVIDED IN FOLLOWING TABLE.

ITEM		QUALITY CLASSIFICATION	DESIGN CLASSIFICATION
AC SYS EXCEPT FOR FOLLOWING ITEMS		F	4
PCV BOUNDARY		B	3
HVAC SYS		G	7
TEST TAP	UPSTREAM OF VALVE	SAME AS PROCESS LINE	
	DOWNSTREAM OF VALVE	G	7
DRAIN	UPSTREAM OF VALVE	SAME AS PROCESS LINE	
	DOWNSTREAM OF VALVE	G	7
INSTRUMENT PIPING		SAME AS PROCESS LINE	
TEST TAP (FROM VALVE TO CAP)		G	7

2. THE EXHAUST TO THE YARD SHALL BE LOCATED AWAY FROM NORMALLY OCCUPIED AREAS. THE EXHAUST SHALL HAVE A STRUCTURE THAT PREVENTS ENTRY OF RAIN.
3. THESE VALVES SHALL BE ABLE TO BE OPENED MANUALLY BY SWITCHES THAT OVERRIDE THE PCV ISOLATION SIGNAL.
4. THIS VALVE IS MANUALLY OPENED AFTER EACH PCV LEAK TEST BY THE HAND WHEEL.
5. THIS VALVE SHALL BE USED FOR LIMITING FLOW RATE DURING DEPRESSURIZATION FOLLOWING PCV INTEGRATED LEAK RATE TEST.
6. THIS FLOW ELEMENT SHALL BE ANNULAR-TYPE.
7. DESIGN CONDITIONS OF PIPING ARE AS FOLLOWS UNLESS OTHERWISE SPECIFIED.
   A. MATERIAL ---------- CARBON STEEL
   B. SCHEDULE ---------- 75A AND OVER – SCH 40
      50A AND LESS – SCH 80
   C. RADIOACTIVE CONCENTRATION ---------- PCV BOUNDARY AND EXHAUST LINE: $\geq 3.7 \times 10^{-4}$ μBq/cc B.G.
   D. SEISMIC CLASS ------ PCV BOUNDARY : As, COPS : B
      OTHER AREAS : C
   E. FLUID ---------- N2 OR AIR
8. DESIGN CONDITIONS OF TEST, DRAIN AND INSTRUMENT PIPING ARE AS FOLLOWS:

ITEM		MAX OPERATING PRESSURE	MAX OPERATING TEMPERATURE	MATERIAL
TEST TAP	UPSTREAM OF VALVE	SAME AS PROCESS LINE		
	DOWNSTREAM OF VALVE	SAME AS PROCESS LINE	66°C	CS
DRAIN	UPSTREAM OF VALVE	SAME AS PROCESS LINE		
	DOWNSTREAM OF VALVE	ATMOSPHERIC PRESSURE	66°C	CS
INSTRUMENT PIPING		SAME AS PROCESS LINE		
INSTRUMENT PIPING CONNECTED TO DRYWELL		0.310 MPa G	171°C	SS
INSTRUMENT PIPING CONNECTED TO SUPPRESSION POOL		0.310 MPa G	104°C	SS
TEST TAP	UPSTREAM OF VALVE	0.310 MPa G	171°C	CS
	DOWNSTREAM OF VALVE	0.310 MPa G	66°C	CS

9. SUPPRESSION POOL WATER TEMPERATURE MONITORING IS PROVIDED BY SPTM SYSTEM, REF 6.
10. THESE VALVES ARE NOT PROVIDED WITH AN ISOLATION SIGNAL CONTROL SWITCHES SHOULD BE LOCKED OPEN.
11. MEANS SHALL BE PROVIDED FOR MAINTAINING INERT CONTAINMENT OVERPRESSURE PROTECTION SYSTEM (COPS) PIPING VOLUME BETWEEN THE RUPTURE DISKS, D001 IS LOCATED AS CLOSE AS PRACTICAL TO THE CONTAINMENT AND D002 TO THE STACK.

REFERENCE DOCUMENTS:

	MPL NO.
1. PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2. HVAC SYSTEM P&ID	U41-1010
3. STANDBY GAS TREATMENT SYSTEM P&ID	T22-1010
4. HIGH PRESS. NITROGEN GAS SUPPLY SYS P&ID	P54-1010
5. NUCLEAR BOILER SYSTEM P&ID	B21-1010
6. SUPPR POOL WATER TEMP MONITORING SYS IED	T53-1010
7. DRYWELL COOLING SYSTEM	T41-1010
8. REMOTE SHUTDOWN SYSTEM IED	C61-1010
9. HIGH PRESSURE CORE FLOODER SYS P&ID	E22-1010
10. REACTOR CORE ISOLATION COOLING SYS P&ID	E51-1010
11. SUPPRESSION POOL CLEANUP SYSTEM P&ID	G51-1010
12. HOUSE BOILER SYS P&ID	P62-1010

MPL NO. T31-1010

Figure 6.2-39 Atmospheric Control System P&ID (Sheet 1 of 3)

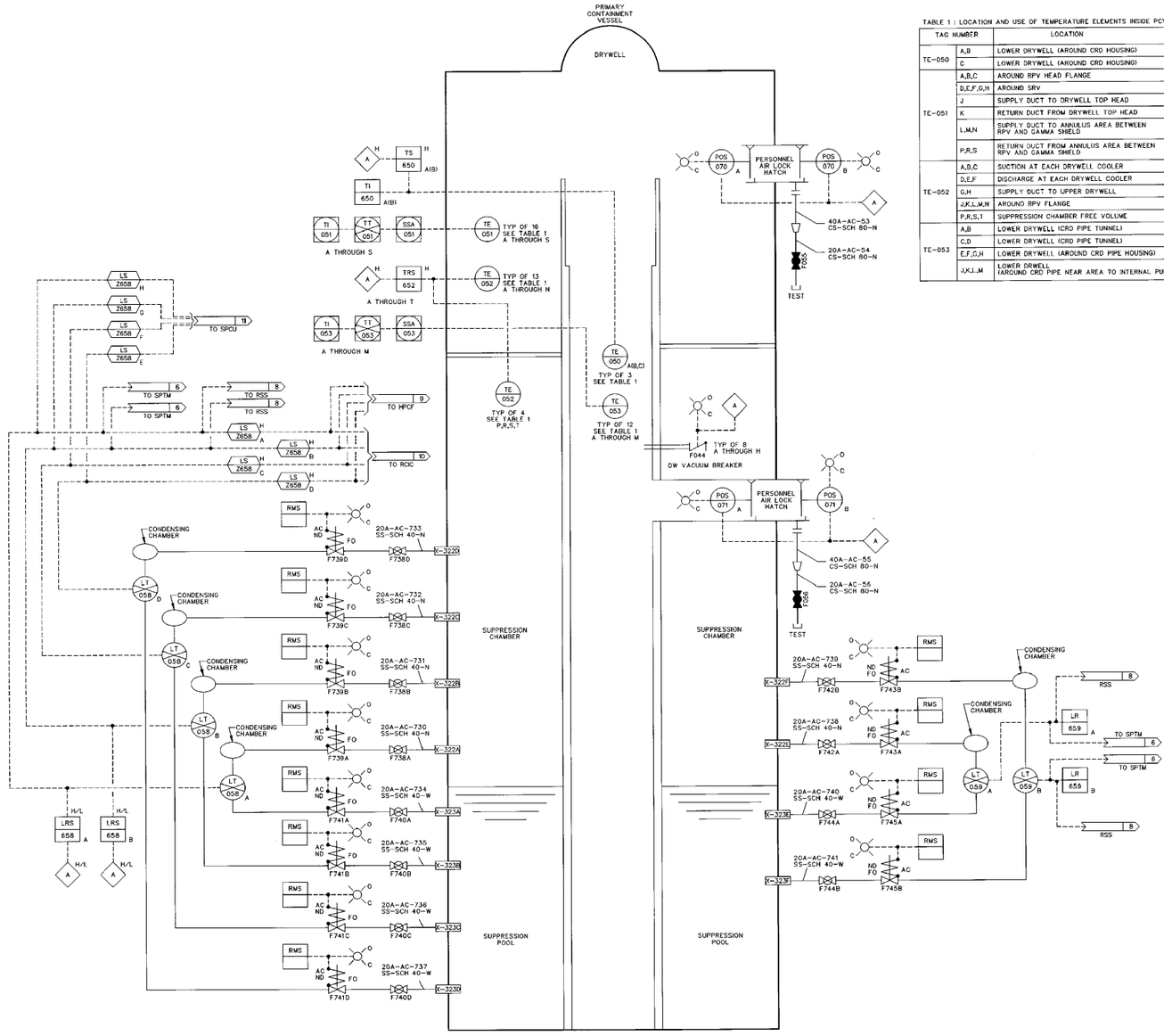


TABLE 1 : LOCATION AND USE OF TEMPERATURE ELEMENTS INSIDE PCV

TAG NUMBER		LOCATION	USE
TE-050	A,B	LOWER DRYWELL (AROUND CRD HOUSING)	INDICATION & ALARM
	C	LOWER DRYWELL (AROUND CRD HOUSING)	RESERVE
TE-051	A,B,C	AROUND RPV HEAD FLANGE	INDICATION
	D,E,F,G,H	AROUND SRV	INDICATION
	J	SUPPLY DUCT TO DRYWELL TOP HEAD	INDICATION
	K	RETURN DUCT FROM DRYWELL TOP HEAD	INDICATION
	L,M,N	SUPPLY DUCT TO ANNULUS AREA BETWEEN RPV AND GAMMA SHIELD	INDICATION
	P,R,S	RETURN DUCT FROM ANNULUS AREA BETWEEN RPV AND GAMMA SHIELD	INDICATION
TE-052	A,B,C	SUCTION AT EACH DRYWELL COOLER	RECORD & ALARM
	D,E,F	DISCHARGE AT EACH DRYWELL COOLER	RECORD & ALARM
	G,H	SUPPLY DUCT TO UPPER DRYWELL	RECORD & ALARM
	J,K,L,M,N	AROUND RPV FLANGE	RECORD & ALARM
	P,R,S,T	SUPPRESSION CHAMBER FREE VOLUME	RECORD & ALARM
TE-053	A,B	LOWER DRYWELL (CRD PIPE TUNNEL)	INDICATION
	C,D	LOWER DRYWELL (CRD PIPE TUNNEL)	INDICATION
	E,F,G,H	LOWER DRYWELL (AROUND CRD PIPE HOUSING)	INDICATION
	J,K,L,M	LOWER DRWELL (AROUND CRD PIPE NEAR AREA TO INTERNAL PUMP)	INDICATION

Figure 6.2-39 Atmospheric Control System P&ID (Sheet 2 of 3)

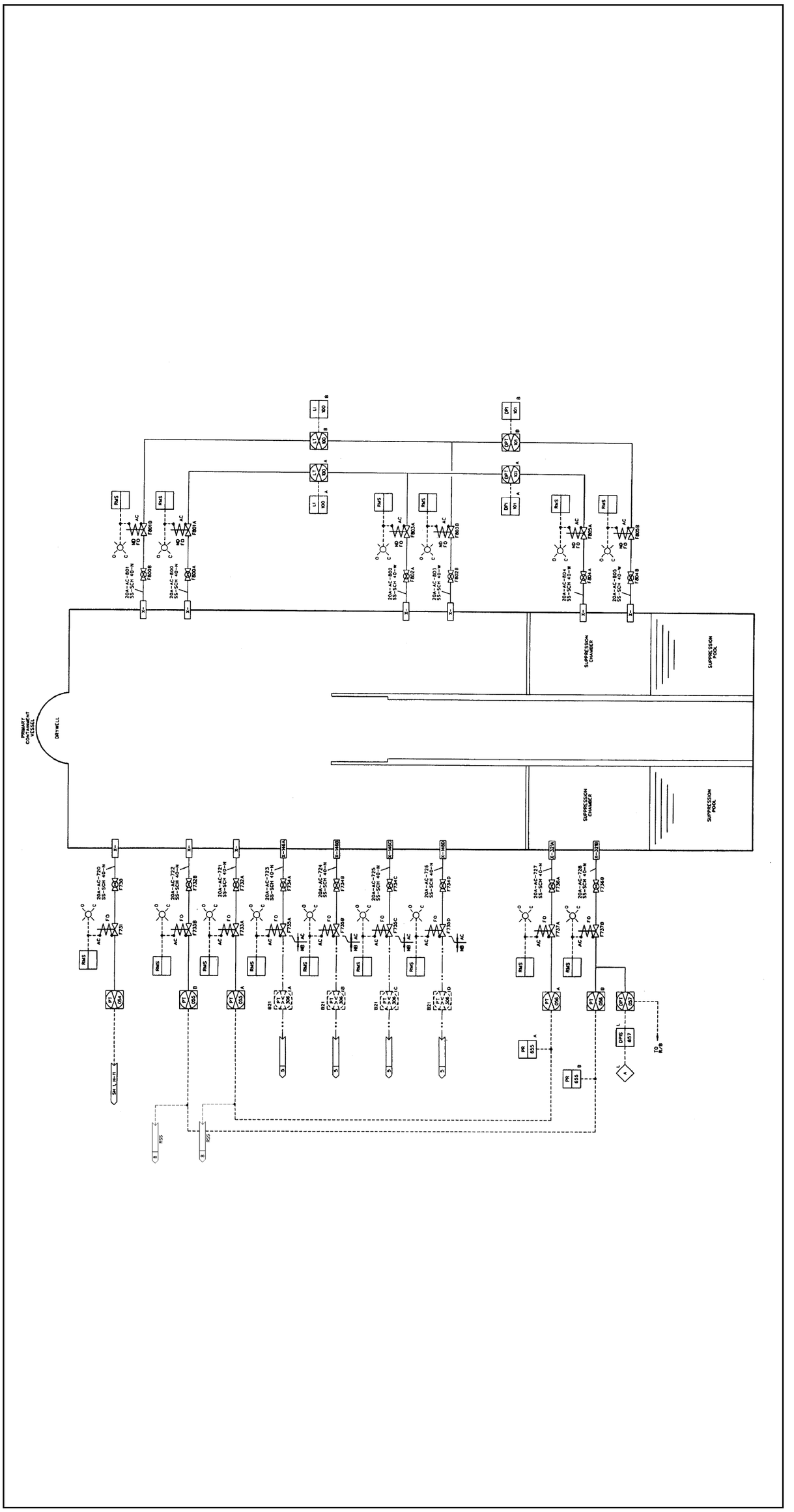
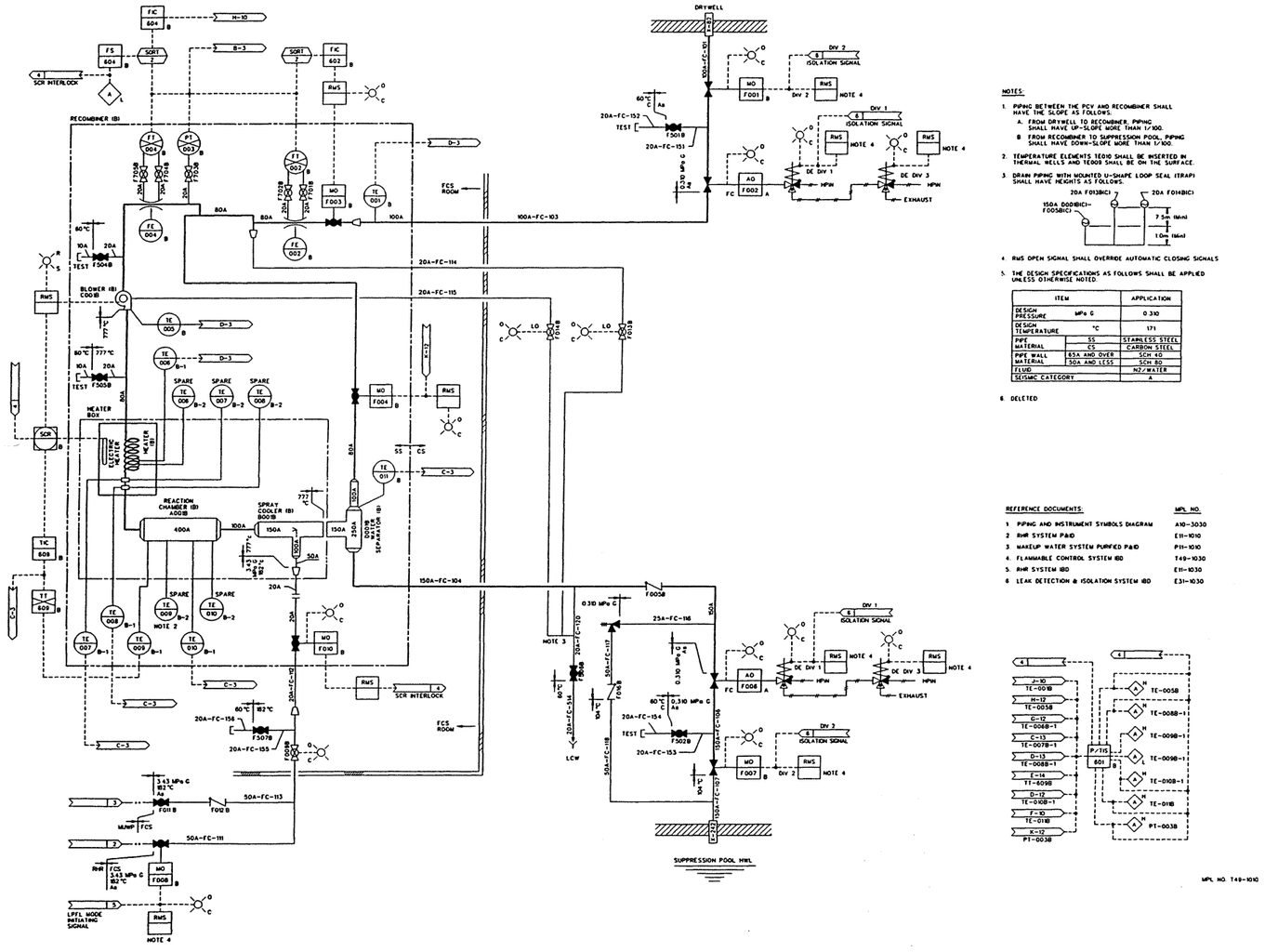


Figure 6.2-39 Atmospheric Control System P&ID (Sheet 3 of 3)



NOTES:

1. PIPING BETWEEN THE PCV AND RECOMBINER SHALL HAVE THE SLOPE AS FOLLOWS.
   - A. FROM DRYWELL TO RECOMBINER, PIPING SHALL HAVE UP-SLOPE MORE THAN 1/100.
   - B. FROM RECOMBINER TO SUPPRESSION POOL, PIPING SHALL HAVE DOWN-SLOPE MORE THAN 1/100.
2. TEMPERATURE ELEMENTS TE010 SHALL BE INSERTED IN THERMAL WELLS AND TE009 SHALL BE ON THE SURFACE.
3. DRAIN PIPING WITH MOUNTED U-SHAPE LOOP SEAL (TRAP) SHALL HAVE HEIGHTS AS FOLLOWS.

4. RWS OPEN SIGNAL SHALL OVERRIDE AUTOMATIC CLOSING SIGNALS
5. THE DESIGN SPECIFICATIONS AS FOLLOWS SHALL BE APPLIED UNLESS OTHERWISE NOTED.

ITEM		APPLICATION
DESIGN PRESSURE	MPa G	0.310
DESIGN TEMPERATURE	°C	171
PIPE MATERIAL	SS	STAINLESS STEEL
	CS	CARBON STEEL
PIPE WALL MATERIAL	65A AND OVER	SCH 40
	50A AND LESS	SCH 80
FLUID		N2/WATER
SEISMIC CATEGORY		A

6. DELETED

REFERENCE DOCUMENTS:

	MFL NO.
1. PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2. RHR SYSTEM P&ID	E11-1010
3. MAKEUP WATER SYSTEM PURIFIED P&ID	P11-1010
4. FLAMMABLE CONTROL SYSTEM IBD	T49-1030
5. RHR SYSTEM IBD	E11-1030
6. LEAK DETECTION & ISOLATION SYSTEM IBD	E31-1030

MFL NO. T49-1010

Figure 6.2-40 Flammability Control System P&ID (Sheet 1 of 2)

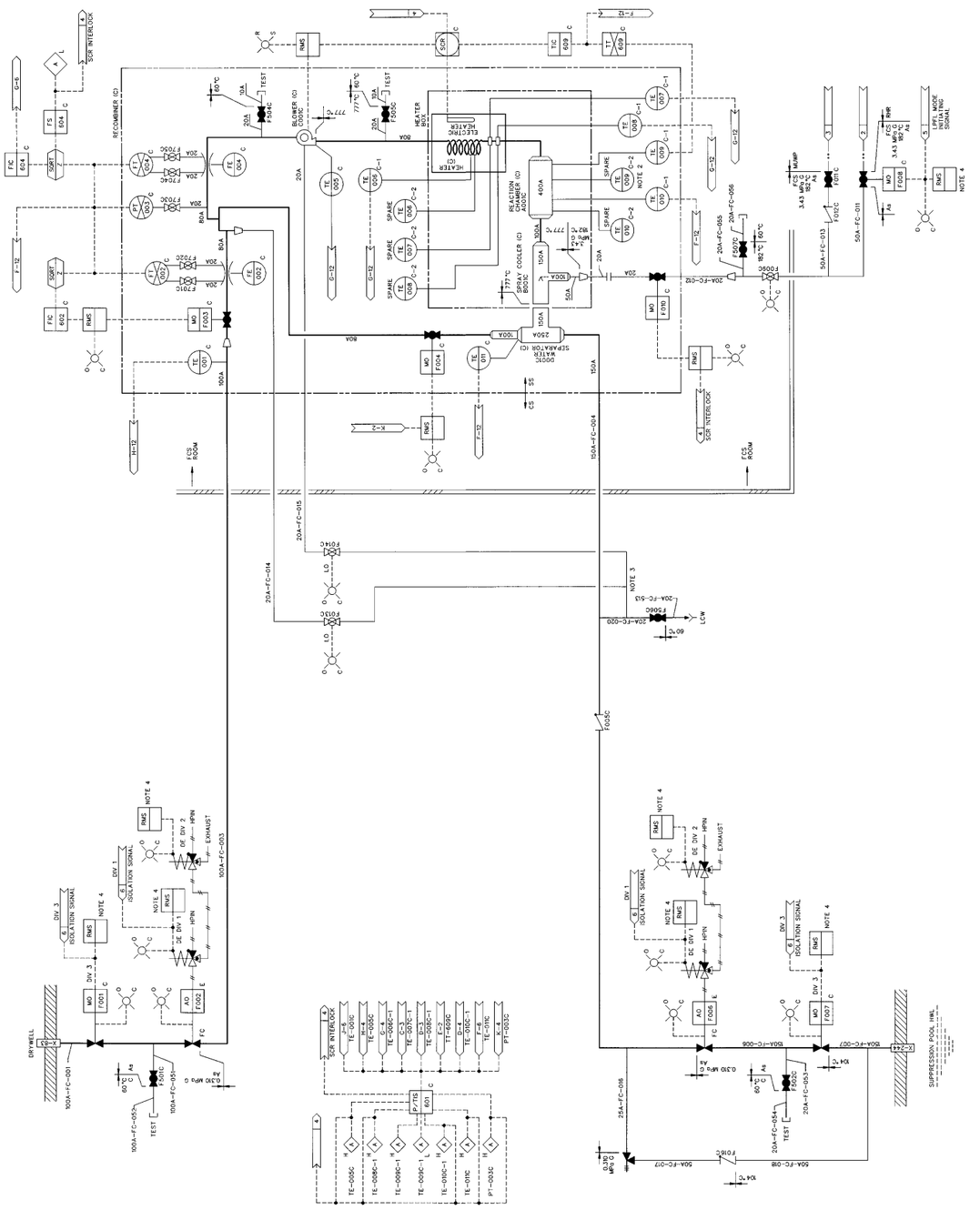
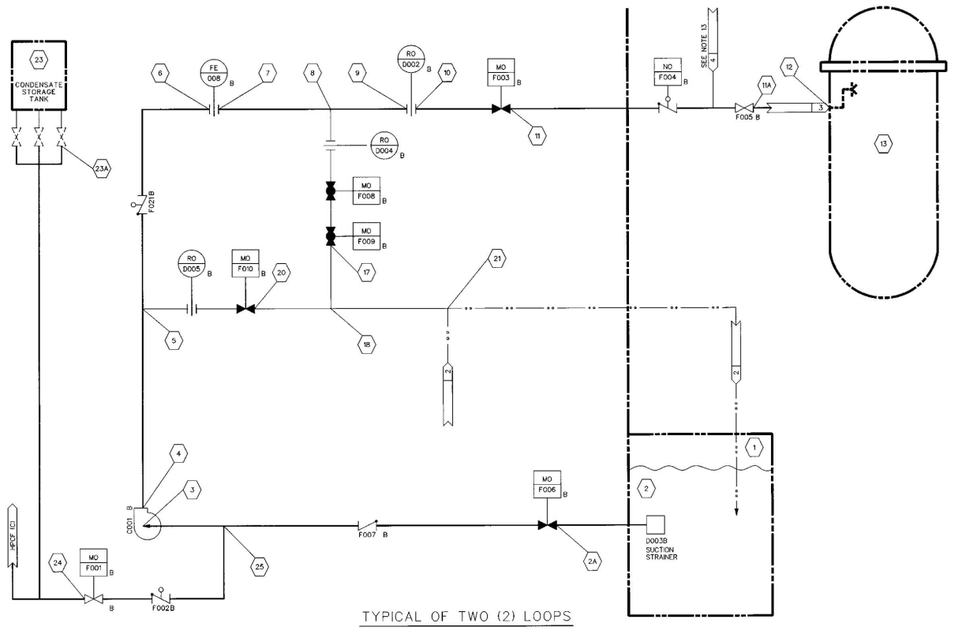


Figure 6.2-40 Flammability Control System P&ID (Sheet 2 of 2)



NOTES:

1. STANDBY LIQUID CONTROL (C41) DISCHARGES INTO CORE FLOODER LOOP B, BUT DOES NOT AFFECT SYSTEM PIPING DESIGN FOR THAT LOOP.
2. EMPTY DATA BLANKS ARE TO BE PROVIDED BY THE PIPING DESIGNER. ☐ INDICATES MAXIMUM AND MINIMUM VALUES OF THAT PARAMETER.
3. MAXIMUM ELEVATION DIFFERENCE BETWEEN THE MINIMUM SUPPRESSION POOL LEVEL AND THE CORE COOLING LOOP VESSEL NOZZLES, IS 20.1 METERS.
4. IN MODE "C" THE NPSH AVAILABLE AT 1 METER ABOVE THE PUMP FLOOR SHALL MEET OR EXCEED 2.2 METERS WITH SUCTION STRAINERS HEAD LOSS AT THE DESIGN VALUE.
5. THE PRESSURE DIFFERENCE BETWEEN POINTS 9 AND 10 SHALL BE ADJUSTED DURING PREOPERATIONAL TESTING, SO THAT:
   (A) THE FLOW SPECIFIED FOR MODE "B" IS EQUALED OR EXCEEDED AT THE REACTOR PRESSURE SPECIFIED.
   (B) THE NPSH AVAILABLE TO THE HPCF PUMPS IN MODE "C" IS NOT LESS THAN SPECIFIED IN NOTE 4.
   (C) THE PUMP VENDOR-ALLOWABLE RUNOUT FLOW IS NOT EXCEEDED.
   (D) THE RUNOUT FLOW DOES NOT EXCEED VENDOR TESTED FLOW.
6. BYPASS FLOW SPECIFIED IN MODE "E" IS APPROXIMATE; IF THE PUMP VENDOR REQUIRES MINIMUM FLOW GREATER THAN THAT SHOWN, THE PUMP REQUIREMENTS FOR MODE "A" MUST BE RE-EXAMINED.
7. THIS TABLE IS FOR REFERENCE ONLY; SEE REFERENCE DOC 1 FOR REQUIRED VALUES.
8. TABLE 1 INDICATES VALVE POSITION DURING VARIOUS OPERATING MODES.
9. FOR MODE B, POINTS 1~12, 77/10°C OCCURS FOR A SHORT DURATION TIME AFTER LOCA.
10. MODE D REFLECTS SYSTEM TEST CONDITIONS FOR THE RATED CONDITION AND HIGH PRESSURE/LOW FLOW CONDITION. THE RUNOUT FLOW CONDITION SHOULD BE USED FOR DESIGN OF THE FLOW TEST LOOP.
11. VALVE E22-F003B & C AUTOMATICALLY OPENS ON REACTOR WATER LOW LEVEL AND CLOSES ON HIGH LEVEL.
12. INTERCONNECTIONS BETWEEN THE HIGH PRESSURE CORE FLOODER SYSTEM AND THE RHR SYSTEM ARE FROM HPCF LOOP "B" TO RHR "B", ETC.
13. THIS CONNECTION IS ON LOOP "B" ONLY.
14. NPSH AVAILABLE FROM THE CONDENSATE TANK SOURCE MUST EQUAL OR EXCEED NPSH REQUIRED IN NOTE 4.
15. POSITIONS 23, 24, AND 25 APPLY WHEN SUCTION IS TAKEN FROM CST.
16. PREFERRED INITIAL SUCTION SOURCE IS CONDENSATE STORAGE TANK.
17. 1.25 METERS SUCTION LINE LOSS FROM SUPPRESSION POOL TO PUMP SUCTION.
18. REQUIRED TOTAL DYNAMIC HEAD.

SUPPLEMENTAL DOCUMENTS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING:

	MPL NO.
1. HIGH PRESSURE CORE FLOODER SYS P&ID	E22-1010
2. RESIDUAL HEAT REMOVAL SYS PFD	E11-1020
3. REACTOR PRESSURE VESSEL SYSTEM	B11-4011
4. STANDBY LIQUID CONTROL SYS PFD	C41-1020

SUPPORTING DOCUMENTS:

	MPL NO.
1. PIPING & INSTRUMENT DIAGRAM SYMBOLS	A10-3030

MPL NO. E22-1020

Figure 6.3-1 High Pressure Core Flooder System PFD (Sheet 1 of 2)

MODE "A" ACCIDENT, REACTOR AT HIGH PRESSURE (LOOP B OR C) SEE NOTE 15

POSITION ◯	1	2	3	4	5	6	7	8	12	13	23	24	25
FLOW m^3/h	N/A	182	◄					►	182	N/A	182	182	182
TEMP °C	49/10	◄						►	49/10		40/10	40/10	40/10
PRESS MPa A	0.10									8.22	0.10		
Max PRESS DIFF-METERS				890 NOTE 18									

MODE "B" ACCIDENT, INJECTION AT RATED FLOW RATE (LOOP B OR C) SEE NOTE 15 AND 9

POSITION ◯	1	2	3	4	5	6	7	8	12	13	23	24	25
FLOW m^3/h	N/A	727	◄					►	727	N/A	727	727	727
TEMP °C	100/10	◄						►	100/10		40/10	40/10	40/10
PRESS MPa A	0.10									0.79	0.10		
Max PRESS DIFF-METERS				190 NOTE 18		6.1			50				

MODE "C" ACCIDENT, PUMP OPERATING AT RUNOUT (LOOP B OR C) SEE NOTE 15

POSITION ◯	1	2	3	4	5	6	7	8	12	13	23	24	25
FLOW m^3/h	N/A	890	◄					►	890	N/A	890	890	890
TEMP °C	100/10	◄						►	100/10		40/10	40/10	40/10
PRESS MPa A	0.10									0.10	0.10		
Max PRESS DIFF-METERS	NOTE 17		~150 NOTE 18										

MODE "D" SYSTEM TEST TO SUPPRESSION POOL (LOOP B OR C) SEE NOTE 15 AND 10

POSITION ◯	1	2	3	4	5	6	7	8	18	21	23	24	25
FLOW m^3/h	N/A	727/182	◄					►	727/182	727/182	727/182	727/182	727/182
TEMP °C	35/10	◄						►	35/10	35/10	40/10	40/10	40/10
PRESS MPa A	0.10										0.10		
Max PRESS DIFF-METERS			~190/890 NOTE 18										

MODE "F" SYSTEM TEST TO REACTOR VESSEL (LOOP B OR C) SEE NOTE 15

POSITION ◯	1	2	3	4	5	6	7	8	12	13	23	24	25
FLOW m^3/h	N/A	890	◄					►	890	N/A	890	890	890
TEMP °C	35/10	◄						►	35/10		40/10	40/10	40/10
PRESS MPa A	0.10									0.10	0.10		
Max PRESS DIFF-METERS			~150 NOTE 18										

MODE "E" PUMP OPERATING ON BYPASS SEE NOTE 15 AND 6

POSITION ◯	1	2	3	4	5	20	18	1	23	24	25
FLOW m^3/h	N/A	73	◄				►	73	N/A	73	73	73
TEMP °C	100/10	◄					►	100/10	40/10	40/10	40/10
PRESS MPa A									0.10		
Max PRESS DIFF-METERS				950 NOTE 18							

MODE "S" – STANDBY

POSITION ◯	23	24	25	3	4	6	8	11	13
FLOW m^3/h	0	◄					►	0	N/A
TEMP °C	40/10	◄					►	40/10	285
PRESS MPa A	0.10	0.10	1.47	◄			►	1.47	~7.17

MISCELLANEOUS INFORMATION (SEE NOTE 7)

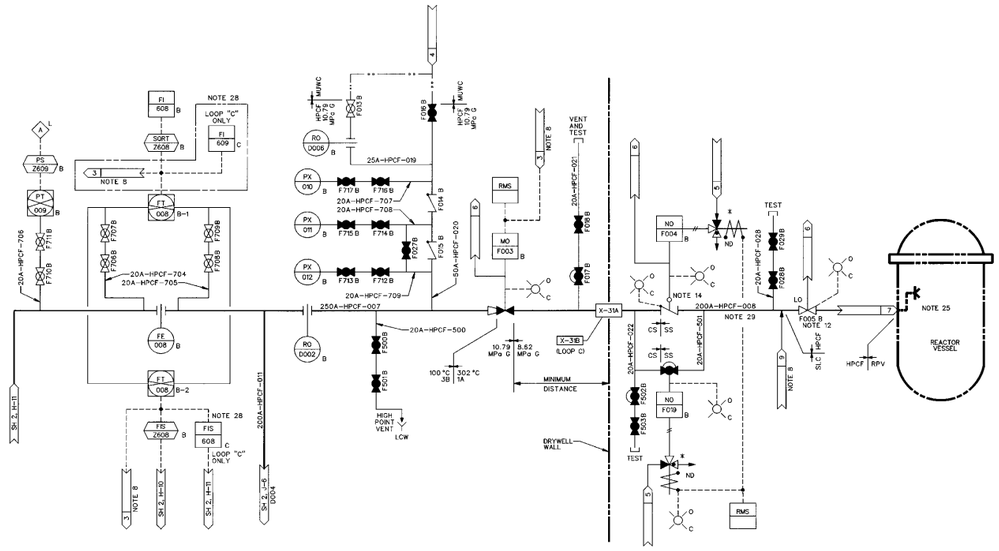
	2	2A	3	4	6	11	11A	12	5	20	18	8	17	18	21	23A	24	25
DESIGN TEMP °C	104	100	100	100	100	302	302		100	104		100	104	104	66	66	100	
DESIGN PRESS MPa A	0.31	2.82	10.79	10.79	10.79	8.62	8.62		10.79	0.31		10.79	0.31	0.31	1.37	2.82	2.82	
EST. LINE SIZE	400A	400A	250A	250A	250A	200A			80A	80A		200A	200A	200A		400A	400A	
LINE	SUCTION		DISCHARGE			DRYWELL			Min FLOW	Min FLOW		TEST	TEST	TEST		SUCTION		

TABLE 1 VALVE POSITION TABLE

VALVE	F006B,C	F016B,C	F038B,C	F008B,C	F063B,C	F039B,C	F009B,C	COMMENT
MODE "A"	C/O	C	C	C	O	O	O/C	NOTE 11
MODE "B"	C/O	C	C	C	O	O	O/C	NOTE 11
MODE "C"	C/O	C	C	C	O	O	O/C	NOTE 11
MODE "D"	C/O	C	T	T	C	O	O/C	NOTE 15
MODE "E"	C/O	O	C	C	C	O	O/C	NOTE 6
MODE "F"	C/O	C	C	C	O	O	O/C	NOTE 16
MODE "S"	C	C	C	C	C	O	O	

O – OPEN; C – CLOSED; T – THROTTLED

Figure 6.3-1 High Pressure Core Flooder System PFD (Sheet 2 of 2)



SUPPLEMENTAL DOCUMENTS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING.

