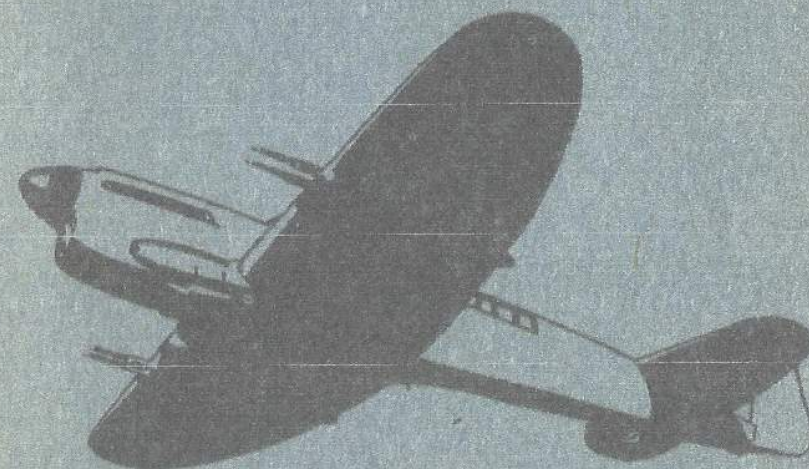


PILOT'S NOTES

FOR

FIREFLY

F.Mk.I. FR.Mk.I. NF.Mk.I. NF.Mk.II
GRIFFON II OR XII ENGINE



PROMULGATED BY ORDER OF THE AIR COUNCIL

W. S. Kearse

AMENDMENTS

Amendment lists will be issued as necessary and will be gummed for affixing to the inside back cover of these notes.

Each amendment list will include all current amendments and will, where applicable, be accompanied by gummed slips for sticking in the appropriate places in the text.

Incorporation of an amendment list must be certified by inserting date of incorporation and initials below.

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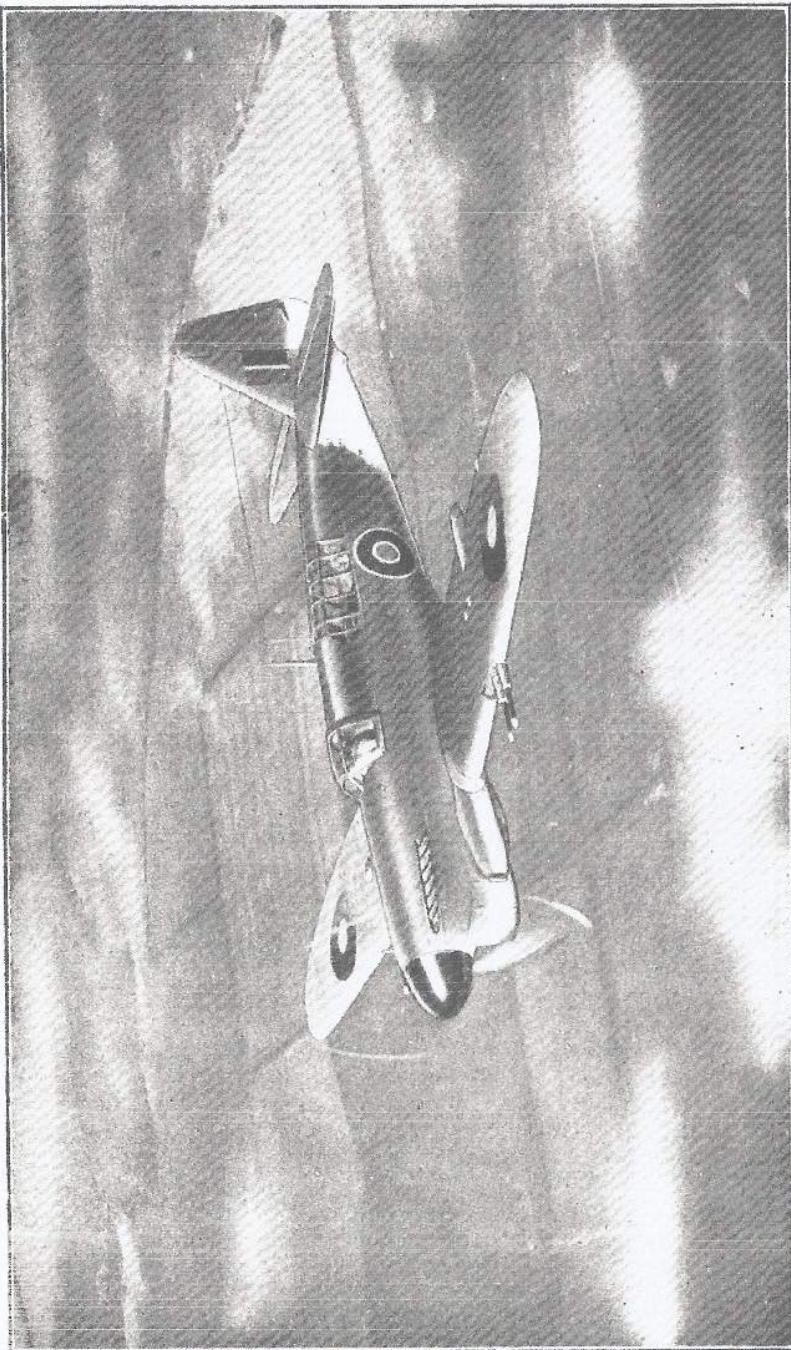
A.L. 5
Notes to
Users.

NOTES TO USERS

These Notes are complementary to A.P. 2095 Pilot's Notes General, and assume a thorough knowledge of its contents. All pilots should be in possession of a copy of A.P. 2095 (See A.F.O. 3789/48).

Additional copies may be obtained from Head of Military Branch (Books), Admiralty Block C, Station Approach Buildings, Kidbrooke, by application on Royal Navy Form S134D or D397. The number of the publication must be quoted in full—A.P. 2102 A & B—P.N.

Comments and suggestions should be forwarded through the usual channels to the Admiralty (D.A.W.).



FIREFLY F. MK. I.

AIR MINISTRY
August 1945

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Pilot's Notes

2nd Edition (cancels edition dated Feb. 1944)

FIREFLY

F. Mk. I, FR. Mk. I, NF. Mk. I & NF. Mk. II

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PART I

DESCRIPTIVE

INTRODUCTION

1. Firefly aircraft are Naval two-seat, low-wing monoplanes powered by a single Griffon II or XII engine driving a Rotol 3-bladed propeller.
The F. Mk. I is designed for fighting and reconnaissance duties, the NF. Mk. II for night fighting and radar interception, while the FR. Mk. I and the NF. Mk. I are variants of the F. Mk. I.
The aircraft can operate from the deck of an aircraft carrier, provision being made for assisted take-offs and deck landings. The main planes can be folded by hand for stowage below deck.

FUEL, OIL AND COOLANT SYSTEMS

2. Fuel tanks and cock

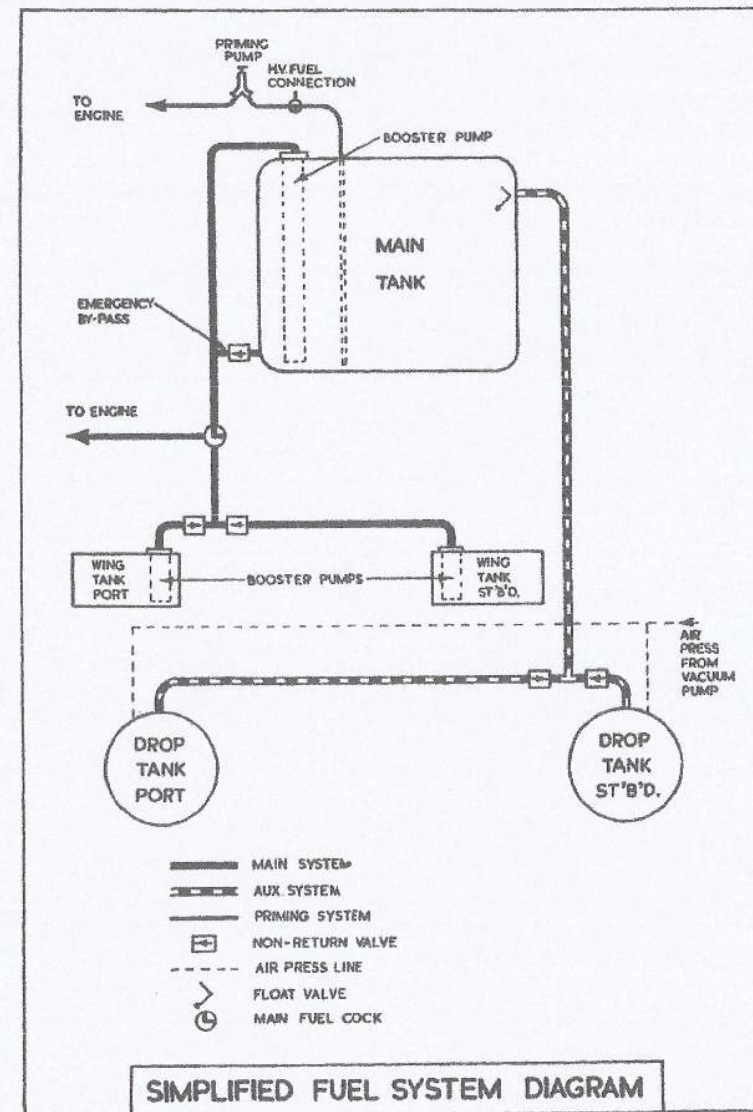
- (i) Fuel is carried in three self-sealing tanks, one in the fuselage between the two cockpits and one in each wing root.

The capacities are as follows:

| | | | |
|-----------------------------|----|----|-----------|
| Main (fuselage) tank | .. | .. | 145½ gal. |
| 2 Wing tanks (each 23 gal.) | .. | .. | 46 " |
| | | | 191½ " |

- (ii) A drop tank of 45 or 90 gallons capacity can be carried under each wing. The fuel from the drop tanks is transferred automatically to the main tank by air pressure from the exhaust side of the vacuum pump, a float operated valve preventing overfilling of the main tank.
- (iii) A three-position cock (30) on the left-hand side of the instrument panel is marked OFF, MAIN TANK and WING TANKS.

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PART I—DESCRIPTIVE

3. Immersed fuel pumps

- (i) An immersed pump in the main tank is automatically switched on when the fuel cock is set to MAIN TANK. Should the immersed pump fail the engine-driven pump can still draw fuel from the main tank through a by-pass pipe.
- (ii) An immersed pump is fitted in each wing tank and is controlled by a selector switch on the centre of the instrument panel. The two switches are interconnected so that when one pump is on the other is off. Setting the fuel cock to WING TANKS automatically switches on the pump which has been selected.

4. Fuel contents gauges.—Three fuel contents gauges (23) marked PORT, STARBOARD and MAIN TANK are fitted in the centre of the instrument panel.

5. Fuel pressure warning lights.—Two fuel pressure warning lights are fitted on the centre of the instrument panel. The left-hand light (26) is marked CARB. PRESS and comes on when the fuel pressure at the carburettor falls below normal working pressure. The second light (24), which is marked FUEL PRESS, comes on when the tank in use is empty, or when the immersed pump in the tank in use has failed. In this latter event fuel can still be drawn from the tank by the engine-driven pump.

