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AN 01-50DB-1

PILOT'S FLIGHT OPERATING INSTRUCTIONS

FOR

AIRPLANES

ARMY MODELS

NAVY MODEL

L-5, L-5B, L-5C and L-5E

OY-1



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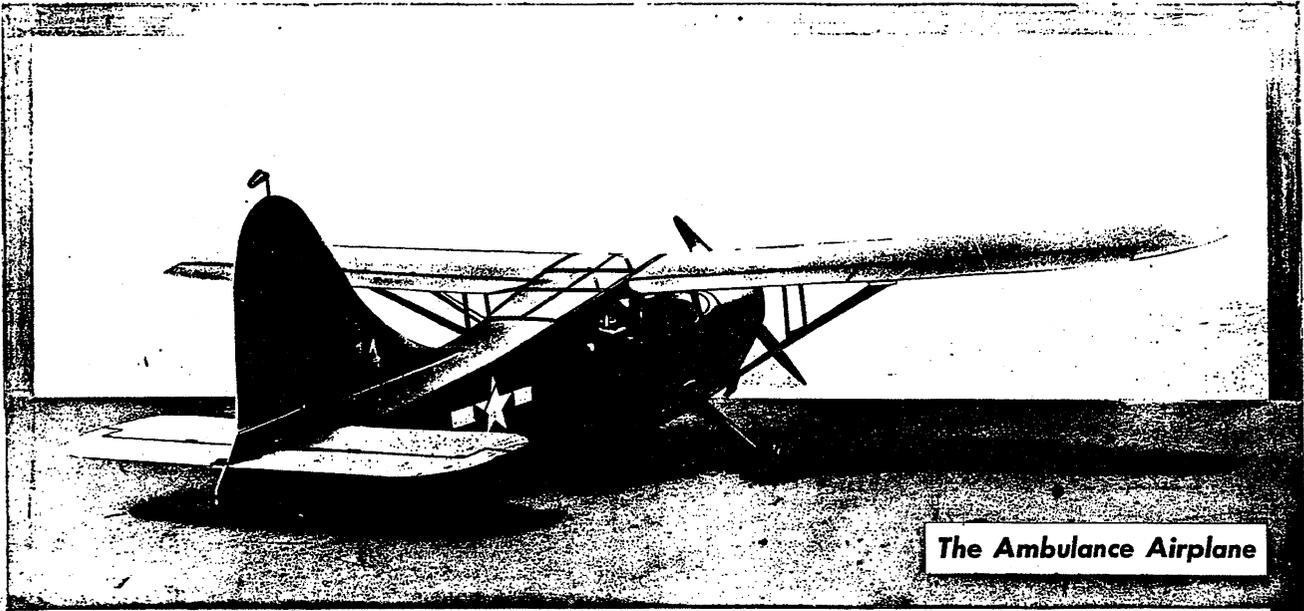
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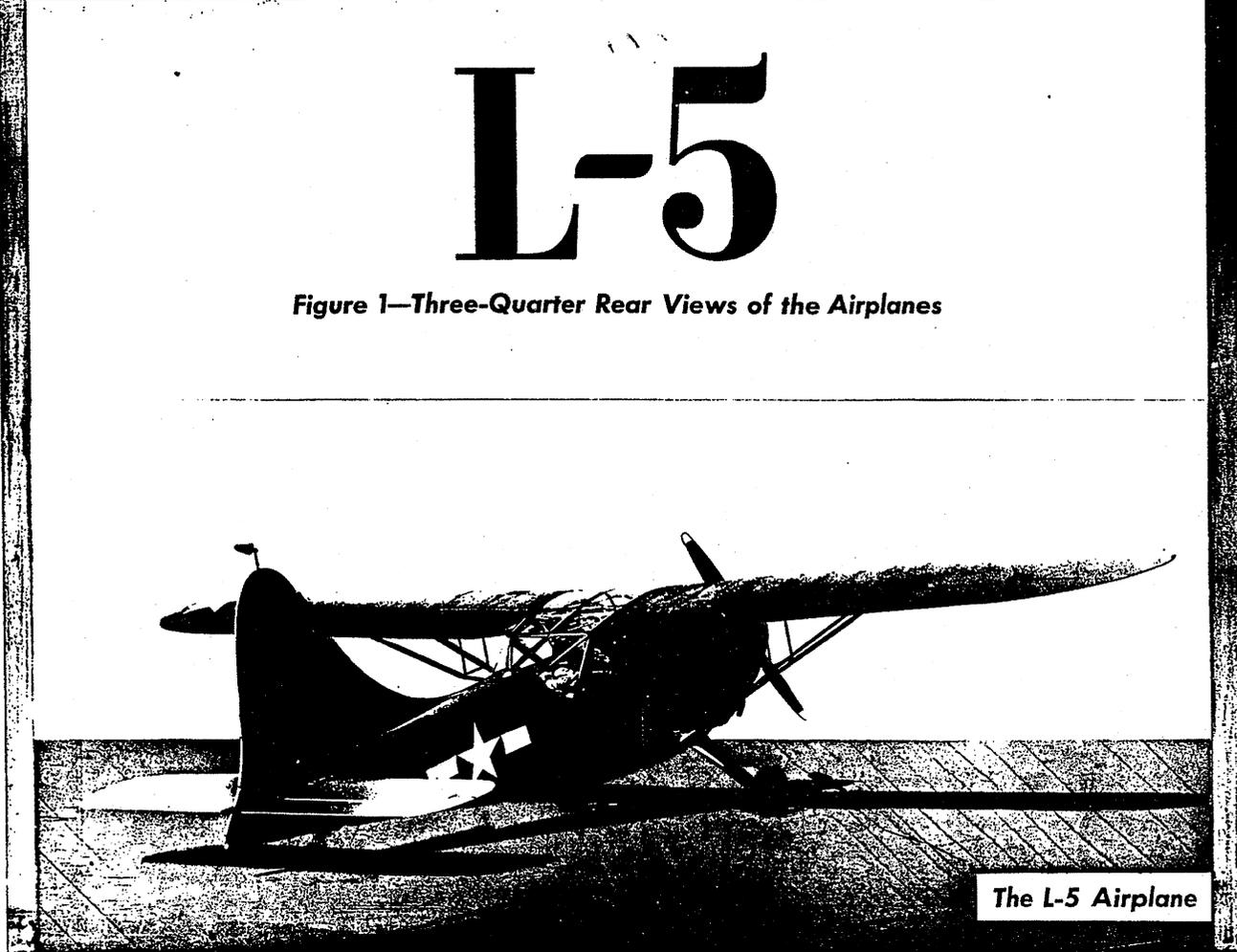
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The Ambulance Airplane

L-5

Figure 1—Three-Quarter Rear Views of the Airplanes



The L-5 Airplane

Figure 1—Three-Quarter Rear Views of Airplanes

SECTION I DESCRIPTION

1. GENERAL.

The models L-5 and L-5B, C and E short range liaison airplanes are tandem, high wing monoplanes manufactured by the Stinson Division, Consolidated Vultee Aircraft Corporation. Design of the airplane is such that take-off and landing over a high obstacle can be accomplished in a short distance. The general over-all dimensions are: length, 24 feet; height, 9 feet; span, 34 feet.

a. THE MODEL L-5.—Power is supplied by a Lycoming 0-435-1 horizontally opposed, air-cooled engine. At sea level the engine develops 185 horsepower at 2550 rpm. The fixed pitch wooden propeller is directly driven by the engine crankshaft. The landing gear is a fixed cantilever type, with a fixed, steerable tail wheel. Flight controls are operated manually and wheel brakes hydraulically. The normal gross weight is 2050 pounds.

b. THE MODEL L-5B.—The model L-5B airplane differs from the L-5 in that it can be instantly converted into an ambulance or cargo-carrying airplane, and provisions are made for the installation of floats. The normal gross weight is 2100 pounds.

c. THE MODEL L-5C.—The model L-5C airplane differs from the L-5B in that provisions are made for

the installation of a type K-20 camera in the fuselage belly aft of the observer's seat.

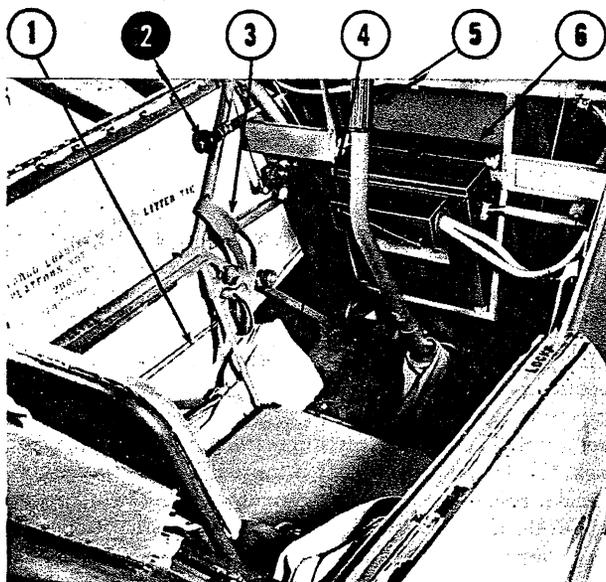
d. THE MODEL L-5E.—The model L-5E airplane differs from the L-5C in that the ailerons have a second control which provides a droop of 15 degrees downward without changing their differential movement.

2. FLIGHT CONTROLS.

a. ELEVATOR.—The elevator controls are the conventional stick and push-pull tube type. A stick is provided in each compartment, but the auxiliary stick in the observer's compartment can be unclipped and removed. In the L-5 airplane, stowage clips for the stick are provided on the fuselage structure behind, and to the right of the observer's seat. (See figure 18.) In the ambulance model airplanes, the stowage clips are on the forward face of the hinged portion of the litter floor. (See figure 23.)

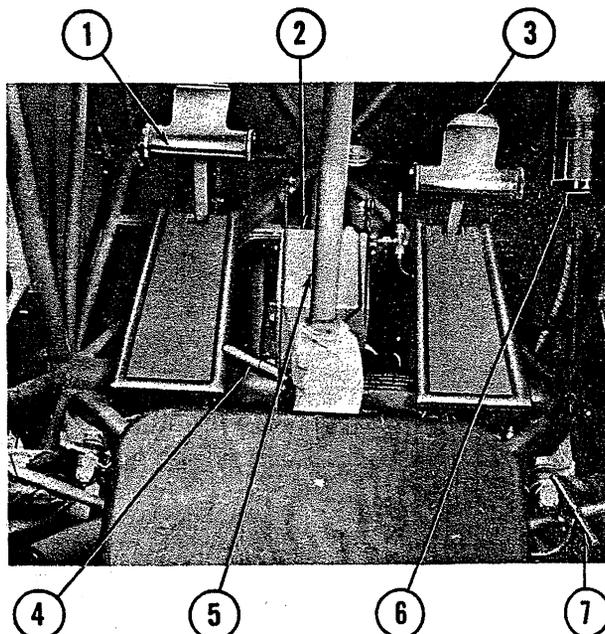
WARNING

At any time that the rear seat of the ambulance models is not used, the stick should be stowed to prevent interference with the elevator controls if the seat back should fall forward.



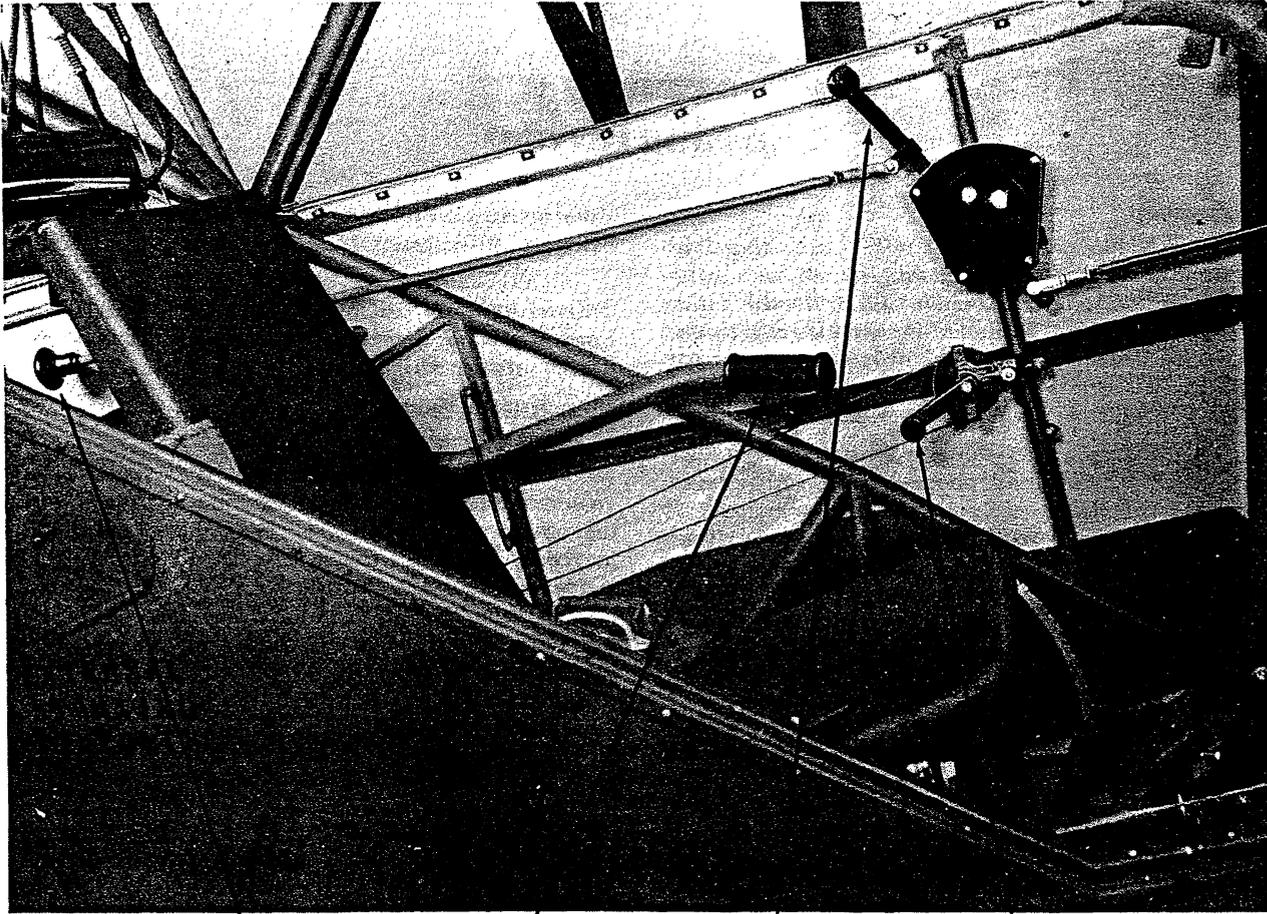
- | | |
|----------------------|------------------|
| 1. Trim Tab Cable | 4. Mooring Kit |
| 2. Throttle Control | 5. Control Stick |
| 3. Litter Tie Straps | 6. Battery |

Figure 2—Observer's Compartment (Ambulance Models)



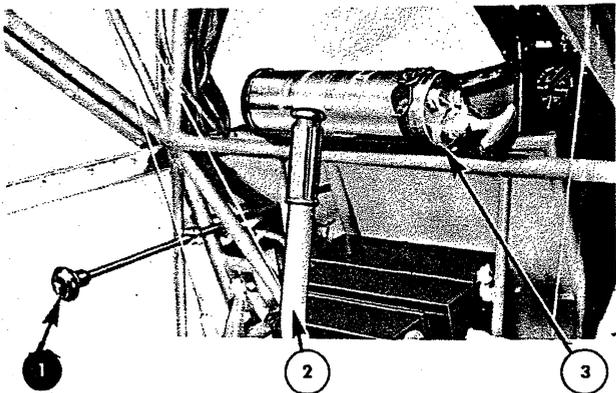
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|-------------------------|---------------------------|
| 1. Rudder Pedal | 5. Pilot's Control Stick |
| *2. Radio Power Supply | *6. Fire Extinguisher |
| 3. Brake Pedal | 7. Seat Adjustment Handle |
| 4. Parking Brake Handle | *Starts on L-5B |

Figure 3—Front of Pilot's Compartment



- 1. Observer's Throttle Control
- 2. Flap Control
- 3. Pilot's Throttle Control
- 4. Trim Tab Control

Figure 4—Pilot's Compartment—Left Side



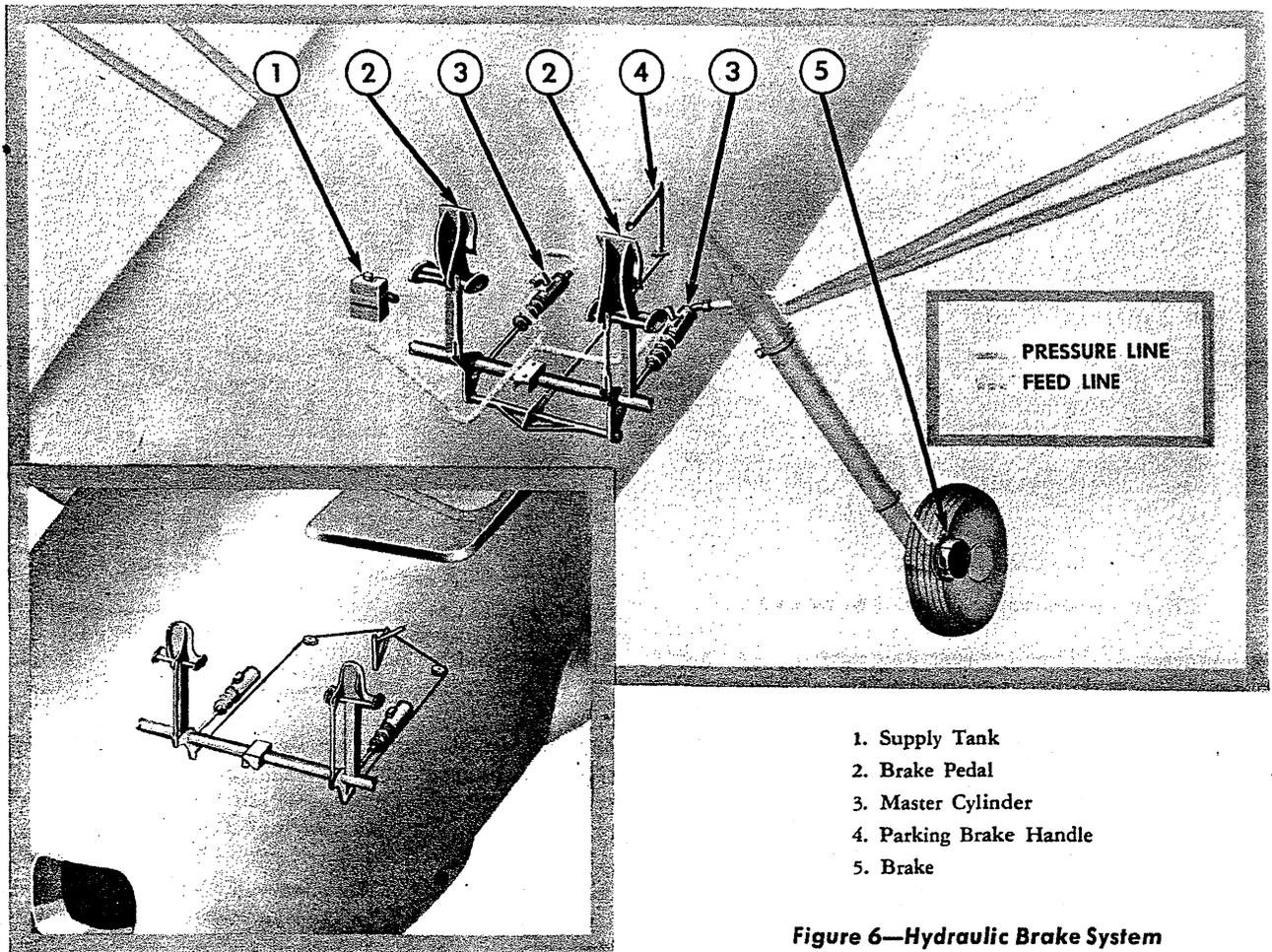
- 1. Observer's Throttle Control
- 2. Observer's Control Stick
- 3. Fire Extinguisher

Figure 5—Front of Observer's Compartment (L-5)

b. AILERONS. — The ailerons are conventionally controlled by the control sticks in the pilot's and observer's compartment. A metal trim tab, adjustable on the ground, is fastened to each aileron.

On L-5E airplanes, the ailerons are provided with a second control which produces a coordinated downward deflection, or drooping, of the ailerons without inhibiting their differential motion actuated by the control stick. The control bracket is installed in the upper right-hand corner of the pilot's compartment. (See 3, figure 9.) A clockwise rotation of the control arm produces a downward deflection of the ailerons.

c. RUDDER.—The rudder control pedals, which also steer the tail wheel, are directly connected to the rudder horn. In earlier models the observer's pedals can be removed by unclipping and pulling them out of their sockets. Directional trim is governed by a metal tab on the rudder which is adjustable only on the ground.