	MPL NO.
1. REACTOR BUILDING COOLING WATER SYSTEM P&ID	P21–1010
2. NUCLEAR BOILER SYSTEM IBD	B21–1030
3. REMOTE SHUTDOWN SYSTEM IED	C61–1040
4. MAKE–UP WATER SYSTEM (CONDENSATE) P&ID	P13–1010
5. HIGH PRESSURE NITROGEN SUPPLY SYSTEM P&ID	P54–1010
6. VALVE GLAND LEAKAGE TREATMENT, RADWASTE SYS P&ID	K17–1010
7. REACTOR PRESSURE VESSEL SYSTEM	B11–4011
8. HIGH CONDUCTIVITY WASTE SYSTEM P&ID	K13–1010
9. STANDBY LIQUID CONTROL SYSTEM P&ID	C41–1010
10. RESIDUAL HEAT REMOVAL SYSTEM P&ID	E11–1010
11. HIGH PRESSURE CORE FLOODER SYSTEM PFD	E22–1020
12. HIGH PRESSURE CORE FLOODER IBD	E22–1030
13. ATMOSPHERIC CONTROL SYSTEM P&ID	T31–1010
14. REACTOR CORE ISOLATION COOLING SYSTEM P&ID	E51–1010
15. SUPPRESSION POOL CLEAN–UP SYSTEM P&ID	G51–1010
16. LOW CONDUCTIVITY WASTE, RADWASTE SYSTEM P&ID	K17–1010

SUPPORTING DOCUMENT	MPL NO.
1. PIPING AND INSTRUMENT DIAGRAM SYMBOLS	A10–3030

LEGEND:

LEAK TESTABLE DOUBLE DISC GATE VALVE

NOTES:

1. PIPING HIGH POINT VENTS AND LOW POINT DRAINS ARE TO BE ADDED AS NECESSARY.
2. INSTRUMENT LINE DESIGN AND VALVING SHALL BE IN ACCORDANCE WITH INSTRUMENT PIPING SPECIFICATION A11–3030.
3. THE METHOD OF MOUNTING LOCAL INSTRUMENTS IS TO BE DETERMINED BY PIPING DESIGNER.
4. VENT DRAIN AND RELIEF VALVE DISCHARGE SYSTEM TO LCW AND HCW OR SUPPRESSION POOL ARE BY PIPING DESIGNER.
5. FOR ADDITIONAL CONTROL ROOM INDICATOR LIGHTS, SYSTEMS ALARMS AND REMOTE MANUAL SWITCHES, SEE THE HPCF LOGIC DIAGRAM.
6. PROVISIONS FOR CONTAINMENT ISOLATION SHALL BE IN ACCORDANCE WITH THE CURRENT LICENSING REQUIREMENTS.
7. EQUIPMENT AND INSTRUMENTS ARE PREFIXED BY SYSTEM NUMBER (E22) UNLESS OTHERWISE NOTED.
8. THIS EQUIPMENT IS CONTROLLABLE FROM THE REMOTE SHUTDOWN SYSTEM FOR LOOP B ONLY.
9. DRYWELL PIPING RUNS SHALL BE HORIZONTAL OR VERTICAL UPWARDS FROM THE DRYWELL WALL TO THE POINT OF ATTACHMENT WITH THE REACTOR VESSEL.
10. INTERFACES WITH RHR SYSTEM ARE BETWEEN CORRESPONDING LOOPS IN THAT SYSTEM, EXAMPLE, B TO B AND C TO C.
11. DESIGN LINE SIZE WILL BE FINALIZED AT THE DETAILED DESIGN PHASE. ACTUAL LINE SIZES DETERMINED BY THE PIPING DESIGNER SHALL MEET THE PROCESS DATA HYDRAULIC REQUIREMENTS.
12. VALVES F005B&C ARE RECOMMENDED FOR MAINTENANCE AND/OR LEAK RATE TESTING.
13. PUMP C009B&C COOLING WATER, IF REQUIRED, IS FROM SYSTEM P21.
14. CHECK VALVES F004B&C SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE REACTOR VESSEL NOZZLE.
15. VALVES F009B&C AND F010B&C SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE CONTAINMENT PENETRATION OF THE RETURN LINE TO THE SUPPRESSION POOL.
16. ALL MOTOR OPERATED VALVES ARE AC OPERATED UNLESS OTHERWISE NOTED.
17. COMMON LINE FOR HPCF–B, HPCF–C, RCIC, AND SPCU.
18. FLUSHING CONNECTIONS AND TEMPORARY STRAINER SCREENS SHALL BE PROVIDED ON THE SUCTION SIDE OF ALL PUMPS C001B & C.
19. FOR LOOP C, REPLACE SUFFIX F WITH G. SUFFIXES D AND E ARE OMITTED.
20. PIPING DESIGN SPECIFICATION ARE AS FOLLOWS:
    A. MAXIMUM OPERATING PRESSURE – SEE SPECIFIC BOUNDARY SYMBOL
    B. MAXIMUM OPERATING TEMPERATURE – SEE SPECIFIC BOUNDARY SYMBOL
    C. MATERIAL – CARBON STEEL EXCEPT AS SPECIFIED
    D. PIPING THICKNESS SHALL BE PER A62–4030, PRESSURE INTEGRITY OF NUCLEAR COMPONENTS.
    E. DESIGN CLASS – SEE SPECIFIC BOUNDARY SYMBOL
    F. QA CLASS – SEE SPECIFIC BOUNDARY SYMBOL
    G. SEISMIC CLASS – As
    H. FLUID – WATER
21. VALVE F012 MUST BE AT LOWEST POINT IN THE SYSTEM TO ALLOW FOR DRAINAGE.
22. DRAIN AND VENT PIPING DESIGN CONDITIONS ARE:
    MAXIMUM OPERATING PRESSURE– SAME AS MAIN LINE UPSTREAM OF VALVE (ATMOSPHERIC PRESSURE FROM LAST VALVE TO FUNNEL).
    MAX. OPERATING TEMPERATURE– SAME AS MAIN LINE UPSTREAM OF VALVE 166°C FROM LAST VALVE TO FUNNEL).
23. PIPE NUMBERS FOR LOOP C SHALL BE THE SAME AS FOR LOOP B PLUS 100 STARTING AT 005 (EXAMPLE: LOOP B – 005 = LOOP C – 105; LOOP B – 701 = LOOP C – 801).
24. VALVES F023B & C SHALL BE LOCATED BELOW THE SUPPRESSION POOL MINIMUM WATER LEVEL.
25. HPCF SPARGER WITHIN THE RPV IS INCLUDED IN HPCF BOUNDARY.
26. PIPE WITH A DESIGN PRESSURE OF 2.82 MPa G OR GREATER SHALL HAVE ITS MINIMUM WALL THICKNESS NO LESS THAN THAT OF A STANDARD WEIGHT PIPE. THICKER THAN STANDARD WEIGHT PIPE SHALL BE USED IF REQUIRED BY THE DESIGN PRESSURE OR OTHER REQUIREMENTS.
27. VALVES WITH A DESIGN PRESSURE OF 2.82 MPa G OR GREATER SHALL BE A MINIMUM OF CLASS 300, OR OF A HIGHER CLASS IF REQUIRED BY THE DESIGN PRESSURE.
28. SIGNAL PROVIDED BY HARDWIRE (NOT MULTIPLEX).
29. LOCATE THE GATE VALVE OF THIS PIPING SECTION AT A DISTANCE GREATER THAN OR EQUAL TO 25 PIPE DIAMETERS FROM THE RPV NOZZLE; OTHERWISE, PERFORM STRESS ANALYSIS TO SHOW THAT STRESSES AND FATIGUE ARE ACCEPTABLE PER THE ASME CODE FROM THE CONCERN OF NRC BULLETIN 88–08, SUPPLEMENT 3 (APRIL 11, 1989) ON POTENTIAL THERMAL STRATIFICATION AND STRIPPING DUE TO PERIODIC EXTERNAL LEAKAGE OF THE GATE VALVE.

MPL NO. E22–1010

Figure 6.3-7 High Pressure Core Flooder System P&ID (Sheet 1 of 2)

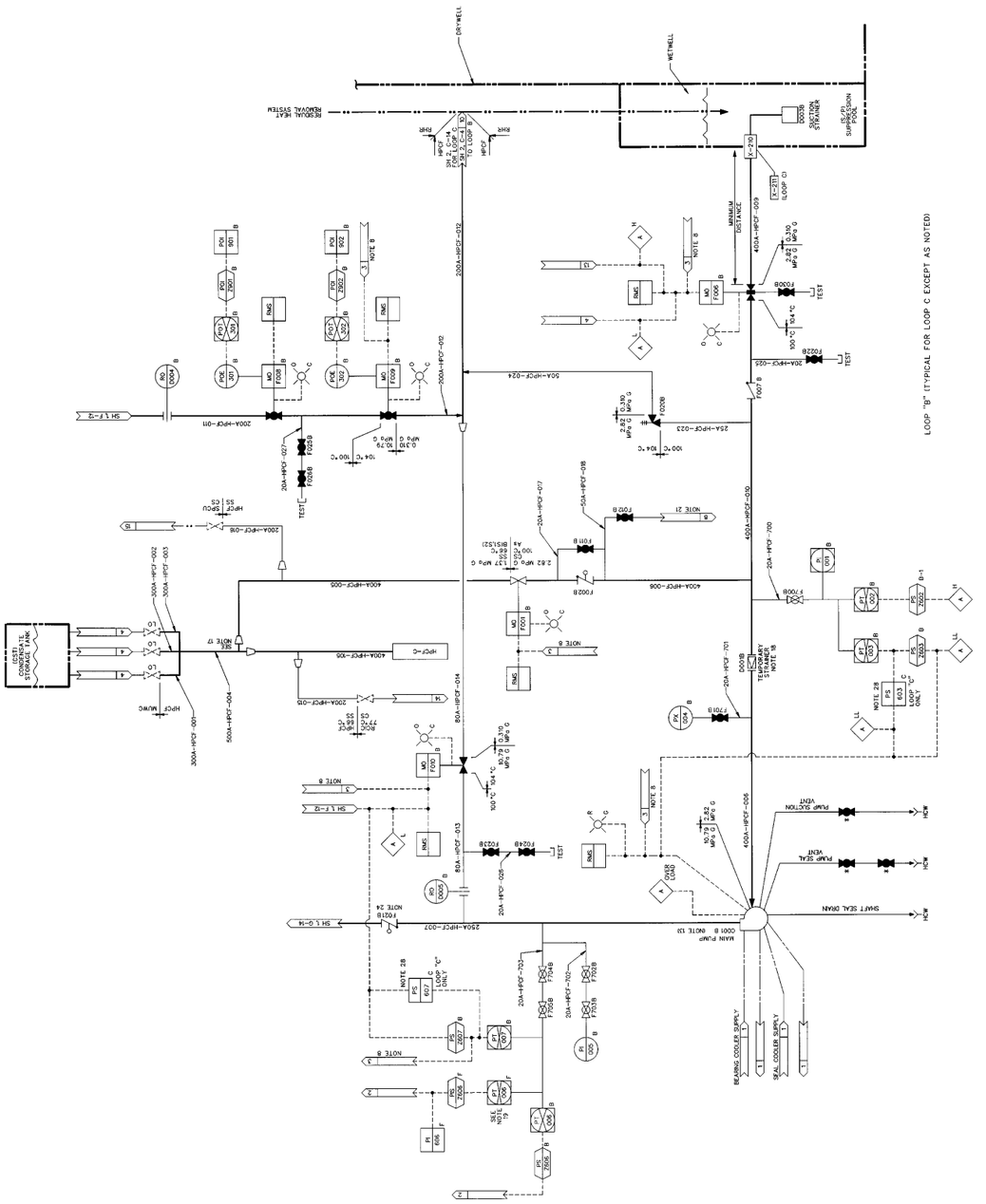
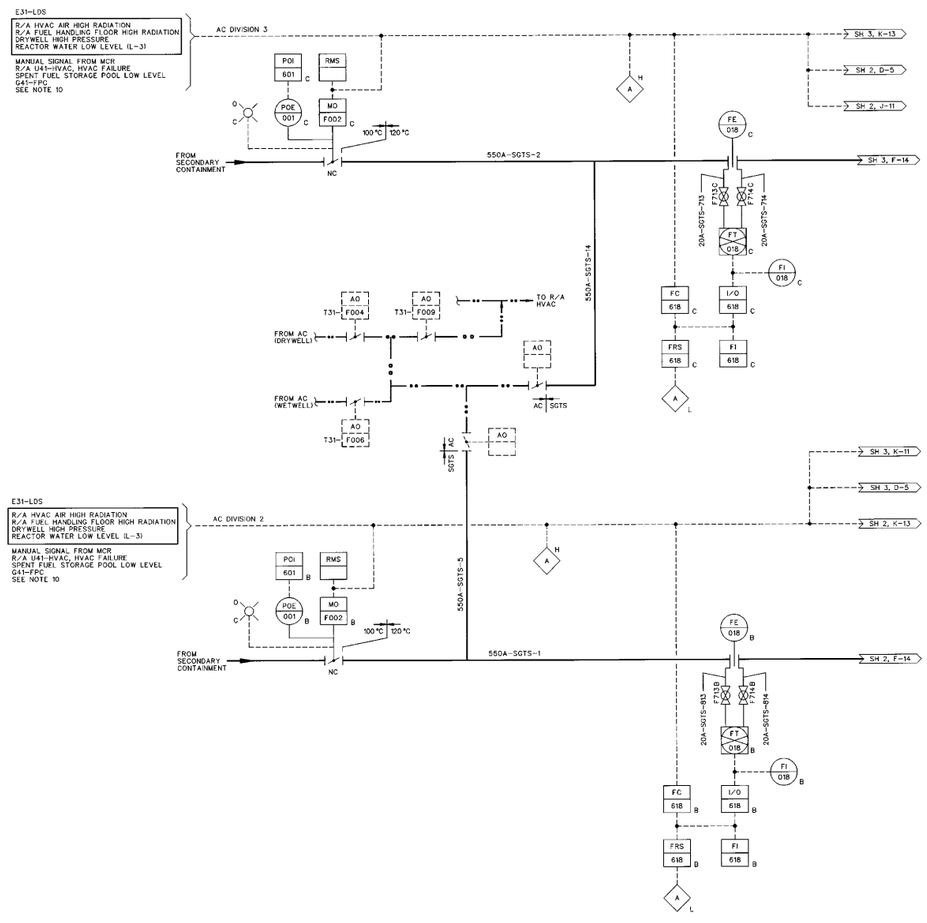


Figure 6.3-7 High Pressure Core Flooder System P&ID (Sheet 2 of 2)



NOTES:

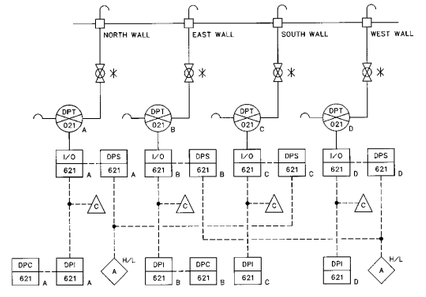
1. QUALITY CLASS, DESIGN CLASS AND SEISMIC CLASS AS FOLLOWS:

	QUALITY CLASS	DESIGN CLASS	SEISMIC CLASS
SGTS EXCEPT FOR FOLLOWING	C	4	B
DRAIN LINE FROM DRAIN VALVE	G	7	B

2. PIPING DESIGN SPECIFICATION SHALL BE AS FOLLOWS EXCEPT AS NOTED:
   MATERIAL: GALVANIZED STEEL
   SCHEDULE: 50A AND LESS – SCH 10
   GREATER THAN 50A – SCH 20
   FLUID : AIR ±0.014 MPa G, 120 °C
3. FREON (R11) INJECTION POINT IS LOCATED UPSTREAM OF CHARCOAL ADSORBER.
4. SAMPLE CANISTERS ARE PROVIDED FOR MONITORING CHARCOAL ADSORBER CONDITION.
5. CHARCOAL ADSORBER TEMPERATURE SHOULD BE MONITORED CONTINUOUSLY.
6. SPACE HEATERS ARE OPERATED DURING SGTS STANDBY MODE TO PREVENT CHARCOAL ADSORBER REACHING THE DEW POINT.
7. FILTER (5 HEXAMESH) IS PROVIDED TO REMOVE FOREIGN OBJECTS.
8. FLOW ELEMENT IS ANNUBAR-TYPE.
9. STOP VALVES SHALL NOT BE FLANGE TYPE.
10. MANUAL INITIATION OF SGTS AND ISOLATION OF HVAC OCCURS WHEN SPENT FUEL STORAGE POOL LOW LEVEL ALARMS.
11. COOLING FANS AND SPACE HEATERS OF THE FILTER TRAIN D002C SHOULD BE CONNECTED TO THE DIVISION POWER OF THE FILTER TRAIN D002B AND VICE VERSA.
12. FIRE HOSE CONNECTION.

REFERENCE DOCUMENTS:

	MPL NO.
1. ATMOSPHERIC CONTROL SYS P&ID	T31-1010
2. MAKEUP WATER SYSTEM (PURIFIED) P&ID	P11-1010
3. PROCESS RAD MONITOR SYS IBD	D11-1030
4. PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
5. FUEL POOL COOLING & CLEANUP SYS P&ID	G41-1010
6. LEAK DETECTION & ISOLATION SYS IED	E31-1040
7. HEATING, VENTILATING AND AIR CONDITIONING SYS P&ID	U41-1010



R/B NEGATIVE PRESSURE INDICATION

MPL NO. T22-1010

Figure 6.5-1 Standby Gas Treatment System P&ID (Sheet 1 of 3)

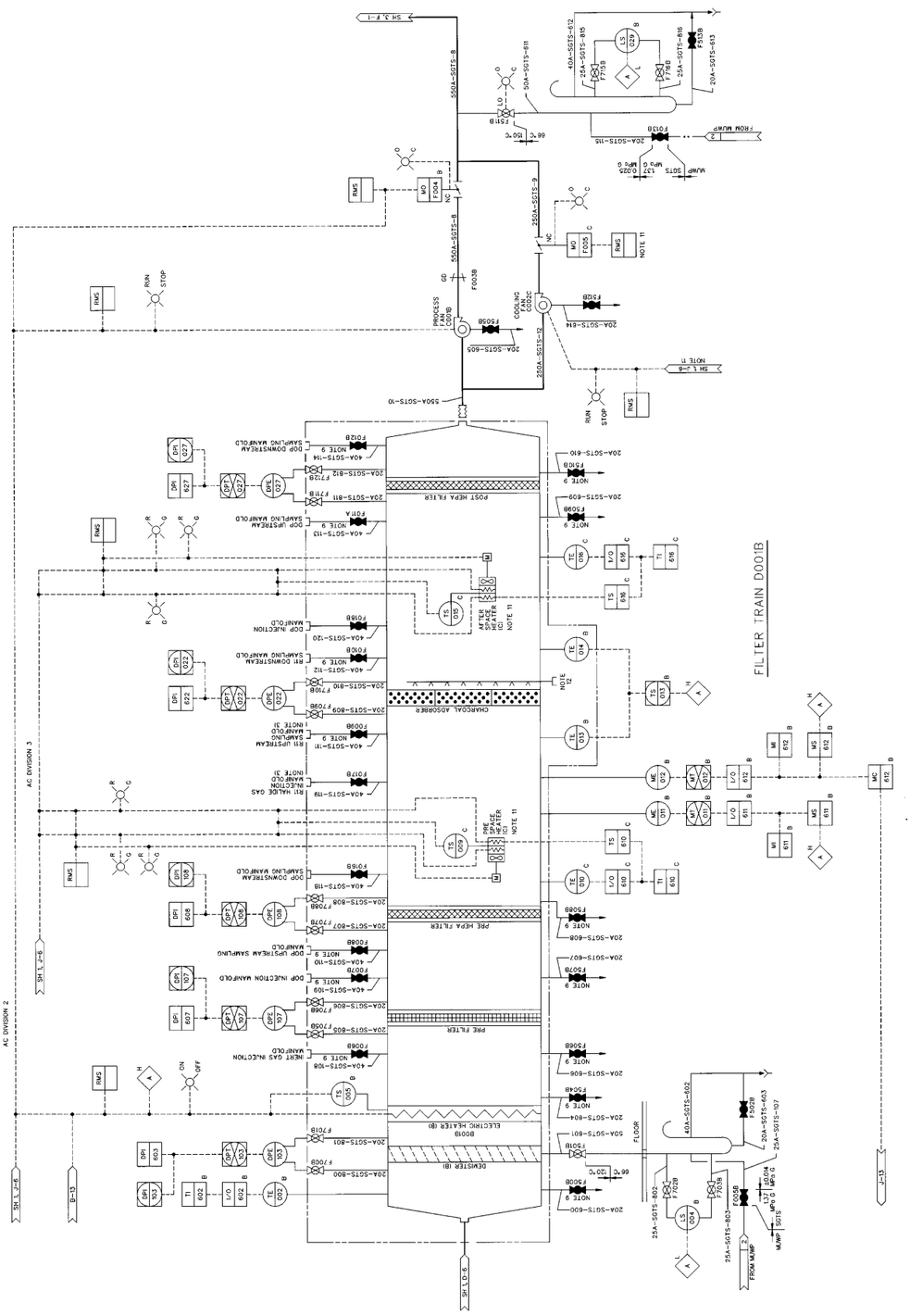


Figure 6.5-1 Standby Gas Treatment System P&ID (Sheet 2 of 3)

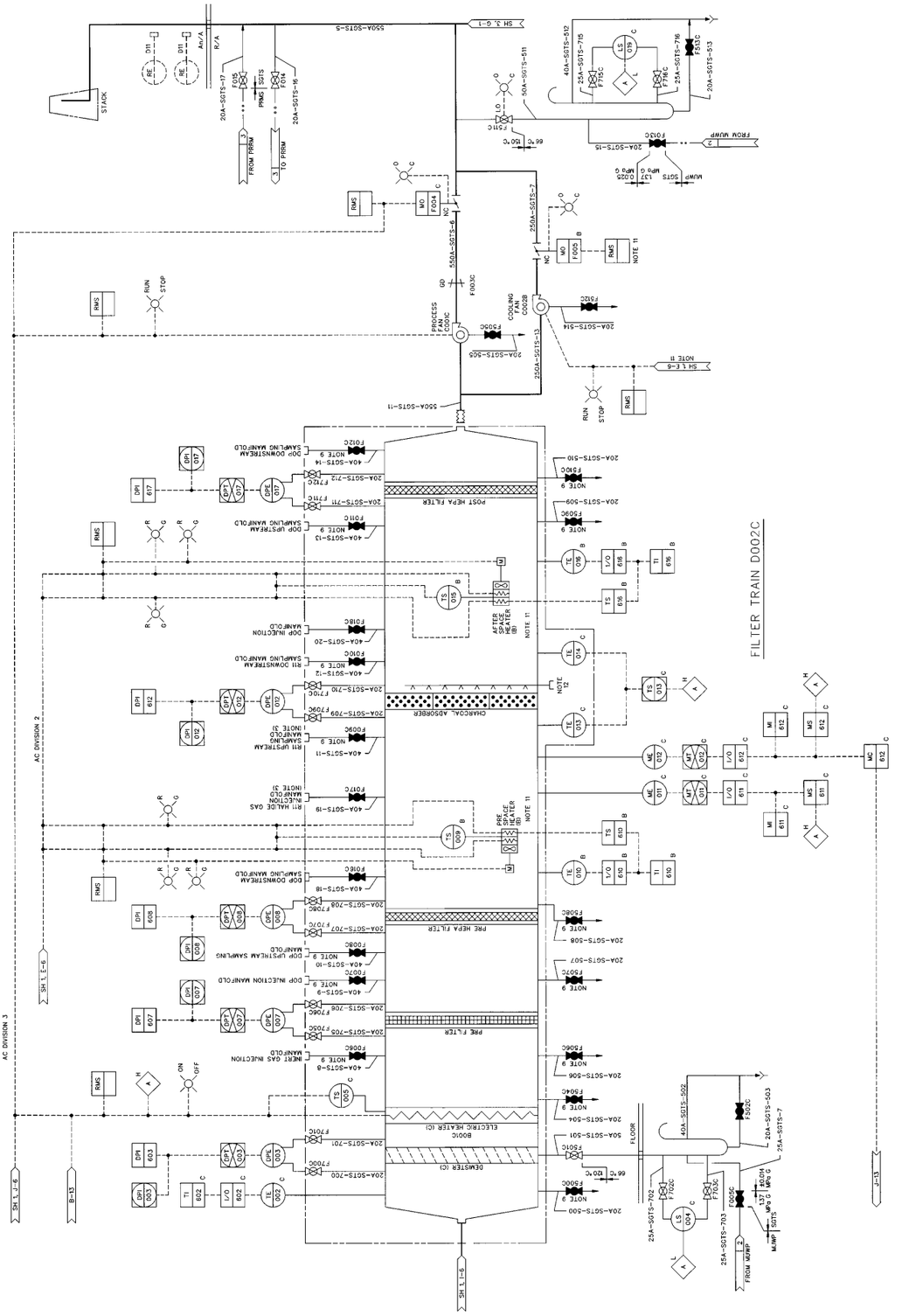


Figure 6.5-1 Standby Gas Treatment System P&ID (Sheet 3 of 3)

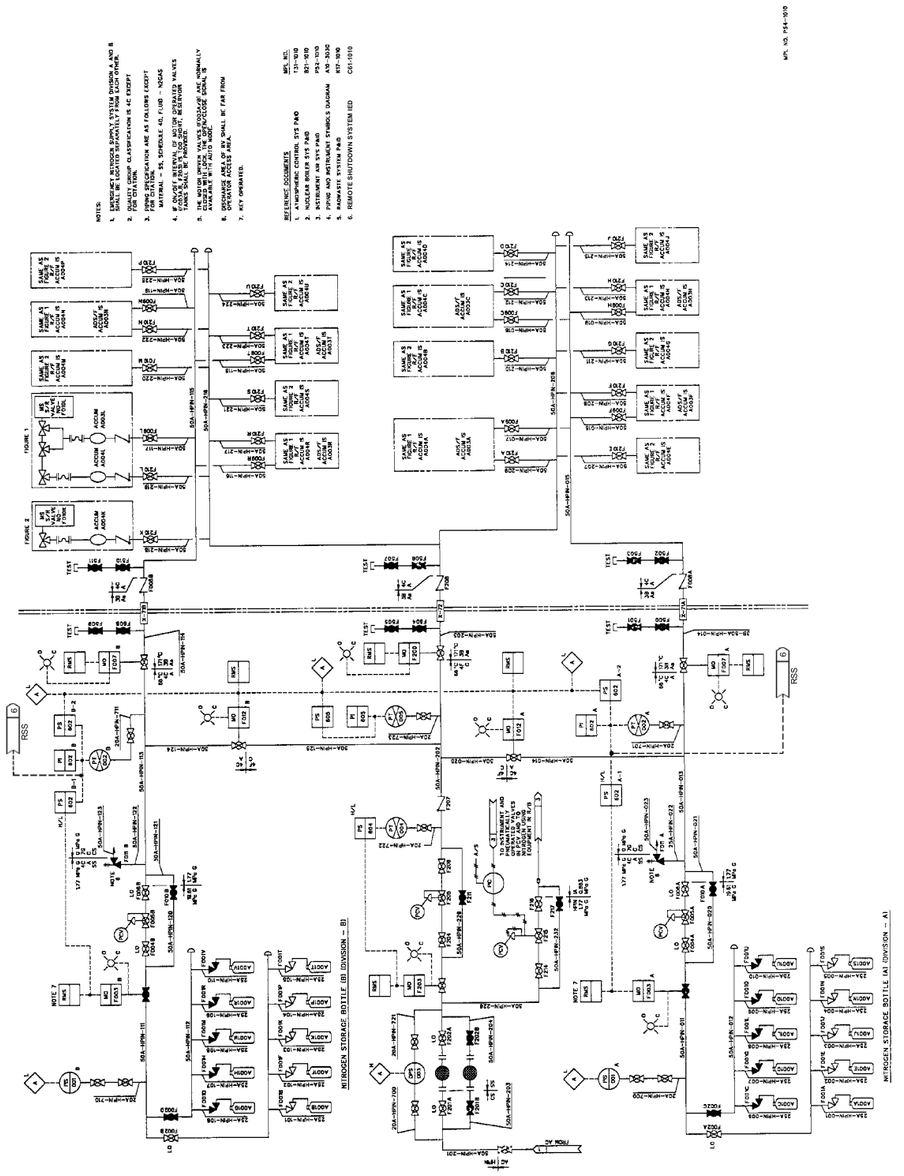


Figure 6.7-1 High Pressure Nitrogen Gas Supply System P&ID

NOTES:

1. ALL REFERENCE DESIGNATIONS ARE PREFIXED WITH C71 UNLESS OTHERWISE SPECIFIED.

2. THE POSITION SWITCHES FOR MAIN STEAM LINE ISOLATION VALVE POSITION ARE A PART OF THE MSIV'S. POSITION SWITCH CONTACTS SHALL OPEN BEFORE THE CLOSING VALVE REACHES THE 92% OPEN POSITION AND REMAIN OPEN WHEN THE VALVE IS FULLY CLOSED. THE SWITCH CONTACTS SHALL CLOSE BEFORE THE OPENING VALVE REACHES FULLY OPEN AND REMAIN CLOSED WHEN THE VALVE IS FULLY OPEN.

3. INTERNAL LOGIC AND EQUIPMENT FUNCTIONS ARE SHOWN ON THE REACTOR PROTECTION SYSTEM IBD, C71–1030.

4. THE APRM TRIP SIGNALS PROVIDED BY THE NEUTRON MONITORING SYSTEM (NMS) REPRESENT EITHER HIGH NEUTRON FLUX TRIP, HIGH SIMULATED THERMAL POWER TRIP, CORE FLOW RAPID COASTDOWN TRIP OR APRM INOPERATIVE AS DETERMINED BY THE NMS. THE SRNM TRIP SIGNALS PROVIDED BY THE NMS REPRESENT EITHER SRNM UPSCALE TRIP, SHORT PERIOD TRIP OR INOPERATIVE TRIP AS DETERMINED BY THE NMS.

5. LETTER DESIGNATIONS FOR EQUIPMENT IN THE FOUR RPS DIVISIONS ARE AS FOLLOWS:

   A – DIVISION I
   B – DIVISION II
   C – DIVISION III
   D – DIVISION IV

   THESE DESIGNATIONS DO NOT NECESSARILY APPLY TO MATCH CIRCLE LETTERS.

6. REDUNDANT LOGIC POWER SUPPLIES ARE TO BE PROVIDED WITHIN EACH INDIVIDUAL SSLC PANEL AND/OR WITHIN EACH MAJOR SSLC MODULE OR UNIT.

7. THE MAIN STEAM LINE HIGH RADIATION TRIP SIGNALS REPRESENT EITHER MSL HIGH HIGH RADIATION OR INOPERATIVE RADIATION MONITOR (PRRM) CHANNEL AS DETERMINED BY THE PROCESS RADIATION MONITORING SYSTEM.

8. REACTOR PROTECTION SYSTEM LOGIC AND MAIN STEAM ISOLATION VALVE LOGIC (PART OF LEAK DETECTION AND ISOLATION SYSTEM) SHARE THE SAME DIGITAL TRIP MODULE AND TRIP LOGIC UNIT. SOFTWARE FUNCTIONS WRITTEN FOR EACH SYSTEM WILL SEPARATELY PROCESS SENSOR INPUT SIGNALS, TRIP DECISION LOGIC, AND INTERLOCK LOGIC RELATED TO A PARTICULAR SYSTEM. HOWEVER, FINAL DIVISION OUTPUT TRIP SIGNALS FOR THE TWO SYSTEMS SHALL BE DEVELOPED IN SEPARATE OUTPUT LOGIC UNITS IN EACH SSLC DIVISION LOGIC PANEL. SEE REF DOC 6.

9. TRIP INPUTS FOR THE TURBINE CONTROL VALVE FAST CLOSURE (TCVFC) TRIP SHALL BE DERIVED FROM ALL THOSE EVENTS CAUSING FAST CLOSURE OF THE TURBINE CONTROL VALVE. PROVISIONS SHALL BE MADE FOR THE PRESSURE SWITCHES TO DIRECTLY MEASURE INDIVIDUAL CONTROL VALVE "DISK DUMP" HYDRAULIC TRIP SYSTEM OIL PRESSURE AND FOR THE PRESSURE SWITCHES TO BE MOUNTED DIRECTLY ON THE TURBINE CONTROL VALVES.

10. ONE POSITION SWITCH EACH WITH TWO CONTACTS SHALL BE MOUNTED ON EACH TURBINE MAIN STOP VALVE (TSV). CONTACT NUMBER 1 OF EACH POSITION SWITCH SHALL PROVIDE TSV CLOSURE TRIP SIGNALS TO THE REACTOR PROTECTION SYSTEM. THESE CONTACTS SHALL BE CLOSED AND REMAIN CLOSED WHEN THE STOP VALVE IS FULLY OPEN, SHALL OPEN BEFORE THE CLOSING VALVE REACHES 90% OPEN, SHALL REMAIN OPEN WHILE THE VALVE IS FULLY CLOSED AND SHALL RECLOSE BEFORE THE OPENING VALVE IS FULLY OPEN. CONTACT NUMBER 2 OF EACH POSITION SWITCH SHALL PROVIDE MAIN CONDENSER VACUUM LOW TRIP BYPASS SIGNALS TO THE LEAK DETECTION SYSTEM. IN GENERAL, THE OPERATION OF THE NUMBER 2 SWITCH CONTACTS IS OPPOSITE TO THE OPERATION OF THE NUMBER 1 CONTACTS. SPECIFIC DETAILS OF THE OPERATION OF THE NUMBER 2 CONTACTS IS DESCRIBED IN THE LEAK DETECTION AND ISOLATION SYSTEM IED, REFERENCE DOCUMENT 6.

11. EACH OF THE FOUR TURBINE FIRST STAGE PRESSURE TRANSMITTERS SHALL BE CONNECTED TO A SEPARATE SENSING LINE AND SHALL BE SEPARATED FROM EACH OTHER BY SUITABLE DISTANCE OR BY BARRIERS TO MINIMIZE THE POTENTIAL FOR COMMON CAUSE FAILURE.

12. LOGIC POWER SOURCES FOR THE SCRAM FOLLOW SIGNALS AND SCRAM TEST SWITCH STATUS SIGNALS SHALL BE PROVIDED BY APPROPRIATE UNITS OF THE ROD CONTROL AND INFORMATION SYSTEM (C11).

13. THE REACTOR MODE SWITCH SHALL BE A SINGLE, FOUR POSITIONS, FOUR BANK, KEYLOCKED SWITCH. EACH OF THE FOUR BANKS SHALL BE ELECTRICALLY ISOLATED FROM ALL OTHER BANKS AND PROVIDE A REACTOR MODE SIGNAL TO ONE OF THE FOUR RPS DIVISIONS. WHEN THE SWITCH IS IN ONE POSITION, THE CONTACTS ASSOCIATED WITH THAT POSITION SHALL BE CLOSED AND THE CONTACTS FOR ALL OTHER POSITIONS SHALL BE OPEN. CONTACT ACTION UPON SWITCHING SHALL BE MAKE BEFORE BREAK. THE DIVISION II AND DIVISION III BANKS SHALL EACH HAVE AN ADDITIONAL CONTACT ASSOCIATED WITH THE "SHUTDOWN" POSITION. THESE CONTACTS SHALL BE OPEN WHEN THE MODE SWITCH IS IN THE "SHUTDOWN" POSITION AND SHALL BE CLOSED IN ALL OTHER POSITIONS.

14. THE MANUAL SCRAM RESET SWITCH SHALL BE A SINGLE, THREE POSITION, TWO BANK, SPRING RETURN TO NEUTRAL SWITCH. THE TWO BANKS SHALL BE ISOLATED FROM EACH OTHER. WHEN THE SWITCH IS IN ONE OF THE TWO NON-NEUTRAL POSITIONS, THE ASSOCIATED CONTACTS SHALL BE CLOSED. WHEN THE SWITCH IS IN THE NEUTRAL POSITION, ALL CONTACTS SHALL BE OPEN.

15. GROUPS 1A, 1B, 2A, 2B, 3A, 3B, 4A AND 4B SOLENOID POWER WIRING SHALL ALL BE RUN IN SEPARATE CONDUIT. INTERCONNECTIONS BETWEEN PDLU, OLU AND SCC ARE SHOWN IN LOGIC DIAGRAM REPRESENTATION IN SUPPORTING DOC 5.

16. RPS ALARMS AND STATUS SIGNALS ARE DESCRIBED IN SUPPORTING DOCUMENTS 1, 5 AND 6.

17. THE NEUTRAL WIRING OF ALL FOUR SCRAM GROUPS SHALL BE CONNECTED TO THE SAME COMMON POINT GROUND.

18. WITHIN THE SCRAM SOLENOID FUSE PANELS, CURRENT SURGE SUPPRESSION DEVICES (E.G. VARISTORS OR EQUIVALENT) SHALL BE CONNECTED ACROSS THE COIL LEADS OF EACH HCU SCRAM PILOT VALVE SOLENOID.

REFERENCES	MPL ITEM NO.
1. NUCLEAR BOILER SYSTEM (NBS) P&ID	B21–1010
2. ROD CONTROL AND INFORMATION SYSTEM (RCIS) IED	C11–1040
3. CONTROL ROD DRIVE SYSTEM (CRD) P&ID	C12–1010
4. NEUTRON MONITORING SYSTEM (NMS) IED	C51–1040
5. PROCESS RADIATION MONITORING SYSTEM (PRRM) IED	D11–1040
6. LEAK DETECTION AND ISOLATION SYSTEM (LDS) IED	E31–1040
7. D.C. POWER ONE LINE DIAGRAM	R42–1010
8. VITAL AC POWER ONE LINE DIAGRAM	R46–1010
9. RECIRCULATION FLOW CONTROL SYSTEM (RFCS) IED	C81–1040
10. SUPPRESSION POOL TEMPERATURE MONITORING (SPTM) SYSTEM IED	T53–1010

SUPPORTING DOCUMENT	MPL ITEM NO.
1. REACTOR PROTECTION SYSTEM DESIGN SPEC	C71–4010
2. DESIGN DOCUMENTS STANDARDS	A10–3020
3. PIPING & INSTRUMENT DIAGRAM SYMBOLS	A10–3020
4. IBD STANDARDS	A10–3070
5. REACTOR PROTECTION SYSTEM IBD	C71–1030
6. REACTOR PROTECTION SYSTEM MMIR	C71–5030

19. FIBER OPTIC CABLES PROVIDING ELECTRICAL SEPARATION BETWEEN EQUIPMENT OF REDUNDANT DIVISIONS SHALL BE RUN IN EITHER THE SENDING OR IN THE RECEIVING DIVISION CABLE TRAYS.

20. THE WIRING CIRCUITS ASSOCIATED WITH THE DIV II AND THE DIV III MODE SWITCH IN "SHUTDOWN" SCRAM SIGNALS SHALL BE RUN SEPARATELY AND BE KEPT SEPARATE BY DISTANCE OR BARRIERS FROM THE WIRING CIRCUITS ASSOCIATED WITH THE DIVISION II MANUAL SCRAM AND THE DIVISION III MANUAL SCRAM SIGNALS SUCH AS TO PREVENT A SINGLE FAULT FROM CAUSING THE LOSS OF BOTH MANUAL SCRAM FUNCTIONS.

21. PLACING ANY ONE OF THE HCU (PAIR-ROD) TEST SWITCHES INTO THE "TEST" POSITION SHALL RESULT IN ISOLATED SIGNALS BEING SENT TO THE RC&IS (REFERNCE DOCUMENT 2) SUCH AS TO PROVIDE TIMING SIGNALS INDICATING THE START OF A ROD SCRAM TEST.

22. METAL ENCLOSED JUNCTION BOXES AND CONDUIT SHALL BE UTILIZED WITHIN THE SCRAM TEST PANEL TO MAINTAIN SEPARATION OF ALL FOUR SCRAM GROUPS AND PROTECTION FROM HOT SHORTS.

