RESTRICTED

PILOT'S HANDBOOK

FOR

MODEL N2S-4

PT17-17A

AIRPLANES

BU. AER. SERIAL NOS.

27960—28058 INCL.
29923—30146 INCL.
34097—34101 INCL.
34107—34111 INCL.
37856—37967 INCL.
37978—37987 INCL.

COMPILED BY

BOEING AIRPLANE COMPANY
WICHITA DIVISION
WICHITA, KANSAS

"THE LOCKER PROVIDED FOR CLASSIFIED DATA IN THIS AIRPLANE GIVES CLASS 'C' STOWAGE AS DEFINED BY ARTICLE 112 OF R.P.S.-6"

SECTION I

A—TABLE OF CONTENTS

A—TABLE OF CONTENTS (Continued)

B — LIST OF ILLUSTRATIONS

C — TABLE OF CHARACTERISTICS

Normal Gross Weight (Pounds)	2671.06
Fuel Capacity (Gallons)	46
Wing Area (Square Feet)	297.6
Wing Span — Upper (Feet and Inches)	32'-2"
Wing Span — Lower (Feet and Inches)	31'-2"
Rated Power of Engine (Horse Power)	220
Rated Altitude	Sea Level
Wing Loading (Pounds Per Square Foot)	8.98
Power Loading (Pounds Per Horse Power)	12.14
High Speed at Sea Level—Knots	107.51
MPH	124
Stalling Speed at Sea Level, with reduced load (50% fuel and oil)—Knots	47.68
MPH	55
Initial Rate of Climb (Feet Per Minute)	850
Service Ceiling (Feet)	13,200
Take-Off Distance in Calm (Feet)	600
Cruising Speed — Knots	86.7
MPH	100
Endurance at Cruising Speed (Hours)	4
Range at Cruising Speed (Miles)	400
Endurance at High Speed (Hours)	2.25
Range at High Speed (Miles)	279

NOTE: The above data are tabulations and calculations based on flight tests of this airplane.

SECTION II

FOREWORD

The purpose of this handbook is to furnish the pilot with a condensed description of the operation and flying characteristics of the N2S-4 Airplane. The manufacturer advises the pilot to read this handbook carefully, and afterward to closely observe its contents whenever the airplane is flown.

For additional information and instructions not contained in this handbook, refer to the N2S-4 Erection and Maintenance Manual which is stowed in the data case attached to the inside of the baggage compartment lid.

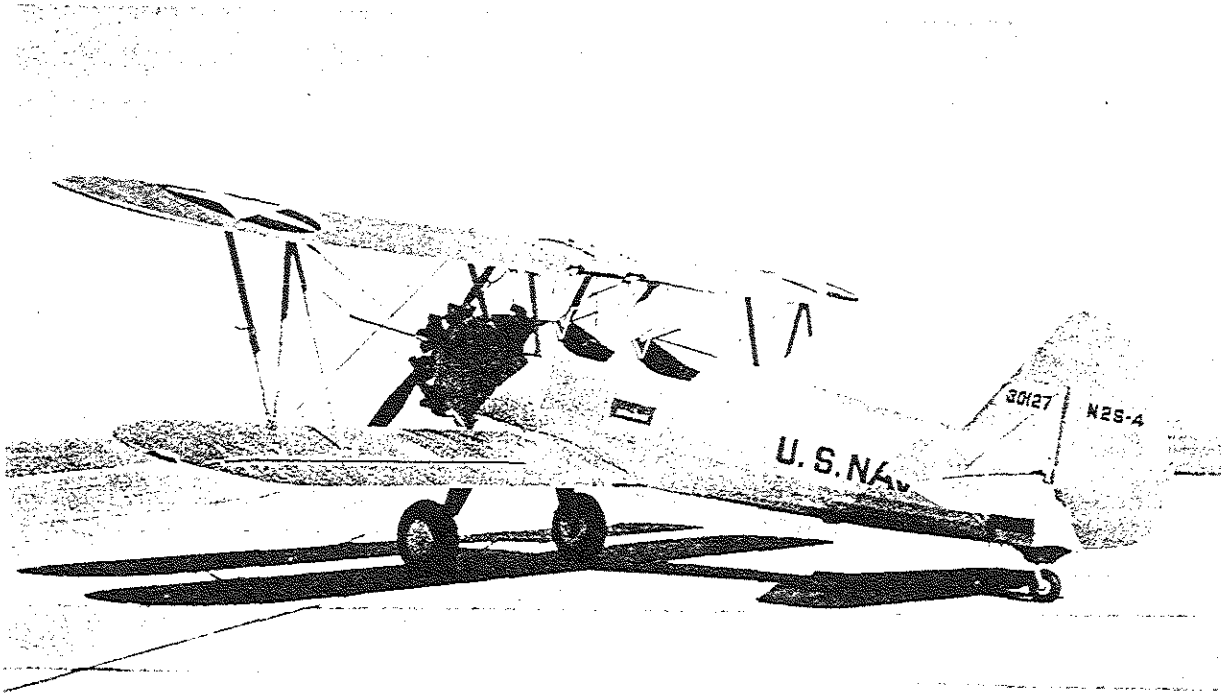
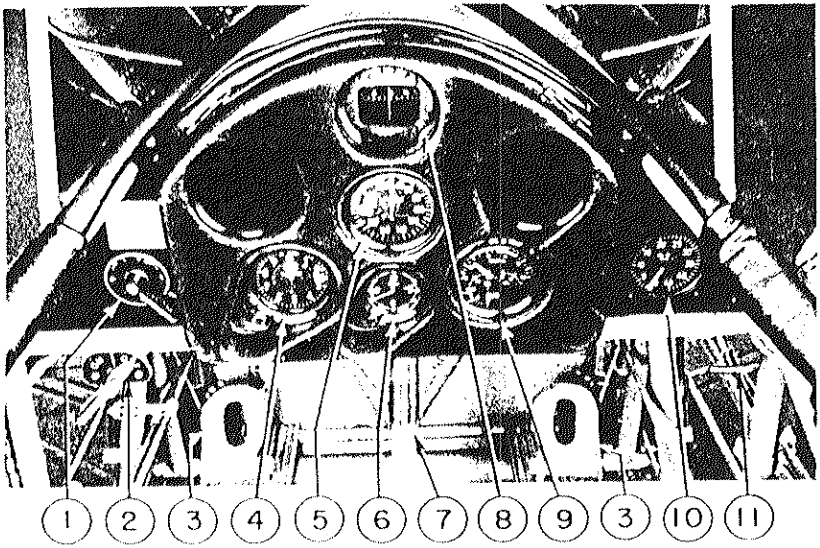


FIG.1 ¾ LEFT REAR VIEW AIRPLANE MODEL N2S-4



1. IGNITION SWITCH CONTROL
2. FUEL VALVE CONTROL
3. RUDDER PEDALS
4. ALTIMETER
5. AIRSPEED INDICATOR
6. CLOCK
7. CONTROL STICK
8. COMPASS
9. OIL TEMPERATURE & PRESSURE GAUGE
10. TACHOMETER
11. PARKING BRAKE HANDLE

FIG. 2 INSTRUMENT PANEL, MODEL N2S-4

SECTION III

GENERAL DESCRIPTION OF OPERATION OF THE AIRPLANE

A. COCKPIT ARRANGEMENT AND CONTROLS

The arrangements of the cockpits and controls are shown in Figures III to VI, inclusive.

