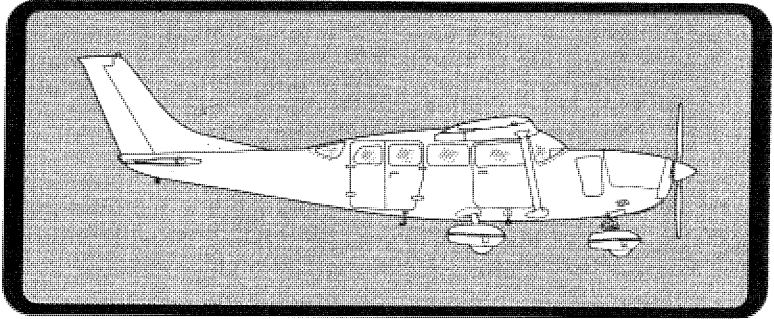


PILOT'S OPERATING HANDBOOK

The Cessna logo features the word "Cessna" in a serif font, with a stylized wing graphic above the letter "s".



207 SKYWAGON

1976 MODEL 207

Serial No. _____

Registration No. _____

THIS HANDBOOK INCLUDES THE MATERIAL
REQUIRED TO BE FURNISHED TO THE PILOT
BY FAR PART 23

CESSNA AIRCRAFT COMPANY
WICHITA, KANSAS, USA

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED
PAGES: DISPOSE OF
SUPERSEDED PAGES.

NOTE: This handbook will be kept current by Service Letters published by Cessna Aircraft Company. These are distributed to Cessna Dealers and to those who subscribe through the Owner Follow-Up System. If you are not receiving subscription service, you will want to keep in touch with your Cessna Dealer for information concerning the change status of the handbook. Subsequent changes should be examined immediately after receipt; the handbook should not be used for operational purposes until it has been updated to a current status. On a changed page, the portion of the text or illustration affected by the change is indicated by a vertical line in the outer margin of the page.

Dates of issue for original and changed pages are:
Original . . . 0 . . . 10 February 1976

THE TOTAL NUMBER OF PAGES IN THIS HANDBOOK IS 304, CONSISTING OF THE FOLLOWING. THIS TOTAL INCLUDES THE SUPPLEMENTS PROVIDED IN SECTION 9 WHICH COVER OPTIONAL SYSTEMS AVAILABLE IN THE AIRPLANE.

Page No.	#Change No.	Page No.	#Change No.
Title	0	5-28 Blank	0
A	0	6-1	0
i thru iii	0	6-2 Blank	0
iv Blank	0	6-3 thru 6-15	0
1-1 thru 1-8	0	6-16 Blank	0
2-1	0	6-17 thru 6-31	0
2-2 Blank	0	6-32 Blank	0
2-3 thru 2-11	0	7-1 thru 7-42	0
2-12 Blank	0	8-1	0
3-1 thru 3-9	0	8-2 Blank	0
3-10 Blank	0	8-3 thru 8-14	0
3-11 thru 3-18	0	9-1 thru 9-2	0
4-1 thru 4-20	0	Supplements (122 Pages)	0
5-1	0	(Refer to Section 9 Table of Contents for Optional Systems Supplements)	
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5-3 thru 5-27	0		

Zero in this column indicates an original page.

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 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 the 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 Program book, 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, since Cessna Dealers have all of the Service Manuals and Parts Catalogs, kept current by Service 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 Cessna Dealer 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 - SPECIFICATIONS

***SPEED:**

Maximum at Sea Level	150 KNOTS
Cruise, 75% Power at 6500 Ft	143 KNOTS
CRUISE: Recommended Lean Mixture with fuel allowance for engine start, taxi, takeoff, climb and 45 minutes reserve at 45% power.	
75% Power at 6500 Ft	Range 390 NM
54 Gallons Usable Fuel	Time 2.8 HRS
75% Power at 6500 Ft	Range 565 NM
73 Gallons Usable Fuel	Time 4.0 HRS
Maximum Range at 10,000 Ft	Range 470 NM
54 Gallons Usable Fuel	Time 4.2 HRS
Maximum Range at 10,000 Ft	Range 690 NM
73 Gallons Usable Fuel	Time 6.2 HRS
RATE OF CLIMB AT SEA LEVEL	810 FPM
SERVICE CEILING	13,300 FT
TAKEOFF PERFORMANCE:	
Ground Roll	1100 FT
Total Distance Over 50-Ft Obstacle	1970 FT
LANDING PERFORMANCE:	
Ground Roll	765 FT
Total Distance Over 50-Ft Obstacle	1500 FT
STALL SPEED (CAS):	
Flaps Up, Power Off	65 KNOTS
Flaps Down, Power Off	58 KNOTS
MAXIMUM WEIGHT	3800 LBS
STANDARD EMPTY WEIGHT (1 Seat).	1964 LBS
MAXIMUM USEFUL LOAD (1 Seat)	1836 LBS
BAGGAGE ALLOWANCE	300 LBS
WING LOADING: Pounds/Sq Ft	21.8
POWER LOADING: Pounds/HP	12.7
FUEL CAPACITY: Total	
Standard Tanks	61 GAL.
Long Range Tanks	80 GAL.
OIL CAPACITY	12 QTS
ENGINE: Teledyne Continental, Fuel Injection	IO-520-F
300 BHP at 2850 RPM (5-Minute Takeoff Rating)	
285 BHP at 2700 RPM (Maximum Continuous Rating)	
PROPELLER: 2-Bladed Constant Speed, Diameter	82 IN.

*Speed performance is shown for an airplane equipped with optional speed fairings, which increase the speed by 3 to 4 knots. There is a corresponding difference in range, while all other performance figures are unchanged when speed fairings are installed. Performance with an optional 3-bladed propeller is essentially the same as shown above.

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SECTION 1 GENERAL

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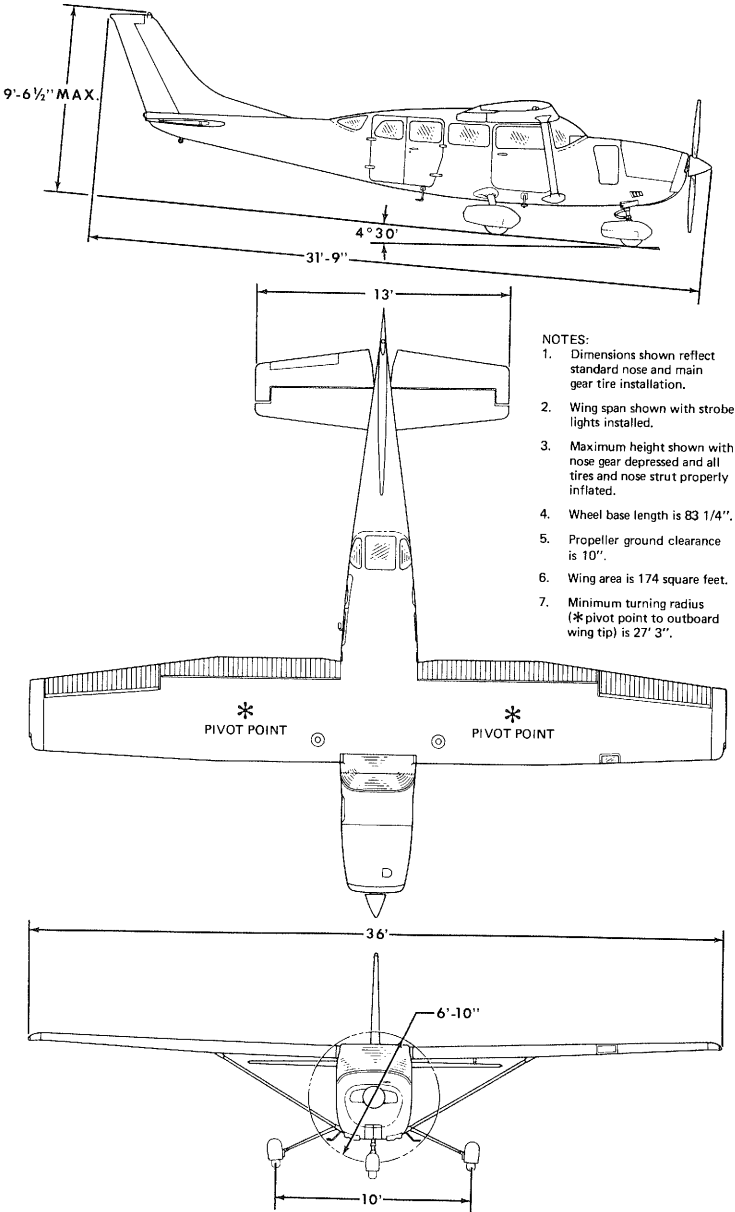


Figure 1-1. Three View

INTRODUCTION

This handbook contains 9 sections, and includes the material required to be furnished to the pilot by FAR Part 23. It also contains supplemental data supplied by Cessna Aircraft Company.

Section 1 provides basic data and information of general interest. It also contains definitions or explanations of symbols, abbreviations, and terminology commonly used.

DESCRIPTIVE DATA

ENGINE

Number of Engines: 1.

Engine Manufacturer: Teledyne Continental.

Engine Model Number: IO-520-F.

Engine Type: Normally-aspirated, direct-drive, air-cooled, horizontally-opposed, fuel-injected, six-cylinder engine with 520 cu. in. displacement.

Horsepower Rating and Engine Speed:

Maximum Power (5 minutes - takeoff): 300 rated BHP at 2850 RPM.

Maximum Continuous Power: 285 rated BHP at 2700 RPM.

PROPELLER

Propeller Manufacturer: McCauley Accessory Division.

Propeller Model Number: D2A34C58/90AT-8.

Number of Blades: 2.

Propeller Diameter, Maximum: 82 inches.

Minimum: 80 inches.

Propeller Type: Constant speed and hydraulically actuated, with a low pitch setting of 9.5° and a high pitch setting of 25.8° (36 inch station).

FUEL

Fuel Grade (and Color): 100/130 Minimum Grade Aviation Fuel (green).

100/130 low lead aviation fuel (blue) with a lead content limited to 2 cc per gallon is also approved.

Fuel Capacity:

Standard Tanks:

Total Capacity: 61 gallons.

Total Capacity Each Tank: 30.5 gallons.

Total Usable: 54 gallons.

Long Range Tanks:

Total Capacity: 80 gallons.
Total Capacity Each Tank: 40 gallons.
Total Usable: 73 gallons.

OIL

Oil Grade (Specification):

MIL-L-6082 Aviation Grade Straight Mineral Oil: Use to replenish supply during first 25 hours and at the first 25-hour oil change. Continue to use until a total of 50 hours has accumulated or oil consumption has stabilized.

NOTE

The airplane was delivered from the factory with a corrosion preventive aircraft engine oil. This oil should be drained after the first 25 hours of operation.

Continental Motors Specification MHS-24A, Ashless Dispersant Oil:
This oil must be used after first 50 hours or oil consumption has stabilized.

Recommended Viscosity For Temperature Range:

SAE 50 above 4°C (40°F).
SAE 10W30 or SAE 30 below 4°C (40°F).

NOTE

Multi-viscosity oil with a range of SAE 10W30 is recommended for improved starting in cold weather.

Oil Capacity:

Sump: 12 Quarts.
Total: 13 Quarts (if oil filter installed).

MAXIMUM CERTIFICATED WEIGHTS

Takeoff: 3800 lbs.

Landing: 3800 lbs.

Weight in Baggage Compartments:

Forward, Station -14 to 0: 120 lbs.
Aft, Station 142 to 168: 180 lbs.

NOTE

Refer to Section 6 of this handbook for loading arrangements with one or more seats removed for cargo accommodation.

STANDARD AIRPLANE WEIGHTS

Standard Empty Weight (1 Seat): 1964 lbs.
Maximum Useful Load (1 Seat): 1836 lbs.

CABIN AND ENTRY DIMENSIONS

Detailed dimensions of the cabin interior and entry door openings are illustrated in Section 6.

BAGGAGE SPACE AND CARGO DOOR ENTRY DIMENSIONS

Dimensions of the baggage/cargo areas and forward baggage door and cargo door openings are illustrated in detail in Section 6.

SPECIFIC LOADINGS

Wing Loading: 21.8 lbs./sq. ft.
Power Loading: 12.7 lbs./hp.

SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

- KCAS Knots Calibrated Airspeed is indicated airspeed corrected for position and instrument error and expressed in knots. Knots calibrated airspeed is equal to KTAS in standard atmosphere at sea level.
- KIAS Knots Indicated Airspeed is the speed shown on the airspeed indicator and expressed in knots.
- KTAS Knots True Airspeed is the airspeed expressed in knots relative to undisturbed air which is KCAS corrected for altitude and temperature.
- V_A Maneuvering Speed is the maximum speed at which you may use abrupt control travel.

- V_{FE} Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
- V_{NO} Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air, then only with caution.
- V_{NE} Never Exceed Speed is the speed limit that may not be exceeded at any time.
- V_S Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
- V_{S_0} Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration at the most forward center of gravity.
- V_X Best Angle-of-Climb Speed is the speed which results in the greatest gain of altitude in a given horizontal distance.
- V_Y Best Rate-of-Climb Speed is the speed which results in the greatest gain in altitude in a given time.

METEOROLOGICAL TERMINOLOGY

- OAT Outside Air Temperature is the free air static temperature. It is expressed in either degrees Celsius (formerly Centigrade) or degrees Fahrenheit.
- Standard Temperature Standard Temperature is 15°C at sea level pressure altitude and decreases by 2°C for each 1000 feet of altitude.
- Pressure Altitude Pressure Altitude is the altitude read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013 mb).

ENGINE POWER TERMINOLOGY

- BHP Brake Horsepower is the power developed by the engine. Percent power values in this handbook are based on the maximum continuous power rating.
- RPM Revolutions Per Minute is engine speed.
- MP Manifold Pressure is a pressure measured in the engine's induction system and is expressed in inches of mercury (Hg).

AIRPLANE PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

Demonstrated Crosswind Velocity 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.

Usable Fuel Usable Fuel is the fuel available for flight planning.

Unusable Fuel Unusable Fuel is the quantity of fuel that can not be safely used in flight.

GPH Gallons Per Hour is the amount of fuel (in gallons) consumed per hour.

NMPG Nautical Miles Per Gallon is the distance (in nautical miles) which can be expected per gallon of fuel consumed at a specific engine power setting and/or flight configuration.

g g is acceleration due to gravity.

WEIGHT AND BALANCE TERMINOLOGY

Reference Datum Reference Datum is an imaginary vertical plane from which all horizontal distances are measured for balance purposes.

Station Station is a location along the airplane fuselage given in terms of the distance from the reference datum.

Arm Arm is the horizontal distance from the reference datum to the center of gravity (C.G.) of an item.

Moment Moment is the product of the weight of an item multiplied by its arm. (Moment divided by the constant 1000 is used in this handbook to simplify balance calculations by reducing the number of digits.)

Center of Gravity (C.G.) Center of Gravity is the point at which an airplane, or equipment, would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.

C.G. Arm Center of Gravity Arm is the arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.

C. G Limits	<u>Center of Gravity Limits</u> are the extreme center of gravity locations within which the airplane must be operated at a given weight.
Standard Empty Weight	<u>Standard Empty Weight</u> is the weight of a standard airplane, including unusable fuel, full operating fluids and full engine oil.
Basic Empty Weight	<u>Basic Empty Weight</u> is the standard empty weight plus the weight of optional equipment.
Useful Load	<u>Useful Load</u> is the difference between takeoff weight and the basic empty weight.
Gross (Loaded) Weight	<u>Gross (Loaded) Weight</u> is the loaded weight of the airplane.
Maximum Takeoff Weight	<u>Maximum Takeoff Weight</u> is the maximum weight approved for the start of the takeoff run.
Maximum Landing Weight	<u>Maximum Landing Weight</u> is the maximum weight approved for the landing touchdown.
Tare	<u>Tare</u> 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.

SECTION 2 LIMITATIONS

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INTRODUCTION

Section 2 includes operating limitations, instrument markings, and basic placards necessary for the safe operation of the airplane, its engine, standard systems and standard equipment. The limitations included in this section have been approved by the Federal Aviation Administration. When applicable, limitations associated with optional systems or equipment are included in Section 9.

NOTE

The airspeeds listed in the Airspeed Limitations chart (figure 2-1) and the Airspeed Indicator Markings chart (figure 2-2) are based on Airspeed Calibration data shown in Section 5 with the normal static source. If the alternate static source is being used, ample margins should be observed to allow for the airspeed calibration variations between the normal and alternate static sources as shown in Section 5.

Your Cessna is certificated under FAA Type Certificate No. A16CE as Cessna Model No. 207.

AIRSPD LIMITATIONS

Airspeed limitations and their operational significance are shown in figure 2-1.

	SPEED	KCAS	KIAS	REMARKS
V _{NE}	Never Exceed Speed	182	186	Do not exceed this speed in any operation.
V _{NO}	Maximum Structural Cruising Speed	148	151	Do not exceed this speed except in smooth air, and then only with caution.
V _A	Maneuvering Speed: 3800 Pounds 3050 Pounds 2300 Pounds	129 115 100	132 118 101	Do not make full or abrupt control movements above this speed.
V _{FE}	Maximum Flap Extended Speed: To 10° Flaps 10° - 30° Flaps	137 96	140 100	Do not exceed these speeds with the given flap settings.
	Maximum Window Open Speed	182	186	Do not exceed this speed with windows open.

Figure 2-1. Airspeed Limitations

AIRSPD INDICATOR MARKINGS

Airspeed indicator markings and their color code significance are shown in figure 2-2.

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	54 - 100	Full Flap Operating Range. Lower limit is maximum weight V_{S_0} in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc	56 - 151	Normal Operating Range. Lower limit is maximum weight V_S with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow Arc	151 - 186	Operations must be conducted with caution and only in smooth air.
Red Line	186	Maximum speed for all operations.

Figure 2-2. Airspeed Indicator Markings

POWER PLANT LIMITATIONS

Engine Manufacturer: Teledyne Continental.

Engine Model Number: IO-520-F.

Engine Operating Limits for Takeoff and Continuous Operations:

Maximum Power,

5 Minutes - Takeoff: 300 BHP.

Continuous: 285 BHP.

Maximum Engine Speed,

5 Minutes - Takeoff: 2850 RPM.

Continuous: 2700 RPM.

Maximum Cylinder Head Temperature: 238°C (460°F).

Maximum Oil Temperature: 116°C (240°F).

Oil Pressure, Minimum: 10 psi.

Maximum: 100 psi.

Fuel Pressure, Minimum: 3.5 psi.

Maximum: 19.5 psi (25.2 gal/hr).

Propeller Manufacturer: McCauley Accessory Division.

Propeller Model Number: D2A34C58/90AT-8.

Propeller Diameter, Maximum: 82 inches.

Minimum: 80 inches.

Propeller Blade Angle at 36 Inch Station, Low: 9.5°

High: 25.8°

POWER PLANT INSTRUMENT MARKINGS

Power plant instrument markings and their color code significance are shown in figure 2-3.

INSTRUMENT	RED LINE	GREEN ARC	YELLOW ARC	RED LINE
	MINIMUM LIMIT	NORMAL OPERATING	CAUTION RANGE	MAXIMUM LIMIT
Tachometer	---	2200 - 2550 RPM	2700 - 2850 RPM	2850 RPM
Manifold Pressure	---	15 - 25 in.Hg	---	---
Oil Temperature	---	100° - 240°F	---	240°F
Cylinder Head Temperature	---	200° - 460°F	---	460°F
Fuel Pressure (Flow)	3.5 psi	7.0 - 17.0 gal/hr	---	25.2 gal/hr (19.5 psi)
Oil Pressure	10 psi	30 - 60 psi	---	100 psi

Figure 2-3. Power Plant Instrument Markings

WEIGHT LIMITS

Maximum Takeoff Weight: 3800 lbs.

Maximum Landing Weight: 3800 lbs.

Maximum Weight in Baggage Compartments:

Forward, Station -14 to 0: 120 lbs.

Aft, Station 142 to 168: 180 lbs.

NOTE

Refer to Section 6 of this handbook for loading arrangements with one or more seats removed for cargo accommodation.

CENTER OF GRAVITY LIMITS

Center of Gravity Range:

Forward: 31.0 inches aft of datum at 2600 lbs. or less, with straight line variation to 43.0 inches aft of datum at 3800 lbs.
Aft: 50.5 inches aft of datum at all weights.

Reference Datum: Front face, lower portion of front baggage compartment rear wall.

MANEUVER LIMITS

This airplane is certificated in the normal category. The normal category is applicable to aircraft intended for non-aerobatic operations. These include any maneuvers incidental to normal flying, stalls (except whip stalls), lazy eights, chandelles, and turns in which the angle of bank is not more than 60°.

Aerobatic maneuvers, including spins, are not approved.

FLIGHT LOAD FACTOR LIMITS

Flight Load Factors:

*Flaps Up: +3.8g, -1.52g

*Flaps Down: +2.4g

*The design load factors are 150% of the above, and in all cases, the structure meets or exceeds design loads.

KINDS OF OPERATION LIMITS

The airplane is equipped for day VFR and may be equipped for night VFR and/or IFR operations. FAR Part 91 establishes the minimum required instrumentation and equipment for these operations. The reference to types of flight operations on the operating limitations placard reflects equipment installed at the time of Airworthiness Certificate issuance.

Flight into known icing conditions is prohibited.

- (2) On control lock:

Control lock - remove before starting engine.

- (3) On fuel selector plate, at appropriate locations (standard tanks):

Off.
Left On -- 27.0 gal.
Right On -- 27.0 gal.
Takeoff and land on fuller tank.

- On fuel selector plate, at appropriate locations (long range tanks):

Off.
Left On -- 36.5 gal.
Right On -- 36.5 gal.
Takeoff and land on fuller on fuller tank.

- (4) Above fuel selector plate:

When switching from dry tank turn aux fuel pump "ON" momentarily.

- (5) Forward of fuel tank filler cap (standard tanks):

Service this airplane with 100/130 min. aviation grade gasoline - capacity 30.5 gal.

- Forward of fuel tank filler cap (long range tanks):

Service this airplane with 100/130 min. aviation grade gasoline - capacity 40.0 gal.

(6) Near manifold pressure gage:

<u>FUEL FLOW AT FULL THROTTLE</u>		
	2700 RPM	2850 RPM
S. L.	23 GPH	24 GPH
4000 ft.	21 GPH	22 GPH
8000 ft.	19 GPH	20 GPH

(7) Near over-voltage light:

HIGH VOLTAGE

(8) On the flap control indicator:

UP to 10°	(Partial flap range with blue color code and 140 knot callout; also, mechanical detent at 10°.)
10° to FULL	(Indices at these positions with white color code and 100 knot callout; also, mechanical detent at 20°.)

(9) On aft cargo door:

Baggage net 180 lbs. max. capacity.
Refer to weight and balance data for baggage/
cargo loading.

(10) On forward cargo door:

EMERGENCY EXIT OPERATION

1. Open fwd cargo door as far as possible.
2. Rotate red lever in rear cargo door fwd.
3. Force rear cargo door full open.

(11) On forward baggage compartment door:

Max. baggage 120 lbs. Refer to weight and balance data for baggage/cargo loading.

SECTION 3

EMERGENCY PROCEDURES

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INTRODUCTION

Section 3 provides checklist and amplified procedures for coping with emergencies that may occur. Emergencies caused by airplane or engine malfunctions are extremely rare if proper preflight inspections and maintenance are practiced. Enroute weather emergencies can be minimized or eliminated by careful flight planning and good judgement when unexpected weather is encountered. However, should an emergency arise the basic guidelines described in this section should be considered and applied as necessary to correct the problem. Emergency procedures associated with the ELT and other optional systems can be found in Section 9.

AIRSPEEDS FOR EMERGENCY OPERATION

Engine Failure After Takeoff:

Wing Flaps Up	85 KIAS
Wing Flaps Down	80 KIAS

Maneuvering Speed:

3800 Lbs	132 KIAS
3050 Lbs	118 KIAS
2300 Lbs	101 KIAS

Maximum Glide:

3800 Lbs	80 KIAS
3400 Lbs	75 KIAS
3000 Lbs	70 KIAS

Precautionary Landing With Engine Power. 75 KIAS

Landing Without Engine Power:

Wing Flaps Up	85 KIAS
Wing Flaps Down	80 KIAS

OPERATIONAL CHECKLISTS

ENGINE FAILURES

ENGINE FAILURE DURING TAKEOFF RUN

- (1) Throttle -- IDLE.
- (2) Brakes -- APPLY.
- (3) Wing Flaps -- RETRACT.
- (4) Mixture -- IDLE CUT-OFF.
- (5) Ignition Switch -- OFF.

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

- (1) Airspeed -- 85 KIAS.
- (2) Mixture -- IDLE CUT-OFF.
- (3) Fuel Selector Valve -- OFF.
- (4) Ignition Switch -- OFF.
- (5) Wing Flaps -- AS REQUIRED (30° recommended).
- (6) Master Switch -- OFF.

ENGINE FAILURE DURING FLIGHT

- (1) Airspeed -- 80 KIAS.
- (2) Fuel Selector Valve and Quantity -- CHECK.
- (3) Mixture -- RICH.
- (4) Auxiliary Fuel Pump -- ON for 3-5 seconds with throttle 1/2 open; then OFF.
- (5) Ignition Switch -- BOTH (or START if propeller is stopped).
- (6) Throttle -- ADVANCE slowly.

FORCED LANDINGS

EMERGENCY LANDING WITHOUT ENGINE POWER

- (1) Airspeed -- 85 KIAS (flaps UP).
80 KIAS (flaps DOWN).
- (2) Mixture -- IDLE CUT-OFF.
- (3) Fuel Selector Valve -- OFF.
- (4) Ignition Switch -- OFF.
- (5) Wing Flaps -- AS REQUIRED (30° recommended).
- (6) Master Switch -- OFF.
- (7) Doors -- UNLATCH PRIOR TO TOUCHDOWN.
- (8) Touchdown -- SLIGHTLY TAIL LOW.
- (9) Brakes -- APPLY HEAVILY.

PRECAUTIONARY LANDING WITH ENGINE POWER

- (1) Airspeed -- 85 KIAS.
- (2) Wing Flaps -- 10°.
- (3) Selected Field -- FLY OVER, noting terrain and obstructions, then retract flaps upon reaching a safe altitude and airspeed.
- (4) Radio and Electrical Switches -- OFF.
- (5) Wing Flaps -- 30° (on final approach).
- (6) Airspeed -- 75 KIAS.
- (7) Master Switch -- OFF.

- (8) Doors -- UNLATCH PRIOR TO TOUCHDOWN.
- (9) Touchdown -- SLIGHTLY TAIL LOW.
- (10) Ignition Switch -- OFF.
- (11) Brakes -- APPLY HEAVILY.

DITCHING

- (1) Radio -- TRANSMIT MAYDAY on 121.5 MHz, giving location and intentions.
- (2) Heavy Objects (in baggage area) -- SECURE or JETTISON.
- (3) Wing Flaps -- 30°.
- (4) Approach -- High Winds, Heavy Seas -- INTO THE WIND.
Light Winds, Heavy Swells -- PARALLEL TO SWELLS.
- (5) Power -- ESTABLISH 300 FT/MIN DESCENT at 70 KIAS.
- (6) Cabin Doors -- UNLATCH.
- (7) Touchdown -- LEVEL ATTITUDE AT 300 FT/MIN DESCENT.
- (8) Face -- CUSHION at touchdown with folded coat.
- (9) Airplane -- EVACUATE through cabin doors. If necessary, open window and flood cabin to equalize pressure so doors can be opened.
- (10) Life Vests and Raft -- INFLATE.

FIRES

DURING START ON GROUND

- (1) Ignition Switch -- START (continue cranking to obtain start).
- (2) Auxiliary Fuel Pump -- OFF.

If engine starts:

- (3) Power -- 1700 RPM for a few minutes.
- (4) Engine -- SHUTDOWN and inspect for damage.

If engine fails to start:

- (3) Ignition Switch -- START (continue cranking for two or three minutes).
- (4) Throttle -- FULL OPEN.
- (5) Mixture -- IDLE CUT-OFF.
- (6) Fire Extinguisher -- OBTAIN (have ground attendants obtain if not installed).

- (7) Engine -- SECURE.
 - a. Ignition Switch -- OFF.
 - b. Master Switch -- OFF.
 - c. Fuel Selector Valve -- OFF.
- (8) Fire -- EXTINGUISH using fire extinguisher, seat cushion, wool blanket or dirt.

NOTE

If sufficient ground personnel are available (and fire is on ground and not too dangerous) move airplane away from the fire by pushing rearward on the leading edge of the horizontal tail.

- (9) Fire Damage -- INSPECT, repair damage or replace damaged components or wiring before conducting another flight.

ENGINE FIRE IN FLIGHT

- (1) Mixture -- IDLE CUT-OFF.
- (2) Fuel Selector Valve -- OFF.
- (3) Master Switch -- OFF.
- (4) Cabin Heat and Air -- OFF (except overhead vents).
- (5) Airspeed -- 105 KIAS (If fire is not extinguished, increase glide speed to find an airspeed which will provide an incombustible mixture).
- (6) Forced Landing -- EXECUTE (as described in Emergency Landing Without Engine Power).

ELECTRICAL FIRE IN FLIGHT

- (1) Master Switch -- OFF.
- (2) All Other Switches (except ignition switch) -- OFF.
- (3) Vents/Cabin Air/Heat -- CLOSED.
- (4) Fire Extinguisher -- ACTIVATE (if available).

WARNING

If an oxygen system is available and breathing is difficult, occupants should use oxygen masks until smoke and discharged dry powder clears. After discharging an extinguisher within a closed cabin, ventilate the cabin.

If fire appears out and electrical power is necessary for continuance of flight:

- (5) Master Switch -- ON.

- (6) Circuit Breakers -- CHECK for faulty circuit, do not reset.
- (7) Radio/Electrical Switches -- ON one at a time, with delay after each until short circuit is localized.
- (8) Vents/Cabin Air/Heat -- OPEN when it is ascertained that fire is completely extinguished.

CABIN FIRE

- (1) Master Switch -- OFF.
- (2) Vents/Cabin Air/Heat -- CLOSED (to avoid drafts).
- (3) Fire Extinguisher -- ACTIVATE (if available).

WARNING

If an oxygen system is available and breathing is difficult, occupants should use oxygen masks until smoke and discharged dry powder clears. After discharging an extinguisher within a closed cabin, ventilate the cabin.

- (4) Land the airplane as soon as possible to inspect for damage.

WING FIRE

- (1) Navigation Light Switch -- OFF.
- (2) Pitot Heat Switch (if installed) -- OFF.
- (3) Strobe Light Switch (if installed) -- OFF.

NOTE

Perform a sideslip to keep the flames away from the fuel tank and cabin, and land as soon as possible.

ICING

INADVERTENT ICING ENCOUNTER

- (1) Turn pitot heat switch ON (if installed).
- (2) Turn back or change altitude to obtain an outside air temperature that is less conducive to icing.
- (3) Pull cabin heat control full out and rotate defrost knob clockwise to obtain maximum windshield defroster effectiveness.
- (4) Increase engine speed to minimize build-up on propeller blades, if excessive vibration is noted, momentarily reduce engine speed to 2200 RPM with the propeller control, and then rapidly move the control full forward.

NOTE

Cycling the RPM flexes the propeller blades and high RPM increases centrifugal force, causing ice to shed more readily.

- (5) Watch for signs of induction air filter ice and regain manifold pressure by increasing the throttle setting.

NOTE

If ice accumulates on the intake filter (causing the alternate air valve to open), a decrease of 1 to 2 inches of full throttle manifold pressure will be experienced.

- (6) If icing conditions are unavoidable, plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site.
- (7) With an ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for a significantly higher power requirement, approach speed, stall speed, and landing roll.
- (8) Open the window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
- (9) Use a 10° - 20° landing flap setting for ice accumulations of 1 inch or less. With heavier ice accumulations, approach with flaps retracted to ensure adequate elevator effectiveness in the approach and landing.
- (10) Approach at 90 to 100 KIAS with 20° flaps and 105 to 115 KIAS with 0° - 10° flaps, depending upon the amount of ice accumulation. If ice accumulation is unusually large, decelerate to the planned approach speed while in the approach configuration at a high enough altitude which would permit recovery in the event that a stall buffet is encountered.
- (11) Land on the main wheels first, avoiding the slow and high type of flare-out.
- (12) Missed approaches should be avoided whenever possible because of severely reduced climb capability. However, if a go-around is mandatory, make the decision much earlier in the approach than normal. Apply maximum power and maintain 95 KIAS while retracting the flaps slowly in 10° increments.

STATIC SOURCE BLOCKAGE
(Erroneous Instrument Reading Suspected)

- (1) Vents and Windows -- CLOSED.

- (2) Alternate Static Source Valve -- PULL ON.
- (3) Airspeed -- Consult calibration table in Section 5.

LANDING WITH A FLAT MAIN TIRE

- (1) Wing Flaps -- AS DESIRED (0° - 10° below 140 KIAS, 10° - 30° below 100 KIAS).
- (2) Elevator Control -- NOSE HIGH.
- (3) Aileron Control -- BANK TOWARD GOOD TIRE.
- (4) Touchdown -- GOOD TIRE FIRST, hold airplane off flat tire as long as possible.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

OVER-VOLTAGE LIGHT ILLUMINATES

- (1) Master Switch -- OFF (both sides).
- (2) Master Switch -- ON.
- (3) Over-Voltage Light -- OFF.

If over-voltage light illuminates again:

- (4) Electrical Load -- REDUCE to minimum to decrease battery current drain.
- (5) Flight -- TERMINATE as soon as practical

AMMETER SHOWS DISCHARGE

- (1) Alternator -- OFF.
- (2) Nonessential Electrical Equipment -- OFF.
- (3) Flight -- TERMINATE as soon as practical.

AMPLIFIED PROCEDURES

ENGINE FAILURE

If an engine failure occurs during the takeoff run, the most important thing to do is stop the airplane on the remaining runway. Those extra items on the checklist will provide added safety during a failure of this type.

Prompt lowering of the nose to maintain airspeed and establish a glide attitude is the first response to an engine failure after takeoff. In most cases, the landing should be planned straight ahead with only small changes in direction to avoid obstructions. Altitude and airspeed are seldom sufficient to execute a 180° gliding turn necessary to return to the runway. The checklist procedures assume that adequate time exists to secure the fuel and ignition systems prior to touchdown.

After an engine failure in flight, the best glide speed as shown in figure 3-1 should be established as quickly as possible. While gliding toward a suitable landing area, an effort should be made to identify the cause of the failure. If time permits, an engine restart should be attempted as shown in the checklist. If the engine cannot be restarted, a forced landing without power must be completed.

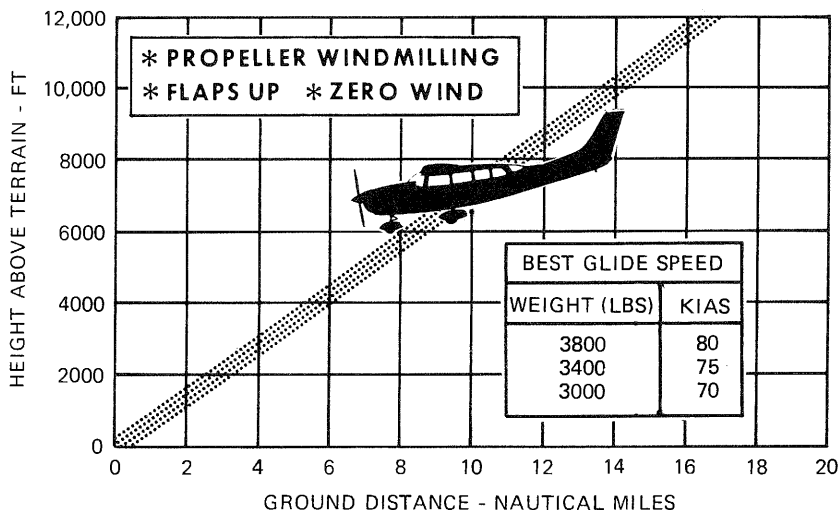


Figure 3-1. Maximum Glide

FORCED LANDINGS

If all attempts to restart the engine fail and a forced landing is imminent, select a suitable field and prepare for the landing as discussed in the checklist for engine-off emergency landings.

Before attempting an "off airport" landing with engine power available, one should drag the landing area at a safe but low altitude to inspect the terrain for obstructions and surface conditions, proceeding as discussed under the Precautionary Landing With Engine Power checklist.

Prepare for ditching by securing or jettisoning heavy objects located in the baggage area and collect folded coats or cushions for protection of occupants' face at touchdown. Transmit Mayday message on 121.5 MHz giving location and intentions.

LANDING WITHOUT ELEVATOR CONTROL

Trim for horizontal flight (with an airspeed of approximately 90 KIAS and flaps set to 20°) by using throttle and trim tab controls. Then do not change the trim tab setting and control the glide angle by adjusting power exclusively.

At flareout, the nose down moment resulting from power reduction is an adverse factor and the airplane may hit on the nose wheel. Consequently, at flareout the trim tab should be set at full nose up position and the power adjusted so that the airplane will rotate to the horizontal attitude for touchdown. Close the throttle at touchdown.

FIRES

Improper starting procedures such as excessive use of the auxiliary fuel pump during a cold weather start can cause a backfire which could ignite fuel that has accumulated in the intake duct. In this event, follow the prescribed checklist.

Although engine fires are extremely rare in flight, the steps of the appropriate checklist should be followed if one is encountered. After completion of this procedure, execute a forced landing.

The initial indication of an electrical fire is usually the odor of burning insulation. The checklist for this problem should result in elimination of the fire.

EMERGENCY OPERATION IN CLOUDS

(Vacuum System Failure)

In the event of a vacuum system failure during flight in marginal weather, the directional indicator and attitude indicator will be disabled, and the pilot will have to rely on the turn coordinator or the turn and bank indicator if he inadvertently flies into clouds. The following instructions assume that only the electrically-powered turn coordinator or the turn and bank indicator is operative, and that the pilot is not completely proficient in instrument flying.

EXECUTING A 180° TURN IN CLOUDS

Upon inadvertently entering the clouds, an immediate plan should be made to turn back as follows:

- (1) Note the time of the minute hand and observe the position of the sweep second hand on the clock.
- (2) When the sweep second hand indicates the nearest half-minute, initiate a standard rate left turn, holding the turn coordinator symbolic airplane wing opposite the lower left index mark for 60 seconds. Then roll back to level flight by leveling the miniature airplane.
- (3) Check accuracy of the turn by observing the compass heading which should be the reciprocal of the original heading.
- (4) If necessary, adjust heading primarily with skidding motions rather than rolling motions so that the compass will read more accurately.
- (5) Maintain altitude and airspeed by cautious application of elevator control. Avoid overcontrolling by keeping hands off the control wheel as much as possible and steering only with rudder.

EMERGENCY DESCENT THROUGH CLOUDS

If conditions preclude reestablishment of VFR flight by a 180° turn, a descent through a cloud deck to VFR conditions may be appropriate. If possible, obtain radio clearance for an emergency descent through clouds. To guard against a spiral dive, choose an easterly or westerly heading to minimize compass card swings due to changing bank angles. In addition, keep hands off the control wheel and steer a straight course with rudder control by monitoring the turn coordinator. Occasionally check the compass heading and make minor corrections to hold an approximate course. Before descending into the clouds, set up a stabilized let-down condition as follows:

- (1) Reduce power to set up a 500 to 800 ft./min. rate of descent.
- (2) Adjust as required for smooth engine operation.

- (3) Adjust the elevator and rudder trim control wheels for a stabilized descent at 105 KIAS.
- (4) Keep hands off control wheel.
- (5) Monitor turn coordinator and make corrections by rudder alone.
- (6) Adjust rudder trim to relieve unbalanced rudder force, if present.
- (7) Check trend of compass card movement and make cautious corrections with rudder to stop turn.
- (8) Upon breaking out of clouds, resume normal cruising flight.

RECOVERY FROM A SPIRAL DIVE

If a spiral is encountered, proceed as follows:

- (1) Close the throttle.
- (2) Stop the turn by using coordinated aileron and rudder control to align the symbolic airplane in the turn coordinator with the horizon reference line.
- (3) Cautiously apply control wheel back pressure to slowly reduce the indicated airspeed to 105 KIAS.
- (4) Adjust the elevator trim control to maintain a 105 KIAS glide.
- (5) Keep hands off the control wheel, using rudder control to hold a straight heading. Use rudder trim to relieve unbalanced rudder force, if present.
- (6) Clear engine occasionally, but avoid using enough power to disturb the trimmed glide.
- (7) Upon breaking out of clouds, resume normal cruising flight.

FLIGHT IN ICING CONDITIONS

Flight into icing conditions is prohibited. An inadvertent encounter with these conditions can best be handled using the checklist procedures. The best procedure, of course, is to turn back or change altitude to escape icing conditions.

STATIC SOURCE BLOCKED

If erroneous readings of the static source instruments (airspeed, altimeter and rate-of-climb) are suspected, the alternate static source valve should be pulled on, thereby supplying static pressure to these instruments from the cabin.

With the alternate static source on, adjust indicated airspeed slightly during climb or approach according to the alternate static source airspeed calibration table in Section 5. During cruise fly 75 feet higher than normal.

SPINS

Intentional spins are prohibited in this airplane. Should an inadvertent spin occur, the following recovery procedure should be used:

- (1) RETARD THROTTLE TO IDLE POSITION.
- (2) PLACE AILERONS IN NEUTRAL POSITION.
- (3) APPLY AND HOLD FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION.
- (4) JUST AFTER THE RUDDER REACHES THE STOP, MOVE THE CONTROL WHEEL BRISKLY FORWARD FAR ENOUGH TO BREAK THE STALL. Full down elevator may be required at aft center of gravity loadings to assure optimum recoveries.
- (5) HOLD THESE CONTROL INPUTS UNTIL ROTATION STOPS. Premature relaxation of the control inputs may extend the recovery.
- (6) AS ROTATION STOPS, NEUTRALIZE RUDDER, AND MAKE A SMOOTH RECOVERY FROM THE RESULTING DIVE.

NOTE

If disorientation precludes a visual determination of the direction of rotation, the symbolic airplane in the turn coordinator or the needle of the turn and bank indicator may be referred to for this information.

ROUGH ENGINE OPERATION OR LOSS OF POWER

SPARK PLUG FOULING

A slight engine roughness in flight may be caused by one or more spark plugs becoming fouled by carbon or lead deposits. This may be verified by turning the ignition switch momentarily from BOTH to either L or R position. An obvious power loss in single ignition operation is evidence of spark plug or magneto trouble. Assuming that spark plugs are the more likely cause, lean the mixture to the recommended lean setting for cruising flight. If the problem does not clear up in several minutes, determine if a richer mixture setting will produce smoother operation. If not, proceed to the nearest airport for repairs using the BOTH position of the ignition switch unless extreme roughness dictates the use of a single ignition position.

MAGNETO MALFUNCTION

A sudden engine roughness or misfiring is usually evidence of magneto problems. Switching from BOTH to either L or R ignition switch

position will identify which magneto is malfunctioning. Select different power settings and enrichen the mixture to determine if continued operation on BOTH magnetos is practicable. If not, switch to the good magneto and proceed to the nearest airport for repairs.

ENGINE-DRIVEN FUEL PUMP FAILURE

Failure of the engine-driven fuel pump will be evidenced by a sudden reduction in the fuel flow indication prior to a loss of power, while operating from a fuel tank containing adequate fuel.

In the event of an engine-driven fuel pump failure during takeoff, immediately hold the left half of the auxiliary fuel pump switch in the HI position until the airplane is well clear of obstacles. Upon reaching a safe altitude, and reducing the power to a cruise setting, release the HI side of the switch. The ON position will then provide sufficient fuel flow to maintain engine operation while maneuvering for a landing.

If an engine-driven fuel pump failure occurs during cruising flight, apply full rich mixture and hold the left half of the auxiliary fuel pump switch in the HI position to re-establish fuel flow. Then the normal ON position (the right half of the fuel pump switch) may be used to sustain level flight. If necessary, additional fuel flow is obtainable by holding the left half of the pump switch in the HI position.

LOW OIL PRESSURE

If low oil pressure is accompanied by normal oil temperature, there is a possibility the oil pressure gage or relief valve is malfunctioning. A leak in the line to the gage is not necessarily cause for an immediate precautionary landing because an orifice in this line will prevent a sudden loss of oil from the engine sump. However, a landing at the nearest airport would be advisable to inspect the source of trouble.

If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect that an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Use only the minimum power required to reach the desired touchdown spot.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

Malfunctions in the electrical power supply system can be detected by periodic monitoring of the ammeter and over-voltage warning light; however, the cause of these malfunctions is usually difficult to determine. A

broken alternator drive belt or wiring is the most likely cause of alternator failures, although other factors could cause the problem. A damaged or improperly adjusted voltage regulator can also cause malfunctions. Problems of this nature constitute an electrical emergency and should be dealt with immediately. Electrical power malfunctions usually fall into two categories: excessive rate of charge and insufficient rate of charge. The paragraphs below describe the recommended remedy for each situation.

EXCESSIVE RATE OF CHARGE

After engine starting and heavy electrical usage at low engine speeds (such as extended taxiing) the battery condition will be low enough to accept above normal charging during the initial part of a flight. However, after thirty minutes of cruising flight, the ammeter should be indicating less than two needle widths of charging current. If the charging rate were to remain above this value on a long flight, the battery would overheat and evaporate the electrolyte at an excessive rate. Electronic components in the electrical system could be adversely affected by higher than normal voltage if a faulty regulator setting is causing the overcharging. To preclude these possibilities, an over-voltage sensor will automatically shut down the alternator, and the over-voltage warning light will illuminate if the charge voltage reaches approximately 16 volts on a 14-volt system and 31.5 volts on the optional 28-volt system. Assuming that the malfunction was only momentary, an attempt should be made to reactivate the alternator system. To do this, turn both sides of the master switch off and then on again. If the problem no longer exists, normal alternator charging will resume and the warning light will go off. If the light comes on again, a malfunction is confirmed. In this event, the flight should be terminated and/or the current drain on the battery minimized because the battery can supply the electrical system for only a limited period of time. If the emergency occurs at night, power must be conserved for later use of the landing light and flaps during landing.

INSUFFICIENT RATE OF CHARGE

If the ammeter indicates a continuous discharge rate in flight, the alternator is not supplying power to the system and should be shut down since the alternator field circuit may be placing an unnecessary load on the system. All nonessential equipment should be turned off and the flight terminated as soon as practical.

CARGO DOOR EMERGENCY EXIT

If it is necessary to use the cargo doors as an emergency exit, open

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CESSNA
MODEL 207

the doors in accordance with the instructions shown on the placard which is mounted on the forward cargo door.

SECTION 4

NORMAL PROCEDURES

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INTRODUCTION

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with Optional Systems can be found in Section 9.

SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 3800 pounds and may be used for any lesser weight. However, to achieve the performance specified in Section 5 for takeoff distance and climb performance, the speed appropriate to the particular weight must be used.

Takeoff:

Normal Climb Out	75-85 KIAS
Maximum Performance Takeoff, Speed at 50 Feet	74 KIAS

Enroute Climb, Flaps Up:

Normal	90-100 KIAS
Best Rate of Climb, Sea Level	82 KIAS
Best Rate of Climb, 10,000 Feet	78 KIAS
Best Angle of Climb, Sea Level	66 KIAS
Best Angle of Climb, 10,000 Feet	70 KIAS

Landing Approach:

Normal Approach, Flaps Up	85-95 KIAS
Normal Approach, Flaps 30°	80-90 KIAS
Short Field Approach, Flaps 30°	76 KIAS

Balked Landing:

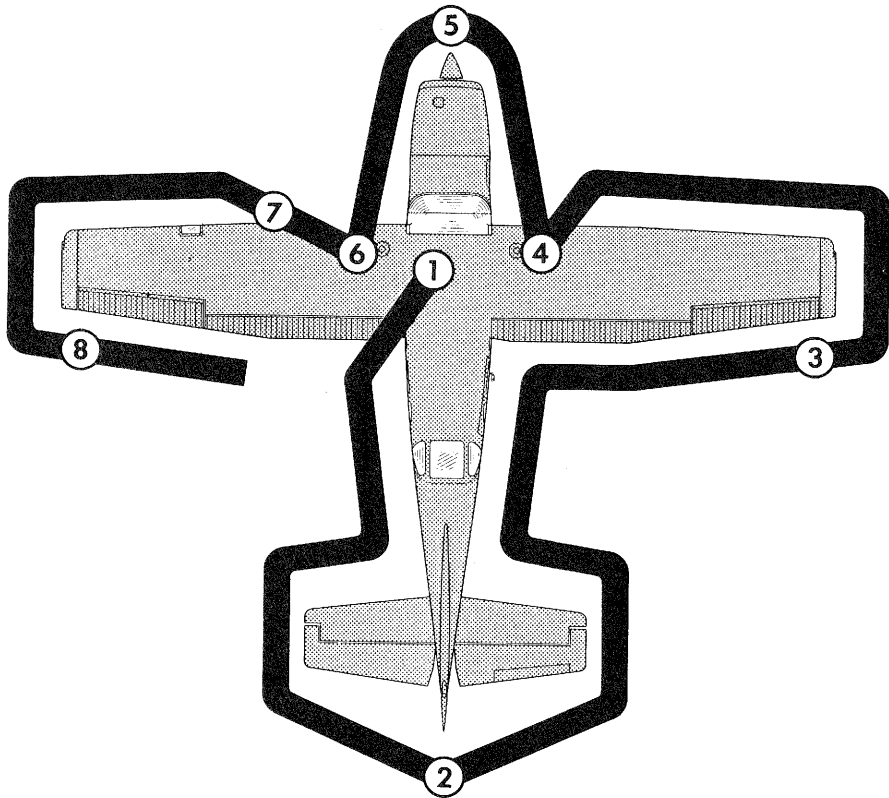
Maximum Power, Flaps 20°	80 KIAS
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Maximum Recommended Turbulent Air Penetration Speed:

3800 Lbs	132 KIAS
3050 Lbs	118 KIAS
2300 Lbs	101 KIAS

Maximum Demonstrated Crosswind Velocity:

Takeoff or Landing	20 KNOTS
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NOTE

Visually check airplane for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. If a night flight is planned, check operation of all lights, and make sure a flashlight is available.

Figure 4-1. Preflight Inspection

CHECKLIST PROCEDURES

PREFLIGHT INSPECTION

① CABIN

- (1) Control Wheel Lock -- REMOVE.
- (2) Ignition Switch -- OFF.
- (3) Master Switch -- ON.
- (4) Fuel Quantity Indicators -- CHECK QUANTITY.
- (5) Master Switch -- OFF.
- (6) Fuel Selector Valve -- FULLER TANK.

② EMPENNAGE

- (1) Static Source Opening (both sides of fuselage) -- CHECK for stoppage.
- (2) Rudder Gust Lock -- REMOVE.
- (3) Tail Tie-Down -- DISCONNECT.
- (4) Control Surfaces -- CHECK freedom of movement and security.
- (5) Check cargo doors securely latched and locked (right side only).
If cargo load will not permit access to the front cargo door inside handle, lock the door from the outside by means of the T-handle stored in the map compartment.

③ RIGHT WING Trailing Edge

- (1) Aileron -- CHECK freedom of movement and security.

④ RIGHT WING

- (1) Wing Tie-Down -- DISCONNECT.
- (2) Fuel Tank Vent -- CHECK for stoppage.
- (3) Main Wheel Tire -- CHECK for proper inflation.
- (4) Before first flight of the day and after each refueling, use sampler cup and drain small quantity of fuel from fuel tank sump quick-drain valve to check for water, sediment, and proper fuel grade (green)
- (5) Fuel Quantity -- CHECK VISUALLY for desired level.
- (6) Fuel Filler Cap -- SECURE and vent unobstructed.

⑤ NOSE

- (1) Forward Baggage Door -- CHECK for security.
- (2) Propeller and Spinner -- CHECK for nicks, security and oil leaks.
- (3) Nose Wheel Strut and Tire -- CHECK for proper inflation.
- (4) Nose Tie-Down -- DISCONNECT.
- (5) Engine Oil Level -- CHECK, do not operate with less than nine quarts. Fill to twelve quarts for extended flight.
- (6) Before first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel strainer of possible water and sediment. Check strainer drain closed. If water is observed, the fuel system may contain additional water, and further draining of the system at the strainer, fuel tank sumps and reservoirs will be necessary.

⑥ LEFT WING

- (1) Main Wheel Tire -- CHECK for proper inflation.
- (2) Before first flight of the day and after each refueling, use sampler cup and drain small quantity of fuel from fuel tank sump quick-drain valve to check for water, sediment, and proper fuel grade (green).
- (3) Fuel Quantity -- CHECK VISUALLY for desired level.
- (4) Fuel Filler Cap -- SECURE and vent unobstructed.

⑦ LEFT WING Leading Edge

- (1) Pitot Tube Cover -- REMOVE and check opening for stoppage.
- (2) Stall Warning Vane -- CHECK for freedom of movement while master switch is momentarily turned on (horn should sound when vane is pushed upward).
- (3) Wing Tie-Down -- DISCONNECT.
- (4) Fuel Tank Vent -- CHECK for stoppage.
- (5) Landing and Taxi Lights -- CHECK for condition and cleanliness.

⑧ LEFT WING Trailing Edge

- (1) Aileron -- CHECK freedom of movement and security.

BEFORE STARTING ENGINE

- (1) Preflight Inspection -- COMPLETE.
- (2) Seats, Belts, Shoulder Harnesses -- ADJUST and LOCK.
- (3) Brakes -- TEST and SET.
- (4) Cowl Flaps -- OPEN (move lever out of locking hole to reposition).
- (5) Radios, Autopilot (if installed), Electrical Equipment -- OFF.
- (6) Master Switch -- ON.
- (7) Fuel Selector Valve -- FULLER TANK.
- (8) Circuit Breakers -- CHECK IN.

STARTING ENGINE

- (1) Mixture -- RICH.
- (2) Propeller -- HIGH RPM.
- (3) Throttle -- CLOSED.
- (4) Auxiliary Fuel Pump -- ON.
- (5) Throttle -- ADVANCE to obtain 8-10 gal/hr fuel flow, then immediately return to closed position.
- (6) Auxiliary Fuel Pump -- OFF as throttle is retarded.
- (7) Propeller Area -- CLEAR.
- (8) Ignition Switch -- START.
- (9) Throttle -- ADVANCE slowly.
- (10) Ignition Switch -- RELEASE when engine starts.

NOTE

The engine should start in two or three revolutions. If it does not continue running, start again at step (3) above. If the engine does not start, leave auxiliary fuel pump switch off, set mixture to idle cut-off, open throttle, and crank until engine fires (or for approximately 15 seconds). If still unsuccessful, start again using the normal starting procedure after allowing the starter motor to cool.

- (11) Throttle -- IDLE.
- (12) Oil Pressure -- CHECK.

BEFORE TAKEOFF

- (1) Parking Brake -- SET.

- (2) Cabin Doors -- CLOSED and LOCKED.
- (3) Cowl Flaps -- OPEN.
- (4) Flight Controls -- FREE and CORRECT.
- (5) Elevator and Rudder Trim -- TAKEOFF setting.
- (6) Mixture -- RICH (below 3000 ft.).
- (7) Throttle -- 1700 RPM.
 - a. Magnetos -- CHECK (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos).
 - b. Propeller -- CYCLE from high to low RPM; return to high RPM (full forward).
 - c. Engine Instruments and Ammeter -- CHECK.
 - d. Suction Gage -- CHECK (4.6 to 5.4 In. Hg).
- (8) Flight Instruments and Radios -- SET.
- (9) Autopilot (if installed) -- OFF.
- (10) Cabin Doors and Window -- CLOSED and LOCKED.
- (11) Flashing Beacon, Navigation Lights and/or Strobe Lights -- ON as required.
- (12) Throttle Friction Lock -- ADJUST.

