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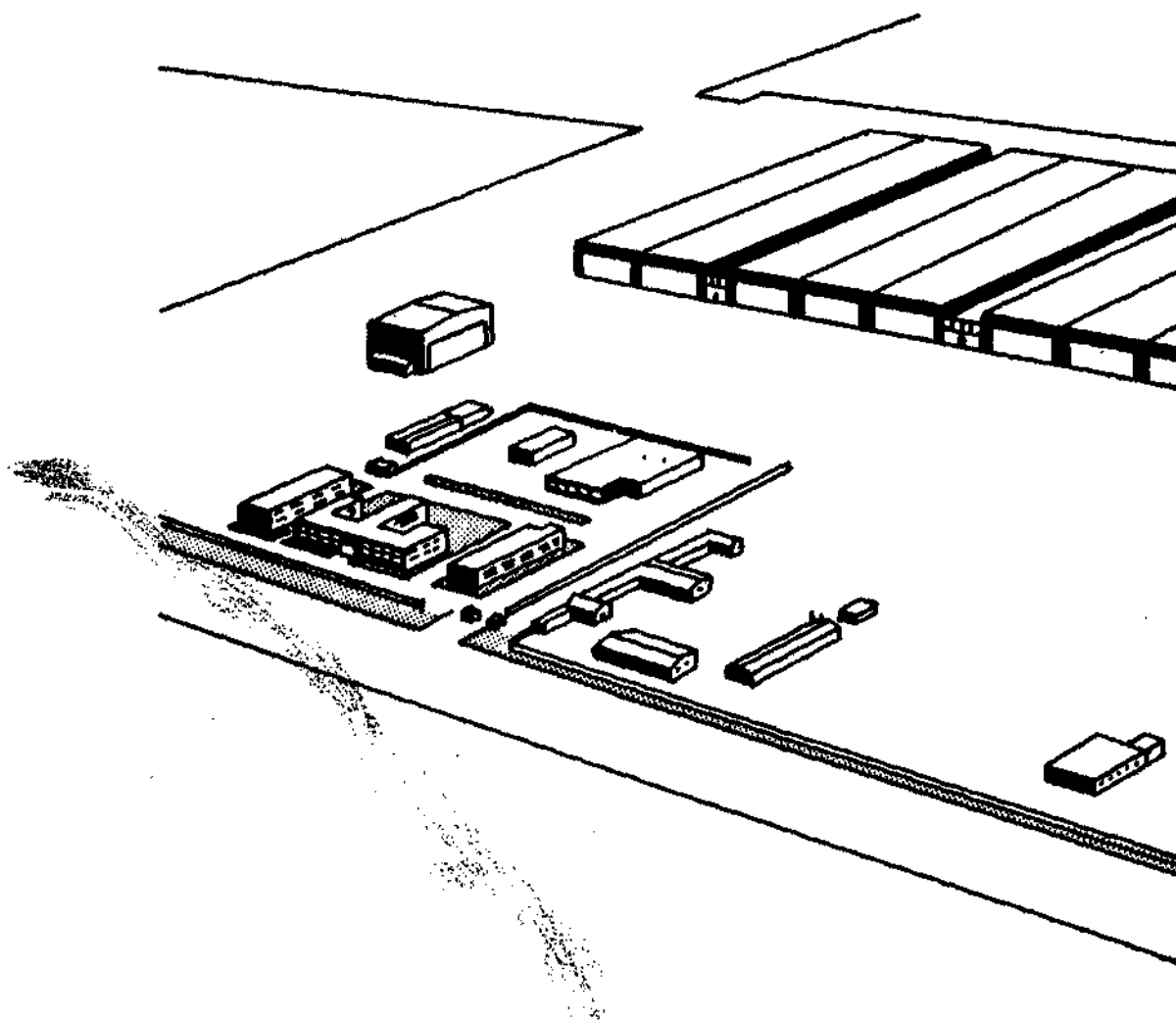
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ANONYMOUS

