

**LOGIC SYMBOLS**

SYMBOL	LOGIC FUNCTION	DESCRIPTION
	OR	A DEVICE WHICH PRODUCES AN OUTPUT WHEN ANY ONE INPUT (OR MORE) EXISTS.
	NOT	A DEVICE WHICH PRODUCES AN OUTPUT ONLY WHEN THE INPUT DOES NOT EXIST.
	AND	A DEVICE WHICH PRODUCES AN OUTPUT ONLY WHEN EVERY INPUT EXISTS.
	COINCIDENCE (2 OUT OF 3 SHOWN)	A DEVICE WHICH PRODUCES AN OUTPUT WHEN THE PRESCRIBED NUMBER (OR MORE) OF INPUTS EXIST (EXAMPLE: 2 INPUTS MUST EXIST FOR AN OUTPUT).
	ADJUSTABLE TIME DELAY	A DEVICE WHICH PRODUCES AN OUTPUT FOLLOWING A DEFINITE INTENTIONAL TIME DELAY AFTER RECEIVING AN INPUT.
	OFF RETURN MEMORY	A DEVICE WHICH RETAINS THE CONDITION OF OUTPUT CORRESPONDING TO THE LAST ENERGIZED INPUT (REGARDLESS OF POWER INTERRUPTION) UPON INTERRUPTION OF POWER; CONDITION STATUS IS MAINTAINED (NO RESET OCCURS) AND THE SAME OUTPUT SIGNAL IS RE-ESTABLISHED WHEN POWER IS RESTORED.
	RETENTIVE MEMORY	A DEVICE WHICH RETAINS THE CONDITION OF OUTPUT CORRESPONDING TO THE LAST ENERGIZED INPUT (REGARDLESS OF POWER INTERRUPTION) UPON INTERRUPTION OF POWER; CONDITION STATUS IS MAINTAINED (NO RESET OCCURS) AND THE SAME OUTPUT SIGNAL IS RE-ESTABLISHED WHEN POWER IS RESTORED.
	RETENTIVE MEMORY WITH ACTUATION BLOCK	A DEVICE HAVING RETENTIVE MEMORY AND ACTUATION SIGNAL BLOCK LOGIC FUNCTIONS AS INDICATED BY THE DIAGRAM BELOW.

**ADDITIONAL SYMBOLS**

	INSTRUMENT CHANNEL BISTABLE
	OUTPUT INDICATOR
	BISTABLE OUTPUT IS A LOGIC '1' WHEN THE MEASURED PARAMETER IS GREATER THAN THE SETPOINT VALUE.
	BISTABLE OUTPUT IS A LOGIC '1' WHEN THE MEASURED PARAMETER IS LESS THAN THE SETPOINT VALUE.
	BISTABLE OUTPUT IS A LOGIC '1' THEN THE MEASURED PARAMETER DEVIATES FROM THE NORMAL VALUE BY MORE THAN THE SETPOINT AMOUNTS
	SAME AS ABOVE EXCEPT WITH AN AUTOMATICALLY ADJUSTED SETPOINT
	SAME AS ABOVE EXCEPT WITH REQUIRED HYSTERESIS.

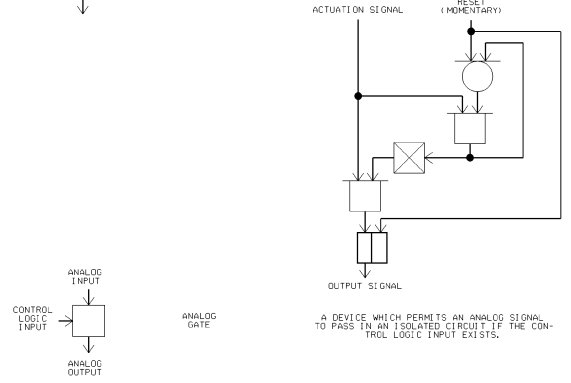
**DEVICE FUNCTION LETTERS AND NUMBERS**

FB	FLOW CHANNEL
LB	LEVEL CHANNEL
NC	NUCLEAR CHANNEL
PB	PRESSURE CHANNEL
RC	RADIATION CHANNEL
SB	SPEED CHANNEL
TB	TEMPERATURE CHANNEL
ZB	POSITION CHANNEL
ZB	ELECTRIC OPERATED VALVE
Z7	UNDERVOLTAGE RELAY
Z3	POSITION SWITCH

	NON-INSTRUMENT BISTABLE
	OUTPUT INDICATOR (SAME AS EXPLAINED ABOVE)
	ALARM ANNUNCIATOR (ALARMS ON THE SAME SHEET WITH THE SAME SUBSCRIPT SHARE A COMMON ANNUNCIATOR WINDOW)
	REACTOR TRIP 'FIRST OUT' ANNUNCIATOR
	TURBINE TRIP 'FIRST OUT' ANNUNCIATOR
	INDICATOR LAMP
	A - ACTUATION STATUS LIGHTS, T - TRIP STATUS LIGHTS, P - PERMISSIVE STATUS LIGHTS, B - BYPASS STATUS LIGHTS
	COMPUTER INPUT
	LOGIC INFORMATION TRANSMISSION
	ANALOG INFORMATION TRANSMISSION
	ANALOG DISPLAY
	I - ANALOG INDICATOR, R - RECORDER, R2 - RECORDER 2 PEN, R3 - RECORDER 3 PEN, R8 - RECORDER 8 POINT
	ANALOG SUMMER

**GENERAL NOTES (FOR ALL SHEETS)**

- ON ALL LOGIC CIRCUITS THE INDICATED ACTUATION OF A SYSTEM OR DEVICE OCCUR WHEN A LOGIC '1' SIGNAL IS PRESENT EXCEPT WHERE INDICATED OTHERWISE. ALL BISTABLES ARE "DE-ENERGIZED TO ACTUATE" SUCH THAT A LOGIC '1' SIGNAL IS DEFINED TO BE PRESENT WHEN THE BISTABLE OUTPUT VOLTAGE IS OFF.
- EXCEPT WHERE INDICATED OTHERWISE, THE FOLLOWING IS TRUE: ALL LOGIC CIRCUITS ARE REDUNDANT, THAT IS, EVERY LOGIC CIRCUIT SHOWN HAS A DUPLICATE LOCATED IN A SEPARATE CABINET. ALL BISTABLES, CIRCUIT BREAKERS, ANNUNCIATORS, COMPUTER INPUTS, AND INDICATOR LAMPS ARE NOT REDUNDANT. MANUAL CONTROLS DO NOT HAVE REDUNDANT ACTUATORS, BUT DO HAVE REDUNDANT CONTACTS WHERE LOGIC IS REDUNDANT. ALL INDICATOR LAMPS, ANNUNCIATORS, AND COMPUTER INPUTS ARE CONNECTED TO BOTH TRAINS (WHERE LOGIC IS REDUNDANT) SO THAT A SIGNAL IN EITHER TRAIN WILL ACTUATE.
- WHEREVER A PROCESS SIGNAL IS USED FOR CONTROL AND IS DERIVED FROM A PROTECTION CHANNEL, ISOLATION MUST BE PROVIDED.
- THIS SET OF DRAWINGS ILLUSTRATES THE FUNCTIONAL REQUIREMENTS OF THE REACTOR CONTROL AND PROTECTION SYSTEM (INCLUDING ENGINEERED SAFEGUARDS). THESE DRAWINGS DO NOT REPRESENT ACTUAL HARDWARE IMPLEMENTATION. FOR HARDWARE IMPLEMENTATION, REFER TO THE FOLLOWING LIST:  
 FUNCTIONAL DIAGRAM BLOCK OR WIRING DIAGRAM  
 REACTOR PROTECTION SYSTEM (SHEETS 1 TO 8 AND 15 TO 16) DRAWING NUMBERS: 5655048, 5655050, 565051, 5756037, 1189E15, 271C335, 7243058, 1984H37  
 REACTOR CONTROL SYSTEM (SHEETS 9 TO 14 AND 17 TO 18) DRAWING NUMBERS: 5655052, 271C335, 8756037
- FOR THIS SET OF DRAWINGS ALL SWITCHES, PUSHBUTTONS, ANNUNCIATORS, AND INDICATORS (EXCEPT FOR THE N.E.S. PROCESS SYSTEMS INDICATORS, CONTROLLERS, AND MANUAL-AUTO STATIONS) WHICH ARE MOUNTED ON THE MAIN CONTROL BOARD ARE SUPPLIED BY OTHERS. IN ADDITION TO THE ABOVE, SCOPE BY OTHERS IS ALSO INDICATED DIRECTLY ON SHEETS WITHIN THIS SET.



**INDEX**

TITLE	SH. NO.	SUBS					
INDEX AND SYMBOLS	1	1	2	3	4	5	6
REACTOR TRIP SIGNALS	2	1	2	3	3	4	
NUCLEAR INSTR. AND MANUAL TRIP SIGNALS	3	1	1	1	1	2	
NUCLEAR INSTR. PERMISSIVES AND BLOCKS	4	1	1	2	2	3	
PRIMARY COOLANT SYSTEM TRIP SIGNALS	5	1	2	3	3	3	
PRESSURIZER TRIP SIGNALS	6	1	1	2	3	3	
STEAM GENERATOR TRIP SIGNALS	7	1	1	2	2	3	
SAFEGUARDS ACTUATION SIGNALS	8	1	2	3	3	3	
ROD CONTROLS & ROD BLOCKS	9	1	2	3	3	4	
STEAM DUMP CONTROL	10	1	2	3	3	3	
PRESSURIZER PRESSURE & LEVEL CONTROL	11	1	2	3	4	4	
PRESSURIZER HEATER CONTROL	12	1	2	2	2	2	
FEEDWATER CONTROL & ISOLATION	13	1	2	3	4	4	
FEEDWATER CONTROL & ISOLATION	14	1	2	3	3	3	
AUXILIARY FEEDWATER PUMPS STARTUP	15	1	2	3	4	4	
TURBINE TRIPS, RUMBACKS & OTHER SIGNALS	16	1	2	3	3	3	
PRESSURIZER PRESSURE RELIEF SYS. (TRAIN A)	17	-	-	-	1	1	
PRESSURIZER PRESSURE RELIEF SYS. (TRAIN B)	18	-	-	-	1	1	

**ESSENTIAL DRAWING**

REVISIONS: INCORPORATED CHANGE PER: THIS DWG. SUPERSEDES: P-744-0008 REV. 05  
 01/08/82 04/08/82 04/08/82 01/08/82 01/08/82 01/08/82

REVISION NOTES: ELECTRONICALLY CONVERTED PER AP 05-010

WOLFP CREEK NUCLEAR OPERATING CORPORATION

ELECTRONIC APPROVAL

USAR FIG. 7.2-1-01  
 M-744-00018 W06

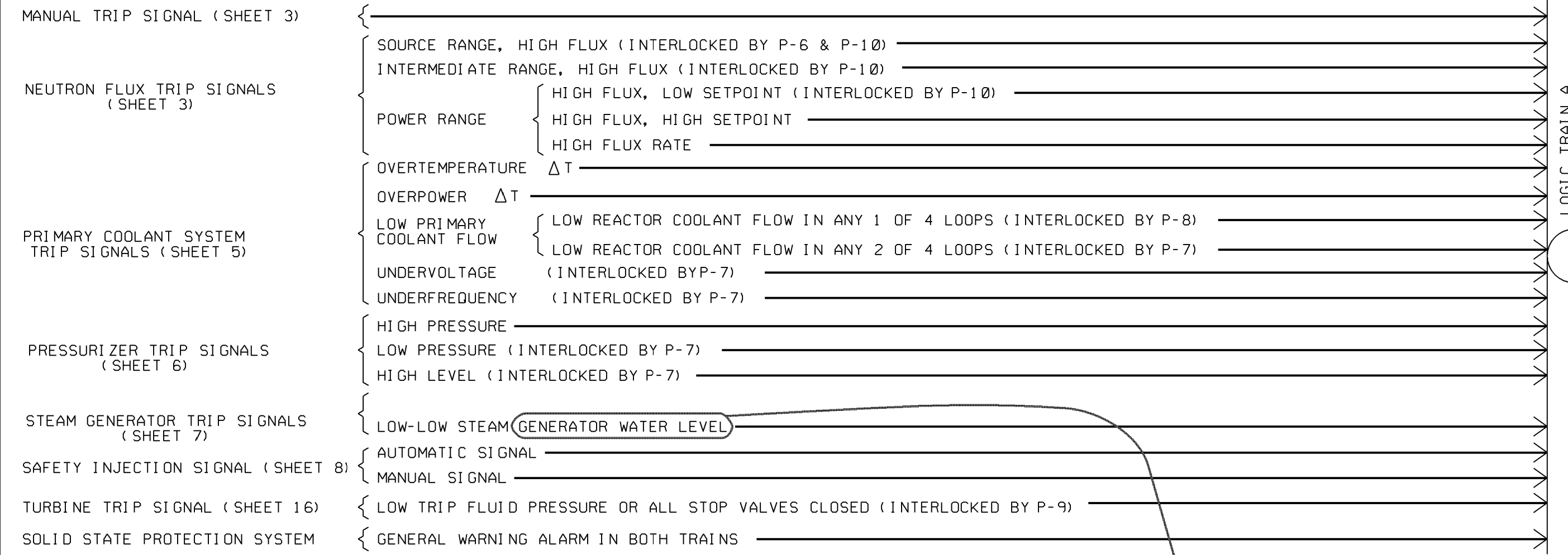
**SNUPPS PROJECTS  
 FUNCTIONAL DIAGRAM  
 INDEX AND SYMBOLS**

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 22934 D SIZE

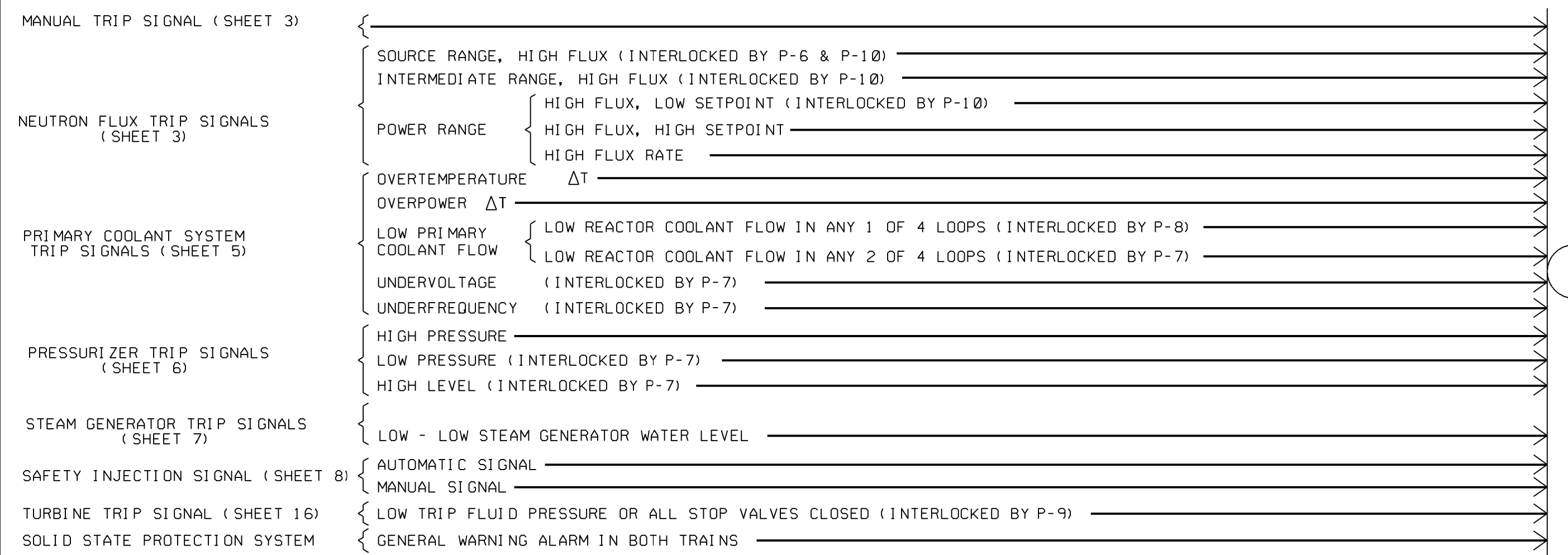
### TRAIN A REACTOR SHUNT TRIP SIGNALS

MANUAL REACTOR TRIP SIGNAL (SHEET 3)  
 MANUAL SAFETY INJECTION SIGNAL (SHEET 6)

### LOGIC TRAIN A REACTOR TRIP SIGNALS



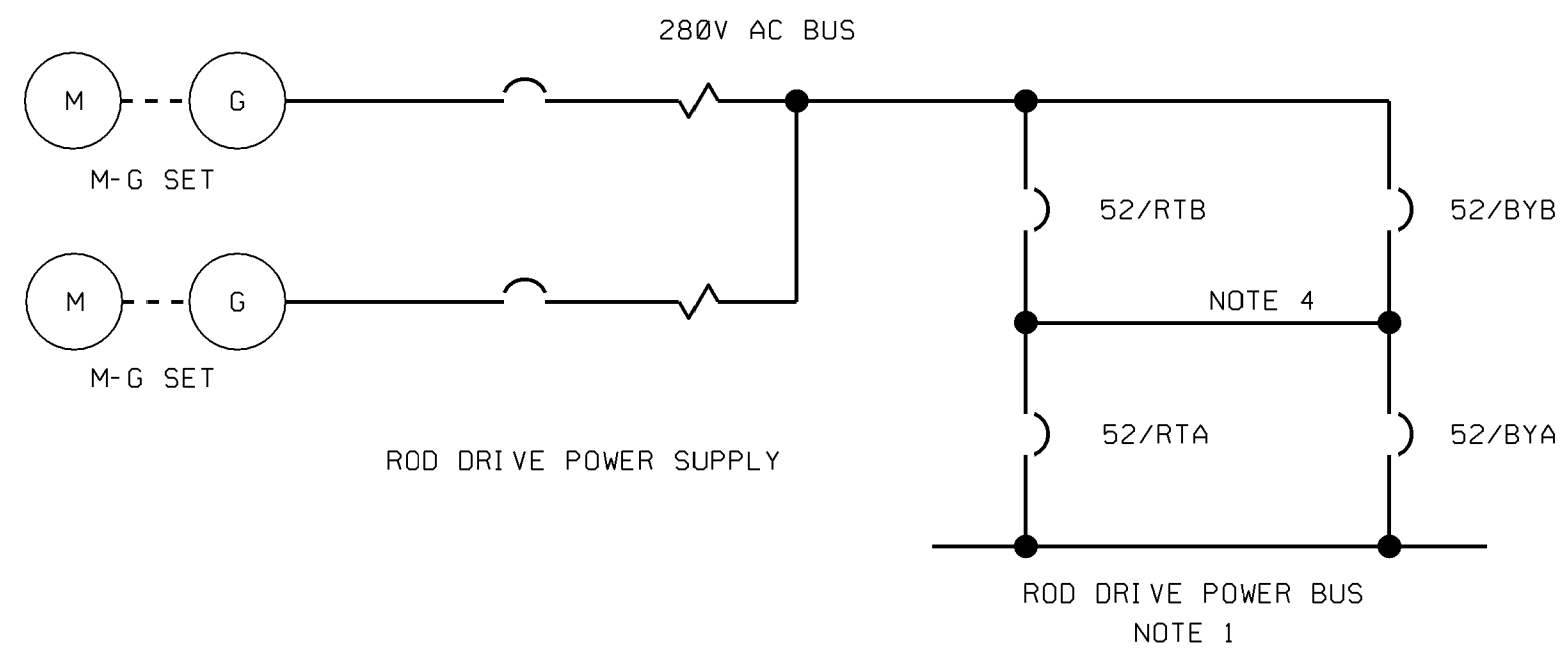
### LOGIC TRAIN B REACTOR TRIP SIGNALS



### TRAIN B REACTOR SHUNT TRIP SIGNALS

MANUAL REACTOR TRIP SIGNAL (SHEET 3)  
 MANUAL SAFETY INJECTION SIGNAL (SHEET 6)