TAKEOFF

NORMAL TAKEOFF

- (1) Wing Flaps -- 0° - 10°.
- (2) Power -- FULL THROTTLE and 2850 RPM.
- (3) Mixture -- LEAN for field elevation per fuel flow placard.
- (4) Elevator Control -- LIFT NOSE WHEEL at 55 KIAS.
- (5) Climb Speed -- 75-85 KIAS.
- (6) Wing Flaps -- RETRACT after obstacles are cleared.

MAXIMUM PERFORMANCE TAKEOFF

- (1) Wing Flaps -- 10°.
- (2) Brakes -- APPLY.
- (3) Power -- FULL THROTTLE and 2850 RPM.
- (4) Mixture -- LEAN for field elevation per fuel flow placard.
- (5) Brakes -- RELEASE.
- (6) Elevator Control -- SLIGHTLY TAIL-LOW ATTITUDE.
- (7) Climb Speed -- 74 KIAS until all obstacles are cleared.
- (8) Wing Flaps -- RETRACT after obstacles are cleared and 80 KIAS is reached.

NOTE

Do not reduce power until wing flaps have been retracted.

ENROUTE CLIMB

NORMAL CLIMB

- (1) Airspeed -- 90-100 KIAS.
- (2) Power -- 25 INCHES Hg. and 2550 RPM.
- (3) Mixture -- LEAN to 18.0 gal./hr fuel flow.
- (4) Cowl Flaps -- OPEN as required.

MAXIMUM PERFORMANCE CLIMB

- (1) Airspeed -- 82 KIAS at sea level to 78 KIAS at 10,000 feet.
- (2) Power -- FULL THROTTLE and 2700 RPM.
- (3) Mixture -- LEAN for altitude per fuel flow placard.
- (4) Cowl Flaps -- FULL OPEN.

CRUISE

- (1) Power -- 15-25 INCHES Hg, 2200-2550 RPM (no more than 75%).
- (2) Mixture -- LEAN for cruise fuel flow as determined from your Cessna Power Computer, or in accordance with the Cruise data in Section 5.
- (3) Elevator and Rudder Trim -- ADJUST.
- (4) Cowl Flaps -- AS REQUIRED.

DESCENT

- (1) Power -- AS DESIRED.
- (2) Mixture -- LEAN for smoothness in power descents. Use full rich mixture for idle power.
- (3) Cowl Flaps -- CLOSED.

BEFORE LANDING

- (1) Fuel Selector Valve -- FULLER TANK.
- (2) Mixture -- RICH (below 3000 ft.).
- (3) Propeller -- HIGH RPM.

- (4) Wing Flaps -- DOWN 0° - 10° (below 140 KIAS), 10° - 30° (below 100 KIAS).
- (5) Airspeed -- 85-95 KIAS (flaps UP), 80-90 KIAS (flaps DOWN).
- (6) Elevator Trim -- ADJUST for landing.
- (7) Autopilot (if installed) -- OFF.

BALKED LANDING

- (1) Power -- FULL THROTTLE and 2850 RPM.
- (2) Wing Flaps -- RETRACT to 20°.
- (3) Airspeed -- 80 KIAS.
- (4) Wing Flaps -- RETRACT slowly.
- (5) Cowl Flaps -- OPEN.

NORMAL LANDING

- (1) Touchdown -- MAIN WHEELS FIRST.
- (2) Landing Roll -- LOWER NOSE WHEEL GENTLY.
- (3) Braking -- MINIMUM REQUIRED.

AFTER LANDING

- (1) Cowl Flaps -- OPEN.
- (2) Wing Flaps -- RETRACT.

SECURING AIRPLANE

- (1) Parking Brake -- SET.
- (2) Radios, Electrical Equipment -- OFF.
- (3) Mixture -- IDLE CUT-OFF (pulled full out).
- (4) Ignition Switch -- OFF.
- (5) Master Switch -- OFF.
- (6) Control Lock -- INSTALL.

AMPLIFIED PROCEDURES

STARTING ENGINE

Proper fuel management and throttle adjustments are the determining factors in securing an easy start from your continuous-flow fuel-injection engine. The procedure outlined in this section should be followed closely as it is effective under nearly all operating conditions.

Conventional full rich mixture and high RPM propeller settings are used for starting; the throttle, however, should be fully closed initially. When ready to start, place the auxiliary fuel pump switch in the ON position and advance the throttle to obtain 8-10 gal/hr fuel flow. Then close the throttle and turn off the auxiliary fuel pump. Place the ignition switch in the START position. While cranking, slowly advance the throttle until the engine starts. Slow throttle advancement is essential since the engine will start readily when the correct fuel/air ratio is obtained. When the engine has started, reset the throttle to the desired idle speed.

When the engine is hot or outside air temperatures are high, the engine may die after running several seconds because the mixture became either too lean due to fuel vapor, or too rich due to excessive prime fuel. The following procedure will prevent over-priming and alleviate fuel vapor in the system:

- (1) Set the throttle $1/3$ to $1/2$ open.
- (2) When the ignition switch is on BOTH and you are ready to engage the starter, place the right half of the auxiliary fuel pump switch ON until the indicated fuel flow comes up to 4 to 6 gal/hr; then turn the switch off.

NOTE

During a restart after a brief shutdown in extremely hot weather, the presence of fuel vapor may require the auxiliary fuel pump to operate in the ON position for up to 1 minute or more before the vapor is cleared sufficiently to obtain 4 to 6 gal/hr for starting. If the above procedure does not obtain sufficient fuel flow, fully depress and hold the left half of the switch in the HI position to obtain additional fuel pump capability.

- (3) Without hesitation, engage the starter and the engine should start in 3 to 5 revolutions. Adjust throttle for 1200 to 1400 RPM.

- (4) If there is fuel vapor in the lines, it will pass into the injector nozzles in 2 to 3 seconds and the engine will gradually slow down and stop. When engine speed starts to decrease, hold the left half of the auxiliary fuel pump switch in the HI position for approximately one second to clear out the vapor. Intermittent use of HI boost is necessary since prolonged use of the HI position after vapor is cleared will flood out the engine during a starting operation.
- (5) Let the engine run at 1200 to 1400 RPM until the vapor is eliminated and the engine idles normally.

If prolonged cranking is necessary, allow the starter motor to cool at frequent intervals, since excessive heat may damage the armature.

After starting, if the oil pressure gage does not begin to show pressure within 30 seconds in normal temperatures and 60 seconds in very cold weather, shut off the engine and investigate. Lack of oil pressure can cause serious engine damage.

TAXIING

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips. Refer to figure 4-2 for additional taxiing instructions.

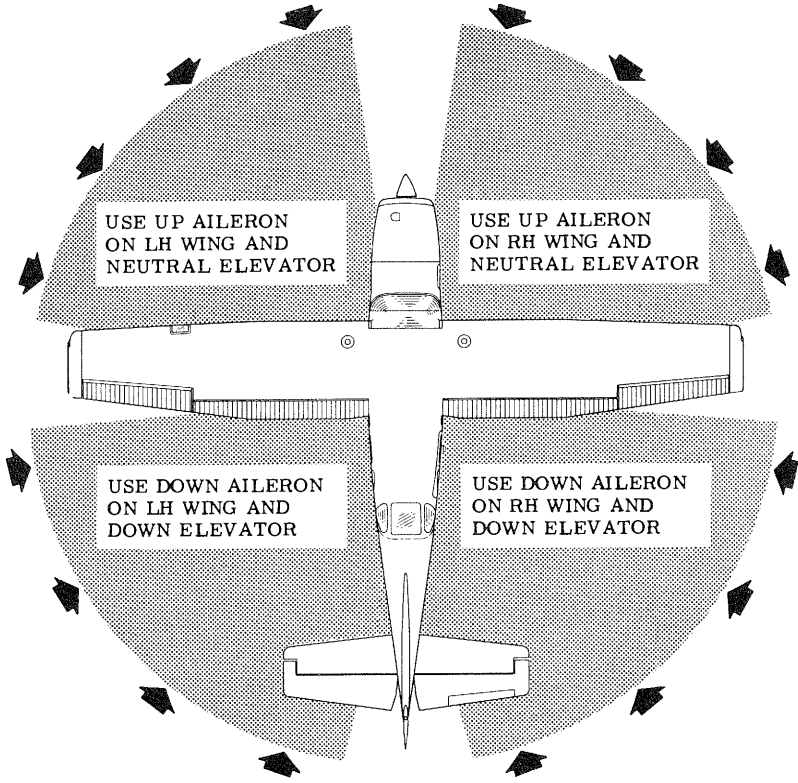
BEFORE TAKEOFF

WARM-UP

Since the engine is closely cowled for efficient in-flight cooling, precautions should be taken to avoid overheating on the ground. Full throttle checks on the ground are not recommended unless the pilot has good reason to suspect that the engine is not turning up properly.

MAGNETO CHECK

The magneto check should be made at 1700 RPM as follows. Move ignition switch first to R position and note RPM. Next move switch back to BOTH to clear the other set of plugs. Then move switch to the L position, note RPM and return the switch to the BOTH position. RPM drop should not exceed 150 RPM on either magneto or show greater than 50



CODE
WIND DIRECTION →

NOTE
Strong quartering tail winds require caution. Avoid sudden bursts of the throttle and sharp braking when the airplane is in this attitude. Use the steerable nose wheel and rudder to maintain direction.

Figure 4-2. Taxiing Diagram

RPM differential between magnetos. If there is a doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists.

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing is set in advance of the setting specified.

ALTERNATOR CHECK

Prior to flights where verification of proper alternator and voltage regulator operation is essential (such as night or instrument flights), a positive verification can be made by loading the electrical system momentarily (3 to 5 seconds) with the landing light during the engine runup (1700 RPM). The ammeter will remain within a needle width of its original position if the alternator and voltage regulator are operating properly.

TAKEOFF

POWER CHECK

It is important to check full-throttle engine operation early in the take-off run. Any sign of rough engine operation or sluggish engine acceleration is good cause for discontinuing the takeoff.

Full throttle runups over loose gravel are especially harmful to propeller tips. When takeoffs must be made over a gravel surface, it is very important that the throttle be advanced slowly. This allows the airplane to start rolling before high RPM is developed, and the gravel will be blown back of the propeller rather than pulled into it.

After full throttle is applied, adjust the throttle friction lock clockwise to prevent the throttle from creeping back from a maximum power position. Similar friction lock adjustments should be made as required in other flight conditions to maintain a fixed throttle setting.

For maximum engine power, the mixture should be adjusted during the initial takeoff roll to the fuel flow corresponding to the field elevation. (Refer to Maximum Performance Takeoff and Climb Settings placard located adjacent to fuel flow indicator.) The power increase is significant above 3000 feet and this procedure always should be employed for field elevations greater than 5000 feet above sea level.

WING FLAP SETTINGS

Using 10° wing flaps reduces the ground run and total distance over the obstacle by approximately 10 percent. Soft field takeoffs are performed with 10° flaps by lifting the nose wheel off the ground as soon as practical and leaving the ground in a slightly tail-low attitude. However, the airplane should be leveled off immediately to accelerate to a safe climb speed.

If 10° wing flaps are used for takeoff, they should be left down until all obstacles are cleared. To clear an obstacle with 10° flaps, a 74 KIAS climb speed should be used. If no obstructions are ahead, a best rate-of-climb speed of 82 KIAS would be most efficient. Flap deflections greater than 10° are not approved for takeoff.

CROSSWIND TAKEOFF

Takeoffs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length to minimize the drift angle immediately after takeoff. The airplane is accelerated to a speed slightly higher than normal, and then pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

ENROUTE CLIMB

A cruising climb at 25 inches of manifold pressure, 2550 RPM (approximately 75% power) and 90-100 KIAS is normally recommended. This type of climb provides better engine cooling, less engine wear, and more passenger comfort due to lower noise level, in addition to improved visibility ahead.

Cruising climbs should be conducted at 18 gal/hr up to 4000 feet and then at the fuel flow shown on the normal climb chart in Section 5 for higher altitudes.

If it is necessary to climb rapidly to clear mountains or reach favorable winds at high altitudes, the best rate-of-climb speed should be used with maximum continuous power (full throttle and 2700 RPM). This speed is 82 KIAS at sea level, decreasing to 78 KIAS at 10,000 feet. The mixture should be leaned as shown by the Maximum Performance Takeoff and Climb Settings placard located adjacent to the fuel flow indicator.

If an obstruction dictates the use of a steep climb angle, climb with

flaps retracted and maximum continuous power at 66 KIAS at sea level to 70 KIAS at 10,000 feet.

CRUISE

Normal cruising is performed between 55% and 75% power. The corresponding power settings and fuel consumption for various altitudes can be determined by using your Cessna Power Computer or the data in Section 5.

NOTE

Cruising should be done at 65% to 75% power until a total of 50 hours has accumulated or oil consumption has stabilized. This 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 Cruise Performance Table, figure 4-3, illustrates the advantage of higher altitude on both true airspeed and nautical miles per gallon. In addition, the beneficial effect of lower cruise power on nautical miles per gallon at a given altitude can be observed. This table should be used as a guide, along with the available winds aloft information, to determine the most favorable altitude and power setting for a given trip. The selection of cruise altitude on the basis of the most favorable wind conditions and the use of low power settings are significant factors that should be considered on every trip to reduce fuel consumption.

ALTITUDE	75% POWER		65% POWER		55% POWER	
	KTAS	NMPG	KTAS	NMPG	KTAS	NMPG
3000 Feet	139	8.8	130	9.5	120	10.3
6500 Feet	143	9.1	134	9.8	124	10.6
10,000 Feet	---	---	138	10.1	127	10.9
Standard Conditions				Zero Wind		

Figure 4-3. Cruise Performance Table

For reduced noise levels, it is desirable to select the lowest RPM in the green arc range for a given percent power that will provide smooth engine operation. The cowl flaps should be opened, if necessary, to maintain the cylinder head temperature at approximately two-thirds of the normal operating range (green arc).

For best fuel economy at 65% power or less, the engine may be operated at one gallon per hour leaner than shown in this handbook and on the power computer. This will result in approximately 6% greater range than shown in this handbook accompanied by approximately a 4 knot decrease in speed.

The fuel injection system employed on this engine is considered to be non-icing. In the event that unusual conditions cause the intake air filter to become clogged or iced over, an alternate intake air valve opens automatically for the most efficient use of either normal or alternate air, depending on the amount of filter blockage. Due to the lower intake pressure available through the alternate air valve or a partially blocked filter, full throttle manifold pressure can decrease approximately 1.5 in. Hg.

LEANING WITH A CESSNA ECONOMY MIXTURE INDICATOR (EGT)

Exhaust gas temperature (EGT) as shown on the optional Cessna Economy Mixture Indicator may be used as an aid for mixture leaning in cruising flight at 75% power or less. To adjust the mixture, using this indicator, lean to establish the peak EGT as a reference point and then enrichen the mixture by a desired increment based on the table below.

Continuous operation at peak EGT is authorized only at 65% power or less. This best economy mixture setting results in approximately 6% greater range than shown in this handbook accompanied by approximately a 4 knot decrease in speed.

MIXTURE DESCRIPTION	EXHAUST GAS TEMPERATURE
RECOMMENDED LEAN (Pilots Operating Handbook and Power Computer)	Peak EGT Minus 25°F (Enrichen)
BEST ECONOMY (65% Power or Less)	Peak EGT

Figure 4-4. EGT Table

NOTE

Operation on the lean side of peak EGT is not approved.

When leaning the mixture, if a distinct peak is not obtained, use the corresponding maximum EGT as a reference point for enriching the mixture to the desired cruise setting. Any change in altitude or power will require a recheck of the EGT indication.

STALLS

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 knots above the stall in all configurations.

Power-off stall speeds at maximum weight for both forward and aft c. g. are presented in Section 5.

LANDINGS

Landings should be made on the main wheels first to reduce the landing speed and subsequent need for braking in the landing roll. The nose wheel is lowered to the runway after the speed has diminished to avoid unnecessary nose gear load. This procedure is especially important in rough field landings.

SHORT FIELD LANDING

For short field landings, make a power approach at 76 KIAS with full flaps. After all approach obstacles are cleared, progressively reduce power. Maintain 76 KIAS approach speed by lowering the nose of the airplane. Touchdown should be made with the throttle closed, and on the main wheels first. Immediately after touchdown, lower the nose gear and apply heavy braking as required. For maximum brake effectiveness after all three wheels are on the ground, retract the flaps, hold full nose up elevator and apply maximum possible brake pressure without sliding the tires.

At light operating weights, during ground roll with full flaps, hold the control wheel full back to ensure maximum weight on the main wheels for braking. Under these conditions, full nose down elevator (control wheel full forward) will raise the main wheels off the ground.

CROSSWIND LANDING

When landing in a strong crosswind, use the minimum flap setting required for the field length. Although the crab or combination method of drift correction may be used, the wing-low method gives the best control. After touchdown, hold a straight course with the steerable nose wheel and occasional braking if necessary.

BALKED LANDING

In a bailed landing (go-around) climb, the wing flap setting should be reduced to 20° immediately after full power is applied. After all obstacles are cleared and a safe altitude and airspeed are obtained, the wing flaps should be retracted.

COLD WEATHER OPERATION

The use of an external pre-heater and an external power source is recommended whenever possible to reduce wear and abuse to the engine and the electrical system.

Pre-heat will thaw the oil trapped in the oil cooler, which probably will be congealed prior to starting in extremely cold temperatures. When using an external power source, the position of the master switch is important. Refer to Section 7, paragraph Ground Service Plug Receptacle, for operating details.

In very cold weather, no oil temperature indication need be apparent before takeoff. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), the engine is ready for takeoff if it accelerates smoothly and the oil pressure is normal and steady.

During let-down, observe engine temperatures closely and carry sufficient power to maintain them in the recommended operating range.

HOT WEATHER OPERATION

The general warm temperature starting information in this section is appropriate. Avoid prolonged engine operation on the ground.

FLIGHT WITH CARGO DOORS REMOVED

When operating with the cargo doors removed, an optional spoiler kit

must be installed to minimize strong air flow buffeting within the cabin. In addition all loose equipment, including head rests, rear window sun shade, removable arm rests, safety belts, etc., should be removed or secured. The seventh seat passengers will receive a strong air blast, and face protection in the form of goggles or helmet is recommended.

With the cargo doors removed, flight characteristics are essentially unchanged, except that a slightly different directional trim setting may be needed.

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 aircraft 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 takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas.

NOTE

The above 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 for him to adequately exercise his duty to see and avoid other aircraft.

SECTION 5 PERFORMANCE

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INTRODUCTION

Performance data charts on the following pages are presented so that you may know what to expect from the airplane under various conditions, and also, to facilitate the planning of flights in detail and with reasonable accuracy. The data in the charts has been computed from actual flight tests with the airplane and engine in good condition and using average piloting techniques.

It should be noted that the performance information presented in the range and endurance profile charts allows for 45 minutes reserve fuel based on 45% power. Fuel flow data for cruise is based on the recommended lean mixture setting. Some indeterminate variables such as mixture leaning technique, fuel metering characteristics, engine and propeller condition, and air turbulence may account for variations of 10% or more in range and endurance. Therefore, it is important to utilize all available information to estimate the fuel required for the particular flight.

Cruise speeds are shown for an airplane equipped with optional speed fairings, which increase the speed by 3 to 4 knots. There is a corresponding difference in range, while all other performance figures are unchanged when speed fairings are installed.

USE OF PERFORMANCE CHARTS

Performance data is presented in tabular or graphical form to illustrate the effect of different variables. Sufficiently detailed information is provided in the tables so that conservative values can be selected and used to determine the particular performance figure with reasonable accuracy.

SAMPLE PROBLEM

The following sample flight problem utilizes information from the various charts to determine the predicted performance data for a typical flight. The following information is known:

AIRPLANE CONFIGURATION

Takeoff weight	3700 Pounds
Usable fuel	73 Gallons

TAKEOFF CONDITIONS

Field pressure altitude	1500 Feet
Temperature	28°C (16°C above standard)
Wind component along runway	12 Knot Headwind
Field length	3500 Feet

CRUISE CONDITIONS

Total distance	550 Nautical Miles
Pressure altitude	7500 Feet
Temperature	16°C (16°C above standard)
Expected wind enroute	10 Knot Headwind

LANDING CONDITIONS

Field pressure altitude	2000 Feet
Temperature	25°C
Wind component along runway	6 Knot Headwind
Field length	3000 Feet

TAKEOFF

The takeoff distance chart, figure 5-4, should be consulted, keeping in mind that the distances shown are based on maximum performance techniques. Conservative distances can be established by reading the chart at the next higher value of weight, altitude and temperature. For example, in this particular sample problem, the takeoff distance information presented for a weight of 3800 lbs., a pressure altitude of 2000 feet and a temperature of 30°C should be used and results in the following:

Ground roll	1465 Feet
Total distance to clear a 50-foot obstacle	2665 Feet

A correction for the effect of wind may be made based on Note 3 of the takeoff chart. The distance correction for a 12 knot headwind is:

$$\frac{12 \text{ Knots}}{11 \text{ Knots}} \times 10\% = 11\% \text{ Decrease}$$

This results in the following distances, corrected for wind:

Ground roll, zero wind	1465
Decrease in ground roll (1465 feet x 11%)	<u>161</u>
Corrected ground roll	1304 Feet
Total distance to clear a 50-foot obstacle, zero wind	2665
Decrease in total distance (2665 feet x 11%)	<u>293</u>
Corrected total distance to clear 50-foot obstacle	2372 Feet

These distances are well within the takeoff field length quoted earlier for the sample problem.

CRUISE

The cruising altitude and winds aloft information has been given for this flight. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics of the airplane presented in figure 5-7, the range profile chart presented in figure 5-8, and the endurance profile chart presented in figure 5-9.

The range profile chart illustrates the relationship between power and range. Considerable fuel savings and longer range result when lower power settings are used.

For this sample problem, with a cruise altitude of 7500 feet, the range profile chart indicates that use of a 65% power setting yields a predicted range of 610 nautical miles under zero wind conditions. The endurance profile chart, figure 5-9, shows a corresponding 4.6 hours and, using this information, the estimated distance can be determined for the expected 10 knot headwind at 7500 feet as follows:

Range, zero wind	610
Decrease in range due to wind (4.6 hours x 10 knot headwind)	<u>46</u>
Corrected range	564 Nautical Miles

This indicates that the trip can be made without a fuel stop using approximately 65% power.

The cruise performance chart for 8000 feet pressure altitude (figure 5-7, sheet 4) is entered using 20°C above standard temperature. These values most nearly correspond to the planned altitude and expected temperature conditions. The power setting chosen is 2500 RPM and 21 inches of manifold pressure, which results in the following:

Power	63%
True airspeed	136 Knots
Cruise fuel flow	13.2 GPH

The power computer may be used to determine power and fuel consumption during flight.

FUEL REQUIRED

The total fuel requirement for the flight may be estimated using the performance information in figures 5-6 and 5-7. For this sample problem, figure 5-6 (using normal climb) shows that a climb from 2000 feet to 8000 feet requires 4.1 gallons of fuel. The corresponding distance during the climb is 23 nautical miles. These values are for a standard temperature and, as noted on the climb chart, the approximate effect of a non-standard temperature is to increase the time, fuel, and distance by 10% for each 8°C above standard temperature, due to the lower rate of climb. In this case, assuming a temperature 16°C above standard, the correction would be:

$$\frac{16^{\circ}\text{C}}{8^{\circ}\text{C}} \times 10\% = 20\% \text{ Increase}$$

With this factor included, the fuel estimate would be calculated as follows:

Fuel to climb, standard temperature	4.1
Increase due to non-standard temperature (4.1 x 20%)	<u>0.8</u>
Corrected fuel to climb	<u>4.9</u> Gallons

In addition, the distance may be corrected for the non-standard temperature as follows:

Distance to climb, standard temperature	23
Increase due to non-standard temperature (23 nautical miles x 20%)	<u>5</u>
Corrected distance to climb	<u>28</u> Nautical Miles

The resultant cruise distance is:

Total distance	550
Climb distance	-28
Cruise distance	<u>522</u> Nautical Miles

With an expected 10 knot headwind, the ground speed for cruise is predicted to be:

136
-10
<u>126</u> Knots

Therefore, the time required for the cruise portion of the trip is:

$$\frac{522 \text{ Nautical Miles}}{126 \text{ Knots}} = 4.1 \text{ Hours}$$

The fuel required for cruise is endurance times fuel consumption:

$$4.1 \text{ hours} \times 13.2 \text{ gallons/hour} = 54.1 \text{ Gallons}$$

The total estimated fuel required is as follows:

Engine start, taxi, and takeoff	2.0
Climb	4.9
Cruise	<u>54.1</u>
Total fuel required	61.0 Gallons

This will leave a fuel reserve of:

73.0
-61.0
<u>12.0</u> Gallons

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel required to complete the trip with ample reserve.

LANDING

A procedure similar to the takeoff calculations should be used for estimating the landing distance at the destination airport. Figure 5-10 presents maximum performance technique landing distances for various

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airport altitude and temperature combinations. The distances corresponding to 2000 feet altitude and 30°C should be used and result in the following:

Ground roll	865 Feet
Total distance to clear a 50-foot obstacle	1660 Feet

A correction for wind may be made based on Note 2 of the landing chart. The distance correction for a 6 knot headwind is:

$$\frac{6 \text{ Knots}}{11 \text{ Knots}} \times 10\% = 5\% \text{ Decrease}$$

This results in the following wind-corrected figures:

Ground roll	822 Feet
Total distance over a 50-foot obstacle	1577 Feet

These distances are well within the landing field length quoted previously for this sample problem.

AIRSPEED CALIBRATION

NORMAL STATIC SOURCE

FLAPS UP														
KIAS	50	60	70	80	90	100	110	120	130	140	150	160		
KCAS	64	69	75	82	90	99	108	117	127	137	147	158		
FLAPS 10°														
KIAS	50	60	70	80	90	100	110	120	130	140	---	---		
KCAS	61	65	71	78	87	97	109	121	134	147	---	---		
FLAPS 30°														
KIAS	50	60	70	80	90	95	---	---	---	---	---	---		
KCAS	59	64	70	78	87	92	---	---	---	---	---	---		

ALTERNATE STATIC SOURCE VENTS AND WINDOWS CLOSED

FLAPS UP														
NORMAL KIAS	50	60	70	80	90	100	110	120	130	140	150	160		
ALTERNATE KIAS	47	58	68	78	88	98	109	120	131	142	152	163		
FLAPS 10°														
NORMAL KIAS	50	60	70	80	90	100	110	120	130	140	---	---		
ALTERNATE KIAS	48	58	70	80	91	102	114	126	137	150	---	---		
FLAPS 30°														
NORMAL KIAS	50	60	70	80	90	95	---	---	---	---	---	---		
ALTERNATE KIAS	42	54	65	76	86	91	---	---	---	---	---	---		

Figure 5-1. Airspeed Calibration

TEMPERATURE CONVERSION CHART

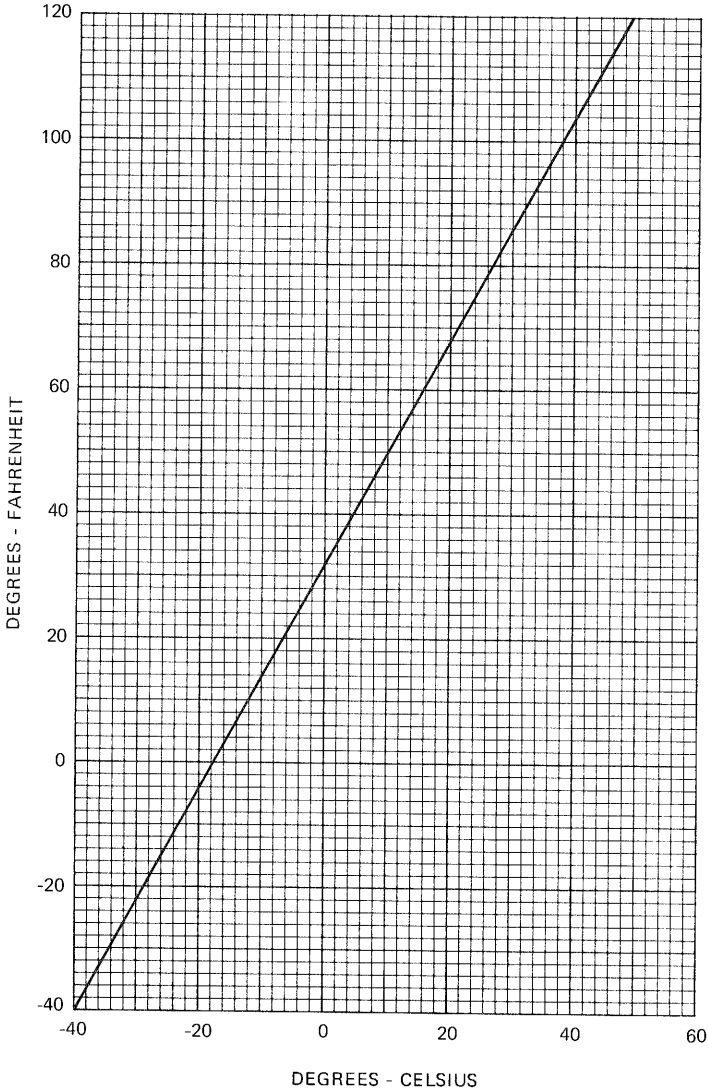


Figure 5-2. Temperature Conversion Chart

STALL SPEEDS

CONDITIONS:
Power Off

NOTES:

1. Maximum altitude loss during a stall recovery is approximately 350 feet.
2. KIAS values are approximate.

MOST REARWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
3800	UP	52	65	56	70	62	77	74	92
	10°	53	62	57	67	63	74	75	88
	30°	47	58	51	62	56	69	66	82

MOST FORWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
3800	UP	56	67	60	72	67	80	79	95
	10°	58	64	62	69	69	76	82	91
	30°	54	61	58	66	64	73	76	86

Figure 5-3. Stall Speeds

**TAKEOFF DISTANCE
MAXIMUM WEIGHT 3800 LBS**

CONDITIONS:

- Flaps 10°
- 2850 RPM and Full Throttle Prior to Brake Release
- Mixture Set at Placard Fuel Flow
- Cowl Flaps Open
- Paved, Level, Dry Runway
- Zero Wind

MIXTURE SETTING	
PRESS ALT	GPH
S.L.	24
2000	23
4000	22
6000	21
8000	20

NOTES:

1. Maximum performance technique as specified in Section 4.
2. Where distance value has been deleted, climb performance after lift-off is less than 150 fpm at takeoff speed.
3. Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2.5 knots.
4. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C			10°C			20°C			30°C			40°C		
	LIFT OFF	AT 150 FT		GRND ROLL	50 FT OBS	TOTAL TO CLEAR	GRND ROLL	50 FT OBS	TOTAL TO CLEAR	GRND ROLL	50 FT OBS	TOTAL TO CLEAR	GRND ROLL	50 FT OBS	TOTAL TO CLEAR	GRND ROLL	50 FT OBS	
3800	62	74	S.L.	985	1770	1060	1900	1140	2040	1225	2195	1315	2355					
			1000	1080	1940	1160	2085	1245	2240	1340	2410	1440	2600					
			2000	1180	2130	1270	2295	1365	2470	1465	2665	1575	2875					
			3000	1290	2345	1390	2530	1495	2730	1610	2955	1730	3195					
			4000	1415	2595	1525	2805	1645	3035	1770	3290	1905	3570					
			5000	1560	2880	1680	3125	1810	3390	1950	3685	2100	4020					
			6000	1715	3215	1850	3495	1995	3810	2150	4165	2320	4575					
			7000	1890	3615	2045	3945	2205	4325	2380	4760	---	---					
8000	2090	4095	2260	4500	2445	4970	---	---	---	---								

Figure 5-4. Takeoff Distance (Sheet 1 of 2)

**TAKEOFF DISTANCE
3500 LBS AND 3200 LBS**

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C			10°C			20°C			30°C			40°C		
	LIFT OFF	AT 50 FT		GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL	GRND ROLL	TO CLEAR 50 FT OBS	TOTAL
3500	60	71	S.L.	815	1460	875	1565	940	1675	1010	1795	1080	1925					
			1000	890	1595	955	1710	1025	1835	1100	1965	1180	2110					
			2000	970	1745	1045	1870	1120	2010	1205	2160	1295	2325					
			3000	1060	1915	1140	2055	1230	2210	1320	2380	1420	2565					
			4000	1165	2105	1250	2265	1345	2440	1450	2635	1555	2845					
			5000	1275	2320	1375	2505	1480	2705	1595	2925	1715	3165					
			6000	1405	2575	1510	2780	1630	3010	1755	3265	1890	3550					
			7000	1545	2865	1665	3105	1795	3370	1935	3670	2085	4005					
8000	1705	3205	1840	3485	1985	3800	2140	4160	2310	4570								
3200	57	68	S.L.	665	1195	715	1280	765	1370	820	1460	880	1565					
			1000	725	1305	780	1395	835	1490	895	1595	960	1710					
			2000	790	1420	850	1520	910	1630	980	1745	1050	1875					
			3000	865	1555	930	1665	1000	1785	1070	1915	1150	2060					
			4000	945	1700	1015	1825	1095	1960	1175	2110	1260	2265					
			5000	1035	1870	1115	2010	1200	2160	1290	2325	1385	2505					
			6000	1135	2060	1225	2220	1315	2390	1415	2580	1525	2785					
			7000	1250	2280	1345	2455	1450	2655	1560	2870	1680	3110					
8000	1375	2530	1485	2735	1600	2960	1720	3210	1855	3490								

Figure 5-4. Takeoff Distance (Sheet 2 of 2)

RATE OF CLIMB

MAXIMUM

CONDITIONS:

Flaps Up
2700 RPM
Full Throttle
Mixture Set at Placard Fuel Flow
Cowl Flaps Open

MIXTURE SETTING	
PRESS ALT	GPH
S.L.	23
4000	21
8000	19
12,000	17

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
3800	S.L.	82	980	885	785	690
	2000	81	845	755	660	570
	4000	80	715	625	540	450
	6000	79	585	500	420	335
	8000	79	460	380	300	220
	10,000	78	340	260	180	---
	12,000	77	220	140	60	---
3500	S.L.	80	1125	1025	925	830
	2000	79	985	890	795	700
	4000	78	845	755	665	575
	6000	77	710	625	540	460
	8000	76	580	495	415	335
	10,000	76	450	370	295	---
	12,000	75	325	245	170	---
3200	S.L.	77	1290	1190	1085	985
	2000	76	1135	1040	940	845
	4000	76	995	900	810	720
	6000	75	850	760	675	590
	8000	74	715	630	550	470
	10,000	73	575	495	420	---
	12,000	72	440	365	290	---

Figure 5-5. Rate of Climb

TIME, FUEL, AND DISTANCE TO CLIMB

MAXIMUM RATE OF CLIMB

CONDITIONS:

Flaps Up
2700 RPM
Full Throttle
Mixture Set at Placard Fuel Flow
Cowl Flaps Open
Standard Temperature

MIXTURE SETTING	
PRESS ALT	GPH
S.L.	23
4000	21
8000	19
12,000	17

NOTES:

1. Add 2.0 gallons of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
3. Distances shown are based on zero wind.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB FPM	FROM SEA LEVEL		
				TIME MIN	FUEL USED GALLONS	DISTANCE NM
3800	S.L.	82	810	0	0	0
	2000	81	700	3	1.0	4
	4000	80	595	6	2.1	8
	6000	79	490	10	3.4	14
	8000	79	385	14	4.9	21
	10,000	78	280	21	6.8	31
	12,000	77	175	30	9.5	45
3500	S.L.	80	950	0	0	0
	2000	79	835	2	0.8	3
	4000	78	725	5	1.8	7
	6000	77	610	8	2.8	11
	8000	76	500	12	4.0	17
	10,000	76	390	16	5.4	24
	12,000	75	280	22	7.2	33
3200	S.L.	77	1115	0	0	0
	2000	76	990	2	0.7	3
	4000	76	870	4	1.5	6
	6000	75	750	7	2.3	9
	8000	74	630	10	3.3	13
	10,000	73	515	13	4.4	19
	12,000	72	400	18	5.7	25

Figure 5-6. Time, Fuel, and Distance to Climb (Sheet 1 of 2)

TIME, FUEL, AND DISTANCE TO CLIMB

NORMAL CLIMB - 90 KIAS

CONDITIONS:

Flaps Up
2550 RPM
25 Inches Hg or Full Throttle
Cowl Flaps Open
Standard Temperature

MIXTURE SETTING	
PRESS ALT	GPH
S.L. to 4000	18
8000	16
12,000	14

NOTES:

1. Add 2.0 gallons of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 8°C above standard temperature.
3. Distances shown are based on zero wind.

WEIGHT LBS	PRESS ALT FT	RATE OF CLIMB FPM	FROM SEA LEVEL		
			TIME MIN	FUEL USED GALLONS	DISTANCE NM
3800	S.L.	530	0	0	0
	2000	530	4	1.1	6
	4000	505	8	2.3	12
	6000	400	12	3.6	19
	8000	290	18	5.2	29
	10,000	185	27	7.5	44
	12,000	80	44	11.5	74
3500	S.L.	640	0	0	0
	2000	640	3	0.9	5
	4000	620	6	1.9	10
	6000	505	10	2.9	16
	8000	395	14	4.2	23
	10,000	280	21	5.8	34
	12,000	170	30	8.0	51
3200	S.L.	770	0	0	0
	2000	770	3	0.8	4
	4000	750	5	1.6	8
	6000	625	8	2.4	13
	8000	505	12	3.4	19
	10,000	385	16	4.6	27
	12,000	265	23	6.1	38

Figure 5-6. Time, Fuel, and Distance to Climb (Sheet 2 of 2)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 2000 FEET

CONDITIONS:
Recommended Lean Mixture
3800 Pounds
Cowl Flaps Closed

		20°C BELOW STANDARD TEMP -9°C			STANDARD TEMPERATURE 11°C			20°C ABOVE STANDARD TEMP 31°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2550	25	---	---	---	78	140	16.3	76	140	15.8
	24	77	136	16.0	74	136	15.4	71	137	14.9
	23	72	132	15.1	70	133	14.6	67	133	14.1
	22	68	129	14.2	65	129	13.7	63	130	13.3
2500	25	78	138	16.4	76	138	15.8	73	139	15.3
	24	74	134	15.5	72	135	15.0	69	135	14.5
	23	70	131	14.7	68	131	14.2	65	132	13.7
	22	66	127	13.8	64	128	13.4	62	128	12.9
2400	25	73	133	15.3	71	134	14.8	68	134	14.3
	24	69	130	14.5	67	131	14.1	65	131	13.6
	23	66	127	13.8	63	127	13.3	61	128	12.9
	22	62	123	13.0	59	124	12.5	57	124	12.2
2300	25	69	130	14.4	66	130	13.9	64	131	13.5
	24	65	126	13.7	63	127	13.2	61	127	12.8
	23	61	123	12.9	59	124	12.5	57	124	12.1
	22	58	120	12.2	56	120	11.8	54	120	11.5
2200	25	64	125	13.3	61	125	12.9	59	126	12.5
	24	60	122	12.7	58	122	12.3	56	123	11.9
	23	57	119	12.0	55	119	11.6	53	119	11.3
	22	53	115	11.4	51	115	11.0	50	115	10.7
	21	50	111	10.7	48	111	10.4	46	111	10.1
	20	46	107	10.0	45	107	9.7	43	106	9.5

Figure 5-7. Cruise Performance (Sheet 1 of 6)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 4000 FEET

CONDITIONS:
Recommended Lean Mixture
3800 Pounds
Cowl Flaps Closed

		20°C BELOW STANDARD TEMP -13°C			STANDARD TEMPERATURE 7°C			20°C ABOVE STANDARD TEMP 27°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2550	24	79	140	16.4	76	140	15.8	73	141	15.3
	23	74	136	15.5	72	137	15.0	69	137	14.5
	22	70	133	14.6	67	133	14.1	65	134	13.7
	21	66	129	13.8	63	129	13.3	61	130	12.9
2500	25	---	---	---	78	142	16.2	75	142	15.7
	24	76	138	15.9	74	138	15.4	71	139	14.9
	23	72	134	15.1	70	135	14.6	67	136	14.1
	22	68	131	14.2	65	131	13.7	63	132	13.3
2400	25	75	137	15.7	72	137	15.1	70	138	14.6
	24	71	134	14.9	69	134	14.4	66	135	13.9
	23	67	130	14.1	65	131	13.6	63	131	13.2
	22	63	127	13.3	61	127	12.9	59	128	12.5
2300	25	70	133	14.7	68	134	14.2	66	134	13.8
	24	67	130	14.0	64	130	13.5	62	131	13.1
	23	63	127	13.3	61	127	12.8	59	128	12.4
	22	59	123	12.5	57	124	12.1	55	124	11.8
2200	25	65	128	13.6	63	129	13.2	61	129	12.8
	24	62	125	13.0	59	126	12.5	57	126	12.2
	23	58	122	12.3	56	123	11.9	54	123	11.6
	22	55	119	11.7	53	119	11.3	51	119	11.0
	21	51	115	11.0	50	115	10.7	48	115	10.4
	20	48	111	10.4	46	111	10.0	45	110	9.8
	19	44	106	9.7	43	106	9.4	41	105	9.1

Figure 5-7. Cruise Performance (Sheet 2 of 6)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 6000 FEET

CONDITIONS:
Recommended Lean Mixture
3800 Pounds
Cowl Flaps Closed

		20°C BELOW STANDARD TEMP -17°C			STANDARD TEMPERATURE 3°C			20°C ABOVE STANDARD TEMP 23°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2550	24	---	---	---	78	144	16.2	75	145	15.7
	23	76	140	16.0	74	141	15.4	71	141	14.9
	22	72	137	15.1	69	137	14.5	67	138	14.1
	21	68	133	14.2	65	133	13.7	63	134	13.3
2500	24	78	142	16.3	75	142	15.8	73	143	15.2
	23	74	138	15.5	71	139	14.9	69	139	14.4
	22	70	135	14.6	67	135	14.1	65	136	13.7
	21	66	131	13.8	63	132	13.3	61	132	12.9
2400	24	73	137	15.2	70	138	14.7	68	138	14.2
	23	69	134	14.5	67	135	14.0	64	135	13.5
	22	65	131	13.7	63	131	13.2	61	132	12.8
	21	61	127	12.9	59	128	12.5	57	128	12.1
2300	24	68	134	14.3	66	134	13.8	64	135	13.4
	23	65	130	13.6	62	131	13.1	60	131	12.7
	22	61	127	12.9	59	127	12.4	57	127	12.1
	21	57	123	12.1	55	123	11.8	53	123	11.4
2200	24	63	129	13.3	61	129	12.8	59	130	12.4
	23	60	126	12.6	58	126	12.2	56	126	11.8
	22	57	122	12.0	54	122	11.6	53	122	11.2
	21	53	119	11.3	51	119	11.0	49	118	10.7
	20	50	115	10.7	48	114	10.3	46	114	10.0
	19	46	110	10.0	44	110	9.7	43	109	9.4

Figure 5-7. Cruise Performance (Sheet 3 of 6)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 8000 FEET

CONDITIONS:
Recommended Lean Mixture
3800 Pounds
Cowl Flaps Closed

		20°C BELOW STANDARD TEMP -21°C			STANDARD TEMPERATURE -1°C			20°C ABOVE STANDARD TEMP 19°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2550	22	74	141	15.5	71	141	14.9	69	142	14.5
	21	70	137	14.6	67	138	14.1	65	138	13.6
	20	66	133	13.7	63	134	13.3	61	134	12.8
	19	61	129	12.9	59	129	12.4	57	129	12.0
2500	22	72	139	15.0	69	139	14.5	67	140	14.0
	21	68	135	14.2	65	136	13.7	63	136	13.2
	20	63	131	13.3	61	132	12.9	59	132	12.5
	19	59	127	12.5	57	127	12.1	55	127	11.7
2400	22	67	135	14.1	65	135	13.6	62	135	13.1
	21	63	131	13.3	61	131	12.8	59	132	12.4
	20	59	127	12.5	57	127	12.1	55	127	11.7
	19	55	123	11.7	53	123	11.4	51	123	11.0
2300	22	63	131	13.2	61	131	12.8	59	131	12.4
	21	59	127	12.5	57	127	12.1	55	127	11.7
	20	55	123	11.8	53	123	11.4	52	123	11.1
	19	52	119	11.1	50	118	10.7	48	118	10.4
2200	22	58	126	12.3	56	126	11.9	54	126	11.5
	21	55	122	11.6	53	122	11.3	51	122	10.9
	20	51	118	11.0	49	118	10.7	48	117	10.3
	19	48	114	10.3	46	113	10.0	44	112	9.7
	18	44	109	9.7	43	108	9.4	41	107	9.1

Figure 5-7. Cruise Performance (Sheet 4 of 6)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 10,000 FEET

CONDITIONS:
Recommended Lean Mixture
3800 Pounds
Cowl Flaps Closed

		20°C BELOW STANDARD TEMP -25°C			STANDARD TEMPERATURE -5°C			20°C ABOVE STANDARD TEMP 15°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2550	20	68	137	14.2	65	138	13.7	63	138	13.2
	19	63	133	13.3	61	134	12.8	59	134	12.4
	18	59	129	12.4	56	129	12.0	55	129	11.6
	17	54	123	11.5	52	123	11.2	50	123	10.8
2500	20	65	135	13.7	63	136	13.3	61	136	12.8
	19	61	131	12.9	59	131	12.4	57	131	12.0
	18	57	127	12.0	55	126	11.6	53	126	11.3
	17	52	121	11.2	50	121	10.8	49	120	10.5
2400	20	61	131	12.9	59	131	12.4	57	131	12.0
	19	57	127	12.1	55	127	11.7	53	127	11.3
	18	53	122	11.3	51	122	11.0	49	121	10.6
	17	49	117	10.6	47	116	10.2	45	115	9.9
2300	20	57	127	12.1	55	127	11.7	53	127	11.4
	19	53	123	11.4	51	122	11.0	50	122	10.7
	18	50	118	10.7	48	117	10.3	46	116	10.0
	17	46	112	9.9	44	111	9.6	42	110	9.3
2200	20	53	122	11.3	51	122	11.0	49	121	10.6
	19	49	118	10.7	48	117	10.3	46	116	10.0
	18	46	113	10.0	44	112	9.7	43	110	9.4

Figure 5-7. Cruise Performance (Sheet 5 of 6)

CRUISE PERFORMANCE
PRESSURE ALTITUDE 12,000 FEET

CONDITIONS:
Recommended Lean Mixture
3800 Pounds
Cowl Flaps Closed

		20°C BELOW STANDARD TEMP -29°C			STANDARD TEMPERATURE -9°C			20°C ABOVE STANDARD TEMP 11°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2550	18	61	133	12.8	58	133	12.3	56	133	12.0
	17	56	128	11.9	54	128	11.5	52	127	11.2
	16	51	122	11.0	50	121	10.7	48	121	10.3
	15	47	115	10.1	45	114	9.8	43	113	9.5
2500	18	59	131	12.4	57	131	12.0	55	130	11.6
	17	54	126	11.6	52	125	11.2	50	124	10.8
	16	50	120	10.7	48	119	10.4	46	118	10.0
	15	45	113	9.8	43	111	9.5	42	109	9.2
2400	18	55	126	11.7	53	126	11.3	51	125	11.0
	17	51	121	10.9	49	120	10.6	47	119	10.2
	16	47	115	10.1	45	114	9.8	43	112	9.5
2300	18	51	122	11.0	49	121	10.6	48	120	10.3
	17	47	116	10.3	46	115	9.9	44	114	9.6
	16	43	110	9.5	42	108	9.2	40	106	8.9
2200	18	48	117	10.3	46	116	10.0	44	114	9.7
	17	44	111	9.6	42	109	9.3	41	107	9.0

Figure 5-7. Cruise Performance (Sheet 6 of 6)

RANGE PROFILE
45 MINUTES RESERVE
54 GALLONS USABLE FUEL

CONDITIONS:

3800 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature
Zero Wind

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb as shown in figure 5-6, (sheet 2).
2. Reserve fuel is based on 45 minutes at 45% BHP and is 7.4 gallons.

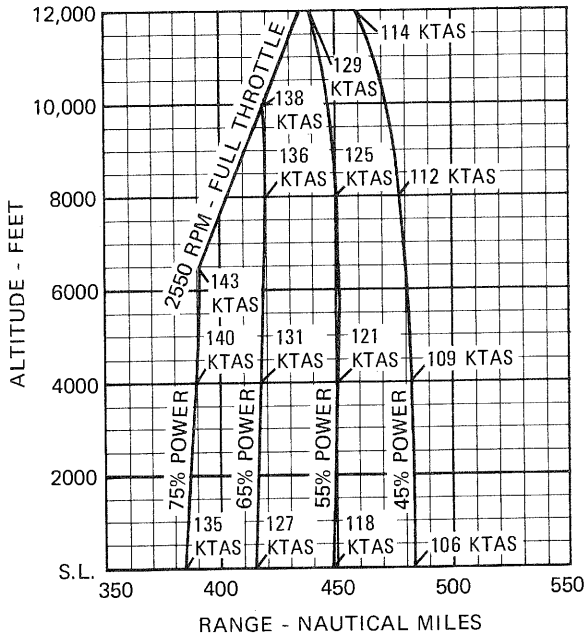


Figure 5-8. Range Profile (Sheet 1 of 2)

RANGE PROFILE
45 MINUTES RESERVE
73 GALLONS USABLE FUEL

CONDITIONS

3800 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature
Zero Wind

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb as shown in figure 5-6 (sheet 2).
2. Reserve fuel is based on 45 minutes at 45% BHP and is 7.4 gallons.

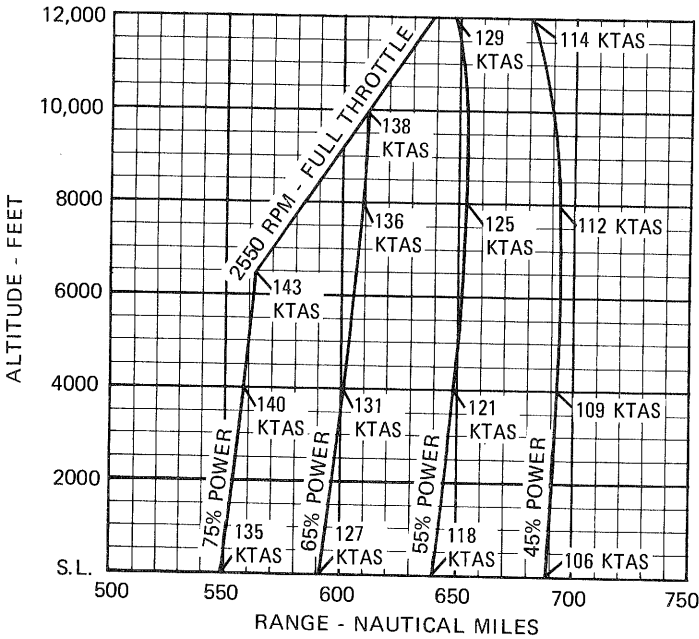


Figure 5-8. Range Profile (Sheet 2 of 2)

ENDURANCE PROFILE

45 MINUTES RESERVE
54 GALLONS USABLE FUEL

CONDITIONS:

3800 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the time during a normal climb as shown in figure 5-6 (sheet 2).
2. Reserve fuel is based on 45 minutes at 45% BHP and is 7.4 gallons.

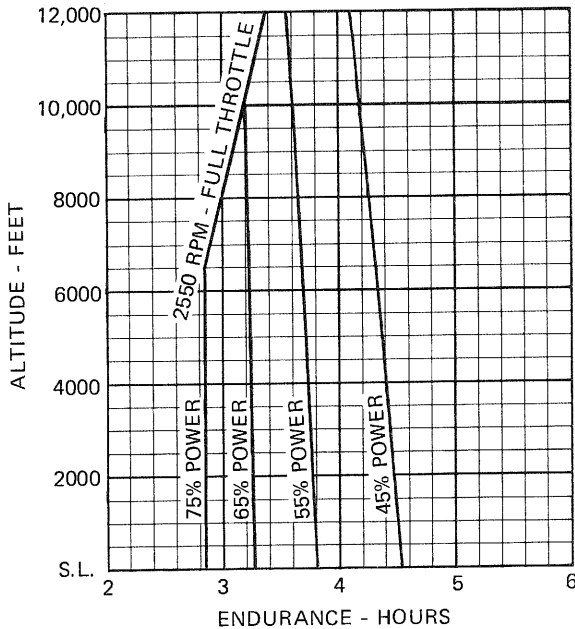


Figure 5-9. Endurance Profile (Sheet 1 of 2)

ENDURANCE PROFILE

45 MINUTES RESERVE
73 GALLONS USABLE FUEL

CONDITIONS:

3800 Pounds
Recommended Lean Mixture for Cruise
Standard Temperature

NOTES:

1. This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the time during a normal climb as shown in figure 5-6 (sheet 2).
2. Reserve fuel is based on 45 minutes at 45% BHP and is 7.4 gallons.

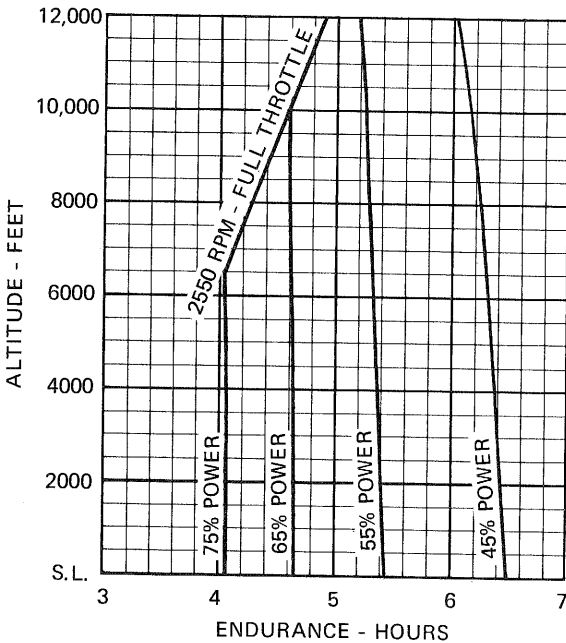


Figure 5-9. Endurance Profile (Sheet 2 of 2)

LANDING DISTANCE

CONDITIONS:

- Flaps 30°
- Power Off
- Maximum Braking
- Paved, Level, Dry Runway
- Zero Wind

NOTES:

1. Maximum performance technique as specified in Section 4.
2. Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2.5 knots.
3. For operation on a dry, grass runway, increase distances by 40% of the "ground roll" figure.

WEIGHT LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	0°C			10°C			20°C			30°C			40°C		
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS			
3800	76	S.L.	725	1435	750	1475	780	1525	805	1565	805	1565	830	1605			
		1000	750	1475	780	1525	805	1565	835	1615	835	1615	860	1655			
		2000	780	1525	810	1570	835	1615	865	1660	865	1660	895	1710			
		3000	810	1570	840	1620	870	1670	900	1720	900	1720	930	1765			
		4000	840	1620	870	1670	900	1720	930	1770	930	1770	965	1825			
		5000	870	1670	905	1725	935	1775	965	1825	965	1825	1000	1880			
		6000	905	1725	940	1780	970	1835	1005	1890	1005	1890	1035	1940			
		7000	940	1785	975	1840	1010	1895	1045	1955	1045	1955	1075	2005			
		8000	975	1840	1010	1900	1050	1960	1085	2020	1085	2020	1120	2075			

Figure 5-10. Landing Distance

SECTION 6 WEIGHT & BALANCE/ EQUIPMENT LIST

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INTRODUCTION

This section describes the procedure for establishing the basic empty weight and moment of the airplane. Sample forms are provided for reference. Procedures for calculating the weight and moment for various operations are also provided. A comprehensive list of all Cessna equipment available for this airplane is included at the back of this section.

