1.6.2005

Flughandbuch
C172
Cessna FR172G

OE-DLP

Dieses Exemplar ist eine aktuelle Kopie des Original-Flughandbuches, Stand 1.6.2005.

Inhalt:

- Wägebericht
- Working Tables für TKOF und LDG Performance, Weight & Balance
- Cessna „Owners Manual“
- Gültige “Supplements”
- Ausrüstungsliste

ISAR Aviation Aircraft Sales & Service GmbH
Flugplatz Ellermühle, 84034 Landshut, LBA Nr. II-A285

Wägebericht	OE-DLP	Datum: 20.04.2005
Muster: Cessna FR172G	Werknummer: FR172-0179	

Daten nach Kennblatt und Ausrüstungsverzeichnis vom: 19.04.2005

Bezugspunkt BP: BE

Bezugsebene BE: Vorderkante Brandspant

Bezugslinie horiz. BL: Oberkante Türrahmen waagerecht

Wägung und Leermassen-Schwerpunktslage:

Auflage	Brutto (Kg)	Tara (kg)	Netto (kg)	Hebelarm (cm)	Moment (m/kg)
Links	294,00			1,45	426,30
Rechts	301,00			1,45	436,45
Vorn/Hinten	261,00			-0,19	-49,59
	856,00	Summe A			813,16

Korrekturen: Kraftstoff im Flugzeug während der Wägung abzüglich nicht ausfliegbaren Kraftstoff

Haupttanks:	174,00		125,28	1,22	152,84
Zusatztank 1					
Zusatztank 2					
Zusatztank 3					
Zusatztank 4					
		Summe B	125,28		152,84
	Wägung	Summe A	856,00		813,16
	Abzüge	Summe B	125,28		152,84
		Leergewicht	730,72		660,32

Leergewicht: 730,72 Kg	Leergewichtsmoment: 660,32 m/Kg

Prüfer:

LBA Luftfahrt-Bundesamt D-377 Certifying Staff

Avionik Plus
Flugzeug Service GmbH
Flugplatz Ellermühle
84034 Landshut
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1.6.2005

C172
Cessna FR172G

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Working Tables:

Take-off Performance (metric)
Landing Performance (metric)

Weight and Balance

3. Flugleistungen

Die hier angegebenen Leistungswerte sind dem Owner's Manual für Cessna FR172G (1970) entnommen. Sie wurden bei gutem Zustand von Flugzeug und Motor, sowie mit durchschnittlicher Flugtechnik erflogen.

3.1 Start: (Landeklappen 10° ausfahren, harte Startbahn)

Flug-Gewicht kp	IAS in 15 m Höhe mph	Gegen-wind Knoten	Seehöhe u. 15°C. Roll-strecke m	Seehöhe u. 15°C. Strecke über 15 m Hind. m	2500 ft u. 10°C. Roll-strecke m	2500 ft u. 10°C. Strecke über 15 m Hind. m	5000 ft u. 5°C. Roll-strecke m	5000 ft u. 5°C. Strecke über 15 m Hind. m	7500 ft u. 0°C. Roll-strecke m	7500 ft u. 0°C. Strecke über 15 m Hind. m
1157	71	0	226	375	268	439	325	526	393	639
		10	158	282	192	335	235	405	288	497
		20	102	201	126	242	158	297	200	370
998	66	0	160	281	191	326	230	383	278	456
		10	110	209	133	244	162	290	198	348
		20	69	145	84	174	106	207	131	252
862	61	0	116	219	137	247	165	287	198	337
		10	76	157	93	181	113	213	137	252
		20	46	107	56	125	70	148	87	178

Achtung: 1. Die Strecken sind für je 14° C. über Standard-Temperatur bei der bestimmten Höhe um 10% zu vergrößern.

2. Für Starte von trockener Grasbahn sind den Werten der Spalten "Rollstrecke" und "Strecke über 15 m Hindernis" 7% des in der Spalte "Strecke über 15 m Hindernis" genannten Wertes hinzuzurechnen.

3. Bei nasser Grasbahn können sich die Werte um mehr als 20% der "Strecke über 15 m Hindernis" erhöhen.

3.3 Landestrecken über ein 15-m-Hindernis

Motor im Leerlauf, Landeklappen 40°, Windstille, feste Landebahn.

Flug-Gewicht	Anflug-geschw.	Seehöhe u. 15°C.		2500 ft u. 10°C.		5000 ft u. 5°C.		7500 ft u. 0°C.	
		Boden-roll-strecke	Gesamt über 15 m Hind.	Boden-roll-strecke	Gesamt über 15 m Hind.	Boden-roll-strecke	Gesamt über 15 m Hind.	Boden-roll-strecke	Gesamt über 15 m Hind.
kp	IAS-mph	m	m	m	m	m	m	m	m
1157	75	189	387	201	411	212	434	224	460

Achtung: 1. Für je 5 Knoten Gegenwind sind von den genannten Strecken 10% abzuziehen.

2. Für Landungen auf trockener Grasbahn sind den Werten der Spalten "Bodenrollstrecke" und "Gesamt über 15 m Hindernis" 20% des Wertes der Spalte "Gesamt über 15 m Hindernis" hinzuzurechnen.

4.2 Schwerpunktlagen im Fluge:

Achtung: Der Pilot hat sich vor jedem Flug zu vergewissern, daß das Flugzeug richtig beladen ist. Das Leergewicht und das Leergewichtsmoment sind dem jeweils letzten Wägebericht zu entnehmen.

4.3 Zuladung, Gewicht, Hebelarm hinter Bezugsebene, Moment:

Pilot u. Fluggast vorn Hebelarm: 92 cm	
Gewicht kp	Moment cmkp
50	4600
60	5520
70	6440
80	7360
90	8280
100	9200
110	10120
120	11040
130	11960
140	12880
150	13800
160	14720
170	15640
180	16560
190	17480
200	18400

Fluggastsitze hinten Hebelarm: 178 cm	
Gewicht kp	Moment cmkp
50	8900
60	10680
70	12400
80	14240
90	16020
100	17800
110	19580
120	21360
130	23140
140	24920
150	26700
160	28480
170	30260
180	32040
190	33820
200	35600

Kraftstoff:

Im Flügel: Hebelarm: 122 cm			
Inhalt		Gewicht	Moment
Gal.	l.	kp	cmkp
5	18,9	13,6	1663,6
10	37,8	27,2	3318,4
15	56,7	40,8	4937,6
20	75,7	54,4	6636,8
25	94,5	68,0	8296,0
30	113,5	81,6	9955,2
35	132,3	95,2	11614,4
40	151,4	108,8	13273,6
45	170,1	122,4	14932,8
46	179,0	125,3	15286,6

Gepäckraum:

Höchstzulässige Gepäcklast 91 kp

Hebelarm: 241 cm	
Gewicht kp	Moment cmkp
5	1205
10	2410
15	3615
20	4820
25	6025
30	7230
35	8435
40	9640
45	10845
50	12050
54	13014
60	14460
65	15665
70	16870
75	18075
80	19280
85	20485
90	21690
91	21931

4.4 Zulässiger Schwerpunktbereich

dargestellt durch Fluggewicht und Moment

Mindestmoment ≙ vorderste S-Lage

Max.Moment ≙ hinterste S-Lage

a. Normalflugzeug

Fluggewicht kp	Min.Moment cmkp	Max.Moment cmkp
760	67640	91276
780	69420	93678
800	71200	96080
820	72980	98482
840	74760	100884
860	76540	103286
880	78320	105688
900	80820	108090
920	83628	110492
940	86480	112894
960	89376	115296
980	92316	117698
1000	95300	120100
1020	98328	122502
1040	101400	124904
1060	104516	127306
1080	107676	129708
1100	110880	132110
1120	114128	134512
1140	117420	136914
1157	120444	138956

4.5 Anwendung der Tabellen unter 4.3 und 4.4:

In den Tabellen sind die Gewichte und Momente für die Zuladung und Fluggewichte des Flugzeuges angegeben.

Zur Kontrolle der S-Lage ist wie folgt zu verfahren:

1. Ermittle die Summe der einzelnen Gewichte. Dadurch erhält man das Fluggewicht. (Leergewicht + Pilot + Fluggäste + Gepäck + Kraftstoff).

2. Ermittle die Summe der Einzelmomente der Gewichte. Dadurch erhält man das Fluggewichtsmoment.

3. Kontrolliere in der Tabelle 4.4, ob das unter 2. ermittelte Fluggewichtsmoment zwischen den Minimal- und Maximal-Momenten, welche zu dem unter 1. ermittelten Fluggewicht gehören, liegt.

4.6 Beispiel: Berechnung des Beladezustandes

a. Normalflugzeug:

	Gewicht kp	Moment cmkp
Leergewicht, einschl. Schmierstoff und Restkraftstoff	731	66032
Pilot und Fluggast, vorn	160	14720
Fluggäste hinten	80	14240
Kraftstoff	125	15287
Gepäck	30	7230
	1126	117509

Nach Tabelle 4.4 a. liegt bei einem Fluggewicht von 1120 kp das zulässige Moment zwischen 114128 cmkp und 134512 cmkp. Dieser Beladezustand ist also zulässig.

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1970

WORLD'S LARGEST PRODUCER OF GENERAL AVIATION AIRCRAFT SINCE 1956

REIMS ROCKET

OWNER'S MANUAL

PERFORMANCE - SPECIFICATIONS

	Reims Rocket*
GROSS WEIGHT	2550 lbs
SPEED, BEST POWER MIXTURE:	
Top Speed at Sea Level	153 mph
Cruise, 75% Power at 5500 ft	145 mph
RANGE, NORMAL LEAN MIXTURE:	
Cruise, 75% Power at 5500 ft	580 mi
46 Gallons, No Reserve	4.0 hrs
	144 mph
Cruise, 75% Power at 5500 ft	795 mi
63 Gallons, No Reserve	5.5 hrs
	144 mph
Optimum Range at 10,000 ft	740 mi
46 Gallons, No Reserve	7.0 hrs
	105 mph
Optimum Range at 10,000 ft	1010 mi
63 Gallons, No Reserve	9.6 hrs
	105 mph
RATE OF CLIMB AT SEA LEVEL	880 fpm
SERVICE CEILING	17,000 ft
TAKE-OFF:	
Ground Run	740 ft
Total Distance Over 50-Foot Obstacle	1230 ft
LANDING:	
Ground Roll	620 ft
Total Distance Over 50-Foot Obstacle	1270 ft
STALL SPEED:	
Flaps Up, Power Off	64 mph
Flaps Down, Power Off	53 mph
EMPTY WEIGHT (Approximate)	1410 lbs
USEFUL LOAD	1140 lbs
BAGGAGE	200 lbs
WING LOADING: Pounds/Sq Foot	14.6
POWER LOADING: Pounds/HP	12.1
FUEL CAPACITY: Total	
Standard Tanks	52 gal.
With Optional Auxiliary Tank	69 gal.
OIL CAPACITY	10 qts
PROPELLER: Constant Speed (Diameter)	76 inches
ENGINE:	
Continental Fuel Injection Engine	IO-360-D
210 rated HP at 2800 RPM	

NOTE: Speed performance data is shown for an airplane equipped with optional speed fairings, which increase the speed by one mph.

*This manual covers operation of the Reims Rocket which is certificated as Model FR172G under French Type Certificate No. 43, and FAA Type Certificate No. A18EU. The Reims Rocket is manufactured by Reims Aviation S.A., Reims (Marne) France.

D744-13–RAND–250–8/69

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 Owner's Manual has been prepared as a guide to help you get the most pleasure and utility from your Reims Rocket. 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.

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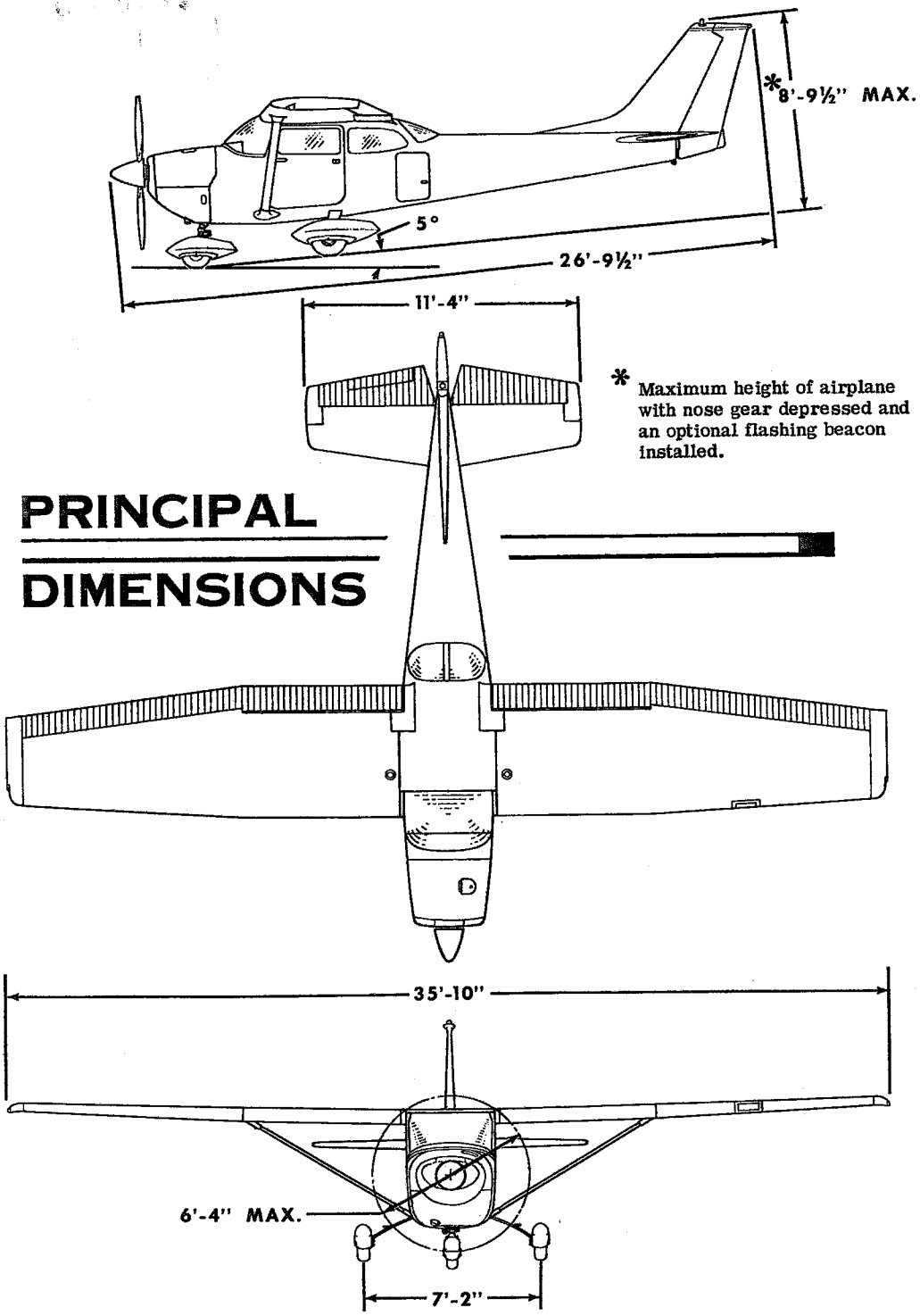
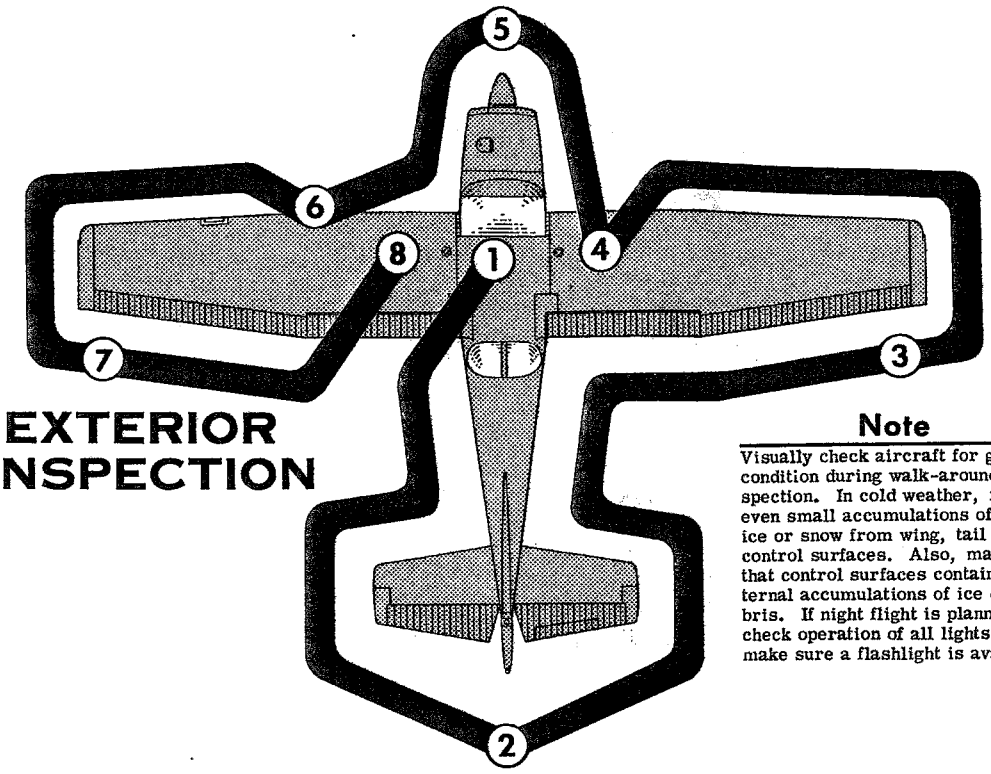
PRINCIPAL DIMENSIONS



* Maximum height of airplane with nose gear depressed and an optional flashing beacon installed.

TABLE OF CONTENTS



EXTERIOR INSPECTION

Note

Visually check aircraft 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 night flight is planned, check operation of all lights, and make sure a flashlight is available.

1
- a. Remove control wheel lock.
- b. Check ignition switch "OFF."
- c. Turn on master switch and check fuel quantity indicators, then turn master switch "OFF."
- d. Check fuel selector valve handle on "BOTH."
- e. Check fuel shutoff valve knob "ON" (full in).
- f. Check baggage door for security.

2
- a. Inspect flight instrument static source opening on side of fuselage for stoppage (both sides).
- b. Remove rudder gust lock, if installed.
- c. Disconnect tail tie-down.
- d. Check control surfaces for freedom of movement and security.

3
- a. Check aileron for freedom of movement and security.

4
- a. Disconnect wing tie-down.
- b. Before first flight of day and after each refueling, use sampler cup and drain small amount of fuel from quick-drain valve in fuel tank sump to check for water.
- c. Check main wheel tire for proper inflation.
- d. Visually check fuel quantity, then check fuel filler cap secure.

5
- a. Check propeller and spinner for nicks and security, and propeller for oil leaks.
- b. Check nose wheel strut and tire for proper inflation.
- c. Disconnect tie-down rope.
- d. Check oil level. Do not operate with less than seven quarts. Fill to ten quarts for extended flight.
- e. Before first flight of 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 reservoir drain valve should be drained and the fuel selector valve drain plug should be removed to check for the presence of water.

6
- a. Remove pitot tube cover, if installed, and check pitot tube opening for stoppage.
- b. Check fuel tank vent opening for stoppage.
- c. Check stall warning vent opening for stoppage.

7 Same as **3**

8 Same as **4**

Figure 1-1.

Section I

OPERATING CHECK LIST

One of the first steps in obtaining the utmost performance, service, and flying enjoyment from your Cessna is to familiarize yourself with your airplane's equipment, systems, and controls. This can best be done by reviewing this equipment while sitting in the airplane. Those items whose function and operation are not obvious are covered in Section II.

