DAKOTA (C.47A AND C.47B) PILOT'S NOTES

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PART I — DESCRIPTIVE

PART I

DESCRIPTIVE

1. INTRODUCTION

The Dakota is a twin-engined low wing transport aircraft, powered by Twin Wasp engines driving Hamilton paddle-bladed fully feathering airscrews. Twin Wasp R.1830-82 or R.1830-92 are to be fitted to all aircraft in accordance with Twin Wasp Power Plant Order No. 2.

The overall dimensions of the aircraft are:

Span	95 ft.
Length	64 ft. 5½ in.
Height (at rest)	17 ft.

The wing ~~area~~ AREA is 987 sq. ft. which at an all up weight of 28,000 lb. gives a wing loading of 28.4 lbs. to the sq. ft.

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, two long range inter-connected fuel tanks, each of ~~66~~ 52 U.S. gallons (~~55~~ 43 imp. gallons) capacity, can be carried in the fuselage (see Dakota Order No. 59).

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.

Note.—Numbers in brackets after components in the text give the position of these components in the diagrams in Part V.

(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**

(i) *Dakota (C.47B)*

Two electrically-driven fuel booster pumps are fitted between the engine driven pumps and the fuel selector cocks. 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 should be ON for starting, take-off and landing, 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.

(ii) *Dakota (C.47A)*

The booster pumps are hand-operated by a lever situated behind the captain's seat, and must be operated to give 5 to 10 lb. for starting.

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**

The 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 selector switch to the appropriate tank. The contents of the long-range tanks can be checked by the dip-stick attached to the rear of the forward main cabin bulkhead.

7. **Fuel Pressure Gauge**

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

8. **Oil Systems**

(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. The tanks incorporate "hot pots" and must, therefore, always be filled to their correct capacity; otherwise, during take-off (when the oil temperature is low) the hot pots may become exhausted, thus leading to oil starvation.

(ii) Oil temperature is controlled automatically by a thermostat fitted to each oil cooler. On C.47A aircraft and some C.47B aircraft, manually-controlled shutters are fitted to the oil coolers. The control lever for each engine is situated on the left-hand side of the control pedestal.

(iii) *Oil dilution*

An oil dilution system is fitted. It is controlled by two switches mounted on the left-hand electrical panel (23); the switches are held UP to operate the oil dilution valves.

MAIN SERVICES

9. **Hydraulic System**

(i) There are two hydraulic systems, the main system and the Sperry Gyropilot system. These systems are fed by two engine-driven pumps, one on each engine. The engine pump selector on the hydraulic control panel has two positions. In the rear position the port engine-driven pump supplies the main hydraulic system, and the starboard engine-driven pump supplies the Sperry Gyropilot system. With the engine pump selector handle in the forward position the functions of the engine-driven pumps are reversed.

During flight, as a means of checking failure of either pump, the engine pump selector should be placed in the alternate position hourly and at any time when hammering or vibration of the pressure regulator occurs.

(ii) The main hydraulic system operates the:—

Brakes;
Cowling gills;
Flaps;
Undercarriage; and
Windscreen wipers.

A hydraulic accumulator is fitted, and there is a pressure regulator which maintains pressure in the system between 650 and 850 lb.sq. in.; this pressure will be shown on the rear hydraulic pressure gauge (7) mounted on the right-hand cockpit wall. The forward gauge (6) shows the pressure in the undercarriage down lines. A hand pump, which will operate all the normal services in the event of failure of the engine-driven pumps, is fitted between the pilot's 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 hand pump is thus always ensured.

A hand pump by-pass valve is mounted on the centre of the hydraulic control panel; with this valve in the OFF (normal) position, the hand pump 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 hand pump; the rear hydraulic pressure gauge will then record the hand pump 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.

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 following services:—

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;
Airscrew feathering motors;

Priming valves;
Airscrew, carburettor and windscreen anti-icing pumps;
Oil dilution solenoids;
Radio; and
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 pilot's compartment. In some aircraft a three-positioned battery master switch is fitted:—

Up	—	AIRCRAFT BATTERY ON
Centre	—	OFF
Down	—	BATTERY CART

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 (i.e., Radio Compass and Radar Equipment). In aircraft that have no inverter switch, the inverter motor is automatically operated when the aircraft operated equipment is selected ON. On aircraft fitted with two inverters (usually Dakota (C.47A)) the selector switch is on the bulkhead above the second pilot.

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 show 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 second 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 its operation see Pilot's Notes General, Part III, Chapter 4 (Air Ministry Publication, A.P.2095, 3rd Edition). 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. 100—110.

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, place the latch in the LATCH RAISED position, re-select 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 pilot's 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. (FOR EMERGENCY OPERATION OF THE U/C. SEE PARAGRAPH 66) AL3

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. In Dakota (C.47A) a switch is provided for dimming.

19. **Undercarriage Warning Horn**

A warning horn sounds when the undercarriage is not locked down or when the undercarriage is locked down, but the selector is not set to NEUTRAL, and either throttle is nearly closed.

20. **Flaps Control**

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. (FOR EMERGENCY OPERATION OF FLAPS SEE PARAGRAPH 67) AL3

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 500 lb./sq.in. When the engines are stopped, if the pressure of the rear hydraulic gauge is below this figure, it may be raised by turning ON the hand-pump by-pass valve and operating the hand-pump. For emergency operation of the brakes, see paragraph 68.".

(A.L. 3 Nov. 1950)

Note.—The parking brake should not be operated in flight.

23. **Tail-wheel Locking Control**

The tail-wheel locking control lever is on the control pedestal on the under-side of the throttle quadrant. To lock the tail-wheel, 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 centralized. To unlock, move the lever to the rear and engage in slot by pressing to the left. If lever is stiff to unlock, taxy the aircraft forward, moving the lever rearwards at the same time.

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 control is provided on the under-side of the throttle quadrant.

25. **Airscrew Controls**

(i) The airscrew 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 airscrew feathering push-buttons (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 thought to be faulty. The IDLE CUT-OFF position is used only for starting and stopping the engines.

27. Carburettor Air-intake Heat Controls

(i) In the Dakota (C.47B) 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 ALWAYS BE USED FOR STARTING AND STOPPING. When operating in dusty or sandy conditions, the lever should be set and locked to the FILTER position for all ground running, take-offs, landings and flying.

The RAM position should be selected for all other flying except when carburettor icing conditions are suspected. In this case, the control lever should be moved to a position on the quadrant marked HOT so as to maintain a temperature of 20°(C) to 25°(C). If ice has already formed in the carburettor, the Carburettor Anti-Icer Control (para. 28) should be used in conjunction with the heat control. Only in severe cases of icing will a temperature of more than 25°(C), used in conjunction with the de-icing fluid, be necessary. The application of excessive hot air in severe cases should be limited to short periods.

and ram positions.

In the Dakota (C.47A), the carburettor air heat control is fitted in the same position as in the Dakota (C.47B), but is locked in all positions by the locking lever. The COLD position (right forward) is used for starting, take-off and all normal running except when icing conditions prevail.

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

28. Carburettor Anti-Icer Control

(i) The 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 be used if carburettor icing cannot be prevented by the application of carburettor air heat up to 25 Degrees (C)

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the right-hand baggage compartment.

29. Supercharger Control

A single supercharger control lever (fitted only on Dakota (C.47B) aircraft with R.1830-90C engines) for both engines is mounted on a shelf on the left-hand cockpit wall. This lever is to be used only in accordance with Twin Row Special Instruction No. 18. 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.

As all R.A.A.F. Dakota aircraft are to be fitted with R.1830-82 or -92 engines which have single speed blowers, all references to supercharger control in this publication will be inapplicable when the changeover is completed. In the meantime the supercharger control should be lock-wired in the low blower position.

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. When the aircraft is standing on the ground for long periods, the control should be placed in CLOSED or OPEN position, for if it is left in the OFF position any rise in temperature will cause the fluid trapped between the control and the gill jacks to expand and thus subject the pipelines to excessive pressures.

31. **Engine Starting Controls**

(i) Direct cranking electric and inertia 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 energized electrically until the brushes are lowered; to do this operate the MESH switch in the cockpit and release it again before energizing.

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31A. **Engine Fire Warning System**

Nine flame switches are mounted in each engine nacelle. In the event of fire in the engines, any of these switches will actuate the fire warning lights situated on each side of, and slightly above, the automatic pilot control panel for the port and starboard engines respectively. Test switches to check the serviceability of the warning lamps are located immediately below each warning light.

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. **Airscrew Anti-icers**

An electric pump supplies anti-icing fluid to both airscrews 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 Anti-icers**

Two independent systems are provided:—

(i) *Sliding Panel Anti-icers.*—To operate this system turn ON the two green cocks, one on each cockpit wall, together with the cock below the tank in the right hand baggage compartment, and operate the handpump mounted on the right-hand cockpit wall.

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the top centre of the instrument panel (Dakota (C.47B)) and then switch ON the electric pump by operating the DE-ICER ON-OFF switch mounted on the left-hand electrical panel. In the case of Dakota (C.47A) the de-icer control valve is on the left-hand side of the instrument 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 De-froster System**

Two windscreen de-frosters are fitted, one each for the left-hand and right-hand sides of the cockpit windscreen.

When the heating and ventilating system is in use the de-frosters may be turned on by opening the butterfly valves at the ends of the flexible tubes. An emergency control for the de-frosters 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 in Dakota (C.47B). In the case of Dakota (C.47A) aircraft these valves are on the left-hand 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.

Note.—some aircraft may be fitted with wiper on captain's windscreen only.

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**

In the Dakota (C.47B) a low- pressure demand oxygen system is installed for all crew positions and a constant flow can be installed, if required, for passengers. In the case of Dakota (C.47A) a high-pressure system is installed.

39. **Static Pressure Alternate Source Switch**

In the Dakota (C.47B) a two-position switch (11) at the bottom of the instrument panel is labelled STATIC TUBE, STATIC PRESSURE SELECTOR VALVE and ALTERNATE SOURCE. In the Dakota (C.47A) this switch is situated at the lower right of the instrument panel. 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.

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, to change to same, turn ON the cocks for these tanks, and then turn OFF the main fuel cocks.

When dipstick shows 5 gallons remaining in the tanks, re-select main fuel tanks ON and turn OFF the [illegible] of the long range tanks.

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Never let thecontentsof the long-range tanks get below 5 galls, as this may induce an air lock in the fuel pipe lines, thus causing engine failure.

NOTE:-Care must be taken when dipping long-range tanks that dip-stick reading is not from the sump, as this may lead to a false reading.

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(iv) *Use of the Booster Pumps (Dakota (C.47B)).*— These may 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 low flying and at any time when the fuel pressure begins to fall.

(v) *Cross Feed (Dakota (C.47A)).* — No booster pumps are fitted. A cross-feed control cock is fitted to Dakota (C.47A) aircraft to enable fuel to be supplied to both engines from either engine-driven fuel pump in the event of one failing. It is situated at lower right face of control pedestal. This cock must be ON for take-off and landing, but should be turned off in normal flight.

