

FALCON 7X	ATA 38 – WATER - WASTE GENERAL	02-38-05
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ACRONYMS

CAS	Crew Alerting System
CB	Circuit Breaker
CMC	Central Maintenance Computer
CMS	Cabin Management System
MAU	Modular Avionic Unit
NAV	Navigation
PWS	Potable Water System
SSPC	Solid State Power Controller
WSCU	Water System Computer Unit

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INTRODUCTION

The Water system provides potable cold and hot water to:

- The washbasin faucets in the aft lavatories,
- The washbasin faucet and coffee maker in the galley.

The system is controlled:

- Automatically through the Water System Computer Unit (WSCU),
- Manually by one of the crew members in case of WSCU failure.

The waste water and the whole water system are drained overboard through two heated drain masts.

The aft toilets are chemical-type with a dedicated tank and recirculating system.

The water and waste system includes the following options:

- Washbasin faucet in the optional forward lavatory,
- Chemical-type toilets in the optional forward lavatory.

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FLIGHT DECK OVERVIEW

CONTROLS

No dedicated control is available in the cockpit for the Water and Waste system. However, water heaters in the galley will be electrically powered only if the GALLEY MASTER pushbutton is selected on the electrical portion of the overhead panel.

INDICATIONS

Cockpit indications related to water and waste system are displayed on:

- The ENG-CAS window for CAS messages,
- The STATus synoptic / FAULT tab for fault messages.

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CABIN OVERVIEW

CONTROLS

Controls available in flight for the water and waste system are:

- The water tank control and indication panel, located in the galley for:
 - o Compressor switch,
 - o Drain pushbutton,
- The water heater override controls located on each water heater:
 - o One in the galley,
 - o One in the rear lavatory,
- The forward and rear isolation valves, located in the galley.

INDICATIONS

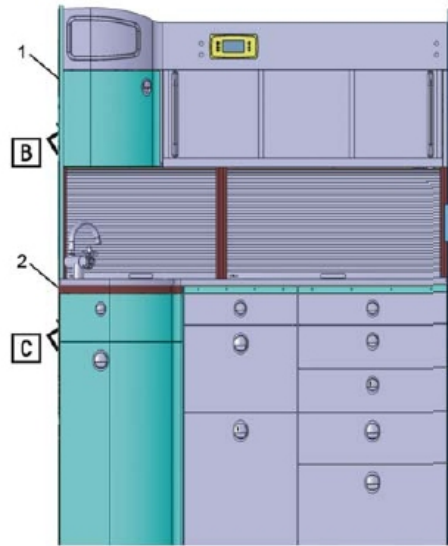
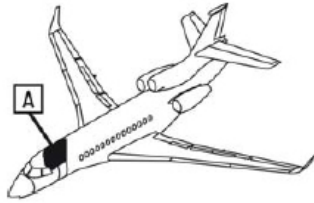
Indications related to the water and waste system are displayed on:

- The water tank control and indication panel, located in the galley for:
 - o Water tank level indication,
 - o Tank drain valve status,
- The water pressure gauge located in the galley,
- The water heater status light located on each water heater.

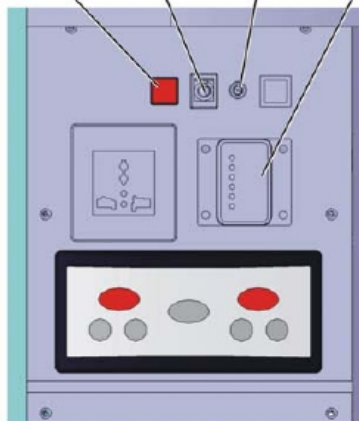
NOTE

Controls and indicating detailed location may change according to completion.

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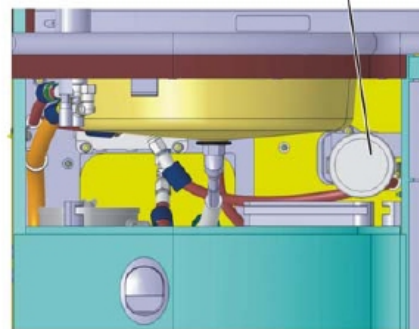


DRAIN
PUSHBUTTON COMPRESSOR
SWITCH DRAIN
LIGHT WATER LEVEL
INDICATION



A

WATER TANK AIR
PRESSURE MANOMETER



B

C

FIGURE-02-38-05-01 - GALLEY WATER SYSTEM CONTROL

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FIGURE 02-38-05-02 - AFT LAVATORY WATER & TOILET CONTROL

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GENERAL

The water and waste system is composed of:

- The potable water system including:
 - o The Water System Computer Unit (WSCU),
 - o The galley control panel,
 - o A pressurised water tank,
 - o Filling, rinsing, venting and distribution lines,
 - o An air compressor,
 - o A water servicing panel,
 - o Two water heaters,
 - o Two sets of drain lines and masts.
- The toilet system including:
 - o A chemical recirculating assembly,
 - o Filling and rinsing lines,
 - o Drain pipe (ground servicing).

The toilet system is the same for the optional forward lavatory as the aft toilet system.

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WATER SYSTEM

WATER SYSTEM ARCHITECTURE

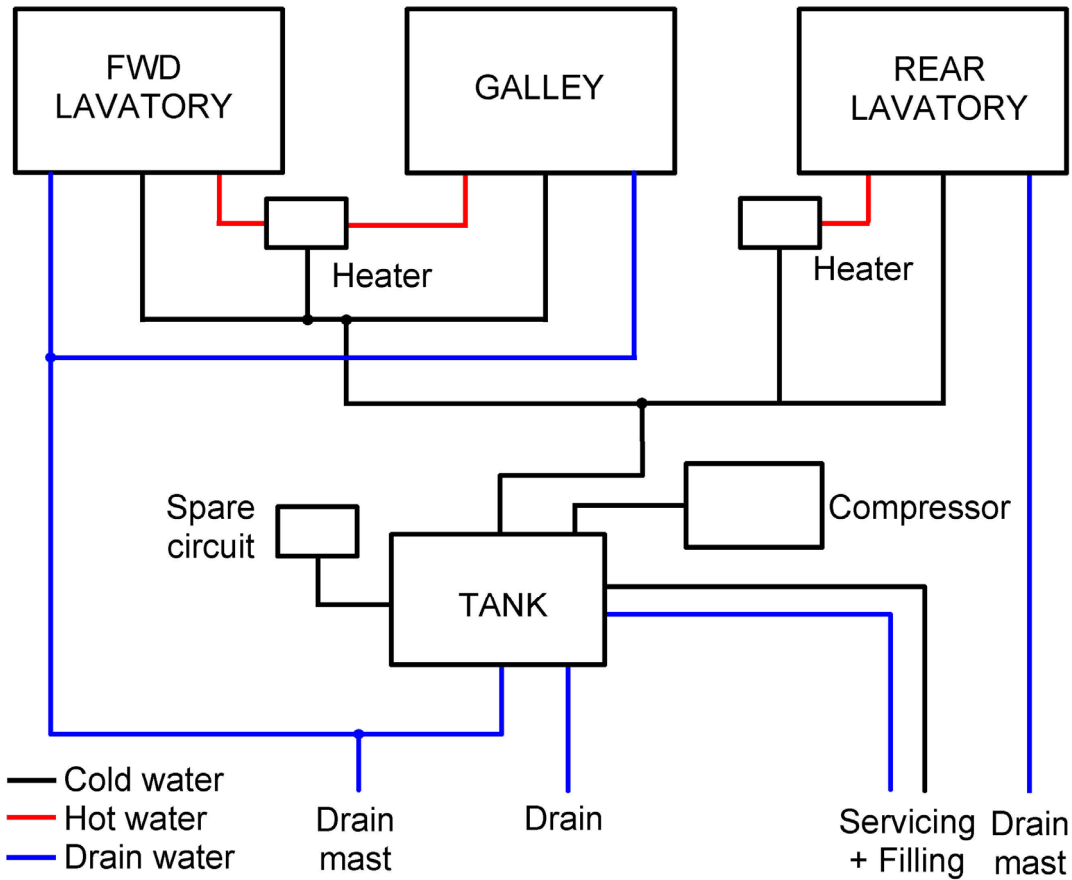


FIGURE 02-38-10-00 - POTABLE PRESSURIZED WATER SYSTEM WITH OPTIONAL FWD LAVATORY

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WATER SYSTEM MAIN COMPONENTS

Water System Computer Unit

The Water System Computer Unit (WSCU) performs:

- Compressor and water heater control,
- Drain heater regulation,
- Monitoring (heater power, overheat protection),
- Indicating (air pressure, water tank gauging),
- Failure report for triggering CAS Messages and Fault message to the Central Maintenance Computer.

Galley control panel

The galley control panel provides information and control capability to a crew member. In case of controller failure override controls are performed.

Water tank

A pressurized water tank located under the floor delivers potable water to lavatories (faucets) and galley (water is distributed by tank pressure). Potable water tank capacity is 20 USG (75 liters).

Compressor

An electrical compressor located in the baggage compartment is used as primary pressure source for the water system.

The tank can be manually pressurized on ground in case of compressor malfunction.

Three operating modes are available for the compressor: ON /OFF /AUTO:

- "OFF" mode:
 - o No Power Supply and no WSCU monitoring is provided.
- "ON" mode:
 - o The compressor is powered independently from the WSCU, with an automatic time limitation of 25 minutes.
- "AUTO" mode:
 - o The compressor operation is managed by the WSCU (operation time limited to 23 minutes),
 - o System pressure is about 20 psi, controlled by the WSCU through a pressure sensor.

Water heater

Two Toilet water heaters (one in the galley and one in the aft lavatory) supply hot water to the system.

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Drain lines and mast

The drain masts and the heating elements of the lines are automatically activated as soon as the airplane is electrically powered.

Waste water is drained through water forward and aft drain masts located under the fuselage. Masts and lines are electrically heated.

The forward mast drains:

- The galley sink,
- The optional forward lavatory washbasin.

The aft mast drain:

- The water tank and vent line,
- The aft lavatory washbasin.

- Refer to *DESCRIPTION - SUPPLEMENTARY INFORMATION* section for additional information on Water system
- Refer to ATA 30-3 for *MAST HEATING* supplementary information.

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TOILET SYSTEM

The toilets installed in the aft lavatories (and optional forward lavatories) are conventional chemical recirculating assemblies.

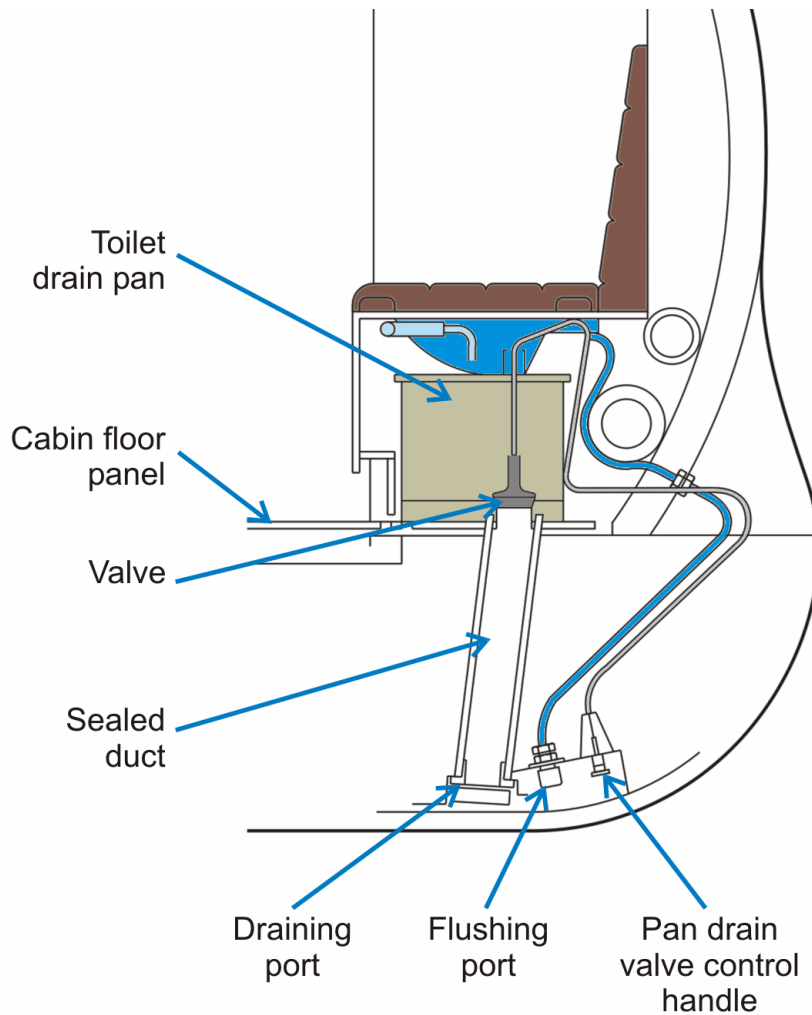


FIGURE 02-38-10-01 - AFT CHEMICAL TOILET

➤ Refer to *DESCRIPTION - SUPPLEMENTARY INFORMATION* section for additional information on Toilet system.

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DESIGN PRINCIPLE

The water waste system was designed considering the following design principles:

With regard to safety:

- Tank, drain and distributions lines are protected against freezing,
- Each heater system is automatically protected against over temperature,
- Water tank and air compressor are protected against overpressure (and negative pressure for tank).

With regard to efficiency:

- Water system is automatically controlled and monitored by the WSCU (a manual control can be performed from the galley control panel).

With regard to comfort:

- Potable water is delivered to the lavatories and galley faucets and to the coffee maker,
- Hot water is delivered to the lavatories and galley faucets,
- Two toilets are installed in the forward and aft lavatories,

With regard to maintenance:

- Facilities for ground servicing with:
 - o A single service panel for potable water tank servicing (pressure filling),
 - o Gravity filling capacity (servicing point close to the galley and main entry),
 - o Each toilet assembly is serviced from its own service panel.
- Facilities for trouble shooting:
 - o The WCSU monitor compressor, drain valves and heater systems operation and send a message to the CMC in case of malfunction.

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EQUIPMENT LOCATION

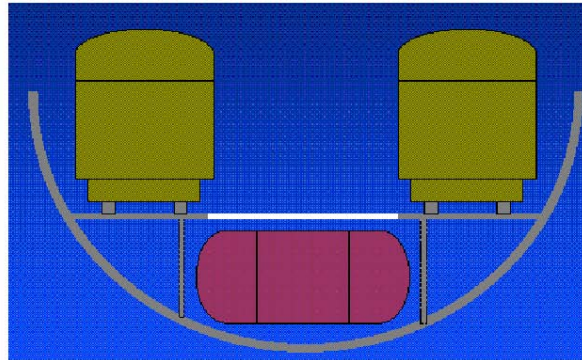
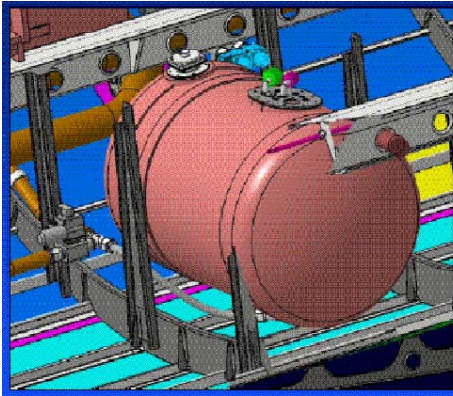


FIGURE 02-38-15-00 - LOCATION OF POTABLE WATER TANK BETWEEN FRAME 15 AND 16

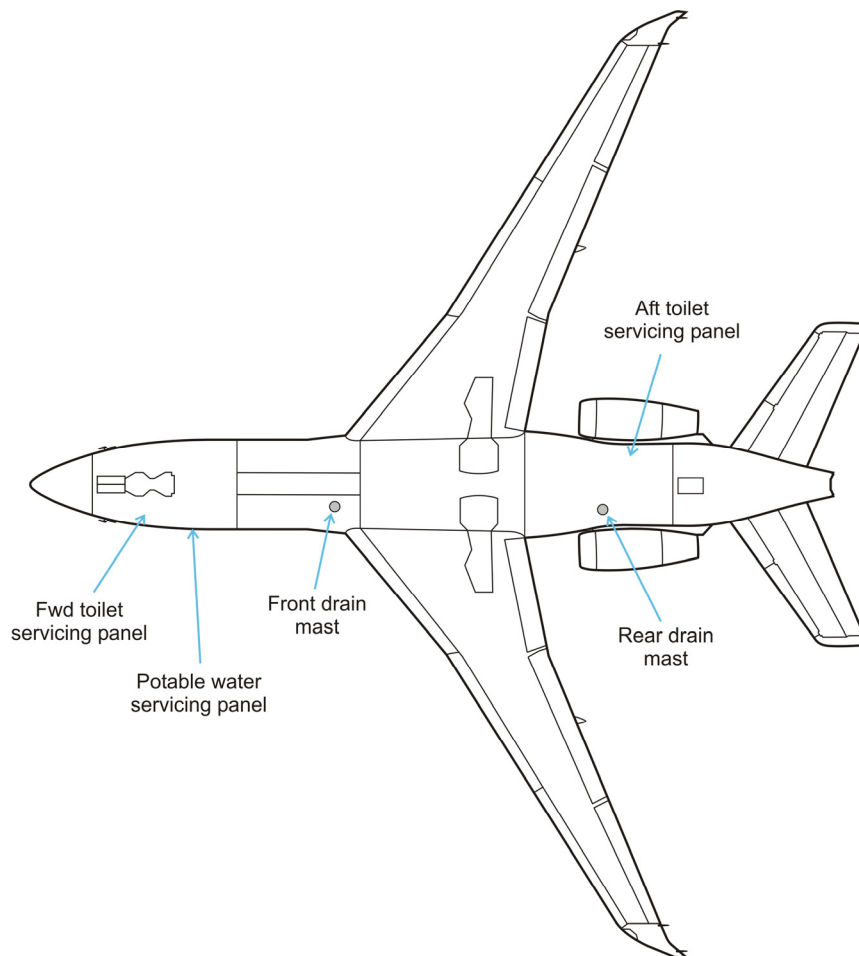


FIGURE 02-38-15-01 - FRONT AND REAR DRAINING SYSTEM PICTURE

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FIGURE 02-38-15-02 - AFT LAVATORY WATER & TOILET CONTROL

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ELECTRICAL POWER SOURCE

Following paragraph describes the power supply of the different equipment of the water waste system.

Electrical protection is provided:

- Either by Solid State Power Controllers (SSPC) ,
- Or by Circuit Breakers (CB).

➤ Refer to ATA 24 – ELECTRICAL POWER for additional information.

EQUIPMENT	POWER SUPPLY	TYPE OF PROTECTION
Compressor	RH Main Bus	SSPC
WSCU	RH Main Bus	CB
Water Heaters	RH Main Bus	CB
Lines heaters (distribution, drain, vent)	RH Main Bus	CB
Tank heater	RH Main Bus	CB
Mast heaters	RH Main Bus	CB
Drain valve	RH Main Bus	CB
FWD & AFT toilet system	RH Main Bus	SSPC

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MAIN COMPONENTS OF THE POTABLE WATER SYSTEM

WATER SYSTEM COMPUTER UNIT (WSCU)


The WSCU is a computer which manages or dialogs with:

- Pressure sensor,
- Cabin Management System (CMS),
- Heater System,
- Compressor,
- Tank drain valve,
- Level gage,
- Drain command,
- MAU 2 channel A which provides airplane data,
- MAU 2 which receives water system status and maintenance report.

WATER HEATERS

Toilet water heaters supply hot water to the toilets washbasins.

It provides 1.4 water liters at 52°C (125°F) approximately.

It is load shed when  pushbutton is OFF (Overhead panel / DC SUPPLY).

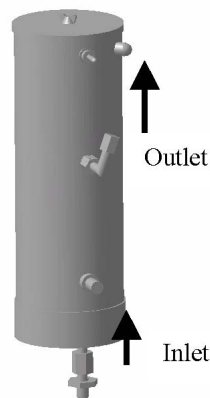


FIGURE 02-38-15-03 - HEATER

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COMPRESSOR

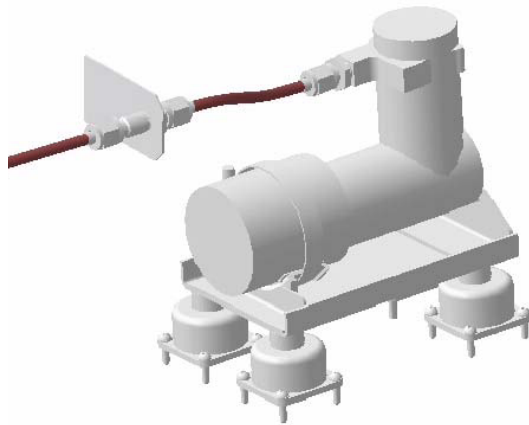


FIGURE 02-38-15-04 - AIR COMPRESSOR

In ON mode,

- The compressor operation is limited to 25 minutes by a circuit board with a reset time of 10 minutes.

In AUTO mode, the compressor operation is managed through the WSCU controls the air compressor operation such that:

- It is activated when pressure decreases below 17 psig (1.17 bar),
- It is deactivated when pressure reaches 22 psig (1.52 bar).

If the humidifier option is installed, the WSCU manages the compressor as follows:

- It is activated when pressure decreases below 24 psig (1.65 bar),
- It is deactivated when pressure reaches 29 psig (1.99 bar).

In AUTO mode, the operation is time limited to 23 minutes.

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WATER DRAIN

Waste water is drained through water front and rear drain masts located under the fuselage. Drain is also used for water tank dump.

Masts and drain lines are electrically heated.

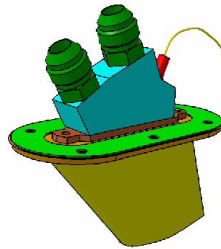


FIGURE 02-38-15-05 - DRAIN MAST

➤ *For more information, refer to ATA 30.*

NOTE

The water system can be drained to prevent damage by freezing in normal operating conditions, it is recommended to drain the tank to avoid contamination.

For more information see GROUND SERVICING document.

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CHEMICAL TOILET

The chemical-type rear toilet unit features a drain pan with a drain valve and bowl equipped with a flush and drain system.

Toilet waste water draining and toilet water tank filling can be performed through ports inside the toilet service panel.

Toilet has a fiberglass drain pan with a capacity of 14.3 USG (54 liters) included 2.8 USG (10.6 liters) for pre-loaded for the aft toilet and 2.1 USG (8 liters) for the forward toilet.

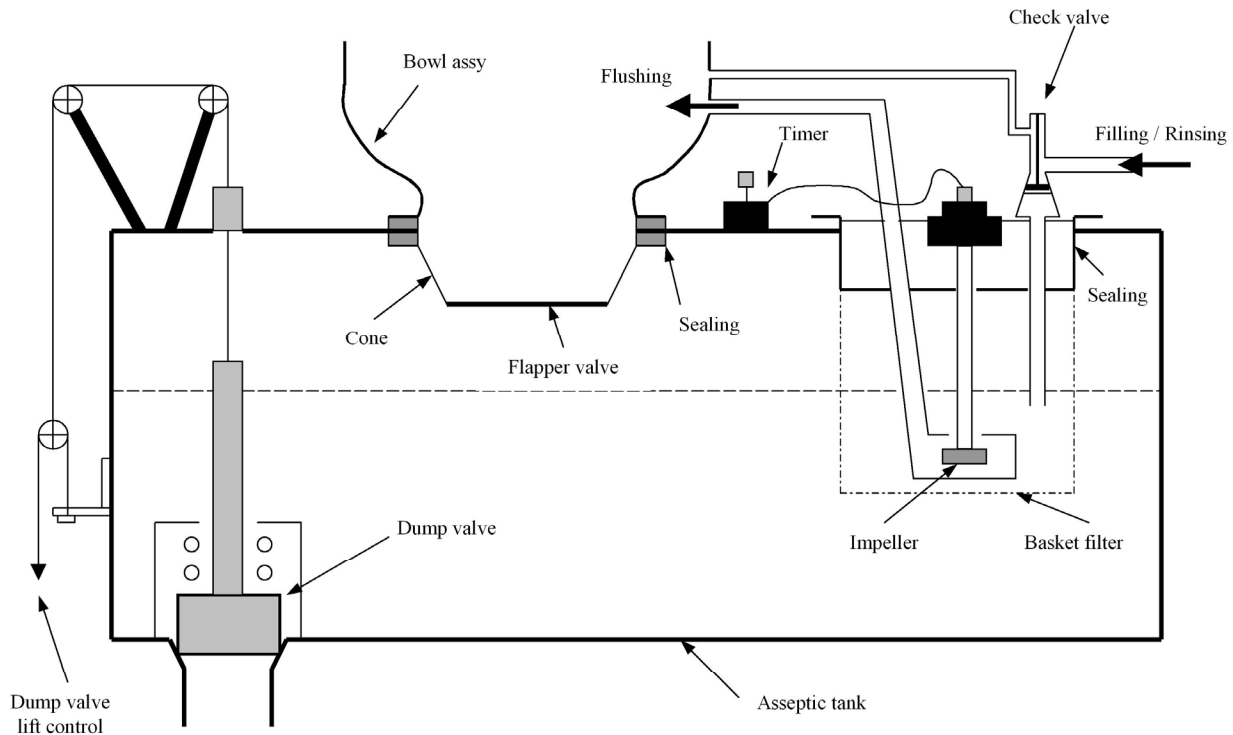


FIGURE 02-38-15-06 - CHEMICAL TOILET

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CONTROLS

The control available in flight for water and waste system is performed via:

- The water tank control and indication panel located in the galley for:
 - o The drainage control,
 - o The compressor control,
- The isolation valves manual control,
- The two water heaters switches.

WATER TANK CONTROL AND INDICATION PANEL

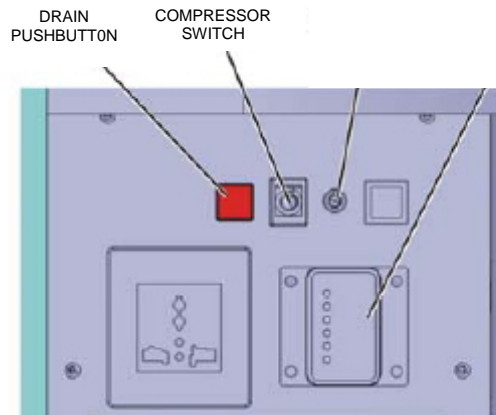


FIGURE 02-38-20-00 - WATER TANK CONTROL AND INDICATION PANEL

CONTROL	FUNCTION
DRAIN PUSHBUTTON	<p>First push: opens the water tank drain valve, thus starting a drainage sequence.</p> <p>Second push: closes the water tank drain valve, thus stopping the drainage sequence.</p>

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CONTROL	FUNCTION
COMPRESSOR SWITCH	<p>The compressor switch has three positions:</p> <ul style="list-style-type: none"> - AUTO: the WSCU controls the compressor power supply using information provided by the pressure sensor, - ON: compressor is power supply independently of the WSCU, - OFF: compressor is not power supply.

ISOLATION VALVES

Two isolation valves allow isolating systems in case of leak or specific maintenance operation:

- Forward valve: isolate the forward portion of the water system to rest of system,
- Aft valve: isolate the aft portion of the water system to rest of system.

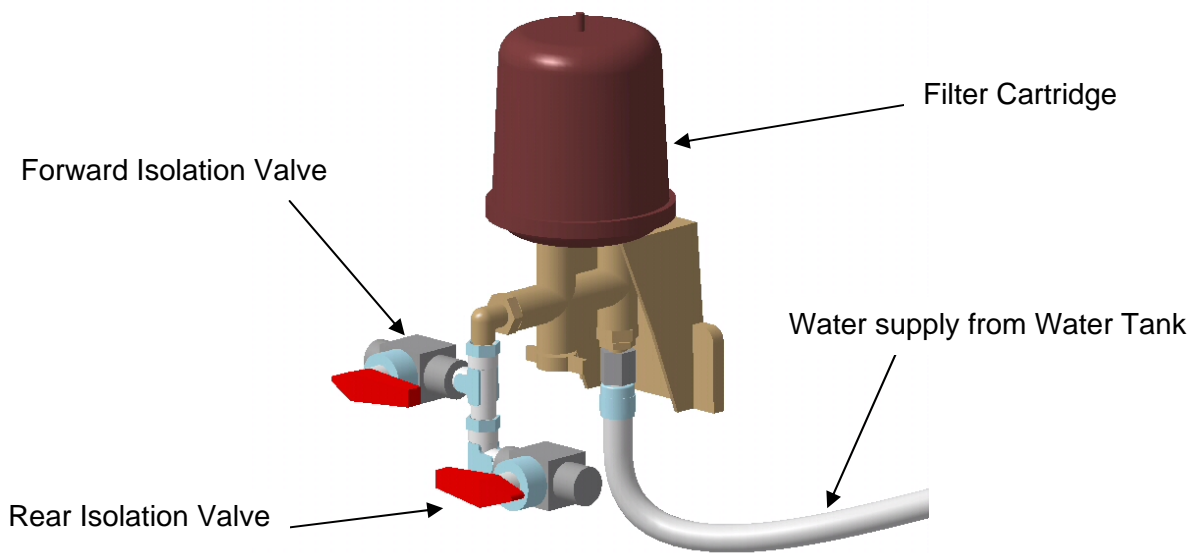


FIGURE 02-38-20-01 - ISOLATION VALVES

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WATER HEATER TEST PANEL

The water heater switch is located on each water heater.

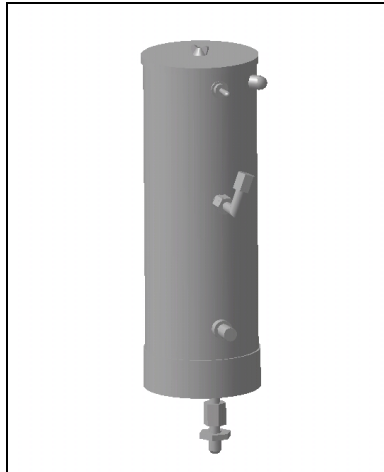


FIGURE 02-38-20-02 - WATER HEATER PICTURE

CONTROL	FUNCTION
Water heater switch	ON: the water heater is powered on, OFF: the water heater is powered off.

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INDICATIONS

Cabin indications related to the Water and Waste system are displayed on:

- The water tank control and indication panel located in the galley for:
 - o Water tank level indication,
 - o Water tank drain valve status,
- The water pressure gauge located in the galley,
- The water heater status light located on each water heater.

WATER TANK CONTROL AND INDICATION PANEL IN THE GALLEY

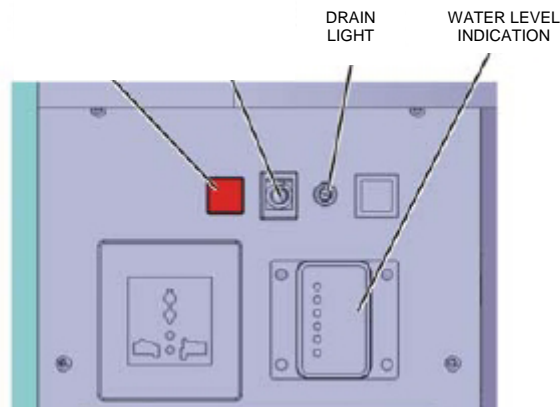


FIGURE 02-38-20-03 - WATER TANK CONTROL AND INDICATION PANEL

WATER TANK LEVEL

The indicator indicates the remaining potable water quantity. The indication is done through six level lights.



FIGURE 02-38-20-04 - WATER LEVEL INDICATION

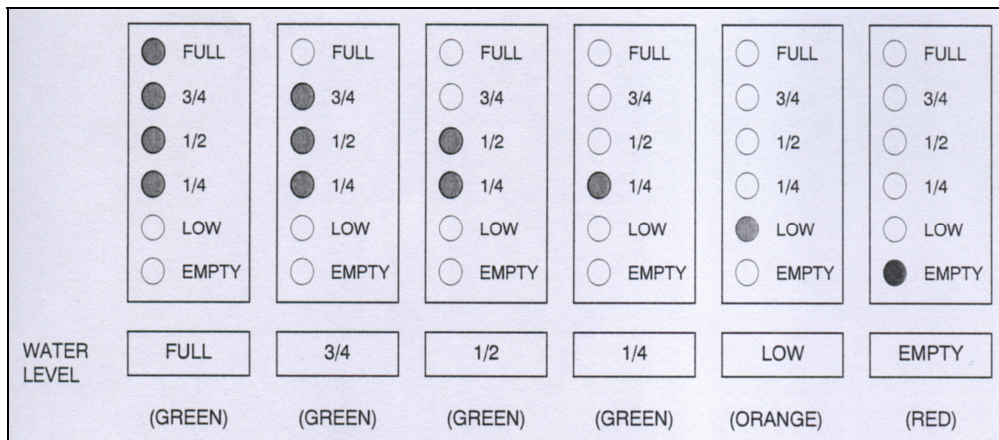


FIGURE 02-38-20-05 - WATER LEVEL DESCRIPTION

Water tank drain valve status

The drain light illuminates when the water tank drain is fully open.

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WATER TANK AIR PRESSURE MANOMETER

The gauge indicates the accumulator water tank pressure.



FIGURE 02-38-20-06 - ACCUMULATOR WATER TANK PRESSURE

WATER HEATER STATUS

Each water heater is equipped with a water heater light.
The light is on when the water heater is powered on.

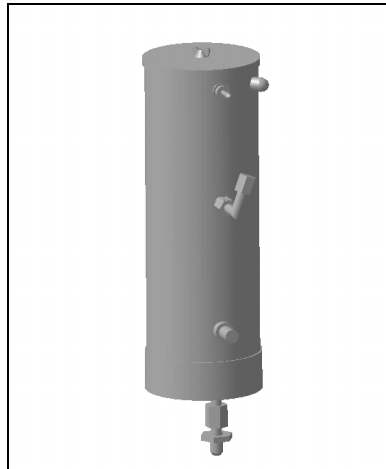


FIGURE 02-38-20-07 - WATER HEATER PICTURE

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No supplementary information to be provided on CONTROLS AND INDICATIONS at present time.

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SYSTEM MONITORING

For the Water and Waste systems, the following parameters are monitored:

- Air compressor operation time,
- Heaters overheat,
- Open status of the Tank drain valve.

In addition, a leak detection system would allow to detect leaks:

- In the water tank drain area,
 - In the baggage compartment.
- *Refer to CODDE 2 for a complete list of CAS messages.*

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ACTIVE PROTECTIONS

Protection against freezing for water system:

- All the drain and distribution lines located underfloor are heated and insulated,
- An automatic drain below the water tank is heated on ground,
- The water tank is heated by a heated blanket, the temperature being regulated through a temperature sensor in the blanket.

Protection against over temperature:

- Overheat protection is performed by a temperature control system through various temperatures sensors and the WSCU.
- The toilet recirculating pump is protected by a thermal device in case of overheat.

Protection against overpressure:

- The tank is protected from overpressure by a pressure relief valve rated at +40 psi and from negative pressure by a vacuum breaker valve,
- The compressor is protected by an integrated overpressure valve.

Protection against leaks:

- Automatic drainage is performed in case of water tank leak,
- Heated pipes allow permanent drainage of water in case of leak in the baggage compartment.

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No supplementary information to be provided on Water and Waste protection at present time.

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POTABLE WATER TANK SERVICING

PRESSURE FILLING

The pressure filling system includes a dual fill valve which is open by a handle on the potable water service panel via flex control.

A dual fill valve has one way for filling the tank and the other way to vent the tank while filling and drain overflow in case of overfilling.

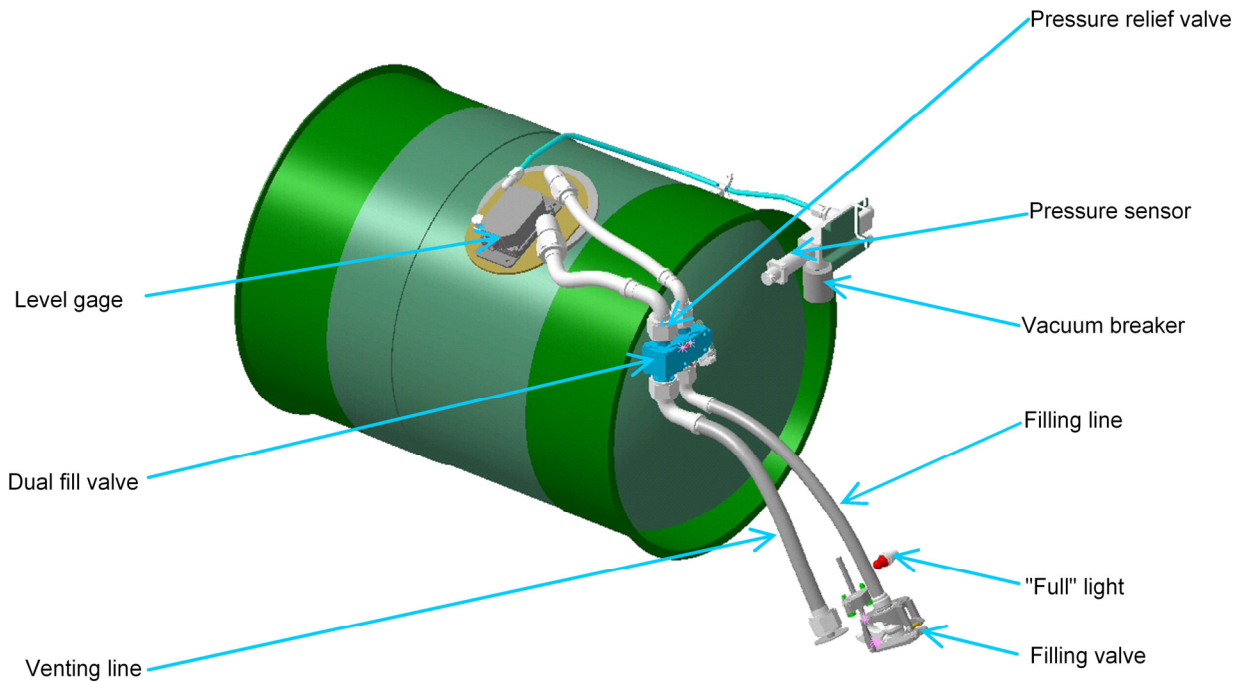
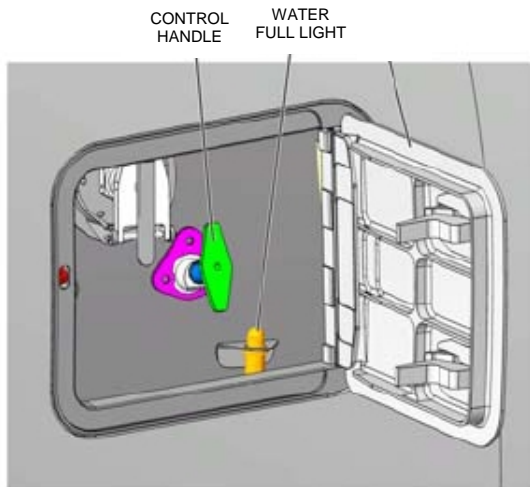
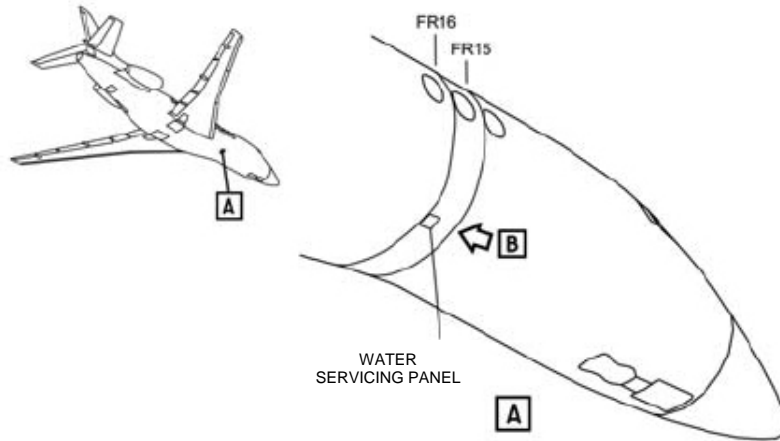


FIGURE 02-38-40-00 WATER TANK PRESSURE FILLING SYSTEM

Pressure filling is achieved from a single potable water service panel located outside of the airplane (RH side frame 15-16).



B

FIGURE 02-38-40-01 WATER SERVICE PANEL

CONTROL AND INDICATING	FUNCTION
Control handle	Control handle has two positions: <ul style="list-style-type: none"> - Pulling the handle opens the dual filling valve, - Pushing the handle closes the dual filling valve.
Water full light	Light illuminates when the tank is full to warn the operator to stop refilling.

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NOTE

The water pressure of the external filling source must not exceed 60 psi (4 bar).

Filling instructions are printed inside of the water service panel door.

The water level indication is displayed on the SERVICING page accessible through TEST synoptic.

GRAVITY FILLING

A gravity filling is available from a point located on the LH side of the airplane at the main entry door area.

A safety cap prohibits opening while the tank is pressurized. It is fitted with a depressurization device (push to vent).

A dedicated "Full light" is located near the gravity filling port.

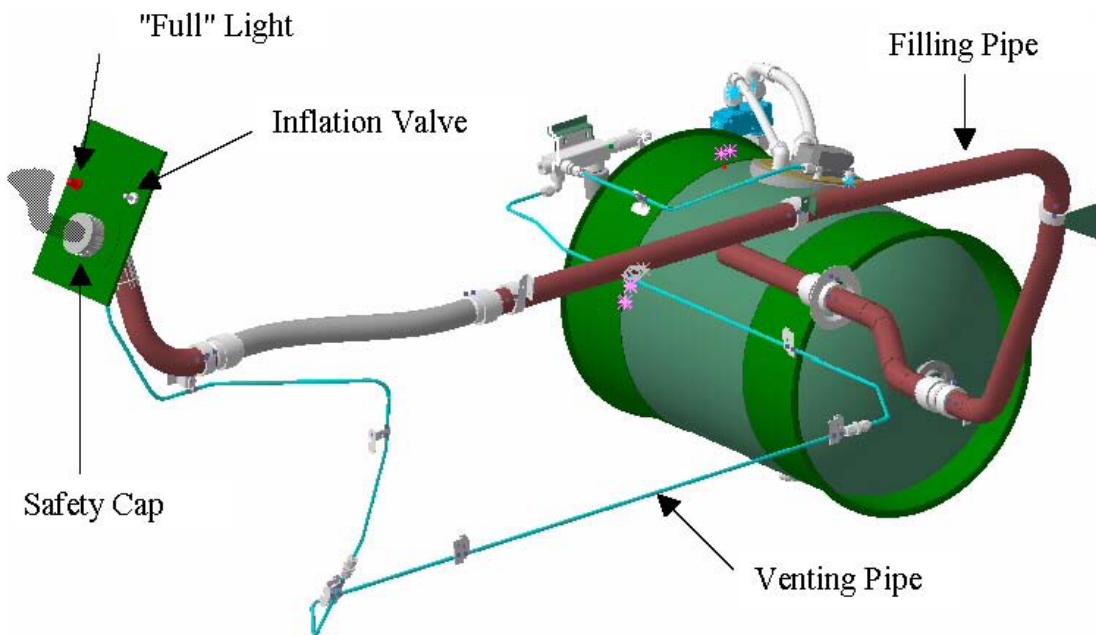


FIGURE 02-38-40-02 WATER TANK GRAVITY FILLING SYSTEM

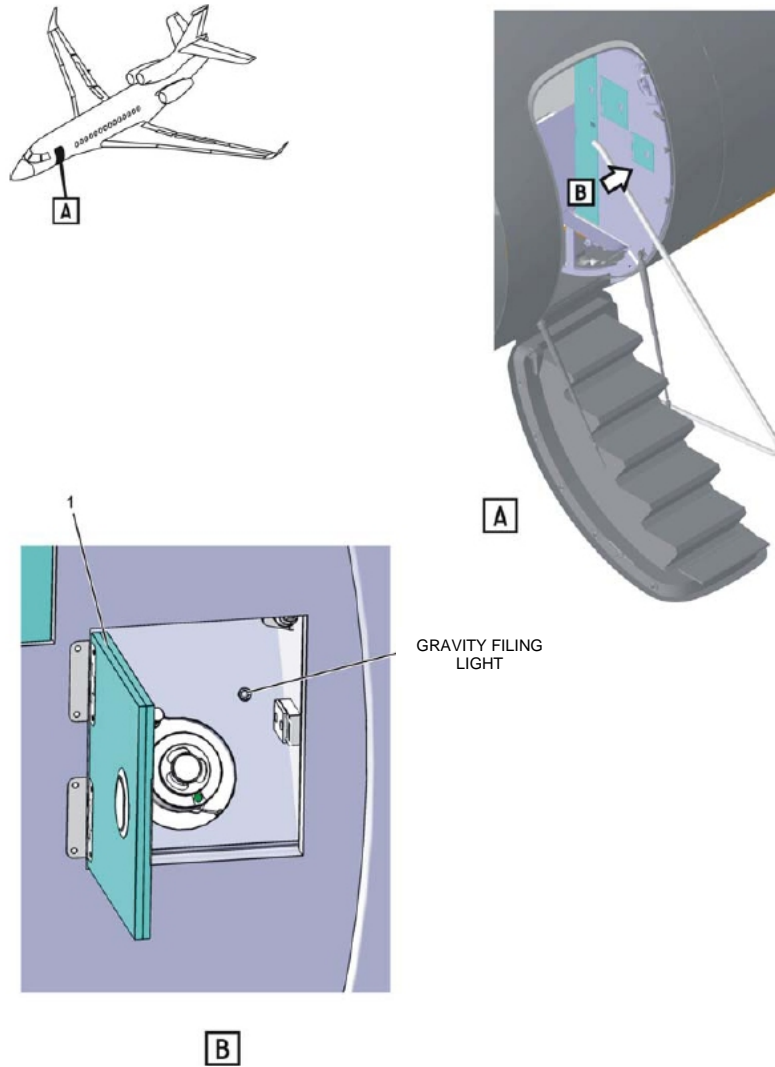


FIGURE 02-38-40-03 - WATER GRAVITY FILLING PANEL

CONTROL AND INDICATING	FUNCTION
Cap	Press to depressurize the water tank. Turn to move it
Gravity filing light	Light illuminates when the tank is full to warn the operator to stop refiling.

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The potable water level is displayed on the SERVICING page accessible through TEST synoptic.

The potable water level is displayed in US gallons (unit name “USG”), If the quantity of water is lower than 0.8 USG (3 l), then an “EMPTY” indication is displayed instead of the water level.

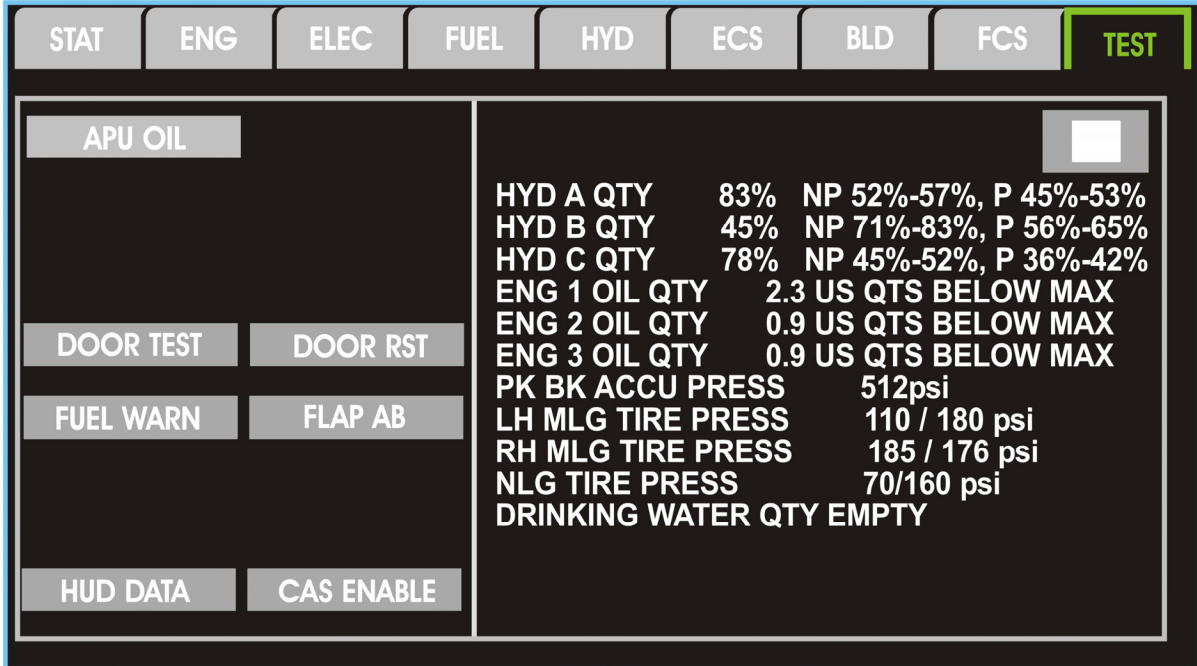


FIGURE 02-38-40-04 - SERVICING PAGE

➤ Refer to *GROUND SERVICING MANUAL* for procedures related to potable water servicing.

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TOILET SERVICING

Servicing is achieved for forward toilet assembly from a service panel installed at the forward fuselage section close to the forward toilet assembly (optional).

Servicing is achieved for rear toilet assembly from two service compartments installed at the rear fuselage section close to the rear toilet assembly.

The toilet service panels allow the following functions:

- Toilet tank draining,
- Toilet tank filling (8 liters for forward toilet and 10.6 liters for rear toilet).

CONTROL AND INDICATING	FUNCTION
Toilet drain control	Control the start / stop draining of the toilet tank. Pull to start the draining of the toilet tank.
Toilet drain cap	To open turn the cap of the toilet drain coupling counterclockwise.
Unlocking indicator: green or red	Indicator is red when drain cap isunlocking. Indicator is green when drain cap is locking
Toilet flushing valve	Control the opening / closure of the toilet valve. Allow to connect the adapter for toilet flushing.

NOTE

Draining tube should be connected prior to opening the draining valve.

➤ Refer to *GROUND SERVICING MANUAL* for procedures related to toilet servicing.

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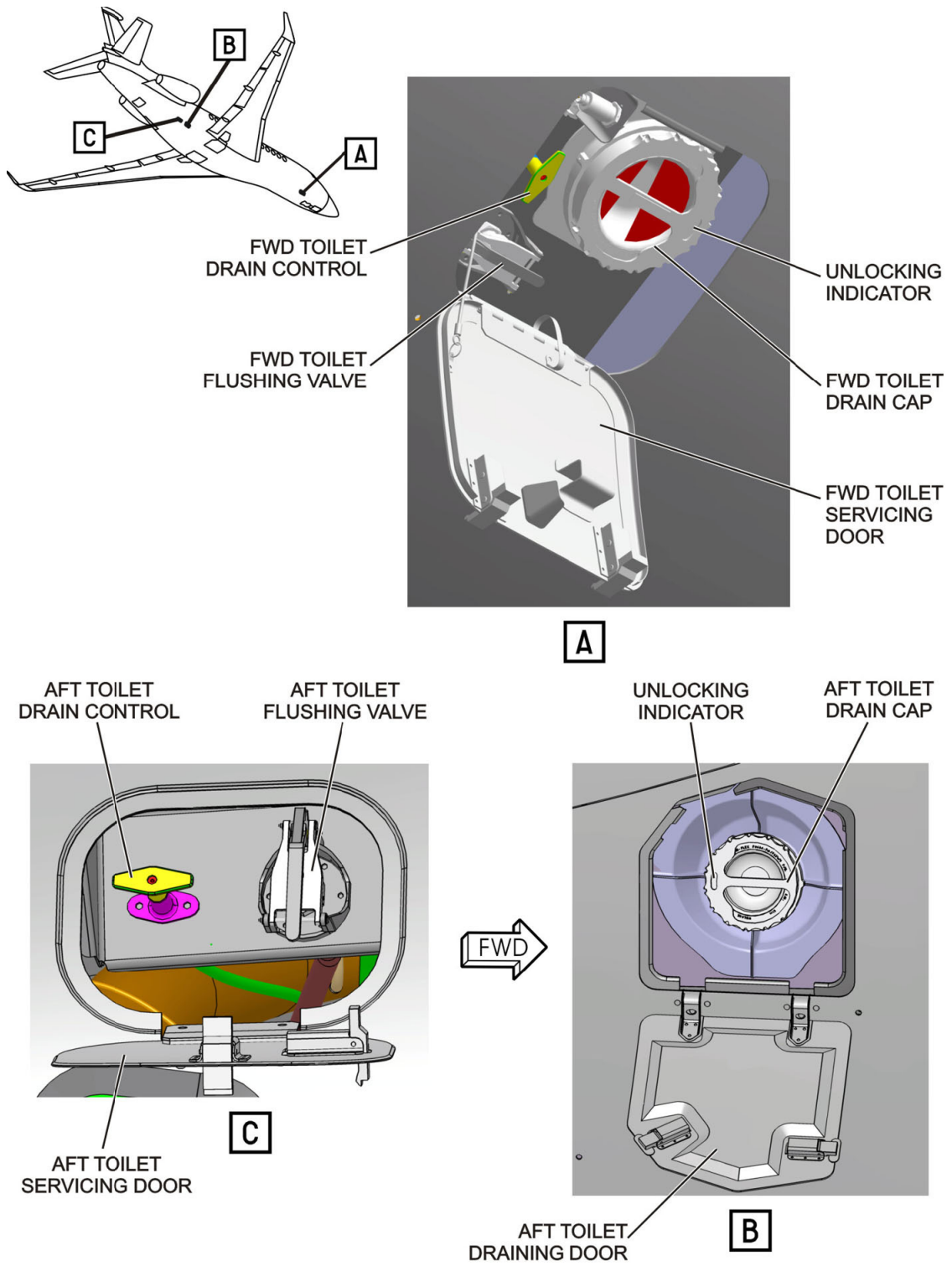


FIGURE 02-38-40-05 - TOILET SERVCING