Section I lists, in Pilot's Check List form, the steps necessary to operate your airplane efficiently and safely. It is not a check list in its true form as it is considerably longer, but it does cover briefly all of the points that you should know for a typical flight.

The flight and operational characteristics of your airplane are normal in all respects. There are no "unconventional" characteristics or operations that need to be mastered. All controls respond in the normal way within the entire range of operation. All airspeeds mentioned in Sections I, II and III are indicated airspeeds. Corresponding calibrated airspeeds may be obtained from the Airspeed Correction Table in Section VI.

BEFORE ENTERING THE AIRPLANE.

(1) Make an exterior inspection in accordance with figure 1-1.

BEFORE STARTING THE ENGINE.

(1) Seats and Seat Belts -- Adjust and lock.
(2) Brakes -- Test and set.
(3) Radios and Electrical Equipment -- "OFF."
(4) Fuel Selector Valve Handle -- "BOTH."
(5) Fuel Shutoff Valve Knob -- "ON" (knob pushed full in).

STARTING THE ENGINE.

(1) Master Switch -- "ON."
(2) Mixture -- Rich.
(3) Propeller -- High RPM.
(4) Throttle -- Cracked (one inch).
(5) Auxiliary Fuel Pump Switch -- On "LOW."
(6) Ignition Switch -- "START" (when fuel flow is steady at 2 to 4 gal/hr). Hold until engine starts but no longer than 30 seconds.
(7) Auxiliary Fuel Pump Switch -- "OFF" (after engine runs smoothly).

NOTE

The engine should start in two to three revolutions. If it does not, increase the fuel flow by turning the auxiliary fuel pump switch momentarily on "HI" and crank for two to four additional revolutions. If it still does not start, turn the auxiliary fuel pump off, set the mixture to idle cut-off, and crank until the engine fires or for approximately 15 seconds. If still unsuccessful, start again using the normal starting procedure after allowing the starter motor to cool.

(8) Oil Pressure Gage -- Check in green arc range within 30 seconds.

BEFORE TAKE-OFF.

(1) Parking Brake -- Set.
(2) Flight Controls -- Check for free and correct movement.
(3) Fuel Selector Valve Handle -- "BOTH."
(4) Elevator Trim -- "TAKE-OFF" setting.
(5) Throttle Setting -- 1800 RPM.
(6) Engine Instruments and Ammeter -- Check.
(7) Suction Gage -- Check (4.6 to 5.4 inches of mercury).
(8) Magnetos -- Check (50 RPM maximum differential between magnetos).
(9) Propeller -- Cycle from high to low RPM; return to high RPM (full in).
(10) Flight Instruments and Radios -- Set.
(11) Optional Wing Leveler -- Off.
(12) Cabin Doors and Window -- Closed and locked.

TAKE-OFF.

NORMAL TAKE-OFF.

(1) Wing Flaps -- 0° to 10°.
(2) Power -- Full throttle and 2800 RPM.
(3) Mixture -- Lean for field elevation per fuel flow indicator placard.
(4) Elevator Control -- Lift nose wheel at 60 MPH.
(5) Climb Speed -- 85 to 95 MPH.
(6) Wing Flaps -- Retract (if extended).

MAXIMUM PERFORMANCE TAKE-OFF.

(1) Wing Flaps 10°.
(2) Brakes -- Apply.
(3) Power -- Full throttle and 2800 RPM.
(4) Mixture -- Lean for field elevation per fuel flow indicator placard.
(5) Brakes -- Release.
(6) Airplane Attitude -- Slightly tail low.
(7) Climb Speed -- 70 MPH until all obstacles are cleared, then set up climb speed as shown in "MAXIMUM PERFORMANCE CLIMB" check list.
(8) Wing Flaps -- Retract after obstacles are cleared.

CLIMB.

NORMAL CLIMB.

(1) Airspeed -- 100 to 110 MPH.
(2) Power -- 25 inches and 2600 RPM.
(3) Mixture -- Lean to 13 gal/hr.

MAXIMUM PERFORMANCE CLIMB.

(1) Airspeed -- 95 MPH at sea level to 87 MPH at 10,000 feet.
(2) Power -- Full throttle and 2800 RPM.
(3) Mixture -- Lean for altitude per fuel flow indicator placard.

CRUISING.

(1) Power -- 15 to 25 inches manifold pressure and 2200 to 2600 RPM. Select combination to give no more than 75% power.

(2) Trim Tab -- Adjust.
(3) Mixture -- Lean for cruise fuel flow as shown in OPERATIONAL DATA, Section VI.

LET-DOWN.

(1) Power -- As desired.
(2) Mixture -- Adjust for smooth operation.

BEFORE LANDING.

(1) Mixture -- Rich (or adjust for altitude).
(2) Fuel Selector Valve Handle -- "BOTH."
(3) Propeller -- High RPM.
(4) Airspeed -- 75 to 85 MPH (flaps up).
(5) Wing Flaps -- As desired.
(6) Airspeed -- 70 to 80 MPH (flaps down).

NORMAL LANDING.

(1) Touchdown -- Main wheels first.
(2) Landing Roll -- Lower nose wheel gently.
(3) Braking -- Minimum required.

AFTER LANDING.

(1) Wing Flaps -- Retract.

SECURING THE AIRCRAFT.

(1) Parking Brake -- Set.
(2) Radios and Electrical Equipment -- "OFF."
(3) Mixture -- Idle cut-off (pulled full out).
(4) Ignition and Master Switch -- "OFF."
(5) Control Lock -- Installed.

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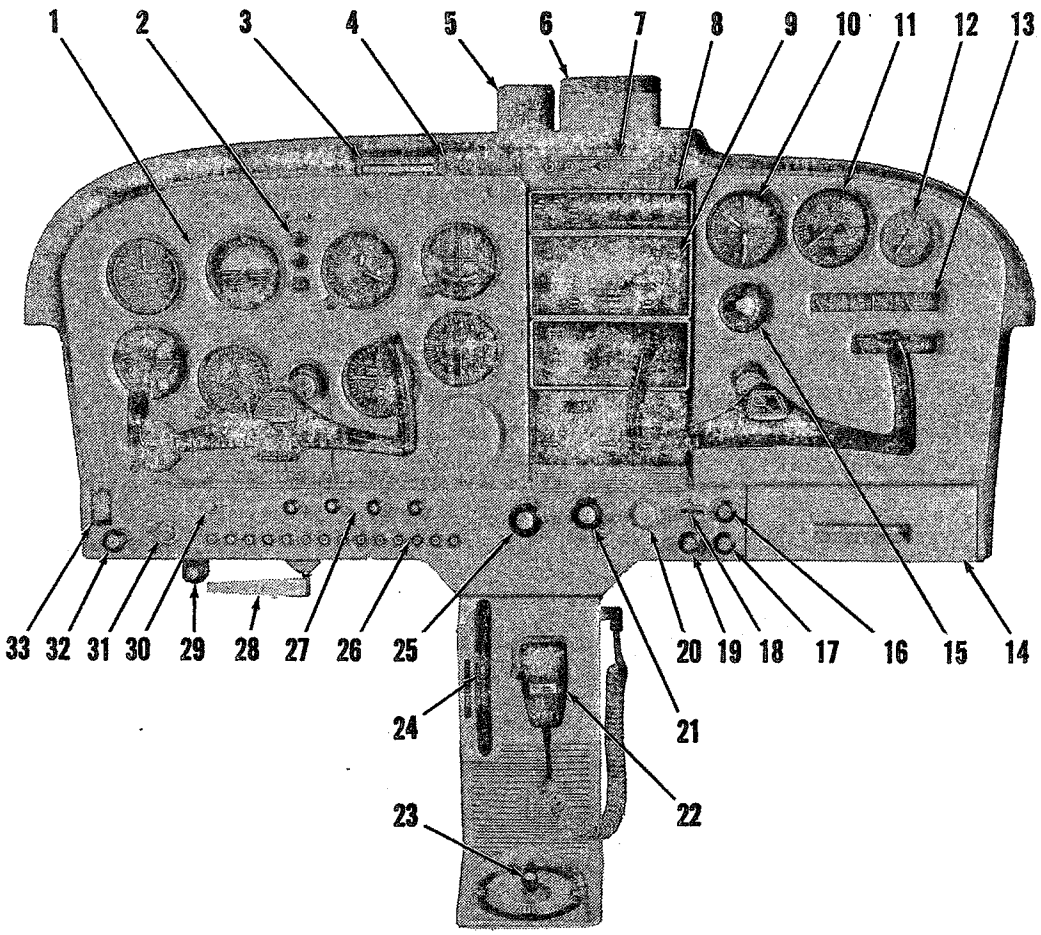
INSTRUMENT PANEL



1. Flight Instrument Group
2. Marker Beacon Indicator Lights and Switches (Opt.)
3. Compass Correction Card
4. Aircraft Registration Number
5. Magnetic Compass
6. Rear View Mirror
7. Radio Selector Switches (Opt.)
8. Transponder (Opt.)
9. Radios (Opt.)
10. Manifold Pressure/Fuel Flow Indicator
11. Tachometer
12. Suction Gage (Opt.)
13. Ammeter, Fuel and Oil Gages
14. Map Compartment
15. Flap Position Indicator
16. Cigar Lighter
17. Cabin Air Control Knob
18. Wing Flap Switch
19. Cabin Heat Control Knob
20. Mixture Control Knob
21. Propeller Control Knob
22. Microphone (Opt.)
23. Fuel Selector Valve Handle
24. Elevator Trim Control Wheel
25. Throttle
26. Circuit Breakers
27. Electrical Switches
28. Parking Brake Handle
29. Fuel Shutoff Valve Knob
30. Auxiliary Fuel Pump Switch
31. Ignition/Starter Switch
32. Primer
33. Master Switch

Figure 2-1.

Section II

DESCRIPTION AND OPERATING DETAILS

The following paragraphs describe the systems and equipment whose function and operation is not obvious when sitting in the airplane. This section also covers in somewhat greater detail some of the items listed in Check List form in Section I that require further explanation.

FUEL SYSTEM.

Fuel is supplied to the engine from two tanks, one in each wing. The total usable fuel, for all flight conditions, is 46 gallons.

Fuel from each tank flows by gravity to a three-position fuel selector valve labeled "LEFT, BOTH and RIGHT." Depending upon the setting of the selector valve, fuel from the left tank, both tanks or right tank flows to a fuel reservoir tank and a manually-operated fuel shutoff valve. A push-pull knob labeled "FUEL, PUSH ON" operates the shutoff valve and controls fuel flow which is then routed through a fuel strainer and by-pass in the electric auxiliary fuel pump (when it is not operating) to the engine-

FUEL QUANTITY DATA
(U.S. GALLONS)

TANK	NO.	USABLE FUEL ALL FLIGHT CONDITIONS	ADDITIONAL USABLE FUEL (LEVEL FLIGHT)	UNUSABLE FUEL (LEVEL FLIGHT)	TOTAL FUEL VOLUME EACH
LEFT WING	1	23 gal.	2.5 gal.	0.5 gal.	26.0 gal.
RIGHT WING	1	23 gal.	2.5 gal.	0.5 gal.	26.0 gal.

Figure 2-2.

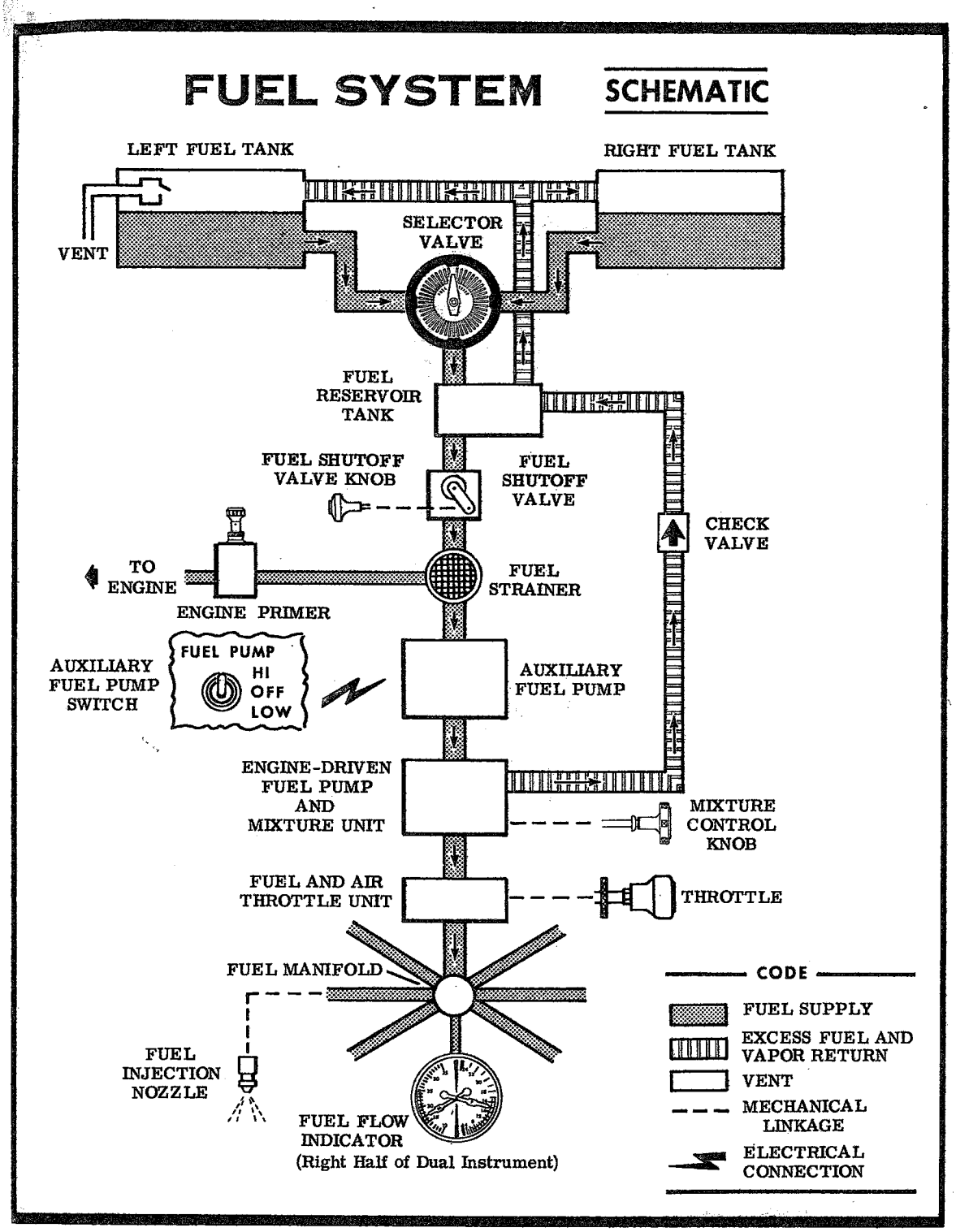

FUEL SYSTEM
SCHEMATIC
LEFT FUEL TANK
RIGHT FUEL TANK
VENT
SELECTOR VALVE
FUEL RESERVOIR TANK
FUEL SHUTOFF VALVE KNOB
FUEL SHUTOFF VALVE
CHECK VALVE
TO ENGINE
ENGINE PRIMER
FUEL STRAINER
AUXILIARY FUEL PUMP SWITCH
FUEL PUMP
HI
OFF
LOW
AUXILIARY FUEL PUMP
ENGINE-DRIVEN FUEL PUMP AND MIXTURE UNIT
MIXTURE CONTROL KNOB
FUEL AND AIR THROTTLE UNIT
THROTTLE
FUEL MANIFOLD
FUEL INJECTION NOZZLE
FUEL FLOW INDICATOR
(Right Half of Dual Instrument)
CODE
FUEL SUPPLY
EXCESS FUEL AND VAPOR RETURN
VENT
MECHANICAL LINKAGE
ELECTRICAL CONNECTION

Figure 2-3.

driven fuel pump and mixture unit. From here, fuel is distributed to the engine cylinders via a fuel and air throttle unit and fuel distribution manifold.

Vapor and excess fuel from the engine-driven fuel pump and mixture unit are returned to the main fuel tanks by way of the fuel reservoir tank.

Refer to figure 2-2 for fuel quantity data. For fuel system servicing information, refer to Lubrication and Servicing Procedures in Section V.

AUXILIARY FUEL PUMP SWITCH.

The down position of the auxiliary fuel pump switch, labeled "LOW," operates the pump at low speed. With the switch in this position, the pump supplies sufficient fuel for priming and starting the engine.

The up position of the switch, labeled "HI," is used for engine operation if the engine-driven pump should fail, or for vapor purging in extremely hot weather. When the switch is in this position, the pump operates at one of two flow rates depending upon the setting of the throttle. With the throttle at a cruise setting, the pump is operating at maximum capacity, supplying sufficient fuel flow to maintain flight. When the throttle is moved toward the closed position, the auxiliary fuel pump flow rate is automatically reduced, preventing an excessively rich mixture during periods of reduced engine speed.

The auxiliary fuel pump is not to be used while the engine is running during normal operation, because, with the engine-driven pump functioning, a fuel/air ratio considerably richer than best power is produced. However, for vapor elimination, the fuel pump may be used with the engine running and the switch in the "HI" position. The mixture must then be leaned as required to prevent an excessively rich mixture.

To ensure a prompt engine restart in flight after running a fuel tank dry, switch to the tank containing fuel and place the auxiliary fuel pump switch in the "HI" position momentarily (3 to 5 seconds) with the throttle at least 1/2 open.

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 "HI" 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.