1. FLYING CONTROLS

a. GENERAL:

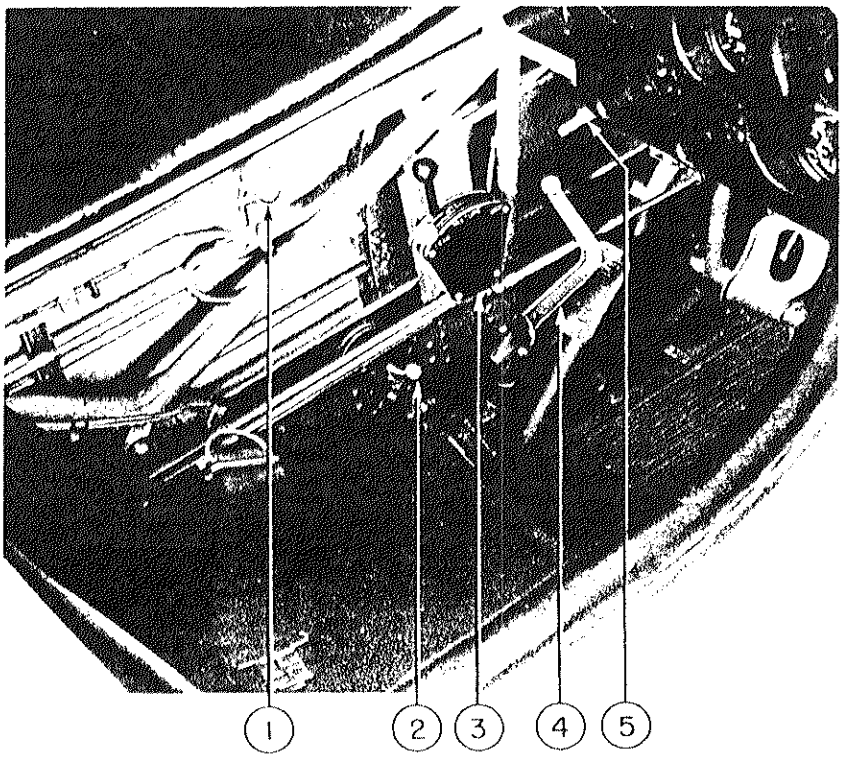
A complete set of flight controls is installed in each cockpit.

b. ELEVATOR CONTROLS:

The elevator control consists of a stick in each cockpit mounted on a large diameter, chrome-molybdenum steel torque tube supported at the front and rear by self-aligning ball bearings in housings bolted to the bottom fuselage truss. The control stick sockets are aluminum alloy forgings. The control sticks are constructed either of swaged aluminum alloy tubing with rubber handgrips or of straight-grained hickory. Elevator control is accomplished by a system of interconnecting push-pull tubes extending from front stick to rear stick, from rear stick to a ball bearing idler located midway back in the fuselage, and from the idler to the single horn bolted between the end fittings of the elevator spars. Rubber "Lord" bushings are incorporated in the connection of the rear push-pull tube and elevator horn to prevent vibration being transmitted from the elevator to the control stick.

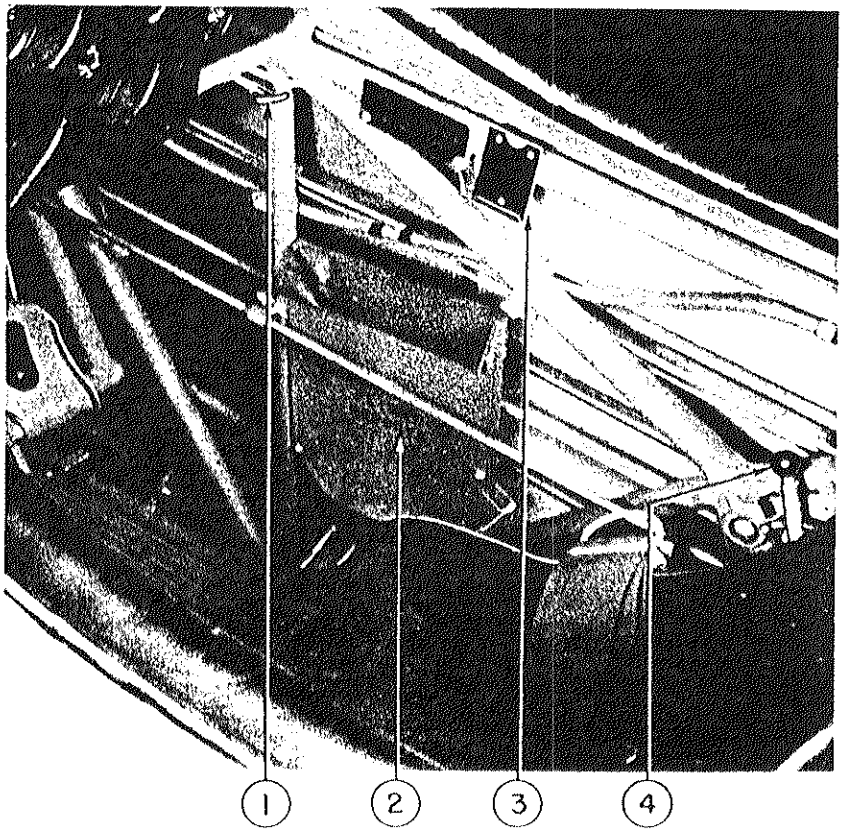
c. AILERON CONTROLS:

The aileron control system is comprised of push-pull tubes which are attached at their inboard end to a control horn bolted to the stick torque tube and extending outboard into the lower wing to an idler, and then to the aileron bellcrank located at the aileron semi-span. A short link connects the bellcrank to the aileron horn. All moving parts in the aileron control system are provided with ball bearing terminals. The controls to the right and left are entirely independent.



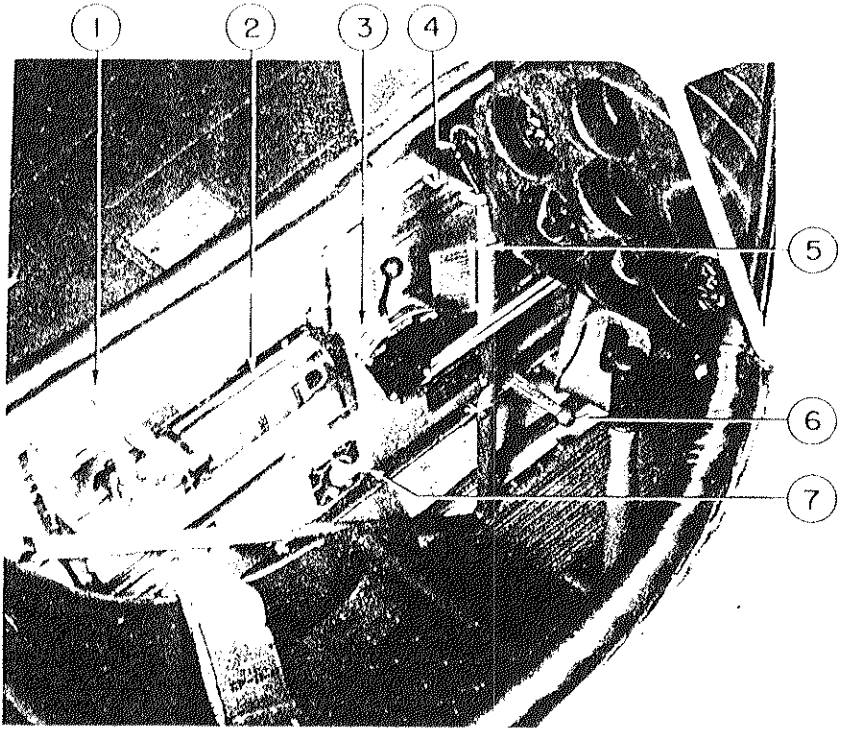
1. SPEAKING TUBE
2. ELEVATOR TRIM TAB CONTROL
3. ENGINE CONTROL QUADRANT
4. CONTROL SURFACE LOCK
5. FUEL VALVE CONTROL

FIG. 3 FRONT COCKPIT L. SIDE MODEL N2S-4



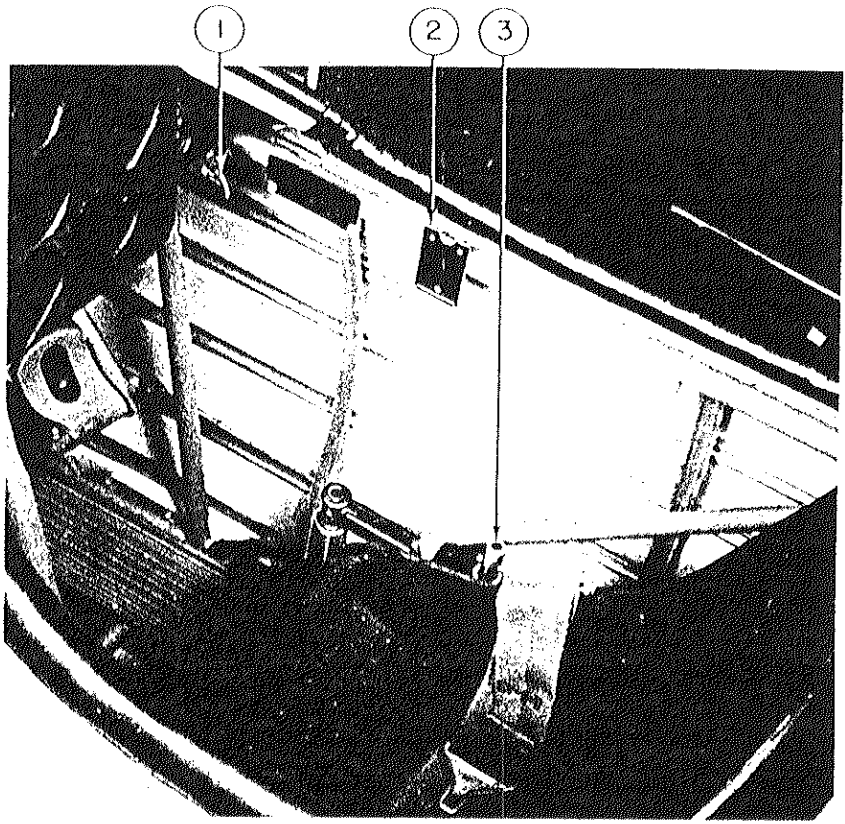
1. PARKING BRAKE HANDLE
2. FLIGHT REPORT HOLDER
3. COMPASS CORRECTION CARD HOLDER
4. CARBURETOR AIR CONTROL