A/A45Y-1 Internal Defoliant Dispenser System

Hayes International Corporation

# INTERNAL DEFOLIANT DISPENSER SYSTEM



**HAYES**  
INTERNATIONAL CORPORATION

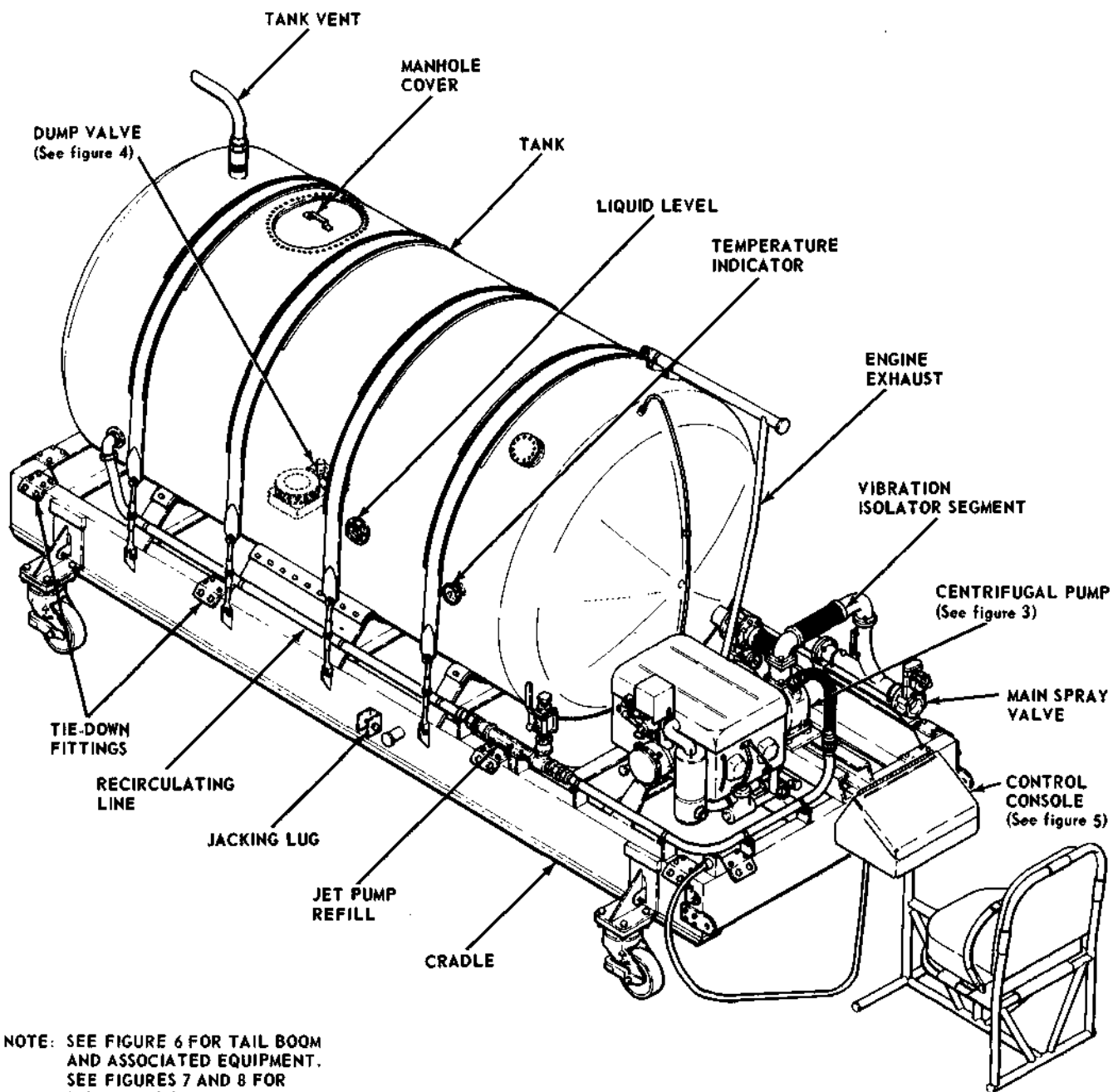
## THE A/A45Y-1 INTERNAL DEFOLIANT DISPENSER

The A/A45Y-1 Internal Defoliant Dispenser, designed and manufactured by Hayes International Corporation, Birmingham, Alabama, is a complete airborne defoliant dispensing system. The dispenser is packaged to permit rapid installation into, and removal from, C-130 and C-123 aircraft, with only minor modifications required to the affected aircraft. See figures 1 and 2.

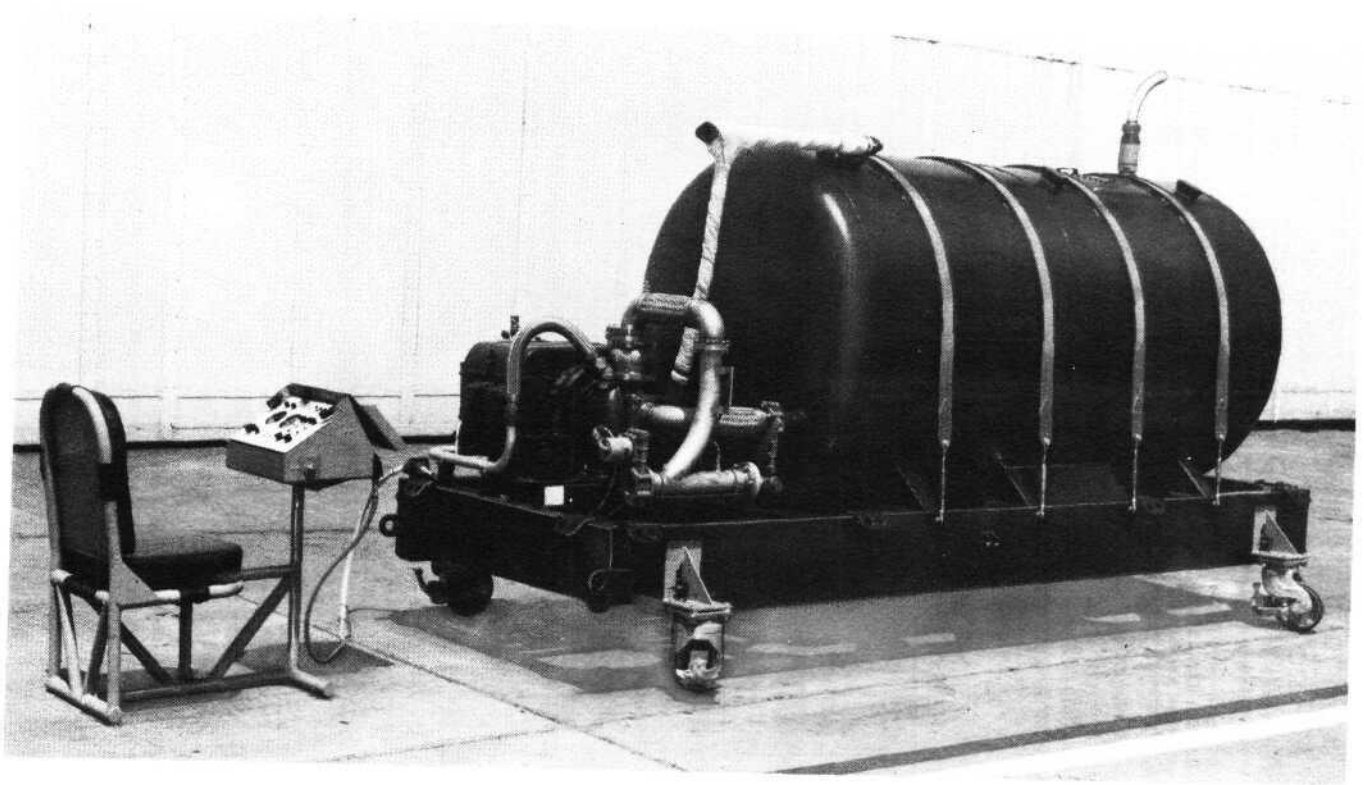
The Internal Defoliant Dispenser, Part No. A/A45Y-1, provides for loading, transporting and dispensing of 1000 gallons of defoliant chemical, and in case of an emergency, dumping the full load overboard in less than 45 seconds. The tank and cradle assembly is mounted on detachable casters which are removed before anchoring in the host aircraft. A control console is electrically connected into an electrical network which in turn is connected to the aircraft electrical system, certain controls and indicators in the flight compartment and the electrically operated units within the system. Pressure is applied to defoliant chemical, by an engine and pump assembly mounted on the same frame with the tank. The defoliant is transported to a nozzle assembly mounted in the slip-stream of the aircraft in such a manner that a strip 250 feet wide along the line