It should be noted that specific information regarding the weight, arm, moment and installed equipment list for this airplane can only be found in the appropriate weight and balance records carried in the airplane.

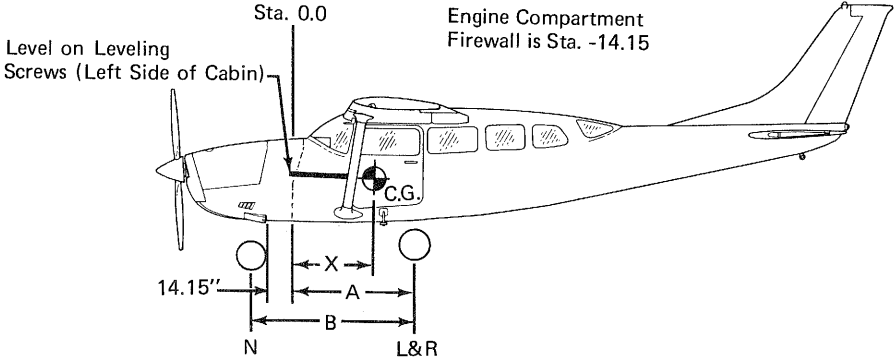
AIRPLANE WEIGHING PROCEDURES

- (1) Preparation:
 - a. Inflate tires to recommended operating pressures.
 - b. Remove the fuel tank sump quick-drain fittings and reservoir tank quick-drain fittings to drain all fuel.
 - c. Remove oil sump drain plug to drain all oil.
 - d. Move sliding seats to the most forward position.
 - e. Raise flaps to the fully retracted position.
 - f. Place all control surfaces in neutral position.
- (2) Leveling:
 - a. Place scales under each wheel (minimum scale capacity, 1000 pounds).
 - b. Deflate nose tire and/or lower or raise the nose strut to properly center the bubble in the level (see Figure 6-1).
- (3) Weighing:
 - a. With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading.
- (4) Measuring:
 - a. Obtain measurement A by measuring horizontally (along the airplane center line) from a line stretched between the main wheel centers to a plumb bob dropped from the firewall, then subtract 14.15 inches from this measurement.
 - b. Obtain measurement B by measuring horizontally and parallel to the airplane center line from center of nose wheel axle, left side, to a plumb bob dropped from the line between the main wheel centers. Repeat on right side and average the measurements.
- (5) Using weights from (3) and measurements from (4) the airplane weight and C. G. can be determined.
- (6) Basic Empty Weight may be determined by completing Figure 6-1.

SECTION 6
WEIGHT & BALANCE/
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CESSNA
MODEL 207

Datum (Front Baggage Compartment Rear Wall, Front Face, Lower Portion)



Scale Position	Scale Reading	Tare	Symbol	Net Weight
Left Wheel			L	
Right Wheel			R	
Nose Wheel			N	
Sum of Net Weights (As Weighed)			W	

$$X = \text{ARM} = (A) - \frac{(N) \times (B)}{W}; X = (\quad) - \frac{(\quad) \times (\quad)}{(\quad)} = (\quad) \text{ IN.}$$

Item	Weight (Lbs.) X C.G. Arm (In.) = Moment/1000 (Lbs.-In.)	
Airplane Weight (From Item 5, page 6-3)		
Add Oil:		
No Oil Filter (12 Qts at 7.5 Lbs/Gal)	-37.4	
With Oil Filter (13 Qts at 7.5 Lbs/Gal)	-37.4	
Add Unusable Fuel:		
Std. Tanks (7.0 Gal at 6 Lbs/Gal)	48.0	
L.R. Tanks (7.0 Gal at 6 Lbs/Gal)	48.0	
Equipment Changes		
Airplane Basic Empty Weight		

Figure 6-1. Sample Airplane Weighing

WEIGHT AND BALANCE

The following information will enable you to operate your Cessna within the prescribed weight and center of gravity limitations. To figure weight and balance, use the Sample Problem, Loading Graph, and Center of Gravity Moment Envelope as follows:

Take the basic empty weight and moment from appropriate weight and balance records carried in your airplane, and enter them in the column titled YOUR AIRPLANE on the Sample Loading Problem.

NOTE

In addition to the basic empty weight and moment noted on these records, the c. g. arm (fuselage station) is also shown, but need not be used on the Sample Loading Problem. The moment which is shown must be divided by 1000 and this value used as the moment/1000 on the loading problem.

Use the Loading Graph to determine the moment/1000 for each additional item to be carried; then list these on the loading problem.

NOTE

Loading Graph information for the pilot, passengers and baggage or cargo is based on seats positioned for average occupants and baggage or cargo loaded in the center of these areas as shown on the Loading Arrangements diagram. For loadings which may differ from these, the Sample Loading Problem lists fuselage stations for these items to indicate their forward and aft c. g. range limitation (seat travel or baggage/cargo area limitation). Additional moment calculations, based on the actual weight and c. g. arm (fuselage station) of the item being loaded, must be made if the position of the load is different from that shown on the Loading Graph.

When a cargo pack is installed, it is necessary to determine the c. g. arm and calculate the moment/1000 of items carried in the pack. The arm for any location in the pack can be determined from the diagram on Figure 6-5. Multiply the weight of the item by the c. g. arm, then divide by 1000 to get the moment/1000. The maximum loading capacity of the pack is 300 pounds.

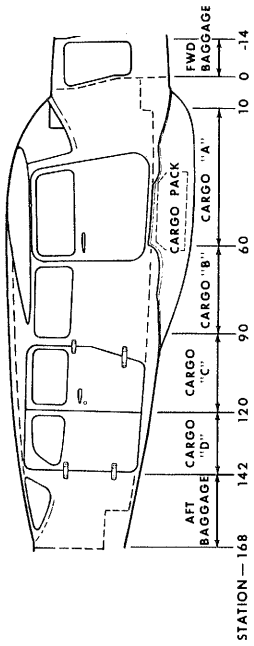
Total the weights and moments/1000 and plot these values on the Center of Gravity Moment Envelope to determine whether the point falls within the envelope, and if the loading is acceptable.

PASSENGER/CARGO LOADING

The airplane forward baggage compartment, aft baggage area and long passenger cabin provide great flexibility in useful load arrangement. However, the pilot must exercise caution in placement of cargo load and passengers since it is possible to exceed allowable center of gravity limits. Also, a temporary shift toward an extreme aft center of gravity can result from improper boarding of passengers in the rear cabin and lead to tail tipping. Operators should study their individual airplane's weight and balance information to become familiar with load capabilities and limitations. The following recommendations are suggested for various loading situations.

- (1) For flights with only a pilot, one passenger and minimum cargo, load full fuel and place all cargo in the rear cabin area.
- (2) In flights with additional passengers or cargo, passengers should occupy the forward seats first. Heavier cargo loads should be placed in the forward baggage compartment.
- (3) When loading is heavy (such as pilot, six passengers or heavy cargo), load the heaviest passengers in the forward seats or place the maximum cargo weight in the forward baggage compartment. If range of flight permits, reduce fuel load.
- (4) Boarding of passengers or loading of cargo presents no special problem if the weight is distributed properly. However, extremely heavy rear cabin loading with little or no forward cabin loading can cause tail tipping on the ground. Therefore, during the process of loading or unloading, concentrations of passengers or cargo in the rear cabin area should be avoided.

LOADING ARRANGEMENTS



* Pilot or passenger center of gravity on adjustable seats positioned for average occupant. Numbers in parenthesis indicate forward and aft limits of occupant center of gravity range.

** Arms measured to the center of the areas shown.

Note: The aft baggage wall (approximate station 168) can be used as a convenient interior reference point for determining the location of baggage area fuselage stations.

C.G. ARM

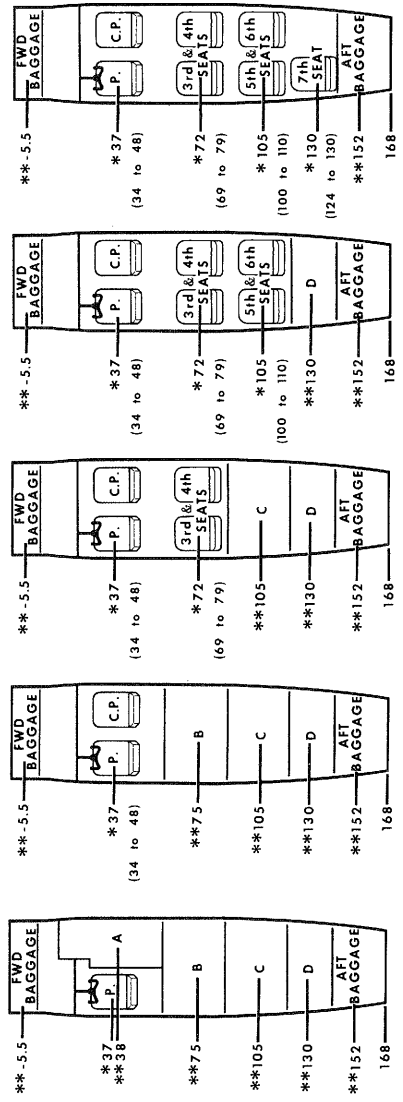


Figure 6-3. Loading Arrangements

Since your Cessna is capable of carrying large amounts of cargo, it will be necessary to properly secure this load before flight. Provided as standard equipment are two tie-downs at the base of the rear window for baggage net tie-down only, and four tie-downs on the floor which can be used for cargo or baggage net tie-down. An optional tie-down kit is available from any Cessna dealer. Provided in this kit are 16 tie-down blocks that fasten to the seat rails, one "D" ring on the floor at fuselage station 154, and four "D" rings in the forward baggage compartment. If more tie-down points are needed, the seat belt attaching points, as well as shoulder harness attaching points, may be used. Rope, strap, or cable used for tie-down should be rated at a minimum of ten times the load weight capacity of the tie-down fittings used.

The following table shows the maximum allowable cargo weight for each type of attachment:

ITEM	LOCATION	*MAXIMUM LOAD (LBS.)
Seat Rail Tie-Down Assy	On Seat Rail Section Without Lock Pin Holes	200
Seat Rail Tie-Down Assy	On Seat Rail Section With Lock Pin Holes	100
"D" Rings	Floor only	60
Seat Belt Attachment	Floor or Side-Wall	200
Shoulder Strap	Cabin Top	175

*Rated load per attachment (Cargo Item Wt. ÷ No. Tie-Downs). A sufficient number of attachments to restrain the cargo from shifting should be used in addition to load requirements.

FOR EXAMPLE:

A 400# load would require a minimum of four (4) tie-downs rated at 100# each.

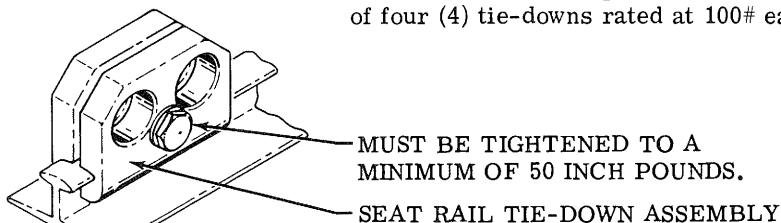
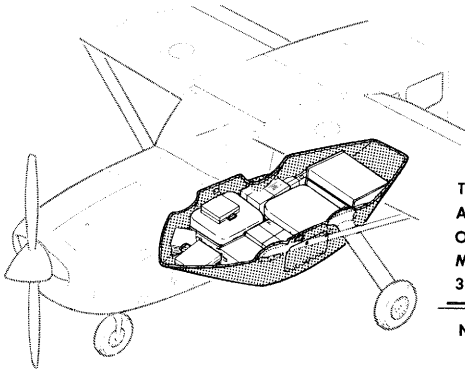
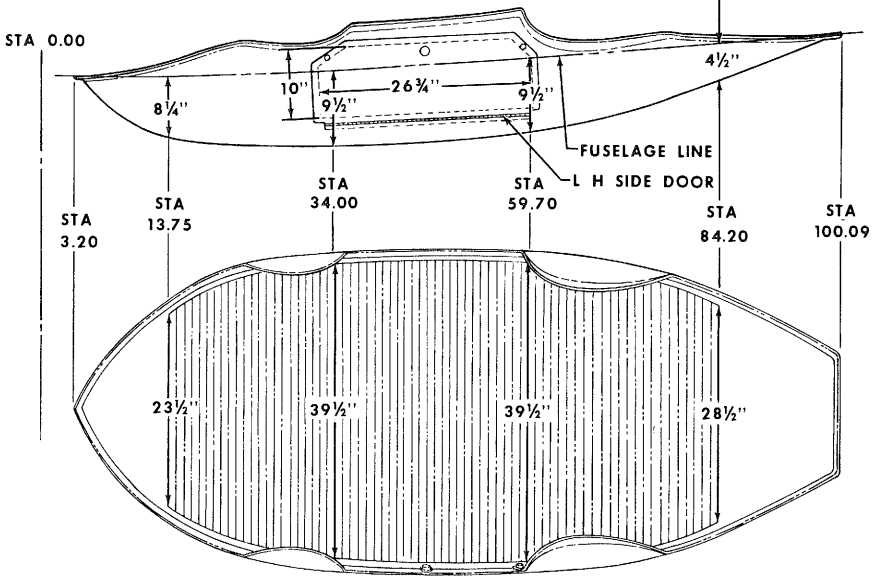


Figure 6-4. Cargo Loading

SECTION 6
WEIGHT & BALANCE/
EQUIPMENT LIST

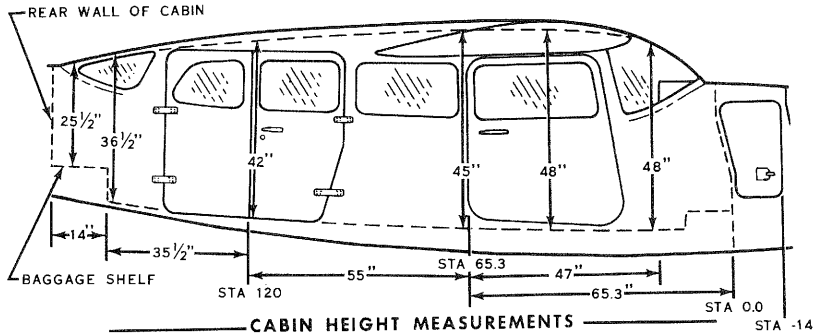
CESSNA
MODEL 207



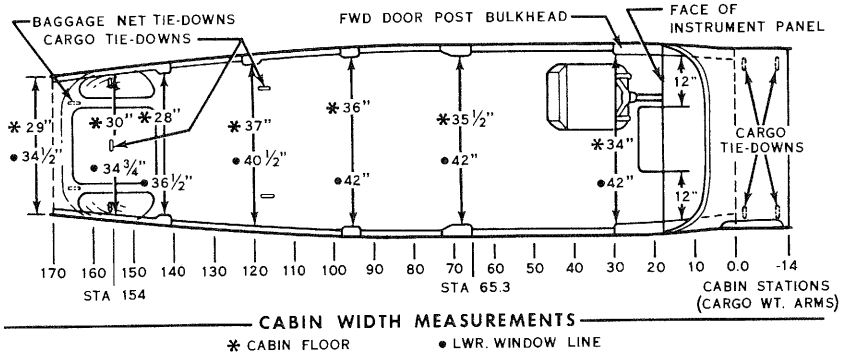
THE CARGO PACK WAS DESIGNED TO ACCOMMODATE THREE "TWO-SUITERS", PLUS OTHER SMALL MISCELLANEOUS ARTICLES. MAXIMUM LOADING FOR CARGO PACK IS 300 POUNDS.

NOTE: STATION LOCATION AND C.G. ARM ARE IDENTICAL

Figure 6-5. Cargo Pack



DOOR OPENING DIMENSIONS				
	WIDTH (TOP)	WIDTH (BOTTOM)	HEIGHT (FRONT)	HEIGHT (REAR)
CABIN DOORS	31 1/2"	37"	41"	39"
CARGO DOORS	43"	40"	40"	38"
BAGGAGE DOOR	16"	12"	22 1/2"	22 1/2"



NOTES:

1. Use the forward face of the rear doorpost, station 65.3 as a reference point to locate C.G. arms. For example, a box with its center of weight located 13 inches aft of station 65.3 would have a C.G. arm of (65.3 + 13.0 = 78.3) 78.3 inches.
2. Maximum allowable floor loading: 200 pounds/square foot. However, when items with small or sharp support areas are carried, the installation of a 1/4" plywood floor is highly recommended to protect the aircraft structure.

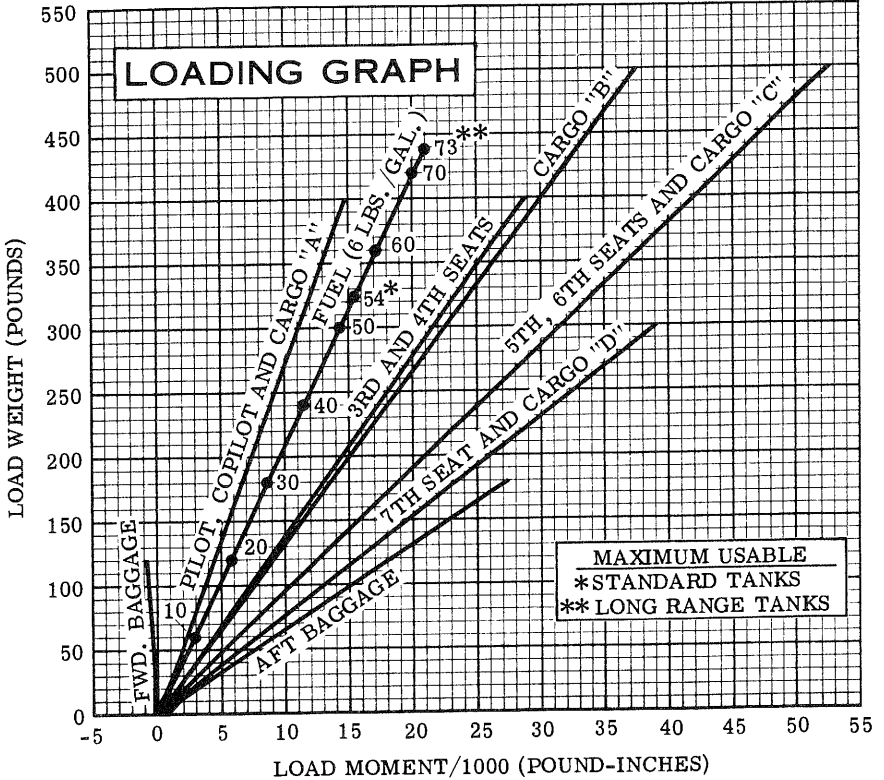
Figure 6-6. Internal Cabin Dimensions

SECTION 6
WEIGHT & BALANCE/
EQUIPMENT LIST

CESSNA
MODEL 207

	SAMPLE AIRPLANE		YOUR AIRPLANE	
	Weight (lbs.)	Moment (lb.-ins./1000)	Weight (lbs.)	Moment (lb.-ins./1000)
1. Basic Empty Weight (Use the data pertaining to your airplane as it is presently equipped. Includes unusable fuel and full oil)	2128	74.8		
2. Usable Fuel (At 6 Lbs./Gal.)				
Standard Tanks (54 Gal. Maximum)				
Long Range Tanks (73 Gal. Maximum)	438	21.0		
3. Pilot and Copilot (Station 34 to 48)	340	12.6		
4. 3rd and 4th Seats (Station 69 to 79)	340	24.5		
5. 5th and 6th Seats (Station 100 to 110)	340	35.7		
6. 7th Seat (Station 124 to 130)				
7. Baggage: Fwd (Station -14 to 0; 120 Lbs. Max.)	120	-0.7		
Aft (Station 142 to 168; 180 Lbs. Max.)	94	14.3		
8. *Cargo "A" (Station 10 to 60)				
*Cargo "B" (Station 60 to 90)				
*Cargo "C" (Station 90 to 120)				
*Cargo "D" (Station 120 to 142)				
9. Cargo Pack (Station 13 to 84; 300 Lbs. Max.)				
10. TOTAL WEIGHT AND MOMENT	3800	182.2		
11. Locate this point (3800 at 182.2) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable. *Maximum allowable cargo loads will be determined by the type and number of tie-downs used as well as by the airplane weight and C.G. limitations. Floor loading must not exceed 200 lbs. per square foot.				

Figure 6-7. Sample Loading Problem



NOTE: Lines representing adjustable seats show the pilot or passenger center of gravity on adjustable seats positioned for an average occupant. Refer to the Loading Arrangements diagram for forward and aft limits of occupant c. g. range.

Figure 6-8. Loading Graph

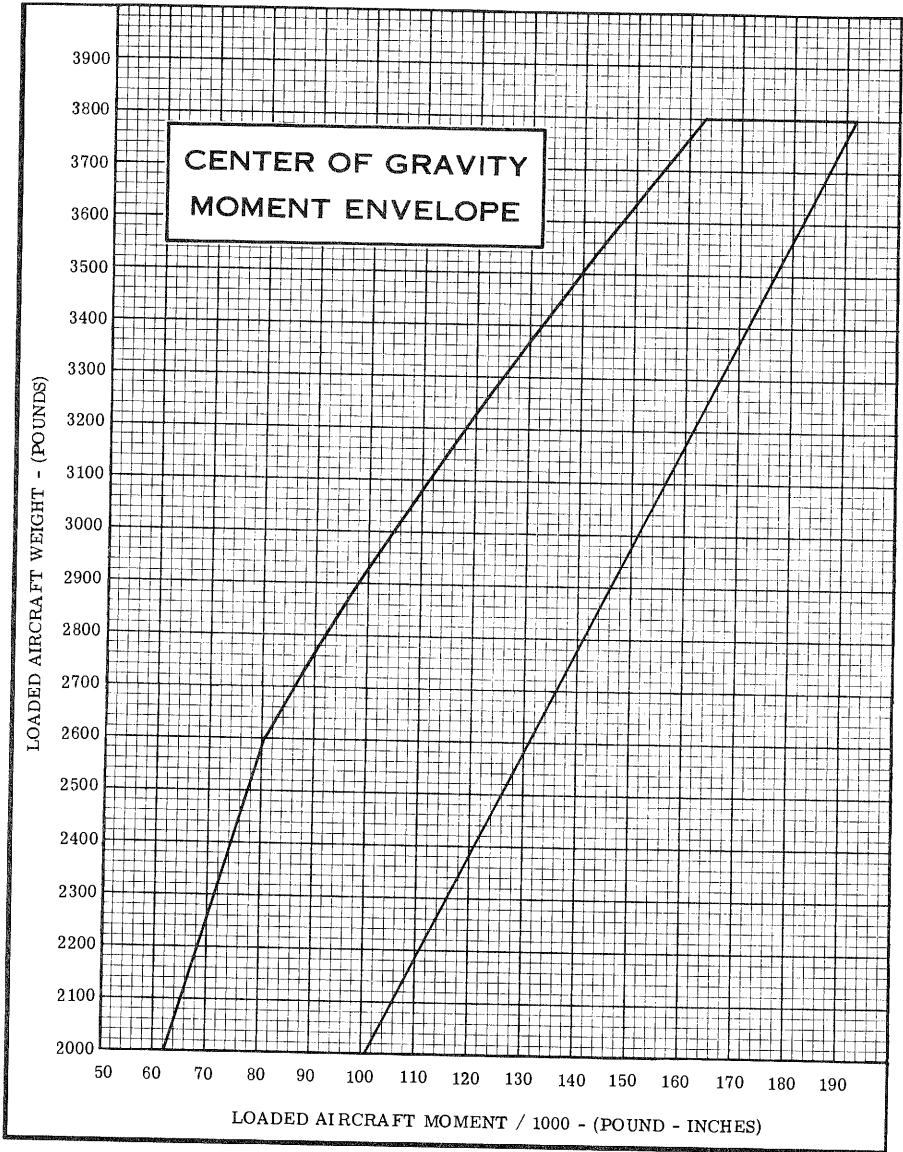


Figure 6-9. Center of Gravity Moment Envelope

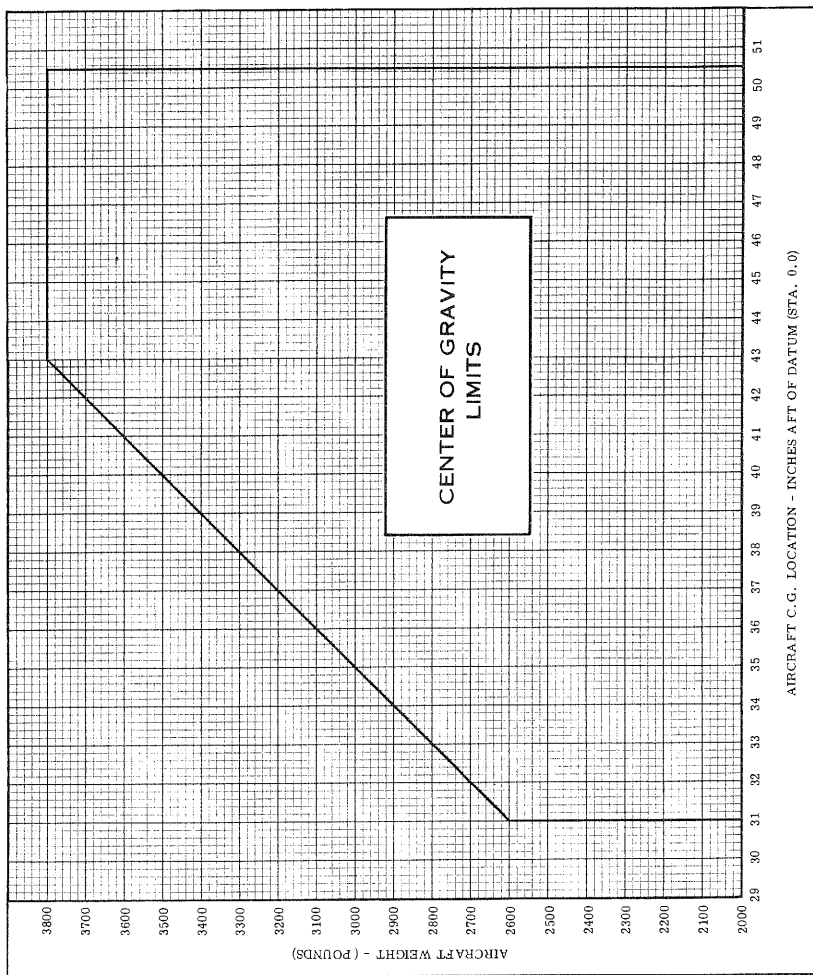


Figure 6-10. Center of Gravity Limits

EQUIPMENT LIST

The following equipment list is a comprehensive list of all Cessna equipment available for this airplane. A separate equipment list of items installed in your specific airplane is provided in your aircraft file. The following list and the specific list for your airplane have a similar order of listing.

This equipment list provides the following information:

An item number gives the identification number for the item. Each number is prefixed with a letter which identifies the descriptive grouping (example: A. Powerplant & Accessories) under which it is listed. Suffix letters identify the equipment as a required item, a standard item or an optional item. Suffix letters are as follows:

- R = required items of equipment for FAA certification
- S = standard equipment items
- O = optional equipment items replacing required or standard items
- A = optional equipment items which are in addition to required or standard items

A reference drawing column provides the drawing number for the item.

NOTE

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

Columns showing weight (in pounds) and arm (in inches) provide the weight and center of gravity location for the equipment.

NOTE

Unless otherwise indicated, true values (not net change values) for the weight and arm are shown. Positive arms are distances aft of the airplane datum; negative arms are distances forward of the datum.

NOTE

Asterisks (*) after the item weight and arm indicate complete assembly installations. Some major components of the assembly are listed on the lines immediately following. The summation of these major components does not necessarily equal the complete assembly installation.

SECTION 6
WEIGHT & BALANCE/
EQUIPMENT LIST

CESSNA
MODEL 207

ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
A01-R	A. POWERPLANT & ACCESSORIES ENGINE, CONTINENTAL IO-520-F SPEC. 3 TWO MAGNETOS WITH IMPULSE COUPLING OIL COOLER, MCDHARRISON OIL COOLER, HARRISON OIL COOLER, MCDHINE TWELVE 18MM X 3/4 20-3A SPARK PLUGS STARTER, 12 VOLT STARTER, 12 VOLT IGN AIR, 6C AMP FILTERNATOR, 14 VOLT AUX COOLER, MCN-CC CIT (REPLACES OIL COOLER IN ITEM A01-R AND CHANGES ENGINE DESIGNATION TO IO-520-F SPEC 9) (NET CHARGE) FIL ADAPTER ASSEMBLY FILTER CAN ASSEMBLY, AC 6436992 FILTER ELEMENT KIT, AC 6435683 PROPELLER ASSEMBLY, 2 BLADE 82 INCH MCCAULEY HUB/BLADE D2A34C58790A1-8 PROPELLER ASSEMBLY, 2 BLADE 80 INCH MCCAULEY HUB/BLADE D3A32C90782NC-2 GOVERNOR, PROPELLER (MCCALLEY C290D4714) GOVERNOR, PROPELLER (WOODWARD 210462) SPINNER ASSEMBLY FOR 2 BLADE PROPELLER SPINNER ASSEMBLY FOR 3 BLADE PROPELLER A41-0 VACUUM SYSTEM, ENGINE DRIVEN A61-A VACUUM PUMP RELIEF VALVE SUCTION GAUGE MISC. 2 POINT MANIFOLD TYPE PRIMER, 2 POINT MANIFOLD TYPE CIT QUICK BRAIN VALVE (NET CHANGE) AIR INDUCTION SYSTEM	1250010 SLICK 662 TCM 626189-A TCM 639171 SLM 350 TCM 634592 1250704 TCM 639171 TCM 639171 0750606-9 1250922-1 C294505-0101 C294505-0102 C161004-0106 C161006-0205 C161032-0102 C161040-0108 1250909 1250909 1201055-1 C431003 C482001-0501 C668540-0101 1250802 1256011 1250700-7	450.0* 12.9 2.3 5.3 5.3 17.8 11.0 11.5 12.3 4.5* 2.0 1.8 0.3 55.3* 37.9 66.0* 6 3.0 3.0 3.5 3.5 4.4* 2.8 10.3 0.6 1.0 1.0 0.5 0.5	-35.5* -31.0 -51.4 -50.5 -38.0 -27.5 -15.5 -50.5 -23.0 -23.3 -22.8 -59.0* -59.0* -59.0 -53.5 -53.5 -59.5 -59.5 -17.7* -22.3 17.4 -9.0 -10.0 -20.5

ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
B01-R	B. LANDING GEAR & ACCESSORIES WHEEL, BRAKE & TIRE ASSY, 6.00-6 MAIN (2) WHEEL ASSY, CLEVELAND 4C-75B (EACH) BRAKE ASSY, CLEVELAND 30-52F (LEFT) BRAKE ASSY, CLEVELAND 30-52F (RIGHT) TIRE, 8 PLY, RATED BLACKWALL (EACH) TUBE, (EACH)	1241200	40.2*	62.0*
		C163001-0301	6.2	62.0
		C163003-0307	2.9	62.0
		C163003-0308	8.7	62.0
		C262003-0208	1.8	62.0*
		C262023-0102	44.4*	62.0*
		1241200	6.2	62.0
		C163001-0302	2.9	62.0
		C163003-0309	2.9	62.0
		C163003-0309	1.9	62.0
B04-R-1	WHEEL, BRAKE & TIRE ASSY, 8.00-6 MAIN (2) WHEEL ASSY, CLEVELAND 4C-75C (EACH) BRAKE ASSY, CLEVELAND 30-52E (LEFT) BRAKE ASSY, CLEVELAND 30-52E (RIGHT) TIRE, 6PLY, RATED BLACKWALL TUBE, (EACH)	C262003-0204	2.2*	62.0*
		1241156-104	8.9*	62.0*
		1241156-12	2.8	62.1*
		C262003-0202	2.0	62.1*
		C1630015B0103	1.1	62.1*
		C163003-0201	1.9*	62.1*
		C163003-0201	3.8	62.1*
		C262023-0202	5.0	62.1*
		C262023-0101	1.1	62.2*
		1241156-107	14.2*	62.2*
B04-O-1	WHEEL & TIRE ASSY, 6.00-6 NCSE WHEEL ASSY, CLEVELAND 4C-77 TIRE, 4 PLY RATED BLACKWALL TUBE, (EACH) GEAR STRUT INSTL, CVERSIZE WHEEL (NET CHANGE)	C262003-0101	6.2	22.3
		1241156-11	3.0	22.3
		C262003-0101	1.9	22.3
		C262023-0102	2.0	21.6
		1243615	2.0	21.6
		C163015B0105	15.3*	22.2*
		C163003-0301	5.2	22.3
		C262003-0101	6.9	22.3
		C262023-0102	1.9	22.3
		1243615	2.0	21.6
B10-O-1	WHEEL FAIRING INSTL, STANDARD TIRES (NET CHANGE) WHEEL FAIRING, MAIN, EACH WHEEL FAIRING, NCSE WHEEL FAIRING, MAIN WHEEL (EACH)	1241230	19.3*	39.8*
		1241225	5.6	57.6
		0543079	3.7	24.1
		1241228	0.6	63.4

SECTION 6
WEIGHT & BALANCE/
EQUIPMENT LIST

CESSNA
MODEL 207

ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
B10-0-2	WHEEL FAIRING, INSTL, OVERSIZE TIRES WHEEL FAIRING, MAIN (EACH) WHEEL FAIRING, NOSE BRAKE FAIRING, MAIN WHEEL (EACH)	1241231 1241229 1243045 1241232	25.0* 7.6 5.2 0.8	50.8* 67.9 -20.6 64.4
C01-R C04-R C07-A C10-A C19-0 C22-A C25-A C31-A C40-A C43-R C43-0 C46-A C49-S C64-0	C. ELECTRICAL SYSTEM BATTERY, 12 VOLT, 33 AMP HOUR REGULATOR, 14 VOLT, ALTERNATOR GROUND SERVICE PLUG RECEPTACLE, 12 OR 24V ELEVATOR TRIM, ELECTRIC ACTUATOR ASSY HEATING SYSTEM, STALL SENSOR & PITOT (NET CHANGE) 14 & 28 VOLT LIGHT INSTL, INSTRUMENT WHEEL MAP (SET OF 2) LIGHT INSTL, CONTROL WHEEL MAP (SET OF 2) LIGHT INSTL, UNDERWING LIGHTS (SET OF 2) DEFLECTORS, NAVIGATION LIGHTS (SET OF 2) LIGHT INSTL, OMNIFLASH BEACON, 14 VOLT BEACON LIGHT (IN FIN TIP) 14 VOLT FLASHER POWER SUPPLY, 14 CR 28 VOLT FLASHER POWER SUPPLY, 14 CR 28 VOLT FLASHER POWER SUPPLY, 14 CR 28 VOLT FLASHER POWER SUPPLY, TIP STROBE LIGHT INSTL, ALTACTION WING TIP STROBE FLASHER LIGHTS (EACH WING TIP) STROBE LIGHTS & TAXI LIGHT (L H WING) LIGHTS LANDING & TAXI (L H WING) 24 VOLT ELECTRICAL SYSTEM (NET CHANGE)	0712605-1 C611001-0201 1213819 1260537 1260153 1200816-1 1213384 0760020 1201054-1 0701013-1 1270802 C621001-0106 C594502-0101 1270810 C561001-0102 C564502-0101 C652007 C652007-0101 C652006-0101 0523118 1270810	26.6 0.5 2.0 5.1* 3.3 0.2 0.5 0.1 0.1 0.5 NEGL 1.6* 0.4 0.7 1.6* 0.7 0.7 2.9* 2.3 0.3 2.5 -1.7	-9.5 -15.5 -24.0 22.4 249.0 22.1 18.5 22.5 61.9 - 246.2* 283.0 282.7 282.2* 282.7 282.7 43.7* 44.7 40.5 31.0 -19.0
D01-R D01-0 D04-A D07-R	D. INSTRUMENTS INDICATOR, AIRSPEED INDICATOR, TRUE AIRSPEED STATIC SOURCE, ALTERNATE ALTITUDE, SPNSITIVE (20,000 FEET)	C661064-0207 1201108-8 1201121-1 C661071-0101	1.0 1.0 0.3 1.0	17.0 17.0 15.4 16.5

ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
D07-0-1	ALTIMETER, SENSITIVE (FEET & MILLIBARS) (20,000 FEET)	C661071-0102	1.0	16.5
D07-0-2	ALTIMETER, SENSITIVE (FEET & MILLIBARS) (32,000 FEET)	C661071-0202	1.0	16.5
D07-0-3	ALTIMETER, SENSITIVE (20 FT. MARKINGS) (35,000 FEET)	C661025-0102	1.0	16.5
D10-A	ALTIMETER, SENSITIVE (2ND INSTL. - MAKES DUAL ALTIMETER INSTL.)	1213681	0.8	17.8
D16-A-1	ALTIMETER, ENCODING (REQUIRES RELOCATION OF REGULAR ALTIMETER)	1213732	2.8	15.1
D16-A-2	ALTIMETER, ENCODING, FEET & MILLIBARS, (REQUIRES RELOCATION OF REG. ALTIMETER)	1213732	2.8	15.1
D25-S	CLOCK, ELECTRIC INSTALLATION	C664508-0101	0.5	17.5
D28-R	COMPASS, MAGNETIC INSTALLATION	1213679-1	0.6	21.5
D34-R	INSTRUMENT CLUSTER ENGINE	C669502-0202	1.5	17.5
D49-A	INDICATOR, INSTALLATION, ECCALCY MIXTURE FGT INDICATOR, ALCCR 2C2-2AY	1200677	0.7*	17.2*
	THERMOCOUPLE, LEAD WIRE	C668501-0211	0.4	17.3
	THERMOCOUPLE, PROBE, ALCCR 01-005-1A44	C668501-0206	0.1	-7.5
D55-R	GAUGE, MANIFOLD PRESSURE & FUEL FLOW (REQUIRES ITEM A61-A VACUUM SYSTEM)	C668501-0204	0.1	-32.2
D64-A-1	GYRO, INSTALLATION, A61-A VACUUM SYSTEM (REQUIRES ITEM A61-A VACUUM SYSTEM)	C662037-0103	1.0	16.5
	DIRECTIONAL INDICATOR	1201070-1	6.9*	13.6*
	FILTER, ASSEMBLY	C661075	2.2	15.5
	FILTER, ASSEMBLY	C661076	2.5	15.1
	FILTER, ASSEMBLY	C294501-0101	2.5	11.7
D64-A-2	GYRO, INSTALLATION FOR 3CCA NAV-O-MATIC (REQUIRES ITEM A61-A VACUUM SYSTEM)	1201070	2.1	10.7
	DIRECTIONAL INDICATOR	40760	6.9*	13.6*
	FILTER, ASSEMBLY	C661076	3.1	14.0
	FILTER, ASSEMBLY	C294501-0101	2.1	15.1
D64-A-3	GYRO, INSTALLATION FOR 4CC NAV-O-MATIC (REQUIRES ITEM A61-A VACUUM SYSTEM)	1201070	0.5	11.5
	DIRECTIONAL INDICATOR	40760	1.2	10.8
	FILTER, ASSEMBLY	37570	7.5*	13.7*
	FILTER, ASSEMBLY	C294501-0101	3.1	14.0
D67-A	GYRO, INSTALLATION	1200747	2.3	15.7
D82-S	GAUGE, OUTSIDE AIR TEMP. (C668507-0101)	0701010	0.5	11.5
D85-R	TACHOMETER, RECORDING	C668020-0107	1.6	11.0
			0.8	12.6
			0.1	26.5
			1.5	15.0

SECTION 6
WEIGHT & BALANCE/
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ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
D88-S	INDICATOR, TURN COORDINATOR 14 VOLT	C661003-0504	1.3	16.8
D88-C-1	INDICATOR, TURN COORDINATOR 28 VOLT	C661003-0505	1.3	16.8
D88-C-2	ITEM H31-A-1 COORDINATOR (FOR USE WITH VOLT	42320-0014	1.9	14.2
D88-C-3	ITEM H31-A-1 COORDINATOR (FOR USE WITH VOLT	42320-0028	1.9	14.2
D88-C-4	ITEM H31-A-2 COORDINATOR (FOR USE WITH VOLT	42320-0014	1.9	14.2
D88-C-5	ITEM H31-A-2 COORDINATOR (FOR USE WITH VOLT	42320-0028	1.9	14.2
D88-C-6	ITEM H31-A-2 COORDINATOR (FOR USE WITH VOLT	S-1413-2	2.0	16.0
D88-C-7	ITEM H31-A-2 COORDINATOR (FOR USE WITH VOLT	S-1303-2	2.0	16.0
D91-S	INDICATOR, RATE OF CLIMB	C661080-0101	1.0	16.5
E. CABIN ACCOMMODATIONS				
E01-A	ARM REST, 2ND ROW SEAT INBOARD REMOVABLE (2)	1214121	1.5	37.0
E02-A	ARM REST, 2ND ROW SEAT INBOARD REMOVABLE (2)	1214121	1.5	74.0
E03-A	SEAT, 2ND, 3RD & 4TH ROW, AV. ARM	1215013	2.8	97.0
E05-C-1	SEAT, 2ND, 3RD & 4TH ROW, AV. ARM	07114024	13.0	44.8
E05-C-2	SEAT, 2ND, 3RD & 4TH ROW, AV. ARM	07114025	24.0	40.5
E05-C-3	SEAT, 2ND, 3RD & 4TH ROW, AV. ARM	07114019	13.0	44.8
E07-A-1	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	07114024	23.0	40.5
E07-A-2	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	07114019	23.0	40.5
E07-A-3	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	07114025	23.0	40.5
E07-A-4	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	07114024	23.0	40.5
E09-A-1	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	07114019	23.0	40.5
E11-A-1	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	07114024	23.0	40.5
E11-A-2	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	07114019	23.0	40.5
E13-A-1	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	112114107	16.5	78.0
E13-A-2	SEAT, CO-PILOT - DELUXE INFINITE ADJUST	112114108	16.5	106.1
E15-C	SAFETY BELT, PILOT	12114108	1.0	10.9
E15-S	SAFETY BELT, PILOT	S-2275-103	1.0	13.4
E15-S	SAFETY BELT, PILOT	S-2275-201	1.0	37.0
E15-S	SAFETY BELT, PILOT	S-2275-201	1.0	102.4

ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
E19-0	SAFETY BELT & SHOULDER HARNESS, INERTIA REEL UNSTL. PILOT & CO-PILOT (NET CHG)	1201136	3.8	89.1
E23-0	SAFETY BELT & SHOULDER HARNESS, (NET CHG)	S-2275-3	1.6	37.0
E27-A-1	SAFETY BELTS, 2ND ROW (SET OF 2)	S-1746	2.0	74.0
E29-A-1	SAFETY BELTS, & SHOULDER HARNESS (2)	S-2275	3.2	95.5
E29-A-2	SAFETY BELTS, & SHOULDER HARNESS, THIRD ROW	S-1746	3.2	95.5
E31-0-1	SAFETY BELT, 4TH ROW (1)	S-2275	1.0	130.0
E31-0-2	SAFETY BELT, 4TH ROW HARNESS, FOURTH ROW	-2275-22	1.6	130.0
E34-0	LEATHER INTERIOR, NET CHANGE	1215013-32	18.5	84.5
E35-A	LEATHER SEATING INSTALLATION (NET CHANGE) (ADCS WEIGHTING IS 0.5 LB. PER SEAT)	CES-1158	3.5	81.4
E37-0	WINDOW, REMOVABLE RH	1211861	2.3	82.3
E41-S	DOOR, FORWARD AND AFT CARGO	1211670	22.1	120.4
F41-A-1	SPEAKER (INSTALLED ARM E41-S)	1200197	1.0	91.7
F41-A-2	SKYDIVING KIT (REQUIRES REMOVAL CF E41-S, REQUIRING KIT (REQUIRES REMOVAL CF E41-S, WEIGHT CHANGE NOT INCLUDED)	1201008	1.3	85.3
E47-A	OXYGEN SYSTEM, 48 CU. FT. CAPACITY REGULATOR EMPTY CYLINDER & C166C02-401 PASSENGERS OXYGEN MASKS (1 PILOT, 4 PASSENGERS) 48 CU. FT. (1800 PSI) OXYGEN @ 0.0832 LBS./CU. FT.	12C0810 C166001-0601 C166005	34.6* 22.4 1.5 4.0	164.5* 179.0 67.2 179.0
E50-A	HEADRESTS, FRONT SEAT (SET OF 2)	1215073	2.0	47.0
E50-S	SUN VISORS, (SET OF 2)	0700122	1.0	33.0
E50-A	FLOOR, APPROACH PLATE	1215036	0.5	22.5
E65-S	NET, BAGGAGE RETAINING	1215036	1.0	152.0
E71-A	CARGO TIE-DOWN PROVISIONS (USE INSTALLED CARGO ARM)	1201123	2.5	-
E75-A	STRETCHER (BOXED)	0700164	-	-
E79-A	AMBULANCE KIT (WITH OXYGEN BOTTLE & ARM)	1210080	68.0	85.4
E80-A	CONTROLS, DUAL (WITH PEDALS, ICE BRAKES)	1260004-7	9.5	12.5
E80-C	CONTROL, DUAL (WHOLE, PEDALS, ICE BRAKES)	0160020	0.0	-
E89-C	CABIN HEATING (INCLUDES ENGINE EXHAUST SYS)	1250011	14.9*	-30.5*
E93-R	CABIN HEAT & HEATER, LEFT SIDE EXHAUST & HEATER, RIGHT SIDE	1250257 1250256	7.2 7.7	-32.9 -28.2

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ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
	F. PLACARDS & WARNING			
F01-R	PLACARD - OPERATIONAL, VFR (DAY-NIGHT) (STANDARD INTERIOR)	1205114-1	NEGL	-
F01-O-1	PLACARD - OPERATIONAL, IFR (DAY-NIGHT) (STANDARD INTERIOR)	1205114-2	NEGL	-
F01-O-2	PLACARD - OPERATIONAL, VFR (DAY-NIGHT) (DELUXE INTERIOR)	1205114-3	NEGL	-
F01-O-3	PLACARD - OPERATIONAL, IFR (DAY-NIGHT) (DELUXE INTERIOR)	1205114-4	NEGL	-
F04-R	INDICATOR, STALL WARNING, AUDIBLE	S-1407-6	1.0	14.0
	G. AUXILIARY EQUIPMENT			
G04-A	HOOK, TOW (INSTALLED ARM SHOWN)	0712643-1	0.5	260.0
G07-A	RINGS, AIR PLANE POISTING	1201016	0.9	78.0
G13-A	CCRRCS, ICN PROOFING, INTERNAL	1260100-5	8.0	158.0
G16-A	DISCHARGERS, STATIC (SET CF 10)	1201140-1	0.4	236.0
G19-A	STARTLIZER, ABRASION, BOOTS	0500041-2	1.5	152.0
G22-S	TOW BAR, OVERALL, EXTERIOR	0501019	1.6	106.3*
G25-S	PAINT, OVERALL, EXTERIOR	1204024	12.9*	1106.5
	OVERALL WHITE, BASE (113453 SQ. IN.)		12.4	165.5
G28-A	COLOR STRIPE (11125 SQ. IN.)		0.5	165.5
G31-O	JACKING PADS (MAIN LANDING GEAR)	1241218-1	0.2	0
G51-O	CABLES, CORROSION RESISTANT (NET CHANGE)	1260100-5	0.0	0
G54-O	FIFE EXTINGUISHER, HAND TYPE	1201029	3.0	12.5
G88-A	PHOTOCGRAPHIC PROVISIONS	1201107	3.0	117.9
G88-A	WINTERIZATION KIT, INSTL	1250191-1	13.9	-25.0
G92-O	FUEL SYSTEM, LCNG RANGE WINGS (NET CHANGE) (180 GALLON CAPACITY)	1220800-5 & -6	7.0	46.0
G94-A	CARGO PACK, EXTERNAL BELLY MOUNTED	1201101	36.5	51.0

ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
H01-A-1	H. AVIONICS & AUTOPILOTS CESSNA 300 ADF W/BFC, NO CARGO POD, 12&24V RECEIVER WITH RFO (R-546E) GNCIOMETER INDICATOR (IN-346A) ADF LOOP ANTENNA & ASSOC. WIRING	3910159-4, -8 41240-0101 40980-1001	7.6* 2.6 0.9 32.7 0.3 8.5*	24.5* 14.5 16.0 120.3 131.6*
H01-A-2	CESSNA 300 ADF W/BFC & CARGO POD INSTALLED (SAME AS H01-A-1 ABOVE EXCEPT THE LOOP ANTENNA IS MOVED FROM STA 39.8 TO STA. 144.5 AND NEW LCOOP CABLE USED)	3910159-4, -8	8.4* 3.4 3.4 0.9 2.1 0.3 9.3*	22.3* 11.5 11.5 16.0 32.7 129.3 129.0*
H01-A-3	CESSNA 400 ADF W/BFC, NO CARGO POD, 12&24V RECEIVER, 12 VOLT (R-446A) RECEIVER, 24 VOLT (R-446A) GNCIOMETER INDICATOR (IN-346A) ADF LOOP ANTENNA & ASSOC WIRING (FWD)	3910160-5, -7 43090-1114 43090-1124 40580-1001	16.9* 3.4 1.8 1.4 0.6 0.1 6.2* 4.9 0.6 0.2 17.2*	22.3* 11.5 16.0 32.7 96.2 16.5* 19.5* 11.0 11.0 145.5* 134.9*
H01-A-4	CESSNA 400 ADF W/BFC & CARGO POD INSTALLED (SAME AS H01-A-3 ABOVE EXCEPT THE LOOP ANTENNA IS MOVED FROM STA 39.8 TO STA. 144.5 AND NEW LCOOP CABLE USED)	3910160-11, -13 43090-1114 40980-1001	3970129-1 3910166-8 3312-400 UDA-3 3910167	14.0 189.3 163.2 189.3
H01-A-5	DUAL CESSNA 400 ADF'S - 12 & 24 VOLT, EACH DUAL GCNIGMETER INDICATORS DUAL ADF LCOOP ANTENNAS & ASSOC. WIRING DUAL ADF SENSE ANTENNAS SWITCH, 2ND ADF NARCO DME 190 TRANSMITTER MOUNTING BOX	44020-1100 44000 42940	1.6 8.5 0.2 0.6	
H04-A-1	CESSNA 400 DME (FOR USE ON 24 VOLT AIRCRAFT ONLY)			
H04-A-2	REMOTE RECEIVER/TRANSMITTER (PTA-476A) ANTENNA REMOTE UNIT MOUNTING RACK			
H05-A-1	CESSNA 400 R-NAV SYSTEM W/300 NAV/COM			

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ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
	VOR/LOC - 24 VOLT ONLY WITH VOR/ILS - 24 VOLT ONLY AREA NAV COMPUTER (RN-478A) VOR/LOC INDICATOR (IN-442AR) (NET CHG) (EXCHANGE FOR 45010-10CC INDICATOR) VOR/ILS INDICATOR (IN-443AR) (NET CHG) (EXCHANGE FOR 45010-20CC INDICATOR) CESSNA 4 COR-NAV SYSTEM W/4CC NAV/COM WITH VOR/ILS - 24 VOLT ONLY AREA NAV COMPUTER (IN-442AR) (NET CHG) VOR/LOC INDICATOR 41640-1012 INDICATOR) (EXCHANGE FOR 41640-2012 INDICATOR) CESSNA 400 GILDSLOPE RECEIVER (K-43B) ANTENNA (CN UPPER FRD WINDSHIELD) PANTRONICS 300 HF TRANSCEIVER 1ST UNIT 12V REMCITE POWER SUPPLY (PT-10A) 12V OR 24V ANTENNA LOAD BOX (DX10-PS-14) 14V ANTENNA INSTL, 351 INCHES LCNG SPEAKER INSTALLATION RADIO COOLING NOISE FILTER WAKE UP/ILL HAND HELD HEADPHONE AUDIO CONTROL SYSTEM PANTRONICS 300 HF TRANSCEIVER 2ND UNIT 12V PANTRONICS 300 HF TRANSCEIVER 2ND UNIT 24V PANTRONICS 300 HF TRANSCEIVER 2ND UNIT 24V REMCITE POWER SUPPLY (PT10-A) 12V CR 24V REMCITE POWER SUPPLY (PT10-PS-14) 14V REMCITE POWER SUPPLY (PT10-PS-28) 28V ANTENNA LOAD BOX (DX10-RL-14) 14V ANTENNA LOAD BOX (DX10-RL-28) 28V ANTENNA INSTL, 351 INCHES LCNG PANTRONICS 300 HF TRANSCEIVER 3RD UNIT 12V PANTRONICS 300 HF TRANSCEIVER 3RD UNIT 24V (SAME AS ITEM H11-A-1 ABOVE) SUNAIR SSB HF TRANSCEIVER 2ND UNIT 12V	3910168-3 3910168-4 44100-1100 43910-1000 43910-2000 3910168-3 3910168-4 44100-1100 43910-1000 43910-2000 3910157-8 42100-0000 1200098-1 3910156-23 C582103-0101 C582103-0201 C589502-0101 1270801-708 3930152-1 3940148-1 3970109-1 1270801-705 3970120 3910156-24 3910156-27 C582103-0102 C582103-0201 C582103-0301 C582502-0101 C589502-0201 3910156-25 3910156-28 3910158-15, -31	4.6* 4.5* 3.8 0.7 0.6 3.2* 3.1* 3.8 -0.7 -0.8 4.0* 2.1 0.2 28.0* 8.2 4.6 4.2 0.2 0.2 1.1 0.1 0.3 0.2 1.9 2.2* 2.2* 2.2* 8.0 8.0 4.2 4.2 0.3 0.2 25.0*	12.4* 12.3* 12.0 14.2 13.9 12.0* 11.9* 12.0 12.1 12.3 0.7* -6.9 -29.6 104.5* 189.2 169.5 152.4 152.4 10.2 -20.9 20.2 15.0 11.3 12.5 11.7 189.2 189.5 169.5 152.4 125.4* 125.4* 131.4*
H05-A-2				
H07-A				
H10-A				
H11-A-1				
H11-A-2				
H11-A-3				

ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
	SUNAIR SSB HF TRANSCEIVER 2ND UNIT 24V TRANSCEIVER, SSB ASB-125 (RE-1000) 14V TRANSCEIVER, SSB ASB-125 (RE-1000) 28V REMOTE POWER AMPLIFIER (PA-1010A) 14V REMOTE POWER AMPLIFIER (PA-1010A) 28V ANTENNA COUPLER (LOAD BOX) (CU-110) ANTENNA INSTL 351 INCHES LCNG SUNAIR SSB HF TRANSCEIVER 3RD UNIT 12V SUNAIR SSB HF TRANSCEIVER 3RD UNIT 24V (SAME AS ITEM H11-A-3 ABOVE)	3910158-17, -33 99680 99681 99682 99683 99816 3910158-16, -32 3910158-18, -34	25.0* 5.3 5.3 8.5 8.5 5.2 5.0* 25.0** 25.0**	131.4* 11.7 11.7 190.3 190.3 170.0 152.1 131.4* 131.4**
H11-A-4				
H13-A-1	CESSNA 400 MARKER 12V RECEIVER (R-402A) 24V ANTENNA INSTL (FLUSH MOUNTED IN TAIL) RECEIVER (GMZ47A)	3910174-9, -10 40012-4706 40012-8-0502	4.2* 1.6 0.9	52.1 -11.5 -23.7
H13-A-2				
H16-A-1	CESSNA 300 VHF TRANSCIEVER 1ST UNIT 28V ANTENNA 300 VHF TRANSCIEVER 1ST UNIT 28V ANTENNA INSTL (FLUSH MOUNTED IN TAIL) ANA 300 TRANSPONDER 12V OR 24V	3910126-2, -1 3910127-21, -25 41420-1114,1128 41530-0001	3.6* 2.7 2.0 2.0	23.7 22.7 160.5 160.5
H16-A-2	CESSNA 400 TRANSPONDER 12V OR 24V ANTENNA (A-105A) TRANSCIEVER (RT-459A) 12V OR 24V ANTENNA (A-105A) SCEIVER 1ST UNIT 28V	3910128-15, -19 41470-1114,1128 41530-0001 3910155-19, 3910155-21	3.6* 2.7 2.0 1.4	127.5 127.5 160.0 160.0
H19-A	CESSNA 300 VHF TRANSCIEVER 1ST UNIT 28V CESSNA 300 VHF TRANSCIEVER 1ST UNIT 28V TRANSCIEVER (RT-524A) 14V TRANSCIEVER (RT-524A) 28V RH COM ANTENNA & CABLE SPEAKER INSTALLATION RADIO CGLTR, ALTERNATOR NOISE FILTER, HAND-HELD MIKE INSTL, INSTL PANEL HEADPHONE INSTL PANEL AUDIO COM TROL & MISC ITEMS	1270801-708 3930152-1 3940148-1 3970109-1 1270801-705 3970120-1 3910155-20 3910155-22 31390-1814 31390-1828	14.0* 15.0* 5.0 5.0 2.2 1.1 1.0 0.3 0.0 1.1 1.6 8.2* 8.2* 3.8 5.0	119.0* 119.0* 11.7 11.7 45.4 45.4 10.2 10.2 -20.9 15.0 13.0 13.0 10.8 10.8 15.0* 15.0* 11.7 11.7 4
H20-A	CESSNA 300 VHF TRANSCIEVER 2ND UNIT 14V CESSNA 300 VHF TRANSCIEVER 2ND UNIT 28V TRANSCIEVER (RT-524A) 14V TRANSCIEVER (RT-524A) 28V LH COM ANTENNA & CABLE			

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ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
H22-A-1	MCUNT, WIRING & MISC ITEMS CESSNA 300 NAV/CCM, 160 CH., FIRST UNIT WITH VOR/LOC - 12 VOLT WITH VOR/LOC - 24 VOLT RECEIVER-TRANSMITTER (RT-308C) VCR/LOC INDICATOR (IN-514B) NOTE-- 1ST NAV/CCM INSTALLATION COMPONENTS ARE AS FOLLOWS-- SPEAKER INSTALLATION RADIO COILING NAV/CCM PARTIAL NOISE FILTER COMM ANTENNA & CABLE OMNI ANTENNA & CABLE MIKE INSTALL. & HAND HELD HEADSET INSTL. PANEL AUDIO CONTROL VCLTAG CTRVTR (24 VOLT ONLY) CESSNA 300 NAV/CCM, 720 CH., FIRST UNIT WITH VOR/LOC - 12 VOLT WITH VOR/LOC - 24 VOLT RECEIVER-TRANSMITTER (RT-328T) VCR/LOC INDICATOR (IN-514B) INSTL. COMPONENTS SIMILAR TO H22-A-1	3910151-26 3910151-30 42450-1114 45010-1000 1270801-708 3630152-1 3930169 3940148-1 3970109-1 1270801-705 3970120-1 41010 3910150-26 3910150-40 43340-1124 45010-1000 3910152-17 3910152-24 43340-1124 45010-1000 3910150-32 3910150-42 42430-1124 45010-1000 3910152-21 3910152-28 42430-1124	1.6 16.6* 18.2* 6.4 0.6 2.2 1.1 1.6 0.1 0.8 1.4 0.3 0.2 1.2 17.1* 18.8* 6.9 0.6 17.2* 18.9* 6.9 0.7 17.2* 18.9* 7.0 0.6 17.3* 19.0* 7.0	10.8 31.8* 26.9* 11.0 16.3 45.4 10.2 10.8 -24.9 47.4 178.7 120.7 15.2 13.0 -28.8 31.2* 26.4* 11.0 16.3 31.1* 26.4* 11.0 16.3 31.1* 26.4* 11.0 16.3 31.0* 26.3* 11.0
H22-A-2	CESSNA 300 NAV/CCM, 720 CH., FIRST UNIT WITH VOR/LOC - 12 VOLT WITH VOR/LOC - 24 VOLT RECEIVER-TRANSMITTER (RT-328T) VCR/LOC INDICATOR (IN-514B) INSTL. COMPONENTS SIMILAR TO H22-A-1	3910152-17 3910152-24 43340-1124 45010-1000	17.2* 18.9* 6.9 0.7	31.1* 26.4* 11.0 16.3
H22-A-3	CESSNA 300 NAV/CCM, 360 CH., FIRST UNIT WITH VOR/ILS - 12 VOLT WITH VOR/ILS - 24 VOLT RECEIVER-TRANSMITTER (RT-328T) VOR/ILS INDICATOR (IN-525B) INSTL. COMPONENTS SIMILAR TO H22-A-1	3910150-32 3910150-42 42430-1124 45010-1000	17.2* 18.9* 7.0 0.6	31.1* 26.4* 11.0 16.3
H22-A-4	CESSNA 300 NAV/CCM, 360 CH., FIRST UNIT WITH VOR/LOC - 12 VOLT WITH VOR/LOC - 24 VOLT RECEIVER-TRANSMITTER (RT-3148) VOR/LOC INDICATOR (IN-5148) INSTL. COMPONENTS SIMILAR TO H22-A-1	3910152-21 3910152-28 42430-1124	17.3* 19.0* 7.0	31.0* 26.3* 11.0

ITEM NO	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS
H22-A-6	VOR/ILS INDICATOR (IN-525B) INSTL. COMPONENTS SIMILAR TO H22-A-1 CESSNA 400 NAV/CCM, 720 CH. FIRST UNIT WITH VOR/LOC - 24 VOLT RECEIVER-TRANSMITTER (RT-428A) VCR/LOC INDICATOR (IN-442A)	45010-2000 3910169-1 43330-1128 41640-1012	0.7 16.9* 6.9 2.0	16.3 31.5* 10.0 14.1
H22-A-7	NOTE--FIRST UNIT INSTL COMPONENTS ARE AS FOLLOWS-- SPEAKER INSTALLATION RADIO COOLING NCISE FILTER COMM ANTENNA & CABLE RF VHF ANTENNA & CABLE MIKE INSTL. & HAND HFLO AUDIO CONTROL PANEL HEADSEY INSTL CESSNA 400 NAV/CCM, 720 CH. FIRST UNIT WITH VOR/ILS - 24 VOLT RECEIVER-TRANSMITTER (RT-428A) VOR/ILS INDICATOR (IN-443A)	1270801-708 3930152-1 3940148-1 3970109-1 3970120-2 1270801-705 3910169-6	2.2 1.1 0.1 1.4 0.8 0.3 0.2 17.0*	45.4 10.2 -24.9 178.7 47.4 20.7 13.0 31.4*
H25-A-1	CESSNA 300 NAV/CCM, 160 CH., SECCND UNIT WITH VOR/LOC - 12 VOLT RECEIVER-TRANSMITTER (RT-308C) VCR/LOC INDICATOR (IN-514B)	44330-1128 41640-2012 3910151-27 3910151-31 42450-1114 45010-1000	6.9 2.1 9.6* 11.3* 6.4 0.6	10.0 14.1 14.2* 8.8* 11.0 16.3
H25-A-2	NOTE--2ND NAV/CCM INSTALLATION COMPONENTS ARE AS FOLLOWS-- LF VHF ANTENNA & CABLE ANTENNA COUPLER MC UNIT, WIPING, & MISC ITEMS VCLTAGE CONVERTER (24 VCLT ONLY) CESSNA 300 NAV/CCM, 720 CH., SECCND UNIT WITH VOR/LOC - 12 VOLT WITH VOR/LOC - 24 VOLT RECEIVER-TRANSMITTER (RT-328T) VCR/LOC INDICATOR (IN-514B)	3960111-1 3940146-4 3910150-29 3910150-41 43340-1124 45010-1000	0.8 0.2 1.6 1.2 10.1* 11.8* 6.9 0.6	47.4 5.0 10.8 -14.5 16.0* 18.9* 11.0 16.3
H25-A-3	CESSNA 300 NAV/CCM, 720 CH., SECCAD UNIT			

SECTION 7 AIRPLANE & SYSTEMS DESCRIPTIONS

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INTRODUCTION

This section provides description and operation of the airplane and its systems. Some equipment described herein is optional and may not be installed in the airplane. Refer to Section 9, Supplements, for details of other optional systems and equipment.

