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INTRODUCTION

This chapter provides a general overview of the DC-3 Fuel System as well as normal operations and limitations.

GENERAL

FUEL TANKS

Fuel tank capacities:
Main (each) 210 gal.
Aux (each) 201 gal.

The fuel system for the Douglas DC-3 has a total capacity of 822 gallons consisting of two main tanks (210 gallons each) and two auxiliary tanks (201 gallons each). Each main tank normally supplies fuel to its respective engine. However, either engine may be operated with fuel supplied from any tank. The main fuel tanks are mounted between the front and center spars. The auxiliary fuel tanks are mounted directly behind the left and right main tanks respectively, between the center and rear spars. Each tank holds 5 gallons of unusable fuel for a total of 20 gallons of unusable fuel. Refueling is accomplished through filler necks recessed into the wing upper surfaces between each nacelle and the fuselage.



Main Tank Drain



Aux Tank Drain

Each tank is individually vented to the outside atmosphere through a port located on the lower wing surface. Each tank is also equipped with a sump drain that protrudes through the lower surfaces of the wing center section.

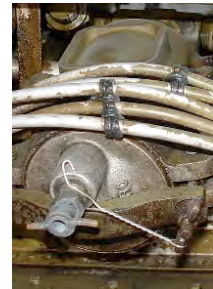
FUEL SELECTOR VALVES



Fuel Selector Valve

A 5-position engine Selector Valve allows each engine to be connected to either main tank, either auxiliary tank, or OFF. The Selector Valve controls are located on each side of the control pedestal.

FUEL STRAINERS



Right C-3 Fuel Strainer

Each engine fuel system is equipped with a C-3 type strainer and drain located on the inboard side of the wheel well. This strainer removes foreign matter from the fuel and acts as a water trap.

BOOST PUMPS

Each engine is equipped with an electrically operated vane-type single speed fuel boost pump. These pumps are controlled from the cockpit by switches on the right overhead switch panel.

CHECK VALVE

The main engine fuel line has a check valve on the outlet side of the strainer to prevent pressurized fuel from returning to the pump.

ENGINE DRIVEN FUEL PUMP

An engine driven fuel pump is mounted on each engine accessory section. This pump maintains fuel pressure necessary for engine operations. It also has a bypass that permits the fuel boost pump to supply fuel to the engine for starting or to supply fuel for engine operation if the engine driven fuel pump fails.

CARBURETOR

(See also the Powerplant Chapter of this manual)

A vapor vent return line at the carburetor inlet returns vapor in the line and a small amount of fuel to the respective main tank. For this reason, it is always desirable to takeoff and land using the main tanks, and to be sure that there is always space available in the main tanks for this fuel.

PRIMER

A single pole double throw switch is located on the overhead console for controlling the primer of each engine. This switch operates a solenoid valve mounted on the inlet side of each carburetor. The valve allows fuel to flow directly to the primer nozzle. The primer nozzle is directed into the carburetor blower section. In order for the primer to function, DC power must be available to the DC bus and fuel pressure must be available from any source, including the respective engine driven fuel pump.

FUEL QUANTITY INDICATOR



Fuel Quantity Indicator

The fuel quantity gauge and selector knobs are located on the First Officer's instrument panel.

The fuel quantity gauge indicates the fuel quantity in the selected tank in gallons. This gauge requires DC bus power to operate. Each fuel tank quantity may be checked by rotating the selector knob. Use caution as the knob should only be rotated clockwise.

FUEL MEASURING STICK



Fuel Measuring Stick



Fuel Stick in use

A fuel measuring stick is located in the aft cargo compartment and should be used in accordance with the preflight checklist to verify tank gauge accuracy.

FUEL PRESSURE GAUGE



Fuel Pressure Gauge

A dual indicating gauge on the center instrument panel indicates fuel pressure existing at the carburetor inlet of each engine.

FUEL PRESSURE WARNING LIGHT



Left Engine Warning Lights

An amber warning light for each fuel system is mounted in the engine warning light cluster and is operated by a pressure switch connected to the pressure gauge line in each nacelle. The pressure switch is set to illuminate the light when the fuel pressure is less than 10 psi.

OPERATION

FUEL LOADING

During all operations including balancing and draining fuel, the aux tanks should contain minimal fuel unless both main tanks are full.

MINIMUM FUEL FOR TAKEOFF

The minimum fuel for takeoff is 130 gallons. Fuel should be evenly distributed between the left and right main tanks. Normal fuel consumption for taxi and run-up is 10 gallons.

