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Pilot's Notes

PILOT'S NOTES

OXFORD I AND II AIRCRAFT

TWO CHEETAH X ENGINES

Prepared by direction of the
Minister of Aircraft Production

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SECTION 1.

PILOT'S CONTROLS AND EQUIPMENT AND GENERAL EMERGENCY EXITS AND EQUIPMENT.

INTRODUCTION

1. The Oxford I and II are low-wing monoplanes of wooden construction powered by two Armstrong Siddeley Cheetah X engines fitted with fixed pitch wooden or metal propellers. Split trailing edge flaps are fitted. Dual controls are provided. The Oxford I is equipped for flying training and navigational, wireless and bombing training, and there is provision for fitting a gun turret for gunnery training. The Oxford II is equipped for navigational and flying training only.

MAIN SERVICES

2. Fuel system.

(i) Each engine is separately fed by engine-driven fuel pumps from main tanks, one for each engine, housed in the centre section. There are also two auxiliary tanks, one in each outer wing, which feed through the main tanks when the auxiliary fuel cocks are on. To avoid any possibility of fuel over-flowing from the main tanks the auxiliary fuel should not be used if there is more than 20 gallons in the main tanks. The contents of the main tanks should not, however, be allowed to fall below 10 gallons before opening the auxiliary fuel cocks, because air locks might occur and the auxiliary fuel could not then be used. There is no fuel cross-feed between the two systems.

(ii) The fuel capacities are as follows:

Each main tank	49 gallons
Each auxiliary tank	29 gallons
Total per engine	78 gallons
Total per aeroplane	156 gallons

(iii) An R.A.E. type, or Ki-gass priming pump, provided for starting the engine in each nacelle, is reached through a door in the top inboard engine cowling.

3. Oil system.

(i) Each engine is provided with an oil tank of $8\frac{1}{2}$ gallons oil capacity, 1 gallon air space, in the nacelle behind the fireproof bulkhead.

(ii) The pilot has no control over the oil cooling, but blanking plates are provided for the oil cooler ducts to prevent excessive cooling in cold weather; these plates should be fitted when the ground air temperature falls to 10°C and should be removed in summer.

4. Hydraulic system.

(i) A pump driven by the starboard engine supplies hydraulic pressure for operating:

Undercarriage
Flaps

(ii) A handpump is provided between the two seats which will operate the undercarriage and flaps through the normal pipe system when the engine is not running.

On L.4574 and subsequent aeroplanes, on the normal pipe system the handpump draws from a stack-pipe in the fluid reservoir, which leaves a reserve for emergency operation of the undercarriage. On earlier aeroplanes the handpump draws fluid from the bottom of the reservoir; therefore if the normal system is damaged and the handpump is operated, all the hydraulic fluid may be pumped away and there will be no reserve for emergency undercarriage operation.

(iii) The handpump may also be used to operate the separate undercarriage emergency lowering system, after the emergency knob marked PUSH FOR EMERGENCY has been operated. The emergency system will not operate the flaps and will not raise the undercarriage.

On aeroplanes up to and including L. 4573, no attempt should be made to pull back the emergency knob; it is not possible to return to normal operation of the hydraulic system.

On L. 4574 and subsequent aeroplanes, the emergency knob may be pulled back to its normal position; then, if sufficient hydraulic fluid still remains in the reservoir, it may be possible to lower the flaps by handpump after selecting flaps DOWN. The emergency system may be used for practice but the emergency knob must be pulled before the undercarriage can be raised on the normal system.

5. Pneumatic system.

(i) An air compressor driven by the starboard engine supplies compressed air for operating the brakes.

(ii) On early aeroplanes, a single vacuum pump for supplying the gyro instruments is driven by the starboard engine; on later aeroplanes there are two vacuum pumps, one driven by each engine, either of which may be selected. See para. 15 (ii).

6. Electrical system.- A generator, driven by the port engine, and an accumulator supply current for operating:

Interior lighting
Identification and navigation lights
Landing lights
Undercarriage and flap position indicators
Fuel contents gauges
Radio
Bomb release gear
Camera motor.

AEROPLANE CONTROLS

7. Flying controls.- The control column (1) and handwheel operate in the normal manner. The pilot's rudder pedals (2) are adjustable for leg reach in flight, by rotating the inner portion (3) of the pedal with the foot; a "nose-down" rotation will cause the pedal shaft to slide aft in its socket, shortening the reach.

8. Flying control locks.

(i) On aeroplanes up to L.4544, a bar is stowed on the top longeron in the cockpit. One end is pivoted to a lug on the longeron. To lock controls, swing the bar out and attach to the handwheel by two straps. Remove the knurled nut at the free end of the bar (but do not remove the length of cord which connects it to the lock bar) and screw it into the fairlead for the rudder cable at the starboard side of the cockpit. This clamps the cable and prevents rudder movement. A length of cord attached to the free end of the bar is connected across the

pilot's seat to the port top longeron, preventing access to the seat when the controls are locked.

(ii) On L. 4545 and subsequent aeroplanes, three rods (joined at one end) for locking the controls are stowed aft of the entrance door. To lock, set the pilot's seat in its mid position, and attach the cross tube to the fitting on the longeron. Engage the claw on the front tube with the fitting on the rudder pedal, and secure the rear tube to the bracket on the bottom corner of the seat with the captive pin attached to the seat. Strap the cross tube to the handwheel. See fig.4.

9. Dual flying controls.- The instructor is provided with control column (38) and handwheel similar to the pilot's. The instructor's rudder pedals (40) may be adjusted for reach, but not in flight, by pulling up the knob marked PULL TO RELEASE and sliding the pedal shaft to the desired position, then releasing the knob. The dual column and rudder pedals are detachable and are removed when a bomb-aimer is carried.

10. Elevator trimming tab.- A handwheel (37) for adjusting the elevator trim is on the starboard side of the control stand, accessible to both pilots. The complete travel of the wheel is about one and a half complete turns; the position of a knob on the rim of the handwheel, in conjunction with a red arrow, beside the handwheel, which travels sideways over a small range as the wheel is rotated, gives an indication of the tab setting. For take-off, the wheel is rotated until the red arrow registers with a fixed arrow placarded TAKE-OFF. The wheel works in the natural sense.

11. Rudder bias gear.- A handle (45) for applying bias to the rudder for single-engined flight is provided at the bottom of the control stand. There is no indicator; the bias is normally set for straight flight and should only be adjusted in flying on one engine. The complete travel is 64 turns; to set to neutral wind fully one way and 32 turns back.

NOTE.- That the rudder bias control works in the unnatural sense - clockwise for left rudder.