FIG. 4 FRONT COCKPIT R. SIDE MODEL N2S-4



1. SPEAKING TUBE
2. FIRE EXTINGUISHER
3. ENGINE CONTROL QUADRANT
4. IGNITION SWITCH CONTROL
5. FUEL VALVE CONTROL
6. CONTROL SURFACE LOCK
7. ELEVATOR TRIM TAB CONTROL

FIG. 5 REAR COCKPIT LEFT SIDE N2S-4



1. PARKING BRAKE HANDLE
2. COMPASS CORRECTION HOLDER
3. ENGINE STARTER CRANK

FIG.6 REAR COCKPIT R. SIDE MODEL N2S-4

d. RUDDER CONTROL:

The rudder control system incorporates "L" shaped tubular hangers, mounting cast aluminum alloy brake treadles, interconnecting front and rear pedal rods and a bus cable which extends from the left interconnecting rod to the right interconnecting rod over a set of pulleys in the front of the fuselage. Provisions have been made for the adjustment of rudder pedals to compensate for the difference in stature of the pilots and for flying requirements.

e. ELEVATOR TRIM TABS:

Horizontal trim of the airplane is effected by trimming tabs located in the inboard trailing edge of the elevators. These tabs are cable operated by an irreversible mechanism located near the front spar of the stabilizer. This irreversible mechanism is, in turn, operated by control handles located at the left side of each cockpit. The full tab range of 15° up and 15° down is sufficient to trim the airplane under all normal conditions of speed and load. The control handle also serves as an indicator, showing in degrees the position of the tabs with respect to the elevator.

2. POWER PLANT CONTROLS

a. GENERAL:

Duplicate power plant controls are installed in each cockpit.

b. THROTTLE:

Control of the engine RPM is accomplished by the use of a B-13 control unit in each cockpit. Forward movement of the throttle control increases the RPM of the engine; aft movement decreases the RPM.

c. MIXTURE CONTROL:

A mixture control lever is mounted adjacent to the throttle in each cockpit. Forward movement of the control enriches the carburetor mixture; aft movement leans the mixture.

d. FUEL COCK CONTROL:

Fuel flow from the tank to the engine is controlled by the fuel shut-off valve. Handles operating the valve are located in both cockpits on the left side of the airplane just below the instrument panel in a position easily seen and accessible to the pilot. A two-position "On"—"OFF" dial is provided with each handle. When operating the fuel valve selector, make certain the pointer is turned to the exact "ON" or "OFF" position.

e. CARBURETOR AIR:

The Type A-1 control is located midway between the front and rear cockpits on the right side of the airplane, readily accessible to both pilots. To operate this control, depress the handle, move to the position desired, and release; this action automatically locks the handle in the desired position. The handle is moved forward to admit cold air to the carburetor and rearward to admit hot air. Intermediate positions provide carburetor with a mixture of hot and cold air. Linkage from the control handle to the mixing chamber consists of rods and bellcranks.

f. STARTING CONTROLS:

The starting controls consist of an NAF1007 primer and a manual spark and starter clutch control handle located on the starter panel in the left side of the engine cowl. To operate the primer depress the handle, turn counterclockwise to the "ON" position and pump as required. Normally four strokes are sufficient for priming. On the last stroke depress fully and turn clockwise to the "OFF" position. The manual spark and starter clutch control consists of a handle which, when pulled, engages the starter and simultaneously retards the spark for starting. A spring attached to the control disengages the clutch and advances the spark when the handle is released. Arrangement of these controls is shown in Fig. VII.

3. AUXILIARY CONTROLS

a. BRAKE PEDALS:

Both front and rear rudder pedals mount cast aluminum alloy brake treadles. These treadles are interconnected by a series of rods and bellcranks.

b. RUDDER PEDAL ADJUSTMENT:

To compensate for the difference in pilot stature and flying requirements, the rudder pedals can be located in any one of four positions. An integral toe operated latch on each pedal secures it in the position desired. To change a rudder pedal location, push the latch lever, on the lower end of the pedal hanger, inboard with the toe and select the approximate desired position; then release the lever. If the latch does not lock, slide the pedal slightly forward or backward, allowing the latch pin to slip into place.

c. PARKING BRAKE:

A small pull handle, conveniently located on the right side of each cockpit, is provided for the control of the parking valve. The brakes may be locked for parking by pulling this handle out and, while holding it,

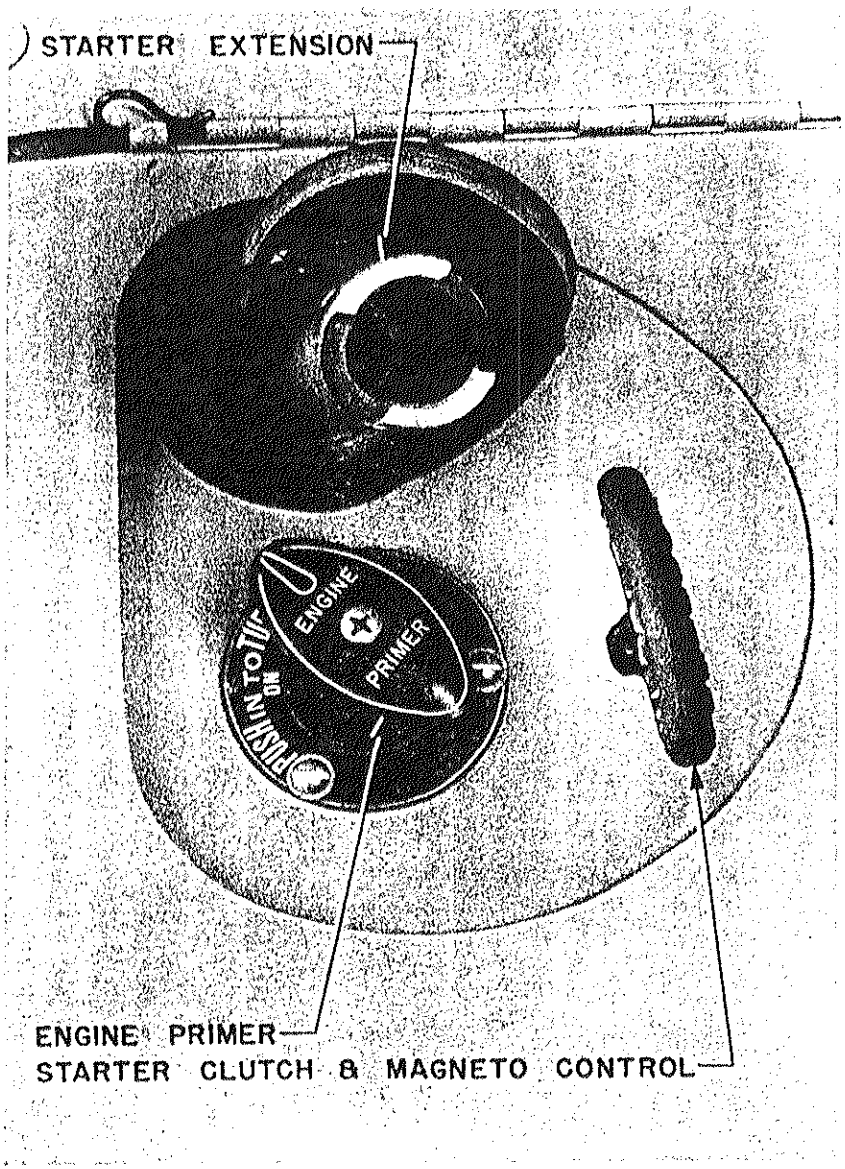


FIG. 7 STARTING CONTROLS

applying firm pressure to both brake pedals. The brakes may be released by the application of further pressure to the pedals without touching the control handle. CAUTION! DO NOT OPERATE THE PARKING BRAKE HANDLE WHILE IN THE AIR.

d. FIRE EXTINGUISHER:

A hand fire extinguisher, Type A-2, is provided at the left side of the rear cockpit. The extinguisher is mounted on a door which may be opened from the outside, making the extinguisher readily accessible from either the inside or outside. To release the extinguisher, lift the latch fastener. Operation of the extinguisher is as follows:

(1) Turn handle.

