

CHAPTER

38

Water and Waste

CHAPTER 38
WATER AND WASTE

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**WATER/WASTE - INTRODUCTION****Purpose**

The water and waste system supplies potable water to the lavatories and galleys and removes sink and toilet waste. The water and waste system also removes rain water from the door sill areas.

General Description

The water and waste system has these subsystems:

- Potable water
- Air supply
- Waste disposal.

The potable water system supplies water to the lavatories and galleys.

The air supply system pressurizes the water tank.

The waste disposal system removes waste from the lavatories, galleys, and door sill drains.

Abbreviations and Acronyms

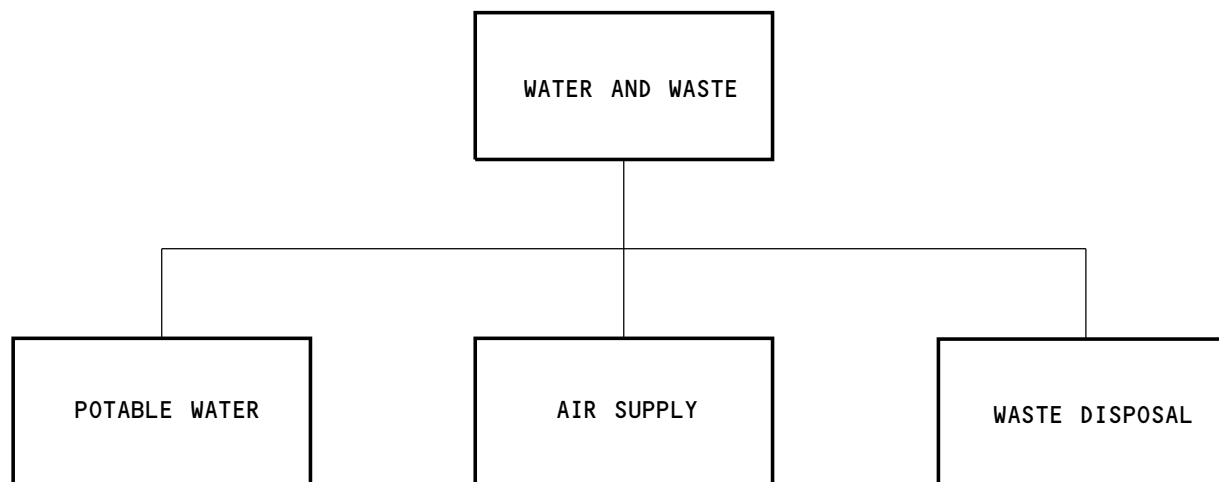
- AC - alternating current
- C - Celsius
- CLS - continuous level sensor
- cont - control
- DC - direct current
- E - empty
- F - Fahrenheit
- F - filter
- F - full
- FCU - flush control unit
- fwd - forward
- H - heater
- ind - indication
- lav - lavatory

- LCM - logic control module
- LED - light emitting diode
- PLS - point level sensor
- psig - pounds per square inch, gauge
- qty - quantity
- ref - reference
- S - switch
- T - transmitter
- TYP - typical

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WATER/WASTE - INTRODUCTION

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**WATER/WASTE - POTABLE WATER - INTRODUCTION****Purpose**

The potable water system supplies water to the lavatories and galleys.

- S - switch
- T - transmitter
- TYP - typical

General Description

The potable water system has these subsystems:

- Passenger water
- Water heating
- Water quantity indication.

The passenger water system supplies water to the lavatories and galleys.

The water heating system heats the water supplied to the lavatory hot water faucets.

The water quantity indication system measures and displays the quantity of water in the potable water system.

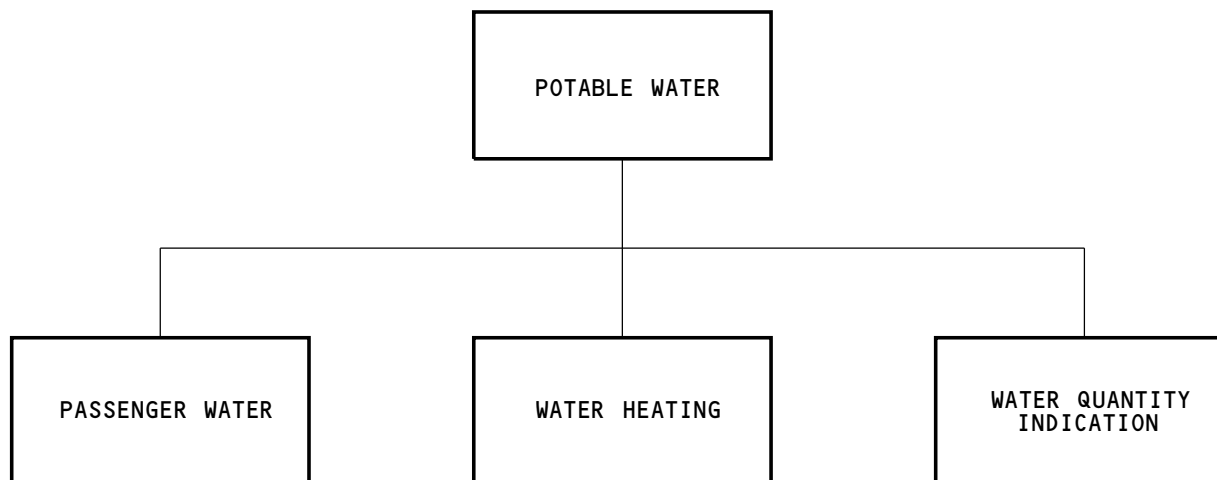
Abbreviations and Acronyms

- AC - alternating current
- C - Celsius
- DC - direct current
- E - empty
- F - Fahrenheit
- F - full
- fwd - forward
- H - heater
- ind - indication
- lav - lavatory
- LED - light emitting diode
- psig - pounds per square inch, gauge
- QTY - quantity
- REF - reference

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WATER/WASTE - POTABLE WATER - INTRODUCTION

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**WATER/WASTE - POTABLE WATER - FUNCTIONAL DESCRIPTION****Functional Description**

The potable water system has one tank that holds potable water.

You fill and drain the water tank at the water service panel.

To fill the water tank, open the fill/overflow valve and add water through the potable water fill fitting until the water flows from the potable water drain port.

The water tank supplies water to these locations:

- Galley faucets
- Lavatory faucets
- Lavatory toilets.

Each lavatory has a water supply shutoff valve. The water supply shutoff valve lets you isolate the water supply to the sink or to the toilet. The water supply shutoff valve also lets you isolate the sink and the toilet at the same time.

The forward lavatory has a drain valve. The forward lavatory drain valve drains water from the forward water supply lines.

A water heater in each lavatory increases the temperature of the water supplied to the hot water faucet.

The water tank level sensor sends the water quantity data to a water quantity transmitter. The water quantity transmitter sends the data to a water quantity indicator at the attendant panel. The water quantity indicator shows the level of water in the tank.

To drain the potable water system, you open these valves:

- Water tank drain valve
- Forward lavatory drain valve (forward lavatory only)
- Lavatory water supply shutoff valves (one in each lavatory).

When you drain the potable water system, the water drains overboard through the forward and aft potable water drain ports.

Training Information Point

When you drain the potable water system, you must drain water from these two areas:

- Water service panel
- Forward lavatory.

The water service panel lets you drain the water tank and aft supply lines. The forward lavatory has a drain valve that lets you drain the forward water supply lines.

When you drain the potable water system, you must turn the water supply shutoff valves in each lavatory to the SUPPLY ON position. If you do not turn the water supply shutoff valve to the SUPPLY ON position, water will not drain from the toilet or lavatory faucets.

WARNING: DRAIN, OR USE THE POTABLE WATER SYSTEM A MINIMUM OF ONE TIME EACH THREE DAYS. IF YOU DO NOT DRAIN, OR USE THE WATER SYSTEM FREQUENTLY, BACTERIA CAN GROW IN THE WATER. IF YOU DRINK WATER WITH BACTERIA IN IT, ILLNESS CAN OCCUR.

CAUTION: DRAIN THE WATER SYSTEM. IF THE WATERLINES HAVE WATER IN THEM, THEY CAN FREEZE IN COLD WEATHER. THIS CAN CAUSE DAMAGE TO THE WATERLINES.

You must fully drain the potable water system before you add a disinfectant or when you park the airplane in cold weather.

WARNING: SEAL THE CARGO COMPARTMENT WITH THE LINING. OBEY THE INSTRUCTIONS IN THE SPECIFIED PROCEDURE WHEN YOU INSTALL THE LINING. IF YOU INSTALL THE LINING INCORRECTLY, THE SMOKE CAN GET INTO THE PASSENGER COMPARTMENT DURING A FIRE.

You must remove the cargo compartment lining to get access to some of the potable water system components. Make sure you correctly replace the lining when you are done.

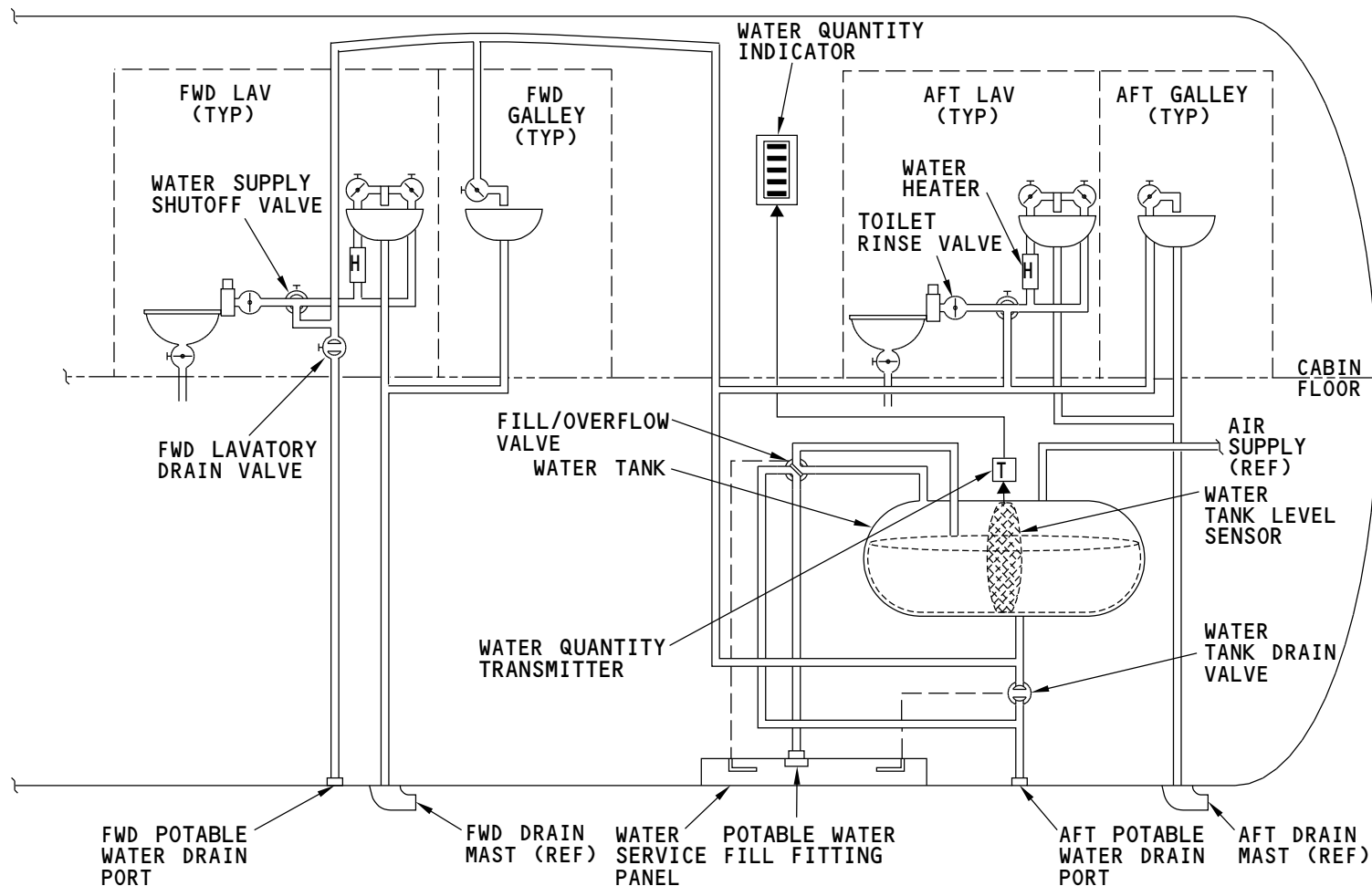
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WATER/WASTE - POTABLE WATER - FUNCTIONAL DESCRIPTION

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**WATER/WASTE - PASSENGER WATER SYSTEM - WATER SERVICE PANEL****Purpose**

The water service panel lets you fill the potable water system. The water service panel also lets you drain the water tank and part of the potable water system.

Location

The water service panel is at the aft section of the fuselage, bottom right side. There are two snap-latches to open the water service panel door.

Access to the inside of the water service panel is from the aft cargo compartment. The water service panel is under the floor on the aft right side of the cargo compartment.

Physical Description

The water service panel has these components:

- Fill/overflow valve handle
- Water tank drain valve handle
- Compressor cut-out switch
- Potable water fill fitting.

Functional Description

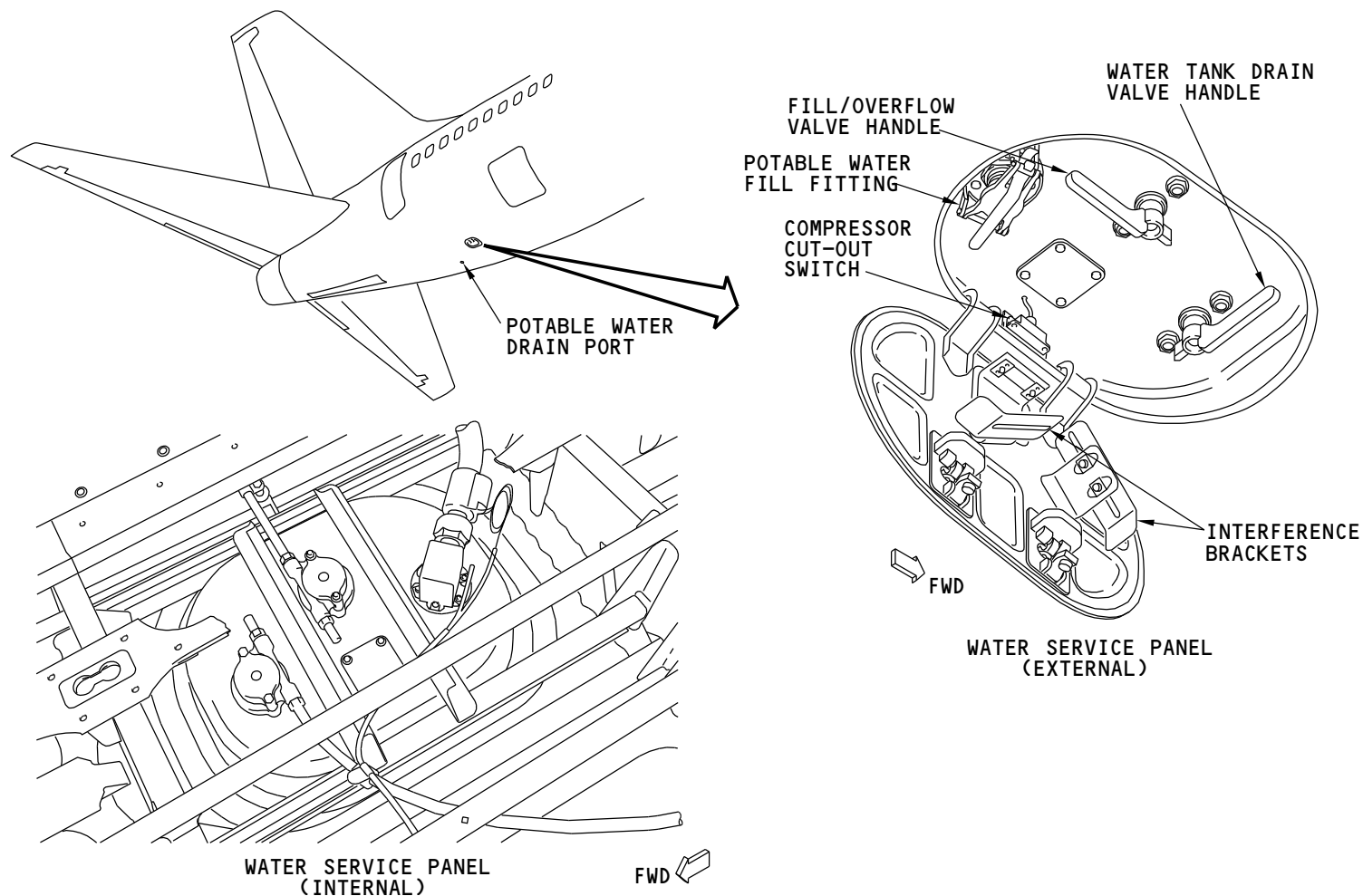
The water service hose connects to the potable water fill fitting. The fill/overflow valve handle lets you open the fill/overflow valve. The fill/overflow valve lets water fill the water tank. The fill/overflow valve also lets air flow overboard from the tank during the fill process. When the tank is at its maximum capacity, water flows overboard through the overflow drain line and potable water drain port.

To drain the tank, open the water tank drain valve. The open water tank drain valve lets water flow out of the water tank and the aft distribution lines.

The compressor cut-out switch stops operation of the air compressor when the water service panel door is open.

Interference brackets on the water service panel door prevent the door from closing if a valve handle is in the wrong position for flight.

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WATER/WASTE - PASSENGER WATER SYSTEM - WATER SERVICE PANEL

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WATER/WASTE - PASSENGER WATER SYSTEM - FILL/OVERFLOW VALVE AND CONTROL CABLE

Purpose

The fill/overflow valve lets you fill the water tank. The control cable lets you open and close the fill/overflow valve from the service panel.

Location

The fill/overflow valve is on the right side of the aft cargo compartment. The valve is on the ceiling on the right side of the water tank, aft of the aft cargo compartment bulkhead liner.

The control cable is on the right side of the aft cargo compartment between the water service panel and the fill/overflow valve.

Physical Description

The fill/overflow valve is a four-port rotary valve. The valve operates by manual input and has open and closed positions. The control cable is a rotary-in rotary-out cable.

The control cable attaches the fill/overflow valve handle on the water service panel to the fill/overflow valve.

Functional Description

The fill/overflow valve has these functions:

- Lets water flow into the water tank from the potable water fill fitting
- Lets air out of the water tank to vent overboard as the tank fills with water
- Lets water flow overboard when water volume reaches the standpipe
- Depressurizes the water tank for system service or maintenance.

The control cable has a rotary actuator input at the water service panel. The control cable transmits movement to the fill/overflow valve at a rotary actuator on the valve.

When you put the fill/overflow valve in the open position, the potable water fill line connects to the water tank fill line and the water tank overflow line connects to the potable water drain line.

When you put the fill/overflow valve in the closed position, the potable water fill line connects to the potable water drain line and the water tank fill line connects to the water tank overflow line.

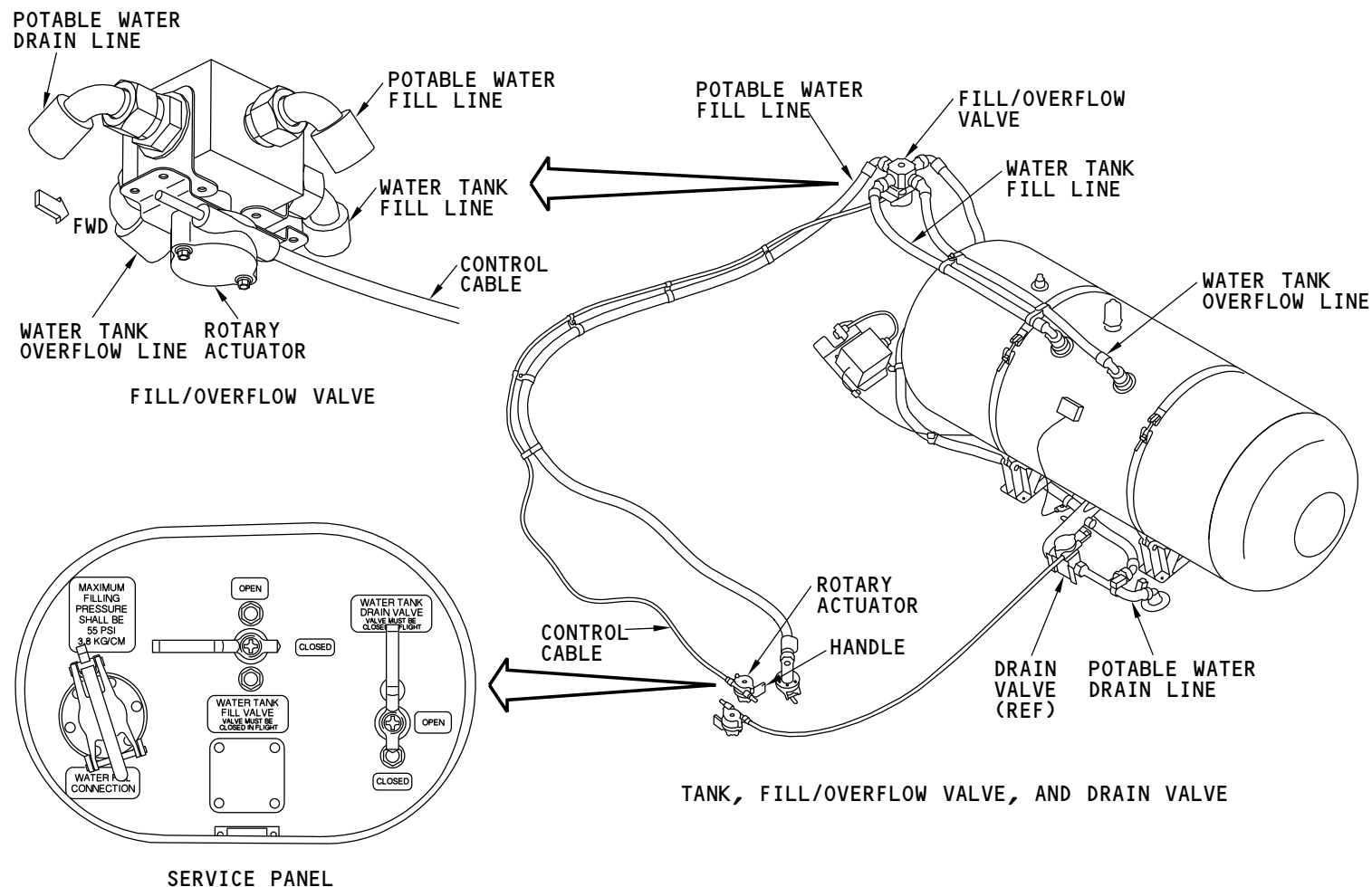
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WATER/WASTE - PASSENGER WATER SYSTEM - FILL/OVERFLOW VALVE AND CONTROL CABLE

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**WATER/WASTE - PASSENGER WATER SYSTEM - WATER TANK DRAIN VALVE AND CONTROL CABLE****Purpose**

The water tank drain valve lets water drain overboard from the water tank and the aft water distribution lines.

The control cable lets you open and close the water tank drain valve from the water service panel.

Location

The water tank drain valve is behind the aft bulkhead of the aft cargo compartment. The valve is forward and below the water tank.

The control cable is below the cargo floor and is between the water service panel and the water tank drain valve.

Physical Description

The water tank drain valve is a two-port, single-ball, dual-seal valve. The valve operates by manual input and has open and closed positions. The control cable is a rotary-in rotary-out cable.

The control cable attaches the water tank drain valve handle on the water service panel to the water tank drain valve.

Functional Description

The control cable has a rotary actuator input at the water service panel. The control cable transmits movement to the water tank drain valve at a rotary actuator on the valve.

Training Information Point

You must drain the water system at two locations to remove all the water in the passenger water system. To fully drain the water system, use the forward lavatory drain valve and the water tank drain valve.

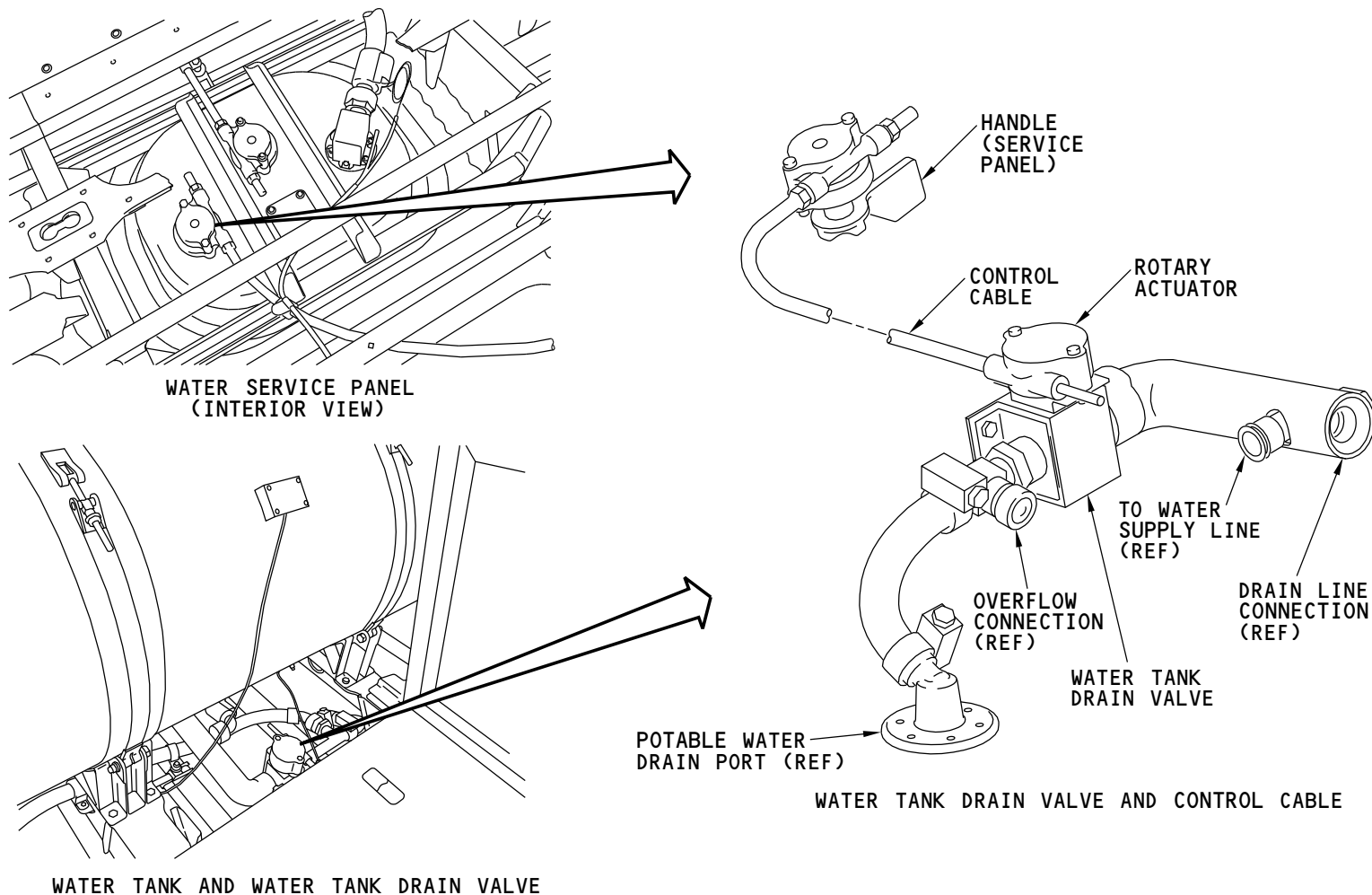
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WATER/WASTE - PASSENGER WATER SYSTEM - WATER TANK DRAIN VALVE AND CONTROL CABLE

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**WATER/WASTE - PASSENGER WATER SYSTEM - WATER TANK****Purpose**

The water tank holds potable water.

Location

The water tank is aft of the aft cargo compartment. You must remove the aft bulkhead cargo lining to get access to the tank.

Physical Description

The water tank is a composite structure. The inner element is a molded thermoplastic lining.

The water tank capacity is 62.1 gallons (235 liters). A standpipe decreases the maximum capacity to 60 gallons (227 liters).

The water tank has these parts:

- Access cover (2)
- Water tank pressurization fitting
- Pressure switch
- Water overflow fitting (standpipe)
- Water fill fitting
- Water level sensor
- Drain fitting
- Bonding stud.

The water level sensor is a copper mesh capacitance sensor. The sensor is bonded to the outside of the lining. The sensor is a permanent part of the tank.

Training Information Point

The 62.1 gallon tank can have these sizes of standpipes:

- 40 gallon (151 liter)
- 50 gallon (189 liter)
- 60 gallon (227 liter).

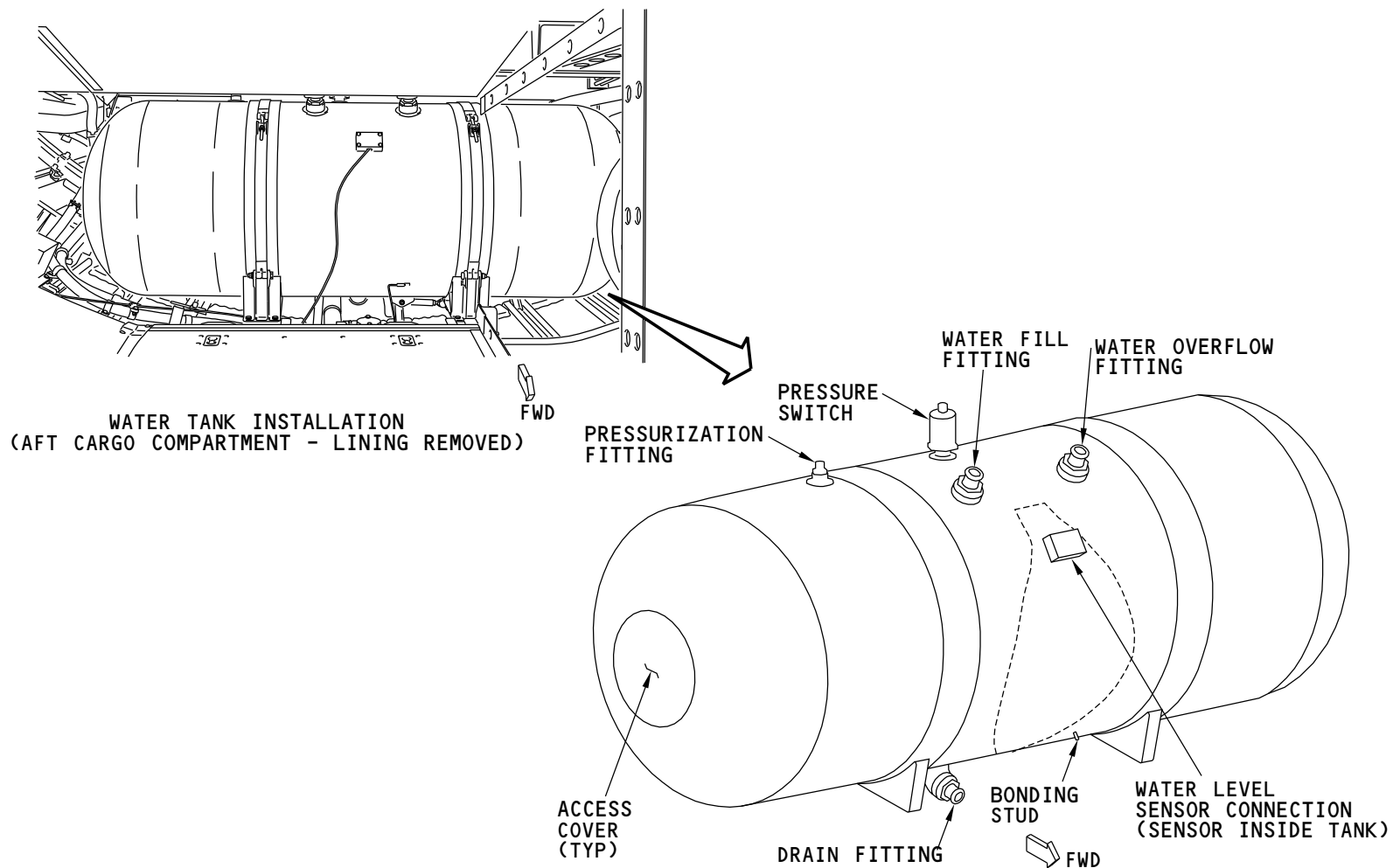
The standpipes are interchangeable for different route requirements. When you install a different standpipe, you must also change the water quantity transmitter adapter cable. If you do not use the correct transmitter adapter cable, the water quantity indicator will not show the correct water level.

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M87350 S0004631184_V1

WATER/WASTE - PASSENGER WATER SYSTEM - WATER TANK

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**WATER/WASTE - PASSENGER WATER SYSTEM - LAVATORY WATER SUPPLY SHUTOFF VALVE****Purpose**

The lavatory water supply shutoff valve lets you isolate the flow of water to the lavatory components.

Location

Each lavatory has a lavatory water supply shutoff valve. You open the sink cabinet door to get access to the valve. The valve is in the lower area of the cabinet.

Physical Description

The lavatory water supply shutoff valve is a four-way valve. The valve has a valve body and a control handle (yellow with a red indicator point). These four positions show on the valve body:

- OFF
- TOILET ONLY
- SUPPLY ON
- FAUCET ONLY.

The valve has one line in and two lines out.

Functional Description

The valve handle lets you turn the valve to one of four positions.

When you turn the valve to the OFF position, the valve shuts off water to all of the lavatory components.

In the TOILET ONLY position, water goes to the toilet only.

In the SUPPLY ON position, water goes to the faucet and toilet.

In the FAUCET ONLY position, water goes to the faucet only.

Training Information Point

Before you work on the lavatory components, turn the lavatory water supply shutoff valve to the OFF position. When you turn the valve to the OFF position, water will not flow through any open lines.

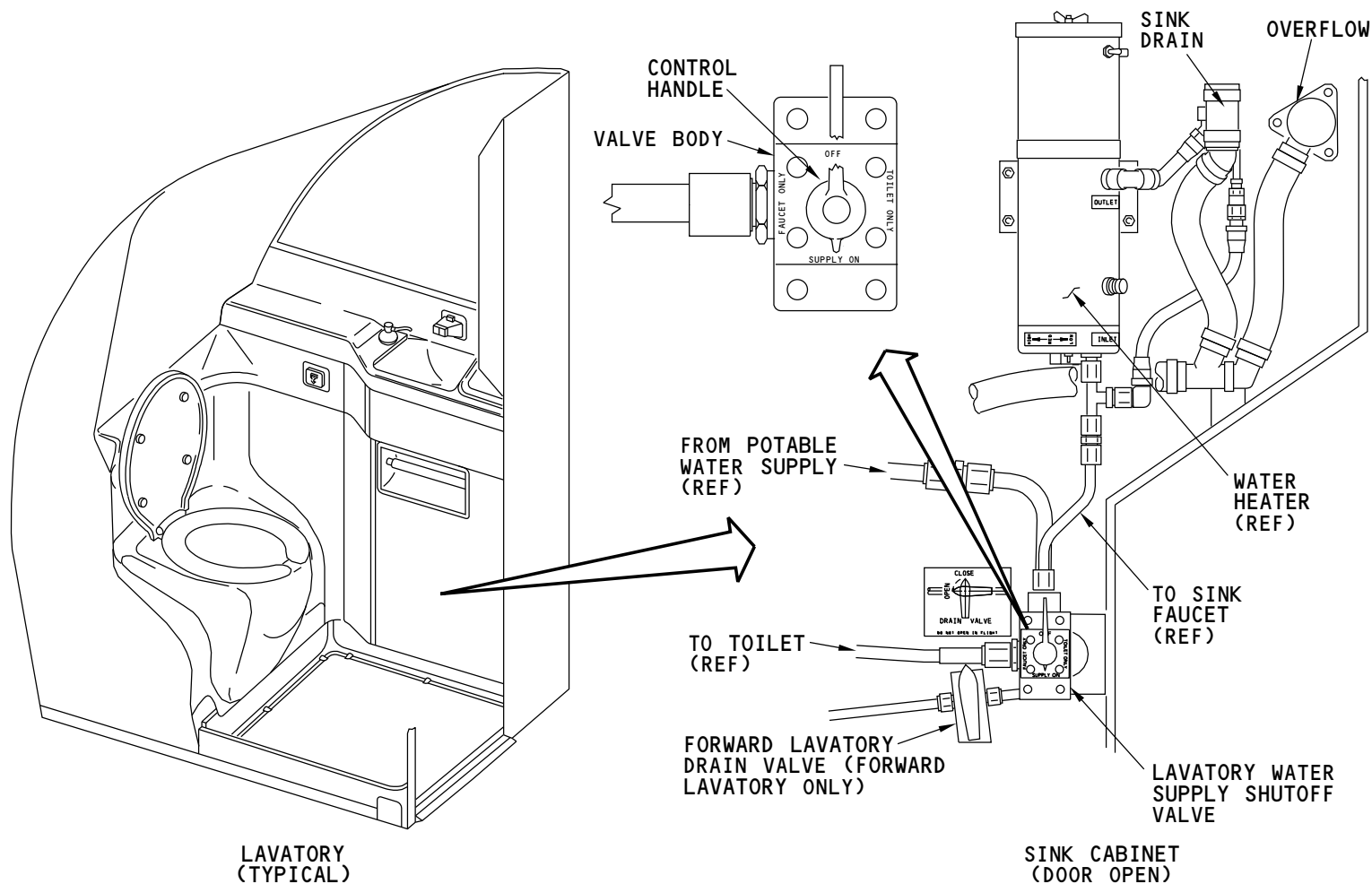
You must turn the lavatory water supply shutoff valve to the SUPPLY ON position when you drain the lavatory supply lines. If you do not turn the valve to the SUPPLY ON position, then the water will not drain from the faucet or toilet supply lines.

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M87365 S0004631186_V1

WATER/WASTE - PASSENGER WATER SYSTEM - LAVATORY WATER SUPPLY SHUTOFF VALVE

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**WATER/WASTE - PASSENGER WATER SYSTEM - FORWARD LAVATORY DRAIN VALVE****Purpose**

The forward lavatory drain valve lets you drain the water from the forward lavatory supply lines.

Location

The forward lavatory drain valve is only in lavatory A (the most forward lavatory). You remove the sink cabinet panel to get access to the valve. The valve is in the lower area of the cabinet.

Physical Description

The forward lavatory drain valve operates manually. The valve has a valve body and a red handle.

