CHAPTER 2

PHYSICAL DESCRIPTION AND DATA

Section I. OVERALL DESCRIPTION OF THE LAUNCHING SET

6. General

This section contains an overall physical description of a typical permanent launching set and a typical mobile launching set.

7. Permanent Launching Set

A typical permanent launching set (figs. 1 and 2) consists of the launching control station, three launching sections, and frequency converters or generators which supply power to the launching control station and the sections.

8. Mobile Launching Set

A typical mobile launching set (fig. 3) consists of the trailer mounted launching control station, three launching sections, and generators which supply power to the launching control station and the sections.

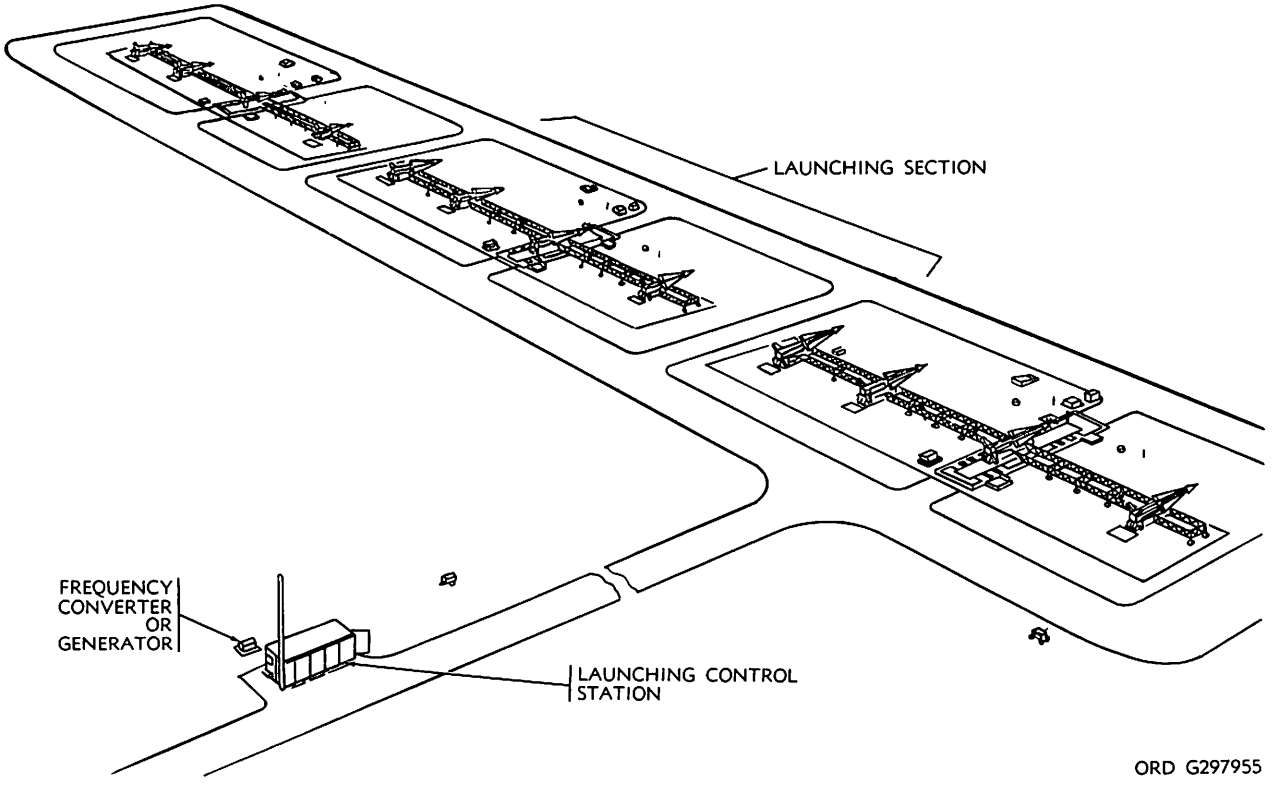


Figure 1. Permanent launching set—typical.

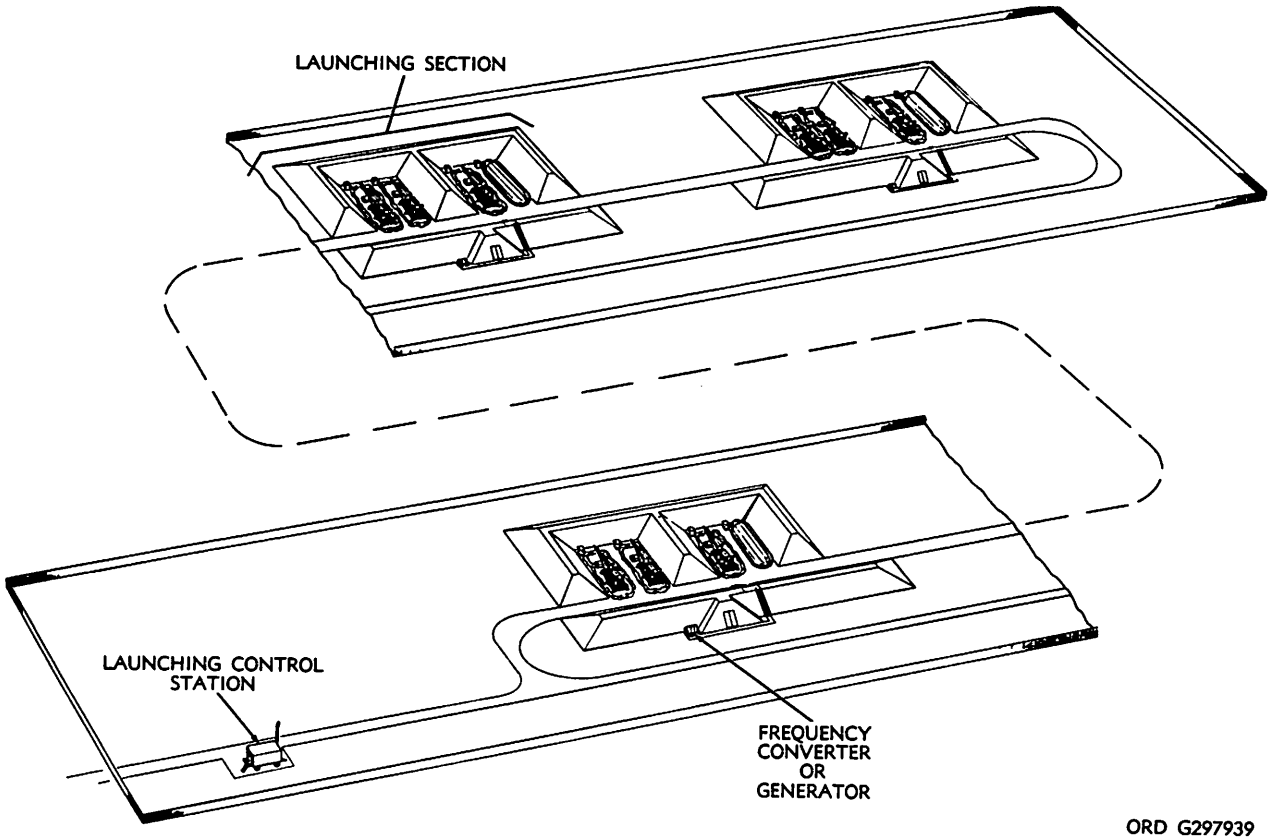


Figure 2. Permanent launching set—typical.

