EO 05-10B-1

ROYAL CANADIAN AIR FORCE

PILOTS
OPERATING INSTRUCTIONS

CHIPMUNK

(This EO replaces EO 05-10B-1 dated 15 Sept 56)

ISSUED ON AUTHORITY OF THE CHIEF OF THE AIR STAFF

15 APR 1958

LIST OF RCAF REVISIONS

DATE	PAGE NO	DATE	PAGE NO

NOTES TO USERS

1 This publication is divided into four Parts: Description, Handling, Emergency Handling and Operating Data.

2 PART 1 - DESCRIPTION of the controls and equipment with which the pilot should be acquainted.

3 PART 2 - HANDLING describes the normal handling of the aircraft by the pilot.

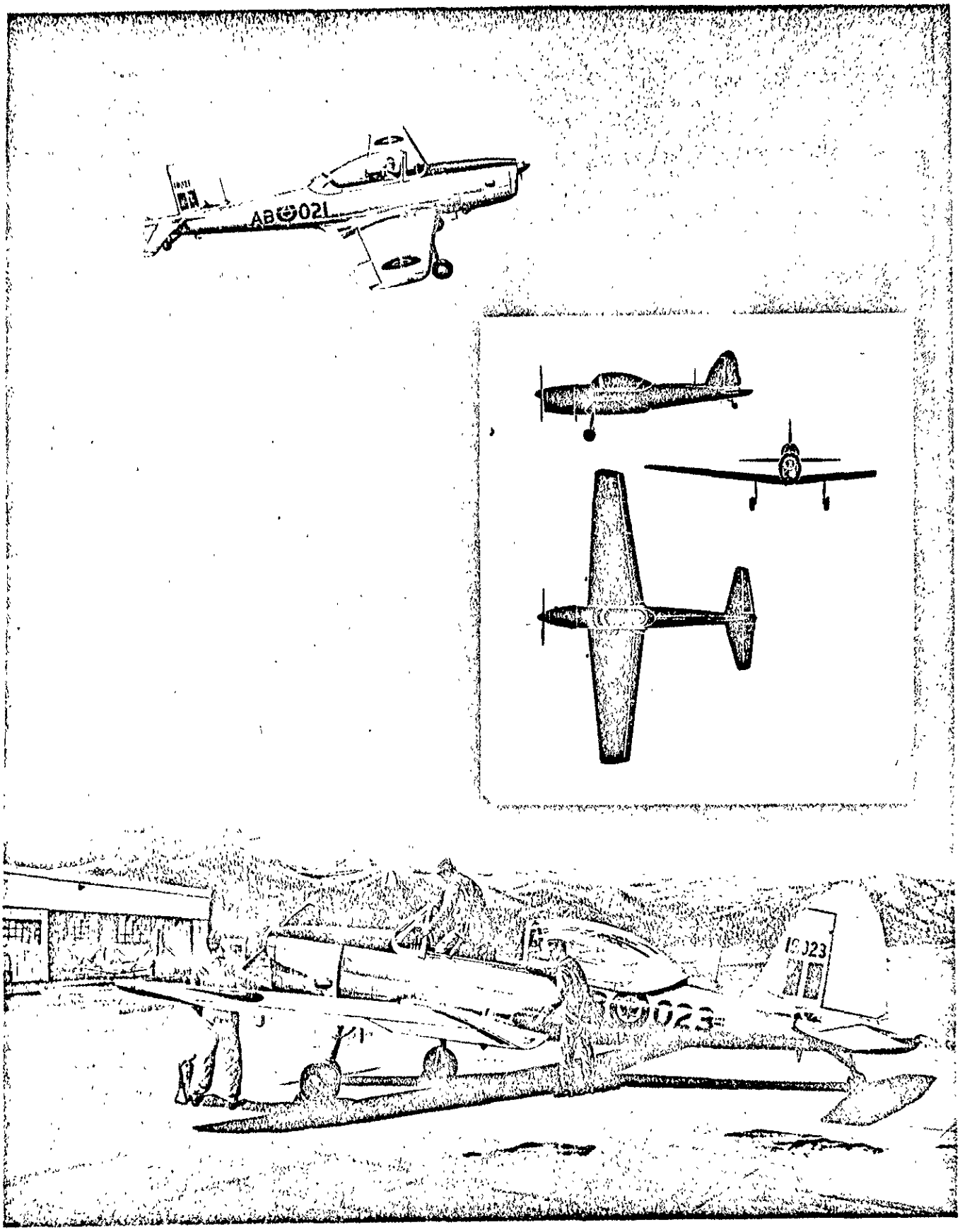
4 PART 3 - EMERGENCY HANDLING describes the emergency handling of the aircraft by the pilot.

5 PART 4 - OPERATING DATA gives the flying and engine limitations and includes information on fuel consumption, range and endurance under various conditions of flight.

6 These notes are complementary to EO 05-1-1 Pilot's Operating Instructions General and assume a thorough knowledge of its contents.

7 In the text, words written in capital letters indicate actual markings on the controls concerned.

8 Comments and suggestions should be forwarded through the usual channels to Air Force Headquarters.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PART 1

DESCRIPTION

INTRODUCTION

GENERAL

1 The DHC-1B Chipmunk is a low wing, single engine monoplane of metal construction designed for elementary flying instruction. It accommodates two in tandem arrangement with duplicate controls and instruments in each cockpit. The landing gear is non-retractable, with a fully castoring tailwheel. The main wheels are fitted with hydraulically operated brakes.

POWER PLANT

2 Aircraft Serial No. 18020 and subsequent are powered by a DH Gipsy Major CIG engine, while aircraft Serial No. 18004 to 18019 and 139 to 187 inclusive are powered by a DH Gipsy Major 7G or 10 Mk 1-3 engine. These series are four cylinder in line, inverted, air cooled engines developing 140 bhp at sea level. The engine has a direct drive to the propeller.

3 The aircraft is equipped with a fixed pitch Fairey Reid metal propeller.

AIRFRAME

4 The fuselage is of all metal semi-monocoque construction. The forward section contains the two cockpits which are covered by a single hood. The windshield structure serves as a crash pylon to protect the occupants in case of a roll-over.

5 The wings are of cantilever construction incorporating an all metal "D" nose box beam which carries flight and landing loads. A fabric covered rear section containing a false spar supports the flaps and ailerons.

6 The tail assembly comprises an all metal horizontal stabilizer and fin, and fabric covered elevators and rudder. The right elevator is fitted with a trim tab adjustable in flight from either cockpit, the rudder is fitted with a trim tab adjustable on the ground.

HOOD

7 The one piece Plexiglas bubble type hood slides on three rails. The hood may be locked in four positions, open, 1/4 open, 1/2 open or closed, by a lock pin which engages in corresponding holes in the centre rail. The lock is operated by handles which are accessible from inside the aircraft, or an external pushbutton at the rear of the hood.

LEADING PARTICULARS

OVERALL DIMENSIONS

8 The main dimensions are as follows:

Length	25 ft 5 in.
Span	34 ft 4 in.
Height	7 ft 0 in.
Wheel Track	8 ft 11 in.

WEIGHT

9 The maximum gross weight of the aircraft is 2000 lb.

TANK CAPACITIES

10 Tank capacities are as follows:

Fuel	27 Imp gal
Oil	2 2/3 Imp gal

FUEL SYSTEM

GENERAL

11 Fuel is contained in two pliocel synthetic rubber fuel cells located in the "D" nose of the wing roots (see Figure 1-2). Each cell has a capacity of 13 1/2 Imp gal and is equipped with a mechanically operated float type fuel quantity gauge, the indicator being mounted flush with the upper surface of the wing. The cells are not interconnected.

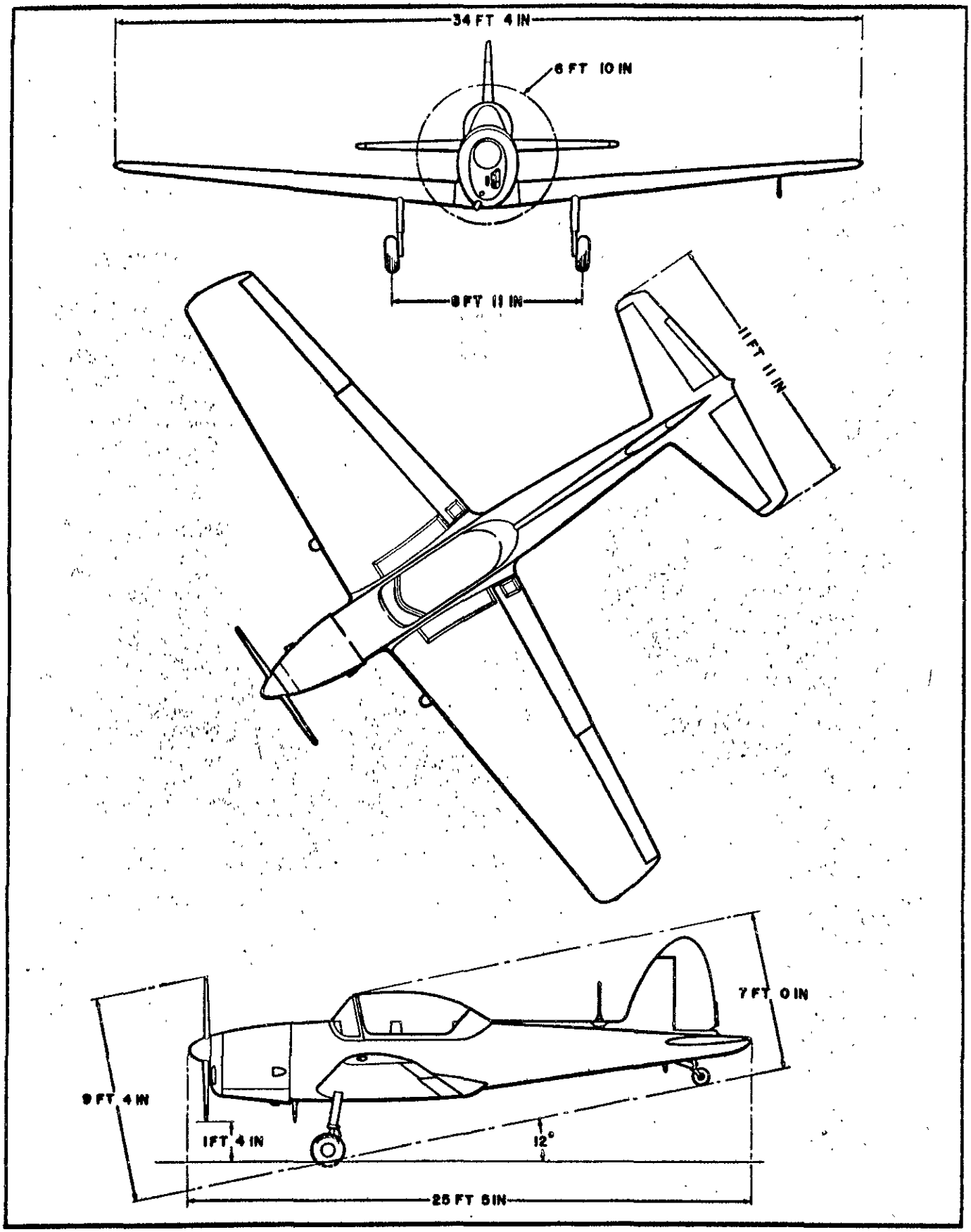


Figure 1-1 Aircraft Dimensions

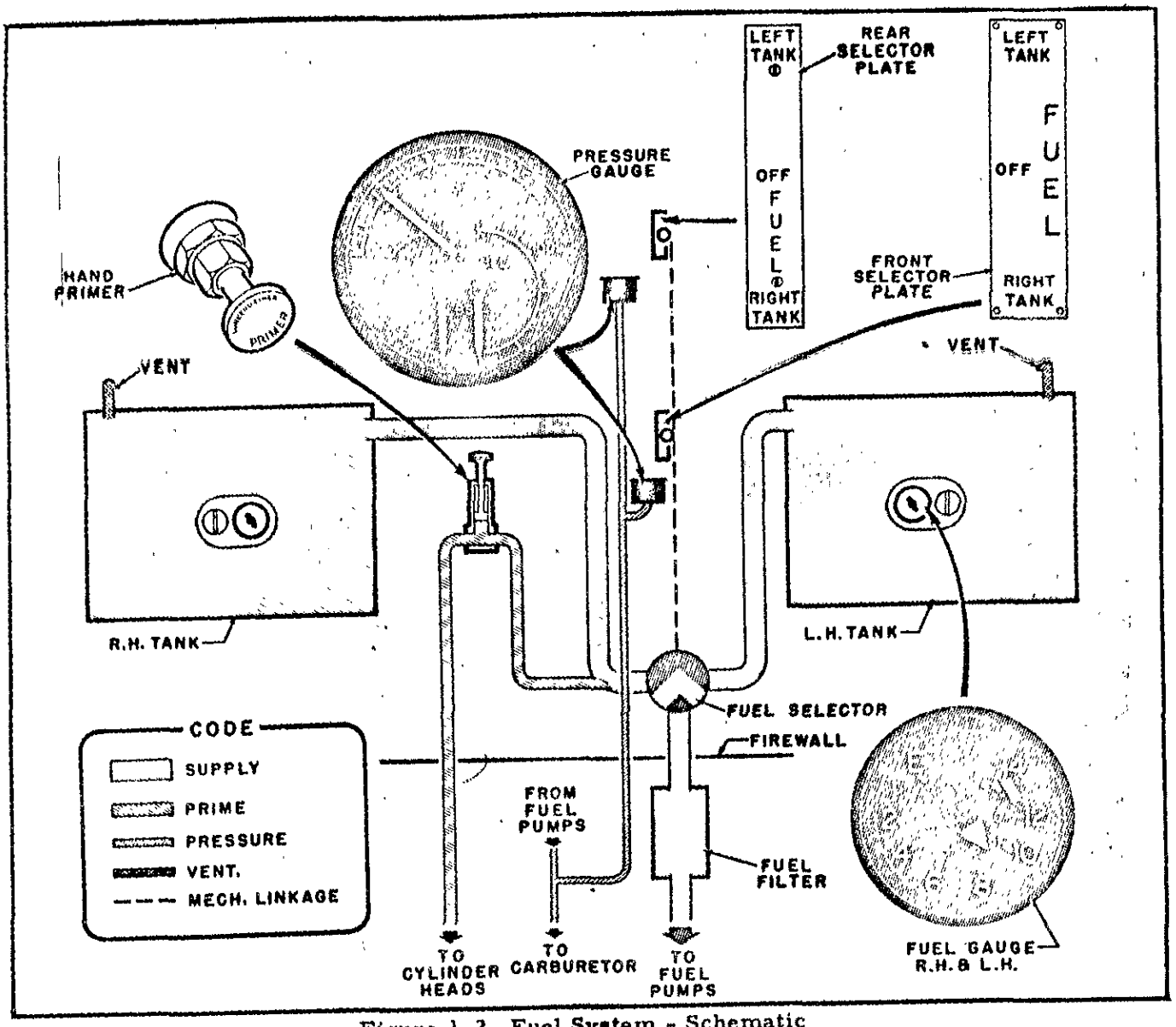


Figure 1-2 Fuel System - Schematic

FUEL SELECTOR LEVER

12 A fuel selector lever is located to the left in each cockpit. The levers are interconnected and operate the fuel selector valve through a mechanical linkage. The positions are marked RIGHT TANK, LEFT TANK and OFF.

