CONGRATULATIONS

Welcome to the ranks of Cessna owners! Your Cessna has been designed and constructed to give you the most in performance, economy, and comfort. It is our desire that you will find flying it, either for business or pleasure, a pleasant and profitable experience.

This Pilot's Operating Handbook and FAA Approved Airplane Flight Manual has been prepared as a guide to help you get the most pleasure and utility from your airplane. It contains information about your Cessna's equipment, operating procedures, and performance; and suggestions for its servicing and care. We urge you to read it from cover to cover, and to refer to it frequently.

Our interest in your flying pleasure has not ceased with your purchase of a Cessna. Worldwide, the Cessna Dealer Organization backed by Cessna Customer Services Department stands ready to serve you. The following services are offered by most Cessna Dealers:

- THE CESSNA WARRANTY, which provides coverage for parts and labor, is available at Cessna Dealers worldwide. Specific benefits and provisions of warranty, plus other important benefits for you, are contained in your Customer Care Handbook supplied with your airplane. Warranty service is available to you at authorized Cessna Dealers throughout the world upon presentation of your Customer Care Card which establishes your eligibility under the warranty.

- FACTORY TRAINED PERSONNEL to provide you with courteous expert service.

- FACTORY APPROVED SERVICE EQUIPMENT to provide you efficient and accurate workmanship.

- A STOCK OF GENUINE CESSNA SERVICE PARTS on hand when you need them.

- THE LATEST AUTHORITATIVE INFORMATION FOR SERVICING CESSNA AIRPLANES. Cessna Dealers have all of the Maintenance Manuals and Parts Catalogs, and are kept current by Service Information Letters and Service News Letters published by Cessna Aircraft Company.

We urge all Cessna owners to use the Cessna Dealer Organization to the fullest.

A current Worldwide Customer Care Directory accompanies your new airplane. The Directory is revised frequently, and a current copy can be obtained from your Cessna Dealer. Make your Directory one of your cross-country flight planning aids; a warm welcome awaits you at every Cessna Dealer.

PERFORMANCE AND SPECIFICATIONS

MAXIMUM WEIGHT:
- Ramp . . . . . 6885 Pounds
- Takeoff . . . . . 6850 Pounds
- Landing . . . . . 6850 Pounds
- Zero Fuel . . . . . 6515 Pounds

*SPEED, BEST POWER MIXTURE:
- Maximum - 16,000 Feet . . . . . 231 KTAS
- Maximum Recommended Cruise
  - 72% Power at 10,000 Feet . . . . . 194 KTAS
  - 72% Power at 20,000 Feet . . . . . 213 KTAS

*RANGE, RECOMMENDED LEAN MIXTURE:
- Maximum Recommended Cruise
  - 72% Power at 10,000 Feet (600 Pounds Usable Fuel) . . . . . 349 Nautical Miles, 1.90 Hours and 190 KTAS
  - 72% Power at 10,000 Feet (900 Pounds Usable Fuel) . . . . . 615 Nautical Miles, 3.29 Hours and 191 KTAS
  - 72% Power at 10,000 Feet (1236 Pounds Usable Fuel) . . . . . 915 Nautical Miles, 4.84 Hours and 192 KTAS
  - 72% Power at 20,000 Feet (600 Pounds Usable Fuel) . . . . . 362 Nautical Miles, 1.90 Hours and 209 KTAS
  - 72% Power at 20,000 Feet (900 Pounds Usable Fuel) . . . . . 653 Nautical Miles, 3.29 Hours and 210 KTAS
  - 72% Power at 20,000 Feet (1236 Pounds Usable Fuel) . . . . . 983 Nautical Miles, 4.84 Hours and 211 KTAS
- Maximum Range
  - 10,000 Feet (600 Pounds Usable Fuel) . . . . . 499 Nautical Miles, 3.45 Hours and 141 KTAS
  - 10,000 Feet (900 Pounds Usable Fuel) . . . . . 855 Nautical Miles, 5.92 Hours and 142 KTAS
  - 10,000 Feet (1236 Pounds Usable Fuel) . . . . . 1273 Nautical Miles, 8.88 Hours and 142 KTAS
  - 20,000 Feet (600 Pounds Usable Fuel) . . . . . 459 Nautical Miles, 2.76 Hours and 164 KTAS
  - 20,000 Feet (900 Pounds Usable Fuel) . . . . . 815 Nautical Miles, 4.89 Hours and 165 KTAS
  - 20,000 Feet (1236 Pounds Usable Fuel) . . . . . 1233 Nautical Miles 7.41 Hours and 166 KTAS

RATE-OF-CLIMB AT SEA LEVEL:
- All Engines . . . . . 1450 Feet Per Minute
- One Engine Inoperative . . . . . 301 Feet Per Minute

SERVICE CEILING:
- All Engines . . . . . 26,900 Feet
- One Engine Inoperative . . . . . 14,800 Feet

TAKEOFF PERFORMANCE: (95 KIAS, 0° Wing Flaps And 6850 Pounds Weight)
- Ground Roll . . . . . 1763 Feet
- Total Distance Over 50-Foot Obstacle . . . . . 2195 Feet

LANDING PERFORMANCE: (95 KIAS, 45° Wing Flaps And 6850 Pounds Weight)
- Ground Roll . . . . . 1055 Feet
- Total Distance (Over 50-Foot Obstacle) . . . . . 2485 Feet

STANDARD EMPTY WEIGHTS: (Approximate)
- 402 Businessliner . . . . . 4074 Pounds
- 402 Businessliner II . . . . . 4220 Pounds
- 402 Businessliner III . . . . . 4325 Pounds
- 402 Utililiner . . . . . 4102 Pounds
- 402 Utililiner II . . . . . 4241 Pounds

BAGGAGE ALLOWANCE: . . . . . 1500 Pounds

WING LOADING: . . . . . 30.34 Pounds Per Square Foot

POWER LOADING: . . . . . 10.50 Pounds Per Horsepower

FUEL CAPACITY: (Total)
- Standard (206 Gallons Usable) . . . . . 213.4 Gallons

OIL CAPACITY: (Total) . . . . . 26 Quarts

ENGINES:
- Six-Cylinder, Turbocharged, Fuel-Injected Engines TSIO-520-VB
  325 Rated Horsepower at 2700 Propeller RPM And 39 Inches Hg. Manifold Pressure To 12,000 Feet. (For Takeoff and One Engine Inoperative Operation) 310 Horsepower at 2600 Propeller RPM and 39 Inches Hg. Manifold Pressure To 16,000 Feet. (Normal Operating Power)

PROPELLERS:
- Constant Speed, Full Feathering, Three-Bladed 6'4.5" Diameter 0850334-29

*Range data includes allowances for start, taxi, takeoff, climb, descent and 45-minute reserve fuel at the particular cruise power. Speeds shown are based on estimated mid-cruise weight.

The above performance figures are based on the indicated weights, standard atmospheric conditions, level hard-surface dry runways and no wind. They are calculated values derived from flight tests conducted by the Cessna Aircraft Company under carefully documented conditions and will vary with individual airplanes and numerous factors affecting flight performance.

REVISION

1980
MODEL 402C

PILOT'S OPERATING HANDBOOK

REVISION 6

29 SEPTEMBER 1998

D1582R6-13PH

INSERT THE FOLLOWING REVISED PAGES INTO BASIC PILOT'S OPERATING HANDBOOK D1582-5-13PH

COVERAGE

The Pilot's Operating Handbook and FAA Approved Airplane Flight Manual in the airplane at the time of delivery from Cessna Aircraft Company contains information applicable to the 1980 Model 402C airplane designated by the serial number and registration number shown on the Title Page of this handbook. This information is based on data available at the time of publication.

REVISIONS

Changes and/or additions to this handbook will be covered by revisions published by Cessna Aircraft Company. These revisions are distributed to owners of U.S. Registered aircraft according to FAA records at the time of revision issuance, and to Internationally Registered aircraft according to Cessna Owner Advisory records at the time of issuance.

Revisions should be examined immediately upon receipt and incorporated in this handbook.

NOTE

It is the responsibility of the owner to maintain this handbook in a current status, when it is being used for operational purposes.

Owners should contact a Cessna Service Station whenever the revision status of their handbook is in question.

A revision bar will extend the full length of new or revised text and/or illustrations added on new or presently existing pages. This bar will be located adjacent to the applicable revised area on the outer margin of the page.

All revised pages will carry the revision number and date on the applicable page.

The following Log of Effective Pages provides the dates of issue for original and revised pages, and a listing of all pages in the handbook. Pages affected by the current revision are indicated by an asterisk (*) preceding the pages listed.

LOG OF EFFECTIVE PAGES

Dates of issue for original and revised pages are:

Original	1 November 1979	Revision 3	2 March 1982
Revision 1	2 January 1980	Revision 4	1 December 1983
Revision 2	3 August 1981	Revision 5	18 March 1998
		Revision 6	29 September 1998

Page	Date	Page	Date
Title	1 Nov 79	1-4	3 Aug 81
Assignment Record	1 Nov 79	1-5 thru 1-7	1 Nov 79
i	3 Aug 81	1-8 thru 1-10	1 Dec 83
ii	1 Dec 83	1-11 thru 1-12	1 Nov 79
* iii thru v/vi	29 Sep 98	2-1 thru 2-2	1 Nov 79
Contents	1 Nov 79	2-3 thru 2-4	1 Dec 83
1-1 thru 1-2	3 Aug 81	2-5	1 Nov 79
1-3	18 Mar 98	2-6	1 Dec 83

LOG OF EFFECTIVE PAGES (Continued)

Page	Date	Page	Date
2-7 thru 2-8	1 Nov 79	4-24	2 Mar 82
2-9	2 Jan 80	4-25	1 Dec 83
2-10 thru 2-11	1 Nov 79	4-26 thru 4-30	1 Nov 79
2-12	2 Jan 80	5-1 thru 5-19	1 Nov 79
2-13 thru 2-14	1 Nov 79	5-20	1 Dec 83
2-15 thru 2-16	2 Jan 80	5-21	1 Nov 79
2-17/2-18	1 Nov 79	5-22	1 Dec 83
3-1	1 Dec 83	5-22A thru 5-22B	1 Dec 83
3-2 thru 3-3	18 Mar 98	5-1 thru 5-19	1 Nov 79
3-4 thru 3-5	1 Nov 79	5-20	1Dec 83
3-6	18 Mar 98	5-21	1Nov 79
3-7	3 Aug 81	5-22	1 Dec 83
3-8	1 Nov 79	5-22A thru 5-22B	1 Dec 83
3-9 thru 3-10	3 Aug 81	5-23	1 Dec 83
3-11	1 Dec 83	5-24	3 Aug 81
3-12	18 Mar 98	5-25 thru 5-27	1 Nov 79
3-13	1 Dec 83	5-28	1 Dec 83
3-14	18 Mar 98	5-29	1 Nov 79
3-15 thru 3-16	1 Dec 83	5-30	2 Mar 82
3-17	18 Mar 98	5-31 thru 5-39	1 Nov 79
3-18 thru 3-20	1 Nov 79	5-40 thru 5-42	1 Dec 83
3-21	18 Mar 98	5-43/5-44	1 Dec 83
3-22	1 Nov 79	6-1	1 Dec 83
3-23 thru 3-24	3 Aug 81	6-2 thru 6-3	1 Nov 79
3-25 thru 3-26	1 Nov 79	6-4	2 Mar 82
3-27	1 Dec 83	6-5	1 Nov 79
3-28	3 Aug 81	6-6 thru 6-8	1 Dec 83
3-29	1 Dec 83	6-9 thru 6-10	1 Nov 79
3-30	1 Nov 79	6-10A/6-10B	18 Mar 98
3-31 thru 3-32	1 Dec 83	6-11	1 Nov 79
4-1	1 Nov 79	6-12	1 Dec 83
4-2	1 Dec 83	6-13	1 Nov 79
4-3/4-4	1 Dec 83	6-14	1 Dec 83
* 4-5	29 Sep 98	6-15 thru 6-23	1 Nov 79
4-6	1 Nov 79	6-24	2 Jan 80
4-7/4-8	1 Nov 79	6-25thru 6-30	1 Nov 79
4-9	1 Nov 79	6-31/6-32	1 Nov 79
4-10 thru 4-13	1 Dec 83	6-33	1 Dec 83
4-14	3 Aug 81	6-34	1 Nov 79
4-15	1 Nov 79	6-35	1 Dec 83
4-16	1 Dec 83	6-36 thru 6-44	1 Nov 79
4-17 thru 4-18	1 Nov 79	6-45	2 Jan 80
4-19 thru 4-20	3 Aug 81	6-46 thru 6-50	1 Nov 79
4-21 thru 4-22	1 Nov 79	6-51/6-52	1 Nov 79
4-23	3 Aug 81	6-53/6-54	1 Nov 79

LOG OF EFFECTIVE PAGES (Continued)

NOTE

Refer to Section 9 Table of Contents for supplements applicable to optional systems.

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL PART NUMBER

D1582-6-13PH

TABLE OF CONTENTS

SECTION 1
GENERAL
TABLE OF CONTENTS

INTRODUCTION

This handbook consists of 9 sections and an alphabetical index as shown on the Contents page. This handbook includes the material required to be furnished to the pilot by CAR Part 3. It also contains supplemental data supplied by Cessna Aircraft Company. Specific information can be rapidly found by referring to the Contents page for the appropriate section, then referring to the Table Of Contents on the first page of the appropriate section, or by the use of the Alphabetical Index.

Section 1 of the handbook presents basic airplane data and general information which will be of value to the pilot.

ENGINES

Number of Engines: 2

Manufacturer:	Teledyne Continental Motors
Engine Model Number:	TSIO-520-VB
Engine Type:	Turbocharged, fuel-injected, direct drive, air-cooled, horizontally opposed, six-cylinder, 520 cubic-inch displacement.
Horsepower:	325 rated horsepower at 2700 propeller RPM and 39.0 inches Hg. manifold pressure to the critical altitude of 12,000 feet. 310 horsepower at 2600 propeller RPM and 39.0 inches Hg. manifold pressure to the critical altitude of 16,000 feet.

THREE-VIEW DRAWING

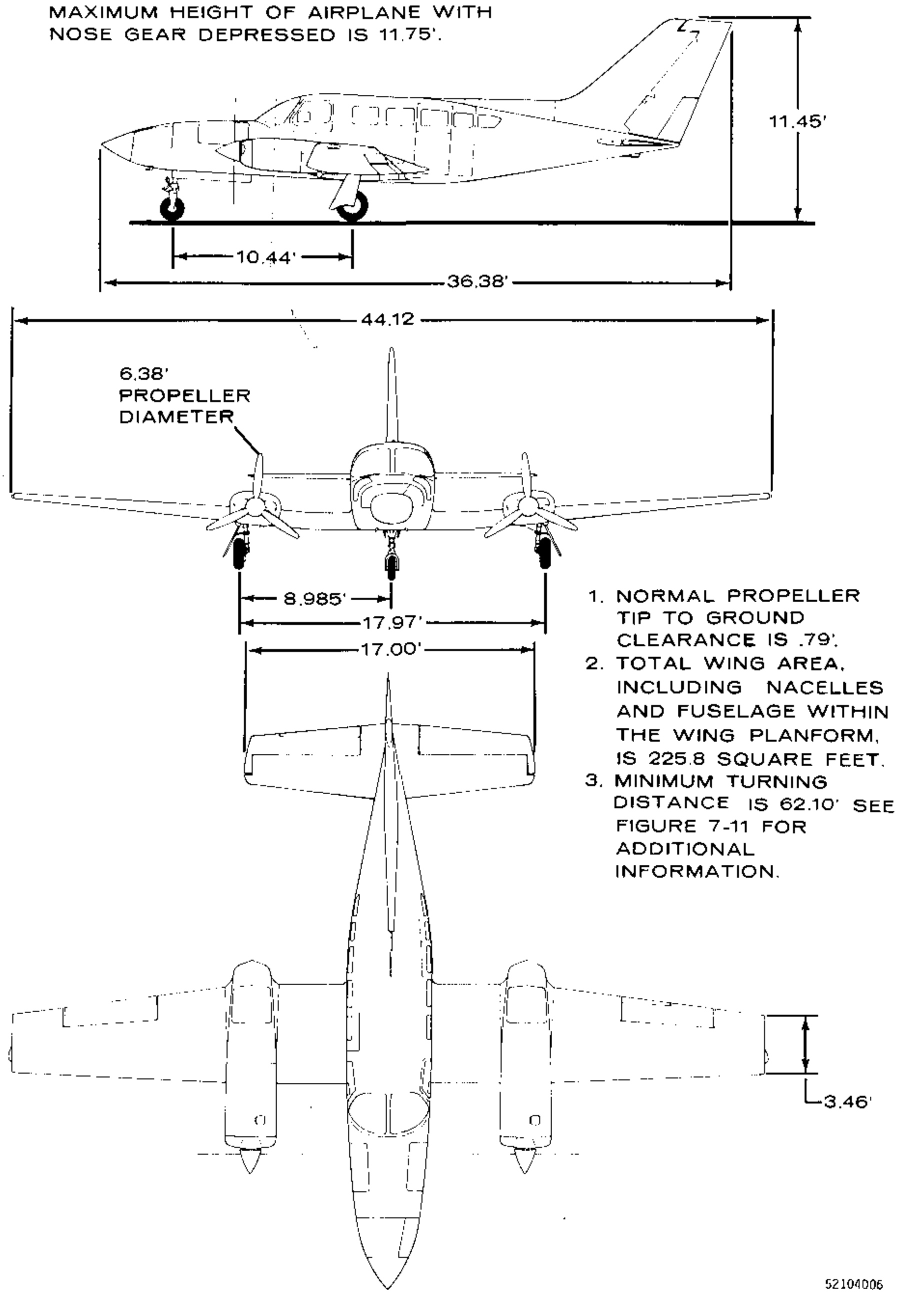


Figure 1-1

PROPELLERS

Number of Propellers:	2
Manufacturer:	McCauley Accessory Division, Cessna Aircraft Company
Propeller Part Number:	0850334-29
Number of Blades:	3
Propeller Diameter:	6' 4.5"
Propeller Type:	Constant speed, full feathering, nonreversible hydraulically actuated.
Blade Range:	(At 30-Inch Station)

a. Low Pitch 14.9° ±0.2°
b. Feather 82.2° ±0.3°

FUEL (Approved Fuel Grades and Colors) *

PRIMARY: 100 (Formerly 100/130) Grade Aviation Fuel (Green)
ALTERNATE: 100LL Grade Aviation Fuel (Blue)

* Isopropyl alcohol, or ethylene glycol monomethyl ether (EGME) may be added to the fuel supply. Additive concentrations by volume shall not exceed 1% for isopropyl alcohol. Additive concentrations by volume for EGME shall be 0.10% minimum to 0.15% maximum. Refer to Section 8 for additional information.

Total Fuel Capacity (U.S. Gallons) - 213.4

Usable Fuel (U.S.) Gallons) - 206.0 780 LTR

OIL

Grade: Aviation grade engine oil. Refer to Section 8 for additional information.

Viscosity:

SAE Rating	Ambient Temperature - °C (°F)
50 30 Multiviscosity	Above 4.4 (40) Below 4.4 (40) Unrestricted - After 25 Hours

Total Sump Capacity: 12 quarts per engine

Drain and Refill Quantity: 13 quarts per engine including one quart for oil filter.

Oil Quantity Operating Range: Do not operate engine on less than 9 quarts. To minimize loss of oil through breather, fill to 10-quart level for normal flights of less than 3 hours. For extended flight, fill to capacity.

NOTE

Dip stick indicates the quantity of oil in the engine and does not account for the 1 quart of oil in the oil filter.

MAXIMUM CERTIFICATED WEIGHTS

Maximum Ramp Weight: 6885 pounds 3123 kg

Maximum Takeoff Weight: 6850 pounds 3107 kg

Maximum Landing Weight: 6850 pounds 3107 kg

Maximum Zero Fuel Weight: 6515 pounds 2955 kg

Maximum Weights in Baggage Compartments (Passenger Configuration):

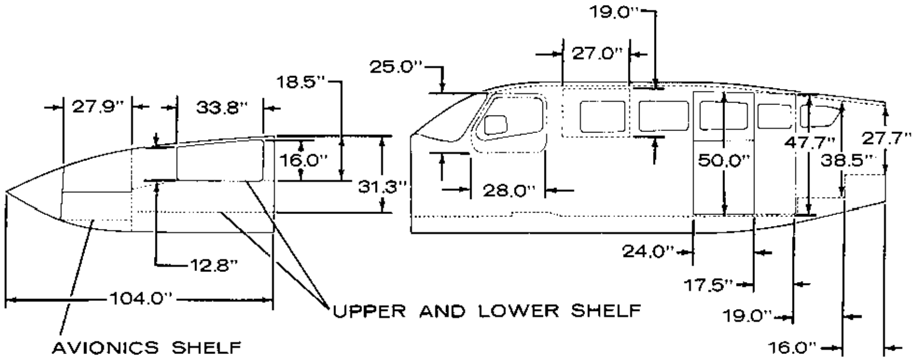
a. Left and Right Wing Lockers - 200 pounds each. 91kg

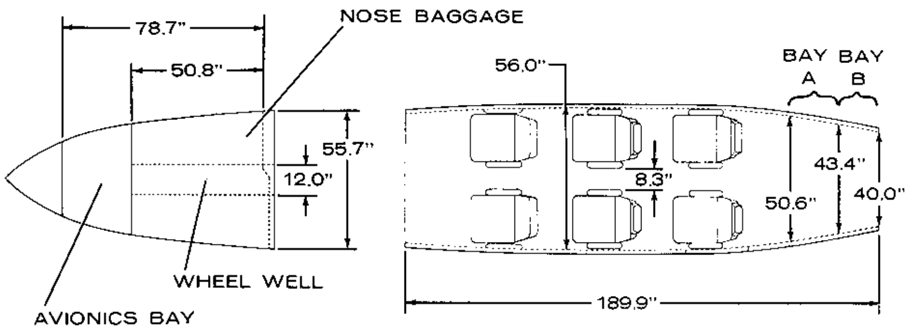
b. Avionics Bay - 250 pounds less installed optional equipment. 113kg Refer to the loading placard in the airplane avionics baggage bay.

c. Nose Bay - 350 pounds less installed optional equipment. 159kg Refer to the loading placard in the airplane nose baggage bay.

CABIN, BAGGAGE AND ENTRY DIMENSIONS

BUSINESSLINER





BUSINESSLINER BAGGAGE
COMPARTMENT VOLUME — CUBIC FEET

AVIONICS BAY	11.0
NOSE	26.0
WING LOCKER EACH (STD)	8.9
AFT CABIN (BAY A AND BAY B)	31.7

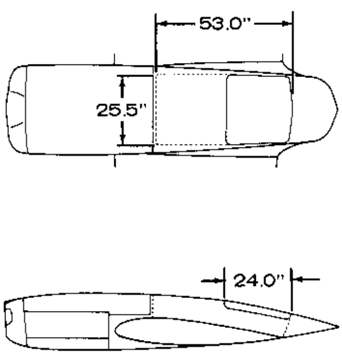


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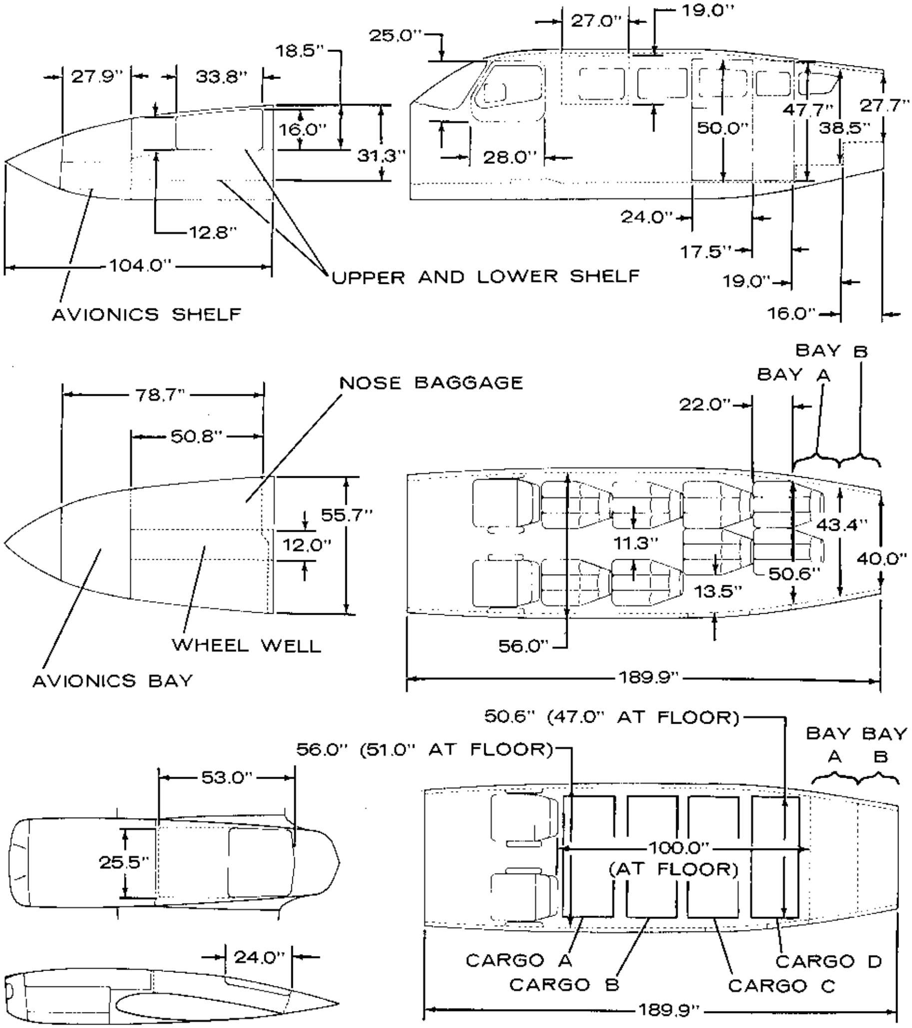
Figure 1-3 (Sheet 1 of 2)

CABIN, BAGGAGE AND ENTRY DIMENSIONS

UTILILINER



UTILILINER BAGGAGE AND CARGO COMPARTMENT VOLUME — CUBIC FEET

AVIONICS BAY	11.0
NOSE	26.0
WING LOCKER EACH (STD)	8.9
AFT CABIN (BAY A AND BAY B)	31.7
CABIN (CARGO A, B, C AND D)	150.0

52103003
54103004

Figure 1-3 (Sheet 2 of 2)

181kg

d. Aft Cabin (Bay A) See Figure 1-3 - 400 pounds (200 Pounds Per Side).

45kg

e. Aft Cabin (Bay B) See Figure 1-3 - 100 pounds (50 Pounds Per Side).

Maximum Weights in Baggage Compartments (Cargo Configuration):

91kg

a. Left and Right Wing Lockers - 200 pounds each.

113kg

b. Avionics Bay - 250 pounds less installed optional equipment. Refer to the loading placard in the airplane avionics baggage bay.

159kg

c. Nose Bay - 350 pounds less installed optional equipment. Refer to the loading placard in the airplane nose baggage bay.

909kg

d. Cargo A Through Cargo D - Maximum cargo load aft of the front spar is not to exceed 2000 pounds. Maximum cargo load in any 22.5-inch length of cabin floor is not to exceed 500 pounds. 227kg The total cabin load, including optional equipment aft of Station 238.1, is not to exceed 600 pounds.

272kg 181kg

e. Aft Cabin (Bay A) See Figure 1-3 - 400 pounds (200 Pounds Per Side).

45kg

f. Aft Cabin (Bay B) See Figure 1-3 - 100 pounds (50 Pounds Per Side).

g. Refer to Section 7, Cargo Loading for additional information.

STANDARD AIRPLANE WEIGHTS

Standard Empty Weight (Businessliner):	4074 pounds (4220 pounds for 402 Businessliner II) (4325 pounds for 402 Businessliner III)
Standard Empty Weight (Utililiner):	4102 pounds (4241 pounds for 402 UtililinerII)
Maximum Useful Load (Businessliner):*	2811 pounds (2665 pounds for 402 Businessliner II) (2560 pounds for 402 Businessliner III)
Maximum Useful Load (Utililiner):*	2783 pounds (2645 pounds for 402 Utililiner II)

*Based On Maximum Ramp Weight.

SPECIFIC LOADINGS

Wing Loading: 30.3 pounds per square foot

Power Loading: 10.5 pounds per horsepower

SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

AC	AC is alternating current.
CAS	Calibrated Airspeed is the indicated speed corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
DC	DC is direct current.
G	G is acceleration due to gravity.
IAS	Indicated Airspeed is the speed as shown on the airspeed indicator. IAS values published in this handbook assume zero instrument error.
KCAS	Calibrated Airspeed expressed in knots.
KIAS	Indicated Airspeed expressed in knots.
KTAS	True Airspeed expressed in knots.
NM	NM is nautical miles.
TAS	True Airspeed is the airspeed relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility.
V_A	Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.
V_{FE}	Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
V_{LE}	Maximum Landing Gear Extended Speed is the maximum speed at which an airplane can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
VMC_A	Air Minimum Control Speed is the minimum flight speed at which the airplane is directionally controllable as determined in accordance with Federal Aviation Regulations. Airplane certification conditions include one engine becoming inoperative and windmilling; not more than a 5° bank towards the operative engine; takeoff power on operative engine; landing gear up; flaps in takeoff position; and most rearward CG.

V_{NE}	Never Exceed Speed is the speed limit that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
V_{SSE}	Intentional One Engine Inoperative Speed is a minimum speed selected by the manufacturer for intentionally rendering one engine inoperative in flight for pilot training.
V_X	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

METEOROLOGICAL TERMINOLOGY

°C	Temperature in degrees Celsius.
°F	Temperature in degrees Fahrenheit.
ISA	International Standard Atmosphere in which: (1) The air is a dry perfect gas; (2) The temperature at sea level is 15° Celsius (59° Fahrenheit); (3) The pressure at sea level is 29.92 inches Hg. (1013.2 mb); (4) The temperature gradient from sea level to the altitude at which the temperature is -56.5°C (-69.7°F) is -1.98°C (-3.5°F) per 1000 feet.
OAT	Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications adjusted for instrument error and compressibility effects or ground meteorological sources.
Pressure Altitude	Altitude measured from standard sea-level pressure (29.92 inches Hg.) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero.
TEMP	TEMP is temperature.
Wind	The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

POWER TERMINOLOGY

BHP	Brake horsepower means the power delivered at the propeller shaft of an airplane engine.
Critical Altitude	The maximum altitude at which in standard temperature it is possible to maintain a specified power.
Maximum Normal Operating Power	The power developed in a standard atmosphere from sea level to the critical altitude at the maximum RPM and manifold pressure approved for use during all engines climb conditions.
Maximum Power For Takeoff And Single Engine Operation	The power developed in a standard atmosphere from sea level to the critical altitude at the maximum RPM and manifold pressure approved for use during takeoff and single engine operation.
RPM	The revolutions per minute (RPM) as referred to the rotational speed of the propeller shaft. Propeller RPM shown on a tachometer.

AIRPLANE PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

Accelerate-Go Distance	The distance required to accelerate an airplane to a specified speed and, assuming failure of an engine at that speed after lift-off and with gear in transit, continue takeoff on the remaining engine to a height of 50 feet.
Accelerate-Stop Distance	The distance required to accelerate an airplane to a specified speed and, assuming failure of an engine at the instant that speed is attained, to bring the airplane to a stop.
Aerobatic Maneuver	An intentional maneuver involving an abrupt change of an airplane's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight.
Balked Landing	A balked landing is an aborted landing (i.e., all engines go-around in the landing configuration).
Balked Landing Transition Speed	The minimum speed at which a transition to a balked landing climb should be attempted from 50-foot obstacle height.
Demonstrated Crosswind Velocity	The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests. The value shown is not considered to be limiting. This value is not an aerodynamic limit for the airplane.
Maneuvering Fuel	Maneuvering fuel is the usable fuel as shown in Section 2 for all airplane configurations, provided the maximum side slip duration is not exceeded.
Maximum Effective Braking	The maximum amount of braking pressure that can be applied to the toe brakes without locking the wheels.

WEIGHT AND BALANCE TERMINOLOGY

Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Basic Empty Weight	Standard empty weight plus installed optional equipment.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.
Center of Gravity (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
Jack Point	One of the three points on the airplane designed to rest on a jack.
MAC	The mean aerodynamic chord of a wing is the chord of an imaginary airfoil which throughout the flight range will have the same force vectors as those of the wing.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes weight of start, taxi and run up fuel.)
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.
Moment	The product of the weight of an item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
Payload	Weight of occupants, cargo and baggage.
Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Residual Fuel	The undrainable fuel remaining when the airplane is defueled in a specific attitude by the normal means and procedures specified for draining the tanks.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.

Station	A location along the airplane fuselage given in terms of distance from the reference datum.
Tare	Tare is the weight of chocks, blocks, stands, etc. used when weighing an airplane, and is included in the scale readings. Tare is deducted from the scale reading to obtain the actual (net) airplane weight.
Unusable Fuel	Fuel remaining after fuel runout tests have been completed in accordance with governmental regulations.
Usable Fuel	Fuel available for flight planning.

SECTION 2
LIMITATIONS
TABLE OF CONTENTS

INTRODUCTION

Section 2 of this handbook presents the operating limitations, the significance of such limitations, instrument markings, color coding and basic placards necessary for the safe operation of the airplane, its powerplants, standard systems and standard equipment. The limitations included in this section and Section 9 have been approved by the Federal Aviation Administration. Observance of these operating limitations is required by law.

Operation in countries other than the United States may require observance of other limitations, procedures or performance data in applicable supplements.

NOTE

Refer to Section 9 of this handbook for amended operating limitations, operating procedures, performance data and other necessary information for airplanes equipped with specific options.

AIRSPEED LIMITATIONS (See Figure 2-1)

AIRSPEED LIMITATIONS TABLE*

SPEED	KIAS	KCAS	REMARKS
Maneuvering Speed V_A (Knots)	150	147	Do not make abrupt control movements above this speed.
Maximum Flap Extended Speed V_{FE} (Knots) 15° 45°	 180 149	 175 145	Do not exceed this speed with the given flap setting.
Maximum Gear Operating Speed V_{LO} (Knots)	180	175	Do not extend or retract landing gear above this speed.
Maximum Gear Extended Speed V_{LE} (Knots)	180	175	Do not exceed this speed with landing gear extended.
Air Minimum Control Speed V_{MC_A} (Knots)	80	81	This is the minimum flight speed at which the airplane is directionally controllable with one engine inoperative and with a 5° bank towards the operative engine.
One Engine Inoperative Best Rate-of-Climb Speed V_Y (Knots)	104	103	This speed delivers the greatest gain in altitude in the shortest possible time with one engine inoperative at sea level, standard day conditions and 6850 pounds weight.
Never Exceed Speed V_{NE} (Knots)	235	231	Do not exceed this speed in any operation.
Maximum Structural Cruising Speed V_{NO} (Knots)	205	200	Do not exceed this speed except in smooth air and then only with caution.

Figure 2-1

* See Robertson POHS

Airspeed Indicator Markings: See Figure 2-2

AIRSPEED INDICATOR TABLE

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
Red Radial	80	Air minimum control speed.
White Arc	71 to 149	Operating speed range with 45° wing flaps. Lower limit is maximum weight stalling speed in landing configuration. Upper limit is maximum speed permissible with wing flaps extended 45°.
Green Arc	80 to 205	Normal operating range. Lower limit is maximum weight stalling speed with flaps and landing gear retracted. Upper limit is maximum structural cruising speed.
Blue Radial	104	One engine inoperative best rate-of-climb speed at sea level standard day conditions and 6850 pounds weight.
Yellow Arc	205 to 235	Caution range. Operations must be conducted with caution and only in smooth air.
Red Radial	235	Maximum speed for all operations.

Figure 2-2

ENGINE LIMITATIONS

Number of Engines: 2
Engine Manufacturer: Teledyne Continental Motors
Engine Model Number: TSIO-520-VB
Engine Operating Limits:

a. Maximum power for takeoff and one engine inoperative operation.

Altitude - Feet	Allowable Manifold Pressure - Inches Hg.	Propeller RPM	Rated Horsepower	Time	Max. Head Temp. °F	Max. Oil Temp. °F
S.L. to 12,000	39.0	2700	325	Continuous	460	240
14,000	37.2	2700	310	Continuous	460	240
16,000	37.2	2700	310	Continuous	460	240
18,000	32.0	2700	274	Continuous	460	240
20,000	29.5	2700	250	Continuous	460	240
22,000	27.0	2700	226	Continuous	460	240
24,000	25.0	2700	206	Continuous	460	240
26,000	23.0	2700	186	Continuous	460	240
28,000	21.0	2700	166	Continuous	460	240
30,000	19.0	2700	146	Continuous	460	240

b. Maximum normal operating power.

Altitude - Feet	Allowable Manifold Pressure - Inches Hg.	Propeller RPM	Rated Horsepower	Time	Max. Head Temp. °F	Max. Oil Temp. °F
S.L. to 16,000	39.0	2600	310	Continuous	460	240
18,000	32.0	2600	262	Continuous	460	240
20,000	29.5	2600	240	Continuous	460	240
22,000	27.0	2600	217	Continuous	460	240
24,000	25.0	2600	199	Continuous	460	240
26,000	23.0	2600	179	Continuous	460	240
28,000	21.0	2600	160	Continuous	460	240
30,000	19.0	2600	141	Continuous	460	240

Oil Pressure:

a. Minimum: 10 PSI (Idle Power).
b. Maximum: 100 PSI.

Oil Viscosity:

SAE Rating	Ambient Temperature - °C (°F)
50	Above 4.4 (40)
30	Below 4.4 (40)
Multiviscosity	Unrestricted - After 25 Hours

Propellers:

a. Number of Propellers: 2
b. Manufacturer: McCauley Accessory Division, Cessna Aircraft Company.
c. Part Number: 0850334-29.
d. Number of Blades: 3
e. Diameter: 6'4.5"
f. Blade Range: (At 30-Inch Station)
   (1) Low Pitch 14.9° ±0.2°
   (2) Feather 82.2° ±0.3°
g. Operating Limits: 2700 RPM maximum speed

Engine Instrument Markings:

a. Tachometer:
   (1) Normal Operating 2100 to 2450 RPM (Green Arc)
   (2) Takeoff and Engine Inoperative 2600 to 2700 RPM (Yellow Arc)
   (3) Maximum 2700 RPM (Red Radial)
b. Manifold Pressure:
   (1) Normal Operating 15.0 to 29.5 Inches Hg. Manifold Pressure (Green Arc)
   (2) Conditional Normal Operating 29.5 to 30.3 Inches Hg. Manifold Pressure at 2200 to 2300 RPM (Narrow Green Arc)
      (a) 2450 RPM Mark at 29.5 Inches Hg. Manifold Pressure
      (b) 2300 RPM Mark at 30.3 Inches Hg. Manifold Pressure
      (c)

Alt. x 1000	Max. M.P.
S.L.-12	39.0
12-16	37.2
18	32.0
20	29.5
22	27.0
24	25.0
26	23.0
28	21.0
30	19.0

   (3) Maximum 39.0 Inches Hg. Manifold Pressure (Red Radial)
c. Oil Temperature:
   (1) Normal Operating 75 to 240°F (Green Arc)
   (2) Maximum 240°F (Red Radial)
d. Oil Pressure:
   (1) Minimum Operating 10 PSI (Red Radial)
   (2) Normal Operating 30 to 60 PSI (Green Arc)
   (3) Maximum 100 PSI (Red Radial)
e. Cylinder Head Temperature:
   (1) Normal Operating 200 to 460°F (Green Arc)
   (2) Maximum 460°F (Red Radial)
f. Fuel Flow:
   (1) Minimum Operating 0 Pounds per hour (3.0 PSI) (Red Radial)
   (2) Normal Operating 27.0 Pounds per hour (4.3 PSI) to 210.0 Pounds per hour (18.0 PSI) (Green Arc)
      (a) Green Dots 45% Power - 68.5 Pounds per hour (5.9 PSI)
         55% Power - 83.0 Pounds per hour (6.7 PSI)
         65% Power - 97.5 Pounds per hour (7.6 PSI)
         75% Power - 112.5 Pounds per hour (8.7 PSI)
      (b) Blue Arc - Takeoff and Engine Inoperative Climb
         20,000 Feet - 133.0 Pounds per hour (10.2 PSI)
         18,000 Feet - 145.0 Pounds per hour (11.2 PSI)
         16,000 Feet - 185.0 Pounds per hour (15.1 PSI)
      (c) Blue Triangle (75% Climb) - 117.0 Pounds per hour (9.0 PSI)
      (d) White Triangle (Maximum Normal Operating Power) - 190.0 Pounds per hour (15.7 PSI)
      (e) White Arc (Takeoff and Engine Inoperative Power - Sea Level to 12,000 Feet) 200.0 Pounds per hour (16.8 PSI) to 210.0 Pounds per hour (18.0 PSI)
   (3) Maximum Operating 214.0 Pounds per hour (18.5 PSI) (Red Radial)
   (4) On Face Of Indicator: "FUEL FLOW LBS/HR" "T.O. & ENG. INOP" "CRUISE % POWER" "75% CLIMB" "FT x 1000" "MAX CLIMB"

MISCELLANEOUS INSTRUMENT MARKINGS

Instrument Vacuum:

a. Red Line: 4.75 Inches Hg.
b. Green Arc: 4.75 to 5.25 Inches Hg.

Oxygen Pressure:

a. Yellow Arc: 0 to 300 PSI
b. Green Arc: 1550 to 1850 PSI
c. Red Line: 2000 PSI
d. The Cubic Foot Capacity of the Bottle Installed Will Be Indicated On The Face of the Gage.

WEIGHT LIMITS

Maximum Ramp Weight: 6885 Pounds
Maximum Takeoff Weight: 6850 Pounds
Maximum Landing Weight: 6850 Pounds
Maximum Zero Fuel Weight: 6515 Pounds
Maximum Weights in Baggage Compartments (Passenger Configuration):

a. Left and Right Wing Lockers - 200 pounds each. 91 kg
b. Avionics Bay - 250 pounds less installed optional equipment. 113 kg
c. Nose Bay - 350 pounds less installed optional equipment. 159 kg
d. Aft Cabin (Bay A) - 400 pounds (200 Pounds Per Side). 181 kg
e. Aft Cabin (Bay B) - 100 pounds (50 Pounds Per Side). 45 kg

Maximum Weights in Baggage Compartments (Cargo Configuration):

a. Left and Right Wing Lockers - 200 pounds each.
b. Avionics Bay - 250 pounds less installed optional equipment.
c. Nose Bay - 350 pounds less installed optional equipment. 907 kg
d. Maximum cargo load aft of the front spar is not to exceed 2000 pounds.
e. The total cabin load including optional equipment aft of Station 238.1 is not to exceed 600 pounds.
f. Maximum cargo load in any 22.5 inch length of cabin floor is 500 pounds. The maximum load for the lower aft cabin shelf (Bay A) is 400 pounds, for the upper aft cabin shelf (Bay B) is 100 pounds.

Center of Gravity Limits (Gear Extended):

a. Aft Limit: 160.67 inches aft of reference datum (34.0% MAC) at 6850 pounds or less.
b. Forward Limit: 151.58 inches aft of reference datum (19.6% MAC) at 6850 pounds and 149.08 inches aft of reference datum (15.5% MAC) at 5800 pounds or less with straight line variation between these points.
c. See Weight and Balance Data in Section 6 for loading schedule. The reference datum line is 100 inches forward of the aft face of the fuselage bulkhead forward of the rudder pedals. The mean aerodynamic chord (MAC) is 62.65 inches in length. The leading edge of the MAC is 139.37 inches aft of the reference datum line.

MANEUVER LIMITS

This is a normal category airplane. Aerobatic maneuvers, including spins, are prohibited.

FLIGHT LOAD FACTOR LIMITS

The design load factors are 150% of the following, and in all cases the structure exceeds design loads.

At Design Takeoff Weight of 6850 Pounds:

a. Landing gear up, wing flaps 0° +3.6G to -1.44G
b. Landing gear down, wing flaps 45° 0.0G to +2.0G

FLIGHT CREW LIMITS

Minimum Flight Crew for FAR 91 operations is one pilot.

OPERATION LIMITS

The standard airplane is approved for day and night operation under VFR conditions. With the proper optional equipment installed, the airplane is approved for day and night IFR operations and flight into icing conditions as defined by the FAA.

FUEL LIMITATIONS

Fuel Pressure:

a. Minimum: 3.0 PSI (0 Pounds Per Hour)
b. Maximum: 18.5 PSI (214.0 Pounds Per Hour)

Fuel Quantity:

76 litres
a. Minimum fuel for takeoff is 20 gallons in each main tank.

Maneuvering Fuel:

a. Due to possible fuel starvation, maximum side slip duration time is 30 seconds. The airplane is considered in a side slip anytime the turn and bank "ball" is more than one half ball out of the center (coordinated flight) position.

Fuel (Approved Fuel Grades And Colors):

PRIMARY - 100 (Formerly 100/130) Grade Aviation Fuel (Green).
ALTERNATE - 100LL Grade Aviation Fuel (Blue).

Total Fuel Capacity (U.S. Gallons) - 213.4

Usable Fuel (U.S. Gallons) - 206.0

MAXIMUM OPERATING ALTITUDE LIMIT

With Oxygen Equipment: 30,000 Feet

MAXIMUM PASSENGER SEATING LIMITS

The two forward seats are pilot seats.

A maximum of 9* passenger seats may be installed aft of the pilot seats. See weight and balance section for seat locations.

See Supp. 9.2

REQUIRED PLACARDS

On Emergency Exit Window Trim:

EMERGENCY EXIT

TO OPEN	1. PUSH SAFETY CLIP FORWARD 2. PULL OUT RED HANDLE FULLY 3. PUSH WINDOW OPEN AT BOTTOM
TO CLOSE	1. PULL OUT RED HANDLE FULLY 2. PULL WINDOW SHUT TIGHT 3. STOW HANDLE UNDER SAFETY CLIP

On Right Wall Adjacent to Emergency Exit Window (With Optional Right Aft Facing Seat):

AFT FACING SEAT BACK MUST BE
ERECT FOR TAKEOFF & LANDING

On Left Wall Near Aft Facing Seat (If Installed):

AFT FACING SEAT BACK MUST BE
ERECT FOR TAKEOFF & LANDING

On Floor Forward of Fuel Selectors:

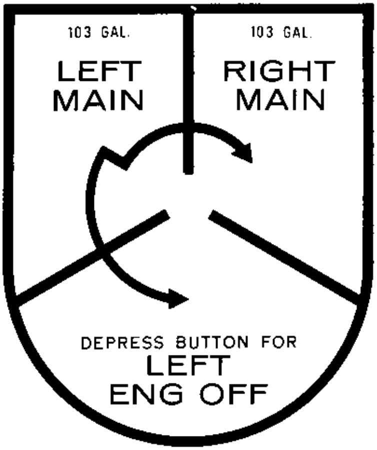
SET FUEL SELECTOR VALVES TO LEFT MAIN FOR LEFT ENGINE AND RIGHT MAIN FOR RIGHT ENGINE FOR TAKEOFF, DESCENT, LANDING, AND ALL NORMAL OPERATIONS.

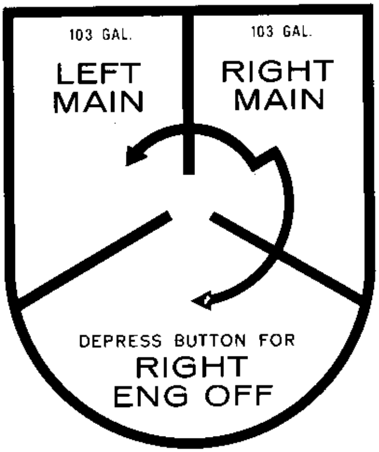
TAKEOFF AND LAND WITH AUXILIARY FUEL PUMPS ON.

EMERGENCY CROSSFEED SHUTOFF VALVE MUST BE OPEN FOR ALL NORMAL OPERATIONS.

100 GRADE AVIATION FUEL MINIMUM.

Around Engine Fuel Selector Handles:





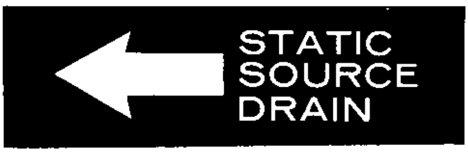
On Floor Forward of Fuel Emergency Crossfeed Shutoff Valve:

EMERGENCY CROSSFEED
SHUTOFF VALVE
PULL
TO SHUT OFF

In Recess on Fuel Emergency Crossfeed Shutoff Valve Bezel (Visible When Lever is Up):

LEVER UP
CROSSFEED
OFF

On Cockpit Right Sidewall:



On Pilot's Sun Visor:

OPERATIONAL LIMITS

THE MARKINGS AND PLACARDS INSTALLED IN THIS AIRPLANE CONTAIN OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING THIS AIRPLANE IN THE NORMAL CATEGORY. OTHER OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING THIS AIRPLANE IN THE NORMAL CATEGORY ARE CONTAINED IN THE "PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL"
NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED.

AIR MINIMUM CONTROL SPEED ———— 80 KIAS
MAXIMUM GEAR OPERATING SPEED ———— 180 KIAS
MAXIMUM GEAR EXTENDED SPEED ———— 180 KIAS
MAXIMUM FLAP EXTENDED SPEED, 15° FLAP ———— 180 KIAS
MAXIMUM FLAP EXTENDED SPEED, 45° FLAP ———— 149 KIAS
MAXIMUM MANEUVERING SPEED ———— 150 KIAS

THIS AIRPLANE IS APPROVED FOR DAY-NIGHT VFR CONDITIONS. IT IS APPROVED FOR DAY-NIGHT IFR CONDITIONS AND FLIGHTS INTO ICING CONDITIONS IF THE PROPER OPTIONAL EQUIPMENT IS INSTALLED AND OPERATIONAL.

On Instrument Panel:

Near Heater Controls:

CABIN AIR
DEFROST AFT FWD

OPEN ONE CABIN AIR CONTROL MINIMUM FOR HEATER OPERATION

CABIN HEAT

RAM AIR PULL

RECIRCULATE PUSH

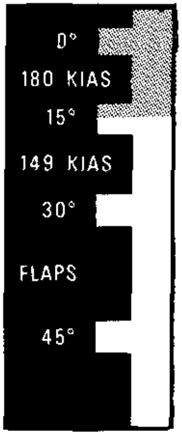
Near Engine Induction Alternate Air Controls:

LH RH

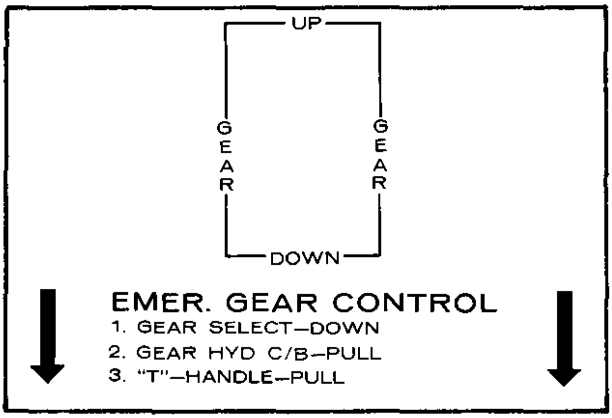
ALT AIR

PULL

Adjacent to Wing Flap Position Switch:



Around Landing Gear Handle:



On Landing Gear Indicator Lights:

GEAR UNLOCKED

NOSE	
LH	RH

Near Propeller Synchrophaser Switch, if Optional Propeller Synchrophaser is Installed:

MUST BE OFF FOR TAKEOFF,
LDG. AND ONE ENG. OPER.

Near Propeller Synchrophaser Switch, if Optional Synchrophaser is Installed:

		PHASE
PHASING	PROP	
	SYNC	OFF

If Optional Unfeathering Accumlators Are Installed:

PROP UNFEATHERING ACCUMULATORS
ARE INSTALLED ON THIS AIRPLANE

On Engine Control Pedestal:

T.O. Range on elevator trim tab indicator -4° nose down, 7° nose up.

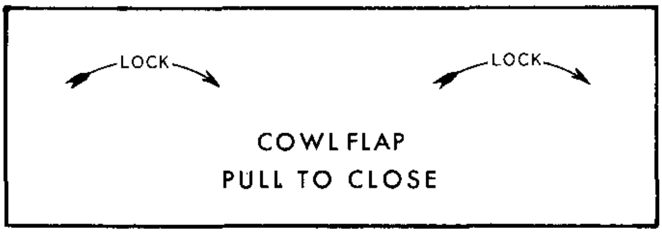
Rudder Trim Indicator:

L NOSE R

Aileron Trim Indicator:

L ROLL R

Cowl Flap Control:



Adjacent to Alternate STATIC SOURCE:

PARKING BRAKE
TO APPLY BRAKES, DEPRESS RUDDER PEDALS, THEN PULL KNOB.
TO RELEASE PUSH IN KNOB. DO NOT DEPRESS RUDDER PEDALS.

STATIC PRESSURE ALTERNATE SOURCE →

On Horizontal Part of First Baggage Step (Station 257):

MAXIMUM BAGGAGE ALLOWANCE
400 POUNDS (200 POUNDS/SIDE)

FOR AIRPLANE LOADING SEE WEIGHT & BALANCE DATA IN THE PILOT'S OPERATING HANDBOOK.

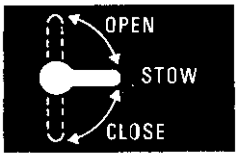
On Horizontal Part of Second Baggage Step (Station 276):

MAXIMUM BAGGAGE ALLOWANCE
100 POUNDS (50 POUNDS/SIDE)

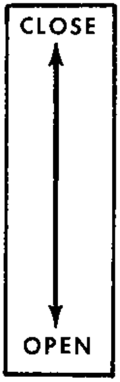
FOR AIRPLANE LOADING SEE WEIGHT & BALANCE DATA IN THE PILOT'S OPERATING HANDBOOK.

On Cabin Door Trim:

CHECK
DOOR LOCK
INDICATOR

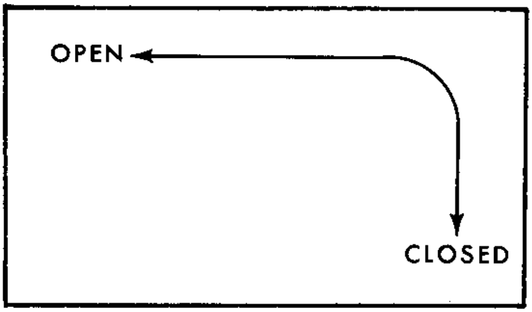


Near Upper Cabin Door Latch Mechanism:
Center of External Door Handle:

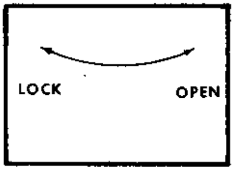


With Optional Crew Door (Hatch) Installed:

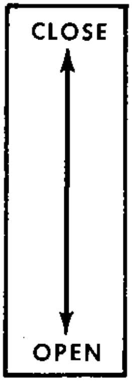
Near Internal Door Handle:



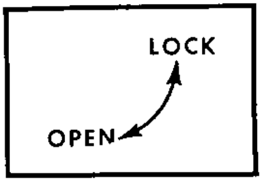
Near Internal Locking Lever:



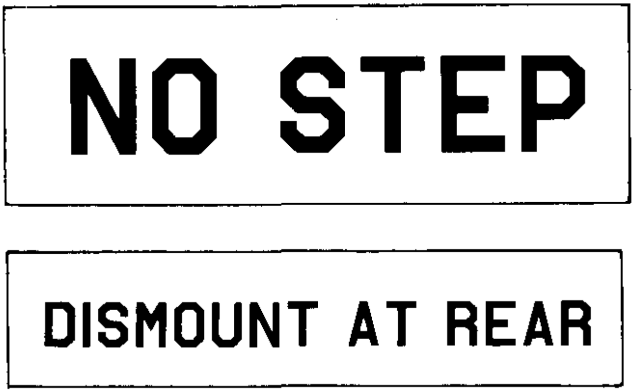
Near External Door Handle:



Near External Safety Latch Opening:

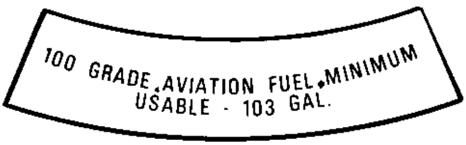


Near Walkway:



Near Optional Cargo Door:

Near Fuel Filler Caps:



Inside Wing Locker Doors:

MAX
BAGGAGE
200 LBS

Inside Left Nose Baggage Door:

EXTERNAL HYD.
RESERVOIR FILL
MIL-H-5606

Inside Nose Baggage Doors:

MAXIMUM BAGGAGE
MAX. CAPACITY 350 LBS. LESS
OPTIONAL EQUIP.

On Hydraulic Reservoir:

MAX FULL —

ADD —

On Avionics Bay Door Forward Partition:

MAXIMUM BAGGAGE
MAX. CAPACITY 250 LBS. LESS
OPTIONAL EQUIP.

LIMITATIONS (PLACARD)

The following new placard is provided to identify that the airplane has been modified and show the proper switch positions for normal operation. It is located on the left cabin sidewall near the auxiliary fuel pump switches.

NOTICE

THE AUXILIARY FUEL PUMP
SYSTEMS IN THIS AIRPLANE
HAVE BEEN MODIFIED BY
SERVICE BULLETIN MEB88-3.

AUX PUMP LOW FOR TAKEOFF,
LANDING AND VAPOR CLEARING.
AUX PUMP HIGH FOR ENGINE
DRIVEN PUMP FAILURE
(VERY LOW OR NO FUEL PRESS)
SEE EMERGENCY PROCEDURES.

An additional placard which specifies TAKEOFF AND LAND WITH AUXILIARY FUEL PUMPS LOW is provided to overlay an existing placard (if installed) near the fuel selectors which reads TAKEOFF AND LAND WITH AUXILIARY FUEL PUMPS ON.

1. The <u>Limitations Section</u> of the aircraft's Aircraft Flight Manual (AFM) by incorporating the following:

"WARNING"

Severe icing may result from environmental conditions outside of those for which the aircraft is certificated.

Flight in freezing rain, freezing drizzle, or mixed icing conditions (super cooled liquid water and ice crystals) may result in:

- ice build-up on protected surfaces and exceed the capability of the ice protection system, or
- ice forming aft of the protected surfaces.

This ice may not be shed using the ice protection systems, and my seriously degrade the performance and controllability of the aircraft.

During flight, severe icing conditions that exceed those for which the aircraft is certificated shall be determined by the visual cues described below. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions. The cues are:

- unusually extensive ice accumulation on the airframe and windscreen in areas not normally observed to collect ice, and/or
- accumulation of ice on the lower surface of the wing aft of the protected area, and/or
- accumulation of ice on the engine nacelles and propeller spinners farther aft than normally observed.

Since the auto-pilot, when installed and operating, may mask tactile cues that indicate adverse changes in handling characteristics, use of the auto-pilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or auto-pilot trim warnings are encountered while the aircraft is in icing conditions.

PAPUA NEW GUINEA

All wing icing inspection lights must be operative prior to flight into known or forecast icing conditions at night. **<u>This direction supersedes any relief provided by any Minimum Equipment List.</u>** 136

of the Civil Aviation Regulation

....

Delegate of the Secretary of Civil Aviation.

Dated......17-04-2000

2. The <u>Normal Procedures Section</u> of the AFM by incorporating the following:

THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

- Visible rain at temperatures below 0 degrees Celsius ambient air temperature.
- Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING A SEVERE ICING ENVIRONMENT: *(These procedures are applicable to all flight phases from take-off to landing.)*

Monitor the ambient air temperature.

While severe icing may form at temperatures as cold as –18 degrees Celsius, increased vigilance is warranted at temperatures around freezing when visible moisture is present.

If the visual cues which are specified in the Limitations Section of the AFM for identifying severe icing conditions are observed, accomplish the following:

- Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the aircraft has been certificated.
- Avoid abrupt and excessive manoeuvring that may exacerbate control difficulties.
- Do not engage the autopilot.
- If the autopilot had previously been engaged, hold the control wheel firmly and disengage the autopilot.
- If an unusual roll response or un-commanded roll control movement is observed, reduce the angle-of-attack.
- Do not extend flaps when holding in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.
- If the flaps are extended, do not retract them until the airframe is clear of ice.
- Report these weather conditions to Air Traffic Control.

SECTION 3
EMERGENCY PROCEDURES

TABLE OF CONTENTS

INTRODUCTION

Section 3 of this handbook describes the recommended procedures for emergency situations. The first part of this section provides emergency procedural action required in an abbreviated checklist form. Amplification of the abbreviated checklist is presented in the second part of this section.

NOTE

Refer to Section 9 of this handbook for amended operating limitations, operating procedures, performance data and other necessary information for airplanes equipped with specific options.

EMERGENCY PROCEDURES
ABBREVIATED CHECKLIST

Procedures in the Abbreviated Checklist portion of this section outlined in black ☐ are immediate-action items and should be committed to memory.

AIRSPEEDS FOR SAFE OPERATION

Conditions:
1. Takeoff Weight 6850 Pounds
2. Landing Weight 6850 Pounds
3. Standard Day, Sea Level

(1)	Air Minimum Control Speed	80 KIAS
(2)	Intentional One Engine Inoperative Speed	95 KIAS
(3)	One Engine Inoperative Best Angle-of-Climb Speed (Wing Flaps UP)	95 KIAS
(4)	One Engine Inoperative Best Rate-of-Climb Speed (Wing Flaps UP)	104 KIAS

Figure 3-1

ENGINE INOPERATIVE PROCEDURES
ENGINE SECURING PROCEDURE

1. Throttle - CLOSE.
2. Mixture - IDLE CUT-OFF.
3. Propeller - FEATHER.
4. Fuel Selector - OFF (Feel For Detent).
5. Auxiliary Fuel Pump - OFF.
6. Magneto Switches - OFF.
7. Propeller Synchrophaser - OFF (Optional System).
8. Alternator - OFF.
9. Cowl Flap - CLOSE.

ENGINE FAILURE DURING TAKEOFF (Speed Below 95 KIAS or Gear Down)

1. Throttles - CLOSE IMMEDIATELY.
2. Brake or Land and Brake - AS REQUIRED.

ENGINE FAILURE AFTER TAKEOFF (Speed Above 95 KIAS with Gear Up or in Transit)

1. Mixtures - FULL RICH.
2. Propellers - FULL FORWARD.
3. Throttles - FULL FORWARD (39.0 Inches Hg.).
4. Landing Gear - CHECK UP.
5. Inoperative Engine:
   a. Throttle - CLOSE.
   b. Mixture - IDLE CUT-OFF.
   c. Propeller - FEATHER.

6. Establish Bank - 5° toward operative engine.
7. Climb To Clear 50-Foot Obstacle - 95 KIAS.
8. Climb At One Engine Inoperative Best Rate-of-Climb Speed - 104 KIAS.
9. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.
10. Cowl Flap - CLOSE (Inoperative Engine).
11. Inoperative Engine - SECURE as follows:
    a. Fuel Selector - OFF (Feel For Detent).
    b. Auxiliary Fuel Pump - OFF.
    c. Magneto Switches - OFF.
    d. Alternator - OFF.
12. As Soon As Practical - LAND.

ENGINE FAILURE DURING FLIGHT (Speed Above V_{MCA})

1. Inoperative Engine - DETERMINE.
2. Operative Engine - ADJUST as required.

Before Securing Inoperative Engine:

3. Fuel Flow - CHECK. If deficient, position auxiliary fuel pump to ON.
4. Fuel Selectors - MAIN TANKS (Feel For Detent).
5. Fuel Quantity - CHECK.
6. Oil Pressure and Oil Temperature - CHECK.
7. Magneto Switches - CHECK ON.
8. Mixture - ADJUST. Lean until manifold pressure begins to increase, then enrichen as power increases.

If Engine Does Not Start, Secure As Follows:

9. Inoperative Engine - SECURE.
    a. Throttle - CLOSE.
    b. Mixture - IDLE CUT-OFF.
    c. Propeller - FEATHER.
    d. Fuel Selector - OFF (Feel For Detent).
    e. Auxiliary Fuel Pump - OFF.
    f. Magneto Switches - OFF.
    g. Propeller Synchrophaser - OFF (Optional System).
    h. Alternator - OFF.
    i. Cowl Flap - CLOSE.
10. Operative Engine - ADJUST.
    a. Power - AS REQUIRED.
    b. Mixture - ADJUST for power.
    c. Fuel Selector - AS REQUIRED (Feel For Detent).
    d. Auxiliary Fuel Pump - ON.
    e. Cowl Flap - AS REQUIRED.
11. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.
12. Electrical Load - DECREASE to minimum required.
13. As Soon As Practical - LAND.

NOTE

Schedule fuel use such that an adequate amount of fuel is available in the operative engine main tank for landing. Crossfeed as required to maintain lateral balance within 120 pounds per side. When crossfeeding, maintain level flight, maintain altitude greater than 1000 feet AGL and position inoperative engine auxiliary fuel pump to LOW.

ENGINE FAILURE DURING FLIGHT (Speed Below V_{MCA})

1. Rudder - APPLY towards operative engine.
2. Power - REDUCE to stop turn.
3. Pitch Attitude - LOWER NOSE to accelerate above V_{MCA})
4. Inoperative Engine Propeller - FEATHER.
5. Operative Engine - INCREASE POWER as airspeed increases above V_{MCA}.
6. Inoperative Engine - SECURE.
7. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.
8. Operative Engine Cowl Flap - AS REQUIRED.

ENGINE INOPERATIVE LANDING

1. Fuel Selector - MAIN TANK (Feel For Detent).
2. Auxiliary Fuel Pump - ON (Operative Engine).
3. Alternate Air Control - IN.
4. Mixture - FULL RICH or lean as required for smooth operation.
5. Propeller Synchrophaser - OFF (Optional System).
6. Propeller - FULL FORWARD.
7. Approach - 108 KIAS with excessive altitude.
8. Landing Gear - DOWN within gliding distance of field.
9. Wing Flaps - DOWN when landing is assured.
10. Speed - DECREASE below 95 KIAS only if landing is assured.
11. Air Minimum Control Speed - 80 KIAS.

ENGINE INOPERATIVE GO-AROUND (Speed Above 95 KIAS)

WARNING

Level flight may not be possible for certain combinations of weight, temperature and altitude. In any event, do not attempt an engine inoperative go-around after wing flaps have been extended beyond 15°.

1. Throttle - FULL FORWARD (39.0 Inches Hg.).
2. Wing Flaps - UP.
3. Positive Rate-of-Climb - ESTABLISH.
4. Landing Gear - UP.
5. Cowl Flap - OPEN.
6. Climb at One Engine Inoperative Best Rate-of-Climb Speed - 104 KIAS.
7. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.

(ABBREVIATED PROCEDURES)

AIRSTART

Airplane Without Optional Propeller Unfeathering System:

1. Auxiliary Fuel Pump - CHECK OFF. If ON or LOW, purge engine by turning OFF auxiliary fuel pump, mixture to IDLE CUT-OFF, throttle full open, magneto switches OFF, and rotating engine 15 revolutions with starter.
2. Magneto Switches - ON.
3. Fuel Selector - MAIN TANK (Feel For Detent).
4. Throttle - FORWARD approximately one and one-half inches.
5. Mixture - FULL RICH then retard approximately two inches.
6. Propeller - FORWARD of detent.
7. Starter Button - PRESS.
8. Primer Switch - ACTIVATE.
9. Starter and Primer Switch - RELEASE when engine fires.
10. Auxiliary Fuel Pump - LOW.
11. Mixture - ADJUST for smooth engine operation.
12. Power - INCREASE after cylinder head temperature reaches 200°F with gradual mixture enrichment as power increases.
13. Cowl Flap - AS REQUIRED.
14. Alternator - ON.

Airplane With Optional Propeller Unfeathering System:

1. Auxiliary Fuel Pump - CHECK OFF. If ON or LOW, purge engine by turning OFF auxiliary fuel pump, mixture to IDLE CUT-OFF, throttle full open, magneto switches OFF, and rotating engine 15 revolutions with starter.
2. Magneto Switches - ON.
3. Fuel Selector - MAIN TANK (Feel For Detent).
4. Throttle - FORWARD approximately one and one-half inches.
5. Mixture - FULL RICH then retard approximately two inches.
6. Propeller - FULL FORWARD.
7. Propeller - RETARD to detent when propeller reaches 1000 RPM.
8. Auxiliary Fuel Pump - LOW.
9. Mixture - ADJUST for smooth engine operation.
10. Power - INCREASE after cylinder head temperature reaches 200°F with gradual mixture enrichment as power increases.
11. Cowl Flap - AS REQUIRED.
12. Alternator - ON.

BOTH ENGINES FAILURE DURING CRUISE FLIGHT

1. Wing Flaps - UP.
2. Landing Gear - UP.
3. Propellers - FEATHER.
4. Cowl Flaps - CLOSE.
5. Airspeed - 117 KIAS (See Figure 3-3).
6. Landing - Refer to FORCED LANDING (Complete Power Loss) in this section.

FIRE PROCEDURES

FIRE ON THE GROUND (Engine Start, Taxi And Takeoff With Sufficient Distance Remaining To Stop)

1. Throttles - CLOSE.
2. Brakes - AS REQUIRED.
3. Mixtures - IDLE CUT-OFF.
4. Battery - OFF (Use Gang Bar).
5. Magnetos - OFF (Use Gang Bar).
6. Evacuate airplane as soon as practical.

INFLIGHT WING OR ENGINE FIRE

1. Both Auxiliary Fuel Pumps - OFF.
2. Operative Engine Fuel Selector - MAIN TANK (Feel For Detent).
3. Emergency Crossfeed Shutoff - OFF (Pull Up).
4. Appropriate Engine - SECURE.
   a. Throttle - CLOSE.
   b. Mixture - IDLE CUT-OFF.
   c. Propeller - FEATHER.
   d. Fuel Selector - OFF (Feel For Detent).
   e. Cowl Flap - CLOSE.
   f. Magnetos - OFF.
   g. Propeller Synchrophaser - OFF (Optional System).
   h. Alternator - OFF.
5. Cabin Heater - OFF.
6. Land and evacuate airplane as soon as practical.

INFLIGHT CABIN ELECTRICAL FIRE OR SMOKE

1. Electrical Load - REDUCE to minimum required.
2. Fuel Selectors - MAIN TANK (Feel For Detent).
3. Emergency Crossfeed Shutoff - OFF (Pull Up).
4. Attempt to isolate the source of fire or smoke.
5. Wemacs - OPEN.
6. Cabin Air Controls - OPEN all vents, including windshield defrost. CLOSE if intensity of smoke increases.

CAUTION

Opening the foul weather windows or emergency exit window will create a draft in the cabin and may intensify a fire.

7. Land and evacuate airplane as soon as practical.

EMERGENCY DESCENT PROCEDURES

PREFERRED PROCEDURE

1. Throttles - IDLE.
2. Propellers - FULL FORWARD.
3. Mixtures - ADJUST for smooth engine operation.
4. Wing Flaps - UP.
5. Landing Gear - UP.
6. Moderate Bank - INITIATE.
7. Airspeed - 230 KIAS.

IN TURBULENT ATMOSPHERIC CONDITIONS

1. Throttles - IDLE.
2. Propellers - FULL FORWARD.
3. Mixtures - ADJUST for smooth engine operation.
4. Wing Flaps - DOWN 45°.
5. Landing Gear - DOWN.
6. Moderate Bank - INITIATE.
7. Airspeed - 149 KIAS.

EMERGENCY LANDING PROCEDURES

FORCED LANDING (With Power)

1. Landing Site - CHECK. Overfly site at 105 KIAS and 15° wing flaps.
2. Landing Gear - DOWN if surface is smooth and hard.
   a. Normal Landing - INITIATE. Keep nosewheel off ground as long as practical.
3. Landing Gear - UP if surface is rough or soft.
   a. Approach - 105 KIAS with 15° wing flaps.
   b. All Switches Except Magnetos - OFF.
   c. Mixtures - IDLE CUT-OFF.
   d. Magneto Switches - OFF.
   e. Fuel Selectors - OFF (Feel For Detent).
   f. Emergency Crossfeed Shutoff - OFF (Pull Up).
   g. Landing Attitude - NOSE HIGH.

FORCED LANDING (Complete Power Loss)

1. Mixtures - IDLE CUT-OFF.
2. Propellers - FEATHER.
3. Fuel Selectors - OFF (Feel For Detent).
4. Emergency Crossfeed Shutoff - OFF (Pull Up).
5. All Switches Except Battery - OFF.
6. Approach - 120 KIAS.
7. If Smooth and Hard Surface:
   a. Landing Gear - DOWN within gliding distance of field.
      (1) Landing Gear Switch - DOWN.
      (2) GEAR HYD Circuit Breaker - PULL.
      (3) Emergency Gear Extension T-Handle - PULL.
      (4) Gear Down Lights - ON; Unlocked Light - OFF.
      (5) Gear Warning Horn - CHECK.
   b. Wing Flaps - AS REQUIRED.
   c. Approach - 105 KIAS.
   d. Battery Switch - OFF.
   e. Normal Landing - INITIATE. Keep nosewheel off ground as long as practical.
8. If Rough or Soft Surface:
   a. Landing Gear - UP.
   b. Wing Flaps - DOWN 15°.
   c. Approach - 105 KIAS.
   d. Battery Switch - OFF.
   e. Landing Attitude - NOSE HIGH.

LANDING WITH FLAT MAIN GEAR TIRE

1. Landing Gear - Leave DOWN.
2. Fuel Selectors - SELECT main tank on same side as defective tire; feel for detent.
3. Fuel Selectors - MAIN TANKS (Feel For Detent) before landing.
4. Wind should be headwind or crosswind opposite the defective tire.
5. Wing Flaps - DOWN 45°.
6. In approach, align airplane with edge of runway opposite the defective tire, allowing room for a mild turn in the landing roll.
7. Land slightly wing low on the side of the inflated tire and lower the nosewheel to the ground immediately for positive steering.
8. Use full aileron in landing roll to lighten the load on the defective tire.
9. Apply brakes only on the inflated tire to minimize landing roll and maintain directional control.
10. Stop airplane to avoid further damage unless active runway must be cleared for other traffic.

LANDING WITH DEFECTIVE MAIN GEAR

1. Fuel Selectors - SELECT main tank on the same side as defective gear; feel for detent.
2. Fuel Selectors - MAIN TANKS (Feel For Detent) before landing.
3. Emergency Crossfeed Shutoff - OFF (Pull Up).
4. Wind - HEADWIND or crosswind opposite defective gear.
5. Landing Gear - DOWN.
6. Wing Flaps - DOWN 45°.
7. Approach - ALIGN AIRPLANE with the edge of runway opposite the defective landing gear.
8. Battery Switch - OFF.
9. Land wing low toward operative landing gear. Lower nosewheel immediately for positive steering.
10. Ground Loop - INITIATE into defective landing gear.
11. Mixtures - IDLE CUT-OFF.
12. Use full aileron in landing roll to lighten the load on the defective gear.
13. Apply brakes only on the operative landing gear to hold desired rate of turn and shorten landing roll.
14. Fuel Selectors - OFF (Feel For Detent).
15. Airplane - EVACUATE.

LANDING WITH FLAT NOSE GEAR TIRE

1. Landing Gear - Leave DOWN.
2. Passengers and Baggage - MOVE AFT.
3. Approach - 105 KIAS with 15° wing flaps.
4. Landing Attitude - NOSE HIGH.
5. Nose - HOLD OFF during landing roll.
6. Brakes - MINIMUM in landing roll.
7. Throttles - RETARD in landing roll.
8. Control Wheel - FULL AFT until airplane stops.
9. Minimize additional taxiing to prevent further damage.

LANDING WITH DEFECTIVE NOSE GEAR

1. If Smooth and Hard Surface:
   a. Baggage and Passengers - MOVE AFT.
   b. Landing Gear - DOWN.
   c. Approach - 105 KIAS with 15° wing flaps.
   d. All Switches Except Magnetos - OFF.
   e. Landing Attitude - NOSE HIGH.
   f. Mixtures - IDLE CUT-OFF.
   g. Magneto Switches - OFF.
   h. Nose - LOWER as speed dissipates.
2. If Rough or Sod Surface:
   a. Landing Gear - UP.
   b. Approach - 105 KIAS with 15° wing flaps.
   c. All Switches Except Magnetos - OFF.
   d. Landing Attitude - NOSE HIGH.
   e. Mixtures - IDLE CUT-OFF.
   f. Magneto Switches - OFF.
   g. Fuel Selectors - OFF (Feel For Detent).
   h. Emergency Crossfeed Shutoff - OFF (Pull Up).

LANDING WITHOUT FLAPS (0° Extension)

1. Mixtures - FULL RICH or lean as required for smooth operation.
2. Propellers - FULL FORWARD.
3. Fuel Selectors - MAIN TANKS (Feel For Detent).
4. Minimum Approach Speed - 108 KIAS (See Figure 5-25).
5. Landing Gear - DOWN.

DITCHING

1. Landing Gear - UP.
2. Approach - HEADWIND if high winds.
   PARALLEL to SWELLS if light wind and heavy swells.
3. Wing Flaps - DOWN 45°.
4. Power - AS REQUIRED (300 Feet Per Minute Descent).
5. Airspeed - 95 KIAS minimum.
6. Attitude - DESCENT ATTITUDE through touchdown.

FUEL SYSTEM EMERGENCY PROCEDURES

ENGINE-DRIVEN FUEL PUMP FAILURE

1. Fuel Selector - MAIN TANK (Feel For Detent).
2. Auxiliary Fuel Pump - ON.
3. Mixture - FULL RICH. Adjust fuel flow to coincide with power setting.
4. Cowl Flap - AS REQUIRED.
5. As Soon As Practical - LAND.
6. Crossfeed is unusable if the other engine is operating.

ELECTRICAL SYSTEM EMERGENCY PROCEDURES

ALTERNATOR FAILURE (Single)

1. Electrical Load - REDUCE.
2. If Circuit Breaker is tripped:
   a. Turn off affected alternator.
   b. Reset affected alternator circuit breaker.
   c. Turn on affected alternator switch.
   d. If circuit breaker reopens, turn off alternator.
3. If Circuit Breaker does not trip:
   a. Select affected alternator on voltammeter and monitor output.
   b. If output is normal and failure light remains on, disregard fail indication and have indicator checked after landing.
   c. If output is insufficient, turn off alternator and reduce electrical load to one alternator capacity.
   d. If complete loss of alternator output occurs, check field fuse and replace if necessary.
   e. If an intermittent light indication accompanied by voltammeter fluctuation is observed, turn off affected alternator and reduce load to one alternator capacity.
   f. Restrict load on remaining alternator to 80% of rated load.

ALTERNATOR FAILURE (Dual)

1. Electrical Load - REDUCE.
2. If Circuit Breakers are tripped:
   a. Turn off alternators.
   b. Reset circuit breakers.
   c. Turn on left alternator and monitor output on voltammeter.
   d. If alternator is charging, leave it on. Disregard failure light if still illuminated.
   e. If still inoperative, turn off left alternator.
   f. Repeat steps c through e for right alternator.
   g. If circuit breakers reopen, prepare to terminate flight.
3. If Circuit Breakers have not tripped:
   a. Turn off alternators.
   b. Check field fuses and replace as required.
   c. Turn on left alternator and monitor output on voltammeter.
   d. If alternator is charging, leave it on. Disregard failure light if still illuminated.
   e. If still inoperative, turn off left alternator.
   f. Repeat steps c through e for right alternator.
   g. If both still inoperative, turn off alternators and turn on emergency power alternator field switch.
   h. Repeat steps c through e for each alternator.
   i. If still inoperative, turn off alternators, nonessential electrical items and prepare to terminate flight.

AVIONICS BUS FAILURE

1. Avionics Bus Switch - OFF.
2. Emergency Power Avionics Bus Switch - ON.

LANDING GEAR EMERGENCY PROCEDURES

HYD PRESS LIGHT REMAINS ILLUMINATED AFTER GEAR CYCLE

1. Landing Gear Switch - RAPIDLY RECYCLE.
2. If HYD PRESS light still illuminated:
   a. Landing Gear - DOWN.
   b. GEAR HYD Circuit Breaker - PULL.
   c. If HYD PRESS light remains illuminated - LAND as soon as practical to prevent damage to the hydraulic systems and/or components.

LANDING GEAR DOWN AND LOCKED LIGHT ILLUMINATED WITH GEAR HANDLE UP AND HYD PRESS LIGHT OUT

1. Perform "LANDING GEAR WILL NOT EXTEND HYDRAULICALLY" Checklist.

LANDING GEAR WILL NOT EXTEND HYDRAULICALLY

1. Airspeed - 130 KIAS or less.
2. Landing Gear Switch - DOWN.
3. GEAR HYD Circuit Breaker - PULL.
4. Emergency Gear Extension T-Handle - PULL.
5. Gear Down Lights - ON; Unlocked Light - OFF.
6. If Main Gear does not lock down - YAW AIRPLANE. Airloads will lock main gear down if uplocks have released.
7. Gear Warning Horn - CHECK.
8. As soon as practical - LAND

CAUTION

The landing gear cannot be retracted in flight once the emergency gear extension T-handle has been pulled. Ground servicing is required.

LANDING GEAR WILL NOT RETRACT HYDRAULICALLY

1. Landing Gear Switch - DOWN.
2. Gear Down Lights - ON; Unlocked Light - OFF.
3. Gear Warning Horn - CHECK.
4. As soon as practical - LAND.

FLIGHT INSTRUMENTS EMERGENCY PROCEDURES

VACUUM PUMP FAILURE (Attitude and Directional Gyros)

1. Failure indicated by left or right red failure button exposed on vacuum gage.
2. Automatic valve will select operative source.
3. Vacuum Pressure - CHECK proper vacuum from operative source.

OBSTRUCTION OR ICING OF STATIC SOURCE:

1. Alternate Static Source - OPEN.
2. Excess Altitude and Airspeed - MAINTAIN to compensate for change in calibration. (See Figures 5-2 and 5-4)

AIR INLET OR FILTER ICING EMERGENCY PROCEDURES

1. Alternate Air Control(s) - PULL OUT.
2. Propeller(s) - INCREASE (2550 RPM for normal cruise).
3. Mixture(s) - LEAN as required.

PROPELLER SYNCHROPHASER

ENGINE INOPERATIVE PROCEDURE

1. Propeller Synchrophaser - OFF (Optional System).

SYNCHROPHASER FAILURE:

1. Propeller Synchrophaser - OFF (Optional System).
2. Propeller Synchrophaser Circuit Breaker - PULL (Optional System).

EMERGENCY EXIT WINDOW OPENING

1. Emergency Release Handle Plastic Cover - PULL OFF.
2. Safety Clip - PUSH FORWARD.
3. Emergency Release Handle - PULL FULL AFT.
4. Emergency Exit Window - PUSH OUT and UP until the uplock brace holds the window open.

SPINS

1. Throttles - CLOSE IMMEDIATELY.
2. Ailerons - NEUTRALIZE.
3. Rudder - HOLD FULL RUDDER opposite the direction of rotation.
4. Control Wheel - FORWARD BRISKLY, 1/2 turn of spin after applying full rudder.
5. Inboard Engine - INCREASE POWER to slow rotation (if necessary).

After rotation has stopped:

6. Rudder - NEUTRALIZE.
7. Inboard Engine (if used) - DECREASE POWER to equalize engines.
8. Control Wheel - PULL to recover from resultant dive. Apply smooth steady control pressure.

AMPLIFIED EMERGENCY PROCEDURES

NOTE

A complete knowledge of the procedures set forth in this section will enable the pilot to cope with various emergencies that can be encountered; however, this does not diminish the fact that the primary responsibility of the pilot is to maintain control at all times. Good judgment and precise action are essential and can only be developed through frequent practice of emergency and simulated engine inoperative procedures. The pilot must have a thorough knowledge of all emergency procedures so that in the event of an emergency, reaction will be precise and done with confidence. This is required so the pilot can cope with the demands of an emergency situation.

AIRSPEEDS FOR SAFE OPERATION

The most critical time for an engine failure condition in a multi-engine airplane is during a two or three second period late in the takeoff run while the airplane is accelerating to a safe engine failure speed. A detailed knowledge of recommended engine inoperative airspeeds is essential for safe operation of the airplane.

The airspeed indicator is marked with a red radial at the air minimum control speed and a blue radial at the one engine inoperative best rate-of-climb speed to facilitate instant recognition. The following paragraphs present a detailed discussion of the problems associated with engine failures during takeoff.

AIR MINIMUM CONTROL SPEED

The multi-engine airplane must reach the air minimum control speed (80 KIAS) before full control deflections can counteract the adverse rolling and yawing tendencies associated with one engine inoperative and full power operation on the other engine. This speed is indicated by a red radial on the airspeed indicator.

INTENTIONAL ONE ENGINE INOPERATIVE SPEED

Although the airplane is controllable at the air minimum control speed, the airplane performance is so far below optimum that continued flight near the ground is improbable. A more suitable intentional one engine inoperative speed is 95 KIAS. At this speed, altitude can be maintained more easily while the landing gear is being retracted and the propeller is being feathered.

ONE ENGINE INOPERATIVE BEST ANGLE-OF-CLIMB SPEED

The one engine inoperative best angle-of-climb speed becomes important when there are obstacles ahead on takeoff. Once the one engine inoperative best angle-of-climb speed is reached, altitude becomes more important than airspeed until the obstacle is cleared. The one engine inoperative best angle-of-climb speed is approximately 95 KIAS with wing flaps and landing gear up.