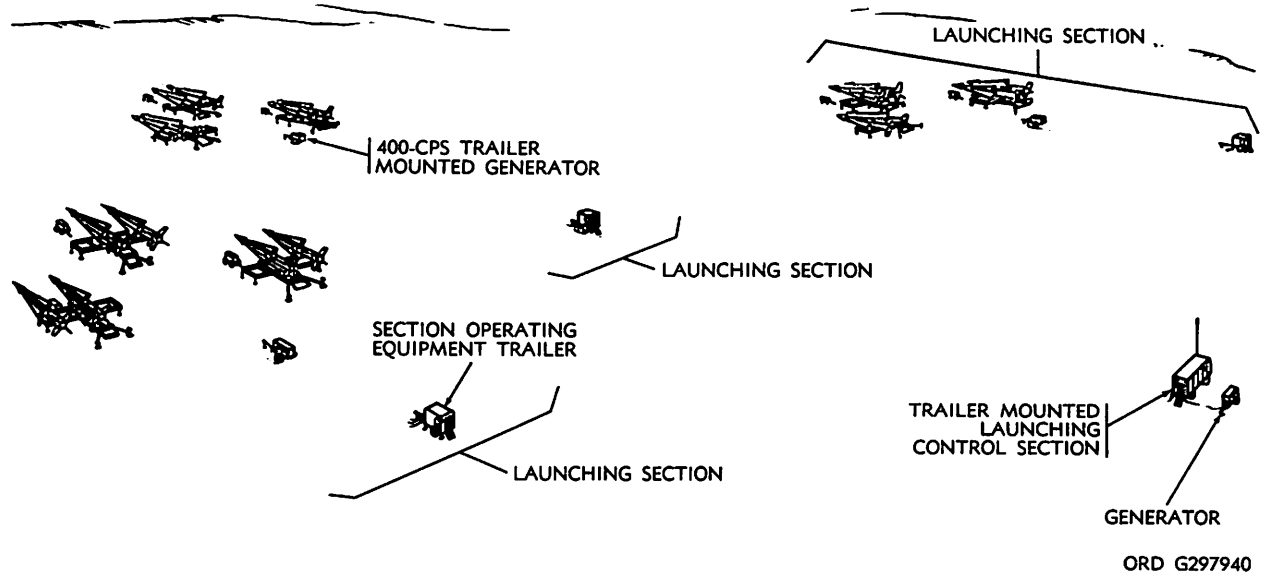


Figure 3. Mobile launching set.

Section II. PHYSICAL DESCRIPTION OF THE LAUNCHING CONTROL STATION

9. General

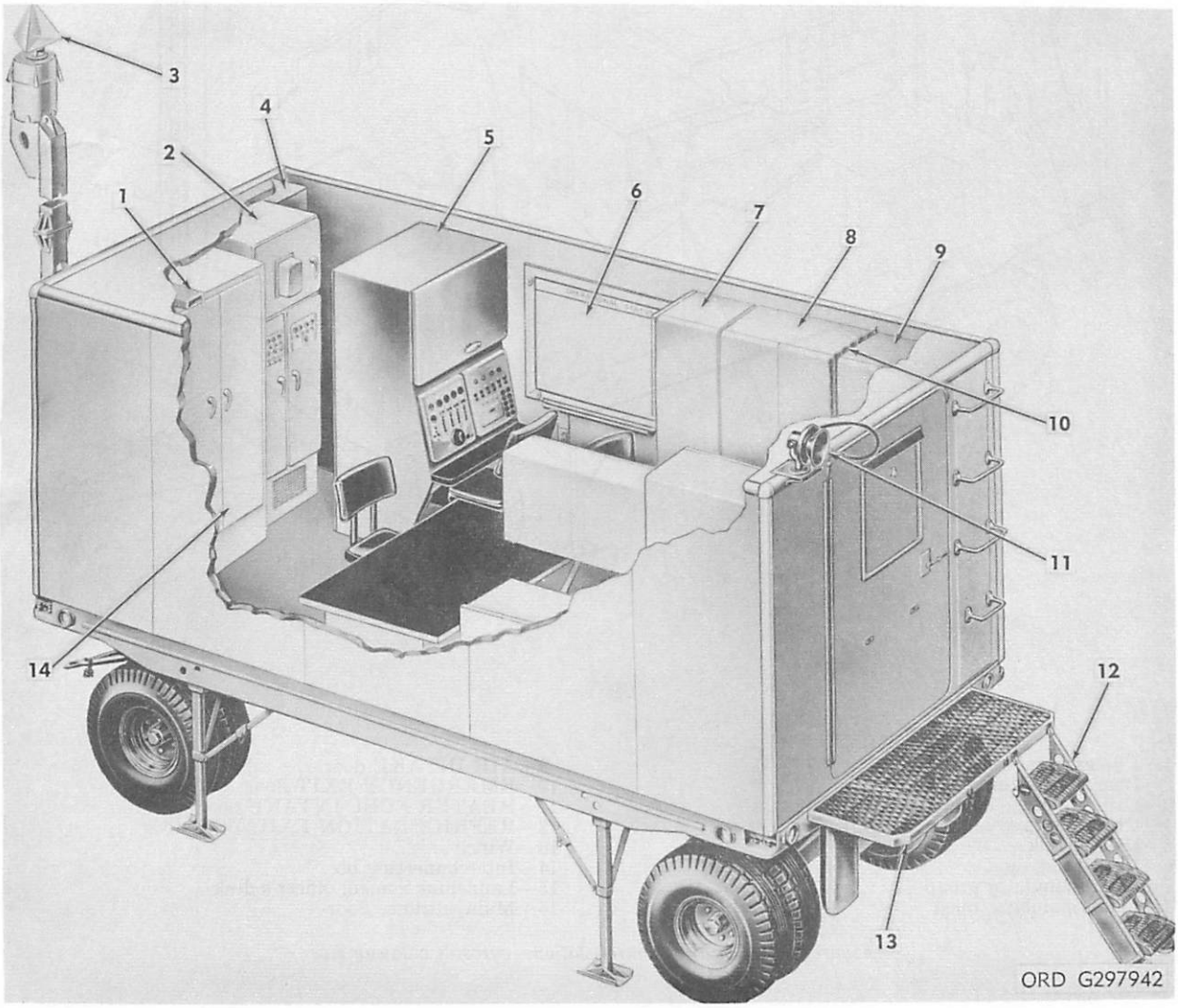
a. This section contains a physical description of the major internal and external components of the launching control station (figs. 4 and 5).

b. The launching control station is identical in all launching sets except for differences in emplacement requirements.