41. **Preliminaries**

(i) *Before entering the aircraft, check*:—
The exterior of the aircraft completely (including trim tabs, control surfaces, tyres, oleo struts, fuselage, perspex and undercarriage assembly);
All external flying control locks removed and stowed in the aircraft (2 aileron locks, 2 elevator locks, 1 rudder lock); AL 2
The undercarriage locking pins (these may be withdrawn provided the pressure in the undercarriage down-lines is in excess of 500 lbs./sq. in));
Chocks in front of wheels.

(ii) *On entering the aircraft, check that the*:—
Rear cargo door is secure;

Cargo is secure; and
Emergency exits are secure.
Long range fuel tank cocks are OFF.

(iii) *On entering cockpit, check*:—

Generator switches ON;

Hydraulic panel:—

(a) Hydraulic oil reservoir level;

(b) Gyro pilot shut off valve wired to ON position;

(c) Hand pump by-pass valve OFF;

(d) Undercarriage and flap selector to NEUTRAL;

(e) Check hydraulic pressure 500 lbs./sq. in.

Electrical panel:—

Battery master switch ON. (If using ground battery, switch OFF or to BATTERY CART according to the type of switch fitted. All other switches off.)

Parking brake ON;
Undercarriage latch POSITIVE lock;
Undercarriage warning light GREEN;
Gyro pilot engaging valve OFF;
All de-icer controls OFF;
Storm windows secure.

42. Starting the Engines and Warming Up

(i) *Check*:—

Long-range fuselage tank cocks	OFF	
Port engine fuel selector cock	LEFT MAIN	See paragraph 40(i)
Starboard engine fuel selector cock	RIGHT MAIN	
Throttles	1 in. open	
Mixture controls	IDLE CUT-OFF	
Supercharger control	LOW BLOWER	
Airscrew controls	Fully forward (increase r.p.m.)	
Carburettor air-intake heat controls	RAM (see paragraph 27)	
Oil shutter controls	COLD	
Gills	OPEN, then set the selectors to OFF	

R.A.N. PUB. " Pilot's Notes on Starting (Dakota) to be amended as follows:-

ENGINE STARTING:

1. Modification Dakota /RAN/II introduce a direct cranking starter motor in lieu of the inertia type starter and requires a slight alteration in starting procedure.

2. The starter motor will become operative through a relay which is controlled by a switch (marked "start") in the cockpit. Adjacent to the "start" switch is another switch (marked "boost") which supplies starting ignition. Both start and boost switches can be selected to Port or Starboard as required.

3. In operation the selected engine will start turning immediately the "Start" switch is closed. The "Boost" switch is closed as soon as the engine is turning and both switches are released when it fires.

(e) When energizing for the re-starting, the engine may be directly meshed to the starter motor. Relieve this by:—

(i) Having the airscrew turned forward through at least half a revolution by hand; or

(ii) Pressing the mesh switch a few times.

(viii) When both engines are running satisfactorily disconnect the ground battery and set the BATTERY MASTER switch ON. Close the flap over the engine fire extinguisher controls.

(ix) 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 until airborne and clear of dust.

43. **Testing the Engines and Services**

While warming-up check:—

(i) All temperatures and pressures.

(ii) The operation of both the hydraulic pumps by:—

(a) Lowering the flaps with the engine hydraulic lever set forward (starboard engine) 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 rearward (port engine) and checking that the pressure again rises to this figure when they are fully up. Then return the flaps selector lever to NEUTRAL.

(iii) That the hydraulic pressure in the undercarriage down-lines (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) Bleed manifold pressure gauges and lines for at least 20 seconds each, at the same time bleeding the automatic pilot.

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be required.

(v) Operation of wing de-icers (if fitted). Note pressure, 8-9½ lbs.

(vi) Satisfactory engine operation with fuel cock controls in all positions.

(vii) Switch off fuel booster pumps and check operation of engine-driven fuel pumps.

(viii) Test all trim controls for free operation.

(ix) Test carburettor heat controls for correct operation.
After warming up to 40 Deg.(oil) and 140Deg. C. (Cyl).
Caution.-Do not close gills to warm engine.

(x)
(a) Check each magneto at 1,000 rpm. for a dead cut.
(b) Then for each engine in turn:-
Open the throttle to boost reading of 20 ins.,exercise and check the operation of the constant speed unit by moving the r.p.m. through the full range at least twice.
Test the feathering circuit and generator charging rate.
The generator should commence charging at approximately 1400 r.p.m.
Increase boost to the "Static Boost" noted before starting the engines and check:-
Static R.P.M. -2,450 plus or minus50rpm.
Check each magneto; the drop should not exceed 75 rpm.
Check temperatures and pressures.
Smoothly close the throttle and check the minimum r.p.m. (650 r.p.m. desired).Set r.p.m. at 1,000r.pm.

NOTE:- If the checks are satisfactory no useful purpose will be served by a full power check, but if the single ignition drop at Static Boost exceeds 75 rpm and provided there is no undue rough running, a full power check may be carried out as follows:-

Open the throttle to 48 ins. of boost and check rpm =2,700, then close the throttle, until a drop in rpm is observed; test each magneto quickly. If the ignition drop exceeds 75rpm or is accompanied by rough running the engine should not be accepted for flight.

Caution; Operation on one magneto at this power output must be held to the shortest possible time because of the possibility of detonation.

(xi) Depress engine fire warning lights test switches to test fire warning.

44. **Taxying**

Before taxying check:—

Hydraulic pressure	650-850 lbs./sq. in.
Undercarriage down-lines pressure	Above 500 lbs./sq. in.
Undercarriage safety locking pins	Removed and stowed.
Tail-wheel	Unlocked.
Rear door	Closed.

The tail-wheel may be locked when taxying across a strong wind, but should be unlocked for all normal taxying.

Chocks away.

45. **Vital Actions Before Take-off**

H — Hydraulics	Check engine pump selector lever. Undercarriage safety latch to "Spring Locked".
Hatches and doors	Closed.
T — Trim	Elevator: Neutral with normal load, 2° tail heavy with light load. Aileron: Neutral. Rudder: Neutral.
Throttle	Throttle friction nut tightened.
M — Mixture	Auto rich.
Carburettor air intake heat controls	RAM or FILTER (see paragraph 27). COLD in Dakota (C.47A).
P — Pitch	Fully forward (INCREASE r.p.m.).
F — Fuel	Check contents, cock settings and pressures (see paragraph 40 (i)). Booster pumps ON (Dakota (C.47B)). Cross feed ON (Dakota (C.47A)).

F---Flaps.....UP normaly(down for shortest run)

Cowl gills....TRAIL

Oil.....COLD

Radome.....HOUSED (RAN 1-55) 1/55

S — Sperry panel	Gyros set and check suction (3.75—4.25 in hg.). Automatic pilot OFF.
S — Supercharger	LOW blower.
Oil temperature ..	60°C minimum (see paragraph 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.

(i) Align the aircraft on the runway and then engage the tail-wheel 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 tail-wheel will help to keep the aircraft straight.

(iii) Safety speed at full load at full take-off power, flaps up or quarter down, is 90 92 kts. (105 m.p.h.) I.A.S.

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

(v) 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 paragraph 27).

(vi) At a safe height (500 ft.), the booster pumps may be switched OFF (Dakota (C.47B)); cross feed OFF (Dakota (C.47A)).

47. **Climbing**

The recommended climbing speed is 108 kts. (125 m.p.h.) I.A.S. from ground level to operating height.

48. **General Flying**

(For details of engine operation in flight, see Engine Operating Table, paragraph 53.)

(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 90-95 kts. (105-110 m.p.h.) I.A.S.; select half flap and increase revs. to 2300 r.p.m.

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 1700, 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 (but see paragraph 29).

(vi) *Pilot Changeover Drill.*—Pilot changeovers may only be made when the aircraft is in straight

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(vii) *Flying in Icing Conditions.*—Whenever icing conditions are suspected the carburettor air temperature should be maintained between 20°(C) and 25°(C). If ice has already been allowed to form, the Carburettor Anti-Icer should be used in conjunction with the Carburettor Air Heat Control. Carburettor air temperatures in excess of 25°(C) are not necessary, except in severe cases, when it should only be applied for short periods. Excessive temperatures may seriously aggravate the faulty operation of the engine if icing is not the cause of rough running and/or loss of power.

49. **Stalling**

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

Undercarriage and flaps UP—At light load 24,000 lb., 67 (77); at maximum load 28,000 lb., 74 (85).

Undercarriage and flaps DOWN—At light load 24,000 lb., 58 (67); at maximum load 28,000 lb., 63 (73).

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

50. **Approach and Landing**

(i) *Vital Actions.*—

Leading edge de-icers	OFF.
Gyropilot	OFF.
Superchargers	LOW BLOWER.
B — Brakes	Hydraulic pressure gauge. 650-850 lbs./sq. in. Parking brake off.

Reduce speed to 138 knots (160 m.p.h.), the maximum for lowering undercarriage.

U-Undercarriage	Safety latch SPRING LOCKED. Undercarriage DOWN — Move selector lever DOWN and hold until forward hydraulic gauge reads 500-850 lb./sq. in. Return selector lever to NEUTRAL and check green light. Visually check that wheels are down.
U — Undercarriage safety latch	POSITIVE LOCK.
Tail-wheel	LOCKED.
M — Mixture control	AUTO RICH.
Carburettor air-intake heat controls	As desired (see paragraph 27).
P---Pitch	Set Full Fine on final approach. AL 2
F — Fuel	Selector cocks to fullest tanks. Booster pumps ON (C.47B) or cross feed ON (C.47A).

Reduce speed to 97 knots (112 m.p.h.), the maximum for lowering flaps.

F — Flaps	Quarter DOWN and lowered as required during approach. Do not use more flap than is considered necessary for the particular conditions.

Cowl gills.....TRAIL

RAdome.....HOUSED

(ii) The recommendedFINAL approach speeds in knots(mph) I.A.S. are:-

At maximum landing weight-27,000 lb.

	Flaps down	Flaps up
Engine assisted	85(98)	90(104)
Glide.....	90(104)	95(109)

AL 2&8

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.

51. **Overshoot**

(i) At 2,000 lb. the aircraft will climb away easily at climbing power with the flaps and undercarriage down at 87 kts.(100 mph) I.A.S.

(ii) Increase Climbing speed to safety speed at 92 kts.(106 mph) as soon as possible.

(iii) Raise flap to quarter flap. Raise the undercarriage; raise the balance of the flap. The flaps come up quickly.

52. After Landing

(i) Before taxying open the gills, switch off the booster pumps (C.47B), cross feed OFF (C.47A). and raise the flaps. Unlock the tail-wheel before attempting to turn. ~~Place airscrew speed control to full fine~~.

(ii) To stop engines, run at 1000 r.p.m. and allow cylinder head temperature to fall to 175°C.; then move mixture controls to IDLE CUT-OFF.

(iii) When the engines have stopped turn off the master and ignition switches, all electrical services, and when fuel pressure has dropped to zero, turn off fuel cocks.

(iv) 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.

(v) Place undercarriage pins, aircraft control locks, wheel chocks and pitot cover in position.