6. Priming pump and cock

- (i) The type K.40 priming pump (14) on the right-hand side of the instrument panel normally draws fuel from the main tank.
- (ii) A selector cock on the rear face of the firewall is accessible through the starboard top cowling panel and can be set to permit priming with high volatility fuel from an outside source in cold weather.

7. Oil system

- (i) Oil is supplied from a tank in the centre section. The capacity is $11\frac{1}{2}$ gallons of oil and $2\frac{1}{2}$ gallons air space.
- (ii) An oil dilution system is fitted. It is controlled by a shielded pushbutton on the panel (61) on the right-hand cockpit wall.

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- 8. **Coolant system.**—The coolant system is thermostatically controlled, the radiator being bypassed at temperatures below approx. 80°C . The radiator shutter is also thermostatically controlled and is fully open at 120°C .

MAIN SERVICES

9. Hydraulic system

- (i) An engine-driven pump supplies hydraulic pressure through an accumulator for the operation of the undercarriage and flaps. If this pump fails the accumulator, when fully charged, can lower the undercarriage and flaps once only.
- (ii) In emergency the handpump (68) on the right of the pilot's seat can be used to lower the undercarriage and to lower and raise the flaps. This pump employs separate pipelines and does not charge the accumulator.

10. Pneumatic system. — An engine-driven compressor charges two air bottles at 450 lb./sq.in. for the operation of the wheel brakes, radiator shutters, electro-pneumatic ram for the supercharger gear change on certain aircraft and the guns.

A reducing valve in the system lowers the supply pressure to between 220 and 230 lb./sq.in.

11. Electrical system

- (i) The services supplied by the electrical system are

- Arrester hook indicator
- Camera and camera gun
- Cartridge starter
- Drop tanks release
- Gun firing
- Gyro gun sight (FR. Mk. I and NF. Mk. I)
- Immersed fuel pumps
- Landing lamps
- Oil dilution
- Pressure-head heater
- Radio
- R.P. and bombs (where applicable)
- Reflector gun sight (F. Mk. I and NF. Mk. II)
- Supercharger control and warning light
- Undercarriage position indicator
- All usual lighting

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On all Mk. of aircraft the generator switch is on a panel (61) on the right-hand cockpit wall, together with a voltmeter. A warning light, marked CUT-OUT, which comes on when the generator is not charging the accumulators, is mounted on the right side of the instrument panel.

- (ii) *F. Mk. I.*—Power is supplied by a 1000 w. generator. A GROUND/FLIGHT switch is on a small sub-panel beneath the observer's floor and can be reached only from outside. The switch must be turned to FLIGHT before take-off.

The GROUND position is used to isolate all services except the generator from the aircraft accumulators when the aircraft is parked or when an outside supply is plugged in. There are also four isolating switches on a panel on the right-hand side of the rear cockpit for isolating certain services from the aircraft accumulators. When all four switches are off, all services are isolated.

On later F. Mk. I aircraft the GROUND/FLIGHT switch is at the right-hand side of the pilot's seat.

- (iii) *NF. Mk. II.*—The system is similar to that on the later F. Mk. I. The GROUND/FLIGHT switch is in the cockpit but the four isolating switches are moved to the bay behind the engine. Power is supplied by a generator with an output of 1200 w. A.C. and 1500 w. D.C.

- (iv) *FR. Mk. I and NF. Mk. I.*—Power is supplied by a generator with an output of 1200 w. A.C. and 3000 w. D.C. The GROUND/FLIGHT switch is in the cockpit but no isolating switches are fitted.

AIRCRAFT CONTROLS

12. **Flying controls.**—The flying controls are conventional, the rudder bar being adjustable for length by means of a central star wheel.
13. **Flying controls locking gear.**—The flying controls are locked by three tubes which are pivoted together and engage with an eyebolt on the top of the control column. The other ends of the tubes engage with pegs on the rudder pedals and an eyebolt on the right-hand cockpit wall. When not in use the locking gear is stowed in a bag in the rear cockpit.

PART I—DESCRIPTIVE

14. **Trimming tabs.**—The three trimming tab controls are mounted on a single unit (52) on the left of the pilot's seat. The control wheels all operate in the natural sense, and the setting is indicated by a scale and pointer incorporated in each hand wheel control.

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15. Undercarriage control

The undercarriage lever (31) is the right-hand one of the two levers mounted on the left-hand side of the instrument panel. It has two positions UP and DOWN and should never be left in a mid-position. If Mod. 978 or Mod. 997 is not embodied an electric lock holds the lever in the DOWN position when the aircraft is on the ground with its weight on the undercarriage wheels. The lock is automatically released when the aircraft takes off. When Mod. 978 or Mod. 997 is embodied this lock is deleted. Most aircraft also have a small safety catch which must be tripped before the undercarriage lever can be moved to the UP position.

16. Undercarriage position indicator and warning light

- (i) The indicator (35) on the left-hand side of the instrument panel is switched on and off by the GROUND/FLIGHT switch and operates as follows:

| | |
|--------------------|--------------------------|
| Three green lights | Undercarriage LOCKED |
| | DOWN |
| Three red lights | Undercarriage UNLOCKED |
| No lights | Undercarriage locked up. |

- (ii) A warning light on the coaming comes on when the undercarriage is not locked down and the throttle is less than one third open.

17. **Flaps control.**—The flaps lever (42) moves in a gated quadrant on the left-hand cockpit wall. The quadrant has four positions:

| | |
|----------|----------------------------|
| HOUSED | (lever fully up) |
| CRUISING | (lever at first gate) |
| TAKE-OFF | (lever in the second gate) |
| and LAND | (lever fully down) |

NOTE.—With the flaps lever at CRUISING the flaps are in position for maximum manoeuvrability and this setting should not be used for normal cruising.

PART I—DESCRIPTIVE

Before the lever can be moved from any of the gates it must be raised slightly and pressed outwards. The setting of the flaps can be seen from the cockpit and no position indicator is therefore fitted.

18. **Arrester hook control.**—The arrester hook is released when the hook-shaped lever (33) on the left-hand side of the instrument panel is moved downwards. The hook should be free by the time the lever reaches the white line on the instrument panel. The lever is spring-loaded, and returns to its original position when released. When the hook has been lowered it cannot be raised again from the cockpit, but is re-engaged by the action of the deck wire, or by hand when the aircraft is on the ground. Three attitude lights are fitted—one in each wing tip and the other below the rear fuselage. They are automatically switched on when the arrester hook is lowered.
19. **Arrester hook indicator.**—The arrester hook indicator (32) is mounted on the left-hand bottom corner of the instrument panel, and a green light comes on during the final third of the hook travel.
20. **Wheel brakes**
- (i) The brake control lever and parking catch are on the control column. Differential braking is afforded by means of a relay valve connected to the rudder bar.
 - (ii) A triple pressure gauge (34) is on the left-hand side of the instrument panel.
21. **Front catapult spools control.**—In flight the front catapult spools are retracted by means of a lever on the cockpit floor to the left of the seat.
- NOTE.—The spools should be retracted soon after take-off before a speed of 135 knots has been attained.

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22. **Wing folding**
- Before folding the wings it is essential that the flaps should be in the HOUSED position and the pressure in the hydraulic accumulator released. The wing locking gear is mounted on the outboard rib of the centre section, and the wing is unlocked and ready for folding when four latch pins are withdrawn by means of a lever behind a hinged fairing in the leading edge.

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The lever is telescopic and is pulled out to its full extent and downwards to withdraw the latch pins. The wing is retained in the folded position by a sleeve at the aileron shroud which is engaged over a retractable locking stay fitted in the side of the rear fuselage. When spreading the wings the operation of the telescopic lever is reversed, but it cannot return to the stowed position within the wing unless the latch pins are fully engaged. On early aircraft a latch pin indicator is provided just forward of the rear spar. The indicator projects above the wing if the latch pins are not fully home.

NOTE.—This aircraft must not be taxied on shore with wings folded.

ENGINE CONTROLS

23. **Throttle and mixture controls.**—The throttle and mixture controls move in a quadrant on the left-hand side of the cockpit. The mixture control lever is automatically returned to RICH (if at WEAK) when the throttle is closed. On later aircraft mixture control is entirely automatic and there is no mixture control lever (or if fitted is rendered inoperative). An economical mixture strength is obtained at boost pressures below +7 lb./sq.in.
24. **Automatic boost control cut-out.**—On some aircraft a control lever which may or may not be operative is fitted on the left-hand cockpit wall forward of the engine control box.
- This control may only be used, where operative, in extreme emergency and then only in low gear.
25. **Propeller speed control.**—The propeller speed control lever (43) is on the inboard side of the engine control box, and varies the governed r.p.m. from below 1800 to 2750. R.p.m. below 1800 should not, however, be used in flight except where it is necessary to lengthen a glide following engine failure.
26. **Supercharger control**
- (i) On FR. Mk. I and NF. Mk. I and later F. Mk. I aircraft supercharger gear changes are controlled by a two-way

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switch near the throttle quadrant. A warning light next to the switch comes on if FULL gear is engaged below full throttle height for MOD. gear.

On some aircraft however, the barometric switch (113) may not yet be fitted, in which case the warning light remains on at all heights if FULL gear is engaged.

- (ii) On NF Mk. II and early F. Mk. I aircraft a supercharger control lever is on the inboard side of the throttle quadrant in front of the propeller speed control lever. It has two positions MOD (up) and FULL (down).
- 27. **Carburettor air-intake heat control.**—A push-pull knob (22) marked HOT AIR PULL and COLD AIR PUSH on the lower right-hand side of the instrument panel controls the carburettor air-intake. When the knob is pushed in cold air is passed to the carburettor, and when pulled, warm air is admitted from the inside of the engine nacelle. Ice guards are fitted to the cold air-intake scoops.
- 28. **Slow running cut-out control.**—The spring-loaded control (29), mounted on the lower left-hand side of the instrument panel, is pulled out and held to stop the engine.
- 29. **Engine starting controls**
 - (i) The shielded pushbutton (11) marked ENGINE STARTER, on the top right-hand side of the instrument panel, fires the starter cartridge and also operates the booster coil.
 - (ii) The reloading control (12) on the top right-hand side of the instrument panel is pulled out and then returned slowly to index the next cartridge in the starter breech. A total of five cartridges is contained in the magazine.

COCKPIT EQUIPMENT

- 30. **Cockpit heating.**—Warm air is admitted to the cockpit by turning the knob (28) slightly to the left and pulling it out. The knob is locked in the warm air position when it is turned to the right.
On later aircraft, cold air is directed to the pilot's face by a small ventilator at the base of the windscreen.

PART I—DESCRIPTIVE

- 31. **Cockpit lighting.**—Cockpit lighting and positions of switches vary on different Marks of aircraft. All aircraft except early F. Mk. I are fitted with ultra-violet lights with standby red lighting.

- 32. **Cockpit hood.**—The cockpit hood consists of a transparent panel which can be slid backwards over the fuel tank hooding by means of a winding handle (71) on the right-hand side of the cockpit, and remains locked in any desired position upon releasing the handle. The hood is released for opening from the outside, by depressing a button just forward of the windscreen. Provision is made for emergency jettisoning. (See para. 64.)