### ROD DRIVE SUPPLY ONE LINE DIAGRAM



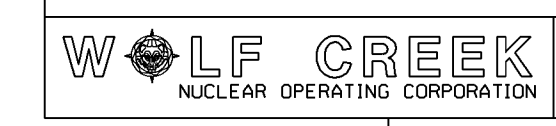
**NOTES:**

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

USAR FIG. 7.2-1-02

**ESSENTIAL DRAWING**

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ISSUED		DOC.	VENDOR MANUAL:	PAGE(S)
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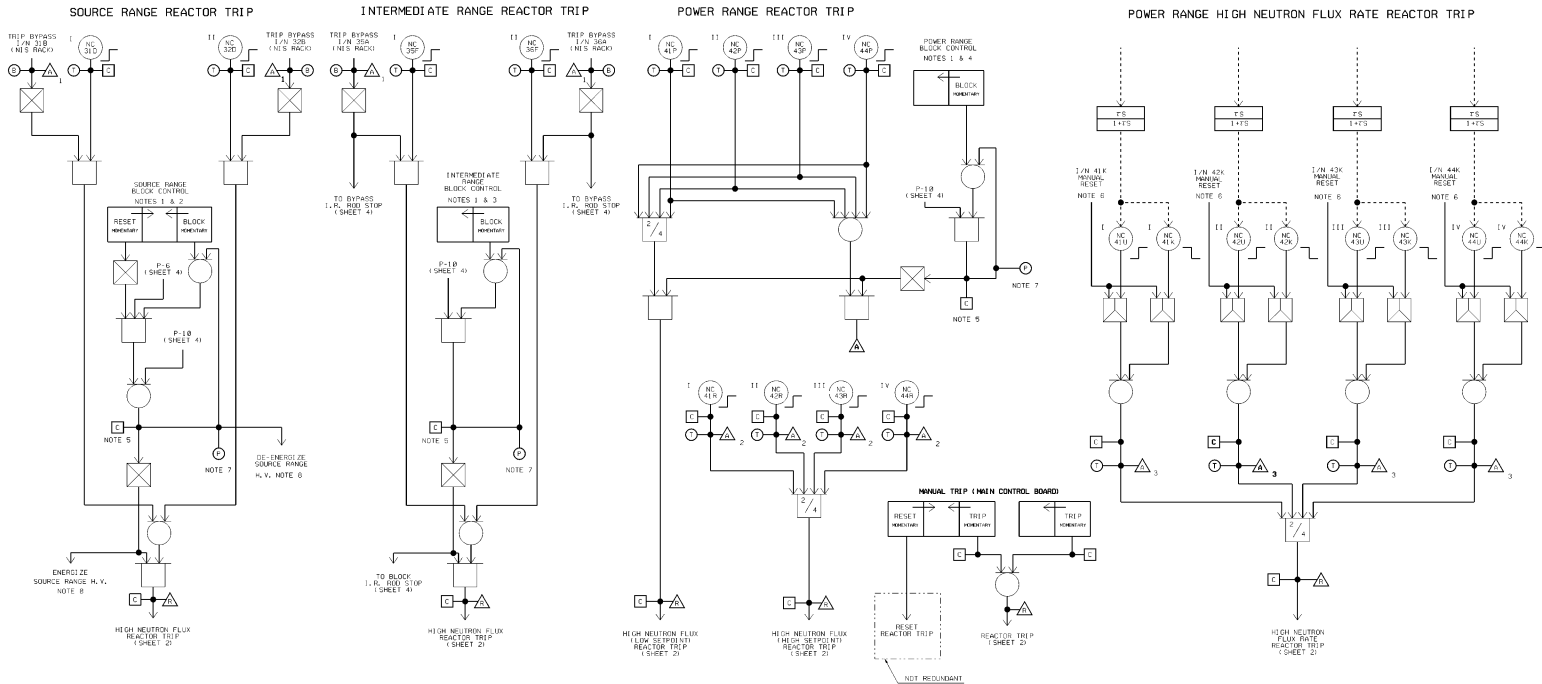


SNUPPS PROJECTS  
 FUNCTIONAL DIAGRAM  
 REACTOR TRIP SIGNALS

SCALE: NONE	DRAWING NUMBER: 7250D64	SHEET: 2	REV:
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- NOTES
1. THE REDUNDANT MANUAL BLOCK CONTROLS CONSIST OF TWO CONTROLS ON THE CONTROL BOARD FOR EACH RANGE, ONE FOR EACH TRAIN.
  2. 1/N 310 IS IN LOGIC TRAIN A, 1/N 315 IS IN LOGIC TRAIN B.
  3. 1/N 320 IS IN LOGIC TRAIN A, 1/N 325 IS IN LOGIC TRAIN B.
  4. 1/N 410 IS IN LOGIC TRAIN A, 1/N 415 IS IN LOGIC TRAIN B.
  5. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.
  6. MANUAL RESET CONTROLS CONSIST OF FOUR MOMENTARY CONTROLS IN THE CONTROL ROOM, ONE CONTROL FOR EACH INSTRUMENT CHANNEL.
  7. TWO REDUNDANT STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.
  8. EACH SOURCE RANGE FLUX DETECTOR IS ENERGIZED AND DE-ENERGIZED BY LOGIC OUTPUT FROM A STABLE TRAIN. THE TWO SOURCE RANGE FLUX DETECTORS (1-N-31 AND 1-N-32) ARE ON SEPARATE TRAINS.

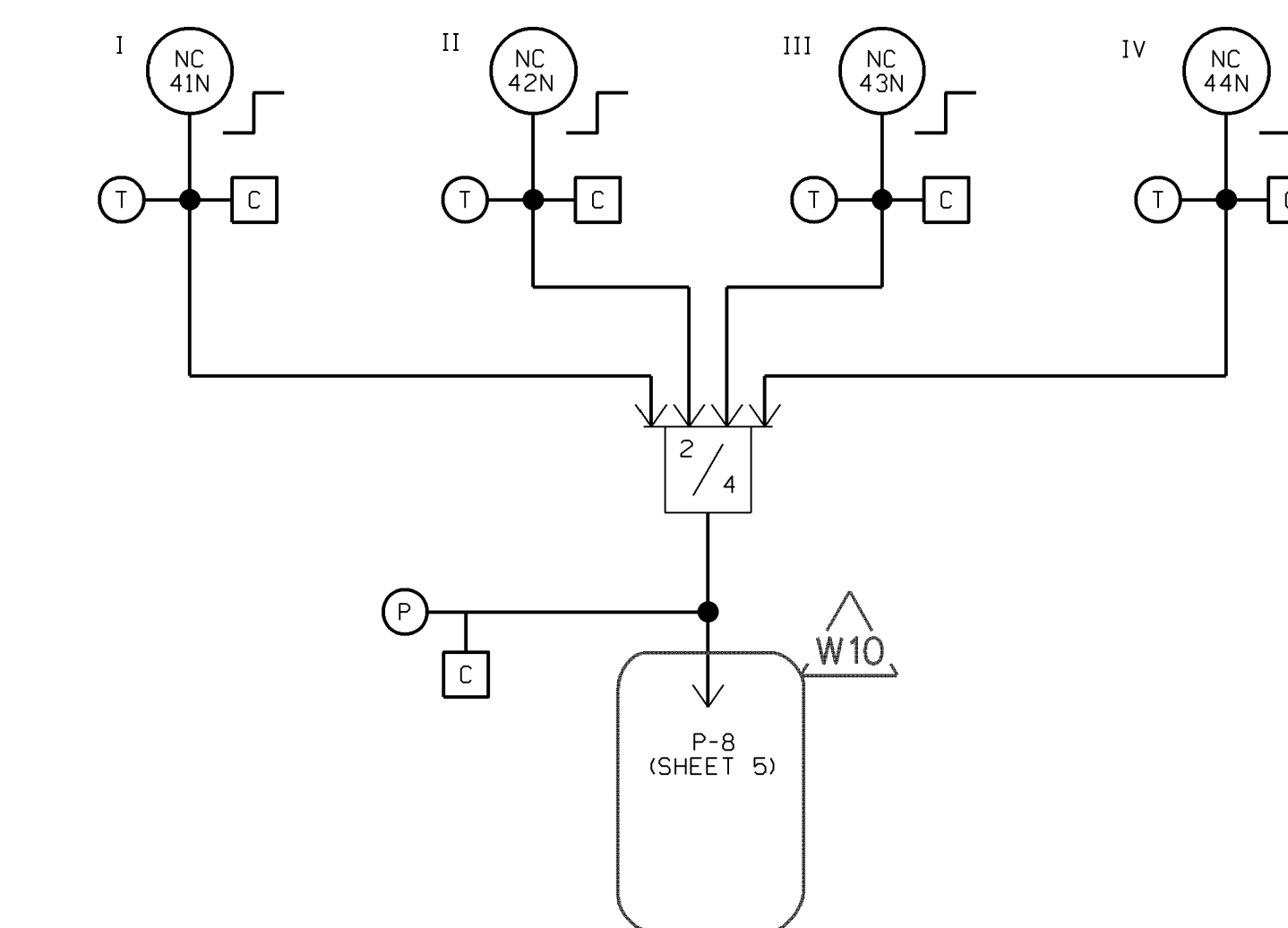
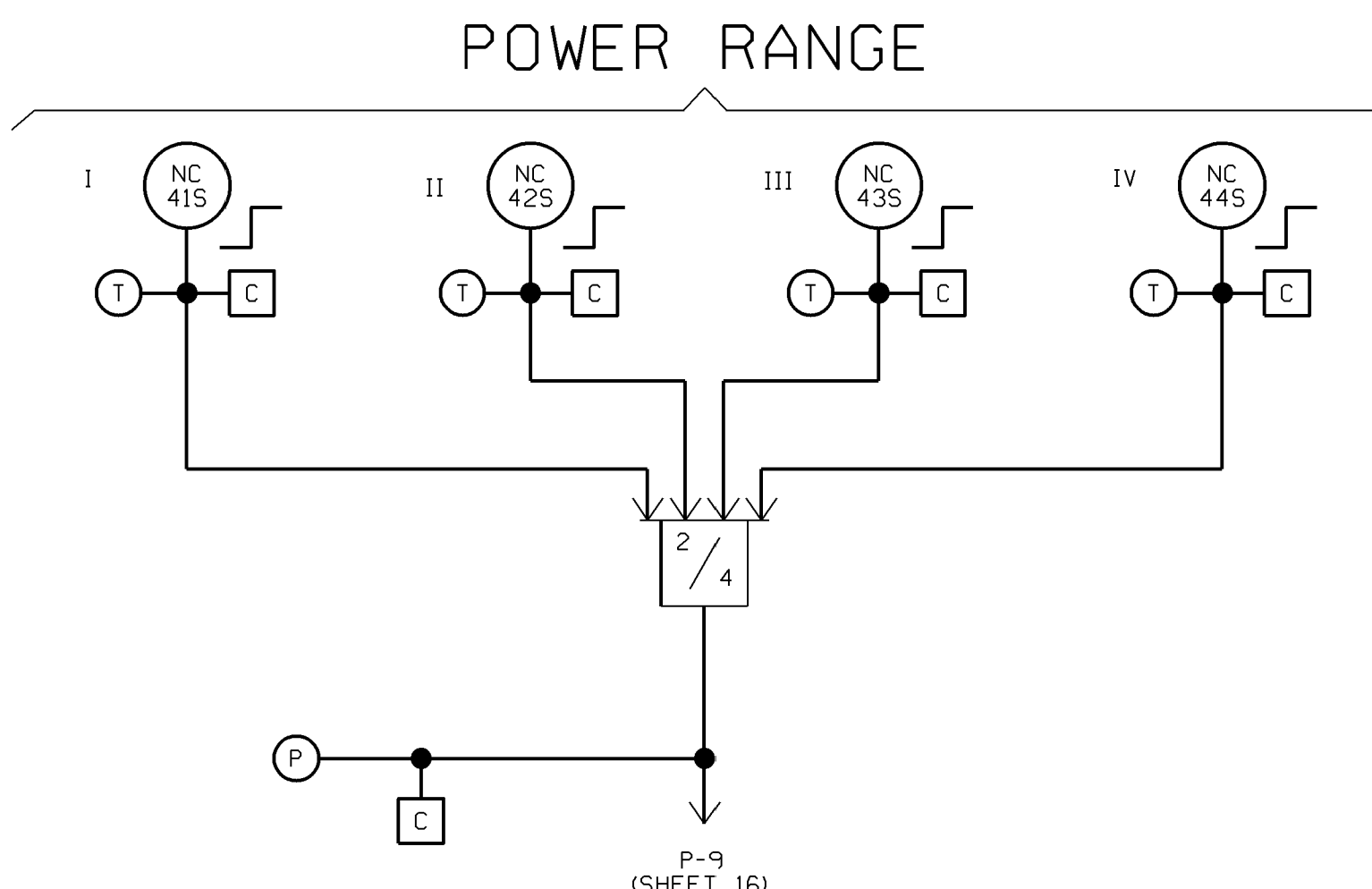
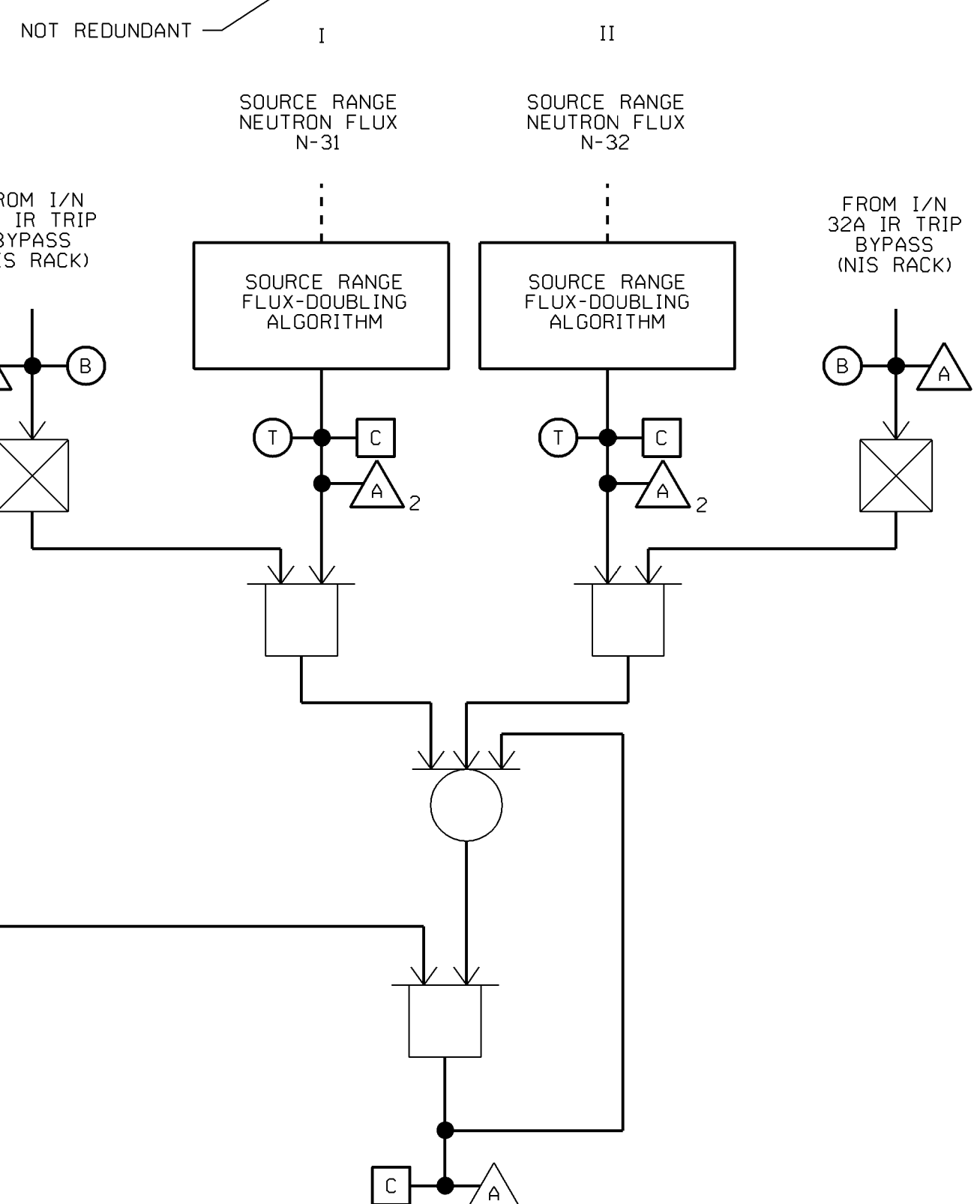
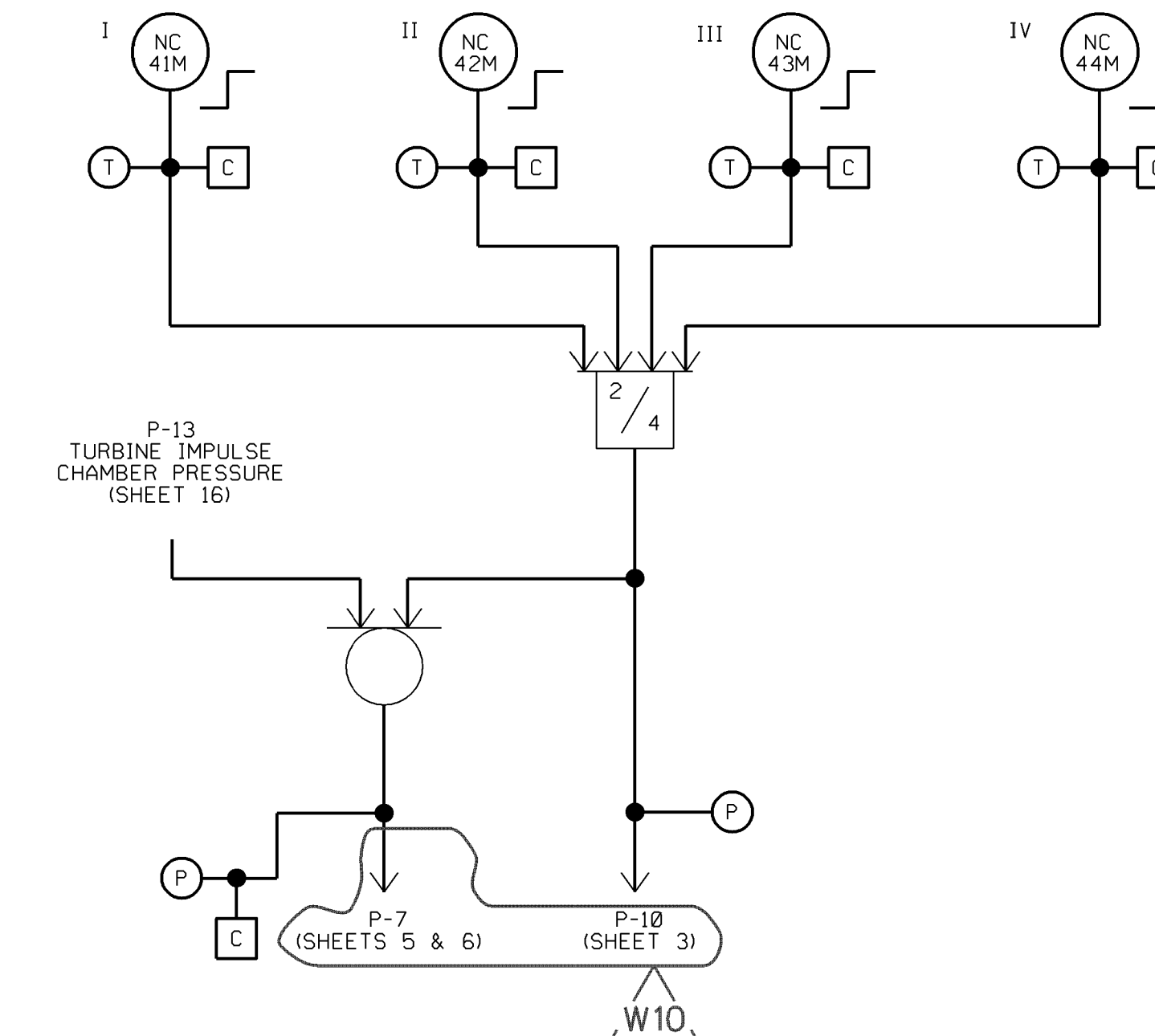
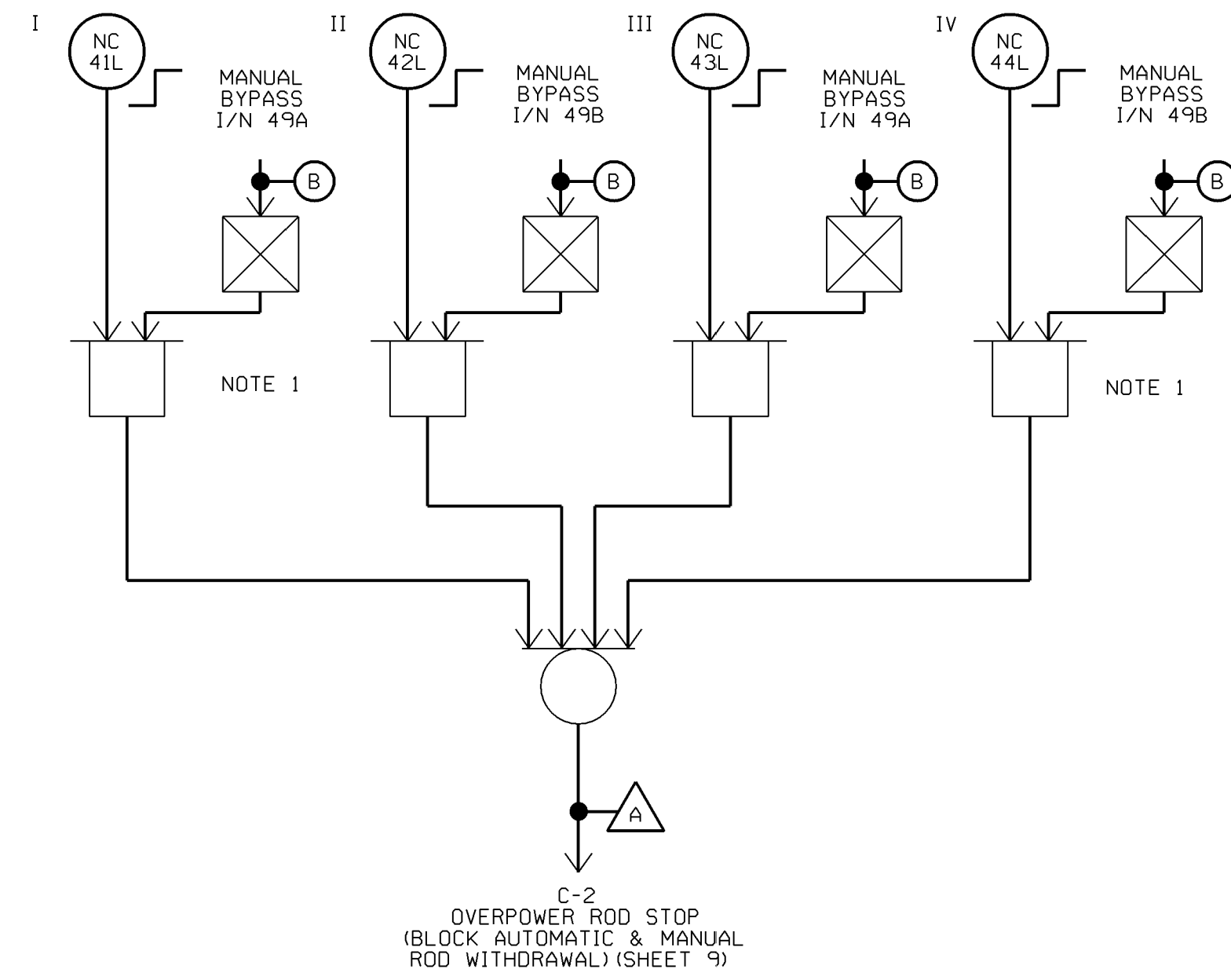
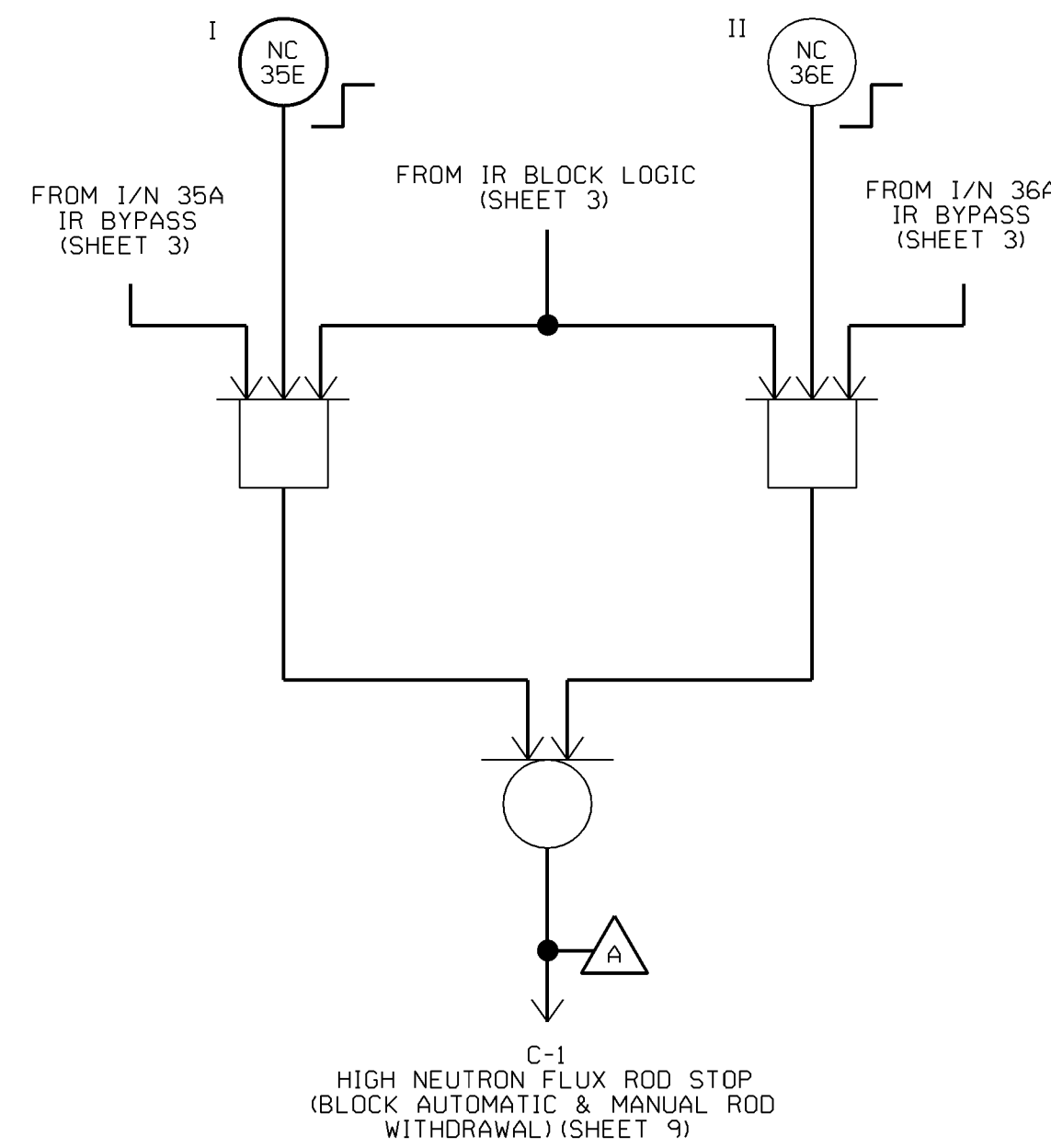
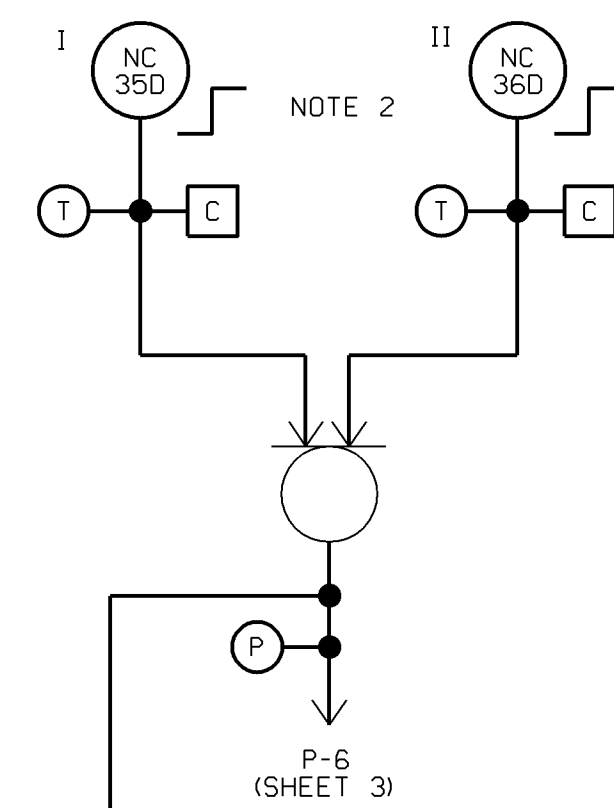
USAR FIG. 7-2-1-03  
M-744-00020 W06

