RESTRICTED

PILOT'S HANDBOOK
FOR
MODEL N2S-3

Boeing

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)	2721.1
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)	9.16
Power Loading (Pounds per Horse Power)	12.40
High Speed at Sea Level — Knots	103.8
MPH	119.5
Stalling Speed at Sea Level, with reduced load (50% fuel and oil) — Knots	47.68
MPH	55
Initial Rate of Climb (Feet per Minute)	800
Service Ceiling (Feet)	12,400
Take-Off Distance in Calm (Feet)	600
Cruising Speed — Knots	84.7
MPH	97.5
Endurance at Cruising Speed (Hours)	3.95
Range at Cruising Speed (Miles)	385
Endurance at High Speed (Hours)	2.25
Range at High Speed (Miles)	265
Weight Decrease (In Pounds) for Elimination of:	
Fixed Fire Extinguisher	20.86
First Aid Kit	2.60
Weight Increase (In Pounds) for Addition of:	
Shoulder Safety Belts	8.10
Wood Control Stick	.20

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-3 airplane. The manufacturer advises the pilot to read carefully, this handbook, and afterward closely observe its contents whenever the airplane is flown.

For additional information and instructions not contained in this handbook, refer to the N2S-3 Erection and Maintenance Manual which is stowed in the data case attached to the inside of the baggage compartment lid.

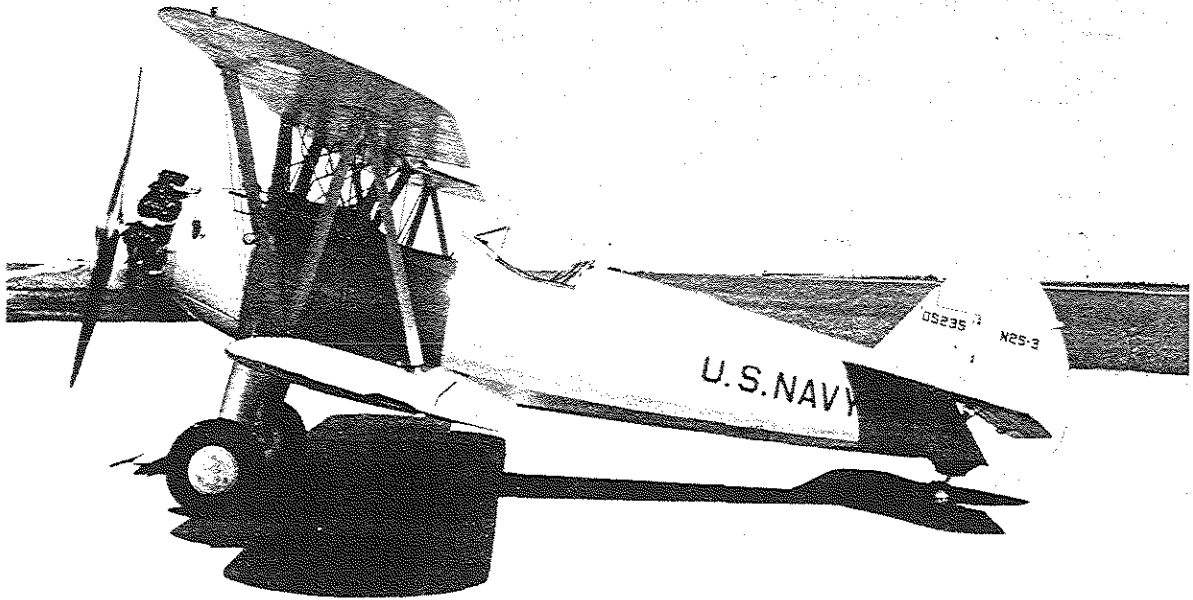
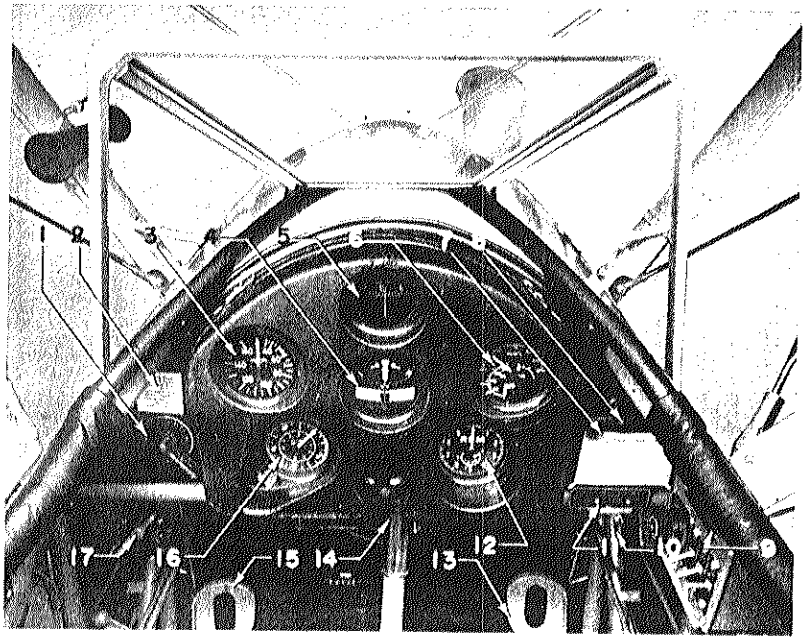


FIG.I MODEL N2S-3 - LEFT SIDE VIEW



PART	PART NO	PART	PART NO
1. IGNITION SW. CONT.	75-3905	10. PARKING BRAKE H'DLE	73-2813-1
2. INSTRUCTION PLATE		11. INSTRUCTION PLATE	
3. AIR SPEED IND.	SPEC. 1-13	12. TACHOMETER	BA-7290
4. TURN AND BANK	BA-791-SK	13. RUDDER PEDAL R.H.	75-3471
5. COMPASS	BA-791-SK	14. CONTROL STICK	75-3362-2
6. ENG. GAGE UNIT	BA-6638	15. RUDDER PEDAL L.H.	75-3471
7. CARD CHECK LIST	B75-3825	16. ALTIMETER	
8. PULL HANDLE CO, FIRE EXTG. W. KIDDE	20523	SENSITIVE	SPEC A-29
9. CONT. SW. BOX. TYPE	TIC-2	17. FUEL COCK CONTROL HANDLE ASSY.	75-3152

REF. DWGS B75N1-3601 B75-3200 B75-3615 75-3175 B75-3801 B75-3918

FIG. 2 INSTRUMENT PANEL MODEL N2S-3

SECTION III

GENERAL DESCRIPTION OF OPERATION OF THE AIRPLANE

A. COCKPIT ARRANGEMENT AND CONTROLS

The arrangements of the cockpits and controls are shown in Figs. 2 to 6, inclusive.

I. 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-algning ball bearings in housings bolted to the bottom fuselage truss. The control stick sockets are aluminum alloy forgings. The control sticks are constructed of swaged aluminum alloy tubing with rubber handgrips, or of straight grained hickory. (Use of hickory effected on BuAer serial No. 07926 and up.) Elevator control is accomplished by a system of inter-connecting push-pull tubes extending from front to rear sticks, from rear stick to a ball bearing idler located about midway back in the fuselage, and from the idler to the single horn bolted between the ends 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 the 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.

