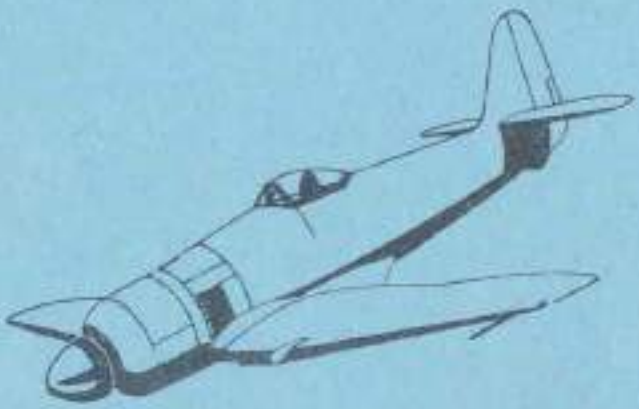
2nd Edition A.P. 4010A & B., F.N.

PILOT'S NOTES

FOR

SEA FURY 10 & 11



PREPARED BY DIRECTION OF THE MINISTER OF SUPPLY

A. C. Rowlands

PROMULGATED FOR INFORMATION AND GUIDANCE OF ALL CONCERNED BY COMMAND OF THEIR LORDSHIPS

J. G. Lang

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, 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.

A.L. NO.	INITIALS	DATE	A.L. NO.	INITIALS	DATE
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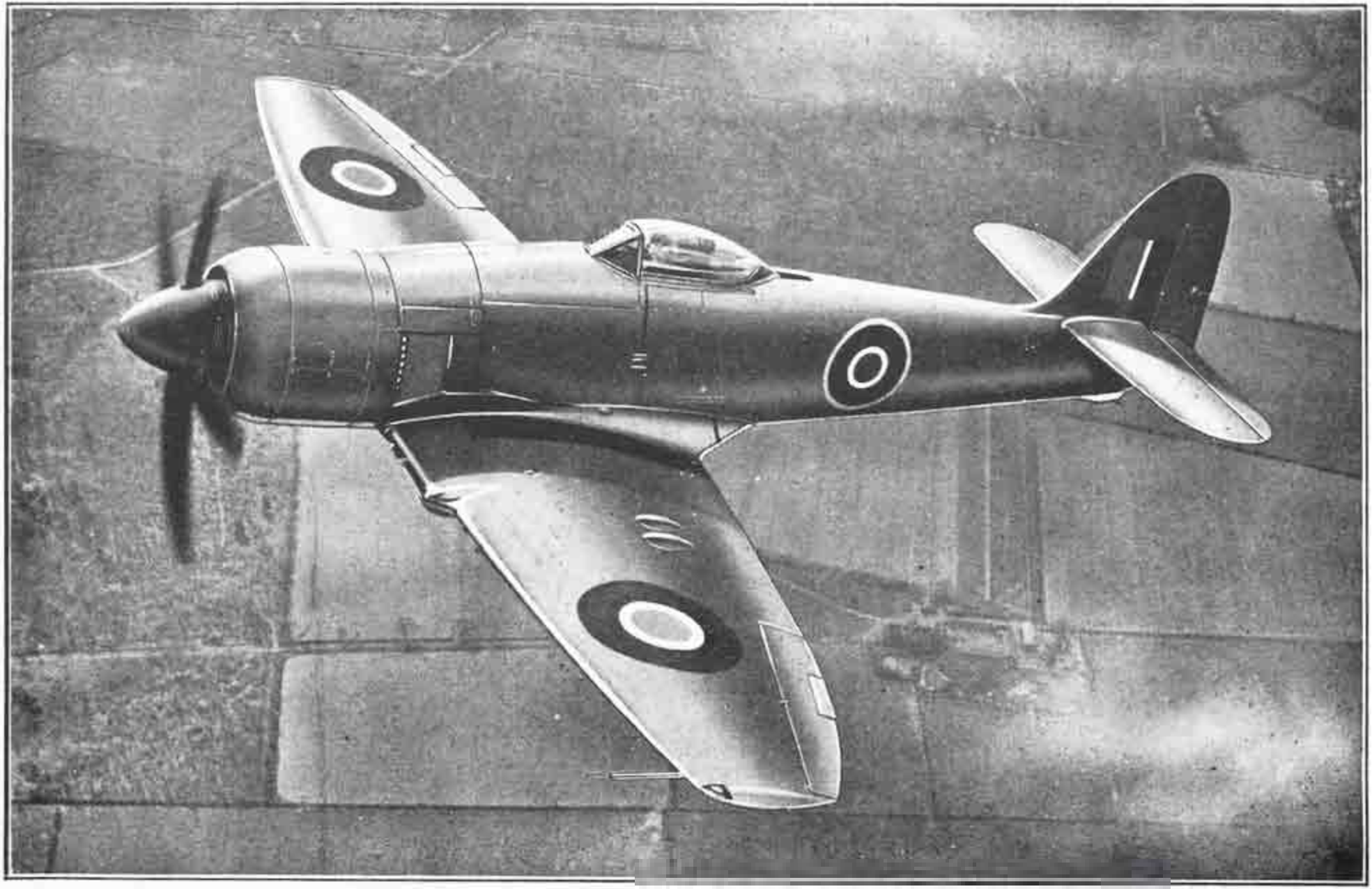
2			8		
3			9		
4			10		
5			11		
6			12		



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 Forms S134D or D397. The number of the publication must be quoted in full—A.P. 4018A & B—P.N.

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

SEA FURY Mks. 10 and 11.

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SEA FURY Mks. 10 and 11.

PILOT'S CHECK LIST.

(Excluding Items of Operational Equipment.)

ITEM	CHECK
External checks.	
N.B.—Start at the cockpit entrance on the port side and work clockwise round the aircraft.	
1. Port mainplane.	Condition of upper surface. Panels secure. Wing locking indicator not showing. Condition of flap. Condition of ZBX aerial.
2. Port aileron.	Condition. External control lock removed. Trimming tab locked.
3. Port navigation light.	Condition.
4. Port mainplane.	Condition of leading edge. Pressure-head cover removed. Security of drop tanks (if fitted). Condition of amber identification light. Condition of lower surface.
5. Port undercarriage.	Extension of oleo leg. Tyre for cuts and creep. Valve free. Brake lead secure. Condition and security of fairing doors. Condition of attitude light. Chock in position.
6. Oil cooler.	Condition. Condition and position of shutter.
7. Engine cooling shutters (port).	Position.
8. Port air intake.	Clear.
9. Fuselage under-surface.	Condition. All panels secure.
10. Engine.	Cowling secure. Absence of oil leaks. Condition of propeller and spinner.
11. Engine cooling shutters (starboard).	Position.
12. Starboard air intake.	Clear.
13. Starboard undercarriage.	Extension of oleo leg. Tyre for cuts and creep. Valve free. Brake lead secure. Condition and security of fairing doors. Spare starter cartridge container full. Chock in position.

	ITEM	CHECK
14.	Starboard mainplane	Condition of leading edge and lower surface. Security of drop tanks (if fitted). Condition of red and green identification lights.
15.	Starboard navigation lights.	Condition.
16.	Starboard aileron.	Condition. External control lock removed. Trimming tab locked.
17.	Starboard mainplane.	Condition of upper surface. Panels secure. Wing locking indicator not showing. Condition of flap. Condition of I.F.F. aerial.
18.	Rear fuselage.	Condition of starboard and under surfaces. Panels secure.
19.	Tailwheel.	Condition of tyre. Extension of oleo leg. Fairing doors, condition and security. Condition of attitude light.
20.	Starboard tailplane.	Condition of leading edge, upper and lower surfaces.
21.	Starboard elevator.	Condition. External control lock removed. Condition of trimming tab.
22.	Tail light (starboard).	Condition.
23.	Fin.	Condition of starboard side.
24.	Rudder.	Condition. External control lock removed. Condition of trimming tab.
25.	Arrester hook.	Condition and security.
26.	Tail light (port).	Condition.
27.	Port elevator.	Condition. External control lock removed. Condition of trimming tab.
28.	Port tailplane.	Condition of upper and lower surfaces. Condition of leading edge.
29.	Fin.	Condition of port side and leading edge.
30.	Rear fuselage.	Condition of port side. Condition of V.H.F. radio aerial. Operation of footstep. Canopy external jettison toggle secure.
	Mount the wing and check :- –	
31.	Cockpit canopy.	Condition and security. Jettison pins projecting. Locking pin in shallow slot.

	ITEM	CHECK
32.	Fuselage top panels.	Condition and security.
	Internal checks.	
33.	Internal control locks.	Removed and stowed.
34.	Wing folding lever.	Spread. Locking catch engaged.
35.	Undercarriage lever.	Down. Locking catch engaged.
36.	Pilot's seat.	Adjust for height.
37.	Rudder pedals.	Adjust for reach.
38.	Flying controls.	Full and correct movement.
39.	Wheel brakes.	On.
	Cockpit checks.	
	N.B.—Set the ground/flight switch to flight and then work from left to right.	
40.	Hydraulic handpump.	Check operation.
41.	Bomb rack jettison (Mk. 11 aircraft).	Fully down.
42.	Trimmers.	Full and correct movement.
43.	R.A.T.O.G. master switch.	Off.
44.	Supercharger gear change lever.	M (up).
45.	Fuel cut-off lever.	Cut-off.
46.	Throttle.	Full and free movement. Adjust friction.
47.	R.p.m. control lever.	Full and free movement. Max. r.p.m position.
48.	Flap lever.	Up.
49.	Arrester hook release.	Forward.
50.	Training switch.	Off.
51.	Undercarriage indicator switch.	On. Check green lights on. Change-over switch and dimmer screen.
52.	Ignition switches.	Off.
53.	R.I. compass.	Reading.
54.	Flap position indicator.	Reading.
55.	Altimeter.	Set as required.
56.	Direction indicator.	Caged.
57.	Magnetic compass.	Serviceability. Reading.
58.	Cockpit lighting.	Test all lamps. Set as required.
59.	Windscreen de-icing pump.	Operation.
60.	Generator warning light.	On.
61.	Oxygen.	Contents and delivery.
62.	Engine cooling shutters switch.	Operation. Shutters open.
63.	Boost gauge.	Static reading.

	ITEM	CHECK
64.	Canopy jettison handle.	In.
65.	Canopy.	Operation of winding handle.
66.	Undercarriage emergency release (early aircraft).	Fully down.
67.	Undercarriage and flaps emergency levers (later aircraft).	Back. Locking pin secure.
68.	**Main** fuel cock.	On.
69.	Drop tanks jettison lever.	Forward (if tanks fitted). Back, and locking plate in position (if tanks not fitted).
70.	Wing/drop tanks cock.	Off.
71.	Mixer switch.	R/T position.
72.	Cockpit heater.	As required.
73.	Tailwheel locking lever.	Free (back).
74.	Fuel gauges.	Check contents.
75.	Identification and navigation lights.	As required.
76.	Pressure-head heater.	Off.
77.	Air-intake filter control.	Check operation and warning lights. Set to clean air.

	ITEM	CHECK
78.	Air-intake heat control.	Normal.
79.	Fuel pump circuit breaker.	Made.
80.	Harness.	Adjust.
	Start and warm up the engine (see para. 52).	
81.	Flaps.	Operation.
82.	Direction indicator.	Set with R.I. compass. Uncage.
83.	Radio.	Test VHF and other radio aids. Altimeter setting.
84.	Pneumatic pressure.	Supply increasing.
	Run up and test the engine (see para. 53).	
85.	Chocks.	Clear.
86.	Taxying.	As soon as possible test the brakes. Direction indicator for accuracy. Artificial horizon for accuracy. Temperatures an pressures. Pressure-head heater on if required.
	Checks before take-off.	
87.	Trimming tabs : Elevator. Rudder.	 Neutral (without flap). ½ Div. nose up (with flap). Fully left.
88.	Throttle.	Friction adjusted.
89.	R.p.m. control lever.	Max. r.p.m. position.

	ITEM	CHECK
90.	Fuel.	Main cock on. Check contents.
91.	Flaps.	Up (airfield). Max. lift (catapult). Take-off (carrier).
92.	Wings.	Correctly spread and locked.
93.	Engine cooling shutters.	Open.
94.	Super-charger.	M (low gear)
95.	Air-intake heat control.	Normal.
96.	Air-intake filter control.	Clean. Ram (carrier take-off).
97.	Sliding canopy.	Locked open.
98.	Harness.	Locked.
99.	Engine.	Clear if necessary.
100.	Tailwheel	Locked.

Checks in flight as necessary.

Checks before landing.

Reduce speed below 185 knots.

101.	Pneumatic supply.	Pressure 450 lb./sq. in. Pressure at each brake.
102.	Super-charger control.	M (low gear).
103.	Air-intake heat control.	Off.
104.	Air-intake filter control.	Clean (ram for carrier landing).
105.	Fuel.	Contents.
106.	Engine cooling shutters.	Shut.
107.	Tailwheel.	Locked (airfield). Unlocked (carrier).

	ITEM	CHECK
108.	Canopy.	Open.
109.	Under-carriage.	Down and locked. Green lights on. Visual indicators protruding.
110.	Flaps.	Max. lift.
111.	R.p.m. control lever.	Set for 2,400 r.p.m.

Reduce speed below 140 knots.

112.	Flaps.	Down.

After landing.

113.	Tailwheel.	Unlocked.

When clear of the landing area.

114.	Flaps.	Up.
115.	Engine cooling shutters.	Open.
116.	R.p.m. control lever.	Max. r.p.m.
117.	Pressure-head heater.	Off.
118.	Brake pressure.	Sufficient for taxying.

On reaching dispersal.

Stop the engine (see para. 69).

119.	Ignition switches.	Off.
120.	Electrical services.	All off.
121.	Fuel cock.	Off.
122.	Ground/flight switch.	Ground.
123.	Direction indicator.	Caged.
124.	Chocks.	In position.
125.	Brakes.	Off.
126.	Control locks.	On.
127.	Pressure-head cover.	On.

FINAL CHECKS FOR TAKE-OFF

TRIM	ELEVATOR : NEUTRAL
	RUDDER : FULLY LEFT
R.P.M. CONTROL	MAX. R.P.M.
FUEL	CHECK CONTENTS
	MAIN TANK
	BOOSTER PUMP ON
WINGS	SPREAD AND LOCKED
FLAPS	TAKE-OFF (CARRIER)
	MAX. LIFT (CATAPULT)
	UP (AIRFIELD)
TAIL WHEEL	LOCKED

FINAL CHECKS FOR LANDING

BRAKES	..	OFF CHECK PRESSURES
FUEL	...	CHECK CONTENTS MAIN TANK
HOOK	..	DOWN (if required)
WHEELS	...	DOWN AND LOCKED
TAIL WHEEL	...	UNLOCKED (CARRIER) LOCKED (AIRFIELD)
R.P.M. CONTROL	...	Set to 2,400 R.P.M.
FLAPS	..	DOWN

PART I
DESCRIPTIVE

NOTE.—Throughout this publication the following conventions apply :—

(a) Words in capital letters indicate the actual markings on the controls concerned.