23. THE SUPPRESSION POOL TEMPERATURE MONITORING (SPTM) TRIP SIGNALS REPRESENT EITHER SUPPRESSION POOL HIGH BULK TEMPERATURE OR SPTM INOPERATIVE AS DETERMINED BY THE SUPPRESSION POOL TEMPERATURE MONITORING SYSTEM.

LEGENDS:

- SINGLE SIGNAL OR POWER CONNECTION
- MULTIPLE (PARALLEL) SIGNAL OR POWER CONNECTION
- SERIAL MULTIPLEXED SIGNAL CONNECTION
- LINE CONNECTION
- SOLENOID POWER WIRING WITHIN GROUNDED STEEL CONDUIT

ABREVIATIONS

APRM – AVERAGE POWER RANGE MONITOR
BPU – BYPASS UNITS
CRD – CONTROL ROD DRIVE
DIV 1 – ELECTRICAL DIVISION I
DIV 2 – ELECTRICAL DIVISION II
DIV 3 – ELECTRICAL DIVISION III
DIV 4 – ELECTRICAL DIVISION IV
DTM – DIGITAL TRIP MODULE
EMS – ESSENTIAL MULTIPLEXING SYSTEM
FO – FIBER OPTIC
HCU – HYDRAULIC CONTROL UNIT
L – LINE
MSIV – MAIN STEAM LINE ISOLATION VALVE
N – NEUTRAL
MSL – MAIN STEAM LINE
OLU – OUTPUT LOGIC UNIT
PDLU – POWER DISTRIBUTION LOGIC UNIT
RMU – REMOTE MULTIPLEXING UNIT
SCC – SOLENOID CONTROL CENTER
SLU – SAFETY SYSTEM LOGIC UNIT
SRNM – SOURCE RANGE NEUTRON MONITOR
SSFP – SCRAM SOLENOID FUSE PANEL
SSLC – SAFETY SYSTEM LOGIC & CONTROL
TLU – TRIP LOGIC UNIT
KOS – KEYLOCK OPERATION SWITCH

MPL NO. C71-1040

Figure 7.2-9 Reactor Protection System IED (Sheet 1 of 11)

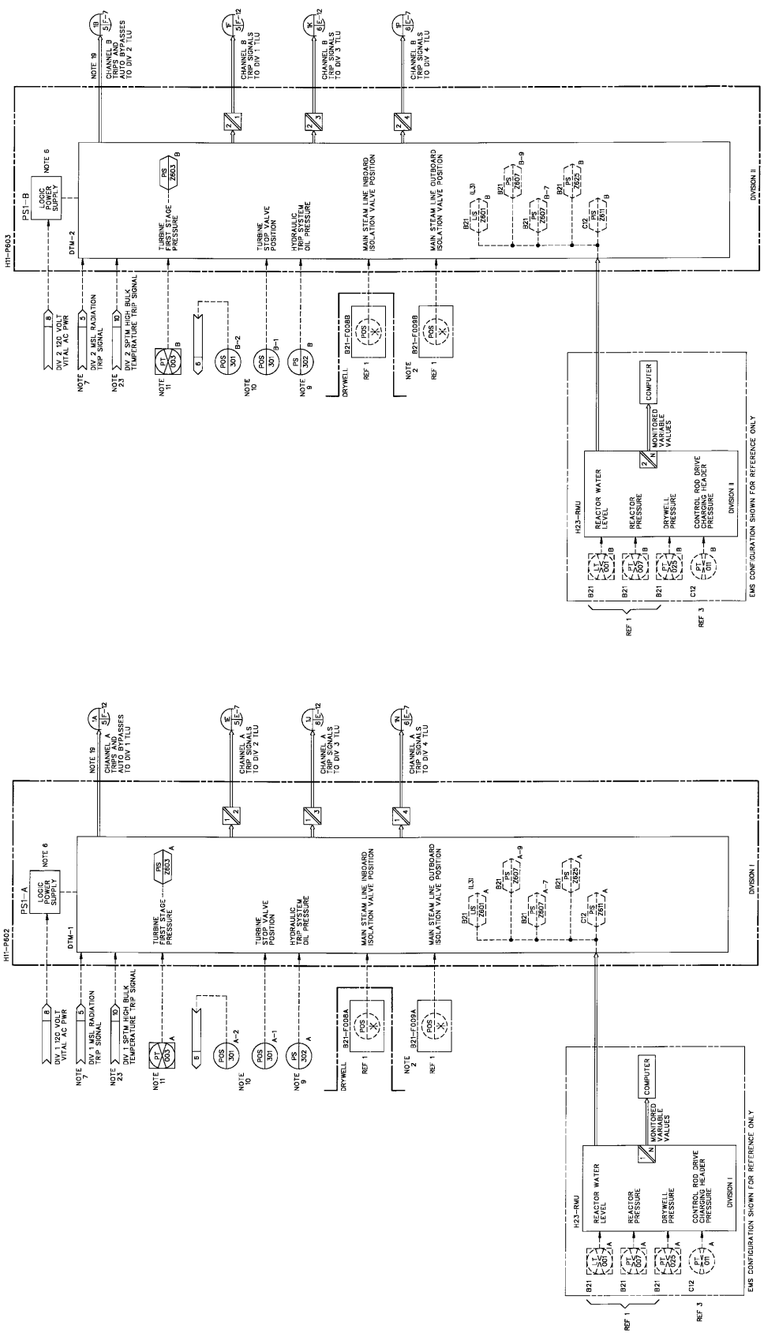


Figure 7.2-9 Reactor Protection System IED (Sheet 2 of 11)

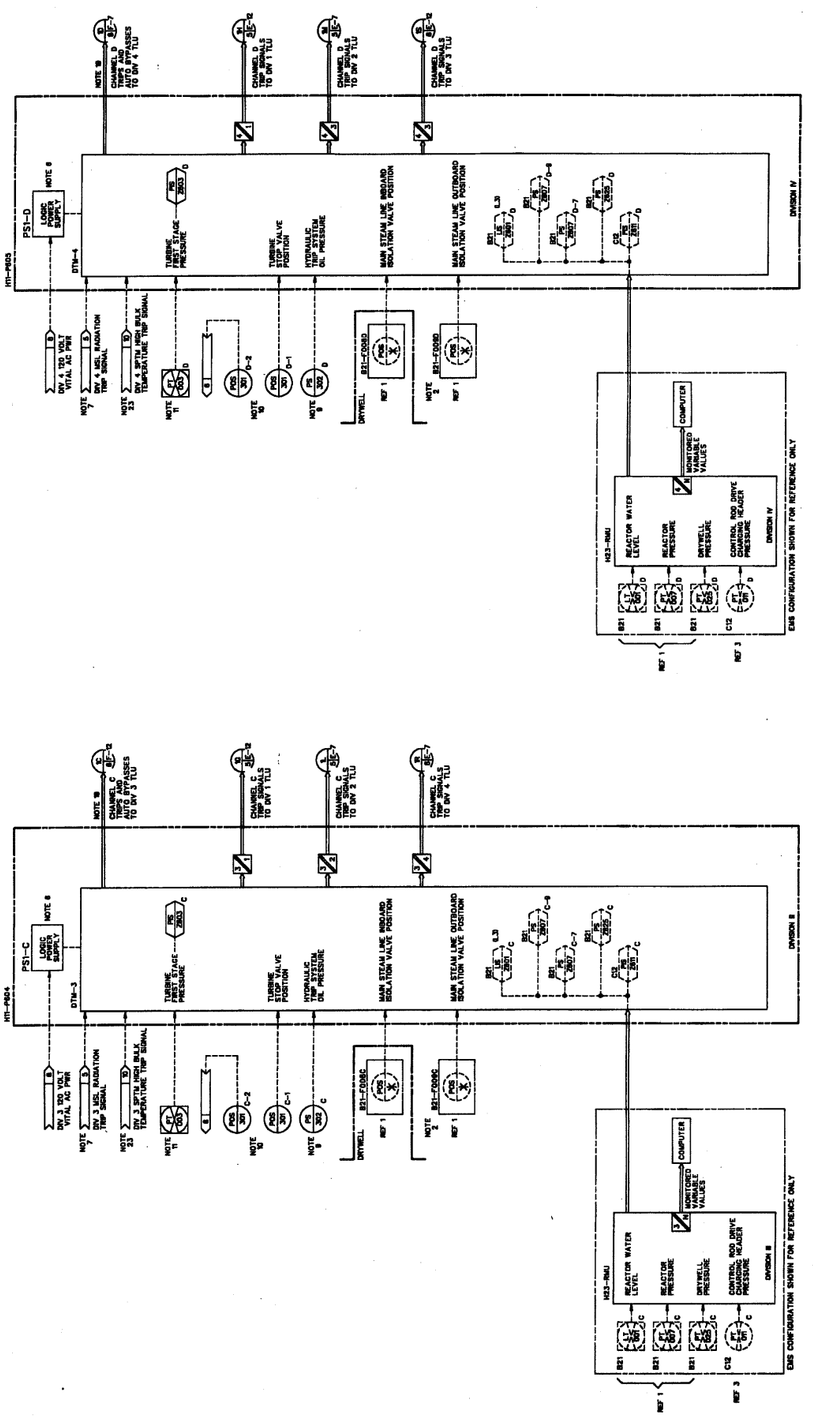


Figure 7.2-9 Reactor Protection System IED (Sheet 3 of 11)

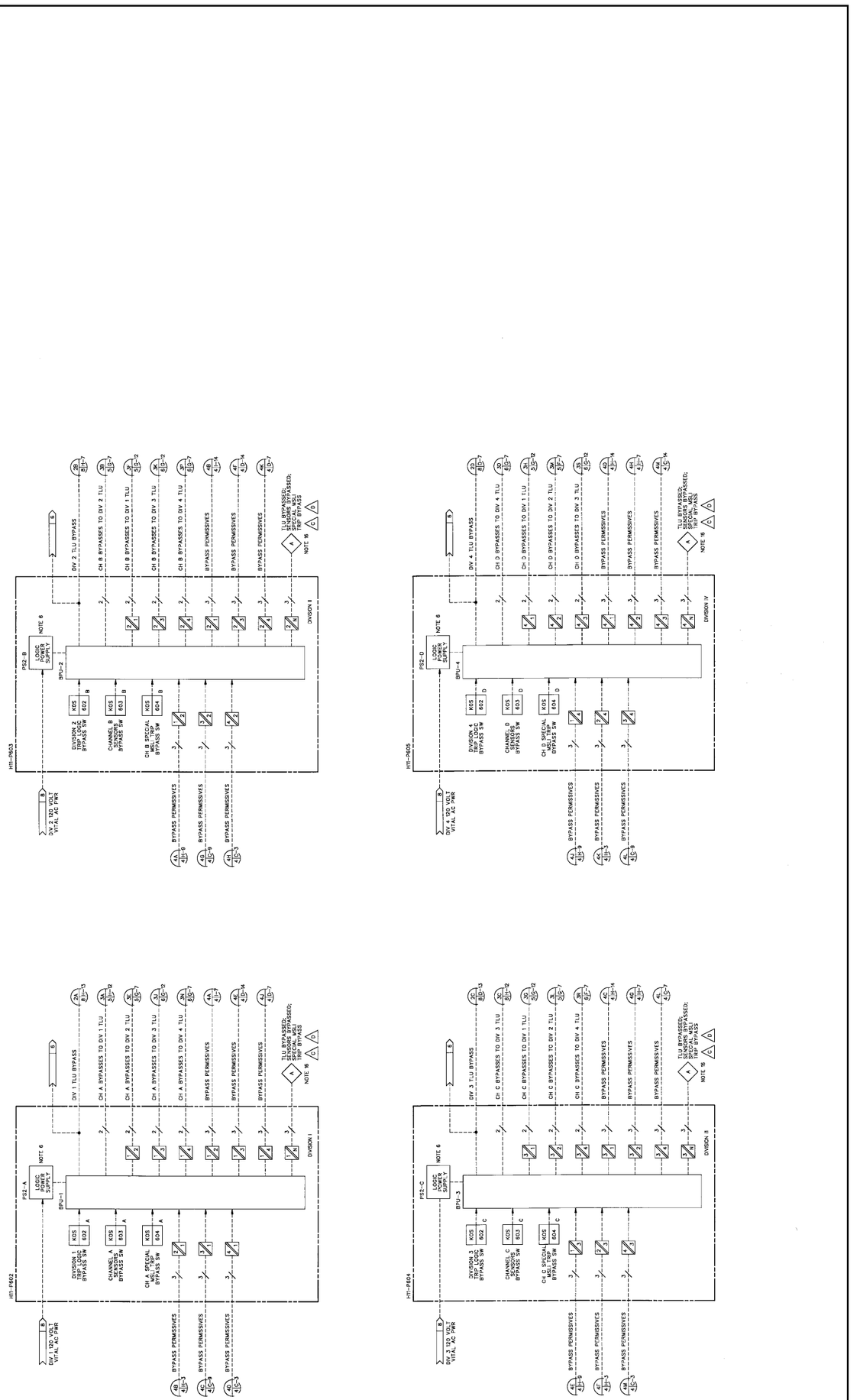


Figure 7.2-9 Reactor Protection System IED (Sheet 4 of 11)

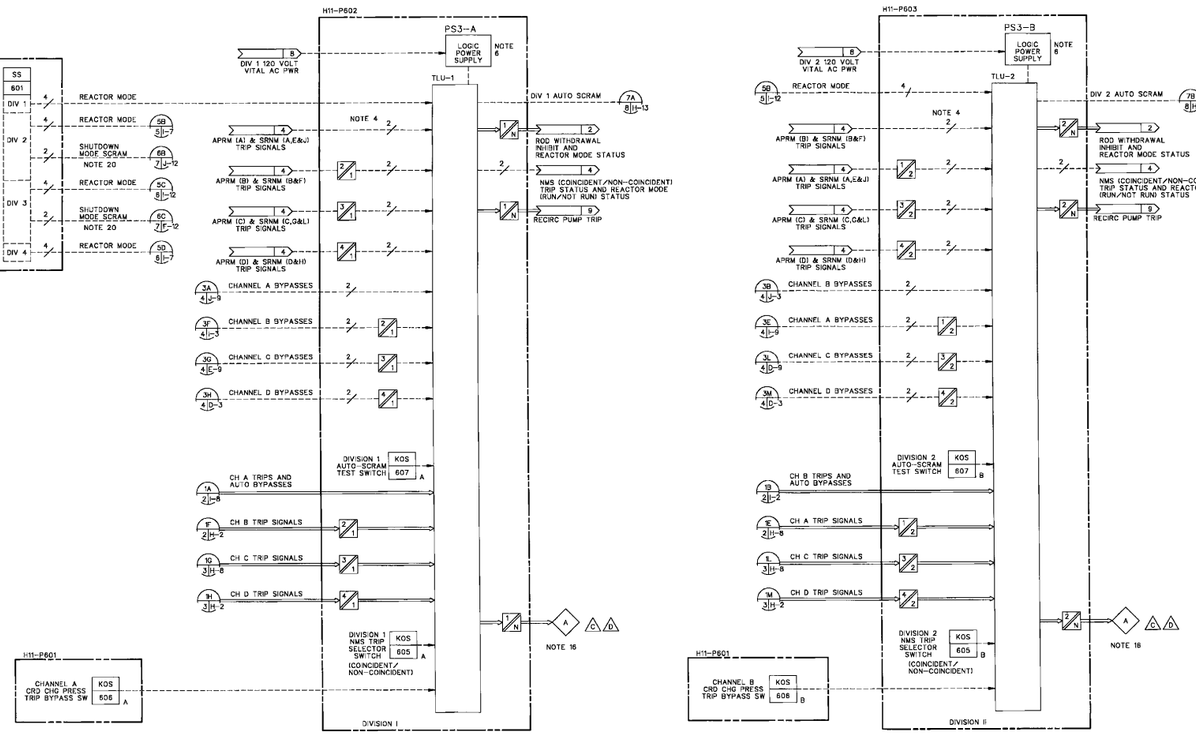


Figure 7.2-9 Reactor Protection System IED (Sheet 5 of 11)

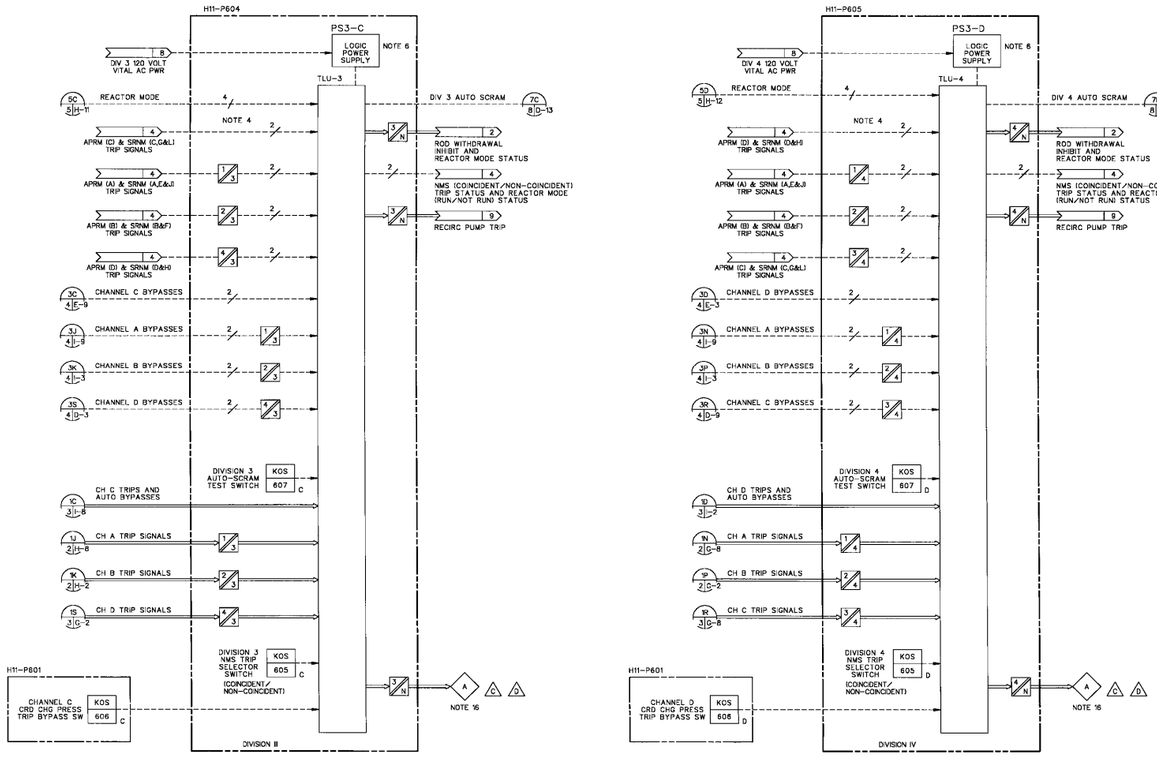


Figure 7.2-9 Reactor Protection System IED (Sheet 6 of 11)

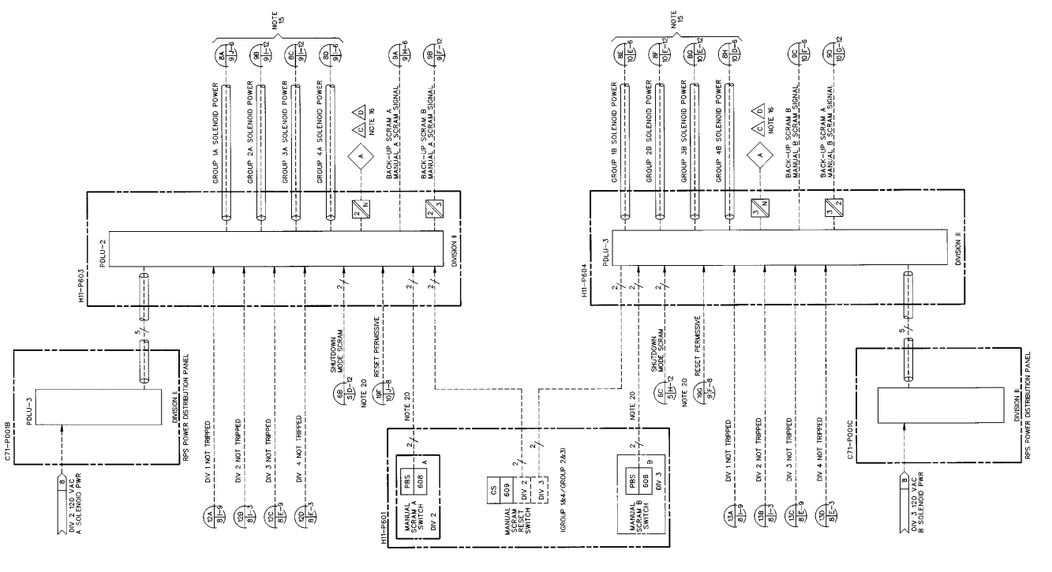
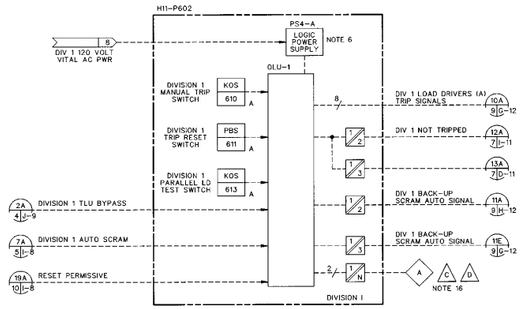
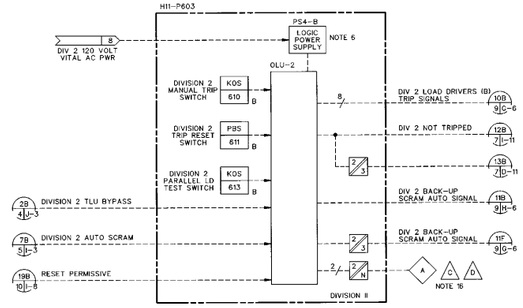
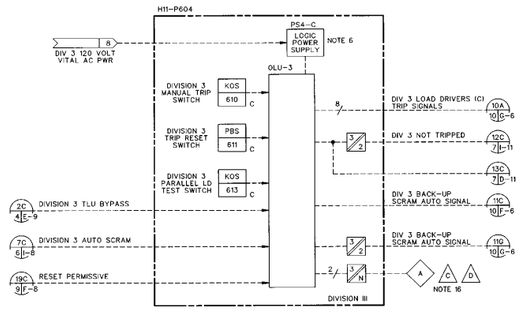


Figure 7.2-9 Reactor Protection System IED (Sheet 7 of 11)







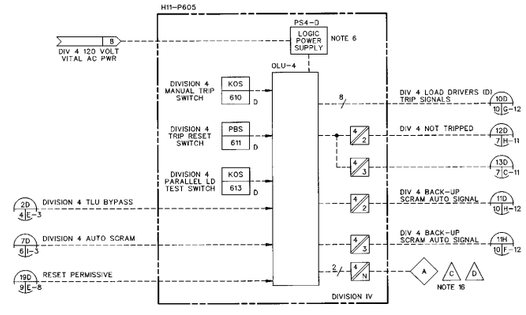


Figure 7.2-9 Reactor Protection System IED (Sheet 8 of 11)

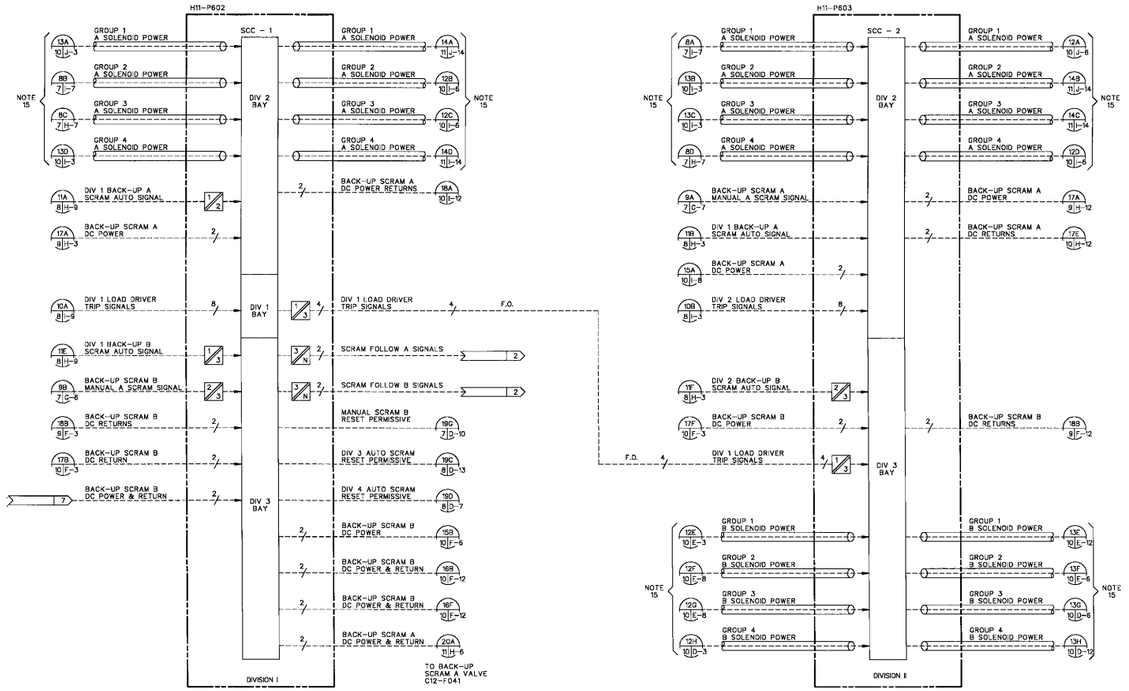


Figure 7.2-9 Reactor Protection System IED (Sheet 9 of 11)

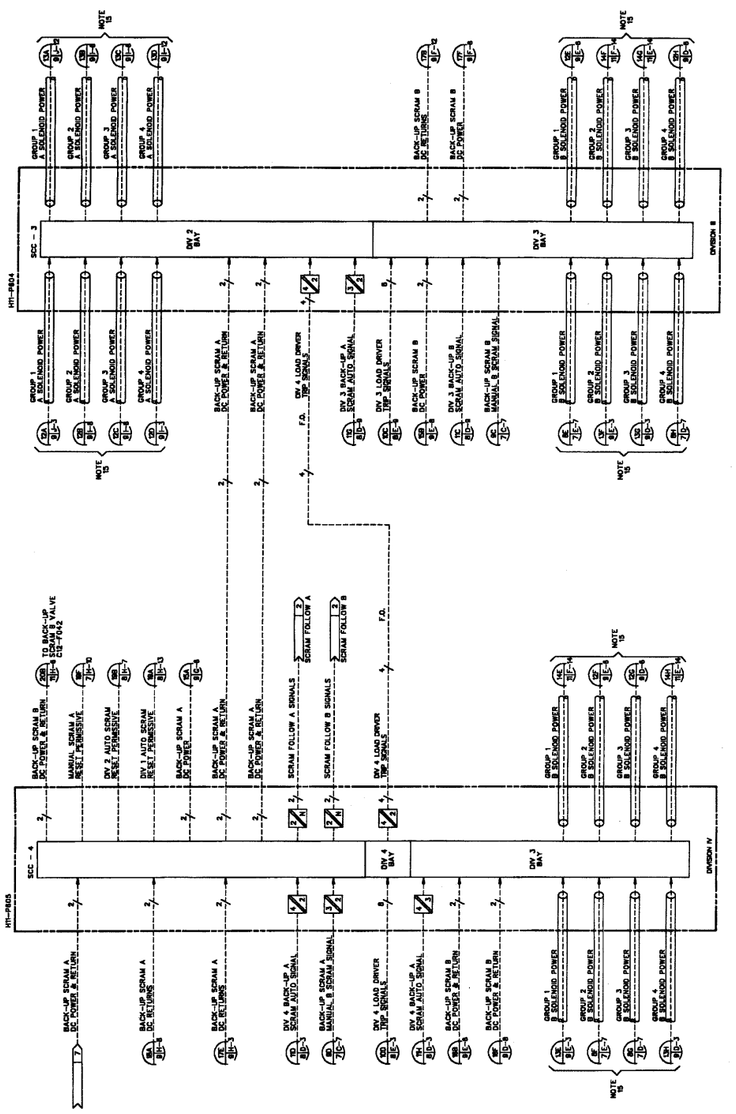


Figure 7.2-9 Reactor Protection System IED (Sheet 10 of 11)

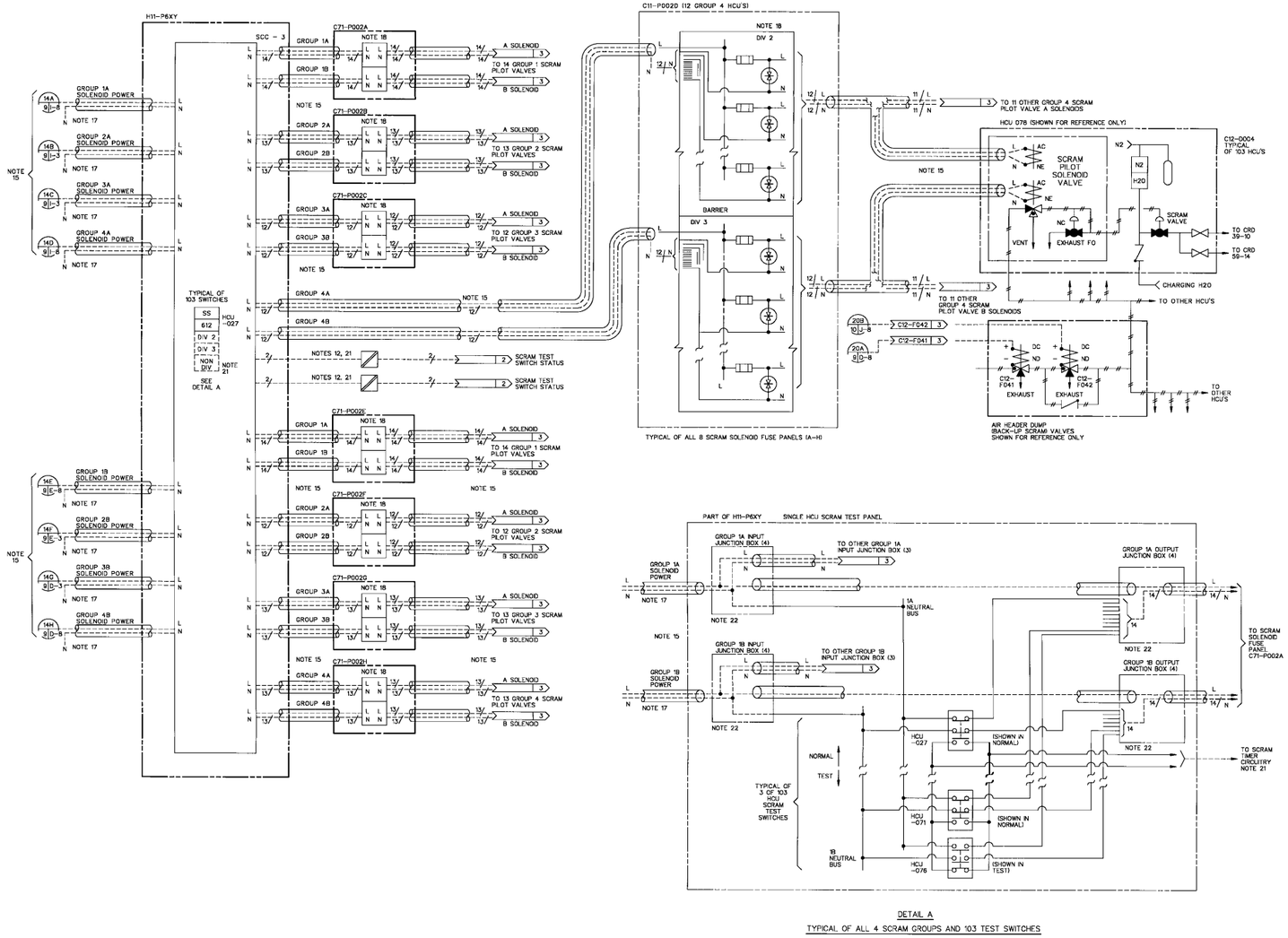


Figure 7.2-9 Reactor Protection System IED (Sheet 11 of 11)

NOTES:

1. LOGIC GATES ARE USED IN THIS DRAWING TO SHOW REACTOR PROTECTION SYSTEM FUNCTIONAL LOGIC AND NOT ACTUAL HARDWARE.

2. LOGIC REPRESENTED IN THIS DOCUMENT FOR PDLU CAN BE IMPLEMENTED BY RELAY LOGIC.

3. ALL SIGNAL DESCRIPTIONS REFLECT THE CONDITION THAT RESULTS IN A LOGIC "1" ON THE SIGNAL LINE. DTM ANALOG INPUT DESCRIPTIONS REFLECT CONDITIONS THAT WILL CAUSE AN INSTRUMENT TRIP.

4. ALL TRIP SIGNALS INTERNAL TO RPS AT THE CHANNEL AND DIVISION LEVEL ARE ASSERTED LOW.

5. ALL BYPASS SIGNALS AND BYPASS PERMISSIVE SIGNALS ARE ASSERTED HIGH.

6. FOR DRAWING CLARITY, ISOLATED SIGNALS ARE SHOWN WITH AN ISOLATOR AT BOTH TRANSMIT AND RECEIVE END. THIS DOES NOT MEAN TO IMPLY THAT TWO SEPARATE ISOLATORS ARE REQUIRED FOR EACH SIGNAL.

7. 2 OUT OF 4 OUTPUT ARRANGEMENT FOR SCC IS REPRESENTED IN THIS DOCUMMENT.

8 LOGIC AND DEVICE SYMBOLS USED IN THIS DRAWING ARE DEFINED IN THE IBD STANDARDS, SUPPORTING DOCUMENT 4.

9. EACH APRM TRIP SIGNAL REPRESENTS EITHER A HIGH NEUTRON FLUX TRIP, A HIGH SIMULATED THERMAL POWER TRIP, AN APRM INOPERATIVE TRIP, AND/OR A CORE FLOW RAPID COASTDOWN TRIP AS DETERMINED BY AN APRM OF THE NMS.

10 EACH SRNM TRIP SIGNAL REPRESENTS EITHER A SRNM UPSCALE (OR HIGH COUNT RATE) TRIP, A SHORT PERIOD TRIP, AND/OR A SRNM INOPERATIVE TRIP AS DETERMINED BY EITHER TWO OR THREE OF THE SRNM'S OF THE NMS.

11. SCRAM SOLENOID POWER WIRING SHALL BE PROTECTED FROM HOT SHORT CONDITIONS BY RUNNING ALL OF THE GROUP 1A, 1B, 2A, 2B, 3A, 3B, 4A AND 4B SOLENOID POWER WIRING WITHIN SEPARATE METAL ENCLOSED RACEWAYS OR WITHIN SEPARATE METAL CONDUIT FROM THE PDLU'S THROUGH TO THE INDIVIDUAL HCU SCRAM PILOT VALVE SOLENOID.

12. PLACING ANY ONE OF THE HCU (PAIR ROD) TEST SWITCHES IN THE "TEST" POSITION SHALL RESULT IN AN ISOLATED SIGNAL BEING SENT TO THE ROD CONTROL AND INFORMATION SYSTEM INDICATING THE START OF A CONTROL ROD SCRAM TEST.

