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CZECH REPUBLIC

PAGE OF ACCEPTANCE

CIVIL AVIATION AUTHORITY OF THE CZECH REPUBLIC ACCEPTS THIS Pilot's  
Operating Handbook DOC.No 206HPHUS05 APPROVED ORIGINALLY BY FAA

FOR THE AIRCRAFT TYPE : Cessna T 206H  
WITH THESE LIMITATIONS : No additional limitations to this Flight Manual

NATIONALITY OR COMMON MARK AND REGISTRATION MARK

OK-MCP

AIRPLANE SERIAL NUMBER : T20608172

THIS MANUAL MUST BE MAINTAINED IN ACCORDANCE WITH  
REVISION SERVICE OF THE MANUFACTURER

19-12-2005

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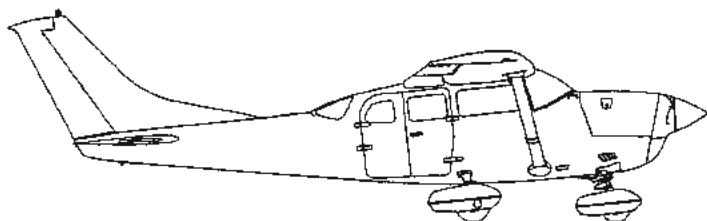


(Ing Bláha)

Podpis -Signature



# Pilot's Operating Handbook and FAA Approved Airplane Flight Manual



THIS DOCUMENT MUST BE  
CARRIED IN THE AIRPLANE  
AT ALL TIMES.

The Cessna Aircraft  
Company

Model T206H

Serial No. T20608172

Registration No. \_\_\_\_\_

This publication includes the material required to be furnished to the pilot by FAR Part 23 and constitutes the FAA Approved Airplane Flight Manual.

#### FAA APPROVAL

FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co  
Delegation Option Manufacturer CE-1

*Michael W. Wilby* Executive Engineer

Date: 19 December 1998

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Original Issue - 9 November 1998

THIS MANUAL WAS PROVIDED FOR THE  
AIRPLANE IDENTIFIED ON THE TITLE  
PAGE ON \_\_\_\_\_  
SUBSEQUENT REVISIONS SUPPLIED BY  
CESSNA AIRCRAFT COMPANY MUST BE  
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\_\_\_\_\_  
Cessna Aircraft Company, Aircraft Division

CESSNA  
MODEL T206H

PUBLICATION PART NUMBER

**Pilot's Operating Handbook  
and**

**FAA Approved Airplane Flight Manual**

**Model T206H Serials T20608001 and On**

**Original Issue - 9 November 1998**

Revision 6 - 12 January 2004

PART NUMBER: T206HPLUS06

## CONGRATULATIONS . . . .

Congratulations on your purchase and welcome to Cessna ownership! Your Cessna has been designed and constructed to give you the most in performance, value and comfort.

This Pilot's Operating Handbook has been prepared as a guide to help you get the most utility from your airplane. It contains information about your airplane's equipment, operating procedures, performance and suggested service and care. Please study it carefully and use it as a reference.

The worldwide Cessna Organization and Cessna Customer Service are prepared to serve you. The following services are offered by each Cessna Service Station:

- THE CESSNA AIRPLANE WARRANTIES, which provide coverage for parts and labor, are upheld through Cessna Service Stations worldwide. Warranty provisions and other important information are contained in the Customer Care Program Handbook supplied with your airplane. The Customer Care Card assigned to you at delivery will establish your eligibility under warranty and should be presented to your local Cessna Service Station at the time of warranty service.
- FACTORY TRAINED PERSONNEL to provide you with courteous, expert service.
- FACTORY APPROVED SERVICE EQUIPMENT to provide you efficient and accurate workmanship.
- A STOCK OF GENUINE CESSNA SERVICE PARTS are available when you need them.
- THE LATEST AUTHORITATIVE INFORMATION FOR SERVICING CESSNA AIRPLANES. Cessna Service Stations have all of the current Maintenance Manuals, Illustrated Parts Catalogs and various other support publications produced by Cessna Aircraft Company.

A current Cessna Service Station Directory accompanies your new airplane. The Directory is revised frequently, and a current copy can be obtained from your nearest Cessna Service Station.

We urge all Cessna owners/operators to utilize the benefits available within the Cessna Organization.

## PERFORMANCE - SPECIFICATIONS

**\* SPEED**

Maximum at 17,000 Ft. ....	178 KNOTS
Cruise, 75% Power at 20,000 Ft. ....	164 KNOTS
Cruise, 75% Power at 10,000 Ft. ....	150 KNOTS

**CRUISE:** Recommended lean mixture with fuel allowance for engine start, taxi, takeoff, climb and 45 minutes reserve.

**Serials T20608001 thru T20608361:**

75% Power at 20,000 Ft. ....	Range	568 NM
88 Gallons Usable Fuel	Time	3.7 HRS
75% Power at 10,000 Ft. ....	Range	541 NM
88 Gallons Usable Fuel	Time	3.7 HRS
Maximum Range at 20,000 Ft. ....	Range	692 NM
88 Gallons Usable Fuel	Time	6.1 HRS
Maximum Range at 10,000 Ft. ....	Range	713 NM
88 Gallons Usable Fuel	Time	6.4 HRS

**Serials T20608362 and on:**

75% Power at 20,000 Ft. ....	Range	559 NM
87 Gallons Usable Fuel	Time	3.6 HRS
75% Power at 10,000 Ft. ....	Range	533 NM
87 Gallons Usable Fuel	Time	3.6 HRS
Maximum Range at 20,000 Ft. ....	Range	682 NM
87 Gallons Usable Fuel	Time	6.0 HRS
Maximum Range at 10,000 Ft. ....	Range	703 NM
87 Gallons Usable Fuel	Time	6.3 HRS

RATE OF CLIMB AT SEA LEVEL ..... 1050 FPM

SERVICE CEILING ..... 27,000 FT

## PERFORMANCE-SPECIFICATIONS

(Continued)

### TAKEOFF PERFORMANCE:

Ground Roll .....	910 FT
Total Distance Over 50 Ft. Obstacle .....	1740 FT

### LANDING PERFORMANCE:

Ground Roll .....	735 FT
Total Distance Over 50 Ft. Obstacle .....	1395 FT

### STALL SPEED (KCAS):

Flaps Up, Power Off .....	62 KCAS
Flaps Down, Power Off .....	54 KCAS

### MAXIMUM WEIGHT:

Ramp .....	3617 LBS
Takeoff or Landing .....	3600 LBS

### STANDARD EMPTY WEIGHT:

Serials T20608001 thru T20608361 .....	2304 LBS
Serials T20608362 and on .....	2299 LBS

### MAXIMUM USEFUL LOAD:

Serials T20608001 thru T20608361 .....	1313 LBS
Serials T20608362 and on .....	1318 LBS

BAGGAGE ALLOWANCE .....

180 LBS

WING LOADING: Lbs./Sq. Ft. ....

20.7

POWER LOADING Lbs./HP .....

11.6

## PERFORMANCE-SPECIFICATIONS

(Continued)

FUEL CAPACITY .....	92 GAL
OIL CAPACITY .....	11 QTS
ENGINE: Textron Lycoming .....	TIO-540-AJ1A 310 BHP at 2500 RPM
PROPELLER: Diameter .....	79 IN.

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

- \* Speed performance and range are shown for an airplane equipped with the standard wheel and brake fairings. These fairings increase the speeds approximately 3 knots over an airplane without the fairings. Heavy duty wheels, tires and brakes are available and when installed with the appropriate wheel and brake fairings result in no significant change in performance.



## COVERAGE

The Pilot's Operating Handbook located in the airplane at the time of delivery from Cessna Aircraft Company contains information applicable to the Model T206H airplane by serial number and registration number shown on the Title Page. This handbook is applicable to airplane serial number T20608001 and On. All information is based on data available at the time of publication.

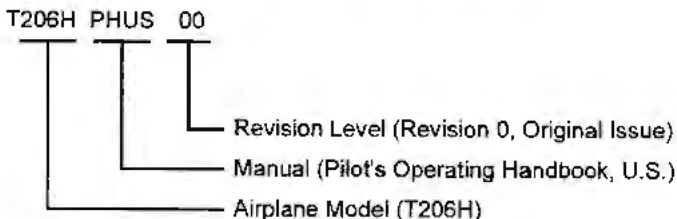
This handbook is comprised of nine sections that cover all operational aspects of a standard-equipped airplane. Following Section 8 are the Supplements, Section 9, which provide expanded operational procedures for the avionics equipment (both standard and optional), and provides information on special operations.

Supplements are individual documents, and may be issued or revised without regard to revision dates which apply to the POH itself. These supplements contain a Log of Effective Pages, which should be used to determine the status of each supplement.

## ORIGINAL ISSUE AND REVISIONS

This Pilot's Operating Handbook and FAA Approved Airplane Flight Manual is comprised of the original issue and any subsequent revisions. To ensure that information in this manual is current, the revisions must be incorporated as they are issued. This manual was originally issued on November 9, 1998. As revisions are issued, they will be noted in the Log of Effective Pages table.

The part number of this manual has also been designed to further aid the owner/operator in determining the revision level of any POH. Refer to the example below for a breakdown:



(Continued Next Page)

## ORIGINAL ISSUE AND REVISIONS

(Continued)

It is the responsibility of the owner to maintain this handbook in a current status when it is being used for operational purposes. Owners should contact their Cessna Service Station whenever the revision status of their handbook is in question.

Revisions are distributed to owners of U.S. Registered aircraft according to FAA records at the time of revision issuance, and to Internationally Registered aircraft according to Cessna Owner Advisory records at the time of issuance. Revisions should be read carefully upon receipt and incorporated in this POH.

## REVISION FILING INSTRUCTIONS

### REGULAR REVISIONS

Pages to be removed or inserted in the Pilots' Operating Handbook and FAA Approved Airplane Flight Manual are determined by the Log of Effective Pages located in this section. This log contains the page number and date of issue/revision level for each page within the POH. At original issue, all pages will contain the same date. As revisions to the POH occur, these dates/revision levels will change on effected pages. When two pages display the same page number, the page with the latest date/revision level shall be inserted into the POH. The date/revision level on the Log of Effective Pages shall also agree with the latest date/revision level of the page in question.

### TEMPORARY REVISIONS

Under limited circumstances, temporary revisions to the POH may be issued. These temporary revisions are to be filed in the applicable section in accordance with filing instructions appearing on the first page of the temporary revision.

The recession of a temporary revision is accomplished by incorporation into the POH at revision time or by a superseding temporary revision. In order to accurately track the status of temporary revisions as they pertain to a POH, a Temporary Revision List will be located previous to this section when required. This list will indicate the date the temporary revision was incorporated into the POH, thus authorizing the recession of the temporary revision.

## IDENTIFYING REVISED MATERIAL

Additions or revisions to the text in an existing section will be identified by a vertical line (revision bar) adjacent to the applicable revised area on the outer margin of the page.

When technical changes cause unchanged text to appear on a different page, a revision bar will be placed in the outer lower margin of the page, opposite the page number and date/revision level of the page. These pages will display the current date/revision level as found in the Original Issue and Revisions paragraph of this section.

When extensive technical changes are made to text in an existing section that requires extensive revision, revision bars will appear the full length of text.

New or existing art that is revised or added to an existing section will be identified by a single pointing hand indicator adjacent to the figure title and figure number. Some existing art which was previously revised will have pointing hand(s) adjacent to the portion of the art which has changed.

## WARNINGS, CAUTIONS AND NOTES

Throughout the text, warnings, cautions and notes pertaining to airplane handling and operations are utilized. These adjuncts to the text are used to highlight or emphasize important points.

**WARNING** - Calls attention to use of methods, procedures or limits which must be followed precisely to avoid injury or death to persons.

**CAUTION** - Calls attention to methods, procedures or limits which must be followed to avoid damage to equipment.

**NOTE** - Calls attention to additional procedures or information pertaining to the text.

## LOG OF EFFECTIVE PAGES

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the POH. Pages which are affected by the current revision will carry the date of that revision.

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1	12 April 2000	5	13 May 2002
2	30 December 2000	6	12 January 2004
3	30 May 2001		

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7-74	Revision 5		

## APPROVED BY

FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co.  
Delegation Option Authorization DCA-102/28-CE

*Michael W. Hestley*      Executive Engineer

DATE OF APPROVAL 01-12-04

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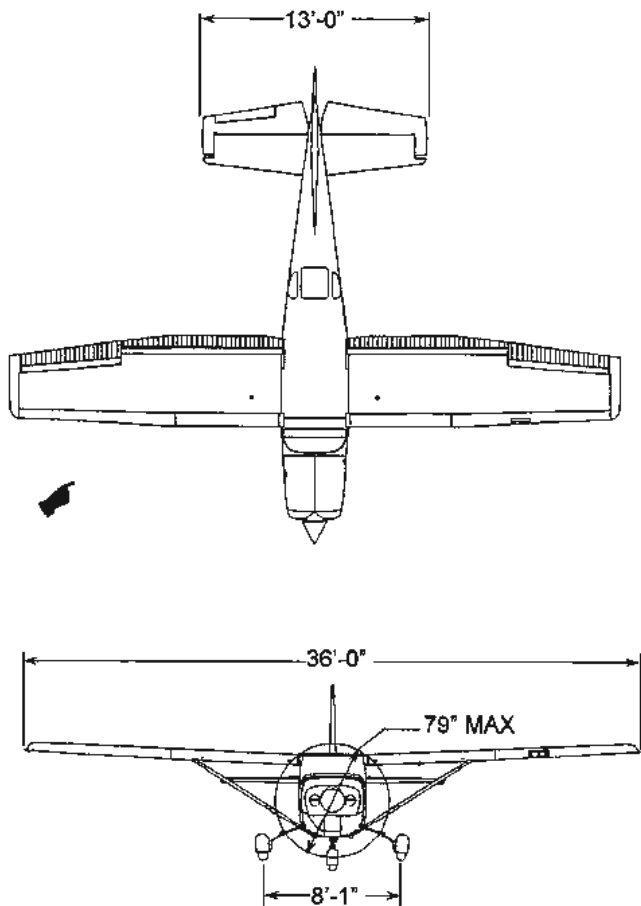
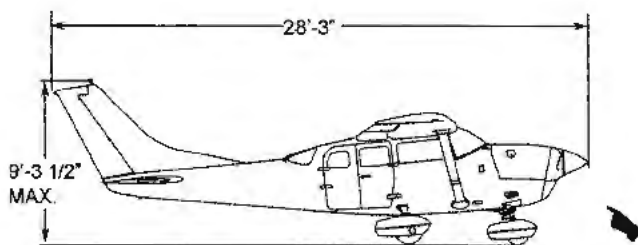


Figure 1-1. Three View - Normal Ground Attitude (Sheet 1 of 2)

3210T1002  
3210T1002



- NOTE 1:** WING SPAN SHOWN WITH STROBE LIGHTS INSTALLED.
- NOTE 2:** WHEEL BASE LENGTH IS 69 1/4".
- NOTE 3:** PROPELLER GROUND CLEARANCE IS 12".
- NOTE 4:** WING AREA IS 174 SQUARE FEET.
- NOTE 5:** MINIMUM TURNING RADIUS (\* PIVOT POINT TO OUTBOARD WING TIP) IS 26'-3".
- NOTE 6:** NORMAL GROUND ATTITUDE IS SHOWN WITH NOSE STRUT SHOWING APPROXIMATELY 2" OF STRUT, AND WINGS LEVEL.

1210T1015

Figure 1-1. Three View - Normal Ground Attitude (Sheet 2 of 2)

## INTRODUCTION

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

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

## DESCRIPTIVE DATA

### ENGINE

Number of Engines: 1.

Engine Manufacturer: Textron Lycoming.

Engine Model Number: TIO-540-AJ1A.

Engine Type: Turbo charged, direct drive, air-cooled,  
horizontally opposed, fuel injected, six cylinder  
engine with 541.5 cu. in. displacement.

Horsepower Rating and

Engine Speed: 310 rated BHP at 39 inches Hg. and 2500 RPM.

### PROPELLER

Propeller Manufacturer: McCauley Propeller Systems.

Propeller Model Number: B3D36C432/80VSA-1.

Number of Blades: 3.

Propeller Diameter: 79 inches.

Propeller Type: Constant speed and hydraulically actuated, with a  
low pitch setting of 16.9° and a high pitch setting of  
33.8° (30 inch station).

### FUEL

#### WARNING

**USE OF UNAPPROVED FUELS MAY RESULT IN  
DAMAGE TO THE ENGINE AND FUEL SYSTEM  
COMPONENTS, RESULTING IN POSSIBLE  
ENGINE FAILURE.**

(Continued Next Page)

**DESCRIPTIVE DATA** (Continued)

**FUEL** (Continued)

Approved Fuel Grades (and Colors):  
100LL Grade Aviation Fuel (Blue).  
100 Grade Aviation Fuel (Green).

**NOTE**

Isopropyl alcohol or diethylene glycol monomethyl ether (DIEGME) may be added to the fuel supply. Additive concentrations shall not exceed 1% for isopropyl alcohol or 0.10% to 0.15% for DIEGME. Refer to Section 8 for additional information.

**Fuel Capacity**

**Serials 20608001 thru 20608361:**

Total Capacity: 92.0 U.S. gallons.  
Total Usable: 88.0 U.S. gallons.  
Total Capacity Each Tank: 46.0 U.S. gallons.  
Total Usable Each Tank: 44.0 U.S. gallons.

**Serials 20608362 and on:**

Total Capacity: 92.0 U.S. gallons.  
Total Usable: 87.0 U.S. gallons.  
Total Capacity Each Tank: 46.0 U.S. gallons.  
Total Usable Each Tank: 43.5 U.S. gallons.

**NOTE**

To ensure maximum fuel capacity and minimize cross-feeding when refueling, always park the airplane in a wings-level, normal ground attitude and place the fuel selector in the Left or Right position. Refer to Figure 1-1 for normal ground attitude dimensions.

(Continued Next Page)

**SECTION 1  
GENERAL**

**CESSNA  
MODEL T206H**

**OIL**

Oil Specification:

MIL-L-22851 or SAE J1899 Aviation Grade Ashless Dispersant Oil: Oil conforming to Textron Lycoming Service Instruction No. 1014, and all revisions and supplements thereto, must be used.

Recommended Viscosity for Temperature Range:

Temperature	MIL-L-22851 or SAE J1899 Ashless Dispersant Oil SAE Grade
Above 27°C (80°F)	60
Above 16°C (60°F)	40 or 50
-1°C (30°F) to 32°C (90°F)	40
-18°C (0°F) to 21°C (70°F)	30, 40 or 20W-40
Below -12°C (10°F)	30 or 20W-30
-18°C (0°F) to 32°C (90°F)	20W-50 OR 15W-50
All Temperatures	15W-50 or 20W-50

**NOTE**

When operating temperatures overlap, use the lighter grade oil.

Oil Capacity:

Sump: 11 U.S. Quarts

Total: 12 U.S. Quarts

## DESCRIPTIVE DATA (Continued)

### MAXIMUM CERTIFICATED WEIGHTS

Ramp Weight :	3617 lbs.
Takeoff Weight:	3600 lbs.
Landing Weight:	3600 lbs.

Weight in Baggage Compartment (Station 109 to 145): 180 lbs. maximum.

### NOTE

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

### STANDARD AIRPLANE WEIGHTS

<b>Serials T20608001 thru T20608361:</b>	
Standard Empty Weight:	2304 lbs.
Maximum Useful Load, Normal Category:	1313 lbs.

<b>Serials T20608362 and on:</b>	
Standard Empty Weight:	2299 lbs.
Maximum Useful Load, Normal Category:	1318 lbs.

### CABIN AND ENTRY DIMENSIONS

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

### BAGGAGE SPACE AND ENTRY DIMENSIONS

Dimensions of the baggage/cargo area and cargo door opening are illustrated in detail in Section 6.

### SPECIFIC LOADINGS

Wing Loading:	20.7 lbs./sq. ft.
Power Loading:	11.6 lbs./hp.

## SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

### GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

KCAS	<b>Knots Calibrated Airspeed</b> is indicated airspeed corrected for position and instrument error and expressed in knots. Knots calibrated airspeed is equal to KTAS in standard atmosphere at sea level.
KIAS	<b>Knots Indicated Airspeed</b> is the speed shown on the airspeed indicator and expressed in knots.
KTAS	<b>Knots True Airspeed</b> is the airspeed expressed in knots relative to undisturbed air which is KCAS corrected for altitude and temperature.
$V_A$	<b>Maneuvering Speed</b> is the maximum speed at which full or abrupt control movements may be used.
$V_{FE}$	<b>Maximum Flap Extended Speed</b> is the highest speed permissible with wing flaps in a prescribed extended position.
$V_{NO}$	<b>Maximum Structural Cruising Speed</b> is the speed that should not be exceeded except in smooth air, then only with caution.
$V_{NE}$	<b>Never Exceed Speed</b> is the speed limit that may not be exceeded at any time.
$V_S$	<b>Stalling Speed or the minimum steady flight speed</b> is the minimum speed at which the airplane is controllable.
$V_{SO}$	<b>Stalling Speed or the minimum steady flight speed</b> is the minimum speed at which the airplane is controllable in the landing configuration at the most forward center of gravity.





- $V_X$  **Best Angle-of-Climb Speed** is the speed which results in the greatest gain of altitude in a given horizontal distance.
- $V_Y$  **Best Rate-of-Climb Speed** is the speed which results in the greatest gain in altitude in a given time.

#### METEOROLOGICAL TERMINOLOGY

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

#### ENGINE POWER TERMINOLOGY

- BHP** **Brake Horsepower** is the power developed by the engine.
- RPM** **Revolutions Per Minute** is engine speed.
- Static RPM** **Static RPM** is engine speed attained during a full throttle engine runup when the airplane is on the ground and stationary.
- MP** **Manifold Pressure** is a pressure measured in the engine's induction system and is expressed in inches of mercury (in Hg).

**AIRPLANE PERFORMANCE AND FLIGHT PLANNING  
TERMINOLOGY**

Demonstrated Crosswind Velocity	<b>Demonstrated Crosswind Velocity</b> is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests. The value shown is not considered to be limiting.
Usable Fuel	<b>Usable Fuel</b> is the fuel available for flight planning.
Unusable Fuel	<b>Unusable Fuel</b> is the quantity of fuel that can not be safely used in flight.
GPH	<b>Gallons Per Hour</b> is the amount of fuel consumed per hour.
NMPG	<b>Nautical Miles Per Gallon</b> is the distance which can be expected per gallon of fuel consumed at a specific engine power setting and/or flight configuration.
g	<b>g</b> is acceleration due to gravity.
Course Datum	<b>Course Datum</b> is the compass reference used by the autopilot, along with course deviation, to provide lateral control when tracking a navigation signal.

