AN 01-230HB-1

HANDBOOK
FLIGHT OPERATING INSTRUCTIONS

USAF SERIES
R-5A, D, and E

NAVY MODEL
HO2S-1

HELICOPTERS

This publication replaces AN 01-230HB-1 dated 3 July 1947

Appendix I of this publication shall not be carried in aircraft on missions where there is a reasonable chance of it falling into the hands of an unfriendly nation.

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Figure 1—Three-quarter Rear View, R-5A and R-5E (Model R-5D has wider cabin and a nose wheel)

INTRODUCTION

This Handbook contains flight operation instruction for three different models of R-5 series helicopters, namely, R-5A, R-5D, and R-5E. Because there are certain instructions which will differ between models, a simplified set-up of contents has been made to enable the reader to readily identify instructions pertaining to a particular model.

All text is set up in two columns, each normally about 3 1/4 inches wide. Bold face (heavy type) paragraph heads appear on the left of these columns, while the right is normally all light face type. Therefore, the right margin of each column is, where necessary, shortened and a bold face "A," "D," or "E"inserted therein and is readily seen. This indicates that the instructions in the paragraph at the left of this bold face initial apply to that model of R-5 helicopters which the initial designates. For instance, a paragraph such as the following:

(2) FUEL-SELECTOR VALVE CONTROL.

(a) The fuel-selector valve is located on the floor, slightly forward of and to the right of the pilot's seat. It has four positions "REAR TANK," "FRONT TANK," and two "BOTH OFF" positions. **A E**

(b) The fuel-selector valve is located on the rear of the pilot's door frame, and has marked positions: "ALL ON," "FWD AND AUX ON 100 GAL.," "ALL OFF" and "REAR ON 50 GAL." **D**

indicates that sub-paragraph *(a)* applies to models R-5A and R-5E, and sub-paragraph *(b)* applies to model R-5D. Thus, by glancing down the right margin of any column those paragraphs applying to a particular model are easily segregated.

It is important to remember, though, that all paragraphs which do not have a particular designation as outlined above apply to all models, A, D, and E.

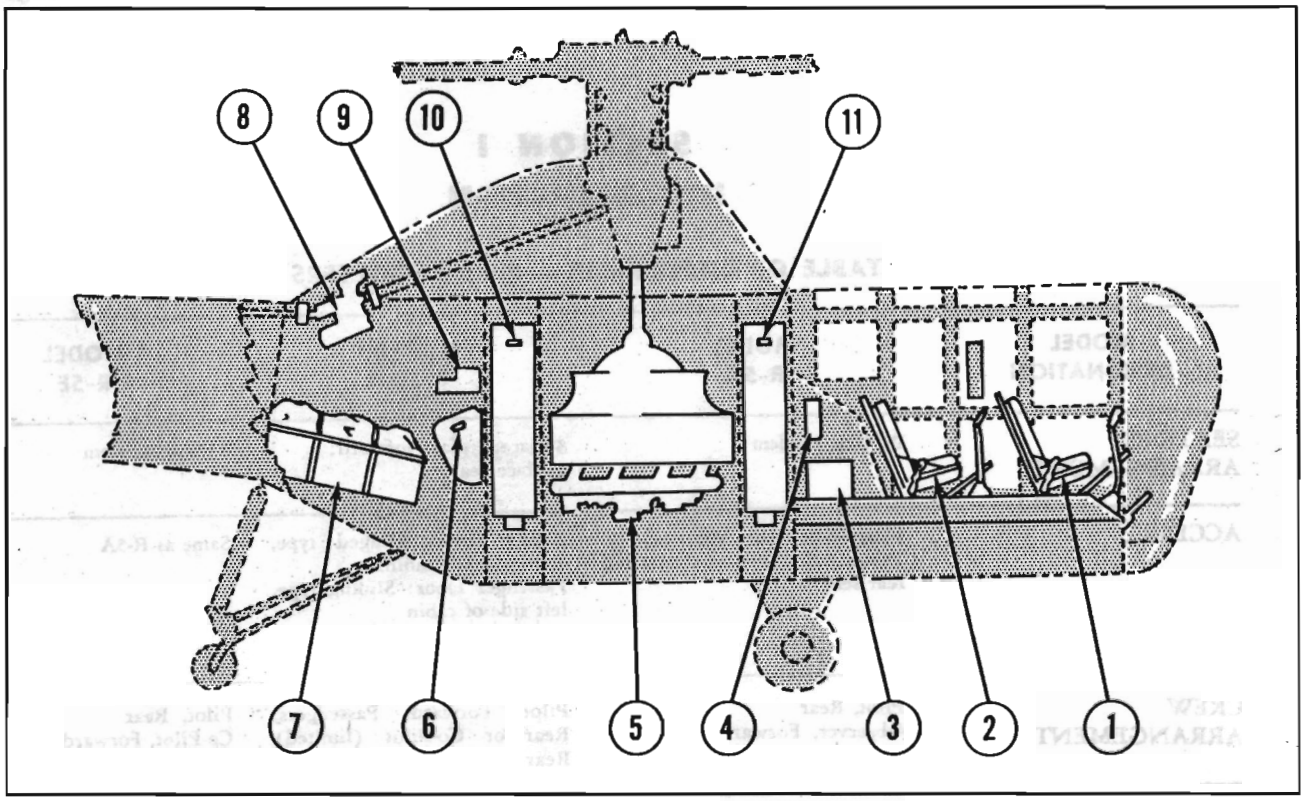
SECTION I
DESCRIPTION

TABLE OF DIFFERENCES — R-5 HELICOPTERS

MODEL DESIGNATION	MODEL R-5A	MODEL R-5D	MODEL R-5E
SEATING ARRANGEMENT	2-Place, tandem	3-Place: 1 place forward; 2 place rear	2-Place, tandem
ACCESS	Hinge-type doors, right side of cabin, 1 for forward seat, 1 for rear seat	Pilot's Door: Hinged type, right side of cabin. Passenger Door: Sliding type, left side of cabin	Same as R-5A
CREW ARRANGEMENT	Pilot, Rear Observer, Forward	Pilot, Forward. Passengers, Rear or Co-Pilot (limited) Rear	Pilot, Rear Co-Pilot, Forward
CO-PILOT FACILITIES	Provisions forward Limited flight only No instruments	Provisions, rear. Limited flight only. No instruments. Passenger seat replaced by co-pilot's seat.	Complete dual in forward position, with flight instruments installed.
DESIGN GROSS WEIGHT	With full tanks (100 gals.) and crew with parachutes: approximately 4900 pounds	With 70 gal. fuel, crew of 3 with parachutes: approximately 5100 pounds	Same as R-5A
EXTERNAL LOAD	Provisions, only, for mounting bomb racks, and litters.	Provisions for mounting auxiliary fuel tank and rescue hoist	Same as R-5A
INTERNAL LOAD	Baggage Compartment Maximum 75 pounds	Same as R-5A	Same as R-5A
HOVERING CEILING (4985 POUNDS)	3000 feet	3000 feet	3000 feet
LANDING GEAR	Main and Tail Wheels	Main, tail and nose wheels	Main and tail wheels
RADIO	Command Set SCR-274-N	Same as R-5A	Same as R-5A

1. THE HELICOPTER.

a. The R-5 helicopter is a 3-bladed main-rotor, and a 3-bladed tail-rotor type, with model differences as generally outlined in Table of Differences, R-5 Helicopters, immediately preceding this paragraph. All models are powered with the fan-cooled Pratt & Whitney, Army-Navy model R-985 AN-5 or AN-7 engine. For interior arrangement, refer to figure 2.



1. Observer's Compartment, R-5A and R-5E Pilot's Compartment, R-5D
2. Pilot's Compartment, R-5A and R-5E Passenger Compartment, R-5D
3. Battery
4. External Power Receptacle Opening
5. Engine and Transmission Section
6. Oil Tank Filler
7. Baggage Compartment
8. Generator
9. Radio Installation
10. Rear Fuel Tank Filler
11. Forward Fuel Tank Filler

Figure 2—Interior Arrangement

2. OVER-ALL DIMENSIONS.

Maximum length (including main- and tail-rotor clearance)—57 ft, 1 in.

Minimum length (blades at minimum extension)—43 feet, 0 in.

Maximum width (main-rotor clearance)—48 feet, 0 in.

Minimum width (blades removed)—12 ft, 0 in.

Height—13 ft, 1-1/2 in.

Fuselage length—41 ft, 7-1/2 in.

Tread (main landing gear)—12 ft, 0 in.

3. POWER PLANT CONTROLS.

a. THROTTLE.—The throttle is a turnable grip (5, figure 4) at the top of the main rotor pitch control. The throttle is opened when the grip is rotated to the left and closed when rotated to the right. It is partially synchronized with the main-rotor pitch control so that an increase in pitch will automatically provide an increase in manifold pressure, and a decrease in pitch will automatically provide a decrease in manifold pressure. However, operation will require additional adjustment of the throttle to maintain desired engine rpm. A knurled friction nut (6, figure 4) for adjustment of ease of turning the throttle grip, as well as to prevent it from "creeping" is located immediately below the grip.

CAUTION

The main rotor pitch control must always be in the full low position and the throttle full closed when the throttle-valve in the carburetor is to remain closed.

b. MIXTURE CONTROL. — The mixture control (3, figure 4 and figure 5) is manually operated and is located on a quadrant mounted on the wall at the left of the pilot's seat.

c. CARBURETOR-AIR HEAT CONTROL. — The carburetor-air heat control (2, figure 4 and 9, figure 5) is on the quadrant mounted on the wall at the left of the pilot's seat. This control must be in full COLD position when moving the carburetor-air filter control to FILTERED position.

d. CARBURETOR-AIR FILTER CONTROL. — The carburetor-air filter control (1, figure 4 and 8, figure 5) is on the quadrant mounted on the wall at the left of the pilot's seat.