53. Engine Data:

ENGINE OPERATING TABLE — TWIN WASP R.1

Condition	R.P.M.	Boost	Mixture	Cyl. Head Temp. Max.	Oil Temp. Max.	Approximat Fuel Consumptio
Take-off	2700	43"	Auto Rich	260°C.	100°C.	250 Imp. 300 U.S.
Climb	2300	33"	Auto Rich	260°C.	100°C.	136 Imp. 163 U.S.
Single Engine	2550	42"	Auto Rich	260°C.	100°C.	180 Imp. 216 U.S.
Maximum Range	1700	30"	Auto Lean	232°C.	100°C.	58 Imp. 69 U.S.
Cruise	See Below	See Below	Auto Lean	232°C.	100°C.	See Below

Standard Temp. °C.	Pressure Altitude Feet	1700 R.P.M. 535 H.P. Boost "	1750 R.P.M. 550 H.P. Boost "	1800 R.P.M. 565 H.P. Boost "	1850 R.P.M. 585 H.P. Boost "
15	S.L.	32·0	32·0	32·0	32·0
13	1,000	32·0	32·0	32·0	32·0
11	2,000	31·5	31·5	31·5	31·5
9·1	3,000	31·5	31·5	31·5	31·5
7·1	4,000	31·5	31·0	31·0	31·0
5·1	5,000	31·0	31·0	31·0	31·0
3·1	6,000	31·0	31·0	30·5	30·5
1·1	7,000	31·0	30·5	30·5	30·5
— 0·8	8,000		30·5	30·5	30·5
— 2·8	9,000			30·5	30·0
— 4·8	10,000				
— 6·8	11,000		Full Throttle		
— 8·8	12,000				
	B.M.E.P.	136	136·7	135·6	136·6
Approximate Fuel Consumption		61 Imp. 73 U.S.	63 Imp. 75 U.S.	65 Imp. 78 U.S.	68 Imp. 81 U.S.

ENGINE OPERATING TABLE — TWIN WASP R.1830 - 90B - 90C (LOW BLOWER) - 90D - 82 - 92 ENGINES — DAKOTA AIRCRAFT

Condition	R.P.M.	Boost	Mixture	Cyl. Head Temp. Max.	Oil Temp. Max.	Approximate Fuel Consumption	Remarks
Take-off	2700	43"	Auto Rich	260°C.	100°C.	250 Imp. 300 U.S.	Figures shown are maximum permissible with a 5 minute limit. Boost may be reduced according to load and condition of runway.
Climb	2300	33"	Auto Rich	260°C.	100°C.	136 Imp. 163 U.S.	Figures shown are maximum. Power should be reduced according to load to 2050 R.P.M. and 32" Boost.
Single Engine	2550	42"	Auto Rich	260°C.	100°C.	180 Imp. 216 U.S.	Figures shown are maximum for continuous operation. Where possible power should be reduced to mimimum required to maintain height and A/S. In emergency use Full Throttle but do not increase R.P.M.
Maximum Range	1700	30"	Auto Lean	232°C.	100°C.	58 Imp. 69 U.S.	Trim aircraft for minimum drag. (See also paragraph 57)
Cruise	See Below	See Below	Auto Lean	232°C.	100°C.	See Below	Fuel consumptions are in Imp. and U.S. gallons and are for both engines. Mixture control is in normal Auto Lean position. Desired oil Temp. 60°C.— 75°C. Desired Cyl. Head Temp. 205°C. Desired Carb. Intake Temp. ~~32°C.~~ 20°(c) to 25°(c)

Standard Temp. °C.	Pressure Altitude Feet	1700 R.P.M. 535 H.P. Boost "	1750 R.P.M. 550 H.P. Boost "	1800 R.P.M. 565 H.P. Boost "	1850 R.P.M. 585 H.P. Boost "	1900 R.P.M. 600 H.P. Boost "	1950 R.P.M. 618 H.P. Boost "	2000 R.P.M. 635 H.P. Boost "	2050 R.P.M. 650 H.P. Boost "	2100 R.P.M. 658 H.P. Boost "	2150 R.P.M. 670 H.P. Boost "	Remarks
15	S.L.	32·0	32·0	32·0	32·0	32·0	32·0	32·0	32·0	31·5	31·5	Maximum permissible B.M.E.P. in Auto Lean is 140. Chart has been based on 135 B.M.E.P. to allow for instrument errors. Boosts are to nearest ·5 inches.
13	1,000	32·0	32·0	32·0	32·0	32·0	31·5	31·5	31·5	31·5	31·5	
11	2,000	31·5	31·5	31·5	31·5	31·5	31·5	31·5	31·5	31·5	31·5	
9·1	3,000	31·5	31·5	31·5	31·5	31·5	31·5	31·5	31·5	31·5	31·0	
7·1	4,000	31·5	31·0	31·0	31·0	31·0	31·0	31·0	31·0	31·0	31·0	Correction for Temperature Below F.T. reduce Boost ·5 in. for each 10°C. below and increase Boost ·5 in. for each 10° C. above Standard temperature.
5·1	5,000	31·0	31·0	31·0	31·0	31·0	31·0	31·0	31·0	31·0	31·0	
3·1	6,000	31·0	31·0	30·5	30·5	30·5	30·5	30·5	30·5	30·5	30·5	
1·1	7,000	31·0	30·5	30·5	30·5	30·5	30·5	30·5	30·5	30·5	30·5	
— 0·8	8 ,000		30·5	30·5	30·5	30·5	30·5	30·5	30·5	30·5	30·5	In calculating Full Throttle altitude no allowance has been made for Ram.
— 2·8	9,000			30·5	30·0	30·0	30·0	30·0	30·0	30·0	30·0	
— 4·8	10,000					30·0	30·0	30·0	30·0	30·0	30·0	
— 6·8	11,000		Full Throttle					30·0	29·5	29·5	29·5	
— 8·8	12,000									29·5	29·5	
	B.M.E.P.	136	136·7	135·6	136·6	136·4	136·9	137·2	137	135·2	136·6	
Approximate Fuel Consumption		61 Imp. 73 U.S.	63 Imp. 75 U.S.	65 Imp. 78 U.S.	68 Imp. 81 U.S.	72 Imp. 86 U.S.	75 Imp. 90 U.S.	78 Imp. 94 U.S.	82 Imp. 98 U.S.	86 Imp. 103 U.S.	89 Imp. 107 U.S.	

Fuel: 100 octane standard, 91 octane alternative.

Oil: 120 seconds standard, 100 seconds alternative.

Oil Pressure:

Maximum ..	100 ~~95~~ lb./sq. in.
Normal ..	75/90 lb./sq. in.
Minimum ~~for Cruising~~ IN FLIGHT	60 lb./sq. in.
Minimum for Idling .	15 lb./sq. in.

Minimum Temperatures for Take-Off:

Oil	40° ~~60~~°C.
Cylinder ..	140° ~~120~~°C.

Maximum Temperature before Take-Off:

Cylinder	205°C.

Maximum Temperature for Stopping the Engines:

Cylinder ..	205 ~~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 28,000 lb.

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

Diving and level flight:

At 28,000 lb. and below	172 (200)
Undercarriage down	138 (160)
Flaps down	98 (112)

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(iii) Maximum weights are :—

Take-off	28,000 lb.
Landing	27,000 lb.

Note.—For all V.I.P. aircraft the maximum permissible weight for take-off and landing is 26,200 lb.

(iv) Distribution of load:

The loading of freight and passengers must be carefully supervised to ensure that the C.G. 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 also paragraph 59.)

I.A.S. in kts. (m.p.h.)	85(98)	110(126)	135(157)	160(186)
P.E. Correction Add	+8	+3	+4	+3

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56. **Maximum Performance** (A.L.2, Feb.1950)

Climbing:

The speed for maximum rate of climb is 95 knots (110 m.p.h.) 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. The throttles must be partially closed when changing gear to avoid overboosting as high gear engages.

57. **Maximum Range**

(ii) Cruising:

Fly in low blower and weak mixture at maximum obtainable boost (not exceeding 30 in.) and adjust r.p.m. as required to maintain the recommended speed - see graph. Engines are not to be operated in the speed range of 1,300 to 1,600 r.p.m. due to the occurrence of dangerous resonance in parts of the airframe when operating within these r.p.m. settings. At light loads and at low altitudes the recommended speed may be exceeded at 30 in. boost and the lowest practicable r.p.m. In this event boost should be reduced as required to maintain the speed desired."

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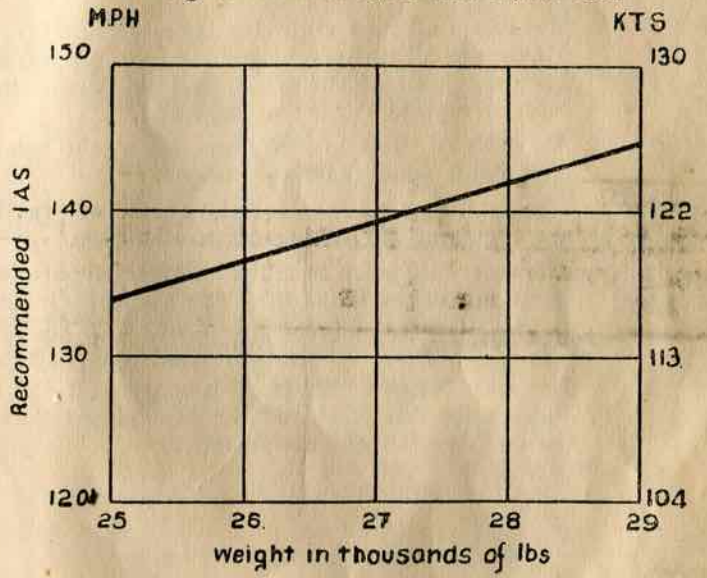
(iii) The following curve gives the recommended speed for maximum range in still air conditions at various a llup weights. The figures apply to all heights between 5,000 and 10,000 feet.



58. **Fuel Capacities**

Fuel Capacities:	*U.S. gals.*	*Imperial gals.*
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, two long-range inter-connected fuel tanks, each of 55 U.S. gallons (46 Imperial gallons) capacity can be carried in the fuselage.

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59. **Weight and Balance**

(i) It is essential that the aircraft be loaded within the prescribed limits of weight and balance. These limits are as follows:—

Maximum all up weight for take-off: 28,000 lb.
Maximum all up weight for landing: ~~26,000 lb.~~ 27,000 lb
Forward limit of the C.G.: ~~62·1~~ 263·1 ins. aft of the reference point (undercarriage up).

Aft limit of the C.G.: ~~85·6~~ 339·6 ins. aft of the reference point (undercarriage down).

The limiting positions for the centre of gravity are the same for taking off and landing.

The reference point is at the bulkhead separating the main cabin from the crew's compartment.

(ii) For method of correct loading of the aircraft and calculation of weight and balance, see Dakota Weight Sheet Summary (R.A.A.F. Publication No. 324) and the provisional Publication "Air Movements Instructions".

PART IV

EMERGENCIES

60. **Engine Failure During Take-Off**

(i) Safety speed at full load at full take-off power, flaps up or quarter down, is 92 knots (105 m.p.h.) 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 knots) I.A.S. provided that the wheels and flaps are fully up, and the airscrew of the failed engine is feathered.

61. **Engine Failure in Flight**

(i) Feather the airscrew of the failed engine and close the gills on that side. Mixture to "IDLE CUT-OFF".