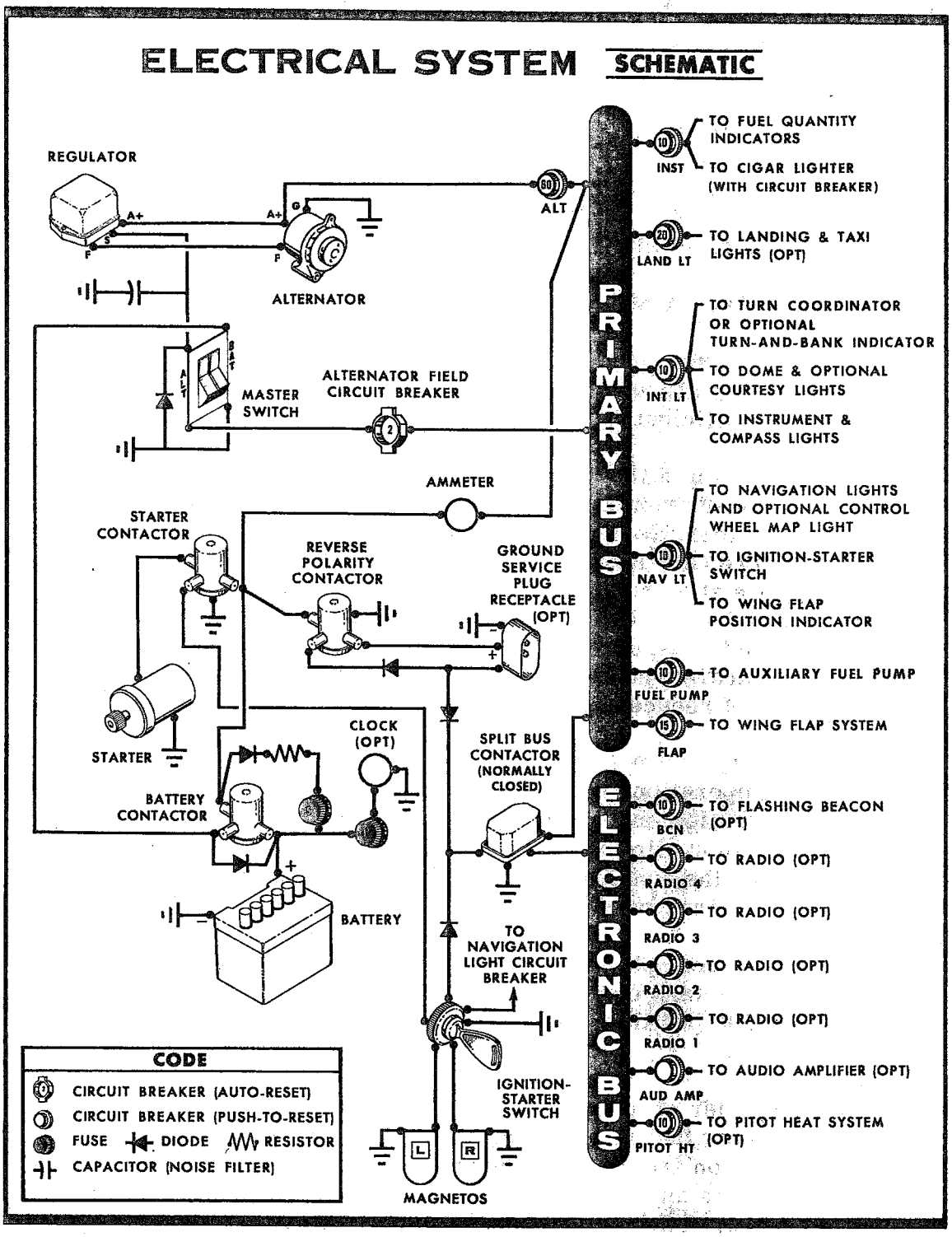

ELECTRICAL SYSTEM SCHEMATIC
REGULATOR
A+
S
F
A+
G
F
ALTERNATOR
ALT
MASTER SWITCH
ALTERNATOR FIELD CIRCUIT BREAKER
AMMETER
STARTER CONTACTOR
REVERSE POLARITY CONTACTOR
GROUND SERVICE PLUG RECEPTACLE (OPT)
STARTER
CLOCK (OPT)
SPLIT BUS CONTACTOR (NORMALLY CLOSED)
BATTERY CONTACTOR
BATTERY
TO NAVIGATION LIGHT CIRCUIT BREAKER
IGNITION-STARTER SWITCH
MAGNETOS
L
R
PRIMARY BUS
ELECTRONIC BUS
INST
TO FUEL QUANTITY INDICATORS
TO CIGAR LIGHTER (WITH CIRCUIT BREAKER)
LAND LT
TO LANDING & TAXI LIGHTS (OPT)
INT LT
TO TURN COORDINATOR OR OPTIONAL TURN-AND-BANK INDICATOR
TO DOME & OPTIONAL COURTESY LIGHTS
TO INSTRUMENT & COMPASS LIGHTS
NAV LT
TO NAVIGATION LIGHTS AND OPTIONAL CONTROL WHEEL MAP LIGHT
TO IGNITION-STARTER SWITCH
TO WING FLAP POSITION INDICATOR
FUEL PUMP
TO AUXILIARY FUEL PUMP
FLAP
TO WING FLAP SYSTEM
BCN
TO FLASHING BEACON (OPT)
RADIO 4
TO RADIO (OPT)
RADIO 3
TO RADIO (OPT)
RADIO 2
TO RADIO (OPT)
RADIO 1
TO RADIO (OPT)
AUD AMP
TO AUDIO AMPLIFIER (OPT)
PITOT HT
TO PITOT HEAT SYSTEM (OPT)
CODE
CIRCUIT BREAKER (AUTO-RESET)
CIRCUIT BREAKER (PUSH-TO-RESET)
FUSE
DIODE
RESISTOR
CAPACITOR (NOISE FILTER)

Figure 2-4.

ELECTRICAL SYSTEM.

Electrical energy is supplied by a 14-volt, direct-current system powered by an engine-driven alternator (see figure 2-4). The 12-volt battery is located aft of the rear baggage compartment wall. Power 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, and all non-essential electrical equipment should be turned off for the remainder of the flight.

AMMETER.

The ammeter indicates the flow of current, in amperes, from the alternator to the battery or from the battery to the aircraft electrical system. When the engine is operating and the master switch is "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 discharge rate of the battery.

CIRCUIT BREAKERS AND FUSES.

The majority of electrical circuits in the airplane are protected by "push-to-reset" circuit breakers mounted on the instrument panel. Exceptions to this are the battery contactor closing (external power) circuit and the optional clock circuit which have fuses mounted adjacent to the

battery. Also, the cigar lighter is protected by a manually reset type circuit breaker mounted directly on the back of the lighter behind the instrument panel. The alternator field and wiring is protected by an automatically resetting circuit breaker.

LANDING LIGHTS (OPT).

A three-position, push-pull switch controls the optional landing lights. To turn one lamp on for taxiing, pull the switch out to the first stop. To turn both lamps on for landing, pull the switch out to the second stop. To turn both lamps off, push the switch full in.

FLASHING BEACON (OPT).

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.

CONTROL WHEEL MAP LIGHT (OPT).

A map light may be mounted on the bottom of the pilot's control wheel. The light illuminates the lower portion of the cabin just forward of the pilot and is helpful when checking maps and other flight data during night operations. To operate the light, first turn the "NAV LIGHTS" switch on, then adjust the map light's intensity with the knurled rheostat knob located at the bottom of the control wheel.

CABIN HEATING, VENTILATING AND DEFROSTING SYSTEM.

For cabin ventilation, pull the "CABIN AIR" knob out. To raise the air temperature, pull the "CABIN HT" knob out approximately 1/4" to 1/2" for a small amount of cabin heat. Additional heat is available by pulling the knob out farther; maximum heat is available with the "CABIN HT" knob pulled full out and the "CABIN AIR" knob pushed full in. When no heat is desired in the cabin, the "CABIN HT" knob is pushed full in.

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 two ducts from the manifold, one

extending down each side of the cabin to an outlet at the front door post at floor level. Windshield defrost air is supplied by two ducts leading from the cabin manifold to outlets below the windshield.

Separate adjustable ventilators supply additional air; one near each upper corner of the windshield supplies air for the pilot and copilot, and two optional ventilators in the rear cabin ceiling supply air to the rear seat passengers.

STARTING ENGINE.

The continuous-flow fuel injection system will start spraying fuel in the intake ports as soon as the throttle and mixture controls are opened and the auxiliary pump is turned on. If the auxiliary pump is turned on accidentally while the engine is stopped, with the throttle open and the mixture rich, solid fuel will collect temporarily in the cylinder intake ports, the quantity depending on the amount of throttle opening and the length of time the pump has been operating. If this happens, it is advisable to wait a few minutes until this fuel drains away before starting the engine. To avoid flooding, be sure you are ready to crank the engine as soon as a steady fuel flow of 2 to 4 gal/hr is obtained.

Engine mis-starts characterized by weak, intermittent firing followed by puffs of black smoke from the exhaust are caused by overpriming or flooding. This situation is more apt to develop in hot weather, or when the engine is hot. If it occurs, repeat the starting routine with the throttle approximately 1/2 open, the mixture in idle cut-off and the auxiliary fuel pump off. As the engine fires, move the mixture control to full rich and decrease the throttle to idle.

Engine mis-starts characterized by sufficient power to take the engine away from the starter but dying in 3 to 5 revolutions are the result of an excessively lean mixture after the start and can occur in warm or cold temperatures. Repeat the starting procedure but allow additional priming time with the auxiliary fuel pump switch on "LOW" before cranking is started, or place the auxiliary fuel pump switch on "HI" immediately for a richer mixture while cranking.

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

TAXIING.

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (see taxiing diagram, figure 2-5) to maintain directional control and balance in strong, gusty winds.

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips and the leading edges of the horizontal stabilizer.

BEFORE TAKE-OFF.

WARM-UP.

Since the engine is closely cowled for efficient in-flight engine cooling, precautions should be taken to avoid overheating during prolonged engine operation on the ground.

MAGNETO CHECK.

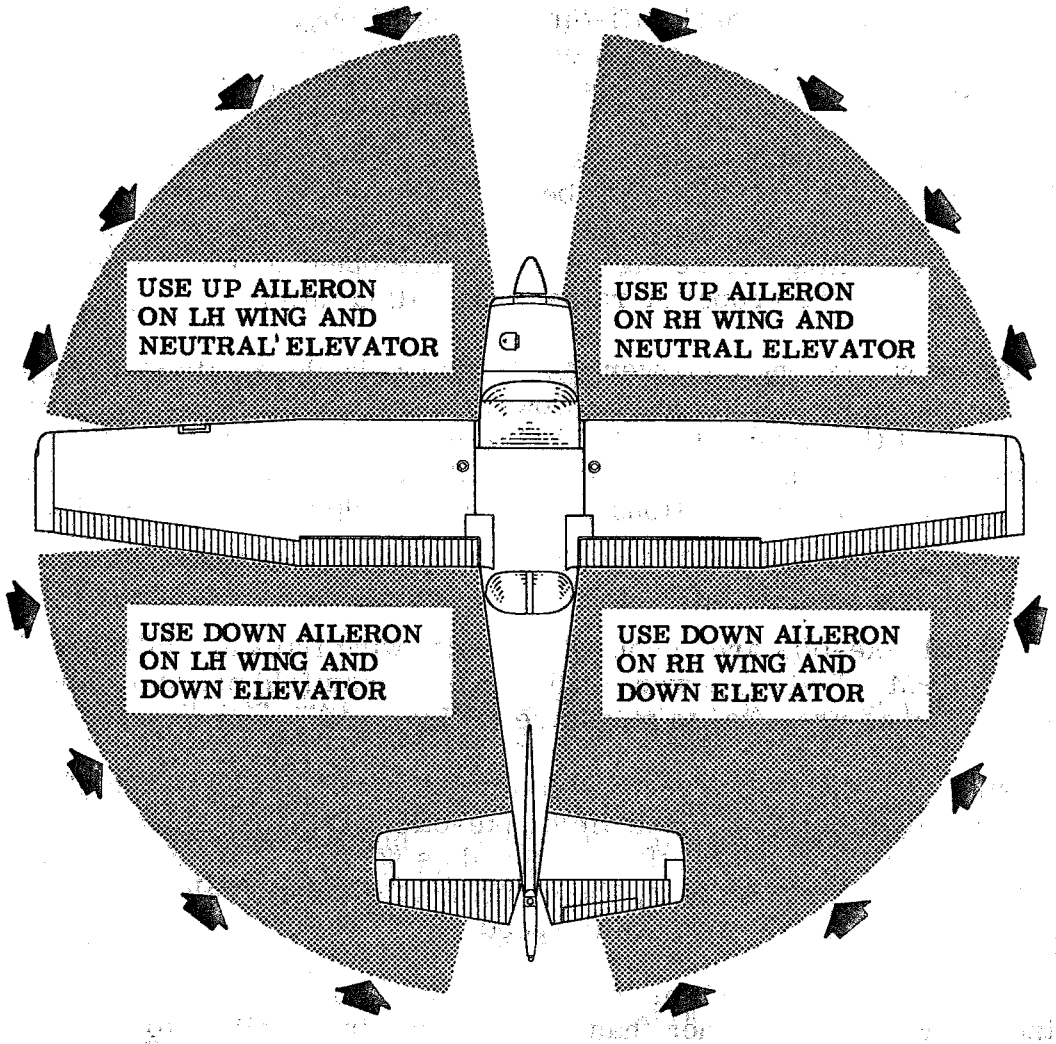
The magneto check should be made at 1800 RPM as follows: Move ignition switch first to "R" position, and note RPM. Next move switch back to "BOTH" to clear the other set of plugs. Then move switch to the "L" position and note RPM. The difference between the two magnetos operated individually should not be more than 50 RPM. 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 optional landing light (if so equipped), or by operating the wing flaps during the engine runup (1800 RPM). The ammeter will remain within a needle width of zero if the alternator and voltage regulator are operating properly.

TAXIING DIAGRAM



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 2-5.

TAKE-OFF.

POWER CHECK.

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

Full-throttle runups over loose gravel are especially harmful to propeller tips. When take-offs 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.

For maximum engine power, the mixture should be adjusted during the initial take-off roll to the fuel flow corresponding to field elevation. (Refer to fuel flow placard located below 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.

Normal take-offs are accomplished with wing flaps up, full throttle, and 2800 RPM. Reduce power to 25 inches of manifold pressure and 2600 RPM as soon as practical to minimize engine wear.

Using 10° wing flaps reduces the total distance over an obstacle by approximately 5 per cent. Soft field take-offs can be performed with 20° flaps by lifting the airplane off the ground as soon as practical in a slightly tail-low attitude. However, the airplane should be leveled off immediately to accelerate to a safe climb speed.

If wing flaps are used for take-off, they should be left down until all obstacles are cleared rather than retract them in the climb to the obstacle. To clear an obstacle with wing flaps 10°, the speeds shown in the Take-Off Data chart in Section VI should be used. If no obstructions are ahead, a best "flaps up" rate-of-climb speed (95 MPH) would be most efficient with flaps retracted. Flap deflections of 30° and 40° are not recommended for take-off under any circumstances.

PERFORMANCE CHARTS.

Consult the Take-Off Data chart in Section VI for take-off distances under various gross weight, altitude, and headwind conditions.

CROSSWIND TAKE-OFFS.

Take-offs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length, to minimize the drift angle immediately after take-off. The airplane is accelerated to a speed slightly higher than normal, 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.

CLIMB.

CLIMB DATA.

For detailed data, refer to the Maximum Rate-Of-Climb Data chart in Section VI.

CLIMB SPEEDS.

Normal climbs are performed at 100 to 110 MPH with flaps up, 25 inches of manifold pressure, and 2600 RPM. The mixture should be set at approximately 13 gal/hr.

The best rate-of-climb speeds range from 95 MPH at sea level to 87 MPH at 10, 000 feet using full throttle, 2800 RPM, and mixture leaned in accordance with the fuel flow indicator placard located below the fuel flow indicator. If an obstacle dictates the use of a steep climb angle, an obstacle clearance speed should be used with flaps up, full throttle, and 2800 RPM. This speed is approximately 75 MPH at all altitudes.

NOTE

Steep climbs at low speeds should be of short duration to improve engine cooling.

CRUISE.

Normal cruising is done between 65% and 75% power. The power settings required to obtain these powers at various altitudes and standard outside air temperatures can be determined by using the OPERATIONAL DATA in Section VI.

OPTIMUM CRUISE PERFORMANCE

FULL THROTTLE AND 2600 RPM

ALTITUDE	% POWER	TRUE AIRSPEED	RANGE
5500	75	144	580
7500	70	142	610
9000	65	139	645

NOTE

The Cruise Performance charts in Section VI outline complete cruise figures for the Reims Rocket.

Cruising can be done most efficiently at high altitudes because very nearly the same cruising speed can be maintained at much less power. This is illustrated in the Optimum Cruise Performance table above.

STALLS.

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

Power-off stall speeds at maximum gross weight and aft c.g. position are presented in figure 6-2 as calibrated airspeeds since indicated airspeeds are unreliable near the stall.

LANDING.

Normal landings are made power-off with any flap setting. Slips are prohibited in full flap approaches because of a downward pitch encountered under certain combinations of airspeed and sideslip angle.

SHORT FIELD LANDINGS.

For short field landings, make a power-off approach at approximately 75 MPH with flaps 40°, and land on the main wheels first. Immediately after touchdown, lower the nose gear to the ground 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.

CROSSWIND LANDINGS.

When landing in a strong crosswind, use the minimum flap setting required for the field length. Use a wing-low, crab, or a combination method of drift correction and land in a nearly level attitude. Hold a straight course with the steerable nose wheel and occasional differential braking if necessary.

BALKED LANDING (GO-AROUND).

In a balked landing (go-around) climb, the wing flap setting should be reduced to 20° immediately after full power is applied. Upon reaching a safe airspeed, flaps should be slowly retracted to the full up position.

COLD WEATHER OPERATION.

STARTING.

Prior to starting on a cold morning, it is advisable to pull the propeller through several times by hand to "break loose" or "limber" the oil, thus conserving battery energy. In extremely cold (0°F and lower) weather, the use of an external preheater and an external power source are recommended to reduce wear and abuse to the engine and the electrical system. When using an external power source, the position of the master switch is important. Refer to Section VII, paragraph Ground Service Plug Receptacle, for operating details.

Cold weather starting procedures are as follows:

With Preheat:
(1) Use normal starting procedure.

Without Preheat:
(1) With ignition switch "OFF" and throttle closed, pull the propeller through three to four revolutions by hand.
(2) Clear propeller.
(3) Master Switch -- "ON."
(4) Throttle -- Cracked (one inch).

(5) Primer -- Use two to three strokes in 20°F temperature range, and four to six strokes in 0°F temperature range.

NOTE

Leave primer full and ready for stroke.

(6) Auxiliary Fuel Pump Switch -- On "LOW."
(7) Ignition Switch -- "START."
(8) When the engine fires, use additional strokes of the primer as necessary to keep the engine running.
(9) Auxiliary Fuel Pump Switch -- "OFF" (after engine runs smoothly).
(10) Primer -- Locked.

NOTE

If engine does not start during first few attempts or if engine firing diminishes in strength, it is probable that the spark plugs have been frosted over. In this case, spark plugs should be removed and heated as necessary to remove ice, or preheat should be applied to engine. Either method should ensure a successful re-start.

IMPORTANT

Excessive priming may cause raw fuel to drain on pavement beneath engine cowling, creating a fire hazard. If this occurs, aircraft should be moved away from fuel puddle before attempting start again. An outside attendant with a fire extinguisher is recommended for cold starts without preheat.

During cold weather operations, no indication will be apparent on the oil temperature gage prior to take-off if outside air temperatures are very cold. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), accelerate the engine several times to higher RPM. If the engine accelerates smoothly and oil pressure remains normal and steady, the aircraft is ready for take-off.

Refer to Section VII for cold weather equipment.

HOT WEATHER OPERATION.

Refer to the general warm temperature starting information under Starting Engine in this section. Avoid prolonged engine operation on the ground.

Section III

EMERGENCY PROCEDURES

Emergencies caused by aircraft or engine malfunctions are extremely rare if proper pre-flight 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.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS.

Malfunctions in the electrical power supply system can be detected by periodic monitoring of the ammeter; however, the cause of these malfunctions is usually difficult to determine. Broken or loose alternator wiring is most likely the cause of alternator failures, although other factors could cause the problem. A damaged or improperly adjusted voltage regulator can also cause malfunctions. All electrical 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 periods of engine starting and heavy electrical usage at low engine speeds (such as extended taxiing) the battery conditions 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 remains above this value on a long flight, it is possible that the battery will overheat and evaporate the electrolyte at an excessive rate. In addition, electronic components in the electrical system could be adversely affected by the higher than normal voltage if a faulty voltage regulator setting is causing the overcharging.

To preclude these possibilities, the alternator side of the split master switch should be turned "OFF." The flight should be terminated and/or the current drain on the battery minimized as soon as practical because the battery can supply the electrical system for only a limited period of time. If it becomes apparent that the battery voltage is getting too low to operate the electrical system, the alternator switch can be turned back on for several minutes at a time until the battery is partially recharged. If the emergency occurs at night, the alternator switch should be returned to the "ON" position just before landing lights and flaps will be required for 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 non-essential equipment should be turned "OFF" and the flight terminated as soon as practical.

ROUGH ENGINE OPERATION OR LOSS OF POWER.

SPARK PLUG FOULING.

An 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 "LEFT" or "RIGHT" 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 normal 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 "LEFT" or "RIGHT" 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.

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 cause for immediate concern because an orifice in this line will prevent a sudden loss of oil from the engine sump. However, a landing at the nearest airport is advisable.

If a total loss of oil pressure is accompanied by a sudden rise in oil temperature, there is reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Leave the engine running at low power during the approach, using only the minimum power required to reach the desired touchdown spot.

FORCED LANDINGS.

PRECAUTIONARY LANDING WITH ENGINE POWER.

Before attempting an "off airport" landing, one should drag the landing area at a safe but low altitude to inspect the terrain for obstructions and surface conditions, proceeding as follows:

(1) Perform "before landing" check.
(2) Drag over selected field with flaps 20° and 75 MPH airspeed, noting the preferred area for touchdown for the next landing approach. Then retract flaps after well clear of all obstacles.
(3) On downwind leg, turn off all switches except the ignition and master switches.
(4) Approach with flaps 40° at 75 MPH.
(5) Unlatch cabin doors prior to final approach.
(6) Before touchdown, turn ignition and master switches "OFF."
(7) Land in a slightly tail-low attitude.