1. Supply Tank
2. Brake Pedal
3. Master Cylinder
4. Parking Brake Handle
5. Brake

Figure 6—Hydraulic Brake System

d. FLAPS. (See 2, figure 4.)—A hand lever on the left side of the pilot's compartment is lifted to lower the flaps and lowered to raise them. Notches are provided to set the flaps at either the intermediate position or the full-down position.

e. ELEVATOR TRIM TAB. (See 4, figure 4.) — Longitudinal trim is adjusted by means of the elevator tab, which is controlled by a flexible cable connecting the control lever in the pilot's cockpit to the flexible shaft and screw mechanism that operates the tab. To trim the airplane, the pilot turns the lever clockwise for a "NOSE DOWN" and counterclockwise for a "NOSE UP" position. The observer can operate the tab by manipulating the cable forward of the pulleys, pulling the upper cable for a "NOSE UP" and the lower cable for a "NOSE DOWN" position.

f. TAIL WHEEL. — The tail wheel is steered by means of flexible cables which are connected to the rudder pedals. These controls operate the tail wheel through 45 degrees either side of neutral. A friction release permits full swiveling beyond this point.

g. CONTROL LOCKS. — A control lock sling is stowed in the box aft of the observer's seat. Refer to

paragraph 18. *e.*, section II, for the use of the control locks.

3. BRAKES.

(See figure 6.)

a. NORMAL. — The brakes are the expander-tube type, actuated by hydraulic pressure. The pilot's rudder pedals have toe-action brake pedals which connect to the master hydraulic cylinders. Pressure on the left pedal operates the left wheel brake, and pressure on the right pedal operates the right wheel brake.

b. PARKING.—The parking brake handle in the L-5 airplane is located just forward of the control stick. It locks the brakes in both wheels. The handle in the ambulance models is at the left of the control stick and connects through a cable system to the master cylinders. To set the brakes, apply pressure to the toe pedals and turn the handle to the left until it locks at slightly more than 90 degrees. Release the brakes by applying pressure to the toe pedals and turning the handle back.

4. ELECTRICAL EQUIPMENT.

a. GENERAL.—A 12-volt single wire, grounded electrical system is used. All circuits except the starter circuit

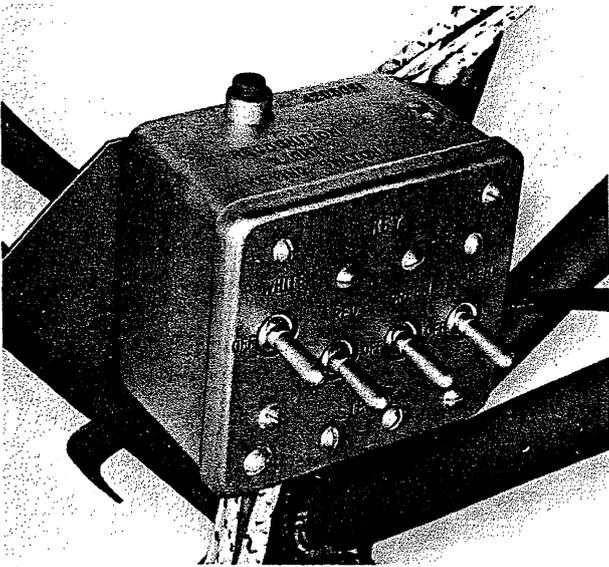


Figure 7—Recognition Light Switch Box

are protected by circuit breakers or protectors. In early airplanes, fuses are used to protect some of the circuits. The fuses are contained in a panel mounted on the rear side of the fire wall. Spare fuses are provided on the fuse panel. On models L-5 and early L-5B airplanes, in order for any electrical unit to operate, the master switch must be turned "ON" and the ignition switch must be in "BOTH" or "BAT" position. On subsequent models, only the master switch must be turned "ON."

b. EXTERNAL POWER RECEPTACLE. (See figure 11.)—A receptacle for connecting an external electrical power source is mounted in the right-hand side of the fuselage just aft of the pilot's door. Turn the thumb screw 90 degrees to open cover door.

c. ELECTRICAL PANEL. (See figure 8.)—The electrical panel is mounted on the left match rib. This panel includes a master battery switch, circuit breakers, circuit protectors, the fluorescent light rheostat, toggle switches

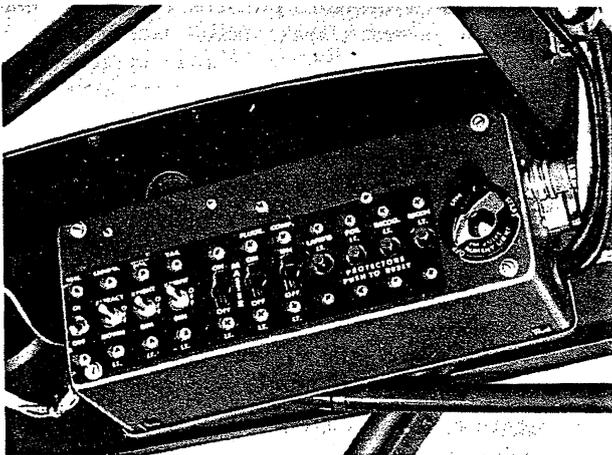
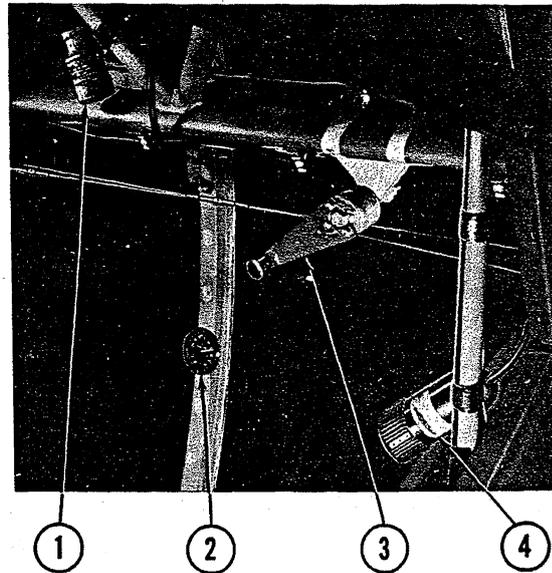


Figure 8—Electrical Panel



- 1. Cockpit Light
- 2. Free Air Thermometer
- 3. Aileron Droop Control
- 4. Fluorescent Light
*Starts on L-5E

Figure 9—Upper Front of Pilot's Compartment

for the compass light, the fluorescent light, the landing light, the position lights and the generator. Circuit protectors are reset by pushing the buttons; circuit breakers are reset by turning the circuit switches "ON."

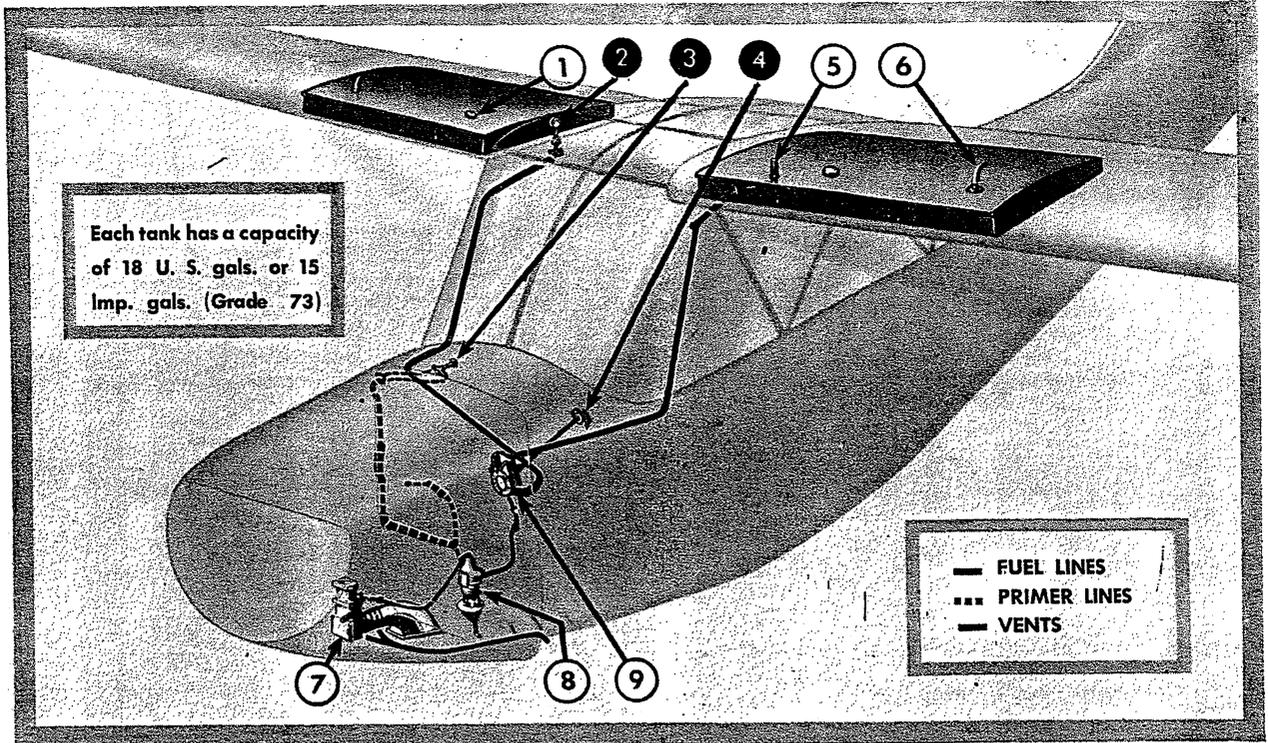
d. STARTER BUTTON. (See 15, figure 12.)—The starter button is on the right side of the instrument panel. It must be depressed in order to operate the starter.

e. GENERATOR SWITCH.—The generator switch is in the switch panel. The switch must be "ON" for generator output. A guard is provided on late model L-5B and subsequent airplanes so that the switch cannot be operated accidentally. The guard must be raised to operate the switch.

f. COCKPIT LIGHTS. (See 1, figure 9.) — A demountable cockpit light is clipped in a bracket above each compartment. The lights are operated by means of a rheostat on each light.

g. INSTRUMENT LIGHT. (See 4, figure 9.) — A fluorescent instrument light is mounted on the structure at the top center of the windshield. To operate the light, turn the toggle switch on the electrical panel to "ON" and hold the control knob of the starting rheostat, which is located on the upper left side of the pilot's compartment, at "START." When the light glows, the rheostat can be adjusted to the desired light intensity. A knurled lens cap on the lamp rotates to permit either visible or ultraviolet light emission. The lamp swivels on its mounting base to change the direction of the light ray.

b. RECOGNITION LIGHTS. — Three recognition lights are mounted in the bottom of the fuselage. A fourth is mounted on the top aft of the canopy of the



1. Filler Cap
2. Fuel Gage
3. Engine Primer

4. Selector Valve Handle
5. Tank Strainer
6. Tank Vent

7. Carburetor
8. Strainer
9. Selector Valve

Figure 10—Fuel System

model L-5. The control box, which is on the right side of the cockpit between the pilot's and observer's compartments, has four toggle switches and a keying switch. (See figure 7.) When the switches are in neutral or centered, the lights are off. When the switches are down, the lights are on. When the switches are up, the lights are operated by the depression of the keying switch. On late airplanes, the recognition lights control box is on the upper right side of the pilot's compartment.

i. LANDING LIGHT. — The retractable landing light, which is mounted in the left wing panel, is operated by a switch in the electrical panel on the left match rib. When the switch is up, the lamp is retracted. To extend and illuminate the light, the switch must be depressed to the lowest position. The lamp can be turned off in the extended position by returning the switch to the center position.

j. POSITION LIGHTS.—The switches for the position lights are located on the electrical panel on the left match rib. The lights are off when the switches are centered and bright and dim with the switches in the up and down position, respectively.

k. COMPASS LIGHT.—A switch on the electrical panel operates the compass light. The light is off when the switch is down.

5. FUEL SYSTEM.

a. GENERAL. (See figure 10.)—The fuel system is a gravity-feed type. A tank in each wing supplies fuel to the engine through a fuel selector valve and strainer.

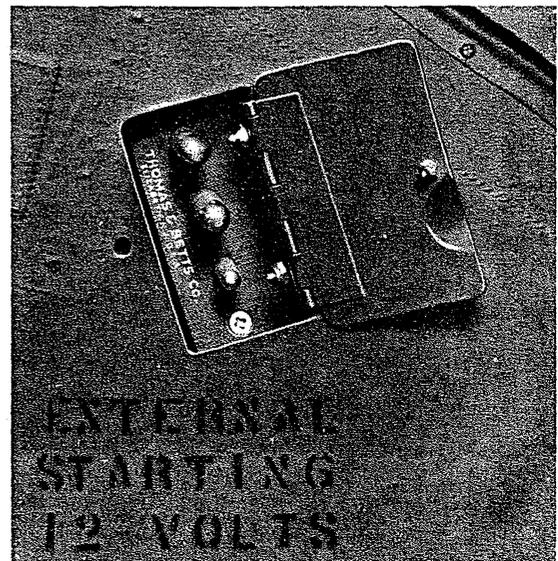
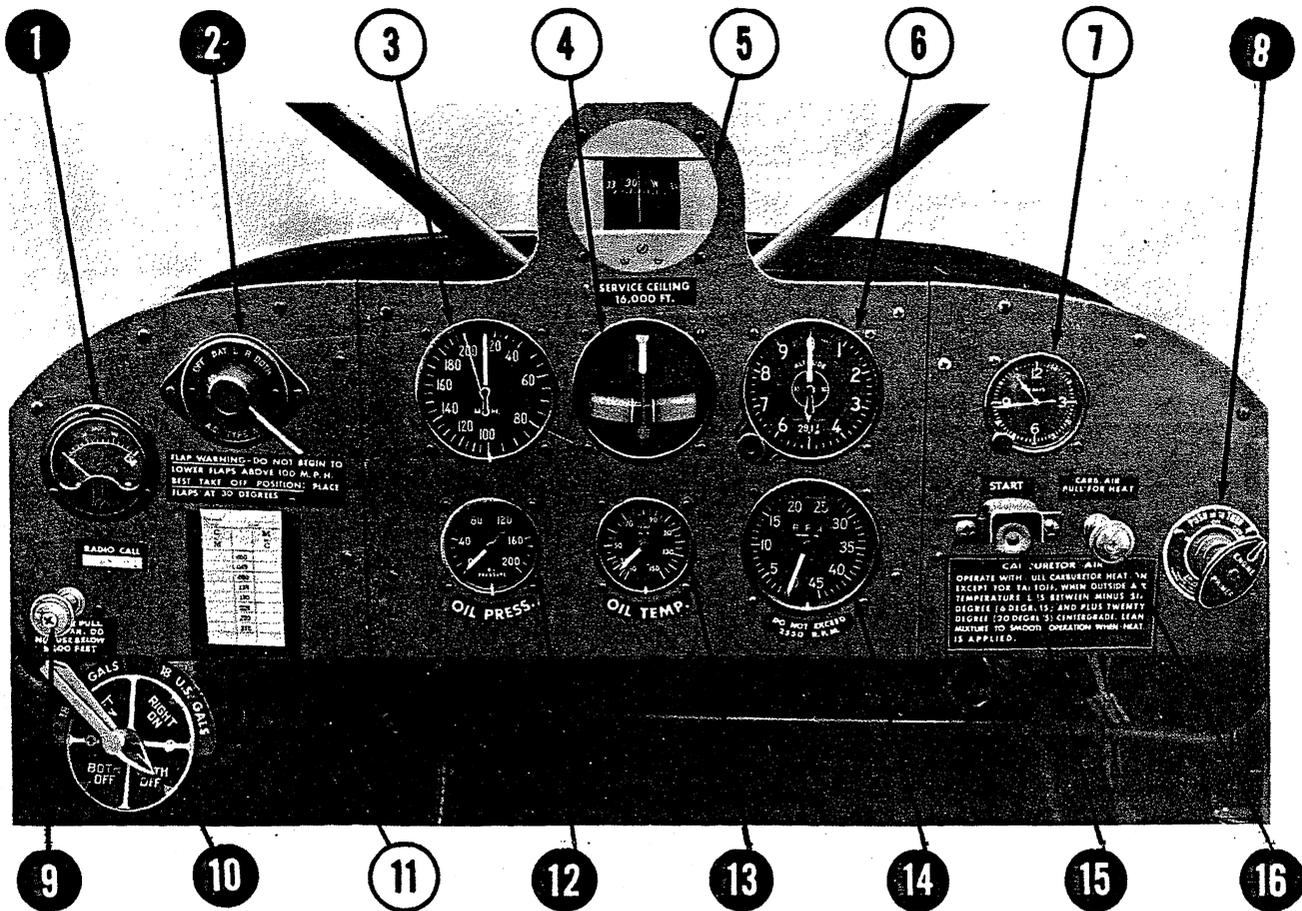
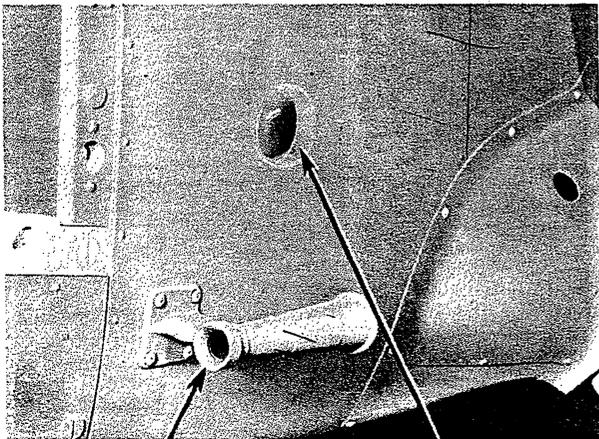


Figure 11—External Power Receptacle



- | | | | |
|----------------------------|------------------|-----------------------------|---------------------------------|
| 1. Ammeter | 5. Compass | 9. Mixture Control | 13. Oil Temperature Gage |
| 2. Ignition Switch | 6. Altimeter | 10. Fuel Selector Valve | 14. Tachometer |
| 3. Air-Speed Indicator | 7. Clock | 11. Compass Correction Card | 15. Starter Button |
| 4. Bank and Turn Indicator | 8. Engine Primer | 12. Oil Pressure Gage | 16. Carburetor Air Heat Control |

Figure 12—Instrument Panel



- | | |
|--------------------------|----------------------|
| 1. Turn and Bank Venturi | 2. Ventilating Scoop |
|--------------------------|----------------------|

Figure 13—Left Shroud Panel

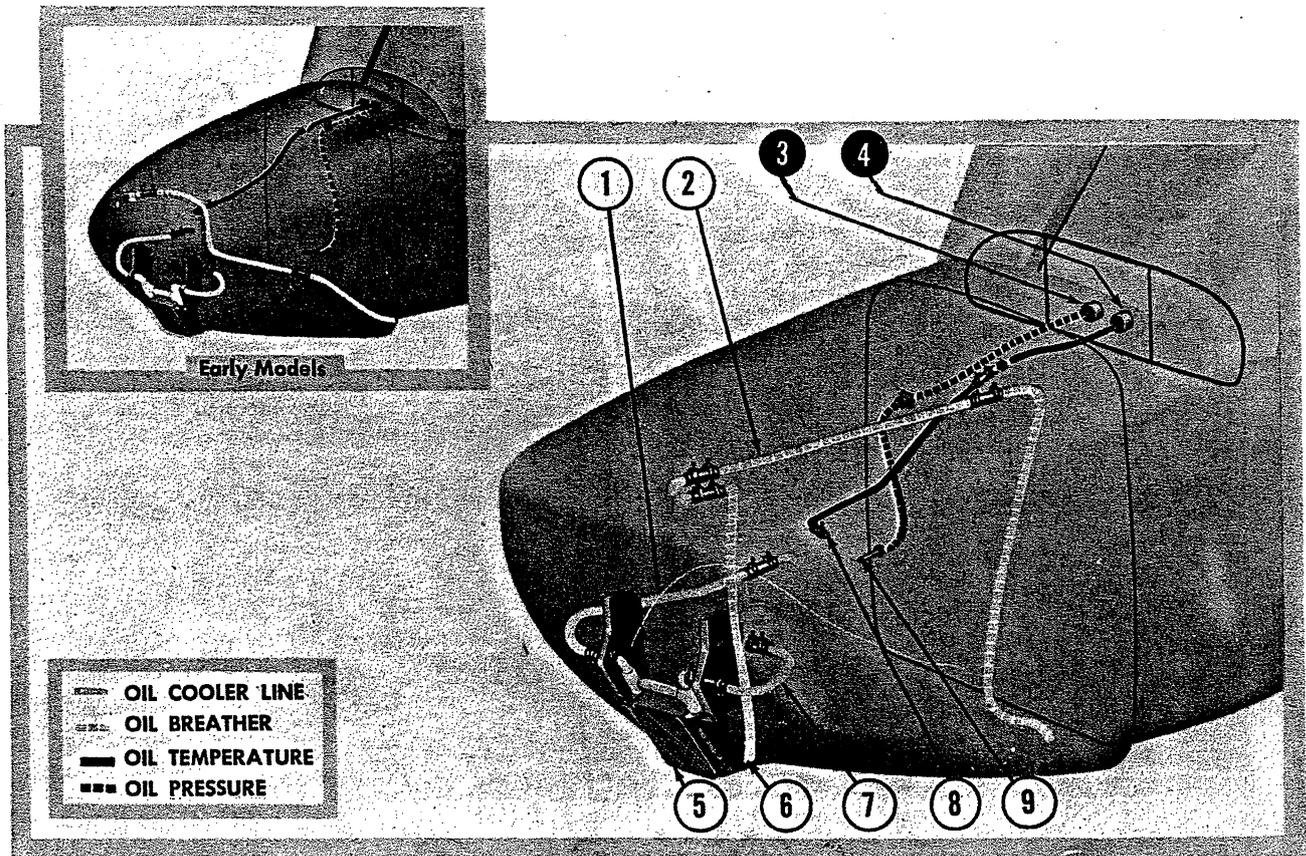
Each tank holds 18 U.S. gallons (15 Imperial gallons) of fuel, although the normal load for this airplane is 25 U.S. gallons (21 Imperial gallons). *There is no reserve fuel supply.* The fuel used is Grade 73, Specification No. AN-F-23.

b. ENGINE PRIMER. (See 8, figure 12.)—The engine primer is at the extreme right of the instrument panel. Pushing in the knob slightly and turning it in a counterclockwise direction will unlock it, after which it can be operated by a push-pull action.

c. FUEL SELECTOR VALVE. (See 10, figure 12.)—The fuel selector valve control is mounted underneath the left-hand side of the instrument panel. The pointer of the selector handle indicates the source of fuel to the engine.

