579th Strategic Missile Squadron
6th Strategic Aerospace Wing (SAC)
UNITED STATES AIR FORCE
Walker AFB, New Mexico

OPERATIONAL READINESS TRAINING

ATLAS "F"

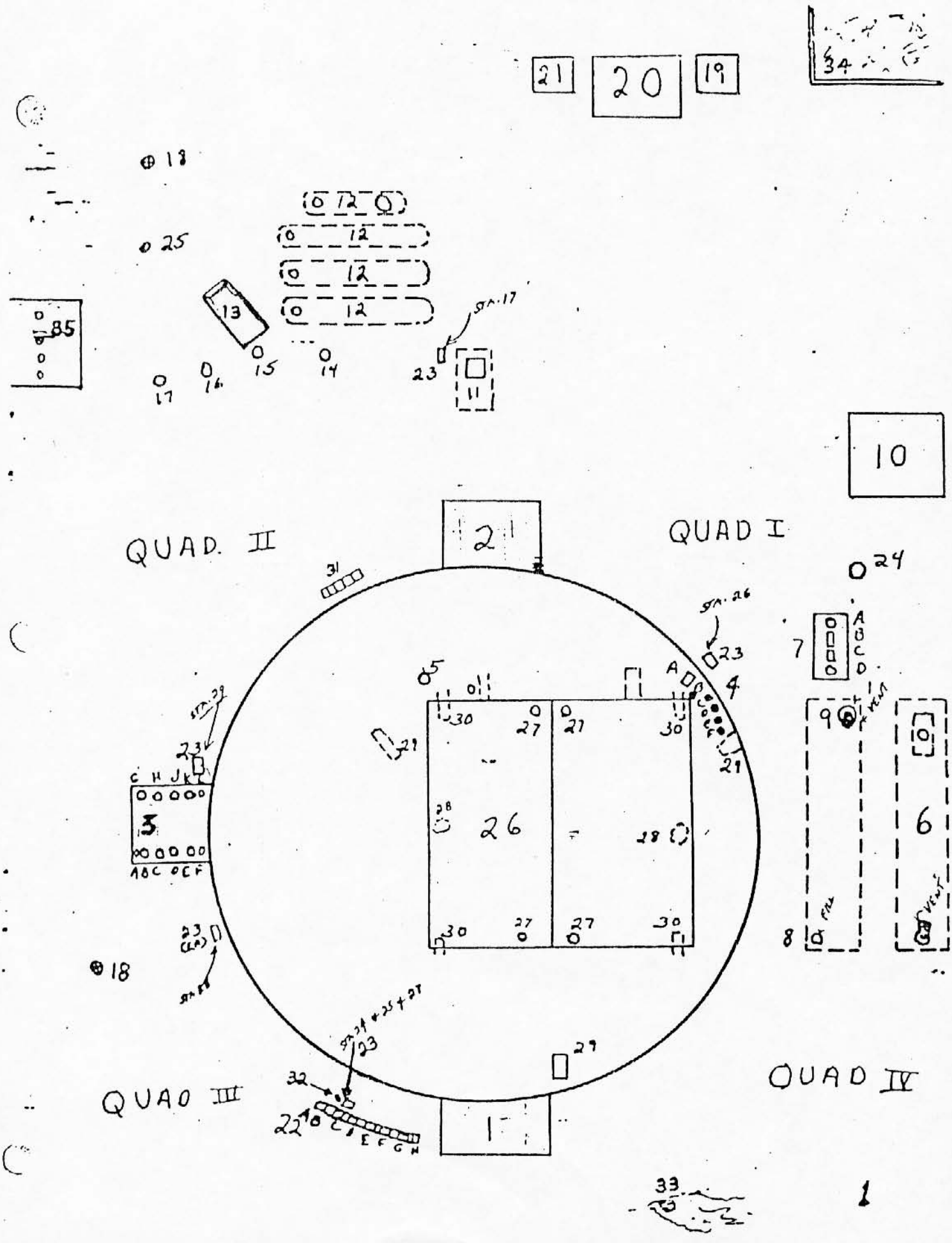
TASK 200

SILO FAMILIARIZATION (REVISED)

(This Guide replaces Silo Famiarlization Guide dated July 1962 and changes 1 Aug 62 and 1 Sep 62 thereto. Previous editions should be destroyed)

FOR INSTRUCTIONAL PURPOSES ONLY

SEPT 1962



SITE PLAN & SURROUNDING AREA

SILO CAP AREA

1. Silo Air Intake: Goes to air wash dust collectors on Quad 3 level #1 of the crib.

2. Silo Air Exhaust: Exits from the Silo wall at level 2, Quad 2.

3. Fill and Vent Shaft:

a. GN2 and GOX Vent (OVP): To pressurization pre-fab to vent LOX storage tank through N-5 and topping tank through N-4.

b. Helium Fill: To Missile LOX tank from pneumatic check-out vehicle (PCV) (During MAPCHE checkout only) (HOF)

c. Helium Fill (HFP): To RP-1 tank from PCV (During MAPCHE check-out only)

d. LN2 Fill (NLS): Through LN2 pre-fab to LN2 storage tank and LN2 heat exchanger.

e. Helium Vent: (HCX-1) Missile LOX tank pressure exhaust through PCU valve 112.

f. GN2 Vent (NEX): LN2 vent from LN2 heat exchanger & storage tank through LN2 pre-fab.

g. LOX Fill: (OFP) Stub up L20 through LOX fill pre-fab valves L-7 & L-6 to LOX storage & topping tanks.

h. Helium Fill (HFD): 6,000 PSI helium through PDU to both inflight helium bottles. Manual valve 23 for IF #1. Manual valve 24 for IF#2.

j. GN2 Fill (NPP): 4,000 PSI GN2 fill to single 500 cubic foot bottle.

k. GN2 Fill (OAF): 4,000 PSI GN2 fill to 2 ea 625 cubic foot bottles.

l. GN2 Fill (NFD): To 6,000 PSI GN2 bottle (Gnd Pressurization & Routine use) through valve 25 in the PDU.

4. A. Manual Valve F-16: From missile to catchment tank.

B. Valve F-15: Missile fill stub up. (RPI)

C. Dirty Lube Oil Drain Line: From tank on level 5 and pump on level 6.

D. Clean Lube Oil Fill Line: To tank on level 5.

E. Helium Vent (NVP): Missile fuel tank pressure exhaust through PCU valve #711

F. GN2 Vent: Vent from fuel loading pre-fab (fuel leveling tank) located on level 8. (NVP)

5. Demineralized Water Fill: To demineralized water tank on level #1 (may not be used).

6. Catchment Tank: Access & vent (15000 gal cap).

7. A. F-17: RP-1 fill stub up.

B. F-20: One way check valve to RP-1 catchment tank.

C. F-18: RP-1 manual shut off valve located between F-19 and F-20.

D. F-19: Catchment tank fill stub up.

8. Diesel Fuel Tank Fill: To diesel storage tank (15,300 gallon cap).

9. Diesel Fuel Tank Vent:

10. Cooling Water Tower: Cools condenser water to maintain return water temp at 90°F. Receives 8 GPM make up water from the utility water system through a chemical pot feeder on level 1. Cools Diesels, Water Chiller Units and Instrument Air Pre-fab.

11. Collimator Sight Tube Opening: Used to orientate the collimator to true North.

12. Utility Water Tanks and Vents: 4 ea tanks 6½ feet under surface. Total capacity 91,000 gallons. 1-16,000 gallon, 3 ea 25,000 gallon. High level alarm 89,450 gallons, low level alarm at 79,300 gallons.

13. LCC Entrance:

14. LCC Sewer Vent: Blast closure closes automatically in event of nuclear blast for 20 seconds, then opens.

15. LCC Air Exhaust: 16" blast closure closes automatically in event of nuclear blast for 30 minutes, then opens.

16. LCC Escape Hatch: Shaft contains 4 tons of sand which empties into level 1 of LCC when trap door is opened.

17. LCC Air Intake: 16" blast closure closes automatically in event of nuclear blast for 30 minutes, then opens.

18. Blast Detection Optical Sensors (2 ea): Converts the light radiation of a nuclear blast to an electrical pulse which is sent to the Nuclear Blast Detector Unit on level 2 of the LCC. The same mast has an optical test light which simulates the light of a Nuclear Blast.

NOTE: Used in conjunction with the optical sensers are 3 ea buried loop anntennae to detect ground shock. Each antenna consists of a 2 foot diameter loop, 10 feet underground and a matched test antenna.

19. Raw Water Storage Tank: Contains Unprocessed water.

20. Water Plant Building Containing:

A. #1 Well and Pump.

B. #2 Well and Pump (may be in seperate pump house).

C. Demineralization, Filtration and Softening Equipment.

21. Processed (Product) Water Storage Tank:

NOTE: Location and makeup equipment (19,20,21) varies from site to site.

22. Electrical Stub-ups: 480 VAC power from NEMCC

A. Helium Compressor Elect Connection. 75KW

B. Oxygen recharger electrical connection. 75KW

C. MAPCHE check-out vehicle electrical connection. MAPCHE contains electronic equipment for rapid automatic checkout of the various missile systems.

D. Ground connection.

E. DMU electrical connection. Now called PTS (Pneumatic test set). Set supplies pressure to the missile during installation and removal and during MAPCHE checkout. 50KW

F. GN2/LN2 recharger electrical connection. 130KW

G. Engine service trailer stubup. 25KW

H. 110V AC 3Ø general purpose outlet.

23. Comm Box (3)(Areas 3,4 and 11)

24. Electrical Connection: For fuel (RP-1) purification unit.

25. Personal Warning Light and Horns: Located above LCC actuated from FRCP, Level 2 of LCC.

26. Silo Doors: 2 ea. 150,000 lbs, 16' 8" X 22' X 2' 6" thick with a 14" overlap. Designed to withstand over-pressure of 100 PSI. Each door opens to 95° in 19 seconds. West door opens 6 seconds after start of east door. Total door opening time 25 seconds.

27. Breakaway Cylinders: 2 each door assists main door actuators. Has 4" stroke with 37,500 lbs lifting capacity.

28. Main Door Actuators: One for each door. Has snubbing action from 90 to 95 degrees of upward travel.

29. Horizontal Crib Locks: (3 each) 120 degrees apart. (NW-NE-S)

30. Uplock Strikers: (For Launcher Platform) 4 each. Used to lock the launcher platform to the silo cap when the launcher platform is in the raised position.

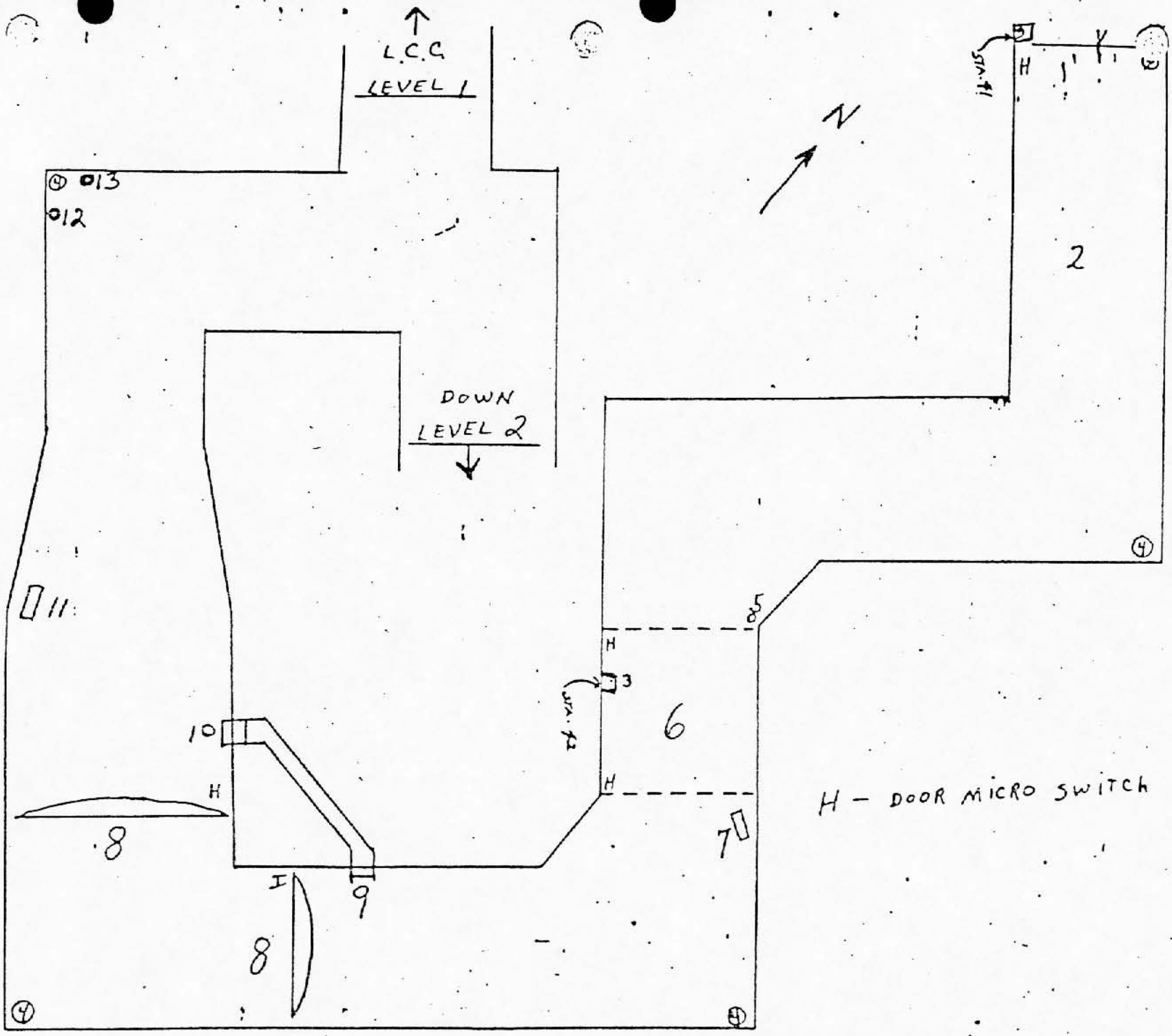
31. Comm "J" Boxes

32. P.A. Alert Button

33. Silo Sump Pump Discharge on to Ground Through 6" Pipe. Location may Vary.

34. Catch Basin: Receives waste water discharge from water processing plant when equipment is back-flushed. Location may vary.

35. Tile Field: Receives discharge from LCC sump pumps.


L.C.C
LEVEL 1
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LEVEL 2
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H – DOOR MICRO SWITCH

LAUNCH CONTROL CENTER

Introduction: The Launch Control Center (LCC) is a cylindrical structure 40 feet in diameter, 6½ feet below grade, and contains a 2 story steel structure called a hung floor. This hung floor hangs from the ceiling of the concrete structure by a suspension system that is air cushioned to absorb ground shock.

The entranceway to the LCC consists of a stairway down from grade level, entrapment area, two blast doors, connecting tunnel and a stairwell for the LCC levels and to the silo connecting tunnel.

The upper floor (level 1) of the LCC is divided into various rooms: Ready room and storage area, janitor room, latrine and shower room, kitchen and dining area, heat, vent and air conditioning room, and medical supplies room.

The lower floor (level 2) of the LCC is also divided into various rooms in which the actual launch equipment is located: Launch Control Room, office, battery room and communications and equipment room. The tunnel to the silo connects LCC level 2 and silo level 2.

The utility tunnel which connects the LCC with the silo is approximately 50 feet long with an inside diameter of 8 feet. Two blast doors are presently located at the silo end of the tunnel together with two blast plates. These blast plates are permanently bolted to the concrete walls (one on the inside wall of the silo and the other in the tunnel) and have numerous 2½ inch holes used for routing cables between the LCC and silo. A third blast door is to be installed at the LCC end of the tunnel.

Entranceway to LCC

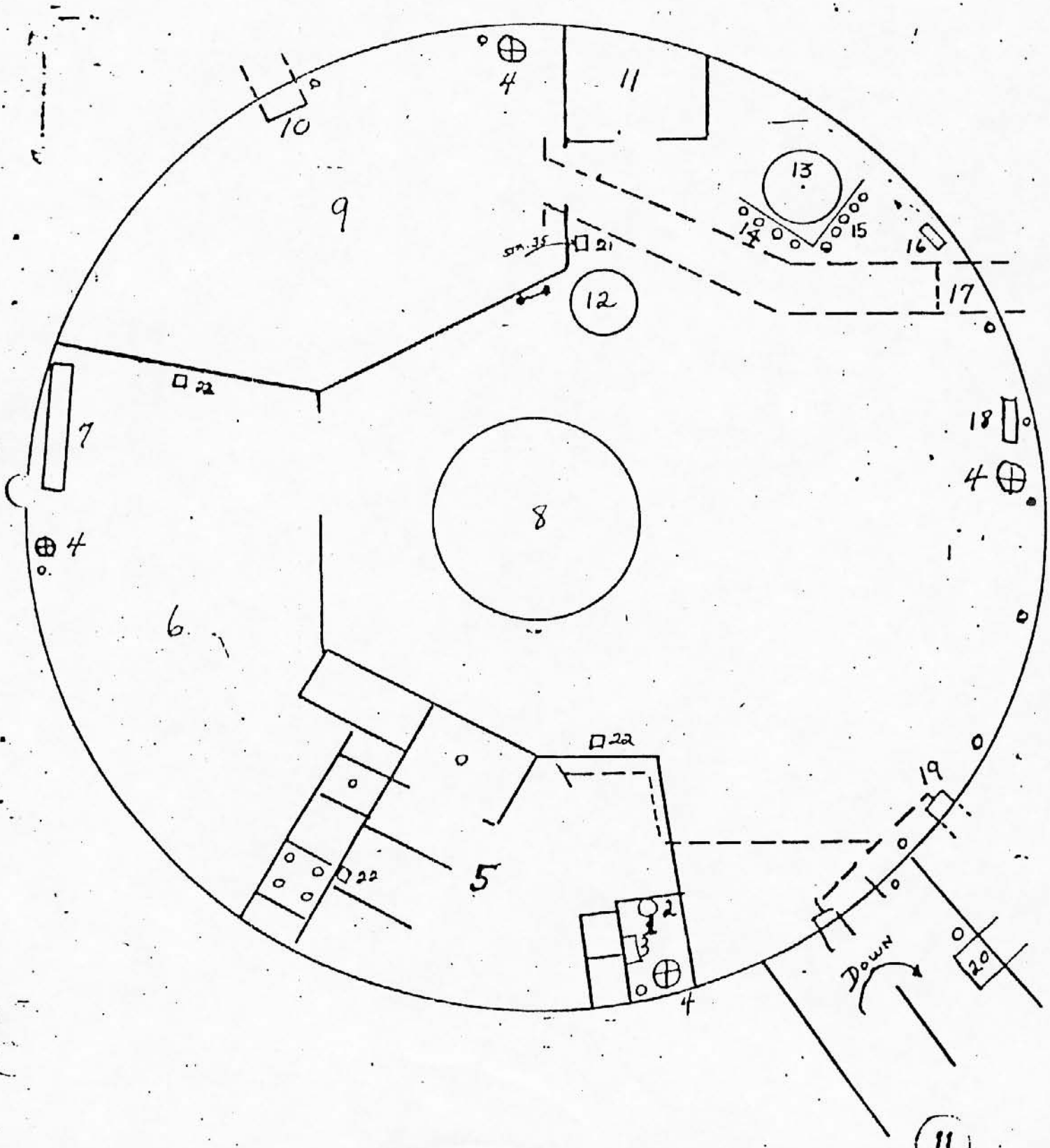
1. Grade entry door and micro switch
2. Stairway down
3. Telephone
4. Bull horns (5 ea)
5. Entrapment area door warning buzzer
6. Entrapment area - two doors and micro switches
7. T.V. monitor camera
8. Blast doors (2) and micro switches
9. LCC Stairwell air exhaust vent
10. LCC Stairwell blast closure - 16"

11. Emergency lighting

12. Sewer Drain

13. Sewer Vent

LEVEL ONE Lec.