13. LOGIC REPRESENTED IN THE SCC'S SHOWN ON SHEETS 65 AND 66 OF THIS DOCUMENT CAN BE IMPLEMENTED BY RELAY LOGIC.

MPL NO. C71-1030

Figure 7.2-10 Reactor Protection System IBD (Sheet 1 of 72)

SH NO.	TITLE
1	NOTES
2	TABLE OF CONTENTS, REF DOCUMENTS, SUPPORTING DOCUMENTS, ABREVIATIONS
3	DIV 1 TLU; RX MODE AND RELATED BYPASSES
4	DIV 2 TLU; RX MODE AND RELATED BYPASSES
5	DIV 3 TLU; RX MODE AND RELATED BYPASSES
6	DIV 4 TLU; RX MODE AND RELATED BYPASSES
7	DIV 1 BPU; BYPASS LOGIC-TLU BYPASS, CHANNEL SENSOR BYPASS, SPECIAL MSLI TRIP BYPASS
8	DIV 2 BPU; BYPASS LOGIC-TLU BYPASS, CHANNEL SENSOR BYPASS, SPECIAL MSLI TRIP BYPASS
9	DIV 3 BPU; BYPASS LOGIC-TLU BYPASS, CHANNEL SENSOR BYPASS, SPECIAL MSLI TRIP BYPASS
10	DIV 4 BPU; BYPASS LOGIC-TLU BYPASS, CHANNEL SENSOR BYPASS, SPECIAL MSLI TRIP BYPASS
11	DIV 1 DTM; CHANNEL A SENSOR TRIP LOGIC
12	DIV 2 DTM; CHANNEL B SENSOR TRIP LOGIC
13	DIV 3 DTM; CHANNEL C SENSOR TRIP LOGIC
14	DIV 4 DTM; CHANNEL D SENSOR TRIP LOGIC
15	DIV 1 DTM; CHANNEL A SENSOR TRIP LOGIC
16	DIV 2 DTM; CHANNEL B SENSOR TRIP LOGIC
17	DIV 3 DTM; CHANNEL C SENSOR TRIP LOGIC
18	DIV 4 DTM; CHANNEL D SENSOR TRIP LOGIC
19	DIV 1 TLU; NMS DIV 1 TRIP LOGIC
20	DIV 2 TLU; NMS DIV 2 TRIP LOGIC
21	DIV 3 TLU; NMS DIV 3 TRIP LOGIC
22	DIV 4 TLU; NMS DIV 4 TRIP LOGIC
23	DIV 1 TLU; RX PRESS DIV 1 TRIP, SUPPRESSION POOL TEMP. TSV CLOSURE DIV 1 TRIP LOGIC
24	DIV 2 TLU; RX PRESS DIV 2 TRIP, SUPPRESSION POOL TEMP. TSV CLOSURE DIV 2 TRIP LOGIC
25	DIV 3 TLU; RX PRESS DIV 3 TRIP, SUPPRESSION POOL TEMP. TSV CLOSURE DIV 3 TRIP LOGIC
26	DIV 4 TLU; RX PRESS DIV 4 TRIP, SUPPRESSION POOL TEMP. TSV CLOSURE DIV 4 TRIP LOGIC
27	DIV 1 TLU; TSV, TCV CLOSURE DIV 1 TRIP LOGIC
28	DIV 2 TLU; TSV, TCV CLOSURE DIV 2 TRIP LOGIC
29	DIV 3 TLU; TSV, TCV CLOSURE DIV 3 TRIP LOGIC
30	DIV 4 TLU; TSV, TCV CLOSURE DIV 4 TRIP LOGIC
31	DIV 1 TLU; MSLI DIV 1 TRIP LOGIC
32	DIV 2 TLU; MSLI DIV 2 TRIP LOGIC
33	DIV 3 TLU; MSLI DIV 3 TRIP LOGIC
34	DIV 4 TLU; MSLI DIV 4 TRIP LOGIC
35	BLANK
36	BLANK

SH NO.	TITLE
37	BLANK
38	BLANK
39	DIV 1 TLU; MSL RAD DIV 1 , DW PRESS DIV 1 TRIP LOGIC
40	DIV 2 TLU; MSL RAD DIV 2 , DW PRESS DIV 2 TRIP LOGIC
41	DIV 3 TLU; MSL RAD DIV 3 , DW PRESS DIV 3 TRIP LOGIC
42	DIV 4 TLU; MSL RAD DIV 4 , DW PRESS DIV 4 TRIP LOGIC
43	DIV 1 TLU; RX WTR LVL DIV 1, CRD PRESS DIV 1 TRIP LOGIC
44	DIV 2 TLU; RX WTR LVL DIV 2, CRD PRESS DIV 2 TRIP LOGIC
45	DIV 3 TLU; RX WTR LVL DIV 3, CRD PRESS DIV 3 TRIP LOGIC
46	DIV 4 TLU; RX WTR LVL DIV 4, CRD PRESS DIV 4 TRIP LOGIC
47	DIV 1 TLU; DIV 1 AUTO-SCRAM LOGIC
48	DIV 2 TLU; DIV 2 AUTO-SCRAM LOGIC
49	DIV 3 TLU; DIV 3 AUTO-SCRAM LOGIC
50	DIV 4 TLU; DIV 4 AUTO-SCRAM LOGIC
51	DIV 1 TLU; TRIP IN CH A BYPASSED SENSOR
52	DIV 2 TLU; TRIP IN CH B BYPASSED SENSOR
53	DIV 3 TLU; TRIP IN CH C BYPASSED SENSOR
54	DIV 4 TLU; TRIP IN CH D BYPASSED SENSOR
55	DIV 2 PDLU; MANUAL SCRAM, SEAL-IN AND MANUAL SCRAM RESET LOGIC
56	DIV 3 PDLU; MANUAL SCRAM, SEAL-IN AND MANUAL SCRAM RESET LOGIC
57	DIV 1 OLU; DIV 1 AUTO SCRAM, SEAL-IN, RESET, MANUAL TRIP AND LD TEST LOGIC
58	DIV 2 OLU; DIV 2 AUTO SCRAM, SEAL-IN, RESET, MANUAL TRIP AND LD TEST LOGIC
59	DIV 3 OLU; DIV 3 AUTO SCRAM, SEAL-IN, RESET, MANUAL TRIP AND LD TEST LOGIC
60	DIV 4 OLU; DIV 4 AUTO SCRAM, SEAL-IN, RESET, MANUAL TRIP AND LD TEST LOGIC
61	GROUP 1 LD ARRANGEMENT AND HCU'S
62	GROUP 2 LD ARRANGEMENT AND HCU'S
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65	BACKUP SCRAM RELAY ARRANGEMENT AND RESET PERMISSIVE LOGIC
66	BACKUP SCRAM RELAY ARRANGEMENT AND RESET PERMISSIVE LOGIC
67	RPS ALARMS
68	RPS ALARMS
69	RPS ALARMS
70	RPS ALARMS
71	RPS ALARMS
72	RPS ALARMS

SUPPORTING DOCUMENTS:

		MPL NO.
1.	REACTOR PROTECTION SYS DESIGN SPEC	C71-4010
2.	REACTOR PROTECTION SYS IED	C71-1040
3.	NEUTRON MONITORING SYS IED	C51-1040
4.	IBD STANDARDS DESIGN STANDARDS	A10-3070

REFERENCES:

		MPL NO.
1.	NEUTRON MONITORING SYS IBD	C51-1030
2.	LEAK DETECTION SYSTEM IBD	E31-1030
3.	ROD CONTROL & INFO SYSTEM IBD	C11-1030
4.	CONTROL ROD DRIVE SYSTEM P&ID	C12-1010
5.	PROCESS RAD MONITORING SYS IED	D11-1040
6.	NUCLEAR BOILER SYS P&ID	B21-1010
7.	RECIRC FLOW CONTROL SYS IBD	C81-1030
8.	SUPPRESSION POOL TEMPERATURE MONITORING SYSTEM IED	T53-1010

ABREVIATIONS

BPU - BYPASS UNITS
DTM - DIGITAL TRIP MODULE
RMU - REMOTE MULTIPLEXING UNIT
TLU - TRIP LOGIC UNIT
SLU - SAFETY SYSTEM LOGIC UNIT
OLU - OUTPUT LOGIC UNIT
PDLU - POWER DISTRIBUTION LOGIC UNIT
SCC - SOLENOID CONTROL CENTER
SSFP - SCRAM SOLENOID FUSE PANEL
SSLC - SAFETY SYSTEM LOGIC & CONTROL
APRM - AVERAGE POWER RANGE MONITOR
CRD - CONTROL ROD DRIVE
HCU - HYDRAULIC CONTROL UNIT
MSIV - MAIN STEAM LINE ISOLATION VALVE
MSL - MAIN STEAM LINE
SRNM - STARTUP RANGE NEUTRON MONITOR
mP - MICROPROCESSOR
LD - LOAD DRIVER
KOS - KEY OPERATED SWITCH
HTS - HYDRAULIC TRIP SYSTEM

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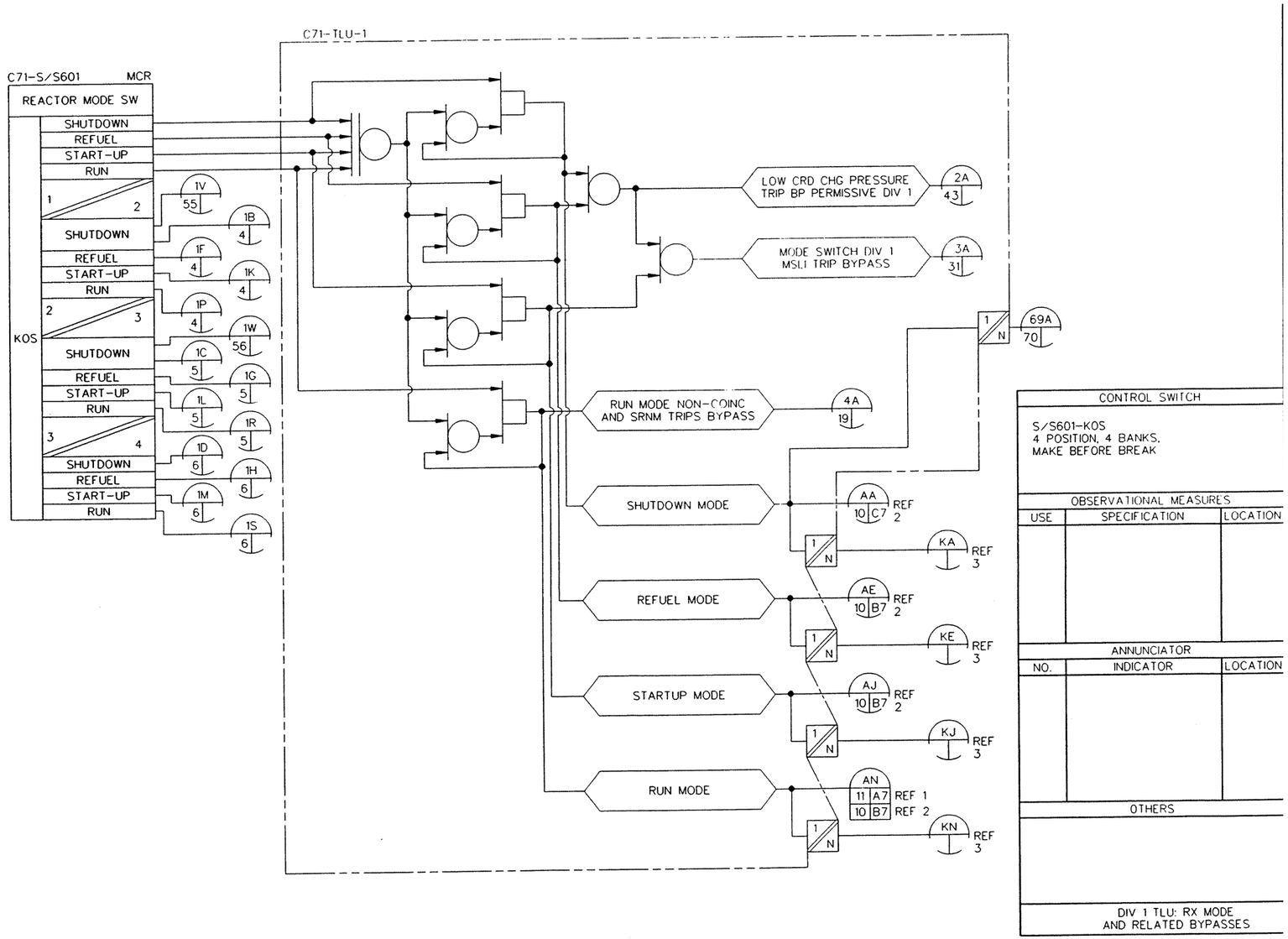

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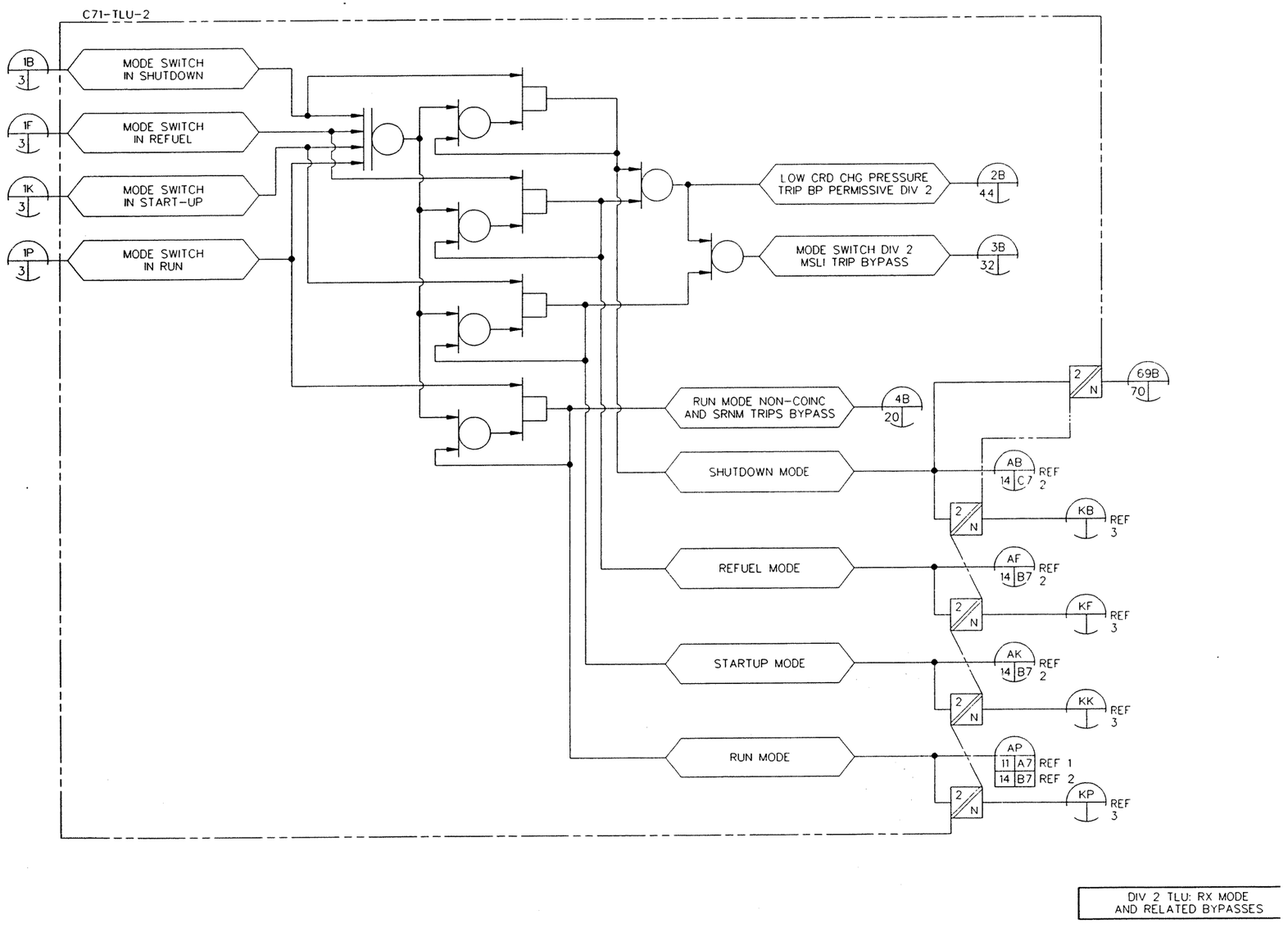

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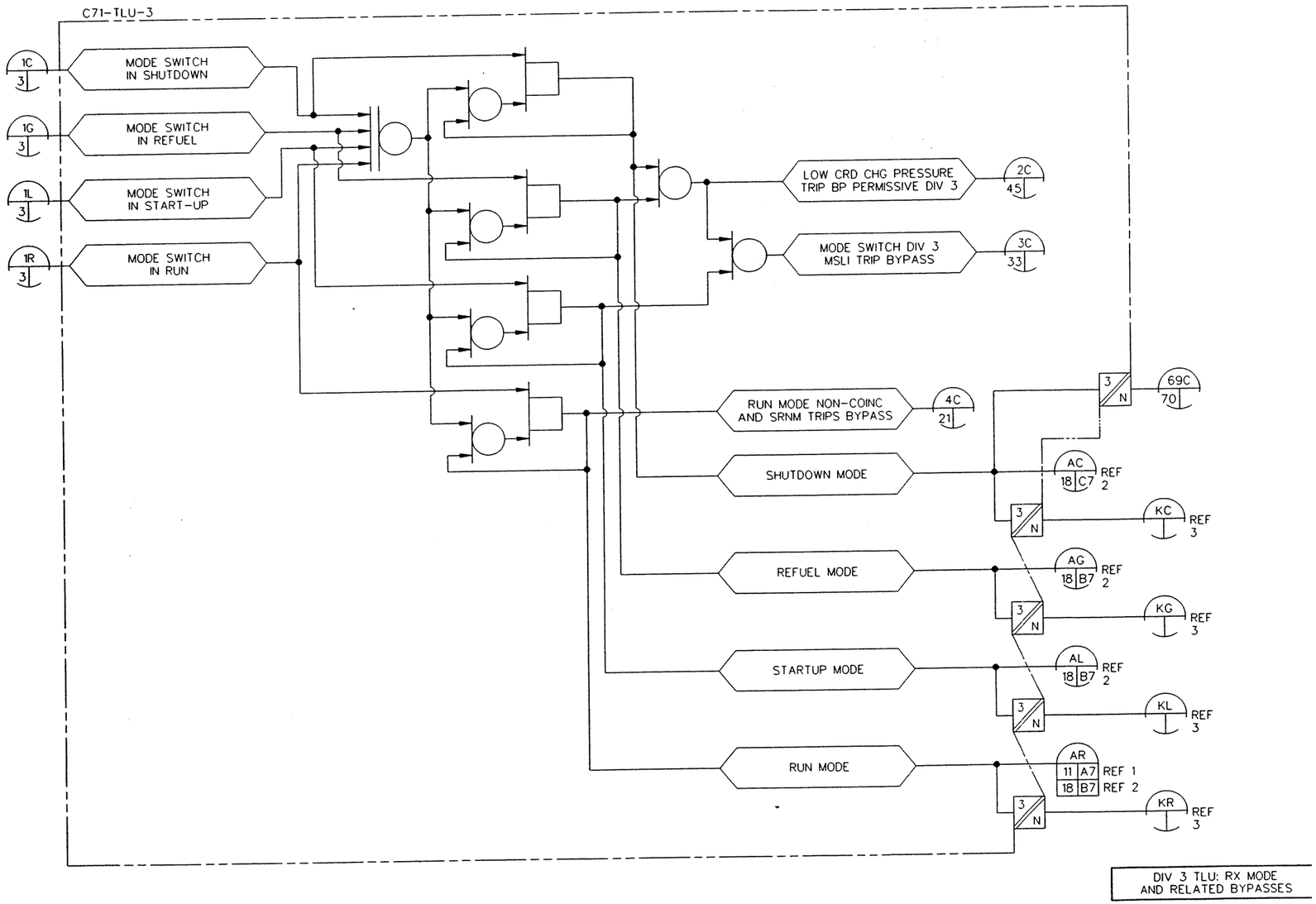

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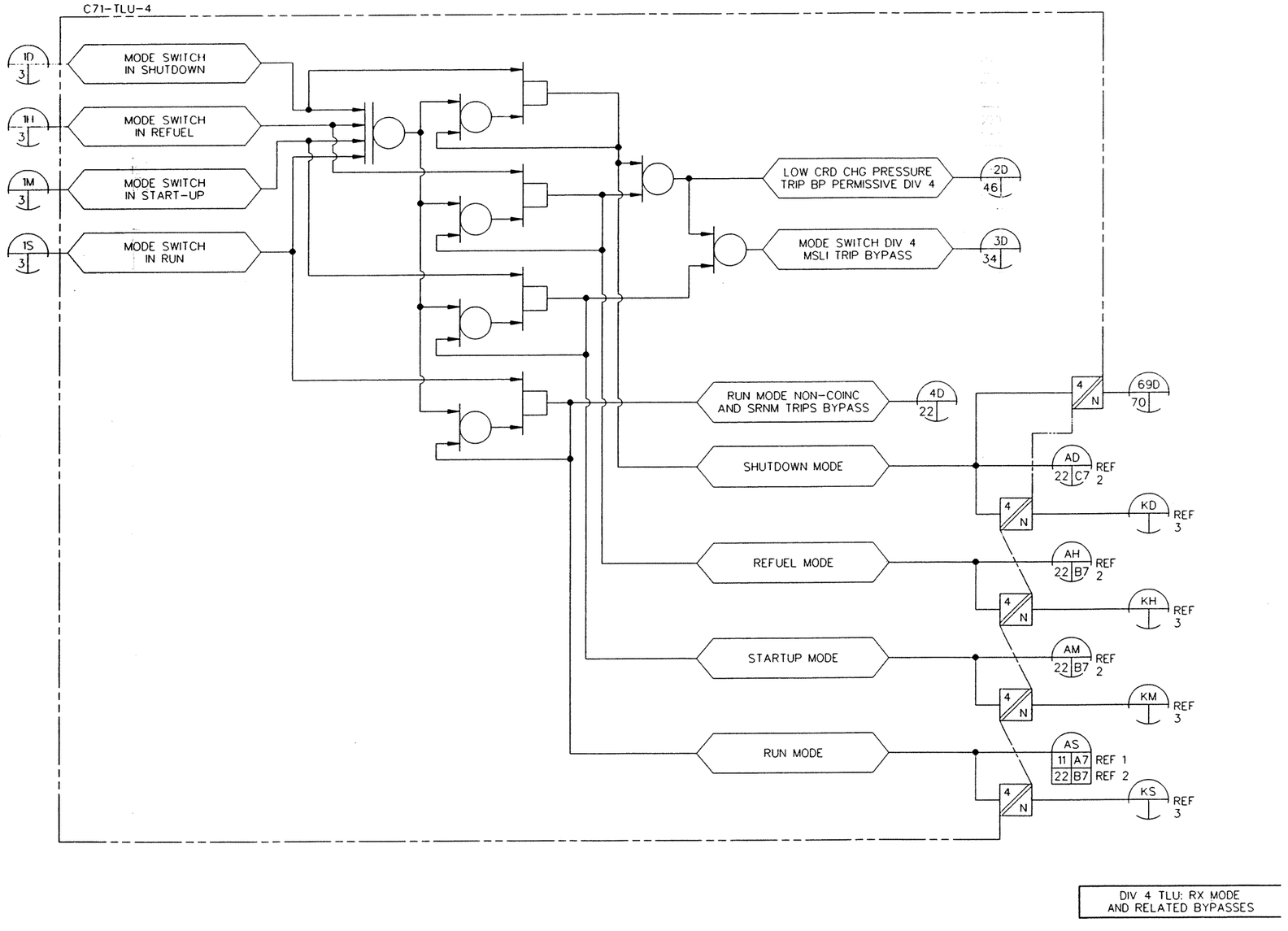

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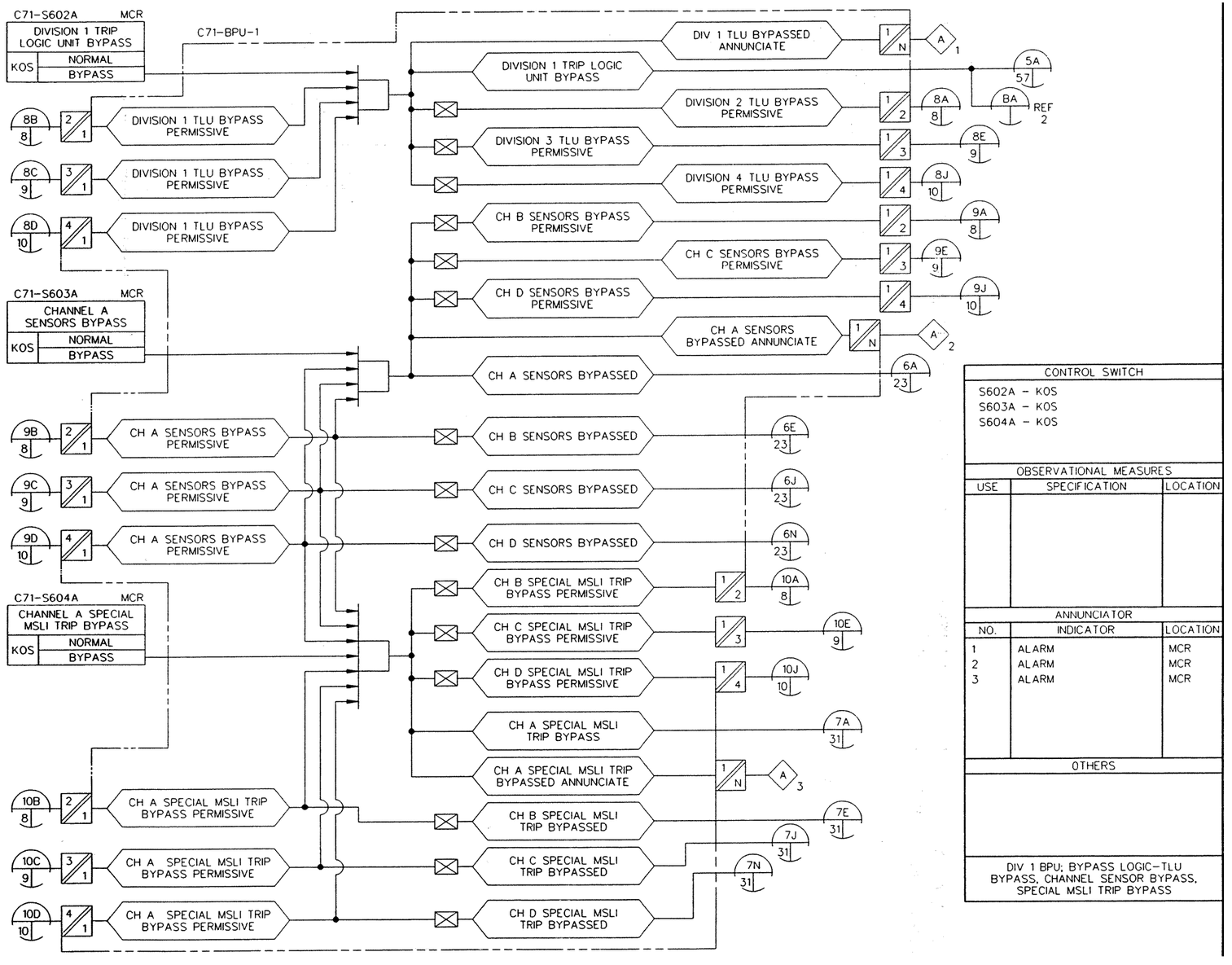

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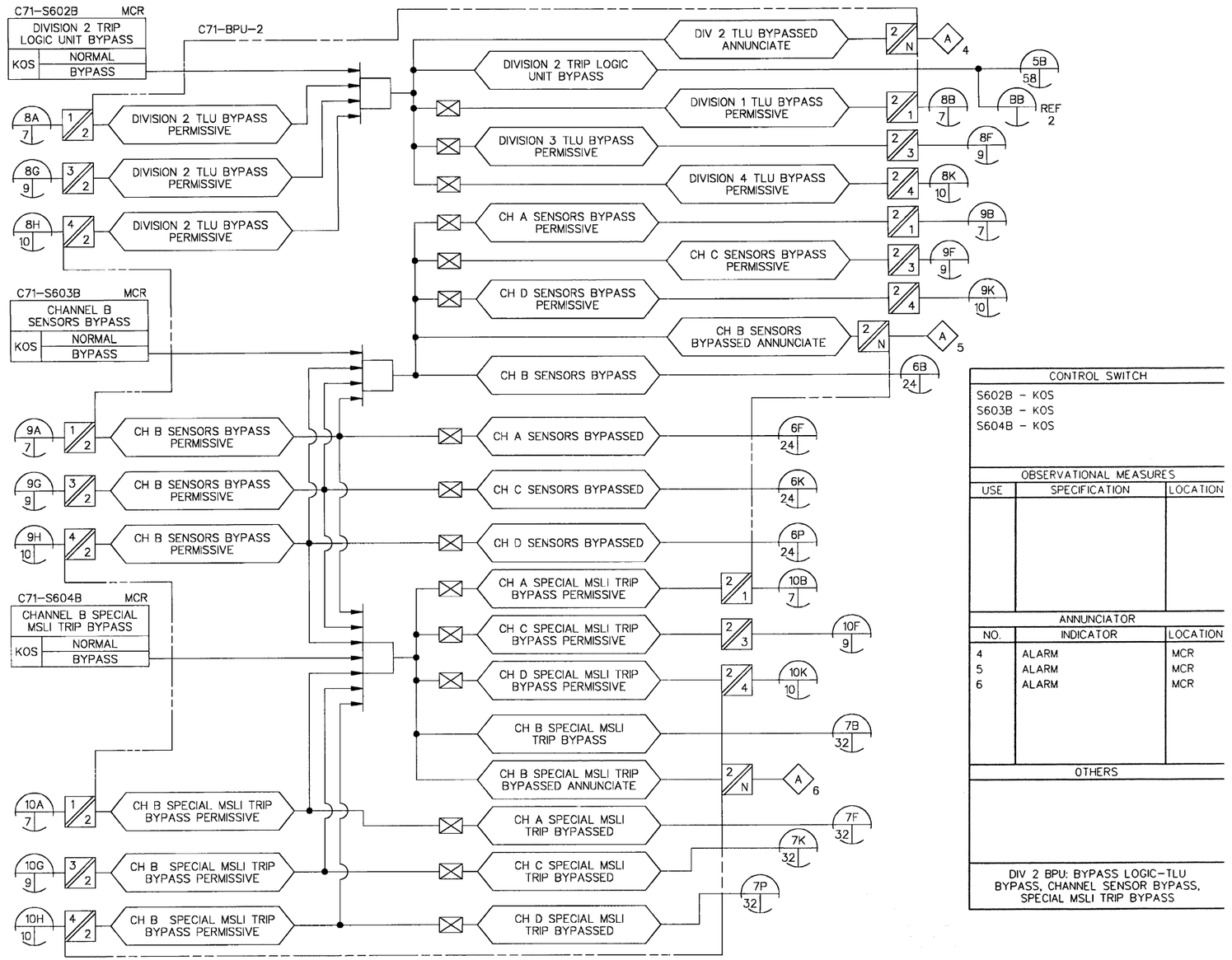

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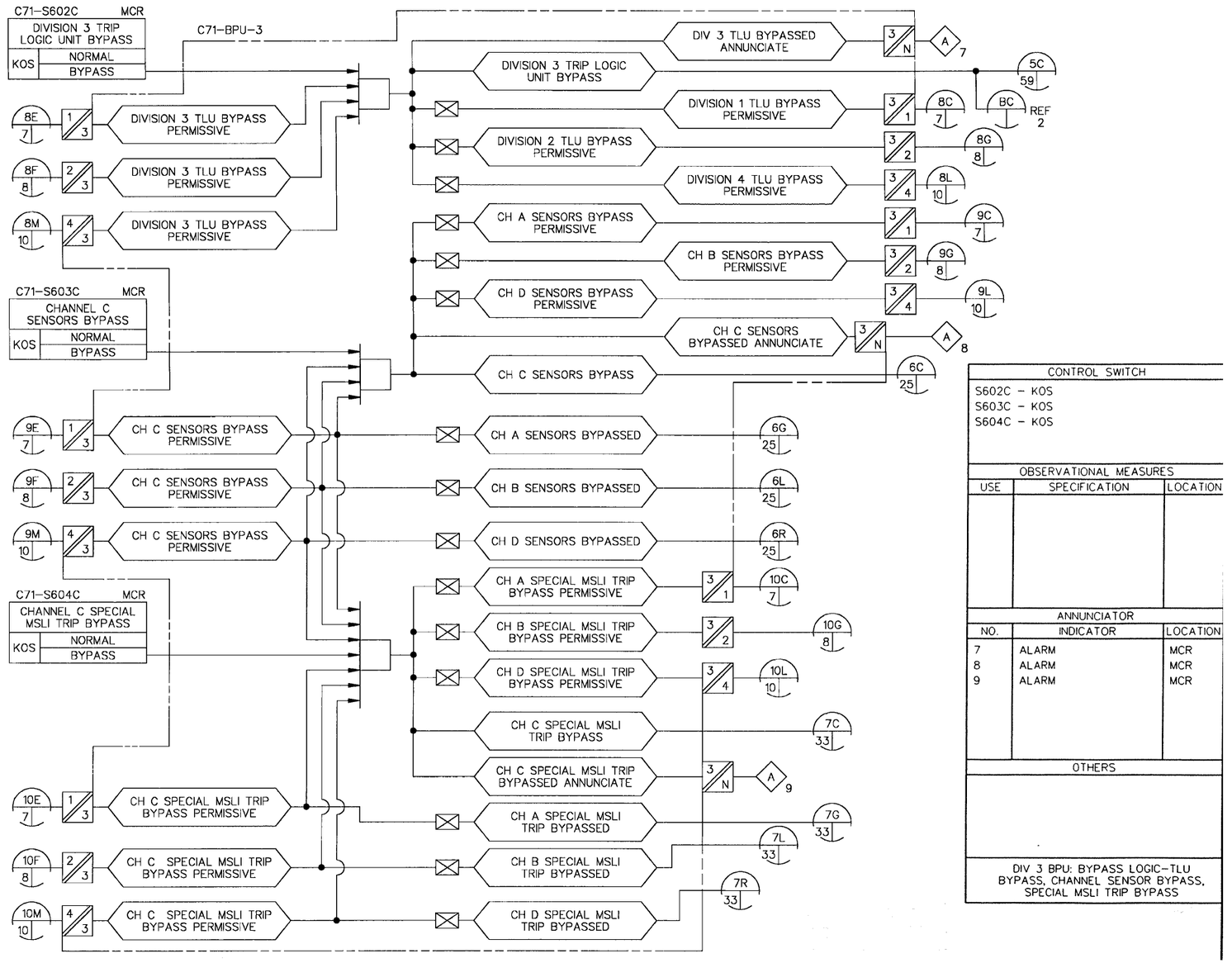

CONTROL SWITCH

S602C – KOS
S603C – KOS
S604C – KOS

OBSERVATIONAL MEASURES

USE	SPECIFICATION	LOCATION

ANNUNCIATOR

NO.	INDICATOR	LOCATION
7	ALARM	MCR
8	ALARM	MCR
9	ALARM	MCR

OTHERS

DIV 3 BPU: BYPASS LOGIC–TLU BYPASS, CHANNEL SENSOR BYPASS, SPECIAL MSLI TRIP BYPASS

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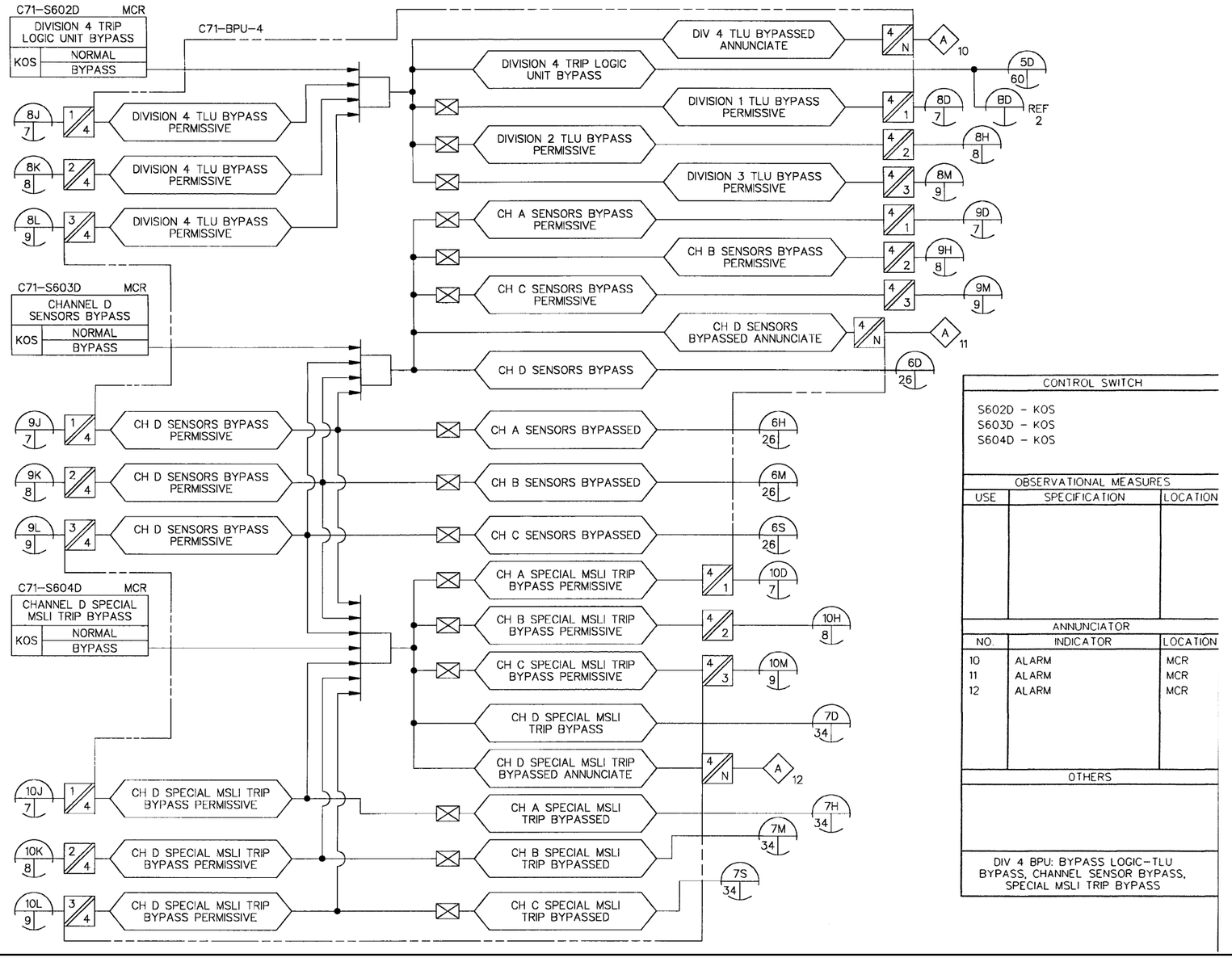

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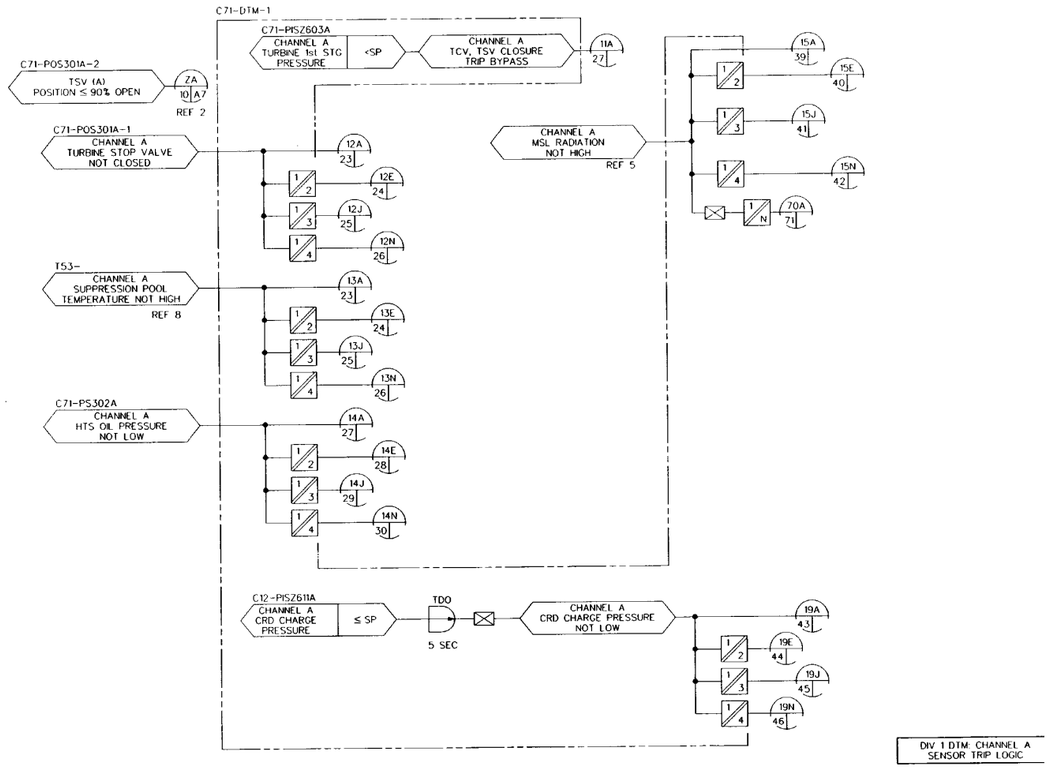