6. CARBURETOR AIR HEAT.
(See 16, figure 12.)

The carburetor air heat control is on the right side of the instrument panel and operates in the same manner as the mixture control. (Refer to paragraph 9, this sec-



*Starts L-5C replaces 2
**Replaced by 6

- 1. Oil Cooler Inlet
- **2. Breather Line
- 3. Oil Temperature Gage

- 4. Oil Pressure Gage
- 5. Oil Cooler
- *6. Breather Line

- 7. Oil Cooler Outlet
- 8. Pressure Fitting
- 9. Temperature Bulb

Figure 14—Oil System

tion.) Warm air is conducted to the carburetor when the control knob is pulled out.

7. OIL SYSTEM.

(See figure 14.)

There is no external oil tank or system. The supply of oil, which is carried in the engine crankcase, can be measured with the measuring rod inside the filler cap located on top of the engine crankcase. (See figure 16.) The oil level should be maintained at 12 U.S. quarts (10 Imperial quarts).

CAUTION

Do not operate the engine with the oil level below 6 U.S. quarts (5 Imperial quarts).

The oil used is grade 1100 above 4.4 degrees C (40 degrees F) and Grade 1080 below 4.4 degrees C (40 degrees F), Specification No. AN-VV-O-446.

8. THROTTLE.

(See 3, figure 4.)

The throttle control is located on the left side of the airplane in the pilot's compartment. A push-pull rod extends into the observer's compartment providing operation of the throttle by the observer.

9. MIXTURE.

(See 9, figure 12.)

The mixture control is a flexible push-pull type operated by a knob on the left side of the instrument panel. When the control knob is in the full-forward position, the mixture is full rich. Pulling the knob out leans the mixture progressively until, at the full extension of the control, the idle cut-off stops the flow of fuel at the carburetor. The button on the knob releases the lock when it is pressed in.

10. INSTRUMENTS.

The pilot's compartment is equipped with the following instruments located as noted:

INSTRUMENT PANEL: (See figure 12.)

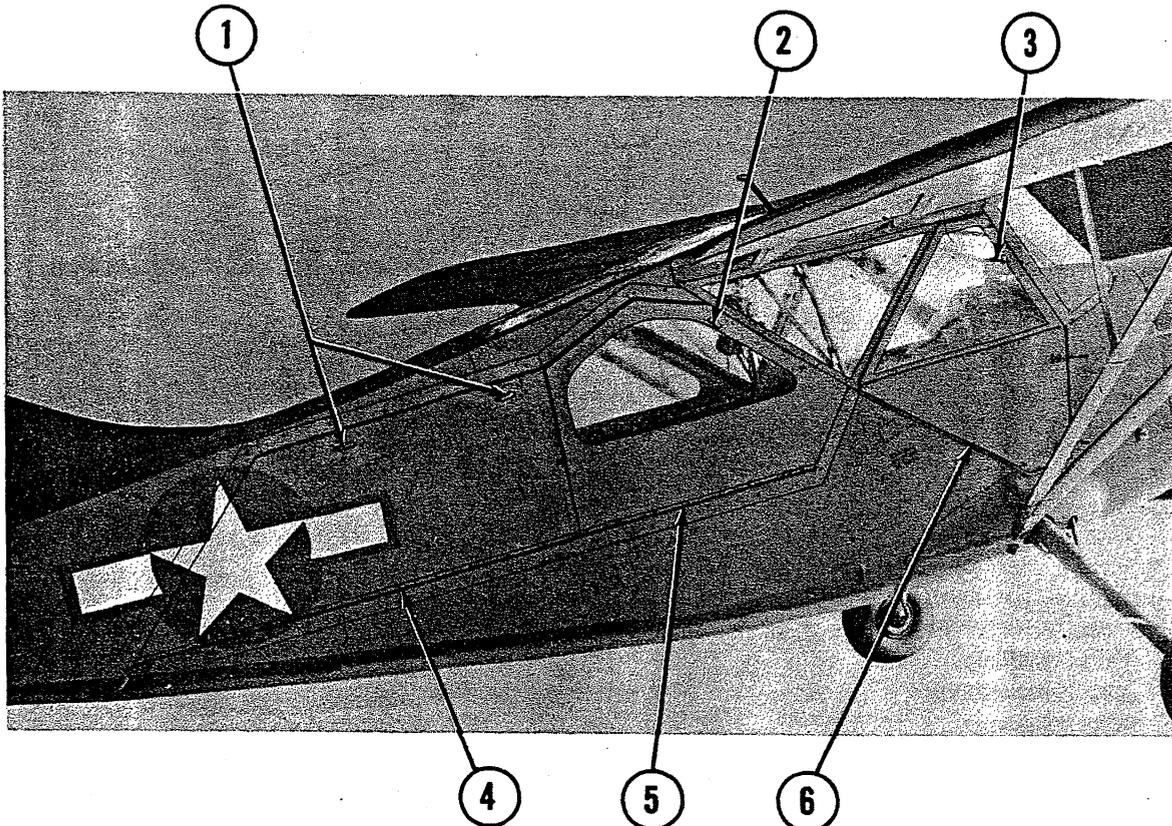
- | | |
|------------|-------------------------|
| Tachometer | Bank and Turn Indicator |
| Altimeter | Oil Temperature Gage |
| Ammeter | Airspeed Indicator |
| Clock | Oil Pressure Gage |

FUSELAGE MATCH RIB: (See figure 10.)

Fuel Level Gages, direct reading.

CABIN DOME: (See figure 9.)

Free Air Temperature Gage.



- 1. Litter Door Latches
- 2. Observer's Door Latch
- 3. Pilot's Window Latch

- 4. Litter Door
- 5. Observer's Door
- 6. Pilot's Door

Figure 15—Right Side of Ambulance Airplane

No instruments are provided for the observer, but those on the pilot's panel are visible to him.

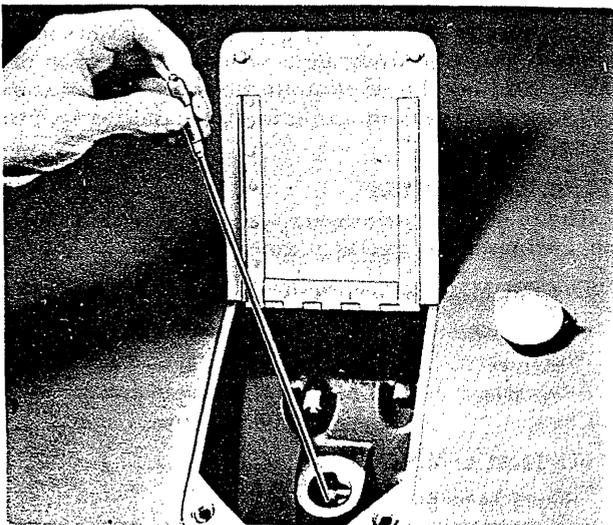


Figure 16—Oil Measuring Rod

11. PERSONNEL ACCOMMODATIONS.

a. DOORS.

(1) L-5 AIRPLANE.—The doors to the compartment of the pilot and observer are placed on the right side of the airplane. The upper halves of the doors consist of triangular windows which open by revolving about their lower edge when the release handle is turned. (See 1, figure 33.) A step is provided on the lift strut outside the pilot's door on early models. No step is provided on late airplanes, but is permissible to step on the root of the lift strut. Emergency releases are provided for both doors. (See figure 33.)

(2) AMBULANCE MODEL AIRPLANES. (See figure 15.)—The pilot's door is the same in all models. The observer's door of the ambulance models is made in one piece which rotates outward and down about its lower edge. It is released from the inside or outside by turning the latch handle down. The latch is locked by turning the handle up. The litter door is on the right side of the fuselage aft of the observer's door. It is released by turning the two latch handles down after opening the observer's door. With both rear doors open,

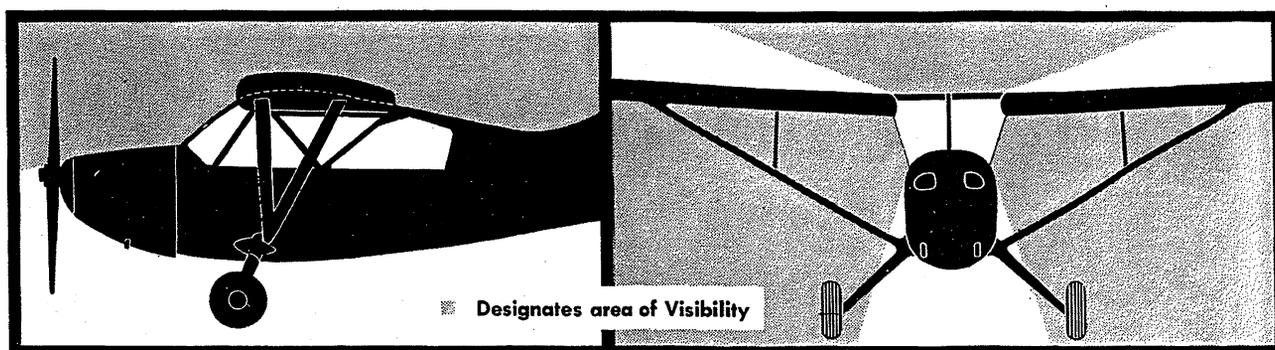


Figure 17—Visibility Diagrams

a full size litter can be easily slid into the fuselage. The latches are locked by turning the handles up.

WARNING

Always lock latches.

b. SEATS.—The pilot's seat, which accommodates a seat-pack parachute, is adjustable fore and aft. Pulling up the tee handle (figure 21), releases the seat for adjustment. The observer's seat, which also accommodates a seat-pack parachute, is fixed. In the ambulance models, the observer's seat back can be folded down to make room for the litter floor. A strap is provided to hold the observer's seat back up when this seat is unoccupied and airplane is not being used for ambulance or cargo. (See 5, figure 23.) Both seats are equipped with AAF type B-11 safety belts.

c. WINDOWS.—The side windows are hinged on the lower edge and pivot outward and downward. Both compartments are roofed with transparent plastic. This canopy, combined with the windows which slope inward from the top, permits observation over a wide angular range. (See figure 17.)

d. VENTILATION.—Six rotatable scoops are provided to allow the entrance of fresh air into the cabin. (See figure 13.) One is located on each side of the windshield below the wing, one on each side of the shroud panel near the lower longeron, and one on each fixed window aft of the pilot's seat.

e. EQUIPMENT. (See figures 20 and 22.)

(1) MOORING KIT.—The mooring kit is on the right side of the fuselage aft of the observer's seat or, in late models, on the left side of floor in the observer's compartment. No mooring kit is provided in model L-5C and subsequent airplanes.

(2) MESSAGE CONTAINERS. — Five message containers are stowed in the box aft of the observer's seat.

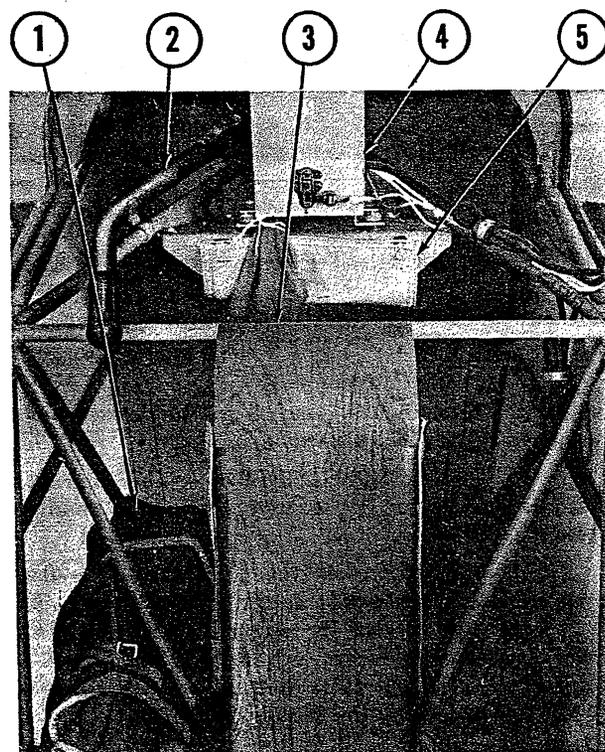
(3) ENGINE TOOL KIT.—A kit containing tools for use in servicing the engine is strapped to the floor aft of the observer's seat in the model L-5.

(4) WEATHER COVERS. — Weather covers for the propeller, engine, and canopy are stowed on the floor aft of the observer's seat. It is intended that these

be removed from the airplane if it is stationed at a base. Refer to paragraph 19, section II, for instructions on installing the covers.

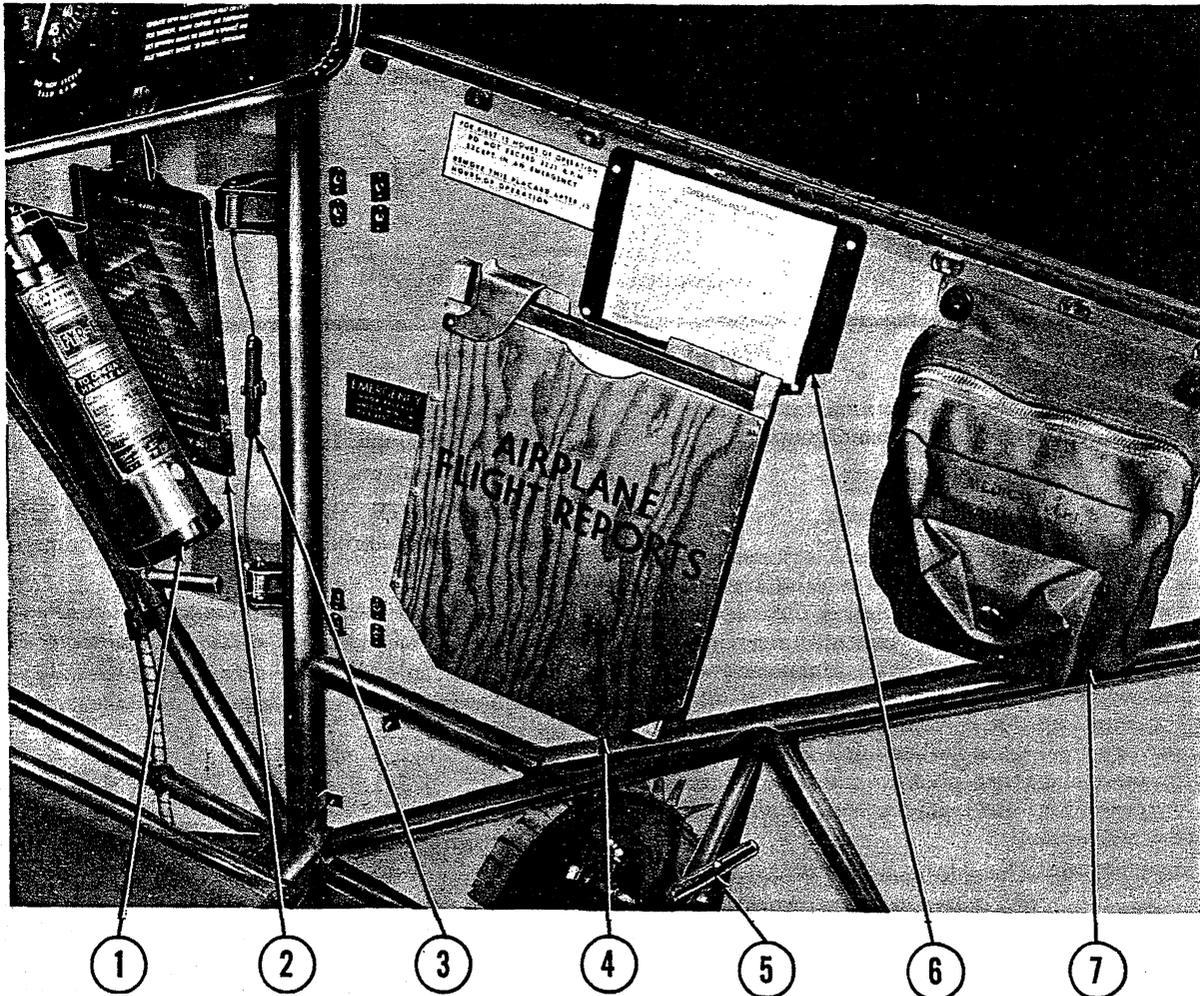
(5) FLIGHT REPORT HOLDER. — The flight report holder is on the inside of the pilot's compartment door.

(6) DATA CASE.—In the model L-5 airplane, the data case is attached to the door of the observer's compartment or, in earlier airplanes, on the left side of the airplane aft of the observer's seat. In the ambulance



1. Tool Kit and Protective Covers
2. Rear Control Stick (Stowed)
3. Observer's Seat
4. Radio Power Supply
5. Spare Crystals

Figure 18—Rear of Observer's Compartment (L-5)



*1. Fire Extinguisher
2. Pilot's Check List

3. Emergency Door Release
4. Flight Report Holder

5. Seat Adjustment Handle
*6. Radio Operating Instructions

*7. First Aid Kit
*Starts on L-5B

Figure 19—Pilot's Compartment—Right Side

models, the data case is attached to the front face of the hinged panel of the litter floor.

(7) CHECK LIST HOLDER. — The check list holder is forward of the door in the pilot's compartment.

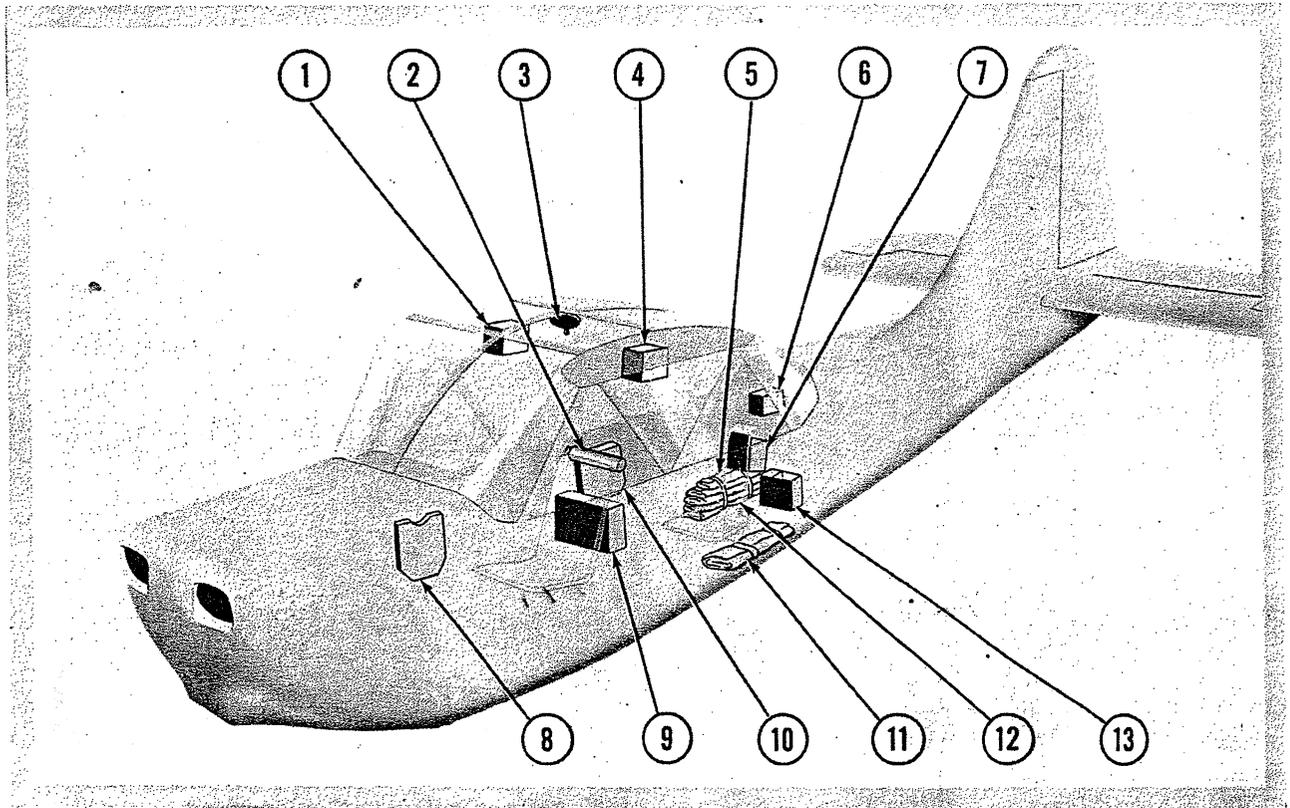
(8) CRASH PAD.—When the airplane is used as an ambulance or cargo airplane, a crash pad, provided for this purpose, should be strapped over the aft face of the cross tube and battery aft of the pilot's seat. (See 1, figure 27.) When the rear controls are used, the pad should be tied down in the cargo department.