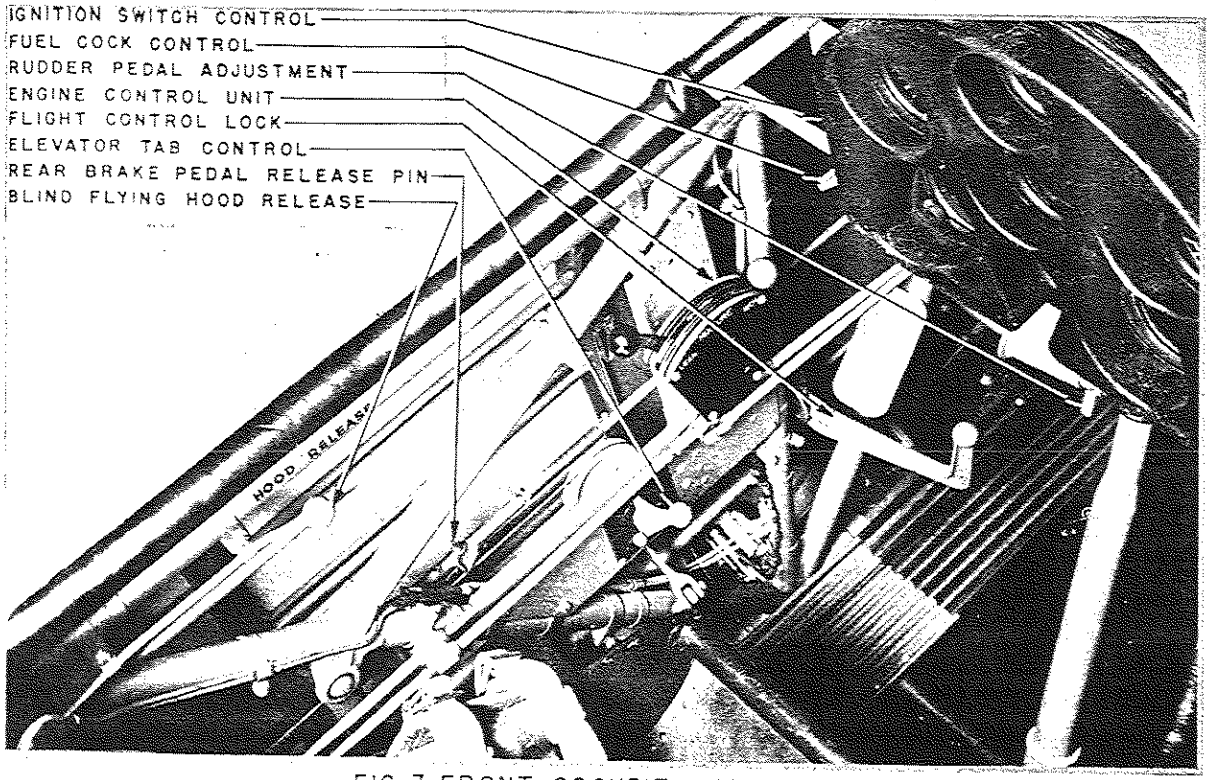


FIG. 3 FRONT COCKPIT LEFT SIDE

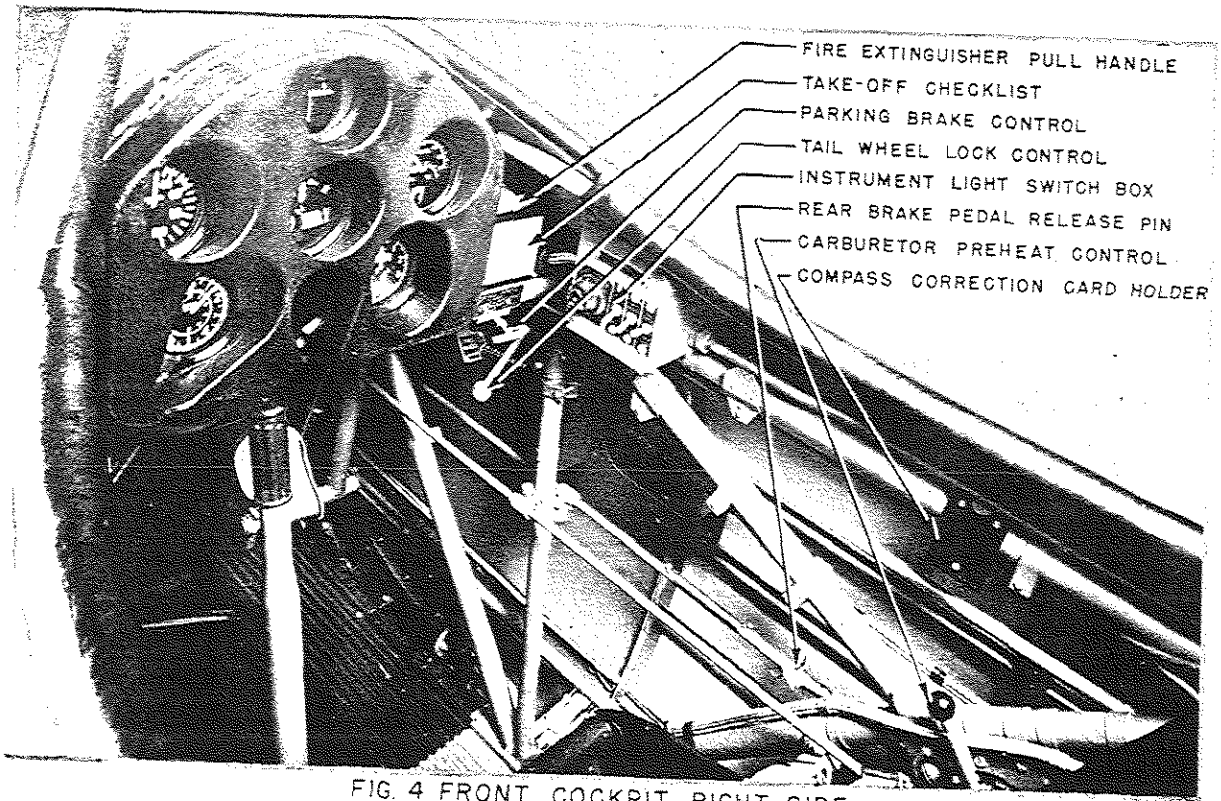


FIG. 4 FRONT COCKPIT RIGHT SIDE

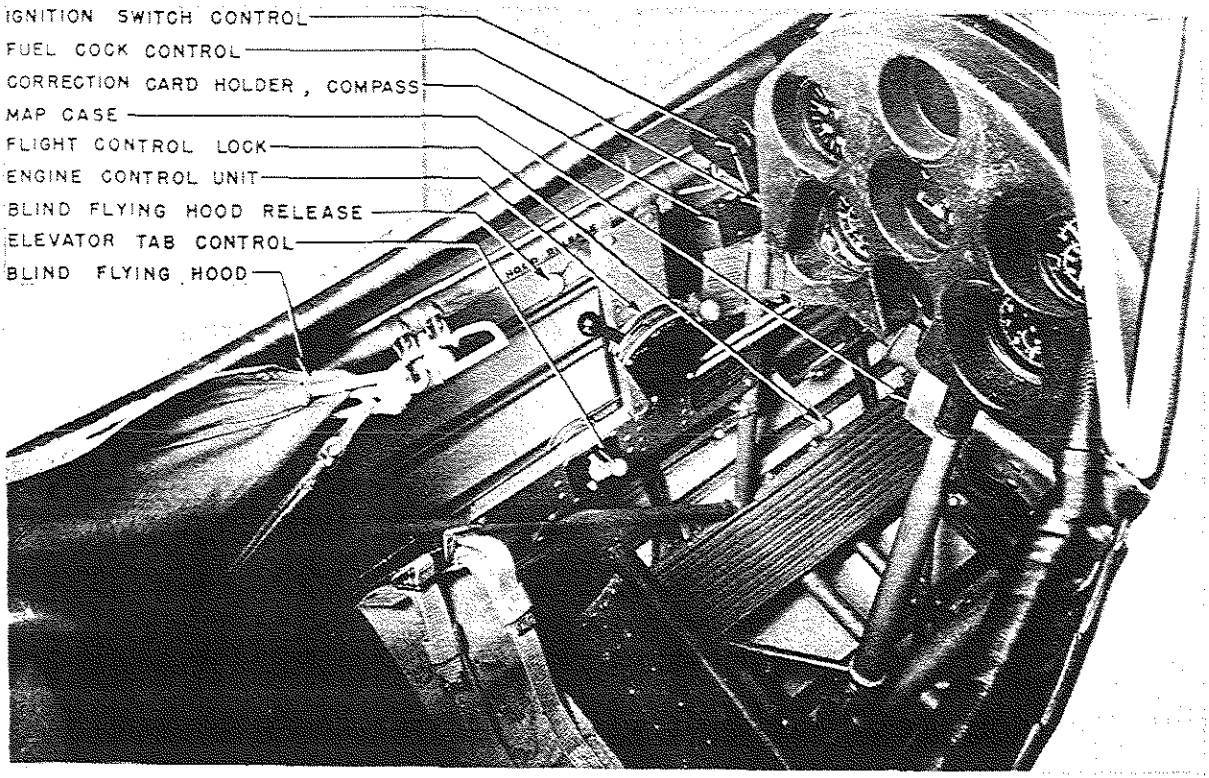


FIG. 5 REAR COCKPIT LEFT SIDE

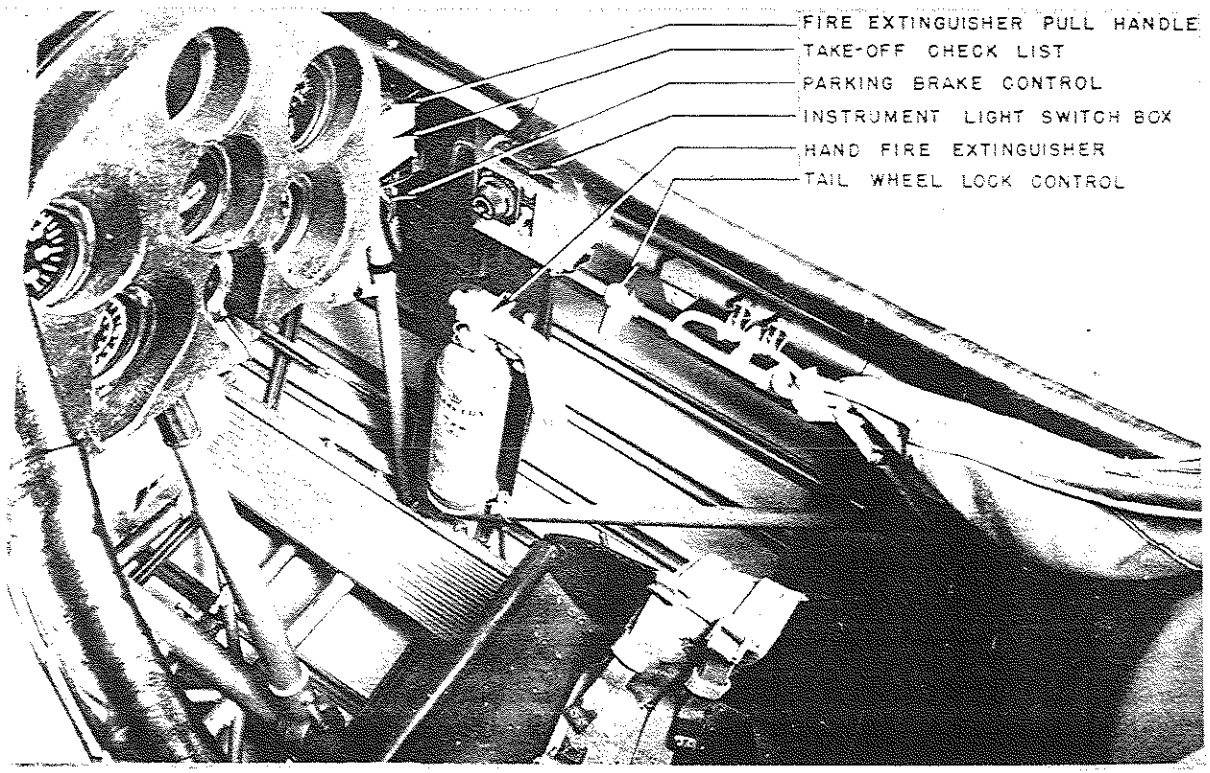


FIG. 6 REAR COCKPIT RIGHT SIDE

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 front inter-connecting rod to the right front 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, with the exception of the mixture lock control.

b. THROTTLE AND MIXTURE CONTROL:

Control of the engine RPM and carburetor mixture is accomplished by the use of a Type B-13 control unit in the front cockpit, and a modified B-13 control unit in the rear cockpit. These units are identical except that a sector type mixture control lock is incorporated in the rear control to prevent accidental leaning of the mixture. The control can be moved forward from "Lean" to "Rich" in either cockpit, but to move from "Rich" to "Lean" necessitates the release of the lock on the rear cockpit mixture control. Accurate and positive control is provided between the carburetor and control units, by the use of rods and bellcranks.

c. 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 both pilots. 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.

d. 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 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. Linkage from the control handle to the mixing chamber consists of rods and bellcranks.

e. STARTING CONTROLS:

The starting controls consist of a primer and a manual spark and clutch control handle located on the starter panel in the left side of the engine cowl. To operate the primer, depress the handle, turn counter clockwise 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 also 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 7.

3. AUXILIARY CONTROLS

a. BRAKE PEDALS

Both front and rear rudder pedals mount cast aluminum alloy brake treadles. Front and rear brake treadles are interconnected by a series of rods and bellcranks. The construction of these rods is such that the rear treadles may be disconnected by removing a pin inserted through a sleeve joint in the bellcrank interconnecting rod. (Replaced by non-releasable type connecting rod on BuAer serial No. 07755 and up.) For location of this pin, see Figs. 3 and 4.

b. RUDDER PEDAL ADJUSTMENT:

To compensate for the difference in pilot stature and flying requirements, each rudder pedal 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 secure the pedal in place, slide it slightly forward or backward in the rack, allowing the latch pin to slip into place.

