2nd Edition

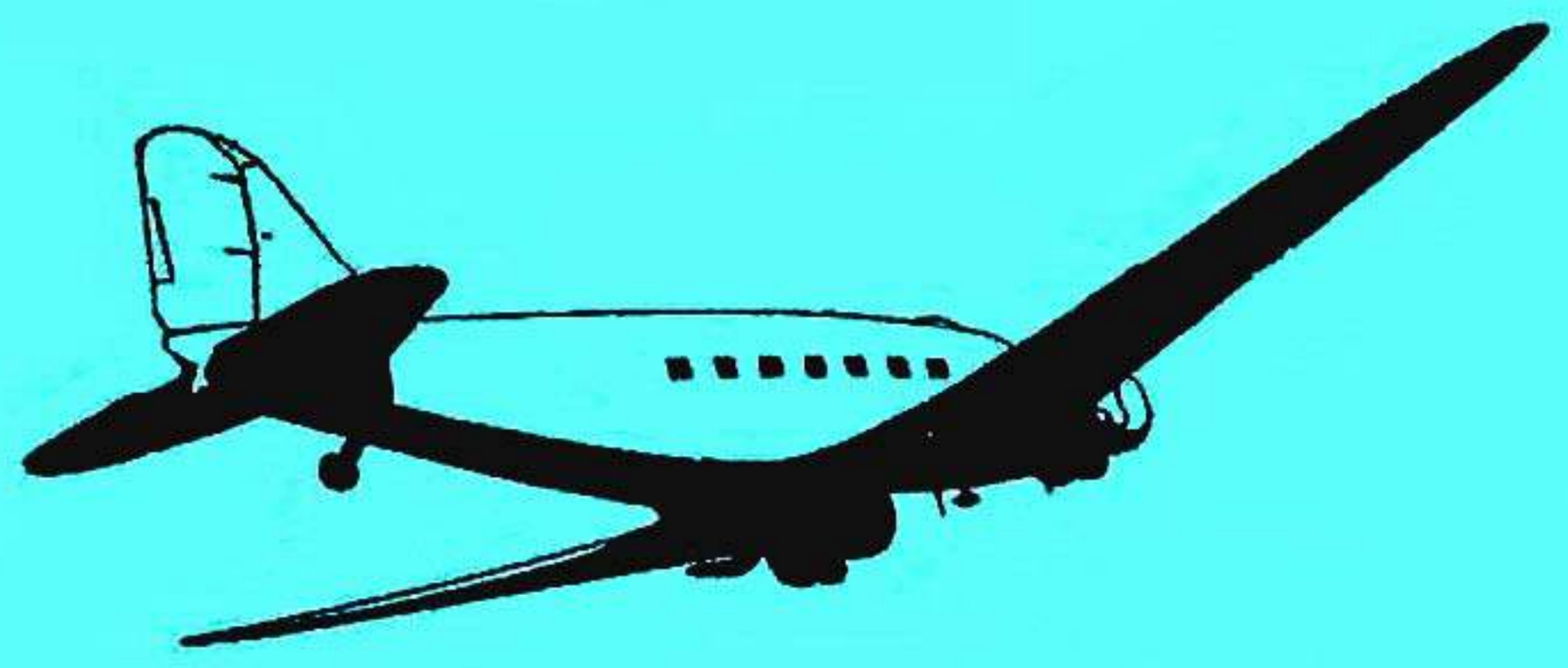
A.P. 2445D—P.N.

PILOT'S NOTES

FOR

DAKOTA IV

TWO TWIN WASP R1830—90C ENGINES



PROMULGATED BY ORDER OF THE AIR COUNCIL

W.B Brown

RESTRICTED

AIR MINISTRY
June 1946

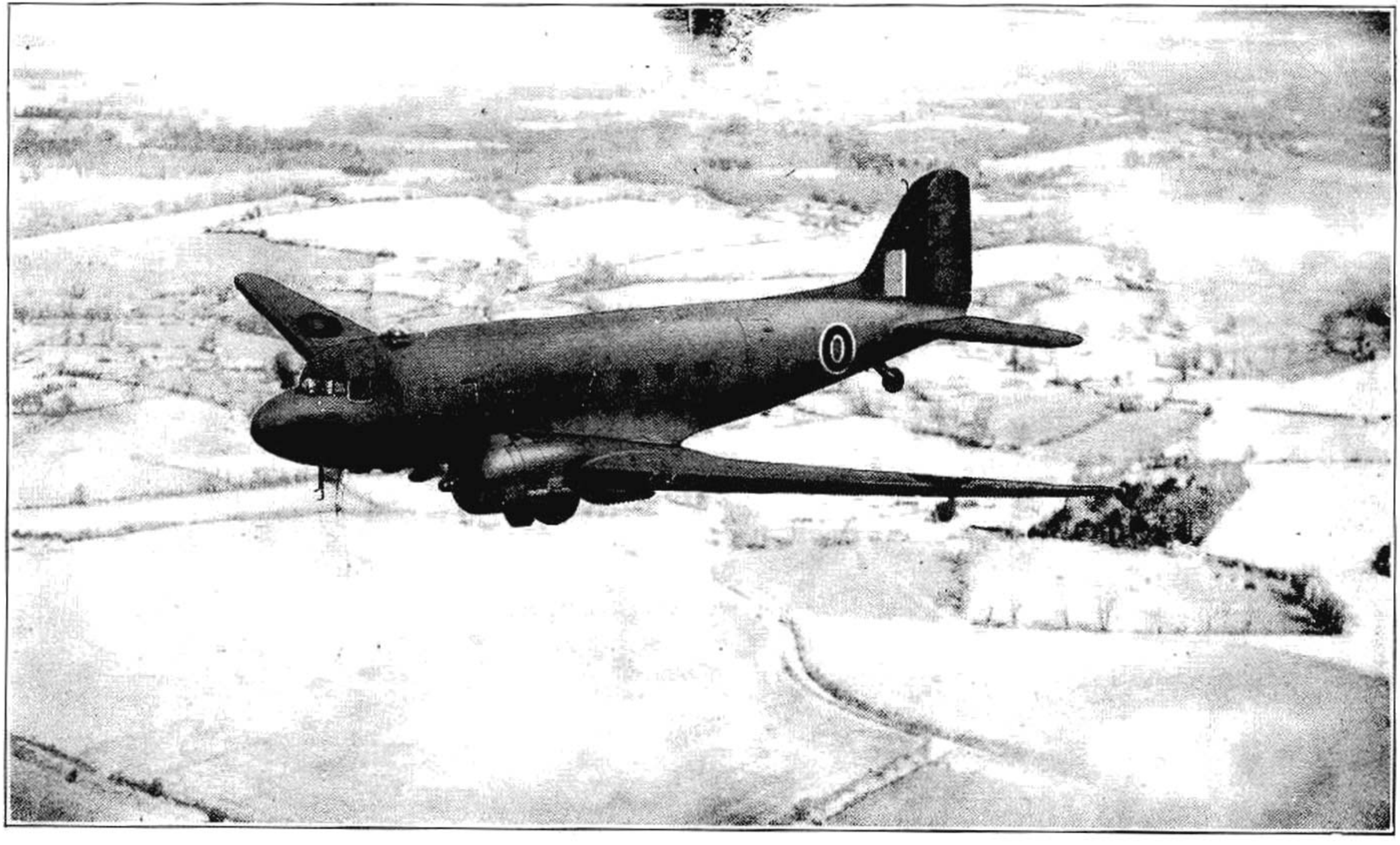
Amendment List No. 1 to
A.P. 2445D—P.N. 2nd Edition

DAKOTA IV

Incorporation of this Amendment List must be certified by inserting date of incorporation and initials in the spaces provided on the inside front cover of the Pilot's Notes.

A.L.	PART	PARA.	AMENDMENT
1	I	8 (ii)	*Amend* by sticking over gummed slip herewith
1	I	11	*Amend* by sticking over gummed slip herewith
1	I	22 (ii)	At line one, after "depress the" *insert* "1st pilot's."
1	I	28 (ii)	*Add* "This is sufficient for about 1¼ hours continuous use."
1	I	30	*Add* (but *see* para. 52 (v)).
1	I	33	*Add* "There is sufficient fluid for about 7 hours at minimum, or 1¼ hours at maximum, rate of flow."
1	I	34 NOTE	*Add* "This is sufficient for about 1¼ hours."
1	II	41	At line 4. *Add* "Undercarriage safety locking pins in place."
1	II	52 (v) page 30	At line 3, after "OPEN" *insert* "or CLOSED as required."

Affix this Amendment List to inside back cover of Notes.



DAKOTA IV

NOTES TO USERS

THIS publication is divided into five parts : Descriptive, Handling, Operating Data, Emergencies, and Illustrations. Part I gives only a brief description of the controls with which the pilot should be acquainted.

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.M.O. A93/43).

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

Additional copies may be obtained by the station publications officer by application on Form 294A, in duplicate, to Command headquarters for onward transmission to A.P.F.S., 81 Fulham Road, S.W.3 (see A.M.O. A1114/44). The number of this publication must be quoted in full—A.P. 2445D—P.N.

Comments and suggestions should be forwarded through the usual channels to the Air Ministry (D.T.F.).

AIR MINISTRY
February 1946

AIR PUBLICATION 2445D—P.N.
Pilot's Notes

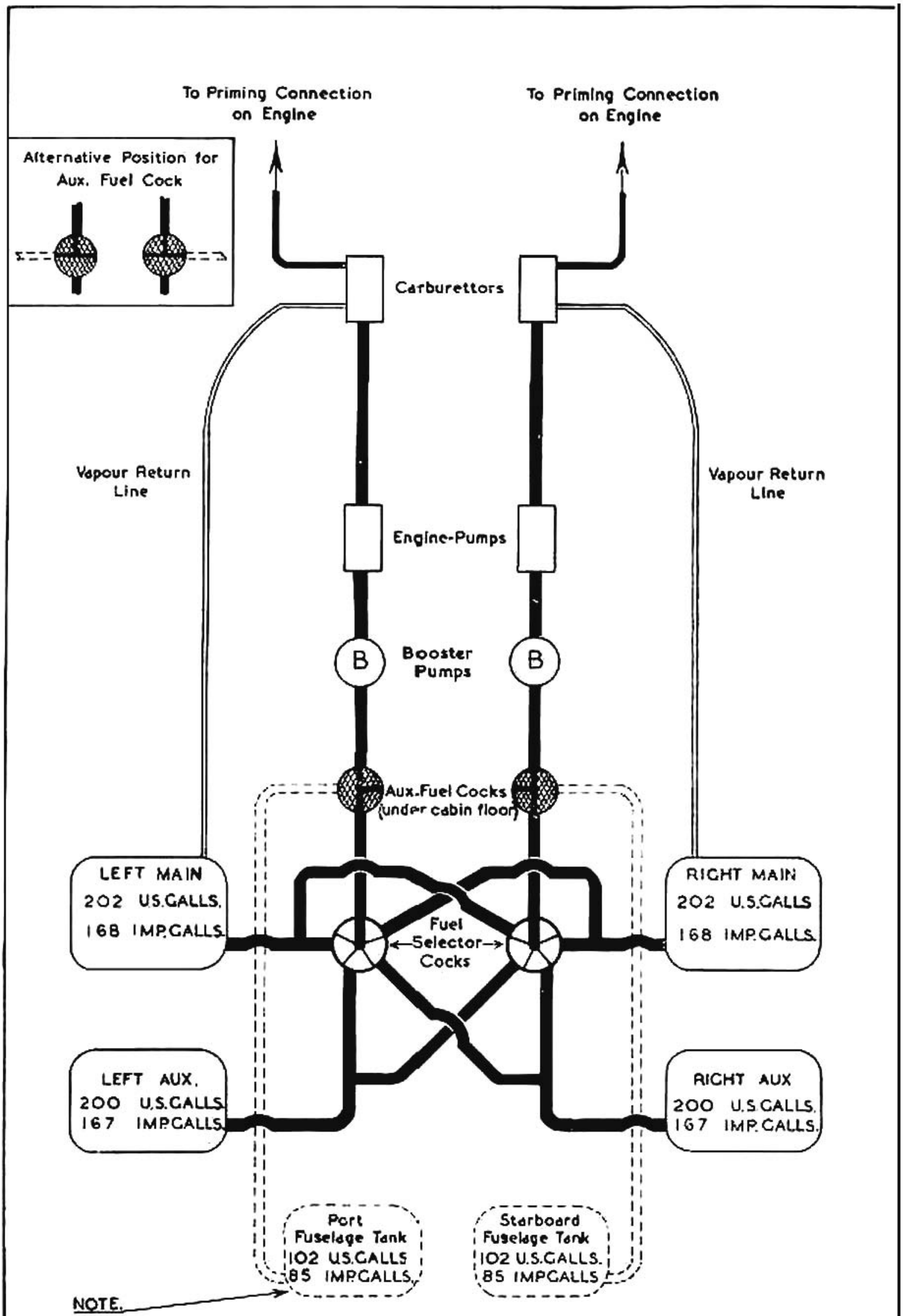
DAKOTA IV PILOT'S NOTES

LIST OF CONTENTS

PART I—DESCRIPTIVE

PART IV—EMERGENCIES

PART V—ILLUSTRATIONS



SIMPLIFIED FUEL SYSTEM DIAGRAM

PART I

DESCRIPTIVE

INTRODUCTION

1. The Dakota IV is a twin-engined low wing transport aircraft, powered by Twin Wasp R1830-90C engines driving Hamilton paddle-bladed fully feathering propellers.