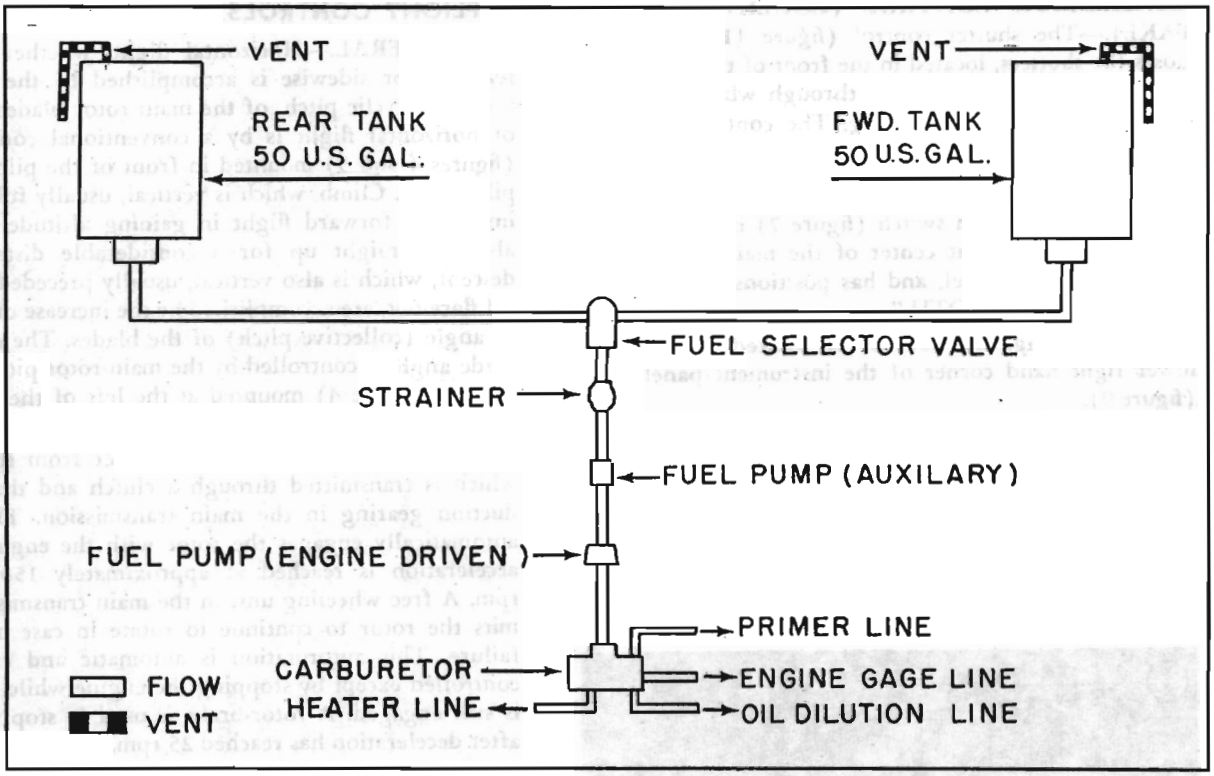
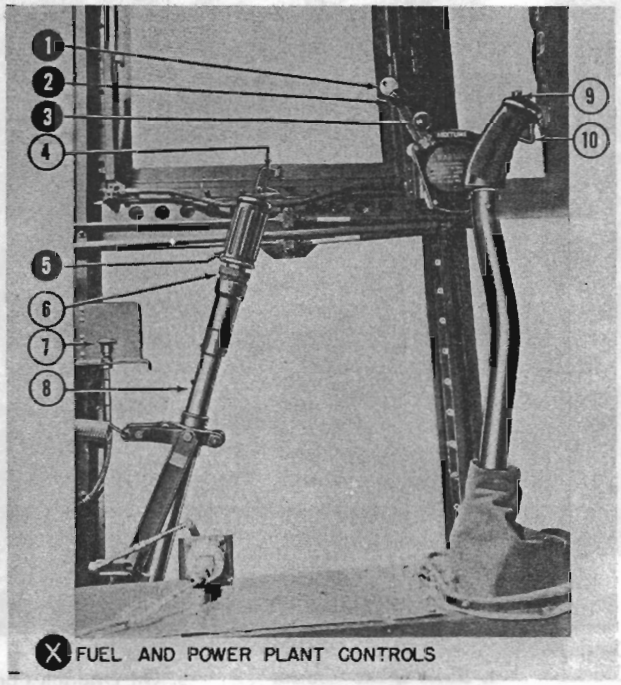


Figure 3—Fuel System Diagram



1. Carburetor-Air Filter Control
2. Carburetor-Air Heat Control
3. Mixture Control
4. Window Latch
5. Throttle Control
6. Throttle Friction Adjustment
7. Cabin Heater Choke
8. Main Rotor Pitch Control
9. Button Switch for Bomb Release (Provision for, only)
10. Trigger Switch for Throat Microphone

Figure 4—Left Side of Pilot's Compartment, R-5A and R-5E

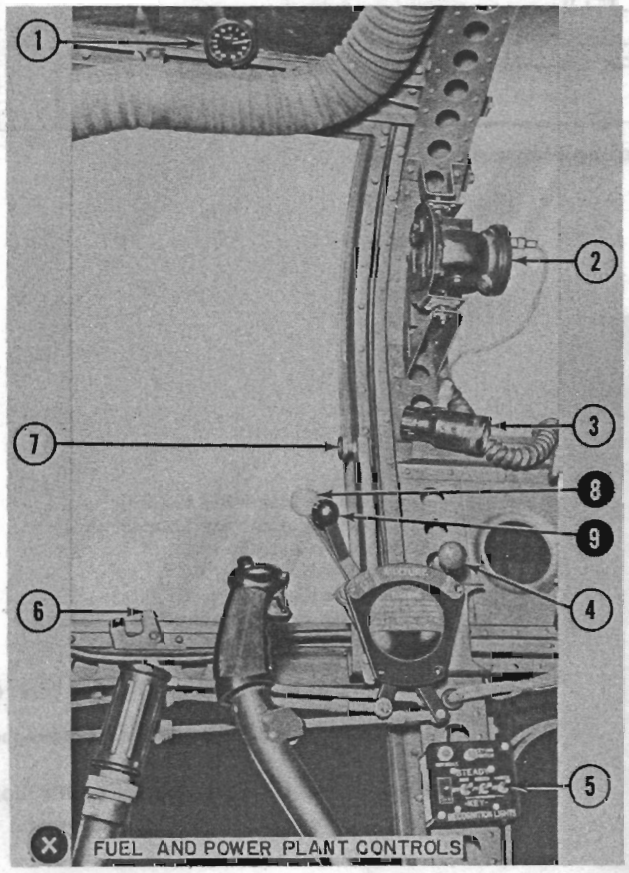
e. SHUTTER CONTROL (COOLING AIR INTAKE).—The shutter control (figure 11) opens and closes the shutters, located in the front of the main gearbox section of the helicopter, through which air enters (figure 10) for engine cooling. The control is located slightly to the right and over the pilot's head.

f. IGNITION SWITCH.

(1) The ignition switch (figure 7) is located immediately below, at center of the main instrument and switch panel, and has positions marked "OFF," "L," "R," "BOTH." A E

(2) The ignition switch is located at the lower right hand corner of the instrument panel (figure 9). D

g. STARTER SWITCH.—The switch for the starter (figures 7 and 9) is located in the upper-left of the electric switch panel. A hinged guard, lettered "STARTER," holds it in the off position when it is not in use. The guard must be lifted and the switch held in the up position to energize the starter.



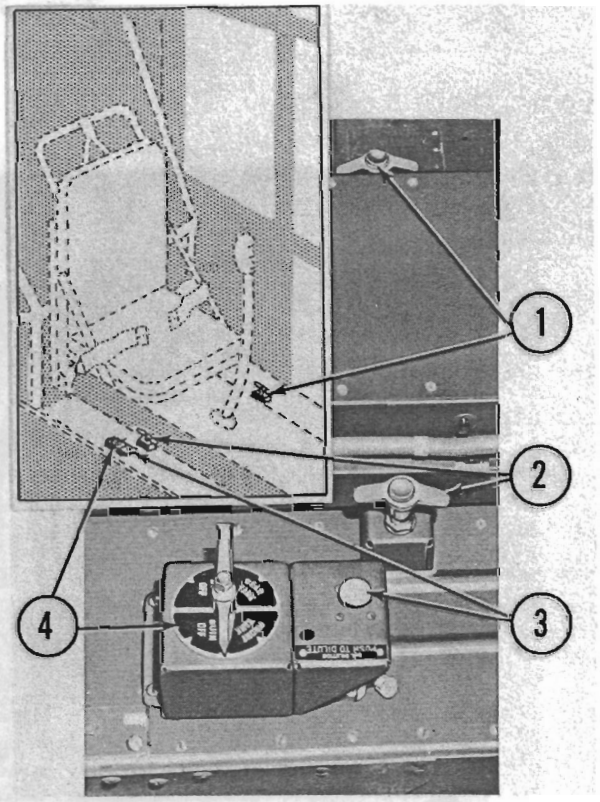
1. Free Air Thermometer
2. Compass
3. Extension Light
4. Mixture Control
5. Recognition Light Switches
6. Window Latch
7. Window Lock
8. Carburetor-Air Filter Control
9. Carburetor-Air Heat Control

Figure 5—Left Side of Pilot's Compartment, R-5D

4. FLIGHT CONTROLS.

a. GENERAL.—Horizontal flight, whether forward, rearward or sidewise is accomplished by the plane of travel, or cyclic pitch, of the main rotor blades. Control of horizontal flight is by a conventional control stick (figures 4 and 5) mounted in front of the pilot's or co-pilot's seat. Climb, which is vertical, usually followed by immediate forward flight in gaining altitude, but may also be straight up for a considerable distance, and descent, which is also vertical, usually preceded by gradual flare-out, are accomplished by the increase or decrease of angle (collective pitch) of the blades. The change in blade angle is controlled by the main-rotor pitch control stick (8, figure 4) mounted at the left of the pilot's or co-pilot's seat.

Rotor rpm is maintained by power from the engine which is transmitted through a clutch and through reduction gearing in the main transmission. The clutch automatically engages the rotor with the engine. Good acceleration is reached at approximately 1500 engine rpm. A free wheeling unit in the main transmission permits the rotor to continue to rotate in case of engine failure. This autorotation is automatic and cannot be controlled except by stopping the engine while the rotor is still engaged. A rotor-brake is used to stop the rotor after deceleration has reached 25 rpm.