ONE ENGINE INOPERATIVE BEST RATE-OF-CLIMB SPEED

The one engine inoperative best rate-of-climb speed becomes important when there are no obstacles ahead on takeoff, or when it is difficult to maintain or gain altitude in one engine inoperative emergencies. The one engine inoperative best rate-of-climb speed is 104 KIAS with wing flaps and landing gear up. This speed is indicated by a blue radial on the airspeed indicator.

The variations of wing flaps up one engine inoperative best rate-of-climb speed with altitude are shown in Section 5. For one engine inoperative best climb performance, the wings should be banked 5° toward the operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.

ENGINE INOPERATIVE PROCEDURES

ENGINE SECURING PROCEDURE

1. Throttle - CLOSE.
2. Mixture - IDLE CUT-OFF.
3. Propeller - FEATHER.
4. Fuel Selector - OFF (Feel For Detent).
5. Auxiliary Fuel Pump - OFF.
6. Magneto Switches - OFF.
7. Propeller Synchrophaser - OFF (Optional System).
8. Alternator - OFF.
9. Cowl Flap - CLOSE.

ENGINE FAILURE DURING TAKEOFF (Speed Below 95 KIAS or Gear Down)

1. Throttles - CLOSE IMMEDIATELY.
2. Brake or Land and Brake - AS REQUIRED.

NOTE

The distance required for the airplane to be accelerated from a standing start to 95 KIAS on the ground, and to decelerate to a stop with heavy braking, is presented in the Accelerate Stop Distance Chart in Section 5 for various combinations of conditions.

ENGINE FAILURE AFTER TAKEOFF (Speed Above 95 KIAS with Gear Up or in Transit)

1. Mixtures - FULL RICH.
2. Propellers - FULL FORWARD.
3. Throttles - FULL FORWARD (39.0 Inches Hg.).
4. Landing Gear - CHECK UP.
5. Inoperative Engine:
   a. Throttle - CLOSE.
   b. Mixture - IDLE CUT-OFF.
   c. Propeller - FEATHER.
6. Establish Bank - 5° toward operative engine.
7. Climb to Clear 50-Foot Obstacle - 95 KIAS.

8. Climb at One Engine Inoperative Best Rate-of-Climb Speed - 104 KIAS.
9. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.
10. Cowl Flap - CLOSE (Inoperative Engine).
11. Inoperative Engine - SECURE as follows:
    a. Fuel Selector - OFF (Feel For Detent).
    b. Auxiliary Fuel Pump - OFF.
    c. Magneto Switches - OFF.
    d. Alternator Switch - OFF.
12. As Soon as Practical - LAND.

Upon engine failure after reaching 95 KIAS on takeoff, the multi-engine pilot has a significant advantage over a single-engine pilot, for he has a choice of stopping or continuing the takeoff. This would be similar to the choice facing a single-engine pilot who has suddenly lost slightly more than half of his takeoff power. In this situation, the single-engine pilot would be extremely reluctant to continue the takeoff if he had to climb over obstructions. However, if the failure occurred at an altitude as high or higher than surrounding obstructions, he would feel free to maneuver for a landing back at the airport.

Fortunately, the airplane accelerates through this "area of decision" in just a few seconds. However, to make an intelligent decision in this type of emergency, one must consider the field length, obstruction height, field elevation, air temperature, headwind, and takeoff weight. The flight paths illustrated in Figure 3-2 indicate that the "go no-go area of decision" is bounded by: (1) the point at which 95 KIAS is reached and (2) the point where the obstruction altitude is reached. An engine failure in this area requires an immediate decision. Beyond this area, the airplane, within the limitations of one engine inoperative climb performance shown in Section 5, may be maneuvered to a landing back at the airport.

ENGINE FAILURE DURING TAKEOFF GO NO-GO DECISION

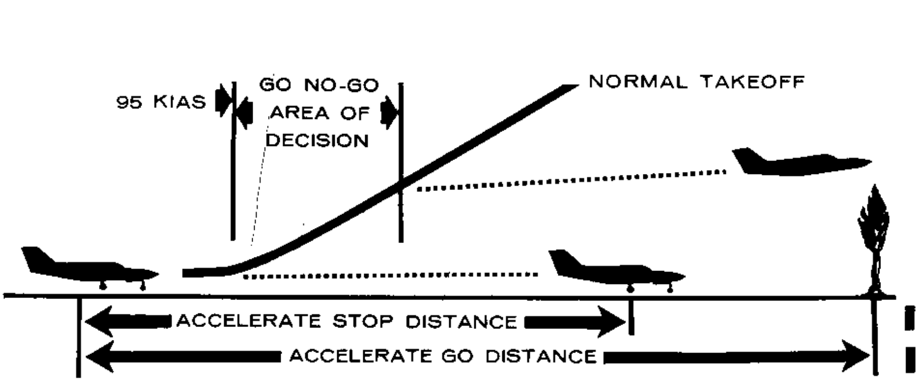


Figure 3-2

At sea level standard day, with zero wind and 6850 pounds weight, the distance to accelerate to 95 KIAS and stop is 3731 feet, while the total unobstructed distance required to takeoff and climb over a 50-foot obstacle after an engine failure at 95 KIAS is 3058 feet. This total distance over an obstacle can be reduced slightly under more favorable conditions of weight, headwind, or obstruction height. However, it is recommended that in most cases it would be better to discontinue the takeoff, since any slight mismanagement of one engine inoperative procedure would more than offset the small distance advantage offered by continuing the takeoff. Still higher field elevations will cause the engine failure takeoff distance to lengthen disproportionately until the altitude is reached where a successful takeoff is improbable unless the airspeed and height above the runway at engine failure are great enough to allow a slight deceleration and altitude loss while the airplane is being prepared for an engine inoperative climb.

During engine inoperative takeoff procedures over an obstacle, only one condition presents any appreciable advantage; this is headwind. A decrease of approximately 2% in ground distance required to clear a 50-foot obstacle can be gained for each 4 knots of headwind. Excessive speed above one engine inoperative best rate-of-climb speed at engine failure is not nearly as advantageous as one might expect since deceleration is rapid and ground distance is used up quickly at higher speeds while the airplane is being cleaned up for climb. However, the extra speed is important for controllability.

The following facts should be used as a guide at the time of engine failure during takeoff: (1) discontinuing a takeoff upon engine failure is advisable under most circumstances; (2) altitude is more valuable to safety after takeoff than is airspeed in excess of the one engine inoperative best rate-of-climb speed since excess airspeed is lost much more rapidly than is altitude; (3) climb or continued level flight at moderate altitude is improbable with the landing gear extended and the propeller windmilling; (4) in no case should the airspeed be allowed to fall below the intentional one engine inoperative speed, even through altitude is lost, since this speed will always provide a better chance of climb, or a smaller altitude loss, than any lesser speed; and (5) if the requirement for an immediate climb is not present, allow the airplane to accelerate to the one engine inoperative best rate-of-climb speed as this is the optimum climb speed and will always provide the best chance of climb or least altitude loss.

WARNING

The propeller on the inoperative engine must be feathered, landing gear retracted and wing flaps up or continued flight may be impossible.

ENGINE OVERSPEED

Should an overspeed condition occur, the pilot should reduce airspeed as quickly as possible by closing both throttles. On reaching an airspeed below 120 KIAS and above the one engine inoperative best rate-of-climb speed (Blue Radial), set the propeller control on the overspeeding engine for feather. If the propeller will not feather, the power on the normally operating engine should be advanced to maximum and the power on the over-speeding engine should be advanced to 50 RPM below the maximum allowable RPM (Red Line). Maintain the one engine inoperative best rate-of-climb speed (Blue Radial) and land as soon as practical. This will provide more than zero thrust at altitudes up to approximately 10,000 feet. During landing, the application of partial throttle on the malfunctioning engine (within limits of the tachometer red line) will minimize asymmetrical thrust.

ENGINE FAILURE DURING FLIGHT
(Speed Above Air Minimum Control Speed)

1. Inoperative Engine - DETERMINE. Idle engine same side as idle foot.
2. Operative Engine - ADJUST as required.

Before Securing Inoperative Engine:

3. Fuel Flow - CHECK. If deficient, position auxiliary fuel pump switch to ON.
4. Fuel Selectors - MAIN TANKS (Feel For Detent).
5. Fuel Quantity - CHECK. Switch to opposite MAIN TANK if necessary.
6. Oil Pressure and Oil Temperature - CHECK. Shutdown engine if oil pressure is low.
7. Magneto Switches - CHECK ON.
8. Mixture - ADJUST. Lean until manifold pressure begins to increase then enrichen as power increases.

If Engine Does Not Start, Secure As Follows:

9. Inoperative Engine - SECURE.
   a. Throttle - CLOSE.
   b. Mixture - IDLE CUT-OFF.
   c. Propeller - FEATHER.
   d. Fuel Selector - OFF (Feel For Detent).
   e. Auxiliary Fuel Pump - OFF.
   f. Magneto Switches - OFF.
   g. Propeller Synchrophaser - OFF (Optional System).
   h. Alternator Switch - OFF.
   i. Cowl Flap - CLOSE.
10. Operative Engine - ADJUST.
    a. Power - AS REQUIRED.
    b. Mixture - ADJUST for power.
    c. Fuel Selector - AS REQUIRED (Feel For Detent).
    d. Auxiliary Fuel Pump - ON.
    e. Cowl Flap - AS REQUIRED.
11. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.
12. Electrical Load - DECREASE to minimum required.

13. As Soon As Practical - LAND.

NOTE

Schedule fuel use such that an adequate amount of fuel is available in the operative engine main tank for landing. Crossfeed as required to maintain lateral balance within 120 pounds per side. When crossfeeding, maintain level flight, maintain altitude greater than 1000 feet AGL and position inoperative engine auxiliary fuel pump to LOW.

ENGINE FAILURE DURING FLIGHT (Speed Below Air Minimum Control Speed)

1. Rudder - APPLY towards operative engine.
2. Power - REDUCE to stop turn.
3. Pitch Attitude - LOWER NOSE to accelerate above V_{MCA}.
4. Inoperative Engine Propeller - FEATHER.
5. Operative Engine - INCREASE POWER as airspeed increases above air minimum control speed.
6. Inoperative Engine - SECURE.
7. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.
8. Operative Engine Cowl Flap - AS REQUIRED.

ENGINE INOPERATIVE LANDING:

1. Fuel Selector - MAIN TANK (Feel For Detent).
2. Auxiliary Fuel Pump - ON (Operative Engine).
3. Alternate Air Control - IN.
4. Mixture - FULL RICH or lean as required for smooth operation.
5. Propeller Synchrophaser - OFF (Optional System).
6. Propeller - FULL FORWARD.
7. Approach at 108 KIAS with excessive altitude.
8. Landing Gear - DOWN within gliding distance of field.
9. Wing Flaps - DOWN when landing is assured.
10. Decrease speed below 95 KIAS only if landing is assured.
11. Air Minimum Control Speed - 80 KIAS.

ENGINE INOPERATIVE GO-AROUND (Speed Above 95 KIAS)

WARNING

Level flight may not be possible for certain combinations of weight, temperature and altitude. In any event, do not attempt an engine inoperative go-around after wing flaps have been extended beyond 15°.

1. If absolutely necessary and speed is above 95 KIAS, increase engine speed to 2700 RPM and apply full throttle.
2. Wing Flaps - UP (If Extended).
3. Positive Rate-of-Climb - ESTABLISH.
4. Landing Gear - UP.
5. Cowl Flap - OPEN.
6. Climb at 104 KIAS (95 KIAS With Obstacles Directly Ahead).
7. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.

AIRSTART (After Feathering)

Airplane Without Optional Propeller Unfeathering System:

1. Auxiliary Fuel Pump - CHECK OFF. If ON or LOW, purge engine by turning OFF auxiliary fuel pump, mixture to IDLE CUT-OFF, throttle full open, magneto switches OFF, and rotating engine 15 revolutions with starter.
2. Magneto Switches - ON.
3. Fuel Selector - MAIN TANK (Feel For Detent).
4. Throttle - FORWARD approximately one and one-half inches.
5. Mixture - FULL RICH then retard approximately two inches.
6. Propeller - FORWARD of detent.
7. Starter Button - PRESS.
8. Primer Switch - ACTIVATE.
9. Starter and Primer Switch - RELEASE when engine fires.
10. Auxiliary Fuel Pump - LOW.
11. Mixture - ADJUST for smooth engine operation.
12. Power - INCREASE after cylinder head temperature reaches 200°F with gradual mixture enrichment as power increases.
13. Cowl Flap - AS REQUIRED.
14. Alternator - ON.

Airplane With Optional Propeller Unfeathering System:

1. Auxiliary Fuel Pump - CHECK OFF. If ON or LOW, purge engine by turning OFF auxiliary fuel pump, mixture to IDLE CUT-OFF, throttle full open, magneto switches OFF, and rotating engine 15 revolutions with starter.
2. Magneto Switches - ON.
3. Fuel Selector - MAIN TANK (Feel For Detent).
4. Throttle - FORWARD approximately one and one-half inches.
5. Mixture - FULL RICH then retard approximately two inches.
6. Propeller - FULL FORWARD.

> NOTE
>
> The propeller will automatically windmill when the propeller lever is moved out of the FEATHER position.

7. Propeller - RETARD to detent when propeller reaches 1000 RPM.
8. Auxiliary Fuel Pump - LOW.
9. Mixture - ADJUST for smooth engine operation.
10. Power - INCREASE after cylinder head temperature reaches 200°F with gradual mixture enrichment as power increases.
11. Cowl Flap - AS REQUIRED.
12. Alternator - ON.

BOTH ENGINES FAILURE DURING CRUISE FLIGHT

1. Wing Flaps - UP.
2. Landing Gear - UP.
3. Propellers - FEATHER.
4. Cowl Flaps - CLOSE.
5. Airspeed - 117 KIAS (See Figure 3-3).

> **NOTE**
>
> Vacuum instruments will be inoperative. Electrical power available will be limited to the amount of energy contained in the battery.

6. Landing - Refer to FORCED LANDING (Complete Power Loss) in this section.

MAXIMUM GLIDE

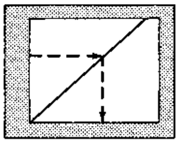
In the event of an all engines failure condition, maximum gliding distance can be obtained by feathering both propellers, and maintaining approximately 117 KIAS with landing gear and wing flaps up. The speed which provides the "absolute maximum" glide distance varies with weight as shown in Figure 3-3.

MAXIMUM GLIDE

CONDITIONS:
1. Landing Gear - UP.
2. Wing Flaps - UP.
3. Propellers - FEATHERED.
4. Cowl Flaps - CLOSED.
5. Best Glide Speed.
6. Zero Wind.

BEST GLIDE SPEED

WEIGHT POUNDS	KIAS
6850	117
6500	114
6000	110
5500	105
5000	100



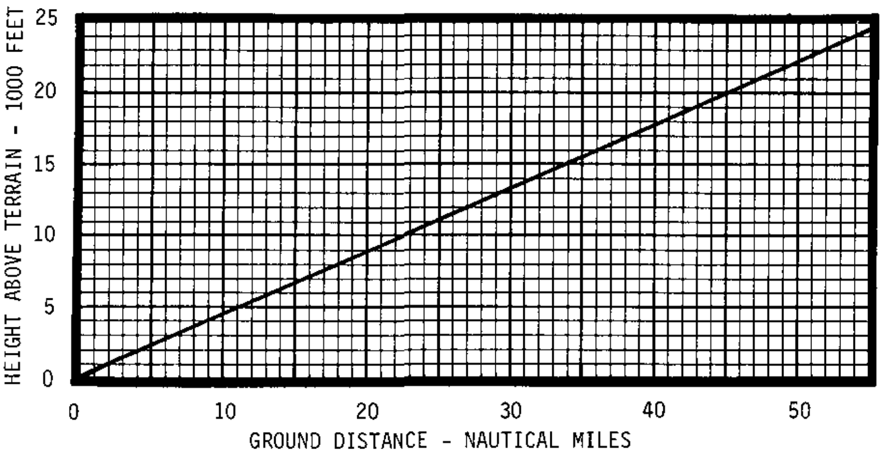


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Figure 3-3

FIRE PROCEDURES

Refer to Section 9 if Fire Detection and Extinguishing System is installed.

FIRE ON THE GROUND (Engine Start, Taxi And Takeoff With Sufficient Distance Remaining To Stop)

1. Throttles - CLOSE.
2. Brakes - AS REQUIRED.
3. Mixtures - IDLE CUT-OFF.
4. Battery - OFF (Use Gang Bar).
5. Magnetos - OFF (Use Gang Bar).
6. Evacuate airplane as soon as practical.

INFLIGHT WING OR ENGINE FIRE

1. Both Auxiliary Fuel Pumps - OFF.
2. Operative Engine Fuel Selector - MAIN TANK (Feel For Detent).
3. Emergency Crossfeed Shutoff - OFF (Pull Up).
4. Appropriate Engine - SECURE.
   a. Throttle - CLOSE.
   b. Mixture - IDLE CUT-OFF.
   c. Propeller - FEATHER.
   d. Fuel Selector - OFF (Feel For Detent).
   e. Cowl Flap - CLOSE.
   f. Magnetos - OFF.
   g. Propeller Synchrophaser - OFF (Optional System).
   h. Alternator - OFF.
5. Cabin Heater - OFF.
6. Land and evacuate airplane as soon as practical.

INFLIGHT CABIN ELECTRICAL FIRE OR SMOKE

1. Electrical Load - REDUCE to minimum required.
2. Fuel Selectors - MAIN TANK (Feel For Detent).
3. Emergency Crossfeed Shutoff - OFF (Pull Up).
4. Attempt to isolate the source of fire or smoke.
5. Wemacs - OPEN.
6. Cabin Air Controls - OPEN all vents including windshield defrost. CLOSE if intensity of smoke increases.

CAUTION

Opening the foul weather windows or emergency exit window will create a draft in the cabin and may intensify a fire.

7. Land and evacuate airplane as soon as practical.

SUPPLEMENTARY INFORMATION CONCERNING AIRPLANE FIRES

With the use of modern installation techniques and material, the probability of an airplane fire occurring in your airplane is extremely remote. However, in the event a fire is encountered, the following information will be helpful in dealing with the emergency as quickly and safely as possible.

The preflight checklist is provided to aid the pilot in detecting conditions which could contribute to an airplane fire. As a fire requires both fuel and an ignition source, close preflight inspection should be given to the engine compartment and wing leading edge and lower surfaces. Leaks in the fuel system, oil system, or exhaust system can lead to a ground or inflight fire.

NOTE

Flight should not be attempted with known fuel, oil or exhaust leaks. The presence of fuel, unusual oil or exhaust stains may be an indication of system leaks and should be corrected prior to flight.

Fires originating in flight must be controlled as quickly as possible in an attempt to prevent major structural damage. Both auxiliary fuel pumps should be turned off to reduce pressure on the total fuel system (each auxiliary pump pressurizes a crossfeed line to the opposite fuel selector). The engine on the wing in which the fire exists should be shut down and its fuel selector positioned to OFF even though the fire may not have originated in the fuel system. The cabin heater draws fuel from the crossfeed system and should also be turned off. Descent for landing should be initiated immediately.

An open window produces a low pressure in the cabin. To avoid drawing the fire into the cabin, the windows should be kept closed. This condition is aggravated with the landing gear and flaps extended. Therefore, the pilot should lower the gear as late in the landing approach as possible. A no-flap landing should also be attempted if practical.

A fire or smoke in the cabin should be controlled by identifying and shutting down the faulty system. Smoke may be removed by opening the cabin air controls and wemacs. If the smoke increases in intensity when the air controls are opened, they should be closed as this indicates a possible fire in the heater or nose compartment. When the smoke is intense, the pilot may choose to expel the smoke through the foul weather windows. The foul weather windows should be closed immediately if the fire becomes more intense when the windows are opened.

EMERGENCY DESCENT

PREFERRED PROCEDURE

1. Throttles - IDLE.
2. Propellers - FULL FORWARD.
3. Mixtures - ADJUST for smooth engine operation.
4. Wing Flaps - UP.
5. Landing Gear - UP.
6. Moderate Bank - INITIATE until descent attitude has been established.
7. Airspeed - 230 KIAS.

IN TURBULENT ATMOSPHERIC CONDITIONS

1. Throttles - IDLE.
2. Propellers - FULL FORWARD.
3. Mixtures - ADJUST for smooth engine operation.
4. Wing Flaps - DOWN 45°.
5. Landing Gear - DOWN.
6. Moderate Bank - INITIATE until descent attitude has been established.
7. Airspeed - 149 KIAS.

EMERGENCY LANDING PROCEDURES

FORCED LANDING (With Power)

1. Drag over selected field with wing flaps 15° and 105 KIAS noting type of terrain and obstructions.
2. Plan a wheels-down landing if surface is smooth and hard.
   a. Execute a normal landing, keeping nosewheel off ground until speed is decreased.
3. If terrain is rough or soft, plan a wheels-up landing as follows:
   a. Approach at 105 KIAS with 15° wing flaps.
   b. All Switches Except Magneto Switches - OFF.
   c. Mixtures - IDLE CUT-OFF.
   d. Magneto Switches - OFF.
   e. Fuel Selectors - OFF (Feel For Detent).
   f. Emergency Crossfeed Shutoff - OFF (Pull Up).
   g. Land in a slightly nose-high attitude.

NOTE

On smooth sod with landing gear retracted, the airplane will slide straight ahead about 800 feet with very little damage.

FORCED LANDING (Complete Power Loss)

1. Mixtures - IDLE CUT-OFF.
2. Propellers - FEATHER.
3. Fuel Selectors - OFF (Feel For Detent).
4. Emergency Crossfeed Shutoff - OFF (Pull Up).
5. All Switches Except Battery - OFF.
6. Approach - 120 KIAS.
7. If Smooth and Hard Surface:
   a. Landing Gear - DOWN within gliding distance of field.
      (1) Landing Gear Switch - DOWN.
      (2) GEAR HYD Circuit Breaker - PULL.
      (3) Emergency Gear Extension T-Handle - PULL.
      (4) Gear Down Lights - ON; Unlocked Light - OFF.
      (5) Gear Warning Horn - CHECK.
   b. Wing Flaps - AS REQUIRED.
   c. Approach - 105 KIAS.
   d. Battery Switch - OFF.
   e. Normal Landing - INITIATE. Keep nosewheel off ground as long as practical.
8. If Rough or Soft Surface:
   a. Landing Gear - UP.
   b. Wing Flaps - DOWN 15°.
   c. Approach - 105 KIAS.
   d. Battery Switch - OFF.
   e. Landing Attitude - NOSE HIGH.

> **NOTE**
>
> On smooth sod with landing gear retracted, the airplane will slide straight ahead about 800 feet with very little damage.

LANDING WITH FLAT MAIN GEAR TIRE

If a blowout occurs during takeoff, proceed as follows:

1. Landing Gear - Leave DOWN.

> **NOTE**
>
> Do not attempt to retract the landing gear if a main gear tire blowout occurs. The main gear tire may be distorted enough to bind the main gear strut within the wheel well and prevent later extension.

2. Fuel Selectors - Turn to main tank on same side as defective tire and feel for detent. Proceed to destination to reduce fuel load.

NOTE

> Fuel should be used from this tank first, to lighten the load on the wing, prior to attempting a landing if inflight time permits. However, an adequate supply of fuel should be left in this tank so that it may be used during landing.

3. Fuel Selectors - Left Engine - LEFT MAIN (Feel For Detent).
   Right Engine - RIGHT MAIN (Feel For Detent).
4. Select a runway with a crosswind from the side opposite the defective tire, if a crosswind landing is required.
5. Wing Flaps - DOWN 45°.
6. In approach, align airplane with edge of runway opposite the defective tire, allowing room for a mild turn in the landing roll.
7. Land slightly wing-low on the side of inflated tire and lower nosewheel to ground immediately for positive steering.
8. Use full aileron in landing roll to lighten load on defective tire.
9. Apply brakes only on the inflated tire to minimize landing roll and maintain directional control.
10. Stop airplane to avoid further damage unless active runway must be cleared for other traffic.

LANDING WITH DEFECTIVE MAIN GEAR

1. Fuel Selectors - Turn to main tank on same side as defective gear and feel for detent. Proceed to destination to reduce fuel load.

NOTE

> Fuel should be used from this tank first, to lighten the load on the wing, prior to attempting a landing if in-flight time permits. However, an adequate supply of fuel should be left in this tank so that it may be used during landing.

2. Fuel Selectors - Left Engine - LEFT MAIN (Feel For Detent).
   Right Engine - RIGHT MAIN (Feel For Detent).
3. Emergency Crossfeed Shutoff - OFF (Pull Up).
4. Select a wide, hard surface runway, or if necessary, a wide sod runway. Select a runway with crosswind from the side opposite the defective landing gear, if a crosswind landing is necessary.
5. Landing Gear - DOWN.
6. Wing Flaps - DOWN 45°.
7. In approach, align airplane with edge of runway opposite the defective landing gear, allowing room for a ground-loop in landing roll.
8. Battery Switch - OFF.
9. Land slightly wing-low toward the operative landing gear and lower the nosewheel immediately for positive steering.
10. Start moderate ground-loop into defective landing gear until airplane stops.

11. Mixtures - IDLE CUT-OFF.
12. Use full aileron in landing roll to lighten the load on the defective landing gear.
13. Apply brakes only on the operative landing gear to maintain desired rate of turn and minimize the landing roll.
14. Fuel Selectors - OFF (Feel For Detent).
15. Evacuate the airplane as soon as it stops.

LANDING WITH FLAT NOSE GEAR TIRE

If a blowout occurred on the nose gear tire during takeoff, proceed as follows:

1. Landing Gear - Leave DOWN.

NOTE

Do not attempt to retract the landing gear if a nose gear tire blowout occurs. The nose gear tire may be distorted enough to bind the nosewheel strut within the wheel well and prevent later extension.

2. Move disposable load to baggage area and passengers to available rear seat space. Do not exceed aft flight center of gravity limits.
3. Approach at 105 KIAS with 15° wing flaps.
4. Land in a nose-high attitude with or without power.
5. Maintain back pressure on control wheel to hold nosewheel off the ground in landing roll.
6. Use minimum braking in landing roll.
7. Throttles - RETARD in landing roll.
8. As landing roll speed diminishes, hold control wheel fully aft until airplane is stopped.
9. Avoid further damage by holding additional taxi to a minimum.

LANDING WITH DEFECTIVE NOSE GEAR

1. If Smooth and Hard Surface:
   a. Move disposable load to baggage area and passengers to available rear seat space. Do not exceed aft flight center of gravity limits.
   b. Landing Gear - DOWN.
   c. Approach at 105 KIAS with 15° wing flaps.
   d. All Switches Except Magneto Switches - OFF.
   e. Land in a slightly nose-high attitude.
   f. Mixtures - IDLE CUT-OFF.
   g. Magneto Switches - OFF.
   h. Hold nose off throughout ground roll. Lower gently as speed dissipates.

2. If Rough or Sod Surface:

NOTE

This procedure will produce a minimum amount of airplane damage and is recommended for short, rough or uncertain field conditions where passenger safety, rather than minimum airplane damage is the prime consideration.

a. Landing Gear - UP.
b. Approach at 105 KIAS with 15° wing flaps.
c. All Switches Except Magneto Switches - OFF.
d. Land in a slightly nose-high attitude.
e. Mixtures - IDLE CUT-OFF.
f. Magneto Switches - OFF.
g. Fuel Selectors - OFF (Feel For Detent).
h. Emergency Crossfeed Shutoff - OFF (Pull Up).

LANDING WITHOUT FLAPS (0° Extension)

1. Mixtures - FULL RICH or lean as required for smooth operation.
2. Propellers - FULL FORWARD.
3. Fuel Selectors - MAIN TANKS (Feel For Detent).
4. Minimum Approach Speed - 108 KIAS (See Figure 5-25).
5. Landing Gear - DOWN.

DITCHING

1. Landing Gear - UP.
2. Plan approach into wind if winds are high and seas are heavy. With heavy swells and light wind, land parallel to swells, being careful not to allow wing tips to hit first.
3. Wing Flaps - DOWN 45°.
4. Carry sufficient power to maintain approximately 300 feet per minute rate-of-descent.
5. Airspeed - 95 KIAS at 6850 pounds weight. Reduce airplane weight by fuel burn-off as much as practical.
6. Maintain a continuous descent until touchdown to avoid flaring and touching down tail-first, pitching forward sharply, and decelerating rapidly. Strive for initial contact at fuselage area below rear cabin section (point of maximum longitudinal curvature of fuselage).

NOTE

The airplane has not been flight tested in actual ditchings, thus the above recommended procedure is based entirely on the best judgment of Cessna Aircraft Company.

FUEL SYSTEM EMERGENCY PROCEDURES

ENGINE-DRIVEN FUEL PUMP FAILURE

1. Fuel Selector - MAIN TANK (Feel For Detent).
2. Auxiliary Fuel Pump - ON.
3. Mixture - FULL RICH. Adjust fuel flow to coincide with power setting.
4. Cowl Flap - AS REQUIRED.
5. As Soon as Practical - LAND.
6. Crossfeed is unusable if the other engine is operating.

NOTE

If both an engine-driven fuel pump and an auxiliary fuel pump fail on the same side of the airplane, the failing engine cannot be supplied with fuel from the opposite main tank since that auxiliary fuel pump will operate on the low pressure setting as long as the corresponding engine-driven fuel pump is operative.

ELECTRICAL SYSTEM EMERGENCY PROCEDURES

ALTERNATOR FAILURE (Single)

Indicated By Illumination Of f Failure Light

1. Electrical Load - REDUCE.
2. If Circuit Breaker is tripped:
   a. Turn off affected alternator.
   b. Reset affected alternator circuit breaker.
   c. Turn on affected alternator switch.
   d. If circuit breaker reopens, turn off alternator.
3. If Circuit Breaker does not trip:
   a. Select affected alternator on voltammeter and monitor output.
   b. If output is normal and failure light remains on, disregard fail indication and have indicator checked after landing.
   c. If output is insufficient, turn off alternator and reduce electrical load to one alternator capacity.
   d. If complete loss of alternator output occurs, check field fuse and replace if necessary. Spare fuses are located on the left side console forward of the field fuses.
   e. If an intermittent light indication accompanied by voltammeter fluctuation is observed, turn off affected alternator and reduce load to one alternator capacity.
   f. Restrict load on remaining alternator to 80% of the rated load.

ALTERNATOR FAILURE (Dual)

Indicated By Illumination Of Failure Light

1. Electrical Load - REDUCE.
2. If Circuit Breakers are tripped:
   a. Turn off alternators.
   b. Reset circuit breakers.
   c. Turn on left alternator and monitor output on voltammeter.
   d. If alternator is charging, leave it on. Disregard failure light if still illuminated.
   e. If still inoperative, turn off left alternator.
   f. Repeat steps c through e for right alternator.
   g. If circuit breakers reopen, prepare to terminate flight.

3. If Circuit Breakers have not tripped:
   a. Turn off alternators.
   b. Check field fuses and replace if necessary. Spare fuses are located on the left side console forward of the field fuses.
   c. Turn on left alternator and monitor output on voltammeter.
   d. If alternator is charging, leave it on. Disregard failure light if still illuminated.
   e. If still inoperative, turn off left alternator.
   f. Repeat steps c through e for right alternator.
   g. If both alternators are still inoperative, turn off alternators and turn on emergency power alternator field switch.
   h. Repeat steps c through e for each alternator.
   i. If still inoperative, turn off alternator, nonessential electrical items and prepare to terminate flight.

AVIONICS BUS FAILURE

1. Avionics Bus Switch - OFF.
2. Emergency Power Avionics Bus Switch - ON.

LANDING GEAR EMERGENCY PROCEDURES

HYD PRESS LIGHT ILLUMINATED AFTER GEAR CYCLE

1. Landing Gear Switch - RAPIDLY RECYCLE.
2. If HYD PRESS light still illuminated:
   a. Landing Gear - DOWN.
   b. GEAR HYD Circuit Breaker - PULL.
   c. If HYD PRESS light remains illuminated - LAND as soon as practical to prevent damage to the hydraulic system and/or components.

NOTE

Ensure the GEAR HYD circuit breaker is reset before further extension or retraction of the landing gear is attempted.

LANDING GEAR DOWN AND LOCKED LIGHT ILLUMINATED WITH GEAR HANDLE UP AND HYD PRESS LIGHT OUT

Perform "LANDING GEAR WILL NOT EXTEND HYDRAULICALLY" Checklist.

NOTE

Failure of any one of the three down lock switches in the down position may result in that gear not locking down during a gear down cycle if the other two gears lock down first. The down and locked light for the affected gear may remain on continually regardless of actual gear position.

LANDING GEAR WILL NOT EXTEND HYDRAULICALLY

1. Airspeed - 130 KIAS or less.

NOTE

As low an airspeed as practical is recommended as a lower airspeed will decrease the airloads on the nose gear during extension, thereby insuring the greatest probability of gear extension.

2. Landing Gear Switch - DOWN.
3. GEAR HYD Circuit Breaker - PULL.
4. Emergency Gear Extension T-Handle - PULL.
5. Gear Down Lights - ON; Unlocked Light - OFF.
6. If Main Gear Does Not Lock Down - YAW AIRPLANE. Airloads will lock main gear down if up locks have released.
7. Gear Warning Horn - CHECK.
8. As Soon As Practical - LAND.

CAUTION

The landing gear cannot be retracted inflight, once the emergency gear extension T-handle has been pulled. Ground servicing is required.

LANDING GEAR WILL NOT RETRACT HYDRAULICALLY

1. Landing Gear Switch - DOWN.
2. Gear Down Lights - ON; Unlocked Light - OFF.
3. Gear Warning Horn - CHECK.
4. As Soon as Practical - LAND.

FLIGHT INSTRUMENTS EMERGENCY PROCEDURES

VACUUM PUMP FAILURE (Attitude And Directional Gyros)

1. Failure indicated by left or right red failure button exposed on vacuum gage.
2. Automatic valve will select operative source.
3. Vacuum Pressure - CHECK proper vacuum from operative source.

OBSTRUCTION OR ICING OF STATIC SOURCE

1. Alternate Static Source - OPEN. Alternate static source is for pilot's instruments only when dual static system is installed.
2. Excess Altitude and Airspeed - MAINTAIN to compensate for change in calibration.

NOTE

See Figures 5-2 and 5-4 for airspeed and altimeter corrections with alternate static source OPEN.

AIR INLET OR FILTER ICING EMERGENCY PROCEDURES

1. Alternate Air Control(s) - PULL OUT.
2. Propeller(s) - INCREASE (2550 RPM For Normal Cruise).
3. Mixture(s) - LEAN as required.

PROPELLER SYNCHROPHASER

ENGINE INOPERATIVE PROCEDURE

1. Propeller Synchrophaser - OFF (Optional System).

SYNCHROPHASER FAILURE

1. Propeller Synchrophaser - OFF (Optional System).
2. Propeller Synchrophaser Circuit Breaker - PULL (Optional System).

EMERGENCY EXIT WINDOW OPENING

The forward cabin window on the right side of the passenger compartment should be opened as follows:

1. Emergency Release Handle Plastic Cover - PULL OFF.
2. Safety Clip - PUSH FORWARD.
3. Emergency Release Handle - PULL FULL AFT.
4. Emergency Exit Window - PUSH OUT and UP until the up-lock brace holds the window open.

NOSE BAGGAGE DOOR OPEN ON TAKEOFF

If a baggage door is left unlatched, it may open as the nose is raised on takeoff. The door will not hit a propeller nor will there be any unusual handling characteristics. If sufficient runway remains for a safe abort, the airplane should be stopped. If the decision is made to continue the takeoff, maintain airspeed below 120 KIAS and return for landing as soon as practical. Avoid lowering the nose abruptly which could throw loose objects out of the compartment.

SPINS

Intentional spins are not permitted in this airplane. Should a spin occur, however, the following recovery procedures should be employed:

1. Throttles - CLOSE IMMEDIATELY.
2. Ailerons - NEUTRALIZE.
3. Rudder - HOLD FULL RUDDER opposite the direction of rotation.
4. Control Wheel - FORWARD BRISKLY, 1/2 turn of spin after applying full rudder.
5. Inboard Engine - INCREASE POWER to slow rotation. (If Necessary).

After rotation has stopped:

6. Rudder - NEUTRALIZE.
7. Inboard Engine (If used) - DECREASE POWER to equalize engines.
8. Control Wheel - PULL to recover from resultant dive. Apply smooth steady control pressure.

NOTE

The airplane has not been flight tested in spins, thus the above recommended procedure is based entirely on the best judgment of Cessna Aircraft Company.

SECTION 4
NORMAL PROCEDURES
TABLE OF CONTENTS

INTRODUCTION

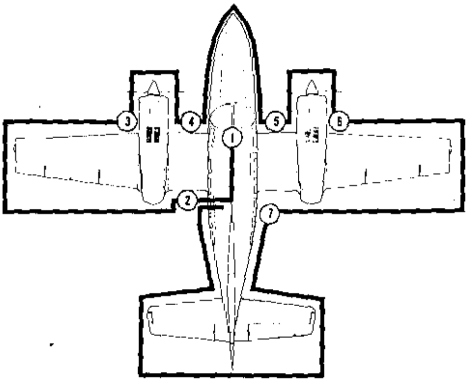
Section 4 of this handbook describes the recommended procedures for normal operations. The first part of this section provides normal procedural action required in an abbreviated checklist form. Amplification of the abbreviated checklist is presented in the second part of this section.

> NOTE
>
> Refer to Section 9 of this Pilot's Operating Handbook for amended operating limitations, operating procedures, performance data and other necessary information for airplanes equipped with specific options.

PREFLIGHT INSPECTION

NOTE

- Visually check inspection plates and general airplane condition during walk-around inspection. If night flight is planned, check operation of all lights and make sure a flashlight is available.
- Ensure airplane has been serviced with the proper grade and type of fuel.
- Refer to Section 8 for quantities, materials and specifications of frequently used service items.



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a. Control Lock(s) - REMOVE and stow.
b. Parking Brake - SET.
c. Alternate Static Source - CLOSED.
d. All Switches - OFF.
e. All Circuit Breakers - IN.
f. Voltammeter Selector - BATT.
g. Oxygen - ON; Quantity, Masks and Hoses - CHECK; Oxygen - OFF.
h. Landing Gear Switch - DOWN.
i. Trim Tab Controls (3) - SET for takeoff.
j. Left Fuel Selector - LEFT MAIN (Feel For Detent).
k. Right Fuel Selector - RIGHT MAIN (Feel For Detent).
l. Emergency Crossfeed Shutoff - OPEN (Push Down).
m. Battery Switch - ON.
n. Fuel Gages - CHECK quantity and operation.
o.*Fuel Totalizer - SET.
p. Wing Flaps - DOWN 15°.
q. Anti-Collision Lights - CHECK operation.
r.*Electric Windshield - CHECK operation by observing discharge on voltammeter if inflight use is anticipated. Ensure system is turned off after operational check.
s. Pitot, Stall and Vent Heat Switch(es) - ON 20 seconds then OFF. Ensure pitot tube cover(s) are removed before actuating pitot heat switch(es).
t. Navigation Lights - ON.
u. Windshields and Windows - CHECK for cracks and general condition.
v.*Cabin Fire Extinguisher - CHECK security and pressure.

2
a. Battery Compartment Cover - SECURE.
b. Wing Locker Baggage Door - SECURE.
c. Wing Flap - CHECK security and attachment.
d. Control Surface Lock - REMOVE, if installed.
e. Aileron and Servo Tab - CHECK condition, freedom of movement and tab position. Move aileron up; tab will move down.
f. Navigation Light - CHECK operation.
g. Landing Light Filament - CHECK condition.
h. Stall Warning Vane - CHECK freedom of movement, audible warning and warm.
i. Main Tank Fuel Vent - CLEAR.
j. Bottom Outboard Wing - CHECK for fuel leaks or stains.
k. Main Tank Fuel Quantity - CHECK; Cap Vent - CLEAR and Cap - SECURE.
l.*Outboard Deice Boot - CHECK condition and security.
m. Main Tank Fuel Sumps - DRAIN (2 Drains); CHECK for water and contamination.
n. Fuel Strainer - DRAIN; CHECK for water and contamination.

3
a. Engine Compartment General Condition - CHECK for fuel, oil, hydraulic fluid and exhaust leaks or stains.
b. Induction Air Opening - CLEAR.
c. Oil Level - CHECK minimum 9 quarts.
d. Propeller and Spinner - EXAMINE for nicks, security and oil leaks.
e. Cowl Openings - CLEAR.
f.*Engine Fire Extinguisher Bottle Pressure - CHECK temperature/charge pressure schedule.
g.*Inboard Deice Boot - CHECK condition and security.
h. Main Gear, Strut, Door, Tire and Wheel Well - CHECK.
i. Cowl Flap - SECURE.
j. Wing Tie Down - REMOVE.
k. Crossfeed Line - DRAIN; CHECK for water and contamination.

Figure 4-1 (Sheet 1 of 2)

PREFLIGHT INSPECTION

4 a. Crew Door - UNLOCK door handle with key.
b. Hydraulic Fluid Reservoir Level - CHECK.
c. Emergency Landing Gear Blow Down Bottle Pressure - CHECK in the green arc. Check that red ring is not showing on the control rod. If red ring is visible, refer to the Airplane Maintenance Manual before flight.
d. Nose Baggage Door - SECURE and LOCKED (with key).
e. Avionics Bay Door - SECURE and LOCKED (with key).
f. Nose Gear, Strut, Door, Tire and Wheel Well - CHECK.
g. Tie Down - REMOVE.
h. Pitot Cover - REMOVE; Pitot Tube - CLEAR and WARM.
i. Ram Air Inlet - CLEAR.
j.*Pitot Cover - REMOVE; Pitot Tube - CLEAR and WARM.
k.*Oxygen Overboard Discharge Indicator - CHECK green disc installed.
l. Heater Inlet and Outlet - CLEAR.
m. Nose Baggage Door - SECURE and LOCKED (with key).
n. Lower Fuselage, Nose and Center Section - CHECK for fuel and oil leaks or stains and antenna security.

5 a. Engine Compartment General Condition - CHECK for fuel, oil, hydraulic fluid and exhaust leaks or stains.
b. Crossfeed Line - DRAIN; CHECK for water and contamination.
c. Wing Tie Down - REMOVE.
d. Main Gear, Strut, Door, Tire and Wheel Well - CHECK.
e. Cowl Flap - SECURE.
f. Induction Air Opening - CLEAR.
g.*Inboard Deice Boot - CHECK condition and security.
h.*Engine Fire Extinguisher Bottle Pressure - CHECK temperature/charge pressure schedule.
i.*Air Conditioning Outlet Air Opening - CLEAR.
j. Oil Level - CHECK minimum 9 quarts.
k. Propeller and Spinner - EXAMINE for nicks, security and oil leaks.
l. Cowl Openings - CLEAR.

6 a.*Air Conditioning Fluid Level - CHECK.
b.*Air Conditioning Inlet Air Opening - CHECK DOOR CLOSED.
c. Fuel Strainer - DRAIN; CHECK for water and contamination.
d. Main Tank Fuel Sumps - DRAIN (2 Drains); CHECK for water and contamination.
e.*Outboard Deice Boot - CHECK condition and security.
f. Main Tank Fuel Quantity - CHECK; Cap vent - -CLEAR and cap - SECURE.
g. Main Tank Fuel Vent - CLEAR.
h. Bottom Outboard Wing - CHECK for fuel leaks or stains.
i.*Landing Light Filament - CHECK condition.
j. Navigation Light - CHECK operation.
k. Control Surface Lock - REMOVE, if installed.
l. Aileron - CHECK condition and freedom of movement.
m. Wing Flap - CHECK security and attachment.
n. Wing Locker Baggage Door - SECURE.
o.*Alcohol Deice Tank - CHECK quantity.

7 a. Lower Fuselage, Nose and Center Section - CHECK for fuel and oil leaks or stains and antenna security.
b. Static Port(s) - CLEAR. Do not blow into static ports.
c. Tailcone Drain Holes - CHECK clear of obstructions.
d.*Horizontal Stabilizer Deice Boot - CHECK condition and security.
e. Control Surface Lock(s) - REMOVE, if installed.
f. Elevator and Tab - CHECK condition, freedom of movement and tab position.
g. Rudder and Tab - CHECK condition, freedom of movement and tab position. Move rudder right; tab should move left.
h.*Vertical Stabilizer Deice Boot - CHECK condition and security.
i. Elevator - CHECK condition and freedom of movement.
j. Tie Down - REMOVE.
k.*Horizontal Stabilizer Deice Boot - CHECK condition and security.
l.*Rudder Lock - UNLOCK.
m. Navigation Light - CHECK operation.
n. Static Port(s) - CLEAR. Do not blow into static ports.
o. Cabin Door and Seal - CHECK security and condition.
p. Wing Flaps - UP. Visually check retraction.
q. Battery Switch - OFF.
r. Navigation Lights - OFF.

*Denotes items to be checked if the applicable optional equipment is installed on your airplane.

Figure 4-1 (Sheet 2 of 2)

NORMAL PROCEDURES
ABBREVIATED CHECKLIST

> **NOTE**
>
> This Abbreviated Normal Procedures Checklist is included as a supplement to the Amplified Normal Procedures Checklist. Use of the Abbreviated Normal Procedures Checklist should not be used until the flight crew has become familiar with the airplane and systems. All amplified normal procedure items must be accomplished regardless of which checklist is used.

*AIRSPEEDS FOR SAFE OPERATION *

Conditions:

1. Takeoff Weight 6850 Pounds
2. Landing Weight 6850 Pounds
3. Sea Level, Standard Day

FLAPS
0° 69 KIAS
10° 73 KIAS
30° 73 KIAS

(1)	Air Minimum Control Speed	~~80~~ KIAS	
(2)	Takeoff and Climb to 50 Feet (0° Wing Flaps)	0° 95 KIAS	10° 86
(3)	All Engines Best Angle-of-Climb Speed (0° Wing Flaps)	0° 84 KIAS	10° 82
(4)	All Engines Best Rate-of-Climb Speed (0° Wing Flaps)	0° 109 KIAS	10° 97
(5)	All Engines Landing Approach Speed (45° Wing Flaps)	88 ~~95~~ KIAS	
(6)	Maneuvering Speed	150 KIAS	
(7)	Structural Cruise Speed	205 KIAS	
(8)	Never Exceed Speed	235 KIAS	
(9)	Speed for Transition to Balked Landing Conditions	30° 88 ~~92~~ KIAS	
(10)	Maximum Demonstrated Crosswind Velocity	19 ~~15~~ KNOTS	

Figure 4-2

(11) MAX SPEED w/FLAPS EXTENDED 10° 173 30° 125
(12) " " w/LANDING GEAR EXTENDED 180

BEFORE STARTING ENGINES

1. Preflight - COMPLETE.
2. Cabin Door(s) - LATCHED and SECURE.
3. Crew Door (If Installed) - CLOSED and LOCKED.
4. Control Locks - REMOVE.
5. Seat, Seat Belts and Shoulder Harness - ADJUST and SECURE.
6. Fuel Selectors - MAIN TANKS.
7. Landing Gear Switch - DOWN.
8. Mixtures, Propellers and Throttles - SET.
9. All Switches and Circuit Breakers - SET.
10. Battery and Alternators - ON.
11. Landing Gear Position Indicator Lights - Check green lights ON.
12. Annunciator Panel - PRESS-TO-TEST.
13. Lights - AS REQUIRED.

* FAA APPROVED AIRPLANE FLT. MAN. SUPP. p. 13, 14

STARTING ENGINES

1. Propellers - CLEAR.
2. Magneto Switches - ON.
3. Engines - START.
4. Auxiliary Fuel Pumps - LOW.
5. Engine Instruments - CHECK.
6. Vacuum System - perform check per Amplified Normal Procedures

BEFORE TAXIING

1. Avionics - SET.

TAXIING

1. Brakes - CHECK.
2. Flight Instruments - CHECK.

BEFORE TAKEOFF

1. Engine Runup - COMPLETE.
   a. Throttles - 1700 RPM.
   b. L and R HYD FLOW Lights - OFF.
   c. Alternators - CHECK.
   d. Vacuum System - CHECK.
   e. Magnetos - CHECK.
   f. Propellers - CHECK.
   g. Engine Instruments - CHECK.
   h. Throttles - 1000 RPM.
2. Fuel Quantity - CHECK.
3. Fuel Selectors - MAIN TANKS.
4. Emergency Crossfeed Shutoff - CHECK OPEN (Push Down).
5. Cowl Flaps - OPEN.
6. Trim Tabs - SET.
7. Wing Flaps - UP.
8. Propeller Synchrophaser - OFF (optional system).
9. Flight Instruments and Avionics - SET.
10. Lights - AS REQUIRED.
11. All Cabin Doors and Windows - CLOSED.
12. Annunciator Panel - CLEAR.
13. Auxiliary Fuel Pumps - ON.
14. Flight Controls - CHECK.
15. Ice Protection - AS REQUIRED.
16. Seat Belts and Shoulder Harness - SECURE.

TAKEOFF

1. Power - SET FOR TAKEOFF.
2. Mixtures - CHECK fuel flows in the white arc.
3. Engine Instruments - CHECK.
4. Air Minimum Control Speed - 80 KIAS.
5. Takeoff and Climb to 50 Feet - 95 KIAS at 6850 pounds. Refer to Section 5 for speeds at reduced weights.

AFTER TAKEOFF

1. Landing Gear - RETRACT.
2. Best Angle-of-Climb Speed - 84 KIAS at sea level to 88 KIAS at 16,000 Feet with obstacle.
3. Best Rate-of-Climb Speed - 109 KIAS at sea level and 6850 pounds. Refer to Section 5 for speed at reduced weight.

CLIMB

1. Power - SET.
2. Mixtures - ADJUST.
3. Cowl Flaps - AS REQUIRED.

DESCENT

1. Fuel Selectors - MAIN TANKS.
2. Auxiliary Fuel Pumps - ~~ON~~. Low
3. Power - AS REQUIRED.
4. Mixtures - ADJUST.
5. Cowl Flaps - CLOSE.
6. Altimeter - SET.

BEFORE LANDING

1. Seat Belts and Shoulder Harness - SECURE.
2. Propeller Synchrophaser - OFF (Optional System).
3. Wing Flaps - AS REQUIRED.
4. Landing Gear - DOWN.
5. Mixtures - ADJUST.
6. Propellers - FULL FORWARD.
7. Approach Speed - 95 KIAS at 6850 pounds. Refer to Section 5 for speeds at reduced weight.

AFTER LANDING

1. Auxiliary Fuel Pumps - LOW.
2. Cowl Flaps - OPEN.
3. Wing Flaps - UP.

SHUTDOWN

Vacuum system - perform check per Amplified Normal Procedures

1. Parking Brake - SET if brakes are cool.
2. Accessory Switches - OFF.
3. Auxiliary Fuel Pumps - OFF.
4. Engines - SHUT DOWN.
5. Battery, Alternator And Magneto Switches - OFF.

AMPLIFIED NORMAL PROCEDURES

PREFLIGHT INSPECTION

The Preflight Inspection, described in Figure 4-1, is recommended for the first flight of the day. Inspection procedures for subsequent flights are normally limited to brief checks of the tail surface hinges, fuel and oil quantity and security of fuel and oil filler caps. If the airplane has been in extended storage, has had recent major maintenance or has been operated from marginal airports, a more extensive exterior inspection is recommended.

After major maintenance has been performed, the flight and trim tab controls should be double-checked for free and correct movement and security. The security of all inspection plates on the airplane should be checked following periodic inspections. Since avionics and heater maintenance requires the mechanic to work in the nose compartment, the nose compartment doors are opened for access to equipment. Therefore, it is important after such maintenance to double-check the security of these doors. If the airplane has been waxed or polished, check the external static pressure source holes for stoppage.

If the airplane has been exposed to much ground handling in a crowded hangar, it should be checked for dents and scratches on wings, fuselage and tail surfaces, as well as damage to navigation, anti-collision and landing lights, deice boots and avionics antennas. Outside storage for long periods may result in water and obstructions in airspeed system lines, condensation in fuel tanks, and dust and dirt on the intake air filters and engine cooling fins. Outside storage in windy or gusty areas, or adjacent to taxiing airplanes, calls for special attention to control surface stops, hinges and brackets to detect presence of wind damage.

If the airplane has been operated from muddy fields or in snow or slush, check the main gear and nose gear wheel wells for obstructions and cleanliness. Operation from a gravel or cinder field will require extra attention to propeller tips and abrasion on leading edges of the horizontal tail. Stone damage to the propeller can seriously reduce the fatigue life of the blades.

Airplanes that are operated from rough fields, especially at high altitudes, are subjected to abnormal landing gear abuse. Check frequently all components of the landing gear retracting mechanisms, shock struts, tires and brakes. Undue landing and taxi loads will be subjected on the airplane structure when the shock struts are insufficiently extended. A completely collapsed (zero extension) shock strut could cause a malfunction in the landing gear retraction system.

To prevent loss of fuel in flight, make sure the main fuel tank filler caps are tightly sealed. The fuel tank vents on the lower surface of the wings should also be inspected for obstructions, ice or water, especially after operation in cold, wet weather.

The interior inspection will vary according to the planned flight and the optional equipment installed. Prior to high-altitude flights, it is important to check the condition and quantity of oxygen face masks and hose assemblies. The oxygen supply system should be functionally checked to ensure that it is in working order. The oxygen pressure gage should indicate 300 to 1800 PSI (44.0 cubic foot system) or 300 to 1850 PSI (114.9 cubic foot system) depending upon the anticipated requirements.

Satisfactory operation of the pitot tube(s) and stall warning transmitter heating elements is determined by observing a discharge on the voltammeter when the pitot and stall heat switches are turned ON. The effectiveness of these heating elements may be verified by cautiously feeling the heat of these devices while the switches are ON.

If the emergency landing gear extension T-handle was noticed to be partly extended during the cockpit preflight inspection, the emergency landing gear extension blowdown valve assembly should be reset at the blowdown bottle in the left nose compartment. Check the valve assembly position. If the red band is visible, the blowdown bottle must be serviced in accordance with the airplane Service Manual before flight. If the red band is not showing, push the cable towards the valve assembly, then check the bottle pressure gage for normal pressure.

Flights at night and in cold weather involve a careful check of other specific areas which will be discussed later in this section.

BEFORE STARTING ENGINES

1. Preflight Inspection - COMPLETE (See Figure 4-1).
2. Cabin Door(s) - LATCHED and SECURE.
3. Crew Door (If Installed) - CLOSED and LOCKED.
4. Control Locks - REMOVE.
5. Seat, Seat Belts and Shoulder Harness - ADJUST and SECURE.
6. Brakes - SET.
7. Fuel Selectors - Left Engine - LEFT MAIN (Feel For Detent).
   Right Engine - RIGHT MAIN (Feel For Detent).
8. Landing Gear Switch - DOWN.
9. Mixtures - FULL RICH.
10. Propellers - FULL FORWARD.
11. Throttles - OPEN ONE INCH.
12. All Switches - OFF.
13. Circuit Breakers - IN.
14. Emergency Power Alternator Field Switch - OFF.
15. Emergency Power Avionics Bus Switch - OFF.
16. Avionics Bus Switch - OFF.
17. Auxiliary Fuel Pump Switches - OFF.
18. Battery and Alternators - ON.

19. Master Light Dimming Switch - AS REQUIRED.
20. Landing Gear Position Indicator ights - Check green lights ON.
21. Annunciator Light Panel - PRESS-TO-TEST.
22. Cowl Flaps - OPEN.
23. Altimeter and Clock - SET.
24. Fuel Quantity - CHECK.
25. Fuel Totalizer - SET (Optional System).
26. Cabin Air Controls - AS REQUIRED.
27. Alternate Air Controls - IN.
28. External Lights - AS REQUIRED.

NOTE

Ground operation of the high intensity anticollision lights can be of considerable annoyance to ground personnel and other pilots.

STARTING ENGINES (Left Engine First Without External Power)

1. Propeller - CLEAR.
2. Magneto Switches - ON.
3. Engine - START.
   a. Starter Button - PRESS.
   b. Primer Switch - Left Engine - LEFT.
      Right Engine - RIGHT.

CAUTION

- If the primer is activated for excessive periods of time with the engine inoperative on the ground or during flight, damage may be incurred to the engine and/or airplane due to fuel accumulation in the cylinder intake ports. Similar conditions may develop when the engine is shutdown with the auxiliary fuel pump ON.

- Should fuel priming or auxiliary fuel pump operation periods in excess of 60 seconds occur, the cylinders must be purged by one of the following procedures:
  a. With auxiliary fuel pump OFF, allow manifold to drain at least 5 minutes or until fuel ceases to flow out of the drains under the nacelle.
  b. If circumstances do not allow natural draining periods recommended above, with the auxiliary fuel pump OFF, magnetos OFF, mixture IDLE CUT-OFF and throttle FULL OPEN, turn engine with starter or by hand a minimum of 15 revolutions.

4. Auxiliary Fuel Pump - LOW to purge vapor from fuel system.
5. Throttle - 800 to 1000 RPM.
6. Oil Pressure - 10 PSI minimum in 30 seconds in normal weather, or 60 seconds in cold weather. If no indication appears, shutdown engine and investigate.
7. Right Engine - START. Repeat steps 1 through 6.
8. Alternators - CHECK.
9. Vacuum system check per supplement Sect 9

STARTING ENGINES (Left Engine First With External Power)

1. Battery Switch - ON.
2. Alternator Switches - OFF.
3. External Power Source - ATTACH.

> **NOTE**
>
> For complete external power source operation, refer to Section 7.

4. Propeller - CLEAR.
5. Magneto Switches - ON.
6. Engine - START.
   a. Starter Button - PRESS.
   b. Primer Switch - Left Engine - LEFT.
      Right Engine - RIGHT.

> **CAUTION**
>
> - If the primer is activated for excessive periods of time with the engine inoperative on the ground or during flight, damage may be incurred to the engine and/or airplane due to fuel accumulation in the cylinder intake ports. Similar conditions may develop when the engine is shutdown with the auxiliary fuel pump ON.
> - Should fuel priming or auxiliary fuel pump operation periods in excess of 60 seconds occur, the cylinders must be purged by one of the following procedures:
>   a. With auxiliary fuel pump OFF, allow manifold to drain at least 5 minutes or until fuel ceases to flow out of the drains under the nacelle.
>   b. If circumstances do not allow natural draining periods recommended above, with the auxiliary fuel pump OFF, magnetos OFF, mixture IDLE CUT-OFF and throttle FULL OPEN, turn engine with starter or by hand a minimum of 15 revolutions.

7. Auxiliary Fuel Pump - LOW to purge vapor from fuel system.
8. Throttle - 800 to 1000 RPM.
9. Oil Pressure - 10 PSI minimum in 30 seconds in normal weather, or 60 seconds in cold weather. If no indication appears, shutdown engine and investigate.
10. Right Engine - START. Repeat steps 4 through 9.
11. External Power Source - REMOVE.
12. Alternator Switches - ON.
13. Alternators - CHECK.
14 Vacuum Sytem Check per Supplement Sect 9

The left engine is normally started first because the cable from the battery to this engine is much shorter permitting more electrical power to be delivered to the starter. If battery is low, the left engine should start more readily.

When using an external power source, it is recommended that the airplane be started with the alternator switches OFF.

NOTE

Release starter button as soon as engine fires or engine will not accelerate and flooding can result.

The continuous flow fuel injection system will start spraying fuel in the engine intake ports as soon as the primer switch is actuated and the throttle and mixture controls are opened. If the auxiliary pump is turned on accidentally while the engine is stopped with the throttle open and the mixture rich, liquid fuel will collect temporarily in the cylinder intake ports. The quantity of fuel deposited will depend upon the amount of throttle opening and the length of time the pump has been operating. If this happens, it is advisable to wait a few minutes until the fuel drains away, then with the auxiliary fuel pump OFF, magnetos OFF, mixture IDLE CUT-OFF, and throttle FULL OPEN, turn the propeller through 15 complete revolutions. This is done to prevent the possibility of engine damage due to hydrostatic lock before starting the engine. To avoid flooding, begin cranking the engine prior to priming the engine.

Engine mis-starts, characterized by weak intermittent explosions followed by black puffs of smoke from the exhaust, are the result of flooding or overpriming. This situation is more apt to develop in hot weather, or when the engines are hot. If it occurs, repeat the starting procedure with the throttle approximately 1/2 open, the mixture in IDLE CUT-OFF and the primer switch OFF. As the engine fires, move the mixture control to FULL RICH and close the throttle to idle.

If an engine is underprimed, as may occur in cold weather with a cold engine, repeat the starting procedure while holding the primer switch ON for 5 to 10 seconds until the engine fires.

If cranking longer than 30 seconds is required, allow starter-motor to cool five minutes before cranking again since excessive heat may damage the armature windings.

After the engines are started, the auxiliary fuel pumps should be switched to LOW to provide for improved purging and vapor clearing in the fuel system.

BEFORE TAXIING

1. Avionics Bus Switch - ON.
2. Avionics - SET.
3. Lights - AS REQUIRED.
4. Cabin Temperature - AS REQUIRED.
   a. If heating and defrosting is required:
      (1) Forward and Aft Cabin Air Knobs - PULL OUT.
      (2) Defrost Knob - AS REQUIRED.
      (3) Cabin Heat Knob - AS REQUIRED.
      (4) Cabin Heat Switch - ON.
      (5) Cabin Fan Switch - AS REQUIRED.
      (6) Ram Air Knob - AS REQUIRED.
   b. If ventilation is required:
      (1) Forward and Aft Cabin Air Knobs - PULL OUT.
      (2) Defrost Knob - PULL OUT.
      (3) Cabin Fan Switch - AS REQUIRED.
      (4) Ram Air Knob - PULL OUT.
5. Brakes - RELEASE. Pushing the parking brake knob in releases the trapped brake fluid, allowing the brakes to be released.

TAXIING

1. Throttles - AS REQUIRED.
2. Brakes - CHECK.
3. Flight Instruments - CHECK.

A steerable nosewheel, interconnected with the rudder system, provides positive control up to 18° left or right, and free turning from 18° to 52° for sharp turns during taxiing. Normal steering may be aided through use of differential power and differential braking on the main wheels. These aids are listed in the preferred order of use. Do not use excessive brake on the inboard side to effect a turning radius as decreased tire life will result.

NOTE

If the airplane is parked with the nosewheel castered in either direction, initial taxiing should be done with caution. To straighten the nosewheel, use full opposite rudder and differential power instead of differential braking. After a few feet of forward travel, the nosewheel will steer normally.

When taxiing near buildings or other stationary objects, observe the minimum turning distance limits as stated in Figure 7-11. No abnormal precautions are required when taxiing in conditions of high winds.

At some time early in the taxi run, the brakes should be checked for any unusual reaction, such as uneven braking. The operation of the turn-and-bank indicator and directional gyro should also be checked during taxiing. When turning right, the turn-and-bank needle should deflect right while the ball goes left and directional gyro heading increases in numerical value. In a left turn the converse is true. At this time the artificial horizon should be up to speed and indicating a level attitude.

Most of the engine warm-up should be done during taxiing, with just enough power to keep the airplane moving. Engine speed should not exceed 1000 RPM while the oil is cold.

Do not operate engines at high RPM when taxiing over gravel or loose material that may cause damage to the propeller blades.

BEFORE TAKEOFF

1. Brakes - SET.
2. Engine Runup:
   a. Throttles - 1700 RPM.
   b. L and R HYD FLOW Lights - OFF.
   c. Alternators - CHECK.
   d. Vacuum System - CHECK 4.75 to 5.25 inches Hg.
   e. Magnetos - CHECK 150 RPM maximum drop with a maximum differential of 50 RPM.

f. Propellers - CHECK feathering to 1200 RPM; return to high RPM (Full Forward Position).

CAUTION

During propeller feathering checks, do not allow the propeller RPM to fall below 1000 RPM as this may damage the hub mechanism.

g. Engine Instruments - CHECK green arc.
h. Throttles - 1000 RPM.

NOTE

It is important that the engine oil temperature be within the normal operating range prior to applying takeoff power. Even cautious power applications with cool oil may result in momentarily exceeding the 39.0 inches Hg. manifold pressure limit. Refer to Section 7 if momentary overboost of manifold pressure occurs.

3. Fuel Quantity - CHECK.
4. Fuel Selectors - RECHECK - Left Engine - LEFT MAIN (Feel For Detent).
   Right Engine - RIGHT MAIN (Feel For Detent).
5. Emergency Crossfeed Shutoff - RECHECK OPEN (Push Down).
6. Alternate Air Controls - IN.
7. Trim Tabs - SET elevator, aileron and rudder tabs in the TAKEOFF range.
8. Cowl Flaps - OPEN.
9. Wing Flaps - UP.
10. Propeller Synchrophaser - OFF (Optional System).
11. Flight Instruments and Avionics - SET.
12. Lights - AS REQUIRED.
13. All Cabin Doors and Windows - CLOSED.
14. Alternate Air Controls - IN.
15. Annunciator Panel - CLEAR.
16. Auxiliary Fuel Pumps - ON.
17. Flight Controls - CHECK, free and correct.
18. Ice Protection Equipment - AS REQUIRED.
19. Seat Belts and Shoulder Harness - SECURE.
20. Brakes - RELEASE. Push in parking brake control.

Full throttle checks on the ground are not recommended unless there is good reason to suspect that the engines are not operating properly. Do not runup the engines over loose gravel or cinders because of possible stone damage or abrasion to the propeller tips.

If the ignition system produces an engine speed drop in excess of 150 RPM, or if the drop in RPM between the left and right magneto differs by more than 50 RPM, continue warm-up a minute or two longer before rechecking the system. If there is doubt concerning operation of the ignition system, checks at higher engine speed will usually confirm if a deficiency exists. In general, a drop in excess of 150 RPM is not considered acceptable.

A careful check should be made of the vacuum system. The minimum and maximum allowable suctions are 4.75 and 5.25 inches Hg., respectively, on the instrument. Good alternator condition is also important for instrument flight since satisfactory operation of all avionics equipment and electrical instruments is essential. The alternators are checked during engine runup (1700 RPM) by positioning the selector switch in the L ALT and R ALT position and observing the charging rate on the voltammeter.

A simple last minute recheck of important items should include a quick glance to see if all switches are ON, the mixture and propeller controls are forward, all flight controls have free and correct movement and the fuel selectors are properly positioned.

NOTE

Make sure that weight does not exceed 6850 pounds before attempting takeoff.

A mental review of all one engine inoperative speeds, procedures and field length requirements should be made prior to takeoff.

TAKEOFF

1. Power - 2700 RPM and FULL THROTTLE.

NOTE

Apply full throttle smoothly to avoid propeller surging and excessive manifold pressures. Refer to Section 7 if momentary overboost of manifold pressure occurs.

2. Mixtures - CHECK fuel flows in the white arc.
3. Engine Instruments - CHECK.
4. Air Minimum Control Speed - 80 KIAS.
5. Elevator Control - Raise nosewheel at 90 KIAS.
6. Lift-Off - 95 KIAS at 6850 pounds. Refer to Section 5 for speed at reduced weight.

Before initiating the takeoff roll, a go, no-go decision should have been made in the event an engine failure should occur. Review the anticipated performance presented in the Accelerate-Stop Distance, Accelerate-Go Distance and One Engine Inoperative Rate-of-Climb charts in Section 5. In addition, review the applicable procedures and speeds associated with one engine inoperative operation so that the transition (in the event of an engine failure) will be smooth, positive and safe. If the anticipated performance exceeds the runway length available or obstacle clearance requirements cannot be achieved, it is recommended to takeoff on a more favorable runway, off-load the airplane until the anticipated performance is consistent with existing conditions or delay the takeoff until more favorable atmospheric conditions exist.

Since the use of full throttle is not recommended in the static runup, closely observe full-power engine operation early in the takeoff run. The maximum allowable manifold pressure of 39.0 inches Hg. manifold pressure should not be exceeded. Throttle action should be smooth and slow in order that the waste gate can become operative as early as possible. Signs of rough engine operation, unequal power between engines, or sluggish engine acceleration are good cause for discontinuing the takeoff. If this occurs, make a thorough full throttle static runup before another takeoff is attempted.

Full throttle operation is recommended on takeoff since it is important that a speed well above air minimum control speed (80 KIAS) be obtained as rapidly as possible. It is desirable to accelerate the airplane to 95 KIAS (intentional one engine inoperative speed) before lift-off for additional safety in case of an engine failure. This safety may have to be compromised slightly where short and rough fields prohibit such high speed before takeoff.

For crosswind takeoffs, additional power may be carried on the upwind engine until the rudder becomes effective. The airplane is accelerated to a slightly higher than normal takeoff speed, and then is pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, a coordinated turn is made into the wind to correct for drift.

A takeoff with one main tank full and the opposite tank low on fuel creates a lateral unbalance. This is not recommended since gusty air or premature lift-off could create a serious control problem.

After takeoff, it is important to maintain the intentional one engine inoperative speed (95 KIAS) to 50 feet. As the airplane accelerates still further to all engines best rate-of-climb speed (109 KIAS), it is good practice to climb rapidly to an altitude at which the airplane is capable of circling the field on one engine.

AFTER TAKEOFF

1. Brakes - APPLY momentarily.
2. Landing Gear - RETRACT. Check gear unlocked and HYD PRESS lights off.
3. Best Angle-of-Climb Speed (Sea Level) - 84 KIAS after reaching 50 feet if immediate obstacle clearance is a consideration.
4. Best Rate-of-Climb Speed - 109 KIAS at sea level and 6850 pounds. Refer to Section 5 for climb speed at altitude and reduced weight.
5. Auxiliary Fuel Pumps - CHECK ON.

To establish climb configuration, retract the landing gear, set climb power, check auxiliary fuel pumps on and adjust the mixtures for the selected power setting.

Before retracting the landing gear, apply the brakes momentarily to stop the rotation of the main wheels. Centrifugal force caused by the rapidly rotating wheels expands the diameter of the tires, and if ice or mud has accumulated in the wheel wells, the rotating wheels may rub as they enter.

On long runways, the landing gear should be retracted at the point over the runway where a wheels-down forced landing on that runway would become impractical. However, on short runways it may be preferable to retract the landing gear after the airplane is safely airborne.

Power reduction will vary according to the requirements of the traffic pattern or surrounding terrain, weight, field elevation, temperature, environmental considerations and engine condition. However, a normal after takeoff power setting is 2450 RPM and 29.5 inches Hg. manifold pressure.

CLIMB

CRUISE CLIMB

1. Power - 2450 RPM and 29.5 inches Hg.
2. Airspeed - 115 to 140 KIAS.
3. Mixtures - ADJUST to climb fuel flow.
4. Cowl Flaps - AS REQUIRED.
5. Propellers - SYNCHRONIZE manually.
6. Quadrant Friction Lock - TIGHTEN securely (With Synchrophaser Installed).
7. Propeller Synchrophaser - PHASE (Optional System). Light should illuminate continuously.
   a. Phasing Knob - ADJUST for desired phasing position.

MAXIMUM CLIMB

1. Power - 2600 RPM and 39.0 inches Hg. below 16,000 feet. Placarded manifold pressure above 16,000 feet.
2. Airspeed - 109 KIAS.
3. Mixtures - SET to white triangle on fuel flow gage below 16,000 feet. LEAN as required above 16,000 feet.
4. Cowl Flaps - AS REQUIRED.

Power settings for climb should be limited to 2600 RPM and 39.0 inches Hg. manifold pressure below 16,000 feet and placarded manifold pressures above 16,000 feet.

Normal cruising climb is recommended where practical and should be conducted at 115 to 140 KIAS, using approximately 75% of maximum normal operating power (2450 RPM and 29.5 inches Hg. or 2300 RPM and 30.3 inches Hg. manifold pressure). The mixture should be leaned in this type of climb to give the desired fuel flow in the climb dial range (blue segment) which is approximately best power mixture.

If it is necessary to climb rapidly to clear mountains or reach favorable winds at high altitudes, the all engines best rate-of-climb speed of 109 KIAS should be used with maximum normal operating power. During maximum performance climbs, the mixture should be set to maintain fuel flows at the white triangle up to the engine critical altitude and at the appropriate climb power range above critical altitude. It is recommended that the auxiliary fuel pumps be ON, and the mixture remain at the climb mixture setting for approximately 5 minutes after establishing cruising flight before leaning is initiated. This procedure will eliminate fuel vaporization problems likely to occur from rapid altitude changes.

If an obstruction ahead requires a steep climb angle, the airplane should be flown at the all engines best angle-of-climb speed with wing flaps up and maximum normal operations power. This speed varies from 84 KIAS at sea level to 88 KIAS at 16,000 feet.

During cruise climbs, positioning the propeller synchrophaser to PHASE will eliminate the unpleasant audio beat accompanying unsynchronized operation. The propeller synchrophaser can also provide a significant reduction in cabin vibration.

With the propellers slightly out of synchronization so that an audio beat is obtained approximately once each 5 seconds, it should be noted that the vibration level of the cabin and instrument panel will increase and decrease at a rate of approximately once each 20 seconds. Optimum operation will be obtained by manually synchronizing the propellers and positioning the synchrophaser switch to PHASE. Best propeller synchronizing is obtained by making the final adjustment of the propeller controls in a DECREASE RPM direction. For best operation, securely tighten the quadrant friction lock to prevent the slaved propeller control from creeping.

CRUISE

1. Cruise Power - 2100 to 2450 RPM and 15.0 to 29.5 inches Hg. or 2200 to 2300 RPM and 15.0 to 30.3 inches Hg.
2. Auxiliary Fuel Pumps - OFF (LOW, if fuel flow fluctuates).
   a. Crossfeeding - LOW.
3. Mixtures - LEAN for desired cruise fuel flow as determined from your power computer. Recheck mixtures if power, altitude or OAT changes.
4. Cowl Flaps - AS REQUIRED.
5. Propellers - SYNCHRONIZE manually.
6. Quadrant Friction Lock - TIGHTEN securely (With Synchrophaser Installed).
7. Propeller Synchrophaser - PHASE (Optional System). Light should illuminate continuously.
   a. Phasing Knob - ADJUST for desired phasing position.
8. Fuel Selectors - Left Engine - LEFT MAIN (Feel For Detent).
   Right Engine - RIGHT MAIN (Feel For Detent).

NOTE

Turn auxiliary fuel pumps to LOW and mixtures to FULL RICH when switching tanks.

9. If oxygen use is desired, proceed as follows:
   a. Mask - Connect mask and hose assembly and put mask on.

WARNING

Permit no smoking when using oxygen. Oil, grease, soap, lipstick, lip balm, and other fatty materials constitute a serious fire hazard when in contact with oxygen. Be sure hands and clothing are oil-free before handling oxygen equipment.

   b. Hose Coupling - Plug into oxygen outlet inside access door in outboard armrest.

c. Oxygen Flow Indicator - Check Flow. (Indicator Toward Mask Indicates Proper Flow).
d. Disconnect hose coupling when not in use.

10. Trim Tabs - ADJUST.

Normal cruising requires between 50% and 70% of maximum normal operating power. The manifold pressure and RPM settings required to obtain these powers at various altitudes and outside air temperatures can be determined with your cruise computer. A maximum cruising power of (29.5 inches Hg. manifold pressure and 2450 RPM or 30.3 inches Hg. manifold pressure and 2300 RPM) may be used if desired. Various percent powers can be obtained with a number of combinations of manifold pressure, engine speed, altitude and outside air temperature. For a given throttle setting, select the lowest engine speed in the green arc range that will give smooth engine operation without evidence of laboring.

CAUTION

The use of 30.3 inches Hg. manifold pressure (narrow green arc on the manifold pressure gage) is restricted to the 2200 to 2300 RPM range only.

The use of lower power settings and the selection of cruise altitude on the basis of the most favorable wind conditions are significant factors that should be considered on every trip to reduce fuel consumption. Additional range can be achieved when operating at select power combinations, see Figure 5-20, by leaning to peak exhaust gas temperature (EGT) for Best Economy mixture. This setting results in an airspeed loss of 4 KTAS and range increase of 8% compared to the Recommended Lean mixture. Do not lean to the extent that engine roughness or excessive speed loss occurs.

CAUTION

Operation at Best Economy mixture is not recommended until oil consumption stabilizes or during the first 50 hours of operation. The purpose of this interval of operation at higher power levels (65% to 75% of maximum normal operations power) is to insure proper seating of the rings and is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

When leaning, accomplish the procedure as precisely as possible. A little extra effort in setting the mixtures will yield significant dividends.

For normal cruise conditions, your cruise computer should be utilized to set the fuel flows. The cruise computer is based on indicated OAT, therefore, the ram rise does not have to be subtracted. The cruise computer is marked with two fuel flow scales. These scales are provided to insure that you can obtain the maximum performance and utilization from your airplane. The inner fuel flow scale (marked Recommended Lean) should be utilized for all normal cruise performance. Data shown in Section 5 are based on Recommended Lean mixture. The outer fuel flow scale (marked Best Power) will provide maximum speed for a given power setting. The speed will be approximately two knots greater than the speed with Recommended Lean mixture.

The cowl flaps should be adjusted to maintain the cylinder head temperature within the normal operating range (green arc).

Best propeller synchrophasing is obtained by making the final adjustment of the propeller controls in a DECREASE RPM direction. Manually synchronize the propellers as closely as possible and tighten the quadrant friction lock securely. Position the synchrophaser switch to PHASE. The phasing knob should then be adjusted until the desired sound and vibration characteristics are obtained. This setting will vary from flight to flight. If non-synchronized operation occurs during long cruise flights, manually re-synchronize the propeller controls as closely as possible and synchronized operation should reoccur. Securely tighten the quadrant friction lock, then adjust the phasing knob as desired.

On long cruise flights, where the slaved governor can eventually operate near either end of its operating range, it may be necessary to periodically select the OFF position, reset the propeller controls and reengage the synchrophaser.

For flight in an icing environment, refer to the Alternate Induction Air paragraphs in this section and other sections dealing with flight in an icing environment.

DESCENT

1. Fuel Selectors - Left Engine - LEFT MAIN (Feel For Detent).
   Right Engine - RIGHT MAIN (Feel For Detent).
2. Auxiliary Fuel Pumps - ON.
3. Power - AS REQUIRED to maintain engine temperatures in the green.
4. Mixtures - ADJUST for smooth operation with gradual enrichment as altitude is lost.
5. Propeller Synchrophaser - AS REQUIRED (Optional System).
6. Cowl Flaps - CLOSE.
7. Altimeter - SET.

Descents should be initiated far enough in advance of estimated landing to allow a gradual rate of descent at cruise speed. It should be at approximately 500 fpm for passenger comfort, using enough power to keep the engines warm. This will prevent undesirable low cylinder head temperatures caused by low power settings at cruise speed. The optimum engine speed in a descent is usually the lowest one in the RPM green arc range that will allow cylinder head temperatures to remain in the recommended operating range.

The combination of high pressure altitudes and above-standard temperatures has a significant effect on engine operation. Power output at any manifold pressure or power setting will be lower at high ambient temperatures than under standard atmospheric conditions. As temperatures increase, a constant fuel flow rate will result in a progressively richer mixture.

When operating at high altitudes and/or high ambient temperatures, careful attention should be paid to proper leaning of the mixture for both fuel economy and engine performance. This is especially important during prolonged low-power or idle-power operation. Overly rich mixtures during a long idle-power descent from cruising altitude could result in loss of power. During low-power operations, mixtures should always be leaned for smooth operation.

If synchronized operation is lost during large power changes, manually re-synchronize the propeller controls as closely as possible and synchronized operation should reoccur. Securely tighten the quadrant friction lock, then adjust the phasing knob as desired.

During the descent, the mixtures should be gradually enrichened to maintain smooth engine operation. This procedure will provide sufficient fuel flow for the descent; however, if a higher power setting (i.e. balked landing) is required before landing, the mixtures must be readjusted to obtain the correct fuel flow.

To prevent confusion in interpreting which 10,000-foot segment of altitude is being displayed on the altimeter, a striped warning segment is exposed on the face of the altimeter at all altitudes below 10,000 feet.

If fuel has been consumed at uneven rates between the two main tanks because of prolonged engine inoperative flight, it is desirable to balance the fuel load by operating both engines from the fullest tank. However, if there is sufficient fuel in both tanks, even though they may have unequal quantities, it is important to switch the left and right fuel selectors to the left and right main tanks, respectively; feel for detent; and check the auxiliary fuel pumps ON for the landing. This will provide an adequate fuel flow to each engine if a balked landing is necessary.

BEFORE LANDING

1. Seat Belts and Shoulder Harness - SECURE.
2. Propeller Synchrophaser - OFF (Optional System).
3. Alternate Air Controls - CHECK IN.
4. Wing Flaps - DOWN 15° below 180 KIAS.
5. Landing Gear - DOWN below 180 KIAS.
6. Landing Gear Position Indicator Lights - Check down lights ON; Unlocked Light - OFF.
7. Mixtures - FULL RICH or lean as required for smooth operation.
8. Propellers - FULL FORWARD.
9. Wing Flaps - DOWN 45° below 149 KIAS.
10. Minimum Multi-Engine Approach Speed - 95 KIAS at 6850 pounds. Refer to Section 5 for speeds at reduced weights.

Landing gear extension before landing is easily detected by a slight change in airplane trim and a slight "bump" as the gear locks down. Illumination of the gear-down indicator lights (green) is further proof that the gear is down and locked. The gear unlocked indicator light (red) will illuminate when the gear uplocks are released and will remain illuminated while the gear is in transit. The unlocked light will extinguish when the gear has locked down. If it is reasonably certain that the gear is down and one of the gear-down indicator lights is still not illuminated, the malfunction could be caused by a burned out light bulb. This can be checked by pushing the press-to-test button. If the bulb is burned out, it can be replaced with the bulb from any post light, or the landing gear unlocked indicator light.

A simple last-minute recheck on final approach should confirm that all applicable switches are on, the gear-down indicator lights (green) are illuminated, the gear unlocked indicator light (red) is extinguished, the propeller controls are full forward, and the mixtures are set for smooth operation.

Landings are conventional in every respect. A power approach is used down to 50 feet above ground level using power as required to stabilize the approach speed and attitude with wing flaps fully extended, landing gear extended and airspeed of 95 KIAS. A decision must be made at the 50-foot point to complete the landing or initiate a balked landing climb using the appropriate procedure. The landing is completed by closing the throttles while passing the 50-foot point and initiating a flare into the landing attitude.

Normally, the throttles are continuously retarded throughout the landing flare while allowing the airplane to touchdown, main wheels first, slightly above stall speed. The nose is then gently lowered to the runway and brakes applied as required. An abrupt power reduction at five feet altitude could result in a hard landing if the airplane is near stall speed. Short field landings on rough or soft runways are done in a similar manner except that the nosewheel is lowered to the runway at a lower speed to prevent excessive nose gear loads.

When a short ground run is the major consideration, the airplane is held off until a full stall touchdown occurs. Maximum effective braking is initiated immediately while continuing to hold the control wheel full aft. Refer to Normal Landing Distance in Section 5 for anticipated ground roll and total distance requirements.

Crosswind landings are performed with the least effort by using the crab method. However, either the wing-low, crab or combination method may be used. Crab the airplane into the wind in a normal approach using a minimum flap setting for the field length. Immediately before touchdown, the airplane is aligned with the flight path by applying down-wind rudder. The landing is made in nearly three-point attitude, and the nosewheel is lowered to the runway immediately after touchdown. A straight course is maintained with the steerable nosewheel and occasional braking if necessary.

BALKED LANDING

1. Increase engine speed to 2700 RPM and apply full throttle if necessary.
2. Balked Landing Transition Speed - 92 KIAS.
3. Landing Gear - RETRACT during IFR go-around or simulated IFR go-around after establishing a positive rate of climb.

> **NOTE**
>
> - Experience indicates that retracting the landing gear during an operational VFR go-around, when an immediate landing is contemplated, has been conducive to gear up landings.
> - Always follow the Before Landing Checklist.

4. Wing Flaps - 15°.
5. Trim airplane for climb.
6. Cowl Flaps - OPEN.
7. Wing Flaps - UP as soon as all obstacles are cleared and a safe altitude and airspeed are obtained.

AFTER LANDING

1. Auxiliary Fuel Pumps - LOW during landing roll.
2. Cowl Flaps - OPEN.
3. Wing Flaps - UP.

Maximum braking effectiveness is obtained by applying full even pressure to the toe brakes without locking the wheels and applying full back pressure to the control column. This procedure is recommended only for emergency stops as excessive brake pad and tire wear will occur. Maximum brake wear occurs at high speed. This brake wear can be reduced using aerodynamic braking supplemented with the use of wheel brakes. Maximum aerodynamic braking occurs with the wing flaps fully extended and the control wheel held aft to keep the nose off the runway as long as possible.

After leaving the active runway, the wing flaps should be retracted. Be sure the wing flaps switch is identified before placing it in the UP position. The auxiliary fuel pump switches are turned to LOW during the landing roll.

SHUTDOWN Vacuum system check per Supplement Sect.9

1. Parking Brake - SET if brakes are cool.
2. Avionics Bus Switch - OFF.
3. All Switches Except Battery, Alternator and Magneto Switches - OFF.
4. Auxiliary Fuel Pumps - OFF.

NOTE

The fuel pumps must be turned OFF prior to stopping engines.

5. Throttles - IDLE.
6. Mixtures - IDLE CUT-OFF.
7. Battery and Alternators - OFF.
8. Magneto Switches - OFF, after engines stop.
9. Control Locks - INSTALL.
10. Fuel Selectors - OFF if a long period of inactivity is anticipated (Feel For Detent).
11. Cabin Door - CLOSE after checking internal upper door handle stowed in the lock plate.