12. AMBULANCE AND CARGO PROVISIONS.

a. CONVERSION.—The L-5B and subsequent model airplanes are readily converted into ambulance or cargo carrying airplanes by two simple actions. The first step is to remove the rear control stick and fold down the observer's seat back. The stick can be stowed

in the brackets on the underside of the litter floor. The second is to release the latch at the upper left corner of the litter floor and rotate the floor down. (See 1, figure 23.) It is locked in the lower position by means of the latch on the forward right-hand corner.

b. AMBULANCE USE.—The airplane is designed to hold any standard Army, Navy, or British type litter. Place the casualty in the litter. Open the observer's door and the litter door. Slide the litter in place so that its supports rest on the front and rear panels of the litter floor. The feet of the casualty should be toward the tail of the airplane. On sunny days, pull the shade curtain forward and fasten it to the two clips on the diagonal tubes aft of the pilot's compartment. (See figure 26.) Hold litter forward against stops with the two straps through the front litter stirrup, then strap the litter down with the four straps which fasten each other to the fuselage structure. Insure that the crash pad is in



1. Radio Receiver
2. Fire Extinguisher
3. Antenna Reel

4. Radio Transmitter
5. Engine Tool Kit
6. Radio Power Supply

7. Pyrotechnics
8. Flight Report Holder
9. Battery

10. Data Case
11. Mooring Kit
12. Protective Covers
13. Stowage Box

Figure 20—Airplane Arrangement (L-5)

place on the cross tube just forward of the litter floor. Then close the doors and lock them by turning the handles up.

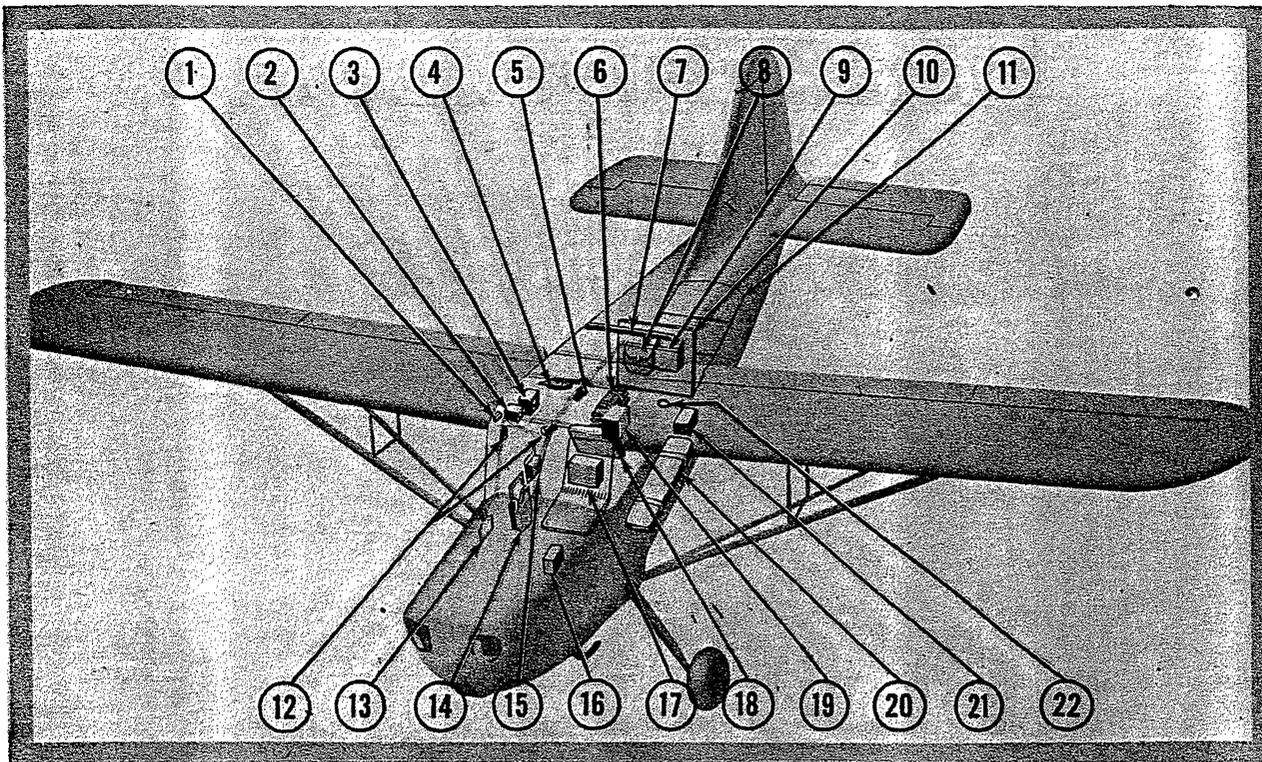
WARNING

Be certain that the rear control stick is removed and stowed and the doors are properly latched and locked before taking off.

c. CARGO INSTALLATION.—It is permissible to carry up to 200 pounds of cargo on the litter floor. This can be done by placing 200 pounds on the front panel of the floor or 150 pounds on the front panel and 50 pounds on the rear panel. Do not carry any cargo when observer's seat is occupied. All cargo must be carefully tied down to prevent shifting. Handles are provided on the fuselage structure for attaching tie-down ropes or straps. (See figure 25.)

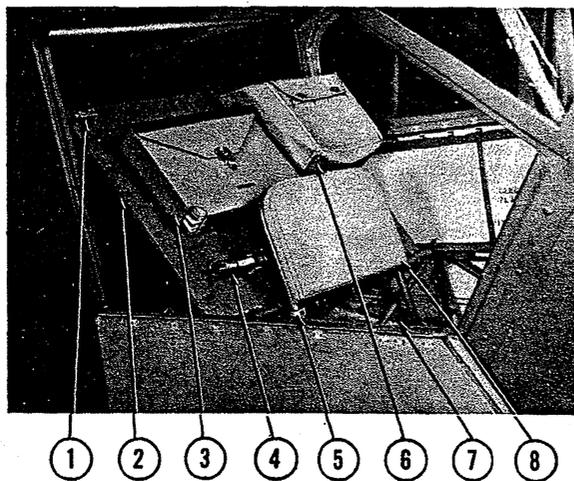


Figure 21—Pilot's Seat Adjustment Handle



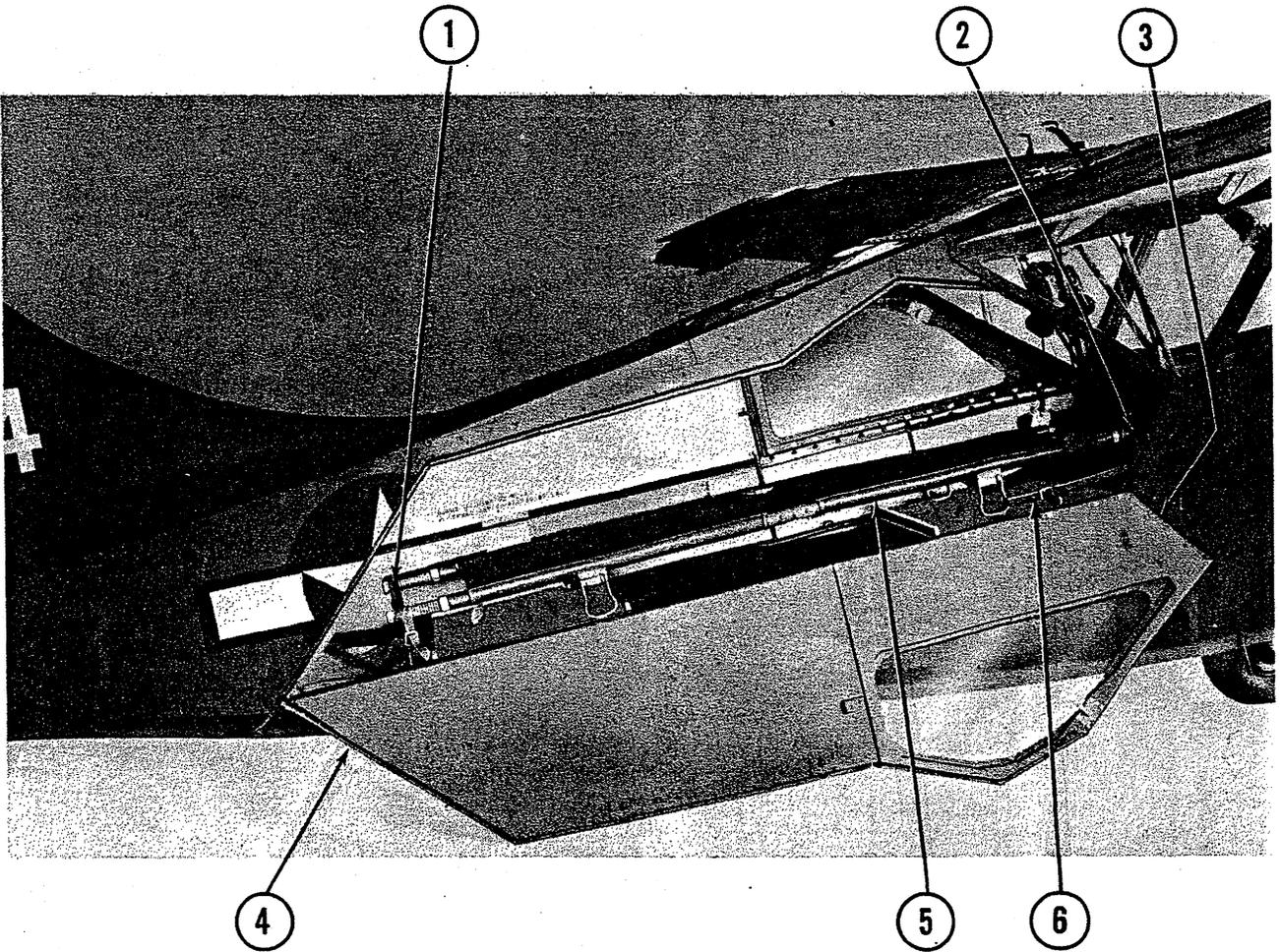
- | | | | |
|-------------------------------------|------------------------|--------------------------|---------------------------|
| 1. Recognition Lights Switches | 7. Shade Curtain | 13. Pilot's Check List | 19. Radio Transmitter |
| 2. Beacon Radio Receiver | 8. Data Case | 14. Flight Report Holder | 20. Mooring Kit |
| 3. Radio Receiver | 9. Pyrotechnics | 15. First Aid Kit | 21. Stowage Box |
| 4. Antenna Reel | 10. Front Litter Panel | 16. Radio Power Supply | *22. Camera Mounting Ring |
| 5. Observer's Cockpit Light | 11. Rear Litter Panel | 17. Battery | *Starts on L-5C |
| 6. Engine Tools and Airplane Covers | 12. Pilot's Lights | 18. Crash Pad | |

Figure 22—Airplane Arrangement (Ambulance Models)



- | | |
|--------------------------------------|--------------------|
| 1. Latch | 5. Seat Back Tie |
| 2. Front Litter Panel | 6. Pyrotechnics |
| 3. Data Case | 7. Stowage Box |
| 4. Observer's Control Stick (Stowed) | 8. Observer's Seat |

Figure 23—Rear of Observer's Compartment (Ambulance Models)



- 1. Rear Tie-Down Straps
- 2. Front Tie-Down Straps

- 3. Observer's Door
- 4. Litter Door

- 5. Stretcher
- 6. Stirrup Straps

Figure 24—Stretcher Installation

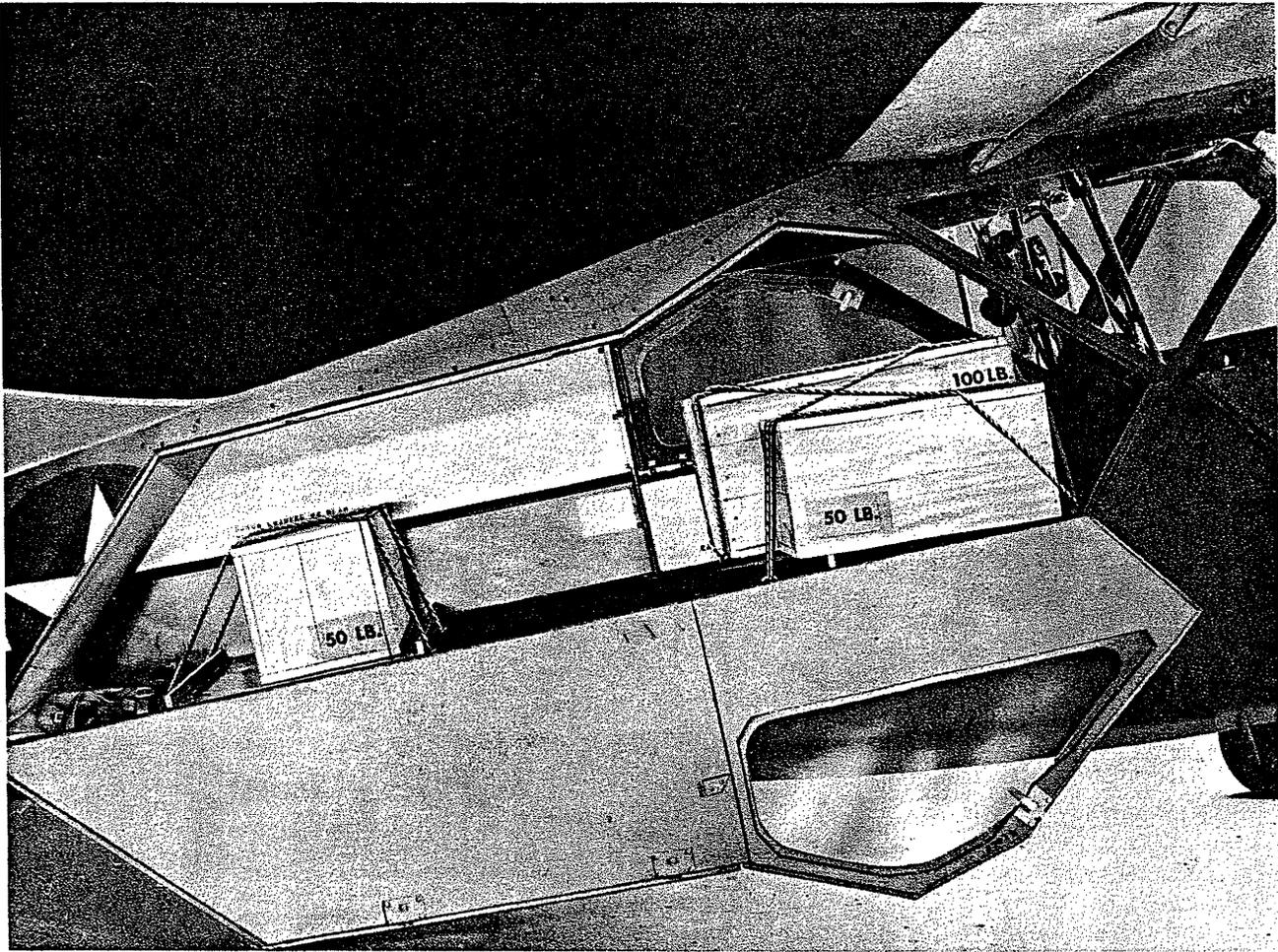
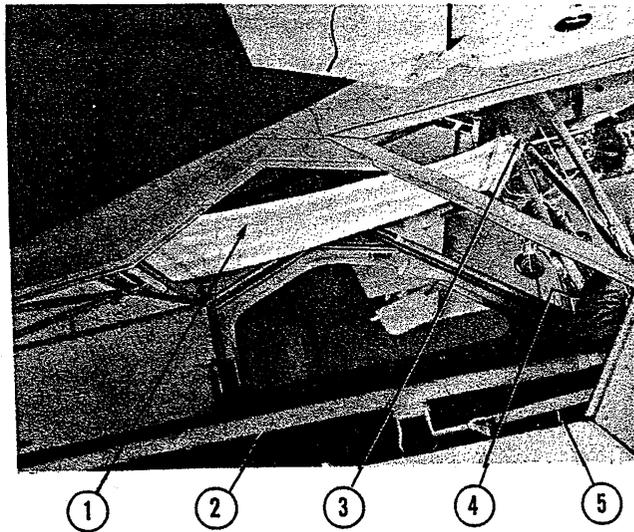


Figure 25—Cargo Installation



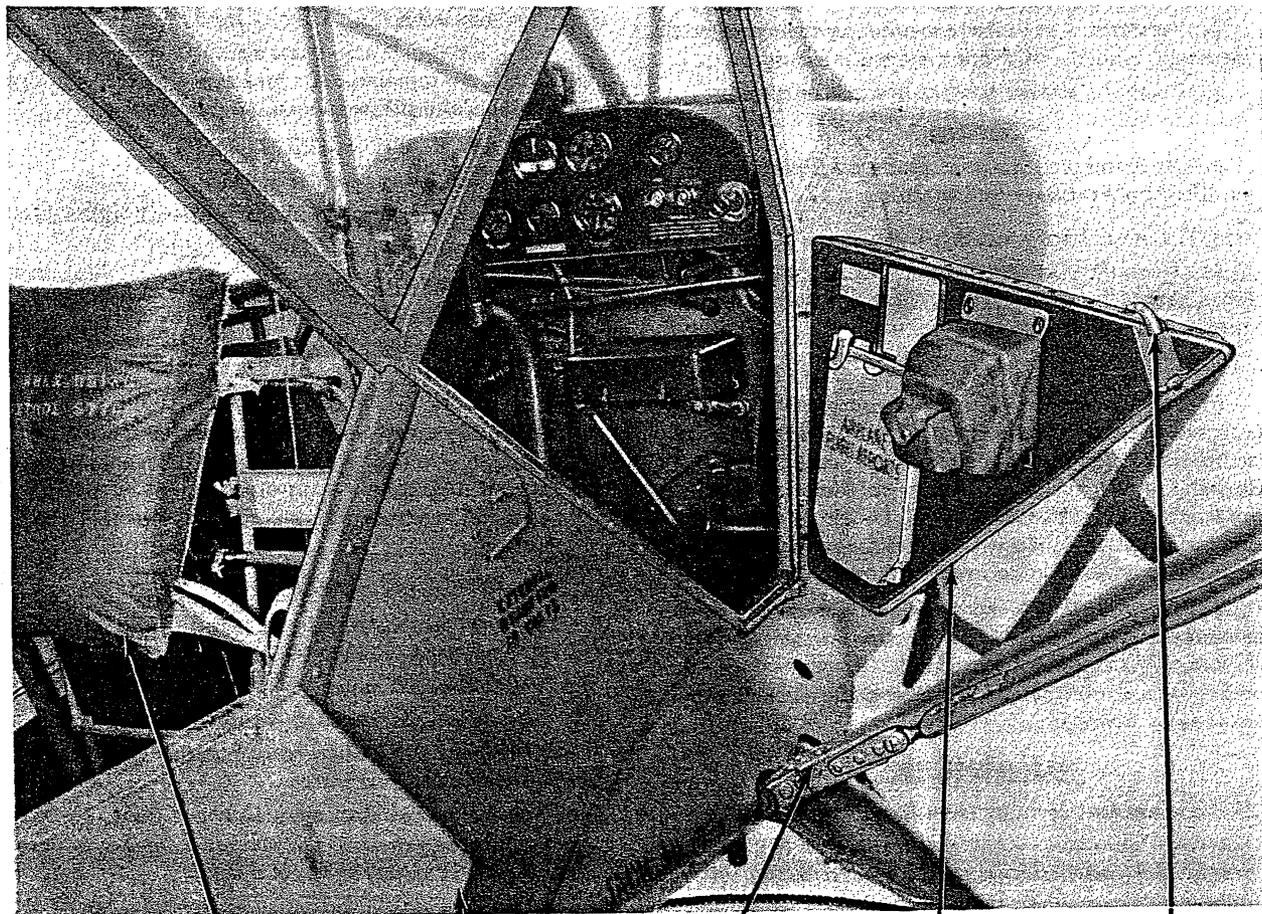
1. Curtain
2. Stretcher

3. Hook

4. Crash Pad
5. Stirrup Tie

Figure 26—Shade Curtain

SECTION II NORMAL OPERATING INSTRUCTIONS



1. Crash Pad
2. Observer's Door

3. Step

4. Pilot's Door
5. Door Latch

Figure 27—Cabin Entrances

1. BEFORE ENTERING PILOT'S COMPARTMENT.

a. RESTRICTIONS.

(1) FLIGHT.

(a) All normal maneuvers can be performed. The outside loop is prohibited. Never spin the airplane when it is being used as an ambulance or cargo airplane.

(b) Do not exceed 200 mph indicated air speed at any time.

(c) Do not exceed 100 mph indicated air speed with flaps down.

