WISCONSIN PUBLIC SERVICE CORPORATION

Kewaunee Nuclear Power Plant

OPERATING PROCEDURE

NO. E-0-10 REV. 1

TITLE Loss of Reactor Coolant

DATE OCT 2 1984 PAGE 1 of 8

REVIEWED BY [signature]

APPROVED BY [signature]

1.0 INTRODUCTION

The purpose of this emergency procedure is to:

1.1 Verify and establish short term cooling to prevent cladding damage.

1.2 Maintain long term shutdown and cooling by recirculation of the containment sump water.

2.0 SYMPTOMS

The following symptoms MAY be present in addition to those utilized in E-0-07, Safety Injection Actuation.

2.1 High containment pressure, humidity and activity (R-2 and R-7).

2.2 Decreasing pressurizer pressure and pressurizer level, or for a loss of coolant from the pressurizer steam space the level will increase as pressure decreases.

2.3 Steam pressure constant in both steam generators.

2.4 High level in the containment sump.

3.0 IMMEDIATE ACTION

3.1 Automatic

3.1.1 Safety Injection is actuated and the automatic actions of E-0-07 occur.

3.2 Operator

3.2.1 Perform the Immediate Operator Actions of E-0-04, Turbine and Reactor Trip.

3.2.2 Verify safety injection pump discharge flow from at least one train is available (actual flow indication OR pump discharge pressure and valve position indication).

3.2.3 Observe the SI and CI active status panels. Follow up any automatic action which did not occur.

3.2.4 If at any time RCS pressure DECREASES to 1500 psig or less AND safety injection flow is verified, TRIP both Reactor Coolant Pumps.

4.0 SUBSEQUENT ACTION

NOTE: THROUGHOUT THE SUBSEQUENT ACTIONS, THE EMERGENCY PLAN IMPLEMENTING PROCEDURES SHOULD BE REVIEWED TO EVALUATE IF THE EMERGENCY RESPONSE ORGANIZATION SHOULD BE ACTIVATED.

4.1 Maintain narrow range indication on both steam generators. If level increases in an unexplained manner go to E-0-09 and investigate for a possible steam generator tube rupture.

4.2 Maintain seal injection flow to both reactor coolant pumps (verify adequate flow using labyrinth differential pressure).

4.3 CLOSE both pressurizer PORV's.

4.4 If the RWST level is decreasing rapidly such that the low level alarm (37%) appears imminent, GO directly to step 4.10.

4.5 Evaluate the following plant conditions:

a. RCS pressure > 2000 psig and stable or increasing

b. At least one steam generator indicates narrow range level

c. Pressurizer level is > 20%

d. RCS subcooling is $\geq$ 50°F

4.6 If ANY of the above conditions are NOT established, GO directly to step 4.8.

4.7 If ALL of the above conditions are established, SI can be terminated; continue with the following steps.

4.7.1 RESET safety injection

4.7.2 RESET containment isolation

4.7.3 STOP both safety injection pumps

4.7.4 If pressurizer level decreases below 20%, or RCS subcooling is less than 50°F, then manually re-initiate SI and GO to step 4.8.

4.7.5 Open instrument air to containment, valve IA-101

4.7.6 Open RCP seal water return motor valves, CVC211 and CVC212

4.7.7 Re-establish normal PZR level control. Adjust reactor makeup concentration as necessary.

4.7.8 Re-establish normal PZR pressure control

4.7.9 Borate to cold shutdown and perform a controlled cooldown to cold shutdown

4.8 Maitain the safety injection pumps in operation, unless operation was terminated in step 4.7.

NOTE: If a blackout occurs after SI is reset, manually restart safety injection components, as needed.

4.9 If the RCS pressure stabilizes above the RHR pumps shutoff head: RESET SI and STOP both RHR pumps.

4.10 As the RWST level decreases, check for Containment Sump B level increase; if increase is NOT evident, return to E-0-07 Safety Injection Actuation, to re-evaluate the symptoms.

4.11 If RCS pressure is decreasing slowly or is stabilizing above 100 psig, commence RCS cooldown at $\leq$ 50°/hr using steam dump or steam generator PORV's.

4.12 If containment pressure is below 4 psig and the containment spray pumps are operating, perform the following:

4.12.1 RESET containment spray

4.12.2 STOP both containment spray pumps

4.12.3 CLOSE the caustic additive valves

4.13 If any safeguards equipment failed to function, attempt control room, or local, manual action as required.

4.14 Monitor incore thermocouples (I1100G Hottest, I1101B Average) and wide range RCS hot leg recorder, for indication of core temperature.