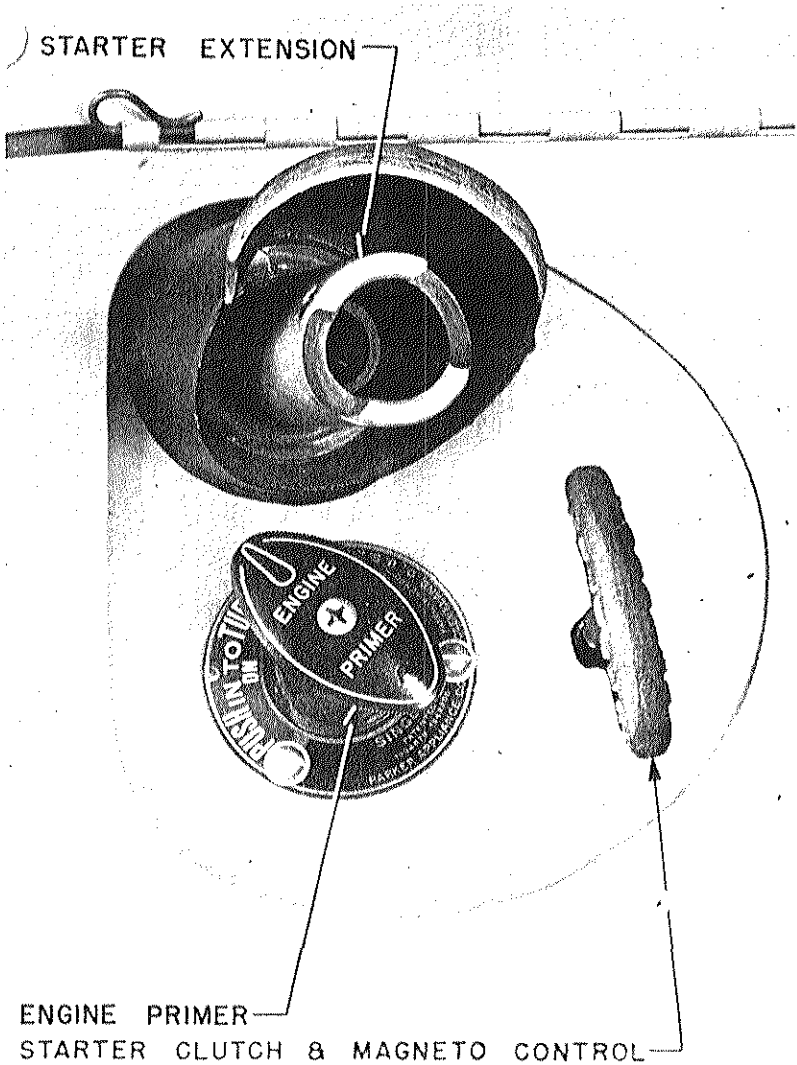


FIG. 7 STARTING CONTROLS

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, 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 two-pound CO_2 hand fire extinguisher is provided on the right side of the rear cockpit just forward of the seat. This is shown in Fig. 6.

A five-pound fixed CO_2 pressure extinguisher system for the engine compartment has also been provided. The control for this system is located on the right side of the instrument base panel in each cockpit. This handle is shown in Figs. 4 and 6. (Fixed system discontinued on airplane BuAer serial No. 07325 and up.)

e. TAIL WHEEL CONTROLS:

A free-swiveling, lockable type tail wheel is provided. The lock control handles are located on the right side of both cockpits just forward of the seat. To lock the tail wheel, move control handle to the "Down" position; to release, return the handle to the "Up" position. If the control handle is placed in the locked position while taxiing in a turn, the lock will not engage until the airplane is taxied straight, permitting the tail wheel to center. The tail wheel should be locked before take-off or landings, and unlocked during taxiing and ground handling.

f. ELECTRICAL CONTROLS:

A switch box is located in each cockpit just below the upper right longeron aft of the instrument panel. The switch box in the front cockpit contains: An instrument light switch and a rheostat for dimming the instrument light on the front instrument panel, a navigation light switch, and a three-position "On," "Off," and "Flash" section light switch. This last switch must be held in the "Flash" position, and returns to "Off" when released.

The switch box in the rear cockpit contains an instrument light switch and a rheostat for dimming the instrument lights on the rear instrument panel. Both switch box covers are hinged to provide access to the spare bulbs and fuses stowed inside each switch box.

g. BLIND FLYING HOOD:

A blind flying hood, used in training for instrument flying, is installed in the rear cockpit. A wire link attached to the front flying hood bow snaps into place above the instrument panel when the hood is closed. Release knobs are provided in both cockpits located below the upper left longeron. The words "Hood Release" are stenciled on the longeron above the release knob. The hood is secured in the open position by snapping the encircling strap on the left side to the turtle back.

h. 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 seat upward to 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. Either a spring or shock cord arrangement on the back of the seat counterbalances a portion of the occupant's weight while changing the seat position.

i. HARNESS LOCK:

Lap and shoulder safety belts are installed on each seat to prevent the occupant from being thrown forward in the event of a crash. (Effected on airplane BuAer serial No. 07410 and up). 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 "forward." When this handle is in the "aft" position, the shoulder straps are released, permitting freedom of movement.

B. POWER PLANT

1. ENGINE DATA

a. ENGINE: Continental Model R-670-4 or 11

b. GEAR RATIO:.....Direct Drive

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

d. SENSENICH WOODEN PROPELLER:
8'-2" Diameter

2. 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 in full "Cold" position.

(5) Mixture control in full "Rich" position.

(6) Ignition switch "On".

(7) Operate primer as required.

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

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

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

(11) Set throttle at 700 RPM for warm-up.

(12) Oil temperature to begin taxiing, 20° C.

b. TAKE-OFF:

(1) Mixture Control — "Full Rich"

(2) Carburetor air control in 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 ft., "Full Rich."

(3) Mixture Control — Above 3000 ft., "Lean" as required — (See "f" below).

d. CRUISING:

(1) Engine RPM — Below 1850

(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 there is no carburetor air temperature gage. 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. MIXTURE CONTROL:

(1) During take-off, climb at or near maximum rate, and during high speed level flight, below 3000 feet altitude, the mixture control shall be maintained in "Full Rich" position. For all operations above 3000 feet altitude, the mixture may be leaned just sufficiently to maintain smooth engine operation. For cruising 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 20 RPM in engine speed. For landing, the mixture control shall be in the "Full Rich" position.

g. FUEL: 73 octane, Spec. AN-VV-F-761

h. OIL: Spec. AN-VV-O-446, Grade (See T. O. 24-41)
Oil Temperature (40° C — 90° C)

Oil Pressure —	Pressure in pounds
Rated Speed	90
Desired	70-90
Min. Cruising	60
Idling	15

i. OVERSPEED:

Maximum allowable 2280 RPM, during dives.