(d) Do not exceed 90 mph indicated air speed with ailerons drooped.

(e) See stalling speed diagrams (figures 28 and 29) for minimum air speeds.

(2) TAXIING.—Always taxi the airplane slowly with flaps up and ailerons neutral. To avoid wear on brakes, do not use them for steering except in an emergency.

(3) GROUND OPERATING LIMITATIONS.

(a) Do not operate recognition lights for more than 10 seconds on the ground.

(b) Do not operate engine above 1800 rpm longer than necessary to test instruments.

b. TAKE-OFF.—Refer to the take-off, climb, and landing charts for effect of gross weight upon take-off distances.

c. ADDITIONAL CHECKS.

(1) Ascertain that there are no repairs in progress on the airplane that will render it unsafe for flying.

(2) See that the wheels are not stuck or mired.

CAUTION

Never attempt to free the airplane by lifting or pushing up on the wing lift strut.

(3) Remove the pitot tube cover.

(4) Check the completeness of the Airplane Flight Report, Form 1, placed in the flight report holder on the inside of the pilot's door.

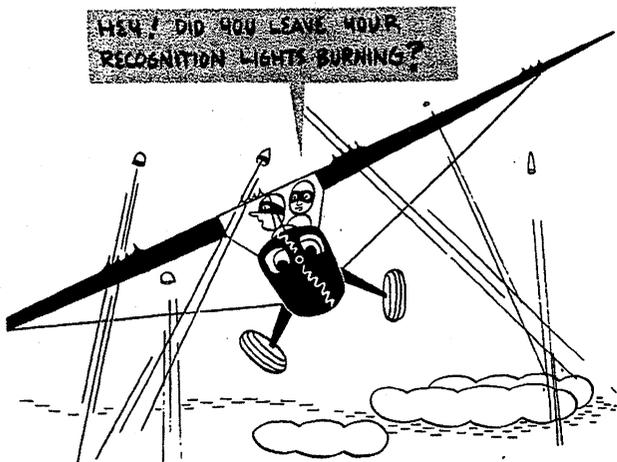
d. HOW TO GAIN ENTRANCE.

(1) Entrance to the pilot's compartment is gained through the door on the right side of the airplane. To open the door, turn down the window latch handle and allow the window to open. Then push the door handle forward to release the door latch. In later airplanes the door is opened by lifting the curved latch handle. It is permissible to use the root of the lift strut as a step.

(2) The observer's compartment is opened in the same manner as the pilot's compartment in the L-5. The rear doors of the ambulance models hinge about their lower edges and are opened by turning the latch handle down. (See 5, figure 15.)

WARNING

If the observer's compartment is not to be used, remove the rear control stick and fasten the rear safety belt across the seat. Fasten back of observer's seat with strap provided. (See 5, figure 23.) See that the microphones and headphones are properly secured and that neither the wires nor any loose object can interfere with the controls.



2. ON ENTERING THE PILOT'S COMPARTMENT.

a. CHECK FOR ALL FLIGHTS.

(1) Check the flight controls for freedom of motion.

(2) See that the trim tab is neutral.

(3) Check the fuel tank contents by means of the fuel gage on each tank. (See 2, figure 10.)

(4) Test the brake operation. If the pedal action feels soft or unresponsive, there is air in the hydraulic lines which should be removed before take-off.

b. CHECK FOR NIGHT FLYING.

(1) Turn the cockpit light "ON."

(2) Turn the fluorescent instrument light "ON."

(3) Test-operate the compass light.

(4) Test-operate the position lights.

(5) Test-operate the landing light.

(6) Test-operate the recognition lights.

WARNING

Do not operate the recognition light for more than 10 seconds while the airplane is on the ground. The lens are not properly cooled when the airplane is not flying and can be burned out easily.

3. STARTING PROCEDURE.

a. Head the airplane into the wind to aid in cooling the engine. Set the parking brakes.

b. Ignition switch must be "OFF."

c. Turn the fuel selector valve to the fullest tank.

d. Carburetor air heat control should be all the way in to the full-cold position.

e. If the engine has been idle for 2 hours, pull the propeller through 4 or 5 revolutions by hand to ensure the cylinders are clear of fuel and oil.

WARNING

Never start engine near a pool of gasoline.

f. Set the throttle approximately $\frac{1}{10}$ open.

g. Mixture control should be pushed all the way into the full-rich position.

b. Prime the engine two to five strokes, depending on the temperature. A warm engine does not need priming.

CAUTION

Do not prime the engine by pumping the throttle, since raw fuel in the carburetor is a definite fire hazard. Be certain that the primer is closed and locked after priming.

i. Turn the master switch "ON" and on L-5 airplanes, the ignition switch to "BAT" position.

j. Press the starter button. Use an external power source for starting whenever possible.

k. Allow at least 1 full engine revolution and then turn the ignition switch to "BOTH." The engine should start within the next 1 or 2 revolutions.

WARNING

If no oil pressure is indicated in 30 seconds after starting, turn the ignition switch "OFF."

l. If the engine does not start, prime half the original number of strokes and try it again. If fuel drips from the carburetor drain showing that the engine is over-primed, turn the ignition switch "OFF," open the throttle wide, and turn the engine by hand through approximately 10 revolutions.

4. WARM-UP.

Head the airplane into the wind. As soon as the oil gage registers pressure, run the engine at 600 to 800 rpm until the oil pressure is approximately 30 psi. Run the engine at this speed for several minutes more and then increase to 1000 rpm. Warm up at 1000 rpm until the throttle can be opened rapidly without the engine backfiring or missing.

5. SCRAMBLE TAKE-OFF.

a. Start the engine as in paragraph 3, this section, with carburetor heat off.

b. Increase rpm as fast as possible, using carburetor air heat to aid the acceleration. Do not exceed 1800 rpm.

c. Disregard the oil temperature if necessary, but the gage must indicate some oil pressure. As soon as the throttle can be opened rapidly without the engine backfiring or missing, shut off the carburetor air heat and take off.

6. GROUND TEST.

a. Open the throttle until a speed of 1800 rpm is attained. The oil pressure should be 50 to 85 psi and the oil temperature at least 10 degrees C (50 degrees F).

CAUTION

The pressure baffle cooling system used on the L-5 airplane requires forward speed to cool the engine. Under no circumstances shall the engine be operated at or near full throttle on the ground longer than is necessary for a quick reading of the instruments.

b. Turn the fuel selector valve to the left and right fuel tanks long enough to insure proper engine performance on each tank. (See 10, figure 12.)

c. With the engine running at about 800 rpm, turn the ignition switch "OFF" momentarily. If the engine does not stop firing, a defective ground connection is indicated. Stop the engine by putting the mixture control in full-lean or idle cut-off position and slowly move the throttle to full-open position. Investigate the ignition switch and connections. Do not touch the propeller until the defect has been corrected.

d. At 1800 rpm, check the operation of the engine on each magneto by switching from "BOTH" to "RIGHT" to "BOTH" to "LEFT" to allow engine to pick up rpm and indicate a true drop. The engine is ready for flight when the operation on each magneto is smooth and the drop in rpm does not exceed 100.

7. TAXIING INSTRUCTIONS.

Always taxi the airplane slowly with flaps up and ailerons neutral. Steering on the ground is controlled by the rudder pedals which operate the tail wheel. To avoid wear on the brakes, do not use them for steering except in an emergency.

8. TAKE-OFF.

a. GENERAL.

(1) The mixture control should be set all the way in to the full-rich position unless the altitude is above 5000 feet, and leaning of the mixture is necessary for smooth operation.

(2) Carburetor air heat should not be used during take-off. With the outside air between -6 degrees and +20 degrees C (21 degrees F and 68 degrees F), use heat just before and after take-off. Refer to the windshield free air temperature gage. (See 2, figure 9.)

(3) Release the parking brake.

b. NORMAL.

(1) The best take-off is obtained with the flaps set in the intermediate position. To find the take-off distance, refer to figure 40.

(2) The best take-off speed for this condition is 49 mph.

(3) After clearing ground hazards, the flaps can be raised gradually as the speed increases. If the flaps are raised suddenly, the airplane will lose altitude.

c. SHORT RUNWAY.

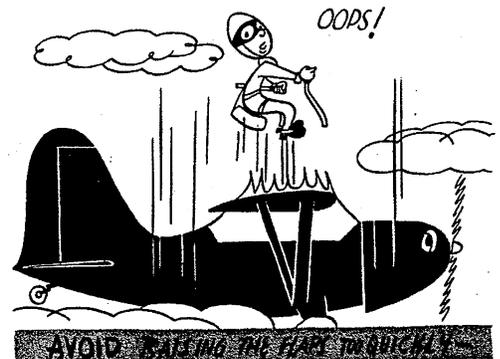
(1) The best take-off to clear an obstacle is obtained after a short run when the flaps are set in the intermediate position and, in airplanes so equipped, the ailerons are drooped TWO TURNS of the control crank. To find the take-off distance, refer to figure 42.

(2) The best take-off speed for this conditions (with ailerons drooped) is 47 mph.

(3) After the obstacle has been cleared, first return the ailerons to neutral and then raise the flaps as the speed increases. The ailerons and flaps must be slowly returned to neutral since their sudden release will cause the airplane to lose altitude.

d. CULTIVATED FIELDS.

(1) The wheels may be pulled out of soft muddy



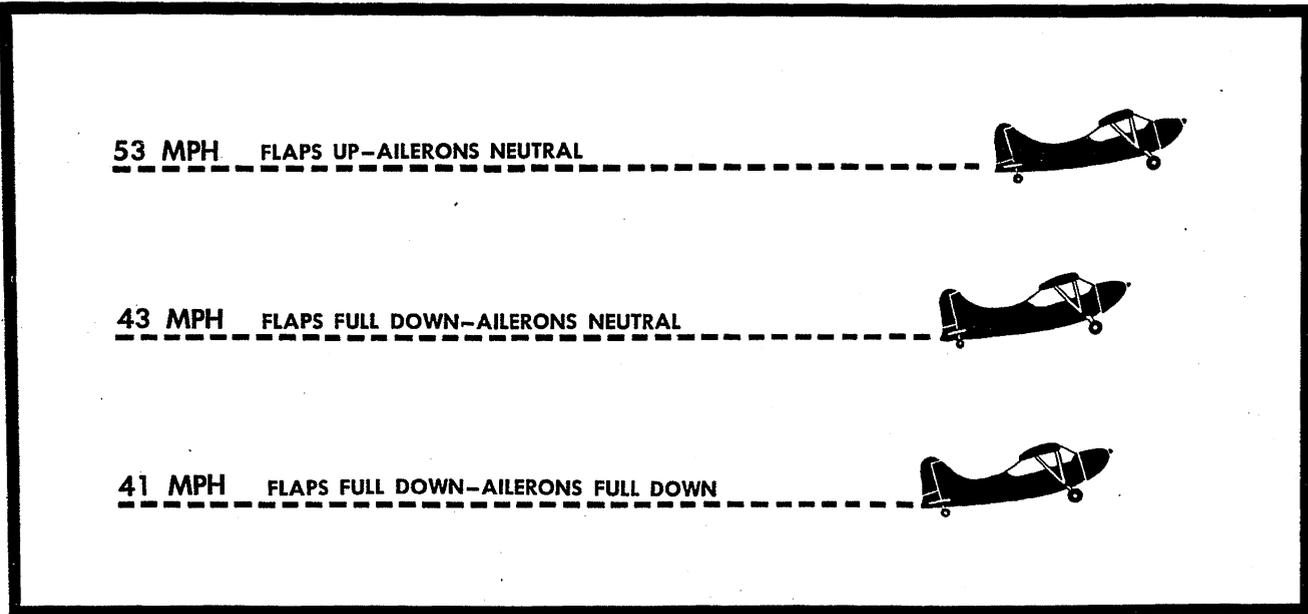


Figure 28—Stalling Speed—Power On

terrain or tall grasses by setting the flaps and ailerons in the full-down position. These conditions are for emergency take-off only.

WARNING

If obstacle is present, do not use this technique.

(2) After wheels have cleared the ground, slowly return ailerons to neutral position as the speed increases and raise the flaps to the intermediate position.

(3) After clearing ground hazards, gradually raise the flaps to the up position as the speed increases.

9. ENGINE FAILURE DURING TAKE-OFF.

a. Put the nose of the airplane down sufficiently to maintain a gliding speed of 65-70 mph.

b. Lower the flaps to the full-down position if time permits.

c. Turn the fuel selector valve "OFF" and pull out the mixture control to the idle-cut-off position.

d. Turn "OFF" the master battery switch unless lights are needed.

e. Turn the ignition switch "OFF" or to "BAT" if lights are needed.

f. Be ready to use the fire extinguisher.

g. LAND STRAIGHT AHEAD!

10. CLIMB.

The best climbing air speed after the obstacle is passed is 82 mph. Refer to the Take-off, Climb, and Landing Chart (appendix I) for climbing speeds at various altitudes.

11. FLIGHT OPERATION.

a. USE OF THE MIXTURE CONTROL.

(1) All operations below 5000 feet altitude shall be conducted with the mixture control all the way into the full-rich position.

(2) Above 5000 feet the mixture can be leaned to obtain smooth operation. The setting is made by placing the throttle at the desired rpm, and adjusting the mixture control to the position at which further leaning decreases the rpm.

(3) Any change in altitude above 5000 feet requires a readjustment of the mixture control.

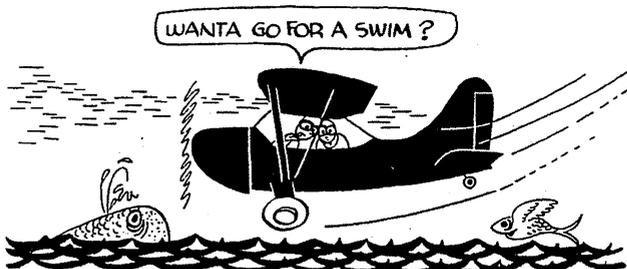
b. USE OF THE CARBURETOR AIR HEAT.

(1) Below -6 degrees C (21 degrees F), and above +20 degrees C (68 degrees F), the carburetor heat should not be used.

(2) Between -6 degrees C (21 degrees F) and +20 degrees C (68 degrees F), use carburetor heat.

(3) During any extended idling as in a glide, use of the carburetor heat is recommended under any temperature conditions.

BRAKES NEED NOT BE USED IN EVERY LANDING



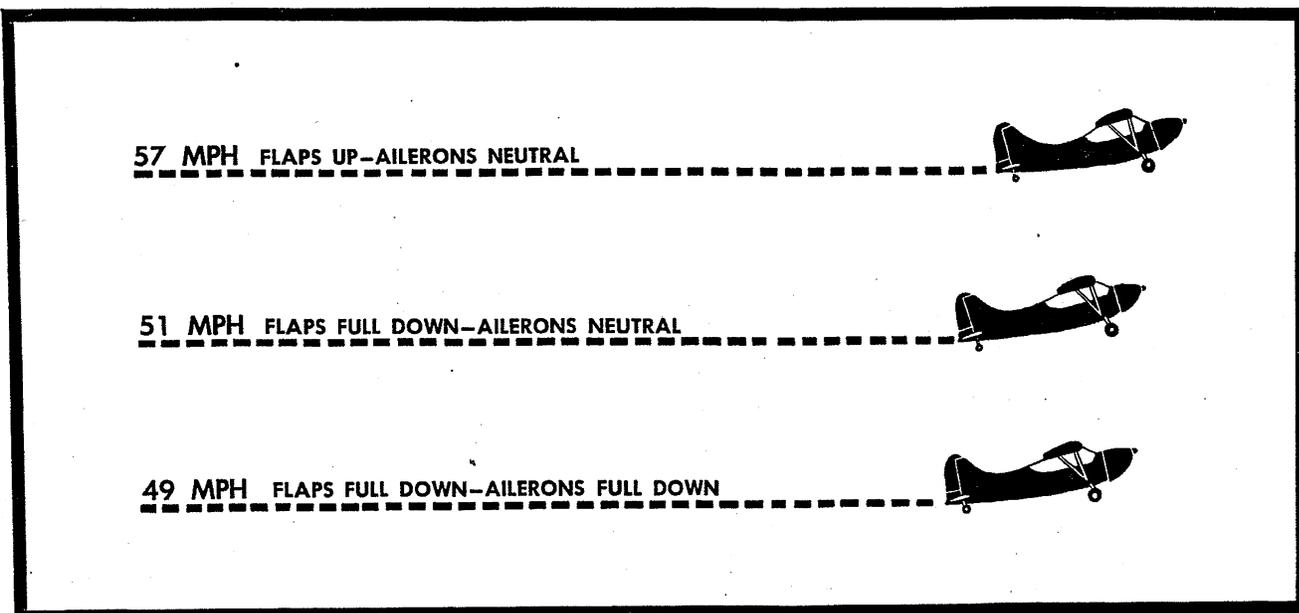


Figure 29—Stalling Speed—Power Off

CAUTION

If the rpm is dropping even though the temperature is outside the specified limits, the probable cause is carburetor icing and not a creeping throttle.

c. USE OF THE THROTTLE.—After such maneuvers as a stall or spin, the engine should be cleared by opening of the throttle. In a long glide, this shall be done at least every 250 feet of lost altitude or about every 20 seconds. A throttle between $\frac{1}{8}$ and $\frac{1}{2}$ open clears the spark plugs and develops sufficient heat to prevent overcooling of the engine.

12. GENERAL FLYING CHARACTERISTICS.

a. STABILITY.—Stability tests of the airplanes have indicated that they are adequately stable longitudinally, laterally, and directionally with the center of gravity located at either the forward or rear limit (20 or 32 percent of the mean aerodynamic chord).

b. CRUISING.—The best cruising condition is obtained at 2230 rpm. At 6000 feet altitude, the indicated air speed will be 100 mph. Above 5000 feet the mixture should be leaned out to obtain smooth operation. Refer to the Power Plant Chart, section III, for other conditions of flight.

c. INCREASING ENGINE POWER.—To increase engine power, open the throttle. If the airplane is above an altitude of 5000 feet, readjust the mixture control, if necessary, to obtain smooth operation.

d. DECREASING ENGINE POWER.—To decrease engine power, pull the throttle back to close the throttle. Then, readjust the mixture control to obtain smooth operation if the airplane is above 5000 feet.

13. STALLS.

The airplane can fly at a high angle of attack without stalling. An approaching stall is indicated by looseness of the controls and mushing. There is no tendency to spin after stalling. Refer to figures 28 and 29, for specific stalling speeds. These speeds are applicable when the gross weight of the airplane is 2100 pounds. When the gross weight is 2200 pounds, the stalling speeds will be about a 1.5 mph greater.

14. SPINS.

It is difficult to spin the airplane, but if it should enter a spin, recovery can be effected in one-half turn in the early stages of the spin. The recommended method is to keep the ailerons neutral, reverse the rudder quickly, and push the stick full forward.

WARNING

Do not spin the airplane when it is being used as a cargo or ambulance carrier.

15. APPROACH AND LANDING.

a. Check the fuel supply.

b. Set the mixture control all the way in to the full-rich position unless the field is more than 5000 feet above sea level.

c. Pull the carburetor air heat control all the way out to give full heat.

d. Open the throttle frequently to clear the engine and prevent too rapid cooling during the approach.

e. Set the flaps at full-down position.

f. Set the ailerons in full-droop position.

g. Set the tab at best trim.

h. The best glide air speed with flaps down is 67 mph.

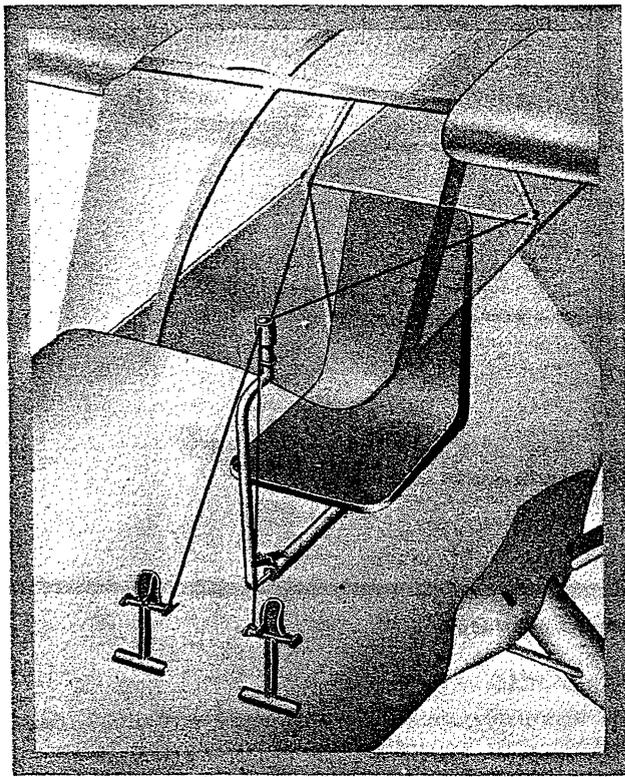


Figure 30—Surface Control Lock

i. The best *glide* air speed with flaps and ailerons down is 65 mph.

j. The best *approach* air speed to an obstacle with flaps down is 58 mph maintained by part throttle.

k. The best *approach* air speed to an obstacle with flaps and ailerons down is at 56 mph maintained by part throttle.

l. At the obstacle, close the throttle and allow the airplane to settle.