(ii) The recommended S.E. Speed is 92-97 knots (105-110 m.p.h.) I.A.S. At this speed the aircraft can be trimmed to fly "hands and feet off".

(iii) Adjust power of live engine to maintain height as desired. Mixture control to AUTO RICH. (Max. continuous 42 in. 2550 R.P.M.) Set the gills on the live engine to TRAIL.

(iv) Ensure that the engine hydraulic pump selector is set to the live engine.

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

(vi) 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.

Note.—Correct S.E. Speed is of vital importance. There should be no hesitation in using 42 in. boost and 2550 R.P.M., if required, to maintain height and speed.

62. **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 92 knots (105 m.p.h.) I.A.S.

(ii) Execute a normal approach 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 one-quarter 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 82-87 knots (95-100 m.p.h.) I.A.S.

63. **Feathering**

(i) Press feathering button and hold 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.

(ii) After feathering action has commenced, set the mixture control to IDLE CUT-OFF and switch OFF the booster pump or cross feed if in use.

(iii) Pitch control to full coarse.

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

(v) Turn the fuel cock of the dead engine OFF and close its gills.

64. **Unfeathering**

(i) Set the throttle slightly open, the airscrew pitch control to full coarse, turn fuel ON and then switch ON the ignition.

(ii) Hold the feathering button in until r.p.m. reach 800-1,000, moving the mixture control to AUTO-RICH after unfeathering action has commenced.

(iii) If the airscrew 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.

65. **Runaway Airscrew**

At the first evidence of a runaway airscrew:—
First: Pull up aircraft and retard throttle so as to reduce forward speed.

Second: Determine which engine is overspeeding.
Third: Place mixture in idle cut-off, and cut ignition switch on runaway engine.

Fourth: Feather airscrew. If cause of airscrew malfunctioning is of such a nature as to prevent feathering, continue flight at an airspeed sufficiently low to hold engine speed within reasonable limits.
Fifth: Adjust throttle on remaining engine to hold necessary airspeed.

There is no mistaking the evidence of a sustained overspeed and the immediate possibility of damage is so great that the pilot should, without hesitation, take action to reduce this possibility. The correct procedure is to reduce power and the aircraft's speed to the practical minimum so that windmilling r.p.m. is held down. Only when the r.p.m. is reduced should the airscrew be feathered.

66. **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 hand pump 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 undercarriage 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 paragraph 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.

67. **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.

"Note. The handpump shut-off valve should be in the CLOSED position during this operation.".

"68. Brakes Emergency Operation

If, during 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. The following is the procedure to ensure efficient braking when using this method:-

(i) Ensure that all hydraulic control

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.

67. **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.

"Note. The handpump shut-off valve should be in the CLOSED position during this operation.".

68. Brakes Emergency Operation

If, during landing, the reading of the ear hydraulic pressure gauge is below 500 b./sq.in., it will be necessary to use the andpump to obtain adequate braking. The ollowing is the procedure to ensure efficient raking when using this method:-

(i) Ensure that all hydraulic control handles are in the NEUTRAL or OFF position.

(ii) Ensure that the handpump shut-off valve is in the CLOSED position to prevent the return of fluid to the aircraft's system, with subsequent pressure loss.

(iii) When brakes are required, DEPRESS THE PEDALS AND KEEP THEM IN THAT POSITION. If the brake pedals are released, even momentarily, fluid will return to the reservoir by means of the return lines, resulting in complete loss of pressure. Operate the handpump.

(iv) Continue to operate the handpump until the brakes are no longer required. The amount of brake pressure will naturally depend upon the extent to which the handpump is operated.".

(A.L. 3 Nov. 1950)

69. **Parachute Exits**

(i) Parachute exits should be made through the main cabin door. For this purpose the inner paratroop door should be removed inwards. The whole door may be jettisoned by depressing the lever on the forward side of the door which withdraws the hinge pins, and 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.

70. **Crash Exits**

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

71. **Fire-Extinguishers**

(i) *Engine Fire-Extinguishers*:

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.

72. **Method of Stopping Engine Following Known or Suspected Leaking of Petrol in Vicinity of Engine**

(i) Mixture Control — Idle Cut-off.

(ii) Throttle — Open Fully.

(iii) Petrol — Off.

(iv) Pitch Control — Full Coarse.

(v) Wait until all signs of petrol leakage disappear.

(vi) Airscrew — Feather.

(vii) Switches — Off.

The above method is for the purpose of stopping an engine when fire HAS NOT actually occurred and minimizes the possibility of backfiring or causing flame in the exhaust manifold or nacelle.

73. **Vital Actions in Event of Nacelle Fire**

(i) Close the throttle of the engine on fire.

(ii) Feather its airscrew.

(iii) Mixture control to "Idle Cut-off" and turn OFF the fuel cock of this engine.

When the engine has stopped or nearly stopped:—

(iv) Switch OFF the ignition.

(v) Operate the fire-extinguisher.

No attempt is to be made to restart an engine after fire in its nacelle.

Note.—For all other fire actions, see Pilot's Notes General, A.P. 2095.

74. **Ditching**

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

(i) The flaps should be set quarter to half down to reduce the touchdown speed as much as possible.

(ii) Further reduce the touchdown speed by use of engine, if possible.

(iii) Ditch with tail down and wings parallel to surface.

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

PT IV EMERGANCIES

45

PART V

ILLUSTRATIONS — DAKOTA (C.47B)

Key to Figure 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~~ PRESSURE selector switch.
12. Fuel contents gauge.
13. Starboard engine fuel selector cock.
14. Mixture control lever.
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.

17L1

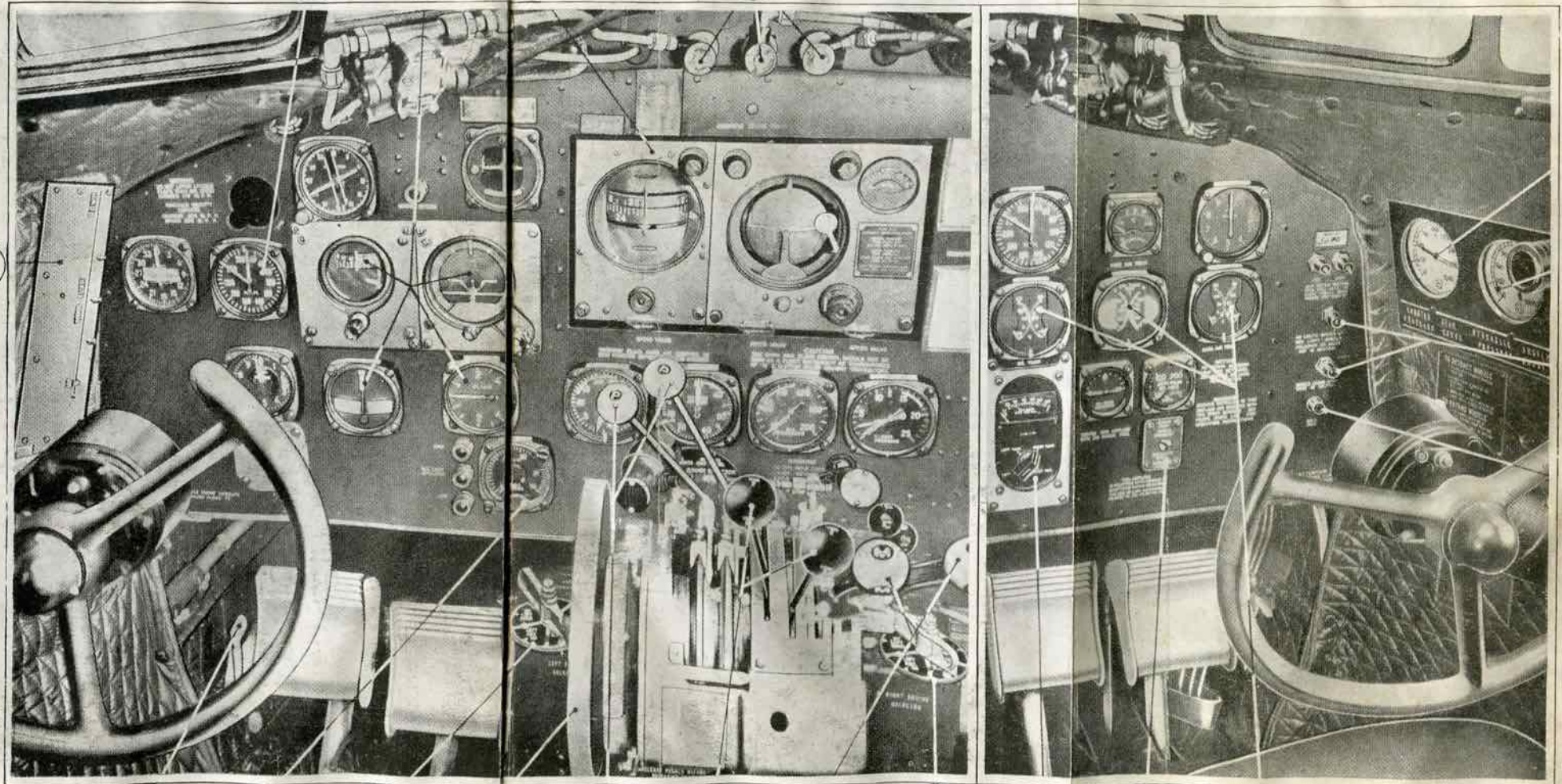


FIG 1

INSTRUMENT PANEL AND ENGINE CONTROLS

FIG 1.