LCC LEVEL 1

1. Utility Room

2. Electric Water Heater

3. Utility Sink

4. Air Support Cylinders (4): The LCC contains a 2 story steel structure. This steel structure hangs from the concrete roof by a suspension system that is air cushioned by 4 supporting and leveling cylinders with approximately 350 ± 15 PSI instrument air supplied to them. The 4 cylinders provide air suspension and absorb ground shock. The support cylinders are individually and automatically controlled to maintain the structure level under normal operating conditions.

5. Latrine and Shower Room

6. Kitchen and Dining Area: The kintchen and dining room has all equipment necessary for a ten day isolation of the launch crew. This equipment consists of a stove, sink with disposal, refrigerator freezer, tables and chairs. Enough food will be stored in the kitchen area to feed the launch crew during a possible ten day isolation period.

7. Facilities Electrical Cabinet

8. Center Column with Canvas Enclosure

9. Heating, Ventilation and Air Conditioning Room: Equipment in this room is capable of supplying approximately 5550 CFM of clean refrigerated (or heated) and dehumidified air to the LCC. Air is drawn thru the above ground air intake duct, a 16" blast closure and filters (including a CBR filter) by a 7½ hp motor and supply fan (S-1). This same fan then forces the air thru a chilled water coil and a heated water coil and thru ducting to both levels of the LCC and the silo tunnel. Normally, approximately 3800 CFM of the 5550 CFM is recirculated air and 1750 CFM is fresh "outside" air. The LCC exhaust fan (E-1) draws approximately 1100 CFM of air from the communications emergency battery room, the kitchen and latrine and forces this air thru a 16" blast closure and out an above ground exhaust vent. In addition to the "recirculated" air and the "exhausted" air, approximately 650 CFM of air flows from the LCC thru the LCC stairwell 16" blast closure and vents into the LCC entranceway tunnel.

10. Air Intake Blast Closure - 16"

11. Medical Supplies Room

12. Escape Hatch and Ladder. Filled with 4 tons dry sand

13. Air Receiver Tank

14. 300 PSI Lines for 4 Blast Closures

15. Five 500 PSI Lines: L to R, 1 ea. supply line to reciver tank and 4 ea. supply lines to LCC support cylinder regulators.

16. Electrical Cabinet

17. Air Exhaust Blast Closure - 16"

18. Electrical Cabinet

19. Sewer Vent Blast Closure

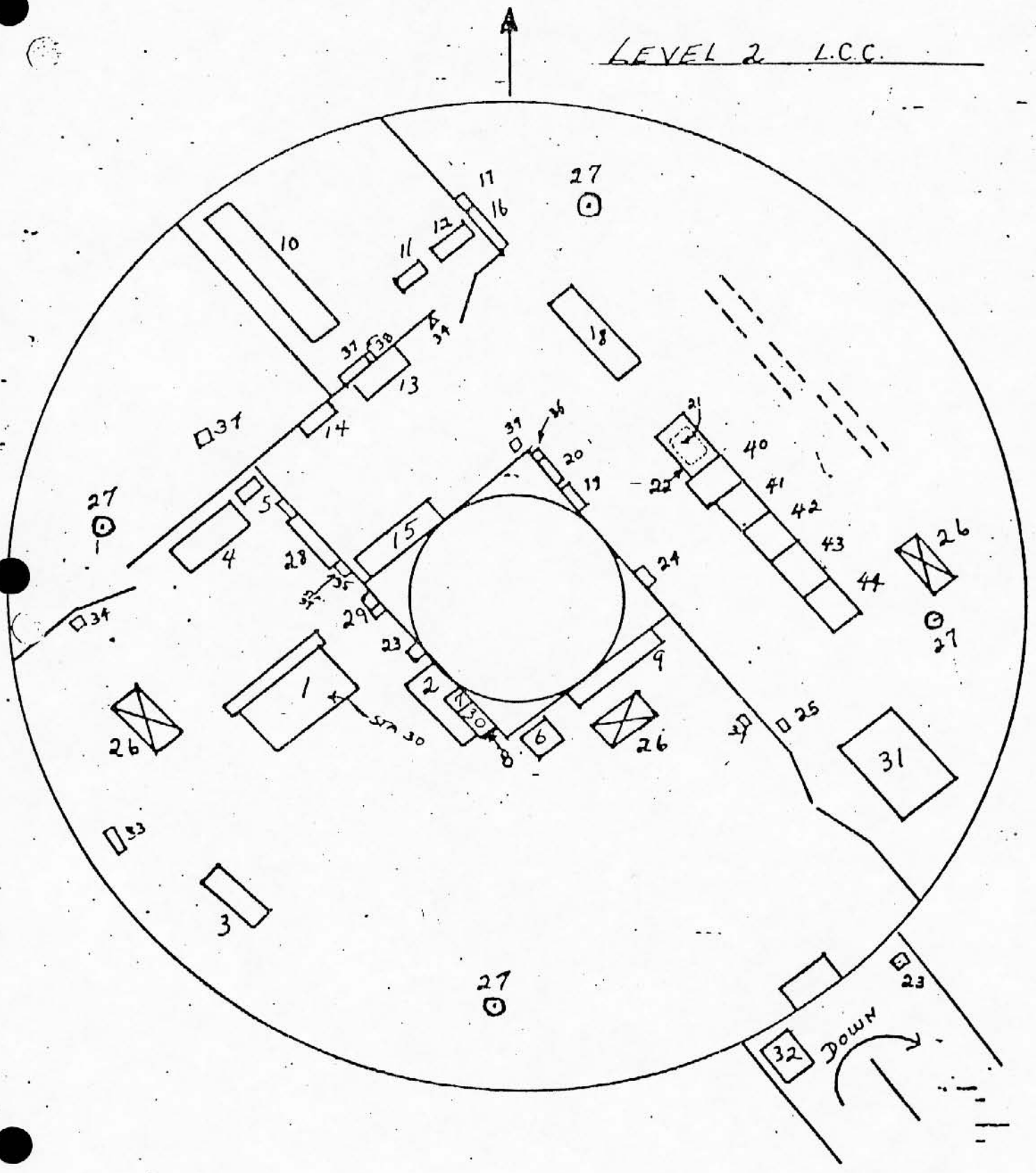
20. LCC Stairwell Blast Closure - 16"

21. Comm Box (Sta - 35)

22. Speakers

23. Emergency Light (6 VDC)

LEVEL 2 L.C.C.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LCC LEVEL TWO

1. Launch Control Console: Monitors standby and countdown status of weapon system with light and pressure gage indications. Has controls to start countdown, commit and abort sequences.

2. Facilities Remote Control Panel: Monitors RPIE. Can control blast closures and missile enclosure fog system.

3. Power Remote Control Panel: Monitors and partially remotely controls the diesel generators.

4. T.V. Monitor & Controls: More than one system may be installed.

5. Gate and Door Control: The gate and door control panel contains 3 buttons and 3 indicator lights. The gate control button and light are for entrance through the perimeter gage (this may or may not be installed). The No. 1 entrapment area, after identification by T.V. The No. 2 button and light will permit entrance through the second security door. Both security doors are electrically un-locked and locked.

6. Blast Detection Console: Detect nuclear blast, closes blast closures and causes guidance to go on memory.

7. Fire Alarm Panel and Rectifier (12VDC): Provides fire alarm and monitor system. (See "note" for Fire Detector Zones and Locations.)

8. Fire Alarm Batteries (12VDC)

9. Blast Detection Terminal Cabinet

10. Battery Bank (Comm)(48VDC)

11. Comm Cable Dryer

12. Battery Charger for Communications Battery Bank and Telephone Ringers

13. Distribution Transformer 440 V (45KVA)

14. Lighting Panel "D" : Provide controlling Ckt. Bks for light system

15. Launch Control Center Motor Control Center: 480 V 60 cycle power through breakers for LCC.

16. Telephone Terminal Cabinet

17. P.A. Terminal Cabinet

18. Central Distribution Frame

19. Power Distribution Service Cabinet (120/208 Volts - 60 Cycle): For inter-site telephone carrier. Has 130V and 48V breakers.

20. Lighting Panel 'C': For communications.

21. Launch Enable System

22. P.A. System: Controls, amplifier (6 ea) and pre-amplifiers.

23. Emergency Lights (6VDC)

24. Alarm Annunciator: Visual and audible alarm or communications malfunction.

25. Switch for Air Conditioning Unit (Ref #31)

26. Floor Access Doors

27. Access, Leveling Devices

28. LCC Lighting Panel "A":

29. Alarm Annunciator and Comm Override Lock Switch

30. Water Plant Panel

31. Communications Room Air Conditioning Unit Chilled Water Only

32. Sewage Pumps (2): From LCC to septic tank and tile field.

33. Control Station Manual Operating Level (new location) Manual Operation of AMF.

34. Speakers

35. Telephone (Sta 39)

36. Circuit Breaker for LES

37. Circuit Breaker Cabinet for Bell Ringers and Communications Battery (48V) Chargers.

38. Fuse Box (slow-blow type): For bell ringers.

39. Switch for Fan Coil Unit-(FC-1)

40. Central Rack for Site Comm Boxes

41. Central Rack for Direct Lines (C.P., ACP etc) and Explosion Proof (E.P.) Comm Boxes

42. Dial Telephone Cable Carrier Wave Equipment

43. Telephone Patch Panel to Each Site and MAMS and Cable Carrier Wave Equip

44. Power Supply Panel for Carrier Wave Equipment

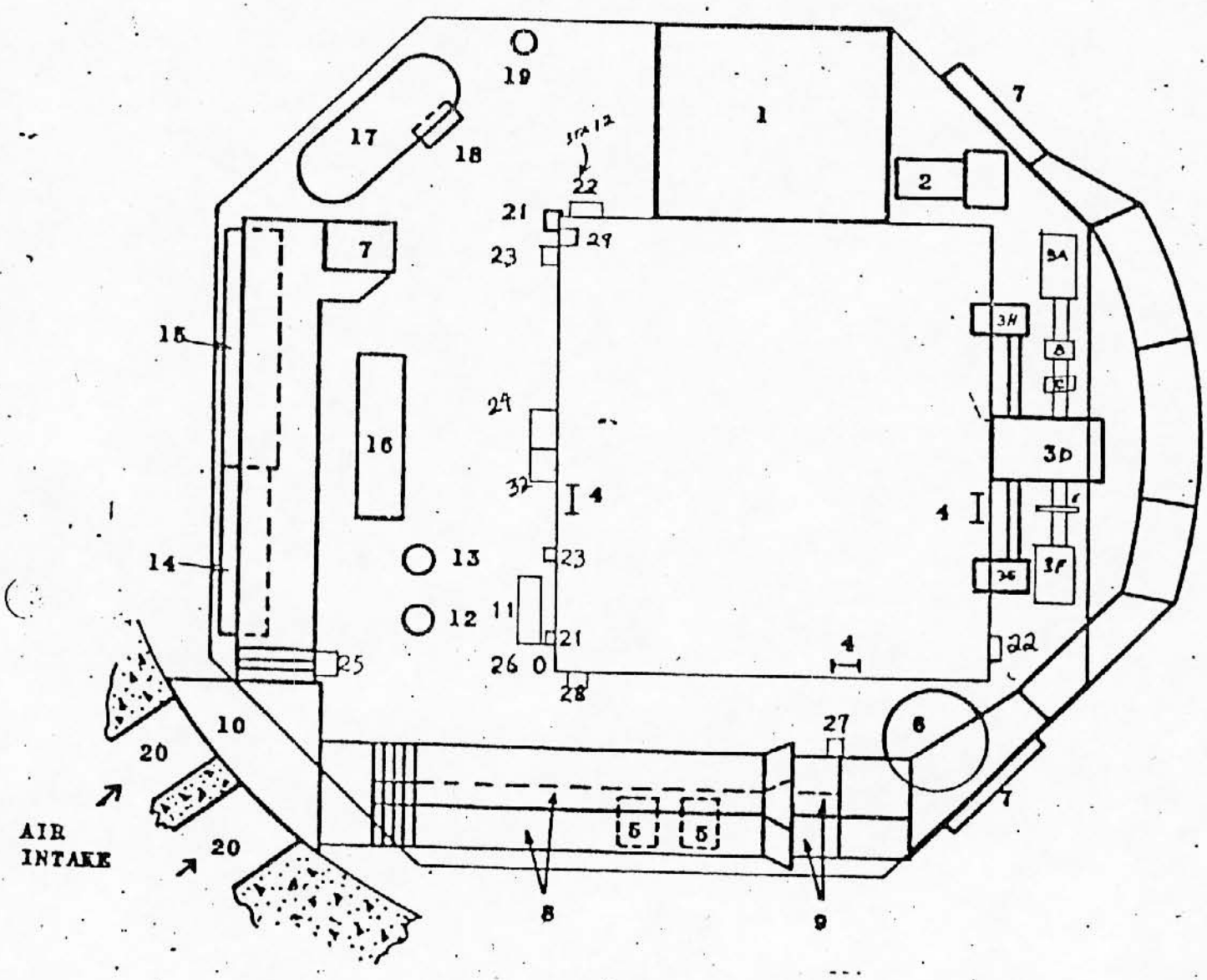
NOTE: FIRE DETECTOR ZONES AND LOCATIONS

ZONE	LOCATION
1	Silo Levels 1 and 2
2	Silo Levels 3 and 4
3	Silo Level 5
4	Silo Level 6
5	Silo Levels 7 and 8
6	MEA Levels 2, 3 and 4
7	MEA Levels 6, 7 and 8
8	LCC

Manual reporting stations on Levels 2, 4, 6 and 8 at entrance to Facility Elevator.

QUAD. II

QUAD. I



QUAD. III

QUAD. IV

SILO - Level 1

SILO LEVEL 1

1. Facility Elevator: Combination freight and passenger elevator for interlevel service from level 1 to level 8. 6000 lb capacity, electrically operated.

2. Facility Elevator Drive and Control: Electric motor incorporating reduction drive and sheaves and pulleys providing motive force to raise and lower facility elevator.

3. Launcher Platform Drive: Elevates and lowers the launcher platform, between stowed and launch positions, under all load conditions. Direct mechanical actuation is supplied by either one of two 125 hp electric motors operating through a power transmission that rotates the two drive sheaves. Five cables for each of the two drive sheaves are attached to the crib structure at one end, and pass under the sheaves at the top of the counterweights, rise and reeve about the drive traction sheaves, undersling the launcher platform sheaves, and are anchored at the top of the crib structure through tension equalizers.

   A. Low Speed Motor
   B. Aux Speed Decreaser
   C. Clutch (Shaft Coupling)
   D. Main Speed Decreaser
   E. Brake
   F. High Speed Motor
   G. and H. Drive Sheaves

4. Launcher Platform Guide Rails: Located on three sides of the launcher platform serve to guide launcher platform as it is lowered and raised within the silo. These rails minimize lateral movement, or tilting of the launcher platform and provide a smooth vertical track for the launcher platform travel. The rails are of I-beam construction with flanges to provide a smooth bearing surface.

5. Spray Pumps (P20 & 21): Consist of two water pumps, each with a capacity of 280 gpm flow. The pumps are connected in parallel, as one pump is in continuous operation and the other pump is on standby. Water is pumped to the sprayers in the dust collectors and then recirculated by the operating pump. Water losses are supplied by the makeup tank, item 12.

6. Circular Stairs: An all steel circular stairway, 5 ft in diameter, goes from level 1 to level 7, thereon a vertical ladder is used to level 8.

7. Air Conditioning Ducts: Distributes air throughout the crib and is routed to the 8th level.

8. Dust Collectors (DC20 & 21): Cylindrical, wet impingement type air washer-dust collector units. Cleans supply air prior to distribution.

9. Supply Fans (SF 20 & 21): Draws the air from the dust collectors and distributes to the air ducting. Alternately used when outside temperature below 60°F.

   a. Direct driven axialvane inlet fan

   b. 20 hp 1750 rpm, 440v, 3 phase, 60 cps

   c. Water agitator equipped sump

10. Air Intake Plenum: Provides intake air chamber to the dust collector units.

11. Sand Settling Tank: In series with dust collectors, provides trap to allow impurities washed from conditioned air to precipitate out. 1 amp to sump.

12. Air Wash Water Makeup Tank: In series with silo air conditioning system.

13. Chilled Water Tank: In series with main water chilling system located on fourth crib level. This tank acts as a header or expansion tank. App 30 gpm.

14. Launcher Platform Motor Control Center: Contains controls that provide power for the two electric motors that in turn afford power to raise and lower missile. The 125 hp motors operate from 480v, 60 cps, 3 phase current. Also furnishes power to amf logic racks, hydraulic power pack and launch platform drive control.

15. Launcher Platform Drive Control: Both motors are controlled from a common saturable-reactor type control network. Motor speed is controlled by tachometer feedback control.

16. Logic AMF Racks (4): Controls the automatic and proper sequencing of mechanisms for raising the missile for launch and then return platform to hard state. Provides checkout and test of this lifting mechanism and locates malfunctions.

17. Demineralized Water Tank: Capacity 345 gal. Furnishes make-up water to chilled water system, hot water system, and diesel engine closed loop cooling system.

18. Demineralized Water Pump (P-90): Transfers water from demineralized water tank through a one way check valve to systems listed in para. 17. Pump is automatically controlled by liquid level control valves in the chilled and hot water systems. Manual operation is from FTC #2, silo level 2.

19. Chemical Pot Feeder: Softins 8 gpm utility water for use in the condenser water system.

20. Intake Vents and Blast Closures: Two 46 in. outside diameter pipes allow the intake air to the silo air conditioning system. It will automatically close upon detection of thermonuclear radiation. Elect heaters and dampers being installed.

21. Emergency Lights (6 Volts)

22. Comm Box

23. Loud Speakers (2 Each)

24. Control Manual Operating Level (Manual Operation of AFM System) Quad II (old location)

25. Missile Lift Junction Box

26. GN2 Pressure Guage (GN2 to Silo Doors Actuators for Cushion)

27. Fire Extinguisher

28. Warning Horn

29. NCU Connect: GN2 to NCU when L/P is up and locked.

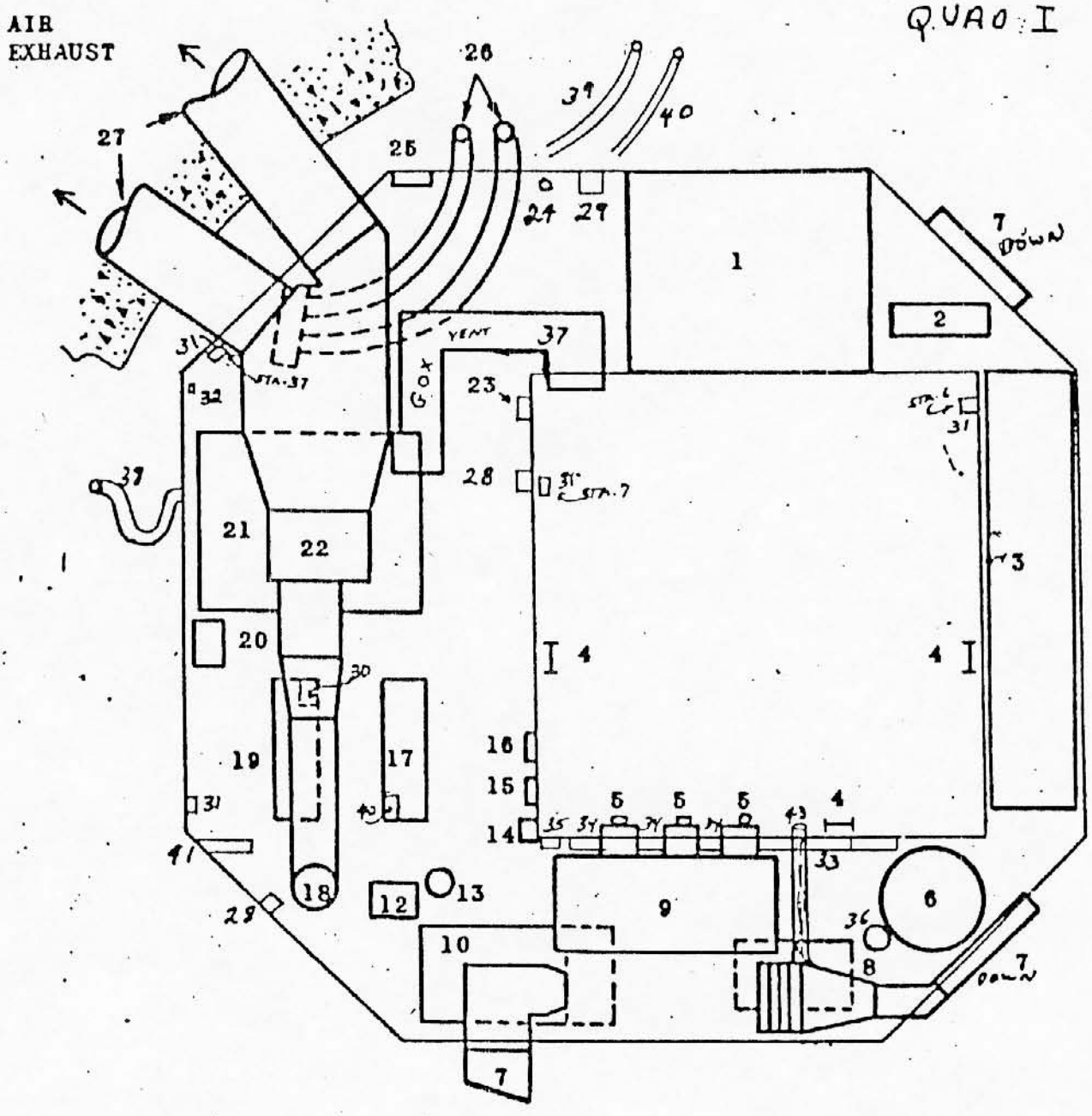
30. Safety Platform & Elevator Entrance (Ref pages 63 & 66)

31. Diesel Fuel Storage Tank Shutoff Valve

32. Overspeed Control Box: This unit provides a means of checking the operation of the overspeed sensor and contains an annunciator to indicate that an emergency stop has been initiated by the overspeed sensor.