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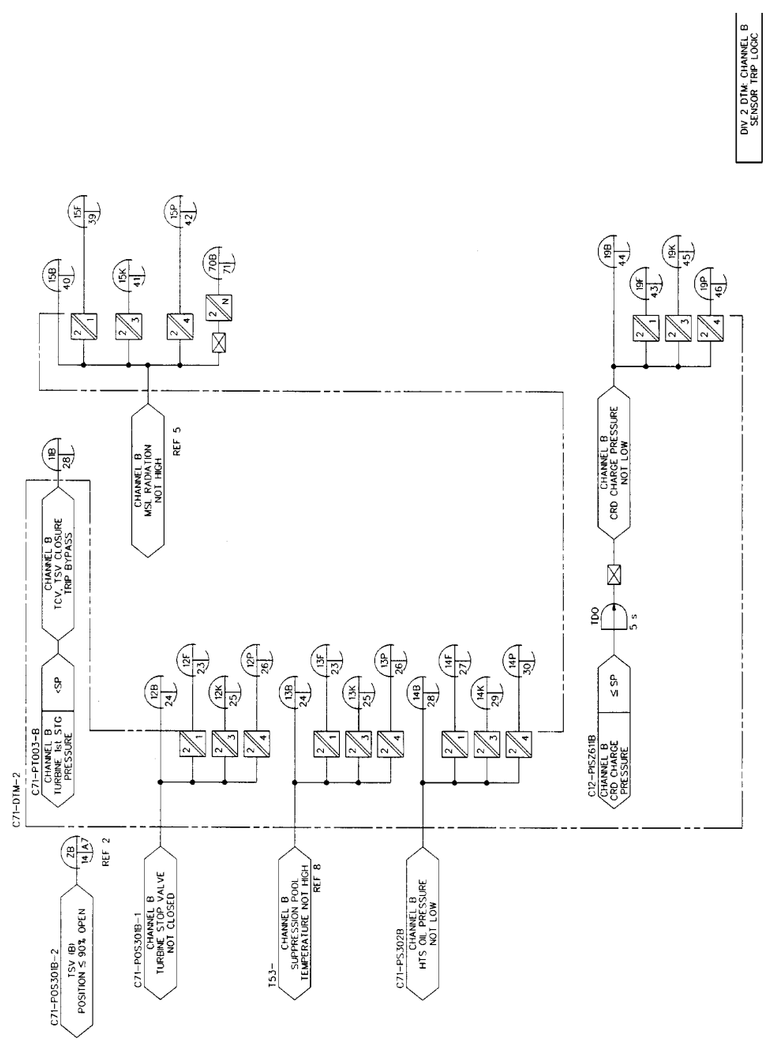

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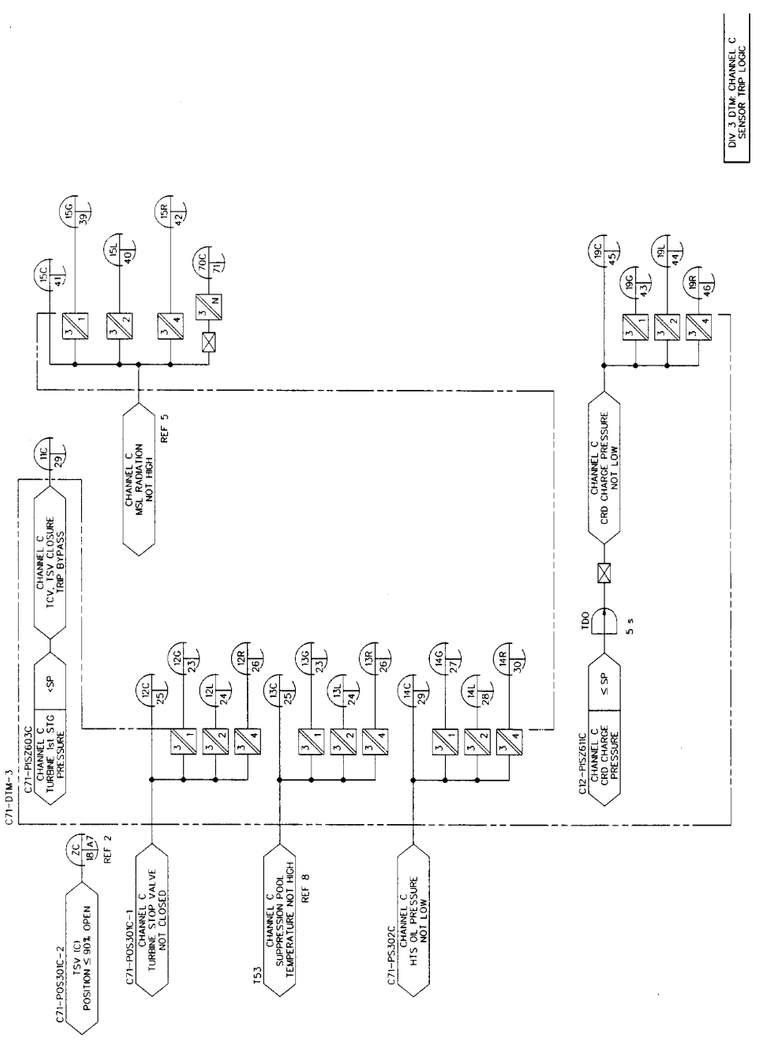

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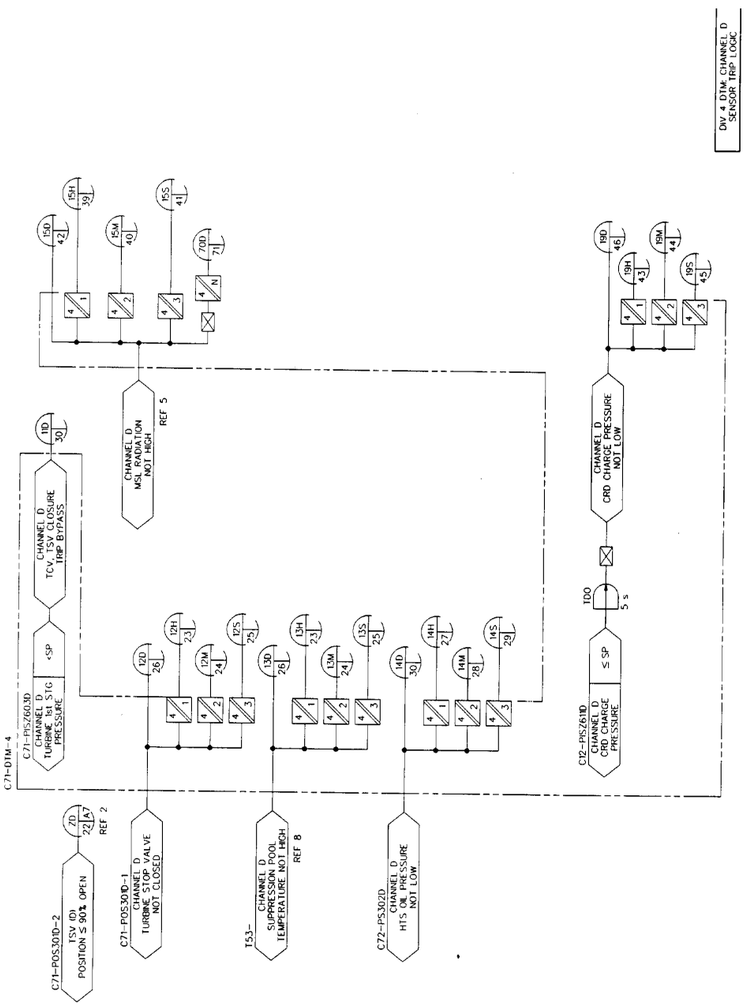

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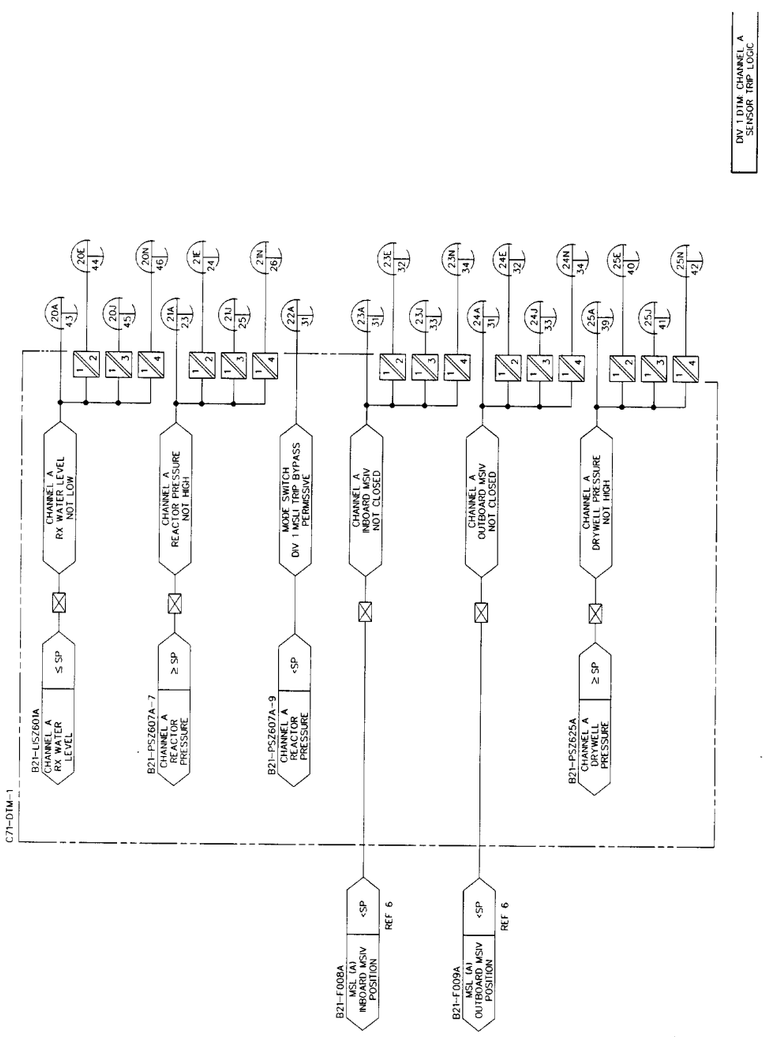

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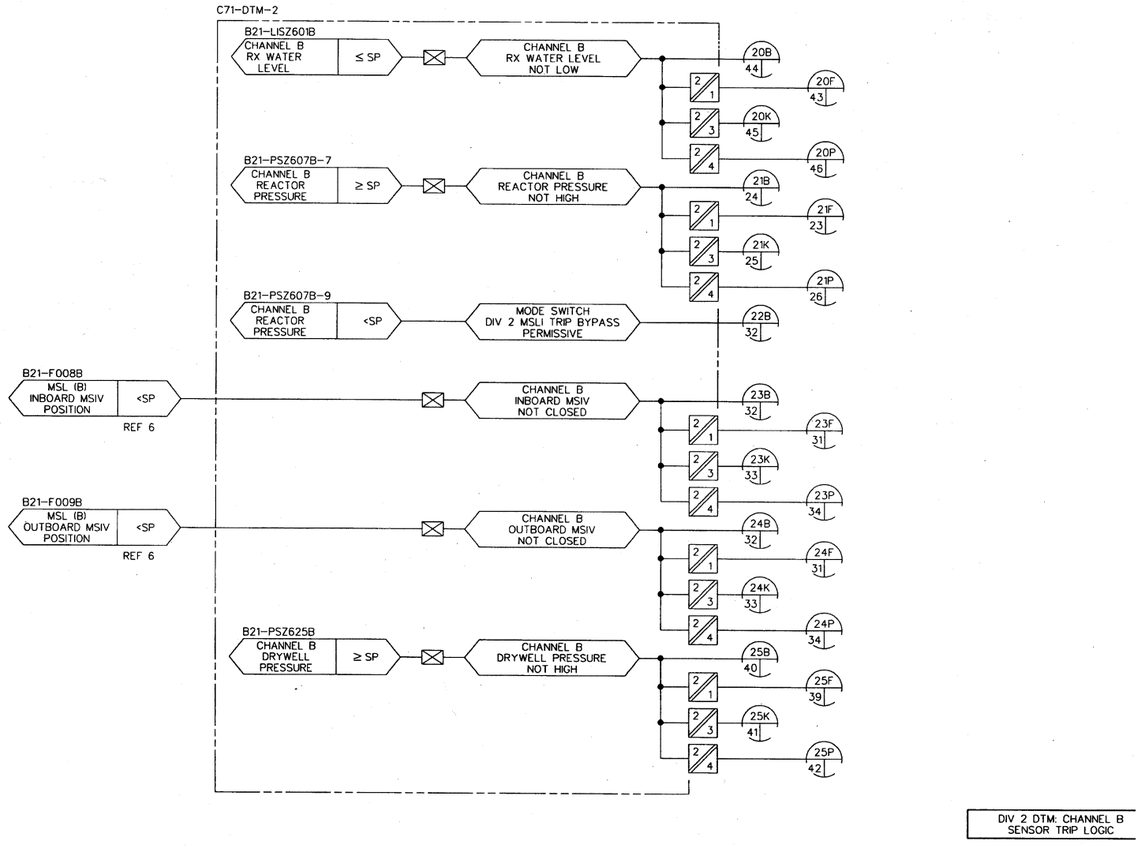

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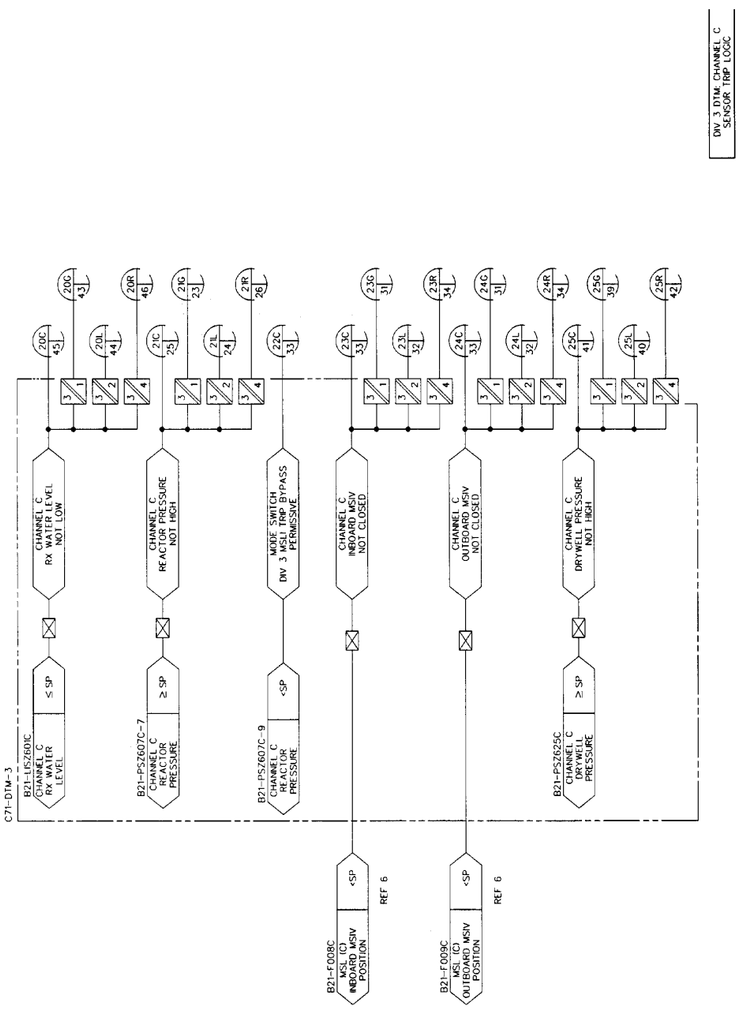

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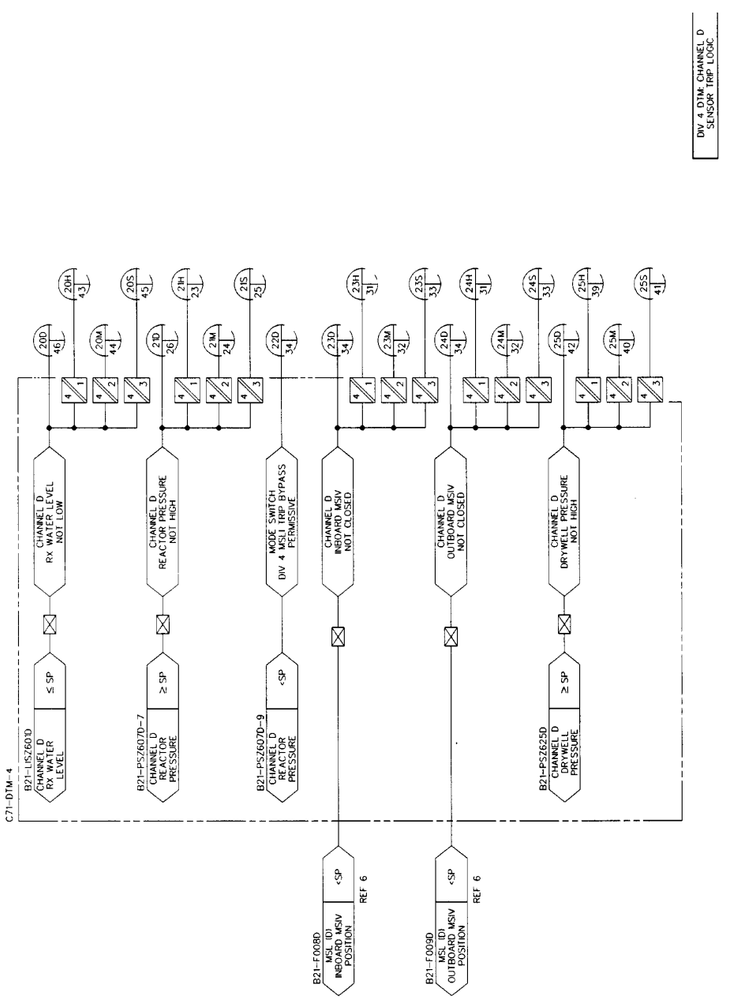

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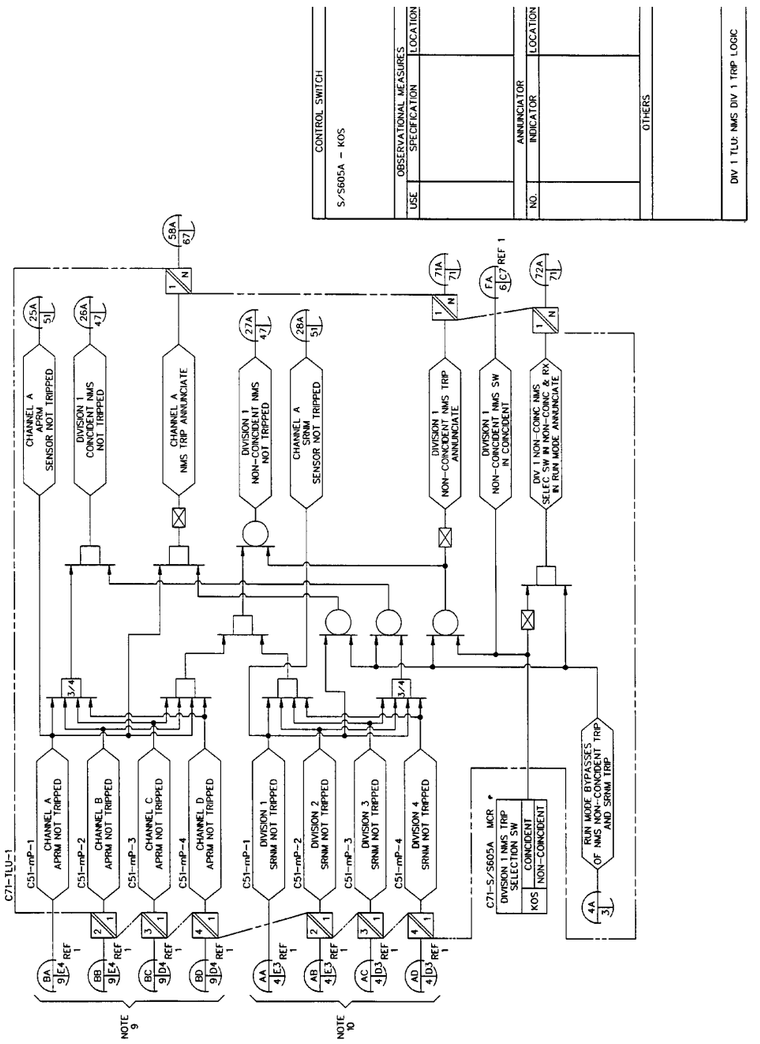

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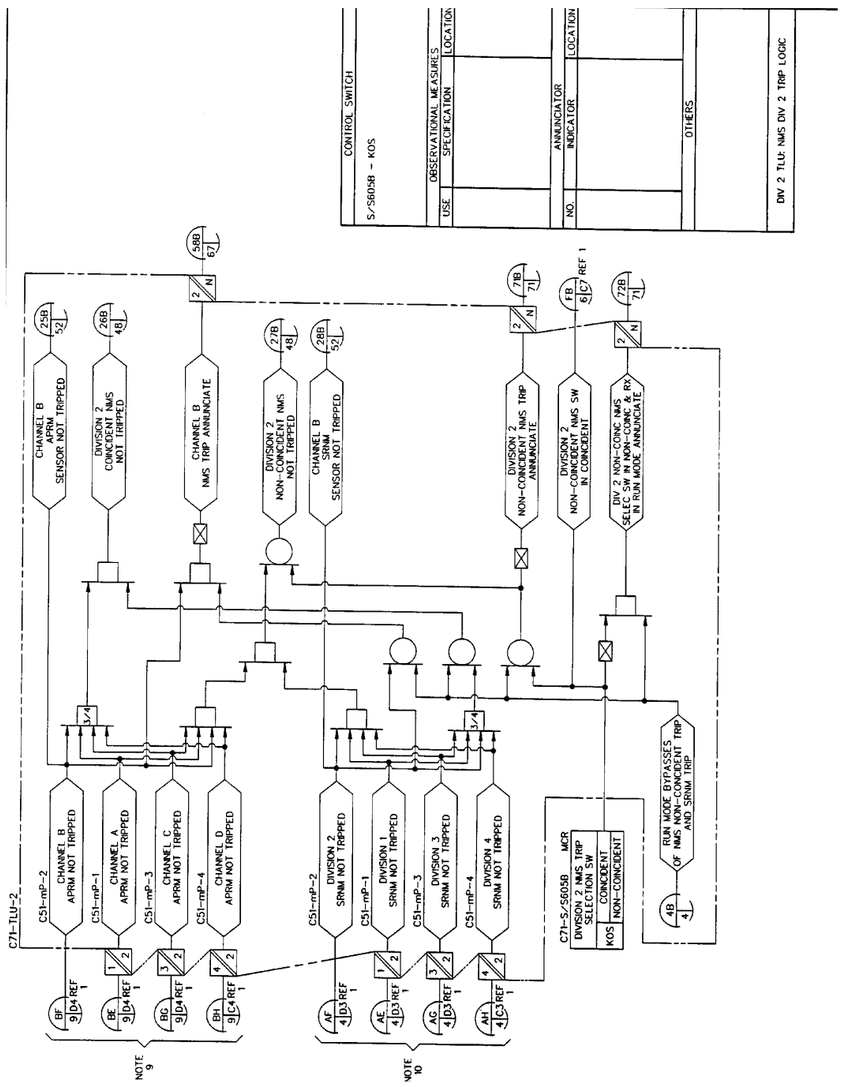

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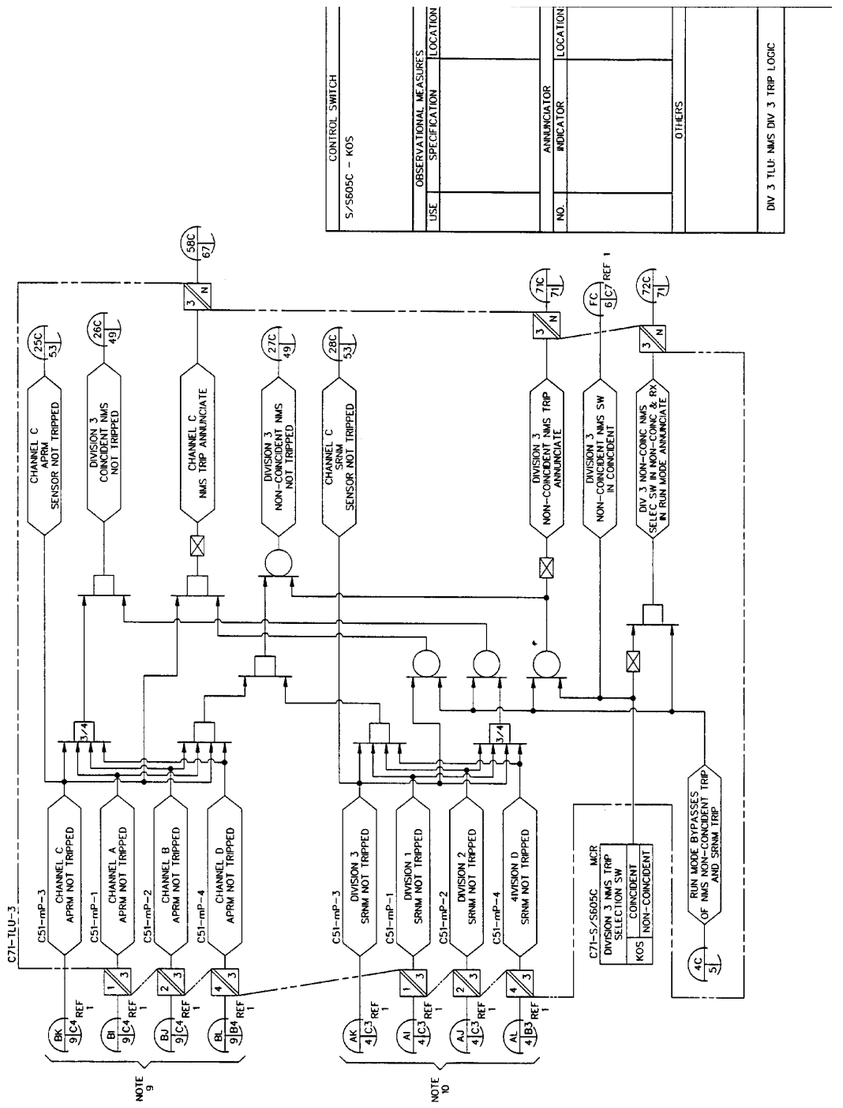

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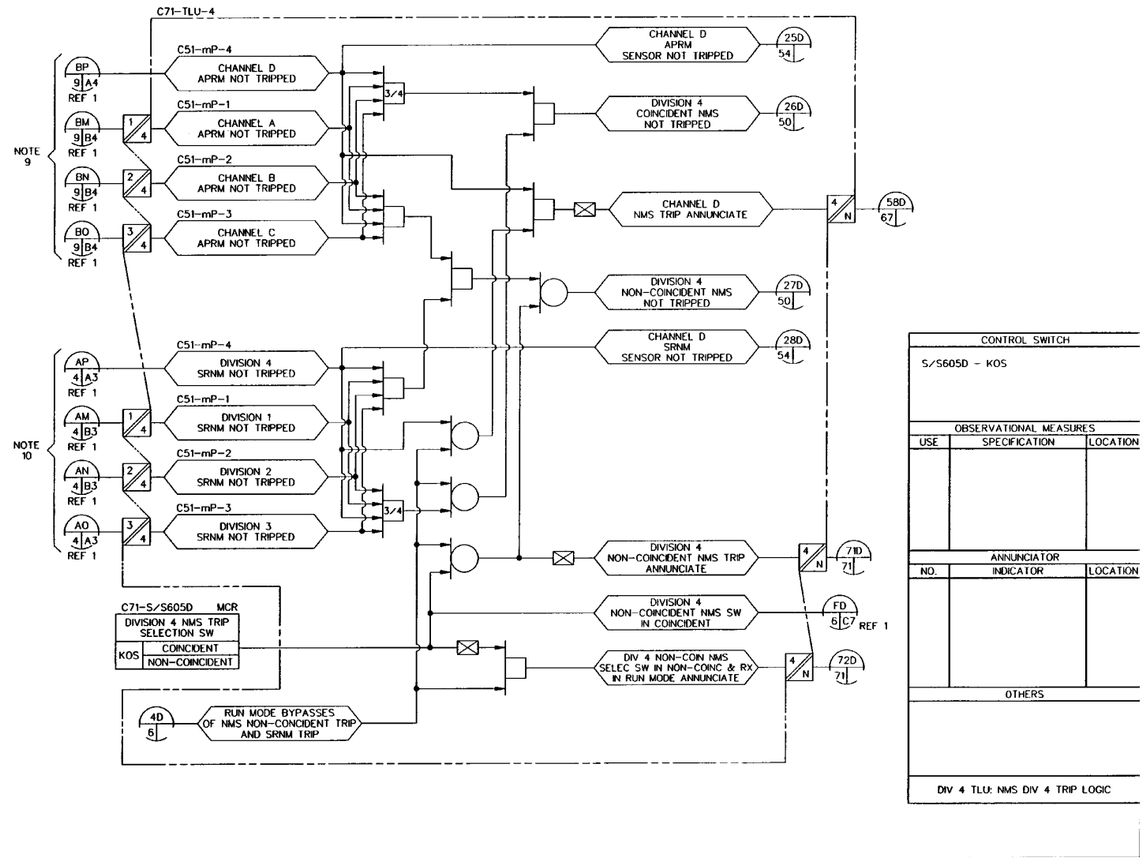

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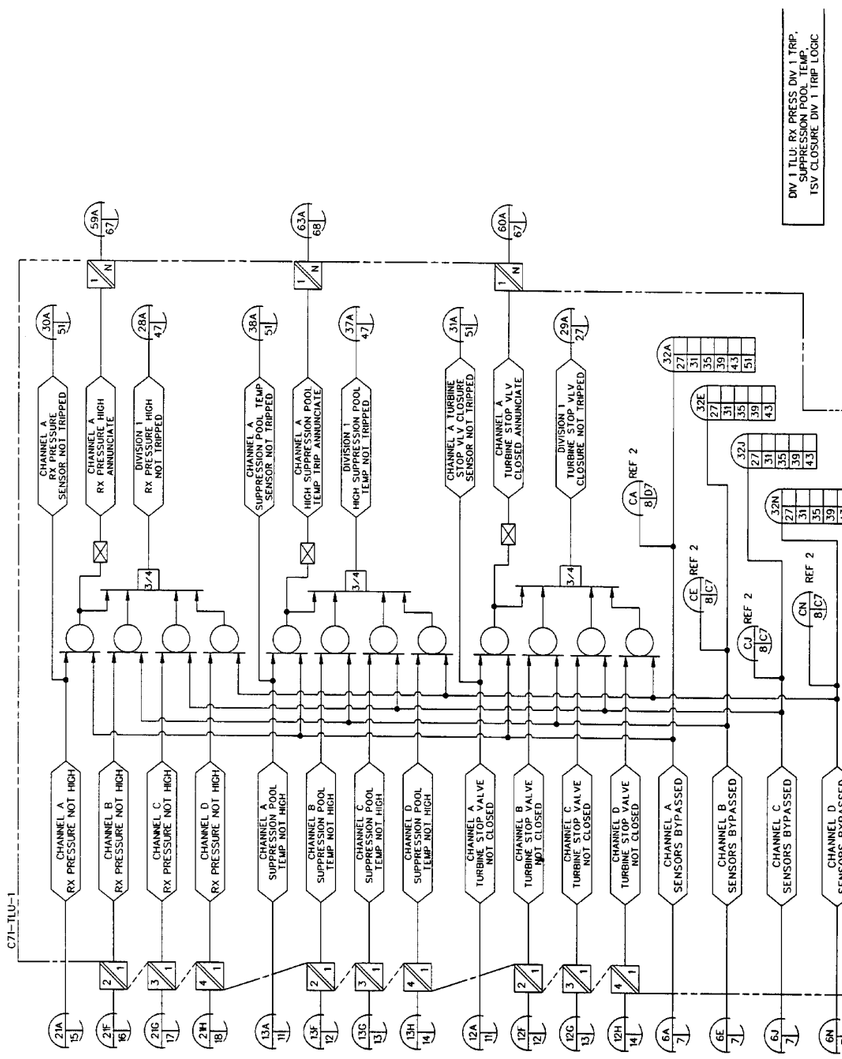

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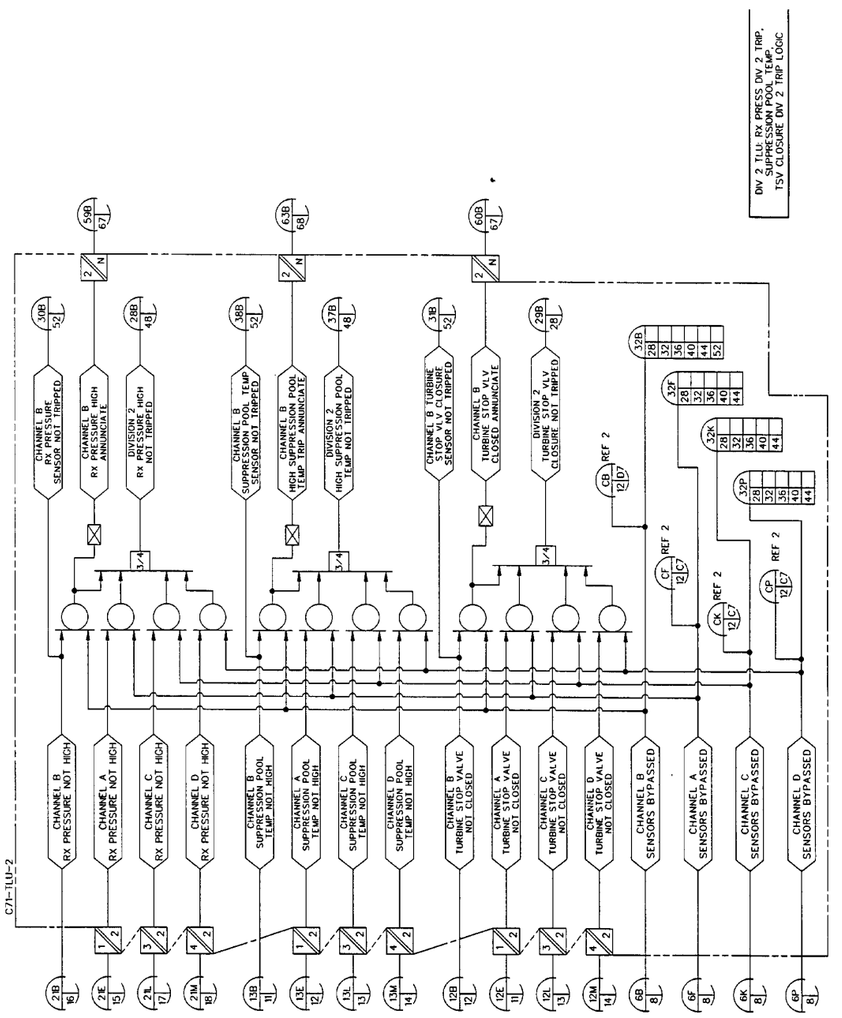

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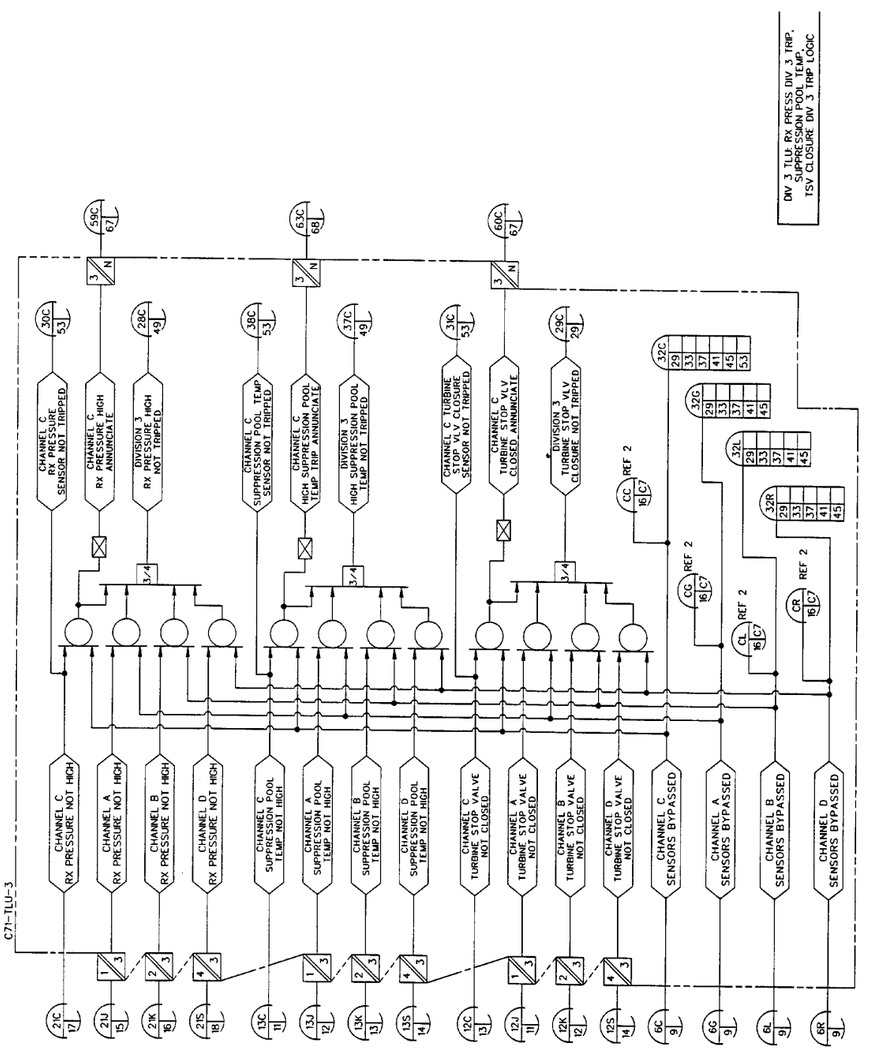