ESSENTIAL DRAWING			
DESIGNED BY	DATE	REVISED BY	REV.
DRAWN BY	DATE	REVISED BY	REV.
		ELECTRONIC APPROVAL	

SNUPPS PROJECTS FUNCTIONAL DIAGRAM NUCLEAR INSTR. & MANUAL TRIP SIGNALS			
SCALE	FIGURE NUMBER	SHEET NO.	TOTAL SHEETS
NONE	7250D64	3	3

INTERMEDIATE RANGE

POWER RANGE



- NOTES
1. THE BYPASS SIGNALS ARE MADE UP BY MEANS OF TWO THREE-POSITION SWITCHES ON A NIS RACK. SWITCH I/N 49A BYPASSES EITHER NC-41L OR NC-43L. SWITCH I/N49B BYPASSES EITHER NC-42L OR NC-44L.
  2. THE TWO P-6 BISTABLES NO. NC-35D AND NC-36D ARE 'ENERGIZED TO ACTUATE' SUCH THAT A LOGIC 1 SIGNAL IS DEFINED TO BE PRESENT WHEN THE BISTABLE OUTPUT VOLTAGE IS ON.
  3. THE REDUNDANT MANUAL BLOCK CONTROL CONSISTS OF TWO CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN, SUPPLIED BY OTHERS
  4. DELETED

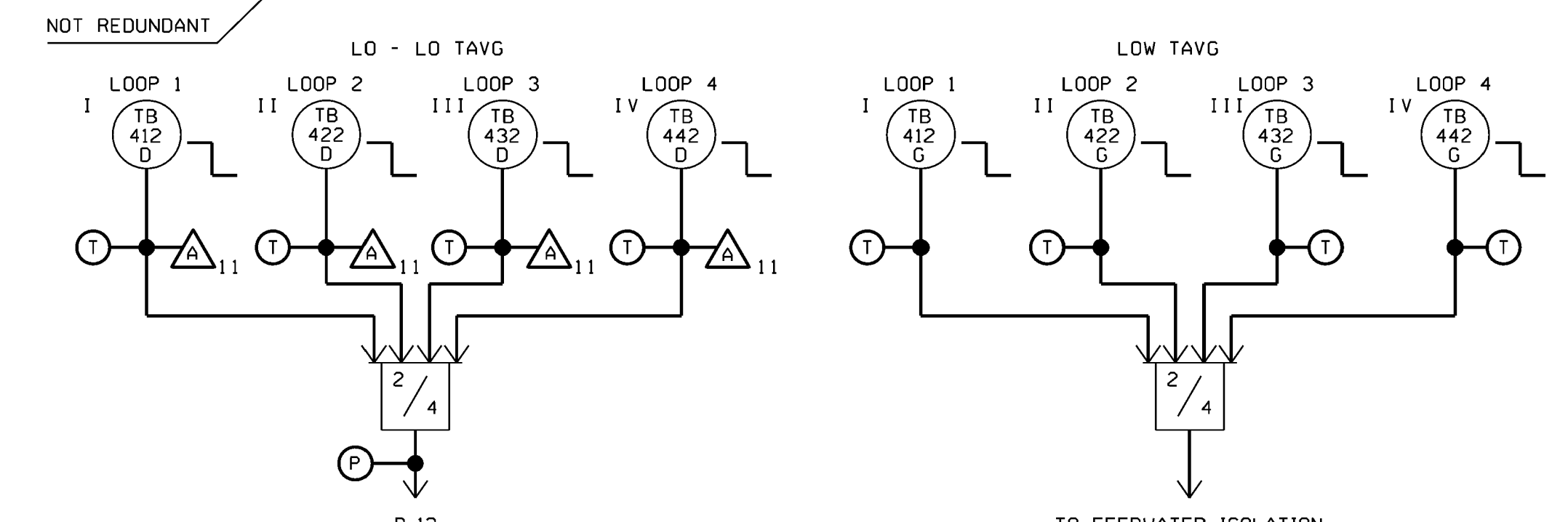
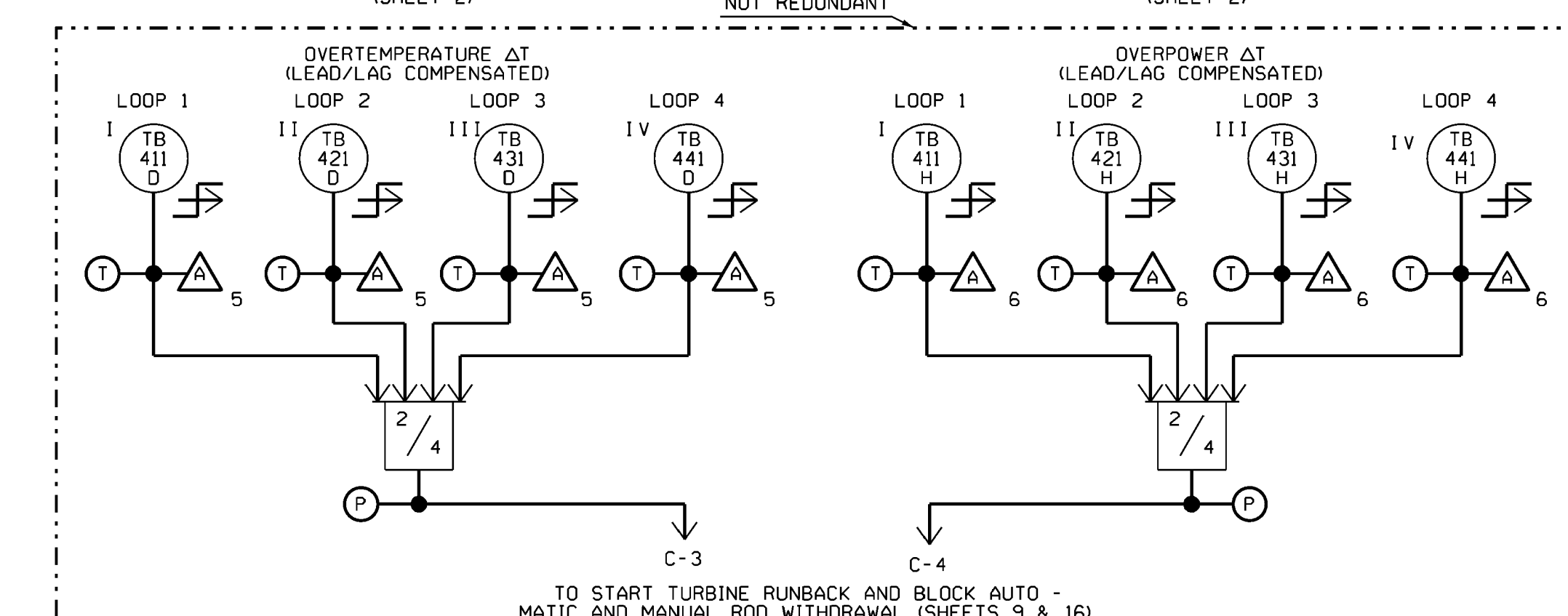
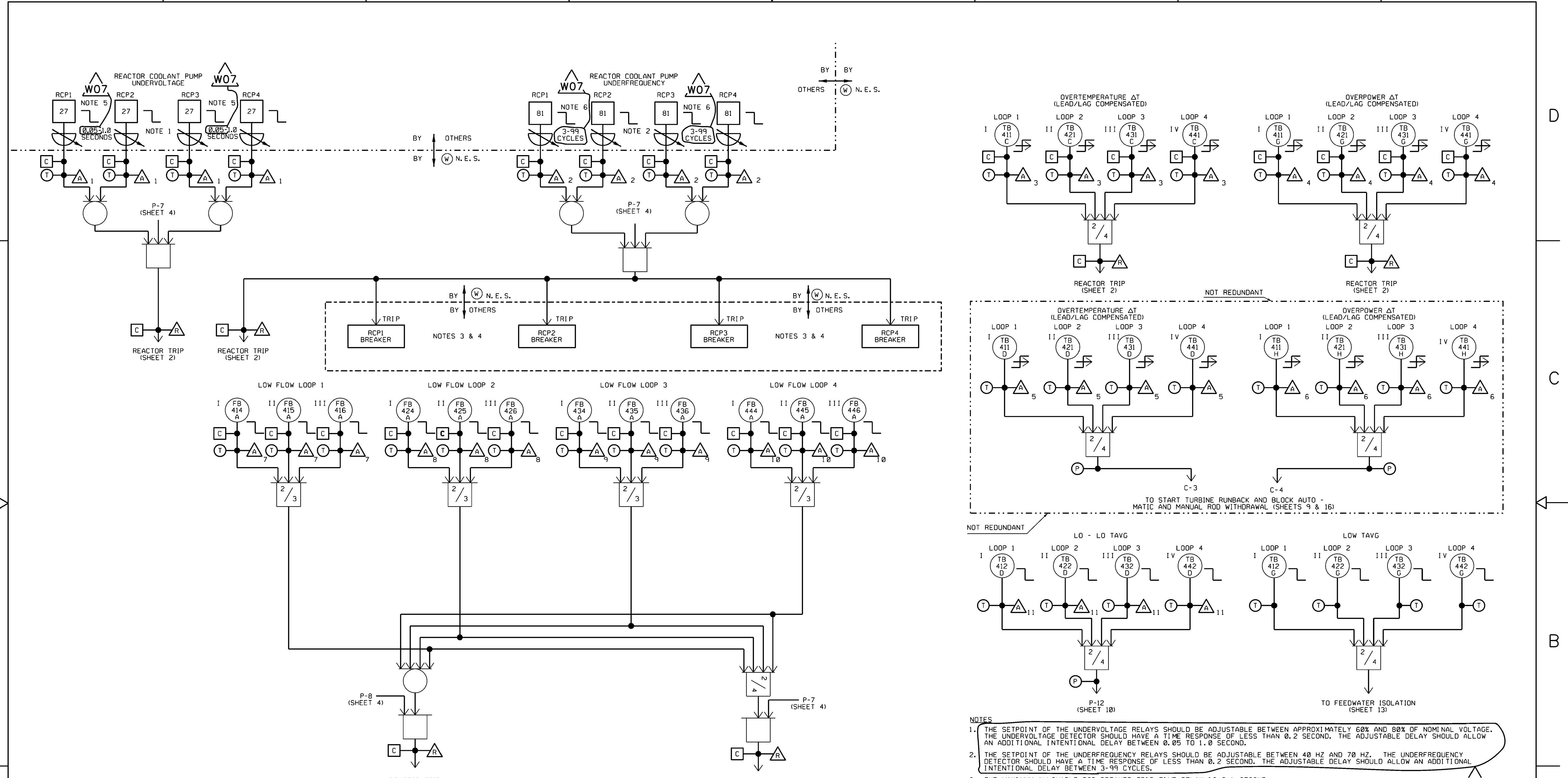
USAR FIG. 7.2-1-04