Note. For detailed procedures of the emplacement of the launching control station, refer to the launching set assembly and emplacement manual.

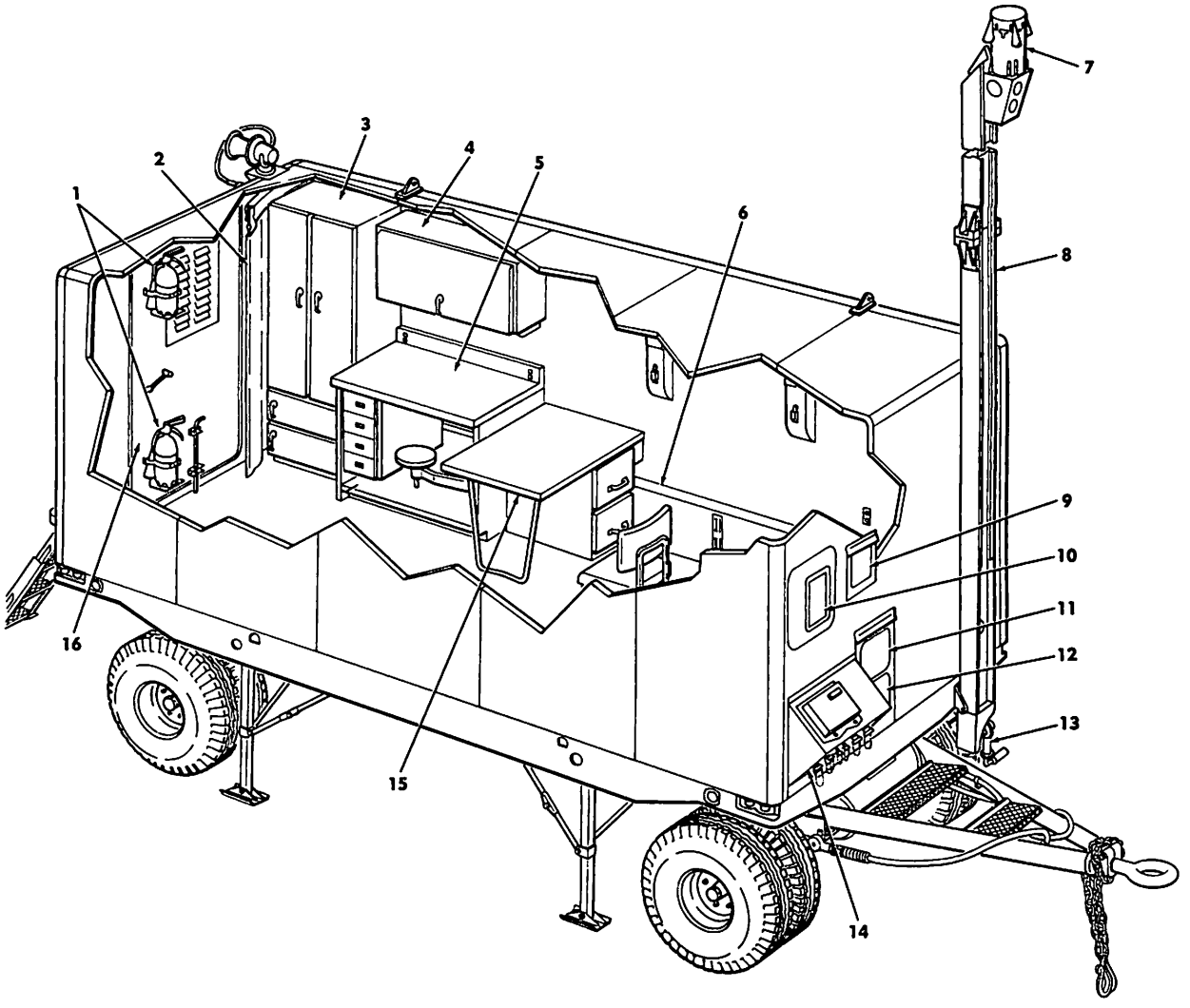
10. Launching Control Console

The launching control console (LCC) (5, fig. 4) is adjacent to the curbside wall of the trailer.



1—Ventilating duct
2—Personnel heater
3—Radar target simulator
4—Main switch box
5—Launching control console
6—Operational status display board
7—Intercommunication cabinet station
8—Utility storage cabinet 8165050
9—Clothing locker
10—Blackout curtain
11—Alarm siren
12—Boarding ladder
13—Platform
14—Utility storage cabinet 8165053

Figure 4. Launching control station—roadside cutaway view.



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1—Fire extinguisher
2—Blackout curtain
3—Utility storage cabinet 8523863
4—Utility storage cabinet 8165051
5—Utility desk
6—Ventilating duct
7—Flight simulator group
8—Flight simulator mast
9—AIR INTAKE door
10—EMERGENCY EXIT door
11—HEATER FUEL INTAKE door
12—REFRIGERATION EXHAUST door
13—Winch
14—Interconnecting box
15—Launching control officer's desk
16—Main entrance door

Figure 5. Launching control station—curbside cutaway view.

The upper section consists of a storage cabinet with an access door. The middle section consists of the right-hand launching control panel (fig. 6) and the left-hand launching control panel. These two panels contain the controls and indicators necessary for missile and mission selection, section selection, and completion of the firing circuits from the battery control area to the launching sections. The lower section consists of a work counter provided for the convenience of the LCC operator and electrical equipment associated with the flight simulator system. Access to the interior is provided by opening the left and right panels and at the rear of the LCC.