With the mixture levers in IDLE CUT-OFF, the fuel flow is effectively blocked at the fuel metering unit. Thus, it is unnecessary to place the fuel selectors in the OFF position if the airplane is receiving normal usage. However, if a long period of inactivity is anticipated, the fuel selectors should be turned OFF to preclude any possible fuel seepage that might develop through the metering valve.

To preclude battery discharge when the airplane is temporarily inactive, refer to FLYABLE STORAGE, Section 8, for servicing instructions.

STALL

The stall characteristics of the airplane are conventional. Aural warning is provided by the stall warning horn between 5 and 10 KIAS above the stall in all configurations. The stall is also preceded by a mild aerodynamic buffet which increases in intensity as the stall is approached. The power-on stall occurs at a very steep pitch angle with or without flaps. It is difficult to inadvertently stall the airplane during normal maneuvering.

MANEUVERING FLIGHT

No aerobatic maneuvers, including spins, are approved in this airplane; however, the airplane is conventional in all respects through the maneuvering range encountered in normal flight.

PROCEDURES FOR PRACTICE DEMONSTRATION OF V_{MC_A}

One engine inoperative procedures should be practiced in anticipation of an emergency. This practice should be conducted at a safe altitude (5000 feet AGL), with full power operation on both engines, and should be started at a safe speed of at least 105 KIAS. As recovery ability is gained with practice, the starting speed may be lowered in small increments until the feel of the airplane in emergency conditions is well known. It should be noted that as the speed is reduced, directional control becomes more difficult. Emphasis should be placed on stopping the initial large yaw angles by the IMMEDIATE application of rudder supplemented by banking slightly away from the yaw. Practice should be continued until: (1) an instinctive corrective reaction is developed and the corrective procedure is automatic and, (2) airspeed, altitude, and heading can be maintained easily while the airplane is being prepared for a climb. In order to simulate an engine failure, set both engines at full power operation; then at a chosen speed, pull the throttle control of one engine to idle, and proceed with one engine inoperative emergency procedures. Simulated one engine inoperative flight characteristics can be practiced by setting propeller RPM to simulate a critical engine inoperative condition as shown in Figure 4-3.

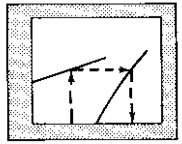
1. Wing Flaps - UP.
2. Landing Gear - UP.
3. Airspeed - V_{SSE} (95 KIAS) or above.
4. Inoperative Engine - IDLE POWER.
5. Operative Engine - 2700 RPM and FULL THROTTLE.
6. Airspeed - DECREASE at approximately 1 knot per second until V_{MC_A} (red radial) or stall warning, whichever occurs first, is obtained.

V_{SSE} is used in training and is not a limitation. It is recommended, however, that except for training, demonstrations, takeoffs and landings, this airplane should not be flown at a speed slower than V_{SSE}.

Under no circumstances should a V_{MC_A} demonstration be attempted at a speed slower than the red radial on the airspeed indicator.

RPM TO SIMULATE CRITICAL (LEFT) ENGINE INOPERATIVE AND FEATHERED

CONDITIONS:
1. Propellers in Low Pitch (Full Forward Position).
2. Manifold Pressure Adjusted to Obtain Proper RPM.



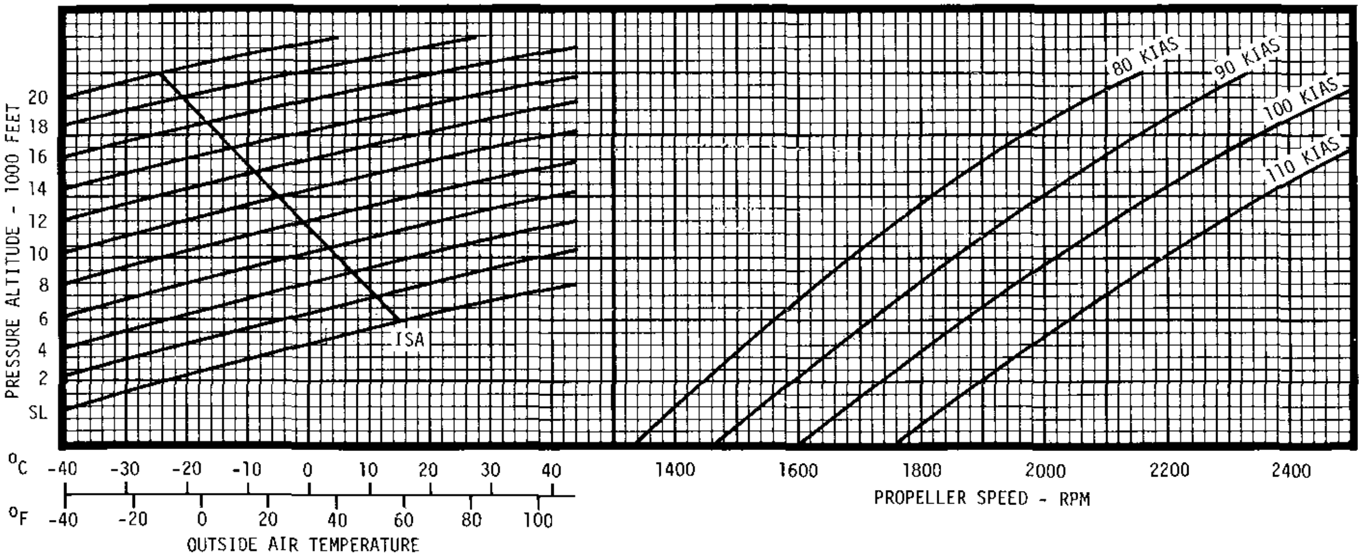


Figure 4-3

NIGHT FLYING

Before starting the engines for a night flight, position the master panel lighting switch to NIGHT and adjust the rheostats to provide enough illumination to check all switches, controls, etc.

Operation of the navigation and anti-collision lights should be checked by observing the reflections on the ground and on the wing tips and wings. After starting the engines, the retractable landing lights (the right landing light is optional equipment) may be extended and checked momentarily. Returning the landing light switches to OFF turns the lights off, but leaves them extended ready for instant use.

Before taxi, the interior lighting intensity is normally decreased to the minimum at which all the controls and switches are visible. The taxi light should be turned on prior to taxiing at night. The landing lights, if used during taxiing, should be used intermittently to avoid excessive drain on the battery. In the engine runups, special attention should be directed to alternator operation by individually turning the voltammeter selector switch to L ALT, R ALT and BATT and noting response on the voltammeter.

Night takeoffs are conventional, although the gear retraction operation is usually delayed slightly to insure that the airplane is well clear of the runway.

In cruising flight, the interior lighting intensity should be decreased to the minimum which will provide adequate instrument legibility.

COLD WEATHER OPERATION

Whenever possible, external preheat should be utilized in cold weather. The use of preheat materially reduces the severity of conditions imposed on both engines and electrical systems. It is the preferred or best method of starting engines in extremely cold weather. Preheat will thaw the oil trapped in the oil coolers and oil filters, which will probably be congealed prior to starting in very cold weather. Refer to the Airplane Service Manual for additional information when operating in extremely cold weather.

When the oil pressure gage is extremely slow in indicating pressure, it may be advisable to fill the pressure line to the gage with kerosene or JP-4.

NOTE

During cold weather operation it is advisable to rotate propellers through four complete revolutions, by hand, before starting engines.

If preheat is not available, external power should be used for starting because of the higher cranking power required and the decreased battery output at low temperatures. The starting procedure is normal; however, if the engines do not start immediately, it may be necessary to position the primer switch to LEFT or RIGHT for 5 to 10 seconds.

After a suitable warm-up period (2 to 5 minutes at 1000 RPM, if preheat is not used) accelerate the engines several times to higher RPM. The propellers should be operated through several complete cycles to warm the governors and propeller hubs. If the engines accelerate smoothly and the oil pressure remains normal and steady, the airplane is ready for takeoff.

WARNING

The wings and tail surfaces must be clear of ice, snow and frost prior to takeoff as flight characteristics can be adversely affected.

NOTE

The waste gate actuators will not operate satisfactorily with engine oil temperatures below the lower limit of the operating range 23.9°C (75°F). With oil temperatures near the bottom of the operating range, the throttle motions should be very slow and care exercised to prevent exceeding the 39.0 inches Hg. manifold pressure limit.

During operation in cold wet weather, the possibility of brake freezing exists; therefore, special precautions should be taken. If ice is found on the brakes during preflight inspection, heat the brakes with a ground heater until the ice melts and all traces of moisture are removed. If a ground heater is not available, spray or pour isopropyl alcohol (MIL-F-5566) on the brakes to remove the ice.

CAUTION

If brakes are deiced using alcohol, insure alcohol has evaporated from the ramp prior to starting engines as a fire could result.

If neither heat nor alcohol are available, frozen brakes can sometimes be freed by cycling the brakes asymmetrically while applying engine power. Caution should be exercised if the airplane is setting on ice or in close proximity to other parked airplanes.

After takeoff from slush-covered runways or taxiways, leave landing gear down for a short period, allowing wheels to spin. This will allow centrifugal force to throw off any accumulated slush which should preclude frozen brakes on landing. Insure wheels are stopped before retracting wheels to prevent buildup of ice or slush in the wheel wells.

During cruise, the propellers should be exercised at half-hour intervals to flush the cold oil from the governors and propeller hubs. Electrical equipment should be managed to assure adequate alternator charging throughout the flight, since cold weather adversely affects battery capacity.

During letdown, watch engine temperatures closely and carry sufficient power to maintain them above operating minimums.

The pitot heat and stall warning heater switches should be turned ON at least 5 minutes before entering potential icing conditions (2 minutes if on ground) so that these units will be warm enough to prevent formation of ice. Preventing ice is preferable to attempting its removal once it has formed.

ALTERNATE INDUCTION AIR

The induction system employed on these engines is considered to be nonicing. However, a manually operated alternate induction air system is incorporated to assure satisfactory operation. Should the induction air inlet, or the induction system air filter become obstructed, the alternate air doors should be manually opened by turning and pulling the alternate air controls full open, which will admit warm unfiltered air to the engines. This system will provide continued satisfactory engine operation. Gradual loss of manifold pressure can be an indication of filter icing.

Should additional power be required, the following procedures may be employed:

1. Increase RPM as required.
2. Move throttles forward to maintain desired manifold pressure.
3. Readjust mixture controls for smooth engine operation.

During ground operation, the alternate air doors should be closed to prevent engine damage caused by ingesting debris through unfiltered air ducts.

NOISE ABATEMENT

Increased emphasis on improving the quality of our environment requires renewed effort on the part of all pilots to minimize the effect of airplane noise on the public.

We, as pilots, can demonstrate our concern for environmental improvement by application of the following suggested procedures, and thereby tend to build public support for aviation:

1. Pilots operating airplanes under VFR over outdoor assemblies of persons, recreational and park areas, and other noise-sensitive areas should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.

2. During departure from or approach to an airport, climb after take-off and descent for landing should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas. Avoidance of noise-sensitive areas, if practical, is preferable to overflight at relatively low altitudes.

NOTE

The preceding recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgment, an altitude of less than 2000 feet is necessary to adequately exercise his duty to see and avoid other airplanes.

The flyover noise level, established in compliance with FAR 36, is 75.1 dB(A).

No determination has been made by the Federal Aviation Administration that the noise level of this airplane is, or should be acceptable or unacceptable, for operation at, into, or out of any airport.

2. The <u>Normal Procedures Section</u> of the AFM by incorporating the following:

THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

- Visible rain at temperatures below 0 degrees Celsius ambient air temperature.
- Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING A SEVERE ICING ENVIRONMENT: *(These procedures are applicable to all flight phases from take-off to landing.)*

Monitor the ambient air temperature.

While severe icing may form at temperatures as cold as –18 degrees Celsius, increased vigilance is warranted at temperatures around freezing when visible moisture is present.

If the visual cues which are specified in the Limitations Section of the AFM for identifying severe icing conditions are observed, accomplish the following:

- Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the aircraft has been certificated.
- Avoid abrupt and excessive manoeuvring that may exacerbate control difficulties.
- Do not engage the autopilot.
- If the autopilot had previously been engaged, hold the control wheel firmly and disengage the autopilot.
- If an unusual roll response or un-commanded roll control movement is observed, reduce the angle-of-attack.
- Do not extend flaps when holding in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.
- If the flaps are extended, do not retract them until the airframe is clear of ice.
- Report these weather conditions to Air Traffic Control.

SECTION 5
PERFORMANCE

TABLE OF CONTENTS

INTRODUCTION

Section 5 of this handbook contains all the performance information required to operate the airplane safely and to help you plan your flights in detail with reasonable accuracy. Safe and precise operation of the airplane requires the pilot to be thoroughly familiar with and understand the data and calculations of this section.

The data on these graphical and tabular charts have been compiled from actual flight tests, with the airplane and engines in good condition, using average pilot techniques. Note that the cruise performance data makes no allowance for wind and/or navigational errors. Allowances for start, taxi, takeoff, climb, descent and 45 minutes reserve at the particular cruise power are provided in the range profile chart.

To determine pressure altitude at origin and destination airports, add 100 feet to field elevation for each .1 inch Hg. below 29.92 or subtract 100 feet from field elevation for each .1 inch Hg. above 29.92.

DEMONSTRATED OPERATING TEMPERATURE

Satisfactory engine cooling has been demonstrated for this airplane with an outside air temperature 23°C (41°F) above standard. This is not to be considered as an operating limitation. Reference should be made to Section 2 for engine operating limitations.

INTRODUCTION TO TABULATED PERFORMANCE

The performance tables are presented in increments of temperature, altitude and any other variables involved. Performance for a given set of conditions can be approximated as follows:

(1) Takeoff, Accelerate Stop, Accelerate Go, Landing - Enter tables at the next higher increment of weight, altitude and temperature.
(2) Cruise - Enter tables at next lower increment of temperature and altitude.

To obtain exact performance values from the tables, it is necessary to interpolate between the increment values. The following is an example of approximation and interpolation, using an excerpt from the Normal Takeoff Distance Chart.

EXAMPLE

Given:		Find:	
Weight	6200 Pounds	Takeoff Speed	____ KIAS
Temperature	(16°C) 61°F	Ground Roll	____ Feet
Pressure Altitude	2400 Feet	Total Distance to Clear 50-Foot Obstacle	____ Feet
Headwind	19 Knots		

Weight Pounds	Takeoff and Climb Speed KIAS	Pressure Altitude Feet	10°C (50°F) Ground Roll - Feet	10°C (50°F) Total Distance to Clear 50-Ft - Feet	20°C (68°F) Ground Roll - Feet	20°C (68°F) Total Distance to Clear 50-Ft - Feet
6500	92	2000	1680	2070	1840	2280
		3000	1790	2190	2000	2450
6000	89	2000	1400	1720	1530	1890
		3000	1480	1820	1620	2000

Approximation Method

Extract from the chart the next increment of weight, altitude and temperature which is more conservative than the actual conditions [i.e.: 6500 pounds, 3000 feet and 20°C (68°F)].

Takeoff and Climb Speed . . . . 92 KIAS
Ground Roll . . . . 2000 Feet
Total Distance to Clear 50-Foot Obstacle . . . . . . 2450 Feet

Interpolation Method

If the approximation method yields a value larger than can be tolerated, a more exact value should be determined using the interpolation method.

The example weight (6200 pounds) is 6000 pounds plus 200/500 or .4 times the difference between 6000 pounds and 6500 pounds [i.e.: 6000-pound value + .4 (6500-pound value - 6000-pound value)]

The example pressure altitude (2400 feet) is 2000 feet plus 400/1000 or .4 times the difference between 2000 feet and 3000 feet [i.e.: 2000-foot value + .4 (3000-foot value - 2000-foot value)].

The example temperature of 16°C (61°F) is 10°C plus 6/10 or .6 times the difference between 10°C and 20°C [i.e.: 10°C value + .6 (20°C value - 10°C value)].

Interpolating Values for Normal Takeoff Distance:

Ground Roll (7 interpolations required)

Altitude interpolation at 10°C (50°F) and 6500 pounds	= 2000-foot value + [.4 (3000-foot value - 2000-foot value)]
	= 1680 feet + [.4 (1790 feet - 1680 feet)]
	= 1680 feet + [44 feet]
	= <u>1724 feet</u>
Altitude interpolation at 20°C (68°F) and 6500 pounds	= 2000-foot value + [.4 (3000-foot value - 2000-foot value)]
	= 1840 feet + [.4 (2000 feet - 1840 feet)]
	= 1840 feet + [64 feet]
	= <u>1904 feet</u>
Altitude interpolation at 10°C (50°F) and 6000 pounds	= 2000-foot value + [.4 (3000-foot value - 2000-foot value)]
	= 1400 feet + [.4 (1480 feet - 1400 feet)]
	= 1400 feet + [32 feet]
	= <u>1432 feet</u>
Altitude interpolation at 20°C (68°F) and 6000 pounds	= 2000-foot value + [.4 (3000-foot value - 2000-foot value)]
	= 1530 feet + [.4 (1620 feet - 1530 feet)]
	= 1530 feet + [36 feet]
	= <u>1566 feet</u>

The Normal Takeoff Distance chart, with altitude interpolation, looks as follows:

Weight Pounds	Takeoff and Climb Speed KIAS	Pressure Altitude Feet	10°C (50°F)		20°C (68°F)	
			Ground Roll - Feet	Total Distance to Clear 50-Ft - Feet	Ground Roll - Feet	Total Distance to Clear 50-Ft - Feet
6500	92	2400	1724	--	1904	--
6000	89	2400	1432	--	1566	--

Weight interpolation at 10°C (50°F) and 2400 feet = 6000-pound value + [.4 (6500-pound value - 6000-pound value)]

= 1432 feet + [.4 (1724 feet - 1432 feet)]

= 1432 feet + [117 feet]

= <u>1549 feet</u>

Weight interpolation at 20°C (68°F) and 2400 feet = 6000-pound value + [.4 (6500-pound value - 6000-pound value)]

= 1566 feet + [.4 (1904 feet - 1566 feet)]

= 1566 feet + [135 feet]

= <u>1701 feet</u>

Takeoff and Climb Speed = 6000-pound value + [.4 (6500-pound value - 6000-pound value)]

= 89 KIAS + [.4 (92 KIAS - 89 KIAS)]

= 89 KIAS + [1.2 KIAS]

= <u>90 KIAS</u>

The Normal Takeoff Distance chart, with altitude and weight interpolation, looks as follows:

Weight Pounds	Takeoff and Climb Speed KIAS	Pressure Altitude Feet	10°C (50°F)		20°C (68°F)	
			Ground Roll - Feet	Total Distance to Clear 50-Ft - Feet	Ground Roll - Feet	Total Distance to Clear 50-Ft - Feet
6200	90	2400	1549	--	1701	--

Temperature interpolation at 2400 feet and 6100 pounds = 10°C (50°F) value + [.6 (20°C (68°F) value - 10°C (50°F) value)]

= 1549 feet + [.6 (1701 feet - 1549 feet)]

= 1549 feet + [91 feet]

= 1640 feet

The Normal Takeoff Distance chart, with altitude, weight and temperature, looks as follows:

Weight Pounds	Takeoff and Climb Speed KIAS	Pressure Altitude Feet	16°C (61°F)	
			Ground Roll - Feet	Total Distance to Clear 50-Ft - Feet
6200	90	2400	1640	--

Ground Roll with 19-knot headwind

$$= 1640 \text{ feet} - [1640 \text{ feet} \left(\frac{19 \text{ knots headwind}}{5 \text{ knots headwind}}\right) (3\%)]$$

= 1640 feet - 187 feet

= 1453 feet

Total Distance to Clear 50-Foot Obstacle (7 interpolations required)

The interpolations required are identical to the ground roll interpolations, except "total distance to clear 50-foot obstacle" values are substituted for the "ground roll" values.

The interpolated value for the total distance to clear 50-foot obstacle is 2021 feet (no wind) and 1791 feet (19-knot headwind).

SAMPLE FLIGHT

The following is an example of a typical flight using the performance data contained in Figures 5-9 through 5-25. The approximation method is used in tabular performance except where noted.

AIRPLANE CONFIGURATION

Airplane Weight . . . . 6200 Pounds
Usable Fuel Load . . . . 900 Pounds

TAKEOFF AIRPORT CONDITIONS

Field Length . . . . 5000 Feet (Runway 23)
Temperature . . . . 16°C (61°F)
Field Pressure Altitude . . . . 2400 Feet
Wind . . . . 270° at 25 Knots
Obstacles . . . . None

CRUISE CONDITIONS

Distance	600 Nautical Miles
Cruise Altitude	9500 Feet
Temperature	$0^{o}C$ ($32^{o}F$)
Wind	15-Knot Tailwind
Power	Maximum Recommended Cruise Power at Recommended Lean Mixture

LANDING AIRPORT CONDITIONS

Field Length	3500 Feet (Runway 19)
Temperature	$7^{o}C$ ($45^{o}F$)
Field Pressure Altitude	1700 Feet
Wind	210^{o} at 17 Knots
Landing Weight	To be Calculated
Obstacles	50-Foot Trees

SAMPLE CALCULATIONS

Wind Component Chart (Figure 5-9)

(1) The angle between the runway and the prevailing wind is 40^{o}.
(2) Enter Figure 5-9 on the 40^{o} wind line and proceed out to the intersection with the 25-knot arc.
(3) Read horizontally left from this intersection; the headwind component is 19 knots.

Normal Takeoff Distance (Figure 5-10)

(1) Enter Figure 5-10 at 6500 pounds weight; the takeoff and climb speed is 92 KIAS.
(2) Proceed horizontally right from 3000 foot pressure altitude to the vertical columns for $20^{o}C$ ($68^{o}F$). The takeoff ground roll is 2000 feet and the total distance required to clear a 50-foot obstacle is 2450 feet without wind correction. With a 19-knot headwind component, the corrected takeoff ground run is 1772 feet and the corrected total distance required is 2171 feet.

$$\frac{\text{19 Knots Headwind}}{\text{5 Knots Headwind}}\ (3\%) = 11.4\%$$

Corrected Takeoff Ground Run = 2000 feet - [11.4% (2000 feet)]

= 2000 feet - [228 feet]

= <u>1772 feet</u>

Corrected Total Distance Required = 2450 feet - [11.4% (2450 feet)]

= 2450 feet - [279 feet]

= <u>2171 feet</u>

Accelerate Stop Distance (Figure 5-11)

(1) Enter Figure 5-11 at 6500 pounds weight; engine failure speed is 92 KIAS.
(2) Proceed horizontally right from 3000-foot pressure altitude to the vertical columns for 20°C. The distance required to accelerate to 92 KIAS and stop is 3990 feet without wind correction. With a 19-knot headwind component, the accelerate stop distance can be reduced by:

$$\frac{\text{19 Knots Headwind}}{\text{5 Knots Headwind}} (3\%) = 11.4\%$$

Corrected Accelerate Stop Distance = 3990 feet - [11.4% (3990 feet)]

= 3990 feet - [455 feet]

= <u>3535 feet</u>

Accelerate Go Distance (Figure 5-12)

(1) Enter Figure 5-12 at 6500 pounds weight; engine failure speed is 92 KIAS.
(2) Proceed horizontally right from 3000 foot pressure altitude to the vertical columns for 20°C. The distance required to clear a 50-foot obstacle, after losing an engine at 92 KIAS, is 3370 feet without wind correction. With a 19-knot headwind component, the distance can be reduced by:

$$\frac{\text{19 Knots Headwind}}{\text{4 Knots Headwind}} (2\%) = 9.5\%$$

Corrected Accelerate Go Distance = 3370 feet - [9.5% (3370 feet)]

= 3370 feet - [320 feet]

= <u>3050 feet</u>

NOTE

- A more exact value of the distance required to accelerate go can be obtained using the interpolation method.
- The interpolation method gives an accelerate go distance of 2716 feet without wind or 2458 feet with 19 knots of headwind.

Rate-Of-Climb — Maximum Climb (Figure 5-13)

(1) Enter Figure 5-13 at 16°C (61°F).
(2) Proceed vertically up to the 2400-foot pressure altitude line.
(3) Proceed horizontally right to the reference line. Follow the slope of the adjacent rate-of-climb lines until intersecting the vertical 6200-pound line.
(4) Proceed horizontally right to obtain rate-of-climb. (1590 Feet per minute)
(5) Enter the climb speed data to determine the climb speed corrected for 6200 pounds and 2400 feet. (104 KIAS)

Rate-Of-Climb — Cruise Climb (Figure 5-14)

(1) Enter Figure 5-14 at 16°C (61°F).
(2) Proceed vertically up to the 2400-foot pressure altitude line.
(3) Proceed horizontally right to the reference line. Follow the slope of the adjacent rate-of-climb lines until intersecting the vertical 6200-pound line.
(4) Proceed horizontally right to obtain rate-of-climb. (980 Feet per minute)
(5) Climb speed is 120 KIAS for all conditions.

Rate-Of-Climb — One Engine Inoperative (Figure 5-15)

(1) Enter Figure 5-15 at 16°C (61°F).
(2) Proceed vertically up to the 2400-foot pressure altitude line.
(3) Proceed horizontally right to the reference line. Follow the slope of the adjacent rate-of-climb lines until intersecting the vertical 6200-pound line.
(4) Proceed horizontally right to obtain rate-of-climb. (360 Feet per minute)
(5) Enter the climb speed data to determine the climb speed corrected for 6200 pounds and 2400 feet. (99 KIAS)

Time, Fuel And Distance To Climb — Cruise Climb (Figure 5-19)

Time, fuel and distance to climb are determined by finding the difference between the airport and the cruise conditions; thus, two calculations are required, one for the airport condition and the second for the cruise condition.

Airport Condition:
(1) Enter Figure 5-19 at 16°C (61°F).
(2) Proceed vertically up to 2400-foot pressure altitude line.
(3) Proceed horizontally right to the 6200-pound line.
(4) Proceed vertically down to obtain time to climb (2.6 minutes), fuel to climb (10 pounds) and distance to climb (6 nautical miles).

Cruise Condition:
(5) Enter Figure 5-19 at 0°C (32°F).
(6) Proceed vertically up to 9500-foot pressure altitude line.
(7) Proceed horizontally right to the 6200-pound line.
(8) Proceed vertically down to obtain time to climb (10.3 minutes), fuel to climb (39 pounds) and distance to climb (22 nautical miles).

Final Calculations:

Time to Climb	= Cruise time to climb - Airport time to climb
	= 10.3 minutes - 2.8 minutes
	= <u>7.5 minutes</u>

Fuel to Climb = Cruise fuel to climb - Airport fuel to climb

= 39 Pounds - 10 pounds

= 29 pounds (add 35 pounds for start, taxi and runup) (64 Pounds total)

Distance to Climb = Cruise distance to climb - Airport distance to climb

= 22 nautical miles - 6 nautical miles

= 16 nautical miles

Adjusted for wind (use 60% of the wind at altitude for climb wind),

= 16 ± wind contribution

$= 16 + [\frac{7 \text{ Minutes}}{60 \text{ Minutes}} (.6 \times 15 \text{ knots})]$

= 16 nautical miles + 1.05 nautical miles

= 17 nautical miles

Time, Fuel And Distance To Descend (Figure 5-24)

Time, fuel and distance to descend are determined by finding the difference between the cruise and the landing airport conditions; thus two calculations are required, one for the cruise condition and the second for the landing airport condition.

Cruise Condition:
(1) Enter Figure 5-24 at the cruise altitude of 9500 feet.
(2) Proceed horizontally right to the guideline.
(3) Proceed vertically down to obtain time to descend (19 minutes), fuel to descend (57 pounds) and distance to descend (60 nautical miles).

Landing Airport Condition:
(4) Enter Figure 5-24 at the airport altitude of 1700 feet.
(5) Proceed horizontally right to the guideline.
(6) Proceed vertically down to obtain time to descend (3.4 minutes), fuel to descend (10 pounds) and distance to descend (11 nautical miles).

Final Calculations:

Time to Descend = Cruise time to descend - Airport time to descend

= 19 minutes - 3.5 minutes

= 15.5 minutes

Fuel to Descend = Cruise fuel to descend - Airport fuel to descend

= 57 pounds - 10 pounds

= 47 Pounds

Distance to Descend = Cruise distance to descend - Airport distance to descend.

= 60 nautical miles - 11 nautical miles

= 49 nautical miles

Adjusted for wind (use 40% of the wind at altitude for descent wind),

= 49 ± wind contribution

$$= 49 + \left[\frac{15.5 \text{ minutes}}{60 \text{ minutes}} (.4 \times 15 \text{ knots})\right]$$

= 49 nautical miles + 1.55 nautical miles

= 51 nautical miles

Cruise Performance With Recommended Lean Mixture (Figure 5-20)

Maximum recommended cruise can be obtained with 2450 RPM and 29.5 Inches Hg. manifold pressure.

The approximation method for extracting data from the cruise tables is to select the next lower temperature and altitude values, which are generally conservative with respect to fuel economy.

(1) Enter the 5000-foot data at 2450 RPM and 29.5 Inches Hg. manifold pressure.
(2) Use -15°C (5°F) data for a power of 76.5%, airspeed of 182 KTAS and a total fuel flow of 229 pounds per hour.
(3) Correcting for a weight of 6200 pounds, the airspeed increases to:

$$182 \text{ KTAS} + \frac{(6850 \text{ pounds} - 6200 \text{ pounds})}{1000 \text{ pounds}} (5 \text{ KTAS}) =$$

$$182 \text{ KTAS} + 3.3 \text{ KTAS} = \underline{185 \text{ KTAS}}$$

Using the interpolation method, interpolating altitude, temperature and weight, the actual performance is 71.1% power, 192 KTAS and total fuel flow of 214 pounds per hour.

In the above calculations, for convenience, the weight was assumed to be equal to the takeoff weight of 6200 pounds. More realistic data can be determined if the average cruise weight is used. This average cruise weight is determined as follows:

$$\text{Cruise Fuel} = \frac{\text{Total distance} - \text{climb distance} - \text{descent distance}}{\text{True airspeed} + \text{wind correction}} \times [\text{Total fuel flow per hour}]$$

$$= \frac{600 \text{ Nautical Miles} - 17 \text{ Nautical Miles} - 51 \text{ Nautical Miles}}{191 \text{ KTAS} + 15 \text{ Knot Tailwind}} \times [214 \text{ pounds per hour}]$$

$$= \frac{532 \text{ Nautical miles}}{206} \times 214 \text{ pounds per hour}$$

= 2.58 hours x 214 pounds per hour

= <u>552 pounds</u>

$$\text{Average Cruise Weight} = \text{Takeoff weight} - \text{start, taxi and climb fuel} - \frac{\text{Cruise Fuel}}{2}$$

$$= 6200 \text{ pounds} - 64 \text{ pounds} - \frac{552 \text{ pounds}}{2}$$

= <u>5860 pounds</u>

Average Cruise Speed = True airspeed from Figure 5-20 + weight correction

$$= 189 \text{ KTAS} + 5.0 \left(\frac{990}{1000}\right)$$

= <u>194.0 KTAS</u>

Average Ground Speed = 193 KTAS + tailwind

= 194 KTAS + 15 knots

= <u>209 knots</u>

Distance During Cruise = Total distance - Climb distance - Descent distance

= 600 - 17 - 51

= <u>532 Nautical Miles</u>

$$\text{Time During Cruise} = \frac{\text{Cruise distance}}{\text{ground speed}}$$

$$= \frac{532}{208}$$

= <u>2.56 hours</u>

Normal Landing Distance (Figure 5-25)

Landing Weight = Takeoff weight - climb fuel - cruise fuel - descent fuel

= 6200 pounds - 64 pounds - 552 pounds - 47 pounds

= <u>5537 pounds</u>

Wind = 210° at 17 knots. Determine headwind component from Figure 5-9. (16 knots headwind))

Enter Figure 5-25 at 6000 pounds; the approach speed is 88 KIAS. Proceed horizontally right from 2000 foot pressure altitude to the vertical column for 10°C (50°F). The landing distance ground roll is 840 feet and the total distance required to clear a 50-foot obstacle is 2270 feet without wind correction. With a 16-knot headwind component, the corrected ground roll distance is 759 feet and the corrected total distance required is 2052 feet.

$$\frac{\text{16 Knots Headwind}}{\text{5 Knots Headwind}} (3\%) = 9.6\%$$

Corrected Landing Ground Roll = 840 feet - [9.6% (840)]
= 840 feet - 81 feet
= 759 feet

Corrected Total Distance Required = 2270 - [9.6% (2270)]
= 2270 feet - 218 feet
= 2052 feet

Rate-Of-Climb — Balked Landing Climb (Figure 5-16)

(1) Enter Figure 5-16 at 7°C (45°F).
(2) Proceed vertically up to the 1700-foot pressure altitude line.
(3) Proceed horizontally right to the weight reference line. Follow the guidelines up and to the right until intersecting the vertical 5572-pound weight line.
(4) Proceed horizontally right to determine the rate-of-climb. (1130 Feet per minute)

Total Fuel Required = Start, taxi and climb fuel + cruise fuel + descent fuel
= 64 pounds + 552 pounds + 47 pounds = 662 pounds (Without Holding Fuel)
or 662 pounds + 103 pounds = 765 pounds (With 45 Minutes Holding Fuel)

Holding Time (Figure 5-23)

To determine holding time, the fuel available for holding must be determined.

Fuel Available for Holding = Initial fuel - [start, taxi and climb fuel + cruise fuel + descent fuel]
= 900 pounds - [64 pounds + 552 pounds + 47 pounds]
= 237 pounds

(1) Enter Figure 5-23 at 237 pounds of fuel available.
(2) Proceed vertically up to the intersection with the guideline.
(3) Proceed horizontally left to obtain holding time available. (1.8 hours)

AIRSPEED CALIBRATION - NORMAL STATIC SOURCE

NOTE:
1. Indicated airspeed assumes zero instrument error.
2. The following calibrations are not valid in the prestall buffet.
3. The following calibrations are valid for the pilot's and copilot's airspeed indicators when the standard or optional dual static system is installed.

Gear Up Flaps 0°		Gear Down Flaps 15°		Gear Down Flaps 45°	
KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
70	72	70	71	70	71
80	81	80	80	80	80
90	90	90	90	90	89
---	---	---	---	95*	93*
100	99	100	99	100	98
110	109	110	108	110	107
120	118	120	118	120	116
140	137	130	127	130	126
160	157	140	137	140	136
180	175	150	146	149	145
200	195	160	156	---	---
220	216	170	165	---	---
235	231	180	174	---	---

*Recommended Minimum All Engines Approach Speed at 6850 Pounds with 45° Wing Flaps.

Figure 5-1

AIRSPEED CALIBRATION - ALTERNATE STATIC SOURCE

NOTE:
1. Indicated airspeed assumes zero instrument error.
2. The following calibrations are not valid in the prestall buffet.
3. The following calibrations are valid for pilot's and copilot's airspeed indicators when the standard static system is installed.
4. An alternate static source is not available for copilot's instruments when optional dual static system is installed.
5. The following calibrations are valid with the ram air control pulled out. Calibrations presented in parenthesis are valid when the ram air control is pushed in.

PILOT'S FOUL WEATHER WINDOW CLOSED WITH HEATER OFF					
Gear Up Flaps 0°		Gear Down Flaps 15°		Gear Down Flaps 45°	
KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
---	---	---	---	80	76
---	---	---	---	90	85
90	91	90	87	98*	93*
100	100	100	96	100	94
120	118	120	114	120	113
140	137	140	133	140	130
160	155	160	151	156	145
180	174	180	169	---	---
200	192	186	175	---	---
PILOT'S FOUL WEATHER WINDOW CLOSED WITH HEATER ON					
---	---	---	---	80	77 (77)
90	91 (91)	90	88 (90)	90	86 (86)
---	---	---	---	97* (97*)	93* (93*)
100	100 (100)	100	97 (99)	100	95 (95)
120	120 (118)	120	115 (117)	120	114 (114)
140	139 (137)	140	134 (135)	140	132 (132)
160	158 (155)	160	152 (153)	154 (154)	145 (145)
180	177 (174)	180	170 (171)	---	---
200	196 (192)	185	175 (175)	---	---
PILOT'S FOUL WEATHER WINDOW OPEN WITH HEATER ON OR OFF					
---	---	---	---	80	73
90	86	90	83	90	82
100	95	100	92	100	91
---	---	---	---	102*	93*
120	114	120	111	120	109
140	133	140	130	140	128
160	152	160	149	159	145
180	170	180	168	---	---
200	189	188	175	---	---

*Recommended Minimum All Engines Approach Speed at 6850 Pounds With 45° Wing Flaps.

Figure 5-2

ALTIMETER CORRECTION - NORMAL STATIC SOURCE

NOTE:
1. Add correction to indicated altimeter reading.
2. The following calibrations are valid for the pilot's and copilot's altimeters when the standard or optional dual static system is installed.

Altitude	Sea Level			10,000 Feet			20,000 Feet		
Gear	Up	Down	Down	Up	Down	Down	Up	Down	Down
Flaps	0°	15°	45°	0°	15°	45°	0°	15°	45°
KIAS	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
80	7	0	0	10	0	0	13	0	0
95*			-17			-23			-32
100	-9	-9	-18	-12	-12	-24	-17	-17	-34
120	-22	-22	-43	-29	-29	-58	-41	-41	-81
140	-38	-38	-51	-51	-51	-69	-71	-71	-95
160	-44	-58	---	-59	-79	---	-82	-109	---
180	-83	---	---	-112	---	---	-155	---	---
200	-93	---	---	-125	---	---	-174	---	---
220	-82	---	---	-111	---	---	-154	---	---

*Recommended Minimum All Engines Approach Speed at 6850 Pounds With 45° Wing Flaps.

ALTITUDE CORRECTION PROCEDURE

$$\begin{bmatrix}\text{INDICATED ALTITUDE}\\ \text{TO FLY}\end{bmatrix} = \begin{bmatrix}\text{DESIRED ALTITUDE}\\ \text{(MSL)}\end{bmatrix} - \begin{bmatrix}\text{ALTIMETER}\\ \text{CORRECTION}\end{bmatrix}$$

Figure 5-3

ALTIMETER CORRECTION - ALTERNATE STATIC SOURCE

NOTE:
1. Add correction to indicated altimeter reading.
2. The following calibrations are valid for pilot's and copilot's altimeters when the standard static system is installed.
3. An alternate static source is not available for copilot's instruments when the optional dual static system is installed.
4. The following calibrations are valid with the ram air control pulled out. Calibrations presented in parenthesis are valid when the ram air control is pushed in.

Altitude	Sea Level			10,000 Feet			20,000 Feet		
Gear	Up	Down	Down	Up	Down	Down	Up	Down	Down
Flaps	0°	15°	45°	0°	15°	45°	0°	15°	45°
KIAS	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
PILOT'S FOUL WEATHER WINDOW CLOSED WITH HEATER OFF									
80	---	---	-29	---	---	-39	---	---	-54
90	8	-24	-40	11	-33	-54	15	-45	-75
98*	---	---	-44	---	---	-59	---	---	-82
100	0	-36	-54	0	-48	-73	0	-67	-101
120	-22	-65	-76	-29	-88	-102	-41	-122	-142
140	-38	-89	-127	-51	-120	-172	-71	-166	-238
160	-73	-131	---	-99	-178	---	-137	-246	---
180	-99	-182	---	-134	-246	---	-186	-341	---
200	-148	---	---	-201	---	---	-278	---	---
PILOT'S FOUL WEATHER WINDOW CLOSED WITH HEATER ON									
80	---(---)	---(---)	-21(-21)	---(---)	---(---)	-29(-29)	---(---)	---(---)	-40(-40)
90	8(8)	-16(0)	-32(-32)	11(11)	-22(0)	-44(-44)	15(15)	-30(0)	-60(-60)
97(97)*	---(---)	---(---)	-35(-35)	---(---)	---(---)	-47(-47)	---(---)	---(---)	-65(-65)
100	0(0)	-27(-9)	-45(-45)	0(0)	-36(-12)	-61(-61)	0(0)	-50(-17)	-84(-84)
120	0(-22)	-54(-32)	-65(-65)	0(-29)	-73(-44)	-88(-88)	0(-41)	-101(-61)	-122(-122)
140	-13(-38)	-76(-63)	-101(-101)	-17(-51)	-103(-86)	-137(-137)	-24(-71)	-143(-119)	-190(-190)
160	-29(-73)	-117(-102)	---(---)	-40(-99)	-158(-138)	---(---)	-55(-137)	-219(-191)	---(---)
180	-50(-99)	-165(-149)	---(---)	-67(-134)	-224(-201)	---(---)	-93(-186)	-310(-279)	---(---)
200	-74(-148)	---(---)	---(---)	-100(-201)	---(---)	---(---)	-139(-278)	---(---)	---(---)
PILOT'S FOUL WEATHER WINDOW OPEN WITH HEATER ON OR OFF									
80	---	---	-50	---	---	-68	---	---	-94
90	-32	-56	-64	-44	-76	-87	-60	-106	-121
100	-45	-72	-81	-61	-97	-109	-84	-134	-151
102*	---	---	-82	---	---	-111	---	---	-154
120	-65	-97	-119	-88	-132	-161	-122	-182	-223
140	-89	-127	-152	-120	-172	-206	-166	-238	-285
160	-117	-160	---	-158	-217	---	-219	-301	---
180	-165	-198	---	-224	-269	---	-310	-372	---
200	-204	---	---	-276	---	---	-382	---	---

*Recommended Minimum All Engines Approach Speed At 6850 Pounds With 45° Wing Flaps

ALTITUDE CORRECTION PROCEDURE

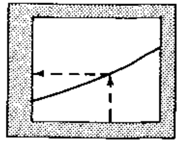
[INDICATED ALTITUDE TO FLY] = [DESIRED ALTITUDE (MSL)] - [ALTIMETER CORRECTION]

Figure 5-4

TEMPERATURE RISE DUE TO RAM RECOVERY

RECOVERY FACTOR (K) = .90

NOTE:
1. Subtract temperature rise from indicated outside air temperature to obtain true outside air temperature



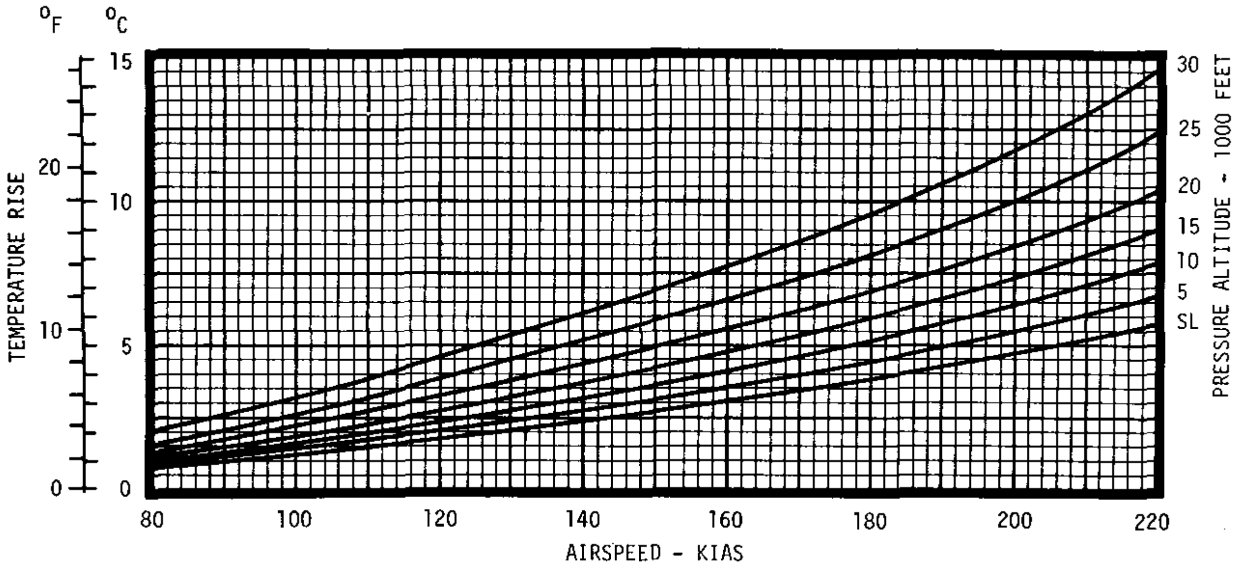


Figure 5-5

TEMPERATURE CONVERSION FROM FAHRENHEIT TO CELSIUS

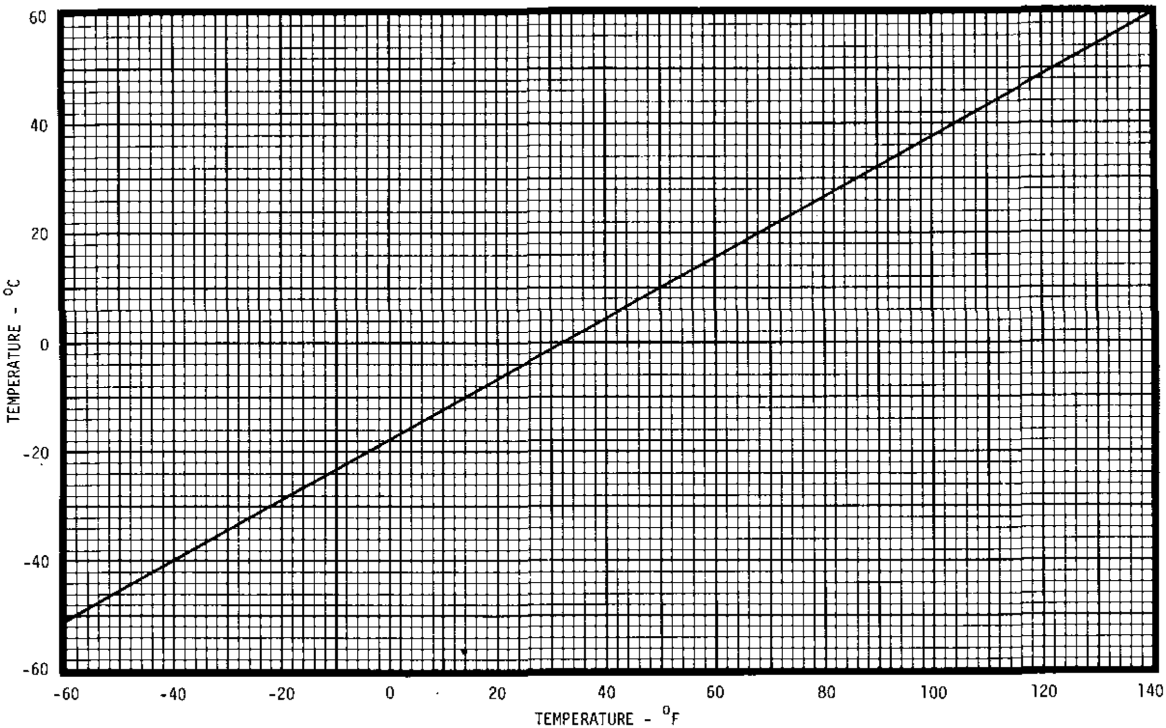


Figure 5-6

PRESSURE CONVERSION
FROM INCHES OF MERCURY TO MILLIBARS

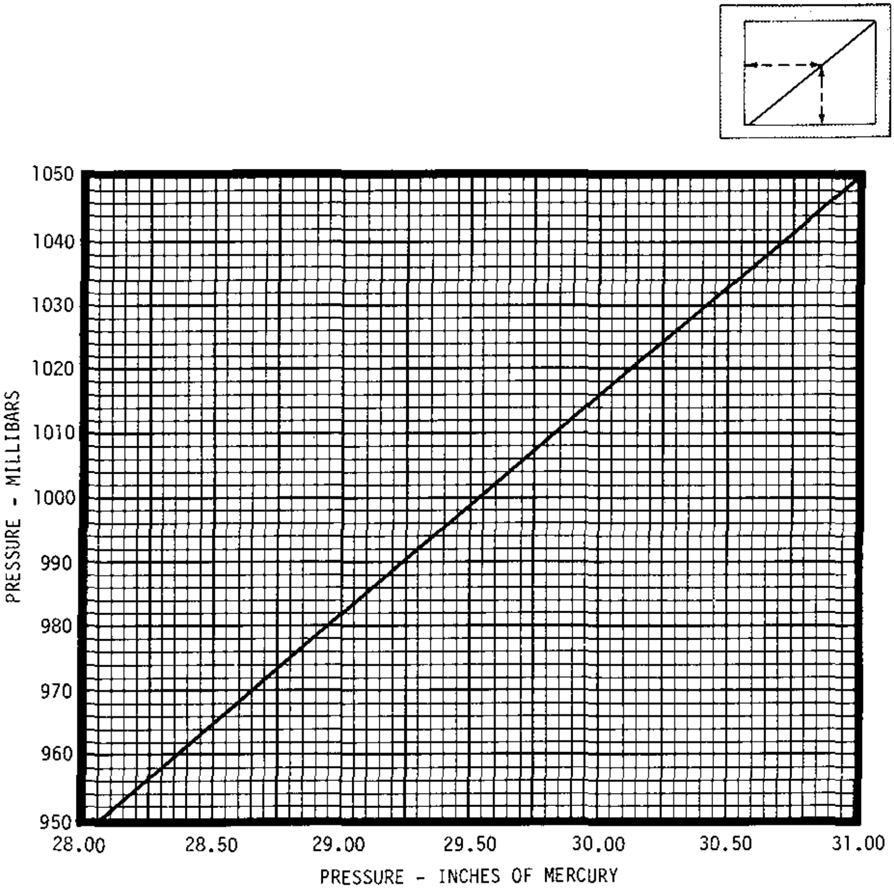


Figure 5-7

STALL SPEEDS

CONDITIONS:
Throttles - IDLE.

NOTE:

1. Maximum altitude loss during a conventional stall is approximately 600 feet.
2. Maximum nose down pitch attitude and altitude loss during recovery from an engine inoperative stall is approximately 10 degrees below the horizon and 300 feet, respectively.

WEIGHT Pounds	Configuration		ANGLE OF BANK							
			0°		20°		40°		60°	
	Flaps	Gear	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
6850	0°	Up	80	78	83	80	93	89	115	110
	15°	Down	78	76	81	78	90	87	111	107
	45°	Down	71	68	74	71	82	78	103	97
6500	0°	Up	78	76	81	78	90	86	112	107
	15°	Down	76	74	78	76	87	84	108	104
	45°	Down	69	67	71	69	80	76	100	94
6000	0°	Up	74	73	76	75	87	83	108	103
	15°	Down	73	71	75	73	83	81	104	100
	45°	Down	64	64	68	66	77	73	96	90
5000	0°	Up	67	66	69	68	78	76	98	94
	15°	Down	66	65	69	67	76	74	74	92
	45°	Down	59	58	61	60	69	67	88	83

Figure 5-8

WIND COMPONENT

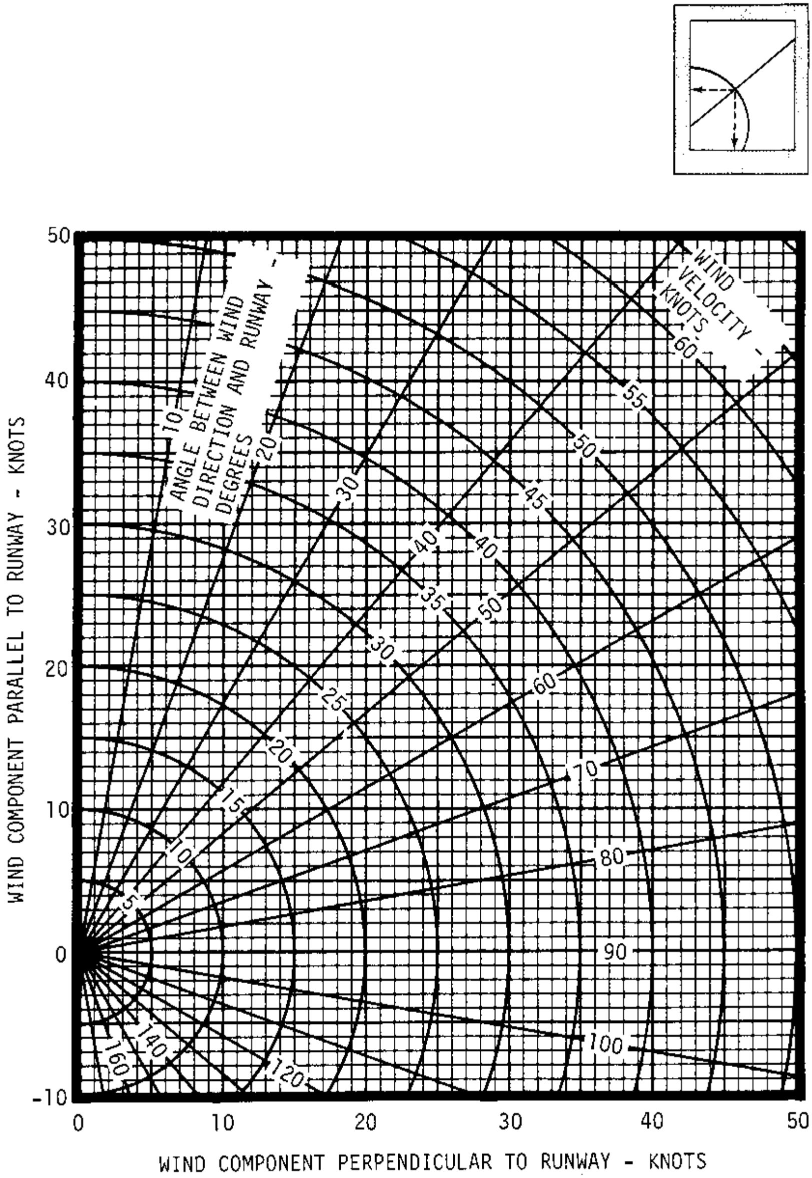


Figure 5-9

NORMAL TAKEOFF DISTANCE

CONDITIONS:
1. 2700 RPM and 39 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In the White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. For altitudes of 10,000 feet or less, decrease distance 3% for each 5 knots of headwind. For altitudes above 10,000 feet, decrease distance by 1% for each 2 knots of headwind.
3. Increase distance 12% for each 5 knots tailwind.

WEIGHT-POUNDS	TAKEOFF TO 50-FOOT OBSTACLE SPEED-KIAS	PRESSURE ALTITUDE-FEET	-20°C (-4°F)		-10°C (14°F)		0°C (32°F)		10°C (50°F)	
			GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
6850	95	Sea Level	1280	1590	1400	1740	1540	1910	1690	2100
		1000	1360	1670	1490	1830	1630	2010	1790	2220
		2000	1440	1770	1580	1940	1730	2130	1900	2340
		3000	1530	1870	1680	2050	1840	2250	2060	2520
		4000	1630	1970	1780	2170	1990	2420	2190	2670
		5000	1730	2090	1930	2330	2120	2560	2330	2830
		6000	1870	2240	2050	2460	2250	2710	2470	3000
		7000	1980	2370	2180	2610	2390	2870	2630	3180
		8000	2110	2510	2320	2770	2550	3050	2810	3380
		9000	2250	2660	2470	2940	2720	3240	2990	3590
		10,000	2390	2830	2630	3120	2900	3450	3190	3830
		11,000	2550	3010	2810	3320	3090	3670	3410	4080
		12,000	2730	3200	3000	3540	3310	3920	3650	4360
		13,000	3030	3580	3340	3970	3690	4410	4080	4940
		14,000	3240	3820	3580	4230	3950	4720	4380	5290
		15,000	3470	4080	3830	4530	4240	5050	4690	5670
6500	92	Sea Level	1140	1410	1240	1540	1360	1690	1490	1850
		1000	1200	1490	1320	1630	1440	1780	1580	1960
		2000	1280	1570	1400	1720	1530	1880	1680	2070
		3000	1360	1660	1490	1810	1630	1990	1790	2190
		4000	1440	1750	1580	1920	1730	2110	1930	2350
		5000	1530	1850	1680	2030	1870	2260	2050	2490
		6000	1630	1960	1810	2180	1990	2390	2180	2640
		7000	1760	2100	1930	2310	2120	2540	2330	2800
		8000	1870	2220	2050	2440	2250	2690	2480	2970
		9000	1990	2360	2180	2590	2400	2860	2640	3160
		10,000	2120	2500	2330	2760	2560	3040	2820	3360
		11,000	2260	2660	2480	2930	2730	3230	3010	3580
		12,000	2410	2830	2650	3120	2920	3440	3220	3820
		13,000	2680	3150	2950	3480	3250	3860	3590	4300
		14,000	2860	3360	3150	3720	3480	4120	3840	4600
		15,000	3060	3590	3380	3970	3730	4410	4120	4930
6000	89	Sea Level	950	1190	1040	1300	1130	1410	1240	1550
		1000	1010	1250	1100	1370	1200	1490	1310	1630
		2000	1070	1320	1170	1440	1280	1570	1400	1720
		3000	1130	1390	1240	1520	1350	1660	1480	1820
		4000	1200	1470	1320	1610	1440	1760	1570	1930
		5000	1280	1550	1400	1700	1530	1860	1670	2040
		6000	1360	1640	1490	1800	1630	1970	1810	2190
		7000	1450	1740	1580	1910	1750	2110	1920	2320
		8000	1540	1850	1700	2040	1870	2240	2050	2460
		9000	1650	1970	1810	2160	1990	2370	2180	2610
		10,000	1760	2090	1930	2290	2120	2520	2320	2770
		11,000	1880	2220	2060	2430	2260	2670	2480	2950
		12,000	2000	2360	2200	2590	2410	2850	2650	3140
		13,000	2220	2610	2430	2880	2670	3170	2940	3510
		14,000	2370	2780	2600	3060	2860	3380	3150	3750
		15,000	2530	2960	2780	3270	3060	3610	3370	4010

Figure 5-10 (Sheet 1 of 4)

NORMAL TAKEOFF DISTANCE

CONDITIONS:
1. 2700 RPM and 39 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In the White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. For altitudes of 10,000 feet or less, decrease distance 3% for each 5 knots of headwind. For altitudes above 10,000 feet, decrease distance by 1% for each 2 knots of headwind.
3. Increase distance 12% for each 5 knots tailwind.

WEIGHT-POUNDS	TAKEOFF TO 50-FOOT OBSTACLE SPEED-KIAS	PRESSURE ALTITUDE-FEET	20°C (68°F)		30°C (86°F)		40°C (104°F)	
			GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
6850	95	Sea Level	1850	2310	2040	2560	2300	2910
		1000	1970	2440	2220	2760	2450	3080
		2000	2140	2630	2350	2920	2600	3260
		3000	2270	2790	2500	3100	2760	3470
		4000	2410	2950	2660	3290	2940	3680
		5000	2560	3130	2830	3490	3130	3920
		6000	2730	3320	3010	3710	3340	4180
		7000	2900	3530	3210	3950	3560	4460
		8000	3100	3760	3420	4210	3800	4770
		9000	3300	4000	3660	4500	4060	5110
		10,000	3530	4270	3910	4810	4350	5480
		11,000	3770	4560	4180	5140	4660	5890
		12,000	4040	4880	4480	5520	4990	6340
		13,000	4530	5580	5040	6390	5640	7540
		14,000	4860	5990	5410	6900	6060	8240
		15,000	5210	6450	5810	7470	6520	9060
6500	92	Sea Level	1640	2040	1800	2250	1980	2490
		1000	1740	2150	1910	2380	2150	2690
		2000	1840	2280	2070	2570	2290	2850
		3000	2000	2450	2200	2720	2430	3020
		4000	2130	2600	2340	2880	2590	3210
		5000	2260	2750	2490	3050	2750	3410
		6000	2400	2920	2650	3240	2930	3630
		7000	2560	3100	2820	3450	3130	3870
		8000	2730	3290	3010	3670	3340	4120
		9000	2910	3500	3220	3910	3570	4400
		10,000	3110	3730	3430	4170	3810	4710
		11,000	3320	3980	3670	4460	4080	5050
		12,00	3550	4250	3930	4770	4370	5420
		13,000	3970	4820	4410	5460	4920	6300
		14,000	4260	5170	4730	5870	5280	6810
		15,000	4570	5540	5080	6320	5680	7390
6000	89	Sea Level	1360	1700	1490	1860	1630	2060
		1000	1440	1790	1580	1970	1730	2180
		2000	1530	1890	1680	2080	1840	2300
		3000	1620	2000	1780	2200	2000	2480
		4000	1730	2120	1930	2370	2120	2630
		5000	1870	2280	2050	2510	2260	2790
		6000	1980	2410	2180	2660	2400	2960
		7000	2110	2550	2320	2830	2560	3150
		8000	2250	2710	2470	3000	2730	3350
		9000	2390	2880	2640	3190	2910	3570
		10,000	2550	3060	2810	3400	3110	3800
		11,000	2730	3260	3000	3630	3320	4060
		12,000	2910	3480	3210	3870	3550	4340
		13,000	3240	3910	3590	4380	3980	4960
		14,000	3470	4180	3840	4690	4270	5330
		15,000	3720	4470	4120	5030	4580	5740

Figure 5-10 (Sheet 2 of 4)

NORMAL TAKEOFF DISTANCE

CONDITIONS:
1. 2700 RPM and 39 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In the White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. For altitudes of 10,000 feet or less, decrease distance 3% for each 5 knots of headwind. For altitudes above 10,000 feet, decrease distance by 1% for each 2 knots of headwind.
3. Increase distance 12% for each 5 knots tailwind.

WEIGHT-POUNDS	TAKEOFF TO 50-FOOT OBSTACLE SPEED-KIAS	PRESSURE ALTITUDE-FEET	-20°C (-4°F)		-10°C (14°F)		0°C (32°F)		10°C (50°F)	
			GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
5500	89	Sea Level	800	1020	870	1100	940	1200	1030	1310
		1000	840	1070	920	1160	1000	1260	1090	1380
		2000	890	1120	970	1220	1060	1330	1150	1450
		3000	950	1180	1030	1290	1120	1400	1220	1530
		4000	1000	1250	1090	1360	1190	1480	1290	1610
		5000	1060	1320	1160	1430	1260	1560	1370	1710
		6000	1130	1390	1230	1510	1340	1650	1470	1820
		7000	1200	1470	1300	1600	1440	1760	1560	1920
		8000	1270	1550	1400	1700	1520	1860	1660	2040
		9000	1360	1650	1480	1800	1620	1970	1760	2150
		10,000	1450	1750	1580	1910	1720	2080	1870	2280
		11,000	1540	1850	1670	2020	1830	2210	1990	2420
		12,000	1630	1960	1780	2140	1940	2340	2120	2570
		13,000	1800	2160	1960	2370	2140	2600	2340	2860
		14,000	1910	2290	2090	2510	2280	2760	2490	3040
		15,000	2040	2440	2220	2670	2430	2930	2650	3240
5000	89	Sea Level	660	850	710	930	770	1000	840	1090
		1000	700	900	750	970	820	1060	880	1150
		2000	740	940	800	1020	860	1110	930	1200
		3000	780	990	840	1070	910	1170	990	1270
		4000	820	1040	890	1130	960	1230	1040	1330
		5000	870	1100	940	1190	1020	1290	1100	1410
		6000	920	1160	1000	1250	1080	1360	1180	1500
		7000	970	1220	1060	1320	1150	1450	1250	1580
		8000	1030	1290	1130	1400	1220	1530	1320	1660
		9000	1100	1360	1190	1480	1290	1610	1400	1760
		10,000	1170	1440	1260	1560	1370	1700	1480	1860
		11,000	1240	1520	1340	1650	1450	1800	1570	1960
		12,000	1310	1610	1420	1750	1540	1900	1670	2080
		13,000	1430	1760	1550	1920	1680	2100	1820	2300
		14,000	1520	1870	1650	2030	1790	2220	1940	2440
		15,000	1610	1980	1750	2160	1900	2360	2060	2590

Figure 5-10 (Sheet 3 of 4)

NORMAL TAKEOFF DISTANCE

CONDITIONS:
1. 2700 RPM and 39 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In the White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. For altitudes of 10,000 feet or less, decrease distance 3% for each 5 knots of headwind. For altitudes above 10,000 feet, decrease distance by 1% for each 2 knots of headwind.
3. Increase distance 12% for each 5 knots tailwind.

WEIGHT-POUNDS	TAKEOFF TO 50-FOOT OBSTACLE SPEED-KIAS	PRESSURE ALTITUDE-FEET	20°C (68°F)		30°C (86°F)		40°C (104°F)	
			GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
5500	89	Sea Level	1120	1430	1220	1560	1330	1720
		1000	1180	1500	1290	1650	1410	1810
		2000	1250	1590	1360	1740	1490	1910
		3000	1330	1670	1450	1840	1610	2050
		4000	1410	1770	1560	1970	1700	2170
		5000	1520	1890	1650	2080	1810	2290
		6000	1610	2000	1750	2200	1920	2430
		7000	1700	2110	1860	2320	2030	2570
		8000	1810	2230	1970	2460	2160	2730
		9000	1920	2370	2100	2610	2300	2900
		10,000	2040	2510	2230	2770	2440	3080
		11,000	2170	2660	2370	2940	2600	3280
		12,000	2310	2830	2530	3130	2770	3490
		13,000	2550	3160	2790	3520	3070	3970
		14,000	2720	3370	2980	3760	3270	4250
		15,000	2900	3590	3180	4010	3490	4560
5000	89	Sea Level	900	1190	980	1290	1060	1410
		1000	960	1250	1030	1360	1120	1490
		2000	1010	1310	1090	1430	1180	1570
		3000	1070	1380	1160	1510	1270	1670
		4000	1130	1450	1240	1610	1340	1770
		5000	1210	1550	1310	1690	1420	1860
		6000	1280	1630	1390	1790	1500	1970
		7000	1350	1720	1470	1890	1590	2080
		8000	1430	1820	1550	1990	1680	2200
		9000	1520	1920	1640	2110	1780	2330
		10,000	1610	2030	1740	2230	1890	2470
		11,000	1700	2150	1850	2360	2000	2620
		12,000	1810	2280	1960	2510	2130	2790
		13,000	1980	2530	2150	2810	2330	3150
		14,000	2100	2690	2280	2990	2480	3370
		15,000	2230	2860	2420	3180	2630	3600

Figure 5-10 (Sheet 4 of 4)

ACCELERATE STOP DISTANCE

CONDITIONS:
1. 2700 RPM and 39.0 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In the White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.
6. Engine Failure at Engine Failure Speed.
7. Idle Power and Maximum Effective Braking After Engine Failure.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. Decrease distance 3% for each 5 knots headwind.
3. Increase distance 13% for each 5 knots tailwind.

WEIGHT - POUNDS	ENGINE FAILURE SPEED - KIAS	PRESSURE ALTITUDE - FEET	TOTAL DISTANCE - FEET						
			-20°C -4°F	-10°C +14°F	0°C 32°F	+10°C +50°F	+20°C +68°F	+30°C +86°F	+40°C +104°F
6850	95	Sea Level	3010	3200	3400	3620	3860	4110	4440
		1000	3150	3350	3570	3800	4040	4360	4660
		2000	3300	3510	3740	3980	4290	4580	4900
		3000	3460	3680	3920	4220	4500	4810	5150
		4000	3630	3870	4150	4430	4730	5050	5420
		5000	3810	4090	4360	4650	4970	5320	5700
		6000	4020	4290	4580	4890	5220	5590	6010
		7000	4220	4510	4810	5140	5500	5890	6330
		8000	4440	4740	5060	5410	5790	6210	6680
		9000	4660	4980	5330	5700	6100	6550	7060
		10,000	4910	5250	5610	6010	6440	6920	7460
6500	92	Sea Level	2680	2850	3020	3210	3420	3640	3890
		1000	2800	2980	3170	3370	3590	3820	4130
		2000	2940	3120	3320	3530	3760	4060	4340
		3000	3080	3270	3480	3710	3990	4260	4560
		4000	3230	3430	3660	3930	4190	4480	4790
		5000	3380	3600	3870	4130	4400	4710	5040
		6000	3550	3810	4060	4340	4630	4950	5310
		7000	3750	4000	4270	4560	4870	5220	5600
		8000	3940	4210	4490	4800	5130	5500	5900
		9000	4140	4420	4720	5050	5410	5800	6230
		10,000	4360	4660	4980	5320	5700	6120	6580
6000	89	Sea Level	2240	2380	2530	2680	2850	3030	3230
		1000	2350	2490	2650	2810	2990	3180	3390
		2000	2460	2610	2780	2950	3140	3340	3560
		3000	2570	2740	2910	3090	3290	3510	3780
		4000	2700	2870	3050	3250	3460	3720	3970
		5000	2830	3010	3210	3410	3660	3910	4180
		6000	2970	3160	3370	3610	3850	4110	4400
		7000	3120	3320	3560	3800	4050	4330	4630
		8000	3280	3510	3740	3990	4260	4550	4880
		9000	3460	3690	3940	4200	4490	4800	5150
		10,000	3640	3880	4140	4420	4730	5060	5430
5500	89	Sea Level	1870	1980	2100	2220	2350	2490	2650
		1000	1950	2070	2190	2320	2460	2610	2770
		2000	2040	2170	2300	2430	2580	2740	2910
		3000	2140	2270	2410	2550	2710	2870	3080
		4000	2240	2380	2520	2670	2840	3040	3230
		5000	2350	2490	2640	2810	3000	3190	3390
		6000	2460	2610	2770	2960	3150	3350	3560
		7000	2580	2740	2930	3110	3300	3520	3740
		8000	2710	2890	3070	3260	3470	3690	3940
		9000	2850	3030	3230	3430	3650	3880	4140
		10,000	3000	3190	3390	3610	3840	4090	4360
5000	89	Sea Level	1520	1610	1710	1800	1910	2020	2130
		1000	1590	1690	1780	1890	1990	2110	2230
		2000	1670	1760	1870	1970	2090	2210	2330
		3000	1740	1840	1950	2070	2180	2310	2470
		4000	1820	1930	2040	2160	2290	2440	2580
		5000	1910	2020	2140	2270	2410	2550	2710
		6000	2000	2120	2240	2390	2530	2680	2840
		7000	2100	2220	2360	2500	2650	2810	2980
		8000	2200	2340	2480	2620	2780	2950	3120
		9000	2310	2450	2600	2750	2920	3090	3280
		10,000	2420	2570	2730	2890	3060	3250	3450

Figure 5-11

ACCELERATE GO DISTANCE

CONDITIONS:
1. 2700 RPM and 39 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In the White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN
5. Level Hard Surface Dry Runway.
6. Engine Failure At Engine Failure Speed.
7. Landing Gear Up or in Transit and Propeller Feathered During Climb.
8. Maintain Engine Failure Speed Until Clear of Obstacle.

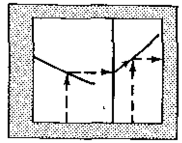
NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. Decrease distance 2% for each 4 knots headwind.
3. Increase distance 11% for each 5 knots of tailwind.
4. Distance in boxes represent rates of climb less than 50 ft/min.

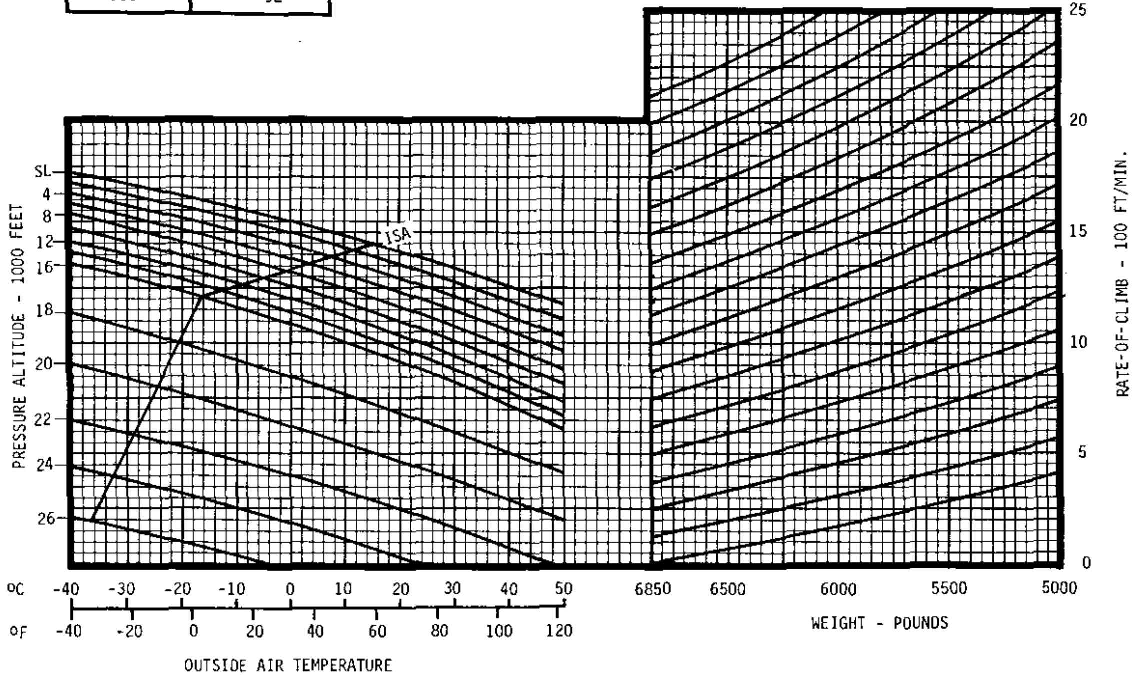
WEIGHT - POUNDS	ENGINE FAILURE - SPEED - KIAS	PRESSURE ALTITUDE - FEET	TOTAL DISTANCE TO CLEAR 50-FOOT OBSTACLE - FEET						
			-20°C -4°F	-10°C +14°F	0°C 32°F	+10°C +50°F	+20°C +68°F	+30°C +86°F	+40°C +104°F
6850	95	Sea Level	2090	2310	2570	2880	3270	3770	4520
		1000	2200	2440	2720	3050	3470	4080	4880
		2000	2320	2570	2870	3240	3740	4370	5300
		3000	2450	2720	3040	3480	3990	4700	5790
		4000	2580	2880	3260	3700	4270	5070	6370
		5000	2730	3080	3460	3940	4580	5500	7090
		6000	2920	3260	3680	4210	4920	6000	8000
		7000	3090	3460	3920	4510	5320	6600	9230
		8000	3280	3680	4180	4840	5770	7330	11,000
		9000	3490	3930	4480	5210	6300	8250	13,900
		10,000	3710	4190	4810	5640	6930	9480	------
6500	92	Sea Level	1840	2020	2240	2490	2790	3160	3650
		1000	1930	2130	2360	2630	2950	3360	3960
		2000	2030	2240	2490	2780	3130	3630	4240
		3000	2140	2370	2630	2940	3370	3870	4560
		4000	2260	2500	2780	3160	3580	4130	4920
		5000	2390	2650	2980	3350	3810	4430	5340
		6000	2520	2830	3160	3560	4070	4770	5820
		7000	2690	2990	3350	3790	4360	5150	6400
		8000	2850	3170	3560	4050	4680	5580	7110
		9000	3020	3370	3800	4330	5040	6090	8000
		10,000	3210	3590	4050	4640	5450	6700	9190
6000	89	Sea Level	1540	1680	1850	2040	2260	2530	2870
		1000	1610	1770	1940	2150	2390	2680	3050
		2000	1690	1860	2050	2270	2530	2840	3240
		3000	1780	1960	2160	2390	2670	3010	3500
		4000	1880	2060	2280	2530	2830	3240	3730
		5000	1980	2180	2410	2680	3040	3450	3990
		6000	2090	2300	2550	2870	3220	3670	4280
		7000	2210	2440	2720	3040	3430	3930	4610
		8000	2340	2600	2880	3230	3650	4200	4980
		9000	2480	2750	3060	3430	3900	4520	5410
		10,000	2630	2920	3250	3660	4170	4870	5910
5500	89	Sea Level	1330	1460	1600	1760	1950	2180	2460
		1000	1400	1530	1680	1850	2050	2300	2610
		2000	1470	1610	1770	1950	2170	2430	2770
		3000	1540	1690	1860	2050	2290	2580	2980
		4000	1620	1780	1960	2170	2420	2760	3180
		5000	1710	1870	2070	2290	2590	2930	3390
		6000	1800	1980	2180	2440	2740	3120	3640
		7000	1890	2090	2320	2590	2910	3330	3910
		8000	2000	2220	2460	2740	3100	3560	4230
		9000	2120	2340	2600	2910	3300	3820	4590
		10,000	2240	2480	2760	3100	3530	4110	5010
5000	89	Sea Level	1150	1250	1370	1500	1660	1850	2090
		1000	1200	1310	1430	1580	1750	1950	2220
		2000	1260	1370	1500	1660	1840	2060	2350
		3000	1320	1440	1580	1740	1940	2180	2520
		4000	1380	1510	1660	1840	2050	2330	2680
		5000	1450	1590	1750	1940	2180	2470	2860
		6000	1530	1670	1850	2060	2310	2630	3070
		7000	1610	1760	1960	2180	2450	2800	3300
		8000	1690	1870	2070	2310	2600	2990	3560
		9000	1790	1970	2190	2450	2770	3210	3870
		10,000	1890	2090	2320	2600	2960	3450	4230

Figure 5-12

RATE-OF-CLIMB - MAXIMUM CLIMB

WEIGHT - POUNDS	CLIMB SPEED - KIAS
6850	109
6500	106
6000	102
5500	97
5000	92





CONDITIONS:
1. 2600 RPM and 39.0 Inches Hg.*
2. Mixtures - FUEL FLOW In White Triangle.*
3. Landing Gear - UP.
4. Wing Flaps UP.
5. Cowl Flaps - OPEN.

*ABOVE 16,000 FEET, USE PLACARDED MANIFOLD PRESSURE AND CLIMB FUEL FLOWS.

Figure 5-13

52847041

RATE-OF-CLIMB - CRUISE CLIMB

CONDITIONS:
1. 2450 RPM and 29.5 Inches Hg.
2. Landing Gear - UP.
3. Wing Flaps - UP.
4. Cowl Flaps - AS REQUIRED.
5. Airspeed - 120 KIAS.
6. Mixtures - 117 Pounds per Hour (Blue Triangle).

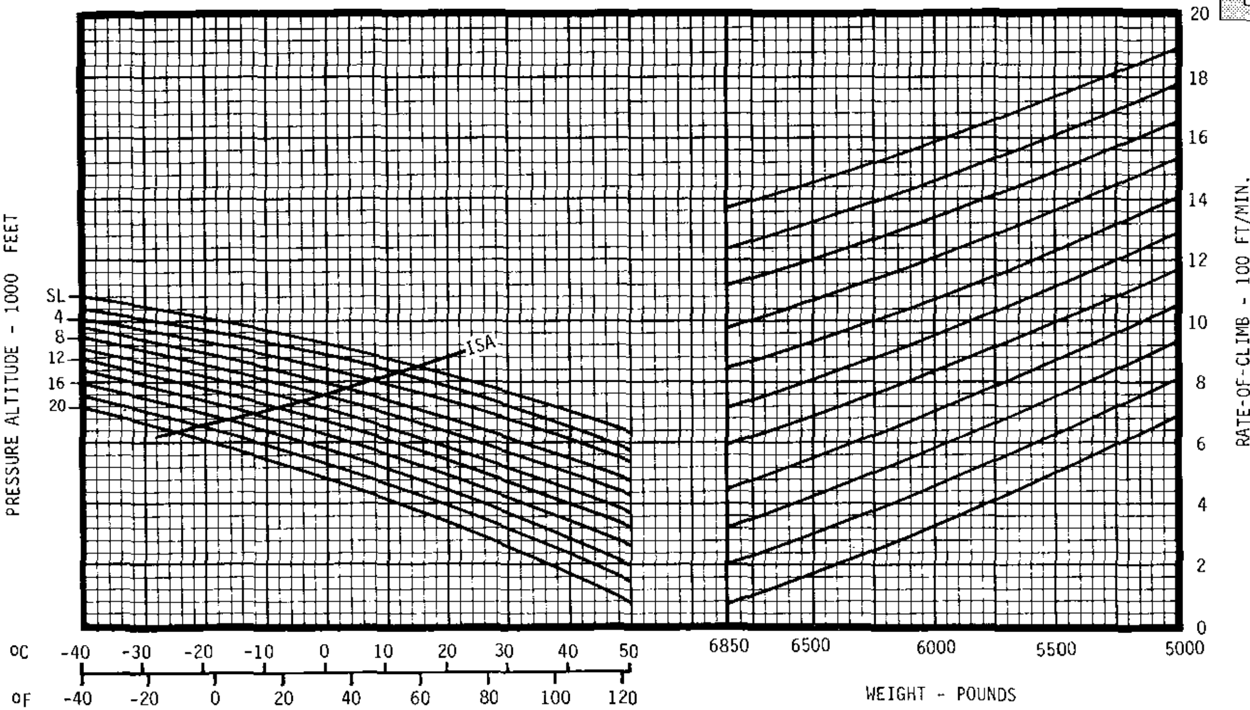
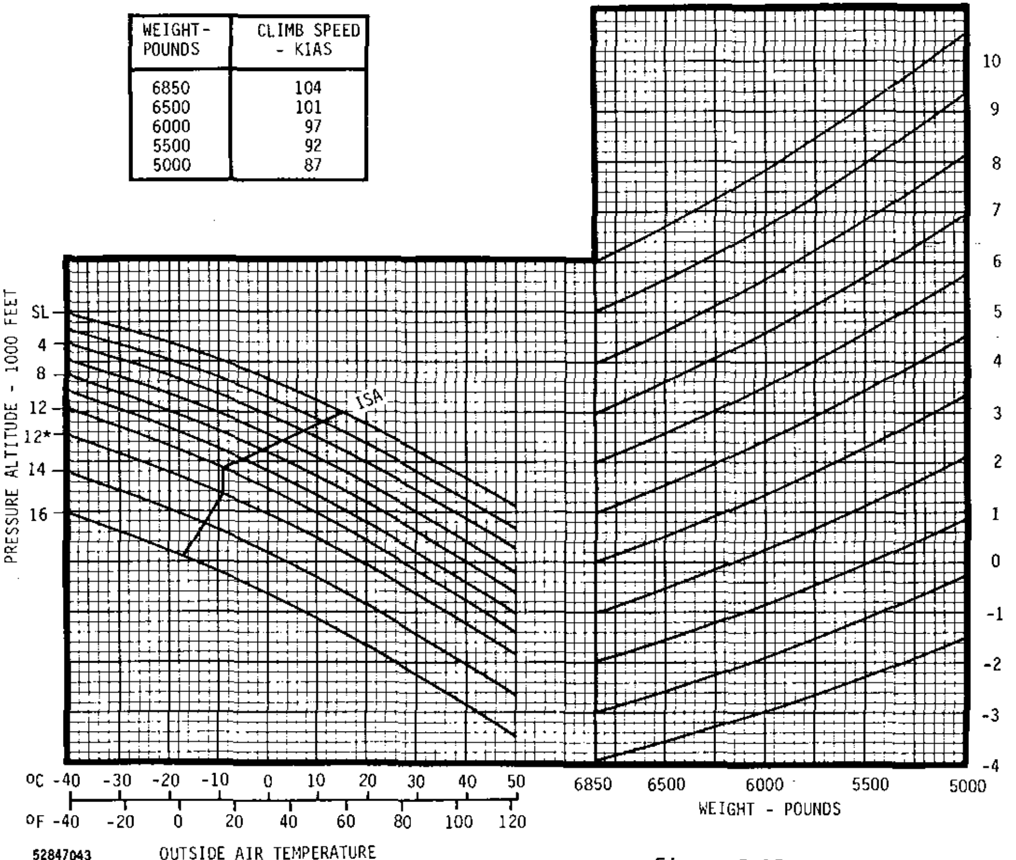


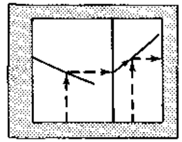
Figure 5-14

52847042

RATE-OF-CLIMB - ONE ENGINE INOPERATIVE

WEIGHT-POUNDS	CLIMB SPEED - KIAS
6850	104
6500	101
6000	97
5500	92
5000	87





CONDITIONS:
1. 2700 RPM and 39.0 Inches Hg.*
2. Mixture - CHECK Fuel Flow In White Arc.*
3. Landing Gear - UP.
4. Wing Flaps - UP.
5. Inoperative Propeller - FEATHERED.
6. Wings Banked 5° Toward Operative Engine With Approximately 1/2 Ball Slip Indicated on the Turn and Bank Indicator.
7. Cowl Flaps - CLOSED on Inoperative Engine.

*ABOVE 12,000 FEET, USE PLACARDED MANIFOLD PRESSURE AND CLIMB FUEL FLOW.