1. Rotor Brake Control
2. Wheel Brake Control
3. Oil Dilution Control
4. Fuel-Selector Valve Control

Figure 6—Floor Controls, R-5A and R-5E

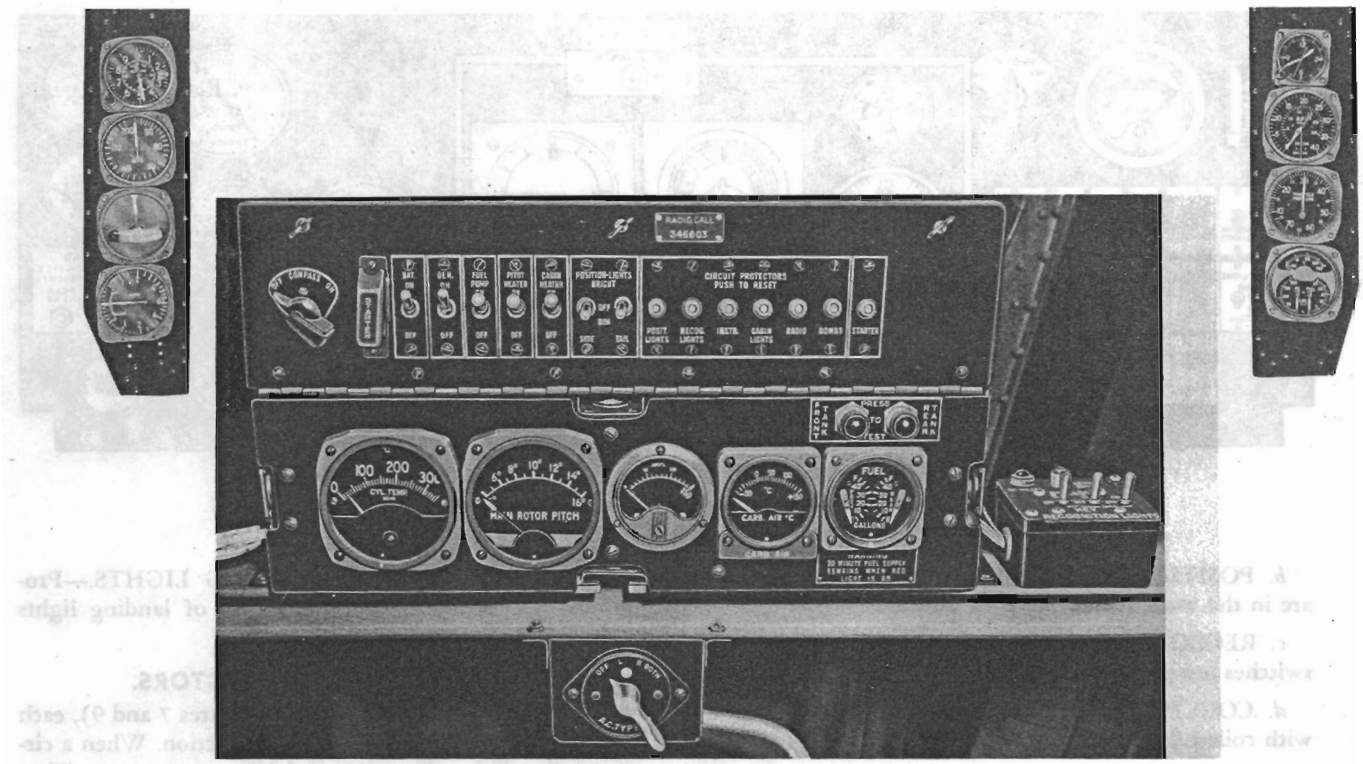


Figure 7—Instrument and Switch Panels, R-5A and R-5E

b. MAIN-ROTOR PITCH CONTROL.—The main-rotor pitch control for changing the pitch, collectively, of the rotor blades, to accomplish lift, climb, descent and landing is rigged to give minimum blade pitch of 3–1/2 ± 1/2 degrees when in the full forward position and maximum blade pitch of 13-1/2 degrees when in the full up or back position. Incorporated in the pitch control and partially synchronized with it is the throttle control. Action of this synchronization is described in this section, paragraph 3.*a.*

c. CONTROL STICK. — The control stick for controlling directional flight by maintaining or changing the cyclic pitch of the blades is similar to the control stick in small fixed-winged aircraft. In the top of the control stick is a switch for microphone off-on control, and in those helicopters equipped with hydraulic rescue-hoists there is a switch for raising and lowering the hoist cable.

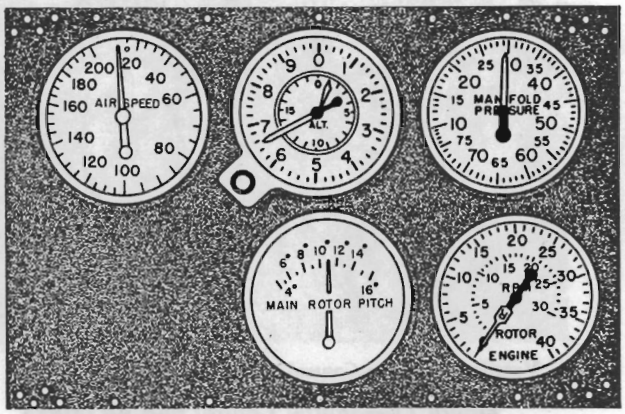


Figure 8—Co-pilot's Instrument Panel, R-5E

d. TAIL ROTOR CONTROL PEDALS. — The tail rotor control pedals which are similar to fixed-wing aircraft rudder pedals, control the pitch of the tail rotor blades. Increasing or decreasing the pitch of these blades gives the pilot control over the normal torque of the fuselage caused by rotation of the main-rotor blades. This anti-torque control is also used for partial directional flight control. Pedals installed in the co-pilot's position, when not to be used, may be made inoperative by locking devices and used as foot rests.

e. ROTOR BRAKE CONTROL.—As the main-rotor will continue to rotate for some time after clutch disengagement when the engine has been slowed down or stopped, its deceleration may be stopped by application of the rotor brake (figure 6). It is not applied, however, until the rotor has slowed to at least 25 rpm.

f. WHEEL BRAKE CONTROL.—The wheel brake is used for parking purposes only. The control (figure 6) is a push-pull type in models R-5A and R-5E and a foot pedal type in model R-5D.

5. LIGHTS.

a. COMPASS LIGHT.—The compass light rheostat is mounted on the main instrument panel (figures 7 and 9) in all models.

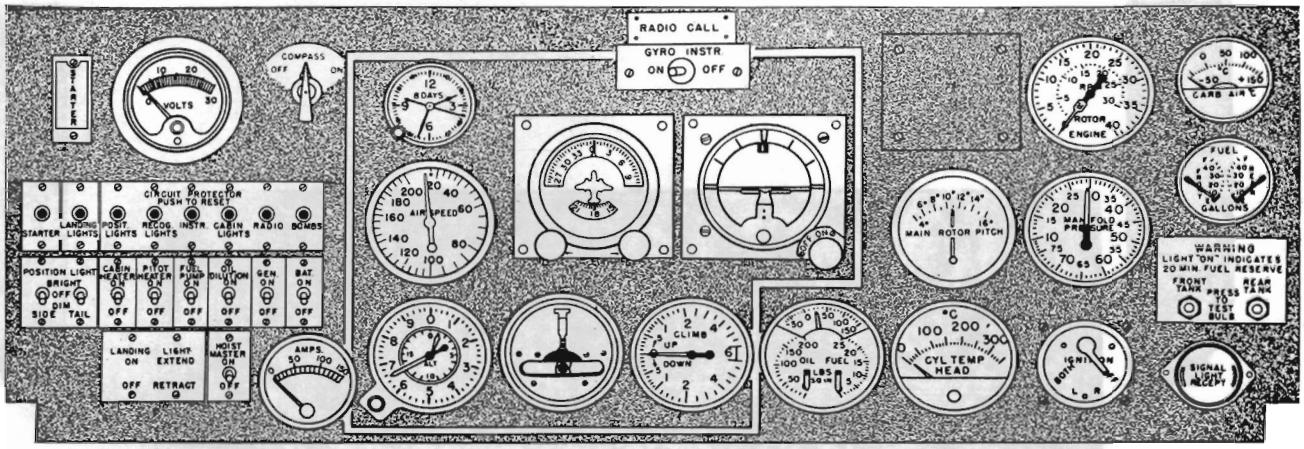


Figure 9—Instrument and Switch Panel, R-5D

b. POSITION LIGHTS.—Switches for position lights are in the main switch panel of all models.

c. RECOGNITION LIGHTS. — Recognition light switches are provided.

d. COCKPIT LIGHTS.—Fluorescent cockpit lights, with coiled extension cords are provided.

e. CABIN DOME LIGHTS.—A cabin dome light is provided.

f. SIGNAL LIGHT RECEPTACLE.—A signal light receptacle is provided:

(1) The receptacle is located on the right hand end of the main instrument panel. **A, E**

(2) The receptacle is located in the lower right hand corner of the main instrument panel. **D**

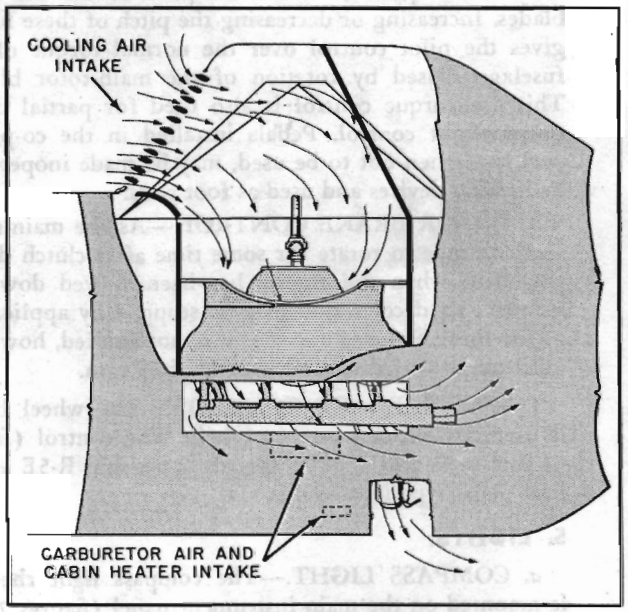


Figure 10—Engine Cooling Air Diagram

g. PROVISIONS FOR LANDING LIGHTS.—Provisions are made for the installation of landing lights although no switches are installed.

6. ELECTRICAL CIRCUIT PROTECTORS.

Circuit protectors are provided (figures 7 and 9), each marked properly for its particular function. When a circuit fails, the protector control buttons snap out. They are pushed in to reset.

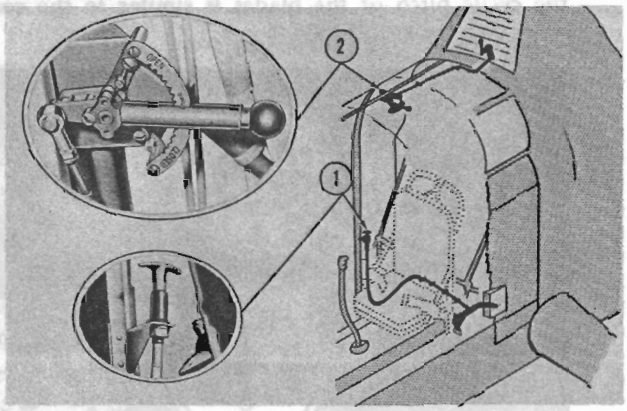
7. FUEL SYSTEM.

Fuel: Specification No. AN-F-48

Recommended grade: 91/98

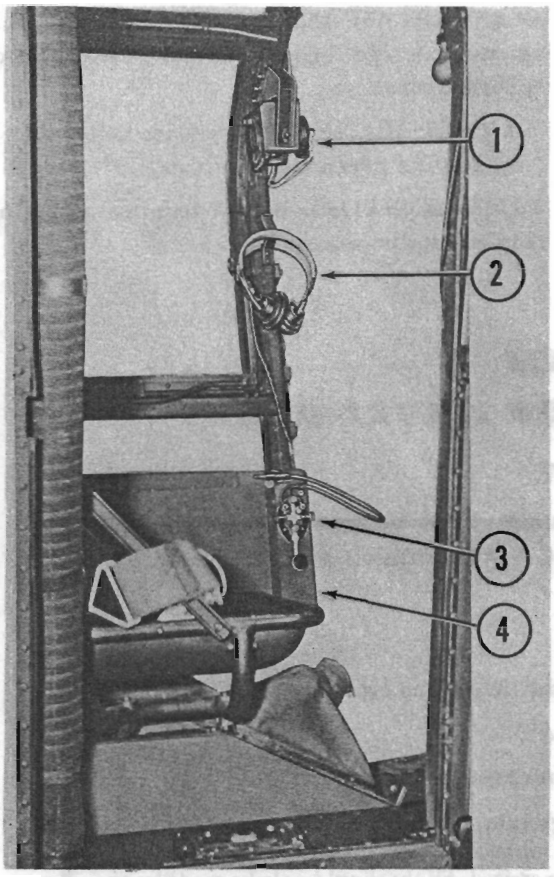
a. The fuel system (figure 3) is gravity-feed type, with two fuel tanks, each having a capacity of 50 US gallons, and 1.5 US gallons expansion space. One tank is located in front of the engine and one behind it, separated and protected from the engine by a fire wall.