ESSENTIAL DRAWING				ELECTRONIC APPROVAL
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ISSUED	CHNG. DOC.	VENDOR MANUAL SUPPLIER DWG. NO.	REV. PAGE(S) SHT. 4	DC4 08/21/2013
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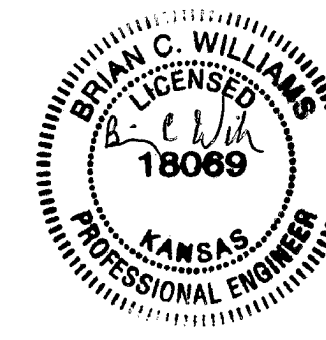
SNUPPS PROJECTS FUNCTIONAL DIAGRAM NUCLEAR INSTR. PERMISSIVES & BLOCKS

SCALE	DRAWING NUMBER	SHEET	REV
NONE	7250D64	4	





- NOTES
1. THE SETPOINT OF THE UNDERVOLTAGE RELAYS SHOULD BE ADJUSTABLE BETWEEN APPROXIMATELY 60% AND 80% OF NOMINAL VOLTAGE. THE UNDERVOLTAGE DETECTOR SHOULD HAVE A TIME RESPONSE OF LESS THAN 0.2 SECOND. THE ADJUSTABLE DELAY SHOULD ALLOW AN ADDITIONAL INTENTIONAL DELAY BETWEEN 0.05 TO 1.0 SECOND.
  2. THE SETPOINT OF THE UNDERFREQUENCY RELAYS SHOULD BE ADJUSTABLE BETWEEN 40 HZ AND 70 HZ. THE UNDERFREQUENCY DETECTOR SHOULD HAVE A TIME RESPONSE OF LESS THAN 0.2 SECOND. THE ADJUSTABLE DELAY SHOULD ALLOW AN ADDITIONAL INTENTIONAL DELAY BETWEEN 3-99 CYCLES.
  3. THE MAXIMUM ALLOWABLE RCP BREAKER TRIP TIME DELAY IS 0.1 SECOND.
  4. REACTOR COOLANT PUMPS NUMBER 1 AND 2 ARE ON BUS H1. REACTOR COOLANT PUMPS NUMBER 3 AND 4 ARE ON BUS H2.
  5. THE UNDERVOLTAGE SENSORS (POTENTIAL TRANSFORMERS) MUST BE LOCATED ON THE MOTOR SIDE OF THE RCP CIRCUIT BREAKERS TO DETECT THE TRIP OF THE RCP CIRCUIT BREAKERS IN ADDITION TO BUS UNDERVOLTAGE.
  6. THE UNDERFREQUENCY SENSORS MAY BE LOCATED ON THE MOTOR SIDE OF THE RCP CIRCUIT BREAKERS.



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by Brian C Williams  
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USAR FIG. 7.2-1-05

**ESSENTIAL DRAWING**

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ISSUED DOC.			VENDOR MANUAL:	PAGE(S)
			SUPPLIER DWG. NO.:	7250064

REVISION NOTES:	DRAWING NUMBER:	REVISION:	SHEET NO.:
	M-744-00022	W07	

**SNUPPS PROJECTS  
FUNCTIONAL DIAGRAM  
PRIMARY COOLANT SYSTEM TRIP SIGNALS**

SCALE:	DRAWING NUMBER:	SHEET:	REV:
NONE	7250D64	5	



D  
C  
B  
A

8

7

6

5

4

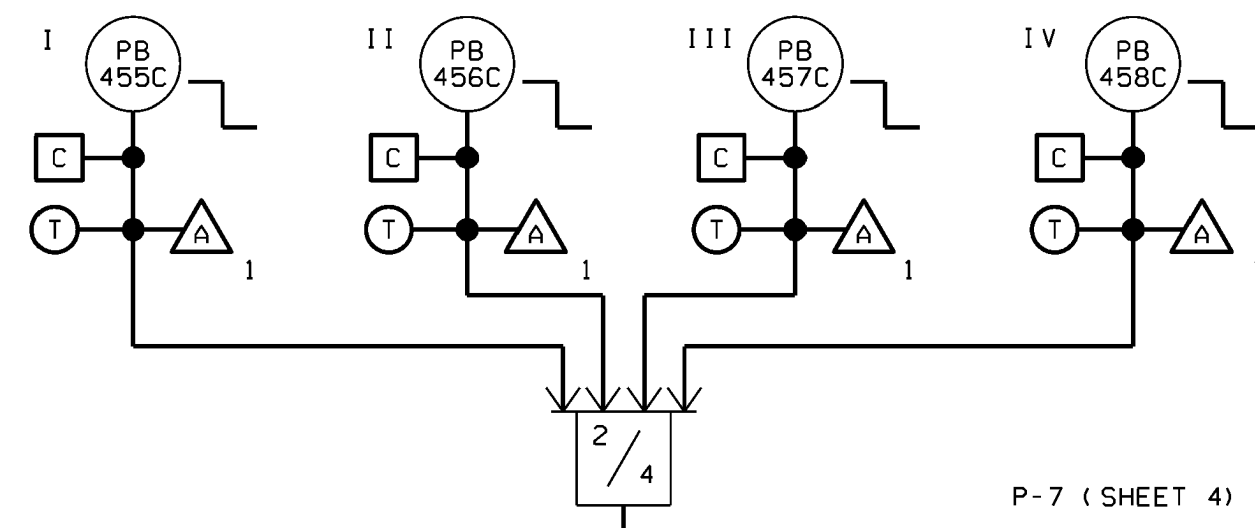
3

2

1

PRESSURIZER LOW PRESSURE

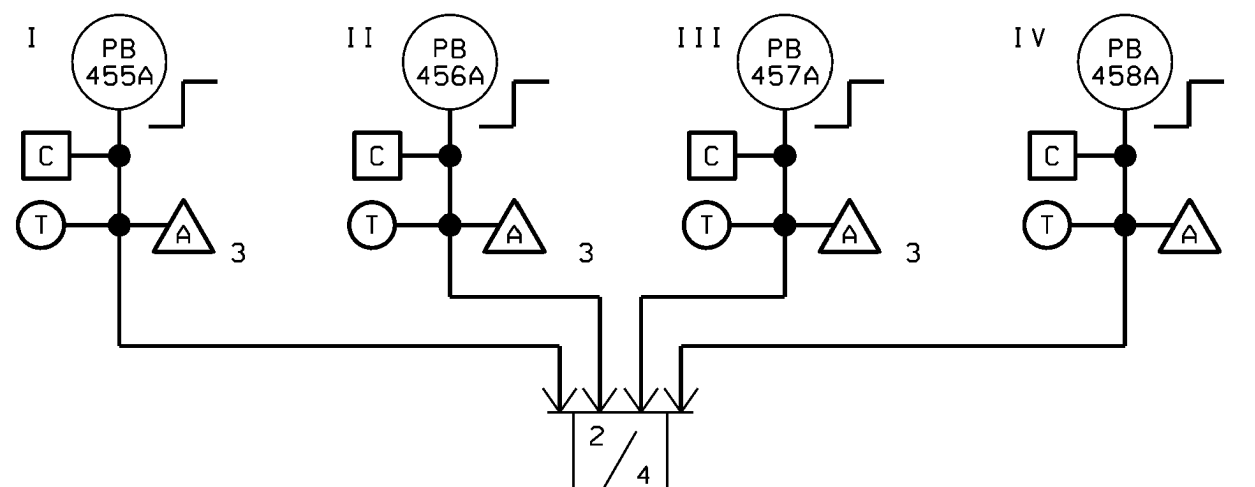
(LEAD/LAG COMPENSATED)



P-7 (SHEET 4)

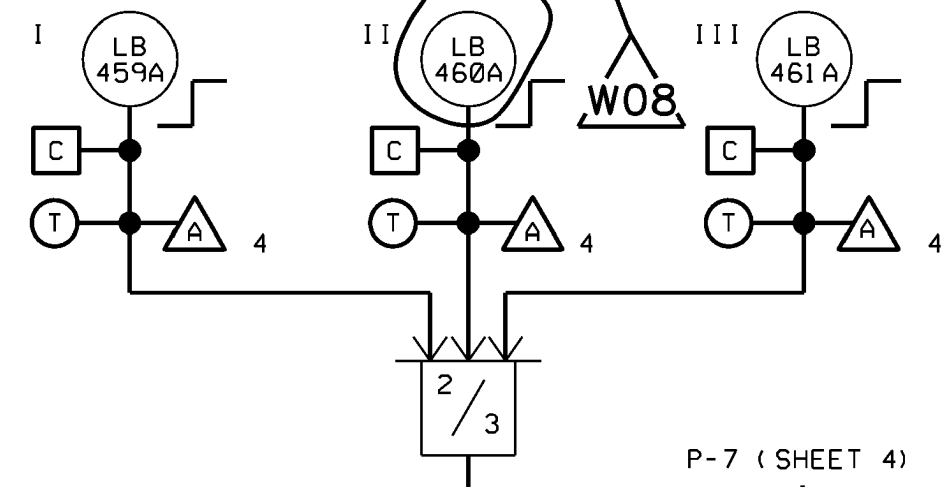
REACTOR TRIP (SHEET 2)

PRESSURIZER HIGH PRESSURE



REACTOR TRIP (SHEET 2)

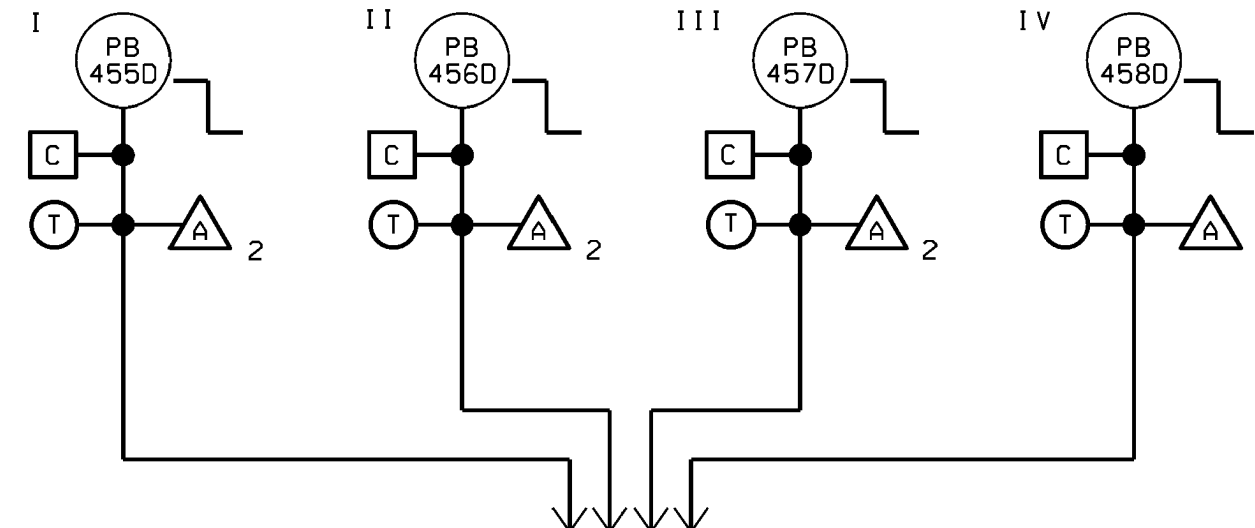
PRESSURIZER HIGH WATER LEVEL



P-7 (SHEET 4)

REACTOR TRIP (SHEET 2)

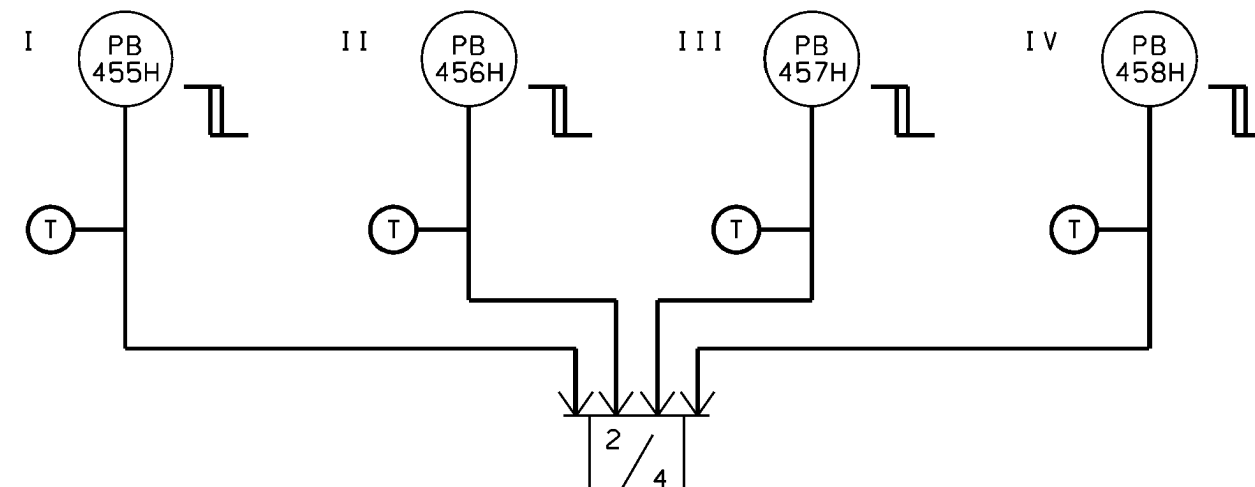
PRESSURIZER LOW PRESSURE



SAFETY INJECTION (SHEET 8)

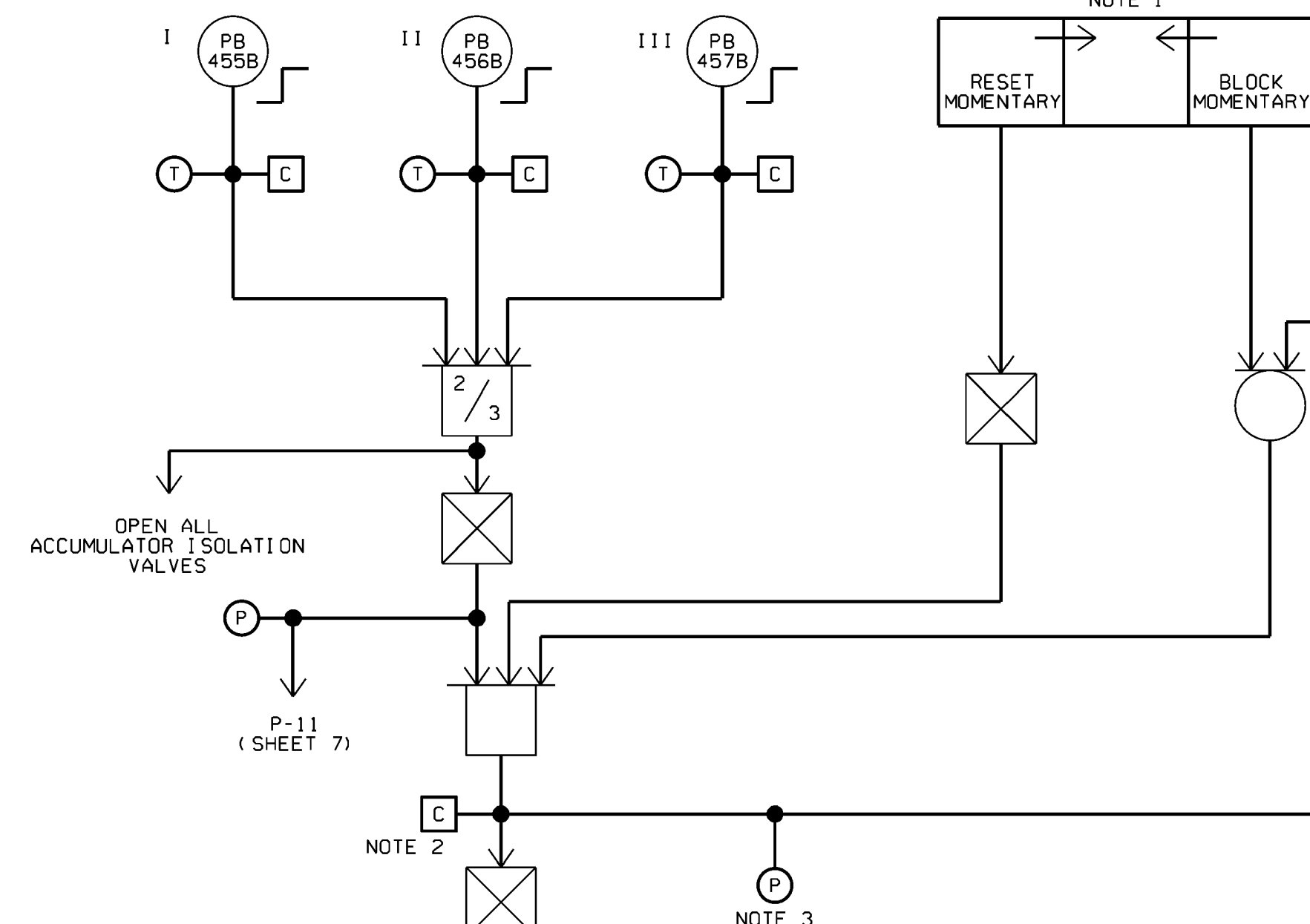
PRESSURIZER LOW PRESSURE

(LEAD/LAG COMPENSATED)