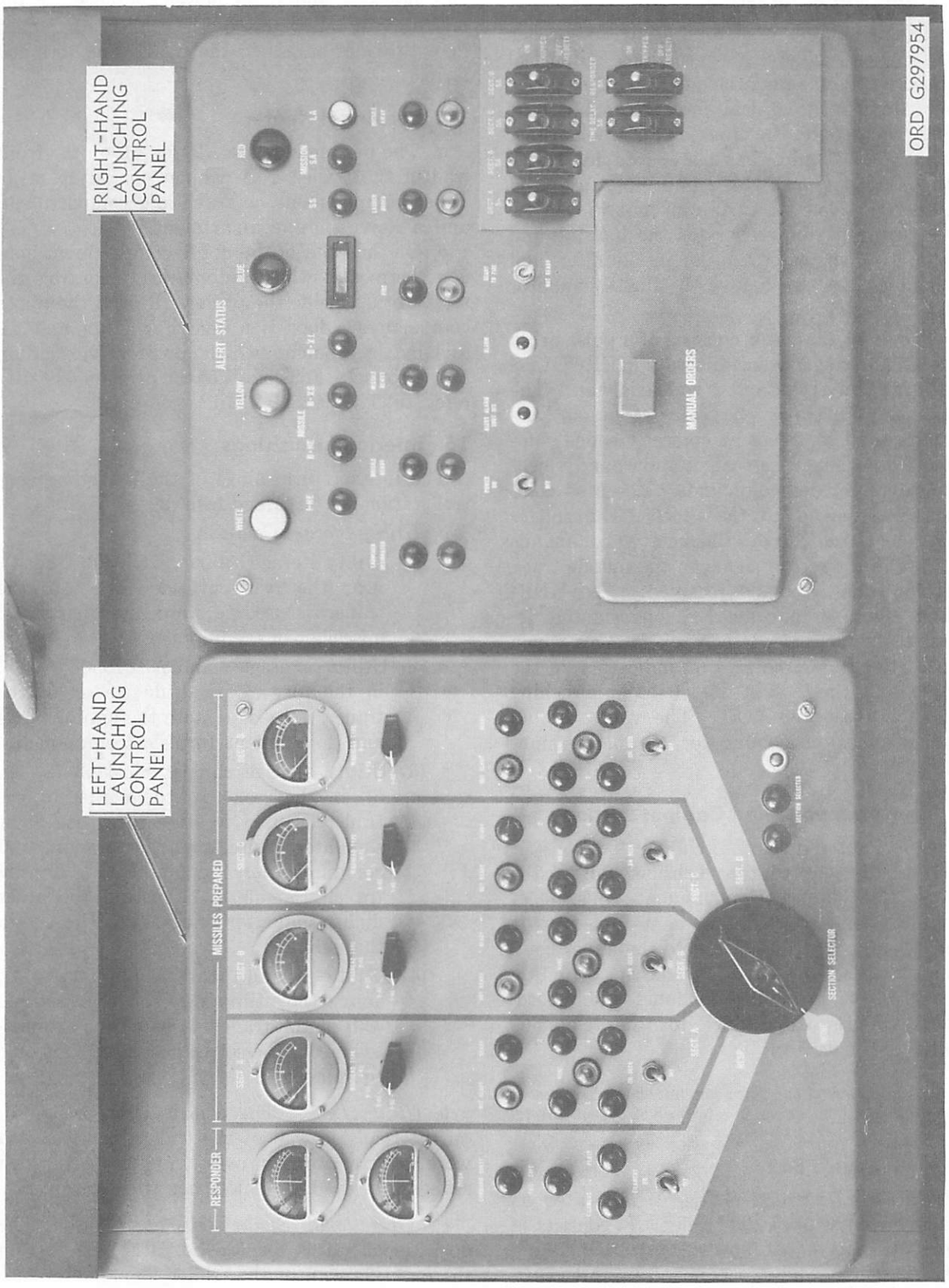


Figure 6. Launching control console.

11. Flight Simulator Group

a. The flight simulator group (7, fig. 5) consists of a slightly tapered two-section cylindrical housing, a flight simulator mounted inside the housing, and four identical antennas mounted at 90° intervals around the upper end of the housing. Antennas No. 1 and No. 3 are used for transmitting, and antennas No. 2 and No. 4 are used for receiving. The vaneaxial fan mounting plate serves as the bottom cover for the housing and contains two connectors, an air intake filter, and two handles used to remove the flight simulator from the housing.

b. The flight simulator consists of a pulse delay network, a receiver-transmitter, a HERCULES signal data converter, and a vaneaxial fan. The pulse delay network basically contains circuitry required to accept all correctly coded commands from the missile track radar and reject all improperly coded commands. Accepted commands are applied to the receiver-transmitter which detects and decodes the received commands and transmits a return signal to the missile track radar for each command received. The HERCULES signal data converter converts the decoded commands into dc control voltages which are used to actuate meters and indicators on the RESPONDER section of the left-hand launching control panel on the LCC. The vaneaxial fan provides forced-air cooling for the flight simulator.

12. Intercommunication Cabinet Station

The intercommunication cabinet station (7, fig. 4) is adjacent to the curbside wall of the trailer. The upper compartment consists of communication control equipment and storage space. A door provides access to the upper compartment. The lower section consists of a fuse and control panel and a telephone switchboard. A work counter is provided for the telephone switchboard operator.

Note. For details of the voice communication equipment and the fuse and control panel, refer to TM 9-1400-251-12.

13. Main Switch Box

The main switch box (4, fig. 4) is located on the right front wall of the trailer. It consists of a circuit breaker panel, power control panel, and terminal strips. The two panels contain the circuit breakers and main power switches for the entire electrical system of the trailer. A hinged door provides access to the panels and terminal strips.

14. Personnel Heater

a. The personnel heater (2, fig. 4), on the front wall of the trailer, is a cabinet consisting of an upper compartment, a lower left compartment, and a lower right compartment.

b. On the front of the upper compartment door is a thermostat which automatically controls the temperature inside the trailer. Behind the upper compartment door is a centrifugal fan and associated equipment which provide ventilation for personnel. For details of the personnel heater, refer to TM 9-2330-212-12.

15. Interior Furnishings

The interior furnishings of the launching control station are described below.

a. Utility Storage Cabinets.

(1) Utility storage cabinet 8165050 (8, fig. 4), near the rear curbside corner of the trailer, is used to store small parts and miscellaneous equipment.

(2) Utility storage cabinet 8165053 (14), in the forward roadside corner of the trailer, is used to store the aiming circle and government furnished equipment.

(3) Utility storage cabinet 8523863 (3, fig. 5), in the rear roadside corner of the trailer, is used to store the spare flight simulator group, small hand tools, and communication equipment. During travel, the alarm siren and the other flight simulator group are stored in this cabinet.

(4) Utility storage cabinet 8165051 (4), above the utility desk on the roadside wall of the trailer, is used to store miscellaneous electrical and electronic equipment.

b. Utility Desk. The utility desk (5, fig. 5), on the roadside wall of the trailer, consists of a work counter, four drawers, and a stool which swings into the knee-hole space when not in use.

c. Operational Status Display Board. The operational status display board (6, fig. 4), on the curbside wall of the trailer, is of metal con-

struction to permit the use of magnets for securing data sheets and similar material.

d. Launching Control Officer's Desk. The launching control officer's desk (15, fig. 5), on the roadside wall of the trailer, consists of a desk top and two large drawers. The desk top and support leg may be folded up against the wall and locked in position by the uplock fitting on the overhead heat duct.

e. Clothing Locker. The clothing locker (9, fig. 4), in the rear curbside corner of the trailer, is provided for the convenience of operating personnel. The locker is also used to store the radar target simulator.