Note

The brakes need not be used in every landing especially since the airplane can land in a short distance. Except in emergencies, avoid using them as much as possible. The steerable tail wheel should be used instead of the brakes for turning purposes.

m. After landing, turn off carburetor air heat and taxi with flaps up.

n. For cross wind landings, keep the windward low to counteract the drift, using the rudder to hold the nose straight.

16. TAKE-OFF IF LANDING IS NOT COMPLETED.

a. Turn off carburetor air heat.

b. Smoothly open the throttle wide.



Figure 31—Protective Covers

c. Hold stick forward to prevent climbing until speed is regained, ailerons are raised, and the elevator tab is reset.

17. STOPPING THE ENGINE.

a. Idle the engine for a short period (1 minute at 800 rpm) to cool it before stopping.

b. Stop the engine by pulling the mixture control all the way out to the full-lean position, simultaneously moving the throttle to full-open position. This operates the idle cut-off and stops the flow of fuel at the carburetor. After the engine has stopped, turn the ignition switch "OFF" and close the throttle. Leave the mixture control in the full-lean position as a safety precaution against accidental starting.

18. BEFORE LEAVING THE AIRPLANE.

a. Turn the fuel selector valve "OFF".

b. Apply the toe brakes and set the parking brake. Always allow the brake expander tubes to cool for a few minutes before setting the parking brake.

c. Turn off the switches on the main panel, on the recognition light panel, on the cockpit lights, and on the communication equipment.

d. Make out forms I and Ia (Army personnel only).

e. Lock the flight controls with the lock stored in the box aft of the observer's seat. The steel cables are hooked to the inboard side of the pilot's rudder pedals, placed over the pilot's stick, and hooked to the tubes above and aft of the pilot's seat. (See figure 30.)

19. TYING DOWN.

(See figure-31.)

The airplane should be moored at the rear assist handle and at the tie-down points on the upper ends of the front lift struts. Under most circumstances, it is advisable to cover the airplane if it is to remain idle for a day or so. Besides providing protection, the covers also assist in camouflaging the airplane by preventing the reflection of light from the canopy. Each set contains a propeller cover, engine cover, canopy cover, exhaust cover, and pitot tube cover, which are put on the airplane in the following manner:

Note

Lower flaps before mooring. This prevents flaps from jiggling in the wind and causing excess wear.

a. PROPELLER COVER.—The propeller cover consists of two pieces, each of which is pulled over a blade. The drawstring is tied at the blade root.

b. ENGINE COVER.—The propeller must be in a horizontal position before the engine cover can be installed. The cover is slipped on over the right side of the propeller so that the pad fits over the propeller hub. It is then pulled back over the cowling and fastened in place by means of the snap fasteners along the left side. The cuff over the left side of the propeller is fastened with snap fasteners and the drawstrings in both cuffs are tightened. A drawstring also tightens the cover around the rear edge of the cowling. It can be secured further by fastening cords from the sides of the cover to the lift struts.

c. CANOPY COVERS.—The canopy cover is put over the top of the airplane, and the side panels are passed under the wings. The windshield thermometer bulb must be put through the hole provided for it.

CAUTION

In putting the canopy cover into place, avoid contact between the Plexiglas and the metal fasteners as much as possible since the surface of the plastic scratches easily.

Fasteners are provided on the covers so that they fasten together along the fuselage rearward from the trailing edge of the wing. Small tabs fasten over the fuel lines where the lines extend from the wing panels to the fuselage. At the rear of the canopy, the cover is fastened to the studs which are screwed into the canopy frame. A cord provided at the front of the cover can be fastened to the propeller hub.

d. PITOT TUBE.—Cover the pitot tube with the sock provided, making certain that the red ribbon can be seen to remind the pilot to remove it before take-off. When not in use, the sock is kept in the box behind the observer's seat.

e. EXHAUST STACK.—Slip the covers over exhaust stacks and tie with strings.

SECTION III OPERATING DATA

1. POWER PLANT CHART.

This chart contains the reading or position of the engine instruments and controls consistent with a specified operating condition. If the rpm, oil temperature, or oil pressure appears irregular during flight, the engine should be throttled down and, if possible, a landing should be made so that the trouble can be investigated.

Note that the specified fuel is grade 73 in accordance with Specification No. AN-F-23. In an emergency, fuel of higher grade may be used. However, this fuel should be used only as long as grade 73 cannot be obtained, since the higher grade fuel will deposit lead on the spark plugs, cause engine roughness, and burn the valves.

Note

If the aircraft fuel and lubricants specified are not available, the following U. S. Army or Navy materials may be used as applicable. Motor fuel (all purpose) may be used for this engine in accordance with U. S. Army Specifica-

tion No. 2-103B (grade 72 or 80) or Navy Specification No. 7M-1.

Oil may be used for this engine in accordance with U. S. Army Specification No. 2-104B (SAE 50) or Navy Specification No. 14-0-13.

2. INSTRUMENT MARKING.

a. GENERAL.—A four color system for designating approved operating ranges and limits is used to facilitate the proper cruising operation of aircraft. Colors used and their meanings are:

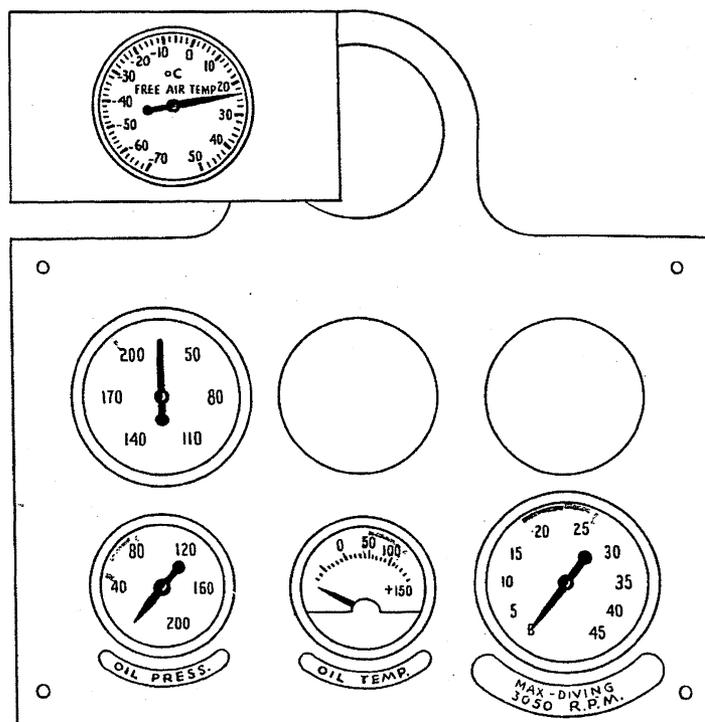
(1) Blue.—Desirable cruising range.

(2) GREEN.—Desirable operating region from max. cruise to max. continuous operation.

(3) RED.—Limit or danger region.

(4) YELLOW.—Caution.

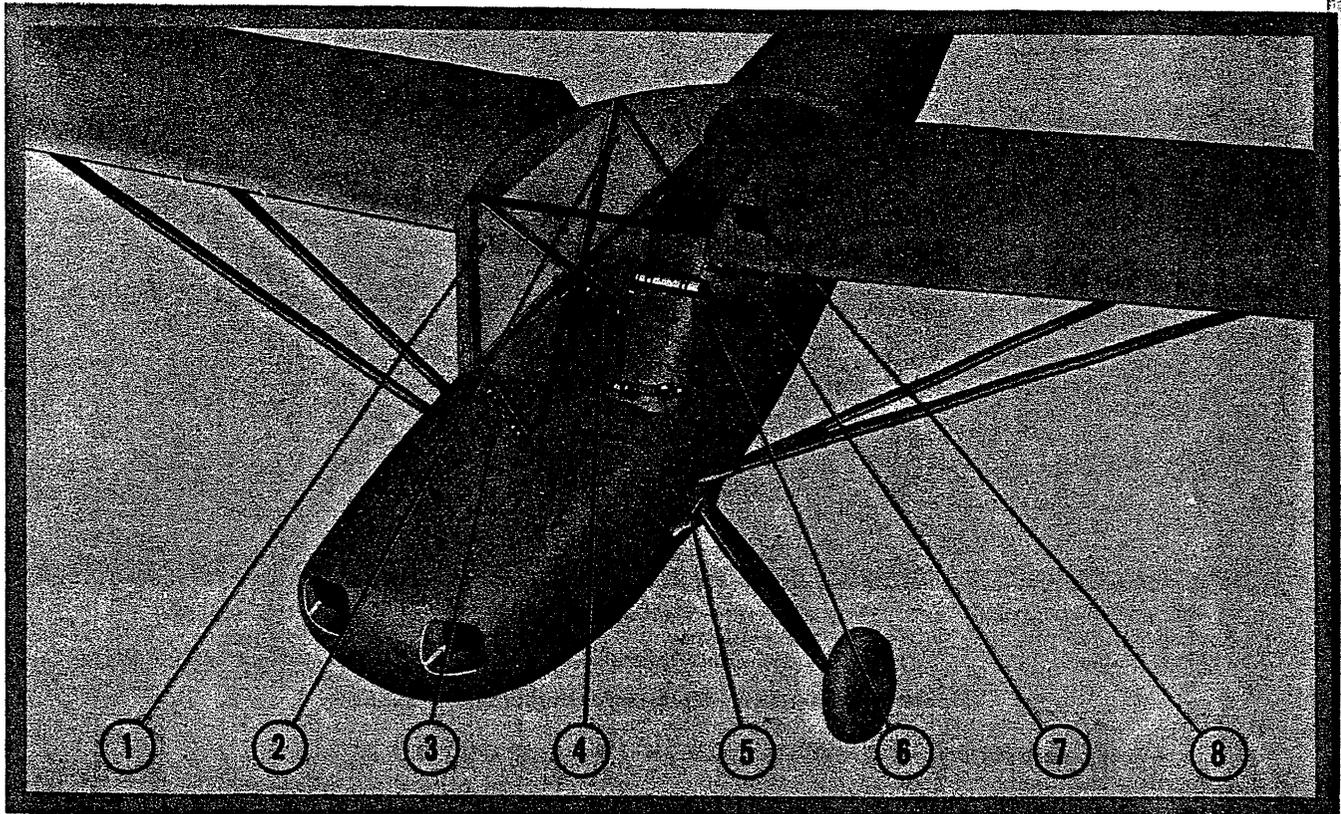
b. OPERATION.—For lean cruising operation it is necessary that the Tachometer pointer registers in the blue region. If the pointer registers in the green arc, rich mixture is required.



INSTRUMENT	RADIAL	ARC
AIR SPEED INSTRUMENT	200-	
TACHOMETER	2550	2300 2550 1900 2300
OIL PRESSURE GAGE	50-85	65-85
OIL TEMPERATURE GAGE	40-105	50-105

Figure 31A—Instrument Marking

SECTION IV EMERGENCY OPERATING INSTRUCTIONS



1. Front Window Latch
2. Rear Window Latch
3. Pilot's Door Release

4. Observer's Door Release
5. Pilot's Safety Belt

6. Fire Extinguisher
7. Observer's Safety Belt
8. Pyrotechnics

Figure 33—Emergency Equipment (L-5)

1. EMERGENCY EQUIPMENT.

a. EMERGENCY DOOR RELEASES.—In the L-5 airplane, the emergency door releases are just forward of each door. To release a door while in flight, unfasten the window latch and pull the red handle. This will release the hinge pins and allow the door to fall out.

In the ambulance models, no emergency release is provided for the observer's door. However, the door can be opened readily by turning the latch handle down and rotating the door about its hinge.

b. FIRE EXTINGUISHER.—The type A-2 fire extinguisher is mounted on a cross tube at the rear of the pilot's seat in the L-5 airplane. In the ambulance models it is strapped to the fuselage tube forward of the pilot's door. (See figures 33 and 34.)

c. PYROTECHNICS.—A pyrotechnic pistol and signal cartridge are in a cloth holder attached to the back

of the observer's seat. In the ambulance models, the holder is fastened to the front face of the hinged panel of the litter floor. (See figures 33 and 34.) For signaling, aim the pistol through an open window, away from the wing and lift struts.

d. FIRST AID KIT.—A first aid kit is fastened to the pilot's door. (See figure 19.)

2. EMERGENCY PROCEDURES.

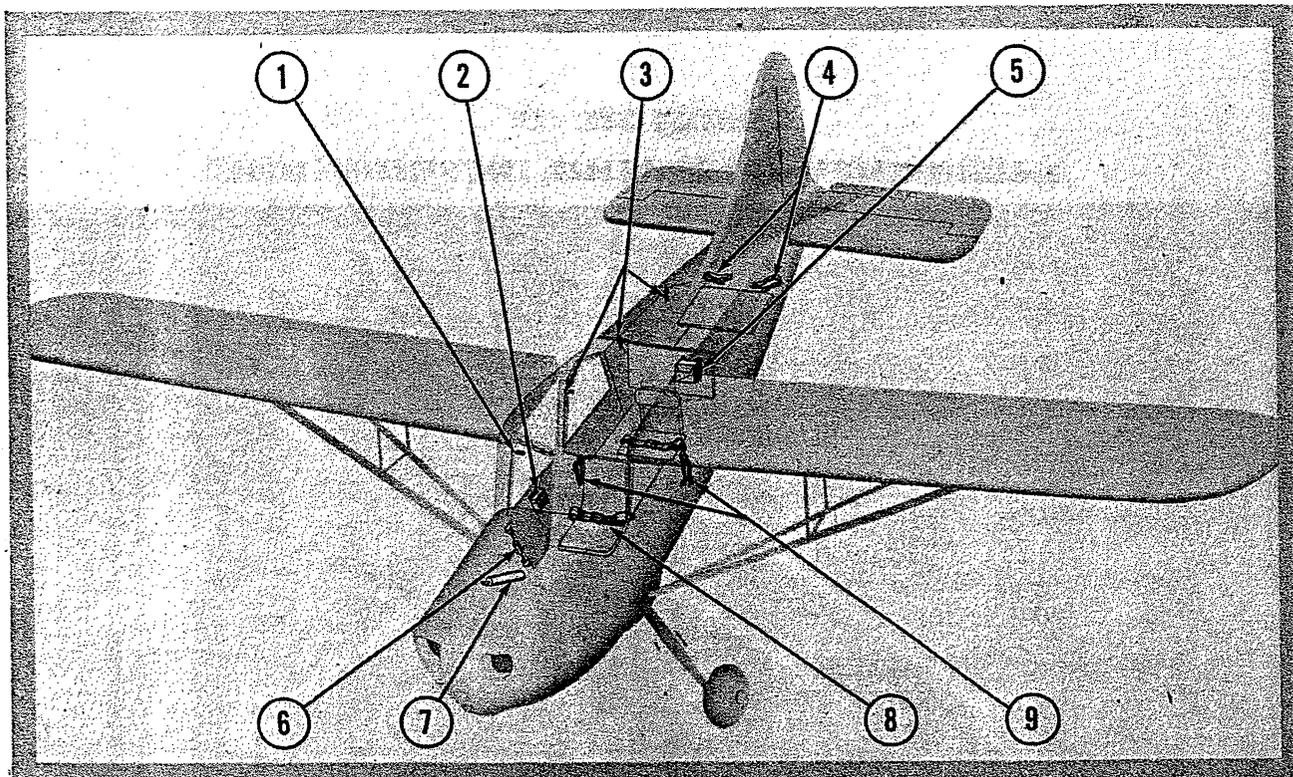
a. ENGINE FAILURE DURING TAKE-OFF.

(1) Put the nose of the airplane down sufficiently to maintain a gliding speed of 65 to 70 mph.

(2) Lower the flaps and ailerons to the full-down position if time permits.

(3) Turn the fuel selector valve "OFF" and pull out the mixture control to the idle cut-off position.

(4) Turn the ignition switch "OFF" or to "BAT" on model L-5 airplanes, if lights are needed.



- | | | |
|-------------------------|------------------------------|------------------------------|
| 1. Pilot's Window Latch | 4. Stretcher Tie-Down Straps | 7. Fire Extinguisher |
| 2. First Aid Kit | 5. Pyrotechnics | 8. Safety Belt |
| 3. Door Latches | 6. Emergency Door Release | 9. Stretcher Tie-Down Straps |

Figure 34—Emergency Equipment (Ambulance Models)

(5) Turn the master battery switch "OFF" unless lights are needed.

(6) Be ready to use the fire extinguisher.

(7) **LAND STRAIGHT AHEAD!**

b. ENGINE FAILURE DURING FLIGHT.

(1) Put the nose of the airplane down to maintain a gliding speed of 65 to 70 mph.

(2) Select the best available field for landing.

(3) Turn the fuel selector valve "OFF" and pull out the mixture control to idle cut-off.

(4) Turn the ignition switch "OFF" or to "BAT" on model L-5 airplanes, if lights are needed.

(5) Turn the master battery switch "OFF" unless lights are needed.

(6) Prepare for landing. Have the fire extinguisher ready for immediate operation.

c. TAKE-OFF IF LANDING IS NOT COMPLETED.

(1) Turn off carburetor air heat.

(2) Smoothly open the throttle wide.

(3) Hold the stick forward to prevent climbing until speed is regained, ailerons are raised, and the elevator tab is reset.

d. FIRE IN FLIGHT.

(1) The only fire-fighting equipment in the airplane is the type A-2 hand extinguisher mounted on the back of the pilot's seat. It is for use primarily on the ground, although it can be used to extinguish fires in flight in their beginning stages. If the airplane is low when the fire breaks out, as much altitude as possible should be gained. Wing fires can sometimes be extinguished by sideslipping.

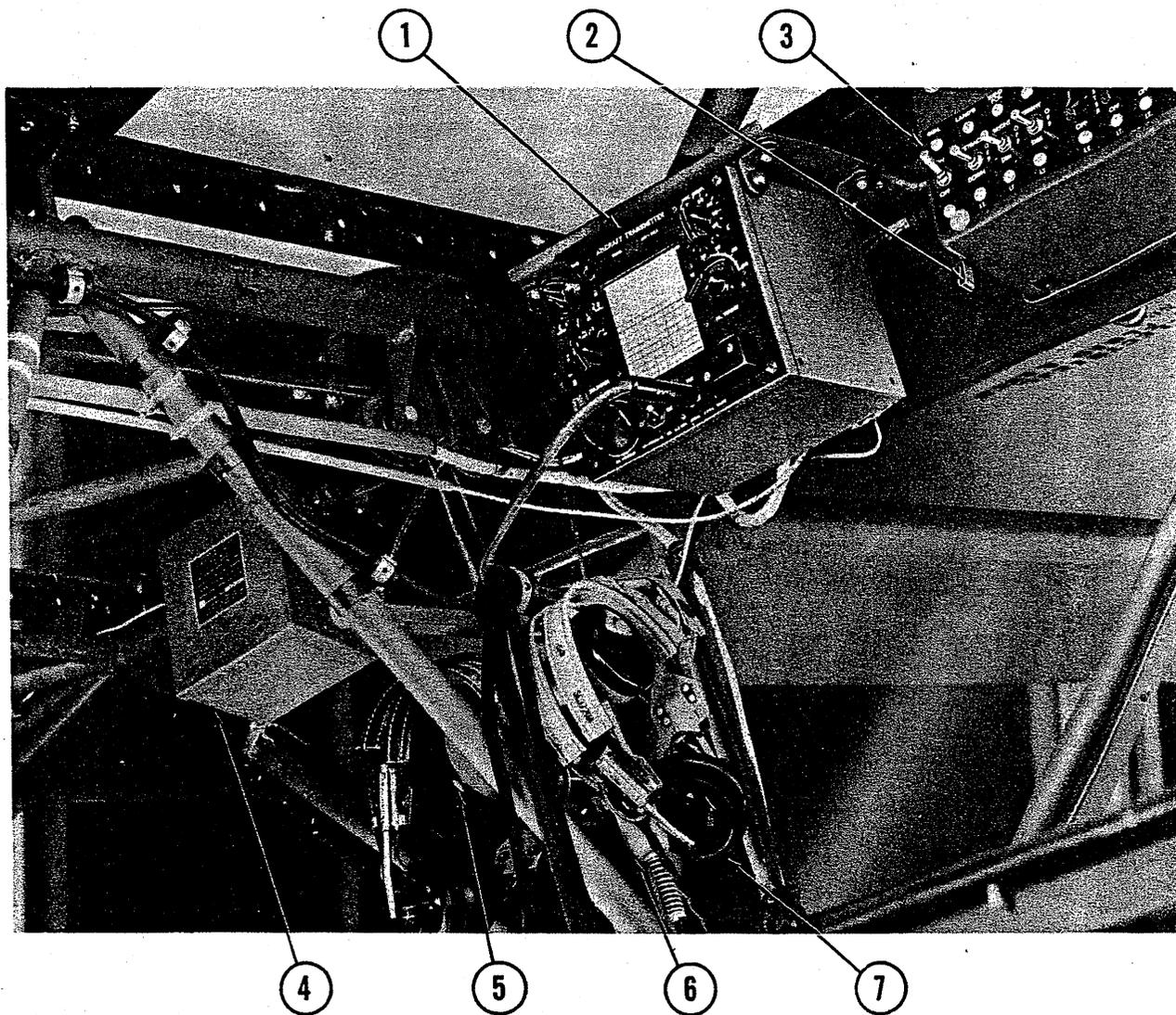
(2) For cabin fires, close the windows and ventilators and direct the extinguisher on the fire. All electrical equipment should be turned off. As soon as the fire is extinguished, open all the windows and ventilators.