b. The model R-5D has provisions for installing a 50 US gallon auxiliary fuel tank on brackets which may be attached to the center section on the right side of the fuselage. **D**



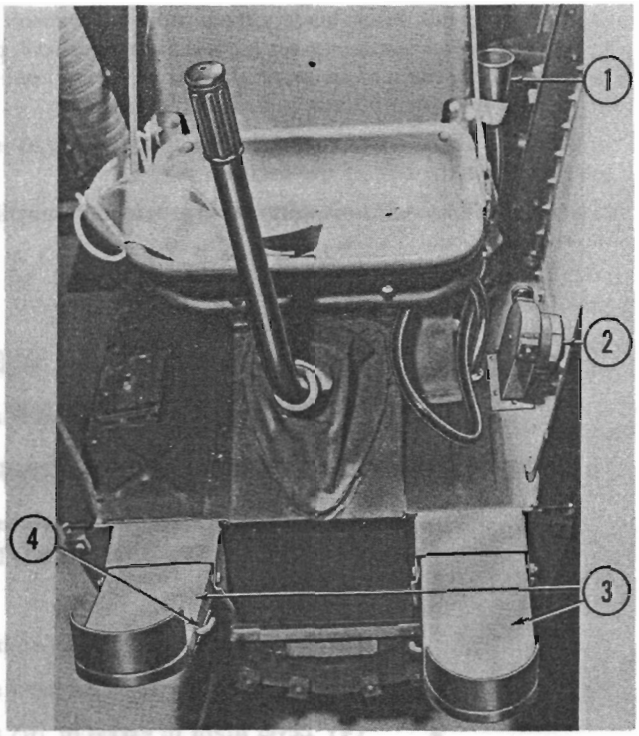
1. Ventilation Intake Control 2. Shutter Control

Figure 11—Shutter Control and Air Intake (Heater) Control



1. Compass
2. Head Set
3. Radio Transmitter Key
4. Observer's Board and Case

Figure 12—Left Side, Observer's Compartment, R-5A and R-5E



1. Relief Tube
2. Cabin Heater Duct Unit (Left Side)
3. Tail Rotor Control (Rudder) Pedals
4. Release Lever

Figure 13—Front View, Observer's Compartment, R-5A

c. FUEL RESERVE WARNING LIGHTS. — A warning light for each tank, marked "FRONT TANK" or "REAR TANK," (figures 7 and 9) are mounted side by side on the main instrument panel. They light when fuel reaches a point of approximately 20 minutes reserve.

d. FUEL-SELECTOR VALVE CONTROL.

(1) The fuel-selector valve control (4, figure 6) is located on the floor on the right side of the pilot's seat. Its four positions are: "REAR TANK," "FRONT TANK," and two "BOTH OFF." A E

(2) The fuel-selector control is located on the rear of the pilot's door frame and has marked positions: "ALL ON," "FWD and AUX ON 100 GAL," "ALL OFF" and "REAR ON 50 GAL." D

e. AUXILIARY FUEL PUMP.—An electrically driven fuel pump for use in starting the engine or in emergency failure of the engine driven fuel pump is provided. It is controlled by an OFF-ON switch (figures 7 and 9) on the main switch panel.

f. ENGINE-DRIVEN FUEL PUMP.—The engine-driven fuel pump becomes operative as soon as the engine is started and functions as long as the engine is running. The auxiliary fuel pump must be turned off as soon as the engine is started because the engine-driven pump is then operating.

8. OIL SYSTEM.

Oil: Specification No. AN-O-8.

Grade: High temperatures: Grade 1120
Low temperatures: Grade 1100

a. CAPACITY.—A single oil tank with 8 US gallon capacity and 1 US gallon expansion space, is located to the rear of the rear fuel tank.

b. OIL DILUTION CONTROL. — The system is manually controlled:

(1) A "PUSH TO DILUTE" button (3, figure 6) mounted beside the fuel-selector valve control on the floor at right-front of the pilot's seat. A E

(2) A toggle switch (figure 9) is located on the main switch panel. It must be held "ON" to be operative. D

9. MISCELLANEOUS.

a. WEATHER COVERS.—The following protective canvas covers are provided in the baggage compartment: three main rotor blade covers, three main rotor tip cov-

ers, three tail rotor blade covers, one main rotor hub cover, one air intake opening cover, one air speed pitot tube cover, three main rotor blade joint covers, one tail rotor hub cover, and two engine air outlet covers.

b. RELIEF TUBE.—A relief tube (1, figure 13) is attached on the left of the forward seat.

c. DATA CASE.—A data case is provided in the pilot's compartment.

d. MAP CASE AND FLIGHT REPORT HOLDER.—A map case and flight report holder is provided in the pilot's compartment.

e. MESSAGE HOLDER.—A message holder is provided in the pilot's compartment.

f. RESIN LENS BOX.—A resin lens box is provided in the pilot's compartment.

SECTION II
NORMAL OPERATING INSTRUCTIONS

1. BEFORE ENTERING THE PILOT'S COMPARTMENT.

a. FLIGHT LIMITATIONS AND RESTRICTIONS.—The following are prohibited:

(1) Acrobatics.

(2) Diving at more than 120 mph—IAS.

(3) Exceeding 80 mph forward speed with full aft cg location.

(4) Level flight in excess of 105 mph—IAS.

(5) Do not fly at less than 175 rotor rpm (2100 engine rpm).

(6) Do not exceed maximum alternate gross weight of 5380 pounds at any time. Reduce this gross weight 150 pounds for each 1000 feet altitude of flight above sea level. Extreme caution should be exercised. Flight should only be made by an experienced pilot.

(7) Prolonged engine operation in the 1600 to 1800 rpm range will be avoided at all times, to alleviate excessive cooling-fan blade vibration. Operation above 2300 rpm will be avoided except for short periods when high rpm may be necessary.

Note

These restrictions apply up to normal gross weight and center of gravity limits applicable for each model.

THESE LIMITATIONS MAY BE SUPPLEMENTED OR SUPERSEDED BY INSTRUCTIONS INCLUDED IN SERVICE PUBLICATIONS.

b. TAKE-OFF GROSS WEIGHT AND BALANCE.—Obtain the take-off gross weight and balance, and fill out Form 1A and F. See Handbook of Weight and Balance, AN 01-1B-40, supplied with the helicopter.

WARNING

When flight is to be made in Model R-5D with both or either the hoist or auxiliary fuel tank installed, make absolutely sure that lateral rerigging has been accomplished to give full lateral control.

c. ENTRANCE TO HELICOPTER.—Access is by either hinged door on the right side of the helicopter. A E

Access to the pilot's seat is by the right front hinged door, and to the passenger seat by the sliding rear left door. D

2. MINIMUM CREW REQUIREMENT.

The minimum crew requirement for the R-5A and E is one pilot in the rear seat and for the R-5D one pilot in the forward seat. Additional crew members required to accomplish special missions will be added at the discretion of the Commanding Officer.

3. ON ENTERING THE PILOT'S COMPARTMENT.

a. STANDARD CHECK FOR ALL FLIGHTS.

(1) Ignition switch: "OFF."

(2) Generator switch: Check "ON."
(3) Battery switch: "OFF," if battery cart is used; "ON," if not.

CAUTION

Make sure battery switch is "OFF" before connecting external power.

Note

Except in an emergency, use a battery cart.

(4) Pitot heater switch: "ON," if icing conditions prevail.
(5) Shutter control (engine-air intake): "OPEN," except in very cold weather (ground temperatures — 18°C to — 54°C (0°F to — 65°F).
(6) Radio: Radio can be operated when battery is "ON." (Refer to section V.)
(7) Wheel brakes: On.
(8) Rotor brake: On.
(9) Check all flight controls for full and free movement.
(10) Check fuel gages for desired fuel loading.
(11) Test the fuel warning lights.
(12) Altimeter: Set as desired.
(13) Mixture Control: Idle Cut-off.

Note

Contact flight only is made in Model R-5 Helicopters. However, position lights and recognition lights are provided as well as extension lights which can illume the instrument panel.

b. SPECIAL CHECK FOR NIGHT FLIGHTS.
(1) Cockpit light: "ON."
(2) Compass light: "ON."
(3) Position lights: "ON."
(4) Recognition lights: Test-operate.

4. FUEL SYSTEM MANAGEMENT.

Fuel tank selection is managed through the fuel-selector valve control. Each helicopter is provided with an individual placard of instructions for trimming by means of fuel tank selection. This placard is on the right side of the instrument panel support.

5. STARTING ENGINE.

a. Main-rotor pitch control: Minimum.

CAUTION

As an increase in pitch opens the throttle valve in the carburetor, the pitch control stick must be in full low position whenever the throttle valve is to remain closed.

b. Throttle control: "CLOSED."

c. Fuel-selector valve control: On desired tank.

d. Carburetor-air filter control: "UNFILTERED." ("FILTERED" if necessary.)

CAUTION

Carburetor-air heat control must be in "COLD" position when moving carburetor-air filter control to "FILTERED."

e. Inch the engine over four or five revolutions with the starter, with the ignition switch "OFF," if the engine has not been operated for two hours or longer, or if it is suspected that excess oil or fuel is present in the cylinders. ("Inching" means that the starter should be so engaged and disengaged that the crankshaft turns only a few degrees at a time.)

f. Mixture control: Full "RICH."

g. Fuel pump switch: "ON."

h. Mixture control: "IDLE CUT-OFF" when fuel pressure is between 3 and 6 psi.

i. While turning over engine, prime by turning throttle grip two to eight times, from "OPEN" to "CLOSED," depending on temperature, the greater number of turns for cold weather.

j. Mixture control: back to "RICH."

Note

Turning the throttle control with the mixture control in "IDLE CUT-OFF" pumps fuel from the carburetor to the priming distributor. Turning the throttle control with the mixture control in "RICH" discharges fuel at the carburetor.

CAUTION

Do not turn the throttle control while the mixture control is in the "RICH" position as fuel discharged will settle to the air intake duct, creating a fire hazard. Do not attempt to start the engine while fuel may be draining from the air duct.

k. Throttle control: "CLOSED" (In temperatures below 0°C (32°F), open throttle very slightly, if judged necessary.

l. Ignition switch: "ON."

m. Starter switch: "ON."

n. As engine starts note oil pressure gage. If oil pressure does not register almost immediately STOP engine and investigate.

o. If a start is not effected almost immediately, reprime and repeat starting procedure.

Note

If evidence of overloading is present, such as fuel draining from the air intake duct, clear out engine by turning engine through about six revolutions with ignition switch "OFF," mixture in IDLE CUT-OFF, and throttle wide open. Then return controls to starting position, reprime, and repeat starting procedure.

p. After engine is running: turn fuel pump "OFF."

q. Battery switch: "ON" when disconnecting external power.

6. WARM-UP AND GROUND TEST.

a. Adjust carburetor heat control to maintain desired carburetor air temperature, as soon as engine appears to be free of back-fires.

Note

Depending upon outside air temperature it may not be necessary to use preheat to obtain the desired carburetor air temperature. When using pre-heat do not allow carburetor air temperature to go over 38°C (100°F).

b. Warm up engine at 1000 rpm until oil temperature shows a steady rise. In cold temperature, warm-up will be facilitated by partial closing of air intake shutter, however, intake shutters must be fully open at all times during flight.