4.14.1 Maintain $\geq$ 50°F subcooling using steam dumps.

4.14.2 For loss of adequate heat removal refer to Appendix

4.15 Unlock and place in ON the MCC breakers for the following motor valves:

VALVE	MCC	MOTOR NO.
SI-9A	1-52B	1-381
SI-11A	1-52B	1-386
SI-11B	1-62B	1-384

4.16 OPEN the component cooling to the RHR heat exchangers, CC-400A and CC-400B.

4.17 At the RWST low level alarm (37%), align ONE train for recirculation as follows:

NOTE: If a component failure makes one train inoperable for recirculation proceed directly to Step 4.19.

4.17.1 RESET safety injection.

4.17.2 AS required by RCS and CNTMT pressure START, or verify running, the SI, RHR, and ICS pumps of one train then STOP the SI, RHR, and ICS pumps in the OTHER train.

4.17.3 CLOSE SI-208 and SI-209, Recirc. to RWST.

NOTE: Valve SI-208 OR SI 209 must close to open SI-350 and SI-351, Sump B to RHR pump suction.

In the shutdown train:

4.17.4 CLOSE SI-300A(B), RWST to RHR pump suction. If the valve fails to close continue with these steps but take manual action to close the valve.

4.17.5 OPEN SI-350A(B) and SI 351A(B), Sump B to RHR pump suction.

4.18 At the RWST low-low level alarm (4%), complete the transfer to the recirculation mode as follows:

4.18.1 Shutdown the remaining RHR, SI, and ICS pumps.

4.18.2 START the RHR pump aligned for recirculation.

4.18.3 Verify recirculation flow with the RHR system. If no flow exists:

a. CLOSE SI-5A (B), SI pump suction.

b. When SI-5A (B) is closed, OPEN RHR-300A (B), RHR heat exchanger to SI pump.

c. START SI pump 1A(1B) and verify recirculation flow.

4.18.4 If high containment pressure exists, open RHR-400A (B), RHR heat exchanger to ICS pump, and start the corresponding ICS pump.

4.18.5 Line up the remaining train for recirculation operation.

4.19 If one train of RHR, SI, or ICS has failed that will prevent recirculation flow to the core or prevent containment spray if it is required, complete the following steps at the RWST low-low level (4%) FOR THE RUNNING TRAIN:

4.19.1 CLOSE SI-208 and SI-209, recirc. to RWST.

NOTE: Valve SI-208 OR SI-209 must close to open SI-350 and SI-351, Sump B to RHR pump suction.

4.19.2 OPEN SI-350A (B) and SI-351A (B), Sump B to RHR pump suction.

4.19.3 CLOSE SI-300A (B), RWST to RHR pump suction. If the valve fails to close continue with these steps but take manual action to close the valve.

4.19.4 If required, START RHR pump 1A (B).

4.19.5 Verify recirculation flow with the RHR system. If no flow exists:

a. Shutdown the running SI pump.

b. CLOSE SI-5A (B), SI pump suction. If this valve fails to close take immediate corrective action.

c. OPEN RHR-300A (B), RHR heat exchanger to SI pump.

d. Restart the SI pump.

e. Verify recirculation flow.

4.19.6 If high containment pressure exists, OPEN RHR-400A (B), RHR heat exchanger to ICS pump, and start the corresponding ICS pump.

RCS SUBCOOLING TABLE

USE INCORE THERMOCOUPLES FOR TEMPERATURE

WIDE RANGE RCS PRESSURE PSIG	T-SAT DEG F	50 DEG SUBCOOLING DEG F
2300	657	607
2250	654	604
2200	650	600
2150	647	597
2050	640	590
2000	637	587
1950	633	583
1900	630	580
1850	626	576
1800	622	572
1750	618	568
1700	614	564
1650	610	560
1600	606	556
1550	602	552
1500	598	548
1450	593	543
1400	588	538
1350	584	534
1300	579	529
1250	574	524
1200	569	519
1150	563	513
1100	558	508
1050	552	502
1000	546	496
950	540	490
900	534	484
850	527	477
800	520	470
750	513	463
700	505	455
650	497	447
600	489	439
550	480	430
500	470	420

APPENDIX

INSTRUCTIONS TO RESTORE CORE COOLING DURING A SMALL LOCA

1.0 INTRODUCTION

This Appendix describes operator actions in the event adequate core cooling is lost during a small break LOCA.