AIRFRAME

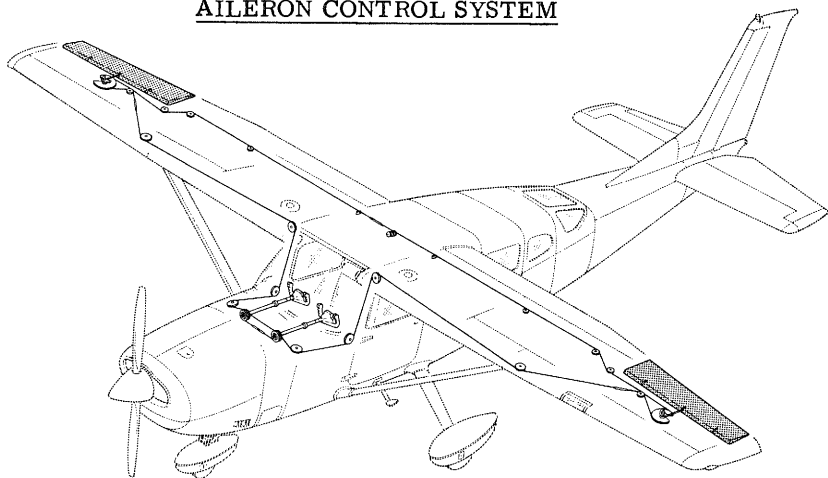
The airplane is an all-metal, seven-place, high-wing, single-engine airplane equipped and designed for general utility purposes.

The construction of the fuselage is a conventional formed sheet metal bulkhead, stringer, and skin design referred to as semi-monocoque. Major items of structure are the front and rear carry-through spars to which the wings are attached, a bulkhead and forgings for main landing gear attachment under the floorboard aft of the pilot and front passenger seats, and a bulkhead just aft of the instrument panel with attaching plates at its base for the strut-to-fuselage attachment of the wing struts. Structural engine mounts are also incorporated on this airplane.

The externally braced wings, containing the fuel tanks, are constructed of a front and rear spar with formed sheet metal ribs, doublers, and stringers. The entire structure is covered with aluminum skin. The front spars are equipped with wing-to-fuselage and wing-to-strut attach fittings. The aft spars are equipped with wing-to-fuselage attach fittings, and are partial span spars. Frise-type ailerons and single-slotted flaps are attached to the trailing edge of the wings. The ailerons are constructed of a forward and aft spar, formed sheet metal ribs, "V" type corrugated aluminum skin joined together at the trailing edge, and a formed leading edge containing a balance weight. The flaps are constructed basically the same as the ailerons, with the exception of the balance weights and aft spars, and the addition of a trailing edge stiffener.

The empennage (tail assembly) consists of a conventional vertical stabilizer, rudder, horizontal stabilizer, and elevator. The vertical stabilizer consists of a forward and aft spar, formed sheet metal ribs and reinforcements, four skin panels, formed leading edge skins, and a dorsal. The rudder is constructed of a forward and aft spar, formed sheet metal ribs and reinforcements, and a wrap-around skin panel. The top of the rudder incorporates a leading edge extension which contains a balance weight. The horizontal stabilizer is constructed of a forward and aft spar, ribs and stiffeners, center upper skin panel, and two left and two right wrap-around skin panels which also form the leading edges. The horizon-

AILERON CONTROL SYSTEM



RUDDER AND RUDDER TRIM CONTROL SYSTEMS

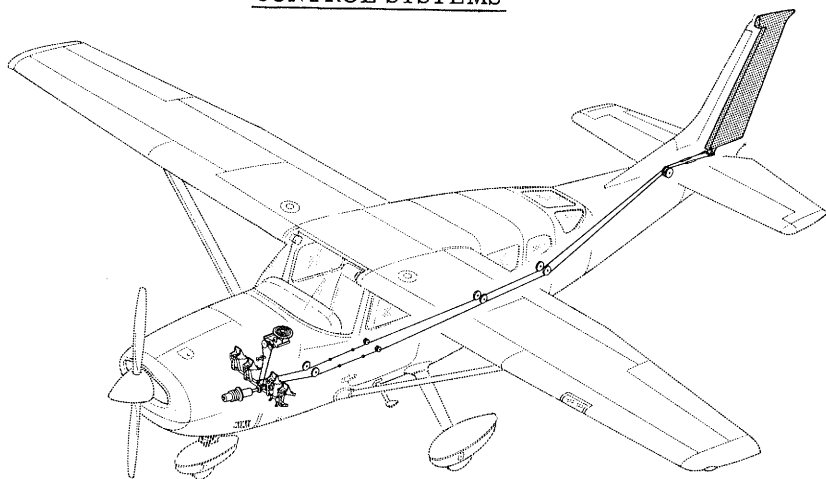


Figure 7-1. Flight Control and Trim Systems (Sheet 1 of 2)

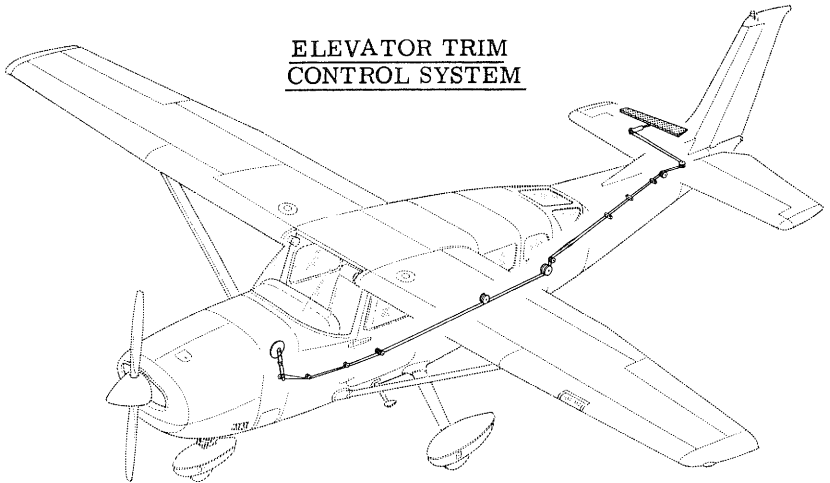
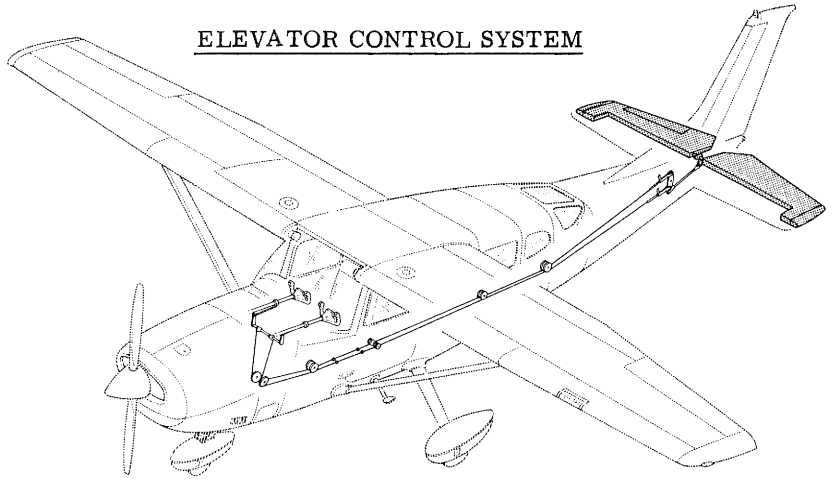


Figure 7-1. Flight Control and Trim Systems (Sheet 2 of 2)

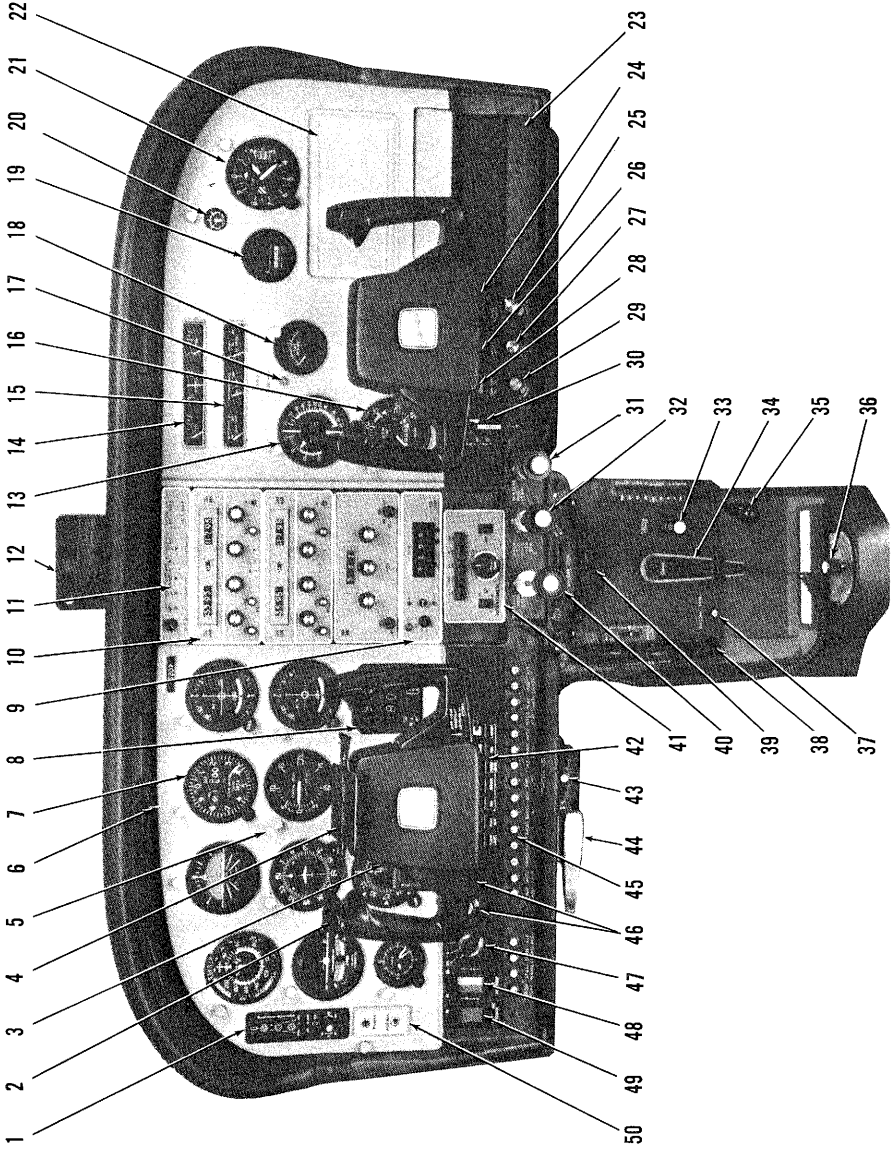


Figure 7-2. Instrument Panel (Sheet 1 of 2)

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Marker Beacon Indicator Lights and Switches 2. Electric Elevator Trim Switch 3. Electric Elevator Trim Disengage Switch 4. Approach Plate Holder 5. Flight Instrument Group 6. Approach Plate Light and Switch 7. Encoding Altimeter 8. DME 9. Transponder 10. Radios 11. Audio Control Panel 12. Rear View Mirror 13. Manifold Pressure/Fuel Flow Indicator 14. Fuel Quantity Indicators and Ammeter 15. Cylinder Head Temperature, Oil Temperature, and Oil Pressure Gages 16. Tachometer 17. Over-Voltage Warning Light 18. Economy Mixture Indicator 19. Flight Hour Recorder 20. Suction Gage 21. Secondary Altimeter 22. Additional Radio Space 23. Map Compartment 24. Defrost Control Knob 25. Auxiliary Cabin Air Control Knob | <ol style="list-style-type: none"> 26. Cabin Air Control Knob 27. Stowable Rudder Pedal Control Knob 28. Cabin Heat Control Knob 29. Cigar Lighter 30. Wing Flap Switch and Position Indicator 31. Mixture Control Knob 32. Propeller Control Knob 33. Engine Primer 34. Microphone 35. Cowl Flap Control Lever 36. Fuel Selector Valve Handle 37. Electric Elevator Trim Circuit Breaker 38. Elevator Trim Control Wheel and Position Indicator 39. Rudder Trim Control Wheel and Position Indicator 40. Throttle (With Friction Lock) 41. Autopilot Control Unit 42. Electrical Switches 43. Static Pressure Alternate Source Valve 44. Parking Brake Handle 45. Circuit Breakers 46. Radio and Instrument Panel 47. Light Rheostat Control Knobs 48. Ignition Switch 49. Auxiliary Fuel Pump Switch 50. Master Switch 50. Phone and Auxiliary Mike Jacks |
|--|---|

Figure 7-2. Instrument Panel (Sheet 2 of 2)

tal stabilizer also contains the elevator trim tab actuator. Construction of the elevator consists of a forward and aft spar, ribs, torque tube and bellcrank, left upper and lower skin panels, a formed one-piece left trailing edge, right upper and lower skin panels, and right inboard and outboard formed trailing edges. The elevator trim tab consists of a bracket assembly, hinge half, and a wrap-around skin panel. Both elevator tip leading edge extensions incorporate balance weights.

FLIGHT CONTROLS

The airplane's flight control system consists of conventional aileron, elevator and rudder control surfaces (see figure 7-1). The control surfaces are manually operated through mechanical linkage using a control wheel for the ailerons and elevator, and rudder/brake pedals for the rudder.

Stowable right-hand rudder pedals may be installed. The pedals fold forward and stow against the firewall, thereby permitting the front passenger to extend his feet forward for greater comfort. When the pedals are stowed, the toe brakes will still operate. A push-pull control on the instrument panel actuates the pedal unlocking mechanism. The pedals are stowed by squeezing the double buttons of the control knob and pulling the knob out to release the pedals; the pedals can then be pushed forward against the firewall where they are retained by spring clips within a bracket. The pedals are restored to their operating positions by pushing the control knob full in, inserting the toe of the shoe underneath each pedal, and pulling each pedal aft until it snaps into position. The pedals are again ready for flight use by the right front passenger.

TRIM SYSTEMS

Manually-operated rudder and elevator trim is provided. Rudder trimming is accomplished through the rudder control system (see figure 7-1) by rotating the horizontally mounted trim control wheel either left or right, which will offset the rudder. Elevator trimming is accomplished through the elevator trim tab by utilizing the vertically mounted trim control wheel. Forward rotation of the trim wheel will trim nose-down; conversely, rearward rotation will trim nose-up. The airplane may also be equipped with an electric elevator trim system. For details concerning this system, refer to Section 9, Supplements.

INSTRUMENT PANEL

The instrument panel (see figure 7-2) is designed around the basic

"T" configuration. The gyros are located immediately in front of the pilot, and arranged vertically. The airspeed indicator and altimeter are located to the left and right of the gyros respectively. The remainder of the flight instruments are located around the basic "T". Avionics equipment is stacked approximately on the center line of the panel, with the right side of the panel containing the wing flap switch and indicator, manifold pressure/fuel flow indicator, tachometer, map compartment, and space for additional instruments and avionics equipment. The engine instrument cluster, fuel quantity indicators, and suction gage are on the right side of the avionics stack near the top of the panel. A switch and control panel, at the lower edge of the instrument panel, contains most of the switches, controls, and circuit breakers necessary to operate the airplane. The left side of the panel contains the master switch, auxiliary fuel pump switch, ignition switch, light intensity controls, electrical switches, and circuit breakers for installed equipment. The center area contains the throttle, propeller control, and mixture control. The right side of the panel contains the cabin heat, cabin air, defroster, and auxiliary cabin air control knobs and the cigar lighter. A pedestal, extending from the edge of the switch and control panel to the floorboard, contains the elevator and rudder trim control wheels, cowl flap control lever, engine primer and microphone bracket. The fuel selector valve handle is located at the base of the pedestal. A parking brake handle is mounted under the switch and control panel, in front of the pilot. An alternate static source valve control knob is installed beneath the switch and control panel.

For details concerning the instruments, switches, circuit breakers, and controls on this panel, refer in this section to the description of the systems to which these items are related.

GROUND CONTROL

Effective ground control while taxiing is accomplished through nose wheel steering by using the rudder pedals; left rudder pedal to steer left and right rudder pedal to steer right. When a rudder pedal is depressed, a spring-loaded steering bungee (which is connected to the nose gear and to the rudder bars) will turn the nose wheel through an arc of approximately 15° each side of center. By applying either left or right brake, the degree of turn may be increased up to 35° each side of center.

Moving the airplane by hand is most easily accomplished by attaching a tow bar to the nose gear strut. If a tow bar is not available, or pushing is required, use the wing struts as push points. Do not use the vertical or horizontal tail surfaces to move the airplane. If the airplane is to be towed by vehicle, never turn the nose wheel more than 35° either side of center or structural damage to the nose gear could result.

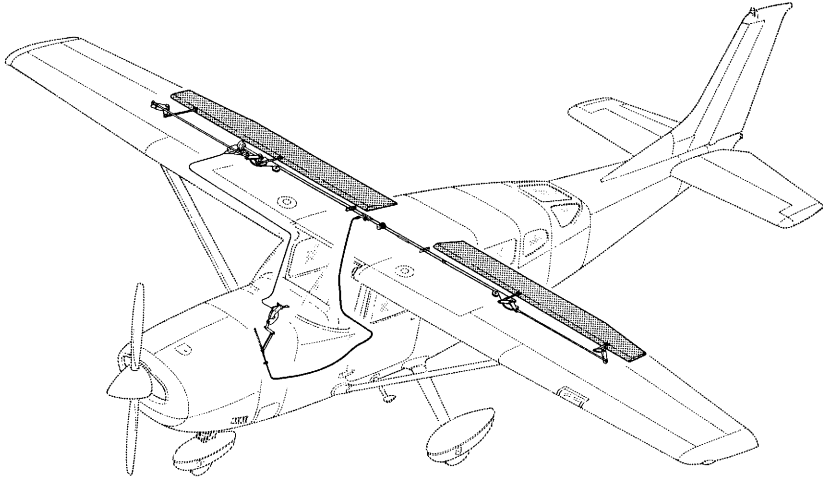


Figure 7-3. Wing Flap System

The minimum turning radius of the airplane, using differential braking and nose wheel steering during taxi, is approximately 27 feet 3 inches.

WING FLAP SYSTEM

The wing flaps are of the large span, single-slot type (see figure 7-3), and are extended or retracted by positioning the wing flap switch lever on the instrument panel to the desired flap deflection position. The switch lever is moved up or down in a slotted panel that provides mechanical stops at the 10° and 20° positions. The switch lever must be moved to the right to clear these stops. A scale and pointer on the left side of the switch lever indicates flap travel in degrees. The wing flap system circuit is protected by a 15-ampere circuit breaker, labeled FLAP, on the left side of the instrument panel.

LANDING GEAR SYSTEM

The landing gear is of the tricycle type with a steerable nose wheel and two main wheels. The landing gear may be equipped with wheel fairings. Shock absorption is provided by the tubular spring-steel main landing gear struts and the air/oil nose gear shock strut. Each main gear

wheel is equipped with a hydraulically actuated disc-type brake on the in-board side of each wheel. When wheel fairings are installed, an aerodynamic fairing covers each brake.

BAGGAGE COMPARTMENT

The space provided for baggage consists of a compartment between a bulkhead forward of the instrument panel and the firewall, and the area from the back of the rear passenger seats to the aft cabin bulkhead. Access to the baggage compartment is gained through a door on the right side of the airplane, and access to the baggage area is through the cargo doors on the right side of the airplane or from within the cabin. A baggage net with six tie-down straps is provided for securing baggage and is attached by tying the straps to tie-down rings provided in the airplane. When utilizing the airplane as a cargo carrier, refer to Section 6 for complete cargo loading details. When loading the airplane, children should not be placed or permitted in the baggage area, and any material that might be hazardous to the airplane or occupants should not be placed anywhere in the airplane. For baggage/cargo area and door dimensions, refer to Section 6.

SEATS

The seating arrangement consists of seven separate four-way adjustable seats. The pilot's and front passenger's seats are also available in the six-way adjustable configuration.

The four-way seats may be moved forward and aft, and the seat back angle changed. Position the seat by lifting up on the tubular handle under the center of the seat bottom of the pilot and front passenger's seats or the handle under the left front corner of the passenger's seats and slide the seat into position; then release the handle and check that the seat is locked in place. The seat back angle may be adjusted by lifting the lever under the left front corner of the pilot and front passenger's seats and the aft inboard corner of the passenger's seats. The seat backs will also fold full forward.

The six-way adjustable pilot's seat may be moved forward or aft, adjusted for height, and the seat back angle is infinitely adjustable. Position the seat by lifting the tubular handle, under the center of the seat bottom, and slide the seat into position; then release the handle and check that the seat is locked in place. Raise or lower the seat by rotating a large crank under the right corner of the seat. Seat back angle is adjustable by rotating a small crank under the left corner of the seat. The seat

bottom angle will change as the seat back angle changes, providing proper support. The seat back will also fold full forward. If the front passenger's seat is six-way adjustable, it will function the same as the pilot's seat except the height adjusting and back reclining cranks will be opposite the respective adjustment cranks of the pilot's seat.

Headrests are available for the pilot's and front passenger's seats only. To adjust the headrest, apply enough pressure to it to raise or lower it to the desired level. The headrest may be removed at any time by raising it until it disengages from the top of the seat back.

SEAT BELTS AND SHOULDER HARNESSSES

All seat positions are equipped with seat belts (see figure 7-4). The pilot's and front passenger's seats are also equipped with separate shoulder harnesses; separate shoulder harnesses are available for the remaining seat positions. Integrated seat belt/shoulder harnesses with inertia reels can be furnished for the pilot's and front passenger's seat positions if desired.

SEAT BELTS

The seat belts for all seat positions are attached to fittings on the floorboard. The buckle half is inboard of each seat and the link half is outboard of each seat.

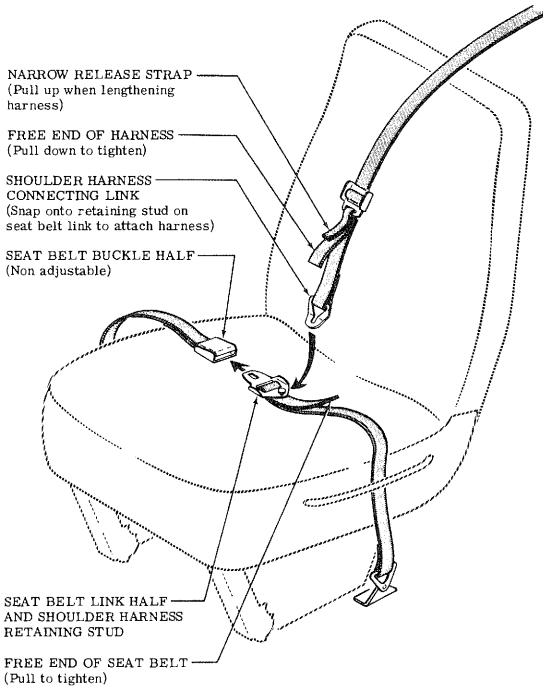
To use the seat belts, position the seat as desired, and then lengthen the link half of the belt as needed by grasping the sides of the link and pulling against the belt. Insert and lock the belt link into the buckle. Tighten the belt to a snug fit. To release the seat belts, grasp the top of the buckle opposite the link and pull upward.

SHOULDER HARNESSSES

Each front seat shoulder harness is attached aft of a rear door post just above the window line and is stowed behind a stowage sheath mounted above the entry doors. To stow the harness, fold it and place it behind the sheath. If the passenger's seats are equipped with shoulder harnesses, the harnesses are attached above the window line aft of the respective seats. The harnesses are stowed behind wire retaining clips above the window line, except for the seventh seat harness which is stowed behind a clip below window line.

To use the shoulder harness, fasten and adjust the seat belt first. Lengthen the harness as required by pulling on the connecting link on the

**STANDARD SHOULDER
HARNESS**



(PILOT'S SEAT SHOWN)

**SEAT BELT/SHOULDER
HARNESS WITH INERTIA
REEL**

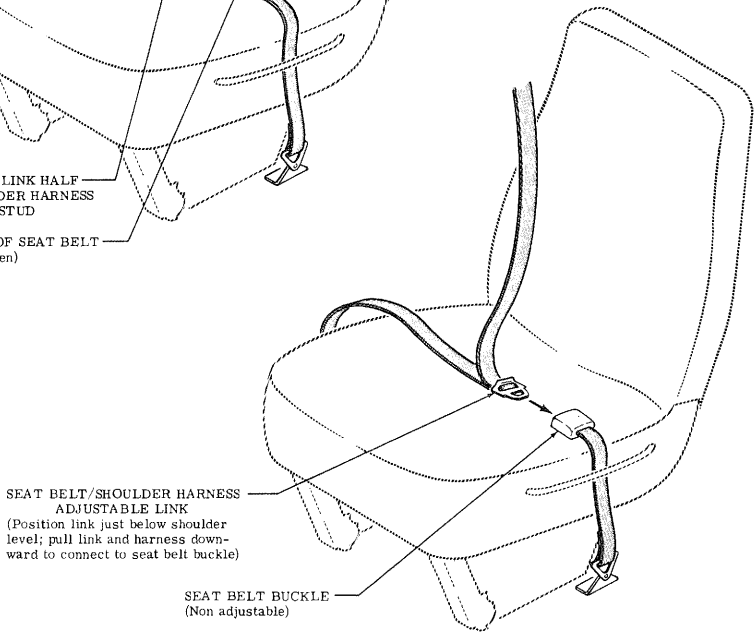


Figure 7-4. Seat Belts and Shoulder Harnesses

end of the harness and the narrow release strap. Snap the connecting link firmly onto the retaining stud on the seat belt link half. Then adjust to length. A properly adjusted harness will permit the occupant to lean forward enough to sit completely erect, but prevent excessive forward movement and contact with objects during sudden deceleration. Also, the pilot will want the freedom to reach all controls easily.

Removing the shoulder harness is accomplished by pulling upward on the narrow release strap, and removing the harness connecting link from the stud on the seat belt link. In an emergency, the shoulder harness may be removed by releasing the seat belt first and allowing the harness, still attached to the link half of the seat belt, to drop to the side of the seat.

INTEGRATED SEAT BELT / SHOULDER HARNESES WITH INERTIA REELS

Integrated seat belt/shoulder harnesses with inertia reels are available for the pilot and front seat passenger. The seat belt/shoulder harnesses extend from inertia reels located in the cabin top structure, through slots in the cabin ceiling, to attach points inboard of the two front seats. A separate seat belt half and buckle is located outboard of the seats. Inertia reels allow complete freedom of body movement. However, in the event of a sudden deceleration, they will lock automatically to protect the occupants.

To use the seat belt/shoulder harness, position the adjustable metal link on the harness just below shoulder level, pull the link and harness downward, and insert the link in the seat belt buckle. Adjust belt tension across the lap by pulling upward on the shoulder harness. Removal is accomplished by releasing the seat belt buckle, which will allow the inertia reel to pull the harness inboard of the seat.

ENTRANCE DOORS AND CABIN WINDOWS

Entry to, and exit from the airplane is accomplished through an entry door on both sides of the cabin at the pilot's and front passenger's seat positions and through double cargo doors at the rear of the cabin on the right side (refer to Section 6 for cabin and cabin door dimensions). The entry doors incorporate a recessed exterior door handle, a conventional interior door handle, a key-operated door lock (left door only), a door stop mechanism, and an openable window in the left door. An openable right door window is also available. The forward cargo door is equipped with a recessed exterior door handle, conventional interior door handle, a key-operated door lock, a receptacle on the outside door skin for operation of the inside door handle-operated lock, and a door stop mechanism. The aft door utilizes a locking pawl on the top and bottom of the door near

the forward edge, a red handle on the forward edge of the door, and a door stop mechanism.

To open either entry door from outside the airplane, utilize the recessed door handle near the aft edge of the door. Depress the forward end of the handle to rotate it out of its recess, and then pull outboard. To open or close the doors from inside the airplane, use the conventional door handle and arm rest. The inside door handle is a three-position handle having a placard at its base with the positions OPEN, CLOSE, and LOCK shown on it. The handle is spring-loaded to the CLOSE (up) position. When the door has been pulled shut and latched, lock it by rotating the door handle forward to the LOCK position (flush with the arm rest). When the handle is rotated to the LOCK position, an over-center action will hold it in that position. Both doors should be locked prior to flight, and should not be opened intentionally during flight.

NOTE

Accidental opening of a cabin door in flight due to improper closing does not constitute a need to land the airplane. The best procedure is to set up the airplane in a trimmed condition at approximately 90 knots, momentarily shove the door outward slightly, and forcefully close and lock the door by normal procedures. If the forward cargo door should come unlatched and open slightly in flight, it is suggested that a landing be made at a suitable airport to close and latch the door, unless a passenger is available to close it. It cannot be reached by the pilot.

The double cargo doors are opened from outside the airplane by utilizing the recessed door handle near the aft edge of the forward door. Depress the forward end of the handle to rotate it out of its recess, and then pull outboard. After the forward door is opened, the aft door may be opened by grasping the red handle on the forward edge of the door and pulling downward to release the locking pawls. To close the cargo doors from inside the airplane, close the aft door first, with enough force to latch both locking pawls, and then close the forward door. When the forward door is closed and latched, rotate the door handle, labeled OPEN, CLOSE, and LOCK, to the locked (up) position. Both doors must be securely closed and the forward door locked prior to flight, and they must not be opened intentionally during flight.

Flight operations with the cargo doors removed are not approved, unless a spoiler is installed on the forward edge of the cargo door opening. With the cargo doors removed and the spoiler installed, flight is restricted to 150 knots.

If the airplane is loaded with cargo which prevents the pilot from locking or unlocking the forward cargo door from inside, the door will have to be locked or unlocked from the outside with a T-handle "key" stowed in the map compartment. This is accomplished by inserting the hex-shaped end of the T-handle into a receptacle in the door skin opposite the inside door handle, and then rotating the T-handle to position the inside door handle in the locked (up) position. The T-handle must be used to lock the forward cargo door prior to flight unless the inside door handle can be utilized. The key-operated lock may not be used in lieu of the T-handle for flight operations.

The left entry door is equipped with an openable window which is held in the closed position by a lock button equipped over-center latch on the lower edge of the window frame. To open the window, depress the lock button and rotate the latch upward. The window utilizes a spring-loaded retaining arm which will help rotate the window outward and hold it there. An openable window is also available for the right entry door, and functions in the same manner as the window in the left door. If required, either window may be opened at any speed up to 186 KIAS. All other cabin windows are of the fixed type and cannot be opened.

CONTROL LOCKS

A control lock is provided to lock the ailerons and elevator control surfaces in a neutral position and prevent damage to these systems by wind buffeting while the airplane is parked. The lock consists of a shaped steel rod with a red metal flag attached to it. The flag is labeled CONTROL LOCK, REMOVE BEFORE STARTING ENGINE. To install the control lock, align the hole on the right side of the pilot's control wheel shaft with the hole in the right side of the shaft collar on the instrument panel and insert the rod into the aligned holes. Proper installation of the lock will place the red flag over the ignition switch. In areas where high or gusty winds occur, a control surface lock should be installed over the vertical stabilizer and rudder. The control lock and any other type of locking device should be removed prior to starting the engine.

ENGINE

The airplane is powered by a horizontally-opposed, six-cylinder, overhead-valve, air-cooled, fuel injection engine with a wet sump oil system. The engine is a Continental Model IO-520-F and is rated at 300 horsepower at 2850 RPM for five minutes and 285 horsepower at 2700 RPM continuous. Major accessories include a propeller governor on the front of the engine and dual magnetos, starter, and belt-driven alter-

nator on the rear of the engine. Provisions are also made for a vacuum pump and a full flow oil filter.

ENGINE CONTROLS

Engine power is controlled by a throttle located on the lower center portion of the instrument panel. The throttle operates in a conventional manner; in the full forward position, the throttle is open, and in the full aft position, it is closed. A friction lock, which is a round knurled disk, is located at the base of the throttle and is operated by rotating the lock clockwise to increase friction or counterclockwise to decrease it.

The mixture control, mounted above the right corner of the control pedestal, is a red knob with raised points around the circumference and is equipped with a lock button in the end of the knob. The rich position is full forward, and full aft is the idle cut-off position. For small adjustments, the control may be moved forward by rotating the knob clockwise, and aft by rotating the knob counterclockwise. For rapid or large adjustments, the knob may be moved forward or aft by depressing the lock button in the end of the control, and then positioning the control as desired.

ENGINE INSTRUMENTS

Engine operation is monitored by the following instruments: oil pressure gage, oil temperature gage, cylinder head temperature gage, tachometer, and manifold pressure/fuel flow indicator. An economy mixture (EGT) indicator is also available.

The oil pressure gage, located on the right side of the instrument panel, is operated by oil pressure. A direct pressure oil line from the engine delivers oil at engine operating pressure to the oil pressure gage. Gage markings indicate that minimum idling pressure is 10 PSI (red line), the normal operating range is 30 to 60 PSI (green arc), and maximum pressure is 100 PSI (red line).

Oil temperature is indicated by a gage adjacent to the oil pressure gage. The gage is operated by an electrical-resistance type temperature sensor which receives power from the airplane electrical system. Oil temperature limitations are the normal operating range (green arc) which is 38°C (100°F) to 116°C (240°F), and the maximum (red line) which is 116°C (240°F).

The cylinder head temperature gage, under the left fuel quantity indicator, is operated by an electrical-resistance type temperature sensor on the engine which receives power from the airplane electrical system. Temperature limitations are the normal operating range (green arc) which

is 93°C (200°F) to 238°C (460°F) and the maximum (red line) which is 238°C (460°F).

The engine-driven mechanical tachometer is located on the lower right side of the instrument panel. The instrument is calibrated in increments of 100 RPM and indicates both engine and propeller speed. An hour meter below the center of the tachometer dial records elapsed engine time in hours and tenths. Instrument markings include a normal operating range (green arc) of 2200 to 2550 RPM, a five minute maximum power range (yellow arc) of 2700 to 2850 RPM, and a maximum (red line) of 2850 RPM.

The manifold pressure gage is the left half of a dual-indicating instrument mounted above the tachometer. The gage is direct reading and indicates induction air manifold pressure in inches of mercury. It has a normal operating range (green arc) of 15 to 25 inches of mercury.

The fuel flow indicator is the right half of a dual-indicating instrument mounted above the tachometer. The indicator is a fuel pressure gage calibrated to indicate the approximate gallons per hour of fuel being metered to the engine. The normal operating range (green arc) is from 7 to 17 gallons per hour, the minimum (red line) is 3.5 PSI, and the maximum (red line) is 25.2 gallons per hour (19.5 PSI).

An economy mixture (EGT) indicator is available for the airplane and is located on the right side of the instrument panel. A thermocouple probe in the right exhaust collector measures exhaust gas temperature and transmits it to the indicator. The indicator serves as a visual aid to the pilot in adjusting cruise mixture. Exhaust gas temperature varies with fuel-to-air ratio, power, and RPM. However, the difference between the peak EGT and the EGT at the cruise mixture setting is essentially constant and this provides a useful leaning aid. The indicator is equipped with a manually positioned peak EGT reference pointer.

NEW ENGINE BREAK-IN AND OPERATION

The engine underwent a run-in at the factory and is ready for the full range of use. It is, however, suggested that cruising be accomplished at 65% to 75% power until a total of 50 hours has accumulated or oil consumption has stabilized. This will ensure proper seating of the rings.

The airplane is delivered from the factory with corrosion preventive oil in the engine. If, during the first 25 hours, oil must be added, use only aviation grade straight mineral oil conforming to Specification No. MIL-L-6082.

ENGINE OIL SYSTEM

Oil for engine lubrication and propeller governor operation is supplied from a sump on the bottom of the engine. The capacity of the engine sump is 12 quarts (one additional quart is contained in the engine oil filter, if installed). Oil is drawn from the sump through a filter screen on the end of a pickup tube to the engine-driven oil pump. Oil from the pump passes through a pressure screen (full flow oil filter, if installed), a pressure relief valve at the rear of the right oil gallery, and a thermostatically controlled oil cooler. Oil from the cooler is then circulated to the left gallery and propeller governor. The engine parts are then lubricated by oil from the galleries. After lubricating the engine, the oil returns to the sump by gravity. If a full flow oil filter is installed, the filter adapter is equipped with a bypass valve which will cause lubricating oil to bypass the filter in the event the filter becomes plugged, or the oil temperature is extremely cold.

An oil dipstick is located at the rear of the engine on the left side, and an oil filler tube is on top of the crankcase near the front of the engine. The dipstick and oil filler are accessible through doors on the engine cowling. The engine should not be operated on less than 9 quarts of oil. To minimize loss of oil through the breather, fill to 10 quarts for normal flights of less than three hours. For extended flight, fill to 12 quarts (dipstick indication only). For engine oil grade and specifications, refer to Section 8 of this handbook.

The oil cooler may be replaced by a non-congealing oil cooler for operations in temperatures consistently below -7°C (20°F). The non-congealing oil cooler provides improved oil flow at low temperatures. Once installed, the non-congealing oil cooler is approved for permanent use in both hot and cold weather.

An oil quick-drain valve is available to replace the drain plug on the bottom of the oil sump, and provides quicker, cleaner draining of the engine oil. To drain the oil with this valve, slip a hose over the end of the valve and push upward on the end of the valve until it snaps into the open position. Spring clips will hold the valve open. After draining, use a suitable tool to snap the valve into the extended (closed) position and remove the drain hose.

IGNITION-STARTER SYSTEM

Engine ignition is provided by two engine-driven magnetos and two spark plugs in each cylinder. The right magneto fires the lower left and upper right spark plugs, and the left magneto fires the lower right and upper left spark plugs. Normal operation is conducted with both magnetos

due to the more complete burning of the fuel-air mixture with dual ignition.

Ignition and starter operation is controlled by a rotary type switch located on the left switch and control panel. The switch is labeled clockwise, OFF, R, L, BOTH, and START. The engine should be operated on both magnetos (BOTH position) except for magneto checks. The R and L positions are for checking purposes and emergency use only. When the switch is rotated to the spring-loaded START position, (with the master switch in the ON position), the starter contactor is energized and the starter will crank the engine. When the switch is released, it will automatically return to the BOTH position.

AIR INDUCTION SYSTEM

The engine air induction system receives ram air through an intake in the front of the engine cowl. Aft of the engine cylinders is an air filter which removes dust and other foreign matter from the induction air. Airflow passing through the filter enters an airbox at the rear of the engine. The airbox has a spring-loaded alternate air door. If the air induction filter should become blocked, suction created by the engine will open the door and draw unfiltered air from inside the upper cowl area. An open alternate air door will result in an approximate 10% power loss at full throttle. After passing through the airbox, induction air enters a fuel/air control unit behind the engine, and is then ducted to the engine cylinders through intake manifold tubes.

EXHAUST SYSTEM

Exhaust gas from each cylinder passes through riser assemblies to a collector and muffler on each side of the engine. The left muffler is constructed with a shroud around the outside which forms a heating chamber for cabin heater air.

FUEL INJECTION SYSTEM

The engine is equipped with a fuel injection system. The system is comprised of an engine-driven fuel pump, fuel/air control unit, fuel manifold, fuel flow indicator, and air-bleed type injector nozzles.

Fuel is delivered by the engine-driven fuel pump to the fuel/air control unit behind the engine. The fuel/air control unit correctly proportions the fuel flow to the induction air flow. After passing through the control unit, induction air is delivered to the cylinders through intake manifold tubes, and metered fuel is delivered to a fuel manifold. The fuel manifold, through spring tension on a diaphragm and valve, evenly distributes the fuel to an air-bleed type injector nozzle in the intake valve cham-

ber of each cylinder. A pressure line is also attached to the fuel manifold, and is connected to a fuel flow indicator on the instrument panel.

COOLING SYSTEM

Ram air for engine cooling enters through two intake openings in the front of the engine cowling. The cooling air is directed around the cylinders and other areas of the engine by baffling, and is then exhausted through cowl flaps on the lower aft edge of the cowling. The cowl flaps are mechanically operated from the cabin by means of a cowl flap lever on the right side of the control pedestal. The pedestal is labeled COWL FLAPS, OPEN, CLOSED. During takeoff and climb operation, the cowl flap lever is normally placed in the OPEN position for maximum cooling. This is accomplished by moving the lever to the right to clear a detent, then moving the lever up to the OPEN position. Anytime the lever is repositioned, it must first be moved to the right. While in cruise flight, cowl flaps should be adjusted to keep the cylinder head temperature at approximately two-thirds of the normal operating range (green arc). During extended let-downs, it is recommended the cowl flaps be completely closed by pushing the cowl flap lever down to the CLOSED position.

A winterization kit is available for the airplane. It consists of two baffles for the engine cowling air intake openings and insulation for the crankcase breather line. This equipment should be installed for operations in temperatures consistently below -7°C (20°F). Once installed, crankcase breather line insulation is approved for permanent installation regardless of temperature.

PROPELLER

The airplane has an all-metal, two-bladed, constant-speed, governor-regulated propeller. A three-bladed propeller is also available, and functions identically to the two-bladed propeller. A setting introduced into the governor with the propeller control establishes the propeller speed, and thus the engine speed to be maintained. The governor then controls flow of engine oil, boosted to high pressure by the governing pump, to or from a piston in the propeller hub. Oil pressure acting on the piston twists the blades toward high pitch (low RPM). When oil pressure to the piston in the propeller hub is relieved, centrifugal force, assisted by an internal spring, twists the blades toward low pitch (high RPM).

A control knob on the lower center portion of the instrument panel is used to set the propeller and control engine RPM as desired for various flight conditions. The knob is labeled PROP PITCH PUSH INCR RPM. When the control knob is pushed in, blade pitch will decrease, giving a

higher RPM. When the control knob is pulled out, the blade pitch increases, thereby decreasing RPM. The propeller control knob is equipped with a vernier feature which allows slow or fine RPM adjustments by rotating the knob clockwise to increase RPM, and counterclockwise to decrease it. To make rapid or large adjustments, depress the button on the end of the control knob and reposition the control as desired.

FUEL SYSTEM

The airplane may be equipped with either a standard fuel system or a long range system (see figure 7-6). Both systems consist of two vented fuel tanks (one in each wing), two fuel reservoir tanks, a fuel selector valve, auxiliary fuel pump, fuel strainer, engine-driven fuel pump, fuel/air control unit, fuel manifold, and fuel injection nozzles.

NOTE

Unusable fuel is at a minimum due to the design of the fuel system. However, with 1/4 tank or less, prolonged uncoordinated flight such as slips or skids can uncover the fuel tank outlets, causing fuel starvation and engine stoppage. Therefore, with low fuel reserves, do not allow the airplane to remain in uncoordinated flight for periods in excess of one minute.

Fuel flows by gravity from the two wing tanks to two reservoir tanks, and from the reservoir tanks to a three-position selector valve labeled LEFT ON, RIGHT ON, and OFF. With the selector valve in the LEFT

FUEL QUANTITY DATA (U. S. GALLONS)			
TANKS	TOTAL USABLE FUEL ALL FLIGHT CONDITIONS	TOTAL UNUSABLE FUEL	TOTAL FUEL VOLUME
STANDARD (30.5 Gal. Each)	54	7	61
LONG RANGE (40 Gal. Each)	73	7	80

Figure 7-5. Fuel Quantity Data

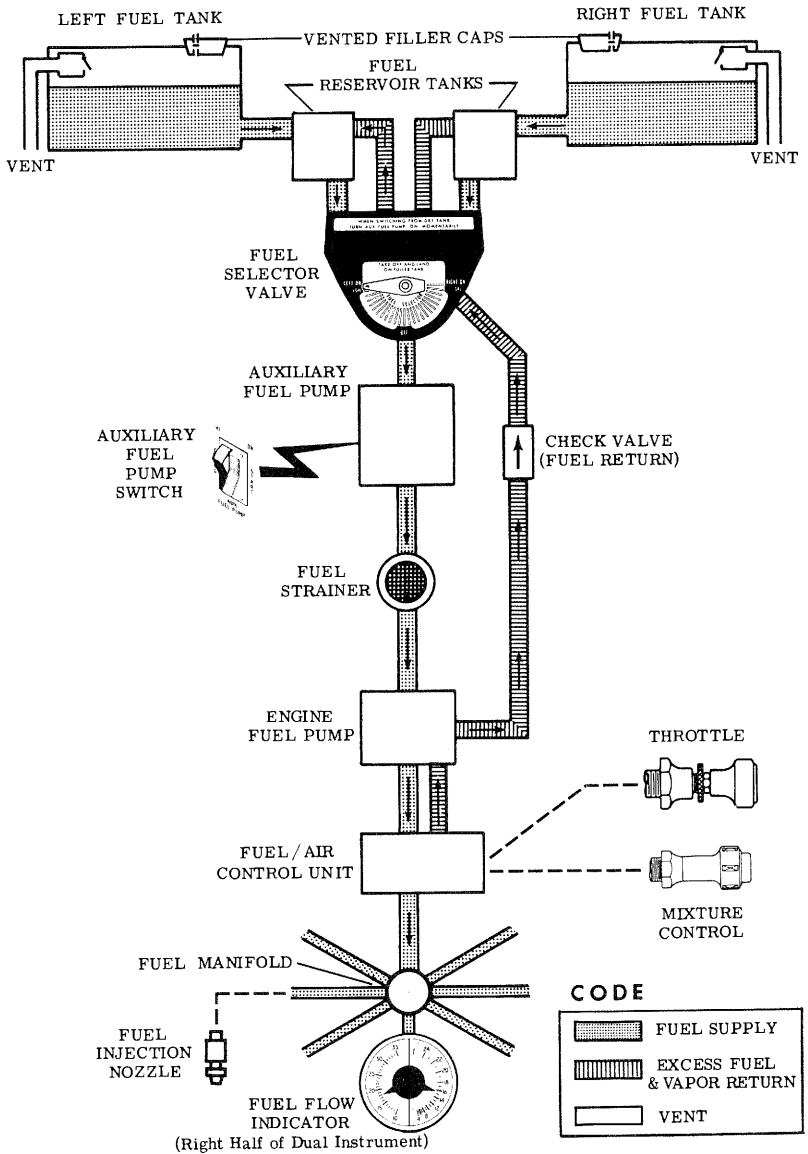


Figure 7-6. Fuel System (Standard and Long Range)

ON or RIGHT ON position, fuel from either the left or right tank flows through a bypass in the auxiliary fuel pump (when it is not in operation), and through a strainer to an engine-driven fuel pump. The engine-driven fuel pump delivers the fuel to the fuel/air control unit where it is metered and directed to a manifold which distributes it to each cylinder.

NOTE

Fuel cannot be used from both fuel tanks simultaneously.

Vapor and excess fuel from the engine-driven fuel pump and fuel/air control unit are returned by way of the selector valve to the reservoir tank of the wing fuel tank system being used.

Fuel system venting is essential to system operation. Complete blockage of the venting system will result in decreasing fuel flow and eventual engine stoppage. Venting is accomplished by check valve equipped vent lines, one from each fuel tank, which protrude from the bottom surface of each wing at the wing strut attach point. The fuel filler caps are equipped with vacuum operated vents which open, allowing air into the tanks, should the fuel tank vent lines become blocked.

Fuel quantity is measured by two float-type fuel quantity transmitters (one in each tank) and indicated by two electrically-operated fuel quantity indicators on the right side of the instrument panel. An empty tank is indicated by a red line and the letter E. When an indicator shows an empty tank, approximately 7 gallons remain in the standard and long range tanks as unusable fuel. The indicators cannot be relied upon for accurate readings during skids, slips, or unusual attitudes. If both indicator pointers should rapidly move to a zero reading, check the cylinder head temperature and oil temperature gages for operation. If these gages are not indicating, an electrical malfunction has occurred.