16. Trailer Lighting Equipment

The trailer is internally lighted by 27 incandescent lights and four blue lights in ten light fixtures. The blue lights are used during blackout conditions when the main entrance door (16, fig. 5) is open.

Note. The controls for the trailer lighting equipment are listed in table 5 and shown in figure 14.

17. Miscellaneous Equipment

The internal and external miscellaneous equipment of the launching control station is described below.

a. The alarm siren (11, fig. 4) is mounted on the top of the trailer at the rear roadside corner. It is used for various alert and warning purposes.

b. Two blackout curtains (10, fig. 4 and 2, fig. 5) are just inside the main entrance door. Each curtain is on a slide track in the ceiling, and fasteners on the floor hold the curtains in place when extended. The curtains are so designed that during blackout conditions, entrance or exit may be made without light showing outside.

c. Four 120-volt, 400-cps, double receptacle-type outlets are located inside the trailer. One outlet is on the curbside wall under the operational status display board; one outlet is on the roadside wall forward of the launching control officer's desk; two outlets are on the roadside wall above the utility desk.

d. Two ventilating ducts (1, fig. 4 and 6, fig. 5) circulate air from the personnel heater through grill openings to the interior of the trailer. One duct extends from the heater to the launching control officer's desk along the ceiling on the roadside. The other duct extends from the heater to the utility desk along the lower roadside wall.

e. Two fire extinguishers (1, fig. 5) are mounted on the inside of the main entrance door.

f. The interconnecting box (14) on the outside front of the trailer provides the necessary connections for carrying power and control signals to and from the trailer.

g. The EMERGENCY EXIT door (10), AIR INTAKE door (9), HEATER FUEL INTAKE door (11), and REFRIGERATION EXHAUST door (12) are on the front of the trailer. Fresh filtered air is supplied to the personnel heater through the AIR INTAKE door. Fuel is supplied to the heater through the external fuel supply connection behind the HEATER FUEL INTAKE door. The REFRIGERATION EXHAUST door is used as an intake for an external air conditioner.

h. The flight simulator mast (8), mounted externally on the roadside front corner of the trailer, provides support for the flight simulator group and the radar target simulator (3, fig. 4). A winch (13, fig. 5) at the bottom permits the flight simulator group to be raised and lowered without removing the mast. During travel, the mast is disassembled into three sections, and stowed in the trailer on the roadside wall.

i. A platform (13, fig. 4) and boarding ladder (12) are provided at the rear of the trailer for the convenience of personnel. During travel, the platform is secured in an upright position on the outside of the main entrance door, and the ladder is stowed on the inside of the door.

Section III. PHYSICAL DESCRIPTION OF THE LAUNCHING SECTION EQUIPMENT

18. Launching Section

A typical launching section consists of a section control group, three or four launchers, associated launcher control-indicators, and loading and storage racks.

Note. Refer to the launching set assembly and emplacement manual for illustrations of the different site configurations.

19. Section Control Group

The section control group consists of the section control-indicator (1, fig. 7) and the section simulator group (17). The section control group is located in the section control room or section control center and distributes power to, and exercises operational control over, all the launchers in the section.

a. The section control-indicator (SCI) consists of the SCI panel (4, fig. 7), the crew safety switch panel (2), and associated internal equipment housed in a metal cabinet. Two access doors (3) on the front provide access to the SCI panel, and a door provides access to the crew safety switch panel. Four handles (19) provide ease of handling. The SCI panel contains the necessary controls and indicators for remote control of the launchers, preparation of the fire and launch order circuits, and coordination of activities at the launchers with the launching control station. The MANUAL ORDERS door (18) provides access to the controls necessary to complete the firing sequence manually at the section, as directed from the battery control area.

b. The section simulator group is housed in a metal cabinet and serves as a base for the SCI. Four handles (15) provide ease of handling. The panel door (9) provides access to the electrical test panel (8), A_G data converter (11), A_G power supply (14), battery charger (12), and other equipment. Access to the circuit breaker panel (10) and the A_G data converter is provided by access doors in the panel door. The air intake filter door (13) and air exhaust door (16) must be open during operation to provide adequate ventilation of the internal equipment. The section simulator group distributes power from the section generator for operation of the SCI and the launchers.

