

A.P. 4347 G.G. H. N.

CHAPTER 4

REPLENISHING

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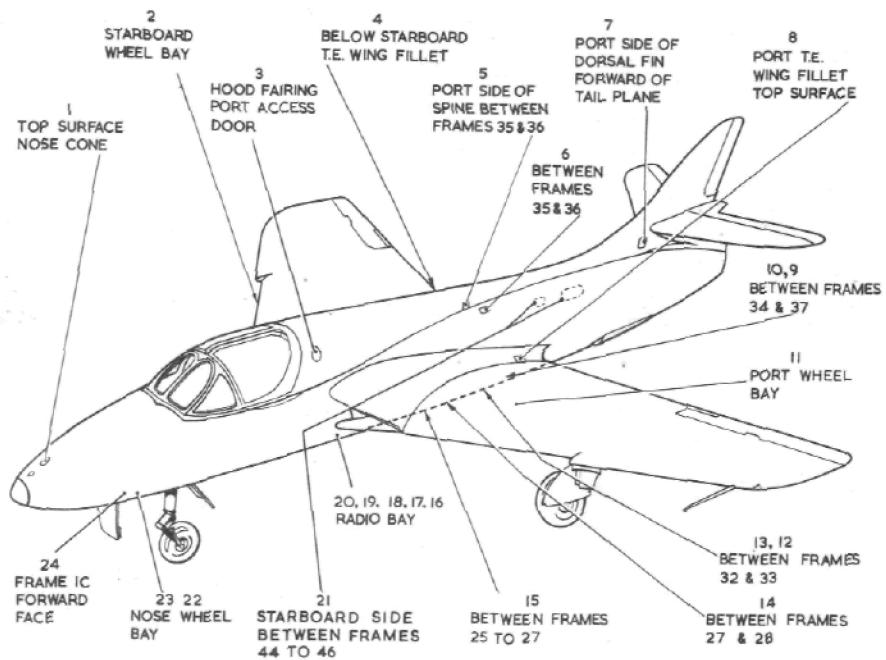
## Refuelling

1. The aircraft is refuelled under pressure through a  $1\frac{1}{2}$  in. standard coupling in the port wheel bay. The system may be refuelled at the rate of 150 gal/min at a pressure of 45 to 50 lb/in<sup>2</sup> using a high-pressure refueller but any other pressure refueller may be used with an adapter hose. The procedure is as follows :-

- ◀ (1) Earth the refueller and connect the hose bonding to the aircraft structure.
- (2) Ensure that the de-fuelling cock, accessible through the engine access door in the bottom of the fuselage, is turned OFF and secured by the locking plate.
- (3) Ensure that the LP cock in the cabin is OFF.
- (4) Remove the sealing cap from the refuelling coupling in the port wheel bay and connect up the refueller hose in its place.
- (5) Start the refueller pump and set the refueller control to REFUEL.
- (6) Pre Mod.1381 aircraft - If using the internal power supply set the battery master switch to ON. If using an external power supply ensure that the switch is set to OFF.

Post Mod.1381 aircraft - Set the battery master switch to OFF whether using the internal or an external power supply.

- (7) Set the time switch in the port wheel bay to ON. The refuelling valves will automatically close when the tanks are full and the refuelling system will cease to operate. Ensure that, after 50 to 100 gallons have passed into the aircraft, air escapes through the pressure relief valves in the underside of the stub wings (especially when icy conditions prevail).