FUEL AND OIL SYSTEMS

2. **Fuel tanks**

Fuel is carried in four tanks, two in each wing. The capacities are as follows :

Main tank
(front) each — 202 U.S. galls. (168 Imp. galls.)
Auxiliary tank
(rear) each — 200 U.S. galls. (167 Imp. galls.)
Total each side 402 U.S. galls. (335 Imp. galls.)

In addition up to eight long-range inter-connected tanks may be carried in the fuselage, four on each side ; each tank has a capacity of 102 U.S. gallons (83 Imp. gallons). The vapour return lines from the Bendix-Stromberg carburettors are vented to the main tanks and these tanks, when full, should be used for starting, take-off and preliminary flying.

3. **Fuel cocks**

(i) A separate five-position selector cock, controlling the fuel supply from the wing tanks, is fitted for each engine. These cocks (13) and (18) are mounted on either side of the control pedestal and are marked OFF, LEFT AUX., LEFT MAIN, RIGHT MAIN, and RIGHT AUX.

(ii) Two cocks mounted on the floor just aft of the navigator's compartment control the supply of fuel from the long-range tanks.

4. **Fuel booster pumps**

Two electrically-driven fuel booster pumps are fitted. They are controlled by switches mounted on the right-hand electrical panel (25). These pumps, which deliver fuel at a pressure of 17 lb./sq. in., may be left ON at all times when the engines are running, but in any case they should be ON for starting, take-off and landing, when climbing, and at any time when the fuel pressure begins to fall. They must never be switched ON when the engines are not running, unless the mixture controls are in the IDLE CUT-OFF position.

5. **Priming system**

Two electrically-operated priming valves are fitted, one for each engine. They are controlled by spring-loaded switches mounted on the left-hand electrical panel (23). The switches are held DOWN to prime the engines.

NOTE.—In the UP position the same switches operate the oil-dilution valves.

6. **Fuel contents gauge**

A liquidometer fuel contents gauge (12) is fitted on the right-hand side of the instrument panel. To read the contents of any wing fuel tank, switch on the BATTERY MASTER switch and turn the fuel selector to the appropriate tank. The contents of the long-range tanks can be checked by the dip-stick attached to the filler cap in each tank.

7. **Fuel pressure gauge**

A dual reading fuel pressure gauge is mounted on the right-hand side of the instrument panel.

8. **Oil system**

(i) Oil is supplied from a separate tank mounted in each engine nacelle. The capacity of each tank is 29 U.S. gallons (24 Imp. gallons) of oil and 2.9 U.S. gallons (2.4 Imp. gallons) airspace.

shows the pressure in the undercarriage down lines. A handpump which will operate all the normal services in the event of failure of the engine-driven pumps, is fitted between the pilots' seats. This pump draws fluid from the bottom of the hydraulic reservoir, whereas the engine-driven pumps draw fluid from an outlet at a higher level ; a reserve of fluid for the handpump is thus always ensured. A handpump by-pass valve is mounted on the centre of the hydraulic control panel ; with this valve in the OFF (normal) position, the handpump will operate any hydraulic service selected, but it will not charge the accumulator, and the hand-pump pressure will not, therefore, be recorded on the rear hydraulic pressure gauge. To charge the hydraulic accumulator when the engines are not running, set the by-pass valve to the ON position and operate the handpump ; the rear hydraulic pressure gauge will then record the handpump pressure. After charging the accumulator in this way, the by-pass valve must be set to the OFF position.

(iii) The level of the fluid in the hydraulic reservoir is shown on a direct reading gauge mounted on the hydraulic control panel.

10. **Vacuum system**

Two vacuum pumps, one driven by each engine, together operate the gyro instruments and automatic pilot. The pressure from the exhaust side of the vacuum pumps operates the Goodrich de-icing system.

A.L.1 Para. 11 (i)

11. **Electrical system**

(i) Two generators, one driven by each engine, and two 12-volt batteries connected in series, supply electric power at 24 volts for the operation of the services listed below.

An inverter supplies power for the alternating current operated equipment. On some aircraft alternating current is supplied by an alternator instead of by an inverter ; it replaces the generator fitted to the port engine.

Cabin lighting
Door warning light
Engine starter motors
Fuel booster pumps
Fluorescent lighting
Instrument lighting

Instruments
Navigation and landing lights
Paratroop warning lights
Pitot-head heater
Propeller feathering motors
Priming valves
Propeller de-icing pump
Oil dilution solenoids
Radio
Undercarriage warning horn and lights

(ii) The BATTERY MASTER switch is on the left-hand electrical panel (23). This switch must be OFF when a ground starter battery is in use. The latter can be plugged in to a socket on the underside of the fuselage just forward of the leading edge of the wing. The generator switches are in the main junction box on the forward side of the port bulkhead, behind the pilots compartment.

The INVERTER switch, on the right-hand electrical panel (25), must be ON in addition to the BATTERY MASTER switch for the operation of the alternating current operated equipment.

12. **Heating and ventilating systems**

Cabin heating is provided by air which is passed through exhaust-heated muffs. The system is controlled by two spill valves and a heat regulator in the wireless operator's compartment. Warning lights in the wireless operator's compartment, and on the right-hand instrument panel, come on when the cabin temperature becomes unduly high. The spill valves should then be opened. A separate heat regulator for the cockpit is fitted behind the first pilot's seat.

AIRCRAFT CONTROLS

13. **Flying controls**

The flying controls, which are duplicated for the first and second pilot, are conventional. Each rudder pedal may be adjusted for reach during flight by depressing the lever (20) on the outboard side of it.

14. **Flying controls locking gear**

The flying controls are locked by external detachable blocks which engage with the control surfaces themselves. Stowage for the locking gear is provided in the rear of the fuselage. There is no nuisance bar or any other indication in the cockpit that the controls are locked, and it is, therefore, essential that the locks are removed before the aircraft is entered.

15. **Trimming tabs**

The trimming tab controls, mounted on the control pedestal, all operate in the natural sense and corresponding indicators show the setting of the tabs.

16. **Automatic pilot**

A Sperry-type A-3 gyropilot is fitted. For operation see A.P.2095 Part III, Note C. The engaging lever is on the bottom left-hand face of the control pedestal, but before the gyropilot can be engaged the oil shut-off valve on the hydraulic control panel must be ON. The automatic pilot oil-pressure gauge is mounted on the lower right centre of the instrument panel ; normal operating pressure is 120 lb./sq. in.

17. **Undercarriage controls**

(i) The undercarriage selector lever, mounted on the hydraulic control panel, has three positions, UP, NEUTRAL, and DOWN. It engages in a slot in each position and must first be pressed outwards before it can be moved. In flight the selector should always be returned to the NEUTRAL position after any operation.

(ii) No undercarriage mechanical uplocks are fitted and the wheels have a tendency to lower under their own weight. When this occurs the hydraulic pressure will slowly rise in the undercarriage pipe lines. Periodically as the pressure builds up to about 150 lb./sq. in. on the forward hydraulic gauge, reselect UP and then return the selector to NEUTRAL. On the ground, if the aircraft is to be left standing for some time, the selector should be set to DOWN, for if it is left in the NEUTRAL

position any rise in temperature will cause the fluid trapped between the selector and the undercarriage jacks to expand and thus subject the pipelines to excessive pressures.

NOTE.—The undercarriage selector lever must always be moved smartly and without pause ; intermediate settings between UP, NEUTRAL, and DOWN must never be used.

(iii) The safety-latch control (for the undercarriage down-locks), which is linked with the undercarriage selector, is on the floor between the pilots' seats. It has three positions, POSITIVE LOCK (fully forward), SPRING LOCKED (lever inclined at about 45° to the cockpit floor), and LATCH RAISED (lever vertical). In the POSITIVE LOCK position the lever is retained by a clip ; this position should always be used when the undercarriage is fully lowered since it engages the downlocks positively. The selector lever cannot be moved to the UP position with the lever at POSITIVE LOCK or at SPRING LOCKED. In flight the latch lever should not be set to the former position once the undercarriage has been retracted for it will prevent the downlocks engaging when the undercarriage is lowered again. The latch lever automatically returns to the SPRING LOCKED position when the selector lever is returned to NEUTRAL after undercarriage retraction. With the latch lever in this position the undercarriage downlocks engage by spring action when the undercarriage is fully lowered. In the LATCH RAISED position the downlocks are completely disengaged and the undercarriage selector can be set to UP or DOWN. The latch lever is locked in the LATCH RAISED position by a dog at the undercarriage selector. After the undercarriage has fully retracted and the selector has been returned to NEUTRAL the dog is automatically disengaged and the latch lever springs back to the SPRING LOCKED position. If the lever fails to spring back from the LATCH RAISED position or the lever is at LATCH RAISED and it is desired to return it to SPRING LOCKED without retracting

the undercarriage, the dog can be disengaged by pulling forward the small knob on the undercarriage selector against the spring, or alternatively by moving the selector slightly to UP and then returning it to NEUTRAL.

(iv) On the ground, when the engines are not running, safety locking pins with red flags attached are inserted in the joints between the hydraulic rams and the undercarriage radius rods. These must be removed before flight.

18. **Undercarriage warning lights**

Two undercarriage warning lights (8) are fitted on the right-hand side of the instrument panel ; they indicate as follows :

Undercarriage locked DOWN, selector NEUTRAL	Green light
Undercarriage locked DOWN, selector not NEUTRAL	Red light
Undercarriage UP, selector NEUTRAL...	No light
Undercarriage between the UP and DOWN positions	Red light

The lights may be tested by depressing their holders into the panel ; dimming for night flying is afforded by rotating them.

19. **Undercarriage warning horn**

A warning horn sounds

(*a*) when the undercarriage is not locked down and either throttle is nearly closed.

(*b*) when the undercarriage is locked down but the selector is not set to NEUTRAL.

20. **Flaps control**

(i) The flaps selector lever on the hydraulic control panel, has three positions UP, NEUTRAL, and DOWN. The selector lever engages in a slot in these positions and must first be pressed outwards before it can be moved. The flaps can be set to any intermediate

position by returning the lever to NEUTRAL when the desired position is indicated on the flaps position indicator. In flight the selector lever should always be returned to NEUTRAL after any operation, but when the aircraft is standing on the ground for long periods it should be set to UP, for if it is left in the NEUTRAL position any rise in temperature will cause the fluid trapped between the selector and the flap jacks to expand and thus subject the pipelines to excessive pressures. The flaps selector lever must always be moved smartly and without pause: intermediate settings of the lever between UP, NEUTRAL, and DOWN must never be used.

21. **Flaps position indicator**

The flaps position indicator (1) is fitted in the left-hand corner of the instrument panel and shows the position of the flaps at all times.

22. **Brakes**

(i) The brakes are operated by toe extensions on the rudder pedals. The minimum hydraulic pressure for effective operation of the brakes is 600 lb./sq. in. If the pressure on the rear hydraulic gauge is below this figure turn ON the handpump by-pass valve and raise the pressure with the handpump.

(ii) To apply the parking brakes, depress the brake pedals fully and pull out the parking brake handle fitted on the front face of the control pedestal, then release the pedals. To release the parking brake depress the rudder pedals.