USE OF BOOST PUMPS

The boost pumps should be used for the following conditions:

- Starting engines.
- Indication of fuel pressure fluctuation.
- Engine driven fuel pump failure.
- Takeoff and landing.
- Switching tanks in flight.

CAUTION

Boost pumps should not be operated when it is known or suspected that a leaking or broken fuel line exists.

FUEL USAGE PROCEDURES

The selection and changing of fuel tanks in flight is the mutual responsibility of both pilots. The Captain is responsible for operation of the tank selector controls and the First Officer is responsible for monitoring the quantities of fuel in the tanks. When either pilot notices that fuel is getting low in a tank being used, he shall advise the other pilot.

Switching fuel tanks shall be coordinated between both pilots.

The normal sequence for fuel usage is as follows:

- Takeoff and landing shall be made with each engine on its respective main tank.
- When cruising altitude has been reached and the total fuel load in each main tank is less than 160 gallons, use fuel out of the auxiliary tanks first, then utilize the main tanks.

EMERGENCY PROCEDURE FOR USING ALL FUEL IN ANY TANK

If it becomes necessary to use all fuel in any tank, use the following procedure:

- Place Mixture Control to - EMER RICH.
- Turn ON respective Fuel Boost Pump.
- Operate engine until fuel pressure fluctuates and a drop in pressure is noted.
- Switch tank selector to a tank containing fuel.
- After engine operation has stabilized, turn off Fuel Boost Pump.
- Place Mixture Control to - AUTO RICH.

NOTE: *A loss in power will not normally be noticed. However, use of the boost pump may be necessary to aid fuel flow.*

Maximum Endurance

Setting a power setting which yields the following indicated airspeeds will provide maximum endurance with the remaining fuel on board.

<u>WEIGHT (LBS)</u>	<u>KIAS</u>
22,000	80
24,000	83
25,200	85

Notes for maximum endurance:

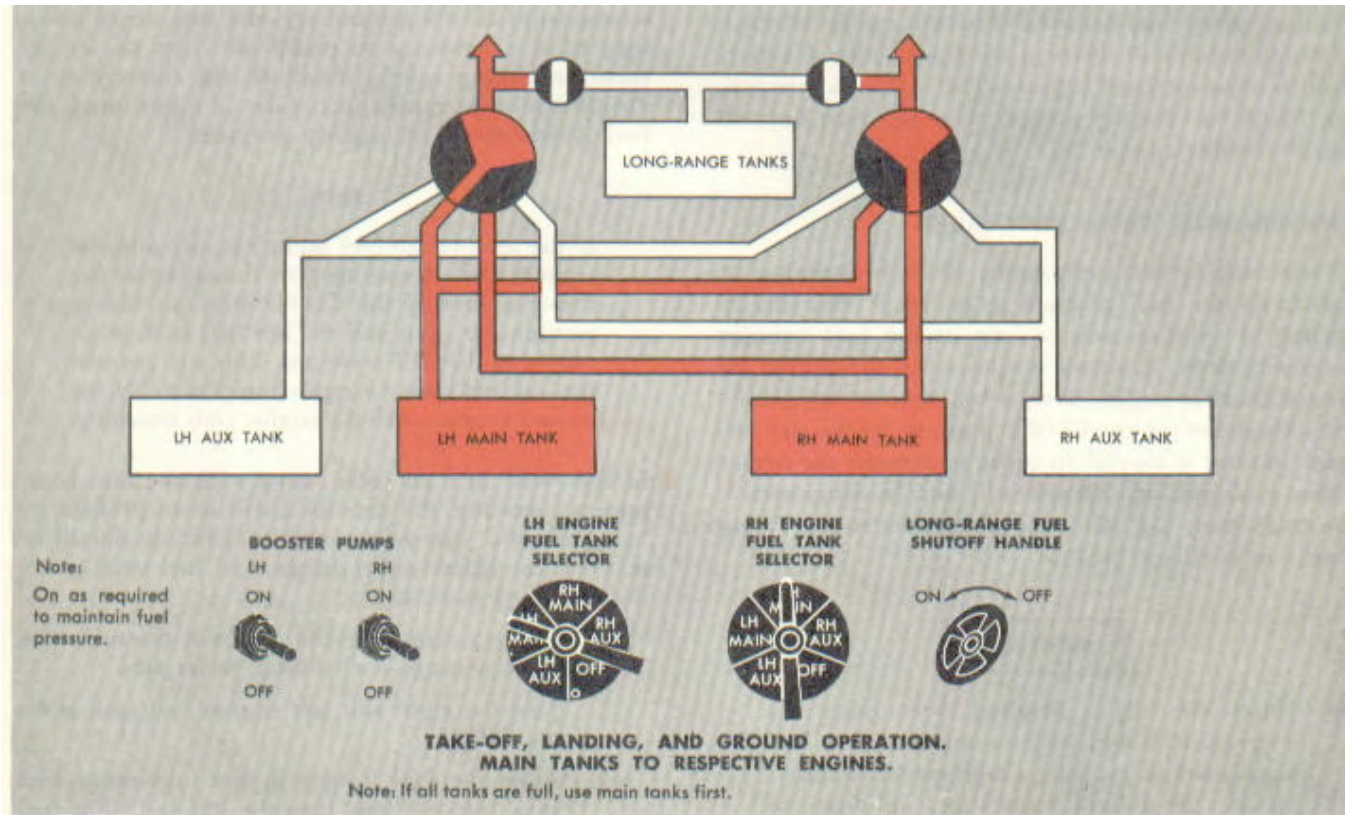
- Fly at the lowest possible altitude.
- Set power to obtain the desired airspeed as indicated by the chart above.
- Check gear and flaps up.
- Keep cowl flaps closed (consistent with adequate cooling).
- Keep airplane trimmed.
- In the event of turbulence or other weather considerations, increase airspeed as necessary to maintain adequate control.