EMERGENCY LANDING WITHOUT ENGINE POWER.

If an engine stoppage occurs, establish a flaps up glide at 85 MPH. If time permits, attempt to restart the engine by checking for fuel quantity, proper fuel selector valve position, and mixture control setting. Also check that engine primer is full in and locked and ignition switch is properly positioned.

If all attempts to restart the engine fail, and a forced landing is imminent, select a suitable field and prepare for the landing as follows:

(1) Pull mixture control to idle cut-off position.
(2) Fuel shutoff valve knob -- "OFF" (pulled full out).
(3) Turn all switches "OFF" except master switch.
(4) Airspeed -- 75 to 85 MPH (flaps up).
(5) Extend wing flaps as necessary within gliding distance of field.
(6) Airspeed -- 70 to 80 MPH (flaps down).
(7) Turn master switch "OFF."
(8) Unlatch cabin doors prior to final approach.
(9) Land in a slightly tail-low attitude.
(10) Apply heavy braking while holding full up elevator.

DITCHING.

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

(1) Plan approach into wind if winds are high and seas are heavy. With heavy swells and light wind, land parallel to swells.
(2) Approach with flaps 40° and sufficient power for a 300 ft./min. rate of descent at 70 MPH.
(3) Unlatch the cabin doors.
(4) Maintain a continuous descent until touchdown in level attitude. Avoid a landing flare because of difficulty in judging airplane height over a water surface.
(5) Place folded coat or cushion in front of face at time of touchdown.
(6) Expect a second impact for the airplane may skip after touchdown.
(7) Evacuate airplane through cabin doors. If necessary, open window to flood cabin compartment for equalizing pressure so that door can be opened.
(8) Inflate life vests and raft (if available) after evacuation of cabin. The aircraft can not be depended on for floatation for more than a few minutes.

DISORIENTATION IN CLOUDS.

When flying in marginal weather, the pilot should make sure that the Wing Leveler control knob (if installed) is "ON." However, if the airplane is not equipped with this device or gyro horizon and directional gyro instruments, the pilot will have to rely on the turn coordinator (or turn

and bank indicator) if he inadvertently flies into clouds. The following instructions assume that only one of the latter two instruments is available.

EXECUTING A 180° TURN IN CLOUDS.

Upon 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 the hands off the control wheel and steering only with rudder.

EMERGENCY LET-DOWNS THROUGH CLOUDS.

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) Adjust mixture for smooth operation.
(2) Reduce power to set up a 500 to 800 ft./min. rate of descent.
(3) Adjust the elevator trim tab for a stabilized descent at 90 MPH.
(4) Keep hands off the control wheel.
(5) Monitor turn coordinator and make corrections by rudder alone.
(6) Check trend of compass card movement and make cautious corrections with rudder to stop the turn.
(7) 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 elevator back pressure to slowly reduce the indicated airspeed to 90 MPH.
(4) Adjust the elevator trim control to maintain a 90 MPH glide.
(5) Keep hands off the control wheel, using rudder control to hold a straight heading.
(6) Clear engine occasionally, but avoid using enough power to disturb the trimmed glide.
(7) Upon breaking out of clouds, apply normal cruising power and resume flight.

FIRES.

ENGINE FIRE DURING START ON GROUND.

Improper starting procedures such as pumping the throttle during a difficult cold weather start can cause a backfire which could ignite fuel that has accumulated in the intake ports. In this event, proceed as follows:

(1) Continue cranking in an attempt to get a start which would suck the flames and accumulated fuel into the engine.
(2) If the start is successful, run the engine at 1700 RPM for a few minutes before shutting it down to inspect the damage.
(3) If engine start is unsuccessful, continue cranking for two or three minutes with throttle full open while ground attendants obtain fire extinguishers.
(4) When ready to extinguish fire, release the starter switch and turn off master switch, ignition switch, and pull fuel shutoff valve knob full out.
(5) Smother flames with fire extinguisher, seat cushion, wool blanket, or loose dirt.
(6) Make a thorough inspection of fire damage, and repair or replace damaged components before conducting another flight.

ENGINE FIRE IN FLIGHT.

Although engine fires are extremely rare in flight, the following steps should be taken if one is encountered:

(1) Pull mixture control to idle cut-off.
(2) Pull fuel shutoff valve knob full out.
(3) Turn master switch "OFF."
(4) Establish a 120 MPH glide.
(5) Close cabin heat control.
(6) Select a field suitable for a forced landing.
(7) If fire is not extinguished, increase glide speed in an attempt to find an airspeed that will provide an incombustible mixture.
(8) Execute a forced landing as described in paragraph Emergency Landing Without Engine Power. Do not attempt to restart the engine.

ELECTRICAL FIRE IN FLIGHT.

The initial indication of an electrical fire is the odor of burning insulation. The immediate response should be to turn the master switch "OFF." Then close off ventilating air as much as practicable to reduce the chances of a sustained fire.

If electrical power is indispensable for the flight, an attempt may be made to identify and cut off the defective circuit as follows:

(1) Master Switch -- "OFF."
(2) All other switches (except ignition switch) -- "OFF."
(3) Check condition of circuit breakers to identify faulty circuit if possible. Leave faulty circuit deactivated.
(4) Master Switch -- "ON."
(5) Select switches "ON" successively, permitting a short time delay to elapse after each switch is turned on until the short circuit is localized.
(6) Make sure fire is completely extinguished before opening ventilators.

FLIGHT IN ICING CONDITIONS.

Although flying in known icing conditions is prohibited, an unexpected icing encounter should be handled as follows:

(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 to obtain windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
(4) Push the propeller control in to increase engine speed and determine if ice is soft enough to be thrown off the propeller blades.
(5) Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site.
(6) With an ice accumulation of one inch or more on the wing leading edges, be prepared for significantly higher stall speed.
(7) Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
(8) Open left window and scrape ice from a portion of the windshield for visibility in the landing approach. The metal control lock shield may be used as a scraper.
(9) Perform a landing approach using a forward slip, if necessary, for improved visibility.
(10) Approach at 80 to 90 MPH, depending upon the amount of ice accumulation.
(11) Avoid steep turns during the landing approach.
(12) Perform a landing in level attitude.

Section IV

OPERATING LIMITATIONS

OPERATIONS AUTHORIZED.

Your Cessna exceeds the requirements for airworthiness as set forth by the United States Government. It is certificated under FAA Type Certificate No. A18EU and French Type Certificate No. 43 as Cessna Model No. FR172G.

With standard equipment, the airplane is approved for day and night operations under VFR. Additional optional equipment is available to increase its utility and to make it authorized for use under IFR day and night. An owner of a properly equipped Cessna is eligible to obtain approval for its operation on single-engine scheduled airline service. Your Cessna Dealer will be happy to assist you in selecting equipment best suited to your needs.

MANEUVERS - NORMAL CATEGORY.

This airplane is certificated in both the normal and utility category. The normal category is applicable to airplanes intended for non-aerobatic operations. These include any maneuvers incidental to normal flying, stalls (except whip stalls) and turns in which the angle of bank is not more than 60°. In connection with the foregoing, the following gross weight and flight load factors apply:

Gross Weight	2550 lbs	
Flight Load Factor *Flaps Up	+3.8	-1.52
Flight Load Factor *Flaps Down	+3.5	

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

Your airplane must be operated in accordance with all approved markings, placards and check lists in the airplane. If there is any infor-

mation in this section which contradicts the approved markings, placards and check lists, it is to be disregarded.

MANEUVERS - UTILITY CATEGORY.

This airplane is not designed for purely aerobatic flight. However, in the acquisition of various certificates such as commercial pilot, instrument pilot and flight instructor, certain maneuvers are required. All of these maneuvers are permitted in this airplane when operated in the utility category. In connection with the utility category the following gross weight and flight load factors apply, with maximum entry speeds for maneuvers as shown.

Gross Weight	2200 lbs	
Flight Maneuvering Load Factor, Flaps Up	+4.4	-1.76
Flight Maneuvering Load Factor, Flaps Down	+3.5	

In the utility category, the baggage compartment and rear seat must not be occupied. No aerobatic maneuvers are approved except those listed below:

MANEUVER	MAXIMUM ENTRY SPEED*
Chandelles	125 mph (109 knots)
Lazy Eights	125 mph (109 knots)
Steep Turns	125 mph (109 knots)
Spins	Slow Deceleration
Stalls (Except Whip Stalls)	Slow Deceleration

*Higher speeds can be used if abrupt use of the controls is avoided.

For spin recovery, apply opposite rudder followed by forward pressure on the control wheel. When airplane rotation has stopped, use moderate back pressure on the control wheel to avoid excessive loads while recovering from the resulting dive.

Aerobatics that may impose high inverted loads should not be attempted. The important thing to bear in mind in flight maneuvers is that the airplane is clean in aerodynamic design and will build up speed quickly with the nose down. Proper speed control is an essential requirement for execution of any maneuver, and care should always be exercised to avoid excessive speed which in turn can impose excessive loads. In the execution of all maneuvers, avoid abrupt use of controls.

AIRSPEED LIMITATIONS (CAS).

The following is a list of the certificated calibrated airspeed (CAS) limitations for the airplane.

Never Exceed Speed (glide or dive, smooth air)	185 MPH
Maximum Structural Cruising Speed	146 MPH
Maximum Speed, Flaps Extended	100 MPH
*Maneuvering Speed	125 MPH

*The speed at which abrupt control travel can be used without exceeding the specified flight maneuvering load factor.

AIRSPEED INDICATOR MARKINGS.

The following is a list of the certificated calibrated airspeed markings (CAS) for the airplane.

Never Exceed (glide or dive, smooth air)	185 MPH (red line)
Caution Range	146-185 MPH (yellow arc)
Normal Operating Range	64-146 MPH (green arc)
Flap Operating Range	53-100 MPH (white arc)

ENGINE OPERATION LIMITATIONS.

Power and Speed	210 BHP at 2800 RPM

ENGINE INSTRUMENT MARKINGS.

OIL TEMPERATURE GAGE.

Normal Operating Range.	Green Arc
Maximum Allowable.	240°F (red line)

OIL PRESSURE GAGE.

Minimum Idling.	10 psi (red line)
Normal Operating Range.	30-60 psi (green arc)
Maximum	100 psi (red line)

FUEL QUANTITY INDICATORS.

Empty (3.0 gallons unusable each tank) . . . . . E (red line)

FUEL FLOW INDICATOR.

Normal Operating Range. . . . . 4.5-11.5 gal/hr (green arc)
Minimum and Maximum . . 3.0 and 18.5 psi (18.0 gal/hr)(red lines)

NOTE

A placard located below the fuel flow indicator provides maximum performance (full throttle and 2800 RPM) take-off and climb fuel flow settings at altitude. These settings, as called out on the placard, are as follows:

Sea Level . . . . . 17 gal/hr
4000 Feet . . . . . 15 gal/hr
8000 Feet . . . . . 13 gal/hr
12,000 Feet . . . . . 11 gal/hr

TACHOMETER.

Normal Operating Range . . . . . 2200-2600 RPM (green arc)
Maximum (Engine rated speed). . . . . 2800 RPM (red line)

MANIFOLD PRESSURE GAGE.

Normal Operating Range. . . . . .15-25.0 in. Hg (green arc)

WEIGHT AND BALANCE.

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

Take the licensed Empty Weight and Moment/1000 from the Weight and Balance Data sheet, plus any changes noted on Repair and Alteration forms carried in your airplane, and write them down in the proper columns. Using the Loading Graph, determine the moment/1000 of each item to

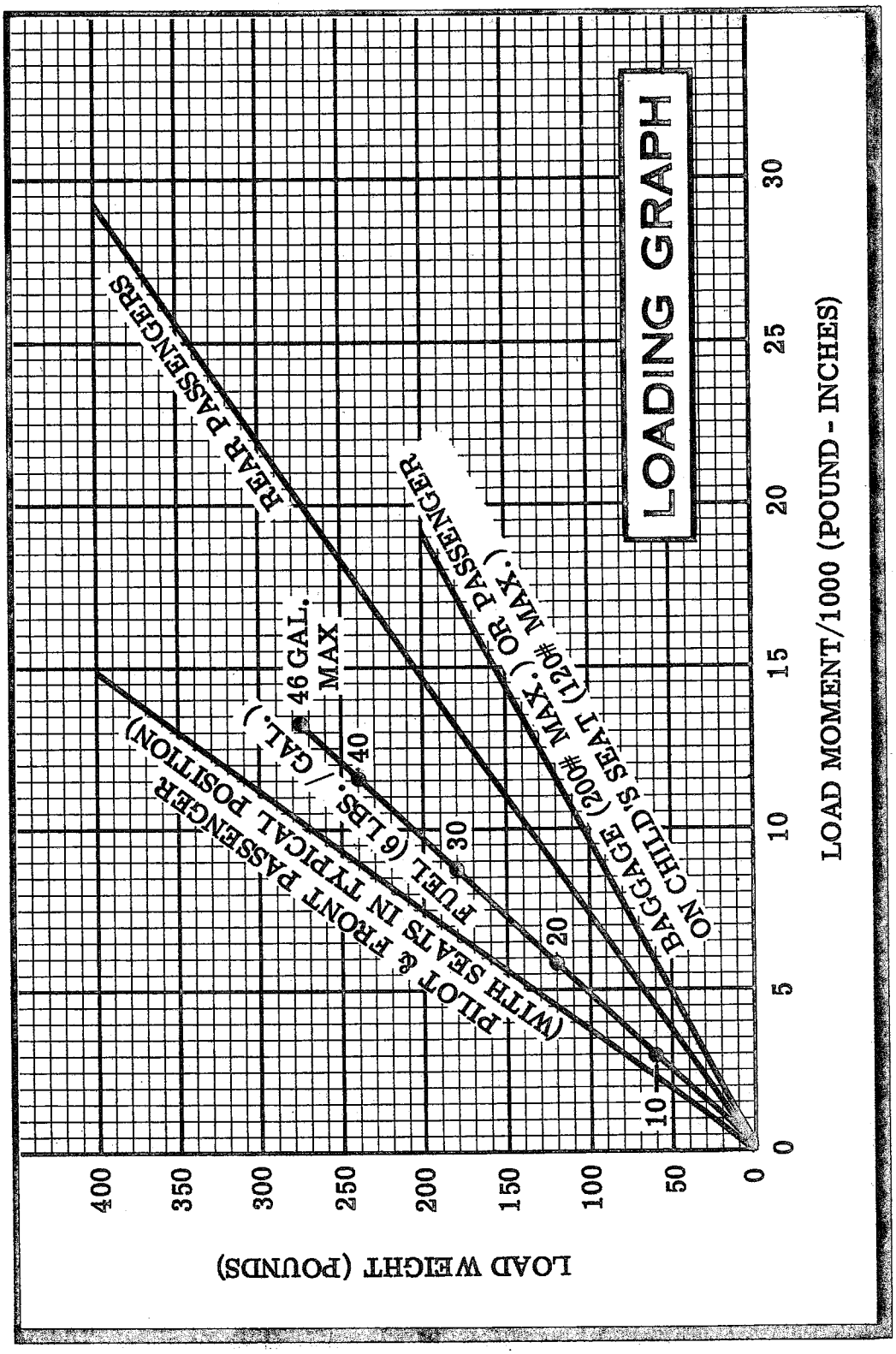
be carried. Total the weights and moments/1000 and use the Center of Gravity Moment Envelope to determine whether the point falls within the envelope, and if the loading is acceptable.

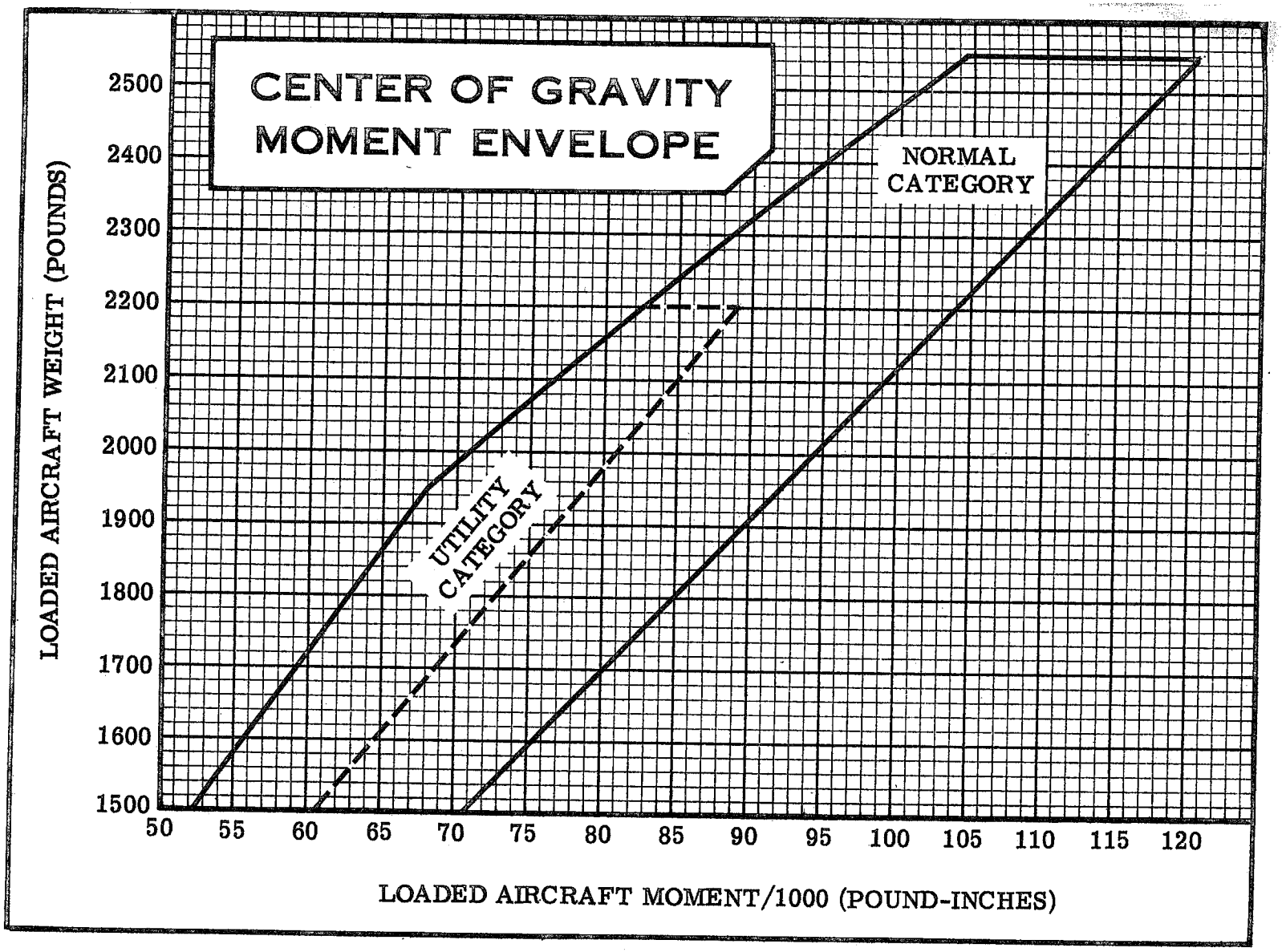
NOTE

The Weight and Balance Data sheet noted above is included in the aircraft file.

