Chapter 4

REPLENISHING

WARNING ...

Before leaning into, or entering, the cockpit, refer to the LETHAL WARNING card at the beginning of this book.

ALIGHTING GEAR

Nose-wheel shock absorber

1. Use the pressure/extension graph (fig.1) to check serviceability. Jacking is not necessary; simply measure the strut extension and the shock-absorber pressure after first rocking the aircraft to ensure correct static positioning. For pressure checking use standard inflation adapter Ref. No. 4G/6246 and pressure gauge Ref. No. 4G/3029.

Main-wheel shock absorber

2. As in the case of the nose-wheel shock absorber, use the appropriate pressure/extension graph (fig. 2) to check serviceability. After rocking the aircraft measure the strut extension and the shock-absorber pressure. Alternatively, if the aircraft all-up weight is known, it is necessary only to measure the shock-absorber extension and check it against fig. 3. For pressure checking, use the standard adapter and pressure gauge (para.1).

3. Charging and inflating the shock absorbers necessitates complete jacking and trestlingof the aircraft an operation which can be performed only with the aid of special-to-type adapter equipment not carried aboard the aircraft.

ANTI-G SYSTEM

947

4. This is automatically charged by the engine compressor.

FUEL SYSTEM

Pressure refuelling

Note...

1. Before commencing, ensure that a serviceable battery is installed in the aircraft.

2. Before refuelling, set the battery and flight refuelling switches to 'ON' and 'FL.REFUEL' respectively, for 30 seconds, to depressurize the ventral pack and main-plane tanks.







53-2030-1

Fig. 1. Nose undercarriage shock-absorber pressure and extension

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3: The contents of the main tanks and ventral pack are indicated on the cockpit gauges. The contents of the flap tanks are indicated as an addition to the main tank contents by depressing the FUEL CONTENTS - T/E TANK switch on the starboard console.

5. The pressure refuelling connection is on the port side of the fuselage behind access panel 63P (fig.4). Take the customary precautions in regard to earthing.

To refuel: -

(1) Open access panel 63P and connect the tanker bonding lead to the earth point, ensuring that the tanker is earthed.

(2) Connect the tanker hose to the refuelling adapter.

(3) Commence refuelling; delivery pressure must not exceed 50 $\rm lb/in^2$ or fall below 35 $\rm lb/in^2$.

(4) Stop delivery when all five coloured indicator lights above the refuelling access panel are extinguished.

(5) Close the tanker delivery cock, disconnect the hose and bonding lead, refit the refuelling-adapter cap and close the access panel.

(6) Check that the 'tank full' indicator lights remain extinguished.

 $\mathfrak{P}_{+}^{\mathfrak{P}}$ (7) If it is required to check the tanks contents gauges, connect external a.c. and d.c. power supplies to the aircraft and set the instrument master switch 'ON'.

Gravity refuelling

6. This provision is for use only when pressure refuelling facilities are not available; it is not possible to fill the tanks completely as the fillers are below capacity level. Refuel through the main tank fillers (access panels 97P and 97S in the upper surface of the main planes).

Defuelling

7. The aircraft is defuelled by applying suction at the refuelling adapter (access panel 63P) using a tanker on which the cocks have been set to permit flow from the aircraft to the tanker. Depression must not be allowed to exceed 11 lb/in² and all d.c. electrical supplies must be disconnected and the engine H.P. cocks closed. The tanks may be defuelled individually or in similar pairs by appropriate selections (*Table 1*) of the two defuelling cocks (*fig. 5*).

8. Access to the cocks is through panels in access panels 99P and 99S. These panels can be fitted only when the cocks are at NORMAL, i.e. in the flight position; with the panels in position the cocks are locked.





RESTRICTED

HYDRAULIC SYSTEMS

Fluid reservoirs

9. There are four reservoirs; three (including the auxiliary reservoir) for the 'services' and 'No.1 controls' systems are situated on the port side of the aircraft and one, for the 'No.2 controls' system, on the starboard side. Access to the refilling points is shown in fig.4 and 5 respectively. A common air-charging and release valve is located behind access panel 63P.

TABLE 1

Defuelling cock settings

TANK TO BE DEFUELLED		PORT DEFUELLING COCK	STAR BOARD DEFUELLING COCK		
MAIN	PORT	defuel main tank	isolate wing tanks defuel main tank defuel main tank		
LEADING	STARBOARD	isolate wing tanks			
EDGE	BOTH	defuel main tank			
FLAP	PORT	normal	isolate wing tanks		
TANKS	STARBOARD	isolate wing tanks	normal		
	BOTH	normal	normal		
VENTRAL		isolate wing	isolate wing		
PACK		tanks	tanks		





RESTRICTED

Lightning Mk. 53 - G.H.N., Chap. 4

10. To replenish the reservoirs the alighting gear must be selected DOWN, the flaps UP, the airbrakes IN, the canopy CLOSED, and the alighting gear emergency lowering system and TAIL CHUTE handles unoperated with the brake parachute compartment doors closed. Connect a d.c. ground supply trolley Ref.No. 4F/3761. Release the hydraulic pressure from all accumulators by:-

(1) Operating the aileron and tail-plane controls until surface movement ceases (the rate of control movement not to exceed one stroke between stops per five seconds).

(2) Alternately applying and releasing the brakes until the gauge registers zero.

(3) Applying fingertip pressure to deflect the control column slightly backward and switching 'feel' ON and OFF. Continue to do this until the slight pulsations felt in the control column cease altogether.

11. Fit overflow pipe Ref. No. 26DK/95368 to each reservoir oil relief valve drain outlet. Attach fluid dispenser Ref. No. 26DK/95191 to each oil-filling connection in turn and fill until fluid begins to flow from the associated relief valve overflow pipe. Remove the overflow pipe, disconnect the fluid dispenser, refit the coupling caps, and refit the access panels.