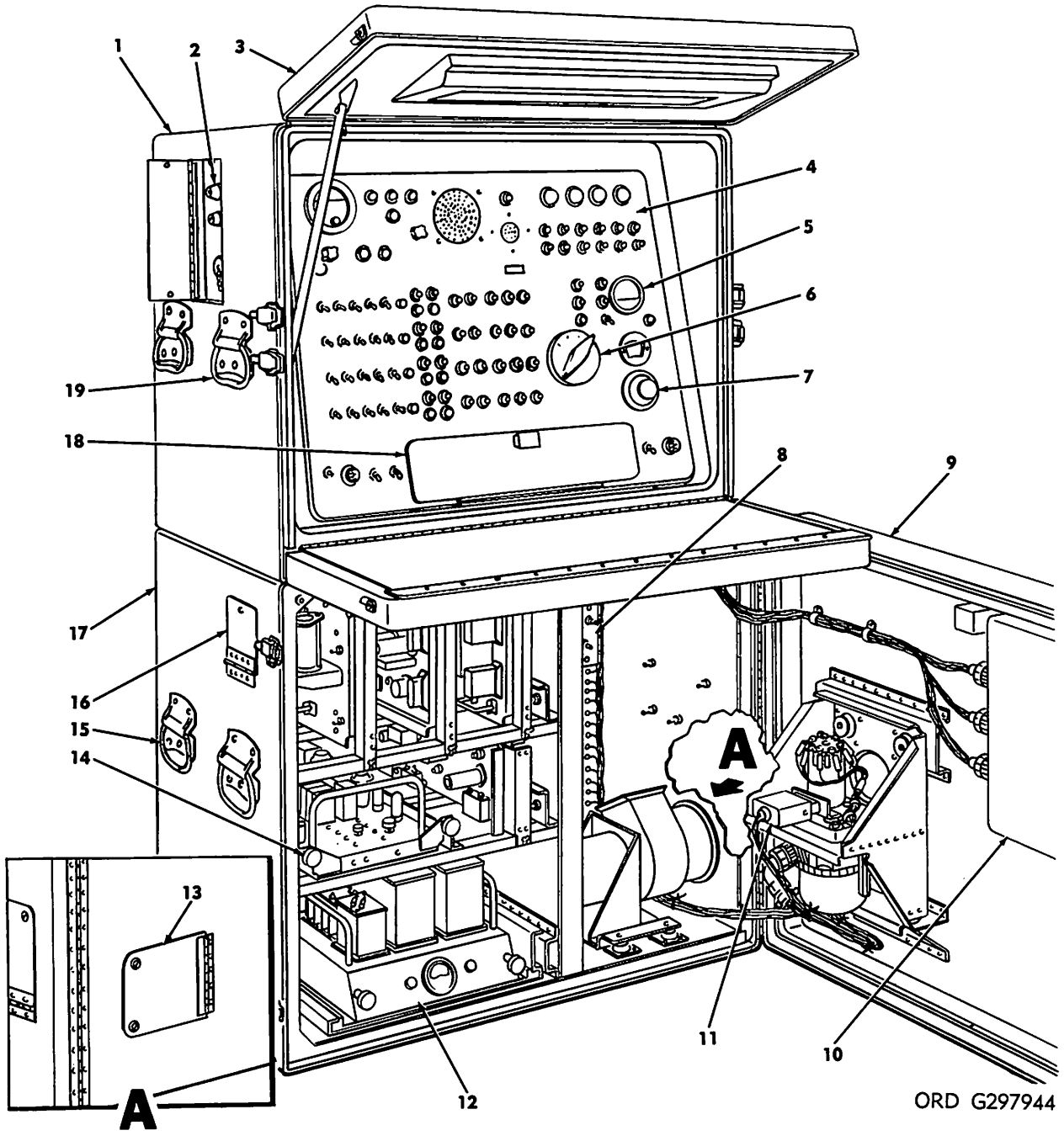
20. Launcher Control-Indicator

a. The launcher control-indicator (LCI) (fig. 8) is housed in a skid-mounted metal cabinet. A cover opens downward in the front to provide access to the LCI panel and the circuit breaker panel. Six panel lights provide illumination for the panels. Access doors on each side and the rear of the LCI provide access to internal equipment.

b. The LCI's are located either in the underground storage chamber, the missile storage building, or on the surface adjacent to their associated launchers. The LCI panel contains the controls necessary for local control of its associated launcher, and for performing operational tests of the missile at the test stations.

21. Launcher

The main components of the launcher are the power distribution box (7, fig. 9), the hydraulic pumping unit (8), the launcher erecting beam (9), and the launcher base (5). The power distribution box receives 120/208-volt, 400-cps power and 60-cps commercial power, and distributes this power to other equipment on the launcher. The circuit breaker panel, located in the power distribution box, contains controls and indicators associated with this power distribution. The hydraulic pumping unit supplies the hydraulic pressure for raising the launcher erecting beam, testing missiles MIM-3A at the test stations (fig. 10), and servicing missiles MIM-14A and MIM-14B. The hydraulic pumping unit panel contains gages which indicate the operation of the hydraulic pumping unit. The launcher base serves as a support for the components of the launcher.



1—Section control-indicator
2—Crew safety switch panel
3—Access door (2)
4—SCI panel
5—Slew meter M3A
6—Launcher designator switch S44A
7—Gyro preset knob
8—Electrical test panel
9—Panel door
10—Circuit breaker panel
11—AG data converter
12—Battery charger
13—Air intake filter door
14—AG power supply
15—Handle (4)
16—Air exhaust door
17—Section simulator group
18—MANUAL ORDERS door
19—Handle (4)

Figure 7. Section control group.

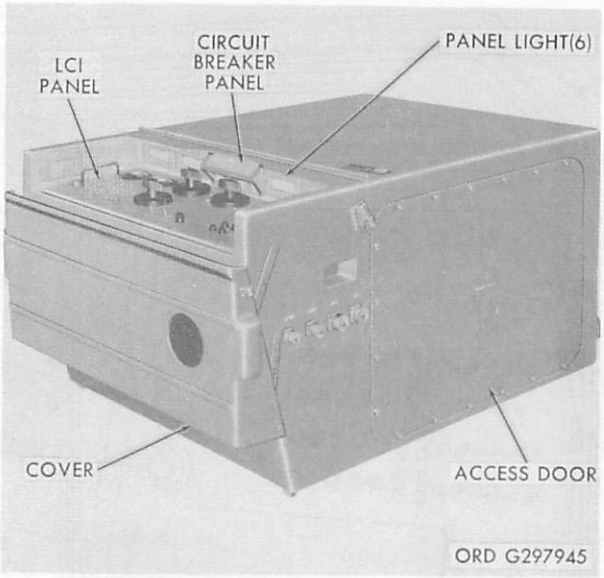
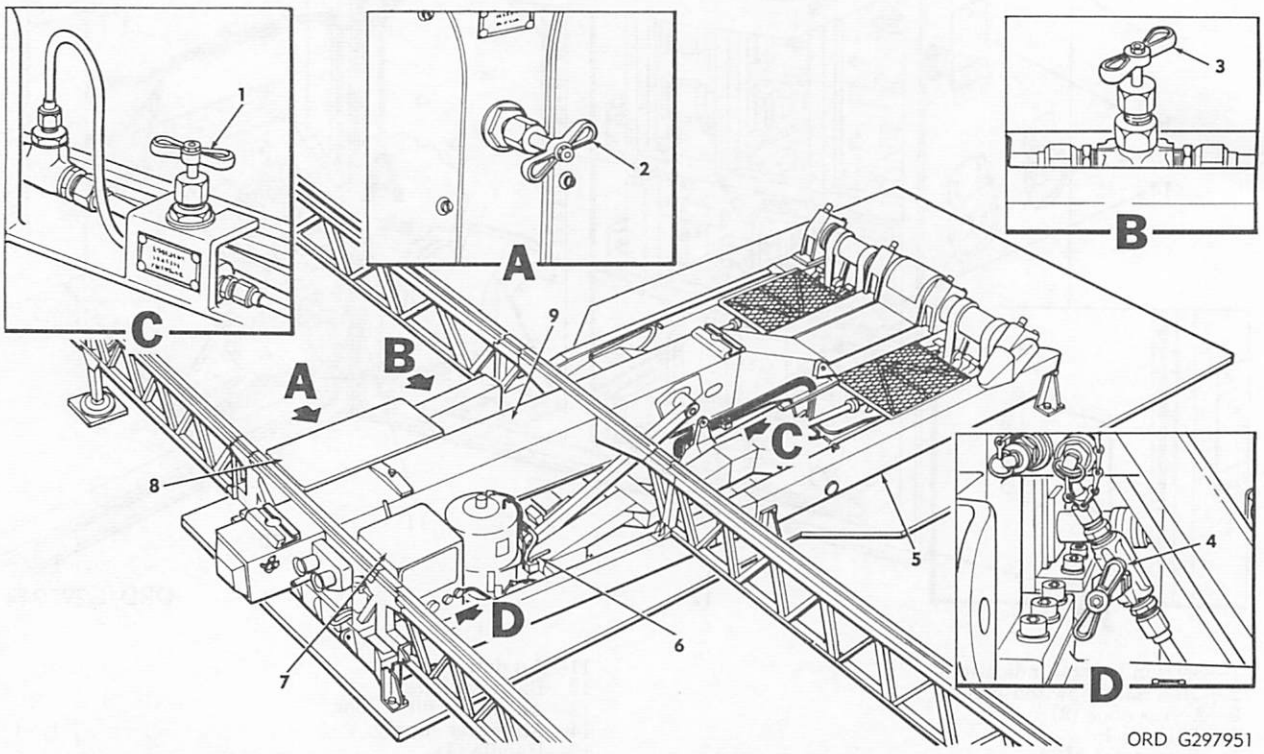


Figure 8. Launcher control-indicator.