### WEIGHT AND BALANCE TERMINOLOGY

Reference Datum	<b>Reference Datum</b> is an imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	<b>Station</b> is a location along the airplane fuselage given in terms of the distance from the reference datum.
Arm	<b>Arm</b> is the horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Moment	<b>Moment</b> is the product of the weight of an item multiplied by its arm. (Moment divided by the constant 1000 is used in this handbook to simplify balance calculations by reducing the number of digits.)
Center of Gravity (C.G.)	<b>Center of Gravity</b> is the point at which an airplane, or equipment, would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	<b>Center of Gravity Arm</b> is the arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	<b>Center of Gravity Limits</b> are the extreme center of gravity locations within which the airplane must be operated at a given weight.
Standard Empty Weight	<b>Standard Empty Weight</b> is the weight of a standard airplane, including unusable fuel, full operating fluids and full engine oil.
Basic Empty Weight	<b>Basic Empty Weight</b> is the standard empty weight plus the weight of optional equipment.
Useful Load	<b>Useful Load</b> is the difference between ramp weight and the basic empty weight.
MAC	<b>MAC (Mean Aerodynamic Chord)</b> is the chord of an imaginary rectangular airfoil having the same pitching moments throughout the flight range as that of the actual wing.

SECTION 1  
GENERAL

CESSNA  
MODEL T206H

Maximum Ramp Weight	<b>Maximum Ramp Weight</b> is the maximum weight approved for ground maneuver, and includes the weight of fuel used for start, taxi and runup.
Maximum Takeoff Weight	<b>Maximum Takeoff Weight</b> is the maximum weight approved for the start of the takeoff roll.
Maximum Landing Weight	<b>Maximum Landing Weight</b> is the maximum weight approved for the landing touchdown.
Tare	<b>Tare</b> is the weight of chocks, blocks, stands, etc. used when weighing an airplane, and is included in the scale readings. Tare is deducted from the scale reading to obtain the actual (net) airplane weight.

## **METRIC / IMPERIAL / U.S. CONVERSION CHARTS**

The following charts have been provided to help international operators convert U.S. measurement supplied with the Pilot's Operating Handbook into metric and imperial measurements.

The standard followed for measurement units shown, is the National Institute of Standards Technology (NIST), Publication 811, "Guide for the Use of the International System of Units (SI)."

Please refer to the following pages for these charts.

SECTION 1  
GENERAL

CESSNA  
MODEL T206H

(Kilograms × 2.205 = Pounds)      (Pounds × .454 = Kilograms)

**KILOGRAMS TO POUNDS  
KILOGRAMMES EN LIVRES**

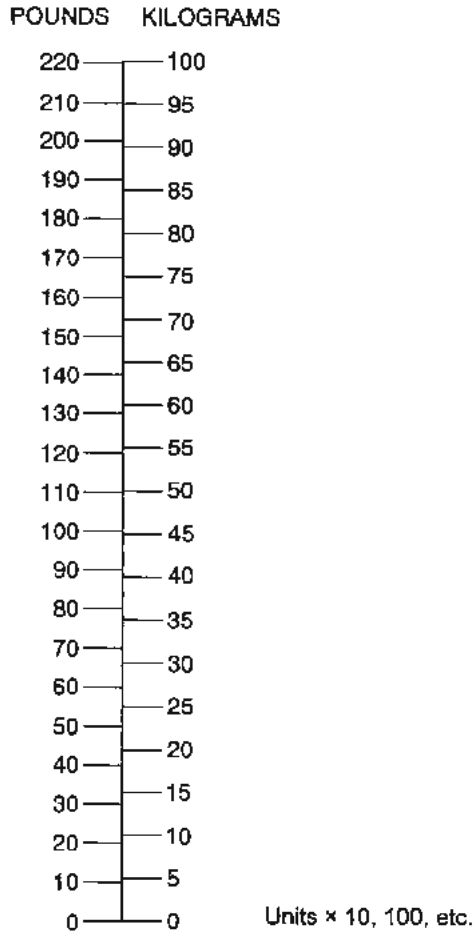
kg	0	1	2	3	4	5	6	7	8	9
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
0		2.205	4.409	6.614	8.819	11.023	13.228	15.432	17.637	19.842
10	22.046	24.251	26.456	28.660	30.865	33.069	35.274	37.479	39.683	41.888
20	44.093	46.297	48.502	50.706	52.911	55.116	57.320	59.525	61.729	63.934
30	66.139	68.343	70.548	72.753	74.957	77.162	79.366	81.571	83.776	85.980
40	88.185	90.390	92.594	94.799	97.003	99.208	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26
100	220.46	222.67	224.87	227.08	229.28	231.49	233.69	235.90	238.10	240.30

**POUNDS TO KILOGRAMS  
LIVRES EN KILOGRAMMES**

lb.	0	1	2	3	4	5	6	7	8	9
	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
0		0.454	0.907	1.361	1.814	2.268	2.722	3.175	3.629	4.082
10	4.536	4.990	5.443	5.897	6.350	6.804	7.257	7.711	8.165	8.618
20	9.072	9.525	9.979	10.433	10.886	11.340	11.793	12.247	12.701	13.154
30	13.608	14.061	14.515	14.969	15.422	15.876	16.329	16.783	17.237	17.690
40	18.144	18.597	19.051	19.504	19.958	20.412	20.865	21.319	21.772	22.226
50	22.680	23.133	23.587	24.040	24.494	24.948	25.401	25.855	26.309	26.762
60	27.216	27.669	28.123	28.576	29.030	29.484	29.937	30.391	30.844	31.298
70	31.752	32.205	32.659	33.112	33.566	34.019	34.473	34.927	35.380	35.834
80	36.287	36.741	37.195	37.648	38.102	38.555	39.009	39.463	39.916	40.370
90	40.823	41.277	41.731	42.184	42.638	43.091	43.545	43.999	44.452	44.906
100	45.359	45.813	46.266	46.720	47.174	47.627	48.081	48.534	48.988	49.442

Figure 1-2. Weight Conversions (Sheet 1 of 2)

(Kilograms  $\times$  2.205 = Pounds)      (Pounds  $\times$  .454 = Kilograms)



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Figure 1-2 . Weight Conversions (Sheet 2 of 2)

SECTION 1  
GENERAL

CESSNA  
MODEL T206H

(Meters × 3.281 = Feet)

(Feet × .305 = Meters)

METERS TO FEET  
METRES EN PIEDS

m	0	1	2	3	4	5	6	7	8	9
	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
0	---	3.281	6.562	9.842	13.123	16.404	19.685	22.966	26.247	29.528
10	32.808	36.089	39.370	42.651	45.932	49.212	52.493	55.774	59.055	62.336
20	65.617	68.897	72.178	75.459	78.740	82.021	85.302	88.582	91.863	95.144
30	98.425	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.95
40	131.23	134.51	137.79	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.32	170.60	173.88	177.16	180.45	183.73	187.01	190.29	193.57
60	195.85	200.13	203.41	206.69	209.97	213.25	216.53	219.82	223.10	226.38
70	229.66	232.94	236.22	239.50	242.78	246.06	249.34	252.62	255.90	259.19
80	262.47	265.75	269.03	272.31	275.59	278.87	282.15	285.43	288.71	291.98
90	295.27	298.56	301.84	305.12	308.40	311.68	314.96	318.24	321.52	324.80
100	328.08	331.36	334.64	337.93	341.21	344.49	347.77	351.05	354.33	357.61

FEET TO METERS  
PIEDS EN METRES

ft	0	1	2	3	4	5	6	7	8	9
	m	m	m	m	m	m	m	m	m	m
0	---	0.305	0.610	0.914	1.219	1.524	1.829	2.134	2.438	2.743
10	3.048	3.353	3.658	3.962	4.267	4.572	4.877	5.182	5.486	5.791
20	6.096	6.401	6.706	7.010	7.315	7.620	7.925	8.230	8.534	8.839
30	9.144	9.449	9.754	10.058	10.363	10.668	10.973	11.278	11.582	11.887
40	12.192	12.497	12.802	13.106	13.411	13.716	14.021	14.326	14.630	14.935
50	15.240	15.545	15.850	16.154	16.459	16.764	17.069	17.374	17.678	17.983
60	18.288	18.593	18.898	19.202	19.507	19.812	20.117	20.422	20.726	21.031
70	21.336	21.641	21.946	22.250	22.555	22.860	23.165	23.470	23.774	24.079
80	24.384	24.689	24.994	25.298	25.603	25.908	26.213	26.518	26.822	27.127
90	27.432	27.737	28.042	28.346	28.651	28.956	29.261	29.566	29.870	30.175
100	30.480	30.785	31.090	31.394	31.699	32.004	32.309	32.614	32.918	33.223

Figure 1-3. Length Conversions (Sheet 1 of 2)



(Meters  $\times$  3.281 = Feet)

(Feet  $\times$  .305 = Meters)

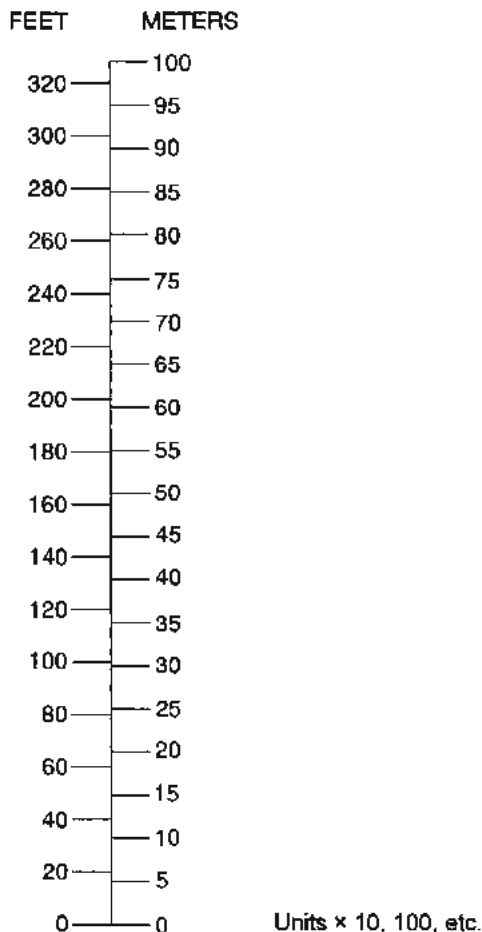


Figure 1-3 . Length Conversions (Sheet 2 of 2)

(Centimeters  $\times$  .394 = Inches) (Inches  $\times$  2.54 = Centimeters)**CENTIMETERS TO INCHES**  
**CENTIMETRES EN POUCES**

cm	0	1	2	3	4	5	6	7	8	9
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
0	---	0.394	0.787	1.181	1.575	1.969	2.362	2.756	3.150	3.543
10	3.937	4.331	4.724	5.118	5.512	5.906	6.299	6.693	7.087	7.480
20	7.874	8.268	8.661	9.055	9.449	9.843	10.236	10.630	11.024	11.417
30	11.811	12.205	12.598	12.992	13.386	13.780	14.173	14.567	14.961	15.354
40	15.748	16.142	16.535	16.929	17.323	17.717	18.110	18.504	18.898	19.291
50	19.685	20.079	20.472	20.866	21.260	21.654	22.047	22.441	22.835	23.228
60	23.622	24.016	24.409	24.803	25.197	25.591	25.984	26.378	26.772	27.164
70	27.559	27.953	28.346	28.740	29.134	29.528	29.921	30.315	30.709	31.102
80	31.496	31.890	32.283	32.677	33.071	33.465	33.858	34.252	34.646	35.039
90	35.433	35.827	36.220	36.614	37.008	37.402	37.795	38.189	38.583	38.976
100	39.370	39.764	40.157	40.551	40.945	41.339	41.732	42.126	42.520	42.913

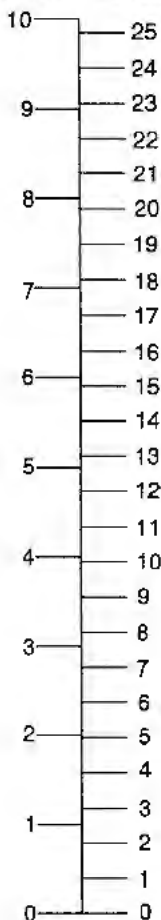
**INCHES TO CENTIMETERS**  
**POUCES EN CENTIMETRES**

in.	0	1	2	3	4	5	6	7	8	9
	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm
0	---	2.54	5.08	7.62	10.16	12.70	15.24	17.78	20.32	22.86
10	25.40	27.94	30.48	33.02	35.56	38.10	40.64	43.18	45.72	48.26
20	50.80	53.34	55.88	58.42	60.96	63.50	66.04	68.58	71.12	73.66
30	76.20	78.74	81.28	83.82	86.36	88.90	91.44	93.98	96.52	99.06
40	101.60	104.14	106.68	109.22	111.76	114.30	116.84	119.38	121.92	124.46
50	127.00	129.54	132.08	134.62	137.16	139.70	142.24	144.78	147.32	149.86
60	152.40	154.94	157.48	160.02	162.56	165.10	167.64	170.18	172.72	175.26
70	177.80	180.34	182.88	185.42	187.96	190.50	193.04	195.58	198.12	200.66
80	203.20	205.74	208.28	210.82	213.36	215.90	218.44	220.98	223.52	226.06
90	228.60	231.14	233.68	236.22	238.76	241.30	243.84	246.38	248.92	251.46
100	254.00	256.54	259.08	261.62	264.16	266.70	269.24	271.78	274.32	276.86

Figure 1-4. Length Conversions (Sheet 1 of 2)

(Centimeters  $\times$  .394 = Inches) (Inches  $\times$  2.54 = Centimeters)

INCHES    CENTIMETERS



Units  $\times$  10, 100, etc.

0585T1028

Figure 1-4. Length Conversions (Sheet 2 of 2)

SECTION 1  
GENERAL

CESSNA  
MODEL T206H

(Statute Miles  $\times$  1.609 = Kilometers)

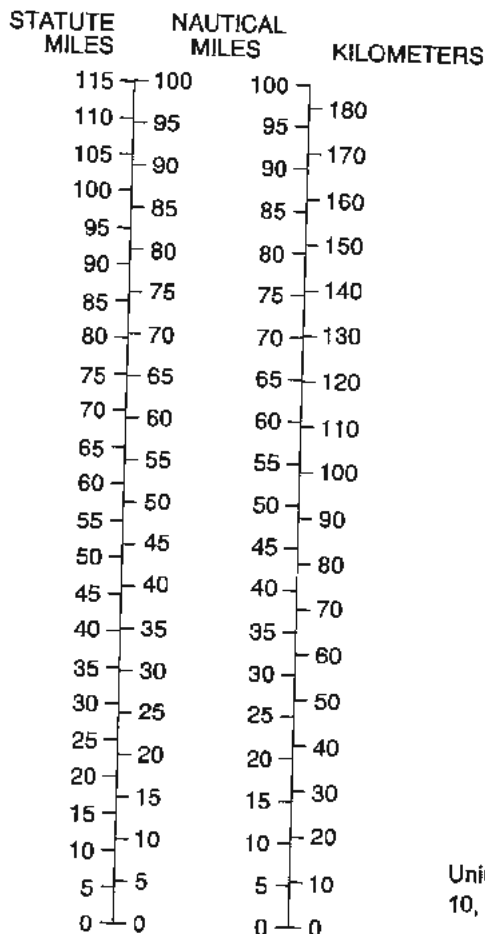
(Kilometers  $\times$  .622 = Statute Miles)

(Statute Miles  $\times$  .869 = Nautical Miles)

(Nautical Miles  $\times$  1.15 = Statute Miles)

(Nautical Miles  $\times$  1.852 = Kilometers)

(Kilometers  $\times$  .54 = Nautical Miles)



Units  $\times$   
10, 100, etc.

0585T1029

Figure 1-5. Distance Conversions

(Imperial Gallons × 4.546 = Liters)  
(Liters × .22 = Imperial Gallons)

LITERS TO IMPERIAL GALLONS  
LITERS EN GALLONS IMPERIAL

Lt	0	1	2	3	4	5	6	7	8	9
	IG	IG	IG	IG	IG	IG	IG	IG	IG	IG
0	---	0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.960	4.180
20	4.400	4.620	4.840	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.699	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.779
50	10.999	11.219	11.439	11.659	11.879	12.099	12.319	12.539	12.759	12.979
60	13.199	13.419	13.639	13.859	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.038	18.258	18.478	18.698	18.918	19.138	19.358	19.578
90	19.798	20.018	20.238	20.458	20.678	20.898	21.118	21.338	21.558	21.778
100	21.998	22.218	22.438	22.658	22.878	23.098	23.318	23.537	23.757	23.977

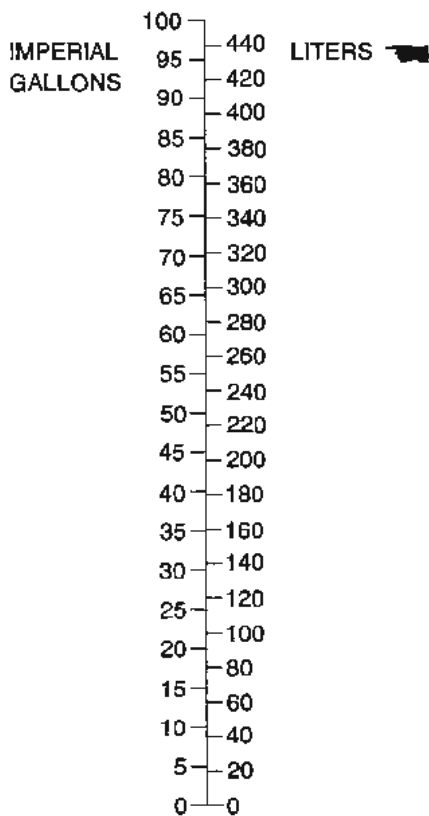
IMPERIAL GALLONS TO LITERS  
GALLONS IMPERIAL EN LITERS

IG	0	1	2	3	4	5	6	7	8	9
	Lt	Lt	Lt	Lt	Lt	Lt	Lt	Lt	Lt	Lt
0	---	4.546	9.092	13.638	18.184	22.730	27.276	31.822	36.368	40.914
10	45.460	50.006	54.552	59.097	63.643	68.189	72.735	77.281	81.827	86.373
20	90.919	95.465	100.011	104.56	109.10	113.65	118.20	122.74	127.29	131.83
30	136.38	140.93	145.47	150.02	154.56	159.11	163.66	168.20	172.75	177.29
40	181.84	186.38	190.93	195.48	200.02	204.57	209.11	213.66	218.21	222.75
50	227.30	231.84	236.39	240.94	245.48	250.03	254.57	259.12	263.67	268.21
60	272.76	277.30	281.85	286.40	290.94	295.49	300.03	304.58	309.13	313.67
70	318.22	322.76	327.31	331.86	336.40	340.95	345.49	350.04	354.59	359.13
80	363.68	368.22	372.77	377.32	381.86	386.41	390.95	395.50	400.04	404.59
90	409.14	413.68	418.23	422.77	427.32	431.87	436.41	440.96	445.50	450.05
100	454.60	459.14	463.69	468.23	472.78	477.33	481.87	486.42	490.96	495.51

Figure 1-6. Volume Conversions (Sheet 1 of 3)

(Imperial Gallons  $\times$  4.546 = Liters)

(Liters  $\times$  .22 = Imperial Gallons)

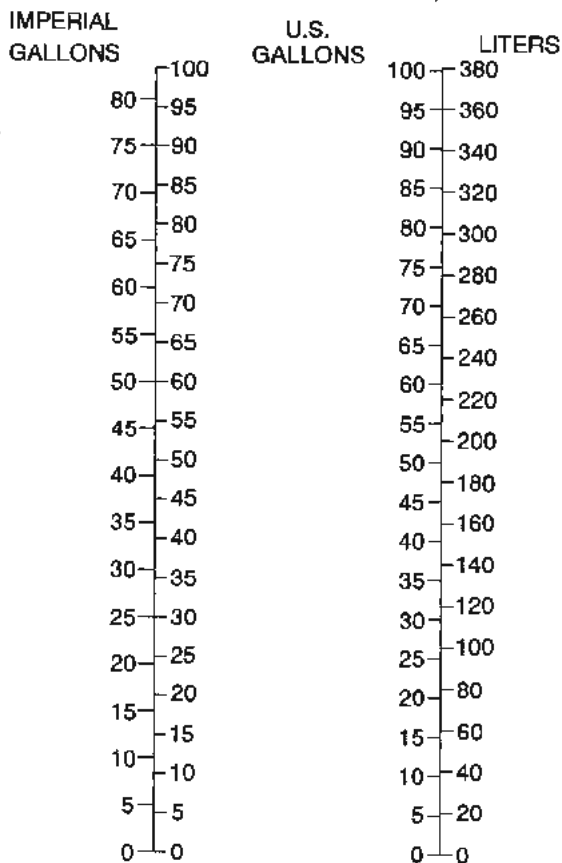


Units  $\times$  10, 100, etc.

0585T1032

Figure 1-6. Volume Conversions (Sheet 2 of 3)

(Imperial Gallons  $\times$  1.2 = U.S. Gallons)  
(U.S. Gallons  $\times$  .833 = Imperial Gallons)  
(U.S. Gallons  $\times$  3.785 = Liters)  
(Liters  $\times$  .264 = U.S. Gallons)



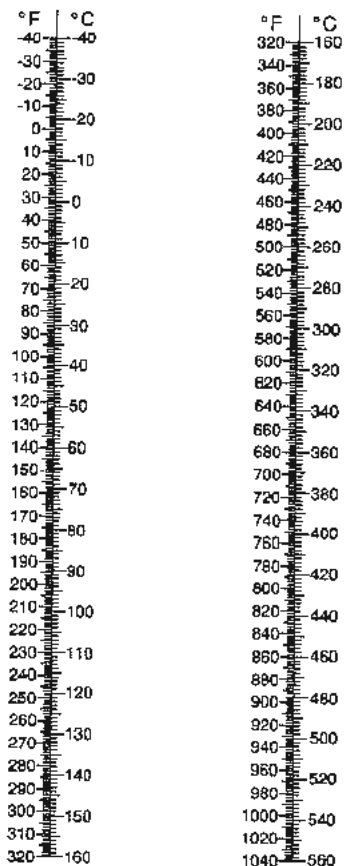
Units  $\times$  10, 100, etc.