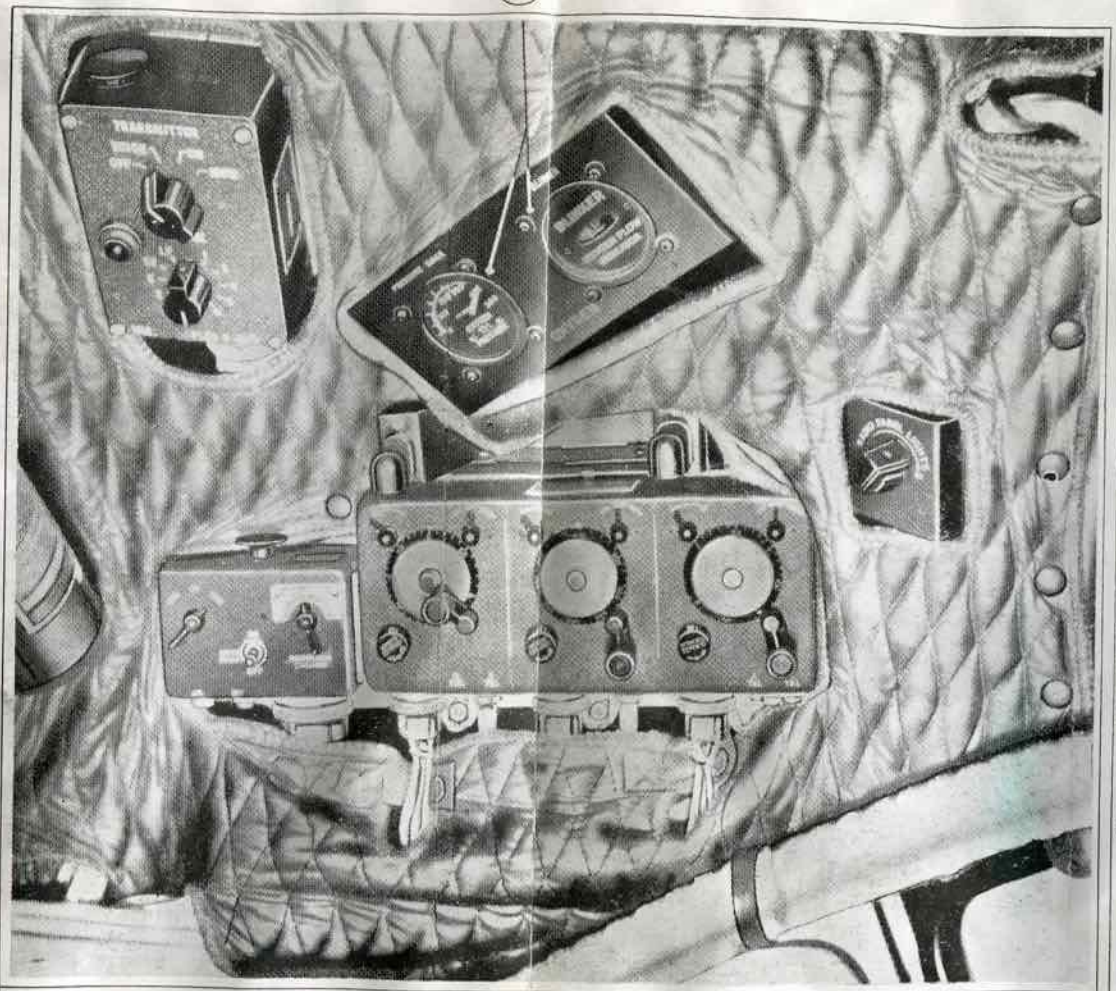


FIG. 2 LEFT HAND ROOF DETAILS

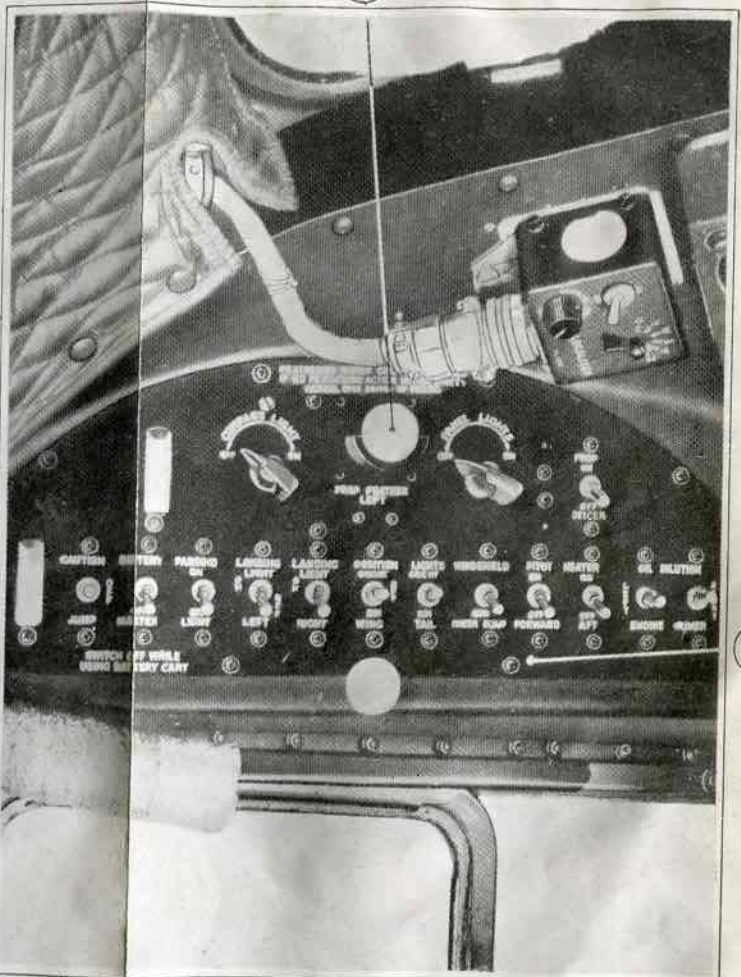


FIG. 3 LEFT HAND UPPER SWITCH PANEL

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.