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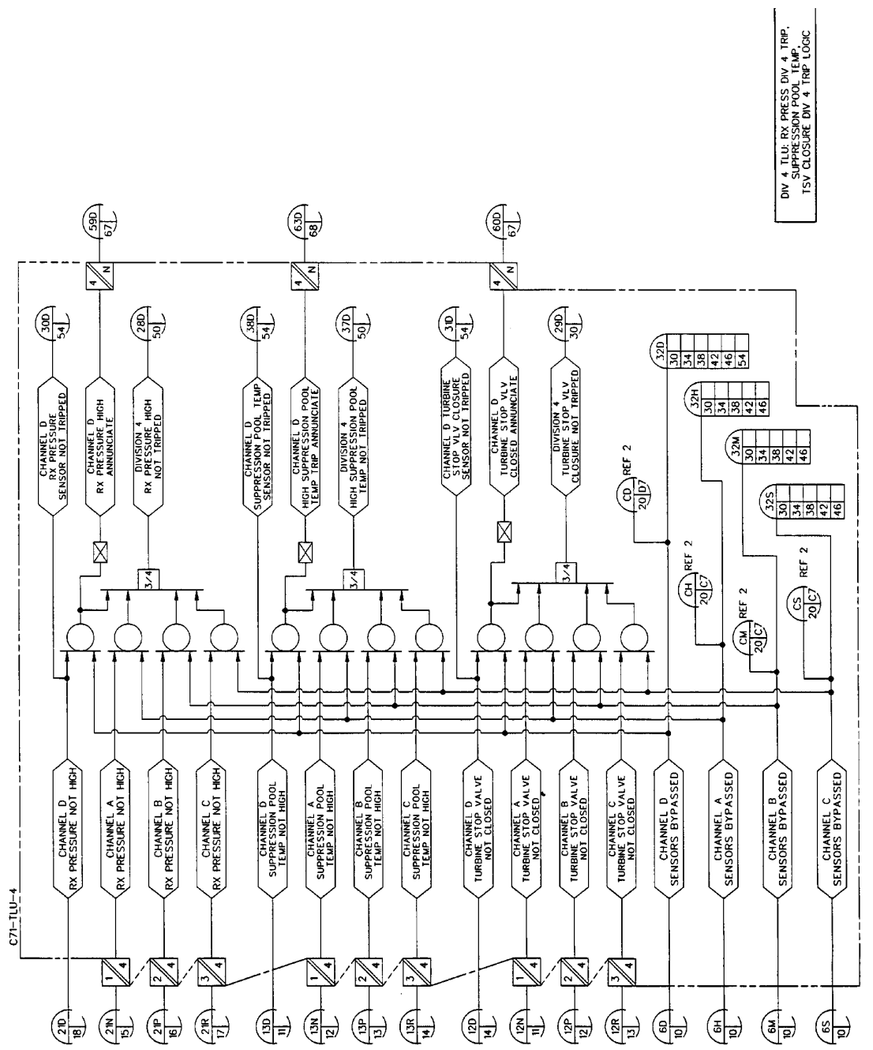

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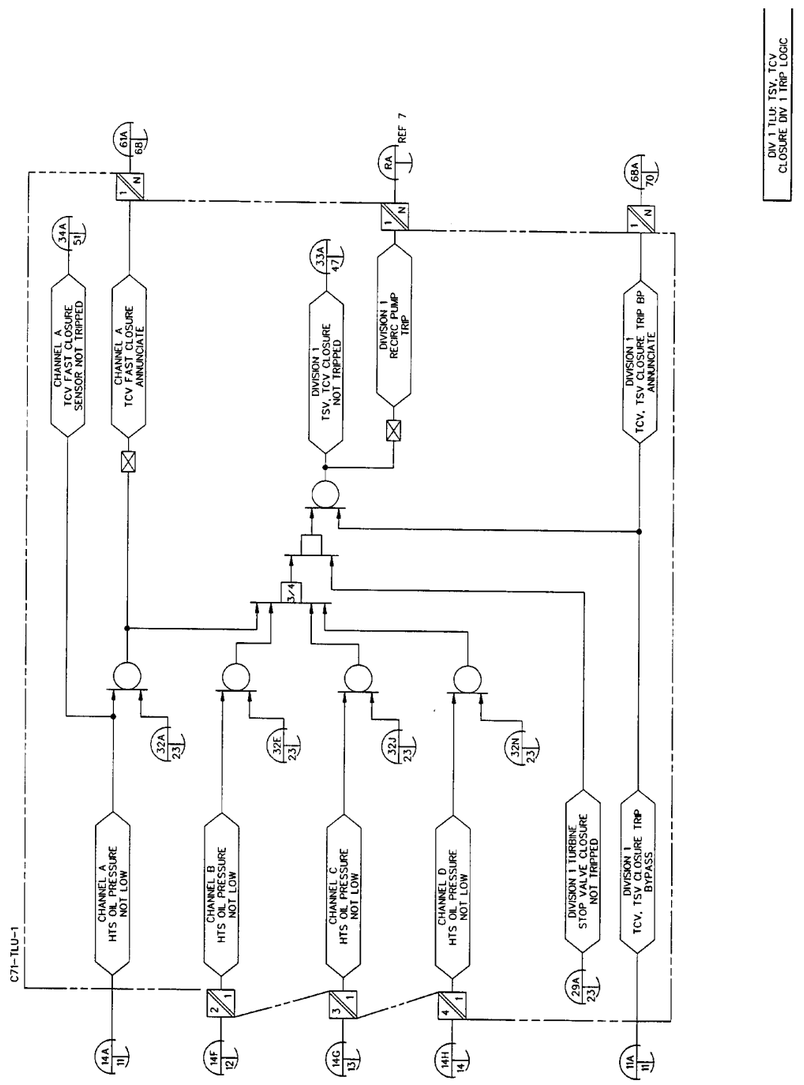

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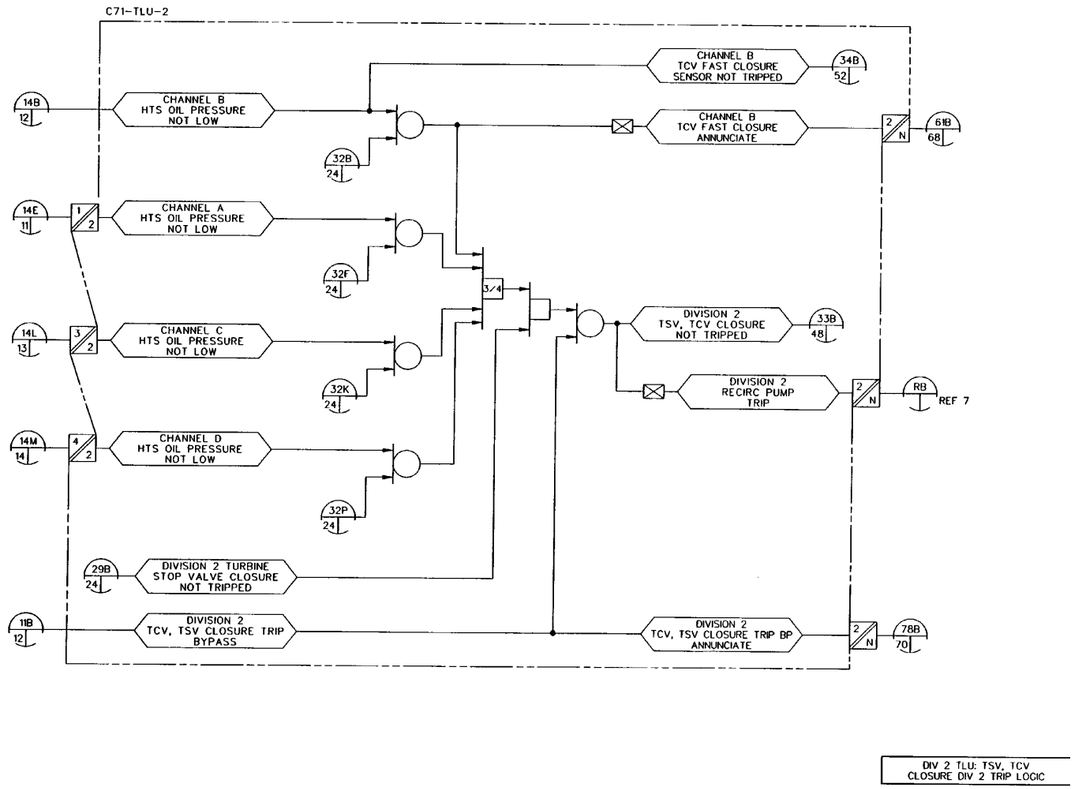

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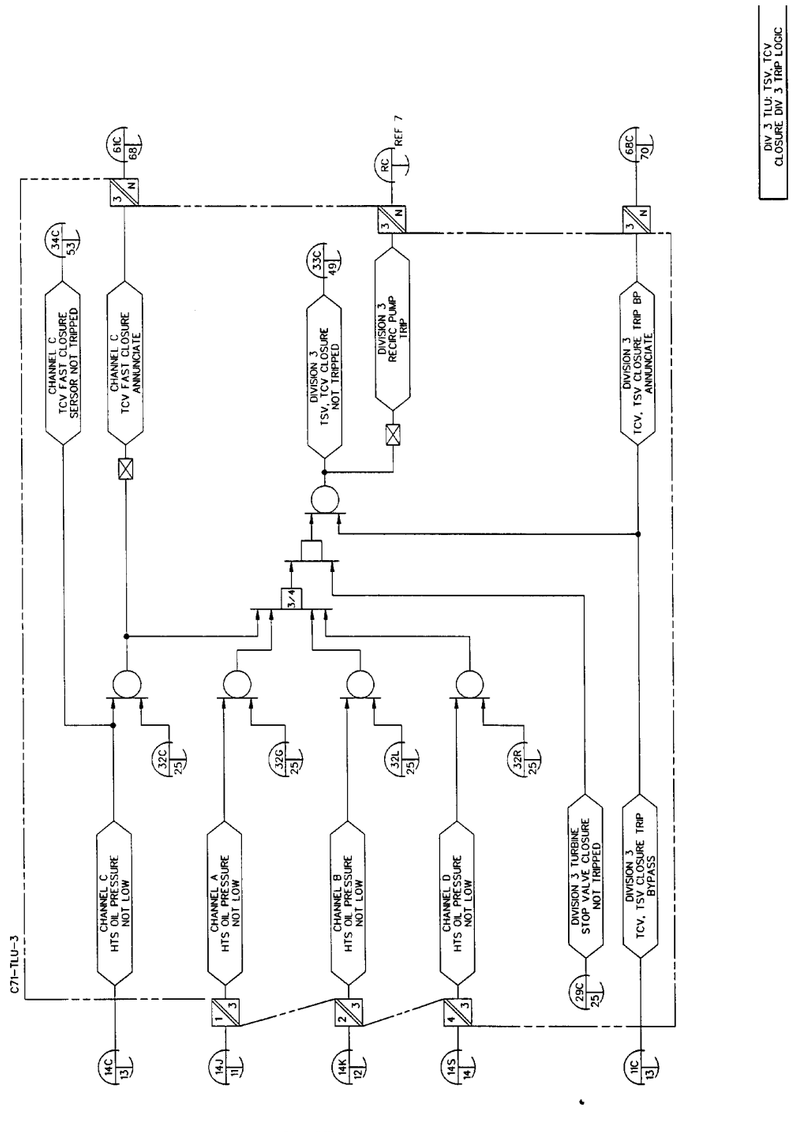

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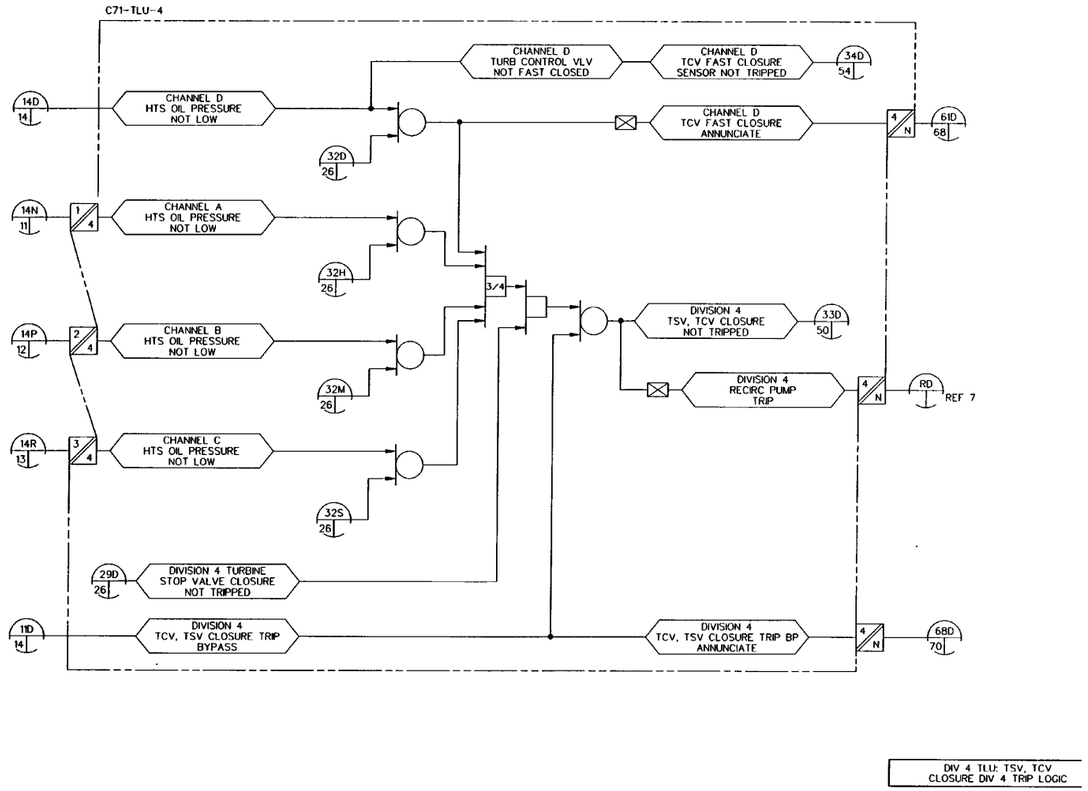

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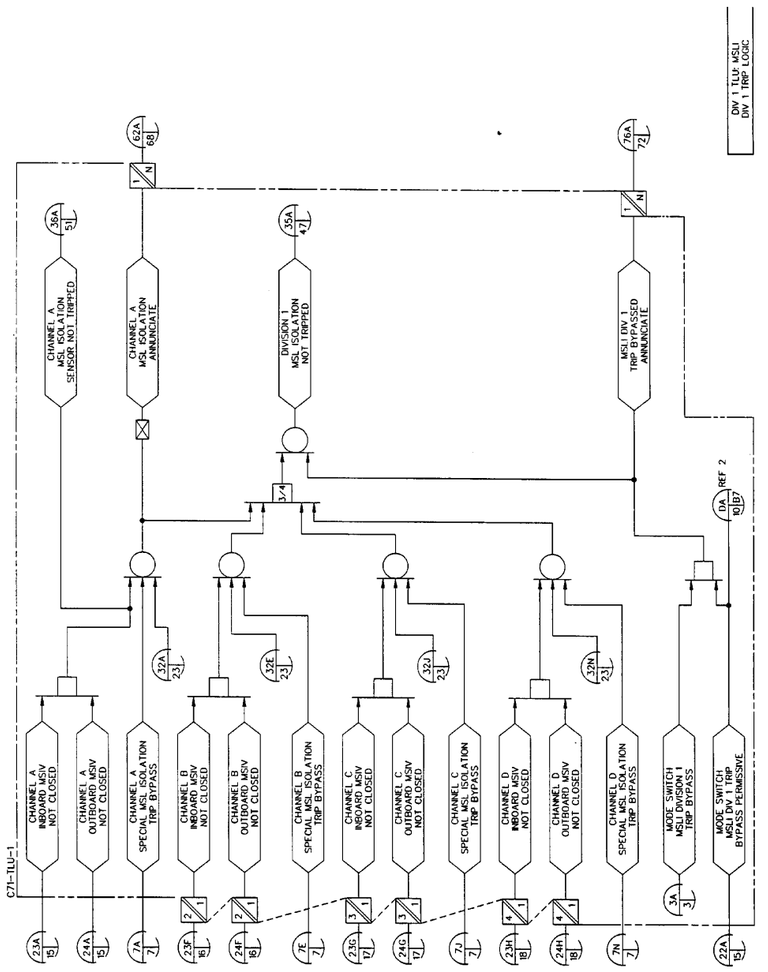

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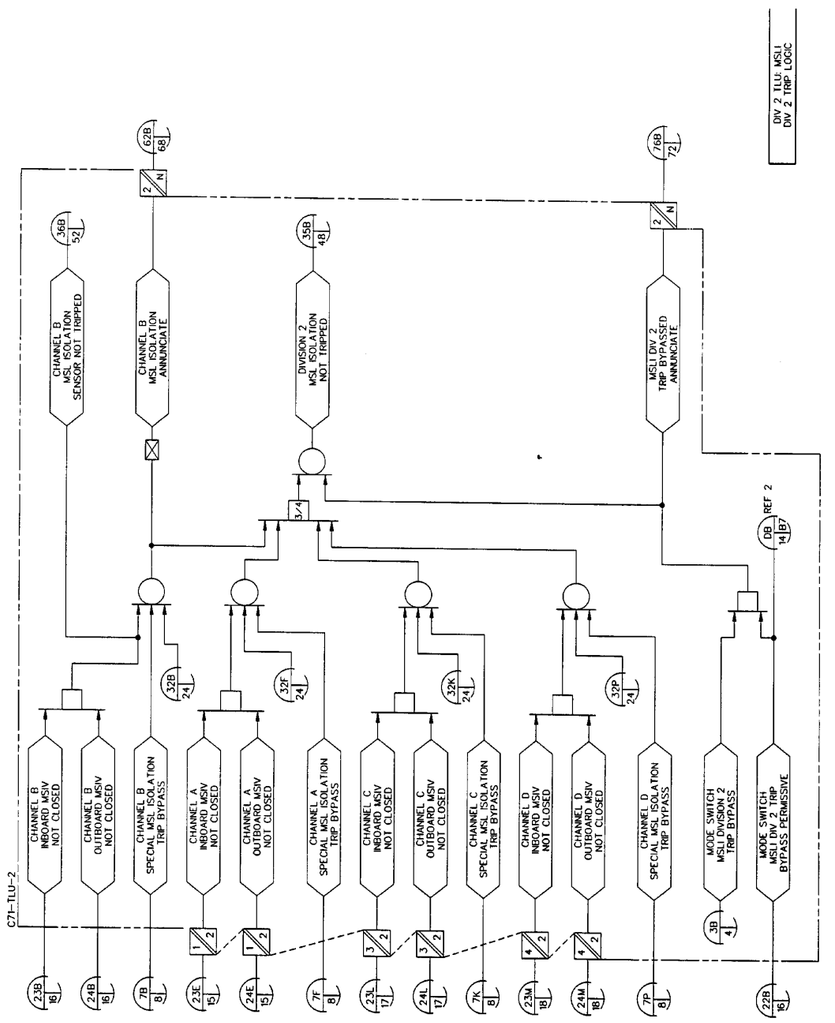

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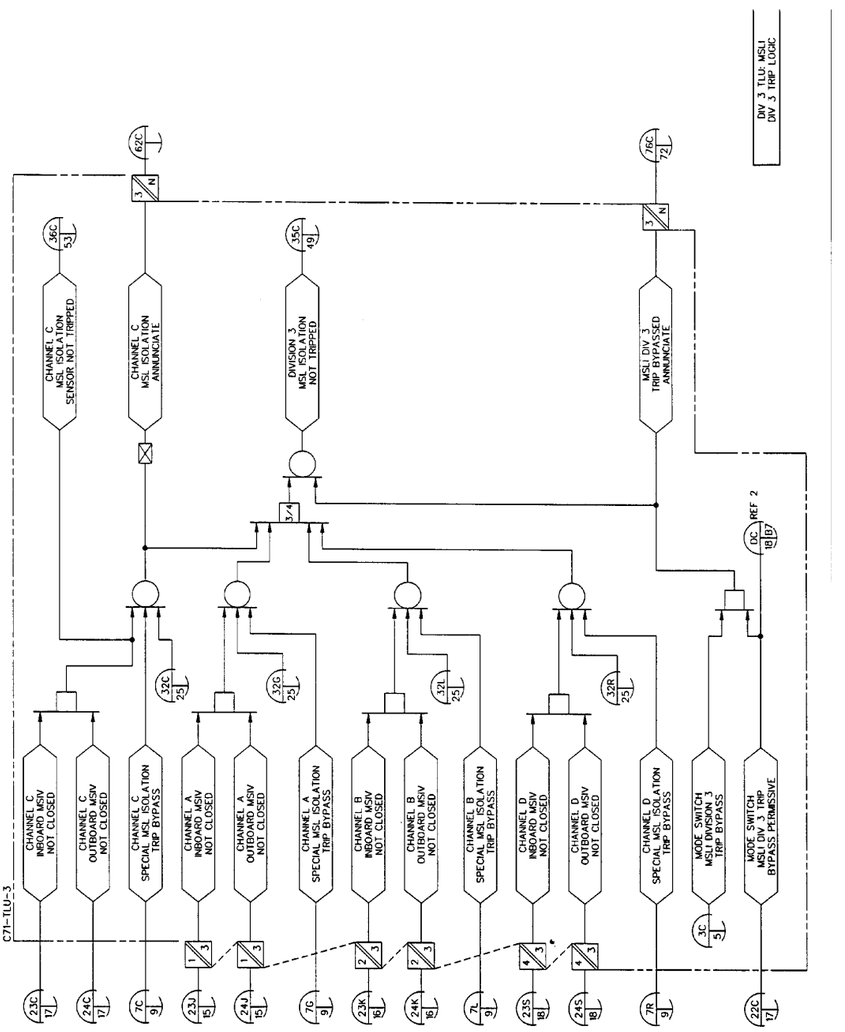

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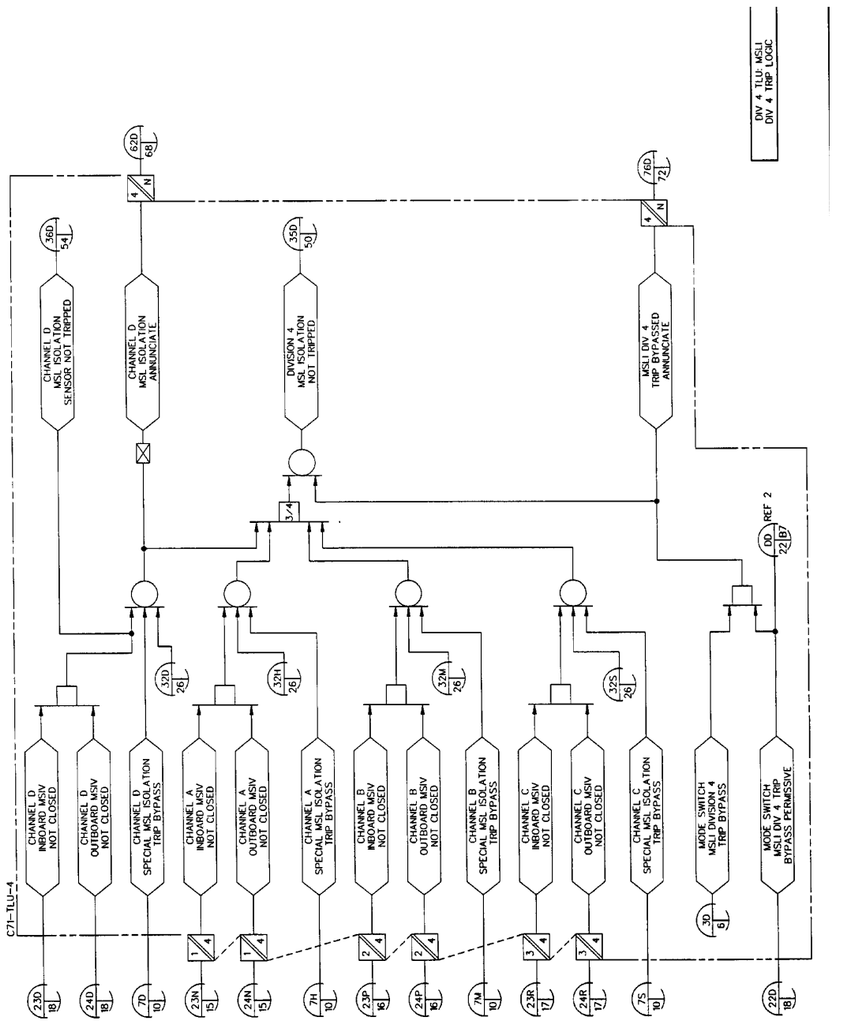

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Figure 7.2-10 Reactor Protection System IBD (Sheet 36 of 72)

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Figure 7.2-10 Reactor Protection System IBD (Sheet 37 of 72)

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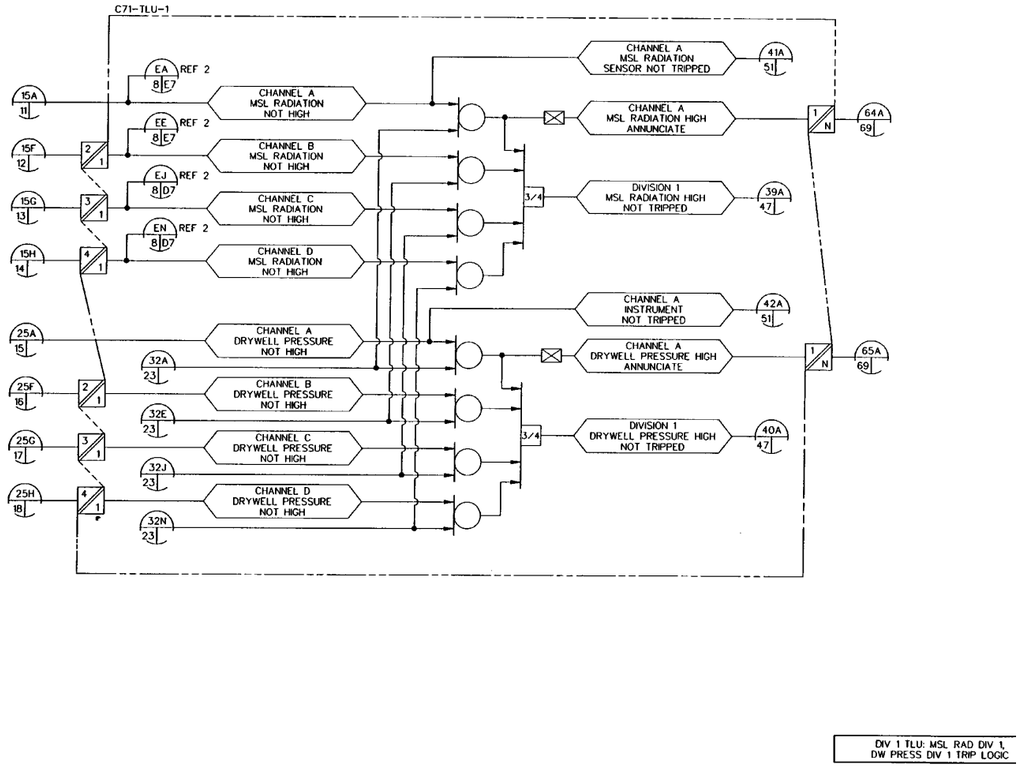

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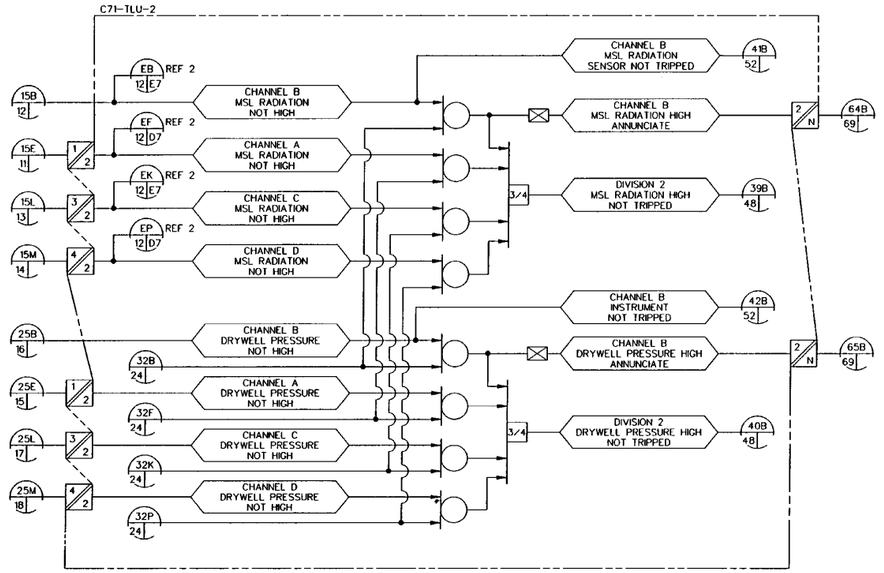

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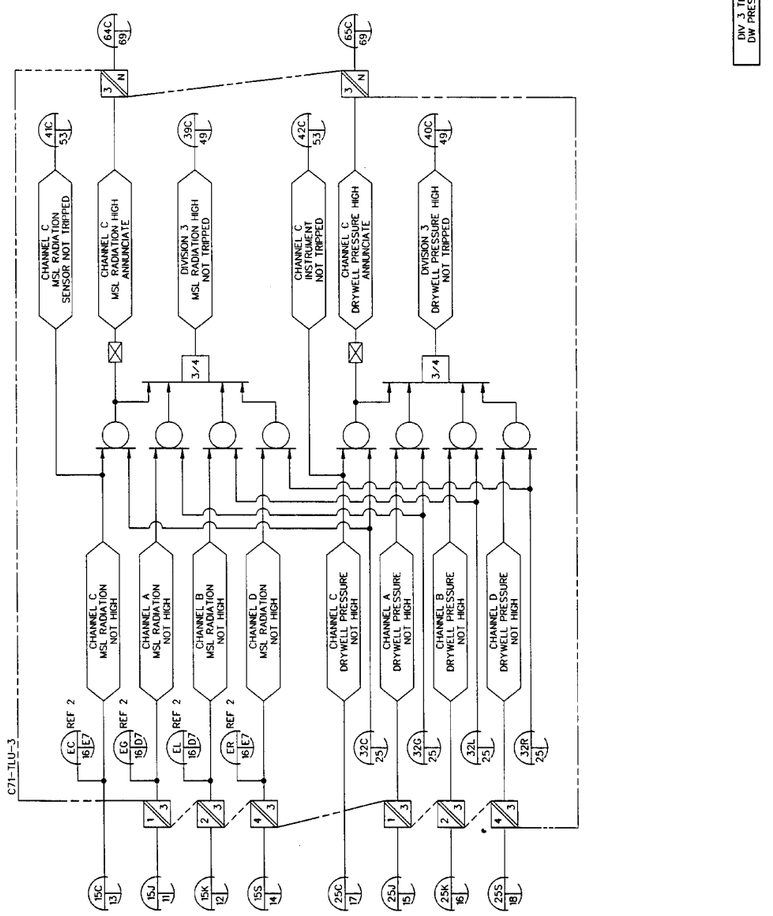

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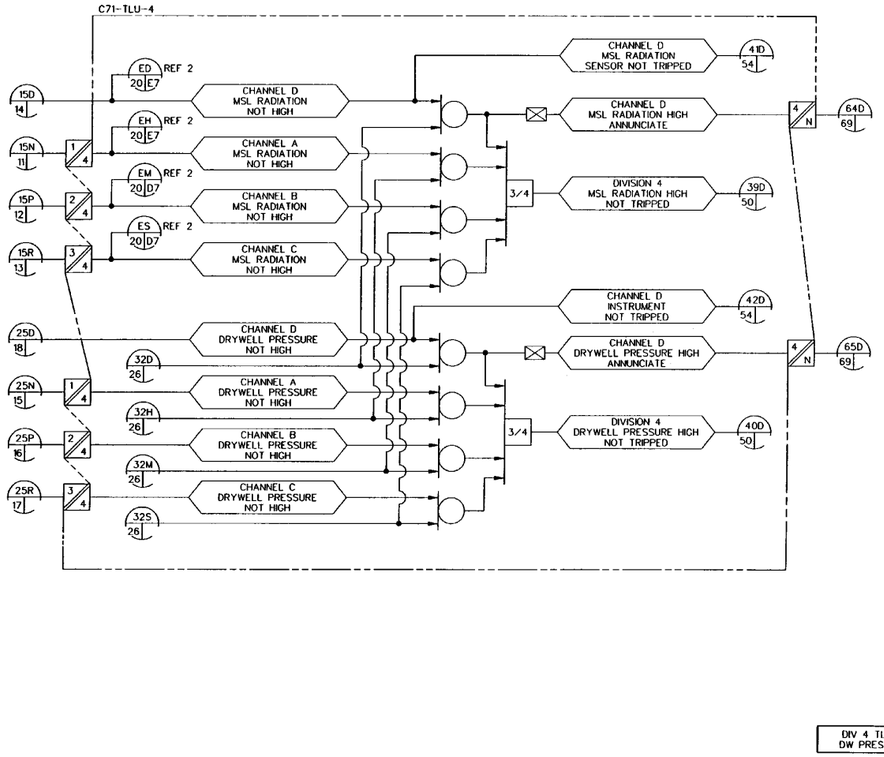

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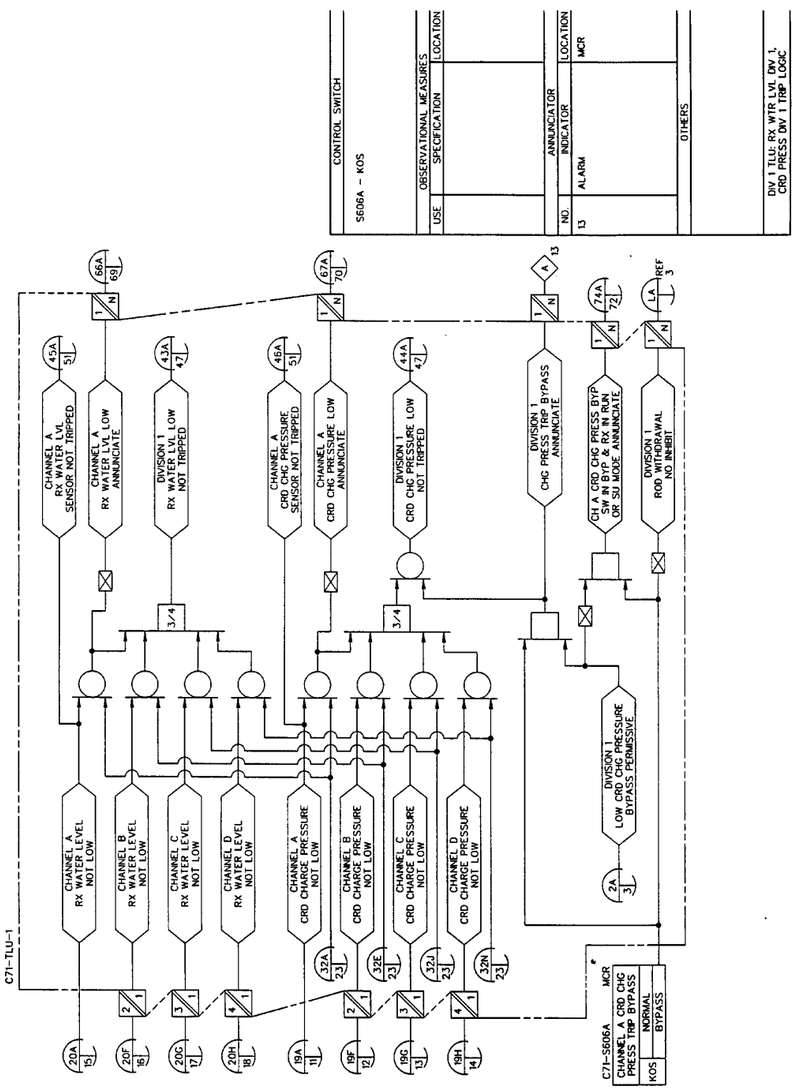

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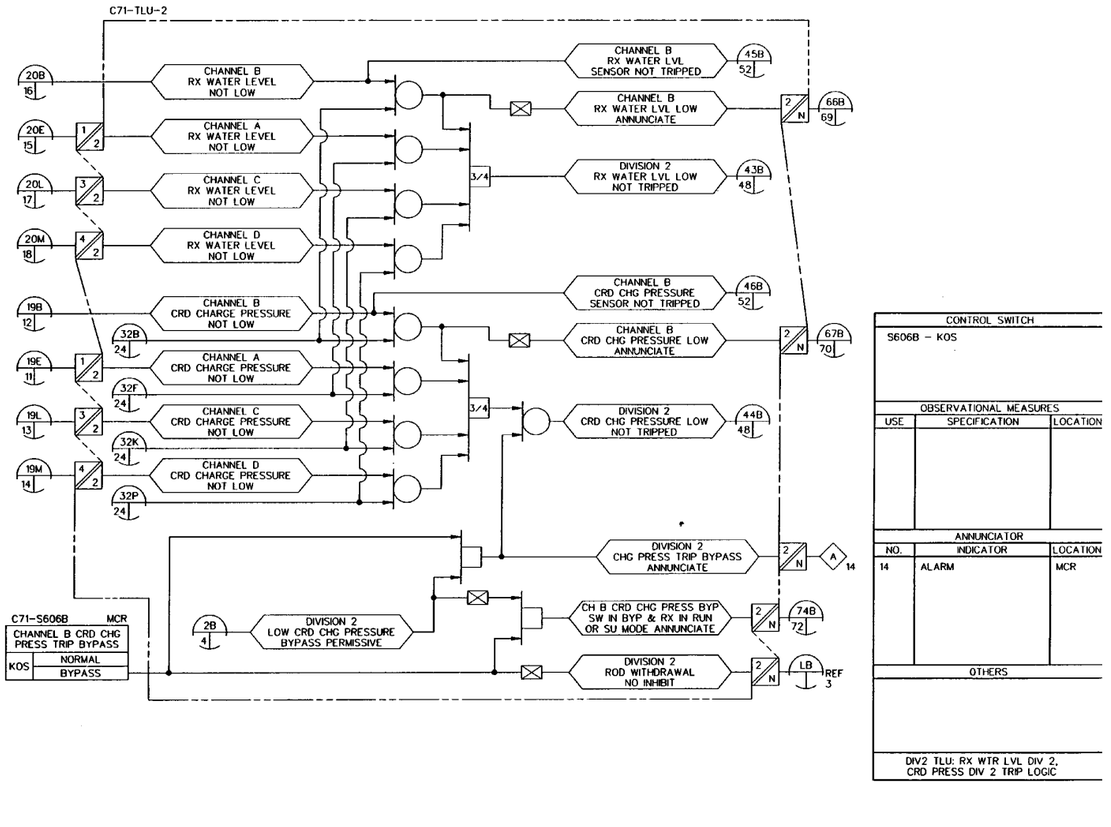