12. Undercarriage.

(i) The undercarriage selector lever (43) is the lever painted red on the control stand. A safety catch must be pulled down before UP can be selected. It is not necessary to release the safety catch to move the selector DOWN.

(ii) The emergency selector knob for the undercarriage emergency lowering system is on the floor between the pilots' seats on L. 4574 and subsequent aeroplanes, on the bottom of the control stand on L. 4573 and earlier aeroplanes; a safety clip, attached by a piece of string to the housing, must be pulled away before the emergency knob can be pushed in.

(iii) Normal operation of undercarriage.

(a) Release the safety catch, move the undercarriage selector (43) to either UP or DOWN, and release.

(b) If engine pump is not running, and normal pipe system is undamaged, operate the handpump.

For emergency lowering of undercarriage, see Section 2, para. 21.

(iv) The selector should automatically return to neutral when the UP or DOWN operation is completed. If the lever does not return when it is certain that the operation is complete, it should be returned by hand. (If a hydraulic pressure gauge is fitted, the lever should be returned immediately the gauge indicates DANGER). If the lever returns prematurely, the undercarriage indicator showing that the wheels are not locked UP or DOWN, the selector lever should be held up or down for not more than 5 seconds. This will occur only when the system is not properly adjusted.

(v) Undercarriage indicator.- The undercarriage indicator (28) is mounted on the centre of the instrument panel. It is controlled by the master electrical switch on the centre instrument panel.

On most aeroplanes the indicator consists of lamps (48,49,50) built into the panel, whose indications are:-

Two green lights (49)	- Undercarriage locked DOWN
Two white lights (48)	- Undercarriage locked DOWN but green lights have failed and need renewing.
No lights	- Undercarriage between locks.
Two red lights (50)	- Undercarriage locked UP.

If the red lights fail, a reserve pair (52) may be operated by pressing two buttons (51) above the normal red lights.

On later aeroplanes the standard undercarriage warning indicator instrument will be fitted. In this case indications are:-

Two green lights (56)	- Undercarriage locked DOWN
Two red lights (54)	- Undercarriage between locks.
No lights	- Undercarriage locked UP.

Night flying shields are fitted.

(vi) Undercarriage horn.- On aeroplanes with the old type of undercarriage indicator, a horn sounds if the undercarriage is not locked down when both throttles are less than one quarter open. There is no override for the warning horn.

On aeroplanes with the standard indicator the horn operates when either throttle is closed to this position. On these aeroplanes a button (53) is provided for ground testing the horn. Press button and red light should glow.

13. Flaps.- The flaps selector lever (42) is on the right of the undercarriage selector lever (43) on the control box. To lower or raise the flaps fully put flap selector DOWN or UP and release. The lever should return automatically to neutral when the operation is complete. To lower or raise the flaps partially, put flap selector DOWN or UP and return it to neutral when the flaps position indicator (29) gives desired position. The flaps position indicator is at the bottom of the centre instrument panel above the control stand.

14. Brakes.

(i) Both control columns (1,38) are provided with a thumb lever (6,35) for operating the brakes. The first pilot's brake control only has a parking catch (5). To park, press in brake thumb lever and engage parking catch.

(ii) Movement of the rudder pedals with the handbrake on will give differential braking.

15. Aircraft instruments.

(i) The first pilot is provided with a complete instrument flying panel (16). The second pilot is provided with airspeed indicator, altimeter, and turn and bank indicator only.

(ii) On later aeroplanes, the vacuum pump selector cock (23) is above the centre instrument panel. If one engine fails, the cock should be set to the other pump to keep the gyro instruments in operation.

ENGINE CONTROLS

16. Throttle and mixture controls.-

(i) Two throttle levers (33) and a single mixture control lever (32) are on the front of the control stand.

(ii) The single mixture control lever has three positions, TAKE-OFF, NORMAL, WEAK. The lever should be set to TAKE-OFF only for take-off and for emergency use; this operates the boost override and brings in an enrichment jet. The lever should be set to WEAK at boosts below -1½ lb/sq.in. during cruising. There are no intermediate mixture settings.

(iii) When the throttle levers are at the gate, climbing boost will be obtained with the mixture control at NORMAL and the throttle will be fully opened with the mixture control at TAKE-OFF. There is therefore no advantage to be gained by putting the throttle levers through the gate.

NOTE. Some engines may still be set to the old boost rating for 87 octane fuel. In these engines the throttle valves are not fully opened when the throttle and mixture levers are set for take-off, and in emergency extra power at low altitude can be obtained by putting the throttle levers through the gate with the mixture control set to TAKE-OFF: this opens the throttle valve fully.

17. Propeller speed control lever.

(i) Fixed pitch propellers are fitted.

(ii) In early aeroplanes a variable 2-pitch propeller control lever was fitted on the left-hand side of the control stand. If the variable pitch control valve on the engine has not been modified by Mod. No. Siddeley E.534, it will be necessary to operate this lever after starting the engine to lubricate the front propeller shaft seals.

(iii) On later aeroplanes in which Mod. No. 532 has been carried out a dummy propeller pitch control lever is fitted on the left-hand side of the control stand for cockpit drill practices only.

18. Carburettor air intake heat control.- The air intake heat control lever (41) on the right-hand control stand has two positions - move down to HOT, up to COLD. In summer the lever should be kept at COLD except when flying in icing conditions and when cruising in weak mixture, but in winter the heat control should be wired in the HOT position. No carburettor air temperature gauge is provided.

19. Slow-running cut-out.- A slow running cut-out control for both engines is mounted on the floor in front of the hydraulic handpump. Pull up on handle and hold until both engines stop, then release smartly to return it to its normal position.

20. Fuel cock controls.- The fuel cocks (31) for the main fuel tanks are on the top of the control stand. The cocks (44) for the auxiliary fuel tanks are at the bottom of the control stand. To open cocks, push down; to close, pull up.

21. Fuel gauge.- A fuel gauge (12) on the port instrument panel indicates the contents of each main tank only. A selector switch (11) permits the contents of either tank to be read: turn to desired tank and push. The master electrical switch (25) must be ON.

22. Ignition switches.- The four magneto switches (26) and the master electrical switch (25) are at the top of the centre instrument panel. The master electrical switch is compelled to be ON when any magneto switch is on. This switch brings into operation the undercarriage and flaps position indicators (28,29) and the fuel contents gauge (12). The main magneto switches must be OFF for starting the engines as they fire a fully advanced spark and may cause back firing.

23. Starting magnetos.- On some aeroplanes starting magnetos are fitted. The switches for these are on the centre instrument panel.