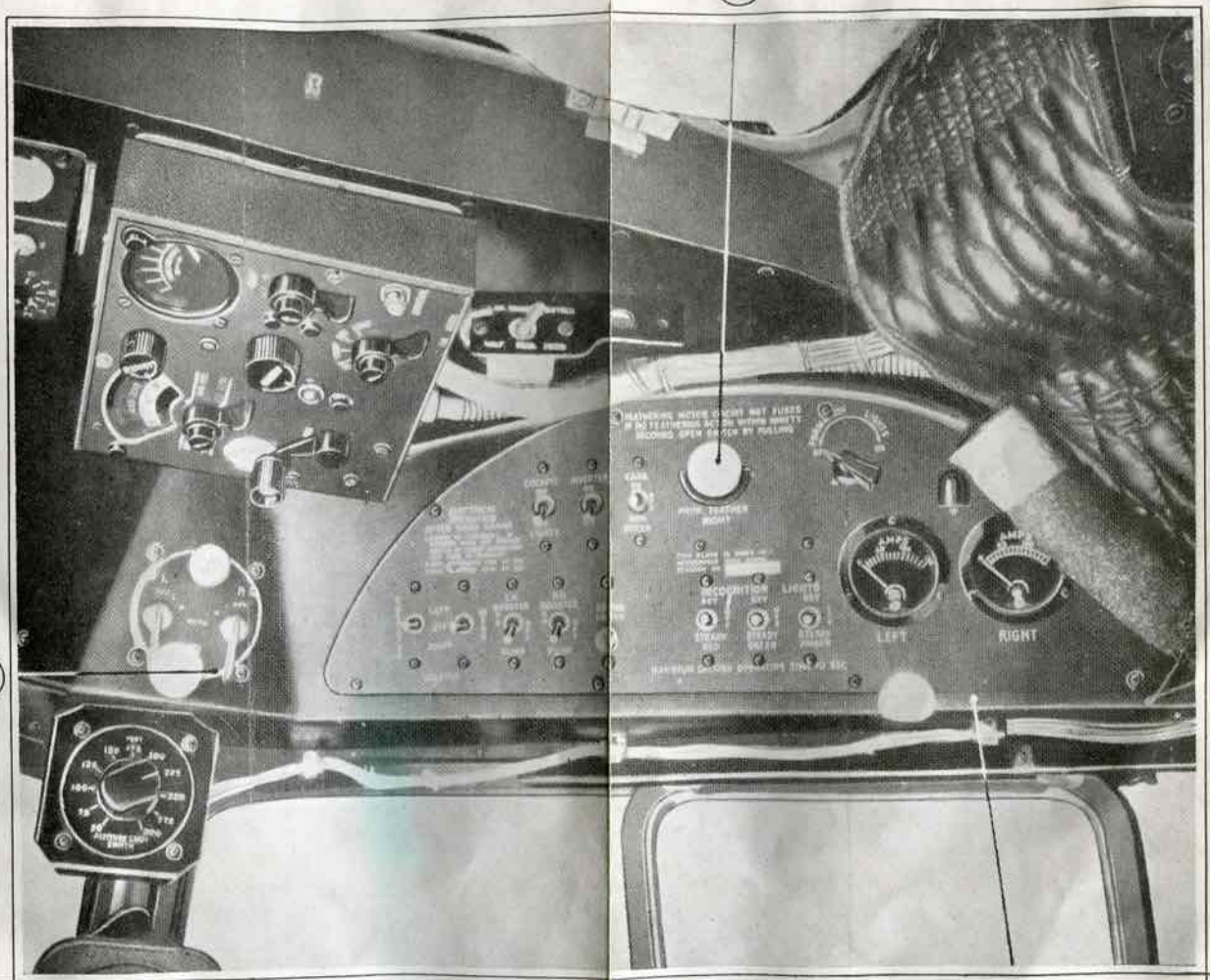


FIG. 4 RIGHT HAND UPPER SWITCH PANEL FIG. 4

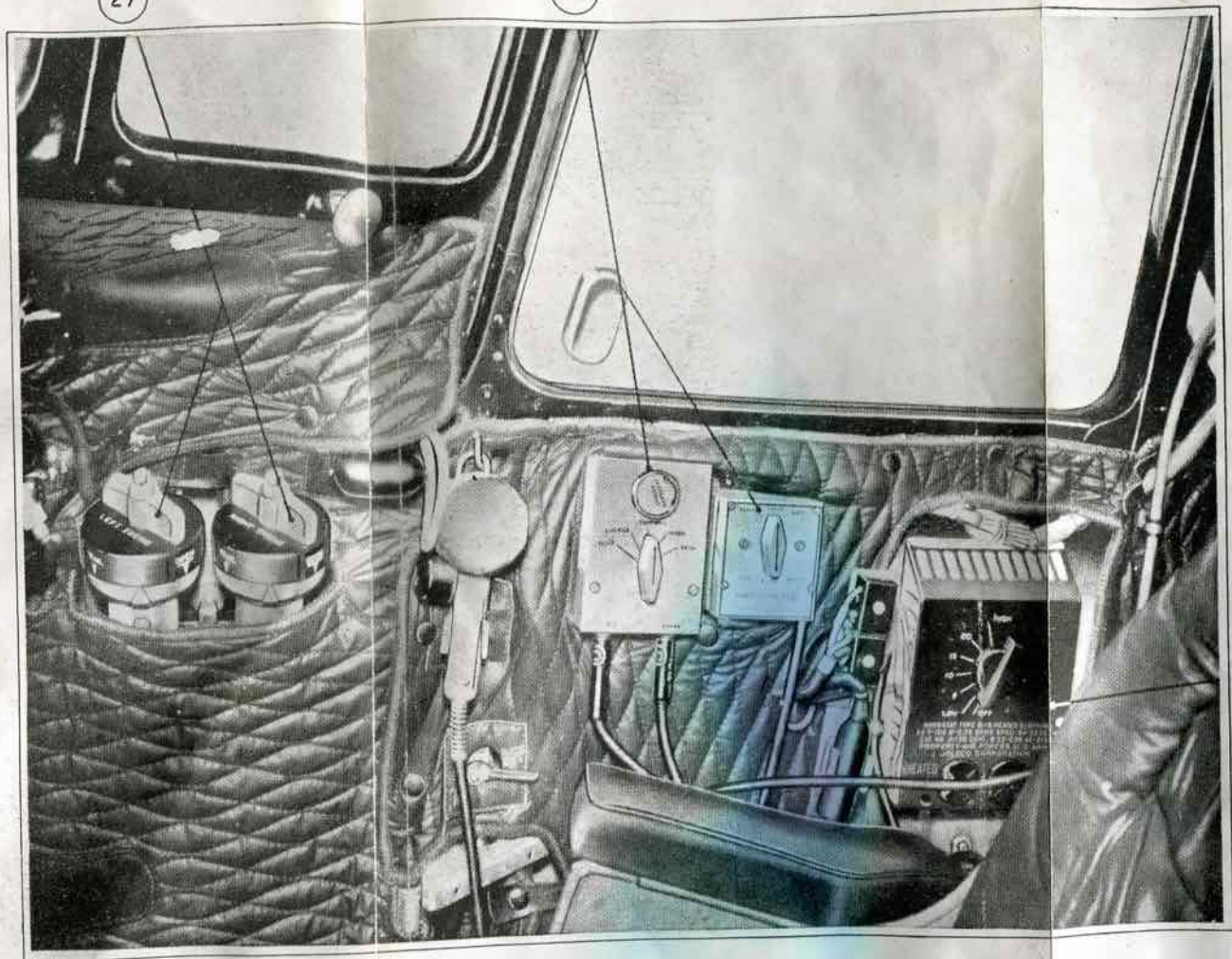
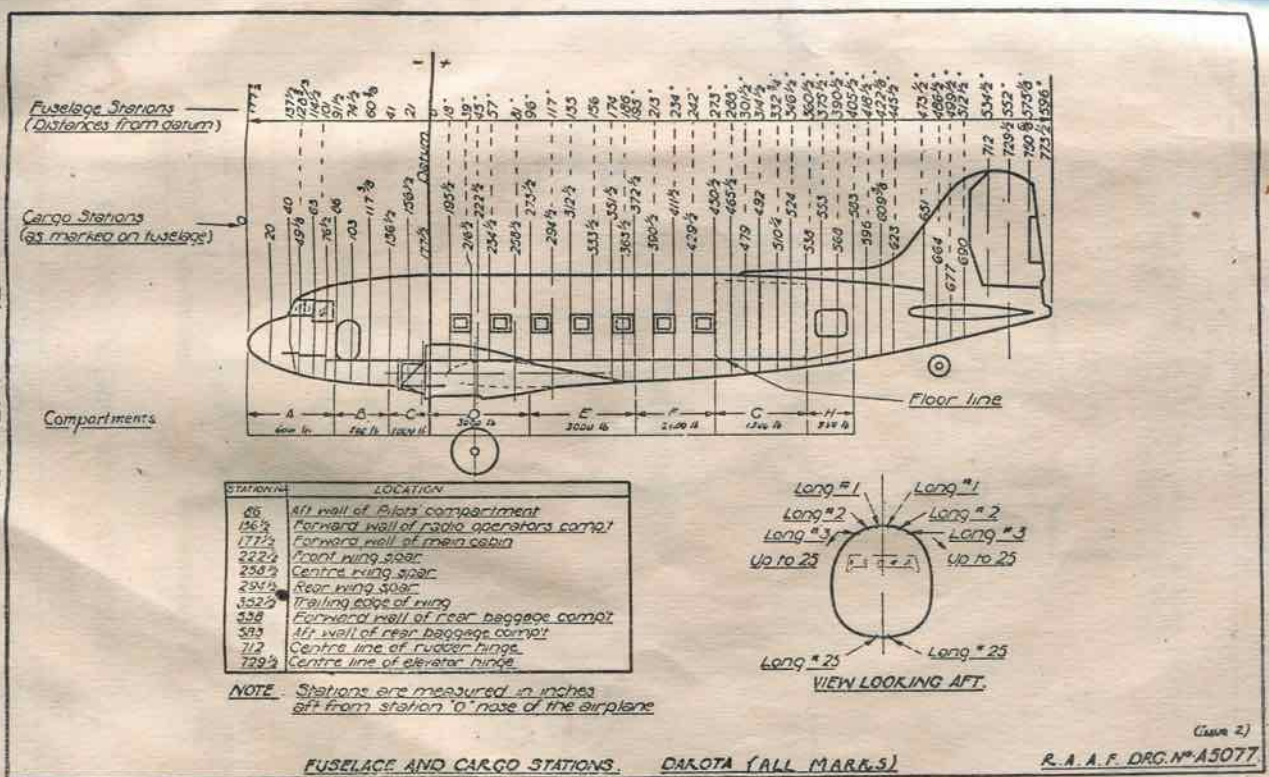


FIG. 5 COCKPIT — STARBOARD SIDE FIG. 5

KEY TO *Fig.* 5

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



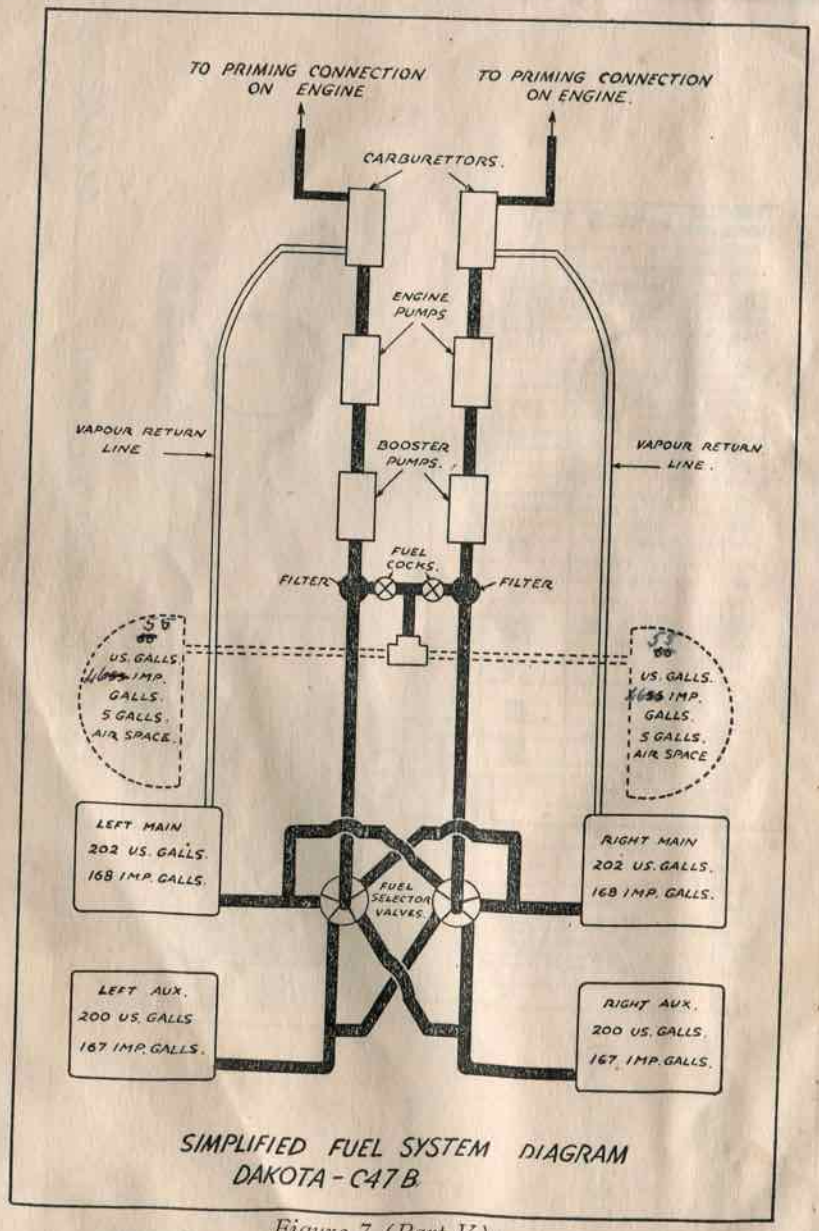
STATION No.	LOCATION
86	Aft wall of Pilots' compartment
136½	Forward wall of radio operators compt
177½	Forward wall of main cabin
222½	Front wing spar
258½	Centre wing spar
294½	Rear wing spar
352½	Trailing edge of wing
438	Forward wall of rear baggage compt
583	Aft wall of rear baggage compt
712	Centre line of rudder hinge
729½	Centre line of elevator hinge

NOTE. Stations are measured in inches aft from station "0" nose of the airplane

(Issue 2)

FUSELAGE AND CARGO STATIONS. DAKOTA (ALL MARKS) R.A.A.F. DRG. No. A5077

Figure 6 (Part V)



SIMPLIFIED FUEL SYSTEM DIAGRAM
DAKOTA - C47B.

Figure 7 (Part V)

PART VI

ILLUSTRATIONS — DAKOTA (C.47A)

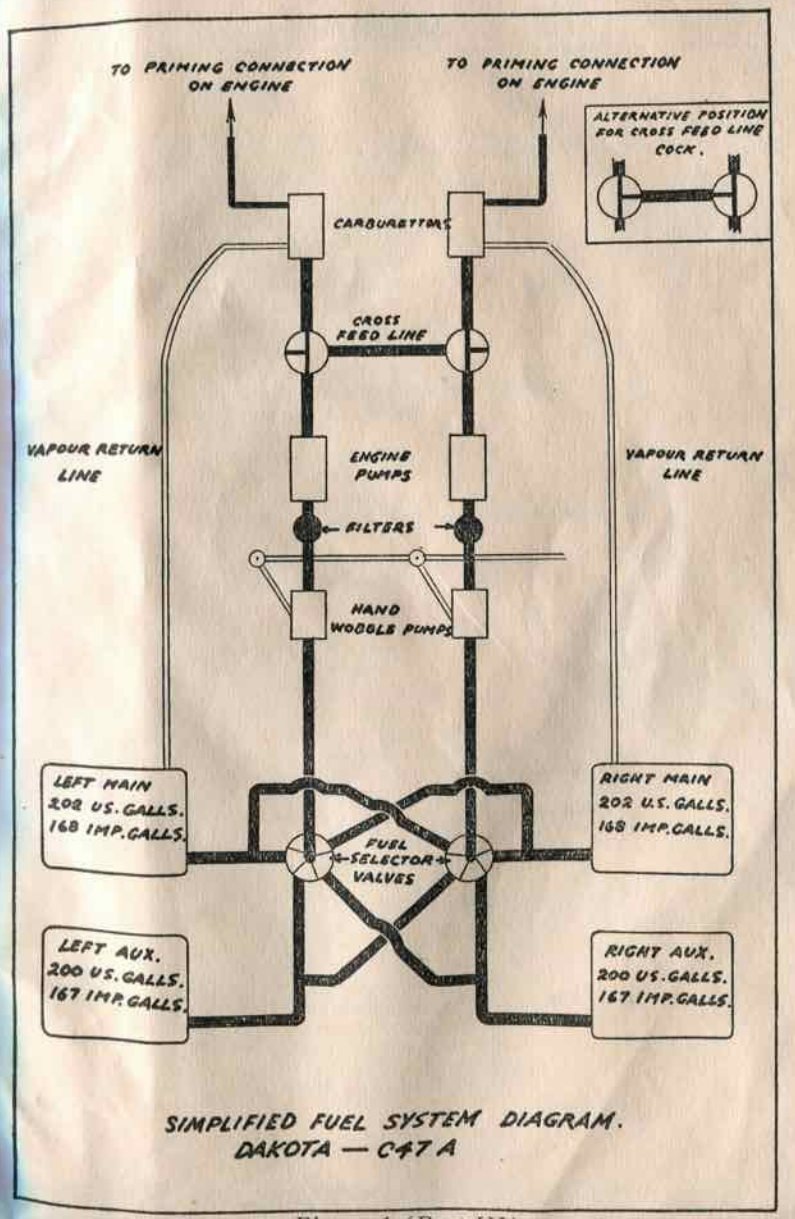


Figure 1 (Part VI)