0585T1033

Figure 1-6. Volume Conversions (Sheet 3 of 3)

TEMPERATURE CONVERSIONS

$(^{\circ}\text{F}-32) \times 5/9 = ^{\circ}\text{C}$        $^{\circ}\text{C} \times 9/5 + 32 = ^{\circ}\text{F}$



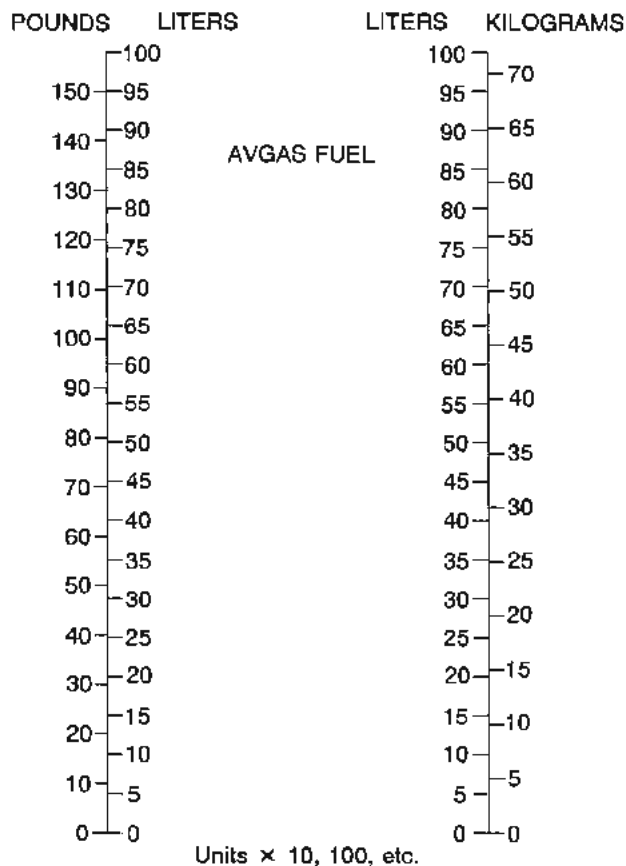
0585T1034

Figure 1-7. Temperature Conversions



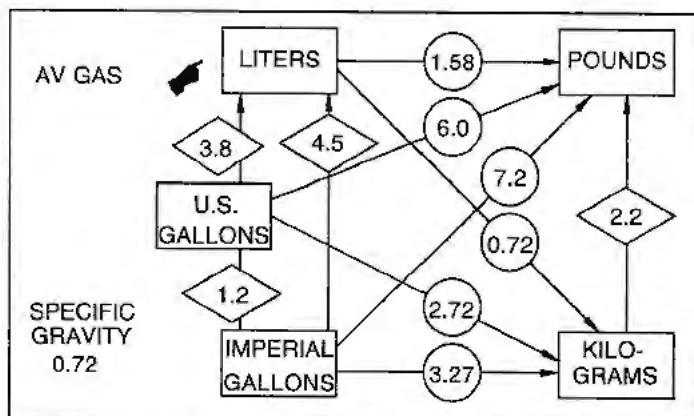
AVGAS Specific Gravity = .72

(Liters  $\times$  1.58 = Pounds) (Pounds  $\times$  .633 = Liters)  
(Liters  $\times$  .72 = Kilograms) (Kilograms  $\times$  1.389 = Liters)



0585T1030

Figure 1-8. Volume to Weight Conversion



0585T1031

Figure 1-9. Quick Conversions

## SECTION 2 LIMITATIONS

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Airspeed Limitations .....	2-4
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## INTRODUCTION

Section 2 includes operating limitations, instrument markings, and basic placards necessary for the safe operation of the airplane, its engine, standard systems and standard equipment. The limitations included in this section and in Section 9 have been approved by the Federal Aviation Administration. Observance of these operating limitations is required by Federal Aviation Regulations.

### NOTE

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

### NOTE

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

The Cessna Model T206H is certificated under FAA Type Certificate No. A4CE.

**AIRSPEED LIMITATIONS**

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

<b>SYMBOL</b>	<b>SPEED</b>	<b>KCAS</b>	<b>KIAS</b>	<b>REMARKS</b>
<b>V<sub>NE</sub></b>	Never Exceed Speed	179	182	Do not exceed this speed in any operation.
<b>V<sub>NO</sub></b>	Maximum Structural Cruising Speed	147	149	Do not exceed this speed except in smooth air, and then only with caution.
<b>V<sub>A</sub></b>	Maneuvering Speed: 3600 Pounds 2950 Pounds 2300 Pounds	123 118 104	125 120 106	Do not make full or abrupt control movements above this speed.
<b>V<sub>FE</sub></b>	Maximum Flap Extended Speed: 0° to 10° Flaps 10° to 40° Flaps	139 100	140 100	Do not exceed this speed with given flap settings.
<b>---</b>	Maximum Window Open Speed	179	182	Do not exceed this speed with windows open.

Figure 2-1. Airspeed Limitations

## AIRSPPEED INDICATOR MARKINGS

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

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	47 - 100	Full Flap Operating Range. Lower limit is maximum weight $V_{SO}$ in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc	59 - 149	Normal Operating Range. Lower limit is maximum weight $V_S$ at most forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow Arc	149-182	Operations must be conducted with caution and only in smooth air.
Red Line	182	Maximum speed for all operations.

Figure 2-2. Airspeed Indicator Markings

## POWERPLANT LIMITATIONS

Engine Manufacturer: Textron Lycoming.

Engine Model Number: TIO-540-AJ1A.

Maximum Power: 310 BHP rating.

Engine Operating Limits for Takeoff and Continuous Operations:

Maximum Continuous Power: 310 rated BHP at 39 inches Hg.  
and 2500 RPM.

Maximum Cylinder Head Temperature: 480°F (249° C).

Maximum Oil Temperature: 245°F (118° C).

Oil Pressure, Minimum: 20 PSI

Maximum: 115 PSI

### NOTE

For manifold pressure limitations above 17,000 feet, refer to minimum fuel flows placard in this section.

SECTION 2  
LIMITATIONS

CESSNA  
MODEL T206H

Fuel Grade: See Fuel Limitations.

Oil Grade (Specification):

MIL-L-22851 or SAE J1899 Ashless Dispersant Oil: Oil conforming to Textron Lycoming Service Instruction No. 1014 and all revisions and supplements thereto, must be used.

Propeller Manufacturer: McCauley Propeller Systems.

Propeller Model Number: B3D36C432/80VSA-1.

Propeller Diameter Maximum: 79.0 inches.

Minimum: 77.5 inches.

Propeller Blade Angle at 30 Inch Station:

Low Pitch: 16.9° High Pitch: 33.8°

Propeller Operating Limits: Avoid continuous operation at or below 2000 RPM above 28 in. Hg. of manifold pressure.

## POWERPLANT INSTRUMENT MARKINGS

Powerplant instrument markings and their color code significance are shown in Figure 2-3.

INSTRUMENT	RED LINE (MINIMUM)	GREEN ARC (NORMAL OPERATING)	RED LINE (MAX)
Tachometer (RPM):	---	2000 to 2400	2500
Manifold Pressure (in. Hg.)	---	15 - 30	39
Cylinder Head Temperature (°F)	---	200 - 480	480
Oil Temperature (°F)	---	100 to 245	245
Oil Pressure (PSI)	20	50 to 90	115
Fuel Quantity (Gal.)	0 (2 Unusable Each Tank)	---	---
Fuel Flow (GPH)	----	5 to 20	34
Vacuum (in. Hg.)	----	4.5 - 5.5	----
Turbine Inlet Temperature (T.I.T.) (°F)	---	1350 - 1675	1675

Figure 2-3. Powerplant Instrument Markings

## WEIGHT LIMITS

Maximum Ramp Weight: 3617 lbs.  
Maximum Takeoff Weight: 3600 lbs.  
Maximum Landing Weight: 3600 lbs.  
Maximum Weight in Baggage Compartment - Station 109 to 145:  
180 lbs. See note below.

### NOTE

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

## CENTER OF GRAVITY LIMITS

Center of Gravity Range:

Forward: 33.0 inches aft of datum at 2500 lbs. or less, with straight line variation to 42.5 inches aft of datum at 3600 lbs.

Aft: 49.7 inches aft of datum at all weights.

Reference Datum: Front face of lower firewall.



## MANEUVER LIMITS

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

Aerobatic maneuvers, including spins, are not approved.

## FLIGHT LOAD FACTOR LIMITS

Flight Load Factors:

*Flaps Up .....	+3.8g, -1.52g
*Flaps Down .....	+2.0g

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

## KINDS OF OPERATION LIMITS

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

Flight into known icing conditions is prohibited.

## FUEL LIMITATIONS

**Serials T20608001 thru T20608361:**

- Total Fuel: 92 U.S. Gallons (46.0 Gallons each tank).
- Usable Fuel: 88.0 U.S. Gallons.
- Unusable Fuel: 4.0 U.S. Gallons (2.0 Gallons each tank).

(Continued Next Page)

TEMPORARY REVISION FOR CESSNA PILOT'S OPERATING HANDBOOK  
AND FAA APPROVED AIRPLANE FLIGHT MANUAL

Publication Affected: Model T206H Nav I/Nav II T20608001 and On basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, Revision 6, dated 12 January 2004.

Airplane Serial Numbers Affected: Airplanes T20608001 thru T20608681 and T20608683 thru T20608704 equipped with the Nav I/Nav II avionics option.

Description of Change: Section 2, Operating Limitations, Other Limitations, Flap Limitations, page 2-9 add information to the Flap Limitations.

Filing Instructions: Insert this temporary revision in the Model T206H Nav I/Nav II T20608001 and On basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual adjacent to page 2-9.

Removal Instructions: This temporary revision must be removed and discarded when Revision 7 has been collated into the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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In Section 2, Operating Limitations, Other Limitations, Flap Limitations, page 2-9 add following information to the existing Flap Limitations:

**OTHER LIMITATIONS**

**FLAP LIMITATIONS**

Approaches with flaps UP throughout descent to Decision Height (DH) or Minimum Descent Altitude (MDA) should be avoided in Instrument Meteorological Conditions (IMC).

If flap UP approaches are required, add 60 feet to Decision Height (DH) or Minimum Descent Altitude (MDA) when operating in Instrument Meteorological Conditions (IMC).

APPROVED BY 

for John Bouma, Lead ODA Administrator  
Cessna Aircraft Company  
Organization Delegation Authorization ODA-100129-CE  
FAA Approved Under 14 CFR Part 183 Subpart D

DATE OF APPROVAL 29 APRIL 2011

FAA APPROVED  
T206HPHUS-06 TR01

## FUEL LIMITATIONS (Continued)

### Serials T20608362 and on:

Total Fuel: 92 U.S. Gallons (46.0 Gallons each tank).

Usable Fuel: 87.0 U.S. Gallons.

Unusable Fuel: 5.0 U.S. Gallons (2.5 Gallons each tank).

### NOTE

To ensure maximum fuel capacity and minimize cross-feeding when refueling, always park the airplane in a wings-level, normal ground attitude and place the fuel selector in the LEFT or RIGHT position. Refer to Figure 1-1 for normal ground attitude definition.

Takeoff and land with the fuel selector valve handle in the BOTH position.

Operation on either LEFT or RIGHT tank limited to level flight only.

With 1/4 tank or less, prolonged uncoordinated flight is prohibited when operating on either left or right tank.

When switching from dry tank, turn auxiliary fuel pump on momentarily.

### Approved Fuel Grades (and Colors):

100LL Grade Aviation Fuel (Blue).

100 Grade Aviation Fuel (Green).

## OTHER LIMITATIONS

### FLAP LIMITATIONS

Approved Takeoff Range: ..... 0° to 20°

Approved Landing Range: ..... 0° to 40°

## PLACARDS

The following information must be displayed in the form of composite or individual placards.

1. In full view of the pilot: (The "DAY-NIGHT-VFR-IFR" entry, shown on the example below, will vary as the airplane is equipped).

The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

No acrobatic maneuvers, including spins, approved.

Flight into known icing conditions prohibited.

This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY-NIGHT-VFR-IFR

2. On control lock flag:

CAUTION  
CONTROL LOCK  
REMOVE BEFORE STARTING ENGINE

3. On aft baggage wall:

EMERGENCY LOCATOR TRANSMITTER  
INSTALLED AFT OF THIS PARTITION.  
MUST BE SERVICED IN ACCORDANCE  
WITH FAR PART 91.207

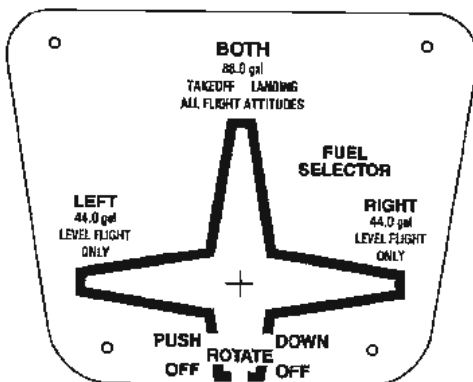
(Continued Next Page)

**PLACARDS** (Continued)

4. On the fuel selector valve:

**Serials T20608001 thru T20608361:**

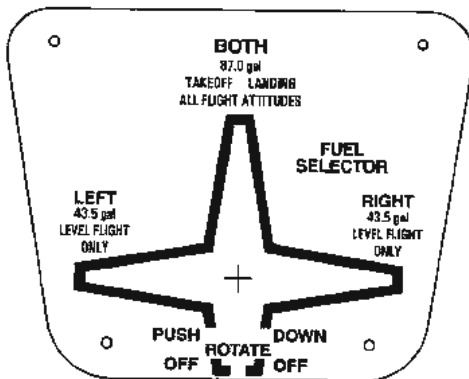
83063



1205125-7

**Serials T20608362 and on:**

83068



1205125-10

(Continued Next Page)

**PLACARDS** (Continued)

5. At the fuel filler ports:

Serials T20608001 thru T20608361:

83667

FUEL  
100LL / 100 MIN. GRADE AVIATION GASOLINE  
CAP. 44.0 U.S. GAL. USABLE  
CAP. 32.5 U.S. GAL. USABLE TO BOTTOM  
OF FILLER INDICATOR TAB.

0705071-9

Serials T20608362 and on:

83668

FUEL  
100LL / 100 MIN. GRADE AVIATION GASOLINE  
CAP. 43.5 U.S. GAL. (164 LITERS) USABLE  
CAP. 32.0 U.S. GAL. (121 LITERS) USABLE TO BOTTOM  
OF FILLER INDICATOR TAB.

0705071-23

6. Near manifold pressure/fuel flow indicator:

MINIMUM FUEL FLOWS MAXIMUM CONTINUOUS POWER 2500 RPM		
<u>ALT (FT.)</u>	<u>MP (IN. Hg.)</u>	<u>FF (GPH)</u>
SL-17,000	39	34.0
18,000	37	30.5
20,000	35	28.5
22,000	33	26.5
24,000	31	24.5
26,000	29	23.0
28,000	27	21.0
30,000	25	19.0

**AVOID CONTINUOUS OPERATION**  
**AT OR BELOW 2000 RPM ABOVE 28 In. Hg. OF**  
**MANIFOLD PRESSURE**

(Continued Next Page)

**PLACARDS** (Continued)

7. On flap control indicator:

**Serials T20608001 thru T20608361:**

0° to 10°	140 KIAS	(Partial flap range with blue color code; also mechanical detent of 10°)
10° to 20° to 40°	100 KIAS	(White color code; indices as noted; also mechanical detent at 20°)

**Serials T20608362 and on:**

0° to 10°	140 KIAS	(Initial flap range with Dark Blue color code; mechanical detent at 10° position)
10° to 20°	120 KIAS	(Intermediate flap range with Light Blue color code; mechanical detent at 20° position)
20° to FULL	100 KIAS	(Full flap range with White color code; mechanical stop at FULL position (40°))

8. On aft cargo door:

BAGGAGE NET 180 LBS. MAXIMUM CAPACITY  
REFER TO WEIGHT AND BALANCE DATA  
FOR BAGGAGE AND CARGO LOADING

(Continued Next Page)

**PLACARDS** (Continued)

9. In RED on forward cargo door:

**Serials T20608001 thru T20608437:**

**EMERGENCY EXIT OPERATION**

1. ROTATE FORWARD CARGO DOOR HANDLE FULL FORWARD THEN FULL AFT.
2. OPEN FORWARD CARGO DOOR AS FAR AS POSSIBLE.
3. ROTATE RED LEVER IN REAR CARGO DOOR FORWARD.
4. FORCE REAR CARGO DOOR FULL OPEN.

**Serials T20608438 and On:**

**REAR CARGO DOOR EMERGENCY EXIT**

1. OPEN FRONT CARGO DOOR AS FAR AS IT WILL GO
2. PUSH REAR DOOR HANDLE FORWARD AND FORCE DOOR OPEN.

10. A calibration card must be provided to indicate the accuracy of the magnetic compass.

11. On the oil filler cap:

OIL  
11 QTS

12. Near airspeed indicator:

MANEUVERING SPEED - 125 KIAS

13. On the pedestal cover near the fuel selector handle:

WHEN SWITCHING FROM DRY TANK TURN  
AUX FUEL PUMP "ON" MOMENTARILY

(Continued Next Page)



**PLACARDS** (Continued)

14. On the upper right instrument panel:

SMOKING PROHIBITED

15. Near the auxiliary electrical power supply plug:

CAUTION            24 VOLTS D.C.  
THIS AIRCRAFT IS EQUIPPED WITH ALTERNATOR AND A  
NEGATIVE GROUND SYSTEM. OBSERVE PROPER POLARITY.  
REVERSE POLARITY WILL DAMAGE ELECTRICAL  
COMPONENTS.

## SECTION 3 EMERGENCY PROCEDURES

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## INTRODUCTION

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

## AIRSPEEDS FOR EMERGENCY OPERATION

Engine Failure After Takeoff:	
Wing Flaps Up .....	85 KIAS
Wing Flaps Down .....	75 KIAS
Maneuvering Speed:	
3600 Lbs .....	125 KIAS
2950 Lbs .....	120 KIAS
2300 Lbs .....	106 KIAS
Maximum Glide:	
3600 Lbs .....	80 KIAS
3200 Lbs .....	75 KIAS
2800 Lbs .....	70 KIAS
Precautionary Landing With Engine Power .....	75 KIAS
Landing Without Engine Power:	
Wing Flaps Up .....	85 KIAS
Wing Flaps Down .....	75 KIAS
Emergency Descent:	
Smooth Air .....	182 KIAS
Rough Air:	
3600 Lbs: .....	125 KIAS
2950 Lbs: .....	120 KIAS
2300 Lbs: .....	106 KIAS

## EMERGENCY PROCEDURES CHECKLIST

Procedures in the Emergency Procedures Checklist portion of this section shown in **bold faced** type are immediate action items which should be committed to memory.

### ENGINE FAILURES

#### ENGINE FAILURE DURING TAKEOFF ROLL

1. **Throttle -- IDLE.**
2. **Brakes -- APPLY.**
3. **Wing Flaps -- RETRACT.**
4. **Mixture -- IDLE CUT OFF.**
5. **Ignition Switch -- OFF.**
6. **Master Switch -- OFF.**

#### ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. **Airspeed -- 85 KIAS (flaps UP),  
75 KIAS (flaps DOWN).**
2. **Mixture -- IDLE CUT OFF.**
3. **Fuel Selector Valve -- PUSH DOWN and ROTATE to OFF.**
4. **Ignition Switch -- OFF.**
5. **Wing Flaps -- AS REQUIRED (40° recommended).**
6. **Master Switch -- OFF.**
7. **Cabin Door -- UNLATCH.**
8. **Land -- STRAIGHT AHEAD.**

#### ENGINE FAILURE DURING FLIGHT (Restart Procedures)

1. **Airspeed -- 80 KIAS.**
2. **Fuel Selector Valve -- BOTH.**
3. **Auxiliary Fuel Pump Switch -- ON.**
4. **Engine Power -- RESTORED.**
5. **Mixture -- RICH (if restart does not occur).**

6. Ignition Switch -- CHECK BOTH (or START if propeller is stopped).

**NOTE**

If propeller is windmilling, engine will restart automatically within a few seconds. If propeller has stopped (possible at low speeds), turn ignition switch to START, advance throttle slowly from idle, and lean the mixture from full rich as required to obtain smooth operation.

7. Auxiliary Fuel Pump Switch -- OFF.

**NOTE**

If the fuel flow indication immediately drops to zero, signifying an engine-driven fuel pump failure, return the auxiliary fuel pump switch to ON.

## **FORCED LANDINGS**

### **EMERGENCY LANDING WITHOUT ENGINE POWER**

1. Passenger Seats -- AS FAR FORWARD AS PRACTICAL.
2. Passenger Seat Backs -- MOST UPRIGHT POSITION.
3. Seats and Seat Belts -- SECURE.
4. Airspeed -- 85 KIAS (flaps UP),  
75 KIAS (flaps DOWN).
5. Mixture -- IDLE CUT OFF.
6. Fuel Selector Valve -- PUSH DOWN and ROTATE to OFF.
7. Ignition Switch -- OFF.
8. Wing Flaps -- AS REQUIRED (40° recommended).
9. Master Switch -- OFF when landing is assured.
10. Doors -- UNLATCH PRIOR TO TOUCHDOWN.
11. Touchdown -- SLIGHTLY TAIL LOW.
12. Brakes -- APPLY HEAVILY.

### **PRECAUTIONARY LANDING WITH ENGINE POWER**

1. Passenger Seats -- AS FAR FORWARD AS PRACTICAL.
2. Passenger Seat Backs -- MOST UPRIGHT POSITION.

3. Seats and Seat Belts -- SECURE.
4. Airspeed -- 85 KIAS.
5. Wing Flaps -- 20°.
6. Selected Field -- FLY OVER, noting terrain and obstructions, then retract flaps upon reaching a safe altitude and airspeed.
7. Avionics Master Switch and Electrical Switches -- OFF.
8. Wing Flaps -- 40° (on final approach).
9. Airspeed -- 75 KIAS.
10. Master Switch -- OFF.
11. Doors -- UNLATCH PRIOR TO TOUCHDOWN.
12. Touchdown -- SLIGHTLY TAIL LOW.
13. Ignition Switch -- OFF.
14. Mixture -- IDLE CUT OFF.
15. Brakes -- APPLY HEAVILY.

#### DITCHING

1. Radio -- TRANSMIT MAYDAY on 121.5 MHz, giving location and intentions and SQUAWK 7700.
2. Heavy Objects (in baggage area) -- SECURE OR JETTISON (if possible).
3. Passenger Seats -- AS FAR FORWARD AS PRACTICAL.
4. Passenger Seat Backs -- MOST UPRIGHT POSITION.
5. Seats and Seat Belts -- SECURE.
6. Wing Flaps -- 40°.
7. Power -- ESTABLISH 300 FT/MIN DESCENT AT 70 KIAS.

#### NOTE

If no power is available, approach at 85 KIAS with flaps up or at 80 KIAS with 10° flaps.