(b) The numbers quoted in brackets after items in the text refer to the illustrations in Part V.

(c) Unless otherwise stated all speeds are indicated airspeeds.

1. INTRODUCTION

(i) The Sea Fury Mk. 10 and Mk. 11 are single-seat low-wing monoplane fighters and fighter bombers designed for duties in the Royal Navy. The Mk. 10 and Mk. 11 are similar aircraft except that the latter is equipped to carry the 100/1,000 lb. jettisonable wing bomb carriers. A variety of external stores can be carried (see para. 71). The aircraft are each powered by a Centaurus Mk. 18 engine driving a Rotol five-bladed 35° constant-speed propeller, and the engine is fitted with a Hobson/R.A.E. injector pump and a two-speed supercharger.

(ii) The aircraft is equipped for operation in both temperate and tropical climates and can operate either from land or an aircraft carrier, provision being made for both catapult and rocket-assisted take-offs and for arrested landings.

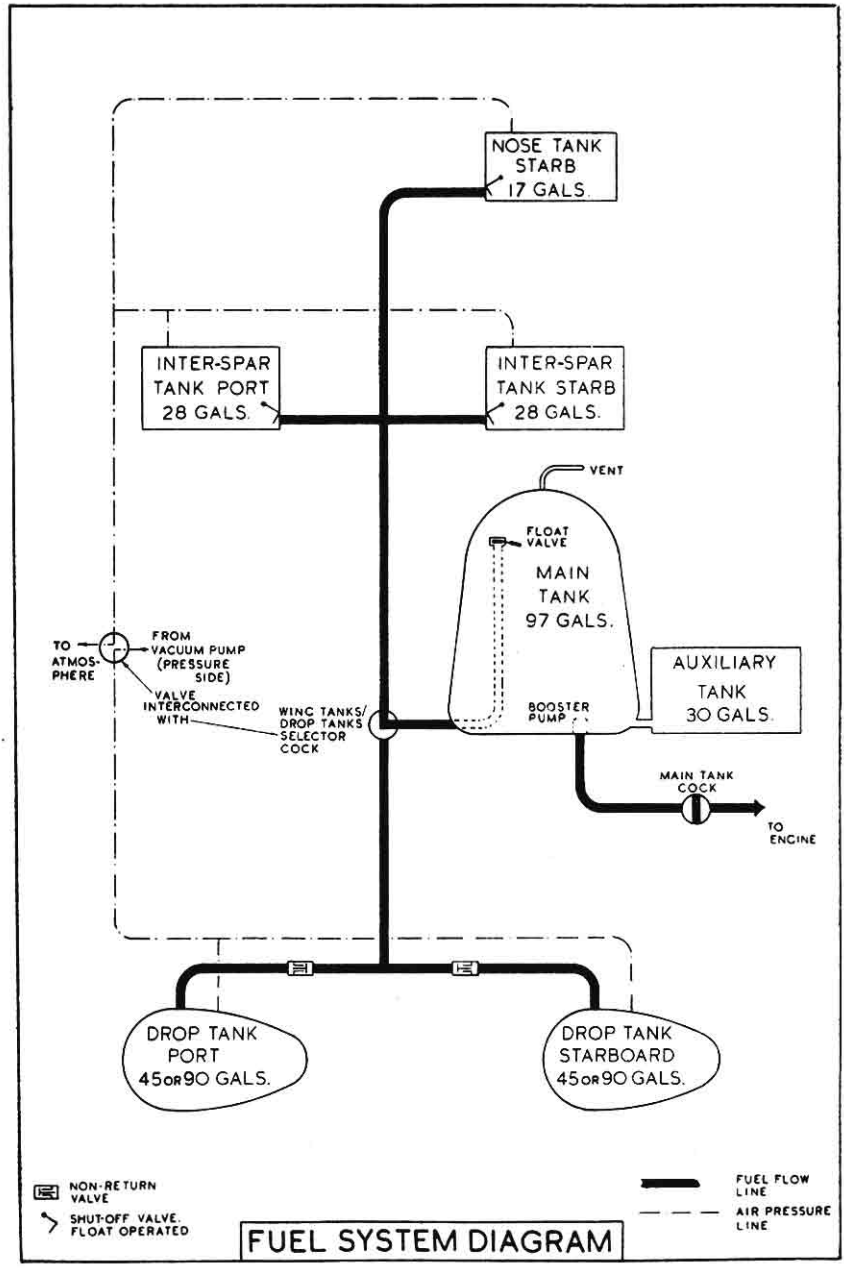
(iii) The outer planes can be folded upwards hydraulically to facilitate stowage below deck.

(iv) The ailerons and rudder incorporate torsion-bar-operated " spring tabs " as well as trimming tabs ; the aileron trimming tabs are adjustable only on the ground.

FUEL AND OIL SYSTEMS

2. **Fuel tanks**

Fuel is carried in five self-sealing tanks, two in the fuselage aft of the fireproof bulkhead and three in the wings,



FUEL SYSTEM DIAGRAM

there being two inter-spar tanks and one nose tank which is carried in the starboard wing. The two fuselage tanks are interconnected and for all practical purposes may be regarded as one main tank. The fuel from the main tank is fed to the engine through the Hobson/R.A.E. injector pump, and the fuel from the other three tanks is transferred to the main tank by air pressure from the exhaust side of the vacuum pump. A float valve in the main tank prevents it from being over-filled with fuel from the other tanks. When the contents of the two fuselage tanks fall to below 117 gallons the float valve opens and allows fuel from the wing tanks (which are all inter-connected) to fill up the main tank to this level constantly, so long as this supply lasts.

The capacities of the tanks are :—

Main (fuselage) tank	97	gallons
Auxiliary (fuselage) tank	30	gallons
2 Inter-spar (wing) tanks, each 28 gall. ...	56	gallons
Nose (starboard wing) tank	17	gallons
Total ...	200	gallons

A drop tank of 45 or 90 gallons capacity may be carried under each wing, the fuel from these tanks being transferred to the main tank in the same way that the wing tank fuel is transferred. When necessary these tanks can be jettisoned by means of the lever (93) on the cockpit starboard shelf.

3. **Fuel cocks**

(i) There is no provision for isolating separate tanks, the wing tanks or alternatively the drop tanks, being used as a group. The transfer of fuel from the wing tanks, or from the drop tanks, to the main tank is controlled by a single selector lever (94) on the cockpit starboard shelf.

(ii) When this lever is moved forward to ON, fuel is transferred from the drop tanks, and the wing tanks are turned off and vented to atmosphere. When it is pulled back to OFF, fuel is transferred from the wing tanks and the drop tanks are turned off and vented to atmosphere.

NOTE.—When drop tanks are not fitted this lever must not be moved forward as this will prevent fuel being transferred from the wings tanks. To

prevent the lever being accidentally moved, a lock plate is provided and must be screwed in place at all times when the aircraft is operating without drop tanks.

(iii) The main tank is not pressurised and the flow of fuel from it to the engine is controlled by the main fuel cock (92) which is also mounted on the starboard shelf.

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4. Fuel booster pump and priming system

An electric fuel booster pump is fitted in the sump of the main tank. It is switched on automatically when the engine oil pressure rises above 30 lb./sq. in. It is switched off again when the pressure falls below this figure. When Mod. 309 is incorporated the pump is manually controlled by switch at the forward end of the cockpit starboard shelf. The switch should be on before flight and off after landing.

For priming purposes, two pushbuttons, one marked CYLINDER PRIMING (80) and the other marked INJECTOR PRIMING (81) are fitted on the cockpit starboard shelf. When the INJECTOR PRIMING pushbutton is depressed it starts up the booster pump, and pumps fuel to the injector; when the CYLINDER PRIMING pushbutton is depressed it also starts up the booster pump, but in addition operates a solenoid which allows a quantity of fuel to be injected into the cylinders by the booster pump. These pushbuttons will only energise the booster pump when the fuel cut-off is in the CUT-OFF position (this is to prevent inadvertent flooding of the engine), but when the CYLINDER PRIMING pushbutton is depressed the solenoid referred to above opens irrespective of the position of the fuel cut-off.

When Mod. N.22 is embodied a high-pressure pump for priming the cylinders is fitted in addition to the booster pump, and the letters H.P. are painted on the spring loaded flap over the CYLINDER PRIMING pushbutton which then operates the high-pressure pump irrespective of the position of the fuel cut-off, but when the latter is in the CUT-OFF position, depressing the CYLINDER PRIMING pushbutton operates both the booster and high-pressure priming pumps.

When the high-pressure pump is fitted, provision is made for priming the cylinders with high volatility fuel from an outside container via a connection in the port wheel-well.

NOTES.—(a) Should the booster pump fail when the engine is running, fuel can still be supplied to the engine by the injector pump.

(b) The booster pump circuit is protected by a circuit breaker (105) at the aft end of the cockpit starboard shelf. If the booster pump does not apparently work, it may be necessary to depress the circuit breaker button to complete the circuit ; if there is a fault in the circuit the button will spring out again.

5. **Fuel contents gauges.**

The four fuel contents gauges (77), (83) and (82) for the main tank, the port and starboard interspar tanks and the starboard nose tank are mid-way along the cockpit starboard shelf and are switched on by the ground/flight switch (88). The main tank gauge, which is of the Pacitor type, will not register correctly until its power unit warms up, about half a minute after switching on. There are no contents gauges for the drop tanks.

6. **Fuel level warning light**

The warning light (78) beside the fuel contents gauges comes on when the contents of the main tank have fallen to approximately 107 gallons, thus indicating that fuel has ceased to transfer from the wing and drop tanks. No fuel pressure warning light is fitted.

7. **Fuel tanks air pressure gauge**

An air pressure gauge (119) marked TANK AIR is also fitted on the cockpit starboard shelf and shows the air pressure available for transferring fuel from the wing or drop tanks to the main tank. The correct air pressure is $3\frac{1}{4}$ to 5 lb./sq. in. ; if the pressure is below $3\frac{1}{4}$ lb./sq. in. fuel transfer will be unsatisfactory at high altitudes.

8. **Oil system**

(i) The oil tank is situated in the engine bay, forward of the fireproof bulkhead and has a capacity of 14 gallons of oil, with a 4-gallon air space. A negative "g" valve ensures a continuous supply of oil to the engine under all conditions of flight.

(ii) The oil cooler is in the port wing root and the cooling system is automatic, the shutter being operated by a thermostatically controlled electric jack.

(iii) An oil dilution system is fitted. The operating pushbutton (104) is situated on the cockpit starboard panel.

MAIN SERVICES

9. **Hydraulic system**

An engine-driven pump which maintains a pressure of 1,800 lb./sq. in. in the system operates the :—

Flaps
Undercarriage and wheel doors
Wing-folding mechanism.

In the event of failure of the engine-driven pump, or if the engine is not running, a handpump (72) on the port side of the pilot's seat, will operate all services through a separate pipe-line.

10. **Pneumatic system**

An engine-driven compressor charges an air bottle at 450-470 lb./sq. in. for the operation of the :—

Brakes
Undercarriage assisters (early Mk. 10 aircraft only)
Undercarriage and flaps emergency operation (not early Mk. 10 aircraft).

A triple pressure gauge (36) is mounted at the bottom starboard corner of the instrument panel.

11. **Electrical system** (24 volt)

(i) An engine-driven generator charges two aircraft batteries and supplies the usual lighting and other services, including :—

Air intake filter shutters
Bomb and R.P. controls
Engine cooling shutters control
Engine instruments
Fuel booster pump
Fuel contents gauges
Gun firing and cameras

Gyro gunsight
Oil cooler shutters
Pressure-head heater
Radio
R.I. compass.

(ii) A ground/flight switch (88) on the cockpit starboard shelf is used to isolate the aircraft batteries when the aircraft is parked or when an external battery is plugged in.

(iii) A generator failure warning light (28) on the upper starboard side of the instrument panel comes on when the generator is not charging the aircraft batteries.

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AIRCRAFT CONTROLS

12. **Flying Controls**

(i) The control column is of the spade grip pattern and incorporates the brake lever and the gun firing control (43) which also controls the cine-camera and bomb or R.P. firing.

(ii) The rudder pedals can be adjusted for reach by a foot operated wheel in the centre of the bar.

(iii) When Mod. 335 is incorporated, the inertia weight of the elevator controls is increased to compensate for the simultaneous fitting of A.R.I. 5491 and a G4F compass. **Should any of this equipment not be carried subsequent to the incorporation of Mod. 335 appropriate ballast must be carried in lieu.**

13. Flying controls locking gear

The gear is stowed in a bag on the starboard side of the cockpit behind the pilot's seat and comprises a hinged clip and four cables. The clip is fitted to the control column and the short pair of cables to the outside flanges on the rudder pedals. With the seat lowered, the long pair of cables is hooked to the seat, using the holes provided, and the cables are tensioned by adjusting the rudder bar and then raising the seat.

NOTE.—There is no direct linkage between the control column and the ailerons, therefore it is essential to lock the ailerons to the wing trailing edges by means of special clamps (supplied as ground equipment) in addition to applying the normal locking gear. If this is not done, severe damage may be caused to the spring tabs.

14. Trimming tabs

The trimming tab control box is mounted below the cockpit port shelf and only the two handwheels and the tab

position indicators are visible from the pilot's seat. The elevator tabs are controlled by the large handwheel (70) on the inboard side of the box, and the bias of the rudder spring tab is adjusted by the smaller handwheel (71) at the top of the box. Both handwheels work in the natural sense, and the tab position indicators are fitted between them. No aileron trim controls are fitted, but pre-set trimming tabs are fitted to the ailerons. These may be adjusted, if necessary, between flights.

15. Undercarriage operation

The undercarriage selector lever (69) moves in a quadrant, on the side of the cockpit port shelf marked UP in the forward and DOWN in the aft position. A safety catch (67) inboard of the quadrant must be pushed up before the lever can be moved from either the UP or DOWN position. (See paras. 72 and 73 for emergency lowering of the undercarriage.) On no account should the safety catch be pushed up preparatory to taxying, since if a member of the ground crew should, by mistake, attempt to close the footstep (see para. 32) which is interconnected with the undercarriage lever, it is possible for the undercarriage lever to be moved to the UP position.

16. Undercarriage position indicators

(i) The electrical visual indicator (1) on the port side of the instrument panel has three green lights (for main wheels and tailwheel) and two red lights (for main wheels only).

The indicator lights show :—

Green	...	corresponding wheel locked down.
Red	...	corresponding main wheel between locks.
No lights	...	main wheels locked up and fairing doors closed.

The central knob on the indicator is pulled out to bring the reserve set of green lights into operation and rotated to operate the dimmer screen for night flying.

The indicator ON-OFF switch (5) on the instrument panel has a sliding bar which prevents the ignition switches from being operated unless this switch is ON.