(2) Operate like a pump.

(3) Direct stream at base of flame.

(4) For burning liquids, direct stream against side of containers above surface of liquid.

WARNING! Avoid exposure to smoke and fumes.

e. SEAT ADJUSTMENT:

The seat in each cockpit is mounted on two support tubes by clamp bearings. The height of each seat may be varied five inches in increments of one-half inch while the airplane is on the ground or in flight. To raise or lower either seat, pull the release lever on the right side of the seat upward and move the seat to the position desired. Secure the seat in place by pushing downward on the release lever. If the locking pin attached to the release lever will not engage, move the seat slightly upward or downward until the pin slides into place. Each seat is counterbalanced to permit ease of adjustment.

f. HARNESS LOCK:

A shoulder type harness is installed on each seat to prevent the occupant from being thrown forward in the event of a crash. The shoulder straps may be locked to hold the occupant in an erect position by moving a control handle at the left of the seat to "forward" position. When this handle is in the "aft" position, the shoulder straps are released, permitting freedom of movement. If the handle is moved to the forward position while the occupant is leaning forward, the mechanism will not lock until the occupant sits erect in the seat.

B. POWER PLANT

1. **ENGINE:**

a. ENGINE.....Continental Model R-670-4

b. GEAR RATIO.....Direct Drive

c. NORMAL RATING
220 BHP @ 2075 RPM @ Sea Level

2. **PROPELLER:**

McCauley, Ground Adjustable, 2 bladed steel propeller — 8'6" diameter.

3. **FUEL:**

73 Octane.....Spec. AN-VV-F-761

4. **OIL:**

Spec. AN-VV-O-446 Grade (See T. O. 24-41)
Oil Temperature 40° C — 90° C.
Oil Pressure (Pounds)

Rated Speed	90
Desired	70-90
Minimum Cruising	60
Idling	15

5. **OVERSPEED:**

Maximum allowable during dives, 2280 RPM.

6. **MIXTURE CONTROL:**

The mixture control shall be maintained in full "RICH" position during take-off, climb at or near maximum power, and during high speed level flight below 3000 feet. For all operations at or below 70% normal rated power, where low specific fuel consumption is of major importance, the mixture may be leaned sufficiently to give a drop of twenty RPM in engine speed. For landing, the mixture control shall be in the full "RICH" position.

7. **CARBURETOR AIR CONTROL:**

Hot air or cold air is fed into the carburetor as desired by the operation of the carburetor air control lever located between the front and rear

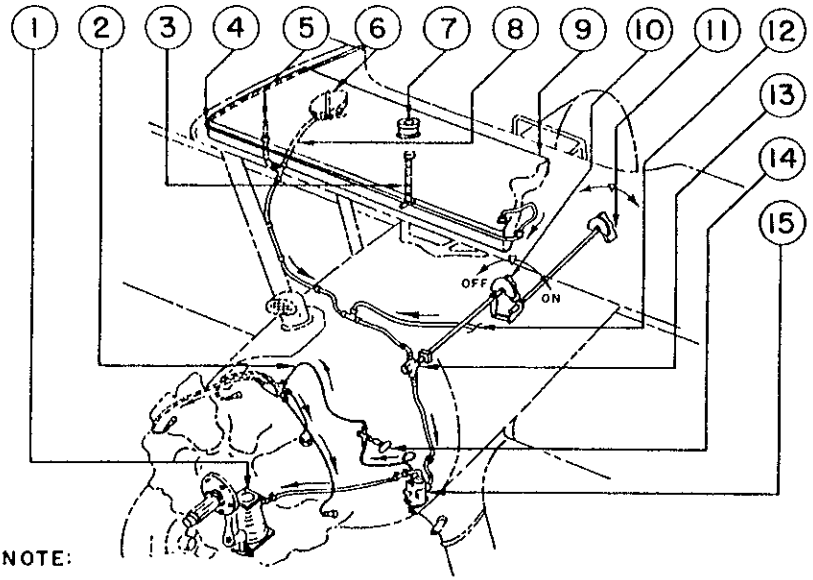
cockpits on the right side of the airplane. Heat is used to prevent ice forming in the carburetor or its adapter when the temperature is low and the humidity is relatively high. Since no carburetor air temperature gage is provided for this airplane, the control should be placed in the "FULL HOT" position when icing conditions are suspected.

8. FUEL SYSTEM:

The fuel system includes an aluminum alloy, 3S-½H, fuel tank incorporating a type NAF 1025 filler cap and adapter assembly, gage, C-2A strainer, D-3 fuel cock and control handles. The fuel tank, located in the center section, has a capacity of forty-six (46) gallons with an expansion space of 1.3 gallons. To insure a constant supply of fuel under all flight attitudes, outlet lines are attached to the fuel tank at each corner. These outlets incorporate finger type strainers which extend into the tank. At the two aft corners sumps are provided which, in addition to housing the strainers, also have cocks provided to drain sediment and water which may have collected. Extending through the bottom of the center section is a sight type fuel gage, calibrated in increments of one-fourth tank capacity, with a drain for drawing off collected sediment. The fuel strainer is located at the lowest point of the fuel system, just ahead of the firewall, in a position readily accessible for servicing. A fuel cock, controllable from either cockpit by a system of rods and levers, is installed in the fuel line at the firewall. The fuel cock control levers are located in both cockpits on the left hand side, directly below the instrument panel. For fuel system diagram, see Figure VII.

9. OIL SYSTEM:

The oil system consists of an oil tank incorporating a Type NAF 1025 filler cap and adapter assembly, lines, "Y" drain and vents. The tank is constructed of 3S-½H aluminum alloy with a capacity of 4.4 gallons and an expansion space of 1.4 gallons. (A short standpipe fitting has been installed at the oil outlet to prevent sediment from flowing into the engine.) Oil temperature wells are provided in the engine inlet oil line. At the lowest point of this line a "Y" drain is provided. All the oil lines are aluminum alloy tubing except the return line, which is a flexible hose. Two vent lines are provided; one interconnects the oil tank and engine crankcase, while the other, through a system of lines, extends from the engine crankcase down the inside of the shock absorber fairing to vent into the atmosphere near the wheel. Through this arrangement of lines, oil is discharged clear of the airplane. For oil system diagram, see Figure IX.

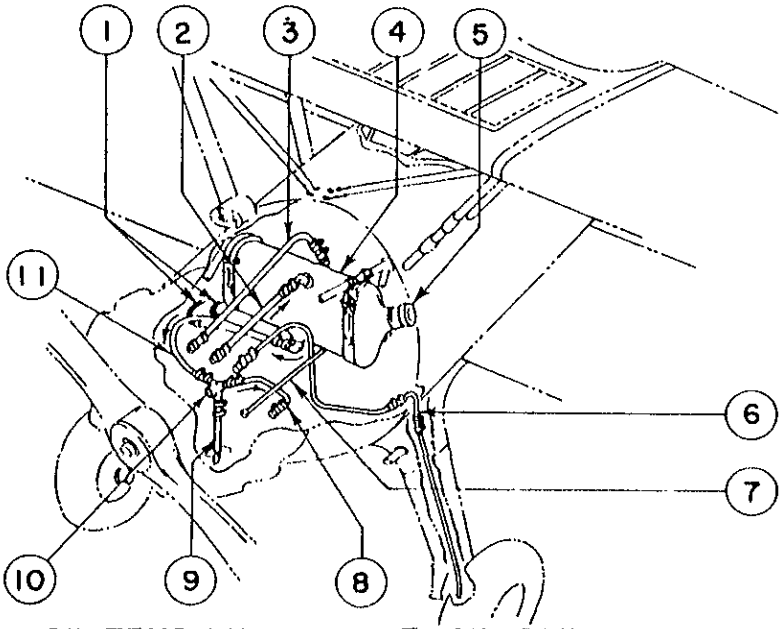


NOTE:
LEFT HAND SIDE OF FUEL TANK IDENTICAL WITH RIGHT HAND SIDE

1. CARBURETOR
2. PRIMER LINE TO ENGINE
3. FUEL GAGE
4. VENT LINE
5. OUTLET LINE
6. SUMP
7. FILLER NECK
8. FUEL LINE FROM TANK
9. FUEL TANK-46 GALS.
10. FUEL VALVE CONTROL FRONT COCKPIT
11. FUEL VALVE CONTROL REAR COCKPIT
12. LINE FROM LEFT OUTLET & SUMP
13. FUEL VALVE
14. PRIMER
15. FUEL STRAINER