The auxiliary fuel pump switch is located on the left side of the instrument panel and is a yellow and red split-rocker type switch. The yellow right half of the switch is labeled START, and its upper ON position is used for normal starting, minor vapor purging and continued engine operation in the event of an engine-driven fuel pump failure. With the right half of the switch in the ON position, the pump operates at one of two flow rates that are dependent upon the setting of the throttle. With the throttle open to a cruise setting, the pump operates at a high enough capacity to supply sufficient fuel flow to maintain flight with an inoperative engine-driven fuel pump. When the throttle is moved toward the closed position (as during letdown, landing, and taxiing), the fuel pump flow rate is automatically reduced, preventing an excessively rich mixture during these periods of reduced engine speed.

NOTE

If the engine-driven fuel pump is functioning and the auxiliary fuel pump switch is placed in the ON position, a fuel/air ratio considerably richer than best power is produced unless the mixture is leaned. Therefore, this switch should be turned off during takeoff.

NOTE

If the auxiliary fuel pump switch is accidentally placed in the ON position with the master switch on and the engine stopped, the intake manifolds will be flooded.

The red left half of the switch is labeled EMERG, and its upper HI position is used in the event of an engine-driven fuel pump failure during takeoff or high power operation. The HI position may also be used for extreme vapor purging. Maximum fuel flow is produced when the left half of the switch is held in the spring-loaded HI position. In this position, an interlock within the switch automatically trips the right half of the switch to the ON position. When the spring-loaded left half of the switch is released, the right half will remain in the ON position until manually returned to the off position.

If it is desired to completely exhaust a fuel tank quantity in flight, the auxiliary fuel pump will be needed to assist in restarting the engine when fuel exhaustion occurs. Therefore, it is recommended that proper operation of the auxiliary fuel pump be verified prior to running a fuel tank dry by turning the auxiliary fuel pump ON momentarily and checking for a slight rise in fuel flow indication.

To ensure a prompt engine restart in flight after running a fuel tank dry, immediately switch to the tank containing fuel at the first indication of fuel pressure fluctuation and/or power loss. Then place the right half of the auxiliary fuel pump switch in the ON position momentarily (3 to 5 seconds) with the throttle at least 1/2 open. Excessive use of the ON position at high altitude and full rich mixture can cause flooding of the engine as indicated by a short (1 to 2 seconds) period of power followed by a loss of power. This can later be detected by a fuel flow indication accompanied by a lack of power. If flooding does occur, turn off the auxiliary fuel pump switch, and normal propeller windmilling should start the engine in 1 to 2 seconds.

If the propeller should stop (possible at very low airspeeds) before the tank containing fuel is selected, place the auxiliary fuel pump switch in the

ON position and advance the throttle promptly until the fuel flow indicator registers approximately 1/2 way into the green arc for 1 to 2 seconds duration. Then retard the throttle, turn off the auxiliary fuel pump, and use the starter to turn the engine over until a start is obtained.

The fuel system is equipped with drain valves to provide a means for the examination of fuel in the system for contamination and grade. The system should be examined before the first flight of every day and after each refueling, by using the sampler cup provided to drain fuel from the wing tank sumps, and by utilizing the fuel strainer drain under an access panel on the left side of the engine cowling. Quick-drain valves are also provided for the fuel reservoir tanks. The valves are located under plug buttons in the belly skin of the airplane, and are used to facilitate purging of the fuel system in the event water is discovered during the preflight fuel system inspection. The fuel tanks should be filled after each flight to prevent condensation.

BRAKE SYSTEM

The airplane has a single-disc, hydraulically-actuated brake on each main landing gear wheel. Each brake is connected, by a hydraulic line, to a master cylinder attached to each of the pilot's rudder pedals. The brakes are operated by applying pressure to the top of either the left (pilot's) or right (copilot's) set of rudder pedals, which are interconnected. When the airplane is parked, both main wheel brakes may be set by utilizing the parking brake which is operated by a handle under the left side of the instrument panel. To apply the parking brake, set the brakes with the rudder pedals, pull the handle aft, and rotate it 90° down.

For maximum brake life, keep the brake system properly maintained, and minimize brake usage during taxi operations and landings.

Some of the symptoms of impending brake failure are: gradual decrease in braking action after brake application, noisy or dragging brakes, soft or spongy pedals, and excessive travel and weak braking action. If any of these symptoms appear, the brake system is in need of immediate attention. If, during taxi or landing roll, braking action decreases, let up on the pedals and then re-apply the brakes with heavy pressure. If the brakes become spongy or pedal travel increases, pumping the pedals should build braking pressure. If one brake becomes weak or fails, use the other brake sparingly while using opposite rudder, as required, to offset the good brake.

ELECTRICAL SYSTEM

Electrical energy (see figure 7-7) is supplied by a 14-volt, direct-current system powered by an engine-driven, 60-amp alternator. The 12-volt, 33 amp hour battery is located inside the forward baggage compartment under the cover plate on the right side of the compartment floor. A 28-volt, direct-current electrical system utilizing a 60-amp alternator, 24-volt, 17-amp hour battery, different circuit breaker values, wiring differences, and additional resistors is also available.

Power from either system is supplied to all electrical circuits through a split bus bar, one side containing electronic system circuits and the other side having general electrical system circuits. Both sides of the bus are on at all times except when either an external power source is connected or the starter switch is turned on; then a power contactor is automatically activated to open the circuit to the electronic bus. Isolating the electronic circuits in this manner prevents harmful transient voltages from damaging the transistors in the electronic equipment.

MASTER SWITCH

The master switch is a split-rocker type switch labeled MASTER, and is ON in the up position and OFF in the down position. The right half of the switch, labeled BAT, controls all electrical power to the airplane. The left half, labeled ALT, controls the alternator.

Normally, both sides of the master switch should be used simultaneously; however, the BAT side of the switch could be turned ON separately to check equipment while on the ground. The ALT side of the switch, when placed in the OFF position, removes the alternator from the electrical system. With this switch in the OFF position, the entire electrical load is placed on the battery. Continued operation with the alternator switch in the OFF position will reduce battery power low enough to open the battery contactor, remove power from the alternator field, and prevent alternator restart.

AMMETER

The ammeter indicates the flow of current, in amperes, from the alternator to the battery or from the battery to the airplane electrical system. When the engine is operating and the master switch is turned on, the ammeter indicates the charging rate applied to the battery. In the event the alternator is not functioning or the electrical load exceeds the output of the alternator, the ammeter indicates the battery discharge rate.

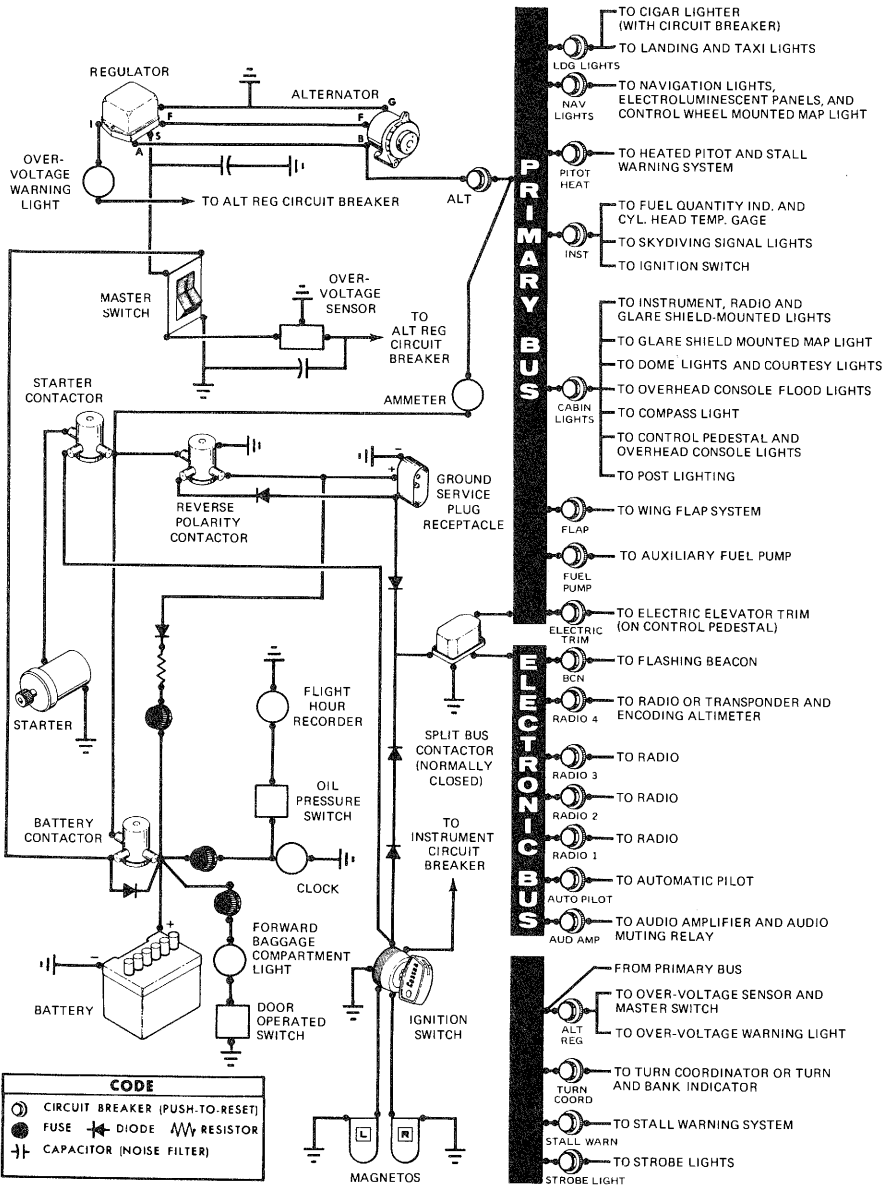


Figure 7-7. Electrical System (12-Volt System Shown)

OVER-VOLTAGE SENSOR AND WARNING LIGHT

The airplane is equipped with an automatic over-voltage protection system consisting of an over-voltage sensor behind the instrument panel and a red warning light, labeled HIGH VOLTAGE, below the oil temperature gage.

In the event an over-voltage condition occurs, the over-voltage sensor automatically removes alternator field current and shuts down the alternator. The red warning light will then turn on, indicating to the pilot that the alternator is not operating and the battery is supplying all electrical power.

The over-voltage sensor may be reset by turning the master switch off and back on again. If the warning light does not illuminate, normal alternator charging has resumed; however, if the light does illuminate again, a malfunction has occurred, and the flight should be terminated as soon as practical.

The warning light may be tested by momentarily turning off the ALT portion of the master switch and leaving the BAT portion turned on.

CIRCUIT BREAKERS AND FUSES

Most of the electrical circuits in the airplane are protected by "push-to-reset" circuit breakers mounted on the left side of the instrument panel. The circuit breaker protecting the electric elevator trim system is mounted on the control pedestal. The cigar lighter is protected by the LDG LIGHTS circuit breaker and a manually-reset type circuit breaker on the back of the lighter. Electrical circuits which are not protected by circuit breakers are the battery contactor closing (external power) circuit, clock circuit, forward baggage compartment light, and flight hour recorder circuit which are protected by fuses mounted adjacent to the battery. The control wheel map light, protected by a fuse behind the instrument panel, is also protected by the NAV LIGHT circuit breaker.

GROUND SERVICE PLUG RECEPTACLE

A ground service plug receptacle may be installed to permit the use of an external power source for cold weather starting and during lengthy maintenance work on the airplane electrical system (with the exception of electronic equipment). The receptacle is located under a cover plate, on the lower left side of the cowl.

NOTE

Electrical power for the airplane electrical circuits is

provided through a split bus bar having all electronic circuits on one side of the bus and other electrical circuits on the other side of the bus. When an external power source is connected, a contactor automatically opens the circuit to the electronic portion of the split bus bar as a protection against damage to the transistors in the electronic equipment by transient voltages from the power source. Therefore, the external power source can not be used as a source of power when checking electronic components.

Just before connecting an external power source (generator type or battery cart), the master switch should be turned on.

The ground service plug receptacle circuit incorporates a polarity reversal protection. Power from the external power source will flow only if the ground service plug is correctly connected to the airplane. If the plug is accidentally connected backwards, no power will flow to the electrical system, thereby preventing any damage to electrical equipment.

The battery and external power circuits have been designed to completely eliminate the need to "jumper" across the battery contactor to close it for charging a completely "dead" battery. A special fused circuit in the external power system supplies the needed "jumper" across the contacts so that with a "dead" battery and an external power source applied, turning on the master switch will close the battery contactor.

LIGHTING SYSTEMS

EXTERIOR LIGHTING

Conventional navigation lights are located on the wing tips and tail stinger, landing and taxi lights are installed in the left wing leading edge, and a flashing beacon is mounted on top of the vertical stabilizer. Additional lighting is available and includes a strobe light on each wing tip and two courtesy lights, one under each wing, just outboard of the cabin. The courtesy lights are operated by a switch located on the left rear door post. All exterior lights, except the courtesy lights, are controlled by rocker type switches on the left switch and control panel. The switches are ON in the up position and OFF in the down position.

The flashing beacon should not be used when flying through clouds or overcast; the flashing light reflected from water droplets or particles in the atmosphere, particularly at night, can produce vertigo and loss of orientation.

The high intensity strobe lights will enhance anti-collision protection. However, the lights should be turned off when taxiing in the vicinity of other aircraft, or during night flight through clouds, fog or haze.

INTERIOR LIGHTING

Instrument and control panel lighting is provided by electroluminescent, flood, and integral lighting, with post lighting also available. All light intensity is controlled by one dual rheostat, with concentric control knobs, and one single rheostat, labeled LWR PANEL, ENG-RADIO, and INSTRUMENTS respectively. Both the dual and single rheostat controls rotate clockwise from dim to bright, and are located on the left switch and control panel. If post lighting is installed, a rocker-type selector switch next to the INSTRUMENTS rheostat control is used to select either post lighting or flood lighting. The switch is labeled POST LIGHTS-FLOOD LIGHTS. The master switch must be turned on to operate any of the light systems except the forward baggage compartment courtesy light.

Switches and controls on the lower part of the instrument panel and the marker beacon control panel are lighted by electroluminescent panels which do not require light bulbs for illumination. To utilize this lighting, turn on the NAV LIGHTS switch and adjust light intensity with the small (inner) control knob of the concentric control knobs labeled LWR PANEL, ENG-RADIO. Electroluminescent lighting is not affected by the selection of post or flood lighting.

Instrument panel flood lighting consists of four red flood lights on the underside of the anti-glare shield, and two red flood lights in the forward part of the overhead console. To use flood lighting, place the POST LIGHTS-FLOOD LIGHTS selector switch (if installed) in the FLOOD LIGHTS position and adjust light intensity with the INSTRUMENTS rheostat control knob.

The instrument panel may be equipped with post lights which are mounted at the edge of each instrument or control and provide direct lighting. The lights are operated by placing the POST LIGHTS-FLOOD LIGHTS selector switch in the POST LIGHTS position and adjusting light intensity with the INSTRUMENTS rheostat control knob. Switching to post lights will automatically turn off flood lighting.

The engine instrument cluster, radio equipment, and magnetic compass have integral lighting and operate independently of post or flood lighting. The light intensity of instrument cluster and radio equipment lighting is controlled by the large (outer) control knob of the concentric control knobs labeled LWR PANEL, ENG-RADIO. Magnetic compass lighting intensity is controlled by the INSTRUMENTS rheostat control knob.

The cabin interior is lighted by three dome lights, two on the left side of the cabin and one on the right side, located just above the side windows. The lights are operated by a switch on the left rear door post labeled UTILITY LIGHTS.

The forward baggage compartment may be equipped with a courtesy light, operated by a spring-loaded switch mounted on the door frame. When the baggage door is opened the light will automatically turn on. The master switch does not have to be turned on for this light to function.

The control pedestal has two post lights and, if the airplane is equipped with oxygen, the overhead console is illuminated by post lights. Pedestal and console light intensity is controlled by the large (outer) control knob of the concentric control knobs labeled LWR PANEL, ENG-RADIO.

Map lighting is provided by overhead console map lights and an anti-glare shield mounted map light. The airplane may also be equipped with a control wheel map light. The overhead console map lights operate in conjunction with instrument panel flood lighting and consist of two openings just aft of the red instrument panel flood lights. The map light openings have sliding covers controlled by small round knobs which uncover the openings when moved toward each other. The covers should be kept closed unless the map lights are required. A map light and toggle switch, mounted in front of the pilot on the underside of the anti-glare shield, is used for illuminating approach plates or other charts when using a control wheel mounted approach plate holder. The switch is labeled MAP LIGHT ON, OFF and light intensity is controlled by the INSTRUMENTS control knob. A map light mounted on the bottom of the pilot's control wheel illuminates the lower portion of the cabin in front of the pilot, and is used for checking maps and other flight data during night operation. The light is utilized by turning on the NAV LIGHTS switch, and adjusting light intensity with the rheostat control knob on the bottom of the control wheel.

The most probable cause of a light failure is a burned out bulb; however, in the event any of the lighting systems fail to illuminate when turned on, check the appropriate circuit breaker. If the circuit breaker has opened (white button popped out), and there is no obvious indication of a short circuit (smoke or odor), turn off the light switch of the affected lights, reset the breaker, and turn the switch on again. If the breaker opens again, do not reset it.

CABIN HEATING, VENTILATING, AND DEFROSTING SYSTEM

The temperature and volume of airflow into the cabin can be regulated

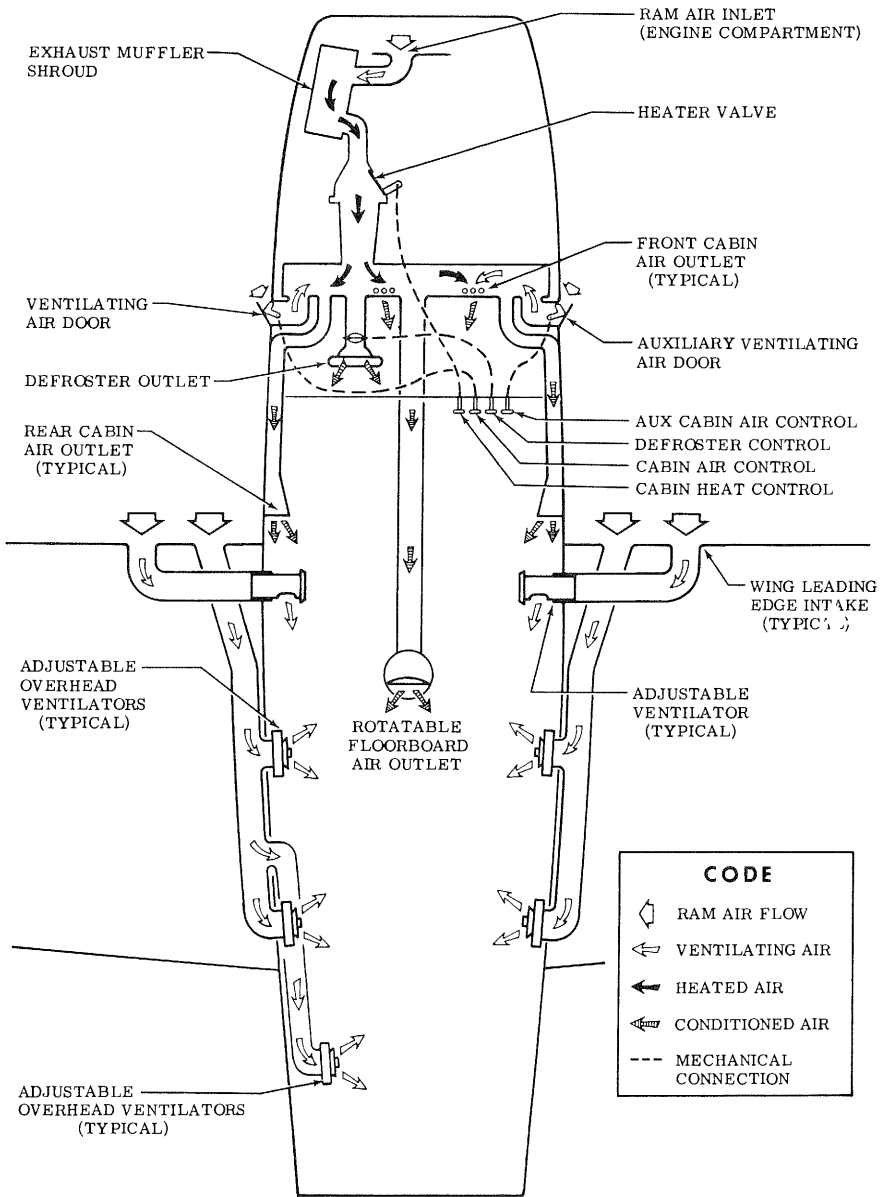


Figure 7-8. Cabin Heating, Ventilating, and Defrosting System

to any degree desired by manipulation of the push-pull CABIN HEAT and CABIN AIR control knobs (see figure 7-8). When partial cabin heat is desired, blending warm and cold air will result in improved ventilation and heat distribution throughout the cabin. Additional outside air for summer ventilation is provided through the heat and vent system by operation of the push-pull AUX CABIN AIR knob. All three control knobs are the double button type with locks to permit intermediate settings.

Front cabin heat and ventilating air is supplied by outlet holes spaced across a cabin manifold just forward of the pilot's and copilot's feet. Rear cabin heat and air is supplied by three ducts from the manifold, one extending down each side of the cabin to an outlet at the front door post area at floor level and one extending under the center of the cabin floor to an outlet in the floor behind the pilot and copilot seats. The cabin floor outlet is flush mounted, with a removable airflow diverter.

Windshield defrost air is supplied by a duct from the cabin manifold to an outlet on top of the anti-glare shield; therefore, the temperature of the defrosting air is the same as heated cabin air. A rotary type control knob labeled DEFROST regulates the volume of air to the windshield. Clockwise rotation of the knob increases defroster air flow.

Additional cabin ventilation can be obtained from separate adjustable ventilators, one near each upper corner of the windshield for the pilot and copilot, and five adjustable ventilators in the cabin ceiling.

PITOT-STATIC SYSTEM AND INSTRUMENTS

The pitot-static system supplies ram air pressure to the airspeed indicator and static pressure to the airspeed indicator, rate-of-climb indicator and altimeter. The system is composed of a pitot tube mounted on the lower surface of the left wing, two external static ports, one on each side of the fuselage below the rear windows, and the associated plumbing necessary to connect the instruments to the sources.

The airplane may also be equipped with a pitot heat system. The system consists of a heating element in the pitot tube, a rocker-type switch labeled PITOT HEAT on the lower left side of the instrument panel, a 10-amp circuit breaker on the lower left side of the instrument panel, and associated wiring. When the pitot heat switch is turned on, the element in the pitot tube is heated electrically to maintain proper operation in possible icing conditions. Pitot heat should be used only as required.

A static pressure alternate source valve is installed to the right of

the parking brake for use when the external static source is malfunctioning. This valve supplies static pressure from inside the forward baggage compartment instead of the external static ports.

If erroneous instrument readings are suspected due to water or ice in the pressure lines going to the standard external static pressure source, the alternate static source valve should be pulled on.

Pressures within the cabin will vary with open cabin ventilators and windows. Refer to Section 5 for the effect of varying cabin and baggage compartment pressures on airspeed readings.

AIRPEED INDICATOR

The airspeed indicator is calibrated in knots and miles per hour. Limitation and range markings include the white arc (54 to 100 knots), green arc (56 to 151 knots), yellow arc (151 to 186 knots), and a red line (186 knots).

If a true airspeed indicator is installed, it is equipped with a rotatable ring which works in conjunction with the airspeed indicator dial in a manner similar to the operation of a flight computer. To operate the indicator, first rotate the ring until pressure altitude is aligned with outside air temperature in degrees Fahrenheit. Pressure altitude should not be confused with indicated altitude. To obtain pressure altitude, momentarily set the barometric scale on the altimeter to 29.92 and read pressure altitude on the altimeter. Be sure to return the altimeter barometric scale to the original barometric setting after pressure altitude has been obtained. Having set the ring to correct for altitude and temperature, then read the airspeed shown on the rotatable ring by the indicator pointer. For best accuracy, this indication should be corrected to calibrated airspeed by referring to the Airspeed Calibration chart in Section 5. Knowing the calibrated airspeed, read true airspeed on the ring opposite the calibrated airspeed.

RATE-OF-CLIMB INDICATOR

The rate-of-climb indicator depicts airplane rate of climb or descent in feet per minute. The pointer is actuated by an atmospheric pressure change supplied by the static source.

ALTIMETER

Airplane altitude is depicted by a barometric type altimeter. A knob near the lower left portion of the indicator provides adjustment of the instrument's barometric scale to the proper barometric pressure reading.

VACUUM SYSTEM AND INSTRUMENTS

An engine-driven vacuum system (see figure 7-9) is available and provides the suction necessary to operate the attitude indicator and directional indicator. The system consists of a vacuum pump on the engine, a vacuum relief valve and vacuum system air filter on the aft side of the firewall below the instrument panel, vacuum operated instruments on the left side of the instrument panel, and a suction gage on the right side of the panel.

ATTITUDE INDICATOR

An attitude indicator is available and gives a visual indication of flight attitude. Bank attitude is presented by a pointer at the top of the indicator relative to the bank scale which is marked in increments of 10°, 20°, 30°, 60°, and 90° either side of the center mark. Pitch attitude is presented by a miniature airplane in relation to the horizon bar. A knob at the bottom of the instrument is provided for in-flight adjustment of the miniature airplane to the horizon bar for a more accurate flight attitude indication.

DIRECTIONAL INDICATOR

A directional indicator is available and displays airplane heading on a compass card in relation to a fixed simulated airplane image and index. The directional indicator will precess slightly over a period of time. Therefore, the compass card should be set in accordance with the magnetic compass just prior to takeoff, and occasionally re-adjusted on extended flights. A knob on the lower left edge of the instrument is used to adjust the compass card to correct for any precession.

SUCTION GAGE

A suction gage is located on the right side of the instrument panel when the airplane is equipped with a vacuum system. Suction available for operation of the attitude indicator and directional indicator is shown by this gage, which is calibrated in inches of mercury. The desired suction range is 4.6 to 5.4 inches of mercury. A suction reading below this range may indicate a system malfunction or improper adjustment, and in this case, the indicators should not be considered reliable.

STALL WARNING SYSTEM

The airplane is equipped with a vane-type stall warning unit, in the leading edge of the left wing, which is electrically connected to a stall warning horn behind the map compartment. A 5-amp circuit breaker pro-

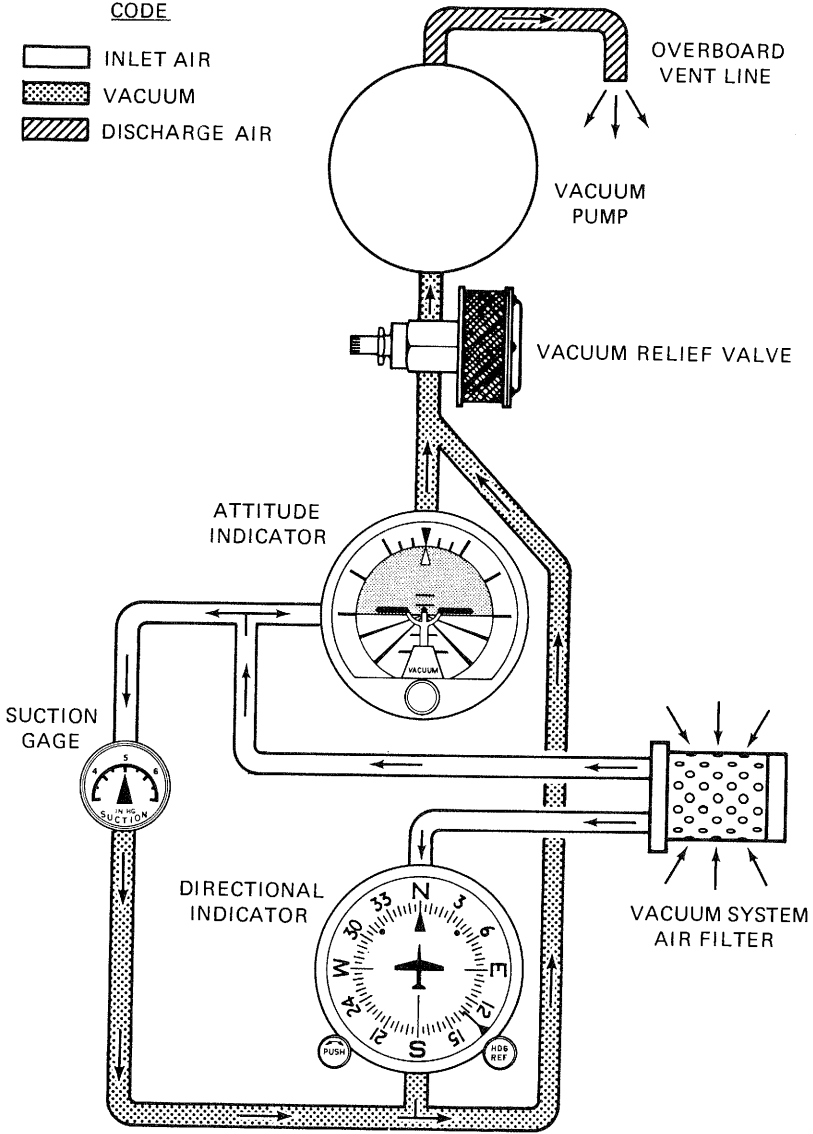


Figure 7-9. Vacuum System

fects the stall warning system. The vane in the wing senses the change in airflow over the wing, and operates the warning horn at airspeeds between 5 and 10 knots above the stall in all configurations.

If the airplane has a heated stall warning system, the vane and sensor unit in the wing leading edge is equipped with a heating element. The heated part of the system is operated by the PITOT HEAT switch, and is protected by the PITOT HEAT circuit breaker.

The stall warning system should be checked during the preflight inspection by momentarily turning on the master switch and actuating the vane in the wing. The system is operational if the warning horn sounds as the vane is pushed upward.

AVIONICS SUPPORT EQUIPMENT

The airplane may, at the owner's discretion, be equipped with various types of avionics support equipment such as an audio control panel, microphone-headsets, and static dischargers. The following paragraphs discuss these items.

AUDIO CONTROL PANEL

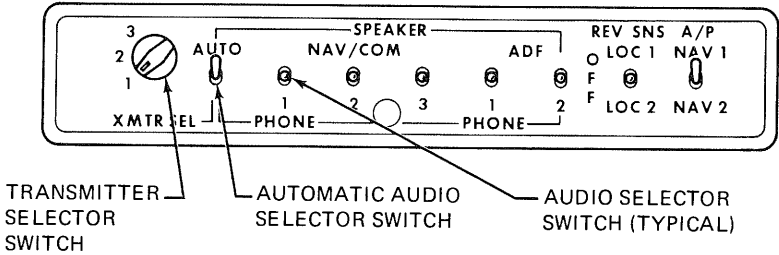
Operation of radio equipment is covered in Section 9 of this handbook. When one or more radios are installed, a transmitter/audio switching system is provided (see figure 7-10). The operation of this switching system is described in the following paragraphs.

TRANSMITTER SELECTOR SWITCH

A rotary type transmitter selector switch, labeled XMTR SEL, is provided to connect the microphone to the transmitter the pilot desires to use. To select a transmitter, rotate the switch to the number corresponding to that transmitter. The numbers 1, 2 and 3 on the left side of the switch correspond to the top, second and third transceivers in the avionics stack.

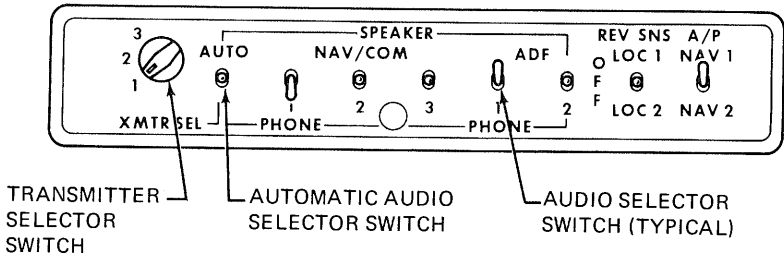
An audio amplifier is required for speaker operation, and is automatically selected, along with the transmitter, by the transmitter selector switch. As an example, if the number 1 transmitter is selected, the audio amplifier in the associated NAV/COM receiver is also selected, and functions as the amplifier for ALL speaker audio. In the event the audio amplifier in use fails, as evidenced by loss of all speaker audio, select another transmitter. This should re-establish speaker audio. Headset audio is

AUTOMATIC AUDIO SELECTION



As illustrated, the number 1 transmitter is selected, the AUTO selector switch is in the SPEAKER position, and the NAV/COM 1, 2 and 3 and ADF 1 and 2 audio selector switches are in the OFF position. With the switches set as shown, the pilot will transmit on the number 1 transmitter and hear the number 1 NAV/COM receiver through the airplane speaker.

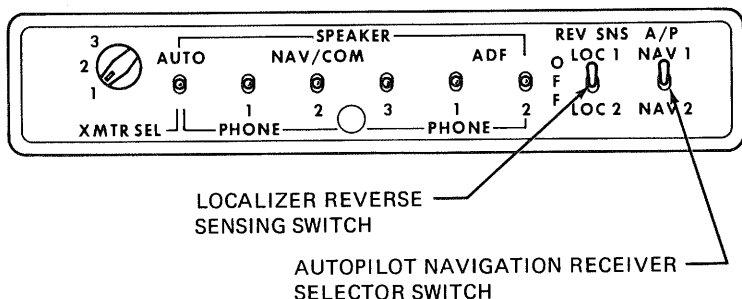
INDIVIDUAL AUDIO SELECTION



As illustrated, the number 1 transmitter is selected, the AUTO selector switch is in the OFF position, the number 1 NAV/COM receiver is in the PHONE position, and the number 1 ADF is in the SPEAKER position. With the switches set as shown, the pilot will transmit on the number 1 transmitter and hear the number 1 NAV/COM receiver on a headset; while the passengers are listening to the ADF audio through the airplane speaker. If another audio selector switch is placed in either the PHONE or SPEAKER position, it will be heard simultaneously with either the number 1 NAV/COM or number 1 ADF respectively.

Figure 7-10. Audio Control Panel (Sheet 1 of 2)

BACK - COURSE AND AUTOPILOT RECEIVER SWITCHES



As illustrated, the Course Deviation Indicator associated with the number 1 Navigation Receiver will indicate normally in localizer operation during a back-course approach, and the autopilot will be operating from number 1 Navigation Receiver. BC light on number 1 CDI will be illuminated, warning pilot that CDI indications have been reversed for back course operations. Glide slope indications are unaffected regardless of switch position.

Figure 7-10. Audio Control Panel (Sheet 2 of 2)

not affected by audio amplifier operation.

AUTOMATIC AUDIO SELECTOR SWITCH

A toggle switch, labeled AUTO, can be used to automatically match the appropriate NAV/COM receiver audio to the transmitter being selected. To utilize this automatic feature, leave all NAV/COM receiver switches in the OFF (center) position, and place the AUTO selector switch in either the SPEAKER or PHONE position, as desired. Once the AUTO selector switch is positioned, the pilot may then select any transmitter and its associated NAV/COM receiver audio simultaneously with the transmitter selector switch.

NOTE

Using Cessna 300 or 400 Series Radios, sidetone (monitoring of the operators own audio transmission) can be heard in the headset by placing the AUTO selector switch in the PHONE position. No sidetone will be heard with the AUTO selector switch in either the SPEAKER (speaker operation) or OFF (center) position.

If automatic audio selection is not desired, the AUTO selector switch should be placed in the OFF (center) position.

AUDIO SELECTOR SWITCHES

The audio selector switches, labeled NAV/COM 1, 2 and 3 and ADF 1 and 2, allow the pilot to initially select pre-tune all NAV/COM and ADF receivers, and then individually select and listen to any receiver or combination of receivers. To listen to a specific receiver, first check that the AUTO selector switch is in the OFF (center) position, then place the audio selector switch corresponding to that receiver in either the SPEAKER (up) or PHONE (down) position. To turn off the audio of the selected receiver, place that switch in the OFF (center) position. If desired, the audio selector switches can be positioned to permit the pilot to listen to one receiver on a headset while the passengers listen to another receiver on the airplane speaker.

The ADF 1 and 2 switches may be used anytime ADF audio is desired. If the pilot wants only ADF audio, for station identification or other reasons, the AUTO selector switch (if in use) and all other audio selector switches should be in the OFF position. If simultaneous ADF and NAV/COM audio is acceptable to the pilot, no change in the existing switch positions is required. Place the ADF 1 or 2 switch in either the SPEAKER or PHONE position and adjust radio volume as desired.

NOTE

If the NAV/COM audio selector switch corresponding to the selected transmitter is in the PHONE position with the AUTO selector switch in the SPEAKER position, all audio selector switches placed in the PHONE position will automatically be connected to both the airplane speaker and any headsets in use.

LOCALIZER REVERSE SENSING (BACK-COURSE) SWITCH

When installed, the optional localizer reverse sensing switch, labeled REV SNS LOC 1, LOC 2, allows the pilot to reverse normal localizer needle indications on the selected Course Deviation Indicator (CDI) when the selected navigation receiver is set to a localizer frequency. This switch is provided for back-course operation only and will allow the pilot to fly a front course outbound or back course inbound. When the REV SNS switch is moved from the center OFF position to either LOC 1 or LOC 2 position, an amber light located within the CDI, labeled BC, will illuminate to warn the pilot that the course indicator needle is reversed.

AUTOPILOT NAVIGATION RECEIVER SELECTOR SWITCH

An autopilot navigation receiver selector switch, labeled A/P NAV 1, NAV 2, is installed when a Cessna 400 Autopilot system is installed. The switch allows the pilot to select the desired navigation receiver for autopilot operation. Since the switch does not have a center OFF position, placing the switch in either position will automatically select the associated navigation information for the autopilot.

MICROPHONE-HEADSET

The microphone-headset combination consists of the microphone and headset combined in a single unit and a microphone keying switch located on the left side of the pilot's control wheel. The microphone-headset permits the pilot to conduct radio communications without interrupting other control operations to handle a hand-held microphone. Also, passengers need not listen to all communications. The microphone and headset jacks are located on the extreme left side of the instrument panel.

STATIC DISCHARGERS

If frequent IFR flights are planned, installation of wick-type static dischargers is recommended to improve radio communications during flight through dust or various forms of precipitation (rain, snow or ice crystals). Under these conditions, the build-up and discharge of static electricity from the trailing edges of the wings, rudder, elevator, propeller tips, and radio antennas can result in loss of usable radio signals on all communications and navigation radio equipment. Usually the ADF is first to be affected and VHF communication equipment is the last to be affected.

Installation of static dischargers reduces interference from precipitation static, but it is possible to encounter severe precipitation static conditions which might cause the loss of radio signals, even with static dischargers installed. Whenever possible, avoid known severe precipitation areas to prevent loss of dependable radio signals. If avoidance is impractical, minimize airspeed and anticipate temporary loss of radio signals while in these areas.

SECTION 8

AIRPLANE HANDLING, SERVICE & MAINTENANCE

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INTRODUCTION

This section contains factory-recommended procedures for proper ground handling and routine care and servicing of your Cessna. It also identifies certain inspection and maintenance requirements which must be followed if your airplane is to retain that new-plane performance and dependability. 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.

IDENTIFICATION PLATE

All correspondence regarding your airplane should include the SERIAL NUMBER. The Serial Number, Model Number, Production Certificate Number (PC) and Type Certificate Number (TC) can be found on the Identification Plate, located on the left forward doorpost. Located adjacent to the Identification Plate is a Finish and Trim Plate which contains a code describing the interior color scheme and exterior paint combination of the airplane. The code may be used in conjunction with an applicable Parts Catalog if finish and trim information is needed.

OWNER FOLLOW-UP SYSTEM

Your Cessna Dealer has an Owner Follow-Up System to notify you when he receives information that applies to your Cessna. In addition, if you wish, you may choose to receive similar notification, in the form of Service Letters, directly from the Cessna Customer Services Department. A subscription form is supplied in your Customer Care Program book for your use, should you choose to request this service. Your Cessna Dealer will be glad to supply you with details concerning these follow-up programs, and stands ready, through his Service Department, to supply you with fast, efficient, low-cost service.

PUBLICATIONS

Various publications and flight operation aids are furnished in the

airplane when delivered from the factory. These items are listed below.

- CUSTOMER CARE PROGRAM BOOK
- PILOT'S OPERATING HANDBOOK AND SUPPLEMENTS FOR YOUR
AIRPLANE
AVIONICS AND AUTOPILOT
- POWER COMPUTER
- SALES AND SERVICE DEALER DIRECTORY
- DO'S AND DON'TS ENGINE BOOKLET

The following additional publications, plus many other supplies that are applicable to your airplane, are available from your Cessna Dealer.

- SERVICE MANUALS AND PARTS CATALOGS FOR YOUR
AIRPLANE
ENGINE AND ACCESSORIES
AVIONICS AND AUTOPILOT

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.

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 ensure that all data requirements are met.

A. To be displayed in the airplane at all times:

- (1) Aircraft Airworthiness Certificate (FAA Form 8100-2).
- (2) Aircraft Registration Certificate (FAA Form 8050-3).
- (3) Aircraft Radio Station License, if transmitter installed (FCC Form 556).

B. To be carried in the airplane at all times:

- (1) Weight and Balance, and associated papers (latest copy of the Repair and Alteration Form, FAA Form 337, if applicable).
- (2) Equipment List.

C. To be made available upon request:

- (1) Airplane Log Book.
- (2) Engine Log Book.

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 Pilot's Operating Handbook, Power Computer, Customer Care Program book and Customer Care Card, be carried in the airplane at all times.

AIRPLANE INSPECTION PERIODS

FAA REQUIRED INSPECTIONS

As required by Federal Aviation Regulations, all civil aircraft of U.S. registry must undergo a complete inspection (annual) each twelve calendar months. In addition to the required ANNUAL inspection, aircraft operated commercially (for hire) must have a complete inspection every 100 hours of operation.

The FAA may require other inspections by the issuance of airworthiness directives applicable to the airplane, engine, propeller and components. It is the responsibility of the owner/operator to ensure compliance with all applicable airworthiness directives and, when the inspections are repetitive, to take appropriate steps to prevent inadvertent noncompliance.

In lieu of the 100 HOUR and ANNUAL inspection requirements, an airplane may be inspected in accordance with a progressive inspection schedule, 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 schedule that satisfies the complete airplane inspection requirements of both the 100 HOUR and ANNUAL inspections as applicable to Cessna airplanes. The program assists the owner in his responsibility to comply with all FAA inspection requirements, while ensuring timely replacement of life-limited parts and adherence to factory-recommended inspection intervals and maintenance procedures.

CESSNA PROGRESSIVE CARE

The Cessna Progressive Care Program has been designed to help you realize maximum utilization of your airplane at a minimum cost and downtime. 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 and the 100-hour inspection have been carefully worked out by the factory and are followed by the Cessna Dealer Organization. The complete familiarity of Cessna Dealers with Cessna equipment and factory-approved procedures provides the highest level of service possible at lower cost to Cessna owners.

Regardless of the inspection method selected by the owner, he should keep in mind that FAR Part 43 and FAR Part 91 establishes the requirement that properly certified agencies or personnel accomplish all required FAA inspections and most of the manufacturer recommended inspections.

CESSNA CUSTOMER CARE PROGRAM

Specific benefits and provisions of the CESSNA WARRANTY plus other important benefits for you are contained in your CUSTOMER CARE PROGRAM book supplied with your airplane. You will want to thoroughly review your Customer Care Program book and keep it in your airplane at all times.

Coupons attached to the Program book entitle you 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 reasonably soon 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.

PILOT CONDUCTED PREVENTIVE MAINTENANCE

A certified pilot who owns or operates an airplane not used as an air carrier is authorized by FAR Part 43 to perform limited maintenance on his airplane. Refer to FAR Part 43 for a list of the specific maintenance operations which are allowed.

NOTE

Pilots operating airplanes of other than U. S. registry should refer to the regulations of the country of certification for information on preventive maintenance that may be performed by pilots.

A Service Manual should be obtained prior to performing any preventive maintenance to ensure that proper procedures are followed. Your Cessna Dealer should be contacted for further information or for required maintenance which must be accomplished by appropriately licensed personnel.

ALTERATIONS OR REPAIRS

It is essential that the FAA be contacted prior to any alterations on the airplane to ensure that airworthiness of the airplane is not violated. Alterations or repairs to the airplane must be accomplished by licensed personnel.

GROUND HANDLING

TOWING

The airplane is most easily and safely maneuvered by hand with the tow-bar attached to the nose wheel. When towing with a vehicle, do not exceed the nose gear turning angle of 35° either side of center, or damage to the gear will result. If the airplane is towed or pushed over a rough surface during hangaring, watch that the normal cushioning action of the nose strut does not cause excessive vertical movement of the tail and the resulting contact with low hangar doors or structure. A flat nose tire or deflated strut will also increase tail height.

PARKING

When parking the airplane, head into the wind and set the parking brakes. Do not set the parking brakes during cold weather when accumulated moisture may freeze the brakes, or when the brakes are overheated.

Close the cowl flaps, install the control wheel lock and chock the wheels. In severe weather and high wind conditions, tie the airplane down as outlined in the following paragraph.

TIE-DOWN

Proper tie-down procedure is the best precaution against damage to the parked airplane by gusty or strong winds. To tie-down the airplane securely, proceed as follows:

- (1) Set the parking brake and install the control wheel lock.
- (2) Install a surface control lock over the fin and rudder.
- (3) Tie sufficiently strong ropes or chains (700 pounds tensile strength) to the wing and tail tie-down fittings and secure each rope to a ramp tie-down.
- (4) Tie a rope (no chains or cables) to the nose gear torque link and secure to a ramp tie-down.
- (5) Install a pitot tube cover.

JACKING

When a requirement exists to jack the entire airplane off the ground, or when wing jack points are used in the jacking operation, refer to the Service Manual for specific procedures and equipment required.

A jack pad assembly is available to facilitate jacking individual main gear. When using the individual gear strut jack pad, flexibility of the gear strut will cause the main wheel to slide inboard as the wheel is raised, tilting the jack. The jack must then be lowered for a second jacking operation. Do not jack both main wheels simultaneously using the individual main gear jack pads.

If nose gear maintenance is required, the nose wheel may be raised off the ground by pressing down on a tailcone bulkhead, just forward of the horizontal stabilizer, and allowing the tail to rest on the tail tie-down ring.

NOTE

Do not apply pressure on the elevator or outboard horizontal stabilizer surfaces. When pushing on the tailcone, always apply pressure at a bulkhead to avoid buckling the skin.

To assist in raising and holding the nose wheel off the ground, weight down the tail by placing sand-bags, or suitable weights, on each side of

the horizontal stabilizer, next to the fuselage. If ground anchors are available, the tail should be securely tied down.

NOTE

Ensure that the nose will be held off the ground under all conditions by means of suitable stands or supports under weight supporting bulkheads near the nose of the airplane.

LEVELING

Longitudinal leveling of the airplane is accomplished by placing a level on leveling screws located on the left side of the airplane, forward of the door. Deflate the nose tire and/or lower or raise the nose strut to properly center the bubble in the level. Corresponding points on the front seat rails may be used to level the airplane laterally.

FLYABLE STORAGE

Airplanes placed in non-operational storage for a maximum of 30 days or those which receive only intermittent operational use for the first 25 hours are considered in flyable storage status. Every seventh day during these periods, the propeller should be rotated by hand through five revolutions. This action "limbers" the oil and prevents any accumulation of corrosion on engine cylinder walls.

WARNING

For maximum safety, check that the ignition switch is OFF, the throttle is closed, the mixture control is in the idle cut-off position, and the airplane is secured before rotating the propeller by hand. Do not stand within the arc of the propeller blades while turning the propeller.

After 30 days, the airplane should be flown for 30 minutes or a ground runup should be made just long enough to produce an oil temperature within the lower green arc range. Excessive ground runup should be avoided.

Engine runup also helps to eliminate excessive accumulations of water in the fuel system and other air spaces in the engine. Keep fuel tanks full to minimize condensation in the tanks. Keep the battery fully charged to prevent the electrolyte from freezing in cold weather. If the airplane is to be stored temporarily, or indefinitely, refer to the Service Manual for proper storage procedures.

SERVICING

In addition to the PREFLIGHT INSPECTION covered in Section 4, COMPLETE servicing, inspection, and test requirements for your airplane are detailed in the Service Manual. The Service 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 Service Manuals, it is recommended that you contact your Cessna Dealer concerning these requirements and begin scheduling your airplane for service at the recommended intervals.

Cessna Progressive Care 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.

For quick and ready reference, quantities, materials, and specifications for frequently used service items are as follows:

ENGINE OIL

GRADE -- Aviation Grade SAE 50 Above 4°C (40°F).

Aviation Grade SAE 10W30 or SAE 30 Below 4°C (40°F).

Multi-viscosity oil with a range of SAE 10W30 is recommended for improved starting in cold weather. Ashless dispersant oil, conforming to Continental Motors Specification MHS-24A, must be used.

NOTE

Your Cessna was delivered from the factory with a corrosion preventive aircraft engine oil. If oil must be added during the first 25 hours, use only aviation grade straight mineral oil conforming to Specification No. MIL-L-6082.

CAPACITY OF ENGINE SUMP -- 12 Quarts.

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 3 hours. For extended flight, fill to 12 quarts. These quantities refer to oil

dipstick level readings. During oil and oil filter changes, one additional quart is required when the filter element is changed.

OIL AND OIL FILTER CHANGE --

After the first 25 hours of operation, drain engine oil sump and clean the oil pressure screen. If an oil filter is installed, change the filter element at this time. Refill sump with straight mineral oil and use until a total of 50 hours has accumulated or oil consumption has stabilized; then change to dispersant oil. On airplanes not equipped with an oil filter, drain the engine oil sump and clean the oil pressure screen each 50 hours thereafter. On airplanes which have an oil filter, the oil change interval may be extended to 100-hour intervals, providing the oil filter element is changed at 50-hour intervals. Change engine oil at least every 6 months even though less than the recommended hours have accumulated. Reduce intervals for prolonged operation in dusty areas, cold climates, or when short flights and long idle periods result in sludging conditions.

FUEL

GRADE (AND COLOR) -- 100/130 Minimum Grade Aviation Fuel (green).
100/130 low lead aviation fuel (blue) with a lead content limited to 2 cc per gallon is also approved.
CAPACITY EACH STANDARD TANK -- 30.5 Gallons.
CAPACITY EACH LONG RANGE TANK -- 40 Gallons.

LANDING GEAR

NOSE WHEEL TIRE PRESSURE -- 49 PSI on 5.00-5, 6-Ply Rated Tire.
29 PSI on 6.00-6, 4-Ply Rated Tire.
MAIN WHEEL TIRE PRESSURE -- 55 PSI on 6.00-6, 8-Ply Rated Tires.
35 PSI on 8.00-6, 6-Ply Rated Tires.
NOSE GEAR SHOCK STRUT --
Keep filled with MIL-H-5606 hydraulic fluid and inflated with air to 90 PSI. Do not over-inflate.

OXYGEN

AVIATOR'S BREATHING OXYGEN -- Spec. No. MIL-O-27210.
MAXIMUM PRESSURE (cylinder temperature stabilized after filling) -- 1800 PSI at 21°C (70°F).
Refer to Oxygen Supplement (Section 9) for filling pressures.

CLEANING AND CARE

WINDSHIELD-WINDOWS

The plastic windshield and windows should be cleaned with an aircraft windshield cleaner. Apply the cleaner sparingly with soft cloths, and rub with moderate pressure until all dirt, oil scum and bug stains are removed. Allow the cleaner to dry, then wipe it off with soft flannel cloths.

If a windshield cleaner is not available, the plastic can be cleaned with soft cloths moistened with Stoddard solvent to remove oil and grease.

NOTE

Never use gasoline, benzine, alcohol, acetone, carbon tetrachloride, fire extinguisher or anti-ice fluid, lacquer thinner or glass cleaner to clean the plastic. These materials will attack the plastic and may cause it to craze.

Follow by carefully washing with a mild detergent and plenty of water. Rinse thoroughly, then dry with a clean moist chamois. Do not rub the plastic with a dry cloth since this builds up an electrostatic charge which attracts dust. Waxing with a good commercial wax will finish the cleaning job. A thin, even coat of wax, polished out by hand with clean soft flannel cloths, will fill in minor scratches and help prevent further scratching.

Do not use a canvas cover on the windshield unless freezing rain or sleet is anticipated since the cover may scratch the plastic surface.

PAINTED SURFACES

The painted exterior surfaces of your new Cessna have a durable, long lasting finish and, under normal conditions, require no polishing or buffing. Approximately 15 days are required for the paint to cure completely; in most cases, the curing period will have been completed prior to delivery of the airplane. In the event that polishing or buffing is required within the curing period, it is recommended that the work be done by someone experienced in handling uncured paint. Any Cessna Dealer can accomplish this work.

Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent.

Waxing is unnecessary to keep the painted surfaces bright. However, if desired, the airplane may be waxed with a good automotive wax. A heavier coating of wax on the leading edges of the wings and tail and on the engine nose cap and propeller spinner will help reduce the abrasion encountered in these areas.

When the airplane is parked outside in cold climates and it is necessary to remove ice before flight, care should be taken to protect the painted surfaces during ice removal with chemical liquids. A 50-50 solution of isopropyl alcohol and water will satisfactorily remove ice accumulations without damaging the paint. A solution with more than 50% alcohol is harmful and should be avoided. While applying the de-icing solution, keep it away from the windshield and cabin windows since the alcohol will attack the plastic and may cause it to craze.

PROPELLER CARE

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. Small nicks on the propeller, particularly near the tips and on the leading edges, should be 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 carbon tetrachloride or Stoddard solvent.

ENGINE CARE

The engine may be cleaned with Stoddard solvent, or equivalent, then dried thoroughly.

CAUTION

Particular care should be given to electrical equipment before cleaning. Cleaning fluids should not be allowed to enter magnetos, starter, alternator and the like. Protect these components before saturating the engine with solvents. All other openings should also be covered before cleaning the engine assembly. Caustic cleaning solutions should be used cautiously and should always be properly neutralized after their use.

INTERIOR CARE

The interior of your airplane is furnished with wear-resistant, hard surface materials designed for maximum usage with minimum upkeep. However, as with any furnishing, the measure of lasting appearance and endurance afforded by the interior is dependent upon the degree of care.

Materials used on the cabin floor and sidewalls are not easily soiled or stained. Dust and loose dirt should be picked up with a vacuum cleaner. Stubborn dirt can be wiped off with a cloth moistened in clean water. Mild soap suds, used sparingly, will remove grease. The soap should be removed with a clean damp cloth.

The headliner, instrument panel, plastic trim and control knobs need only be wiped off with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with Stoddard solvent. Volatile solvents, such as mentioned in paragraphs on care of the windshield, must never be used since they soften and craze the plastic.

Care of the seating materials is identical to care of the furnishings in your home. Vacuum clean regularly to remove dust and loose dirt.

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.

Soiled upholstery may be cleaned with foam-type detergent, used according to the manufacturer's instructions. Keep the foam as dry as possible and remove it with a vacuum cleaner.

SECTION 9 SUPPLEMENTS

(Optional Systems Description & Operating Procedures)

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INTRODUCTION

This section consists of a series of supplements, each covering a single optional system which may be installed in the airplane. Each supplement contains a brief description, and when applicable, operating limitations, emergency and normal procedures, and performance. Other routinely installed items of optional equipment, whose function and operational procedures do not require detailed instructions, are discussed in Section 7.