QUAD II

QUAD I



QUAD III

Level 2

QUAD IV

SILO LEVEL 2

1. Facility Elevator

2. Facility Elevator Counterweights: Consist of iron slabs which are guided by rails and lower to the 8th level. Has chain attached to bottom, to compensate for cable weight changes.

3. Launcher Platform Counterweight: This slab unit comprises 26 cast iron and three steel slabs bolted together to form a 541,000 lb counterweight. The counterweight minimizes the power requirement to raise and lower the launcher platform together with a fully loaded missile and all AGE on the platform. The V-shaped groove in each vertical end of the counterweight accomodates a guide rail. The counterweight weighs approximately 6000 pound more than the launch platform.

4. Launch Platform Guide Rails

5. AC Outlets: Three full size ac outlets provide receptacles for use of 115V and 208V.

6. Spiral Staircase

7. Air Conditioning Duct

8. Hydraulic Reservoir and Pump Unit (Hyd Power Pack): Contains a 275 gal reservoir, a 1 hp 5 gpm electric driven hydraulic pump with 200 psi output, a 40 hp 20 gpm pump with 3000 psi output, one accumulator and necessary filters and valves. Pumps receive power from M/L MCC and provide power to horizontal and vertical crib locks, doors, launch platform brakes, drive complings and the work platforms.

9. Launcher Platform Fan Coil Unit (FC-40): Provides positive circulation of conditioned air throughout launch platform contained units.

10. Accumulator Rack: Eight accumulators and 5 GN2 bottles are mounted in a support rack. The hydraulic fluid is pressurized by 3700 psi nitrogen gas. Six accumulators and 2 GN2 bottles are used to operate the silo doors and the remaining two accumulators and 3 bottles operate the other systems.

NOTE: Silo Air Conditioning Specifications

Areas	Temperatures
Launch Platform Enclosure	70°F ± 5° 65% RH
Collimator	70°F ± 3° 65% RH
Control Cabinets	70°F ± 3° 65% RH
Remainder of Silo	50°F to 100°F

11.

12. Hydraulic Control Panel: Provides (1) a means of pinpointing trouble areas, (2) manual control of the main and standby hydraulic pumps and (3) control of nitrogen cylinder recharging.

13. Sand Settling Tank: Allows solid impurities washed from conditioned air to precipitate out. 1 GPM to sump.

14. 30 KVA Lighting Transformer: Input of 440 volts is reduced to 120/208 V, 3 phase power through panel LD to the lighting panels LA and LB for illumination of the crib and launch platform. (100 Amp with 70 A Breaker)

15. Lighting Panel LA: Provides 120VAC 60 cycle, single phase to silo lighting at silo levels 1,2,3 and grade.

16. Distribution Panel LD: Receiver 120/208VAC from the 30DVA lighting transformer on level 2 and distributes it to lighting panel LA on level 2, lighting panel LB on level 4; RP-1, diesel fuel and GOX detectors on level 7, and to the 6V emergency lighting chargers and relays on all levels.

17. Nonessential Motor Control Center (10 Units): Controls main air supply fans (2-20 hp each), lower silo supply fan (3 hp), hot water heater, (1 hp), main exhaust fan (15 hp), exhaust vent bent blast closures, waste water pump (10 hp), standby spray pump, spray pump, LO2 vacuum pump, LO2 vacuum pump subcooler, LN2 vacuum pump, water condensate return pump, missile fuel drain pump, fog system pump, water chiller pump, dirty lube oil pump air compressors (2-15 hp), utility water pump, defueling pump, condenser water pumps, hot water pump, hot water pump standby, launch platform purge exhaust fan, launch platform exhaust fan, launch platform fan control unit, 30 KVA transformer silo level 2 and detector units silo level 7. This bus is de-enterized at commit as these items are not necessary for launch.

18. Exhaust Duct for Level 6

19. Essential Motor Control Center (Six Units): 30KVA transformer, silo level 3, DC power supply unit, pod air conditioning control cabinet for air handling, air handling fan, control cabinet fan coils, thrust section heating blower, thrust section heating element, hydraulic pumping unit, 400 cps motor generator and distribution system, 48 vdc battery rectifier, water chiller unit, chilled water pump, emergency water pump. Contains motor controllers protective circuit devices and pilot controls for equipment required for standby and countdown.

20. Air Compressor: Supplies compressed air for electro-pneumatic panel.

21. Exhaust Plenum: Collects silo air conditioning exhaust and diesel exhaust into common plenum which vents gases to the atmosphere.

22. Main Exhaust Fan (EF-30): Provides impetus to used silo air, diesel exhaust and RP-1 vapors, with draws accumulated waster from plenum and forces it to vent to atmosphere at ground level. Draws air from silo levels 2 and 5.

23. Telephone Terminal Cabinet: Provides switching center to facilitate routing of telephone communication between silo and LCC.

24. Fire Alarm Bell

25. Fire Alarm Cabinet

26. Diesel Exhaust: Exhaust gases carried toward exhaust plenum from diesel engines located on levels 5 and 6.

27. Exhaust Vents and Closures: Two 46 in. outside diameter pipes provide exit of contaminated air into the exhaust tunnel and shaft. Blast closure doors will automatically close upon detection of thermonuclear radiation.

28. Emergency Lights, 6 Volts:

29. Fire Manual Alarm

30. FTC #1

31. Comm Box

32. Test Switch for Upper Silo Exhaust Fan

33. Hydraulic Manifold

A. Hydraulic doors manifold (2 each).
B. Crib Locks, and launch platform locks.
C. Work Platforms.
D. Launch Platform drive brake.

34. Missile Enclosure Air Exhaust: Air into missile enclosure area on level 7.

35. Hydraulic Manifold J Box

36. Portable Fire Extinguisher

37. GOX Vent: Mechanically extended and retracted (see P26, par 38)

38. Sump Pump Discharge

39. Condenser Water Supply (From cooling tower)

40. Condenser Water Return (To cooling tower)

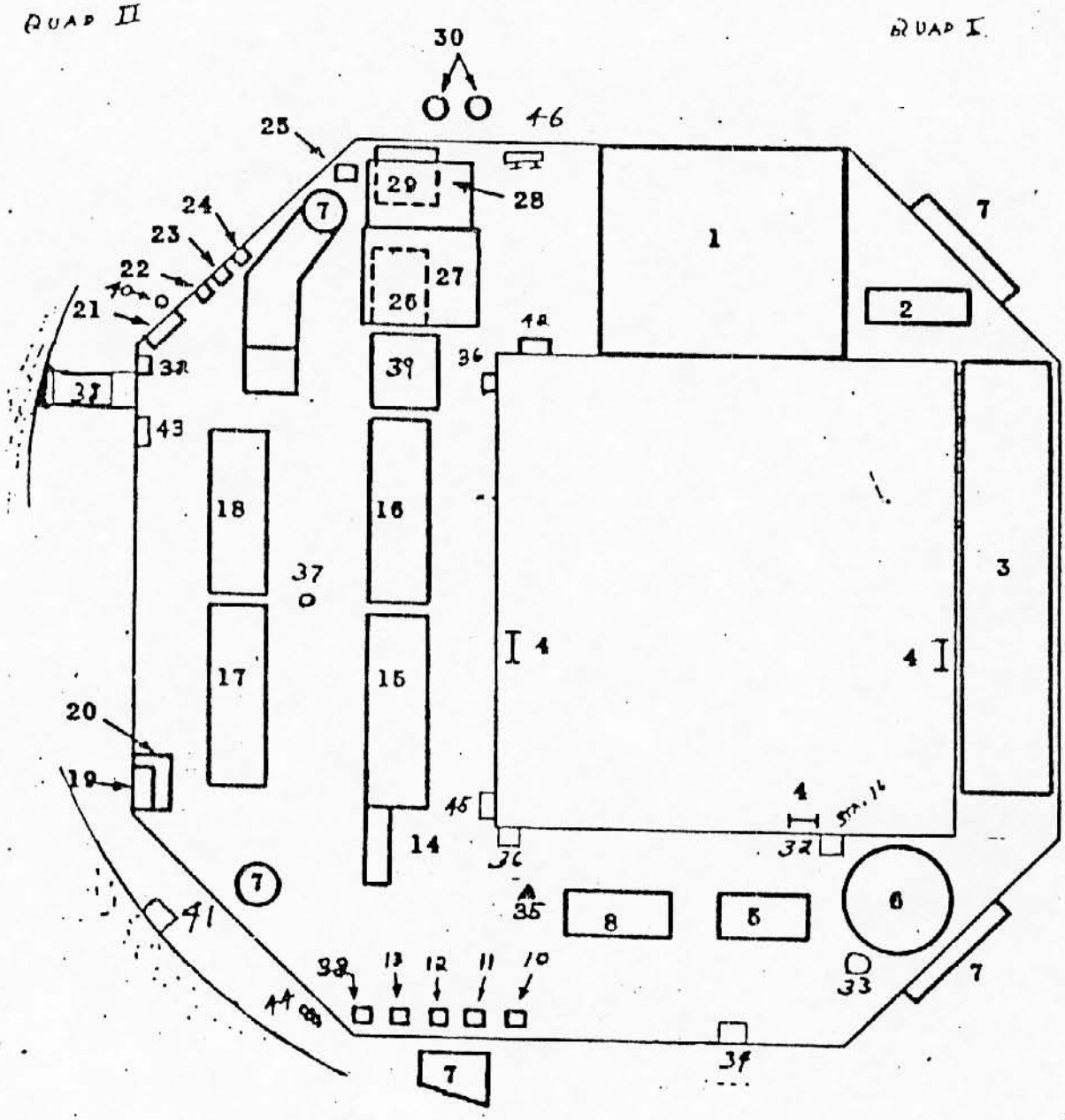
41. Electro-Pneumatic Panel: Contains controls for electro-pneumatic valve system operation in the water and air conditioning systems.

42. FTC #2: Contains controls and indicators for EMCC and NEMCC equipment. The fact that it is physically a part of the NEMCC is insignificant.

43. Missile Enclosure Area Makeup Air Input

QUAD II

QUAD I



Level 3

QUAD III

QUAD IV

SILO LEVEL 3

1. Facility Elevator

2. Facility Elevator Counterweights

3. Launch Platform Counterweights

4. Launch Platform Guide Rails

5. G.E. Pre-launch Monitor: Capable of continuous and periodic monitoring of the mated re-entry vehicle. MK3 or MK4 can set R/V for ground or air burst.

6. Circular Staircase

7. Air Conditioning Ducts

8. ARMA 1A1, 1A2 Racks: Two racks provide the continuous hold of the inertial guidance alignment system and includes confidence checks on the system. Controls and monitors the guidance system during C/D.

9.

10. Telephone Cabinet: Terminal board for all telephone cabling in the silo.

11. Pod Cooling J Box:
12. Hydraulic Pump J Box:
13. Launch Platform J Box:

All three units receive electric power, 440, 3 phase, 60 cycles from the essential bus control center and from these three function boxes electric power is routed to the cableloop assembly, crib to launcher.

14. Facility Interface Cabinet: Junction box for providing electric power to the following prefabs: liquid oxygen, fuel and pressurization.

15 and 16. Control Monitor Group 1 & 2: Two units contain necessary relays, computers, comparators, and circuitry to sequentially send actuation signals to the missile and AGE during countdown. They obtain feedback information from these actuations, compute and compare these signals and present results of this analysis as GO/NO-GO signal at the launch control console.

17 and 18. Control Monitor Group 3 & 4: Two units designed to simulate signals that are normally produced by the missileborne and ground support equipment when stimulated by the two logic units. The feedback of signals from the simulated system of the LSR is computed and compared by the logic units and results are indicated as GO/NO-GO signals on the launch control console. Primary purpose of the LSR is to check-out the operation of the logic units and the launch control console and identify any malfunctions of these units.

19. Launch Control Power Supply Panel: Distributes 120/208 volts, 3 phase, 60 cps to the logic units, LSR units, GE pre-launch monitor and the ARMA guidance units.

20. 30 KVA Transformer: Reduces 440 volts, 3 phase, 60 cycles to 120/208 volts and this power is routed to the launch control power supply panel, item 19.

21. 60 Cycle and 400 Cycle AC Distribution Panel: Receives 120/208 volts, 3 phase, 400 cycles from the motor generator and directs it to the logic units, LSR units and ARMA guidance units. Motor generator requires 440 volts, 3 phase 60 cycle input from the motor control center. Voltage regulation is controlled electrically and frequency regulation is controlled by the 60 cycles power to the synchronous drive motor. Has SPGG and engine valve heater indicators.

22. 28 VDC Power Supply Switch: 60 amp, unfused safety switch for AC power input into the 28 vdc power supply unit.

23. Motor Generator Disconnect Switch: 30 amp, unfused safety switch for the AC power input into the motor generator unit.

24. Spare J Box

25. Drinking Fountain

26. MD-2 Motor Generator (400 Cycle)

27. Control Cabinet Fan Coil Unit: Contains three electric heating coils, one chilled water coil, and a 2 hp electric fan motor. Furnishes conditioned air to launch control cabinets, checkout equipment (LSR), ARMA racks, and collimater equipment. Manually controlled from FTC #2, silo level #2.

28. Plenum: Air chamber for the control cabinet air conditioning system.

29. Emergency Missile Power Battery: This equipment supplements the normal 28 vdc power supply and distribution unit during countdown. Provides an emergency source of 28 vdc shutdown power in event normal DC power supply as a malfunction or an AC input voltage failure. Battery unit consists of 21 nickle-cadium alkaline cells mounted on wood trays. Each cell has an amp-hr rating of 240 amp-hr at the 8 hr rate to a cell voltage of 1.14 volts. Trickle charge from the main power supply (rectifier) will maintain the charging of the batteries. A test panel with a voltmeter, cell selector switch and a press-to-read switch will enable to check each individual cell.

30. Diesel Exhaust: Exhaust piping from levels 5 and 6.

32. Comm Box

33. Portable Fire Extinguisher

34. Fire Detector Head

35. P.A. Speaker

36. Emergency Lights

37. Fire Detector Head

38. GOX Vent Blast Closure: GOX from the missile boiloff valve through the duct on level 2 exhausts through the fan and 24" blast closure into the bottom of the fill and vent shaft.

39. Transformer Rectifier (28 VDC): Power supply component consists of a transformer rectifier assembly with required power input of 440 AC volts, 3 phase, 60 cycle. The output is 28 DC volts, 600 amp. A power distribution panel is mounted to the power supply unit. It contains the relays and terminals to switch and distribute rectified 28 vdc and/or battery DC to the ground support equipment and to the missile.

40. Main Utility Water Shutoff Valve Located on Silo Wall

41. Commerical Power Cable Entrance Throught Silo Wall

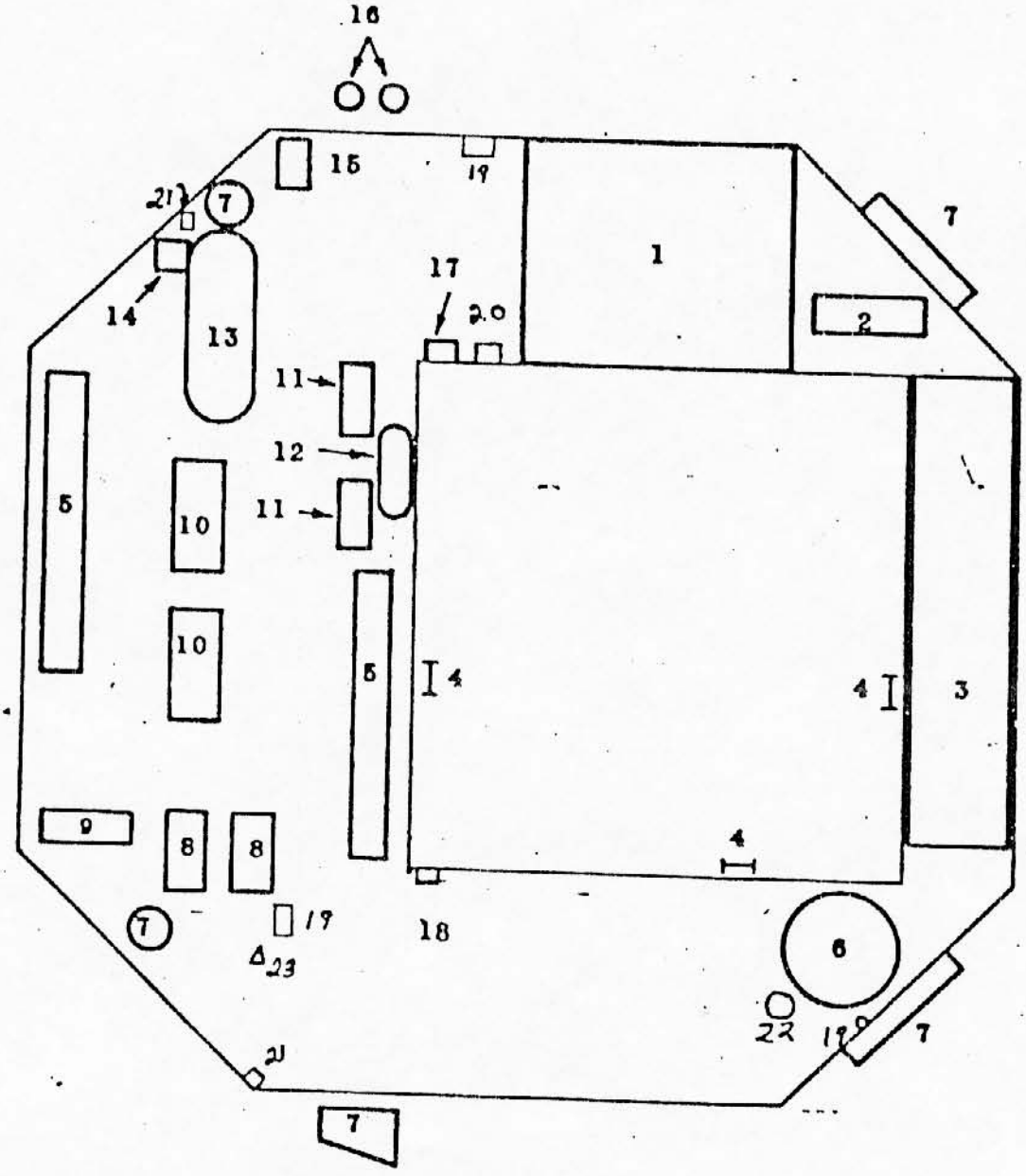
42. Telephone Terminal Cabinet

43. GOX Vent Blast Closure "J" Box

44. Cable Loop to Cap: Ref #22, page 1

45. AMF "J" Box: For work Platforms. -

46. Filter for Utility Water to Airwash Duct Collectors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Level 4

1. Facility Elevator

2. Facility Elevator Counterweights

3. Launcher Platform Counterweights

4. Launcher Platform Guide Rails

5. Water Chiller Units 50 and 51: To provide chilled water to the following:

   A. Launch Control Center Fan Coil Unit.

   B. Control Cabinet fan coil unit.

   C. Launch Platform enclosure fan coil unit.

   D. Pod air conditioner on the launch platform.

6. Circular Stairs

7. Air Conditioning Ducts

8. Chilled Water Pumps P50 and P51: Two 15 hp chilled water pumps, one pump for normal and the other is for standby. Water is circulated by these pumps to water chiller units then directed to air conditioning cooling coils throughout the silo, launch control center and returned to the pumps in a closed loop system.