8. Approach -- High Winds, Heavy Seas -- INTO THE WIND.  
Light Winds, Heavy Swells -- PARALLEL TO SWELLS.



9. Cabin Doors -- UNLATCH.
10. Touchdown -- LEVEL ATTITUDE AT 300 FT/MIN DESCENT.
11. Face -- CUSHION at touchdown with folded coat.
12. ELT -- Activate.
13. Airplane -- EVACUATE through cabin doors. If necessary, open window and flood cabin to equalize pressure so doors can be opened.
14. Life Vests and Raft -- INFLATE WHEN CLEAR OF AIRPLANE.

## FIRES

### DURING START ON GROUND

1. **Ignition Switch -- START** (continue cranking to get a start which would suck the flames and accumulated fuel into the engine).

If engine starts:

2. Power -- 1800 RPM for a few minutes.
3. Engine -- SHUTDOWN and inspect for damage.

If engine fails to start:

4. **Ignition Switch -- START** (continue cranking).
5. **Throttle -- FULL OPEN.**
6. **Mixture -- IDLE CUT OFF.**
7. **Fuel Selector Valve -- PUSH DOWN and ROTATE to OFF.**
8. **Auxiliary Fuel Pump Switch -- OFF.**
9. Fire Extinguisher -- OBTAIN (have ground attendants obtain, if not installed).
10. Engine -- SECURE.
  - a. Master Switch -- OFF.
  - b. Ignition Switch -- OFF.
11. Parking Brake -- RELEASE.
12. Airplane -- EVACUATE.
13. Fire -- EXTINGUISH using fire extinguisher, wool blanket, or dirt.
14. Fire Damage -- INSPECT, repair damage or replace damaged components or wiring before conducting another flight.

## **FIRES** (Continued)

### **ENGINE FIRE IN FLIGHT**

1. **Mixture – IDLE CUT OFF.**
2. **Fuel Selector Valve – PUSH DOWN and ROTATE to OFF.**
3. **Auxiliary Fuel Pump Switch – OFF.**
4. **Master Switch – OFF.**
5. **Cabin Heat and Air – OFF** (except overhead vents).
6. **Airspeed – 110 KIAS** (If fire is not extinguished, increase glide speed to find an airspeed - within airspeed limitations - which will provide an incombustible mixture).
7. **Forced Landing – EXECUTE** (as described in Emergency Landing Without Engine Power).

### **ELECTRICAL FIRE IN FLIGHT**

1. **Master Switch – OFF.**
2. **Vents/Cabin Air/Heat – CLOSED.**
3. **Fire Extinguisher – ACTIVATE.**
4. **Avionics Master Switch – OFF.**
5. **All Other Switches (except ignition switch) – OFF.**

#### **WARNING**

**AFTER DISCHARGING FIRE EXTINGUISHER AND ASCERTAINING THAT FIRE HAS BEEN EXTINGUISHED, VENTILATE THE CABIN.**

6. **Vents/Cabin Air – OPEN** when it is ascertained that fire is completely extinguished.

If fire has been extinguished and electrical power is necessary for continuance of flight to nearest suitable airport or landing area:

7. **Master Switch – ON.**
8. **Circuit Breakers – CHECK** for faulty circuit, do not reset.
9. **Radio Switches – OFF.**
10. **Avionics Master Switch – ON.**
11. **Radio/Electrical Switches – ON** (minimum needed) one at a time, with delay after each until short circuit is localized or necessary equipment is energized.

(Continued Next Page)

## **FIRES** (Continued)

### **CABIN FIRE**

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

### **⚠ WARNING**

**AFTER DISCHARGING FIRE EXTINGUISHER AND ASCERTAINING THAT FIRE HAS BEEN EXTINGUISHED, VENTILATE THE CABIN.**

4. **Vents/Cabin Air -- OPEN** when it is ascertained that fire is completely extinguished.
5. **Land the airplane as soon as possible to inspect for damage.**

### **WING FIRE**

1. **Landing/Taxi Light Switches -- OFF.**
2. **Navigation Light Switch -- OFF.**
3. **Strobe Light Switch -- OFF.**
4. **Pitot Heat Switch -- OFF.**

### **NOTE**

Perform a sideslip to keep the flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown.

## **ICING**

### **INADVERTENT ICING ENCOUNTER**

1. **Turn pitot heat switch ON.**
2. **Turn back or change altitude to obtain an outside air temperature that is less conducive to icing.**
3. **Pull cabin heat and defrost controls full out to obtain maximum windshield defroster airflow.**

(Continued Next Page)

4. Increase engine speed to minimize ice build-up on propeller blades. If excessive vibration is noted, momentarily reduce engine speed to 2200 RPM with the propeller control, and then rapidly move the control full forward.

**NOTE**

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

5. Watch for signs of induction air filter icing and regain manifold pressure by increasing the throttle setting.

**NOTE**

If ice accumulates on the intake filter (causing alternate air door to open), decreases of up to 15 in. Hg. in full throttle manifold pressure can be experienced, above 8000 feet.

6. Plan a landing at the nearest airport. With an extremely rapid ice build up, select a suitable "off airport" landing site.
7. With an ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for significantly higher power requirement, higher approach and stall speeds and a longer landing roll.
8. Open left window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
9. Use a 10°-20° landing flap setting for ice accumulations of 1 inch or less. With heavier ice accumulations, approach with flaps retracted to ensure adequate elevator effectiveness in the approach and landing.
10. Approach at 95-100 KIAS with 20° flaps and 110-120 KIAS with 0° - 10° flaps, depending upon the amount of ice accumulation. If ice accumulation is unusually large, decelerate to the planned approach speed while in the approach configuration at a high enough altitude which would permit recovery in the event that a stall buffet is encountered.
11. Land on the main wheels first, avoiding the slow and high type of flare-out.

12. Missed approaches should be avoided whenever possible because of severely reduced climb capability. However, if a go-around is mandatory, make the decision much earlier in the approach than normal. Apply maximum power and maintain 100 KIAS while retracting the flaps slowly in 10° increments.

**STATIC SOURCE BLOCKAGE**  
(Erroneous Instrument Reading Suspected)

1. **Static Pressure Alternate Source Valve – PULL ON.**
2. Heat and Air Valves -- PULL ON.
3. Vents -- CLOSED.
4. Airspeed – Consult appropriate calibration tables in Section 5.
5. Altitude – Consult appropriate calibration tables in Section 5.

**EXCESSIVE FUEL VAPOR**

**FUEL FLOW STABILIZATION PROCEDURES**  
(If Fuel Flow Fluctuations of 1 GPH Or More Or Power Surges Occur)

1. **Auxiliary Fuel Pump Switch – ON.**
2. Mixture -- RESET as required.
3. Fuel Selector Valve – SELECT OPPOSITE TANK if vapor symptoms continue.
4. Auxiliary Fuel Pump Switch -- OFF after fuel flow has stabilized.

**LANDING WITH A FLAT MAIN TIRE**

1. Approach -- NORMAL.
2. Wing Flaps – AS DESIRED. (0° - 10° below 140 KIAS,  
10° - 40° below 100 KIAS).
3. Touchdown – GOOD MAIN TIRE FIRST, hold airplane off flat tire as long as possible with aileron control.
4. Directional Control – MAINTAIN using brake on good wheel as required.

## LANDING WITH A FLAT NOSE TIRE

1. Approach -- NORMAL.
2. Flaps -- AS REQUIRED.
3. Touchdown -- ON MAINS, hold nose wheel off the ground as long as possible.
4. When nose wheel touches down, maintain full up elevator as airplane slows to stop.

## ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

### AMMETER SHOWS EXCESSIVE RATE OF CHARGE (Full Scale Deflection)

1. Alternator -- OFF.

#### CAUTION

**WITH THE ALTERNATOR SIDE OF THE MASTER SWITCH OFF, COMPASS DEVIATIONS OF AS MUCH AS 25° MAY OCCUR.**

2. Nonessential Electrical Equipment -- OFF.
3. Flight -- TERMINATE as soon as practical.

### LOW VOLTAGE ANNUNCIATOR (VOLTS) ILLUMINATES DURING FLIGHT (Ammeter Indicates Discharge)

#### NOTE

Illumination of "VOLTS" on the annunciator panel may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the annunciator will go out at higher RPM. The master switch need not be recycled since an overvoltage condition has not occurred to deactivate the alternator system.

SECTION 3  
EMERGENCY PROCEDURES

CESSNA  
MODEL T206H

1. Avionics Master Switch -- OFF.
2. Alternator Circuit Breaker (ALT FLD) -- CHECK IN.
3. Master Switch -- OFF (both sides).
4. Master Switch -- ON.
5. Low Voltage Annunciator (VOLTS) -- CHECK OFF.
6. Avionics Master Switch -- ON.

If low voltage annunciator (VOLTS) illuminates again:

7. Alternator-- OFF.

 CAUTION

WITH THE ALTERNATOR SIDE OF THE MASTER SWITCH OFF, COMPASS DEVIATIONS OF AS MUCH AS 25° MAY OCCUR.

8. Nonessential Radio and Electrical Equipment -- OFF.
9. Flight -- TERMINATE as soon as practical.

## EMERGENCY DESCENT PROCEDURES

### SMOOTH AIR

1. Seats and Seat Belts -- SECURE.
2. Throttle -- IDLE.
3. Propeller -- HIGH RPM.
4. Mixture -- FULL RICH.
5. Wing Flaps -- UP.
6. Airspeed -- 182 KIAS.

### ROUGH AIR

1. Seats and Seat Belts -- SECURE.
2. Throttle -- IDLE.
3. Propeller -- HIGH RPM.
4. Mixture -- FULL RICH.
5. Wing Flaps -- UP.
6. Weights and Airspeeds:
  - 3600 Lbs -- 125 KIAS.
  - 2950 Lbs -- 120 KIAS.
  - 2300 Lbs -- 106 KIAS.

## VACUUM SYSTEM FAILURE

Left Vacuum Annunciator (L VAC) or Right Vacuum Annunciator (VAC R) Illuminates.

### CAUTION

IF VACUUM IS NOT WITHIN NORMAL OPERATING LIMITS, A FAILURE HAS OCCURRED IN THE VACUUM SYSTEM AND PARTIAL PANEL PROCEDURES MAY BE REQUIRED FOR CONTINUED FLIGHT.

1. Vacuum Gauge – CHECK to ensure vacuum within normal operating limits.



## AMPLIFIED EMERGENCY PROCEDURES

The following Amplified Emergency Procedures elaborate upon information contained in the Emergency Procedures Checklists portion of this section. These procedures also include information not readily adaptable to a checklist format, and material to which a pilot could not be expected to refer in resolution of a specific emergency. This information should be reviewed in detail prior to flying the airplane, as well as reviewed on a regular basis to keep pilot's knowledge of procedures fresh.

### ENGINE FAILURE

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

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

After an engine failure in flight, the most important course of action is to continue flying the airplane. Best glide speed as shown in Figure 3-1 should be established as quickly as possible. While gliding toward a suitable landing area, an effort should be made to identify the cause of the failure. If time permits, an engine restart should be attempted as shown in the checklist. If the engine cannot be restarted, a forced landing without power must be completed.

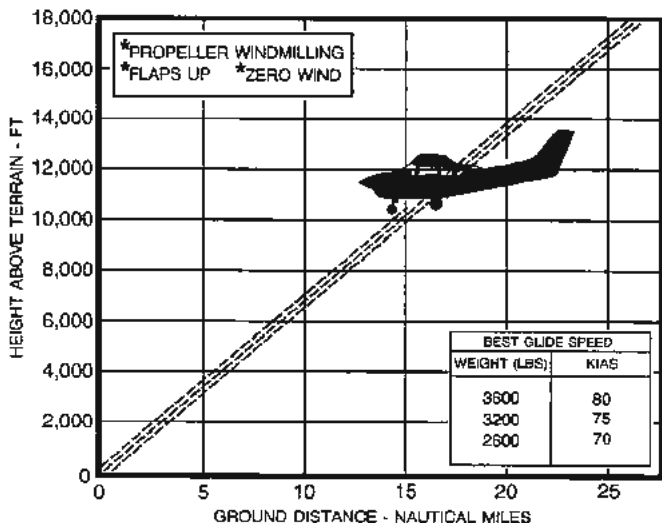


Figure 3-1. Maximum Glide

## FORCED LANDINGS

If all attempts to restart the engine fail and a forced landing is imminent, select a suitable field and prepare for the landing as discussed under the Emergency Landing Without Engine Power checklist. Transmit Mayday message on 121.5 MHz giving location and intentions and squawk 7700.

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

Prepare for ditching by securing or jettisoning heavy objects located in the baggage area and collect folded coats for protection of occupants' face at touchdown. Transmit Mayday message on 121.5 MHz giving location and intentions and squawk 7700. Avoid a landing flare because of difficulty in judging height over a water surface. The checklist assumes the availability of power to make a precautionary water landing. If power is not available, use of the airspeeds noted with minimum flap extension will provide a more favorable attitude for a power off ditching.

In a forced landing situation, do not turn off the AVIONICS MASTER switch or the MASTER switch until a landing is assured. Premature deactivation of the switches will disable the airplane electrical systems.

Before performing a forced landing, especially in remote and mountainous areas, activate the ELT transmitter by positioning the cockpit-mounted switch to the ON position. For complete information on ELT operation, refer to the Supplements, Section 9.

## LANDING WITHOUT ELEVATOR CONTROL

Trim for horizontal flight with an airspeed of approximately 90 KIAS by using throttle and elevator trim controls. Then do not change the elevator trim control setting; control the glide angle by adjusting power exclusively.

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

## **FIRES**

Improper starting procedures involving the excessive use of auxiliary fuel pump operation can cause engine flooding and subsequent collection of fuel on the parking ramp as the excess fuel drains overboard from the intake manifolds. This is sometimes experienced in difficult starts in cold weather where engine preheat service is not available. If this occurs, the airplane should be pushed away from the fuel puddle before another engine start is attempted. Otherwise, there is a possibility of raw fuel accumulations in the exhaust system igniting during an engine start, causing a long flame from the tailpipe, and possibly igniting the collected fuel on the pavement. If a fire occurs, proceed according to the checklist.

Although engine fires are extremely rare in flight, the steps of the appropriate checklist should be followed if one is encountered. After completion of this procedure, execute a forced landing. Do not attempt to restart the engine.

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

## **EMERGENCY OPERATION IN CLOUDS (Total Vacuum System Failure)**

If both the vacuum pumps fail in flight, the directional indicator and attitude indicator will be disabled, and the pilot will have to rely on the turn coordinator if he inadvertently flies into clouds. If an autopilot is installed, it too may be affected. Refer to Section 9, Supplements, for additional details concerning autopilot operation. The following instructions assume that only the electrically powered turn coordinator is operative, and that the pilot is not completely proficient in instrument flying.

### EXECUTING A 180° TURN IN CLOUDS

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

1. Note the compass heading.
2. Using the clock, 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 over controlling by keeping the hands off the control wheel as much as possible and steering only with rudder.

### EMERGENCY DESCENT THROUGH CLOUDS

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

1. Apply full rich mixture or 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 and rudder trim for a stabilized descent at 100 KIAS.
4. Keep hands off the control wheel.
5. Monitor turn coordinator and make corrections by rudder alone.
6. Adjust rudder trim to relieve unbalanced rudder force, if present.

7. Check trend of compass card movement and make cautious corrections with rudder to stop the turn.
8. Upon breaking out of clouds, resume normal cruising flight.

#### **RECOVERY FROM SPIRAL DIVE IN THE CLOUDS**

If a spiral is encountered in the clouds, proceed as follows:

1. Retard throttle to idle position.
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 airspeed to 100 KIAS.
4. Adjust the elevator trim control to maintain a 100 KIAS glide.
5. Keep hands off the control wheel, using rudder control to hold a straight heading. Adjust rudder trim to relieve unbalanced rudder force.
6. Clear engine occasionally, but avoid using enough power to disturb the trimmed glide.
7. Upon breaking out of clouds, resume normal cruising flight.

#### **INADVERTENT FLIGHT INTO ICING CONDITIONS**

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

#### **STATIC SOURCE BLOCKED**

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

With the alternate static source on, refer to the Alternate Static Source Airspeed Calibration and Altimeter Correction tables in Section 5 for additional details.

Maximum airspeed and altimeter variation from normal is 5 knots and 70 feet over the normal operating range with the window(s) closed. See Section 5 tables for airspeed and altimeter calibration data.

## SPINS

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

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

### NOTE

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

## ROUGH ENGINE OPERATION OR LOSS OF POWER

### SPARK PLUG FOULING

A slight engine roughness in flight may be caused by one or more spark plugs becoming fouled by carbon or lead deposits. This may be verified by turning the ignition switch momentarily from BOTH to either L or R position. An obvious power loss in single ignition operation is evidence of spark plug or magneto trouble.

Assuming that spark plugs are the more likely cause, lean the mixture to the recommended lean setting for cruising flight. If the problem does not clear up in several minutes, determine if a richer mixture setting will produce smoother operation. If not, proceed to the nearest airport for repairs using the BOTH position of the ignition switch unless extreme roughness dictates the use of a single ignition position.

#### MAGNETO MALFUNCTION

A sudden engine roughness or misfiring is usually evidence of magneto problems. Switching from BOTH to either L or R Ignition switch position will identify which magneto is malfunctioning. Select different power settings and enrichen the mixture to determine if continued operation on BOTH magnetos is practicable. If not, switch to the good magneto and proceed to the nearest airport for repairs.

#### ENGINE DRIVEN FUEL PUMP FAILURE

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

In the event of an engine driven fuel pump failure, immediately turn the auxiliary fuel pump switch ON to restore engine power. In this event, the flight should be terminated when practical and the fuel pump repaired.

#### EXCESSIVE FUEL VAPOR INDICATIONS

Excessive fuel vapor indications are most likely to occur on the ground typically during prolonged taxi operations, when operating at higher altitudes and/or in unusually warm temperatures.

An indication of excessive fuel vapor accumulation is fuel flow gage fluctuations greater than 1 gal./hr. This condition with leaner mixtures or with larger fluctuations may result in power surges, and if not corrected, may cause power loss.



To eliminate vapor and stabilize fuel flow on the ground or in the air, turn the auxiliary fuel pump on and reset the mixture as required. If vapor symptoms persist, select the opposite fuel tank. When fuel flow stabilizes, turn off the auxiliary fuel pump and reset the mixture as desired.

### **LOW OIL PRESSURE**

If the low oil pressure annunciator (OIL PRESS) illuminates, check the oil pressure gage to confirm low oil pressure condition. If gage oil pressure and oil temperature remains normal, it is possible the oil pressure sending unit or relief valve is malfunctioning. However, land at the nearest airport to inspect the source of trouble.

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

### **ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS**

Malfunctions in the electrical power supply system can be detected by periodic monitoring of the ammeter and low voltage annunciator (VOLTS); however, the cause of these malfunctions is usually difficult to determine. A broken alternator drive belt or wiring is most likely the cause of alternator failures, although other factors could cause the problem. A defective alternator control unit can also cause malfunctions. Problems of this nature constitute an electrical emergency and should be dealt with immediately. Electrical power malfunctions usually fall into two categories: excessive rate of charge and insufficient rate of charge. The following paragraphs describe the recommended remedy for each situation.

### EXCESSIVE RATE OF CHARGE

After engine starting and heavy electrical usage at low engine speeds (such as extended taxiing) the battery condition will be low enough to accept above normal charging during the initial part of a flight. However, after thirty minutes of cruising flight, the ammeter should be indicating less than two needle widths of charging current. If the charging rate were to remain above this value on a long flight, the battery would overheat and evaporate the electrolyte at an excessive rate.

Electronic components in the electrical system can be adversely affected by higher than normal voltage. The alternator control unit includes an overvoltage sensor which normally will automatically shut down the alternator if the charge voltage reaches approximately 31.75 volts. If the overvoltage sensor malfunctions, as evidenced by an excessive rate of charge shown on the ammeter, the alternator should be turned off, nonessential electrical equipment turned off and the flight terminated as soon as practical.

### INSUFFICIENT RATE OF CHARGE

#### NOTE

Illumination of the low voltage annunciator (VOLTS) and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system, such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM.

If the overvoltage sensor should shut down the alternator and trip the alternator circuit breaker (ALT FLD), or if the alternator output is low, a discharge rate will be shown on the ammeter followed by illumination of the low voltage annunciator (VOLTS). Since this may be a "nuisance" trip out, an attempt should be made to reactivate the alternator system. To reactivate, turn the avionics master switch off, check that the alternator circuit breaker (ALT FLD) is in, then turn both sides of the master switch off and then on again. If the problem no longer exists, normal alternator charging will resume and the low voltage annunciator (VOLTS) will go off. The avionics master switch may then be turned back on.

If the annunciator illuminates again, a malfunction is confirmed. In this event, the flight should be terminated and/or the current drain on the battery minimized because the battery can supply the electrical system for only a limited period of time. Battery power must be conserved for later operation of the wing flaps and, if the emergency occurs at night, for possible use of the landing lights during landing.

## **CARGO DOOR EMERGENCY EXIT**

If it is necessary to use the cargo doors as an emergency exit and the wing flaps are not extended, open the doors and exit. If the wing flaps are extended, open the doors in accordance with the instructions shown on the red placard which is mounted on the forward cargo door. Here the forward door must be opened far enough to allow access to the aft door latch. After unlatching the aft door, release the latch lever and push the aft door full open. These placarded instructions may also be found in Section 2.

## **OTHER EMERGENCIES**

### **WINDSHIELD DAMAGE**

If a bird strike or other incident should damage the windshield in flight to the point of creating an opening, a significant loss in performance may be expected. This loss may be minimized in some cases (depending on amount of damage, altitude, etc.) by opening the side windows while the airplane is maneuvered for a landing at the nearest airport. If airplane performance or other adverse conditions preclude landing at an airport, prepare for an "off airport" landing in accordance with the Precautionary Landing With Engine Power or Ditching checklists.

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## INTRODUCTION

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Supplements, Section 9.

## AIRSPEEDS

### AIRSPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 3600 pounds and may be used for any lesser weight. However, to achieve the performance specified in Section 5 for takeoff distance and climb performance the speed appropriate to the particular weight must be used.