REFERENCE DRAWING A75NI-3100

FIG. 8 FUEL SYSTEM DIAGRAM MODEL N2S-4



1. OIL TEMP. LINES TO GAGES ON BOTH INSTRUMENT PANELS
2. RETURN LINE FROM ENGINE
3. VENT LINE FROM TANK TO ENGINE
4. OIL TANK - 4.4 GALS.
5. FILLER NECK
6. BREATHER LINE FROM ENGINE
7. OIL PRESSURE LINE FROM ENGINE TO GAGES ON BOTH INSTRUMENT PANELS
8. INTAKE LINE TO ENGINE
9. DRAIN LINE
10. DRAIN "Y"
11. OUTLET LINE FROM TANK

REFERENCE DRAWING A75N1 - 3000

FIG. 9 OIL SYSTEM DIAGRAM MODEL N2S-4

10. ENGINE OPERATION:

a. STARTING AND WARMING UP:

(1) Ignition switch —"OFF."

(2) Rotate engine by hand at least two complete revolutions, to make certain that combustion chambers are free of excess oil.

(3) Fuel cock control "ON."

(4) Carburetor air control — Full "COLD" position.

(5) Mixture control — Full "RICH."

(6) Throttle — Open about ½ inch.

(7) Ignition switch "ON."

(8) Operate primer as required.

(9) *Engage starter. Pull starter clutch and magneto control* handle located on the starter panel in the left side of the engine cowl.

(10) When engine starts, set throttle to obtain 500 to 700 RPM.

(11) CAUTION! If oil pressure gage does not register within 30 seconds, STOP ENGINE.

(12) Set throttle to 700 RPM for warm-up.

(13) Oil temperature to begin taxiing, 20° C.—40° C.

b. TAKE-OFF:

(1) Mixture Control — Full "RICH."

(2) Carburetor air control — Full "COLD" position.

(3) Advance throttle to maximum RPM for take-off.

c. CLIMB:

(1) Full or part throttle as needed.

(2) Mixture Control — Below 3000 feet full "RICH."

(3) Mixture Control — Above 3000 feet "LEAN" as required. (See "f" below.)

d. CRUISING:

(1) Engine RPM — Below 1890.

(2) Mixture — As required (See "f" below).

(3) Throttle setting as required for cruising.

(4) Carburetor air control "FULL COLD" except if icing conditions are suspected, then "FULL HOT" since no carburetor air temperature gage is installed on this airplane. No intermediate position should be used.

e. STOPPING ENGINE:

(1) Idle engine to approximately 1000 RPM to scavenge oil.

(2) Fuel cock control "OFF" position

(3) Ignition switch "OFF" position, after engine stops.

f. CONDENSED CHECK-OFF LIST FOR TAKE-OFF:

(1) Flight Controls — Unlocked (Up).

(2) Elevator Trim Tab — Neutral.

(3) Mixture Control — Full "RICH" (Forward).

(4) Carburetor Air — "COLD" (Forward).

(5) Throttle: Ground RPM should be approximately 1750 — Take-Off at full throttle.

(6) Oil Pressure — 90 p.s.i.

(7) Oil Temperature — 40° C.— 90° C.

g. CONDENSED CHECK-OFF LIST FOR LANDING:

(1) Elevator Trim Tab — As required.

(2) Mixture Control — Full "RICH" (Forward).

(3) Carburetor Air — "COLD" (Forward).