On early aircraft a clear vision panel is fitted in the left side panel of the windscreen. The panel is hinged at the top with a release catch at the lower edge. On some aircraft this panel is half-hinged; in this case a check must be made that the toggle-type catches are wire-locked.

- 33. **Footstep.**—A retractable footstep, which must be pulled down for use, is stowed in clips in the root fairing of the centre section on the port side. It is connected with the tailwheel by means of a bowden cable, and is retracted with the undercarriage.

OPERATIONAL CONTROLS

- 34. **Landing lamp.**—The landing lamp switch is on the port switch panel (50); there is no dipping device, but the lamp may be pre-set at the required position on the ground.
- 35. **Navigation lights.**—These are operated from the switch panel on the right-hand cockpit wall and the intensity is controlled by a rheostat (62) just aft of the panel.
- 36. **Gun firing pushbutton.**—The pushbutton on the spade grip fires the guns electro-pneumatically and is covered by a spring-loaded safety cover to obviate accidental operation. The master switch for the gun sight is mounted on the left-hand cockpit wall forward of the throttle control lever.

PART I—DESCRIPTIVE

37. Cameras

- (i) A G.45 camera gun is mounted in the starboard outer plane and is fired electro-pneumatically either by the gun firing pushbutton, or by a separate pushbutton on the spade grip. Before the camera gun can be fired the master switch on the panel (61) on the right-hand cockpit wall must be ON.
- (ii) An F.24 camera is installed in F. Mk. I, FR. Mk. I and NF. Mk. I aircraft. On F. Mk. I aircraft it may be controlled by the pilot by a switch on the left-hand cockpit wall.

38. Gunsight

- (i) On F. Mk. I aircraft a GM 2 sight is fitted. It is controlled by the rheostat switch below the gunsight bracket. On NF. Mk. II aircraft a projector unit (86) is fitted below the coaming.
- (ii) FR. Mk. I and NF. Mk. I aircraft are normally fitted with a gyro gunsight (7), but a GM2 sight may be fitted as an alternative.

39. **Ammunition rounds counter.**—This is fitted on the right-hand cockpit wall. Errors may be expected of this instrument depending upon the rate of firing of the guns, in addition to the instrumental error of the counter. When Mk. II 20-mm. guns are fitted and the counter reads 88, the actual expenditure may be between 75 and 100. When Mk. V 20-mm. guns are fitted and the counter reads 75, the actual expenditure may be between 75 and 100. Intermediate readings in each case are proportionately inaccurate.

PART II HANDLING

NOTE.—If an aircraft is to be flown with the observer's seat unoccupied, 200 lb. ballast is to be secured in the vacant seat unless it is calculated that for the flight in question the aircraft loading will not cause the C.G. to travel beyond the specified limits.

40. Management of the fuel system

NOTE.—In order to keep the C.G. of the aircraft within the permissible limits, the wing tanks must be kept full until at least 30 gallons of fuel have been used from the main tank. If the wing tanks are not filled for take-off, not more than 116 gallons should be put in the main tank.

(i) Without wing drop tanks

Start the engine, warm up, taxi out and take-off with the main fuel cock set to MAIN TANK. When 30 gallons have been used from the main tank, change over to WING TANKS and drain them in turn, setting the pump selector switch to the unused tank when the FUEL PRESS warning light comes on. When the second wing tank is exhausted, change back to MAIN TANK.

(ii) With drop tanks

After take-off continue to fly on the MAIN TANK until all fuel has been transferred from the drop tanks (this will be indicated by a continuous drop in the reading of the MAIN TANK gauge), then change to WING TANKS, drain them in turn and finish the flight on the MAIN TANK.

41. Preliminaries

(i) Before entering the cockpit check:

Correct spread
GROUND/FLIGHT switch (where external) FLIGHT
Isolating switches (where applicable) .. ON
Arrester hook Locked up

A.L. 2
Part II

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(ii) On entering the cockpit check:

Ignition switches OFF.
GROUND/FLIGHT switch (where internal) ... FLIGHT.
Undercarriage lever DOWN.
Green lights on.
Generator switch ON.
Cockpit hood for free movement (wind it back, thus locking it, and test the lock by trying to pull the hood forward).
All immersed fuel pumps audibly. Then test the operation of the flying controls.

PART II—HANDLING

42. Starting the engine and warming up

(i) Set the engine controls as follows :

Fuel cock MAIN TANK
Throttle $\frac{1}{2}$ inch open
Mixture control (if fitted) RICH
Propeller speed control . . Fully forward
(INCREASE REVS.)

Supercharger MOD.

Carb. air-intake heat control COLD AIR

(ii) Operate the priming pump until the suction and delivery pipes are full. This may be judged by a sudden increase in resistance.

NOTE.—For priming at air temperatures below freezing high volatility fuel should be used (see para. 6).

(iii) Immediately before attempting to start, switch on the ignition and prime the engine with the following number of strokes if it is cold:

| | | | | | | |
|----------------------|-----|-----|-----|---|-----|-----|
| Air temperature °C. | +30 | +20 | +10 | 0 | -10 | -20 |
| Normal fuel | 1 | 1 | 2½ | 5 | | |
| High volatility fuel | | | 1 | 2 | 3 | |

Leave the priming pump plunger out ready for use and press the starter pushbutton. Keep the pushbutton depressed until the engine is firing evenly since it also operates the booster coil.

NOTE.—(a) It may be necessary to continue priming after the engine has fired and until it picks up on the carburettor.

(b) If a cartridge misfires, a wait of 1 minute should be allowed before attempting to reload.

(iv) Screw down the priming pump, then open the engine up slowly to 1,200 r.p.m. and warm up at this speed.

43. Testing the engine and services

(i) While warming up

Check all temperatures and pressures, and the operation of the hydraulic system by lowering and raising the flaps. Test each magneto in turn as a precautionary check before increasing power further.

PART II—HANDLING

(ii) After warming up, until the oil temperature is 15°C., and the coolant temperature is 40°C. :—

(a) Open up to the static boost reading observed before starting the engine (0 lb./sq. in. under "standard atmosphere" sea level conditions) and exercise and check the operation of the constant-speed propeller by moving the lever slowly over its full range at least twice. With the lever fully forward check that the r.p.m. are within 50 of those normally obtained.

(b) At the same boost check the operation of the supercharger gear change by moving the switch to FULL. The supercharger warning light should come on. R.p.m. should fall and boost rise when high gear is engaged. Change back to low gear and ensure that the original conditions are restored.

(c) At the same boost check that the generator is charging.

(d) At the same boost test each magneto in turn. If the single ignition drop exceeds 100 r.p.m. but there is no undue vibration, the ignition should be checked at high power, see below. If there is marked vibration the engine should be shut down and the cause investigated.

NOTE.—The following full power checks should be carried out after repair, inspection other than daily, when the single ignition drop at the static boost reading exceeds 100 r.p.m. or at the discretion of the pilot. Except in these circumstances if the checks above are satisfactory no useful purpose will be served by a full power check. When these checks are made the tail of the aircraft must be securely lashed down.

(e) Open the throttle fully and check take-off boost and r.p.m. This check should be as brief as possible.

(f) Throttle back until the r.p.m. fall just below the take-off figure indicating that the propeller is not constant speeding and test each magneto in turn. If the single ignition drop exceeds 100 r.p.m. the aircraft should not be flown.

(iii) Before taxiing check brake pressure (110-120 lb./sq. in.) and pneumatic supply pressure (220-230 lb./sq. in.).

(iv) The only check of proper functioning of the drop tank fuel system is the escape of air which can be heard when each filler cap is cased off in turn.

44. Check list for take-off

| | At normal overload (2 x 90 gallon drop tanks) 13,170 lb. | At normal full load 12,000 lb. |
|-------------------------------------|--|-----------------------------------|
| T—Trimming tabs : Elevator | $\frac{1}{2}$ division nose down | Zero |
| | Rudder } Aileron } | Zero |
| M—Mixture control (if fitted) | RICH. | |
| Carburettor air-intake heat control | COLD AIR. | |
| Supercharger | MOD. | |
| P—Propeller speed control | Fully forward | |
| F—Fuel | MAIN TANK. | |
| F—Flaps | TAKE-OFF. | |
| Pneumatic supply pressure | 200 lb./sq. in. minimum. If the supply pressure is below this figure the radiator shutter ram may not operate and excessive coolant temperatures may then be experienced early after take-off. | |

PART II—HANDLING

A.L. 2
Part II
Para. 45

45. Take-off

- (i) The tendency to swing to the right is easily controlled by use of the rudder.
- (ii) Before retracting the undercarriage, apply the brakes to stop the wheels rotating.
- (iii) Climb initially at 120 knots I.A.S. and raise the flaps at a height of 300 ft.

46. Climbing

- (i) The speed for maximum rate of climb is 135 knots I.A.S. from sea level to 16,000 ft., but in tropical conditions it will probably be necessary to increase speed slightly in order to maintain temperatures within the limitations.
- (ii) When carrying 2 × 90-gallon drop tanks, the most comfortable climbing speed is approximately 155 knots I.A.S.

47. General flying

- (i) *Stability.*—At all normal loadings the aircraft is easy and pleasant to fly and stability about all axes is reasonably satisfactory.
- (ii) *Change of trim*
Undercarriage up. Slightly nose up
Flaps up from TAKE-OFF Nose up
Flaps lowered to LAND Strongly nose down
There are marked changes of lateral and directional trim with changes of power and speed. These should be countered by accurate use of the trimming tabs.
- (iii) *Flying at reduced airspeed in conditions of poor visibility.*—Reduce speed to 175 knots I.A.S. and lower the flaps to the CRUISING setting. Set the propeller speed control lever to give 2,400 r.p.m. Speed may then be reduced to 120 knots I.A.S.

48. Stalling

A.L. 2
Part II
Para. 48 (i)

- (i) The stalling speeds, engine off, in knots I.A.S. are approximately as follows:

| | With 16 × 60 lb. R.P. weapons 12,200lb | With 2 × 90 gallon drop tanks 19,170lb | At normal full load 12,200lb | At light load 11,000lb |
|---------------------------------|---|---|------------------------------------|------------------------------|
| Undercarriage and flaps up | 85 | 90 | 80 | 75 |
| Undercarriage and flaps down | 72 | 78 | 70 | 66 |

PART II—HANDLING

- (ii) Warning of the approach of the stall is given by slight elevator buffet, the onset of which can be felt some 2-4 knots before the stall itself. At the stall the nose and left wing tend to drop, the wing drop being more pronounced with the undercarriage and flaps down.
- (iii) Warning of the approach to the stall in a steep turn is given by the sudden lightening in feel of the elevator. If the pull force is not then relaxed, the aircraft will in general flick out of the turn.

49. Spinning

Deliberate spinning is not permitted on this aircraft. In the event of an inadvertent spin, standard recovery action (full opposite rudder followed by forward movement of the control column) will normally effect recovery in half a turn, but if initiated when the nose is up during pitching, recovery is immediate. An I.A.S. of at least 160 knots must be attained in the ensuing dive before pulling out.