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

(1) Flight Controls — Unlocked (Up)

(2) Tail Wheel — Locked (Down)

(3) Elevator Trim Tab — Neutral

(4) Mixture Control — "Full Rich" (Forward)

(5) Carburetor Air — "Cold" (Forward)

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

(7) Oil Pressure — (See T.O. 4-41)

(8) Oil Temperature — (40° C — 90° C)

k. CONDENSED CHECK-OFF LIST FOR LANDING:

(1) Tail Wheel — Locked (Down)

(2) Elevator Trim Tab — As Required

(3) Mixture Control — "Full Rich" (Forward)

(4) Carburetor Air — "Cold" (Forward)

3. FUEL SYSTEM

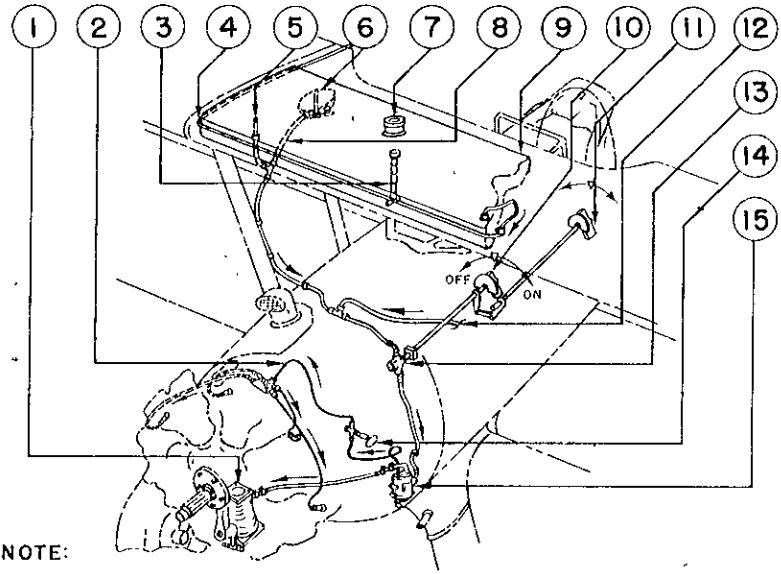
The fuel system includes an aluminum alloy 3S½H fuel tank incorporating an NAF1025-1 filler unit, fuel gage, C-2A strainer, D-3 fuel cock and control handles. The fuel tank, located in the center section, has a capacity of forty-six (46) gallons, with an expansion space of 1.3 gallons. To insure a constant 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 Fig. 8.

4. OIL SYSTEM

The oil system consists of an oil tank incorporating a modified NAF1025-5 filler unit, which has an integral sounding rod and screen, oil temperature wells, "Y" drain, and vents. The tank is constructed of 3S½ hard 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 lines. 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 Fig. 9.

5. 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 when the temperature is low and the humidity is relatively high. Since no carburetor temperature gage is provided for this airplane—when icing conditions are suspected, the control should be placed in the "Full Hot" position.