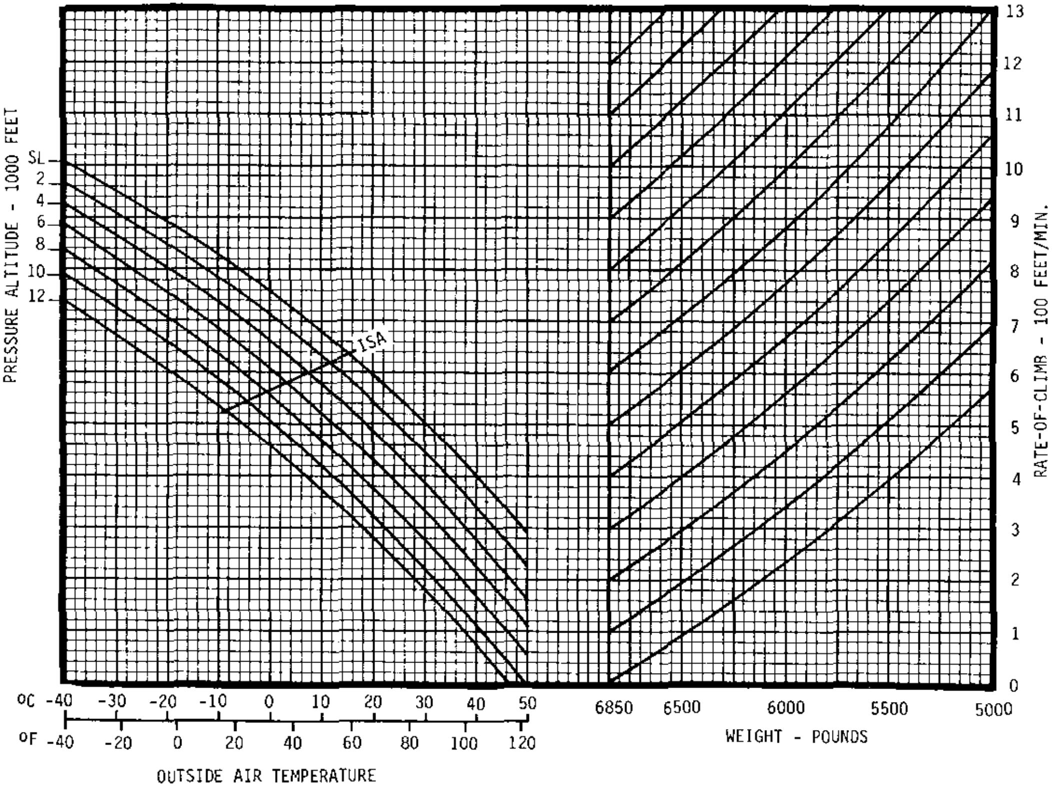
NOTE: Approximate Effect of Configuration on One Engine Inoperative Rate-of-Climb.

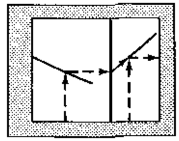
Subtract values listed below from value obtained in above graph. Effects for a combination of gear, flap or windmilling propeller may be obtained by adding the effects for each.

Inoperative Engine Windmilling	400 Ft/Min
Gear Down	350 Ft/Min
Flaps Down 15°	200 Ft/Min
Flaps Down 45°	800 Ft/Min

Figure 5-15

RATE-OF-CLIMB - BALKED LANDING CLIMB





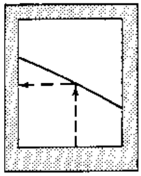
CONDITIONS:
1. 2700 RPM and 39.0 Inches Hg.
2. Mixtures - CHECK Fuel Flows In White Arc.
3. Landing Gear - DOWN.
4. Wing Flaps - 45°.
5. Cowl Flaps - OPEN.
6. Climb Speed - Refer To Table.

WEIGHT - POUNDS	CLIMB SPEED - KIAS
6850	92
6500	89
6000	85
5500	84
5000	84

Figure 5-16

52847044

ENGINE INOPERATIVE SERVICE CEILING



CONDITIONS:

1. Engine Inoperative Climb Configuration.

NOTE:

1. Engine Inoperative service ceiling is the maximum altitude where the airplane has the capability of climbing 50 feet per minute with one engine inoperative and feathered.
2. Increase indicated service ceiling 100 feet for each 0.10 inch Hg. altimeter setting greater than 29.92.
3. Decrease indicated service ceiling 100 feet for each 0.10 inch Hg. altimeter setting less than 29.92.
4. This chart provides performance information to aid in route selection when operating under FAR 135.181 and 91.119 requirements.

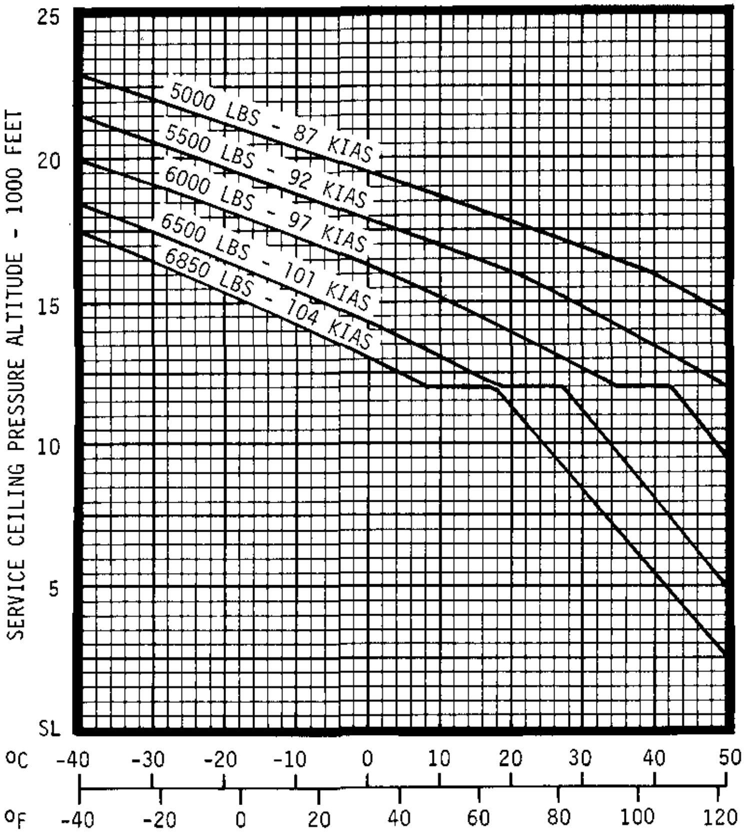
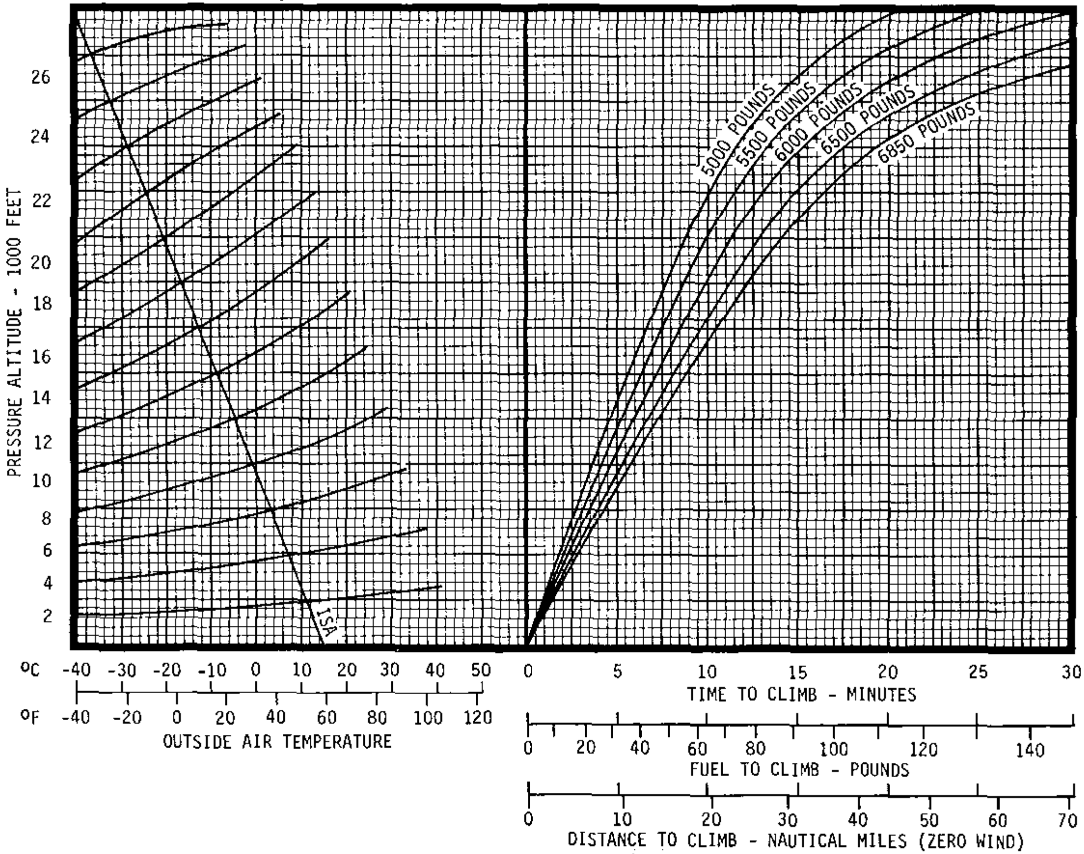
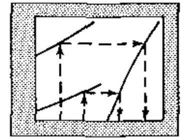


Figure 5-17

TIME, FUEL AND DISTANCE TO CLIMB - MAXIMUM CLIMB





CONDITIONS:
1. 2600 RPM and 39.0 Inches Hg.*
2. Mixture - Check Fuel Flow In White Triangle.*
3. Landing Gear - UP.
4. Wing Flaps - UP.
5. Cowl Flaps - OPEN.

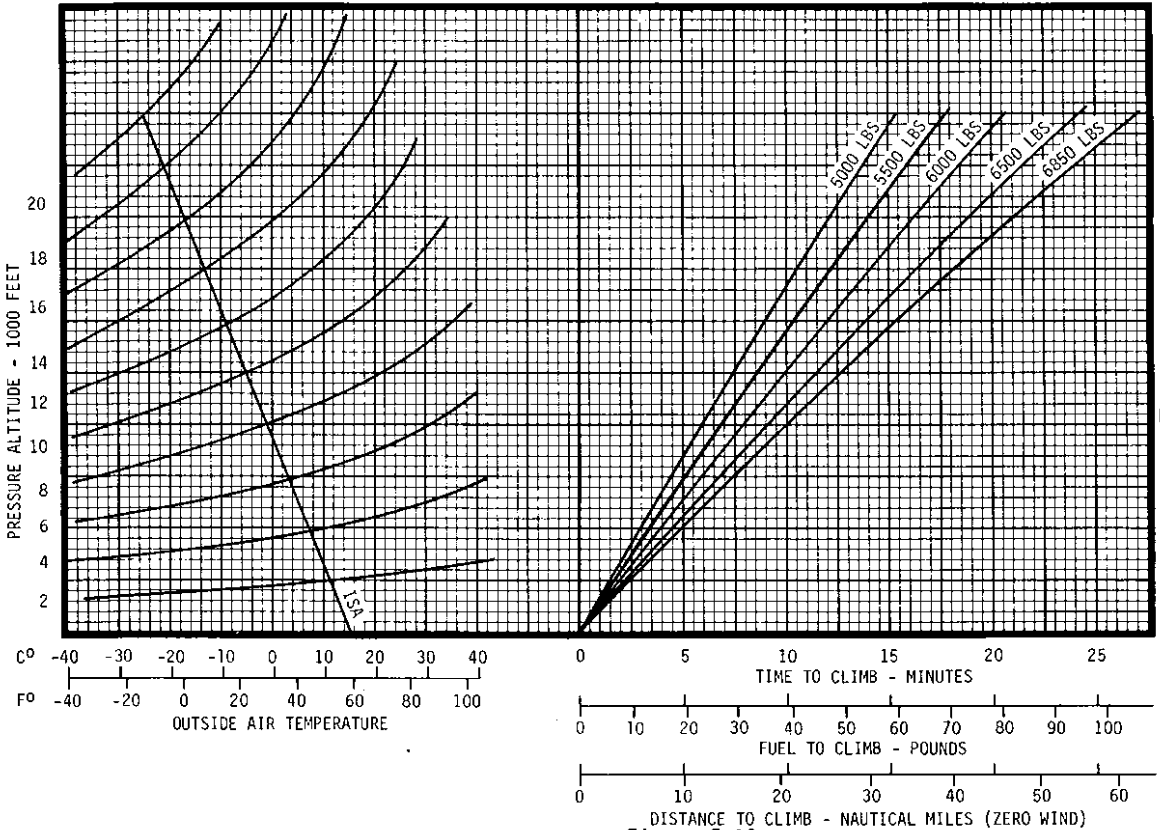
*Above 16,000 Feet, Use Placarded Manifold Pressure and Climb Fuel Flow.

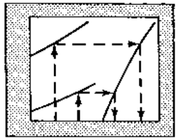
NOTE:
1. Time, Fuel and Distance for the Climb are Determined by Taking the Difference Between the Airport Altitude and Initial Cruise.
2. For Total Fuel Used, Add 35 Pounds for Start, Taxi and Takeoff.

WEIGHT-POUNDS	CLIMB SPEED - KIAS
6850	109
6500	106
6000	102
5500	97
5000	92

Figure 5-18

TIME, FUEL AND DISTANCE TO CLIMB - CRUISE CLIMB





CONDITIONS:
1. 2450 RPM and 29.5 Inches Hg.
2. Landing Gear - UP.
3. Wing Flaps - UP.
4. Cowl Flaps - AS REQUIRED.
5. Airspeed - 120 KIAS.
6. Mixtures - Recommended Fuel Flow.

NOTE:
1. Time, fuel and distance for the climb are determined by taking the difference between the airport altitude and initial cruise, altitude conditions.
2. For total fuel used, add 35 pounds for start, taxi and takeoff.

Figure 5-19

52847019

CRUISE PERFORMANCE
WITH RECOMMENDED LEAN MIXTURE

NOTE:
1. At Sea Level, increase speed by 5 KTAS for each 1000 pounds below 6850 pounds.
2. At 5000 Feet, increase speed by 5 KTAS for each 1000 pounds below 6850 pounds.
3. Operations at peak EGT may be utilized with power settings within the boxes if the airplane is equipped with the optional EGT system.

ALTITUDE	RPM	MP	-5°C (23°F) PERCENT BHP	KTAS	TOTAL LB/HR	15°C (STD TEMP) (59°F) PERCENT BHP	KTAS	TOTAL LB/HR	35°C (95°F) PERCENT BHP	KTAS	TOTAL LB/HR
SEA LEVEL	2450	29.5	76.5	175	229	72.0	174	216	67.5	173	203
	2450	27.0	68.8	167	207	64.7	166	195	60.7	165	183
	2450	25.0	62.8	161	189	59.1	160	178	55.5	158	167
	2450	23.0	56.9	154	172	53.6	153	162	50.2	151	152
	2300	30.3	76.5	175	229	72.0	174	216	67.5	173	203
	2300	28.0	69.4	168	209	65.3	167	197	61.3	165	184
	2300	26.0	63.5	162	191	59.8	161	180	56.0	159	169
	2300	24.0	57.6	155	174	54.2	154	164	50.8	152	154
	2300	22.0	51.3	147	155	48.3	146	146	45.3	144	137
	2200	30.3	72.1	170	216	67.8	170	204	63.6	168	191
	2200	28.0	65.8	164	198	61.9	163	186	58.1	162	175
	2200	26.0	60.4	158	182	56.8	157	171	53.3	156	161
	2200	24.0	54.6	151	165	51.4	151	155	48.2	148	146
	2200	22.0	49.0	144	148	46.1	143	140	43.3	139	131
	2100	29.5	66.5	165	200	62.6	164	188	58.6	162	177
	2100	27.0	60.2	158	181	56.7	157	171	53.1	156	160
	2100	25.0	54.8	151	165	51.6	151	156	48.3	148	146
	2100	23.0	49.5	145	150	46.6	143	141	43.7	140	133
	2100	21.0	44.1	137	134	41.5	134	126	38.9	129	119
			-15°C (5°F)			5°C (STD TEMP) (41°F)			25°C (77°F)		
5000 FEET	2450	29.5	76.5	182	229	72.0	182	216	67.5	180	203
	2450	27.0	68.8	174	207	64.7	173	195	60.7	172	183
	2450	25.0	62.8	168	189	59.1	167	178	55.5	165	167
	2450	23.0	56.9	161	172	53.6	160	162	50.2	157	152
	2300	30.3	76.5	182	229	72.0	182	216	67.5	180	203
	2300	28.0	69.4	175	209	65.3	174	197	61.3	173	184
	2300	26.0	63.5	168	191	59.8	167	180	56.0	166	169
	2300	24.0	57.6	161	174	54.2	161	164	50.8	158	154
	2300	22.0	51.3	153	155	48.3	152	146	45.3	148	137
	2200	30.3	72.1	178	216	67.8	177	204	63.6	175	191
	2200	28.0	65.8	171	198	61.9	170	186	58.1	169	175
	2200	26.0	60.4	165	182	56.8	164	171	53.3	162	161
	2200	24.0	54.6	158	165	51.4	156	155	48.2	153	146
	2200	22.0	49.0	150	148	46.1	147	140	43.3	143	131
	2100	29.5	66.5	172	200	62.6	171	188	58.6	169	177
	2100	27.0	60.2	164	181	56.7	164	171	53.1	162	160
	2100	25.0	54.8	158	165	51.6	156	156	48.3	154	146
	2100	23.0	49.5	151	150	46.6	148	141	43.7	144	133
	2100	21.0	44.1	141	134	41.5	137	126	38.9	128	119

Figure 5-20 (Sheet 1 of 3)

CRUISE PERFORMANCE
WITH RECOMMENDED LEAN MIXTURE

NOTE:
1. At 10,000 Feet, increase speed by 5 KTAS for each 1000 pounds below 6850 pounds.
2. At 15,000 Feet, increase speed by 5 KTAS for each 1000 pounds below 6850 pounds.
3. Operations at peak EGT may be utilized with power settings within the boxes if the airplane is equipped with the optional EGT system.

ALTITUDE	RPM	MP	-25°C (-13°F) PERCENT BHP	KTAS	TOTAL LB/HR	-5°C (STD TEMP) (23°F) PERCENT BHP	KTAS	TOTAL LB/HR	15°C (59°F) PERCENT BHP	KTAS	TOTAL LB/HR
10,000 FEET	2450	29.5	76.5	191	229	72.0	190	216	67.5	188	203
	2450	27.0	68.8	182	207	64.7	181	195	60.7	180	183
	2450	25.0	62.8	175	189	59.1	174	178	55.5	172	167
	2450	23.0	56.9	168	172	53.6	166	162	50.2	162	152
	2300	30.3	76.5	191	229	72.0	190	216	67.5	188	203
	2300	28.0	69.4	183	209	65.3	182	197	61.3	181	184
	2300	26.0	63.5	176	191	59.8	175	180	56.0	173	169
	2300	24.0	57.6	169	174	54.2	167	164	50.8	163	154
	2300	22.0	51.3	159	155	48.3	156	146	45.3	150	137
	2200	30.3	72.1	186	216	67.8	185	204	63.6	183	191
	2200	28.0	65.8	178	198	61.9	178	186	58.1	176	175
	2200	26.0	60.4	172	182	56.8	171	171	53.3	168	161
	2200	24.0	54.6	164	165	51.4	162	155	48.2	158	146
	2200	22.0	49.0	155	148	46.1	152	140	43.3	144	131
	2100	29.5	66.5	179	200	62.6	178	188	58.6	177	177
	2100	27.0	60.2	172	181	56.7	171	171	53.1	168	160
	2100	25.0	54.8	164	165	51.6	163	156	48.3	159	146
	2100	23.0	49.5	156	150	46.6	153	141	43.7	146	133
	2100	21.0	44.1	146	134	41.5	138	126	----	---	---

ALTITUDE	RPM	MP	-35°C (-30°F) PERCENT BHP	KTAS	TOTAL LB/HR	-15°C (STD TEMP) (6°F) PERCENT BHP	KTAS	TOTAL LB/HR	5°C (42°F) PERCENT BHP	KTAS	TOTAL LB/HR
15,000 FEET	2450	29.5	76.5	199	229	72.0	198	216	67.5	197	203
	2450	27.0	68.8	190	207	64.7	190	195	60.7	187	183
	2450	25.0	62.8	183	189	59.1	181	178	55.5	178	167
	2450	23.0	56.9	174	172	53.6	172	162	50.2	166	152
	2300	30.3	76.5	199	229	72.0	198	216	67.5	197	203
	2300	28.0	69.4	191	209	65.3	190	197	61.3	188	184
	2300	26.0	63.5	184	191	59.8	182	180	56.0	179	169
	2300	24.0	57.6	175	174	54.2	173	164	50.8	168	154
	2300	22.0	51.3	165	155	48.3	160	146	45.3	149	137
	2200	30.3	72.1	194	216	67.8	193	204	63.6	192	191
	2200	28.0	65.8	187	198	61.9	186	186	58.1	183	175
	2200	26.0	60.4	180	182	56.8	178	171	53.3	174	161
	2200	24.0	54.6	171	165	51.4	167	155	48.2	160	146
	2200	22.0	49.0	160	148	46.1	154	140	----	---	---
	2100	29.5	66.5	187	200	62.6	187	188	58.6	184	177
	2100	27.0	60.2	179	181	56.7	178	171	53.1	173	160
	2100	25.0	54.8	171	165	51.6	168	156	48.3	161	146
	2100	23.0	49.5	161	150	46.6	155	141	----	---	---
	2100	21.0	44.1	147	134	----	---	---	----	---	---

Figure 5-20 (Sheet 2 of 3)

CRUISE PERFORMANCE
WITH RECOMMENDED LEAN MIXTURE

NOTE:

1. At 20,000 Feet, increase speed by 6 KTAS for each 1000 pounds below 6850 pounds.
2. At 25,000 Feet, increase speed by 6 KTAS for each 1000 pounds below 6850 pounds.
3. Operations at peak EGT may be utilized with power settings within the boxes if the airplane is equipped with the optional EGT system.

ALTITUDE	RPM	MP	-45°C (-48°F) PERCENT BHP	KTAS	TOTAL LB/HR	-25°C (STD TEMP) (-12°F) PERCENT BHP	KTAS	TOTAL LB/HR	-5°C (24°F) PERCENT BHP	KTAS	TOTAL LB/HR
20,000 FEET	2450	29.5	76.5	209	229	72.0	208	216	67.5	206	203
	2450	27.0	68.8	199	207	64.7	198	195	60.7	194	183
	2450	25.0	62.8	191	189	59.1	188	178	55.5	183	167
	2450	23.0	56.9	181	172	53.6	177	162	50.2	166	152
	2300	29.5	73.9	205	222	69.5	205	209	65.2	202	196
	2300	28.0	69.4	200	209	65.3	199	197	61.3	195	184
	2300	26.0	63.5	192	191	59.8	190	180	56.0	185	169
	2300	24.0	57.6	182	174	54.2	179	164	50.8	169	154
	2300	22.0	51.3	170	155	48.3	160	146	----	---	---
	2200	30.3	72.1	203	216	67.8	202	204	63.6	200	191
	2200	28.0	65.8	195	198	61.9	193	186	58.1	189	175
	2200	26.0	60.4	187	182	56.8	184	171	53.3	177	161
	2200	24.0	54.6	177	165	51.4	171	155	----	---	---
	2200	22.0	49.0	163	148	----	---	---	----	---	---
	2100	29.5	66.5	196	200	62.6	194	188	58.6	190	177
	2100	27.0	60.2	187	181	56.7	184	171	53.1	177	160
	2100	25.0	54.8	177	165	51.6	171	156	----	---	---
	2100	23.0	49.5	164	150	----	---	---	----	---	---
			-54°C (-66°F)			-34°C (STD TEMP) (-30°F)			-14°C (6°F)		
25,000 FEET	2450	24.0	60.0	193	181	56.5	187	170	----	---	---
	2450	22.0	53.6	178	162	----	---	---	----	---	---
	2450	21.0	50.3	167	152	----	---	---	----	---	---
	2300	24.0	57.4	188	173	54.0	180	163	----	---	---
	2300	22.0	51.3	171	155	----	---	---	----	---	---
	2200	24.0	54.6	181	165	----	---	---	----	---	---
	2200	22.0	----	---	---	----	---	---	----	---	---
	2100	24.0	52.2	174	158	----	---	---	----	---	---
	2100	22.0	----	---	---	----	---	---	----	---	---

Figure 5-20 (Sheet 3 of 3)

RANGE PROFILE

CONDITIONS:
1. Takeoff Weight - 6850 Pounds.
2. Cruise Clumb to Deisred Altitude.
3. Recommended Lean Fuel Flow.
4. Zero Wind.
5. Standard Day.

NOTE:
1. Range computations include fuel required for start, taxi, takeoff, cruise climb to altitude, cruise, descent, and 45 minutes reserve fuel at the particular cruise power.
2. The distances shown are the sum of the distances to climb, cruise and descend.

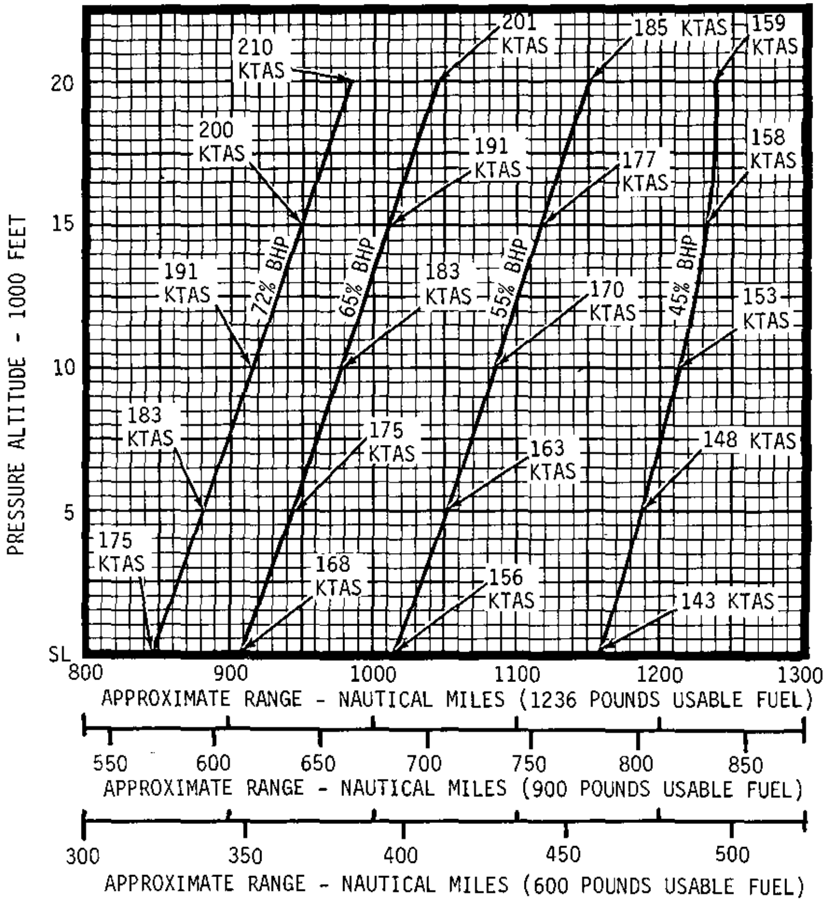
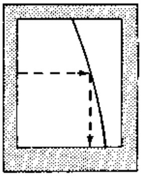


Figure 5-21

52847045

ENDURANCE PROFILE



CONDITIONS:
1. Takeoff Weight - 6850 POUNDS.
2. Cruise Climb to Deisred Altitude.
3. Recommended Lean Fuel Flow.
4. Standard Day.

NOTE:
1. Endurance computations include fuel required for start, taxi, takeoff, cruise climb to altitude, cruise, descent and 45 minutes reserve fuel at the particular cruise power.
2. The endurance shown is the sum of the times to climb, cruise and descend.

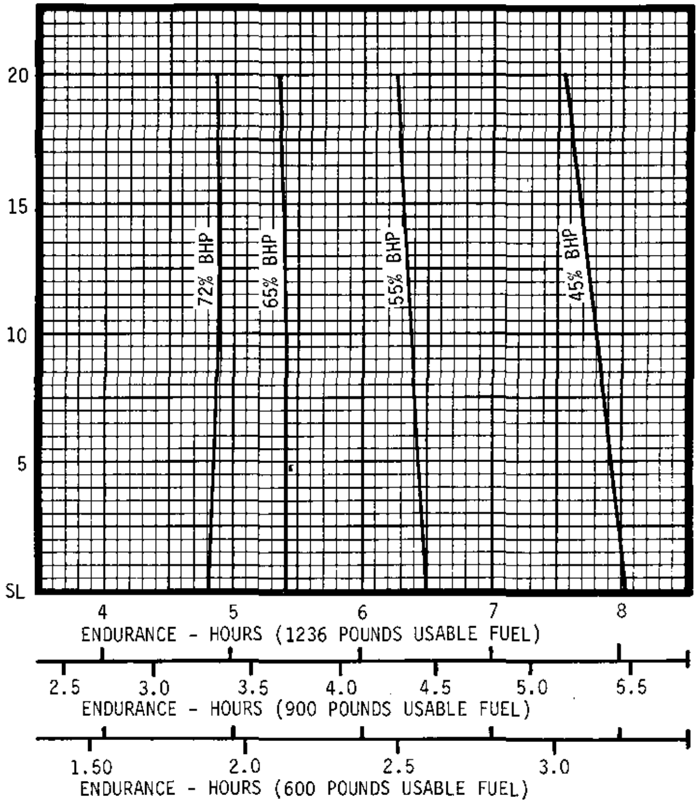
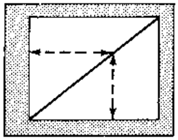


Figure 5-22

52847045

HOLDING TIME

CONDITIONS:
1. 2100 RPM and 22.0 Inches Hg. Manifold Pressure (45% Power).
2. Recommended Lean Fuel Flow (137 Pounds Per Hour Total).



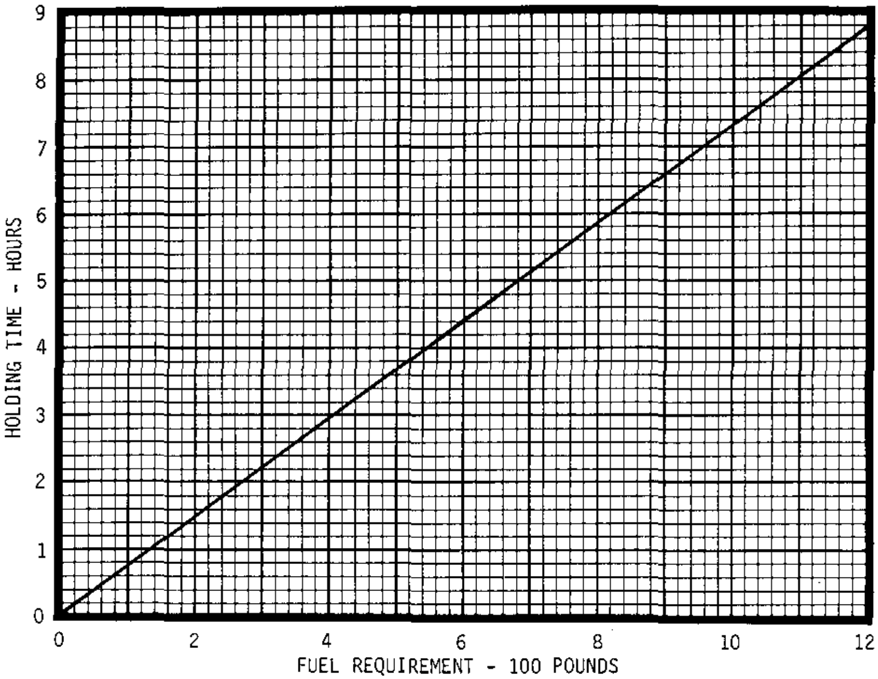
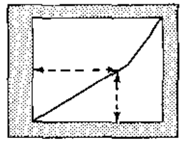


Figure 5-23

TIME, FUEL AND DISTANCE TO DESCEND



CONDITIONS:
1. Power - AS REQUIRED.
2. Above 10,000 Feet, Descend at 1000 Feet Per Minute.
3. Below 10,000 Feet, Descend at 500 Feet Per Minute.
4. Landing Gear - UP.
5. Wing Flaps - UP.
6. Airspeed - 180 KIAS.
7. Cowl Flaps - CLOSED.

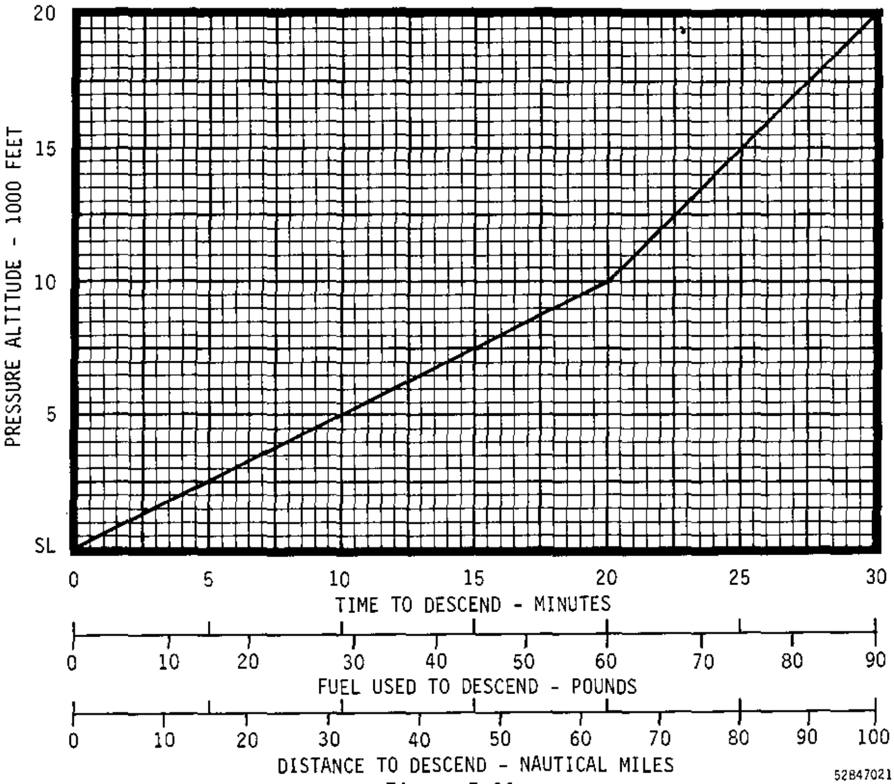


Figure 5-24

NORMAL LANDING DISTANCE

CONDITIONS:
1. Throttles - IDLE.
2. Landing Gear - DOWN.
3. Wing Flaps - 45°.
4. Cowl Flaps - CLOSE.
5. Level, Hard Surface Runway.
6. Maximum Effective Braking.

NOTE:
1. If necessary to land with wing flaps UP, the approach speed should be increased above the normal approach speed by 13 knots. Expect total landing distance to increase by 35%.
2. For altitudes of 10,000 feet or less, decrease distance by 3% for each 5 knots headwind. For altitudes above 10,000 feet, decrease the total landing distance by 1% for each 2 knots of headwind.
3. For operations with tailwinds up to 10 knots, increase total distances by 14% for each 5 knots wind.

WEIGHT-POUNDS	SPEED AT 50-FOOT OBSTACLE KIAS	PRESSURE ALTITUDE - FEET	-20°C (-4°F)		-10°C (14°F)		-0°C (32°F)		10°C (50°F)	
			GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
6850	95	Sea Level	930	2360	970	2400	1010	2440	1040	2470
		1000	970	2400	1000	2430	1040	2470	1080	2510
		2000	1000	2430	1040	2470	1080	2510	1120	2550
		3000	1040	2470	1080	2510	1120	2550	1160	2590
		4000	1080	2510	1120	2550	1160	2590	1210	2640
		5000	1120	2550	1160	2590	1210	2640	1250	2680
		6000	1160	2590	1210	2640	1250	2680	1300	2730
		7000	1210	2640	1250	2680	1300	2730	1350	2780
		8000	1250	2680	1300	2730	1350	2780	1400	2830
		9000	1300	2730	1350	2780	1400	2830	1460	2890
		10,000	1350	2780	1410	2840	1460	2890	1510	2940
		11,000	1410	2840	1460	2890	1520	2950	1570	3000
		12,000	1460	2890	1520	2950	1580	3010	1640	3070
		13,000	1520	2950	1580	3010	1640	3070	1700	3130
		14,000	1580	3010	1650	3080	1710	3140	1770	3200
		15,000	1650	3080	1710	3140	1780	3210	1840	3270
6500	93	Sea Level	830	2260	860	2290	900	2330	930	2360
		1000	860	2290	900	2330	930	2360	960	2390
		2000	890	2320	930	2360	960	2390	1000	2430
		3000	930	2360	960	2390	1000	2430	1040	2470
		4000	960	2390	1000	2430	1040	2470	1070	2500
		5000	1000	2430	1040	2470	1080	2510	1120	2550
		6000	1040	2470	1080	2510	1120	2550	1160	2590
		7000	1080	2510	1120	2550	1160	2590	1200	2630
		8000	1120	2550	1160	2590	1200	2630	1250	2680
		9000	1160	2590	1210	2640	1250	2680	1300	2730
		10,000	1210	2640	1250	2680	1300	2730	1350	2780
		11,000	1250	2680	1300	2730	1350	2780	1400	2830
		12,000	1300	2730	1350	2780	1410	2840	1460	2890
		13,000	1360	2790	1410	2840	1460	2890	1520	2950
		14,000	1410	2840	1470	2900	1520	2950	1580	3010
		15,000	1470	2900	1530	2960	1580	3010	1640	3070
6000	88	Sea Level	700	2130	720	2150	750	2180	780	2210
		1000	720	2150	750	2180	780	2210	810	2240
		2000	750	2180	780	2210	810	2240	840	2270
		3000	780	2210	810	2240	840	2270	870	2300
		4000	810	2240	840	2270	870	2300	900	2330
		5000	840	2270	870	2300	900	2330	940	2370
		6000	870	2300	900	2330	940	2370	970	2400
		7000	900	2330	940	2370	970	2400	1010	2440
		8000	940	2370	970	2400	1010	2440	1050	2480
		9000	970	2400	1010	2440	1050	2480	1090	2520
		10,000	1010	2440	1050	2480	1090	2520	1130	2560
		11,000	1050	2480	1090	2520	1130	2560	1180	2610
		12,000	1090	2520	1140	2570	1180	2610	1220	2650
		13,000	1140	2570	1180	2610	1230	2660	1270	2700
		14,000	1180	2610	1230	2660	1280	2710	1320	2750
		15,000	1230	2660	1280	2710	1330	2760	1380	2810

Figure 5-25 (Sheet 1 of 4)

NORMAL LANDING DISTANCE

CONDITIONS:
1. Throttles - IDLE.
2. Landing Gear - DOWN.
3. Wing Flaps - 45°.
4. Cowl Flaps - CLOSE.
5. Level, Hard Surface Runway.
6. Maximum Effective Braking.

NOTE:
1. If necessary to land with wing flaps UP, the approach speed should be increased above the normal approach speed by 13 knots. Expect total landing distance to increase by 35%.
2. For altitudes of 10,000 feet or less, decrease distance by 3% for each 5 knots headwind. For altitudes above 10,000 feet, decrease the total landing distance by 1% for each 2 knots of headwind.
3. For operations with tailwinds up to 10 knots, increase total distances by 14% for each 5 knots wind.

WEIGHT-POUNDS	SPEED AT 50-FOOT OBSTACLE KIAS	PRESSURE ALTITUDE - FEET	20°C (68°F)		30°C (86°F)		40°C (104°F)	
			GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
6850	95	Sea Level	1080	2510	1110	2540	1150	2580
		1000	1120	2550	1160	2590	1190	2620
		2000	1160	2590	1200	2630	1240	2670
		3000	1200	2630	1240	2670	1280	2710
		4000	1250	2680	1290	2720	1330	2760
		5000	1290	2720	1340	2770	1380	2810
		6000	1340	2770	1390	2820	1440	2870
		7000	1400	2830	1440	2870	1490	2920
		8000	1450	2880	1500	2930	1550	2980
		9000	1510	2940	1560	2990	1610	3040
		10,000	1570	3000	1620	3050	1670	3100
		11,000	1630	3060	1680	3110	1740	3170
		12,000	1690	3120	1750	3180	1810	3240
		13,000	1760	3190	1820	3250	1880	3310
		14,000	1830	3260	1890	3320	1960	3390
		15,000	1910	3340	1970	3400	2040	3470
6500	93	Sea Level	960	2390	990	2420	1030	2460
		1000	1000	2430	1030	2460	1060	2490
		2000	1030	2460	1070	2500	1100	2530
		3000	1070	2500	1110	2540	1140	2570
		4000	1110	2540	1150	2580	1190	2620
		5000	1150	2580	1190	2620	1230	2660
		6000	1200	2630	1240	2670	1280	2710
		7000	1240	2670	1290	2720	1330	2760
		8000	1290	2720	1340	2770	1380	2810
		9000	1340	2770	1390	2820	1430	2860
		10,000	1400	2830	1440	2870	1490	2920
		11,000	1450	2880	1500	2930	1550	2980
		12,000	1510	2940	1560	2990	1610	3040
		13,000	1570	3000	1620	3050	1680	3110
		14,000	1630	3060	1690	3120	1740	3170
		15,000	1700	3130	1760	3190	1820	3250
6000	88	Sea Level	810	2240	830	2260	860	2290
		1000	840	2270	860	2290	890	2320
		2000	870	2300	900	2330	930	2360
		3000	900	2330	930	2360	960	2390
		4000	930	2360	970	2400	1000	2430
		5000	970	2400	1000	2430	1030	2460
		6000	1010	2440	1040	2470	1070	2500
		7000	1040	2470	1080	2510	1120	2550
		8000	1080	2510	1120	2550	1160	2590
		9000	1130	2560	1170	2600	1200	2630
		10,000	1170	2600	1210	2640	1250	2680
		11,000	1220	2650	1260	2690	1300	2730
		12,000	1270	2700	1310	2740	1350	2780
		13,000	1320	2750	1360	2790	1410	2840
		14,000	1370	2800	1420	2850	1460	2890
		15,000	1430	2860	1470	2900	1520	2950

Figure 5-25 (Sheet 2 of 4)

NORMAL LANDING DISTANCE

CONDITIONS:
1. Throttles - IDLE.
2. Landing Gear - DOWN.
3. Wing Flaps - 45°.
4. Cowl Flaps - CLOSE.
5. Level, Hard Surface Runway.
6. Maximum Effective Braking.

NOTE:
1. If necessary to land with wing flaps UP, the approach speed should be increased above the normal approach speed by 13 knots. Expect total landing distance to increase by 35%.
2. For altitudes of 10,000 feet or less, decrease distance by 3% for each 5 knots headwind. For altitudes above 10,000 feet, decrease the total landing distance by 1% for each 2 knots of headwind.
3. For operations with tailwinds up to 10 knots, increase total distances by 14% for each 5 knots wind.

			-20°C (-4°F)		-10°C (14°F)		-0°C (32°F)		10°C (50°F)	
WEIGHT-POUNDS	SPEED AT 50-FOOT OBSTACLE KIAS	PRESSURE ALTITUDE - FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
5500	83	Sea Level	580	2010	600	2030	620	2050	640	2070
		1000	600	2030	620	2050	640	2070	670	2100
		2000	620	2050	640	2070	670	2100	690	2120
		3000	640	2070	670	2100	690	2120	720	2150
		4000	670	2100	690	2120	720	2150	750	2180
		5000	690	2120	720	2150	750	2180	770	2200
		6000	720	2150	750	2180	770	2200	800	2230
		7000	750	2180	780	2210	800	2230	830	2260
		8000	770	2200	810	2240	840	2270	870	2300
		9000	810	2240	840	2270	870	2300	900	2330
		10,000	840	2270	870	2300	900	2330	940	2370
		11,000	870	2300	900	2330	940	2370	970	2400
		12,000	900	2330	940	2370	980	2410	1010	2440
		13,000	940	2370	980	2410	1010	2440	1050	2480
		14,000	980	2410	1020	2450	1060	2490	1090	2520
		15,000	1020	2450	1060	2490	1100	2530	1140	2570
5000	83	Sea Level	470	2020	490	2040	510	2060	520	2080
		1000	490	2040	500	2060	520	2080	540	2100
		2000	500	2060	520	2080	540	2100	560	2120
		3000	520	2080	540	2100	560	2120	580	2140
		4000	540	2100	560	2120	580	2140	610	2160
		5000	560	2120	580	2140	610	2160	630	2180
		6000	580	2140	610	2160	630	2180	650	2210
		7000	610	2160	630	2180	650	2210	680	2230
		8000	630	2180	650	2210	680	2230	700	2260
		9000	650	2210	680	2230	700	2260	730	2290
		10,000	680	2230	710	2260	730	2290	760	2310
		11,000	710	2260	730	2290	760	2320	790	2340
		12,000	730	2290	760	2320	790	2350	820	2380
		13,000	760	2320	790	2350	820	2380	850	2410
		14,000	790	2350	830	2380	860	2410	890	2440
		15,000	830	2380	860	2410	890	2450	920	2480

Figure 5-25 (Sheet 3 of 4)

NORMAL LANDING DISTANCE

CONDITIONS:
1. Throttles - IDLE.
2. Landing Gear - DOWN.
3. Wing Flaps - 45°.
4. Cowl Flaps - CLOSE.
5. Level, Hard Surface Runway.
6. Maximum Effective Braking.

NOTE:
1. If necessary to land with wing flaps UP, the approach speed should be increased above the normal approach speed by 13 knots. Expect total landing distance to increase by 35%.
2. For altitudes of 10,000 feet or less, decrease distance by 3% for each 5 knots headwind. For altitudes above 10,000 feet, decrease the total landing distance by 1% for each 2 knots of headwind.
3. For operations with tailwinds up to 10 knots, increase total distances by 14% for each 5 knots wind.

			20°C (68°F)		30°C (86°F)		40°C (104°F)	
WEIGHT-POUNDS	SPEED AT 50-FOOT OBSTACLE KIAS	PRESSURE ALTITUDE - FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
5500	83	Sea Level	670	2100	690	2120	710	2140
		1000	690	2120	720	2150	740	2170
		2000	720	2150	740	2170	770	2200
		3000	740	2170	770	2200	790	2220
		4000	770	2200	800	2230	820	2250
		5000	800	2230	830	2260	860	2290
		6000	830	2260	860	2290	890	2320
		7000	860	2290	890	2320	920	2350
		8000	900	2330	930	2360	960	2390
		9000	930	2360	960	2390	990	2420
		10,000	970	2400	1000	2430	1030	2460
		11,000	1010	2440	1040	2470	1070	2500
		12,000	1050	2480	1080	2510	1120	2550
		13,000	1090	2520	1130	2560	1160	2590
		14,000	1130	2560	1170	2600	1210	2640
		15,000	1180	2610	1220	2650	1260	2690
5000	83	Sea Level	540	2100	560	2120	580	2130
		1000	560	2120	580	2140	600	2150
		2000	580	2140	600	2160	620	2180
		3000	600	2160	620	2180	640	2200
		4000	630	2180	650	2200	670	2220
		5000	650	2210	670	2230	690	2250
		6000	680	2230	700	2250	720	2280
		7000	700	2260	720	2280	750	2300
		8000	730	2280	750	2310	780	2330
		9000	760	2310	780	2340	810	2360
		10,000	790	2340	810	2370	840	2390
		11,000	820	2370	840	2400	870	2430
		12,000	850	2400	880	2430	910	2460
		13,000	880	2440	910	2470	940	2500
		14,000	920	2470	950	2510	980	2540
		15,000	960	2510	990	2540	1020	2580

Figure 5-25 (Sheet 4 of 4)

SECTION 6
WEIGHT & BALANCE/EQUIPMENT LIST

TABLE OF CONTENTS

INTRODUCTION

Section 6 of this handbook provides procedures for establishing the airplane's basic empty weight and moment and procedures for determining the weight and balance for flight. This section also describes all items on the Weight and Balance Data sheet which was provided with the airplane (located in the back of this handbook in a plastic envelope) as delivered from Cessna Aircraft Company. An equipment list, provided at the end of this section, provides arms and weights of all equipment available for installation on the airplane.

AIRPLANE WEIGHING PROCEDURES

To Establish Basic Empty Weight

The airplane must be weighed in the following configuration.

1. Wing flaps shall be fully retracted and all other control surfaces shall be in neutral.
2. Service engine oil and landing gear hydraulic fluid reservoir as required to obtain a normal full indication.
3. Check landing gear down and parking brake released.
4. Remove all equipment and items not to be included in basic empty weight.
5. Adjust all seats to the normal operating position.
6. Close all baggage doors, main cabin door and emergency exit window.
7. Clean the airplane inside and out.
8. Remove all snow, ice or water which may be on the airplane.
9. Weigh the airplane in a closed hangar to avoid errors caused by air currents.
10. Defuel the airplane in accordance with the following steps.

WARNING

Conduct all defueling operations at a safe distance from other airplanes and buildings. Fire fighting equipment must be readily available. Attach two ground wires from different points on the airplane to separate approved grounding stakes. The use of two ground wires will prevent ungrounding of the airplane due to accidental disconnecting of either wire.

a. Turn off all electrical power.
b. Turn fuel selectors OFF.
c. Remove engine cowling.
d. Disconnect inlet fuel supply hose at the inlet side of the engine-driven fuel pump.
e. Connect defueling hose to inlet fuel supply hose.
f. Turn fuel selectors ON and defuel wing until all possible fuel is removed.
g. Drain the remaining fuel through the drain valves into an appropriate container.
   (1) The main tanks are drained by opening the drain valve on the bottom of each tank sump. The main tank fuel lines are drained by removing a fuel sump drain valve located at the wing gap fairings, inboard of the respective engine nacelle. The right and left fuel filters are drained aft of the main spar inboard of each main fuel tank.
   (2) Each drain should remain open until the defueling rate slows to approximately 1 drop per second.
   (3) Drain fuel selector valves and fuel crossfeed lines.
h. The fuel remaining on-board after defueling is residual fuel and is included in the basic empty weight.
i. Drainable unusable fuel must be added after the weighing to obtain basic empty weight. Figure 6-1 includes the weight and arms necessary to add the drainable unusable fuel.

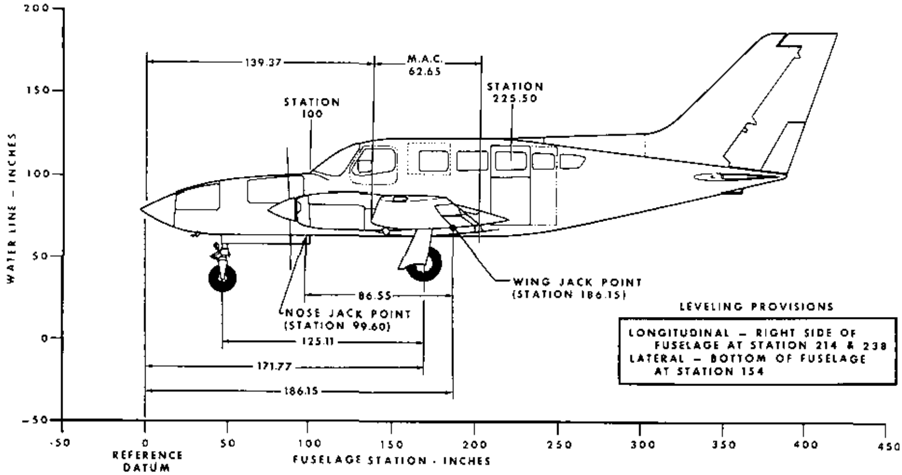
11. The airplane must be level when weighed.
    a. For longitudinal leveling, two bolts are located on the right side of the fuselage at stations 214 and 238. Unscrew these two bolts approximately 1/4 inch so a spirit level can be placed on them.
    b. For lateral leveling, use a spirit level on the underside of the fuselage at station 154.0.
12. When weighing on the wheels or jack points with mechanical scales, insure the scales are in calibration and used per the applicable manufacturer's recommendations. When weighing on the wheels, deflate or inflate the gear struts and/or tires until the airplane is level.

CAUTION

Keep the airplane level while jacking to prevent the airplane from slipping off the jacks and damaging the airplane.

13. When weighing on the jack points with electronic weighing scales, attach the electronic weighing cells to the proper mounting adapters to prevent slipping.
    a. Prepare the electronic weighing kit for use by following the manufacturer's instructions provided with the weighing kit. Adjust all jacks simultaneously until the cells are in contact with the jack points. Continue jacking, keeping the airplane level, until the airplane is supported at the jack points only.

AIRPLANE WEIGHING FORM



AIRPLANE AS WEIGHED TABLE

POSITION	SCALE READING	SCALE DRIFT	TARE	NET WEIGHT
LEFT WING				
RIGHT WING				
NOSE				
AIRPLANE TOTAL AS WEIGHED				

FUSELAGE STATION OF AFT WEIGHING POINT
IF WEIGHED ON JACK POINTS, USE 86.55
IF WEIGHED ON WHEELS, USE 125.11
NOSE NET WEIGHT

CG ARM OF AIRPLANE AS WEIGHED USING JACK POINTS OR WHEELS✱ = ( ) − ( ) × ( ) / ( ) = ( ) INCHES AFT OF DATUM

TOTAL AS WEIGHED

NOTE

IT IS THE RESPONSIBILITY OF THE OPERATOR TO INSURE THAT THE AIRPLANE IS LOADED PROPERLY.

LEGEND

✱ IF WEIGHED ON WHEELS CROSS OUT "JACK POINTS OR" IF WEIGHED ON JACK POINTS CROSS OUT "OR WHEELS"

▲ INCLUDES ALL UNDRAINABLE FLUIDS AND FULL OIL

BASIC EMPTY WEIGHT AND CENTER OF GRAVITY TABLE

ITEM		WEIGHT - POUNDS	CG ARM - INCHES	MOMENT (INCH-POUNDS/100)
▲ AIRPLANE (CALCULATED OR AS WEIGHED)				
DRAINABLE UNUSABLE FUEL AT 6 POUNDS PER GALLON	LEFT AND RIGHT WING	41.0	165.2	67.7
BASIC EMPTY WEIGHT				

Figure 6-1

14. Determine scale reading, scale drift and tare from all three scales.
15. Lower the airplane and clear the weighing cells as soon as the readings are obtained.
16. Computations (see Figure 6-1).
    a. Enter the scale reading, scale drift and tare from all three scales in the columns in the Airplane As Weighed Tab   Compute and enter values for the Net Weight and Airplane Total As Weighed columns.
    b. Determine the CG arm of the airplane using the formula presented in Figure 6-1, if the jack points are used for weighing. If the airplane is weighed on the wheels, use the following formula.

$$\text{CG Arm of Airplane As Weighed} = 171.77 - \frac{125.11\ W_N}{W_T} = \text{Inches Aft of Datum}$$

where W_N = net weight on nosewheel and W_T = total net weight on all three wheels

    c. Enter the total Net Weight and CG Arm in the Basic Empty Weight and Center of Gravity Table columns. Multiply the Weight (Lbs) entry times the CG Arm (In) entry to determine Moment (In-Lbs/100) entry. Delete printed weight, arm and moments listed for fuel tank configurations not installed in the airplane. Total each of the three columns to determine basic empty weight, CG arm and moment.

NOTE

An attempt should be made to verify the results of each weighing, when data for comparison is available.

    d. Enter Basic Empty Weight, CG arm and moment in the Weight and Balance Record, see Figure 6-4.

WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

The following is a sample weight and balance determination. For an actual determination for your airplane, refer to the equivalent illustrations on the Weight and Balance Data sheet provided in your airplane.

To compute the weight and balance for your airplane, use Figures 6-2 through 6-4 as follows:

Take the Basic Empty Weight and Moment/100 from the latest entry shown on the Weight and Balance Data sheet or in Figure 6-4 and enter them in item 1 (Basic Empty Weight) of Figure 6-3. For this sample, assume a weight of 4225 pounds and moment/100 of 6526.6.

NOTE

A blank Weight and Balance Form is provided, for the operator's convenience, at the end of this section.

Determine arm, weight and Moment/100 of the crew, passengers, baggage and cabinet contents from Figure 6-2 and enter them under Payload Computations in Figure 6-3. The crew and passenger loading table is applicable only when the CG of the occupant is at the location specified. Refer to Section 7 for additional information about loading passengers and cargo.

If the seats are in any other position than stated in Figure 6-2, the moment must be computed by multiplying occupant weight times the arm in inches. A point 9 inches forward of the intersection of the seat bottom and seat back with seat cushions compressed can be assumed to be the occupant CG. For a reference in determining the arm, the forward face of the cabin doorway structure is fuselage station 213.60.

See Figure 6-3. Total the Payload Computations items and enter the resulting Weight and Moment/100 in item 2.

See Figure 6-3. Total items 1 (Basic Empty Weight) and 2 (Payload) to determine appropriate entries for item 3 (Zero Fuel Weight).

See Figure 6-3. Item 4 (Fuel Loading), is determined from the applicable columns of Figure 6-2.

Total items 3 and 4 to determine item 5 (Ramp Weight).

See Figure 6-3. Subtract item 6 (Less Fuel For Taxiing) from item 5 (Ramp Weight) to determine item 7 (Takeoff Weight). Enter item 7 in Figure 6-2 to determine if the loading is within allowable limits. If the point falls outside of the envelope, it will be necessary to redistribute the load.

Refer to Section 5 for estimated fuel used during the flight. After determining the fuel used, obtain the appropriate weights and Moment/100 from Figure 6-2. Enter the total of these weights and Moment/100 in item 8 (Less Fuel To Destination).

Item 9 (Landing Weight) is determined by subtracting item 8 from item 7. Enter item 9 in Figure 6-2 to determine if the loading is within allowable limits. If the point falls within the envelope, the loading is approved. If the point falls outside the envelope, it will be necessary to redistribute the load.

WEIGHT AND BALANCE RECORD

The Weight and Balance Record, see Figure 6-4, provides a record to reflect the continuous history of changes in airplane structure and/or equipment which will affect the weight and balance of the airplane.

The Basic Empty Weight of your airplane is entered at the appropriate location on the Weight and Balance Data sheet as delivered from the factory. Changes to the structure or equipment should be entered on the Weight and Balance Record when any modifications are made to the airplane. It is the responsibility of the airplane owner to assure this record is up to date, as all loadings will be based on the latest entry.

WEIGHT AND MOMENT TABLES - BUSINESSLINER

CREW AND PASSENGERS

WEIGHT (POUNDS)	1ST OR 2ND SEATS ARM = 137"	3RD OR 4TH SEATS: FORWARD FACING ARM = 175"	3RD OR 4TH SEATS: AFT FACING ARM = 175"	5TH OR 6TH SEATS ARM = 218"	7TH OR 8TH SEAT ARM = 261"	TOILET SEAT ARM = 250"
	MOMENT/100					
10	14	18	18	22	26	25
20	27	35	35	44	52	50
30	41	52	52	65	78	75
40	55	70	70	87	104	100
50	68	88	88	109	130	125
60	82	105	105	131	157	150
70	96	122	122	153	183	175
80	110	140	140	174	209	200
90	123	158	158	196	235	225
100	137	175	175	218	261	250
110	151	192	192	240	287	275
120	164	210	210	262	313	300
130	178	228	228	283	339	325
140	192	245	245	305	365	350
150	206	262	262	327	392	375
160	219	280	280	349	418	400
170	233	298	298	371	444	425
180	247	315	315	392	470	450
190	260	332	332	414	496	475
200	274	350	350	436	522	500
210	288	368	368	458	548	525
220	301	385	385	480	574	550
230	315	402	402	501	600	575
240	329	420	420	523	626	600
250	342	438	438	545	652	625
260	356	455	455	567	679	650
270	370	472	472	589	705	675
280	384	490	490	610	731	700
290	397	508	508	632	757	725
300	411	525	525	654	783	750

BAGGAGE AND CABINET CONTENTS

WEIGHT (POUNDS)	NOSE AVIONICS BAY ARM = 32"	NOSE COMPARTMENT ARM = 71"	WING LOCKERS ARM = 186"	AFT CABIN: BAY "A" ARM = 266"	AFT CABIN: BAY "B" ARM = 282"	AFT CABIN: OVERHEAD CABINET ARM = 282"	AFT CABIN: REFRESHMENT BAR ARM = 279"
	MOMENT/100						
10	3	7	19	26	28	28	28
20	6	14	37	53	56	56	56
30	10	21	56	80	85		
40	13	28	74	106	113		
50	16	36	93	133	141		
60	19	43	112	160	169		
70	22	50	130	186	197		
80	26	57	149	213	226		
90	29	64	167	239	254		
100	32	71	186	266	282		
110	35	78	205	293			
120	38	85	223	319			
130	42	92	242	346			
140	45	99	260	372			
150	48	107	279	399			
160	51	114	298	426			
170	54	121	316	452			
180	58	128	335	479			
190	61	135	353	505			
200	64	142	372	532			
210	67	149	391	559			
220	70	156	409	585			
230	74	163	428	612			
240	77	170	446	638			
250	80	178		665			
260		185		692			
270		192		718			
280		199		745			
290		206		771			
300		213		798			
310		220		825			
320		227		851			
330		234		878			
340		241		904			
350		248		931			
360				958			
370				984			
380				1011			
390				1037			
400				1064			

FUEL

GALLONS (AT 6.0 POUNDS PER GALLON)	WEIGHT (POUNDS)	MOMENT/100 ARM VARIES	GALLONS (AT 6.0 POUNDS PER GALLON)	WEIGHT (POUNDS)	MOMENT/100 ARM VARIES
5	30	50	105	630	1022
10	60	99	110	660	1070
15	90	148	115	690	1118
20	120	197	120	720	1166
25	150	246	125	750	1214
28	168	275	130	780	1262
30	180	294	135	810	1310
35	210	343	140	840	1359
40	240	392	145	870	1407
45	270	440	150	900	1455
50	300	489	155	930	1503
55	330	537	160	960	1550
56	336	547	165	990	1598
60	360	586	170	1020	1646
65	390	635	175	1050	1694
70	420	683	180	1080	1742
75	450	731	185	1110	1790
80	480	780	190	1140	1838
85	510	828	195	1170	1886
90	540	877	200	1200	1934
95	570	925	205	1230	1981
100	600	973	206	1236	1990

CREW AND PASSENGER AND BAGGAGE MOMENT ARMS

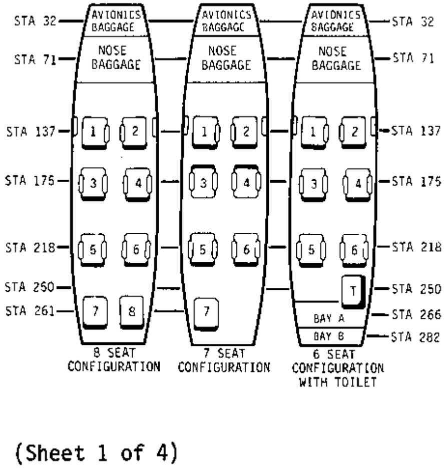


Figure 6-2 (Sheet 1 of 4)

WEIGHT AND MOMENT TABLES

UTILILINER PASSENGER CONFIGURATION

lbs x .4536 = kg in x 25.4 = mm

in·lbs x 11.521 = mm·kg

CREW AND PASSENGERS

WEIGHT (POUNDS)	1ST OR 2ND SEATS ARM = 137"	3RD OR 4TH SEATS ARM = 162"	5TH OR 6TH SEATS ARM = 190"	7TH OR 8TH SEATS ARM = 218"	9TH OR 10TH SEATS ARM = 246"
	MOMENT/100				
10	14	16	19	22	25
20	27	32	38	44	49
30	41	49	57	65	74
40	55	65	76	87	98
50	68	81	95	109	123
60	82	97	114	131	148
70	96	113	133	153	172
80	110	130	152	174	197
90	123	146	171	196	221
100	137	162	190	218	246
110	151	178	209	240	271
120	164	194	228	262	295
130	178	211	247	283	320
140	192	227	266	305	344
150	206	243	285	327	369
160	219	259	304	349	394
170	233	275	323	371	418
180	247	292	342	392	443
190	260	308	361	414	467
200	274	324	380	436	492
210	288	340	399	458	517
220	301	356	418	480	541
230	315	373	437	501	566
240	329	389	456	523	590
250	342	405	475	545	615
260	356	421	494	567	640
270	370	437	513	589	664
280	384	454	532	610	689
290	397	470	551	632	713
300	411	486	570	654	738

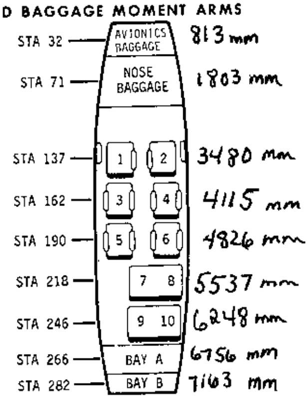
BAGGAGE CONTENTS

WEIGHT (POUNDS)	NOSE AVIONICS BAY ARM = 32"	NOSE COMPARTMENT ARM = 71"	WING LOCKERS ARM = 186" (2184 mm)	AFT CABIN BAY "A" ARM = 266"	AFT CABIN BAY "B" ARM = 282"
	MOMENT/100				
10	3	7	19	26	28
20	6	14	37	53	56
30	10	21	56	80	85
40	13	28	74	106	113
50	16	36	93	133	141
60	19	43	112	160	169
70	22	50	130	186	197
80	26	57	149	213	226
90	29	64	167	239	254
100	32	71	186	266	282
110	35	78	205	293	
120	38	85	223	319	
130	42	92	242	346	
140	45	99	260	372	
150	48	107	279	399	
160	51	114	298	426	
170	54	121	316	452	
180	58	128	335	479	
190	61	135	353	505	
200	64	142	372	532	
210	67	149	391	559	
220	70	156	409	585	
230	74	163	428	612	
240	77	170	446	638	
250	80	178		665	
260		185		692	
270		192		718	
280		199		745	
290		206		771	
300		213		798	
310		220		825	
320		227		851	
330		234		878	
340		241		904	
350		248		931	
360				958	
370				984	
380				1011	
390				1037	
400				1064	

FUEL

GALLONS (AT 6.0 POUNDS PER GALLON)	WEIGHT (POUNDS)	MOMENT/100 ARM VARIES	GALLONS (AT 6.0 POUNDS PER GALLON)	WEIGHT (POUNDS)	MOMENT/100 ARM VARIES
5	30	50	105	630	1022
10	60	99	110	660	1070
15	90	148	115	690	1118
20	120	197	120	720	1166
25	150	246	125	750	1214
28	168	275	130	780	1262
30	180	294	135	810	1310
35	210	343	140	840	1359
40	240	392	145	870	1407
45	270	440	150	900	1455
50	300	489	155	930	1503
55	330	537	160	960	1550
56	336	547	165	990	1598
60	360	586	170	1020	1646
65	390	635	175	1050	1694
70	420	683	180	1080	1742
75	450	731	185	1110	1790
80	480	780	190	1140	1838
85	510	828	195	1170	1886
90	540	877	200	1200	1934
95	570	925	205	1230	1981
100	600	973	206	1236	1990

CREW AND PASSENGER AND BAGGAGE MOMENT ARMS



10 SEAT CONFIGURATION

Figure 6-2 (Sheet 2 of 4)

WEIGHT AND MOMENT TABLES

UTILILINER CARGO CONFIGURATION

CREW

WEIGHT (POUNDS)	1ST OR 2ND SEATS ARM = 137"
	MOMENT /100
10	14
20	27
30	41
40	55
50	68
60	82
70	96
80	110
90	123
100	137
110	151
120	164
130	178
140	192
150	206
160	219
170	233
180	247
190	260
200	274
210	288
220	301
230	315
240	329
250	342
260	356
270	370
280	384
290	397
300	411

BAGGAGE CONTENTS

WEIGHT (POUNDS)	NOSE AVIONICS BAY ARM = 32"	NOSE COMPARTMENT ARM = 71"	WING LOCKERS ARM = 186"	AFT CABIN BAY "A" ARM = 266"	AFT CABIN BAY "B" ARM = 282"
	MOMENT/100				
10	3	7	19	26	28
20	6	14	37	53	56
30	10	21	56	80	85
40	13	28	74	106	113
50	16	36	93	133	141
60	19	43	112	160	169
70	22	50	130	186	197
80	26	57	149	213	226
90	29	64	167	239	254
100	32	71	186	266	282
110	35	78	205	293	
120	38	85	223	319	
130	42	92	242	346	
140	45	99	260	372	
150	48	107	279	399	
160	51	114	298	426	
170	54	121	316	452	
180	58	128	335	479	
190	61	135	353	505	
200	64	142	372	532	
210	67	149	391	559	
220	70	156	409	585	
230	74	163	428	612	
240	77	170	446	638	
250	80	178		665	
260		185		692	
270		192		718	
280		199		745	
290		206		771	
300		213		798	
310		220		825	
320		227		851	
330		234		878	
340		241		904	
350		248		931	
360				958	
370				984	
380				1011	
390				1037	
400				1064	

CARGO CONTENTS

WEIGHT (POUNDS)	CARGO "A" ARM = 176"	CARGO "B" ARM = 199"	CARGO "C" ARM = 221"	CARGO "D" ARM = 244"
	MOMENT/100			
20	35	40	44	49
40	70	80	88	98
60	106	119	133	146
80	141	159	177	195
100	176	199	221	244
120	211	239	265	293
140	246	279	309	342
160	282	318	354	390
180	317	358	398	439
200	352	398	442	488
220	387	438	486	537
240	422	478	530	586
260	458	517	575	634
280	492	557	619	683
300	528	597	663	732
320	563	637	707	781
340	598	677	751	830
360	634	716	796	878
380	669	756	840	927
400	704	796	884	976
420	739	836	928	1025
440	774	876	972	1074
460	810	915	1017	1122
480	845	955	1061	1171
500	880	995	1105	1220

FUEL

GALLONS (AT 6.0 POUNDS PER GALLON)	WEIGHT (POUNDS)	MOMENT/100 ARM VARIES	GALLONS (AT 6.0 POUNDS PER GALLON)	WEIGHT (POUNDS)	MOMENT/100 ARM VARIES
5	30	50	105	630	1022
10	60	99	110	660	1070
15	90	148	115	690	1118
20	120	197	120	720	1166
25	150	246	125	750	1214
28	168	275	130	780	1262
30	180	294	135	810	1310
35	210	343	140	840	1359
40	240	392	145	870	1407
45	270	440	150	900	1455
50	300	489	155	930	1503
55	330	537	160	960	1550
56	336	547	165	990	1598
60	360	586	170	1020	1646
65	390	635	175	1050	1694
70	420	683	180	1080	1742
75	450	731	185	1110	1790
80	480	780	190	1140	1838
85	510	828	195	1170	1886
90	540	877	200	1200	1934
95	570	925	205	1230	1981
100	600	973	206	1236	1990

CREW, BAGGAGE AND CARGO MOMENT ARMS

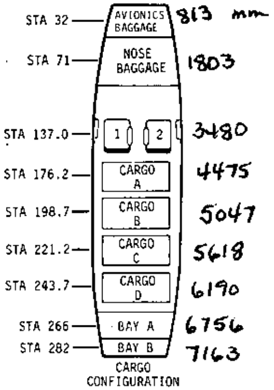


Figure 6-2 (Sheet 3 of 4)

WEIGHT AND MOMENT TABLE
BUSINESSLINER AND UTILILINER

Ferry 8562.5

See Robertson Cessna 402C POHS p 4-4

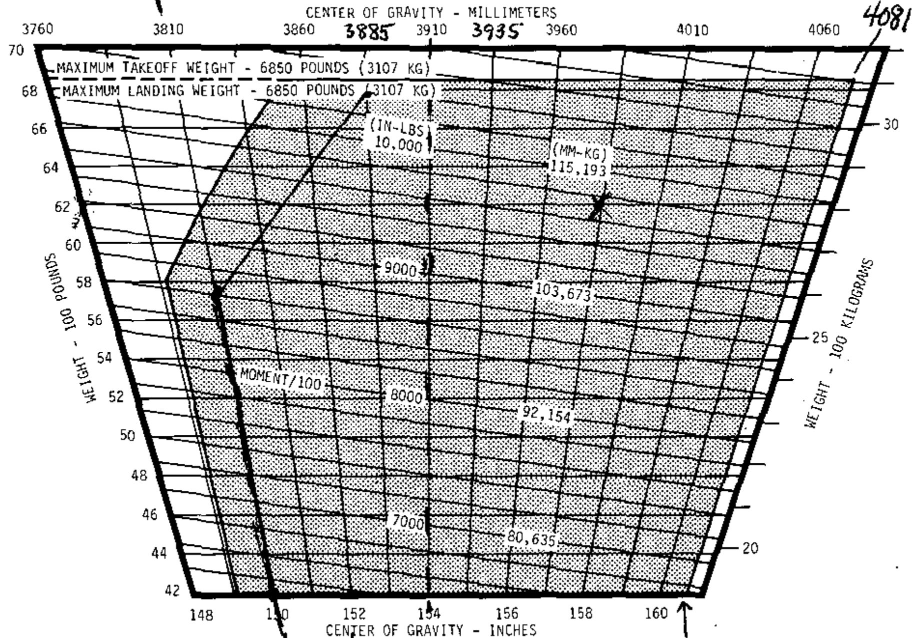


Figure 6-2 (Sheet 4 of 4)

11.5.93

SAMPLE WEIGHT AND BALANCE FORM

PAYLOAD COMPUTATIONS

ITEM OCCUPANTS OR CARGO	ARM	WEIGHT	MOMENT/ 100
SEAT 1	137	170	233
SEAT 2	137	190	260
SEAT 3	175	100	175
SEAT 4	175	140	245
SEAT 5	218	200	436
SEAT 6	218	200	436
SEAT __			
SEAT __			
SEAT __			
SEAT __			
TOILET			
BAGGAGE			
WING LOCKERS			
AVIONICS			
NOSE	32	110	35
BAY A			
BAY B			
CABINET CONTENTS	--	---	---
PAYLOAD	--	1110	1820

REF	ITEM	WEIGHT	MOMENT/ 100
1.	BASIC EMPTY WEIGHT	4225	6526.6
2.	PAYLOAD	1110	1820.0
3.	ZERO FUEL WEIGHT (sub-total) (Do not exceed maximum zero fuel weight of 6515 pounds)	5335	8346.6
4.	FUEL LOADING	900	1455
5.	RAMP WEIGHT (sub-total) (Do not exceed maximum ramp weight of 6885 pounds)	6235	9801.6
6.	LESS FUEL FOR TAXIING	35	58
7.	TAKEOFF WEIGHT (Do not exceed maximum takeoff weight of 6850 pounds)	6200	9743.6
8.	LESS FUEL TO DESTINATION	628	1018.7
9.	LANDING WEIGHT (Do not exceed maximum landing weight of 6850 pounds)	5572	8724.9

Totals must be within approved weight and C.G. limits. It is the responsibility of the operator to insure that the airplane is loaded properly. The Basic Empty Weight C.G. is noted on the Airplane Weighing Form. If the airplane has been altered, refer to the Weight and Balance Record for this information.

Figure 6-3

LOADING

WARNING

If a tail ground strike has occurred or there is evidence of any damage to the tailcone or empennage area, the airplane must be examined by a qualified aircraft mechanic and repaired, if necessary, before the next flight.

Due to differences in optional equipment installed on the airplane, a wide center of gravity range exists. Under certain loading conditions, it is possible to exceed the aft CG limits which could cause the tail to tip and allow the tail bumper to strike the ground. The force of a tail ground strike could damage internal aircraft structure, resulting in possible interference with elevator control system operation.

To prevent tail tipping during airplane loading, it is recommended that owners and operators study their individual airplane's weight and balance information to become familiar with its capabilities and limitations. When loading, it is recommended the following steps be followed:

1. During unusual loading conditions where the airplane aft CG limits could possibly be exceeded, use a suitable padded tail stand under the tailcone, whenever possible. The tail stand should be removed by a crew member or ground service personnel only when airplane loading is complete.
2. Load the baggage in the nose and avionics compartments prior to boarding of the crew and passengers.
3. Avoid carrying baggage in the aft cabin.
4. When boarding people, have the pilot or person who is to occupy the copilot seat be the first to board with remaining persons filling the most forward seats first and the aft seats last. Arrange to have heavier people occupy the most forward seats.
5. When unloading the aircraft, have one person remain in the copilot or pilot seat while the other flight deck occupant goes aft to open the door. Arrange to have the passengers in the aft seats to be the first to deplane.

WEIGHT AND BALANCE RECORD

CONTINUOUS HISTORY OF CHANGES IN STRUCTURE OR EQUIPMENT AFFECTING WEIGHT AND BALANCE

DATE	ITEM		DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE						BASIC EMPTY WEIGHT	
				ADDED (+)			REMOVED (-)				
	IN	OUT		WT. (LB)	ARM (IN)	MOMENT /100	WT. (LB)	ARM (IN)	MOMENT /100	WT. (LB)	MOMENT /100

Figure 6-4

EQUIPMENT LIST

The following pages of this handbook contain a comprehensive listing of all equipment available from the factory for the airplane. This equipment list is divided into two sections, the first of which (Section A) lists all equipment required to be installed. The second section (Section B) lists the remaining standard equipment and all available optional equipment.

NOTE

If additional equipment is to be installed, it must be done in accordance with the reference drawing, accessory or service kit instructions or a separate FAA approval.

A "Mark If Installed" column has been provided after each item in the equipment list. If desired, the operator may check each appropriate item which is installed in his particular airplane. Columns showing weight in pounds and arm in inches provide the weight and center of gravity location for the equipment.

A customized equipment list, detailing only the equipment installed in your airplane as delivered from the factory, is provided with your airplane papers. This list is presented in the same order and format as the comprehensive listing.

EQUIPMENT LIST (BUSINESSLINER)

THE FOLLOWING IS A COMPLETE LIST OF EQUIPMENT WHICH CAN BE INSTALLED IN THE AIRPLANE WHEN DELIVERED BY CESSNA AIRCRAFT COMPANY. REFER TO THE EQUIPMENT LIST IN THE AIRPLANE FOR A LIST OF EQUIPMENT ACTUALLY INSTALLED WHEN DELIVERED BY CESSNA AIRCRAFT COMPANY.
DATUM STATION 0.0 IS 100.0 INCHES FORWARD OF THE AFT FACE OF THE FUSELAGE BULKHEAD JUST FORWARD OF THE RUDDER PEDALS.
POSITIVE ARMS ARE DISTANCES AFT OF DATUM STATION 0.0.
AN ASTERISK (*) INDICATES EXCHANGE WEIGHT.
THE TOTAL OPTIONAL EQUIPMENT WEIGHT AND MOMENT IS THE WEIGHT OF THE OPTION PACKAGE ONLY AND NOT THE SUM OF ALL THE ITEMS LISTED.
INSTALLATION APPROVAL OF EQUIPMENT INCLUDED IN THIS LIST IS MAINTAINED EITHER BY THE MANUFACTURER'S SUPPLEMENTARY TYPE CERTIFICATE WITH THE APPROVAL NUMBER NOTED WITH EQUIPMENT OR IN THE MANUFACTURER'S TYPE DESIGN FILE IN ACCORDANCE WITH DELEGATION OPTION AUTHORIZATION CE-3.