FUEL PRESSURE GAUGE

13 A combined fuel pressure, oil temperature and pressure gauge is located on the right-hand side of the instrument panel.

FUEL QUANTITY INDICATOR

14 The fuel quantity indicators, located one on each wing, are graduated in white and green figures. The white figures indicate quantities in flying attitude while the green figures indicate quantities in the three point attitude.

PRIMER PUMP

15 The hand-operated engine primer pump (23, Figure 1-5) is located to the right of the instrument panel in the front cockpit. The pump draws fuel from the right-hand fuel tank and injects it into the induction manifold at four points.

FUEL SPECIFICATION

16 The following fuel specification is recommended:-

3-GP-25c (grade 80/87)

OIL SYSTEM

GENERAL (See Figure 1-3)

17 The oil for engine lubrication is supplied from a 2 2/3 Imp gal + 1 gal air space tank which is mounted on the forward face of the firewall. Cooling air is scooped in on the left side of the cowling, ducted around the oil tank and exhausted through a louvre on the right side. Access to the combined filler cap and dipstick is gained through a quick release panel in the oil tank cooling shroud at the right side.

OIL SPECIFICATION

18 The following specifications are recommended:-

Summer	3-GP-100B
Winter	3-GP-80B

ELECTRICAL SYSTEM

GENERAL

19 Electrical power is direct current supplied by a 17 amp 28 volt generator in conjunction with a pair of 12 volt, 25 ampere hour batteries connected in series to provide 24 volts. The generator output is controlled by an automatic voltage regulator and the charge rate is indicated on the voltmeter on the electric panel, see Figure 1-7.

ELECTRICALLY OPERATED EQUIPMENT

20 The following equipment is operated by the electrical system:- starter, interior lights, navigation lights, landing light, intercomm, radio, pitot heater.

EXTERNAL POWER RECEPTACLE

21 A receptacle for connecting an external

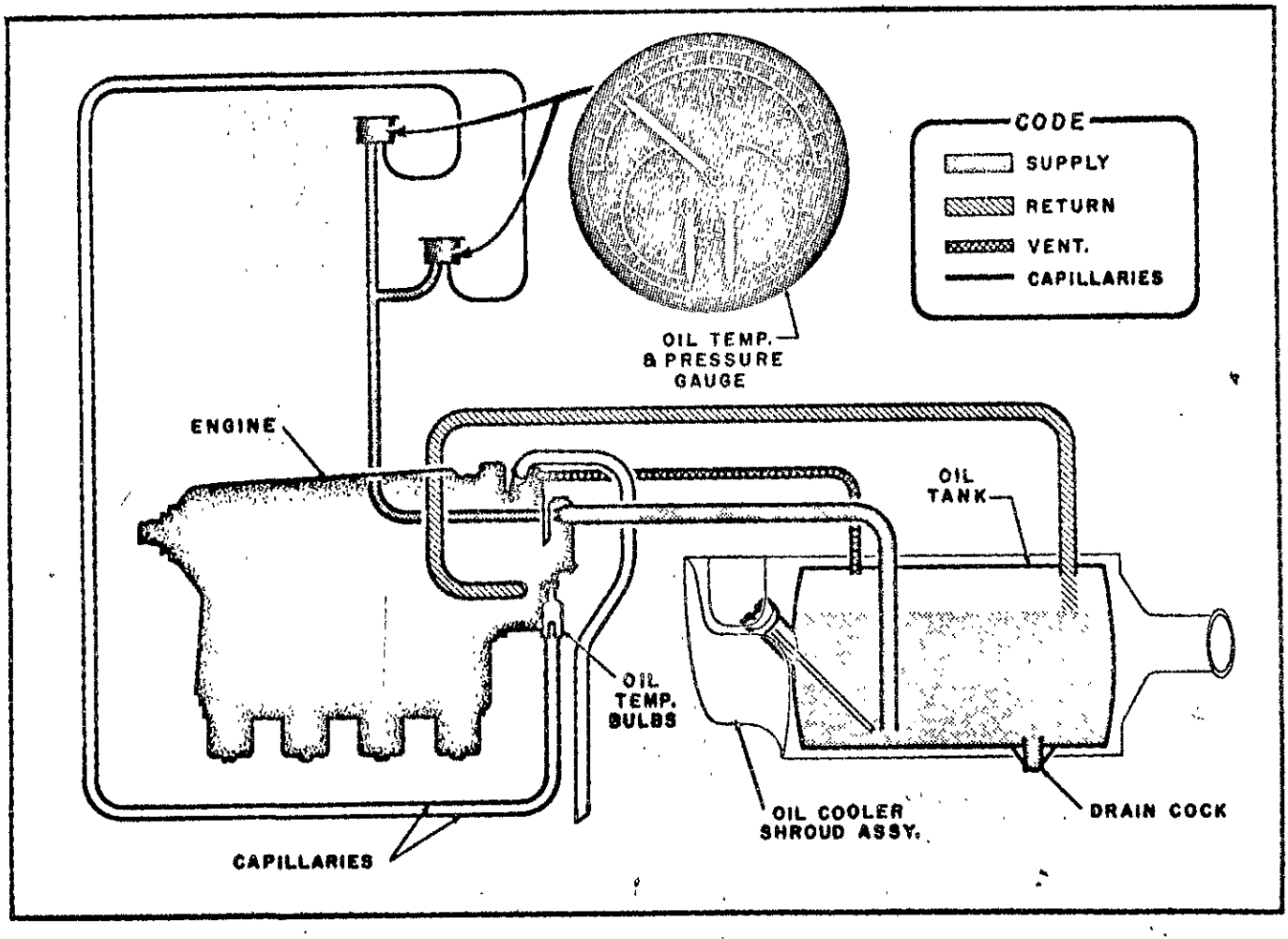


Figure 1-3 Oil System - Schematic

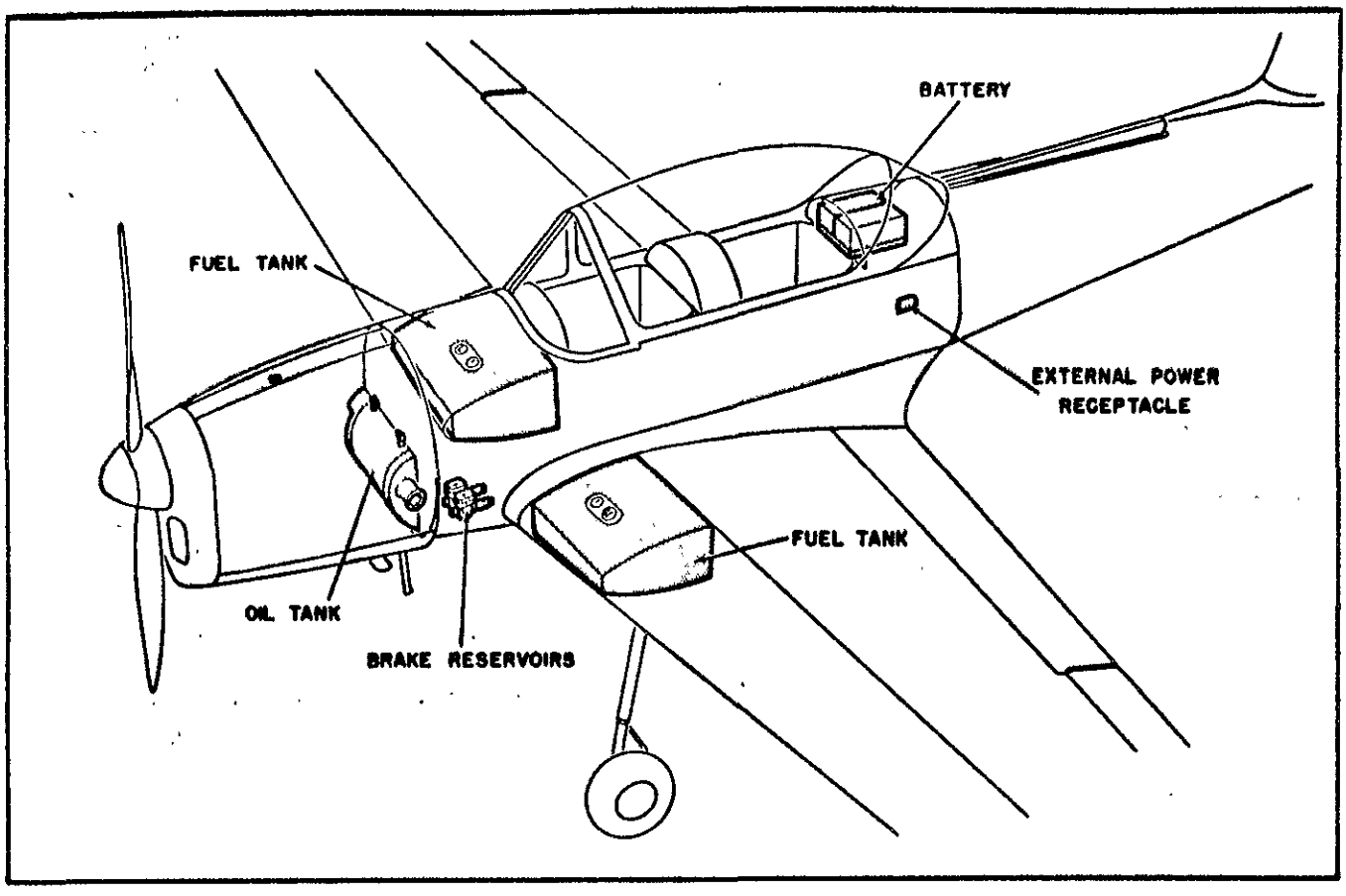


Figure 1-4 Servicing Points

power supply is located on the left side of the fuselage above the trailing edge of the wing, see Figure 1-4.

GENERATOR SWITCH

22 The generator switch is located on the electric panel, Figure 1-7. A generator circuit breaker switch on the top of the panel trips to the off position when the maximum (17 amps) generator output is exceeded.

BATTERY MASTER SWITCH

23 The battery MASTER switch is located on the electrical panel, see Figure 1-7.

NOTE

When an external power supply is connected, the MASTER switch must be left in the OFF position otherwise the batteries will parallel the external supply.

PITOT HEAT SWITCH

24 The pitot heat switch (50, Figure 1-5), located to the left of the airspeed indicator on the instrument panel in the front cockpit, is a two position toggle type circuit breaker switch. The switch controls the electrical power to the pitot heater and also acts as a circuit breaker to safeguard the pitot heater circuit.

CAUTION

The pitot heater must not be switched on when the aircraft is on the ground. It must not be operated simultaneously with the landing light at any time.

ELECTRICAL SYSTEM INDICATOR

25 The voltmeter, located centrally on the electrical panel, operates only when the battery master switch is ON. The instrument indicates generator output voltage when the generator is functioning, battery voltage at other times.