Functional Description

The handle lets you put the valve in the OPEN or CLOSE position.

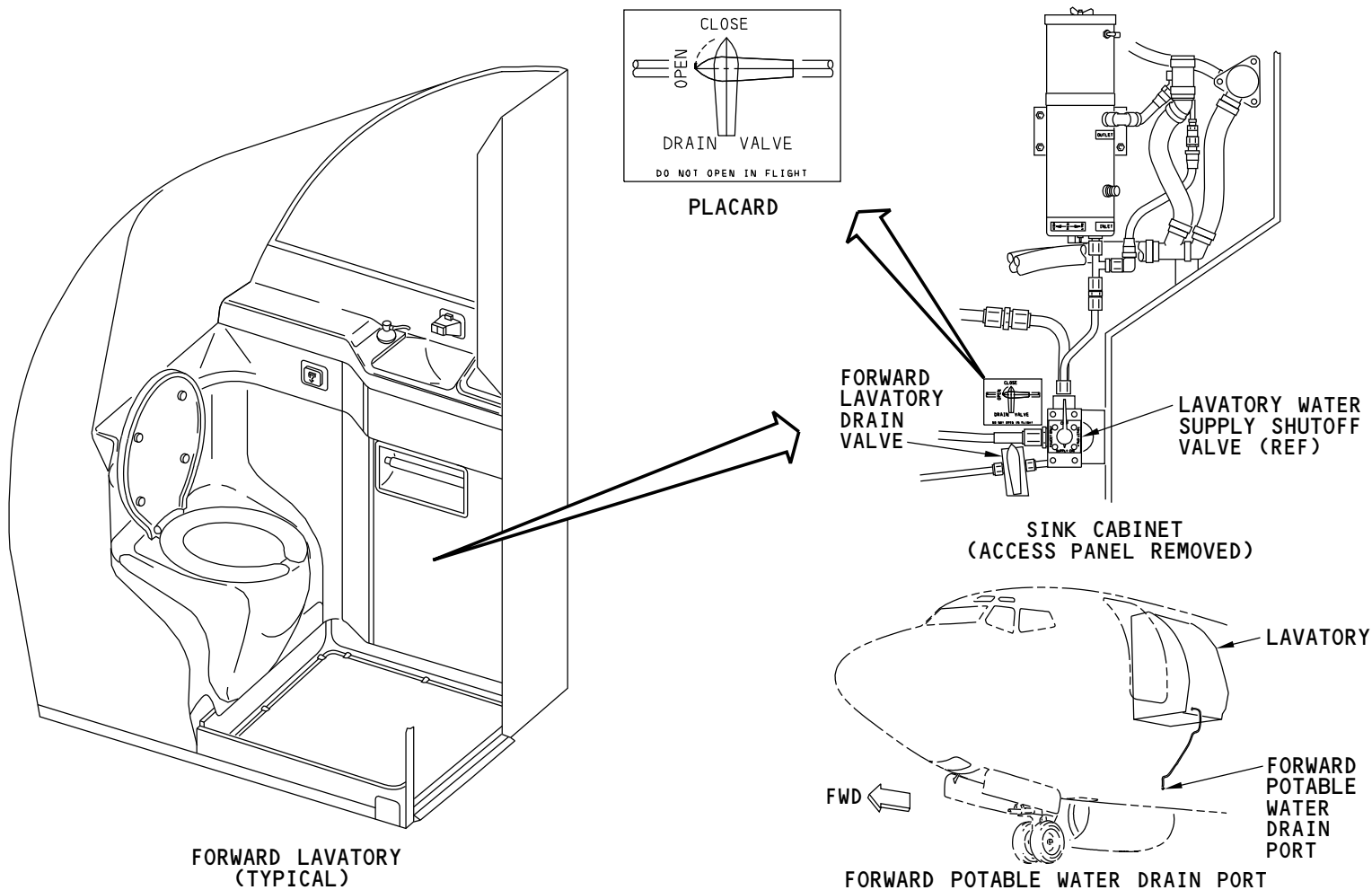
In the OPEN position, the forward lavatory drain valve lets the water drain from all the forward lavatory and galley supply lines. The water drains through the forward potable water drain port.

In the CLOSE position, the water from the supply lines flows to the lavatory and galley components. Water does not flow overboard.

A placard shows the valve in the OPEN and CLOSE positions.

Training Information Point

You must put the forward lavatory drain valve in the CLOSE position before you operate the water system. If you do not put the valve in the CLOSE position, water will drain from the forward lavatory during operation.



**FORWARD LAVATORY
(TYPICAL)**

FWD

FORWARD POTABLE WATER DRAIN PORT

M87362 S0004631190_V1

WATER/WASTE - PASSENGER WATER SYSTEM - FORWARD LAVATORY DRAIN VALVE

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**WATER/WASTE - PASSENGER WATER SYSTEM - LAVATORY FAUCET****Purpose**

The lavatory faucet controls the hot and cold water supply to the lavatory sink.

Location

There is a faucet in each lavatory. The faucet is on the sink backsplash.

Physical Description

These are the parts on the outside of the faucet:

- Knob
- Setscrew
- Decorative cover
- Drain rod
- Aerator

| The setscrew attaches the knob to the decorative cover of the faucet.

The hydraulic timer lets you adjust the water flow from 5 seconds to 11 seconds. Turn the hydraulic timer to adjust timing using an Allen-head wrench. Clockwise for slower timing, and counterclockwise for faster timing.

Functional Description

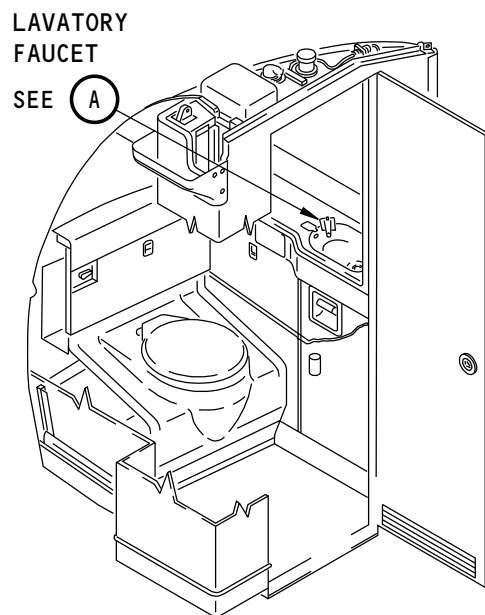
| The knob operates the cartridge valve and the hydraulic timer. The hydraulic timer lets water flow through the valve for a specified time. Turn faucet knob for desired temperature.

The faucets are self-venting. You do not have to open the faucets to drain the potable water system.

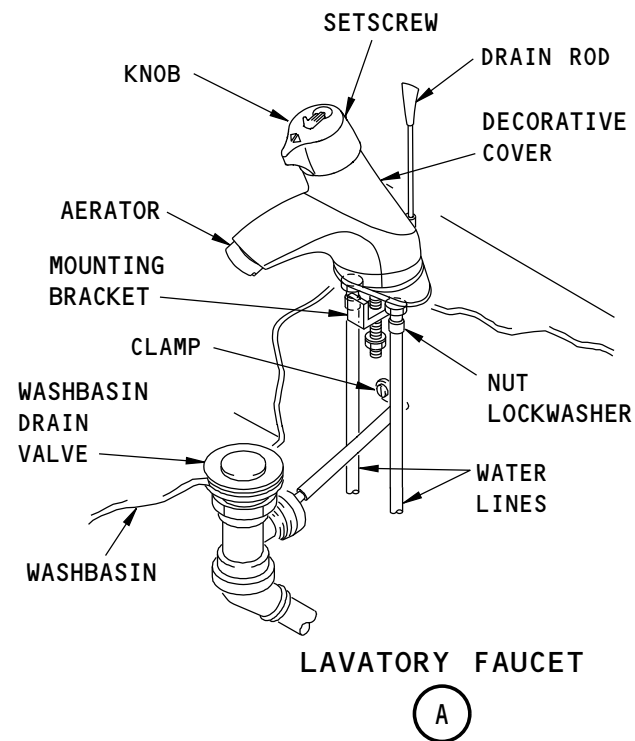
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LAVATORY
(EXAMPLE)



LAVATORY FAUCET

1308962 S0000227146_V1

WATER/WASTE - PASSENGER WATER SYSTEM - LAVATORY FAUCET

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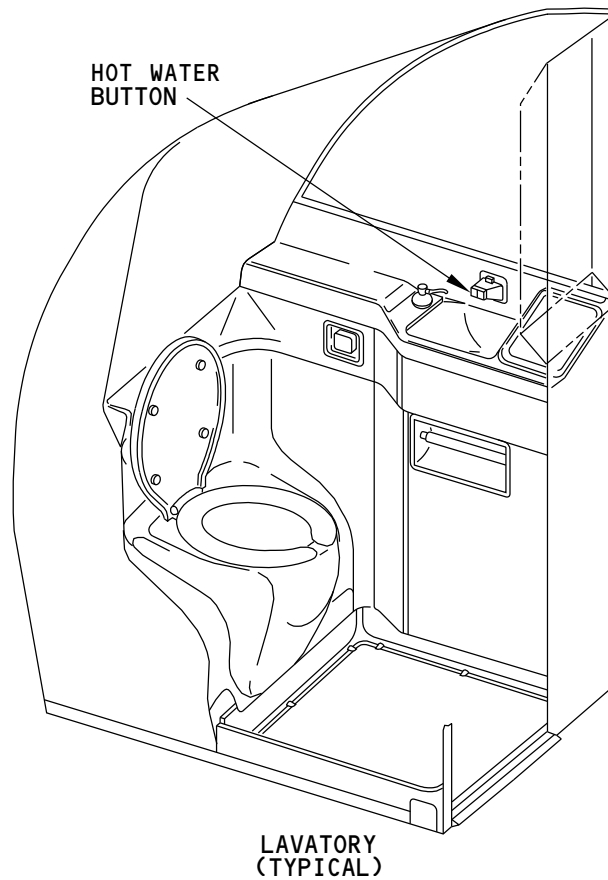
WATER/WASTE - WATER HEATING - INTRODUCTION

Purpose

The water heating system supplies hot water to the lavatory hot water faucet.

Abbreviations and Acronyms

- AC - alternating current
- C - Celsius
- F - Fahrenheit
- psig - pounds per square inch, gauge
- REF - reference
- TYP - typical
- v - volts



M87376 S0004631202_V1

WATER/WASTE - WATER HEATING - INTRODUCTION

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**WATER/WASTE - WATER HEATING - WATER HEATER****Purpose**

The water heater increases the temperature of water supplied to the lavatory hot water faucet.

Location

There is a water heater in each lavatory. You open the sink cabinet door to get access to the water heater.

Physical Description

The water heater has these parts:

- Power switch
- Temperature selector switch
- Power indicator light
- Cover
- Overheat switch
- Pressure relief valve.

The temperature selector switch sets the water temperature to one of these three temperatures:

- LOW (105F/40C)
- MEDIUM (115F/46C)
- HIGH (125F/52C).

The power indicator light shows that power is available and that the overheat switch is closed (no overheat).

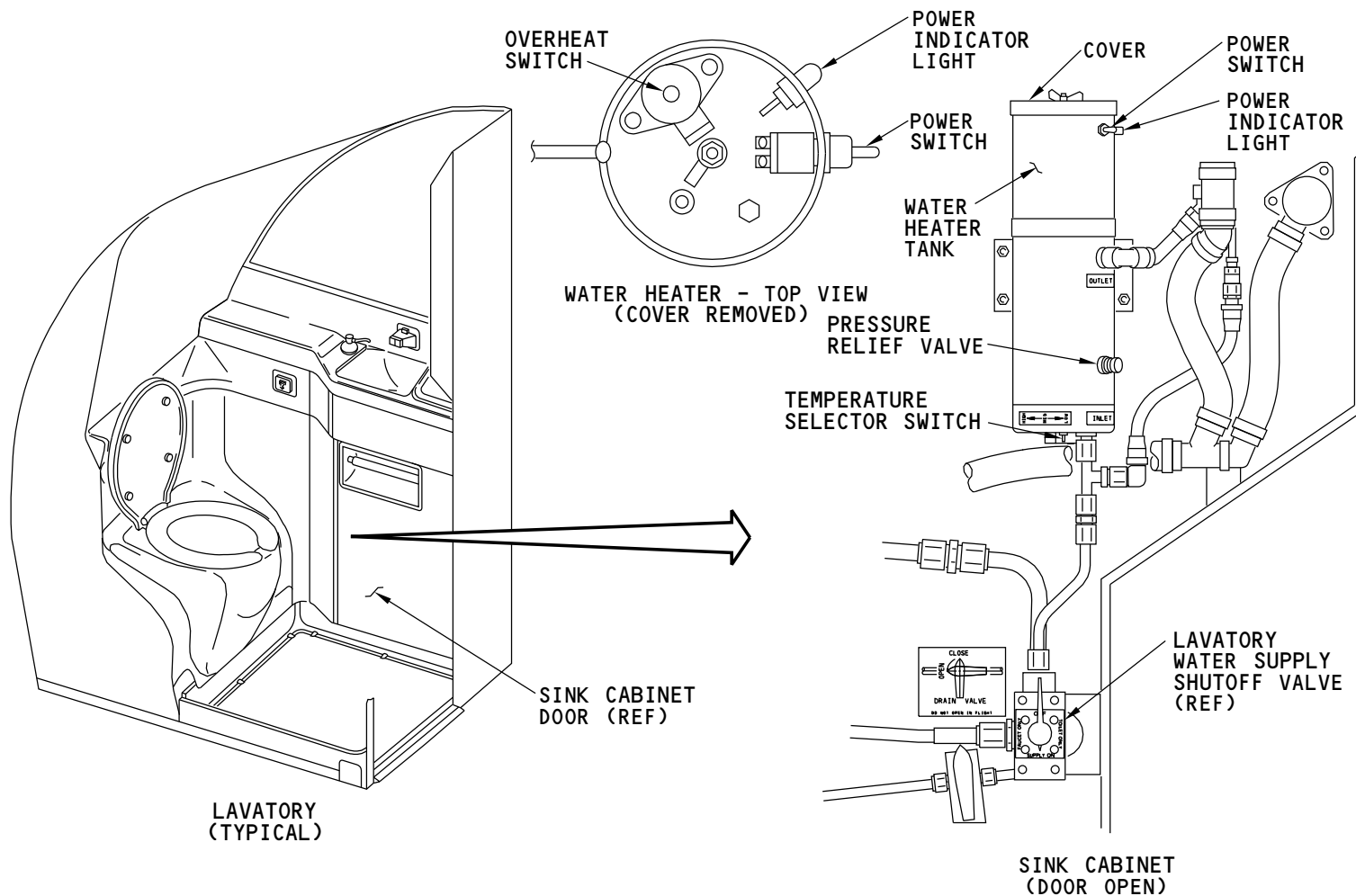
The overheat switch opens when the water temperature is more than 170F (76C).

The pressure relief valve opens if pressure inside the water heater is more than 140 psig.

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M87370 S0004631205_V1

WATER/WASTE - WATER HEATING - WATER HEATER

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**WATER/WASTE - WATER HEATING - FUNCTIONAL DESCRIPTION****Functional Description**

When the power switch is in the ON position, 115v AC power goes to the control electronics.

The temperature selector switch sets the temperature of the water heater. The temperature selector switch has three positions:

- LOW (105F/40C)
- MEDIUM (115F/46C)
- HIGH (125F/52C).

The sense probe (thermistor) gives data on the temperature of the water in the water heater.

If the water is too cold, the control electronics connects power to the heater elements. If the water is at the correct temperature, the control electronics disconnects power from the heater elements.

The overheat switch is a fail-safe device that is a back up to the control electronics. The overheat switch opens the power circuit if the water temperature is more than 170F (76C). If the overheat switch opens, you must manually reset the overheat switch.

Training Information Point

If the power switch is ON and the power indicator light is off, the water heater may have been too hot and opened the overheat switch. You must remove the heater cover to reset the overheat switch.

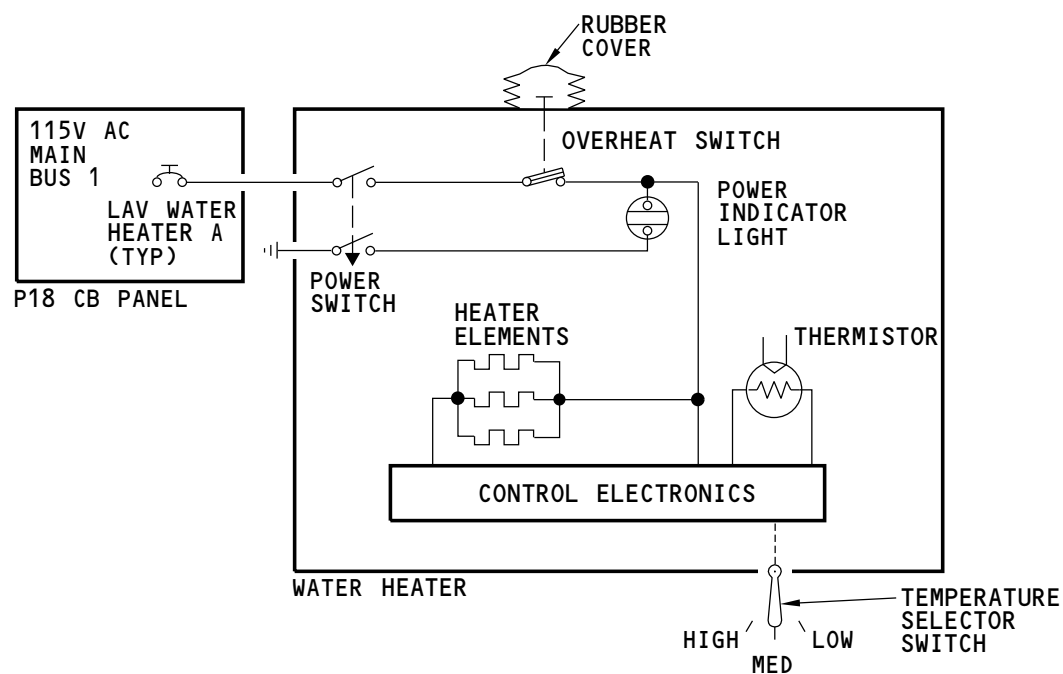
The rubber cover on the overheat switch isolates electrical power. Do not use a sharp object to reset the overheat switch.

Open the circuit breaker for the water heater when you drain the potable water system.

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WATER/WASTE - WATER HEATING - FUNCTIONAL DESCRIPTION

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WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - INTRODUCTION

Purpose

The water quantity indication system measures and shows the quantity of water in the water tank.

General Description

These are the water quantity indication system components:

- Water level sensor
- Water quantity transmitter
- Water quantity indicator.

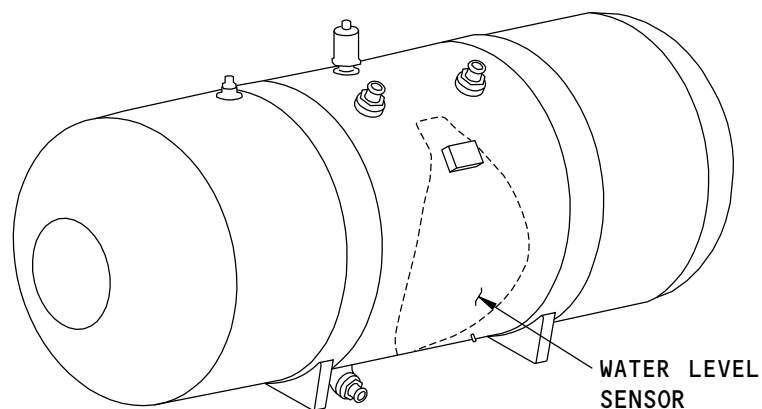
The water level sensor is a copper mesh capacitance-type sensor that is a part of the water tank. The water level sensor is permanently bonded between the inner lining and the composite structure of the water tank.

The water quantity transmitter uses the measurement signal from the sensor to calculate the water level.

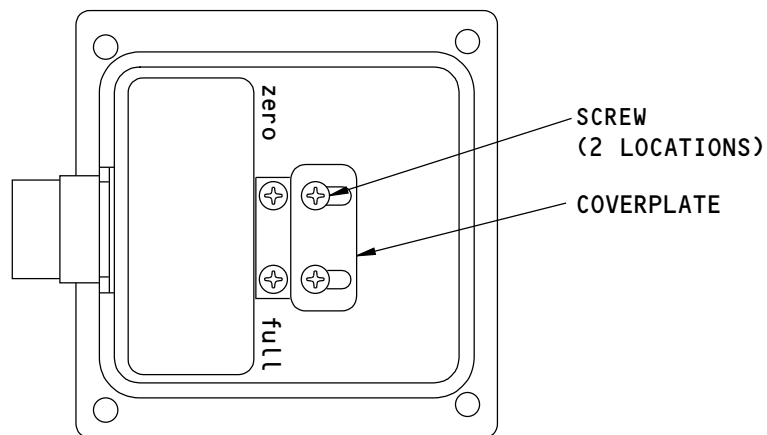
The water level shows at the attendant control panel (ACP) on the water quantity indicator from the ENVIRONMENT menu.

Abbreviations and Acronyms

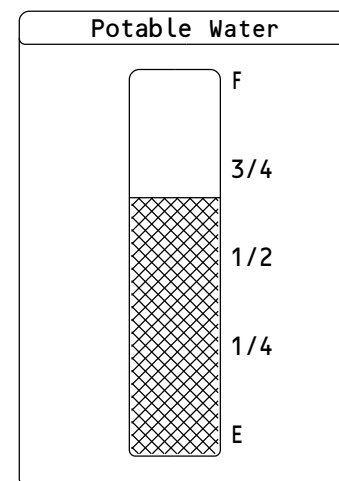
- ACP - attendant control panel
- dc - direct current
- E - empty
- F - full
- LED - light emitting diode
- REF - reference
- T - transmitter



WATER TANK



WATER QUANTITY TRANSMITTER



WATER QUANTITY INDICATOR

WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - INTRODUCTION

2092283 S0000442115_V2

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**WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - WATER QUANTITY TRANSMITTER****Purpose**

The water quantity transmitter sends water level data to the water quantity indicator.

Location

The water quantity transmitter is behind the aft cargo lining in the aft cargo compartment. The water quantity transmitter is outboard and below the water tank.

Physical Description

The water quantity transmitter has electrical connections from the water tank level sensor to the water quantity indicator.

An adapter cable connects the transmitter to the wire bundle for the water quantity indicator.

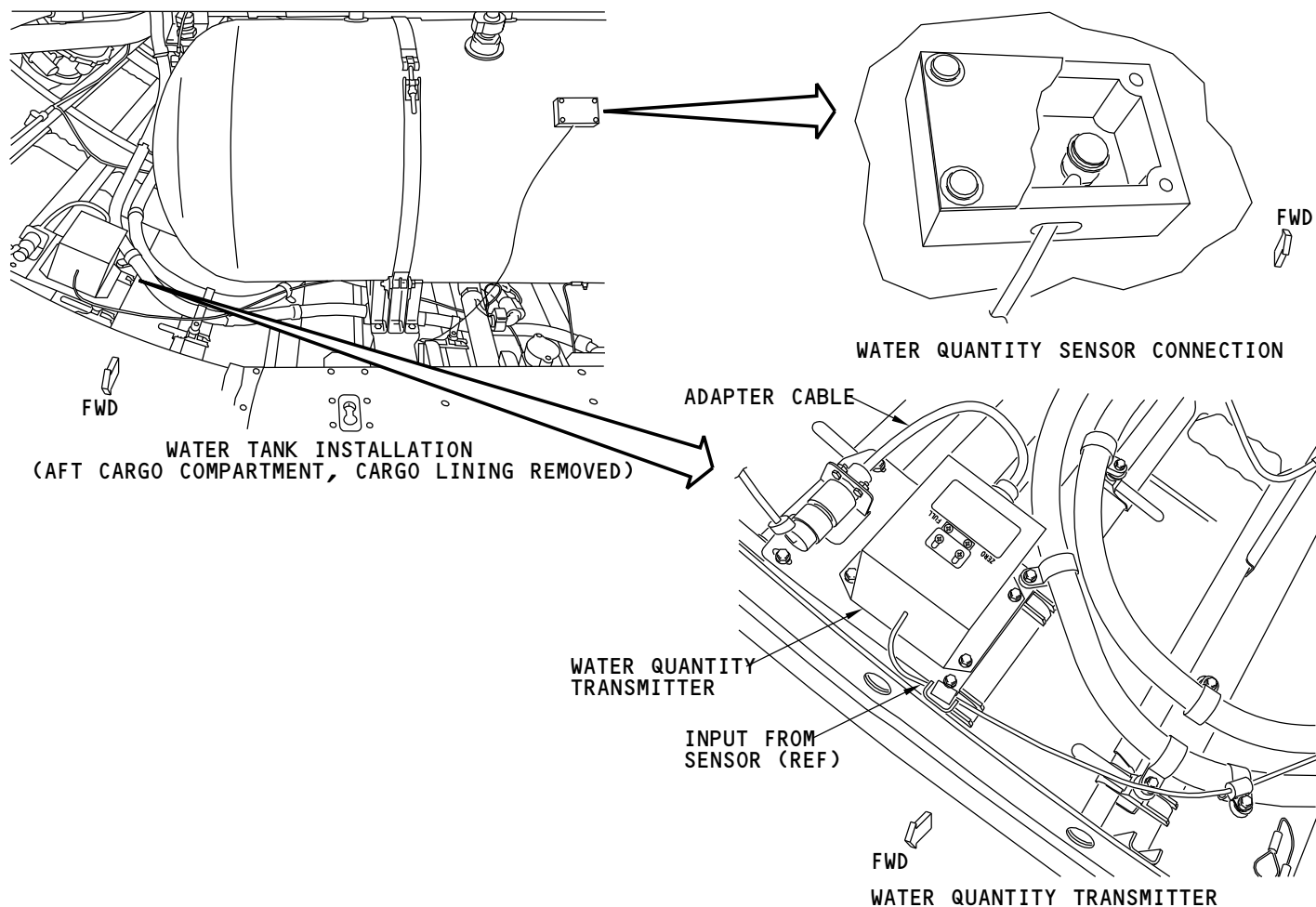
Functional Description

The water quantity transmitter receives 28v dc from bus 1. The water quantity transmitter reads the capacitance of the water level sensor in the tank and supplies a 0 to -10v dc output to the water quantity indicator.

Training Information Point

There are two adjustment screws in the water quantity transmitter. One adjustment screw changes the output voltage when the water tank is empty. The other adjustment screw changes the output voltage when the water tank is full. The adjustment screws are behind a coverplate on the water quantity transmitter.

There are different adapter cables for each water tank /standpipe configuration. If you change the water tank or standpipe, you must also change the adapter cable. If you do not change the adapter cable, the water tank quantity will not be correct.



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WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - WATER QUANTITY TRANSMITTER

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**WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - WATER QUANTITY INDICATOR****Purpose**

The water quantity indicator shows the level of water in the water tank.

Location

The potable water quantity indicator is viewed on the ACP from the ENVIRONMENT menu.

NOTE: The ACP is in the forward or aft attendant stations.

Physical Description

The water quantity indicator is a bar style segment display. The segments are from E (empty) to F (full), in increments of 1/16 of a tank.

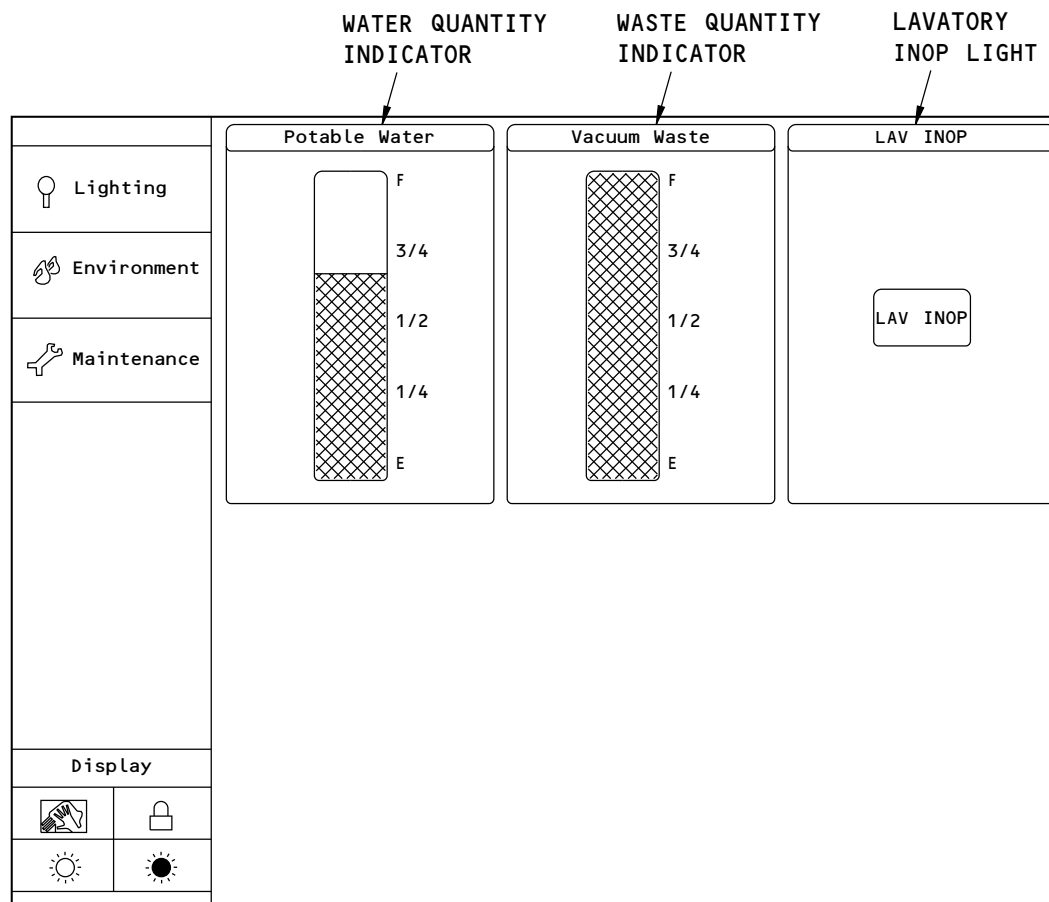
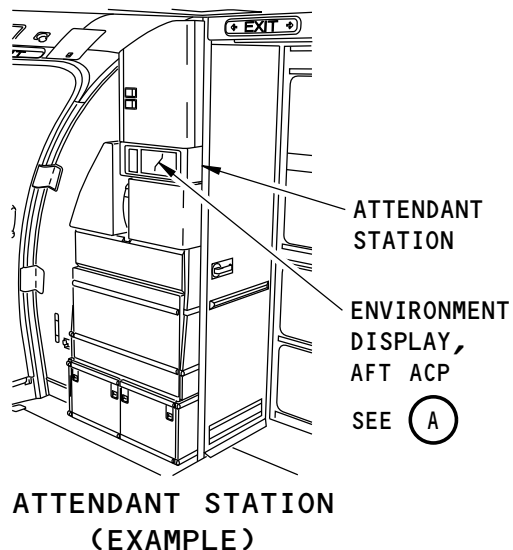
Functional Description

The water quantity transmitter sends a voltage that is in proportion to the level of water in the water tank. The ACP software logic causes a specified number of indicator segments to come on. The number of segments shows the level of water in the tank.

E (empty) to 1/4 full displays in red.

1/4 to 1/2 full displays amber.

1/2 to F (full) displays green.



ENVIRONMENT DISPLAY, AFT ACP
(V4 SOFTWARE VERSION)

(A)

2091894 S0000441911_V3

WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - WATER QUANTITY INDICATOR

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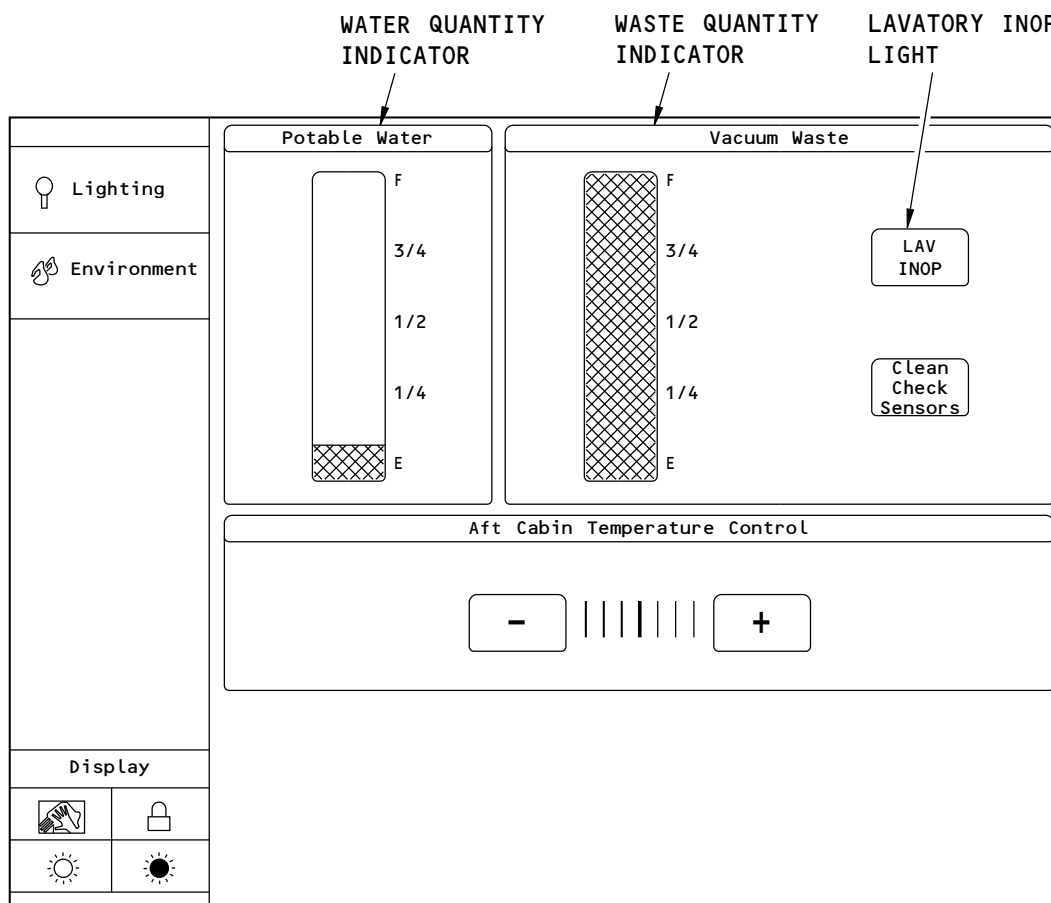
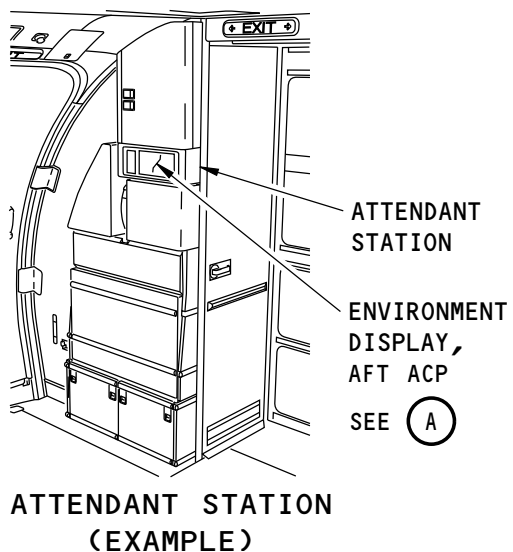
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**ENVIRONMENT DISPLAY, AFT ACP
(V5 SOFTWARE VERSION)**

(A)

2304933 S0000523363_V1

WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - WATER QUANTITY INDICATOR

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**WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - FUNCTIONAL DESCRIPTION****Functional Description**

The capacitance of the water tank level sensor changes when the water level in the water tank changes.

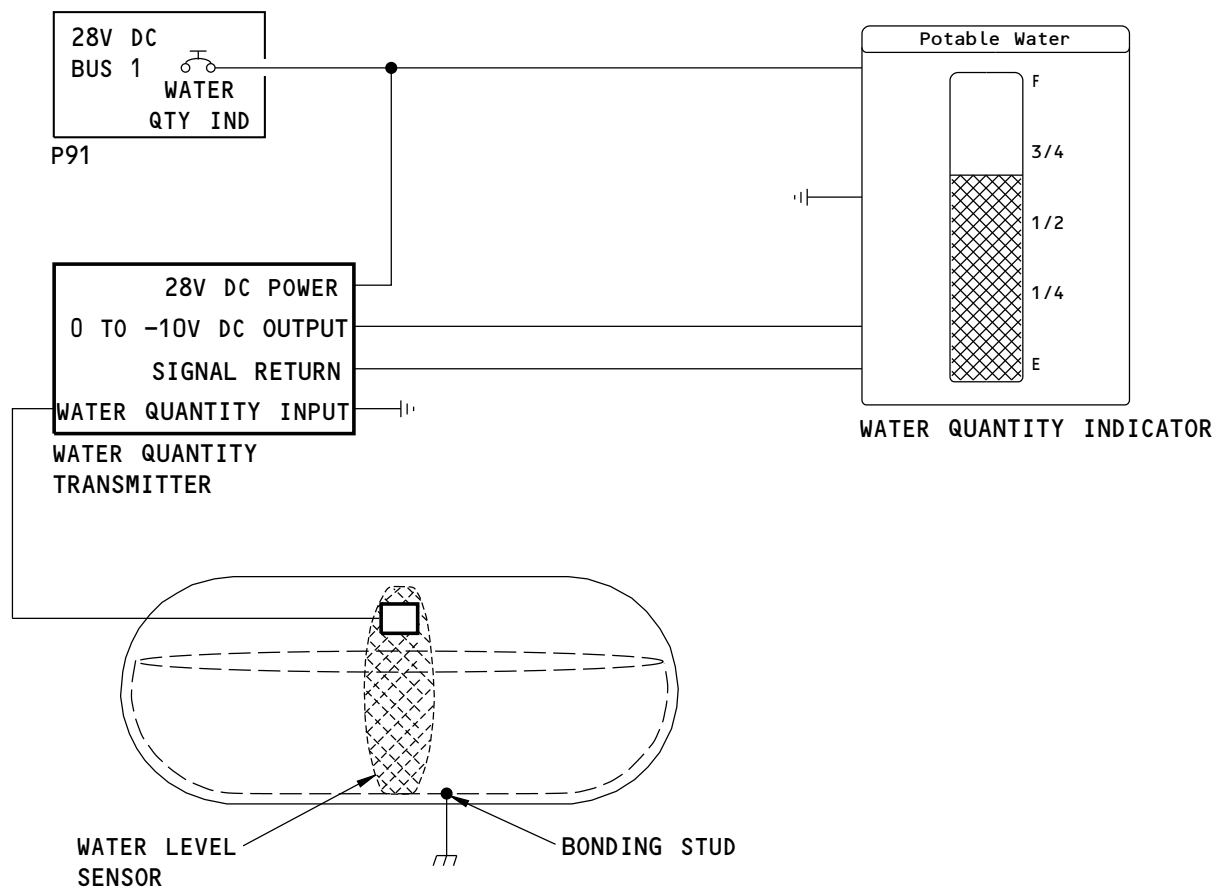
The water quantity transmitter senses the capacitance of the water tank level sensor and changes the capacitance input to a 0 to -10v dc output voltage. The output voltage of the water quantity transmitter is in proportion to the quantity of water in the water tank.

The ACP interprets the output voltage of the water quantity transmitter. The 0 to -10v dc input voltage is changed to a digital signal and used to operate a bar style segment display. The display shows as continuous water quantity indicator when selected from the ENVIRONMENT menu. The water quantity indicator shows water quantity as a percentage of full, with 1/16th tank intervals.

Training Information Point

NOTE: If the water tank is not correctly grounded, intermittent operation of the water quantity indicator can occur.

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WATER TANK AND LEVEL SENSOR

WATER/WASTE - WATER QUANTITY INDICATION SYSTEM - FUNCTIONAL DESCRIPTION

2091912 S0000441942_V2

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**WATER/WASTE - WASTE DISPOSAL - INTRODUCTION****Purpose**

The waste disposal system removes water from the lavatory and galley sinks, human waste from the lavatory toilets, and rain water from the door sills.

General Description

The waste disposal system has these subsystems:

- Gray water
- Vacuum waste
- Waste tank quantity indication.

Gray Water System

The gray water comes from the lavatory and galley sinks, and from door sill drains at each entry and galley service door.

The gray water from the sinks drains overboard through drain masts.

The gray water from the door sills drains overboard through drain fittings.

Vacuum Waste System

The vacuum waste system removes human waste from the toilets. The waste material is held in a waste tank until servicing.

Waste Tank Quantity Indication System

The waste tank quantity indication system measures and shows the level of waste in the waste tank.

Abbreviations and Acronyms

- AC - alternating current
- A/C - air conditioning
- BIT - built in test
- C - Celsius
- DC - direct current

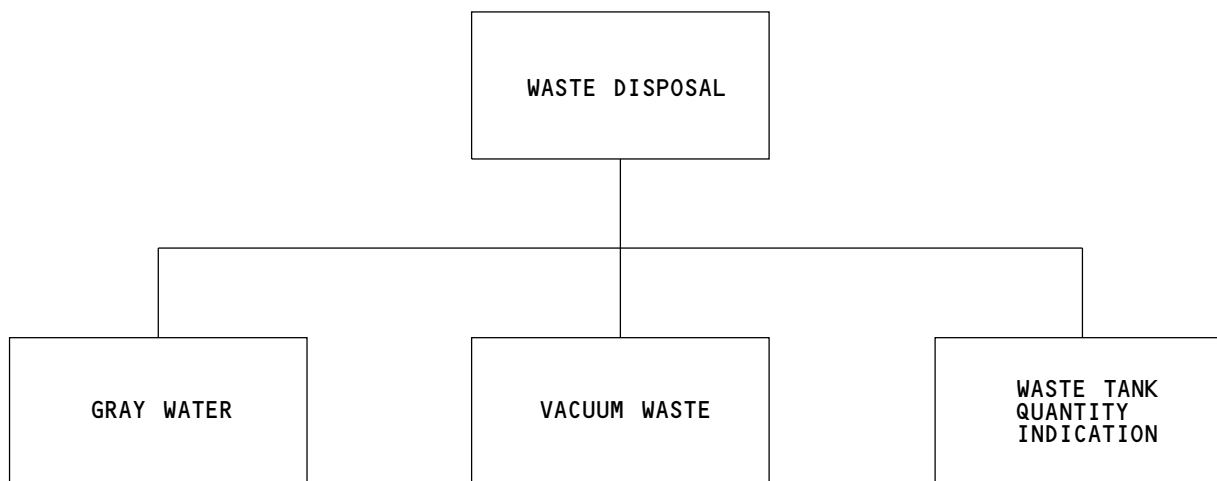
- F - Fahrenheit
- FCU - flush control unit
- FWD - forward
- GND - ground
- LCM - logic control module
- mm - millimeter
- PSID - pounds per square inch differential
- REF - reference
- SEC - section
- SYS - system
- TYP - typical
- v - volts

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WATER/WASTE - WASTE DISPOSAL - INTRODUCTION

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WATER AND WASTE - GRAY WATER SYSTEM - INTRODUCTION

Purpose

The gray water system has these functions:

- Drains water and other liquids from the lavatory and galley sinks
- Gives exhaust ventilation from the lavatories and galleys
- Drains rain water from the entry/service door sill areas.

- TYP - typical
- v - volts

General Description

The gray water system has these two subsystems:

- Waste water system
- Door sill drain system.

Waste Drain System

The waste water system collects the waste water from the lavatory and galley sinks and drains the waste water overboard through heated drain masts. The waste water system also gives exhaust ventilation from the lavatories and galleys.

Door Sill Drain System

The door sill drain system collects rain water from the entry/service door sill areas and drains the water overboard through drain fittings.

Abbreviations and Acronyms

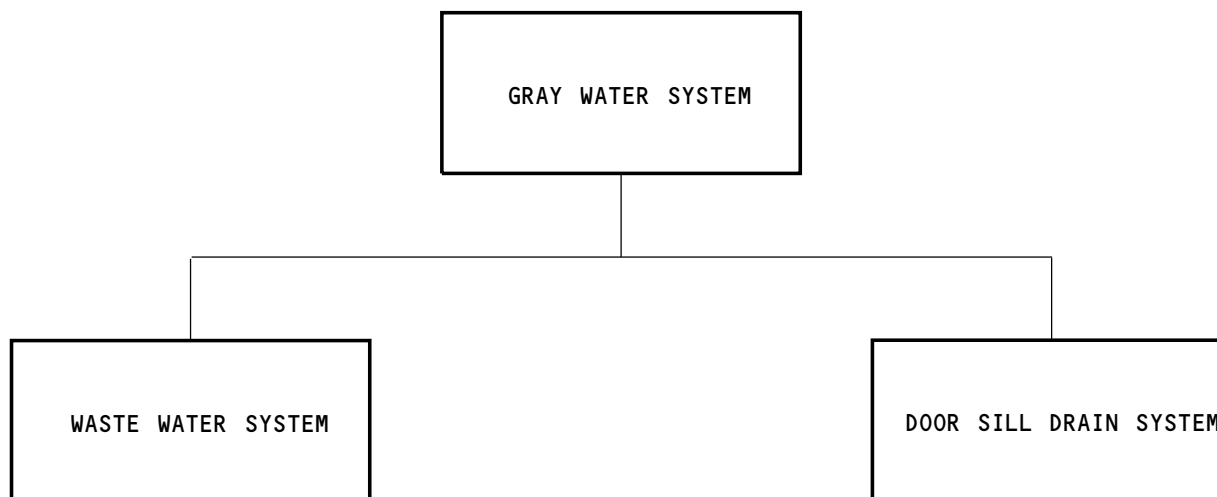
- A/C - air conditioning
- dc - direct current
- FWD - forward
- GND - ground
- PSID - pounds per square inch differential
- REF - reference
- SEC - section
- SYS - system

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WATER AND WASTE - GRAY WATER SYSTEM - INTRODUCTION

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W/W - GRAY WATER SYSTEM - WASTE WATER SYSTEM

Purpose

The waste water system collects the waste water from the lavatory and galley sinks and drains the waste water overboard through heated drain masts.

The system also gives exhaust ventilation for the lavatories and galleys.

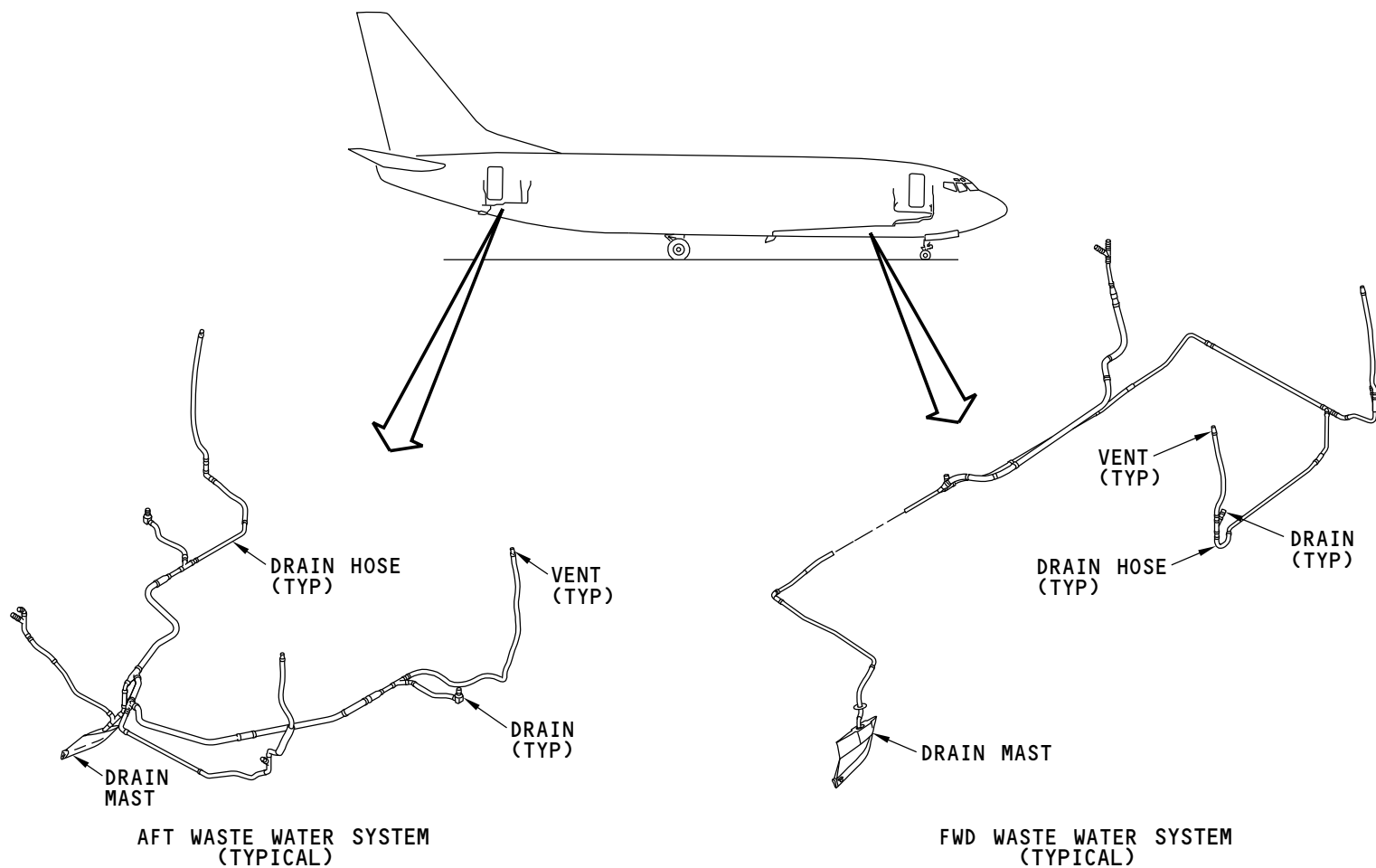
General Description

The waste water system has these components:

- Lavatory and galley sink drains
- Lavatory and galley sink drain vents
- Drain hoses and lines
- Drain masts.

The waste water drains overboard through the drain masts when the airplane is on the ground and when the airplane is in the air.

Electrical heaters in the drain masts prevent the drain masts from freezing.



M87404 S0004631248_V1

W/W - GRAY WATER SYSTEM - WASTE WATER SYSTEM

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**W/W - GRAY WATER SYSTEM - DRAIN MAST****Purpose**

The drain masts let waste water from the lavatory and galley sinks flow overboard.

The drain masts have internal heaters that keep the waste water from freezing.

Location

There are two drain masts on the lower fuselage.

The forward drain mast is on the bottom of the fuselage, forward of the right air conditioning compartment.

The aft drain mast is on the bottom of the fuselage, aft of the aft cargo compartment.

Physical Description

The drain mast is an aerodynamic fairing that attaches to the fuselage.

Each drain mast has an internal 250 watt heater.

See the Water and Toilet Drain Anti-Icing System section for information on the drain mast heaters. (SECTION 30-71).

Training Information Point

The heater on the forward drain mast connects to the airplane wiring through an electrical connector.

The heater on the aft drain mast connects to the airplane wiring through wire splices. When you replace the aft drain mast, you must make a splice in the wires.

CAUTION: WHEN YOU REMOVE THE FASTENERS, HOLD THE DRAIN MAST. IF THE DRAIN MAST FALLS, DAMAGE CAN OCCUR.

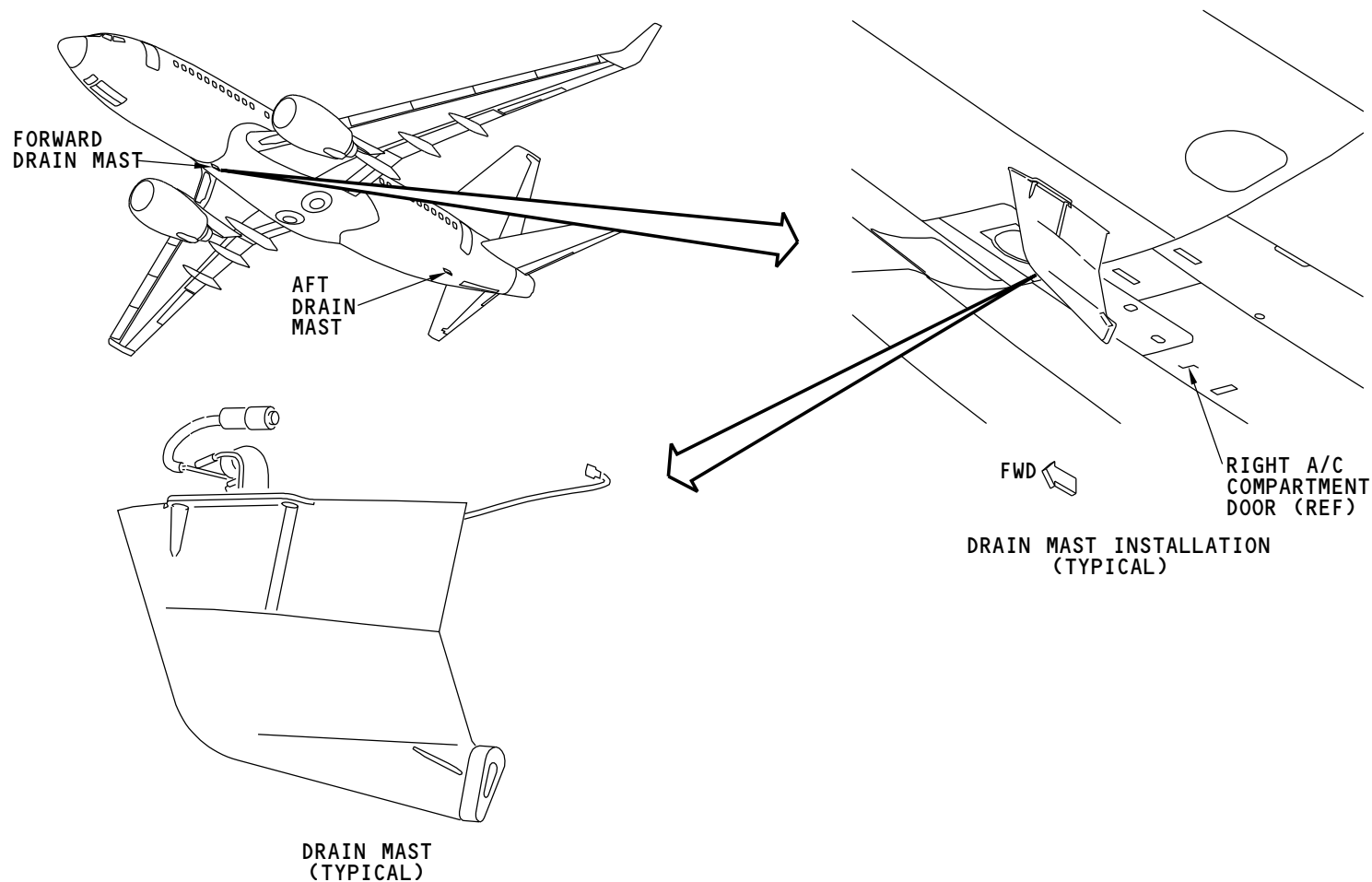
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M87398 S0004631264_V1

WW - GRAY WATER SYSTEM - DRAIN MAST

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W/W - GRAY WATER SYSTEM - DOOR SILL DRAIN SYSTEM

Purpose

The door sill drain system removes rain water from the door sill areas.

Physical Description

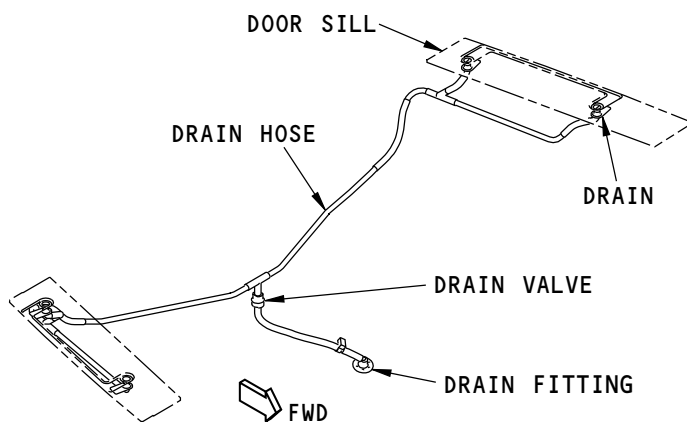
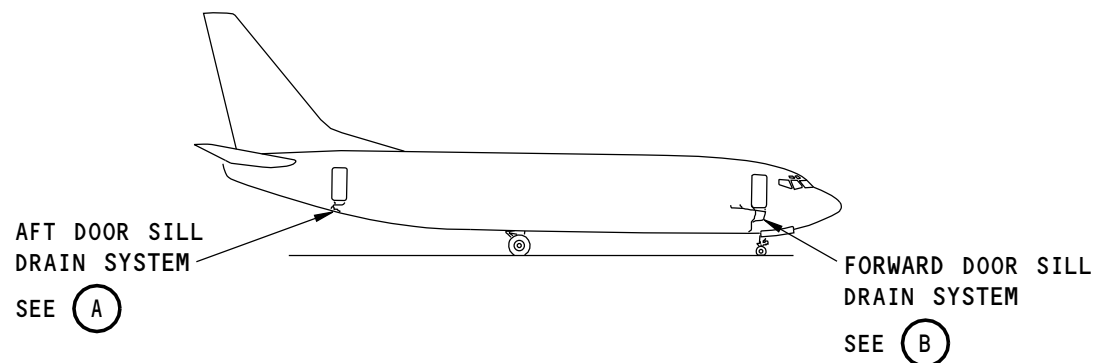
The door sill drain system has these components:

- Door sills
- Door sill drains
- Drain hose
- Drain Valve
- Drain fittings.

When the airplane is on the ground, the sill drain check valves are open and the water drains overboard through a door sill drain fitting on the bottom of the airplane.

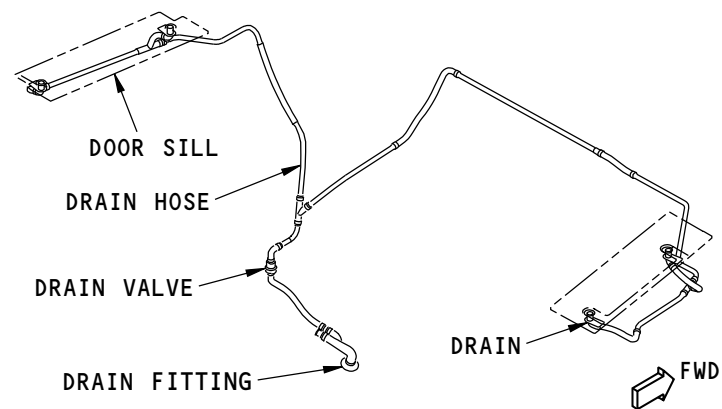
When the airplane is in the air, differential pressure closes the sill drain check valves, and any remaining water is held in the system.

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AFT DOOR SILL DRAIN SYSTEM

(A)



FORWARD DOOR SILL DRAIN SYSTEM

(B)

N40952 S0000103572_V1

W/W - GRAY WATER SYSTEM - DOOR SILL DRAINS

38-31-00

38-31-00-006

AKS ALL

EFFECTIVITY

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W/W - GRAY WATER SYSTEM - DOOR SILL DRAINS

Purpose

The door sill drains remove rain water from the door sill areas.

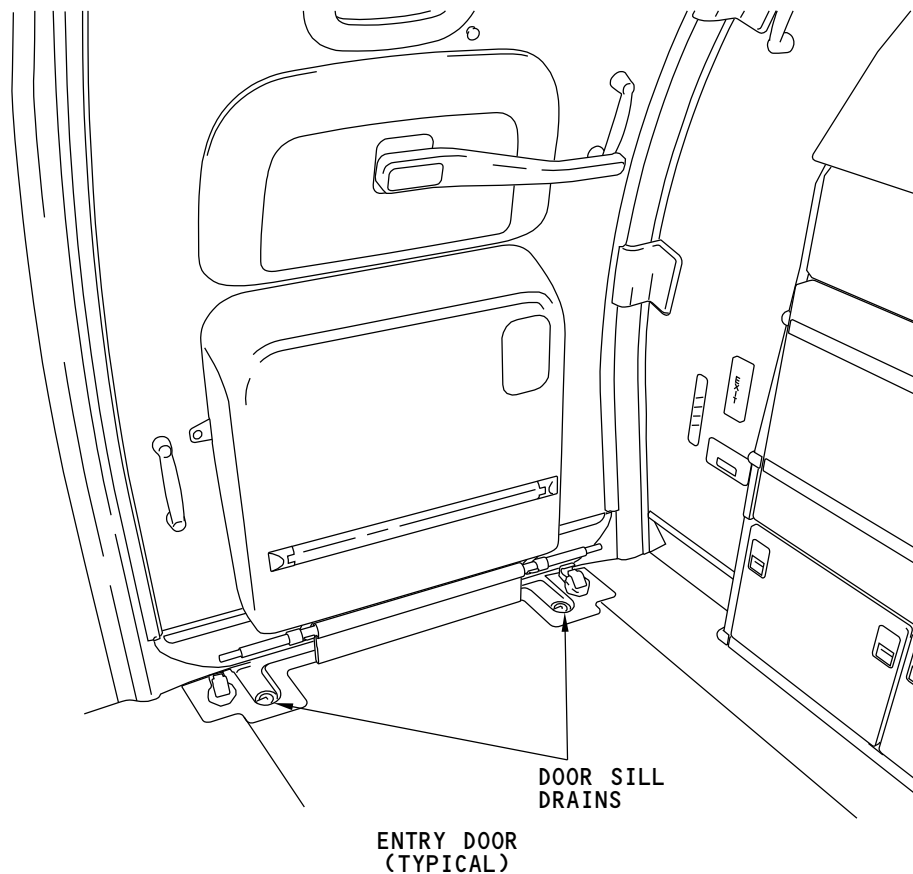
Location

There are two door sill drains at each entry and galley service door.

Physical Description

The door sills send rain water to the door sill overboard drains when the airplane is on the ground. During flight, differential pressure closes a check valve in the system to prevent the overboard drainage of water and the escape of air.

EFFECTIVITY	
AKS ALL	



W/W - GRAY WATER SYSTEM - DOOR SILL DRAINS

M87409 S0004631271_V1

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AKS ALL **EFFECTIVITY**

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**WATER/WASTE - VACUUM WASTE SYSTEM - INTRODUCTION****Purpose**

The vacuum waste system removes human waste material from the toilets and holds it in the waste tank.

General Description

The vacuum toilet collects human waste. A flush cycle puts the waste material into the vacuum waste tubing.

Cabin pressure pushes the material to the vacuum waste tank. There are two sources that cause low pressure (vacuum) in the tank:

- The vacuum blower
- Cabin-to-ambient pressure differential.

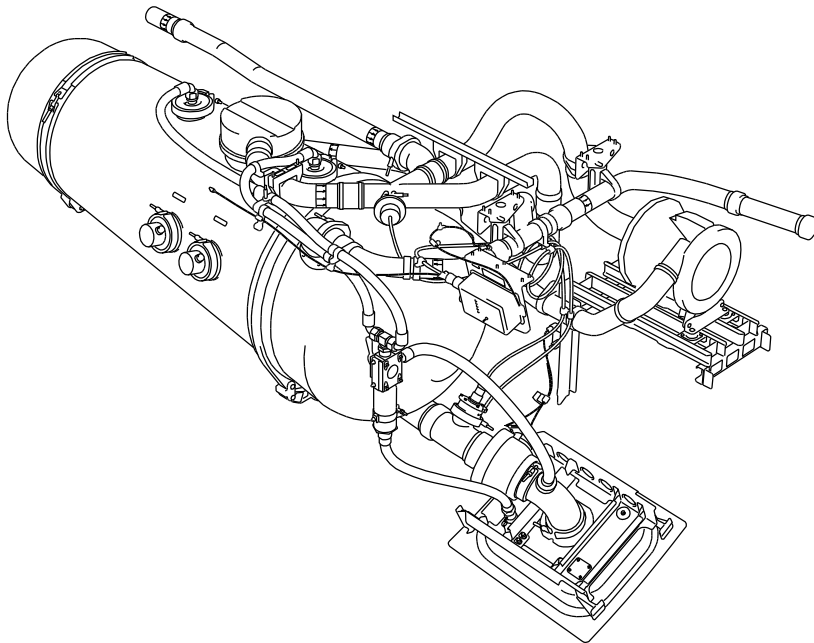
The waste is kept in the waste tank until servicing. Servicing is done at the waste service panel.

The vacuum waste system has these components:

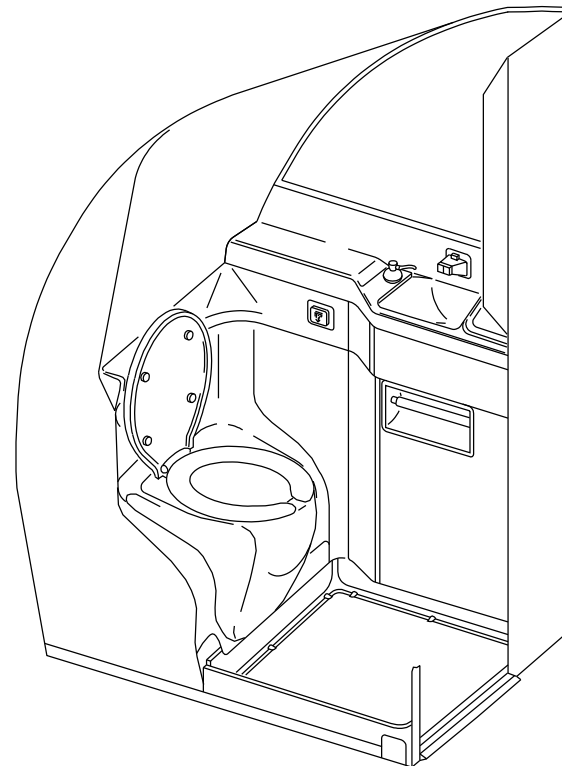
- Toilet assembly
- Waste tank
- Liquid separator
- Waste tank rinse nozzle
- Waste tank rinse filter
- Waste tank rinse fitting assembly
- Waste drain valve assembly
- Waste drain ball valve
- Drain line blockage removal fitting
- Vacuum check valve
- Vacuum blower
- Vacuum blower barometric switch.

Abbreviations and Acronyms

- AC - alternating current
- C - Celsius
- DC - direct current
- F - Fahrenheit
- FCU - flush control unit
- FWD - forward
- LCM - logic control module
- REF - reference
- TYP - typical
- v - volts



VACUUM WASTE SYSTEM



TOILET ASSEMBLY

M87413 S0004631282_V1

WATER/WASTE - VACUUM WASTE SYSTEM - INTRODUCTION

38-32-00

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**WATER/WASTE - VACUUM WASTE SYSTEM - COMPONENT LOCATIONS - LAVATORY****Component locations**

There is a toilet assembly and a flush switch in each lavatory.

Training Information Point

To get access to the flush switch, you must first remove the flush switch cover. You then remove the collar, if necessary.

The toilet assembly is behind the toilet shroud. You must remove the toilet shroud first to get access to the toilet assembly for a repair, removal and installation.

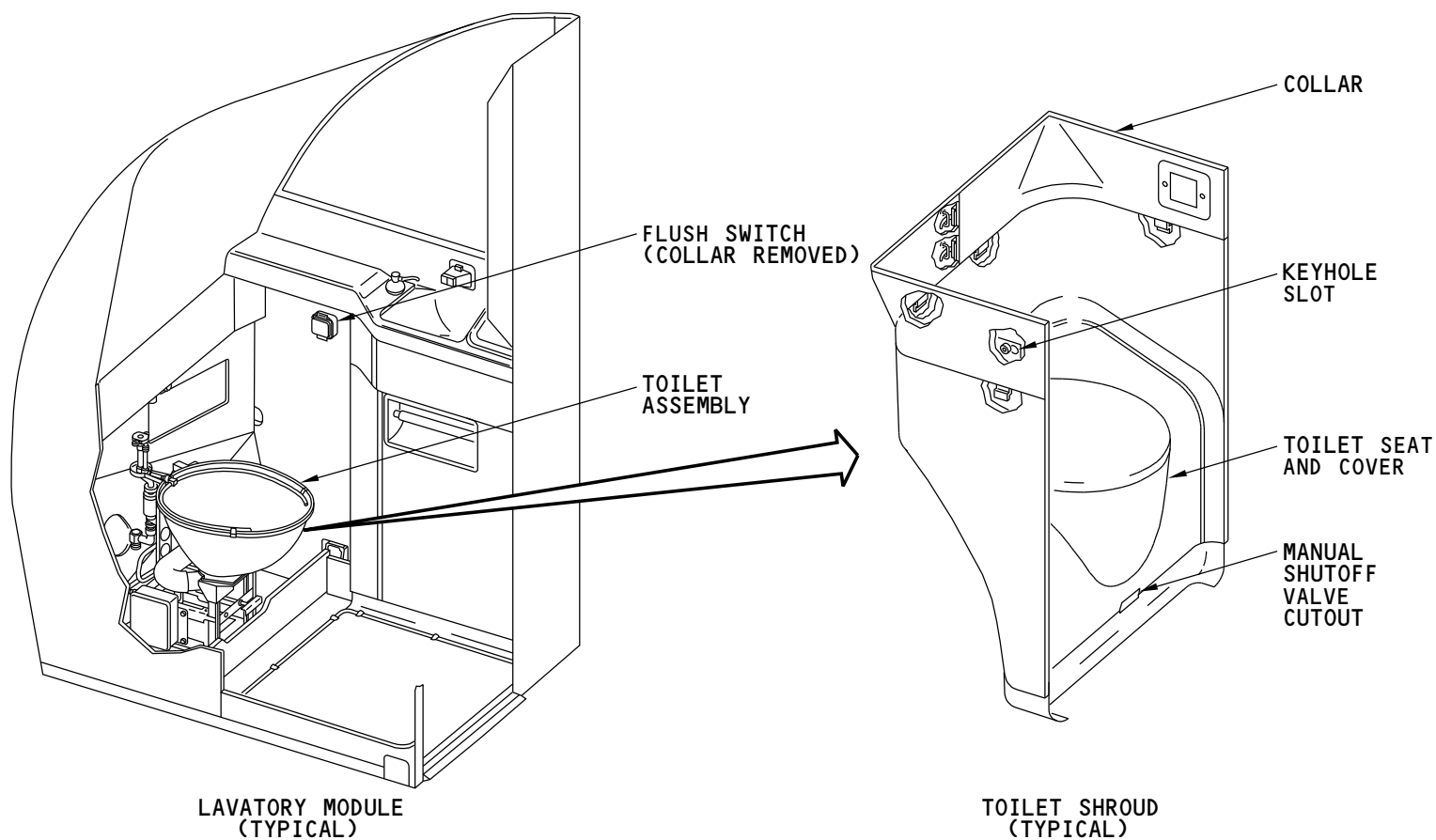
The toilet shroud has a seat and a cover.

| AKS 001-024

There is a cutout for the toilet manual shutoff valve handle on the lower part of the shroud.

| AKS ALL

EFFECTIVITY	
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WATER/WASTE - VACUUM WASTE SYSTEM - COMPONENT LOCATIONS - LAVATORY

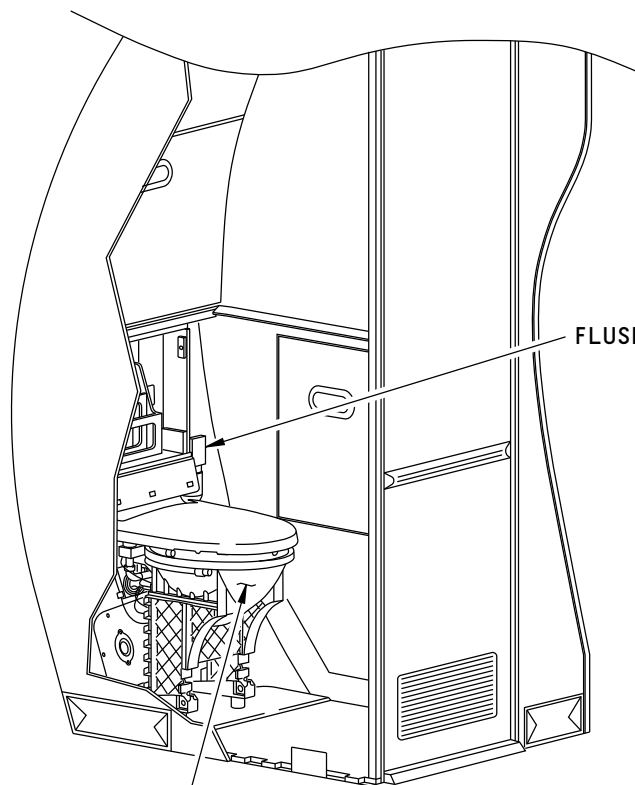
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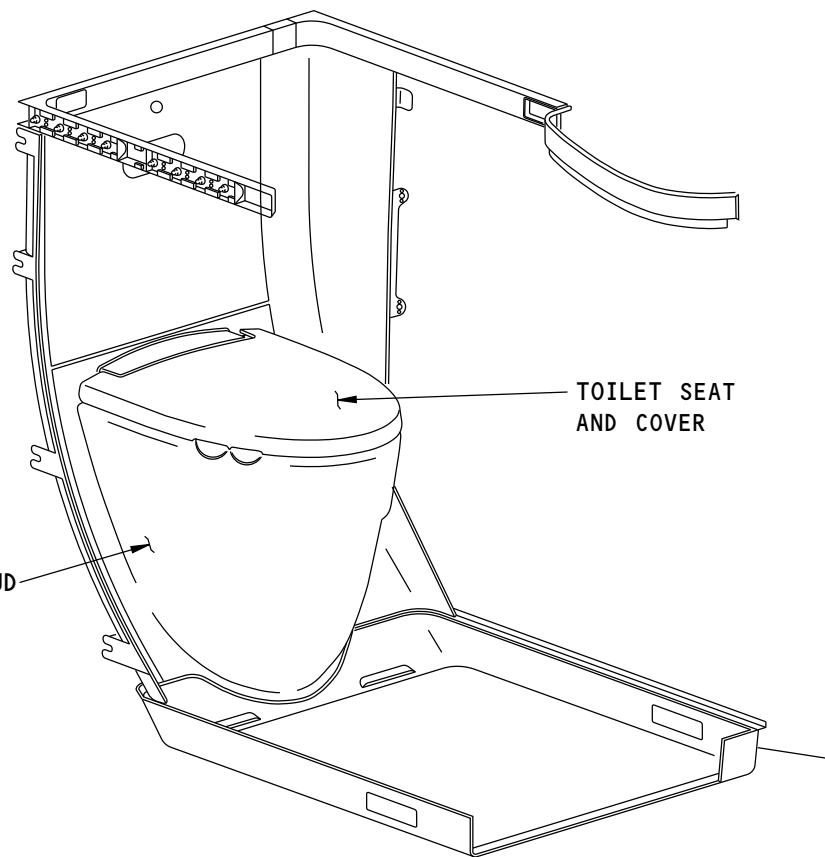
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TOILET
ASSEMBLY

LAVATORY MODULE
(EXAMPLE)



TOILET SEAT
AND COVER

SHROUD

TOILET SHROUD
(EXAMPLE)

2367118 S0000541932_V1

WATER/WASTE - VACUUM WASTE SYSTEM - COMPONENT LOCATIONS - LAVATORY

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WATER/WASTE - VACUUM WASTE SYSTEM - FLUSH SWITCH

Purpose

The flush switch starts the flush cycle for the vacuum waste system.

Location

Each lavatory has a flush switch adjacent to the toilet assembly. You must remove the flush switch cover and the collar to get access to the switch.

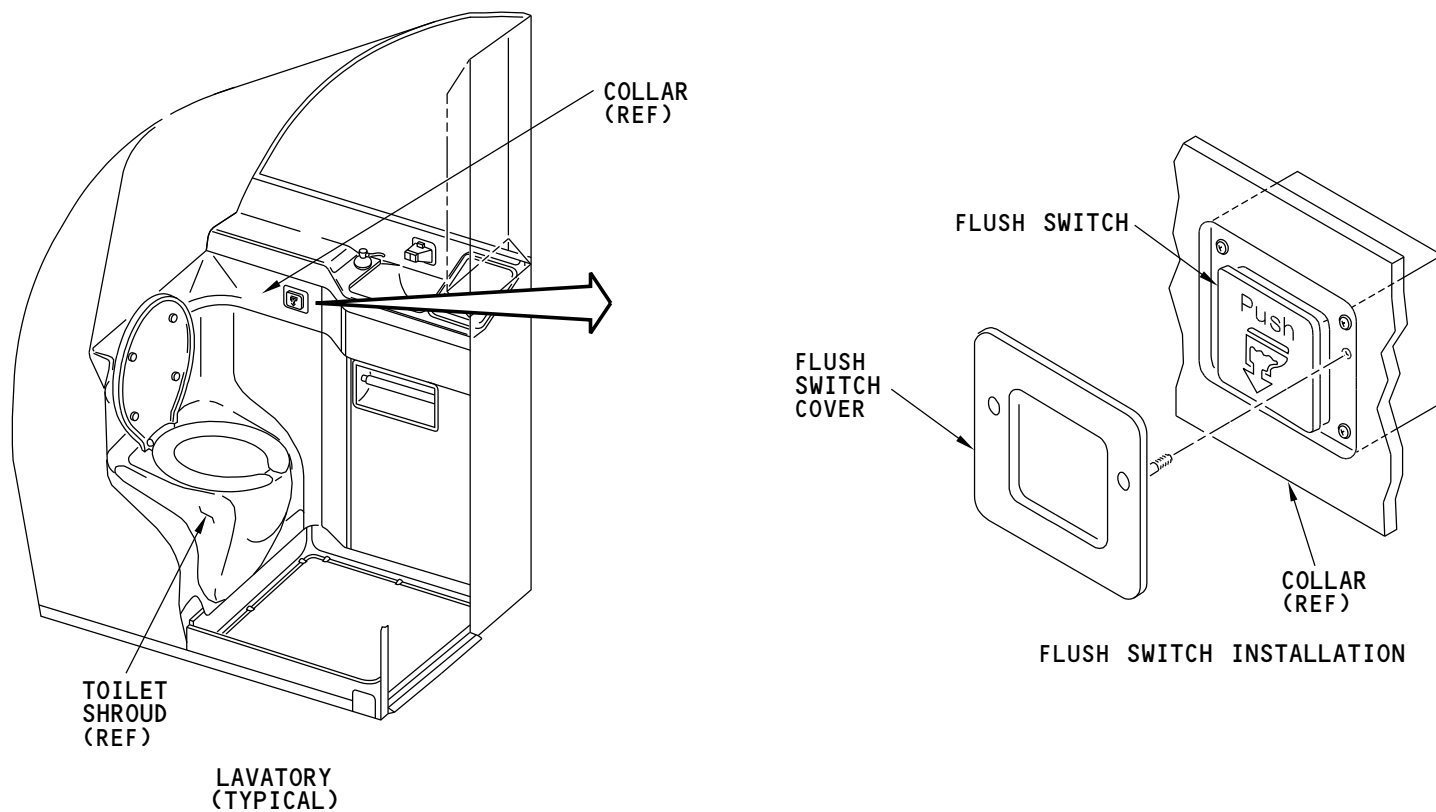
Physical Description

The flush switch is a momentarily closed switch.

Functional Description

The flush switch controls the vacuum waste system flush cycle. The flush switch sends a signal to the flush control unit on the toilet assembly.

EFFECTIVITY	
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WATER/WASTE - VACUUM WASTE SYSTEM - FLUSH SWITCH

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WATER/WASTE - VACUUM WASTE SYSTEM - TOILET ASSEMBLY

Purpose

The toilet assembly collects human waste material. The toilet assembly operates the vacuum waste system to send the waste to the waste tank.

Location

There is a toilet assembly in each lavatory.

Physical Description

AKS 001-024

The toilet assembly has these parts:

- Toilet bowl
- Rinse ring
- Pedestal
- Rinse valve
- Anti-siphon valve
- Flush valve
- Manual shutoff valve
- Manual shutoff handle
- Flush control unit (FCU).

AKS 025-999

The B/E Aerospace Vacuum Toilet Assembly uses a quarter-turn studs or two hitch pins for easy removal and installation of the toilet assembly for maintenance.

The toilet assembly has these parts:

- Toilet bowl
- Toilet Support Structure
- Toilet Base Support
- Rinse Valve Assembly
- Flush Valve Assembly

- Integrated System Controller (ISC)

AKS 001-024

The toilet bowl and the pedestal are stainless steel. The internal surface of the toilet bowl has a layer of non-stick material on it to keep the toilet bowl clean of toilet waste.

The rinse ring is a stainless steel tube. The rinse ring attaches to the inside, upper rim of the toilet bowl and connects to the rinse valve through the anti-siphon valve.

The rinse valve gives water for toilet flush. The rinse valve is a flow through, solenoid operated, poppet valve with an internal filter. The rinse valve opens and self drains when the potable water system is not pressurized.

The anti-siphon valve prevents backflow of water from the toilet bowl into the potable water system.

The flush valve keeps the flow path between the toilet bowl and the waste line closed. The valve opens to let waste material move from the toilet bowl to the waste lines and to the waste tank. The flush valve is an electrically actuated, reversible, rotating disk valve. The motor has built-in thermal overload protection.

The manual shutoff handle closes the manual shutoff valve.

AKS 025-999

The toilet bowl have rinse nozzles that are bonded into the toilet bowl and cannot be replaced separately. There are two quarter-turn studs installed in front of the toilet bowl for an easy removal and installation. The toilet bowl may be replaced without removing the entire toilet assembly.

The toilet support structure have four components: two side supports, a front support and a flush valve assembly. These components are connected by an inter-locking dovetail design. When the toilet bowl is attached into its position, it locks the toilet support structure tightly together with the toilet bowl.

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WATER/WASTE - VACUUM WASTE SYSTEM - TOILET ASSEMBLY

AKS 025-999 (Continued)

The toilet base supports attach the vacuum toilet assembly to the floor of the lavatory structure. There are two quarter-turn studs that attach the vacuum toilet assembly to the toilet base supports for an easy removal and installation.

The rinse valve assembly controls the flow of water to the toilet bowl rinse nozzles to clean the walls of the bowl.

The flush valve assembly is installed at the bowl rear outlet and connects the vacuum toilet assembly to the vacuum waste plumbing. The flush valve assembly is installed together with the rear support of the toilet structure.

The Integrated System Controller (ISC) is set to control flush and rinse cycles and is not adjustable during maintenance. The ISC is attached to the flush valve assembly and also located near the rinse valve assembly for minimum cable lengths. The cables of the ISC is connected to the potentiometer, flush valve assembly, rinse valve assembly and to the lavatory waste/water system.

AKS ALL

Functional Description

The flush cycle starts when a flush signal is received from the flush switch. Each flush cycle has the following steps:

- Rinse valve opens to rinse the toilet bowl
- Rinse valve closes
- Flush valve opens to drain the toilet contents.
- Flush valve closes.

AKS 001-024

When the rinse valve is open, 8 fl-oz (237 ml) of water flushes the toilet bowl.

AKS 025-999

When the rinse valve is open, 5 fl-oz (148 ml) of water flushes the toilet bowl.

AKS ALL

Training Information Point

AKS 001-024

If the flush valve fails in the open position, cabin pressure goes through the open valve. You can use the manual shutoff handle to close the manual shutoff valve. Pull the manual shutoff handle to close the manual shutoff valve. Push the manual shutoff handle to open the manual shutoff valve.

The FCU has a maintenance switch. Use the maintenance switch to keep the flush valve open during maintenance operations. Push the maintenance switch one time to open the flush valve. Push the maintenance switch again and hold it in for two seconds to operate the vacuum blower. The vacuum blower operates for ten seconds and then stops. Push the toilet flush switch to close the flush valve and return the toilet to normal operation.

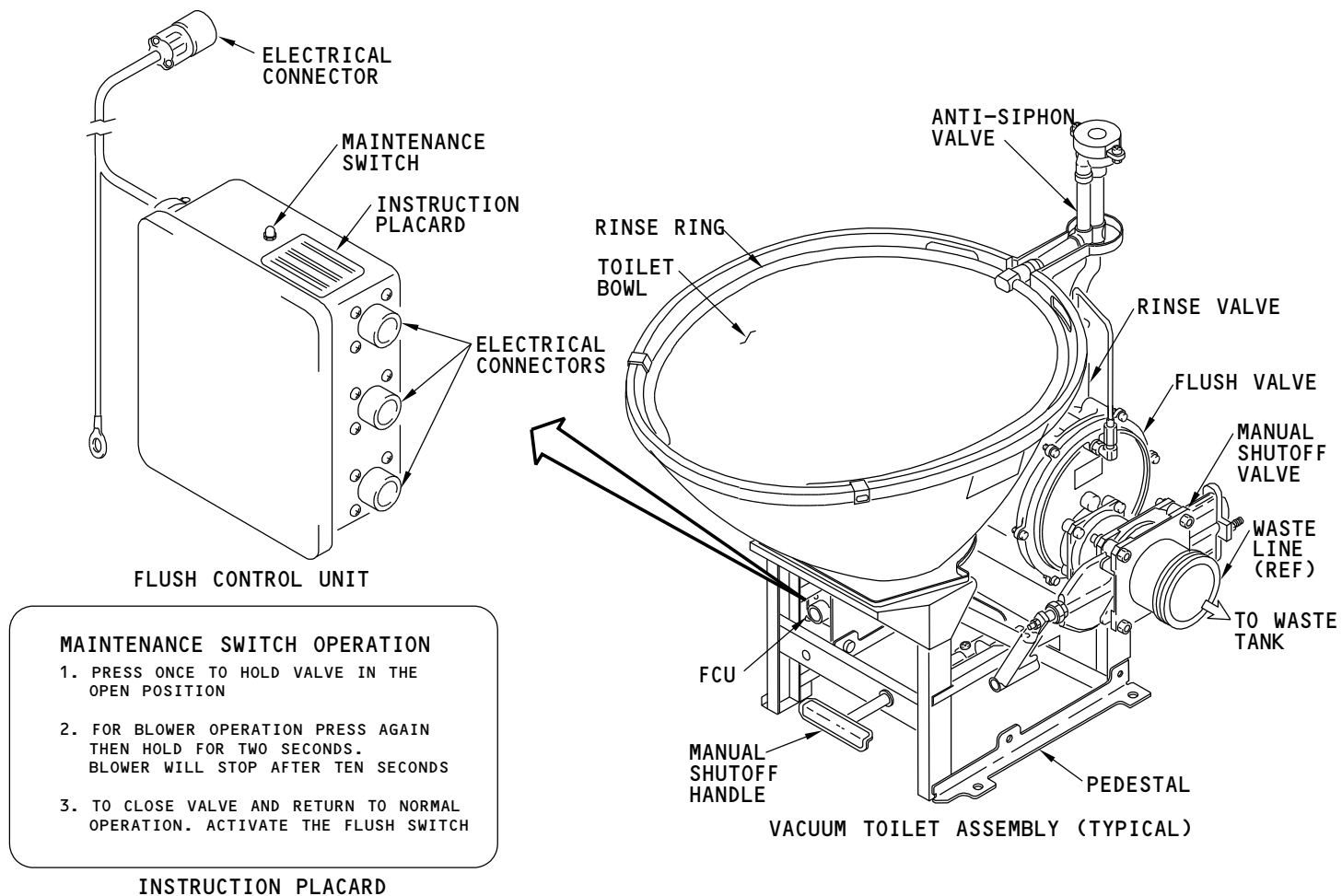
AKS 025-999

If there is a blockage that prevents the flush valve to close, the ISC will do a re-flush cycle. The re-flush cycle moves the flush valve back to the open position to try to clear the blockage from the valve. After approximately 4 seconds, the flush valve closes. The re-flush cycle will occur a maximum of three times to try to clear the blockage from the valve. Rinse water will flow during the three re-flush cycles. If the blockage still exists, subsequent flush and re-flush cycles will continue until the blockage is clear. To conserve potable water and prevent the risk of toilet bowl overflows, rinse water will not flow from this point forward.

AKS ALL

The toilet bowl has a layer of non-stick material. Do not let toilet bowl cleaner fluid stay in the toilet bowl for a long period of time. The toilet bowl cleaner fluid can damage the surface of the toilet bowl.

EFFECTIVITY	
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WATER/WASTE - VACUUM WASTE SYSTEM - TOILET ASSEMBLY

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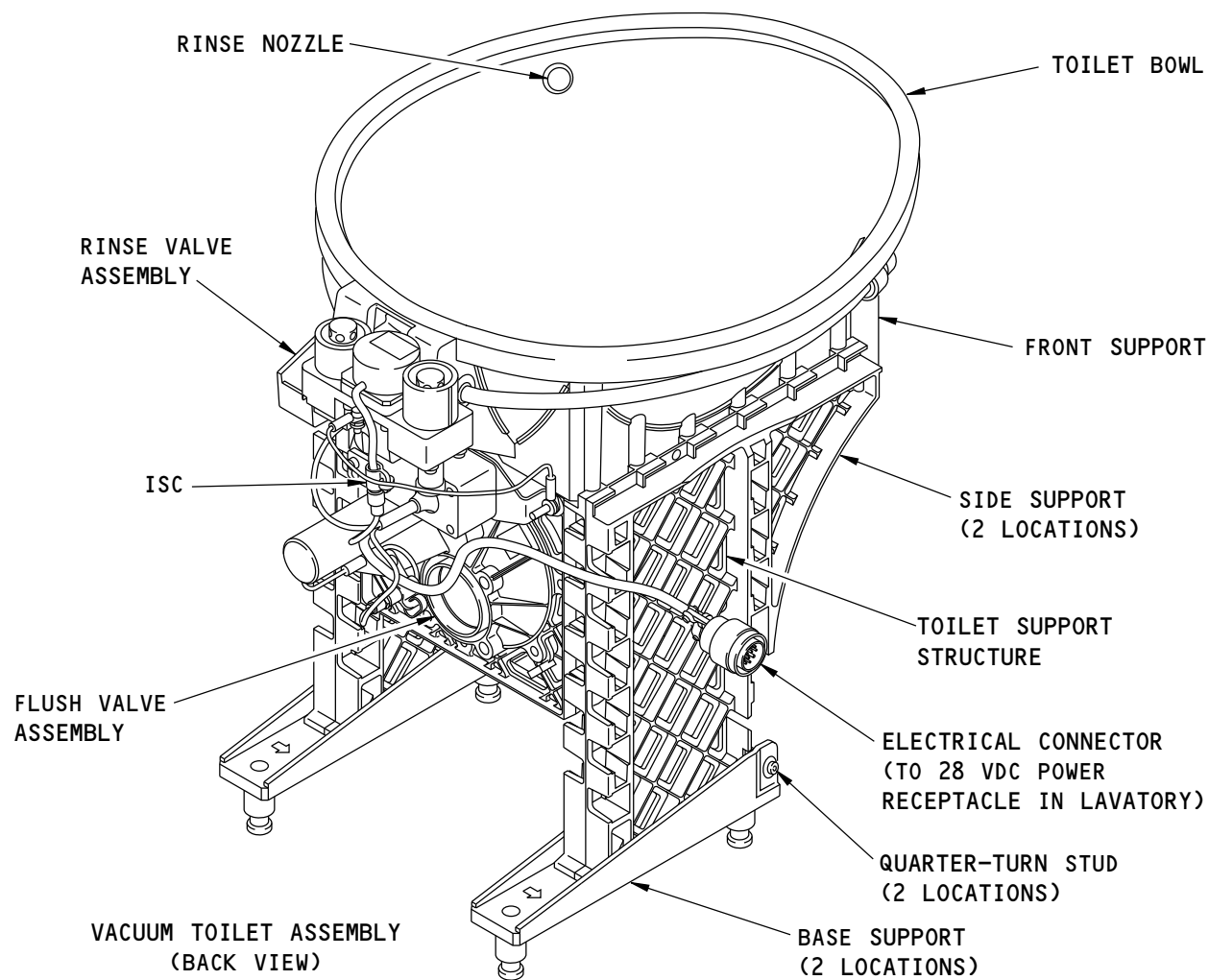
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WATER/WASTE - VACUUM WASTE SYSTEM - TOILET ASSEMBLY

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WATER/WASTE - VACUUM WASTE SYSTEM - FLUSH CYCLE

| AKS 001-024

Lavatory Flush Cycle Operation

The flush control unit (FCU) must receive an enable signal from the logic control module (LCM) to operate the toilet assembly components. The LCM sends an enable signal to the FCU when the waste tank is not full.

If the FCU is enabled, the flush cycle will start with the operation of the flush switch.

The flush control unit (FCU) controls the operation of these components during the flush cycle:

- Vacuum blower
- Rinse valve
- Flush valve.

When you push the flush switch, the FCU immediately starts a duty cycle inhibit. The duty cycle inhibit prevents another input from the flush switch for the next 15 seconds.

The FCU also sends a signal to operate the vacuum blower. The vacuum blower will operate if the airplane is below 16,000 feet and the waste drain ball valve is closed. The FCU sends the vacuum blower signal for 15 seconds.

One second after the flush cycle starts, the FCU opens the rinse valve. The rinse valve is open for 0.7 seconds. During this time, eight ounces of potable water goes into the toilet bowl. The FCU then closes the rinse valve.

Two seconds after the flush cycle starts, the FCU opens the flush valve. The flush valve is open for four seconds to drain the toilet waste. The FCU then closes the flush valve.

The vacuum blower continues to operate for nine seconds. The vacuum blower then stops.

The FCU is then ready for another flush cycle.

AKS 025-999

Lavatory Flush Cycle Operation — B/E Aerospace Vacuum Toilet Assembly

The B/E Aerospace Vacuum Toilet Assembly operates with the Integrated System Controller (ISC) that controls the flush cycle.

Lavatory Flush Cycle Operation:

- The Logic Control Module (LCM) monitors the aircraft waste tank to make sure that there is a sufficient capacity in the waste tank. When the waste tank is full, the LCM cuts power to the lavatory to prevent the use of the toilet.
- The user starts a flush cycle with a flush switch in the lavatory module, which sends 28 VDC to the flush circuit of the ISC.
- The ISC starts the flush, sets the flush cycle to 15 seconds and sends 28 VDC to the Vacuum Generator Assembly (VGA) relay.
- To find out if the VGA is necessary, the aircraft contains an altitude switch in series between the ISC and the VGA relay. If the aircraft is on the ground or below 16,000 feet (4,877 meters), the altitude switch closes to send the 28 VDC to the VGA relay. Above this altitude, cabin pressure and atmospheric pressure differential is sufficient to send waste material without the VGA.
- The ISC opens and closes the rinse valve and flush valve assemblies in the sequence as shown. The rinse valve assembly sends about 5 fl-oz (148 ml) of rinse water to wash the sides of the toilet bowl and helps the removal of waste material.

Flush Valve Assembly Operation:

- The flush valve assembly is usually closed to keep the pressure boundary between the aircraft cabin and the aircraft waste tank.
- The flush valve assembly contains a disk that turns 90° to the open and closed position. A 28 VDC motor actuator turns the disk to the open position in approximately 0.7 seconds.



WATER/WASTE - VACUUM WASTE SYSTEM - FLUSH CYCLE

| AKS 025-999 (Continued)

- The disk of the flush valve assembly can be manually set to the open or closed position by an override lever. The override lever is on the flush valve at the back of the toilet.

ISC Flush Cycle Operation:

- If there is a blockage that prevents the flush valve to close, the ISC will do a re-flush cycle.
- The re-flush cycle moves the flush valve back to the open position to try to clear the blockage from the valve. After approximately 4 seconds, the flush valve closes.
- The re-flush cycle will occur a maximum of three times to try to clear the blockage from the valve. Rinse water will flow during the three re-flush cycles.
- If the blockage still exists, subsequent flush and re-flush cycles will continue until the blockage is clear.
- To conserve potable water and prevent the risk of toilet bowl overflows, rinse water will not flow from this point forward.

Flush Cycle Completion:

- After 15 seconds, the ISC removes the run signal to the VGA relay and resets the flush cycle.

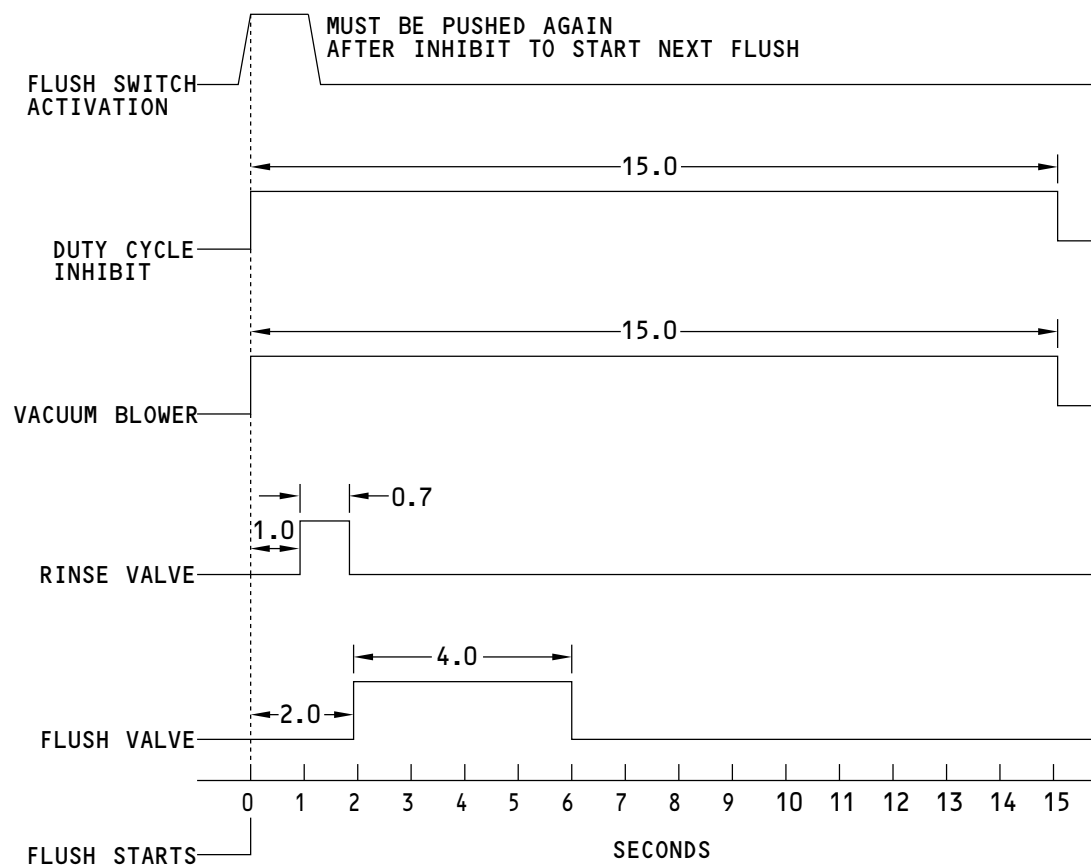
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WATER/WASTE - VACUUM WASTE SYSTEM - FLUSH CYCLE

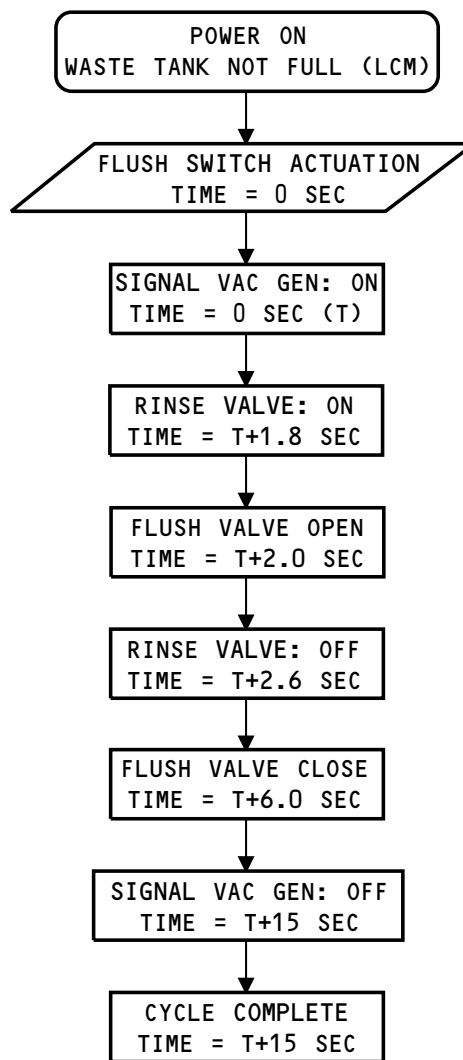
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WATER/WASTE - VACUUM WASTE SYSTEM - TOILET ASSEMBLY - FLUSH CYCLE

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**WATER/WASTE - VACUUM WASTE SYSTEM - COMPONENT LOCATIONS - CARGO COMPARTMENT****Location**

These components are in the aft cargo compartment, left side, behind the cargo lining:

- Waste tank
- Liquid separator
- Vacuum blower
- Vacuum check valve
- Waste drain ball valve and linkage assembly
- Waste drain valve assembly
- Waste tank rinse fitting assembly
- Waste tank rinse nozzles
- Waste tank rinse filter
- Drain line blockage removal fitting

The liquid separator is on top of the waste tank.

The vacuum blower and vacuum check valve are forward of the waste tank. The vacuum blower and vacuum check valve are behind the sidewall panels in the aft cargo compartment.

The waste drain ball valve is below, outboard, and forward of the waste tank.

The waste drain valve assembly and the waste drain rinse fitting assembly are on the waste service panel. You can access the waste drain valve assembly and the waste drain rinse fitting assembly from below the floor.

The waste tank rinse nozzles are on the top of the waste tank.

The waste tank rinse filter is along the inboard side of the waste tank.

The drain line blockage removal fitting is on the waste drain tube, forward of the waste tank.

Training Information Point

Before you work on the waste system, make sure that the waste system servicing task is complete. Wear protective clothing.

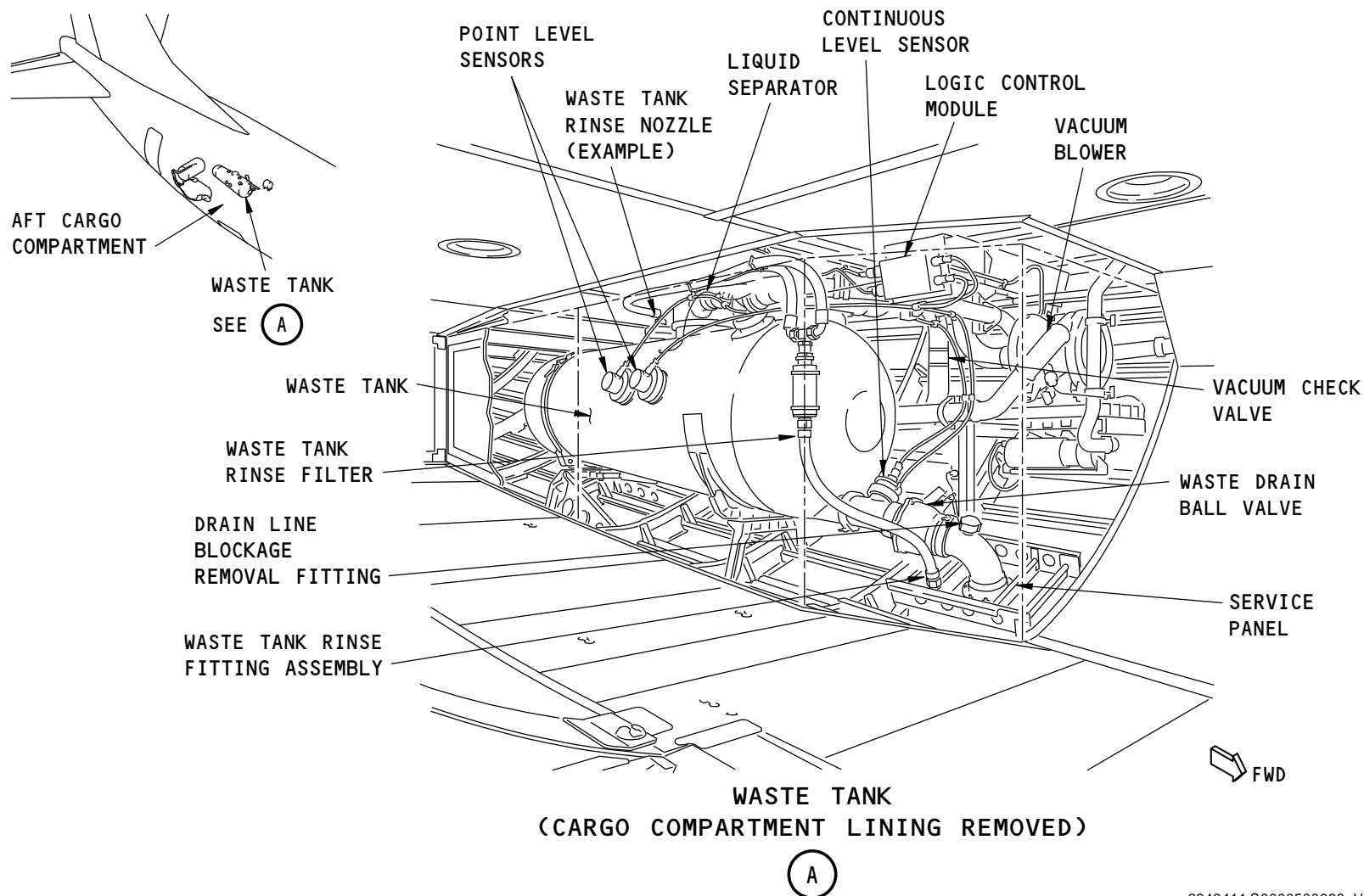
WARNING: SEAL THE CARGO COMPARTMENT WITH THE LINING. OBEY THE INSTRUCTIONS IN THE SPECIFIED PROCEDURE WHEN YOU INSTALL THE LINING. IF YOU INSTALL THE LINING INCORRECTLY, THE FIRE EXTINGUISHING AGENT OR SMOKE CAN GET INTO THE PASSENGER COMPARTMENT DURING A FIRE.

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WATER/WASTE - VACUUM WASTE SYSTEM - COMPONENT LOCATIONS - CARGO COMPARTMENT

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**WATER/WASTE - VACUUM WASTE SYSTEM - WASTE TANK****Purpose**

The waste tank holds waste material from the lavatory toilets.

Location

The waste tank is in the aft cargo compartment on the left side of the airplane. You must remove the cargo lining to get access to the waste tank.

Physical Description

The waste tank is a graphite fiber reinforced plastic container. The tank wall is graphite filaments wound over a stainless steel liner. The center section of the tank wall includes a honeycomb core.

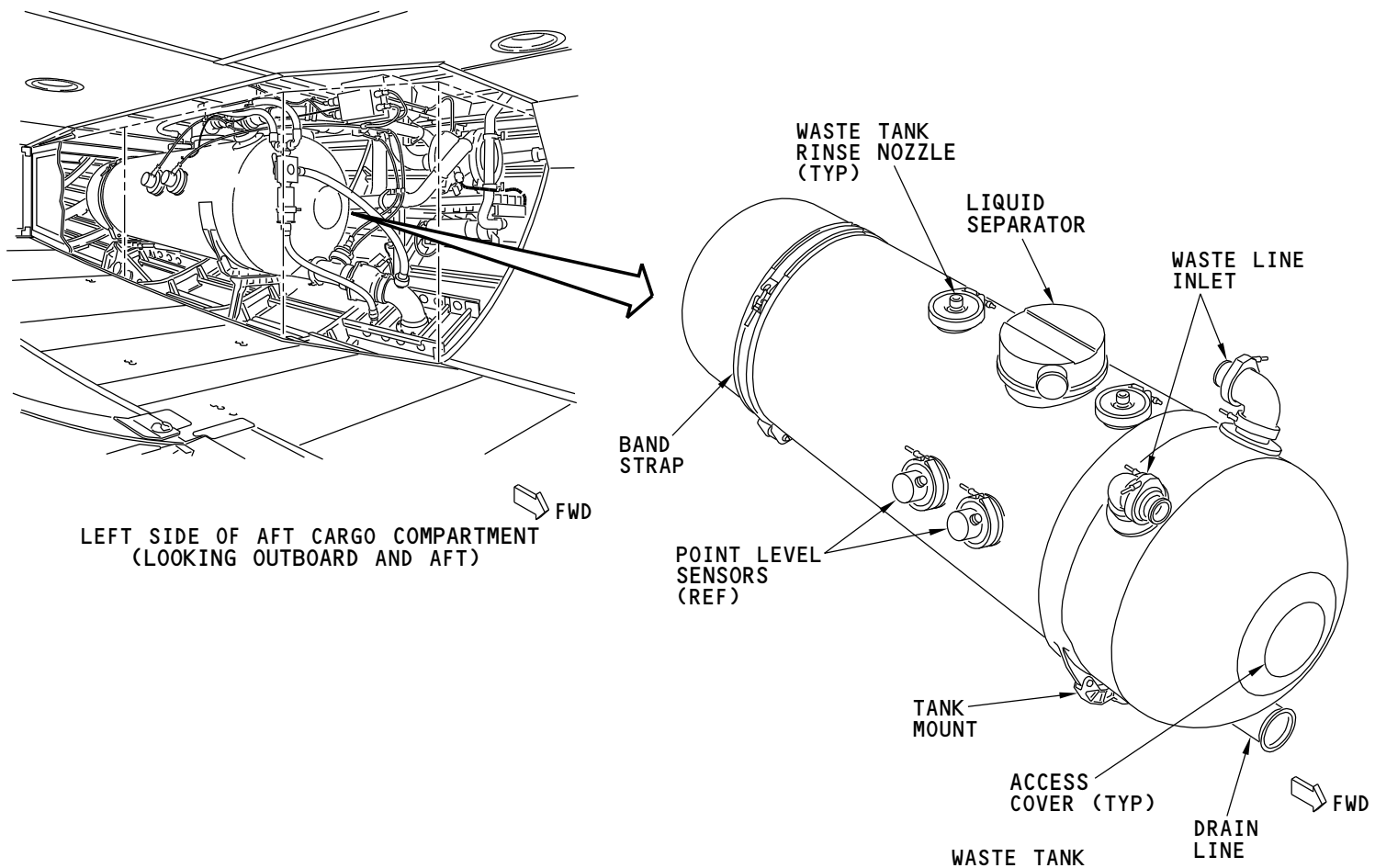
The waste tank usable capacity is 60 gallons (227 liters).

The waste tank has fittings for these components:

- Waste tank rinse nozzle (2)
- Liquid separator
- Waste line inlet (2)
- Drain line
- Point level sensor (2).

An access cover at each end of the tank lets you examine or clean the inside of the tank.

A band strap at the aft end of the tank and a tank mount on the forward end of the tank holds the waste tank to the airplane structure.



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WATER/WASTE - VACUUM WASTE SYSTEM - WASTE TANK

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AKS ALL

EFFECTIVITY

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**WATER/WASTE - VACUUM WASTE SYSTEM - LIQUID SEPARATOR****Purpose**

The liquid separator removes moisture and waste particles from the waste tank air.

Location

The liquid separator is at the top of the waste tank.

Physical Description

The liquid separator has these parts:

- Separator cap
- V-band coupling
- Upper separator assembly
- Lower separator assembly
- O-ring.

The v-band coupling attaches the liquid separator to the top of the waste tank.

Functional Description

The vacuum blower pulls air out of the waste tank to an overboard port. The air goes through the liquid separator. Filters in the liquid separator remove the moisture and waste particles before the air goes through the port in the separator cap.

Training Information Point

Before you work on the liquid separator, isolate the waste tank electrical components. Do the waste tank servicing. Do not add the chemical precharge.

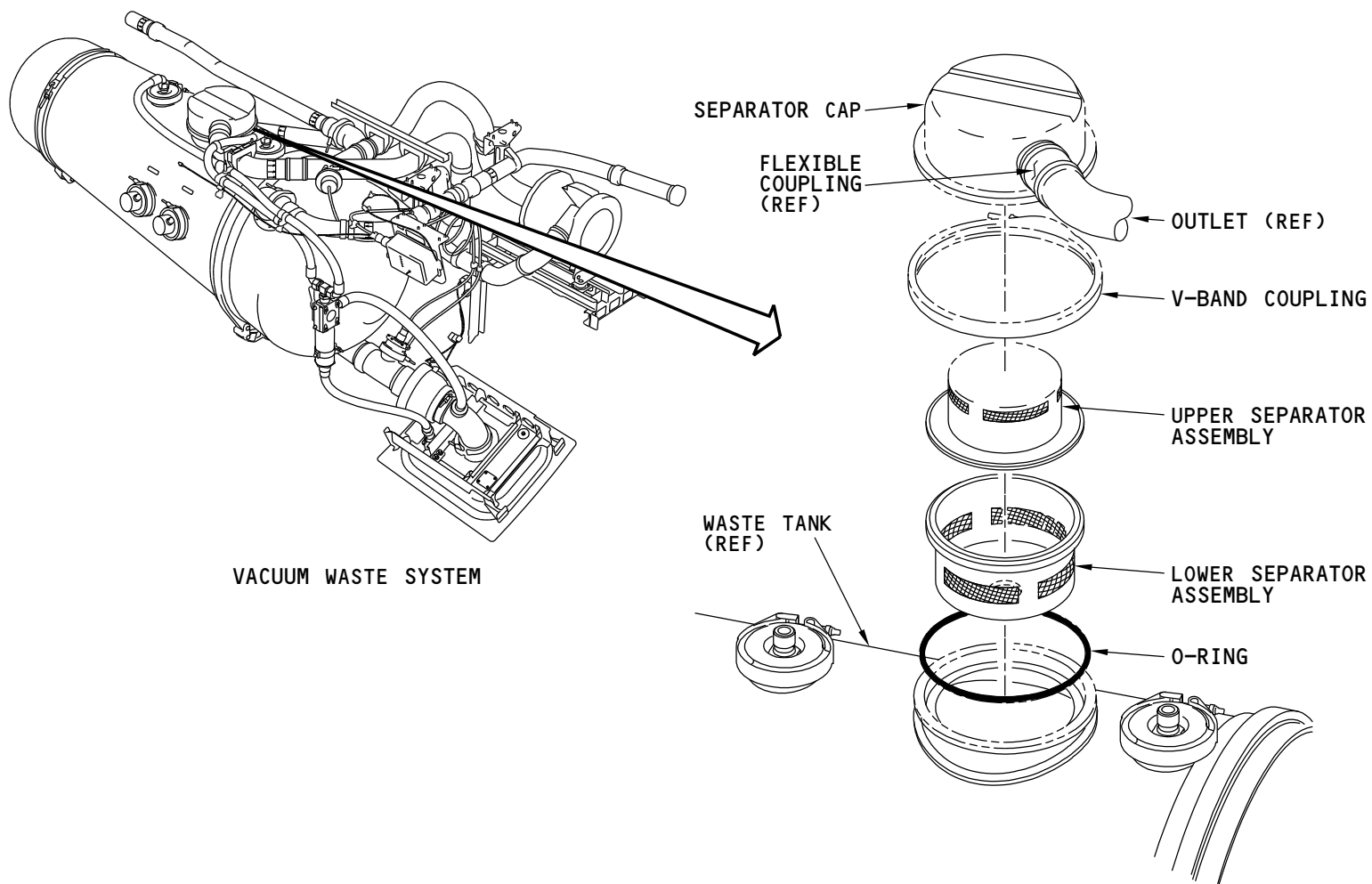
Use a general purpose cleaner detergent to clean the liquid separator.

Use food grade processing grease on the O-ring when you install the liquid separator.

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WATER/WASTE - VACUUM WASTE SYSTEM - LIQUID SEPARATOR

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**WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM BLOWER AND FILTER****Purpose**

The vacuum blower removes air from the waste tank.

Location**AKS ALL; AIRPLANES WITH VACUUM BLOWERS WITHOUT AN AIR FILTER**

The vacuum blower is in the aft cargo compartment on the left side. The vacuum blower is on a shelf forward of the waste tank.

AKS ALL**Physical Description**

The vacuum blower is a three phase, high-speed, motor operated fan.

The vacuum blower has these features:

- Intake port
- Exhaust port
- Electrical connection.

Functional Description

The vacuum blower removes the air from the waste tank and blows it out of the airplane. Removal of the air from the waste tank causes the pressure in the waste tank to decrease. When a flush valve opens, higher pressure cabin air pushes lavatory toilet waste to the waste tank.

Three thermal switches give overheat protection. The switches are wired in series and operate at 270F (132C). If a switch operates, it stops motor operation. The switches reset when the temperature decreases to less than their set point.

Operation

The vacuum blower operates when you push the flush switch and the airplane is below 16,000 feet.

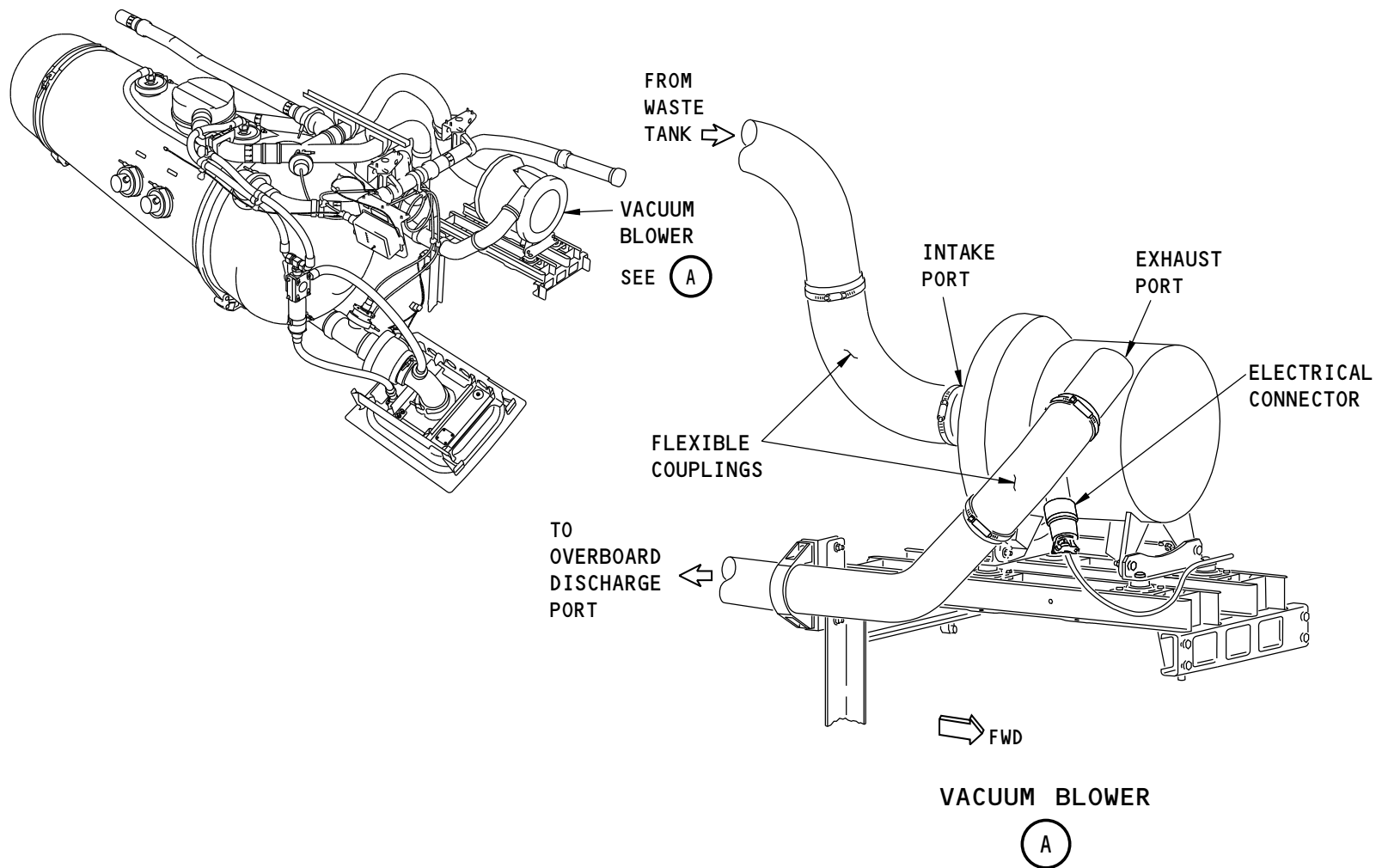
Training Information Point

The vacuum blower has two flexible coupling hoses that attach with clamps. Four fasteners on shock mounts and a jumper cable attach the blower to the shelf.

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WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM BLOWER

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EFFECTIVITY
AKS ALL; AIRPLANES WITH VACUUM BLOWERS WITHOUT AN AIR FILTER

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WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM BLOWER BAROMETRIC SWITCH

Purpose

The vacuum blower barometric switch opens when the altitude is above 16,000 feet. The open switch does not let the vacuum blower come on.

Location

The vacuum blower barometric switch is in the jackscrew compartment. You get access to it through the section 48 access and blowout door.

The barometric switch attaches to structure on the left side of the fuselage.

Physical Description

The barometric switch has an aneroid capsule and an electrical connector.

Functional Description

The capsule senses the ambient air pressure. As the pressure outside decreases, the capsule expands. When the capsule expands to a specific size, it opens an internal switch.

Interfaces

The vacuum blower barometric switch is part of the control circuit for vacuum blower operation.

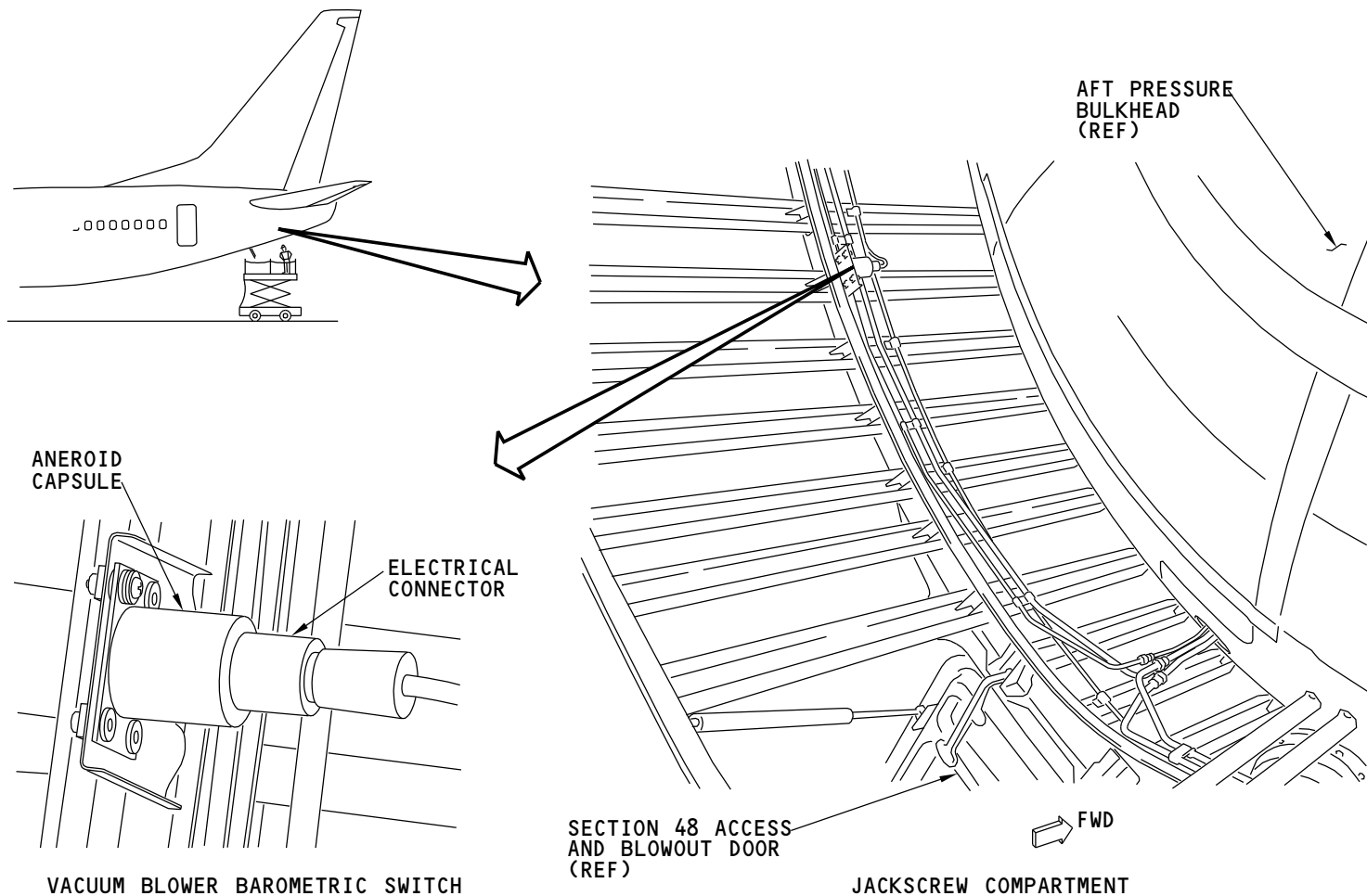
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EFFECTIVITY	
AKS ALL	

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38-32-00



M87446 S0004631305_V1

WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM BLOWER BAROMETRIC SWITCH

38-32-00-017

AKS ALL	EFFECTIVITY
	D633A101-AKS

38-32-00

**WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM BLOWER - FUNCTIONAL DESCRIPTION****Power**

- | Transfer bus 1 supplies 115v AC three-phase power for vacuum blower operation.
- | The control power is 28v DC from bus 1.

Functional Description

The vacuum blower operates when the airplane is below 16,000 feet altitude and these conditions are true:

- Waste drain ball valve is closed
- Waste tank is not full
- Lavatory flush switch operates.

The barometric pressure switch senses ambient pressure. When the airplane is below 16,000 feet, the barometric pressure switch is closed.

The waste drain ball valve proximity switch is closed when the waste drain ball valve is closed.

If the tank is not full, the logic control module (LCM) sends an enable signal to each flush control unit (FCU). Each lavatory flush switch sends a signal to the FCU. The operational logic in each FCU completes the circuit for the vacuum blower to operate.

The barometric pressure switch stops operation of the vacuum blower when the airplane is above 16,000 feet.

Three thermal switches in the vacuum blower stop the motor operation if the temperature in the vacuum blower is more than 270F (132C). The thermal switches reset when the vacuum blower temperature decreases to less than 270F (132C).



M87452 S0004631307_V1

WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM BLOWER - FUNCTIONAL DESCRIPTION

38-32-00

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**WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM CHECK VALVE****Purpose**

The vacuum check valve prevents the pull of air from the waste tank vent port by the vacuum blower.

Location

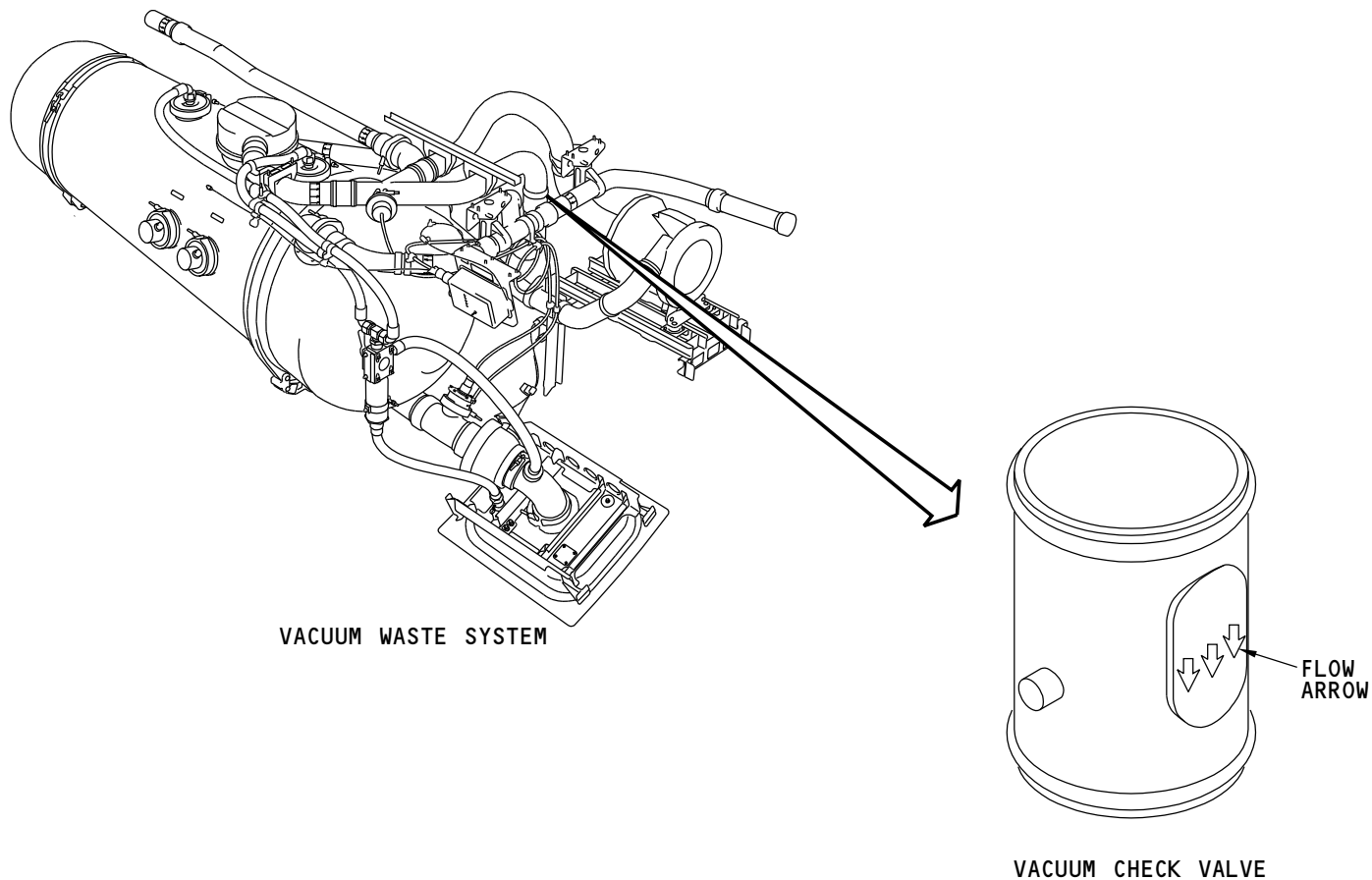
The vacuum check valve is in the aft cargo compartment on the left side.
The vacuum check valve is in the exhaust duct, upstream of the waste tank vent port.

Physical Description

The vacuum check valve is a flapper type valve. A flow direction arrow shows the correct installation orientation.

Functional Description

The vacuum check valve is spring-loaded to the closed position. The vacuum check valve opens when there is sufficient differential pressure between the waste tank and the waste tank vent port.



M87432 S0004631310_V1

WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM CHECK VALVE

38-32-00

38-32-00-011

AKS ALL

EFFECTIVITY

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**WATER/WASTE - VACUUM WASTE SYSTEM - WASTE DRAIN BALL VALVE & LINKAGE ASSEMBLY****Purpose**

The waste drain ball valve and linkage assembly control the flow of waste out of the waste tank.

Location

The waste drain ball valve and linkage assembly are in the aft cargo compartment on the left side. The waste drain ball valve is in the drain line, between the waste tank and the waste service panel. The linkage assembly is adjacent to the waste drain ball valve, between the valve and the waste service panel.

Physical Description

The waste drain ball valve is a manually-operated two- position ball valve. It has these parts:

- Ball valve
- Actuator lever
- Proximity switch.

There is an electrical connection at the proximity switch.

The linkage assembly has these parts:

- Control rod
- Uniball assembly
- Handle (not shown).

Functional Description

You pull the handle at the waste service panel to open the waste drain ball valve. The handle transmits the movement through the control rod to the actuator lever. The actuator lever moves the waste drain ball valve.

The proximity switch stops the operation of the vacuum blower when the waste drain ball valve is not closed.

Training Information Point

The waste drain ball valve connects to the drain lines with v-band clamps and gask-o-seal gaskets.

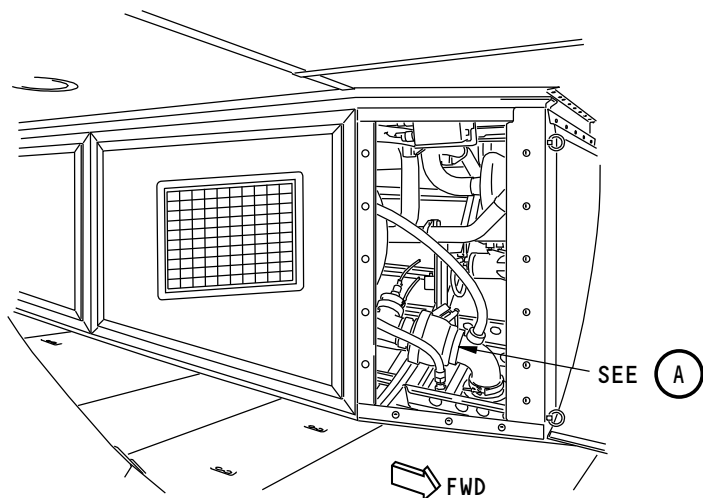
You must remove the waste drain heater blanket before you work on the waste drain ball valve.

38-32-00

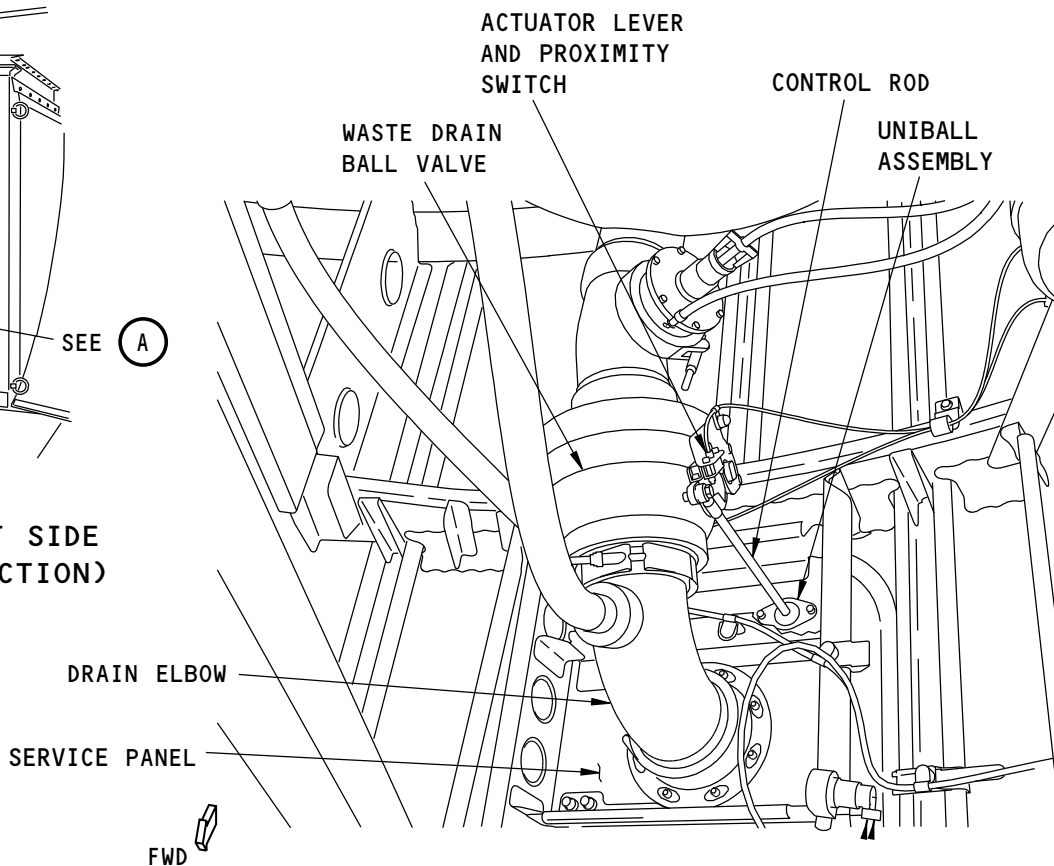
AKS ALL EFFECTIVITY

D633A101-AKS

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AFT CARGO COMPARTMENT LEFT SIDE
(VIEW IN THE OUTBOARD DIRECTION)



WASTE DRAIN BALL VALVE AND LINKAGE ASSEMBLY
(HEATER BLANKET NOT SHOWN)

(A)

M87426 S0004631313_V2

WATER/WASTE - VACUUM WASTE SYSTEM - WASTE DRAIN BALL VALVE & LINKAGE ASSEMBLY

38-32-00

AKS ALL

EFFECTIVITY

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**WATER/WASTE - VACUUM WASTE SYSTEM - WASTE SERVICE PANEL****Purpose**

The waste service panel lets you drain the vacuum waste system. The waste service panel also lets you rinse the waste tank.

Location

The waste service panel is in the aft, lower-left area of the fuselage.

Physical Description

These are the components in the waste service panel:

- Waste drain valve assembly
- Waste drain ball valve control handle
- Waste tank rinse fitting assembly.

Two snap-latches hold the waste service panel closed.

You can get access to the waste service panel components from the aft cargo compartment. The service panel components are forward and below the waste tank.

Functional Description

The waste drain valve assembly connects to the waste drain elbow. The waste tank rinse fitting assembly connects to the rinse hose. The control handle lets you open the waste drain ball valve.

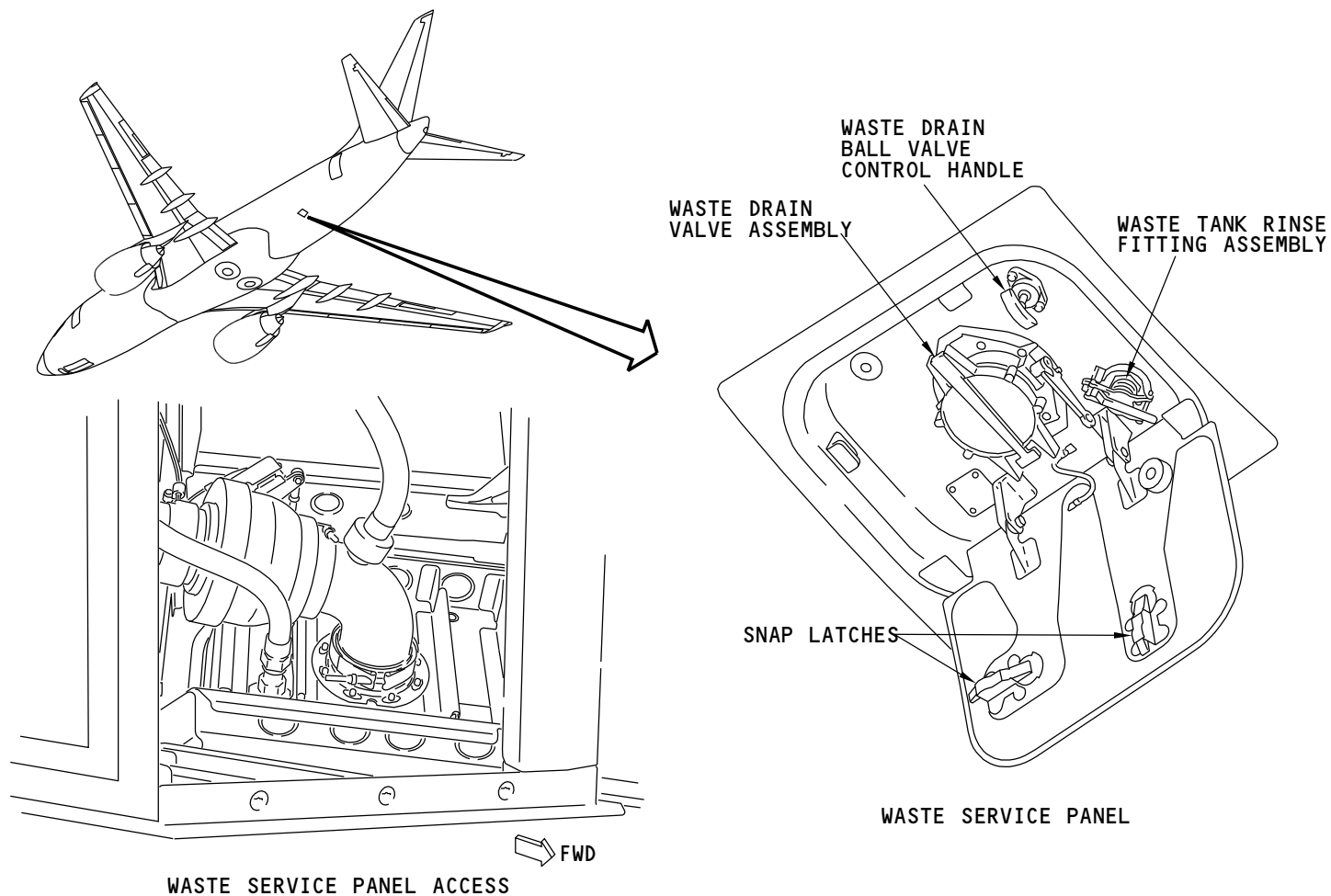
To drain the waste tank, you open the waste drain ball valve.

The proximity switch on the waste drain ball valve stops operation of the vacuum blower when the waste drain ball valve is open.

38-32-00**EFFECTIVITY**
AKS ALL

D633A101-AKS

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WATER/WASTE - VACUUM WASTE SYSTEM - WASTE SERVICE PANEL

M87418 S0004631315_V1

38-32-00-004

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EFFECTIVITY

D633A101-AKS

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38-32-00

**WATER/WASTE - VACUUM WASTE SYSTEM - WASTE DRAIN VALVE ASSEMBLY****Purpose**

The waste drain valve assembly lets you drain the vacuum waste system.

Location

The waste drain valve assembly is part of the waste service panel at the aft left side of the airplane.

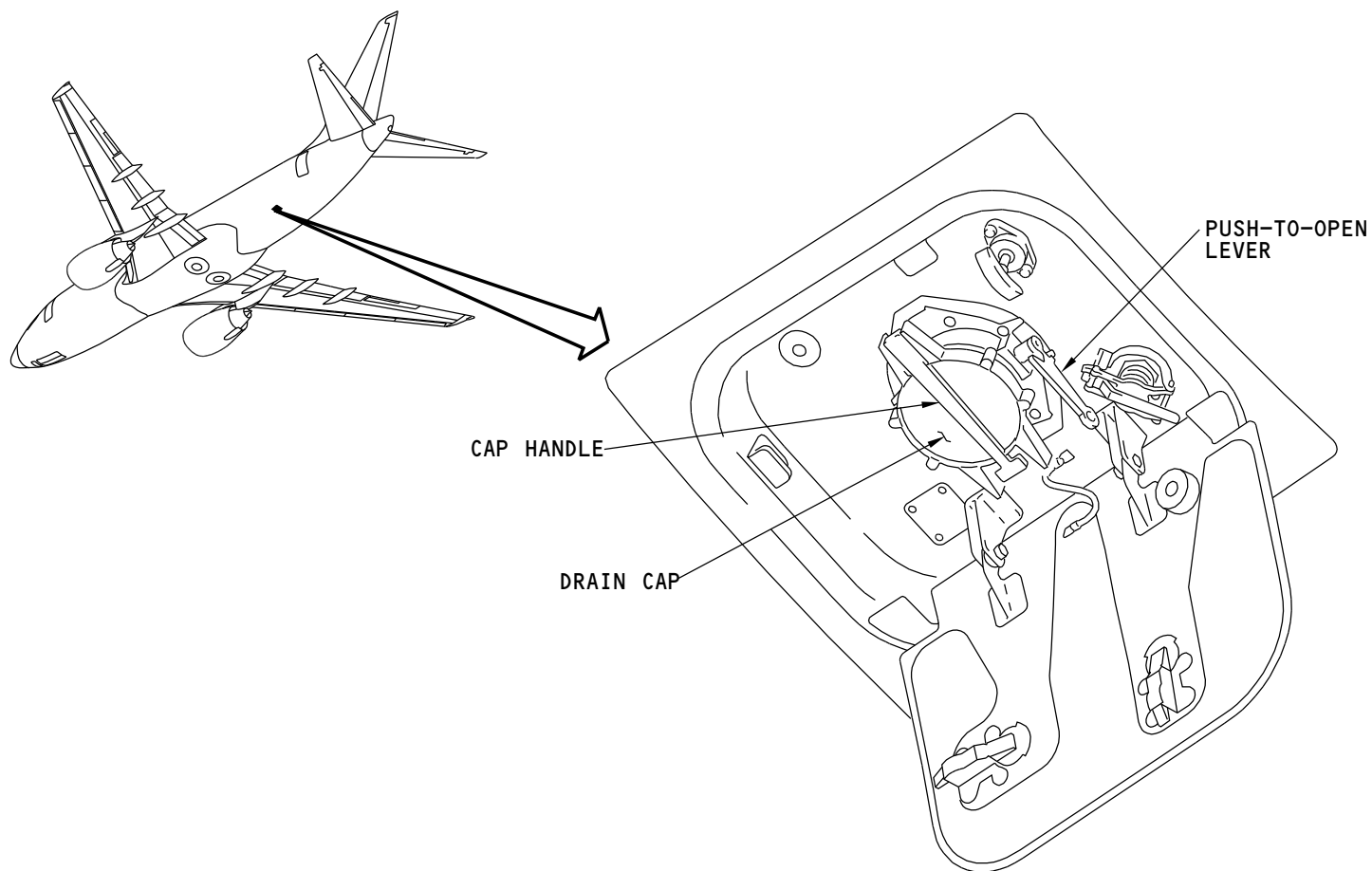
Physical Description

The waste drain valve assembly has these parts:

- Quick-disconnect fitting (not shown)
- Push-to-open lever
- Flapper valve (not shown)
- Drain cap
- Cap handle.

Functional Description

You open the drain cap and attach the waste drain hose to the quick-disconnect fitting. The push-to-open lever opens the flapper valve and lets waste drain from the vacuum waste system.



M87434 S0004631320_V1

WATER/WASTE - VACUUM WASTE SYSTEM - WASTE DRAIN VALVE ASSEMBLY

38-32-00-013

AKS ALL

EFFECTIVITY

38-32-00

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**WATER/WASTE - VACUUM WASTE SYSTEM - WASTE TANK RINSE FITTING ASSEMBLY****Purpose**

The waste tank rinse fitting assembly is the connection for the rinse water hose.

Location

The waste tank rinse fitting assembly is in the waste service panel at the aft fuselage lower left side.

Physical Description

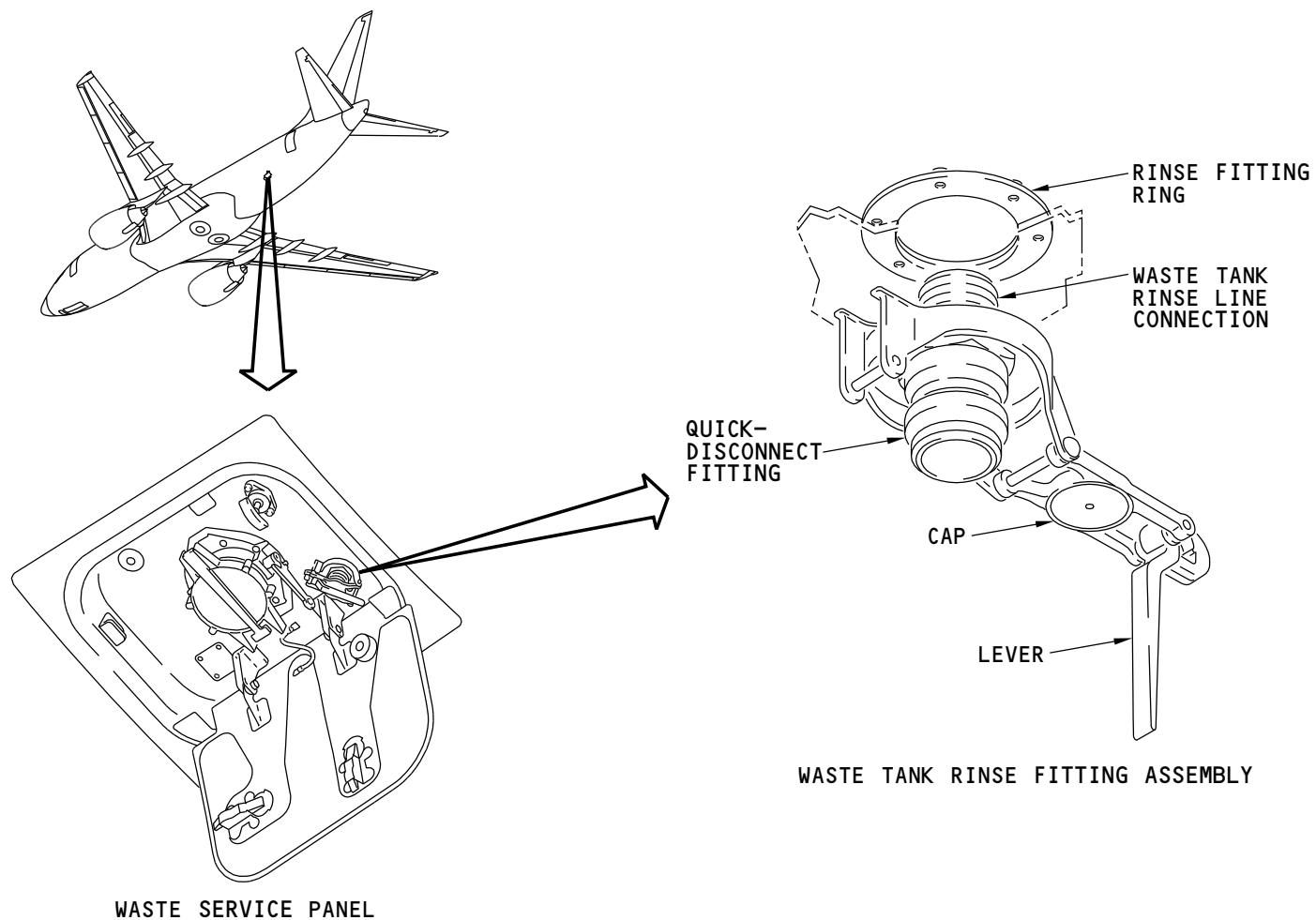
The waste tank rinse fitting assembly has these parts:

- Waste tank rinse line connection
- Rinse fitting ring
- Quick-disconnect fitting
- Cap
- Lever.

Functional Description

You open the cap and attach the rinse water hose to the quick-disconnect fitting. Rinse water can then be supplied to flush the point level sensors and waste tank.

AKS ALL	EFFECTIVITY
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M87441 S0004631325_V1

WATER/WASTE - VACUUM WASTE SYSTEM - WASTE TANK RINSE FITTING ASSEMBLY

38-32-00-014

AKS ALL

EFFECTIVITY

38-32-00

D633A101-AKS

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**WATER/WASTE - VACUUM WASTE SYSTEM - WASTE TANK RINSE FILTER****Purpose**

The waste tank rinse filter removes contamination from the rinse water.

Location

The waste tank rinse filter is in the aft cargo compartment. You remove the waste access panel to get access to the waste tank rinse filter. The waste tank rinse filter is at the forward end of the waste tank.

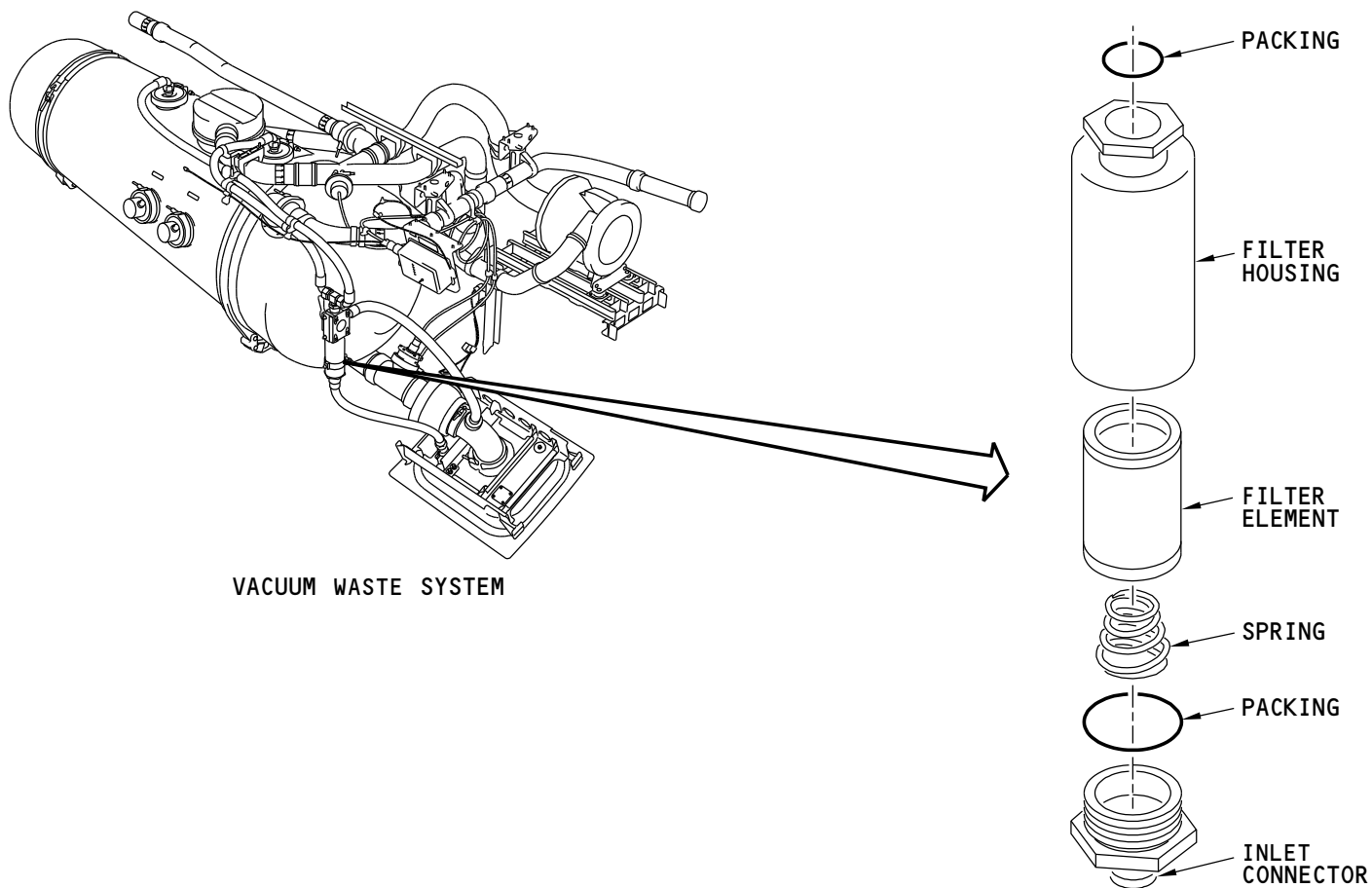
Physical Description

A filter element in the waste tank rinse filter removes contamination from the rinse water. If the contamination is not removed, the contamination could clog the waste tank rinse nozzles.

Training Information Point

You can remove and clean the rinse filter element when it becomes dirty.

EFFECTIVITY	
AKS ALL	



VACUUM WASTE SYSTEM

M87444 S0004631330_V1

WATER/WASTE - VACUUM WASTE SYSTEM - WASTE TANK RINSE FILTER

38-32-00-016

AKS ALL	EFFECTIVITY
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**WATER/WASTE - VACUUM WASTE SYSTEM - WASTE TANK RINSE NOZZLE****Purpose**

The waste tank rinse nozzles spray rinse water at the point level sensors and at the waste tank interior surface.

Location

The waste tank rinse nozzles attach to fittings at the top of the waste tank.

Physical Description

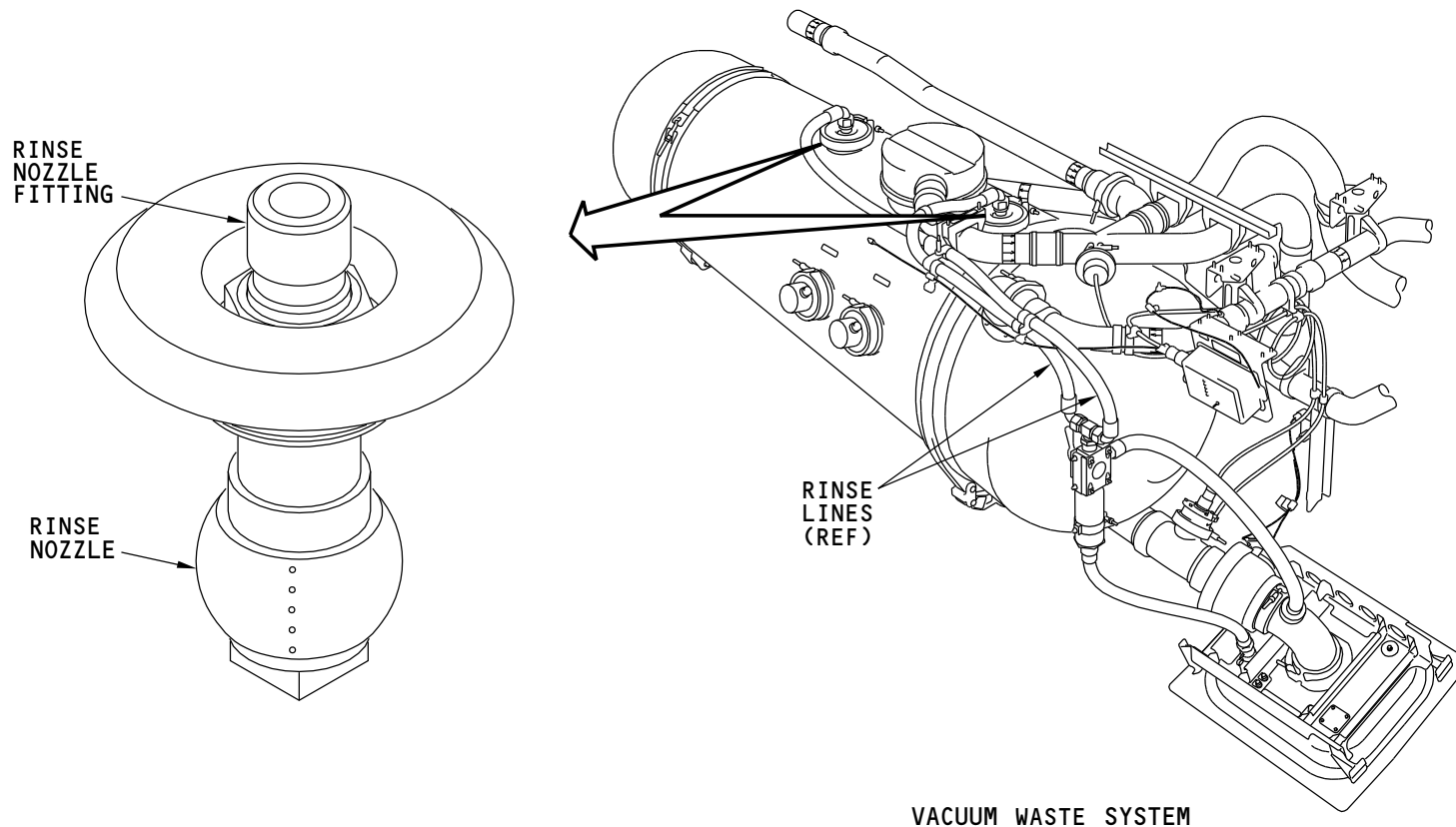
The waste tank rinse nozzle is a rotating sphere with small holes.

Functional Description

The rinse water supplied to the waste tank rinse nozzles is pressurized by the waste service vehicle.

The pressurized rinse water goes through the rinse nozzle fitting and exits through small diameter holes on the rinse nozzle. The force of the rinse water leaving the small diameter holes causes the rinse nozzle to rotate. The rotating rinse nozzle sprays the rinse water around the inside of the waste tank. The rinse water spray flushes the point level sensors and waste tank.

EFFECTIVITY	
AKS ALL	



M87442 S0004631333_V1

WATER/WASTE - VACUUM WASTE SYSTEM - WASTE TANK RINSE NOZZLE

38-32-00-015

AKS ALL

EFFECTIVITY

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**WATER/WASTE - VACUUM WASTE SYSTEM - DRAIN LINE BLOCKAGE REMOVAL FITTING****Purpose**

The drain line blockage removal fitting supplies a tool connection to let air pressure clean a blocked waste tank drain line.

Location

The drain line blockage removal fitting is in the aft cargo compartment. You must remove the waste access panel to get access to the drain line blockage removal fitting. The drain line blockage removal fitting is on the waste drain tube elbow between the waste drain valve and the waste drain ball valve.

Physical Description

The drain line blockage removal fitting is a single, threaded port. The fitting port connects with the blockage removal tool. The fitting port is closed with a threaded cap when not in use.

Operation

Air pressure is put into the waste drain elbow tube through the port with the blockage removal tool. The pressure moves the blockage into the tank where it can be removed manually or by servicing.

Functional Description

An external air source supplies air to the blockage removal tool which provides the pressure to clear the blockage.

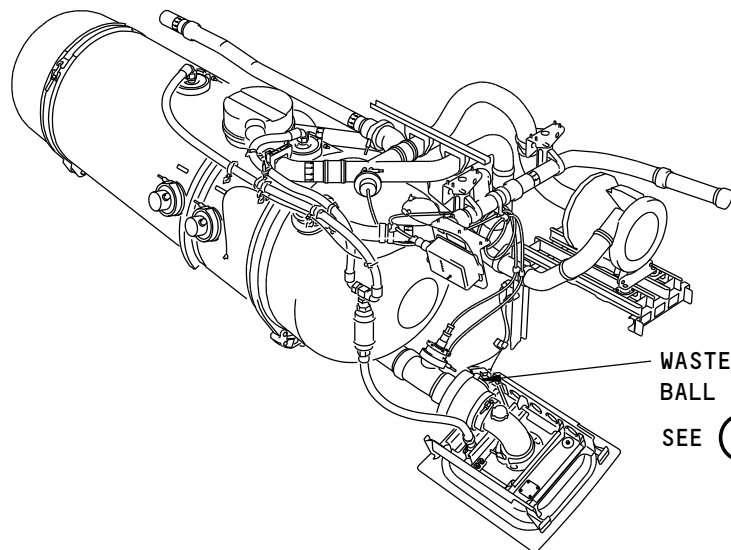
Training Information Point

The blockage procedure may be performed several times until the blockage is removed.

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WASTE DRAIN
BALL VALVE

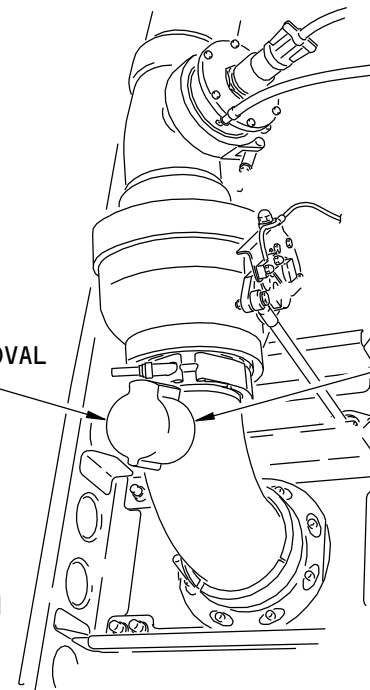
SEE (A)

VACUUM WASTE SYSTEM

WASTE DRAIN
BLOCKAGE REMOVAL
FITTING CAP

WASTE DRAIN
BLOCKAGE
REMOVAL
FITTING

FWD



WASTE DRAIN BALL VALVE

(A)

2243726 S0000500809_V1

WATER/WASTE - VACUUM WASTE SYSTEM - DRAIN LINE BLOCKAGE REMOVAL FITTING

38-32-00-022

AKS ALL

EFFECTIVITY

D633A101-AKS

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38-32-00

**WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM WASTE LINE CLEAN-OUT FITTING****Purpose**

The vacuum waste line clean-out fitting lets you clean a blockage between the forward cargo compartment and the waste tank.

Location

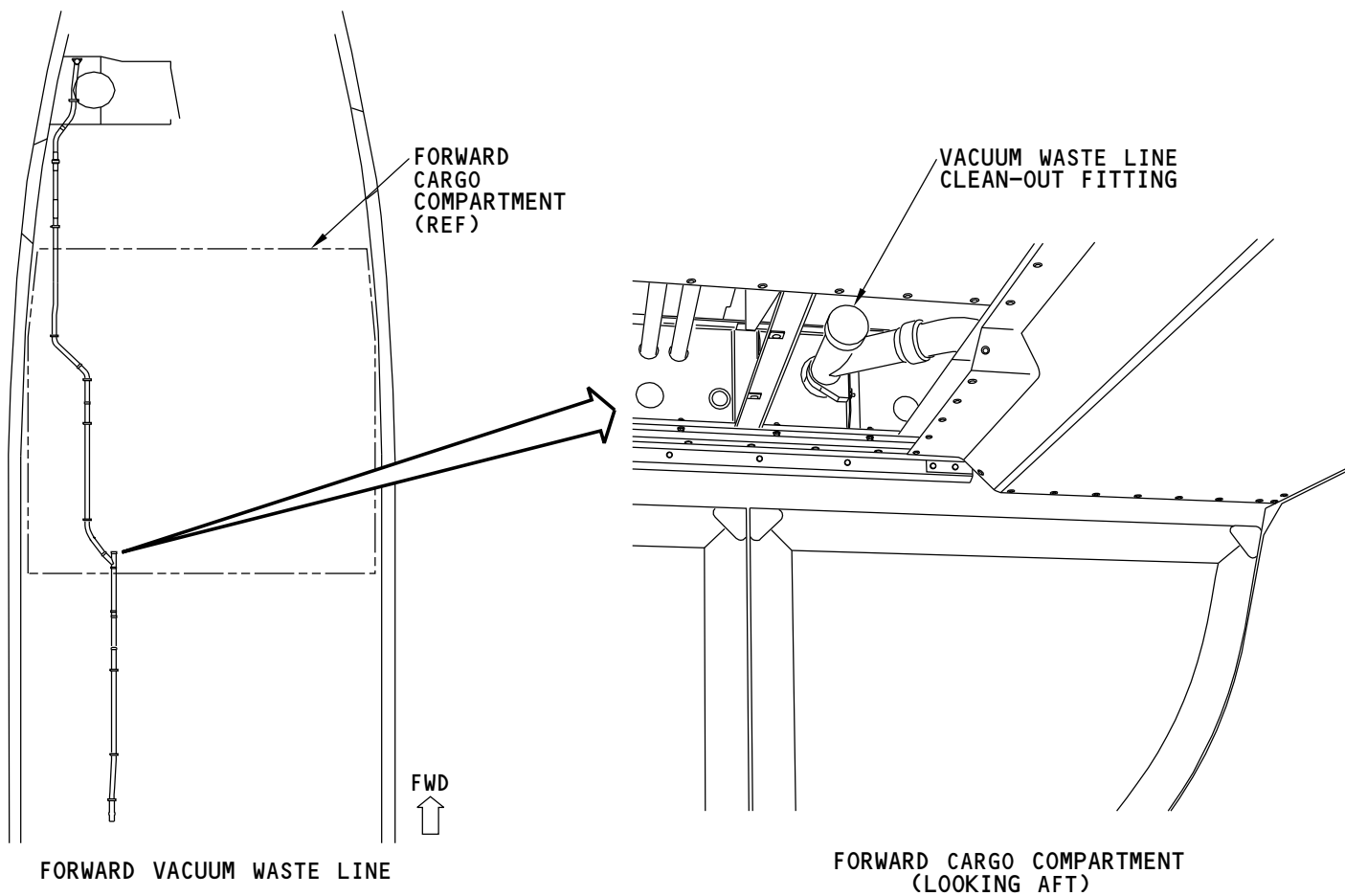
The vacuum waste line clean-out fitting is in the forward cargo compartment. Remove the cargo compartment ceiling lining to get access to the vacuum waste line clean-out fitting.

Functional Description

When the vacuum waste line clean-out fitting is removed, you can put a plumbers snake or a kinetic air-ram equipment in the vacuum waste line to remove the blockage.

Training Information Point

WARNING: MAKE SURE YOU ATTACH A DO-NOT-OPERATE TAG TO THE TOILET FLUSH HANDLES FOR ALL TOILETS IN THE SYSTEM. IF YOU FLUSH THE TOILETS UPSTREAM OF THE BLOCKAGE, THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.



M87455 S0004631339_V1

WATER/WASTE - VACUUM WASTE SYSTEM - VACUUM WASTE LINE CLEAN-OUT FITTING

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WATER/WASTE - VACUUM WASTE SYSTEM - FUNCTIONAL DESCRIPTION

Vacuum Toilet Assemblies

AKS 001-024

Operation of the flush switch sends a signal to the flush control unit (FCU). The FCU opens the rinse valve to supply potable water to flush the toilet bowl. After 0.7 seconds, the FCU closes the rinse valve. Each rinse cycle uses eight ounces of potable water. The FCU then opens the flush valve for four seconds to let the toilet waste drain out of the toilet. The flush valve then closes.

The anti-siphon valve prevents the vacuum waste system from siphoning water from the potable water system.

The manual shutoff handle closes the manual shutoff valve.

AKS 025-999

The operation of the flush switch sends a signal to the Integrated System Controller (ISC). The ISC controls the toilet flush and rinse cycles and sends a signal to activate the Vacuum Generator Assembly (VGA). The Logic Control Module (LCM) sends 28 VDC to the ISC if the waste tank has sufficient capacity. The ISC starts a 15 second flush cycle and supply a ground circuit of the vacuum generator relay to start the vacuum generator.

If the aircraft is on the ground or below approximately 16,000 feet, the altitude switch closes to send a 28 VDC to the vacuum generator relay. Above this altitude, the differential cabin pressure altitude versus the reduced atmospheric pressure is sufficient to transport the waste material without the vacuum generator. At this point, the altitude switch stays open and the vacuum generator relay is not activated.

The ISC opens and closes the vacuum toilet, rinse valve and flush valve assemblies. The rinse valve dispenses approximately 5 fl-oz (148 ml) of rinse water to clean the sides of the toilet bowl and helps in the removal of waste material.

AKS ALL

Waste Tank Assembly

The waste tank collects the waste from the lavatory toilets.

Differential pressure causes the toilet bowl contents to flow from the toilet to the waste tank. The vacuum blower or cabin differential pressure supplies the differential pressure for the waste tank.

The vacuum check valve prevents the pull of ambient air in from the waste tank vent port by the vacuum blower.

Waste System Servicing

You service the waste tank from the waste service panel.

Attach the waste drain hose to the waste drain valve and open the waste drain ball valve.

When the tank is empty, attach the rinse hose to the waste tank rinse fitting. Then pressurize the rinse water supply. Rinse water flows through the waste tank rinse filter and two rinse nozzles.

The waste tank rinse nozzles spray water on the inside of the tank to clean the point level sensors and waste tank.

Add chemical precharge after the waste tank is fully drained and flushed.

The waste drain ball valve proximity switch stops the operation of the vacuum blower when the waste drain ball valve is open.

You use the drain line blockage removal fitting to remove a blockage in the waste tank drain line. An air pressure tool can be connected to the fitting on the drain line elbow and used to push the blockage out of the drain line.

WATER/WASTE - VACUUM WASTE SYSTEM - FUNCTIONAL DESCRIPTION

Interfaces

AKS 001-024

The FCU must receive an enable signal from the logic control module (LCM) to operate the toilet components. The LCM disables the FCU if the waste tank is full. The LCM monitors the two point level sensors to find if the waste tank is full.

AKS 025-999

The ISC receives the signal from the Logic Control Module (LCM) to operate the toilet components. The LCM disables the power to the lavatory to stop flush cycles when the waste tank is full. The LCM monitors the two point level sensors to find if the waste tank is full.

AKS 001-024

If the FCU is enabled, a flush cycle starts with the operation of the flush switch.

AKS 025-999

If the ISC is enabled, a flush cycle starts with the operation of the flush switch.

The ISC sets the flush cycle to 15 seconds and sends 28 VDC to the Vacuum Generator Assembly (VGA) relay. The VGA relay is an interface device of the toilet to the vacuum waste system. The VGA is an electric-driven turbine that supplies the vacuum when differential cabin pressure versus atmospheric pressure is not sufficient.

AKS 001-024

The flush switch sends a signal to the FCU. The FCU then sends a signal to operate the vacuum blower for 15 seconds. The signal goes through the waste drain ball valve proximity switch and the vacuum blower barometric switch. The waste drain ball valve proximity switch and vacuum blower barometric switch must be closed for the vacuum blower to operate.

AKS 025-999

The flush switch sends a signal to the ISC. The ISC then sends a signal to operate the vacuum blower for 15 seconds. The signal goes through the waste drain ball valve proximity switch and the vacuum blower barometric switch. The waste drain ball valve proximity switch and vacuum blower barometric switch must be closed for the vacuum blower to operate.

AKS ALL

The waste drain ball valve proximity switch is closed when the waste drain ball valve is closed.

The barometric switch is closed when the airplane is below 16,000 feet.

Training Information Point

The waste tank must be flushed at each servicing interval. If the waste tank is not serviced correctly, unwanted waste material can collect on the point level sensors. The waste material on the point level sensors can cause a tank full signal and stop operation of the lavatory toilets.

You should flush crushed ice down the toilets at regular intervals. The crushed ice will help to prevent unwanted material from collecting in the vacuum waste lines.

CAUTION: DO NOT USE ICE CUBES AS AN ALTERNATIVE TO THE CRUSHED ICE. ICE CUBES CAN CAUSE DAMAGE TO THE POINT LEVEL SENSORS IN THE WASTE TANK.

There is a clean-out fitting in the forward vacuum waste line. You can use the clean-out fitting to clean a blockage between the waste tank and the forward lavatory.

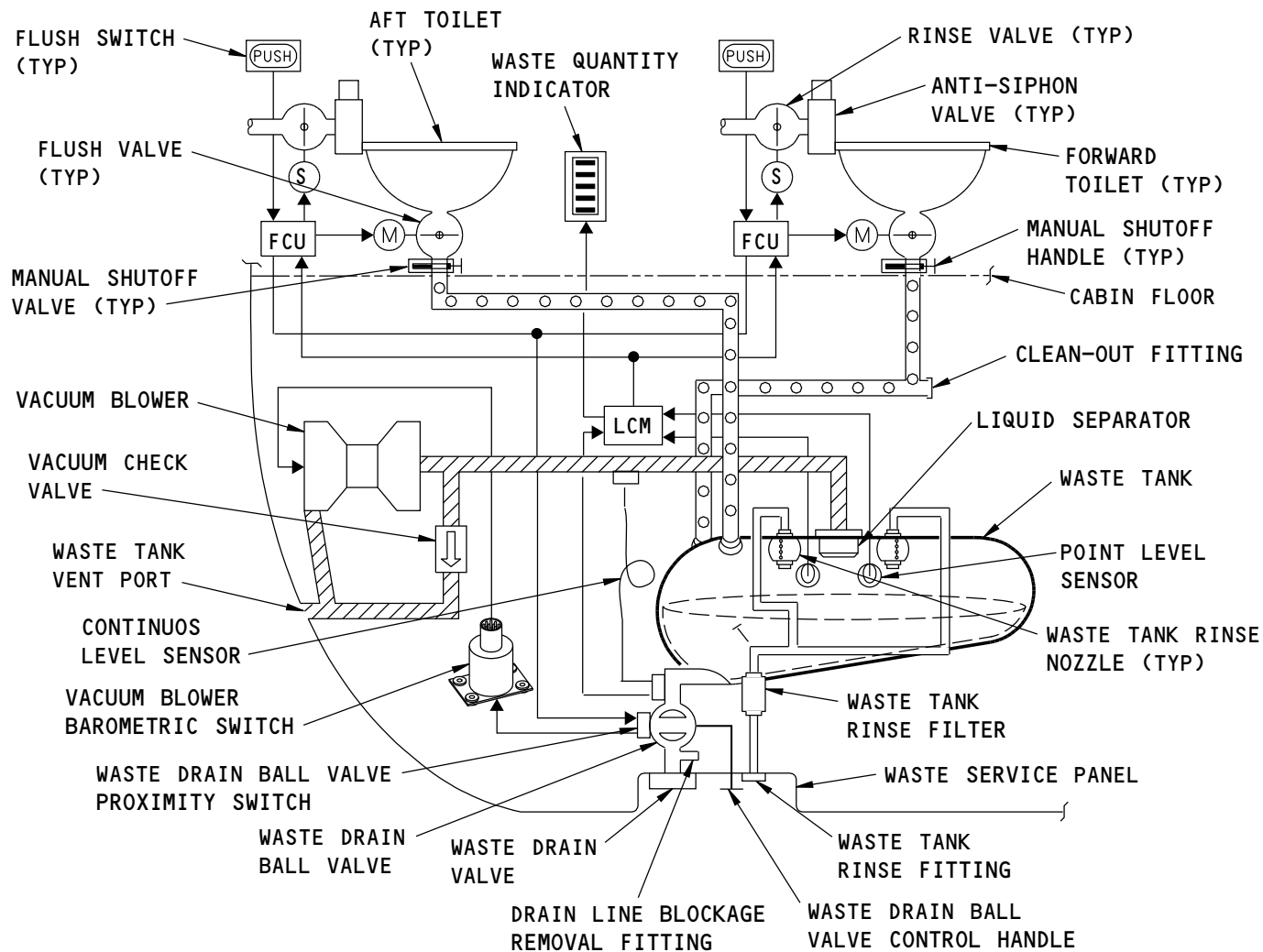
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2243578 S0000500745_V1

WATER/WASTE - VACUUM WASTE SYSTEM - FUNCTIONAL DESCRIPTION

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**WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - INTRODUCTION****Purpose**

The waste tank quantity indication system measures and shows the quantity of waste in the waste tank.

- TYP - typical
- v - volts

General

These components are in the waste tank quantity indication system:

- Waste tank point level sensor (2)
- Waste tank continuous level sensor
- Logic control module (LCM)
- Waste quantity indicator.

The waste tank quantity indication system does these functions:

- Monitors and shows the level of waste in the waste tank
- Stops operation of the toilets when the waste tank is full
- Gives indication when the lavatories stop operation for waste tank full condition
- Gives indication when the sensors are dirty
- BIT.

Abbreviations and Acronyms

- AC - alternating current
- BIT - built in test
- C - Celsius
- DC - direct current
- F - Fahrenheit
- FCU - flush control unit
- FWD - forward
- LCM - logic control module
- mm - millimeter
- REF - reference

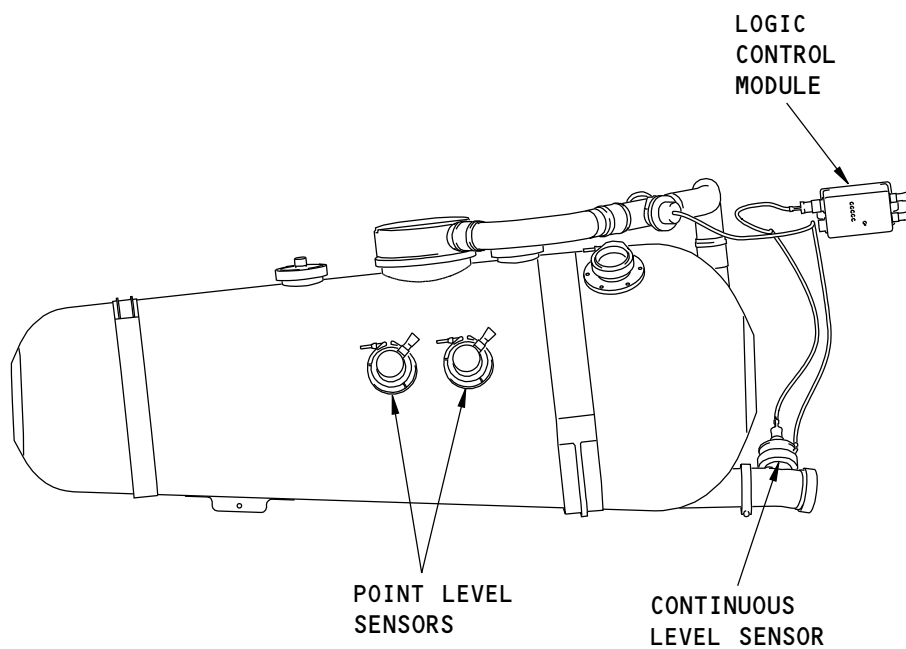
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WASTE TANK INSTALLATION

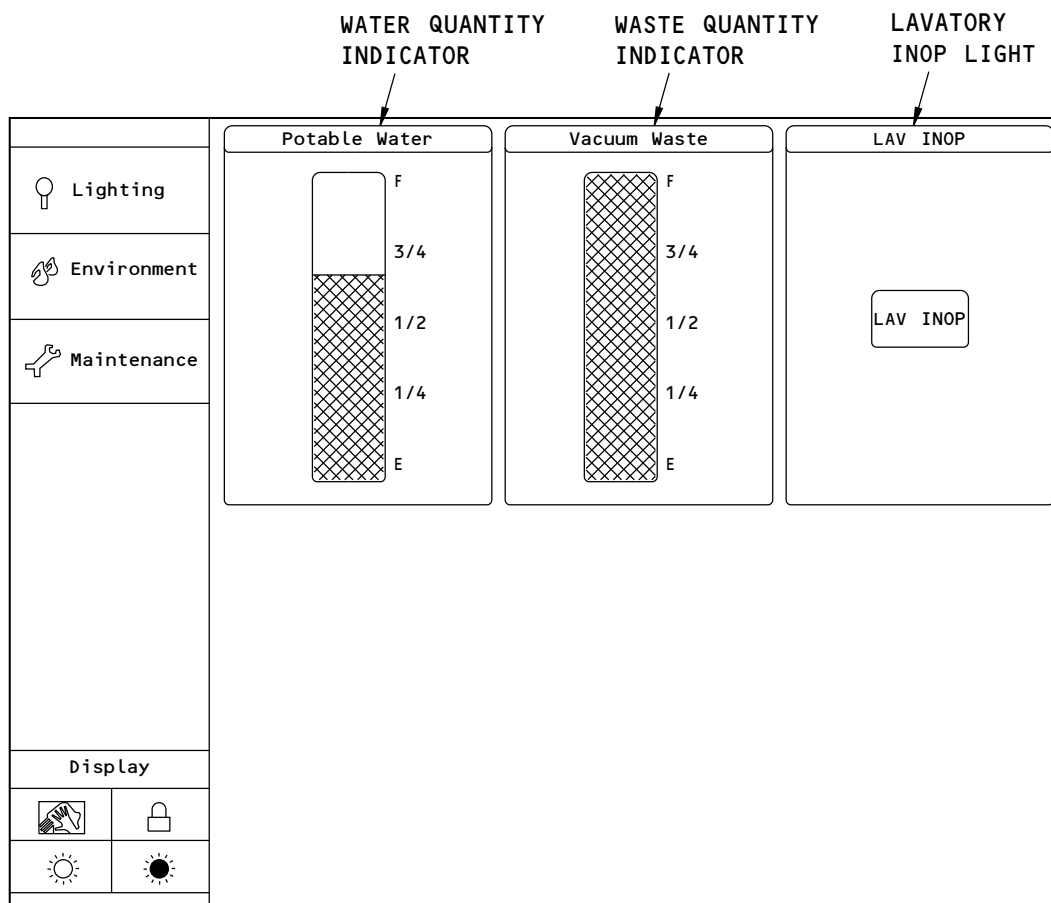
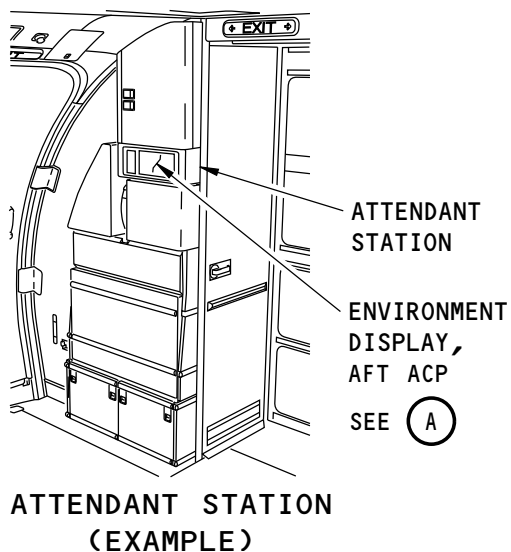
WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - INTRODUCTION

2092422 S0000442101_V3

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AKS ALL	EFFECTIVITY
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ENVIRONMENT DISPLAY, AFT ACP
(V4 SOFTWARE VERSION)

(A)

2091894 S0000441911_V3

WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - INTRODUCTION

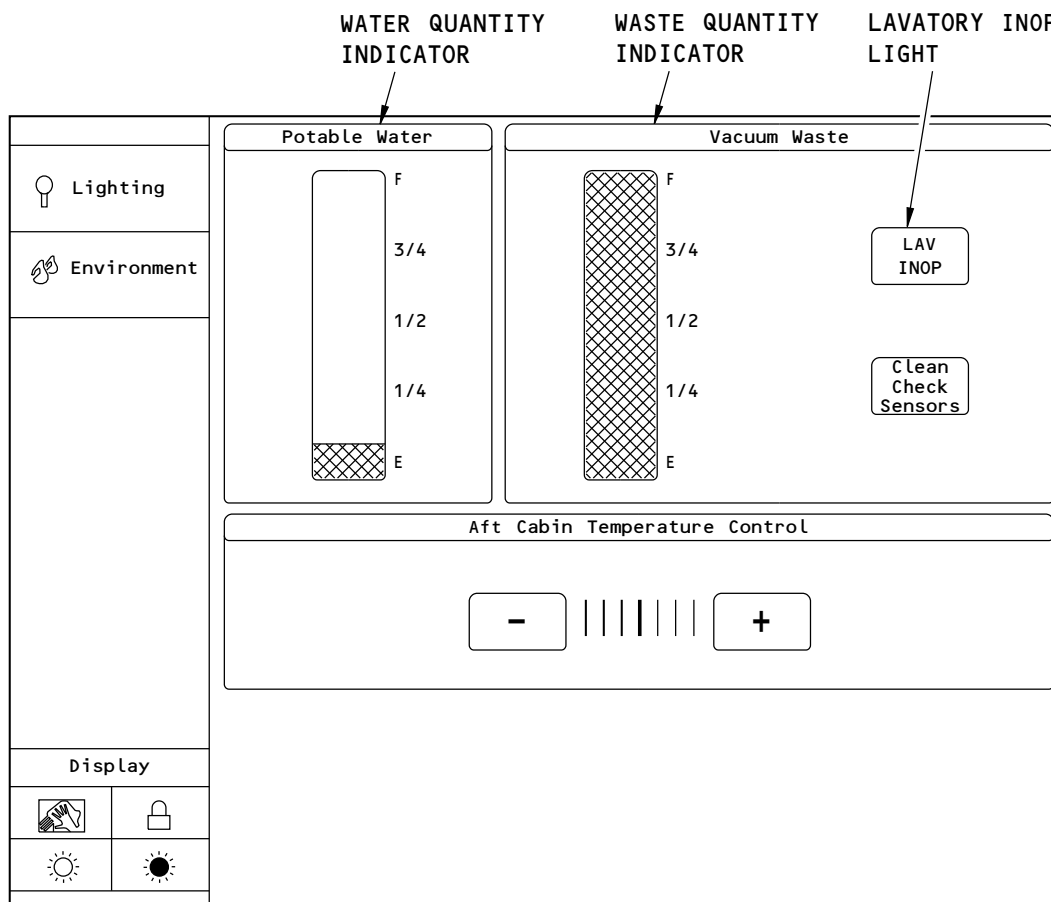
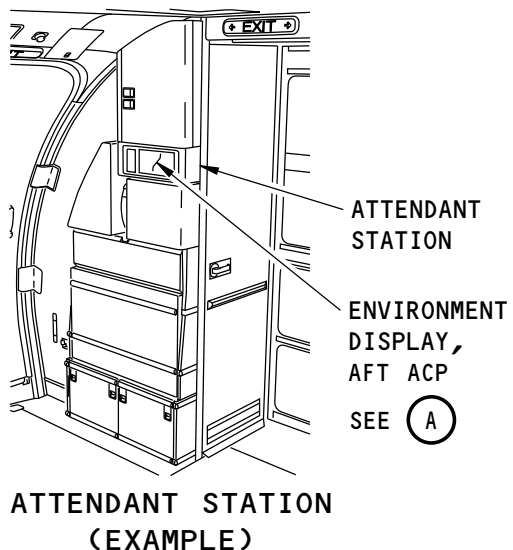
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AKS ALL	EFFECTIVITY

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ENVIRONMENT DISPLAY, AFT ACP
(V5 SOFTWARE VERSION)

(A)

2304933 S0000523363_V1

WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - INTRODUCTION

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AKS ALL EFFECTIVITY

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**WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - POINT LEVEL SENSOR****Purpose**

The point level sensor gives a signal to the logic control module (LCM) when the waste tank is full.

Location

There are two point level sensors in the aft cargo compartment. You remove the waste tank access panel to get access to the point level sensors. The point level sensors are on the center inboard side of the waste tank.

Physical Description

The point level sensor is a capacitance type sensor. It has a sensor face and an electrical connector.

Functional Description

The LCM supplies 15v dc power to the point level sensors. The point level sensors supply these signals to the LCM:

- Tank not full (0v dc)
- Tank full (15v dc)
- Sensor fouled (1.83 Hz)
- BIT test results.

When the waste tank level is below a point level sensor, the point level sensor sends a tank not full signal to the LCM.

When the waste tank level covers 50 percent of the face of a point level sensor, the point level sensor sends a tank full signal to the LCM.

The point level sensors can tell the difference between the build-up of waste material on a point level sensor and a full tank. A point-level sensor sends a sensor fouled signal to the LCM when the build-up is more than 1/8-inch (3.2 mm). If the build-up becomes more than 3/8-inch (9.5 mm), the point level sensor sends a tank full signal to the LCM.

When a system BIT input signal is received from the LCM, the point level sensor starts BIT. If the point level sensor passes the BIT tests, a 0.0v dc signal goes to the LCM. If the point level sensor fails the BIT tests, a 1.83 Hz signal goes to the LCM.

Training Information Point

The point level sensors sense changes in the level of the waste tank by changes in capacitance. The waste tank must be grounded to the airplane structure for the point level sensors to accurately sense the waste tank level changes.

When a point level sensor is fouled, a sensor fouled signal goes to the LCM. The sensor fouled signal causes these indications:

- Related SENSOR J1 or SENSOR J2 light on the LCM flashes
- CLEAN/CHECK SENSOR light on the attendant panel comes on
- Waste material on the sensor is greater than 3/8 inch.