1 CAMERA GUN	14 FUEL SYSTEM DRAIN VALVES (2)
2 CHARGING CONNECTION-AILERON ACCUMULATOR	15 FUEL SYSTEM DE-FUELLING COCK, ENGINE STARTER & CARTRIDGES
3 CABIN HOOD ACCUMULATOR	16 FUEL SYSTEM DRAIN VALVES (2)
4 ENGINE OIL SUMP FILLER	17 EXTERNAL ELECTRIC SUPPLY SOCKET
5 EXTERNAL AIR CONNECTION-FUEL SYSTEM	18 BATTERIES
6 COLD AIR UNIT DIPSTICK	19 CHARGING CONNECTION-EMERGENCY AIR BOTTLES
7 CHARGING CONNECTION-ELEVATOR ACCUMULATOR	20 CHARGING CONNECTION-OXYGEN CYLINDERS
8 HYDRAULIC RESERVOIR FILLER	21 FUEL FILTER DE-ICING TANK FILLER CONNECTION & CONTENTS INDICATOR
9 ENGINE FUEL FILTER	22 EXTERNAL HOOD SWITCH
10 HYDRAULIC HANDPUMP	23 CHARGING CONNECTION-WHEEL BRAKES ACCUMULATORS
11 RE-FUELLING AND DE-FUELLING COUPLING	24 GROUND PRESSURISING CONNECTION
12 ACCESSORIES GEARBOX FILLER	
13 HYDRAULIC EXTERNAL SUPPLY VALVES	

Fig. 1 Replenishing diagram

KEY TO FIG. 1 (REPLENISHING DIAGRAM)

### Fuel data

Store	Item	J-S designation and NATO Code No.	Capacity	Pressure (lb/in <sup>2</sup> )	Para
Approved Fuels	11	Avtur/FSII F-34 or Avtag/FSII F-40	-	45-50	1

Both fuels contain AL-38 (99% FS11 (AL-31) and 1% Hitec E515 (lubricity agent)). If either fuel is from non-RAF sources Note (1) applies.

Emergency Substitute  
Fuels Avtur F-35  
or  
Avcat F-44

Neither of these fuels contain FSII or Hitec E515. Note (1) applies to each.

F-42

French equivalent to F-44 but contains FSII. Note (1) applies.

Note. . . .

(1) (a) F-34 and F-40 from non-RAF sources and F-42 contain FSII but not Hitec E515.

(b) AVCAT and F-35 contain neither FSII nor Hitec E515.

(c) A maximum of one flight only without Hitec E515 is permitted unless arrangements are made to blend in AL-38 when no restriction applies. The double-dosing with FSII is permissible where it occurs.

(d) All uplifts of fuel not containing AL-38 are to be annotated in the F-700.

Oil (engine)	4	OX-38 0-149	17 pints (approx.)	-	-
(gearbox)	12	OX-38 0-149	2.5 pints	-	-
(cold air unit)	6	OX-38 0-149	-	-	16

◀ KEY TO FIG. 1 (REPLENISHING DIAGRAM) (continued)

Store	Item	J-S designation and NATO Code No.	Capacity	Pressure (lb/in <sup>2</sup> )	Para
Hydraulic fluid (system)	8	OM-15 H-515	-	3000	4
(legs, main)	-	OM-15 H-515	-	1500±50	-
(leg, nose)	-	OM-15 H-515	-	2000±50	-
Fuel filter de- icing fluid	21	AL-8 S-738	1 gal	-	15
Air					
Aileron acc	2	-	Pre Mod. 690	1575	6
		-	Post Mod. 690	900	6
Elevator acc	7	-	-	1575	7
Brake acc	23	-	-	750	5
Al. gear (emerg)	19	-	-	1800-2000	8
Flaps (emerg)	19	-	-	1800-2000	8
Anti-g	19	-	-	1800-2000	8
Cabin hood accumulator	3	-	-	1575	8
Oxygen	20	-	-	1800	-
Silica gel	-	-	-	-	11
Starter cartridges, Type 10, Mk.3, 720 gramme	15	-	3	-	-
Ammunition	-	30 mm	150 rounds	-	13

## ◆ Note . . .

If a low pressure refueller is being employed, refuelling may take longer than 8 minutes and this will necessitate switching on the time switch for a second cycle.

- (8) When refuelling is completed, total the fuel contents by adding the amount put in (as recorded on the refueller gauges) to the amount remaining after the previous flight (as recorded in the F.700).
- (9) Remove the refuelling equipment and replace the sealing cap on the refuelling coupling.
- (10) Switch OFF the time switch if it has not run a full cycle and switch OFF the battery master switch if using the internal power supply.