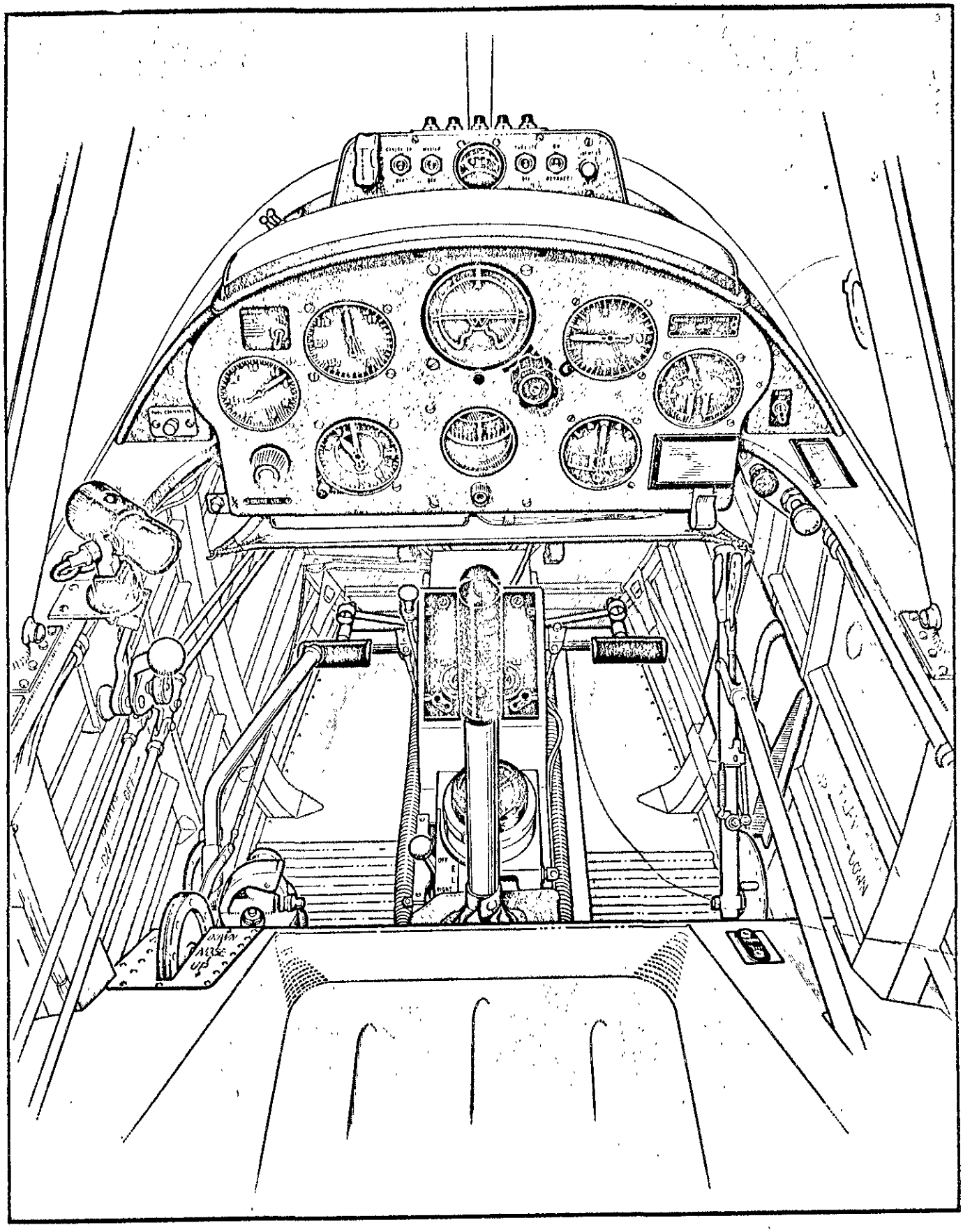
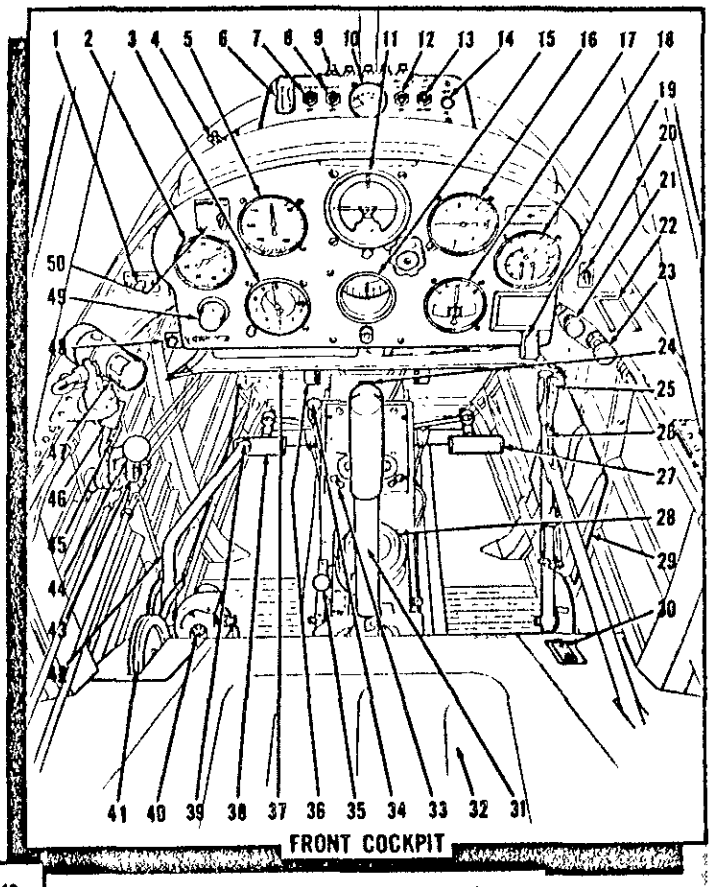
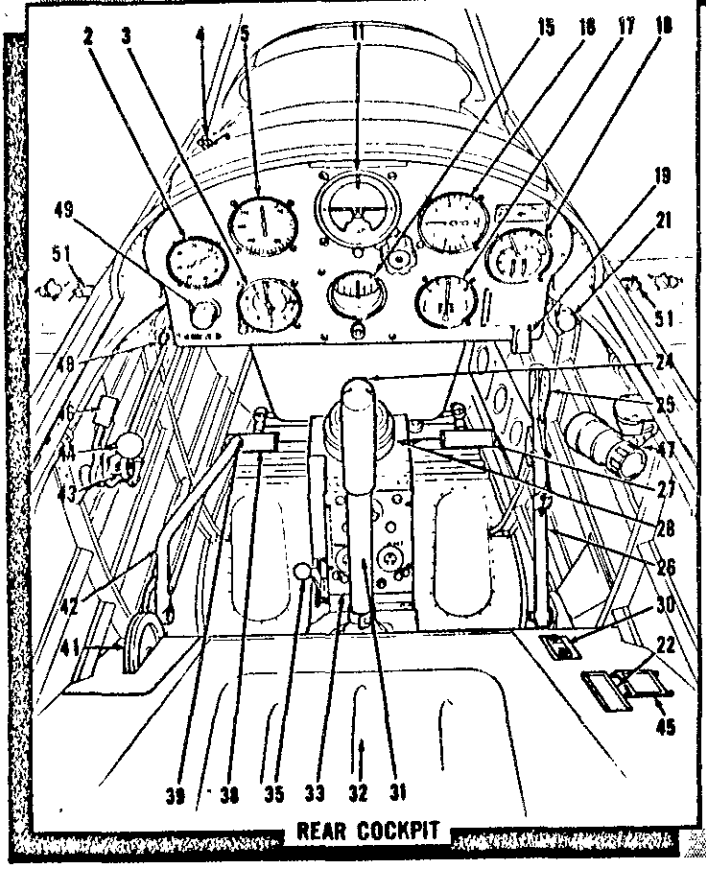


Figure 1-5 Cockpits Layout (Sheet 1 of 2)

1.Fuel Quantity Lights Switch
2.Tachometer
3. Altimeter
4.Ignition Switches
5.Airspeed Indicator
6.Starter Switch
7.Generator Switch
8.Battery Master Switch
9.Circuit Breakers
10.Voltmeter
11.Artificial Horizon
12.Navigation&Fuel Gauge Light Switch
13.Landing Light Switch
14.Identification Lights Switch
15.Direction Indicator
16.Rate Of Climb Indicator
17.Turn& Bank Indicator
18.Oil Temp.Pressure & Fuel Pressure Gauge
19.Headset Stowage
20.Radio Master Switch
21.Carburettor Heat Control
22.Radio Frequency Card Holder
23.Primer Pump
24.I/C and Transmit Button





25.Flap Selector Lever Release
26.Flap Selector Lever
27.Right Hand Rudder Pedal
28.Magnetic Compass
29.Map Stowage
30.Microphone & Headset Jacks
31.Control Column
32.Cockpit Seat
33.Radio Control Panel
34.Cockpit Heat Control
35.Fuel Selector
36.Control Locks Stowage
37.Luggage Rack
38.Left Hand Rudder Pedal
39.Parking Brake Release Button
40.Fire Extinguisher
41.Elevator Trim Wheel
42.Brake Lever
43.Tension Nut
44.Mixture Lever
45.Compass Deviation Card Holder
46.Throttle Lever
47.Instrument U/V Light
48.I/C Button
49.Cockpit Lights Rheostat
50.Pitot Heat Switch
51.Fuel Contents Gauge

Figure 1-5 Cockpits Layout (Sheet 2 of 2)

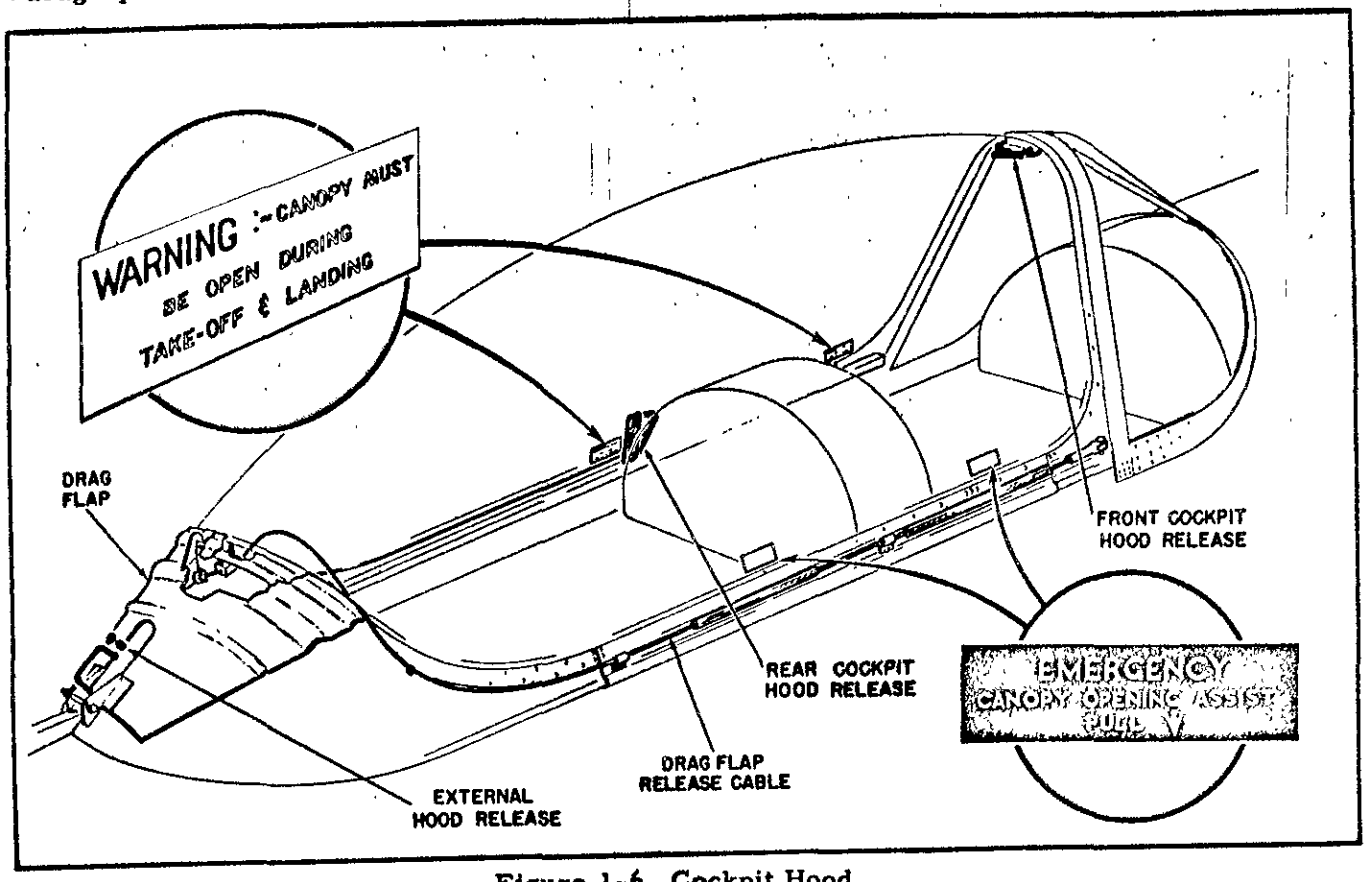


Figure 1-6 Cockpit Hood

ENGINE CONTROLS

THROTTLE LEVER

26 The throttle levers (46, Figure 1-5) are located on the left side in the cockpits and are interconnected. A push-pull rod connects the throttle levers to the carburettor throttle valve. A tension nut (43, Figure 1-5) on each quadrant, when rotated clockwise, increases the friction on the levers.

MIXTURE CONTROL

27 The fuel-air mixture is manually controlled by the mixture control levers (44, Figure 1-5) mounted inboard of the throttle levers. The levers are connected to the carburettor by a push-pull rod linkage and are moved aft for rich and forward for lean mixture. The tension nut (43, Figure 1-5) is common to both throttle and mixture control levers.

CARBURETTOR HEAT CONTROL

28 Hot air for the carburettor is drawn from the crankcase wall, between the inter-cylinder baffles and passed into the mixing chamber. The mixing chamber contains a flap valve which is operated by a push-pull control in each cockpit (21, Figure 1-5). A flame trap fitted in the hot air inlet restricts the flame travel from a backfire.

ENGINE IGNITION SWITCHES

29 There are two sets of magneto switches, (4, Figure 1-5) one set on the front fuselage deck, the other set on the left side of the fuselage deck between the two cockpits.

STARTER SWITCH

30 The starter switch (6, Figure 1-5) is located on the electrical panel on the front fuselage deck. The switch is protected by a guard to prevent inadvertent operation.

ENGINE INSTRUMENTS

31 The engine instruments are situated on the left and right-hand sides of the instrument panels and consist of a tachometer (2, Figure 1-5) and an oil temperature, oil pressure and fuel pressure gauge (18, Figure 1-5).

FLIGHT CONTROLS

GENERAL

32 The control surfaces are conventionally operated by a control column and rudder pedals from either cockpit. Movement of the controls is transmitted to the surfaces by cables and mechanical linkages. Longitudinal trim may be accomplished in flight by a trim tab on the right-hand elevator, controllable from a trimwheel in each cockpit.

CONTROL COLUMNS

33 The control columns are of the conventional stick type. A transmit - intercomm switch is installed in the handgrip of each control column.

RUDDER PEDALS

34 The rudder pedals may be adjusted for reach by removing the lock pin and sliding the pedals in or out as required and replacing the lock pin in any of the three positions. The rudder pedals also provide the differential braking action in conjunction with the position of the hand brake lever, Part 1, paragraph 39.

ELEVATOR TRIM WHEELS

35 The elevator trim tabs are actuated by trimwheels (41, Figure 1-5) from either cockpit. The trimwheel label is marked *NOSE* and DOWN and UP. A nose down change in trim is produced by rotating the wheel in the forward direction.

CONTROL LOCKS

36 Control locks may be fitted to secure the control column and rudder pedals. The rudder control lock also locks the fuel selector in the OFF position, see Figure 1-8.