WARNING

Carbon tetrachloride, used in the fire extinguisher, becomes a vapor which acts as an anesthetic when inhaled in large amounts. If an extinguisher leaks, it must be repaired or emptied.

(3) In case of a fire in the engine section, the mixture control should be pulled all the way out to the idle cut-off position. The fuel selector valve and the ignition switch should be turned off.

SECTION V OPERATIONAL EQUIPMENT



1. Transmitter
2. Pilot's Microphone Clip

3. Electrical Panel
4. Voltage Booster
5. Observer's Headphones

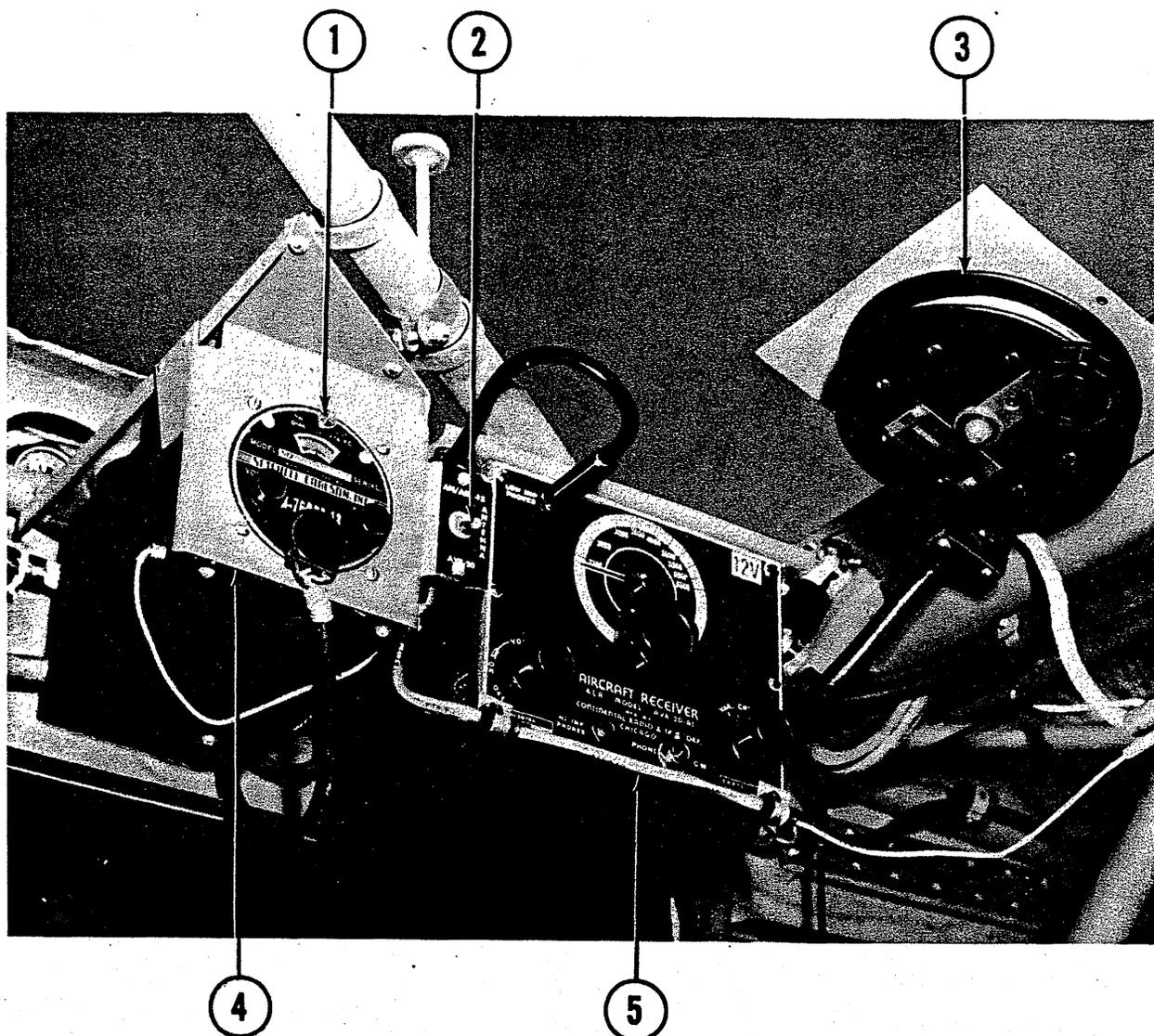
6. Observer's Microphone
7. Pilot's Headphones

Figure 35—Radio Transmitter

1. COMMUNICATIONS EQUIPMENT.

a. DESCRIPTION.—The communications equipment consists of an AVT-15 or AVT-112 transmitter mounted on the left match rib beside the pilot's seat (figure 35), an AVR-20A receiver mounted on the right match rib opposite the transmitter, and on later L-5B and subsequent model airplanes, an AN/ARR-13 receiver mounted forward of the AVR-20A receiver. (See figure 36.) L-5

airplanes equipped with the AVT-112 transmitter have an AVA-126 power supply mounted on a shelf behind the observer's seat. (See figure 18.) The power supply unit is mounted forward of the pilot's control stick in the L-5B and subsequent model airplanes. (See figure 3.) An AVA-120 antenna reel is mounted in the top of the cabin near the receiver. (See figure 36.) L-5 airplanes equipped with the AVT-15 transmitter have a



1. Push-Pull Selector Switch
2. Antenna Switch

3. Antenna Reel

4. AVR-20A1 Receiver
5. AN/ARR-13 Receiver

Figure 36—Radio Receiver

radio fuse located on the right side of the cabin between the doors.

b. OPERATION.

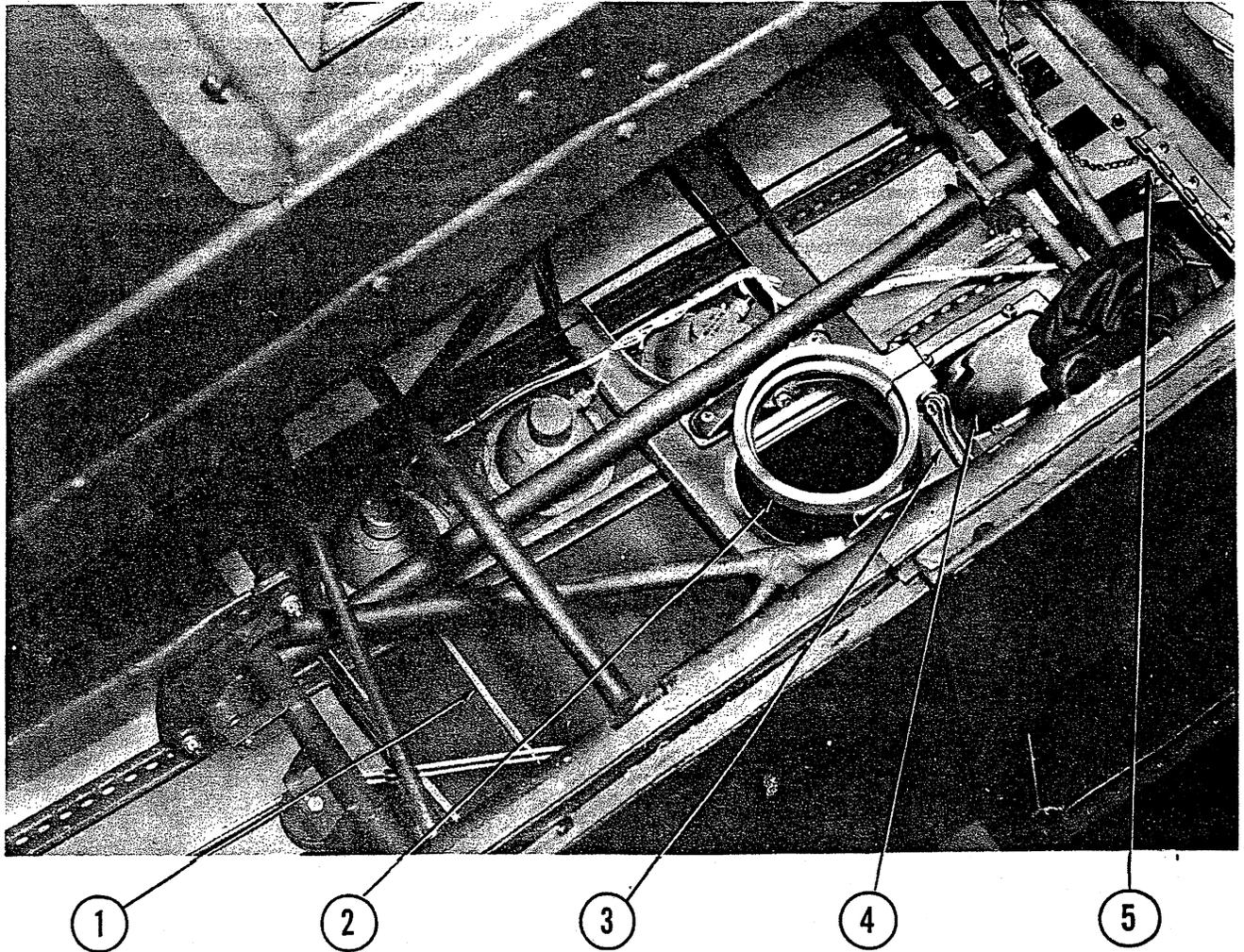
(1) GENERAL.—To operate the radio equipment, turn the master battery switch "ON" and on model L-5 airplanes put the ignition switch in the "BOTH" or "BAT" position.

(2) AVR-20A RECEIVER.—Turn the antenna switch along side the receiver to the "AVR-20" position. Turn the receiver on by a clockwise rotation of the combination "VOLUME" control and "ON-OFF" switch. A distinctly audible click indicates that the power is turned on, but several seconds must elapse before the tubes are warmed up. For variable tuning, rotate the three-position switch marked "VAR-CRYS-

TAL" to the "VAR" position. Advance the volume control nearly to maximum and rotate the tuning knob until a signal is heard.

Code signals can be received by shifting the "PHONE-CW" switch to the "CW" position. To receive voice signals, place the switch in the "PHONE" position. The tuning knob should be adjusted so that the desired signal produces a whistling tone in the headphones when receiving code signals. After locating the signal in the "CW" position, turn the switch to the "PHONE" position and retune the receiver slightly to obtain the maximum output.

(3) AN/ARR-13 RECEIVER.—Turn the receiver on by a clockwise rotation of the "VOLUME" control switch. A distinctly audible click indicates that the



1. Camera Window Cover
2. Camera Mount Ring

3. Clamp Lever

4. Observation Window
5. Hinge Pins

Figure 37—Camera Installation Provisions

power is turned on, but several seconds must elapse before the tubes are warmed up. Turn the antenna switch along side the receiver to the "AN/ARR-13" position and tune the radio to receive the beacon. The push-pull button above the dial will select either dial tuning or fixed frequency for control tower operation.

(4) TRANSMITTER.—The transmitter is turned on by a conventional "OFF-ON" switch. When it is "ON", a jewel light on face of the transmitter should glow. The receiver must be "ON" before the transmitter will operate. The filaments require about 30 seconds to warm up. The transmitter controls and the antenna are set to the desired frequency according to

the tuning chart on the face of the transmitter. Use the antenna length which gives the maximum shadow angle on the antenna current (top) sector of the tuning indicator tube.

To use the microphone, press the button switch and talk directly into the mouthpiece with the lips barely touching it.

DANGER

Do not operate the transmitter in a hangar or near any fuel supplies or while the airplane is being fueled. Electric sparks can cause a fire or an explosion.

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Both the receiver and the transmitter can be turned off by rotating the receiver volume control counter-clockwise. A distinct click indicates that the power has been turned off.

Note

Antenna current must always register on the tuning indicator tube when transmitting. Improper adjustment may result in the current not registering.

An Interphone Communication System (ICS) is incorporated in the transmitter and is switched on at the No. 4 position of the antenna switch. Extra crystals are stored in a rack behind the observer's seat in the L-5. The extra crystals are stowed aft of the receiver in the L-5B and subsequent model airplanes.

(5) ANTENNA REEL.—To operate the antenna reel, pull the handle about a quarter of an inch away from the bakelite disk and turn it to extend or retract the antenna.

CAUTION

Before landing the airplane, be sure to retract the antenna wire.

2. PHOTOGRAPHIC EQUIPMENT.

a. FIXED CAMERA.

(1) INSTALLATION.—In L-5C and subsequent model airplanes, provisions are made for the installation of a type K-20 camera. (See figure 37.) Before installing camera, remove the hinged portion of the litter floor by pulling out the two hinge pins and secure on rear litter floor by use of litter tie-down straps. Unfasten forward edge of canvas litter floor and roll it aft securing the roll with straps provided at the rear litter floor. *Slide the cover over the camera window aft in the slot provided.* Mount camera in the ring provided in the belly of the airplane and secure by depressing clamp handle.

(2) OPERATION.—The camera is operated by the observer who can sit facing aft by folding down the back of the observer's seat.

b. HAND HELD CAMERA.—The large transparent panels of the canopy and the downward slope of the fuselage sides facilitate taking oblique photographs with a camera held in the hands of the observer.

SECTION VI

EXTREME WEATHER OPERATION

1. COLD WEATHER.

a. GENERAL.

(1) ICE, SNOW, OR FROST.

(a) FABRIC SURFACES.—Remove ice and snow from fabric surfaces by melting with warm water and flushing with a brine solution or kerosene. Wipe dry with a clean cloth. Remove loose snow with brooms, evergreen boughs, or light slats.

CAUTION

Do not attempt to chip ice from fabric or Plexiglas surfaces.

(b) WINDOWS.—Remove ice, snow, and frost from Plexiglas surfaces by melting with warm water and flushing with a brine solution, kerosene or glycol. Wipe dry with a clean cloth.

CAUTION

Do not use gasoline on Plexiglas.

(c) CONTROL HINGES.—Remove the ice from inaccessible places by melting with hot water and flushing with unleaded gasoline or kerosene to remove water.

(2) AIR FILTER.—Remove the air filter from the intake scoop in the engine cowl when the prevailing atmospheric conditions indicate a precipitation of snow or ice.

(3) LUBRICATION.—Use engine oil Grade 1080 below 4.4 degrees C (40 degrees F), Specification No. AN-VV-O-446.

b. OPERATION.

(1) PREFLIGHT.

(a) See that flight surfaces are free of ice and snow.

(b) Check the hinges of the doors and windows to make certain that moisture has not frozen them. Ice may prevent the operation of the emergency door release.

(c) Use external power for operation of all electrical equipment while on the ground.

(d) Follow instructions of paragraphs 1. and 2., section II.

(2) PRESTARTING.

(a) Use engine heater to warm engine until it may be easily pulled through by hand.

(b) Connect external power supply.

(c) Do not prime engine until immediately before or during cranking. Prime five strokes.

(3) STARTING.

(a) Start engine in normal manner. Refer to paragraph 3., section II.

(b) Turn on carburetor heat approximately 1 minute after starting.

(4) TAKE-OFF.

(a) Pack or remove loose snow from runway before take-off. If necessary, taxi up and down several times to pack runway.

(b) Do not turn on electrical equipment, except that absolutely needed until generator shows output.

(c) Follow instructions of paragraph 8., section II.

(5) FLIGHT.

(a) Use carburetor air heat when the outside air temperature is between -6 and +20 degrees C (21 and 68 degrees F).

CAUTION

Do not use carburetor air heat for take-off.

(b) Watch oil pressure. A rise in pressure may indicate oil congealing; a drop in pressure may indicate blown oil lines.

(6) LANDING.

(a) Place carburetor heat on before landing. Be prepared to place carburetor heat off to obtain maximum power when it is necessary to go around again.

(b) Turn off electrical equipment not absolutely needed.

(c) Land in usual manner. Refer to paragraphs 14. and 15., section II.

(7) POST FLIGHT.

(a) When parking the airplane on snow or ice, place a layer of fabric, straw, or some other insulating material under the wheels to keep them from freezing to the surface.

(b) Do not use parking brake. If airplane is not moored, use chocks to block wheels.

(c) Install the weather covers. (Refer to paragraph 19., section II.)

2. HOT WEATHER (DESERT).

a. GENERAL.

(1) Take all possible precautions to prevent entrance of sand and dust into the engine and other moving parts. Sand and dust mixed with oil act as a grinding agent and quickly destroy close fitting parts.

(2) Use protector covers to prevent the entrance of sand into the engine compartment and sand abrasion of

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the propeller, windshield, and canopy. Covers also help camouflage the airplane by preventing reflection of light from plastic surfaces. (Refer to paragraph 19., section II.)

(3) Do not cover the canopy on hot days unless required for sand or camouflage protection, as covers increase the temperature around the canopy and may cause permanent deformation of the Plexiglas panels, and malfunctioning of equipment.

(4) Avoid leaving the airplane in the sun's rays. Radio equipment and instruments can be damaged in hot weather by excessive temperatures which develop in closed cockpits of airplanes parked in the sun.

(5) When airplane must be parked in the sun, keep windows open to allow circulation of air unless unfavorable weather conditions require use of covers.

CAUTION

Be careful when handling an airplane that has been standing in the sun. All metal parts exposed to the sun are burning hot to the touch and gloves should be worn when working around exposed surfaces.

(6) Use oil Grade 1100 above 4.4 degrees C (40 degrees F) Specification No. AN-VV-O-446.

b. OPERATION.

(1) ON THE GROUND.

(a) Land on hard surface when possible. If conditions permit, select a site out of the path of blowing sand.

(b) Avoid taking off or running up to windward of other planes, personnel, or ground installations.

(c) Watch out for cacti, sharp rocks, and brush that may puncture the tires.

(d) Do not park the airplane in a dry wash. A flash flood may occur and destroy the airplane before it can be removed.

(2) PREFLIGHT.

(a) Engine should never be run on the ground any longer than necessary. Pilots should make their own preflight.

(b) Be certain that the condensation in the fuel tanks is drained before flying. Desert weather conditions greatly increase the amount of condensation.

(3) IN THE AIR.

(a) Wear a sun helmet or other protection for the head.

(b) If caught in a sandstorm, land the airplane or fly out of the storm if possible.

(c) Heat waves emanating from sand and rocks make the preception of ground features from the air difficult. Avoid making careless landings.

APPENDIX I FLIGHT OPERATING CHARTS

1. WEIGHT AND BALANCE.

For weight and balance information, refer to AN-01-1B-40.

2. TAKE-OFF, CLIMB, AND LANDING CHARTS.

Take-off, Climb, and Landing Charts are provided for two airplane combinations. The first set (Diagram and Chart) is applicable to all models with ailerons neutral for take-off and landing. The second set is applicable to the model L-5E with ailerons drooped TWO TURNS for take-off and full-down for landing.

CAUTION

Be sure you have the correct chart. Refer to paragraph 8., section II, for take-off technique.

The purpose of the chart is to present the effects of various conditions on the take-off, climb, and landing of the airplane. The variables in the take-off distance are gross weight, runway surface, wind velocity, and altitude. A highway or runway with a concrete or asphalt surface is the best example of a hard runway surface. A medium surface is exemplified by cinder runways and dry pastures with short grass. Soft surfaces are found on muddy fields, loose sand, and tall grasses.

The revised structure and equipment of the ambulance airplane increases the empty weight of the airplane 40 pounds over the empty weight of the L-5 airplane. The charts have been arranged to include the lightest as well as the heaviest condition of the L-5 or ambulance airplane. The loading conditions which determine the gross weights are as follows:

a. IN THE L-5 AIRPLANE.

2150—Includes 36 gallons of fuel, both crew members, pyrotechnics, mooring kit, and miscellaneous equipment.

2050—Includes 25 gallons of fuel and both crew members.

1850—Includes 25 gallons of fuel and the pilot.

b. THE AMBULANCE AIRPLANE.

2200—Includes 36 gallons of fuel, both crew members, pyrotechnics, mooring kit, and miscellaneous equipment.

or

36 gallons of fuel, the pilot, a casualty and stretcher, pyrotechnics, mooring kit, and miscellaneous equipment.

or

36 gallons of fuel, the pilot, 200 pounds of cargo, pyrotechnics, mooring kit, and miscellaneous equipment.

2100—Includes 25 gallons of fuel and both crew members.

or

25 gallons of fuel, the pilot, and a casualty and stretcher.

or

25 gallons of fuel, the pilot and 200 pounds of cargo.

1900—Includes 25 gallons of fuel and the pilot.

The variables in climbing are gross weight and altitude. In landing, the variables are gross weight, runway surface, and altitude. When the L-5 airplane contains just the pilot and has no fuel, the minimum gross weight will be 1700 pounds. When the ambulance airplane contains just the pilot and has no fuel, the gross weight will be 1750 pounds.

The figures in the landing chart are based upon landing runs made with the brakes applied. However, to conserve the brakes, do not use them unless they are needed.