CAUTION

Do not idle engine below 1000 rpm. To avoid clutch drag, do not exceed 1100 rpm during warm-up.

c. Rotor brake: Off.

d. Increase rpm until clutch produces good acceleration (approximately 1500 engine rpm).

CAUTION

Prolonged operation between 1600 and 1800 engine rpm shall be avoided at all times, to alleviate excessive cooling-fan blade vibration. Operation above 2300 rpm will be avoided except for short periods when high rpm may be necessary.

e. Check limits of fuel and oil pressure and oil temperature. Check that transmission oil pressure warning light is off.

f. MAGNETO CHECK.

(1) Set main-rotor pitch and throttle to obtain about 2000 rpm and 20" manifold pressure.

(2) Check magnetos from "BOTH" to "R" to "BOTH" to "L" to "BOTH." The normal drop-off is 50 to 75 rpm. A drop-off of 100 is not dangerous but if the drop-off exceeds 100, have the ignition system checked by maintenance crew. During the magneto test, do not exceed 15 seconds on either magneto.

g. Check generator by putting a load on the electrical system. If ammeter shows a reading with the engine at 2000 rpm, the generator is functioning. (If the battery is fully charged the ammeter reading will be low.)

h. Wheel brakes: Off.

7. TAXIING INSTRUCTIONS.

a. Taxiing is prohibited because of danger of nose-over. A E D

b. Taxiing forward is permitted. A E D

CAUTION

In Model R-5D do not taxi rearwards as damage to tail landing gear or to the tail rotor may result.

8. TAKE-OFF.

a. Maintain 2300 engine rpm, increasing main pitch until airborne.

CAUTION

Do not hover between 10 and 400 feet at zero airspeed.

9. CLIMB.

Refer to Take-off, Climb and Landing Chart, figure 19, Appendix I.

10. GENERAL FLYING CHARACTERISTICS.

a. FLIGHT OPERATION.—For smoothest cruising use 185 to 193 rotor rpm.

b. USE OF MIXTURE CONTROL FOR CRUISING. Manual leaning of the engine may be accomplished by maintaining constant rotor pitch while performing either of the following procedures:

(1) Move the mixture control away from full "RICH" until a 50 rpm engine drop is noted, and then increase richness until 25 rpm is regained.

(2) Move the mixture control from full "RICH" until engine roughness is noticed, then increase richness until engine runs smoothly.

c. CONTROL STICK LAG.—Anticipate a time lag in the control stick. Over-control results in swinging, which, when close to the ground, may result in damage to the helicopter.

d. MAIN-ROTOR PITCH CONTROL LAG. — Lag will very seldom be noticeable in the main-pitch control. The only circumstance in which it must be anticipated is when stopping a rapid vertical descent.

e. DIRECTIONAL CONTROL.—In winds up to 35 mph there is sufficient directional control to maintain any desired heading.

f. VERTICAL DESCENT.—In prolonged part-power descent at zero air speed, the rate of descent sometimes increases very rapidly after approximately 500 feet per minute is reached. Applications of additional pitch and power will not always stop the descent. Recovery is definitely accomplished, however, by acquiring approximately 20 mph forward speed. Avoid prolonged part-power vertical descent at low altitudes. When executing this maneuver at proper altitudes, start recovery through forward air speed above 400 feet.

11. STALLS.

Stalling is not possible when the speed of this aircraft is reduced because the lifting rotor blades are always turning at speeds far in excess of a stalling speed.

12. NIGHT FLYING.

There are no landing lights on this helicopter. Do not fly at night when there is no horizon or other visible references.

13. APPROACH AND LANDING.

a. APPROACH.

(1) Mixture control: "RICH."

(2) Keep the approach speed above 40 mph—IAS.

b. LANDING.

(1) Make the transition from approach to hovering at least 10 feet from the ground.

(2) Decrease pitch very slightly from vertical descent, maintaining 2300 engine rpm.

(3) As soon as wheels are on the ground, do the following simultaneously:

(a) Close throttle.

(b) Decrease main-rotor pitch to almost full low.

(c) Apply sufficient right rudder to compensate for decreasing torque of the main rotor.

(4) Apply wheel brakes.

c. POWER-OFF LANDING. — Execute power-off landings in emergencies only.

d. CROSS-WIND LANDING.—With this helicopter under control it is usually not necessary to land cross-wind. However, when unavoidable, as in landing on shipboard, avoid side drift.

e. TAKE-OFF IF LANDING IS NOT COMPLETED. —Apply sufficient power and pitch for hovering and, if possible, acquire forward speed.

14. STOPPING OF ENGINE.

a. Hold control stick slightly forward.

b. Carburetor-air heat: "COLD."

c. Mixture control: "IDLE CUT-OFF," when cylinder-head temperature is down to 205°C.

d. When engine has stopped, turn ignition switch "OFF."

e. Apply rotor brake when rotor rpm is at or below 25.

f. OIL DILUTION.—Upon stopping the engine when a cold-weather start (ground temperatures below 4°C (39°F) is anticipated, proceed as follows:

(1) Permit the engine to cool by idling until cylinder-head temperatures fall below 148°C and oil temperatures below 50°C.

(2) Run the engine at approximately 1000 rpm and hold the oil dilution switch "ON" for a period varying between 1 and 5 minutes.

(3) Place mixture control in "IDLE CUT-OFF" position and continue to hold the oil dilution control down until the engine has stopped.

Note

The proper duration of the diluting period is dependent on the anticipated temperature and the grade and amount of oil in the system. A considerable drop in oil pressure can be expected, and this may serve as an indication that dilution is being satisfactorily accomplished. Behavior of the oil pressure should not be the governing factor in the duration of the dilution period, however, and it is recommended that the 5-minute period not be exceeded.

15. BEFORE LEAVING PILOT'S COMPARTMENT.

a. All electrical switches: "OFF" except generator switch.

b. Fuel selector-valve control: "BOTH OFF."

c. Rotor brake: On.

d. Wheel brakes: On.

SECTION III
OPERATING DATA

AIR-SPEED INSTALLATION CORRECTION TABLE.

IAS	CORRECTED INDICATED AIR SPEED
10	9
20	18
30	29
40	39
50	50
60	60
70	71
80	81
90	92
100	103
110	113

POWER PLANT CHART

AIRCRAFT MODEL(S)
R-5A, R-5D, R-5E

MAIN ROTOR BLADES: SIKORSKY 48M

CARBURETOR
NA-R9B
ENGINE MODEL
PRATT & WHITNEY
R-985-AN-5,-7

GAUGE READING	FUEL PRESS.	OIL PRESS.	OIL TEMP.	COOLANT TEMP.	CARB AIR TEMP.
DESIRED MAXIMUM	3-4 6	70-90 90	60-75 85	AIR COOLED	28°C 50°C
MINIMUM IDLING	3 3	50 50			

MAXIMUM PERMISSABLE DIVING RPM: 2750
MINIMUM RECOMMENDED CRUISE RPM: 2100
MINIMUM RECOMMENDED ROTOR RPM: 175

OIL GRADE: (S) 1120 (W) 1100 OR 1100P
FUEL GRADE: 91 AN-F-48 91/98

WAR EMERGENCY (COMBAT EMERGENCY)			MILITARY POWER (NON-COMBAT EMERGENCY)			OPERATING CONDITION			NORMAL RATED (MAXIMUM CONTINUOUS)			MAXIMUM CRUISE (NORMAL OPERATION)		
MINUTES			MINUTES			TIME LIMIT			UNLIMITED			UNLIMITED		
						MAX. CYL. HD. TEMP.			260°C			232°C		
						MIXTURE			F.R.			MANUAL LEAN		
						R. P. M.			2300			2300		
MANIF. PRESS.	SUPER-CHARGER	FUEL (1) Gal/Min	MANIF. PRESS.	SUPER-CHARGER	FUEL (1) Gal/Min	STD. TEMP. °C	PRESSURE ALTITUDE	STD. TEMP. °F	MANIF. PRESS.	SUPER-CHARGER	FUEL GPH (2)	MANIF. PRESS.	SUPER-CHARGER	FUEL GPH (2)
						-55.0	40,000 FT.	-67.0						
						-55.0	38,000 FT.	-67.0						
						-55.0	36,000 FT.	-67.0						
						-52.4	34,000 FT.	-62.3						
						-48.4	32,000 FT.	-55.1						
						-44.4	30,000 FT.	-48.0						
						-40.5	28,000 FT.	-40.9						
						-36.5	26,000 FT.	-33.7						
						-32.5	24,000 FT.	-26.5						
						-28.6	22,000 FT.	-19.4						
						-24.6	20,000 FT.	-12.3						
						-20.7	18,000 FT.	- 5.2						
						-16.7	16,000 FT.	2.0	F.T.		26	F.T.		26
						-12.7	14,000 FT.	9.1	F.T.		28	F.T.		28
						- 8.8	12,000 FT.	16.2	F.T.		31	25.5		30
						- 4.8	10,000 FT.	23.4	F.T.		35	26.0		30
						- 0.8	8,000 FT.	30.5	F.T.		40	26.5		30
						3.1	6,000 FT.	37.6	F.T.		45	27.5		30
						7.1	4,000 FT.	44.7	F.T.		51	28.0		30
						11.0	2,000 FT.	51.8	F.T.		55	28.5		30
						15.0	SEA LEVEL	59.0	37.5		55	29.5		30

GENERAL NOTES

(1) *Gal/Min:* APPROXIMATE U.S. GALLON PER *MINUTE* PER ENGINE
(2) GPH: APPROXIMATE U.S. GALLON PER HOUR PER ENGINE.
F.T.: MEANS FULL THROTTLE OPERATION.
VALUES ARE FOR LEVEL FLIGHT WITH RAM.

FOR COMPLETE CRUISING DATA SEE APPENDIX II
NOTE: TO DETERMINE CONSUMPTION IN BRITISH IMPERIAL UNITS, MULTIPLY BY 10 THEN DIVIDE BY 12.

TAKE-OFF CONDITIONS: 2300 R.P.M. RICH
MANIFOLD PRESSURE VARIABLE

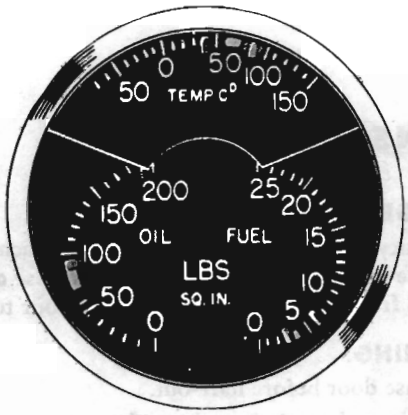
CONDITIONS TO AVOID: DO NOT IDLE ENGINE BELOW 1000 R.P.M. DO NOT OPERATE HELICOPTER BELOW 2100 ENGINE R.P.M. AVOID OPERATION 1600-1800 R.P.M.