SAMPLE LOADING PROBLEM	SAMPLE AIRPLANE		YOUR AIRPLANE	
	Weight (lbs.)	Moment (lb. -ins. /1000)	Weight (lbs.)	Moment (lb. -ins. /1000)
1. Licensed Empty Weight (Sample Airplane) . . . 688 kg	1494	55.6		
2. Oil (10 qts. - Full oil may be assumed for all flights)	19	-0.4	19	-0.4
3. Fuel (46 gal at 6 lbs. / gallon) . . . . . 125 kg	276	13.2		
4. Pilot and Front Passenger . . . . . 155 kg	340	12.6		
5. Rear Passengers . . . . . 155 kg	340	24.8		
6. Baggage (or Passenger on Child's Seat) 37 kg	81	7.7		
7. TOTAL WEIGHT AND MOMENT 1,760 kg	2550	113.5		

8. Locate this point (2550 at 113.5) on the center of gravity moment envelope, and since this point falls within the envelope, the loading is acceptable.


LOADING GRAPH
LOAD WEIGHT (POUNDS)
400
350
300
250
200
150
100
50
0
0
5
10
15
20
25
30
LOAD MOMENT/1000 (POUND - INCHES)
REAR PASSENGERS
46 GAL. MAX
40
FUEL (6 LBS./GAL.)
30
20
10
(WITH SEATS IN TYPICAL PASSENGER POSITION)
PILOT & FRONT PASSENGER
ON CHILD'S SEAT (120# MAX.) OR PASSENGER
BAGGAGE (200# MAX.)


CENTER OF GRAVITY
MOMENT ENVELOPE
NORMAL
CATEGORY
UTILITY
CATEGORY
LOADED AIRCRAFT WEIGHT (POUNDS)
2500
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
LOADED AIRCRAFT MOMENT/1000 (POUND-INCHES)

Section V

CARE OF THE AIRPLANE

If your airplane is to retain that new plane performance and dependability, certain inspection and maintenance requirements must be followed. It is wise to follow a planned schedule of lubrication and preventative 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.

GROUND HANDLING.

The airplane is most easily and safely maneuvered by hand with the tow-bar attached to the nose wheel.

NOTE

When using the tow-bar, never exceed the turning angle of 30°, either side of center, or damage to the gear will result.

MOORING YOUR AIRPLANE.

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

(1) Set the parking brake and install the control wheel lock.
(2) Tie sufficiently strong ropes or chains (700 pounds tensile strength) to wing, tail, and nose tie-down fittings and secure each rope to a ramp tie-down.
(3) Install a surface control lock over the fin and rudder.
(4) Install a pitot tube cover.

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 cor-

rosion 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 accumulation 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. It is vital that small nicks on the propeller, particularly near the tips and on the leading edges, are dressed out as soon as possible since these nicks produce stress concentrations, and if ignored, may result in cracks. Never use an alkaline cleaner on the blades; remove grease and dirt with carbon tetrachloride or Stoddard solvent.

INTERIOR CARE.

To remove dust and loose dirt from the upholstery and carpet, clean the interior regularly with a vacuum cleaner.

Blot up any spilled liquid promptly, with cleansing tissue or rags. Don't pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, then spot-clean the area.

Oily spots may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent; it may damage the padding and backing materials.

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

The plastic trim, headliner, instrument panel 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.

Radio faceplates are finished with a suede coating which produces a soft, rich appearance and warm feel comparable to suede. Unlike suede leather, dust and dirt marks can be removed easily with a damp sponge. Remove non-greasy stains with a liquid cleaner such as "Mr. Clean", "Handy Andy", "Lestoil", "Liquid Ajax", or "Cinch". Greasy stains can be removed with a naptha-dampened sponge, scrub brush or lint-free cloth.

FLYABLE STORAGE.

Aircraft which are not in daily flight should have the engine started and warmed up at least once each week. In damp climates and in storage areas where the daily temperature variation can cause condensation, the warm-up operation should be accomplished more frequently. Warming up the engine replaces oil which has drained from surfaces of internal parts while standing idle. Warm-up should be accomplished at a throttle setting necessary to produce a minimum oil temperature of 100°F.

NOTE

Excessive ground runup should be avoided. Runup should not exceed 10 minutes duration.

Engine warm-up 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 aircraft is to be stored temporarily, or indefinitely, refer to the Service Manual for proper storage procedures.

INSPECTION SERVICE AND INSPECTION PERIODS.

With your airplane you will receive an Owner's Service Policy. Coupons attached to the policy entitle you to an initial inspection and the first 100-hour inspection at no charge. If you take delivery from your Dealer, he will perform the initial inspection before delivery of the airplane to you. If you pick up the airplane at the factory, plan to take it to your Dealer reasonably soon after you take delivery on it. This will permit him to check it over and to make any minor adjustments that may appear necessary. Also, plan an inspection by your Dealer at 100 hours or 180 days, whichever comes first. This inspection also is performed by your Dealer for you at no charge. 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.

The Cessna Aircraft Company recommends a 100-hour periodic inspection for your airplane. The procedure for this 100-hour inspection has been carefully worked out by the factory and is followed by the Cessna Dealer Organization. The complete familiarity of the Cessna Dealer Organization with Cessna equipment and with factory-approved procedures provides the highest type of service possible at lower cost.

AIRCRAFT FILE.

There are miscellaneous data, information and licenses that are a part of the aircraft file. The following is a check list for that file.

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

(1) Aircraft Airworthiness Certificate.
(2) Aircraft Registration Certificate.
(3) Aircraft Radio Station License.

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

(1) Weight and Balance, and associated papers.
(2) Aircraft Equipment List.

C. To be made available upon request.

(1) Aircraft Log Book.
(2) Engine Log Book.

NOTE

Cessna recommends that these items, plus the Owner's Manual and Service Policies, be carried in the aircraft at all times.

The regulations of various countries may require other documents and data, and owners of exported aircraft should check with their own aviation officials to determine their individual requirements.

LUBRICATION AND SERVICING PROCEDURES

Specific servicing information is provided here for items requiring daily attention. A Servicing Intervals Check List is included to inform the pilot when to have other items checked and serviced.

DAILY

FUEL TANK FILLERS:

Service after each flight with 100/130 minimum grade fuel. The capacity of each wing tank is 26 gallons.

FUEL TANK SUMP DRAINS:

Before the first flight of the day and after each refueling, use fuel sampler cup stored in the map compartment and drain a small amount of fuel from the quick-drain valve in each fuel tank.

LUBRICATION AND SERVICING PROCEDURES

DAILY (Continued)

FUEL STRAINER:

Before the first flight of the day and after each refueling, pull out fuel strainer drain knob for about four seconds, to clear fuel strainer of possible water and sediment. Release drain knob, then check that strainer drain is closed after draining. If water is observed, there is a possibility that the fuel tank sumps contain water. Water accumulation in the sumps should be drained as outlined in Fuel Tank Sump Drains. Also, if water is observed in the strainer, the fuel reservoir drain valve should be drained and the fuel selector valve drain plug should be removed to check for presence of water.

OIL DIPSTICK:

Check oil level before each flight. Do not operate on less than 7 quarts. To minimize loss of oil through breather, fill to 8 quart level for normal flights of less than 3 hours. For extended flight, fill to 10 quarts. If optional oil filter is installed, one additional quart is required when filter element is changed.

OIL FILLER:

When preflight check shows low oil level, service with aviation grade engine oil; SAE 50 above 40°F and SAE 10W30 or SAE 30 below 40°F. (Multi-viscosity oil with a range of SAE 10W30 is recommended for improved starting in cold weather.) Detergent or dispersant oil, conforming to Continental Motors Specification MHS-24A, must be used. Your Cessna Dealer can supply approved brands of oil.

NOTE

To promote faster ring seating and improved oil control, your Cessna was delivered from the factory with straight mineral oil (non-detergent). This "break-in" oil should be used only for the first 25 hours of operation, at which time it must be replaced with detergent oil.

SERVICING INTERVALS CHECK LIST

EACH 50 HOURS

BATTERY - - Check and service. Check more often (at least every 30 days) if operating in hot weather.

ENGINE OIL AND OIL FILTER -- Change engine oil and replace filter element. If optional oil filter is not installed, change oil and clean screen every 25 hours. Change engine oil at least every four months even though less than 50 hours have been accumulated. Reduce periods for prolonged operation in dusty areas, cold climates, or when short flights and long idle periods result in sludging conditions.

NOTE

After first 25 hours of engine operation, an initial oil change should be made to remove "break-in" oil and change the filter, if installed.

INDUCTION AIR FILTER -- Clean or replace. Under extremely dusty conditions, daily maintenance of the filter is recommended.

NOSE GEAR TORQUE LINKS -- Lubricate. When operating under dusty conditions, more frequent lubrication is recommended.

EACH 100 HOURS

SPARK PLUGS -- Clean, test and regap.

BRAKE MASTER CYLINDERS -- Check and fill.

SHIMMY DAMPENER -- Check and fill.

FUEL STRAINER -- Disassemble and clean.

FUEL TANK SUMP DRAINS -- Drain water and sediment.

FUEL RESERVOIR DRAIN VALVE -- Drain water and sediment.

FUEL SELECTOR VALVE DRAIN PLUG -- Drain water and sediment.

VACUUM SYSTEM OIL SEPARATOR (OPT) -- Clean.

SUCTION RELIEF VALVE INLET SCREEN (OPT) -- Clean.

SERVICING INTERVALS CHECK LIST

(Continued)

EACH 500 HOURS

VACUUM SYSTEM AIR FILTER (OPT) -- Replace filter element. Replace sooner if suction gage reading drops to 4.6 in. Hg.

WHEEL BEARINGS -- Lubricate at first 100 hours and at 500 hours thereafter. Reduce lubrication interval to 100 hours when operating in dusty or seacoast areas, during periods of extensive taxiing, or when numerous take-offs and landings are made.

AS REQUIRED

NOSE GEAR SHOCK STRUT -- Keep filled with fluid and inflated to 45 psi.

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 directly from the Cessna Service Department. A subscription card is supplied in your aircraft file 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 aircraft when delivered from the factory. These items are listed below.

- OWNER'S MANUALS FOR YOUR
  - AIRCRAFT
  - ELECTRONICS
- CESSNA FLIGHT GUIDE (FLIGHT 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 aircraft, are available from your Cessna Dealer.

- SERVICE MANUALS AND PARTS CATALOGS FOR YOUR
  - AIRCRAFT
  - ENGINE AND ACCESSORIES
  - ELECTRONICS

Your Cessna Dealer has a current catalog of all available Customer Services Supplies, many of which he keeps on hand. If supplies are not in stock, your Cessna Dealer will be happy to order for you.

Section VI

OPERATIONAL DATA

The operational data shown on the following pages are compiled from actual tests with the airplane and engine in good condition and using average piloting technique. You will find this data a valuable aid when planning your flights.

A power setting selected from the range charts usually will be more efficient than a random setting, since it will permit you to estimate your fuel consumption more accurately. You will find that using the charts will pay dividends in overall efficiency.

Cruise performance shown in the charts is based on flight test using a McCauley D2A34C67/76C-O propeller and a normal lean mixture. Other conditions of the tests are shown in the chart headings. Allowances for fuel reserve, headwinds, take-offs and climb, and variations in mixture leaning technique should be made and are in addition to those shown on the charts. Other indeterminate variables such as fuel metering characteristics, engine and propeller conditions, and turbulence of the atmosphere may account for variations of 10% or more in maximum range.

Speed performance data is shown for an airplane equipped with optional speed fairings, which increase the speed by one MPH.

AIRSPEED CORRECTION TABLE

	IAS	50	60	70	80	90	100	110	120	130	140	150
FLAPS UP	CAS	60	64	69	77	86	96	106	116	126	137	147
FLAPS DOWN	CAS	59	63	71	80	88	98	•	•	•	•	•

Figure 6-1.

STALL SPEEDS, POWER OFF

	CONDITION	ANGLE OF BANK 0°	20°	40°	60°
2550 LBS. GROSS WEIGHT	FLAPS UP	64	66	73	90
	FLAPS 20°	58	60	67	83
	FLAPS 40°	53	55	60	75

SPEEDS ARE MPH, CAS

Figure 6-2.

TAKE-OFF DATA

TAKE-OFF DISTANCE FROM HARD SURFACE RUNWAY WITH FLAPS 10°

GROSS WEIGHT POUNDS	IAS AT 50' MPH	HEAD WIND KNOTS	AT SEA LEVEL & 59°		AT 2500 FT. & 50°F		AT 5000 FT. & 41°F		AT 7500 FT. & 32°F	
			GROUND RUN	TOTAL TO CLEAR 50 FT OBS	GROUND RUN	TOTAL TO CLEAR 50 FT OBS	GROUND RUN	TOTAL TO CLEAR 50 FT OBS	GROUND RUN	TOTAL TO CLEAR 50 FT OBS
2550	71	0	740	1230	880	1440	1065	1725	1290	2095
		10	520	925	630	1100	770	1330	945	1630
		20	335	660	415	795	520	975	655	1215
2200	66	0	525	920	625	1070	755	1255	910	1495
		10	360	685	435	800	530	950	650	1140
		20	225	475	275	560	345	680	430	825
1900	61	0	380	710	450	810	540	940	650	1105
		10	250	515	305	595	370	700	450	825
		20	150	350	185	410	230	485	285	585

NOTES:
1. Increase distance 10% for each 25°F above standard temperature for particular altitude.
2. For operation on a dry, grass runway, increase distances (both "ground run" and "total to clear 50 ft. obstacle") by 7% of the "total to clear 50 ft. obstacle" figure.

MAXIMUM RATE-OF-CLIMB DATA

GROSS WEIGHT POUNDS	AT SEA LEVEL & 59°F			AT 5000 FT. & 41°F			AT 10,000 FT. & 23°F			AT 15,000 FT. & 5°F		
	IAS MPH	RATE OF CLIMB FT/MIN	GAL. OF FUEL USED	IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED	IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED	IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED
2550	95	880	1.3	91	650	3.1	87	420	5.3	83	190	8.8
2200	92	1120	1.3	88	860	2.7	85	595	4.3	81	340	6.4
1900	88	1390	1.3	85	1095	2.3	82	800	3.5	79	505	5.1

NOTES:
1. Flaps up, full throttle, 2800 RPM, mixture at recommended leaning schedule.
2. Fuel used includes warm up and take-off allowance.
3. For hot weather, decrease rate of climb 20 ft./min. for each 10°F above standard day temperature for particular altitude.

Figure 6-3.

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight - 2550 Pounds

2500 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	46 GAL (NO RESERVE) ENDR. HOURS	RANGE MILES
2600	24	77	142	11.7	3.9	560
	23	72	138	11.0	4.2	580
	22	67	134	10.2	4.5	605
	21	62	130	9.5	4.8	625
2500	25	78	142	11.8	3.9	555
	24	73	139	11.1	4.1	575
	23	69	136	10.5	4.4	595
	22	64	131	9.8	4.7	615
2400	25	73	139	11.1	4.1	575
	24	69	136	10.5	4.4	595
	23	65	132	9.8	4.7	615
	22	60	128	9.2	5.0	635
2300	25	68	135	10.4	4.4	600
	24	64	131	9.8	4.7	615
	23	60	128	9.2	5.0	640
	22	56	123	8.6	5.3	660
2200	25	63	131	9.7	4.8	620
	24	60	127	9.1	5.0	640
	23	56	123	8.6	5.4	660
	22	52	119	8.0	5.7	680
	21	48	114	7.5	6.1	695
	20	44	108	7.0	6.6	710
	19	41	102	6.5	7.1	720
	18	37	94	6.0	7.7	720

Figure 6-4 (Sheet 1 of 5).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight - 2550 Pounds

5000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	46 GAL (NO RESERVE) ENDR. HOURS	46 GAL (NO RESERVE) RANGE MILES
2600	23	75	144	11.4	4.0	580
	22	71	140	10.7	4.3	600
	21	66	136	10.0	4.6	620
	20	61	131	9.3	4.9	645
2500	23	72	141	11.0	4.2	595
	22	68	137	10.3	4.5	615
	21	63	133	9.6	4.8	635
	20	58	128	8.9	5.2	660
2400	23	68	137	10.3	4.5	615
	22	63	133	9.7	4.8	635
	21	59	129	9.0	5.1	655
	20	55	124	8.4	5.5	680
2300	23	63	133	9.7	4.8	635
	22	59	129	9.0	5.1	655
	21	55	124	8.4	5.4	675
	20	51	119	7.9	5.8	695
2200	23	59	129	9.0	5.1	660
	22	55	124	8.5	5.4	675
	21	51	120	7.9	5.8	695
	20	47	114	7.4	6.2	710
	19	43	108	6.9	6.7	720
	18	40	100	6.4	7.2	730
	17	36	93	5.9	7.8	725

Figure 6-4 (Sheet 2 of 5).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight - 2550 Pounds

7500 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	46 GAL (NO RESERVE) ENDR. HOURS	RANGE MILES
2600	21	69	142	10.5	4.4	620
	20	64	137	9.8	4.7	640
	19	60	132	9.1	5.1	665
	18	55	126	8.4	5.5	690
2500	21	66	139	10.1	4.6	635
	20	62	134	9.4	4.9	655
	19	57	129	8.7	5.3	680
	18	52	123	8.0	5.7	700
2400	21	62	135	9.5	4.9	655
	20	58	130	8.8	5.2	675
	19	53	125	8.2	5.6	695
	18	49	118	7.6	6.0	715
2300	21	58	130	8.9	5.2	675
	20	54	125	8.3	5.6	695
	19	50	119	7.7	6.0	710
	18	45	112	7.1	6.5	725
2200	21	54	125	8.3	5.5	695
	20	50	120	7.8	5.9	710
	19	46	114	7.2	6.4	720
	18	42	107	6.7	6.9	730
	17	38	99	6.2	7.4	735

Figure 6-4 (Sheet 3 of 5).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight - 2550 Pounds

10,000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	46 GAL (NO RESERVE) ENDR. HOURS	46 GAL (NO RESERVE) RANGE MILES
2600	19	63	138	9.6	4.8	665
	18	58	133	8.9	5.2	685
	17	53	126	8.2	5.6	710
	16	48	118	7.5	6.2	725
2500	19	60	135	9.2	5.0	675
	18	55	129	8.5	5.4	700
	17	50	122	7.8	5.9	720
	16	46	114	7.1	6.4	735
2400	19	56	130	8.6	5.3	695
	18	52	124	8.0	5.7	715
	17	47	117	7.4	6.2	730
	16	43	109	6.8	6.8	740
2300	19	52	125	8.1	5.7	710
	18	48	118	7.5	6.1	725
	17	44	111	6.9	6.6	735
	16	40	102	6.4	7.2	740
2200	19	49	120	7.6	6.0	725
	18	45	113	7.1	6.5	735
	17	41	105	6.5	7.0	740
	16	37	97	6.0	7.6	740

Figure 6-4 (Sheet 4 of 5).

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight - 2550 Pounds

15,000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	46 GAL (NO RESERVE) ENDR. HOURS	46 GAL (NO RESERVE) RANGE MILES
2600	15 14 13	49 44 38	123 112 101	7.6 6.9 6.1	6.0 6.7 7.5	740 750 755
2500	15 14 13	47 41 36	118 108 98	7.3 6.6 5.9	6.3 7.0 7.7	745 750 755
2400	15 14	44 39	112 103	6.9 6.3	6.7 7.4	750 755
2300	15 14	40 36	106 97	6.5 5.9	7.1 7.8	755 755
2200	15	38	101	6.1	7.5	755

Figure 6-4 (Sheet 5 of 5).

LANDING DISTANCE TABLE

LANDING DISTANCE WITH FULL FLAPS, POWER OFF, AND NO WIND ON HARD SURFACE RUNWAY

GROSS WEIGHT POUNDS	APPROACH IAS MPH	AT SEA LEVEL & 59° F		AT 2500 FT. & 50°F		AT 5000 FT. & 41°F		AT 7500 FT. & 32°F	
		GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS.	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS.	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS.	GROUND ROLL	TOTAL TO CLEAR 50 FT. OBS.
2550	75	620	1270	660	1350	695	1425	735	1510

NOTES:
1. Reduce landing distance 10% for each 5 knots of headwind.
2. For operation on a dry, grass runway, increase distances (both "ground roll" and "total to clear 50 ft. obstacle") by 20% of the "total to clear 50 ft. obstacle" figure.