9. Emergency Water Pump (P-32): Provides emergency backup for the condenser water pumps. It is started by a signal received from the blast detection system. Provides a 50 GPM flow of hard water from the utility water system. This water flows from the pump to the water chiller units, to diesel generators water jacket heat exchangers, inst. air prefab and to drain in the sump.

10. Condenser Water Pumps (P-30 & P-31): The two condenser water pumps provide normal circulation of cooling water from the cooling tower to water chiller units, diesel generator's heat exchangers and instrument air prefab.

11. Hot Water Pumps (P-60 & P-61): Circulates hot water in a closed loop system from the heat recovery silencers of the diesel generators to the thrust section heating coil, fan coil unit FC-40 on crib level 2 and fan coil unit FC-1 on level 1 of the LCC.

12. Hot Water Expansion Tank (TK-63): A 30 gallon capacity tank which serves dual purpose:

    (A) An expansion vessel for the system.

(B) A storage tank for the system receiving make-up water as required from the demineralized water system.

13. Utility Water Tank (TK80): Primary function is to maintain a head pressure on the utility water system. The tank is pressurized with air of 85 psig from the instrument air prefab. As the water level drops, the air pressure will be simulataneously reduced, and at 63 psig the utility water pump will start operation to replenish the water supply and stop operation at 85 psig. When tank pressure drops to 48 psig a low level alarm indication will be registered on the FRCP in the LCC.

14. Fog System Pump (P-80): Pump is centrifugal type with a capacity of 500 GPM. This pump supplies water for the fog nozzles, emergency showers, eye wash fixtures, fire hose stations, air washer emergency supply and condenser water emergency supply. Operates in conjunction with the utility water pump. Starts when the utility water tank pressure drops to 55 psig and stops when pressure reaches 74 psig.

15. Utility Water Pump (P-81): The 30 GPM capacity utility water pump is sized to supply the normal demand for drinking water, domestic water, cooling tower make-up (8 GPM) and air wash system make-up (2 GPM). Operation of the pump is controlled by pressure switches located in the utility water tank. Pump starts when utility water tank pressure drops to 63 psig and stops when pressure reaches 85 psig.

16. Diesel Exhaust Ducts

17. Telephone Terminal Cabinet

18. Lighting Panel LB: Power to lights and reciptacles on levels 4,5,6,7, 8 and sumps.

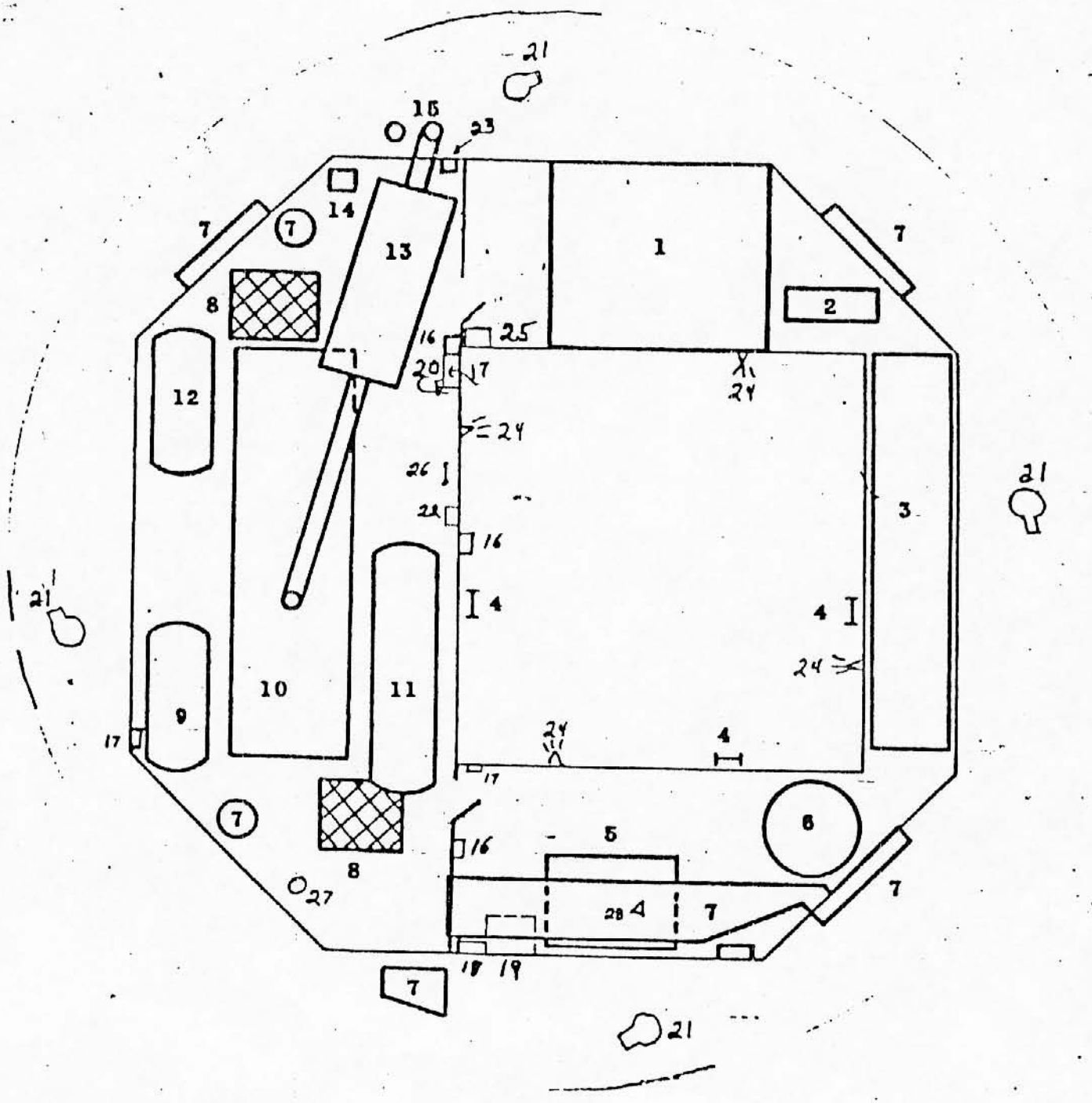
19. Fire Detector Head

20. Comm Box

21. Emergency Lights (6 Volts)

22. Hand Fire Extinguisher

23. P.A. Speaker



Level 5

SILO LEVEL 5

1. Facility Elevator

2. Facility Elevator Counterweights

3. Launcher Platform Counterweights

4. Launcher Platform Guide Rails

5. 480V Diesel Switchgear: This unit receives the 440 vac, 3 phase, 60 cycle produced by the diesel generators. From the circuit breakers, which have protective trip breakers for undervoltage or overcurrent loads, the electrical power is distributed to the essential motor control center, nonessential motor control center, missile lift (L/P) motor control center and the launch control center. Operation of this switchgear can be locally controlled or partially remotely controlled from the launch control center.

6. Circular Stairs

7. Air Conditioning Ducts

8. Opening Grating

9. Dirty Lube Oil Tank (Overhead): Dirty lube oil from the two diesel generators is pumped into this tank. The tank capacity is 348 gal, size is 3 ft diameter by 7 ft length.

10. Diesel Generator (#60): The diesel engine is a model 40, manufactured by White Diesel Engine Division, Springfield, Ohio. It is a heavy duty, vertical, multicylinder, solid injection full diesel type. The electrical power unit is a roller bearing synchronous generator, manufactured by the Ideal Electric and Manufacturing Company. Specifications are: kw 440, dva 550, volts 480/277, amp 662, rpm 720, temperature 50°C, continuous duty, 3 phase, 4 wire, 60 cycles.

11. Diesel Fuel Storage Tank (Overhead): Stores adequate diesel fuel for one day operation. Capacity is 665 gal. Fuel oil from external underground tank of 15,300 gal is drawn continuously in a topping process to maintain the silo storage tank in a full capacity.

12. Clean Lube Oil Tank (Overhead): Provides clean lube oil to the two diesel generators. Capacity is 348 gal, size is 3 ft diameter by 7 ft length.

13. Heat Recovery Silencer: Designed as a muffler silencer for the diesel exhaust gases and also has a heat recovery unit. The heat recovery unit has coils in the silencer for heating of demineralized water which is circulated to the launch control center, thrust section heat coil and the air conditioning units.

14. Drinking Water

15. Diesel Exhaust

16. Comm Box

17. Emergency Light (6 Volts)

18. Commercial Power Circ Breaker

19. Electric Hot Water Heater Circuit Breakers

20. Exhaust Section Temperature

21. Vertical Crib Locks (4 Ea): Locks the crib to the silo wall by removing the spring tension on each odd numbered suspension spring. See page 66, item B and diagram on page 63.

22. Work Platform Key Switch

23. Fog System Control Valve

24. Fog Nozzles (4 Each)

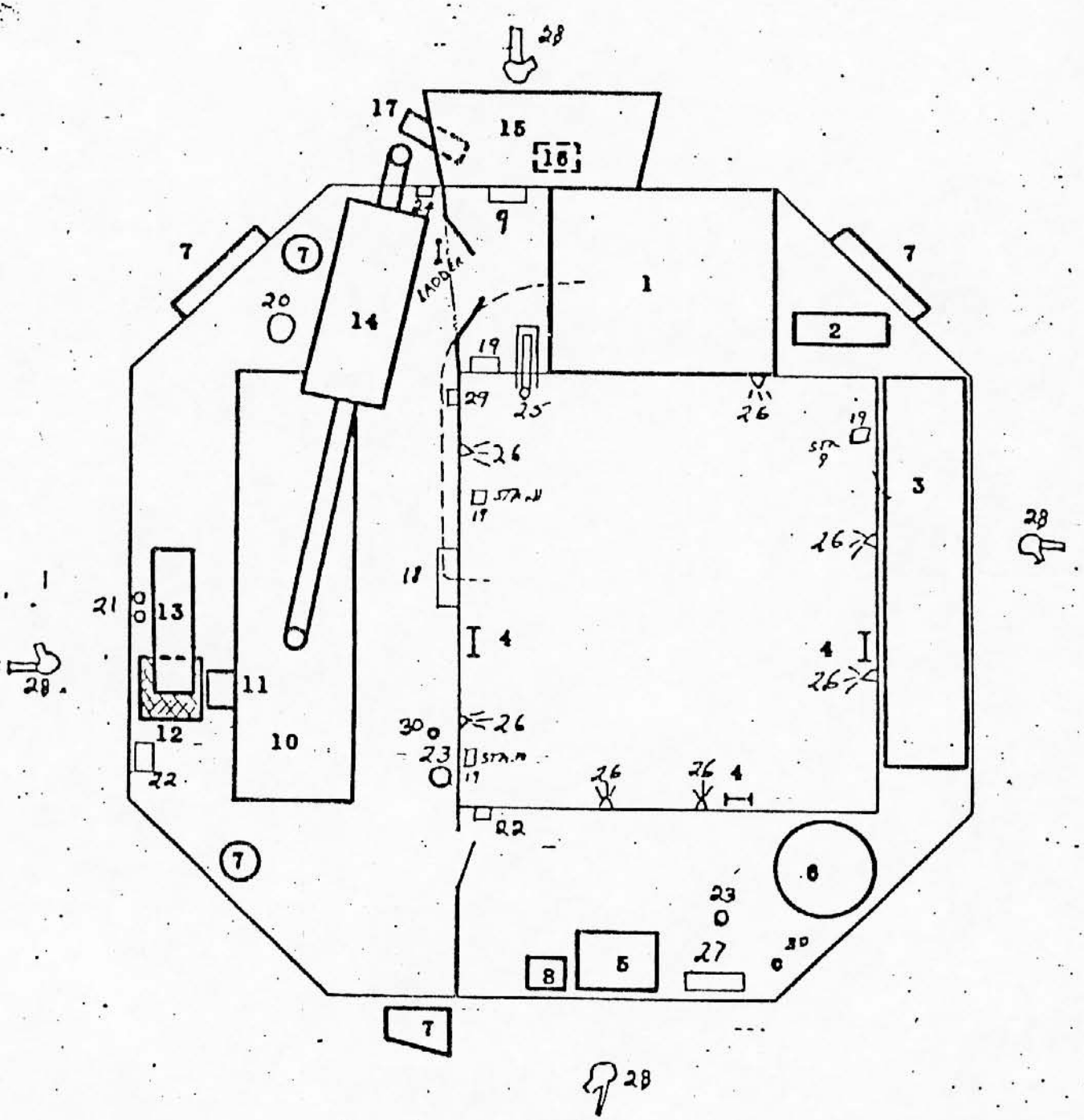
NOTE: Water Fog System pressure supplied by the fog system pump on level 4. Pump rated at 500 GPM. Fog System turned on manually at the FRCP in the LCC.

25. Telephone Terminal Cabinet

26. Ladder to Work Platform #2

27. Fire Detector Head

28. P.A. Speaker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Level 6

SILO LEVEL 6

1. Facility Elevator

2. Facility Elevator Counterweights

3. Launcher Platform Counterweights

4. Launcher Platform Guide Rails

5. 48 VDC Station Battery: Provides 48 vdc power to the 480v diesel switchgear to trip the air circuit breakers and to operate the diesel engine controls. Battery is a 24 cell, wet, NICAD type, rated as 80 Amp/hr.

6. Circular Stairs

7. Air Conditioning Duct

8. 48 VDC Battery Charger: Transformer rectifier to charge the 48 vdc station battery. Receives electrical power 440 vac from the essential motor control center.

9. Manual Fire Alarm

10. Diesel Generator (#61): Same as Item 10, level 5.

11. Dirty Lube Oil Pump (#62): The pump will transfer the dirty lube oil from the lube oil sump of the two diesel engines to the dirty lube oil storage tank. The pump will also transfer dirty lube oil from the storage tank to a discharge at the top of the silo. Pump design is a rotary gear type with a capacity of 20 gpm.

12. Motor Operation Damper Below Grating: Grating opening is 36 by 36 in. square with air outlet capacity of 17,500 cfm. Damper is controlled by pneumatic motor operation through the air conditioning system.

13. Air Start Tank (Overhead): Provides air pressure for starting of the two diesel engines. Air pressure of 300 psi is supplied by the instrument air prefab. The air start tank is 2 ft in diameter by 7½ ft length.

14. Heat Recovery Silencer: Same as item 13, level 5.

15. Collimator Housing and Platform: The collimator enclosure is an insulated room which houses the collimator, collumator support platform, and bench mark supports (Fig 19). This room is fastened to the silo between the sixth and seventh levels and houses the operational and maintenance personnel for the collimator system. The enclosure is provided with a positive-action, self-closing door and is caulked and insulated to maintain a constant internal temperature level. A handrail is provided around the collimator platform for personnel and equipment safety.

Since the enclosure is located approximately 8 ft above the level 7 of the crib structure, a ladder is provided to give personnel safe and unrestricted access to the enclosure.

The collimator support platform is a 3 ft 6 in. diameter plate which supports the collimator rigidly. The supporting structure of the platform fastens to a steel plate mounted on the wall of the silo. Two bench mark supports are housed in the collimator enclosure. The supporting structures fasten to facility-furnished steel plates mounted on the wall of the silo.

16. Collimator: The collimator sight tube provides an optically unobstructed path for a beam of light to transmit data from the collimator to the missile. The tube is constructed of 10.75 in. diameter aluminum tubing coated on the inside to reduce light diffraction. Neoprene boots and sleeve joints are installed at each end of the tube. These boots and joints preserve alignment adjoining structures. The tube is constructed in two section; one section is fixed, the other is movable. The fixed section is fastened to the crib structure with two adjustable fittings. These fittings allow minor adjustments in alignment. One end of the fixed section is provided with an adjustable, flexible connection with the collimator enclosure. The other end of this section mates with the hinged end of the movable section of the tube.

The movable section is fastened to the structure by a hinge. A seal fitting on the lower end of the movable section mates with a similar fitting on the fixed section when the tube is in operating position. The upper end of the movable section is coupled to the missile through a sleeve coupling, neoprene boot, and another sleeve coupling. This upper sleeve has a $\frac{1}{2}$ in. thick neoprene gasket that mates and provides a soft contact with the skin of the B2 pod. The upper sleeve is also provided with a bar that acts as a window-hook fastener to keep the tube locked to the B2 pod.

The collimator sight tube retraction mechanism consists of a 190 lb counterweight. Upward movement of the missile causes the windowhook fastener to release and the movable section of the tube to swing upward through an arc of approximately 64 degrees to stowed possition. In stowed position there is a 2 in. minimum clearance between the sight tube and the launcher platform. A detent equipped with a neoprene bumper provides shock absorption and prevents tube rebound from the stowed position. This arrangement allows one man manual extension of the collimator tube to operating position.

Signal devices consisting of 28 vdc microswitches signal the position of the movable section of the collimator tube to the missile launcher lift control.

In order to align the collimator in reference to the polaris star, a sight tube is necessary. From level 904 ft 3 in. a 10 in. outside diameter pipe is inserted in the silo wall at a 4c degree angle. This piping extends in a straight line to the surface, approximately 100 ft, where the top end is protected by a manhole type cover. At the top and bottom of this pipe, glass plates are installed and sealed, and a vacuum is induced in order to prevent refraction effects on the collimator.

17. Collimator Air Conditioning: One 6 in. air conditioning duct which is insulated, tees off at the bottom of collimator housing and enters into the bottom of the housing at two ports. The temperature in the collimator must be maintained at 70°F ± 3°, 65% relative humidity maximum.