PRESSURE RELIEF INTERLOCK (SHEETS 17 AND 18)

PRESSURIZER PRESSURE



PRESSURIZER S.I. BLOCK CONTROL

NOTE 1

NOTE 2

NOTE 3

NOTES

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

USAR FIG. 7.2-1-06

ESSENTIAL DRAWING

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ISSUED	DOC.	NO.	VENDOR MANUAL:	SUPPLIER DWG. NO.:
REVISION NOTES:				
WOLF CREEK NUCLEAR OPERATING CORPORATION		DRAWING NUMBER: M-744-00023	REVISION: W08	SHEET NO.:

ELECTRONIC APPROVAL

SNUPPS PROJECTS FUNCTIONAL DIAGRAM PRESSURIZER TRIP SIGNALS

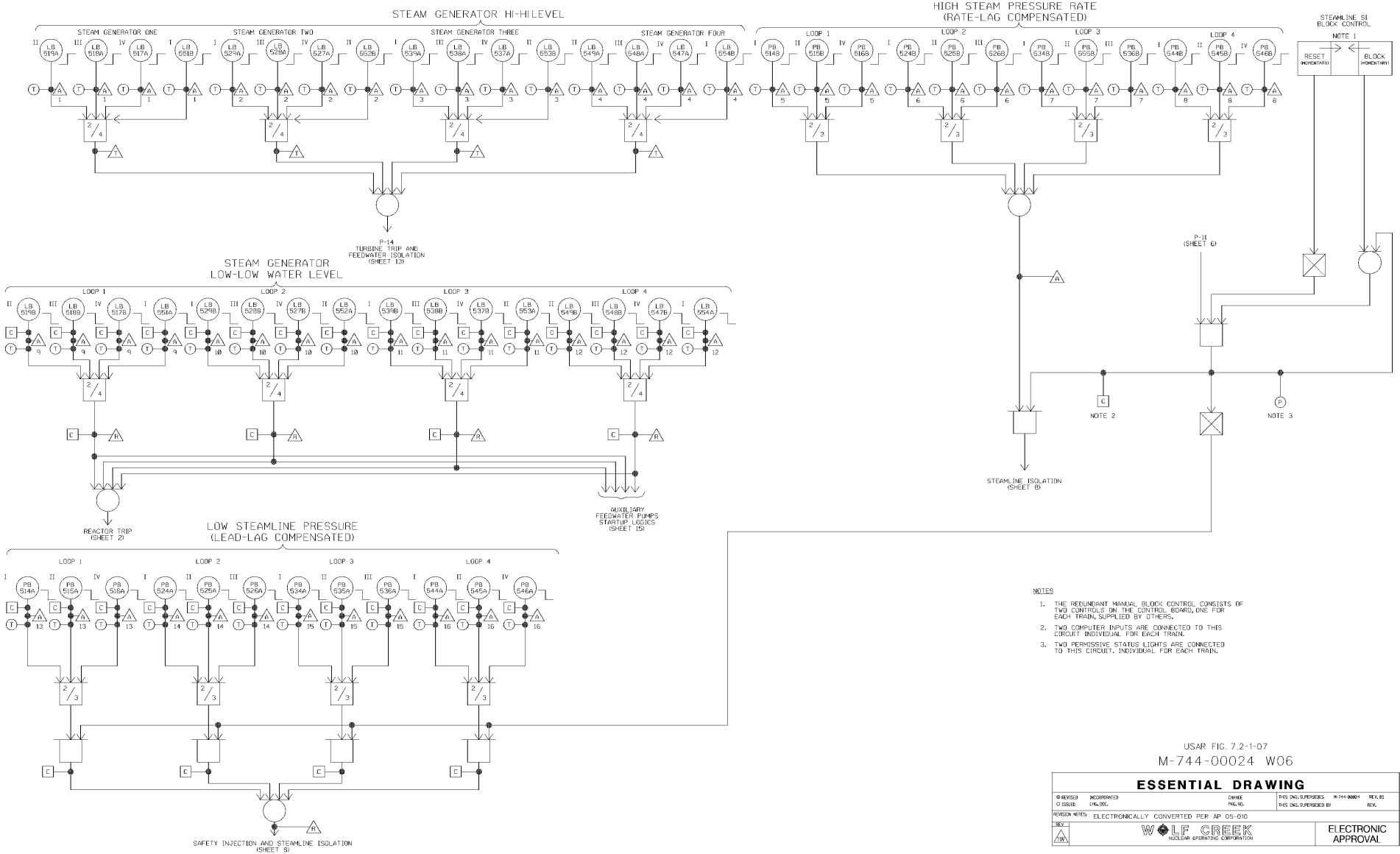
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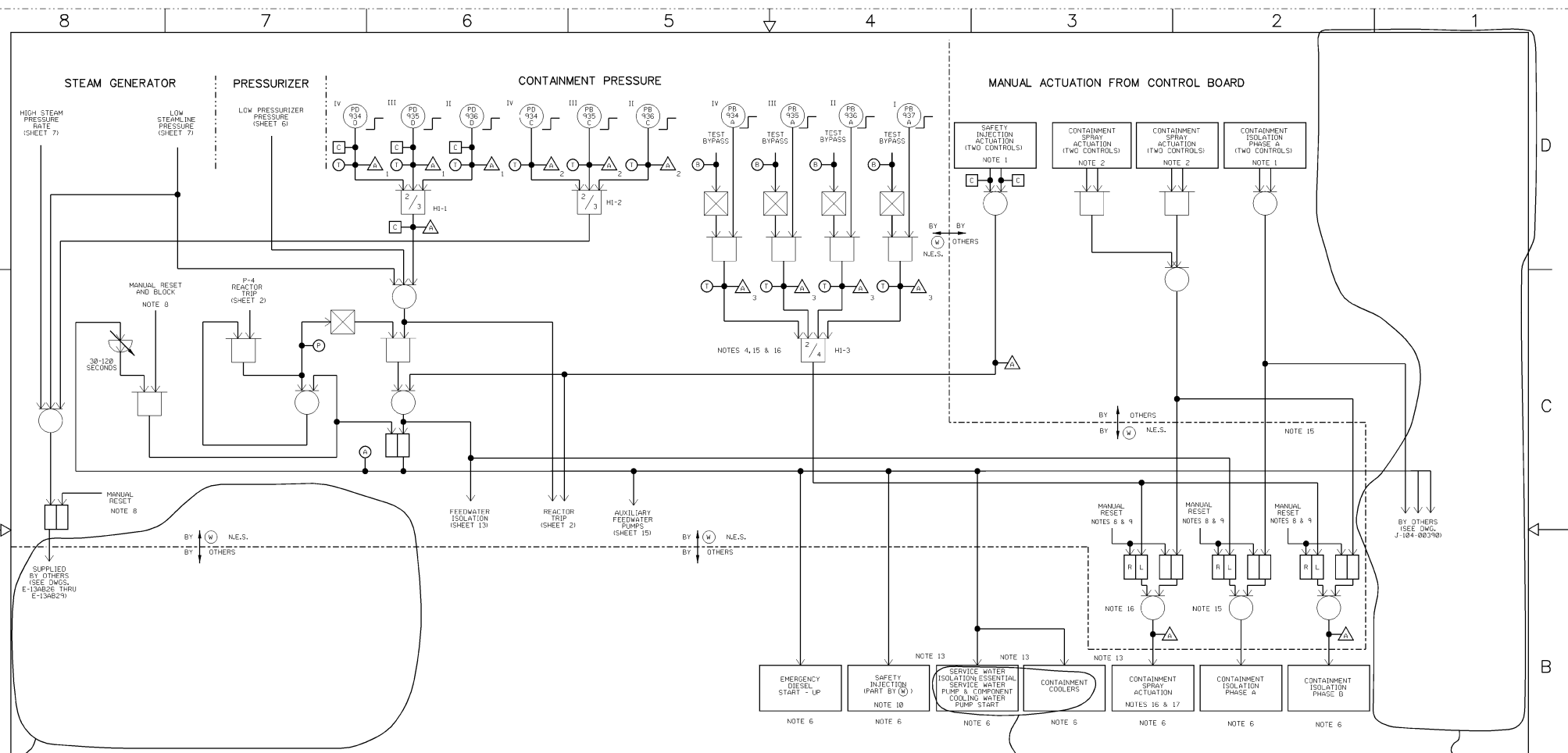


- NOTES
1. THE REDUNDANT MANUAL BLOCK CONTROL CONSISTS OF TWO CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN, SUPPLIED BY OTHERS.
  2. TWO COMPUTER INPUTS ARE CONNECTED TO THIS CIRCUIT INDIVIDUALLY FOR EACH TRAIN.
  3. TWO PERMISSIVE STATUS LIGHTS ARE CONNECTED TO THIS CIRCUIT, INDIVIDUAL FOR EACH TRAIN.

USAR FIG. 7.2-1-07  
M-744-00024 W06

REVISION			
REVISED	INCORPORATED	DATE	DESIGN SUPERSEDES
ISSUED	ENCL. INC.	FIG. NO.	THIS ONE SUPERSEDES BY
REVISION NOTES		ELECTRONICALLY CONVERTED PER AP 05-010	
		ELECTRONIC APPROVAL	

SNUPPS PROJECTS FUNCTIONAL DIAGRAM STEAM GENERATOR TRIP SIGNALS			
SCALE	DRAWING NUMBER	SHEET	REV
NONE	7250D64	7	
22034 D SIZE			



W07

- NOTES**
1. TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, OPERATING EITHER CONTROL WILL ACTUATE.
  2. THE MANUAL SPRAY ACTUATION CONSISTS OF FOUR MOMENTARY CONTROLS. ACTUATION WILL OCCUR ONLY IF TWO ASSOCIATED CONTROLS ARE OPERATED SIMULTANEOUSLY.
  3. ~~DELETED~~
  4. CONTAINMENT PRESSURE BISTABLES FOR SPRAY ACTUATION ARE ENERGIZE TO ACTUATE (OTHER BISTABLES ARE DE-ENERGIZE TO ACTUATE).
  5. ~~DELETED~~
  6. COMPONENTS ARE ALL INDIVIDUALLY SEALED IN (LATCHED), SO THAT LOSS OF THE ACTUATION SIGNAL WILL NOT CAUSE THESE COMPONENTS TO RETURN TO THE CONDITION HELD PRIOR TO THE ADVENT OF THE ACTUATION SIGNAL.
  7. ~~DELETED~~
  8. THE REDUNDANT MANUAL RESET CONSISTS OF TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TRAIN.
  9. SUPPLIED BY OTHERS.
  10. SAFETY INJECTION SEQUENCE REQUIREMENTS (IF SEQUENCING IS NECESSARY) ARE SPECIFIED BY (N) NUCLEAR ENERGY SYSTEMS.
  11. ~~DELETED~~
  12. ~~DELETED~~
  13. THE ACTUATION MAY BE DELAYED AND SEQUENCED IF THE EMERGENCY DIESEL POWER CAPABILITY IS LESS THAN THE TOTAL LOAD WITH ALL SYSTEMS STARTING. THE TIME DELAYS, IF USED, MAY NOT EXCEED THE MAXIMUM STARTING TIME REQUIREMENTS FOR EACH SYSTEM.
  14. ~~DELETED~~
  15. SOME ENGINEERED SAFEGUARDS FUNCTIONS ARE NOT WITHIN THE FUNCTIONAL DESIGN SCOPE OF (N) NUCLEAR ENERGY SYSTEMS BUT ONLY SHOWN ON THIS SHEET AS THE FUNCTIONS ARE BUILT IN THE (N) SUPPLIED EQUIPMENT.

16. THE 2 OUT OF 4 COINCIDENCE MEMORY AND 'OR' LOGIC ARE DUPLICATED WITHIN EACH TRAIN. SEPARATE OUTPUT RELAYS ARE ALSO PROVIDED IN EACH TRAIN, TO MINIMIZE FALSE CONTAINMENT SPRAY ONE OUTPUT RELAY SHOULD START THE PUMPS WHILE ANOTHER SHOULD OPEN THE SYSTEM VALVES.
17. THE CONTAINMENT SPRAY SYSTEM IS INDEPENDENT OF THE SAFETY INJECTION SYSTEM. THE SEQUENCE INTERLOCK IS SUCH THAT SPRAY WILL START WITHIN THE REQUIRED TIME INDEPENDENT OF THE SAFETY INJECTION SIGNAL STATUS.

W07

W07

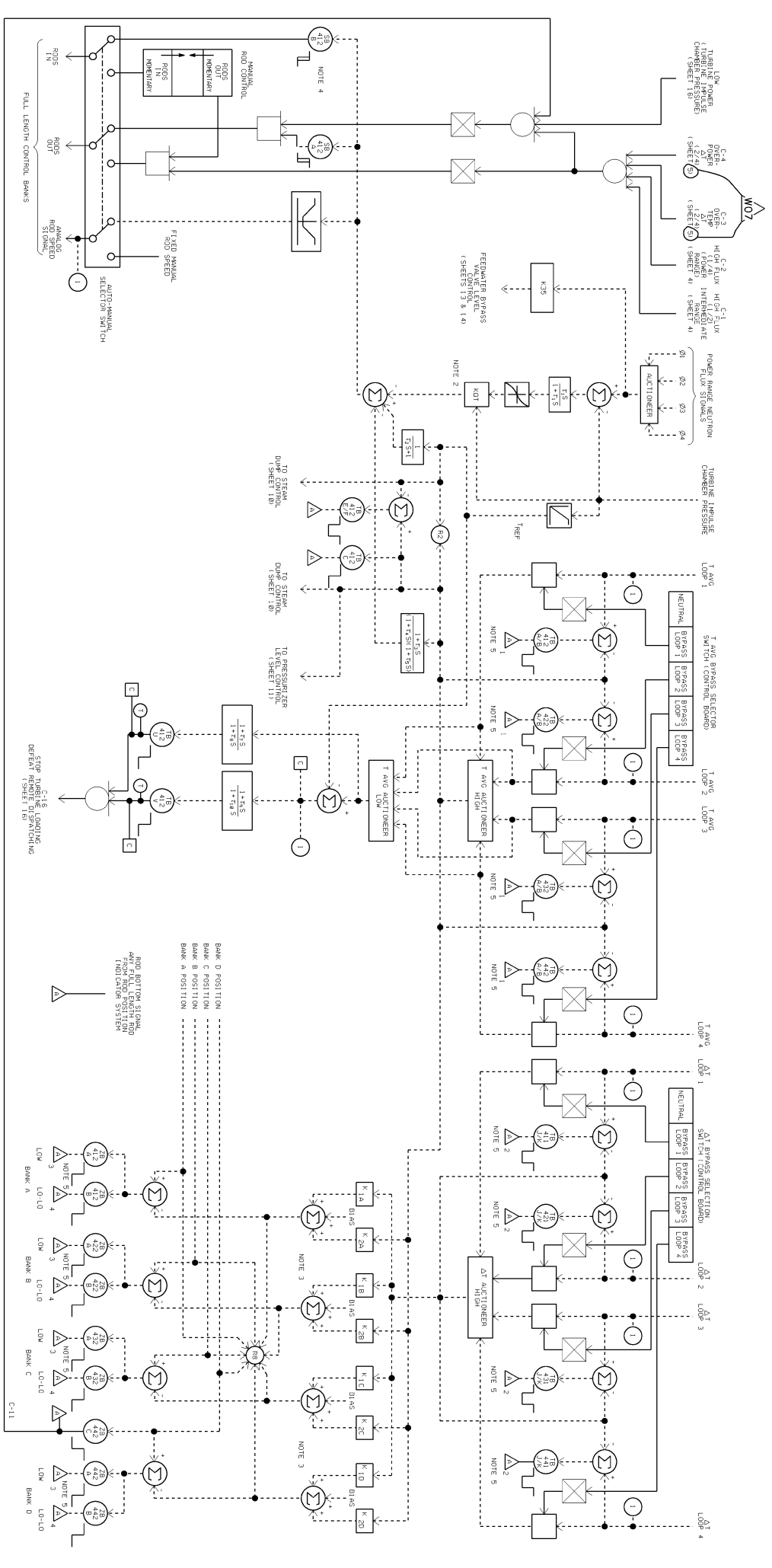
USAR FIG. 7.2-1-08

ESSENTIAL DRAWING			
REVISED NO.	CHG. NO.	THIS DWG SUPERSEDES:	REV.
ISSUED NO.	PROJ. NO.	TRAINER MANUAL:	PAR. NO.
ISSUED DOC.	NO.	SUPPLIER DWG. NO.:	7250064
REVISION NOTES:		DRAWING NUMBER:	REVISION:
		<b>M-744-00025</b>	<b>W07</b>
<b>SNUPPS PROJECTS</b> <b>FUNCTIONAL DIAGRAM</b> <b>SAFEGUARDS ACTUATION SIGNALS</b>			
SCALE:	DRAWING NUMBER:	SHEET:	REV.
NONE	<b>7250D64</b>	8	1

ELECTRONIC APPROVAL

A





- NOTES
1. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT.
  2. FOR MAXIMUM INVERSELY PROPORTIONAL TO LOAD WITH A FIXED AT-38 TO SHUT AND 60 TO OPEN TURBINE LOAD.
  3. THE SUMMER OUTPUTS HAVE FIXED MANUALLY ADJUSTABLE UPPER AND LOWER LIMITS.
  4. \*REMOVED TO ACTUATOR\*
  5. ALARM 1, ALARM 2, ALARM 3, AND ALARM 4 MUST HAVE REDUNDANT CAPABILITY.