SPECIAL NOTES

AAF(C)-526
7-1-44

DATA AS OF BASED ON PRATT & WHITNEY MODEL SPEC. AN-2036, REV. 1

Figure 14—Power Plant Chart



ENGINE GAGE

Oil Temperature

- 40°C MINIMUM
- 60°C TO 75° DESIRED
- 85°C MAXIMUM

Oil Pressure

- 50 PSI MINIMUM
- 70-90 PSI DESIRED
- 90 PSI MAXIMUM

Fuel Pressure

- 3 PSI MINIMUM
- 3-4 PSI DESIRED
- 6 PSI MAXIMUM

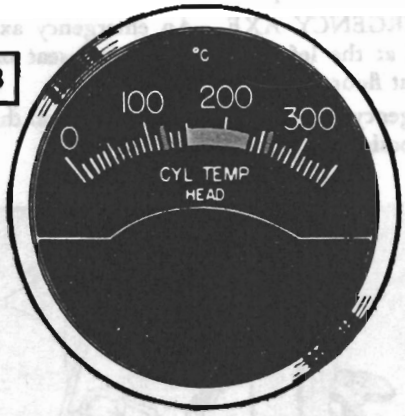
AIR SPEED INDICATOR

- 120 MPH MAXIMUM

MANIFOLD PRESSURE GAGE

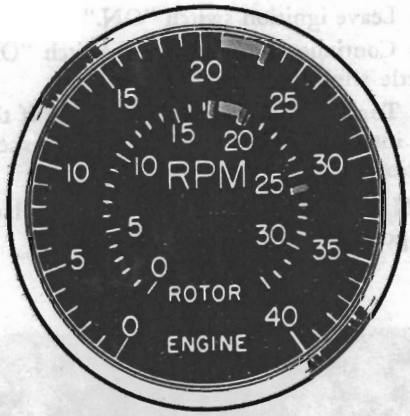
- 25" TO 37.5" HG. DESIRED
- 38" HG. MAXIMUM

FUEL GRADE 91/98



CYLINDER HEAD TEMPERATURE GAGE

- 120°C MINIMUM
- 150°C TO 232°C DESIRED
- 260°C MAXIMUM



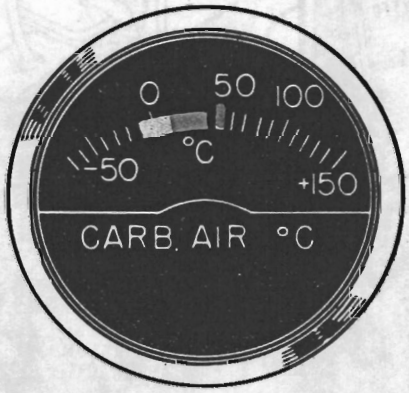
DUAL TACHOMETER

Rotor

- 175 RPM MINIMUM
- 175 TO 195 RPM DESIRED
- 195 RPM MAXIMUM
- 260 RPM MAXIMUM AUTOROTATION

Engine

- 2100 TO 2300 RPM DESIRED
- 2300 MAXIMUM



CARBURETOR-AIR TEMPERATURE GAGE

- —10°C TO +15°C CAUTION
- +15°C TO +40°C DESIRED
- +50°C MAXIMUM

Figure 15—Instrument Range Markings

SECTION IV
EMERGENCY OPERATING INSTRUCTIONS

1. EMERGENCY EQUIPMENT.

a. FIRE EXTINGUISHER.—A hand fire extinguisher (figure 16) is located on the rear of the observer's seat. **A, E**

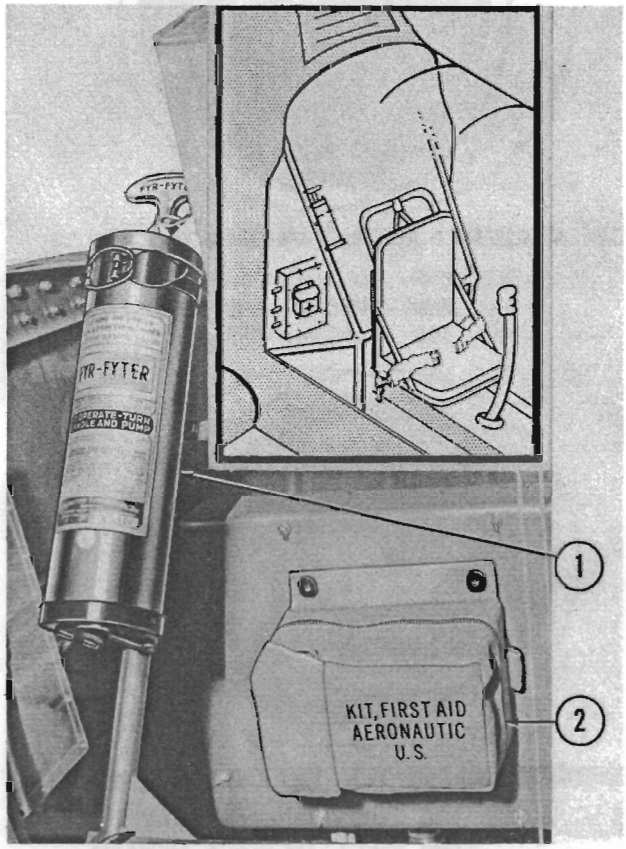
A hand fire extinguisher is located on the right, behind the pilot's seat. **D**

b. FIRST AID KIT.—The first-aid kit (figure 16) is located behind and to the right of the pilot's seat. **A E**

The first-aid kit is located on the left side of the cabin behind the pilot's seat. **D**

c. EMERGENCY AXE.—An emergency axe is located at the left of the observer's seat on the wall, at floor level. **A, E**

The emergency axe is mounted in brackets on the left wall beside the pilot's seat. **D**



1. Fire Extinguisher 2. First Aid Kit

Figure 16—Emergency Equipment Location, R-5A and R-5E

2. EMERGENCY CREW EXIT.

Emergency door releases (figure 17) are attached inside and outside of each door. Pulling either release draws the hinge pins from the hinges, allowing the door to fall off.

3. DITCHING.

a. Release door before flare-out.

b. Flare out abruptly just above the water.

c. Follow through immediately with a movement of the stick to the right if carrying passengers, or to the left if flying solo.

Note

This procedure will cause the helicopter to slip into the water sidewise, using the resistance of the water to stop the main-rotor blades, thus preventing the blades from injuring the occupants while abandoning the helicopter.

d. After coming to rest, release safety belts and swim clear.

4. FIRE.

a. ENGINE FIRE.

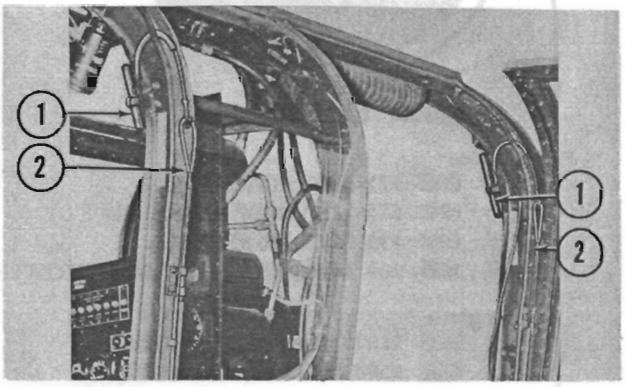
(1) IN STARTING.

(a) Leave ignition switch "ON."

(b) Continue to hold starter switch "ON," and open throttle slightly.

(c) Turn ignition switch "OFF" and if the fire is not drawn into the engine use a fire extinguisher on the engine section.

(2) IN FLIGHT.—Make an emergency landing as quickly as possible and proceed as follows:



1. Inside Release 2. Outside Release

Figure 17—Emergency Door Releases

(a) Fuel-selector valve control: "BOTH OFF."

(b) Engine air-intake shutter control: "OPEN."

(c) Mixture Control: "IDLE CUT-OFF."

(d) Ignition: "OFF."

(e) Cabin doors: Open.

(f) Use a fire extinguisher on the engine section.

b. FUEL TANK OR CONE SUPPORT SECTION FIRE.—Land as quickly as possible, since there are no means of combating fires in the fuel tank or cone support section in flight. Use fire extinguisher upon landing.

c. CABIN FIRE.

(1) Close all windows.

(2) Use hand fire extinguisher and stay as far from the fire as possible.

(3) After using fire extinguisher open the windows.

d. ELECTRICAL FIRE.—Turn off main switches.

e. LEAKING FUEL LINES.—Shut off fuel-selector valve.

5. BAILING OUT.

a. Jettison the door, or doors.

b. Bail out away from the helicopter.

6. ENGINE FAILURE DURING FLIGHT.

a. ABOVE 400 FEET.

(1) Instantly reduce pitch to maintain high rotor rpm and go into a glide, keeping air speed at approximately 70 mph.

Note

If at sufficient altitude, try to restart engine by using starter switch.

(2) If engine does not restart, make a normal forward-speed power-off landing. If the terrain is unsuitable for such a landing, a much sharper flare-out will be necessary. Immediately after the flare-out utilize main-pitch to cushion the final settling. An emergency landing of this type can be accomplished at speeds less than that for normal power-off landings, depending on sharpness of flare-out.

b. BELOW 400 FEET IN FAST FLIGHT.

(1) Instantly reduce pitch to autorotation.

(2) Reduce forward speed to 70 mph.

(3) Flare out at proper level.

c. BETWEEN 10 AND 400 FEET IN SLOW FLIGHT, AND IN TAKE-OFF.

(1) Instantly reduce pitch to autorotative position, obtain as much forward gliding speed as possible, not more than approximately 70 mph, and into the wind if possible.

(2) Flare out just above the ground.

(3) Increase pitch as the helicopter settles the last few feet.

d. BELOW 10 FEET.

(1) Increase pitch as rapidly as possible.

Note

Since the landing in all probability will be a hard one under these conditions, utilize ground roll if the landing area is adequate.

7. TAIL-ROTOR FAILURE.

Note

The following instructions are for cases where tail-rotor failure is complete and anti-torque control thereby lost. In partial failure there may be enough control left to make an immediate normal landing.

a. BELOW 400 FEET IN FAST FLIGHT.

(1) Instantly put pitch into autorotative position.

(2) Close throttle completely, and go into a glide, keeping air speed at approximately 70 mph.

(3) Make a flare-out landing suitable to the terrain, keeping throttle control closed when increasing pitch just after the flare-out.

b. UNDER 10 FEET IN SLOW FLIGHT OR HOVERING.—Make an immediate part-power landing.

c. BETWEEN 10 AND 400 FEET IN SLOW FLIGHT.

(1) Instantly reduce pitch to autorotative position.

(2) Close throttle completely, obtain as much forward gliding speed as possible, not more than 70 mph (into wind if feasible).

(3) Flare out just above the ground, keeping throttle control closed while increasing pitch as the helicopter settles the last few feet.

8. GROUND RESONANCE.

a. In take-off or landing, in the event of failure of either the main rotor blades or landing gear damping mechanism, a severe vibration called ground resonance may develop if hovering with the wheels gently touching the ground. Recovery may be made as follows:

(1) AT LOWER POWER.

(a) Completely reduce power and rpm.

(2) AT HIGH POWER.

(a) Immediately regain flight attitude.

(b) Make subsequent landing in soft ground.