The undercarriage indicator circuit is also interconnected electrically with the engine cooling shutters circuit, so

that if the undercarriage indicator switch is set to OFF (and the ground/flight switch is at FLIGHT or an external battery is plugged in) the engine cooling shutters will always assume the fully open position irrespective of the position of the engine cooling shutters switch (30) (see para. 28).

(ii) When the undercarriage main wheels are down a small rod protrudes through the upper surface of each wing.

(iii) A red light (14) on the port side of the gyro gunsight comes on if the throttle lever is less than one third open and the wheels are not locked down.

(iv) An attitude light is fitted to the port undercarriage leg and comes on when the arrester hook is down (or the training switch is ON) and the port undercarriage leg is down and locked.

17. **Arrester hook control**

(i) The arrester hook control (66) is mounted just forward of the undercarriage control, and is pulled back to lower the hook, which cannot be re-engaged in the up position during flight. Should the lever be accidentally pulled a normal landing can be made without fear of damaging the hook or the structure.

(ii) A green indicator light (64) is positioned on the cockpit port shelf beside the arrester hook control, and indicates when the hook is down. An attitude light fitted inside the port tailwheel door also comes on when the hook is lowered.

(iii) A switch (65) marked TRAINING SWITCH is mounted beside the deck hook indicator light. This switch should always be left in the OFF position and should not be used.

18. **Flaps control and position indicator**

(i) The flaps are hydraulically controlled by a pre-selector lever (63) mounted on the cockpit port shelf, so that the flap angle follows the position of the lever in the quadrant. The lever may be left in any intermediate position but there are four positions specially marked UP, TAKE-OFF, MAX. LIFT and DOWN. If the engine-driven pump fails, or if the engine is not running, the flaps can be operated by using the handpump (72).

(ii) The setting of the flaps is shown on an indicator (8) on the port side of the instrument panel.

19. **Wheel brakes**

The control lever for the pneumatic brakes is on the control column spade grip. A parking catch is provided and differential control of the brakes is provided by a relay valve connected to the rudder bar. The triple pressure gauge (36) on the starboard side of the instrument panel shows the air pressure in the storage cylinder (450-470 lb./sq. in. maximum) and at each brake (110 lb./sq. in.).

20. **Tailwheel lock**

The tailwheel locking control (116) is on the starboard side of the cockpit. When the knob at the side of the control is pulled the control springs forward into the "tailwheel locked" position. To unlock the tailwheel the control is pulled back.

21. **Wing folding control**

(i) The lever (110) for operating the hydraulic wing-folding jacks is mounted in a quadrant on the cockpit starboard shelf, level with the back of the seat. It moves downwards from FOLDED to SPREAD, and is protected by a safety catch (111) similar to that of the undercarriage (see para. 15). The lever cannot, however, be moved to the SPREAD position unless the flaps selector lever (63) is at UP.

(ii) If the engine-driven pump fails, or if the engine is not running, the wing folding mechanism can be operated by using the handpump, and in the event of complete failure of the hydraulic system the wings can be folded manually by the ground crew.

(iii) There is a visual indicator on the top surface of each wing which lies flush with the surface of the wing when the locks are home, and rises above the wing when the locks are withdrawn.

ENGINE CONTROLS

22. **Mixture control**

The mixture control is entirely automatic and is governed by the setting of the throttle lever (11). An economical

mixture strength is obtained when the throttle lever is at a position which will give 2,250 r.p.m. or less with the r.p.m. control lever in the AUTO position (see para. 23).

23. **R.p.m. control lever**

(i) The lever (9) on the engine control box moves forward to MAXIMUM and back to AUTO. With the lever at AUTO, r.p.m. are controlled automatically by the setting of the throttle lever, but with it at MAXIMUM the inter-connection device is overriden and r.p.m. are then governed at 2,700 r.p.m.

(ii) The lever can be used in the same way as the conventional r.p.m. control lever to enable the pilot to select higher r.p.m. than those with the lever in the AUTO position. If higher r.p.m. than those obtainable in the AUTO position at a given throttle setting are selected, automatic control of the r.p.m. will still apply if the throttle is opened beyond the position at which the selected r.p.m. would normally be obtained. Indiscriminate use of the r.p.m. control will increase fuel consumption considerably.

(iii) The friction damping control (2) for the throttle also serves the r.p.m. control lever.

24. **Fuel cut-off control**

The two-position fuel cut-off control (61) is the red-topped lever at the rear of the engine controls box, and is moved down from NORMAL to CUT-OFF. The control must be in the CUT-OFF position before the injector priming and cylinder priming pushbuttons will work (see para. 4).

25. **Supercharger control and warning light**

(i) The supercharger change-gear control is the black-topped lever (59) at the rear of the engine controls box and is moved downwards from low (M) gear to high (S) gear.

(ii) A warning light (6) on the port side of the instrument panel indicates when the supercharger is in high gear below 7,000 ft.

26. **Air-intake filter control**

(i) Normally air is drawn into the engine through two ram intakes in the wing root leading edges, but filtered air

can be supplied to the engine when required through filters just above the engine under-panel, and the wing root intakes are blanked off.

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(ii)
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(ii) The air intake shutters are controlled by a two-position selector switch (74), marked RAM AIR and CLEAN AIR, on the cockpit starboard shelf. Two micro switches incorporated in the circuit override the selector and cause the shutters to move to the CLEAN AIR position whenever the WARM AIR intake heat selector lever is moved to ON.

(iii) Two red warning lights (75) beside the filter switch, marked PORT AIR and STBD. AIR, indicate while the electric jacks are in operation to change from clean air to ram air or vice versa. Should one or both of the electric jack motors fail in an intermediate position the appropriate light(s) will stay on.

27. Air-intake heat control

The air-intake heat control is manually operated by a lever (109) at the rear of the cockpit starboard shelf. When this control is moved to the WARM AIR–ON position, warm air from the engine bay is taken into the intake ducts and an interconnection ensures that the wing root intakes are simultaneously blanked off by movement of the filter shutters, although the filtered air intakes are still open.

Except under conditions of extreme cold this control should always be in the OFF position.

28. Engine cooling shutters control

(i) The engine cooling shutters are operated electrically by means of a three-position switch (30) mounted on the starboard side of the instrument panel. The three positions of the switch are OPEN, OFF and SHUT. The OFF position allows the pilot to select any intermediate position of the shutters, but the switch need not be returned to the OFF position if the shutters are fully opened or fully shut, as the shutters motor cuts out automatically when these positions are reached.

(ii) When the undercarriage indicator switch (5) is moved to OFF it overrides the engine cooling shutters switch and moves the shutters to the fully open position if electric power is available (see para. 16).

(iii) No engine cooling shutters position indicator is fitted as the shutters are normally fully open for take-off and

climb, and closed for all other conditions of flight, but as opening the shutters causes a nose-down change of trim in flight it is possible to check their operation.

29. **Engine starting controls**

The ignition switches (4) are on the port side of the instrument panel, and the combined cartridge starter and booster-coil pushbutton (79) is on the cockpit starboard shelf beside the priming pushbuttons. There is also a booster-coil test pushbutton (108) to the rear of the same shelf. The pushbutton enables the booster coil to be tested without firing a starter cartridge.

30. **Coffman starter re-indexing control**

The toggle (44) at the bottom port side of the instrument panel is pulled out and returned gently to re-index the Coffman starter breech.

COCKPIT EQUIPMENT

31. **Sliding canopy controls**

(i) *Operation.* To operate the winding gear the spring-loaded knob on the crank lever (29) should be pulled out while the crank lever is rotated in the required direction. When the knob is released the canopy will be locked in position provided that the projection on the knob is not engaged with the crank lever. Before leaving the cockpit, the knob on the crank lever should be pulled out as far as possible and turned until the projection on the knob engages in a small recess in the crank lever ; this permits the canopy to be moved from the outside by hand.

(ii) *Locking from outside.* To lock the canopy shut from the outside the knob should first be set as in sub para. (i) and the canopy closed by hand. A handgrip is fitted at the back of the canopy to help in closing it. The spring-loaded locking bolt in the side of the fuselage should then be engaged with the slot in the starboard side of the canopy framing. One end of this spring-loaded locking bolt engages in the sliding canopy, and the other end incorporating a pin, lies in a deep slot when in the

canopy-locking position, and in a shallow slot when not in use.

NOTE.—Before flight, the bolt must be positioned so that the pin is properly home in the shallow slot. With the pin in any intermediate position, vibration may cause it to rotate and fall into the deep slot, locking the canopy, or preventing it shutting fully, if it is open when this occurs. Accidental locking of this nature in flight with the canopy closed will prevent its normal opening, and may prevent its emergency release.

(iii) *Opening the canopy from outside.* If the canopy has been locked in the closed position, the spring-loaded locking bolt must first be pushed in and rotated a quarter turn with a screwdriver. The canopy may then be pushed back by hand.

(iv) In emergency the canopy may be jettisoned from inside by means of the T-handle (34) and from outside by means of the toggle above the port wing fillet (see para. 75).

(v) To prevent inadvertent jettisoning of the canopy, check before take-off that the jettison pins are projecting through the channels by about $\frac{1}{8}$ inch, and that the sliding mechanism functions correctly by closing and opening the canopy.

32. **Retracting footsteps**

(i) A retracting footstep in the port side of the fuselage behind the wing is connected by an elastic cord to a hand-hold behind the cockpit. When the footstep is pulled down, the cover over the hand-hold opens and sets a trigger so that, by closing the hand-hold cover, the footstep automatically retracts. Care must be taken to ensure that the footstep is correctly retracted before flight; otherwise, engine fumes may be drawn into the cockpit.

(ii) A second footstep in the side of the fuselage is automatically closed and opened when the undercarriage is raised and lowered (see para. 15) and a third footstep in the wing root is spring-loaded to return to its position flush with the wing when the foot is removed from it.

33. **Cockpit lighting**

(i) *U/v lighting.* The rheostat switch (27) on the top starboard side of the instrument panel controls the two u/v lamps fitted beneath the coaming.

(ii) *Red lighting.* Four red lamps are fitted to illuminate the instrument panel and the starboard and port shelves. These lamps are controlled by a master switch (24) at the top of the instrument panel, and dimmer switches are fitted to the left of the switch, and on each shelf.

(iii) *Emergency lighting.* A single emergency lamp (20) is fitted for use only in the event of complete electrical failure. It is powered by a separate small battery and is controlled by a switch (25) beside the red lamps master switch.

34. External lighting

(i) *Identification lights.* The red and green downward identification lights are mounted under the starboard wing and the amber light under the port wing. The colour selector switch (85) and the signalling switch (76) are on the cockpit starboard shelf with the morse pushbutton (84) mounted between them.

(ii) *Navigation lights.* Four navigation lights are fitted, one at each wingtip and two in the tail, one on each side of the fuselage. The navigation lights switch (86) is on the cockpit starboard shelf. The navigation light circuit is connected to the arrester hook micro-switch so that when the hook is lowered the navigation lights are switched on, thus enabling the batsman to see the attitude of the aircraft during night landings.

(iii) *Attitude lights.* Two attitude lights, one on the port undercarriage leg and one on the tailwheel door port fairing, indicate when the arrester hook is lowered if the undercarriage is down (see paras. 16 and 17). These lights serve as an indication for the batsman when night landings are being carried out.

35. Oxygen system

Two high-pressure oxygen cylinders are carried in cradles inside the fuselage beneath the cockpit floor. The oxygen supply is controlled by the regulator (31) on the starboard side of the instrument panel, and is connected to the flexible oxygen tube (112) on the starboard side of the pilot's seat.

36. **Pressure-head heater**

The heater element for the pressure-head on the port wing is controlled by a two-position switch (87) on the cockpit starboard shelf.

37. **Pilot's seat and headrest**

(i) The height of the pilot's seat may be adjusted by means of a lever on the starboard side of the seat. The knob at the top is depressed to unlock and the lever then works in the natural sense to raise or lower the seat.

(ii) To enable the pilot to move forward without unlocking his safety harness, a control lever (98) is mounted on the cockpit starboard wall. The lever operates a spring-loaded release unit and should be pulled up to slacken the harness.

(iii) The pilot's headrest is fitted to the armour plated seat back and is not adjustable.

38. **Cockpit air-conditioning**

The cockpit air-conditioning is controlled by a hand-wheel (117) on the starboard side of the cockpit. The supply of air to the feet can be varied between WARM and COLD, but only COLD air can be selected for the upper part of the cockpit. A ventilating louvre (13) for the cold air supply can be directed where required but cannot be shut off.

39. **Windscreen de-icing**

A tank containing the de-icing fluid is mounted in the port wheel bay and is pumped to a spray in front of the windscreen by a pump (26) mounted on the starboard decking just aft of the instrument panel.

OPERATIONAL CONTROLS

40. **Gyro gunsight**

(i) A Mk. 4B gyro gunsight is mounted above the instrument panel. The gunsight master switch (15) is on the port side of the top of the instrument panel, the selector-

dimmer switch (12) is above the contacting altimeter and the control (22) which enables the G.G.S. to be used in conjunction with R.P. is on the starboard side of the G.G.S. Two skid indicators (16) and (23) are mounted on the cockpit coaming, one on each side of the gunsight.

(ii) The G.G.S. camera recorder motor runs continuously whenever the G.G.S. master switch is ON. The G.G.S. should, therefore, not be switched on unnecessarily.

(iii) The G.G.S. is automatically caged whenever the GUNS/R.P. switch is at R.P. When the cine-camera circuit is energised the G.G.S. is uncaged until the R.P. portion of the firing button is depressed when the G.G.S. is again caged.

(iv) When the G.G.S. is used in conjunction with R.P. the span knob on the span scale should be set to R.P.

41. **Guns/R.P. firing**

(i) The four 20 mm. guns are fired electrically and the gun-firing control consists of a selective switch (43) mounted on the control column spade grip, the same switch controlling the bomb, R.P. or cine-camera firing.

(ii) To fire the guns the safety plate should be set to FIRE and the top of the switch depressed. This action also operates the cine-camera and/or camera recorder if the cine master switch (17) is ON.

(iii) To fire the R.P., the R.P./BOMBS master switch (53) on the cockpit port wall should be set to R.P. and the bottom of the selective switch depressed. When firing R.P. if it is desired to use the cine-camera and/or camera recorder, the camera master switch should be ON and the camera portion of the firing button should be depressed when approaching the target. This starts the cine-camera and or camera recorder and uncages the G.G.S. When the R.P. portion of the selective switch is depressed the cine-camera and/or recorder are stopped and the G.G.S. caged, as the R.P. are fired.

(iv) A safety relay coupled to the undercarriage locks prevents inadvertent firing of the guns when the aircraft is on the ground. A butt test switch is fitted in the starboard centre wing to enable the guns to be tested at the stop-butts.

42. **Cine-camera and camera recorder**

A cine-camera is mounted in the leading edge of the port wing and is operated independently by the selective switch when set to SAFE and the camera portion depressed. This action also operates the camera recorder which, when fitted, is mounted over the gunsight. The action of the cine-camera and/or camera recorder in conjunction with guns and R.P. is explained in para. 41.
The camera master switch (17) is on top of the instrument panel together with a SUNNY/CLOUDY switch (18) for adjusting the aperture according to weather conditions.