NOTES

GENERAL VIEW OF COCKPIT

KEY TO *Fig.* 2

1. Switch for paratroop pack salvo.
2. Switch for paratroop jump signal light.
3. Master battery switches.
4. " Bale out " warning switch.
5. Navigation light switch.
6. Compass light rheostat.
7. Landing light switches.
8. Propeller feathering button (port engine).
9. Panel light rheostat.
10. Position light switches.
11. Pitot-head heater switches.
12. Propeller de-icer master switch.
13. Oil dilution and engine primer switches.
14. Radio compass controls.
15. Ignition switches.
16. Cockpit lights switch.
17. Fluorescent lights switch.
18. Carburettor de-icing switch.
19. Propeller feathering button (starboard engine).
20. Ammeters.
21. Identification lights switchbox and key.
22. Engine starter switches.
23. Starter safety switch.
24. Watch.
25. Fuel pressure gauges.
26. Oil pressure gauges.
27. De-icer air pressure gauge.
28. Oil temperature gauges.
29. Undercarriage warning light.
30. Carburettor air temperature gauge.
31. Undercarriage warning light test switch.
32. Outside air temperature gauge.
33. Fuel contents gauge and selector switch.
34. Cylinder temperature gauges.
35. Aileron trimming tab control.
36. Fuel cross-feed cock.
37. Aileron trimming tab indicator.
38. Engine control quadrant.
39. Tailwheel locking lever.
40. Parking brake.
41. Rudder trimming tab indicator.
42. Gyro pilot engaging lever.
43. Rudder trimming tab control.
44. Elevator trimming tab control.
45. Flaps position indicator.
46. Boost pressure gauges.
47. Altimeter.
48. A.S.I.
49. Sperry gyropilot instruments.

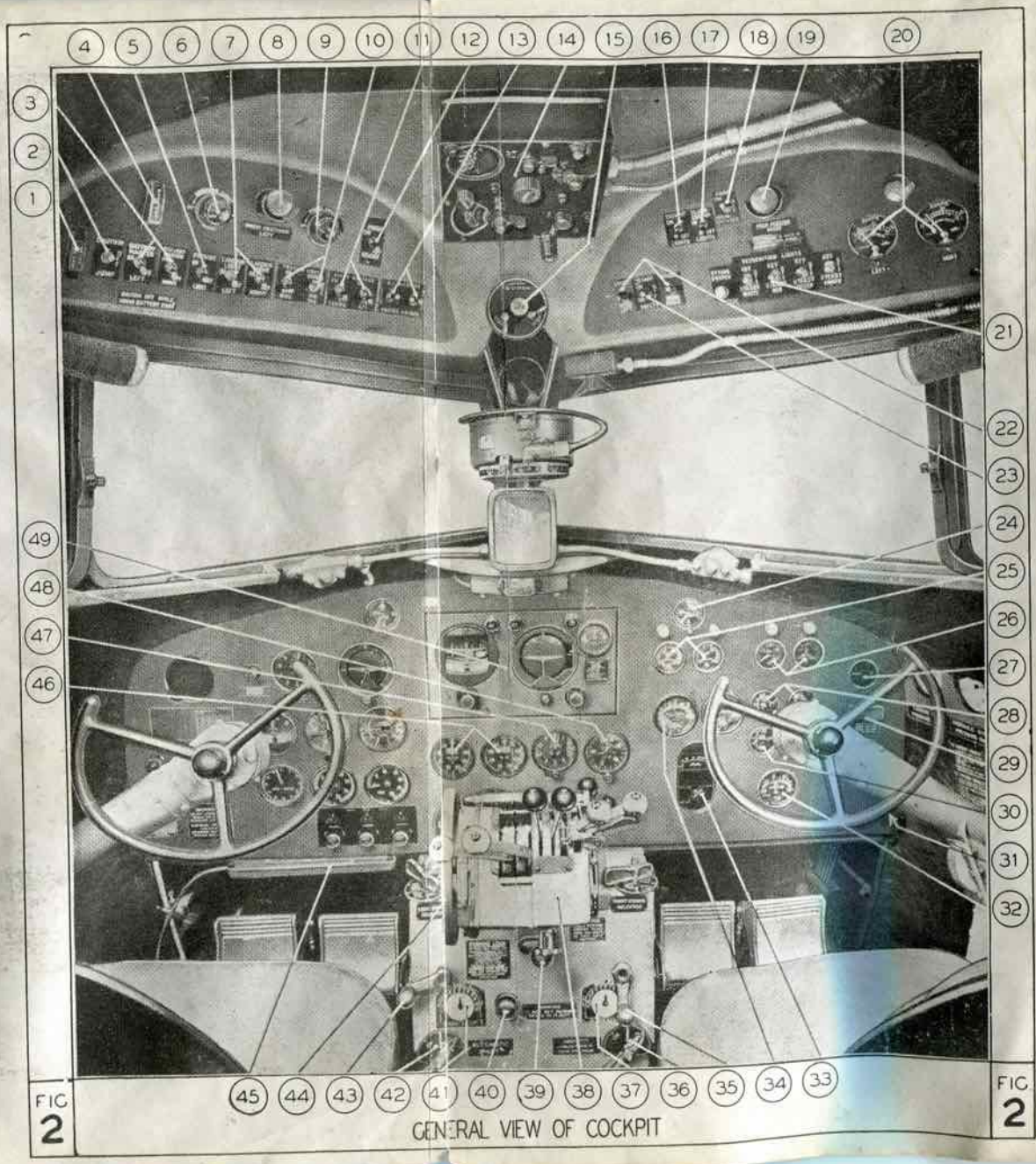


FIG 2

GENERAL VIEW OF COCKPIT

FIG 2

GENERAL VIEW OF COCKPIT

KEY TO *Fig.* 2

1. Switch for paratroop pack salvo.
2. Switch for paratroop jump signal light.
3. Master battery switches.
4. " Bale out " warning switch.
5. Navigation light switch.
6. Compass light rheostat.
7. Landing light switches.
8. Propeller feathering button (port engine).
9. Panel light rheostat.
10. Position light switches.
11. Pitot-head heater switches.
12. Propeller de-icer master switch.
13. Oil dilution and engine primer switches.
14. Radio compass controls.
15. Ignition switches.
16. Cockpit lights switch.
17. Fluorescent lights switch.
18. Carburettor de-icing switch.
19. Propeller feathering button (starboard engine).
20. Ammeters.
21. Identification lights switchbox and key.
22. Engine starter switches.
23. Starter safety switch.
24. Watch.
25. Fuel pressure gauges.
26. Oil pressure gauges.
27. De-icer air pressure gauge.
28. Oil temperature gauges.
29. Undercarriage warning light.
30. Carburettor air temperature gauge.
31. Undercarriage warning light test switch.
32. Outside air temperature gauge.
33. Fuel contents gauge and selector switch.
34. Cylinder temperature gauges.
35. Aileron trimming tab control.
36. Fuel cross-feed cock.
37. Aileron trimming tab indicator.
38. Engine control quadrant.
39. Tailwheel locking lever.
40. Parking brake.
41. Rudder trimming tab indicator.
42. Gyro pilot engaging lever.
43. Rudder trimming tab control.
44. Elevator trimming tab control.
45. Flaps position indicator.
46. Boost pressure gauges.
47. Altimeter.
48. A.S.I.
49. Sperry gyropilot instruments.

LEFT-HAND SIDE OF INSTRUMENT PANEL

KEY TO *Fig.* 3

4. Watch.
8. Engine control quadrant.
5. Flaps position indicator.
7. Altimeter.
8. A.S.I.
9. Sperry gyropilot instruments.
50. Gyropilot servo speed controls.
51. Windscreen de-icer pump rheostat.
52. Windscreen wiper control.
53. Windscreen de-icer pump master switch.
54. Radio compass indicator.
55. Turn and bank indicator.
56. Marker beacon warning light.
57. Gyro horizon.
58. Rate of climb indicator.
59. R.P.M. indicators.