NOTE.—The parking brakes should not be left on in hot weather since the hydraulic fluid will expand and thus subject the pipelines to excessive pressures.

23. **Tailwheel locking control**

The tailwheel locking control lever is on the control pedestal on the under-side of the throttle quadrant. To lock the tailwheel, move the lever to the right and allow it to spring forward to the locked position; the tail-wheel will then lock when it is centralised.

ENGINE CONTROLS

24. Throttles

The throttle levers (15) are mounted in a quadrant on the top of the control pedestal. No automatic boost control is fitted and care must be taken to avoid over-boosting on take-off and at all times in flight. A friction damper is provided on the under side of the throttle quadrant.

25. Propeller controls

(i) The propeller speed control levers (16) are mounted in a quadrant on the left of the throttle levers and are moved forward to INCREASE R.P.M. and backwards to DECREASE R.P.M.

(ii) The propeller feathering pushbuttons (22) and (24) are mounted on the electrical panels above the windscreen.

26. Mixture controls

Two mixture control levers (14) are mounted on a quadrant on the right of the throttle levers.

They have four positions, FULL RICH, AUTO RICH, AUTO LEAN, and IDLE CUT-OFF. The levers should only be set to FULL RICH if the automatic regulation of mixture strength is found to be faulty. The IDLE CUT-OFF position is used only for starting and stopping the engines.

27. Carburettor air-intake heat controls

(i) Two combined air-intake heat and filter control levers, together with a locking lever, are mounted on the right-hand side of the engine control pedestal.

The levers, which move in a quadrant marked HOT, RAM, and FILTERED, are locked in the HOT and FILTERED positions by the locking lever, and in the RAM position by a notch in the quadrant.

If the engines are started with the control levers set to FILTERED, any backfiring may cause serious damage to the air-intake shutters. The RAM position should, therefore, always be used for starting, but the levers should be set to FILTERED, and locked in that position, for all ground running, take-off, landing and flying in dusty or sandy conditions.

The RAM position should be selected for all other flying except when carburettor icing conditions prevail.

(ii) A dual reading carburettor air temperature gauge is mounted on the right-hand side of the instrument panel.

28. **Carburettor anti-icer control**

(i) A three-position spring-loaded switch which is marked ON, OFF, and MOM (momentary) is mounted on the right-hand electrical panel. It controls the flow of anti-icing fluid to the carburettors and should only be used if carburettor icing cannot be prevented by use of the normal air intake heat controls.

(ii) Anti-icing fluid is contained in a tank of 10 U.S. gallons (8 Imp. gallons) capacity, mounted in the right-hand baggage compartment.

29. **Supercharger control**

A single supercharger control lever for both engines is mounted on a shelf on the left-hand cockpit wall. It is marked LOW BLOWER in the rear position and HIGH BLOWER ON in the forward position. When high gear is engaged two red warning lights next to the control lever come on. When changing gear the control must always be operated smartly and without pause.

30. **Cowling gills**

The cowling gills are operated hydraulically by the two controls (27) mounted on the right-hand cockpit wall ; these are marked CLOSE, OFF, TRAIL, OFF, and OPEN. The TRAIL position, which gives about 15° of gill opening, is used for take-off and climb and the OPEN position only for ground running. When the OPEN or CLOSE position has been selected and the operation is complete the controls should be returned to OFF.

31. **Engine starting controls**

(i) Jack and Heinz inertia-and-direct cranking starters are fitted. They are controlled by two spring-loaded switches mounted on the right-hand electrical panel, marked ENERGISE and MESH respectively.

(ii) The starters can be hand-cranked and engaged by a manual engaging cable in each nacelle. If the starter is engaged by operating the manual engaging cable, the brushes are lifted off the starter motor, which cannot then be energised electrically until the brushes are lowered ; to do this operate the MESH switch in the cockpit and release it again before energising.

OTHER CONTROLS

32. **Leading edge de-icers**

An ON—OFF control for the Goodrich de-icers is fitted on the bulkhead behind the second pilot's seat. To operate, pull out and then turn to starboard.

33. **Propeller anti-icers**

An electric pump supplies anti-icing fluid to both propellers from a tank of 4 U.S. gallons (3.3 Imp. gallons) capacity, mounted behind the first pilot's seat. The pump is controlled by an ON—OFF switch on the left-hand electrical panel. A rheostat controlling the rate of flow of fluid is mounted on the bulkhead behind the first pilot's seat.

34. **Windscreen de-icers**

Two independent systems are provided :

(i) Sliding panel de-icers : To operate this system turn ON the two green cocks, one on each cockpit wall, together with the cock behind the first pilot's seat, and operate the handpump mounted on the right-hand cockpit wall.

(ii) Main windscreen de-icers : To operate this system first open the de-icer control valve on the top centre of the instrument panel and then switch ON the electric pump by operating the DE-ICER ON—OFF switch mounted on the left-hand electrical panel.

NOTE.—Both systems are supplied from the same tank, which is fitted in the right-hand baggage compartment. It has a capacity of 6 U.S. gallons (4.9 Imp. gallons) of fluid.

35. **Windscreen defroster system**

Three windscreen defrosters are fitted, one each for the left-hand and right-hand sides of the cockpit windscreen, and one for the astrodome.

When the heating and ventilating system is in use the defrosters may be turned on by opening the butterfly valves at the ends of the flexible tubes. An emergency control for the defrosters is provided in the navigator's compartment.

36. **Windscreen wipers**

The two windscreen wipers are hydraulically operated and are controlled by the valves mounted on the centre of the instrument panel. Rotation of the valves controls the rate of operation of the wipers. The wipers must not be used when the windscreens are dry.

37. **Cabin door warning light**

A red warning light (9) on the right-hand instrument panel comes on when the cabin door is open. This light will only operate when the BATTERY MASTER switch is ON.

38. **Oxygen**

A low-pressure demand oxygen system is installed for all crew positions and a constant flow system can be installed, if required, for passengers.

39. **Static pressure selector switch**

A two-position switch (11) at the bottom centre of the instrument panel is labelled STATIC TUBE, STATIC PRESSURE SELECTOR VALVE, and ALTERNATE SOURCE.

The switch should normally be set to STATIC TUBE in which position the static pressure for the altimeter, A.S.I. and Rate of Climb Indicator is drawn from the pitot head, which is the normal source. If the switch is set to ALTERNATE SOURCE the instruments will function but readings will not be so accurate.

PART II

HANDLING

NOTE.—All handling speeds quoted apply when the static pressure selector switch is at STATIC TUBE. If ALTERNATE SOURCE is selected all handling speeds should be increased by 20 m.p.h. On ALTERNATE SOURCE altimeter readings will be erratic and may be as much as 150 feet high.

40. **Management of the fuel system**

(i) Normally start the engines, warm, taxy and take-off with the port engine feeding from the LEFT MAIN tank and the starboard engine from the RIGHT MAIN tank. Continue to fly on these tanks for about half-an-hour since the vapour return lines from the Bendix-Stromberg carburettors are connected to them.

NOTE.—Take-off may be made on the auxiliary tanks if these contain ample fuel and the main tanks contain less than 156 U.S. gallons (130 Imp. gallons), for with this quantity of fuel in the main tanks there is already sufficient space to accommodate the fuel vented back through the carburettor vapour return lines.

(ii) The auxiliary wing tanks may be used at any time after half-an-hour's fuel supply has been drained from the main tanks ; a check of the contents of the main tanks should, however, be made periodically to ensure that fuel vented back from the carburettors does not cause them to overflow.

(iii) If long-range fuselage tanks are fitted, turn ON the cocks for these tanks and then turn OFF the main fuel cocks. When the fuselage tanks are nearly empty and/or fuel pressure begins to fall reselect the main fuel tanks and turn OFF the cocks of the long-range tanks.

NOTE.—The long-range fuel tank cocks must never be left ON when the tanks are empty as this may induce an airlock in the pipe lines, thus causing the engines to cut.

(iv) *Use of the booster pumps*

These may normally be left ON at all times when the engines are running, but in any case they should be switched ON for starting, take-off, landing, when climbing and at any time when the fuel pressure begins to fall.

41. Preliminaries

Before entering the aircraft check :

External flying control locks removed and stowed in the aircraft (2 aileron locks, 2 elevator locks, 1 rudder lock).

On entering the aircraft check :

Generator switches ...	...	ON
Master ignition switch	...	Pushed in
Ignition switches ...	...	OFF
MASTER BATTERY switch ...	...	OFF, if using ground battery
Inverter switch ...	...	OFF
Parking brake ...	...	ON—hydraulic pressure 600 lb./sq. in.
Undercarriage ...	...	Selector NEUTRAL Latch POSITIVE LOCK
Undercarriage warning light		Green
Handpump by-pass valve ...		OFF
Engine pump selector valve		Normal position (handle down)
Gyropilot	...	Shut-off valve ON Engaging lever OFF
All de-icer controls	...	OFF

42. Starting the engines and warming up

(i) Check :

Long-range fuselage tank cocks	OFF	
Port engine fuel selector cock	LEFT MAIN	See para. 40(i)
Starboard engine fuel selector cock	RIGHT MAIN	See para. 40(i)
Throttles	1 in. open	
Mixture controls	IDLE CUT-OFF	
Supercharger control ...	LOW BLOWER	
Propeller controls	Fully forward (INCREASE R.P.M.)	
Carburettor air-intake heat controls	RAM (see para. 27)	
Gills	OPEN, then set the selectors to OFF	

(ii) Have each engine turned by hand for at least two revolutions of the propeller in order to overcome the possibility of hydraulic shock damage.

Then, for each engine in turn

(iii) Switch ON the fuel booster pump and prime the engine by giving 2-4 flicks of the primer, keeping it depressed for periods of about one second at a time.

(iv) Switch ON the ignition. Energise the starter for about 20 seconds.

(v) Keep the energising switch on and mesh the starter. When the engine fires and picks up speed release the switches and move the mixture control to AUTO RICH ; continue priming as required until the engine is running smoothly, but if it shows signs of over richness stop priming and return the mixture control to IDLE CUT-OFF for a few seconds.

NOTE.—The energising switch must not be held on for more than 30 seconds.

(vi) If the engine fails to pick up :

(*a*) Stop priming and return the mixture control immediately to IDLE CUT-OFF.

(*b*) Wait until the propeller stops rotating.

(*c*) Switch OFF the ignition.

(*d*) Close the switches to engage the flywheel with the engine, thus ensuring that the flywheel stops, then release the switches.

(*e*) Have the propeller turned forward through at least half a revolution by hand to disengage the flywheel from the engine. If the engine has been over-primed, open the throttle and have the propeller turned by hand through several revolutions.

(vii) When both engines are running satisfactorily disconnect the ground battery and set the INVERTER and BATTERY MASTER switches ON.

(viii) Open the throttles slowly and warm up at 1,000 r.p.m. If dusty or sandy conditions prevail set the carburettor air intake heat controls to FILTERED.

43. **Testing the engines and services**

Whilé warming-up check :

(i) All temperatures and pressures.

(ii) Test the operation of both the hydraulic pumps by :

(*a*) Lowering the flaps (with the engine hydraulic lever set to the normal position) and noting that the hydraulic pressure builds up to 650—850 lb./sq. in. when they are fully down.

(*b*) Raising the flaps (with the engine hydraulic selector lever set to the alternative position) and checking that the pressure again rises to this figure when they are fully up. Then return the engine hydraulic selector lever to the normal position and the flaps selector lever to NEUTRAL.

(iii) That the hydraulic pressure in the undercarriage downlines (forward hydraulic gauge) is at least 500 lb./sq. in. If it is below this figure, move the undercarriage selector lever to the DOWN position and allow the pressure to build up, then return the lever to NEUTRAL.

(iv) The correct functioning of the leading edge de-icer system.

(v) The operation of the gyropilot (see A.P.2095 Part III Note C Para. 2 (i) (c), type A.3.A.)

(vi) Satisfactory engine operation with the fuel cock controls in all positions. Switch OFF the fuel booster pumps and check the operation of the engine driven fuel pumps.

(vii) Bleed the boost pressure gauges by means of the cock on the bottom centre of the instrument panel.

After warming up to 40°*C* (*oil*) *and* 120°*C* (*Cyl.*).