43. **Bomb firing**

Bomb firing is controlled by the R.P. portion of the selective switch when the BOMBS/R.P. master switch is at BOMBS. The appropriate fuzing and selector switches are on the cockpit port wall. The bomb racks jettison control (73) is on the cockpit port shelf aft of the trimming tab controls.

44. **P.R. cameras**

On most aircraft provision is made for carrying vertical and oblique cameras for photographic-reconnaissance duties, the control box being mounted on the port side of the cockpit.

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45. **R.A.T.O.G.**

When fitted, the R.A.T.O.G. master switch (58) is mounted on the windscreen port pillar just above the throttle lever, the jettison pushbutton (47) is on the cockpit port shelf and the firing button (62) is in the end of the throttle lever twist grip. When Mod. 223 is embodied the firing button is moved to a position immediately above the contacting altimeter.

46. **"Window" launcher**

(i) The "window" launcher speed control unit (97) is mounted on the cockpit starboard side. It has four speed settings and an off position, and is used to control the speed at which the window packets are launched.

(ii) The override control unit (95) mounted just below the speed control unit, has two on/off switches, each with an indicator light, and a light testing pushbutton. As each packet is ejected the appropriate light flashes.

47. Flares container

The flare container door switch (49) is on the cockpit port shelf and has three positions, OPEN-OFF-SHUT. The switch should be moved to the OPEN position, to open the container doors before dropping flares. Two red warning lights (48) come on when the doors are open.

48. Camera container

The master switch (50) is on the cockpit port shelf. This controls the camera carried in the wing container, if fitted.

49. Radio and radar controls

A.L.2 Para. 49 (i) Page 29

(i) A 4-channel VHF transmitter-receiver control box (99) is fitted to the starboard side of the cockpit. A mic/tel socket is on the starboard side of the pilot's seat and a press-to-speak button (42) is at the top of the control column. When Mod. 223 is embodied the press-to-speak button is moved to the throttle lever twist grip replacing the R.A.T.O. firing pushbutton (62).

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(ii) *V.H.F. airborne relay—A.R.I.* 5491

When Mods. 311-314 are incorporated a 10-channel airborne relay TR 1934/1935 is carried. The control unit type 383 is situated on the cockpit starboard side. (See also para. 12 (iii)).

(iii) *A.R.I. 5307*

The ZBX installation may be fitted on all aircraft, the control unit (100) being mounted on the cockpit starboard wall. A mixer box (96) mounted alongside the V.H.F. control box enables the selection of either V.H.F. or ZBX or both together.

50. Contacting altimeter

A contacting altimeter (10) is mounted on the upper port side of the instrument panel with an adjacent ON—OFF switch for the telephone warning signal.

50A. G.4F compass

(i) When Mod. 274 is embodied a G.4F compass is fitted in place of the existing R.I. compass repeater.

(ii) Whenever the Ground/Flight switch is at FLIGHT and electrical power is available, an adjacent amber warning light, marked COM., indicates the necessity to switch ON the inverter which supplies A.C. to the compass. It is important that the inverter should *not* be switched ON until just before take-off; otherwise, if the engine is running at low r.p.m. below generator cut-in speed, the drain on the batteries will be too excessive.

(iii) No indication is given of inverter failure in flight other than the incorrect functioning of the compass.

PART II
HANDLING

51. Management of the fuel system

(i) When flying without drop tanks, the drop tank selector lever should be OFF, and the main tank fuel cock ON.

(ii) When flying with drop tanks, both the drop tank selector lever and the main tank fuel cock should be ON. When the fuel level warning light comes on, indicating that all drop tank fuel has been transferred, select drop tanks OFF. The main tank will then be replenished with fuel from the interspar and nose tanks and the fuel level warning light will go out. When the light comes on again it indicates that the transfer of fuel is complete, and no further action is necessary, fuel now being drawn from the main tank.

52. Starting the engine and warming up

(i) Before starting the engine carry out the external, internal and cockpit checks laid down in the Pilot's Check List, items 1 to 80.

(ii) Confirm:—

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Ignition switches	OFF
Main fuel cock	ON
Booster pump	OFF
Fuel cut-off control	CUT-OFF
Throttle	½" open
R.p.m. control lever	MAXIMUM
Air-intake heat control	OFF
Air-intake filter control	CLEAN (or FILTER)
Engine cooling shutters	OPEN
Supercharger control	M (low gear)

Depress the booster pump circuit breaker if necessary.

(iii) Have the propeller turned through at least two revolutions by hand to minimise the risk of hydraulic shock damage.

(iv) Note the static boost reading (0 lb./sq. in. under "standard atmosphere" sea level conditions).

(v) Prime the injector with the pushbutton for 30 seconds.

(vi) When high-pressure priming (Mod. N.22) is fitted prime the cylinders with the pushbutton for 2 to 5 seconds according to the air and engine temperature. (If high-pressure priming is not fitted, 10 to 20 seconds is necessary).

(vii) If high-pressure priming is fitted, move the fuel cut-off control to NORMAL. If it is not fitted, leave the cut-off control at CUT-OFF to facilitate priming if it is necessary after the engine has fired, to make the engine pick up (see para. 4).

(viii) Index the starter breech and switch ON the ignition.

(ix) Press the combined starter and booster-coil pushbutton, and if necessary the cylinder priming pushbutton until the engine is running smoothly. On aircraft not equipped with high-pressure priming, move the fuel cut-off to NORMAL, and if the engine does not pick up, return the fuel cut-off control to CUT-OFF and carry on priming.

(x) (a) If a cartridge fires, but the engine fails to start, carry out any priming or other work that may be necessary before indexing a fresh cartridge. Then proceed as in (ix) above without delay. If for any reason it is decided not to fire the fresh cartridge at once, a period of 30 seconds must elapse before any personnel may approach the engine or propeller.

(b) If a cartridge fails to fire a period of 30 seconds must elapse before re-indexing the starter breech.

(c) If the engine fails to start after three cartridges have been fired no further priming should be performed, and after four cartridges have been fired unsuccessfully starting should be abandoned and the cause investigated.

(xi) Run the engine at 1,200 r.p.m. and warm up at this speed.

53. **Exercising and testing**

(i) Warm up to 120° C. cylinder head temperature and 15° C. oil temperature. While warming up carry out the checks detailed in the Pilot's Check List items 81 to 84.

(ii) Test each magneto as a precautionary check before increasing power further.

(iii) Holding the control column well back to prevent any tendency for the aircraft to nose over, open up to the static boost reading and check that the generator is charg-

ing the batteries by noting that the generator failure warning light is out.

(iv) At the same boost exercise and check the operation of the constant-speed propeller by moving the control lever over its full range at least twice. Then return it to MAXIMUM.

(v) At the same boost, exercise the supercharger by changing to high gear. Note the momentary drop in oil pressure as high gear is engaged, that the static boost reading is maintained and that the r.p.m. drop by 80-100. After about 30 seconds change back to low gear. The oil pressure should flicker and the r.p.m. should be restored

(vi) At the same boost check that the r.p.m. are within 50 of the reference r.p.m. noted in the Form 700.

(vii) At the same boost test each magneto in turn. If the single ignition drop exceeds 50 r.p.m. a full power check should be carried out; if there is marked vibration the engine should be stopped and the cause investigated. The full power check should also be carried out after repair, inspection other than daily inspection, when the single ignition drop at static boost exceeds 50 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 run-up. For a full power check the tail of the aircraft must be securely lashed down.

(viii) The full power check should be carried out as follows :—
Open the throttle fully and check take-off boost and r.p.m. Throttle back until the r.p.m. fall just below the take-off figure and test each magneto in turn. If the single ignition drop exceeds 50 r.p.m. the aircraft must not be flown.

(ix) After completing the checks, either at the static boost reading, or at full power, steadily move the throttle to the fully closed position, and check the minimum idling r.p.m., then open up to 1,000/1,200 r.p.m.

54. **Taxying**

Before taxying carry out the checks detailed in the Pilot's Check List, items 85 and 86.

55. **Take-off**

(i) Before take-off carry out the checks detailed in the Pilot's Check List, items 87 to 100

(ii) Full throttle should always be used at take-off, even though the aircraft may become airborne before the full throttle position is reached.

(iii) The tendency to swing to the right can be controlled easily by the rudder particularly if the aircraft is flown off tail down.

(iv) When taking off with flaps at TAKE-OFF or MAX. LIFT the aircraft should be flown off tail down.

(v) Brake the wheels and retract the undercarriage as soon as possible after take-off. Should the undercarriage red lights fail to go out, throttle back and reduce speed when the reduction in airflow should allow the wheels to lock up.

(vi) When comfortably airborne move the r.p.m. control lever smoothly back to AUTO before reducing boost.

(vii) For a carrier take-off use TAKE-OFF flap and trim the elevator slightly nose up. The engine should be opened up against the brakes as far as is practicable and the aircraft flown off tail down.

(viii) For a catapult take-off trim the elevator slightly nose up and select MAX. LIFT flap. The tailwheel *must* be locked and the rudder held neutral.

56. R.A.T.O.

A.L.2 Para. 56 (i) to (iii) Page 33

(i) Determine the correct firing point from Fig. 5, Part V and note the actual position on the take-off run at which the rockets should be fired. It is *essential* that the rockets should be fired at the correct firing point.

(ii) Check List as for normal take-off but in addition :—

Flaps	TAKE-OFF
Tail wheel control	LOCKED
R.A.T.O.G. master switch ...	ON

A.L. 3 Para. 56 (iii) Page 33

(iii) The run should be started as for a normal take-off, extra care being taken to keep the aircraft straight. After release of the brakes, the control column should be held firmly and approximately central fore and aft and slightly offset to port.

(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.

A.L.2 Para. 56 (v) Page 34

(v) During the firing of the rockets there is a nose up change of trim and the reverse when they have expired. These changes are fairly strong, but should be corrected if the aircraft tends to assume a steeper nose up attitude than the normal ground attitude. *No attempt should be made to pull the aircraft off, as this can cause a stall and starboard wing drop*

(vi) When clear of the ship and having reached a safe height, the flaps should be raised, the R.A.T.O.G. master switch switched OFF and locked, and then the rocket carriers jettisoned in level flight at a speed not exceeding 150 knots. Jettisoning the rocket carriers induces a slight nose down change of trim.

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

57. **Climbing**

(i) If the take-off was made in CLEAN air (or FILTER) change to RAM air (or NORMAL) when clear of the dust layer.

(ii) The speed for maximum rate of climb is 165 knots from sea level to 20,000 ft., thereafter reducing speed by 5 knots for each 4,000 ft. increase in height. There is little loss in rate of climb and the aircraft handles much better if the climbing speed is increased to 185 knots.
If the climb is done at 2,700 r.p.m. and $+9\frac{1}{2}$ lb./sq. in. boost, change to high gear when the boost in low gear has fallen to $+4\frac{3}{4}$ lb./sq. in.. If the climb is done at 2,400 r.p.m. and +4 lb./sq. in. boost, change to high gear when the boost in low gear has fallen to $+1\frac{3}{4}$ lb./sq. in.

(iii) For economical climbing the following procedure should be adopted. With the r.p.m. control lever at AUTO, the throttle should be set to give not more than 2,250 r.p.m. and the climb made at the speed for maximum rate of climb given above.

58. **Cruising and Flight Planning Charts**

The purpose and method of use of the three charts on pages 35 to 37 is fully explained in A.P. 2095 Pilot's Notes General, 4th Edition. The first chart is for cruising at 5,000 ft., the second at 10,000 ft., and the third at 20,000 ft.