1—EQUILIBRATOR SYSTEM BY-PASS valve
2—SYSTEM BY-PASS valve
3—MISSILE HYDRAULIC SHUT-OFF valve
4—MISSILE HYDRAULIC SHUT-OFF valve
5—Launcher base
6—AIR-N-VENT valve
7—Power distribution box
8—Hydraulic pumping unit
9—Launcher erecting beam

Figure 9. Launcher.

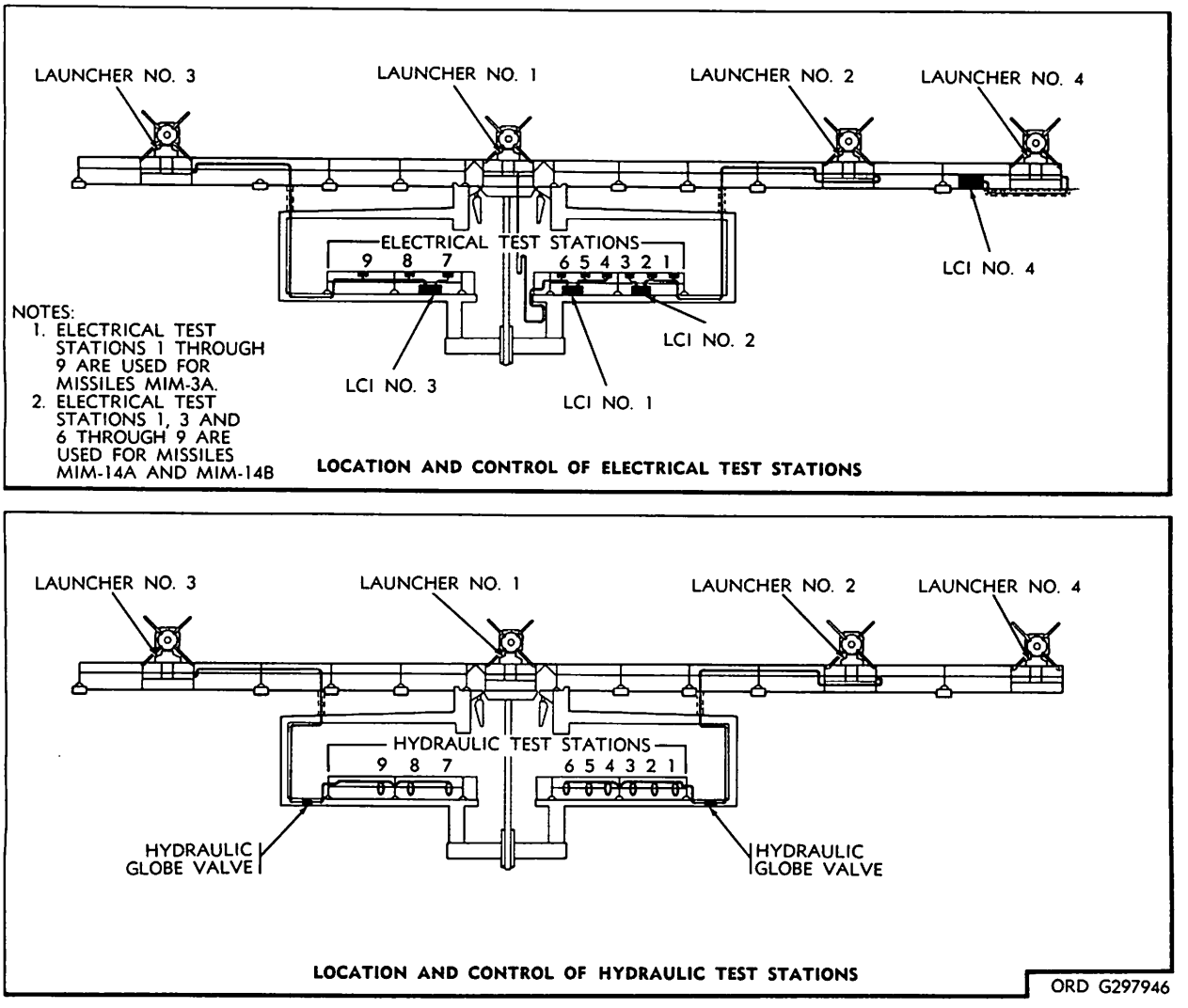


Figure 10. Hydraulic and electrical power distribution (typical).

Section IV. PHYSICAL DESCRIPTION OF THE MOBILE LAUNCHING SECTION

22. General

A mobile launching section (fig. 3) consists of the section operating equipment trailer (fig. 11), generator junction box (fig. 12), power cabinet junction box, 400-cps trailer-mounted generator (fig. 3), and three launchers and associated equipment.

23. Section Operating Equipment Trailer

The section operating equipment trailer (fig. 11) contains the section control group and provides protection for personnel during firing operations and inclement weather.

a. Refer to paragraphs 19*a* and 19*b* for descriptions of the SCI and the section simulator group, which comprise the section control group. In the trailer, the section control group is tied down to prevent movement during operation and travel. Two access doors on the front of the trailer provide access to the electrical connectors on the section control group. Air intake and exhaust ports on the sides of the trailer provide

adequate ventilation of the simulator group internal equipment.

b. The trailer contains a heater, an operator's chair, and a stowage box. The trailer also provides storage space for the power cabinet junction box and other associated electrical equipment.

24. Junction Boxes

a. The generator junction box (fig. 12), located adjacent to the section generator trailer, distributes power from the generator to the launchers and the section control group. The junction box contains a voltage booster to prevent voltage drop in the circuit.

b. The power cabinet junction box (fig. 12) is connected to the section simulator group on the outside of the section operating equipment trailer, and provides the correct termination for the wiring from the generator junction box.