## Defuelling

2. The aircraft is defuelled through the refuelling coupling in the port wheel bay, being either sucked out by a refueller or pumped out by the aircraft booster pumps. An air pressure supply is required, during defuelling, to transfer the fuel from the drop tanks, wing tanks and rear tanks to the front tanks from which it is sucked or pumped. The air supply, which must not exceed 120 lb/in<sup>2</sup>, is fed into the system from an external supply connection accessible through a panel in the spine of the centre fuselage. The procedure for defuelling the aircraft is as follows:-

- (1) Earth the refueller and connect the hose bonding to the aircraft structure.
- (2) Remove the sealing cap from the refuelling coupling in the port wheel bay and connect the refueller hose in its place.
- (3) Connect an external air supply to the external air pressurisation connection in the spine of the centre fuselage (fig.1, item 5). Apply a pressure of 10 lb/in<sup>2</sup>. (A cabin pressurisation test rig is usually used for this purpose after setting it to the required pressure).
- (4) Set the refueller control to DEFUEL.
- (5) Turn the LP fuel cock to OFF.
- (6) Connect an external electrical power supply or set the battery master switch to ON.

- ◀(7) Set the engine master switch to ON.
- (8) Turn the defuelling cock to ON (the cock is accessible through the engine starter access door in the bottom of the fuselage aft of the main spar frame).
- (9) Start the refueller to draw out fuel. When the refueller starts to suck air, switch on the booster pumps to ensure that all fuel is removed. When the refueller again starts to suck air, switch off the booster pumps and stop the refueller.
- (10) Set the battery master and engine master switches to OFF (the battery master switch should already be OFF if an external power supply has been used).
- (11) Disconnect the external power supply, if used.
- (12) Turn OFF the defuelling cock and engage the lever of the cock with the locking plate. Secure the locking plate with the locking pin.
- (13) Disconnect the defuelling equipment and refit the sealing caps on the refuelling coupling and the air pressurisation connection in the spine.

#### Draining water from fuel system

3. Drain valves are provided at the lowest points of the fuel system, together with a small plug in the engine fuel filter casing. These are used to drain off a few pints of fuel and any water that may have accumulated. The positions of these valves are indicated in fig.1, items 14 and 16. To use the valves, remove the sealing caps and insert a suitable length and diameter of hose into each valve in turn. Inserting the hose pushes open a spring-loaded valve. When drainage of water is complete, remove the hose, replace the sealing caps and secure the access doors.

### Filling hydraulic reservoir

4. If, with the aircraft standing on its wheels, the hydraulic accumulators charged with air but no oil pressure and the landing flaps and air brake up, the fluid level no longer overlaps the white background below the sight glass, the reservoir must be topped up; to do this, remove the filler cap slowly to release any built-up pressure and pour in fluid until it reaches the top of the filler neck.

### Charging hydraulic accumulators

5. The brake accumulator pressure gauge is mounted on the port shelf in the cabin. Before checking the air pressure or charging the system the wheels must be chocked and the hydraulic pressure dissipated by operating the brakes several times.

6. The accumulator for the aileron power-operated controls is checked by exhausting the hydraulic system pressure in the circuit, reading the pressure on the pressure gauge and if necessary charging to the correct pressure.

7. The elevator accumulator pressure is checked and charged in the same way as the aileron accumulator.

8. The accumulator for the emergency operation of the hood is located in the hood fairing (fig.1, item 3); an in-situ charging valve and pressure gauge is located in the radio bay (fig.1, item 19). Prior to recharging, dissipate the pressure by repeatedly operating the hood.

### Charging air bottles

9. The emergency air bottles for the alighting gear and flaps and the anti-g system air bottles are charged simultaneously at the charging point indicated on fig.1. The three air pressure gauges are in the cabin. If the emergency air system is used it is necessary to bleed the hydraulic system before the aircraft is again serviceable.