18. AIG Hoist and Rail

19. Telephone Terminal Cabinet

20. Hot Water Heater

21. Diesel Fuel Detector

22. Emergency Lights (6 Volt)

23. P.A. Speaker

24. Exhaust Temperature Indicator (Stack)

25. Collimator Sight Tube to Missile

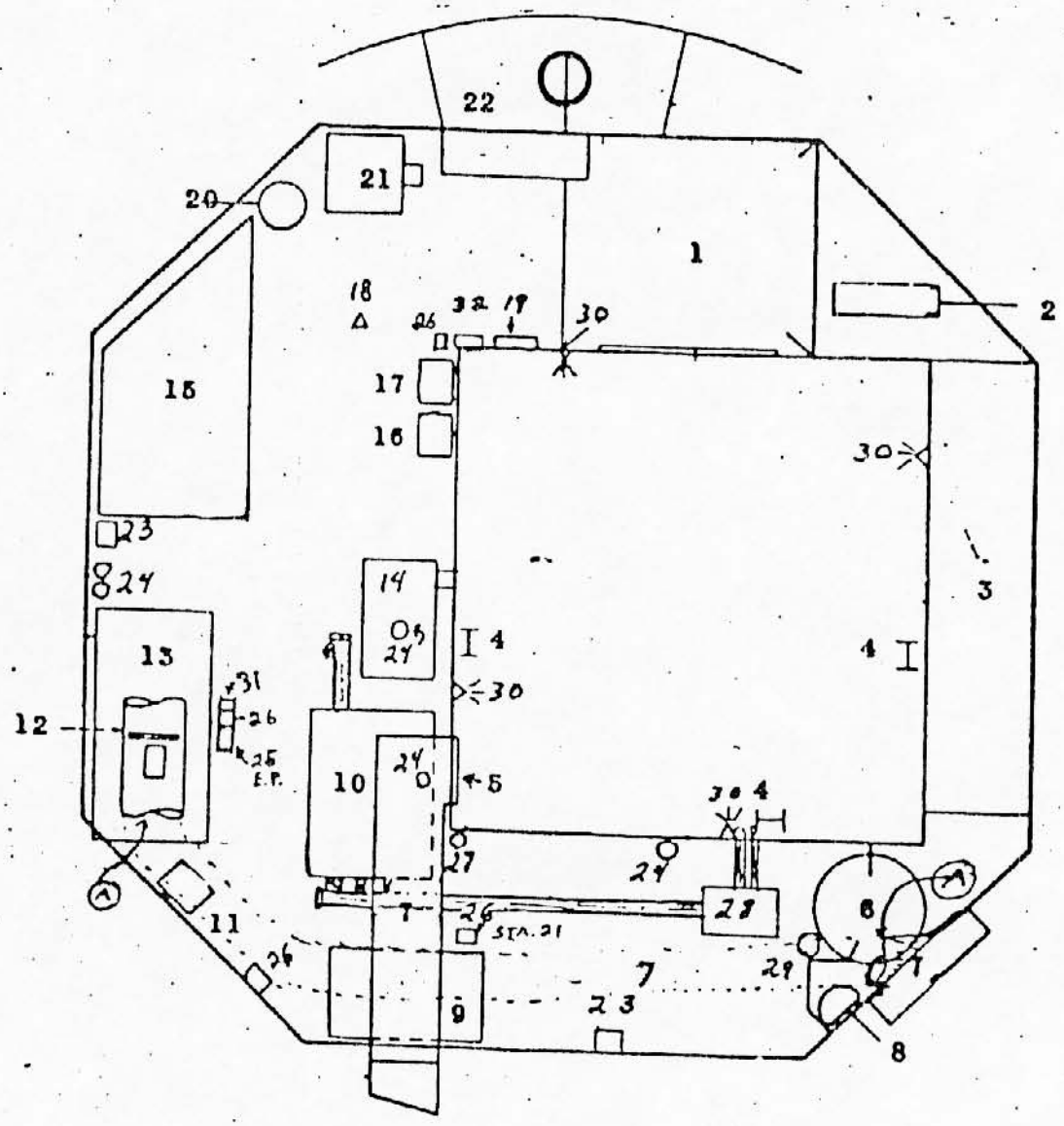
26. Fog Nozzles (8 Each)

27. Panel DC: 48VDC distribution panel contains 4 ea circuit breakers; diesel #60, diesel #61, 480 V switchgear and spare.

28. Horizontal Dampers (4 ea)(Ref P-65 & 66)

29. Comm Box

30. Fire Detector Head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Level 7

SILO LEVEL 7

1. Facility Elevator

2. Facility Elevator Counterweights

3. Launcher Platform Counterweights

4. Launcher Platform Guide Rails

5. Missile Enclosure Area Air Conditioning Return Duct: Acts as an air return to the missile enclosure area from the fan coil unit FC-40 on silo level 2 for recirculation to the missile enclosure area.

6. Circular Stairs: End of the circular stairs at this level.

7. Air Conditioning Duct

8. Ladder: Vertical ladder extending downward to level 8.

9. Liquid Nitrogen Prefab: Unit contains the necessary sequence valves which are manually controlled to fill the liquid nitrogen storage tank and heat exchanger. During countdown, liquid nitrogen is directed through auto valves into the prefab to flow in the coax pipe (PN2/He) in order to maintain a cold temperature of the helium flow and to fill the LN2/He shrounds on the missile.

10. Liquid Oxygen Control Prefab: Unit contains the necessary valves and components to filter and control the flow of liquid oxygen from the storage tank to the missile. It contains the valves to provide rapid and fine loading of the missile during countdown. It also has the control of flow for draining the missile.

11. Gaseous Oxygen Detector Cabinet: Detector Contains the necessary electronic equipment and oxygen-analyzer to detect the oxygen atmosphere in the crib and launch platform areas. When the oxygen content goes below 19% or above 25% by volume, the detector unit will initiate audible and visible alarms in the silo area and to the facilities remote control panel in the launch control center.

12. Lower Silo Supply Fan (Overhead)SF22: Electric driven fan directs 17,500 cfm of air from diesel generator area on the 6th level to lower part of silo. Open grating between level 5 and 6 allow air to be drawn from level 5. Operates in conjunction with SF20 and SF21. Shuts off automatically when diesel vapor reaches 10% LEL.

13. Instrument Air Prefab: The unit contains two air compressors with capacity of 15 SCFM flow, 1500 psig output. The unit has a 65 SCFM spherical air receiver and contains the necessary valves, filters and air dryers. Purpose of the unit is to compress, store and deliver clean

dry air at various pressures to pneumatically operated valves, controllers, etc, throughout the silo and LCC. An alarm indication on the FRCP in the LCC will occur when receiver tank pressure drops to 1,100 psig. Applications: silo instrument air, LCC suspension, diesel start and blast closures.

14. Liquid Oxygen Fill Prefab: A unit that contains necessary valves to control, during resupply, the flow of liquid oxygen to the storage tank and topping tank in the crib assembly.

15. Pressurization Prefab: A unit which controls and distributes gaseous nitrogen to the following subsystems:

    a. Resupply of nitrogen and charging of the three gaseous nitrogen storage tanks. (4000 PSI)

    b. Liquid oxygen storage tank and topping tank for transfer flow to the missile.

    c. Nitrogen control unit on the launch platform.

    d. Pneumatic distribution unit. (PDU)

    e. GN2 storage bottle in the fuel prefab for fuel transfer to the missile. (4000 PSI)

16. RP-1 Detector Cabinet: Storing missile fuel (RP-1) in the missile tank makes the area inside the missile enclosure hazardous when contaminated by fuel fumes. An explosive vapor detection system initiates audible and visible alarms in the missile enclosure area and at the FRCP panel in the LCC when predetermined lower limit explosive levels are reached. High rate air purging at the 20% fume concentration level is automatic and continues until 40% LEL is reached. When 40% LEL is reached the purge cycle stops and the water fog system is manually activated. At 20% LEL the silo telephone system is deenergized to reduce explosion hazards. The 20% and 40% LEL alarm indications are located on the trouble section of the FRCP and on the RP-1 detector unit. Fog system "ON" "OFF" push buttons and indicator lights are located on the control section of the FRCP.

17. Diesel Fuel Dectector Cabinet: Contains electronic equipment and hydrocarbon-analyzer for detecting concentration of diesel fuel vapors. When a 10% concentration of diesel fuel vapor is indicated at the detector unit, circuitry will stop lower silo supply fan SF-22, close volume damper VD-21 (ceiling of silo level 7), and open volume damper VD-31 on main silo exhaust fan EF-30 (silo level 2). At 20% concentration of diesel vapors the above purge cycle continues and an audible and visual alarm will be initiated at the FRCP in the LCC.

18. Speaker

19. Fire Hose

20. Air Conditioning Exhaust Duct: A 28 in, duct, routing exhaust air from the launch platform area at level 8 to the exhaust plenum chamber at level 2.

21. Emergency Shower and Eye Wash

22. Collimator Housing: Described in item 15, level 6.

23. Emergency Light (6 Volts)

24. GOX Detector Heads

25. Communications Panel for Fueling/Defueling: Sta 36 (E.P.)

26. Comm Box

27. P.A. Speaker

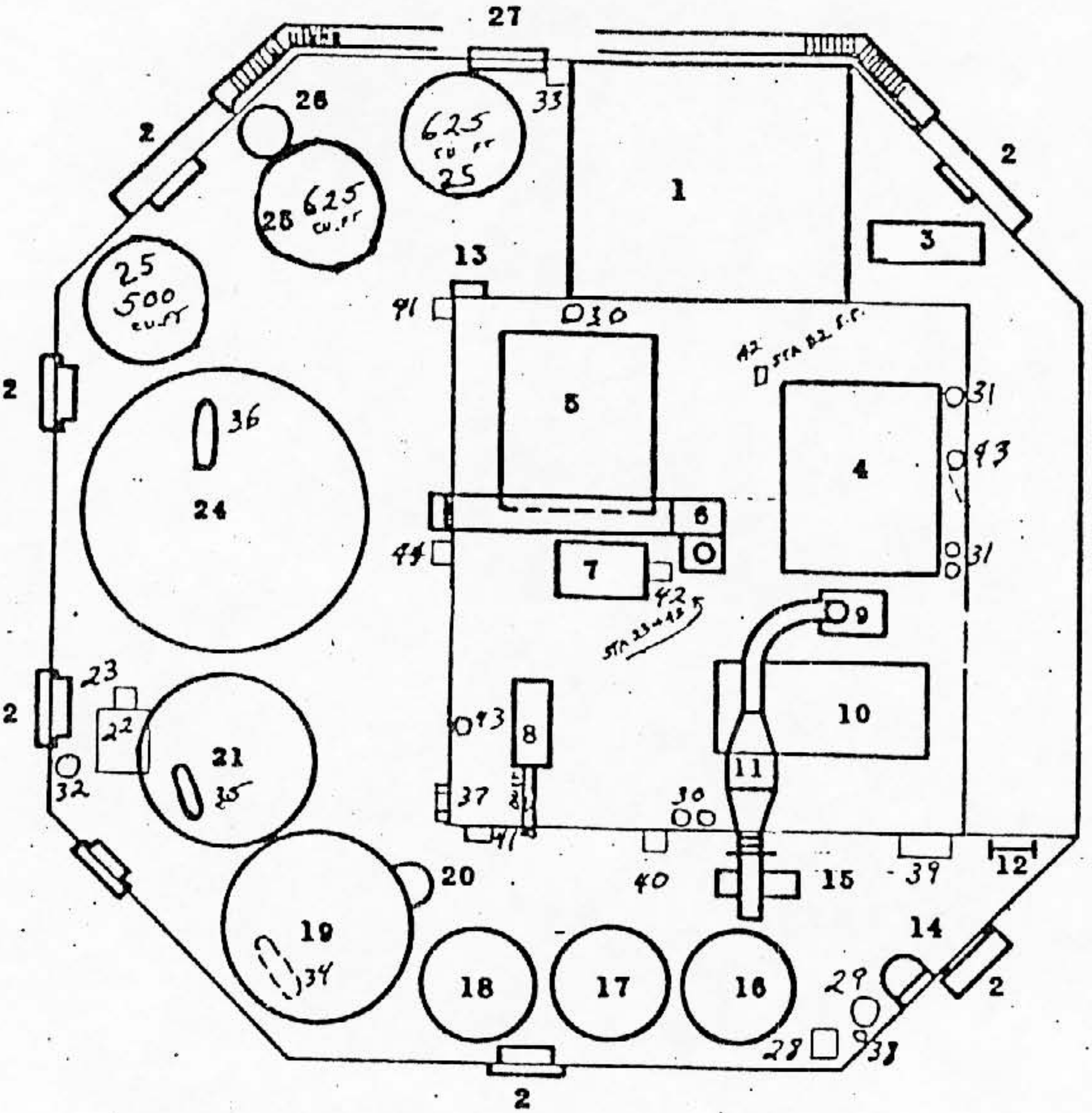
28. LOX Topping Control Unit: Controls the rate of LOX topping during countdown. Also performs LOX line drain.

29. Fire Extinguisher

30. Fog Nozzles (4 Each)

31. Alert Button

32. Telephone Terminal Cabinet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Level 8

SILO LEVEL 8

1. Facility Elevator

2. Air Conditioning Ducting: Ducting for intake and exhaust air distribution is routed at the bottom of the crib, and also inter-connected to the enclosed launch platform area.

3. Facility Elevator Counterweight

4. Fuel Loading Prefab: Loading, topping and unloading the missile fuel tank is controlled by the prefab. It is an enclosed unit, having a fuel storage tank with capacity of 630 gal, gaseous nitrogen supply pressure tank, filter and necessary valves. Included is a 10 hp fuel pump used for draining the missile fuel tank.

5. Pressure System Manifold Regulator (Pressurization Distribution Unit): Remotely and semiautomatically controls and flow of helium and gaseous nitrogen and inst. air from storage vessels to other AGE equipment within the silo. The unit provides stable regulated pressure under both static and dynamic pressure conditions. It consists of the following system; helium flow control and regulating, helium emergency, helium charge, gaseous nitrogen pressurization and emergency instrument air. During standby provides GN2 to PCU for missile tank pressure. During C/D it provides He for missile tank pressure.

6. Air Conditioning Duct To Launch Platform: A rectangular ducting, which has a quick disconnect at the launch platform, is then routed downward to go underneath level 8 flooring and into the main air exhaust duct. The complete ducting, until connected to main air exhaust ducting, is insulated against heat loss. This ducting carries the heated exhaust air from the pod air conditioning unit.

7. Cold Disconnect Panel: Contains the lower half of riseoff connections which supply the following services to the launch platform; missile LO2 and fuel tank pressurization, helium pressurization line to one unshrouded sphere, helium to HCU and GN2 to NCU when L/P is down and locked.

8. Liquid Nitrogen Overflow Evaporator: The evaporator is a tank which collects the overflow of liquid nitrogen or gaseous nitrogen from the LN2/helium shrouds during countdown. Thereon, the liquid nitrogen boils off into a gaseous state and vents into silo level 8, quad III. Vapors are picked up and exhausted by exhaust fan EF41 in sump. The evaporator tank is fabricated of aluminum alloy.

9. Hot Disconnect Panel: Contains the lower half of riseoff connections which supplies RP-1 fuel and the thrust section heat to the launch platform.

10. Pressurization Control Unit (PCU): The PCU automatically and manually controls the pressures in the propellant tanks of the missile during all phases of operation. During standby, the PCU will maintain pressurization of missile tanks with gaseous nitrogen. This unit also has an emergency system for backup in maintaining missile pressurization.

NOTE: When PCU is in emergency, missile tank pressures can be maintained only from the LCC by means of the raise/lower buttons on the launch officers console.

11. Thrust Section Heater: This unit provides hot air, 145°F to 200°F into the thrust section of the missile during loading procedures of liquid oxygen and liquid nitrogen. The heater receives hot water from the two diesel heat recovery silencers and also an electric heat coil is used to heat the air to be blown through the ducting into the thrust section. The complete unit is insulated in order to maintain temperature control in the launch platform area.

12. Ladder (down from level 8): Vertical ladder from level 8 to the bottom of the silo.

13. Telephone Cabinet

14. Ladder (up to level 7): Vertical ladder with cage from level 8 to level 7.

15. Thrust Section Pressure Fan: Electric Operated fan (blower) to force ambient air through the heating coil section, where the air is heated and forced into the thrust section of missile. Capacity of the fan is 1000 cfm.

16. Inflight Helium I

17. Inflight Helium II: Two high pressure helium storage tanks are manifolded, so that either tank can be selected to provide pressurization. These tanks furnish helium for the spheres on the missile, to the missile propellant tanks during countdown, and for emergency pressurization of missile tanks during standby or countdown. Capacity per tank is 250 cu ft water volume, storing 163,000 scf of helium at 6000 psi.

18. Ground Pressurization Nitrogen (6000 PSI): Consists of one high pressure gaseous nitrogen storage tank. Provides nitrogen to the pressurization control unit for maintaining pressurization of the missile propellant tanks during standby status. It also provides nitrogen to the pneumatic distribution unit for pressurizing the hydraulic accumulator rack for opening the silo doors. Quad III

19. LN2/He Heat Exchanger (above): Helium gas is chilled in this exchanger by having helium flow through tubing emmersed in liquid nitrogen. Helium is distributed into 12 loops. Each loop is 70 ft long and the diameter of the loop is ½ in. tubing. The ends of the loops are manifolded into one outlet and the external piping is coaxial type with helium flowing in the center piping which is surrounded by liquid nitrogen in the outer piping. The coaxial piping is routed to the missile shrouds and spheres. The liquid nitrogen unit is a crygonic constructed vessel, with a capacity of 600 gal. It is mounted above the liquid nitrogen storage tank.

19. LN2 Storage Tank (below): This tank provides liquid nitrogen to the coaxial piping and thereon into the missile shrouds. The storage tank is vertically installed and it has a capacity of 4000 gal.

20. Ladder and Cage: Vertical ladder mounted to the LN2 storage tank extending to the top of the LN2/He heat exchanger. A work platform is provided at the top of the LN2 storage tank.

21. LO2 Topping Tank: During countdown, this tank will top off the missile oxidizer tank due to LO2 boiloff losses and for losses during hold periods. It is installed in a vertical position. It is a crygonic type vessel, with water volume capacity of 3600 gal. The normal LO2 capacity is 3420 gal which allows for ullage.

22. Emergency Shower

23. Eye Wash

24. LO2 Storage Tank: It is the main liquid oxygen storage tank for servicing the missile oxidizer tank and is installed in a vertical position. It is a crygonic type vessel, with a water volume of 23,000 gal. The normal LO2 capacity is 21,850 gal which allows for ullage.

25. Gaseous Nitrogen Storage Tanks: Stores adaquate supply of gaseous nitrogen to pressure transfer LO2 and LN2 to the Missile. Consists of three vertical mounted vissels. The two 625 scf tanks are used for the liquid oxygen transfer system. The remaining 500 scf tank is used to provide liquid nitrogen transfer pressure to LN2 storage tank and GN2 pressure to the nitrogen control unit on the launch platform. This tank also provides backup pressure for the instrument air prefab system. The tanks have 1750 cubic feet of water volume total with pressurization at 4,000 PSI.

26. Air Conditioning Exhaust Duct: A 28 inch air exhaust duct into which two fan motors remove air from the launch platform area, route it through the exhaust duct to level 2, and force it into the exhaust shaft.

27. Fire Hose

28. Oxygen Masks

29. Portable Fire Extinguisher

30. GOX Detector

31. RP-1 Detector

32. Warning Horn

33. Fire Alarm Box

34. LN2 Storage Tank & Heat Exchanger Vacuum Pump: Located on floor.

35. LOX Topping Tank Vacuum Pump: Located on top of tank.

36. LOX Storage Tank Vacuum Pump: Located on top of tank.

37. Switches for Items 34, 35 and 36

38. Test Switch for SF-41 Supply Fan Purge Cycle

39. Supply Fan Purge Cycle SF-41: Purge supply fan will draw air from the silo area into the launcher platform enclosed area when the gas detector denotes there are hazardous air conditions in the shaftway. Also operates during a four minute purge cycle at start of C/D. Air flow is 10,000 CFM.