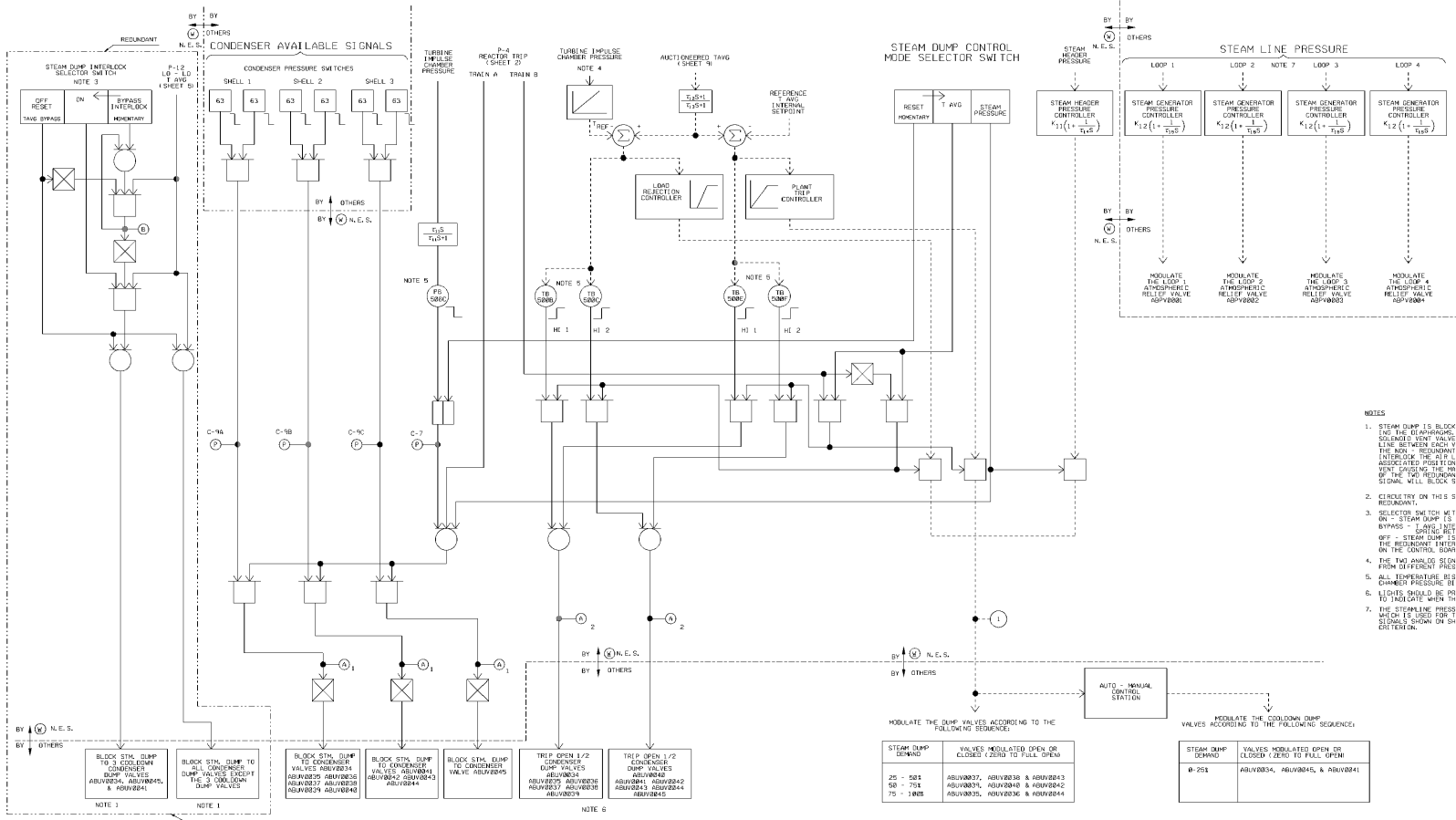
USAR FIG. 7.2-1-09

**ESSENTIAL DRAWING**

WILCOX ENGINEERING CORPORATION  
 744-00026 W07

SNUPPS PROJECTS  
 FUNCTIONAL DIAGRAM  
 ROD CONTROLS & ROD BLOCKS

7250064



- NOTES**
1. STEAM DUMP IS BLOCKED BY BLOCKING AIR TO THE DUMP VALVES AND VENT - THE TWO ANALOGS, THE REDUNDANT LOGIC OUTPUT OPERATES TWO SOLANOID VENT VALVES TO SERVE TO REDUNDANTLY CONTROL THE AIR LINE BETWEEN EACH VALVE TO APPROXIMATE ITS ASSOCIATED POSITIONER. THE NON-REDUANT LOGIC OUTPUT OPERATES ONE SOLANOID VENT VALVE TO CONTROL THE AIR LINE BETWEEN EACH VALVE TO APPROXIMATE ITS ASSOCIATED POSITIONER. THE SOLANOID VALVES ARE OPERABLE TO VENT CAUSING THE MAIN DUMP VALVE TO CLOSE IN FIVE SECONDS. EITHER OF THE TWO REDUNDANT BLOCK SIGNALS OR THE NON-REDUANT BLOCK SIGNAL WILL BLOCK STEAM DUMP INDEPENDENT OF THE OTHER.
  2. CIRCUITRY ON THIS SHEET IS NOT REDUNDANT EXCEPT WHERE INDICATED REDUNDANT.
  3. SELECTOR SWITCH WITH THE FOLLOWING THREE POSITIONS: BY - STEAM DUMP IS POSITIONED. BYPASS - T-ANG INTERLOCK IS BYPASSED FOR LO-LO 1 AVG. OFF - STEAM DUMP IS OFF PERMITTED AND RESET T-ANG BYPASS OF THE REDUNDANT INTERLOCK SELECTOR SWITCH CONSISTS OF TWO CONTROLS (NON-REDUANT ONE FOR EACH VALVE).
  4. THE TWO ANALOG SIGNAL INPUTS COMING FROM TURBINE PRESSURE MUST COME FROM DIFFERENT PRESSURE TAPS TO MEET THE SINGLE FAILURE CRITERION.
  5. ALL TEMPERATURE MEASURES ON THIS SHEET AND THE TURBINE IMPULSE CHAMBER PRESSURE INSTRUMENT NO. PROVIDED ARE "ENERGIZE TO ACTIVATE".
  6. LOGS SHOULD BE PROVIDED IN THE CONTROL ROOM FOR EACH DUMP VALVE TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
  7. THE STEAMLINE PRESSURE SIGNALS MUST BE DIFFERENT FROM THAT WHICH IS USED FOR THE STEAMLINE PRESSURE PROTECTION SIGNALS SHOWN ON SHEET 7 TO MEET THE SINGLE FAILURE CRITERION.

STEAM DUMP DEMAND	VALUES MODULATED OPEN OR CLOSED (ZERO TO FULL OPEN)	STEAM DUMP DEMAND	VALUES MODULATED OPEN OR CLOSED (ZERO TO FULL OPEN)
25 - 501	ABUV0037, ABUV0038 & ABUV0043	0 - 201	ABUV0034, ABUV0045, & ABUV0041
50 - 704	ABUV0031, ABUV0040 & ABUV0042		
72 - 1002	ABUV0025, ABUV0036, & ABUV0044		

USAR FIG. 7.2-1-10  
M-744-00027 W07

**ESSENTIAL DRAWING**

DESIGN	INTEGRATED	DATE	THIS DRAWING/ISSUE WITH SHEET	REV.
01000	04/03/00	REL.	THIS INCLUDES SHEET BY	REV.
ISSUED WITH	ELECTRONICALLY CONVERTED PER AP 05-21-0	DATE		
		BY		

W. L. CREEK  
ELECTRONIC APPROVAL

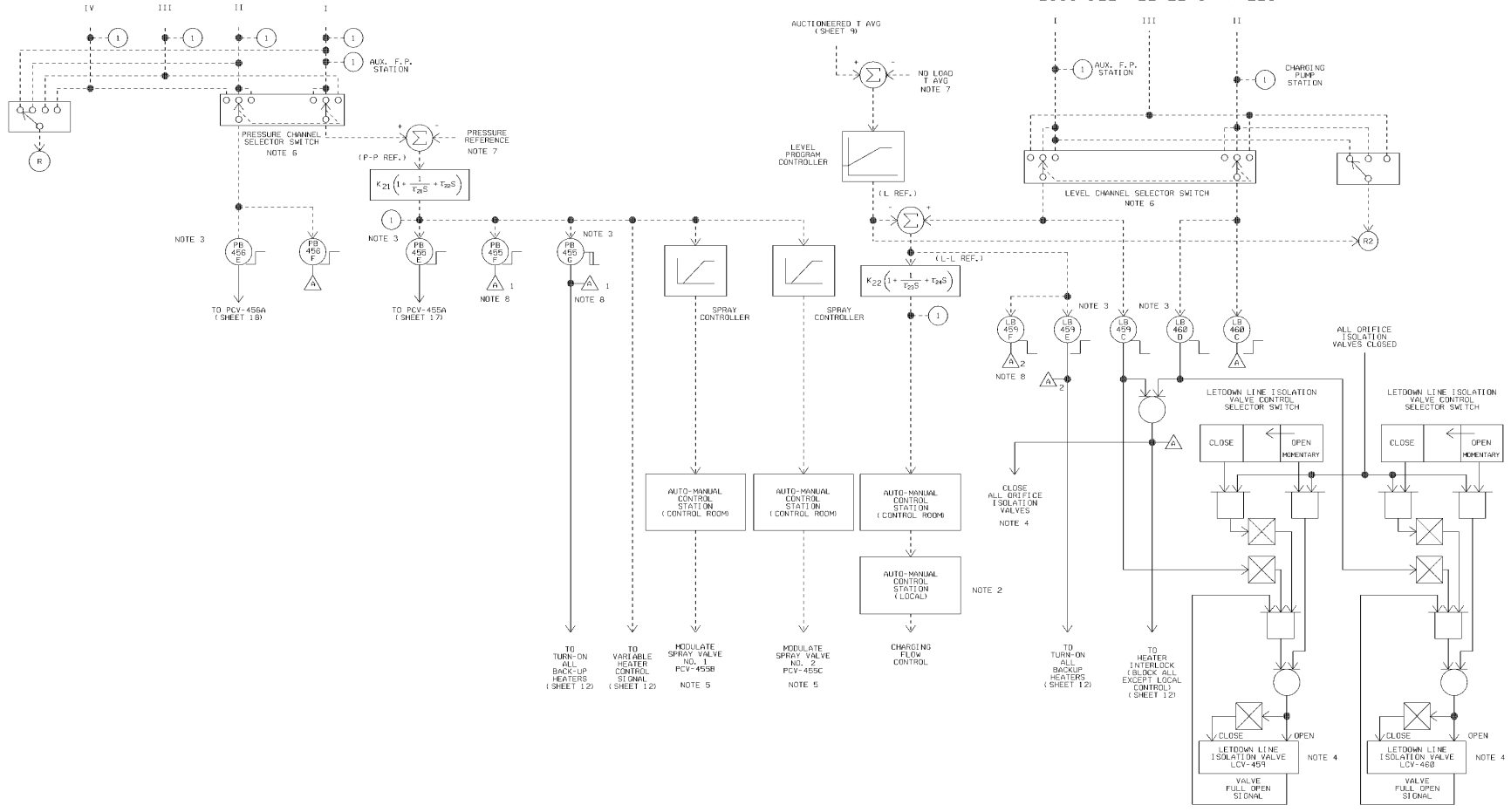
**SNUPPS PROJECTS  
FUNCTIONAL DIAGRAM  
STEAM DUMP CONTROL**

SCALE	DRAWING NUMBER	SHEET	REV.
NONE	7250064	0	0

3044 C 02

PRESSURIZER PRESSURE CHANNELS

PRESSURIZER LEVEL CHANNELS



- NOTES
1. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT.
  2. LOCAL CONTROL OVERRIDES ALL OTHER SIGNALS. LOCAL OVERRIDE ACTUATES ALARM IN CONTROL ROOM.
  3. PRESSURE DISTABLES NO. PB-455C, PB-456C, PB-456E AND LEVEL DISTABLES NO. LB-459C, LB-459E, & LB-460D ARE ENERGIZE TO ACTUATE.
  4. OPEN/SHUT INDICATION IN CONTROL ROOM.
  5. A LIGHT SHOULD BE PROVIDED IN THE CONTROL ROOM FOR EACH SPRAY VALVE TO INDICATE WHEN THE VALVE IS NOT FULLY CLOSED.
  6. CENTER POSITION NORMALLY SELECTED.
  7. ADJUSTABLE SETPOINT WITHIN CONTROLLER.
  8. ALARM 1 AND ALARM 2 MUST HAVE REFRESH CAPABILITY.

USAR FIG. 7.2-1-11  
M-744-00028 W07

**ESSENTIAL DRAWING**

DESIGNED BY	INTEGRATED	CHARGE	THIS DWG SUPERSEDES	NO. 744-00028	REV. 05
CHECKED BY	ORG. INC.	FILE NO.	THIS DWG SUPERSEDES BY		REV.
REASON FOR	ELECTRONICALLY CONVERTED PER AP 05-01-0				

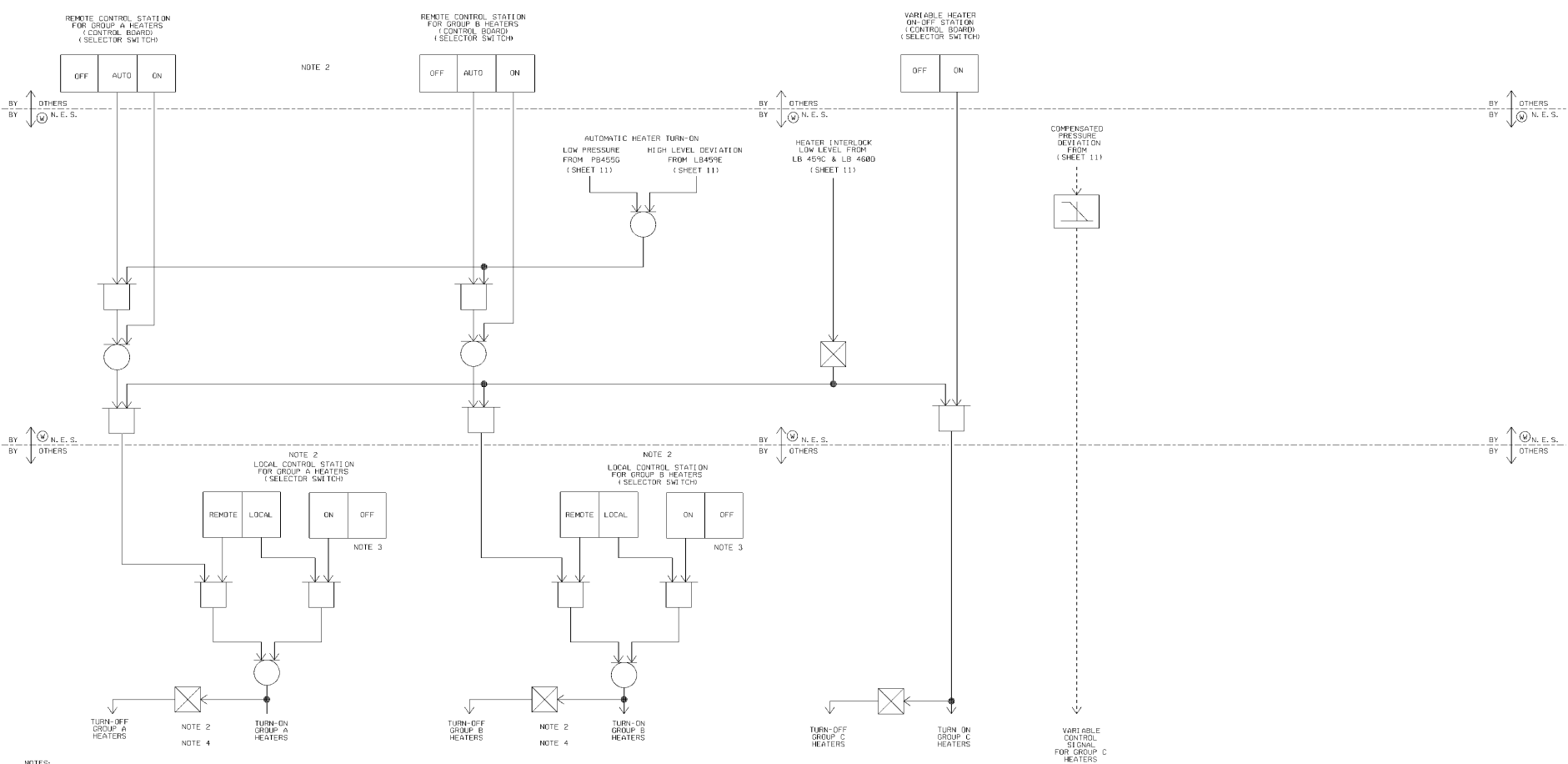
WFL ORBEC  
NATION OPERATING CORPORATION

**ELECTRONIC APPROVAL**

SNUPPS PROJECTS  
FUNCTIONAL DIAGRAM  
PRESSURIZER PRESSURE & LEVEL CONTROL

SCALE	DRAWING NUMBER	SHEET	REV
NONE	7250D64	11	

8 7 6 5 4 3 2 1



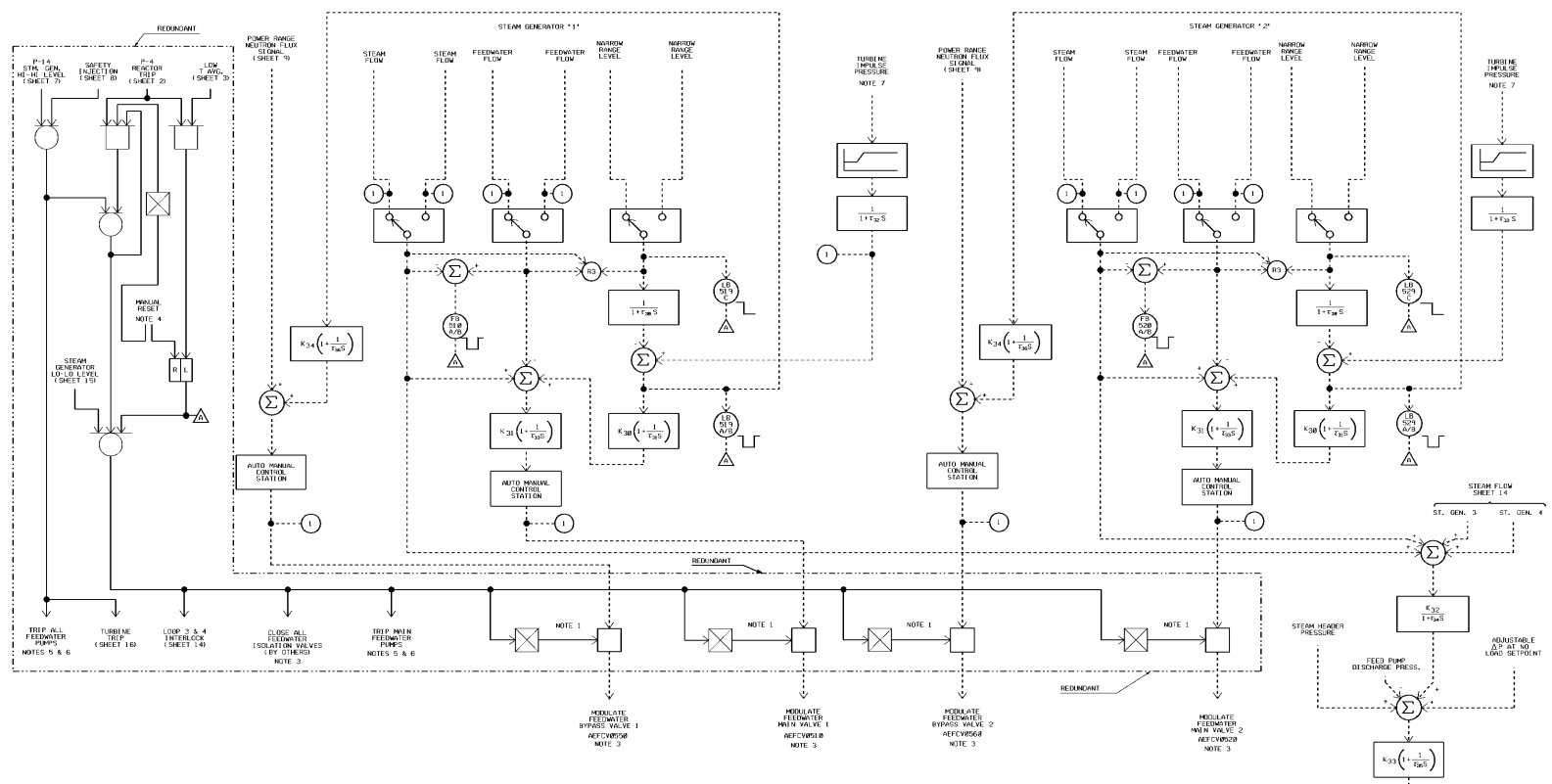
- NOTES:
1. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT.
  2. GROUP A AND GROUP B HEATERS MUST BE ON SEPARATE VITAL POWER SUPPLIES WITH THE LOCAL CONTROL SEPARATED SO THAT ANY SINGLE FAILURE DOES NOT DEFEAT BOTH.
  3. PRECAUTIONS SHOULD BE TAKEN TO AVOID MANUAL HEATER OPERATION, WHICH WOULD CAUSE HEATER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

USAR FIG. 7.2-1-12  
M-744-00029 W06

**ESSENTIAL DRAWING**

DESIGNED BY	INTEGRATED BY	CHANGE NO.	THE ENG. SUPERVISOR	DATE	REV. NO.
ISSUED	CHK. NO.	PLG. NO.	THE ENG. SUPERVISOR BY		REV.
REVISION NOTE: ELECTRONICALLY CONVERTED PER AP 05-010					
			ELECTRONIC APPROVAL		

SNUPPS PROJECTS FUNCTIONAL DIAGRAM PRESSURIZER HEATER CONTROL			
SCALE	DRAWING NUMBER	SHEET	REV
NONE	7250D64	12	
			22X34 0 SIZE



- NOTES**
1. ANALOG GATE CONSISTS OF TWO SOLENOID VENT VALVES IN SERIES TO REDUNDANTLY INTERLOCK THE AIR LINE BETWEEN EACH VALVE. NEAR APPROX ONLY IS INDICATED FOR INDICATOR. THE SIGNALS FROM THESE VALVES ARE TO BE USED TO CAUTION EACH FEEDWATER VALVE TO CLOSE IN FIVE SECONDS. EITHER OF THE TWO REDUNDANT BLOCK SIGNALS WILL CLOSE THE ASSOCIATED VALVES INDEPENDENT OF THE OTHER SIGNAL(S).
  2. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT, EXCEPT WHERE INDICATED OTHERWISE.
  3. OPEN-SHIFT INDICATION FOR EACH FEEDWATER VALVE IN CONTROL ROOM.
  4. THE REDUNDANT MANUAL RESET CONSISTS OF TWO MOMENTARY CONTROLS ON THE CONTROL BOARD, ONE FOR EACH TUBINE.
  5. TRIPPING OF FEEDWATER PUMPS CAUSES CLOSURE OF ASSOCIATED PUMP DISCHARGE VALVES.
  6. THE FEEDWATER PUMPS AND PUMP DISCHARGE VALVES ARE SUPPLIED BY OTHERS.
  7. SWITCHING BETWEEN TWO PRESSURE SIGNALS IS PROVIDED ON THE CONTROL BOARD.