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

(ix) Check the operation of the supercharger gear change by opening up both engines simultaneously to 1,200 r.p.m. and changing to high gear; run in that gear for 30 seconds then change back to low gear.

NOTE.—When high gear is engaged the boost pressure should rise slightly.

Then for each engine in turn,

(x) Set the throttle to give not more than 20″ boost and exercise and check the operation of the constant-speed propeller by moving the speed control lever over its full range at least twice.

(xi) Check that the generator is charging.

(xii) Check that the carburettor air intake shutter is undamaged, by opening up to 30″ boost, setting the control lever to RAM (or FILTERED) and then returning it to FILTERED (or RAM)—see para. 42 (viii). A damaged shutter will be indicated by a marked drop in boost pressure when the FILTERED position is engaged.

NOTE.—The following comprehensive checks should be carried out after repair, inspection other than daily, or at any time at the discretion of the pilot. Normally they would be reduced in accordance with local instructions.

(xiii) Open the throttle to give 48″ boost and check take-off r.p.m. (2700).

(xiv) Throttle back to 30" boost and test each magneto in turn. The single ignition drop should not exceed 100 r.p.m.

44. Taxying

(i) Before taxying check :

Hydraulic pressure	650—850 lb/sq. in.
Undercarriage downlines pressure	Above 500 lb/sq. in.
Undercarriage safety locking pins	Removed and stowed.
Tailwheel	Unlocked.

(ii) The brakes are powerful and must be used with care. When taxying straight it is advisable to lock the tailwheel, but it must always be unlocked before attempting to turn.

45. Check list before take-off

T—Trimming tabs ...	Elevator : Neutral with aft C.G. Up to 4 div. tail heavy with forward C.G. Aileron : Neutral Rudder : Neutral
M—Mixture controls ...	AUTO RICH
Carburettor air-intake heat controls ...	RAM or FILTER (see para. 27)
P—Propeller speed controls	Fully forward (INCREASE R.P.M.)
F—Fuel	Check contents and cock settings (see para. 40 (i)) Booster pumps ON.
F—Flaps :...	UP normally ($\frac{1}{4}$ DOWN for shortest run) Selector NEUTRAL
Gills	TRAIL
Superchargers ...	LOW blower
Generators ...	ON
Undercarriage ...	Latch lever—POSITIVE LOCK (Safety clip engaged)
Cabin door ...	Closed. Warning light off
Oil temperature ...	60°C minimum (see para. 8)

46. Take-off

WARNING.—If backfiring is experienced during the take-off run the take-off should, if possible, be abandoned and the air intake shutter examined for damage (see para. 43).

(i) Align the aircraft on the runway and then engage the tailwheel lock.

(ii) There is little or no tendency to swing on take-off except in cross wind conditions when the aircraft tends to weathercock. This tendency can easily be corrected by slow differential throttle opening and by coarse use of the rudder. The tail should not be raised too early in the take-off run as the tailwheel will help to keep the aircraft straight.

(iii) At full load (31,000 lb.) the aircraft can be pulled off the ground at 90 m.p.h. (78 kts.) I.A.S. flaps up, and at 85 m.p.h. (74 kts.) I.A.S. if the flaps are $\frac{1}{4}$ down. (At light loads the aircraft can be pulled off the ground at speeds 5 m.p.h. below these figures.)

(iv) When comfortably airborne brake the wheels and raise the undercarriage.

(v) Safety speed at full load at full take-off power, flaps up or $\frac{1}{4}$ down, is 105 m.p.h. (90 kts.) I.A.S.

(vi) At 200 ft. raise the flaps (if used) ; the resultant change of trim is slightly nose down.

(vii) If the carburettor air-intake heat controls have been set to FILTERED for take-off they should be returned to RAM when dusty conditions no longer prevail (see para. 27).

47. Climbing

The recommended climbing speed is 120 m.p.h. (104 kts.) I.A.S. from ground level to operating height.

48. General flying

(i) *Stability :* The aircraft is stable about all axes under all conditions of flight.

(ii) *Change of trim :*

Undercarriage UP	...	No appreciable change
Flaps UP	... ...	Slightly nose down
Gills OPEN	... ...	Slightly nose down

(iii) *Controls*

Rudder : The rudder is moderately heavy at all speeds but is very effective.

Ailerons : The ailerons are reasonably light but are somewhat spongy.

Elevators : The elevators are moderately light and effective throughout the speed range.

Trimmers : All trimmer tabs are powerful and sensitive and must be used with care.

(iv) *Flying at reduced airspeeds in conditions of poor visibility*

Reduce speed to 120 m.p.h. (104 kts.) I.A.S., set the flaps ½ down and the propeller speed controls to give 2,325 r.p.m. Speed may then be reduced to 105–110 m.p.h. (90–95 kts.) I.A.S.

NOTE.—When the clear vision panel is open it may be found necessary to open the side window to prevent misting of the windscreen.

(v) *Two-speed superchargers*

During the course of a long flight the supercharger gear should be changed at intervals of not more than 2 hours to prevent the accumulation of sludge in the clutches.

NOTE (i) The newly selected gear should be kept engaged for at least 5 minutes.

(ii) Before changing gear r.p.m. should be reduced to 1,700, the mixture controls should be set to AUTO RICH, and, when changing from low to high gear, the throttles should be partially closed to prevent overboosting.

49. Stalling

(i) The stalling speeds in m.p.h. (knots) I.A.S., "engines off," are :

	At light load 24,000 lb.	At normal load 29,000 lb.	At full load 31,000 lb.
Undercarriage and flaps UP ...	77 (67)	85 (74)	86 (75)
Undercarriage and flaps DOWN ...	67 (58)	73 (63)	76 (66)

(ii) There is little warning of the approach of the stall except for a slight tail buffeting which may be felt some 5 m.p.h. (kts.) before the stall itself. At the stall the nose drops gently. In all cases recovery is straightforward and easy.

50. **Approach and landing**

(i) Check list before landing :

Leading edge de-icers	OFF
Gyropilot	OFF
Gills	CLOSED (then set the selectors to OFF)
Superchargers ...	LOW blower
Hydraulic pressure (rear gauge) ...	650—850 lb/sq. in.
Reduce speed to 160 m.p.h.	(138 kts) I.A.S.
Undercarriage safety latch	SPRING LOCKED
U—Undercarriage ...	DOWN. Hold selector lever DOWN until forward hydraulic gauge reads 850 lb/sq. in. and the hydraulic pressure regulator cuts out. Return selector lever to NEUTRAL and check green light.
Undercarriage safety latch	POSITIVE LOCK
Tailwheel	Locked
M—Mixture control ...	AUTO RICH
Carburettor air-intake heat controls ...	As desired (see para. 27)
P—Propeller speed controls	Set for 2,550 r.p.m.
F—Fuel	Selector cocks to fullest tanks Booster pumps ON
Reduce speed to 110 m.p.h.	(95 kts) I.A.S.
F—Flaps	¼ DOWN, fully down on the final approach

(ii) The recommended final approach speeds in m.p.h. (Knots) I.A.S. are :

At maximum landing weight : 27,000 lb.

	Flaps down	*Flaps up*
Engine assisted	85 (74)	90 (78)
Glide	95 (82)	100 (87)

At light loads these speeds may safely be reduced by 5 m.p.h. (kts.)

NOTE.—If approaching with the static pressure selector switch set to ALTERNATE SOURCE speed should be increased by 20 m.p.h. (kts) I.A.S. above these figures, and care should be taken not to exceed a rate of descent of 600 feet/min. as at higher rates the altimeter will give high readings.

(iii) With the flaps lowered fully a three point landing is difficult and in this condition a wheel landing is, therefore, recommended. With the flaps up a three point landing is straightforward and easy.

(iv) The brakes are fierce and must be used with care.

51. **Mislanding**

(i) At 29,000 lb. the aircraft will climb away easily at climbing power with the flaps and undercarriage down.

(ii) Climb at 100 m.p.h. (87 kts) I.A.S.

(iii) Raise the undercarriage immediately, then raise the flaps in stages above 200 ft. and retrim. The flaps come up quickly.

52. **After landing**

(i) Before taxying, open the gills, switch off the booster pumps and raise the flaps. Unlock the tailwheel before attempting to turn.

(ii) After reaching dispersal open up both engines simultaneously to 1,200 r.p.m. and exercise the superchargers by changing to high gear, running in that gear for 30 seconds and then changing back to low gear.

(iii) Throttle back slowly to 800 r.p.m. and idle at this speed for a short period to allow the cylinder temperatures to fall below 175°C, then stop the engines by moving the mixture controls to IDLE CUT-OFF.

(iv) When the engines have stopped turn off the fuel and switch off all the electrical services.

(v) If the aircraft is to be left standing for long periods, set the undercarriage selector lever DOWN, the flaps selector lever UP, the cowling gills selectors OPEN and the parking brakes OFF, to allow for the expansion of fluid in the hydraulic pipelines.

(vi) See that the undercarriage safety locking pins are inserted and that the flying control locks are fitted.

(vii) Oil dilution—See A.P.2095. The correct dilution period for these engines is 2 minutes.

PART III

OPERATING DATA

53. Engine data. Twin Wasp R 1830-90C

(i) Fuel : 100 octane

(ii) Oil : See A.P.1464/C37

(iii) The principal engine limitations are as follows :

	Super-charger gear	RPM	Boost ins. Hg.	Temperature °C.		
				Cyl.	Oil	
					Max.	Desired
MAX. TAKE-OFF 5 MINS. LIMIT	Low	2,700	48	260		
MAX. CLIMBING CONTINUOUS	Low High	2,550 2,550	41 40	260	100*	50–70
MAX. RICH CONTINUOUS	Low High	2,325 2,325	34 31	230	95	50–70
MAX. WEAK CONTINUOUS	Low High	2,250	29½	230	95	50–70
MAX. ALL OUT 5 MINS. LIMIT	Low High	2.700 2.700	45 41	260	100	

*For short period only.

OIL PRESSURE :

MAXIMUM ... ... 95 lb./sq. in.
NORMAL ... ... 75/90 lb./sq. in.
MINIMUM FOR CRUISING 60 lb./sq. in.
MINIMUM FOR IDLING... 15 lb./sq. in.

MINIMUM TEMPERATURES FOR TAKE-OFF :

OIL ... ... 60°C.
CYLINDER ... ... 120°C.

MAXIMUM TEMPERATURE BEFORE TAKE-OFF :

CYLINDER ... ... 205°C.

MAXIMUM TEMPERATURE FOR STOPPING THE ENGINES :

CYLINDER ... ... 175°C.

FUEL PRESSURE :

NORMAL ... ... 17 lb./sq. in.
IDLING ... ... 7 lb./sq. in.

54. Flying limitations

(i) The aircraft is designed for manoeuvres appropriate to a transport aircraft, and care must be taken to avoid imposing excessive loads in turns and in the recovery from dives. Extreme care must be exercised when flying at weights above 29,000 lb.

(ii) Maximum speeds in m.p.h. (knots) I.A.S. are :

Diving and level flight :

At full load 31,000 lb.	180 (154)
At 29,000 lb. and below	200 (172)
Undercarriage down	160 (138)
Flaps down	112 (98)

(iii) Maximum weights are :

Take-off and gentle manoeuvres	31,100 lb.
All permitted forms of flying	29,000 lb.
Landing	27,000 lb.

(iv) Distribution of load :

The loading of freight and passengers must be carefully supervised to ensure that the CG remains within the permitted limits. If required, up to 350 lb. of ballast may be carried in the lavatory compartment ; this will be necessary with no seats, passengers or freight in the main cabin (see Figs. 6A and 6B).

55. Position error corrections

Approximately +5 m.p.h. (kts) throughout the speed range.

56. Maximum performance

(i) *Climbing*

The speed for maximum rate of climb is 110 m.p.h. (95 kts.) I.A.S. from sea level to 5,000 ft. thereafter reducing speed at the rate of one m.p.h. per 1,000 ft. Change to high gear when the maximum obtainable boost in low gear is 37 ins. Hg.

NOTE.—The throttles must be partially closed when changing gear to avoid overboosting as high gear engages.

(ii) *All out level*

Change to high gear when the maximum obtainable boost in low gear is 38 ins. Hg.

NOTE.—The throttles must be partially closed when changing gear to avoid overboosting as high gear engages.

57. **Maximum range**

(i) *Climbing*

Climb as for maximum performance (see para. 56 (i)).