### LEADING PARTICULARS

Length (app)	16 feet, 4 inches
Width (app)	4 feet, 10 inches
Height (app) (without casters)	6 feet, 5 inches
Weight	
Empty	1420 lbs
Full	12,420 lbs
Capacity	1000 gallons
Normal operating pressure	$60 \pm 5$ psi
Normal dispensing interval	3 to 4 minutes
Emergency dump duration	Less than 45 sec.
Electrical system	28 volts dc (supplied by host aircraft)
Dump valve operation	Electrical or manual
Refill time (app)	20 minutes
Dump valve	Electrical, 10 inch
Spray valve	Electrical, 3 inch
Suction valve	Manual, 3 inch



*Figure 1. Major Components of Defoliant Dispenser*



*Figure 2. Defoliant Dispenser (right side)*

of flight is effectively covered. The nozzle assembly is designed for the most effective atomizing of the defoliant and coverage of foliage to be destroyed. The dispensing operation and, in emergency, the dump valve operation can be controlled from either the control console near the tank and cradle assembly or from the pilot's position in the flight compartment.

#### **CAPABILITIES AND LIMITATIONS**

The internal defoliant dispenser is capable of containing 1000 gallons of defoliant which can be completely dumped overboard by remote control or manually in less than 45 seconds. The pump is capable of maintaining  $60 \pm 5$  psi pressure during the normal 4 minute (app) period of operational spraying. Refilling the tank assembly is accomplished with power and equipment contained within the defoliation dispensing system.

#### **TANK AND CRADLE ASSEMBLY**

The tank and cradle assembly is the major unit of the entire system, having; a 1000 gallon tank with baffles, manhole, tube connections and stabilizing and tiedown brackets; an engine and pump assembly which consists of a four cylinder horizontally opposed engine and pump directly coupled to the engine crankshaft; and a cradle which carries the tank, and engine and pump assembly and is provided with four casters which are readily detachable. A temperature gage and a fluid quantity gage are installed in the tank. The engine is slightly modified from its original configuration to achieve adaptability to the requirements of the dispenser system. The detachable casters are to provide limited mobility and are removed when the unit is tied down.

The defoliant used in the dispenser is stored in the tank and is fed through a suction line to the pump (two assemblies used on C-130 aircraft). The pump is driven by an air-cooled engine and forces the defoliant through a discharge line to a spray valve. A recirculation line is provided so that when the spray valve is closed, the defoliant will recirculate back through the tank. When the spray valve is open, the defoliant is forced into the spray boom and atomized by spray nozzles. When the tank is empty, a float-operated switch, located in the tank, automatically stops the engines. On C-130 aircraft, when either tank is empty, the engine of the empty unit will automatically shut down. The spray valve will not automatically close until the second unit's tank empties and the float switch is actuated, shutting down its engine.

The centrifugal pump consists essentially of an impeller and a pump body, and is driven by the engine through a direct drive. The engine drives the pump and the speed of the engine controls the quantity of defoliant being dispensed. See figure 3.

The recirculation line incorporates a jet-pump (ejector) tank refilling system which utilizes the fluid left in the tank from prior operation to initially operate the jet pump.

#### **TEMPERATURE GAGE**

Temperature gage, located on the side of the tank, indicates temperature of the defoliant in the tank.

#### **LIQUID METER**

A liquid meter, located on the side of the tank, indicates the defoliant quantity in the tank.