50. Diving

The aircraft becomes increasingly tail heavy as speed is gained, and should, therefore, be trimmed into the dive. The tendency to yaw to the left should be corrected by careful use of the rudder trimming tab.

51. Aerobatics

The following initial speeds (in knots I.A.S.) are recommended:

| | | |
|---------------------------------|---------|---------------|
| Loop | | 260-280 |
| Roll | | 180-220 |
| Half roll off the top of a loop | | 280-300 |
| Upward roll | | 300 and above |

52. Check list for landing

- (i) Reduce speed to 175 knots I.A.S. and lower the flaps to the CRUISING setting.
- (ii) Open the cockpit hood and then (for deck landing) lower the arrester hook.

NOTE.—The arrester hook indicator light may not come on until speed is reduced below 110 knots I.A.S.

PART II—HANDLING

- (iii) Reduce speed to 150 knots I.A.S., check brake pressure and

U—Undercarriage DOWN (check by indicators and warning light)

M—Mixture control (if fitted) RICH

Carburettor air-intake

heat control COLD AIR

Supercharger MOD.

P —Propeller speed control 2,600 r.p.m.

F —Fuel MAIN TANK

F —Flaps LAND (when speed is reduced below 125 knots I.A.S.)

A.L.3
Part II
paras. 53
and 54

53. Approach and landing

- (i) Recommended final approach speeds, in knots I.A.S. are :

| | At maximum landing weight 12,200 lb. | At light load, half fuel, all ammunition expended |
|--|--|---|
|--|--|---|

Flaps down

| | | |
|-----------------|----|----|
| Engine-assisted | 90 | 85 |
|-----------------|----|----|

| | | |
|-------|-----|----|
| Glide | 100 | 95 |
|-------|-----|----|

Flaps up

| | | |
|-----------------|-----|----|
| Engine-assisted | 100 | 95 |
|-----------------|-----|----|

| | | |
|-------|-----|-----|
| Glide | 105 | 100 |
|-------|-----|-----|

The initial approach should be made at a speed some 5-10 knots above these speeds.

- (ii) The recommended approach speed for deck-landing is 78-80 knots I.A.S. An improved view of the deck is obtained if a curved approach is made.

54. Mislanding

The aircraft will climb away easily at climbing power ; the use of full take-off power is unnecessary.

- Open the throttle to +9 lb./sq. in. boost.
- Increase airspeed to 90 knots I.A.S.
- Raise the undercarriage and retrim.
- Climb at 100 knots I.A.S. and raise the flaps in stages above 300 feet, retrimming as required.

NOTE.—Care must be taken when raising the undercarriage as the nose tends to rise.

55. After landing

- (i) Before taxiing, raise the flaps fully.

A.L.6
Para. 55
(ii) and
(iii)
Page 22

- (ii) If the serviceability of the engine is in doubt such items of the run up given in para. 43 as may be necessary, should be carried out. In all cases, however, the engine should be idled at 800-1,000 r.p.m. and if no other check of the ignition has been made, the magnetos should be tested for a dead cut.

- (iii) Stop the engine by pulling out and holding the slow running cut-out control.

PART II—HANDLING

- (iv) When the engine has stopped, switch off the ignition and all other electrical services, turn off the fuel and set the GROUND/FLIGHT switch to GROUND.

- (v) *Oil dilution.*—See A.P. 2095.

The correct dilution period for this engine is 1 minute at air temperatures down to -10° C. Below this temperature the period should be increased to 2 minutes.

PART III

OPERATING DATA

56. Engine data: Griffon II or XII.

- (i) Fuel: 100 octane only.
- (ii) Oil: See N.A.M.O. General/S.4 or A.P. 1464/C.37.
- (iii) The principal engine limitations are as follow:

| | R.p.m. | Boost lb./sq.in. | Temp. °C. Coolant | Oil |
|-----------------------------------|--------|---------------------|----------------------|-----|
| MAX. TAKE-OFF M | 2,750 | +12 (+15) | — | — |
| MAX. CLIMBING M 1 HOUR LIMIT S | 2,600 | + 9 | 125 | 90 |
| MAX. CONTINUOUS M S | 2,400 | + 7 | 105* | 90 |
| COMBAT 5 MINS. LIMIT M S | 2,750 | +12 (+15) | 135 | 105 |

Figures in brackets apply to Griffon XII engines.

*Temperatures up to 115°C. are permitted for short periods if necessary.

OIL PRESSURE:

| | |
|-----------------|------------------|
| NORMAL | 60-80 lb./sq.in. |
| MINIMUM | 45 lb./sq.in. |

MINM. TEMP. FOR TAKE-OFF:

| | |
|-----------------|-------|
| OIL | 15°C. |
| COOLANT | 60°C. |

- (iv) Supercharger gear changes must not be made at engine speeds in excess of 2,600 r.p.m.

57. Flying limitations

- (i) The aircraft is designed for manœuvres appropriate to a fighter; but intentional spinning is not permitted.

PART III—OPERATING DATA

A.L.6
Para. 57
(d)
Page 25

- (ii) The aircraft is designed for the following maximum I.A.S.:

| | |
|--|-----------|
| Diving (with flaps at HOUSED) | 370 knots |
| Diving (with flaps at CRUISING) | 250 knots |
| Lowering flaps to CRUISING or TAKE-OFF ... | 175 knots |
| Flaps at TAKE-OFF | 175 knots |
| Flaps at or lowering to LANDING | 125 knots |
| Undercarriage DOWN | 155 knots |

NOTE.—Firing of R.P. with flaps at the CRUISING setting is not permitted. Guns may be fired with flaps at the CRUISING setting, but if external stores are carried the guns may only be fired provided cartridge ejection chutes (Mods. 565, 566) are fitted. It is also necessary for the bomb, R.P. or drop tank installation to be covered by the appropriate Firefly modification in the series 567 to 570.

- (iii) Maximum weights for all forms of flying and landing are 12,200 lb. (F Mk. I, FR Mk. I and NF Mk. I) and 12,400 lb. (NF Mk. II).

- (iv) (a) Maximum permissible (overload) weight is 13,600 lb.

(b) When aircraft is cleared for carrying Mk. VIII R.P. the maximum weight of 14,320 lb. is permitted.

(c) When aircraft is cleared for carrying two 1,000 lb. bombs the maximum weight of 14,900 lb. is permitted.

(d) At weights in excess of 12,200 lb. violent manœuvres must be avoided and care must be taken not to impose heavy loads on the structure.

- (v) With 2 × 45 gallon Sea Hurricane (Mod. 241) or 2 × 90 gallon American type (Mod. 329) drop tanks.

(a) Maximum permissible speed is 350 knots I.A.S.

(b) Tanks may be released at speeds up to 260 knots I.A.S.

(c) Accelerated take-offs are permitted on F Mk. I aircraft only.

(d) Arrested landings may be made with the 45 gallon tanks full or the 90 gallon tanks not more than half full; otherwise, these must be jettisoned.

- (vi) With 2 × 45 gallon standard catapult drop tanks (Mod. 426).

(a) Maximum permissible speed is 220 knots I.A.S. and tanks may be released up to this speed.

(b) Accelerated take-offs are prohibited.

(c) Arrested landings are permitted only when the tanks are empty; otherwise, they should be jettisoned.

PART III—OPERATING DATA

A.L.4
Part III
Para. 57
(vii), (viii)

(vii) With 2 × 500 lb. bombs

(a) Maximum permissible speed is 350 knots I.A.S. and bombs may be released up to this speed.

(b) Accelerated take-offs and arrested landings are prohibited.

(c) Salvo release is prohibited.

(viii) *Launching smoke floats.*—Until Mod. 463 is incorporated smoke floats should not be launched at speeds in excess of 150 knots I.A.S. At higher speeds some failures must be expected.

58. Position error corrections (Flaps up)

The static vent is connected on all aircraft.

| | | | | |
|--------|-----|-----|-----|--------|
| From | 120 | 160 | 200 | Knots |
| To .. | 160 | 200 | 240 | I.A.S. |
| Deduct | 1 | 2 | 3 | Knots |

NOTE.—(a) The position error correction with flaps down is large and negative so that the I.A.S. during approach will appear high.

(b) The position error correction for the NF. Mk. II is $1\frac{1}{2}$ knots more positive than the corrections tabulated above.

59. Maximum performance

(i) *Climbing* (see para. 46)

The speed for maximum rate of climb is 135 knots I.A.S. from sea level to 16,000 ft., thereafter decreasing speed by 2 knots per 3,000 ft. Change to high gear when the boost in low gear has fallen to +5 lb./sq.in.

(ii) *Combat*

Change to high gear when the maximum obtainable boost in low gear is +8 lb./sq.in. (Griffon II) or +9 $\frac{3}{4}$ lb./sq.in. (Griffon XII).

NOTE.—When changing gear, r.p.m. must not exceed 2,600.

PART III—OPERATING DATA

60. Maximum range

(i) To obtain maximum range, fly at the highest obtainable boost (not exceeding +7 lb./sq.in.) or full throttle and reduce r.p.m. as required down to 1,800 to maintain the recommended speed. If at 1,800 r.p.m. the recommended speed is exceeded, reduce boost accordingly.

(ii) At high altitudes engage high gear if 155 knots I.A.S. cannot be maintained in low gear at 2,400 r.p.m. and full throttle.

(iii) The recommended speeds are:

155 knots I.A.S. at high altitudes

175 knots I.A.S. at low altitudes

61. Maximum endurance

For maximum endurance fly at 150 knots I.A.S. at 1,800 r.p.m. with the throttle open only far enough to maintain this speed.

NOTE.—(i) At high altitudes with the throttle fully open it will probably be necessary to increase r.p.m. above 1,800 to maintain the optimum speed.

(ii) At very low altitudes at light load do not close the throttle so far that the manual mixture control lever is tripped to RICH.

62. Fuel capacities and consumptions

(i) Fuel capacities:

| | | | | |
|--------------|----|----|----|------------------------|
| Main tank | .. | .. | .. | 145 $\frac{1}{2}$ gal. |
| 2—wing tanks | .. | .. | .. | 46 " |

| | | | |
|------------------------|----|----|------------------------|
| Total | .. | .. | 191 $\frac{1}{2}$ gal. |
| 2 × 45-gal. drop tanks | .. | .. | 90 " |
| 2 × 90-gal. drop tanks | .. | .. | 180 " |

| | | | |
|-----------------|----|----|---|
| Total all tanks | .. | .. | 281 $\frac{1}{2}$ or 371 $\frac{1}{2}$ gal. |
|-----------------|----|----|---|

PART III—OPERATING DATA

- (ii) Approximate weak mixture consumptions in low gear at 5,000 ft. in gallons/hour:

| Boost lb./sq.in. | R.p.m. | | | |
|---------------------|--------|-------|-------|-------|
| | 2,400 | 2,200 | 2,000 | 1,800 |
| +7 | 86 | — | — | — |
| +6 | 78 | 70 | — | — |
| +4 | 73 | 66 | 60 | 51 |
| +2 | 66 | 60 | 56 | 50 |
| 0 | 59 | 54 | 50 | 46 |
| -2 | 52 | 48 | 45 | 42 |
| -3 | 49 | 45 | 43 | 40 |

- (iii) Approximate rich mixture consumptions in low gear at 5,000 ft.:

| Boost lb./sq.in. | R.p.m. | Total Gallons/hour |
|---------------------|--------|-----------------------|
| +12 | 2,750 | 138 |
| + 9 | 2,600 | 106 |

PART IV EMERGENCIES

63. Undercarriage and flaps emergency operation

- (i) In the event of failure of the engine-driven pump, the pressure in the accumulator (when fully charged) is sufficient to lower the undercarriage and flaps once only.
- (ii) If it is clear that the engine-driven pump has failed and the accumulator is discharged, the undercarriage can be lowered and the flaps lowered and raised by the handpump on the right of the pilot's seat in the front cockpit. The following procedure should be adopted:—
 - (a) Select undercarriage down.
 - (b) Fly straight and level and operate the handpump. The lever operating the pressure relief valve must be held close against the pump handle during this operation. A considerable number of strokes will be required after resistance is felt before the undercarriage is locked down.
 - (c) If the undercarriage cannot be disengaged from the up-locks the application of negative "g" while pumping may be effective in releasing it.
 - (d) Do not operate the flaps until the undercarriage has been locked down, unless all measures have failed to lower it.
 - (e) The flaps must be selected and pumped down one stage at a time; otherwise, they may not lower evenly.