SUPPLEMENT

EMERGENCY LOCATOR TRANSMITTER (ELT)

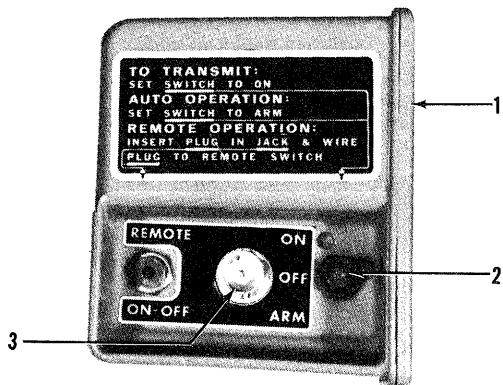
SECTION 1 GENERAL

The ELT consists of a self-contained dual-frequency radio transmitter and battery power supply, and is activated by an impact of 5g or more as may be experienced in a crash landing. The ELT emits an omni-directional signal on the international distress frequencies of 121.5 and 243.0 MHz. (Some ELT units in export aircraft transmit only on 121.5 MHz.) General aviation and commercial aircraft, the FAA, and CAP monitor 121.5 MHz, and 243.0 MHz is monitored by the military. Following a crash landing, the ELT will provide line-of-sight transmission up to 100 miles at 10,000 feet. The duration of ELT transmissions is affected by ambient temperature. At temperatures of +21° to +54°C (+70° to +130°F), continuous transmission for 115 hours can be expected; a temperature of -40°C (-40°F) will shorten the duration to 70 hours.

The ELT is readily identified as a bright orange unit mounted behind the baggage compartment wall in the tailcone. To gain access to the unit, remove the baggage compartment wall. The ELT is operated by a control panel at the forward facing end of the unit (see figure 1).

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this equipment is installed.



1. COVER - Removable for access to battery.
2. FUNCTION SELECTOR SWITCH (3-position toggle switch):
 - ON - Activates transmitter instantly. Used for test purposes and if "g" switch is inoperative.
 - OFF - Deactivates transmitter. Used during shipping, storage and following rescue.
 - ARM - Activates transmitter only when "g" switch receives 5g or more impact.
3. ANTENNA RECEPTACLE - Connection to antenna mounted on top of the tailcone.

Figure 1. ELT Control Panel

SECTION 3

EMERGENCY PROCEDURES

Immediately after a forced landing where emergency assistance is required, the ELT should be utilized as follows.

- (1) ENSURE ELT ACTIVATION: Turn a radio transceiver ON and select 121.5 MHz. If the ELT can be heard transmitting, it was activated by the "g" switch and is functioning properly. If no emergency tone is audible, gain access to the ELT and place the function se-

lector switch in the ON position.

(2) **PRIOR TO SIGHTING RESCUE AIRCRAFT:** Conserve airplane battery. Do not activate radio transceiver.

(3) **AFTER SIGHTING RESCUE AIRCRAFT:** Place ELT function selector switch in the OFF position, preventing radio interference. Attempt contact with rescue aircraft with the radio transceiver set to a frequency of 121.5 MHz. If no contact is established, return the function selector switch to ON immediately.

(4) **FOLLOWING RESCUE:** Place ELT function selector switch in the OFF position, terminating emergency transmissions.

SECTION 4

NORMAL PROCEDURES

As long as the function selector switch remains in the ARM position, the ELT automatically activates following an impact of 5g or more over a short period of time.

Following a lightning strike, or an exceptionally hard landing, the ELT may activate although no emergency exists. To check your ELT for inadvertent activation, select 121.5 MHz on your radio transceiver and listen for an emergency tone transmission. If the ELT can be heard transmitting, place the function selector switch in the OFF position and the tone should cease. Immediately place the function selector switch in the ARM position to re-set the ELT for normal operation.

SECTION 5

PERFORMANCE

There is no change to the airplane performance data when this equipment is installed.

SUPPLEMENT

ELECTRIC ELEVATOR TRIM SYSTEM

SECTION 1 GENERAL

The electric elevator trim system provides a simple method of relieving pitch control pressures without interrupting other control operations to adjust the manual elevator trim wheel. The system is controlled by a slide-type trim switch on the top of the left control wheel grip and a disengage switch located on the left side of the control wheel pad. Pushing the trim switch to the forward position, labeled DN, moves the elevator trim tab in the "nose down" direction; conversely, pulling the switch aft to the UP position moves the tab in the "nose up" direction. When the switch is released, it automatically returns to the center off position, and elevator trim tab motion stops. The disengage switch, labeled ELEC TRIM DISENGAGE, removes all electrical power from the system when placed in the DISENGAGE position.

A servo unit (which includes a motor and chain-driven, solenoid-operated clutch) actuates the trim tab to the selected position. When the clutch is not energized (trim switch off) the electric portion of the trim system freewheels so that manual operation is not affected. The electric trim system can be overridden at any time by manually rotating the elevator trim wheel, thus overriding the servo that drives the trim tab.

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this trim system is installed.

SECTION 3

EMERGENCY PROCEDURES

- (1) Elevator Trim Disengage Switch -- DISENGAGE.

NOTE

For maximum altitude loss during an electric trim malfunction, refer to placarding on the instrument panel.

- (2) Manual Trim -- AS REQUIRED.

SECTION 4

NORMAL PROCEDURES

To operate the electric elevator trim system, proceed as follows:

- (1) Master Switch -- ON.
- (2) Elevator Trim Disengage Switch -- ON.
- (3) Trim Switch -- ACTUATE as desired.
- (4) Elevator Trim Position Indicator -- CHECK.

NOTE

To check the operation of the disengage switch, actuate the elevator trim switch with the disengage switch in the DISENGAGE position. Observe that the manual trim wheel and indicator do not rotate when the elevator trim switch is activated.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this trim system is installed.

SUPPLEMENT

OXYGEN SYSTEM (MODEL 207)

SECTION 1 GENERAL

A seven-place oxygen system provides the supplementary oxygen necessary for continuous flight at high altitude. In this system, an oxygen cylinder, located behind the rear baggage compartment wall, supplies the oxygen. Cylinder pressure is reduced to an operating pressure of 70 PSI by a pressure regulator attached to the cylinder. A shutoff valve is included as part of the regulator assembly. An oxygen cylinder filler valve is located on the left side of the rear baggage compartment wall. Cylinder pressure is indicated by a pressure gage located in the overhead oxygen console above the pilot's and front passenger's seats.

Seven oxygen outlets are provided; two in the overhead oxygen console and five in the cabin ceiling just above the side windows (one at each of the rear seating positions). One permanent, microphone-equipped mask is provided for the pilot, and six disposable type masks are provided for the passengers. All masks are the partial-rebreathing type, equipped with vinyl plastic hoses and flow indicators.

A remote shutoff valve control, located adjacent to the pilot's oxygen outlet in the overhead oxygen console, is used to shut off the supply of oxygen to the system when not in use. The control is mechanically connected to the shutoff valve at the cylinder. With the exception of the shutoff function, the system is completely automatic and requires no manual regulation for change of altitude.

The oxygen cylinder, when fully charged, contains approximately 48 cubic feet of aviator's breathing oxygen (Spec. No. MIL-O-27210), under a pressure of 1800 PSI at 21°C (70°F). Filling pressures will vary, however, due to ambient temperature in the filling area, and the temperature rise resulting from compression of the oxygen. Because of this, merely filling to 1800 PSI will not result in a properly filled cylinder. Fill to pressures indicated on the following page for ambient temperature.

WARNING

Oil, grease or other lubricants in contact with oxygen

AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG	AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG
0	1600	50	1825
10	1650	60	1875
20	1700	70	1925
30	1725	80	1975
40	1775	90	2000

Figure 1. Oxygen Filling Pressures

create a serious fire hazard, and such contact must be avoided when handling oxygen equipment.

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when oxygen equipment is installed.

Supplemental oxygen should be used by all occupants when cruising above 10,000 feet. As described in the Cessna booklet "Man At Altitude," it is often advisable to use oxygen at altitudes lower than 10,000 feet under conditions of night flying, fatigue, or periods of physiological or emotional disturbances. Also, the habitual and excessive use of tobacco or alcohol will usually necessitate the use of oxygen at less than 10,000 feet.

WARNING

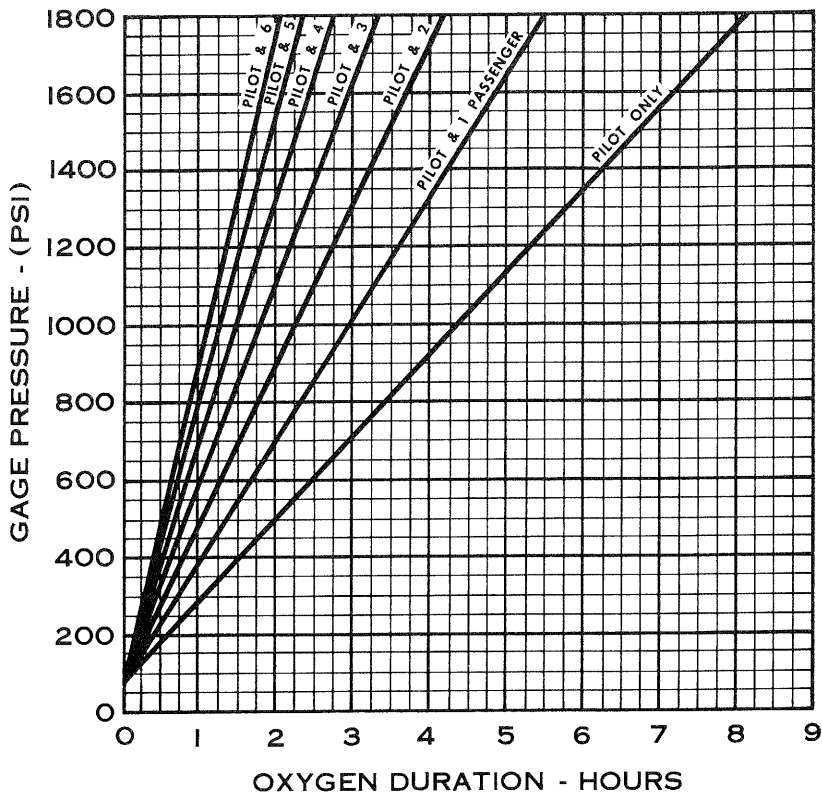
For safety reasons, no smoking should be allowed in the airplane while oxygen is being used.

The Oxygen Duration Chart (figure 2) should be used in determining the usable duration (in hours) of the oxygen supply in your airplane. The following procedure outlines the method of finding the duration from the chart.

- (1) Note the available oxygen pressure shown on the pressure gage.
- (2) Locate this pressure on the scale on the left side of the chart, then go across the chart horizontally to the right until you intersect the line representing the number of persons making the flight. After

OXYGEN DURATION CHART

(48 CUBIC FEET CAPACITY)



NOTE: This chart is based on a pilot with an orange color-coded oxygen line fitting and passengers with green color-coded line fittings.

Figure 2. Oxygen Duration Chart

intersecting the line, drop down vertically to the bottom of the chart and read the duration in hours given on the scale.

(3) As an example of the above procedure, 1400 PSI of pressure will safely sustain the pilot only for nearly 6 hours and 15 minutes. The same pressure will sustain the pilot and three passengers for approximately 2 hours and 30 minutes.

NOTE

The Oxygen Duration Chart is based on a standard configuration oxygen system having one orange color-coded hose assembly for the pilot and green color-coded hoses for the passengers. If orange color-coded hoses are provided for pilot and passengers, it will be necessary to compute new oxygen duration figures due to the greater consumption of oxygen with these hoses. This is accomplished by computing the total duration available to the pilot only (from PILOT ONLY line on chart), then dividing this duration by the number of persons (pilot and passengers) using oxygen.

SECTION 3

EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when oxygen equipment is installed.

SECTION 4

NORMAL PROCEDURES

Prior to flight, check to be sure that there is an adequate oxygen supply for the trip, by noting the oxygen pressure gage reading, and referring to the Oxygen Duration Chart (figure 2). Also, check that the face masks and hoses are accessible and in good condition.

When ready to use the oxygen system, proceed as follows:

- (1) Mask and Hose -- SELECT. Adjust mask to face and adjust metallic nose strap for snug mask fit.

NOTE

The hose provided for the pilot is of a higher flow rate than those for the passengers; it is color-coded with an orange band adjacent to the plug-in fitting. The passenger hoses are color-coded with a green band. If the airplane owner prefers, he may provide higher flow hoses

for all passengers. In any case, it is recommended that the pilot use the larger capacity hose. The pilot's mask is equipped with a microphone to facilitate use of the radio while using oxygen. An adapter cord is furnished with the microphone-equipped mask to mate the mask microphone lead to the auxiliary microphone jack located on the left side of the instrument panel. To connect the oxygen mask microphone, connect the mask lead to the adapter cord and plug the cord into the auxiliary microphone jack. (If an optional microphone-headset combination has been in use, the microphone lead from this equipment is already plugged into the auxiliary microphone jack. It will be necessary to disconnect this lead from the auxiliary microphone jack so that the adapter cord from the oxygen mask microphone can be plugged into the jack.) A switch is incorporated on the left hand control wheel to operate the microphone.

- (2) Delivery Hose -- PLUG INTO OUTLET nearest to the seat you are occupying.

NOTE

When the oxygen system is turned on, oxygen will flow continuously at the proper rate of flow for any altitude without any manual adjustments.

- (3) Oxygen Supply Control Knob -- ON.
- (4) Face Mask Hose Flow Indicator -- CHECK. Oxygen is flowing if the indicator is being forced toward the mask.
- (5) Delivery Hose -- UNPLUG from outlet when discontinuing use of oxygen. This automatically stops the flow of oxygen.
- (6) Oxygen Supply Control Knob -- OFF when oxygen is no longer required.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when oxygen equipment is installed.

SUPPLEMENT

CARGO PACK (MODEL 207)

SECTION 1 GENERAL

The cargo pack provides additional cargo and baggage space. It is attached to the bottom of the fuselage with screws and, after the initial installation, can readily be removed or installed. The basic shell of the cargo pack, including the loading door, is fabricated from fiberglass. Corrugated aluminum forms the inner floor of the pack. A loading door is located on the left side of the pack, and is hinged at the bottom. It is secured in the closed position by two quick-release fasteners, and has a key-operated lock.

The volume of the cargo pack is 16 cubic feet. Dimensions of the pack and its loading door opening are contained in Section 6 of this handbook. The pack is designed to accommodate three "two-suiters", plus other small miscellaneous articles.

SECTION 2 LIMITATIONS

The following limitations are presented in the form of individual placards, located on the inside of the cargo pack door:

Refer to weight & balance data for baggage/cargo loading. Never exceed 300 lbs. cargo weight.

The ADF bearing accuracy may be adversely affected by the type and/or arrangement of the cargo pack contents.

SECTION 3

EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when the cargo pack is installed.

SECTION 4

NORMAL PROCEDURES

There is no change to the airplane normal procedures when the cargo pack is installed. However, consideration should be given to loading of the cargo pack and the necessary weight and balance computations outlined in Section 6 of this handbook.

SECTION 5

PERFORMANCE

There is a slight reduction in airplane performance with the cargo pack installed. Performance reduction is summarized as follows:

<u>ITEM</u>	<u>DIFFERENTIAL</u>
Cruise Speed	5 Knots
Rate of Climb	50 FPM
Service Ceiling	1000 Feet

SUPPLEMENT

SKYDIVING KIT

SECTION 1

GENERAL

The skydiving kit is designed to improve passenger comfort and facilitate diver-to-pilot communications during skydiving operations. The kit consists of an externally-mounted step, a spoiler, skydiver steering switch, and a steering signal light console. The step is mounted beneath the cargo door opening to facilitate boarding and leaving the airplane. The spoiler is installed on the door hinges of the removed front cargo door to minimize the strong air flow buffeting within the cabin when the cargo doors are removed. The rocker-type steering switch is mounted inside the cabin on the upper sill of the cargo door opening and is used by the skydiver to signal the pilot of his desired flight path over the drop zone. A steering signal light console, with red and green lights controlled by operation of the steering switch, is mounted on top of the instrument panel. Illumination of the red light indicates to the pilot that the diver desires that the airplane be steered left; conversely, a green light shows that the pilot is to steer right.

SECTION 2

LIMITATIONS

Removal of the cargo doors requires that a spoiler be installed. With the doors removed and the spoiler installed, the following placard must be displayed on the instrument panel:

With cargo doors removed
do not exceed 150 Knots IAS.

SECTION 3

EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when the skydiving kit is installed.

SECTION 4

NORMAL PROCEDURES

For skydiving operations, removal of both cargo doors is suggested, since exit through a single door would be difficult with the spoiler obstructing part of the door opening. Installation of the spoiler substantially reduces air flow buffeting in the cabin; however, all loose equipment, including head rests, rear window sun shade, removable arm rests, safety belts, etc., should be removed or secured. The seventh seat passenger will receive a strong air blast, and face protection in the form of goggles and helmet is recommended.

With the cargo doors removed, flight characteristics are essentially unchanged, except that slightly different directional trim may be needed.

Seating accommodations for as many as six skydivers are more easily provided by removing all of the right hand seats and allowing these divers to sit on the floor facing forward. All seat belts should be used in the normal manner.

SECTION 5

PERFORMANCE

Airplane performance information provided in this handbook does not apply when the airplane is flown with the cargo doors removed since significant performance decrements result. For example, maximum rate of climb is reduced by approximately 100 fpm and cruise speed is reduced by approximately 10 knots.

SUPPLEMENT

CESSNA 300 TRANSCEIVER

(Type RT-524A)

SECTION 1

GENERAL

The Cessna 300 Transceiver, shown in Figure 1, is a self-contained communications system capable of receiving and transmitting on any one of 360 manually tuned, crystal-controlled channels. The channels are spaced 50 kHz apart and cover a frequency range of 118.00 thru 135.95 MHz.

The 300 Transceiver system consists of a panel-mounted receiver/transmitter, a spike antenna and interconnecting cables. The system utilizes the airplane microphone, headphone and speaker.

All of the required operating controls are mounted on the front panel of the 300 Transceiver except the microphone switch. In addition, when two or more radios are installed, a transmitter selector switch and a speaker-phone selector switch are provided. Each control function is described in Figure 1.

SECTION 2

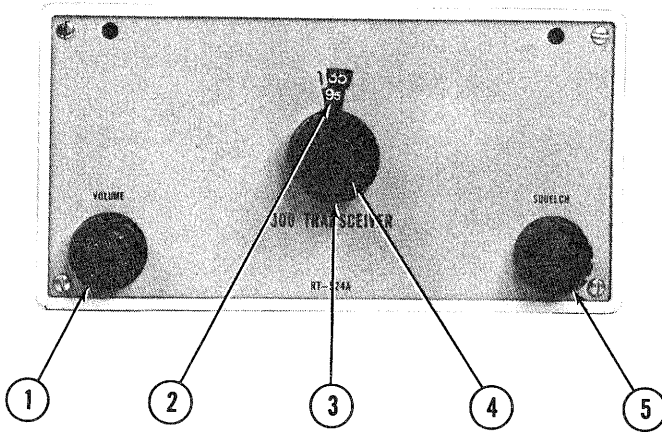
LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.

SECTION 3

EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.



1. OFF/ON VOLUME CONTROL - Turns complete set on and controls volume of audio from receiver.
2. RECEIVER-TRANSMITTER FREQUENCY DIAL.
3. RECEIVER-TRANSMITTER FREQUENCY SELECTOR - Selects receiver-transmitter frequency in 1-MHz steps between 118.00 and 135.00 MHz.
4. RECEIVER-TRANSMITTER FRACTIONAL FREQUENCY SELECTOR - Selects receiver-transmitter fractional frequency in 0.05-MHz steps.
5. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.

Figure 1. Cessna 300 Transceiver Controls

SECTION 4

NORMAL PROCEDURES

TO TRANSMIT:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) Frequency Selector Knobs -- SELECT operating frequency.
- (3) Radio VOLUME Control -- ON.
- (4) Mike Button -- DEPRESS.

TO RECEIVE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT desired mode.
- (3) Frequency Selector Knobs -- SELECT operating frequency.
- (4) Radio VOLUME Control -- ON and adjust to listening level.
- (5) SQUELCH Control -- ROTATE counterclockwise to decrease background noise.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 300 NAV/COM

(VOR Only - Type RT-308C)

SECTION 1

GENERAL

The Cessna 300 Nav/Com (Type RT-308C), shown in Figure 1, consists of a panel-mounted receiver-transmitter (RT-308C) and a single course deviation indicator (IN-514R or IN-514B). The RT-308C Receiver-Transmitter includes a 360-channel VHF communication receiver-transmitter and a 160-channel VHF navigation receiver, both of which may be operated simultaneously.

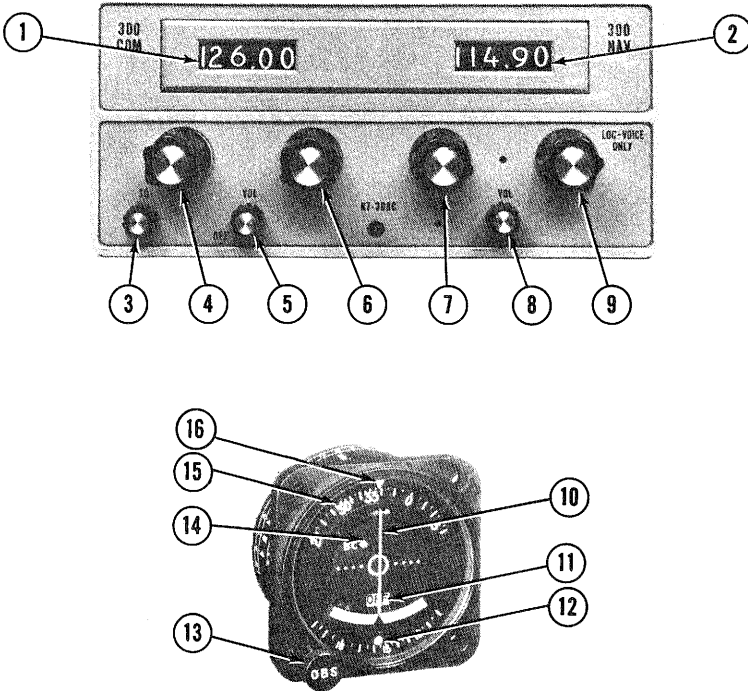
The communication receiver-transmitter receives and transmits signals between 118.00 and 135.95 MHz in 50 kHz steps. The navigation receiver receives and interprets VHF omnidirectional range (VOR) signals between 108.00 and 117.95 MHz. Although localizer signals (all odd-tenth frequencies between 108.1 and 111.9 MHz) can also be received, the navigation receiver does not include the circuits required to actuate the course deviation needle. However, the audio portion of the localizer is audible so that flight information, such as that broadcast in certain areas on selected localizer frequencies by the Automatic Terminal Information Service (ATIS), may be heard.

All controls for the Cessna 300 Nav/Com (Type RT-308C), except the omni bearing selector (OBS), are mounted on the front panel of the receiver-transmitter. The course selector and the navigation indicators are included in the course deviation indicator. The communication receiver-transmitter and the navigation receiver are synthesizer-controlled and are tuned automatically when the frequency is selected. In addition, when two or more radios are installed, a transmitter selector switch and a speaker-phone selector switch are provided. Each control function is described in Figure 1.

SECTION 2

LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.



1. RECEIVER-TRANSMITTER FREQUENCY INDICATOR.
2. NAVIGATION RECEIVER FREQUENCY INDICATOR.
3. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.
4. COMMUNICATION RECEIVER-TRANSMITTER MEGAHERTZ SELECTOR - Selects communication receiver-transmitter frequency in 1-MHz steps between 118 and 135 MHz.

Figure 1. Cessna 300 Nav/Com (Type RT-308C) - VOR only (Sheet 1 of 2)

5. OFF/ON VOLUME CONTROL - Turns complete set on and controls volume of audio from communication receiver.
6. COMMUNICATION RECEIVER-TRANSMITTER FRACTIONAL MEGAHERTZ SELECTOR - Selects communication receiver-transmitter fractional frequency in 0.05 MHz steps between 0.00 and 0.95 MHz.
7. NAVIGATION RECEIVER MEGAHERTZ SELECTOR - Selects navigation receiver frequency in 1-MHz steps between 108 and 117 MHz.
8. NAVIGATION RECEIVER VOLUME CONTROL - Controls volume of audio from navigation receiver only. Clockwise rotation increases audio level.
9. NAVIGATION RECEIVER FRACTIONAL MEGAHERTZ SELECTOR - Selects navigation receiver frequency in 0.05 MHz steps between 0.00 and 0.95 MHz.
10. COURSE DEVIATION POINTER - Indicates course deviation from selected omni bearing.
11. OFF/TO-FROM (OMNI) INDICATOR - Operates only with VOR signal. "OFF" position (flag) indicates unreliable signal or no signal. When "OFF" position disappears, indicator shows whether selected course is "TO" or "FROM" the station.
12. RECIPROCAL COURSE INDEX - Indicates reciprocal of selected VOR course.
13. OMNI BEARING SELECTOR (OBS) - Selects desired course to or from a VOR station.
14. BACK COURSE (BC) INDICATOR LIGHT (On IN-514B Only) - Not used with this radio.
15. BEARING DIAL.
16. COURSE INDEX - Indicates selected VOR course.

Figure 1. Cessna 300 Nav/Com (Type RT-308C) - VOR only (Sheet 2 of 2)

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO TRANSMIT:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) COM Frequency Selector Knobs -- SELECT operating frequency.
- (3) OFF/VOL control -- ON.
- (4) Mike Button -- DEPRESS.

TO RECEIVE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT desired mode.
- (3) COM/NAV Frequency Selector Knobs -- SELECT frequency.
- (4) VOL Control -- ADJUST to listening level (OFF/VOL knob must be ON).
- (5) SQ Control -- ROTATE counterclockwise to decrease background noise.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 300 NAV/COM

(360-Channel - Type RT-528E-1)

SECTION 1

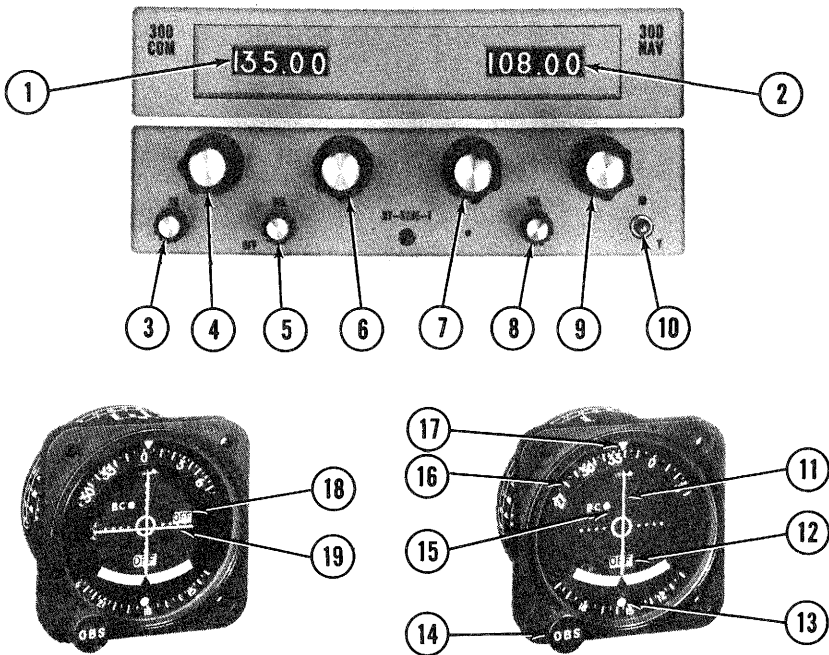
GENERAL

The Cessna 300 Nav/Com (Type RT-528E-1), shown in Figure 1, consists of a panel-mounted receiver-transmitter and a single- or dual-pointer remote course indicator. The receiver-transmitters include a 360-channel VHF communication receiver-transmitter and a 200-channel VHF navigation receiver.

The communication receiver-transmitter receives and transmits signals between 118.00 and 135.95 MHz in 50 kHz steps. The navigation receiver receives and interprets VOR and localizer signals between 108.00 and 117.95 MHz in 50 kHz steps. The communication receiver-transmitter and the navigation receiver are synthesizer-controlled and are tuned automatically when the frequency is selected.

A DME receiver-transmitter or a glide slope receiver, or both, may be interconnected with the Cessna 300 Nav/Com set for automatic selection of the associated DME or GS frequency. When a VOR frequency is selected on the Nav/Com, the associated VORTAC or VOR-DME station frequency will also be selected automatically; likewise, if a localizer frequency is selected, the associated glide slope frequency will be selected automatically.

All controls of the Cessna 300 Nav/Com, except the omni bearing selector knob (OBS), which is located on the course indicator, are mounted on the front panel of the receiver-transmitter. The course indicator includes either a single pointer and related OFF flag for VOR/LOC indication only, or dual pointers and related OFF flags for both VOR/LOC and glide slope indications. The course indicator also incorporates a back-course lamp (BC) which lights when back-course operation is selected. In addition, when two or more radios are installed, a transmitter selector switch and a speaker-phone selector switch are provided. Each control function is described in Figure 1.



1. RECEIVER-TRANSMITTER FREQUENCY INDICATOR.
2. NAVIGATION RECEIVER FREQUENCY INDICATOR.
3. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.
4. COMMUNICATION RECEIVER-TRANSMITTER MEGAHERTZ SELECTOR - Selects communication receiver-transmitter frequency in 1-MHz steps between 118 and 135 MHz.
5. OFF/ON VOLUME CONTROL - Turns complete set on and controls volume of audio from communication receiver.
6. COMMUNICATION RECEIVER-TRANSMITTER FRACTIONAL MEGAHERTZ SELECTOR - Selects communication receiver-transmitter fractional frequency in 0.05-MHz steps between 0.00 and 0.95 MHz.

Figure 1. Cessna 300 Nav/Com (Type RT-528E-1) (Sheet 1 of 2)

7. NAVIGATION RECEIVER MEGAHERTZ SELECTOR - Selects navigation receiver frequency in 1-MHz steps between 108 and 117 MHz.
8. NAVIGATION RECEIVER VOLUME CONTROL - Controls volume of audio from navigation receiver only. Clockwise rotation increases audio level.
9. NAVIGATION RECEIVER FRACTIONAL MEGAHERTZ SELECTOR - Selects navigation receiver frequency in 0.05-MHz steps between 0.00 and 0.95 MHz.
10. COMBINED IDENTIFIER SIGNAL SELECTOR AND VOR SELF-TEST SELECTOR SWITCH - When VOR station is selected in ID position, station identifier is audible; in center (unmarked) position, identifier is off; in T (momentary on) position, tests VOR navigation circuits.
11. COURSE DEVIATION POINTER - Indicates course deviation from selected omni bearing or localizer centerline.
12. OFF/TO-FROM (OMNI) INDICATOR - Operates only with VOR or localizer signal. "OFF" position (flag) indicates unreliable signal. When "OFF" position disappears, indicator shows whether selected VOR course is "TO" or "FROM" the station (if LOC frequency is selected, indicator will only show "TO").
13. RECIPROCAL COURSE INDEX - Indicates reciprocal of selected VOR course.
14. OMNI BEARING SELECTOR (OBS) - Selects desired course to or from a VOR station.
15. BC - Amber light illuminates when an optional autopilot system is installed and the autopilot's back-course button is engaged; indicates CDI needle is reversed on selected receiver when tuned to a localizer frequency (type IN-514B or IN-525B Indicators only).
16. BEARING DIAL.
17. COURSE INDEX - Indicates selected VOR course.
18. GLIDE SLOPE "OFF" FLAG - When visible, indicates unreliable glide slope signal or no glide slope signal. The flag disappears when a reliable glide slope signal is being received.
19. GLIDE SLOPE DEVIATION POINTER - Indicates deviation from normal glide slope.

Figure 1. Cessna 300 Nav/Com (Type RT-528E-1) (Sheet 2 of 2)

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed. However, the pilot should be aware that on many Cessna airplanes equipped with the windshield mounted glide slope antenna, pilots should avoid use of 2700 \pm 100 RPM (or 1800 \pm 100 RPM with a three bladed propeller) during ILS approaches to avoid propeller interference caused oscillations of the glide slope deviation pointer.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO TRANSMIT:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) COM Frequency Selector Knobs -- SELECT operating frequency.
- (3) OFF/VOL Control -- ON.
- (4) Mike Button -- DEPRESS.

TO RECEIVE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT desired mode.
- (3) COM/NAV Frequency Selector Knobs -- SELECT frequency.
- (4) VOL Control -- Adjust to listening level (OFF/VOL knob must be ON).
- (5) SQ Control -- ROTATE counterclockwise to decrease background noise.

TO OPERATE IDENT FILTER:

- (1) ID-T Switch -- CENTER (unmarked) to include filter in audio circuit of both receivers.

(2) ID-T Switch -- ID position disconnects filter from audio circuit to hear navigation station identifier (Morse Code) signal.

NOTE

The ID-T switch should be left in ID position for best communications reception.

TO SELF TEST VOR NAVIGATION CIRCUITS:

- (1) Tune to usable VOR signal from either a VOR station or a test signal.
- (2) OBS Knob -- ROTATE course index to 0° .
- (3) ID-T Switch -- T position. Vertical pointer should center and OFF-TO-FROM indicator should show FROM.
- (4) ID-T Switch -- T position and rotate OBS knob to displace course index approximately 10° to either side of 0° . Vertical pointer should deflect full scale in direction corresponding to course index displacement.
- (5) ID-T Switch -- CENTER (unmarked) position for normal VOR operation.

NOTE

This test does not fulfill the requirements of FAR 91.25.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 300 NAV/COM

(720-Channel - Type RT-328T)

SECTION 1

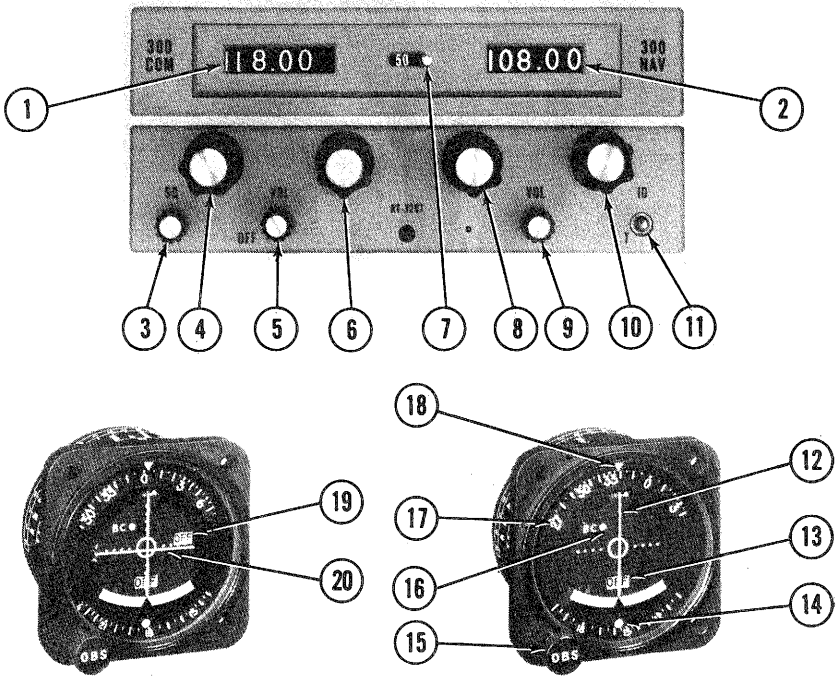
GENERAL

The Cessna 300 Nav/Com (Type RT-328T), shown in Figure 1, consists of a panel-mounted receiver-transmitter and a single- or dual-pointer remote course indicator. The set includes a 720-channel VHF communication receiver-transmitter and a 200-channel VHF navigation receiver, both of which may be operated simultaneously.

The communication receiver-transmitter receives and transmits signals between 118.000 and 135.975 MHz in 25-kHz steps. The navigation receiver receives and interprets VHF omnidirectional and localizer signals between 108.00 and 117.95 MHz in 50-kHz steps. The communication receiver-transmitter and the navigation receiver are synthesizer-controlled and are tuned automatically when the frequency is selected.

A DME receiver-transmitter or a glide slope receiver, or both, may be interconnected with the Cessna 300 Nav/Com set for automatic selection of the associated DME or GS frequency. When a VOR frequency is selected on the Nav/Com, the associated VORTAC or VOR-DME station frequency will also be selected automatically; likewise, if a localizer frequency is selected, the associated glide slope frequency will be selected automatically.

All controls of the Cessna 300 Nav/Com, except the omni bearing selector knob (OBS), which is located on the course indicator, are mounted on the front panel of the receiver-transmitter. The course indicator includes either a single pointer and related OFF flag for VOR/LOC indication only, or dual pointers and related OFF flags for both VOR/LOC and glide slope indications. The course indicator also incorporates a back-course lamp (BC) which lights when back-course operation is selected. In addition, when two or more radios are installed, a transmitter selector switch and a speaker-phone selector switch are provided. Each control function is described in Figure 1.



1. RECEIVER-TRANSMITTER FREQUENCY INDICATOR.
2. NAVIGATION RECEIVER FREQUENCY INDICATOR.
3. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.
4. COMMUNICATION RECEIVER-TRANSMITTER MEGAHERTZ SELECTOR - Selects communication receiver-transmitter frequency in 1-MHz steps between 118 and 135 MHz. (There are two inactive positions between 135- and 118-position which are identified by the appearance of a "06" or a "07".)
5. OFF/ON VOLUME CONTROL - Turns set on and controls volume of audio from communications receiver.
6. COMMUNICATION RECEIVER-TRANSMITTER FRACTIONAL MEGAHERTZ SELECTOR - Selects communication receiver-transmitter fractional frequency in .05-MHz steps between .000 and .950 MHz or between .025 and .975 MHz depending on position of 50-25 MHz selector switch.

Figure 1. Cessna 300 Nav/Com (Type RT-328T) (Sheet 1 of 2)

7. 50-25 FRACTIONAL MHz SELECTOR SWITCH. - In "50" position, enables communication whole MHz frequency readout to display and communication fractional MHz control to select fractional part of frequency in .05-MHz steps between .000 and .950 MHz. In "25" position, frequency display and coverage is in .05-MHz steps between .025 and .975.

NOTE

The third-decimal-place digit is not shown on the receiver-transmitter frequency readout.

8. NAVIGATION RECEIVER MEGAHERTZ SELECTOR. - Selects navigation receiver frequency in 1-MHz steps between 108 and 117 MHz; simultaneously selects paired glide slope frequency or DME channel.
9. NAVIGATION RECEIVER VOLUME CONTROL. - Controls volume of audio from navigation receiver only. Clockwise rotation increases audio level.
10. NAVIGATION RECEIVER FRACTIONAL MEGAHERTZ SELECTOR. - Selects navigation receiver frequency in .05-MHz steps between .00 and .95 MHz; simultaneously selects paired glide slope frequency or DME channel.
11. COMBINED IDENTIFIER SIGNAL SELECTOR AND VOR SELF-TEST SELECTOR SWITCH. - When VOR station is selected in ID position, station identifier is audible; in center (unmarked) position, identifier is off; in T (momentary on) position, tests VOR navigation circuits.
12. COURSE DEVIATION POINTER. - Indicates course deviation from selected omni bearing or localizer centerline.
13. OFF/TO-FROM (OMNI) INDICATOR - Operates only with VOR or localizer signal. "OFF" position (flag) indicates unreliable signal. When "OFF" position disappears, indicator shows whether selected VOR course is "TO" or "FROM" the station (if LOC frequency is selected, indicator will only show "TO").
14. RECIPROCAL COURSE INDEX - Indicates reciprocal of selected VOR course.
15. OMNI BEARING SELECTOR (OBS) - Selects desired course to or from a VOR station.
16. BC - Amber light illuminates when an optional system is installed and the autopilot's back-course button is engaged; indicates CDI needle is reversed on selected receiver when tuned to a localizer frequency (Type IN-514B or IN-525B Indicators Only).
17. BEARING DIAL.
18. COURSE INDEX - Indicates selected VOR course.
19. GLIDE SLOPE "OFF" FLAG - When visible, indicates unreliable glide slope signal or no glide slope signal. The flag disappears when a reliable glide slope signal is being received.
20. GLIDE SLOPE DEVIATION POINTER - Indicates deviation from normal glide slope.

Figure 1. Cessna 300 Nav/Com (Type RT-328T) (Sheet 2 of 2)

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed. However, the pilot should be aware that on many Cessna airplanes equipped with the windshield mounted glide slope antenna, pilots should avoid use of 2700 \pm 100 RPM (or 1800 \pm 100 RPM with a three bladed propeller) during ILS approaches to avoid propeller interference caused oscillations of the glide slope deviation pointer.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO TRANSMIT:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) COM Frequency Selector Knobs -- SELECT operating frequency.
- (3) 50-25 Fractional MHz Selector Switch -- SELECT operating frequency.
- (4) OFF/VOL Control -- ON.
- (5) Mike Button -- DEPRESS.

TO RECEIVE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT desired mode.
- (3) COM/NAV Frequency Selector Knobs -- SELECT operating frequency.
- (4) 50-25 Fractional MHz Selector Switch -- SELECT operating frequency (not selected for navigational frequencies).
- (5) VOL Control -- ADJUST to listening level (OFF/VOL knob must be ON).
- (6) SQ Control -- ROTATE counterclockwise to decrease background noise.

TO OPERATE IDENT FILTER:

- (1) ID-T Switch -- CENTER (unmarked) to include filter in audio circuit of both receivers.
- (2) ID-T Switch -- ID position disconnects filter from audio circuit to hear navigation station identifier (Morse Code) signal.

NOTE

The ID-T switch should be left in ID position for best communications reception.

TO SELF TEST VOR NAVIGATION CIRCUITS:

- (1) Tune to usable VOR signal from either a VOR station or a test signal.
- (2) OBS Knob -- ROTATE course index to 0°.
- (3) ID-T Switch -- T position. Vertical pointer should center and OFF-TO-FROM indicator should show FROM.
- (4) ID-T Switch -- T position and rotate OBS knob to displace course index approximately 10° to either side of 0°. Vertical pointer should deflect full scale in direction corresponding to course index displacement.
- (5) ID-T Switch -- CENTER (unmarked) position for normal VOR operation.

NOTE

This test does not fulfill the requirements of FAR 91.25.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 300 NAV/COM
(Type RT-328T)

WITH

CESSNA 400 AREA NAVIGATION SYSTEM
(Type RN-478A)

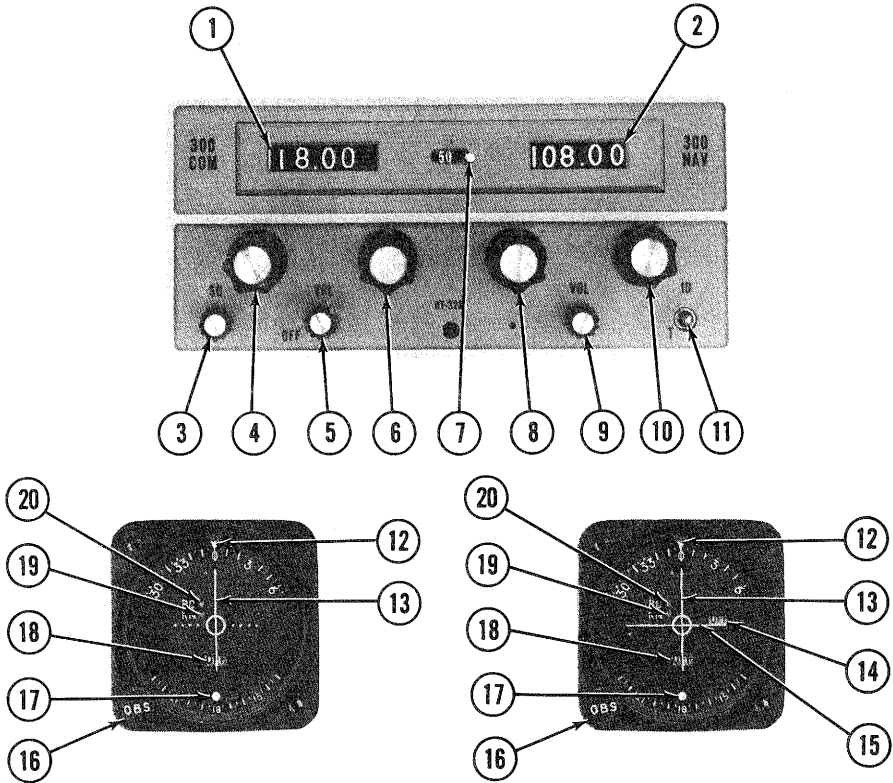
SECTION 1

GENERAL

The Cessna 300 Nav/Com (Type RT-328T) Set with Cessna 400 Area Navigation (RNAV-Type RN-478A) consists of a RT-328T Nav/Com, a R-476A DME system, a RN-478A Area Navigation Computer and a Course Indicator. The RN-478A includes circuits which combine the VOR navigation information with distance information from the R-476A DME system to provide data for area navigation. Operating information for the communication set and for VOR/localizer navigation is presented in this supplement. Operating information for area navigation and for DME is presented in separate supplements.

The RT-328T Receiver-Transmitter includes a 720-channel VHF communication receiver-transmitter which receives and transmits signals between 118.000 MHz and 135.975 MHz in 25-kHz steps. It also includes a 200-channel VHF navigation receiver which receives VOR and localizer signals between 108.00 MHz and 117.95 MHz in 50-kHz steps. The communication receiver-transmitter and the navigation receiver can be operated simultaneously.

The VOR or localizer signal from the navigation receiver is applied to the converter circuits in the RN-478A Area NAV Computer. The con-



1. COMMUNICATION OPERATING FREQUENCY READOUT (Third-decimal-place digit is not shown).
2. NAVIGATION OPERATING FREQUENCY READOUT.
3. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate COM receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.
4. COMMUNICATION RECEIVER-TRANSMITTER MHz FREQUENCY SELECTOR - Selects COM frequency in 1 MHz steps between 118 and 135 MHz. (There are two inactive positions between 135- and 118-MHz positions which are identified by the appearance of a "06" or a "07".)
5. COM OFF-VOL CONTROL - Combination on/off switch and volume control; turns on NAV/COM Set and RNAV Computer circuits; controls volume of communication receiver audio.

Figure 1. Cessna 300 Com/Nav Set, Operating Controls and Indicators
(Sheet 1 of 2)

6. COMMUNICATION RECEIVER-TRANSMITTER FRACTIONAL MHz FREQUENCY SELECTOR - Depending on position of the 50-25 Switch, selects COM frequency in .05 MHz steps between .000 and .950 MHz or between .025 and .975 MHz.
7. 50-25 SWITCH - Part of COM Receiver-Transmitter Fractional MHz Frequency Selector. In "25" position, enables COM frequency readout to display and COM FRACT MHz selector to select frequency in .05 MHz steps between .025 and .975 MHz. In "50" position, enables COM frequency readout to display and COM FRACT MHz selector to select frequency in .05 MHz steps between .000 and .950 MHz.

NOTE

The third decimal digit is not displayed in the COM fractional frequency display.

8. NAVIGATION RECEIVER MEGAHERTZ FREQUENCY SELECTOR - Selects NAV frequency in 1-MHz steps between 108 and 117 MHz; simultaneously selects paired glide slope frequency and DME channel.
9. NAV VOL CONTROL - Adjusts volume of navigation receiver audio. Clockwise rotation increases audio level.
10. NAVIGATIONAL FRACTIONAL MEGAHERTZ FREQUENCY SELECTOR - Selects NAV frequency in .05 MHz steps between .00 and .95 MHz; simultaneously selects paired glide slope frequency and DME channel.
11. ID-T SWITCH - In ID position, station identifier signal is audible; in center (unmarked) position, identifier signal is suppressed; in T (momentary on) position, selects self-test function to self-test VOR and RNAV navigation circuits.
12. COURSE INDEX - Indicates selected VOR or RNAV course (bearing).
13. COURSE DEVIATION POINTER - Indicates deviation from selected VOR or RNAV course or localizer centerline.
14. GLIDE SLOPE "OFF" FLAG - When visible, indicates unreliable glide slope signal or improperly operating equipment. The flag disappears when a reliable glide slope signal is being received.
15. GLIDE SLOPE DEVIATION POINTER - Indicates deviation from normal glide slope (not part of RNAV system).
16. OMNI BEARING SELECTOR (OBS) - Selects desired bearing to or from a VOR station or to a selected RNAV waypoint.
17. RECIPROCAL COURSE INDEX - Indicates reciprocal of selected VOR or RNAV course.
18. OFF/TO-FROM (OMNI) INDICATOR - Operates only with VOR or localizer signal. OFF position (flag) indicates unusable signal. With usable VOR signal, when OFF position disappears, indicates whether selected course is TO or FROM station or waypoint. With usable localizer signal, shows TO.
19. RN LAMP - When lighted, indicates that RNAV operation is selected.
20. BC LAMP - Amber light illuminates when the autopilot or reverse sense option is installed and the reverse sense switch or the autopilot's back-course button is engaged; indicates CDI needle is reversed on selected receiver when tuned to a localizer frequency.

Figure 1. Cessna 300 Com/Nav Set, Operating Controls and Indicators
(Sheet 2 of 2)

verter processes the received navigation signal to provide omni bearing information for display by the course indicator.

CAUTION

If the RNAV set is removed from the airplane or becomes inoperative, the associated VHF navigation indicator will be inoperative.

The course indicator includes a Course Deviation Indicator (CDI), an Omni Bearing Selector (OBS), and Off/To-From Indicator Flags. It also includes an RNAV lamp (RN) which lights when area navigation operation is selected, and a back-course lamp (BC) which lights when back-course operation is selected. The IN-443AR and the IN-443BR Course Deviation Indicators include a glide slope deviation pointer and flag circuit for use with a glide slope receiver (not part of the 300 Nav/Com).

All operating controls and indicators for the Cessna 300 Nav/Com are included on the front panel of the RT-328T Receiver-Transmitter and in the selected Course Indicator. These controls and indicators are shown and described in Figure 1. Operating controls for the RN-478A Area NAV Computer, which are used for area navigation, and operating controls for the associated Type R-476A DME are shown in the appropriate supplements in this manual.

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed. However, the pilot should be aware that on many Cessna airplanes equipped with the windshield mounted glide slope antenna, pilots should avoid use of 2700 ± 100 RPM with a two bladed propeller (or 1800 ± 100 RPM with a three bladed propeller) during ILS approaches to avoid propeller interference caused oscillations of the glide slope deviation pointer.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4

NORMAL PROCEDURES

TO TRANSMIT:

- (1) XMTR SEL Switch (on Audio Control Panel) -- SELECT transceiver.
- (2) 50-25 Fractional MHz Selector Switch -- SELECT desired operating frequency.
- (3) COM Frequency Selector Knobs -- SELECT desired operating frequency.
- (4) OFF/VOL Control -- ON.
- (5) Mike Button -- DEPRESS and speak into microphone.

TO RECEIVE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT desired Mode.
- (3) 50-25 Fractional MHz Selector Switch -- SELECT desired operating frequency (does not affect navigation frequencies).
- (4) COM/NAV Frequency Selector Knobs -- SELECT desired operating frequency.
- (5) COM/NAV VOL Controls -- Adjust to desired listening level (OFF/VOL knob must be ON).
- (6) SQ Control -- ROTATE counterclockwise to decrease background noise of COM receiver.

TO OPERATE IDENT FILTER.

- (1) ID-T Switch -- Center (unmarked) to include filter in audio circuit of NAV receiver.
- (2) ID-T Switch -- ID position disconnects filter from audio circuit to hear navigation station identifier (Morse Code) signal.

NOTE

The ID-T switch should be left in ID position for best station identifier reception.

TO SELF TEST VOR NAVIGATION CIRCUITS:

- (1) COM OFF/VOL Control -- ON.
- (2) NAV MHz and Fractional MHz Frequency Selectors -- SELECT a usable VOR signal from a VOR station.
- (3) OBS Knob -- ROTATE course index to 0°. CDI centers or

deflects left or right, depending on bearing of signal.

OFF/TO-FROM indicator shows TO or FROM.

(4) ID-T Switch -- PRESS to T and hold at T.

a. CDI -- CENTERS.

b. OFF/TO-FROM Indicator -- FROM.

(5) OBS Knob -- ROTATE to displace course index approximately 10° to either side of 0° while holding ID-T switch in T position.

Vertical pointer should deflect full scale in direction corresponding to course index displacement. OFF/TO-FROM indicator shows FROM.

NOTE

This test does not fulfill the requirements of FAR 91.25.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 300 ADF

(Type R-546E)

SECTION 1

GENERAL

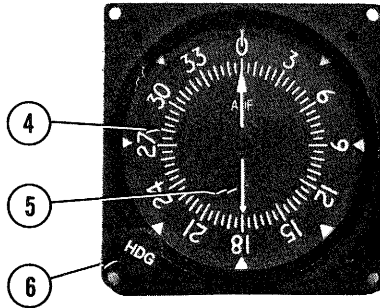
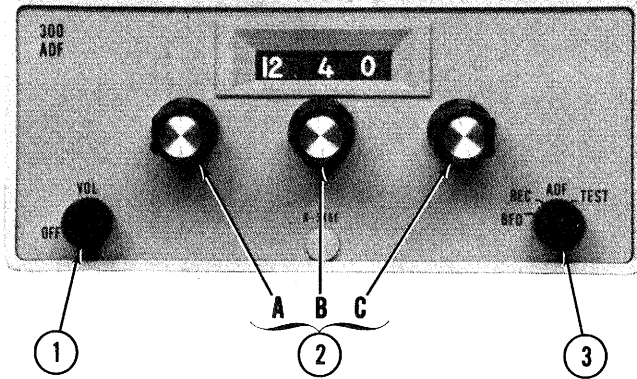
The Cessna 300 ADF is a panel-mounted, digitally tuned automatic direction finder. It is designed to provide continuous 1 kHz digital tuning in the frequency range of 200 kHz to 1,699 kHz and eliminates the need for mechanical band switching. The system is comprised of a receiver, loop antenna, bearing indicator and a sense antenna. In addition, when two or more radios are installed, speaker-phone selector switches are provided. Each control function is described in Figure 1.

The Cessna 300 ADF can be used for position plotting and homing procedures, and for aural reception of amplitude-modulated (AM) signals.

With the function selector knob at ADF, the Cessna ADF provides a visual indication, on the bearing indicator, of the bearing to the transmitting station relative to the nose of the airplane. This is done by combining signals from the sense antenna with signals from the loop antenna.

With the function selector knob at REC, the Cessna ADF uses only the sense antenna and operates as a conventional low-frequency receiver. In the REC, position, the indicator will automatically move to the pointer stow position. This feature alerts the operator to non-ADF operation by positioning and retaining the pointer at the 3:00 o'clock position.

The Cessna 300 ADF is designed to receive transmission from the following radio facilities: commercial broadcast stations, low-frequency range stations, FAA radio beacons, and ILS compass locators.



1. **OFF/VOL** - Controls primary power and audio output level. Clockwise rotation from OFF position applies primary power to receiver; further clockwise rotation increases audio level.
2. **FREQUENCY SELECTORS** - Knob (A) selects 100-kHz increments of receiver frequency, knob (B) selects 10-kHz increments, and knob (C) selects 1-kHz increments.

Figure 1. Cessna 300 ADF Operating Controls and Indicators (Sheet 1 of 2)

3. FUNCTION

- BFO:** Set operates as communication receiver using only sense antenna and activates 1000-Hz tone beat frequency oscillator to permit coded identifier of stations transmitting keyed CW signals (Morse Code) to be heard.
- REC:** Set operates as standard communication receiver using only sense antenna.

NOTE

In this position an automatic pointer stow feature will alert the pilot to non-ADF operation by positioning and retaining the pointer at the 3:00 o'clock position when the 300 ADF is in the REC function.