(ii) *Cruising*

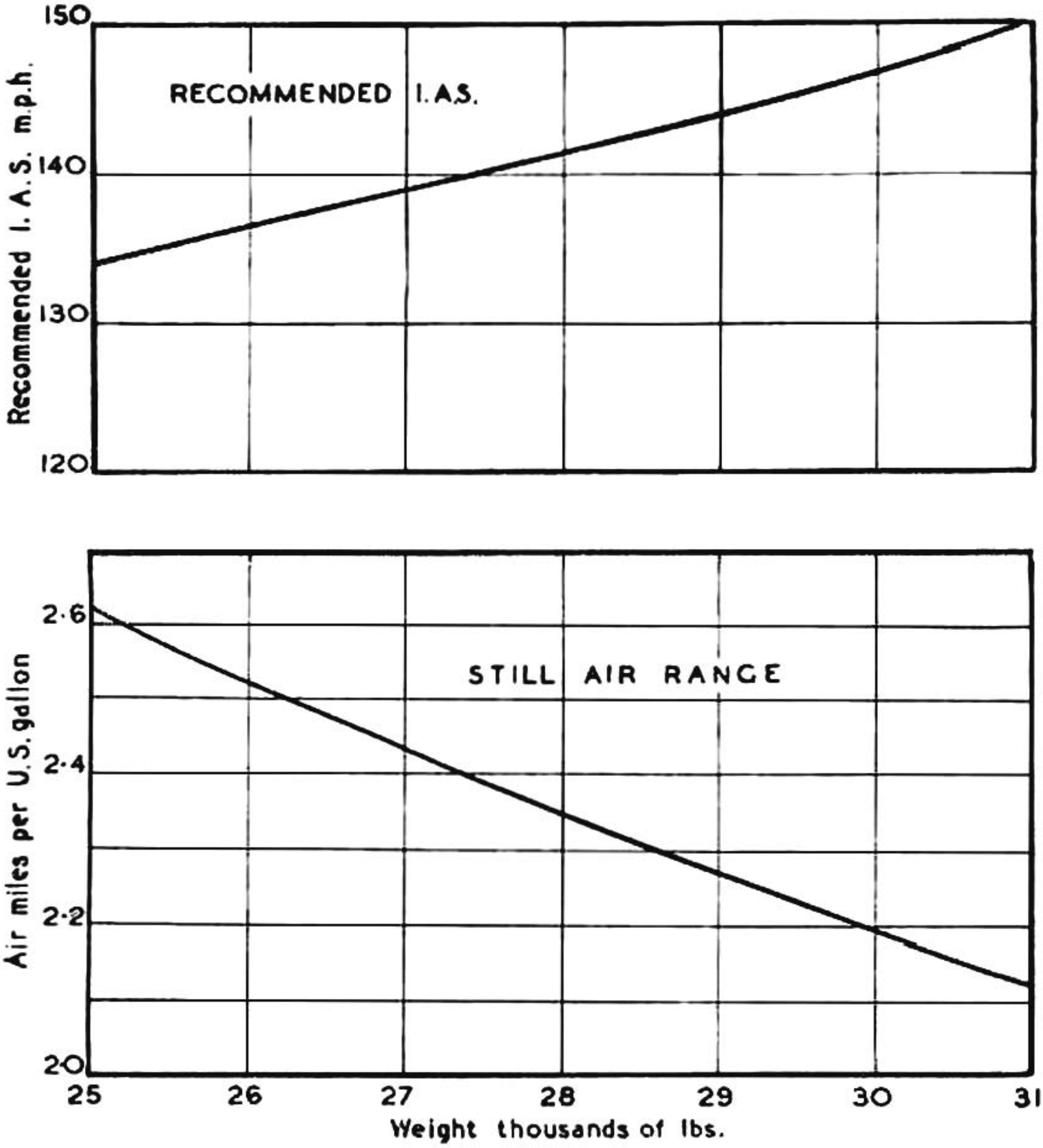
Fly in low gear and weak mixture at maximum obtainable boost (not exceeding 29½ in.) and adjust r.p.m. as required to maintain the recommended speed—see graphs. Do not, however, reduce r.p.m. below 1,700, if at lower r.p.m. engine vibration is experienced.

NOTE (i) At light loads and at low altitudes the recommended speed may be exceeded at 29½ in. boost and the lowest practicable r.p.m. In this event boost should be reduced as required to maintain the speed desired.

(ii) At high altitudes change to high gear if the recommended speed cannot be maintained in low gear at 2,250 r.p.m. and full throttle.

(iii) To obtain the utmost range, the recommended speed should be reduced progressively as fuel is consumed and weight is thus lost ; but if one speed is to be maintained throughout the flight, use a speed 5 m.p.h. (kts.) higher than that corresponding to the estimated mean weight (½ fuel consumed). The loss in range incurred by flying at a constant speed throughout the flight will not be great.

(iv) The following curves give the recommended speed for maximum range and the corresponding air miles per gallon in still air conditions. The weight scale gives the take-off weight and the figures then apply at all heights between 5,000 and 10,000 feet.



58. Fuel capacities and consumptions

(i) *Fuel capacities :*

	U.S. gallons	Imperial gallons
LEFT MAIN tank	202	168
LEFT AUX. tank	200	167
RIGHT MAIN tank	202	168
RIGHT AUX. tank	200	167
Total without long-range fuselage tanks	804	670

In addition, up to eight long-range fuselage tanks, each of 102 U.S. gallons (84 Imp. gallons) capacity, can be carried in the fuselage.

(i) *Fuel consumption*

(*a*) The approximate total fuel consumptions in rich mixture in U.S. gallons per hour are :

Low gear :

Boost ins. Hg.	R.P.M.	Fuel flow galls./hr.
48	2,700	320
45	2,700	300
41	2,550	255
34	2,325	150

High gear :

Boost ins. Hg.	R.P.M.	Fuel flow galls./hr.
41	2,700	290
40	2,550	255
31	2,325	145

(*b*) The approximate total consumptions in weak mixture in U.S. gallons per hour are :

Boost inches	R.P.M.				
	2,250	2,000	1,900	1,800	1,700
29½	105	95	82	77	73
28	—	—	77	72	68
27	—	—	73	70	66
26	—	—	71	67	64
25	—	—	—	64	60

NOTE.—(i) In high gear the fuel flow in gallons per hour will be increased by approximately 5% at low power, increasing to 10% at maximum weak mixture power.

(ii) To convert U.S. gallons to Imperial gallons divide by 1.2.

PART IV

EMERGENCIES

59. Engine failure during take-off

(i) Safety speed at full load at full take-off power, flaps up or ¼ down, is 105 m.p.h. (92 kts.) I.A.S.

(ii) If safety speed has not been attained close both throttles and land straight ahead.

(iii) If safety speed has been attained the aircraft will climb away slowly on one engine at full take-off power at about 105 m.p.h. (92 kts.) I.A.S., provided that the wheels and flaps are fully up, and the propeller of the failed engine is feathered.

60. Engine failure in flight

(i) Feather the propeller of the failed engine and close the gills on that side.

(ii) Ensure that the engine hydraulic selector lever is set to the live engine.

(iii) Set the gills on the live engine to TRAIL.

(iv) Turn off the fuel supply to the failed engine and switch off its booster pump.

(v) Set the fuel selector cock of the live engine to one of the tanks in the failed engine wing ; this will improve both trim and handling.

(vi) At full load the aircraft will maintain height on either engine at maximum rich mixture cruising power at 105–110 m.p.h. (92–97 kts.) I.A.S. but it is difficult to climb at this load even at full take-off power. At 105–110 m.p.h. (92–97 kts.) I.A.S. the aircraft can be trimmed to fly " hands and feet off " ; in single-engine cruising flight speed should not, therefore, be reduced below this figure.

61. **Single-engine landing**

The single-engine performance of the aircraft is good and a left-hand circuit can safely be made (and is recommended) irrespective of which engine has failed.

(i) While manoeuvring with the undercarriage and flaps up maintain a speed of at least 105 m.p.h. (92 kts.) I.A.S.

(ii) Keep extra height in hand if possible and lower the undercarriage later than normally, aiming to have it locked down just before the final straight approach.

(iii) When cross-wind, preparatory to turning into the airfield, the flaps may be lowered $\frac{1}{4}$ but they should not be lowered further until it is certain that the airfield is within easy reach.

(iv) The live engine may be used carefully to regulate the descent to ground level.

(v) The final approach should be made at a speed of 95–100 m.p.h. (82–87 kts.) I.A.S.

62. **Feathering**

(i) Close the throttle immediately.

(ii) Hold the feathering pushbutton in only long enough to ensure that it stays in by itself, then release it so that it can spring out when feathering is complete.

(iii) Set the mixture control to IDLE CUT-OFF and switch OFF the booster pump if in use.

(iv) Switch OFF the ignition when the propeller has stopped, or nearly stopped, rotating.

(v) Switch OFF the generator.

NOTE.—If an engine fails during take-off (ii) may be completed before (i).

63. **Unfeathering**

(i) Set the throttle slightly open, the propeller speed control lever fully back, mixture control to AUTO-RICH, and then switch ON the ignition.

(ii) Hold the pushbutton in until r.p.m. reach 800–1,000.

(iii) If the propeller does not return to normal constant-speed operation, re-feather it and then unfeather again releasing the pushbutton at slightly higher r.p.m.

NOTE.—It is advisable not to unfeather at speeds above normal cruising speed to avoid any risk of over-speeding.

64. **Undercarriage emergency operation**

(i) If, after selecting DOWN, the reading of the rear hydraulic pressure gauge is below 500 lb./sq. in.:—

(*a*) Set the engine hydraulic pump selector lever to the alternative position. If this proves unsuccessful :—

(*b*) Operate the handpump and check that pressure begins to build up on the forward hydraulic pressure gauge. If it does not, stop pumping and proceed as in (ii) below.

(ii) If, after selecting DOWN, pressure does not begin to build up on the forward hydraulic pressure gauge.

(*a*) Leave the undercarriage selector DOWN.

(*b*) Attempt to lower the undercarriage by applying slight "*g*" to the aircraft.

NOTE.—(i) If, on returning the undercarriage selector to NEUTRAL, the green light comes on (indicating that the undercarriage down-locks have engaged correctly) a landing can safely be made even if the reading of the forward hydraulic pressure gauge is 0 lb./sq. in.

(ii) If the reading of the forward hydraulic pressure gauge is 500 lb./sq. in. or more, but the green light fails to come on on returning the undercarriage selector to NEUTRAL, it is probable that the under-carriage downlocks have failed to engage—See (iii) below.

(iii) If, after lowering the wheels by the normal or emergency method, the green light fails to come on, firstly check that the latch lever is not at LATCH RAISED ; if it is, it should be set to SPRING LOCKED and then to POSITIVE LOCK—See para. 17 (iii). If the green light still fails to come on, a landing can safely be made with the undercarriage selector at NEUTRAL provided that a visual check shows that the wheels are down and that the forward pressure gauge shows 500 lb./sq. in. or more. The brakes, however, should be used as sparingly as possible after touchdown or excessive pressures may be built up in the undercarriage downlines which may fracture and thus cause the undercarriage to collapse.

65. **Flaps emergency operation**

If the flaps fail to lower when selected normally they may generally be lowered by means of the handpump. Whether the attempt to lower the flaps by handpump proves successful or not, the flaps selector lever must be returned to the NEUTRAL position.

66. **Brakes emergency operation**

If, on landing, the reading of the rear hydraulic pressure gauge is below 500 lb./sq. in., it will be necessary to use the handpump to obtain adequate braking. A constant force should be applied on the pump handle throughout the landing run.

67. **Parachute exits**

(i) Whenever possible parachute exits should be made through the main cabin door. The hinge pins are released when the lever on the forward side of the door is depressed ; the door can then be pushed out.

(ii) Two auxiliary window exits are provided, one on either side of the fuselage forward of the main cabin door. They are jettisoned by turning the handles in the direction indicated and then pushing the windows out.

68. **Crash exits**

In addition to the parachute exits there are two crash exits, one in the roof of the pilots compartment and the second in the port side of the forward baggage compartment.

69. **Fire-extinguishers**

(i) *Engine fire-extinguisher*

The fire-extinguisher selector cock and operating handle are under the panel in the floor between the pilots' seats. To operate the extinguisher set the selector cock to the engine on fire and pull out the handle.