HYDRAULIC SYSTEM ACCUMULATORS

12. Exhaust all hydraulic pressure in the accumulators (*para.11*) before reading the pressure gauges (*fig.4 and 5*). To recharge, remove the associated panel, fit standard inflation adapter Ref. No. 4G/6246 with, in all cases except that of the feel-unit accumulator, 3500 lb/in^2 pressure gauge Ref. No. 4G/3029. For checking the feel-unit accumulator use the 0-600 lb/in² gauge, Ref. No. 4G/3026. Refer to Table 2 for access and pressure details.

13. Connect the hose of nitrogen-charging trolley Ref. No. 4G/4272 to the adapter and charge according to Table 2. Disconnect the charging equipment and refit all blanking caps and access panels.

AIR CONDITIONING SYSTEM

14. This is automatically charged by the engine compressors.

OIL SYSTEMS

953

Checking engine sump oil levels

15. No. 1 engine filler sight glass is visible behind access panel 44S; No. 2 sight glass is behind panel 58S. It is important that the sumps be checked and if necessary refilled, after run-down of the turbines.



Fig. 4. Servicing points (1)

RESTRICTED

TABLE 2

ACCUMULATOR	CH ARG I NG ACCESS	PRESSURE LIMITS	PRESSURE (16/in ²) RELATED TO AMBLENT TEMP					
The The	PANEL		-26°C	-10°C	0°C	15°C	3000	50°C
Ailerons (No.l and 2 controls)	26 P	Stra Stra					and a	
Tail plane (No.1 controls)	76P							
Tail plane (No.2 controls	725	+ 50	1285	1370	1420	1500	1580	1680
Systems (front fuselage)	26 S	- 0	120 /	1110	1110	1,00	1 100	1000
Systems (rear fuselage)	66s _							
Wheel brakes	26 S	+ 50	1455	1550	1610	1700	1790	1905
Feel units	76S	+ 0 - 5	100	105	110	115	122	130

Hydraulic system accumulator nitrogen pressure

Refilling engine sumps

955

16. Use Mk. 1 fluid replenishing can, Ref.No. 4G/4864, attached to the self-sealing coupling. No.1 engine filler is behind access panel 46S and No.2 filler is behind panel 58S. Refer to Chapter 1 for oil specification.

Refilling accessory-drive gearbox

17. It is important that the sump be checked and, if necessary, replenished immediately following each turbine run-down. Check the level with the dipstick (access panel 108P). Remove the blank from the overflow union. Replenish, using Mk. 1 fluid replenishing can Ref. No. 4G/4864, until oil appears at the overflow. Remove the can, refit the filler cap, and refit and wire-lock the overflow blank. Refer to Chapter 1 for the oil specification.

Reheat pump oil reservoirs

18. Use Mk. 1 fluid replenishing can, Ref. No. 4G/4864, and fill the reservoirs until oil begins to flow from the associated skin drain. The reservoirs are filled through self-sealing couplings behind access panels 43P (No. 1 engine) and 110P (No. 2 engine). Refer to Chapter 1 for the oil specification.

ENGINE STARTER FUEL TANK

19. Access is by opening the hinged part of the spine fairing forward of



Fig.5.

Servicing points (2)

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No.2 engine hatch. During filling, vent the tank by depressing a springloaded plunger in the banjo bolt at the aft end of the tank (this action displaces the inward-vent valve from its seat). Refer to Chapter 1 for the fuel specification and capacity.

OXYGEN SYSTEM

WARNING ...

Liquid oxygen has a temperature of -183 deg C at atmospheric pressure. If it comes into contact with the skin it can cause a severe burn which must have immediate medical attention. Provided that normal precautions are observed, however, no danger needs ensue from its use. The precautions to be observed are described in A.P.4765A, Vol.1 and 6.

20. To replenish the container: -

Note...

The contents gauges can read up to approximately $\frac{1}{4}$ full when the system is empty, due to the presence of small quantities of water vapour in the container.

(1) Remove access panel 6P and the filler valve cap (it may be necessary to depress the manual vent valve to release the pressure in the system).

(2) Connect the hose of the replenishing trolley (Mk. 1, Ref. No. 71AA/1 or Mk. 2, Ref. No. 71AA/64) to the filler value.

(3) Following the procedure given on the trolley instruction plate, fill the system until the contents gauge pointer is in line with the dial cursor (between ¾ and 7/8 full) and disconnect the hose.

Note...

Filling beyond the cursor will result only in wastage of oxygen due to peculiarities of the system; the system will ultimately be filled to capacity after the following sequence of events has been noted:-

(a) No indication on the contents gauge of any increase for approximately 2½ minutes after replenishment begins, but continuous venting from the filler vent. Afterwards, a steady increase up to the moment of disconnection.

(b) After disconnection, a rapid increase to above 7/8 full.

(c) A static period lasting 1 minute during which no change of condition is observed.

(d) A rapid rise in contents gauge indication to beyond the F graduation with a similar rapid increase in regulator pressure gauge indi-

cation to 230 lb/in², accompanied by gaseous oxygen venting through the nose-wheel bay.

(e) A fall in regulator pressure to $200 \ lb/in^2$ and an F reading on the contents gauge.

DE-ICING SYSTEMS

21. Engine and air-intake de-icing systems are operated by enginecompressor air and Spraymat electrical heaters respectively, and are jointly selected by the DE-ICE/RAIN DISP. switch in the cockpit.

WARNING

The DE-ICE/RAIN DISP. switch must not be selected to DE-ICE when the engines are not running and a ground a.c. supply is connected. Failure to observe this warning could result in serious damage to the Spraymat heaters.