ADF: Set operates as automatic direction finder using loop and sense antennas.

TEST: Momentary-on position used during ADF operation to test bearing reliability. When held in TEST position, slews indicator pointer clockwise; when released, if bearing is reliable, pointer returns to original bearing position.

4. **INDEX (ROTATABLE CARD)** - Indicates relative, magnetic, or true heading of aircraft.
5. **POINTER** - Indicates station bearing in degrees of azimuth, relative to the nose of the aircraft. When heading control is adjusted, indicates relative, magnetic, or true bearing from which radio signal is being received.
6. **HEADING CONTROL** - Rotates card to induce relative, magnetic, or true bearing information.

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO OPERATE AS A COMMUNICATIONS RECEIVER ONLY:

- (1) OFF/VOL Control -- ON.
- (2) Function Selector Knob -- REC.

NOTE

Indicator's pointer will stow at a 3:00 o'clock position to alert the pilot to non-ADF operation.

- (3) Frequency Selector Knobs -- SELECT operating frequency.
- (4) ADF SPEAKER/PHONE Switch -- SELECT speaker or phone position as desired.
- (5) VOL Control -- ADJUST to desired listening level.

TO OPERATE AS AN AUTOMATIC DIRECTION FINDER:

- (1) OFF/VOL Control -- ON.
- (2) Frequency Selector Knobs -- SELECT operating frequency.
- (3) ADF SPEAKER/PHONE Switch -- SELECT speaker or phone position.
- (4) Function Selector Knob -- ADF position and note relative bearing on indicator.
- (5) VOL Control -- ADJUST to desired listening level.

NOTE

When switching stations place function selector knob in REC position. Then, after station has been selected,

return selector knob to ADF to resume automatic direction finder operation (this practice prevents the bearing indicator from swinging back and forth as frequency dial is rotated).

TO TEST RELIABILITY OF AUTOMATIC DIRECTION FINDER:

- (1) Function Selector Knob -- ADF position and note relative bearing on indicator.
- (2) Function Selector Knob -- TEST position and observe that pointer moves away from relative bearing at least 10 to 20 degrees.
- (3) Function Selector Knob -- ADF position and observe that pointer returns to same relative bearing as in step (1).

TO OPERATE BFO:

- (1) OFF/VOL Control -- ON.
- (2) Function Selector Knob -- BFO.
- (3) Frequency Selector Knobs -- SELECT operating frequency.
- (4) ADF SPEAKER/PHONE Switch -- SELECT speaker or phone position.
- (5) VOL Control -- ADJUST to desired listening level.

NOTE

A 1000-Hz tone is heard in the audio output when a CW signal (Morse Code) is tuned in properly.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 300 TRANSPONDER
(Type RT-359A)

AND

OPTIONAL ALTITUDE ENCODER
(Type EA-401A)

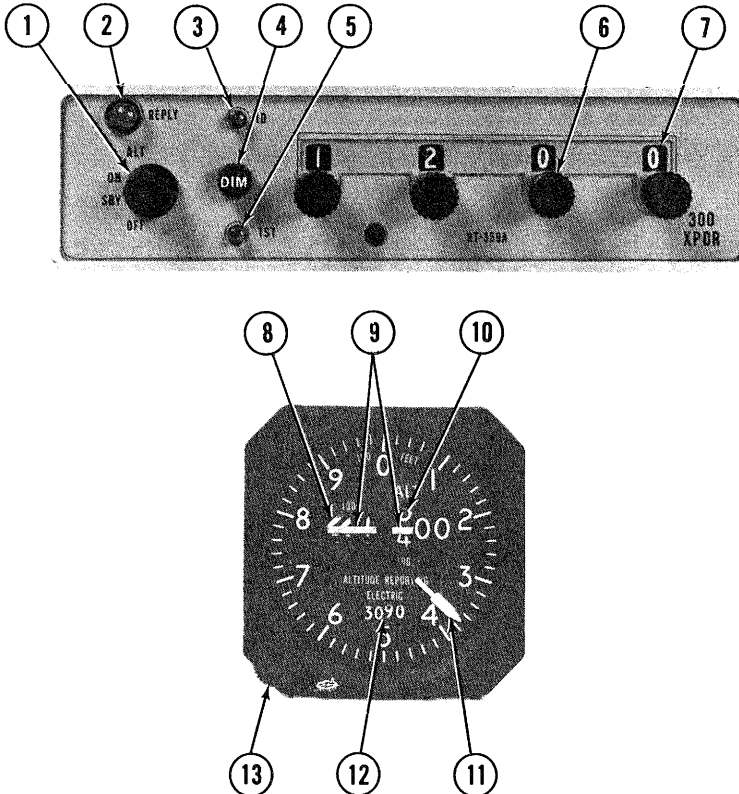
SECTION 1

GENERAL

The Cessna 300 Transponder (Type RT-359A), shown in Figure 1, is the airborne component of an Air Traffic Control Radar Beacon System (ATCRBS). The transponder enables the ATC ground controller to "see" and identify the aircraft, while in flight, at distances beyond the primary radar range.

The Cessna 300 Transponder consists of a panel-mounted unit and an externally-mounted antenna. The transponder receives interrogating pulse signals on 1030 MHz and transmits coded pulse-train reply signals on 1090 MHz. It is capable of replying to Mode A (aircraft position identification) and Mode C (altitude information) interrogations on a selective reply basis on any of 4,096 information code selections. When an optional panel-mounted EA-401 altitude encoder (not part of a standard 300 Transponder system) is included in the avionic configuration, the transponder can provide altitude reporting in 100-foot increments between -1000 and +35,000 feet.

All Cessna 300 Transponder operating controls, with the exception of the optional altitude encoder's barometric pressure set knob, are located on the front panel of the unit. The barometric pressure set knob is located on the altitude encoder. Function of the operating controls is described in Figure 1.



1. **FUNCTION SWITCH** - Controls application of power and selects transponder operating mode, as follows:
 - OFF - Removes power from transponder (turns set off).
 - SBY - Applies power for equipment warm-up.
 - ON - Applies operating power and enables transponder to transmit Mode A reply pulses.
 - ALT - Applies operating power and enables transponder to transmit either Mode A reply pulses or Mode C altitude information pulses selected automatically by the interrogating signal.
2. **REPLY LAMP** - Provides visual indication of transponder replies. During normal operation, lamp flashes when reply pulses are transmitted; when special pulse identifier is

Figure 1. Cessna 300 Transponder (Sheet 1 of 2)

selected, lamp glows steadily for duration of IDENT pulse transmission. (Reply Lamp will also glow steadily during initial warm-up period.)

3. IDENT SWITCH - When depressed, selects special pulse identifier to be transmitted with transponder reply to effect immediate identification of aircraft on ground controller's display. (Reply Lamp will glow steadily during duration of IDENT pulse transmission.)
4. DIMMER CONTROL - Allows pilot to control brilliance of reply lamp.
5. SELF-TEST SWITCH - When depressed, causes transponder to generate a self-interrogating signal to provide a check of transponder operation. (Reply Lamp will illuminate to verify self test operation.)
6. REPLY-CODE SELECTOR SWITCHES (4) - Selects assigned Mode A (or Mode C) reply code.
7. REPLY-CODE INDICATORS (4) - Displays selected Mode A (or Mode C) reply code.
8. 1000-FOOT DRUM TYPE INDICATOR - Provides digital altitude readout in 1000-foot increments between -1000 feet and +35,000 feet.
9. OFF INDICATOR WARNING FLAG - Flag appears when power is removed from the system.
10. 100-FOOT DRUM TYPE INDICATOR - Provides digital altitude readout in 100-foot increments between 0 feet and 1000 feet.
11. 20-FOOT INDICATOR NEEDLE - Indicates altitude in 20-foot increments between 0 feet and 1000 feet.
12. BAROMETRIC PRESSURE SET INDICATOR - DRUM TYPE - Indicates selected barometric pressure in the range of 27.9 to 31.0 inches of mercury.
13. BAROMETRIC PRESSURE SET KNOB - Dials in desired barometric pressure setting in the range of 27.9 to 31.0 inches of mercury.

Figure 1. Cessna 300 Transponder (Sheet 2 of 2)

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.

SECTION 3 EMERGENCY PROCEDURES

TO TRANSMIT AN EMERGENCY SIGNAL:

- (1) Function Switch -- ON.
- (2) Reply-Code Selector Switches -- SELECT 7700 operating code.
- (3) ID Switch -- DEPRESS to effect immediate identification of aircraft on ground controller's display.
- (4) DIM Control -- ADJUST light brilliance of reply lamp.

TO TRANSMIT A SIGNAL REPRESENTING LOSS OF ALL COMMUNICATIONS:

- (1) Function Switch -- ON.
- (2) Reply-Code Selector Switches -- SELECT 7700 operating code for 1 minute, then select 7600 operating code for 15 minutes and then repeat this procedure for remainder of flight.
- (3) ID Switch -- DEPRESS to effect immediate identification of aircraft on ground controller's display.
- (4) DIM Control -- ADJUST light brilliance of reply lamp.

SECTION 4 NORMAL PROCEDURES

BEFORE TAKEOFF AND WHILE TAXIING:

- (1) Function Switch -- SBY.

TO TRANSMIT MODE A (AIRCRAFT POSITION IDENTIFICATION) CODES IN FLIGHT:

- (1) Reply-Code Selector Switches -- SELECT assigned code.

- (2) Function Switch -- ON.
- (3) DIM Control -- ADJUST light brilliance of reply lamp.

NOTE

During normal operation with function switch in ON position, REPLY lamp flashes indicating transponder replies to interrogations.

- (4) ID Button -- DEPRESS momentarily when instructed by ground controller to "squawk IDENT" (REPLY lamp will glow steadily, indicating IDENT operation).

TO TRANSMIT MODE C (ALTITUDE INFORMATION) CODES IN FLIGHT:

- (1) Altitude Encoder Barometric Pressure Set Knob -- DIAL assigned barometric pressure.
- (2) Reply-Code Selector Switches -- SELECT assigned code.
- (3) Function Switch -- ALT.

NOTE

When directed by ground controller to "stop altitude squawk", turn Function Switch to ON for Mode A operation only.

NOTE

Pressure altitude is transmitted, and conversion to indicated altitude is done in ATC computers. Altitude squawk will agree with indicated altitude when altimeter setting in use by the ground controller is set in the altitude encoder.

- (4) DIM Control -- ADJUST light brilliance of reply lamp.

TO SELF-TEST TRANSPONDER OPERATION:

- (1) Function Switch -- SBY and wait 30 seconds for equipment to warm-up.
- (2) Function Switch -- ON.
- (3) TST Button -- DEPRESS (Reply lamp should light brightly regardless of DIM control setting).

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

DME

(Type 190)

SECTION 1

GENERAL

The DME 190 (Distance Measuring Equipment) system consists of a panel mounted 200 channel UHF transmitter-receiver and an externally mounted antenna. The transceiver has a single selector knob that changes the DME's mode of operation to provide the pilot with: distance-to-station, time-to-station, or ground speed readouts. The DME is designed to operate in altitudes up to a maximum of 50,000 feet at ground speeds up to 250 knots and has a maximum slant range of 199.9 nautical miles.

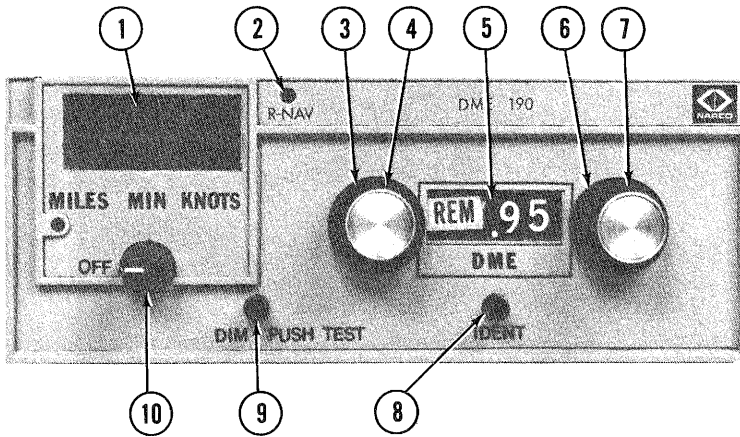
The DME can be channeled independently or by a remote NAV set. When coupled with a remote NAV set, the MHz digits will be covered over by a remote (REM) flag and the DME will utilize the frequency set by the NAV set's channeling knobs. When the DME is not coupled with a remote NAV set, the DME will reflect the channel selected on the DME unit. The transmitter operates in the frequency range of 1041 to 1150 MHz and is paired with 108 to 117.95 MHz to provide automatic DME channeling. The receiver operates in the frequency range of 978 to 1213 MHz and is paired with 108 to 117.95 MHz to provide automatic DME channeling.

All operating controls for the DME are mounted on the front panel of the DME and are described in Figure 1.

SECTION 2

LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.



1. READOUT WINDOW - Displays function readout in miles (distance-to-station), minutes (time-to-station) or knots (ground speed).
2. R-NAV INDICATOR LAMP - The green R-NAV indicator lamp is provided to indicate the DME is coupled to an R-NAV system. Since this DME is not factory installed with an R-NAV system on Cessna airplanes, the R-NAV indicator lamp should never be illuminated. However, if an R-NAV system is coupled to the DME, and when in R-NAV mode, the R-NAV lamp will light which indicates that the distance readout is to the "way point" instead of the DME station. The DME can only give distance (Miles) in R-NAV mode.
3. REMOTE CHANNELING SELECTOR - This knob is held stationary by a stop when not coupled to a remote NAV receiver. When coupled to a remote NAV receiver, a stop in the selector is removed and the selector becomes a two position selector. In the first position, the DME will utilize the frequency set by the DME channeling knobs. In the second position, the MHz digits will utilize the frequency set by the NAV unit's channeling knobs.
4. WHOLE MEGAHERTZ SELECTOR KNOB - Selects operating frequency in 1-MHz steps between 108 and 117 MHz.
5. FREQUENCY INDICATOR - Shows operating frequency selected on the DME or displays remote (REM) flag to indicate DME is operating on a frequency selected by a remote NAV receiver.

Figure 1. DME 190 Operating Controls (Sheet 1 of 2)

6. FRACTIONAL MEGAHERTZ SELECTOR KNOB - Selects operating frequency in 50 kHz steps. This knob has two positions, one for the 0 and one for the 5.
7. FRACTIONAL MEGAHERTZ SELECTOR KNOB - Selects operating frequency in tenths of a Megahertz (0-9).
8. IDENT KNOB - Rotation of this control increases or decreases the volume of the received station's Ident signal. An erratic display, accompanied by the presence of two Ident signals, can result if the airplane is flying in an area where two stations, using the same frequency, are transmitting.
9. DIM/PUSH TEST KNOB -
 - DIM: Controls the brilliance of the readout lamp's segments. Rotate the control as desired for proper lamp illumination in the function window (The frequency window is dimmed by the aircraft's radio light dimming control).
 - PUSH TEST: This control is used to test the illumination of the readout lamps, with or without being tuned to a station. Press the control, a readout of 188.8 should be seen with the mode selector switch in the MIN or KNOTS position. The decimal point along with 188.8 will light in the MILES mode. When the control is released, and had the DME been channeled to a nearby station, the distance to that station will appear. If the station channeled was not in range, a "bar" readout will be seen (--.- or --.-).
10. MODE SELECTOR SWITCH -
 - OFF: Turns the DME OFF.
 - MILES: Allows a digital readout to appear in the window which represents slant range (in nautical miles) to or from the channeled station.
 - MIN: Allows a digital readout (in minutes) to appear in the window that it will take the airplane to travel the distance to the channeled station. This time is only accurate when flying directly TO the station and after the ground speed has stabilized.
 - KNOTS: Allows a digital readout (in knots) to appear in the window that is ground speed and is valid only after the stabilization time (approximately 2 minutes) has elapsed when flying directly TO or FROM the channeled station.

Figure 1. DME 190 Operating Controls (Sheet 2 of 2)

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO OPERATE:

- (1) Mode Selector Switch -- SELECT DME function.
- (2) Frequency Selector Knobs -- SELECT desired operating frequency and allow equipment to warm-up at least 2 minutes.

NOTE

If frequency is set on remote NAV receiver, place remote channeling selector in the REM position.

- (3) PUSH TEST Control -- PUSH and observe reading of 188.8 in function window.
- (4) DIM Control -- ADJUST.
- (5) IDENT Control -- ADJUST audio output in speaker.
- (6) Mode Selector Functions:
 - MILES Position -- Distance-to-Station is slant range in nautical miles.
 - MIN Position -- Time-to-Station when flying directly to station.
 - KNOTS Position -- Ground Speed in knots when flying directly to or from station.

CAUTION

After the DME 190 has been turned OFF, do not turn it on again for 5 seconds to allow the protective circuits to reset.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

HF TRANSCEIVER

(Type PT10-A)

SECTION 1

GENERAL

The PT10-A HF Transceiver, shown in Figure 1, is a 10-channel AM transmitter-receiver which operates in the frequency range of 2.0 to 18.0 Megahertz. The transceiver is automatically tuned to the operating frequency by a Channel Selector. The operating controls for the unit are mounted on the front panel of the transceiver. The system consists of a transceiver, antenna load box, fixed wire antenna and associated wiring.

The Channel Selector Knob determines the operating frequency of the transmitter and receiver. The frequencies of operation are shown on the frequency chart adjacent to the channel selector.

The VOLUME control incorporates the power switch for the transceiver. Clockwise rotation of the volume control turns the set on and increases the volume of audio.

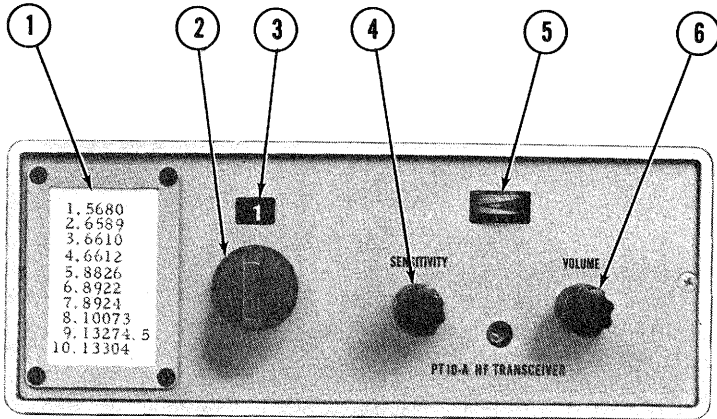
The meter on the face of the transceiver indicates transmitter output.

The system utilizes the airplane microphone, headphone and speaker. When two or more radios are installed, a transmitter selector switch and a speaker-phone switch are provided.

SECTION 2

LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.



1. **FREQUENCY CHART** - Shows the frequency of the channel in use (frequencies shown may vary and are shown for reference purposes only).
2. **CHANNEL SELECTOR** - Selects channels 1 thru 10 as listed in the frequency chart.
3. **CHANNEL READOUT WINDOW** - Displays channel selected in frequency chart.
4. **SENSITIVITY CONTROL** - Controls the receiver sensitivity for audio gain.
5. **ANTENNA TUNING METER** - Indicates the energy flowing from the transmitter into the antenna. The optimum power transfer is indicated by the maximum meter reading.
6. **ON/OFF VOLUME CONTROL** - Turns complete set on and controls volume of audio.

Figure 1. HF Transceiver (Type PT10-A)

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO OPERATE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT desired mode.
- (3) VOLUME Control -- ON (allow equipment to warm up and adjust audio to comfortable listening level).
- (4) Frequency Chart -- SELECT desired operating frequency.
- (5) Channel Selector -- DIAL in frequency selected in step 4.
- (6) SENSITIVITY Control -- ROTATE clockwise to maximum position.

NOTE

If receiver becomes overloaded by very strong signals, back off SENSITIVITY control until background noise is barely audible.

NOTE

The antenna tuning meter indicates the energy flowing from the airplane's transmitter into the antenna. The optimum power transfer is indicated by the maximum meter reading.

- (7) To Transmit -- DEPRESS microphone switch button and speak directly into microphone.
- (8) To Receive -- RELEASE microphone switch button.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

SSB HF TRANSCEIVER

(Type ASB-125)

SECTION 1

GENERAL

The ASB-125 HF transceiver is an airborne, 10-channel, single sideband (SSB) radio with a compatible amplitude modulated (AM) transmitting-receiving system for long range voice communications in the 2 to 18 MHz frequency range. The system consists of a panel mounted receiver/exciter, a remote mounted power amplifier/power supply, an antenna coupler and an externally mounted, fixed wire, medium/high frequency antenna.

A channel selector knob determines the operating frequency of the transceiver which has predetermined crystals installed to provide the desired operating frequencies. A mode selector control is provided to supply the type of emission required for the channel, either sideband, AM or telephone for public correspondence. An audio knob, clarifier knob and squelch knob are provided to assist in audio operation during receive. In addition to the aforementioned controls, which are all located on the receiver/exciter, a meter is incorporated to provide antenna loading readouts.

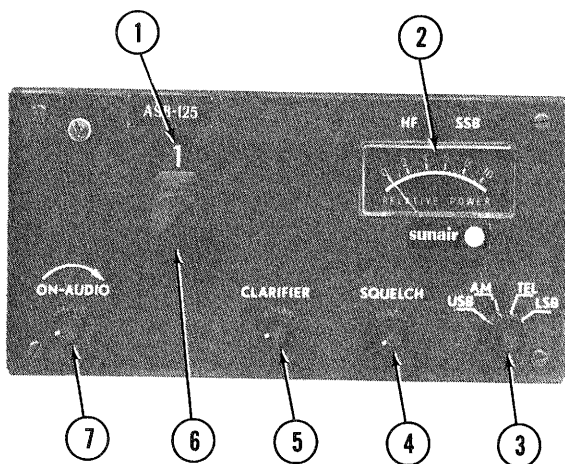
The system utilizes the airplane microphone, headphone and speaker. When two or more radios are installed, a transmitter selector switch and a speaker-phone switch are provided.

SECTION 2

LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed. However, the pilot should be aware of the two following radio limitations:

- (1) For sideband operation in the United States, Canada and various



1. CHANNEL WINDOW - Displays selected operating channel.
2. RELATIVE POWER METER - Indicates relative radiated power of the power amplifier/antenna system.
3. MODE SELECTOR CONTROL - Selects one of the desired operating modes:
 - USB - Selects upper side band operation for long range voice communications.
 - AM - Selects compatible AM operation and full AM reception.
 - TEL - Selects upper sideband with reduced carrier, used for public correspondence telephone and ship-to-shore.
 - LSB - (Optional) Selects lower sideband operation (not legal in U. S., Canada and most other countries).
4. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.
5. CLARIFIER CONTROL - Used to "clarify" single sideband speech during receive while in USB mode only.
6. CHANNEL SELECTOR CONTROL - Selects desired channel. Also selects AM mode if channel frequency is 2003 kHz, 2182 kHz or 2638 kHz.
7. ON - AUDIO CONTROL - Turns set ON and controls receiver audio gain.

Figure 1. SSB HF Transceiver Operating Controls

other countries, only the upper sideband may be used. Use of lower side band is prohibited.

- (2) Only AM transmissions are permitted on frequencies 2003 kHz, 2182 kHz, and 2638 kHz. The selection of these channels will automatically select the AM mode of transmission.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO OPERATE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT.
- (3) ON-AUDIO Control -- ON (allow equipment to warm up for 5 minutes for sideband or one minute for AM operation and adjust audio to comfortable listening level).
- (4) Channel Selector Control -- SELECT desired operating frequency.
- (5) Mode Selector Control -- SELECT operating mode.
- (6) Squelch Control -- ADJUST the audio gain counterclockwise for normal noise output, then slowly adjust clockwise until the receiver is silent.
- (7) Clarifier Control -- ADJUST when upper single sideband RF signal is being received for maximum clarity.
- (8) Mike Button -- DEPRESS to transmit voice communications.

NOTE

Voice communications are not available in the LSB mode.

NOTE

Lower sideband (LSB) mode is not legal in the U.S., Canada, and most other countries.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 400 NAV/COM

(Type RT-428A)

SECTION 1

GENERAL

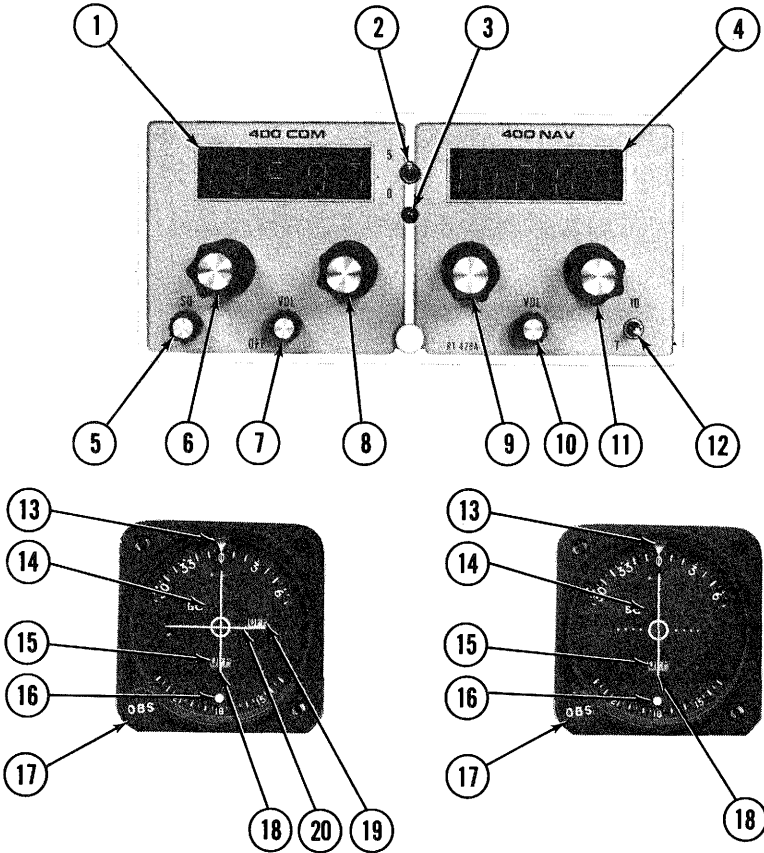
The Cessna 400 Nav/Com (Type RT-428A), shown in Figure 1, consists of a panel-mounted receiver-transmitter and a single- or dual-pointer remote course indicator.

The set incorporates a 720-channel VHF communications receiver-transmitter and a 200-channel VHF navigation receiver; both of which may be operated simultaneously. The receiver-transmitter receives and transmits signals between 118.000 and 135.975 MHz in 25-kHz steps, and the navigation receiver receives omni and localizer signals between 108.00 and 117.95 MHz in 50-kHz steps. The circuits required to interpret the omni and localizer signals are located within the course indicator. Both the communication and navigation operation frequencies are digitally displayed by incandescent readouts on the front panel of the 400 Nav/Com. A transmit lamp, also on the front panel, indicates normal transmitter output.

A DME receiver-transmitter or a glide slope receiver, or both, may be interconnected with the Cessna 400 Nav/Com set for automatic selection of the associated DME or GS frequency. When a VOR frequency is selected on the Nav/Com, the associated VORTAC or VOR-DME station frequency will also be selected automatically; likewise, if a localizer frequency is selected, the associated glide slope frequency will be selected automatically.

The course indicator includes either a single-pointer and related OFF flag for VOR/LOC indication only, or dual-pointers and related OFF flags for both VOR/LOC and glide slope indications. Both types of course indicators incorporate a back-course lamp (BC) which lights when optional back-course (reversed sense) operation is selected.

All controls for the Cessna 400 Nav/Com, except the omni bearing selector knob (OBS), which is located on the course indicator, are mounted on the front panel of the receiver-transmitter. In addition, when two or more radios are installed, a transmitter selector switch and a speaker-phone selector switch are provided. Each control function is described in Figure 1.



1. COMMUNICATION OPERATING FREQUENCY READOUT (Third-decimal-place is not shown).
2. 5-0 SWITCH - Part of COM Receiver-Transmitter Fractional MHz Frequency Selector. In "5" position, enables COM frequency readout to display and COM FRACT MHz selector to select frequency in .05 MHz steps between .025 and .975 MHz. In "0" position, enables COM frequency readout to display and COM FRACT MHz control to select frequency in .05 MHz steps between .000 and .950 MHz.

NOTE

The "5" or "0" may be read as the third decimal digit, which is not displayed in the COM fractional frequency display.

3. TRANSMIT LAMP - Lights when transmitter output is normal.

Figure 1. Cessna 400 Nav/Com (Type RT-428A), Operating Controls and Indicators (Sheet 1 of 2)

4. NAVIGATION OPERATING FREQUENCY READOUT.
5. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate Com receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.
6. COMMUNICATION RECEIVER-TRANSMITTER MEGAHERTZ SELECTOR - Selects COM frequency in 1-MHz steps between 118 and 135 MHz. (There are two inactive positions between 118 and 135 MHz; these selector positions are indicated by "11C" or "11D" on the COM frequency readout.)
7. COM OFF-VOL CONTROL - Combination on/off switch and volume control; turns on NAV/COM Set and controls volume of communication receiver audio.
8. COMMUNICATION RECEIVER-TRANSMITTER FRACTIONAL MEGAHERTZ SELECTOR - Depending on position of the 5-0 Switch, selects COM frequency in .05-MHz steps between .025 and .975 MHz or between .000 and .950 MHz.
9. NAVIGATION RECEIVER MEGAHERTZ SELECTOR - Selects NAV frequency in 1-MHz steps between 108 and 117 MHz; simultaneously selects paired glide slope frequency and DME channel.
10. NAV VOL CONTROL - Adjusts volume of navigation receiver audio.
11. NAVIGATION RECEIVER FRACTIONAL MEGAHERTZ SELECTOR SWITCH - Selects NAV frequency in .05-MHz steps between .00 and .95 MHz; simultaneously selects paired glide slope frequency and DME channel.
12. ID-T SWITCH - In ID position, station identifier signal is audible; in center (unmarked) position, identifier signal is suppressed; in T (momentary on) position, selects self-test function to self-test VOR circuits, the transmit lamp will light and the COM and NAV frequency readouts change to a test display (188.88).
13. COURSE INDEX - Indicates selected VOR course (bearing).
14. BC LAMP - Amber light illuminates when the autopilot or reverse sense option is installed and the reverse sense switch or the autopilot's back-course button is engaged; indicates CDI needle is reversed on selected receiver.
15. OFF/TO-FROM (OMNI) INDICATOR - Operates only with VOR or localizer signal. OFF position (flag) indicates unusable signal. With usable VOR signal, when OFF position disappears, indicates whether selected course is TO or FROM station. With usable localizer signal, shows TO.
16. RECIPROCAL COURSE INDEX - Indicates reciprocal of selected VOR course.
17. OMNI BEARING SELECTOR OBS - Selects desired bearing to or from a VOR station.
18. COURSE DEVIATION POINTER - Indicates course deviation from selected omni bearing or localizer centerline.
19. GLIDE SLOPE "OFF" FLAG - When visible, indicates unreliable glide slope signal or improperly operating equipment. The flag disappears when a reliable glide slope signal is being received.
20. GLIDE SLOPE DEVIATION POINTER - Indicates deviation from normal glide slope.

Figure 1. Cessna 400 Nav/Com (Type RT-428A), Operating Controls and Indicators (Sheet 2 of 2)

SECTION 2 LIMITATIONS

There is no change to the airplane emergency procedures when this avionic equipment is installed. However, the pilot should be aware that on many Cessna airplanes equipped with the windshield mounted glide slope antenna, pilots should avoid use of 2700 \pm 100 RPM with a two bladed propeller (or 1800 \pm 100 RPM with a three bladed propeller) during ILS approaches to avoid propeller interference caused oscillations of the glide slope deviation pointer.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed. However if the frequency readouts fail, the radio will remain operational on the last frequency selected. The frequency controls should not be moved due to the difficulty of obtaining a known frequency under this condition.

SECTION 4 NORMAL PROCEDURES

TO TRANSMIT:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) 5-0 Fractional MHz Selector Switch -- SELECT desired operating frequency.
- (3) COM Frequency Selector Knobs -- SELECT desired operating frequency.
- (4) OFF/VOL Control -- ON.
- (5) Mike Button -- DEPRESS and speak into microphone. Transmit lamp lights.

TO RECEIVE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT desired mode.
- (3) 5-0 Fractional MHz Selector Switch -- SELECT desired operating frequency (does not affect navigation frequencies).

- (4) COM/NAV Frequency Selector Knobs -- SELECT desired operating frequency.
- (5) COM/NAV VOL Controls -- ADJUST to desired listening level (OFF/VOL knob must be ON).
- (6) SQ Control -- ROTATE counterclockwise to decrease background noise of COM receiver.

TO OPERATE IDENT FILTER:

- (1) ID-T Switch -- CENTER (unmarked) to include filter in audio circuit of NAV receiver.
- (2) ID-T Switch -- ID position disconnects filter from audio circuit to hear navigation station identifier (Morse Code) signal.

NOTE

The ID-T switch should be left in ID position for best station identifier reception.

TO SELF TEST VOR NAVIGATION CIRCUITS:

- (1) Tune to usable VOR signal from either a VOR station or a test signal.
- (2) OBS Knob -- ROTATE course index to 0°.
- (3) ID-T Switch -- T position. Vertical pointer should center and OFF-TO-FROM indicator should show FROM.
- (4) ID-T Switch -- T position and rotate OBS knob to displace course index approximately 10° to either side of 0°; vertical pointer should deflect full scale in direction corresponding to course index displacement.
- (5) ID-T Switch -- CENTER (unmarked) position for normal VOR operation.

NOTE

This test does not fulfill the requirements of FAR 91.25.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 400 NAV/COM
(Type RT-428A)

WITH

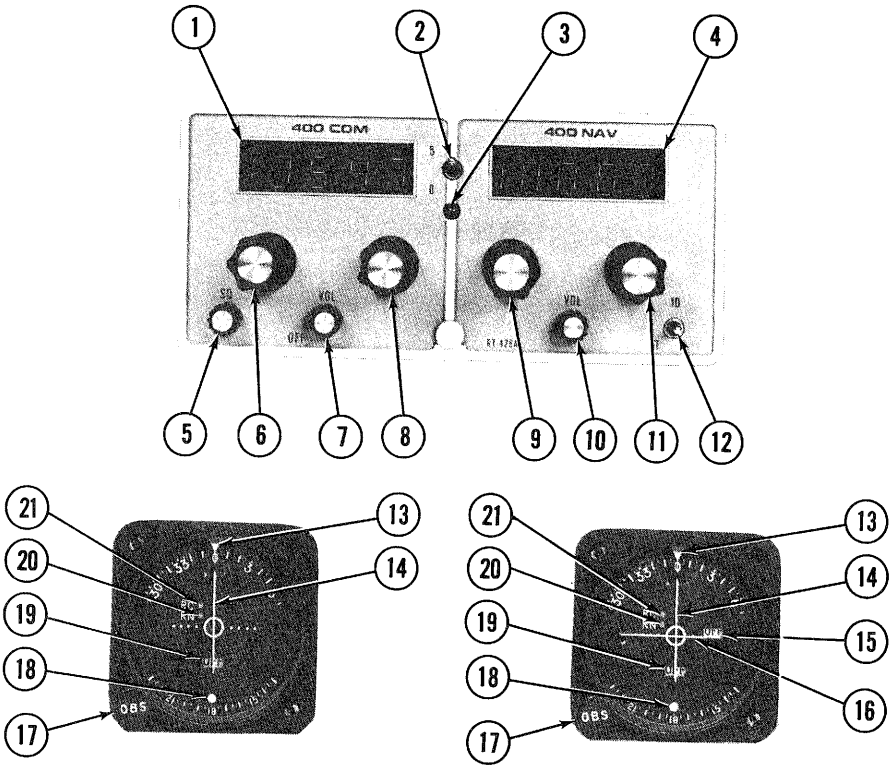
CESSNA 400 AREA NAVIGATION SYSTEM
(Type RN-478A)

SECTION 1
GENERAL

The Cessna 400 Nav/Com (Type RT-428A) Set with Cessna 400 Area Navigation (RNAV-Type RN-478A) consists of a RT-428A Nav/Com, a R-476A DME system, a RN-478A Area Navigation Computer and a Course Indicator. The RN-478A includes circuits which combine the VOR navigation information with distance information from the R-476A DME system to provide data for area navigation. Operating information for the communication set and for VOR/localizer navigation is presented in this supplement. Operating information for area navigation and for DME is presented in separate supplements.

The RT-428A Receiver-Transmitter includes a 720-channel VHF communication receiver-transmitter which receives and transmits signals between 118.000 MHz and 135.975 MHz in 25-kHz steps. It also includes a 200-channel VHF navigation receiver which receives VOR and localizer signals between 108.00 MHz and 117.95 MHz in 50-kHz steps. The communication receiver-transmitter and the navigation receiver can be operated simultaneously.

The VOR or localizer signal from the navigation receiver is applied to the converter circuits in the RN-478A Area NAV Computer. These circuits are a part of the VHF navigation set and are controlled directly by the navigation receiver (DME power is not required). The converter



1. COMMUNICATION OPERATING FREQUENCY READOUT (Third-decimal-place digit is not shown).
2. 5-0 SWITCH - Part of COM Receiver-Transmitter Fractional MHz Frequency Selector. In "5" position, enables COM frequency readout to display and COM FRACT MHz selector to select frequency in .05 MHz steps between .025 and .975 MHz. In "0" position, enables COM frequency readout to display and COM FRACT MHz selector to select frequency in .05 MHz steps between .000 and .950 MHz.

NOTE

The "5" or "0" may be read as the third decimal digit, which is not displayed in the COM fractional frequency display.

3. TRANSMIT LAMP - Lights when transmitter output is normal.
4. NAVIGATION OPERATING FREQUENCY READOUT.

Figure 1. Cessna 400 Com/Nav Set, Operating Controls and Indicators
(Sheet 1 of 2)

5. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate Com COM receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.
6. COMMUNICATION RECEIVER-TRANSMITTER MHz FREQUENCY SELECTOR- Selects COM frequency in 1 MHz steps between 118 and 135 MHz. (There are two inactive positions between 118 and 135 MHz; these selector positions are indicated by "11□ " or "11] " on the COM frequency readout.)
7. COM OFF-VOL CONTROL - Combination on/off switch and volume control; turns on NAV/COM Set and RNAV Computer circuits; controls volume of communication receiver audio.
8. COMMUNICATION RECEIVER-TRANSMITTER FRACTIONAL MHz FREQUENCY SELECTOR - Depending on position of the 5-0 Switch, selects COM frequency in .05 MHz steps between .025 and .975 MHz or between .000 and .950 MHz.
9. NAVIGATION RECEIVER MEGAHERTZ FREQUENCY SELECTOR - Selects NAV frequency in 1-MHz steps between 108 and 117 MHz; simultaneously selects paired glide slope frequency and DME channel.
10. NAV VOL CONTROL - Adjusts volume of navigation receiver audio.
11. NAVIGATIONAL FRACTIONAL MEGAHERTZ FREQUENCY SELECTOR - Selects NAV frequency in .05 MHz steps between .00 and .95 MHz; simultaneously selects paired glide slope frequency and DME channel.
12. ID-T SWITCH - In ID position, station identifier signal is audible; in center (unmarked) position, identifier signal is suppressed; in T (momentary on) position, selects self-test function to self-test VOR and RNAV navigation circuits, the transmit lamp will light and the COM and NAV frequency readouts change to test display (188.88).
13. COURSE INDEX - Indicates selected VOR or RNAV course (bearing).
14. COURSE DEVIATION POINTER - Indicates deviation from selected VOR or RNAV course or localizer centerline.
15. GLIDE SLOPE "OFF" FLAG - When visible, indicates unreliable glide slope signal or improperly operating equipment. The flag disappears when a reliable glide slope signal is being received.
16. GLIDE SLOPE DEVIATION POINTER - Indicates deviation from normal glide slope (not part of RNAV system).
17. OMNI BEARING SELECTOR (OBS) - Selects desired bearing to or from a VOR station or to a selected RNAV waypoint.
18. RECIPROCAL COURSE INDEX - Indicates reciprocal of selected VOR or RNAV course.
19. OFF/TO-FROM (OMNI) INDICATOR - Operates only with VOR or localizer signal. OFF position (flag) indicates unusable signal. With usable VOR signal, when OFF position disappears, indicates whether selected course is TO or FROM station or waypoint. With usable localizer signal, shows TO.
20. RN LAMP - Green light illuminates to indicate RNAV operation is selected.
21. BC LAMP - Amber light illuminates when the autopilot or reverse sense option is installed and the reverse sense switch or the autopilot's back-course button is engaged; indicates CDI needle is reversed on selected receiver.

Figure 1. Cessna 400 Com/Nav Set, Operating Controls and Indicators
(Sheet 2 of 2)

processes the received navigation signal to provide omni bearing information for display by the course indicator.

CAUTION

If the RNAV set is removed from the airplane or becomes inoperative, the associated VHF navigation indicator will be inoperative.

The course indicator includes a Course Deviation Indicator (CDI), a Course Selector (OBS), and Off/To-From Indicator Flags. It also includes an RNAV lamp (RN) which lights when area navigation operation is selected, and a back-course lamp (BC) which lights when back-course operation is selected. The IN-443AR and the IN-443BR Course Deviation Indicators include a glide slope deviation pointer and flag circuit for use with a glide slope receiver (not part of the 400 Nav/Com).

All operating controls and indicators for the Cessna 400 Nav/Com are included on the front panel of the RT-428A Receiver-Transmitter and in the selected Course Indicator. These controls and indicators are shown and described in Figure 1. Operating controls for the RN-478A Area NAV Computer, which are used for area navigation, and operating controls for the associated Type R-476A DME are shown in the appropriate supplements in this manual.

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed. However, the pilot should be aware that on many Cessna airplanes equipped with the windshield mounted glide slope antenna, pilots should avoid use of 2700 ± 100 RPM with a two bladed propeller (or 1800 ± 100 RPM with a three bladed propeller) during ILS approaches to avoid propeller interference caused oscillations of the glide slope deviation pointer.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4

NORMAL PROCEDURES

TO TRANSMIT:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) 5-0 Fractional MHz Selector Switch -- SELECT desired operating frequency.
- (3) COM Frequency Selector Knobs -- SELECT desired operating frequency.
- (4) OFF/VOL Control -- ON.
- (5) Mike Button -- DEPRESS and speak into microphone. Transmit lamp lights and side tone voice is heard on airplane speaker.

TO RECEIVE:

- (1) XMTR SEL Switch -- SELECT transceiver.
- (2) SPEAKER/PHONE Switch -- SELECT desired Mode.
- (3) 5-0 Fractional MHz Selector Switch -- SELECT desired operating frequency (does not affect navigation frequencies).
- (4) COM/NAV Frequency Selector Knobs -- SELECT desired operating frequency.
- (5) COM/NAV VOL Controls -- Adjust to desired listening level (OFF/VOL knob must be ON).
- (6) SQ Control -- ROTATE counterclockwise to decrease background noise of COM receiver.

TO OPERATE IDENT FILTER:

- (1) ID-T Switch -- Center (unmarked) to include filter in audio circuit of NAV receiver.
- (2) ID-T Switch -- ID position disconnects filter from audio circuit to hear navigation station identifier (Morse Code) signal.

NOTE

The ID-T switch should be left in ID position for best station identifier reception.

TO SELF TEST VOR NAVIGATION CIRCUITS:

- (1) COM OFF/VOL Control -- ON.
- (2) NAV MHz and Fractional MHz Frequency Selectors -- SELECT a usable VOR signal from a VOR station. Frequency is displayed on NAV readout.
- (3) OBS Knob -- ROTATE course index to 0°. CDI centers or

deflects left or right, depending on bearing of signal.

OFF/TO-FROM indicator shows TO or FROM.

- (4) ID-T Switch -- PRESS to T and hold at T.
 - a. CDI -- CENTERS.
 - b. OFF/TO-FROM Indicator -- FROM.
 - c. COM and NAV Frequency Readouts -- 188.88.
 - d. Transmit Lamp -- LIGHTED.
- (5) OBS Knob -- ROTATE to displace course index approximately 10° to either side of 0° while holding ID-T switch in T position. Vertical pointer should deflect full scale in direction corresponding to course index displacement. OFF/TO-FROM indicator shows FROM.
- (6) ID-T Switch -- CENTER (unmarked) position for normal VOR operation.

NOTE

This test does not fulfill the requirements of FAR 91.25.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 400 AREA NAVIGATION SYSTEM (Type RN-478A)

SECTION 1 GENERAL

The Cessna 400 Area Navigation System (Type RN-478A) consists of an RN-478A Area NAV Computer (RNAV), a compatible VHF navigation receiver and course deviation indicator, and the Type R-476A distance measuring equipment (DME). The RNAV includes converter circuits which operate with the VHF navigation receiver and produce positional information for display by the course deviation indicator. It also includes computer circuits which combine the bearing information from the navigation set with the distance information from the R-476A DME to establish navigation data for selected waypoints. During RNAV operation, a course scalloping suppressor circuit suppresses the spurious navigation signal phases to provide stable waypoint information which enhances autopilot operation.

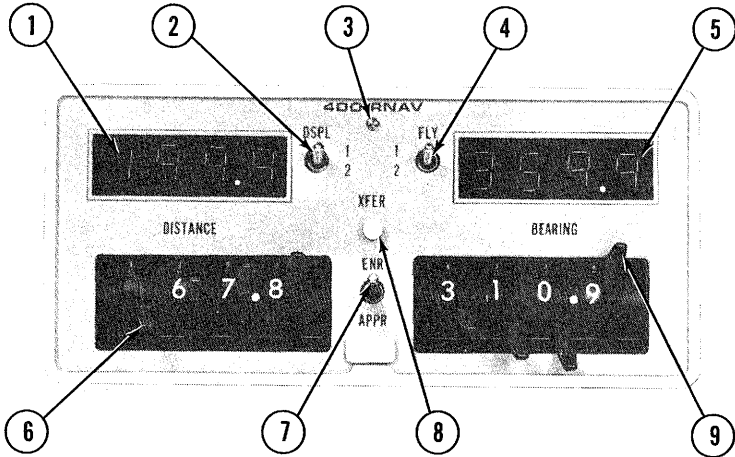
CAUTION

If RNAV set is removed from the airplane or becomes inoperative, the associated VHF navigation indicator will be inoperative.

All operating controls and displays which are part of the RN-478A are shown and described in Figure 1. Other controls required for operation of the Cessna 400 Area Navigation System are included on the VHF navigation receiver and on the R-476A DME control; these controls are shown and described in the respective supplements included for this equipment.

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.



1. DISTANCE DISPLAY READOUT - Depending on position of DSPL Switch, displays distance programmed for waypoint 1 or waypoint 2.
2. DSPL 1-2 SWITCH - Determines information shown on DISTANCE and BEARING displays: In position 1, distance and bearing programmed for waypoint 1 are displayed; in position 2, distance and bearing programmed for waypoint 2 are displayed.
3. FLY/DISPLAY ANNUNCIATOR LAMP - Flashes amber when FLY Switch and DSPL Switch are not set to same number; indicates that waypoint information being displayed is not waypoint information being flown.
4. FLY SWITCH - Determines waypoint being used for navigation. In position 1, waypoint 1 is in use; in position 2, waypoint 2 is in use.
5. BEARING DISPLAY READOUT - Depending on position of DSPL Switch, displays bearing programmed for waypoint 1 or waypoint 2.
6. DISTANCE MINILEVER SWITCHES (4) - Select distance of desired waypoint from VOR/DME station.
7. ENR/APPR SWITCH - Controls width of navigation corridor. ENR position provides standard (± 5 NM) enroute sensitivity; APPR position provides standard ($\pm 1/4$ NM) approach course sensitivity.

NOTE

Due to unreliable signals, do not operate in the APPR position when computed distance to waypoint exceeds 51 nautical miles.

8. XFER PUSHBUTTON SWITCH - Transfers waypoint distance and bearing from minilevers into either waypoint 1 or 2 as selected by DSPL switch position.
9. BEARING MINILEVER SWITCHES (4) - Select bearing of desired waypoint from VOR/DME station.

Figure 1. Cessna 400 Area Nav (Type RN-478A) Computer, Operating Controls and Indicators

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

VOR/LOC OPERATION

VOR NAVIGATION CIRCUITS VERIFICATION TESTS:

- (1) VHF Navigation Receiver Operating Controls -- PRESET as follows:
 - a. Receiver -- ON.
 - b. Frequency Selector Switches -- SET to usable VOR frequency.
- (2) Course Indicator OBS or CRS on HSI -- SET to 0° on course index.
 - a. Deviation Indicator -- CENTERS or DEFLECTS LEFT or RIGHT, depending on VOR bearing.
 - b. OFF/TO-FROM Indicator -- SHOWS FROM, TO or FLAG.
- (3) VHF Navigation Receiver ID-T Switch -- PRESS to T and hold.
 - a. Deviation Indicator -- CENTERS.
 - b. OFF/TO-FROM Indicator -- SHOWS FROM.
 - c. VHF Navigation Receiver Frequency -- READOUT is 188.88 on 400 Nav/Com radio.
- (4) Course Indicator OBS or CRS on HSI -- TURN to course of 10°.
 - a. Deviation Indicator -- DEFLECTS to FULL SCALE, RIGHT.
 - b. OFF/TO-FROM Indicator -- SHOWS FROM.
- (5) Course Indicator OBS or CRS on HSI - TURN to course of 350°.
 - a. Deviation Indicator -- DEFLECTS to FULL SCALE, LEFT.
 - b. OFF/TO-FROM Indicator -- SHOWS FROM.
- (6) VHF Navigation Receiver ID-T Switch -- RELEASE.
 - a. VHF Navigation Receiver Frequency -- READOUT returns to selected test frequency.
 - b. Deviation Indicator -- CENTERS or DEFLECTS LEFT or RIGHT, depending on VOR bearing.
 - c. OFF/TO-FROM Indicator -- SHOWS TO or FROM, depending on VOR signal.

VOR/LOC NAVIGATION:

As a convenience to the pilot, a separate supplement (Avionic Opera-

tion Guide) is supplied to explain the various procedures for using the VHF Navigation Set for VOR and localizer navigation. Refer to the Avionic Operations Guide for flight procedures.

AREA NAVIGATION OPERATION

WAYPOINT PROGRAMMING:

- (1) Using Selected VOR/DME Station Data -- DETERMINE distance and bearing for desired waypoint(s).
- (2) VHF Navigation Receiver -- ON.
- (3) DME TEST/ON-OFF Switch -- ON.
- (4) DME Mode Selector Switch -- RNAV.
- (5) RNAV DSPL Switch -- 1.
- (6) BEARING Minilever Switches -- SET to first waypoint bearing.
- (7) DISTANCE Minilever Switches -- SET to first waypoint distance.
- (8) XFER Pushbutton Switch -- PUSH in.
 - a. First waypoint bearing and distance are placed in memory as waypoint 1.
 - b. BEARING Display Readout -- DISPLAYS readout of first waypoint bearing.
 - c. DISTANCE Display Readout -- DISPLAYS readout of first waypoint distance.
- (9) RNAV DSPL Switch -- SET to 2.
- (10) BEARING Minilever Switches -- SET to second waypoint bearing.
- (11) DISTANCE Minilever Switches -- SET to second waypoint distance.
- (12) XFER Pushbutton Switch -- PUSH in.
 - a. Second Waypoint Readout -- BEARING and DISTANCE are placed in memory as waypoint 2.
 - b. BEARING Display Readout -- DISPLAYS readout of second waypoint bearing.
 - c. DISTANCE Display Readout -- DISPLAYS readout of second waypoint distance.
- (13) BEARING Minilever Switches -- SET to standby waypoint bearing.
- (14) DISTANCE Minilever Switches -- SET to standby waypoint distance.

NOTE

As first waypoint is reached, it can be replaced with the third "standby" waypoint (already set) before placing the RNAV "DSPL" and "FLY" switches to 2. Then a fourth waypoint, if necessary, can be set with the minilever selectors.

DISPLAY RELIABILITY TESTS:

- (1) VHF Navigation Receiver -- ON.
- (2) DME TEST/ON-OFF Switch -- ON.
- (3) VHF Navigation Receiver Frequency Selector Switches -- SET to VOR frequency.
- (4) RNAV DSPL and FLY Switches -- DSPL set to 1, FLY set to 2.
 - a. Readout -- DISPLAYS first waypoint bearing and distance.
 - b. Annunciator Lamp -- FLASHES.
- (5) RNAV DSPL and FLY Switches -- DSPL set to 2, FLY set to 1.
 - a. Readout -- DISPLAYS second waypoint bearing and distance.
 - b. Annunciator Lamp -- FLASHES.
- (6) RNAV DSPL and FLY Switches -- BOTH SET to same number.
 - a. Readout -- DISPLAYS waypoint bearing and distance as selected by DSPL switch.
 - b. Annunciator Lamp -- NOT LIGHTED.
- (7) DME Mode Selector Switch -- SET to RNAV.
 - a. Both RN and NM displays on DME Distance-to-Station -- DISPLAY is LIGHTED.
 - b. RN Lamp on Course Indicator -- LIGHTS.

NOTE

The RN Lamp incorporated in the Course Deviation Indicator (CDI) is mounted on the instrument panel adjacent to the optional Horizontal Situation Indicator (HSI) when RNAV is coupled to an HSI.

- (8) VHF Navigation Receiver Frequency Selector Switches -- SET to LOC frequency.
 - a. DME Distance-to-Station display -- BLANK.
 - b. RN Lamp on Course Indicator -- LIGHTED.
 - c. Course Indicator Off/To-From Indicator -- OFF.
- (9) DME Mode Selector Switch -- SET to NAV 1, NAV 2, or HOLD.
 - a. NM display on DME Distance-to-Station -- DISPLAY is LIGHTED.
 - b. RN Lamp on Course Indicator -- NOT LIGHTED.
 - c. Course Indicator Off/To-From Indicator -- Shows TO if a usable signal is received.
- (10) DME Mode Selector Switch -- RNAV.
- (11) DME TEST/ON-OFF Switch -- HOLD to TEST.
 - a. DME RN/NM Distance-to-Station Display -- READOUT is 888.8.
 - b. DME KTS/MIN Ground Speed Display/Time-to-Station -- BLANK.
 - c. RNAV BEARING Display -- READOUT is 888.8
 - d. RNAV DISTANCE Display -- READOUT is 188.8.

AREA NAVIGATION CIRCUITS SELF-TEST:

- (1) VHF Navigation Receiver -- ON.
- (2) VHF Navigation Receiver Frequency Selector Switches -- SET to VOR frequency.
- (3) DME TEST/ON-OFF Switch -- ON.
- (4) DME Mode Selector Switch -- RNAV.
- (5) RNAV Computer -- PROGRAMMED to waypoint 1.
- (6) DSPL and FLY Switches -- SET both to 1.
 - a. BEARING Display -- READOUT is waypoint 1 bearing.
 - b. DISTANCE Display -- READOUT is waypoint 1 distance.
 - c. Course Indicator -- RN LAMP lights.
- (7) Course Indicator OBS or CRS on HSI -- SET to waypoint 1 bearing.
- (8) VHF Navigation Receiver ID-T Switch -- HOLD in T position.
 - a. Course Indicator Deviation Indicator -- CENTERS.
 - b. Course Indicator OFF/TO-FROM Indicator -- SHOWS TO.
 - c. DME Distance-to-Station Display -- READOUT is the same as the RNAV DISTANCE readout.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 400 ADF

(Type R-446A)

SECTION 1

GENERAL

The Cessna 400 ADF is an automatic direction finder set which provides continuous, visual bearing indications of the direction from which an RF signal is being received. It can be used for plotting position, for homing, and for aural reception of AM signals between 200 kHz and 1699 kHz. In addition, a crystal-controlled, beat frequency oscillator (BFO) permits coded identifier of stations transmitting keyed CW signals (Morse Code) to be heard.