WING FLAPS SYSTEM

37 The wing flaps are of the trailing edge type and extend from the wing roots to the inboard ends of the ailerons. They are operated mechanically from either cockpit by interconnected levers located on the right side. The levers are fitted with catch release handles

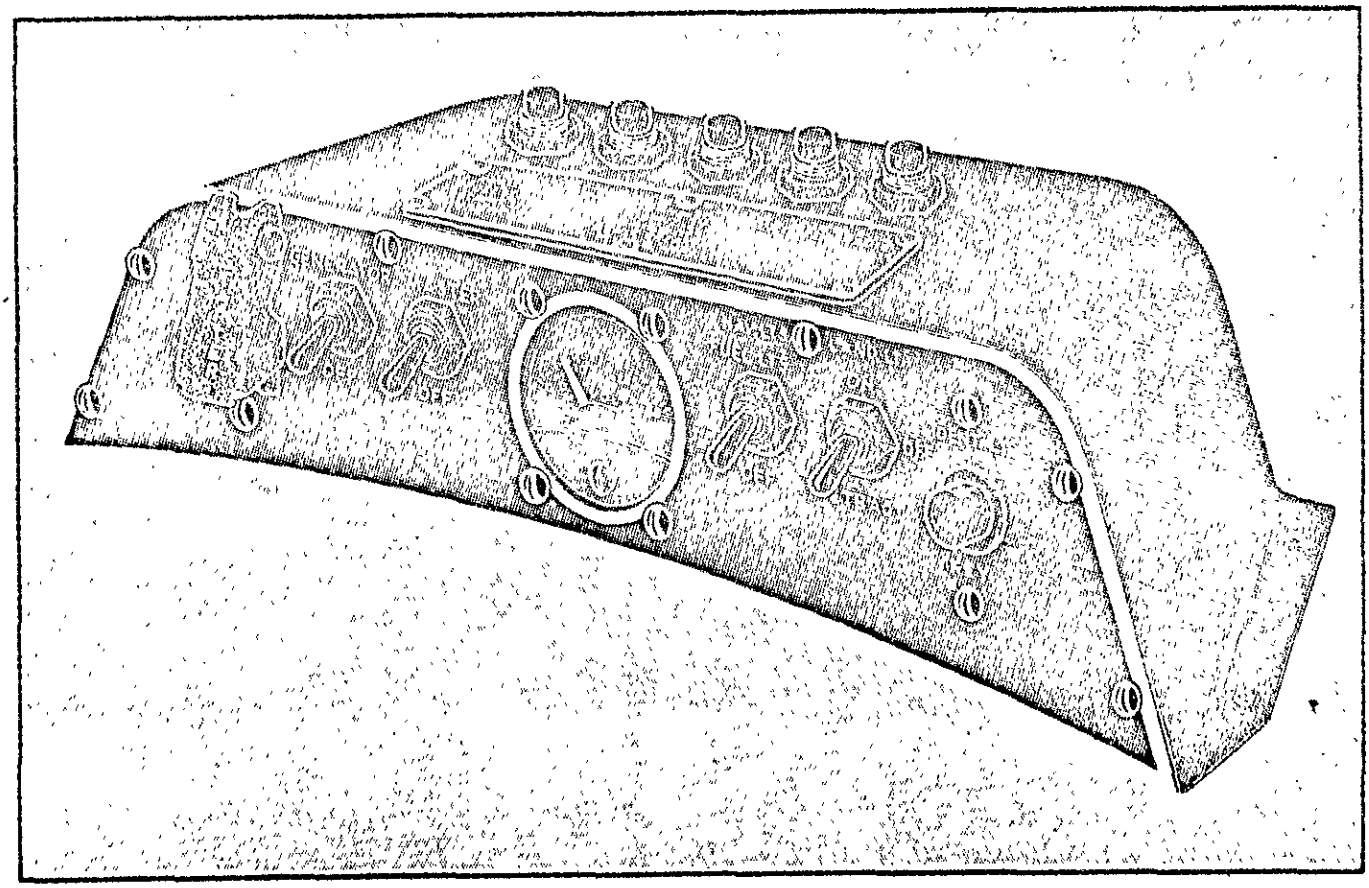


Figure 1-7 Electrical Panel

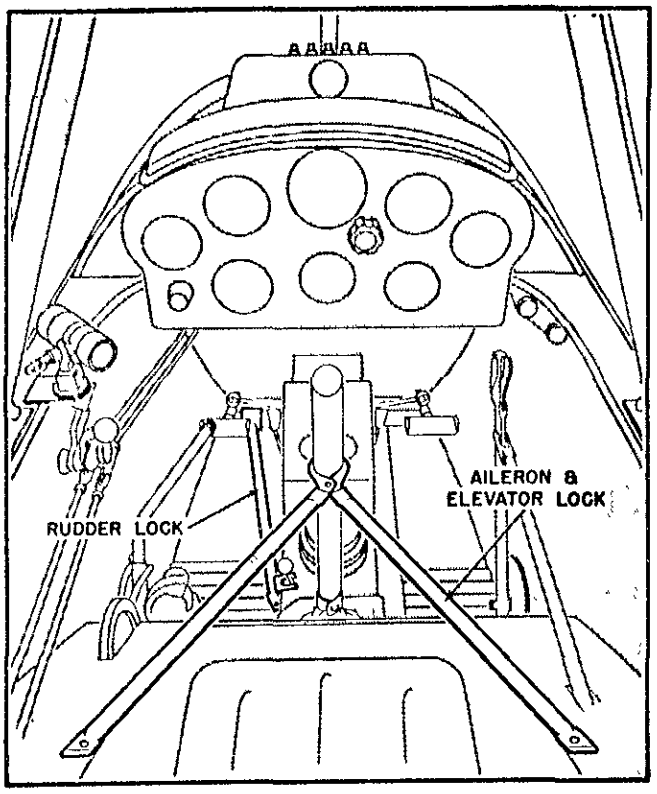


Figure 1-8 Control Locks

which enable the flaps to be locked in any of three positions: UP, half flap or DOWN. There is no indicator in the cockpits apart from the position of the levers. See Figure 1-9 for system arrangement in the aircraft.

LANDING GEAR

GENERAL

38 The landing gear is a non-retractable installation consisting of two main wheel units and a fully castoring tail wheel. Springing of the main wheel legs is achieved through a series of rubber compression and rebound blocks contained within the cantilever legs.

BRAKE SYSTEM

39 The main landing gear wheels are fitted with hydraulic brake units connected by hydraulic lines to the brake master cylinders. To provide for partial braking, the master cylinders are connected by a differential pulley and cable arrangement to the front cockpit rudder bar, which in turn is mechanically connected to the rear cockpit rudder bar. With the rudder pedals in neutral, operation of the hand lever actuates the pistons in the master cylinders, causing an equal pressure to be applied to the wheel brake units. Differential braking, when taxiing, is accomplished by movement of the rudder pedals in conjunction with partial application of the hand lever.

HAND BRAKE LEVERS

40 A hand brake lever is located on the left side of each cockpit. A counterbalanced pawl, which is operated by a plunger at the top of the lever, provides for positive locking of the brakes in any position. The brake lever can be applied fully to prevent the wheels from turning, as for parking and when running up the engine, or partially to allow for differential braking when taxiing.

CAUTION

To lock the brake in any position, press down the plunger. Do not depress the plunger while pulling the lever to set the brakes. To unlock the brake, first pull back further to release the pawl, then move lever forward without touching the plunger.

HEATING AND VENTILATION SYSTEM

GENERAL (See Figure 1-11)

41 Air circulation in the cockpit enclosure (see Figure 1-11) is provided by an outside ventilator on the right side of the windshield. Warm air to the cockpits is provided by a heater tube located inside the engine exhaust manifold. Cold air enters the tube through the nose cowl and, after being heated, passes to the cockpits through flexible ducting. A dump valve containing a flap valve regulates the amount of heated air to the cockpits. The flap valve is operated by the cockpit heat control (34, Figure 1-5) in the front cockpit. On some aircraft additional ventilation is provided for the rear cockpit through a ventilator located on the right-hand side of the fuselage.

INSTRUMENTS

GENERAL

42 Shock mounted instrument panels are provided in both cockpits; each contains the

following instruments: (see Figure 1-10)

Airspeed Indicator

Altimeter

Turn and Bank Indicator

Directional Gyro

Artificial Horizon

Rate of Climb Indicator

Oil Temperature - Oil Pressure - Fuel Pressure Gauge

Tachometer Indicator

Both panels are illuminated by ultra-violet lights for night flying.

PITOT-STATIC OPERATED INSTRUMENTS

43 The airspeed indicator, altimeter and rate of climb indicator are operated by the pitot-static system.

VACUUM OPERATED INSTRUMENTS

44 The directional gyro, artificial horizon and turn and bank indicators are operated by the vacuum system.

MAGNETIC COMPASS

45 A magnetic compass (28, Figure 1-5) is

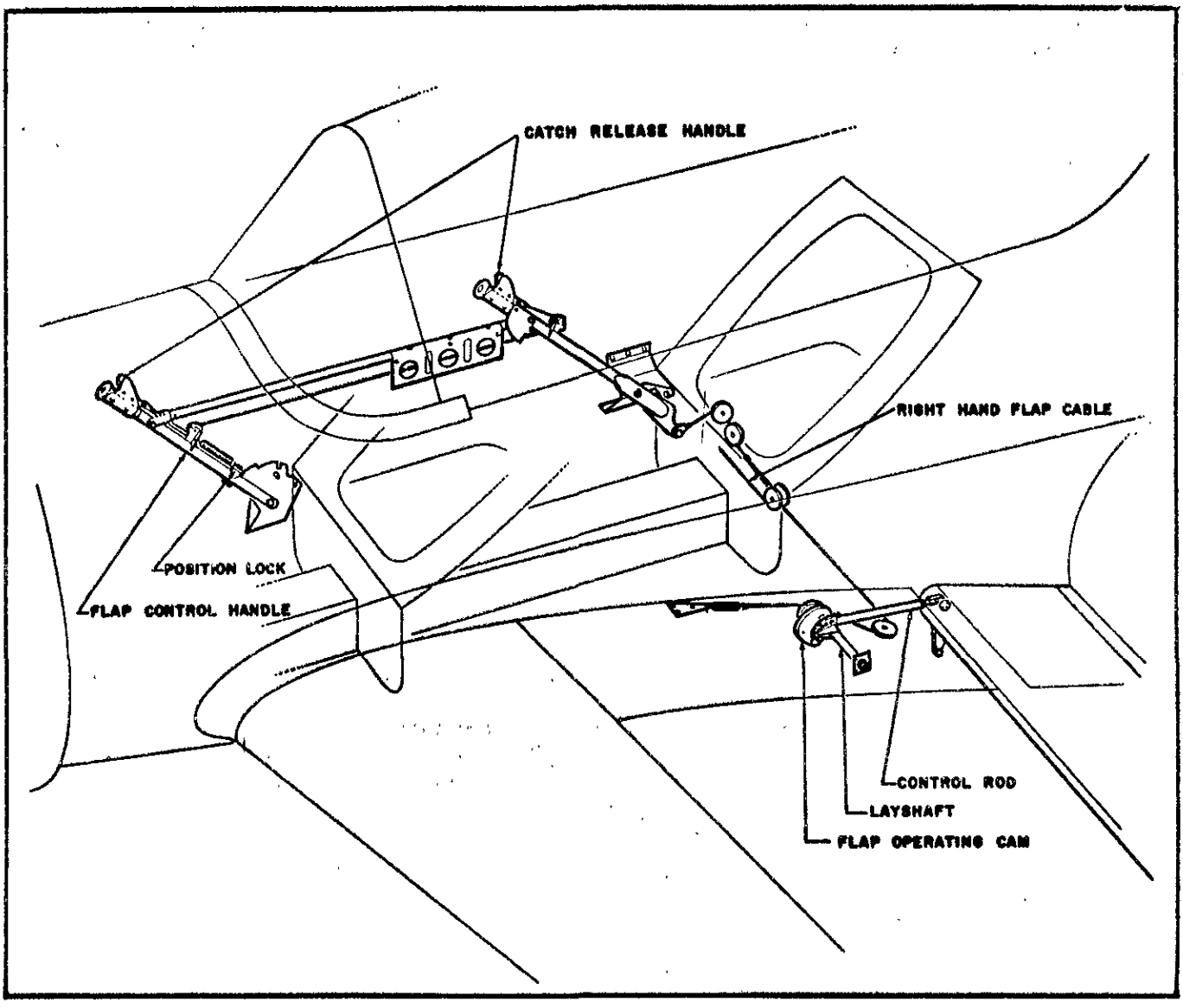


Figure 1-9 Flap System

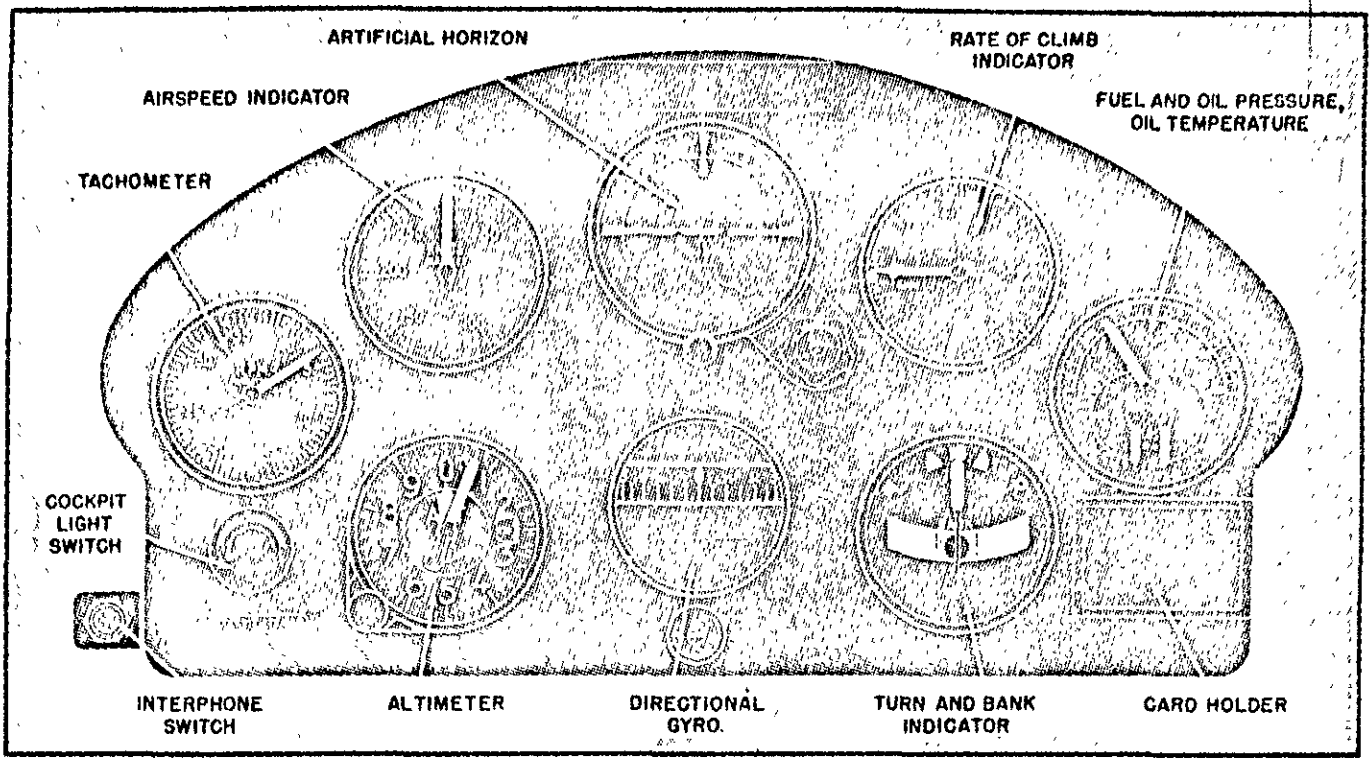


Figure 1-10 Instrument Panel

mounted on top of the radio remote control panel in the rear cockpit. In the front cockpit, the magnetic compass is mounted on the floor between the radio remote control panel and the control column.

LIGHTING SYSTEM

GENERAL

46 All circuits are protected by circuit breakers located on top of the electric panel, see Figure 1-7. The circuits are routed through the MASTER switch and this switch must therefore be ON before any light can be operated. (See Figure 1-12.)

NAVIGATION LIGHTS

47 The aircraft is equipped with standard navigation lights mounted in the wing tips and tailcone. They are controlled by a NAV LIGHTS switch on the electrical panel, which also controls the circuit for the fuel quantity indicator lights.

COCKPIT AND INSTRUMENT LIGHTS

48 The cockpit and instrument lights are individually controlled by rheostats and circuit breaker switches on the electrical panel.

FUEL QUANTITY INDICATOR LIGHTS

49 The fuel quantity indicator lights can only be operated when the navigation lights are on. To illuminate the instruments, press the FUEL CONTENTS LTS. button on the left side of the instrument panel in the front cockpit.