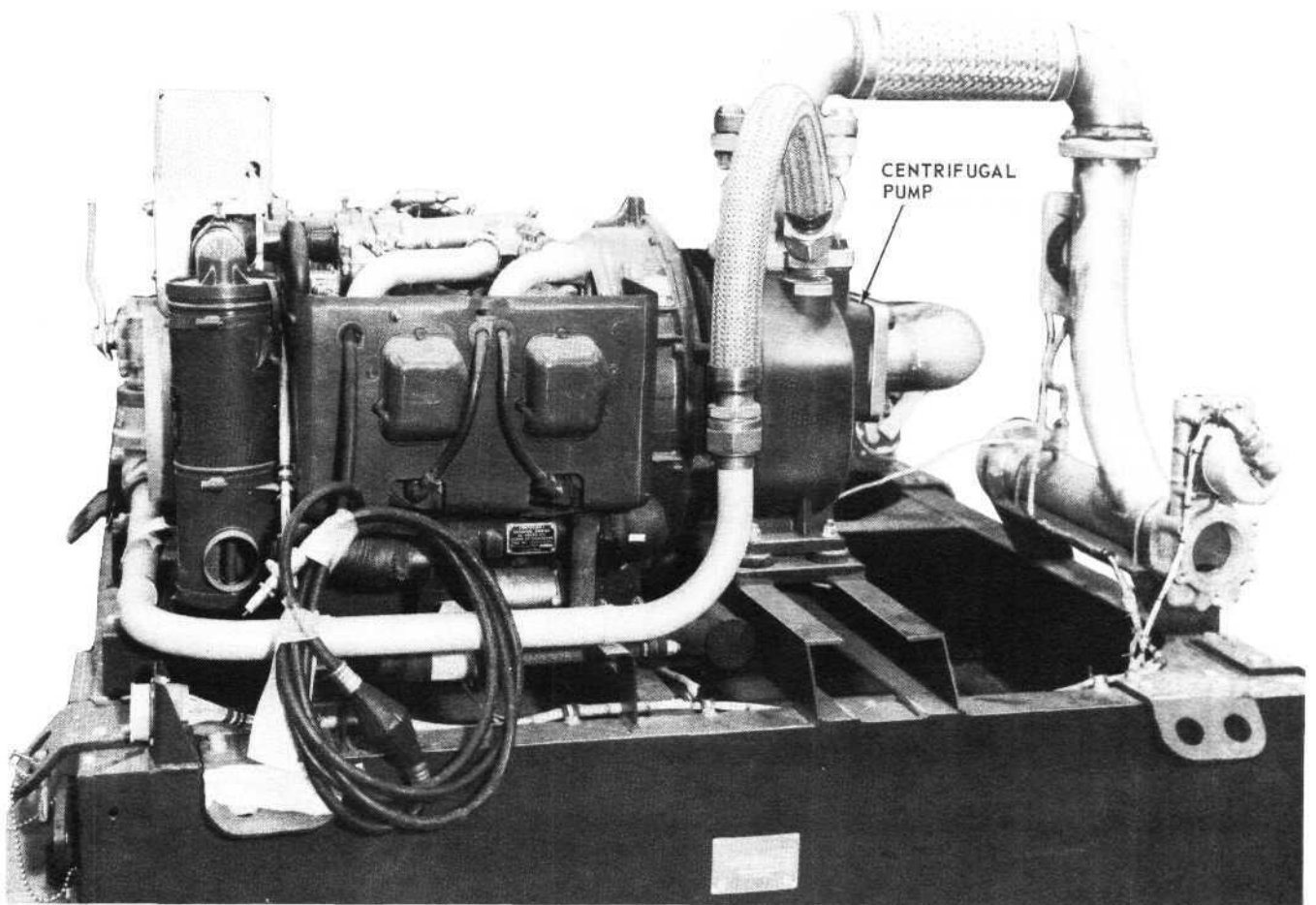
#### **DUMP VALVE**

The dump valve is a 10 inch gate valve having both electrical or manual activation. It is designed for horizontal (vertical flow) installation and liquid flow in only one direction. The bottom of the defoliant tank incorporates a vortex interrupter and adapter to which the dump valve is secured and is in perfect alignment with an opening and spring loaded door in the belly of the aircraft. A high speed motor coupled to an actuator provides 2 second operation of the dump valve in either direction and circuit manipulation to indicate open condition. See figure 4.

#### **CONTROL CONSOLE**

The control console is the nerve center of the defoliation system. All functions are controlled from this position; all monitoring equipment is located in this position; and the electrical supply is channeled and protected at this position. Prefabricated electrical cables tie the control console to all related parts of the system, including the controls on the pilot's instrument panel and the aircraft electrical supply system. Tandem or single installations are controlled and monitored from the control console without any changes or alterations being performed. In the event of electrical power failure of the aircraft electrical system, certain critical functions have an option of manual operation. See figure 5.