Figure 6-5.

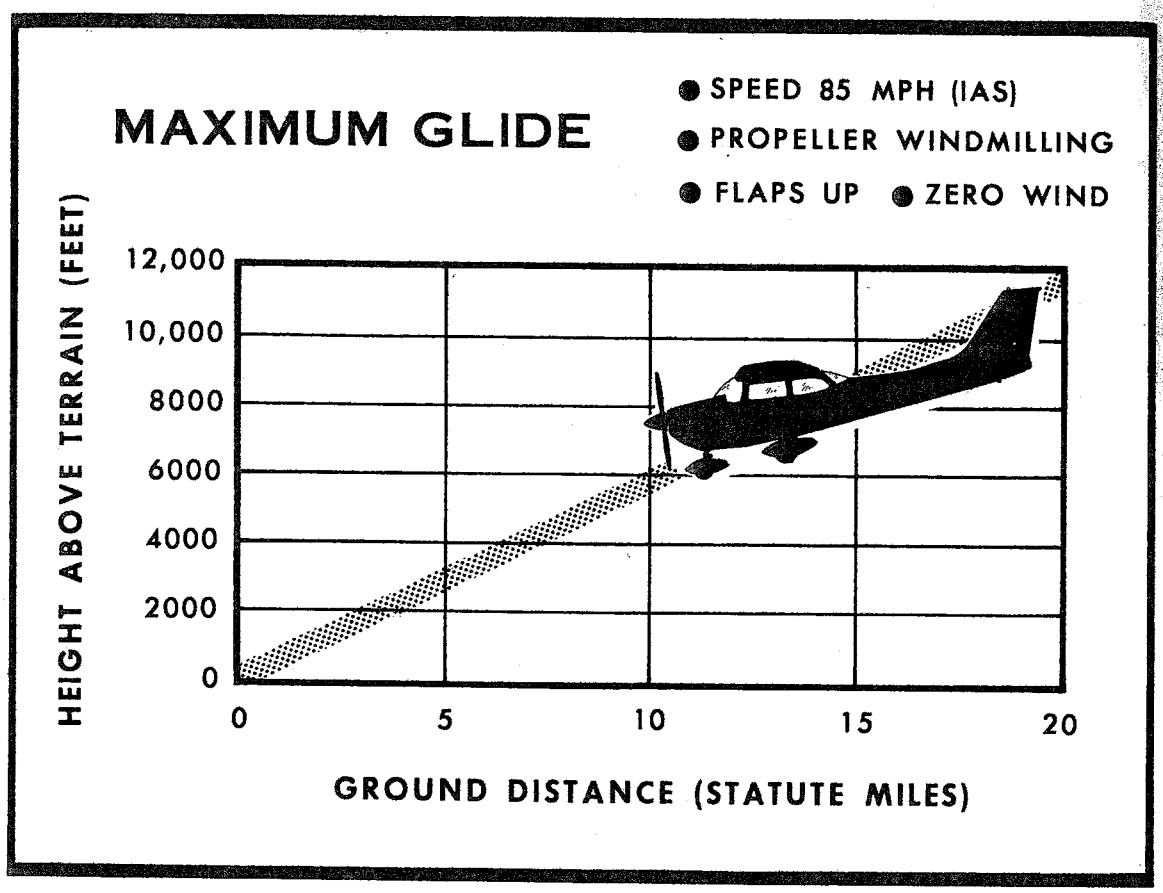

MAXIMUM GLIDE
SPEED 85 MPH (IAS)
PROPELLER WINDMILLING
FLAPS UP
ZERO WIND
HEIGHT ABOVE TERRAIN (FEET)
12,000
10,000
8000
6000
4000
2000
0
0
5
10
15
20
GROUND DISTANCE (STATUTE MILES)

Figure 6-6.

Section VII

OPTIONAL SYSTEMS

This section contains a description, operating procedures, and performance data (when applicable) for some of the optional equipment which may be installed in your Cessna. Owner's Manual Supplements are provided to cover operation of other optional equipment systems when installed in your airplane. Contact your Cessna Dealer for a complete list of available optional equipment.

AUXILIARY FUEL TANK SYSTEM

An optional auxiliary fuel tank system (figure 7-1) is available to increase the airplane operating range. System components include a 17 gallon fuel tank (17 gallons usable) installed on the baggage compartment floor, an electric fuel transfer pump behind the tank, an electrically-operated fuel quantity indicator and fuel transfer pump switch on the instrument panel, a fuel tank filler provision on the right side of the fuselage, a fuel tank sump drain valve at the front of the tank on the bottom of the fuselage, and the necessary plumbing.

The auxiliary fuel system is connected to the right main fuel tank plumbing above the right cabin door.

AUXILIARY FUEL SYSTEM OPERATION.

To operate the auxiliary fuel system, proceed as follows:

PRE-FLIGHT CHECK.

(1) Turn on master switch and check auxiliary tank fuel quantity indicator for reading.

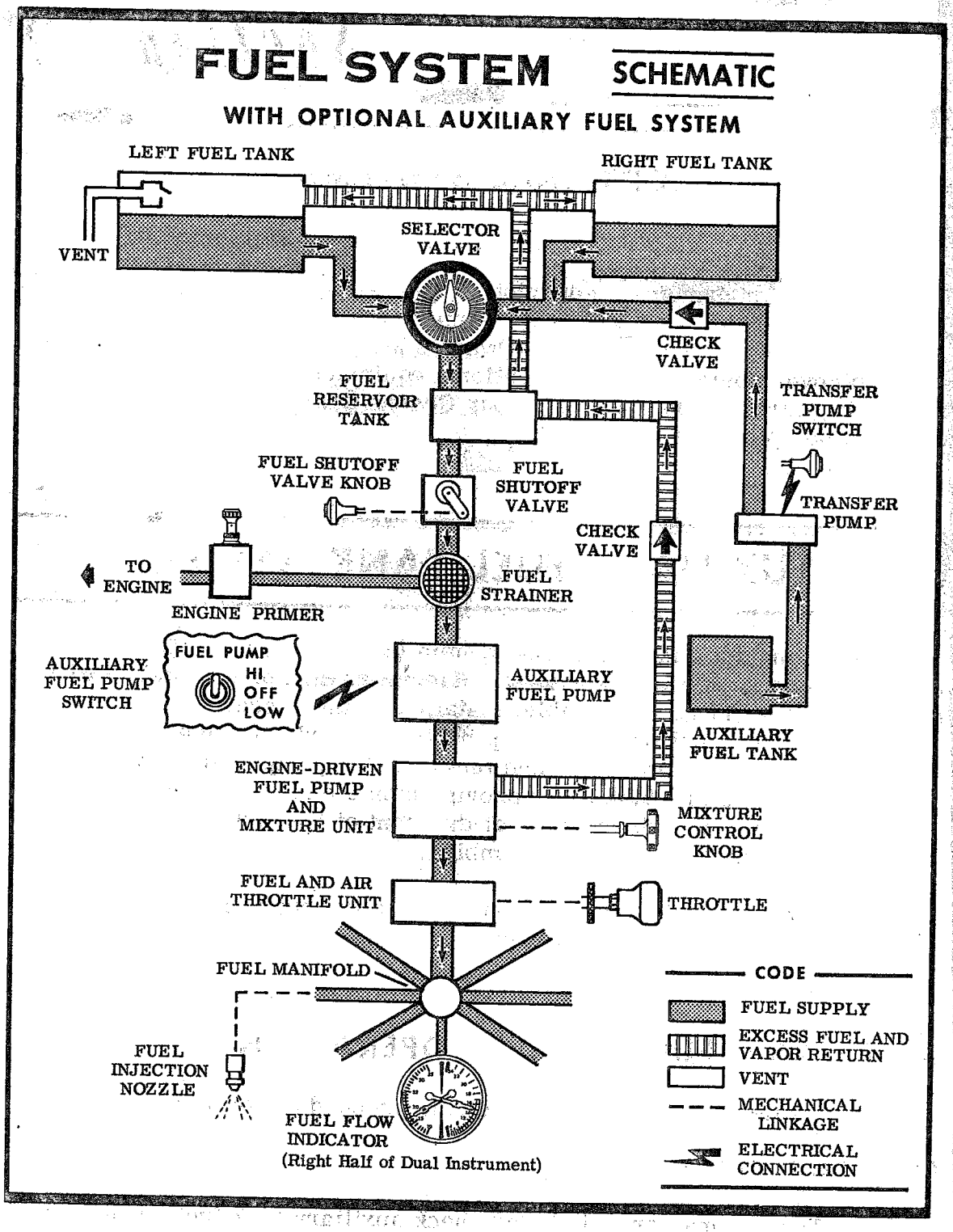

FUEL SYSTEM SCHEMATIC
WITH OPTIONAL AUXILIARY FUEL SYSTEM
LEFT FUEL TANK
RIGHT FUEL TANK
VENT
SELECTOR VALVE
CHECK VALVE
FUEL RESERVOIR TANK
TRANSFER PUMP SWITCH
FUEL SHUTOFF VALVE KNOB
FUEL SHUTOFF VALVE
TRANSFER PUMP
CHECK VALVE
TO ENGINE
FUEL STRAINER
ENGINE PRIMER
AUXILIARY FUEL PUMP SWITCH
FUEL PUMP
HI
OFF
LOW
AUXILIARY FUEL PUMP
AUXILIARY FUEL TANK
ENGINE-DRIVEN FUEL PUMP AND MIXTURE UNIT
MIXTURE CONTROL KNOB
FUEL AND AIR THROTTLE UNIT
THROTTLE
FUEL MANIFOLD
FUEL INJECTION NOZZLE
FUEL FLOW INDICATOR
(Right Half of Dual Instrument)
CODE
FUEL SUPPLY
EXCESS FUEL AND VAPOR RETURN
VENT
MECHANICAL LINKAGE
ELECTRICAL CONNECTION

Figure 7-1.

(2) Momentarily pull on transfer pump switch and listen for pump operation. Turn off master switch.
(3) Check quantity of fuel in tank for agreement with fuel quantity indicator. Fill tank for anticipated requirements.
(4) Drain small amount of fuel from fuel tank drain valve to check for possible water and sediment.

DURING FLIGHT:

(1) Take-off, climb and land with fuel selector valve handle set on "BOTH" for maximum safety.
(2) After leveling off at cruise altitude, switch to "RIGHT" and operate from this tank until the fuel supply is exhausted.
(3) Switch to "LEFT" for operation, then pull on transfer pump switch and refill right main fuel tank from auxiliary tank. Push transfer pump switch off when fuel transfer is completed.

NOTE

Transfer of total fuel from the auxiliary tank will take from 45 minutes to 1 hour.

(4) Return fuel selector valve handle to "BOTH" position after refilling right tank, or if desired switch again to right main tank.

IMPORTANT

Do not operate the transfer pump with the fuel selector turned to either "BOTH" or "RIGHT" positions. Total or partial engine stoppage might result from air being pumped into fuel lines after fuel transfer has been completed. If the pump should accidentally be turned on with the fuel selector in either of these positions, and engine stoppage occurs, the engine will restart in from 3 to 5 seconds after turning off the transfer pump as the air in the fuel line will be evacuated rapidly. To hasten restart, momentarily place the auxiliary fuel pump switch in the "HI" position.

COLD WEATHER EQUIPMENT

WINTERIZATION KIT.

For continuous operation in temperatures consistently below 20°F, the Cessna winterization kit should be installed to improve engine operation. The kit consists of two baffles to partially cover the cowl nose cap opening, and insulation for the crankcase breather line. Once installed, the crankcase breather insulation is approved for permanent use in both cold and hot weather.

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).

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 accidently connected backwards, no power will flow to the airplane's 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 the master switch "ON" will close the battery contactor.

STATIC PRESSURE ALTERNATE SOURCE VALVE.

A static pressure alternate source valve may be installed in the static system for use when the external static source is malfunctioning.

If erroneous instrument readings are suspected due to water or ice in the static pressure lines, the static pressure alternate source valve should be opened, thereby supplying static pressure from the cabin. Cabin pressures will vary, however, with open cabin ventilators or windows. The most adverse combinations will result in airspeed and altimeter variations of no more than 2 MPH and 15 feet, respectively.

RADIO SELECTOR SWITCHES

RADIO SELECTOR SWITCH OPERATION.

Operation of the radio equipment is normal as covered in the respective radio manuals. When more than one radio is installed, an audio switching system is necessary. The operation of this switching system is described below.

TRANSMITTER SELECTOR SWITCH.

The transmitter selector switch is labeled "TRANS," and has two positions. When two transmitters are installed, it is necessary to switch the microphone to the radio unit the pilot desires to use for transmission. This is accomplished by placing the transmitter selector switch in the position corresponding to the radio unit which is to be used. The up position selects the upper transmitter and the down position selects the lower transmitter.

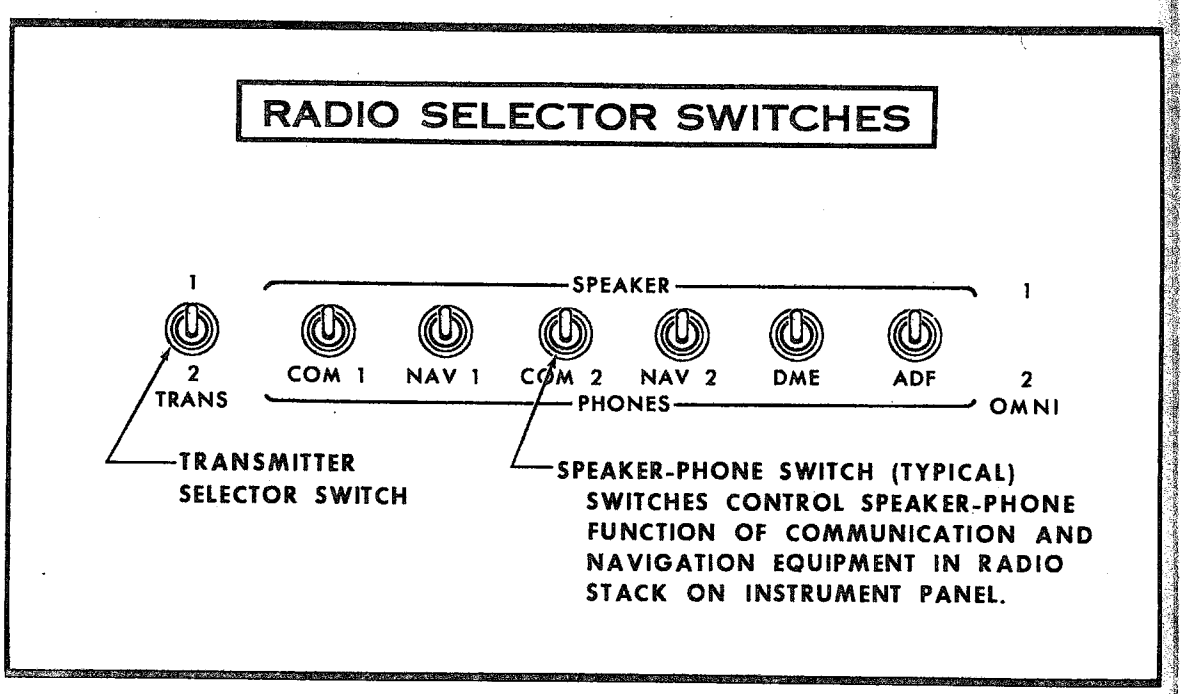


Figure 7-2.

The installation of Cessna radio equipment provides certain audio back-up capabilities and transmitter selector switch functions that the pilot should be familiar with. When the transmitter selector switch is placed in position 1 or 2, the audio amplifier of the corresponding transceiver is utilized to provide the speaker audio for all radios. If the audio amplifier in the selected transceiver fails, as evidenced by loss of speaker audio for all radios, place the transmitter selector switch in the other transceiver position. Since an audio amplifier is not utilized for headphones, a malfunctioning amplifier will not affect headphone operation.

SPEAKER-PHONE SWITCHES.

The speaker-phone switches determine whether the output of the receiver in use is fed to the headphones or through the audio amplifier to the speaker. Place the switch for the desired receiving system either in the up position for speaker operation or in the down position for headphones.

OIL QUICK DRAIN VALVE

An oil quick-drain valve is optionally offered to replace the drain plug in the oil sump drain port. The valve provides a quicker and cleaner method of draining engine oil. To drain the oil with this valve installed, slip a hose over the end of the valve, route the hose to a suitable container, then 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 screwdriver or suitable tool to snap the valve into the extended (closed) position and remove the drain hose.

WING LEVELER

A wing leveler may be installed to augment the lateral stability of the airplane. The system uses the Turn Coordinator for roll and yaw sensing. Vacuum pressure, from the engine-driven vacuum pump, is routed from the Turn Coordinator to cylinder-piston servo units attached to the aileron control system. As the airplane deviates from a wing level attitude, vacuum pressure in the servo units is increased or relieved as needed to actuate the ailerons to oppose the deviations.

A separately mounted push-pull control knob, labeled "WING LVLR," is provided on the left side of the instrument panel to turn the system on and off. A "ROLL TRIM" control knob on the Turn Coordinator is used for manual roll trim control to compensate for asymmetrical loading of fuel and passengers, and to optimize system performance in climb, cruise and let-down.

OPERATING CHECK LIST

TAKE-OFF.

(1) "WING LVLR" Control Knob -- Check in off position (full in).

CLIMB.

(1) Adjust elevator trim for climb.
(2) "WING LVLR" Control Knob -- Pull control knob "ON."
(3) "ROLL TRIM" Control Knob -- Adjust for wings level attitude.

CRUISE.

(1) Adjust power and elevator trim for level flight.
(2) "ROLL TRIM" Control Knob -- Adjust as desired.

DESCENT.

(1) Adjust power and elevator trim for desired speed and rate of descent.
(2) "ROLL TRIM" Control Knob -- Adjust as desired.

LANDING.

(1) Before landing, push "WING LVLR" control knob full in to the off position.

EMERGENCY PROCEDURES

If a malfunction should occur, the system is easily overpowered with pressure on the control wheel. The system should then be turned off. In the event of partial or complete vacuum failure, the wing leveler will automatically become inoperative. However, the Turn Coordinator used with the wing leveler system will not be affected by loss of vacuum since it is designed with a "back-up" system enabling it to operate from either vacuum or electrical power in the event of failure of one of these sources.

OPERATING NOTES

(1) The wing leveler system may be overpowered at any time without damage or wear. However, for extended periods of maneuvering it may be desirable to turn the system off.

(2) It is recommended that the system not be engaged during take-off and landing. Although the system can be easily overpowered, servo forces could significantly alter the manual "feel" of the aileron control, especially should a malfunction occur.

INTENTIONALLY BLANK

ALPHABETICAL INDEX

A

B

C

D

E

F

G

H

I

L

M

N

O

P

Q

R

S

T

U

V

W

WARRANTY

The Cessna Aircraft Company ("Cessna") warrants each new aircraft manufactured by it and such new aircraft equipment, accessories and service parts as are sold through its Commercial Aircraft Marketing Division to be free from defects in material and workmanship under normal use and service for a period of six (6) months after delivery to the original retail purchaser or first user in the case of aircraft, aircraft equipment and accessories (except Cessna-Crafted Electronics as herein defined) and service parts therefor, and for a period of one (1) year after such delivery in the case of Cessna-Crafted Electronics (which term includes all communication, navigation and autopilot systems bearing the name "Cessna", beginning at the connection to the aircraft electrical system (bus bar) and including "black boxes", antennas, microphones, speakers and other components and associated wiring but excluding gyro instruments used in connection with autopilot and navigation systems) and service parts therefor.