25. Launcher Control-Indicator

a. The launcher control-indicator (LCI) (fig. 13) is housed in a metal cabinet mounted on a dolly. A cover opens downward in the front to provide access to the LCI panel and the circuit breaker panel. Six panel lights provide illumination for the panels. Access doors on each side and the rear of the LCI provide access to internal equipment.

b. Each LCI is located adjacent to its associated launcher. The LCI panel contains the controls necessary for local control of its associated launcher and test station.

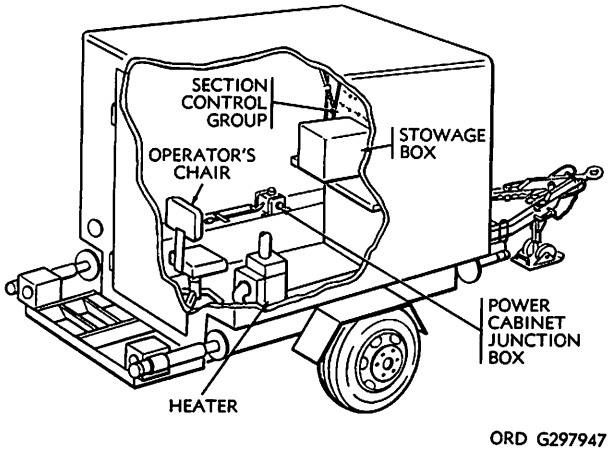


Figure 11. Section operating equipment trailer—cutaway view.

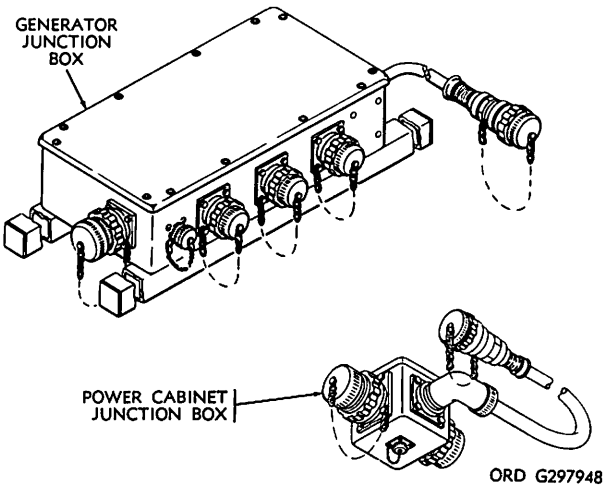


Figure 12. Junction boxes.

26. Launcher and Associated Equipment

a. Refer to paragraph 21 for a description of the main components of the launcher.

b. Each launcher (fig. 13) is emplaced by means of a field adaption kit consisting of seven jacks, two outriggers and associated hardware, and a blast deflector kit consisting of a deflector and associated hardware. These kits enable the launcher to be emplaced at many different locations. One loading rack section is located on each side of the launcher. A transport modification kit adapts the launcher for travel.

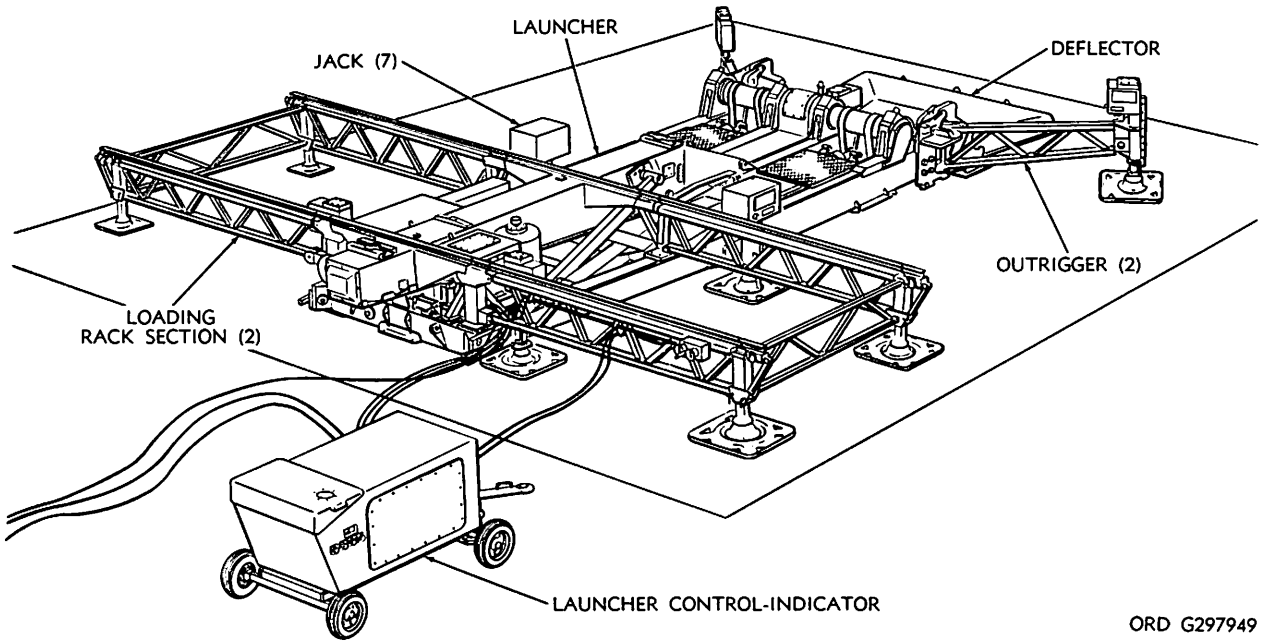


Figure 13. Launcher and associated equipment.

Section V. OPERATING DATA

27. Scope

This section contains operating data consisting of power requirements for the launching set and electrical data on the equipment comprising the flight simulator system.

28. Power Requirements

a. Launching Control Station.

(1) Power requirement 3-phase, 120/208-volt, 400-cps

(2) Total power consumption ... 1.84 kw

(3) Maximum power surge ..... 1.84 kw

b. Section Control Group.

(1) Power requirement 3-phase, 120/208-volt, 400-cps

(2) Total power consumption .... 2.0 kw

(3) Maximum power surge ..... 2.0 kw

c. Launcher and Associated Equipment.

(1) Power requirement ..... 3-phase, 120/208-volt, 400-cps and 60-cps commercial

(2) One-launcher operation:

(*a*) Total power consumption .. 13.4 kw

(*b*) Maximum power surge .... 22.7 kw

(3) Two-launcher operation:

(*a*) Total power consumption .. 26.8 kw

(*b*) Maximum power surge .... 36.0 kw

29. Flight Simulator System

a. Flight Simulator Group Receiving System.

(1) RF detector (2) ..... MK408 silicon diodes

(2) Bandwidth ..... 5 to 9 mc

b. Flight Simulator Group Transmitting System.

(1) Transmitter ..... Tunable magnetron

(2) Frequency (tuning range) ... 8,900 to 9,400 mc