CHART I — 5,000 FT. — LOW GEAR

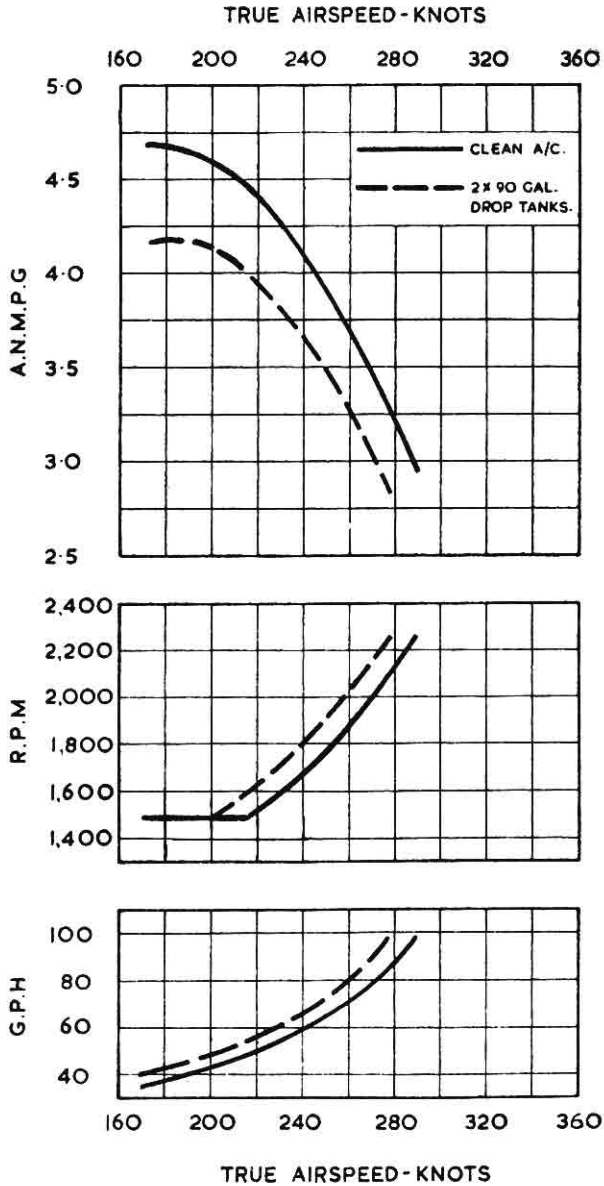


CHART 2 — 10,000 FT. — LOW GEAR

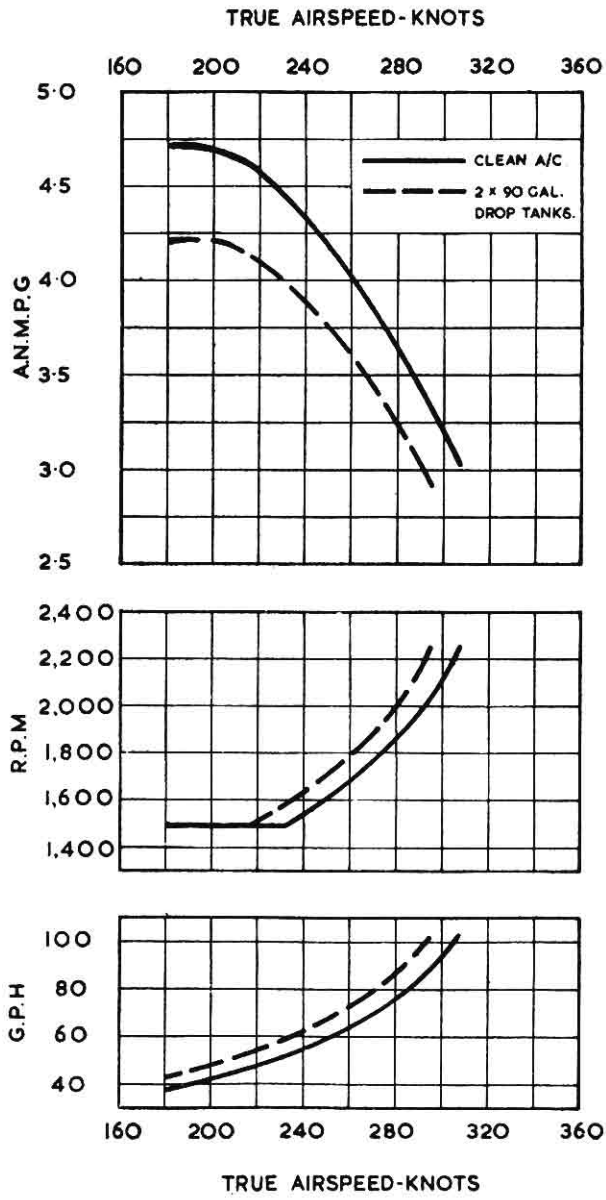
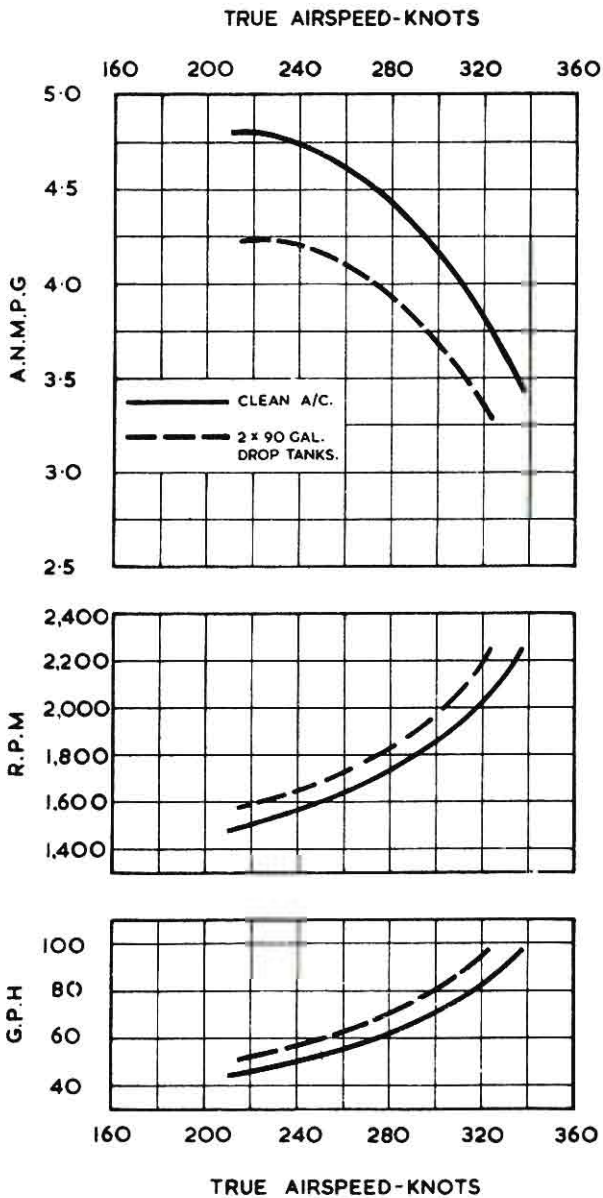


CHART 3 — 20,000 FT. — HIGH GEAR



On each chart are two sets of curves, the key to which is given on the charts. The curves are based on the following mean weights :—

(i) Fighter Reconnaissance

Mean weight	11,610 lb.
Take-off weight (200 gals.)	12,370 lb.

(ii) Long-range fighter reconnaissance

Mean weight	13,215 lb.
Take-off weight (380 gals.)	13,865 lb.

2 × 90 gallon drop tanks. It is assumed that the drop tanks are not jettisoned.

NOTE.—R.p.m. which promote airframe vibration should be avoided.

59. Position error corrections

A.L.4 Para. 59 Page 38

The position error corrections at sea level are:—

From	140	180	220	260	300	knots
To	180	220	260	300	340	knots
Subtract	2	0				knots
Add		0	2	3	4	knots

60. Fuel consumptions

(i) The approximate fuel consumptions in the rich mixture range at full throttle heights are :—

Supercharger Gear	Boost lb./sq. in.	R.P.M.	Gals./hr.
Low	+9½	2,700	261
High	+9½	2,700	258
Low	+4	2,400	169
High	+4	2,400	161

(ii) The approximate fuel consumptions in the weak mixture range may be obtained from the Flight Planning Charts.

61. General flying

(i) *Controls*

All the controls are light and effective and generally the aircraft is pleasant to fly at all altitudes and throughout its speed range ; there is, however, a slight tendency to

tighten in turns at high altitudes. There is little change of longitudinal trim with change of speed for a given power setting.

(ii) *Changes of trim*

Undercarriage down	Slightly nose down
Undercarriage up	nose up
Flaps down	nose down
Flaps up	nose up
Engine cooling shutters open ...	nose down
Engine cooling shutters closed ...	nose up

There is a large change in directional trim with alterations in speed and power, moreover changes in directional trim induce variation in longitudinal trim. These tendencies should be countered by accurate use of the rudder trimming tab.

Operation of the engine cooling shutters produces a marked change of trim and no attempt should be made to operate them in a high-speed dive.

(iii) *Flying at reduced airspeed*

Reduce speed to below 170 knots, open the cockpit canopy and lower the flaps to MAX. LIFT. Set the r.p.m. control lever to give 2,200 r.p.m. and fly at about 145 knots.

(iv) *Supercharger gear changing*

In order to avoid sludging of the clutch plates, every endeavour should be made to change gear at least once during each flight and in any case on entering the circuit prior to landing. The change to high gear should normally be made at engine conditions not exceeding 0 lb./sq. in. boost and 2,400 r.p.m.

62. **Stalling**

(i) The approximate stalling speeds, engine off, engine cooling shutters closed, in knots are :—

	at 12,400 lb.	at 14,650 lb.
Flaps and undercarriage up	105	115
Flaps and undercarriage down	90	100
Power on, typical approach conditions	80–82	

NOTE.—The position of the engine cooling shutters has little effect on the stalling speeds and characteristics with the undercarriage and flaps down or in the approach condition. With undercarriage and

flaps up, however, buffeting may set in about 20 knots above the quoted stalling speeds or increase progressively as speed is reduced. It can become marked just before the stall which, in this condition, occurs some 5 knots higher than the quoted speeds.

(ii) Warning of the approach of the stall is given by tail buffeting and at the stall the nose will drop gently. If the control column is pulled back at all sharply, however, the ailerons will snatch and the nose and port wing will drop. Warning of a stall under typical approach conditions is given by aileron snatching. In addition the attitude will be markedly nose-up and a large amount of left rudder will be necessary to maintain directional trim. When the stall occurs the starboard wing drops sharply, and since this action is assisted by torque, the throttle should be closed when initiating recovery action ; if this is not done difficulty in regaining control at once may be experienced, resulting in an unnecessary loss of height.

(iii) Ample warning of the approach of a stall in a steep turn is given by aileron snatching and a tendency for the aircraft to flick out of the turn.

63. **Spinning**

Intentional spinning is prohibited. Should an accidental spin occur, normal recovery action should be applied immediately, and a speed of 175 knots should be attained before recovery from the resulting dive is attempted.

64. **Diving**

(i) There is little change of trim when diving to the limiting speed.

(ii) Speed is gained very rapidly and care should be taken to avoid exceeding the limiting speeds.

(iii) The tendency to yaw should be countered by accurate use of the rudder trimming tab. This control, like the elevator trimming tab control, becomes extremely sensitive at high speeds.

65. **Aerobatics**

All normal aerobatics are easy to perform.

The following are the recommended speeds for the manœuvres :—

Roll	200 to 250 knots
Loop	320 to 360 knots
Roll off loop	320 to 360 knots
Upward roll	350 to 400 knots

66. **Approach and landing**

(i) Before landing carry out the checks detailed in the Pilot's Check List, items 101 to 112.

(ii) The recommended final approach speeds in knots are :—

	At typical service load 12,400 lb.	At Max. landing weight 14,000 lb.
Flaps down, engine on	100	110
Flaps up, engine on	115	125

The initial approach should be made at a speed of some 10-15 knots higher than those quoted above.

(iii) Power off landings should not normally be made with full flap as the glide path with engine off, full flap and undercarriage down is very steep and the rate of descent very high. When a power-off landing is to be made the following technique is recommended :—

(a) The flaps should be lowered to the TAKE-OFF position and a speed of 130 knots maintained during the initial approach.

(b) When it is certain that the airfield can be reached MAX. LIFT flap should be selected.

(c) The round-out should be started at a speed of 130 knots in plenty of time to allow for the change in attitude and to enable a speed of 115 knots to be attained over the airfield boundary ; from this point a normal hold-off and landing can be made.

(d) There is very little increase in the landing run over that obtained when using full flap.

(iv) Deck landing

(a) Lower the arrester hook and check the indicator light.

(b) Ensure the tailwheel is unlocked.

(c) With the r.p.m. control lever set to give 2,400 r.p.m.

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approximately – 1 lb./sq. in. boost will be necessary during the initial turn in, decreasing to about – 3 to – 4 lb./sq. in. towards the latter stages of the approach as the turn is slackened.

(d) The recommended speed for deck landing is 90-92 knots. It is necessary to pull the control column well back to effect a three-point touchdown.

67. Mislanding and going round again

(i) The aircraft will climb away easily, flaps and undercarriage down, at climbing power.

(ii) Raise the undercarriage and climb at 125 knots.

(iii) Raise the flaps in stages above a safe height retrimming as required.

68. After landing

Carry out the checks detailed in the Pilot's Check List, items 115 to 118.

69. Running down and stopping the engine

(i) If the serviceability of the engine is in doubt such items of the run-up given in para. 53 as may be necessary should be carried out. The engine should be run at static boost and the supercharger exercised if this has not already been done in the air. In all cases the engine should be idled at 800 to 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.

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(ii) Stop the engine by closing the throttle and setting the fuel cut-off control to CUT-OFF. When the engine has stopped carry out the checks in the Pilot's Check List, items 118 to 127.

(iii) *Oil dilution*

(a) Adjust oil level to 9 gallons.

(b) To ensure a satisfactory start, without pre-heating, at the following outside air temperatures, dilution for the periods quoted is required :—

Using 100 octane fuel for induction priming	− 5°C. to − 10°C.	...	2 mins.
	− 10°C. to − 15°C.	...	2½ mins.
Using H.V. fuel for induction priming	− 15°C. to − 20°C.	...	2 mins.
	− 20°C. to − 26°C.	...	2½ mins.

(c) Without H.V. fuel induction priming at temperatures below − 15°C., a considerably longer dilution period is necessary. This is undesirable and H.V. fuel should be used for priming in these conditions.

(d) After a 2 minutes dilution period no special boiling off period is necessary.
After a 2½ minutes dilution period the recommended boiling off period is 12 minutes.

PART III
LIMITATIONS

70. **Engine data—Centaurus Mk. 18**

The principal engine limitations are as follows :—

		R.p.m.	Boost lb./sq. in.	Temp. °C. Cyl.	Oi
TAKE-OFF 5 MINS. LIMIT	M	2,700	+9½	—	—
INTERMEDIATE 1 HR. LIMIT	M, S	2,400	+6½*	300	90
MAX. CONTINUOUS RICH	M, S	2,400	+6½*	300	80
MAX. CONTINUOUS WEAK	M, S	2,400	+2½	300	80
OPERATIONAL NECESSITY 5 MINS. LIMIT	M, S	2,700	+9½	310	100

* The interconnected throttle and propeller controls permit only +4 lb./sq. in. boost to be obtained at 2,400 r.p.m. and not the full permissible rated boost of +6½ lb./sq. in.

OIL PRESSURE :
NORMAL ... ... 100 lb./sq. in.
MINIMUM IN FLIGHT ... ... 80 lb./sq. in.

MINIMUM OIL TEMPERATURE FOR TAKE-OFF :
Normal ... ... +15°C.
Operational necessity ... ... + 5°C.

MAX. CYL. TEMP. FOR STOPPING ENGINE ... 230°C.

71. **Flying limitations**

(i) The aircraft is designed for the duties of a single-seat fighter and fighter-bomber ; intentional spinning is prohibited. Catapulting and R.A.T.O. is permitted with or without external stores, and with any permitted combination of stores. When external stores or wing drop tanks are carried aerobatics are prohibited and violent manœuvres are to be avoided.

(ii) The Mk. 10 and Mk. 11 aircraft are cleared to carry the following stores :—

2 × 45-gallon or 90-gallon drop tanks.
12 × 25 lb. or 60 lb. head R.P.

In addition the Mk.11 aircraft is cleared to carry the stores outlined in sub para. (iv) (c) below.

(iii) *Maximum speeds in knots without external stores*

Up to 10,000 ft.	425
From 10,000 ft. to 15,000 ft.	385
„ 15,000 ft. to 20,000 ft.	355
„ 20,000 ft. to 25,000 ft.	320
„ 25,000 ft. to 30,000 ft.	285
„ 30,000 ft. to 35,000 ft.	255

(iv) *Maximum speeds in knots with external stores*

(a) With 45-gallon drop tanks

Up to 10,000 ft.	400
From 10,000 ft. to 15,000 ft.	360
„ 15,000 ft. to 20,000 ft.	340
„ 20,000 ft. to 25,000 ft.	300

(b) With 90-gallon drop tanks and with R.P.

Up to 5,000 ft.	380
From 5,000 ft. to 10,000 ft.	360
„ 10,000 ft. to 15,000 ft.	340
„ 15,000 ft. to 20,000 ft.	320
„ 20,000 ft. to 25,000 ft.	300

(c) With bombs (Mk. 11 aircraft only)

	Max. speed (Knots) for Carriage	Release	Max. angle of dive for Release
2 × 1,000 lb. MC	400	400	80°
2 × 500 lb. SAP (No. 11 tail)	425	400	80°
2 × 500 lb. SAP (No. 77 tail)	425	425	40°
2 × 500 lb. MC	425	425	80°
2 × 500 lb. Smoke	425	300	Level
8 × 25 lb. Practice	425	425	85°
8 × 11½ or 10 lb. Practice ...	425	400	85°
2 × 250 lb. Mk. 11 depth charges	288	250	Level
2 × 200 lb. Smoke float ...	310	260	Level
2 × Mk. 7 Mines Type "A"	270	215	Level
2 × Mk. 8 Mines Type "A"	380	260	Level
2 × 250 lb. SCI	270	250 (Full) 200 (Empty)	Level
8 × rec. flares or marine markers	300	250	Level
12 × 3 inch R.P. (60 lb., 25 lb or flare heads)	... ... See (iii) above		60°

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(v) *Jettisoning speed limitations*

(a) The 45-gallon and 90-gallon drop tanks may be jettisoned in straight and level flight at speeds between 150 and 260 knots

(b) The 100/1,000 bomb carrier, *with* stores attached, may be jettisoned at speeds up to 350 knots and angles of dive up to 40°. The 100/1,000 lb. bomb carrier, *without* stores attached, may be jettisoned at speeds up to 290 knots and angles of dive up to 20°.