64. Hood jettisoning

- (i) The cockpit hood may be jettisoned by pulling down the handle on the hood framing on the starboard side of the cockpit. If Mod. 849 is not incorporated the handle on the hood framing is above the pilot.
- (ii) Before jettisoning the hood the pilot should lower the seat and keep his head well down to avoid the possibility of injury. The hood should be jettisoned when in level flight or in a climbing attitude but the most important factor is that, if possible, there should be no yaw.

65. Fire-extinguishers

- (i) No automatic-type extinguishers are carried. Two hand-operated extinguishers are fitted, one behind the pilot's left shoulder and the other in the left-hand front corner of the rear cockpit.
- (ii) In the event of a crash landing, the fire hazard is reduced if the immersed fuel pumps are switched off; the fuel cock should, therefore, be turned OFF. On aircraft where the GROUND/FLIGHT switch is in the pilot's cockpit, this should be set to GROUND.

66. Dinghy and ditching

- (i) Both members of the crew are provided with K-type single seater dinghies.
- (ii) The ditching characteristics of the aircraft are good provided that all external stores have been jettisoned or dropped. If the stores cannot be jettisoned the aircraft should be abandoned by parachute rather than ditched.

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Para. 66
(cont'd.)
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- (iii) If it is decided to ditch, the following procedure should be observed :—
- (a) The cockpit hood should be jettisoned (see para. 64).
 - (b) The undercarriage should be kept retracted.
 - (c) The safety harness should be kept tightly adjusted and locked, and the R/T plug should be disconnected after warning the observer that ditching is imminent.
 - (d) Flaps should be lowered fully, to reduce the touchdown speed as much as possible.
 - (e) The engine, if available, should be used to help make the touchdown in a tail-down attitude at as low a forward speed as possible.
 - (f) Ditching should be made along the swell or into wind if the swell is not steep.

67. **Incendiary bomb.**—A 1½-lb. incendiary bomb is carried in spring clips on the bulkhead behind the pilot.

APPENDIX ROCKET-ASSISTED TAKE-OFF PROCEDURE

I. Rocket-assisted take-off gear is incorporated by Mod. 394.

The pilot's controls are situated as follows :—

Master switch mounted on a panel approximately by the pilot's right elbow. It is provided with a locking slide and nut.

Firing button mounted on the throttle. The button also operates the "press-to-speak" unless Mod. 501 is fitted when the latter is re-positioned on the control column.

Jettisoning switch mounted immediately above the R.A.T.O. master switch.

II. Take-off procedure

- (i) Determine the correct firing point from the chart and note the actual position on the take-off run at which the rockets should be fired.

NOTE.—It is preferable to fire the rockets slightly late rather than early.

(ii) Check list as for normal take-off, but in addition:
R.A.T.O. master switch . . . ON.

(iii) The run should be started as for a normal take-off, extra care being taken to keep the aircraft straight. A better take-off will result if the tail is kept down throughout the run.

(iv) When opposite the firing point, depress the firing button. (The rockets should fire simultaneously within half a second of pressing the button; if they do not do so the take-off should be abandoned).

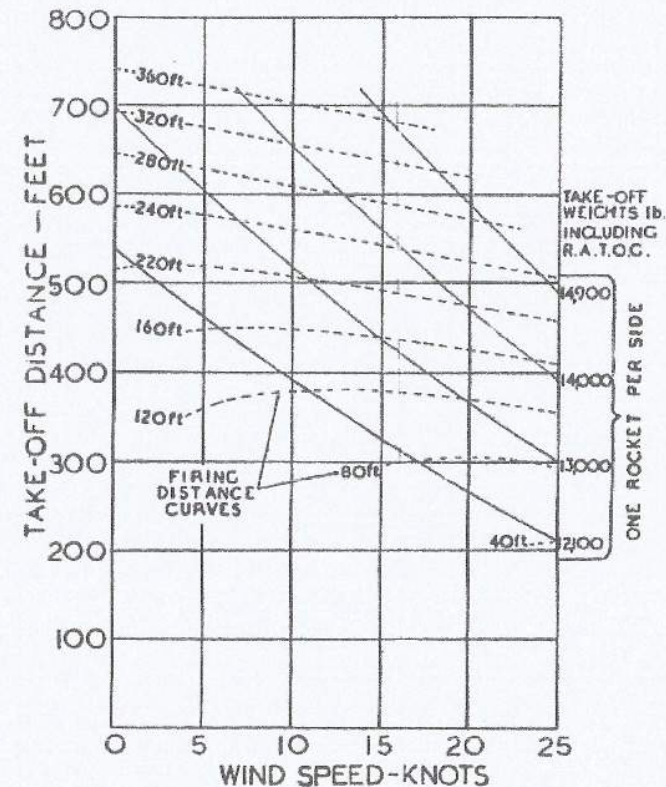
(v) On becoming airborne, switch OFF and lock the R.A.T.O. master switch. When clear of the ship, and having reached a safe height of 300 feet, raise the flaps and then jettison the rocket carriers at a speed not exceeding 150 knots I.A.S. The observer should check visually that the rocket carriers have jettisoned satisfactorily. To avoid possible damage to the flaps, the rocket carriers should not be jettisoned with the flaps in the take-off position except in an emergency.

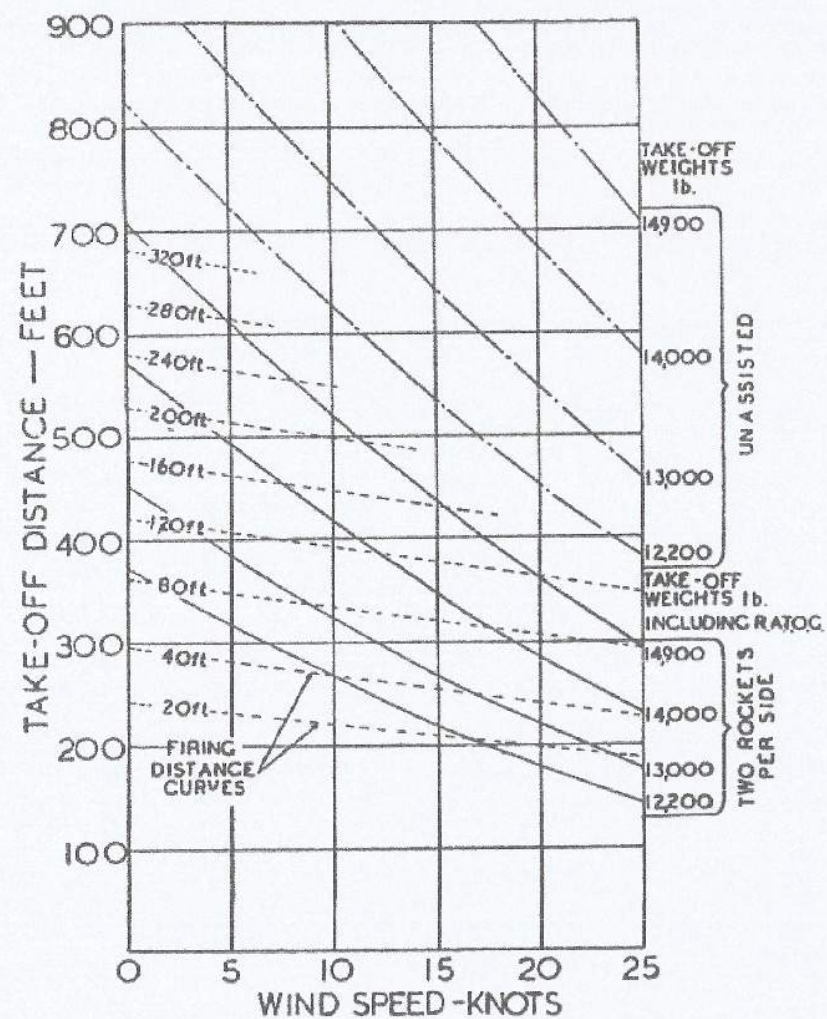
WARNING.—If the take-off is cancelled, make sure that the R.A.T.O. master switch is OFF and locked before leaving the cockpit.

ROCKET-ASSISTED TAKE-OFF CHARTS

INSTRUCTIONS FOR USING CHARTS

1. Measure the windspeed over the deck and on the chart on the right, plot the available take-off distance against the wind speed. If the point obtained lies above the "unassisted" curve corresponding to the aircraft weight, assistance is unnecessary.
2. If rocket assistance is found to be necessary, select the point on the appropriate "assisted" curve corresponding to the aircraft weight, vertically above the value of the windspeed. (If two rockets per side are to be fitted, use the curve on the chart to the right; if one rocket per side is to be fitted, use the curve on the chart below). Read off the value of this point on the vertical scale. The take-off distance so obtained is a minimum and an allowance of 50 ft. should be added as a safety margin.
3. The same point on the "assisted" curve gives the distance of the correct firing point from rest, by interpolation between the dotted lines.