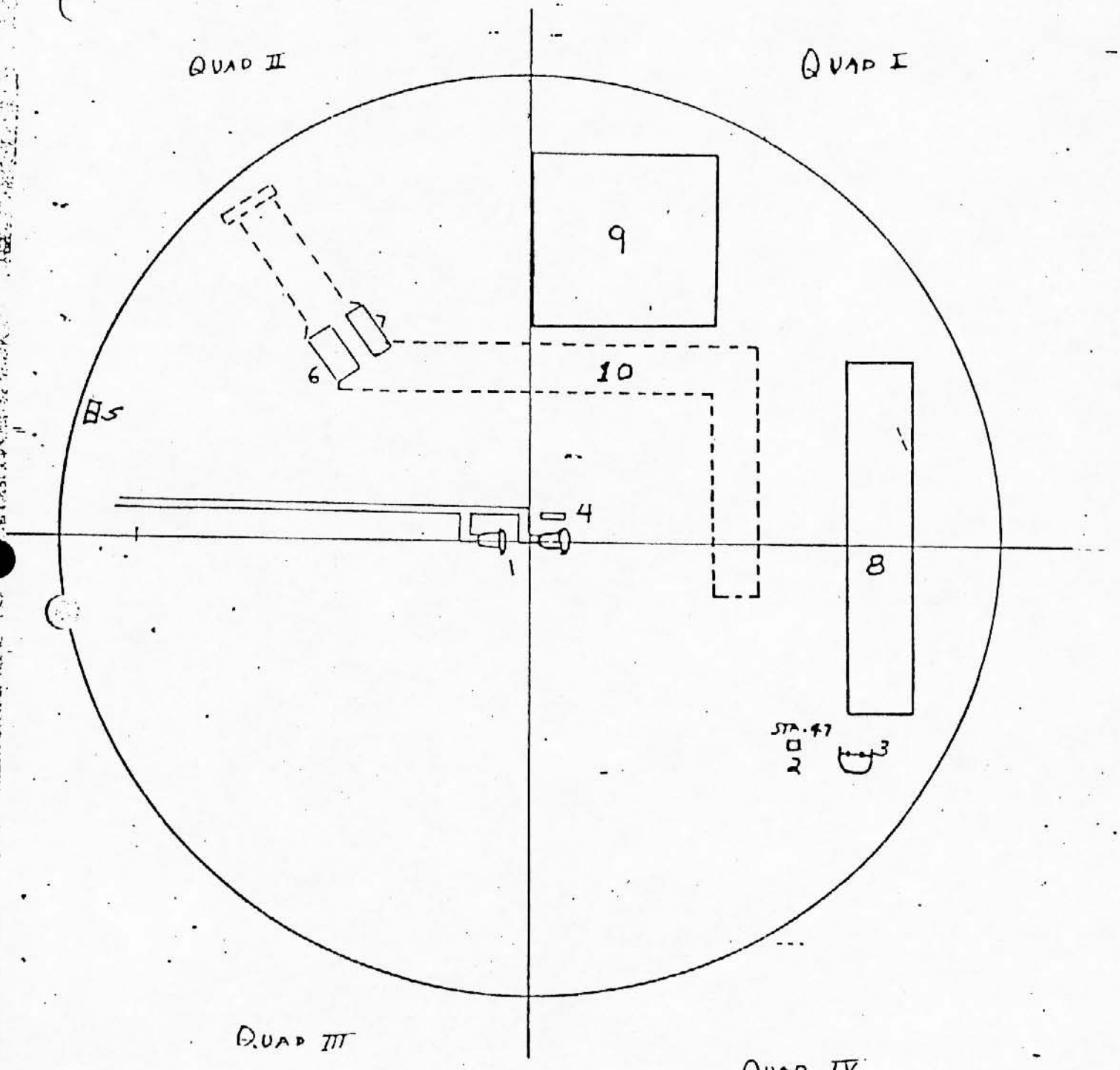
40. Test Switch for Thrust Section Heater Supply Fan

41. Emergency Light (6 Volts)

42. Comm Box

43. Automatic Fire Dectector

44. GOX Alarm Bell and Light



SUMP LEVEL

SILO SUMP

1. Sump Pumps: Two explosion proof submersion pumps, P-82 and P-83 are mounted in the Silo Sump. Each pump is rated at 7.5 hp and has a capacity of 100 GPM. Electrical power for the pumps is 480 VAC 3 phase current. The pumps are automatic in operation and are rotated in usage by means of a magnetic alternator to provide equal running time for each pump. Normally one pump will operate alone.

   When the liquid level of the sump rises to 3' from the grating the first pump will start. When the liquid level rises to 1' 8" from the grating the second pump will cut in. If a malfunction occurs and the liquid level rises to within 1' 2" of the grating a high level alarm signal will be sent to the trouble section of the FRCP "Silo Sump Hi Level". All liquids discharged by the sump pumps are routed up the silo wall through the discharge line. The discharge line exits the silo through the concrete wall at crib level 2 and is routed to a catch basin outside the silo at grade level.

2. Comm Box: Explosion proof.

3. Ladder

4. Sump Pump Controls

5. EF-40 and EF-41 Test Switches

6. EF-41 Launcher Platform Purge Exhaust Fan: Exhaust fan EF-41 is electrically innerlocked with EF-40. EF-41 is normally deenergized. It will be energized to operate during the following conditions:

   A. RP-1 vapor concentration 20% LEL.

   B. At start of countdown (signal start of LN2 fill). EF-41 is powered by a 7.5 hp electric motor operating on 480 VAC 60 cycle 3 phase current. EF-41 has capacity of 13,000 CFM which is exhausted up through the main exhaust fan (EF-30) on level 2 and out of the silo. Operation of EF-41 opens Volume Damper VD-42 which signals the FRCP of the purge condition ("RP-1 fire fog system damper open" - Red Light).

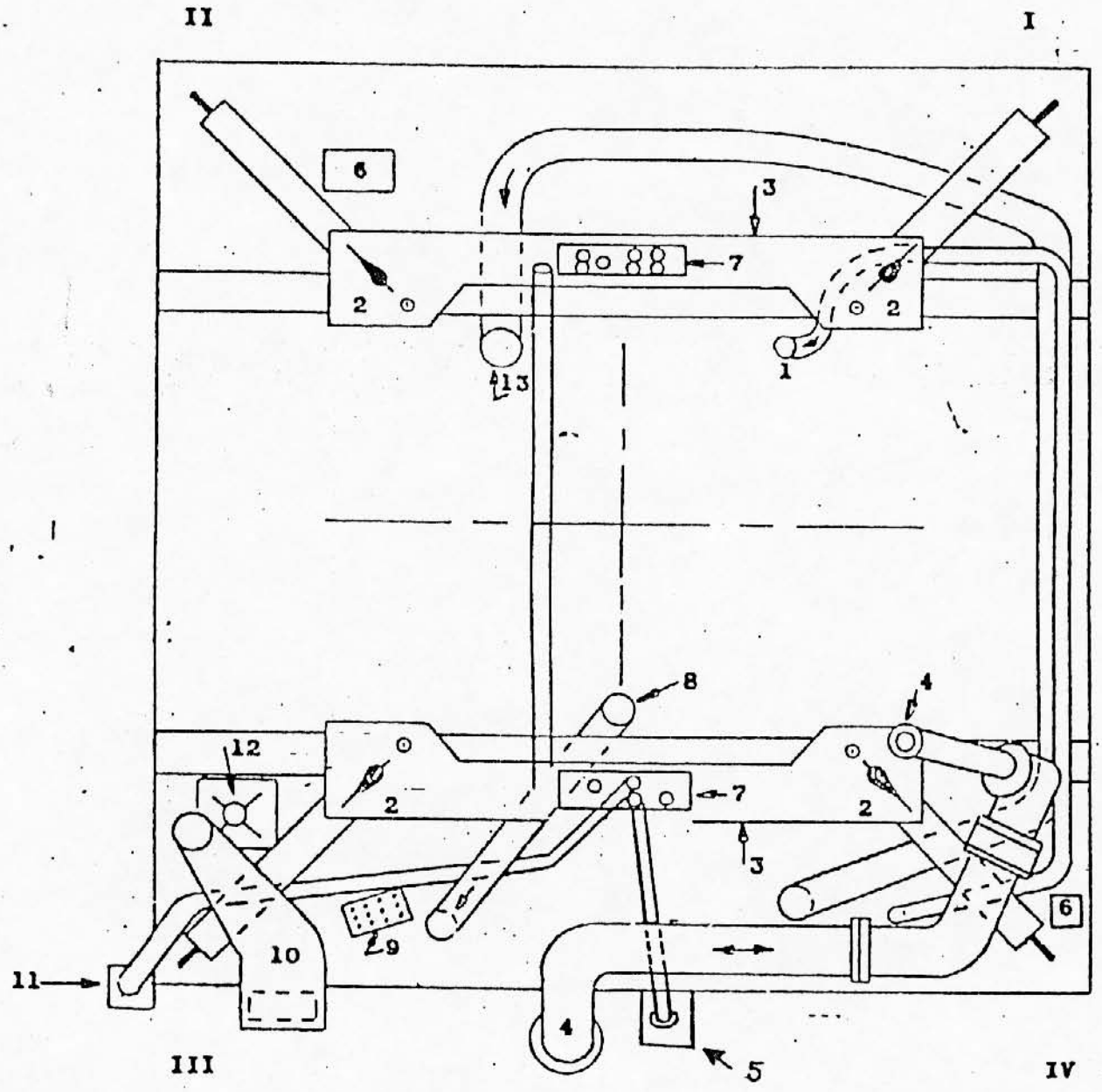
7. EF-40 Launcher Platform Exhaust Fan: Exhaust fan EF-40 is electrically innerlocked with EF-41. Only one fan will operate at a time. EF-40 will operate normally exhausting air from the launcher platform area at a rate of 3,000 CFM. The fan motor is rated at 2 hp and operates on 480 VAC 60 cycle 3 phase current. Air is exhausted identically as EF-41.

   NOTE: A fire thermostat (FST-41) is located at the inlet side of the two exhaust fans and senses inlet temperature. When in let temp. exceeds 125°F. Each fan will be deenergized.

8. Launch Platform Counter

9. Facility Elevator Area

10. Air Conditioning Duct



1st Level - Elevation 1015 ft 4 in.

Launcher Platform Equipment Location (Level 1)

LEVEL 1

1. Fuel Fill and Drain: The fuel fill-and-drain line is a 4 in. piping routed from the hot disconnect panel (level 4) to a ground fuel-and-drain valve located on the launcher pedestal in quad I.

2. Missile Alignment Pin and Latch Assembly: Four alignment pins are installed on a box housing support mounted to the launcher pedestal. The pins have length of approximately 2 3/8 in. protruding into the female connector of the missile. Two of the round pins have squared off sides mounted in quads I and II. The standard round pins are mounted in quads III and IV. The four latches have a hook design which slides into the slots of the four main lognerons of the missile booster section. They are used to clamp down the missile to the launcher when the missile is not fueled. During normal standby with the missile fueled, these latches are removed.

3. Launcher Pedestal Frame: The frame assembly consisting of two welded structures, is mounted with one structure in quads I and II and the other in quads III and IV. The structures consist of welded, 8 in. steel piping in a rigid, vertical and tripon framework. Another steel box framework is mounted on top of this assembly. This framework contains the riseoff disconnect panels, alignment pins, and latches. The pedestal support in quad IV contains the one inch rise-off switch (MOS Switch).

4. LO2 Fill-and-Drain Assembly: The ground LO2 fill-and-drain valve is mounted in quad III. It mates with the other half of the disconnect valve on the crib when the launcher platform is in the lowered position. The LO2 inlet piping is 10 in. in diameter until it connects to the probe that enters the missile. This probe has a diameter of 8 in. The probe unit is mounted in a swivel unit at the lower section, which is pneumatically actuated to move outboard 28 degrees upon riseoff of the Missile.

5. LO2 Topping Line Assembly: The LO2 topping line assembly provides liquid oxygen to the propulsion assembly prior to engine start. The piping is 3.5 in diameter.

6. Comm Box

7. Riseoff Disconnect Panels: Two panels provide automatic cutoff of servicing of fluids at missile riseoff. The two panels on the pedestals are the lower half disconnects, which contain the female couplings.

The panel located in quads I and II contain the following outlet ports reading left to right.

1. Helium pressurization to ambient spheres in missile (1)
2. LN2 to shrouds (1)
3. Fuel tank pressurization line (1)
4. Hydraulic pressure lines to booster and sustainer/vernier engines (2)
5. Hydraulic return lines from the engines (2)

The other panel, located at quads III and IV, has the following outlet ports.

1. LO2 tank-pressurization (1)
2. LO2 topping (1)
3. LN2 to shrouds (1)
4. Helium-pressurization to the shrouded spheres

8. LN2 Drain Assembly: During countdown, liquid nitrogen is directed into the missile shrouds for cooling the helium gas. The LN2 overflow and its boiloff gases are routed through the drain piping assembly and from there into the LN2 evaporator unit. This line assembly on the launch pedestal is divided into two sections and then coverges into one main drain line. The drain line at quad II is 4 in. diameter steel turing routed across to quad III. It tees into the main drain line, which is 8 in. diameter aluminum alloy material.

9. Missile Umbilical Cables: The six missile umbilical cables are routed from the umbilical J box on level 2, to vertical racks, to level 1, and from there to the missile. B2 pod.

10. Pod Air Conditioning Duct (Quad III): Cooled air is routed from the pod air conditioning unit on level 4 through a rectangular duct (inside dimension of 2 in. X 15 in.) to level 1, and from there it is routed in a tubular duct of 8 in. diameter. This tubular duct is clamped to a vertical support, and in the proximity of B-2 pod, it is divided into three separate flexible tubes that are then connected to the B-2 pod.

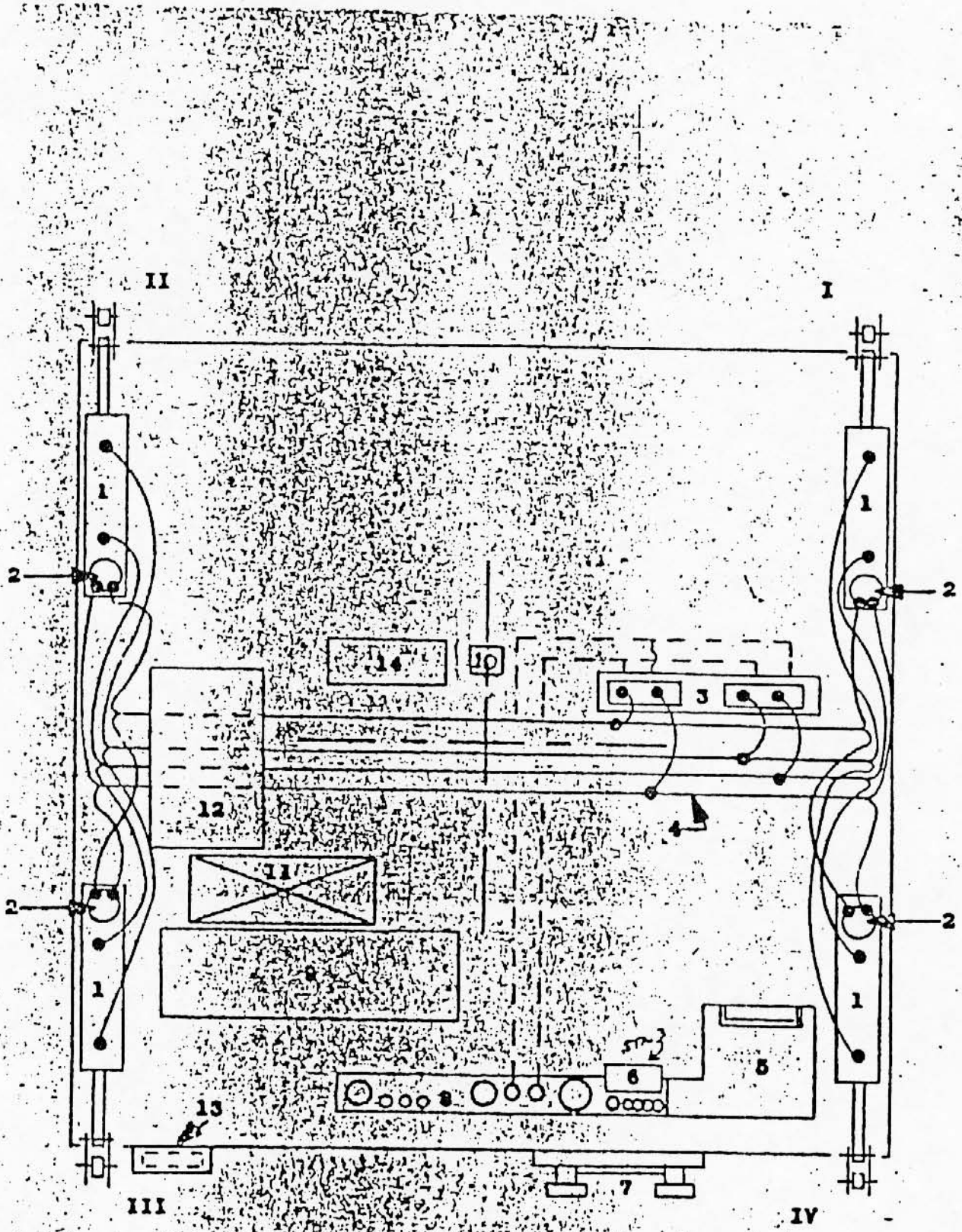
11. LN2/He Coaxial Disconnect Panel: The upper half of the quick-disconnect unit is mounted at the corner of quad III. This unit contains the female half of the quick disconnect. The mating unit, the male half, is mounted on the crib structure. The unit has spearate quick-disconnect valve for helium and for liquid nitrogen. The liquid nitrogen tees into the helium line and at this tee connection a coaxial tubing is

connected for helium to flow internal with liquid nitrogen surrounding it. This coaxial tubing is routed to the riseoff disconnect panel in quads III and IV.

12. Pod Air Duct and Umbilical Support Assembly: The pod air duct and umbilical support assembly is a tubular support of approximately 6.5 in. diameter by 12.5 ft length. It provides the support for clamping the pod air conditioning duct and the six missile umbilical cables. All of these cables are connected to the B-2 pod.

13. Thrust Air Heat Ducting: Heated air is routed from the thrust section heater on level 8 of the crib, through the hot disconnect panel of the launcher platform (level 4), upward to level 1 and into quad II of the launcher pedestal and missile. The duct is 8 in. in diameter and is insulated against heat loss.

14. Engine Compartment Access Platforms: Ref pages 64 and 67.



2nd Level - Elevation 997 ft 4 3/4 in.

Launcher Platform Equipment Location (Level 2)

LEVEL 2

1. Locking Assembly: Each corner of this level has a hydraulic actuator locking assembly for locking the launcher platform to the crib structure or silo cap. The rod end of the actuator has an attached guide roller assembly. This assembly consists of two rollers mounted in vertical plates. The upper roller follows an arc of the tapered rail mounted to the crib and pulls the lower roller into locking position as it hits the upper and lower striker plate. The four lock actuators are to be in rigid locked position within 5 sec after the platform is in fullraised or full-lowered position.

2. Interlock of Locking Assembly: Above each actuator locking assembly, there is at 90 degrees an additional mounted hydraulic actuator unit. The rod end is attached to a wedge. When the locking assembly piston rod has moved out to the rigid locked position, this interlock unit positions its wedge in down movement and locks the main piston rod from retracting. The interlock unit positions its wedge lock within 1 sec.

3. Hydraulic Manifold: The hydraulic manifold receives its main source of hydraulic pressure from the crib hydraulic equipment. By electric solenoid valves it distributes hydraulic pressure to the locking and interlock assemblies for locking or unlocking the launcher platform to the crib.

4. Hydraulic Tubing Installation: Stainless steel tubing is routed from the hydraulic manifold to the proximity of the locking actuators. From there, flexible hoses are attached from the tubing to the locking assemblies.

5. Access Area: An access area with a vertical ladder is provided to level 3.

6. Comm Box

7. Guide Rollers: On this level there is one large guide roller assembly. As the launcher platform rises to the full-up position, the rollers will rise over a small length rail tapered to an oversize I beam mounted to the silo cap. The tapered I beam is wedged between the rollers and aligns the launch platform to the silo.

8. Tubing and Piping Supports: Propellant gases, hydraulics, and heated air routed from level 4 to level 1 and into the missile. Reading from left to right the indentification of lines is:

   1. LN2 drain from missile shrouds (1)

   2. Helium pressurization of spheres in missile (3)

   3. LO2 topping to missile (1)

4. Hydraulic pressure to locking assembly of launcher platform (2)

5. Thrust section heated air (1)

6. RP-1 fuel to missile or drain (1)

7. Hydraulic pressure/return to booster and sustainer/vernier engines (4)

9. Umbilical J Box (A junction points for missile umbilical cables & launch control cables): This umbilical J box provides circuitry to the missile during standby and countdown from the AGE on the crib and the launch control center. During LSR checkout, it disconnects the missile and reroutes the circuitry to tie in the LSR and the logic units. When performing APCHE checkout of the missile, this unit provides ac and dc power to the missile power control unit (APCHE) (item 14, Fig 15). Cable connections at this J box are plug-in types for rapid replacement. The unit also houses an Arma (guidance) amplifier. The box enclosure is provided with cooling air from the pod air conditioning unit. The dimensions of this unit are 66 in. wide, 24 in. deep, and 80 in. high.