SECTION V
OPERATIONAL EQUIPMENT

1. COMMUNICATION EQUIPMENT.

a. TYPE.—The radio installation is an SCR-274-N Command set, with a multichannel remote control panel (figure 18). This set is designed for aircraft-to-aircraft, or aircraft-to-station communications in short range (15-25 miles) operation. The transmitter dials are calibrated in megacycles (MC). The radio remote control panel for transmitter and receiver tuning is centrally located near the top of the cabin on the right side, and is accessible to both the pilot and the observer. Two throat microphones, type T-30, are provided for the pilot and the observer. The pilot's microphone is on a bracket on the right wall of the pilot's compartment and the observer's microphone is on the right wall of the observer's compartment. A radio transmitter key (3, figure 12) is mounted on the observer's board and case (4, figure 12) to the left of the observer's seat. The observer's board and case may be detached and placed in front of the observer by two straps with rings that fit on hooks furnished one on each side of the observer's compartment. A single antenna is installed, suitable to all units. Continuous wave (CW) or amplitude modulated (MCW) radio signals may be received.

b. OPERATION.—For ground operation with engine not running, put battery switch "ON."

(1) TO RECEIVE.

(a) Insert head-set plug into adapter and the adapter into "A-TEL" or "B-TEL" jack in the receiver control panel. Set the "A-TEL" and "B-TEL" switch (4, figure 18) (at the desired frequency dial) to correspond with the jack being used.

(b) Put the "CW-OFF-MCW" power switch (5, figure 18) (above the frequency dial being used) to the desired position.

(c) Rotate tuning knob for desired frequency.

(d) For volume control turn "INCREASE OUTPUT" knob (8, figure 18).

(2) TO TRANSMIT.

(a) Set the "TRANSMITTER SELECTION" switch to the desired present transmitting frequency indicated on the write-in plate.

CAUTION

Do not switch from one transmitter to another while the transmitter is being used and do not leave transmitter ON for extended periods of time if the transmitter in use is not properly tuned.

(b) Set the "TONE-CW-VOICE" switch to desired position.

(c) Turn "TRANS. POWER" switch to "ON" position and allow 15 seconds for warm up.

(d) For Voice operation press the "press-to-talk" button on the microphone.

For Tone or CW operation press built in key or external key.

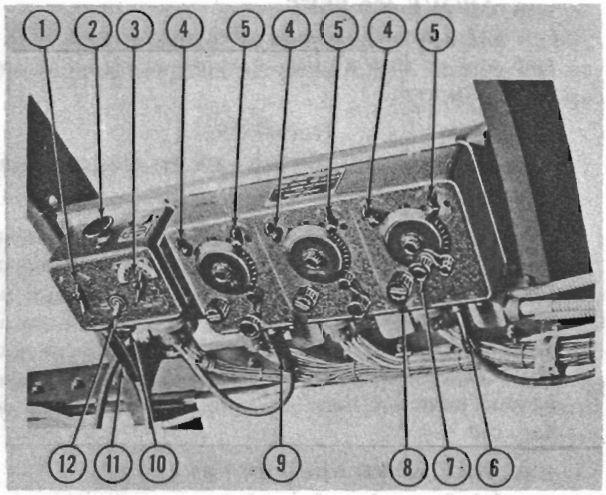
CAUTION

Do not key the transmitter when the controls are in the "VOICE" position.

(3) TO STOP EQUIPMENT.

(a) To turn off receiver equipment place the "CW-OFF-MCW" switch in the "OFF" position.

(b) To turn off transmitter turn the "TRANS. POWER" switch to the "OFF" position.



1. Transmitter Selector Switch ("CW," "TONE," "VOICE")
2. Transmitter Key
3. Transmitter Selector Switch (No. 1 or No. 2)
4. "A-TEL" and "B-TEL" Switch
5. "CW," "OFF," and "MCW" Receiver Switch
4. "A-TEL" and "B-TEL" Switch
5. "CW," "OFF," and "MCW" Receiver Switch
4. "A-TEL" and "B-TEL" Switch
5. "CW," "OFF," and "MCW" Receiver Switch
6. Head-Set Plug (Without Adapter)
7. Dial Control Crank
8. Volume Control
9. Head-Set Plug
10. Jack-Plug (Observer's Keying Switch)
11. Throat-Microphone Plug
12. "TRANS. POWER" Switch

Figure 18—Radio Control Panel—R-5A, R-5D and R-5E

CAUTION

Never operate the equipment on the ground longer than is necessary to complete the preflight check. Never leave the helicopter without setting the "TRANS. POWER" (12, figure 18) and all "CW-MCW" switches (5, figure 18) at the "OFF" positions.

2. CABIN HEATING SYSTEM.

a. GENERAL.

(1) A Stewart-Warner internal combustion type heater unit supplies heat for the cabin. The system is manually controlled. Fuel for the heater flows through a line from the engine carburetor to the heater carburetor. The heater exhaust is through a line out the bottom of the fuselage. A distribution chamber is immediately below the heater unit. A duct leads forward from this chamber, branching to six outlets in the cabin. One outlet is beneath a plastic deflector for nose heating and defrosting. The other five outlets are anemostat-controlled and are located one each side of the pilot's and co-pilot's seat and one at top center of the front of the cabin.

b. CONTROLS.

(1) "CABIN HEATER" "ON-OFF" switch is located on the main switch panel.

(2) A heater choke control for control of the heater-fuel mixture is mounted on the left hand wall beside the pilot's seat. Adjustment of this control provides smoother and more effective operation of the heater unit.

(3) The anemostats at the duct outlets beside the pilot's and co-pilot's seats and at front-top-center of cabin have two positions "OPEN" and "CLOSED." They may be set in any intermediate position to control amount of heat flowing from the outlets.

c. OPERATION.

(1) Put "CABIN HEATER" switch "ON."

(2) If necessary, adjust heater choke.

(3) If necessary, open or close anemostats.

(4) When heat is no longer required, turn "HEATER" switch "OFF."

3. VENTILATION.

A fresh-air intake scoop is located in the fairing forward of the left main alighting gear leg. When fresh air is desired in the cabin, pull up on the ventilation intake control (1, figure 11) mounted on the right wall of the pilot's compartment. Push the control down to shut off the supply. The fresh air enters the cabin through the heater ducts and thusly may be partially warmed when the heater is in operation.

4. PROVISIONS FOR BOMBING EQUIPMENT.

a. Although bombing equipment has never been installed in a model R-5 helicopter, the electrical system is so wired that such equipment could be installed. In such case, the button and trigger switch at top of the control stick would become the control for release of bombs. **A E**

5. HYDRAULIC RESCUE HOIST.

a. Provisions are made for the installation of an hydraulic hoist for rescue purposes. The hoist winch would be installed at top-left-forward of the helicopter center section. The hoist cable raises and lowers from the outer end of the winch, so that a person, when raised by the cable, could enter or be pulled in through the passenger door on the left of the helicopter. At the normal hovering condition of 2300 engine rpm, the hoist is capable of raising or lowering 300 pounds, at the rate of 2-1/2 feet per second. The capacity of the hoist-winch drum is 75 feet of cable. **D**

(1) CONTROLS.—The controls for operation of the hoist consist of a "HOIST MASTER" ON-OFF toggle switch on the main switch panel, and the button and trigger switches at the top of the control stick.

(2) OPERATION.

(a) "HOIST MASTER" switch: "ON."

(b) Button switch (top control stick): Press in to lower cable.

(c) Trigger switch (top-front of control stick): Press in to raise cable.

(d) "HOIST MASTER" switch: "OFF" when operation is concluded.

APPENDIX I
OPERATING CHARTS AND TABLES

1. FLIGHT PLANNING.

a. GENERAL.

(1) A series of charts on the following pages is provided to aid in selecting the proper power and altitude to be used for obtaining optimum range of this helicopter.

(2) If the flight plan calls for a continuous flight where the desired cruising power and air speed are reasonably constant after take-off and climb and the external load items are the same throughout the flight, the fuel required and flight time may be computed as a single section flight.

b. USE OF CHARTS.

(1) The following expanded information on proper use of charts may be helpful:

(a) Select the Flight Operation Instruction Chart (figure 20) for the gross weight, and the external loading to be used at take-off. The amount of gasoline available for flight planning purposes depends upon the reserve required and the amount required for starting and warm-up. Base the reserve on the type of mission, the terrain over which the flight is to be made, and weather conditions. The fuel required for climb and the time to climb to various altitudes is shown on Take-Off, Climb, and Landing Chart (figure 19). Fuel remaining, after subtracting reserve, warm-up, and climb, fuel from total amount available, is the amount to be used for flight planning.

(b) Select a figure in the fuel column in the upper section of the Chart, equal to, or the next entry less than, the amount of fuel available for flight planning. Move horizontally to the right or left and select a figure equal to, or the next entry greater than, the distance (with no wind) to be flown. Operating values contained in the lower section of the column number in which this figure appears represent the highest cruising speeds possible at the range desired. It will be noted that the ranges listed in Column I are figured for the altitude which gives the fewest miles per gallon. The ranges shown in Column II and other columns to the right of Column II can be obtained at the two altitudes listed in the altitude column. All of the power settings listed in a column will give approximately the same number of miles per gallon if each is used at the altitude shown on the same horizontal line with it. The flight duration is obtained by dividing the true air speed of the flight altitude into the air miles to be flown.

(c) The flight plan can be changed at any time en route, and the chart will show the balance of range available at various cruising powers.

(d) SAMPLE PROBLEM.—With helicopter of 4650 pounds gross weight (Pilot, 100 gals. of fuel, and no baggage), climb to 5000 ft.; fly 100 miles to objective; fly at full throttle for 5 minutes over objective; and then return 100 miles to base.

1. Reference to the Take-Off, Climb, and Landing Chart (figure 19) shows that 10 gallons will be used to climb 5000 feet (for the take-off gross weight of 4900 pounds).

2. Reference to the Power Plant Chart (figure 14) shows that 4 gallons of fuel is used to fly at full throttle 5 minutes.

3. From *1.* and *2.*, 86 gallons of fuel is available for cruising. The pilot refers to Flight Operation Instruction Chart (figure 20) that shows 75 gallons of fuel is needed to fly 200 miles at a cruising speed of 90 mph. This leaves 11 gallons of fuel for reserve.