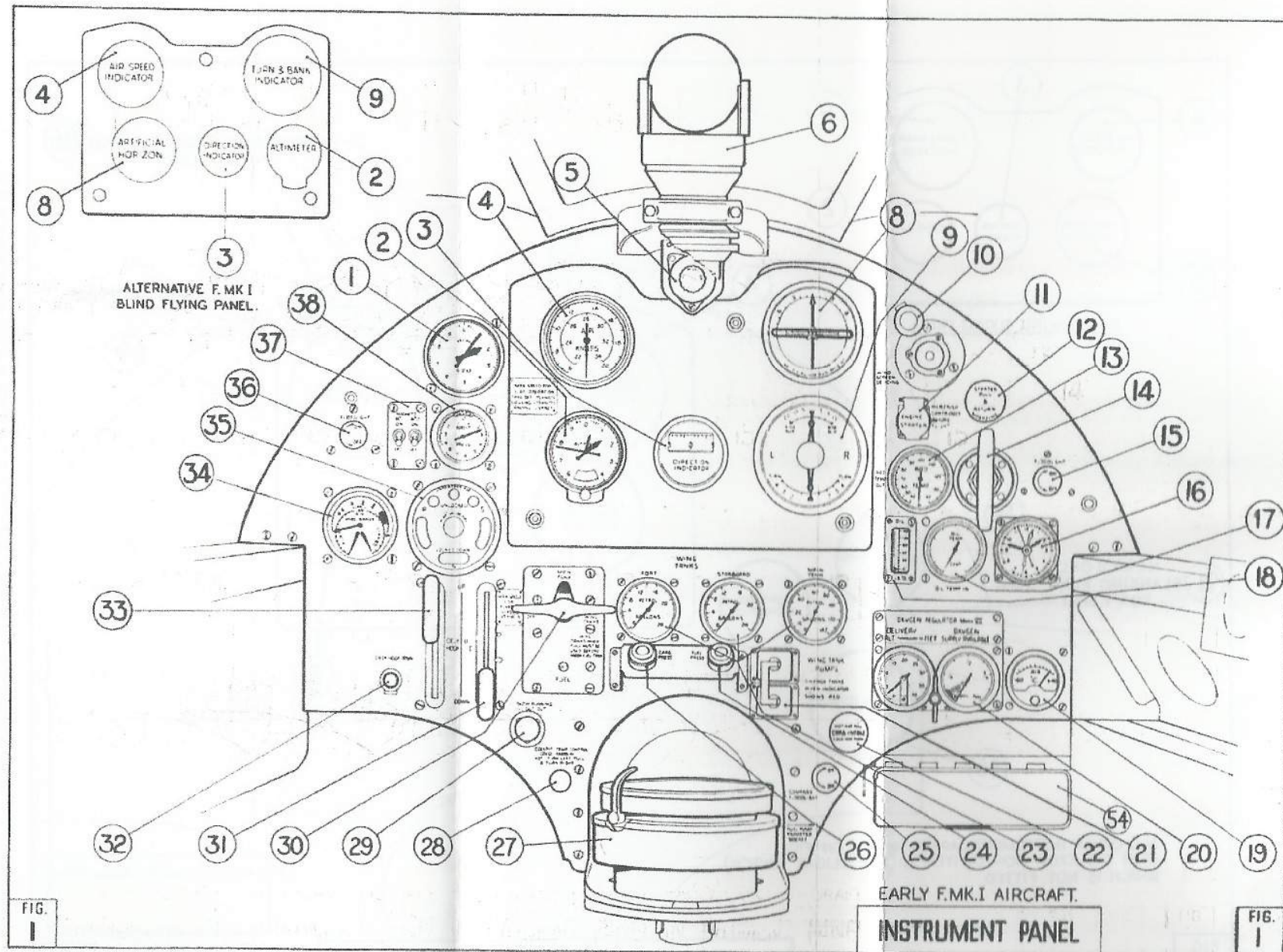


NOTE—The all-up weight of aircraft must be ascertained by reference to A.P.2102 A & B, Volume 1, Section 4.

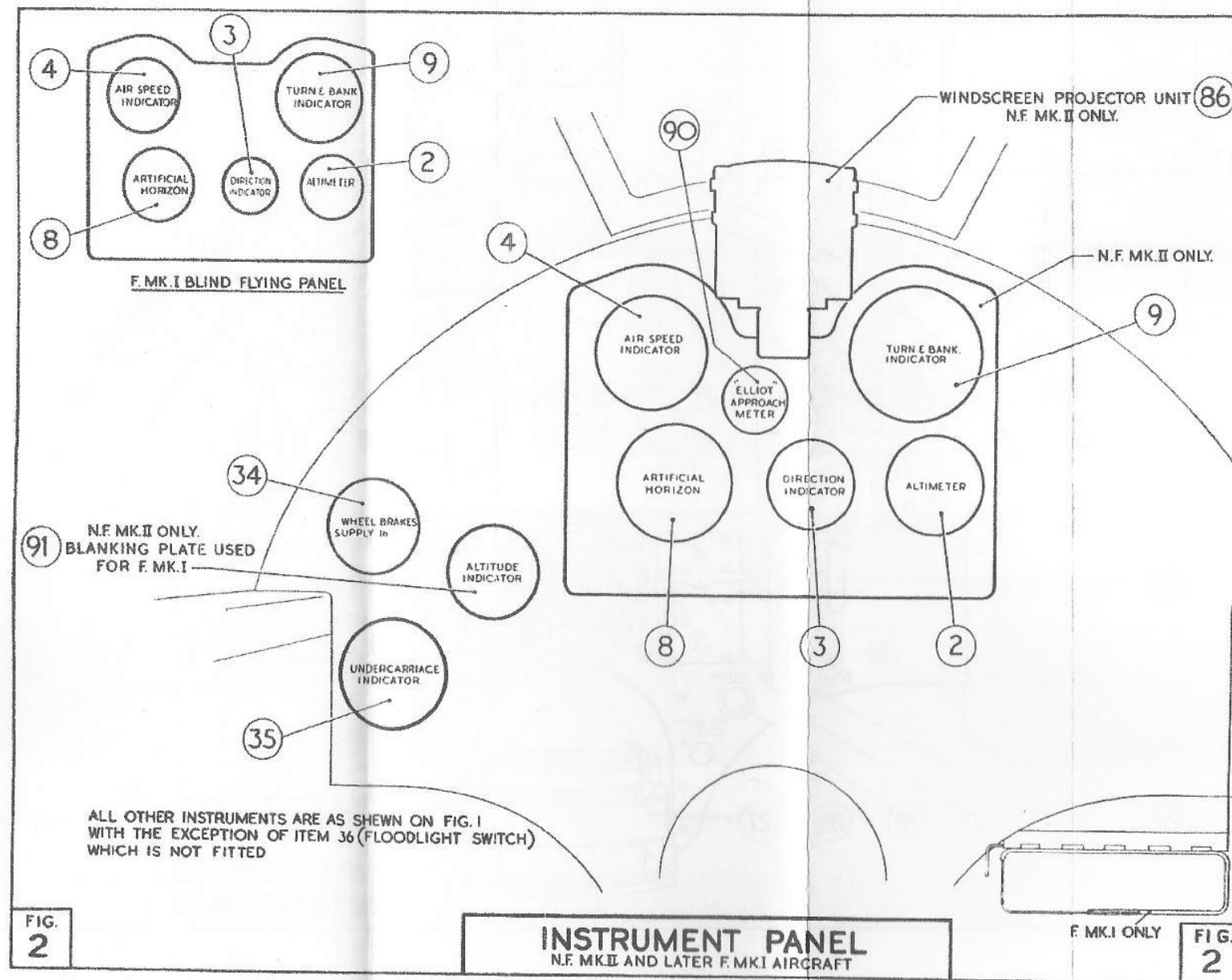
PART V ILLUSTRATIONS

Key to Fig. 1

1. Engine speed indicator
2. Altimeter
3. Direction indicator
4. Air speed indicator
5. Gun-sight lamp switch
6. Gun-sight
8. Artificial horizon
9. Turn and bank indicator
10. Windscreen de-icing pump
11. Engine starter push-button
12. Starter re-loading control
13. Radiator temperature gauge
14. Cylinder priming pump
15. Floodlight switch
16. Clock
17. Oil temperature gauge
18. Oil pressure gauge
19. Air temperature gauge
20. Oxygen regulator
21. Wing tank fuel pump, change-over switch
22. Carburettor air-intake heat control
23. Fuel contents gauges
24. Wing tank pumps warning light
25. Compass floodlight switch
26. Fuel pressure warning light
27. Compass
28. Cockpit heating control
29. Slow-running cut-out control
30. Fuel tank cock control
31. Undercarriage control lever
32. Arrestor hook indicator
33. Arrestor hook control lever
34. Brakes and supply pressure gauge
35. Undercarriage indicator
36. Floodlight switch
37. Ignition switches
38. Boost pressure gauge
4. Map case



Key to Figs. 2, 3 & 4



2. Altimeter
3. Direction indicator
4. Air speed indicator
8. Artificial horizon
9. Turn and bank indicator
34. Brakes and supply pressure gauge
35. Undercarriage indicator
39. Headrest
41. Vacuum flask
42. Flaps control
43. Propeller control
44. Throttle lever
45. Gun-sight master switch
46. T.R. 1196 or T.R. 5043
50. Port switch panel
52. Trimming tabs control unit
53. Front catapult spool lever
55. Fire-extinguisher
57. Hood jettison control
58. Identification lights switchbox
60. Engine data plate
61. Starboard switch panel
62. Rheostat type H
63. Incendiary bomb
64. Floodlights
65. Oxygen master valve
66. Seat-raising handle
67. Signal cartridge stowage
68. Hydraulic handpump
69. Ammunition rounds counter
70. Junction box
71. Hood operating handle
72. Signal pistol
73. Camera footage indicator
74. Spare bulbs for gun-sight
76. Speaking tubes
77. Sunblind
79. Junction box for A.R.I. 5245 or T.R. 5043
81. Dimmer switch (aft floodlight)
82. Gun-sight supply socket
83. Floodlight switch panel
85. Radio altimeter indicator lights
86. Projector unit
89. Controller for A.R.I. 5245 or 5307
90. Approach meter for A.R.I. 5552
91. Radio altimeter
92. Ground/flight switch
93. R.P. and bomb switches
94. R.P. switches
95. R.P. auto-selector box
96. Long-range tanks and bombs switch panel
97. Bombs auto-distributor box
98. Supercharger control switch and warning light
13. Supercharger light barometric switch
14. F.24 camera switch
15. Undercarriage warning light