Cessna's obligation under this warranty is limited to repairing or replacing, at its option, any part or parts which, within the applicable six (6) or twelve (12) months period as above set forth, shall be returned transportation charges prepaid to Cessna at Wichita, Kansas, or to any Cessna appointed or Cessna Distributor appointed dealer authorized by such appointment to sell the aircraft, equipment, accessories and service parts of the type involved and which upon examination shall disclose to Cessna's satisfaction to have been thus defective. (A new warranty period is not established for replacements. Replacements are warranted for the remainder of the applicable six (6) or twelve (12) months original warranty period.) The repair or replacement of defective parts under this warranty will be made by Cessna or the dealer without charge for parts, or labor for removal, installation and/or actual repair of such defective parts. (Locations of such dealers will be furnished by Cessna on request.)

The provisions of this warranty do not apply to any aircraft, equipment, accessories (including Cessna-Crafted Electronics) or service parts therefor manufactured or sold by Cessna which have been subject to misuse, negligence, or accident, or which shall have been repaired or altered outside of Cessna's factory in any way so as in the judgment of Cessna to affect adversely its performance, stability and reliability, nor to normal maintenance services (such as engine tune up, cleaning, control rigging, brake and other mechanical adjustments, maintenance inspections, etc.) and the replacement of service items (such as spark plugs, brake linings, filters, hoses, belts, tires, etc.) made in connection with such services or required as maintenance, nor to normal deterioration of soft trim and appearance items (such as paint, upholstery, rubber-like items, etc.) due to wear and exposure.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED IN FACT OR BY LAW, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATION OR LIABILITY ON THE PART OF CESSNA TO ANYONE OF ANY NATURE WHATSOEVER BY REASON OF THE MANUFACTURE AND/OR SALE OR THE USE OF SUCH AIRCRAFT PRODUCTS, INCLUDING LIABILITY FOR CONSEQUENTIAL OR SPECIAL DAMAGES, AND CESSNA NEITHER ASSUMES NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH SUCH AIRCRAFT PRODUCTS.

SERVICING REQUIREMENTS

FUEL:

AVIATION GRADE -- 100/130 MINIMUM GRADE
CAPACITY EACH TANK -- 26 GALLONS

ENGINE OIL:

AVIATION GRADE -- SAE 50 ABOVE 40°F.
SAE 10W30 OR SAE 30 BELOW 40°F.
(MULTI-VISCOSITY OIL WITH A RANGE OF SAE 10W30 IS RECOMMENDED FOR IMPROVED STARTING IN COLD WEATHER. DETERGENT OR DISPERSANT OIL, CONFORMING TO CONTINENTAL MOTORS SPECIFICATION MHS-24A, MUST BE USED.)
CAPACITY OF ENGINE SUMP -- 10 QUARTS
(DO NOT OPERATE ON LESS THAN 7 QUARTS. TO MINIMIZE LOSS OF OIL THROUGH BREATHER, FILL TO 8 QUART LEVEL FOR NORMAL FLIGHTS OF LESS THAN 3 HOURS. FOR EXTENDED FLIGHT, FILL TO 10 QUARTS. IF OPTIONAL OIL FILTER IS INSTALLED, ONE ADDITIONAL QUART IS REQUIRED WHEN THE FILTER ELEMENT IS CHANGED.)

HYDRAULIC FLUID:

MIL-H-5606 HYDRAULIC FLUID

TIRE PRESSURES:

NOSE WHEEL----------26 PSI ON 5.00X5 TIRE
26 PSI ON 6.00X6 TIRE
MAIN WHEELS----------24 PSI ON 6.00X6 TIRES

NOSE GEAR SHOCK STRUT:

KEEP FILLED WITH FLUID AND INFLATED TO 45 PSI.

Cessna

FAA APPROVED
Supplemental Airplane Flight Manual

FOR

MODELS	SERIALS
170	18000 thru 27169
172	28000 thru 47746
	17247747 thru 17271034
F172	F172-0001 thru F17201749
P172	P17257120 thru P17257188
FP172	FP172-0001 thru FP172-0003
R172	R172-0001 thru R1720625
	R1722000 thru R1722929
FR172	FR17200001 thru FR17200630
175	55001 thru 56777
	17556778 thru 17557119
177	17700001 thru 17702752
177RG	177RG0001 thru 177RG1366
F177RG	F177RG0001 thru F177RG0177
180	30000 thru 32999
	50000 thru 50911
	18050912 thru 18053000

MODELS	SERIALS
182	33000 thru 34999
	51001 thru 53007
	18253008 thru 18266590
A182	A182-0001 thru A182-0148
F182	F18200001 thru F18200094
R182	R18200001 thru R18200583
FR182	FR18200001 thru FR18200020
185	185-0001 thru 18503683
205	205-0001 thru 205-0577
206	206-0001 thru 206-0275
P206/TP206	P206-0001 thru P20600647
U206/TU206	U206-0276 thru U20604649
207/T207	20700001 thru 20700482
210/T210	57001 thru 57575
	21057576 thru 21062954
T210	T210-0001 thru T210-0454
P210	P21000001 thru P21000150

Serial No. FR 172 - 0179

Registration No. OE-DLP

This Supplemental Airplane Flight Manual must be carried in the airplane when the Secondary Seat Stop modification is installed in accordance with Cessna Single-Engine Service Bulletin SEB89-2.

The information contained herein supplements or supersedes the information contained in the form of placards, markings, manuals and checklists. For limitations and procedures not contained in this Supplemental Airplane Flight Manual, consult the original placards, markings, manuals and checklists.

FAA APPROVED
Cessna Aircraft Co., Aircraft Div.
Delegation Option Manufacturer, CE-1

R. D. Hamilton Executive Engineer

Date MARCH 21, 1989

Member of GAMA

D1326-13-RPC-5300-3/89

Original Issue - 24 March 1989

SECTION 1
GENERAL

A secondary seat stop installation is provided for the pilot's seat to prevent the seat from inadvertently sliding aft beyond the adjusted flight position if it is not securely locked by the standard seat lock.

The secondary seat stop installation (see Figure 1) consists of a seat stop lever assembly mounted to the inboard seat rail and floor structure and a stop plate attached to the inboard side of the pilot's seat pedestal or frame. The stop lever rotates and is spring-loaded to maintain contact with the seat rail, and thereby serves as a secondary seat stop to prevent rearward movement of the seat beyond the stop. Either the aft seat roller housing or the tabs which protrude from the seat stop plate will contact the stop lever, preventing additional rearward movement. Depending on the seat position selected by the seat occupant, the secondary stop may be slightly aft of the entire seat or it may be in a position forward of the aft roller or one of the tabs on the seat stop plate when the seat is adjusted to the desired flight position. Regardless of where the seat is positioned, rearward seat travel will be restricted in the event the sea occupant fails to lock the seat in position by normal means. Wher rearward seat movement is desired for additional leg room or wher exiting the airplane, the stop lever can be manually rotated to the UNLATCH position while the normal seat lock release is simultaneously operated. This will allow clearance between the stop lever and the sea rail for passage of the seat roller housing or seat stop plate tabs as the seat is moved aft.

SECTION 2
LIMITATIONS

There is no change to the airplane limitations when a secondary sea stop is installed.

SECTION 3
EMERGENCY PROCEDURES

The pilot must advise all passengers of the operation of the pilot seat lock release and secondary seat stop to assist those wishing to e the airplane through the door on the pilot's side or in case an emergenc

NOTE

- The installation shown depicts a seat stop lever and seat stop plate installed on the inboard seat rail and inboard side of a pilot's seat.
- On airplanes with a floorboard tunnel, the retainer shape is modified to clear all tunnel structure.

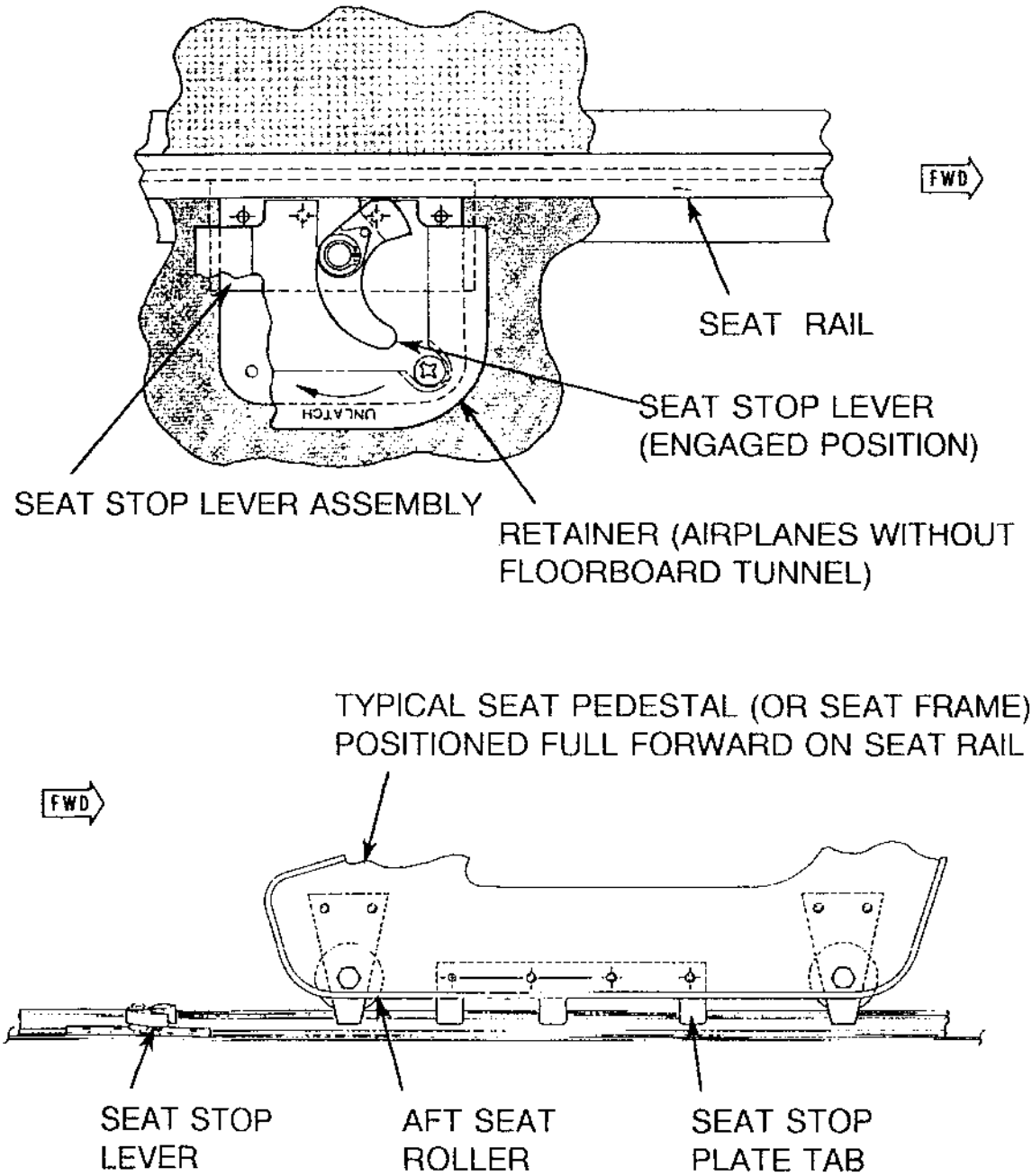


Figure 1. Secondary Seat Stop Installation

ground egress is required after a forced landing or ditching.

⚠ WARNING

The pilot seat cannot be moved aft appreciably without releasing both the normal locking device and the secondary seat stop simultaneously.

SECTION 4
NORMAL PROCEDURES

During the Preflight Inspection, test the pilot's seat for proper operation by releasing the seat locking pins, moving the seat full forward, and then pushing the seat aft. If operating normally, rearward movement of the seat will be stopped when the aft roller housing on the seat contacts the secondary seat stop. Then momentarily unlatch the secondary seat stop and move the seat farther aft to test that each seat stop plate tab contacts the secondary seat stop to restrict seat movement. When the seat is again moved full forward, the secondary seat stop should momentarily rotate to an unlatched position to allow the passage of each stop plate tab and the aft seat roller housing.

The pilot should demonstrate the operation of all seats to the passengers before flight.

SECTION 5
PERFORMANCE

There is no change to the airplane performance when the pilot's secondary seat stop is installed.

LOG OF APPROVED SUPPLEMENTS

Register.: OE-DLP
Type: Cessna FR172G
Serial No.: 172-0179

DIAMOND Aircraft Industries GmbH
A-2700 Wr. Neustadt N. A. Ottostr 5

Supp.	*SUPPLEMENT Name*	*Rev. Level*
1	King KX155 COMM/NAV	0
2	Bendix/King KR87 ADF	0

A.C.G. APPROVED:

by:

Date: 25. JUNI 2003

FLIGHT MANUAL SUPPLEMENT

ACG APPROVED FLIGHT MANUAL SUPPLEMENT

Register.: OE-DLP
Type: Cessna FRG
Serial No.: 172-0179

KX 155 COMM NAV
BENDIX/KING

SUPPLEMENT 1.

DIAMOND Aircraft Industries GmbH
A-2700 Wr. Neustadt N. A. Ottostr 5

A.C.G. APPROVED:

by: Date: 24 NOV 2000

COMM NAV

KX 155

Table of Contents

This document must be carried in the aircraft at all times. It describes the operating procedures for the BENDIX/KING KX155 navigation system.

The Information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this document, consult the basic Airplane Flight Manual.

SECTION I.
GENERAL

DESCRIPTION:

1. Both NAV and COMM frequency displays on these units incorporate the popular “flip-flop” preselect feature. So, you can set up en route or approach frequency changeovers well in advance of your actual transition point or ATC handoff sequence for true “stay ahead” flight management.

Just select your upcoming NAV or COMM frequency in the “standby” (STBY) display, and you’re all set to “flip-flop” it into “active” status at the press of a button. This function my also be controlled from an optional remote mounted switch.

Both “active” and “standby” frequencies are displayed simultaneously, so you never have to worry about what’s being stored. And there’s no chance of inadvertently erasing a frequency just when you need it most.

An innovative non-volative memory circuit holds all the displayed frequencies in storage-through aircraft shutdowns or momentary power interruptions-without the need for battery power of any kind.

Large self-dimming, microprocessor-controlled gas discharge readouts and solid-state electronic tuning provide fast , accurate selection of all 200 NAV and 760 COMM frequencies - KX155 feature a built-in 40-channel glideslope receiver.

On the COMM side, KX155 system gives you 10 watts minimum transmitter power for maximum range and clarity.

SECTION II.
LIMITATIONS

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

SECTION III.
EMERGENCY PROCEDURES

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

SECTION IV.
NORMAL PROCEDURES

COMMUNICATION RECEIVER-TRANSMITTER OPERATION:

1. OFF/PULL/TEST Volume Control - Turn clockwise; pull out and adjust to desired audio level; push control back in to activate the automatic Squelch.

2. MIC Selector Switch (on audio control panel) - SET to COMM 1.
3. SPEAKER Selector (on audio control panel) - SET to desired mode.
4. COMM Frequency Selector Knobs - Select desired operating frequency.
5. COMM Transfer Button - PRESS to transfer desired frequency from the STBY display into the COMM display.
6. MIC Button:
   a. To transmit - Press button and speak in microphone.

NOTE

During COMM transmission, a lighted “T” will appear between the “COMM” and “STBY” displays to indicate that the transceiver is operating in the transmit code.

   b. To Receive - RELEASE mike button.

NAVIGATION RECEIVER OPERATION:

1. NAV Frequency Selector Knobs - SELECT desired operating frequency in “STBY” display.
2. NAV TRANSFER BUTTON - PRESS to transfer desired frequency from the “STBY” display into the “NAV” display.
3. Speaker Selector (on audio panel) - SET to desired mode.
4. NAV Volume Control -
   a. ADJUST to desired audio level.
   b. PULL out to identify station.

VOR OPERATION:
Channel the NAV Receiver to the desired VOR and monitor the

audio to positively identify the station. To select an OBS course, turn the OBS knob to set the desired course. When a signal is received, the NAV flag will pull out of view and show a “TO” or “FROM” flag as appropriate for the selected course.

LOC OPERATION:

Localizer circuitry is energized when the NAV Receiver is channelled to an ILS frequency. Monitor the LOC audio and positively identify the station. The NAV flag will be out of view when the signal is of sufficient strength to be usable.

GLIDE SLOPE OPERATION:

The glide slope receiver is automatically channelled when a localizer frequency is selected. A separate warning flag is provided to indicate usable signal conditions.

SECTION V.
PERFORMANCE

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

SECTION VI.
WEIGHT AND BALANCE

See current weight and balance data.

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FLIGHT MANUAL SUPPLEMENT

ACG APPROVED FLIGHT MANUAL SUPPLEMENT

Register.: OE-DLP
Type: Cessna FR172G
Serial No.: 172-0179

KR 87 ADF
BENDIX/KING

SUPPLEMENT 2.

DIAMOND Aircraft Industries GmbH
A-2700 Wr. Neustadt N. A. Ottostr 5

APPROVED:

by: Austro Control GmbH 651 Date: 25. JUNI 2003

ADF

KR 87

Table of Contents

This document must be carried in the aircraft at all times. It describes the operating procedures for the B/K ADF KR87 navigation system when it has been installed in accordance with B/K Installation Manual 006-05184-0007 Rev. 7 and ACG approved of EO 017-FR172G-00.

For aircraft with an FAA Approved Airplane Flight Manual, this document serves as the ACG Approved Flight Manual Supplement for the B/K ADF KR87. For aircraft that do not have an Approved flight manual, this document serves as the ACG Approved Supplemental Flight Manual for the B/K ADF KR87.

The Information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this document, consult the basic Airplane Flight Manual.

SECTION I.
GENERAL

DESCRIPTION:

The Bendix/King Digital 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 1799-kHz and eliminates the need for mechanical band switching. The system is comprised of a receiver, a buil-in electronics timer, a bearing indicator, and a KA-44B combined loop and sense antenna. Operating controls and displays for the Bendix/King Digital ADF are shown and described in Figure 1.

The audio system used in conjunction with this radio for speaker-phone selection is shown and described in Supplement 1 of this handbook.

The Bendix/King Digital ADF can be used for position plotting and homing procedures, and for aural reception of amplitude-modulated (AM) signals.

The “flip-flop” frequency display allows switching between pre-selected “STANDBY” and “ACTIVE” frequencies by pressing the frequency transfer button. Both pre-selected frequencies are stored in a non-volatile memory circuit (no battery power required) and displayed in large, easy-to-read, self-dimming gas discharge numeric. The active frequency is continuously displayed in the left window, while the right window will display either the standby frequency or the selected readout from the built-in electronic timer.

The built-in electronic timer has two separate and independent timing functions. An automatic flight timer that starts whenever the unit is turned on, functions up to 59 hours and 59 minutes. And an elapsed timer which will count up or down for up to 59 minutes and 59 seconds. When a preset time interval has been programmed and the countdown reaches :00, the display will flash for 15 seconds. Since both the flight timer and elapsed timer operate independently, it is possible to monitor either one without disrupting the other. The pushbutton controls and the bearing indicators are internally lighted. Intensity is controlled by the RADIO light dimming rheostat.

ANT/ADF MODE ANNUNCIATOR:

Antenna (ANT) is selected by the “out” position of the ADF button. This mode improves the audio reception and is usually used for station identification. The bearing pointer is deactivated and will park in the 90° relative position. Automatic Direction Finder (ADF) mode is selected by the depressed position of the ADF button. This mode activates the bearing pointer. The bearing pointer will point in the direction of the station relative to the aircraft heading.

IN-USE FREQUENCY DISPLAY:

The frequency to which the ADF is tuned is displayed here. The active ADF frequency can be changed directly when either of the timer functions is selected.

BFO (Beat Frequency Oscillator) ANNUNCIATOR:

The BFO mode, activated and annunciated when the “BFO” button is depressed, permits the carrier wave and associated morse code identifier broadcast on the carrier wave to be heard.

NOTE

CW signals (Morse Code) are unmodulated and no audio will be heard without use of BFO. This type of signal is not used in the United States air navigation. It is used in some foreign countries and marine beacons.