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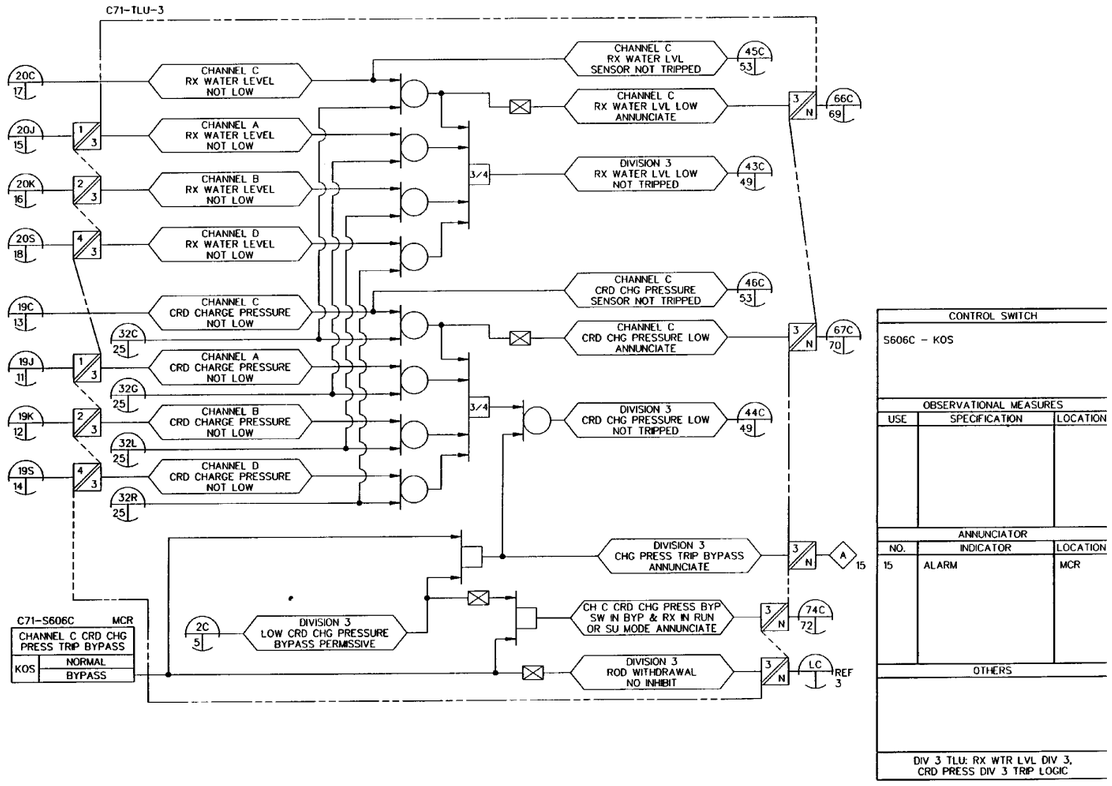

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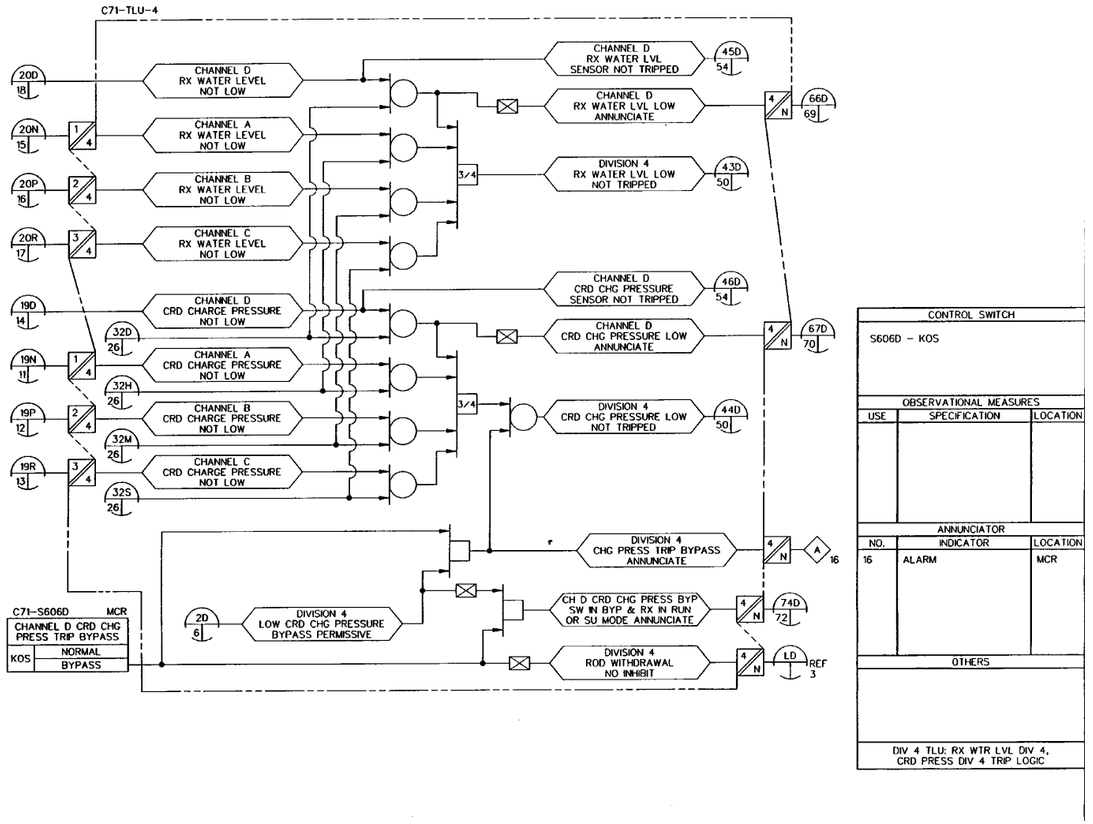

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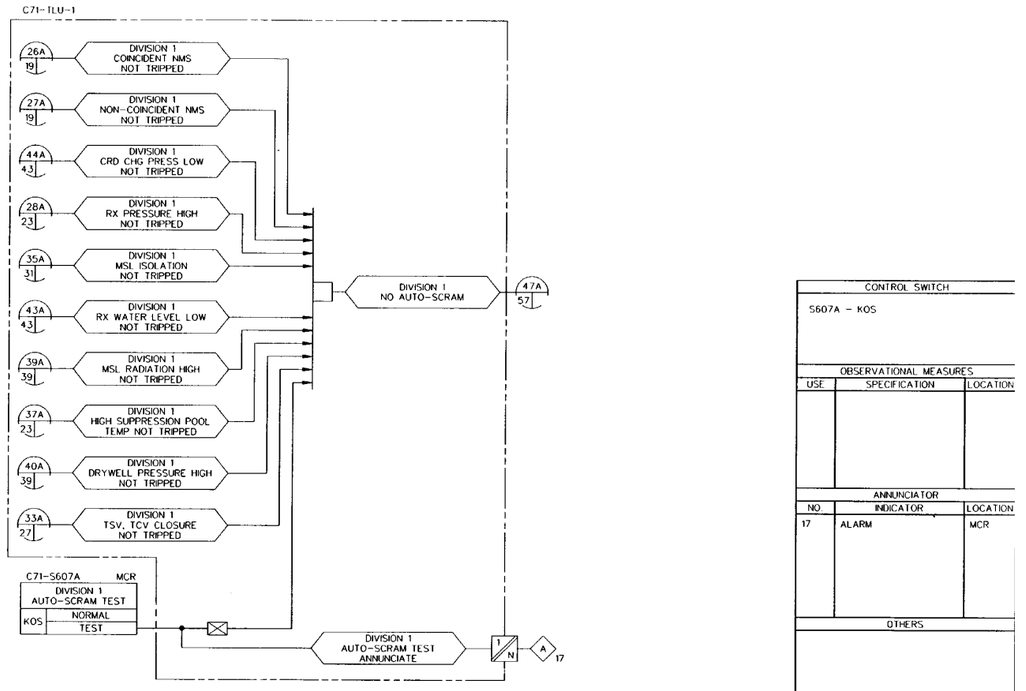

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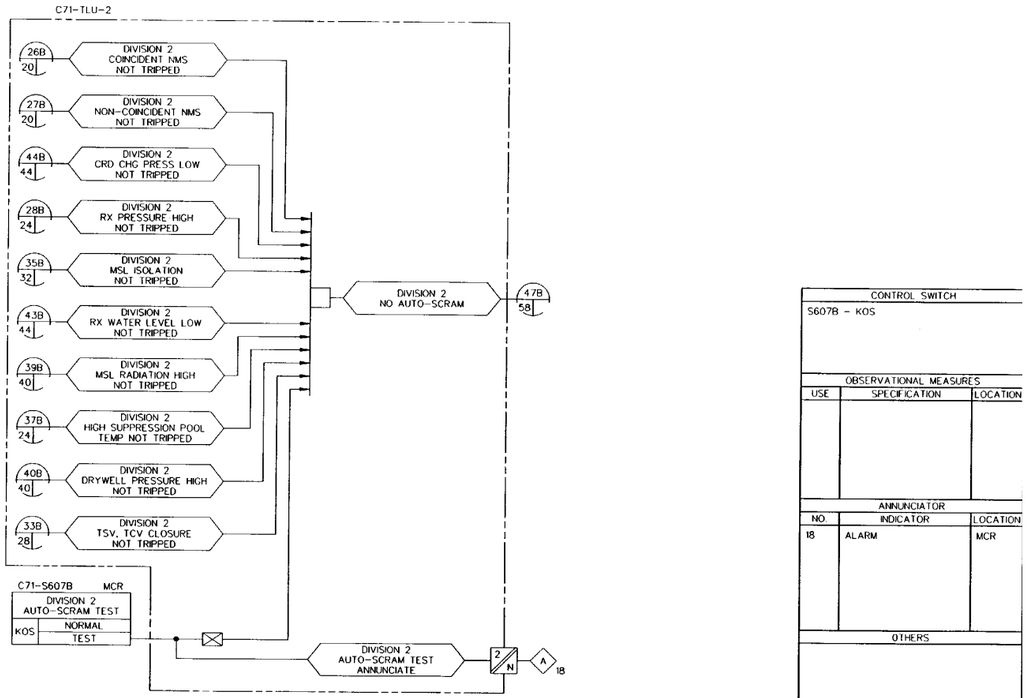

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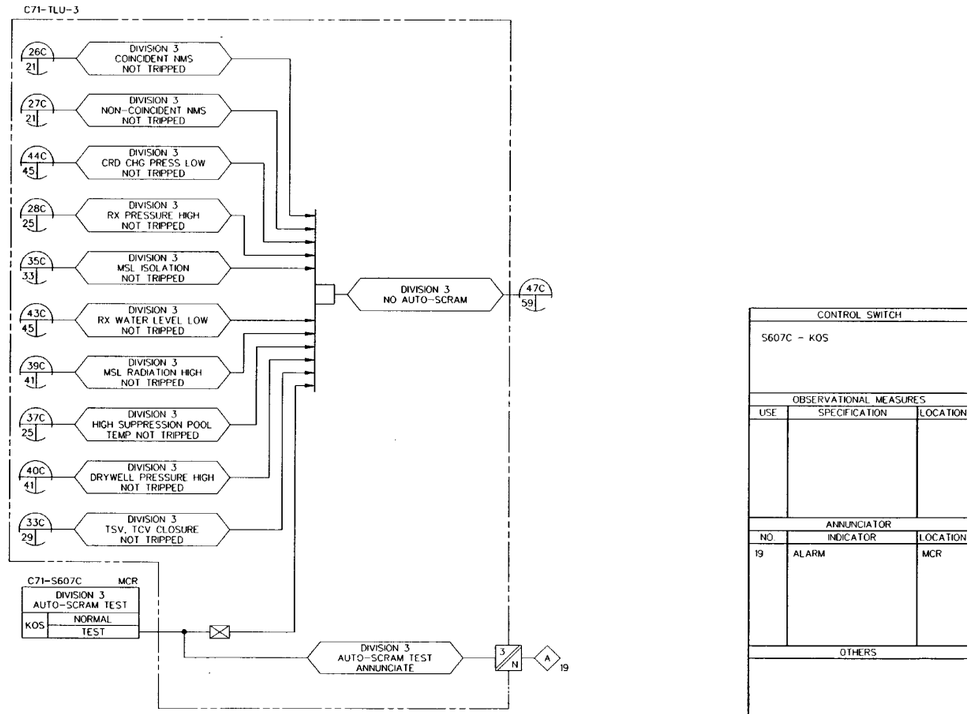

CONTROL SWITCH		
S607C - KOS		
OBSERVATIONAL MEASURES		
USE	SPECIFICATION	LOCATION
ANNUNCIATOR		
NO.	INDICATOR	LOCATION
19	ALARM	MCR
OTHERS		
DIV 3 TLU: DIV 3 AUTO-SCRAM LOGIC		

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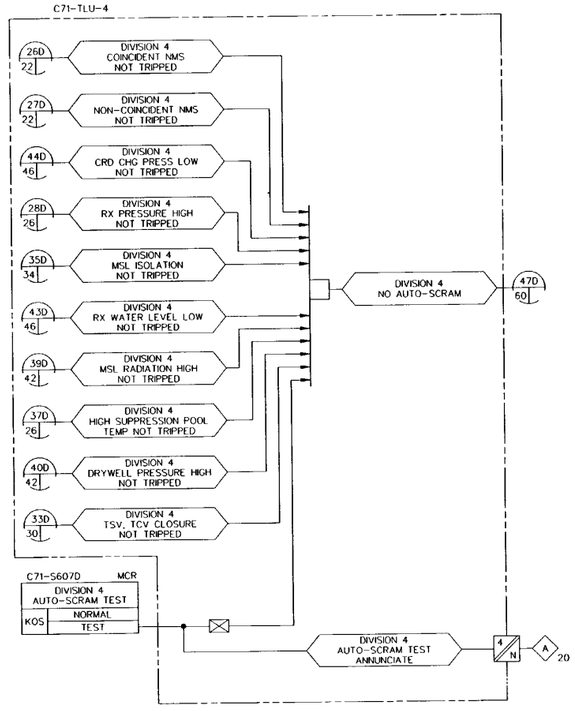

CONTROL SWITCH		
S607D – KOS		
OBSERVATIONAL MEASURES		
USE	SPECIFICATION	LOCATION
ANNUNCIATOR		
NO.	INDICATOR	LOCATION
20	ALARM	MCR
OTHERS		
DIV. 4 TLU: DIV. 4 AUTO-SCRAM LOGIC		

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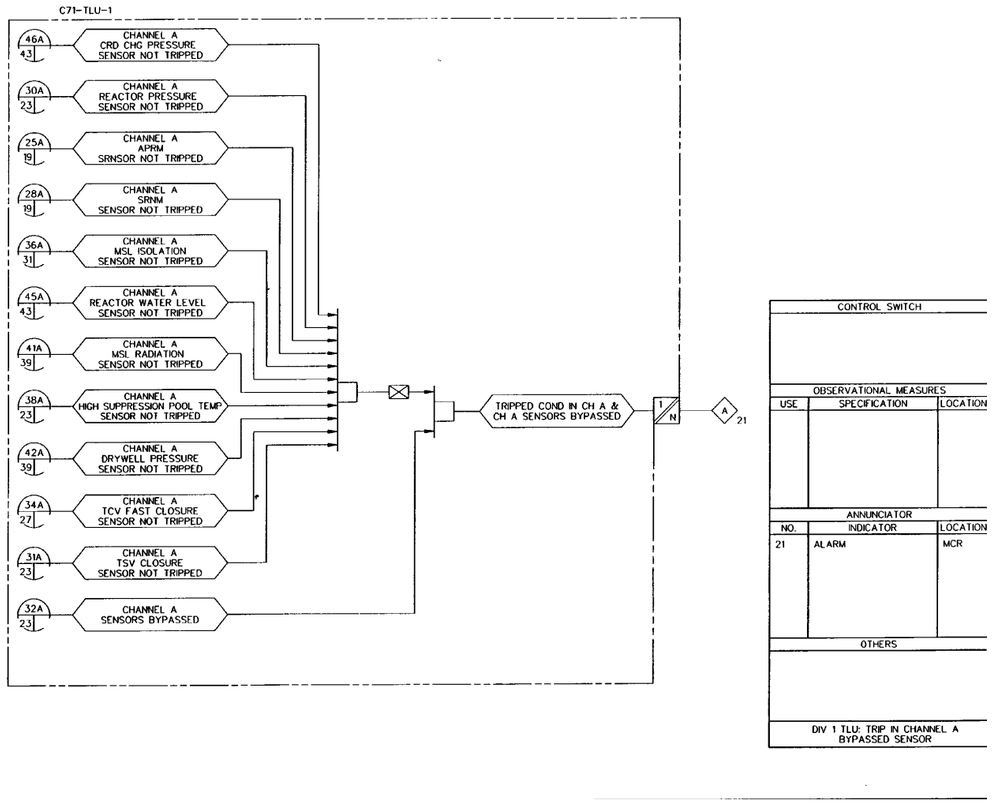

Figure 7.2-10 Reactor Protection System IBD (Sheet 51 of 72)

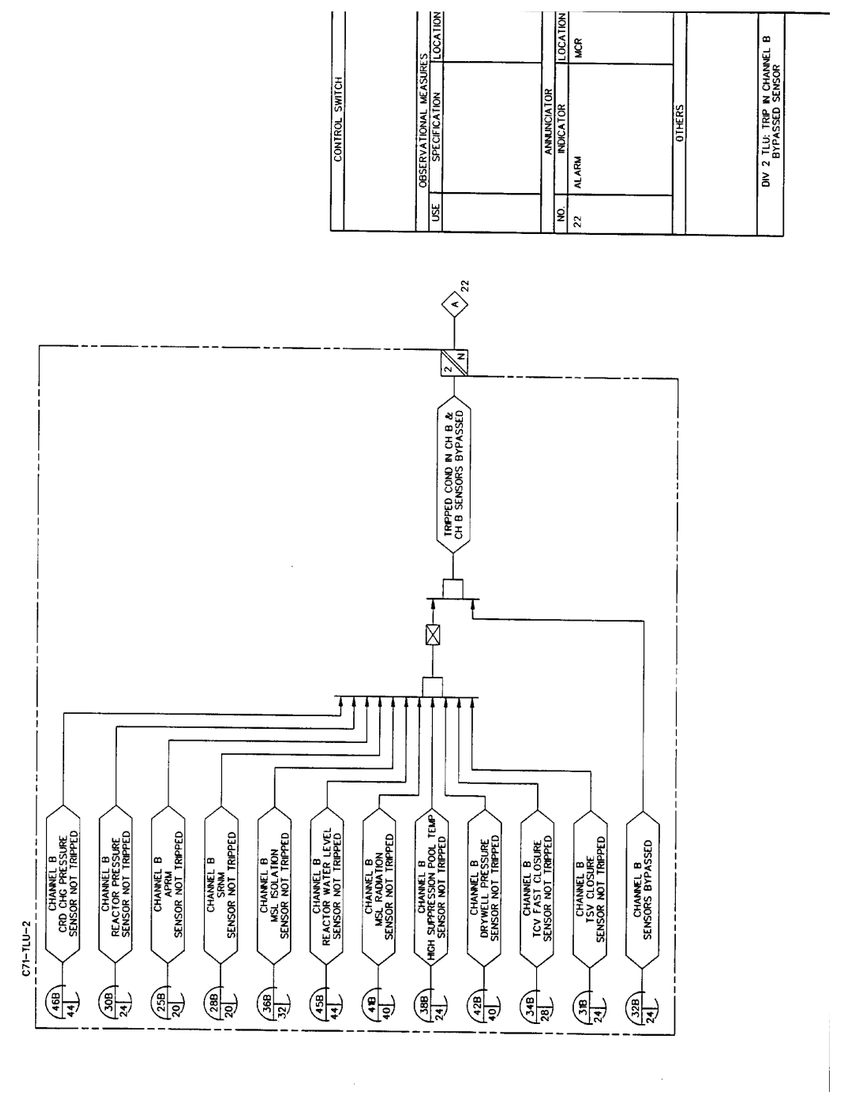

Figure 7.2-10 Reactor Protection System IBD (Sheet 52 of 72)

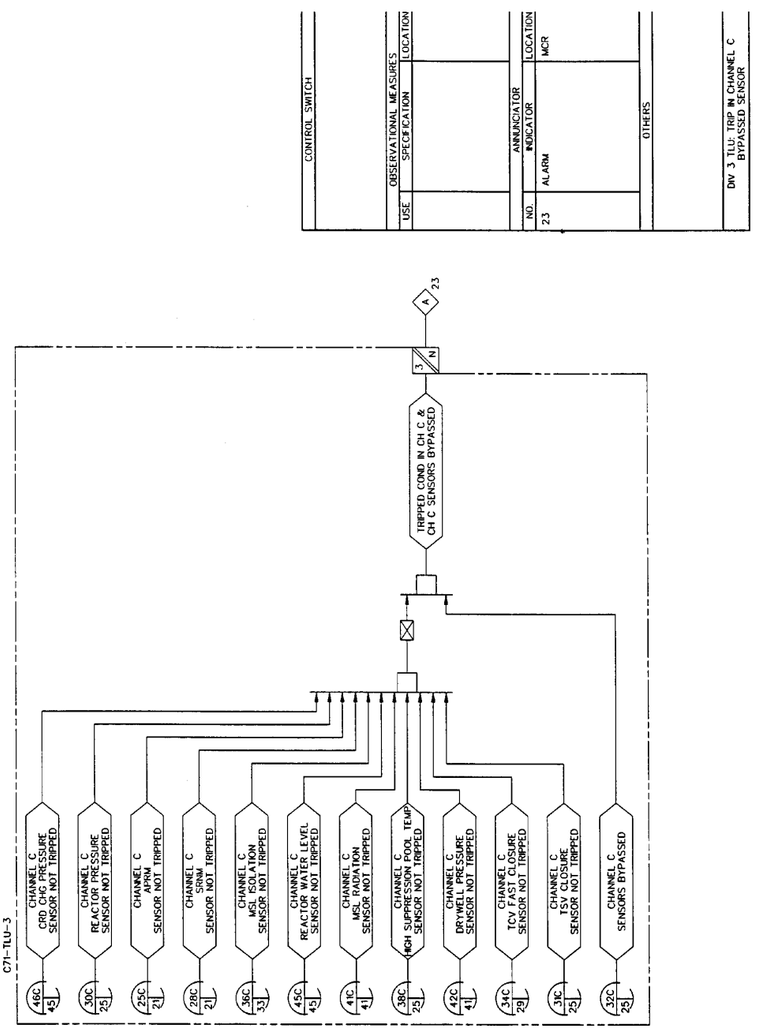

Figure 7.2-10 Reactor Protection System IBD (Sheet 53 of 72)

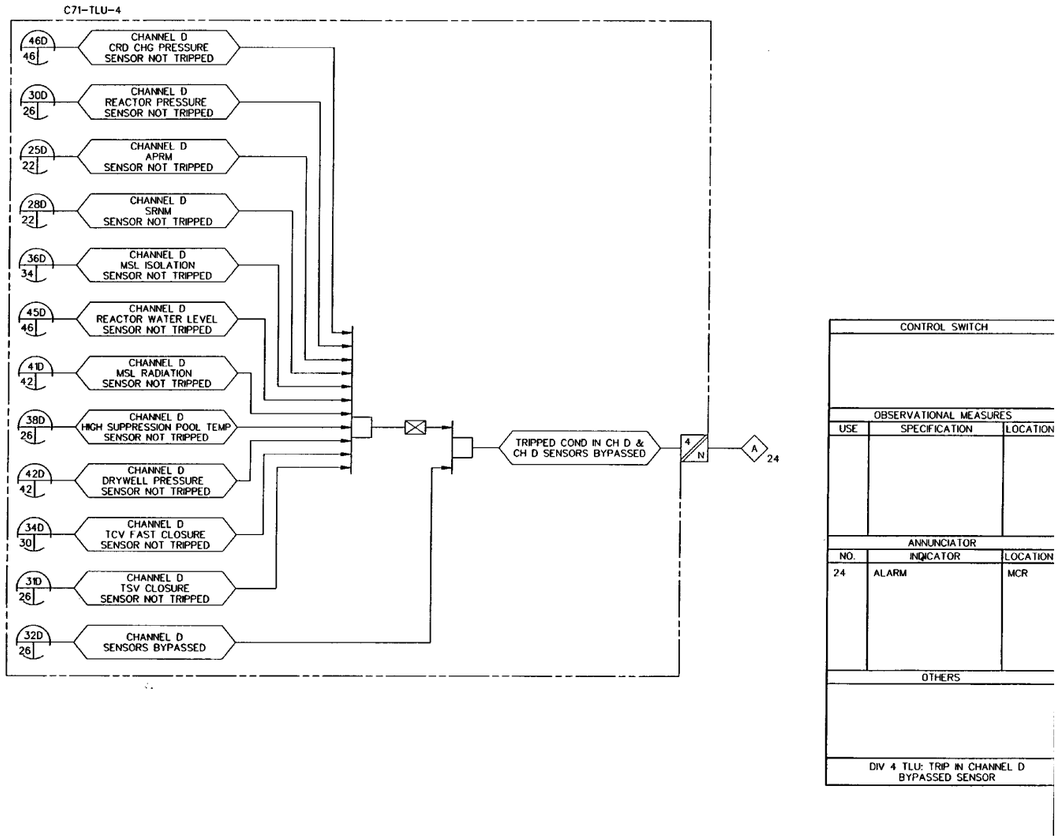

Figure 7.2-10 Reactor Protection System IBD (Sheet 54 of 72)

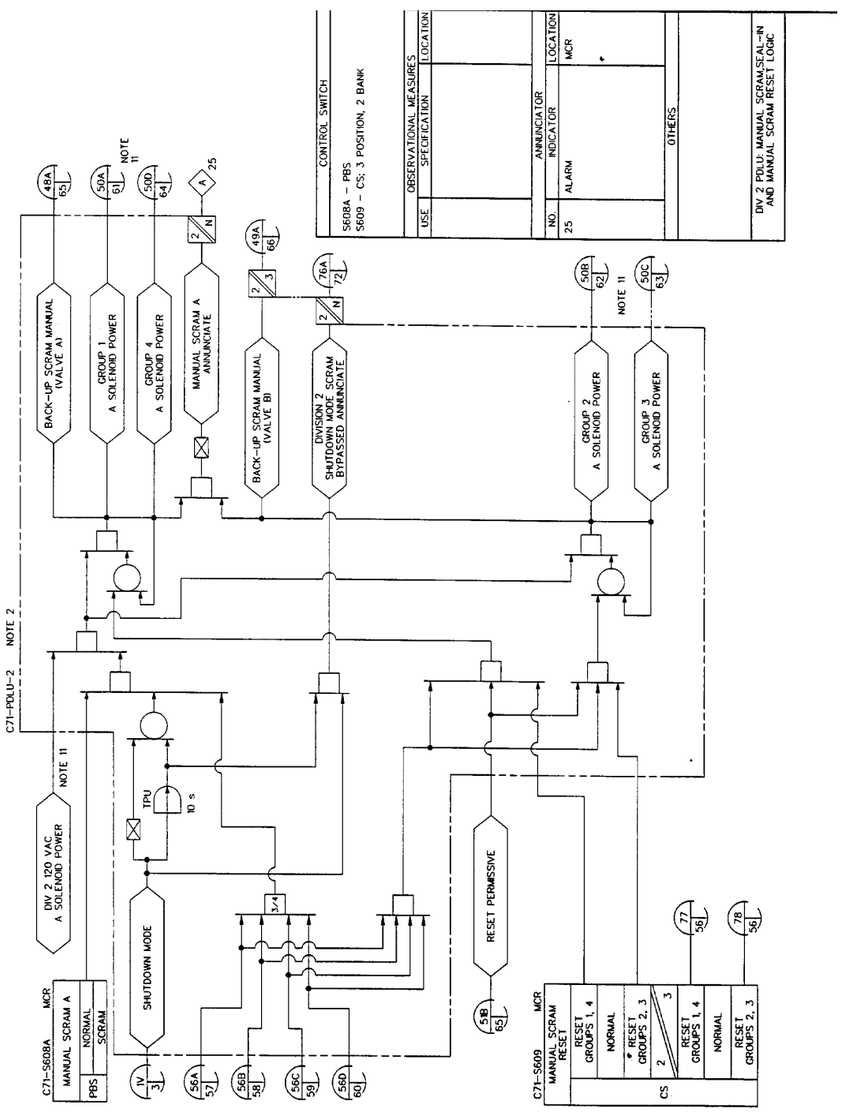

Figure 7.2-10 Reactor Protection System IBD (Sheet 55 of 72)

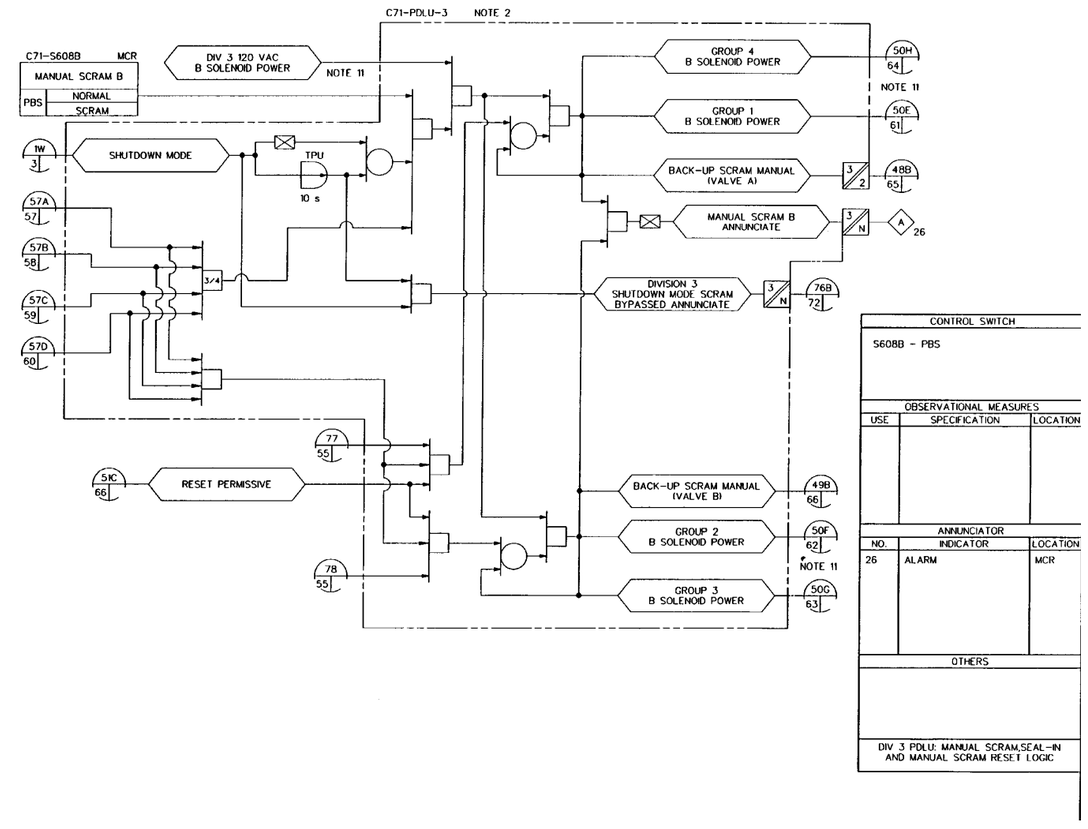

Figure 7.2-10 Reactor Protection System IBD (Sheet 56 of 72)

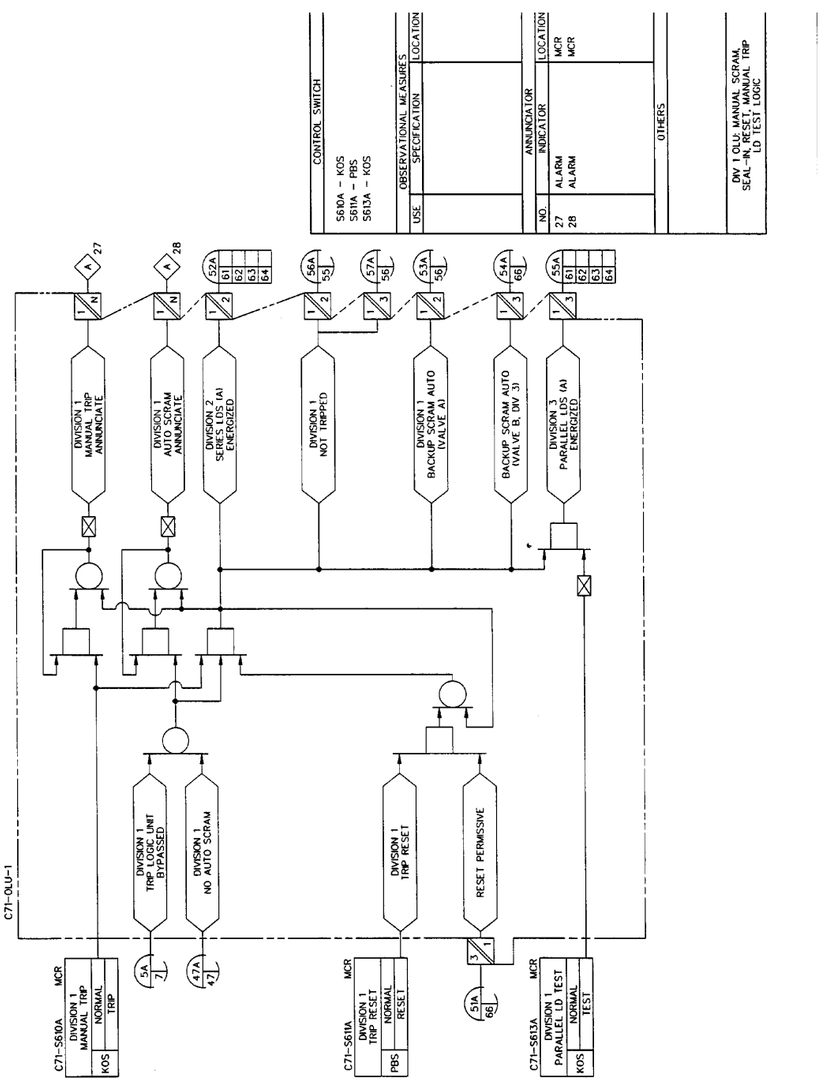

Figure 7.2-10 Reactor Protection System IBD (Sheet 57 of 72)

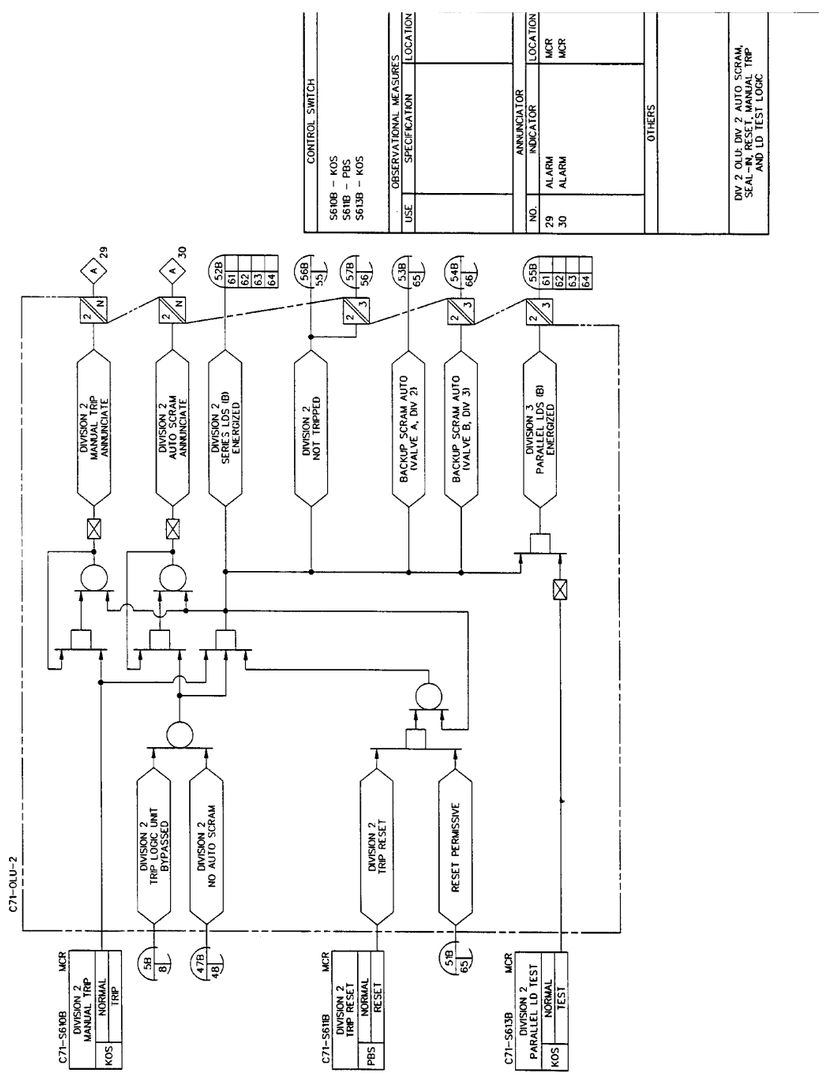

Figure 7.2-10 Reactor Protection System IBD (Sheet 58 of 72)