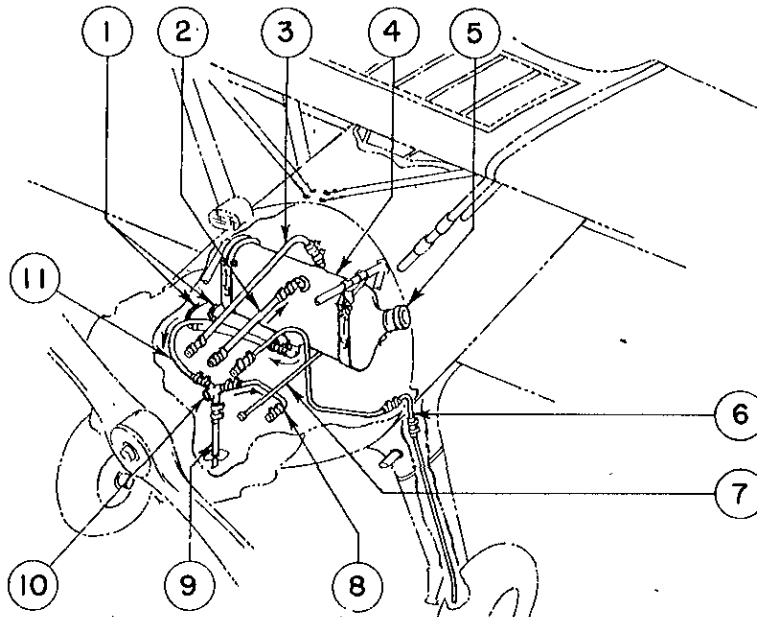


NOTE:
LEFT HAND SIDE OF FUEL TANK IDENTICAL WITH RIGHT HAND SIDE

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 B75NI-3101

FIG. 8 FUEL SYSTEM DIAGRAM MODEL N2S-3



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 B75N1 - 3000

FIG. 9 OIL SYSTEM DIAGRAM MODEL N2S-3

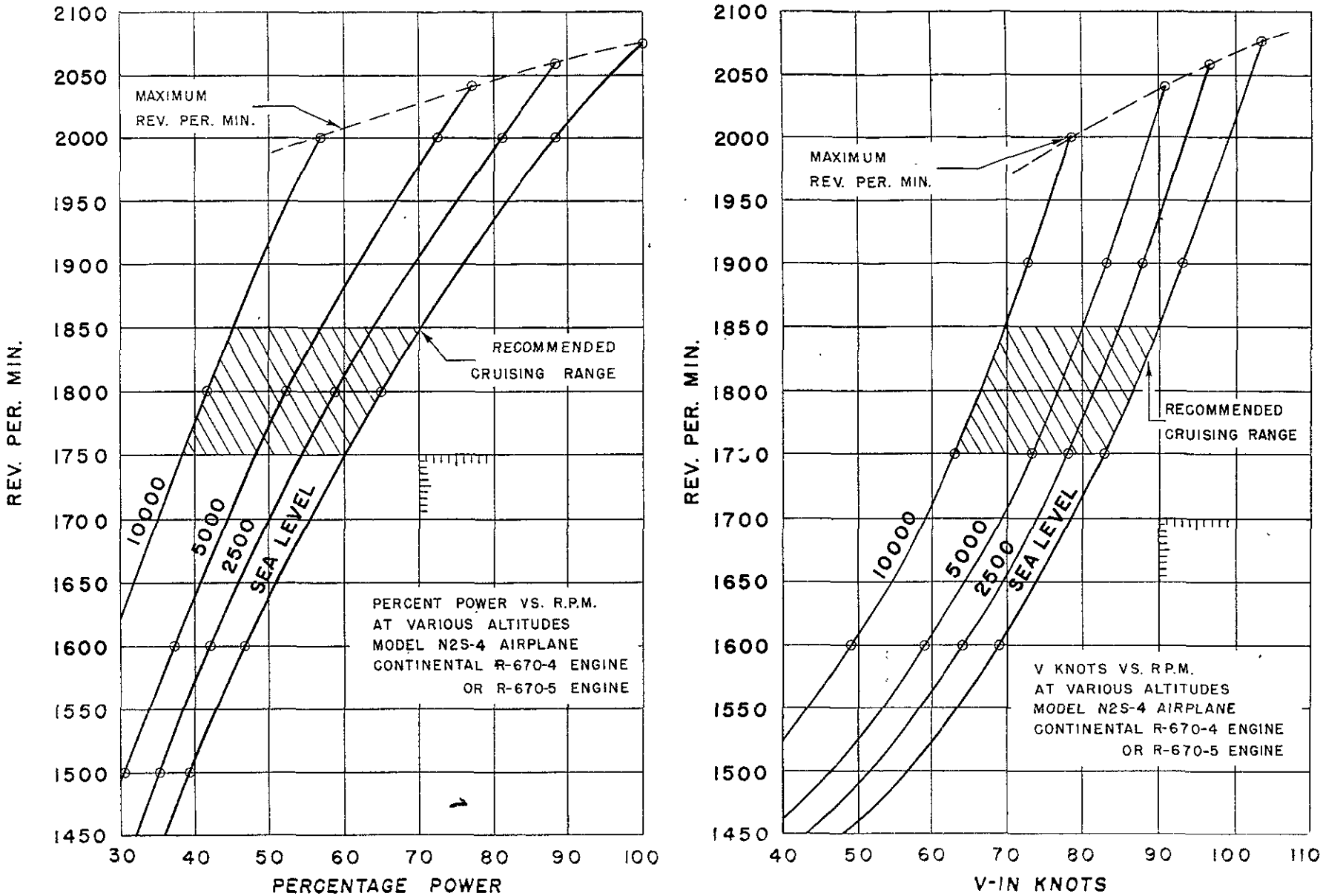


FIG. 10 POWER CONTROL CHARTS

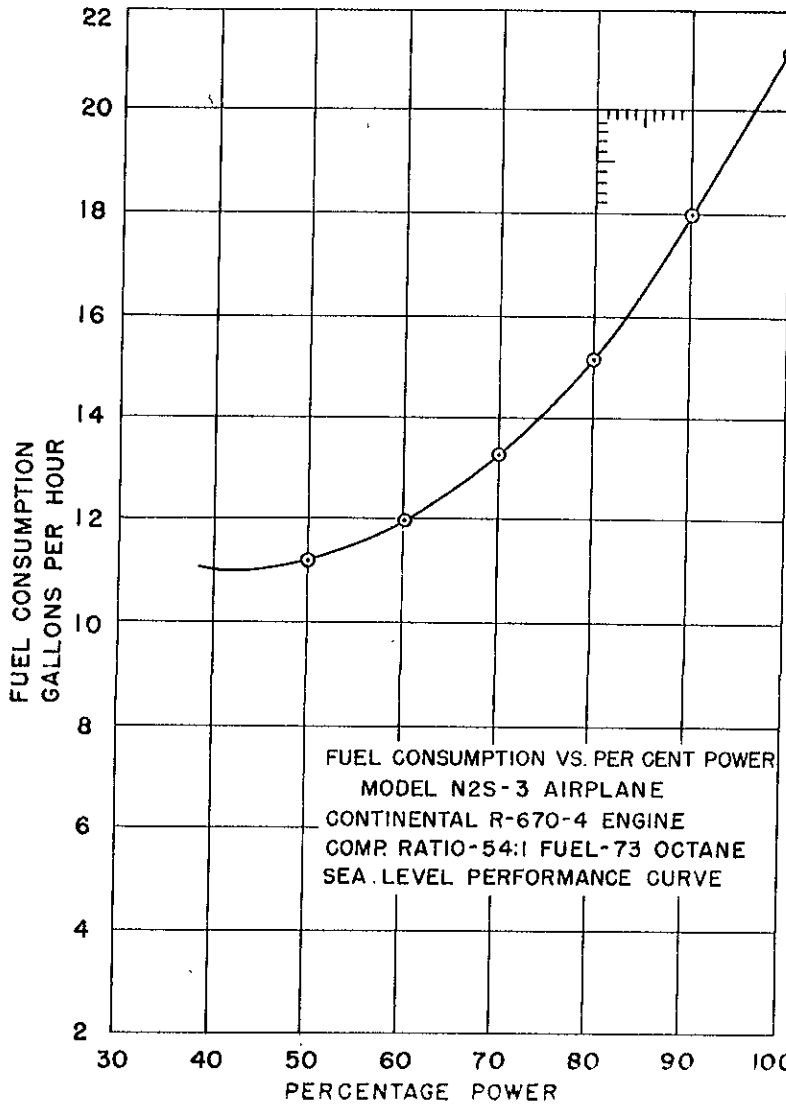
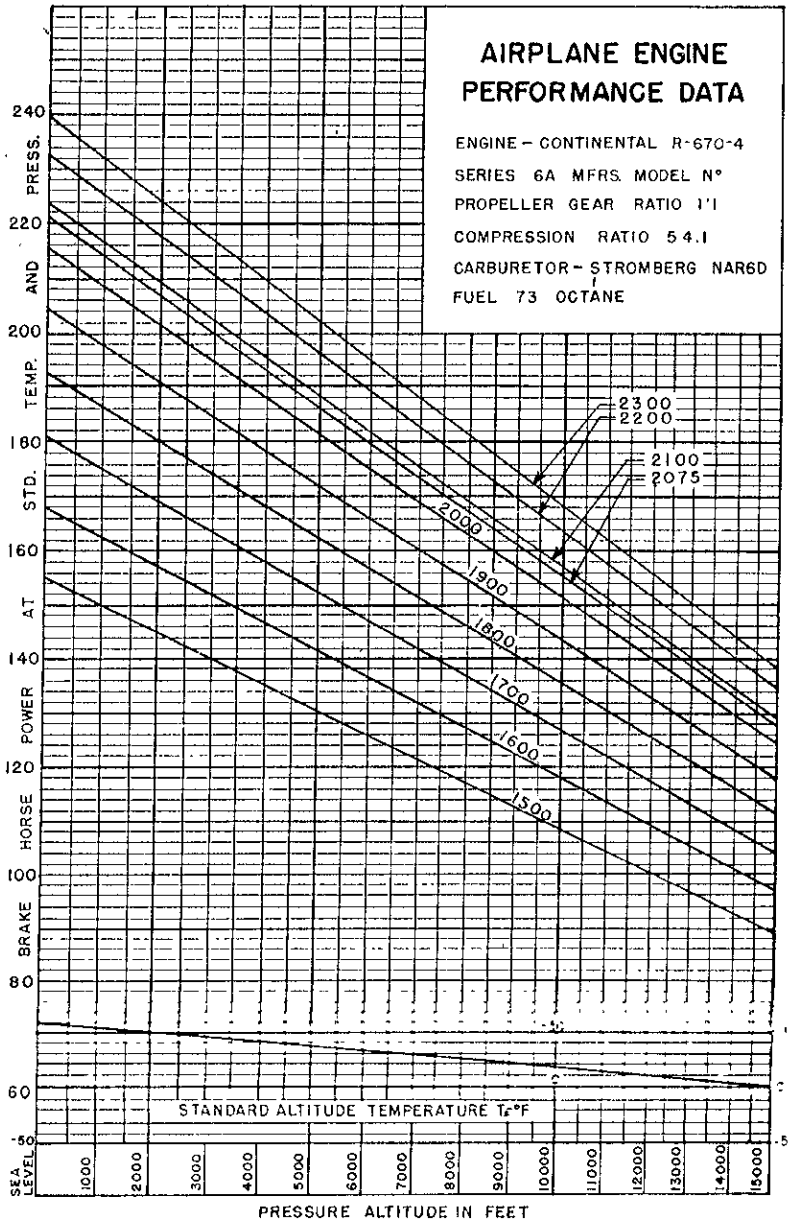


FIG. 11 FUEL CONSUMPTION CHART



ENGINE PERFORMANCE CHART MODEL N2S-3

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)	85
RPM	1850
Oil Pressure (Pounds per Square Inch)	70-80
Oil Temperature (Degrees Centigrade)	60-70

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, Fig. 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 Fig. 13. From the above equation, the curves on Figs. 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 Fig. 14. The corresponding index unit for any quantity of oil may be found by reference to Fig. 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, Fig 13, with the corresponding Index Unit. By use of the above mentioned equation, an index 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", Fig. 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, Figs. 13, 14, 15 and 16.