#### Takeoff:

Normal Climb Out .....	75-85 KIAS
Short Field Takeoff, Flaps 20°, Speed at 50 Feet .....	74 KIAS

#### Enroute Climb, Flaps Up:

Normal .....	95 KIAS
Best Rate of Climb, Sea Level to 17,000 feet .....	89 KIAS
Best Rate of Climb, 24,000 feet .....	79 KIAS
Best Angle of Climb, Sea Level .....	69 KIAS
Best Angle of Climb, 10,000 Feet .....	72 KIAS

#### Landing Approach:

Normal Approach, Flaps Up .....	80-90 KIAS
Normal Approach, Flaps 40° .....	70-80 KIAS
Short Field Approach, Flaps 40° .....	67 KIAS

#### Balked Landing:

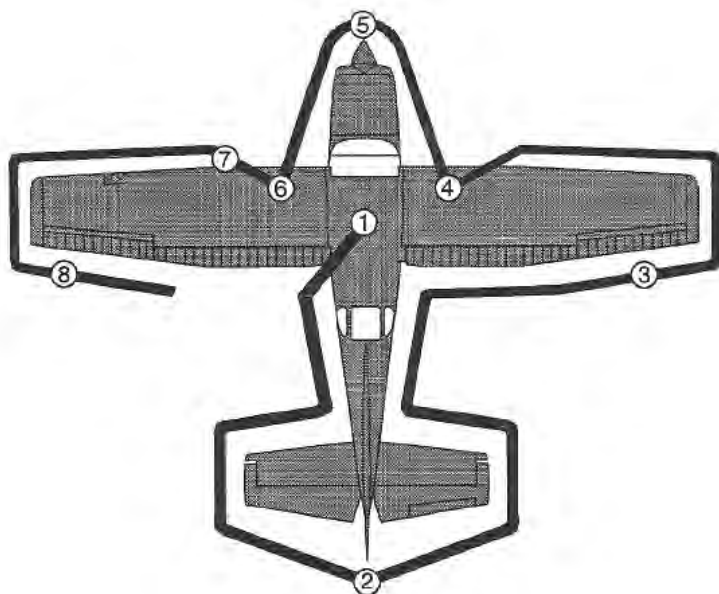
Maximum Power, Flaps 20° .....	85 KIAS
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#### Maximum Recommended Turbulent Air Penetration Speed:

3600 Lbs .....	125 KIAS
2950 Lbs .....	120 KIAS
2300 Lbs .....	106 KIAS

#### Maximum Demonstrated Crosswind Velocity:

Takeoff or Landing .....	20 KNOTS
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**NOTE**

- Visually check airplane for general condition during walk-around inspection. Airplane should be parked in a normal ground attitude (refer to Figure 1-1) to ensure that fuel drain valves allow for accurate sampling. Use of the refueling steps and assist handles will simplify access to the upper wing surfaces for visual checks and refueling operations. 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. Prior to flight, check that pitot heater is warm to touch within 30 seconds with battery and pitot switches on. If a night flight is planned, check operation of all lights, and make sure a flashlight is available.

Figure 4-1. Preflight Inspection



## PREFLIGHT INSPECTION

### ① CABIN

1. Pitot Tube Cover -- REMOVE. Check for pitot blockage.
2. Pilot's Operating Handbook -- AVAILABLE IN THE AIRPLANE.
3. Cargo Door Locking Pin (Airplane Serial Numbers T20608438 and On) -- REMOVE and STOW.
4. Airplane Weight and Balance -- CHECKED.
5. Parking Brake -- SET.
6. Control Wheel Lock -- REMOVE.
7. Ignition Switch -- OFF.
8. Avionics Master Switch -- OFF.

### WARNING

WHEN TURNING ON THE MASTER SWITCH, USING AN EXTERNAL POWER SOURCE, OR PULLING THE PROPELLER THROUGH BY HAND, TREAT THE PROPELLER AS IF THE IGNITION SWITCH WERE ON. DO NOT STAND, NOR ALLOW ANYONE ELSE TO STAND, WITHIN THE ARC OF THE PROPELLER, SINCE A LOOSE OR BROKEN WIRE OR A COMPONENT MALFUNCTION COULD CAUSE THE PROPELLER TO ROTATE.

9. Master Switch -- ON.
10. Fuel Quantity Indicators -- CHECK QUANTITY and ENSURE LOW FUEL ANNUNCIATORS (L LOW FUEL R) ARE EXTINGUISHED.
11. Avionics Master Switch -- ON.
12. Avionics Cooling Fan -- CHECK AUDIBLY FOR OPERATION.
13. Avionics Master Switch -- OFF.
14. Static Pressure Alternate Source Valve -- OFF.
15. Annunciator Panel Switch -- PLACE AND HOLD IN TEST POSITION and ensure all annunciators illuminate.

(Continued Next Page)

## **PREFLIGHT INSPECTION** (Continued)

### **① CABIN** (Continued)

- 16. Annunciator Panel Test Switch – RELEASE. Check that appropriate annunciators remain on.

#### **NOTE**

When master switch is turned ON, some annunciators will flash for approximately 10 seconds before illuminating steadily. When panel TST switch is toggled up and held in position, all remaining lights will flash until the switch is released.

- 17. Fuel Selector Valve – BOTH.
- 18. Flaps – EXTEND.
- 19. Pitot Heat – ON. (Carefully check that pitot tube is warm to the touch within 30 seconds.)
- 20. Pitot Heat – OFF.
- 21. Master Switch – OFF.
- 22. Trim Controls – NEUTRAL.
- 23. Oxygen Supply Pressure – CHECK.
- 24. Oxygen Masks – CHECK.

### **② EMPENNAGE**

- 1. Rudder Gust Lock (if installed) – REMOVE.
- 2. Tail Tie-Down – DISCONNECT.
- 3. Control Surfaces – CHECK freedom of movement and security.
- 4. Trim Tab – CHECK security.
- 5. Check that cargo doors are securely latched (right side only). If cargo load will not permit access to the front cargo door inside handle, lock the door from the outside by pulling the handle from its recess, pulling outboard on the vertical tab behind the handle and pushing the handle back into its recess. Door locking can be verified by observing that the inside door handle has rotated toward the locked position. The outside handle can then be locked using the key.

(Continued Next Page)

**NOTE**

The cargo doors must be fully closed and latched before operating the electric wing flaps. A switch in the upper door sill of the front cargo door interrupts the wing flap electrical circuit when the front door is opened or removed, thus preventing the flaps from being lowered with possible damage to the cargo door or wing flaps when the cargo door is open.

6. Antennas – CHECK for security of attachment and general condition.

**3 RIGHT WING Trailing Edge**

1. Flap – CHECK for security and condition.
2. Aileron – CHECK freedom of movement and security.

**4 RIGHT WING**

1. Wing Tie-Down – DISCONNECT.
2. Fuel Tank Vent Opening – CHECK for stoppage.
3. Main Wheel Tire – CHECK for proper inflation and general condition (weather checks, tread depth and wear, etc...).
4. Fuel Tank Sump Quick Drain Valves – DRAIN at least a cupful of fuel (using sampler cup) from each sump location to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If contaminants are still present, refer to WARNING below and do not fly airplane.

**▲ WARNING**

**IF, AFTER REPEATED SAMPLING, EVIDENCE OF CONTAMINATION STILL EXISTS, THE AIRPLANE SHOULD NOT BE FLOWN. TANKS SHOULD BE DRAINED AND SYSTEM PURGED BY QUALIFIED MAINTENANCE PERSONNEL. ALL EVIDENCE OF CONTAMINATION MUST BE REMOVED BEFORE FURTHER FLIGHT.**

5. Fuel Quantity – CHECK VISUALLY for desired level.
6. Fuel Filler Cap – SECURE and VENT UNOBSTRUCTED.

**5 NOSE**

1. Static Source Opening (right side of fuselage) -- CHECK for blockage.
2. Fuel Strainer Quick Drain Valve (Located on bottom of fuselage) – DRAIN at least a cupful of fuel (using sampler cup) from valve to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from **all** fuel drain points, including the fuel reservoirs and the fuel selector, until **all** contamination has been removed. If contaminants are still present, refer to WARNING on page 4-9 and do not fly airplane.
3. Engine Oil Dip Stick/Filler Cap -- CHECK oil level, then check dipstick SECURE. Do not operate with less than 6 quarts. Fill to 11 quarts for extended flight.
4. Engine Cooling Air Inlets – CHECK left and right upper inlets clear of obstructions. Also, CHECK lower left oil cooling air inlet clear of obstructions.
5. Propeller and Spinner -- CHECK for nicks and security.
6. Engine Induction Air Filter – CHECK for restrictions by dust or other foreign matter.
7. Nose Wheel Strut and Tire – CHECK for proper inflation of strut and general condition (weather checks, tread depth and wear, etc...) of tire.
8. Static Source Opening (left side of fuselage)– CHECK for blockage.

**6 LEFT WING**

1. Fuel Quantity -- CHECK VISUALLY for desired level.
2. Fuel Filter Cap -- SECURE AND VENT UNOBSTRUCTED.
3. Fuel Tank Sump Quick Drain Valves -- DRAIN at least a cupful of fuel (using sampler cup) from each sump location to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If contaminants are still present, refer to WARNING on page 4-9 and do not fly airplane.
4. Main Wheel Tire -- CHECK for proper inflation and general condition (weather checks, tread depth and wear, etc.).

**7 LEFT WING Leading Edge**

1. Fuel Tank Vent Opening -- CHECK for blockage.
2. Stall Warning Vane -- CHECK for freedom of movement. To check the system, place the vane upward; a sound from the warning horn will confirm system operation.
3. Wing Tie-Down -- DISCONNECT.
4. Landing/Taxi Light(s) -- CHECK for condition and cleanliness of cover.

**8 LEFT WING Trailing Edge**

1. Aileron -- CHECK for freedom of movement and security.
2. Flap -- CHECK for security and condition.

## BEFORE STARTING ENGINE

1. Preflight Inspection – COMPLETE.
2. Passenger Briefing – COMPLETE.
3. Seats and Seat Belts -- ADJUST and LOCK. Ensure inertia reel locking.
4. Brakes -- TEST and SET.
5. Circuit Breakers – CHECK IN.
6. Electrical Equipment -- OFF.

### CAUTION

**THE AVIONICS MASTER SWITCH MUST BE OFF DURING ENGINE START TO PREVENT POSSIBLE DAMAGE TO AVIONICS.**

7. Avionics Master Switch – OFF.
8. Cowl Flaps – OPEN.
9. Fuel Selector Valve – BOTH.
10. Avionics Circuit Breakers -- CHECK IN.

## STARTING ENGINE (With Battery)

1. Throttle – OPEN 1/4 INCH.
2. Propeller – HIGH RPM.
3. Mixture – IDLE CUT OFF.
4. Propeller Area – CLEAR.
5. Master Switch – ON.

### NOTE

If engine is warm, omit priming procedure of step 6, 7, and 8 below.

6. Auxiliary Fuel Pump Switch – ON.
7. Mixture – ADVANCE to full rich until the fuel flow just starts to rise, then return to IDLE CUT OFF position.
8. Auxiliary Fuel Pump Switch – OFF.

9. Ignition Switch -- START (release when engine starts).
10. Mixture -- ADVANCE smoothly to RICH when engine fires.

**NOTE**

If engine floods, turn off auxiliary fuel pump, place mixture in idle cut off, open throttle 1/2 to full, and crank engine. When engine fires, advance mixture to full rich and retard throttle promptly.

11. Oil Pressure -- CHECK.
12. Flashing Beacon and Navigation Lights -- ON as required.
13. Avionics Master Switch -- ON.
14. Radios -- ON.

**STARTING ENGINE (With External Power)**

1. Throttle -- OPEN 1/4 INCH.
2. Propeller -- HIGH RPM.
3. Mixture -- IDLE CUT OFF.
4. Propeller Area -- CLEAR.
5. External Power -- CONNECT to airplane receptacle.
6. Master Switch -- ON.

**NOTE**

If engine is warm, omit priming procedure of step 7, 8, and 9 below.

7. Auxiliary Fuel Pump Switch -- ON.
8. Mixture -- ADVANCE to full rich until the fuel flow just starts to rise, then return to IDLE CUT OFF position.
9. Auxiliary Fuel Pump Switch -- OFF.
10. Ignition Switch -- START (release when engine starts).
11. Mixture -- ADVANCE smoothly to RICH when engine fires.

**NOTE**

If engine floods, turn off auxiliary fuel pump, place mixture in idle cut off, open throttle 1/2 to full, and crank engine. When engine fires, advance mixture to full rich and retard throttle promptly.

**SECTION 4  
NORMAL PROCEDURES**

**CESSNA  
MODEL T206H**

12. Oil Pressure – CHECK.
13. External Power – DISCONNECT from airplane receptacle. Secure external power door.
14. Ammeter – CHECK (see checklist, Section 7, Ground Service Plug Receptacle).
15. Flashing Beacon and Navigation Lights – ON as required.
16. Avionics Master Switch – ON.
17. Radios – ON.

**BEFORE TAXIING**

1. Windows, vents and heater – ADJUST as desired.
2. Mixture – AS REQUIRED. Preferably LEANED at 1200 RPM.
3. Throttle – AS REQUIRED or 1800 RPM to 2000 RPM as required by fuel vapor conditions.
4. Auxiliary Fuel Pump – OFF (ON, if fuel vapor conditions exist).
5. Parking Brake – RELEASE.

**BEFORE TAKEOFF**

1. Parking Brake – SET.
2. Passenger Seats – AS FAR FORWARD AS PRACTICAL.
3. Passenger Seat Backs – MOST UPRIGHT POSITION.
4. Seats and Seat Belts – CHECK SECURE.
5. Cabin Doors – CLOSED and LOCKED.
6. Cargo Door (Airplane Serial Numbers T20608438 and On) – CHECK (Locking Pin removed and stowed).
7. Flight Controls – FREE and CORRECT.
8. Flight Instruments – CHECK and SET.
9. Fuel Quantity – CHECK.
10. Auxiliary Fuel Pump – OFF.
11. Mixture – RICH.
12. Fuel Selector Valve – RECHECK BOTH.
13. Throttle – 1800 RPM.
  - a. Magnetos – CHECK (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos).
  - b. Propeller – CYCLE from high to low RPM; return to high RPM (full in).
  - c. Vacuum Gage – CHECK.
  - d. Engine Instruments and Ammeter – CHECK.
  - e. Annunciator Panel – Ensure no annunciators are illuminated.
14. Throttle – CHECK IDLE.
15. Throttle – 1000 RPM.



16. Throttle Friction Lock -- ADJUST.
17. Strobe Lights -- AS DESIRED.
18. Electric Trim (if installed) -- PREFLIGHT TEST.
19. Radios and Avionics -- SET.
20. NAV/GPS Switch (if installed) -- SET.
21. Autopilot (if installed) -- OFF.
22. Elevator Trim and Rudder Trim -- SET for takeoff.
23. Cowl Flaps -- OPEN.
24. Wing Flaps -- SET for takeoff (0° TO 20°).
25. Brakes -- RELEASE.

## TAKEOFF

### NORMAL TAKEOFF

1. Wing Flaps -- 0° - 20°.
2. Power -- 39 INCHES Hg. and 2500 RPM.
3. Mixture -- ADJUST to 34 GPH fuel flow.
4. Elevator Control -- LIFT NOSE WHEEL at 55 KIAS.
5. Climb Speed -- 75 - 85 KIAS (flaps 20°).
6. Wing Flaps -- RETRACT (after obstacles are cleared).

### SHORT FIELD TAKEOFF

1. Wing Flaps -- 20°.
2. Brakes -- APPLY.
3. Power -- 39 INCHES Hg. and 2500 RPM.
4. Mixture -- Adjust to 34 GPH fuel flow.
5. Brakes -- RELEASE.
6. Elevator Control -- MAINTAIN SLIGHTLY TAIL LOW ATTITUDE.
7. Climb Speed -- 74 KIAS (until all obstacles are cleared).
8. Wing Flaps -- RETRACT slowly after reaching 90 KIAS.

### NOTE

Do not reduce power until wing flaps have been retracted.

## ENROUTE CLIMB

### NORMAL CLIMB

1. Airspeed -- 95-105 KIAS.
2. Power -- 30 in. Hg. and 2400 RPM.

3. Mixture -- LEAN to 20 GPH fuel flow.
4. Fuel Selector Valve -- BOTH.
5. Cowl Flaps -- OPEN as required.

**MAXIMUM PERFORMANCE CLIMB**

1. Airspeed -- 89 KIAS.

**NOTE**

Some optional equipment items require the use of higher indicated airspeed for maximum performance climbs. This information is included in the Supplements section for applicable installed options.

2. Power -- 39 in. Hg. and 2500 RPM.
3. Mixture -- ADJUST to 34 GPH fuel flow.

**NOTE**

See Minimum Fuel Flow placard for maximum continuous power manifold pressure and fuel flow above 17,000 feet.

**NOTE**

On hot days at higher altitudes, be alert for possible fuel vapor indications. If fuel flow fluctuations are observed or if desired fuel flows cannot be maintained, turn the auxiliary fuel pump ON and reset the mixture as required.

4. Fuel Selector Valve -- BOTH.
5. Cowl Flaps -- FULL OPEN.

## CRUISE

1. Power – 15 - 30 in. Hg., 2000 - 2400 RPM (no more than 75%).
2. Mixture – LEAN for cruise fuel flow using the T.I.T. gage or the Cruise Data in Section 5.
3. Elevator and Rudder Trim – ADJUST.
4. Cowl Flaps – AS REQUIRED.

### NOTE

Turn auxiliary fuel pump on momentarily when switching tanks in cruise.

## DESCENT

### Serials T20608001 thru T20608361:

1. Power -- AS DESIRED.
2. Mixture -- ENRICHEN as required.
3. Cowl Flaps -- CLOSED.
4. Altimeter -- SET.
5. Nav/GPS Switch -- SET.
6. Fuel Selector Valve -- BOTH.
7. Wing Flaps -- AS DESIRED (0°-10° below 140 KIAS; 10° - 40° below 100 KIAS).

### Serials T20608362 and on:

1. Power -- AS DESIRED.
2. Mixture -- ENRICHEN as required.
3. Cowl Flaps -- CLOSED.
4. Altimeter -- SET.
5. Nav/GPS Switch -- SET.
6. Fuel Selector Valve -- BOTH.
7. Wing Flaps -- AS DESIRED (0°-10° below 140 KIAS; 10°- 20° below 120 KIAS; 20° - 40° below 100 KIAS).

## BEFORE LANDING

1. Passenger Seats -- AS FAR FORWARD AS PRACTICAL.
2. Pilot and Passenger Seat Backs -- MOST UPRIGHT POSITION.
3. Seats and Seat Belts -- SECURED and LOCKED.
4. Fuel Selector Valve -- BOTH.
5. Mixture -- RICH.
6. Propeller -- HIGH RPM.
7. Landing/Taxi Lights -- ON.
8. Autopilot (if installed) -- OFF.

## LANDING

### NORMAL LANDING

#### Serials T20608001 thru T20608361:

1. Airspeed -- 80 - 90 KIAS (flaps UP).
2. Wing Flaps -- AS DESIRED (0°-10° below 140 KIAS; 10° - 40° below 100 KIAS).
3. Airspeed -- 70 - 80 KIAS (flaps DOWN).
4. Trim -- ADJUST as desired.
5. Touchdown -- MAIN WHEELS FIRST.
6. Landing Roll -- LOWER NOSE WHEEL GENTLY.
7. Braking -- MINIMUM REQUIRED.

#### Serials T20608362 and on:

1. Airspeed -- 80 - 90 KIAS (flaps UP).
2. Wing Flaps -- AS DESIRED (0°-10° below 140 KIAS; 10° - 20° below 120 KIAS; 20° - 40° below 100 KIAS).
3. Airspeed -- 70 - 80 KIAS (flaps DOWN).
4. Trim -- ADJUST as desired.
5. Touchdown -- MAIN WHEELS FIRST.
6. Landing Roll -- LOWER NOSE WHEEL GENTLY.
7. Braking -- MINIMUM REQUIRED.

(Continued Next Page)

### SHORT FIELD LANDING

1. Airspeed -- 80-90 KIAS (flaps UP).
2. Wing Flaps -- FULL (below 100 KIAS).
3. Airspeed -- MAINTAIN 67 KIAS.
4. Power -- REDUCE TO IDLE as obstacle is cleared.
5. Trim -- ADJUST.
6. Touchdown -- MAIN WHEELS FIRST.
7. Brakes -- APPLY HEAVILY.
8. Wing Flaps -- RETRACT for maximum brake effectiveness.

### BALKED LANDING

1. Power -- 39 in. Hg and 2500 RPM.
2. Mixture -- ADJUST to 34 GPH fuel flow.
3. Wing Flaps -- RETRACT TO 20°.
4. Climb Speed -- 85 KIAS.
5. Wing Flaps -- RETRACT slowly.
6. Cowl Flaps -- OPEN.

### AFTER LANDING

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

### SECURING AIRPLANE

1. Parking Brake -- SET.
2. Throttle -- IDLE.
3. Electrical Equipment, Avionics Master Switch, Autopilot (if installed) -- OFF.
4. Mixture -- IDLE CUT-OFF (pulled full out).
5. Ignition Switch -- OFF.
6. Master Switch -- OFF.
7. Control Lock -- INSTALL.
8. Fuel Selector Valve -- LEFT or RIGHT to prevent cross feeding.
9. Cowl Flaps -- Closed.
10. Cargo Door Locking Pin (Airplane Serial Numbers T20608438 and On) -- INSTALL.

## AMPLIFIED PROCEDURES

### PREFLIGHT INSPECTION

The Preflight Inspection, described in Figure 4-1 and adjacent checklist, is recommended prior to each flight. If the airplane has been in extended storage, has had recent major maintenance, or has been operated from marginal airports, a more extensive exterior inspection is recommended.

After major maintenance has been performed, the flight and trim tab controls should be double checked for free and correct movement and security. The security of all inspection plates on the airplane should be checked following periodic inspections. If the airplane has been waxed or polished, check the external static pressure source hole for stoppage.

If the airplane has been exposed to a great deal of ground handling in a crowded hangar, it should be checked for dents and scratches on wings, fuselage, and tail surfaces, damage to navigation and anti-collision lights, damage to nose wheel as a result of exceeding tow limits, and avionics antennas.

Outside storage for long periods may result in dust and dirt accumulation on the induction air filter, obstructions in airspeed system lines, water contamination in fuel tanks and bird/rodent nests in any opening. If any water is detected in the fuel system, the fuel tank sump quick drain valves, fuel reservoir quick drain valve, and fuel strainer quick drain valve should all be thoroughly drained. Then, the wings should be gently rocked and the tail lowered to the ground to move any further contaminants to the sampling points. Repeated samples should then be taken at all quick drain points until all contamination has been removed. If, after repeated sampling, evidence of contamination still exists, the fuel tanks should be completely drained and the fuel system cleaned.

Additionally, if the airplane has been stored outside in windy or gusty areas, or tied down adjacent to taxiing airplanes, special attention should be paid to control surface stops, hinges, and brackets to detect the presence of potential wind damage.

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

Airplanes that are operated from rough fields, especially at high altitudes, are subjected to abnormal landing gear abuse. Frequently check all components of the landing gear, shock strut, tires, and brakes. If the shock strut is insufficiently extended, undue landing and taxi loads will be subjected on the airplane structure.

To prevent loss of fuel in flight, make sure the fuel tank filler caps are tightly sealed after any fuel system check or servicing. Fuel system vents should also be inspected for obstructions, ice or water, especially after exposure to cold, wet weather.