(c) R.A.T.O.G. carriers should be jettisoned in straight and level flight at speeds up to a maximum of 150 knots.

(vi) *Carriage of A.S.R. apparatus type G (Mk. 11 aircraft only).*

(a) Type G A.S.R. apparatus may be carried up to a maximum speed of 300 knots, but gentle manœuvres only are permitted. The contents of the carriers may be released in straight and level flight at speeds not exceeding 175 knots.

(b) The containers when full may be jettisoned up to a maximum speed of 200 knots in straight and level flight, and when empty may be jettisoned up to a maximum speed of 150 knots in straight and level flight.

(c) Catapult take-offs may be made with the containers empty or full, subject to the observance of the appropriate permissible take-off weight.

(d) Deck landings with the containers full or empty are permitted, subject to the observance of the landing weight limitations.

(e) Carriage of mixed loads of A.S.R. apparatus type G and 45 or 90-gallon drop tanks are permitted subject to the observance of the minimum limitations appropriate to the independent store. Drop tanks or A.S.R. apparatus may be jettisoned independently subject to the appropriate limitations.

(vii) *Other speed limitations*

	Knots
Undercarriage down	185
Flaps at MAX. LIFT	185
Flaps fully down	140
Canopy open	260

(viii) *Loading limitations*

(a) Carriage of two F24 cameras in the rear fuselage is permitted provided that the interspar fuel tanks are

not filled. For increased range in this condition either 45 or 90-gallon wing drop tanks may be carried.

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(b) Mixed loads of R.P.'s. and wing drop tanks may be carried up to 8 × 60 lb. R.P. (on the centre and outer stations only) and 2 × 45 or 90 gallon drop tanks, subject to the observance of the lower maximum permissible speed applicable to the individual stores.

(c) On Mk. 11 aircraft mixed loads of bombs (or other armament stores) and wing drop tanks may be carried up to 2 × 500 lb. bombs and 2 × 45-gallon or 2 × 90-gallon drop tanks.

(ix) *Landing limitations*

(a) Arrested landings with wing drop tanks fitted are permitted subject to weight limitation (see sub para. (x) below).

(b) Arrested landings with bombs (or other armament stores) attached are permitted only in emergency.

(c) Landings either arrested or on aerodromes with R.P.'s attached are permitted only in emergency.

(x) *Maximum permissible all-up weights*

Take-off, catapulting, R.A.T.O. and gentle manœuvres only	14,650 lb.
Aerodrome landings	14,000 lb.
All permitted forms of flying, ADDL's and arrested landings ...	12,400 lb.

(xi) *Approximate aircraft weights with different stores*

Typical Service Load	12,400 lb.
TSL + 2 × 45-gallon drop tanks (full) ...	13,200 lb.
TSL + 2 × 90-gallon drop tanks (full) ...	13,900 lb.
TSL + 12 × 60 lb. R.P.	13,600 lb.
TSL + 2 × 1,000 lb. bombs	14,650 lb.

Typical service load (TSL) means the aircraft "clean" with full internal fuel and ammunition.

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(xii) *R.A.T.O.G. (rockets discharged) limitations (Mk. 11 only)*

(a) When carrying out practice R.A.T.O.'s, the aircraft is restricted to gentle manoeuvres and landing is permitted *on airfields only*, providing the rockets have been discharged.

(b) Max. speed	150 kts.
Max. altitude	1,500 ft.
Max. landing weight	14,000 lb.

(xiii) *Carriage and release of Sonobuoys T. 1945 (Mk. 11 only)*

(a) Modified T.1945	
Max. speed for carriage	250 kts.
Max. speed for release	220 kts.
(b) Non-modified T.1945	
Max. speed for carriage and release	160 kts.
(c) Release of both types	
Max. angle of dive	20°
Max. altitude	3,000 ft.
Min altitude	200 ft.
Max. speed for jettisoning sonobuoys and carriers ..	250 kts.

(d) Mixed loads of sonobuoys and drop tanks are prohibited. Catapult take-offs, arrested and aerodrome landings, are permitted subject to (x) above.

PART IV
EMERGENCIES

72. Undercarriage emergency operation (early aircraft only)

If after selecting DOWN, the undercarriage does not lower normally or the correct sequence of lights does not appear :—

(i) Return the undercarriage selector lever to UP.

(ii) Lower the flaps to MAX. LIFT by means of the hand-pump (if the engine-driven pump will not lower them) having selected the MAX. LIFT position on the quadrant. Then reduce speed to 115 knots. As many as 80 double strokes may be required to lower the flaps if the undercarriage red lights have come on.

(iii) Select undercarriage DOWN and operate the handpump until the green lights come on. Up to 120 double strokes may be required, the resistance being very light at first, but if the red lights do not come on during the first twelve strokes, the use of the handpump should be abandoned and the following procedure adopted.

(iv) Leave the undercarriage selector lever at DOWN, ensure that the aircraft is flying straight and then pull up the undercarriage emergency release lever on the right-hand side of the pilot's seat; this releases the catches and allows the legs to drop down. Then release the lever and let it drop.

(v) After the undercarriage red lights come on, allow a few seconds for the wheels to drop and then pull the emergency release lever fully up a second time. This action operates " pneumatic assisters " which pump air into the system to bring about the final locking down of the undercarriage.

(vi) If any difficulty is experienced, close the throttle and, still maintaining a speed of 115 knots, yaw the aircraft while applying the " pneumatic assisters ". The lower attitude of the nose should ensure that the wheels lock down.

(vii) If, in the first instance it is not possible to lower the flaps to MAX. LIFT, speed should be reduced only to 130 knots, before the procedure outlined in (iv) and (v) above is followed. In this case more drastic yawing of the aircraft will probably be necessary before the wheels lock down and (due to the lower attitude of the nose, engine " off ") will be more effective if the throttle is first closed.

(viii) Check the visual indicators before landing.

(ix) The tailwheel lowers automatically on failure of the hydraulic system and locks on touching down.

73. **Undercarriage and flaps emergency operation (later aircraft)**

(i) On aircraft embodying Mod. N.30 the undercarriage and flaps may be lowered by an emergency method whereby air from the pneumatic system is injected into the hydraulic lines of the undercarriage and flap jacks.

(ii) The levers (90) and (91) for the emergency operation of the flaps and undercarriage are situated on the starboard side of the cockpit on the side of the instrument shelf and are pushed forward to lower the flaps and undercarriage, after the withdrawal of the locking pin (89) through the quadrant. The knobs on the levers are identical with those on the normal flaps and undercarriage selector levers.

(iii) When lowering both the undercarriage and flaps by the emergency system the undercarriage should be lowered before the flaps so that the maximum pneumatic pressure is available for locking down the undercarriage. If lowered by the emergency method, the flaps **will** not come fully down until speed and power have been reduced on the approach.

NOTE.—If for any reason the pneumatic pressure is less than 300 lb./sq. in. and cannot be built up any higher, no attempt should be made to lower the

undercarriage by the emergency method, unless one or both of the main wheels have already been partially lowered and cannot be re-engaged in the up position.

(iv) The undercarriage and flaps can be lowered by the emergency system, irrespective of the position of the normal undercarriage and flaps selector levers. Once the emergency system has been used the flaps and undercarriage cannot be raised again until the hydraulic system has been bled.

(v) The method for using the emergency system is as follows :—

(a) If after selecting DOWN, the undercarriage does not lower normally or the correct sequence of lights does not appear, return the undercarriage selector lever to UP.

(b) Lower the flaps to MAX. LIFT by means of the handpump (if the engine-driven pump will not lower them) having selected the MAX. LIFT position on the quadrant. Then reduce speed to 115 knots. As many as 80 double strokes may be required to lower the flaps if the undercarriage red lights have come on.

(c) Select undercarriage DOWN and operate the handpump until the green lights come on. Up to 120 double strokes may be required, the resistance being very light at first, but if the red lights do not come on during the first twelve strokes the use of the handpump should be abandoned and the following procedure adopted.

(d) Ensure that the aircraft is flying straight, then withdraw the locking pin from the emergency controls quadrant and push the undercarriage emergency lever fully forward. The undercarriage should drop and lock down. If any difficulty is experienced, close the throttle, and still maintaining a speed of 115 knots yaw the aircraft. The lower attitude of the nose should ensure that the wheels lock down.

(e) If in the first instance it is not possible to lower the flaps either by the engine-driven pump or handpump, speed should be reduced only to 130 knots before the procedure outlined in (d) above is followed. In this case more drastic yawing of the aircraft will probably be necessary before the wheels lock down and (due to the lower attitude of the nose, engine "off") will be more effective if the throttle is first closed.

(f) When the undercarriage is locked down, the flaps should be lowered by pushing the flaps emergency lever fully forward. Then check the pneumatic pressure before landing.

(g) The tailwheel will often lower automatically if the hydraulic system fails, but if not it will be released when the undercarriage emergency system is operated.

74. Engine failure in flight due to fuel starvation

If the engine cuts due to sustained negative "g" or inverted flight conditions, and cannot be restarted when normal flight is resumed and the throttle is closed, the fuel cut-off lever should be placed in the CUT-OFF position for a period of 5 to 10 seconds and then returned to the NORMAL position. This action facilitates the re-priming of the injector pump and the restoring of power.

75. Canopy jettisoning

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(i) The sliding canopy, together with the port side-panel of the cockpit, may be jettisoned by pulling the T-handle (34) on the lower starboard side of the instrument panel. A minimum speed of 210 knots is essential to ensure satisfactory jettisoning. A vigourous pull is required to operate the handle and before jettisoning, the pilot should, if possible, open the canopy about 1 inch to ensure that the locating latches are disengaged, lower the seat fully, and keep his head well down. When Mod. 339 is embodied it is not necessary to open the canopy, which may be jettisoned satisfactorily from the fully closed position.

(ii) The canopy may be jettisoned from outside by pulling a toggle fitted behind a small transparent panel above the port wing fillet. The panel must be broken to gain access to the toggle.

76. **Flapless landing**

(i) Flapless landings present no unusual difficulty, a runway of normal length being adequate even in conditions of light wind.

(ii) The approach should be made flat and large movements of the throttle avoided as it is difficult to lose excess speed.

(iii) At typical service load 12,400 lb. the approach should be commenced at 120 knots reducing to 110 knots final, when, if the aircraft has been brought in low, the throttle should be cut and a three-point landing effected. When making a flapless landing in the overloaded condition these speeds should be increased by 10 knots.

NOTE.—To avoid the possibility of pre-stall buffeting and increased stalling speed described in the note to para. 62 (i) flapless landings should be made with the engine cooling shutters closed.

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77. **Ditching**

(i) The pilot is provided with a K-type dinghy.

(ii) The ditching characteristics of the aircraft are known to be satisfactory, provided that all external armament stores are jettisoned or dropped.

(iii) If it is decided to ditch, the following procedure should be adopted:—

(a) Initiate the distress procedure on the R/T.

(b) Jettison bombs and R.P., if carried.

(c) Jettison the canopy and side panel and disconnect the R/T plug. Keep the safety harness tightly adjusted and locked.

(d) If the engine is still available, lower the flaps fully and use the engine to help make the touchdown in a tail-down attitude at as low a forward speed as possible. If the engine has failed, do not lower the flaps more than 30°, otherwise, the rate of sink will be very high and judgment of the hold-off will in consequence be rendered more difficult.

(e) If the engine is not available push the throttle lever fully forward, as in the closed position it is liable to obstruct the exit. If the engine is being used, push the throttle fully forward when the aircraft has come to rest.

(f) Ditching should be along the swell, or into wind if the swell is not steep.

(g) Additional protection will be afforded if, immediately before touchdown, the pilot places his left arm across his forehead and grasps a convenient handhold.

(h) After the aircraft has come to rest, release the harness and if possible leave by the port side.

78. **Crash landing**

In the event of an engine failure necessitating a crash landing :—

(i) Initiate the distress procedure on the R/T.

(ii) All external stores and fuel tanks should be jettisoned.

(iii) The sliding canopy should also be jettisoned together with the side panel.

(iv) The harness should be kept tightly adjusted and locked.

(v) Lower the flaps to the TAKE-OFF position and maintain a speed of 130 knots while manœuvring for the final approach. The glide may be considerably lengthened if oil pressure is still available, by moving the r.p.m. control lever to AUTO.

(vi) When it is certain that the chosen landing area can be reached, lower the flaps to MAX. LIFT and carry out a normal glide landing (see para. 66).

(vii) For the minimum landing run the flaps should be lowered fully just before touchdown. Full flap should only be used on the approach to correct overshooting.

(viii) If the flaps cannot be lowered a shallower approach will result and a final approach speed of 120 knots should be maintained.

(ix) The undercarriage should be kept retracted.

(x) Additional protection will be afforded if, immediately before touchdown the pilot places his left arm across his forehead and grasps a convenient handhold.

(xi) If the landing is being made with engine off, the fuel and ignition should be switched off and the ground/flight switch set to GROUND prior to touchdown.

(xii) When the aircraft has come to rest the fuel and ignition should be switched off, if this has not already been done, and the ground/flight switch set to GROUND. If the aircraft is not inverted the parachute and safety harnesses should be released and the aircraft left as soon as possible.

79. **Baling out**

If the aircraft is to be abandoned the following procedure should be adopted :—

(i) Initiate the distress procedure on the R/T.

(ii) Reduce speed as much as possible.

(iii) Jettison the canopy and side panel.

(iv) Disconnect R/T and oxygen leads.

(v) Move fuel cut-off control to CUT-OFF, switch off the fuel and ignition and push the throttle lever fully forward.

(vi) The aircraft may then be abandoned as follows :—

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(a) Leave the cockpit head first over the port side, diving downwards towards the trailing edge of the mainplane and keeping the body as compact as possible.

or (b) Trim the aircraft nose heavy, invert the aircraft and when completely inverted release the safety harness and drop out. Any tendency for the nose to drop when the aircraft is inverted may prevent the pilot from leaving the aircraft due to "g" force. It is essential that a clean exit be made since if snagging occurs, e.g., on the throttle lever, the pilot may be unable to free himself.

Whenever possible it is recommended that method (a) be used.

(vii) When clear of the aircraft place one hand on the rip-cord handle.

80. **Tyre bursting**

If it is known that a tyre has burst no attempt should be made to land with the undercarriage lowered. Greater safety to the pilot and less damage to the aircraft will result from a belly landing.