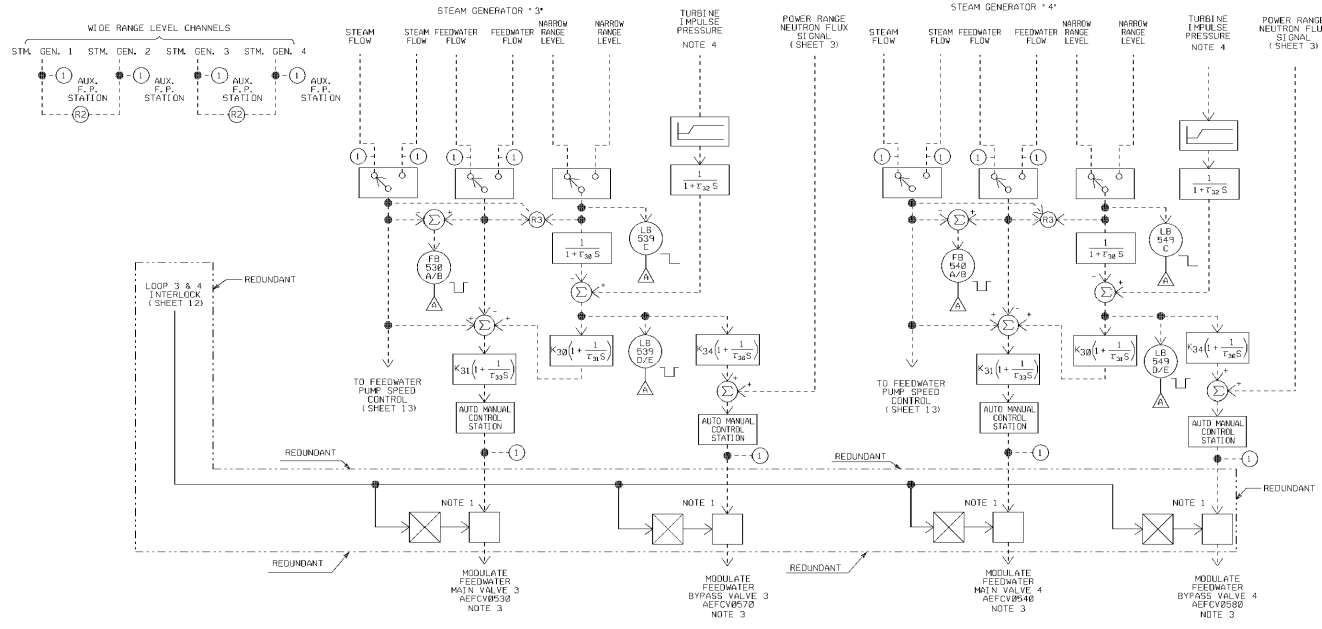
USAR FIG. 7.2-1-15  
M-744-00030 W08

**ESSENTIAL DRAWING**

DESIGN	APPROVED	DATE	THIS DRAWING	BY	DATE
DRAWN	DATE	THIS DRAWING	BY	DATE	
REVISIONS: ELECTRONICALLY CONVERTED PER: SP 85-81-0					
				ELECTRONIC APPROVAL	

**SNUPPS PROJECTS  
FUNCTIONAL DIAGRAM  
FEEDWATER CONTROL & ISOLATION**

SCALE	7250D64	SHEET	1 OF 1
DATE		BY	



**NOTES**

1. ANALOG GATE CONSISTS OF TWO SOLENOID VENT VALVES IN SERIES TO REDUNDANTLY INTERLOCK THE AIR LINE BETWEEN EACH VALVE DIAPHRAGM AND ITS ASSOCIATED POSITIONER. THE SOLENOID VALVES ARE DE-ENERGIZED TO VENT, CAUSING EACH FEEDWATER VALVE TO CLOSE IN FIVE SECONDS. EITHER OF THE TWO REDUNDANT BLOCK SIGNALS WILL CLOSE THE ASSOCIATED VALVES INDEPENDENT OF THE OTHER SIGNAL (5).
2. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT, EXCEPT WHERE INDICATED 'REDUNDANT'.
3. OPEN/SHUT INDICATION FOR EACH FEEDWATER VALVE IN CONTROL ROOM.
4. SWITCHING BETWEEN TWO PRESSURE SIGNALS IS PROVIDED ON THE CONTROL BOARD.

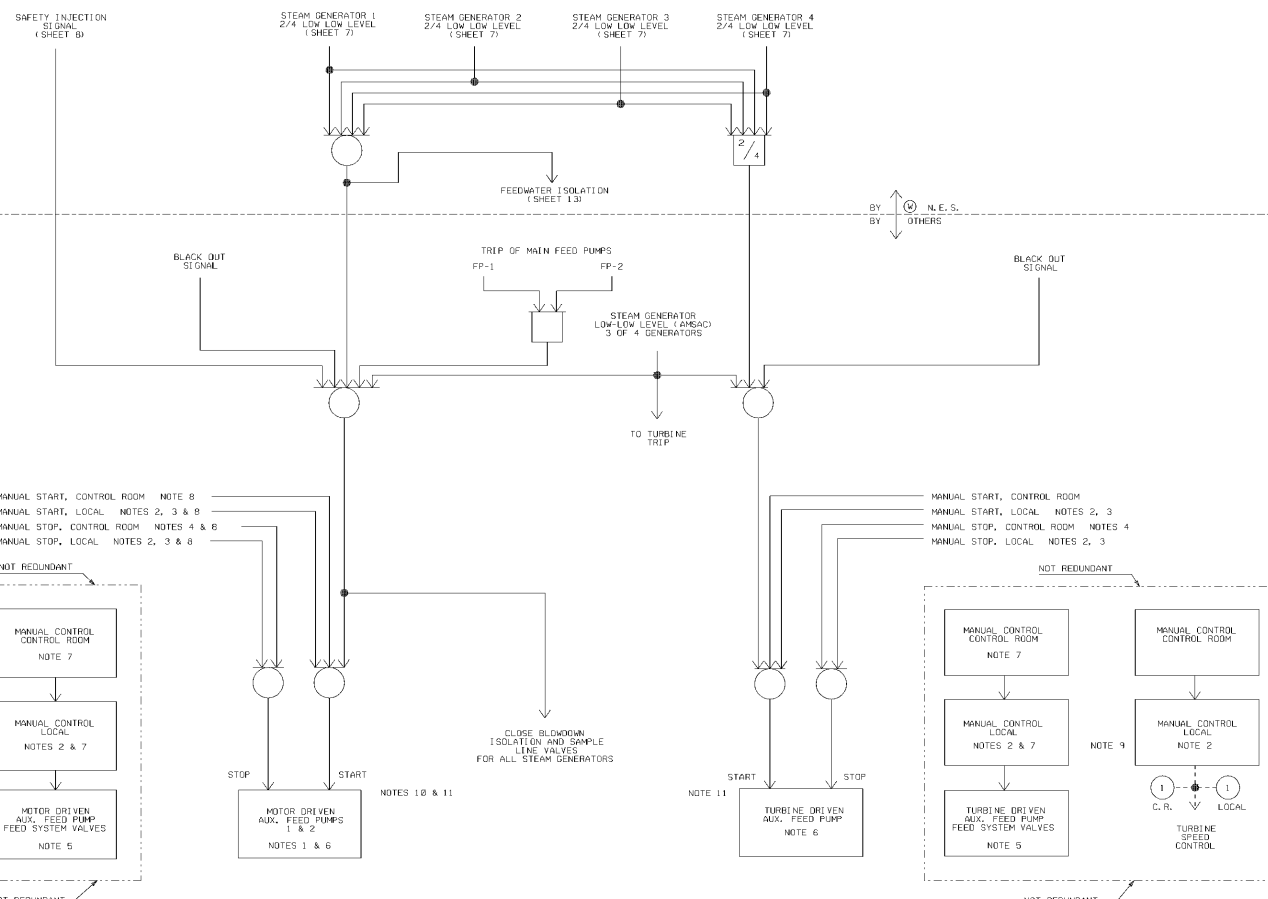
USAR FIG. 7.2-1-14  
M-744-00031 W06

**ESSENTIAL DRAWING**

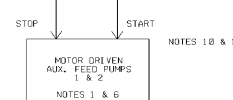
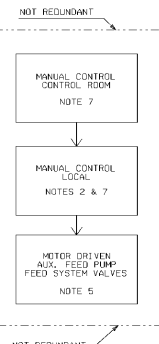
REVISED	INTEGRATED	DATE	THIS DMS/SUPERSEDES	REV.
CHG. DOC.	CHG. DOC.	FIG. NO.	THIS DMS/SUPERSEDES BY	REV.
REVISION NUMBER ELECTRONICALLY CONVERTED PER AF 05-010				
			ELECTRONIC APPROVAL	

<b>SNUPPS PROJECTS FUNCTIONAL DIAGRAM FEEDWATER CONTROL &amp; ISOLATION</b>			
SCALE	DRAWING NUMBER	SHEET	REV
NONE	7250D64	14	
			22X34 D SIZE

8 7 6 5 4 3 2 1

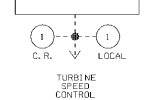
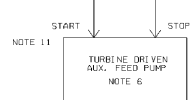
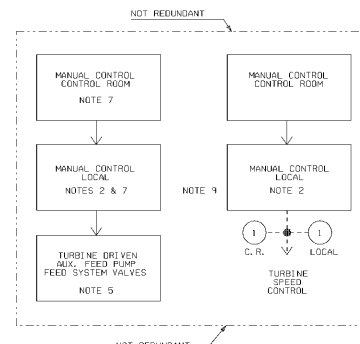


MANUAL START, CONTROL ROOM NOTE 8  
 MANUAL START, LOCAL NOTES 2, 3 & 8  
 MANUAL STOP, CONTROL ROOM NOTES 4 & 8  
 MANUAL STOP, LOCAL NOTES 2, 3 & 8



CLOSE BLOWDOWN ISOLATION AND SAMPLE LINE VALVES FOR ALL STEAM GENERATORS

MANUAL START, CONTROL ROOM  
 MANUAL START, LOCAL NOTES 2, 3  
 MANUAL STOP, CONTROL ROOM NOTES 4  
 MANUAL STOP, LOCAL NOTES 2, 3



- NOTES:
1. TRAIN 4 CONTROLS MAFP 1; BREAKER NUMBER TRAIN B CONTROLS MAFP 2; BREAKER NUMBER
  2. LOCAL CONTROL OVERRIDES ALL OTHER SIGNALS.
  3. LOCAL OVERRIDE ACTUATES ALARM IN CONTROL ROOM.
  4. MANUAL STOP AND PULL OVERRIDES THE AUTOMATIC START. MANUAL STOP OVERRIDE ACTUATES ALARM IN CONTROL ROOM.
  5. OPEN/SHUT INDICATION IN CONTROL ROOM.
  6. PUMP OPERATING LIGHTS IN CONTROL ROOM.
  7. INDIVIDUAL FOR EACH VALVE.
  8. INDIVIDUAL FOR EACH PUMP.
  9. THE TURBINE SPEED CONTROL IS TYPICAL. ACTUAL IMPLEMENTATION MAY NOT INCLUDE SPEED CONTROL.
  10. THE PUMP START MAY BE DELAYED AND SEQUENCED IF THE EMERGENCY DIESEL POWER CAPABILITY IS LESS THAN THE TOTAL LOAD WITH ALL SYSTEMS STARTING. THE TIME DELAY, IF USED, MAY NOT EXCEED THE MAXIMUM STARTING TIME REQUIREMENTS FOR THIS SYSTEM.
  11. THE PUMP START MUST BE SEALED IN (LATCHED), SO THAT LOSS OF THE ACTUATION SIGNAL WILL NOT CAUSE THE PUMP TO STOP.