Prior to flight, check to be sure that there is an adequate oxygen supply for the trip, by noting the oxygen pressure gage reading, and referring to the Oxygen Duration Chart of the Pilot's Operating Handbook. Also check that the face masks and hoses are accessible and in good condition.

## **STARTING ENGINE**

In cooler weather, the engine compartment temperature drops off rapidly following engine shutdown and the injector nozzle lines remain nearly full of fuel.

However, in warmer weather, engine compartment temperatures may increase rapidly following engine shutdown, and fuel in the lines will vaporize and escape into the intake manifold. Hot weather starting procedures depend considerably on how soon the next engine start is attempted. Within the first 20 to 30 minutes after shutdown, the fuel manifold is adequately primed and the empty injector nozzle lines will fill before the engine dies. However, after approximately 30 minutes, the vaporized fuel in the manifold will have nearly dissipated and some "priming" could be required to refill the nozzle lines and keep the engine running after the initial start. Starting a hot engine is facilitated by advancing the mixture control promptly to 1/3 open when the engine fires, and then smoothly to full rich as power develops.

Should the engine tend to die after starting, turn on the auxiliary fuel pump temporarily and adjust the throttle and/or mixture as necessary to keep the engine running. In the event of over priming or flooding, turn off the auxiliary fuel pump, open the throttle from 1/2 to full open, and continue cranking with the mixture full lean. When the engine fires, smoothly advance the mixture control to full rich and retard the throttle to desired idle speed.

If the engine is under primed (most likely in cold weather with a cold engine) it will not fire at all, and additional priming will be necessary.

After starting, if the oil pressure does not begin to indicate pressure within 30 seconds in the summer and approximately one minute in very cold weather, stop the engine and investigate. Lack of oil pressure can cause serious engine damage.

#### NOTE

Additional details concerning cold weather starting and operation may be found under COLD WEATHER OPERATION paragraphs in this section.

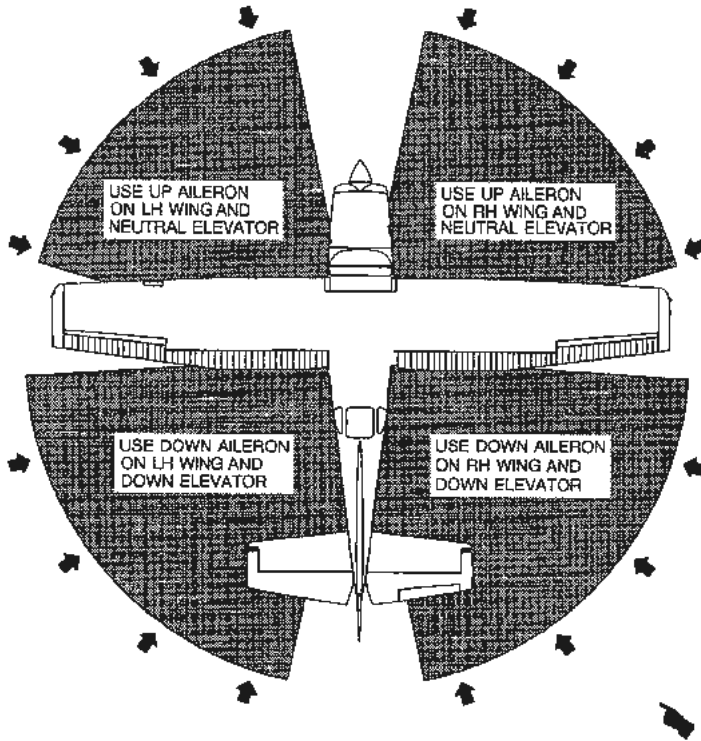
Recommended starter duty-cycle: Crank the starter for 10 seconds followed by a 20 second cool-down period. This cycle can be repeated two additional times, followed by a ten minute cool-down period before resuming cranking. After cool-down, crank the starter again, three cycles of 10 seconds followed by 20 seconds of cool-down. If the engine still fails to start, an investigation to determine the cause should be initiated.

## TAXIING

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (Refer to Figure 4-2, Taxiing Diagram) to maintain directional control and balance.

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





**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 situation. Use the steerable nose wheel and rudder to maintain direction.

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Figure 4-2. Taxiing Diagram

## BEFORE TAKEOFF

### WARM UP

If the engine idles (approximately 650 RPM) and accelerates smoothly, the airplane is ready for takeoff. 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. Also, with the oil cooler inlet located on the lower left cowl, oil cooling should be monitored closely during ground operations with a right cross-wind. Further, long periods of idling may cause fouled spark plugs.

### 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, note RPM and return the switch to the BOTH position. RPM drop should not exceed 150 RPM on either magneto or show greater than 50 RPM differential between magnetos. If there is 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 alternator control unit operation is essential (such as night or instrument flights), a positive verification can be made by loading the electrical system momentarily (3 to 5 seconds) with the landing light or by operating the wing flaps during the engine runup (1800 RPM). The ammeter will remain within a needle width of its initial reading if the alternator and alternator control unit are operating properly.

### LANDING LIGHTS

If landing lights are to be used to enhance the visibility of the airplane in the traffic pattern or enroute, it is recommended that only the taxi light be used. This will extend the service life of the landing light appreciably.

## TAKEOFF

### POWER CHECK

It is important to check takeoff power early in the takeoff roll. Any sign of rough engine operation or sluggish engine acceleration is good cause for discontinuing the takeoff.

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

On the first flight of the day when the throttle is advanced for takeoff, manifold pressure will normally exceed 39 in. Hg and fuel flows will exceed 34 GPH if the throttle is opened fully. On any takeoff, the manifold pressure should be monitored and the throttle set to provide 39 in. Hg; then, for maximum engine power, the mixture should be adjusted as required, during the initial takeoff roll to 34 GPH fuel flow.

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

### WING FLAP SETTINGS

Normal takeoffs are accomplished with wing flaps 0° to 20°. Using 20° wing flaps reduces the ground roll and total distance over an obstacle by approximately 10 percent. Flap deflections greater than 20° are not approved for takeoff.

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On a short field, 20° wing flaps and an obstacle clearance speed of 74 KIAS should be used. If 20° wing flaps are used for takeoff, they should be left down until all obstacles are cleared and a safe flap retraction speed of 90 KIAS is reached.

Soft or rough field takeoffs are performed with 20° flaps by lifting the airplane off the ground as soon as practical in a slightly tail low attitude. If no obstacles are ahead, the airplane should be leveled off immediately to accelerate to a higher climb speed.

**CROSSWIND TAKEOFF**

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

**ENROUTE CLIMB**

Power settings for a Best Rate-of-Climb Profile using MCP must be limited to 39 inches of manifold pressure, 2500 RPM and 34 GPH fuel flow.

A cruise climb at 30 inches of manifold pressure, 2400 RPM, 20 GPH fuel flow, and 95 to 105 KIAS is normally recommended to provide an optimum combination of performance, visibility ahead, engine cooling, economy and passenger comfort (due to lower noise level). However, MCP power settings may be used for increased climb performance, as desired.

If it is necessary to climb rapidly to clear mountains or reach favorable winds or better weather at high altitudes, the best rate-of-climb speed should be used with maximum continuous power. This speed is 89 KIAS from sea level to 17,000 feet, decreasing to 79 KIAS at 24,000 feet.

If an obstruction dictates the use of a steep climb angle, climb with flaps retracted and maximum continuous power at 69-72 KIAS. Engine temperatures should be monitored closely at these climb speeds.

For maximum power, the mixture should be set in accordance with the Minimum Fuel Flow placard.

## CRUISE

Normal cruising is performed between 55% and 75% of the rated maximum continuous power (MCP). However, any power setting within the green arc ranges on the manifold pressure gage and tachometer may be used. The power settings and corresponding fuel consumption for various altitudes can be determined by using the data in Section 5.

### NOTE

Cruising should be done at 65% to 75% power as much as practicable until a total of 50 hours has been accumulated or oil consumption has stabilized. Operation at this higher power will ensure proper seating of the rings and is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

The Cruise Performance charts in Section 5 provide the pilot with detailed information concerning the cruise performance of the Model T206H in still air. Power and altitude, as well as winds aloft, have a strong influence on the time and fuel needed to complete any flight. The Cruise Performance table, Figure 5-3, illustrates the advantage of higher altitude on both true airspeed and nautical miles per gallon. In addition, the beneficial effect of lower cruise power on nautical miles per gallon at a given altitude can be observed. The selection of cruise altitude on the basis of most favorable wind conditions and the use of low power settings are significant factors that should be considered on every trip to reduce fuel consumption.

The Cruise Performance charts in Section 5 provide the pilot with cruise performance at maximum gross weight. When normal cruise is performed at reduced weights, there is an increase in true airspeed. During normal cruise at power settings between 65% and 75%, the true airspeed will increase approximately 1 knot for every 125 pounds below maximum gross weight. During normal cruise at power settings below 65%, the true airspeed will increase approximately 1 knot for every 100 pounds below maximum gross weight.

ALTITUDE	75% POWER		65% POWER		55% POWER	
	KTAS	NMPG	KTAS	NMPG	KTAS	NMPG
5000 feet	144	7.5	135	8.1	125	8.9
10000 feet	150	7.8	141	8.5	129	9.2
15000 feet	157	8.2	147	8.8	132	9.4
20000 feet	164	8.6	152	9.2	135	9.6

Figure 4-3. Cruise Performance Table

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

The fuel injection system employed on this engine is considered to be non-icing. In the event that unusual conditions cause the intake air filter to become clogged or iced over, an alternate intake air door opens automatically for the most efficient use of either normal or alternate air, depending on the amount of filter blockage. Due to the lower intake pressure available through the alternate air door or a partially blocked filter, manifold pressure can decrease from a cruise power setting. This manifold pressure should be recovered by increasing the throttle setting or higher RPM as necessary to maintain the desired power.

## LEANING WITH THE T.I.T. INDICATOR

Exhaust gas turbine inlet temperature (T.I.T.) as shown on the T.I.T./C.H.T. indicator should be used for mixture leaning in cruising flight. This unit displays the exhaust gas temperature at the inlet of the turbine in degrees Fahrenheit.

### CAUTION

**LEANING WITH A T.I.T. INDICATOR IS PERMITTED ONLY WHEN USING POWER SETTINGS WITHIN THE GREEN ARC RANGES. IF HIGHER POWER SETTINGS ARE USED, WHETHER FOR LEVEL FLIGHT OR CLIMB, THE MINIMUM FUEL FLOW REQUIREMENTS MUST BE MET.**

Cruise performance data in this handbook is based on a recommended lean mixture setting which may be established using the T.I.T. indicator at powers of 75% MCP and below as follows:

1. Lean the mixture slowly until the T.I.T. peaks and begins to drop.
2. Enrichen the mixture 75°F rich of peak for recommended lean or a desired increment based on the data in Figure 4-4, T.I.T. Table.

At maximum cruise power settings, the 1675°F limit (red line) T.I.T. may occur before reaching peak T.I.T. In this case, enrichen the mixture from redline 75°F for Recommended Lean Mixture. Any change in altitude or power setting will require a change in the recommended lean mixture setting and a recheck of the T.I.T. setting.

As noted in the T.I.T. table, Figure 4-4, operation at peak T.I.T. provides the best fuel economy. This results in approximately 5% greater range than shown in this handbook accompanied by a 4 knot decrease in speed. Under some conditions, engine roughness may occur while operating at peak T.I.T. In this case, operate at the Recommended lean Mixture.

MIXTURE DESCRIPTION	TURBINE INLET TEMPERATURE (T.I.T.)
RECOMMENDED LEAN (Pilot's Operating Handbook)	75°F Rich of Peak T.I.T.
BEST ECONOMY	Peak T.I.T.
BEST POWER	150°F Rich of Peak T.I.T.

Figure 4-4. T.I.T. Table

**⚠ CAUTION**

**OPERATION ON THE LEAN SIDE OF PEAK T.I.T.  
IS NOT APPROVED.**

**NOTE**

When cruising at altitudes above 22,000 feet, the maximum allowable manifold pressure is below the top of the green arc due to detonation restrictions. Reference Section 5 cruise tables for operational power settings.

Certain considerations must be made when using a T.I.T. indicator. Operations which are not approved include:

1. Power settings above the green arc range limitation.
2. Operations at T.I.T. indications above 1675°F.
3. Mixture settings that cause engine roughness or excessive power loss occurs.



### FUEL SAVINGS PROCEDURES FOR NORMAL FLIGHT OPERATIONS

For best fuel economy during normal operations, the following procedures are recommended.

1. After engine start and for all ground operations, set the throttle to 1200 RPM and lean the mixture for maximum RPM. After leaning, set the throttle to the appropriate RPM for ground operations. Leave the mixture at this setting until beginning the BEFORE TAKEOFF checklist. If prolonged ground operations are conducted after the BEFORE TAKEOFF checklist is complete, re-lean the mixture as described above until ready for TAKEOFF checklist.
2. Adjust the mixture for placarded fuel flows during maximum continuous power climbs.
3. Adjust the mixture at any altitude for RECOMMENDED LEAN or BEST ECONOMY fuel flows, when using 75% or less power.

Using the above recommended procedures can provide fuel savings in excess of 5% when compared to typical operations at full rich mixture. In addition, the above procedures will minimize spark plug fouling since the reduction in fuel consumption results in a proportional reduction in tetraethyl lead passing through the engine.

### FUEL VAPOR PROCEDURES

The engine fuel system can become susceptible to fuel vapor formation on the ground during warm weather. This will generally occur when the outside ambient air temperature is above 80°F. The situation is further aggravated by the fact that the engine fuel flows are lower at idle and taxi engine speeds. When vapor occurs as evidenced by idle engine speed and fuel flow fluctuations, the following procedures are recommended.

1. With the mixture full rich, set the throttle at 1800 RPM to 2000 RPM. Maintain this power setting for 1 to 2 minutes or until smooth engine operation returns.
2. Retard the throttle to idle to verify normal engine operation.

3. Advance the throttle to 1200 RPM and lean the mixture as described under FUEL SAVINGS PROCEDURES FOR NORMAL FLIGHT OPERATIONS.
4. In addition to the above procedures, the Auxiliary Fuel Pump may be turned ON with the mixture adjusted as required to aid vapor suppression during ground operations. The Auxiliary Fuel Pump should be turned OFF prior to takeoff.
5. Just prior to TAKEOFF, advance the throttle to 39 inches Hg. for approximately 10 seconds to verify smooth engine operation for takeoff.

#### NOTE

When the engine is operated above 1800 RPM, the resulting increased fuel flow also makes for lower fuel temperatures throughout the engine fuel system. This increased flow purges the fuel vapor and the cooler fuel minimizes vapor formation.

In addition to the above procedures, the sections below should be reviewed and where applicable, adhered to:

- Section 2 -- Take note of the placard on "When Switching From Dry Tank".
- Section 3 -- Take note of the excessive fuel vapor procedures in both the checklist and amplified procedures sections.
- Section 4 -- Take note of the hot weather operational notes and procedures in both the checklist and the amplified procedures sections.
- Section 7 -- Take note of the altitude operational procedures and the section on auxiliary fuel pump operation.

## STALLS

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

Power off stall speeds at maximum weight for both forward and aft C.G. positions are presented in Section 5.

## DESCENT

Descent should be initiated far enough in advance of estimated landing to allow at gradual rate of descent at cruising speed.

Descent should be at approximately 500 FPM for passenger comfort, using enough power to keep the engine warm. The optimum engine RPM in a let-down is usually the lowest RPM in the green arc range that will allow cylinder head temperature to remain in the recommended operating range.

The airplane is equipped with a specially marked altimeter to attract the pilot's attention and prevent misreading the altimeter. A striped warning segment on the face of the altimeter is exposed at all altitudes below 10,000 feet to indicate low altitude.

## LANDING

### NORMAL LANDING

Normal landing approaches can be made with power on or power off with any flap setting desired. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds.

Actual touchdown should be made with power off and on the main wheels first to reduce the landing speed and subsequent need for braking in the landing roll. The nose wheel is lowered to the runway gently after the speed has diminished to avoid unnecessary nose gear loads. This procedure is especially important in rough or soft field landings.

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

### SHORT FIELD LANDING

For a short field landing in smooth air conditions, make an approach at 67 KIAS with full flaps using enough power to control the glide path. (Slightly higher approach speeds should be used under turbulent air conditions.) After all approach obstacles are cleared, smoothly reduce power and maintain the approach speed by lowering the nose of the airplane. Touchdown should be made with power off and on the main wheels first. Immediately after touchdown, lower the nose wheel and apply heavy braking as required. For maximum brake effectiveness, retract the flaps, hold the control wheel full back, and apply maximum brake pressure without sliding the tires.

### CROSSWIND LANDING

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

The maximum allowable crosswind velocity is dependent upon pilot capability as well as airplane limitations. Operation in direct crosswinds of 20 knots has been demonstrated.

### BALKED LANDING

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

## COLD WEATHER OPERATION

Special consideration should be given to the operation of the airplane fuel system during the winter season or prior to any flight in cold temperatures. Proper preflight draining of the fuel system is especially important and will eliminate any free water accumulation. The use of additives such as isopropyl alcohol, ethylene glycol monomethyl ether or diethylene glycol monomethyl ether may also be desirable. Refer to Section 8 for information on the proper use of additives.

Cold weather often causes conditions which require special care during airplane operations. Even small accumulations of frost, ice, or snow must be removed, particularly from wing, tail and all control surfaces to assure satisfactory flight performance and handling. Also, control surfaces must be free of any internal accumulations of ice or snow.

If snow or slush covers the takeoff surface, allowance must be made for takeoff distances which will be increasingly extended as the snow or slush depth increases. The depth and consistency of this cover can, in fact, prevent takeoff in many instances.

### NOTE

The waste gate controller will not respond quickly to variations in manifold pressure when oil temperature is near the lower limit of the green arc. Therefore, under these conditions, throttle motion should be made slowly and care should be exercised to prevent exceeding the 39 inches Hg manifold pressure limit. In addition, the fuel flow indications may exceed 34 GPH on takeoff if the mixture isn't leaned to compensate.

The Turbo-System engine installation has been designed such that a winterization kit is not required. With the cowl flaps fully closed, engine temperature will be normal (in the green arc range) in outside air temperature as low as 20° to 30°C below standard. When cooler surface temperatures are encountered, the normal air temperature inversion will result in warmer temperatures at cruise altitudes above 5000 feet.

If low altitude cruise in very cold temperature results in engine temperature below the green arc, increasing cruise altitude or cruise power will increase engine temperature into the green arc. Cylinder head temperatures will increase approximately 50°F as cruise altitudes increase from 5000 feet to 24,000 feet.

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

## STARTING

### WARNING

**WHEN PULLING THE PROPELLER THROUGH BY HAND, TREAT IT AS IF THE IGNITION SWITCH IS TURNED ON. A LOOSE OR BROKEN GROUND WIRE ON EITHER MAGNETO COULD CAUSE THE ENGINE TO FIRE.**

Prior to starting on cold mornings, it is advisable to pull the propeller through several times by hand to "break loose" or "limber" the oil, thus conserving battery energy.

When air temperatures are below 20°F (-6°C), the use of an external preheater and an external power source are recommended whenever possible to obtain positive starting and to reduce wear and abuse to the engine and electrical system. Preheat will thaw the oil trapped in the oil cooler, which probably will be congealed prior to starting in extremely cold temperatures.

When using an external power source, the master switch must be in the OFF position before connecting the external power source to the airplane receptacle. See Section 7, Ground Service Plug Receptacle, for external power source operations.

## **COLD WEATHER OPERATION** (Continued)

### **STARTING** (Continued)

Cold weather starting procedures are the same as the normal starting procedures. Use caution to prevent inadvertent forward movement of the airplane during starting when parked on snow or ice.

#### **NOTE**

If the engine does not start during the first few attempts, or if engine firing diminishes in strength, it is probable that the spark plugs have been frosted over. Preheat must be used before another start is attempted.

During cold weather operations, no indication will be apparent on the oil temperature gage prior to takeoff 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 engine RPM. If the engine accelerates smoothly and the oil pressure remains normal and steady, the airplane is ready for takeoff.

## **HOT WEATHER OPERATION**

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

## **NOISE CHARACTERISTICS AND NOISE REDUCTION**

The certificated takeoff noise level for the Model T206H at 3600 pounds maximum weight is 75.8 dB(A) per 14CFR Part 36 Appendix G and 79.9 dB(A) per ICAO Annex 16 Chapter 10. No determination has been made that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

(Continued Next Page)

## **NOISE CHARACTERISTICS AND NOISE REDUCTION (Continued)**

For reduced noise levels, it is desirable to select the lowest RPM and manifold pressure combination in the green arc ranges (consistent with safe operating practice under prevailing flight conditions) that will provide smooth engine operation and required performance.

The following procedures are suggested to minimize the effect of airplane noise on the public:

1. Pilots operating airplanes under VFR over outdoor assemblies of persons, recreational and park areas, and other noise sensitive areas should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.
2. During departure from or approach to an airport, climb after takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise sensitive areas.

### **NOTE**

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



## SECTION 5 PERFORMANCE

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## INTRODUCTION

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

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

## USE OF PERFORMANCE CHARTS

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

## SAMPLE PROBLEM

The following sample flight problem utilizes information from the various charts to determine the predicted performance data for a typical flight. Assume the following information has already been determined:

### AIRPLANE CONFIGURATION:

#### Serials T20608001 thru T20608361:

Takeoff weight  
Usable fuel

3550 Pounds  
88.0 Gallons

(Continued Next Page)

## **SAMPLE PROBLEM** (Continued)

### AIRPLANE CONFIGURATION:

#### **Serials T20608362 and on:**

Takeoff weight	3550 Pounds
Usable fuel	87.0 Gallons

#### TAKEOFF CONDITIONS

Field pressure altitude	3500 Feet
Temperature	24°C (16°C above standard)
Wind component along runway	12 Knot Headwind
Field length	4000 Feet

#### CRUISE CONDITIONS:

Total distance	475 Nautical Miles
Pressure altitude	11,500 Feet
Temperature	8°C
Expected wind enroute	10 Knot Headwind

#### LANDING CONDITIONS:

Field pressure altitude	3000 Feet
Temperature	25°C
Field length	3000 Feet

### TAKEOFF

The takeoff distance chart, Figure 5-6, should be consulted, keeping in mind that distances shown are based on the short field technique. Conservative distances can be established by reading the chart at the next higher value of weight, altitude and temperature. For example, in this particular sample problem, the takeoff distance information presented for a weight of 3600 pounds, pressure altitude of 4000 feet and a temperature of 30°C should be used and results in the following:

Ground roll	1310 Feet
Total distance to clear a 50-foot obstacle	2430 Feet

(Continued Next Page)

### SAMPLE PROBLEM (Continued)

#### TAKEOFF (Continued)

These distances are well within the available takeoff field length. However, a correction for the effect of wind may be made based on Note 2 of the takeoff chart. The correction for a 12 knot headwind is:

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

This results in the following distances, corrected for wind:

Ground roll, zero wind	1310
Decrease in ground roll (1310 feet X 12%)	<u>-157</u>
Corrected ground roll	1153 Feet
Total distance to clear a 50-foot obstacle, zero wind	2430
Decrease in total distance (2430 feet X 12%)	<u>-291</u>
Corrected total distance to clear 50-foot obstacle	2139 Feet

#### CRUISE

The cruising altitude should be selected based on a consideration of trip length, winds aloft, and the airplane's performance. A typical cruising altitude and the expected wind enroute have been given for this sample problem. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics presented in Figure 5-9, the range profile charts presented in Figure 5-10, and the endurance profile charts presented in Figure 5-11.