A typical loading for ferry purposes will consist of:

Basic Weight (Typical Actual)	2035.9 pounds
Blind Flying Hood	5.5 pounds
Pilot (Front Cockpit)	200.0 pounds
Oil (4.4 gallons)	33.0 pounds
Fuel (46.0 gallons)	276.0 pounds
Baggage	50.0 pounds

Refer to the Balance Diagram, Fig. 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	164.3	2035.9
Blind Flying Hood	0.8	5.5
Pilot (Front Cockpit)	20.0	200.0
Oil (4.4 gallons)	1.8	33.0
Fuel (46.0 gallons)	20.8	276.0
Baggage	8.3	50.0
Total Index & Gross Weight	216.0	2600.4

Finally, refer to Fig. 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.

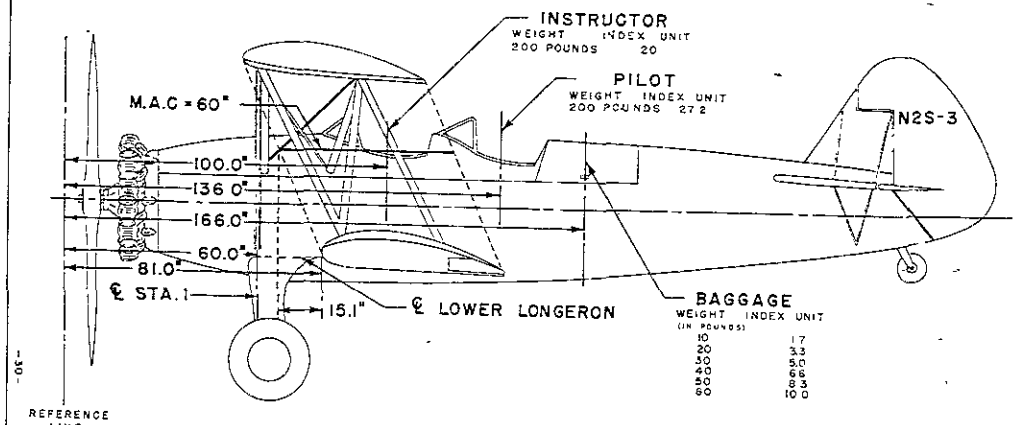
The following example will show the effect on balance of expended fuel and oil upon the completion of a typical ferry flight with oil and fuel, remaining in tanks, as shown below.

Oil (3.2 gallons)	24.0 pounds
Fuel (3.0 gallons)	18.0 pounds
All other items remain constant	

The simplest manner for determining balance at the end of a ferry flight is to deduct expended weight and corresponding index from the original Gross Weight and Index Unit.

Oil Expended 4.4 — 3.2 = 1.2 gallons or 9.0 pounds

Fuel Expended 46.0 — 3.0 = 43.0 gallons or 258.0 pounds



	WEIGHT (IN POUNDS)	INDEX UNIT
BASIC WEIGHT	2035 9	164 3
FUEL (FULL TANK 46 GALLONS)	276 0	20 8
OIL (FULL TANK 4 4 GALLONS)	33 0	1 8

NOTE. REFER TO FIGURES 15 & 16 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 COMPARTMENT	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 HANDBOOK	" "	0 6	0 1
BLIND FLYING HOOD REAR COCKPIT		5 5	0 8
FIRST AID KIT (ELIMINATED 07249 AND ALL FUTURES)	BAGGAGE COMPARTMENT	2 6	4

FIG. 13 BALANCE DIAGRAM

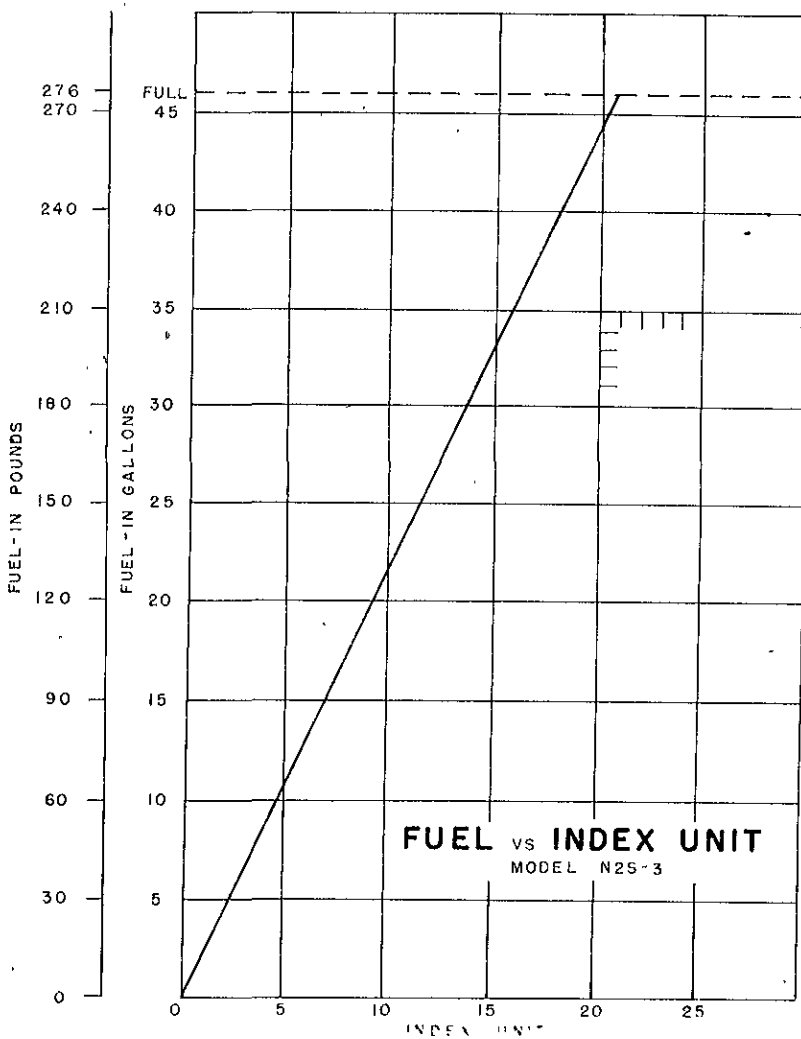

FUEL - IN POUNDS
276
270
240
210
180
150
120
90
60
30
0
FUEL - IN GALLONS
FULL
45
40
35
30
25
20
15
10
5
0
5
10
15
20
25
FUEL VS INDEX UNIT
MODEL N2S-3