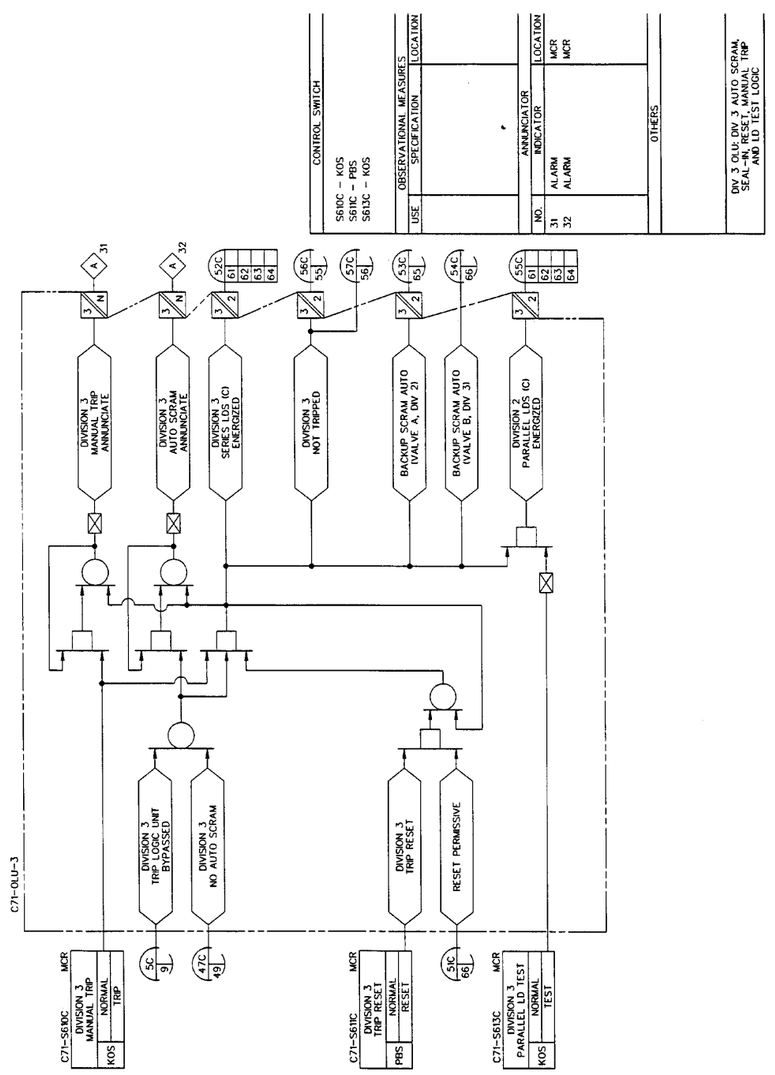

Figure 7.2-10 Reactor Protection System IBD (Sheet 59 of 72)

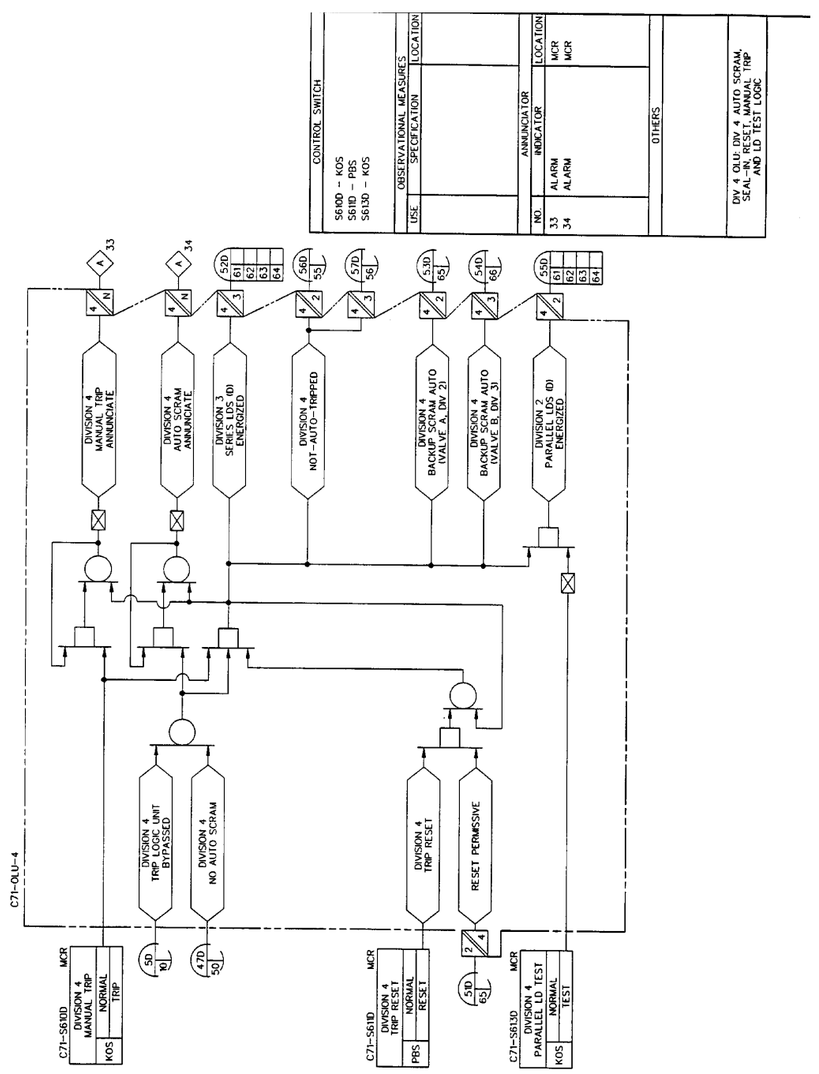

Figure 7.2-10 Reactor Protection System IBD (Sheet 60 of 72)

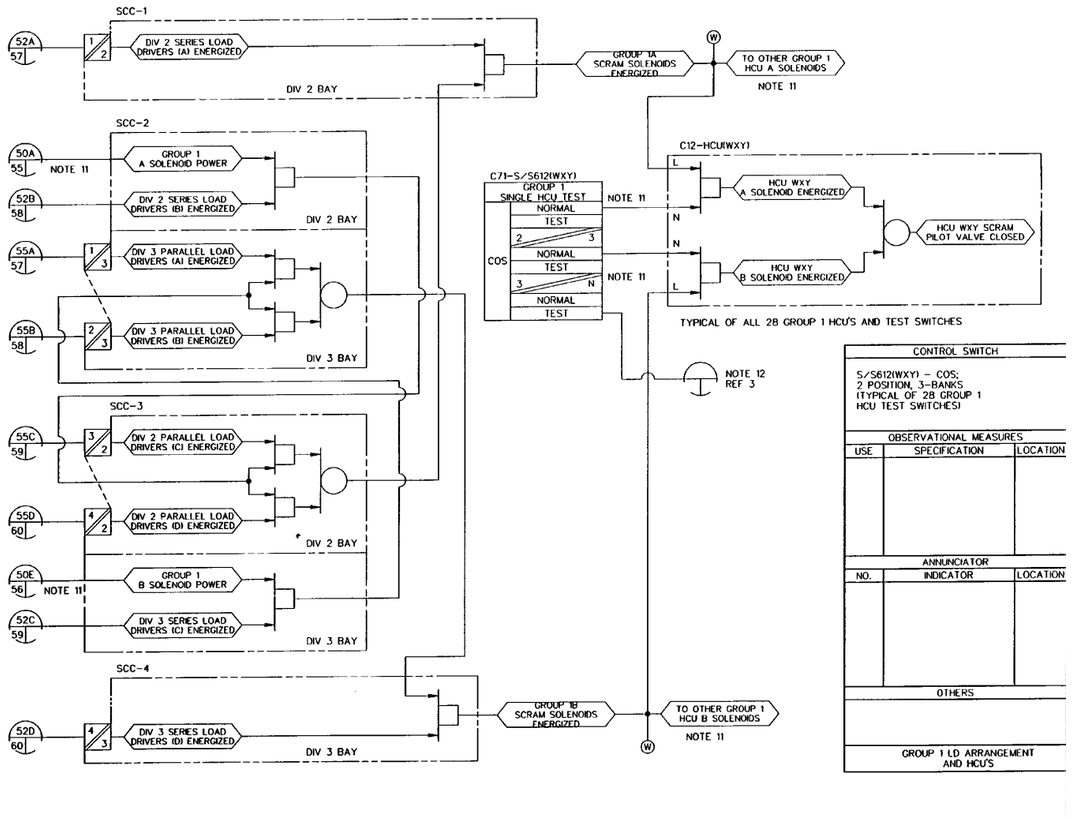

Figure 7.2-10 Reactor Protection System IBD (Sheet 61 of 72)

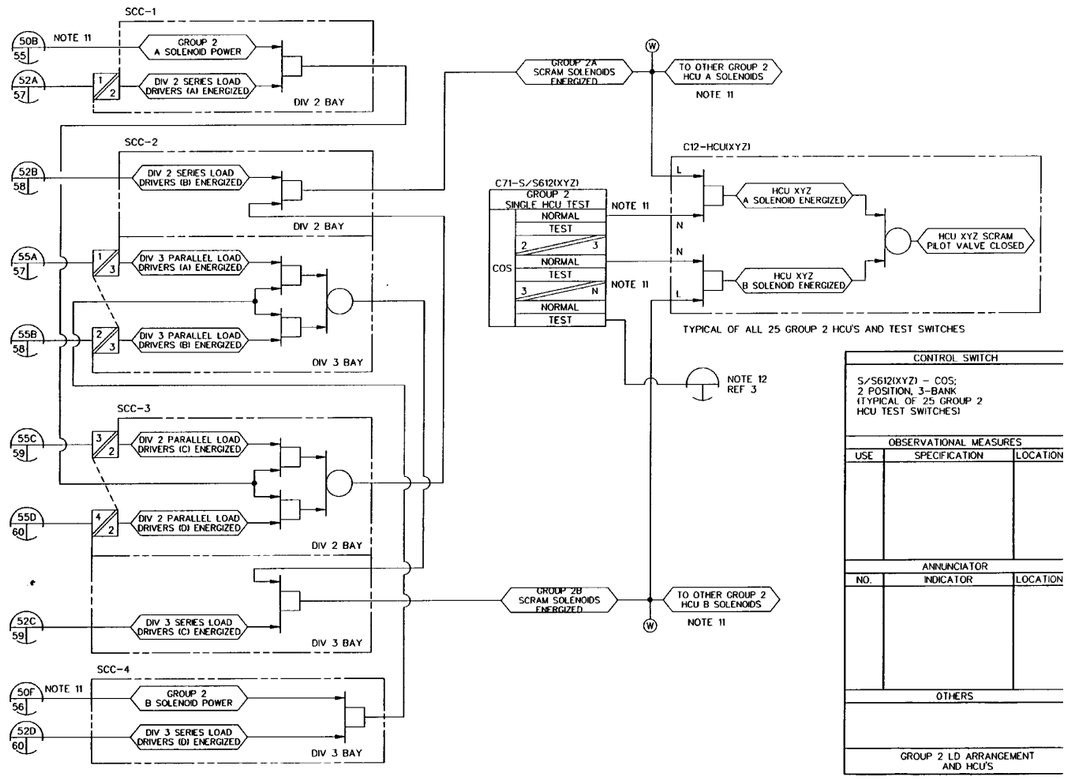

Figure 7.2-10 Reactor Protection System IBD (Sheet 62 of 72)

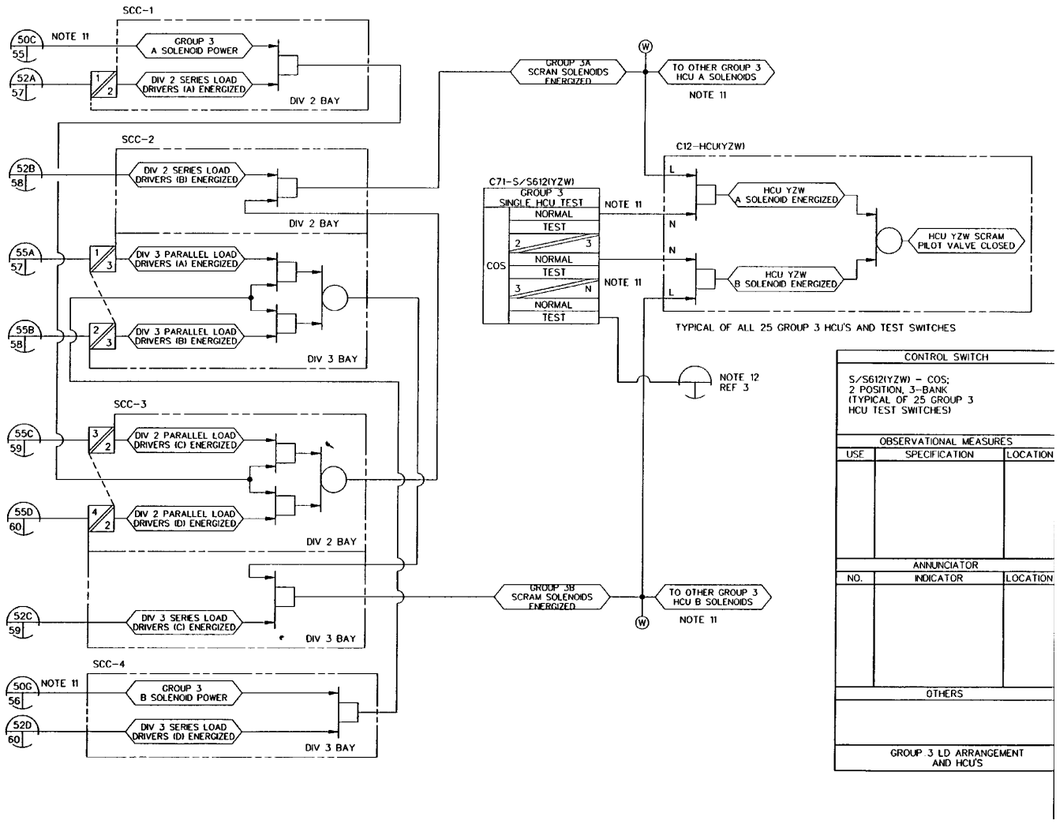

Figure 7.2-10 Reactor Protection System IBD (Sheet 63 of 72)

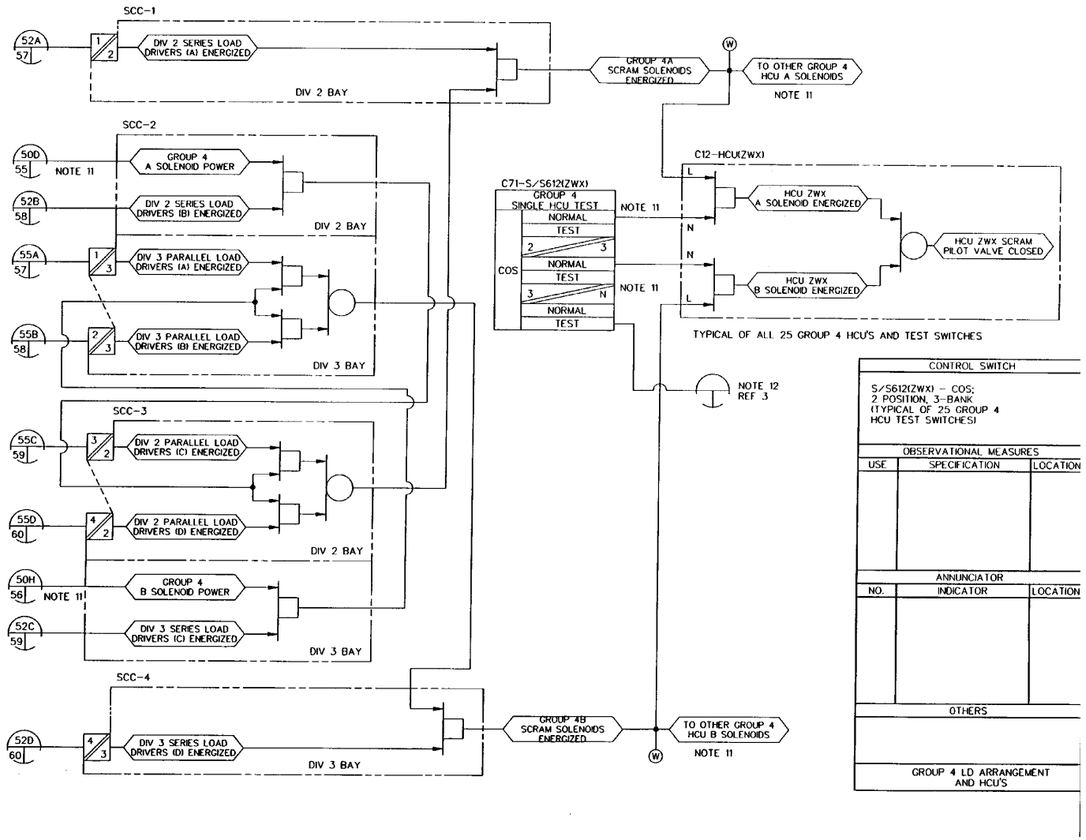

Figure 7.2-10 Reactor Protection System IBD (Sheet 64 of 72)

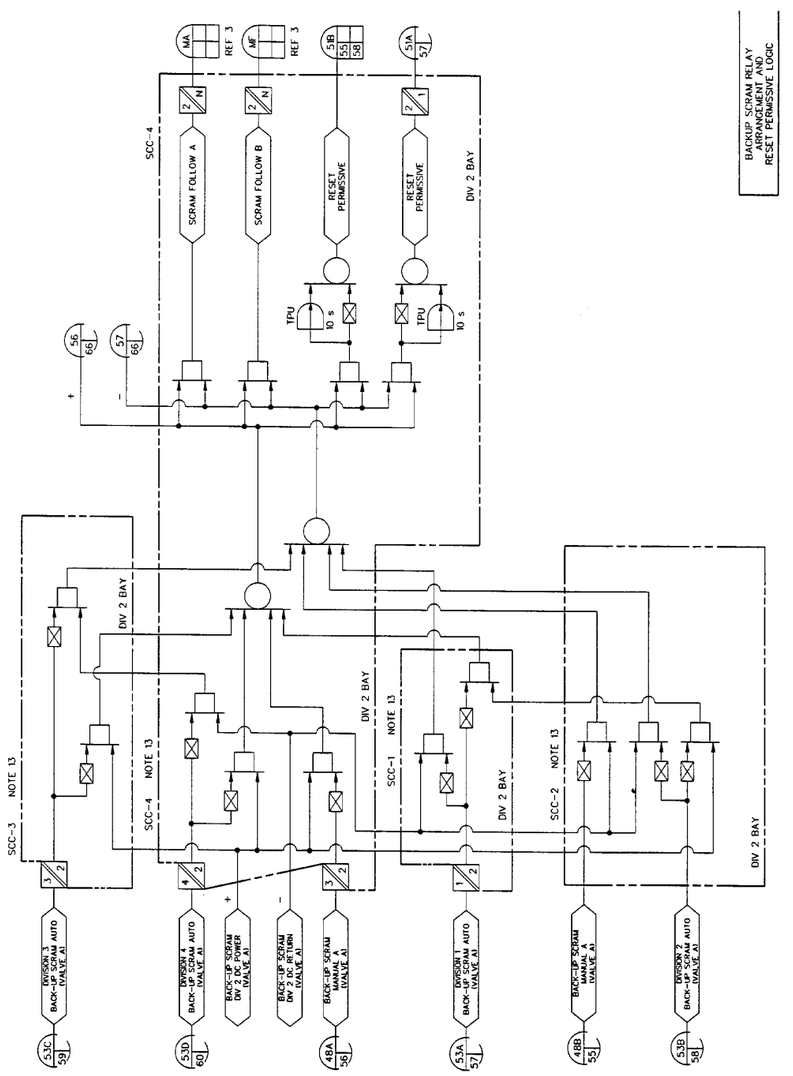

Figure 7.2-10 Reactor Protection System IBD (Sheet 65 of 72)

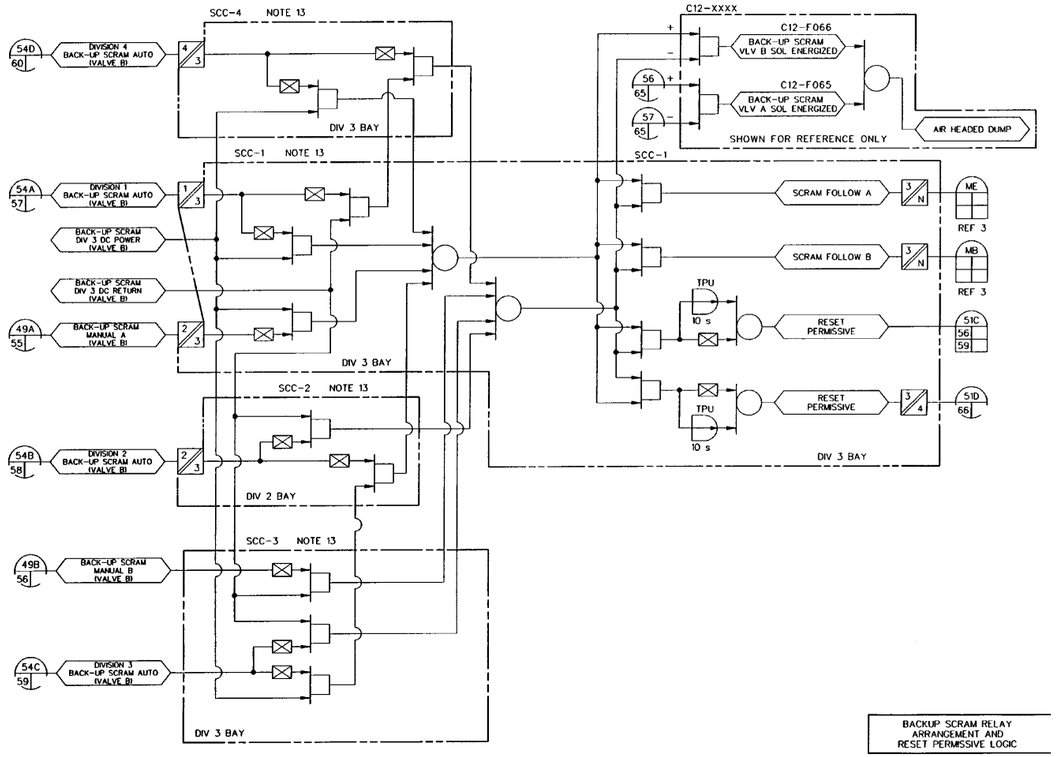

Figure 7.2-10 Reactor Protection System IBD (Sheet 66 of 72)

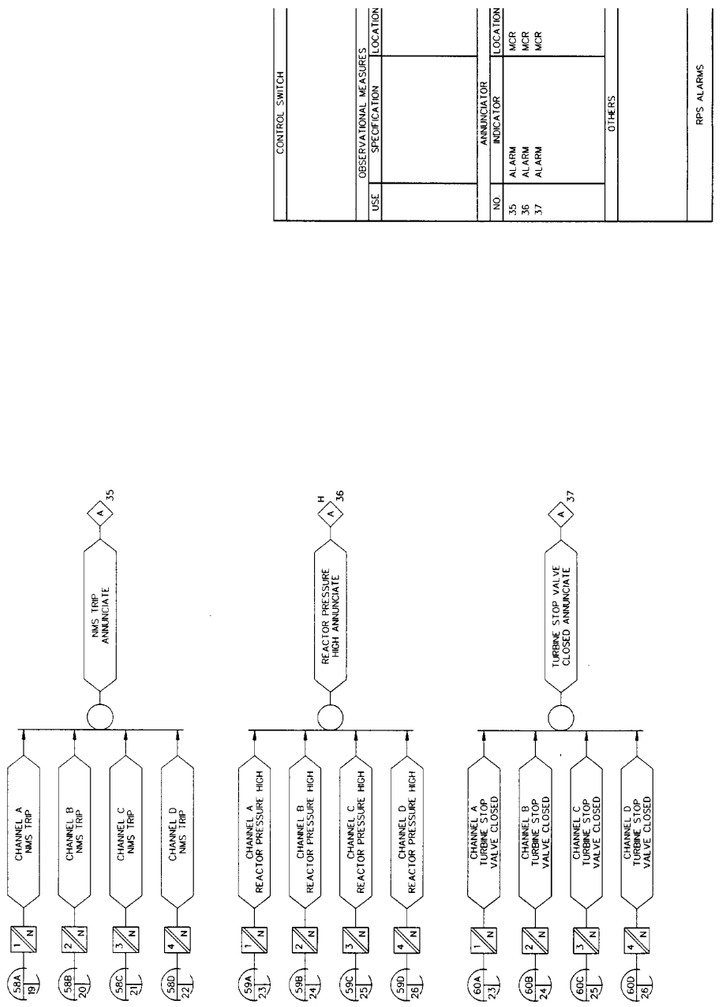

Figure 7.2-10 Reactor Protection System IBD (Sheet 67 of 72)

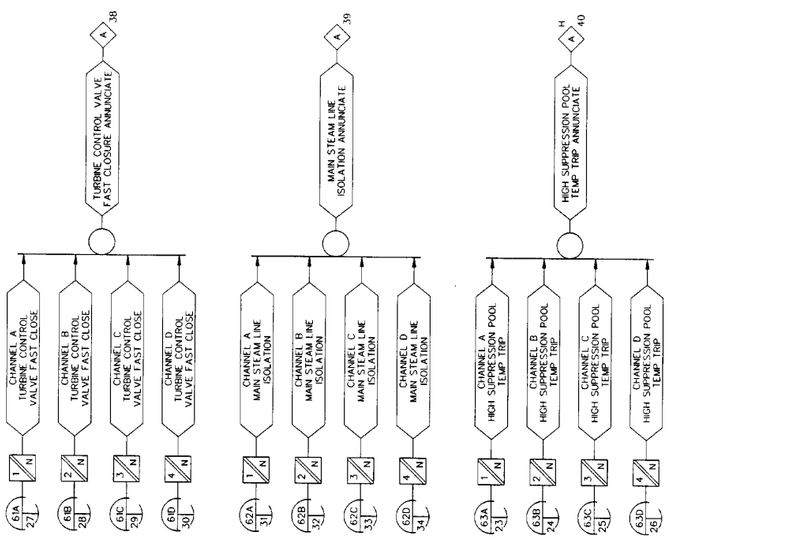

Figure 7.2-10 Reactor Protection System IBD (Sheet 68 of 72)

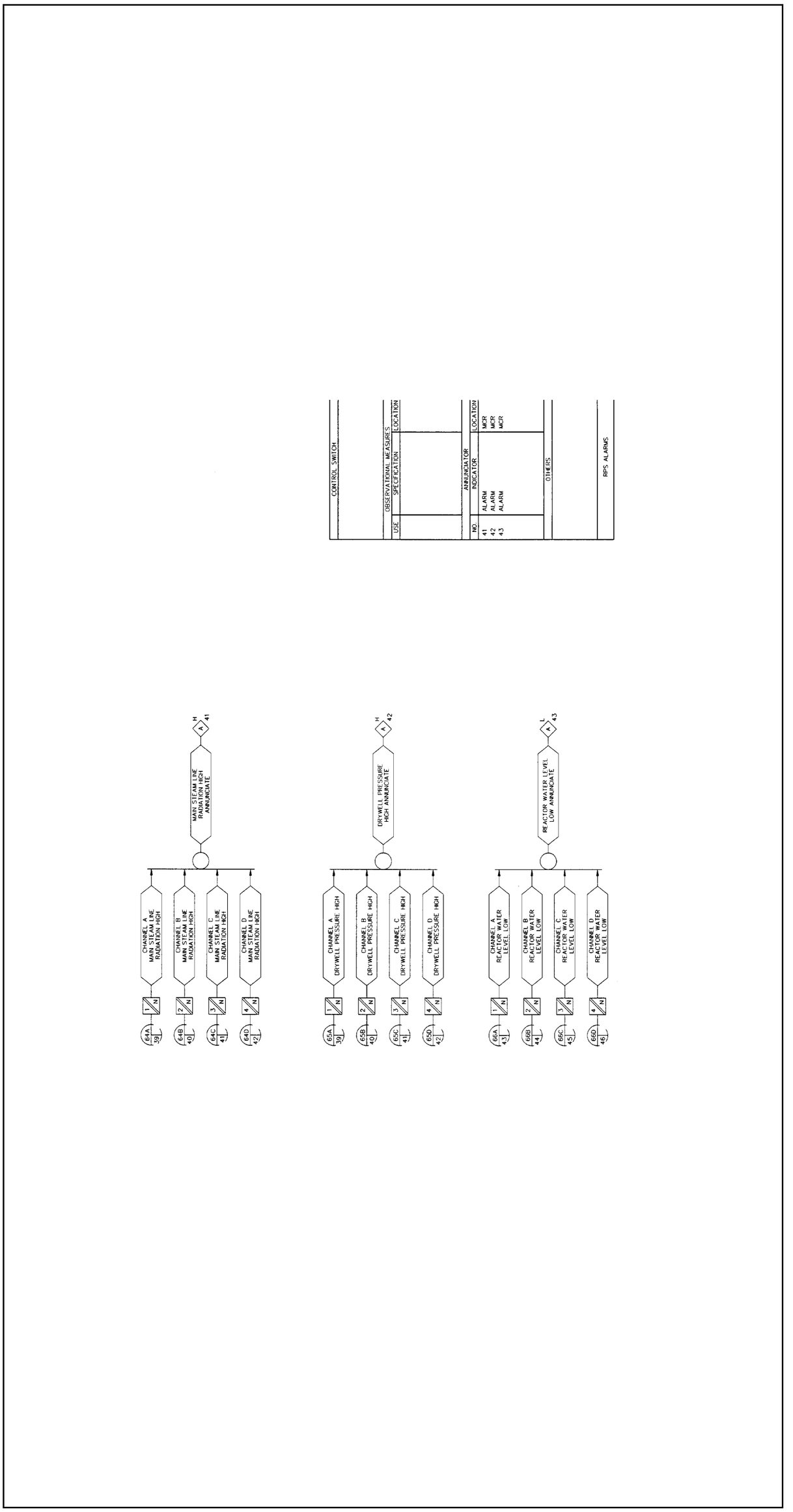

Figure 7.2-10 Reactor Protection System IBD (Sheet 69 of 72)

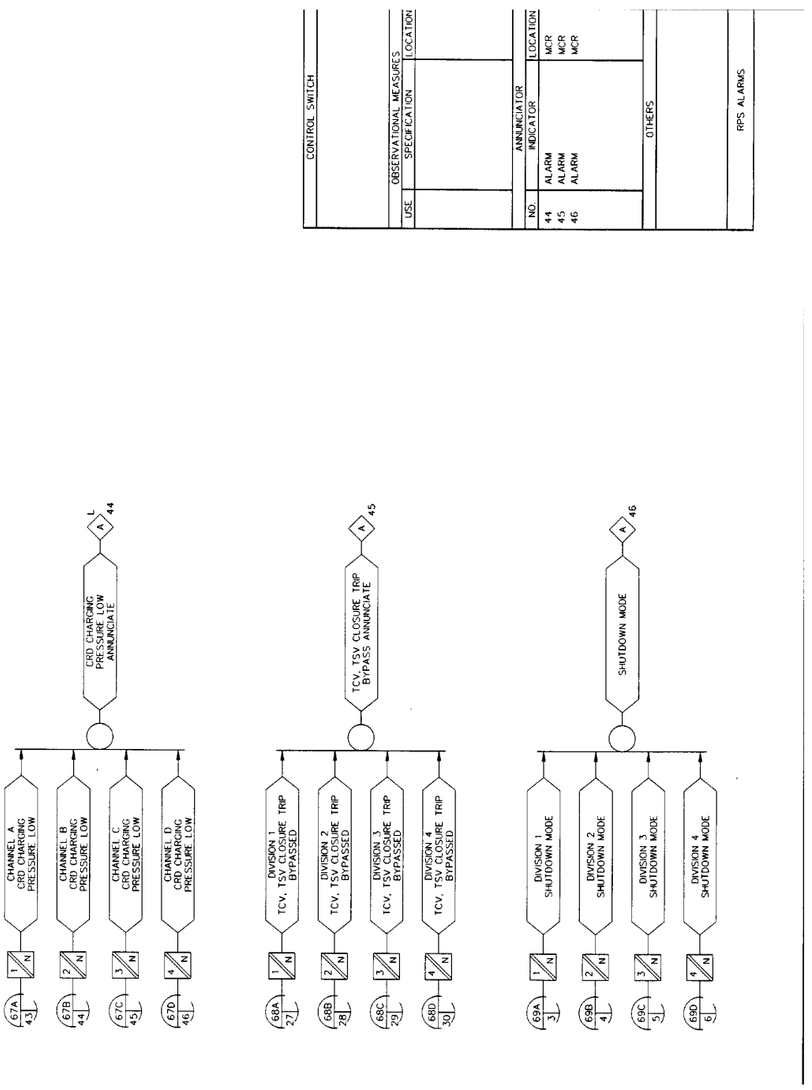

Figure 7.2-10 Reactor Protection System IBD (Sheet 70 of 72)

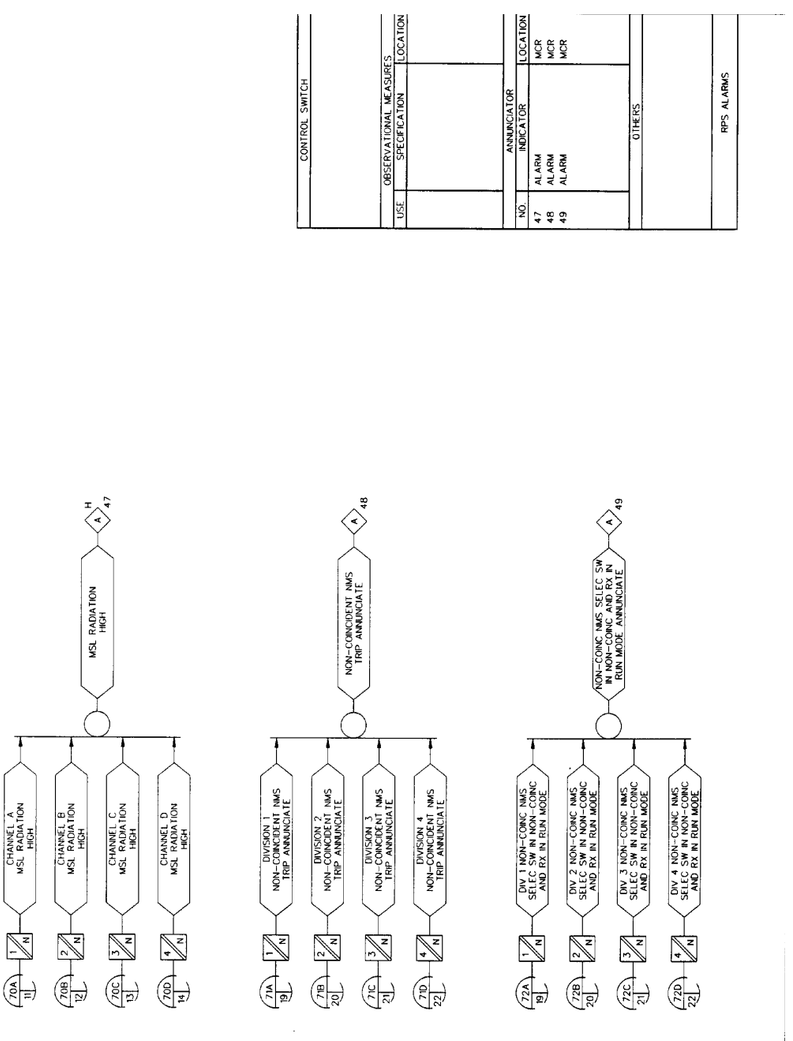

Figure 7.2-10 Reactor Protection System IBD (Sheet 71 of 72)

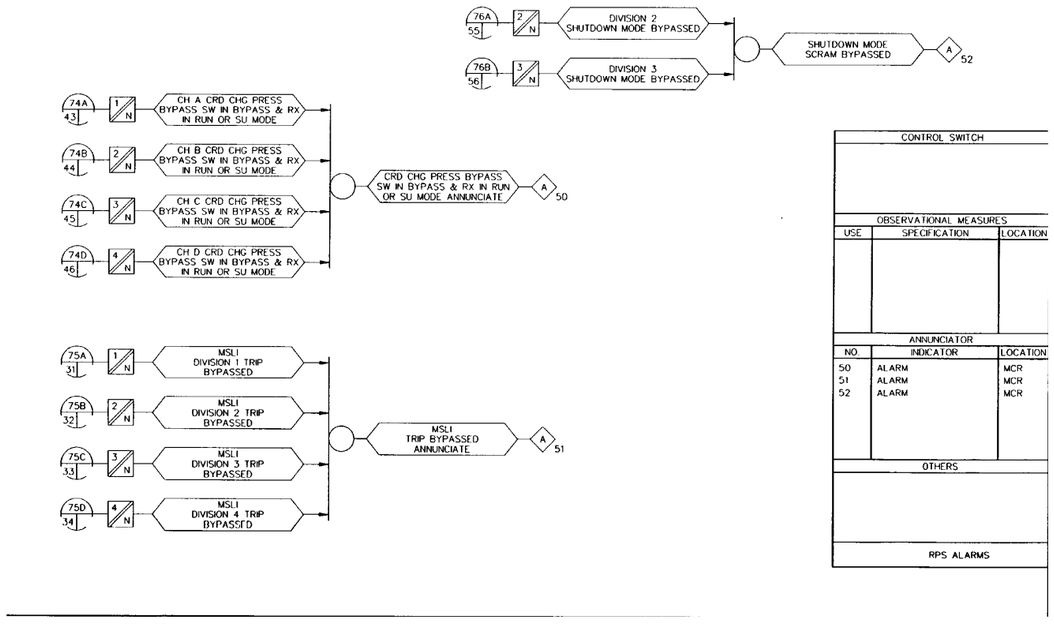

Figure 7.2-10 Reactor Protection System IBD (Sheet 72 of 72)