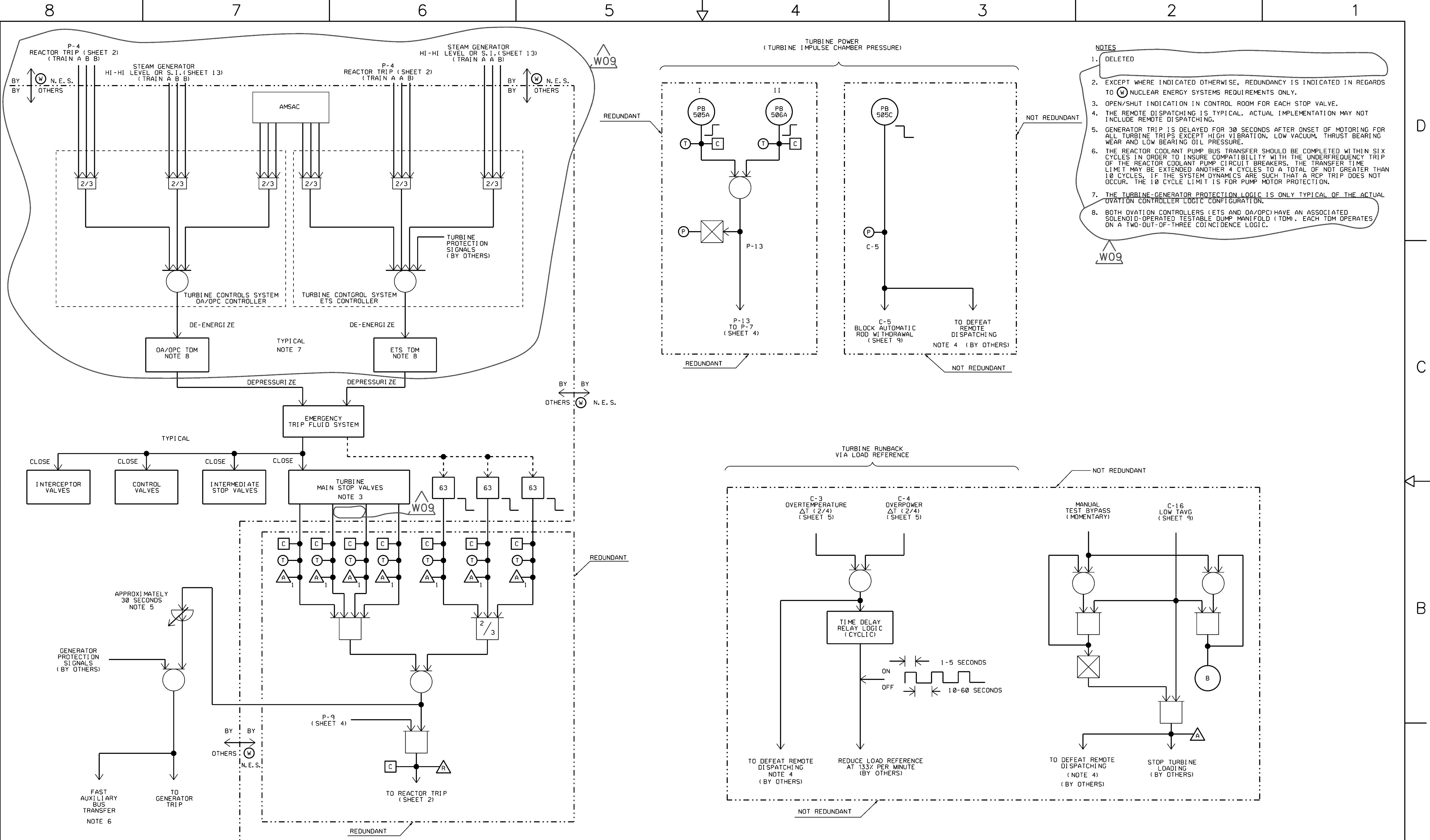
USAR FIG. 7.2-1-15  
 M-744-00032 W07

**ESSENTIAL DRAWING**

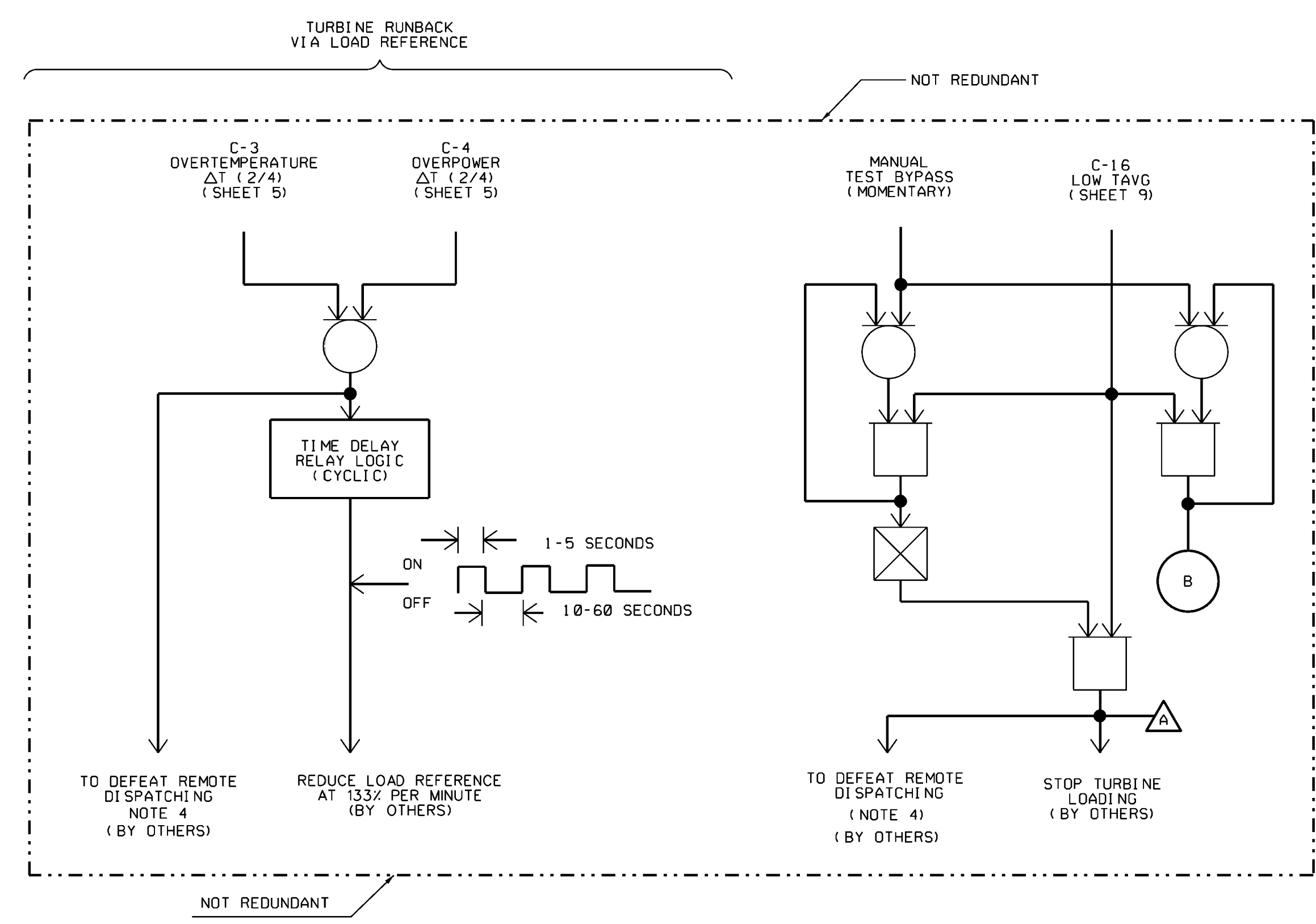
REVISION	DATE	BY	CHKD.	DATE	BY
01	05-01-00	WOLF CREEK	WOLF CREEK	05-01-00	WOLF CREEK
ELECTRONICALLY CONVERTED PER AP 05-01-00					
WOLF CREEK NUCLEAR OPERATING CORPORATION			ELECTRONIC APPROVAL		

SNUPPS PROJECTS  
 FUNCTIONAL DIAGRAM  
 AUXILIARY FEEDWATER PUMPS STARTUP

SCALE	DRAWING NUMBER	SHEET	REV
NONE	7250D64	5	



- NOTES**
1. DELETED
  2. EXCEPT WHERE INDICATED OTHERWISE, REDUNDANCY IS INDICATED IN REGARDS TO (W) NUCLEAR ENERGY SYSTEMS REQUIREMENTS ONLY.
  3. OPEN/SHUT INDICATION IN CONTROL ROOM FOR EACH STOP VALVE.
  4. THE REMOTE DISPATCHING IS TYPICAL. ACTUAL IMPLEMENTATION MAY NOT INCLUDE REMOTE DISPATCHING.
  5. GENERATOR TRIP IS DELAYED FOR 30 SECONDS AFTER ONSET OF MOTORING FOR ALL TURBINE TRIPS EXCEPT HIGH VIBRATION, LOW VACUUM, THRUST BEARING WEAR AND LOW BEARING OIL PRESSURE.
  6. THE REACTOR COOLANT PUMP BUS TRANSFER SHOULD BE COMPLETED WITHIN SIX CYCLES IN ORDER TO INSURE COMPATIBILITY WITH THE UNDERFREQUENCY TRIP OF THE REACTOR COOLANT PUMP CIRCUIT BREAKERS. THE TRANSFER TIME LIMIT MAY BE EXTENDED ANOTHER 4 CYCLES TO A TOTAL OF NOT GREATER THAN 10 CYCLES, IF THE SYSTEM DYNAMICS ARE SUCH THAT A RCP TRIP DOES NOT OCCUR. THE 10 CYCLE LIMIT IS FOR PUMP MOTOR PROTECTION.
  7. THE TURBINE-GENERATOR PROTECTION LOGIC IS ONLY TYPICAL OF THE ACTUAL OVIATION CONTROLLER LOGIC CONFIGURATION.
  8. BOTH OVIATION CONTROLLERS (ETS AND OA/OPC) HAVE AN ASSOCIATED SOLENOID OPERATED TESTABLE DUMP MANIFOLD (TDM). EACH TDM OPERATES ON A TWO-OUT-OF-THREE COINCIDENCE LOGIC.



USAR FIG. 7.2-1-16

REVISED	INC. WIP-M-744-00033-W08-A-1	CHNG. 012135	THIS DWG. SUPERSEDES:	REV.
ISSUED	CHNG. DOC.	PKG. NO.	VENDOR MANUAL:	PAGE(S)
REVISION NOTES:	DRAWING NUMBER: M-744-00033		SUPPLIER DWG. NO.:	REVISION: W09
WOLF CREEK NUCLEAR OPERATING CORPORATION		SHEET NO.: 01		ELECTRONIC APPROVAL

SNUPPS PROJECT FUNCTIONAL DIAGRAM TURBINE TRIP, RUNBACKS, AND OTHER SIGNALS		
SCALE: NONE	DRAWING NUMBER: 7250D64	SHEET: 16

Released by Document Services.  
Release Date: 2013.04.03 11:13:45 -05'00'

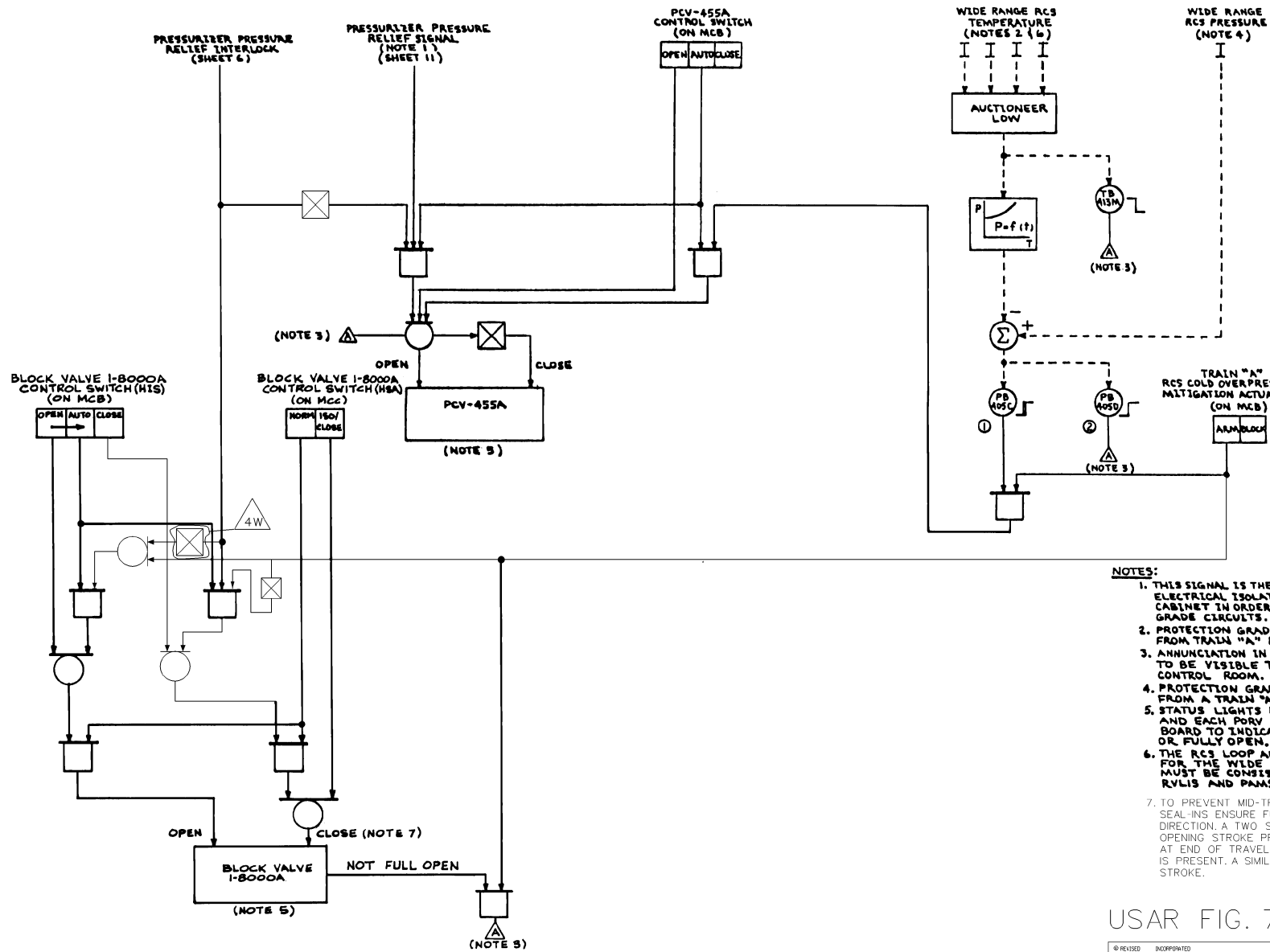












**NOTES:**

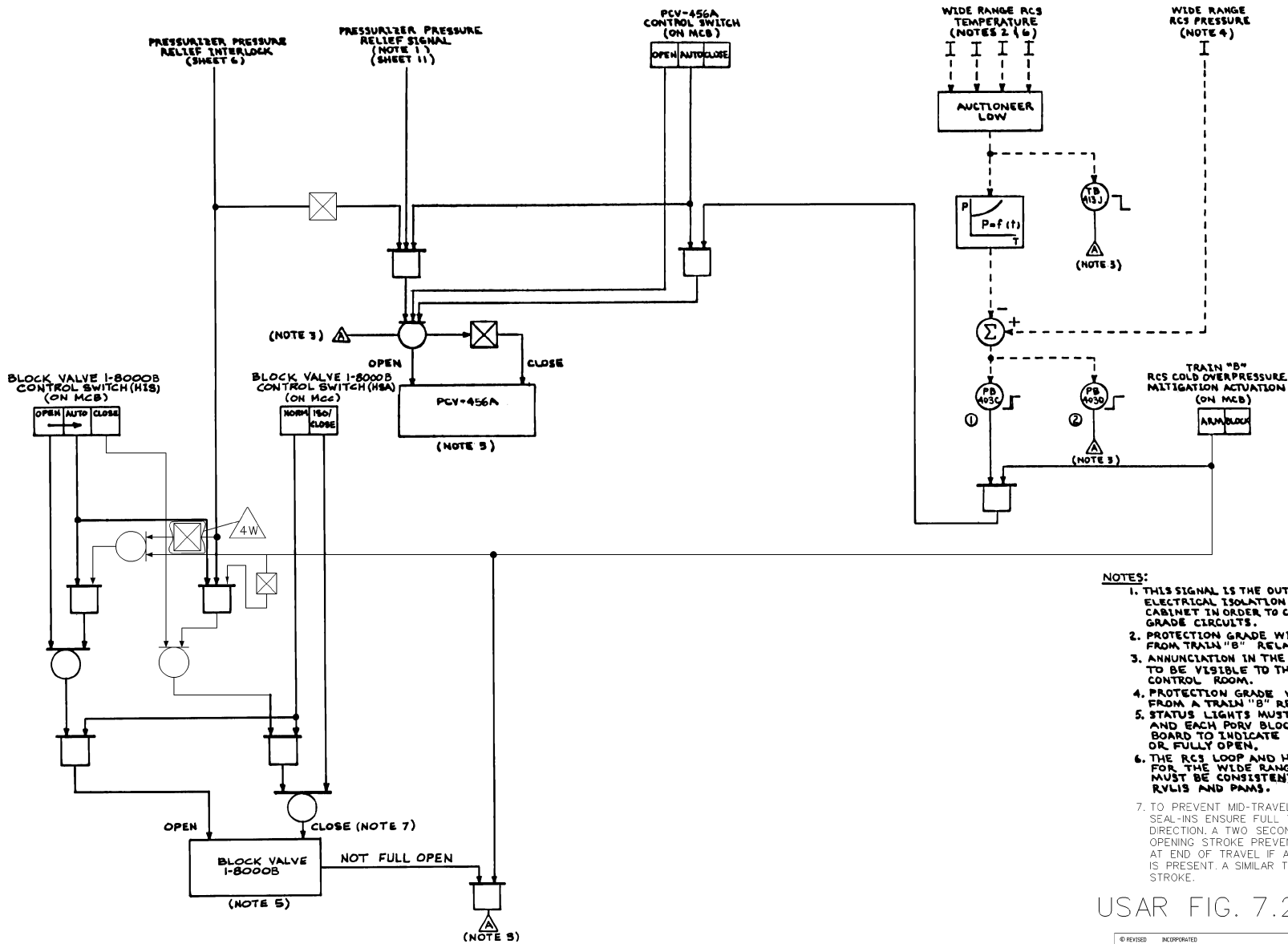
1. THIS SIGNAL IS THE OUTPUT FROM DISTABLE PB-455E. ELECTRICAL ISOLATION IS REQUIRED IN THE TRAIN "A" 55PS CABINET IN ORDER TO CONNECT THIS SIGNAL TO THE SAFETY GRADE CIRCUITS.
2. PROTECTION GRADE WIDE RANGE RCS TEMPERATURE SIGNALS FROM TRAIN "A" RELATED PROTECTION SETS.
3. ANNUNCIATION IN THE MAIN CONTROL ROOM IS REQUIRED TO BE VISIBLE TO THE OPERATOR AT THE MAIN CONTROL ROOM.
4. PROTECTION GRADE WIDE RANGE RCS PRESSURE SIGNAL FROM A TRAIN "A" RELATED PROTECTION SET.
5. STATUS LIGHTS MUST BE PROVIDED FOR EACH PORV AND EACH PORV BLOCK VALVE AT THE MAIN CONTROL BOARD TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
6. THE RCS LOOP AND HOT LEG OR COLD LEG ASSIGNMENTS FOR THE WIDE RANGE RCS TEMPERATURE SIGNALS MUST BE CONSISTENT WITH THE REQUIREMENTS FOR RVLIS AND PANS.
7. TO PREVENT MID-TRAVEL REVERSAL OF THE MOTOR, SEAL-INS ENSURE FULL TRAVEL OF THE VALVE IN EACH DIRECTION. A TWO SECOND TIME DELAY AFTER THE OPENING STROKE PREVENTS IMMEDIATE REVERSAL AT END OF TRAVEL IF AN AUTOMATIC CLOSING SIGNAL IS PRESENT. A SIMILAR TIME DELAY IS ON THE CLOSING STROKE.

USAR FIG. 7.2-1-17 & 7.6-4-1

DESIGNED BY	INCORPORATED	CHANGE	0765	THIS ENG SUPERSEDES	REV.
DRAWN BY	ENG. NO.	FIG. NO.		THIS ENG SUPERSEDES BY	REV.
REVISION NOTES					
				ELECTRONIC APPROVAL	

M-744-00039-W06

DATE	BY	FOR	SCALE	7250064
10/22/98	G. LABER	WESTINGHOUSE		
WESTINGHOUSE ELECTRIC CORPORATION BRIDGE PLAZA PITTSBURGH, PA 15201				
THE SHUPPS PROJECTS FUNCTIONAL DIAGRAM PRESSURIZER RELIEF SYSTEM (TRAIN A)				
SHEET 17				



**NOTES:**

1. THIS SIGNAL IS THE OUTPUT FROM BISTABLE PB-456C. ELECTRICAL ISOLATION IS REQUIRED IN THE TRAIN "B" 55PS CABINET IN ORDER TO CONNECT THIS SIGNAL TO THE SAFETY GRADE CIRCUITS.
2. PROTECTION GRADE WIDE RANGE RCS TEMPERATURE SIGNALS FROM TRAIN "B" RELATED PROTECTION SETS.
3. ANNUNCIATION IN THE MAIN CONTROL ROOM IS REQUIRED TO BE VISIBLE TO THE OPERATOR AT THE MAIN CONTROL ROOM.
4. PROTECTION GRADE WIDE RANGE RCS PRESSURE SIGNAL FROM A TRAIN "B" RELATED PROTECTION SET.
5. STATUS LIGHTS MUST BE PROVIDED FOR EACH PORT AND EACH PORT BLOCK VALVE AT THE MAIN CONTROL BOARD TO INDICATE WHEN THE VALVE IS FULLY CLOSED OR FULLY OPEN.
6. THE RCS LOOP AND HOT LEG OR COLD LEG ASSIGNMENTS FOR THE WIDE RANGE RCS TEMPERATURE SIGNALS MUST BE CONSISTENT WITH THE REQUIREMENTS FOR RVLIS AND PAMS.
7. TO PREVENT MID-TRAVEL REVERSAL OF THE MOTOR, SEAL-INS ENSURE FULL TRAVEL OF THE VALVE IN EACH DIRECTION. A TWO SECOND TIME DELAY AFTER THE OPENING STROKE PREVENTS IMMEDIATE REVERSAL AT END OF TRAVEL IF AN AUTOMATIC CLOSING SIGNAL IS PRESENT. A SIMILAR TIME DELAY IS ON THE CLOSING STROKE.

USAR FIG. 7.2-1 -18 & 7.6-4-2

© REVISED	INCORPORATED	CHANGE	07195	THIS ENCL. SUPERSEDES	REV.
○ ISSUED	CHG. DOC.	PKS. NO.		THIS ENCL. SUPERSEDED BY	REV.
REVISION NOTES:					
			ELECTRONIC APPROVAL		

M-744-00040-W06

DATE	BY	CHKD	APP'D	SCALE	7250064
07/18/81	G. LASTER				
DATE	BY	CHKD	APP'D	SCALE	7250064
07/18/81					
DATE	BY	CHKD	APP'D	SCALE	7250064
07/18/81					
DATE	BY	CHKD	APP'D	SCALE	7250064
07/18/81					
DATE	BY	CHKD	APP'D	SCALE	7250064
07/18/81					

Westinghouse Electric Corporation  
 WESTINGHOUSE ELECTRIC CORPORATION  
 360 WESTINGHOUSE AVENUE  
 PITTSBURGH, PA. 15224  
 THE SHUPTS PROJECT  
 FUNCTIONAL DIAGRAM  
 PRESSURIZER PRESSURE RELIEF  
 SYSTEM (ISSUE 5)  
 SHEET 18