*Figure 3. Centrifugal Pump*

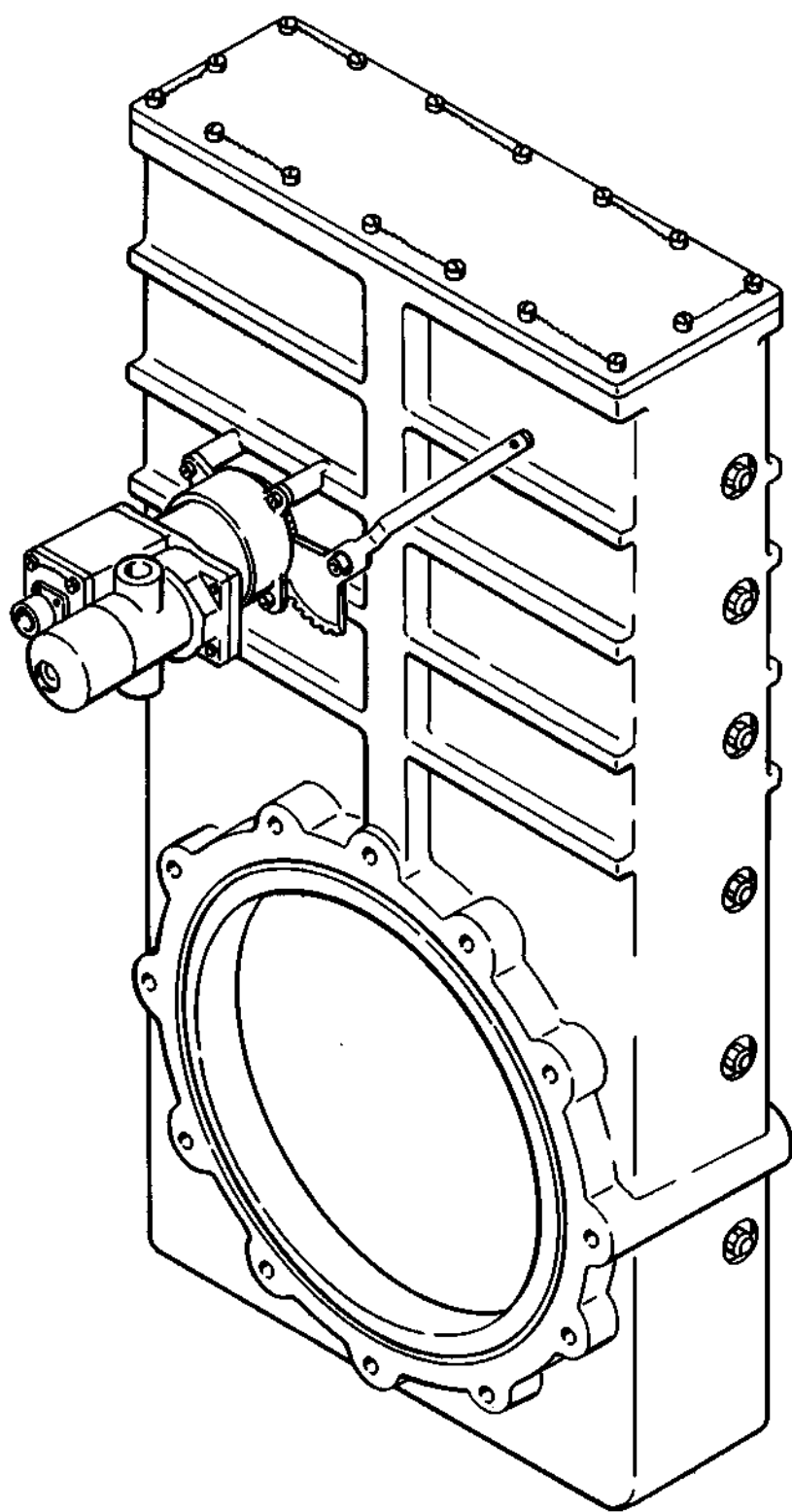


Figure 4. Dump Valve

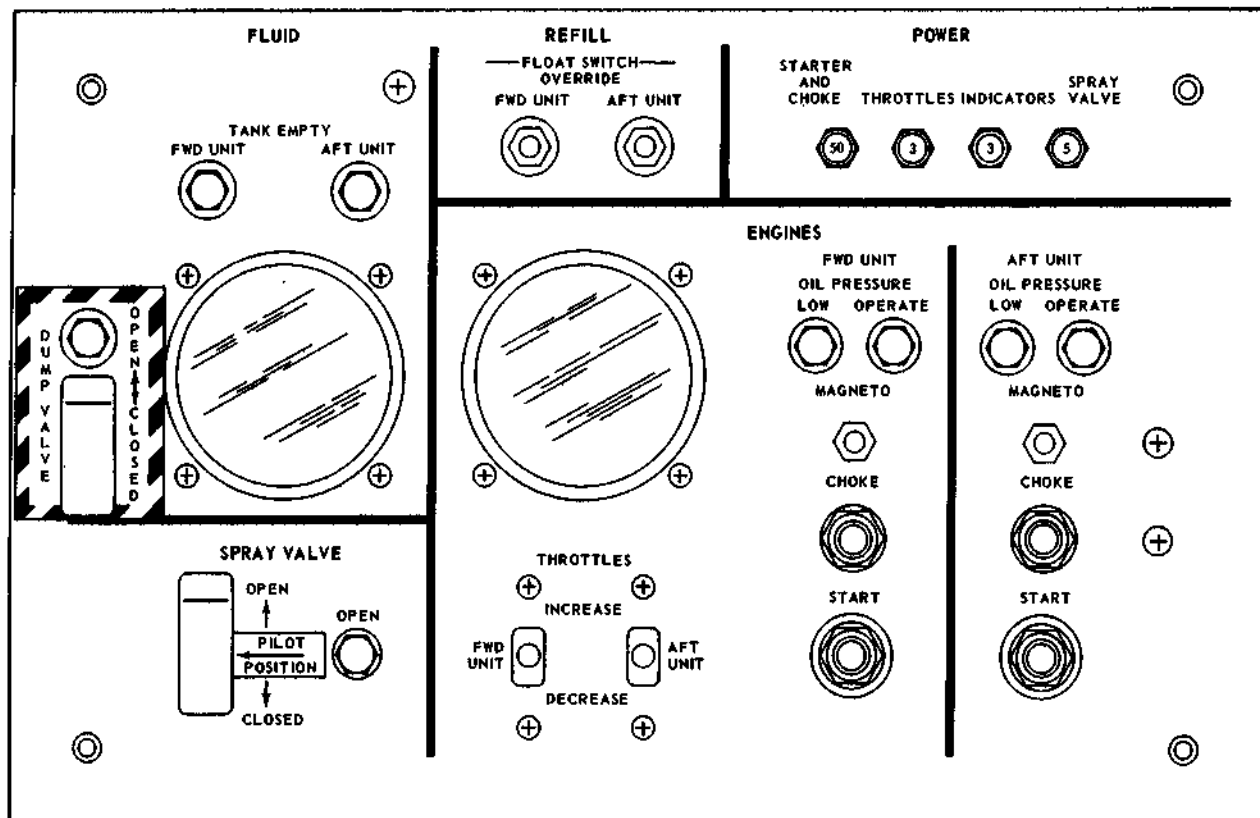


Figure 5. Control Console

## **MAGNETO SWITCH**

The MAGNETO switch (AFT UNIT and FWD UNIT) is a single-pole, double-throw toggle switch used to control the engine magneto. In the down position the engine magneto is grounded; in the up position the ground is removed from the magneto, permitting the engine to run (if tank is not empty).