LIMITATIONS

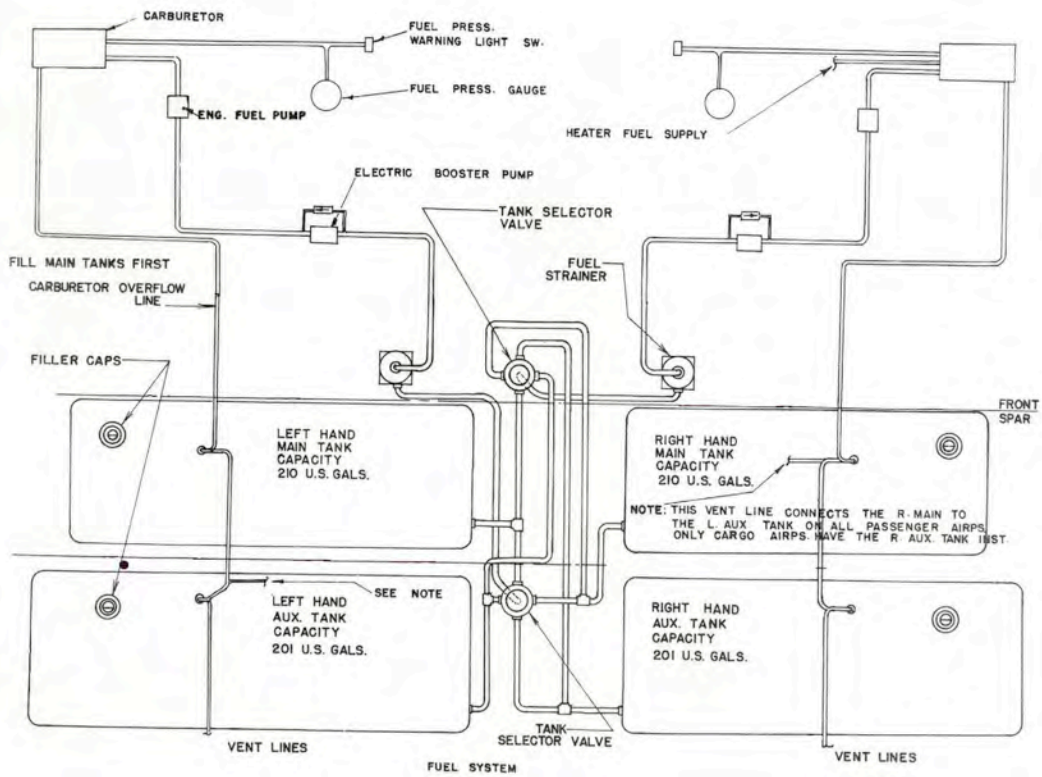
Minimum fuel rating	100 octane
Minimum fuel for takeoff	130 gallons
Unusable fuel	20 gallons
Normal fuel pressure	14 - 16 psi
Normal boost pump pressure	14 - 16 psi
Fuel pressure warning light	10 psi

Do not operate both engines on any one tank containing 50 gallons or less of fuel.

Do not operate an engine from any tank containing less than 20 gallons except in an emergency.



DC-3 Fuel Tank Selector



Fuel System Schematic

———— End of Chapter ————