24. Booster coils.- Later aeroplanes are fitted with booster coils instead of starting magnetos. The press buttons (27) for these are below the main magneto switches (26).

25. Electric starter motors.- The press buttons for the starter motors are on the central instrument panel below the main magneto switches. Electric starters are not fitted to aeroplanes equipped with booster coils.

26. Hand starting.- The starting handle is stowed above the entrance door. The sockets for the starting handles on the engines are accessible through a door in the top inboard engine cowling.

27. Oil dilution.- On later aeroplanes oil dilution buttons (24) are provided above the centre instrument panel.

28. Engine instruments.- On early aeroplanes cylinder head temperature gauges were provided at the top of the starboard instrument panel, and the boost gauges were at the bottom of the panel. On later aeroplanes the cylinder temperature gauges were deleted and the boost gauges positioned at the top of the panel. R.P.M. indicators, oil temperature gauges and oil pressure gauges are provided on all aeroplanes.

COCKPIT ACCOMMODATION AND EQUIPMENT

29. Pilot's seat.- A lever (47) on the left of the pilot's seat provides adjustment for height. Push in knob on end of lever to release lever, and move lever forward to lower or back to raise the seat. There is no fore and aft adjustment. A Sutton harness is provided.

30. Instructor's seat.- The instructor's seat can be adjusted for height in three positions but not during flight. To raise or lower, remove pins from the lower collars on the seat brackets and slide seat up or down to desired position. The seat can be positioned fore or aft by the lever (39) on the right of the seat: push in knob on end of lever to release lever, and pull lever back to move seat forward.

31. Windows.

(i) Two side panels on the windscreen are opened by turning knobs (13) at the top; they provide direct vision panels. If opened fully in flight they become disengaged from the control and have to be pulled down manually to re-engage.

(ii) Two side cockpit windows can be opened by unscrewing knobs at the window rail and sliding the windows back.

32. Heating.- One cockpit heating control is provided on the floor at the back corner of the pilot's seat and another at the back corner of the instructor's seat. The pilot's control moves forward to give heat ON; the instructor's control moves back to give heat ON.

OPERATIONAL EQUIPMENT

33. Bomb release controls

(i) The bomb gear master switch (21) is on the bottom of the port instrument panel.

(ii) The bomb selector switches (18) are on the bottom of the port instrument panel. The master switch (21) must be ON before the bombs can be selected. A bomb warning light (20) beside the master switch lights up when a bomb has been selected.

(iii) The pilot's bomb release button (22) is on the top port side of the control stand.

(iv) A bomb jettison button (19) for releasing all bombs at once is situated beside the selector switches, under a safety flap. The master switch (21) must be ON before bombs can be jettisoned.

(v) A bombing steering indicator (10) is provided at the bottom corner of the port instrument panel.

NAVIGATIONAL, SIGNALLING AND LIGHTING EQUIPMENT

34. Radio.

(i) Provision is made for installing R.1082 - T.1083 or T.1154 - R.1155, or T.R.9.D. On aeroplanes in which T.R.9.D. is installed the controller (7) is on the port cockpit wall. A normal/special switch (9) is also provided on the port cockpit wall.

(ii) The R.3002 destruction switches (36) are on the starboard cockpit wall.

35. Intercommunication.- Intercommunication sockets are provided for pilot and instructor on each cockpit wall.

36. Beam approach.- On P.1920 and subsequent aeroplanes provision is made for installing standard beam approach equipment. The beam approach indicator, when fitted. is on the top of the port instrument panel.

37. Signal pistol.- The signal pistol is stowed behind the pilot's seat and is fired through the tube on the floor at the starboard rear corner of the pilot's seat. Stowage for eight signal cartridges is provided on the port cockpit wall.

38. Landing flares.- Two flare release handles are on the pilot's left hand side. On later aeroplanes flares are not carried and these controls are deleted.

39. Identification lights.- The identification switchbox (8) is on the port sidewall. The upward and downward lamps may be used for signalling with the morsing key when the switches are in the MORSE position.

40. Navigation lights.- The switch (15) is on the top port instrument panel.

41. Landing lights.- The landing lights switch (4) is on the port cockpit wall; and controls both landing lights. Only one can be on at a time. A lever (46) for controlling the landing light elevation is on the control stand to the left side of the throttle levers.

EMERGENCY EXITS AND EQUIPMENT (see Fig.4).

42. Parachute exits.- Parachute exit should be made through the normal entrance door. To jettison door: on aeroplanes in which Mod. 318 is not incorporated, open normal handle and pull red emergency handle forward of the door. On aeroplanes in which Mod. 318 has been carried out it is only necessary to pull the red emergency handle on the door itself to jettison the door.

43. Crash exits.- The roof panel in the radio compartment can be jettisoned by pulling the two red handles. This exit is only for use in the event of a crash landing and should not be used for parachute exit.

44. Fire extinguishers.- Two hand fire extinguishers are provided in the cockpit in each rear corner.

45. First aid outfit.- This is on the starboard side of the fuselage just forward of the gun turret.

SECTION 2

HANDLING AND FLYING NOTES FOR PILOT

Note:- The flying technique outlined in these notes is based on A.P.129, Flying Training Manual Part I, Chapter III and A.P.2095, Pilot's Notes General, to which reference should always be made if further information is required.

1. ENGINE DATA,

(i) Fuel.- 87 octane or higher.

(ii) Oil.- See A.P.1464/C.37.

(iii) The principal engine limitations are as follows:

	R.p.m.	Boost lb/sq.in.	Temp.°C. Cylr.	Oil.
MAX. TAKE-OFF TO 1,000 FT. OR 5 MINS. LIMIT	2,300	Full throttle		
MAX. CLIMBING 1 HR LIMIT	2,300	+2¼	220	80
MAX. RICH CONTINUOUS	2,100	+1	220	80
MAX. ECONOMICAL CONTINUOUS	2,100	-1½	180	80
MAX. COMBAT 5 MINS LIMIT	2,425	+2¼	250	90

NOTE. Some engines may still be set to the old boost rating for 87 octane fuel, in which case it will not be possible to get more than +2½ lb/sq.in. for take-off, and +½ lb/sq.in. for max. climb and combat.

OIL PRESSURE: NORMAL: 70 lb/sq.in.
EMERGENCY MINM (5 MINS): 35 lb/sq.in.

MINM. TEMP. FOR TAKE-OFF: OIL: 25°C.

(iii) The following limitations must also be observed:

R.P.M: Minimum at take-off boost 1,925

Diving: Maximum boost +2¼ lb/sq.in.
Maximum r.p.m. 2,910

2,425 r.p.m. may be exceeded only for 20 seconds, with throttle not less than ⅓ open.