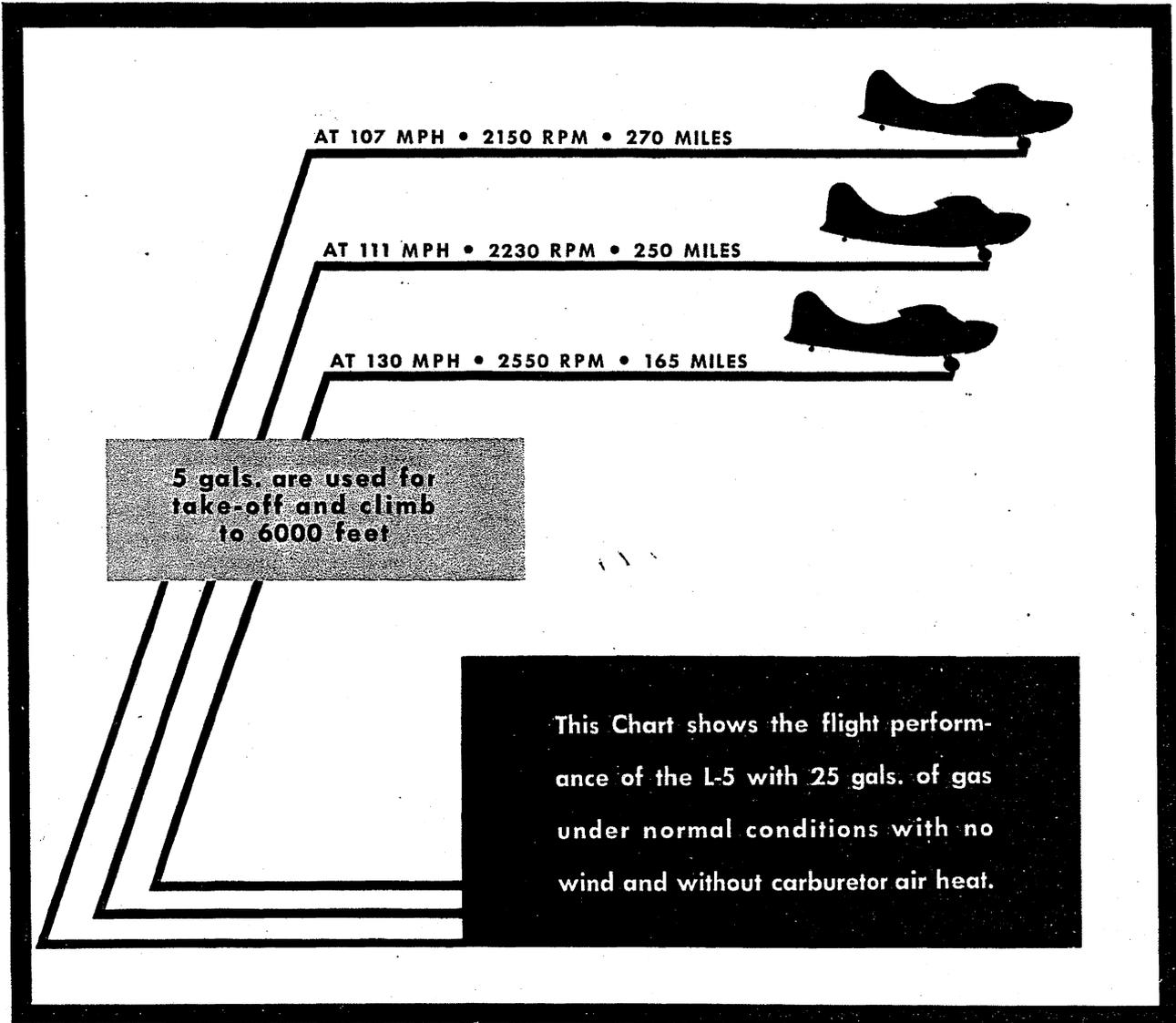


Figure 38—Performance Diagram

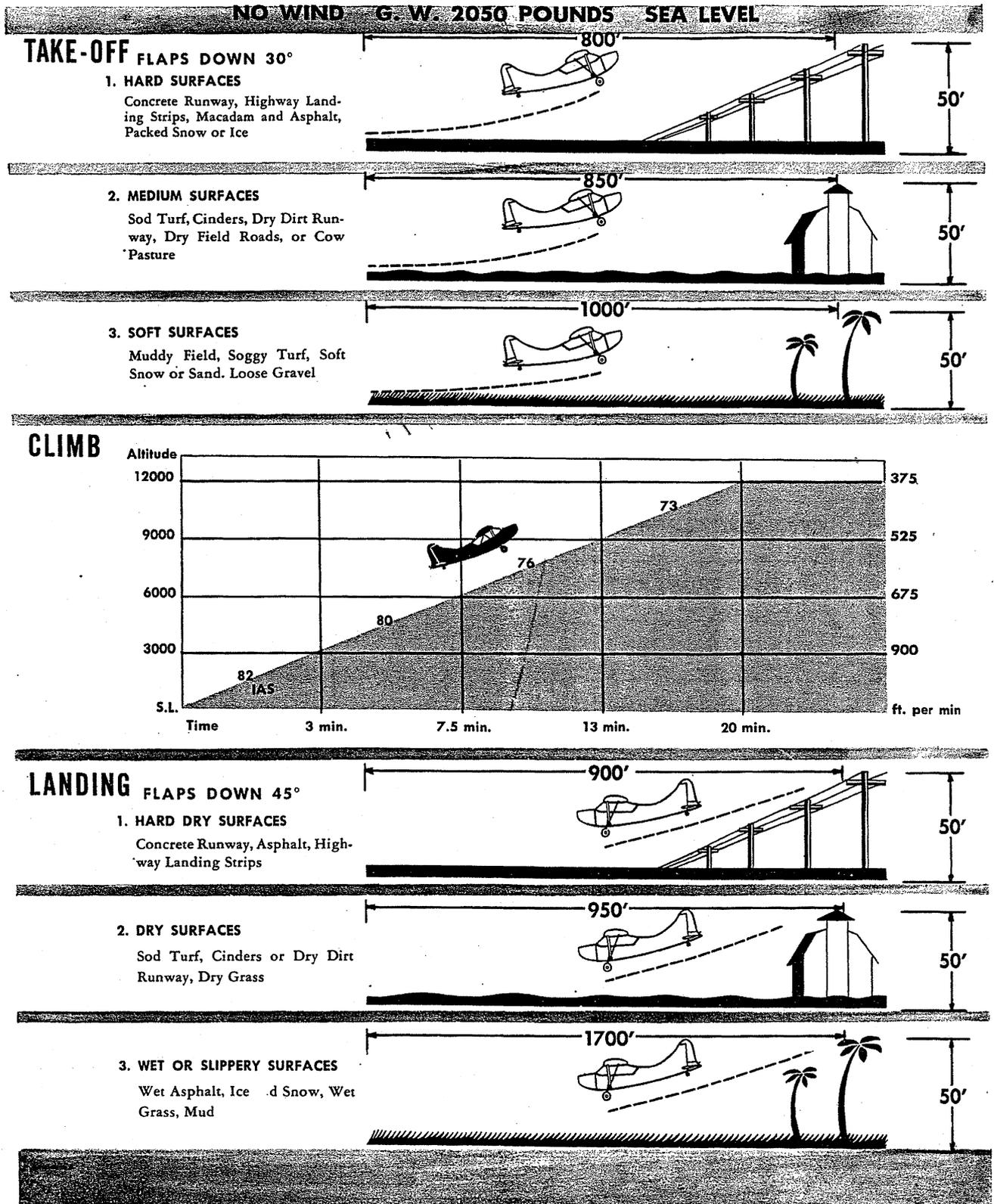


Figure 39—Take-off, Climb, and Landing Diagram (Ailerons Neutral)

AIRCRAFT MODELS L-5, L-5B, C, E		TAKE-OFF, CLIMB & LANDING CHART AILERONS NEUTRAL TAKE-OFF DISTANCE FEET																		ENGINE MODEL O-435-1
GROSS WEIGHT LB.	HEAD WIND		HARD SURFACE RUNWAY						SOD-TURF RUNWAY						SOFT SURFACE RUNWAY					
			AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET	
	M.P.H.	KTS.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.
2200	0	0	600	950	800	1300	1000	1600	650	1000	900	1400	1200	1800	800	1150	1100	1600	1400	2000
	17	15	300	500	400	650	500	850	350	550	500	750	600	950	400	600	600	850	750	1100
	34	30	200	300	250	400	350	500	250	350	300	450	400	550	300	400	400	550	500	650
	51	45	100	150	150	200	200	300	150	200	200	250	250	350	200	250	250	300	300	400
2050	0	0	500	800	700	1100	900	1400	550	850	750	1150	1000	1500	700	1000	900	1300	1250	1750
	17	15	250	400	350	550	450	700	300	450	400	600	500	750	350	500	500	700	650	900
	34	30	150	250	200	350	300	450	200	300	250	400	350	500	250	350	300	450	450	600
	51	45	75	125	100	175	150	250	125	175	150	225	200	300	175	225	225	300	250	350
1850	0	0	400	650	550	900	700	1100	450	700	600	950	800	1200	550	800	700	1050	1000	1400
	17	15	200	300	300	450	350	550	250	350	350	500	400	600	300	400	400	550	550	750
	34	30	100	200	150	300	200	350	150	250	200	350	250	400	200	300	250	400	350	500
	51	45	50	100	75	150	100	200	100	150	125	200	150	250	150	200	200	275	250	350

NOTE: INCREASE CHART DISTANCES AS FOLLOWS: 75°F + 10%; 100°F + 20%; 125°F + 30%; 150°F + 40%
DATA AS OF 6-1-43 BASED ON: FLIGHT TEST AND CALCULATIONS. OPTIMUM TAKE-OFF WITH F.T. RPM, F.T. IN.HG. & 30 DEG. FLAP IS 80% OF CHART VALUES

CLIMB DATA																								
GROSS WEIGHT LB.	AT SEA LEVEL				AT 5000 FEET				AT 10,000 FEET				AT 15,000 FEET				AT FEET				AT FEET			
	BEST I.A.S.		RATE OF CLIMB		BEST I.A.S.		RATE OF CLIMB		BEST I.A.S.		RATE OF CLIMB		BEST I.A.S.		RATE OF CLIMB		BEST I.A.S.		RATE OF CLIMB		BEST I.A.S.		RATE OF CLIMB	
	MPH	KTS	F.P.M.	USED	MPH	KTS	F.P.M.	USED	MPH	KTS	F.P.M.	USED	MPH	KTS	F.P.M.	USED	MPH	KTS	F.P.M.	USED	MPH	KTS	F.P.M.	USED
2200	84	73	875	3.0	82	71	600	6.5	4.8	77	67	350	17.0	7.2	72	62	100	40	13.0					
2050	82	71	975	3.0	80	69	725	6.0	4.6	75	65	475	15.0	6.7	70	61	225	34	11.5					
1850	80	70	1125	3.0	78	68	850	5.0	4.3	73	63	600	12.0	5.9	68	59	350	27	9.8					

POWER PLANT SETTINGS: (DETAILS ON FIG. SECTION III):
DATA AS OF 6-1-43 BASED ON: FLIGHT TEST AND CALCULATIONS. FUEL USED (U.S.GAL.) INCLUDES WARM-UP & TAKE-OFF ALLOWANCE

LANDING DISTANCE FEET																							
GROSS WEIGHT LB.	BEST IAS APPROACH				HARD DRY SURFACE						FIRM DRY SOD						WET OR SLIPPERY						
	POWER OFF		POWER ON		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		
	MPH	KTS	MPH	KTS	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	
2100	65	57	57	50	500	900	550	1000	600	1100	550	950	600	1050	700	1200	1300	1700	1400	1850	1600	2100	
1750	60	52	54	47	400	750	450	850	500	1000	450	800	500	900	600	1100	1100	1450	1200	1600	1400	1900	

DATA AS OF 6-1-43 BASED ON: FLIGHT TEST AND CALCULATIONS. OPTIMUM LANDING IS 80% OF CHART VALUES

REMARKS:

- ABOVE 5000 FT. LEAN OUT ENGINE TO OBTAIN SMOOTH OPERATION.
- TAKE-OFF WITH FLAPS DOWN 30°
- LAND WITH FLAPS DOWN 45°

NOTE: TO DETERMINE FUEL CONSUMPTION IN BRITISH IMPERIAL GALLONS, MULTIPLY BY 10, THEN DIVIDE BY 12

LEGEND
I.A.S. : INDICATED AIRSPEED
M.P.H. : MILES PER HOUR
KTS. : KNOTS
F.P.M. : FEET PER MINUTE

Figure 40—Take-off, Climb, and Landing Chart (Ailerons Neutral)

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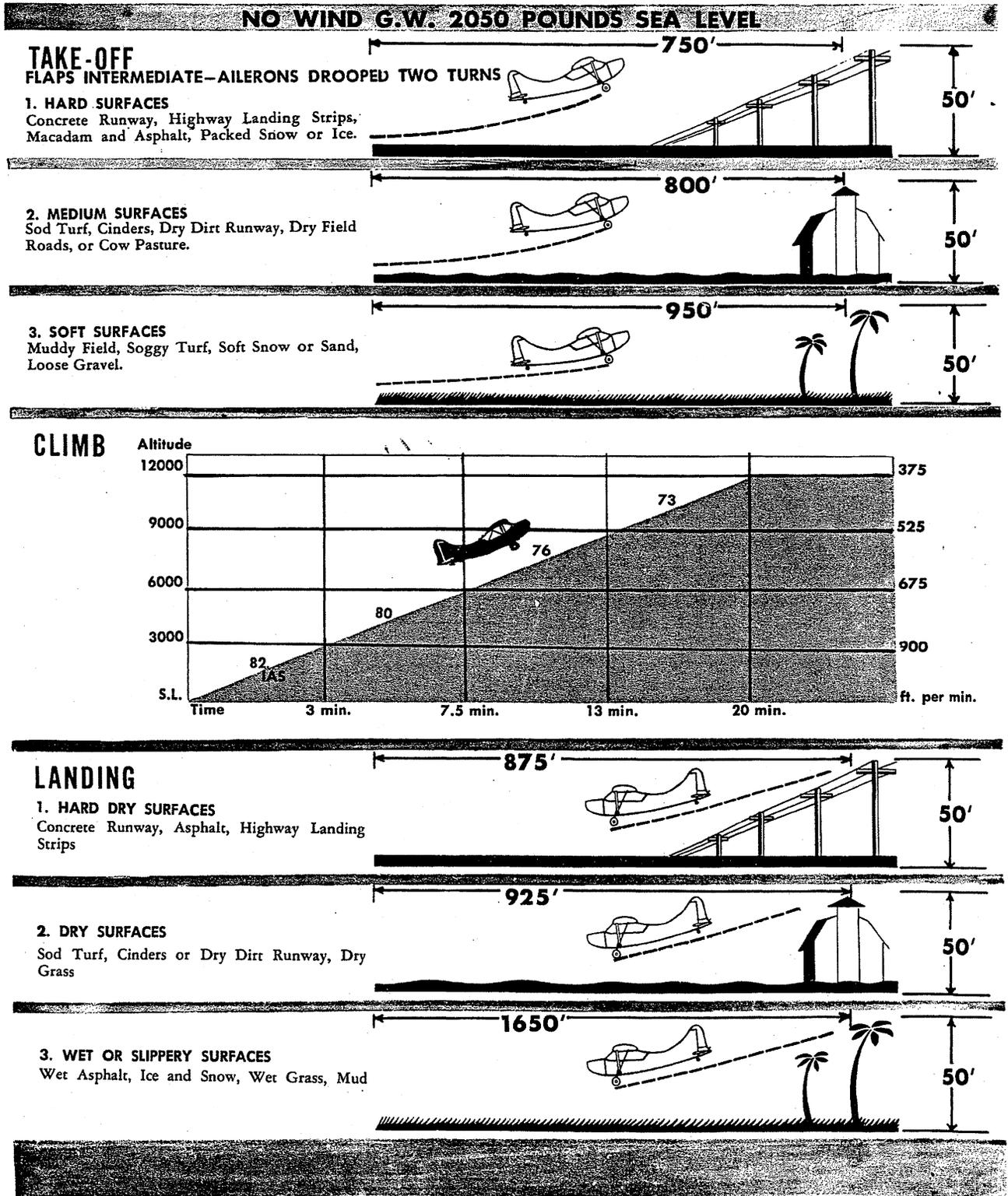


Figure 41—Take-off, Climb, and Landing Diagram (Ailerons Down)

Figure 42—Take-off, Climb, and Landing Chart (Ailerons Down)

AIRCRAFT MODEL		TAKE-OFF, CLIMB & LANDING CHART																		ENGINE MODEL	
L-5E		AILERONS DROOPED																		O-435-1	
		TAKE-OFF DISTANCE																		FEET	
GROSS WEIGHT LB.	HEAD WIND		HARD SURFACE RUNWAY						SOD-TURF RUNWAY						SOFT SURFACE RUNWAY						
			AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		
	M.P.H.	KTS.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	
2200	0	0	550	900	725	1225	900	1525	575	950	800	1325	1075	1700	725	1100	1000	1525	1250	1900	
	17	15	275	475	350	625	450	800	300	525	450	700	550	900	350	575	550	800	675	1050	
	34	30	175	275	225	375	325	475	225	325	275	425	350	525	275	375	350	525	450	625	
	51	45	90	140	130	190	175	275	125	190	175	225	225	325	175	225	225	275	275	375	
2050	0	0	450	750	625	1050	800	1325	500	800	675	1100	900	1425	625	950	800	1225	1125	1675	
	17	15	225	380	315	525	400	650	275	425	350	575	450	700	300	475	450	650	575	850	
	34	30	125	235	180	325	275	425	175	275	225	375	300	475	225	325	275	425	400	575	
	51	45	65	120	90	160	135	225	110	165	135	215	175	275	150	200	200	275	225	325	
1850	0	0	360	615	500	850	625	1050	400	650	550	900	725	1150	500	750	625	1000	900	1325	
	17	15	180	285	275	425	300	525	225	325	300	475	350	575	275	375	350	525	500	700	
	34	30	90	190	135	275	175	325	135	235	175	325	225	375	175	275	225	375	325	475	
	51	45	45	95	65	140	85	190	90	140	115	190	135	225	125	175	175	250	225	325	

NOTE: INCREASE CHART DISTANCES AS FOLLOWS: 75°F + 10%; 100°F + 20%; 125°F + 30%; 150°F + 40%
 DATA AS OF 2-1-45
 BASED ON: FLIGHT TEST AND CALCULATIONS.
 OPTIMUM TAKE-OFF WITH F.T. RPM, F.T. IN.HG. & 30 DEG. FLAP IS 80% OF CHART VALUES

CLIMB DATA																									
GROSS WEIGHT LB.	AT SEA LEVEL				AT 5000 FEET				AT 10,000 FEET				AT 15,000 FEET				AT FEET				AT FEET				
	BEST I. A. S.		RATE OF CLIMB F. P. M.	GAL. OF FUEL USED	BEST I. A. S.		RATE OF CLIMB F. P. M.	FROM SEA LEVEL		BEST I. A. S.		RATE OF CLIMB F. P. M.	FROM SEA LEVEL		BEST I. A. S.		RATE OF CLIMB F. P. M.	FROM SEA LEVEL		BEST I. A. S.		RATE OF CLIMB F. P. M.	FROM SEA LEVEL		
	MPH	KTS			MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH
2200	84	73	875	3.0	82	71	600	6.5	4.8	77	67	350	17.0	7.2	72	62	100	40	13.0						
2050	82	71	975	3.0	80	69	725	6.0	4.6	75	65	475	15.0	6.7	70	61	225	34	11.5						
1850	80	70	1125	3.0	78	68	850	5.0	4.3	73	63	600	12.0	5.9	68	59	350	27	9.8						

POWER PLANT SETTINGS: (DETAILS ON FIG. SECTION 1111):
 DATA AS OF 6-1-43
 BASED ON: FLIGHT TEST AND CALCULATIONS.
 FUEL USED (U. S. GAL.) INCLUDES WARM-UP & TAKE-OFF ALLOWANCE

LANDING DISTANCE FEET																							
GROSS WEIGHT LB.	BEST IAS APPROACH				HARD DRY SURFACE						FIRM DRY SOD						WET OR SLIPPERY						
	POWER OFF		POWER ON		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		
	MPH	KTS	MPH	KTS	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	
2100	65	57	57	50	500	900	550	1000	600	1100	550	950	600	1050	700	1200	1300	1700	1400	1850	1600	2100	
1750	60	52	54	47	400	750	450	850	500	1000	450	800	500	900	600	1100	1100	1400	1200	1600	1400	1900	

DATA AS OF 2-1-45
 BASED ON: FLIGHT TEST AND CALCULATIONS.
 OPTIMUM LANDING IS 80% OF CHART VALUES

REMARKS:

- ABOVE 5000 FT. LEAN OUT ENGINE TO OBTAIN SMOOTH OPERATION.
- TAKE-OFF WITH FLAPS DOWN TO INTERMEDIATE POSITION AND AILERONS DROOPED TWO TURNS.
- LAND WITH FLAPS FULL DOWN AND AILERONS FULL DOWN.

NOTE: TO DETERMINE FUEL CONSUMPTION IN BRITISH IMPERIAL GALLONS, MULTIPLY BY 10, THEN DIVIDE BY 12

LEGEND
 I. A. S. : INDICATED AIRSPEED
 M. P. H. : MILES PER HOUR
 KTS. : KNOTS
 F. P. M. : FEET PER MINUTE