2.0 SYMPTOMS

2.1 Incore thermocouple temperatures are rapidly increasing.

3.0 IMMEDIATE ACTIONS

3.1 Operator

3.1.1 Initiate MANUAL SI and verify injection flow to the Reactor Coolant System.

4.0 SUBSEQUENT ACTIONS

4.1 Monitor incore thermocouples to determine effectiveness of actions taken.

4.2 In the event of equipment failure, attempt to take manual action.

4.3 Throughout this instruction, continue effort to provide:

a. Safety Injection to the Reactor Coolant System.

b. Feedwater flow to the steam generator (s).

4.4 Depressurize the Reactor Coolant System by:

a. Atmospheric or condenser steam dump

b. Open both pressurizer PORV's ONLY IF:

1. Reactor Coolant System depressurization cannot be accomplished with the steam generator.

2. Safety injection is capable of being delivered to the Reactor Coolant System, i.e., pumps running.

4.5 If no means of depressurizing the Reactor Coolant System is available, or if the depressurization did not result in decreasing incore thermocouple temperatures, then start a reactor coolant pump - if possible.

ANNUNCIATOR NUMBER 47017-15

SETPOINT 10% ON 1/4 SENSORS

SYSTEM CV-35

FLOW DWG. X-K100-38

LOGIC DWG. E-2029

S.E.R. PT. NONE

COMPUTER PT. NONE

FUNCT. DESC. E-752

OTHER E-2033

BORIC ACID
TANK 1A LEVEL
LOW - LOW

COMMENTS:

1. LO-LO LEVEL IN THE SI SELECTED BORIC ACID TANK CAUSES THE REFUELING WATER TO SAFETY INJECTION PUMPS SUPPLY VALVES (SI-4A, SI-4B) TO OPEN AND THE BORIC ACID SUPPLY VALVES (SI-2A, SI-2B) TO SAFETY INJECTION PUMPS TO CLOSE.

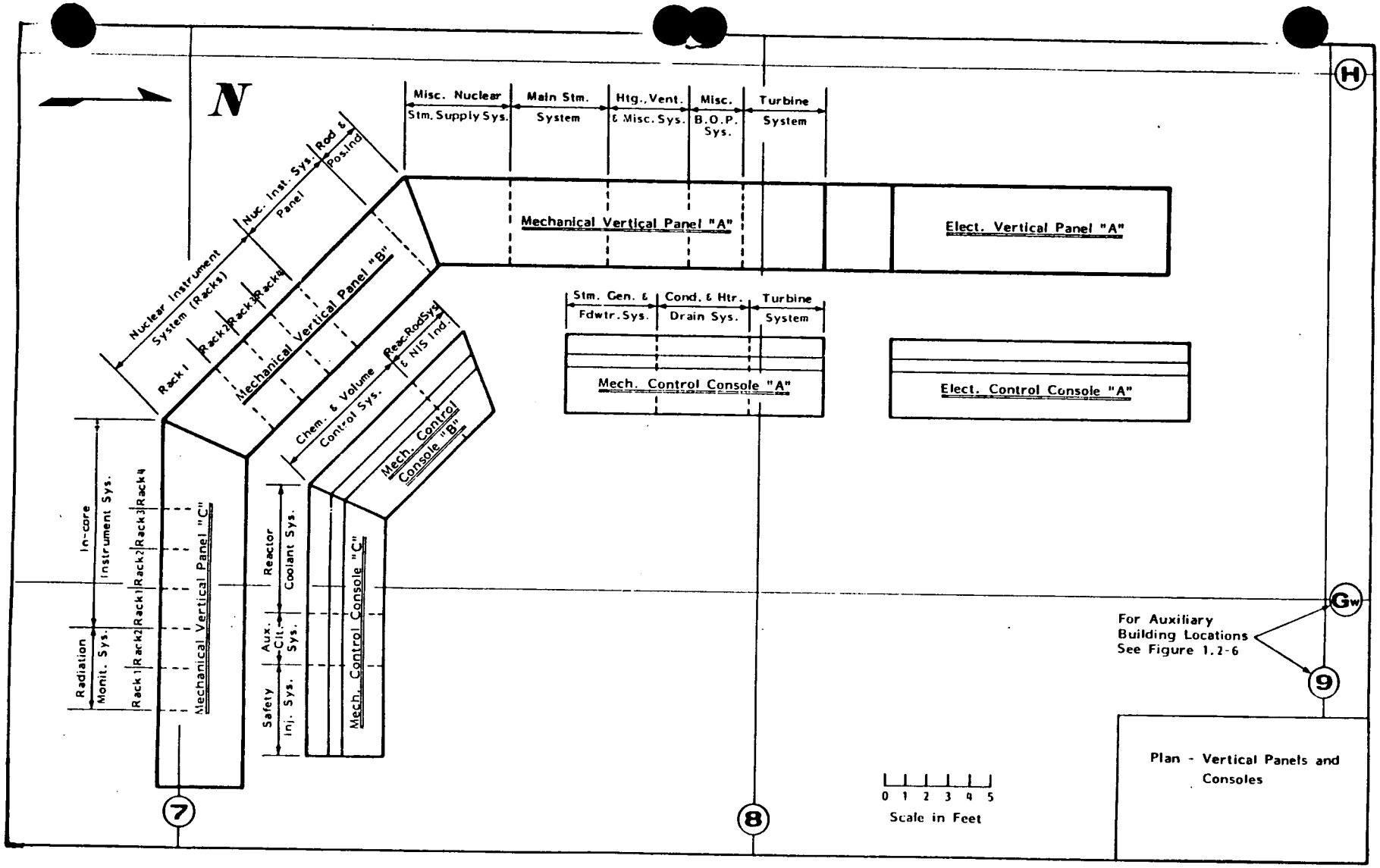
RECOMMENDED ACTION:

1. IF SI HAS BEEN ACTIVATED VERIFY THAT AT 10% LEVEL SI 4A/B OPEN AND SI 2A/B CLOSE OR MANUALLY DO SO.
2. WHEN LEVEL GOES BELOW 10% TURN OFF BORIC ACID TANK HEATER.

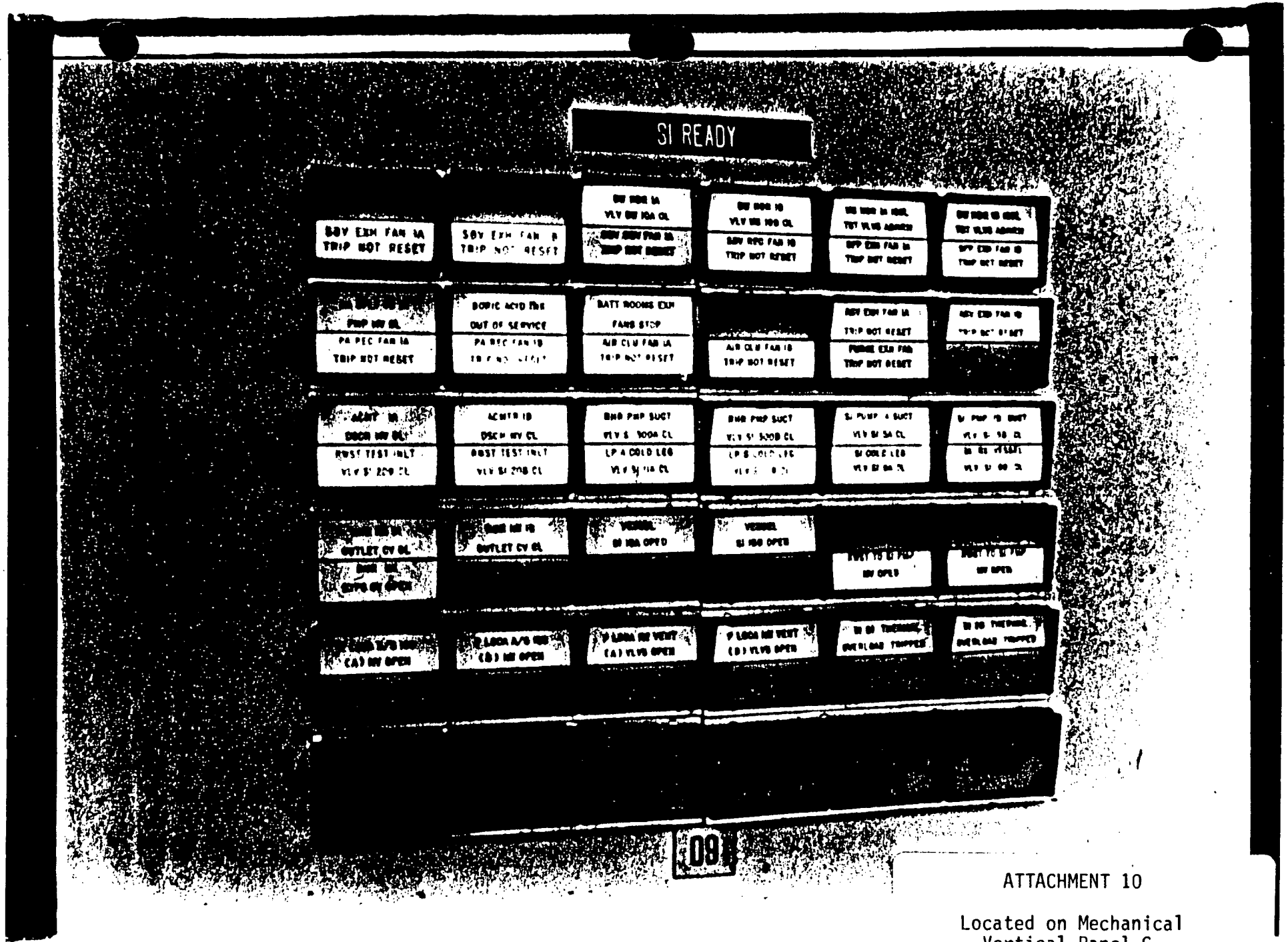
REVISION DATE 2-02-84

ATTACHMENT 8

PLAN-VERTICAL PANELS AND CONSOLES

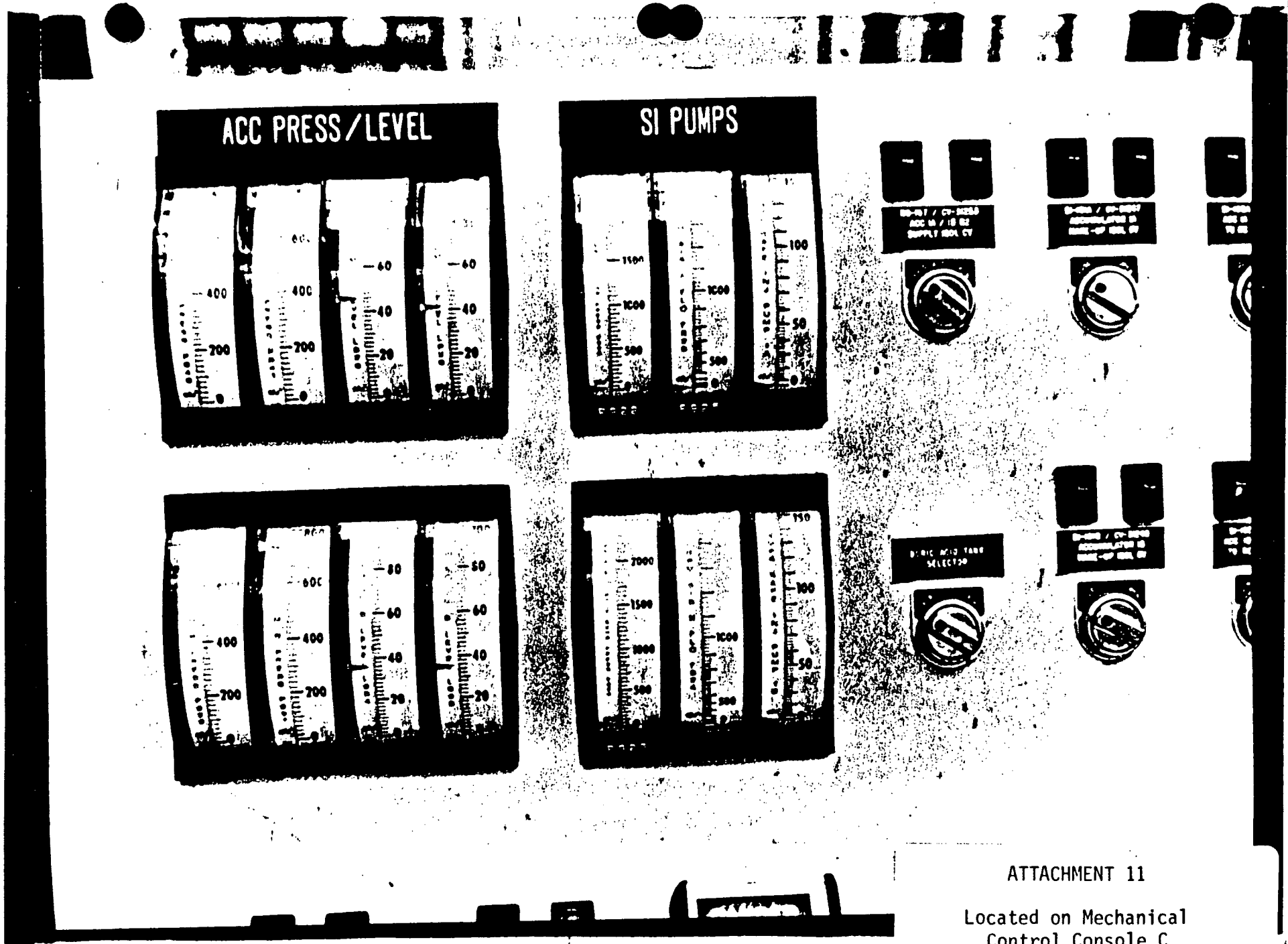