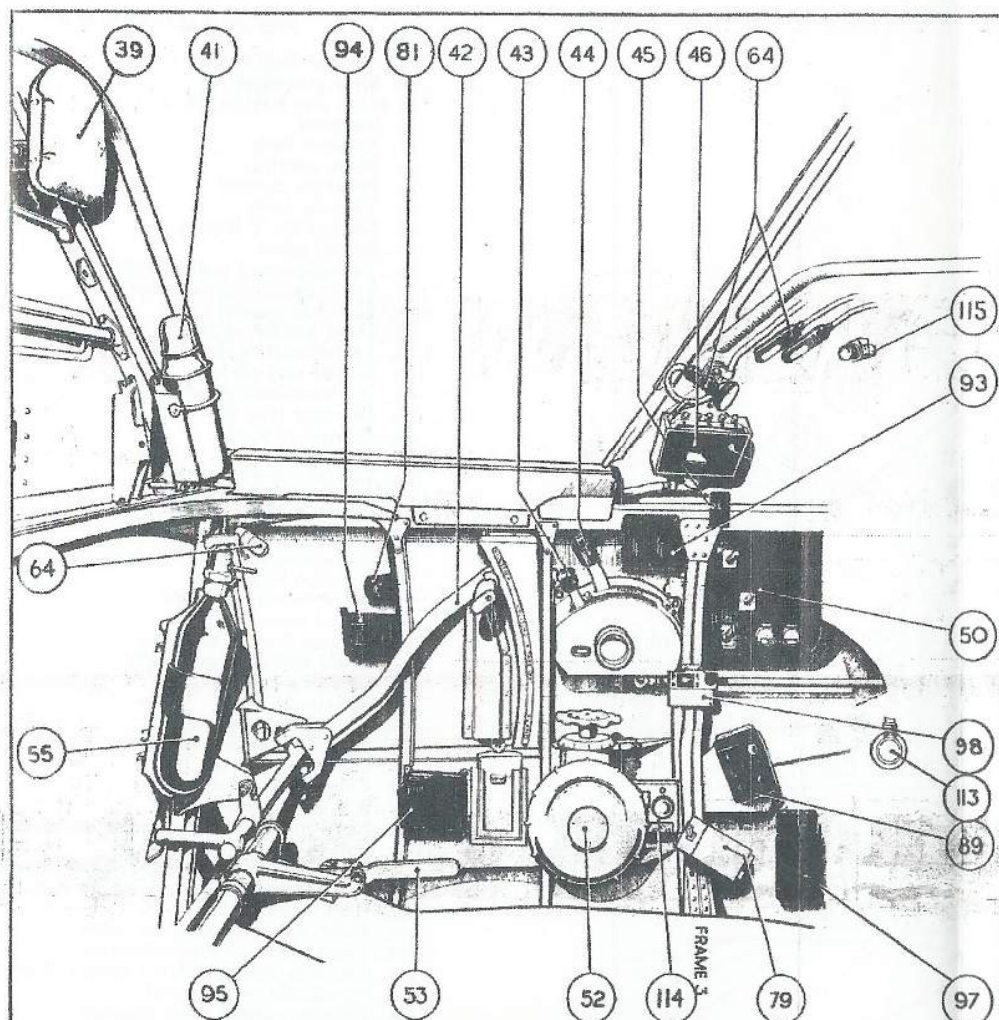


FIG. 3

EQUIPMENT ON LEFT-HAND SIDE OF FUSELAGE
F. MK.1

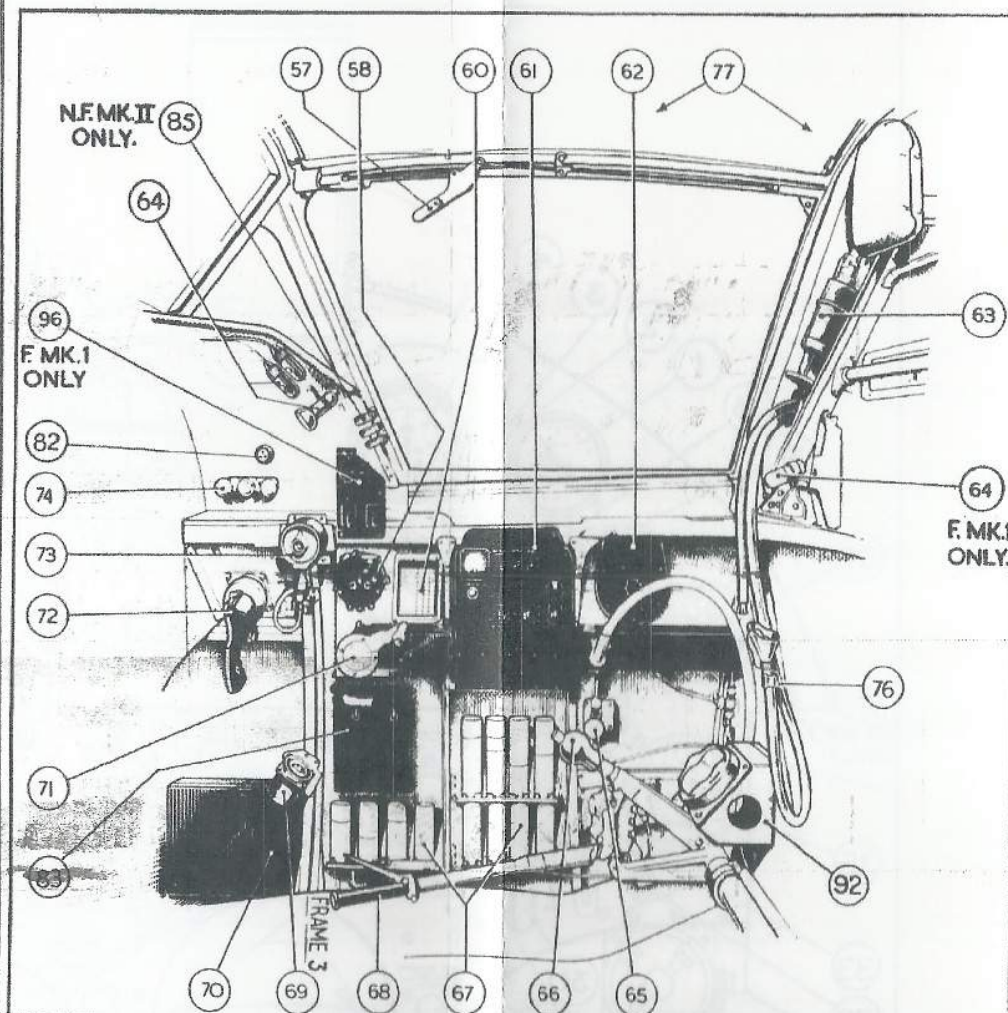
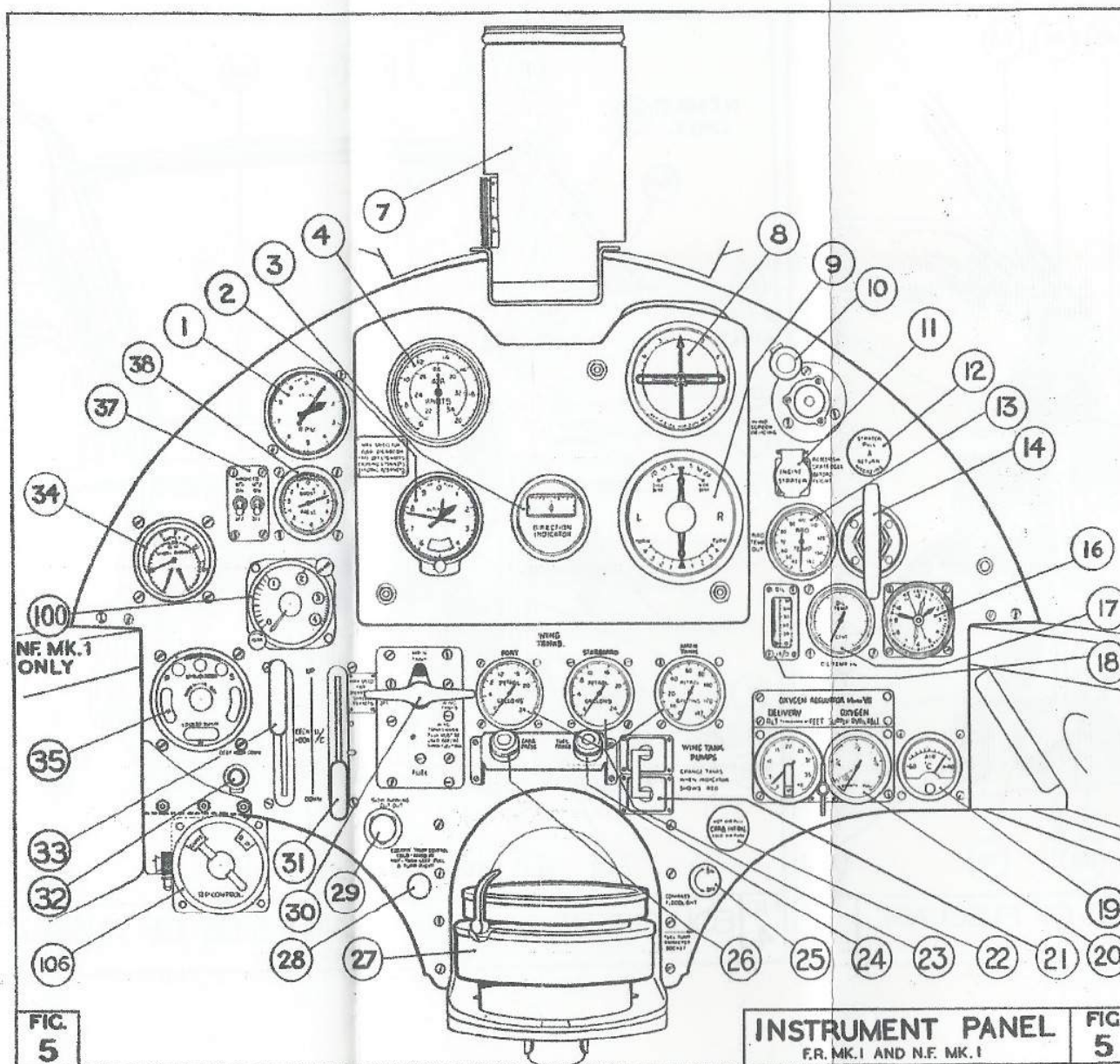