STANDBY FREQUENCY/FLIGHT TIME OR ELAPSED TIME ANNUNCIATION:

When FRQ is displayed the STANDBY frequency is displayed in the right hand display. The STANDBY frequency is selected using the frequency select knobs. The selected STANDBY frequency is put into the ACTIVE frequency windows by pressing the frequency transfer button. Either the standby frequency, the flight timer, or the elapsed time is displayed in this position. The flight timer and elapsed timer are displayed replacing the standby frequency which goes into “blind” memory to be called back at any time by depressing the FRQ button. Flight time or elapsed time are displayed and annunciated alternatively by depressing the FLT/ET button.

FLIGHT TIMER AND ELAPSED TIMER MODE ANNUNCIATION:

Either the elapsed time (ET) or flight time (FLT) mode is annunciated here.

FREQUENCY SELECT KNOBS:

Selects the standby frequency when FRQ is displayed and directly selects the active frequency whenever either of the time functions is selected. The frequency selector knobs may be rotated either clockwise or counterclockwise. The small knob is pulled out to tune the 1's. The small knob is pushed in to tune the 10's . The outer knob tunes the 100's with rollover into the 1000's up to 1799. The knobs are also used to set the desired time when the elapsed timer is used in the countdown mode.

ON/OFF/VOLUME CONTROL SWITCH (ON/OFF/VOL):

Controls primary power and audio output level. Clockwise rotation from OFF position applies primary power to the receiver; further clockwise rotation increases audio level. Audio muting causes the audio output to be muted unless the receiver is locked on a valid station.

SET/RESET ELAPSED TIMER BUTTON (SET/RST):

The set/reset button when pressed resets the elapsed timer whether it is being displayed or not.

FLIGHT TIMER/ELAPSED TIMER MODE SELECTOR BUTTON (FLT/ET):

The Flight Timer/Elapsed Timer mode selector button when pressed alternatively selects either Flight Timer mode or Elapsed Timer mode.

FREQUENCY TRANSFER BUTTON (FRQ):

The FRQ transfer button when pressed exchanges the active and standby frequencies. The new frequency becomes active and the former active frequency goes into standby.

BFO (Beat Frequency Oscillator) BUTTON:

The BFO button selects the BFO mode when in the depressed position. (See note under item 3.)

ADF BUTTON:

The ADF button selects either the ANT mode or the ADF mode. The ANT mode is selected with the ADF button in the out position. The ADF mode is selected with the ADF button in the depressed position.

LUBBER LINE:

Indicates relative or magnetic heading of the aircraft. The heading must be manually input by the pilot with the heading (HDG) knob.

COMPASS CARD:

Manually rotatable card that indicates relative or magnetic heading of aircraft, as selected by HDG knob.

BEARING POINTER:

Indicates relative or magnetic bearing to station as selected by HDG knob. If the relative heading of North (N) is manually selected under the lubber line by the pilot, then the bearing pointer indicates the relative bearing to the station. If the aircraft's magnetic heading is selected under the lubber line by the pilot, then the bearing pointer indicates the magnetic bearing to the station.

HEADING KNOB (HDG):

Rotates card to set in relative or magnetic heading of aircraft.

SECTION II.
LIMITATIONS

There is no change to airplane limitations when the KR 87 ADF is installed.

SECTION III.
EMERGENCY PROCEDURES

There are no changes to the basic airplane emergency procedures when the KR 87 ADF is installed.

SECTION IV.
NORMAL PROCEDURES

TO OPERATE AS AN AUTOMATIC DIRECTION FINDER:

1. OFF/VOL Control - ON.
2. Frequency Selector Knobs - SELECT desired frequency in the standby frequency display.
3. FRQ Button - Press to move the desired frequency from the standby to the active position.
4. ADF Selector Switch (on audio control panel) - SELECT as desired.
5. OFF/VOL Control - SET to desired volume level and identify that desired station is being received.
6. ADF Button - SELECT ADF mode and note relative bearing on indicator.

ADF TEST (PRE-FLIGHT or IN-FLIGHT):

1. ADF Button - SELECT ANT mode and note pointer moves to 90° position.

2. ADF Button - SELECT ADF mode and note the pointer moves without hesitation to the station bearing. Excessive pointer sluggishness, wavering or reversals indicate a signal that is too weak or a system malfunction.

TO OPERATE BFO:

1. OFF/VOL Control - ON.
2. BFO Button -PRESS on.
3. ADF Selector Buttons (on audio control panel) - SET to desired mode.
4. VOL Control - ADJUST to desired listening level.

NOTE

A 1000-Hz tone and Morse Code identifier is heard in the audio output when a CW signal is received.

TO OPERATE FLIGHT TIMER:

1. OFF/VOL Control - ON.
2. FLT/ET Mode Button - PRESS (once or twice) until FLT is annunciated. Timer will already be counting since it is activated by turning the unit on.
3. OFF/VOL Control - OFF and then ON if it is desired to reset the flight timer.

TO OPERATE AS A COMMUNICATIONS RECEIVER ONLY:

1. OFF/VOL Control - ON.
2. ADF Button - SELECT ANT mode.
3. Frequency Selector Knobs - SELECT desired frequency in the standby frequency display.
4. FRQ Button - PRESS to move the desired frequency from the standby to the active position.
5. ADF Selector Buttons (on audio control panel) - SET to desired mode.
6. VOL Control - ADJUST to desired listening level.

TO OPERATE ELAPSED TIME TIMER-COUNT UP MODE:

1. OFF/VOL Control - ON.
2. FLT/ET Mode Button - PRESS (once or twice) until ET is annunciated.
3. SET/RST Button - PRESS momentarily to reset elapsed timer to zero.

NOTE

The Standby Frequency which is in memory while Flight Time or Elapsed Time modes are being displayed may be called back by pressing the FRQ button, then transferred to active use by pressing the FRQ button again.

TO OPERATE ELAPSED TIME TIMER-COUNT DOWN MODE:

1. OFF/VOL Control.
2. FLT/ET Mode Button - PRESS (once or twice) until ET is annunciated.
3. SET/RST Button - PRESS until the ET begins to flash.
4. FREQUENCY SELECTOR KNOBS - SET desired time in the elapsed time display. The small knob is pushed in to tune the 10's. The outer knob tunes minutes up to 59 minutes.

NOTE

Selector knobs remain in the time set mode for 15 seconds after the last entry or until the SET/RST, FLT/ET or FRQ button is pressed.

5. SET/RST Button - PRESS to start countdown. When the timer reaches 0, it will start to count up as display flashes for 15 seconds.

NOTE

While FLT or ET are displayed, the active frequency on the left side of the window may be changed, by using the frequency selector knobs, without any effect on the stored standby frequency or the other modes.

ADF OPERATION NOTES:

ERRONEOUS ADF BEARING DUE TO RADIO FREQUENCY PHENOMENA:

AM radio frequencies occasionally will assign the same frequency to more than one station in an area. Certain conditions, such as Night Effect, may cause signals from such stations to overlap.This should be taken into consideration when using AM broadcast station for navigation. Sunspots and atmospheric phenomena may occasionally distort reception so that signals from two stations on the same frequency will overlap. For this reason, it is always wise to make positive identification of the station being tuned, by switching the function selector to ANT and listening for station call letters.

ELECTRICAL STORMS:

In the vicinity of electrical storms, an ADF indicator pointer tends to swing from the station tuned toward the Center of the storm.

NIGHT EFFECT:

This is a disturbance particularly strong just after sunset and just after dawn. An ADF indicator pointer may swing erratically at these times. If possible, tune to the most powerful station at the lowest frequency. If this is not possible, take the average of pointer oscillations to determine relative station bearing.

MOUNTAIN EFFECT:

Radio waves reflecting from the surface of mountains may cause the pointer to fluctuate or show an erroneous bearing. This should be taken into account when taking bearings over mountainous terrain.

COASTAL REFRACTION**:**

Radio waves may be refracted when passing from land to sea or when moving parallel to the coastline. This also should be taken into account.

SECTION V.
PERFORMANCE

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

SECTION VI.
WEIGHT AND BALANCE

See current weight and balance data.

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Cessna
FR 172 G
Serial Nr. 0179

Flight Manual Supplement

Garmin GNS 430

Aircraft Make: Cessna
Aircraft Model: FR 172 G
Aircraft Serial Number: 0179

GARMIN GNS 430 VHF Communications Transceiver / VOR/ILS Receiver / GPS Receiver

LBA APPROVED FLIGHT MANUAL SUPPLEMENT GARMIN GNS 430 VHF COMMUNICATIONS TRANSCEIVER / VOR/ILS RECEIVER / GPS RECEIVER

AIRCRAFT MAKE: Cessna

AIRCRAFT MODEL: FR 172 G

AIRCRAFT SERIAL NO.: 0179

This document must be carried in the aircraft at all times. It describes the operating procedures for the GARMIN GNC 430 navigation system when it has been installed in accordance with GARMIN Installation Manual 190-00140-02 Rev.___ (Rev. A or later).

For aircraft with an FAA/LBA Approved Airplane Flight Manual, this document serves as the LBA Approved Flight Manual Supplement for the GARMIN GNS 430. For aircraft that do not have an approved flight manual, this document serves as the LBA Approved Supplemental Flight Manual for the GARMIN GNS 430.

The Information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic Airplane Flight Manual.

LBA APPROVED

Date: 01. April 99

Aircraft Make: Cessna
Aircraft Model: FR172G
Aircraft Serial Number:: 0179

GARMIN GNS 430 VHF Communications Transceiver / VOR/ILS Receiver / GPS Receiver

Table of Contents

Aircraft Make: Cessna GARMIN GNS 430 VHF Communications
Aircraft Model: FR1726 Transceiver / VOR/ILS Receiver / GPS Receiver
Aircraft Serial Number:: 0179

SECTION I
GENERAL

1. The GNS 430 System is a fully integrated, panel mounted instrument, which contains a VHF Communications Transceiver, a VOR/ILS receiver, and a Global Positioning System (GPS) Navigation computer. The system consists of a GPS antenna, GPS Receiver, VHF VOR/LOC/GS antenna, VOR/ILS receiver, VHF COMM antenna and a VHF Communications Transceiver. The primary function of the VHF Communication portion of the equipment is to facilitate communication with Air Traffic Control. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS system satellites, recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.

2. Provided the GARMIN GNS 430's GPS receiver is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications for:

   - VFR/IFR enroute, terminal, and non-precision instrument approach (GPS, Loran-C,. VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) in accordance with AC 20-138.

   - North Atlantic Minimum Navigation Performance Specification (MNPS) Airspace in accordance with AC 91-49 and AC 120-33.

   Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. Navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.

SECTION II
LIMITATIONS

1. The GARMIN GNS 430 Pilot's Guide, P/N 190-00140-00, Rev. A, dated October, 1998, or later appropriate revision, must be immediately available to the flight crew whenever navigation is predicated on the use of the system.

Aircraft Make: Cessna · GARMIN GNS 430 VHF Communications
Aircraft Model: FR 172G Transceiver / VOR/ILS Receiver / GPS Receiver
Aircraft Serial Number:: 0179

2. The GNS 430 must utilize the following or later FAA approved software versions:

Sub-System	Software Version
Main	2.00
GPS	2.00
COMM	1.22
VOR/LOC	1.25
G/S	2.00

The Main software version is displayed on the GNS 430 self test page immediately after turn-on for 5 seconds. The remaining system software versions can be verified on the AUX group sub-page 2, „SOFTWARE/DATABASE VER".

3. IFR enroute and terminal navigation predicated upon the GNS 430's GPS Receiver is prohibited unless the pilot verifies the currency of the data base or verifies each selected waypoint for accuracy by reference to current approved data.

4. Instrument approach navigation predicated upon the GNS 430's GPS Receiver must be accomplished in accordance with approved instrument approach procedures that are retrieved from the GPS equipment data base. The GPS equipment database must incorporate the current update cycle.

   (a) Instrument approaches utilizing the GPS receiver must be conducted in the approach mode and Receiver Autonomous Integrity Monitoring (RAIM) must be available at the Final Approach Fix.

   (b) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for GPS overlay with the GNS 430's GPS receiver is not authorized.

   (c) Use of the GNS 430 VOR/ILS receiver to fly approaches not approved for GPS require VOR/ILS navigation data to be present on the external indicator.

   (d) When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation, the aircraft must have

the operational equipment capable of using that navigation aid, and the required navigation aid must be operational.

(e) VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee Step-Down Fix altitude protection, or arrival at approach minimums in normal position to land.

5. If not previously defined, the following default settings must be made in the „SETUP 1" menu of the GNS 430 prior to operation (refer to Pilot's Guide for procedure if necessary):

(a) **dis, spd** ..... nm kt (sets navigation units to „nautical miles" and „knots")
(b) **alt, vs** ..... ft fpm (sets altitude units to „feet" and „feet per minute")
(c) **map datum** . WGS 84 (sets map datum to WGS-84, see note below)
(d) **posn** ..... deg-min (sets navigation grid units to decimal minutes)

NOTE: In some areas outside the United States, datums other than WGS-84 or NAD-83 may be used. If the GNS 430 is authorized for use by the appropriate Airworthiness authority, the required geodetic datum must be set in the GNS 430 prior to its use for navigation.

SECTION III
EMERGENCY PROCEDURES

ABNORMAL PROCEDURES

1. If GARMIN GNS 430 navigation information is not available or invalid, utilize remaining operational navigation equipment as required.

2. If "RAIM POSITION WARNING" message is displayed the system will flag and no longer provide GPS based navigational guidance. The crew should revert to the GNS 430 VOR/ILS receiver or an alternate means of navigation other than the GNS 430's GPS Receiver.

3. If "RAIM IS NOT AVAILABLE" message is displayed in the enroute, terminal, or initial approach phase of flight, continue to navigate using the GPS equipment or revert to an alternate means of navigation other than the GNS 430's GPS receiver appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using the GNS 430's VOR/ILS receiver or another IFR-approved navigation system.

4. If "RAIM IS NOT AVAILABLE" message is displayed while on the final approach segment, GPS based navigation will continue for up to 5 minutes with approach CDI sensitivity (0.3 nautical mile). After 5 minutes the system will flag and no longer provide course guidance with approach sensitivity. Missed approach course guidance may still be available with 1 nautical mile CDI sensitivity by executing the missed approach.

5. In an in-flight emergency, depressing and holding the Comm transfer button for 2 seconds will select the emergency frequency of 121.500 Mhz into the "Active" frequency window.

SECTION IV
NORMAL PROCEDURES

1. DETAILED OPERATING PROCEDURES

Normal operating procedures are described in the GARMIN GNS 430 Pilot's Guide, P/N 190-00140-00, Rev. A, dated October, 1998, or later appropriate revision.

2. PILOT'S DISPLAY

The GNS 430 System data will appear on the Pilot's HSI. The source of data is either GPS or VLOC as annunciated on the display above the CDI key.

3. AUTOPILOT / FLIGHT DIRECTOR OPERATION

Coupling of the GNS 430 System steering information to the autopilot/flight director can be accomplished by engaging the autopilot/flight director in the NAV or APR mode.

When the autopilot/flight director system is using course information supplied by the GNS 430 System and the course pointer is not automatically driven to the desired track, the course pointer on the HSI must be manually set to the desired track (DTK) indicated by the GNS 430. For detailed autopilot/flight director operational instructions, refer to the FAA/LBA Approved Flight Manual Supplement for the autopilot/flight director.

Aircraft Make: Cessna
Aircraft Model: FR 172 G
Aircraft Serial Number:: 0179

GARMIN GNS 430 VHF Communications Transceiver / VOR/ILS Receiver / GPS Receiver

SECTION V
PERFORMANCE

No change.

SECTION VI
WEIGHT AND BALANCE

See current weight and balance data.

SECTION VII
AIRPLANE & SYSTEM DESCRIPTIONS

See GNS 430 Pilot's Guide for a complete description of the GNS 430 system.

AUSRÜSTUNGSLISTE - EQUIPMENT LIST

Datum: 19.04.2005

Kennzeichen: **OE-DLP** Baumuster: **Cessna FR 172 G** S/N: **FR172-0179**

Pos.	Description	*	Hersteller	P/N	S/N	Bemerkung
1	**Propeller**	X	Mc Cauley	D2A34C67-LNP / S76C-0	692249	
1.1	Governor	X	Mc Cauley	C290D2K/T6	69570DF	
2	**Motor**	X	TCM	IO-360-DB20	808839-R	
2.1	Vergaser	X				
2.2	Benzinpumpe	X				
2.3	Vacuumpumpe	X				
2.4	Magnet	X	TCM	S6LN25 (BL500556-3)	D02CA1912	
2.5	Magnet	X	TCM	S6LN25 (BL500556-3)	D02CA188R	
2.6	Alternator	X	TCM	633661 (C611501 0204)	K290104	
2.7	Starter	X	TCM	646238-2	G-060080	
2.8	FCU					
3	**Elektrik**					
3.1	Batterie	X	Gill	G-35	G02036961	
3.2	Voltage Regulator	X				
3.3	Amperemeter	X				
3.4	Strobe light	X				
3.5	Landing light	X				
3.6	Taxi light	X				
3.7	Nav. light	X				
4	**Instrumente**					
4.1	Höhenmesser	X	United Instruments	5934PM-1	4B099	
4.2	Höhenmesser	X	United Instruments	5934PD-3	5K574	
4.3	Höhenm. inkl. Enc.					
4.4	Digitizer	X	TCI	D120-P2-T	71038	
4.5	Fahrtmesser	X	United Instruments	8030	127706	
4.6	Fahrtmesser					
4.7	VSI					
4.8	Kompaß	X				
4.9	Gyro-Horizont	X				
4.10	Gyro-Directional	X	R. C. Allen	RCA11A-8	42H0313G	
4.11	Wendezeiger/T/B	X				
4.12	Drehzahlmesser	X				
4.13	Öltemperatur	X				
4.14	Öldruck	X				
4.15	EGT	X				
4.16	Manifoldgage	X				
4.17	Vergasertemp.					
4.18	Uhr	X				
4.19	Suction Gage	X				

*) mit X ankreuzen, wenn vorhanden

AUSRÜSTUNGSLISTE - EQUIPMENT LIST

Datum:

Kennzeichen: **OE-DLP** Baumuster: **Cessna FR 172 G** S/N: **FR172-0179**

Pos.	Description	*	Hersteller	P/N	S/N	Bemerkung
5	**Radio (Avionic)**					
5.1	ELT	X	Pointer	3000	320544	
5.2	GPS/NAV1/COM1	X	Garmin	GNS 430 (010-00139-11)	97124443	
5.3	NAV2/COM2	X	Alliedsignal	KX155 (069-1024-42)	33306	
5.4	NAV Indicator 1	X	Garmin	GI 106 (013-00049-00)	B05-10205	
5.5	NAV Indicator 2	X	?	?	?	
5.6	Transponder	X	King	KT76A (066-1062-00)	76240	
5.7	ADF Receiver	X	Bendix	KR87 (066-01072-0004)	72539	
5.8	ADF Ind.	X	Bendix	KI227 (066-03063-0000)	46717	
5.9	DME	X	King	KN62A (066-1068-01)	14200	
5.10	Marker	X				
5.11	Headset	X				
5.12	Avion. Cooling Fan					
5.13	Autopilot					
5.14	Electr. Trim					
5.15	GPS					
5.16	Stormscope					
5.17	Intercom	X		PM501	WA-07428	
5.18	GPS Annunciator	X	Mid-Continent	MD-4 ACU (MD41-1464A)	F211063	
6	**Zus. Ausrüstung**					
6.1	Feuerlöscher	X				
6.2	Sanipack	X				
6.3	Taschenlampe	X				
6.4	Schleppkupplung					
6.5	Torque-Indicator					
6.6	TOT-Indicator					
6.7	N1-Indicator					
6.8	NP-Indicator					
6.9	XMSN-Oil-Press.					
6.10	Hobbs Meter					
6.11	Fuel Totalizer					

*) mit X ankreuzen, wenn vorhanden