(Continued Next Page)

## **ISAMPLE PROBLEM** (Continued)

### **ICRUISE** (Continued)

The relationship between power and range is illustrated by the range profile chart. Considerable fuel savings and longer range result when lower power settings are used. For this sample problem, a cruise power of approximately 70% will be used.

The cruise performance chart, Figure 5-9, is entered at 12,000 feet altitude and 20°C above standard temperature. These values most nearly correspond to the planned altitude and expected temperature conditions. The engine speed chosen is 2400 RPM and 30 inches of manifold pressure, which results in the following:

Power	70%
True airspeed	151 Knots
Cruise fuel flow	17.9 GPH

### **FUEL REQUIRED**

The total fuel requirement for the flight may be estimated using the performance information in Figure 5-8 and Figure 5-9. For this sample problem, Figure 5-8 shows that a climb from 4000 feet to 12,000 feet requires 4.6 gallons of fuel. The corresponding distance during the climb is 24 nautical miles. These values are for a standard temperature and are sufficiently accurate for most flight planning purposes. However, a further correction for the effect of temperature may be made as noted on the climb chart. The approximate effect of a non-standard temperature is to increase the time, fuel, and distance by 10% for each 8°C above standard temperature, due to the lower rate of climb. In this case, assuming a temperature 16°C above standard, the correction would be:

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

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**SAMPLE PROBLEM** (Continued)

**FUEL REQUIRED** (Continued)

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

Fuel to climb, standard temperature	4.6
Increase due to non-standard temperature (4.6 X 20%)	<u>1.0</u>
Corrected fuel to climb	5.6 Gallons

Using a similar procedure for the distance to climb results in 29 nautical miles.

The resultant cruise distance is:

Total distance	475
Climb distance	<u>-29</u>
Cruise distance	<u>446</u>
	Nautical Miles

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

151
<u>-10</u>
141 Knots

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

$$\frac{446 \text{ Nautical Miles}}{141 \text{ Knots}} = 3.2 \text{ Hours}$$

The fuel required for cruise is:

$$3.2 \text{ hours} \times 17.9 \text{ gallons/hour} = 57.3 \text{ Gallons}$$

(Continued Next Page)

## **SAMPLE PROBLEM** (Continued)

### **FUEL REQUIRED** (Continued)

A 45-minute reserve requires:

$$\frac{45}{60} \times 17.9 \text{ gallons / hour} = 13.4 \text{ Gallons}$$

The total estimated fuel required is as follows:

Engine start, taxi, and takeoff	2.6
Climb	5.6
Cruise	57.3
Reserve	<u>13.4</u>
Total fuel required	78.9 Gallons

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

## **LANDING**

A procedure similar to takeoff should be used for estimating the landing distance at the destination airport. Figure 5-12 presents landing distance information for the short field technique. The distances corresponding to 3000 feet and 30°C are as follows:

Ground roll	865 Feet
Total distance to clear a 50-foot obstacle	1580 Feet

A correction for the effect of wind may be made based on Note 2 of the landing chart, using the same procedure as outlined for takeoff.

## **DEMONSTRATED OPERATING TEMPERATURE**

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

## AIRSPEED CALIBRATION

### NORMAL STATIC SOURCE

Condition: Power required for level flight or maximum power descent.

<b>FLAPS UP</b>	
KIAS	-- 60 70 80 90 100 110 120 130 140 150 160 170 180
KCAS	-- 65 72 80 89 99 108 118 128 138 148 158 168 177
<b>FLAPS 20°</b>	
KIAS	50 60 70 80 90 100 -----
KCAS	54 59 68 78 89 99 -----
<b>FLAPS FULL</b>	
KIAS	50 60 70 80 90 100 -----
KCAS	56 62 71 80 90 100 -----

Figure 5-1. Airspeed Calibration (Sheet 1 of 4)  
Serials T20608001 thru T20608361.



## AIRSPPEED CALIBRATION

### ALTERNATE STATIC SOURCE

HEATER ON, VENTS AND WINDOWS CLOSED  
CABIN HEAT/CABIN AIR AND DEFROSTER ON MAXIMUM

Condition: Power required for level flight or maximum power descent.

<b>FLAPS UP</b>	
KIAS	— 60 70 80 90 100 110 120 130 140 150 160 170 180
KCAS	— 67 74 82 91 99 109 118 126 138 148 159 170 180
<b>FLAPS 20°</b>	
KIAS	50 60 70 80 90 100 - - - - -
KCAS	59 65 72 80 90 101 - - - - -
<b>FLAPS FULL</b>	
KIAS	50 60 70 80 90 100 - - - - -
KCAS	58 65 74 83 93 104 - - - - -

Figure 5-1. Airspeed Calibration (Sheet 2)  
Serials T20608001 thru T20608361.

## AIRSPEED CALIBRATION

### NORMAL STATIC SOURCE

Condition: Power required for level flight or maximum power descent.

<b>FLAPS UP</b>	
KIAS	-- 60 70 80 90 100 110 120 130 140 150 160 170 180
KCAS	-- 65 72 80 89 99 108 118 128 138 148 158 168 177
<b>FLAPS 20°</b>	
KIAS	50 60 70 80 90 100 110 120 --- --- --- --- ---
KCAS	54 59 68 78 89 99 113 127 --- --- --- --- ---
<b>FLAPS FULL</b>	
KIAS	50 60 70 80 90 100 --- --- --- --- ---
KCAS	56 62 71 80 90 100 --- --- --- --- ---

Figure 5-1. Airspeed Calibration (Sheet 3)  
Serials T20608362 and on.

## AIRSPPEED CALIBRATION

### ALTERNATE STATIC SOURCE

#### HEATER ON, VENTS AND WINDOWS CLOSED CABIN HEAT/CABIN AIR AND DEFROSTER ON MAXIMUM

Condition: Power required for level flight or maximum power descent.

<b>FLAPS UP</b>	
KIAS	— 60 70 80 90 100 110 120 130 140 150 160 170 180
KCAS	— 67 74 82 91 99 109 118 128 138 148 159 170 180
<b>FLAPS 20°</b>	
KIAS	50 60 70 80 90 100 110 120 --- --- --- --- ---
KCAS	59 65 72 80 90 101 110 123 --- --- --- --- ---
<b>FLAPS FULL</b>	
KIAS	50 60 70 80 90 100 --- --- --- --- ---
KCAS	58 65 74 83 93 104 --- --- --- --- ---

Figure 5-1. Airspeed Calibration (Sheet 4)  
Serials T20608362 and on.

## ALTIMETER CORRECTION

### ALTERNATE STATIC SOURCE

**NOTE:**

Add correction to desired altitude to obtain indicated altitude to fly. Windows closed, ventilators closed, cabin heater, cabin air, and defroster on maximum.

**CONDITIONS:**

Power required for level flight or maximum power descent cruise configuration. Altimeter corrections for the takeoff and landing configuration are less than 50 feet.

CONDITION FLAPS UP	CORRECTION TO BE ADDED- FEET KIAS - alternate static source ON					
	60	80	100	120	140	160
S.L.	50	10	-20	-20	-10	0
5000 ft.	50	10	-20	-20	-10	0
10,000 ft.	60	10	-20	-30	-10	0
15,000 ft.	70	10	-30	-30	-10	0

Figure 5-2. Altimeter Correction

### TEMPERATURE CONVERSION CHART

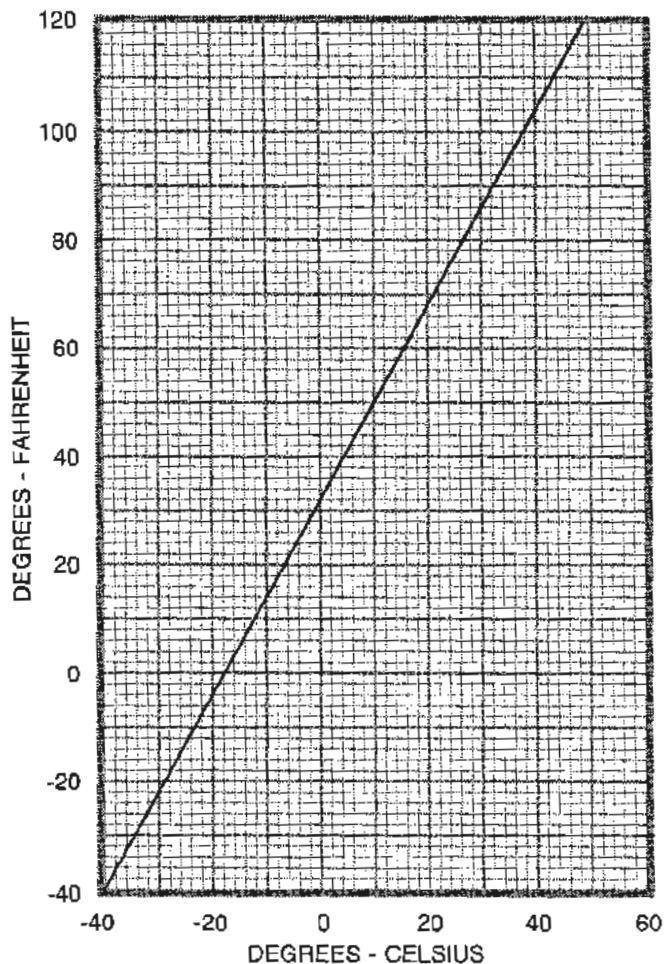


Figure 5-3. Temperature Conversion Chart

## STALL SPEEDS AT 3600 POUNDS

Conditions:  
Power Off

### MOST REARWARD CENTER OF GRAVITY

#### ANGLE OF BANK

FLAP SETTING	ANGLE OF BANK							
	0°		30°		45°		60°	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	50	62	54	67	59	74	71	88
20°	43	57	46	61	51	68	61	81
40°	39	54	42	58	46	64	55	76

### MOST FORWARD CENTER OF GRAVITY

#### ANGLE OF BANK

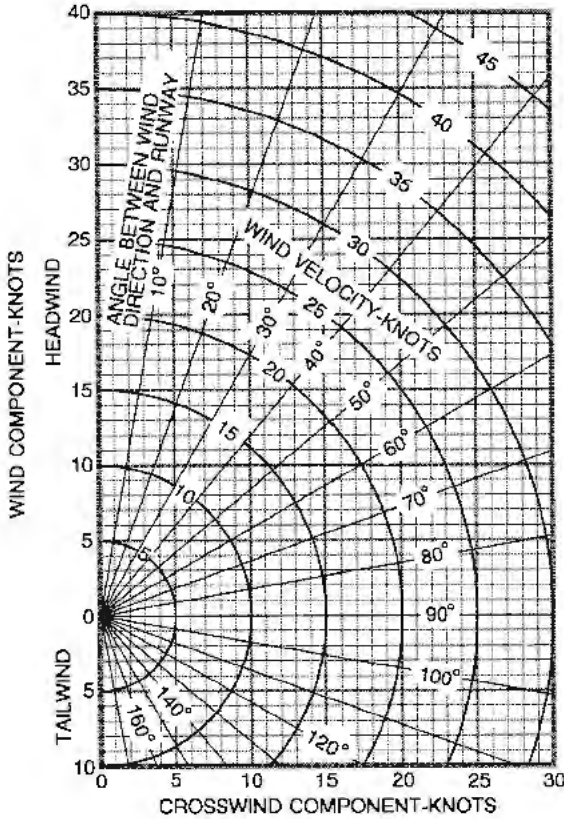
FLAP SETTING	ANGLE OF BANK							
	0°		30°		45°		60°	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	59	67	63	72	70	80	83	95
20°	50	60	54	65	59	71	71	85
40°	47	57	51	61	56	68	66	81

NOTES:

- Altitude loss during a stall recovery may be as much as 360 feet.
- KIAS values are approximate.

Figure 5-4. Stall Speeds

### CROSSWIND COMPONENTS



NOTE: Maximum Demonstrated Crosswind velocity is 20 knots (Not a limitation).

Figure 5-5. Crosswind Components

### SHORT FIELD TAKEOFF DISTANCE AT 3600 POUNDS

**CONDITIONS:**

Flaps 20°

2500 RPM, 39 inches Hg. and Mixture set at 34 GPH

Prior to Brake Release

Cowl Flaps Open

Paved, level, dry runway

Zero Wind

Lift Off: 64 KIAS

Speed at 50 Ft: 74 KIAS

Press Alt In Feet	0°C		10°C		20°C		30°C		40°C	
	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst
S. L.	825	1575	885	1685	945	1800	1015	1920	1085	2050
1000	875	1665	940	1785	1010	1905	1080	2035	1155	2170
2000	935	1765	1005	1890	1075	2020	1150	2160	1230	2305
3000	1000	1870	1070	2005	1150	2145	1230	2290	1315	2445
4000	1065	1985	1145	2125	1225	2275	1310	2430	1400	2595
5000	1135	2105	1220	2255	1310	2415	1400	2580	1500	2765
6000	1215	2235	1305	2395	1405	2570	1505	2760	1615	2955
7000	1300	2380	1405	2560	1510	2750	1620	2950	1735	3160
8000	1400	2545	1510	2735	1625	2940	1740	3155	1865	3380

**NOTES:**

1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 10 knots headwind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2.5 knots.
3. For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.

Figure 5-6. Short Field Takeoff Distance (Sheet 1 of 3)



**SHORT FIELD TAKEOFF DISTANCE  
AT 3300 POUNDS**

**CONDITIONS:**

Flaps 20°  
2500 RPM, 39 inches Hg. and Mixture set at 34 GPH  
Prior to Brake Release

Cowl Flaps Open  
Paved, level, dry runway  
Zero Wind  
Lift Off: 61 KIAS  
Speed at 50 Ft: 71 KIAS

Press Alt In Feet	0°C		10°C		20°C		30°C		40°C	
	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst
S. L.	675	1320	725	1410	775	1505	830	1600	885	1705
1000	720	1395	770	1490	825	1590	885	1695	945	1805
2000	765	1475	825	1580	880	1685	945	1795	1010	1915
3000	820	1565	880	1670	940	1785	1005	1905	1075	2030
4000	875	1655	935	1770	1005	1895	1075	2020	1145	2150
5000	930	1755	1000	1880	1070	2005	1145	2140	1225	2290
6000	995	1865	1070	1995	1150	2135	1230	2285	1320	2445
7000	1065	1985	1150	2130	1235	2280	1325	2440	1420	2610
8000	1145	2115	1235	2270	1325	2435	1425	2605	1525	2785

**NOTES:**

1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 10 knots headwind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2.5 knots.
3. For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.

Figure 5-6. Short Field Takeoff Distance (Sheet 2)

## SHORT FIELD TAKEOFF DISTANCE AT 3000 POUNDS

**CONDITIONS:**

Flaps 20°

2500 RPM, 39 inches Hg. and Mixture set at 34 GPH

Prior to Brake Release

Cowl Flaps Open

Paved, level, dry runway

Zero Wind

Lift Off: 57 KIAS

Speed at 50 Ft: 57 KIAS

Press Alt In Feet	0°C		10°C		20°C		30°C		40°C	
	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst
S. L.	545	1100	585	1175	625	1250	670	1330	715	1410
1000	580	1160	625	1240	665	1320	715	1405	760	1490
2000	620	1230	665	1310	710	1395	760	1485	810	1580
3000	660	1300	710	1385	760	1475	810	1570	865	1675
4000	705	1375	755	1465	810	1565	865	1665	925	1770
5000	750	1455	805	1555	865	1655	925	1765	990	1885
6000	805	1540	860	1645	925	1760	995	1880	1060	2010
7000	860	1640	925	1755	995	1880	1065	2005	1140	2140
8000	925	1745	995	1870	1070	2005	1145	2140	1225	2280

**NOTES:**

1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 10 knots headwind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2.5 knots.
3. For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.

Figure 5-6. Short Field Takeoff Distance (Sheet 3)

SECTION 5  
PERFORMANCE

CESSNA  
MODEL T206H

**MAXIMUM RATE-OF-CLIMB**

CONDITIONS:

Flaps Up  
2500 RPM  
Cowl Flaps Open

PRESS ALT	MP	GPH
S.L. to 17,000	39	34
18,000	37	30.5
20,000	35	28.5
22,000	33	26.5
24,000	31	24.5

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KTAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
3600	S.L.	87	1305	1160	1015	865
	2000	87	1235	1090	945	795
	4000	87	1170	1025	880	730
	6000	87	1100	955	810	660
	8000	87	1030	890	745	600
	10,000	87	970	825	685	545
	12,000	87	900	760	625	485
	14,000	87	830	695	560	430
	16,000	87	765	635	510	385
	20,000	81	515	400	285	175
	24,000	79	230	120	---	---
3300	S.L.	85	1485	1330	1180	1025
	2000	85	1410	1260	1105	950
	4000	85	1340	1190	1040	885
	6000	85	1265	1120	970	815
	8000	85	1195	1050	900	750
	10,000	85	1130	985	840	695
	12,000	85	1060	915	775	635
	14,000	85	990	850	715	580
	16,000	85	925	790	660	530
	20,000	79	670	550	435	325
	24,000	77	370	260	155	---
3000	S.L.	83	1695	1530	1370	1205
	2000	83	1615	1455	1290	1130
	4000	83	1540	1385	1225	1060
	6000	83	1460	1310	1155	990
	8000	83	1385	1235	1085	925
	10,000	83	1315	1170	1015	865
	12,000	83	1240	1095	950	805
	14,000	83	1170	1030	890	750
	16,000	83	1105	970	835	700
	20,000	77	840	720	605	485
	24,000	75	525	415	310	210

Figure 5-7. Maximum Rate of Climb

**TIME, FUEL AND DISTANCE TO CLIMB  
AT 3600 POUNDS**

**MAXIMUM RATE OF CLIMB**

CONDITIONS:

Flaps Up  
2500 RPM  
Cowl Flaps Open  
Standard Temperature

PRESS ALT	MP	GPH
S.L. to 17,000	39	34
18,000	37	30.5
20,000	35	28.5
22,000	33	26.5
24,000	31	24.5

PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB FPM	FROM SEA LEVEL		
			TIME IN MIN	FUEL USED GAL	DIST NM
S.L.	87	1050	0	0.0	0
2000	87	1010	2	1.1	3
4000	87	975	4	2.2	6
6000	87	935	6	3.4	9
8000	87	895	8	4.7	13
10,000	87	860	11	6.0	16
12,000	87	820	13	7.3	20
14,000	87	780	15	8.8	25
16,000	87	745	18	10.2	30
18,000	82	665	21	11.8	35
20,000	81	545	24	13.4	41
22,000	80	420	29	15.4	49
24,000	79	300	34	17.8	60

NOTES:

1. Add 2.6 gallons of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
3. Distances shown are based on zero wind.

Figure 5-8. Time, Fuel and Distance to Climb (Sheet 1 of 4)

**TIME, FUEL AND DISTANCE TO CLIMB  
AT 3300 POUNDS**

**MAXIMUM RATE OF CLIMB**

CONDITIONS:

Flaps Up  
2500 RPM  
Cowl Flaps Open  
Standard Temperature

PRESS ALT	MP	GPH
S.L. to 17,000	39	34
18,000	37	30.5
20,000	35	28.5
22,000	33	26.5
24,000	31	24.5

PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB FPM	FROM SEA LEVEL		
			TIME IN MIN	FUEL USED GAL	DIST NM
S.L.	85	1215	0	0.0	0
2000	85	1175	2	1.0	2
4000	85	1140	3	1.9	5
6000	85	1095	5	3.0	8
8000	85	1055	7	4.0	11
10,000	85	1020	9	5.1	14
12,000	85	980	11	6.2	17
14,000	88	940	13	7.4	21
16,000	88	905	15	8.7	25
18,000	88	825	18	9.9	29
20,000	87	695	20	11.2	34
22,000	87	565	24	12.7	39
24,000	86	440	28	14.4	47

NOTES:

1. Add 2.6 gallons of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
3. Distances shown are based on zero wind.

Figure 5-8. Time, Fuel and Distance to Climb (Sheet 2)

**TIME, FUEL AND DISTANCE TO CLIMB  
AT 3000 POUNDS**

**MAXIMUM RATE OF CLIMB**

CONDITIONS:

Flaps Up  
2500 RPM  
Cowl Flaps Open  
Standard Temperature

PRESS ALT	MP	GPH
S.L. to 17,000	39	34
18,000	37	30.5
20,000	35	28.5
22,000	33	26.5
24,000	31	24.5

PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB FPM	FROM SEA LEVEL		
			TIME IN MIN	FUEL USED GAL	DIST NM
S.L.	83	1410	0	0.0	0
2000	83	1365	1	0.8	2
4000	83	1325	3	1.7	4
6000	83	1285	4	2.5	6
8000	83	1240	6	3.4	9
10,000	83	1205	8	4.4	12
12,000	83	1160	9	5.3	14
14,000	83	1120	11	6.3	17
16,000	83	1085	13	7.4	20
18,000	78	1005	15	8.4	24
20,000	77	870	17	9.4	28
22,000	76	730	20	10.6	32
24,000	75	595	23	11.9	38

NOTES:

1. Add 2.6 gallons of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
3. Distances shown are based on zero wind.

Figure 5-8. Time, Fuel and Distance to Climb (Sheet 3)

## TIME, FUEL AND DISTANCE TO CLIMB

## NORMAL CLIMB - 95 KIAS

## CONDITIONS:

Flaps Up

2400 RPM, 30 inches Hg, 20 GPH Fuel Flow, Cowl Flaps Open.

Standard Temperature

WEIGHT LB	PRESS ALT FT	RATE OF CLIMB FPM	FROM SEA LEVEL		
			TIME IN MIN	FUEL USED GAL	DIST NM
3600	S.L.	690	0	0.0	0
	2000	665	3	1.0	5
	4000	640	6	2.0	10
	6000	615	9	3.1	15
	8000	590	13	4.2	21
	10,000	560	16	5.4	27
	12,000	535	20	6.6	34
	14,000	510	24	7.9	41
	16,000	485	28	9.2	49
18,000	460	32	10.6	58	
3300	S.L.	815	0	0.0	0
	2000	790	2	0.8	4
	4000	765	5	1.7	8
	6000	740	8	2.6	13
	8000	715	11	3.5	17
	10,000	690	13	4.5	22
	12,000	665	16	5.4	28
	14,000	635	19	6.5	34
	16,000	615	23	7.5	40
18,000	585	26	8.7	47	
3000	S.L.	965	0	0.0	0
	2000	935	2	0.7	3
	4000	910	4	1.4	7
	6000	885	7	2.2	10
	8000	860	9	2.9	14
	10,000	830	11	3.7	18
	12,000	805	14	4.5	23
	14,000	780	16	5.4	28
	16,000	755	19	6.3	33
18,000	730	21	7.2	38	

## NOTES:

1. Add 2.6 gallons of fuel for engine start, taxi and takeoff allowance.
2. Increase time, fuel and distance by 10% for each 8°C above standard temperature.
3. Distances shown are based on zero wind.