(iv) Mixture control.

TAKE-OFF to be used only for take-off and when emergency full power is required.

NORMAL to be used for all other boosts above $-1\frac{1}{2}$ lb/sq.in.

WEAK to be used for all boosts below $-1\frac{1}{2}$ lb/sq.in.

2. CORRECTION FOR POSITION ERROR

The corrections for position error are as follows:

From	80	85	95	105	120	130	145	155	170
To	85	95	105	120	130	145	155	170	185
Add	6	4	2	0					
Subtract					2	4	6	8	10

3. FLYING LIMITATIONS

(i) Maximum speeds in m.p.h. I.A.S:

Diving:	270
Undercarriage down:	120
Flaps down:	120

(ii) Bomb clearance angles:

Dive:	60°
Climb:	20°
Bank:	10°

4. PRELIMINARIES

(i) Check that generator switch (on electrical control panel, aft of cockpit) is ON.

(ii) Master electrical switch ON.

(iii) Check flaps UP, flap selector neutral.

(iv) Check undercarriage emergency knob in normal position, undercarriage selector neutral, and safety catch engaged.

5. STARTING ENGINES AND WARMING UP

(i) Main fuel cocks on, auxiliary fuel cocks off.

(ii) Set engine controls as follows:-

Throttle	-	1 inch open
Mixture	-	NORMAL
Air intake heat	-	COLD in summer. In winter, air intake heat control should be wired in HOT position.

(iii) The ground crew will operate the engine pump priming levers to raise the fuel pressure (if fitted fuel pressure gauge should show 1½ - 2 lb/sq.in.)

(iv) The ground crew will operate the Kigass or R.A.E. priming pump until the suction and delivery pipes are full; this may be judged by a sudden increase in resistance.

(v) (a) <u>On aeroplanes fitted with electric starters, if ground starter battery is available:</u>

Switch on starting magneto; leave main magnetos off; press the starter button. Turning periods must not exceed 20 seconds, with a 30 seconds wait between each.

(b) <u>On aeroplanes not fitted with electric starters:</u>

NOTE. If mod.no.394 is not incorporated, the cylinders must be primed before the engine is turned.

Leave main magneto off; have the engine cranked by hand, and press booster-coil button.

The ground crew works the priming pump as rapidly and vigorously as possible while the engine is being turned, and it should start after the following number of strokes:

Air temperature °C	+30	+20	+10	0	-10	-20
No. of strokes	1	2	3	6	14	25

NOTE. If the engine is hot, no priming will be necessary for restarting. If the engine has been stopped for about an hour, 1 stroke of the priming pump should be sufficient for starting.

(vi) When the engine fires, switch on main magnetos. Switch off starting magneto or booster coil. Screw down the priming pump, and secure the cowl door.

(vii) Run the engine as slowly as possible for half a minute then warm up at 1,000 r.p.m.

6. TESTING ENGINES AND INSTALLATIONS

(i) On early aeroplanes with 2-pitch propeller control lever in which Mod.No.Siddeley E.534 is not incorporated, move propeller control to fine pitch for 3 minutes and then return to coarse pitch, to lubricate the front propeller shaft seals.

(ii) Check operation of hydraulic system by lowering and raising flaps; flaps selector should return to neutral.

After warming up

(iii) Move mixture control to TAKE-OFF, open up to the gate and check boost and r.p.m.

(iv) Gently return mixture control to NORMAL. Check that boost falls to +2½ lb/sq.in. (On some engines boost control may still be set to the old 87 octane rating: in this case boost should fall to + ½ lb/sq.in.). Throttle back to 1,600 r.p.m. and test each magneto in turn. The drop should not exceed 80 r.p.m.

7. TAXYING

(i) The flaps should be UP for taxying.

(ii) The aeroplane is easy to steer with engines only; while the use of brakes is rarely necessary on grass, they will be needed on hard surfaces and in restricted spaces.

8. FINAL PREPARATIONS FOR TAKE-OFF

The drill of vital actions is T,M,P,Fuel, Flaps, Turret.

T - Trim	- Elevator trim tab control wheel one half turn back from fully forward. Register red arrow on indicator with fixed arrow marked TAKE-OFF. Rudder bias central (32 turns from either limiting position)
M - Mixture	- TAKE-OFF
P - Propeller	- Fully forward (if dummy control fitted)
Fuel	- Check contents. Main fuel cocks on; auxiliary fuel cocks off unless less than 20 gallons in main tonks.
Flaps	- UP. Selector neutral.
Turret (if fitted)	- Secure turret with gun slot on aft centreline. Check that rear gunner moves forward, immediately behind pilot.

9. TAKE-OFF

(i) There is a tendency to swing right which can be checked on the throttles, which should be opened slowly.

(ii) Do not hurry the tail off the ground. The aeroplane should be eased off the ground at not less than 65 m.p.h. I.A.S.

(iii) If buffeting of the elevator is felt when taking-off, due to local stalling at the wing roots caused by air leaks due to badly fitting panels, etc:-

(a) Keep the tail up and increase speed until buffeting ceases. If buffeting continues and it is too late to abandon the take-off, lower the flaps 25°.

(b) Alternatively, abandon attempt to take-off, and have aeroplane checked by maintenance personnel.

(iv) Retract undercarriage when airborne; if flaps have been used, raise them when 300 feet is reached.

(v) Before climbing increase speed to 100 m.p.h. I.A.S. (which gives a good margin above safety speed of 85 m.p.h. I.A.S.) and return mixture control gently to NORMAL. If surging of the engines occurs, move the mixture control back to TAKE OFF and then very slowly and gently back to NORMAL.

10. CLIMB

(i) The speed for maximum rate of climb is 110 m.p.h. I.A.S. up to 6,500 feet. Above 6,500 feet reduce speed by 2 m.p.h. per 1,000 feet.

(ii) The aeroplane should not be climbed in weak mixture as overheating will occur.

11. ECONOMICAL CRUISING

(i) Fly in WEAK mixture and set air intake heat control to HOT.

(ii) The recommended speed for maximum range is 120 m.p.h. I.A.S.

(iii) Approximate range data, at a mean weight of 6800 lb.

(a) Oxford I equipped with gun turret.

Height feet.	m.p.h. I.A.S.	Total gallons/hour (2 engines)	Air miles/gallon
10000	90	17	6.4
	100	18	6.55
	110	19	6.60
	120	22	6.45
	130	24	6.10

(b) Oxford I or II without gun turret.