### ► Main Undercarriage

10. Recuperators are fitted to the main oleo legs; with the hydraulic system pressure normal and with the weight of the aircraft on its wheels the dimension between the centres of the upper and lower torque link pins should not be less than 10 in., otherwise the leg will require servicing. In tropical heat this dimension should not be exceeded as the undercarriage and armament safety switch would become inoperative.

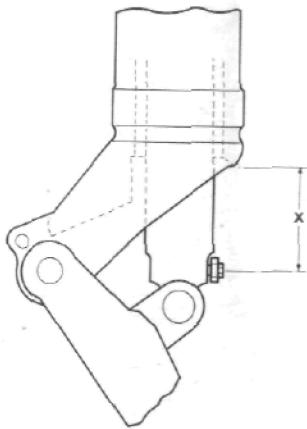


Fig.2 Nose undercarriage extension

#### Nose Undercarriage

11. With the weight of the aircraft on its wheels the dimension X, fig.2, should be at least 3.4 in., otherwise servicing is required.

#### ◆ Air drier, windscreens

12. Two silica gel containers, one for each windscreens panel, are located beneath a cover marked 'JB 2' just aft of the base of the windscreens panels. The crystals can be examined for colour through the 3/8 in. holes in the cover using a bright torch light and should be changed when they turn pink. The cover is secured by two winged fasteners (wired together) and must be removed for access. Disconnect the rubber tubes from the containers and blank the open ends of the tubes immediately to prevent the ingress of moisture to the windscreens dry-air sandwich. Remove the blanks immediately before re-connecting the tubes.

#### Triple-breech turbo starter

13. A stowage for 3 cartridges is provided on the inside of the starter access panel in the bottom of the fuselage. Before loading the starter check that each cartridge is of the correct type (fig.1). Examine each cartridge and reject it if it has a damaged case, flange or lip of the sealing cap. Invert each cartridge and shake it gently; if loose black granules drop into the sealing cap, reject the cartridge.

## 14. Loading a cartridge:-

- (1) Ensure that the engine master switch is OFF.
- (2) Press the button in the star wheel of the breech cap and unscrew the cap until its ratchet disengages.
- (3) Release the button, then fully unscrew and withdraw the breech cap.
- (4) Assemble a cartridge into the breech cap, ensuring that the rim of the cartridge casing is gripped by the two spring-loaded claws in the cap, then insert the assembly into the breech and screw the cap into position; the ratchet will then engage, indicated by clicking as the cap is screwed home. Screw to finger-tightness only, this is important to prevent jamming.

## 15. Unloading a cartridge:-

To remove a cartridge from the starter, unscrew the breech cap as described above and withdraw the cap and cartridge assembly, ensuring that the metal grid in the end of the spent cartridge is removed with the case. Remove the cartridge from the cap by depressing the two small plungers in the breech cap, to lift the two spring-loaded claws which grip the rim of the cartridge casing, and withdraw the cartridge.

## ◀ Drop tanks

## 16. Special tools and equipment are required to fit the drop tanks.

## Fuel filter de-icing tank (pre Mod.1396 aircraft)

## 17. Check the indicator (fig.1, item 21). A pointer on the indicator shows FULL or USED; if used is shown, replenish the tank as follows:-

- (1) Remove the blanks from the two self-sealing couplings and connect a replenishing can to the larger coupling.
- (2) Connect a short length of hose to the smaller coupling.

Oxygen system

18. Access to the charging valve is obtained via the radio access doors (pre Mod.745) or by removing a panel at the rear of the gun bay access panel (post Mod.745). The cylinders may be charged in situ to the pressure stipulated in the Key to fig.1.►

Engine oil

19. The oil level in the sump is indicated by a graduated sight glass window in the sump wall.

Cold air unit

20. Pour oil through the dipstick orifice in small quantities, otherwise a false level will be indicated on the dipstick.



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