## **CHOKE SWITCH**

The CHOKE switch (AFT UNIT and FWD UNIT) is a spring-loaded pushbutton switch used to control the solenoid that actuates the engine choke. When pushed in, the CHOKE switch applies power to the engine choke solenoid.

## **START SWITCH**

The START switch (AFT UNIT and FWD UNIT) is a spring-loaded pushbutton switch used to control the engine starter. When pushed in, the START switch applies power to the engine starter. The START switch is guarded to prevent accidental engagement of the engine starter.

## **THROTTLE SWITCH**

The THROTTLE switch (AFT UNIT and FWD UNIT) is a three-position toggle switch, spring-loaded to the neutral position. The switch has INCREASE and DECREASE positions and is used to electrically control the engine throttle through a geared servo-motor. The engine throttle may be set at any intermediate position between minimum and maximum engine rpm by positioning the switch to INCREASE or DECREASE and releasing to the neutral position when desired engine RPM is reached. A governor on the engine regulates maximum engine RPM.

## **SPRAY VALVE SWITCH**

The SPRAY VALVE switch is a single-pole, double-throw toggle switch used to electrically open and close the spray valve. In the OPEN position power is applied to open the spray valve; in the CLOSED position power is applied to close the spray valve. The SPRAY VALVE switch is guarded in the CLOSED position.

A cockpit SPRAY VALVE switch is provided for control of the spraying operation by the pilot.

## **DUMP VALVE SWITCH**

The DUMP VALVE switch, located at the extreme left side of the control panel (figure 5), provides electrical control for the dump valve. The switch is provided with a guard which maintains the switch in the CLOSED position. Placing the switch in the OPEN position actuates the valve motor and opens the dump valve.

The cockpit DUMP VALVE switch provides positive electrical control for opening the dump valve by the pilot. Operation is in conjunction with the console DUMP VALVE switch. Placing either switch in the OPEN position will actuate the dump valve motor and open the dump valve.

## **FLOAT SWITCH OVERRIDE**

The FLOAT SWITCH OVERRIDE (AFT UNIT and FWD UNIT) is a single-pole, double-throw toggle switch (with a holding coil) used to override the float switch (in tank) when the float switch has grounded the magneto. The FLOAT SWITCH OVERRIDE is spring-loaded in the down position and when placed in the up position, enables the engine to be run when the tank is empty (in order to fill the tank using the pump). The holding coil holds the FLOAT SWITCH OVERRIDE in the up position until the float switch is actuated.

## **ENGINE TACHOMETER**

The engine tachometer is dual indicating (two needles) and indicates engine speed in hundreds of RPM.

## **FLUID PRESSURE INDICATOR**

The FLUID pressure indicator indicates fluid pressure in increments of 4 PSI. When properly calibrated this gage can be used as a flow-rate indicator.