Height feet	m.p.h. I.A.S.	Total gallons/hour (2 engines)	Air miles/gallon
10000	90	16	6.7
	100	17	7.0
	110	18	7.1
	120	20	7.0
	130	22	6.7

NOTE. The air miles per gallon will not vary much with height.
The gallons per hour will be increased (or decreased) by roughly 1½% with every 1000 feet increase (or decrease) in height.

Curves showing air miles per gallon and fuel gallons per hour plotted against I.A.S. will be found at the end of Section 2.

(iv) The approximate fuel consumptions in rich mixture at sea level are:-

Boost	r.p.m.	Total gallons/hour (2 engines)
Max. climb	2,300	70
Max. continuous	2,100	50

(v) The effective fuel capacities are:

2 main tanks	98 gallons
2 auxiliary tanks	58 gallons
	156 gallons

12. GENERAL FLYING

(i) Change of trim.-

Undercarriage down - nose down
Flaps down - nose down

(ii) Stability.- The aeroplane is directionally and laterally stable. The aeroplane is slightly unstable fore and aft at high speed with the C.G. normal, and becomes progressively more unstable as the C.G. is moved aft.

(iii) Controls.- The controls are light, effective and quick in response, except that the rudder is sluggish during take-off. All controls become slightly heavier with increase in speed. The elevator trimming tab is effective and can cope with all conditions of flight. The rudder bias is barely powerful enough to cope with one-engined flight without foot load.

(iv) Flying at low height in poor visibility.- Lower flaps to 25° and fly at 110 m.p.h. I.A.S. Keep undercarriage up.

(v) Vibration due to turret.- If the gun turret is to port or starboard, considerable vibration may occur when the aircraft is turned.

13. STALLING

(i) The stalling speeds at full load are:-

Flaps and undercarriage up 67 m.p.h.I.A.S.
" " " down 58 m.p.h.I.A.S.

(ii) Ample warning of approaching stall is given by vibration; at the stall, which occurs with the control column about $\frac{3}{4}$ back, the nose drops slightly. Either wing may drop. Buffeting of the elevator controls occurs. Recovery is straightforward. If the control column is brought right back the controls lose their effectiveness, the wing cannot be picked up by aileron and a spinning tendency may develop, in which case the normal method of recovery is effective.

NOTE. When gliding at low speed with flaps up buffeting of the elevator and tailplane may occur at about 10 m.p.h. above stalling speed, and the aeroplane may tend to sink; this is caused by a local stall at the wing roots due to badly fitting panels, torn fabric etc. To stop the buffeting, lower the flaps 20° to 30°, or if necessary, fully; if practicable, open throttles or dive to increase the speed of airflow.

14. SPINNING AND AEROBATICS

(i) Deliberate spinning is not permitted. If an accidental spin should develop, the normal method of recovery will be effective if both engines are throttled right back and the controls applied firmly. If practicable, the inner engine should be opened up to assist the rudder. The nose drops suddenly and a heavy pull is needed to recover from the dive. If the elevator trimming tab is used it must be applied very gently and carefully.

(ii) Aerobatics are not permitted.

(iii) Care must be taken not to apply heavy loads with the elevator.

15. DIVING

The aeroplane can be dived without changing trim from level flight.

16. APPROACH AND LANDING

(i) Reduce speed to 120 m.p.h. I.A.S. and carry out the drill of vital actions, U.M.P, flaps, and turret.

U - Undercarriage	- DOWN. Selector lever should return to neutral. Check by indicator and horn that undercarriage is locked down. Also check visually.
M - Mixture	- TAKE-OFF
P - Propeller	- Fully forward (if dummy control fitted)
Flaps	- Fully down; except that in a high wind 40° or over should be used as needed.
Turret(if fitted)	- Secure turret with gun slot on aft centreline. Check that rear gunner moves forward, immediately behind pilot.

(ii) Recommended speed for the approach:

Engine assisted	80-85 m.p.h. I.A.S.
Glide	85-90 m.p.h. I.A.S.

17. MISLANDING

(i) Retract undercarriage at once. Climb at 85 m.p.h. I.A.S. with flaps down.

(ii) Raise the flaps slowly, in stages at 300 feet; if the flaps are raised in one operation they come up very quickly and considerable sink will occur.

(iii) The aeroplane will climb away without retrimming.

18. AFTER LANDING

(i) Raise the flaps before taxying.

(ii) Let the engines idle for a minute, then pull out the slow running cut-out and hold until the engines stop.

(iii) After engines have stopped switch off ignition and turn off fuel. Release the cut-out smartly to return it to the normal position.

19. OIL DILUTION IN COLD WEATHER

See A.P.2095/4. The oil dilution period is 3 minutes.

20. ENGINE FAILURE

(i) <u>During take-off</u>.

(a) The aeroplane can be held straight at take-off power on one engine provided at least 85 m.p.h. I.A.S. has been attained. Do not attempt to climb at less then 85 m.p.h. I.A.S.

(b) If it is certain that any obstacles can be cleared, check that mixture control is at TAKE-OFF; put live throttle through the emergency gate (if boost control is set at lower rating; no advantage will be gained by this when set at higher rating). At full load the aeroplane may climb away slowly at 85 m.p.h. I.A.S: the performance on one engine will be affected by the condition of the engine cowling, fairings, and sealings.

(c) Unless there is ample room to clear obstacles, close both throttles and land straight ahead.

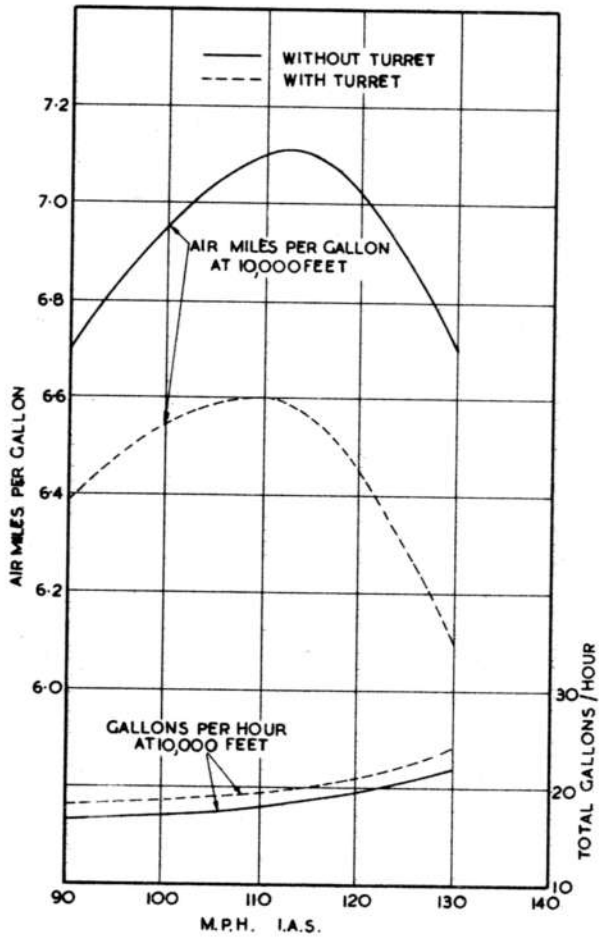


FIG. 1 — RANGE AND FUEL CONSUMPTION — FIG. 1

To Fit Lock

(a) Put seat in mid-position.
(b) Fit cross tube to lug on longeron and engage front stay with bracket on starboard rudder pedal.
(c) Engage rear stay bottom socket with bracket on seat and fit pin.
(d) Strap handwheel to cross tube.