The basic units of the Cessna 400 ADF are an R-446A Receiver with dual frequency selectors, a goniometer-indicator (IN-346A, IN-346B, IN-346C, or IN-346D), and sense and loop antennas. The receiver and goniometer-indicator are panel-mounted units. The sense and loop antennas are mounted on the external airplane surfaces. Operating controls for the Cessna 400 ADF are mounted on the receiver front panel. The goniometer-indicator presents station bearing in degrees of azimuth. An automatic pointer-stow feature alerts the operator to non-ADF operation by slewing the pointer to the 3:00 o'clock position when the REC mode is selected. An optional RA-446A, RA-346A, or RA-346B receiver accessory may be substituted for the goniometer-indicator to supply the goniometer function for driving a conventional ADF indicator or a RMI.

The frequency range of the Cessna 400 ADF is electronically divided into three bands: 200-399 kHz, 400-799 kHz, and 800-1699 kHz. Frequency spacing within each band is in 1-kHz increments. The operating frequency and band are selected by a four-section Minilever switch which displays a digital readout of the frequency selected and supplies a binary code to control the logic circuits within the set. A secondary (standby) operating frequency is selected by another four-section Minilever switch. Frequency control of the ADF is switched to the primary or the secondary operating frequency by a toggle switch. The operating modes (ADF and REC) are selected by individual pushbutton switches. Additional pushbutton switches are used to select the BFO and to test signal reliability during ADF operation. Operating controls for the Cessna 400 ADF are shown and described in Figure 1.

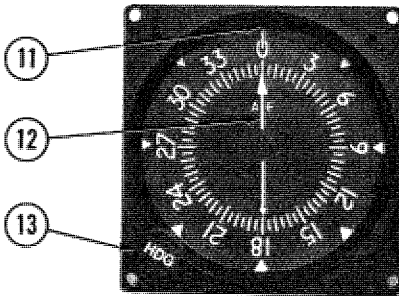
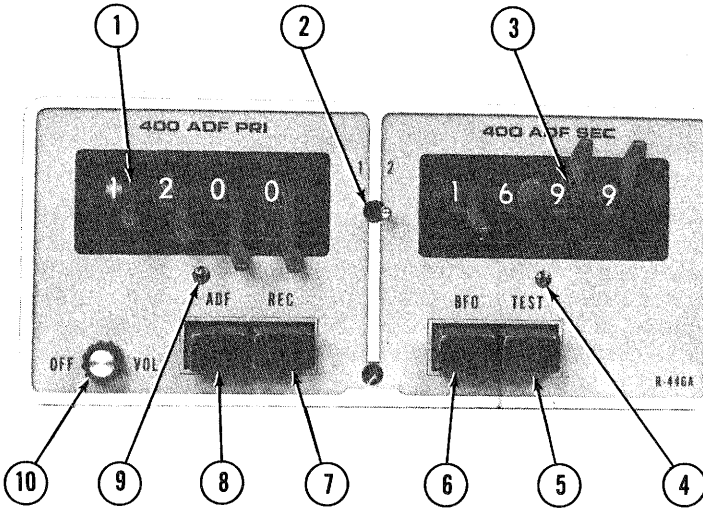


Figure 1. Cessna 400 ADF Operating Controls and Indicator
(Sheet 1 of 2)

1. PRI (PRIMARY FREQUENCY SELECTOR) - Selects and displays "primary" frequency.
2. 1-2 - The "1" position activates "primary" (PRI) frequency. The "2" position activates "secondary" (SEC) frequency.
3. SEC (SECONDARY FREQUENCY SELECTOR) - Selects and displays "secondary" frequency.
4. SECONDARY RESELECT LAMP - Lamp will flash only when "secondary" (SEC) frequency selection is outside of operating range of the receiver and 1-2 switch is in the "2" position.
5. TEST - Momentary-on switch used only with ADF function to test bearing reliability. When held depressed, slews indicator pointer; when released, if bearing is reliable, pointer returns to original position.
6. BFO - Pushed in: Activates beat frequency oscillator tone to permit coded identifier of stations transmitting keyed CW signals (Morse Code) to be heard.
7. REC - Pushed in: Selects receive mode (set operates as a standard communications receiver using sense antenna only).

NOTE

In this position an automatic pointer stow feature will alert the pilot to non-ADF operation by positioning and retaining the pointer at the 3:00 o'clock position when the 400 ADF is in the REC function.

8. ADF - Pushed in: Selects ADF mode (set operates as automatic direction finder using loop and sense antennas).
9. PRIMARY RESELECT LAMP - Lamp will flash only when "primary" (PRI) frequency selection is outside of operating range of the receiver and 1-2 switch is in the "1" position.
10. OFF-VOL - Turns set on or off and adjusts receiver volume.
11. INDEX - Fixed reference line for dial rotation adjustment.
12. POINTER - When HDG control is adjusted, indicates either relative, magnetic, or true bearings of a radio station.
13. HDG - Rotates dial to facilitate relative, magnetic, or true bearing information.

Figure 1. Cessna 400 ADF Operating Controls and Indicator
(Sheet 2 of 2)

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO OPERATE AS A COMMUNICATIONS RECEIVER ONLY:

- (1) OFF/VOL Control -- ON.
- (2) REC Pushbutton -- PUSH in.

NOTE

ADF indicator pointer will stow at a 90-degree position to alert the pilot to non-ADF operation.

- (3) PRI Frequency Selectors -- SELECT desired operating frequency.
- (4) SEC Frequency Selectors -- SELECT desired operating frequency.
- (5) 1-2 Selector Switch -- 1 position.

NOTE

1-2 selector switch can be placed in the 2 position for operation on secondary frequency. The re-select lamp will flash only when frequency selection is outside of operating range of the receiver.

- (6) ADF SPEAKER/PHONE Switch -- SELECT speaker or phone position.

- (7) VOL Control -- ADJUST to desired listening level.

TO OPERATE AS AN AUTOMATIC DIRECTION FINDER:

- (1) OFF/VOL Control -- ON.
- (2) PRI Frequency Selectors -- SELECT desired operating frequency.
- (3) SEC Frequency Selectors -- SELECT desired operating frequency.
- (4) 1-2 Selector Switch -- 1 position.

NOTE

1-2 selector switch can be placed in the 2 position for operation on secondary frequency. The re-select lamp will flash only when frequency selection is outside of operating range of the receiver.

- (5) ADF SPEAKER/PHONE Switch -- SELECT speaker or phone position as desired.
- (6) ADF Pushbutton -- PUSH in and note relative bearing on ADF indicator.
- (7) HDG Control -- SET goniometer-indicator dial so that index indicates magnetic or true heading of airplane. Pointer indicates bearing to station.
- (8) VOL Control -- ADJUST to desired listening level.

NOTE

When switching stations, place function pushbutton in the REC position. Then, after station has been selected, place function pushbutton in the ADF position to resume automatic direction finder operation. (This practice prevents the bearing indicator from swinging back and forth as frequency dial is rotated).

TO TEST RELIABILITY OF AUTOMATIC DIRECTION FINDER:

- (1) ADF Pushbutton -- PUSH in and note relative bearing on indicator.
- (2) TEST Pushbutton -- PUSH in and hold TEST button until indicator pointer slews off indicated bearing at least 10 to 20 degrees.
- (3) Indicator Pointer -- Observe that pointer returns to the same relative bearing as in step (1).

TO OPERATE BFO:

- (1) OFF/VOL Control -- ON.

- (2) ADF SPEAKER/PHONE Switch -- SELECT speaker or phone position.
- (3) BFO Pushbutton -- PUSH in.
- (4) 1-2 Selector Switch -- SELECT 1 position to activate PRI frequency or 2 to activate SEC frequency that is transmitting keyed CW signals (Morse Code).
- (5) VOL Control -- ADJUST to desired listening level.

NOTE

A 1000-Hz tone is heard in the audio output when CW signal (Morse Code) is tuned in properly.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 400 DME

(Type R-476A)

SECTION 1

GENERAL

The Cessna 400 DME (Type R-476A) is the airborne "interrogator" portion of a navigation system which supplies continuous, accurate, distance information from a fixed ground station to an aircraft in flight.

Except for selection of the operating channel, which is selected by the VHF navigation receiver frequency selector switches, the Cessna 400 DME is capable of independent operation. The equipment consists of a panel-mounted C-476A Control Unit which contains all of the operating controls and displays, and a remotely mounted RTA-476A Receiver-Transmitter. The RTA-476A transmits interrogating pulse pairs on 200 channels between 1041 MHz and 1150 MHz; it receives associated ground-to-air replies between 978 MHz and 1213 MHz. The C-476A Control Unit digitally displays distances up to 200 nautical miles and either ground speed or time-to-station information, as selected. All operating controls and displays for the DME are shown in Figure 1, and the functions of each are described.

SECTION 2

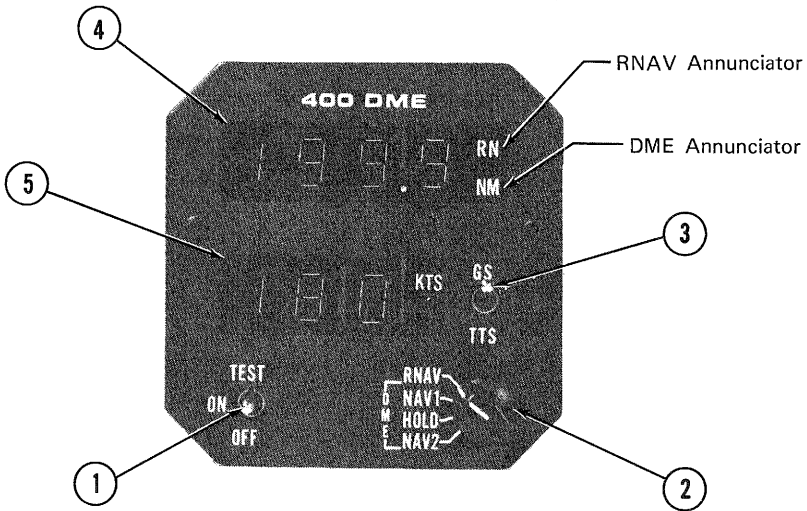
LIMITATIONS

There is no change to the airplane limitations when this avionics equipment is installed.

SECTION 3

EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionics equipment is installed.



1. **TEST/ON-OFF SWITCH** - Controls application of power to DME circuits (turns equipment on or off); selects display lamp test for DME and RNAV displays.
2. **DME MODE SELECTOR SWITCH** - Selects DME operating mode as follows:
 - RNAV:** Selects area navigation operation; selects display of nautical miles (distance) to selected RNAV waypoint.
 - NAV 1:** Selects DME operation with No. 1 VHF navigation set; enables channel selection by NAV 1 frequency selector switches.
 - HOLD:** Selects DME memory circuit; DME remains channeled to station to which it was channeled when HOLD was selected; display of distance continues to be nautical miles to that station. Both the NAV 1 and the NAV 2 sets may be set to new operating frequencies.

CAUTION

In the HOLD mode, there is no annunciation of the VOR/DME station frequency.

Figure 1. Cessna 400 DME (Type R-476A) (Sheet 1 of 2)

- NAV 2: Selects DME operation with No. 2 VHF navigation set; enables channel selection by NAV 2 frequency selector switches.
3. GS/TTS SELECTOR SWITCH - In NAV 1, NAV 2, or HOLD mode, selects display of ground speed (GS) or time to station (TTS). Does not operate with RNAV mode.
 4. RN/NM DISTANCE-TO-STATION DISPLAY - In NAV 1, NAV 2, or HOLD mode, displays distance to selected VOR/DME station in nautical miles; only NM (Nautical Miles) annunciator lights. In RNAV mode, displays distance to selected way-point in nautical miles; both RN (RNAV) and NM annunciator light.
 5. KTS/MIN DISPLAY - Displays ground speed in knots or time-to-station in minutes, as follows:
 - a. With GS/TTS Switch set to GS, displays ground speed component to or from station in knots (aircraft must be flying directly to or from the VOR/DME station for accurate indication).
 - b. With GS/TTS Switch set to TTS, displays time to VOR/DME station in minutes at the ground speed component indicated.
 - c. GS/TTS will not operate in RNAV mode.

Figure 1. Cessna 400 DME (Type R-476A) (Sheet 2 of 2)

SECTION 4

NORMAL PROCEDURES

DME OPERATION:

- (1) TEST/ON-OFF Switch - SET to ON.
- (2) DME Mode Selector Switch - SET to NAV 1 or NAV 2.
- (3) NAV 1 and NAV 2 VHF Navigation Receivers - ON; SET FREQUENCY selector switches to VOR/DME station frequencies, as required.
- (4) GS/TTS Switch - SET as desired.
- (5) TEST/ON-OFF Switch - HOLD to TEST:
 - a. Distance-to-Station Display readout is 188.8.
 - b. Knots/Minutes Display readout is 888.
- (6) TEST/ON-OFF Switch - RELEASE to ON; display readouts return to normal.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 400 MARKER BEACON

(Type R-402A)

SECTION 1

GENERAL

The system consists of a 75 MHz marker beacon receiver, three indicator lights, one speaker/phone switch, a light dimming control, an ON/OFF/VOLUME control, and a 75 MHz marker beacon antenna. In addition, on 150, 182, 206, 207, 210 and 337 series models, a HI-LO sensitivity selector switch and a press-to-test button are provided. On all 172, 177, 177RG, 180 and 185 series models, a single, three position switch is provided for HI-LO sensitivity selection or test selection.

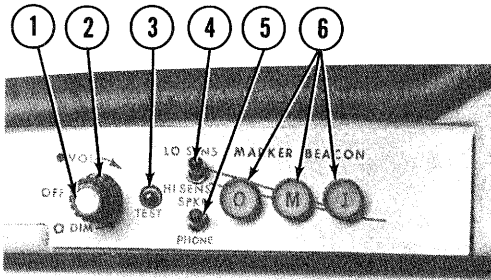
This system provides visual and aural indications of 75 MHz ILS marker beacon signals as the marker is passed. The following table lists the three most currently used marker facilities and their characteristics.

MARKER FACILITIES

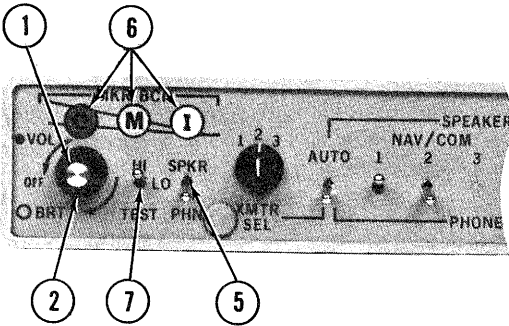
MARKER	IDENTIFYING TONE	LIGHT*
Inner	Continuous 6 dots/sec (3000 Hz)	White
Middle	Alternate dots and dashes (1300 Hz)	Amber
Outer	2 dashes/sec (400 Hz)	Blue

* When the identifying tone is keyed, the respective indicating light will blink accordingly.

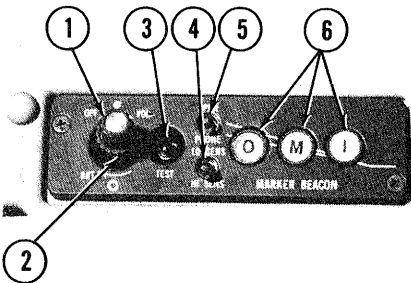
Operating controls and indicator lights are shown and described in Figure 1.



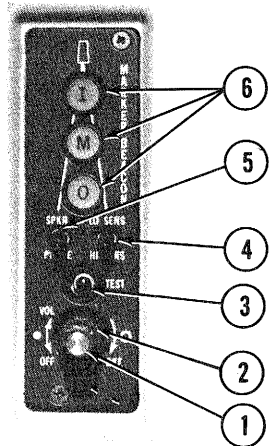
TYPICAL INSTALLATION
ON ALL 150 MODEL SERIES



TYPICAL INSTALLATION
ON ALL 172, 177, 177RG,
180 & 185 MODEL SERIES



TYPICAL INSTALLATION
ON ALL 337 MODEL SERIES



TYPICAL INSTALLATION
ON ALL 182, 206, 207
& 210 MODEL SERIES

Figure 1. Cessna 400 Marker Beacon Operating Controls and Indicator Lights (Sheet 1 of 2)

1. OFF/VOLUME CONTROL - The small, inner control turns the set on or off and adjusts the audio listening level. Clockwise rotation turns the set on and increases the audio level.
2. DIM/BRT CONTROL - The large, outer control provides light dimming for the marker lights. Clockwise rotation increases light intensity.
3. TEST SWITCH - (150, 182, 206, 207, 210 & 337 Model Series Only) When the press-to-test switch button is depressed, the marker beacon lights will illuminate, indicating the lights are operational (the test position is a lamp test function only).

NOTE

Turn the set on, and rotate the DIM control clockwise (fully on) in order to view the marker beacon lights during test.

4. LO/HI SENS SWITCH - (150, 182, 206, 207, 210 & 337 Model Series Only) In the LO position (Up), receiver sensitivity is positioned for ILS approaches. In the HI position (Down), receiver sensitivity is positioned for airway flying.
5. SPEAKER/PHONE SWITCH - Selects speaker or phone for aural reception.
6. MARKER BEACON INDICATOR LIGHTS - Indicates passage of outer, middle and inner marker beacons. The OUTER light is blue, the MIDDLE light is amber and the INNER light is white.
7. HI/LO/TEST SWITCH - (172, 177, 177RG, 180 & 185 Model Series Only) In the HI position (Up), receiver sensitivity is positioned for airway flying. In the LO position (Center), receiver sensitivity is positioned for ILS approaches. In the TEST position (Down), the marker lights will illuminate, indicating the lights are operational (the test position is a lamp test function only).

NOTE

Turn the set on, and rotate the BRIGHT control clockwise (fully on) in order to view the marker beacon lights during test. The TEST position on the switch is spring loaded to return the switch to the LO SENS position when TEST position is released.

Figure 1. Cessna 400 Marker Beacon Operating Controls and Indicator Lights (Sheet 2 of 2)

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.

SECTION 3 EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4 NORMAL PROCEDURES

TO OPERATE:

- (1) OFF/VOL Control -- VOL position and adjust to desired listening level.
- (2) LO/HI SENS Switch -- SELECT HI position for airway flying or LO position for ILS approaches.
- (3) SPKR/PHONE Switch -- SELECT speaker or phone audio.
- (4) TEST Switch -- PRESS and ensure that marker beacon indicator lights are operative.

NOTE

Ensure that BRT control is on enough to view the marker beacon.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA 400 TRANSPONDER
(Type RT-459A)
AND
OPTIONAL ALTITUDE ENCODER
(Type EA-401A)

SECTION 1
GENERAL

The Cessna 400 Transponder (Type 459A), shown in Figure 1, is the airborne component of an Air Traffic Control Radar Beacon System (ATCRBS). The transponder enables the ATC ground controller to "see" and identify the aircraft, while in flight, at distances beyond the primary radar range.

The 400 Transponder consists of a panel-mounted unit and an externally-mounted antenna. The transponder receives interrogating pulse signals on 1030 MHz and transmits coded pulse-train reply signals on 1090 MHz. It is capable of replying to Mode A (aircraft position identification) and Mode C (altitude information) interrogations on a selective reply basis on any of 4,096 information code selections. When an optional panel mounted EA-401A altitude encoder (not part of 400 Transponder System) is included in the avionic configuration, the transponder can provide altitude reporting in 100-foot increments between -1000 and +35,000 feet.

All Cessna 400 Transponder operating controls are located on the front panel of the unit. The optional altitude encoder's barometric pressure set knob is located on the altitude encoder. Function of the operating controls is described in Figure 1.

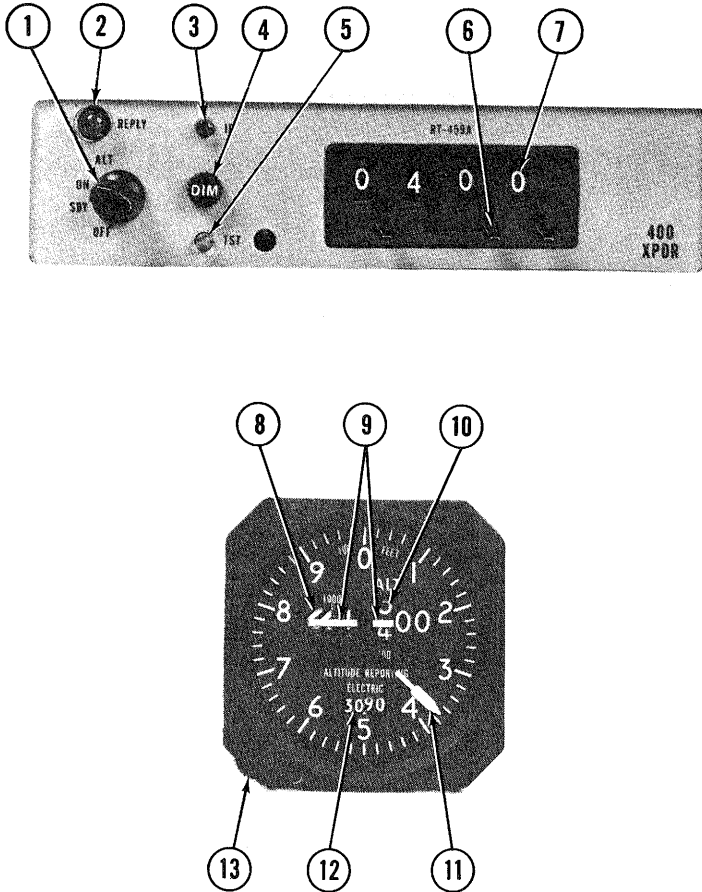


Figure 1. Cessna 400 Transponder and Altitude Encoder
Operating Controls (Sheet 1 of 2)

1. FUNCTION SWITCH - Controls application of power and selects Transponder operating mode, as follows:
 - OFF - Removes power from transponder (turns set off).
 - SBY - Applies power for equipment warm-up.
 - ON - Applies operating power and enables transponder to transmit Mode A reply pulses.
 - ALT - Applies operating power and enables transponder to transmit either Mode A reply pulses or Mode C altitude information pulses selected automatically by the interrogating signal.
2. REPLY LAMP - Provides visual indication of transponder replies. During normal operation, lamp flashes when reply pulses are transmitted; when special pulse identifier is selected, lamp glows steadily for duration of IDENT pulse transmission. (Reply Lamp will also glow steadily during initial warm-up period.)
3. IDENT SWITCH - When depressed, selects special pulse identifier to be transmitted with transponder reply to effect immediate identification of aircraft on ground controller's display. (Reply Lamp will glow steadily during duration of IDENT pulse transmission.)
4. DIMMER CONTROL - Allows pilot to control brilliance of Reply Lamp.
5. SELF-TEST SWITCH - When depressed, causes transponder to generate a self-interrogating signal to provide a check of transponder operation. (Reply Lamp will illuminate to verify self test operation.)
6. REPLY-CODE SELECTOR SWITCHES (4) - Select assigned Mode A (or Mode C) Reply Code.
7. REPLY-CODE INDICATORS (4) - Display selected Mode A (or Mode C) Reply Code.
8. 1000-FOOT DRUM TYPE INDICATOR - Provides digital altitude readout in 1000-foot increments between -1000 feet and +35,000 feet.
9. OFF INDICATOR WARNING FLAG - Flag appears when power is removed from the system.
10. 100-FOOT DRUM TYPE INDICATOR - Provides digital altitude readout in 100-foot increments between 0 feet and 1000 feet.
11. 20-FOOT INDICATOR NEEDLE - Indicates altitude in 20-foot increments between 0 feet and 1000 feet.
12. BAROMETRIC PRESSURE SET INDICATOR - DRUM TYPE - Indicates selected barometric pressure in the range of 27.9 to 31.0 inches of mercury.
13. BAROMETRIC PRESSURE SET KNOB - Dials in desired barometric pressure setting in the range of 27.9 to 31.0 inches of mercury.

Figure 1. Cessna 400 Transponder and Altitude Encoder
Operating Controls (Sheet 2 of 2)

SECTION 2 LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.

SECTION 3 EMERGENCY PROCEDURES

TO TRANSMIT AN EMERGENCY SIGNAL:

- (1) Function Switch -- ON.
- (2) Reply-Code Selector Switches -- SELECT 7700 operating code.
- (3) ID Switch -- DEPRESS to effect immediate identification of aircraft on ground controller's display.
- (4) DIM Control -- ADJUST light brilliance of reply lamp.

TO TRANSMIT A SIGNAL REPRESENTING LOSS OF ALL COMMUNICATIONS:

- (1) Function Switch -- ON.
- (2) Reply-Code Selector Switches -- SELECT 7700 operating code for 1 minute, then select 7600 operating code for 15 minutes and then repeat this procedure for remainder of flight.
- (3) ID Switch -- DEPRESS to effect immediate identification of aircraft on ground controller's display.
- (4) DIM Control -- ADJUST light brilliance of reply lamp.

SECTION 4 NORMAL PROCEDURES

BEFORE TAKEOFF AND WHILE TAXIING:

- (1) Function Switch -- SBY.

TO TRANSMIT MODE A (AIRCRAFT POSITION IDENTIFICATION) CODES IN FLIGHT:

- (1) Reply-Code Selector Switches -- SELECT assigned code.

- (2) Function Switch -- ON.
- (3) DIM Control -- ADJUST light brilliance of reply lamp.

NOTE

During normal operation with function switch in ON position, REPLY lamp flashes indicating transponder replies to interrogations.

- (4) ID Button -- DEPRESS momentarily when instructed by ground controller to "squawk IDENT" (REPLY lamp will glow steadily, indicating IDENT operation).

TO TRANSMIT MODE C (ALTITUDE INFORMATION) CODES IN FLIGHT:

- (1) Altitude Encoder Barometric Pressure Set Knob -- DIAL assigned barometric pressure.
- (2) Reply-Code Selector Switches -- SELECT assigned code.
- (3) Function Switch -- ALT.

NOTE

When directed by ground controller to "stop altitude squawk", turn Function Switch to ON for Mode A operation only.

NOTE

Pressure altitude is transmitted, and conversion to indicated altitude is done in ATC computers. Altitude squawk will agree with indicated altitude when altimeter setting in use by the ground controller is set in the altitude encoder.

- (4) DIM Control -- ADJUST light brilliance of reply lamp.

TO SELF-TEST TRANSPONDER OPERATION:

- (1) Function Switch -- SBY and wait 30 seconds for equipment to warm-up.
- (2) Function Switch -- ON.
- (3) TST Button -- DEPRESS (Reply lamp should light brightly regardless of DIM control setting).

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.

SUPPLEMENT

CESSNA NAVOMATIC 200A AUTOPILOT

(Type AF-295B)

SECTION 1

GENERAL

The Cessna 200A Navomatic is an all electric, single-axis (aileron control) autopilot system that provides added lateral and directional stability. Components are a computer-amplifier, a turn coordinator, an aileron actuator, and a course deviation indicator(s) incorporating a localizer reversed (BC) indicator light.

Roll and yaw motions of the airplane are sensed by the turn coordinator gyro. The computer-amplifier electronically computes the necessary correction and signals the actuator to move the ailerons to maintain the airplane in the commanded lateral attitude.

The 200A Navomatic will also capture and track a VOR or localizer course using signals from a VHF navigation receiver.

The operating controls for the Cessna 200A Navomatic are located on the front panel of the computer-amplifier, shown in Figure 1. The primary function pushbuttons (DIR HOLD, NAV CAPT, and NAV TRK), are interlocked so that only one function can be selected at a time. The HI SENS and BACK CRS pushbuttons are not interlocked so that either or both of these functions can be selected at any time.

SECTION 2

LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed. However, the following autopilot limitations should be adhered to during airplane operation:

BEFORE TAKE-OFF AND LANDING:

- (1) A/P ON-OFF Switch -- OFF.

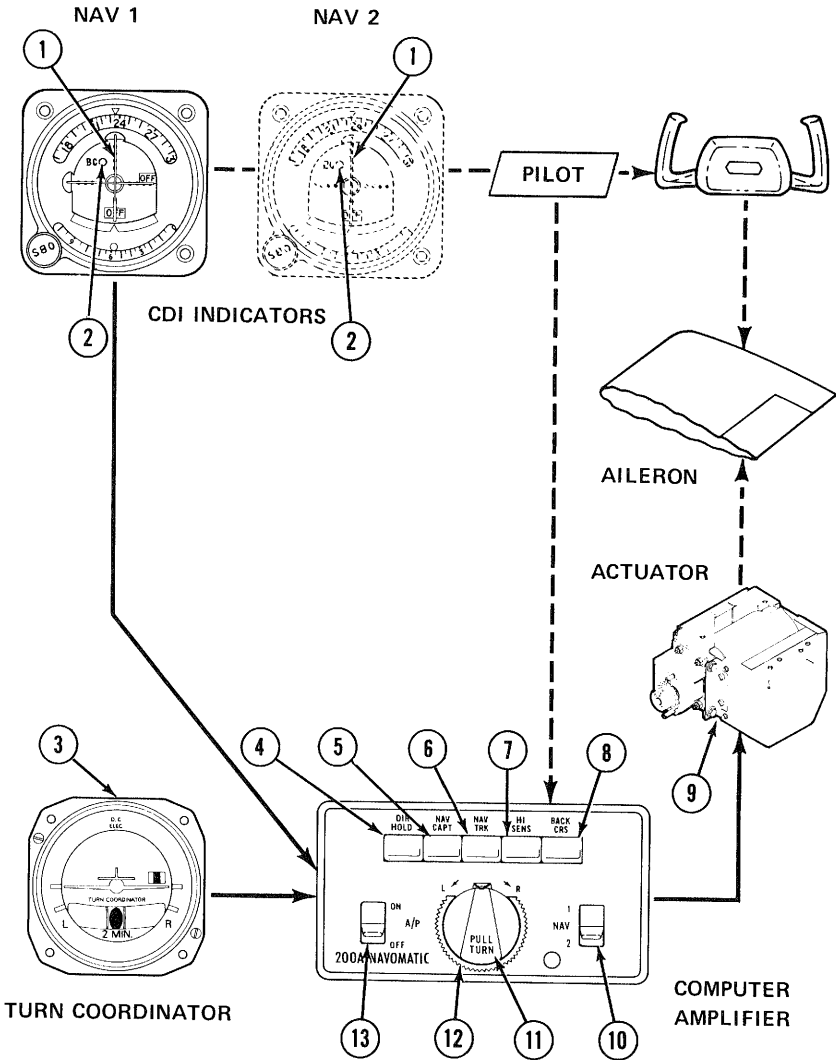


Figure 1. Cessna 200A Autopilot, Operating Controls and Indicators
(Sheet 1 of 2)

1. COURSE DEVIATION INDICATOR - Provides VOR/LOC navigation inputs to autopilot for intercept and tracking modes.
2. LOCALIZER REVERSED INDICATOR LIGHT - Amber light, labeled BC, illuminates when BACK CRS button is pushed in (engaged) and LOC frequency selected. BC light indicates course indicator needle is reversed on selected receiver (when tuned to a localizer frequency). This light is located within the CDI indicator.
3. TURN COORDINATOR - Senses roll and yaw for wings leveling and command turn functions.
4. DIR HOLD - Airplane holds direction it is flying at time button is pushed.
5. NAV CAPT - Airplane will turn to and capture selected VOR or LOC course.
6. NAV TRK - Airplane tracks selected VOR or LOC course.
7. HI SENS - During NAV CAPT or NAV TRK operation, this high sensitivity setting increases autopilot response to NAV signal to provide more precise operation during localizer approach. In low sensitivity position (pushbutton out), response to NAV signal is dampened for smoother tracking of enroute VOR radials; it also smooths out effect of course scalloping during NAV operation.
8. BACK CRS - Used with LOC operation only. With A/P switch OFF or ON, and when navigation receiver selected by NAV switch is set to a localizer frequency, it reverses normal localizer needle indication (CDI) and causes localizer reversed (BC) light to illuminate. With A/P switch ON, reverses localizer signal to autopilot.
9. ACTUATOR - The torque motor in the actuator causes the ailerons to move in the desired direction.
10. NAV - Selects NAV 1 or NAV 2 navigation receiver.
11. PULL TURN - When pulled out and centered in detent, airplane will fly wings-level; when turned to the right (R), the airplane will execute a right, standard rate turn; when turned to the left (L), the airplane will execute a left, standard rate turn. When centered in detent and pushed in, the operating mode selected by a push button is engaged.
12. TRIM - Used to trim autopilot to compensate for minor variations in aircraft trim or weight distribution. (For proper operation, the aircraft's rudder trim must be manually trimmed before the autopilot is engaged.)
13. A/P - Turns autopilot ON or OFF.

Figure 1. Cessna 200A Autopilot, Operating Controls and Indicators
(Sheet 2 of 2)

- (2) BACK CRS Button -- DISENGAGED (OUT). (Refer to Section 4 of this supplement and see Step 6 and Caution note under 'NAV CAPTURE (VOR/LOC)').

NAV CAPTURE (VOR/LOC):

- (1) Fly a manual intercept procedure if more than 15 miles from the station or more than 3 minutes from intercept.

SECTION 3

EMERGENCY PROCEDURES

TO OVERRIDE THE AUTOPILOT:

- (1) Airplane control Wheel -- ROTATE as required to override autopilot.

NOTE

The servo may be overpowered at anytime without damage.

TO TURN OFF AUTOPILOT:

- (1) A/P ON-OFF Switch -- OFF.

SECTION 4

NORMAL PROCEDURES

BEFORE TAKE-OFF AND LANDING:

- (1) A/P ON-OFF Switch -- OFF.
- (2) BACK CRS Button -- OFF (see Caution note under Nav Capture).

NOTE

Periodically verify operation of amber warning light(s), labeled BC on CDI(s), by engaging BACK CRS button with a LOC frequency selected.

INFLIGHT WINGS LEVELING:

- (1) Airplane Trim -- ADJUST.
- (2) PULL-TURN Knob -- PULL out and center in detent.
- (3) A/P ON-OFF Switch -- ON.
- (4) Autopilot TRIM Control -- ADJUST for zero turn rate.

COMMAND TURNS:

- (1) PULL-TURN Knob -- PULL and ROTATE.

DIRECTION HOLD:

- (1) PULL-TURN Knob -- PULL out and center in detent.
- (2) DIR HOLD Button -- PUSH.
- (3) PULL-TURN Knob -- PUSH in detent position.
- (4) Autopilot TRIM Control -- READJUST to minimize heading drift.

NAV CAPTURE (VOR/LOC):

- (1) PULL-TURN Knob -- PULL out.
- (2) NAV 1-2 Selector Switch -- SELECT desired VOR receiver.
- (3) Nav Receiver OBS -- SET VOR course (if tracking omni).
- (4) NAV CAPT Button -- PUSH.
- (5) HI SENS Button -- PUSH.
- (6) BACK CRS Button -- PUSH only if intercepting localizer front course outbound or back course inbound.

CAUTION

With BACK CRS button pushed in and localizer frequency selected, the CDI on selected nav radio will be reversed even when the autopilot switch is OFF.

- (7) PULL-TURN Knob -- TURN airplane parallel to course. Then PUSH for automatic intercept. If more than 15 miles from the station or more than 3 minutes from intercept, use a manual intercept procedure.
- (8) NAV TRK Button -- PUSH when CDI centers and airplane is within $\pm 5^\circ$ of course heading.
- (9) HI SENS Button -- DISENGAGE for omni tracking (leave ENGAGED for localizer).

NAV TRACKING (VOR/LOC):

- (1) PULL-TURN Knob -- PULL out.

- (2) NAV 1-2 Selector Switch -- SELECT desired VOR receiver.
- (3) Nav Receiver OBS -- SET VOR course (if tracking omni).
- (4) NAV TRK Button -- PUSH.
- (5) HI SENS Button -- PUSH for localizer; disengage for omni.
- (6) BACK CRS Button -- PUSH only if tracking localizer front course outbound or back course inbound.

CAUTION

See caution paragraph under Nav Capture.

- (7) PULL-TURN Knob -- PUSH when airplane is on course and on heading.
- (8) Autopilot TRIM Control -- READJUST as required to maintain track.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed.

SUPPLEMENT

CESSNA NAVOMATIC 300A AUTOPILOT

(Type AF-395A)

SECTION 1

GENERAL

The Cessna 300A Navomatic is an all electric, single-axis (aileron control) autopilot system that provides added lateral and directional stability. Components are a computer-amplifier, a turn coordinator, a directional gyro, an aileron actuator and a course deviation indicator(s) incorporating a localized reversed (BC) indicator light.

Roll and yaw motions of the airplane are sensed by the turn coordinator gyro. Deviations from the selected heading are sensed by the directional gyro. The computer-amplifier electronically computes the necessary correction and signals the actuator to move the ailerons to maintain the airplane in the commanded lateral attitude or heading.

The 300A Navomatic will also intercept and track a VOR or localizer course using signals from a VHF navigation receiver.

The operating controls for the Cessna 300A Navomatic are located on the front panel of the computer-amplifier and on the directional gyro, shown in Figure 1. The primary function pushbuttons (HDG SEL, NAV INT, and NAV TRK), are interlocked so that only one function can be selected at a time. The HI SENS and BACK CRS pushbuttons are not interlocked so that either or both of these functions can be selected at any time.

SECTION 2

LIMITATIONS

There is no change to the airplane limitations when this avionic equip-

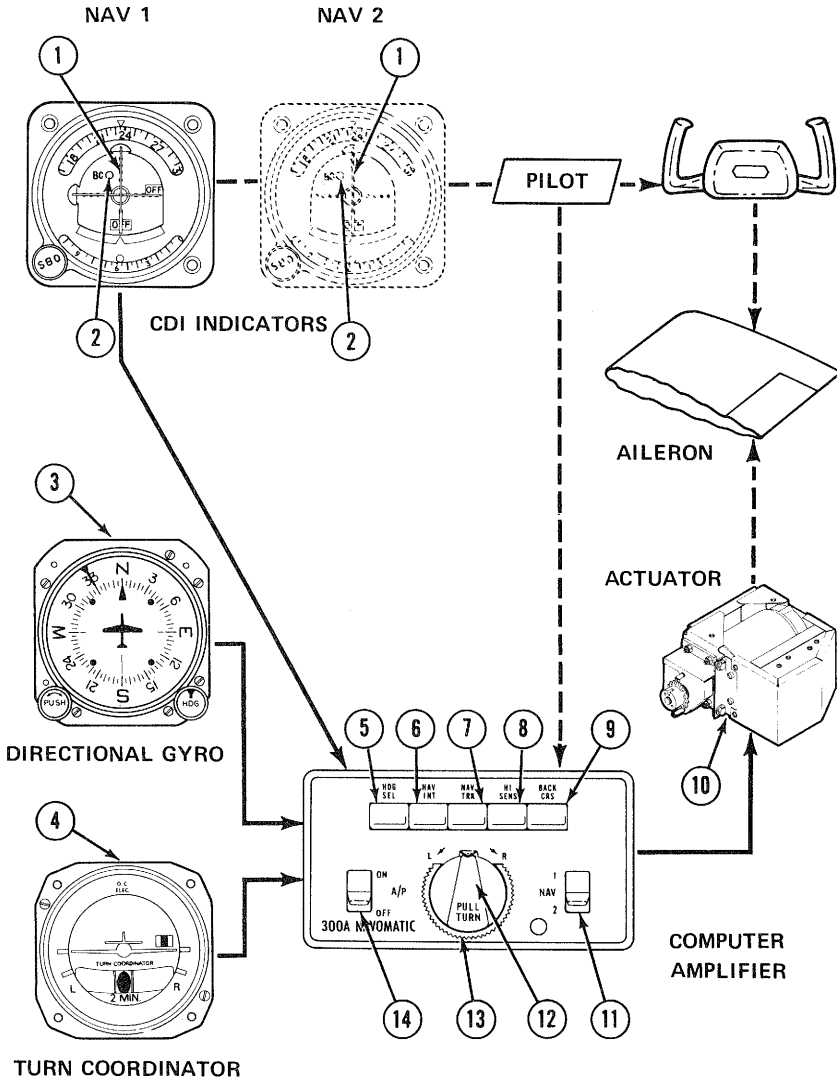


Figure 1. Cessna 300A Autopilot, Operating Controls and Indicators
(Sheet 1 of 2)

1. COURSE DEVIATION INDICATOR - Provides VOR/LOC navigation inputs to autopilot for intercept and tracking modes.
2. LOCALIZER REVERSED INDICATOR LIGHT - Amber light, labeled BC, illuminates when BACK CRS button is pushed in (engaged) and LOC frequency selected. BC light indicates course indicator needle is reversed on selected receiver (when tuned to a localizer frequency). This light is located within the CDI indicator.
3. DIRECTIONAL GYRO INDICATOR - Provides heading information to the autopilot for heading intercept and hold.
4. TURN COORDINATOR - Senses roll and yaw for wings leveling and command turn functions.
5. HDG SEL - Aircraft will turn to and hold heading selected by the heading "bug" on the directional gyro.
6. NAV INT - When heading "bug" on DG is set to selected course, aircraft will turn to and intercept selected VOR or LOC course.
7. NAV TRK - When heading "bug" on DG is set to selected course, aircraft will track selected VOR or LOC course.
8. HI SENS - During NAV INT or NAV TRK operation, this high sensitivity setting increases autopilot response to NAV signal to provide more precise operation during localizer approach. In low-sensitivity position (pushbutton out), response to NAV signal is dampened for smoother tracking of enroute VOR radials; it also smooths out effect of course scalloping during NAV operation.
9. BACK CRS - Used with LOC operation only. With A/P switch OFF or ON, and when navigation receiver selected by NAV switch is set to a localizer frequency, it reverses normal localizer needle indication (CDI) and causes localizer reversed (BC) light to illuminate. With A/P switch ON, reverses localizer signal to autopilot.
10. ACTUATOR - The torque motor in the actuator causes the ailerons to move in the desired direction.
11. NAV - Selects NAV 1 or NAV 2 navigation receiver.
12. PULL TURN - When pulled out and centered in detent, airplane will fly wings-level; when turned to the right (R), the airplane will execute a right, standard rate turn; when turned to the left (L), the airplane will execute a left, standard rate turn. When centered in detent and pushed in, the operating mode selected by a push button is engaged.
13. TRIM - Used to trim autopilot to compensate for minor variations in aircraft trim or lateral weight distribution. (For proper operation, the aircraft's rudder trim must be manually trimmed before the autopilot is engaged.)
14. A/P - Controls primary power to autopilot servo (turns autopilot ON or OFF).

Figure 1. Cessna 300A Autopilot, Operating Controls and Indicators
(Sheet 2 of 2)

ment is installed. However, the following autopilot limitations should be adhered to during airplane operation:

BEFORE TAKE-OFF AND LANDING:

- (1) A/P ON-OFF Switch -- OFF.
- (2) BACK CRS Button -- DISENGAGED (OUT). (Refer to Section 4 of this supplement and see Step 8 and Caution note under "NAV INTERCEPT (VOR/LOC)".)

SECTION 3 EMERGENCY PROCEDURES

TO OVERRIDE THE AUTOPILOT:

- (1) Airplane Control Wheel -- ROTATE as required to override autopilot.

NOTE

The servo may be overpowered at any time without damage.

TO TURN OFF AUTOPILOT:

- (1) A/P ON-OFF Switch -- OFF.

SECTION 4 NORMAL PROCEDURES

BEFORE TAKE-OFF AND LANDING:

- (1) A/P ON-OFF Switch -- OFF.
- (2) BACK CRS Button -- OFF (see caution note under Nav Intercept).

NOTE

Periodically verify operation of amber warning light(s), labeled BC on CDI(s), by engaging BACK CRS button with a LOC frequency selected.

INFLIGHT WINGS LEVELING:

- (1) Airplane Trim -- ADJUST.

- (2) PULL-TURN Knob -- PULL out and center in detent.
- (3) A/P ON-OFF Switch -- ON.
- (4) Autopilot TRIM Control -- ADJUST for zero turn rate.

HEADING SELECT:

- (1) Directional Gyro -- SET to airplane magnetic heading.
- (2) Heading Selector Knob -- ROTATE bug to desired heading.
- (3) Heading Select Button -- PUSH.
- (4) PULL-TURN Knob -- PUSH.

NOTE

Airplane will return automatically to selected heading.
If airplane fails to hold the precise heading, readjust
autopilot lateral TRIM knob as required or disengage
autopilot and reset manual trim.

NAV INTERCEPT (VOR/LOC):

- (1) PULL-TURN Knob -- PULL out.
- (2) NAV 1-2 Selector Switch -- SELECT.
- (3) Nav Receiver OBS -- SET VOR course (if tracking omni).
- (4) Heading Selector Knob -- ROTATE bug to selected course (VOR or localizer).
- (5) Directional Gyro -- SET for magnetic heading.
- (6) NAV INT Button -- PUSH.
- (7) HI SENS Button -- PUSH for localizer and "close-in" omni intercepts.
- (8) BACK CRS Button -- PUSH only if intercepting localizer front course outbound or back course inbound.

CAUTION

With BACK CRS button pushed in and localizer frequency selected, the CDI on selected nav radio will be reversed even when the autopilot switch is OFF.

- (9) PULL-TURN Knob -- PUSH.

NOTE

Airplane will automatically turn to a 45° intercept angle.

- (10) NAV TRK Button -- PUSH when CDI centers (within one dot) and airplane is within $\pm 10^\circ$ of course heading.

- (11) HI SENS Button -- Disengage for omni tracking (leave engaged for localizer).

NAV TRACKING (VOR/LOC):

- (1) PULL-TURN Knob -- PULL out.
- (2) NAV 1-2 Selector Switch -- SELECT desired VOR receiver.
- (3) Nav Receiver OBS -- SET VOR course (if tracking omni).
- (4) Heading Selector Knob -- ROTATE bug to selected course (VOR or localizer).
- (5) Directional Gyro -- SET for magnetic heading.
- (6) NAV TRK Button -- PUSH.
- (7) HI SENS Button -- PUSH for localizer; disengage for omni.
- (8) BACK CRS Button -- PUSH only if tracking localizer front course outbound or back course inbound.

CAUTION

See caution paragraph under Nav Intercept.

- (9) PULL-TURN Knob -- PUSH when CDI is within 1 dot and airplane is within $\pm 10^\circ$ of course heading.

NOTE

If CDI remains steadily off center, readjust autopilot lateral trim control as required.

SECTION 5

PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed.

SUPPLEMENT

CESSNA NAVOMATIC 400 AUTOPILOT (Type AF-420A)

SECTION 1

GENERAL

The Cessna Navomatic 400 autopilot is an all-electric, aileron and elevator control system that provides lateral, directional, and pitch stability and control. The system uses an attitude gyro for lateral and pitch sensing and a directional gyro for heading deviation sensing. An atmospheric pressure sensing device maintains a selected altitude. Also included is an omni coupler that permits automatic interception and tracking of any VOR radial, either to or from omni stations. An autopilot NAV 1/NAV 2 selector switch is provided in the audio control panel for selection of the associated Nav receiver. An optional reverse sense LOC 1/LOC 2 selector switch may be installed with this equipment even though there is no ILS coupler in the autopilot.

SECTION 2

LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed. However, the following autopilot limitations should be adhered to during airplane operation:

OPERATING LIMITATIONS:

- (1) ON-OFF Switch -- OFF for Take-Off and Landing.
- (2) Maximum Airspeed for Autopilot Operation -- REFER to Autopilot Limitations Placard on instrument panel of airplane.
- (3) Possible Altitude Loss with Autopilot Malfunction -- REFER to Autopilot Limitations Placard on instrument panel of airplane.

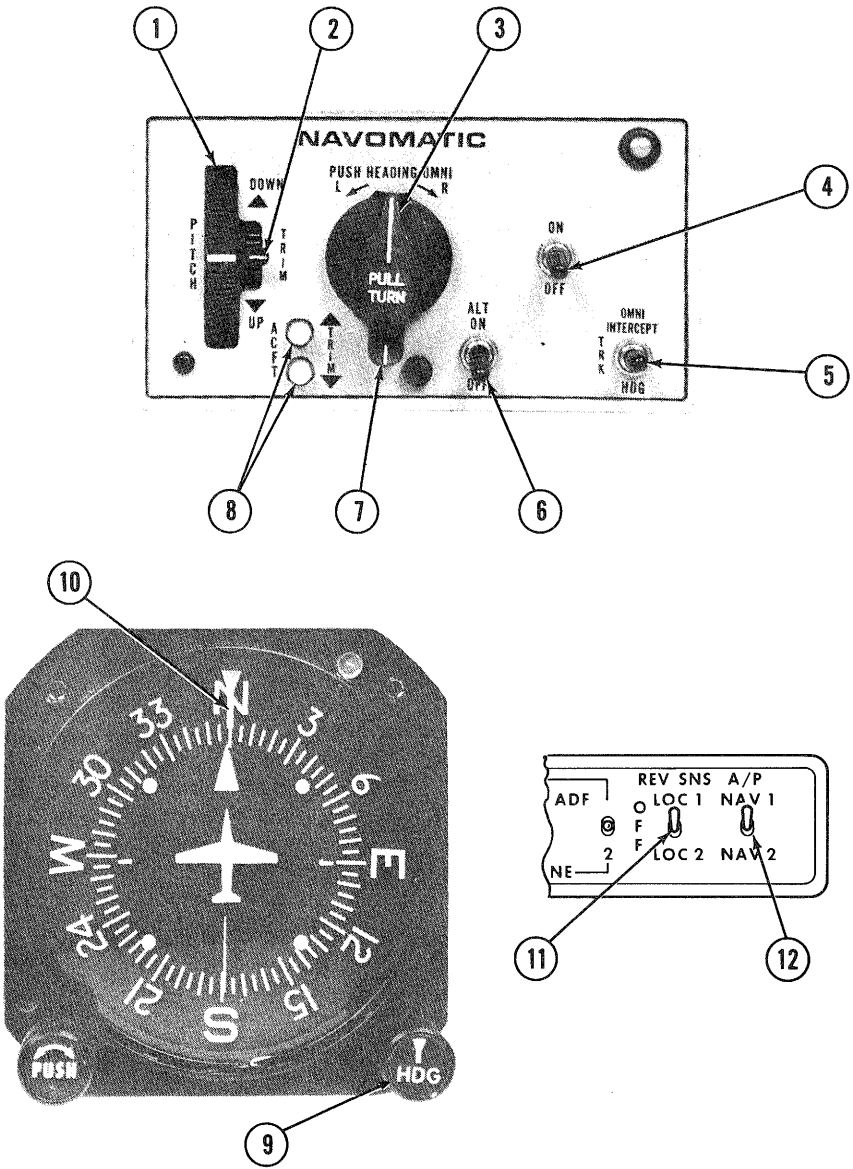


Figure 1. Cessna 400 Autopilot (Type AF-420A) (Sheet 1 of 2)

1. PITCH CONTROL - Controls pitch attitude of aircraft. When rotated toward UP, airplane will pitch up. When rotated toward DOWN, airplane will pitch down. Pitch attitude depends on displacement of control from detent (level flight) position. (Must be coordinated with aircraft elevator trim.)
2. PITCH TRIM - Used only when PITCH control is in detent to trim aircraft for level flight.
3. PULL-TURN CONTROL KNOB - When pulled out and turned, aircraft can be banked right (R) or left (L). When in detent and pushed in, intercepts and maintains selected heading or VOR radial.
4. ON-OFF SWITCH - Controls primary power to Navomatic 400.
5. FUNCTION SWITCH - Selects mode of operation. In HDG position, heading hold circuits are engaged. In OMNI INTERCEPT position, omni coupler is engaged. In TRK position, omni coupler is engaged, but turn rate is limited to that appropriate to two dots course deviation.
6. ALT ON-OFF - When at ALT ON, with PITCH control in detent, maintains the selected altitude. Movement of the PITCH control from the level flight detent disengages the altitude hold circuit.
7. LATERAL TRIM - Used when PULL-TURN control knob is pulled out and in detent to trim aircraft for wing level attitude.
8. AIRCRAFT TRIM LIGHTS - These lights illuminate as the pitch actuator corrects toward the selected attitude or when the aircraft is out of trim to a degree that the pitch actuator is not able to correct to the attitude selected by the PITCH control. When the upper light is illuminated, the aircraft elevator trim wheel should be rotated forward for more nose down trim. When the lower light is illuminated, a need for additional nose up trim is indicated.
9. HEADING KNOB - Sets Heading Index (10) to desired magnetic heading or omni bearing.
10. HEADING INDEX.
11. REVERSE SENSE (REV SNS) LOC 1 or LOC 2 SELECTOR SWITCH - Reverses normal localizer needle indication on a course deviation indicator (CDI). BC light on CDI will illuminate to alert the pilot that CDI needle is reversed on selected receiver.
12. AUTOPILOT (A/P) NAV 1 or NAV 2 SELECTOR SWITCH - Selects the desired navigation receiver.

Figure 1. Cessna 400 Autopilot (Type AF-420A) (Sheet 2 of 2)

SECTION 3

EMERGENCY PROCEDURES

IN CASE OF AUTOPILOT MALFUNCTION:

- (1) Airplane Control Wheel -- OPERATE as required to manually override the autopilot.

NOTE

The servos may be manually overpowered at any time without damage. However, this practice should be kept to a minimum since slip-clutch wear will result from extended periods of manual overpower.

- (2) Autopilot ON-OFF Switch -- OFF.

NOTE

If electrical malfunction persists, turn aircraft master switch OFF.

SECTION 4

NORMAL PROCEDURES

BEFORE TAKE-OFF AND LANDING:

- (1) Autopilot ON-OFF Switch -- OFF.

IN-FLIGHT WINGS LEVELING:

- (1) Airplane Elevator and Rudder Trim -- ADJUST.
- (2) PULL-TURN Knob -- PULL out and center in detent.
- (3) PITCH Control -- ADJUST to centered position.
- (4) PITCH TRIM Lever -- ADJUST to centered position.
- (5) ON-OFF Switch -- ON.
- (6) A/P NAV 1/NAV 2 Selector Switch (On Audio Control Panel) -- SELECT desired Nav receiver.
- (7) Lateral Trim Lever -- ADJUST to level wings.
- (8) PITCH TRIM Lever -- ADJUST for longitudinal trim.

ALTITUDE HOLD:

- (1) PITCH control -- DETENT position.
- (2) OFF-ALT ON Switch -- ALT ON.

COMMAND TURNS:

- (1) PULL TURN Knob -- PULL and ROTATE.

CLIMB OR DESCENT:

- (1) Aircraft Power and Trim -- ADJUST.
- (2) PITCH Control Wheel -- Rotate UP or DOWN.
- (3) Lateral Trim Lever -- ADJUST to level wings.
- (4) PITCH Trim Lever -- ADJUST if aircraft trim light is illuminated.

NOTE

If trim light remains illuminated readjust the aircraft elevator trim wheel.

HEADING SELECT:

- (1) PUSH Knob on DG -- SET to aircraft magnetic heading.
- (2) HDG Knob on DG or HSI -- ROTATE bug to desired heading.
- (3) Function Switch -- SET to HDG.
- (4) PULL-TURN Knob -- PUSH.

NOTE

Airplane will turn automatically to selected heading.

OMNI COUPLING:

- (1) PULL-TURN Knob -- PULL out.
- (2) A/P NAV 1/NAV 2 Selector Switch (On Audio Control Panel) -- SELECT desired Nav receiver.
- (3) Nav Indicator OBS or CRS on HSI -- SET VOR course.
- (4) HDG Knob on DG or HSI -- ROTATE bug to agree with OBS on CDI or CRS on HSI.
- (5) Function Switch -- SET to OMNI INTERCEPT.
- (6) PULL-TURN Knob -- PUSH.

NOTE

Airplane will automatically intercept at 45° and then track the selected omni course.

- (7) Function Switch -- SET to TRK for VOR station passage and smoother tracking of omni radials.

SECTION 5 PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed.