TECHSAVIATION
Training Center

Este material em hipótese alguma substituirá os manuais do fabricante para qualquer ação de manutenção. Consulte os manuais correspondentes. **EDUCATIONAL PURPOSE ONLY**

FUEL - ATA 28-00

Fuel

Fuel Tanks

The fuel system has three fuel tanks, two main tanks and one center tank. The tanks are part of the wing structure and the center wing section.

There is a surge tank at the outer end of the left and right main tanks. The surge tanks are part of the wing structure.

The left and right main tanks are from rib 9 to rib 32 and the center tank is from rib 9 in the left wing to rib 9 in the right wing.

The surge tanks are from rib 32 to rib 35 in each wing.

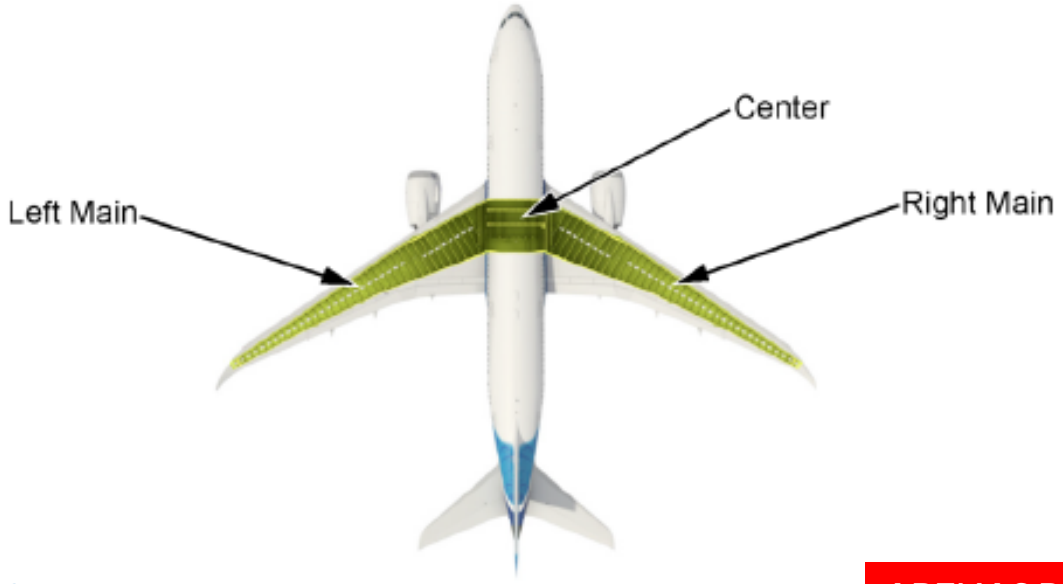
Most fuel system components are in the fuel tanks. These components are on the wing rear spars:

- Fuel pumps
- Scavenge jet pumps
- Valve actuators.

Most of these components can be removed and replaced without the need to defuel the tanks.

Fuel Tank	Left Main	Center	Right Main	Total
Volume (Liter) 787-8 787-9/10	21,085 20,895	84,036 84,566	21,085 20,895	126,200 126,356
Volume (US Gal) 787-8 787-9/10	5570 5520	22,200 22,340	5570 5520	33,340 33,380
Weight (KG) 787-8 787-9/10	16,965 16,800	67,570 67,995	16,965 16,800	101,500 101,595
Weight (LB) 787-8 787-9/10	37,400 37,040	148,970 149,900	37,400 37,040	223,770 223,980

Total Usable Fuel (Jet A-1 at Standard Density)



Fuel Capacity

Fuel Tank Components

Fuel vent tubes maintain the fuel tanks at near ambient pressure during all phases of the airplane operation.

Each fuel tank vents to the surge tanks through tubes in the wings.

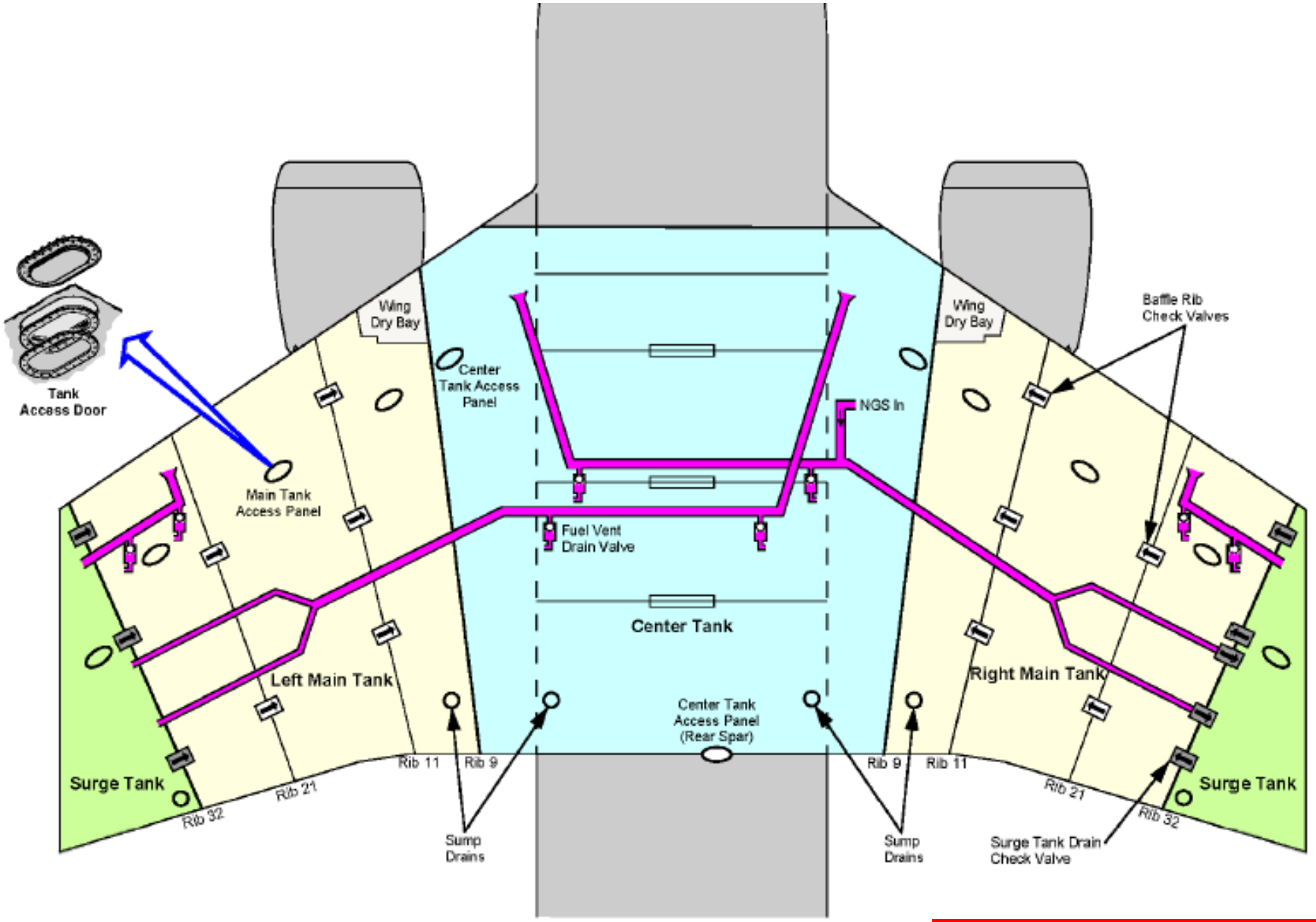
These vent tubes also permit fuel overflow into the surge tanks if necessary. Surge tank drain valves allow fuel to migrate back to the main tanks when the fuel level drops sufficiently.

There are float-operated drain valves in the vent tubes to allow fuel to drain back into the tanks after refueling.

There are sump drain valves in the lowest points of the three fuel tanks and the surge tanks. These provide the means to remove water, obtain fuel samples, or drain the tanks for maintenance purposes.

There are baffle rib check valves at ribs 11 and 21 in each main tank that allow fuel to migrate inward. This is to ensure that the main tank boost pump inlets are always covered in fuel.

Main tank access is through tank access doors on the lower side of the wings. The center tank is accessed using the center tank access panel in the right main wheel well.



Pressure Refueling System

The refuel station is on the leading edge of the left wing. It has two refuel adapters and a Refuel Control Panel (RCP).

The RCP has these components:

- Three fuel quantity indicators
- Two load select displays
- Three fueling valve switches
- Six fuel valve lights
- One ALL VALVES switch
- One LOAD SELECT QTY switch
- One TEST switch
- Two display select switches
- One POWER switch
- One DEFUEL switch
- One OVERFILL light.

There are six refuel valves, two for each main tank and two for the center tank. The fuel/jettison manifold supplies fuel from the refuel station to the valves. The tanks can be filled individually or all at the same time.

The Fuel Quantity Indicating System (FQIS) is a dual redundant system with two sets of components designated channel A and channel B. This eliminates the need for fuel measuring sticks on the 787.

The Fuel Quantity Management System (FQMS) application software is in the Common Computing Resource (CCR) cabinets.

A proximity sensor on the refuel door provides the indication to Remote Power Distribution Units (RPDU) to send 28V DC power to the RCP.

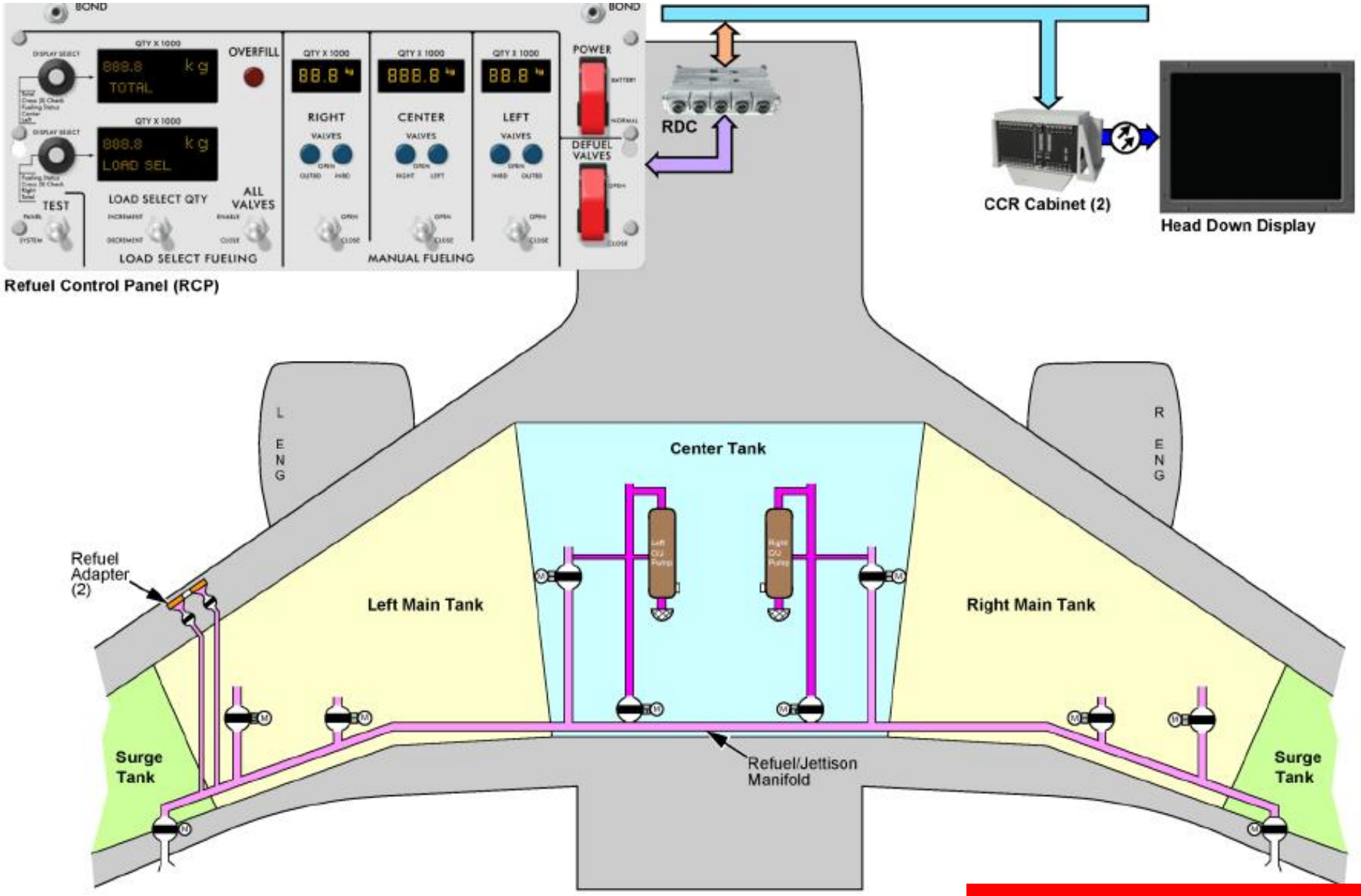
The control switches on the RCP open and close the refuel valves. The valves also close automatically when one of these occurs:

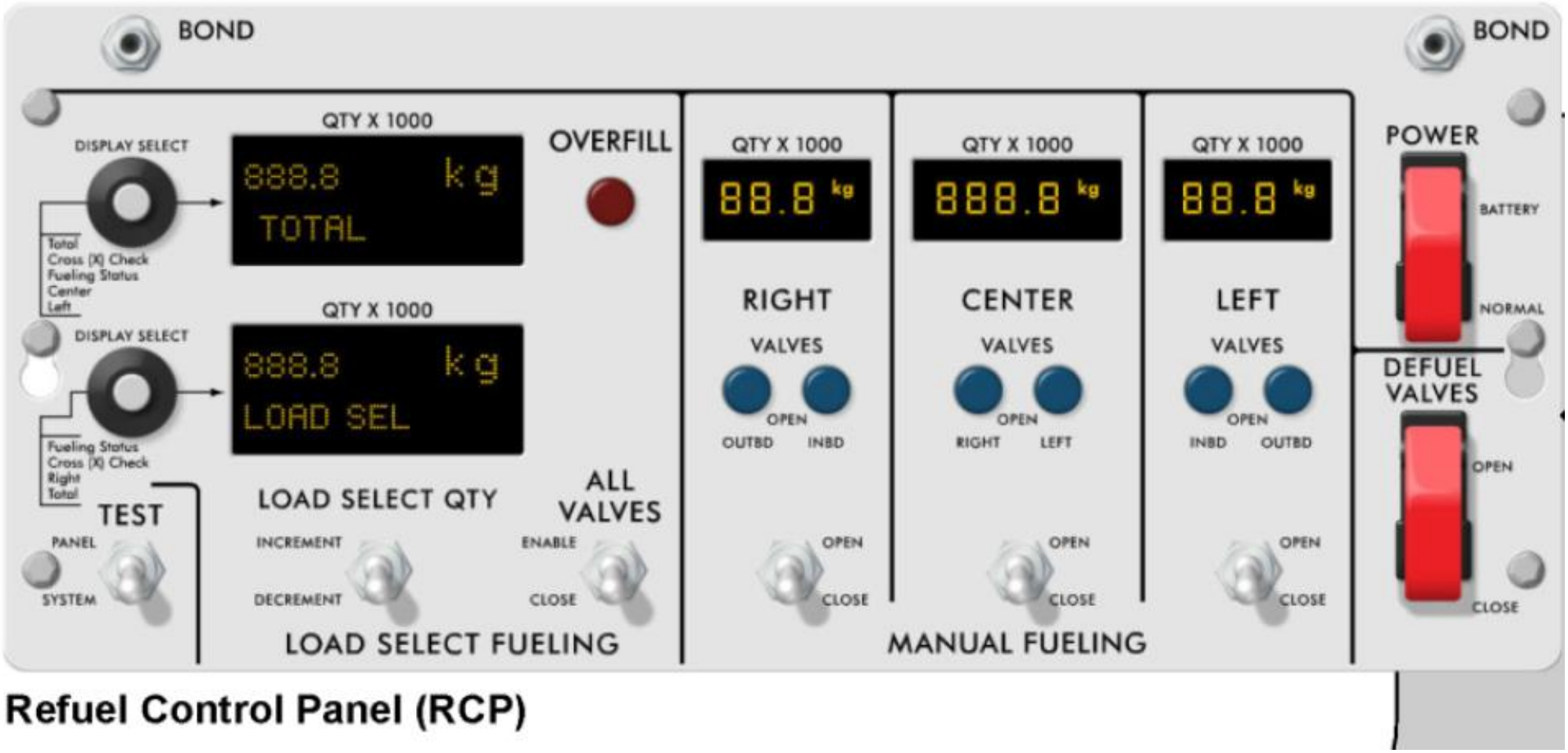
Tank weight gets to a level set on the refuel panel

Tank gets to the Volumetric Shut Off (VSO).

When you push the system test switch, the valves close and then open again automatically.

The refuel valves can also be manually operated at the valve.





Refuel Control Panel (RCP)

APU Fuel Feed System

The APU can receive fuel from each tank by using the applicable fuel pumps and crossfeed valve.

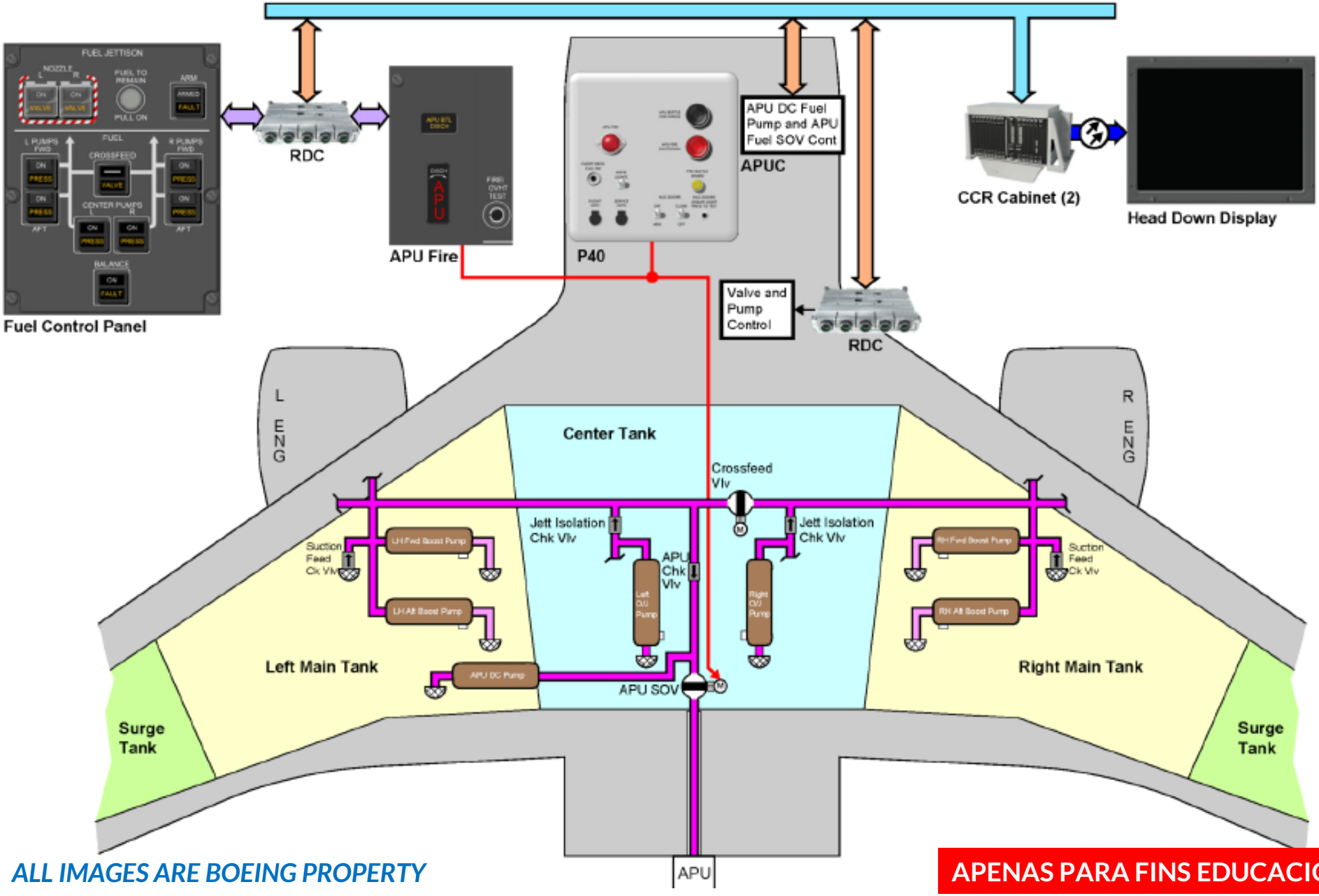
When the fuel pumps are not running, the APU gets fuel from the left main tank.

An APU Shutoff Valve (SOV) lets fuel flow from the engine fuel feed manifold to the APU manifold.

The APU Controller (APUC) opens and closes the APU SOV during normal operation.

The APU fire switch on the P5 overhead panel and the APU fire switch on the P40 service and APU shutdown panel are used to close the APU SOV if an APU fire occurs.

Normally, with AC power available, the left aft boost pump comes on to provide a positive flow of fuel to the APU. However, if AC power is not available, the APU DC pump supplies fuel from the left main tank.



Engine Fuel Feed System

There are two boost pumps for each main tank and two override/jettison pumps in the center tank to supply fuel to the engines. The fuel flows through the engine fuel feed manifold to the engines.

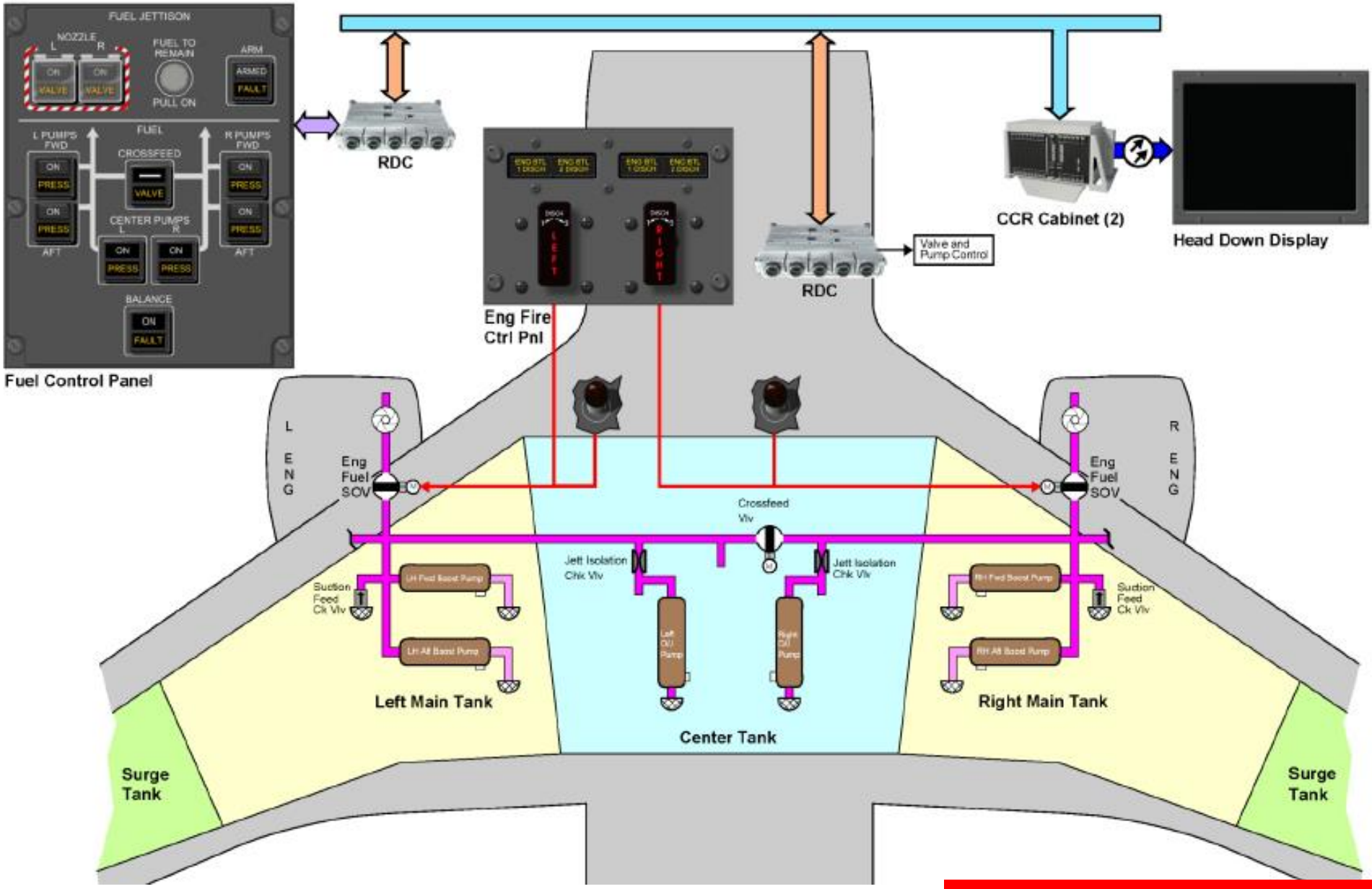
At the start of a flight when all the tanks are full, the normal procedure is to turn on all six fuel pumps.

Initially, the override/jettison pumps in the center tank supply fuel to the engines. This occurs because the override/jettison pumps have a higher output pressure than the main tank boost pumps.

When the fuel in the center tank is low, the crew will get an EICAS message and they will turn off the center tank pumps. This will let the main tank boost pumps supply fuel to the engines.

The individual pumps in a fuel tank are powered from different sources for redundancy. One pump in a tank is sufficient to supply the fuel needs of the engines. The pumps do not run until main engine start.

If both pumps in a main tank are inoperative, the engines can suction feed.



Fuel Jettison System

The fuel jettison system moves fuel overboard to decrease the landing weight. The system is inhibited on the ground and operates only in the air.

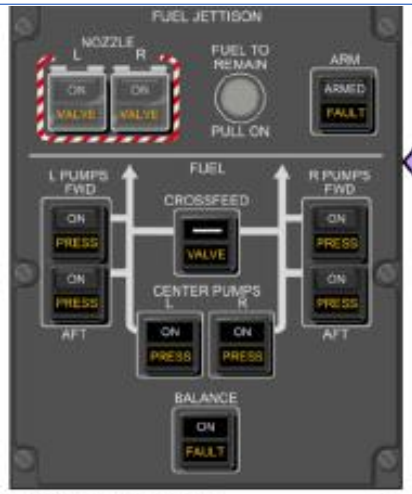
Initially, the flight crew sets the ARM switch to the ARM position and the nozzle valve switches to the ON position. The Fuel Quantity Management System (FQMS) application software in the Common Computing Resource (CCR) cabinets will open:

- Jettison isolation valves (2)
- Jettison nozzle valves (2)
- Defuel isolation valves (2).

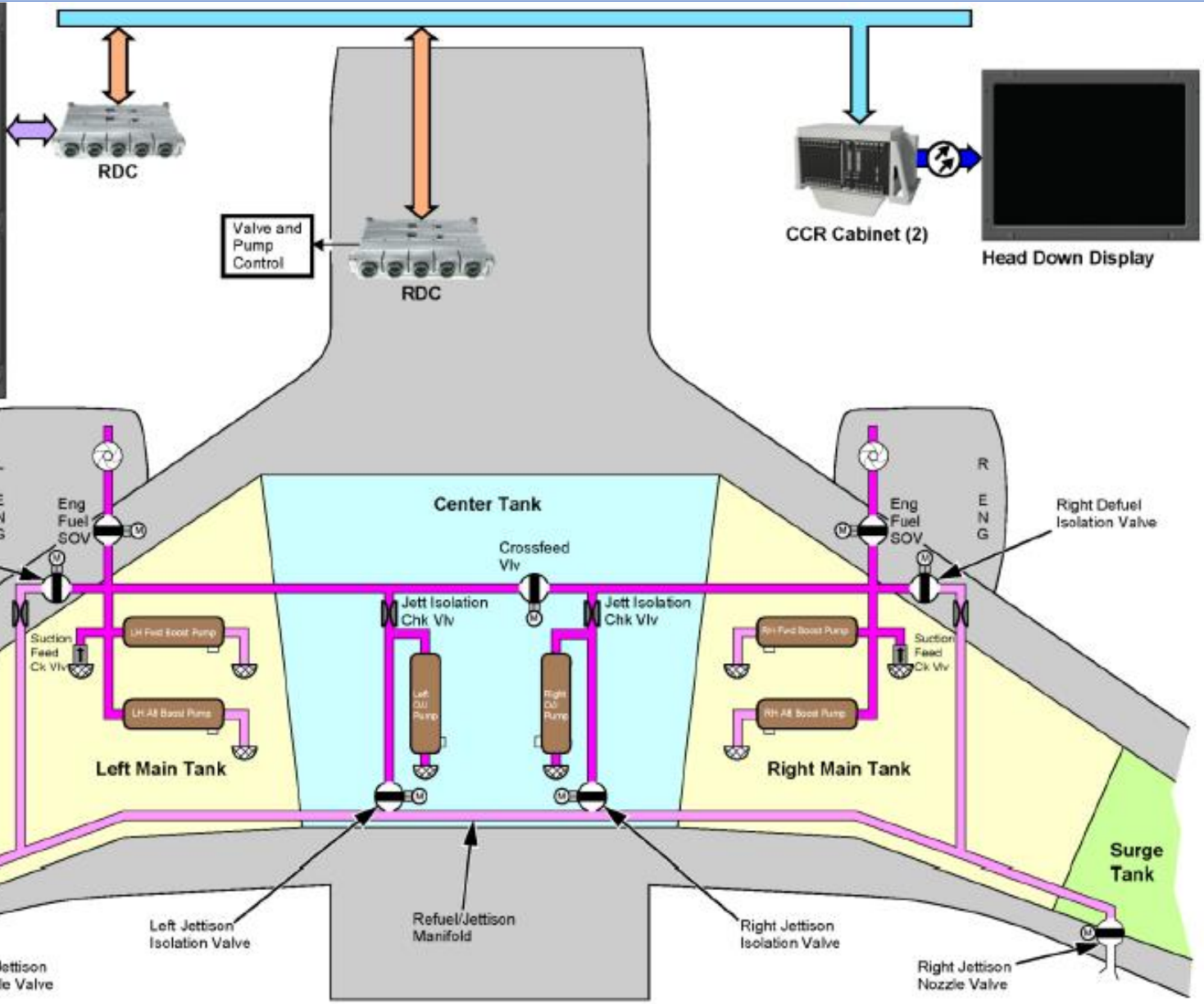
The override/jettison pumps send center tank fuel into the fuel feed manifolds. The fuel then goes through the jettison isolation valves and into the refuel/jettison manifold.

The fuel now goes overboard through the jettison nozzle valves. Fuel quantity and jettison time shows on EICAS and the fuel synoptic. The jettison system automatically stops at the airplane Maximum Landing Weight (MLW).

The flight crew can set the MLW up or down with the FUEL TO REMAIN switch.



Fuel Control Panel



Fuel System Controls

Controls on the fuel control panel include:

- Forward and aft boost pump switches for each main tank
- Crossfeed valve switch
- Left and right override/jettison pump switches for the center tank.
- Balance switch.

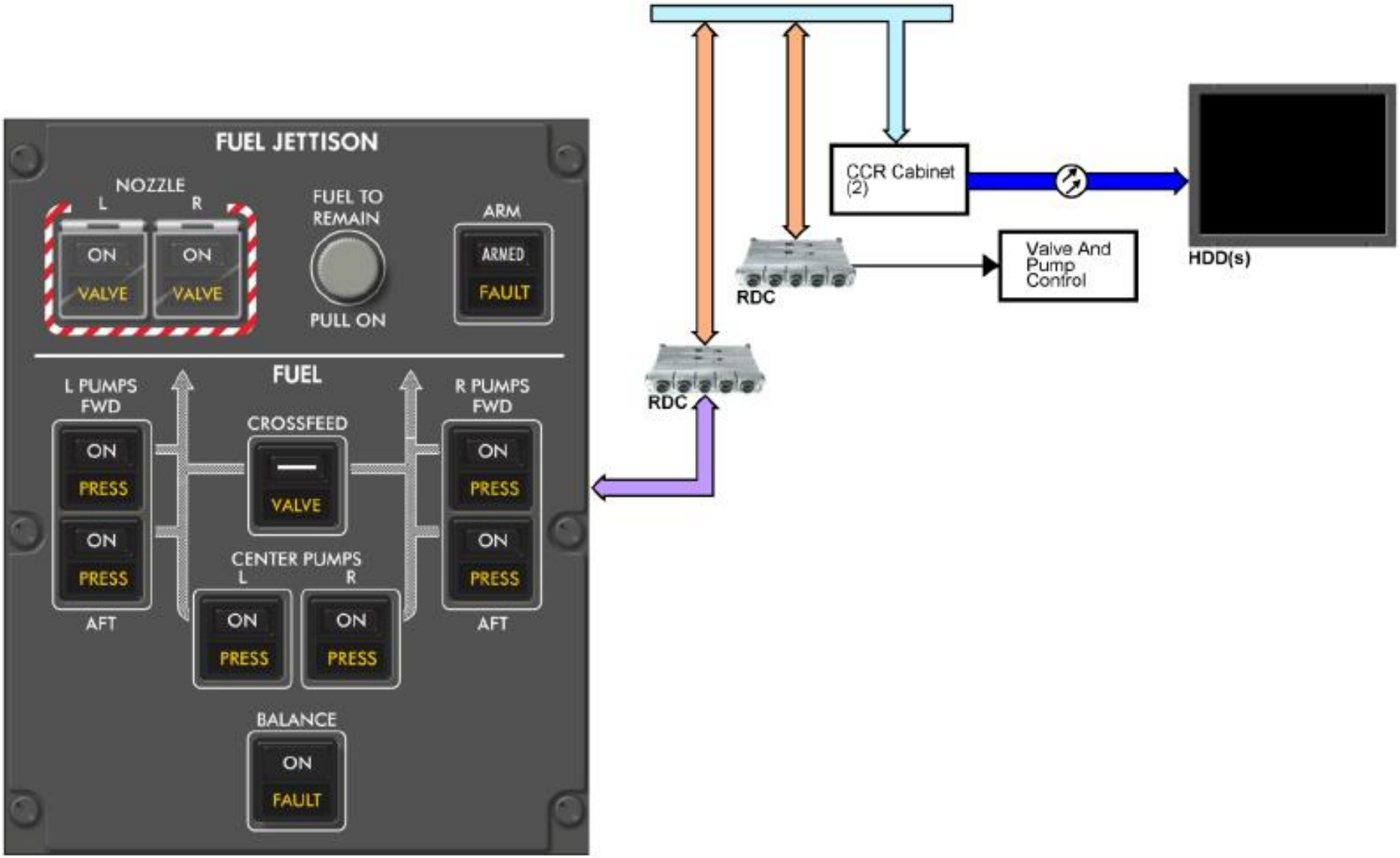
Fuel pump and crossfeed valve switch positions go through the Common Data Network (CDN) to the Fuel Quantity Management System (FQMS) application software in the Common Computing Resource (CCR) cabinets.

The FQMS controls the pumps and the crossfeed valve. It also monitors the pump pressure switches and valve positions. If there is a disagreement or fault, the FQMS turns on a light on the fuel control panel and sends fault data to the Common Core System (CCS).

Controls on the fuel jettison panel include:

- Left and right nozzle valve switches
- Fuel to remain selector
- ARM switch.

The FQMS monitors fuel jettison switch positions through the CDN and calculates the maximum landing weight and time to complete jettison.



Fuel Control Panel

Fuel Quantity Indicating System

The Fuel Quantity Indicating System (FQIS) measures fuel quantity, calculates fuel weight, and shows fuel weight.

There are two isolated sensor groups designated A and B. Using dual redundant FQIS components eliminates the need for fuel measuring sticks on the 787.

In each main tank there are:

- Fuel height sensors (14)
- Fuel height/temperature sensors (1)
- Fuel compensator sensors (1)
- Fuel density sensors (1).

The center tank has:

- Fuel height sensors (9)
- Fuel height/temperature sensors (1)
- Fuel compensator sensors (2).

There are also three Fuel Quantity Data Concentrators (FQDC) that provide the interface with the Common Data Network (CDN).

The signals go through the CDN to the Fuel Quantity Management System (FQMS) application software in the Common Computing Resource (CCR) cabinets.

The fuel height sensors supply a capacitance signal that is equal to fuel height at a specific location in a tank.