FIG. 14

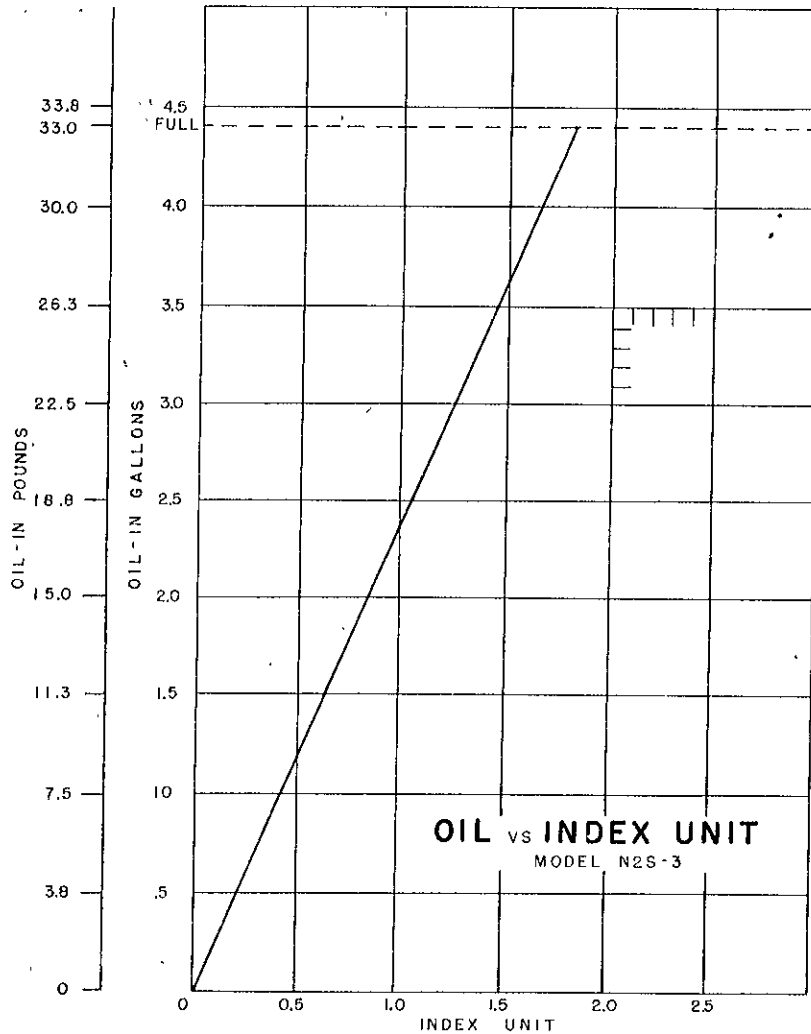

33.8
33.0
30.0
26.3
22.5
18.8
15.0
11.3
7.5
3.8
0
OIL - IN POUNDS
4.5
FULL
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
OIL - IN GALLONS
OIL vs INDEX UNIT
MODEL N2S-3
0
0.5
1.0
1.5
2.0
2.5
INDEX UNIT

FIG. 15

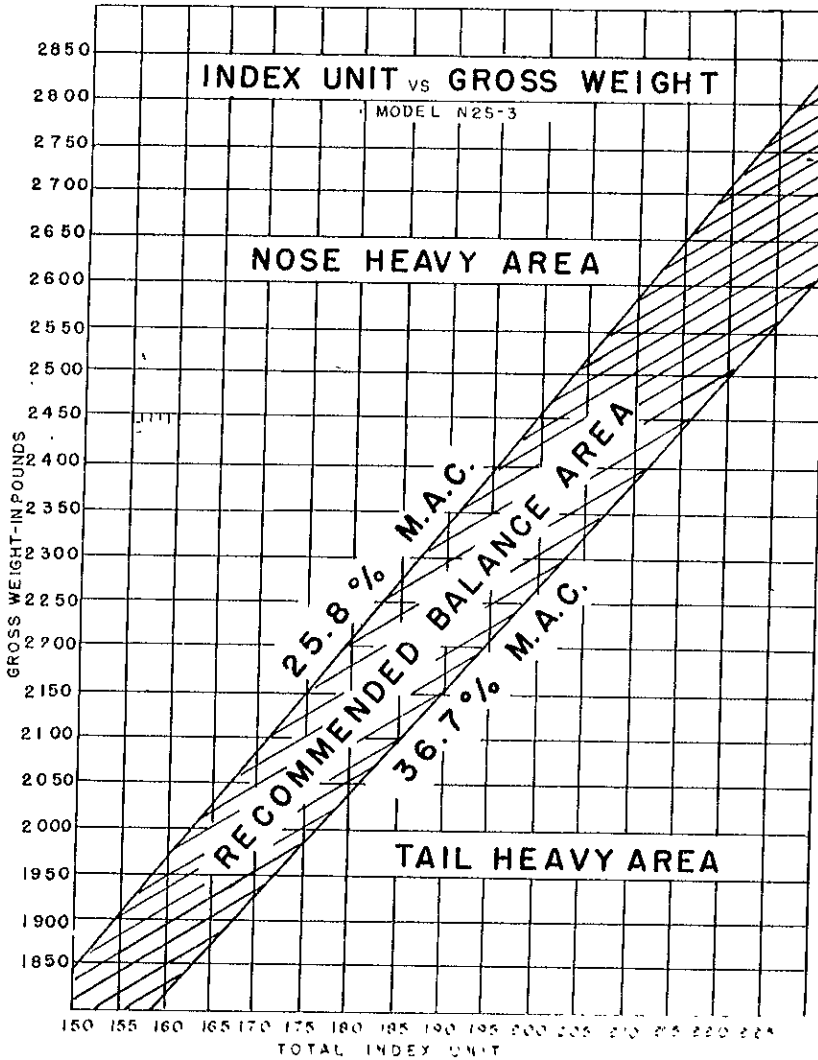

INDEX UNIT vs GROSS WEIGHT
MODEL N25-3
NOSE HEAVY AREA
25.8 % M.A.C.
RECOMMENDED BALANCE AREA
36.7 % M.A.C.
TAIL HEAVY AREA
GROSS WEIGHT-IN POUNDS
2850
2800
2750
2700
2650
2600
2550
2500
2450
2400
2350
2300
2250
2200
2150
2100
2050
2000
1950
1900
1850
150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225
TOTAL INDEX UNIT

FIG.16

Refer to Fig. 14, "Fuel vs. Index Unit", for the index unit corresponding to 258.0 pounds of gasoline. Refer to Fig. 15, "Oil vs. Index Unit", for the index unit corresponding to 9.0 pounds of oil. The index units taken from the charts and their corresponding weights should be tabulated along with Gross Weight and Index Unit, as shown.

	Index		Weight (in pounds)	
Total Index & Gross Weight		216.0		2600.4
Oil (Expended)	0.5		9.0	
Fuel (Expended)	19.4		258.0	
Total Expended Fuel & Oil		19.9		267.0
Resulting Index Unit & Gross Weight		196.1		2333.4

Finally, refer to Fig. 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	pounds
Fuel (46.0 Gallons)	276	pounds
Oil (4.4 Gallons)	33	pounds
Total Useful Load	709	ponnds

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 2750 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.

G — SPECIAL PRECAUTIONS

None

H — TAXIING

Taxi in the normal manner—use brakes only in emergency or when necessary to make a turn of very small radius.