To Dismantle Lock.

Proceed in reverse order to fitting.

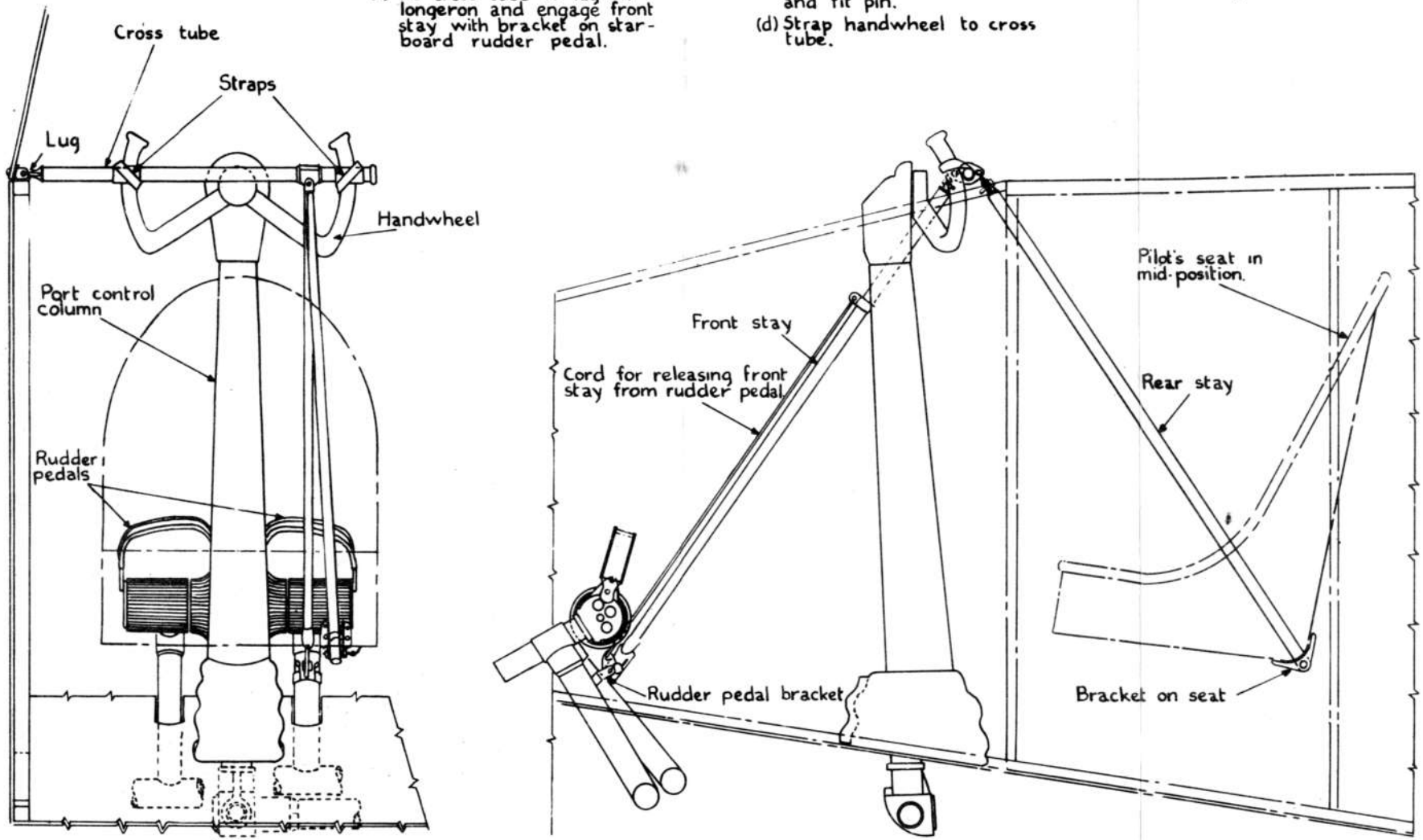


FIG. 1

CONTROL LOCKING GEAR
L.4545 & Subsequent Aeroplanes.

FIG. 1

FS/B

Key to fig.2.

COCKPIT CONTROLS.

1. Pilot's control column
2. Pilot's rudder pedals
3. Adjuster for pilot's rudder pedals
4. Landing lights switch
5. Parking brake catch
6. Brake control lever
7. T.R.9.D. controller
8. Identification switchbox
9. Radio normal/special switch
10. Bombing steering indicator
11. Fuel gauge selector switch
12. Fuel gauge for main tanks
13. Direct vision panel opening control
14. Pressure head heater switch
15. Navigation lights switch
16. Instrument flying panel
17. Stowage for beam approach indicator
18. Bomb selector switches
19. Bomb jettison switch
20. Bomb warning light
21. Bomb gear master switch
22. Bomb release switch
23. Vacuum pump selector switch
24. Oil dilution buttons
25. Master electrical switch
26. Main magneto switches
27. Booster coil switches
28. Undercarriage position indicator
29. Flap position indicator

(25–29) See Fig.3.

30. Starboard instrument panel (engine instruments, air temp.gauge, instructor's airspeed indicator, turn and bank indicator and altimeter).
31. Main fuel cocks
32. Mixture control lever
33. Throttle control levers
34. Triple pressure gauge
35. Instructor's brake control lever
36. R.3002 destruction switches
37. Elevator trimming tab control handwheel and indicator
38. Instructor's control column
39. Instructor's seat fore-and-aft control lever
40. Instructor's rudder pedals
41. Air intake heat control
42. Flap selector lever
43. Undercarriage selector lever
44. Auxiliary fuel cocks
45. Rudder bias control
46. Landing lights elevation control lever
47. Pilot's seat-raising lever.