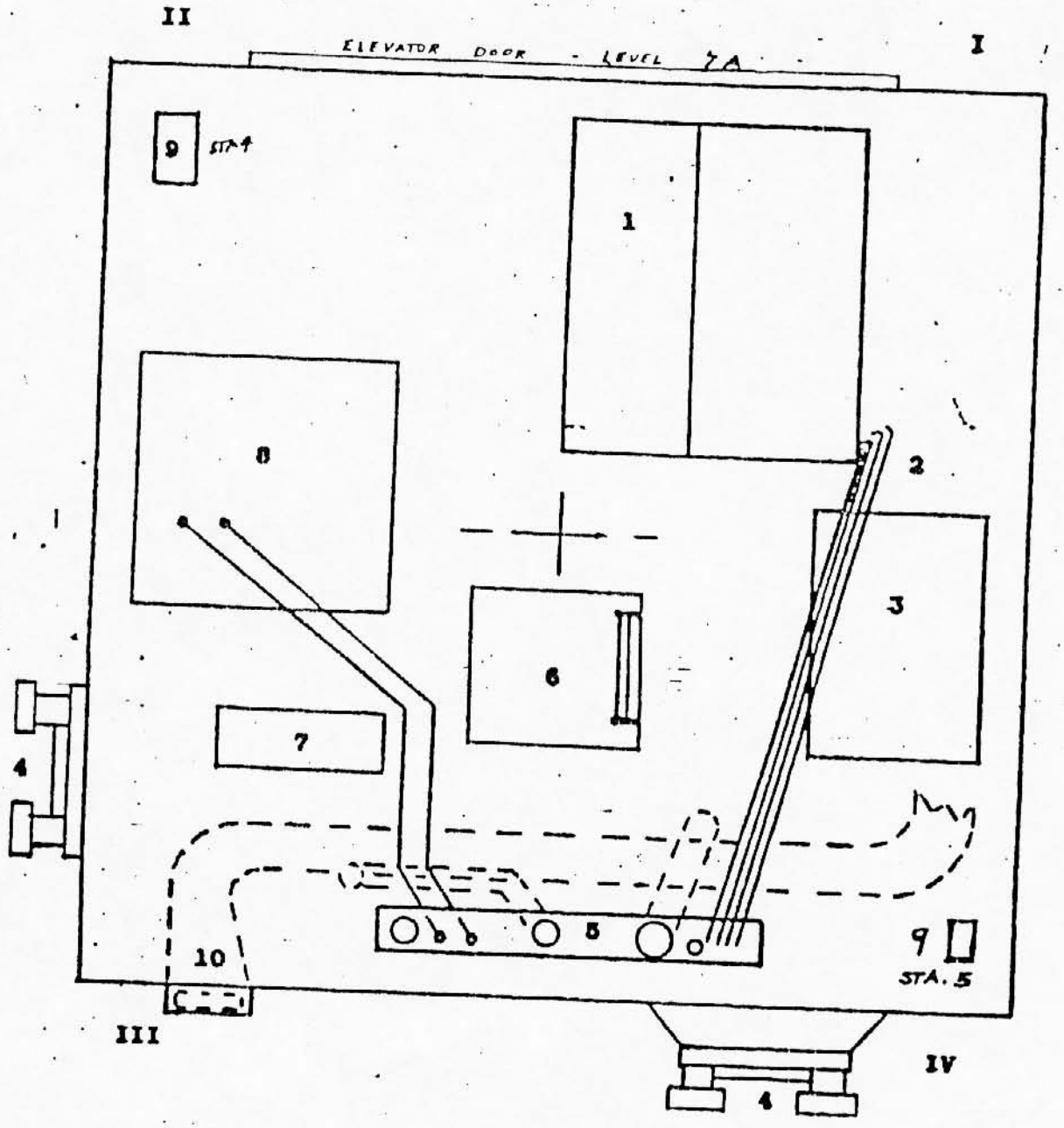
10. MA-3 Valve Control Box: The MA-3 valve control box receives 28 vdc power from the crib power distribution unit and command signals from the auto-pilot and signal control unit. Through relays, circuitry is directed when necessary to the booster, sustainer, and vernier engines for cut-off control.

11. Cable Duct: The cable duct is a ladder design on which electric cables are secured and supported. These cables are routed to various junction boxes and to the ground support equipment.

12. J Box (APCHE): This unit provides an interface for the MAPCHE trailer. It connects the trailer circuitry to the missile umbilical J box (item 9, Fig 15). Also dist power to MAPCHE, control monitors, PTS (DMU) and checkout equipment NOT incl. emer. 24VDC.

13. Pod Air Conditioning Duct: The pod air conditioning duct is insulated ducting that comes from the pod air conditioning unit on the fourth level and is routed to the missile.

14. Missile Power Control Unit (APCHE): This power control unit provides the necessary relays and receptacles for distribution of 400 cps and 28 vdc power to the missile and APCHE during APCHE checkout mode. Its power source is the power distribution boxes on level 3 of the crib assembly. Power is routed through the cable loop system to this unit. The dimensions are 24 in. long, 20 in. high, and 8 in. wide.



3rd Level - Elevation 990 ft 1 1/16 in.

Launcher Platform Equipment Location (Level 3)

1. Hydraulic Pumping Unit: The hydraulic pumping unit contains two independent hydraulic pumping systems in one common cabinet. The first stage system services the booster engine hydraulic system, and the second stage system services the sustainer/vernier engine hydraulic system. Each stage independently supports its system in the fill-and-bleed function and provides hydraulic pressure to its system. The first and second stages use a 20 gal common reservoir. Each hydraulic system contains a hydraulic pump with a capacity output of 3000 psig and 8 gpm flow, driven by a 30 hp, 400v, 3 phase electric motor. Standard components, such as filters, sight tubes, oil cooler, electric and hand-operated valves, restrictors, indicators, and relief valves, are in each system. The dimensions of the unit are: width, 5 ft; height, 5 ft; length, 6 ft; and weight, approximately 2,500 lb.

2. Hydraulic Tubing: Two hydraulic pressure and two return lines (one pair for booster and the other pair for the sustainer/vernier systems) are routed from the hydraulic pumping unit to the riseoff disconnect panels at level 1.

3. Nitrogen Control Unit (NCU): The NCU is an enclosed unit with necessary valves, regulators, and gages to regulate all nitrogen gas distribution to the missile and equipment on the launcher platform. Primarily, the unit is manually operated. Gaseous nitrogen is received from the crib storage and distribution units at an inlet pressure of 1200 to 4000 psig. It is then pressure regulated and distributed to the following:

    1. 1000 psig to engine service unit (checkout)
    2. 1000 psig to hydraulic pumping unit, item No. 1
    3. 0.1 psig to the J box (APCHE)
    4. 0.1 psig to the pod air conditioning unit

    Four additional outlets are provided, with each outlet having attached to it a 45 ft length of flexible hose. The hoses are mounted on reels in the unit. They are used for ground servicing in charging and purging the missile and launcher components. The dimensions of the NCU are: length, 4 ft; height, 5 ft; width, 3 ft; and weight, 1,500 lb.

4. Guide Rollers: Two large guide roller assemblies ride on a 17 in. wide I beam, with the beam positioned between the rollers. The guide rail and rollers minimize the lateral or tilting movement of the launcher platform. The rollers are 3.75 in. wide and 10.5 in. in diameter. The roller shaft is mounted in a roller bearing.

5. Tubing and Piping Supports (Item 8, level 2)

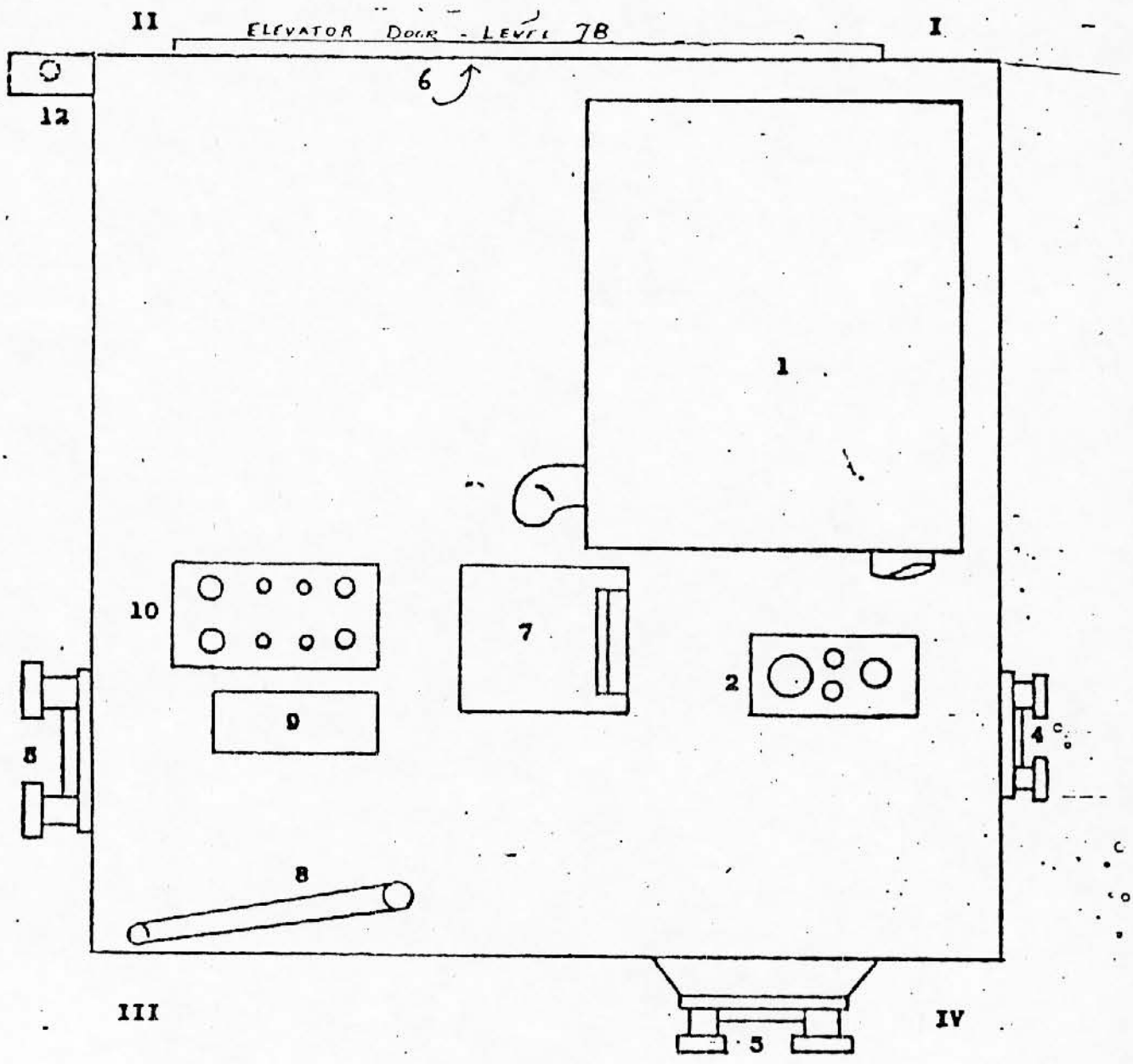
6. Access Area

7. Cable Loop Assembly (Item 9, level 4)

8. Helium Charge Unit: When the launcher platform rises during tactical launch, this helium charge unit provides and continues the required pressurization of the missile. Two storage spheres are contained in this unit: One is a high-pressure sphere (6000 psi), and its controls maintain or relieve the required pressurization of the missile storage spheres during launching procedures. This sphere also provides emergency pressurization of the missile RP-1 tank. The second sphere, the low-pressure sphere (1000 psi), and its controls operate unit controllers in this assembly and sense variables of pressures. The unit is 60 in. square and weighs approximately 500 lb.

9. Comm Box

10. Pod Air Conditioning Duct: This is continuous duction from the missile and is routed underneath the level decking and into the pod air conditioning unit.



4th Level - Elevation 976 ft 1 1/16 in.

Launcher Platform Equipment Location

1. Pod Air Conditioning Unit: The pod air conditioning unit provides the necessary cooled air to the missile pod, which contains the electronic equipment and circuitry requiring constant controlled temperature and humidity during checkout, standby and countdown. The required temperature is 46°F ± 3°, with maximum moisture content of 20 grains per pound of dry air. (Ref T.O. SM65F-2-30-1, page 1-1.) The major components enclosed in the unit are: dehumidifier, refrigeration, chilled water and expansion coils, blowers, filters, and necessary valves and controls. The unit is 8 ft square and 10 ft high and weighs approximately 6,500 lb.

2. Hot Disconnect Panel: The hot disconnect panel is the top half of the quick-disconnect panel. It mates to the lower half panel located on level 8 of the crib structure. The following subsystems are routed through this disconnect-panel, reading the outlet ports right to left:

    1. RP-1 fuel (1)

    2. Thrust air heating line (1)

    The unit is 22 in. wide by 33.5 in. long.

4. Guide Roller Assembly: One small guide roller assembly rides on an I beam (10 in. wide with the beam positioned in between the rollers). The rollers are 2.5 in. wide and 7.5 in. in diameter, with their shaft mounted in a roller bearing.

5. Guide Roller Assembly (Same as item 4, level 3)

6. Elevator Door Level 7B

7. Access Area (An access area with a vertical ladder to the bottom of the crib, level 8)

8. LN2 Evaporator Piping: This piping routes the overflow of liquid nitrogen and its gases from the shrouds in the missile to a coupling located directly under the level decking. From there it is routed to the LN2 evaporator tank located on the crib, level 8.

9. Cable Loop Assembly: This cable loop assembly provides the necessary continuous circuitry and hydraulic pressure from the crib equipment to the launch platform equipment and missile. The cable consists of 63 electrical cables, 2 chilled water lines and 3 hydraulic lines secured and supported on 2 mount brackets. As they are routed upward in the launcher, the cables and lines are directed to their respective units for power and control.

11. Cold Disconnect Panel: This is the top half of the quick-disconnect panel. It mates to the lower half panel located on level 8 of the crib structure. The following subsystems are routed through this panel, reading the outlet ports left to right:

a. LO2 and fuel pressurization to missile lines (2)

b. GN2 to MCO when launcher platform is down and locked

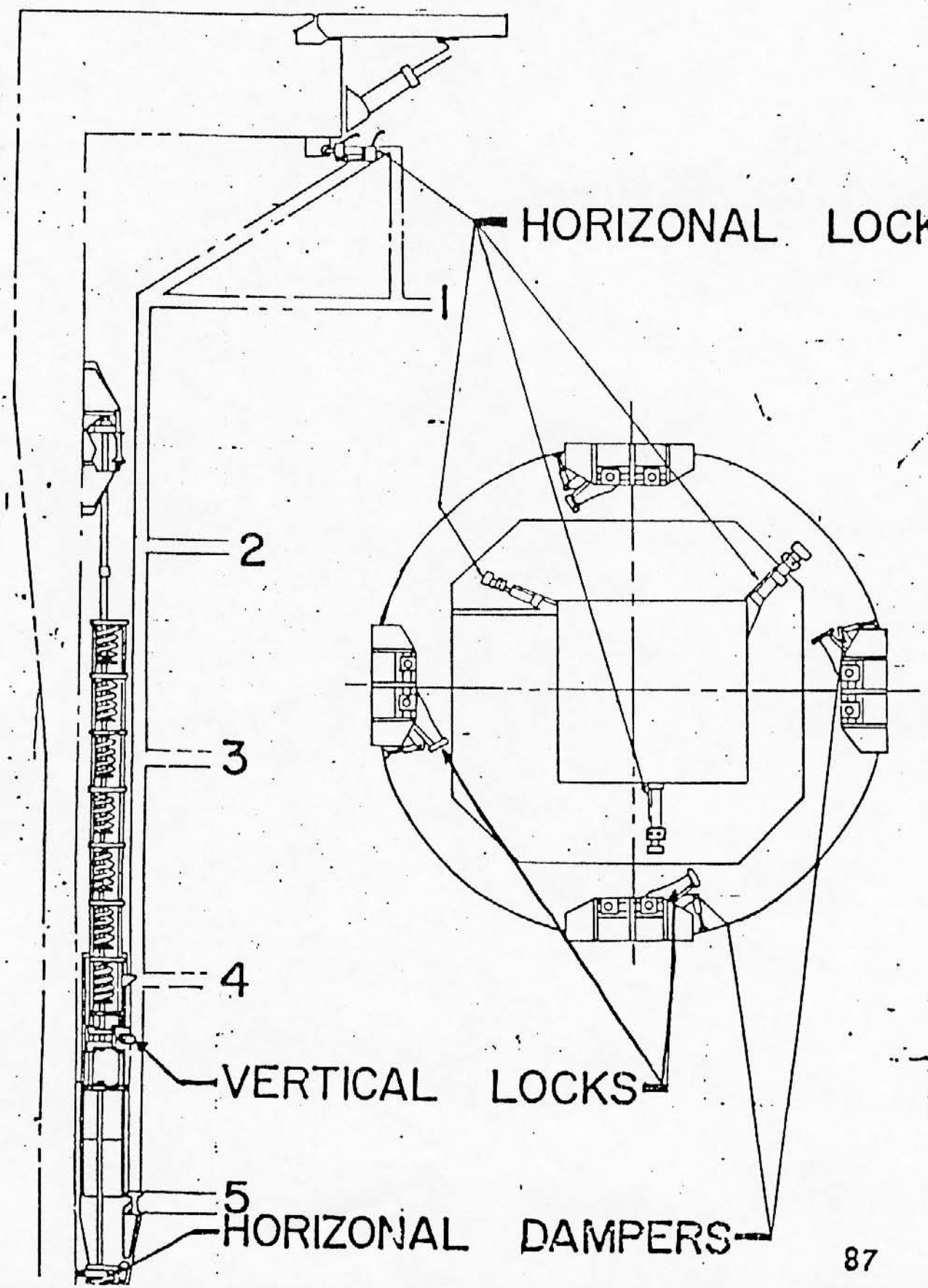
c. Helium missile controlline (1)

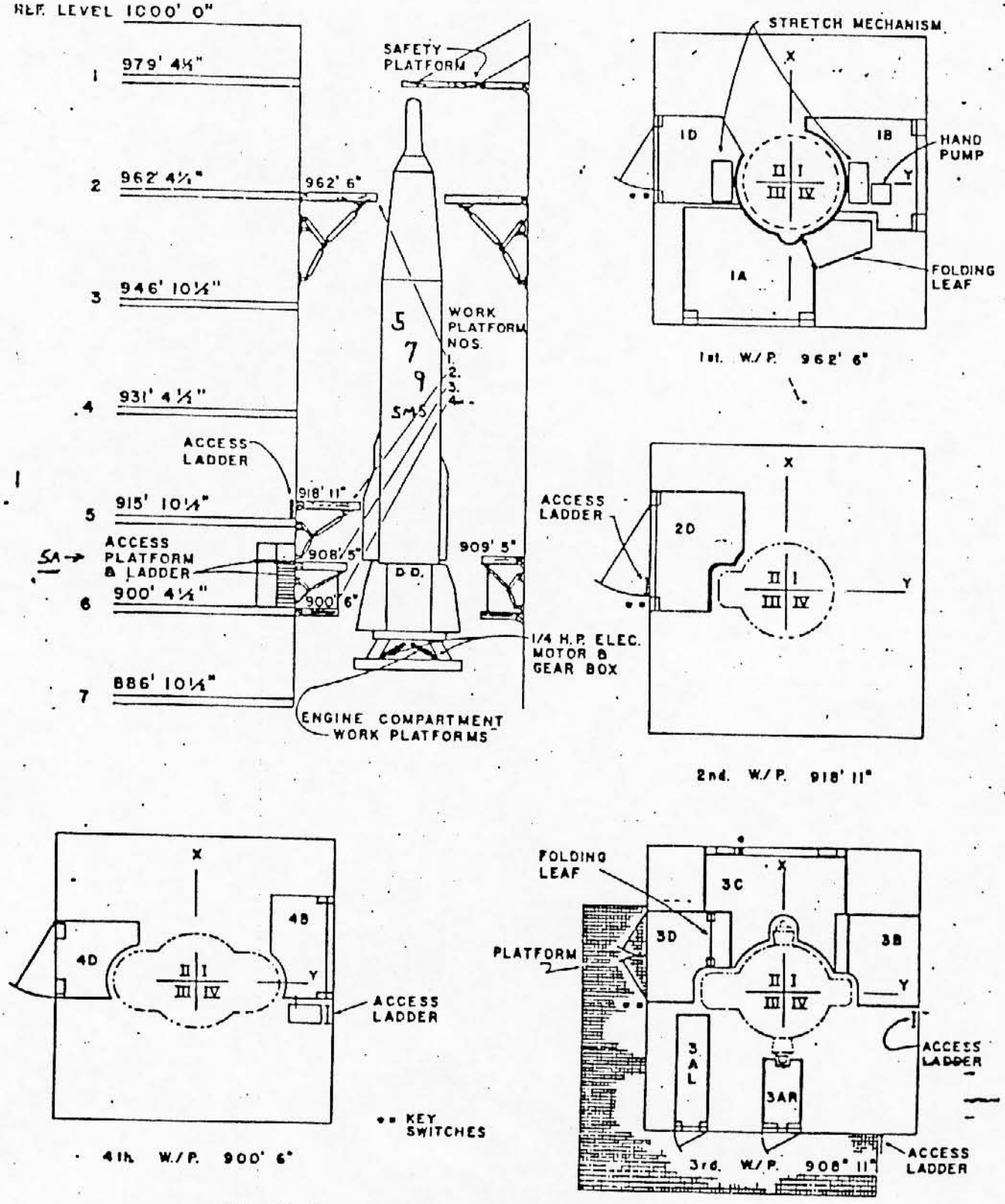
d. Helium to HCU

This panel is 27.5 in. wide and 45 in. long.