(ii) *Hand fire-extinguishers*

Two hand fire-extinguishers are provided, one on the right-hand cockpit wall and the other just aft of the main cabin door.

70. **First-aid kit**

The first-aid kit is stowed on the front face of the door of the rear baggage compartment.

71. **Ditching.**—See A.P. 2095.

The ditching qualities of this aircraft are known to be good. It is recommended that :

(i) The flaps should be set $\frac{1}{2}$ down to reduce the touch-down speed as much as possible.

(ii) If the engines are still available they should be used to ensure a touch-down in a tail-down attitude at as low a forward speed as possible.

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

PART V

ILLUSTRATIONS

KEY TO *Fig.* 1

1. Flaps position indicator.
2. Altimeter.
3. Flying instruments.
4. Automatic controls panel.
5. Windscreen wiper, and de-icing flow, controls.
6. Forward hydraulic pressure gauge.
7. Rear hydraulic pressure gauge
8. Undercarriage warning lights.
9. Cabin doors warning light.
10. Engine temperature gauges.
11. Static pressure selector switch.
12. Fuel contents gauge.
13. Starboard engine fuel selector cock.
14. Mixture control levers.
15. Throttle levers.
16. Propeller speed control levers.
17. Elevator trim tab control.
18. Port engine fuel selector cock.
19. Radio altimeter indicator.
20. Rudder pedal adjustment trigger.

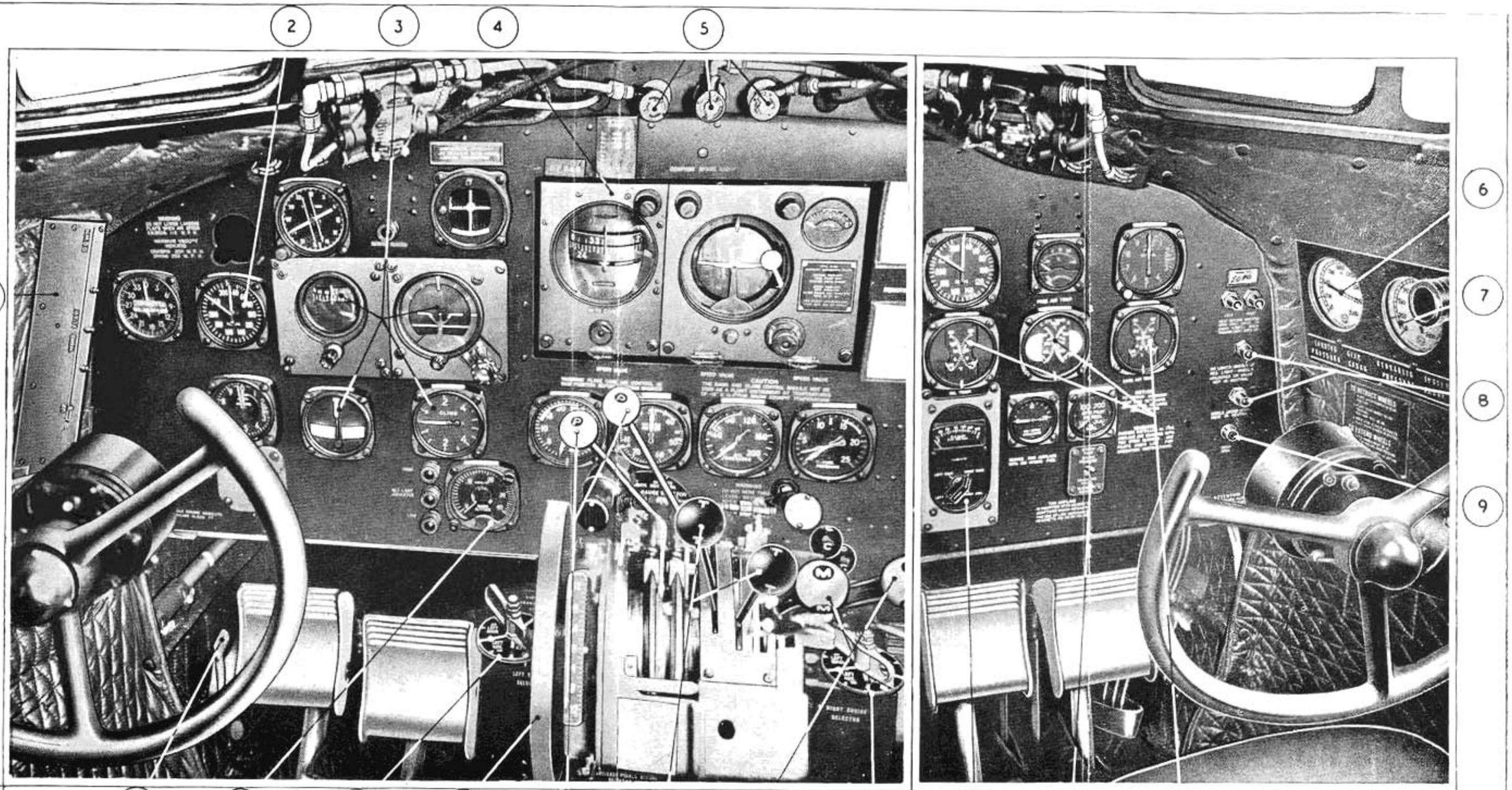


FIG 1

INSTRUMENT PANEL AND ENGINE CONTROLS

FIG 1

21

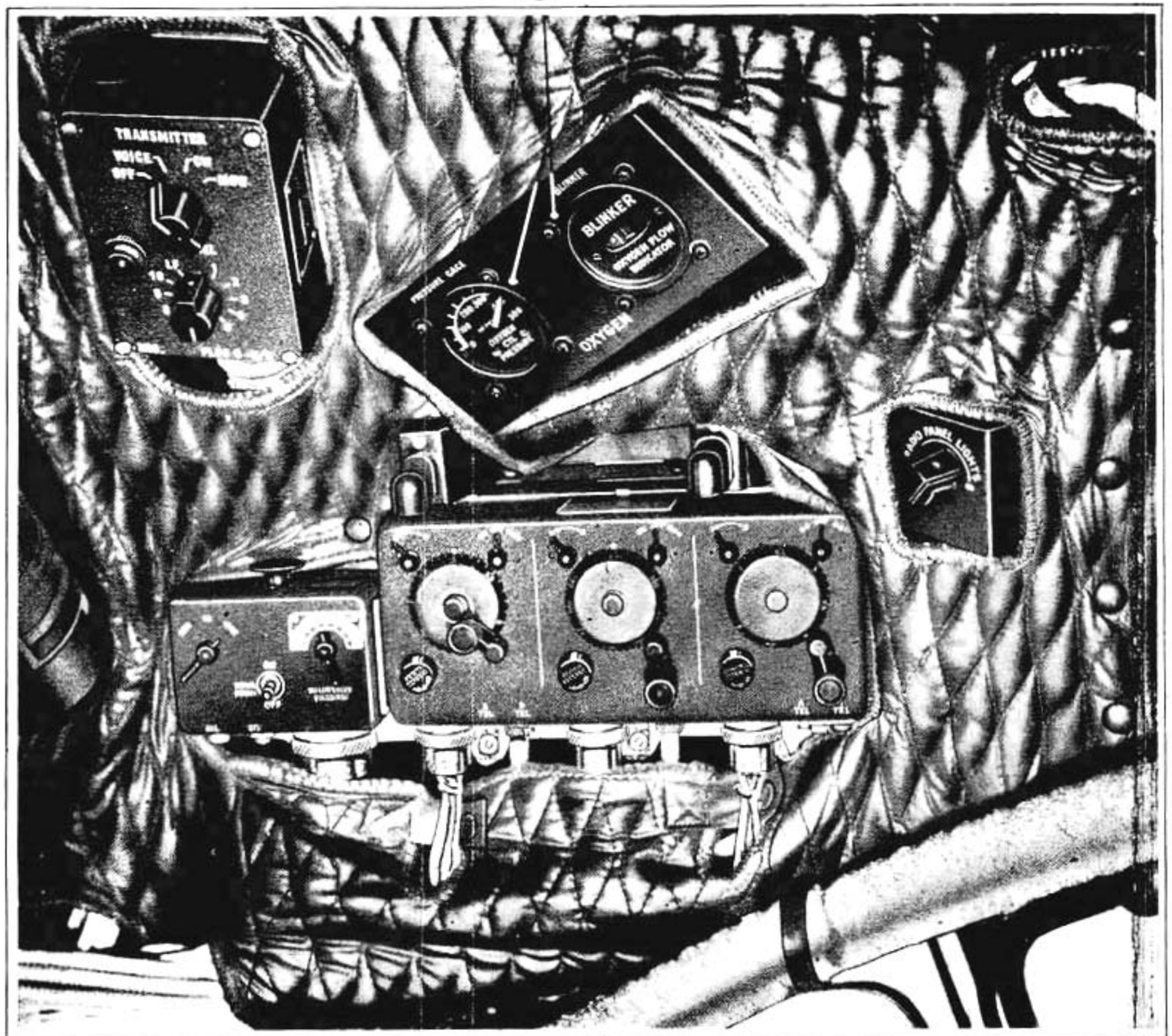
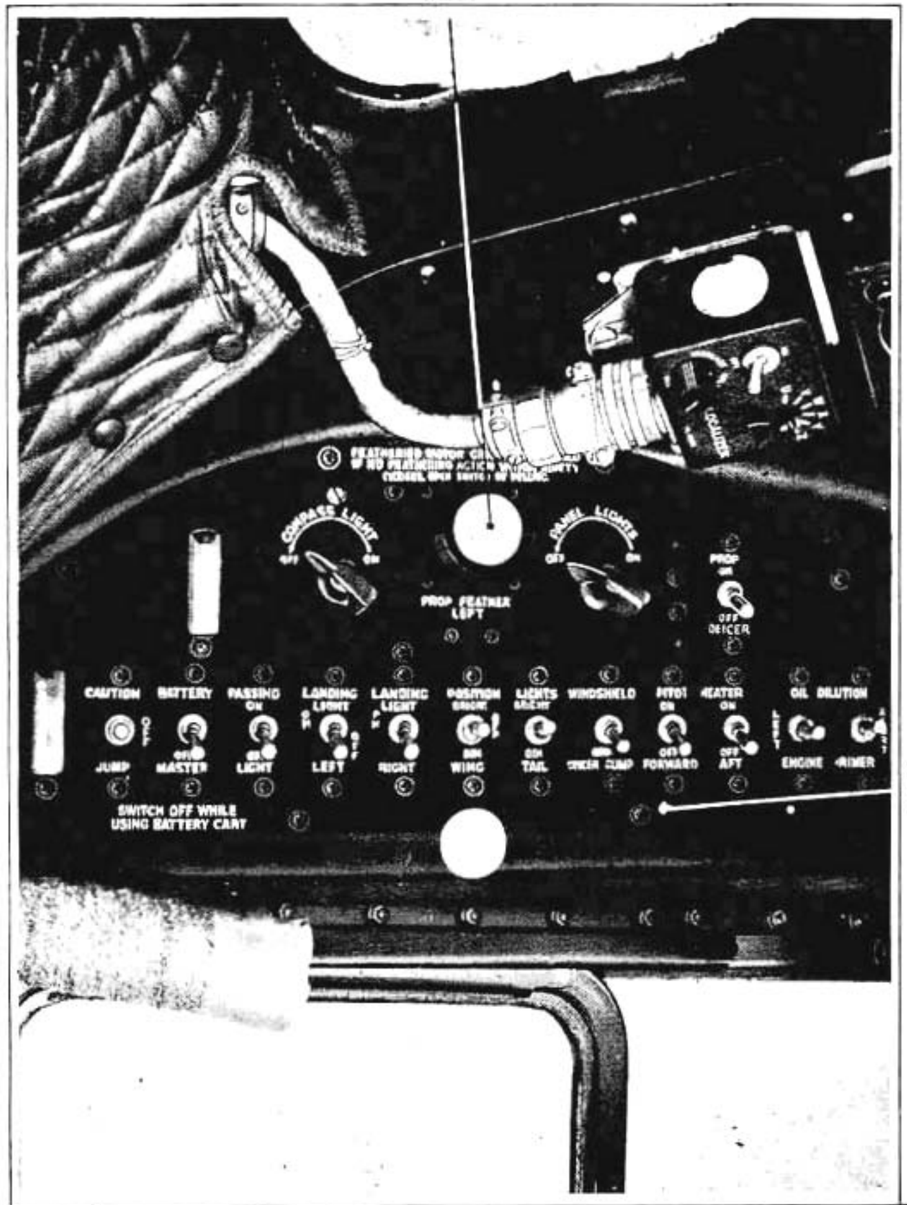


FIG.		FIG.
2	LEFT HAND ROOF DETAILS	2

22



23

FIG.		FIG.
3	LEFT HAND UPPER SWITCH PANEL	3

KEY TO *Figs.* 2, 3 and 4

21. Oxygen pressure gauge and flow indicator.
22. Port engine feathering push-button.
23. Left-hand electrical panel.
24. Starboard engine feathering push-button.
25. Right-hand electrical panel.
26. Ignition switches.