SECTION A
REQUIRED EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	WHEEL-MAIN GEAR	9910393 2		2	17.5	171.8
	TIRE-MAIN GEAR	A650C81 3		2	31.9	171.8
	TUBE-MAIN GEAR	C262023105		2	5.6	171.8
	BRAKE-MAIN GEAR	9910393 3		2	28.5	171.8
	WHEEL-NOSE GEAR 600X6	9910194 5		1	5.5	47.0
	TIRE-NOSE GEAR 600X6 6 PLY III	9910336 1		1	7.8	47.0
	TUBE-NOSE GEAR	C262023102		1	1.7	47.0
	ENGINE CMC 6 CYL	TSIO-520VB		2	865.9	115.8
	CONTROLLER VAR	C165004604		2	14.8	140.2
	TURBOCHARGERS AIRESEARCH	632729 28		2	50.0	142.1
	AIR INDUCTION FILTER ASSY	5650300 14		2	8.4	134.5

SECTION A
REQUIRED EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	OIL RADIATOR	637132		2	15.0	122.3
	OIL FILTER & ADAPTER	631641		2	5.4	125.4
	FUEL PUMP-ENGINE DRIVEN	641583 639		2	5.2	125.4
	FUEL PUMP-BOOST	9910202 2		2	7.0	174.7
	PROPELLER 3 BLADE	0850334 29		2	176.7	87.4
	PROP SPINNER	D3534		2	4.0	87.0
	PROP BULKHEAD	D3796		2	3.1	92.0
	PROP GOVERNOR LH STD	290D7/T3		1	2.8	99.3
76D	PROP GOVERNOR LH SYNCHROPHASER	S290D8/T3		1	3.9	99.3
76B	PROP GOVERNOR LH UNFEATH/SYNCHRO	US290D8/T3		1	4.0	99.3
7700	PROP GOVERNOR LH UNFEATHERING	U290D7/T3		1	2.9	99.3
	PROP GOVERNOR RH STD	290D7/T3		1	2.8	99.3
76D	PROP GOVERNOR RH SYNCHROPHASER	S290D7/T3		1	2.9	99.3
76B	PROP GOVERNOR RH UNFEATH/SYNCHRO	US290D7/T3		1	3.1	99.3
7700	PROP GOVERNOR RH UNFEATHERING	U290D7/T3		1	2.9	99.3
	AIRSPEED INDICATOR STD	C661040218		1	0.7	112.6
400	AIRSPEED INDICATOR TAS	5204013 1		1	2.8	112.6
	ALTIMETER STD	C661014101		1	1.1	112.6
1A	ALTIMETER FT & MILIBARS	5204007 1		1	1.1	112.6
1BB	ALTIMETER FT & MILIBARS RH	5204007 2		1	1.1	112.6
624C	400 ENCODING ALTIMETER-INCHES	EA-401A		1	2.6	113.0
624E	400 ENCODING ALTIMETER-MILIBARS	EA-401A		1	2.6	113.0
675A	800 ENCODING ALTIMETER-INCHES	EA-801A		1	2.8	113.0
675B	800 ENCODING ALTIMETER-MILIBARS	EA-801A		1	2.8	113.0
	TACHOMETER-DUAL STD	C668017110		1	1.8	112.6
900	TACHOMETER SYNCHRONOUS DUAL	5204002 1		1	1.8	112.6
	FUEL QUANTITY INDICATOR-DUAL	9910232 10		1	1.1	112.6
	FUEL FLOW INDICATOR-DUAL STD	C662020118		1	2.6	135.4
3900	FUEL FLOW GAGE & MGMT COMPUTER	9910395 10		1	2.2	114.6
	GAGE-MANIFOLD PRESSURE-DUAL	C662026117		1	1.1	112.6

SECTION A
REQUIRED EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	GAGE-UNIT LEFT ENGINE COMB	C662019101		1	1.1	112.6
	GAGE-UNIT RIGHT ENGINE COMB	C662019101		1	1.1	112.6
	COMPASS	C660501401		1	0.7	118.2
	STALL WARNING HORN	9910080 2		1	0.2	114.0
	STALL WARNING TRANSMITTER	186 16		1	0.2	142.5
1100	ANGLE OF ATTACK SYSTEM	0800302 3		1	1.0	124.1
	ALTERNATOR 50 AMP-CMC STD	634445		2	25.5	107.0
16A	ALTERNATOR 100 AMP 634788	5218003 1		2	38.1	107.0
	VOLTAGE REGULATOR CMC	9910126 2		2	1.7	136.1
	BATTERY 24 VOLTS STD	9910128 1		1	42.0	172.2
1800	BATTERY-NOSE SECTION INSTL	5118701 15		1	53.4	46.7
	MASTER SWITCH	8501KA		3	0.3	122.5
	STROBE LIGHT 30 -1080-6	60-2798 1		2	8.8	162.6
96A	STROBE LT (HIGH INTENSITY)	5118708 1		2	9.3	162.6
96B	STROBE LIGHT (ICAO RED)	5118708 2		2	9.3	162.6
	SEAT-PILOT ADJUSTABLE STD	0812782 1		1	15.2	140.0
L	SEAT-PILOT ADJUSTABLE-LEATHER	0812782 1		1	15.8	140.0
8900	SEAT-PILOT MECH ADJUST	0812780 17		1	23.1	140.8
890L	SEAT-PILOT MECH ADJUST-LEATHER	0812782 17		1	23.7	140.8
	SAFETY BELT-SHOULDER HARNESS	CM4008		1	1.1	153.1
18100	INERTIA REEL INSTL-PILOT	5204015 1		1	1.3	154.8
	PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL	D1582-4-13PH		1	1.4	144.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	CONTROLS & AUTOPILOT					
	GYRO-DIRECTIONAL	C661053-0101		1	2.6	113.0
53301	GYRO-DIRECT G-502A			1	3.6	113.0
53302	GYRO-DIRECT G-504A			1	3.5	113.0
53303	GYRO-HSI (3 IN) IG-832A			1	5.0	113.0
53304	GYRO-HSI (4 IN) IG-895A			1	5.3	113.0
	GYRO-HORIZONTAL	C661055-0103		1	1.9	112.5
53310	GYRO-HORIZ G-519B-1			1	2.5	112.5
53311	GYRO-ADI (3 IN) G-550A			1	3.5	112.5
53312	GYRO-ADI (4 IN) G-895A			1	5.0	112.5
53000	400B NAV-O-MATIC INSTL			1	16.6	198.4
53000	COMPUTER CA-550A/FD & MOUNT			1	6.3	303.1
53000	CONTROLLER C-530A			1	1.7	109.7
53000	ACTUATOR PA-495A-1 & MOUNT			1	4.1	294.6
53000	ACTUATOR PA-495A-2 & MOUNT			1	4.1	220.0
53000	ACTUATOR TA-495A & MOUNT			1	2.1	300.4
53000	ALTITUDE SENSOR AS-895A			1	2.3	318.6
53100	400B NAV-O-MATIC SLAVED DG OPT			1	2.8	215.4
53100	FLUX DETECTOR CT-504A			1	0.5	361.9
53101	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
53102	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
53200	400B NAV-O-MATIC HSI (3 IN) OPT			1	3.1	213.6
53201	CONVERTER B-445A & MOUNT			1	1.3	33.0
53200	FLUX DETECTOR CT-504A			1	0.5	361.9
53202	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
53203	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
53400	YAW DAMPER INSTL YD-840B			1	3.9	234.3
53400	ACTUATOR PA-495A-1 & MOUNT			1	4.1	298.2

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
55000	400B IFCS INSTL			1	25.1	197.1
55000	COMPUTER CA-550A/FD & MOUNT			1	6.3	303.1
55000	CONTROLLER C-531A			1	1.5	109.7
55000	ACTUATOR PA-495A-1 & MOUNT			1	4.1	294.6
55000	ACTUATOR PA-495A-2 & MOUNT			1	4.1	220.0
55000	ACTUATOR TA-495A & MOUNT			1	2.1	300.4
55000	ALTITUDE SENSOR AS-895A			1	2.3	318.6
55000	MODE SELECTOR S-550A			1	2.6	112.9
55001	CONVERTER B-445A & MOUNT			1	1.3	33.0
55000	FLUX DETECTOR CT-504A			1	0.5	361.9
55002	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
55003	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
56000	800B IFCS INSTL			1	24.6	190.9
56000	COMPUTER CA-550A/FD & MOUNT			1	6.3	303.1
56000	CONTROLLER C-830FD			1	1.5	109.7
56000	ACTUATOR PA-495A-1 & MOUNT			1	4.1	294.6
56000	ACTUATOR PA-495A-2 & MOUNT			1	4.1	220.0
56000	ACTUATOR TA-495A & MOUNT			1	2.1	300.4
56000	ALTITUDE SENSOR AS-895A			1	2.3	318.6
56000	MODE SELECTOR S-550A			1	2.6	112.9
56001	CONVERTER B-445A & MOUNT			1	1.3	33.0
56002	INVERTER DV-1060A			1	5.2	33.0
56000	FLUX DETECTOR CT-504A			1	0.5	361.9
56003	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
56004	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
56000	YAW DAMPER INSTL			1	3.9	234.3
56000	ACTUATOR PA-495A-1 & MOUNT			1	4.1	298.2

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
57000	HSI & ADI 3 IN OPTION, RH			1	3.3	211.8
57000	INDICATOR IN-832R			1	0.8	112.9
57001	CONVERTER B-445A & MOUNT			1	1.3	33.0
57000	FLUX DETECTOR CT-504A			1	0.5	361.9
57002	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
57003	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
2400	DUAL CONTROLS	5115270 11		1	7.6	113.8
2700	CORROSION PROOFING, INTERNAL	5800009 000		1*	12.5	217.0
3300	ELECTRIC ELEVATOR TRIM	5215093 1		1	2.8	265.0
47B	GUST LOCK, RUDDER	5130387 1		1	1.1	375.6
	PROPELLER					
76D	PROP SYNCHROPHASER SYSTEM	5618124 1		1	2.7	134.7
76B	PROP SYNC/UNFEATH SYSTEM	5650116 2		1	13.2	119.2
7700	PROP UNFEATHERING SYSTEM	5650116 1		1	10.5	115.3
	INSTRUMENT					
675A	ALTITUDE ALERTER AA-801A			1	0.8	113.0
675B	ALTITUDE ALERTER AA-801A			1	0.8	113.0
624B	400 ENCODING ALTIMETER-INCHES	EA-401A		1	2.6	113.0
624D	400 ENCODING ALTIMETER-MILIBARS	EA-401A		1	2.6	113.0
676A	800 ENCODING ALTIMETER-INCHES	EA-801A		1	2.8	113.0
676A	ALTITUDE ALERTER AA-801A			1	0.8	113.0
676B	800 ENCODING ALTIMETER-MILIBARS	EA-801A		1	2.8	113.0
676B	ALTITUDE ALERTER AA-801A			1	0.8	113.0
	CLOCK-ELECTRIC STD	C664509101		1	0.4	114.1
23B	CLOCK- 8 DAY, 24 HOUR	5204016 1		1	0.4	114.1
23A	CLOCK-DIGITAL ELECTRONIC	5114584 9		1	0.6	114.1

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	RATE-OF-CLIMB IND STD	C661031101		1	0.9	113.1
800	INDICATOR-INST VERTICAL VEL	5204008 1		1	1.9	113.1
	TURN & BANK INDICATOR STD	C661032101		1	1.4	112.1
500	TURN COORDINATOR	5204004 1		1	2.5	112.1
53400	GYRO-COMPUTER G-840A			1	2.6	112.8
56000	GYRO-COMPUTER G-840A			1	2.6	112.8
300	FLIGHT HOUR RECORDER (PNL MTD)	5118479 7		1	0.8	112.1
3A	HEATER HOUR METER INSTL	5213127 1		1	0.2	96.0
4500	FUEL LOW LEVEL WARNING SYS	5118628 5		1	0.6	154.5
200	ECONOMY MIXTURE INDICATOR	5118650 6		1	3.5	123.2
700	RH PANEL & PLUMBING	5214305 10		1	4.0	112.5
710	ALTIMETER RH PNL	C661014101		1	1.1	112.6
1B	ALTIMETER RH PNL FT & MILIBAR	5204007 2		1	1.1	112.6
720	AIRSPEED IND RH PANEL	C661040201		1	0.7	112.6
4A	AIRSPEED IND RH PANEL TAS	5204013 2		1	2.8	112.6
730	RATE-OF-CLIMB RH PANEL	C661035101		1	0.9	113.1
8A	INDICATOR-INST VERTICAL VEL	5204008 2		1	1.9	113.1
740	GYRO-DIRECTIONAL RH PANEL	C661053101		1	2.6	113.0
53305	GYRO-HSI (3-IN) IG-832A RH			1	5.0	113.0
750	GYRO-HORIZONTAL RH PANEL	C661055103		1	1.9	112.5
53313	GYRO-ADI (3-IN) G-550A RH			1	3.5	112.5
760	DUAL PITOT SYS	5214300 4		1	1.3	42.1
770	DUAL STATIC SOURCE	5217525 3		1	0.3	225.5
1900	TURN & BANK IND (3 IN) RH	5214150 4		1	1.4	112.1
19A	TURN & BANK IND (2 IN) RH	5204020 2		1	1.2	114.5
	PNEUMATIC					
	VACUUM PUMPS-PWR FOR GYROS STD	212CW		2	3.7	126.3
3200	VACUUM PUMPS-SURFACE DEICE	442CW		2	6.5	126.3
19400	VACUUM PUMPS-FLT IN KNOWN ICE	442CW		2	6.5	126.3

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	ELECTRICAL					
5200	LIGHT-TAXI	5618101 4		1	1.5	54.6
87A	STATIC DISCHARGE WICKS (8 EA)	5100015 10		1	0.4	296.5
4600	GROUND SERVICE PLUG	5118116 2		1	5.0	104.8
4900	LIGHT-LANDING-RH	5118652 1		1	6.0	184.0
4300	LIGHT-COURTESY-NACELLE & NOSE	0851862 8		1	1.2	143.2
8500	TIMER-COURTESY LIGHT	5618712 1		1	0.4	128.6
4800	LIGHT-ICE DETECTION LH	5618701 1		1	0.4	134.6
48A	LIGHT-ICE DETECTION RH	5618701 2		1	0.4	134.6
5000	LIGHT-PASSENGER READING 10 PL	5217505 1		1	6.9	209.4
2600	CONVERTER 110 VO	5218061 3		1	3.3	273.8
5400	TAIL FLOODLIGHT	40200001		1	2.9	291.0
	ELECTRONICS					
30000	300 NAV/COM INSTL NO. 1			1	2.1	109.6
30000	TRANSCEIVER RT-385A & MOUNT			1	6.0	109.4
30001	INDICATOR IN-386A			1	2.2	111.9
66400	INDICATOR IN-386AC			1	2.4	111.9
30003	300 NAV/COM INSTL NO. 2			1	2.1	109.6
30003	TRANSCEIVER RT-385A & MOUNT			1	6.0	109.4
30004	INDICATOR IN-385A			1	2.2	111.9
66410	INDICATOR IN-385AC			1	2.4	111.9
30104	INDICATOR IN-386A			1	2.2	111.9
66411	INDICATOR IN-386AC			1	2.4	111.9
30005	400 GLIDE SLOPE INSTL NO. 1			1	3.2	51.0
30005	RECEIVER R-443B & MOUNT			1	3.3	33.0
30005	ANTENNA RGS-10-48			1	0.1	7.4

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
30006	300 ADF INSTL			1	2.5	100.0
30006	RECEIVER R-546E & MOUNT			1	3.9	109.4
30007	INDICATOR IN-346A			1	1.1	111.9
30107	ACCESSORY UNIT RA-446A			1	1.4	140.0
30106	ANTENNA-LOOP L-346A	5074021 16		1	1.6	161.5
30006	ANTENNA-SENSE	9751044 2		1	1.9	190.7
30008	400 MARKER BEACON INSTL			1	3.2	33.0
30008	RECEIVER R-402A & MOUNT			1	1.1	33.0
30008	ANTENNA CI-102			1	0.8	73.0
40000	400 NAV/COM INSTL NO. 1			1	3.9	70.3
40000	TRANSCEIVER RT-485A & MOUNT			1	6.3	109.4
40001	INDICATOR IN-486AC			1	2.1	111.9
40002	400 NAV/COM INSTL NO. 2			1	3.9	70.3
40002	TRANSCEIVER RT-485A & MOUNT			1	6.3	109.4
40003	INDICATOR IN-485AC			1	2.1	111.9
40103	INDICATOR IN-486AC			1	2.1	111.9
40004	400 GLIDE SLOPE INSTL NO. 1			1	3.2	51.0
40004	RECEIVER R-443B & MOUNT			1	3.3	33.0
40004	ANTENNA RGS-10-48			1	0.1	7.4
40044	400 GLIDE SLOPE INSTL NO. 2			1	3.2	51.0
40044	RECEIVER R-443B & MOUNT			1	3.3	33.0
40044	ANTENNA COUPLER & CABLE			1	0.3	13.8
40005	400 ADF INSTL			1	3.2	91.9
40005	RECEIVER R-446A & MOUNT			1	4.0	109.4
40006	INDICATOR IN-346A			1	1.1	111.9
40106	ACCESSORY UNIT RA-446A			1	1.4	140.0
40105	ANTENNA-LOOP L-346A	5074021 16		1	1.6	161.5
40005	ANTENNA-SENSE	9751044 2		1	1.9	190.7

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
40007	400 MARKER BEACON INSTL			1	3.2	33.0
40007	RECEIVER R-402A & MOUNT			1	1.1	33.0
40007	ANTENNA CI-102			1	0.8	73.0
10000	1000 COM INSTL NO. 1			1	3.9	72.9
10000	TRANSCEIVER RT-1038A & MOUNT			1	6.6	33.0
10000	CONTROL C-1038A & MOUNT			1	2.0	112.9
10001	1000 COM INSTL NO. 2			1	3.9	72.9
10001	TRANSCEIVER RT-1038A & MOUNT			1	6.6	33.0
10001	CONTROL C-1038A & MOUNT			1	2.0	112.9
10002	1000 NAV INSTL NO. 1			1	2.9	72.4
10102	RECEIVER R-1048A & MOUNT			1	4.5	33.0
10112	RECEIVER R-1048B & MOUNT			1	5.0	33.0
10002	CONTROL C-1048A & MOUNT			1	2.0	112.9
10003	INDICATOR IN-486AC			1	1.7	111.9
10004	1000 NAV INSTL NO. 2			1	2.9	72.4
10104	RECEIVER R-1048A & MOUNT			1	4.5	33.0
10114	RECEIVER R-1048B & MOUNT			1	5.0	33.0
10004	CONTROL C-1048A & MOUNT			1	2.0	112.9
10005	INDICATOR IN-1048AC			1	1.6	111.9
10105	INDICATOR IN-1049AC			1	1.7	111.9
10006	1000 GLIDE SLOPE INSTL NO. 1			1	3.2	51.0
10006	RECEIVER R-1043A & MOUNT			1	2.6	33.0
10006	ANTENNA RGS-10-48			1	0.1	7.4
10066	1000 GLIDE SLOPE INSTL NO. 2			1	3.2	51.0
10066	RECEIVER R-1043A & MOUNT			1	2.6	33.0
10066	ANTENNA COUPLER & CABLE			1	0.3	13.9

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
10007	1000 ADF INSTL			1	3.2	118.9
10007	RECEIVER R-846A & MOUNT			1	4.6	33.0
10007	CONTROL C-1046A & MOUNT			1	2.0	112.5
10007	POWER SUPPLY P-1000A			1	1.2	33.0
10008	INDICATOR IN-346A			1	1.1	111.9
10009	ACCESSORY UNIT RA-846A			1	1.4	140.0
10107	ANTENNA-LOOP L-346A	5074021 16		1	1.6	161.5
10007	ANTENNA-SENSE	9751044 2		1	1.9	190.7
10010	400 MARKER BEACON INSTL			1	3.2	33.0
10010	RECEIVER R-402A & MOUNT			1	1.1	33.0
10010	ANTENNA CI-102			1	0.8	73.0
20001	HAND MICROPHONE			1	0.4	120.3
20002	HEADSET & BOOM MIC, COMBINATION			1	0.3	110.0
20003	800 AUDIO AMPLIFIER AA-108			1	1.2	111.9
20004	1000 AUDIO AMPLIFIER F1010A			1	1.6	111.9
20005	SPEAKER INSTL			1	2.9	218.4
20006	AVIONICS BUS	5118714 1		1	4.5	141.7
20007	APPROACH PLATE HOLDERS			2	0.2	124.6
20008	JUNCTION BLOCK			1	2.6	31.5
20011	ANTENNA-COM NO. 1 A-29C			1	1.6	105.8
20012	ANTENNA-COM NO. 2			1	1.6	417.0
20013	ANTENNA-DUAL NAV VT 10-56-5			1	2.1	406.3
20021	AVIONICS COOLING-PANEL	9756080 9		1	0.9	111.0
20022	AVIONICS COOLING-NOSE (ONE)	9756098 1		1	2.4	25.7
20023	AVIONICS COOLING-NOSE (TWO)	9756098 2		1	4.3	29.7
20024	BLOWER INSTL	9754126 2		1	1.0	97.9
20031	SHELF INSTL	9756112 1		1	2.2	36.4
20032	COVER SHELF	9756113 1		1	7.0	30.0
90001	GLIDE SLOPE ANTENNA W/CABLES	RGS-10-48		1	0.1	7.4
90002	MARKER BEACON ANTENNA W/CABLES	CI-102		1	0.8	73.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
90003	TRANSPONDER ANTENNA W/CABLES	L10-216		1	0.2	134.0
90004	ADF SENSE ANTENNA W/CABLES	9751044 2		1	1.9	190.7
90005	DME ANTENNA W/CABLES	L10-216		1	0.2	38.0
62200	400 TRANSPONDER INSTL NO. 1			1	0.6	121.7
62200	TRANSCEIVER RT-459A & MOUNT			1	3.2	109.5
62200	ANTENNA L10-216			1	0.3	134.0
62203	400 TRANSPONDER INSTL NO. 2			1	0.6	134.1
62203	TRANSCEIVER RT-459A & MOUNT			1	3.2	109.5
62203	ANTENNA L10-216			1	0.2	158.8
62300	800 TRANSPONDER INSTL NO. 1			1	0.6	121.7
62300	TRANSCEIVER RT-859A & MOUNT			1	3.2	109.5
62300	ANTENNA L10-216			1	0.3	134.0
62302	800 TRANSPONDER INSTL NO. 2			1	0.6	134.1
62302	TRANSCEIVER RT-859A & MOUNT			1	3.2	109.5
62302	ANTENNA L10-216			1	0.3	158.8
68100	400 DME INSTL NO. 1			1	2.9	60.7
68100	TRANSCEIVER RTA-476A & MOUNT			1	9.8	33.0
68100	CONTROL C-476A			1	1.7	111.0
68100	ANTENNA L10-216			1	0.3	38.0
68103	400 DME INSTL NO. 2			1	2.9	72.9
68103	TRANSCEIVER RTA-476A & MOUNT			1	9.8	33.0
68103	CONTROL C-476A			1	1.7	111.0
68103	ANTENNA L10-216			1	0.3	74.7
68103	MULTIPLEXER M4876A & MOUNT			1	1.1	33.0
68106	800 DME INSTL NO. 1			1	2.9	60.7
68106	TRANSCEIVER RTA-876A & MOUNT			1	9.3	33.0
68106	CONTROL C-876A			1	1.7	111.0
68106	ANTENNA L10-216			1	0.3	38.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
68107	800 DME INSTL NO. 2			1	2.9	72.9
68107	TRANSCEIVER RTA-876A & MOUNT			1	9.3	33.0
68107	CONTROL C-876A			1	1.7	111.0
68107	ANTENNA L10-216			1	0.3	74.7
67700	HORIZONTAL SITUATION INDICATOR			1	3.2	211.0
67700	(3 IN) TO BE USED W/O AUTOPILOT				0.0	0.0
67701	CONVERTER B-445A & MOUNT			1	1.3	33.0
67700	FLUX DETECTOR CT-504A			1	0.5	361.9
67702	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
67703	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
69200	MARKER BEACON MUTE TIMER R-14A			1	0.1	33.0
62907	RDR-150 RADAR INSTL			1	3.0	59.1
62907	TRANSCEIVER RT-131A & MOUNT			1	13.0	24.9
62907	INDICATOR IN-152A & MOUNT			1	6.8	103.9
62907	WAVEGUIDE			1	2.6	18.0
62907	ANTENNA DA-144A			1	3.6	9.0
62907	REFLECTOR AA-1212A			1	1.2	7.5
62907	RADOME NOSE (EXCHANGE)			1	-0.3	7.4
62904	RDR-160 RADAR INSTL			1	3.0	57.5
62904	TRANSCEIVER, ANTENNA & MOUNT	ANT-161A		1	10.5	11.0
62904	INDICATOR IN-152A & MOUNT			1	6.8	103.9
62904	RADOME NOSE (EXCHANGE)			1	-0.3	7.4

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
633D	COLLINS HF-200 INSTL			1	2.7	152.4
633D	CONTROL HEAD CTL-200	9752007 155		1	1.1	112.9
633D	TRANSCEIVER ICR-200	9756031 242		1	6.9	33.0
633D	POWER AMPLIFIER PWR-200	9756031 243		1	7.4	33.0
633D	ANT & COUPLER (TAIL)	9751094 1		1	11.9	308.3
65000	300 ADF INSTL NO. 2			1	2.5	100.0
65000	RECEIVER R-546E & MOUNT			1	3.9	109.4
65001	INDICATOR IN-346A			1	1.1	111.9
65002	INDICATOR IN-13A-1			1	1.4	111.9
65003	ACCESSORY UNIT RA-446A			1	1.4	140.0
65004	ACCESSORY UNIT RA-446A			1	1.4	140.0
65005	INVERTER DV-1060A			1	5.2	33.0
65006	ANTENNA-LOOP L-346A	5074021 17		1	1.6	207.6
65000	ANTENNA-SENSE	9751044 1		1	1.9	190.7
65100	400 ADF INSTL NO. 2			1	3.2	91.9
65100	RECEIVER R-446A & MOUNT			1	4.0	109.4
65101	INDICATOR IN-346A			1	1.1	111.9
65102	INDICATOR IN-13A-1			1	1.4	111.9
65103	ACCESSORY UNIT RA-446A			1	1.4	140.0
65104	ACCESSORY UNIT RA-446A			1	1.4	140.0
65105	INVERTER DV-1060A			1	5.2	33.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
65106	ANTENNA-LOOP L-346A	5074021 17		1	1.6	207.6
90006	ANTENNA-SENSE #2	9751044 1		1	1.9	190.7
65100	ANTENNA-SENSE	9751044 1		1	1.9	190.7
65600	1000 ADF INSTL NO. 2			1	3.2	118.9
65600	RECEIVER R-846A & MOUNT			1	4.6	33.0
65600	CONTROL C-1046A & MOUNT			1	2.0	112.5
65600	POWER SUPPLY P-1000A			1	1.2	33.0
65601	INDICATOR IN-346A			1	1.1	111.9
65602	INDICATOR IN-13A-1			1	1.4	111.9
65603	ACCESSORY UNIT RA-846A			1	1.4	140.0
65604	ACCESSORY UNIT RA-846A			1	1.4	140.0
65605	INVERTER DV-1060A			1	5.2	33.0
65606	ANTENNA-LOOP L-346A	5074021 17		1	1.6	207.6
65600	ANTENNA-SENSE	9751044 1		1	1.9	190.7
66000	ADF IN-346B			1	1.3	111.9
66200	ADF RA-446A			1	1.4	140.0
66300	ADF RA-846A			1	1.4	140.0
68500	400 AREA NAVIGATION INSTL			1	2.8	111.0
68501	INDICATOR IN-1048AC			1	1.6	111.9
68502	INDICATOR IN-1049AC			1	1.7	111.9
68500	COMPUTER RN-478A & MOUNT			1	5.1	112.0
68700	800 AREA NAVIGATION INSTL			1	2.8	72.5
68701	INDICATOR IN-1048AC			1	1.6	111.9
68702	INDICATOR IN-1049AC			1	1.7	111.9
68700	COMPUTER RN-878A & MOUNT			1	5.1	112.0
67200	AA-215 RADIO ALTIMETER INSTL			1	0.5	195.5
67200	TRANSCEIVER RT-220			1	6.8	279.0
67200	INDICATOR RA-215			1	2.6	112.0
67200	ANTENNA AT-220			1	0.8	244.4

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
68800	AA-100 RADIO ALTIMETER INSTL			1	0.5	216.0
68800	TRANSCEIVER RT-100			1	3.6	320.0
68800	INDICATOR RA-100			1	1.3	112.0
68800	ANTENNA AT-100			1	1.1	284.6
67000	400 RMI INSTL			1	1.2	175.0
67001	INDICATOR IN-404A			1	2.3	111.0
67002	FLUX DETECTOR CT-504A			1	0.5	361.9
67003	SLAVE ACCESS W/BS SA-832B			1	2.2	33.0
67004	INVERTER DV-1060A			1	5.2	33.0
67100	1000 RMI INSTL			1	1.2	175.0
67101	INDICATOR IN-1004A			1	2.4	111.0
67102	FLUX DETECTOR CT-504A			1	0.5	361.9
67103	SLAVE ACCESS W/BS SA-832B			1	2.2	33.0
67104	INVERTER DV-1060A			1	5.2	33.0
7900	RADOME NOSE	9711019 1		1*	-0.3	7.4
674A	RADIO TELEPHONE FLITEFONE III			1	21.3	228.4
674B	FLITEFONE III (COCKPIT CONTROL)			1	12.2	294.4
14100	HEADSET W/MIKE-PILOT	9754030 5		1	0.4	120.9
141A	HEADSET W/MIKE-PILOT & COPILOT	9754030 6		1	0.8	120.9
141D	HEADSET W/MIKE-COPILOT	9754030 6		1	0.4	120.9
1700	BAGGAGE RETAINER-FWD NOSE	5113016 1		1	0.8	62.0
5500	BOOM MICROPHONE INSTL	5272423 1		1	0.6	137.3
55A	PASSENGER MIC AFT CABIN	9715030 3		1	1.0	186.2
	FURNISHINGS					
	SEAT-COPILOT ADJUSTABLE	0812782 2		1	15.2	140.0
AL	SEAT-COPILOT ADJUSTABLE-LEATHER	0812782 2		1	15.8	140.0
89A	SEAT-COPILOT MECH ADJUST	0812780 18		1	23.1	140.8
89AL	SEAT-COPILOT MECH ADJUST LTHR	0812780 18		1	23.7	140.8

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	SAFETY BELT SHOULDER HARNESS			1	1.1	153.1
18100	INERTIA REEL INSTL-COPILOT	5204015 1		1	1.3	154.8
	SEAT-3RD FWD	5619145 45		1	24.5	183.0
11200	SEAT-3RD AFT	5619145 51		1	25.7	167.5
11400	SEAT-3RD AFT	5619145 51		1	25.7	167.5
11299	SEAT-3RD AFT			1	25.4	170.5
	SEAT-4TH FWD	5619145 45		1	24.5	183.0
11200	SEAT-4TH AFT	5619145 51		1	25.7	167.5
11400	SEAT-4TH AFT	5619145 51		1	25.7	167.5
11299	SEAT-4TH AFT			1	25.4	170.5
	SEAT-5TH FWD	5619145 47		1	24.5	225.7
11299	SEAT-5TH FWD			1	26.6	225.7
	SEAT-6TH FWD	5619145 46		1	24.5	225.7
11299	SEAT-6TH FWD			1	26.6	225.7
11200	SEAT-7TH FWD	5214040 1		1	15.4	266.0
11300	SEAT-7TH FWD	5214040 3		1	15.4	266.0
11400	SEAT-7TH FWD	5214040 3		1	15.4	266.0
11299	SEAT-7TH FWD			1	15.2	266.0
11300	SEAT-8TH FWD	5214040 3		1	15.4	266.0
11400	SEAT-8TH FWD	5214040 3		1	15.4	266.0
99600	SEATS, ALL LEATHER STD	5214068 800		1	2.4	196.6
99601	SEATS, ALL LEATHER OPT 1	5214068 801		1	3.0	210.5
99602	SEATS, ALL LEATHER OPT 2	5214068 802		1	3.6	224.9
99603	SEATS, ALL LEATHER OPT 3	5214068 803		1	3.6	219.7
99700	SEAT TRIM LEATHER STD	5200016 800		1	0.6	196.6
99701	SEAT TRIM LEATHER OPT 1	5200016 801		1	0.8	210.5
99702	SEAT TRIM LEATHER OPT 2	5200016 802		1	0.9	224.9
99703	SEAT TRIM LEATHER OPT 3	5200016 803		1	0.9	219.7
99800	SIDE PANELS-LEATHER	5214006 800		1*	3.6	194.7
99801	SIDE PANELS-VINYL	5214006 800		1*	3.6	194.7

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
11299	SIDE PANELS			1*	4.4	194.7
5800	OXYGEN MASK (W/MIKE) COPILOT	C166015201		1	0.8	150.5
22D	CARGO TIE DOWN (100 LB RATED)	0711121 2		1	0.2	187.0
22D4	CARGO TIE DOWN (100 LB RATED)	711121 2		4	0.8	187.0
22D3	CARGO TIE DOWN (100 LB RATED)			3	0.6	187.0
22D2	CARGO TIE DOWN (100 LB RATED)	711121 2		6	1.2	187.0
22E	CARGO TIE DOWN (200 LB RATED)	5014089 20		1	0.2	187.0
22E3	CARGO TIE DOWN (200 LB RATED)			3	0.6	187.0
4200	AVIONICS BAY DOOR	5213001 2		1	2.2	32.0
4100	FENDER, NOSE GEAR	5042021 1		1	1.0	51.2
98A	CREW DOOR HATCH	5210010 4		1	8.9	141.5
35A	TWIN CARGO DOORS	5210010 5		1	10.4	245.6
35C	EXTENDER INSTL LWR (STD DOOR)	5211137		1	1.8	241.3
35D	EXTENDER INSTL LWR (CARGO DOOR)	5211137 1		1	1.7	241.2
9900	CREW DOOR & TWIN CARGO	5210010 6		1	20.8	245.6
99A	CREW DOOR & TWIN CARGO	5210010 6		1	20.8	245.6
10200	RELIEF TUBE INSTL	5214079 13		1	1.2	263.2
2800	FLIGHT DECK CURTAIN DIVIDER	5219503 12		1	2.7	156.0
2800	PAIN, U.S. ALUMIGRIP	5200350 000		1	0.0	0.0
128D	THERMOS CARRIER	5314543 2		1	9.4	285.7
12800	REFRESHMENT CENTER	5219500 1		1	28.1	273.0
130B	TOILET,DIVIDER,RACK,CURTAIN,HDR	5219520 2		1	37.7	244.7
130A	TOILET,CURTAIN,HOLDER,TUBE	5219520 1		1	23.0	249.7
130E	TOILET,FLUSH-CURTAIN-HOLDER	5219531 2		1	35.6	248.2
130F	TOILET,FLUSH-DIVIDER-RACK-HDR	5219531 1		1	50.3	244.9
6300	OXYGEN SYS 115.0 CU FT	5814002 1		1	54.9	41.5
63A	OXYGEN SYS 115.0 CU FT	5814002 1		1	54.9	41.5
64C	OXYGEN SYS 44.0 CU FT	5814002 2		1	33.8	18.4
64A	OXYGEN SYS 44.0 CU FT	5814002 2		1	33.8	18.4
120A	FLIGHT DECK DIVIDER W/CURT-SIGN	5219503 1		1	19.5	156.5

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
124A	EXECUTIVE TABLE LH	5219506 1		1	9.5	193.9
124B	EXECUTIVE TABLE RH	5219506 2		1	9.5	193.9
138Y	STEREO INSTL W/AVN	9715029 3		1	3.8	204.2
138G	STEREO INSTL W/O AVN	9715029 4		1	11.8	170.4
104M3	STOWAGE DRAWER 3RD AFT SEAT	5319031 1		1	3.9	159.9
104MF	STOWAGE DRAWER 3RD FWD SEAT	5319031 3		1	3.9	166.8
104MA	STOWAGE DRAWER 4TH AFT SEAT	5319031 2		1	3.9	159.9
104M4	STOWAGE DRAWER 4TH FWD SEAT	5319031 4		1	3.9	166.8
104M5	STOWAGE DRAWER 5TH FWD SEAT	5319031 003		1	3.9	202.0
104M6	STOWAGE DRAWER 6TH FWD SEAT	5319031 4		1	3.9	202.0
137A	INTERCOM SYS	5218046 1		1	1.2	204.2
1700	BAGGAGE RETAINER, NOSE	5113016 1		1	0.8	62.0
128Q	THERMOS CARRIER, FWD CABIN	5119071 2		1	8.8	156.9
128S	CUP HOLDER LH	5219507 1		1	0.4	194.1
128R	CUP HOLDER RH	5219507 2		1	0.4	194.1
3100	CAA CONVERSION KIT	5200013 2		1	1.3	136.8
	EMERGENCY EQUIPMENT					
37A	FIRE EXTINGUISHER-HALOGEN-HAND	5114243 6		1	5.1	130.7
4400	NACELLE FIRE EXTINGUISHER STC	5118705 8 & 9		1	18.5	133.3
44B	FIRE EXTINGUISHER-CABIN FLOOD	5214069 1		1	31.2	174.2
17700	LOCATOR BEACON	9754083 45		1	2.9	312.1
177A	LOCATOR BEACON (CANADA)	9754083 36		1	3.7	312.3

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	AIR COND. & ANTI-ICE					
15H	AIR CONDITIONER-CABIN	5214524 17		1	119.6	176.7
3200	DEICE SYS WING STABILIZER & FIN	5214136 1		1	40.2	176.8
6700	PARTIAL PLUMBING DEICE	5214136 2		1	3.1	213.3
19400	FLIGHT IN KNOWN ICING	5114400 8		1	75.0	163.2
9200	CIRCULATION BLOWER SYS	5210112 1		1	13.8	272.9
3000	DEICE SYS 3 BLADE-PROP	5250250 9		1	14.8	101.8
94A	DEICE WINDSHIELD-ALCOHOL	5114136 5		1	29.8	204.3
7800	FUSELAGE ICE PROTECTION PANELS	5113115 1 & 8		1	5.1	90.7
8800	STATIC SOURCE-DUAL HEATED	5217525 3		1	0.3	255.5
	PHOTOGRAPHIC PROVISIONS					
73B	CAMERA PROVISIONS	5211501 1		1	21.6	207.0

EQUIPMENT LIST (UTILILINER)

THE FOLLOWING IS A COMPLETE LIST OF EQUIPMENT WHICH CAN BE INSTALLED IN THE AIRPLANE WHEN DELIVERED BY CESSNA AIRCRAFT COMPANY. REFER TO THE EQUIPMENT LIST IN THE AIRPLANE FOR A LIST OF EQUIPMENT ACTUALLY INSTALLED WHEN DELIVERED BY CESSNA AIRCRAFT COMPANY.
DATUM STATION 0.0 IS 100.0 INCHES FORWARD OF THE AFT FACE OF THE FUSELAGE BULKHEAD JUST FORWARD OF THE RUDDER PEDALS.
POSITIVE ARMS ARE DISTANCES AFT OF DATUM STATION 0.0.
AN ASTERISK (*) INDICATES EXCHANGE WEIGHT.
THE TOTAL OPTIONAL EQUIPMENT WEIGHT AND MOMENT IS THE WEIGHT OF THE OPTION PACKAGE ONLY AND NOT THE SUM OF ALL THE ITEMS LISTED.
INSTALLATION APPROVAL OF EQUIPMENT INCLUDED IN THIS LIST IS MAINTAINED EITHER BY THE MANUFACTURER'S SUPPLEMENTARY TYPE CERTIFICATE WITH THE APPROVAL NUMBER NOTED WITH EQUIPMENT OR IN THE MANUFACTURER'S TYPE DESIGN FILE IN ACCORDANCE WITH DELEGATION OPTION AUTHORIZATION CE-3.

SECTION A
REQUIRED EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	WHEEL-MAIN GEAR	9910393 2		2	17.5	171.8
	TIRE-MAIN GEAR	A650C81 3		2	31.9	171.8
	TUBE-MAIN GEAR	C262023105		2	5.6	171.8
	BRAKE-MAIN GEAR	9910393 3		2	28.5	171.8
	WHEEL-NOSE GEAR 600X6	9910194 5		1	5.5	47.0
	TIRE-NOSE GEAR 600X6 6 PLY III	9910336 1		1	7.8	47.0
	TUBE-NOSE GEAR	C262023102		1	1.7	47.0
	ENGINE CMC 6 CYL	TSIO-520VB		2	865.9	115.8
	CONTROLLER VAR.	C165004604		2	14.8	140.2
	TURBOCHARGERS AIRESEARCH	632729 28		2	50.0	142.1
	AIR INDUCTION FILTER ASSY	5650300 14		2	8.4	134.5

SECTION A
REQUIRED EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	OIL RADIATOR	637132		2	15.0	122.3
	OIL FILTER & ADAPTER	631641		2	5.4	125.4
	FUEL PUMP-ENGINE DRIVEN	641583 639		2	5.2	125.4
	FUEL PUMP-BOOST	9910202 2		2	7.0	174.7
	PROP 3 BLADE	0850334 29		2	176.7	87.4
	PROP SPINNER	D3534		2	4.0	87.0
	PROP BULKHEAD	D3796		2	3.1	92.0
	PROP GOVERNOR LH STD	290D7/T3		1	2.8	99.3
76D	PROP GOVERNOR LH SYNCHROPHASER	S290D8/T3		1	3.9	99.3
76B	PROP GOVERNOR LH UNFEATH/SYNCHRO	US290D8/T3		1	4.0	99.3
7700	PROP GOVERNOR LH UNFEATHERING	U290D7/T3		1	2.9	99.3
	PROP GOVERNOR RH STD	290D7/T3		1	2.8	99.3
76D	PROP GOVERNOR RH SYNCHROPHASER	S290D7/T3		1	2.9	99.3
76E	PROP GOVERNOR RH UNFEATH/SYNCRO	US290D7/T3		1	3.1	99.3
7700	PROP GOVERNOR RH UNFEATHERING	U290D7/T3		1	2.9	99.3
	RATE-OF-CLIMB IND STD	C661035101		1	0.9	113.1
800	INDICATOR-INST VERTICAL VEL	5204008 1		1	1.9	113.1
	AIRSPEED INDICATOR STD	C661040218		1	0.7	112.6
400	AIRSPEED INDICATOR TAS	5204013 1		1	2.8	112.6
	ALTIMETER STD	C661014101		1	1.1	112.6
1A	ALTIMETER FT & MILIBARS	5204007 1		1	1.1	112.6
1BB	ALTIMETER FT & MILIBARS RH	5204007 2		1	1.1	112.6
624C	400 ENCODING ALTIMETER-INCHES	EA-401A		1	2.6	113.0
624E	400 ENCODING ALTIMETER-MILIBARS	EA-401A		1	2.6	113.0
675A	800 ENCODING ALTIMETER-INCHES	EA-801A		1	2.8	113.0
675B	800 ENCODING ALTIMETER-MILIBARS	EA-801A		1	2.8	113.0
	TACHOMETER-DUAL STD	C668017110		1	1.8	112.6
900	TACHOMETER SYNCHRONOUS DUAL	5204002 1		1	1.8	112.6
	FUEL QUANTITY INDICATOR-DUAL	9910232 10		1	1.1	112.6
	FUEL FLOW INDICATOR-DUAL STD	C662020118		1	2.6	135.4

SECTION A
REQUIRED EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
3900	FUEL FLOW GAGE & MGMT COMPUTER	9910395 10		1	2.2	114.6
	GAGE-MANIFOLD PRESSURE-DUAL	C662026117		1	1.1	112.6
	GAGE-UNIT LEFT ENGINE COMB	C662019101		1	1.1	112.6
	GAGE-UNIT RIGHT ENGINE COMB	C662019101		1	1.1	112.6
	COMPASS	C660501401		1	0.7	118.2
	STALL WARNING HORN	9910080 2		1	0.2	114.0
	STALL WARNING TRANSMITTER	186 16		1	0.2	142.5
1100	ANGLE OF ATTACK SYSTEM	0800302 3		1	1.0	124.1
	ALTERNATOR 50 AMP-CMC STD	634445		2	25.5	107.0
16A	ALTERNATOR 100 AMP 634788	5218003 1		2	38.1	107.0
	VOLTAGE REGULATOR CMC	9910126 2		2	1.7	136.1
	BATTERY 24 VOLTS STD	9910128 1		1	42.0	172.2
1800	BATTERY-NOSE SECTION INSTL	5118701 15		1	53.4	46.7
	MASTER SWITCH	8501KA		3	0.3	122.5
	STROBE LIGHT 30-1080-6	60-2798 1		2	8.8	162.6
96A	STROBE LT (HIGH INTENSITY)	5118708 1		2	9.3	162.6
96B	STROBE LIGHT (ICAO RED)	5118708 2		2	9.3	162.6
	SEAT-PILOT ADJUSTABLE STD	0812782 1		1	15.2	140.0
L	SEAT-PILOT ADJUSTABLE-LEATHER	0812782 1		1	15.8	140.0
8900	SEAT-PILOT MECH ADJUST	0812780 17		1	23.1	140.8
890L	SEAT-PILOT MECH ADJUST-LEATHER	0812782 17		1	23.7	140.8
	SAFETY BELT-SHOULDER HARNESS	CM4008		1	1.1	153.1
18100	INERTIA REEL INSTL-PILOT	5204015 1		1	1.3	154.8
	PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL	D1582-4-13PH		1	1.4	144.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	CONTROLS & AUTOPILOT					
2400	DUAL CONTROLS	5115270 11		1	7.6	113.8
2700	CORROSION PROOFING, INTERNAL	5800009 000		1*	12.5	217.0
3300	ELECTRIC ELEVATOR TRIM	5215093 1		1	2.8	265.0
47B	GUST LOCK, RUDDER	5130387 1		1	1.1	375.6
	GYRO-DIRECTIONAL	C661053-0101		1	2.6	113.0
53301	GYRO-DIRECT G-502A			1	3.6	113.0
53302	GYRO-DIRECT G-504A			1	3.5	113.0
53303	GYRO-HSI (3 IN) IG-832A			1	5.0	113.0
53304	GYRO-HSI (4 IN) IG-895A			1	5.3	113.0
	GYROHORIZONTAL	C661055-0103		1	1.9	112.5
53310	GYRO-HORIZ G-519B-1			1	2.5	112.5
53311	GYRO-ADI (3 IN) G-550A			1	3.5	112.5
53312	GYRO-ADI (4 IN) G-895A			1	5.0	112.5
53000	400B NAV-O-MATIC INSTL			1	16.6	198.4
53000	COMPUTER CA-550A/FD & MOUNT			1	6.3	303.1
53000	CONTROLLER C-530A			1	1.7	109.7
53000	ACTUATOR PA-495A-1 & MOUNT			1	4.1	294.6
53000	ACTUATOR TA-495A & MOUNT			1	2.1	300.4
53000	ACTUATOR PA-495A-2 & MOUNT			1	4.1	220.0
53000	ALTITUDE SENSOR AS-895A			1	2.3	318.6
53100	400B NAV-O-MATIC SLAVED DG OPT			1	2.8	215.4
53100	FLUX DETECTOR CT-504A			1	0.4	361.9
53101	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
53102	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
53200	400B NAV-O-MATIC HSI (3 IN) OPT			1	3.1	213.6
53201	CONVERTER B-445A & MOUNT			1	1.3	33.0
53200	FLUX DETECTOR CT-504A			1	0.5	361.9
53202	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
53203	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
53400	YAW DAMPER INSTL YD-840B			1	3.9	234.3
53400	ACTUATOR PA-495A-1 & MOUNT			1	4.1	298.2
55000	400B IFCS INSTL			1	25.1	197.1
55000	COMPUTER CA-550A/FD & MOUNT			1	6.3	303.1
55000	CONTROLLER C-531A			1	1.5	109.7
55000	ACTUATOR PA-495A-1 & MOUNT			1	4.1	294.6
55000	ACTUATOR PA-495A-2 & MOUNT			1	4.1	220.0
55000	ACTUATOR TA-495A & MOUNT			1	2.1	300.4
55000	ALTITUDE SENSOR AS-895A			1	2.3	318.6
55000	MODE SELECTOR S-550A			1	2.6	112.9
55001	CONVERTER B-445A & MOUNT			1	1.3	33.0
55000	FLUX DETECTOR CT-504A			1	0.5	361.9
55002	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
55003	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
56000	800B IFCS INSTL			1	24.6	190.9
56000	COMPUTER CA-550A/FD & MOUNT			1	6.3	303.1
56000	CONTROLLER C-830FD			1	1.5	109.7
56000	ACTUATOR PA-495A-1 & MOUNT			1	4.1	294.6
56000	ACTUATOR PA-495A-2 & MOUNT			1	4.1	220.0
56000	ACTUATOR TA-495A & MOUNT			1	2.1	300.4
56000	ALTITUDE SENSOR AS-895A			1	2.3	318.6
56000	MODE SELECTOR S-550A			1	2.6	112.9
56001	CONVERTER B-445A & MOUNT			1	1.3	33.0
56002	INVERTER DV-1060A			1	5.2	33.0
56000	FLUX DETECTOR CT-504A			1	0.5	361.9

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
56003	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
56004	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
56000	YAW DAMPER INSTL			1	3.9	234.3
56000	ACTUATOR PA-495A-1 & MOUNT			1	4.1	298.2
57000	HSI & ADI 3 IN OPTION, RH			1	3.3	211.8
57000	INDICATOR IN-832R			1	0.8	112.9
57001	CONVERTER B-445A & MOUNT			1	1.3	33.0
57000	FLUX DETECTOR CT-504A			1	0.5	361.9
57002	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
57003	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
	PROPELLER					
76D	PROP SYNCHROPHASER SYSTEM	5618124 1		1	2.7	134.7
7700	PROP UNFEATHERING SYSTEM	5650116 1		1	10.5	115.3
76E	PROP SYNC/UNFEATH SYSTEM	5650116 2		1	13.2	119.2
	INSTRUMENT					
675A	ALTITUDE ALERTER AA-801A			1	0.8	113.0
675B	ALTITUDE ALERTER AA-801A			1	0.8	113.0
624B	400 ENCODING ALTIMETER-INCHES	EA-401A		1	2.6	113.0
624D	400 ENCODING ALTIMETER-MILIBARS	EA-401A		1	2.6	113.0
676A	800 ENCODING ALTIMETER-INCHES	EA-801A		1	2.8	113.0
676A	ALTITUDE ALERTER AA-801A			1	0.8	113.0
676B	800 ENCODING ALTIMETER-MILIBARS	EA-801A		1	2.8	113.0
676B	ALTITUDE ALERTER AA-801A			1	0.8	113.0
	CLOCK-ELECTRIC STD	C664509101		1	0.4	114.1
23B	CLOCK- 8 DAY, 24 HOUR	5204016 1		1	0.4	114.1
23A	CLOCK-DIGITAL ELECTRONIC	5114584 9		1	0.6	114.1

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	TURN & BANK INDICATOR STD	C661031101		1	1.4	112.1
500	TURN COORDINATOR	5204004 1		1	2.5	112.1
53400	GYRO-COMPUTER G-840A			1	2.6	112.8
56000	GYRO-COMPUTER G-840A			1	2.6	112.8
300	FLIGHT HOUR RECORDER (PNL MTD)	5118479 7		1	0.8	112.1
3A	HEATER HOUR METER INSTL	5213127 1		1	0.2	96.0
4500	FUEL LOW LEVEL WARNING SYS	5118628 5		1	0.6	154.5
200	ECONOMY MIXTURE INDICATOR	5118650 6		1	3.5	123.2
700	RH PANEL & PLUMBING	5214305 10		1	4.0	112.5
710	ALTIMETER RH PNL	C661014101		1	1.1	112.6
1B	ALTIMETER RH PNL FT & MILIBAR	5204007 2		1	1.1	112.6
720	AIRSPEED IND RH PANEL	C661040217		1	0.7	112.6
4A	AIRSPEED IND RH PANEL TAS	5204013 2		1	2.8	112.6
730	RATE-OF-CLIMB RH PANEL	C661035101		1	0.9	113.1
8A	INDICATOR-INST VERTICAL VEL	5204008 1		1	1.9	113.1
740	GYRO-DIRECTIONAL RH PANEL	C661053101		1	2.6	113.0
53305	GYRO-HSI (3-IN) IG-832A RH			1	5.0	113.0
750	GYRO-HORIZONTAL RH PANEL	C661055103		1	1.9	112.5
53313	GYRO-ADI (3-IN) G-550A RH			1	3.5	112.5
760	DUAL-PITOT SYS	5214300 4		1	1.3	42.1
770	DUAL STATIC SOURCE	5217525 3		1	0.3	225.5
1900	TURN & BANK IND (3 IN) RH	5214150 4		1	1.4	112.1
19A	TURN & BANK IND (2 IN) RH	5204020 2		1	1.2	114.5
	PNEUMATIC					
	VACUUM PUMPS-PWR FOR GYROS STD	212CW		2	3.7	126.3
3200	VACUUM PUMPS-SURFACE DEICE	442CW		2	6.5	126.2
19400	VACUUM PUMPS-FLT IN KNOWN ICE	442CW		2	6.5	126.3

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
	ELECTRICAL					
5200	LIGHT-TAXI	5618101 4		1	1.5	54.6
87A	STATIC DISCHARGE WICKS (8 EA)	5100015 10		1	0.4	296.5
4600	GROUND SERVICE PLUG	5118116 2		1	5.0	104.8
4900	LIGHT-LANDING-RH	5118652 1		1	6.0	184.0
4300	LIGHT-COURTESY-NACELLE & NOSE	0851862 8		1	1.2	143.2
8500	TIMER-COURTESY LIGHT	5618712 1		1	0.4	128.6
4800	LIGHT-ICE DETECTION LH	5618701 1		1	0.4	134.6
48A	LIGHT-ICE DETECTION RH	5618701 2		1	0.4	134.6
5000	LIGHT-PASSENGER READING 10 PL	5217505 1		1	6.7	209.4
5400	LIGHT, FLOOD, VERT TAIL			1	2.9	291.0
	ELECTRONICS					
30000	300 NAV/COM INSTL NO. 1			1	2.1	109.6
30000	TRANSCEIVER RT-385A & MOUNT			1	6.0	109.4
30001	INDICATOR IN-386A			1	2.2	111.9
66400	INDICATOR IN-386AC			1	2.4	111.9
30003	300 NAV/COM INSTL NO. 2			1	2.1	109.6
30003	TRANSCEIVER RT-385A & MOUNT			1	6.0	109.4
30004	INDICATOR IN-385A			1	2.2	111.9
66410	INDICATOR IN-385AC			1	2.4	111.9
30104	INDICATOR IN-386A			1	2.2	111.9
66411	INDICATOR IN-386AC			1	2.4	111.9
30005	400 GLIDE SLOPE INSTL NO. 1			1	3.2	51.0
30005	RECEIVER R-443B & MOUNT			1	3.3	33.0
30005	ANTENNA RGS-10-48			1	0.1	7.4

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
30006	300 ADF INSTL			1	2.5	100.0
30006	RECEIVER R-546E & MOUNT			1	3.9	109.4
30007	INDICATOR IN-346A			1	1.1	111.9
30107	ACCESSORY UNIT RA-446A			1	1.4	140.0
30106	ANTENNA-LOOP L-346A	5074021 16		1	1.6	161.5
30006	ANTENNA-SENSE	9751044 2		1	1.9	190.7
30008	400 MARKER BEACON INSTL			1	3.2	33.0
30008	RECEIVER R-402A & MOUNT			1	1.1	33.0
30008	ANTENNA CI-102			1	0.8	73.0
40000	400 NAV/COM INSTL NO. 1			1	3.9	70.3
40000	TRANSCEIVER RT-485A & MOUNT			1	6.3	109.4
40001	INDICATOR IN-486AC			1	2.1	111.9
40002	400 NAV/COM INSTL NO. 2			1	3.9	70.3
40002	TRANSCEIVER RT-485A & MOUNT			1	6.3	109.4
40003	INDICATOR IN-485AC			1	2.1	111.9
40103	INDICATOR IN-486AC			1	2.1	111.9
40004	400 GLIDE SLOPE INSTL NO. 1			1	3.2	51.0
40004	RECEIVER R-443B & MOUNT			1	3.3	33.0
40004	ANTENNA RGS-10-48			1	0.1	7.4
40044	400 GLIDE SLOPE INSTL NO. 2			1	3.2	51.0
40044	RECEIVER R-443B & MOUNT			1	3.3	33.0
40044	ANTENNA COUPLER & CABLE			1	0.3	13.8
40005	400 ADF INSTL			1	3.2	91.9
40005	RECEIVER R-446A & MOUNT			1	4.0	109.4
40006	INDICATOR IN-346A			1	1.1	111.9
40106	ACCESSORY UNIT RA-446A			1	1.4	140.0
40105	ANTENNA-LOOP L-346A	5074021 16		1	1.6	161.5
40005	ANTENNA-SENSE	9751044 2		1	1.9	190.7

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
40007	400 MARKER BEACON INSTL			1	3.2	33.0
40007	RECEIVER R-402A & MOUNT			1	1.1	33.0
40007	ANTENNA CI-102			1	0.8	73.0
10000	1000 COM INSTL NO. 1			1	3.9	72.9
10000	TRANSCEIVER RT-1038A & MOUNT			1	6.6	33.0
10000	CONTROL C-1038A & MOUNT			1	2.0	112.9
10001	1000 COM INSTL NO. 2			1	3.9	72.9
10001	TRANSCEIVER RT-1038A & MOUNT			1	6.6	33.0
10001	CONTROL C-1038A & MOUNT			1	2.0	112.9
10002	1000 NAV INSTL NO. 1			1	2.9	72.4
10102	RECEIVER R-1048A & MOUNT			1	4.5	33.0
10112	RECEIVER R-1048B & MOUNT			1	5.0	33.0
10002	CONTROL C-1048A & MOUNT			1	2.0	112.9
10003	INDICATOR IN-1049AC			1	1.7	111.9
10004	1000 NAV INSTL NO. 2			1	2.9	72.4
10104	RECEIVER R-1048A & MOUNT			1	4.5	33.0
10114	RECEIVER R-1048B & MOUNT			1	5.0	33.0
10004	CONTROL C-1048A & MOUNT			1	2.0	112.9
10005	INDICATOR IN-1048AC			1	1.6	111.9
10105	INDICATOR IN-1049AC			1	1.7	111.9
10006	1000 GLIDE SLOPE INSTL NO. 1			1	3.2	51.0
10006	RECEIVER R-1043A & MOUNT			1	2.6	33.0
10006	ANTENNA RGS-10-48			1	0.1	7.4
10066	1000 GLIDE SLOPE INSTL NO. 2			1	3.2	51.0
10066	RECEIVER R-1043A & MOUNT			1	2.6	33.0
10066	ANTENNA COUPLER & CABLE			1	0.3	13.9
10007	1000 ADF INSTL			1	3.2	118.9
10007	RECEIVER R-846A & MOUNT			1	4.6	33.0
10007	CONTROL C-1046A & MOUNT			1	2.0	112.5
10007	POWER SUPPLY P-1000A			1	1.2	33.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
10008	INDICATOR IN-346A			1	1.1	111.9
10009	ACCESSORY UNIT RA-846A			1	1.4	140.0
10107	ANTENNA-LOOP L-346A	5074021 16		1	1.6	161.5
10007	ANTENNA-SENSE	9751044 2		1	1.9	190.7
10010	400 MARKER BEACON INSTL			1	3.2	33.0
10010	RECEIVER R-402A & MOUNT			1	1.1	33.0
10010	ANTENNA CI-102			1	0.8	73.0
20001	HAND MICROPHONE			1	0.8	120.3
20002	HEADSET & BOOM MIC, COMBINATION			1	0.3	110.0
20003	800 AUDIO AMPLIFIER AA-108			1	1.2	111.9
20004	1000 AUDIO AMPLIFIER F1010A			1	1.6	111.9
20006	AVIONICS BUS	5118714 1		1	0.9	141.7
20007	APPROACH PLATE HOLDERS			2	0.2	124.6
20008	JUNCTION BLOCK			1	2.6	31.5
900A	JUNCTION BLOCK	9754050 34		1	2.6	13.0
20011	ANTENNA-COM NO. 1 A-29C			1	1.6	105.8
20012	ANTENNA-COM NO. 2 VF10-22			1	1.6	417.0
20013	ANTENNA-DUAL NAV VT 10-56-5			1	2.1	406.3
20021	AVIONICS COOLING-PANEL	9756080 9		1	0.8	111.0
20022	AVIONICS COOLING-NOSE (ONE)	9756098 1		1	2.4	25.7
20023	AVIONICS COOLING-NOSE (TWO)	9756098 2		1	4.3	29.7
20024	BLOWER INSTL	9754126 2		1	0.9	96.7
20025	SPEAKER INSTL			1	2.9	218.4
20031	SHELF INSTL	9756112 1		1	2.2	36.4
	COVER SHELF	9756113 1		1	7.0	30.0
90001	GLIDE SLOPE ANTENNA W/CABLES	RGS-10-48		1	0.1	7.4
90002	MARKER BEACON ANTENNA W/CABLES	CI-102		1	0.8	73.0
90003	TRANSPONDER ANTENNA W/CABLES	L10-216		1	0.2	134.0
90004	ADF SENSE ANTENNA W/CABLES	9751044 2		1	1.9	190.7
90005	DME ANTENNA W/CABLES	L10-216		1	0.2	38.0

SECTION B
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FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
62200	400 TRANSPONDER INSTL NO. 1			1	0.6	121.7
62200	TRANSCEIVER RT-459A & MOUNT			1	3.2	109.5
62200	ANTENNA L10-216			1	0.3	134.0
62203	400 TRANSPONDER INSTL NO. 2			1	0.6	134.1
62203	TRANSCEIVER RT-459A & MOUNT			1	3.2	109.5
62203	ANTENNA L10-216			1	0.3	158.8
62300	800 TRANSPONDER INSTL NO. 1			1	0.6	121.7
62300	TRANSCEIVER RT-859A & MOUNT			1	3.2	109.5
62500	ANTENNA L10-216			1	0.3	134.0
62302	800 TRANSPONDER INSTL NO. 2			1	0.6	134.1
62302	TRANSCEIVER RT-859A & MOUNT			1	3.2	109.5
62302	ANTENNA L10-216			1	0.3	158.8
68100	400 DME INSTL NO. 1			1	2.9	60.7
68100	TRANSCEIVER RTA-476A & MOUNT			1	9.8	33.0
68100	CONTROL C-476A			1	1.7	111.0
68100	ANTENNA L10-216			1	0.3	38.0
68103	400 DME INSTL NO. 2			1	2.9	72.9
68103	TRANSCEIVER RTA-476A & MOUNT			1	9.8	33.0
68103	CONTROL C-476A			1	1.7	111.0
68103	ANTENNA L10-216			1	0.3	74.7
68103	MULTIPLEXER M4876A & MOUNT			1	1.1	33.0
68106	800 DME INSTL NO. 1			1	2.9	60.7
68106	TRANSCEIVER RTA-876A & MOUNT			1	9.3	33.0
68106	CONTROL C-876A			1	1.7	111.0
68106	ANTENNA L10-216			1	0.3	38.0
68107	800 DME INSTL NO. 2			1	2.9	72.9
68107	TRANSCEIVER RTA-876A & MOUNT			1	9.3	33.0
68107	CONTROL C-876A			1	1.7	111.0
68107	ANTENNA L10-216			1	0.3	74.7

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
67700	HORIZONTAL SITUATION INDICATOR			1	3.2	211.0
67700	(3 IN) TO BE USED W/O AUTOPILOT				0.0	0.0
67701	CONVERTER B-445A & MOUNT			1	1.3	33.0
67700	FLUX DETECTOR CT-504A			1	0.5	361.9
67702	SLAVE ACCESS W/O BS SA-832A			1	0.8	35.0
67703	SLAVE ACCESS W/BS SA-832B			1	2.2	35.0
69200	MARKER BEACON MUTE TIMER R-14A			1	0.1	33.0
62907	RDR-150 RADAR INSTL			1	3.0	59.1
62907	TRANSCEIVER RT-131A & MOUNT			1	13.0	24.9
62907	INDICATOR IN-152A & MOUNT			1	6.8	103.9
62907	WAVEGUIDE			1	2.6	18.0
62907	ANTENNA DA-144A			1	3.6	9.0
62907	REFLECTOR AA-1212A			1	1.2	7.5
62907	RADOME NOSE (EXCHANGE)			1	-0.3	7.4
62904	RDR-160 RADAR INSTL			1	3.0	57.5
62904	TRANSCEIVER, ANTENNA & MOUNT	ANT-161A		1	10.5	11.0
62904	INDICATOR IN-152A & MOUNT			1	6.8	103.9
62904	RADOME NOSE (EXCHANGE)			1	-0.3	7.4

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
633D	COLLINS HF-200 INSTL			1	2.7	152.4
633D	CONTROL HEAD CTL-201	9752007 155		1	1.1	112.9
633D	TRANSCEIVER ICR-200	9756031 242		1	6.9	33.0
633D	POWER AMPLIFIER PWR-200	9756031 243		1	7.4	33.0
633D	ANT & COUPLER AAC-200	9751094 1		1	11.9	308.3
65000	300 ADF INSTL NO. 2			1	2.5	100.0
65000	RECEIVER R-546E & MOUNT			1	3.9	109.4
65001	INDICATOR IN-346A			1	1.1	111.9
65002	INDICATOR IN-13A-1			1	1.4	111.9
65003	ACCESSORY UNIT RA-446A			1	1.4	140.0
65004	ACCESSORY UNIT RA-446A			1	1.4	140.0
65005	INVERTER DV-1060A			1	5.2	33.0
65006	ANTENNA-LOOP L-346A	5074021 17		1	1.6	207.6
65000	ANTENNA-SENSE	9751044 1		1	1.9	190.7
65100	400 ADF INSTL NO. 2			1	3.2	91.9
65100	RECEIVER R-446A & MOUNT			1	4.0	109.4
65101	INDICATOR IN-346A			1	1.1	111.9
65102	INDICATOR IN-13A-1			1	1.4	111.9
65103	ACCESSORY UNIT RA-446A			1	1.4	140.0
65104	ACCESSORY UNIT RA-446A			1	1.4	140.0
65105	INVERTER DV-1060A			1	5.2	33.0
65106	ANTENNA-LOOP L-346A	5074021 17		1	1.6	207.6
65100	ANTENNA-SENSE	9751044 1		1	1.9	190.7
65600	1000 ADF INSTL NO. 2			1	3.2	118.9
65600	RECEIVER R-846A & MOUNT			1	4.6	33.0
65600	CONTROL C-1046A & MOUNT			1	2.0	112.5
65600	POWER SUPPLY P-1000A			1	1.2	33.0
65601	INDICATOR IN-346A			1	1.1	111.9
65602	INDICATOR IN-13A-1			1	1.4	111.9
65603	ACCESSORY UNIT RA-846A			1	1.4	140.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
65604	ACCESSORY UNIT RA-846A			1	1.4	140.0
65605	INVERTER DV-1060A			1	5.2	33.0
65606	ANTENNA-LOOP L-346A	5074021 17		1	1.6	207.6
65600	ANTENNA-SENSE	9751044 1		1	1.9	190.7
66000	ADF IN-346B			1	1.3	111.9
66200	ADF RA-446A			1	1.4	140.0
66300	ADF RA-846A			1	1.4	140.0
68500	400 AREA NAVIGATION INSTL			1	2.8	111.0
68501	INDICATOR IN-1048AC			1	1.6	111.9
68502	INDICATOR IN-1049AC			1	1.7	111.9
68500	COMPUTER RN-478A & MOUNT			1	5.1	112.0
68700	800 AREA NAVIGATION INSTL			1	2.8	72.5
68701	INDICATOR IN-1048AC			1	1.6	111.9
68702	INDICATOR IN-1049AC			1	1.7	111.9
68700	COMPUTER RN-878A & MOUNT			1	5.1	112.0
67200	AA-215 RADIO ALTIMETER INSTL			1	0.5	195.5
67200	TRANSCEIVER RT-220			1	6.8	279.0
67200	INDICATOR RA-215			1	2.6	112.0
67200	ANTENNA AT-220			1	0.8	244.4
68800	AA-100 RADIO ALTIMETER INSTL			1	0.5	216.0
68800	TRANSCEIVER RT-100A			1	3.6	320.0
68800	INDICATOR AA-100			1	1.7	112.0
68800	ANTENNA AT-100			1	1.1	284.6
67000	400 RMI INSTL			1	1.2	175.0
67001	INDICATOR IN-404A			1	2.3	111.0
67002	FLUX DETECTOR CT-504A			1	0.5	361.9
67003	SLAVE ACCESS W/BS SA-832B			1	2.2	33.0
67004	INVERTER DV-1060A			1	5.2	33.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
67100	1000 RMI INSTL			1	1.2	175.0
67101	INDICATOR IN-1004A			1	2.4	111.0
67102	FLUX DETECTOR CT-504A			1	0.5	361.9
67103	SLAVE ACCESS W/BS SA-832B			1	2.2	33.0
67104	INVERTER DV-1060A			1	5.2	33.0
7900	RADOME NOSE	9711019 1		1*	-0.3	7.4
5500	BOOM MIKE INSTL W/BEK	5272423 1		1	0.6	137.3
55A	PASSENGER MIC INSTL AFT CAB	9715030 3		1	1.0	186.2
674A	RADIO TELEPHONE FLITEFONE III			1	21.3	228.4
674B	FLITEFONE III (COCKPIT-CONTROL)			1	12.2	294.4
14100	HEADSET W/MIKE-PILOT	9754030 5		1	0.4	120.9
141A	HEADSET W/MIKE-PILOT & COPILOT	9754030 6		1	0.8	120.9
141D	HEADSET W/MIKE-COPILOT	9754030 6		1	0.4	120.9
13799	INTERCOM SYSTEM			1	1.2	204.2
900A	DUAL AFT CABIN SPEAKER INSTL	5218042 3		1	1.4	230.3
900A	WIRING	9715012 3		1	0.1	171.1
1700	BAGGAGE RETAINER-FWD NOSE	5113016 1		1	0.8	62.0
	FURNISHINGS					
	SEAT-COPILOT ADJUSTABLE	0812782 2		1	15.2	140.0
AL	SEAT-COPILOT ADJUSTABLE-LEATHER	0812782 2		1	15.8	140.0
89A	SEAT-COPILOT MECH ADJUST	0812730 18		1	23.1	140.8
89AL	SEAT-COPILOT MECH ADJUST-LTHR	0812730 18		1	23.7	140.8
	SAFETY BELT SHOULDER HARNESS			1	1.1	153.1
110A	SEAT 3RD PLACE FWD			1	13.5	169.8
18100	INERTIA REEL INSTL-COPILOT	5204015 1		1	1.3	154.8
	SEAT-3RD PLACE STD	5219125 1		1	13.5	169.8
11399	SEAT-3RD FWD			1	24.5	183.0
900	SEAT-3RD PLACE (HINGED)			1	13.9	169.8

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
910	SEAT-3RD PLACE			1	13.5	169.8
920					0.0	0.0
	SEAT-4TH PLACE STD	5219140 1		1	13.9	169.8
110A	SEAT 4TH PLACE FWD			1	13.5	169.8
11399	SEAT-4TH FWD			1	24.5	183.0
900	SEAT-4TH PLACE (HINGED)			1	13.9	169.8
910	SEAT-4TH PLACE			1	13.9	169.8
920					0.0	0.0
	SEAT-5TH PLACE STD	5219140 1		1	13.9	199.2
110A	SEAT 5TH PLACE FWD			1	13.5	199.2
11399	SEAT-5TH FWD			1	24.5	225.7
900	SEAT-5TH PLACE (HINGED)			1	13.9	199.2
910					0.0	0.0
920					0.0	0.0
	SEAT-6TH PLACE STD	5219125 1		1	13.5	199.2
110A	SEAT 6TH PLACE FWD			1	13.5	199.2
11399	SEAT-6TH FWD			1	24.5	225.7
900	SEAT-6TH PLACE (HINGED)			1	13.9	199.2
910					0.0	0.0
920					0.0	0.0
	TWIN SEAT-7TH & 8TH PLACE STD	5219128 1		1	32.0	227.1
110A	SEAT TWIN 7TH & 8TH PLACE			1	32.0	227.1
11399	SEAT-7TH FWD			1	15.4	266.0
900	SEAT 7TH & 8TH PLACE (HINGED)			1	32.8	227.1
910					0.0	0.0
920					0.0	0.0
	TWIN SEAT-9TH & 10TH PLACE STD	5219128 1		1	32.0	255.0
110A	SEAT TWIN 9TH & 10TH HINGED			1	35.8	255.0
11399	SEAT-8TH FWD			1	15.4	266.0

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
900	SEAT-9TH & 10TH PLACE (HINGED)			1	32.8	255.0
910					0.0	0.0
920					0.0	0.0
7300	SEAT-9TH PLACE W/CAMERA INSTL	5219125 1		1	13.5	255.0
920	SEAT TRACK (404)			1	1.3	197.1
99700	SEAT TRIM LEATHER			1	0.9	224.5
99800	SIDE PANEL LEATHER	5214006 000		1*	3.6	194.7
99801	SIDE PANEL VINYL	5214006		1*	3.6	194.7
6300	OXYGEN SYSTEM 114.9 CU FT	5814002 1		1	54.9	41.5
64C	OXYGEN SYSTEM 44 CU FT	5814002 2		1	33.8	18.4
5800	OXYGEN MASK (W/MIKE COPILOT)	C166015201		1	0.8	150.5
9900	CREW DOOR & TWIN CARGO DOORS	5210010 3		1	19.3	197.6
128D	THERMOS CARRIER	5314543 2		1	9.4	285.7
22D	CARGO TIE DOWN (100 LB RATED)	0711121 2		1	0.2	187.0
22D2	CARGO TIE DOWN (100 LB RATED)			2	0.4	187.0
22D4	CARGO TIE DOWN (100 LB RATED)			4	0.8	187.0
22D8	CARGO TIE DOWN (100 LB RATED)			8	1.6	187.0
22D0	CARGO TIE DOWN (100 LB RATED)			10	2.0	187.0
22E	CARGO TIE DOWN (200 LB RATED)	5014089 20		1	0.2	187.0
22E2	CARGO TIE DOWN (200 LB RATED)			2	0.4	187.0
22E4	CARGO TIE DOWN (200 LB RATED)			4	0.8	187.0
22E8	CARGO TIE DOWN (200 LB RATED)			8	1.6	187.0
3500	TWIN CARGO DOORS	5210010 2		1	10.4	245.6
35C	EXTENDER INSTL LWR (STD DR)	5211137		1	1.8	241.3
35D	EXTENDER INSTL LWR (CARGO DR)	5211137 1		1	1.7	241.2
4100	FENDER-NOSE GEAR	5042021 1		1	1.0	51.2
13600	CARPET-CABIN	5219104 31		1*	9.4	197.3
98A	CREW DOOR HATCH	5210010 1		1	8.9	141.5
1400	CARPET NOSE BAGGAGE SHELF	5213107 1		1	6.0	69.0
29A	CURTAIN INSTL, CABIN W/DOOR	5219105 2		1	2.8	222.7

SECTION B
STANDARD AND OPTIONAL EQUIPMENT

FACTORY KIT	ITEM	PART NUMBER	MARK IF INSTALLED	QUANTITY	WEIGHT (POUNDS)	ARM (INCHES)
99200	POCKETS-ENVIROFORM SEAT (10-PL)	5219125 18		8	2.0	212.8
2900	CURTAIN INSTL, CABIN	5219105 1		1	2.8	222.7
8600	SIGN NO SMOKING-ENGLISH	5215089 15		1	0.1	156.5
83B	SIGN-FASTEN SEAT BELT ENGLISH	5215089 14		1	0.2	151.1
28B	CURTAIN DIVIDER, PILOT-CABIN	5214026 1		1	2.7	156.0
199A	PAINT, U.S. ALUMIGRIP	5200350 000		1	0.0	0.0
3100	CAA CONVERSION KIT	5200013 1		1	1.3	136.8
	EMERGENCY EQUIPMENT					
37A	FIRE EXTINGUISHER-HALOGEN-HAND	5114243 6		1	5.1	130.7
4400	NACELLE FIRE EXTINGUISHER STC	5118705 8 & 9		1	18.5	133.3
44B	FIRE EXTINGUISHER-CABIN FLOOD	5214069 1		1	31.2	174.2
17700	LOCATOR BEACON	9754083 45		1	2.9	312.1
177A	LOCATOR BEACON (CANADA)	9754083 36		1	3.7	312.3
	AIR COND. & ANTI-ICE					
1500	AIR CONDITIONER-CABIN	5214524 16		1	119.4	176.7
15B	AIR CONDITIONER-CABIN W/OPT LTS	5214524 18		1	119.4	176.7
3200	DEICE SYS WING STABILIZER & FIN	5214136 1		1	40.2	176.7
6700	PARTIAL PLUMBING DEICE	5214136 2		1	3.1	213.3
19400	FLIGHT IN KNOWN ICING	5114400 8		1	75.0	163.2
9200	CIRCULATION BLOWER SYS	5210112 1		1	13.8	272.9
3000	DEICE SYS 3 BLADE-PROP	5250250 9		1	14.7	101.7
94A	DEICE WINDSHIELD-ALCOHOL	5114136 5		1	29.8	204.3
7800	FUSELAGE ICE PROTECTION PANELS	5113115 1 & 8		1	5.1	90.7
8800	STATIC SOURCE-DUAL HEATED	5217525 3		1	0.3	255.5
	PHOTOGRAPHIC PROVISIONS					
	CAMERA PROVISIONS	5211501 1		1		

WEIGHT AND BALANCE FORM

BUSINESSLINER AND UTILILINER PASSENGER CONFIGURATION

PAYLOAD COMPUTATIONS

ITEM OCCUPANTS OR CARGO	ARM	WEIGHT	MOMENT/ 100
SEAT 1			
SEAT __			
SEAT __			
SEAT __			
SEAT __			
SEAT __			
SEAT __			
SEAT __			
SEAT __			
SEAT __			
TOILET			
BAGGAGE			
WING LOCKERS			
AVIONICS			
NOSE			
BAY A			
BAY B			
CABINET CONTENTS			
PAYLOAD			

REF	ITEM	WEIGHT	MOMENT/ 100
1.	BASIC EMPTY WEIGHT		
2.	PAYLOAD		
3.	ZERO FUEL WEIGHT (sub-total) (Do not exceed maximum zero fuel weight of 6515 pounds)		
4.	FUEL LOADING		
5.	RAMP WEIGHT (sub-total) (Do not exceed maximum ramp weight of 6885 pounds)		
6.	LESS FUEL FOR TAXIING		
7.	TAKEOFF WEIGHT (Do not exceed maximum takeoff weight of 6850 pounds)		
8.	LESS FUEL TO DESTINATION		
9.	LANDING WEIGHT (Do not exceed maximum landing weight of 6850 pounds)		

Totals must be within approved weight and C.G. limits. It is the responsibility of the operator to insure that the airplane is loaded properly. The Basic Empty Weight C.G. is noted on the Airplane Weighing Form. If the airplane has been altered, refer to the Weight and Balance Record for this information.

WEIGHT AND BALANCE FORM
UTILILINER CARGO CONFIGURATION

PAYLOAD COMPUTATIONS			
ITEM OCCUPANTS OR CARGO	ARM	WEIGHT	MOMENT/ 100
SEAT 1			
SEAT 2			
BAGGAGE			
WING LOCKERS			
AVIONICS			
NOSE			
BAY A			
BAY B			
CARGO A			
CARGO B			
CARGO C			
CARGO D			
CABINET CONTENTS			
PAYLOAD			

REF	ITEM	WEIGHT	MOMENT/ 100
1.	BASIC EMPTY WEIGHT		
2.	PAYLOAD		
3.	ZERO FUEL WEIGHT (sub-total) (Do not exceed maximum zero fuel weight of 6515 pounds)		
4.	FUEL LOADING		
5.	RAMP WEIGHT (sub-total) (Do not exceed maximum ramp weight of 6885 pounds)		
6.	LESS FUEL FOR TAXIING		
7.	TAKEOFF WEIGHT (Do not exceed maximum takeoff weight of 6850 pounds)		
8.	LESS FUEL TO DESTINATION		
9.	LANDING WEIGHT (Do not exceed maximum landing weight of 6850 pounds)		

Totals must be within approved weight and C.G. limits. It is the responsibility of the operator to insure that the airplane is loaded properly. The Basic Empty Weight C.G. is noted on the Airplane Weighing Form. If the airplane has been altered, refer to the Weight and Balance Record for this information.

SECTION 7
AIRPLANE & SYSTEMS DESCRIPTIONS

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

INTRODUCTION

Section 7 of this handbook provides a description and operation of the airplane and its systems.

NOTE

Operational procedures for optional systems and equipment are presented in Section 9.

AIRFRAME

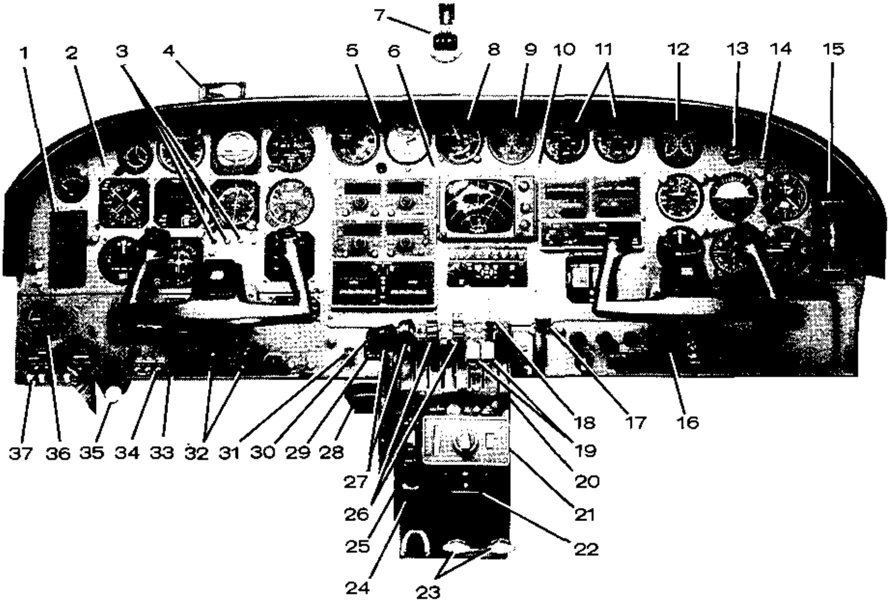
The 402 Businessliner is a 6 to 8-place, all-metal, low-wing airplane. The 402 Utililiner is a 10-place, all-metal, low-wing airplane that can be converted to a cargo configuration. The fuselage and empennage are of semimonocoque construction. The wing and horizontal and vertical tail surfaces are of conventional aluminum construction. The wing uses 2 main spars which attach to the carry-thru spars. The retractable landing gear is a tricycle design using air-over-oil shock struts.

The 402 Businessliner II, 402 Businessliner III and 402 Utililiner II are identical to the 402 Businessliner and 402 Utililiner except a selection of popular optional equipment has been included as standard equipment.

INSTRUMENT PANEL

The instrument panel, see Figure 7-1, contains the instruments and controls necessary for safe flight. The instrument panel presented is typical, as it contains all standard items and a good selection of popular optional equipment. The function and operation of the instrument panel features not described here have been explained in this section or Section 9 under the applicable system.

INSTRUMENT PANEL



1. ANNUCIATOR PANEL
2. FLIGHT INSTRUMENT GROUP
3. MARKER BEACON LIGHTS (OPTIONAL)
4. ANGLE-OF-ATTACK INDICATOR (OPTIONAL)
5. ENGINE INSTRUMENT GROUP
6. PROPELLER SYNCHROPHASER SWITCH (OPTIONAL)
7. COMPASSS
8. FUEL FLOW GAGE
9. ECONOMY MIXTURE INDICATOR (OPTIONAL)
10. AVIONICS CONTROL PANEL
11. COMBINATION ENGINE GAGES
12. FUEL QUANTITY GAGE
13. PROPELLER DEICE AMMETER (OPTIONAL)
14. RIGHT FLIGHT INSTRUMENT GROUP (OPTIONAL)
15. AIR CONDITIONING OUTLET (OPTIONAL)
16. HEATER AND CABIN AIR CONTROL PANEL
17. WING FLAP POSITION SWITCH
18. LIGHT DIMMING CONTROLS
19. MIXTURE CONTROLS
20. QUADRANT FRICTION LOCK
21. AUTOPILOT OR IFCS CONTROL HEAD (OPTIONAL)
22. RUDDER TRIM CONTROL
23. COWL FLAP CONTROLS
24. AILERON TRIM CONTROL
25. ELEVATOR TRIM CONTROL
26. PROPELLER CONTROLS
27. THROTTLE CONTROLS
28. EMERGENCY LANDING GEAR EXTENSION T-HANDLE
29. LANDING GEAR POSITION INDICATOR LIGHTS
30. LANDING GEAR UNLOCKED INDICATOR LIGHT
31. LANDING GEAR SWITCH
32. ALTERNATE AIR CONTROLS
33. OXYGEN CONTROL
34. CABIN DOOR LIGHT SWITCH
35. PARKING BRAKE CONTROL
36. OXYGEN CYLINDER PRESSURE GAGE (OPTIONAL)
37. LEFT SIDE CONSOLE

Figure 7-1

OVERHEAD CONSOLE

The overhead console, see Figure 7-2, includes the avionics speaker and instrument panel floodlight and aisle courtesy lights with dimming control, pilot and copilot overhead directional air vents and overhead directional map lights with dimming controls.

OVERHEAD CONSOLE

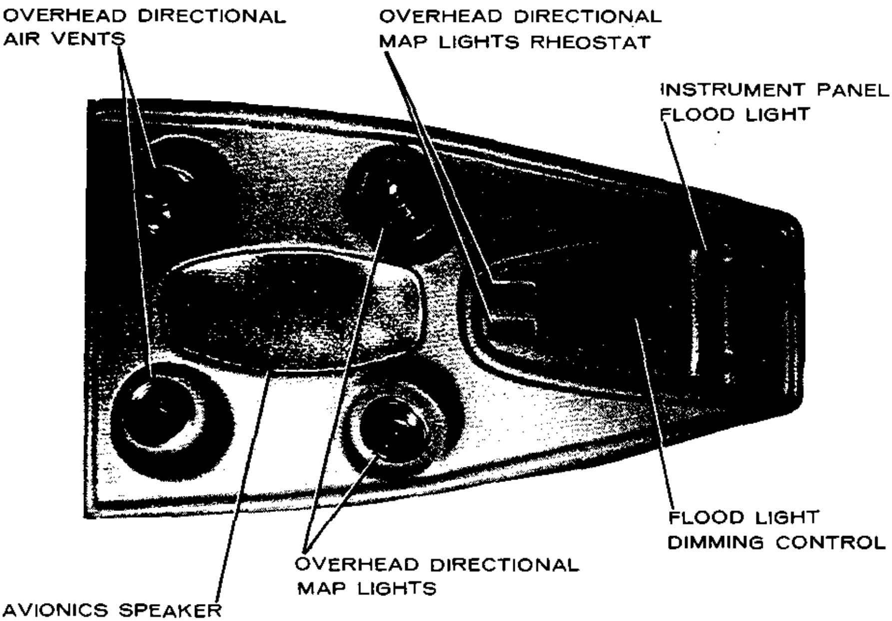


Figure 7-2

ANNUNCIATOR PANEL

The annunciator panel, see Figure 7-3, is located on the left side of the pilot's instrument panel. The panel annunciates items of interest to the pilot in the applicable color of red, amber, green or white. No dimming capability of the annunciator lights is provided.

When a hazardous condition exists, requiring immediate corrective action, a red warning light will illuminate. When an impending possibly dangerous condition exists, requiring attention but not necessarily immediate action, an amber light will illuminate. A green or white light will illuminate to indicate a safe or normal configuration, condition of performance, operation of essential equipment or to attract attention and impart information for routine action purposes.

A press-to-test button is provided to the left of the annunciator panel. When the button is pressed, all annunciator panel lights, landing gear position and unlocked lights, propeller synchrophaser light and marker beacon lights will be tested and should illuminate. If the throttles are retarded or flaps are extended more than 15 degrees, the gear warning horn will sound when the button is pressed.

ANNUNCIATOR PANEL

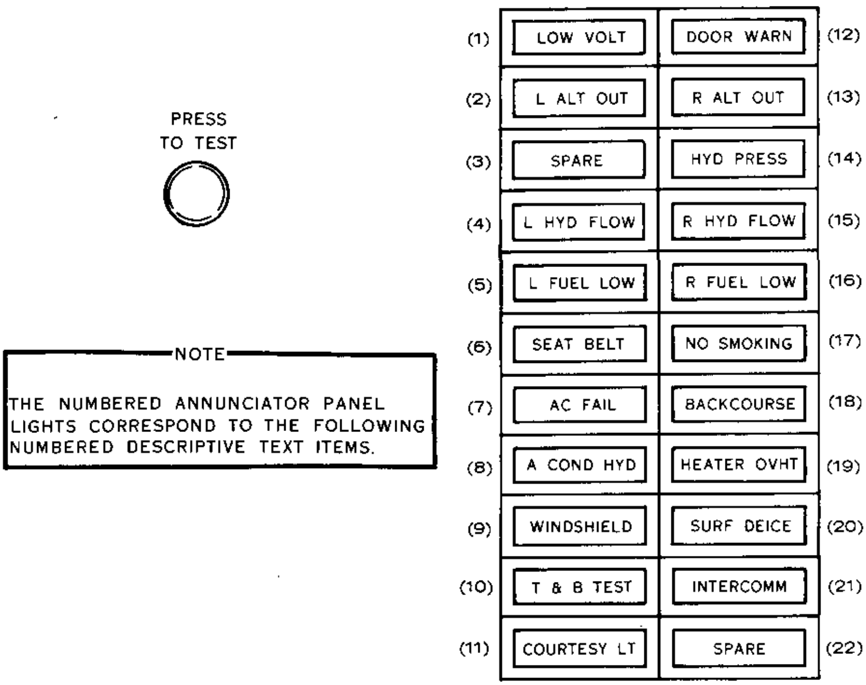


Figure 7-3

---NOTE---

A spare light lens is installed in each blank location of the annunciator panel when the optional system is not installed. These lenses can be replaced with the appropriate lens when additional optional equipment is installed.

The following numbered items, see Figure 7-3, describe the applicable system condition when the annunciator light is illuminated.

1. The red low voltage light advises that the airplane bus voltage is less than 25 volts.
2. The amber left alternator out light advises that the left alternator is not operating.

3. The white spare light is reserved for optional equipment.
4. The amber left hydraulic flow light advises that insufficient flow exists at 1000 propeller RPM or above and that the cause may be a result of pump, lines, filter or bypass valve failure.
5. The amber left main tank fuel low light advises that approximately 60 pounds of fuel remains in the left main tank.
6. The white seat belt light advises that the optional seat belt sign is illuminated.
7. The amber alternating current failure light advises that a loss of AC power has occurred.
8. The green air conditioning hydraulic pressure light advises that the optional air conditioning compressor is in operation.
9. The green electric windshield heater light advises that the heating elements in the optional electric windshield are operating.
10. The green turn-and-bank test light will only illuminate when the press-to-test button is pushed and power is being provided to the turn-and-bank electrical circuit.
11. The white courtesy light advises that the overhead flight deck floodlight and main cabin door entry lights are illuminated.
12. The red door warning light advises that either the main cabin door, the emergency exit window, the optional crew door or the optional aft cargo door are not secured for flight.
13. The amber right alternator out light advises that the right alternator is not operating.
14. The amber hydraulic pressure light advises that hydraulic pressure is being applied to the landing gear retraction and extension system.
15. The amber right hydraulic flow light advises that insufficient flow exists at 1000 propeller RPM or above and that the cause may be a result of pump, lines, filter or bypass valve failure.
16. The amber right main tank fuel low light advises that approximately 60 pounds of fuel remains in the right main tank.
17. The white no smoking light advises that the optional no smoking sign is illuminated.
18. The amber back course light advises that the optional navigation equipment is programmed for a back course approach.
19. The amber heater overheat light advises that the heater has reached an abnormal temperature and has been automatically deenergized. Once this light illuminates, the heater cannot be operated until resetting of the safety device has been completed.
20. The green surface deice light advises that the optional tail deice boots have reached full inflation pressure.
21. The white intercom light advises that the optional flight deck or passenger compartment microphone switch is pressed and communication is possible.
22. The white spare light is reserved for optional equipment.