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81. **Signal pistol**

The signal pistol is in a stowage (118) on the cockpit floor, slightly in front of the pilot's seat. A firing aperture is provided on the cockpit port wall to enable the pistol to be fired without opening the canopy.

PART V

ILLUSTRATIONS

KEY TO *Fig.* 1.

COCKPIT—FRONT VIEW.

1. Undercarriage position indicator.
2. Throttle and r.p.m. controls friction nut.
3. R.I. compass indicator.
4. Ignition switches.
5. Undercarriage position indicator switch.
6. Supercharger warning light.
7. Contacting altimeter switch.
8. Flaps position indicator.
9. R.p.m. control lever.
10. Contacting altimeter.
11. Throttle lever.
12. Gyro gunsight selector dimmer control.
13. Ventilating louvre.
14. Undercarriage warning light.
15. G.G.S. master switch.
16. Gyro gunsight skid indicator.
17. Cine-camera master switch.
18. Cloudy/sunny selector switch.
19. Gyro gunsight.
20. Emergency lamp.
21. Cockpit lamps dimmer switch.
22. Guns/R.P. selector switch.
23. Gyro gunsight skid indicator.
24. Cockpit lamps master switch.
25. Emergency lamp switch.
26. Windscreen de-icing pump.
27. U/V lamps dimmer switch.
28. Generator failure warning light.
29. Sliding canopy control.
30. Engine cooling shutters control.
31. Oxygen regulator.
32. Boost gauge.
33. Oil temperature gauge.
34. Canopy jettison control.
35. Engine speed indicator.
36. Triple pressure gauge.
37. Cylinder temperature gauge.
38. Oil pressure gauge.
39. Spare bulbs for gyro gunsight.
40. P.11 compass.
41. Parking brake lever.
42. Press-to-speak switch.
43. Firing button.
44. Starter re-indexing control.

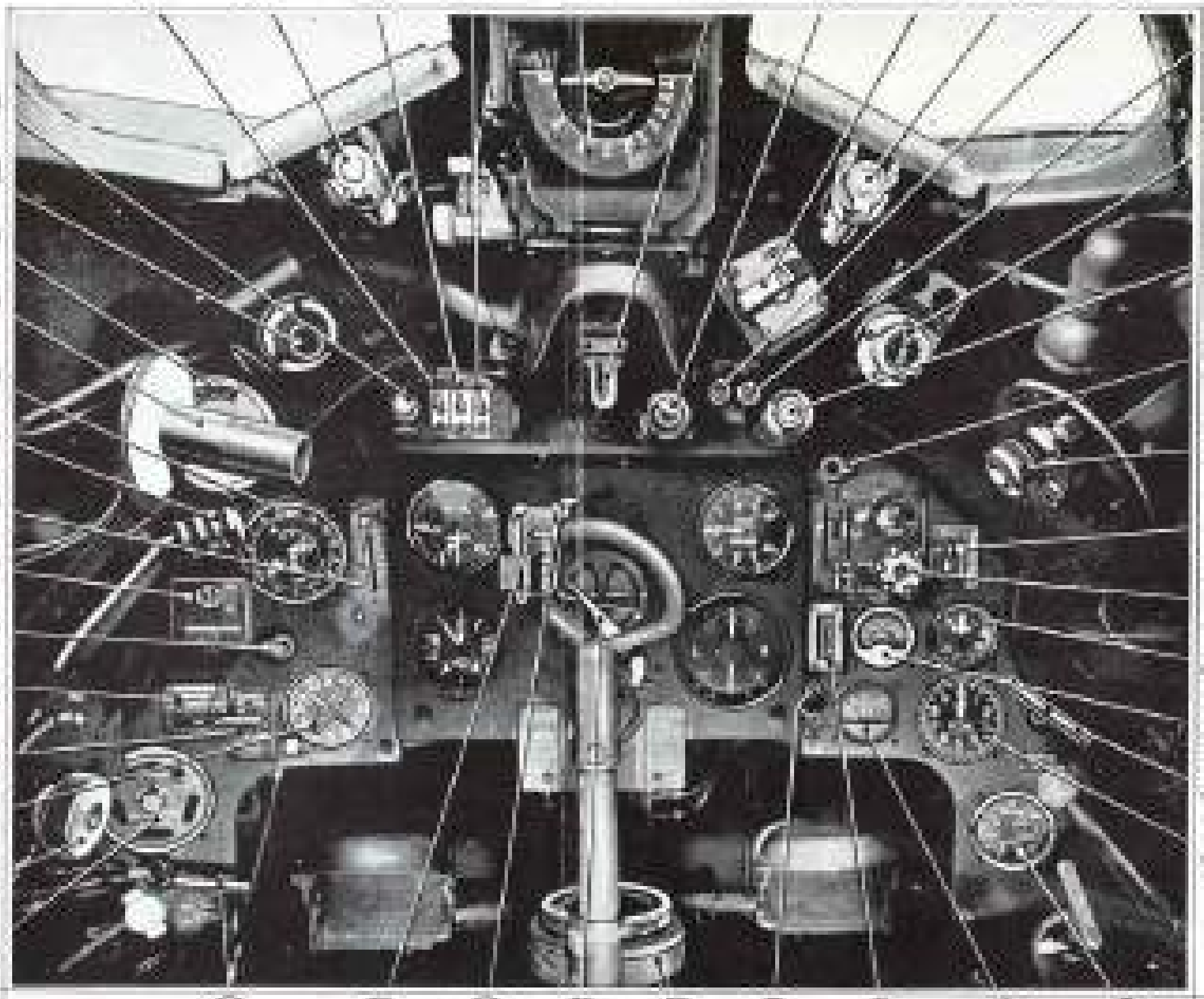


FIG 1

COCKPIT — FRONT VIEW

FIG 1

45. I.F.F. control unit.
46. I.F.F. selector unit.
47. R.A.T.O.G. jettison pushbutton.
48. Flare door warning lights.
49. Flare doors operating switch.
50. Camera container master switch.
51. Fusing switch.
52. Pairs/salvo switch.
53. R.P./Bombs selector switch.
54. Canopy locking control.
55. Port/Starboard selector switches.
56. Single/salvo switch.
57. S.C. jettison pushbutton.
58. R.A.T.O.G. master switch.
59. Supercharger gear change control.
60. Cockpit (port) lamps dimmer switch.
61. Fuel cut-off control.
62. R.A.T.O.G. firing button
63. Flaps selector lever.
64. Arrester hook indicator light.
65. Arrester hook training switch.
66. Arrester hook control.
67. Undercarriage control lever safety catch.
68. Sanitary bottle.
69. Undercarriage control lever.
70. Elevator trimming handwheel.
71. Rudder trimming handwheel.
72. Hydraulic handpump.
73. Bomb rack jettison control.
74. Air-intake filter control.
75. Air-intake filter control warning lights.
76. Downward identification lights signalling switch.
77. Main tank fuel gauge.
78. Fuel level warning light.
79. Cartridge starter and booster-coil push-button.
80. Cylinder priming pushbutton.
81. Injector priming pushbutton.
82. Nose tank fuel gauge.
83. Interspar tanks fuel gauges.
84. Downward identification lights signalling pushbutton.
85. Downward identification lights colour selector switch.
86. Navigation lights switch.
87. Pressure-head heater switch.
88. Ground/Flight switch.
89. Locking pin for emergency hydraulic selector levers.
90. Flaps emergency selector lever.
91. Undercarriage emergency selector lever.
92. Main fuel cock.
93. Drop tanks jettison control.
94. Drop tanks selector lever.
95. "Window" launcher override control unit.
96. Mixer box.
97. "Window" launcher speed control unit.
98. Safety harness locking control.
99. V.H.F. control unit.
100. Z.B.X. control unit.
101. I.F.F. auxiliary control unit.
102. Watch holder.
103. Clock holder.
104. Oil dilution pushbutton.
105. Fuel pump circuit breaker.
106. Fuel pump ammeter test pushbutton.
107. Fuel pump ammeter test socket.

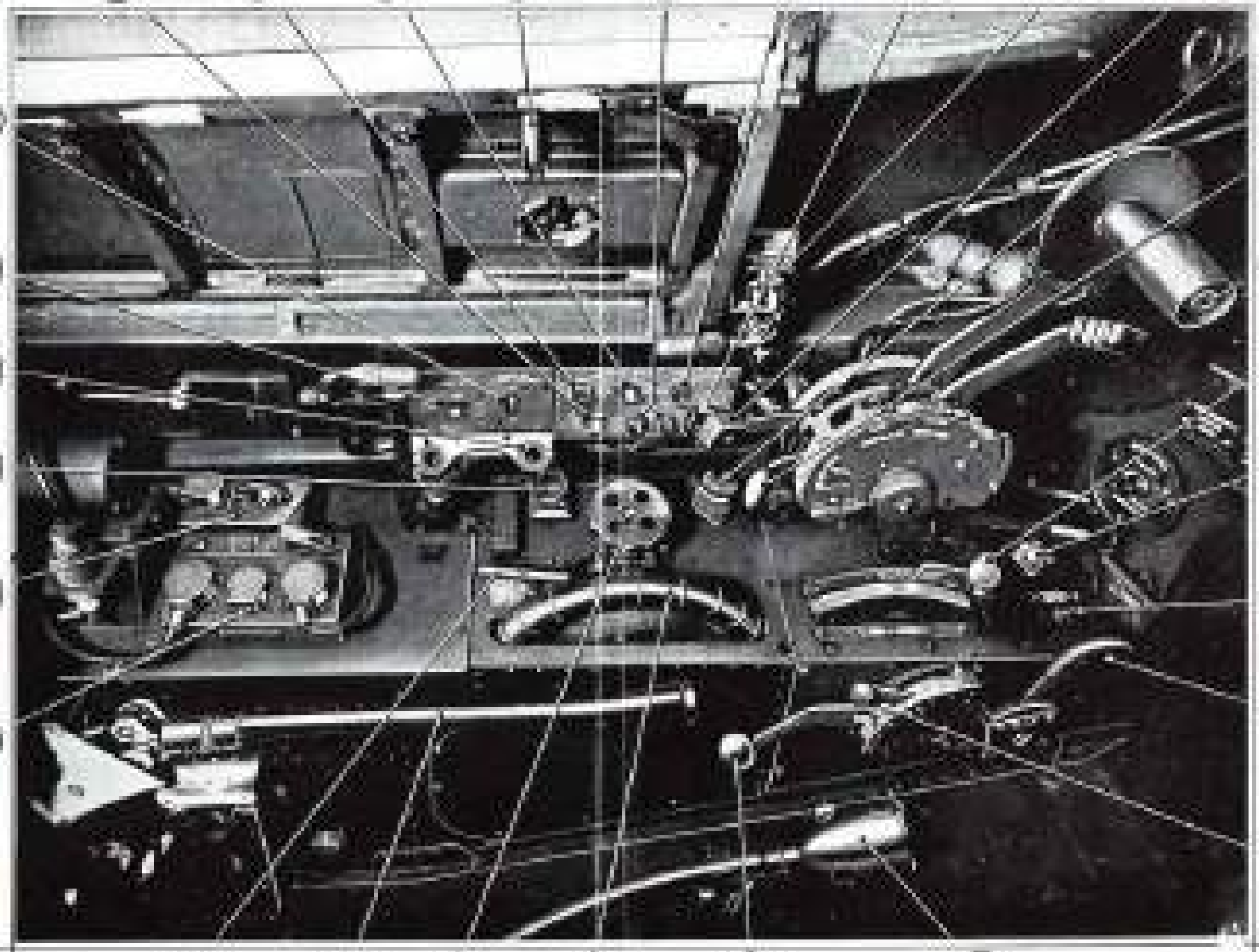


Fig 2

COCKPIT – PORT SIDE

Fig 2

108. Ignition booster-coil test pushbutton.
109. Air-intake heat control.
110. Wing folding control lever.
111. Wing folding control safety lever.
112. Oxygen pipe.
113. Map case.
114. Chartboard container.
115. See Fig. 3.
116. Tailwheel locking control.
117. Cockpit heating control.
118. Signal pistol stowage.
119. Fuel tank air pressure gauge.