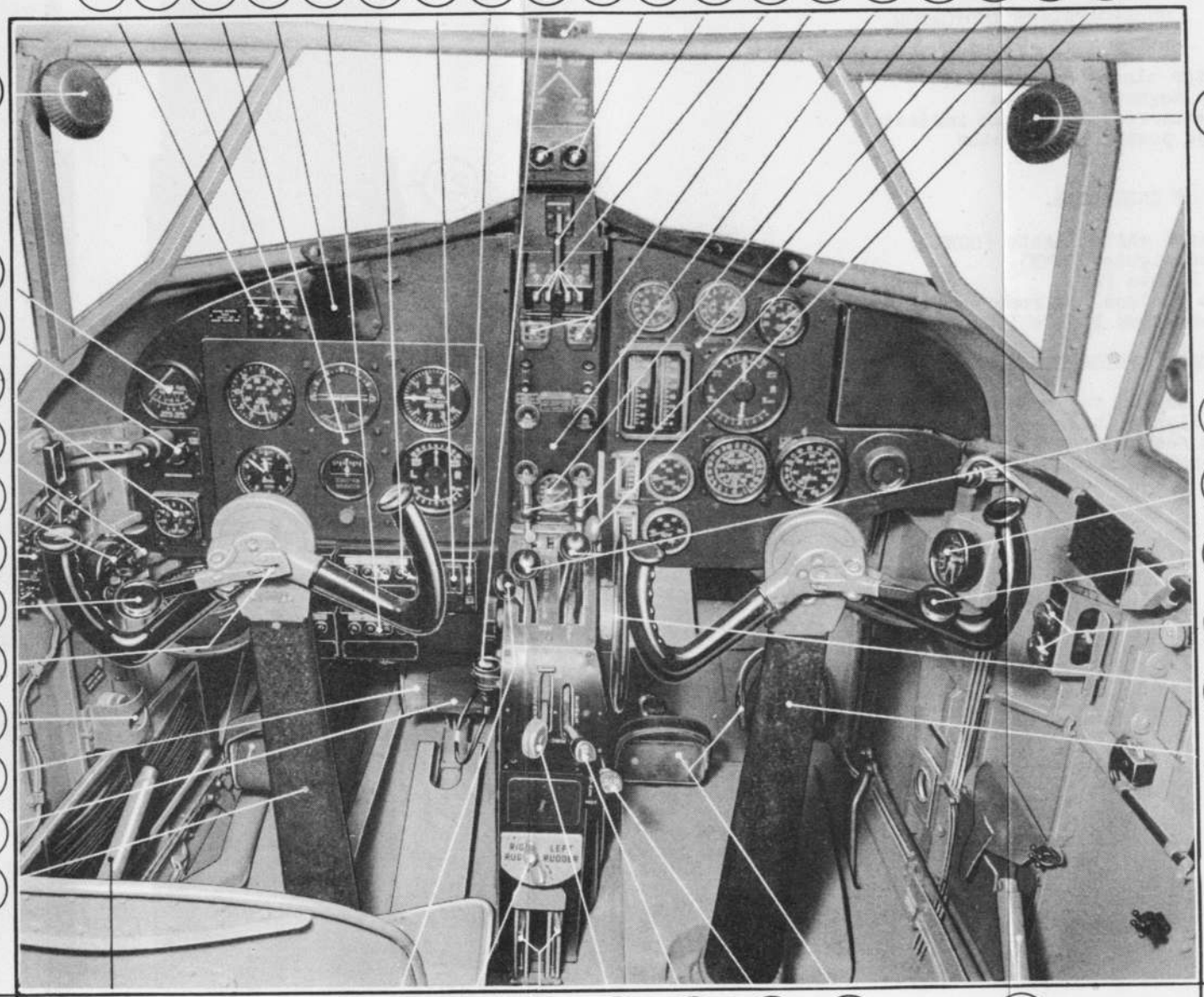


FIG. 2

COCKPIT CONTROLS

FIG. 2

FS/9

Key to fig.3.

UNDERCARRIAGE INDICATOR.

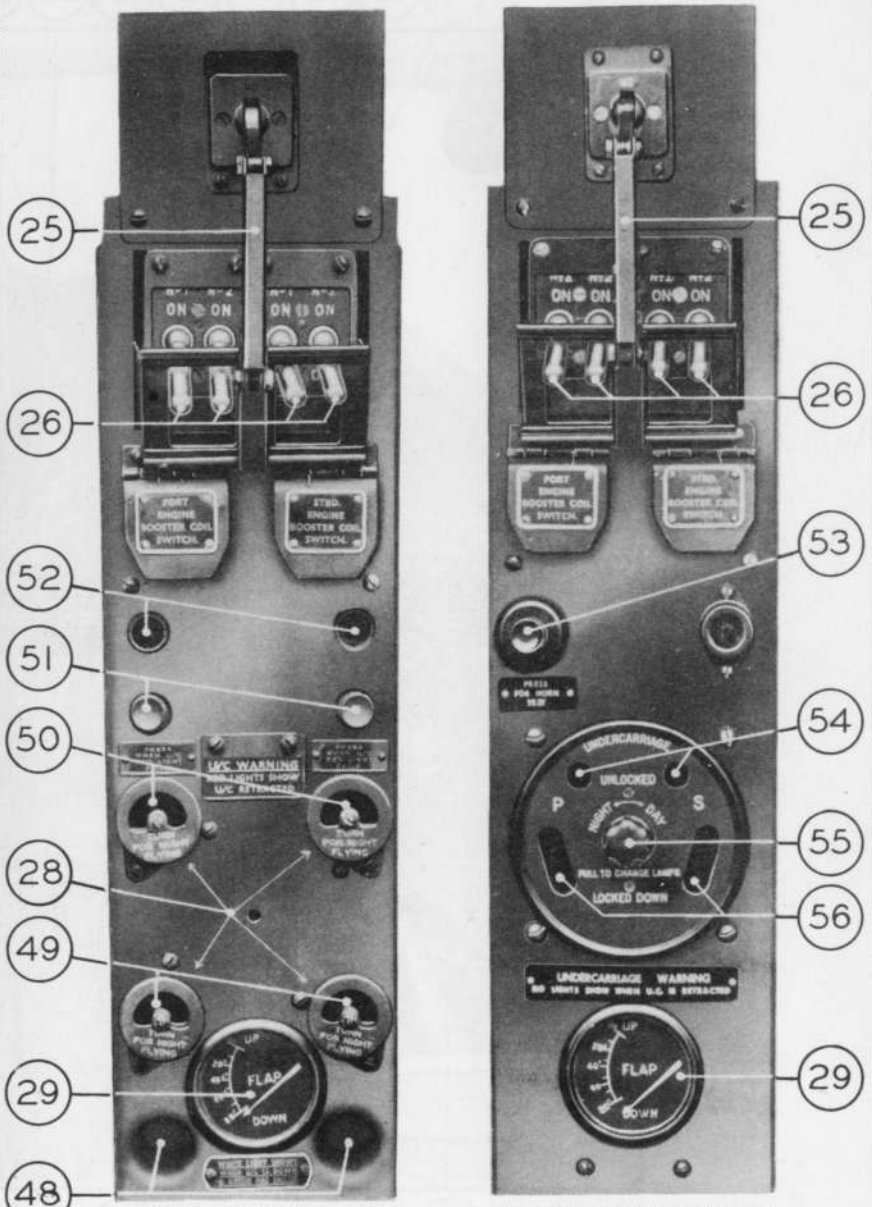
25. Master electrical switch
26. Main magneto switches
28. Undercarriage position indicator
29. Flaps position indicator