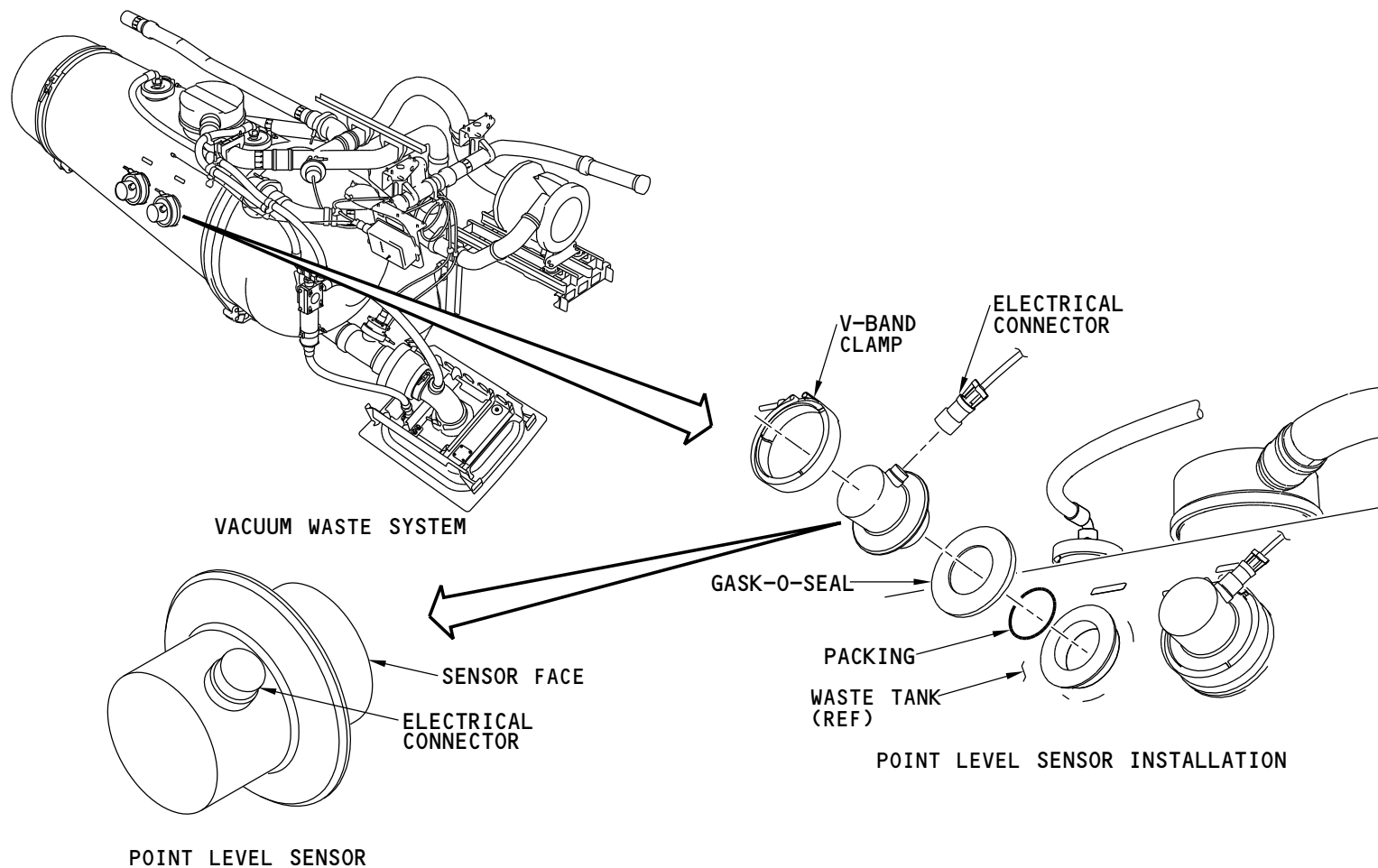
The sensor fouled signal continues until one of these conditions occur:

- Waste material is no longer on the point level sensor surface
- Level of waste in the tank covers the sensor(s).

If the SENSOR J1 or SENSOR J2 light continues to flash after a rinse, it may be necessary to remove the sensor to clean it.

CAUTION: USE EXTREME CARE TO AVOID DAMAGE TO THE FACE OF THE POINT LEVEL SENSOR. SCRATCHES OR DAMAGE CAN CAUSE A FAILURE OF THE POINT LEVEL SENSOR.

Use a soft bristle brush and soap to clean the face of the point level sensor.



M87461 S0004631353_V1

WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - POINT LEVEL SENSOR

38-33-00-002

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38-33-00

**WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - CONTINUOUS LEVEL SENSOR****Purpose**

The continuous level sensor measures the level of waste material in the waste tank.

Location

The continuous level sensor is in the aft cargo compartment. You get access to the continuous level sensor through the waste tank access panel on the left side of the cargo compartment.

The sensor module connects to the drain line at the forward lower end of the waste tank. The remote diaphragm connects to the vacuum line at the forward upper end of the waste tank.

Physical Description

The continuous level sensor is a capacitance-type pressure sensor. The sensor has these parts:

- Remote diaphragm
- Sensor module
- Capillary tube.

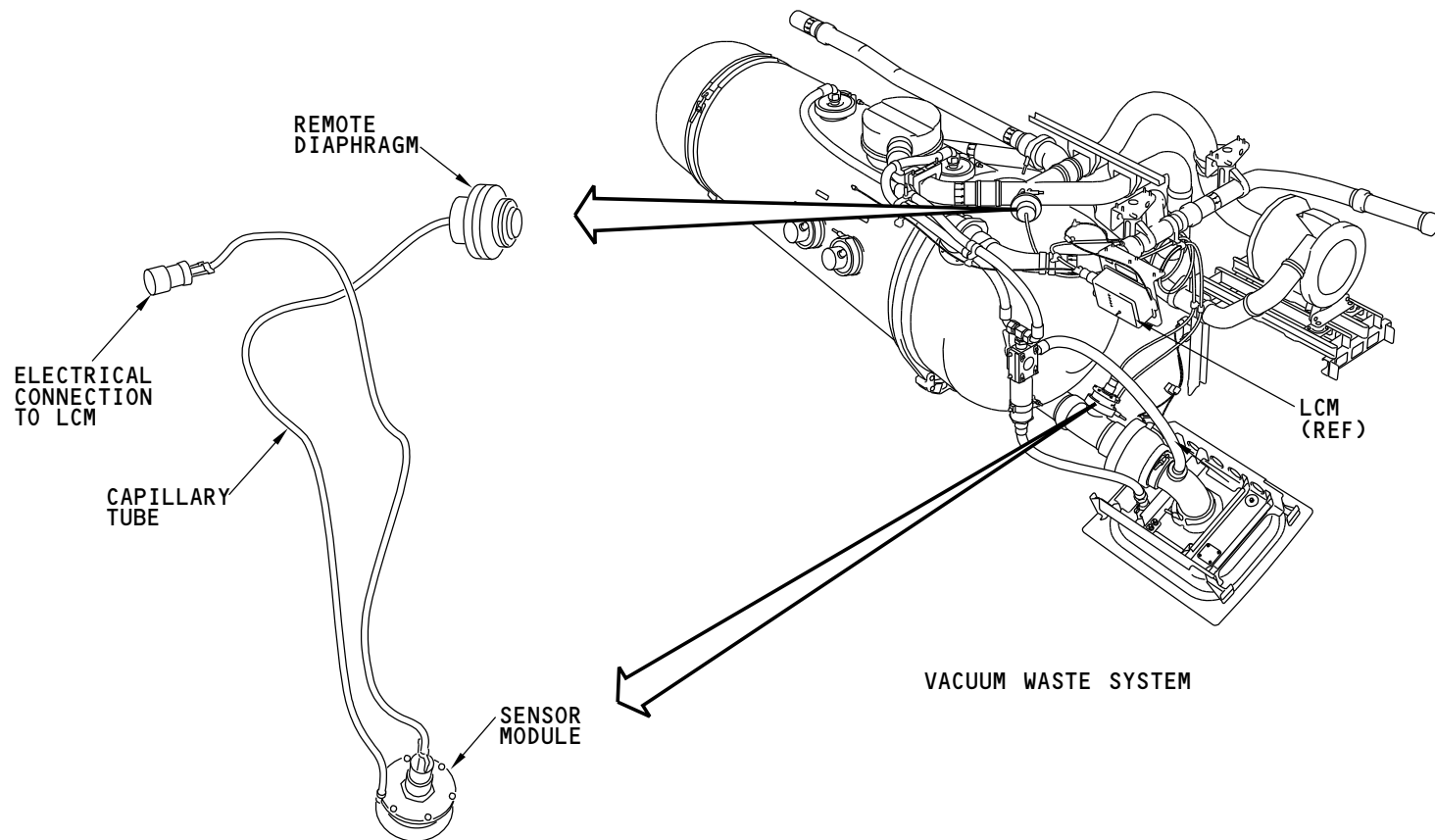
The capillary tube connects the remote diaphragm to the sensor module. The sensor module connects to the logic control module (LCM).

Functional Description

The sensor module measures the liquid (head) pressure at the bottom of the waste tank. The remote diaphragm measures the pressure of the air in the waste tank. The pressure transmits through the oil-filled capillary tube to the sensor module. The sensor module finds the difference between the air pressure in the waste tank and the liquid pressure in the drain line. The sensor uses the difference to calculate the level of waste in the waste tank. The output signal goes to the LCM.

Training Information Point

CAUTION: DO NOT BEND THE CAPILLARY TUBE OF THE CONTINUOUS LEVEL SENSOR TO LESS THAN A 3-INCH RADIUS. SHARP BENDS CAN CAUSE DAMAGE TO THE CAPILLARY TUBE.



M87463 S0004631356_V1

WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - CONTINUOUS LEVEL SENSOR

38-33-00-003

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**WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - LOGIC CONTROL MODULE****Purpose**

The logic control module (LCM) measures the level of waste in the waste tank. The LCM stops the operation of the vacuum waste system when the waste tank is full.

Location

The LCM is in the aft cargo compartment. You get access to the LCM through the waste tank access panel on the left side of the cargo compartment.

The LCM is above and forward of the waste tank.

Physical Description

The LCM has these features:

- Electrical connectors (4)
- Test switch
- Indicator lights (5).

Two of the electrical connectors are for the point level sensors. One electrical connector is for the continuous level sensor. One electrical connector is for the power and signal connections to the airplane.

The test switch is a three-position (center off) momentary switch. In the UP position (TEST SENSORS), the LCM starts a power-up sequence which includes a full system BIT test. In the DOWN position (TEST LAMPS), a test of the LEDs occurs. If the test switch is held down for more than 10 seconds and the point level sensors are disconnected, an auto zero adjustment of the continuous level sensor will occur.

The five indicator lights are LEDs. These are the labels for the LEDs:

- SENSOR J1
- SENSOR J2
- SENSOR J3
- TANK FULL
- POWER ON.

The SENSOR J1 and SENSOR J2 LEDs show the status of the two point level sensors. The SENSOR J3 LED shows the status of the continuous level sensor. The TANK FULL LED shows the status of the waste tank and the LCM. The POWER ON LED shows that system power is on.

The POWER ON LED is green. The other LEDs are red.

Functional Description

The LCM gets data from the two point level sensors and the continuous level sensor. The LCM uses the data from the continuous level sensor to calculate the level of the waste in the waste tank.

The LCM sends a waste tank level signal to the waste tank quantity indicator on the attendant panel.

A tank full signal from the continuous level sensor does not affect toilet operation.

The two point level sensors are level switches. When the level of the waste in the waste tank covers 50 percent of the face of a point level sensor, the point level sensor sends a tank full signal to the LCM. When both point level sensors send a tank full signal to the LCM, the LCM stops the operation of the toilets.

The LCM uses a delay of 20 seconds on the point level sensor data before it stops the operation of the toilets. This delay makes sure that there is a stable tank full signal and prevents the effects of momentary tank full signals due to airplane maneuvers or turbulence.

In normal circumstances, both point level sensors must send the tank full signal to the LCM for the LCM to stop toilet operation. However, when one point level sensor has an error, the LCM uses a tank full signal from the other point level sensor to stop toilet operation. If both point level sensors have an error, the LCM will stop toilet operation.

Lamp Test

You do a lamp test when you put the test switch in the TEST LAMPS position.

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WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - LOGIC CONTROL MODULE

During the lamp test, the four software-controlled LEDs on the LCM come on. The green POWER ON LED will be on when system power is on.

System BIT

When system power comes on, the LCM does a power-up BIT test. The power-up BIT test makes sure that these components operate correctly:

- Point level sensors
- Continuous level sensor
- LCM.

During the power-up BIT test, the LEDs flash momentarily and then come on for three seconds. If all components pass the BIT test, all LEDs go off. If a component did not pass the BIT test, the related LED flashes at a two Hz rate. The results of the BIT test for the LCM are reported by the TANK FULL LED.

To do the power-up BIT test, put the LCM test switch in the TEST SENSORS position. You can also do the power-up BIT test by a push of the test switch on the attendant panel waste quantity module.

After the LCM completes the power-up BIT test, it then starts a continuous monitor cycle. This monitor cycle occurs every five milliseconds. The monitor cycle makes sure that the point level sensors and LCM are functional. The continuous level sensor does not do a test during the monitoring cycle.

If the continuous level sensor fails after the power-up BIT test is complete, the failure will not be sensed. An erroneous signal from the continuous level sensor will not affect toilet operation. You can detect errors in the continuous level sensor when you do the power-up BIT test.

LED Status

The four red LEDs show system status. System status updates every 250 milliseconds.

These are the conditions necessary for LED status:

LED	STATUS		
	OFF	ON	FLASHING ^{*[1]}
SENSOR J1	Tank not full.	Tank full or sensor disconnected.	Sensor fouled or sensor failed BIT.
SENSOR J2	Tank not full.	Tank full or sensor disconnected.	Sensor fouled or sensor failed BIT.
SENSOR J3	Tank not full.	Tank is above full.	Sensor failed BIT.
TANK FULL	Tank not full, FCU powered.	Tank full, FCU power off.	Two Hz flash: LCM failed BIT. Eight Hz flash: fatal error.

*[1] Flashing rate is two Hz unless otherwise noted.

Auto Zero Adjustment

You must do the auto zero adjustment when one of these conditions occur:

- When you move or replace the continuous level sensor
- When you move or replace the waste tank.

You use the LCM to do the auto zero adjustment. The auto zero adjustment calibrates the LCM for variations between the remote diaphragm and sensor module on the continuous level sensor.

To do the auto zero adjustment, you must make sure that the waste tank is fully drained. You must disconnect the point level sensors. Then you put the test switch in the TEST LAMPS position for more than 10 seconds.

These lights will go off for three seconds to show that the test is complete:

- SENSOR J1
- SENSOR J2
- SENSOR J3
- TANK FULL.

The POWER ON light will stay on.

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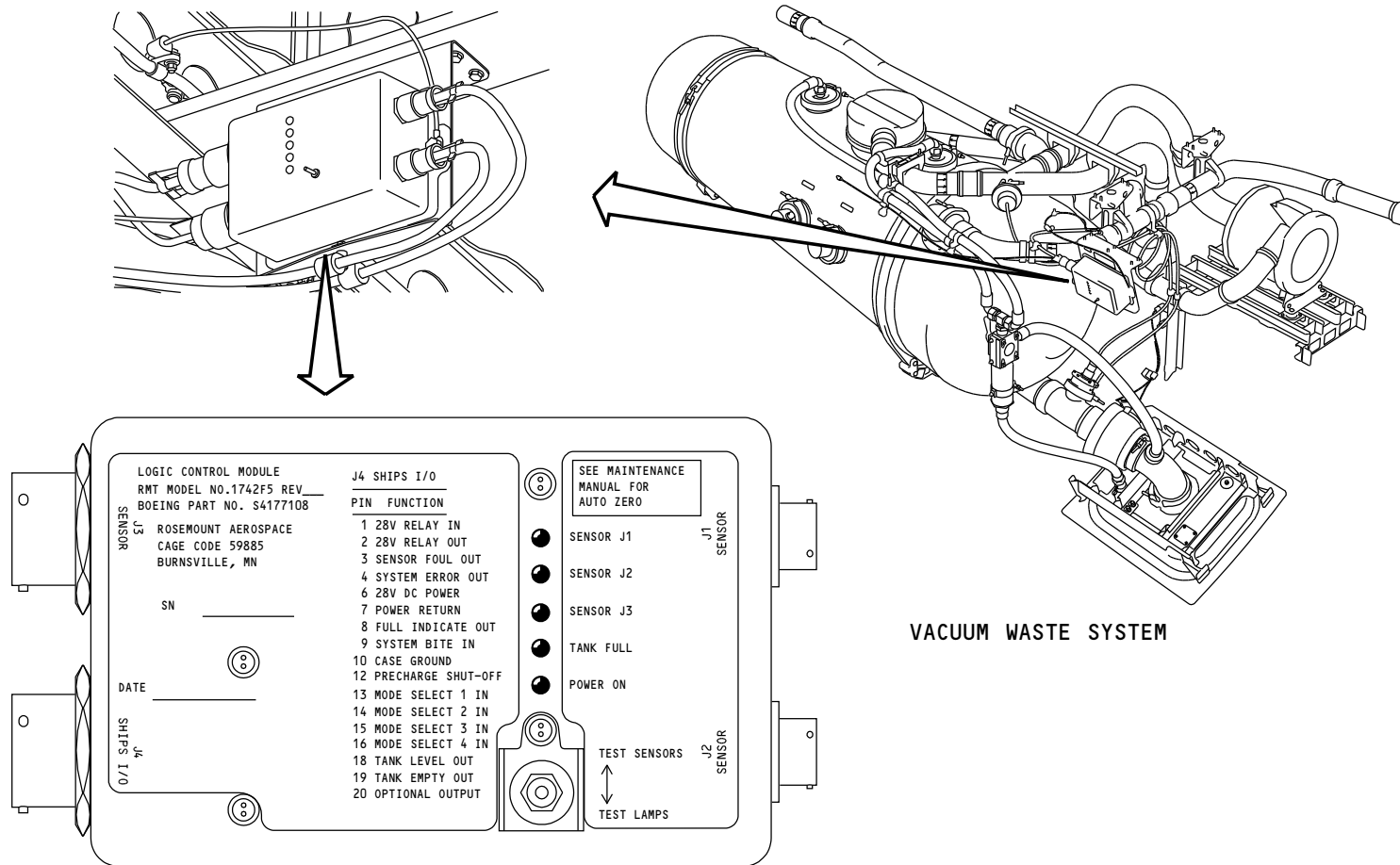
WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - LOGIC CONTROL MODULE

Training Information Point

NOTE: Make sure that you drain the waste tank fully before you do the auto zero adjustment procedure. If you do not drain the waste tank fully, an error in the waste quantity indication can occur.

NOTE: The two point level sensor connectors are identical. Make sure that you connect the point level sensor connectors to the correct receptacle on the LCM.

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M87465 S0004631359_V1

WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - LOGIC CONTROL MODULE

38-33-00-004

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**WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - WASTE QUANTITY INDICATOR****Purpose**

The waste quantity indicator shows the level of waste in the waste tank.

Location

The waste quantity indicator is viewed at the attendant control panel (ACP) from the ENVIRONMENT menu.

NOTE: The attendant control panel (ACP) is in the forward or aft attendant stations.

Physical Description

The waste quantity indicator is displayed from the ENVIRONMENT menu on the attendant control panel. The ENVIRONMENT menu has these features:

- Waste quantity indicator
- LAV INOP indicator

The MAINTENANCE menu has these features:

- LAV INOP indicator
- LAV INOP test switch
- Clean/Check sensor indicator

Operation

The waste quantity indicator shows the waste quantity with a bar style segment display. The segment display shows the waste quantity from E (empty) to F (full) in 1/8-tank increments.

The CLEAN/CHECK SENSOR light comes on when the waste tank level is three inches (7.6 cm) or more below the tank full level and one of these conditions occur:

- A point level sensor is fouled (dirty)
- A point level sensor failed the system BIT test
- There is a sensor disagreement.

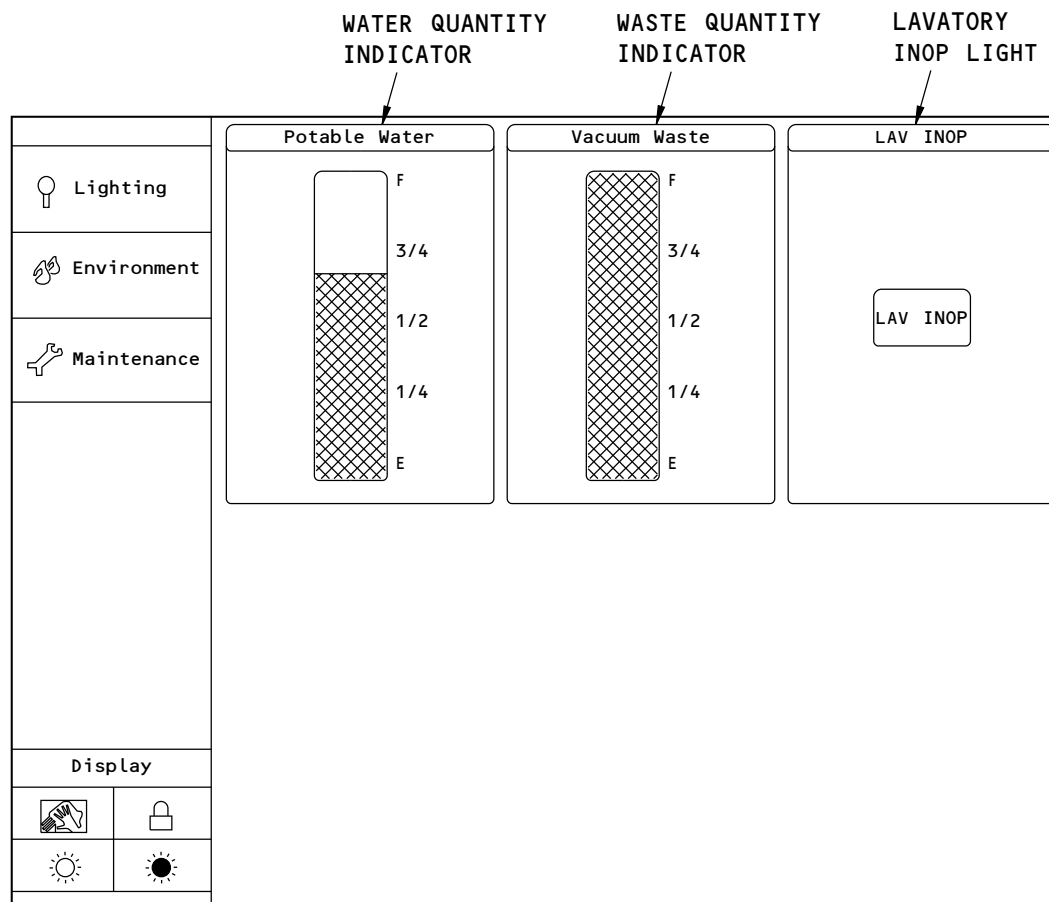
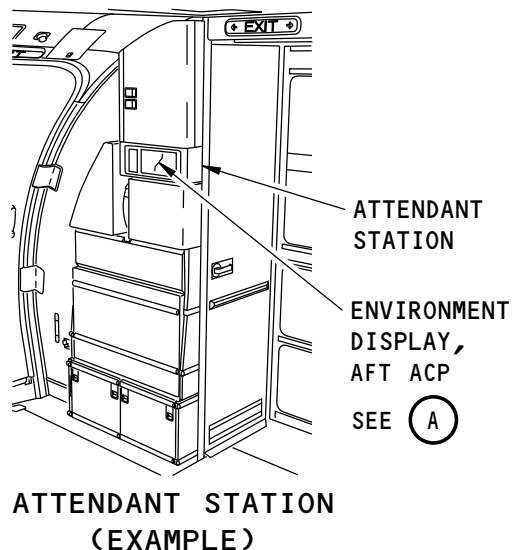
A sensor disagreement occurs when one point level sensor sends a tank full signal and the other point level sensor sends a tank not full or sensor fouled signal.

The LAVS INOP light comes on when both point level sensors send a tank full signal.

You can do the system BIT test when you push the LAVS INOP test switch. If all components pass the system BIT test, the waste quantity indicator shows a full tank and the CLEAN/CHECK SENSOR light is off.

Training Information Point

The CLEAN/CHECK SENSOR light shows problems with the point level sensors. When the waste tank level is three inches (7.6 cm) or less from the waste tank full level, the CLEAN/CHECK SENSOR light is disabled and can not come on. The CLEAN/CHECK SENSOR light is disabled to prevent nuisance indications when splashes from turbulence or airplane maneuvers could cause the light to come on. The signal to disable the CLEAN/CHECK SENSOR light comes from the continuous level sensor, through the logic control module.



ENVIRONMENT DISPLAY, AFT ACP
(V4 SOFTWARE VERSION)

A

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WATER/WASTE - WASTE QUANTITY INDICATION SYSTEM - WASTE QUANTITY INDICATOR

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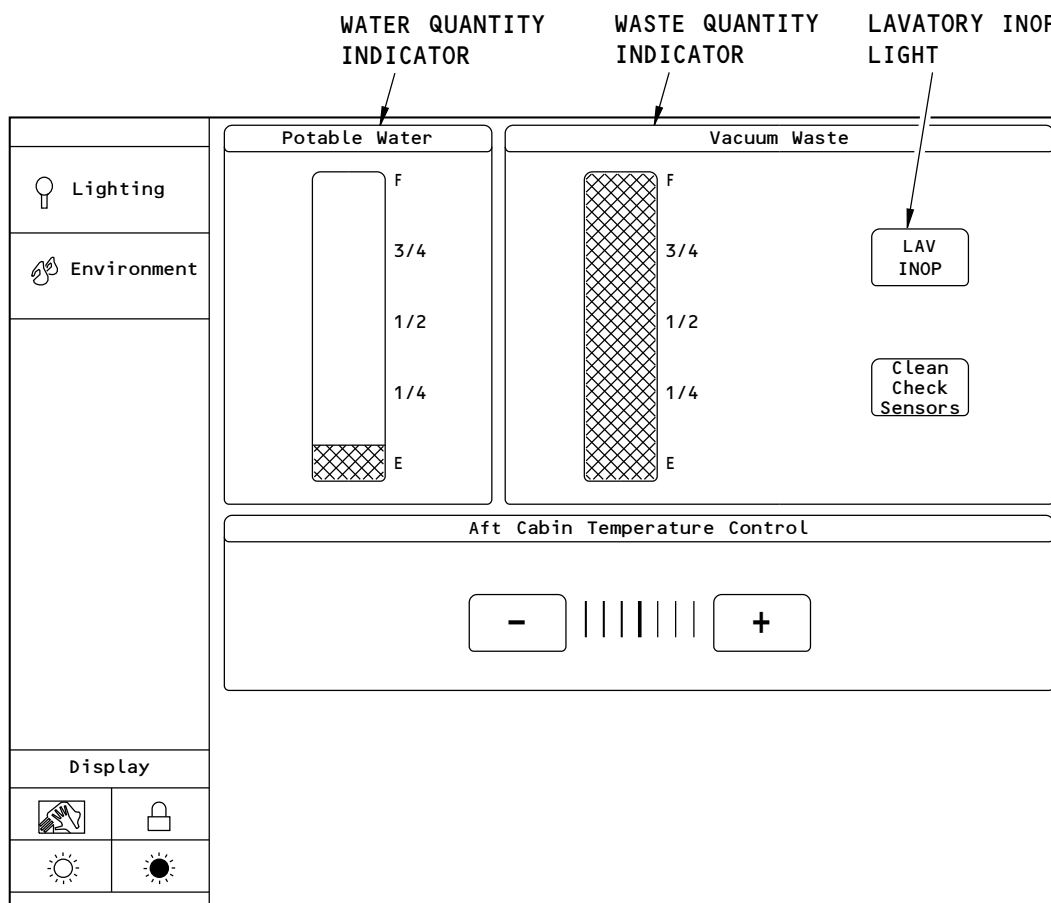
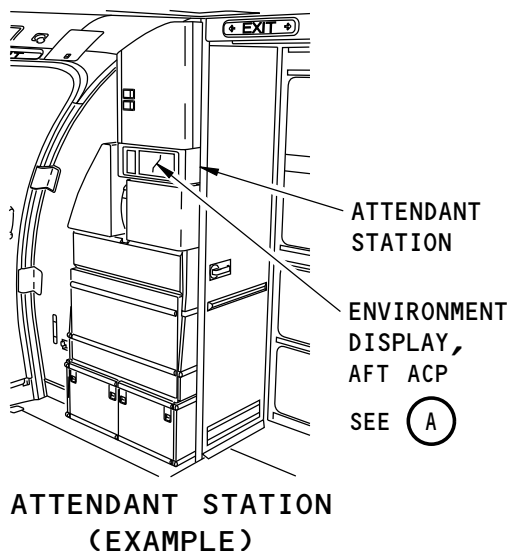
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ENVIRONMENT DISPLAY, AFT ACP
(V5 SOFTWARE VERSION)

(A)

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WATER/WASTE - WASTE QUANTITY INDICATION SYSTEM - WASTE QUANTITY INDICATOR

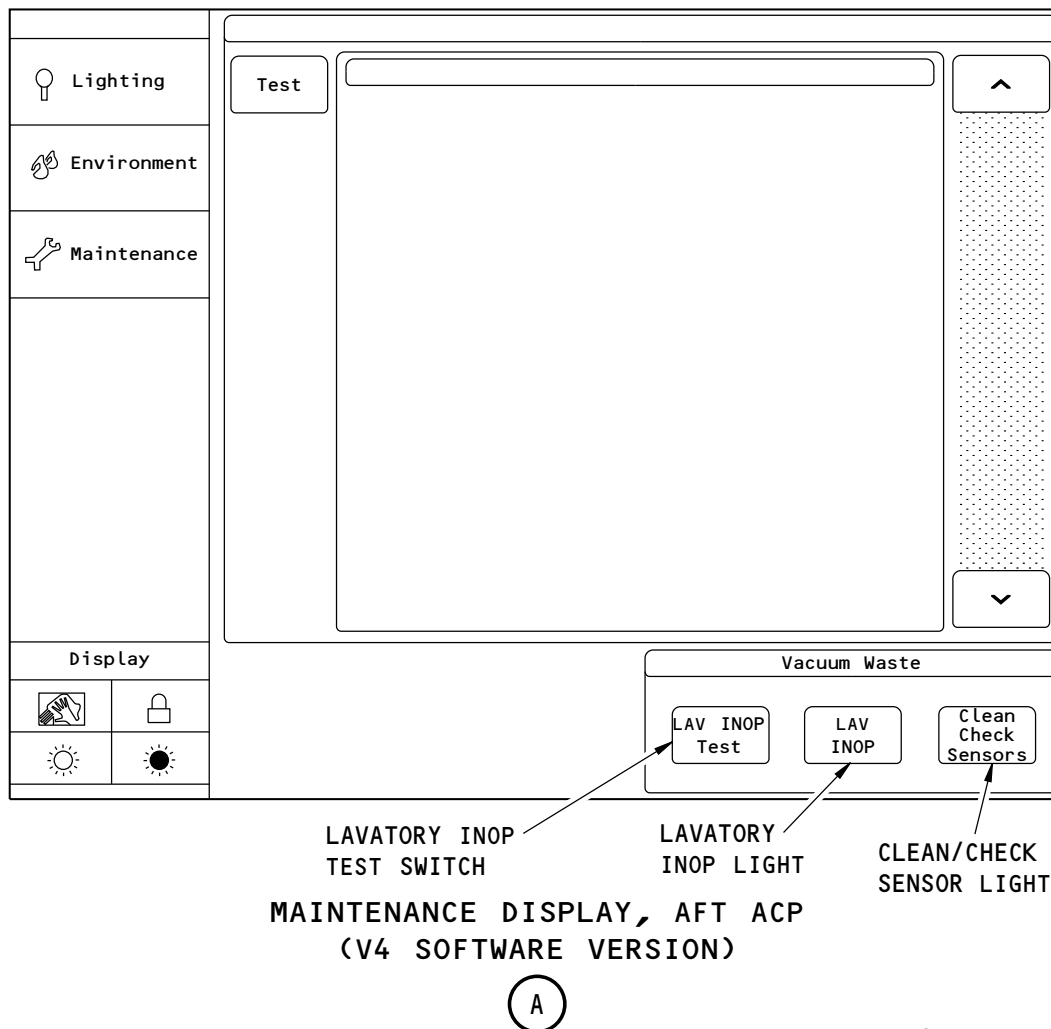
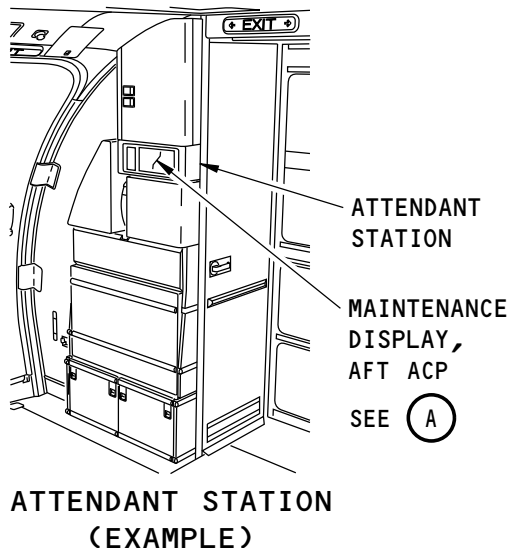
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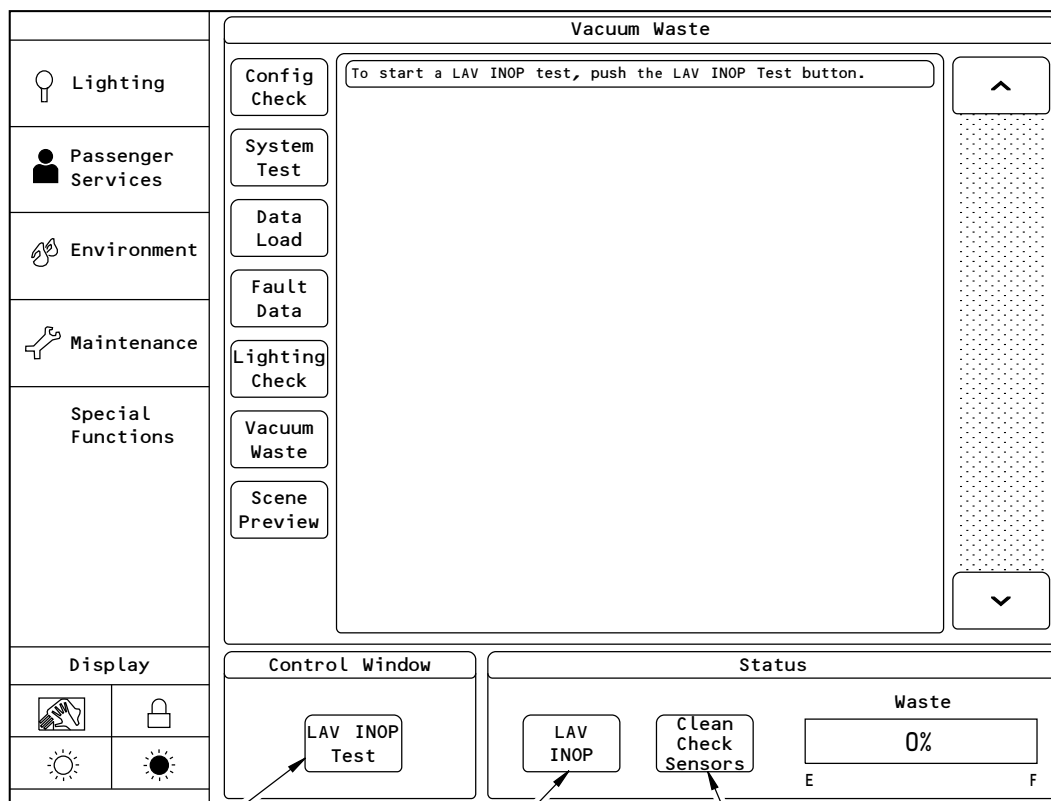
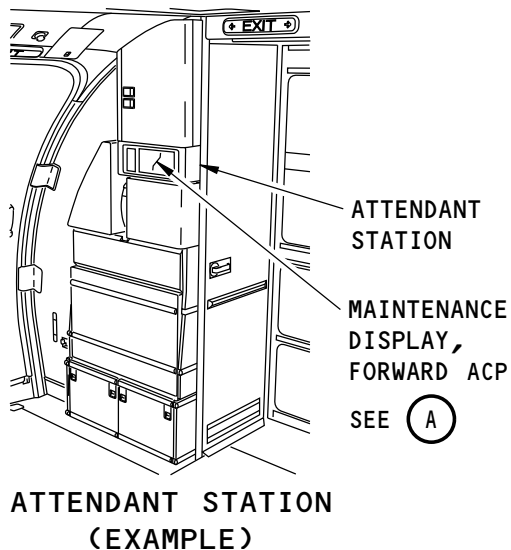
WATER/WASTE - WASTE QUANTITY INDICATION SYSTEM - WASTE QUANTITY INDICATOR

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LAVATORY INOP
TEST SWITCH

LAVATORY
INOP LIGHT

CLEAN/CHECK
SENSOR LIGHT

MAINTENANCE DISPLAY, FORWARD ACP
(V5 SOFTWARE VERSION)

(A)

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WATER/WASTE - WASTE QUANTITY INDICATION SYSTEM - WASTE QUANTITY INDICATOR

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**WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - FUNCTIONAL DESCRIPTION****Power**

The 28v dc ground service bus supplies power to the waste tank quantity indication system.

Displays

The continuous level sensor sends waste level data to the logic control module (LCM). The LCM sends a waste level signal to the attendant control panel (ACP) display logic. The display logic controls which bar segment displays. The waste quantity indicator shows the waste level in 1/8 tank intervals.

When both point level sensors send a full tank signal to the LCM, the LCM does these steps:

- Stops operation of the toilets
- Sends a full tank signal to the waste system module.

The full tank signal causes the LAVS INOP indicator to come on.

The CLEAN/CHECK SENSOR light comes on when the waste tank level is three inches (7.6 cm) or more below the tank full level and one of these conditions occur:

- A point level sensor is fouled (dirty)
- A point level sensor has failed the power-up BIT test or the continuous monitoring test
- There is a sensor disagreement.

A sensor disagreement occurs when one point level sensor sends a tank full signal and the other point level sensor sends a tank not full or sensor fouled signal.

System BIT

When system power comes on, the LCM does a power-up BIT test. The power-up BIT test makes sure that these components operate correctly:

- Point level sensors
- Continuous level sensor

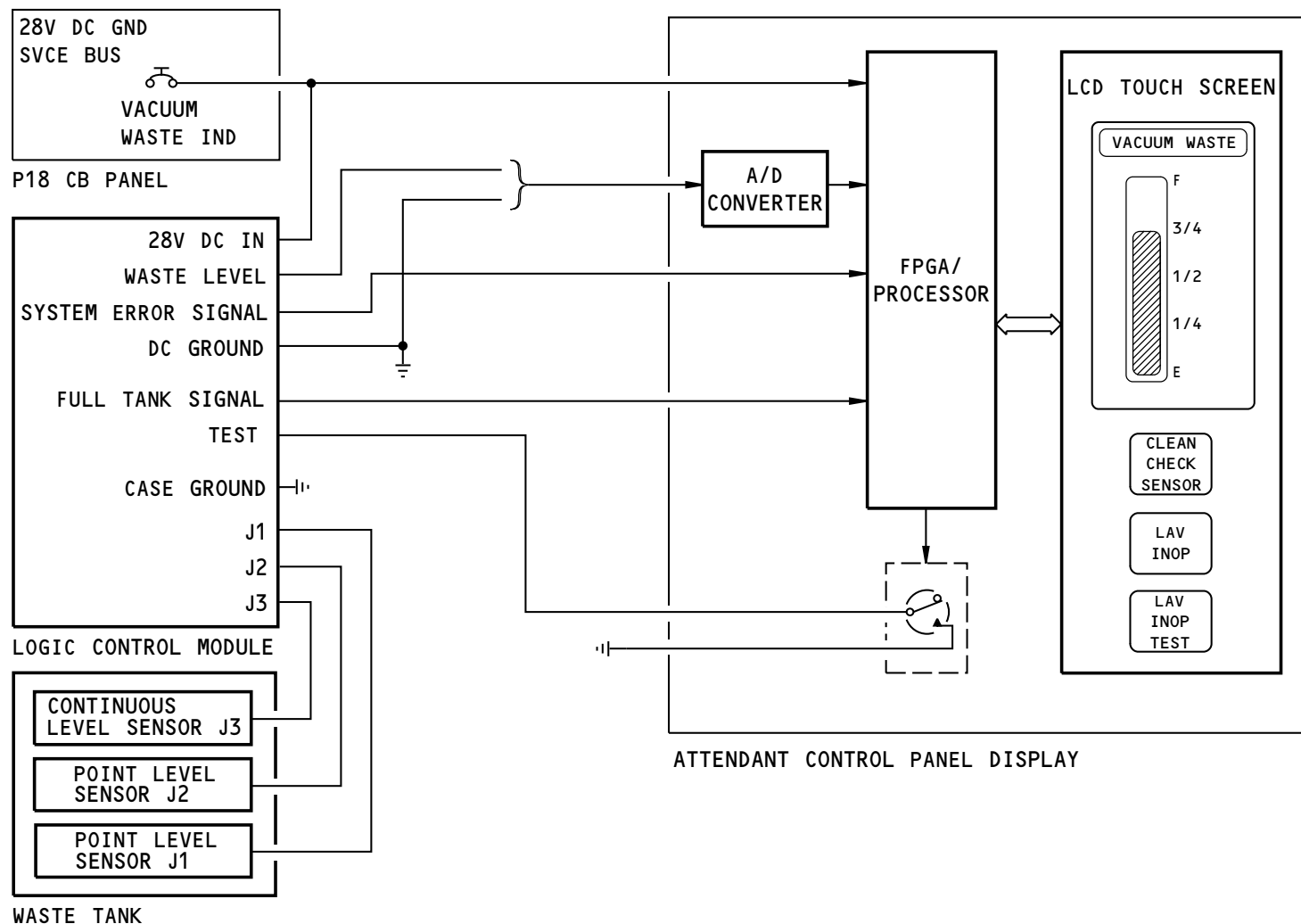
- LCM.

You can do the power-up BIT test at anytime when you do one of these steps:

- Push the LAVS INOP test switch on the MAINTENANCE display.
- Put the test switch on the LCM in the TEST SENSORS position.

After the LCM completes the power-up BIT test, it starts a continuous monitor cycle. This monitor cycle makes sure that the point level sensors and the LCM are functional. The continuous level sensor does not do a test during the monitor cycle.

EFFECTIVITY	
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WATER/WASTE - WASTE TANK QUANTITY INDICATION SYSTEM - FUNCTIONAL DESCRIPTION

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WATER/WASTE - WATER TANK PRESSURIZATION - INTRODUCTION

Purpose

The water tank pressurization system pressurizes the potable water tank.

General Description

Pressure for the water tank comes from the pneumatic system or the air compressor.

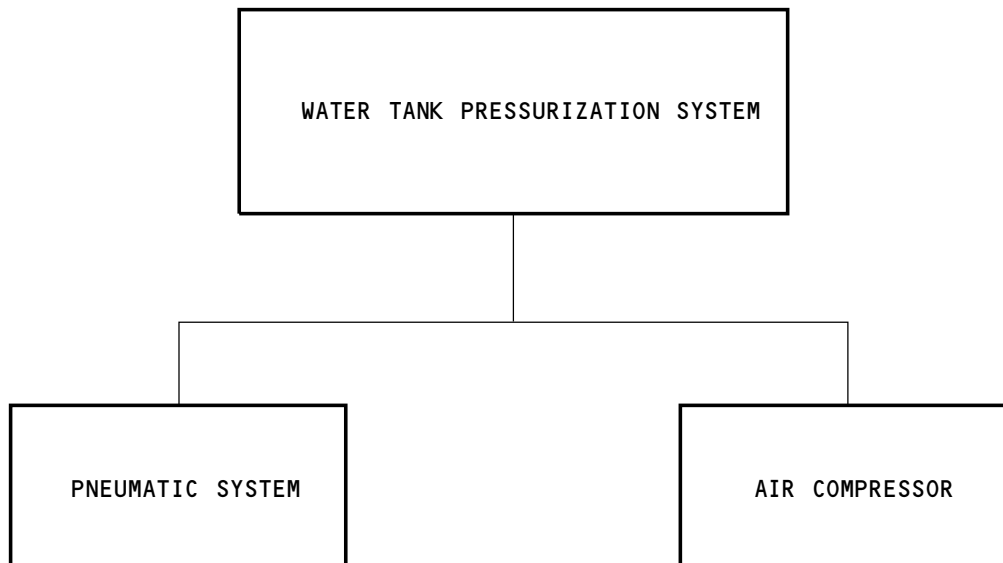
The water tank pressurization system has these functions:

- Controls the air pressure that goes into the water tank
- Selects the source of the pressurized air
- Prevents contamination from unwanted material in the air.

Abbreviations and Acronyms

- AC - alternating current
- fwd - forward
- psig - pounds per square inch gage
- ref - reference
- S - switch
- typ - typical
- V - volts

EFFECTIVITY	
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WATER/WASTE - WATER TANK PRESSURIZATION - INTRODUCTION

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WATER/WASTE - WATER TANK PRESSURIZATION - COMPONENT LOCATION

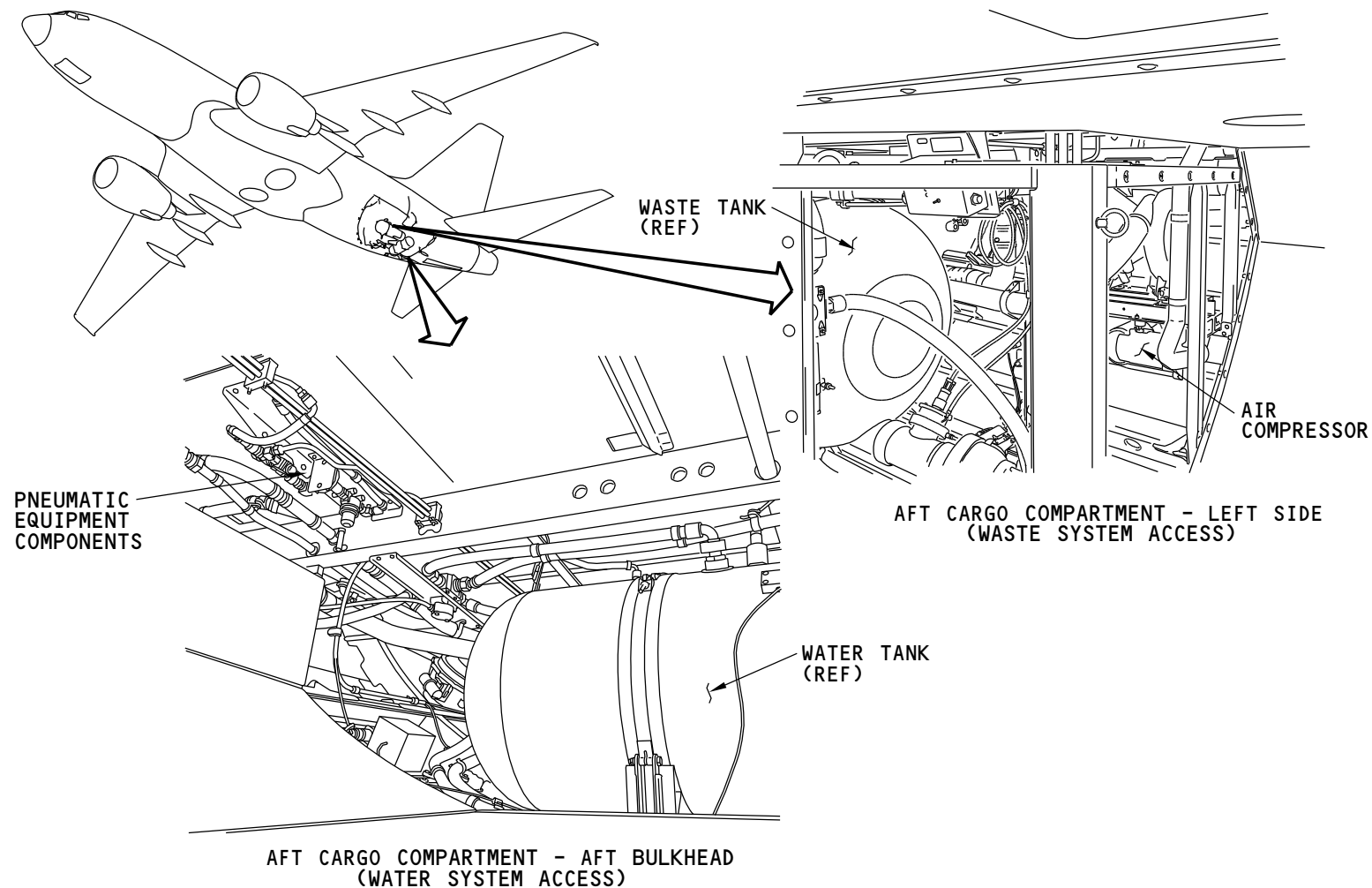
General

The water tank pressurization components are in the aft cargo compartment.

The air compressor is forward of the waste tank on a shelf below the vacuum blower.

The pneumatic equipment components are on the ceiling forward of the aft cargo compartment bulkhead liner.

The water tank components are aft of the aft cargo compartment bulkhead liner.



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WATER/WASTE - WATER TANK PRESSURIZATION - COMPONENT LOCATION

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WATER/WASTE - WATER TANK PRESSURIZATION - PNEUMATIC EQUIPMENT**Location**

The pneumatic equipment is in the aft cargo compartment and in the potable water system pneumatic line. In the aft cargo compartment you remove the cargo compartment ceiling lining to get access to the pneumatic equipment.

Physical Description

The pneumatic equipment installation has these components:

- In-line air filter
- Pressure regulator
- Check valves (2)
- Pressure relief valve.
- Restrictor Assembly.

In-Line Air Filter

The in-line air filter removes contamination from the pneumatic system supply line.

The in-line air filter has these features:

- Inlet fitting
- Head
- Packing
- Air filter element
- Bowl
- Outlet fitting.

The filter element is a 10-20 micron paper filter element.

Two fasteners attach the in-line filter to the ceiling structure.

Pressure Regulator

The pressure regulator controls the air pressure that goes into the water tank from the pneumatic system.

The pressure regulator has a circular disk-shape body and two threaded fittings. One fitting is for the line from the pneumatic system. The other fitting is for the line that goes to the water tank.

The pressure regulator keeps the air pressure from the pneumatic system to a limit of 35 psig.

Check Valves

The check valves prevent the loss of air pressure in the water tank and do not let water into the water tank pressurization system.

There are two check valves. There is a check valve in the air compressor supply line and a check valve in the pneumatic supply line.

The check valve has these features:

- Tube fittings
- Wrench flats
- Flow direction arrow.

Pressure Relief Valve

The pressure relief valve prevents an over-pressure condition in the water tank pressure lines.

The pressure relief valve has these features:

- Wrench flats
- Tube fitting
- Pressure relief actuator.

The tube fitting connects to the same manifold as the two pressurization sources.

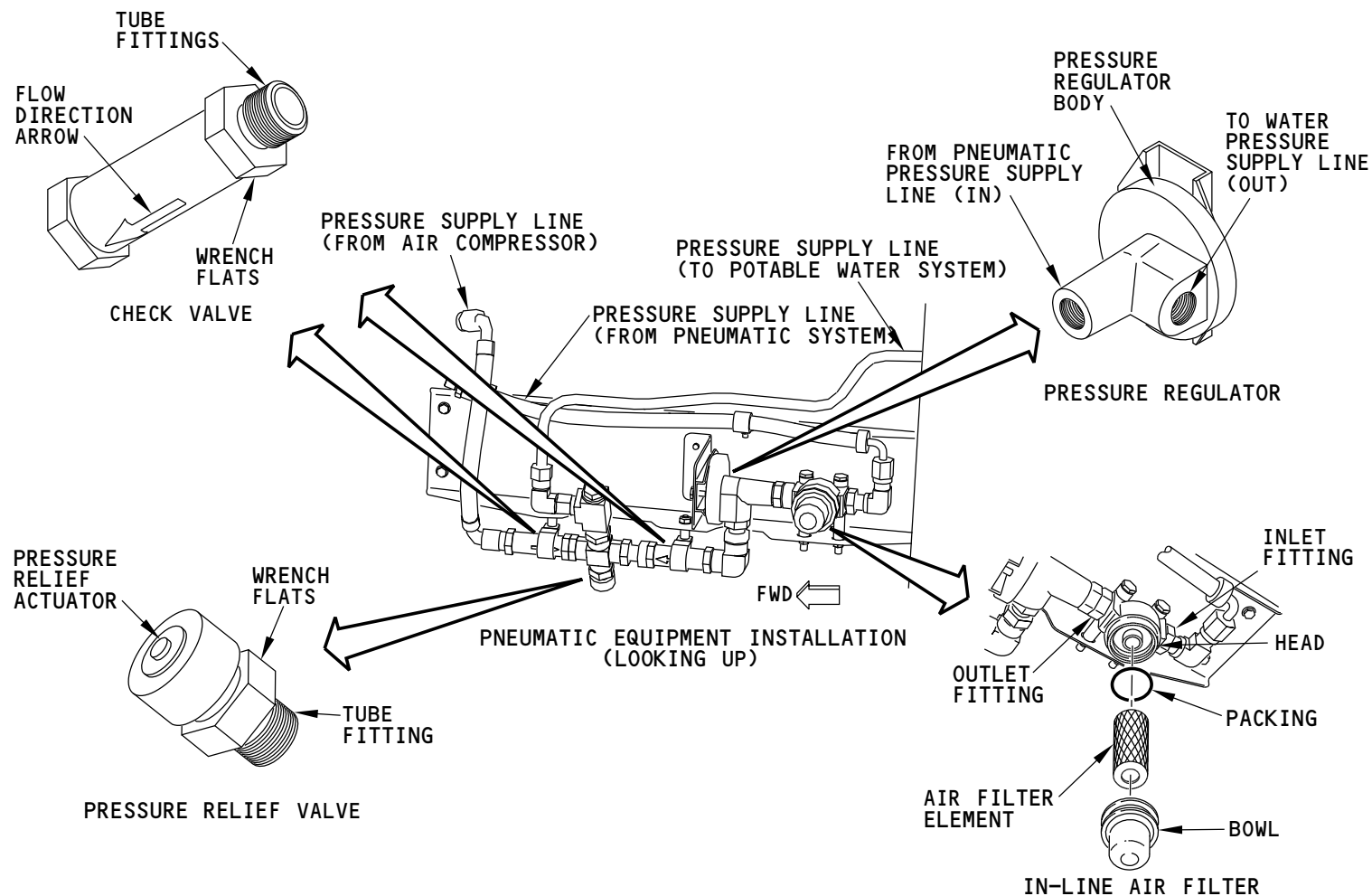
If pressure in the pneumatic supply line increases to 60 psig, the pressure relief valve opens. The valve resets at 55 psig.



WATER/WASTE - WATER TANK PRESSURIZATION - PNEUMATIC EQUIPMENT

Restrictor Assembly

The restrictor limits the flow rate of air from the pneumatic system. The flow rate is limited so it does not exceed the maximum flow rate of the pressure relief valve. The restrictor forms part of the over-pressurization protection from the water tanks.



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WATER/WASTE - WATER TANK PRESSURIZATION - PNEUMATIC EQUIPMENT

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**WATER/WASTE - WATER TANK PRESSURIZATION - AIR COMPRESSOR/INLET AIR FILTER****Purpose**

The air compressor pressurizes the water tank when the pneumatic system is not on.

The inlet air filter removes particles of unwanted material from the air that goes into the water tank.

Location

The air compressor is on the left side of the aft cargo compartment. You remove the forward waste access panel to get access to the air compressor. The air compressor attaches to the lower side the vacuum blower support shelf.

Physical Description

The air compressor has these parts:

- Inlet air filter
- Electrical connector
- Inlet
- Outlet
- Pressure relief valve.

The inlet air filter has these parts:

- Noise baffle
- Filter assembly
- Perforated disk
- Snap ring
- O-ring (2)
- Housing.

Functional Description

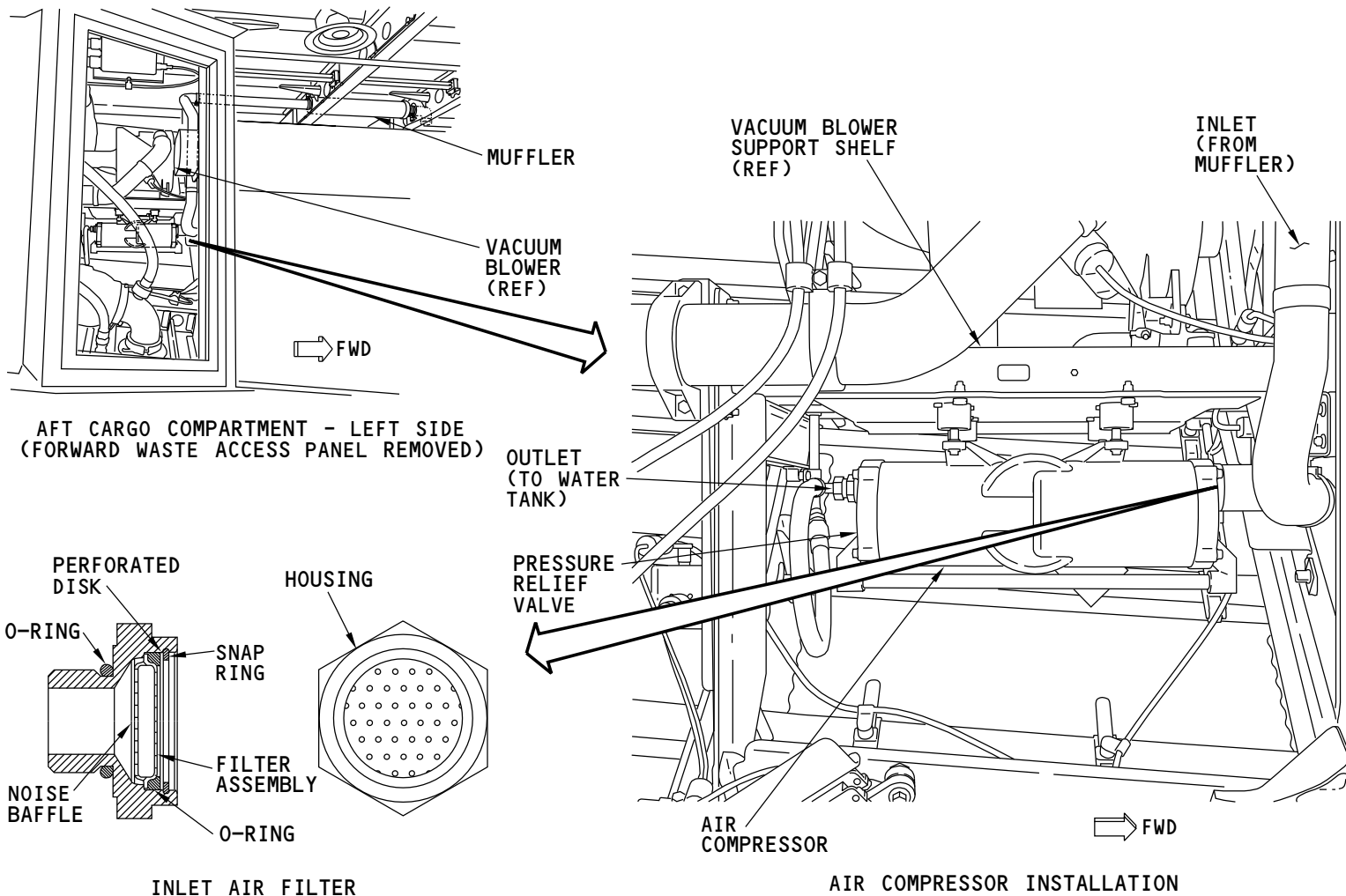
The three-phase AC motor operates the air compressor to pressurize the water tank. The motor starts when the pressure limit switch senses that tank pressure is less than 30 psig. The motor stops when tank pressure is 40 psig. The air compressor pulls air through the inlet air filter from the cargo ceiling area.

The inlet air filter element is a 40 micron, layered disk filter. The filter housing attaches to the inlet side of the air compressor.

The pressure relief valve prevents the air compressor from over pressurization. The pressure relief valve opens at 90 psig.

Training Information Point

You can replace the inlet air filter element.



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WATER/WASTE - WATER TANK PRESSURIZATION - AIR COMPRESSOR/INLET AIR FILTER

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**WATER/WASTE - WATER TANK PRESSURIZATION - PRESSURE LIMIT SWITCH****Purpose**

The pressure limit switch controls the operation of the air compressor.

Location

The pressure limit switch is in the aft cargo compartment behind the aft bulkhead. You must remove the water tank access panel to get access to it.

The pressure limit switch attaches to the top of the water tank.

Physical Description

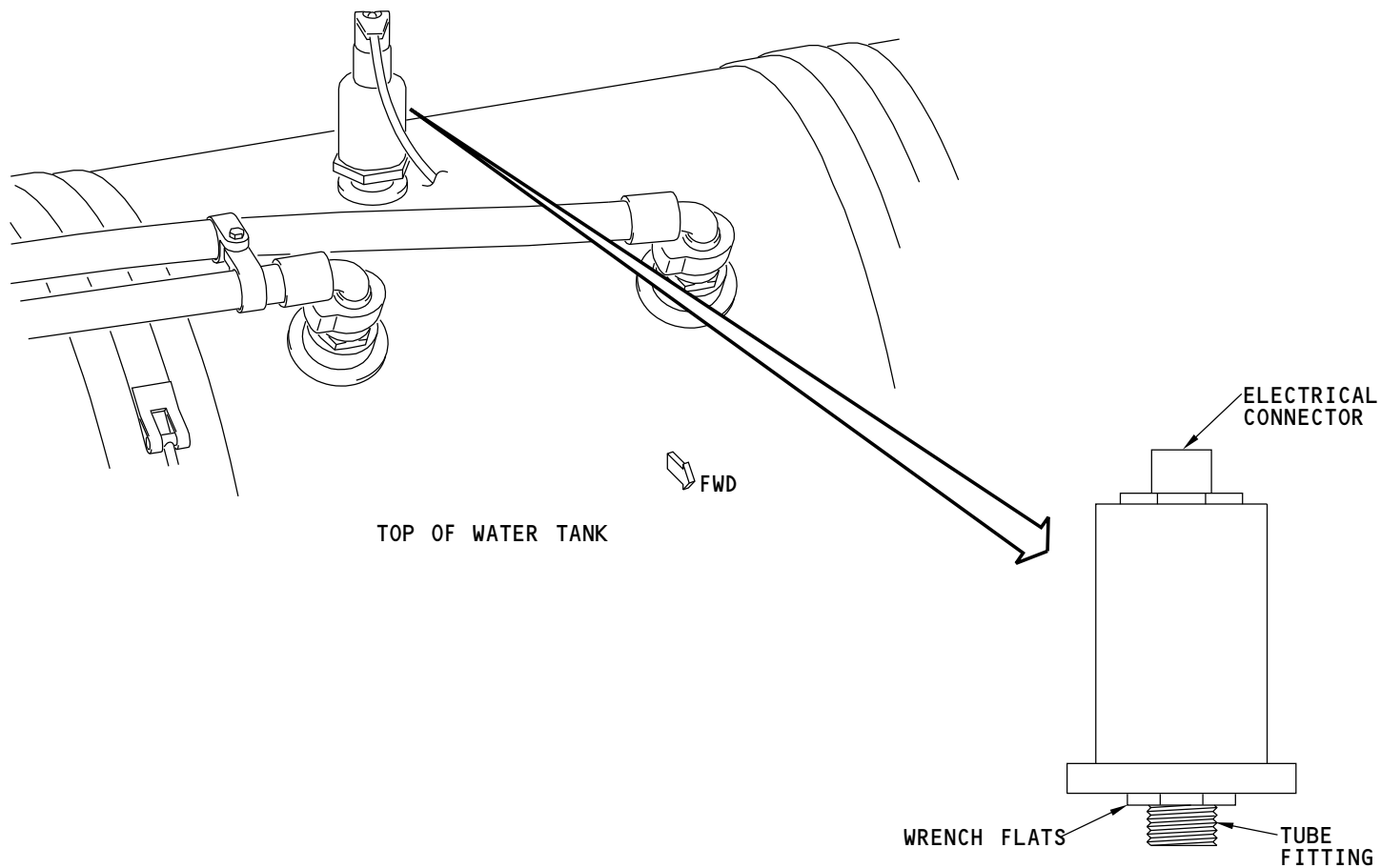
The pressure limit switch has these features:

- Electrical connector
- Tube fitting
- Wrench flats.

Functional Description

The switch starts the air compressor when the pressure in the water tank is 30 psig or less. The switch stops the air compressor when the pressure in the water tank is 40 psig.

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WATER/WASTE - WATER TANK PRESSURIZATION - PRESSURE LIMIT SWITCH

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**WATER/WASTE - WATER TANK PRESSURIZATION - COMPRESSOR CUT-OUT SWITCH****Purpose**

The compressor cut-out switch stops the operation of the air compressor when the water service panel door is open.

Location

The compressor cut-out switch is on the water service panel at the aft section of the fuselage, bottom right side.

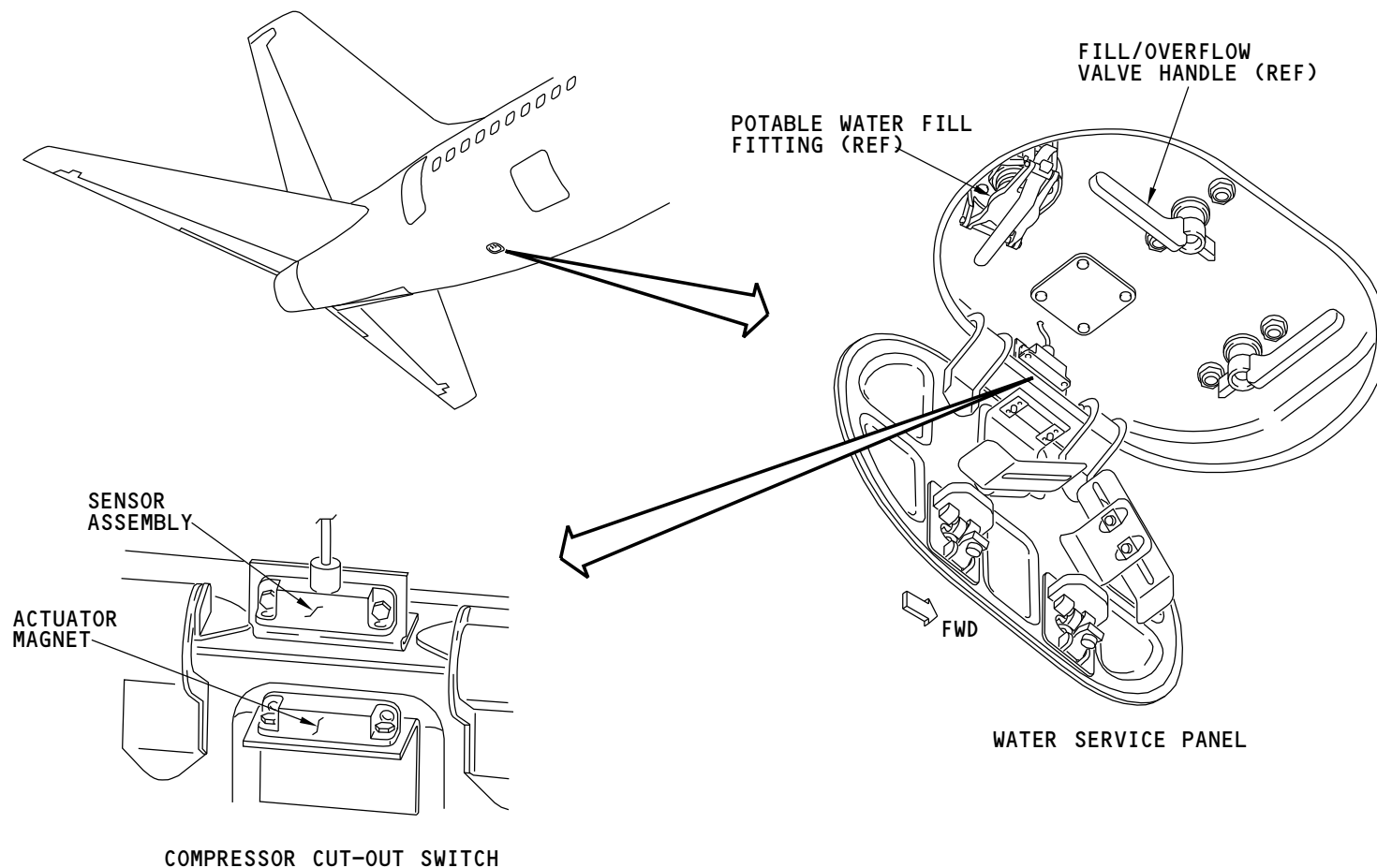
Description

The compressor cut-out switch has these components:

- Sensor assembly
- Actuator magnet.

The compressor cut-out switch opens when the water service panel door is open.

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WATER/WASTE - WATER TANK PRESSURIZATION - COMPRESSOR CUT-OUT SWITCH

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WATER/WASTE - WATER TANK PRESSURIZATION - AIR COMPRESSOR - FUNCTIONAL DESCRIPTION

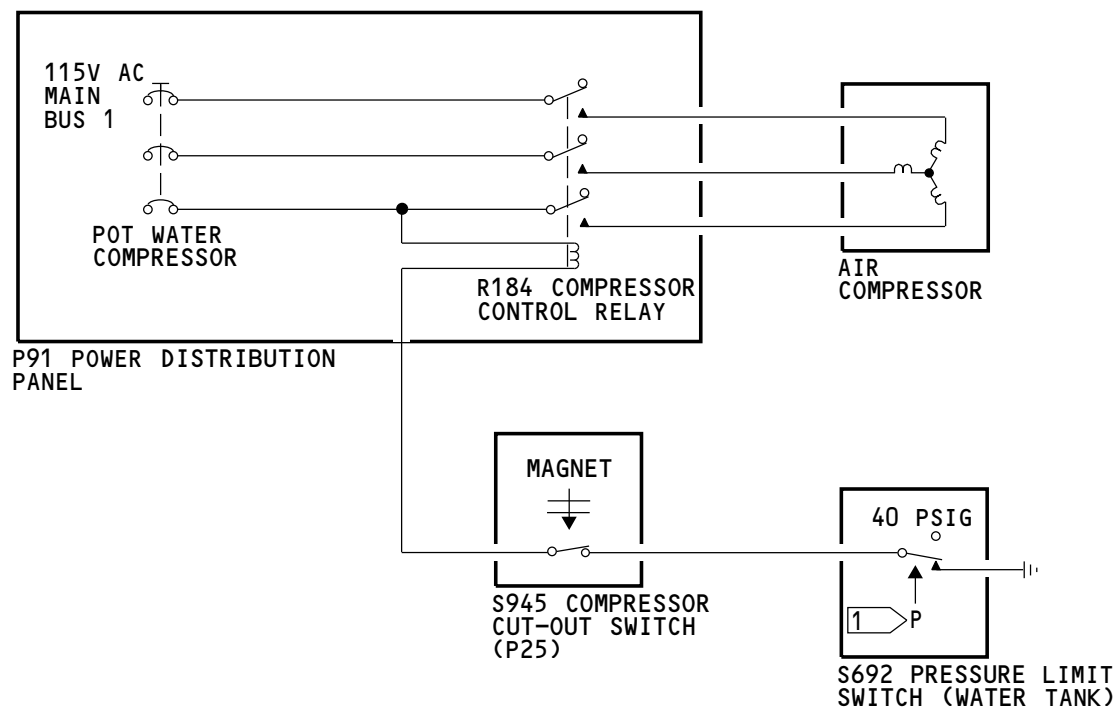
Functional Description

| The air compressor operates with 115v AC, three-phase power.

The compressor control relay energizes when these conditions are true:

- Water service door is closed (compressor cut-out switch is closed)
- Water tank pressure is less than 30 psig (pressure limit switch is closed)
- 115v AC main bus 1 is on.

The air compressor operates when the compressor control relay energizes.



1 THE SWITCH CLOSSES WHEN THE PRESSURE IS 30 PSIG OR LESS AND OPENS WHEN THE PRESSURE IS 40 PSIG OR MORE.

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WATER/WASTE - WATER TANK PRESSURIZATION - AIR COMPRESSOR - FUNCTIONAL DESCRIPTION

38-42-00

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WATER/WASTE - WATER TANK PRESSURIZATION - FUNCTIONAL DESCRIPTION

General

The water tank pressurization system uses pressurized air from the pneumatic system or the air compressor to pressurize the water tank.

Pneumatic System

The pneumatic system supplies pressurized air to the water tank when the pneumatic system is on.

The pneumatic system supply line gets air from a tap on the pneumatic manifold forward of the APU check valve.

An in-line air filter cleans the air in the pneumatic system supply line.

A pressure regulator controls the pneumatic system supply line pressure to a maximum of 35 psig.

Air Compressor

The air compressor supplies pressurized air to the water tank when the pneumatic system is off and these conditions are true:

- Pressure in the water tank is less than 30 psig (pressure limit switch is closed)
- Water service panel door is closed (compressor cut-out switch is closed)
- 115v AC main bus 1 is on.

The air compressor gets air from a muffler above the ceiling of the cargo compartment. An air filter at the inlet of the air compressor cleans the air in the air compressor supply line.

The pressure limit switch opens and stops the operation of the air compressor when the air pressure in the water tank increases to 40 psig. When the pressure decreases to 30 psig, the pressure limit switch closes and the air compressor starts.

Training Information Point

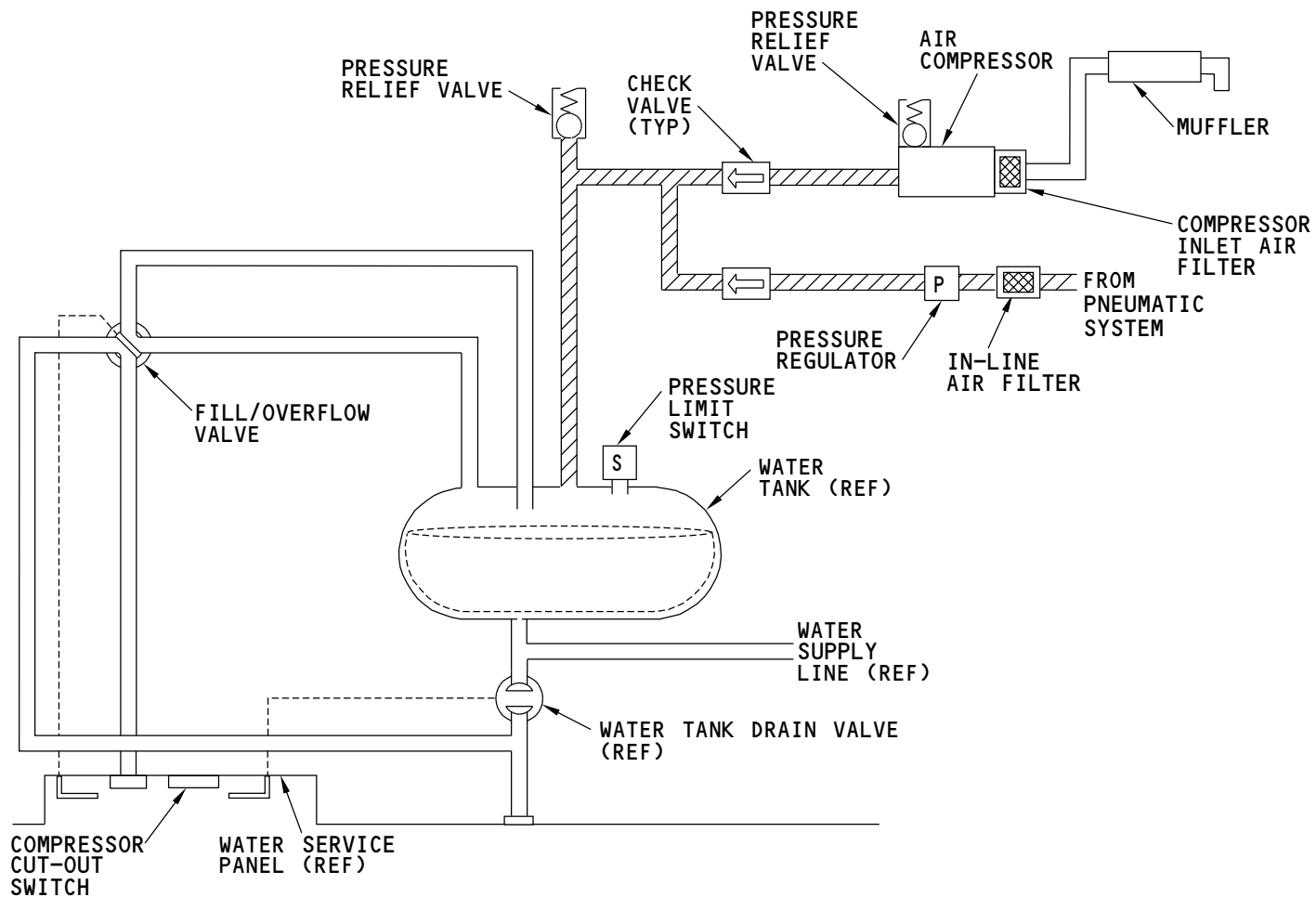
WARNING: SEAL THE CARGO COMPARTMENT WITH THE LINING. OBEY THE INSTRUCTIONS IN THE SPECIFIED PROCEDURE WHEN YOU INSTALL THE LINING. IF YOU INSTALL THE LINING INCORRECTLY, THE FIRE EXTINGUISHING AGENT OR SMOKE CAN GET INTO THE PASSENGER COMPARTMENT DURING A FIRE.

To get access to the water tank pressurization system components, you remove the cargo compartment lining. When you are done, you must replace and seal the cargo compartment lining.

WARNING: MAKE SURE THERE IS NO PRESSURE IN THE PNEUMATIC PRESSURE LINES BEFORE YOU DISCONNECT THEM. THE HIGH PRESSURE/TEMPERATURE AIR IN THE LINES CAN CAUSE INJURY TO PERSONS.

Before you remove water tank pressurization system components, you must release the pressure from the system. You can open the fill/overflow valve to release the pressure from the pneumatic pressure lines. To open the fill/overflow valve, use the valve handle at the water service panel.

To stop operation of the air compressor, open the water service panel.



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WATER/WASTE - WATER TANK PRESSURIZATION - FUNCTIONAL DESCRIPTION

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