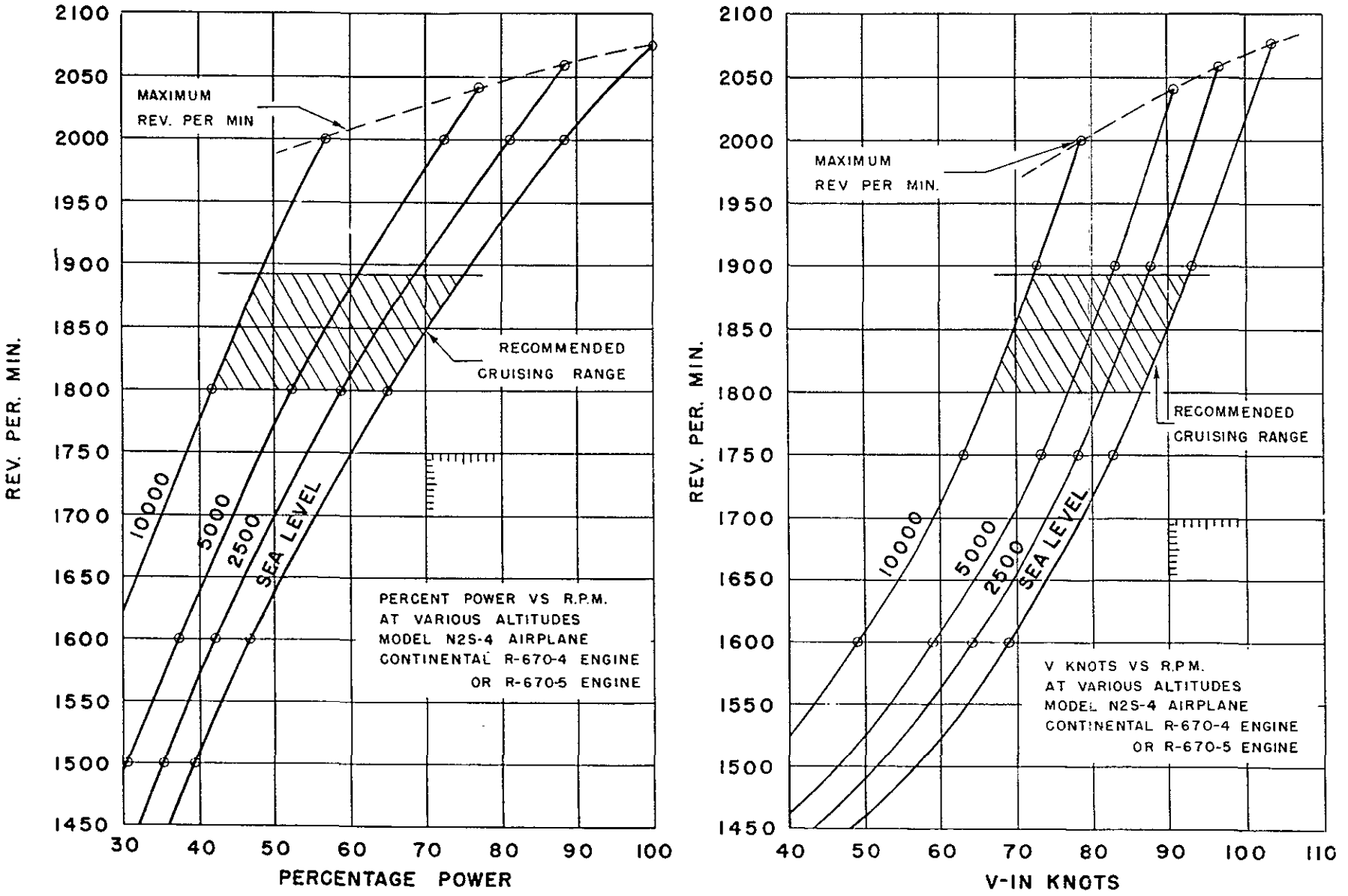


FIG. 10 POWER CONTROL CHARTS

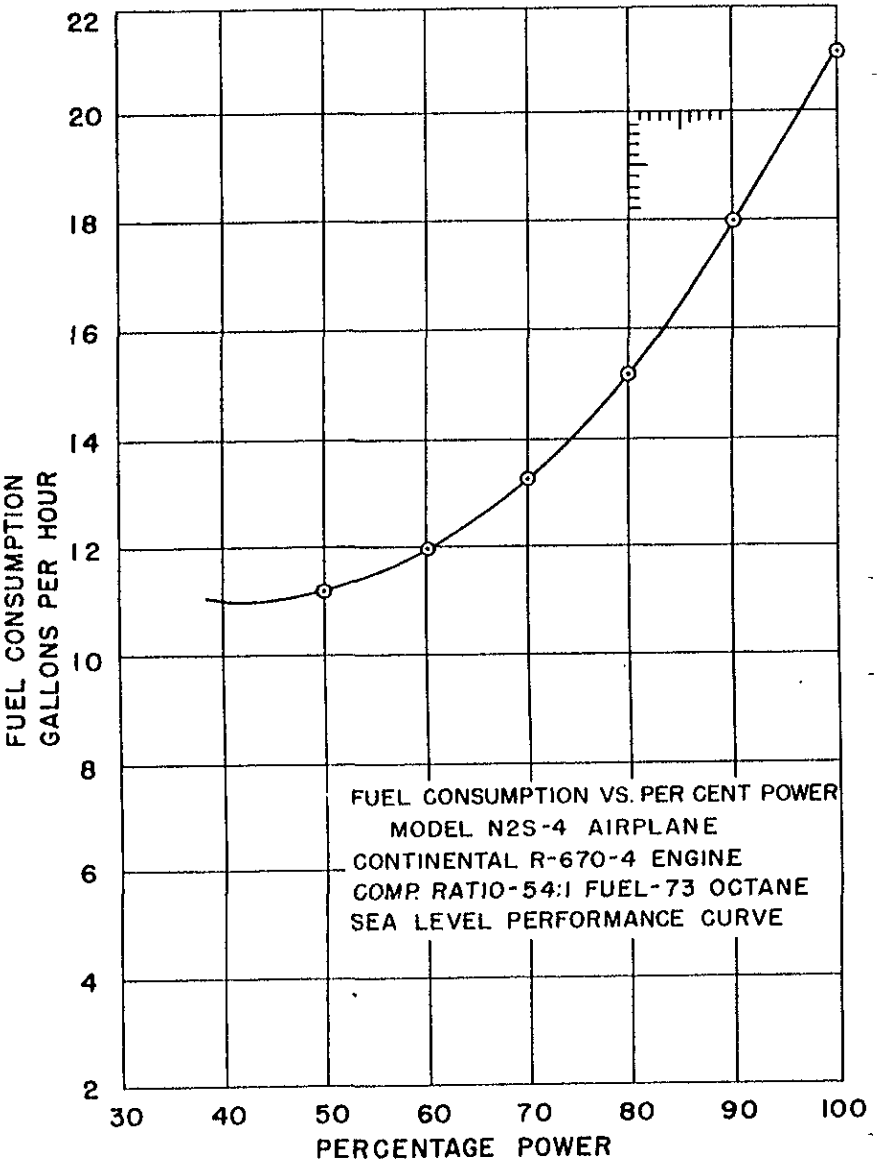
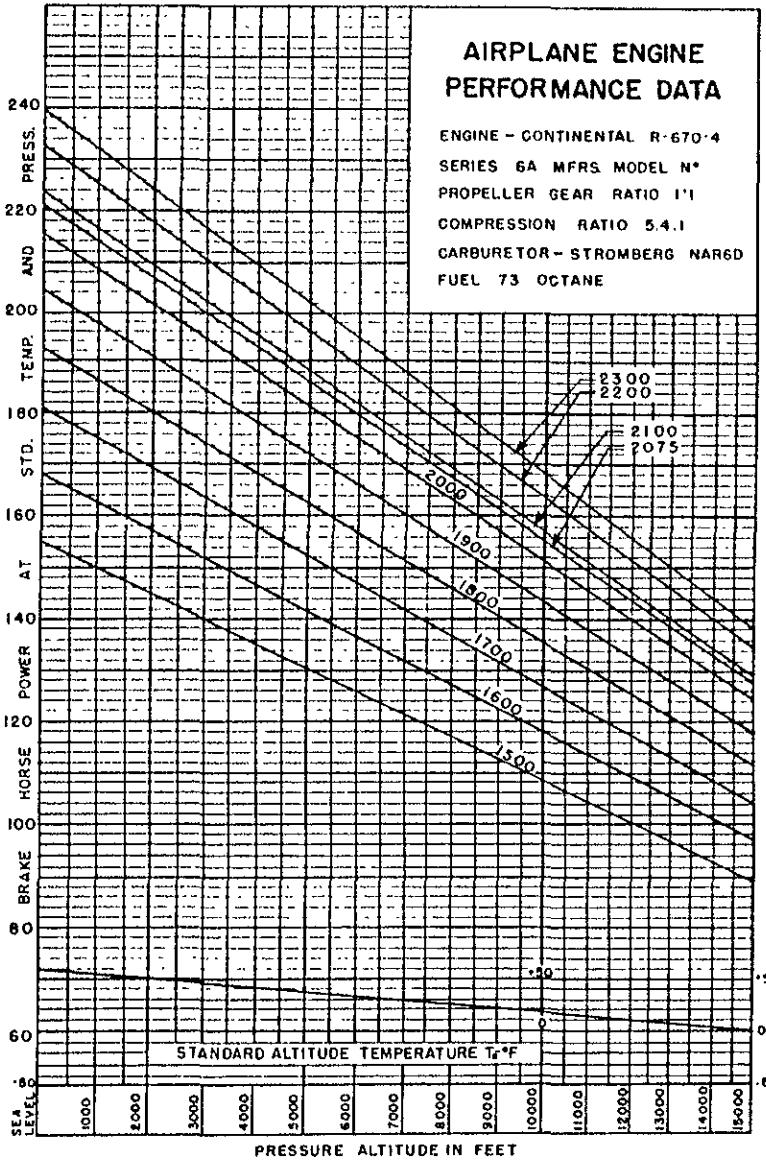


FIG. 11 FUEL CONSUMPTION CHART



ENGINE PERFORMANCE CHART MODEL N2S-4
FIG. 12

D — NORMAL INSTRUMENT READINGS

The instrument readings that might be expected under normal level flight cruising conditions are as follows:

Altitude (Feet)	2000
Indicated Airspeed (Knots)	87
RPM	1890
Oil Pressure (Pounds per Square Inch)	70-80
Oil Temperature (°C) (Hot Day)	75

E — FLYING CHARACTERISTICS

1. WEIGHT DISTRIBUTION AND BALANCE OF THE AIRPLANE

The purpose of the weight and balance section of this book is to introduce and acquaint the pilot with weight distribution and its resultant effect on the location of the center of gravity. Keep in mind that every airplane, regardless of the type, should be so loaded at all times as to keep the center of gravity within certain recommended limits which are predetermined from calculations and flight tests. The curves on the following pages may be used for determining if this airplane is loaded within recommended limits.

Before considering these curves, the following paragraphs, which explain the derivation of the Basic Weight and corresponding index, *should be studied. The Basic Weight of this airplane is the weight of the* airplane empty and does not include instructor, student, gasoline, oil or special equipment. In order that the student may quickly determine whether the airplane is in proper balance, the recommended range of center of gravity (given in per cent of Mean Aerodynamic Chord) is plotted on a chart, Figure 16. On this same chart is plotted the "Index Unit" vs. "Gross Weight." The index unit is derived from the following equation:

$$\frac{WA}{1000} = I$$

Where W = Weight (in pounds)
A = Distance from forward reference line (in inches)
I = Index Unit

The Basic Weight and Index are listed on Figure 13. From the above equation, the curves on Figures 14 and 15, "Fuel vs. Index Unit" and "Oil vs. Index Unit," were constructed. If the amount of fuel in the airplane is known, the corresponding index unit may be found from Figure

14. The corresponding index unit for any quantity of oil may be found by reference to Figure 15. The crew weight and their respective locations, along with the location of baggage and its weight, in increments of ten pounds, are shown on the Balance Diagram, Figure 13, with the corresponding Index Unit. By use of the above mentioned equation, an index unit may be calculated for each item at its specified location. The weight and index unit for all items to be carried should be tabulated and the totals obtained for each. The next step for determining final balance of the airplane is to refer to "Index Unit vs. Gross Weight," Figure 16, and by use of total weight and total index unit determined above, check the location of the "balance point." This point should fall in the "RECOMMENDED BALANCE AREA" of the chart.

The following example illustrates the use of the charts and balance diagram, Figures 13, 14, 15, and 16.