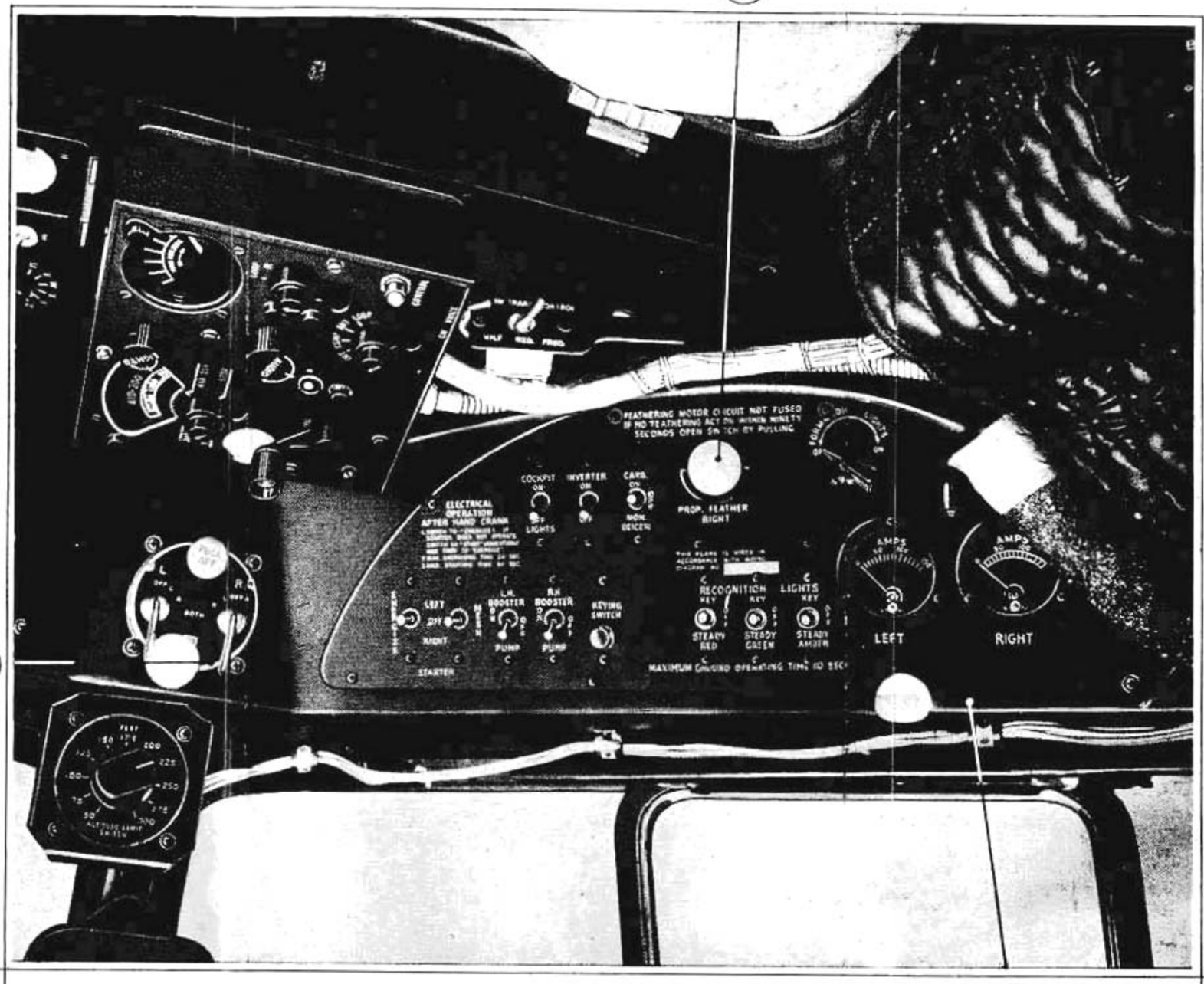


FIG. 4 — RIGHT HAND UPPER SWITCH PANEL — FIG. 4

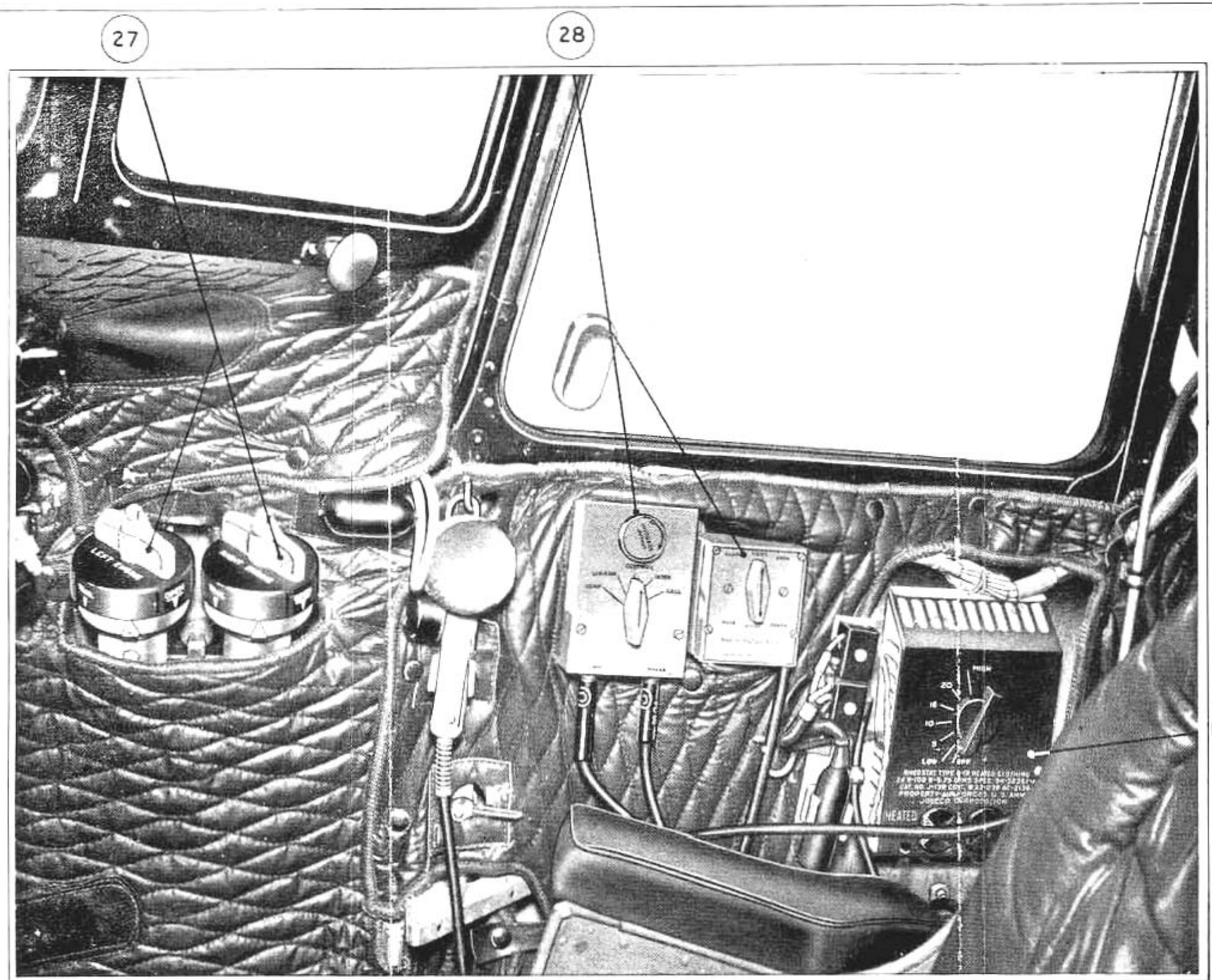


FIG. 5 — COCKPIT — STARBOARD SIDE — FIG. 5

KEY TO *Fig.* 5

27. Cowling gill controls.
28. Radio controls.
29. Heated clothing regulator.

LOADING CHART

Item	Weight	Index Units
Weight Empty	16,621	403·1
Pilots (2) and Parachutes	400	2·8
Radio Operator (or Crew Chief) and Parachute	200	3·3
Oil, Full (58 gallons)	435	8·0
Trapped Fuel (3 gallons)	201	1·6
Trapped Oil (11 gallons)	84	
Fixed Sub-Total	17,760	418·8
Alcohol, Carburettor De-icer (10·0 gal.)	66	·8
Alcohol, Propeller De-icer (4·2 gal.)	28	·2
Alcohol, Windshield De-icer (6·5 gal.)	43	·5
Filters, Carburettor Air (2)	18	·2
Floor, Special Removable	40	1·1
Life Rafts, Type A-2(2) in L.H. Baggage Compt.	120	1·8
Life Rafts, Type B-3(1) in L.H. Baggage Compt.	34	·5
Litters (with Patient and 4 Blankets in each)		
Front Position (1)	233	5·1
Centre Position (1)	233	7·4
Rear Position (1)	233	9·7
Parachute Pack Release Rack, Front (1)	57	1·3
Parachute Pack Release Rack, Centre (1)	57	1·7
Parachute Pack Release Rack, Rear (1)	57	2·3
Parachute Pack, Front (Consider as Cargo at Cargo Sta. 60)		
Parachute Pack, Centre (Consider as Cargo at Cargo Sta. 130)		
Parachute Pack, Rear (Consider as Cargo at Cargo Sta. 220)		
Propellers as Cargo, Front (Consider as Cargo at Cargo Sta. 100)		
Propellers as Cargo, Rear (Consider as Cargo at Cargo Sta. 250)		

NOTE.—No British Mods are included in this weight data, but if the FIXED SUB-TOTAL is suitably adjusted for the individual aircraft, the chart can still be used.

FUEL WEIGHT AND INDEX UNITS.

Rear Wing Tanks			Full Rear Wing Tanks Plus Front Wing Tanks		
U.S. Gals.	Wt. Lb.	Index Units	U.S. Gals.	Wt. Lb.	Index Units
50	300	8·3	450	2,700	73·5
100	600	16·6	500	3,000	80·7
150	900	24·9	550	3,300	87·9
200	1,200	33·1	600	3,600	95·1
250	1,500	41·4	650	3,900	102·3
300	1,800	49·7	700	4,200	110·0
350	2,100	58·0	750	4,500	116·7
400	2,400	66·2	804	4,824	124·5

Two long-range fuselage tanks at Cargo Station 35·5:
Weight of tanks empty 2 × 113·5 lb.
Weight of 2 × 102 U.S. gallons 2 × 612 lb.
Index units for tanks and fuel 30·9.

INDEX UNITS PER PASSENGER (200 LBS. EACH).

Row	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Index Unit	3·8	4·2	4·6	4·9	5·3	5·7	6·1	6·5	6·8	7·2	7·7	8·0	8·4	8·8

Total for 28 passengers : Weight 5,600 lbs. Index units 175·8

Fuselage Station = Distance in inches from nose. (marked on top of frame)

Cargo Station 0 = Fuselage Sta. 177·5.

M.A.C. = Mean Aerodynamic Chord.