## **CIRCUIT BREAKERS**

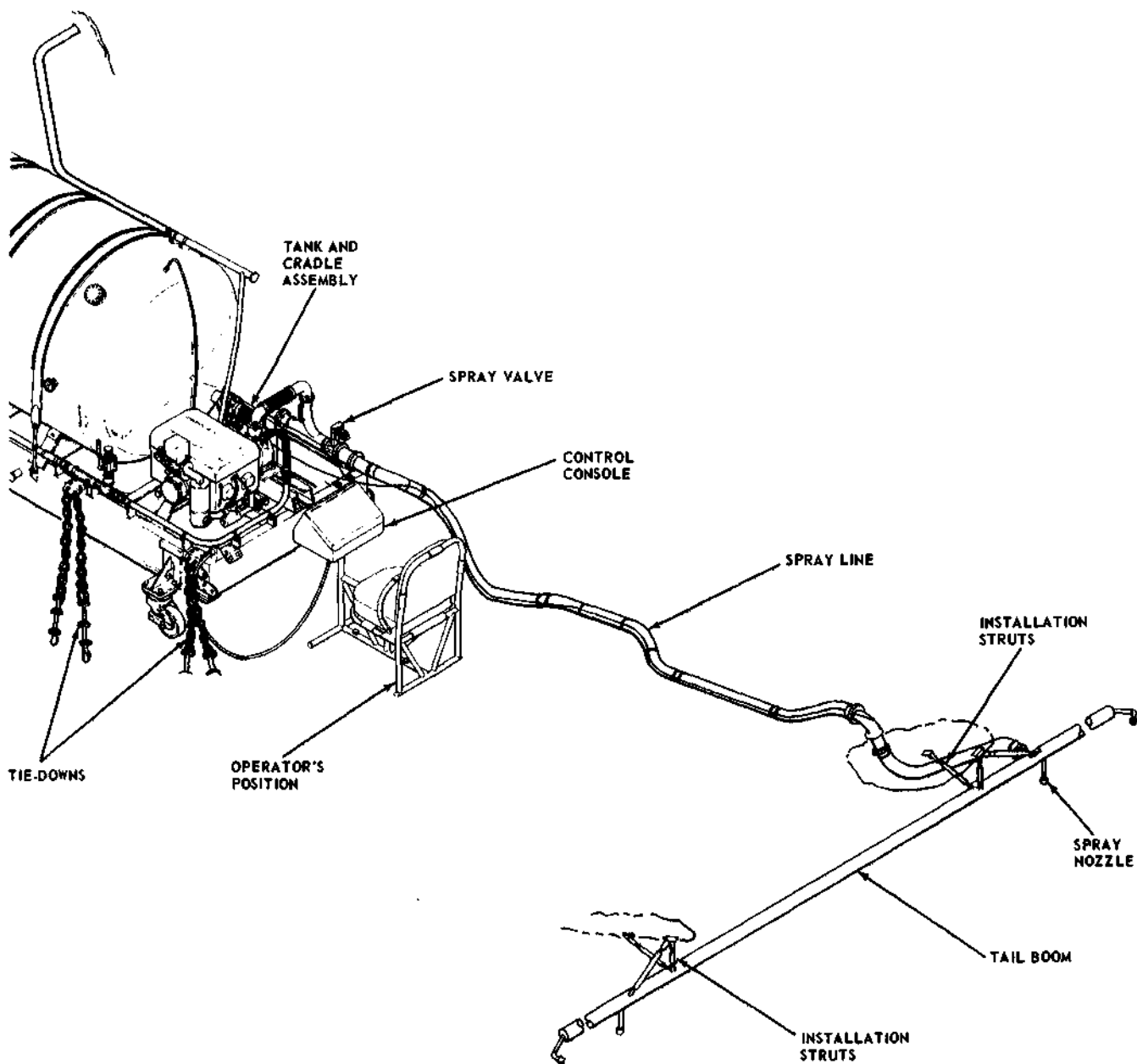
Four circuit breakers (STARTER AND CHOKE, THROTTLES, INDICATORS, and SPRAY VALVE) control power to the control panel and provide protection from electrical overload and short circuits.

## **SPRAY BOOM**

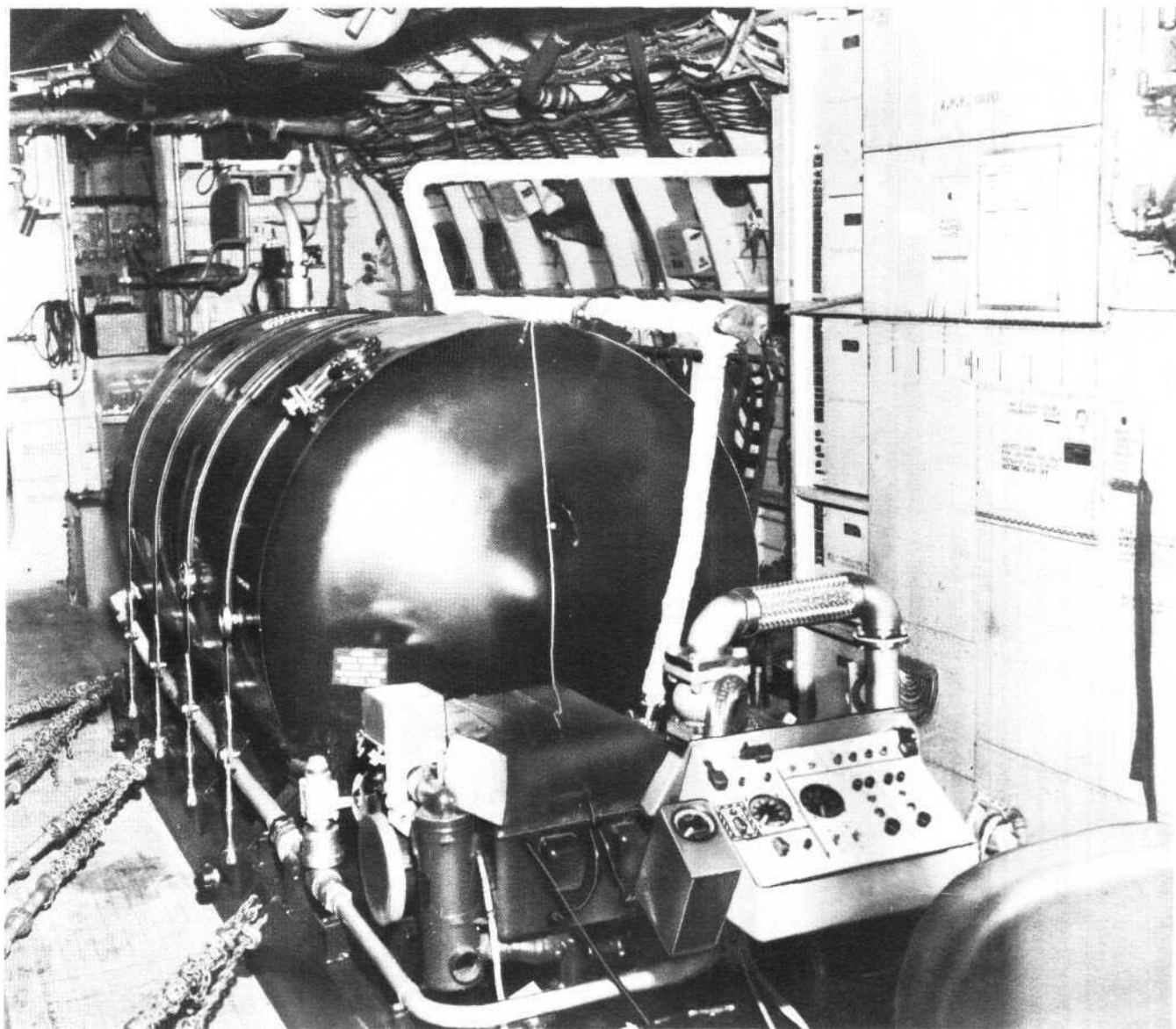
The spray boom (figure 6) is designed to accommodate 18 spray nozzles and provide a method for dispensing the defoliant over a wide area. The spray boom is constructed of 4-1/2 inch diameter steel tubing. The discharge line is off-set from the centerline of the spray boom to allow the aircraft's ramp to operate with the dispenser installed. Eighteen spigots are welded to the spray boom to receive the spray nozzles. C-123 aircraft utilize only 12 of the spray nozzles and the remaining six spigots are capped. The spray boom is attached to the fuselage with six struts.