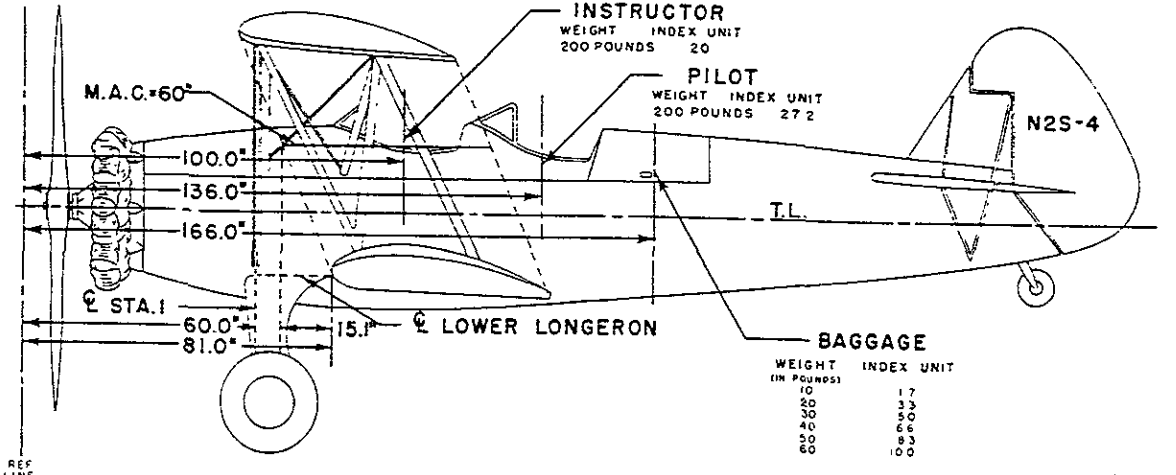
A typical loading for ferry purposes will consist of:

Basic Weight	1971 pounds
Pilot (Front Cockpit)	200 pounds
Oil (4.4 gallons)	33 pounds
Fuel (46.0 gallons)	276 pounds
Baggage	50 pounds

Refer to the Balance Diagram, Figure 13, for the index units corresponding to the above listed items. The index units taken from the diagram and their corresponding weights should be tabulated as shown below.

	Index	Weight In Pounds
Basic Weight	156.4	1971.0
Pilot (Front Cockpit)	20.0	200.0
Oil (4.4 gallons)	1.8	33.0
Fuel (46 gallons)	20.8	276.0
Baggage	8.3	50.0
Total Index and Gross Weight	907.3	2530.0

Finally, refer to Figure 16, "Index Unit vs. Gross Weight." The "balance point," which is the intersection of the "Index Unit" line and the "Gross Weight" line, falls within the "RECOMMENDED BALANCE AREA." Under this loading condition, the airplane is therefore loaded within recommended limits.



	WEIGHT (IN POUNDS)	INDEX UNIT
BASIC WEIGHT	1971 0	156.4
FUEL (FULL TANK 46 GALLONS)	276 0	20.8
OIL (FULL TANK 44 GALLONS)	33 0	1 8

NOTE: REFER TO FIGURES 14 AND 15 FOR WEIGHT AND INDEX UNIT FOR SMALLER QUANTITIES OF FUEL AND OIL.

SPECIAL EQUIPMENT

ITEM	WHERE STOWED	WEIGHT (IN POUNDS)	INDEX UNIT
ENGINE COVER	BAGGAGE COMP	9 5	1 6
COCKPIT COVER	" "	7 0	1 2
TOOL KIT	" "	6.8	1 1
E&M. MANUAL	" "	1 4	0 2
PILOT'S H'DB'K	" "	0.6	0.1

FIG. 13 BALANCE DIAGRAM

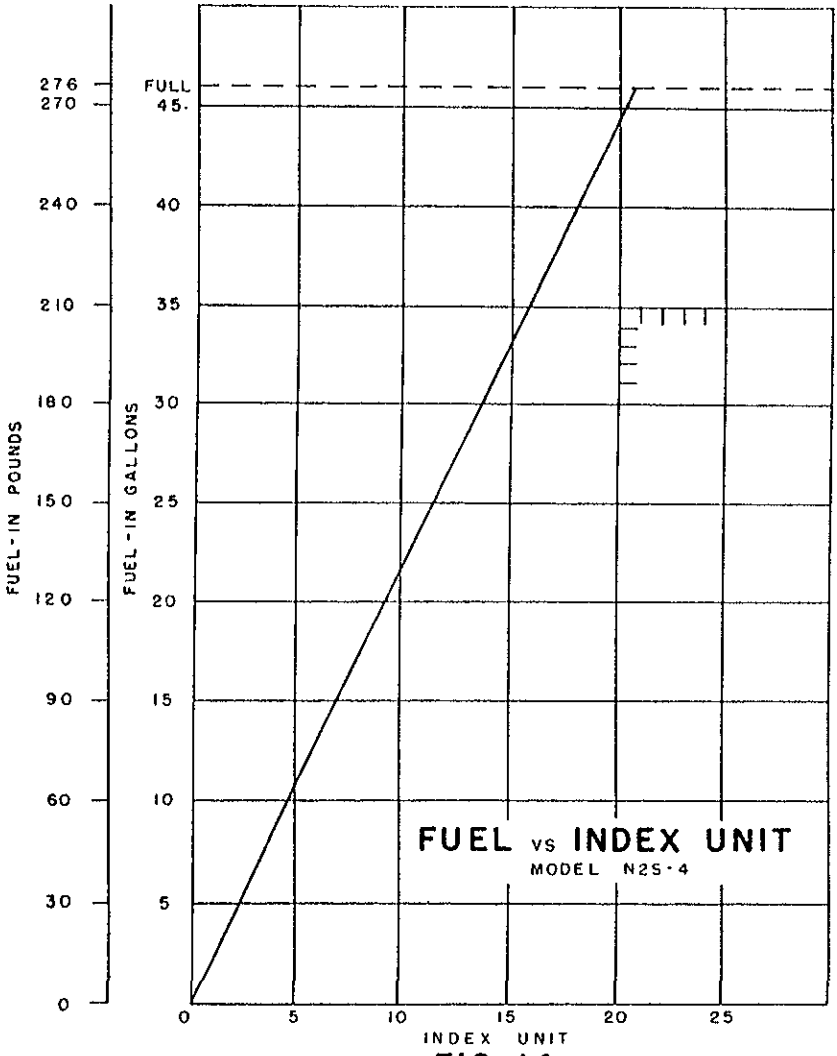

FUEL - IN POUNDS
276
270
240
210
180
150
120
90
60
30
0
FUEL - IN GALLONS
FULL
45.
40
35
30
25
20
15
10
5
0
5
10
15
20
25
INDEX UNIT
FUEL vs INDEX UNIT
MODEL N2S-4