FLIGHT CONTROLS SYSTEM

The flight controls consist of the ailerons, elevators and rudder and their respective trim systems. All of these surfaces are constructed of aluminum and are statically mass balanced.

AILERON SYSTEM

Each aileron, see Figure 7-4, is attached to the rear main wing spar at two points. The aileron is actuated by a bellcrank which is attached to a wheel in the wing. The wheel is actuated by cables attached to the pilot's control wheel. When the rudder is actuated, a spring assembly, interconnected to the aileron system, causes the ailerons to automatically assist the turn.

AILERON SYSTEM

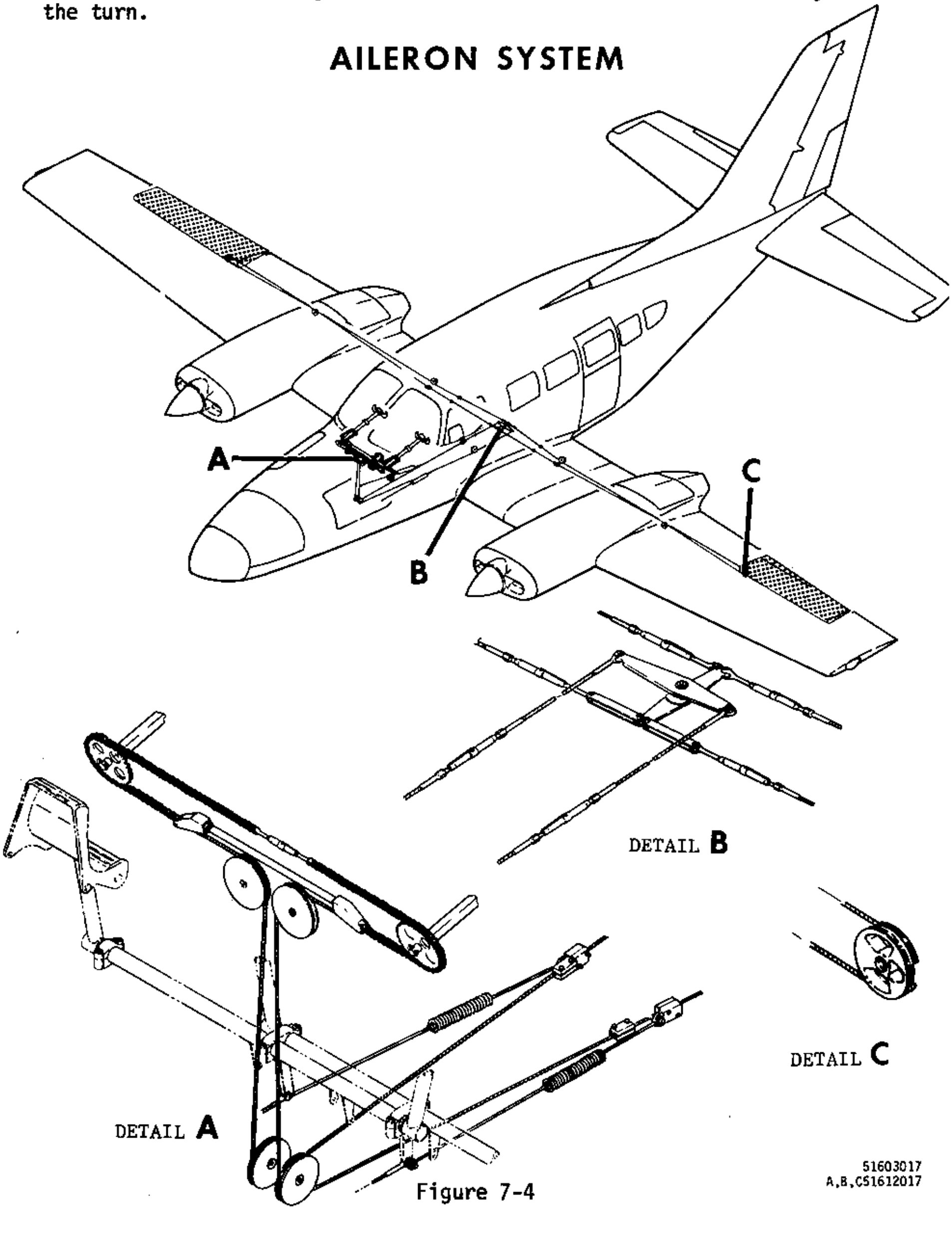


Figure 7-4

AILERON TRIM SYSTEM

Aileron trim, see Figure 7-5, is achieved by a trim tab attached to the left aileron with a full length piano-type hinge. The trim tab is actuated by a push-pull rod which is attached to a jack screw type actuator in the wing. The actuator is driven by cables attached to the trim control knob on the cockpit control pedestal. The aileron trim tab also acts as a servo tab so that aerodynamic forces on the tab will move the ailerons to the selected position, which reduces the forces required to activate the ailerons in flight.

AILERON TRIM SYSTEM

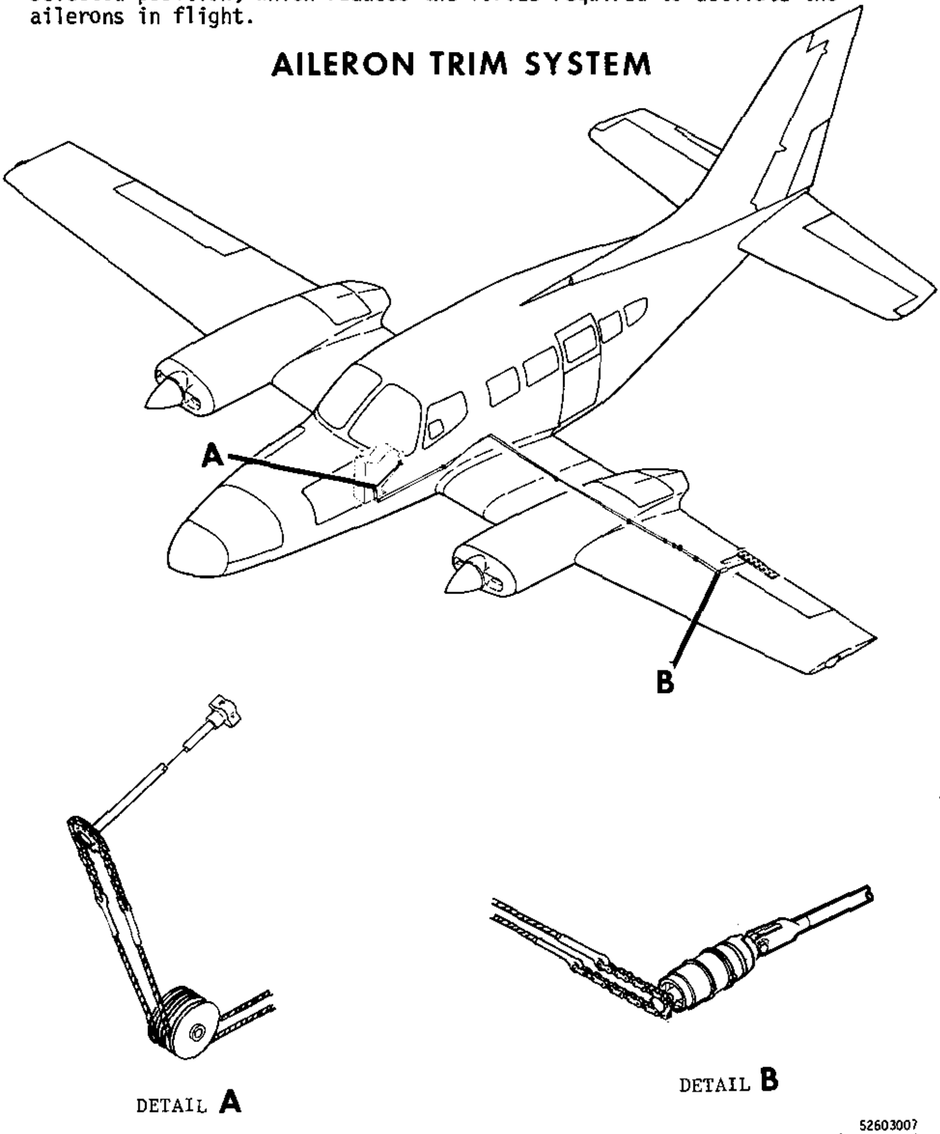


Figure 7-5

ELEVATOR SYSTEM

The two elevator control surfaces, see Figure 7-6, are connected by a torque tube. The resulting elevator assembly is attached to the rear spar of the horizontal stabilizer at six points. The elevator assembly is actuated by a push-pull rod which is attached to a bellcrank in the empennage. The bellcrank is actuated by cables attached to the pilot's control wheel.

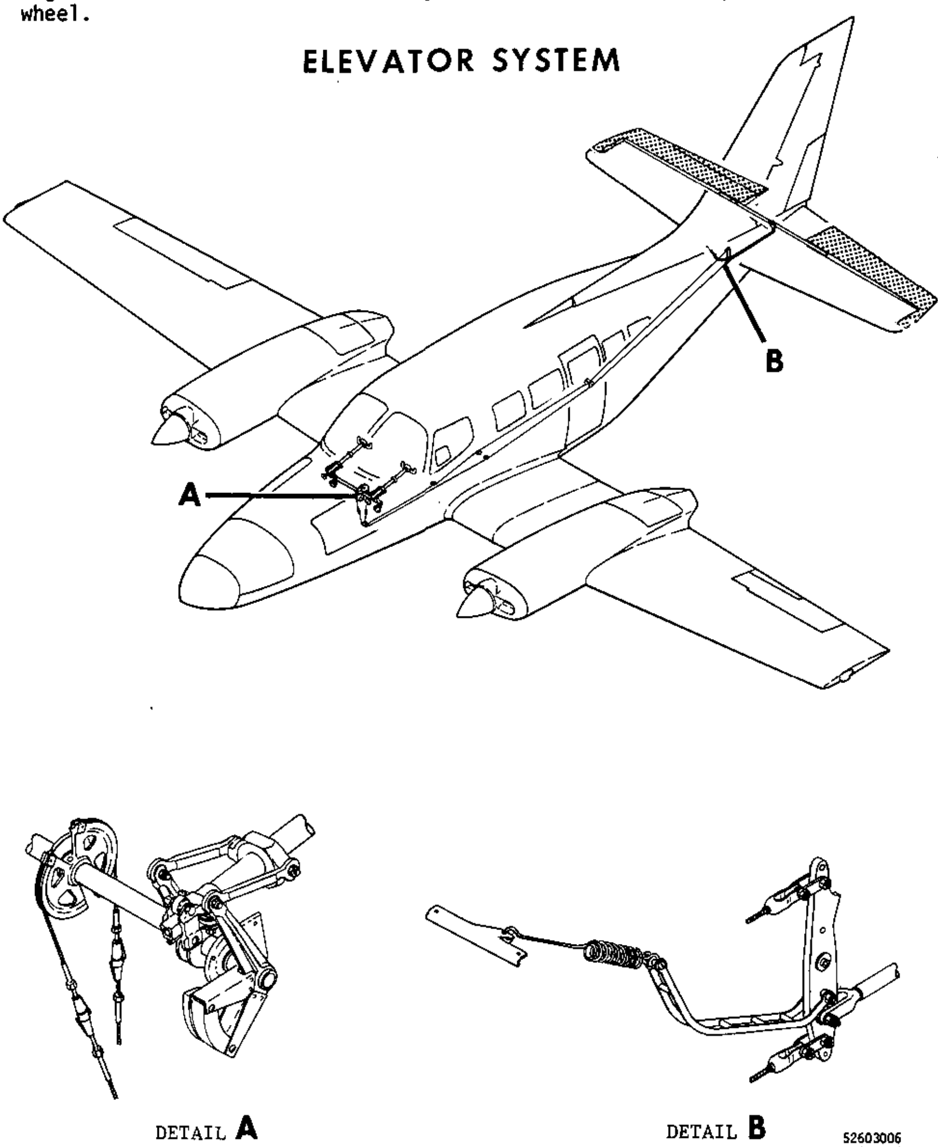
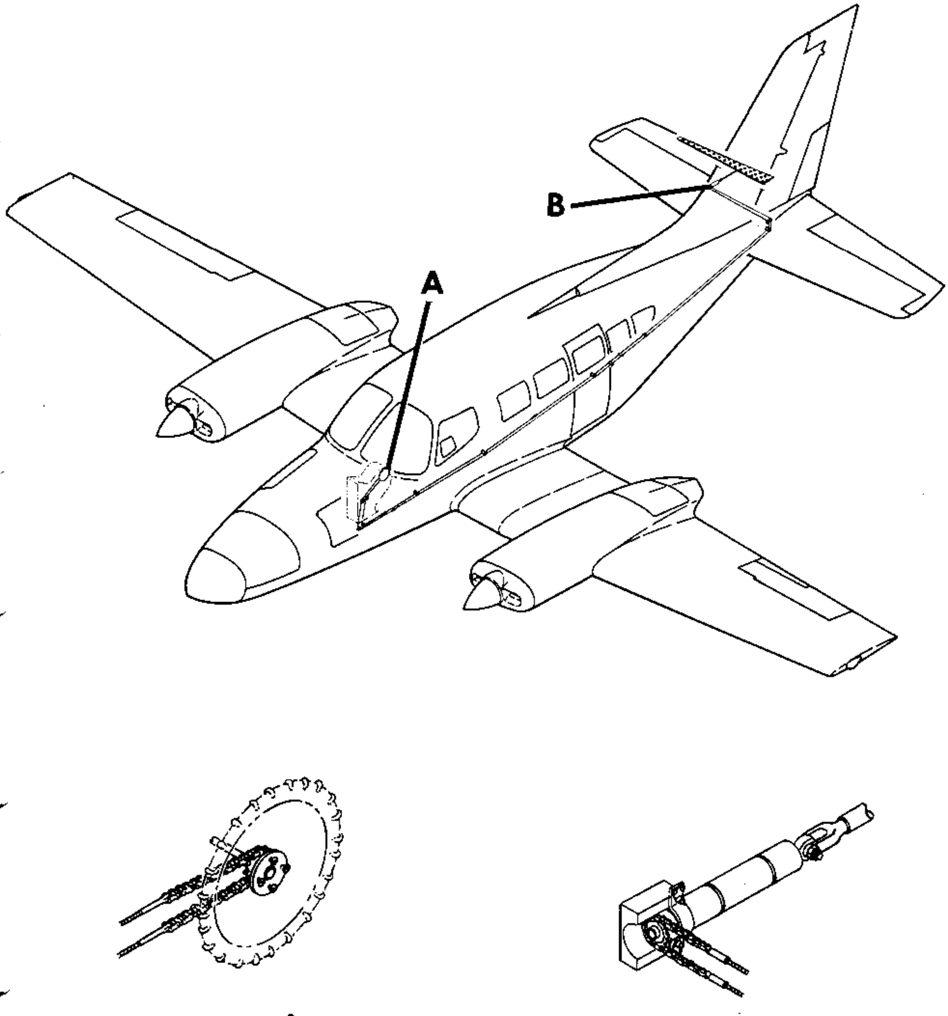


Figure 7-6

ELEVATOR TRIM SYSTEM

Elevator trim, see Figure 7-7, is achieved by an elevator trim tab attached to the right elevator with a full length piano-type hinge. The trim tab is actuated by a push-pull rod which is attached to a jack screw type actuator in the horizontal stabilizer. The actuator is driven by cables attached to the trim control wheel on the cockpit control pedestal.

ELEVATOR TRIM SYSTEM



DETAIL A

DETAIL B

52603004
A,854611016

Figure 7-7

RUDDER SYSTEM

The rudder, see Figure 7-8, is attached to the vertical stabilizer rear main spar at three points. The rudder is actuated by a bellcrank attached to the bottom of the rudder. The bellcrank is actuated by cables attached to the cockpit rudder pedals. When the rudder is actuated, a cable and spring assembly that is connected to the aileron system causes the ailerons to automatically assist the turn.

RUDDER SYSTEM

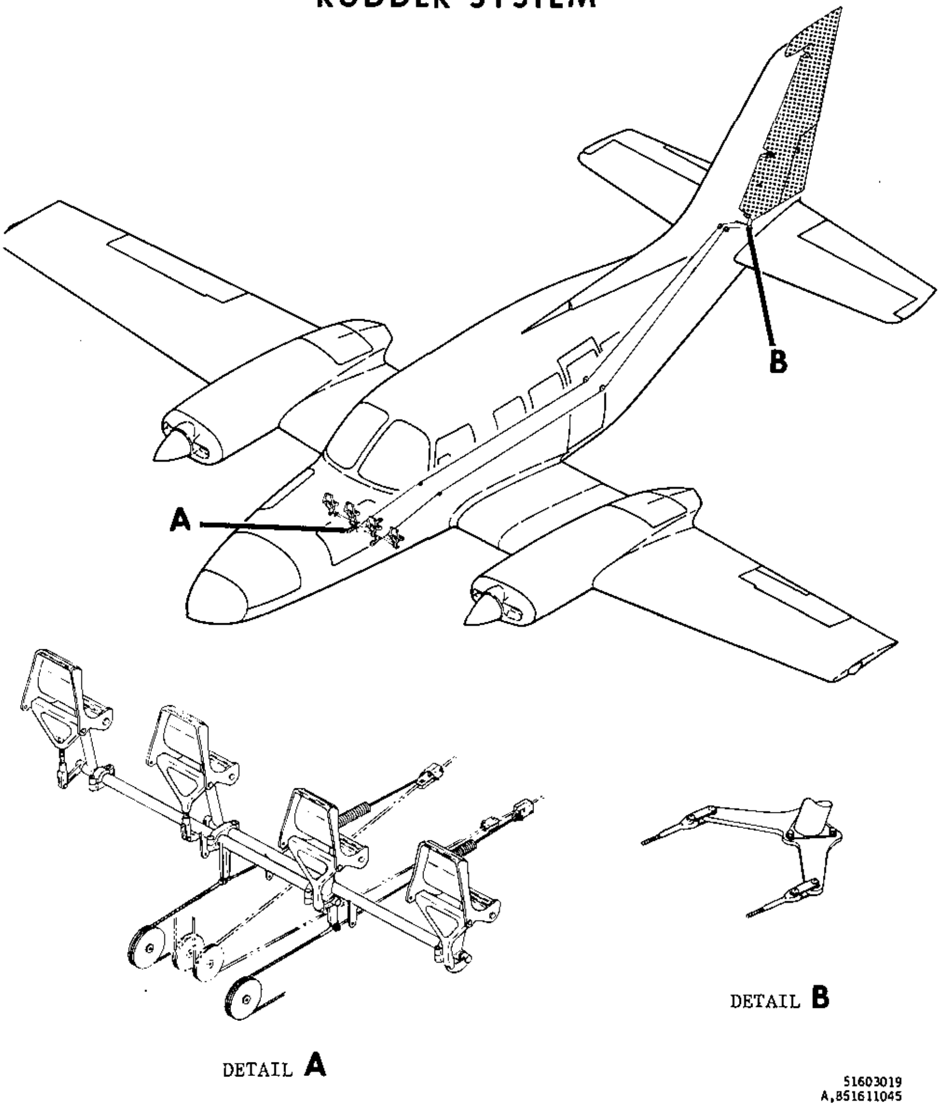
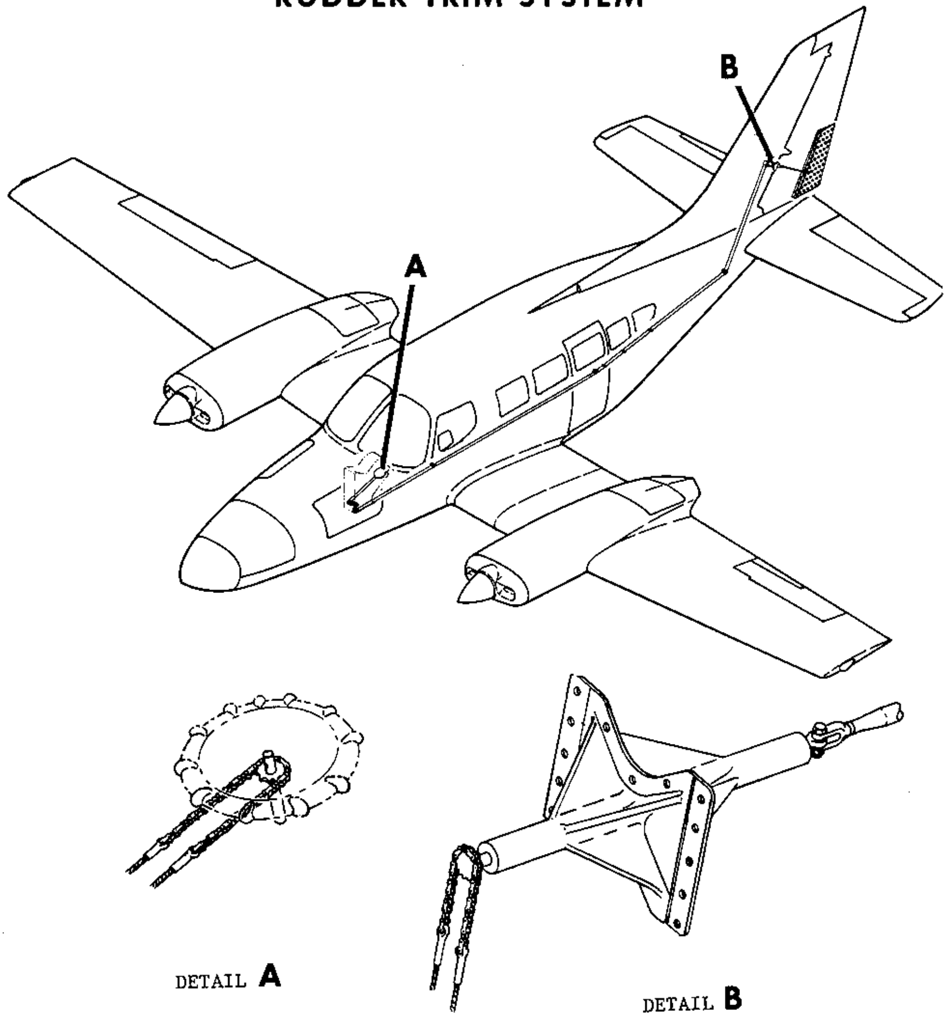


Figure 7-8

RUDDER TRIM SYSTEM

Rudder trim, see Figure 7-9, is achieved by a trim tab attached to the lower half of the rudder with a full length piano-type hinge. The trim tab is actuated by a push-pull rod which is attached to a jack screw type actuator in the vertical stabilizer. The actuator is driven by cables attached to the rudder trim wheel on the cockpit control pedestal. The rudder trim tab also acts as a servo tab so that aerodynamic forces on the tab will move the rudder to the selected position, which reduces the forces required to activate the rudder in flight.

RUDDER TRIM SYSTEM



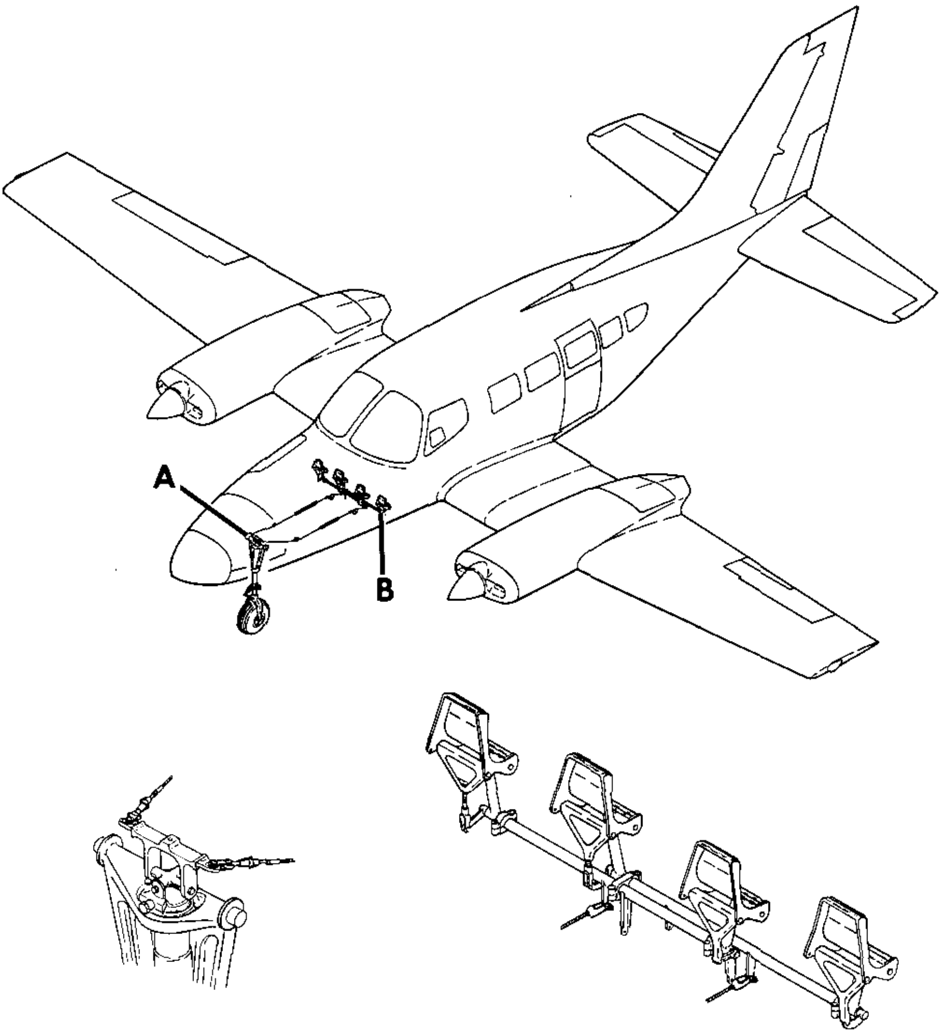
52603008
A54611012
B52611011R

Figure 7-9

NOSEWHEEL STEERING SYSTEM

The nosewheel steering system, see Figure 7-10, consists of the rudder pedals, nose gear, bungee spring assembly and cables. During ground operation, the nose gear automatically engages the nosewheel steering system, allowing normal directional control.

NOSEWHEEL STEERING SYSTEM



51603015
A,B54611013

Figure 7-10

The minimum turning distance is presented in Figure 7-11. Always use as large a radius of turn as is practical. Turning tighter than necessary requires excessive braking on the inboard wheel which decreases the tire life.

NOTE

Minimum turning distance is effected with inboard wheel brake locked, full rudder and differential power.

MINIMUM TURNING DISTANCE

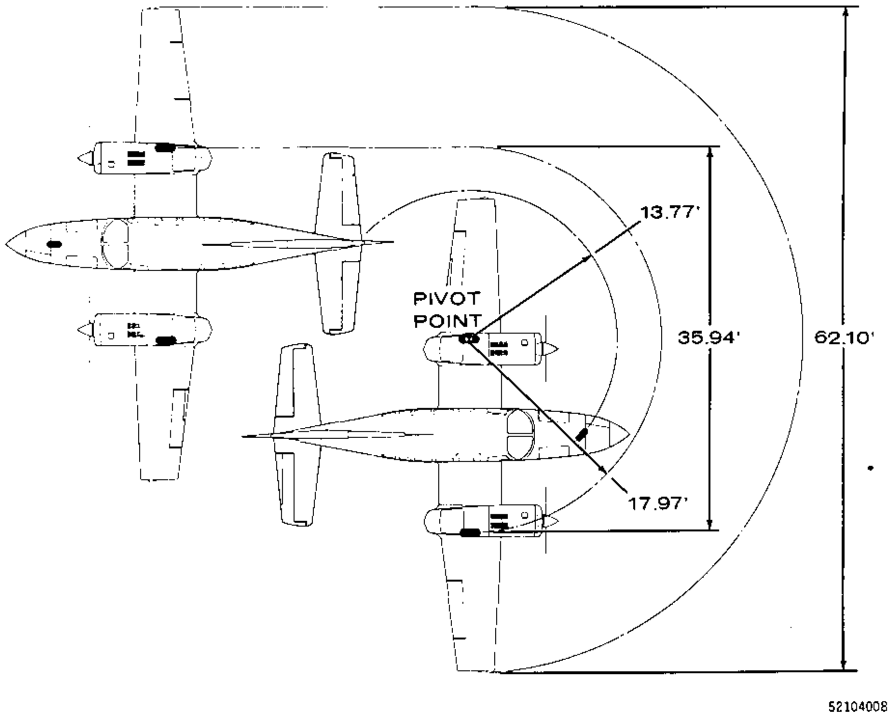


Figure 7-11

WING FLAPS SYSTEM

The wing flaps, see Figure 7-12, are of the split flap design. Each wing flap (two per side) is attached to the rear wing main spar lower surface and is actuated by two push-pull rods attached to bellcranks in the wing. The bellcranks in each wing are ganged together with push-pull rods. Each inboard push-pull rod is attached to a cable which is actuated by an electric motor with reduction gear in the fuselage center section.

The electric flap motor is controlled by the wing flap position switch, see Figure 7-1, in the cockpit. This switch incorporates a preselect feature which allows the pilot to select the amount of flap extension desired. When the 0°, 15°, 30° or 45° position is selected, the flap motor is electrically actuated and drives the flaps toward the selected position. As the flaps move, an intermediate cable feeds position information back to the preselect assembly. When the actual flap position equals the selected position, a microswitch deenergizes the flap motor.

WING FLAPS SYSTEM

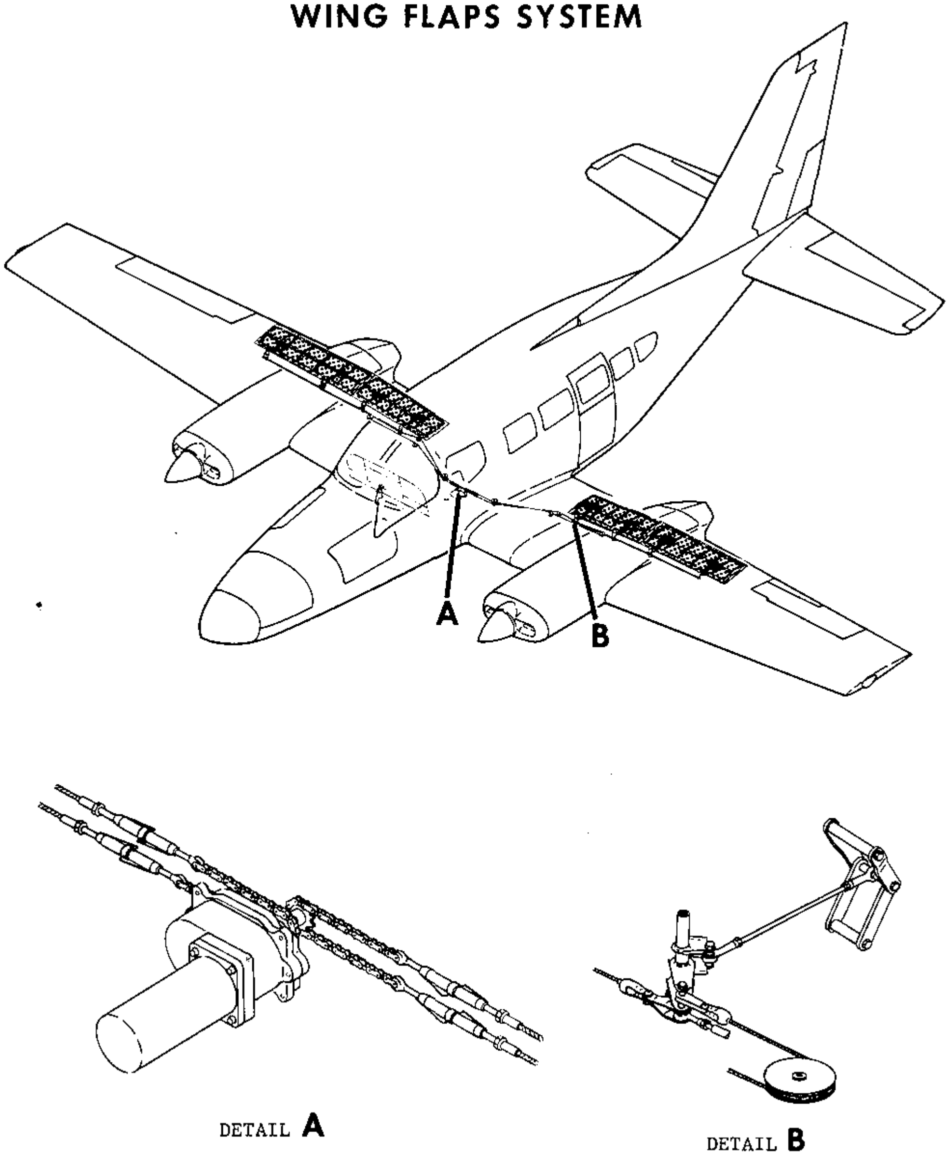


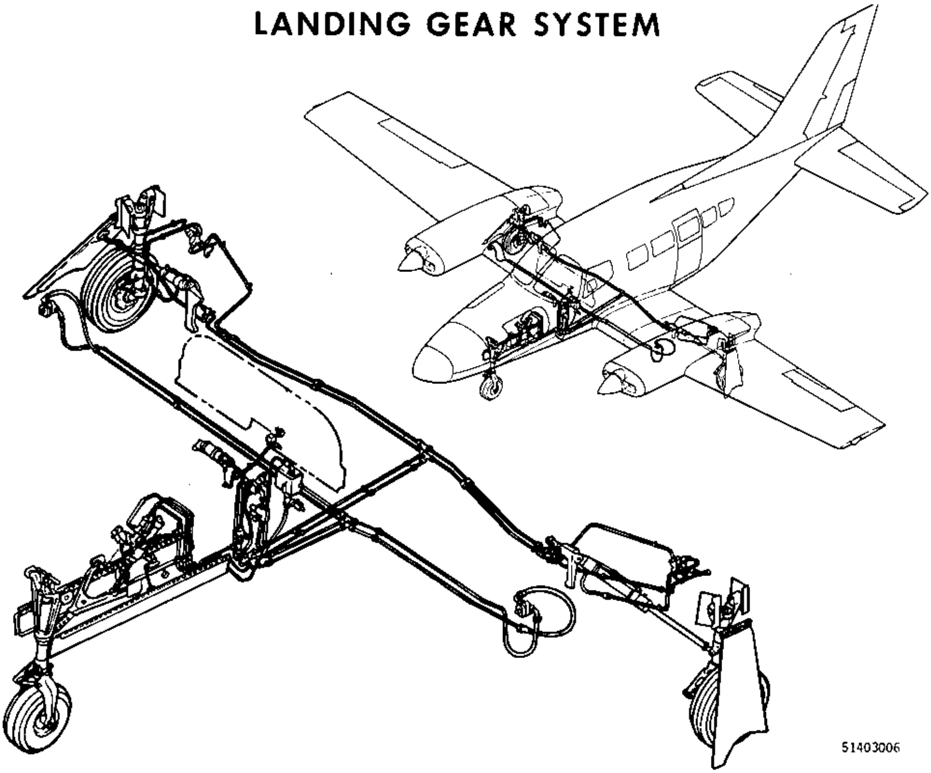
Figure 7-12

LANDING GEAR SYSTEM

The retractable tricycle landing gear, see Figure 7-13, is electrically controlled and hydraulically actuated. The individual landing gear actuators incorporate an internal lock to hold the landing gear in the extended position. The landing gear is held in the retracted position by mechanical uplocks that are released hydraulically during gear extension. During ground operation, accidental gear retraction, regardless of gear switch position, is prevented by a safety switch located on the left landing gear shock strut. The weight of the airplane compresses the shock strut, causing the safety switch to open, thus preventing electrical power from reaching the shuttle valve.

The landing gear doors are mechanically linked to their respective landing gear, retracting and extending with each landing gear. The landing gear is operated by a switch, see Figure 7-15, which is identified by a wheel-shaped knob. The switch positions are UP and DOWN. To operate the gear, pull out the landing gear switch and move it to the desired position. This allows electrical power to energize the gear control valve and the hydraulic pressure to drive the landing gear towards the selected position. The hydraulic pressure light, located on the annunciator panel, see Figure 7-3, will remain on until the landing gear is locked into position. The system also incorporates a left and right hydraulic flow light which illuminates at low engine RPM or in the event of a hydraulic pump failure.

LANDING GEAR SYSTEM



51403006

Figure 7-13

HYDRAULIC SYSTEM SCHEMATIC

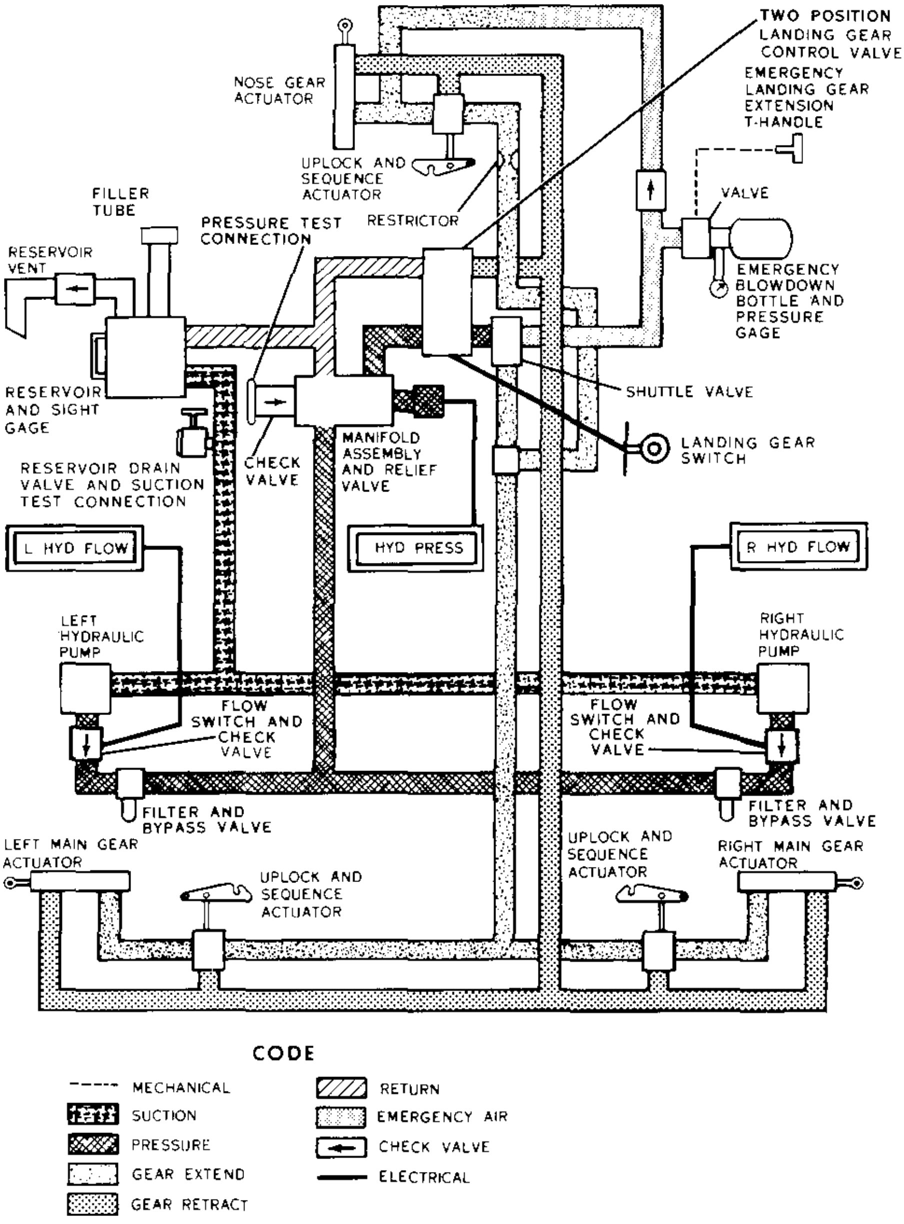


Figure 7-14

LANDING GEAR HYDRAULIC SYSTEM

Hydraulic pressure at 1750 psi is supplied on demand by the hydraulic pump which is mounted on each engine, see Figure 7-14. The hydraulic reservoir, located in the nose baggage compartment incorporates a sight gage for checking the fluid level while the gear is extended. An electrically actuated gear control valve controls the flow of hydraulic fluid to the individual gear cylinders. The gear control valve receives power through the landing gear position switch. The landing gear completes the retraction cycle in approximately 4.5 seconds at maximum engine RPM. The actuation cycle time increases as engine RPM decreases or with the loss of an engine-drive hydraulic pump.

EMERGENCY LANDING GEAR EXTENSION SYSTEM

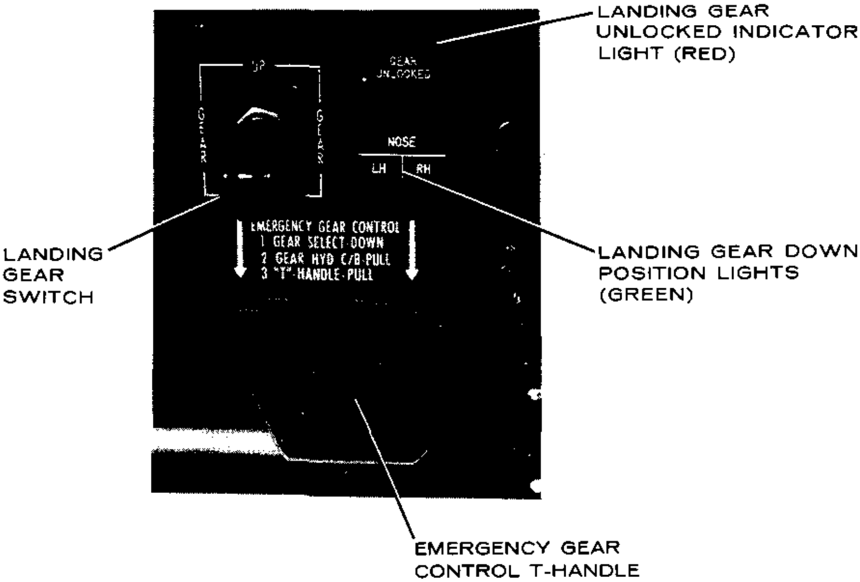


Figure 7-15

LANDING GEAR POSITION LIGHTS

Four landing gear position indicator lights, see Figure 7-15, are contained in two modules located beneath the avionics control panel just left of the center of the instrument panel. One module contains three of these lights (one for each gear) which are green and will illuminate when each landing gear is fully extended and locked. The other light module is red and will illuminate when any or all the gears are unlocked (intermediate position). When the gear unlocked light and gear down lights are not illuminated, the landing gear is in the UP and locked position.

LANDING GEAR WARNING HORN

The landing gear warning horn is controlled by the throttles and the wing flap position. The warning horn will sound intermittently if either throttle is retarded below approximately 13.0 inches Hg. manifold pressure with the landing gear retracted or if the wing flaps are lowered past the 15° position with the landing gear in any position except extended and locked. The warning horn can be activated by either the wing flap position switch or by throttle position as each functions independently of the other. The warning horn is also connected to the UP position of the landing gear position switch and will sound if the switch is placed in the UP position while the airplane is on the ground. The system can be checked by activating the PRESS-TO-TEST button, see Figure 7-3, located near the annunciator panel while retarding one throttle at a time. Also, lowering the wing flaps past the 15° position with the PRESS-TO-TEST button activated will cause the landing gear warning horn to sound.

LANDING GEAR EMERGENCY EXTENSION SYSTEM

The landing gear emergency extension system, see Figure 7-15, consists of a red emergency gear extension T-handle, a blowdown bottle, located in the nose baggage compartment, and associated plumbing. The procedure for emergency gear extension is given in Section 3. Pulling the emergency control releases dry nitrogen under pressure into the shuttle valve, causing the shuttle valve to move from the hydraulic to the air position. The nitrogen then flows into the uplocks which releases the gear to the free-fall position, and then into the landing gear cylinders, which drives the landing gear into the down and locked position.

> **NOTE**
>
> The landing gear cannot be retracted after emergency gear extension until the system has been ground serviced.

LANDING GEAR SHOCK STRUTS

Shock absorption is provided on each gear by an air-over-oil shock strut. This strut is composed of two basic parts: an upper barrel assembly and an inner tube assembly which fits inside the upper barrel assembly. The inner barrel assembly contains an orifice and tapered metering pin which vary the resistance to shock according to severity transmitted to the upper barrel assembly.

FUEL SYSTEM

The fuel system, see Figure 7-16, consists of two main tanks, two fuel selectors, emergency crossfeed shutoff valves and necessary components to complete the system.

MAIN TANKS

The main fuel tanks are an integral portion of the sealed wet wing. These tanks supply their respective engine with fuel for normal operations, including takeoffs and landings. An auxiliary fuel pump, located outside the tank, provides fuel pressure for priming during engine start. In the event of an engine fuel pump failure, the auxiliary fuel pump will supply fuel to the engine if the auxiliary fuel pump switches are on. The main tank is vented to the atmosphere by a combination flush vent and a .50-inch diameter drain located on the lower surface of the wing. The flush-mounted vent eliminates the need for heated vents. The fuel tanks are serviced through a flush filler located in the top surface of each wing.

FUEL SELECTORS

Two fuel selectors, mechanically connected to fuel valves located in the wings, are provided for each engine. The selectors, located on the floor between the pilot and copilot seats, allow selection of main fuel, crossfeed and no fuel.

During normal flight operations, position the left fuel selector to LEFT MAIN and the right fuel selector to RIGHT MAIN. This allows fuel to flow from each main tank, through the fuel selector, to the respective engine-driven fuel pump. Fuel may be crossfed from the left main tank to the right engine or from the right main tank to the left engine. Both engines will be supplied with fuel from the right main tank when both fuel selectors are positioned to RIGHT MAIN. Conversely, both engines will be supplied with fuel from the left main tank when both fuel selectors are positioned to LEFT MAIN. The crossfeed function is used for balancing asymmetric fuel loads and supplying the engine-driven fuel pump from the opposite main tank. The LEFT ENG OFF position or RIGHT ENG OFF position (the center button must be depressed as the selector valve is rotated to the off position) on the fuel selectors allows no fuel to flow to the engine-driven fuel pump.

The fuel selector handles form the pointers for the selectors. The ends of the handles are arrow-shaped and point to the position on the selector placard which corresponds to the position of the control valves.

EMERGENCY CROSSFEED SHUTOFF LEVER

A two-position emergency crossfeed shutoff lever is located between the fuel selector handles. When the shutoff lever is pulled up, crossfeeding of main tank fuel and heater operation is stopped. This lever is for emergency crossfeed control only, since its function is to isolate the fuel crossfeed lines from the fuel tanks in the event of a nacelle, wing or center section fire or a wheels up landing.

AUXILIARY FUEL PUMP SWITCHES

A 3-position auxiliary fuel pump switch, see Figure 7-18, is provided for each main fuel tank pump providing 5.5 PSI pressure for vapor clearing and purging. In the LOW position, the auxiliary fuel pumps operate at low speed. The ON position runs the auxiliary fuel pumps at low speed, as long as the engine-driven pumps are functioning. With an engine-driven pump failure and the switch in the ON position, the auxiliary pump on that side will switch to high speed automatically, providing sufficient fuel for all partial-power engine operations.

FUEL DRAIN VALVES

Fuel quick-drain valves are provided for each fuel tank, fuel filter and crossfeed line. The drains provide a location for removing moisture and sediment from the fuel system. The drains, located on the lower surface of the main tanks, are actuated by depressing the lower portion of the valve. A special screwdriver is provided with the airplane which allows a 2-ounce sample to be drained and inspected without fuel spillage.

FUEL SYSTEM SCHEMATIC

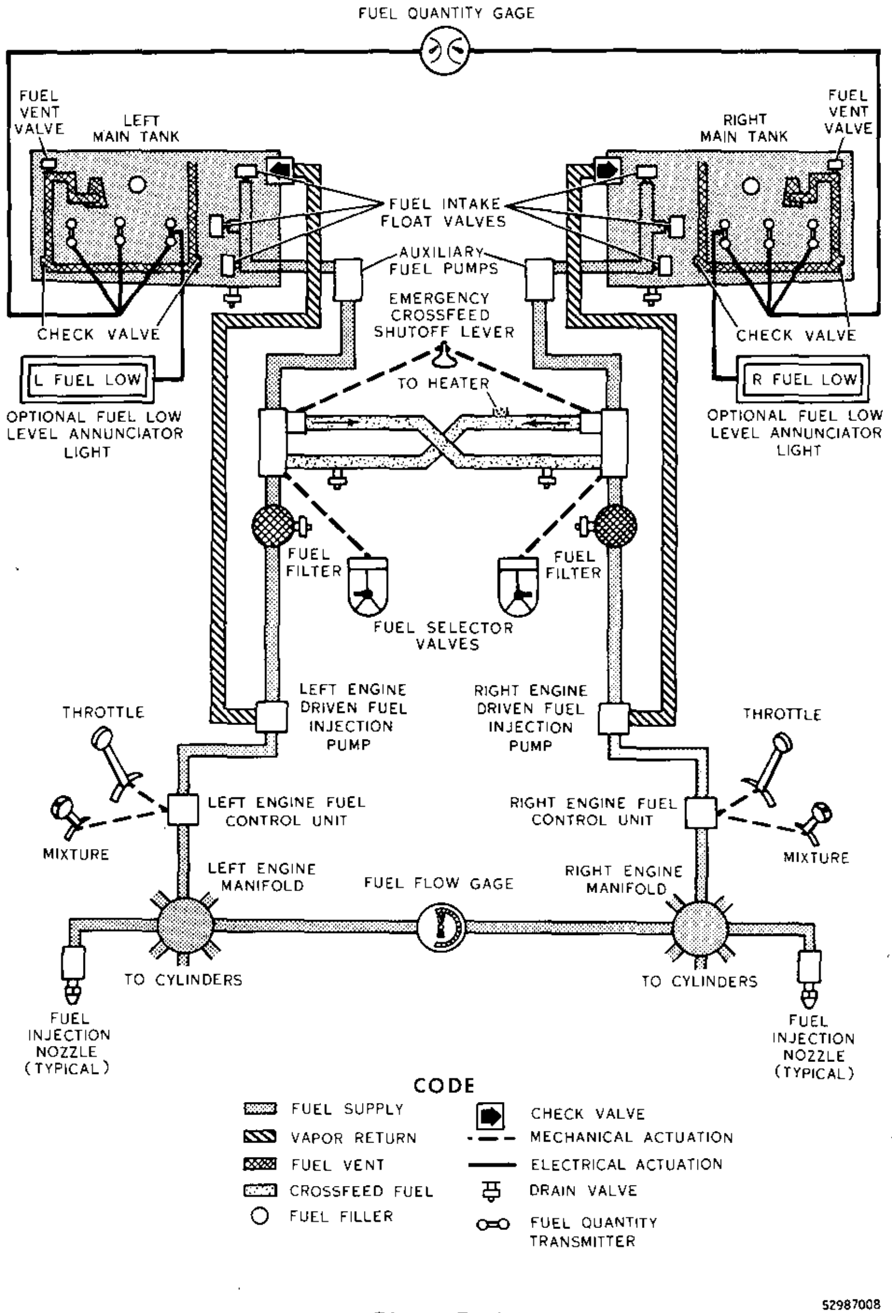


Figure 7-16

FUEL FLOW GAGE

The fuel flow gage, see Figure 7-1, is a dual instrument which indicates the fuel consumption of each engine in pounds per hour. The fuel flow gage used with the injection system senses the pressure at which fuel is delivered to the engine spray nozzles. Since fuel pressure at this point is proportional to the fuel consumption of the engine, the gage is marked as a flowmeter.

The gage dial is marked with arc segments corresponding to proper fuel flow for various power settings and maximum power altitudes and is used as a guide to quickly set the mixtures. These gage markings are predicated on the use of 100 grade aviation fuel. Increase fuel flow 2% above markings when 100LL grade aviation fuel is used.

The gage has takeoff, climb and cruise markings for various percentages of power. The takeoff range (white arc) presents the desired fuel flow (full rich schedule for proper engine cooling) for full power (2700 RPM and 39.0 inches Hg. manifold pressure) operation under all conditions up to 12,000 feet altitude. The climb range (blue segments) presents the desired fuel flow for best power mixture at 75% power with an enriched mixture for higher power settings to allow proper engine cooling during climb conditions. The cruise range presents the desired fuel flow for recommended lean mixture at the specified percent power.

FUEL QUANTITY GAGE

The dual indicating fuel quantity gage, see Figure 7-1, is calibrated in pounds and will accurately indicate the weight of fuel contained in the tanks regardless of whether 100 grade aviation or 100LL grade aviation fuel is used; however, fuel density varies with temperature, therefore a full tank will weigh more on a cold day than on a warm day. This will be reflected by the weight shown on the gage. A gallons scale is provided in blue on the indicator for convenience in allowing the pilot to determine the approximate volume of fuel on board. The volume markings are predicated on the use of 100 aviation grade fuel. Reduce the indicated gallonage reading by 4% when 100LL grade aviation fuel is being used.

FUEL LOW LEVEL WARNING LIGHTS

The optional fuel low level warning lights, see Figure 7-3, provide a warning when the left and/or right main tanks contain approximately 60 pounds of fuel. The warning is provided by the L FUEL LOW and R FUEL LOW lights located on the annunciator panel. These lights are actuated by a float switch located in each main fuel tank. Each light operates independently from the fuel quantity indicating system.

ENGINE-DRIVEN FUEL PUMPS

Each engine is equipped with a mechanically driven fuel pump which provides fuel to the metering unit. Each pump also contains a bypass which returns excess fuel and vapor to the main tanks at all times. Should these pumps fail, the main tank auxiliary pumps can provide sufficient fuel flow for all partial-power engine operations. These auxiliary pumps, however, operate at a fixed pressure, consequently the mixture must be leaned when operating at a low power setting to prevent flooding of the engine. Conversely, if an engine-driven pump failure should occur during high power operation, adequate fuel flow may not be available to ensure rated power and adequate engine cooling.

BRAKE SYSTEM

The airplane is provided with an independent hydraulically actuated brake system for each main wheel. A hydraulic master cylinder is attached to each pilot's rudder pedal. Hydraulic lines and hoses are routed from each master cylinder to the wheel cylinder on each brake assembly. No manual adjustment is necessary on these brakes. The brakes can be operated from either pilot's or copilot's pedals. The parking brake system consists of a manually operated handle assembly, see Figure 7-1, connected to the parking brake valves located in each main brake line. When pressure is applied to the brake system and the parking brake handle is pulled, the valve holds pressure on the brake assemblies until released. To release the parking brakes, push the parking brake handle in. It is not necessary to depress the rudder pedals when releasing the parking brake.

ELECTRICAL SYSTEM

Electrical energy, see Figure 7-17, is supplied by a 28-volt, negative-ground, direct current system powered by an alternator on each engine. The electrical system has independent circuits for each side with each alternator having its own regulator and overvoltage protection relay. The voltage regulators are connected to provide proper load sharing. The standard location for the 24-volt battery is in the left stub wing. The optional location for the 24-volt battery is in the nose area. Immediate detection of low system voltage is provided by a LOW VOLT light on the annunciator panel, see Figure 7-3. The light will illuminate when the airplane bus voltage decreases below approximately 25 volts.

NOTE

Ensure all circuit breakers are engaged and serviceable fuses are installed before all flights. Never operate with any blown fuses or disengaged circuit breakers without a thorough knowledge of the consequences.

A hot battery bus is provided to supply power to essential circuits regardless of the position of the battery switch (see Figure 7-17). This bus is energized any time the battery or external power is connected to the airplane. The circuits connected to the bus are protected from the battery by a circuit breaker located in the wing near the battery and by individual circuit breakers. If the battery is located in the nose, the emergency power and cabin lights circuit breakers are located near the battery in the nose.

BATTERY AND ALTERNATOR SWITCHES

Separate battery and alternator switches, see Figure 7-18, are provided as a means of checking for a malfunctioning alternator circuit and to permit such a circuit to be turned off. If an alternator circuit fails or malfunctions, or when one engine is not running, the switch for that alternator should be turned off. Operation should be continued on the functioning alternator, using only necessary electrical equipment. If both alternator circuits should malfunction, equipment can be operated at short intervals on the battery alone. In either case, a landing should be made as soon as practical to check and repair the circuits.

EMERGENCY POWER ALTERNATOR FIELD SWITCH

An emergency power alternator field switch, see Figure 7-18, is located on the aft top side of the side console. The switch is used when the alternators will not self-excite. Placing the switch in the ON position provides excitation from the battery even though the battery is considered to have failed.

OVERVOLTAGE RELAYS

Two overvoltage relays in the electrical system constantly monitor their respective alternator output. Should an alternator exceed the normal operating voltage, the overvoltage relay will trip, taking the affected alternator off the line. The overvoltage relay can be reset by cycling the applicable alternator switch.

VOLTAMMETER

A voltammeter, see Figure 7-18, located on the left side console, is provided to monitor alternator current output, battery charge or discharge rate and bus voltage. A selector switch, see Figure 7-18, labeled L ALT, R ALT, BATT, and VOLTS is located to the left of the voltammeter. By positioning the switch to L ALT, R ALT, or BATT position, the respective alternator or battery amperage can be monitored. By positioning the switch to the VOLTS position, the electrical system bus voltage can be monitored.

CIRCUIT BREAKERS AND SWITCH BREAKERS

All electrical systems in the airplane are protected by push-to-reset type circuit breakers or switch breakers, see Figure 7-18. Should an overload occur in any circuit, the resulting heat rise will cause the controlling circuit breaker to "pop" out, opening the circuit or allowing the switch breaker to return to the OFF position. After allowing to cool for approximately three minutes, the circuit breaker may be pushed in (until a click is heard or felt) or the switch breaker may be returned to the ON position to reenergize the circuit. However, the circuit breaker should not be held in nor the switch breaker forced to remain in the ON position if it opens the circuit a second time as this indicates a short circuit.

EXTERNAL POWER RECEPTACLE

An optional external power receptacle may be installed in the left wing aft nacelle fairing. The receptacle accepts a standard AN-type external power source plug. The following precautions must be observed when starting an airplane using an external power source:

1. Avionics Master Switch - OFF.
2. Battery Switch - ON (The battery will tend to absorb transients that are present in some external power sources).
3. Alternator Switches - OFF.
4. Airplane Voltammeter - READ battery voltage.

NOTE

Set External Power Source Output Voltage to 28 volts.

5. External Power Source - TURN OFF before connecting to airplane.
6. External Power Source - ATTACH and TURN ON.

ELECTRICAL SYSTEM SCHEMATIC

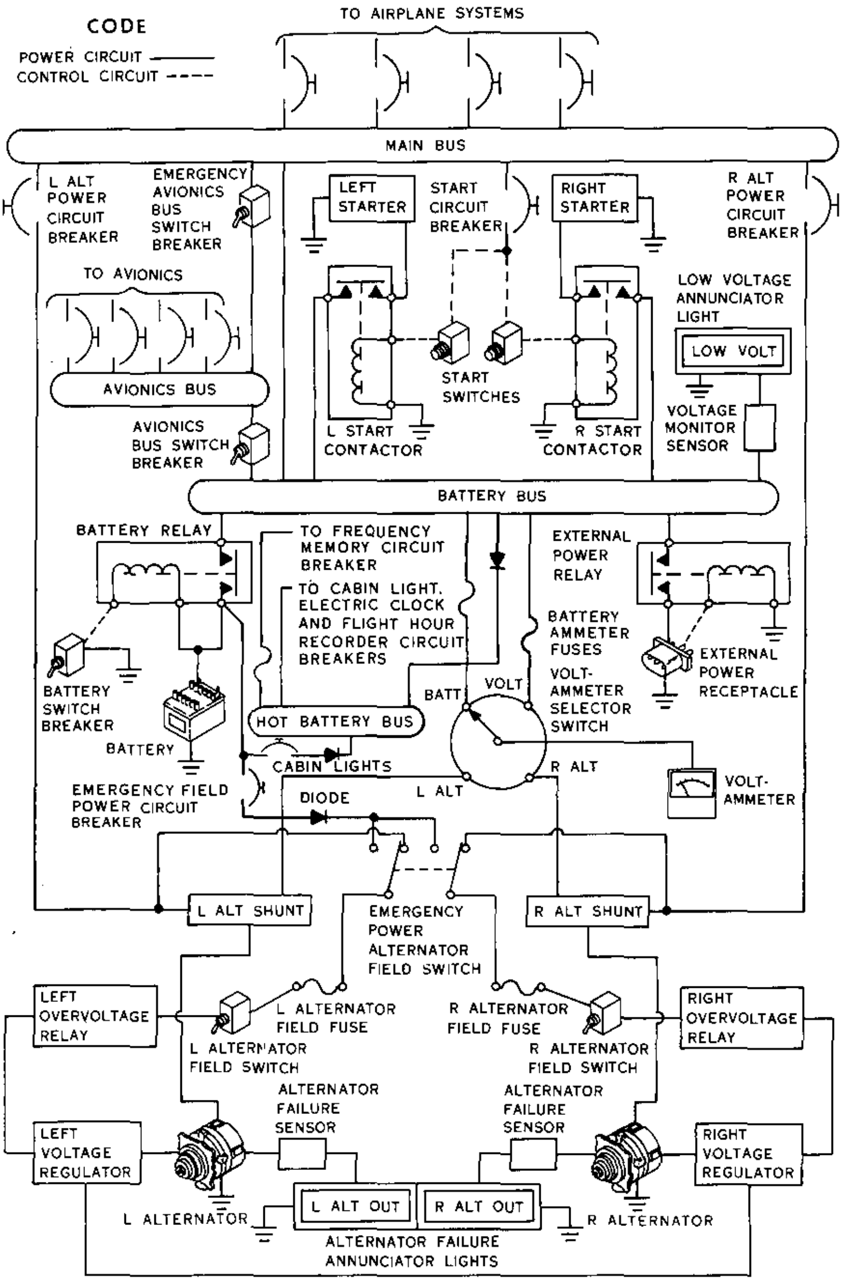


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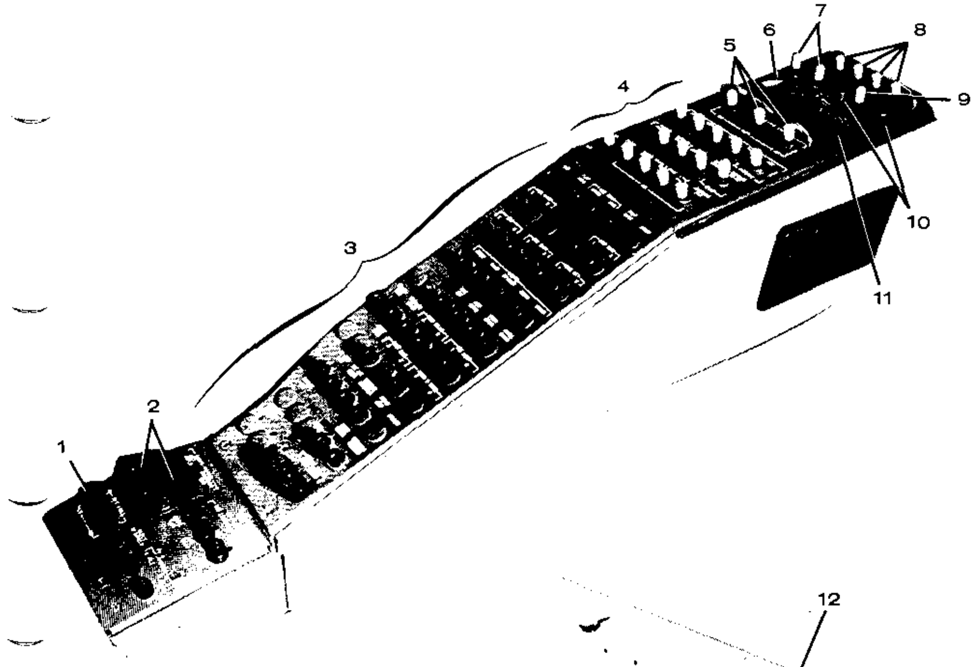
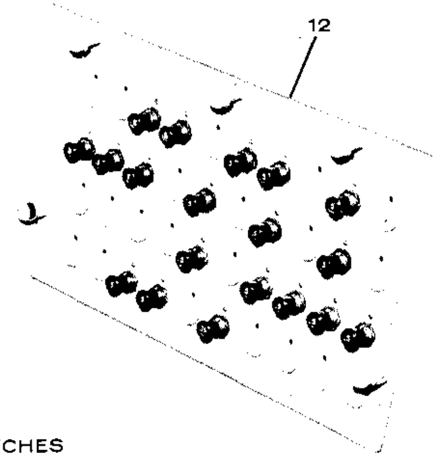
Figure 7-17

LEFT AND RIGHT SIDE CONSOLES



LEFT SIDE



RIGHT SIDE

1. SYSTEMS CIRCUIT BREAKERS
2. EMERGENCY POWER SWITCHES
3. SYSTEMS CIRCUIT BREAKERS
4. SYSTEMS SWITCHES AND SWITCH BREAKERS
5. BATTERY AND ALTERNATOR SWITCHES
6. VOLTAMMETER SELECTOR SWITCHES
7. AUXILIARY FUEL PUMP SWITCHES
8. MAGNETO SWITCHES
9. PRIMER SWITCH
10. STARTER SWITCHES
11. VOLTAMMETER
12. AVIONICS AND RELATED SYSTEMS CIRCUIT BREAKERS

5214P6024
5214P6023

Figure 7-18

7. Airplane Voltammeter - READ VOLTAGE. (If external power source is properly connected, the reading will be greater than when reading battery voltage only.)

LIGHTING SYSTEM

EXTERNAL LIGHTING

The airplane is equipped with three navigation lights, two retractable landing lights (right light is optional), an optional taxi light, two anti-collision lights and two optional wing deice lights.

Navigation Lights

The navigation lights are located in the tailcone stinger and in each wing tip assembly. These lights are energized with the navigation lights switch breaker on the left side console, see Figure 7-18. Proper operation can be checked by observing reflections on the ground below the tail light and from objects surrounding the airplane to ensure the lights are illuminated.

Landing Lights

The retractable landing lights (right light is optional) are located in the lower surface of the wing tips. These lights are extended, retracted and illuminated by the landing light switch breaker on the side console, see Figure 7-18. With the switch positioned to LDG, the landing lights will extend and illuminate. In the off (center) position, the lights will remain extended but will not illuminate. In the RETRACT position, the lights will retract flush with the respective wing tip.

Taxi Light

The optional taxi light, attached to the nose gear, provides adequate illumination for night taxiing. The taxi light is controlled by the taxi light switch breaker on the side console, see Figure 7-18.

Anti-Collision Lights

The anti-collision lights, with individual power supplies, are located adjacent to each wing navigation light. These lights are actuated by the anti-collision light switch breaker on the left side console, see Figure 7-18.

NOTE

Do not operate the anti-collision lights in conditions of fog, clouds or haze as the reflection of the light beam can cause disorientation or vertigo.

Wing Deice Lights

The optional wing deice lights are installed in the outboard side of each engine nacelle and illuminate the outboard wing leading edge deice boots. The lights allow the pilot to check for ice accumulation on the wing leading edges. The lights are actuated by the deice light switch breaker on the side console, see Figure 7-18.

All exterior lighting should be checked for proper operation before night flying. Cockpit recognition of operational exterior lighting can be determined by looking for ground illumination by the various lights.

INTERNAL LIGHTING

The airplane is equipped with lighting for baggage areas, cabin doorway, cockpit controls and indicators, cockpit illumination and cabin illumination.

Optional baggage area lights are provided for both wing lockers and the nose baggage areas. The lights are actuated when the applicable baggage door is opened and extinguish when the door is closed.

The cabin doorway and instrument panel floodlights provide adequate illumination for night boarding. These lights are controlled by a switch immediately inside the cabin doorway, see Figure 7-20, or by a switch on the instrument panel, see Figure 7-1. An optional timer is available which will automatically extinguish the cabin doorway and instrument panel floodlights 15 minutes after leaving the airplane if the lights were not switched off. The system operation is as follows:

1. The cabin doorway and instrument panel floodlights can be actuated by either of the two switches described above. Any time the lights come on, the timer begins to count down for 15 minutes.
2. With the cabin door closed, the lights will operate in a normal fashion (i.e., lights out, movement of either switch turns lights on; lights on, movement of either switch turns lights off), unless the timer has extinguished the lights, thus requiring cycling of either switch to turn the lights on again.

COCKPIT LIGHTING CONTROLS

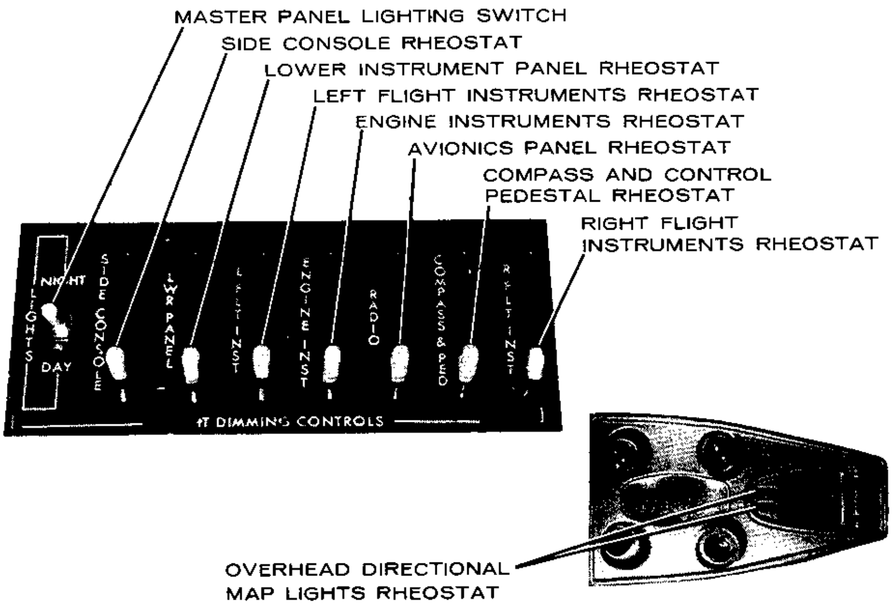


Figure 7-19

3. Opening the door will turn the lights on unless the timer extinguished the lights, in which case, one movement of the door switch is also required in order to turn the lights on.
4. With the cabin door open, the lights will always be on unless the timer has turned them off. Movement of the door switch is required to reset the lights to on for an additional 15 minutes.
5. Closing the door will extinguish the lights only if the system is switched off. If the system is on, the timer must continue to run down to extinguish the lights.

Cockpit lighting is provided by the instrument panel floodlight, instrument postlights and overhead map lights. All cockpit lights are variable intensity. Except for the instrument panel floodlight and the map lights, lighting intensity is controlled by rheostats on the top of the control pedestal, see Figure 7-19. The instrument panel floodlight and map lights are controlled by rheostats on the overhead console, see Figure 7-2.

NOTE

The master panel lighting switch must be positioned to DAY during daylight operations to insure adequate illumination of the annunciator panel lights.

Individual reading lights and controls, see Figure 7-19, are provided in the cabin for each passenger seat.

CABIN LIGHTING AND CONTROLS

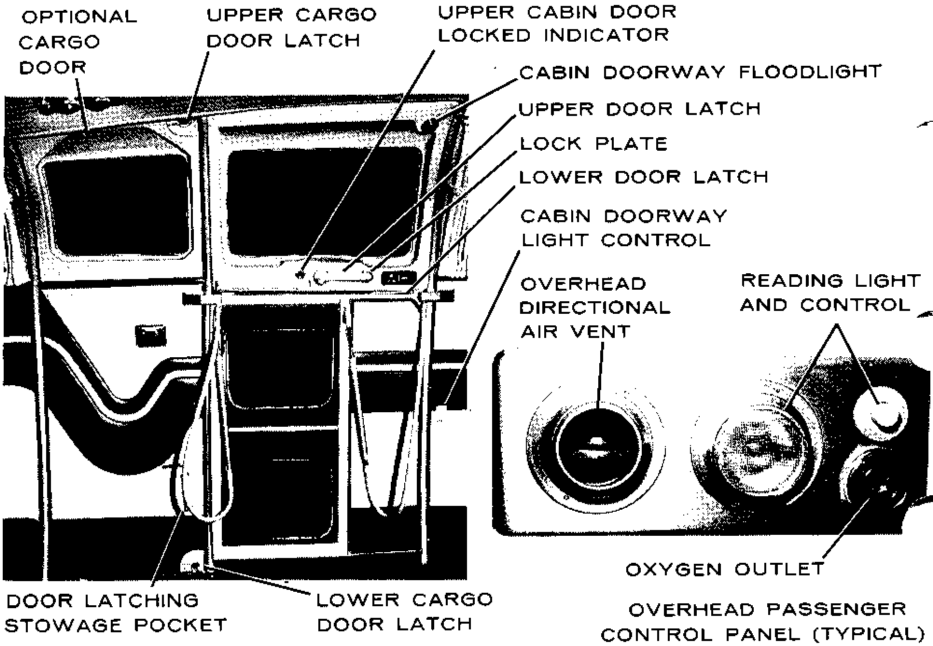


Figure 7-20

PITOT PRESSURE SYSTEM

The standard pitot pressure system, see Figure 7-21, consists of an electrically heated pitot tube mounted on the left side of the fuselage aft of the nose cap, suitable plumbing and an airspeed indicator.

When the pitot heat switch is placed in the ON position, the heating elements in the pitot tube are electrically heated to maintain proper operation of the system during icing conditions. Do not operate for prolonged periods while on the ground to prevent overheating of the heating elements.

When the optional copilot's instruments are installed, a second pitot system is used. This second pitot head is located on the right side of the fuselage aft of the nose cap and is connected to the copilot's airspeed indicator. This dual system allows a completely independent second presentation of airspeed pitot pressure. Pitot heat for the additional head is controlled by the standard pitot heat switch.

STATIC PRESSURE SYSTEM

Static pressure for the pilot's airspeed, altimeter and rate-of-climb indicators, see Figure 7-20, is obtained by a normal external static source or an alternate internal static source should the external source fail.

An alternate static source, installed in the static system directly below the parking brake handle, supplies an alternate static source to the pilot's instruments should the external static source malfunction. Refer to Section 5 for airspeed and altimeter corrections when the alternate static source is used. A drain valve is located behind the map pocket on the copilot's side.

When the optional copilot's instruments are installed, a second set of static ports are installed aft of the main cabin door below the standard static ports. The added static ports are manifolded together and are used as a reference for the copilot's instruments only. This dual system allows a completely independent second static pressure source. No alternate static source is provided for the copilot's instruments. Optional static port heaters are controlled by the stall and vent heat switch.

VACUUM SYSTEM

A vacuum system, see Figure 7-22, is installed to provide a source of vacuum for the vacuum instruments. The system consists of an engine-driven vacuum pump on each engine, pressure relief valve for each pump, a common vacuum manifold, vacuum air filter, suction gage and gyro instruments.

Each vacuum pump pulls a vacuum on the common manifold, exhausting the air overboard. The maximum amount of vacuum pulled on the manifold by each vacuum pump is controlled to a preset level by each pressure relief valve. Should either of the pumps fail, a check valve is provided in each end of the manifold to isolate the inoperative vacuum pump from the system.

PITOT STATIC SYSTEM SCHEMATIC

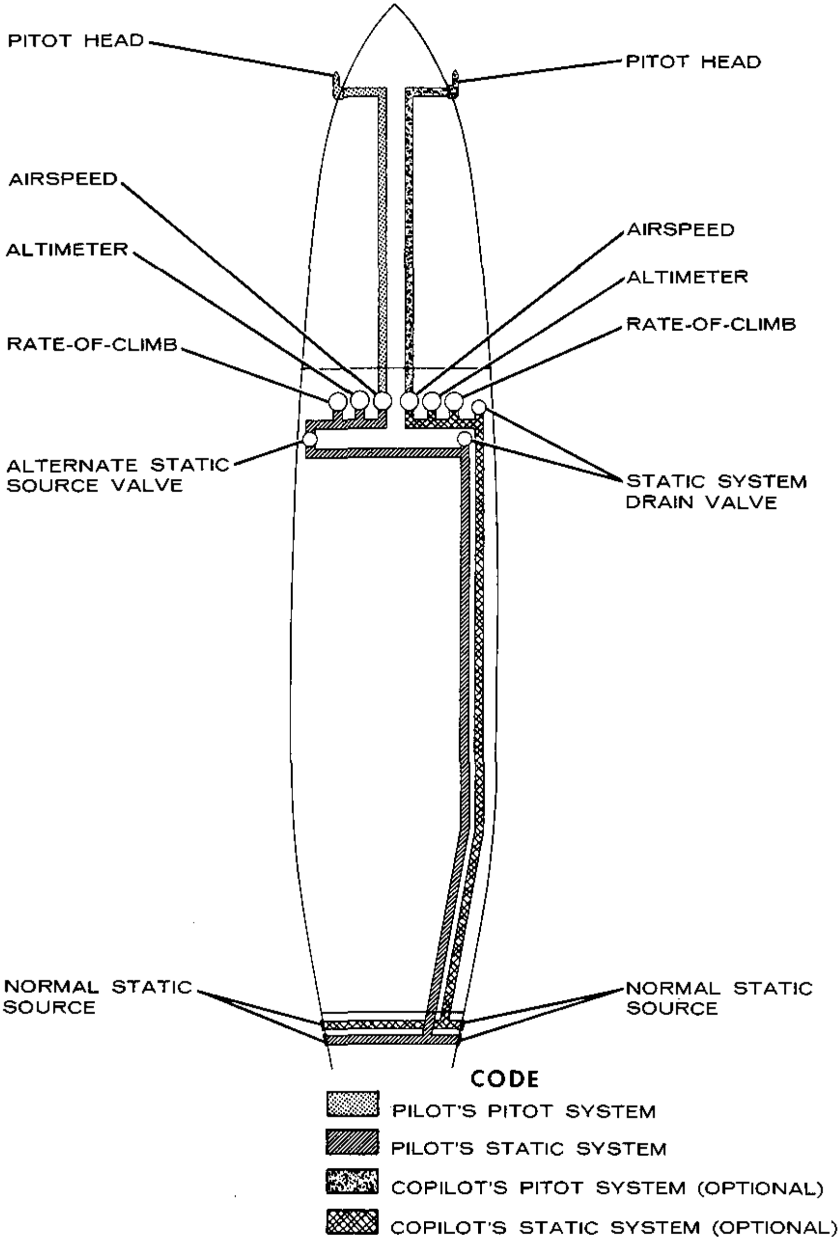


Figure 7-21

The exhaust air side of each attitude gyro is connected to the vacuum manifold thus providing a smooth steady vacuum for the gyros. The vacuum pressure being applied to the gyros is constantly presented on the suction gage. This gage also provides failure indicators for the left and right vacuum pumps. These indicators are small red buttons located in the lower portion of the suction gage which are spring-loaded to the extended (failed) position. When normal vacuum is applied in the manifold, the failure buttons are pulled flush with the gage face. Should insufficient vacuum occur on either side, the respective red button will extend. No corrective action is required by the pilot, as the system will automatically isolate the failed vacuum source, allowing normal operation on the remaining operative vacuum pump.

The inlet air side of the attitude gyros are connected to a common vacuum air filter which cleans the ambient cabin air before allowing it to enter the gyros.

FLIGHT INSTRUMENTS

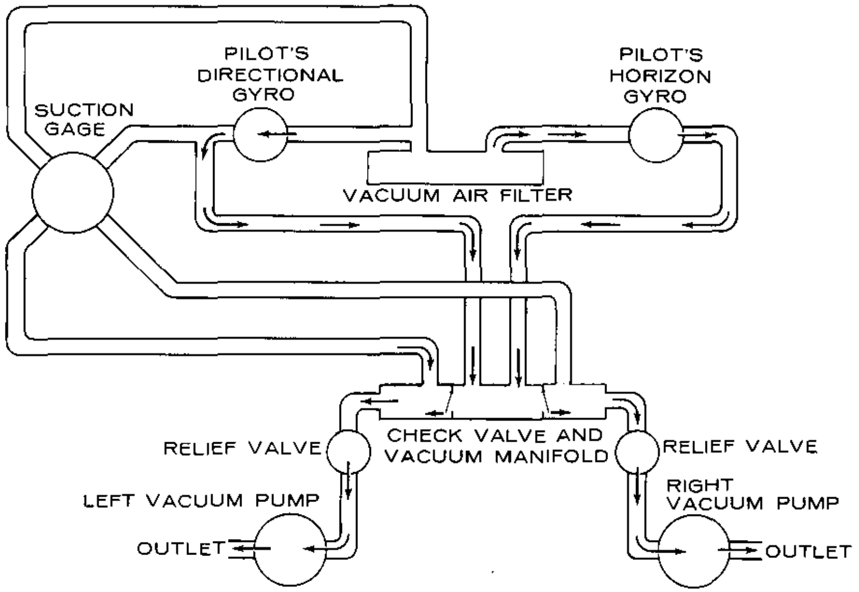
The basic flight instruments, see Figure 7-1, consist of airspeed, altimeter and rate-of-climb indicators, electric turn-and-bank and vacuum horizon and directional gyros.

Operation of the airspeed, altimeter and rate-of-climb indicators can be determined by cross-checking the copilot's instruments, if installed. Also, when a climb or descent is initiated, these instruments should indicate the appropriate change. If no change is indicated, it is reasonable to assume static source blockage has occurred and the alternate static source should be selected. If the possibility of static source icing is present, actuation of the stall and vent heat switch might deice the static sources, allowing a return to the normal static source, if the optional heated static sources are installed. If only the airspeed indicator appears to be affected when the climb or descent is initiated, it is reasonable to assume a pitot system blockage has occurred. If the possibility of pitot source icing is present, actuation of the pitot heat switch will clear the ice blockage. Reference the optional copilot's instruments and optional angle-of-attack indicator for airspeed information until a reliable airspeed indication can be obtained. If neither optional system is installed, fly attitude and power references.

Operation of the turn-and-bank needle can be checked by initiating a standard rate turn and cross-checking the turn rate with the directional gyro. An indicated standard rate turn should show a turning rate of 3 degrees per second on the directional gyro. Pushing the PRESS-TO-TEST button adjacent to the annunciator panel will illuminate the T & B TEST annunciator light if power is being applied to the turn-and-bank indicator. After shutdown of the airplane on the ground, abnormal noise coming from the turn-and-bank can indicate a near failure condition. The ball part of the turn-and-bank is virtually failure proof. Inaccuracy can result only if the indicator is not level in the instrument panel. With the airplane on level ground, the ball should be centered in the race.

VACUUM SYSTEM SCHEMATIC

STANDARD SYSTEM



OPTIONAL SYSTEM

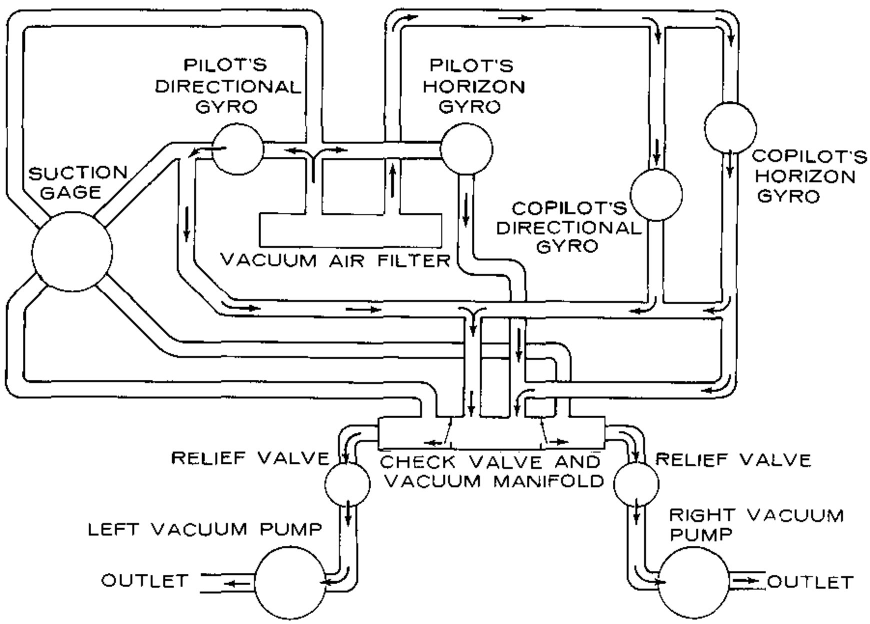


Figure 7-22

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Operation of the directional and horizon gyros can be checked during taxiing by watching for an abnormally slow erection rate and erratic operation. After shutdown of the airplane on the ground, abnormal noise coming from either gyro can indicate a near failure condition. Checking the suction gage for proper vacuum and no failure buttons exposed will assure proper gyro vacuum is available.

In flight, the directional gyro can be checked by flying a standard rate turn and observing the directional gyro for a turning rate of 3 degrees per second. Also the precession rate in straight and level flight should not exceed 5 degrees in 10 minutes. The horizon gyro operation can be checked by establishing a level flight attitude; the gyro should indicate wings level within 1 degree. Initiate a 20-degree bank for a 180-degree turn, then smoothly return to level flight; gyro should indicate wings level within 3 degrees. Establish level flight at 150 KIAS; gyro should indicate level airplane within 1 degree. Smoothly pitch airplane nose down 10 degrees, then return to level flight; gyro should indicate level flight within 1 degree.

STALL WARNING SYSTEM

A stall warning system is required equipment which consists of a stall warning transmitter vane located in the left outboard wing leading edge, a flight deck warning horn and the necessary wiring to complete the system.