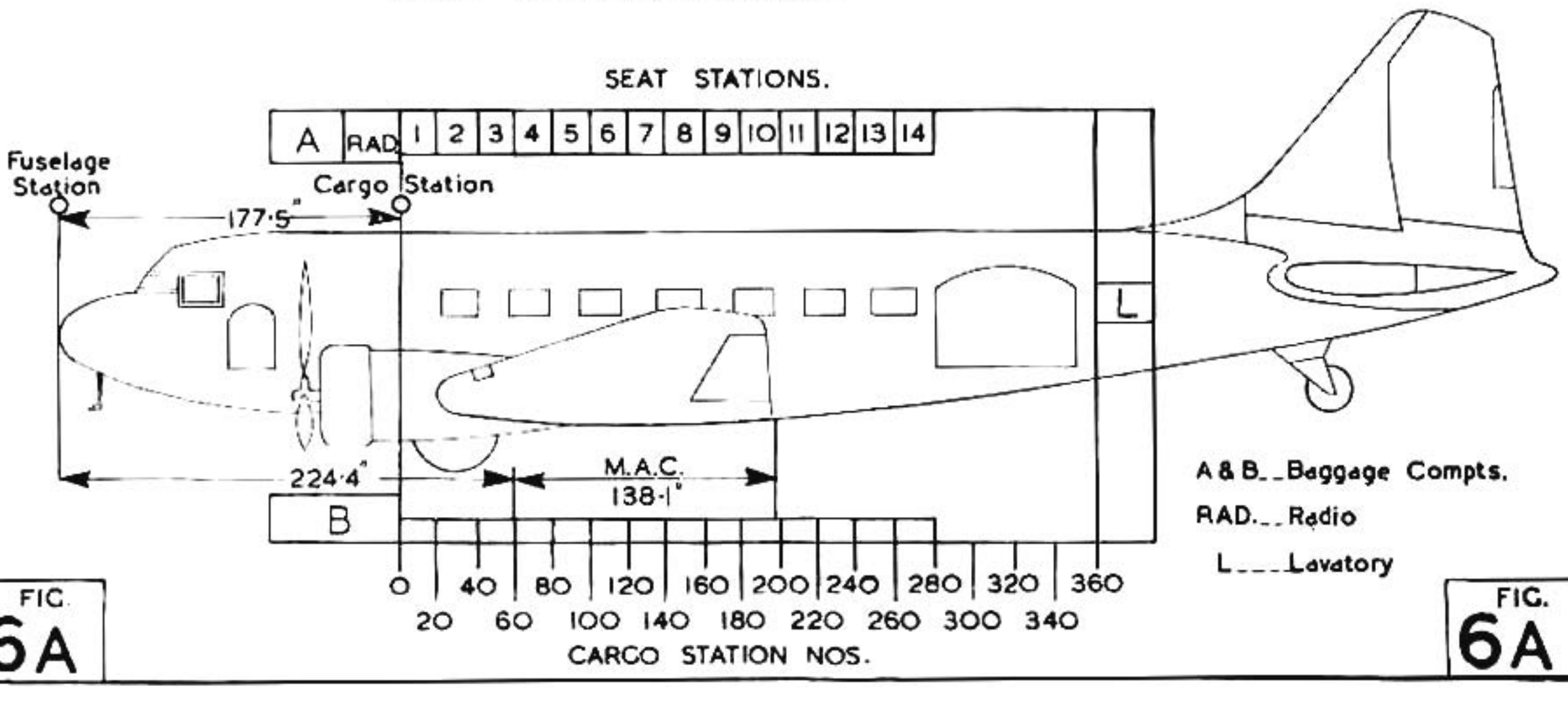
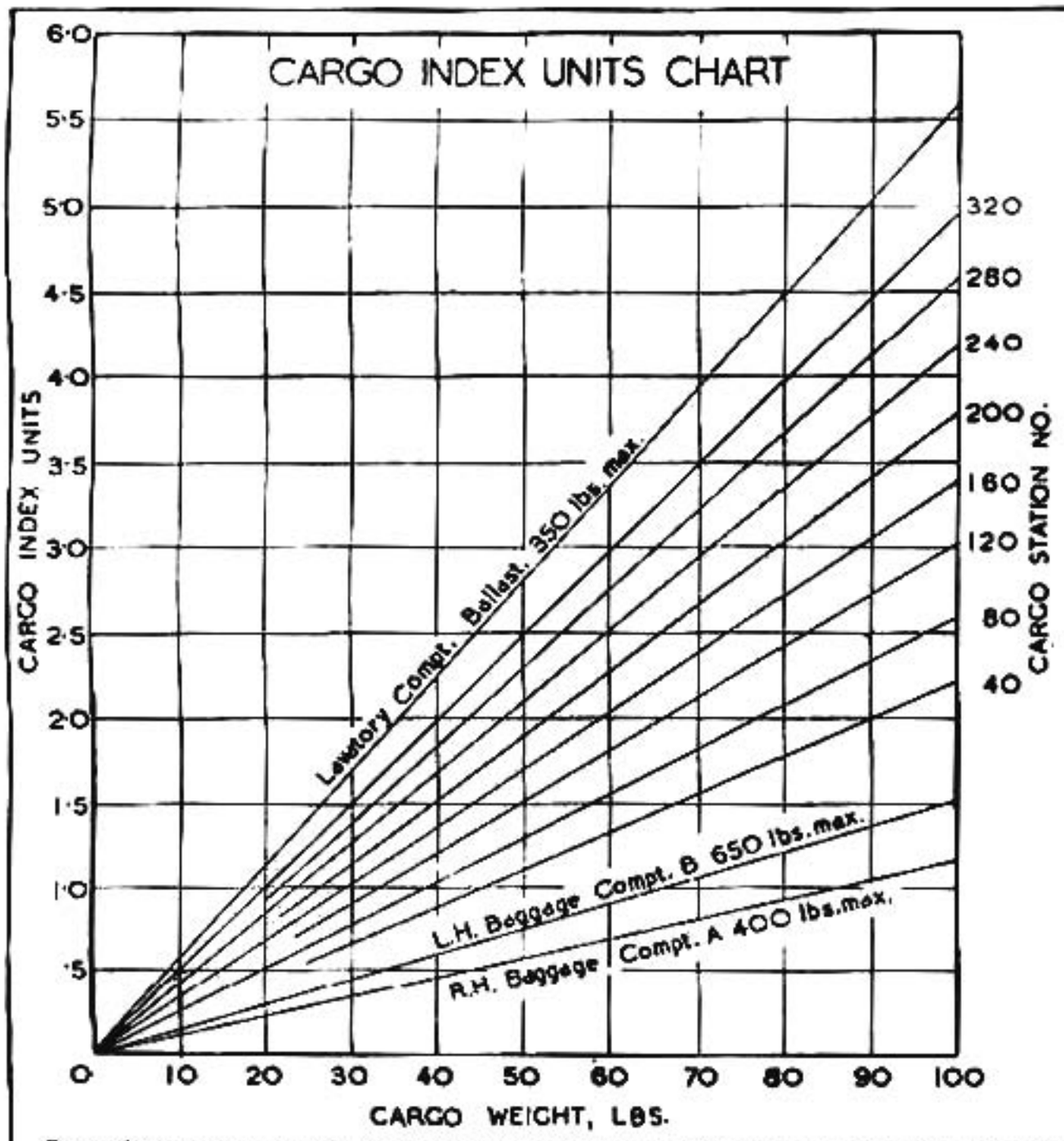
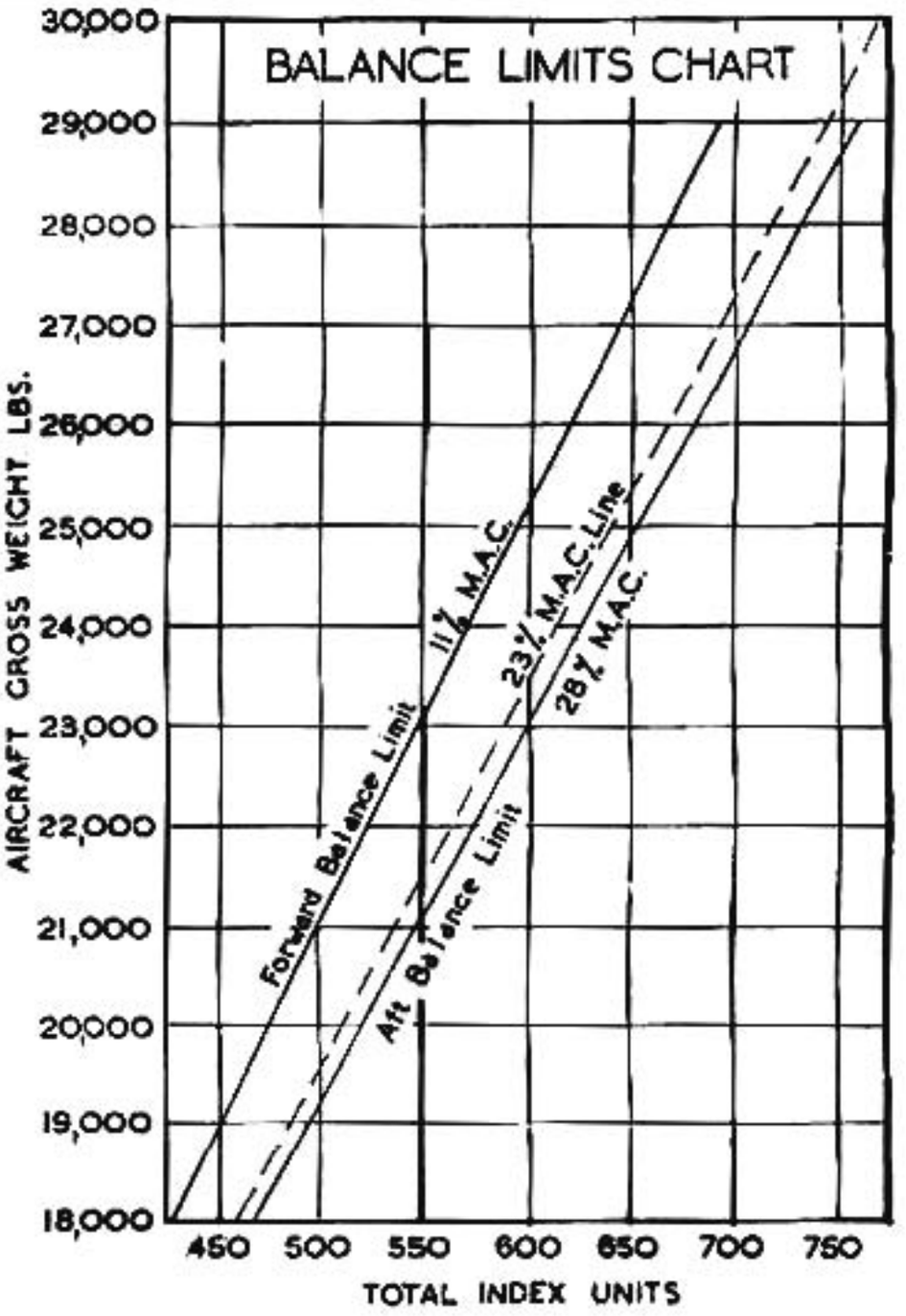


FIG. 6A

FIG. 6A



For weights above 100 lbs. find index units for 1/10 (or 1/100) and multiply by 10 (or 100)



INDEX UNITS = WEIGHT X DISTANCE FROM NOSE ÷ 10,000

INSTRUCTIONS

A. For Checking Gross Weight:

1. To "Fixed Sub-Total" Weight add weights of all other items of load including fuel.

B. For Checking Balance:

1. To "Fixed Sub-Total" add weights and index units of all other items of load EXCEPT FUEL IN WING TANKS.

2. Plot value thus obtained on "Balance Limits Chart". Point must fall between Limit Lines. This indicates that aircraft will balance properly for ANY wing fuel load. (If long-range fuselage tanks are carried, these must be considered as cargo.)

3. If desired, an accurate balance for take-off may be determined by adding Weight and Index Units for wing fuel (from table) to sub-total found in Instruction B.1. It is suggested that the value thus obtained, when plotted on the Balance Limits Chart, be made to fall as closely as possible to the 23% MAC line to give best flying condition.

4. Instruction B.3 is for supplementary information only and MAY NOT BE SUBSTITUTED for Instruction B.1 and B.2.

FIG. 6B

FIG. 6B

AIR DATA PUBLICATIONS LIMITED
SOUTHSIDE, MANCHESTER AIRPORT, WILMSLOW, CHESHIRE. SK9 4LL
ISBN 0 85979 064 9

(Dakota)