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11-1-48

AIRCRAFT MODEL(S)
R-5A, R-5D & R-5E

TAKE-OFF, CLIMB & LANDING CHART

ENGINE MODEL(S)
R-985-AN-5 OR AN-7

TAKE-OFF DISTANCE FEET

GROSS WEIGHT LB.	HEAD WIND M.P.H.	HEAD WIND K.T.S.	AT SEA LEVEL BEST I.A.S. M.P.H.	AT SEA LEVEL BEST I.A.S. K.T.S.	AT SEA LEVEL TO RUN	AT SEA LEVEL TO CLEAR 50' OBJ.	AT 2000 FEET BEST I.A.S. M.P.H.	AT 2000 FEET BEST I.A.S. K.T.S.	AT 2000 FEET TO RUN	AT 2000 FEET TO CLEAR 50' OBJ.	AT 4000 FEET BEST I.A.S. M.P.H.	AT 4000 FEET BEST I.A.S. K.T.S.	AT 4000 FEET TO RUN	AT 4000 FEET TO CLEAR 50' OBJ.	AT 6000 FEET BEST I.A.S. M.P.H.	AT 6000 FEET BEST I.A.S. K.T.S.	AT 6000 FEET TO RUN	AT 6000 FEET TO CLEAR 50' OBJ.	AT 8000 FEET BEST I.A.S. M.P.H.	AT 8000 FEET BEST I.A.S. K.T.S.	AT 8000 FEET TO RUN	AT 8000 FEET TO CLEAR 50' OBJ.	AT 10000 FEET BEST I.A.S. M.P.H.	AT 10000 FEET BEST I.A.S. K.T.S.	AT 10000 FEET TO RUN	AT 10000 FEET TO CLEAR 50' OBJ.	AT 12000 FEET BEST I.A.S. M.P.H.	AT 12000 FEET BEST I.A.S. K.T.S.	AT 12000 FEET TO RUN	AT 12000 FEET TO CLEAR 50' OBJ.
R-5D 5400	0	0	35	30	220	480	35	30	250	525	40	35	390	780	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	17	15	17	15	0	0	17	15	0	0	35	30	90	290	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	34	30	34	30	0	0	33	29	0	0	32	28	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	51	45	51	45	0	0	50	44	0	0	48	42	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–
R-5F-4985 R-5A,E-4900	0	0	0	0	0	0	0	0	0	0	30	26	180	400	35	30	320	640	40	35	600	1100	50	43	1350	2225	55	48	2700	5000
	17	15	17	15	0	0	17	15	0	0	16	14	0	0	16	14	0	0	35	30	150	430	45	39	500	1050	55	48	1450	3050
	34	30	34	30	0	0	33	29	0	0	32	28	0	0	31	27	0	0	30	26	0	0	29	25	0	0	50	43	400	1300
	51	45	51	45	0	0	50	44	0	0	48	42	0	0	47	41	0	0	45	39	0	0	44	38	0	0	43	37	0	0
R-5A,E,F, 4400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	26	300	540	35	30	590	950	40	35	1210	1760
	17	15	17	15	0	0	17	15	0	0	16	14	0	0	16	14	0	0	15	13	0	0	30	26	120	290	35	30	320	680
	34	30	34	30	0	0	33	29	0	0	32	28	0	0	31	27	0	0	30	26	0	0	29	25	0	0	28	24	0	0
	51	45	51	45	0	0	50	44	0	0	48	42	0	0	47	41	0	0	45	39	0	0	44	38	0	0	43	37	0	0

REMARKS: FOR EACH 30° ABOVE STANDARD TEMPERATURE, USE DATA FOR THE NEXT HIGHER ALTITUDE.
FOR EACH 30° BELOW STANDARD TEMPERATURE, USE DATA FOR THE NEXT LOWER ALTITUDE.

DATA AS OF BASED ON:

CLIMB DATA

GROSS WEIGHT LB.	AT SEA LEVEL BEST I.A.S. MPH	AT SEA LEVEL BEST I.A.S. KTS	AT SEA LEVEL RATE OF CLIMB F.P.M.	AT SEA LEVEL GAL. OF FUEL USED	AT 5000 FEET BEST I.A.S. MPH	AT 5000 FEET BEST I.A.S. KTS	AT 5000 FEET RATE OF CLIMB F.P.M.	AT 5000 FEET FROM SEA LEVEL TIME MIN.	AT 5000 FEET FROM SEA LEVEL FUEL USED	AT 10,000 FEET BEST I.A.S. MPH	AT 10,000 FEET BEST I.A.S. KTS	AT 10,000 FEET RATE OF CLIMB F.P.M.	AT 10,000 FEET FROM SEA LEVEL TIME MIN.	AT 10,000 FEET FROM SEA LEVEL FUEL USED	AT 15,000 FEET BEST I.A.S. MPH	AT 15,000 FEET BEST I.A.S. KTS	AT 15,000 FEET RATE OF CLIMB F.P.M.	AT 15,000 FEET FROM SEA LEVEL TIME MIN.	AT 15,000 FEET FROM SEA LEVEL FUEL USED	AT ___ FEET BEST I.A.S. MPH	AT ___ FEET BEST I.A.S. KTS	AT ___ FEET RATE OF CLIMB F.P.M.	AT ___ FEET FROM SEA LEVEL TIME MIN.	AT ___ FEET FROM SEA LEVEL FUEL USED	AT ___ FEET BEST I.A.S. MPH	AT ___ FEET BEST I.A.S. KTS	AT ___ FEET RATE OF CLIMB F.P.M.	AT ___ FEET FROM SEA LEVEL TIME MIN.	AT ___ FEET FROM SEA LEVEL FUEL USED
5400	50	43	750	5	50	43	480	8	12	50	43	20	39	31	–	–	–	–	–									
4900	50	43	1010	5	50	43	740	6	10	50	43	290	16	16	–	–	–	–	–									
4400	50	43	1300	5	50	43	1040	4	9	50	43	580	11	13	–	–	–	–	–									

POWER PLANT SETTINGS: (DETAILS ON FIG. SECTION III):
DATA AS OF BASED ON:

FUEL USED (U.S. GAL.) INCLUDES WARM-UP & TAKE-OFF ALLOWANCE

LANDING DISTANCE FEET (POWER OFF)

GROSS WEIGHT LB.	BEST IAS APPROACH POWER OFF MPH	POWER OFF KTS	POWER ON MPH	POWER ON KTS	HARD DRY SURFACE AT SEA LEVEL GROUND ROLL	AT SEA LEVEL TO CLEAR 50' OBJ.	AT 3000 FEET GROUND ROLL	AT 3000 FEET TO CLEAR 50' OBJ.	AT 6000 FEET GROUND ROLL	AT 6000 FEET TO CLEAR 50' OBJ.	FIRM DRY SOD AT SEA LEVEL GROUND ROLL	AT SEA LEVEL TO CLEAR 50' OBJ.	AT 3000 FEET GROUND ROLL	AT 3000 FEET TO CLEAR 50' OBJ.	AT 6000 FEET GROUND ROLL	AT 6000 FEET TO CLEAR 50' OBJ.	WET OR SLIPPERY AT SEA LEVEL GROUND ROLL	AT SEA LEVEL TO CLEAR 50' OBJ.	AT 3000 FEET GROUND ROLL	AT 3000 FEET TO CLEAR 50' OBJ.	AT 6000 FEET GROUND ROLL	AT 6000 FEET TO CLEAR 50' OBJ.
4900	50	43	50	43	330	680	340	716	350	763	SAME AS HARD DRY SURFACE						SAME AS HARD DRY SURFACE					

DATA AS OF BASED ON:

OPTIMUM LANDING IS 80% OF CHART VALUES

REMARKS: NORMAL LANDING (FINAL PHASE) IS VERTICAL DESCENT WITH POWER ON.

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

Figure 19—Take-off, Climb and Landing Chart

AAFMC-528 8-1-44

AIRCRAFT MODEL(S)
R-5A, R-5D AND R-5E
ENGINE(S): R-985-AN-5 OR -7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 5380 TO 4900 POUNDS

EXTERNAL LOAD ITEMS
NONE

NUMBER OF ENGINES OPERATING: 1

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.							
MILITARY POWER							

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I		FUEL	COLUMN II		COLUMN III		COLUMN IV		FUEL	COLUMN V	
RANGE IN AIRMILES		U.S.	RANGE IN AIRMILES		RANGE IN AIRMILES		RANGE IN AIRMILES		U.S.	RANGE IN AIRMILES	
STAUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL
170	145	95	190	165	205	175	210	180	95	245	210
135	115	75	150	130	160	140	170	150	75	195	170
100	85	55	110	95	120	105	125	110	55	140	120
65	55	35	70	60	75	65	80	70	35	90	80

SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]

MAXIMUM CONTINUOUS						PRESS ALT. FEET	(2.0 STAT. (1.7 NAUT.) MI./GAL.)						(2.1 STAT. (1.8 NAUT.) MI./GAL.)						(2.3 STAT. (2.0 NAUT.) MI./GAL.)						PRESS ALT. FEET	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000						
						25000 20000 15000																			25000 20000 15000						
2300	37½"	F.R.	55	99	87	10000 5000 S.L.	2300	35"	M.L.	48	95	82	2300 2300	32" 33"	M.L. M.L.	44 42	95 90	82 78	2300 2300	31" 32"	M.L. M.L.	40 38	90 85	78 74	10000 5000 S.L.	2300 2300	28" 29"	M.L. M.L.	31 29	80 75	70 65

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 27) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
(2) MAXIMUM ENDURANCE MAINTAIN 55 M.P.H. 2300 R.P.M. 27½" M.P. (APPROX FUEL CONSUMPTION 26 G.P.H.)

EXAMPLE

AT 5400 LB. GROSS WEIGHT WITH 80 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 12 GAL.) TO FLY 165 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2300 RPM AND 31 IN. MANIFOLD PRESSURE WITH MIXTURE SET: M.L.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF-NOV, 1946 BASED ON: (SEE SHEET 2, THIS FIGURE)

Figure 20—Flight Operation Instruction Chart (Sheet 1 of 2 Sheets)

AAFMC-528 4-1-46

AIRCRAFT MODEL(S)
R-5A, R-5D AND R-5E
ENGINE(S): R-985-AN-5 OR-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 4900 TO 4300 POUNDS

EXTERNAL LOAD ITEMS
NONE

NUMBER OF ENGINES OPERATING: 1

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.							
MILITARY POWER							

FOR DETAILS SEE POWER PLANT CHART SECT. III(1)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I		FUEL	COLUMN II		COLUMN III		COLUMN IV		FUEL	COLUMN V	
RANGE IN AIRMILES		U.S.	RANGE IN AIRMILES		RANGE IN AIRMILES		RANGE IN AIRMILES		U.S.	RANGE IN AIRMILES	
STAUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
170	145	95	200	175	225	195	250	215	95	270	235
135	115	75	160	140	180	155	200	175	75	215	185
100	85	55	115	100	130	115	145	125	55	155	135
65	55	35	75	65	85	75	95	85	35	100	85

MAXIMUM CONTINUOUS						PRESS	(2.1 STAT. (NAUT.) MI./GAL.)						(2.4 STAT. (NAUT.) MI./GAL.)						(2.7 STAT. (NAUT.) MI./GAL.)						PRESS	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. M.P.H.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000						
						25000 20000 15000																			25000 20000 15000						
2300	37½"	F.R.	55	102	90	10000	2300	33"	M.L.	47	100	87	2300	31"	M.L.	40	95	82	2300	27½"	M.L.	34	90	78	10000	2300	25½"	M.L.	28	80	70
						5000	2300	34"	M.L.	45	95	82	2300	32"	M.L.	38	90	78	2300	29"	M.L.	34	90	78	5000	2300	26"	M.L.	26	75	65
						S.L.	2300												2300	30"	M.L.	32	85	74	S.L.	2300	27½"	M.L.	26	75	65

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 27) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

(2) FOR MAXIMUM ENDURANCE MAINTAIN 55 M.P.H. 2300 R.P.M. 26 M.P. (APPROX FUEL CONSUMPTION - 23 G.P.H.)

(3) FUEL CONSUMPTION WHILE HOVERING IS 48 G.P.H.

EXAMPLE

AT 4900 LB. GROSS WEIGHT WITH 80 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 10 GAL.) TO FLY 200 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2300 RPM AND 29 IN. MANIFOLD PRESSURE WITH MIXTURE SET: M.L

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

AMC FLIGHT TEST REPORT SERIAL NO. TSFTE-2043,
DATA AS OF NOV, 1946 BASED ON: PRATT & WHITNEY MODEL SPEC. AN-2036, REV. 1 & SIKORSKY SER-1620

Figure 20—Flight Operation Instruction Chart (Sheet 2 of 2 Sheets)