The stall warning horn will sound 5 to 10 KIAS above the stall in all flight configurations. Proper operation of the warning system can be checked during preflight inspection by moving the stall warning vane; the horn should sound. Condition of the stall warning vane heater should also be checked during preflight by actuating the stall and vent heat switch and feeling the vane for heat. Full heat to the system is available only in flight. The heating circuits are wired through the landing gear shock strut safety switch to provide lower heat during ground operation.

AVIONICS

AVIONICS INTERFERENCE

NOTE

When tuned to a weak NAV signal, keying the COMM transmitter may cause momentary interference within the NAV receiver causing a NAV flag to appear. Should circumstances warrant, ATC should be requested to assign another COMM frequency.

AVIONICS MASTER SWITCHES

Two optional avionics master switches are provided with factory installed avionics. The master switch breaker labeled AVIONICS BUS is located on the top forward section of the side console, see Figure 7-18. This switch supplies power from the battery bus through a circuit breaker located aft of the battery box to the individual avionics circuit breakers and is used for all normal operations. An emergency power avionics bus switch breaker labeled EMER POWER AVIONICS BUS is located in the lower section of the side console and is protected by a red switch guard cover, see Figure 7-18. This switch supplies power from the alternator bus to the individual avionics circuit breakers. The emergency power avionics bus switch is recommended for use only when the avionics bus switch, associated wiring or battery circuits become inoperative.

ENGINES

The airplane is equipped with two 6-cylinder, turbocharged, fuel-injected engines. Each engine is rated at 325 horsepower at 2700 RPM and 39.0 inches Hg. manifold pressure for takeoff and engine inoperative power and 310 horsepower at 2600 RPM and 39.0 inches Hg. manifold pressure for maximum normal operating power. Each engine is provided with an oil pump, fuel pump, vacuum pump, hydraulic pump, propeller governor, tachometer generator, starter and alternator.

ENGINE CONTROLS

The control pedestal contains all engine controls except the alternate air controls. The three primary engine controls are in groups of two at the top of the pedestal; starting from left to right they are: (1) throttle, (2) propeller and (3) mixture.

Throttle Control

The throttle control lever, see Figure 7-1, is used to increase or decrease the engine power by moving the butterfly valve in the fuel-air control unit.

Propeller Control

The propeller control lever, see Figure 7-1, is used to change the propeller pitch to maintain or set a desired propeller RPM.

Mixture Control

The mixture control lever, see Figure 7-1, is used to control the amount of fuel to be metered by the fuel-air control unit.

Quadrant Friction Lock

A quadrant friction lock, see Figure 7-1, is provided to prevent the three primary engine controls (six total levers) from creeping once they have been set. The locking knob (approximately one and one-half inches in diameter) is located on the right side of the pedestal.

Cowl Flap Control

Two cowl flap controls, see Figure 7-1, are located just below the rudder trim tab wheel; one control for each engine. These controls are used to set the cowl flaps in any position from full open to full closed. A locking feature is provided for each control to prevent inadvertent cowl flap control position change. Rotating the control clockwise engages the locking mechanism.

Alternate Air Control

An alternate air control is provided for each engine, see Figure 7-1. These mechanically actuated, two-position controls are located on the instrument panel below the pilot's control wheel. Normally the controls are pushed in, providing cold filtered ram air to the engines. When the controls are pulled fully out, warm unfiltered air from inside the cowling is provided to the engines. A locking feature is provided for each control to prevent inadvertent alternate air control position change. Rotating the control clockwise engages the locking mechanism.

ENGINE OIL SYSTEM

The engines installed in the airplane have a wet sump type, pressure lubricating system. Oil temperature is controlled by a thermally operated valve which either routes oil through the externally mounted cooler or bypasses the oil around the cooler. Oil is routed through internal passages to all moving parts of the engine which require lubrication.

In addition to providing lubrication and cooling for the engine, the oil is used for control of the propeller, actuating the turbocharger waste gate and for lubricating the turbocharger.

Oil pressures from both engines are routed into the fuselage, to the left and right engine gages, see Figure 7-1, where direct oil pressure readings are mechanically displayed. The oil temperatures of both engines are measured on the output side of the oil coolers. The measurements are electrically transmitted to the left and right engine gages where the oil temperatures are displayed.

IGNITION SYSTEM

Each engine is equipped with a dual ignition system. The ignition systems are entirely independent from each other such that a failure of any part of one system will have no effect on the other system. Each system consists of a magneto located on the rear engine accessory case, ignition harness to distribute the electrical energy and a spark plug in each engine cylinder. The left magneto fires the lower right and upper left spark plugs while the right magneto fires the upper right and lower left spark plugs. When the primary circuit of each magneto is electrically grounded by placing the magneto switch in the OFF position, the magneto will not produce a spark. With the magneto switch positioned to ON, the primary magneto circuit is ungrounded, allowing a high voltage spark to be produced to fire the spark plugs. During engine starting, a high voltage vibrator supplements the magneto spark to assure a fast start.

FUEL INJECTION SYSTEM

Fuel is supplied to the engine using a low-pressure injection system. The fuel is injected into the cylinder head adjacent to the intake valve on all cylinders. This continuous flow type injection system controls fuel flow to match engine airflow. A manual mixture control and a flow gage, see Figure 7-1, indicating fuel flow are provided for precise leaning at any combination of altitude and power setting. There are no moving parts in this system except for the engine-driven fuel injection pump.

COWL FLAP SYSTEM

A cowl flap system, consisting of a cowl flap located on the bottom of the nacelle, is provided for each engine to allow manual control of the engine cooling airflow. Cowl flap actuation is achieved by use of a push-pull cable assembly. The cowl flap controls, located on the lower control pedestal, allow any intermediate position to be selected. A locking feature is provided for each control to prevent inadvertent cowl flap control position change. Rotating the control fully clockwise engages the locking mechanism.

STARTING SYSTEM

The starting system consists of a 24-volt lead acid battery, a direct-drive starter mounted on each engine, a starter button for each engine and necessary wiring and components to complete the system.

The starter is engaged when the starter button, located on the left side console, is pushed, see Figure 7-18. Pushing the button closes the starting contactor, allowing the starter to be energized. While the starter is energized, a starting vibrator provides a high-voltage current through the left magneto at a retarded position to assist the normal magneto ignition during the start.

ENGINE INSTRUMENTS

Engine instrumentation for each engine, see Figure 7-1, consists of mechanical oil pressure, electrical oil temperature and electrical cylinder head temperature presented on the combination engine gage, a mechanical manifold pressure gage, electric tachometer and mechanical fuel flow gage. The gages are placarded as to their operational parameters.

ENGINE MOUNTS

The engine is mounted to the nacelle structure by four engine mounts. Each mount incorporates two rubber pads capable of sustaining operational loads and providing absorption for engine vibrations.

ENGINE BREAK-IN PROCEDURE

The engine underwent a run-in at the factory and is ready for the full range of use. It is, however, recommended that cruising be accomplished at 65% to 75% of maximum normal operating power until a total of 50 hours has accumulated or oil consumption has stabilized.

CAUTION

The purpose of operating at 65% to 75% of maximum normal operating power with Best Power or Recommended Lean mixture is to ensure proper seating of the rings and is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

The airplane is delivered from the factory with corrosion preventive oil in the engine. This oil allows fast ring seating and should not be used any longer than 25 hours. If during the first 25 hours oil must be added, use only aviation grade straight mineral oil conforming to Specification MIL-L-6082. Refer to Section 8 for additional oil servicing information.

TURBO-SYSTEM

Each engine is equipped with a turbocharger and related components to allow takeoff and engine inoperative power to 12,000 feet and maximum normal operations power to 16,000 feet.

The engines work and act just like any normally aspirated engines; however, because the engines are turbocharged, some of the engine characteristics are different. The intent of this section is to point out some of the items that are affected by turbocharging, and outline the correct procedures to be followed.

For a better understanding of the Turbo-System, let us follow the induction air through the engine until it is expelled as exhaust gases. Reference should be made to the Turbo-System Schematic shown in Figure 7-23 when reading through the following steps.

TURBO-SYSTEM SCHEMATIC

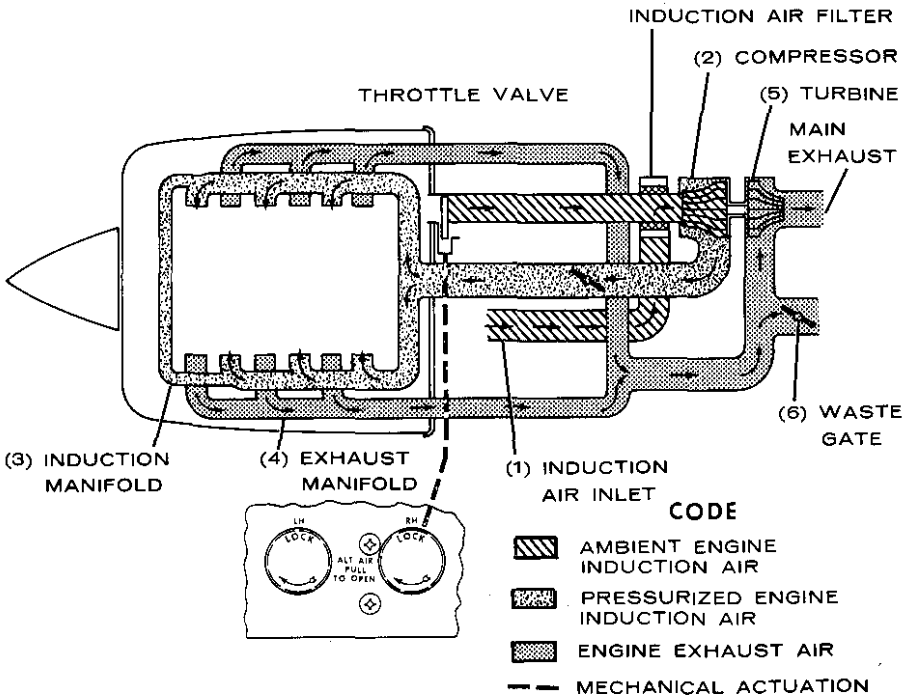

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Figure 7-23

1. Engine induction air is taken in through the induction air inlet (1), located in the bottom of the engine nacelle, at which point it passes through a filter and then into the compressor (2).
2. The compressor compresses the induction air.
3. The pressurized induction air from the compressor then passes into the cylinders through the induction manifold (3).
4. The air and fuel are burned and the exhaust gases are then routed to the turbine through the exhaust manifold (4).
5. The exhaust gases drive the turbine (5) which, in turn, drives the compressor.
6. The turbine has enough power to allow the engine to operate in excess of the maximum 39.0 inches Hg. manifold pressure. Therefore, in order not to exceed 39.0 inches Hg. manifold pressure, a bypass or waste gate (6) is used so the excess exhaust gas will be expelled overboard instead of passing through the turbine.

It can be seen from studying steps (1) through (6) that anything that affects the flow of induction air into the compressor, or the flow of exhaust gases into the turbine, will increase or decrease the speed of the turbocharger. This resultant change in flow will have no effect on the engine if the waste gate is still open, because the waste gate position will automatically change to hold compressor discharge pressure constant. The waste gate automatically maintains allowable compressor discharge pressure when below 12,000 feet with full throttle and full RPM. Above 12,000 feet, the throttles must be retarded to maintain the manifold pressure within the allowable limits. When the waste gate is closed, any change in the turbocharger speed will mean a change in engine operation. Anything that causes an increase or decrease in turbine speed will cause an increase or decrease in manifold pressure. If turbine speed increases, the manifold pressure increases; if the turbine speed decreases, the manifold pressure decreases. Any change in exhaust flow to the turbine or ram induction air pressure, whether it is an increase or decrease, will be magnified approximately 8 to 10 times by the compression ratio and the change in flow through the exhaust system.

Manifold Pressure Variation With Altitude

At full throttle your turbocharger is capable of maintaining the maximum allowable 39.0 inches Hg. manifold pressure, well above 16,000 feet; however, engine operating limitations establish the maximum manifold pressure that may be used. From 16,000 feet to higher altitudes, the throttles must be retarded to maintain the manifold pressure within the allowable limits.

Manifold Pressure Variation With Airspeed

When the waste gate is open at low altitude, changes in airspeed have little or no effect on manifold pressure. However, at high altitudes when the waste gate is closed, manifold pressure will vary with variations in airspeed. This is because any change in pressure at the compressor inlet is magnified 8 to 10 times at the compressor outlet due to compression ratio and exhaust flow changes.

Fuel Flow Variations With Changes In Manifold Pressure

The engine-driven fuel pump output is regulated by engine speed and compressor discharge pressure. Engine fuel flow is regulated by fuel pump output and the metering effects of the throttle and mixture control. When the waste gate is open, fuel flow will vary directly with manifold pressure, engine speed, mixture or throttle position. In this case, manifold pressure is controlled by throttle position and the waste gate controller, while fuel flow varies with throttle movement and manifold pressure.

When the waste gate is closed and manifold pressure changes are due to turbocharger output, as discussed previously, fuel flow will follow manifold pressure even though the throttle position is unchanged. This means that fuel flow adjustments required by the pilot are minimized to the following: (1) small initial adjustments on takeoff or climb-out for the proper rich climb setting, (2) lean-out in cruise to the recommended lean cruise setting, and (3) return to the full rich position for approach and landing.

Manifold Pressure Variations With Increasing Or Decreasing Fuel Flow

When the waste gate is open, movement of the mixture control has little or no effect on the manifold pressure of the turbocharged engine.

When the waste gate is closed, any change in fuel flow to the engine will have a corresponding change in manifold pressure. That is, increasing the fuel flow will increase the manifold pressure and decreasing the fuel flow will decrease the manifold pressure. This is because an increased fuel flow to the engine increases the mass flow of the exhaust. This turns the turbocharger faster, increasing the induction airflow and raising the manifold pressure.

Momentary Overboost Of Manifold Pressure

Under some circumstances (such as rapid throttle movement, especially with cold oil) it is possible that the engine can be overboosted above the maximum allowable 39.0 inches Hg. manifold pressure. This would most likely be experienced during the takeoff roll or during a change to full throttle operation in flight. Therefore, it is still necessary that the pilot observe and be prepared to control the manifold pressure.

Slight overboosting is not considered detrimental to the engine so long as it is momentary. Momentary overboost of 2 to 3 inches Hg. manifold pressure can usually be controlled by slower throttle movement and no corrective action is required when momentary overboost corrects itself and is followed by normal engine operation. However, if overboosting of this nature persists, or if the amount of overboost goes as high as 4 inches Hg. manifold pressure or more, the controller system should be checked for necessary replacement or adjustment of components.

Altitude Operation

Turbocharged airplanes can maintain higher power settings and fuel flows to higher altitudes than are possible with normally aspirated airplanes. As a result, turbocharged airplanes climb faster and higher. Due to the higher fuel flows and the more rapid temperature and barometric pressure changes during these climbs, fuel vaporization in the fuel lines is more probable than with normally aspirated airplanes. Fuel vaporization is usually indicated by fuel flow fluctuations and can be eliminated by pressurizing the fuel system with the auxiliary fuel pumps. Refer to the Normal Procedures Checklist for recommended positioning of the auxiliary fuel pump switches.

High Altitude Engine Acceleration

The engines will accelerate normally from idle to maximum normal operating power with full rich mixture at any altitude below 16,000 feet. At higher altitudes, it is usually necessary to lean the mixture to get smooth engine operation from idle to maximum power. At altitudes above 25,000 feet, and with temperatures above standard, it takes one to two minutes for the turbine to accelerate from idle to maximum RPM, although adequate power is available in 20 to 30 seconds. If fuel flow has been interrupted for any reason, the mixture should be leaned until the engine begins to accelerate as shown by an increase in manifold pressure (with throttle open). Thereafter, adjust the mixture control for smooth engine operation.

Engine Shutdown

After extended periods of ground engine operation above 1600 RPM or when the cylinder head temperature indicator shows values within the upper half of the green arc, reduce power to between 600 and 800 RPM for a period of not less than 2 to 3 minutes prior to engine shutdown. This procedure is intended to reduce internal turbocharger temperatures and preclude the possibility of premature accumulation of carbon on the turbine shaft seals.

CABIN AIR SYSTEM

The cabin air system provides for cabin heating, ventilating and defrosting. The system consists of an air inlet in the nose, a cabin fan, a gasoline combustion-type heater and heat outlets in the cabin. Two heat outlets are located at the base of the windshield for defrosting purposes. Passenger compartment heat is provided by two plenums with nonadjustable heat outlets, located on the left and right side of the cabin just above the floor. Two outlets are located on the forward bulkhead, see Figure 7-24.

Cabin heating and ventilating is accomplished by the cabin air DEFROST, AFT and FWD controls, see Figure 7-24. The overhead directional vents also supply unheated ventilating air. Forced ventilation is obtained with the two-speed cabin fan which may be operated independently of the heater. When the heater is actuated, the fan automatically operates in low speed; if additional airflow is desired, the HIGH position may be selected.

HEATING AND DEFROSTING

During heating and/or defrosting operation, cabin recirculated air or ram air from the fuselage nose air inlet is directed to the heater and heated, then flows to the pilot and passenger compartments. A cabin compartment air outlet is provided to exhaust cabin air.

The cabin heater depends upon the aircraft fuel system for its fuel supply. Fuel pressure is supplied by a fuel pump mounted on the heater assembly; the main fuel system auxiliary fuel pumps need not be turned on for proper heater operation.

On the ground, the cabin overhead air system can be used for additional ventilation by placing the optional auxiliary cabin ventilation blower switch in the ON position. The fan provides unheated fresh air to the cabin through the overhead directional air vent outlets. In flight, the blower becomes inoperative and the heating system can be used for ventilation by placing the cabin heat switch to the OFF position, pulling out the cabin air knobs and opening the heat outlets as desired.

CABIN HEAT SWITCH

The cabin heater is controlled by a two-position cabin heat switch, see Figure 7-18. Switch positions are ON and OFF. Placing the switch in the ON position starts and maintains heater operation and turns the cabin fan on low.

AUXILIARY CABIN VENTILATION BLOWER SWITCH (OPTIONAL)

The auxiliary cabin ventilation blower is controlled by a two-position blower switch on the instrument panel. Switch positions are CABIN VENT FAN and OFF. Placing the switch in CABIN VENT FAN position operates the ventilation blower on the ground to furnish fresh air to overhead directional air vents.

CABIN FAN SWITCH

The cabin fan is controlled by a three-position switch, see Figure 7-18. Switch positions are HI, OFF and LO. Placing the switch in the HI position operates the cabin fan at high speed, or if the cabin heat switch is on, the heater blower will operate at high speed rather than its normal low speed.

CABIN AIR TEMPERATURE CONTROL KNOB

The cabin air temperature is controlled by the cabin heat knob, see Figure 7-1. Clockwise rotation of this knob increases the desired temperature.

This knob adjusts a thermostat, which in turn controls heated air temperature in a duct located just aft of the heater. When the temperature of the heated air exceeds the setting of the thermostat, the thermostat automatically opens and shuts off the heater. When the heated air cools to the thermostat setting, the heater starts again. Thus the heater cycles on and off to maintain an even air temperature.

The heater also will be cycled by a thermoswitch in the cabin air duct, which shuts off the heater when the duct temperature reaches approximately 104.4°C (220°F). When the duct temperature drops to a normal operating level, the heater will restart automatically. The action of this switch is independent of the cabin thermostat setting and is not adjustable in flight.

FORWARD CABIN AIR KNOB

The forward cabin air knob directs warm air to outlets located on the forward cabin bulkhead. These direct outlets allow fast warm-up when the airplane is on the ground. Airflow through the direct outlets is completely shut off by pushing the knob all the way in. The knob may be set at any intermediate position to regulate the quantity of air to the pilot's compartment.

RAM AIR CONTROL KNOB

The ram air knob controls ram airflow to the heater. When the knob is pulled out, ram air is supplied to the cabin heater. When the knob is pushed in, ram airflow to the heater is shut off and cabin air is recirculated to the cabin heater. Intermediate positions of this control will provide a combination of recirculated and ram air.

AFT CABIN AIR KNOB

The aft cabin air knob controls airflow to the passenger compartment. When the knob is pulled out, the air flows to the heater plenums and then into the passengers' compartment. Airflow to the plenums is completely shutoff by pushing the knob all the way in. The knob may be set in any intermediate position to regulate the quantity of air to the cabin.

DEFROST KNOB

Windshield defrosting and defogging is controlled by the push-pull defrost knob. When the knob is pulled out, air flows from the defroster outlets at the base of the windshield. When the knob is pushed all the way in, airflow to the defroster outlets is shut off. The knob may be set in any intermediate position to regulate the defroster airflow.

HEATER OVERHEAT WARNING LIGHT

An amber overheat warning light provided in the annunciator panel is labeled HEATER OVHT, see Figure 7-3. When illuminated, the light indicates that the heater overheat switch has been actuated and that the temperature of the air in the heater has exceeded 163°C (325°F). Once the heater overheat switch has been actuated, the heater turns off and cannot be restarted until the overheat switch, located in the right forward nose compartment, has been reset. This switch is accessible from inside the nose wheel well. Prior to resetting the switch the heater should be thoroughly checked to determine the reason for the malfunction.

HEATER OPERATION FOR HEATING AND DEFROSTING

(1) Battery Switch - ON.
(2) Cabin Air Knobs - PULL OUT.
(3) Defrost Knob - AS REQUIRED.
(4) Cabin Heat Knob - AS REQUIRED.
(5) Cabin Heat Switch - ON.
(6) Cabin Fan Switch - AS REQUIRED.
(7) Ram Air Knob - AS REQUIRED.

Cabin heated air temperature can be increased during operation in cold weather by pushing the ram air knob fully in. This will allow heated cabin air to be recirculated through the heater, thus increasing heater capability. During extremely cold weather, manually adjust the defrost, forward cabin and aft cabin air controls to reduce total airflow into the cabin.

NOTE

- If warm air is not coming out of the registers within one minute, turn cabin heat switch breaker OFF; check and try another start. If heater still does not start, no further starting attempt should be made.
- During heater operation, the defrost and/or cabin air knobs must be out.
- Under certain flight conditions the, relative humidity of the cabin air may increase to the point that moisture (condensation) forms on the inside of the cabin windows. To control cabin window "fogging", open the Ram Air vent (as required), to increase air ventilation in the cabin.

HEATER USED FOR VENTILATION

(1) Battery Switch - ON.
(2) Cabin Air Knobs - PULL OUT.
(3) Defrost Knob - PULL OUT.
(4) Cabin Fan Switch - LO or HI as desired.
(5) Ram Air Knob - PULL OUT.

VENTILATING SYSTEM

During ground operation, ventilation is provided by the ventilating fan of the cabin heat system or the optional circulation blower, if installed.

In flight ventilation, for airplanes without air conditioning installed, is obtained through the ram air inlet located at the forward end of the dorsal fin. This ram air is then distributed to the cabin via the overhead directional air vents. On airplanes with optional air conditioning or optional blower systems, a duct mounted internally in the dorsal fin, activated by cam/microswitch butterfly valves, provides availability of conditioned air or outside ram air, depending on cabin comfort requirements.

OXYGEN SYSTEM

The oxygen system provides individual service for the pilot, copilot and each passenger. The oxygen supply is stored in either two 22.0 cubic foot or a 114.9 cubic foot bottle located in the nose compartment. Cabin plumbing, including outlets for each occupant, is standard with each airplane and will vary with individual airplane seating configuration. The oxygen control, pressure gage (see Figure 7-1), bottle, regulator and nose compartment plumbing is optional.

HEATING, VENTILATING AND DEFROST SYSTEM SCHEMATIC

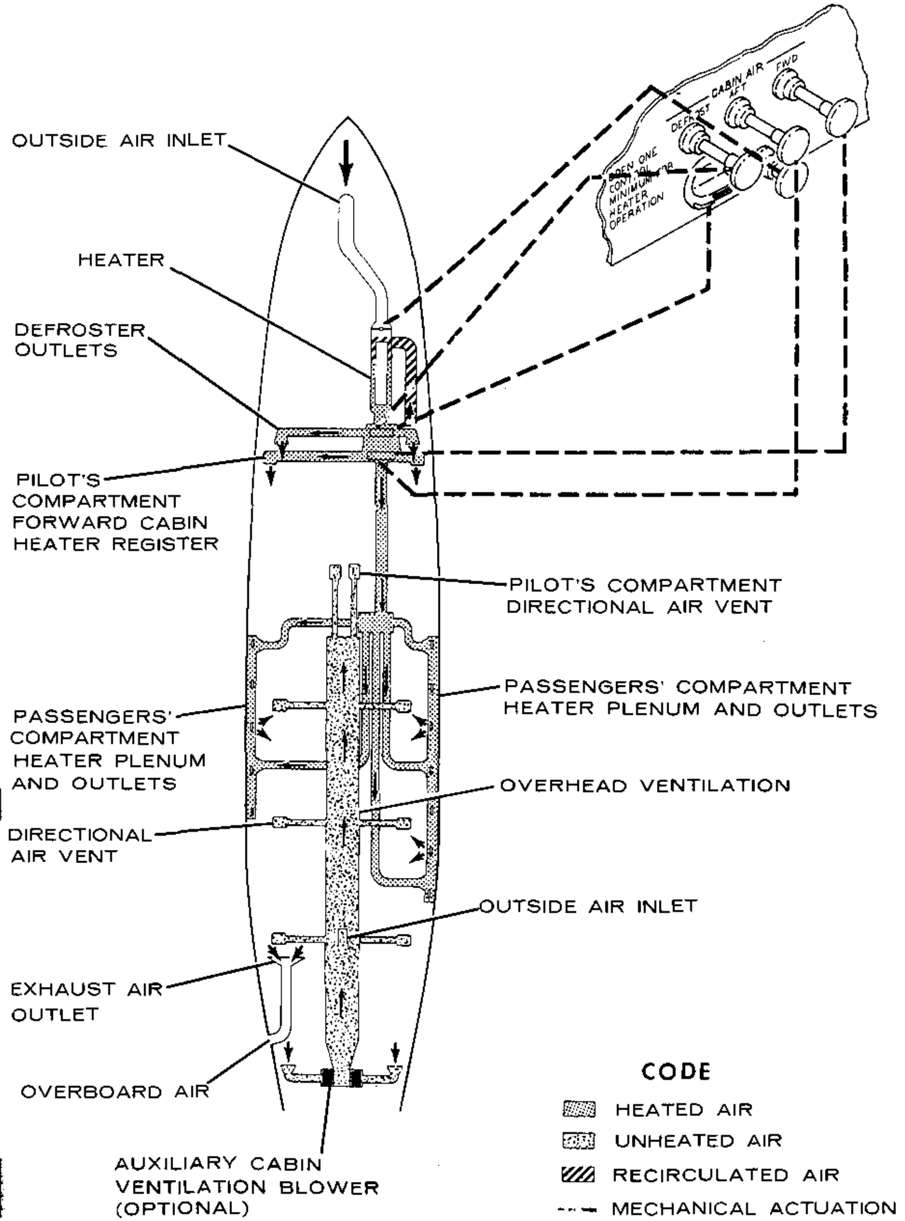
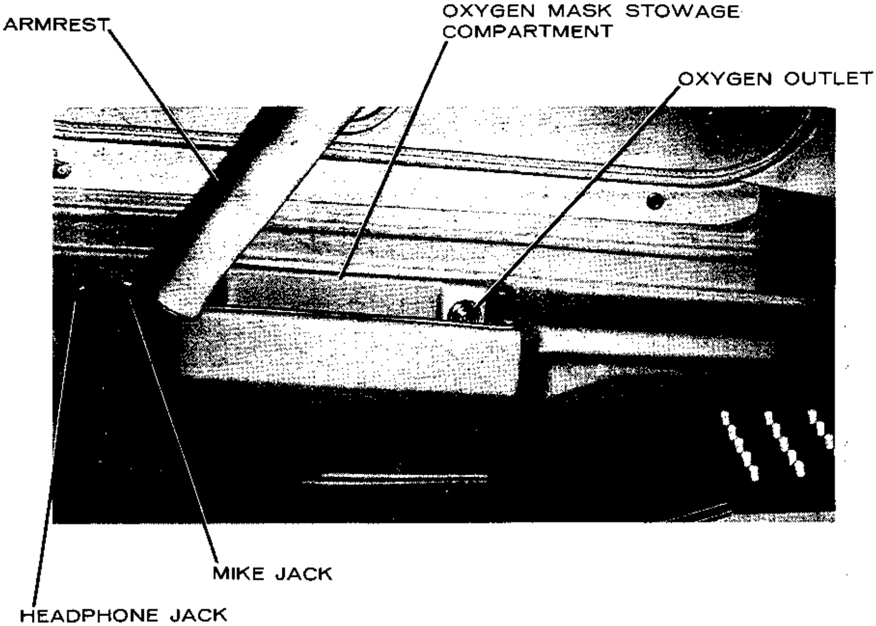


Figure 7-24

The oxygen system is activated by pulling the oxygen control knob, see Figure 7-1, to the ON position, allowing oxygen to flow from the regulator to all cabin outlets. A normally closed valve in each oxygen outlet is opened by inserting the connector of the mask and hose assembly. After flights using oxygen, the pilot should insure that the oxygen system has been deactivated by unplugging all masks and pushing the oxygen control knob completely to the OFF position.

> **NOTE**
>
> If the oxygen control knob is left in an intermediate position between ON and OFF, it may allow low pressure oxygen to bleed through the regulator into the nose compartment of the airplane.

COCKPIT OXYGEN OUTLETS



PILOT'S SIDE SHOWN; IDENTICAL CONTROLS ARE PROVIDED FOR THE COPILOT.

Figure 7-25

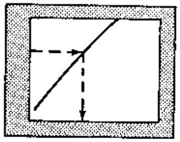
The oxygen system with optional 114.9 cubic foot oxygen bottle provides adequate oxygen flow rates up to 30,000 feet, see Figure 7-26. The oxygen outlets for the pilot and copilot are located inside the stowage compartment under the outboard armrests, see Figure 7-25. Oxygen outlets for passengers are located overhead of each seat position, see Figure 7-20. The pilot, copilot and passengers shall always use the blue hose assemblies.

The oxygen system with two 22.0 cubic foot oxygen bottles (44.0 cubic foot total) provides adequate oxygen flow rates up to 30,000 feet, see Figure 7-26. The oxygen outlets for the pilot and copilot are located inside the stowage compartment under the outboard armrests, see Figure 7-25. Oxygen outlets for passengers are located overhead of each seat position, see Figure 7-20. The pilot, copilot and passengers shall always use the blue hose assemblies.

OXYGEN DURATION CHART

44.0 AND 114.9 CUBIC FOOT SYSTEM

$$\frac{\text{OXYGEN DURATION IN HOURS}}{\text{NUMBER OF PERSONS}} = \text{TOTAL HOURS DURATION}$$



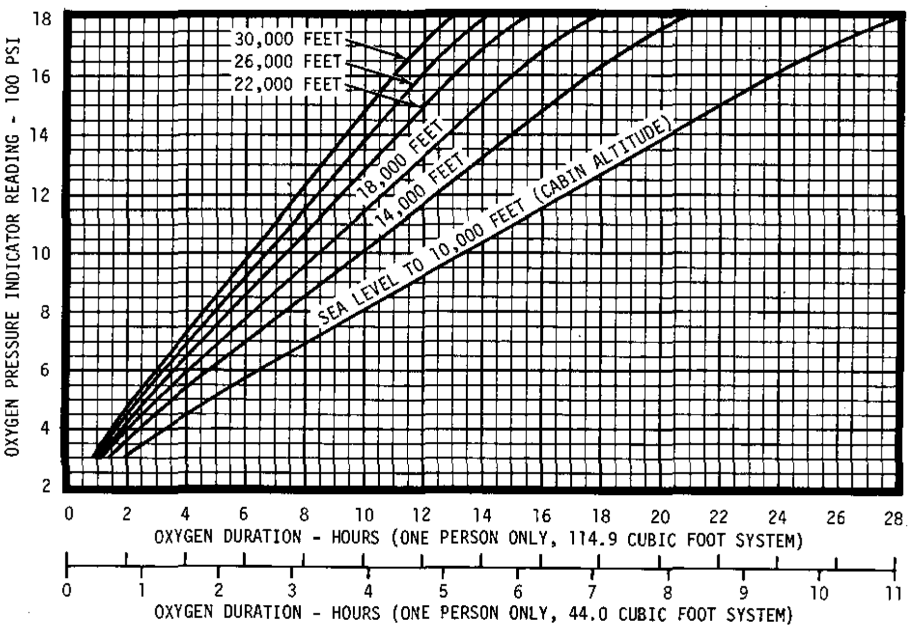


Figure 7-26

BAGGAGE COMPARTMENTS

Six baggage locations, see Figure 1-3, are available: one in the avionics bay, one in the fuselage nose section, two in the aft cabin area and one location in the aft portion of each engine nacelle.

These baggage areas are intended primarily for low-density items such as luggage and briefcases. The floors of the wing locker baggage areas are primary structure. Therefore, care should be exercised during loading and unloading to prevent damage. When loading high-density objects, insure that adequate protection is available to prevent damage to any of the airplane's primary structure. Without optional equipment installed, 200 pounds can be carried in each wing locker, 250 pounds in the avionics bay, 350 pounds in the nose baggage compartment, 400 pounds in the aft cabin Bay A and 100 pounds in the aft cabin Bay B. With optional equipment installed, refer to Section 2 or the loading placards in your airplane's baggage compartments.

WARNING

- The transportation of hazardous materials is discouraged. However, if transport of this material is necessary, it shall be done in accordance with FAR 103 and any other applicable regulations.
- Under no circumstances, allow the loading of people or animals in the avionics bay, nose baggage area or wing lockers. These areas do not qualify for carriage of animate objects.

CARGO LOADING

Care should be exercised during loading and unloading to prevent damage. When loading high-density objects, insure that adequate protection is available to prevent damage to any of the airplane's primary structure. Without optional equipment installed, 500 pounds of cargo can be carried in each cargo area (A, B, C and D), 400 pounds on the lower aft cabin shelf (Bay A) and 100 pounds on the upper aft cabin shelf (Bay B). Additional loading instructions in the form of limitations are presented in Section 2.

a. Tie-downs shall be provided in such a manner that at least one forward and one aft tie-down will be available for each 100 pounds of cargo when tie-down rings are used, or 200 pounds when tie-down bolts are used, with a minimum of four tie-downs for any one piece of cargo. Tie-downs are to be located at seat hole locations only.
b. A system of retention, suitable to the cargo being loaded and having strength compatible to the seat rail tie-downs, must be used.
c. The total airplane loading must be consistent with the weight and balance limitations of the passenger configuration airplane.
d. If the cargo has a smooth, reasonably flat lower surface, load densities of up to 200 pounds per square foot may be loaded on the floorboards. For higher density objects, with rough or sharp edged supports, suitable supports, such as plywood or thin lumber should be employed to reduce the floor pressure load.

e. The bulk and position of the loaded cargo should be such as to permit entrance and emergency exit of the pilot and passengers.

WARNING

- The transportation of hazardous materials is discouraged. However, if transport of this material is necessary, it shall be done in accordance with FAR 103 and any other applicable regulations.
- Under no circumstances, allow the loading of people or animals in the avionics bay, nose baggage area or wing lockers. These areas do not qualify for carriage of animate objects.

AIRPLANE TIE-DOWN PROVISIONS AND JACK POINTS

A wing tie-down fitting is provided on the lower surface of each wing, aft of each main gear. The fittings retract into the wing when not in use. The empennage is secured at the tail tie-down fitting located on the fuselage bottom, below the elevator hinge line. In addition the nose gear can be secured with ropes attached to the nose gear assembly above the scissors linkage.

Three jack points are provided on the underside of the airplane. The main gear jack points are located inboard of and in-line with the wing flap hinge. The nose gear jack point is located aft of the left nose gear door hinge. Jack pads, which are provided with the airplane, are required to be installed in each wing jack point before the airplane can be jacked.

SEAT, SEAT BELTS AND SHOULDER HARNESSES

PILOT AND COPILOT PROVISIONS

The pilot and copilot seats are secured to seat pan assemblies which are attached to the forward main spar carry-thru structure. The seats are adjustable fore and aft on seat rails by lifting the handle located on the forward face of the seat.

Seat belts are provided for both seats and are attached to airplane structure on the floor. The shoulder harnesses attach aft and outboard of the pilot's and copilot's seats to overhead structure. The opposite end of each harness can be attached permanently to the outboard pilot's or copilot's seat belt. An adjustment is provided between the attach points. With the optional shoulder harnesses, inertia reels are bolted to overhead structure aft and outboard of the pilot's and copilot's seats. The opposite end of the harnesses attach to the seat belts with a detachable fastener. The inertia reels allow normal fore and aft movement of the occupants until a violent movement occurs, at which time the reel will lock, restricting forward movement of the seat occupant.

PASSENGER PROVISIONS (BUSINESSLINER)

The passenger seats are attached to continuous seat rails located on each side of the cabin area. The seats are adjustable fore and aft, within the limits of the seat stops, by raising the handle located on the front of the seat. If the optional adjustable seats are installed, a second handle is provided on the front of the seat which allows reclining of the seat back. Insure the seat stop pins are engaged with the holes in the seat rails before takeoff and landing. Each seat is equipped with a seat belt which is attached to the seat structure.

PASSENGER PROVISIONS (UTILILINER)

The passenger seats are attached to continuous seat rails located on each side of the cabin area. The seats are adjustable fore and aft, within the limits of the seat stops, by raising up on the stop pin lever located near the outside edges of the foot rests. The seats do not have reclining backs. An optional aft twin seat offers backs which fold forward, allowing improved accessibility to the rear baggage shelf. Insure that the seat stop pins are engaged with the holes in the seat rails before takeoff and landing. Each seat is equipped with a seat belt which is attached to the seat structure.

DOORS, WINDOWS AND EXITS

CABIN DOOR

The main cabin door is a two-section, outward opening, airstair door. The lower section folds down to provide two steps for ease in boarding and deplaning passengers, while the top portion folds up.

CAUTION

When entering or exiting airplane equipped with pneumatic lower door extender, ensure lower cabin door is fully extended before putting weight on steps.

The lower door handle is located such that the upper door must be open to gain access to it. In addition, the locking pin receptacles can be visually inspected for positive engagement, see Figure 7-20. It is important, to ensure positive locking, that the upper door inner handle be rotated fully clockwise against the stop before being stowed. If the door is fully locked (overcenter), a white vertical line will show against a green background in the inspection hole.

WARNING

Failure to properly latch the cabin door may allow the door to open in flight.

As an additional safety feature, a cabin door warning light is provided. This light is located in the annunciator panel, see Figure 7-3, and is illuminated when the cabin door is not securely latched.

CREW DOOR

An optional crew door, located next to the pilot's seat, provides direct access to the cockpit. The door is hinged at the top and an assist handle and wing walkway are provided to allow easy access. The door warning light on the annunciator panel will illuminate if the crew door is not securely latched.

CARGO DOOR

An optional cargo door, located adjacent to the cabin door, is a one-piece, outward opening, side-hinged door. The cargo door provides a larger opening when loading large, bulky items. The door warning light on the annunciator panel will illuminate if the cargo door is not securely latched.

WINDOWS

Six windows are provided on each side of the airplane. All windows are unopenable, except the emergency exit window. A foul weather window is incorporated into both the pilot's and copilot's side window. The foul weather windows may be opened during all ground operations and inflight. Airspeed is not restricted with the foul weather windows open.

EMERGENCY EXIT WINDOW

The forward cabin window on the right side of the passenger compartment can be opened for emergency exit or during ground operations. To open the emergency exit window, remove the plastic cover over the emergency release handle under the window. Push the safety clip forward and pull the red handle fully aft until the window releases. Push the window out and up until the up-lock brace holds the window up. The door warning light on the annunciator panel will illuminate if the emergency exit window is not closed.

CONTROL LOCKS

A control column lock is provided to restrict control column movement. This restriction holds the ailerons in a neutral position and the elevators approximately 10° down, thus preventing damage to the control surfaces in gusty wind conditions.

The rudder is secured with the optional rudder gust lock. To engage the lock, center the rudder, insure the elevator is fully down, then move the external rudder lock handle to the lock position. The rudder lock is disengaged by rotating the external rudder lock handle to the unlock position. The rudder lock handle is located above the left horizontal stabilizer in the side of the fuselage. If the optional rudder lock is not installed, the rudder can be secured by placing an external control surface lock over the vertical stabilizer and rudder. If neither rudder lock is available, caster the nosewheel to the full left or right position. This action will deflect the rudder against its stop, thus restricting rudder movement.

WARNING

Ensure all control locks are removed before starting the engines.

PROPELLERS

The airplane is equipped with all-metal, three-bladed, constant-speed, full-feathering, single-acting, governor-regulated propellers. Each propeller utilizes oil pressure which opposes the force of springs and counterweights to obtain correct pitch for engine load. Oil pressure from the propeller governor drives the blades toward low pitch (increasing RPM) while the springs and counterweights drive blades toward high pitch (decreasing RPM). The source of oil pressure for propeller operation is furnished by the engine oil system, boosted in pressure by the governor gear pump, and supplied to the propeller hub through the engine crankshaft flange.

To feather the propeller blades, the propeller control levers on the control pedestal must be placed in the feather position. Unfeathering the propeller is accomplished by positioning the propeller control lever to the increase RPM position. The optional unfeathering system uses accumulator air and oil to force the propeller out of feather and into the low pitch condition.

PROPELLER SYNCHROPHASER

The optional propeller synchrophaser system, see Figure 7-27, is designed to match propeller RPM and propeller phase angle of the two engines. The propeller RPM and phase angle of the slaved (left) engine will follow changes in RPM and phase angle of the master (right) engine over a limited range. This limited range feature prevents the left engine from losing more than 50 propeller RPM should the right engine be feathered with the synchrophaser system on.

With the function switch in the OFF position, the system is deenergized and the automatic phaser RPM control is positioned to its mid-range to insure normal operation when next turned on. When the left engine is manually synchronized to the right engine and the synchrophaser switch is positioned to PHASE, the propeller RPM of the left and right engines will be automatically synchronized. The phase relationship of the left engine propeller relative to the right engine propeller can be adjusted by rotating the phasing knob. After initial synchrophaser engagement, the propellers will remain synchronized and can be phased as long as the RPM difference between the left and right engines does not exceed 50 RPM. When the RPM difference between the left and right engines exceeds 100 RPM, the synchrophaser light will flash and the automatic phaser control circuits will be disabled, causing the actuator drive motor to stop at a random position. If the propeller control of the left engine is again adjusted as close as possible to the right engine, the synchrophaser light will illuminate continuously and the propeller RPM of the left and right engines will be automatically synchronized.

PROPELLER SYNCHROPHASER

Figure 7-27

Make certain that both engines are functioning properly with the synchrophaser turned OFF. Since the left propeller is slaved to the right propeller, and the slaving range is limited, the synchrophaser should not be operated at either extreme of the RPM governing range.

For best operation, it is important to guard against propeller control creeping by setting the quadrant friction lock tightly, see Figure 7-1. On extended flights, it may be necessary to periodically switch to the OFF position, reset the propeller control levers and reengage the synchrophaser.

NOTE

Manually synchronize the propellers as close as possible prior to selecting the PHASE position.

CABIN FEATURES

CABIN FIRE EXTINGUISHER (If Installed)

A portable 2-1/2 pound Halon 1211 fire extinguisher is provided in case of an inadvertent cabin fire. The fire extinguisher, locater beneath the copilot's seat, should be checked prior to each flight to ensure that bottle pressure, as indicated by the gage on the bottle, is within the green arc (approximately 125 PSI). To operate the bottle:

1. Loosen the retaining clamp and remove extinguisher from bracket.
2. Hold bottle upright, pull retaining pin, and press lever to discharge.

NOTE

- Begin discharge 5 feet from fire, at base of the flame, and sweep as required across the flame.
- Extinguisher should be recharged after each use.

SECTION 8
AIRPLANE HANDLING, SERVICE AND MAINTENANCE

TABLE OF CONTENTS

INTRODUCTION

Section 8 of this handbook provides information on cleaning, inspection, servicing and maintenance of the airplane.

If your airplane is to retain the new plane performance and dependability, certain inspection and maintenance requirements must be followed. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered in your locality.

Keep in touch with your Cessna Dealer, and take advantage of his knowledge and experience. He knows your airplane and how to maintain it. He will remind you when lubrications and oil changes are necessary, and about other seasonal and periodic services.

All correspondence concerning your airplane should include the airplane model and serial number. This information may be obtained from the FAR-45 required identification plate located on the forward door post. Refer to the Airplane Maintenance Manual for an illustration of the identification plate.

PUBLICATIONS

Various publications and flight operation aids are furnished in the airplane when delivered from the factory. These items are listed as follows:

CUSTOMER CARE HANDBOOK
PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL
PILOT'S CHECKLIST
AVIONICS OPERATION GUIDE
CRUISE COMPUTER
WORLDWIDE CUSTOMER CARE DIRECTORY

The following additional publications, plus many other supplies that are applicable to your airplane, are available from your Cessna Dealer.

INFORMATION MANUAL (Contains Pilot's Operating Handbook and FAA Approved Flight Manual Information)
MAINTENANCE MANUALS, WIRING DIAGRAM MANUALS AND PARTS CATALOGS FOR:
- AIRPLANE
- ENGINES AND ACCESSORIES
- AVIONICS

Your Cessna Dealer has a Customer Care Supplies Catalog covering all available items, many of which he keeps on hand. He will be happy to place an order for any item which is not in stock.

NOTE

A Pilot's Operating Handbook and FAA Approved Airplane Flight Manual which is lost or destroyed may be replaced by contacting your Cessna Dealer. An affidavit containing the owner's name, airplane serial number and registration number must be included in replacement requests since the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual is identified for specific airplanes only.

OWNER NOTIFICATION SYSTEM

As the owner of a Cessna, you will receive applicable Cessna Owner Advisories at no charge. These Owner Advisories will be mailed to the address that is provided to Cessna on the Warranty Registration Application Card which is included in your Customer Care Program Book. A subscription service for Service Information Letters is available directly from the Cessna Customer Services Department. Your Cessna Dealer will be glad to supply you with details concerning this subscription program, and stands ready, through his Service Department, to supply you with fast efficient, low-cost service.

INSPECTION REQUIREMENTS

As required by Federal Aviation Regulations, all civil airplanes of U.S. registry must undergo a complete inspection (annual) each twelve calendar months. In addition to the required annual inspection, airplanes operated commercially (for hire) must have a complete inspection every 100 hours of operation.

In lieu of the above requirements, an airplane may be inspected in accordance with a progressive inspection program, which allows the work load to be divided into smaller operations that can be accomplished in shorter time periods.

The Cessna Progressive Care Program has been developed to provide a modern progressive inspection program that satisfies the complete airplane inspection requirements of both the 100-hour and annual inspections as applicable to Cessna airplanes.

Additional inspections may be required by the FAA. These inspections are issued in the form of Airworthiness Directives and can apply to the airframe, engines and/or components of the airplane. It is the owner's responsibility to insure compliance with these directives. In some cases, the Airworthiness Directives require repetitive compliance; therefore, the owner should insure inadvertent noncompliance does not occur at future inspection intervals.

NOTE

Refer to FAR Parts 43 and 91 for properly certificated agency or personnel to accomplish the inspections. Contact your local Cessna dealer for additional information.

CESSNA PROGRESSIVE CARE PROGRAM

The Cessna Progressive Care Program has been developed to provide a modern progressive inspection program that satisfies the complete airplane inspection requirements and to help you realize maximum utilization of your airplane at a minimum cost and down time. Under this program, your airplane is inspected and maintained in four operations at 50-hour intervals during a 200-hour period. The operations are recycled each 200 hours and are recorded in a specially provided Aircraft Inspection Log as each operation is conducted.

The Cessna Aircraft Company recommends Progressive Care for airplanes that are being flown 200 hours or more per year, and the 100-hour inspection for all other airplanes. The procedures for the Progressive Care Program have been carefully worked out by the factory and are followed by the Cessna Dealer Organization. The complete familiarity of Cessna 402 Dealers with Cessna equipment and factory-approved procedures provides the highest level of service possible at lower cost to Cessna owners.

CESSNA CUSTOMER CARE PROGRAM

Specific benefits and provisions of the Cessna Warranty plus other important benefits for you are contained in your Customer Care Handbook supplied with your airplane. You will want to thoroughly review your Customer Care Handbook and keep it in your airplane at all times.

You are engitled to an initial inspection and either a Progressive Care Operation No. 1 or the first 100-hour inspection within the first 6 months of ownership at no charge to you. If you take delivery from your Dealer, the initial inspection will have been performed before delivery of the airplane to you. If you pick up your airplane at the factory, plan to take it to your Dealer within 30 days after you take delivery, so the initial inspection may be performed allowing the Dealer to make any minor adjustments which may be necessary.

You will also want to return to your Dealer either at 50 hours for your first Progressive Care Operation, or at 100 hours for your first 100-hour inspection depending on which program you choose to establish for your airplane. While these important inspections will be performed for you by any Cessna Dealer, in most cases you will prefer to have the Dealer from whom you purchased the airplane accomplish this work.

SERVICING REQUIREMENTS

For quick and ready reference, quantities, materials, and specifications for frequently used service items (such as fuel, oil, etc.) are shown in this section.

In addition to the Preflight Inspection covered in Section 4, complete servicing, inspection, and test requirements for your airplane are detailed in the Airplane Maintenance Manual. The Maintenance Manual outlines all items which require attention at 50, 100, and 200 hour intervals plus those items which require servicing, inspection, and/or testing at special intervals.

Since Cessna Dealers conduct all service, inspection, and test procedures in accordance with applicable Maintenance Manuals, it is recommended that you contact your Dealer concerning these requirements and begin scheduling your airplane for service at the recommended intervals.

Cessna Progressive Care Program ensures that these requirements are accomplished at the required intervals to comply with the 100-hour or annual inspection as previously covered.

Depending on various flight operations, your local government aviation agency may require additional service, inspections, or tests. For these regulatory requirements, owners should check with local aviation officials where the airplane is being operated.

AIRPLANE FILE

There are miscellaneous data, information and licenses that are a part of the airplane file. The following is a checklist for that file. In addition, a periodic check should be made of the latest Federal Aviation Regulations to insure that all data requirements are met.

A. To be displayed in the airplane at all times:
   (1) Standard Airworthiness Certificate (FAA Form 8100-2).
   (2) Aircraft Registration Certificate (FAA Form 8050-3).
   (3) Aircraft Radio Station License (if transmitter is installed, Federal Communication Commission Form 556).
   (4) Radio Telephone Station License (if Flitefone Radio Telephone is installed, Federal Communication Commission Form 409).

B. To be carried in the airplane at all times:
   (1) Weight and Balance Data Sheets and associated papers (all copies of the Repair and Alteration Form, FAA Form 337, if applicable).
   (2) Equipment List.
   (3) Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
   (4) Pilot's Checklist.

C. To be made available upon request:
   (1) Airplane Log Book.
   (2) Engine Log Books.

Most of the items listed are required by the United States Federal Aviation Regulations. Since the regulations of other nations may require other documents and data, owners of airplanes not registered in the United States should check with their own aviation officials to determine their individual requirements.

Cessna recommends that these items, plus the power computer, Customer Care Handbook and Customer Care Card, be carried in the airplane at all times.

PREVENTIVE MAINTENANCE

Part 43 of the FAR's allows the holder of a pilot certificate, issued under Part 61, to perform preventive maintenance on any airplane owned or operated by him that is not used in air carrier service. Refer to FAR Part 43 for a list of preventive maintenance items the pilot is authorized to accomplish.

NOTE

- Prior to performance of preventive maintenance, review the applicable procedures in the Airplane Maintenance Manual to insure the procedure is properly completed.
- All maintenance other than preventive maintenance must be accomplished by appropriately licensed personnel. Contact your Cessna dealer for additional information.
- Pilots operating airplanes of other than United States registry should refer to the regulations of the country of certification for information on preventive maintenance that may be performed by pilots.

ALTERATIONS OR REPAIRS TO THE AIRPLANE

Alterations or repairs to the airplane must be accomplished by appropriately licensed personnel. If alterations are considered, the FAA should be consulted to ensure that the airworthiness of the airplane is not violated.

GROUND HANDLING

TOWING

The airplane should be moved on the ground with the aid of the nose-wheel towing bar provided with the airplane. The tow bar is designed to attach to the nose gear strut fork.

CAUTION

> Remove all rudder locks before ground handling. When using the tow bar, never exceed the nosewheel turning limits of 52° either side of the center. Structural damage may occur if the turn limits are exceeded. Do not push or pull on propellers or control surfaces when moving the airplane on the ground.

Should towing operations be required which cannot be accomplished with the nosewheel towing bar, refer to the Airplane Maintenance Manual for proper power towing procedures using either the nose or main landing gear.

PARKING

Parking is normally accomplished with the nosewheel aligned straight ahead. This minimizes stress on the nose gear during starting and simplifies the steering during subsequent departures from the parking area. If gusty wind conditions prevail and the optional rudder gust lock is not installed, restrict rudder travel with an external rudder gust lock or caster the nosewheel to the extreme right or left position. This forces the rudder against the rudder stop which minimizes buffeting of the rudder in gusty weather. When parking the airplane, head into the wind and set the parking brake. If gusty wind conditions prevail, lock the controls with the control lock and secure the rudder with the rudder gustlock.

CAUTION

> Do not set parking brakes when the brakes are overheated or during cold weather when accumulated moisture may freeze the brakes.

When setting the parking brake is impractical, chock the main and nose wheels to prevent airplane movement.

With the mixture levers in IDLE CUT-OFF, the fuel flow is effectively blocked at the fuel metering unit. Thus, it is unnecessary to place the fuel selectors in the OFF position if the airplane is receiving normal usage. However, if a long period of inactivity is anticipated, the fuel selectors should be turned OFF to preclude any possible fuel seepage that might develop through the metering valve.

TIE-DOWN

Proper tie-down procedure is the best precaution against damage to a parked airplane by gusty or strong winds. To tie-down the airplane securely, proceed as follows:

1. Head airplane into the wind if possible. Close engine cowl flaps after engines have cooled sufficiently.
2. Set parking brake and install control locks to restrict travel of all movable surfaces.

CAUTION

Do not set parking brake when the brakes are overheated or during cold weather when accumulated moisture may freeze the brakes.

3. Secure the rudder with the rudder gustlock.
4. Install pitot tube cover(s) if available.
5. Set elevator, aileron and rudder trim tabs to neutral, so the trim tabs fair with the control surfaces.
6. Use ropes or chains of at least 700 pounds tensile strength. Secure the nose gear with a rope or chain attached above the nose gear torque link. The other end should be attached to a substantial ground anchor. The rope or chain angle to the ground should be 45 degrees. Attach a second rope or chain in a similar manner to the opposite side of the nose gear. Secure the tail tie-down fitting in a similar manner.

JACKING AND LEVELING

Three jack points are provided on the underside of the airplane. One jack point is located just aft of the nose wheel well, and one is located on the lower surface of each wing, inboard and in-line with the wing flap hinge.

NOTE

- To prevent the flight hour recorder from recording while the airplane is on jacks and battery switch is in the ON position, disconnect the electrical connectors (bayonet fittings) from back of recorder or disconnect battery.
- Special two-ton jacks, ideally suited to the airplane, can be supplied by the Cessna Aircraft Company. Three jacks are required to lift the airplane.

To level the airplane longitudinally and laterally, use the three jacking points provided on the airplane. Level longitudinally by backing out the two screws at "Level Point" on the right outside fuselage (opposite cabin door) at Stations 214.00 and 238.00 and place a spirit level on these screws, then level longitudinally. To level laterally, place a spirit level at Station 154.00 (aft of front spar) on the underside of fuselage. Refer to the Airplane Maintenance Manual for additional information.

FLYABLE STORAGE

Flyable storage applies to all airplanes which will not be flown for an indefinite period but which are to be kept ready to fly with the least possible preparation. If the airplane is to be stored temporarily, or indefinitely, refer to the Airplane Maintenance Manual for proper storage procedures.

Airplanes which are not in daily flight should have the propellers rotated, by hand, six revolutions at least once each week. In damp climates and in storage areas where the daily temperature variation can cause condensation, propeller rotation should be accomplished more frequently. Rotating the propeller 45° to 90° from its original position redistributes residual oil on the cylinder walls, crankshaft and gear surfaces and repositions the pistons in the cylinders, thus minimizing corrosion. Rotate propellers as follows:

1. Throttles - IDLE.
2. Mixtures - IDLE CUT-OFF.
3. Magneto Switches - OFF.
4. Propellers - ROTATE CLOCKWISE. Manually rotate propellers six revolutions, standing clear of arc of propeller blades. Stop propellers 45° to 90° from its original position.

Keep fuel tanks full to minimize condensation in the fuel tanks. Maintain battery at full charge to prevent electrolyte from freezing in cold weather. If the optional 1000 series avionics and/or optional fuel flow indicating system are installed, the battery will discharge continuously, regardless of battery switch position. This flow of current is required to maintain the memories of the referenced equipment. If the airplane is not in frequent use, battery discharge can be avoided by disconnecting the battery or pulling the circuit breakers on all items wired to the hot battery bus. These items include the frequency memory, fuel flow memory circuit, baggage lights, and electric clock (if parked for more five days).

NOTE

- A malfunctioning nose baggage or wing locker light will completely deplete the battery in approximately four days, depending on the degree of charge and condition of the battery.
- Airplanes inactive for long periods of time should service the battery in accordance with BATTERY servicing, this section.

If the optional nose compartment mounted battery is installed, the circuit breaker is located adjacent to the battery. If the airplane is stored outside, tie-down airplane in anticipation of high winds. Secure airplane as follows:

1. Secure rudder with the optional rudder gust lock or with a control surface lock over the fin and rudder. If a lock is not available, caster the nosewheel to the full left or right position.
2. Install pitot tube cover(s) if available.
3. Set elevator, aileron and rudder trim tabs to neutral so the trim tabs fair with the control surfaces.
4. Install control column lock in pilot's control column, if available. If column lock is not available, tie the pilot's control wheel full aft with a seat belt.

5. Tie ropes or chains of at least 700 pounds tensile strength to the wing tie-down fittings located on the underside of each wing, aft of each main landing gear. Secure the opposite ends of the ropes or chains to ground anchors. Chock the main landing gear tires; do not set the parking brake if a long period of inactivity is anticipated, as brake seizing can result.
6. Secure a rope (no chains or cables) to the upper nose gear trunnion and secure opposite end of rope to a ground anchor. Chock the nose landing gear tire.
7. Secure the middle of a rope or chain to the tail tie-down fitting. Pull each end of the rope or chain at a 45-degree angle and secure to ground anchors at each side of the tail.
8. If at the end of 30 days, the airplane is not removed from storage, the airplane should be flown for 30 minutes, reaching, but not exceeding normal oil and cylinder temperatures. If the airplane cannot be flown, it should be represerved in temporary or indefinite storage.

SERVICING

NOTE

Refer to the Airplane Service Manual for complete servicing requirements.

FUEL (Approved Fuel Grades and Colors)

PRIMARY - 100 (Formerly 100/130) Grade Aviation Fuel (Green)
ALTERNATE - 100LL Grade Aviation Fuel (Blue)

Tank capacities are:

Each Main Tank - 106.7 Gallons

Isopropyl alcohol, or ethylene glycol monomethyl ether (EGME) may be added to the fuel supply. Additive concentrations by volume for alcohol shall not exceed 1%. Additive concentrations by volume for EGME shall be 0.10 percent minimum to 0.15 percent maximum, either individually or mixed in a common tank. Fuel, when added to the tank, should have a minimum concentration of 0.10 percent by volume. Refer to Fuel Additive paragraphs in this section for additional information.

WARNING

- Do not operate any avionics or electrical equipment on the airplane during fueling. Do not allow open flame or smoking in the vicinity of the airplane while fueling.
- During all fueling operations, fire fighting equipment must be available. Two ground wires from different points on the airplane to separate approved grounding stakes shall be used.

Fuel Additive

Strict adherence to recommended preflight draining instructions as called for in Section 4 will eliminate any free water accumulations from the tank sumps. While small amounts of water may still remain in solution in the gasoline, it will normally be consumed and go unnoticed in the operation of the engine.

One exception to this can be encountered when operating under the combined effect of: 1) use of certain fuels, with 2) high humidity conditions on the ground 3) followed by flight at high altitude and low temperature (flight levels of 20,000 feet or above and temperatures -28.9°C (-20°F) or below). Under these unusual conditions small amounts of water in solution can precipitate from the fuel stream and freeze in sufficient quantities to induce partial icing of the engine fuel injection system.

While these conditions are quite rare and will not normally pose a problem to owners and operators, they do exist in certain areas of the world and consequently must be dealt with, when encountered.

Therefore, to alleviate the possibility of fuel icing occurring under these unusual conditions it is permissible to add isopropyl alcohol, or ethylene glycol monomethyl ether (EGME) compound to the fuel supply.

The introduction of alcohol, EGME compound into the fuel provides two distinct effects: 1) it absorbs the dissolved water from the gasoline and 2) alcohol has a freezing temperature depressant effect.

Alcohol, if used, is to be blended with the fuel in a concentration of 1% by volume. Concentrations greater than 1% are not recommended since they can be detrimental to fuel tank materials.

The manner in which the alcohol is added to the fuel is significant because alcohol is most effective when it is completely dissolved in the fuel. To insure proper mixing the following is recommended:

1. For best results the alcohol should be added during the fueling operation by pouring the alcohol directly on the fuel stream issuing from the fueling nozzle.

2. An alternate method that may be used is to premix the complete alcohol dosage with some fuel in a separate clean container (approximately 2-3 gallon capacity) and then transfer this mixture to the tank prior to the fuel operation.

Any high quality isopropyl alcohol may be used, such as:

Anti-icing fluid (isopropyl alcohol) (MIL-F-5566) or
Isopropyl alcohol (Federal Specification TT-I-735a).

Figure 8-1 provides additive-fuel ratio mixing information.

EGME compound must be carefully mixed with the fuel in concentrations of 0.10% minimum to 0.15% maximum by volume.

CAUTION

- Mixing of the EGME compound with the fuel is extremely important because concentration in excess of that recommended (0.15 percent by volume maximum) will result in detrimental effects to the fuel tanks, such as deterioration of protective primer and sealants and damage to O-rings and seals in the fuel system and engine components. Use only blending equipment that is recommended by the manufacturer to obtain proper proportioning.
- Do not allow the concentrated additive compound to come in contact with the airplane finish or fuel cell as damage can result.

Prolonged storage of the airplane will result in a water buildup in the fuel which "leeches out" the additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. The concentration can be checked using a differential refractometer. It is imperative that the technical manual for the differential refractometer be followed explicitly when checking the additive concentration.

ADDITIVE - FUEL MIXING RATIO CHART

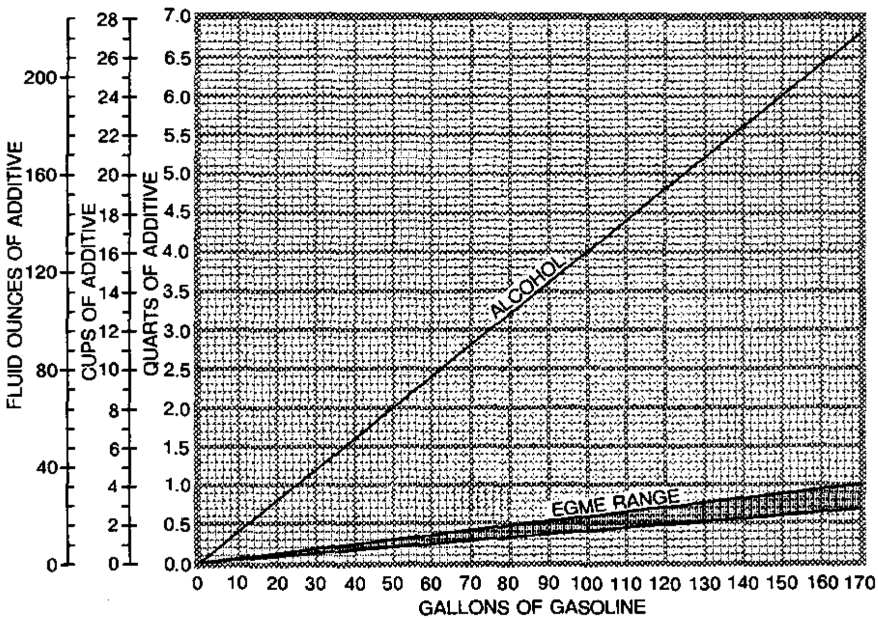


Figure 8-1

Fuel Contamination

Fuel contamination is usually the result of foreign material present in the fuel system, and may consist of water, rust, sand, dirt, microbes or bacterial growth.

Before the first flight of the day and after each refueling, use the fuel sampler and drain fuel from the fuel tank sump drains, the fuel strainer drains and the crossfeed line drains to determine if contaminants are present, and that the airplane has been fueled with the proper grade and type of fuel.

If contamination is detected, continue draining from all fuel drain points until all contamination has been removed. If the airplane has been serviced with the improper fuel, defuel completely and refuel with the correct grade and type. Do not fly the airplane with contaminated or unapproved fuel.

In addition, Owners/Operators who are not acquainted with a particular fixed base operator should be assured that the fuel supply has been checked for contamination and is properly filtered before allowing the airplane to be serviced. Also, fuel tanks should be kept full between flights, provided weight and balance considerations will permit, to reduce the possibility of water condensing on the walls of partially filled tanks.

To further reduce the possibility of contaminated fuel, routine maintenance of the fuel system should be performed in accordance with the airplane Maintenance Manual. Only the proper fuel, as defined in Section 2 of this handbook, should be used, and fuel additives should not be used unless approved by Cessna and the Federal Aviation Administration.

OIL (Aviation Grade Engine Oil; SAE 50 Above 4.4°C (40°F), and SAE 30 Below 4.4°C (40°F) or Multiviscosity Unrestricted Temperature Range - Filter Element 643226 or 643227)

Multiviscosity oil is recommended for use after the first 25 hours of engine operation for improved starting and turbocharger controller operation in temperatures below 4.4°C (40°F). When operating temperatures overlap indicated ranges, use the lighter grade of oil. Ashless dispersant oil, conforming to the latest issue of Continental Motors Specification MHS-24, must be used. No oil additives are approved for use. Airplanes equipped with short filters (4.80 inches) should change the oil and filter every 50 hours or 6 months, whichever occurs first. Airplanes equipped with the long filters (5.80 inches), may extend the recommended oil and filter change interval to every 100 hours or 6 months, whichever occurs first. Reduce oil and filter change intervals for prolonged operation in dusty areas, cold climates or when short flights and long idle periods result in sludging conditions.

NOTE

For faster ring seating and improved oil control, your Cessna was delivered from the factory with corrosion preventive oil conforming to the latest issue of MIL-C-6529, Type II. This break-in oil must be used only for the first 25 hours of operation; at that time it must be replaced with ashless dispersant oil. If oil must be added during this first 25 hours of operation, use straight mineral oil conforming to MIL-L-6082.

Check oil level before each flight. Do not operate on less than 9 quarts. To minimize loss of oil through breather, fill to 10-quart level for normal flights of less than three hours. For extended flight, fill to capacity which is 13 quarts for each engine sump including one quart for oil filter.

OXYGEN (Aviators Breathing Oxygen - Specification MIL-O-27210)

Check pressure gage for anticipated requirements before each flight. Refill whenever pressure drops below 300 PSI.

The small oxygen cylinder, when fully charged and allowed to stabilize at a temperature of 21.1°C (70°F), contains approximately 44.0 cubic feet of oxygen under a pressure of 1800 PSI. The large oxygen cylinder, when fully charged and allowed to stabilize at a temperature of 21.1°C (70°F), contains approximately 114.9 cubic feet of oxygen under a pressure of 1850 PSI. Filling pressures will vary, however, due to the ambient temperature in the filling area, and because of the temperature rise resulting from compression of the oxygen. Because of this, merely filling to 1800 or 1850 PSI will not result in a properly filled cylinder. Fill to the pressures indicated in Figure 8-2 for the ambient temperature.

WARNING

Oil, grease, or other lubricants in contact with oxygen create a serious fire hazard, and such contact must be avoided when handling oxygen equipment.

The oxygen cylinder is serviced through a filler valve accessible through the right nose baggage door.

OXYGEN SERVICING TABLE

AMBIENT TEMPERATURE °C	AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG	AMBIENT TEMPERATURE °C	AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG
−17.8	0	1600	21.1	70	1925
−12.2	10	1650	26.7	80	1950
−6.7	20	1675	32.2	90	2000
−1.1	30	1725	37.8	100	2050
4.4	40	1775	43.3	110	2100
10.0	50	1825	48.9	120	2150
15.6	60	1875	54.4	130	2200

THE NUMBERS SHOWN ABOVE ARE APPLICABLE TO 1800 PSI OXYGEN BOTTLES. IF AN 1850 PSI OXYGEN BOTTLE IS INSTALLED, INCREASE EACH FILLING PRESSURE BY 50 PSI.

Figure 8-2

AIR CONDITIONING RESERVOIR (Hydraulic Fluid MIL-H-5606)

Check reservoir fluid level above screen bottom. Reservoir capacity is 2.75 quarts.

LANDING GEAR HYDRAULIC RESERVOIR (Hydraulic Fluid MIL-H-5606)

Check reservoir fluid level; fill as required to maintain fluid level between the ADD and MAX FULL marks. Reservoir capacity is approximately 1.2 quarts when the landing gear is down and locked.

ALCOHOL WINDSHIELD DEICE RESERVOIR (Isopropyl Alcohol MIL-F-5566)

Check reservoir fluid level; fill as required. Reservoir capacity is 3.0 gallons.

BATTERY

Low electrolyte level, inadequate charging and long idle periods in a discharged condition can cause batteries to become sulfated and unserviceable. Airplanes intended to be idle for long periods of time should have the batteries removed and placed on charge.

NOTE

Water consumption will increase during warmer temperatures and should be checked regularly. Fifty (50) hour inspection intervals are recommended, but may need to be reduced to maintain proper electrolyte level, depending on use and weather conditions.

TIRES

Tire pressure should be maintained at 70 PSI for the main wheel tires and 35 PSI for the nosewheel tire.

FLUSH TOILET RESERVOIR

The optional flush toilet uses a reservoir tank which contains water and chemicals. The reservoir tank should be removed and serviced after excessive use or after 35 or 40 cycles of the system. Service the reservoir with a 2-quart solution of water and a 3-ounce package of Monogram DG-19 chemical.

CAUTION

During cold weather operation, where cabin temperatures can fall below 0°C (32°F), ethylene glycol base anti-freeze should be added to the reservoir tank to prevent freezing of the flush solution.

AIRPLANE CLEANING AND CARE

PAINTED SURFACES

The painted exterior surfaces of your new airplane require an initial curing period which may be as long as 90 days after the finish is applied. During this curing period some precautions should be taken to avoid damaging the finish or interfering with the curing process. The finish should be cleaned only by washing with clean water and mild soap, followed by a rinse water and drying with cloths or a chamois. Do not use polish or wax, which would exclude air from the surface, during this 90-day curing period. Do not rub or buff the finish and avoid flying through rain, hail or sleet.

To help prevent development of corrosion, particularly filiform corrosion, the airplane should be spray washed at least every two or three weeks (especially in warm, damp and salty environments), and waxed with a good grade of water repellent wax to help keep water from accumulating in skin joints and around countersinks. A heavier coating of wax on the leading edges of the wing and tail (on airplanes without deice boots) and on the engine nose cap and propeller spinner, will help reduce abrasions encountered in these areas.

PROPELLER

Preflight inspection of propeller blades for nicks and wiping them occasionally with an oily cloth to clean off grass and bug stains will assure long, trouble-free service. It is vital that small nicks on the propeller, particularly near the tips and on the leading edges, are dressed out as soon as possible since these nicks produce stress concentrations, and if ignored, may result in cracks. Never use an alkaline cleaner on the blades; remove grease and dirt with Stoddard solvent.

LANDING GEAR

Cessna Dealer's mechanics have been trained in the proper adjustment and rigging procedures of the landing gear system. To assure trouble-free gear operation, have your Cessna Dealer check the gear regularly and make any necessary adjustments. Only properly trained mechanics should attempt to repair or adjust the landing gear components and system.

DEICE BOOTS

The optional deice boots have a special, electrically conductive coating to bleed-off static charges which cause radio interference and may perforate the boots. Fueling and other servicing operations should be done carefully, to avoid damaging this conductive coating or tearing the boots.

To prolong the life of surface and propeller deice boots, they should be washed and serviced on a regular basis. Keep the boots clean and free from oil, grease and other solvents which cause rubber to swell and deteriorate. Outlined below are recommended cleaning and servicing procedures.

CAUTION

Use only the following instructions when cleaning boots. Disregard instructions which recommend petroleum base liquids (Methyl-Ethyl-Ketone, non-leaded gasoline, etc.) which can harm the boot material.

Clean the boots with mild soap and water, then rinse thoroughly with clean water.

NOTE

- Temperature of water for cleaning deice boots shall not exceed 140°F.
- Isopropyl alcohol can be used to remove grime which cannot be removed using soap. If isopropyl alcohol is used for cleaning, wash area with mild soap and water, then rinse thoroughly with clean water.

To possibly improve the service life of deice boots and to reduce the adhesion of ice, it is recommended that the deice boots be treated with AGE MASTER No. 1 and ICEX.

AGE MASTER No. 1, used to protect the rubber against deterioration from ozone, sunlight, weathering, oxidation and pollution, and ICEX, used to help retard ice adhesion and for keeping deice boots looking new longer, are both products of and recommended by B. F. Goodrich.

The application of both AGE MASTER No. 1 and ICEX should be in accordance with the manufacturer's recommended directions as outlined on the containers.

CAUTION

- Protect adjacent areas, clothing, and use plastic or rubber gloves during applications, as AGE MASTER No. 1 stains and ICEX contains silicone which makes paint touchup almost impossible.
- Ensure that the manufacturer's warnings and cautions are adhered to when using AGE MASTER No. 1 and ICEX.

Small tears and abrasions in surface deice boots can be repaired temporarily without removing the boots, and the conductive coating can be renewed. Your Cessna Dealer has the proper materials and know-how to do this correctly.

ENGINES

The engine compartments should be cleaned, using a suitable solvent. Most efficient cleaning is done using a spray-type cleaner. Before spray cleaning, ensure protection is afforded for other components which might be adversely affected by the solvent. Refer to the Airplane Maintenance Manual for proper lubrication of controls and components after engine cleaning.

INTERIOR CARE

To remove dust and loose dirt from the upholstery, headliner and carpet, clean the interior regularly with a vacuum cleaner.

Blot up any spilled liquid promptly with cleansing tissue or rags. Don't pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, then spot-clean the area.

Oily spots may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent; it may damage the padding and backing materials.

WARNING

- Use all cleaning agents in accordance with the manufacturer's recommendations.
- The use of toxic or inflammable cleaning agents is discouraged. If these cleaning agents are used, insure adequate ventilation is provided to prevent harm to the user and/or damage to the airplane.

Soiled upholstery and carpet may be cleaned with foam-type detergent, used according to the manufacturer's instructions. To minimize wetting the fabric, keep the foam as dry as possible and remove it with a vacuum cleaner.

The plastic trim, instrument panel and control knobs need only be wiped with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with kerosene. Volatile solvents, such as mentioned in paragraphs on care of the windshield, must never be used since they soften and craze the plastic.

WINDOWS AND WINDSHIELDS

The plastic windshields and windows should be kept clean and waxed at all times. To prevent scratches and crazing, wash them carefully with plenty of soap and water, using the palm of the hand to feel and dislodge dirt and mud. A soft cloth, chamois or sponge may be used, but only to carry water to the surface. Rinse thoroughly, then dry with a clean, moist chamois. Rubbing the surface of the plastic with a dry cloth builds up an electrostatic charge which attracts dust particles in the air. Wiping with a moist chamois will remove both the dust and this charge.

If the optional electrical windshield is installed, it is recommended that a suitable anti-static agent be applied to the window after each cleaning. A recommended anti-static agent for this purpose is ANSTAC-M (Chemical Development Corp), or Wilco Anti-Static Cleaner (Wilco Co.), or equivalent. Apply the anti-static agent per the manufacturer's recommendations.

Remove oil and grease with a cloth moistened with kerosene. Never use gasoline, benzine, acetone, carbon tetrachloride, fire extinguisher fluid, lacquer thinner or glass cleaner. These materials will soften the plastic and may cause it to craze.

After removing dirt and grease, if the surface is not badly scratched, it should be waxed with a good grade of commercial wax. The wax will fill in minor scratches and help prevent further scratching. Apply a thin, even coat of wax and bring it to a high polish by rubbing lightly with a clean, dry, soft flannel cloth. Do not use a power buffer; the heat generated by the buffing pad may soften the plastic.

Do not use a canvas cover on the windshield unless freezing rain or sleet is anticipated. Canvas covers may scratch the plastic surface.

OXYGEN MASKS

The pilot's mask is a permanent-type mask which contains a microphone for radio transmissions. The remaining masks are basically the same as the pilot's, except they do not have the microphone provision. All masks can be cleaned with alcohol. Additional masks and hoses are available from your Cessna Dealer.

P2-SIB

SECTION 9 – SUPPLEMENTS

9.1 – GENERAL

Flight Manual supplements covering the special operations for which this aeroplane is approved are listed below.

The operations shall be conducted in accordance with limitation and instruction contained in the appropriate supplement included in this manual

9.2 – SUPPLEMENTS

SUPPLEMENT TITLE

Attenuating seats (9)	STC SA120850
Micro VG System	STC SA5131NM
Robertson STOL	STC SA927NW
Engine Start/Shutdown Procedures (Vac System Check)	
Airplane Loading	
Electronics International Fuel Flow Instruments	
Auxiliary Fuel Pump Switching Systems	
IFR and/or Limited IFR Operations	
Digital Clock	
Fire Detection System	
Radio & A/P Equipment Operations	
Engine Failure During Flight Emergency Procedures	

PAPUA NEW GUINEA
CIVIL AVIATION AUTHORITY
APPROVED PURSUANT TO SECTION 126
OF THE CIVIL AVIATION REGULATION
DELEGATE OF THE DIRECTOR OF CIVIL AVIATION
DATE: 16 June 2013

United States of America
Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

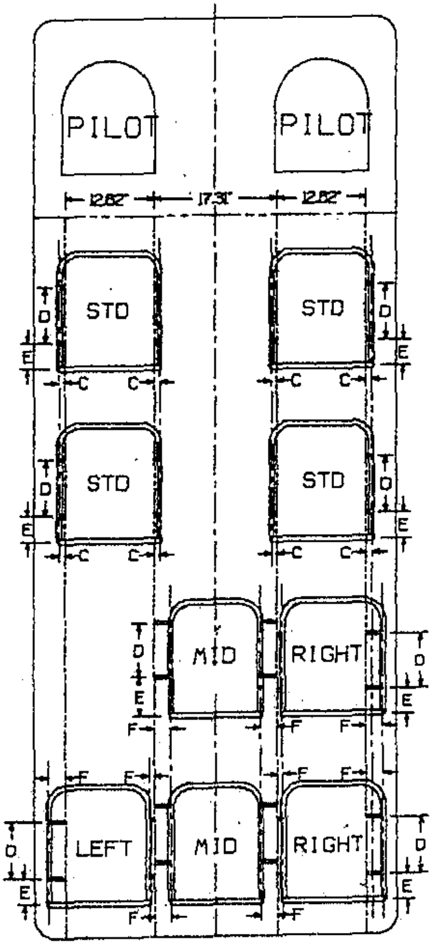
Number SA1208SO

This certificate, issued to Jungle Aviation and Radio Service, Inc.

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations.

Original Product — Type Certificate Number: A7CE
Make: Cessna
Model: 402C

Description of Type Design Change: Installation of seats in accordance with JAARS Drawing SK810424, dated May 7, 1981.



SEAT ARRANGEMENT

TOLERANCE				
DECIMAL .XXX=±.002 .XX=±.03	TITLE CESSNA 402 PASSENGER SEAT			
FRACTIONAL ± 1/64	DRAWING NUMBER SK-810424			
ANGULAR	DATE 08-09-94	REV 1 / REV DATE 10-31-94	DRAWN BY DW	PAGE

SK810424

Guidance on the use of Micro VG Supplement & Robertson STOL Supplement

Applicability

This information is applicable to Cessna 402C aircraft, fitted with BOTH Robertson STOL (Fowler Flaps) as per STC SA972NW and Micro Vortex Generators as per STC SA5131NM.

Robertson STOL (Fowler Flaps) Kit (STC SA972NW) Supplement

This supplement is applicable ANYTIME flaps are selected at any position other than UP (Beyond 0° Take-off & Landing). This supplement is restricted to an aircraft all-up weight for Take-off (MTOW) or Landing (MLDW) of 3107 Kg (6850 Lbs).

The supplement gives a REVISED Centre of Gravity (CoG) envelope, and includes a TRIM SPRING HANDLE that must be selected to the correct position as per CoG position, and Flap Position (Refer Page 16).

Micro VG Kit (STC SA5131NM) Supplement

This supplement is applicable ONLY when flaps are selected in the UP position, and gives an increase in Maximum Take-off Weight (MTOW) to 3270 Kg (7210 Lbs). Maximum Landing Weight (MLDW) remains unchanged.

THEREFORE

For takeoff above 3107 Kg (6850 Lbs):
Flaps must be positioned in the UP position and Micro VG Kit (STC SA5131NM) Performance Data Applies.

For takeoff at or below 3107 Kg (6850 Lbs):
Flaps can be either UP or 10° (as required) and Robertson STOL Kit (STC SA927NW) Performance Data Applies.

For Landing with Flaps UP (MLDW 3107Kg 6850 Lbs):
Micro VG Kit (STC 5131NM) Performance Data Applies

For Landing with Flaps in any position other than UP (MLDW 3107Kg or 6850 Lbs):
Robertson STOL Kit (STC SA927NW) Performance Data Applies including the setting of the TRIM SPRING HANDLE prior to flap selection before landing.

This information is for GUIDANCE ONLY.

Darryl Newman
Chief Pilot
Australasian Jet Pty Ltd

Dated: 11 Jan 2004

POH / AFM SUPPLEMENT

MICRO AERODYNAMICS INC.
"Vortex Generator Technology"
(800) 677-2370
4000 Airport Road, Suite D
Anacortes, Washington 98221
(360) 293-8082 FAX (360) 293-5499

PILOT'S OPERATING HANDBOOK

AND

FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT

FOR

CESSNA 402C MICRO VG SYSTEM

WITH

GROSS WEIGHT INCREASE

REGISTRATION NUMBER: ~~P2-SIB~~ VH-2MG

SERIAL NUMBER: 402C-0263

This Supplement must be attached to the FAA Approved Flight Manual when a MICRO VG SYSTEM is installed in accordance with STC# SA5131NM. The information contained in this Supplement supersedes the information of the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this Supplement, consult the basic Airplane Flight Manual.

MICRO AERODYNAMICS DOCUMENT C402C-AFMS-1

FAA APPROVED: Collet E. McElroy
for Manager, Seattle Aircraft Certification Office

Date: 19 AUG 96

LOG OF EFFECTIVE PAGES

Page No.	Revision Number	Page No.	Revision Number	Page No.	Revision Number
1	B				
2	B				
3	B				
4	B				
5	B				
6					
7					
8					
9*					
10*					
11					
12*					
13					
14*					
15*					
16*					
17*	B				

* Not FAA Approved. Provided as supplemental performance information.

EFFECTIVITY:

ˋll Cessna 402C airplanes equipped with
ˍ3IO-520-VB engines.

GENERAL

The Micro VG System consists of 118 vortex generators affixed to the wings and vertical stabilizer and four strakes, one mounted on each side of each nacelle. The purpose of the Micro VG System is to improve stall characteristics and to reduce stall and Vmca speeds through control of boundary layer airflow.

The Gross Weight Increase Supplement allows for increased operating weight. For the changes in zero fuel weight, refer to Limitations (page 5) and the Weight & Moment table (page 17).

LIMITATIONS

1. MAXIMUM RAMP WEIGHT — 7,250 POUNDS
MAXIMUM TAKEOFF WEIGHT: — 7,210 POUNDS
MAXIMUM LANDING WEIGHT: — 6,850 POUNDS (Unchanged)
MAXIMUM ZERO FUEL WEIGHT:
The original Maximum Zero Fuel Weight of 6515 pounds remains applicable except as follows: At 151.0 inches aft datum, the maximum Zero Fuel Weight is increased in a straight line to 6750 pounds at 151.9 inches aft datum, and continues aft at 6750 pounds to a point 160.66 inches aft datum. The Zero Fuel Weight is thus limited to permit takeoff with at least 240 pounds of fuel and landing with 100 pounds of fuel.

2. FLIGHT LOAD FACTOR LIMITS
At Design Takeoff Weight of 7210 pounds:
   a. Landing gear up, wing flaps 0°, +3.4G to -1.3G
   b. Landing gear down, wing flaps 45°, 0.00 to +2.0G (Unchanged)

3. 114 Vortex generators constitute the minimum requirement. Micro VG System consists of 118 vortex generators, if 4 or more are missing or damaged, the aircraft must be operated in accordance with the original Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

4. Change all references to Vmca values in text and on placards to: **69KIAS**

5. AIRSPEED INDICATOR MARKINGS:

MARKING OR RANGE	KIAS VALUE
Red Radial	69
White Arc	71-149
Green Arc	80-205
Blue Radial	104
Yellow Arc	205-235
Red Radial	235

6. AIRSPEED LIMITATIONS:
Maneuvering Airspeed, Va

Aircraft weight	Airspeed KIAS
7210	153
6850	149
6500	145
6000	140
5000	127

EMERGENCY PROCEDURES

Emergency Airspeeds:
Air Minimum Control Speed (Vmca) — **69KIAS**

NORMAL PROCEDURES

Noise Abatement:

The flyover noise level, established in compliance with FAR Part 36, Appendix G, is 84.7 dB(A).