## **AIRCRAFT INSTALLATION**

The dispenser installation in C-123 aircraft consists of towing the tank and cradle assembly (unfilled) into the aircraft and securing it to the aircraft floor utilizing twenty 10,000-pound hook and chain assemblies and the cargo floor tie-down fittings (figures 7 and 8). All piping and hose assemblies are installed and the console assembly mounted to the aircraft floor. The spray boom and connecting struts are attached to outside fittings on the aircraft and the electrical cables are connected. In the case of the C-130 aircraft, two dispensers are installed in the same manner, and interconnected.

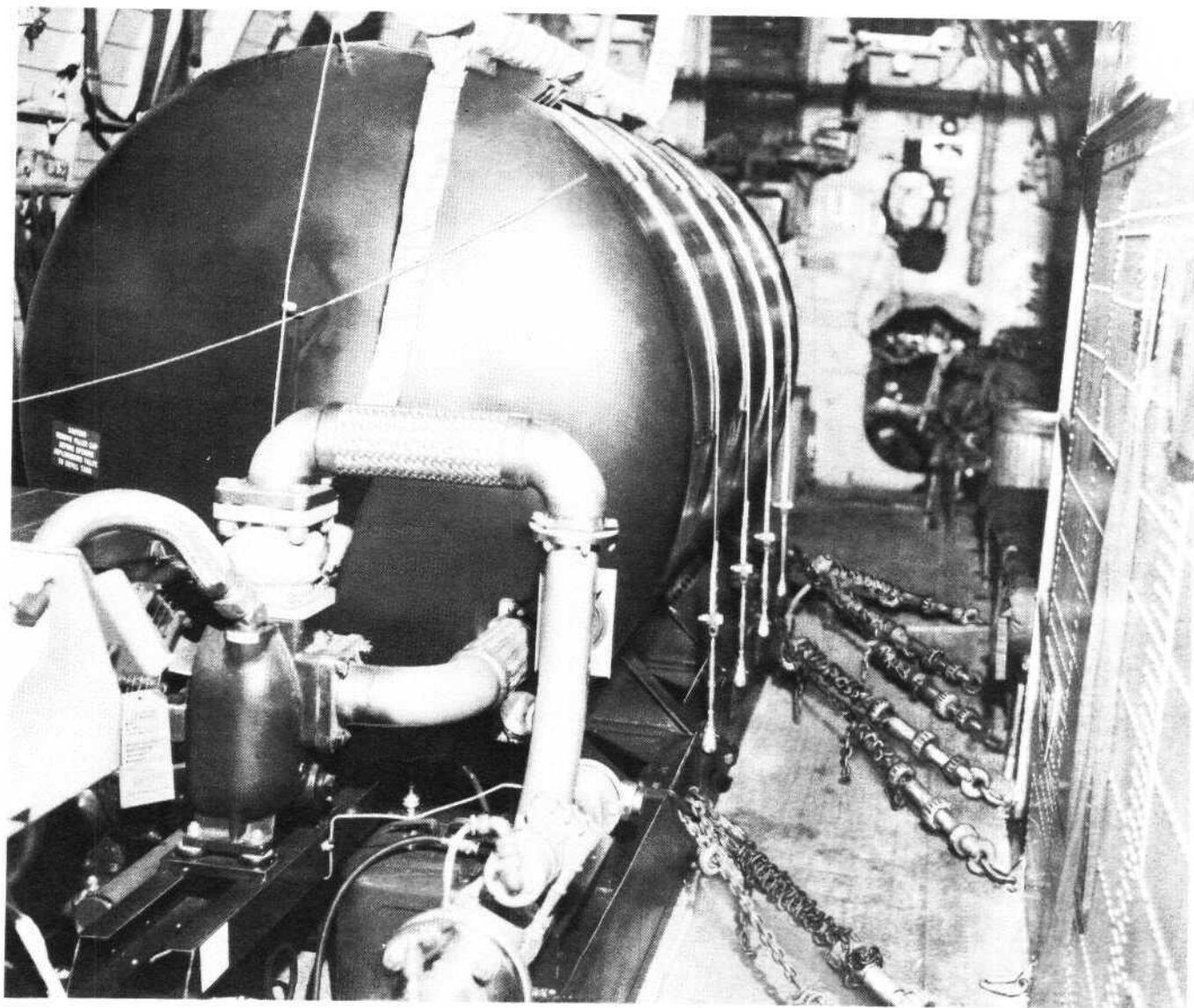


**Figure 6. Spray Boom and Associated Plumbing**



*Figure 7. Installation in C-123 (left side)*





*Figure 8. Installation in C-123 (right side)*