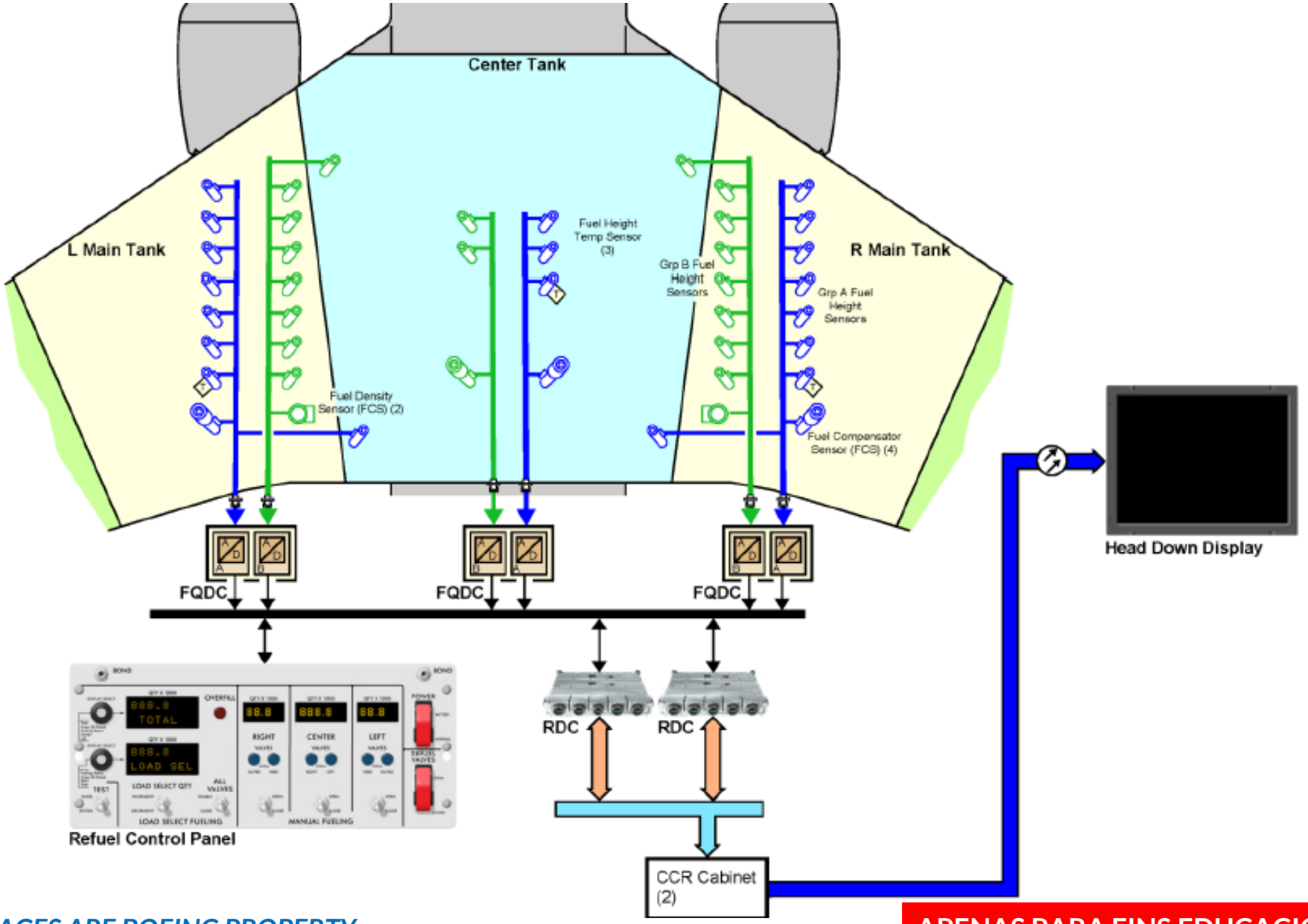
The fuel compensator sensors supply a capacitance signal that is proportional to fuel density.

The fuel density sensor is a vibrating element device that measures the fuel density. It is used only during refuel operations.

The fuel height/temperature sensors are resistive-type elements that supply temperature data.

The FQMS does these functions:

- Calculates total fuel weight
- Calculates fuel weight in each tank
- Monitors the fuel system for faults.



Fuel Quantity Indications

The fuel quantity indications are shown at the lower right of the EICAS display on the Head-Down Displays (HDD).

Normally in flight, the EICAS fuel display shows:

- Gross weight
- Total fuel
- Static Air Temperature (SAT)
- Fuel temperature.

The expanded fuel quantity indications are shown when:

- Airplane is on the ground with engines shut down
- Fuel configuration EICAS message displayed
- Fuel low EICAS messages displayed
- Fuel imbalance EICAS message displayed
- Crossfeed valve is open
- Balance system is in operation.

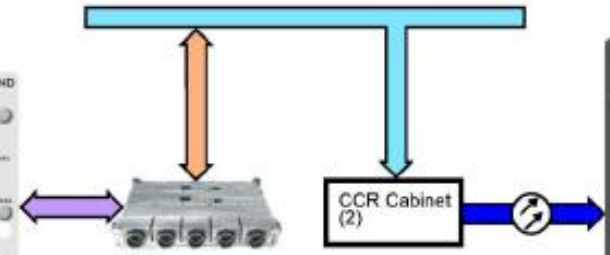
These fuel indications are shown on the synoptic display:

- Total fuel quantity
- Individual tank quantities
- Minimum fuel temperature
- Fuel temperature.

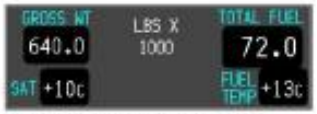
The Refuel Control Panel (RCP) shows:

- Total fuel quantity
- Load selected fuel quantity
- Individual tank quantities.

Refuel Control Panel (RCP)

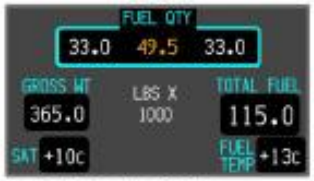


RDC



Normal Indication In Air

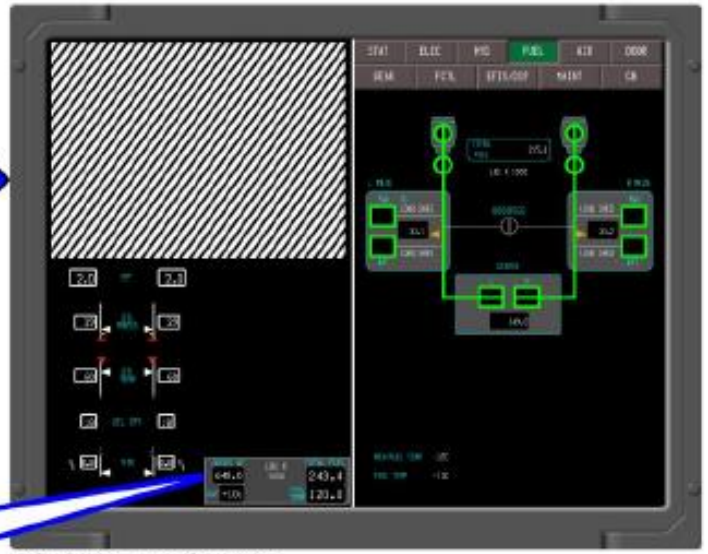
Normal Indication On Grid



Fuel In Center Tank

Fuel Imbalance

Low Fuel



EICAS and Fuel Synoptic