FIG. 4

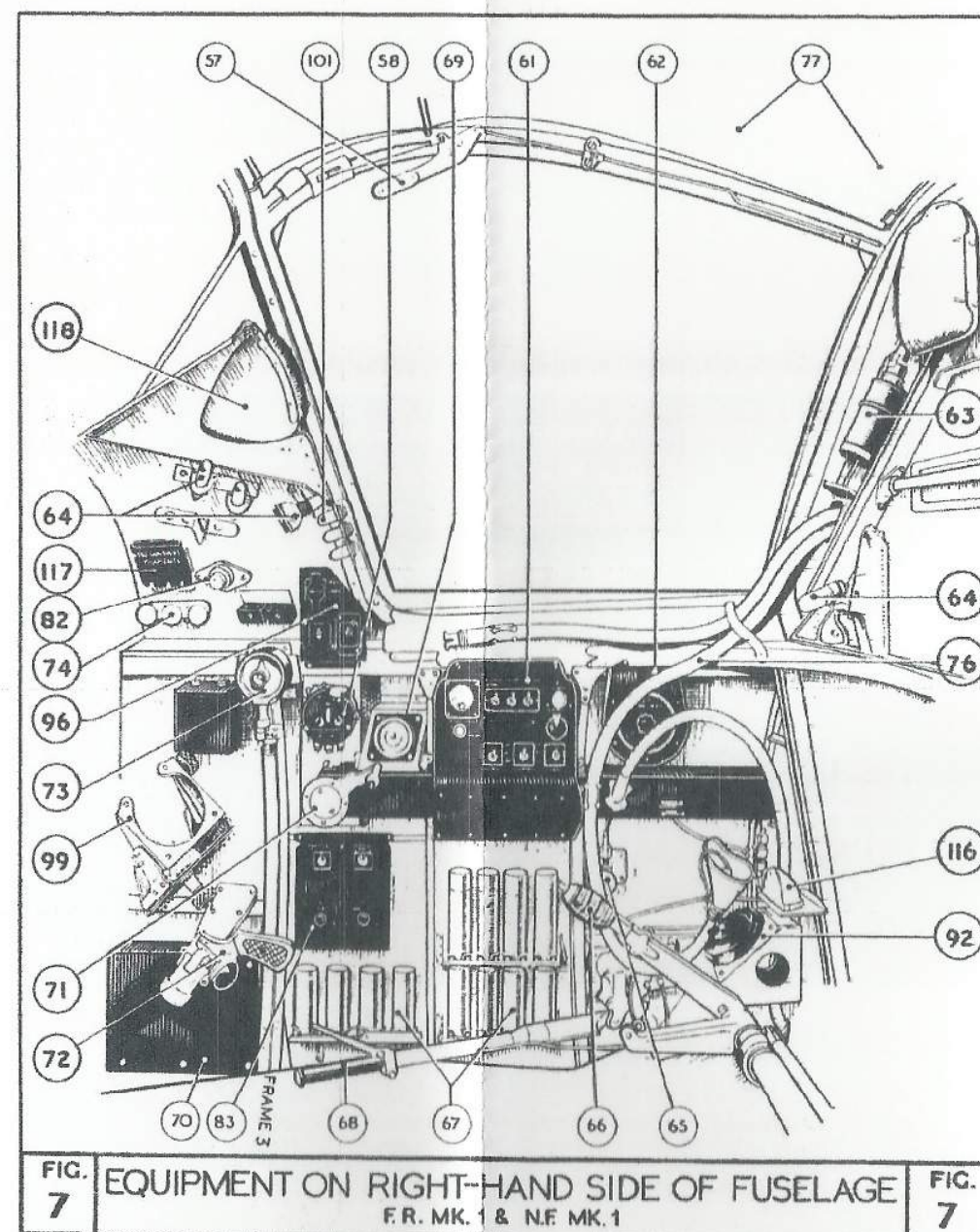
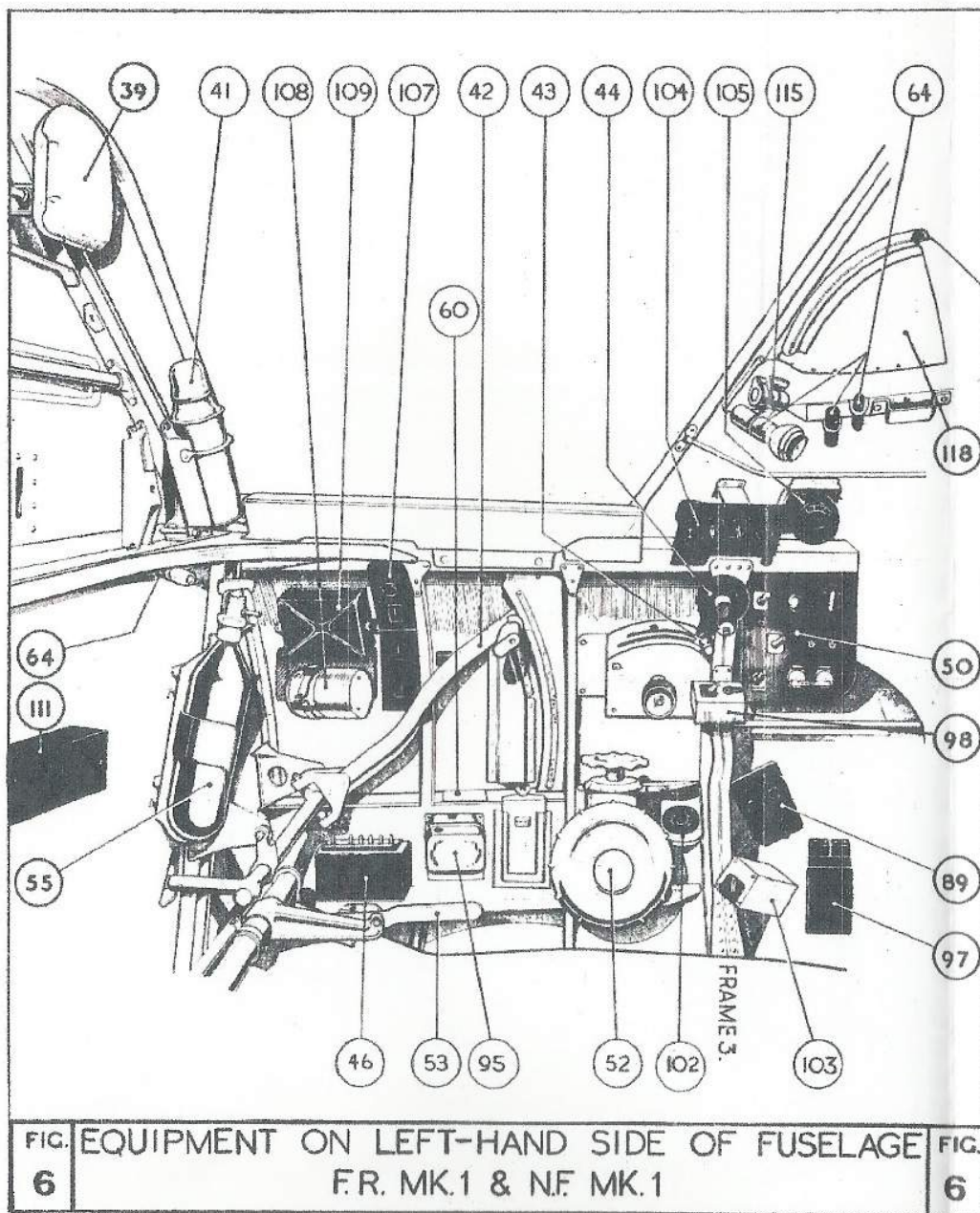
EQUIPMENT ON RIGHT-HAND SIDE OF FUSELAGE
F. MK.I AND N.F. MK.II

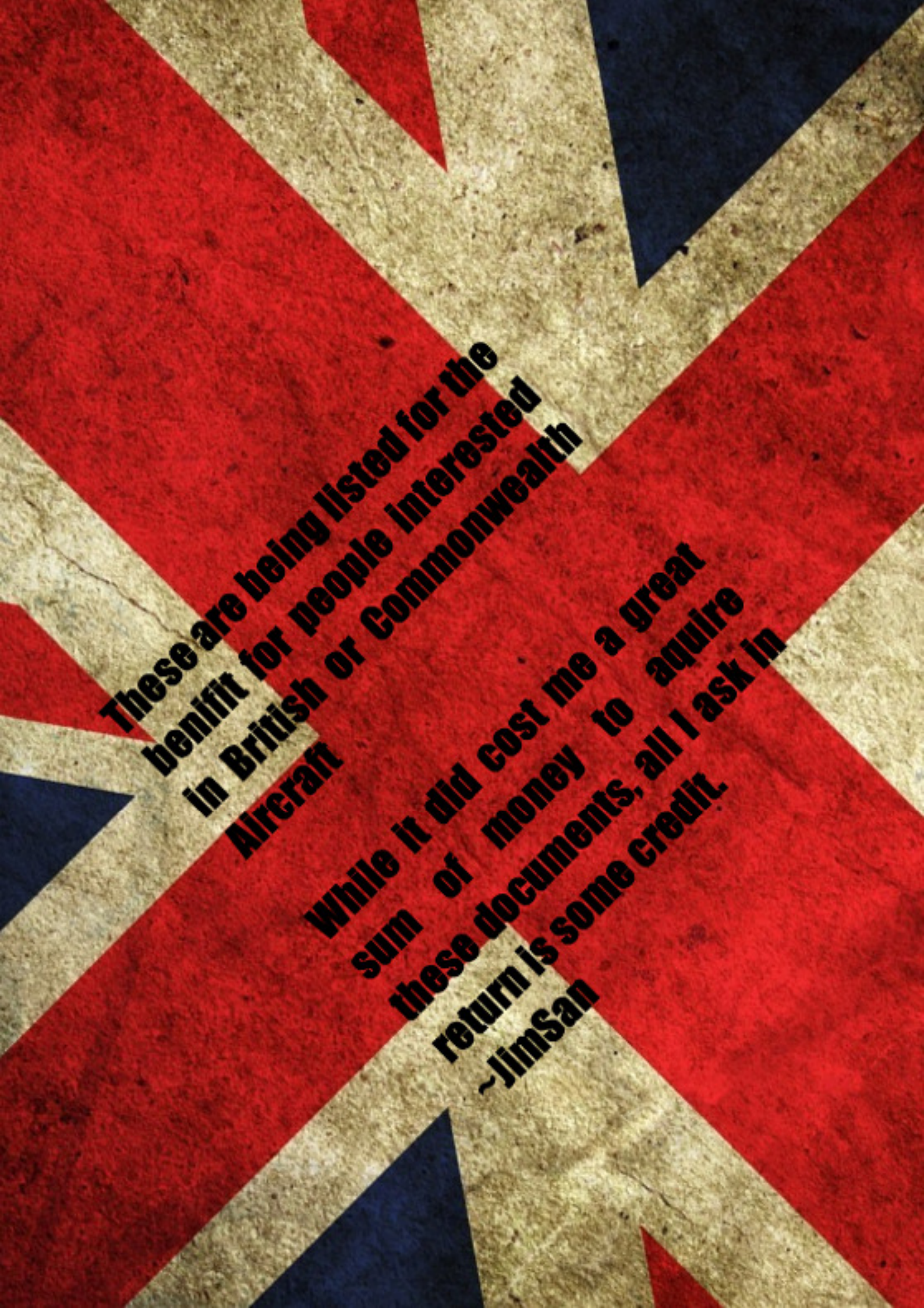
FIG
4

Key to Figs. 5, 6 & 7



- 1 to 4. See Key to Fig. 1
7. Gyro gun-sight
- 8 to 38. See Key to Fig. 1
39. Headrest
41. Vacuum flask
42. Flaps control
43. Propeller control
44. Throttle lever
46. Control for T.R.5043
50. Switch panel
52. Trimming tabs control unit
53. Front catapult spool control
55. Fire-extinguisher
57. Hood jettison control
58. Identification lights switchbox
60. Engine data plates
61. Starboard switch panel
62. Rheostat type H
63. Incendiary bomb
64. Floodlights
65. Oxygen master valve
66. Seat-raising handle
67. Signal cartridge stowage
68. Hydraulic handpump
69. Ammunition rounds counter
70. Junction box
71. Hood operating handle
72. Signal pistol
73. Camera footage indicator
74. Spare bulbs for gun-sight
76. Speaking tubes
77. Sunblind
82. Gun sight supply socket
83. Floodlight switch panel
89. Controller for A.R.I.5307
92. Ground/flight switch
95. R.P. auto-selector box
96. Long-range tank and bombs switch panel
97. Bombs auto-distributor box
98. Supercharger control switch and warning light
99. Viewing indicator mounting for A.R.I.5607
100. Radio altimeter
101. Radio altimeter indicator lights
102. Limit switch for radio altimeter
103. Junction box for A.R.I.5307/T.R.5043
104. Armament switch panel
105. Sighting selector and dimmer control for gyro-gun-sight
106. Guns/R.P. change-over switch
107. Switch panel
108. Voltage regulator for gyro-gun-sight
109. Suppressor for gyro-gun-sight
111. Junction box for gyro-gun-sight
115. Undercarriage warning lamp
116. Stowage for A.R.I.5607 viewing indicator visor
117. Gyro-gun-sight spare filament stowage
118. Instrument panel mask





**These are being listed for the
benefit for people interested
in British or Commonwealth
Aircraft**

**While it did cost me a great
sum of money to acquire
these documents, all I ask in
return is some credit.
~JimSan**