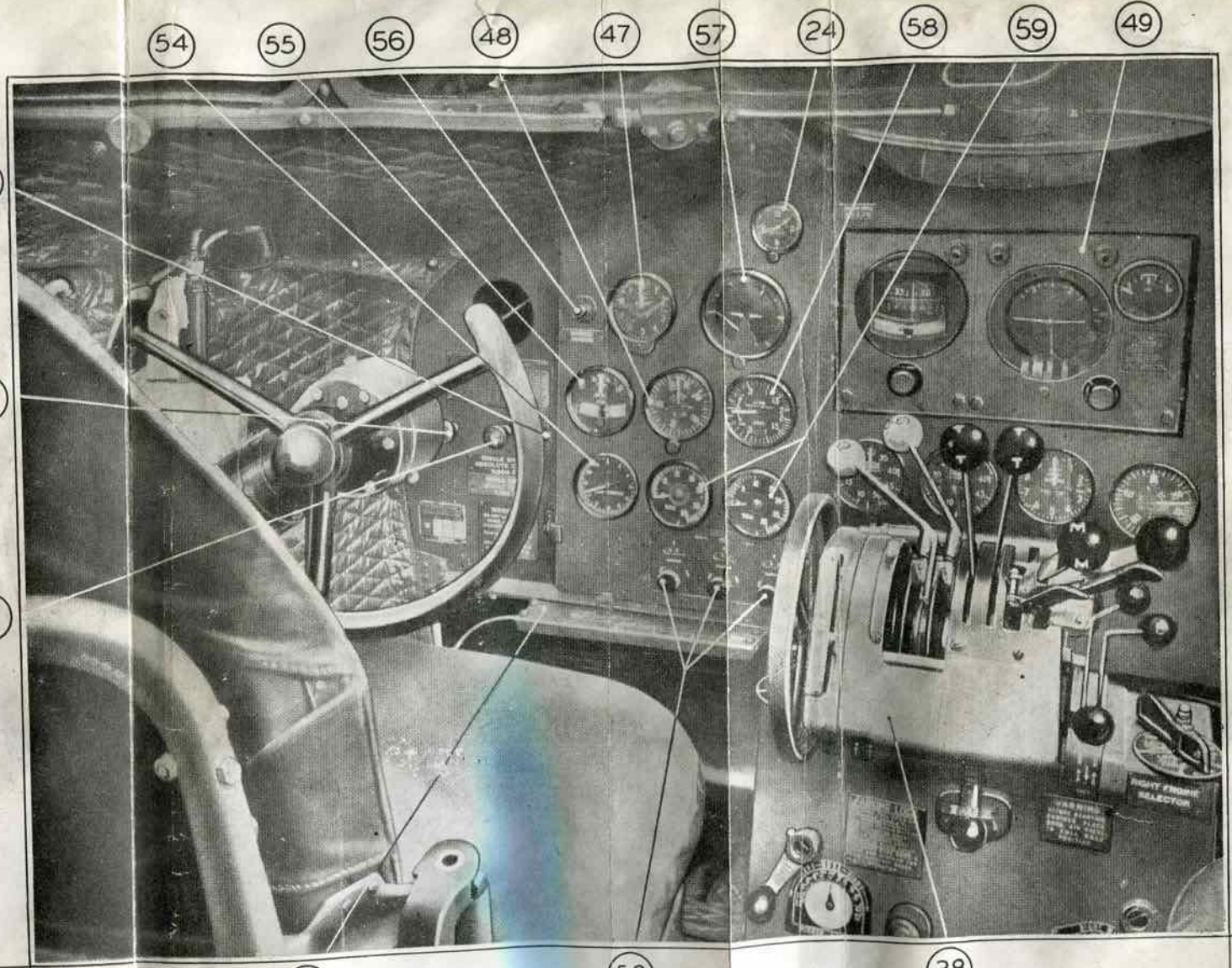
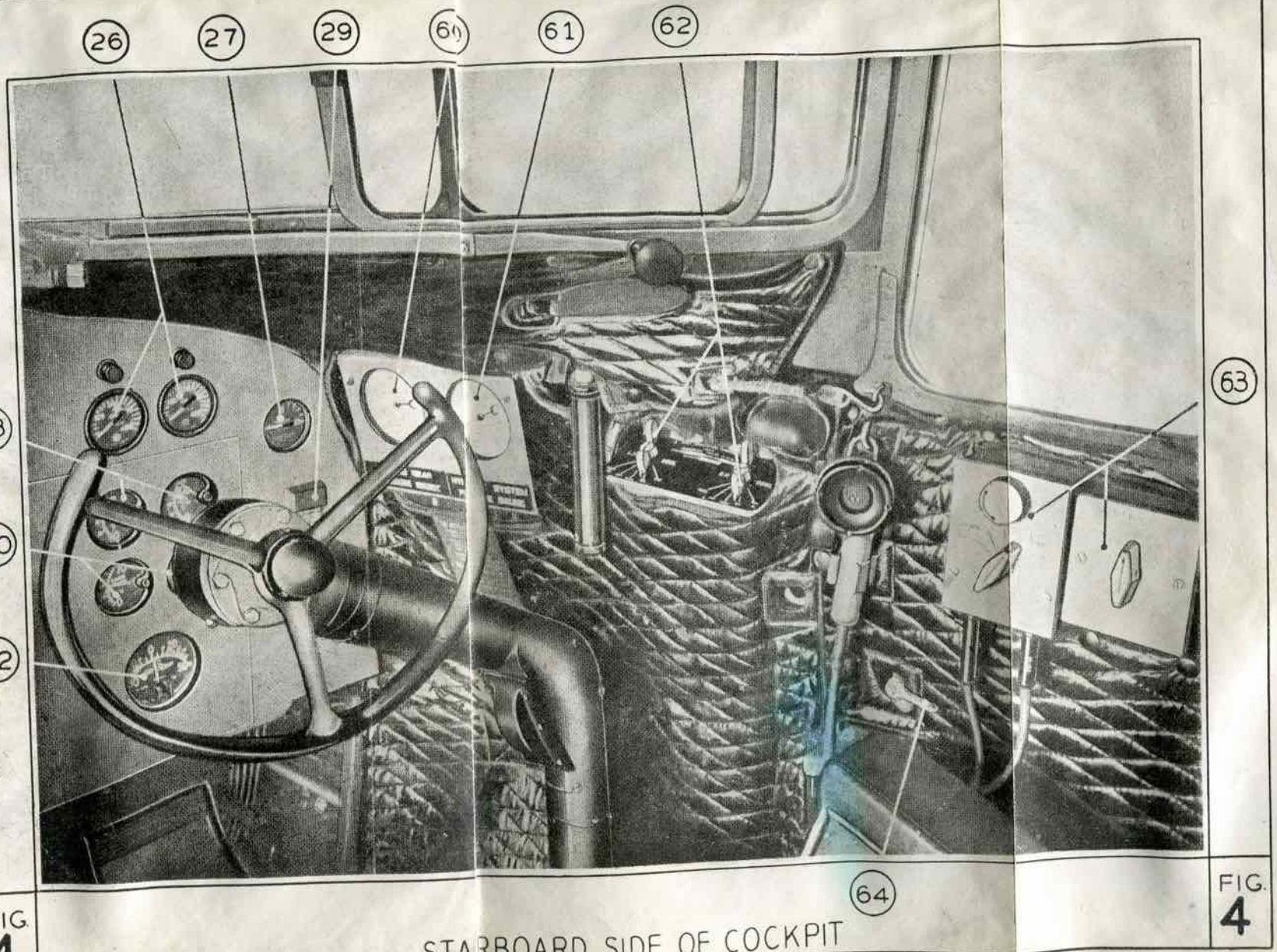


FIG. 3

LEFT-HAND SIDE OF INSTRUMENT PANEL

FIG. 3



STARBOARD SIDE OF COCKPIT

FIG. 4

STARBOARD SIDE OF COCKPIT

KEY TO *Fig.* 4

26. Oil pressure gauges.
27. De-icer air pressure gauge.
28. Oil temperature gauges.
29. Undercarriage warning light.
30. Carburettor air temperature gauges.
32. Outside air temperature gauge.
60. Undercarriage downline pressure gauge.
61. Hydraulic system pressure gauge.
62. Cowling gill controls.
63. Intercom. station boxes.
64. Windscreen de-icing fluid supply cocks.

FIG. 4

IGINE CONTROL QUADRANT

KEY TO *Fig.* 5

Elevator trimming tab control.
Boost pressure gauges.
Altimeter
A.S.I
Gyropilot oil pressure gauge
Manifold pressure gauge selector (for testing boost gauges).
A.S.I. static pressure selector
Panel light.
Carburettor air intake heat controls.
Fuel tank selectors.
Locking lever for carburettor air intake heat controls
Throttle levers.
Mixture control levers.
Propeller speed control levers
Oil cooler shutter controls.
Locking lever for oil cooler shutter controls.

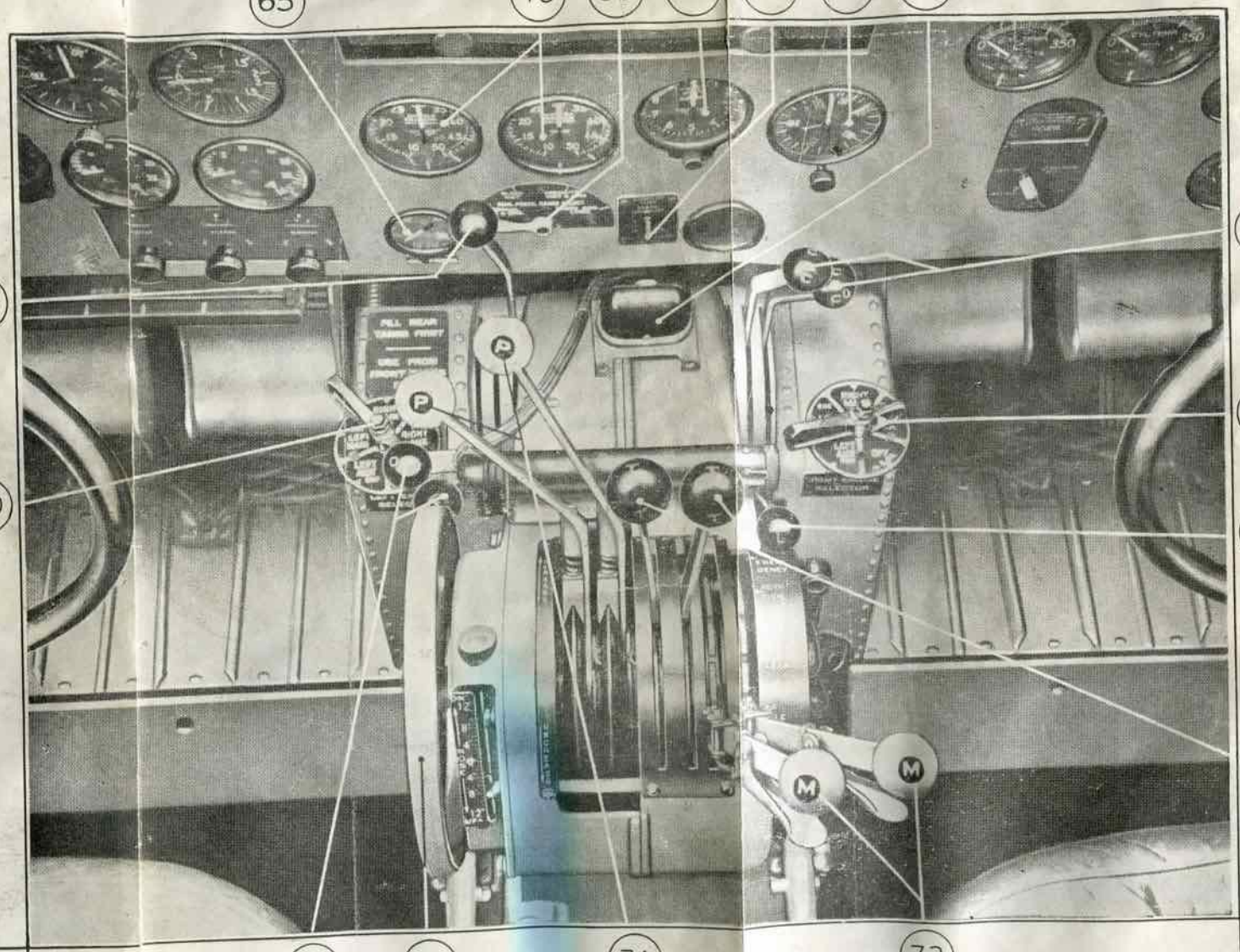


FIG 5

ENGINE CONTROL QUADRANT

FIG 5

175. HAND STARTING PROCEDURE.

Should the starter motor be inoperative, the engine may be started by hand. The following is the procedure to be adopted, varying where applicable, to suit the type of starter motor fitted to the aircraft. This may be either the Eclipse or the Jack and Heintz type starter.

(i) Open access door at the side of the nacelle.

(ii)
(a) Eclipse starter.- Cut the safety wire on the brush release handle on the rear of the starter motor, lift the button, and allow the handle to move to the OFF position.
(b) Jack and Heintz starter.- Pull the meshing cable to raise the brushes from the commutator.

(iii) Insert the crank handle in the extension sleeve.

(iv) Begin acceleration of the flywheel slowly, reserving full energy until approximately 45 r.p.m. is reached to permit final acceleration to 60 r.p.m. in the case of the Eclipse, and approximately 70 r.p.m. to permit final acceleration to 95 r.p.m. in the case of the Jack and Heintz.

(v) At maximum r.p.m. remove the crank handle.

(vi) Pull the hand meshing cable, and hold it in the "operation" position. At the same time, close the MESH switch, if practicable, to obtain booster coil operation.

(vii) When the engine starts, release the pull cable and open the MESH switch.

CAUTION: If the engine fails to start, be sure to release the pull cable before the airscrew stops turning, to prevent the starter jaws from remaining in the engaged position.

Should it be necessary to release the starter jaws, pull the airscrew through a half revolution in the normal direction of rotation.

(viii)
(a) Eclipse starter. Move the brush release handle to the ON position and replace the safety wire.

(b) Jack and Heintz starter. Closing of the MESH switch returns the brushes to the commutator.".

(A.L.2, Feb.1950)