ATTACHMENT 9
Control Room Layout



ATTACHMENT 10

Located on Mechanical
Vertical Panel C

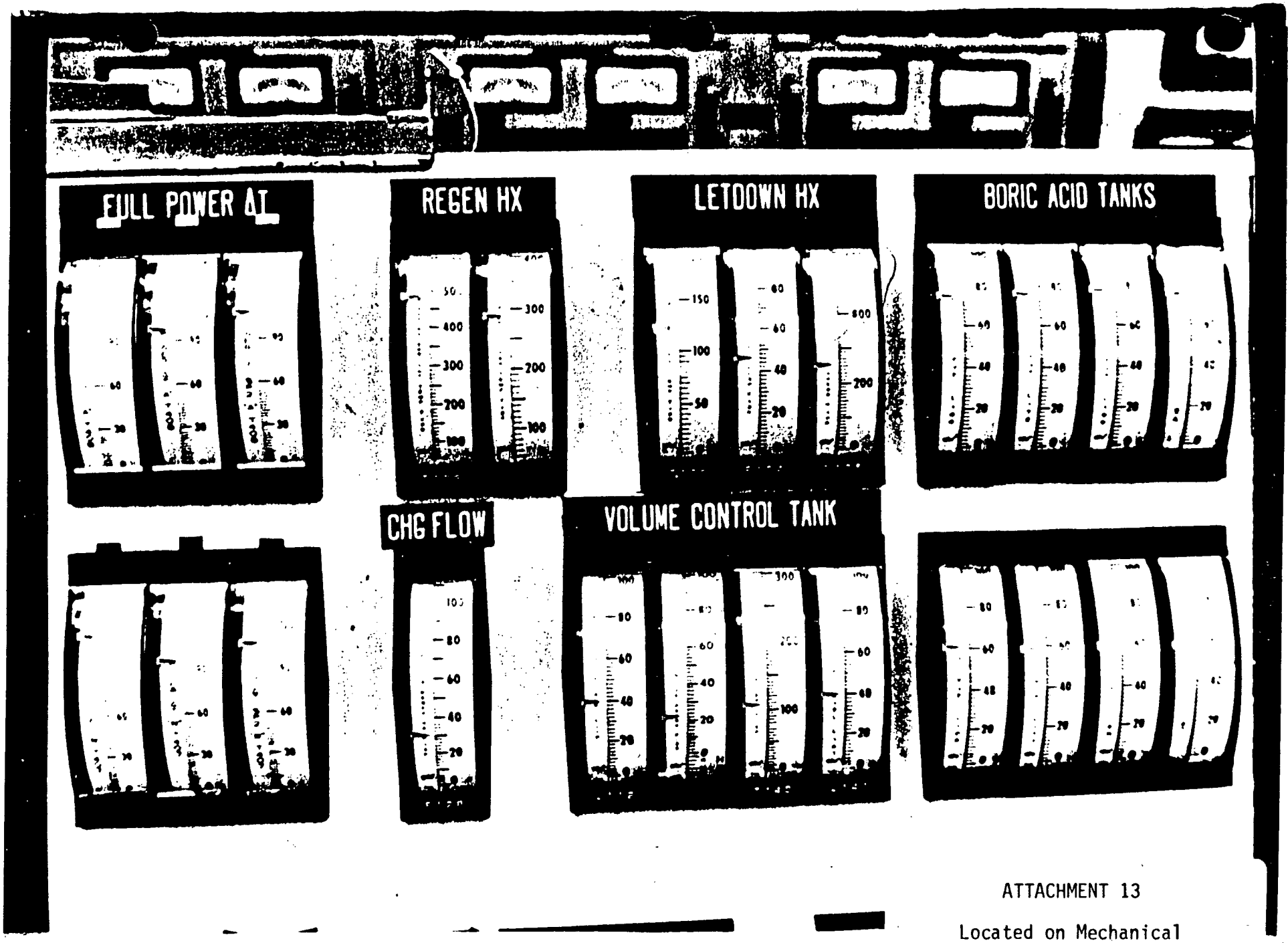


ATTACHMENT 11

Located on Mechanical