LANDING LIGHT

50 A retractable landing light is fitted in the lower surface of the left wing. The light is operated by a landing light switch (Figure 1-7) on the electrical panel, marked ON-OFF - RETRACT. The ON position extends and illuminates the light.

IDENTIFICATION LIGHT

51 The identification light is illuminated by pushing the IDENT. LT. KEY (Figure 1-7) on the right side of the electrical panel. The navigation lights need not be on to operate the identification light.

COCKPIT EQUIPMENT

GENERAL

52 The equipment is identical for each cockpit and consists of a bucket type seat de-

signed to accommodate a seat type parachute and a safety harness, see Figure 1-14. A map case is slung under the instrument panel in the front cockpit. A canvas luggage rack is also provided on some aircraft.

MISCELLANEOUS EQUIPMENT

53 Lumerith flying screens can be installed in the front cockpit if required. The screens are secured to the windscreens with press stud fasteners; the side screens slide into channels in the canopy.

EMERGENCY EQUIPMENT

FIRE EXTINGUISHER

54 A hand operated type A20 fire extinguisher is mounted on a quick release bracket on the left side of the front seat diaphragm, see Figure 1-5.

FIRST AID KIT

55 The first aid kit is stored on the top of the fuselage just above and behind the rear cockpit on the battery access panel.

CANOPY DRAG FLAP

56 A drag flap is installed on the rear of the canopy to assist the pilot in opening it for emergency exit during flight. A release cable is attached to the canopy frame on the right side of each cockpit. The flap is released by pulling the coloured release cable inward sharply. When the flap is extended, wind force on the

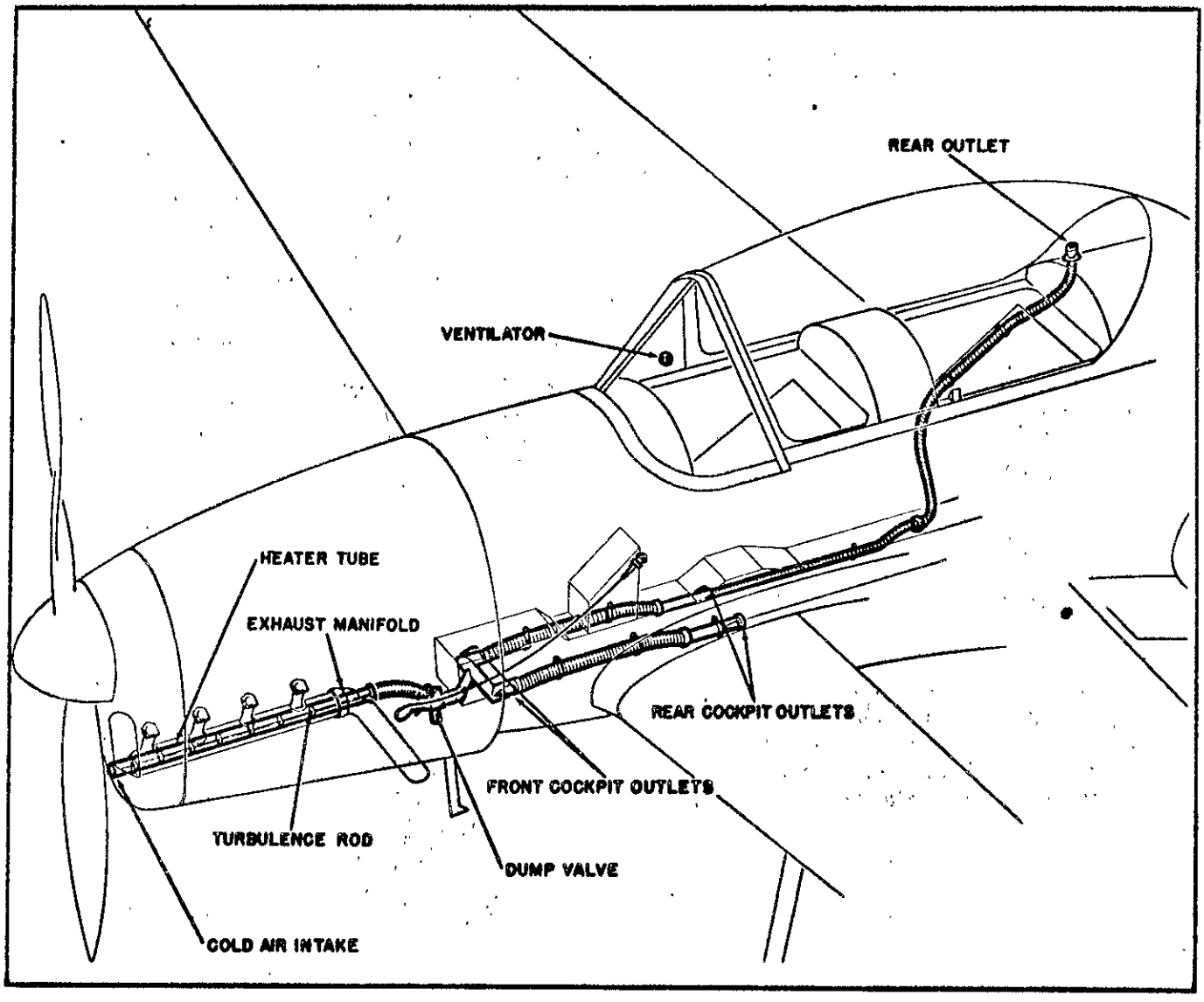


Figure 1-11 Heating and Ventilating System

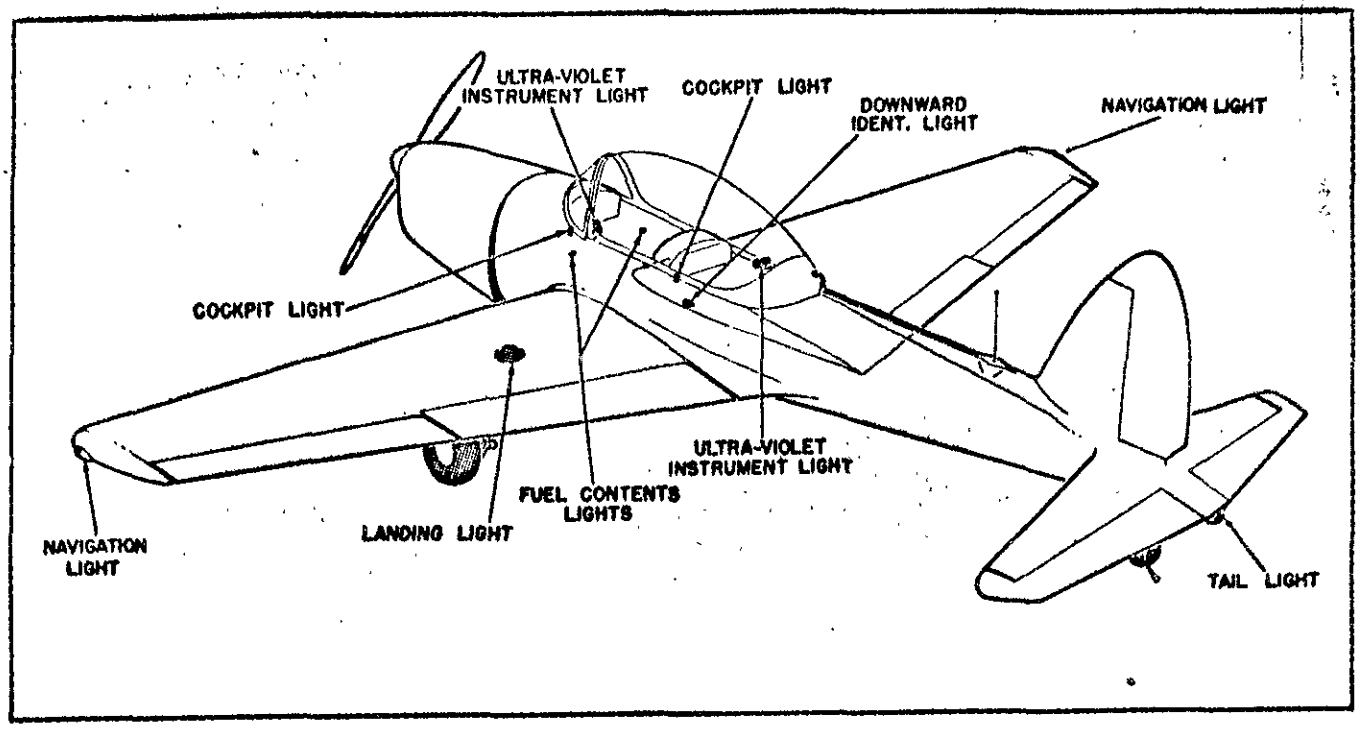


Figure 1-12 Aircraft Lighting

flap releases the canopy locking pin and drags the canopy to the rear.

COMMUNICATION EQUIPMENT

RADIO

57 The aircraft is equipped with an ARC-12 type communication system which operates on 28 volts and which has a frequency range of 116-148 mcs on R/T. It may also be used on radio range frequencies between 200 and 550 kcs. The three transmitters, of five channels each, and the R-19 receiver are located behind the seat in the rear cockpit, and the R-11A receiver is located aft of the firewall. (See Figure 1-15.) The set is controlled from either cockpit by means of remote control panels (33, Figure 1-5) installed forward of each control column. The R/T antenna is a standard 1/4 whip type mounted on top of the fuselage just forward of the fin. The range antenna is a non-directional fixed wire type installed beneath the fuselage between the wing and tailwheel.

INTERCOMM

58 The intercomm, which is fed through channel 16 of the radio, can be selected by pressing the I/C push button switch (48, Figure 1-5) on the lower left-hand corner of the instrument panel, or the press to talk button (24, Figure 1-5) on the control column. If the press to talk button on the control column is used, the first pressure should be applied for speaking on intercomm.