OLD TYPE OF INDICATOR.

48. Reserve white lights (DOWN).
49. Green lights (DOWN).
50. Red lights (UP).
51. Push buttons for reserve red lights
52. Reserve red lights (UP).

NEW STANDARD INDICATOR

53. Push button for testing warning horn
54. Red lights (between locks)
55. Knob for dimming lights
56. Green lights (DOWN).



OLD TYPE OF INDICATOR

NEW STANDARD INDICATOR

FIG. 3

UNDERCARRIAGE INDICATOR

FIG. 3

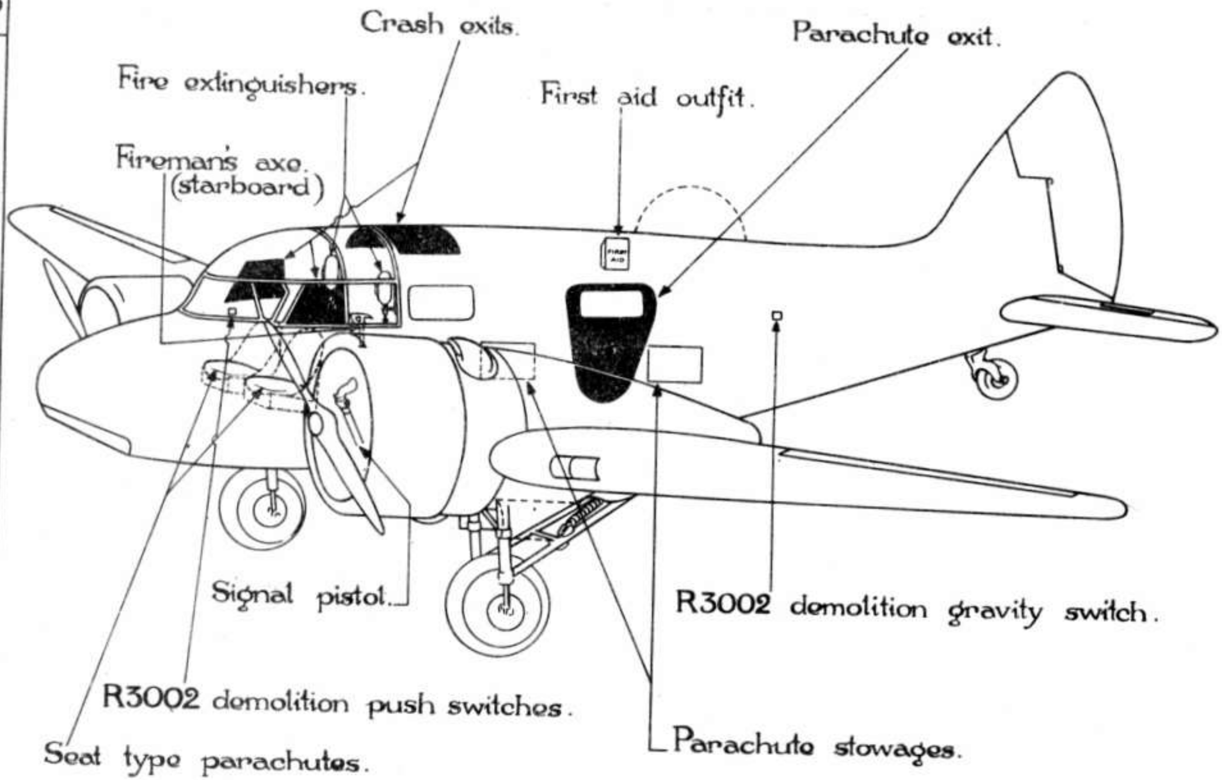
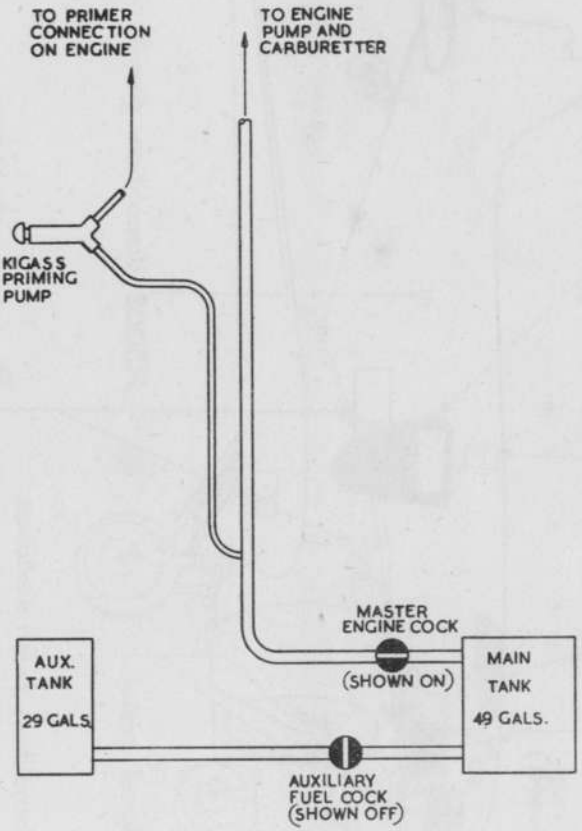


FIG. 4 EMERGENCY EXITS & EQUIPMENT FIG. 4



THE PORT ENGINE SYSTEM SHOWN
THE STARBOARD ENGINE SYSTEM IS SIMILAR

FIG. 5 SIMPLIFIED FUEL SYSTEM DIAGRAM FIG. 5