Control Console C

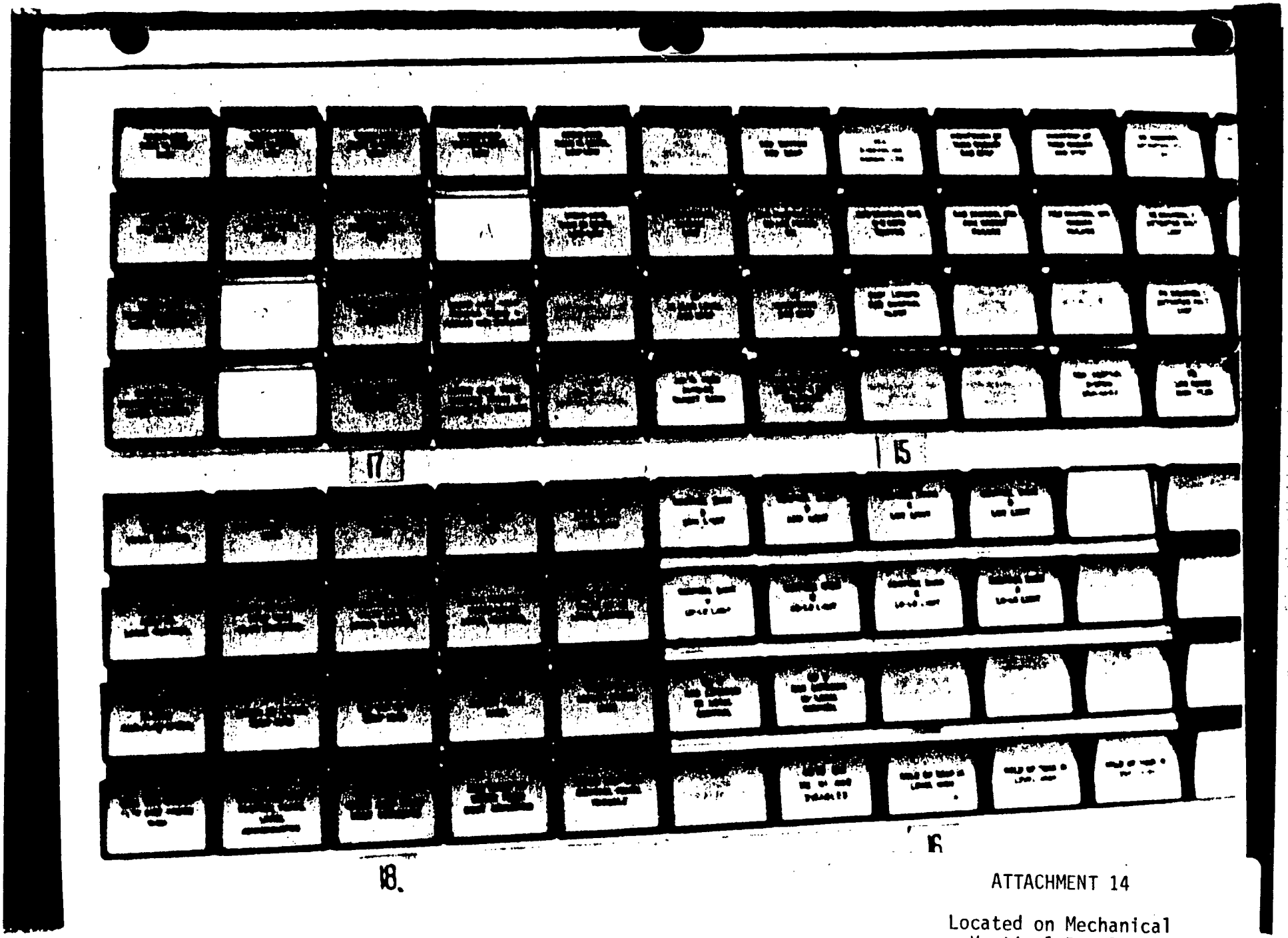
ATTACHMENT 12

Located on Mechanical
Vertical Panel C



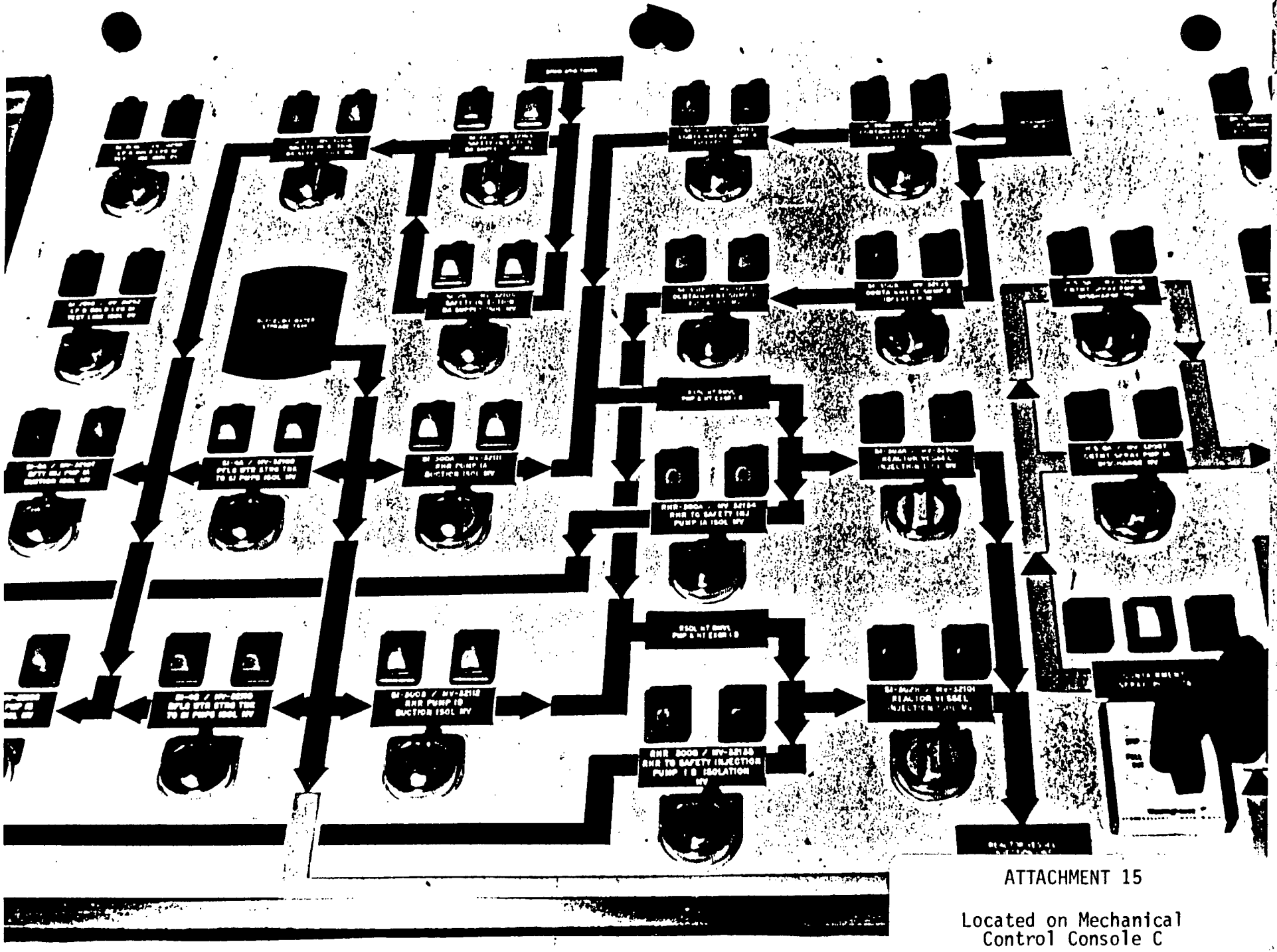
ATTACHMENT 13

Located on Mechanical
Control Console B



ATTACHMENT 14

Located on Mechanical
Vertical Panel B



ATTACHMENT 15

Located on Mechanical
Control Console C