No determination has been made by the Federal Aviation Administration that the noise level of this airplane is, or should be acceptable unacceptable, for operation at, into, or out of any airport.

PERFORMANCE

See Following Performance Charts.

STALL SPEEDS

Conditions: Zero Thrust

Note: Maximum Altitude lost during a stall is 300 feet.

WEIGHT Pounds	CONFIGURATION		ANGLE OF BANK			
			0°	20°	40°	60°
	Flaps	Gear	KCAS	KCAS	KCAS	KCAS
7210	0°	Up	79	82	90	112
	15°	Down	75	77	86	106
	45°	Down	69	71	79	97
6850	0°	Up	77	79	88	109
	15°	Down	73	76	84	104
	45°	Down	67	69	77	95
6500	0°	Up	75	77	86	106
	15°	Down	71	74	82	101
	45°	Down	66	68	75	93
6000	0°	Up	72	74	82	102
	15°	Down	69	71	78	97
	45°	Down	63	65	72	89
5000	0°	Up	66	68	75	93
	15°	Down	63	65	72	89
	45°	Down	58	59	66	81

NORMAL TAKEOFF DISTANCE

Sheet 1 of 2

CONDITIONS:
1. 2700 RPM and 39.0 inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In The White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.

NOTES:
1. If full power is applied without brakes set, distances apply from point where, full power is applied.
2. Decrease distance 3% for each 5 knots headwind.
3. Increase distances 12% for each 5 knots tailwind.

WEIGHT - POUNDS	TAKEOFF SPEED - KIAS	PRESSURE ALTITUDE - FEET	-20° C (-4° F) GROUND ROLL - FEET	-20° C (-4° F) TOTAL DISTANCE TO CLEAR 50 FEET	-10° C (14° F) GROUND ROLL - FEET	-10° C (14° F) TOTAL DISTANCE TO CLEAR 50 FEET	0° C (32° F) GROUND ROLL - FEET	0° C (32° F) TOTAL DISTANCE TO CLEAR 50 FEET	10° C (50° F) GROUND ROLL - FEET	10° C (50° F) TOTAL DISTANCE TO CLEAR 50 FEET
7210	100	Sea Level	1440	1780	1570	1960	1740	2155	1910	2370
		1000	1530	1875	1675	2055	1840	2270	2020	2510
		2000	1620	1990	1780	2185	1940	2405	2140	2640
		3000	1720	2110	1890	2305	2075	2540	2340	2865
		4000	1840	2210	2000	2440	2250	2740	2500	3040
		5000	1950	2350	2180	2640	2410	2910	2650	3225
		6000	2110	2530	2325	2790	2550	3075	2785	3400
		7000	2240	2680	2480	2960	2700	3240	2975	3605
		8000	2390	2835	2620	3120	2875	3445	3170	3825
		9000	2540	2990	2785	3320	3065	3680	3380	4075
		10000	2690	3185	2960	3520	3270	3905	3610	4350
6850	95	Sea Level	1280	1590	1400	1740	1540	1910	1690	2100
		1000	1360	1670	1490	1830	1630	2010	1790	2220
		2000	1440	1770	1580	1940	1730	2130	1900	2340
		3000	1530	1870	1680	2050	1840	2250	2060	2520
		4000	1630	1970	1780	2170	1990	2420	2190	2670
		5000	1730	2090	1930	2330	2120	2560	2330	2830
		6000	1870	2240	2050	2460	2250	2710	2470	3000
		7000	1980	2370	2180	2610	2390	2870	2630	3180
		8000	2110	2510	2320	2770	2550	3050	2810	3380
		9000	2250	2660	2470	2940	2720	3240	2990	3590
		10000	2390	2830	2630	3120	2900	3450	3190	3830
6500	92	Sea Level	1140	1410	1240	1540	1360	1690	1490	1850
		1000	1200	1490	1320	1630	1440	1780	1580	1960
		2000	1280	1570	1400	1720	1530	1880	1680	2070
		3000	1360	1660	1490	1810	1630	1990	1790	2190
		4000	1440	1750	1580	1920	1730	2110	1930	2350
		5000	1530	1850	1680	2030	1870	2260	2050	2490
		6000	1630	1960	1810	2160	1990	2390	2180	2640
		7000	1760	2100	1930	2310	2120	2540	2330	2800
		8000	1870	2220	2050	2440	2250	2690	2480	2970
		9000	1990	2360	2180	2590	2400	2860	2640	3160
		10000	2120	2500	2330	2750	2560	3040	2820	3360
6000	89	Sea Level	950	1190	1040	1300	1130	1410	1240	1550
		1000	1010	1250	1100	1370	1200	1490	1310	1630
		2000	1070	1320	1170	1440	1280	1570	1400	1720
		3000	1130	1390	1240	1520	1350	1660	1480	1820
		4000	1200	1470	1320	1610	1440	1760	1570	1930
		5000	1280	1550	1400	1700	1530	1860	1670	2040
		6000	1360	1640	1490	1800	1630	1970	1810	2190
		7000	1450	1740	1580	1910	1750	2110	1920	2320
		8000	1540	1850	1700	2040	1870	2240	2050	2460
		9000	1650	1970	1810	2160	1990	2370	2180	2610
		10000	1760	2090	1930	2290	2120	2520	2320	2770

NORMAL TAKEOFF DISTANCE

Sheet 2 of 2

CONDITIONS:

1. 2700 RPM and 39.0 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In The White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.

NOTES:

1. If full power is applied without brakes set, distances apply from point where, full power is applied.
2. Decrease distance 3% for each 5 knots headwind.
3. Increase distances 12% for each 5 knots tailwind.

			20° C	(68° F)	30° C	(86° F)	40° C	(104° F)
WEIGHT - POUNDS	TAKEOFF SPEED - KIAS	PRESSURE ALTITUDE - FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET	GROUND ROLL - FEET	TOTAL DISTANCE TO CLEAR 50 FEET
7210	100	Sea Level	2080	2610	2300	2905	2620	3325
		1000	2230	2780	2525	3150	2805	3540
		2000	2430	2980	2685	3345	2980	3750
		3000	2590	3190	2860	3560	3120	3980
		4000	2750	3365	3010	3740	3335	4200
		5000	2890	3545	3205	3970	3545	4480
		6000	3090	3780	3410	4230	3790	4785
		7000	3280	4010	3640	4510	4040	5115
		8000	3505	4280	3880	4810	4315	5475
		9000	3740	4550	4150	5150	4610	5875
		10000	4005	4860	4440	5510	4950	6320
6850	95	Sea Level	1850	2310	2040	2560	2300	2910
		1000	1970	2440	2220	2780	2450	3080
		2000	2140	2630	2350	2920	2600	3260
		3000	2270	2790	2500	3100	2780	3470
		4000	2410	2950	2680	3290	2940	3680
		5000	2560	3130	2830	3490	3130	3920
		6000	2730	3320	3010	3710	3340	4180
		7000	2900	3530	3210	3950	3560	4460
		8000	3100	3760	3420	4210	3800	4770
		9000	3300	4000	3680	4500	4060	5110
		10000	3530	4270	3910	4810	4350	5480
6500	92	Sea Level	1640	2040	1800	2250	1980	2490
		1000	1740	2150	1910	2380	2150	2690
		2000	1840	2280	2070	2570	2290	2850
		3000	2000	2450	2200	2720	2430	3020
		4000	2130	2600	2340	2880	2590	3210
		5000	2260	2750	2490	3050	2750	3410
		6000	2400	2920	2650	3240	2930	3630
		7000	2560	3100	2820	3450	3130	3870
		8000	2730	3290	3010	3670	3340	4120
		9000	2910	3500	3220	3910	3570	4400
		10000	3110	3730	3440	4170	3810	4710
6000	89	Sea Level	1360	1700	1490	1860	1630	2080
		1000	1440	1790	1580	1970	1730	2180
		2000	1530	1890	1680	2080	1840	2300
		3000	1620	2000	1780	2200	2000	2460
		4000	1730	2120	1930	2370	2120	2630
		5000	1870	2260	2050	2510	2260	2790
		6000	1980	2410	2180	2660	2400	2960
		7000	2100	2550	2320	2830	2560	3150
		8000	2250	2710	2470	3000	2730	3350
		9000	2390	2860	2640	3190	2910	3570
		10000	2550	3060	2810	3400	3110	3800

ACCELERATE STOP DISTANCE

CONDITIONS:

1. 2700 RPM and 39.0 inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In The White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.
6. Engine Failure at Engine Failure Speed.
7. Idle Power and Maximum Effective Braking After Engine Failure.

NOTES:

1. If full power is applied without brakes set, distances apply from point where, full power is applied.
2. Decrease distance 3% for each 5 knots headwind.
3. Increase distances 13% for each 5 knots tailwind.

WEIGHT - POUNDS	ENGINE FAILURE SPEED - KIAS	PRESSURE ALTITUDE - FEET	TOTAL DISTANCE - FEET						
			-20° C -4° F	-10° C +14° F	0° C +32° F	+10° C +50° F	+20° C +68° F	+30° C +86° F	+40° C +104° F
7210	100	Sea Level	3370	3590	3810	4065	4345	4630	5015
		1000	3530	3760	4010	4275	4540	4925	5280
		2000	3700	3930	4195	4470	4840	5180	5550
		3000	3880	4120	4395	4760	5060	5440	5805
		4000	4070	4340	4670	5000	5345	5680	6110
		5000	4275	4600	4915	5250	5590	5990	6425
		6000	4520	4835	5160	5500	5870	6290	6780
		7000	4750	5080	5400	5775	6190	6630	7145
		8000	5000	5325	5690	6085	6520	7010	7530
		9000	5230	5600	5985	6410	6870	7385	7970
		10000	5510	5900	6310	6760	7250	7810	8430
6850	95	Sea Level	3010	3200	3400	3620	3860	4110	4440
		1000	3150	3350	3570	3800	4040	4360	4680
		2000	3300	3510	3740	3980	4290	4580	4900
		3000	3460	3680	3920	4220	4500	4810	5150
		4000	3630	3870	4150	4430	4730	5050	5420
		5000	3810	4090	4360	4650	4970	5320	5700
		6000	4020	4290	4580	4890	5220	5590	6010
		7000	4220	4510	4810	5140	5500	5890	6330
		8000	4440	4740	5060	5410	5790	6210	6680
		9000	4660	4980	5330	5700	6100	6550	7060
		10000	4910	5250	5610	6010	6440	6920	7460
6500	92	Sea Level	2680	2850	3020	3210	3420	3640	3890
		1000	2800	2980	3170	3370	3590	3820	4130
		2000	2940	3120	3320	3530	3760	4060	4340
		3000	3080	3270	3480	3710	3990	4260	4580
		4000	3230	3430	3660	3930	4190	4480	4790
		5000	3380	3600	3870	4130	4400	4710	5040
		6000	3550	3810	4060	4340	4630	4950	5310
		7000	3750	4000	4270	4560	4870	5220	5600
		8000	3940	4210	4490	4800	5130	5500	5900
		9000	4140	4420	4720	5050	5410	5800	6230
		10000	4360	4660	4960	5320	5700	6120	6580
6000	89	Sea Level	2240	2380	2530	2680	2850	3030	3230
		1000	2350	2490	2650	2810	2990	3180	3390
		2000	2460	2610	2780	2950	3140	3340	3560
		3000	2570	2740	2910	3090	3290	3510	3780
		4000	2700	2870	3050	3250	3480	3720	3970
		5000	2830	3010	3210	3410	3660	3910	4180
		6000	2970	3180	3370	3610	3850	4110	4400
		7000	3120	3320	3560	3800	4050	4330	4630
		8000	3280	3510	3740	3990	4260	4550	4860
		9000	3460	3690	3940	4200	4490	4800	5150
		10000	3640	3880	4140	4420	4730	5060	5430

ACCELERATE GO DISTANCE

CONDITIONS:

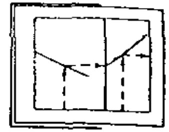
1. 2700 RPM and 39.0 inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In The White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.
6. Engine Failure at Engine Failure Speed.
7. Landing Gear Up or in Transit and Propeller Feathered During Climb.
8. Maintain Engine Failure Speed Until Clear of Obstacle.

NOTES:

1. If full power is applied without brakes set, distances apply from point where, full power is applied.
2. Decrease distance 2% for each 4 knots headwind.
3. Increase distances 11% for each 5 knots tailwind.
4. Distance in boxes represent rates of climb less than 50 ft/min.

WEIGHT - POUNDS	ENGINE FAILURE SPEED - KIAS	PRESSURE ALTITUDE - FEET	TOTAL DISTANCE TO CLEAR 50-FOOT OBSTACLE - FEET						
			-20° C -4° F	-10° C +14° F	0° C +32° F	+10° C +50° F	+20° C +68° F	+30° C +86° F	+40° C +104° F
7210	100	Sea Level	2370	2630	2940	3310	3795	4420	5390
		1000	2500	2780	3120	3520	4040	4810	5870
		2000	2640	2930	3285	3740	4365	5190	6410
		3000	2790	3110	3490	4040	4690	5600	7015
		4000	2965	3300	3760	4310	5030	6040	----
		5000	3110	3540	4000	4800	5380	6590	----
		6000	3340	3750	4270	4900	5800	----	----
		7000	3540	3960	4540	5270	----	----	----
		8000	3760	4230	4850	6680	----	----	----
		9000	4000	4530	5220	----	----	----	----
		10000	4260	4840	5620	----	----	----	----
6850	95	Sea Level	2090	2310	2570	2880	3270	3770	4520
		1000	2200	2440	2720	3050	3470	4060	4680
		2000	2320	2570	2870	3240	3740	4370	5300
		3000	2450	2720	3040	3480	3990	4700	5790
		4000	2580	2880	3260	3700	4270	5070	6370
		5000	2730	3080	3460	3940	4580	5500	7090
		6000	2920	3260	3680	4210	4920	6000	8000
		7000	3090	3460	3920	4510	5320	6600	9230
		8000	3280	3680	4180	4840	5770	7330	11000
		9000	3490	3930	4480	5210	6300	8250	13900
		10000	3710	4190	4810	5640	6930	9480	----
6500	92	Sea Level	1840	2020	2240	2490	2790	3160	3650
		1000	1930	2130	2380	2630	2950	3360	3960
		2000	2030	2240	2490	2780	3130	3630	4240
		3000	2140	2370	2630	2940	3370	3670	4560
		4000	2260	2500	2780	3180	3580	4130	4920
		5000	2390	2650	2960	3350	3810	4430	5340
		6000	2520	2830	3160	3560	4070	4770	5820
		7000	2690	2990	3350	3790	4360	5150	6400
		8000	2850	3170	3580	4050	4660	5560	7110
		9000	3020	3370	3800	4330	5040	6090	8000
		10000	3210	3590	4050	4640	5450	6700	9190
6000	89	Sea Level	1540	1680	1850	2040	2260	2530	2870
		1000	1610	1770	1940	2150	2390	2680	3050
		2000	1690	1860	2050	2270	2530	2840	3240
		3000	1780	1960	2160	2390	2670	3010	3500
		4000	1880	2060	2280	2530	2830	3240	3730
		5000	1980	2160	2410	2680	3040	3450	3990
		6000	2090	2300	2550	2870	3220	3670	4260
		7000	2210	2440	2720	3040	3430	3930	4610
		8000	2340	2600	2880	3230	3650	4200	4960
		9000	2480	2750	3060	3430	3900	4520	5410
		10000	2630	2920	3250	3660	4170	4870	5910

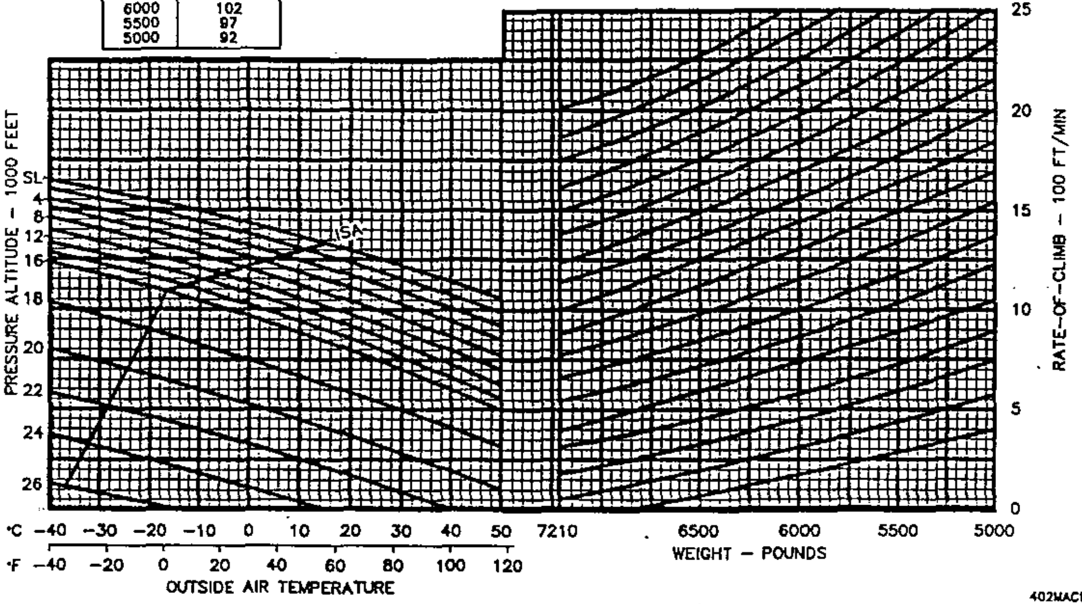
RATE-OF-CLIMB – MAXIMUM CLIMB



CONDITIONS:
1. 2600 RPM and 39.0 Inches Hg.•
2. Mixtures – FUEL FLOW in White Triangle.•
3. Landing Gear – UP.
4. Wing Flaps – UP.
5. Cowl Flaps – OPEN.

•ABOVE 16,000 FEET, USE PLACARDED MANIFOLD PRESSURE AND CLIMB FUEL FLOWS.

WEIGHT – POUNDS	CLIMB SPEED – KIAS
7210	112
6850	109
6500	106
6000	102
5500	97
5000	92



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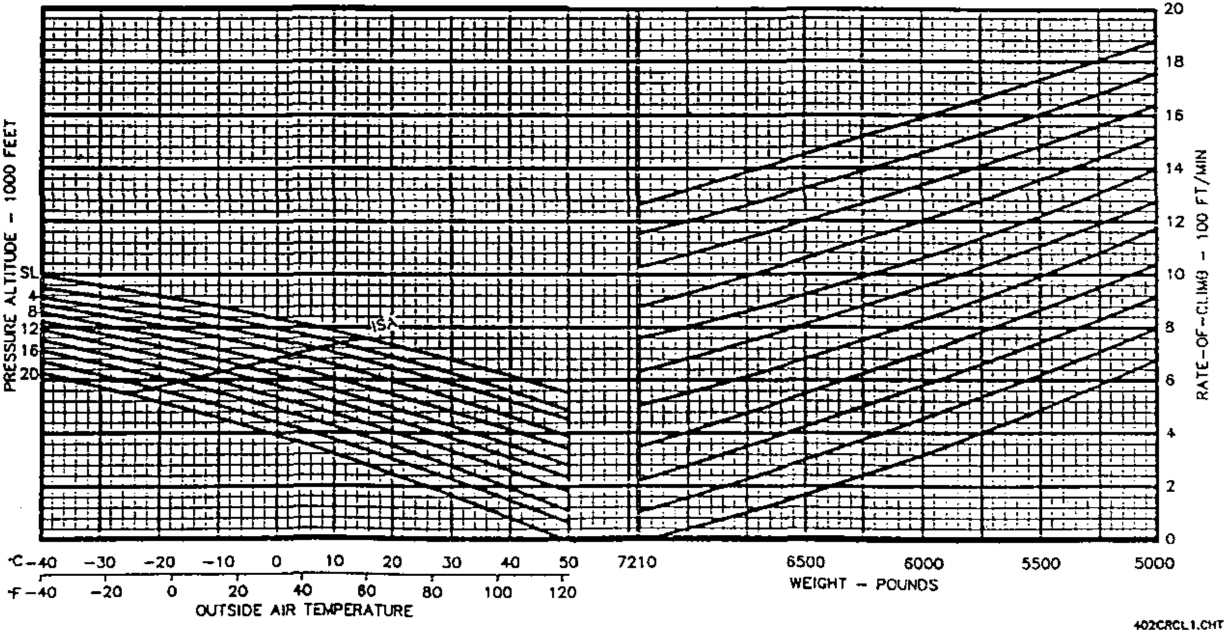
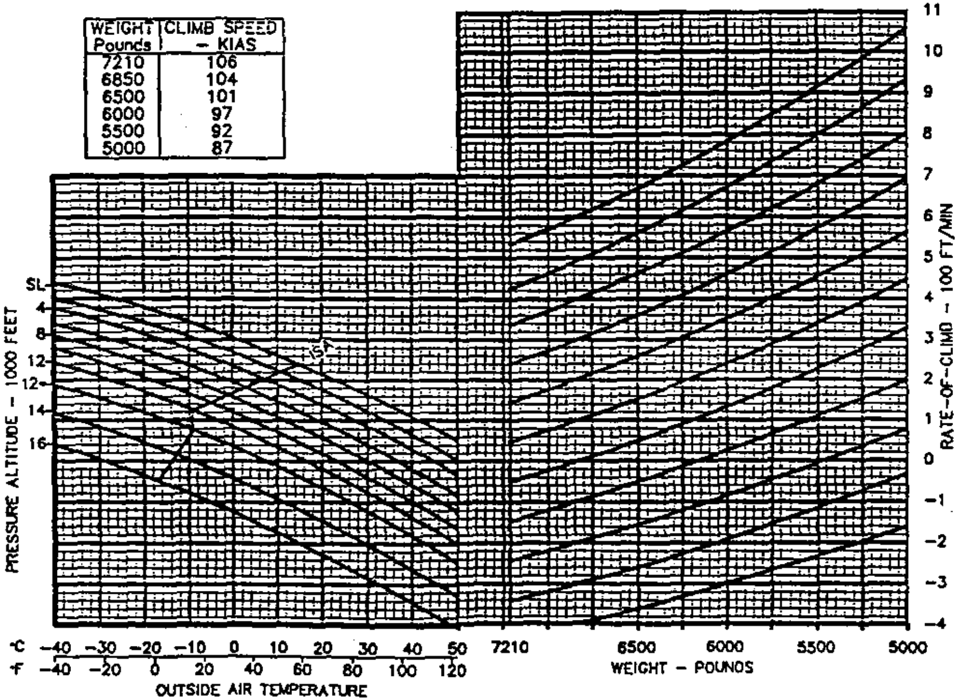
RATE-OF-CLIMB – CRUISE CLIMB

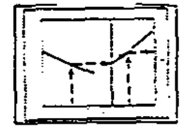
CONDITIONS:
1. 2450 RPM and 29.5 Inches Hg.
2. Landing Gear – UP.
3. Wing Flaps – UP.
4. Cowl Flaps – AS REQUIRED.
5. Airspeed 120 KIAS
6. Mixtures – 117 Pounds per Hour (Blue Triangle)



RATE-OF-CLIMB – ONE ENGINE INOPERATIVE

WEIGHT Pounds	CLIMB SPEED – KIAS
7210	106
6850	104
6500	101
6000	97
5500	92
5000	87





CONDITIONS:
1. 2700 RPM and 39.0 Inches Hg.*
2. Mixture – CHECK Fuel Flow in the White Arc.*
3. Landing Gear – UP.
4. Wing Flaps – UP.
5. Inoperative Propeller – FEATHERED.
6. Wings Banked 5° Toward Operative Engine With Approximately 1/2 Ball Slip Indicated on the Turn and Bank Indicator.
7. Cowl Flaps – CLOSED on Inoperative Engine.

*ABOVE 12,000 FEET, USE PLACARDED MANIFOLD PRESSURE AND FUEL FLOW.

NOTE: Approximate Effect of Configuration on Single-Engine Rate-of-Climb.

Subtract values listed below from value obtained in above graph. Effects for a combination of gear, flap or windmilling propeller may be obtained by adding the effects for each.

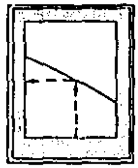
Inoperative Engine Windmilling	400 Ft/Min
Gear Down	350 Ft/Min
Flaps Down 15°	200 Ft/Min
Flaps Down 45°	800 Ft/Min

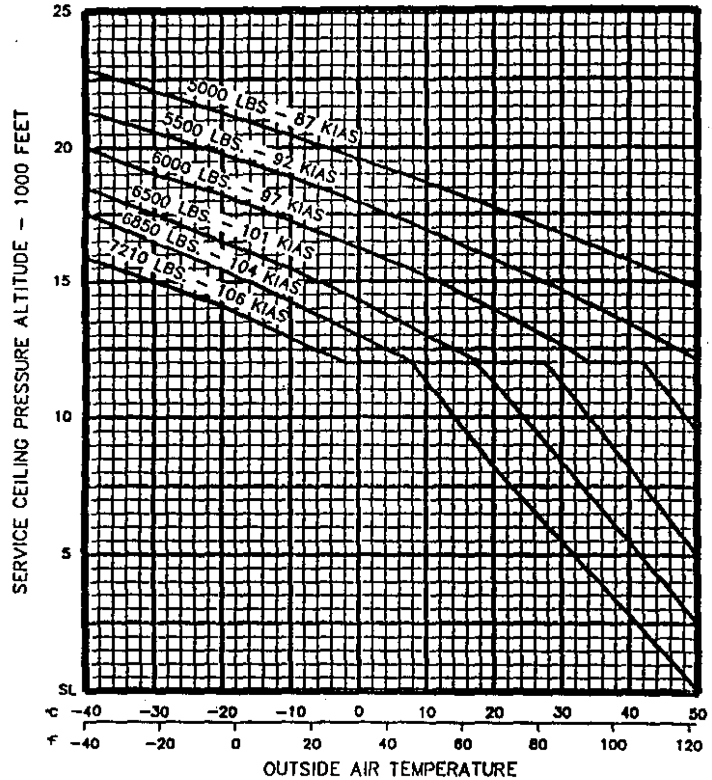
402SECL1.CHT

ENGINE INOPERATIVE SERVICE CEILING

CONDITIONS
1. Engine Inoperative Climb Configuration

NOTE:
1. Engine Inoperative service ceiling is the maximum altitude where the airplane has the capability of climbing 50 feet per minute with one engine inoperative and feathered
2. Increase indicated service ceiling 100 feet for each 0.10 inches Hg. altimeter setting greater than 29.92.
3. Decrease indicated service ceiling 100 feet for each 0.10 inches Hg. altimeter setting less than 29.92.
4. This chart provides performance information to aid in route selection when operating under FAR 135.181 and 91.119 requirements.





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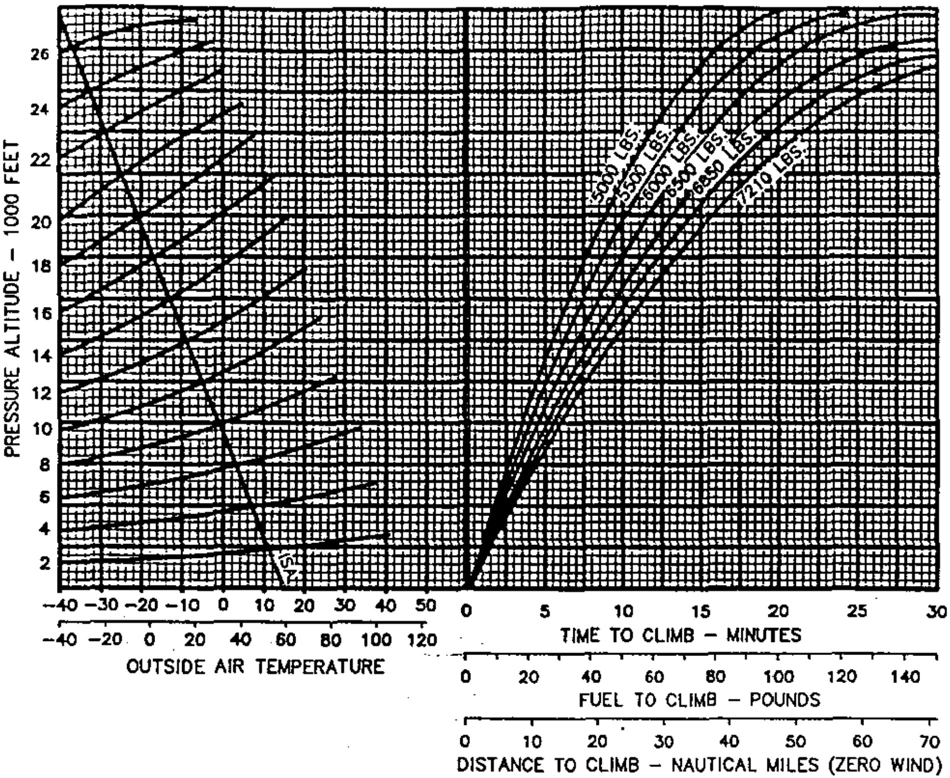
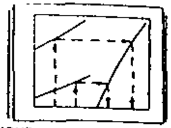
TIME, FUEL AND DISTANCE TO CLIMB – MAXIMUM CLIMB





CONDITIONS:
1. 2600 RPM and 39.0 Inches Hg.*
2. Mixture – Check Fuel Flow In White Arc.*
3. Landing Gear – UP.
4. Wing Flaps – UP.
5. Cowl Flaps – OPEN.

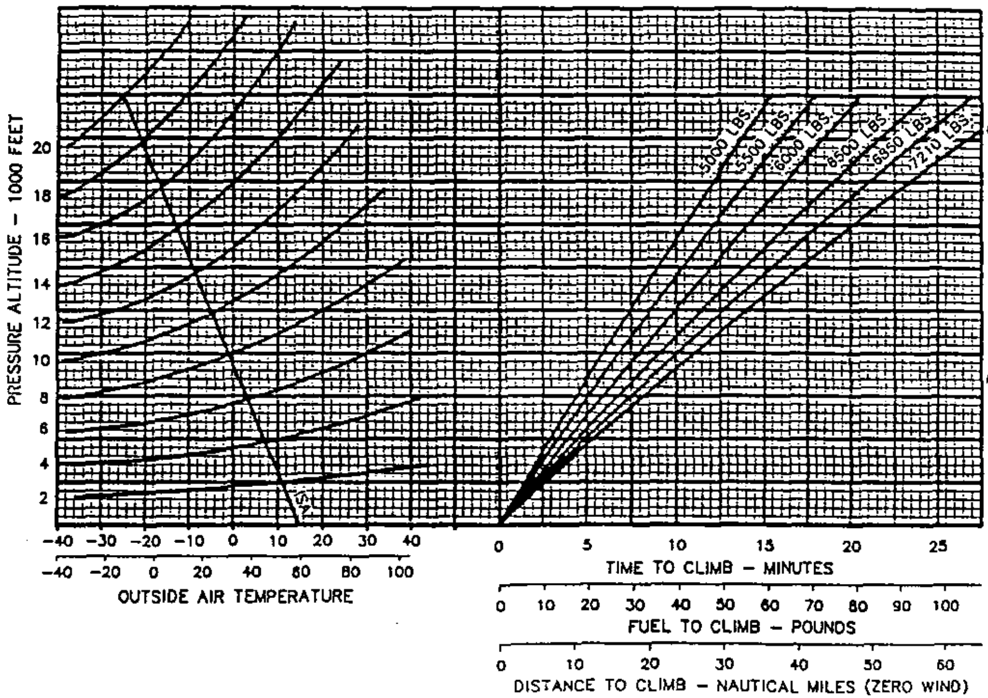
*Above 16,000 Feet, Use Placarded Manifold Pressure and Climb Fuel Flow.

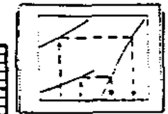
NOTE:
1. Time, Fuel and Distance for the Climb are Determined by Taking the Difference Between the Airport Altitude and Initial Cruise.
2. For Total Fuel Used, Add 35 pounds for Start, Taxi and Takeoff.

WEIGHT POUNDS	CLIMB SPEED – KIAS
7210	112
6850	109
6500	106
6000	102
5500	97
5000	92

402TTCM1.

TIME, FUEL AND DISTANCE TO CLIMB – CRUISE CLIMB





CONDITIONS:

1. 2450 RPM and 29.5 Inches Hg.
2. Landing Gear – UP.
3. Wing Flaps – UP.
4. Cowl Flaps – AS REQUIRED.
5. Airspeed – 120 KIAS.
6. Mixtures – Recommended Fuel Flow.

NOTE:

1. Time, fuel and distance for the climb are determined by taking the difference between the airport altitude and initial cruise, altitude conditions.
2. For total fuel used, add 35 pounds for start, taxi and takeoff.

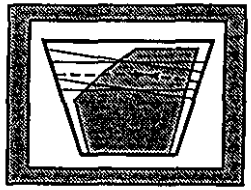
402TTCC1.CHT

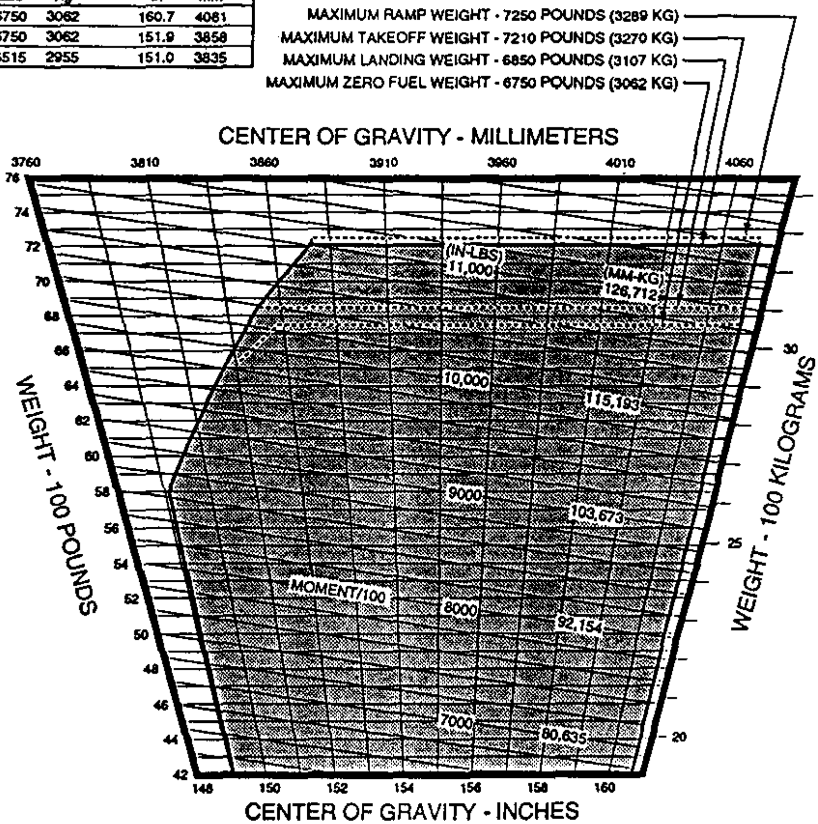
WEIGHT AND MOMENT TABLES

RAMP WEIGHT RANGE:			
WEIGHT		AFT OF DATUM	
Lbs	Kg	in	mm
7250	3289	160.7	4081
7250	3289	152.7	3879
7210	3270	152.6	3876

ZERO FUEL WEIGHT RANGE:			
WEIGHT		AFT OF DATUM	
Lbs	Kg	in	mm
6750	3062	160.7	4081
6750	3062	151.9	3858
6515	2955	151.0	3835

CG RANGE:			
WEIGHT		AFT OF DATUM	
Lbs	Kg	in	mm
7210	3270	160.7	4081
7210	3270	152.6	3877
6850	3107	151.6	3851
5800	2631	149.1	3786





Use this supplement only if (4) four or more vortex generators are missing. (Must be in POH)

ROBERTSON-EQUIPPED CESSNA MODEL 402C
Pilot's Operating Handbook Supplement
and
FAA-Approved Airplane Flight Manual Supplement

This document includes material required to be furnished to the pilot by CAR Part 3. It also contains supplemental data supplied by Robertson Aircraft Corporation.

This document must be carried in the airplane at all times when the airplane is Robertson-equipped in accordance with STC SA927NW.

The information in this document supersedes the basic Pilot Operating Handbook only where covered by the items contained herein. For limitations, procedures, and performance not contained in this supplement, consult Pilot's Operating Handbook for the basic airplane.

PAPUA NEW GUINEA
OFFICE OF CIVIL AVIATION
APPROVED PURSUANT TO SECTION 176
OF THE CIVIL AVIATION REGULATION

DELEGATE OF THE DIRECTOR OF CIVIL AVIATION
DATE: 13.10.98

Airplane Serial Number: 402C0422

Registration Number: ~~N6787Z~~ ~~P2-SLB~~. VH-2MG

Robertson Kit Number: ____________

FAA Approved: Charles C Schroeder
Chief, Engineering and Manufacturing Branch, Northwest Region.

Approval Date: APRIL 21, 1980

PERFORMANCE AND SPECIFICATIONS SUMMARY

NOTE: Only those items changed by the installation of the Robertson equipment are listed below. For other performance and specification data, see the Pilot's Operating Handbook for the basic airplane.

Takeoff Performance: (86 KIAS, 10° wing flaps, 6850 lb weight)

Ground Roll	1100 feet
Total distance over 50 foot obstacle	1800 feet

Landing Performance (88 KIAS, 30° wing flaps, 6850 lb weight)

Ground Roll	865 feet
Total distance over 50 foot obstacle	1477 feet
Stalling speed in landing configuration	68 KIAS

Single engine minimum control speed:
Flaps 10° 76 KIAS
Flaps 30° 70 KIAS

COVERAGE

The Robertson Pilot's Operating Handbook Supplement (POHS) in the airplane at the time of delivery from the Robertson Installation Center contains all of the information applicable to the EFFECTS OF THE ROBERTSON EQUIPMENT on the characteristics and performance of the 402C, serial numbers 402C 0001 and up.

REVISIONS

This POHS will be kept current by Service Letters published by Robertson Aircraft Corporation. These will be distributed by mail addressed to the latest owner of the airplane known to Robertson Aircraft Corporation. The owner of the airplane should keep Robertson Aircraft Corporation informed of any changes in mailing address in order to be sure of receiving Robertson Service Letters pertinent to this airplane.

ROBERTSON AIRCRAFT CORPORATION

FAA-Approved Pilot's Operating Handbook Supplement

to

Cessna 402C

LOG OF PAGES

FAA-Approved: Charles C Schneider
Chief, Engineering and Manufacturing
Branch, Northwest Region.

Approval Date: APRIL 21, 1980

PAGE	APPROVAL DATE
Title	APRIL 21, 1980
(i) Performance & Specifications Summary	Information only, not FAA approved
(ii) Log of Pages	APRIL 21, 1980
(iii) Table of Contents	Information only, not FAA approved
1-1	Information only, not FAA approved
2-1	APRIL 21, 1980
2-2	APRIL 21, 1980
2-3	APRIL 21, 1980
3-1	APRIL 21, 1980
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5-12	APRIL 21, 1980
5-13	APRIL 21, 1980
5-14	Information only, not FAA approved.

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SECTION 1

GENERAL

TABLE OF CONTENTS

INTRODUCTION

his POHS consists of five sections as shown on the contents page. In association with the Cessna Pilot's Operating Handbook furnished with the airplane on delivery from the Cessna factory, it presents the material required to be furnished to the pilot by CAR 3.

GENERAL DESCRIPTION OF THE ROBERTSON EQUIPMENT

The Robertson modification installation on the Cessna 402C consists of the following principal elements.

1. Fowler wing flaps replacing the split flaps with which the standard aircraft is equipped.
2. A new flap drive system powered by the existing electric flap motor/gearbox, through new control cables and a system of bellcranks and pushrods in each wing. The flap motor drives the left and right cable through a double sprocket. This sprocket is attached to the drive shaft with a single shear pin. The shear pin is designed to protect the flap system from any overload.
3. A two position elevator upspring is installed which must be positioned by the pilot with respect to the C.G loading of the aircraft. This spring is connected to the flap drive which allows flap motion to provide some nose-up pitch trim as the flaps are lowered.

SECTION 2

LIMITATIONS

TABLE OF CONTENTS

INTRODUCTION

Section 2 of this POHS presents only the limitations for the Robertson-equipped Cessna Model 402C that are different from the limtations that apply to the basic airplane. Unless specifically changed or eliminated by information in this section, all limitations given in the Pilot's Operating Handbook for the basic airplane still apply. Observance of all applicable operating limitations is required by law.

AIRSPEED LIMITATIONS

Airspeed Limitations Table
(Refer to basic POH for other limitations)

Speed	IAS	CAS	Remarks
Maximum flap extended			
V_{FE}(Knots) 10°	173	169	Do not exceed this speed with the given flap setting
30°	125	122	
Air Minimum Control Speed V_{MCA} (Knots)			This is the minimum flight speed at which the airplane is controllable with a bank of more than 5° towards the operating engine, with one engine inoperative and the remaining engine operating at takeoff power
Flaps up*	80	81	
10°	76	74	
30°	70	68	
Best single engine rate-of-climb speed V_y (Knots)			This is the speed that will give the greatest increase in altitude in the shortest time.
Flaps up*	104*	103	
10°	90	88	

* Flaps up values are the same as for the standard airplane.

AIRSPEED INDICATOR MARKINGS TABLE

Marking	KIAS value of range	
White Arc	68 - 125	Operating speed range with 30° flaps, lower limit is maximum weight stalling speed in landing configuration.
Green Arc	78 - 205	Normal operating range, lower limit is maximum weight stalling speed with flaps and landing gear up. Upper limit is maximum structural cruising speed.

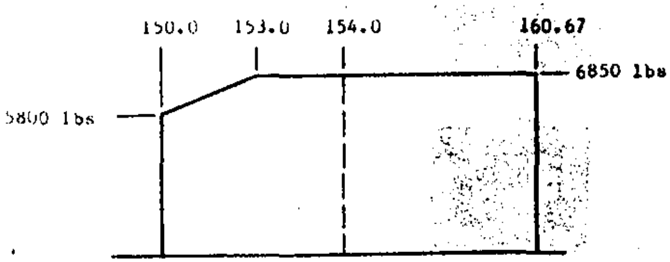
Note: Other markings unchanged.

WEIGHT LIMITS

No change except:

This modification requires that the forward C.G. be revised. Nose compartment compartment baggage may be limited. Determine that your C.G. is within the envelope for flight duration.

Center of Gravity Limits (Gear Extended)
(+153.0) to (+160.67) at 6850 lbs
(+150.0) to (+160.67) at 5800 lbs.
Straight line variation between points.



Fuselage Station, Inches.

PLACARDS

No change except:

PLACARD: Adjacent to wing flap position selector switch
Blue Segment 173 KIAS 0° to 10°
White Segment 125 KIAS 10° to 30°

PLACARD: Position near autopilot, in full view of pilot.
"Autopilot must be off for all operations with flaps extended"

PLACARD: (3 required)
Position on inside of each Nose Compartment Baggage Door.
(Two Doors). Position one in full view of pilot in Cockpit Area.

"For proper weight and balance consult the Revised Center of
Gravity Envelope per STC SA927NW.

PLACARD: (2 required)
Position one in full view of pilot near flap selector.
Position one near Aux Power Plug.
"CAUTION - DO NOT move Flaps when Aux Power Plug is Inserted"

PLACARD: Position in full view of pilot in Instrument Panel

	V_{MC}
Flaps up	80 KIAS
Flaps 10°	76 KIAS
Flaps 30°	70 KIAS

PLACARD: Placards installed on two position Trim Spring Handle
as indicated.

Installed on Trim Handle as shown with handle in FWD position

Installed on Trim Handle as shown with handle in AFT position

(Two reqd.) Install under Trim Handle such that one is in view at all times

SECTION 3

EMERGENCY PROCEDURES

TABLE OF CONTENTS

INTRODUCTION

Section 3 of this POHS provides information as to those emergency procedures which are changed with the installation of the Robertson equipment.

Some information given under the title "Amplified Emergency Procedures" in the Cessna POH will also be altered. However, the pertinent information is all included in the "Emergency Procedure - Abbreviated Checklist" which follows.

EMERGENCY PROCEDURES

ABBREVIATED CHECKLIST

SINGLE ENGINE AIRSPEEDS FOR SAFE OPERATION

Conditions
1. Takeoff weight 6850 lbs. 2. Landing weight 6850 lbs.
3. Standard Day, Sea-level.

(1) Air Minimum Control Speed:	Flaps Up	80 KIAS
	Flaps 10°	76 KIAS
	Flaps 30°	70 KIAS
(2) Recommended Safe Single Engine Speed:	Flaps Up	95 KIAS
	Flaps 10°	86 KIAS
(3) Best Single Engine Angle of Climb Speed:	Flaps Up	95 KIAS
	Flaps 10°	89 KIAS
(4) Best Single Engine Rate of Climb Speed:	Flaps Up	104 KIAS
	Flaps 10°	90 KIAS

ENGINE INOPERATIVE PROCEDURES

Engine Securing Procedures -- No Change.

Engine Failure During Takeoff: (Speed below 95 KIAS with Flaps 0°, or speed below 86 KIAS with Flaps 10°)

1. Throttles - CLOSE IMMEDIATELY
2. Brakes, or land and brakes -AS REQUIRED

Engine Failure After Takeoff: (Speed above 95 KIAS with Flaps 0° and with gear up or in transit) -- No Change.

Engine Failure After Takeoff With Flaps 10°: (Speed above 86 KIAS with gear up or in transit.)

WARNING

Level flight may not be possible for certain combinations of weight, temperature and altitude. In any event, do not attempt to continue the takeoff unless landing gear is already up or in transit and a positive climb capability has been determined from page 5-11. DO NOT ALLOW AIRSPEED TO FALL BELOW 86 KIAS.

Engine Failure After Takeoff With Flaps 10° (Contd.)

1. Mixtures - FULL RICH.
2. Propellors - FULL FORWARD.
3. Throttles - FULL FORWARD (39.0 inches Hg.).
4. Landing Gear - CHECK UP.
5. Inoperative Engine:
   a. Throttle - CLOSE.
   b. Mixture - IDLE CUT OFF.
   c. Propellor - FEATHER.
6. Establish Bank - 5° TOWARD OPERATING ENGINE.
7. Climb to clear 50 foot obstacle - 89 KIAS - FLAPS 10°.
8. Wing Flaps - RETRACT.
9. Speed - ACCELERATE TO SINGLE ENGINE BEST RATE OF CLIMB SPEED - 104 KIAS.
10. Trim Tabs - ADJUST - 5° Bank towards operating engine.
11. Cowl Flap - CLOSE ON INOPERATIVE ENGINE.
12. Inoperative Engine - SECURE as follows:
    a. Fuel Selector - OFF (Feel for detent).
    b. Auxiliary Fuel Pump - OFF
    c. Magneto switches - OFF
    d. Alternator - OFF
13. As soon as practical - LAND

Engine Failure During Flight -- No Change

Engine Inoperative Landing:

1. Fuel Selector - MAIN TANK (Feel for detent).
2. Auxilary Fuel Pump - LOW (Operative engine). MEB 88-3
3. Alternate Air Control - IN.
4. Mixture - FULL RICH or lean as required for smooth operation.
5. Propeller Synchrophaser - OFF (Optional System).
6. Propeller - FULL FORWARD.
7. Wing Flaps - 10°
8. Approach - 90 KIAS with excessive altitude.
9. Landing Gear - DOWN within gliding distance of field.
10. Wing Flaps - 30° when landing is assured.
11. Speed - Decrease below 90 KIAS only if landing is assured.
12. Air Minimum Control Speed - 76 KIAS with flaps 10°.

Engine Inoperative Go-Around (Speed above 90 KIAS - Flaps 10°.)

WARNING

Level flight may not be possible for certain combinations of weight, temperature and altitude. In any event, do not attempt an engine inoperative go-around after flaps have been lowered beyond 10° without sufficient altitiude to transition to a positive climb configuration.

ENGINE INOPERATIVE PROCEDURES: (Contd.)

1. Throttle - FULL FORWARD (39.0 inches Hg.)
2. Wing Flaps - 10°
3. Positive Rate of Climb - ESTABLISH
4. Landing Gear - UP
5. Cowl Flap - OPEN
6. Climb at Best Single Engine Rate of Climb Speed with Flaps 10° - 90 KIAS

AIRSTART - No change

BOTH ENGINES FAILURE DURING FLIGHT - No Change

FIRE PROCEDURES - No change.

EMERGENCY DESCENT PROCEDURES

Preferred procedure -- No change
In turbulent atmospheric conditions -- No change except

4. Wing Flaps - Down 10°
7. Airspeed - 173 KIAS

FOR ALL OTHER EMERGENCY CONDITIONS In the abbreviated Checklist --

No Change except:

A. Read "10° Flaps" anywhere "15° Flaps" is mentioned in Cessna P.O.H.
B. Read "30° Flaps" anywhere "45° Flaps" is mentioned in Cessna P.O.H.

SECTION 4

NORMAL PROCEDURES

Table of contents

INTRODUCTION

Section 4 of the POHS provides information as to those normal operating procedures that are changed (or added) by installation of the Robertson equipment.

Some information given under the title "Amplified Normal Procedures" in the Cessna POH will also be altered. However, the pertinent information is all included in the "Normal Procedures - Abbreviated Checklist" which follows.

NORMAL PROCEDURES
ABBREVIATED CHECKLIST

AIRSPEEDS FOR SAFE OPERATION

Conditions:
1. Takeoff Weight 6850 pounds
2. Landing Weight 6850 pounds
3. Sea Level, Standard Day

(1)	Air Minimum Control Speed	(0^{o} Flaps)	80 KIAS
		(10^{o} Flaps)	76 KIAS
(2)	Takeoff and Climb to 50 Feet	(0^{o} Flaps)	95 KIAS
		(10^{o} Flaps)	86 KIAS
(3)	All Engines Best-Angle-of-Climb Speed	(0^{o} Flaps)	84 KIAS
		(10^{o} Flaps)	82 KIAS
(4)	All Engines Best Rate-of-Climb Speed	(0^{o} Flaps)	109 KIAS
		(10^{o} Flaps)	97 KIAS
(5)	All Engines Landing Approach Speed	(30^{o} Flaps)	88 KIAS
(6)	Maneuvering Speed		150 KIAS
(7)	Structural Cruise Speed		205 KIAS
(8)	Never Exceed Speed		235 KIAS
(9)	Speed for Transition to Balked Landing Conditions	(30^{o} Flaps)	88 KIAS
(10)	Maximum Demonstrated Crosswind Velocity		19 KIAS
(11)	Maximum Speed with Flaps	10^{o}	173 KIAS
		30^{o}	125 KIAS
(12)	Maximum Speed with Gear Extended		180 KIAS

BEFORE ENGINE STARTING — No Change.

STARTING ENGINES -- No Change.

BEFORE TAXIING — No Change.

TAXIING — No Change.

BEFORE TAKEOFF -- No Change Except:

7A Position Trim Spring Handle per C.G. Range (See page 4-4)
7B Wing Flaps - Up or 10^{o}

SECTION 5.

PERFORMANCE

Introduction:

Section 5 of this POHS contains information as to performance items that are changed by installation of the Robertson equipment. For other performance information, refer to Section 5 of the Cessna Pilot's operating Handbook.

AIRSPEED CALIBRATION

NORMAL STATIC SOURCE

Note:

1. Indicated airspeed assumes zero instrument error.
2. The following calibrations are not valid in the pre-stall buffet.
3. The following calibrations are valid for the pilot's and co-pilot's airspeed indicators when the standard or (Cessna) optional dual static system is installed.
4. Refer to basic POH for gear up flaps 0° configuration.

Gear Down Flaps 10^{0}		Gear Down Flaps 30°	
KIAS	KCAS	KIAS	KCAS
-	-	60	58
70	68	70	68
80	78	80	78
90	88	90	88
100	98	100	98
110	108	110	108
120	117	120	117
-	-	125	122
140	137	-	-
160	157	-	-
173	169	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	

AIRSPEED CALIBRATION
ALTERNATE STATIC SOURCE

Note:

1. Indicated airspeed assumes zero instrument error.
2. The following calibrations are not valid in the pre-stall buffet.
3. The following calibrations are valid for the pilot's and co-pilot's airspeed indicators when the standard or (Cessna) optional dual static system is installed.
4. Refer to basic POH for gear up flaps 0° configuration

RAM AIR CONTROL IN AND PILOT'S WINDOW CLOSED			
GEAR DOWN FLAPS 10°		GEAR DOWN FLAPS 30°	
KIAS	KCAS	KIAS	KCAS
70	69	70	71
80	79	80	81
90	89	90	90
100	99	100	100
110	108	110	110
120	118	120	120
-	-	123	123
140	138	-	-
160	157	-	-
173	170	-	-
RAM AIR CONTROL OUT AND PILOT'S WINDOW CLOSED			
70	72	70	73
80	82	80	83
90	92	90	92
100	101	100	102
110	111	110	112
120	121	120	122
-	-	121	123
140	140	-	-
160	160	-	-
170	170	-	-
RAM AIR CONTROL OUT AND PILOT'S WINDOW OPEN			
70	65	70	66
80	75	80	76
90	85	90	85
100	95	100	95
110	104	110	105
120	114	120	115
-	-	125	119
140	134	-	-
160	153	-	-
170	163	-	-

ALTIMETER CORRECTION

NORMAL STATIC SOURCE

Note:

1. Add correction to indicated altimeter reading
2. The following calibrations are valid for the pilot's and co-pilot's altimeters when the standard or optional dual static system is installed.
3. Refer to basic POH for gear up flaps up configuration.

ALTITUDE	SEA-LEVEL		10,000 FEET	
GEAR	DOWN	DOWN	DOWN	DOWN
FLAPS	10°	30°	10°	30°
KIAS	FEET	FEET	FEET	FEET
70	-12	-12	-17	-17
80	-14	-14	-19	-19
90	-16	-16	-22	-22
100	-18	-18	-24	-24
110	-20	-20	-27	-27
120	-32	-32	-44	-44
125	-	-34	-	-46
140	-38	-	-51	-
160	-44	-	-59	-
173	-63	-	-86	-

Altitude Correction Procedure

[Indicated Altitude to fly] = [Desired Altitude (MSL)] − [Altimeter Correction]

ALTIMETER CORRECTION

ALTERNATE STATIC SOURCE

Note:

1. Add correction to indicated altimeter reading.
2. The following calibrations are valid for pilot's and co-pilot's altimeters when the standard static system is installed.
3. An alternate static source is not available for co-pilot's instruments when the optional dual static system is installed.
4. Refer to basic POH for gear up, flaps 0° configuration.

RAM AIR CONTROL IN AND PILOT'S WINDOW CLOSED				
ALTITUDE	SEA-LEVEL		10,000 FEET	
GEAR	DOWN	DOWN	DOWN	DOWN
FLAPS	10°	30°	10°	30°
KIAS	FEET	FEET	FEET	FEET
70	-6	6	-8	8
80	-7	7	-10	10
90	-8	0	-11	0
100	-9	0	-12	0
110	-20	0	-27	0
120	-22	0	-29	0
123	-	0	-	0
140	-25	-	-34	-
160	-44	-	-59	-
173	-48	-	-64	-
RAM AIR CONTROL OUT AND PILOT'S WINDOW CLOSED				
70	12	19	17	25
80	14	21	19	29
90	16	16	22	22
100	9	18	12	24
110	10	20	13	27
120	11	22	15	29
121	-	22	-	29
140	0	-	0	-
160	0	-	0	-
170	0	-	0	-
RAM AIR CONTROL OUT AND PILOT'S WINDOW OPEN				
70	-31	-25	-42	-34
80	-36	-29	-48	-39
90	-40	-40	-54	-54
100	-45	-45	-61	-61
110	-59	-49	-80	-67
120	-65	-54	-88	-73
125	-	-68	-	-92
140	-76	-	-103	-
160	-102	-	-138	-
170	-109	-	-147	-

STALL SPEEDS

Conditions:
(1) Zero thrust at $1.1V_{S1}$

WEIGHT (lb)	CONFIGURATION FLAPS	GEAR	ANGLE OF BANK 0° KIAS	KCAS	20° KIAS	KCAS	40° KIAS	KCAS	60° KIAS	KCAS
6850 3107 kg	0°	Up	78	76	80	78	91	87	112	107
	10°	Down	74	72	76	74	84	82	104	[illegible]
	30°	Down	68	66	70	68	77	75	95	[illegible]
6300 2857 kg	0°	Up	74	73	76	75	87	83	108	103
	10°	Down	71	69	73	71	81	79	100	[illegible]
	30°	Down	65	63	67	65	74	72	91	69
5800 2630 kg	0°	Up	71	70	73	72	83	80	104	99
	10°	Down	68	66	70	68	77	75	95	[illegible]
	30°	Down	63	61	65	63	72	70	88	86
5300 2404 kg	0°	Up	68	67	70	69	79	77	99	95
	10°	Down	65	63	67	65	74	72	91	[illegible]
	30°	Down	60	58	62	60	68	66	84	[illegible]

FAA Approved: [illegible]

NORMAL PROCEDURES: (Continued)

TAKEOFF -- No Change Except:

5. Takeoff and Climb to 50 Feet - See basic manual with Flaps 0°
86 KIAS with Flaps 10°

AFTER TAKEOFF

1. Landing Gear - RETRACT

2. Best Angle-of-Climb Speed - 84 KIAS (Flaps 0°) at sea level to 88 KIAS at 16,000 feet with obstacle. 82 KIAS (Flaps 10°) at sea-level.

3. Best Rate of Climb Speed - 109 KIAS (Flaps 0°) at sea level and 6850 lb. Refer to Section 5 for speed at altitude and at reduced weight.
97 KIAS (Flaps 10°) at sea level

CLIMB -- No Change.

DESCENT -- No Change.

BEFORE LANDING -- No Change Except:

5A Position Trim Spring Handle per center of gravity (See page 4-4.)

5B Wing Flaps - DOWN 10° below 173 KIAS.
DOWN 30° below 125 KIAS.

9. Approach Speed - 86 KIAS
10. Air Minimum Control Speed - 80 KIAS with Flaps 0°.
76 KIAS with Flaps 10°.

BALKED LANDING

1. Increase engine speed to 2700 RPM and apply full throttle if necessary.
2. Balked Landing Transition Speed - 88 KIAS.
3. Reduce Wing Flap Setting to 10°.
4. Landing Gear - RETRACT during IFR go-around or simulated IFR go-around after establishing a positive rate of climb.
5. Trim airplane for climb.
6. Cowl Flaps - OPEN.
7. Retract Wing Flaps as soon as all obstacles are cleared and a safe altitude and airspeed are obtained.

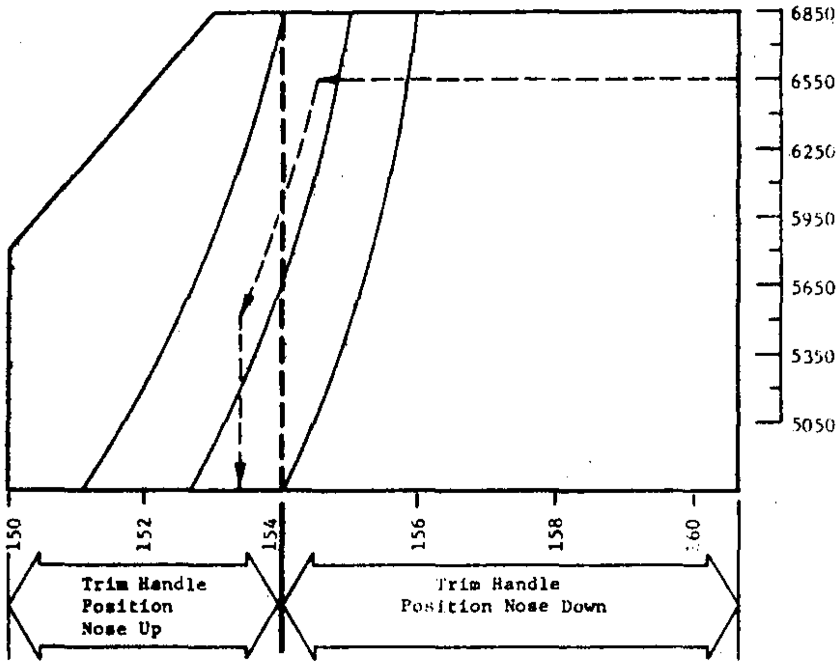
AFTER LANDING -- No Change.

SHUTDOWN -- No Change.

GRAPH FOR QUICK DETERMINATION OF LANDING C.G.

Takeoff Center of Gravity must be known and trim Spring Handle positioned accordingly prior to flap extension.

Landing Center of Gravity must be known and Trim Spring Handle positioned accordingly prior to flap extension.



1. Plot takeoff Wt. and C.G.
2. Follow fuel burn line for total Wt. of fuel used.
3. Read C.G. directly on bottom scale.
4. Position trim handle according to C.G. prior to flap extension.

Sample Problem:

Takeoff 6550# @ 154.5"
Fuel Burn 1050 LBS
Landing C.G. = 153.4

PERFORMANCE CHARTS AND TABLES - Discussion

With Flaps Retracted, The following charts and tables in the Cessna POH still apply.

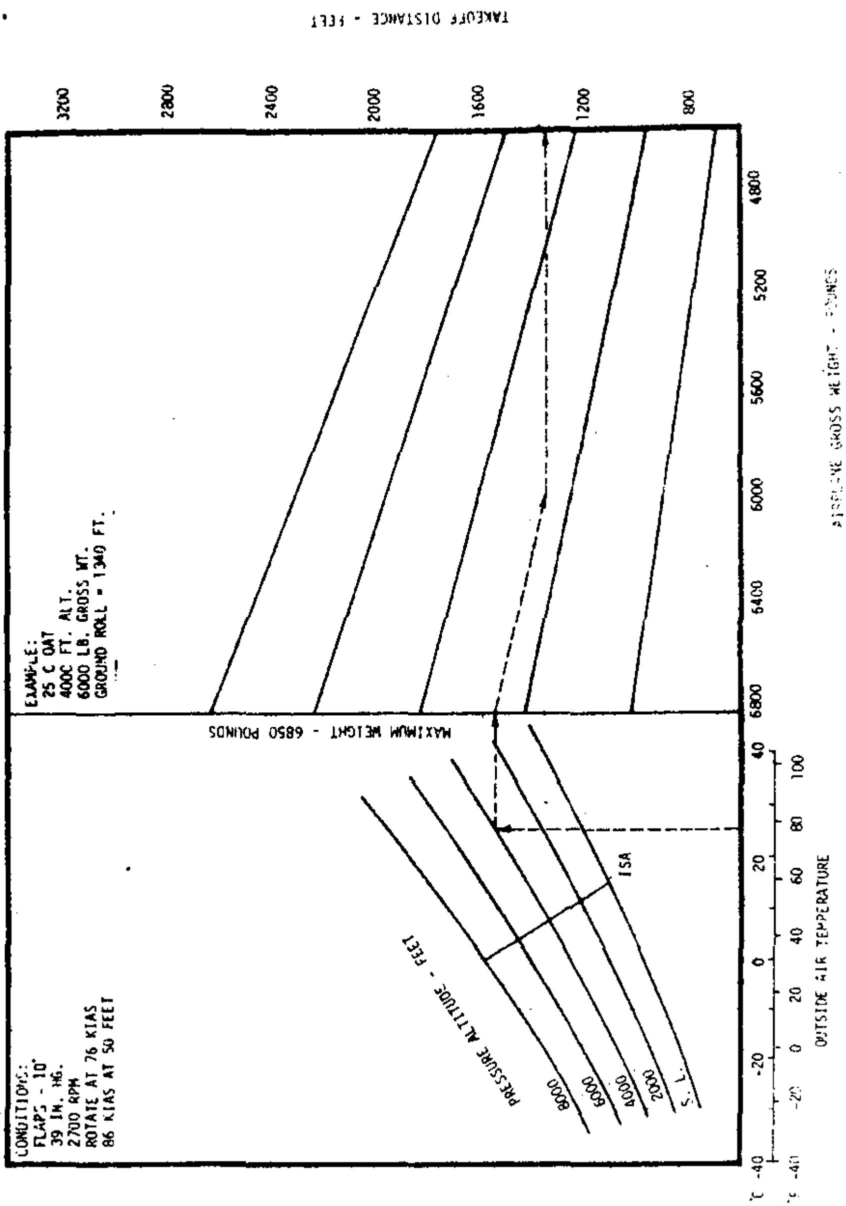
Norman Takeoff Distance
Accelerate - Stop Distance
Accelerate - Go Distance
Rate-of-Climb -- Maximum Climb
Rate-of-Climb -- Cruise Climb
Rate-of-Climb -- Single Engine
Single-Engine Service Ceiling
Time, Fuel and Distance to Climb - Maximum Climb
Time, Fuel and Distance to Climb - Cruise Climb
Cruise Performance with Recommended Lean Mixture
Range Profile
Endurance Profile
Holding Time
Time, Fuel and Distance to Descend

With Robertson flaps extended 10° or 30° as appropriate, charts are provided herewith covering the following performance items.

Takeoff Ground Roll Distance - Flaps 10°
Takeoff Distance to Clear 50-Foot Obstacle - Flaps 10°
Rate-of-Climb -- Takeoff Climb - Flaps 10° with Gear Down
Single-Engine Rate-of-Climb -- Flaps 10°
Balked Landing Climb - Flaps 30°
Landing Ground Roll Distance - Flaps 30°
Landing Distance over 50-Foot Obstacle - Flaps 30°
Accelerate - Stop Distances for Flaps 10°

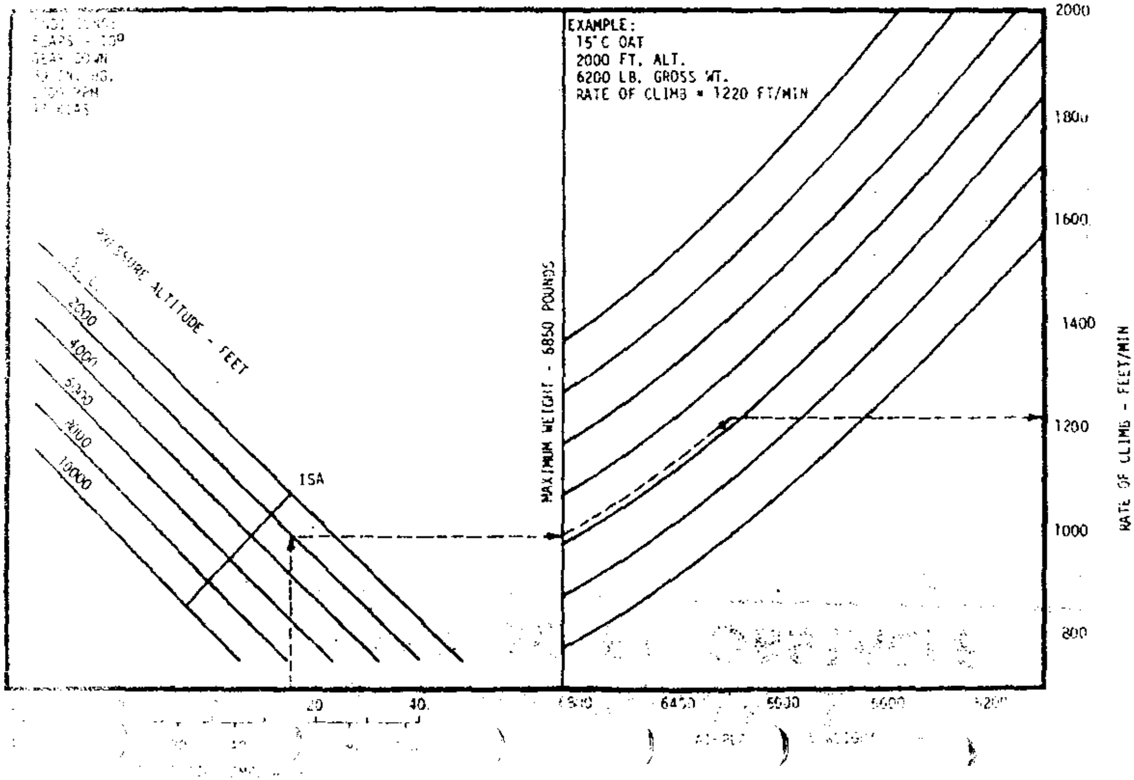
Accelerate - go distances have not been determined for takeoffs with flaps 10°. Since single-engine climb performance is not as good with flaps 10° as it is with flaps 0°, continued flight after loss of power on one engine with flaps 10° should be attempted only when a positive rate of climb has been verified by reference to the chart on page 5-11.

TAKEOFF DISTANCE GROUND ROLL

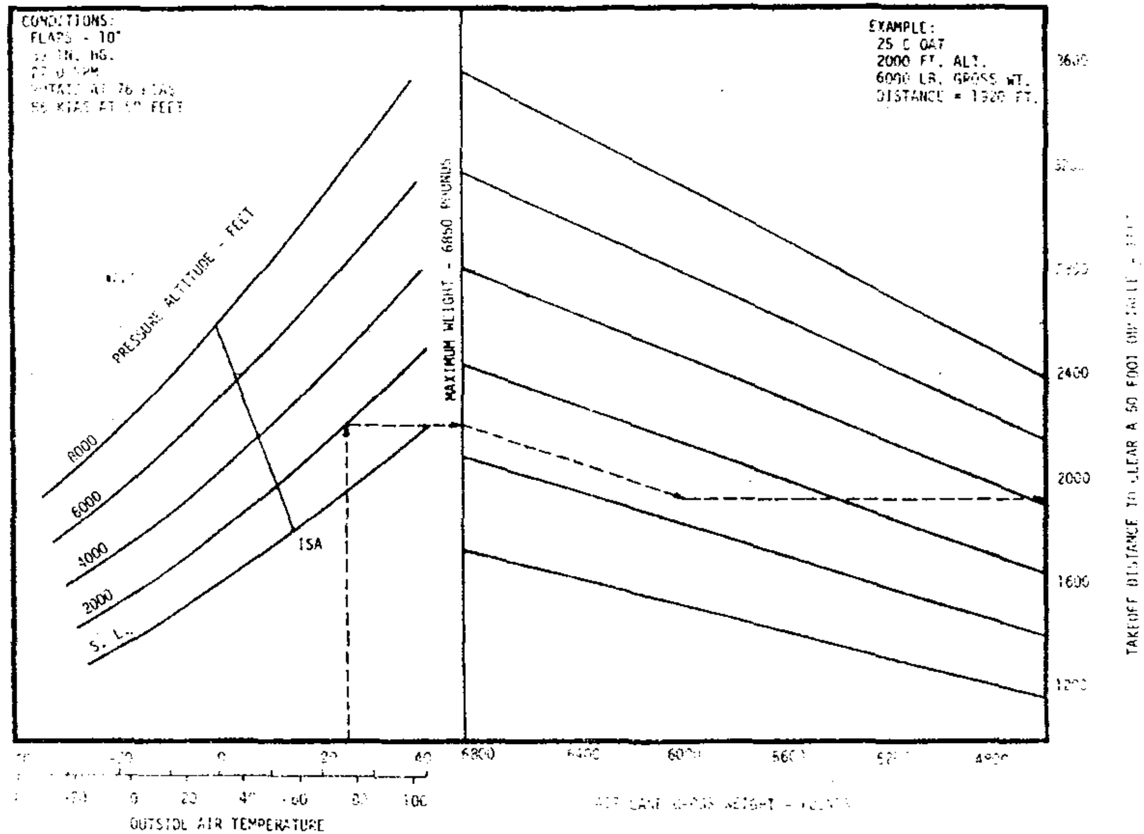


FAA Approved: April 21, 1980

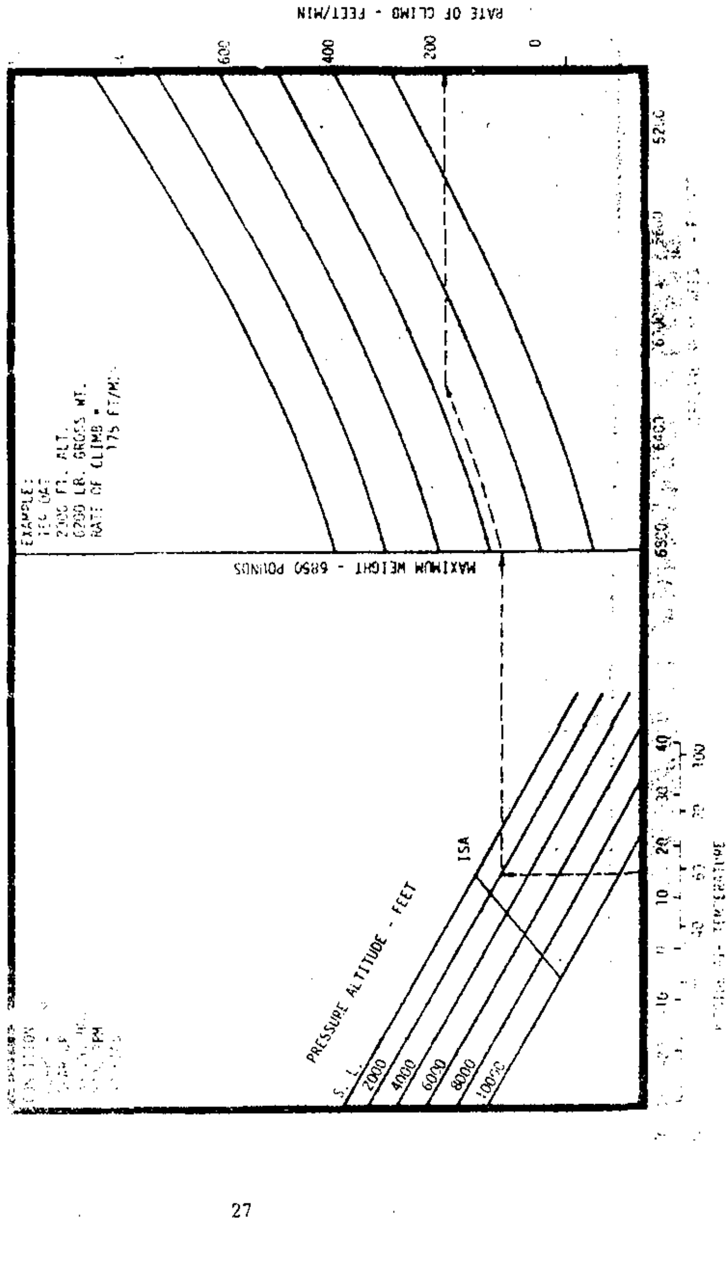
TAKEOFF CLIMB



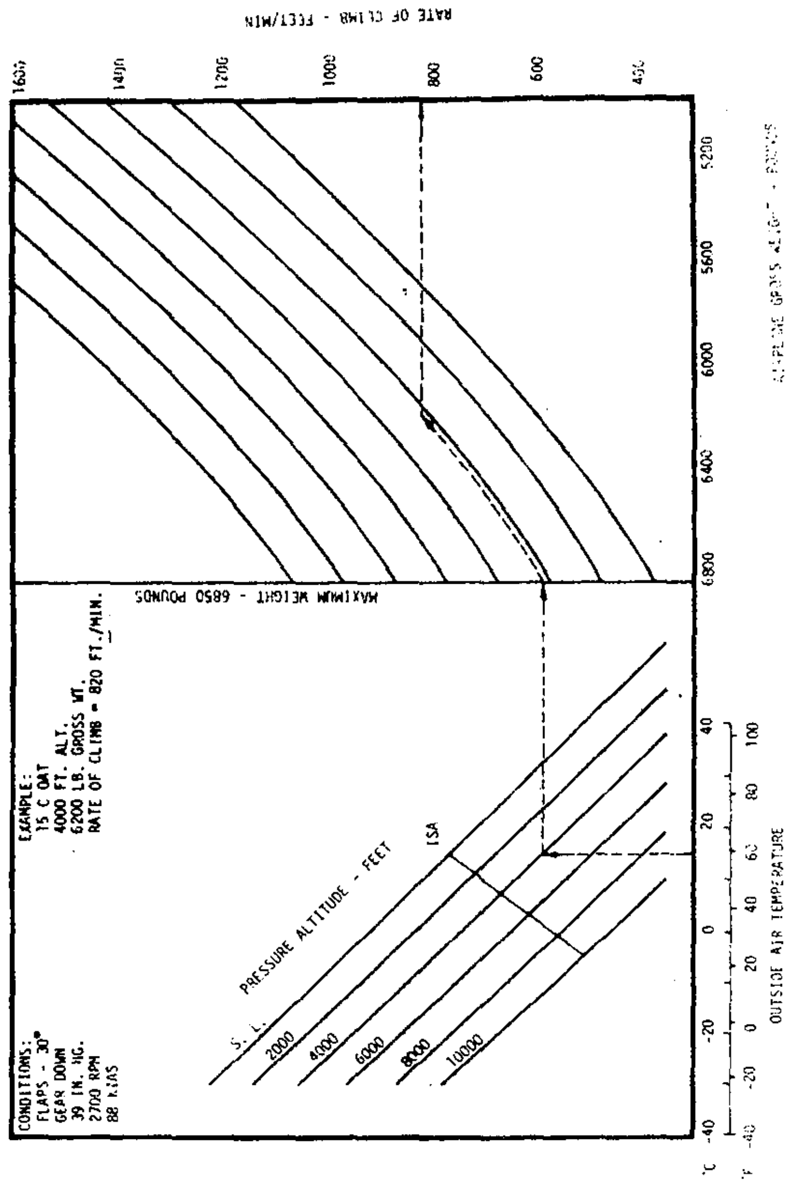
TAKEOFF DISTANCE TO CLEAR 50 FT. OBSTACLE



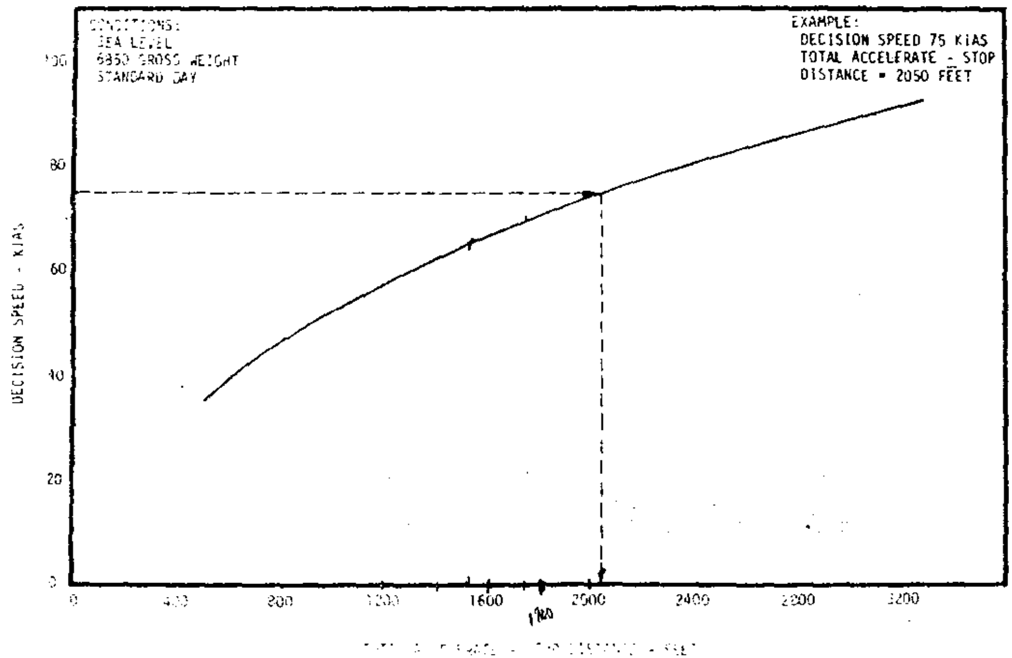
ENGINE OUT CLIMB



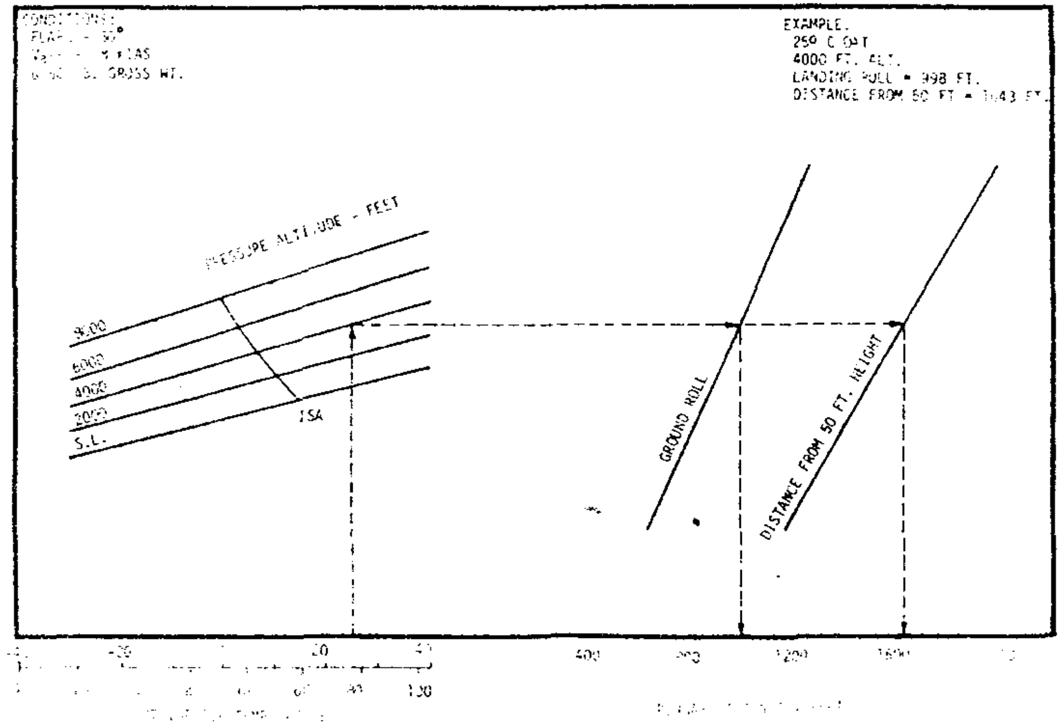
BALKED LANDING CLIMB



ACCELERATE-STOP DISTANCE



LANDING DISTANCE



United States of America

Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)

Number SA927NW

SUPPLEMENTAL TYPE CERTIFICATE ADDENDUM NO. SA927NW

The conditions and limitations of Type Certificate Data Sheet No. A7CE apply except as follows:

This STC Addendum, which is a part of Supplemental Type Certificate No. SA927NW, prescribes conditions and limitations under which the product for which the STC was issued meets the airworthiness requirements of the Civil Air Regulations. A copy of this STC Addendum is required to be maintained as part of the modified aircrafts permanent records.

IX - Model 402C (Normal Category)

Airspeed Limits (IAS) remain the same except:

Flaps Extended 10^0	173 KIAS
Flaps Extended 30^0	125 KIAS
Minimum Control Flaps Up	80 KIAS
Minimum Control Flaps 10^0	76 KIAS
Minimum Control Flaps 30^0	70 KIAS

C. G. Range (Landing Gear Extended)

(+153.0) to (160.67) at 6850 lbs
(+150.0) to (160.67) at 5800 lbs
Straight line variation between points given.

Control Surface Movements remain the same except:

Wing Flaps	Takeoff	10^0 $\pm 1^0$
Wing Flaps	Landing	30^0 $+0, -2^0$

Note: The placards required by Type Data Sheet A7CE must be displayed plus the changes made by the FAA approved Airplane Flight Manual Supplement, POHS 82-2.

- END -

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Regional Office of the transfer of this Supplemental Type Certificate.

The FAA will reissue the certificate in the name of the transferee and forward it to him.

TRANSFER ENDORSEMENT

Transfer the ownership of Supplemental Type Certificate Number ____________________

to *(Name of transferee)* ____________________

(Address of transferee) ____________________
(Number and street)

____
(City, State, and ZIP code)

from *(Name of grantor)* *(Print or type)* ____________________

(Address of grantor) ____________________
(Number and street)

____
(City, State, and ZIP code)

Extent of Authority (if licensing agreement): ____________________

____

____

____

Date of Transfer ____________________

Signature of grantor *(In ink)* ____________________

United States of America
Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number SA927NW

This certificate, issued to Robertson Aircraft Corporation

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations, dated May 15, 1956.

Original Product — Type Certificate Number: A7CE
Make: Cessna
Model: 402C

Description of Type Design Change:

Addition of Fowler wing flaps, elevator trim spring with cockpit tension select lever, fuselage strakes, and nacelle strakes in accordance with FAA sealed Robertson Drawing List No. 82. FAA approved Pilot's Operating Handbook Supplement 82-2 (POHS 82-2) is required.

Limitations and Conditions: The approval of this change in type design applies basically to the above model aircraft only. This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any other type design changes or previously approved modifications will introduce no adverse effect upon the airworthiness of the aircraft. A copy of this Certificate shall be maintained part of the permanent records for the modified aircraft. (Continued on page 3, STC Addendum SA927NW)

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: January 7, 1980 Date reissued:

Date of issuance: April 21, 1980 Date amended:

By direction of the Administrator

Charles C. Schroeder
(Signature)

Chief, Engineering and Manufacturing Branch
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

 This certificate may be transferred in accordance with FAR 21.47.

FAA Form 8110-2 (10-68)