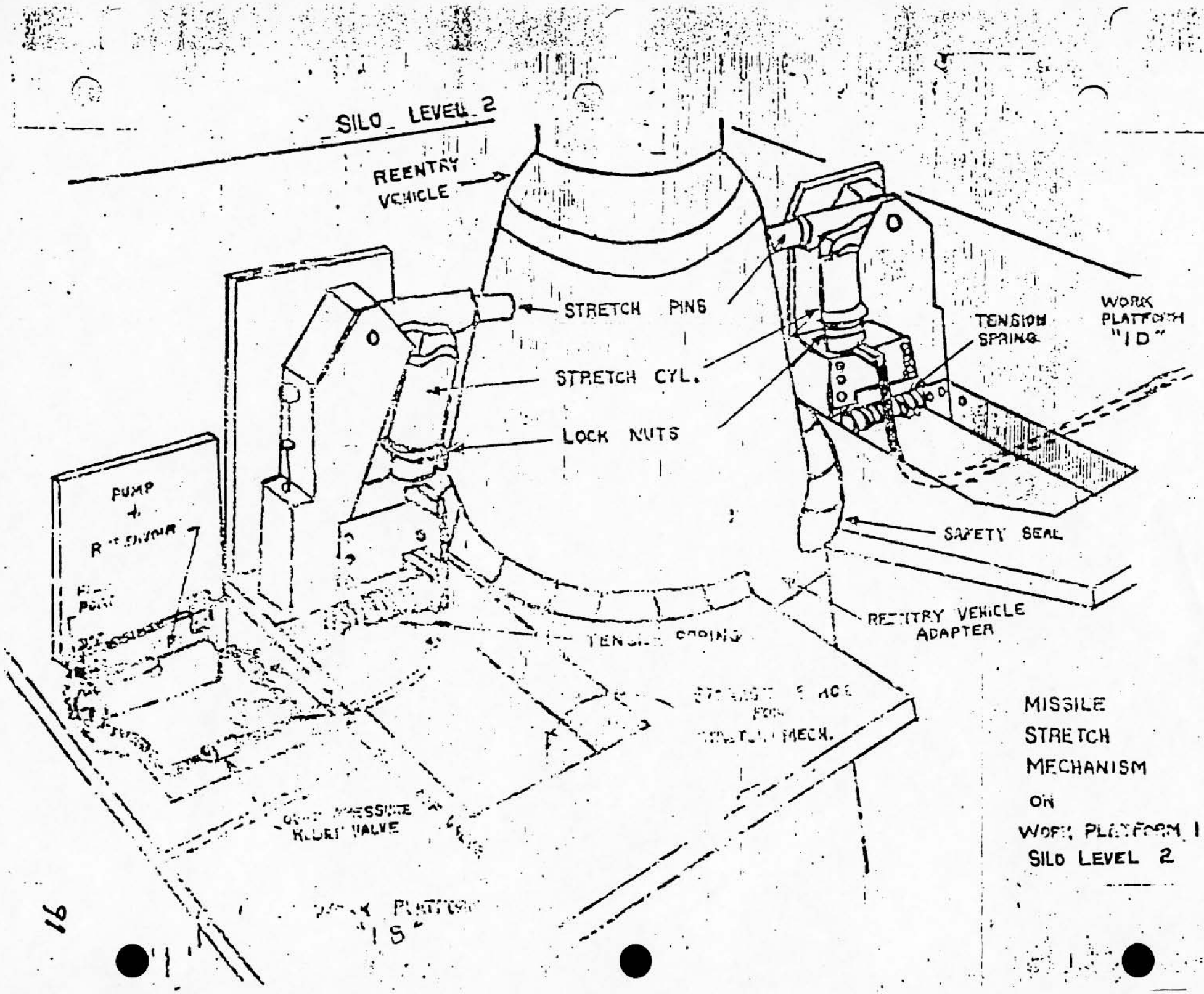
12. MCU Disconnect (Upper): This is one-half of a quick-disconnect for receiving gaseous nitrogen from the crib storage equipment. The gaseous nitrogen pressurization is disconnected from the launcher to the crib on raising of the launcher at the cold disconnect panel. At the full-raised position, the upper MCU disconnect unit is connected to the other lower-half disconnect, which is mounted on the crib approximately 3 ft below crib level 1.

CRIB LOCKING AND SUSPENSION SYSTEMS





WORK PLATFORM IN SILO CRIB


SILO LEVEL 2
REENTRY VEHICLE
STRETCH PINS
STRETCH CYL.
LOCK NUTS
TENSION SPRING
WORK PLATFORM "1D"
SAFETY SEAL
REENTRY VEHICLE ADAPTER
PUMP
MISSILE STRETCH MECHANISM ON WORK PLATFORM 1 SILO LEVEL 2

CRIB SUSPENSION, WORK PLATFORMS AND EMERGENCY STRETCH SYSTEMS

A. Crib Suspension System Assembly: The crib suspension assembly provides for isolation of the crib and equipment, launcher platform and missile to minimize damage from ground shock. The suspension shock struts are mounted on the silo wall 90° apart at level 2 and are attached to the crib at level 6. Each strut is 64' 2½" long and has 7 decks of springs, 3 sets of springs per deck. The suspension system will allow 1.45" of vertical travel.

B. Lock and Damper System Assembles:

1. A single vertical strut lock is mounted on the bottom of the 7th spring on each odd numbered suspension strut. Each lock consists of a hydraulic cylinder and fork lock that neutralizes the spring action of the strut and levels the crib.

2. Three horizontal crib locks are located 120° apart on the top level of the crib. Each lock has a hydraulic piston that exerts a force against a striker plate mounted to the silo cap and positions the crib center line. To the center line of the silo cap.

3. There are four friction type horizontal strut dampers, one mounted on the bottom of each shock strut assembly pair. The dampers exert a damping force of 200 lbs and allow 4" of horizontal crib travel.

C. Platforms: Missile Work Platforms are provided at four silo levels (2,5,5A & 6). In addition, a safety platform is located at silo level 1 and an engine compartment access platform is located on the launcher platform (at silo level 7 with the L/P down). These platforms are located so as to permit access to the missile for limited maintenance and service to support and house the missile stretch mechanism.

1. Work Platforms: Work platforms (w/p) 1,2,&3 are hydraulically retractable. Work platform 4 is mechanically linked to W/P 3. Hyd. pressure is supplied by the 40 hp motor driven pump, (Hyd. power pack) on crib level 2. The pump is started from either the Hyd. control panel on level 2 or the control station manual operating level panel on level 1. The W/P can be stopped and retracted at any point during the extend cycle, but they cannot be stopped or re-extended in the retract cycle until fully retracted.

A system of limit switches is utilized with the work platforms. These switches permit current flow to a light on the applicable level key switch panel to indicate that the platform on that level is extended, and by means of an interlock system to prevent motion of the L/P if any W/P is not fully retracted. Conversely, the interlock system prevents the extension of the work platforms when interference with the launcher platform would occur. The work platforms can be operated only when the L/P is in the fully down and locked position.

(a) W/P1 Silo level 2. Three sections provide access for attaching or detaching, maintaining and servicing the re-entry vechile. It also houses the stretch mechanism.

(b) W/P2 Silo level 5. (Three feet above silo level 5). One section provides access to the upper section of the B-2 pod, containing the retro-rockects, missile inverter, exdication transformer (U-4 Pkg), programmer (U-3 Pkg), filter servo amplifier (U-2 Pkg), programmer (U-3 Pkg), power changer over SW, rocket engine relay box, missile battery and propellant utilization system.

(c) W/P3 Silo Level 5A. (Eight feet above silo level 6). Five sections provide access to the vernier engines, B-1 pod and to the lower section of the B-2 pod, which contains the umbilical connections and the AIG platform, control and computer.

(d) W/P4 Silo level 6. Three sections provide access to the booster engine nacelles. Mechanically linked to W/P3.

2. Safety Platform: The safety platform is located at silo level 1. Equipment can be lowered down through the silo cap and received at this platform. The safety platform is accessable from the facility elevator and is the largest of the platforms (13½' long X 8' wide). It is pneudraulically operated. 300 psi air pressure charges a hydraulic accumulator which supplies pressure to the "up" side of apair of actuators. These actuators retract the platform through pulley and cable linkages. The platform slowly free-falls to the extended position as hydraulic fluid is forced back into the de-pressurized accumulator through orfices. A Hyd. hand pump is provided for use in the event that air pressure fails.

3. Engine Compartment Access Platforms: The right and left engine compartment access platforms are each 15 ft long and 5 ft wide and are located directly under the missile engines. The platforms are fixed to the L/P and are actuated by ¾ hp motors and gear boxes. The access ladder and electric motors control station are on level 1 of the L/P.

D. Stretch Mechanism:

(a) Functional Description: The function of the mechanisms is to supply two upward acting forces at diametrically opposite sides of the missile skin rendering the thin-walled cylinder section of the skin safe from collapsing under its weight in case the cylinder loses its internal pressure.

When loss of pressure occurs the stretch mechanism will be positioned in its operating position and locked. The support pin is manually moved forward and the pin insert is introduced into the opening provided for it in the skin of the missile cone.

The load applied from the missile skin onto the support pin is reacted at the work platform. The platform load in turn is transmitted to the crib structure.

(b) Physical Description: The stretch mechanism is stored horizontally within a space envelope approximately 6 in. X 18 in. X 40 in. It is hinged into the No. 1 work platform along its lifting arm extends about 18 in. beyond the 18 in. envelope width to reach the missile. The mechanism has two main moving parts, or links contained between two outer side plates. Pins or shafts supported by the side plates pass through one end of each link allowing it to rotate about that end. One link is a hydraulic cylinder, the other a missile stretching arm. In operation, the cylinder presses upward on the lifting or stretching arm. The Top side plate is flush with the work platform deck when stored. There are two equivalent mechanism.

(c) Operation: The stretch mechanism is so designed that it may be manually positioned, pumped to operating pressure and manually locked in place within 10 min. by two men. The stretch mechanism is divided into a left hand mechanism assembly which is located in platform 1D and a right hand mechanism assembly which is located in platform 1B. Each mechanism assembly consists of a housing assembly, a support pin housing and a hydraulic actuator.

Either the right hand or the left hand mechanism may be erected first. The mechanisms are similar and the same erection and operating sequence is used with each mechanism. The steps of the sequence are as follows:

1. Unlatch and lift the left hand stretch mechanism assembly out of work platform 1D.

2. Lock in the upright position by allowing the lock block at the rear of the housing to drop into the locking slot.

3. Lift the support pin housing out of the mechanism housing and place it so that it is supported by its pivot and by the hydraulic stretch actuator.

4. Remove the tee handle from the clip on top of the pin housing and insert in the hole provided in the support pin.

5. Slide the support pin forward and insert the pin in the missile nose cone adapter bearing.

6. Repeat steps 1 through 5 with the right-hand mechanism assembly.

7. Pump hydraulic pressure into both stretch mechanism actuators by manually pumping the hand pump which is located in platform 1B.

8. When the desired stretch has been achieved, lock each actuator mechanically by rotating the locking collar until it is jammed against the actuator cap.

9. The hydraulic pressure may then be relieved until it is necessary to remove the stretch mechanism from the missile.

10. When it is desired to relieve the stretch, again pump pressure into the actuators until the pressure is relieved on the locking collar.

11. Turn the locking collar (on the actuator) down so that the actuator can be retracted.

12. Relieve hydraulic pressure by opening valve on the hand pump.

13. Slide the support pin back into the pin housing until the ball lock in the housing drops into the detent in the slide and holds the slide in place.

14. Replace the tee handle in the clip on top of the pin housing.

15. Fold the pin housing and the actuator and replace in the mechanism housing.

16. Unlock the mechanism by pulling the cable handle to lift the lock block out of the locking slot.

17. Stow the stretch mechanism in the platform.

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EMERGENCY EVACUATION PLAN - FOR SILO

This plan is designed to provide an organized route and procedure for emergency evacuation of the silo area. It is important to notice the difference between an EMERGENCY evacuation and a NORMAL precautionary evacuation.

All personnel that enter the silo regardless of the reason for entry must understand the evacuation signals and the procedures to be followed. Base support personnel such as Civil Engineering inspectors or repairmen must be briefed on the procedures listed below before they enter the silo area.

It can be anticipated that any condition that requires an emergency evacuation of the silo will be associated with smoke, noise, lack of lighting and other factors that will tend to confuse or cause panic. Therefore, it is important that personnel are aware of the emergency procedures and location of escape devices fro the work area they are in.

EMERGENCY EVACUATION

There are primarily six (6) reasons why it would become necessary to evacuate the silo, under emergency conditions. These conditions are as follows:

1. Fire.
2. High oxygen concentration.
3. Low oxygen concentration (N2 or He rich).
4. RP-1 vapors in missile enclosure.
5. Diesel vapors in generater area.
6. Any other conditions that the MCCC requires evacuation.

Emergency evacuation will be indicated by automaticly or manually sounding of the klaxon horns and/or verbal announcement over the P.A. System. The following procedures will be followed:

1. Personnel working in the silo will always use the buddy system. Make sure your buddy is aware of the emergency and evacuates the silo with you.

2. All personnel on the first six levels will use the spiral stairway and evacuate to the L.C.C.

3. All personnel on the 7th, 8th and sump level will immediately put on emergency breathing apparatus, and use the personnel elevator for escape. If the personnel on the 7th level are the first ones to encounter the elevator they will procede to level 7a and 8. Be sure before leaving level 8 that personnel from the missile enclosure area, and sump area have had time to reach the elevator. Then procede to evacuate the silo to the L.C.C.

4. If the personnel elevator is being used at the time of a evacuation alarm and is not located at level 7 or 8, the personnel using it will stop and evacuate the elevator immediately. Making sure the elevator gates are closed so that personnel on level 7 and 8 can ring for it.

FLUID LINE CODE

NAME	FUNCTION
AHE	Air Supply-Valves & Controllers
APC	Air Supply-LCC Air Cylinders
APD	Air Supply-PDU
APU	Air Supply-PCU Valves and Controllers
AUS	Air Supply-Blast Closures, Diesel Air Tank
FFM	Fuel Fill Line-Missile
FFP	Fuel Fill Line-Prefab
HAS1	Helium Supply-PDU-Airborne Spheres
HAS2	Helium Supply-PDU-Airborne Spheres
HCS	Helium Supply-HCU
HCX1	Missile LOX Tank Exhaust
HCX2	Missile Fuel Tank Exhaust
HES	Helium Emerg. Supply to PCU
HEX	Helium Exhaust from HCU
HFD	Helium Charge Line-Inflight Tanks
HFP	Fuel Tank Pressure Checkout
HFS	Fuel Tank Ullage Sensor (L/P)
HHE	Helium-Heat Exchanger for Airborne Spheres
HOP	LOX Tank Pressure Checkout
HOS	LOX Tank Ullage Sensor (L/P)
HMC	Helium-Missile Controls
HNS	Helium Normal Supply-PCU
HRS	Refrigerated Helium-Airborne Spheres
HSM	Helium Supply-Missile from HCU(L/P)
NDP	Equalize Pressure-Drain FFM
NEX	Vent LN2 Tank & Relief Valves on LN2 Prefab
NFD	GN2 Supply-Ground Pressure Tank(GSE)
NFF	Equalize Pressure-Drain FFP
NFP	GN2 Charge Line for Fuel Prefab Cylinder
NHA	GN2 Charge Line for Hydraulic Accumulators
NHS	GN2 Supply-Hyd. Pumping Unit (L/P)
NLD	LN2 Drain from Missile Shrouds(L/P)
NLF	LN2 Coaxial Line-Airborne Spheres
NLS1	LN2 Supply-LN2 Prefab
NLS2	LN2 Supply from LN2 Storage Tank
NLS3	LN2 Supply to Heat Exchanger
NML1	Lower Liquid Level Sensor, Heat Exchanger
NML2	Lower Liquid Level Sensor, Liquid Nitrogen Storage
NMU1	Upper Liquid Level Sensor, Heat Exchanger
NMU2	Upper Liquid Level Sensor, LN2 Stge.
NOD	Equalize Pressure-Drain OFM
NOP	GN2 Supply-Pressurization Prefab to Press LOX Tanks
NOT1	GN2 Press-LOX Storage Tank
NOT2	GN2 Press-LOX Topping Tank
NPC	GN2 Supply-PDU-Missile Press
NPM	GN2 Purge-Mobile SFC. Unit(L/P)
NPP	GN2 Re-supply from Press'n Prefab
NPS1	LN2 Storage Tank Press Line
NPS2	LN2 Storage Tank Vent Line
NPS	Heat Exchanger Vent Line
NRM	GN2 - Retraction Mech. (L/P)
NSD	GN2 - PDU
NSU1	GN2 Supply-Raised Launch Platform
NSU2	GN2 Supply-Launch Platform
NTP	GN2 Supply-Press'n Prefab
NUS	GN2 Press-APCHE Units (L/P)
NYP	Fuel Leveling Tank Vent
OAF	GN2 Supply-GN2 Tanks (4000 PSI)
OFC	LOX Supply-Storage Tank
OFM	LOX Fill Line to Missile
OFP	LOX Supply Line-Fill Prefab
OFS	LOX Supply Line-Topping Tank
OFT	LOX Fill Line-Control Prefab
OML1	Lower Liquid Level Sensor, LOX Storage
OMU2	Upper Liquid Level Sensor, LOX Topping
OST	LOX Topping Line-Missile
OVC	Vent line from Relief Valve on LOX Control Prefab
OVF	Vent Line from Relief Valves on LOX Fill Prefab
OVP	Vent Line from LOX Tanks
PDX	PDU Exhaust from Relief Valves