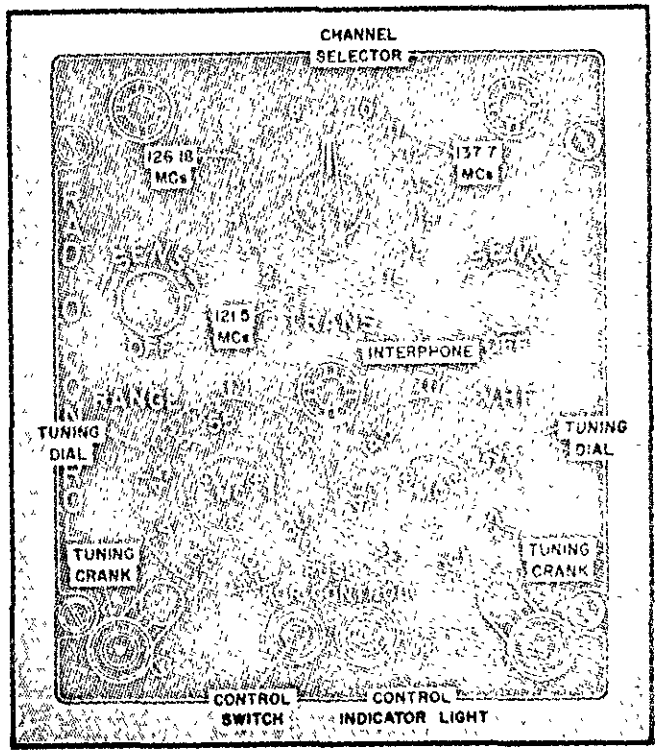


Figure 1-13 Radio Panel

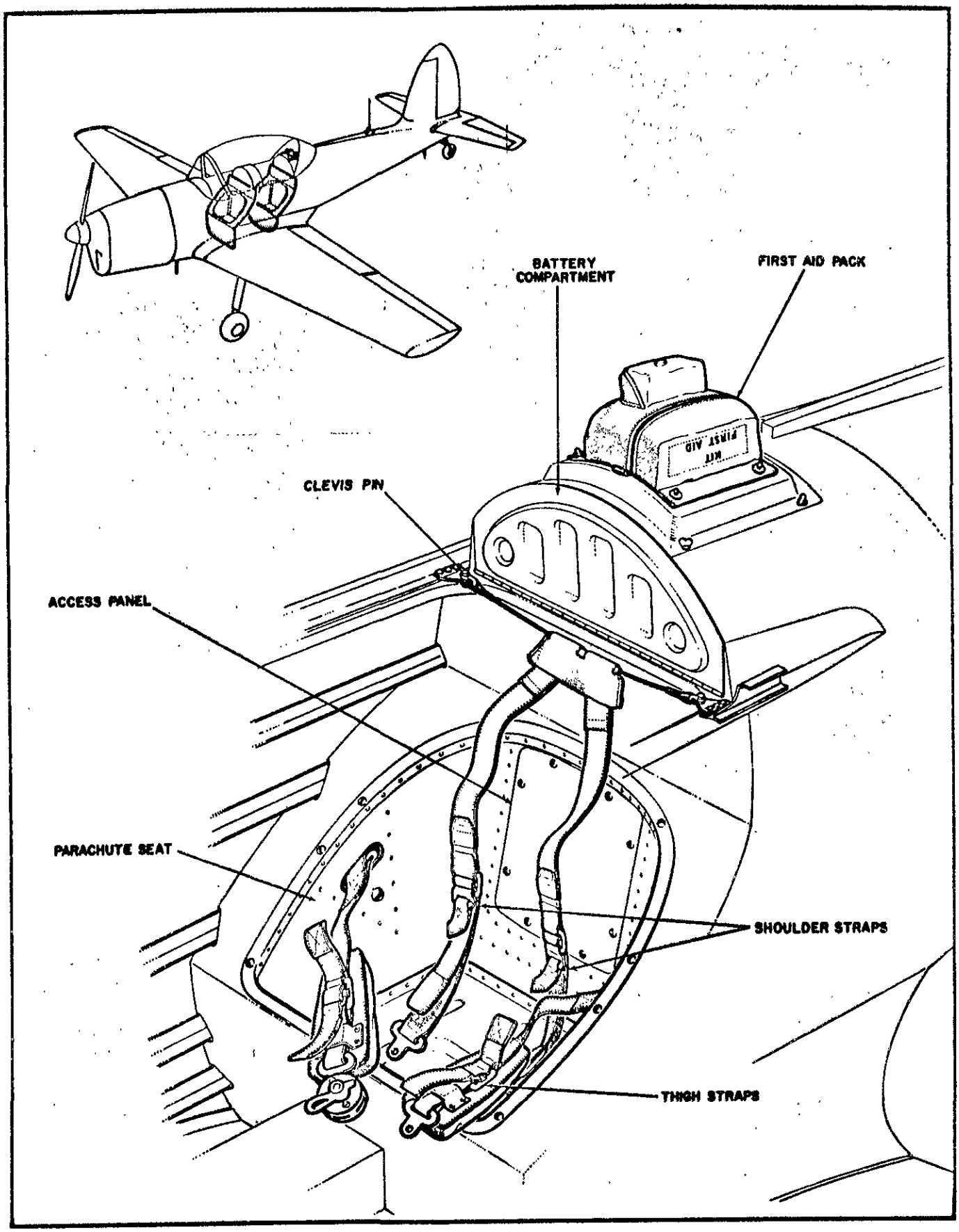


Figure 1-14 Harness and Seating Arrangement

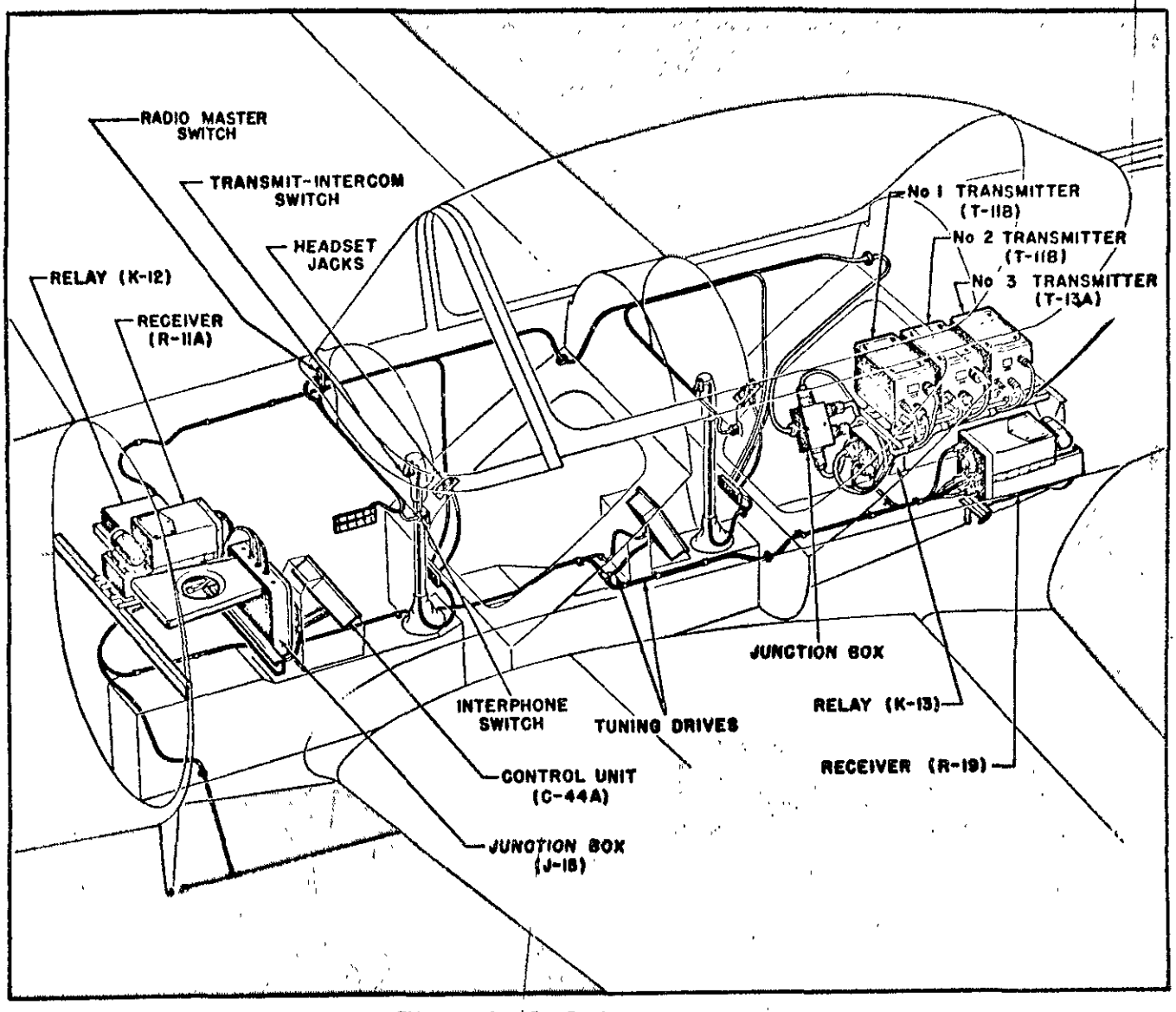


Figure 1-15 Radio Installation

RADIO OPERATION

59 To operate the radio, proceed as follows: (see Figure 1-13)

(a) To supply power, operate the RADIO switch (20, Figure 1-5), located to the right of the instrument panel, front cockpit.

(b) To establish communications on R/T, press the control switch on the remote control panel, then turn the VHF SENS control initially to maximum volume. While the set is warming up, turn the VHF tuning crank to the desired transmitting frequency. To fine tune the frequency, press in the tuning crank first, and then the transmit button. Still pressing in the tuning crank, tune to maximum whistle. Release the transmit button before releasing the pressure on the tuning crank. The range receiver is tuned by turning the RANGE SENS control to maximum volume initially, allowing the set to warm up, then turning the tuning crank to the desired frequency.

(c) By applying the second pressure to the press to talk button on the control column, transmission can be made.

(d) Transference of radio control from one cockpit to the other is accomplished by pressing the control switch on the remote control panel in the cockpit to which control is to be transferred. When transference of control is accomplished the desired frequency may be selected.

PART 2

HANDLING

PRELIMINARIES

FITNESS OF THE AIRCRAFT FOR FLIGHT

1 Determine whether any limitations have been imposed on the aircraft and abide by them. Insure that the aircraft is fit for flight by checking Form L-14A.

NOTE

With two occupants, the total fuel load is at present restricted to 17 Imperial gallons.

EXTERNAL CHECK

2 Inspect the aircraft externally in accordance with Figure 2-1.

REAR COCKPIT FOR SOLO FLYING

3 Check the rear cockpit as follows:

(a) Ensure there are no loose articles.

(b) Harness, radio cord and hatchet for security.

(c) Rudder pedals in place.

(d) Gyros caged.

(e) Throttle tension nut loose.

(f) Canopy half closed.

PRE-START CHECK

4 On entering aircraft proceed as follows:-

(a) Harness fastened and adjusted.

(b) Check controls for freedom of movement.

(c) Brakes on.

(d) Select fuel LEFT TANK on.

(e) Throttle 1/2 inch open.

(f) Mixture fully rich; carburettor air cold.

START CHECK

5 Proceed as follows:-

(a) Prime engine six or seven positive strokes when engine is cold, less when warm.

(b) External Battery (APU) connected.

(c) Call "All Clear" and place both sets of ignition switches ON.

(d) Press starter button until engine starts, do not press for more than 5 seconds at a time. Allow 1 minute to elapse between attempts.

(e) Check oil pressure, external battery (APU) out, master battery switches ON.

CAUTION

If oil pressure does not register within 30 seconds, stop the engine immediately and have the cause investigated.

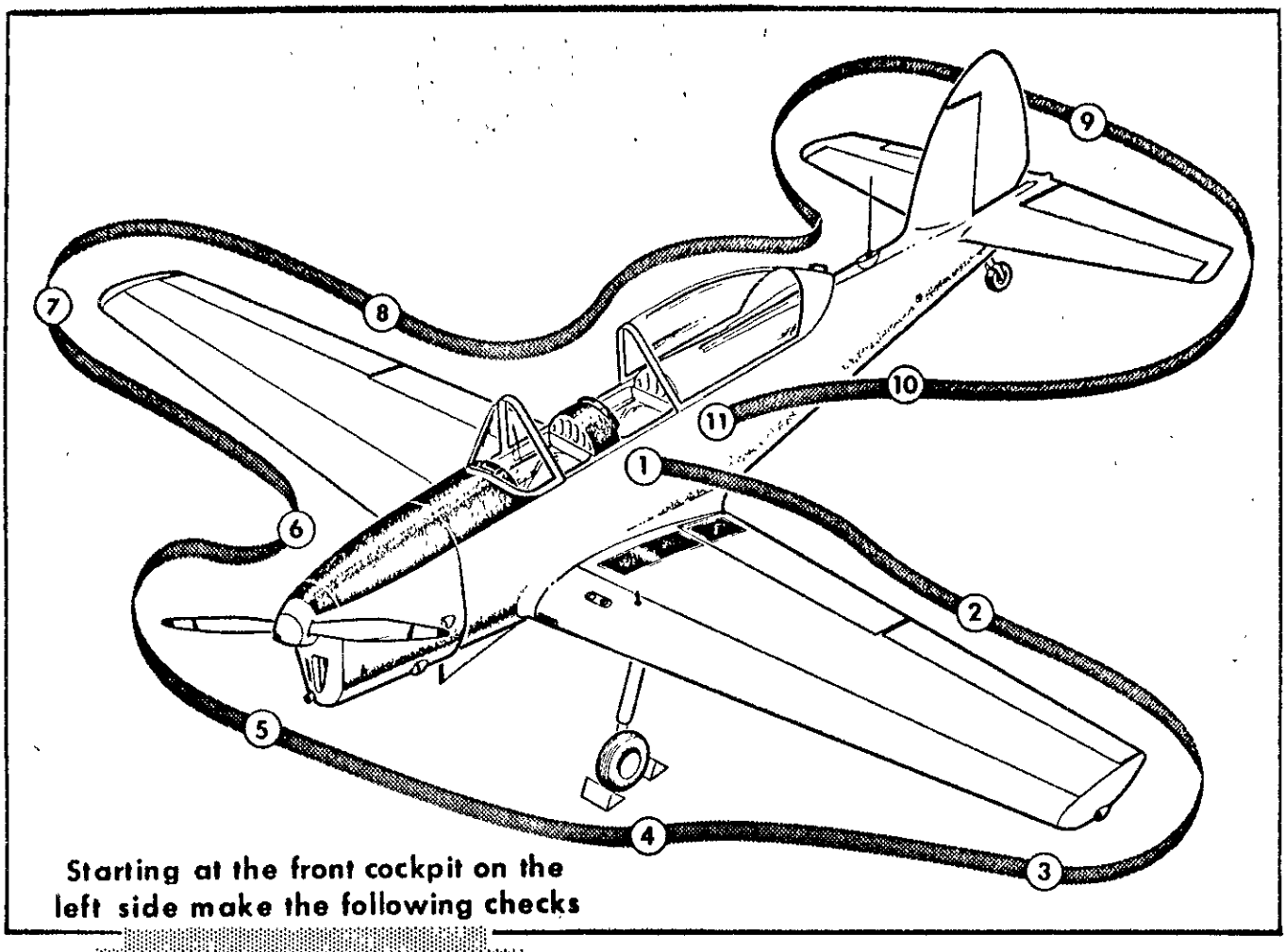
FAILURE TO START

6 If engine fails to start, due to over-priming, proceed as follows:-

(a) Switch ignition OFF.

(b) Open throttle wide.

(c) Have propeller rotated by hand 6 complete revolutions in direction of rotation.



1. Battery master and ignition switches OFF. Parking brakes OFF. Control locks OFF. No loose articles.

2. Left wing - Flap, aileron and upper wing surfaces for damage.

3. Left wing - Condition of navigation light, pitot head, landing light, zipper fasteners; leading edge and lower wing surface for damage.

4. Left fuel tank - Contents, cap secure, vent clear, drain cock closed and wired secure. Left undercarriage - Oleo leg extension, chock in place. Tire for wear and creep, brake line condition.

5. Power plant - Cowlings for damage and security. Carburettor and oil cooler intake clear. Exhaust manifold for condition. Propeller blades for nicks and fairings for condition.

6. Same as 4 for right side.

7. Right Wing - Leading edge and lower surface for damage; condition of zipper fasteners and navigation light.

8. Right wing - Upper wing surface, aileron and flap for damage.

9. Tail assembly - Condition of rudder, elevator, trim, tailwheel, ground wire.

10. Fuselage - Aerials secure, static vent clear.

11. First aid kit, crash instructions in place. Battery cover secure.

Figure 2-1 Exterior Inspection Diagram

(d) Repeat starting procedure, but do not prime.

WARMING UP ENGINE

7 As soon as the engine is started and external power disconnected, check the following:-

(a) Battery MASTER switch ON.

(b) Generator switch and circuit breaker ON.

(c) Run the engine slowly at first, 600-800 rpm. The oil pressure gauge should indicate 30-40 psi when cold. Providing the oil pressure is satisfactory, run the engine at 1000-1200 rpm in order that the oil may be warmed up to give a free circulation. Continue until the oil temperature reaches a minimum of 15°C. Check that the oil pressure is registering at 40-45 psi normal. Minimum oil pressure should not be less than 30 psi.

GROUND CHECKS AND TAXIING

TARMAC CHECK

8 Before commencing to taxi aircraft, complete the following:-

(a) Radio MASTER switch ON - Sense volume on HIGH.

(b) Fire extinguisher and axe secure.

(c) Test elevator trim for full, free and correct movement.

(d) Select right fuel tank ON.

(e) Compass appears serviceable, check heading.

(f) Test flap actuation and return to UP position.

(g) Emergency maps in place.

(h) Ensure primer fully in and locked.

(j) Check operation of carburettor heat control.

(k) Check instruments for reading within specified range.

(m) Uncage gyros. Set directional indicator to compass heading.

(n) At minimum rpm, switch OFF each magneto in turn. Check for dead magneto.

(p) Check all unnecessary switches OFF.

(q) Check circuit breakers in.

(r) Fine tune radios to desired frequency.

TAXIING

9 Set hand brake lever approximately four notches to obtain proper control on the wheel brakes. Check brake operation when leaving the line. Adjust setting as required for strong wind conditions. Taxi with control column fully back, particularly over rough ground.

RUN UP

10 Proceed as follows:-

(a) Taxi to run-up position and apply brakes fully.

(b) Check fuel selector on take-off tank.

(c) Check oil temperature 15° - 85°C, oil pressure above 30 psi, fuel pressure 0.5 - 2.5 psi. Tension adjusted.

(d) Check that the areas ahead and behind are clear.

(e) Hold control column fully back.

(f) Open throttle to give 1600 rpm and check each magneto in turn. Drop should not exceed 100 rpm on either magneto.

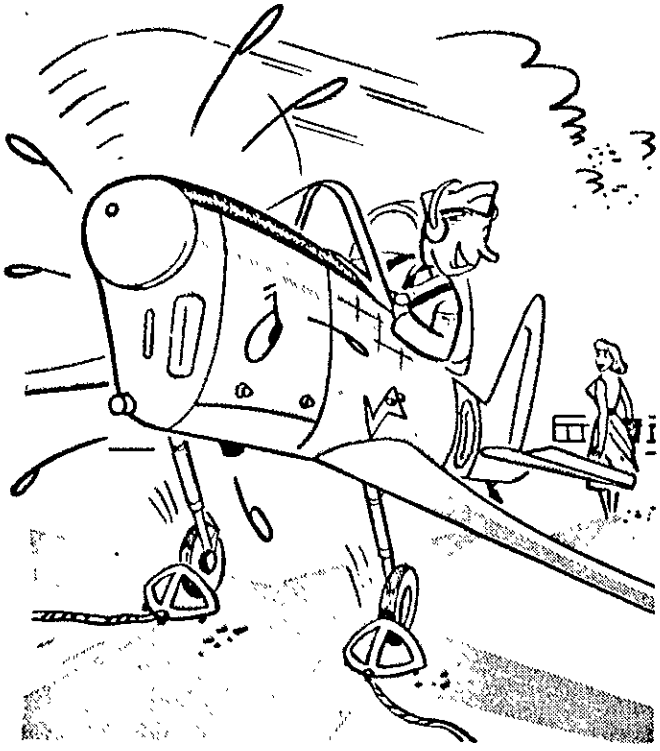
(g) Switch generator switch off and on and check voltmeter for indication that the generator is functioning.

(h) Apply full carburettor heat for approximately 30 seconds and then return to off position and note slight change in rpm.

(j) Open throttle fully and check rpm which should be approximately 1925. Check oil pressure 40-45 psi. Oil temperature 15°-85°C and fuel pressure 0.5 to 2.5 psi.

(k) If a drop of more than 100 rpm was

indicated on the initial magneto check, throttle back to 1600 rpm and check again before throttling fully back. Drop should not exceed 100 rpm on either magneto. Check slow running 650-750 rpm.



CAUTION

Engine must not be run with full throttle for more than 30 seconds.

TAKE-OFF PROCEDURES

PRE TAKE-OFF CHECK

11 Prior to taking up position for take-off, carry out the following check:-

H - Hood fully open if dual; half open if solo; or fully closed if axes are installed.

T - Trim - elevator trim to neutral. Slightly tail heavy for solo flying from front cockpit. - Throttle tension adjusted - Temperatures and pressures in the green.

M - Mixture - fully rich position for all take-offs. Carburettor air - cold.

F - Fuel - on take-off tank, check contents and pressure.
- Flaps - up (15° for take-off on short strip).

G - Gyros - uncaged.

S - Switches - all ignition switches on. Battery MASTER generator switches ON.

H - Harness - tight.

TAKE-OFF

12 Proceed as follows:-

(a) Line the aircraft up on the take-off strip, making sure that it is clear and that brakes are fully off.

(b) Open the throttle smoothly to the fully open position.

(c) Keep straight initially by coarse use of the rudder, decreasing coarseness as speed increases. There is a tendency to swing to the right when the throttle is advanced.

(d) Raise the tail into flying attitude by gently easing the control column forward.

(e) At 53 knots IAS ease the aircraft off the ground by gently moving the control column back.

(f) Climb away at 70 knots IAS.

(g) Raise the flaps (if used) and adjust the elevator trim.

(h) Close the hood.

CLIMBING

13 The aircraft should be climbed at 70 knots IAS using full throttle. This gives the recommended rate of climb.

NOTE

During the climb the oil temperature should not exceed 85°C.

CRUISING

14 Below 3000 ft the mixture control should be left in rich position. Above 3000 ft the mixture control can be adjusted to give a leaner

mixture, but care must be taken to ensure that the engine does not overheat or run roughly. Refer to Part 4, paragraph 6 for recommended cruising speeds.

NOTE

Use carburettor heat when ambient air temperatures are below 10°C.

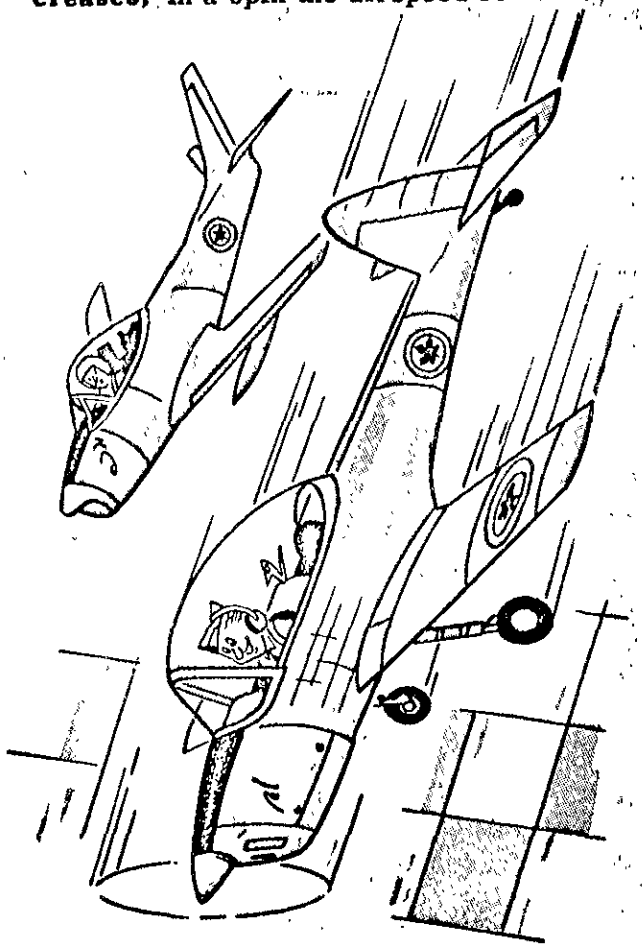
FLIGHT CHARACTERISTICS

GENERAL

15 The aircraft is reasonably stable, the controls are well harmonized, are light and have good response. When flown solo the C.G. is forward, and there is a tendency at the stall to develop a tight spiral dive instead of a spin. Recovery can be effected, however, with less loss of height than in a spin.

NOTE

Do not confuse this spiral dive with spinning. Airspeed in a spiral dive increases; in a spin the airspeed remains reasonably constant at, or near, the stalling speed.



STALLING

16 Since the controls are effective down to the point of stall there is little warning and, therefore, care must be exercised during slow flying. The stall without flaps is very gentle, the control column must be moved fully back in order to demonstrate the nose drop at the point of stall. With flaps fully extended the stall is more positive. In all cases recovery is normal - move control column forward until the aircraft recovers and gently ease out of the ensuing dive. Without power, there is a slight tendency for a wing to drop during the stall, this tendency becoming more pronounced with power on. The stalling speeds, with engine idling and an all up weight of 2,000 lb, are:-

(a)	Flaps UP	49 knots IAS
(b)	Half flap	44 knots IAS
(c)	Flaps DOWN 30°	43 knots IAS

SPINNING

17 Spins should always be commenced at a safe altitude, allowing plenty of height for recovery. Entry is made in the usual manner, stalling the aircraft and applying full rudder in the desired direction. The first turn is very slow, the next two are fast after which the rate of turn diminishes and becomes constant. For the first three turns the attitude is fairly steep and then becomes approximately 45° to the vertical. The initial dive after recovery is quite steep. The spin can be stopped in a maximum of 1 1/2 turns regardless of the previous number of turns, provided positive recovery action is taken - i.e. full opposite rudder, then control column moved steadily forward until the spinning stops. Centralize the rudder and ease out of the ensuing dive.

AEROBATICS

18 The aircraft handles well during all aerobatic manoeuvres providing they are commenced at the recommended speeds.

(a)	Roll	110 knots IAS
(b)	Loop	120 knots IAS
(c)	Half roll off top of loop	135 knots IAS

NOTE

Hood should be closed during all aerobatics and spinning. Elevator trim should be neutral during all aerobatics.

DIVING

19 Before diving the aircraft, place the elevator trim in the neutral position. The engine tends to overspeed in a dive at 175 knots IAS, even when the throttle is fully closed.

CAUTION

At no time must the engine speed be permitted to exceed a maximum of 2550 rpm.

LANDING PROCEDURES

DESCENDING

20 During all prolonged descents the pilot should exercise the engine in order to prevent the plugs from fouling, and to keep the oil temperature within the operating limits.

PRE LANDING CHECK

21 During the down wind leg, carry out the following checks:-

(a) Fuel - Select fullest tank.

(b) Brakes - Fully OFF.

(c) Mixture - RICH. Carburettor air - COLD.

(d) Harness - Tight.

(e) Hood - Fully open if dual, half open if solo. Fully closed if axes installed.

APPROACH AND LANDING

22 Proceed as follows:-

(a) Reduce speed to 65 knots IAS for the final approach.

(b) Lower flaps for landing (if required) and adjust elevator trim.

(c) Normally a three point landing will be made. Be prepared to correct any tendency to swing by use of coarse rudder; the aircraft should be allowed its full landing run, without braking, unless landing on a short strip.

POST LANDING CHECK

23 When safely clear of the runway complete the following checks:-

(a) Flaps - UP.

(b) Elevator trim - neutral.

(c) Reduce friction on throttle lever.

STOPPING THE ENGINE

24 When stopping the engine, proceed as follows:-

(a) Apply parking brake fully.

(b) Idle engine at 700 to 800 rpm for 30 seconds under normal conditions, or for one minute in extremely hot conditions.

(c) Switch ignition OFF.

NOTE

Should auto-ignition occur after switching off, close the throttle and switch on until auto-ignition stops.

(d) Open throttle fully.

NOTE

This sequence of shutting down will reduce any tendency to back fire or continued running due to auto-ignition.

ACTION AFTER STOPPING ENGINE

25 After stopping engine, proceed as follows:-

(a) Turn off fuel.

(b) Set all switches - OFF.

(c) Close throttle.

(d) Cage gyro.

(e) Switch radio - OFF.

COLD WEATHER OPERATION

GENERAL

26 Ensure that the airframe is thoroughly cleared of all snow and ice, in particular the control surfaces and hinges.

STARTING THE ENGINE

27 When starting the engine observe the following:-

(a) After completing the customary checks of the aircraft, have the propeller turned through at least six revolutions by hand to guard against hydraulic locks in the engine.

WARNING

Do not turn propeller when engine is warm. With a warm engine there is always a danger of hot spots which may cause auto-ignition.

(b) It may be necessary to use the primer pump to keep the engine running until the carburettor can pick up. The warming up period will take longer than usual but no attempt should be made to rush the process.

(c) Check the rpm at full throttle (30 seconds only), should indicate approximately 1925. Keep a continual check on the oil temperature and pressure throughout the run up.

TAXIING

28 Taxi slower than normal to prevent snow, ice or slush being sprayed over the control surfaces and freezing.

TAKE-OFF

29 Beware of sprayed control surfaces on take-off as they may freeze up after the aircraft becomes airborne.

CAUTION

The use of carburettor hot air for take-off is not recommended as it reduces the full-throttle power output of the engine.

NOTE

When ambient air temperatures are below 10°C in flight, apply carburettor heat at all times to prevent carburettor icing. If engine roughness occurs during flight at or above 10°C, carburettor icing should be suspected and carburettor heat applied. In case of a go-around return to cold air to ensure full power available.

LANDING CHECK

30 Inspect the aircraft as soon as possible after the engine is stopped, and have the control surfaces and hinges cleared of possible accumulations of snow and ice.

PART 3

EMERGENCY HANDLING

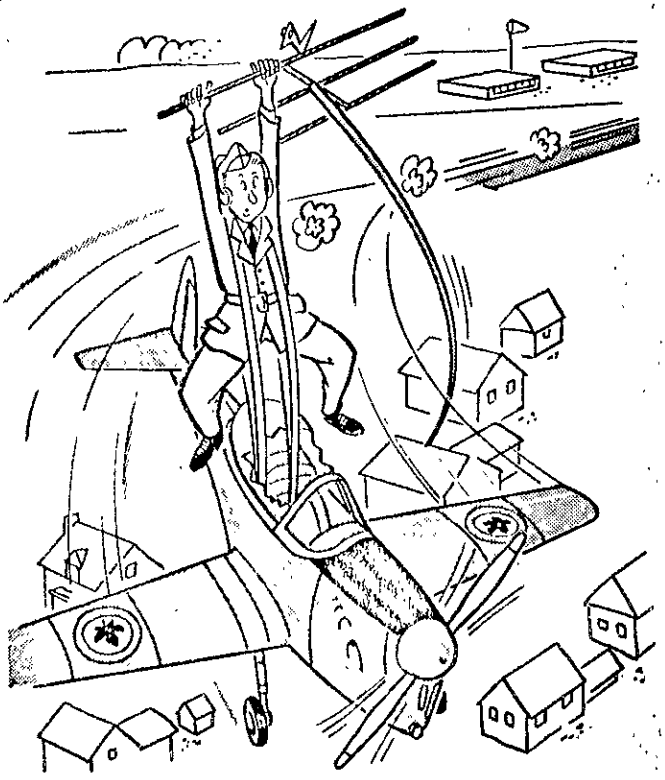
ENGINE FAILURE PROCEDURES

ENGINE FAILURE DURING TAKE-OFF

1 Proceed as follows:-

(a) If the aircraft is not airborne, carefully apply brakes and stop in the shortest safe distance.

(b) If the aircraft is airborne, depress the nose and assume gliding airspeed, 70 knots IAS, and land straight ahead making only essential maneouvres in order to avoid obstacles. Before touching down select fuel and all switches OFF.



CAUTION

Never turn back to the airfield, as this entails a downwind landing at greater ground speed, with the possibility of losing control during the turn.

ENGINE FAILURE IN FLIGHT

2 Should failure occur at a reasonable altitude, gain height with excess airspeed then depress the nose and assume a normal gliding airspeed of 70 knots IAS, then:-

(a) Check fuel pressure. If no indication, check tank selector and contents.

(b) Check mixture - RICH and carburettor air-hot. (Control knob - out.)

(c) Check ignition switches on.

(d) Trim elevators for glide, 70 knots IAS.

FORCED LANDING

3 With the engine inoperative, the landing area should be selected with extra care. A normal glide approach should be made. Aim directly into wind to reduce the landing run to a minimum and touch down in the three point attitude. On final approach ensure that the following actions are accomplished:-

(a) Fuel - OFF.

(b) Brakes - OFF.

(c) Mixture - RICH, carburettor air - cold.

(d) Hood - open, harness - tight.

(e) Switches - OFF.

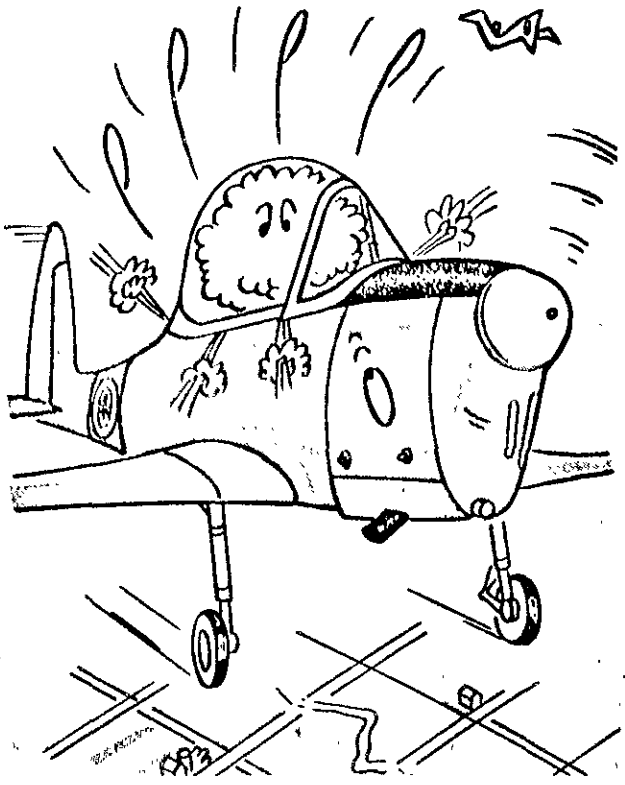
FIRE

ACTION IN EVENT OF FIRE

4 No fire extinguisher system is fitted in the aircraft, therefore, in the event of engine fire sideslip the aircraft so that flames and fumes are not directed at the cockpit, and select fuel and all switches OFF. Close throttle and bail out.

COCKPIT FIRE

5 Operate the hand fire extinguisher, if it is obvious that the fire can be so controlled, and make a landing as soon as possible, otherwise abandon the aircraft in flight.



WARNING

Care should be taken to avoid a dangerous concentration of fumes in the cockpit. Open the canopy as far as possible after the fire is extinguished, to dissipate fumes. Prolonged exposure to these fumes is dangerous.

ABANDONING AIRCRAFT IN FLIGHT

6 Proceed as follows:-

(a) Open the canopy fully by pulling inward sharply on the canopy drag flap release cable.

WARNING

In the normal speed ranges the canopy may only partially open. It will move fully to the rear, however, with slight elbow or hand pressure, or when the aircraft is placed in a climbing attitude. At airspeeds above 150 knots the flap will drag the canopy fully to the rear stops.

(b) Ensure that student or passenger abandons the aircraft.

(c) Turn fuel OFF.

(d) Place all switches OFF.

(e) Undo safety harness.

(f) Trim aircraft for normal glide and away from inhabited areas.

(g) Vacate the cockpit, step out on the wing and dive over the trailing edge away from the aircraft.

DITCHING

7 Ditching this aircraft is not recommended, unless there is no alternative. If it is necessary to ditch, stall the aircraft onto the water in the three point attitude with full flaps, canopy open, and harness tight. Expect the aircraft to nose over on contact.

ELECTRICAL FAILURE

8 In the event of electrical failure check:-

(a) Generator switch ON and circuit breaker in.

(b) Voltmeter reading.

(c) If generator inoperative, turn off all unnecessary electrical equipment to conserve battery power.

(d) Land as soon as practicable.

LANDING WITH FLAT TIRE

9 From a normal approach, using full flap, land on the good tire and tailwheel. Keep the flat tire off the ground as long as possible and use brake as necessary to keep the aircraft straight and to slow down. Remember that the aircraft will swing towards the flat tire.

PART 4

OPERATING DATA

RESTRICTIONS

GENERAL

1 The aircraft must be operated according to the limitations and instructions given in this part.

NOTE

With two occupants, the fuel load is at present restricted to 17 Imp gal.

WEIGHT AND BALANCE

2 The maximum gross weight is 2000 lb for take-off and landing. Refer also to EO 05-10B-8.

INSTRUMENT MARKINGS

3 For instrument markings, showing operating limits, see Figure 4-1.

AIRSPEED LIMITATIONS

4 The following chart shows airspeed limitations under various conditions of flight.

AIRSPEED LIMITATIONS

CONDITION	SPEED (Knots IAS)
For Lowering Flaps	75
For Lowering Landing Light	65
Max. Diving Speed, 2550 rpm (5 min. limit)	175

MAXIMUM SPEEDS

5 The following chart shows the maximum speeds under various conditions of flight.

MAXIMUM SPEEDS

CONDITION	SPEED (Knots IAS)
Level at S.L. (Full throttle)	122
Level at 1000 ft (Full throttle)	118
Level at 5000 ft (Full throttle)	108

RECOMMENDED SPEEDS

6 The following Chart shows the recommended speeds under various conditions of flight.

RECOMMENDED SPEEDS

CONDITION	SPEED (Knots IAS)
Take-off	53
Rough Air	80
Climb to 5000 ft	70
Glide	70
Approach	65
Overshoot (Flaps DOWN) (No flaps)	65 70
Cruising at S.L. (2100 rpm)	107
Cruising at 5000 ft (2100 rpm)	97
Aerobatics Roll Loop Half roll off top of loop	 110 120 135

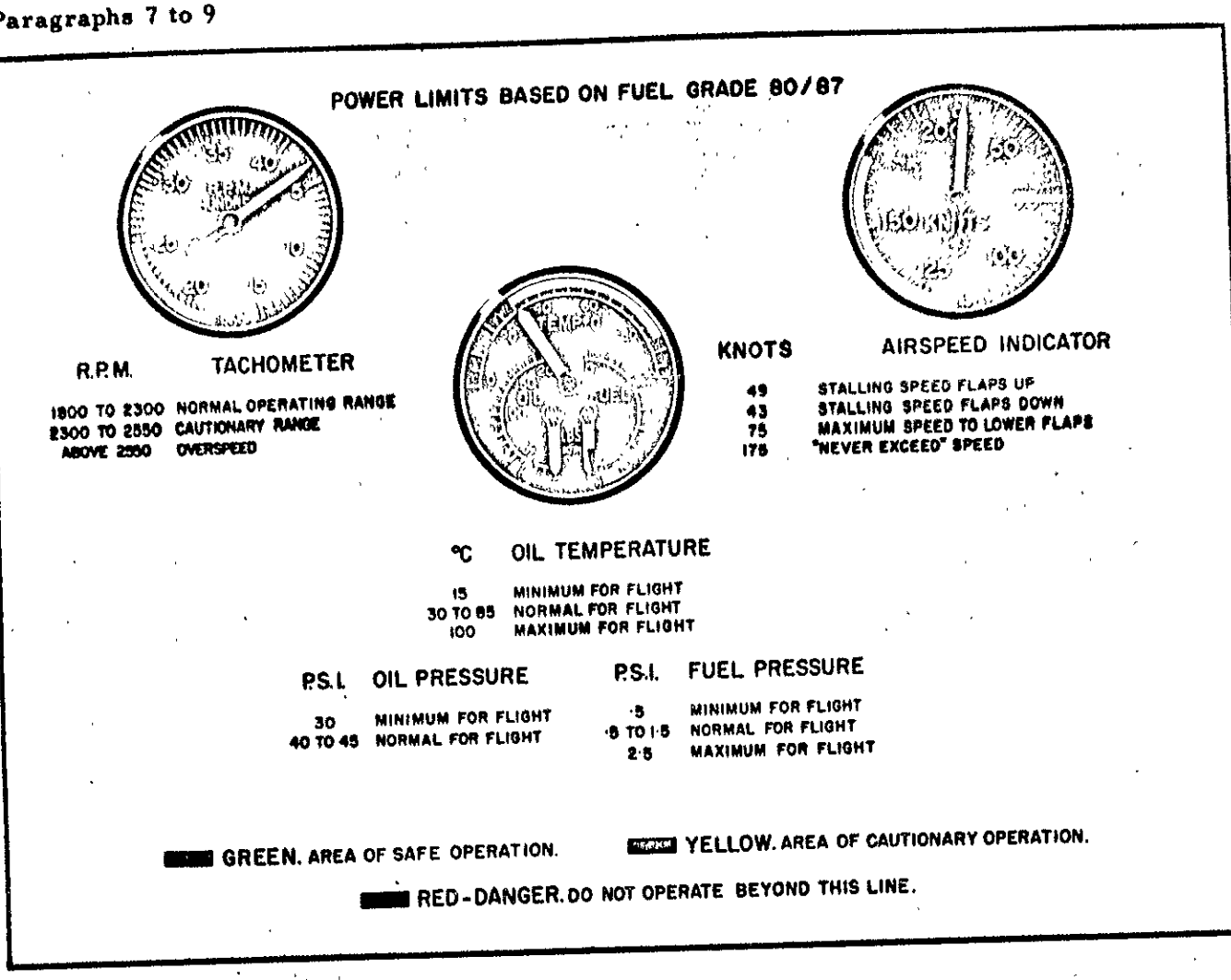


Figure 4-1 Instrument Markings

STALLING SPEEDS

7 The following stalling speeds are for a gross weight of 2000 lb with power off.

STALLING SPEEDS

CONDITION	SPEED (Knots IAS)
Flaps UP	49
Half flaps	44
Flaps DOWN	43

ACCELERATION LIMITS

8 The Operating Flight Strength Diagram Figure 4-2, gives the maximum g-values t which the airframe may be safely subjected i flight under various conditions.

ENGINE LIMITATIONS

9 The following chart gives the limitation for the Gipsy Major C1G, 7G and 10 Mk 1- engines as recommended by the manufacture and should not be exceeded.

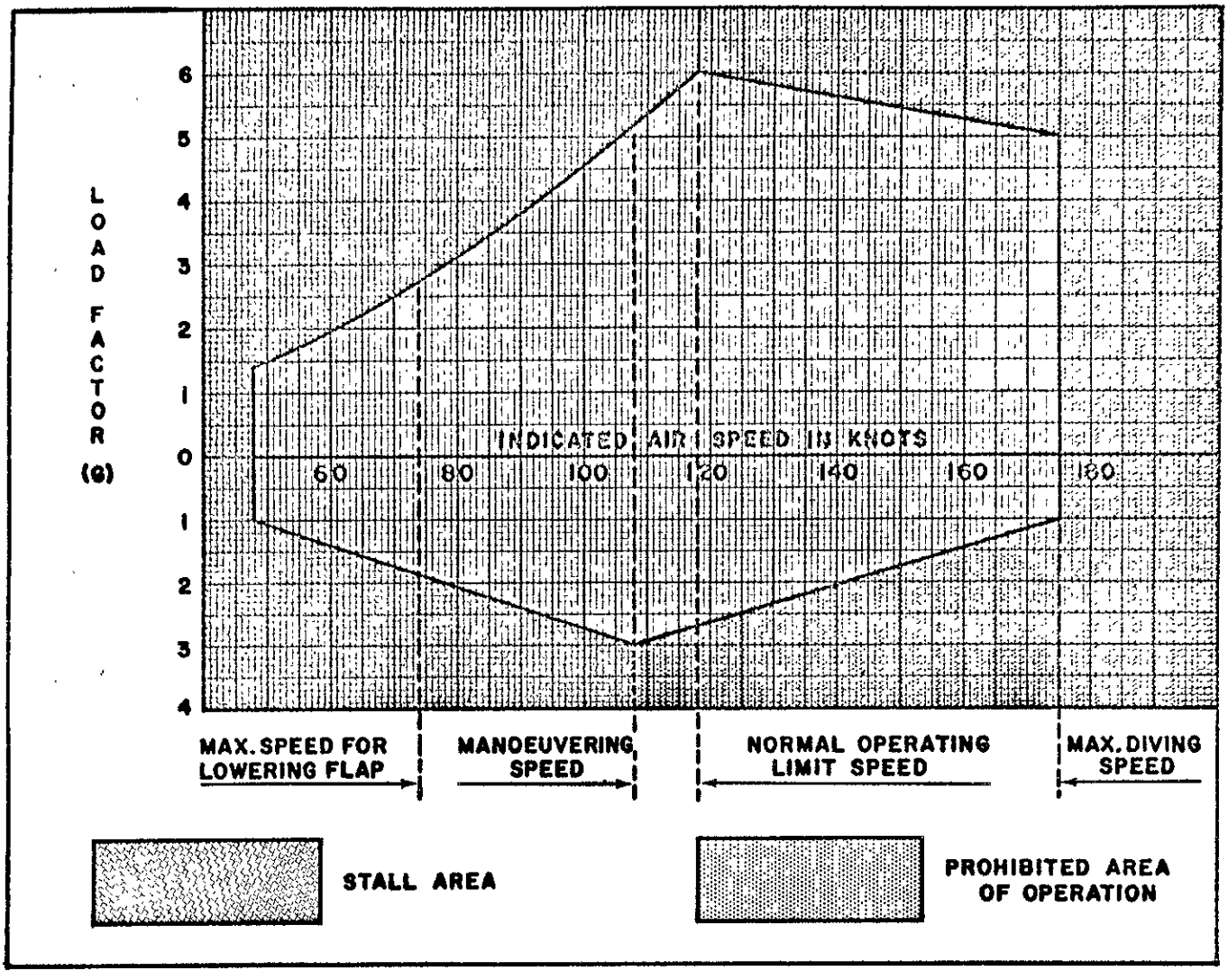


Figure 4-2 Operating Flight Strength Diagram

ENGINE LIMITATIONS

CONDITION	RPM	OIL TEMP.	MIXTURE
Take-off to 1000 ft.	2400 (Full Throttle)	100°C	Rich
Climb	2400 (Full Throttle)	85°C	Rich
Cruising	2300	85°C	Rich
Maximum RPM	2550 (5 min Limit)	100°C	Rich
Overspeed	above 2550		
Engine Removal	2675		Rich

NOTE

The maximum rpm obtainable with the DHC-1B aircraft under level flight conditions is 2250 to 2300.

POSITION ERROR CORRECTION

10 The correction for position error is negligible.

FUEL CONSUMPTION

11 The following chart gives the fuel consumption for various power settings.

FUEL CONSUMPTION

CONDITION	RPM	IMP GAL PER HOUR
Economical Cruising (Below 3000 ft)	2100	6.75
Economical Cruising (Above 3000 ft)	1800/2100	5.5-6.4
Take-off	1925/2100	8.7-9.8

OIL CONSUMPTION

12 The oil consumption varies from 4.5 pints per hour at full throttle to 2.0 pints per hour at economical cruising.

FLIGHT DATA

13 The following data is based on ICAN standard atmosphere, with an aircraft gross weight of 2000 lb.

NOTE

With one occupant only the fuel capacity is 27 Imp gal. Range and endurance increases accordingly.

FLIGHT DATA

Take-off Ground Run, Sea Level, Zero Wind Total Take-off Distance to Clear 50 ft	645 ft 1040 ft
Landing Ground Run, Sea Level, Zero Wind Total Landing Distance over 50 ft	490 ft 960 ft
Rate of Climb at Sea Level	825 fpm
Service Ceiling	16,000 ft
Absolute Ceiling	18,200 ft
*Cruising at 5000 ft (17 Imp gal. fuel capacity)	235 nms
*Endurance, cruising at 5000 ft (17 Imp gal. fuel capacity)	2-1/4 hrs

NOTE

With one occupant only the fuel capacity is 27 Imp gal. Range and endurance increases accordingly.

*Based on an allowance of approx. 2 Imp gal. fuel for warming up, take-off and climb to 5000 ft.