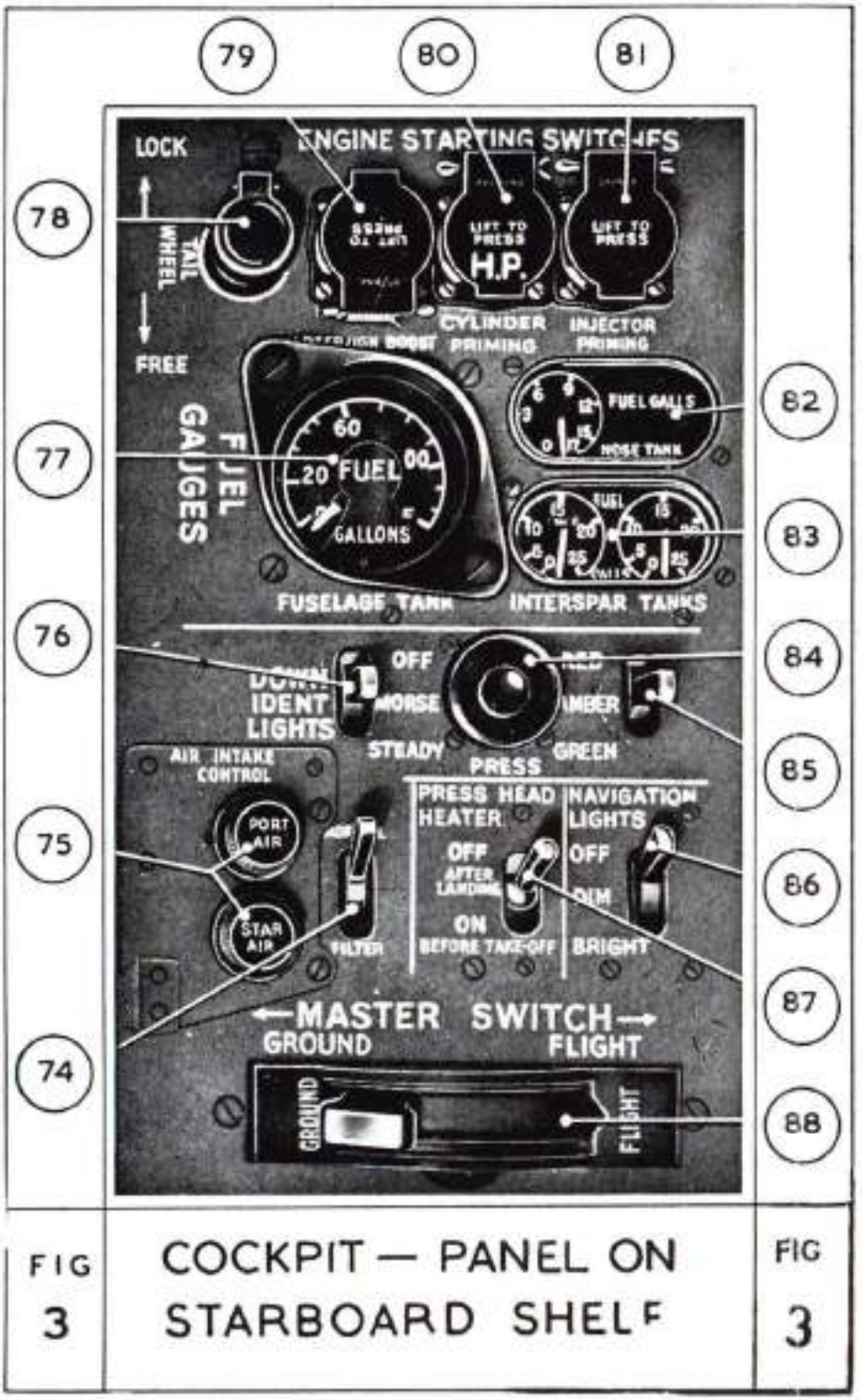


FIG 3 COCKPIT — PANEL ON STARBOARD SHELF FIG 3

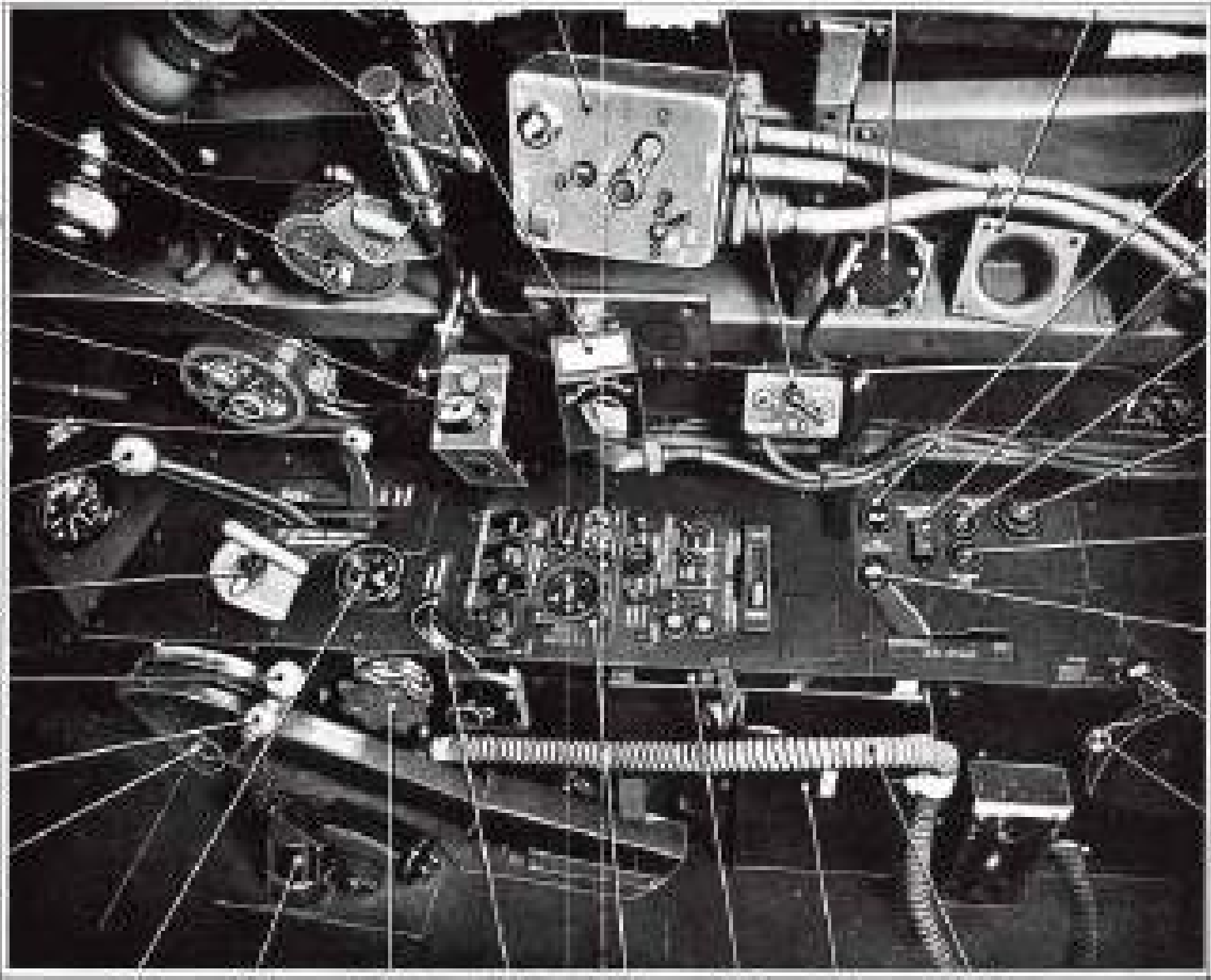


FIG 4

COCKPIT – STARBOARD SIDE

FIG 4

ROCKET ASSISTED TAKE-OFF CHARTS

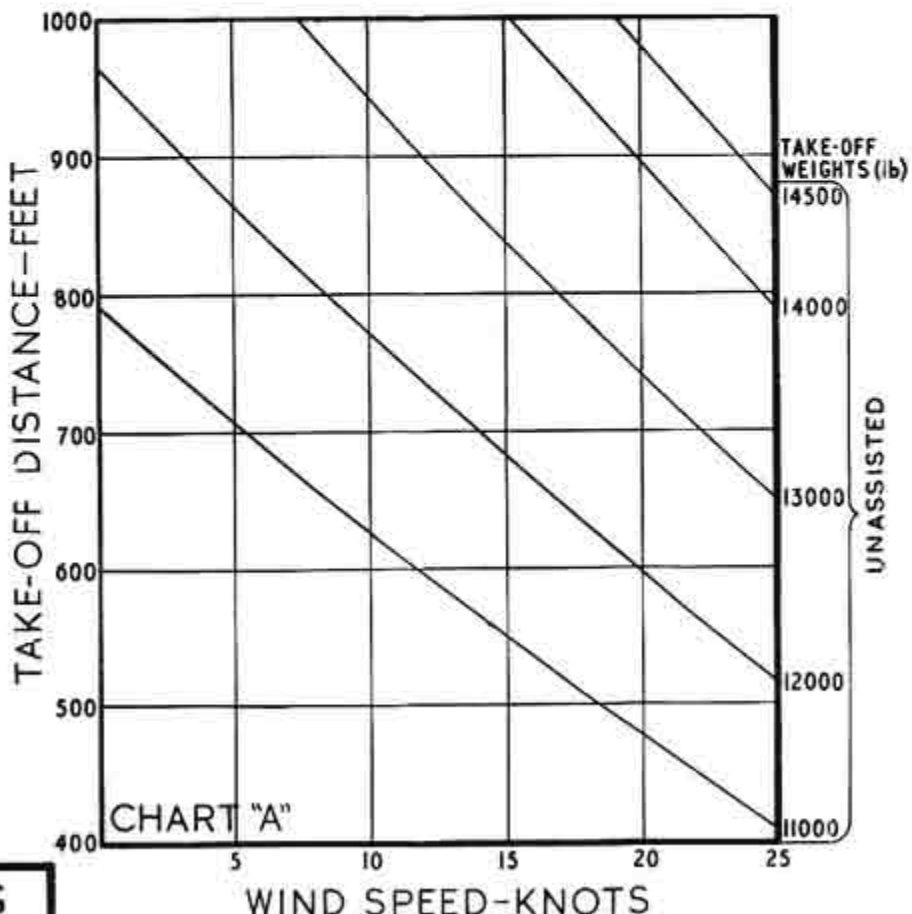
INSTRUCTIONS FOR USING CHARTS

1 Measure the wind speed over the deck and on the charts plot the available take-off distance against the wind speed If the point obtained lies above the curves on Chart A corresponding to the aircraft weight, assistance is unnecessary

2 If rocket assistance is found to be necessary select the point on Chart B (if two rockets per side are to be fitted) or on Chart C (if three rockets per side are to be fitted). 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 The rockets should never be fired at less than 20 ft. from rest

NOTE — The all up weight of the aircraft must be ascertained by reference to the appropriate Volume I and to para. 71 (xi) of this publication



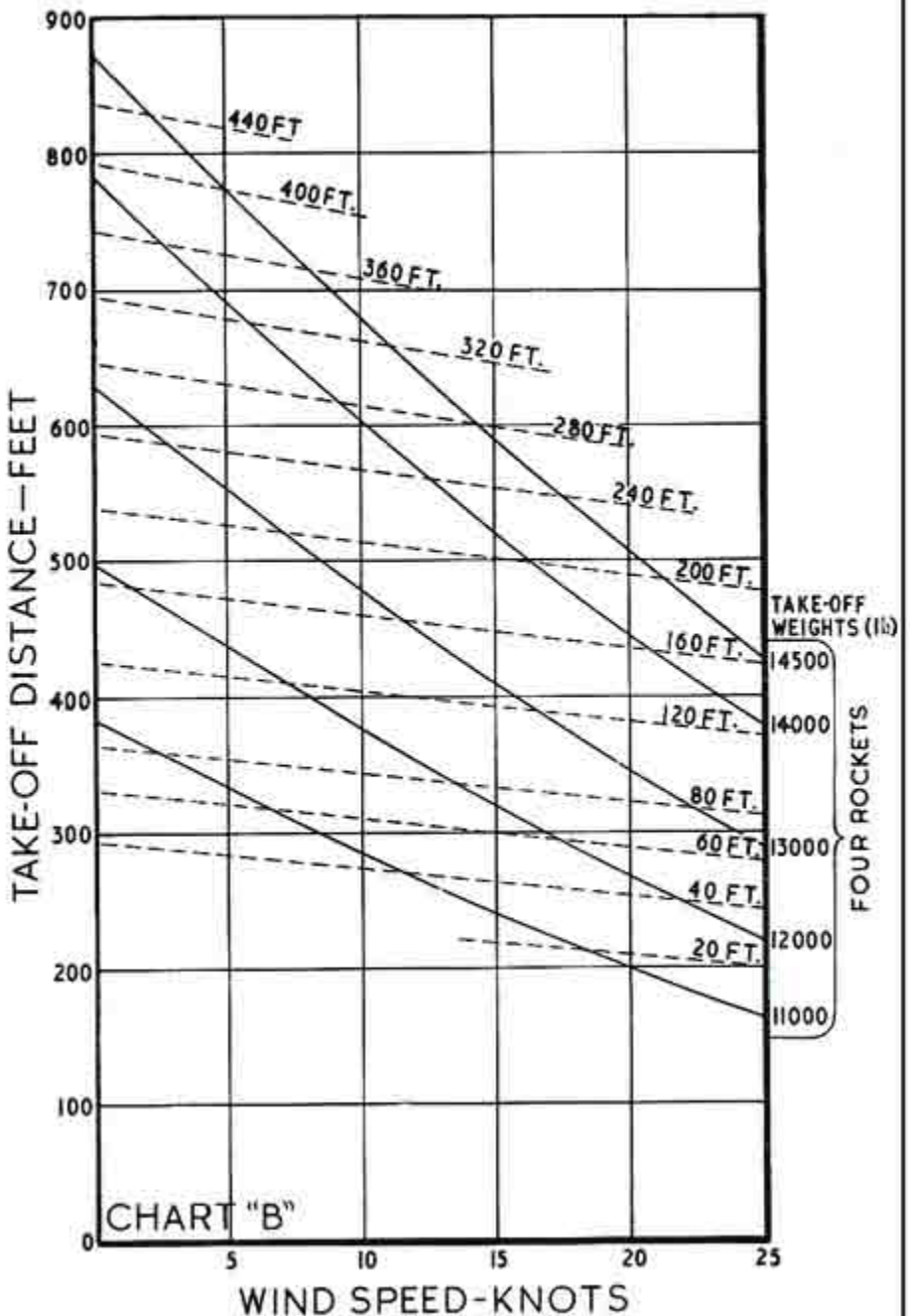


FIG 5

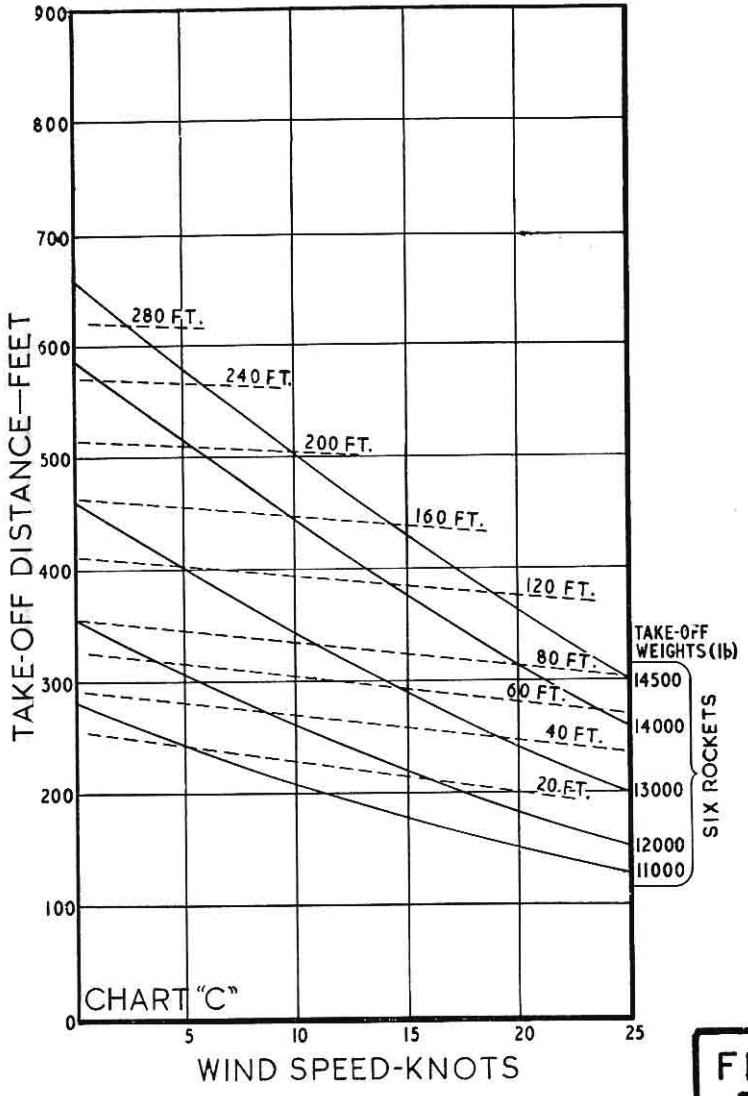

TAKE-OFF DISTANCE—FEET
900
800
700
600
500
400
300
200
100
0
280 FT.
240 FT.
200 FT.
160 FT.
120 FT.
80 FT.
60 FT.
40 FT.
20 FT.
TAKE-OFF WEIGHTS (lb)
14500
14000
13000
12000
11000
SIX ROCKETS
CHART "C"
5
10
15
20
25
WIND SPEED-KNOTS

FIG 5