FIG. 14

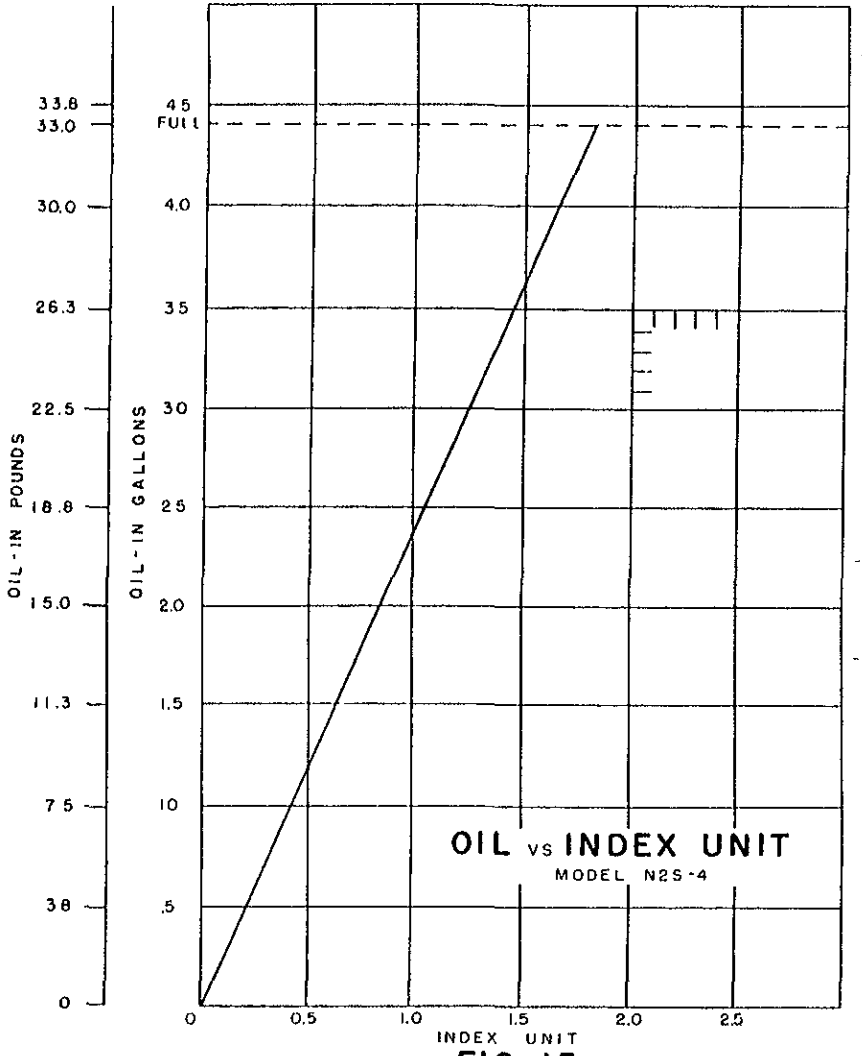

33.8
33.0
30.0
26.3
22.5
18.8
15.0
11.3
7.5
3.8
0
OIL - IN POUNDS
4.5
FULL
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
OIL - IN GALLONS
0
0.5
1.0
1.5
2.0
2.5
INDEX UNIT
OIL VS INDEX UNIT
MODEL N2S-4

FIG. 15

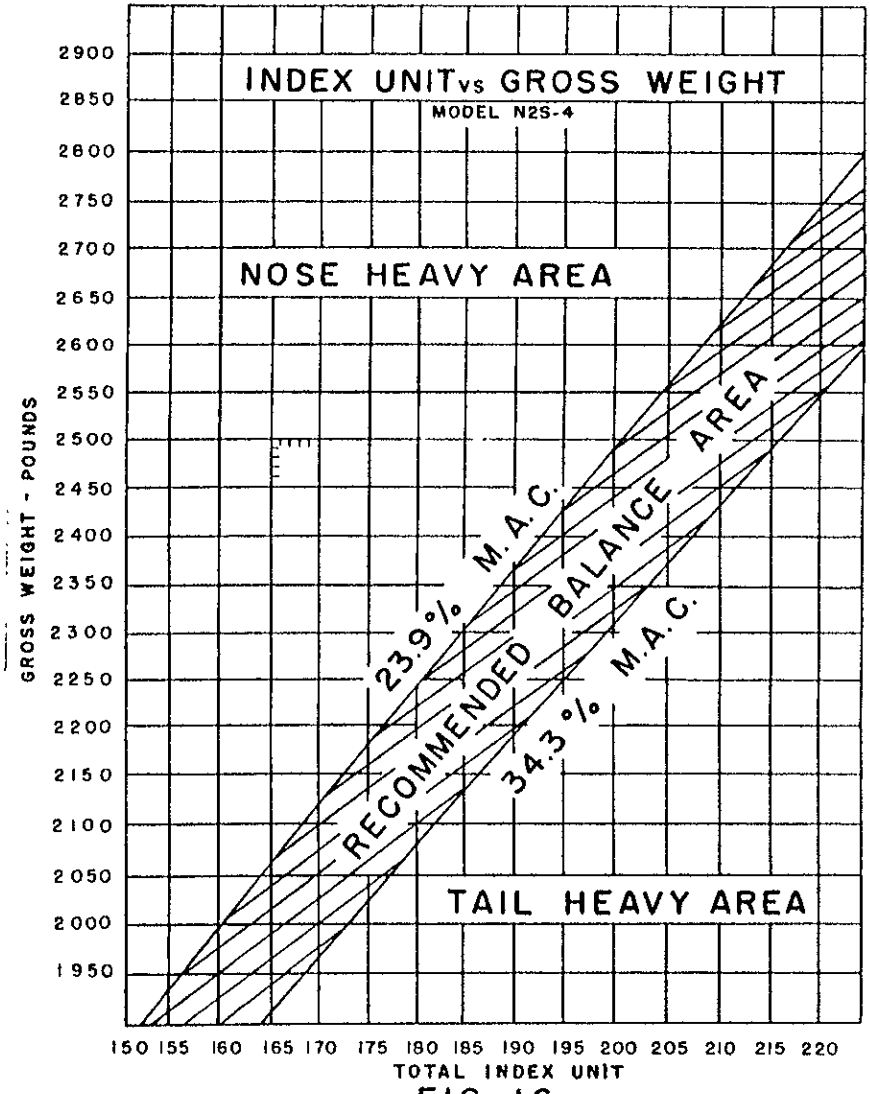

INDEX UNIT vs GROSS WEIGHT
MODEL N2S-4
NOSE HEAVY AREA
RECOMMENDED BALANCE AREA
23.9% M.A.C.
34.3% M.A.C.
TAIL HEAVY AREA
GROSS WEIGHT - POUNDS
2900
2850
2800
2750
2700
2650
2600
2550
2500
2450
2400
2350
2300
2250
2200
2150
2100
2050
2000
1950
150 155 160 165 170 175 180 185 190 195 200 205 210 215 220
TOTAL INDEX UNIT

FIG. 16

The following example will show the effect on balance of expended fuel and oil upon the completion of a typical ferry flight.

Basic Weight	1971.0 pounds
Pilot (Front Cockpit)	200.0 pounds
Oil (3.2 gallons)	24.0 pounds
Fuel (3.0 gallons)	18.0 pounds
Baggage	50.0 pounds

Refer to the Balance Diagram, Figure 13, for the index units corresponding to the pilot and to fifty pounds of baggage. Refer to Figure 14, "Fuel vs. Index Unit," for the index unit corresponding to three gallons of gasoline. Refer to Figure 15, "Oil vs. Index Unit," for the index unit corresponding to 3.2 gallons of oil. The index units taken from the charts and diagram and their corresponding weights should be tabulated as shown:

	Index	Weight in Pounds
Basic Weight	156.4	1971.0
Pilot (Front Cockpit)	20.0	200.0
Oil (3.2 gallons)	1.3	24.0
Fuel (3.0 gallons)	1.4	18.0
Baggage	8.3	50.0
Total Index and Gross Weight	187.4	2263.0

Finally, refer to Figure 16, "Index Unit vs. Gross Weight." The "balance point" falls within the "RECOMMENDED BALANCE AREA." Under this loading condition, the airplane is therefore loaded within recommended limits.

More advanced types of aircraft contain removable armor, and fuel tanks, or other removable weight empty items. For such airplanes, the Weight and Balance section of the Erection and Maintenance Manual lists the items in detail, giving weight and index unit for each. This airplane has no removable equipment, therefore, the weight data herein is identical to that appearing in the Erection and Maintenance Manual.

2. USEFUL LOAD:

Crew (2 at 200 Pounds Each)	400 lbs.
Fuel (46 gallons)	276 lbs.
Oil (4.4 gallons)	33 lbs.
Total Useful Load	709 lbs.

3. TAKE-OFF:

For data, see Check-Off List on page 20.

Take-Off Distance — Normal Load

Altitude	Distance (feet)
Sea Level	600
1000	665
2000	735
3000	805
4000	875
5000	960
6000	1060
7000	1175
8000	1290

4. MANEUVERS:

The following maneuvers are permitted: Loop, Snap Roll, Chandelle, Immelman Turn, Inverted Spins, Wing Over, Vertical Turn, Prolonged Spin, Aileron Roll at speeds less than 125 knots. Maximum acceleration of plus 6G's and minus 3G's at weight of 2671 pounds should never be exceeded. DO NOT exceed an indicated airspeed of 180 knots or an engine speed of 2280 RPM.

F — LANDING CHARACTERISTICS

Normally the airplane is trimmed slightly tail heavy for landing. This is accomplished by moving the tab control to the "UP" position. For details as to settings, see Check-Off List for Landing, on page 21.

G — SPECIAL PRECAUTIONS

None.

H — TAXIING

Because of the steerable tail wheel on this airplane, taxiing turns of small radius are possible without the use of the brakes. Remember that rudder pedal travel gives positive control over the tail wheel 30 degrees on each side of neutral; beyond these limits a throwout latch permits the tail wheel to become full swiveling for the remainder of the travel.