Figure 5-8. Time, Fuel and Distance to Climb (Sheet 4)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 2000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -9°C			STANDARD TEMPERATURE 11°C			20°C ABOVE STANDARD TEMP 31°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	74	139	18.9	69	138	17.8
	28	73	135	18.7	69	135	17.6	65	134	16.5
	26	68	131	17.4	64	131	16.4	60	130	15.4
	24	63	127	16.1	59	126	15.1	56	125	14.2
	22	57	122	14.7	54	121	13.8	51	119	13.0
	20	52	116	13.3	49	114	12.6	46	111	11.8
2300	30	75	137	19.2	71	137	18.1	67	136	17.0
	28	70	133	17.9	66	132	16.8	62	131	15.8
	26	64	128	16.4	61	128	15.5	57	126	14.5
	24	59	124	15.1	56	123	14.2	52	120	13.3
	22	54	119	13.8	51	117	13.0	48	114	12.2
	20	49	112	12.5	46	110	11.8	43	105	11.1
2200	30	72	134	18.4	68	134	17.3	64	133	16.3
	28	67	130	17.0	63	130	16.1	59	128	15.1
	26	61	125	15.5	57	124	14.6	54	122	13.7
	24	55	120	14.1	52	118	13.3	49	115	12.5
	22	50	115	12.9	48	112	12.2	45	109	11.5
	20	45	107	11.7	43	104	11.0	40	99	10.4
2100	30	69	132	17.6	65	132	16.6	61	130	15.5
	28	64	128	16.3	60	127	15.3	56	125	14.4
	26	58	123	14.9	55	122	14.0	51	119	13.1
	24	53	117	13.5	50	115	12.7	47	112	12.0
	22	48	112	12.3	45	109	11.7	42	105	11.0
2000	30	66	129	16.8	62	129	15.8	58	127	14.8
	28	60	125	15.5	57	124	14.6	53	122	13.7
	26	56	120	14.2	52	119	13.4	49	116	12.6
	24	50	114	12.9	47	112	12.2	44	108	11.5
	22	46	108	11.8	43	105	11.1	40	100	10.5

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 1 of 12)



**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 4000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -13°C			STANDARD TEMPERATURE 7°C			20°C ABOVE STANDARD TEMP 27°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	75	142	19.1	70	141	17.9
	28	74	138	18.9	70	138	17.8	65	137	16.7
	26	69	134	17.6	65	134	16.6	61	132	15.6
	24	64	130	16.3	60	129	15.4	56	127	14.4
	22	58	125	14.9	55	124	14.0	51	121	13.2
2300	20	53	119	13.5	50	117	12.8	47	113	12.0
	30	76	140	19.4	71	139	18.3	67	138	17.1
	28	71	136	18.0	66	135	17.0	62	134	15.9
	26	65	131	16.6	61	130	15.7	57	129	14.7
	24	60	126	15.3	56	125	14.4	53	123	13.5
2200	22	55	121	14.0	51	119	13.2	48	116	12.4
	20	49	115	12.7	47	112	12.0	44	108	11.3
	30	72	137	18.5	68	137	17.4	64	136	16.4
	28	67	133	17.1	63	132	16.1	59	131	15.1
	26	61	128	15.7	58	127	14.8	54	125	13.8
2100	24	56	122	14.3	53	121	13.5	49	118	12.7
	22	51	117	13.1	48	114	12.3	45	110	11.6
	20	46	109	11.8	43	106	11.2	41	101	10.6
	30	69	135	17.7	65	134	16.7	61	133	15.7
	28	64	130	16.4	60	130	15.4	57	128	14.5
2000	26	59	125	15.0	55	124	14.2	52	122	13.3
	24	53	120	13.6	50	118	12.9	47	114	12.1
	22	49	114	12.5	46	111	11.8	43	106	11.1
	30	66	132	16.9	62	132	16.0	59	130	15.0
	28	61	128	15.6	57	127	14.7	54	124	13.8
2000	26	56	123	14.4	53	121	13.5	50	118	12.7
	24	51	117	13.0	48	114	12.3	45	110	11.6
	22	46	110	11.9	44	107	11.3	41	102	10.7

## NOTE:

- For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
- Some power settings may not be obtainable, but are listed to aid interpolation.
- Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 2)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 6000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -17°C			STANDARD TEMPERATURE 3°C			20°C ABOVE STANDARD TEMP 23°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	75	145	19.2	70	144	18.0
	28	75	141	19.1	70	141	18.0	66	140	16.9
	26	69	137	17.7	65	136	16.7	61	135	15.6
	24	64	133	16.5	61	132	15.5	57	130	14.5
	22	59	127	15.0	55	126	14.1	52	123	13.3
2300	20	54	122	13.7	51	120	13.0	47	115	12.2
	30	76	142	19.5	72	142	18.3	67	141	17.2
	28	71	138	18.1	67	138	17.1	63	137	16.0
	26	65	134	16.7	62	133	15.8	58	131	14.8
	24	60	129	15.4	57	128	14.5	53	125	13.6
2200	22	55	123	14.1	52	121	13.3	49	118	12.5
	20	50	117	12.8	47	114	12.1	44	109	11.4
	30	73	140	18.6	68	139	17.5	64	138	16.4
	28	67	135	17.2	63	135	16.2	59	133	15.2
	26	62	130	15.8	58	129	14.8	54	127	13.9
2100	24	56	125	14.4	53	123	13.6	50	120	12.8
	22	51	119	13.1	48	116	12.4	45	112	11.7
	20	46	111	11.9	44	108	11.3	41	103	10.7
	30	70	137	17.8	66	137	16.8	62	135	15.7
	28	64	133	16.5	61	132	15.5	57	130	14.5
2000	26	59	128	15.1	56	127	14.3	52	124	13.4
	24	54	122	13.7	51	120	13.0	47	115	12.2
	22	49	116	12.6	46	112	11.9	43	108	11.2
	30	67	135	17.1	63	134	16.1	59	132	15.1
	28	61	130	15.7	58	129	14.8	54	127	13.9
2000	26	57	125	14.5	53	124	13.7	50	120	12.9
	24	51	119	13.1	48	116	12.4	45	111	11.6
	22	47	112	12.0	44	108	11.4	41	103	10.7

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 3)

SECTION 5  
PERFORMANCE

CESSNA  
MODEL T206H

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 8000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -21°C			STANDARD TEMPERATURE -1°C			20°C ABOVE STANDARD TEMP 19°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	75	147	19.2	70	146	18.0
	28	75	144	19.1	70	144	18.0	66	142	16.9
	26	69	139	17.7	65	139	16.7	61	137	15.6
	24	65	135	16.5	61	134	15.6	57	132	14.6
	22	59	130	15.1	56	128	14.2	52	125	13.3
	20	54	124	13.8	51	121	13.0	48	117	12.3
2300	30	76	145	19.5	72	145	18.3	67	144	17.2
	28	71	141	18.2	67	140	17.1	63	139	16.0
	26	66	136	16.8	62	135	15.8	58	133	14.8
	24	61	131	15.5	57	130	14.6	54	127	13.7
	22	55	126	14.1	52	123	13.3	49	119	12.5
	20	50	119	12.9	48	115	12.2	45	111	11.5
2200	30	73	142	18.6	69	142	17.5	64	140	16.4
	28	67	138	17.2	63	137	16.2	59	135	15.2
	26	62	133	15.8	58	131	14.9	55	129	14.0
	24	56	127	14.4	53	125	13.6	50	121	12.8
	22	52	121	13.2	49	117	12.5	46	113	11.8
	20	47	113	12.1	44	109	11.4	41	104	10.8
2100	30	70	140	17.9	66	139	16.8	62	138	15.8
	28	65	135	16.5	61	134	15.5	57	132	14.6
	26	59	130	15.2	56	129	14.3	53	125	13.4
	24	54	124	13.8	51	121	13.0	48	117	12.3
	22	49	117	12.7	46	113	12.0	44	109	11.3
2000	30	67	137	17.1	63	137	16.1	59	135	15.1
	28	62	133	15.8	58	131	14.9	55	129	14.0
	26	57	128	14.6	54	126	13.8	51	122	12.9
	24	52	121	13.2	49	117	12.5	46	113	11.7
	22	47	113	12.1	44	109	11.4	42	104	10.8

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 4)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 10,000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -25°C			STANDARD TEMPERATURE -5°C			20°C ABOVE STANDARD TEMP 15°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	75	150	19.2	70	149	18.0
	28	75	147	19.2	71	146	18.0	66	145	16.9
	26	69	142	17.7	65	141	16.7	61	139	15.6
	24	65	138	16.6	61	137	15.6	57	134	14.7
	22	59	132	15.2	56	130	14.3	52	126	13.4
	20	54	126	13.9	51	123	13.1	48	119	12.4
2300	30	76	148	19.5	72	147	18.4	67	146	17.2
	28	71	144	18.2	67	143	17.1	63	141	16.1
	26	66	139	16.8	62	137	15.8	58	135	14.8
	24	61	134	15.5	57	132	14.6	54	128	13.7
	22	56	128	14.2	52	125	13.4	49	120	12.6
	20	51	121	13.0	48	117	12.3	45	112	11.6
2200	30	73	145	18.6	69	144	17.6	64	143	16.5
	28	67	140	17.2	63	139	16.2	59	137	15.2
	26	62	135	15.8	58	133	14.9	55	130	14.0
	24	57	129	14.5	53	126	13.6	50	122	12.8
	22	52	123	13.3	49	119	12.5	46	114	11.8
	20	47	115	12.2	45	111	11.5	42	105	10.9
2100	30	70	143	17.9	66	142	16.9	62	140	15.8
	28	65	138	16.6	61	137	15.6	57	134	14.6
	26	60	133	15.3	56	131	14.4	53	127	13.5
	24	54	126	13.9	51	123	13.1	48	118	12.3
	22	50	119	12.7	47	115	12.0	44	110	11.3
2000	30	67	140	17.2	63	139	16.2	59	137	15.2
	28	62	135	15.9	59	134	15.0	55	131	14.1
	26	58	130	14.7	54	128	13.9	51	124	13.0
	24	52	123	13.3	49	119	12.5	46	114	11.8
	22	47	115	12.2	45	111	11.5	42	105	10.9

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 5)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 12,000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -29°C			STANDARD TEMPERATURE -9°C			20°C ABOVE STANDARD TEMP 11°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	75	153	19.1	70	151	17.9
	28	74	149	19.0	70	148	17.9	66	147	16.8
	26	69	144	17.7	65	143	16.6	61	141	15.6
	24	65	140	16.5	61	138	15.6	57	135	14.6
	22	59	134	15.2	56	132	14.3	52	127	13.4
	20	55	128	14.0	51	124	13.2	48	120	12.4
2300	30	76	150	19.5	72	150	18.3	67	148	17.2
	28	71	146	18.1	67	145	17.0	62	143	16.0
	26	65	141	16.7	62	139	15.8	58	136	14.8
	24	61	136	15.5	57	133	14.6	53	129	13.7
	22	56	129	14.2	52	126	13.4	49	121	12.6
	20	51	122	13.0	48	118	12.3	45	113	11.6
2200	30	73	148	18.6	69	147	17.5	64	145	16.4
	28	67	142	17.1	63	141	16.1	59	138	15.1
	26	62	137	15.8	58	135	14.9	55	131	14.0
	24	56	131	14.4	53	127	13.6	50	123	12.8
	22	52	124	13.3	49	120	12.5	46	115	11.8
	20	47	116	12.2	45	111	11.5	42	105	10.9
2100	30	70	145	17.9	66	144	16.9	62	142	15.8
	28	65	140	16.5	61	139	15.6	57	135	14.6
	26	60	135	15.3	56	132	14.4	53	128	13.5
	24	54	128	13.9	51	124	13.1	48	119	12.3
	22	50	120	12.7	47	116	12.0	44	110	11.4
2000	30	67	143	17.2	63	142	16.2	60	139	15.2
	28	62	138	16.0	59	136	15.0	55	132	14.1
	26	58	132	14.8	54	129	13.9	51	125	13.1
	24	52	124	13.3	49	120	12.6	46	115	11.9
	22	48	116	12.2	45	112	11.6	42	105	10.9

## NOTE:

- For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
- Some power settings may not be obtainable, but are listed to aid interpolation.
- Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 6)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 14,000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -33°C			STANDARD TEMPERATURE +13°C			20°C ABOVE STANDARD TEMP 7°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	75	155	19.1	70	154	17.9
	28	74	151	18.9	70	151	17.8	65	149	16.7
	26	69	147	17.6	65	145	16.6	61	143	15.6
	24	64	142	16.5	61	140	15.5	57	136	14.5
	22	59	136	15.2	56	133	14.3	52	128	13.4
	20	55	130	14.0	52	126	13.2	48	120	12.4
2300	30	76	153	19.4	72	152	18.3	67	151	17.2
	28	70	148	18.0	66	147	17.0	62	145	15.9
	26	65	143	16.7	62	141	15.7	58	138	14.8
	24	60	137	15.4	57	135	14.5	53	130	13.6
	22	56	131	14.2	52	127	13.4	49	122	12.6
	20	51	123	13.0	48	119	12.3	45	113	11.6
2200	30	73	150	18.6	68	149	17.5	64	147	16.4
	28	67	144	17.1	63	143	16.1	59	140	15.1
	26	62	139	15.8	58	137	14.8	54	132	13.9
	24	56	132	14.4	53	128	13.6	50	123	12.8
	22	52	125	13.3	49	121	12.5	46	115	11.8
	20	47	116	12.1	44	111	11.5	42	105	10.8
2100	30	70	148	17.9	66	147	16.9	62	144	15.8
	28	65	142	16.5	61	140	15.6	57	137	14.6
	26	60	137	15.3	56	134	14.4	53	129	13.5
	24	54	129	13.9	51	125	13.1	48	120	12.3
	22	50	121	12.8	47	117	12.1	44	111	11.4
2000	30	67	145	17.3	64	144	16.3	60	141	15.3
	28	63	140	16.0	59	138	15.1	55	134	14.1
	26	58	134	14.8	54	131	13.9	51	126	13.1
	24	52	126	13.4	49	122	12.7	46	116	11.9
	22	48	117	12.3	45	113	11.6	42	106	11.0

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.J.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 7)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 16,000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -37°C			STANDARD TEMPERATURE -17°C			20°C ABOVE STANDARD TEMP 3°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	75	158	19.1	70	156	17.9
	28	74	154	18.8	69	153	17.7	65	150	16.6
	26	69	149	17.6	65	148	16.6	61	144	15.5
	24	64	144	16.4	60	142	15.4	57	137	14.5
	22	59	138	15.2	56	135	14.3	52	129	13.4
	20	55	131	14.0	52	127	13.2	48	121	12.4
2300	30	76	156	19.4	71	155	18.2	67	153	17.1
	28	70	150	17.9	66	149	16.9	62	146	15.8
	26	65	145	16.6	61	143	15.7	58	139	14.7
	24	60	139	15.4	57	136	14.5	53	131	13.6
	22	56	132	14.2	52	128	13.4	49	123	12.6
	20	51	124	13.0	48	119	12.3	45	113	11.6
2200	30	72	153	18.5	68	152	17.4	64	149	16.4
	28	66	146	17.0	63	145	16.0	59	141	15.0
	26	61	141	15.7	58	138	14.8	54	133	13.9
	24	56	133	14.4	53	129	13.5	50	124	12.7
	22	52	126	13.3	49	121	12.5	46	115	11.8
	20	47	117	12.1	44	111	11.4	42	103	10.8
2100	30	70	150	17.9	66	149	16.9	62	146	15.8
	28	64	144	16.5	61	142	15.5	57	138	14.6
	26	60	139	15.3	56	135	14.4	53	130	13.5
	24	54	130	13.9	51	126	13.1	48	120	12.3
	22	50	122	12.8	47	117	12.1	44	111	11.4
2000	30	68	148	17.3	64	146	16.3	60	143	15.3
	28	63	142	16.0	59	140	15.1	55	135	14.1
	26	58	136	14.8	55	132	14.0	51	127	13.1
	24	53	127	13.5	50	123	12.7	47	117	12.0
	22	48	119	12.3	45	113	11.7	42	106	11.0

## NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 8)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 18,000 FEET**

CONDITIONS:  
3800 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -41°C			STANDARD TEMPERATURE -21°C			20°C ABOVE STANDARD TEMP -1°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	74	161	19.0	70	159	17.8
	28	73	156	18.7	69	155	17.6	65	152	16.5
	26	68	151	17.5	65	149	16.5	61	145	15.5
	24	63	145	16.2	60	142	15.3	56	137	14.3
	22	59	139	15.1	56	135	14.2	52	130	13.4
	20	55	132	14.0	51	127	13.2	48	121	12.4
2300	30	75	158	19.3	71	157	18.2	67	155	17.0
	28	70	152	17.8	65	151	16.7	61	147	15.7
	26	65	147	16.6	61	144	15.6	57	140	14.7
	24	60	140	15.3	56	136	14.4	53	131	13.5
	22	55	133	14.2	52	129	13.3	49	123	12.6
	20	51	125	13.0	48	119	12.3	45	112	11.6
2200	30	72	155	18.4	68	153	17.3	64	150	16.3
	28	66	148	16.9	62	146	15.9	58	141	14.9
	26	61	142	15.6	58	139	14.7	54	134	13.8
	24	56	134	14.3	53	130	13.5	49	124	12.7
	22	52	127	13.2	49	122	12.5	46	115	11.8
	20	47	117	12.0	44	111	11.4	41	101	10.8
2100	30	70	153	17.8	66	151	16.8	62	147	15.8
	28	64	146	16.4	61	144	15.5	57	139	14.5
	26	60	140	15.3	56	136	14.4	53	131	13.5
	24	54	131	13.9	51	127	13.1	48	120	12.3
	22	50	123	12.8	47	118	12.1	44	111	11.4
2000	30	68	150	17.3	64	148	16.3	60	144	15.3
	28	63	144	16.0	59	141	15.1	55	136	14.1
	26	58	138	14.9	55	134	14.0	51	128	13.1
	24	53	129	13.5	50	124	12.7	47	117	12.0
	22	48	120	12.4	45	114	11.7	43	105	11.0

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 9)



**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 20,000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -45°C			STANDARD TEMPERATURE -25°C			20°C ABOVE STANDARD TEMP -5°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	74	163	19.0	70	161	17.8
	28	73	158	18.6	68	157	17.5	64	153	16.4
	26	68	153	17.4	64	151	16.4	60	146	15.4
	24	63	147	16.1	59	143	15.2	56	138	14.2
	22	59	141	15.1	55	136	14.2	52	130	13.3
	20	54	133	13.9	51	128	13.1	48	121	12.4
2300	30	75	161	19.2	71	160	18.1	66	156	17.0
	28	69	154	17.7	65	152	16.6	61	148	15.6
	26	65	149	16.5	61	146	15.6	57	140	14.6
	24	59	141	15.2	56	137	14.3	52	131	13.4
	22	55	134	14.1	52	129	13.3	49	123	12.5
	20	50	125	12.9	48	119	12.2	45	111	11.5
2200	30	72	157	18.3	67	155	17.2	63	151	16.2
	28	66	150	16.8	62	147	15.8	58	142	14.8
	26	61	144	15.6	57	140	14.7	54	134	13.8
	24	56	135	14.2	52	130	13.4	49	123	12.6
	22	52	127	13.2	49	122	12.5	46	114	11.7
	2100	30	70	155	17.8	66	153	16.8	61	148
28		64	148	16.4	60	145	15.4	57	139	14.5
26		60	142	15.2	56	137	14.4	53	131	13.5
24		54	132	13.9	51	127	13.1	48	120	12.3
22		50	124	12.8	47	118	12.1	44	109	11.4
2000		30	68	153	17.3	64	150	16.3	60	145
	28	63	146	16.0	59	142	15.1	55	137	14.1
	26	58	140	14.9	55	135	14.0	51	129	13.2
	24	53	130	13.5	50	125	12.8	47	117	12.0
	22	48	120	12.4	45	114	11.7	43	104	11.1

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 10)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 22,000 FEET**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -49°C			STANDARD TEMPERATURE -29°C			20°C ABOVE STANDARD TEMP -9°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	---	---	---	---	---	---
	28	72	161	18.5	68	158	17.4	64	154	16.3
	26	68	155	17.3	64	152	16.3	60	147	15.3
	24	63	148	16.0	59	144	15.1	55	138	14.1
	22	59	142	15.0	55	137	14.1	52	130	13.3
	20	54	133	13.8	51	128	13.0	48	120	12.3
2300	30	---	---	---	---	---	---	---	---	---
	28	69	156	17.6	65	154	16.5	61	148	15.5
	26	64	150	16.4	60	146	15.5	57	141	14.5
	24	59	142	15.1	55	137	14.2	52	131	13.3
	22	55	135	14.1	52	129	13.2	49	122	12.5
	20	50	125	12.9	47	119	12.1	44	108	11.5
2200	30	---	---	---	---	---	---	---	---	---
	28	65	152	16.7	61	148	15.7	55	142	14.7
	26	61	145	15.5	57	140	14.6	53	134	13.7
	24	55	135	14.1	52	130	13.3	49	123	12.5
	22	51	128	13.1	48	121	12.4	45	112	11.7
2100	30	---	---	---	---	---	---	---	---	---
	28	64	150	16.3	60	146	15.4	56	140	14.4
	26	59	143	15.2	56	138	14.3	52	132	13.4
	24	54	133	13.8	51	128	13.0	48	120	12.3
	22	50	124	12.7	47	118	12.0	44	107	11.4
2000	30	---	---	---	---	---	---	---	---	---
	28	62	148	16.0	59	143	15.0	55	137	14.1
	26	58	141	14.9	55	136	14.0	51	129	13.2
	24	53	131	13.5	50	125	12.8	47	117	12.0

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 11)

**CRUISE PERFORMANCE**  
**PRESSURE ALTITUDE 24,000 FEET**

CONDITIONS:  
3800 Pounds  
Recommended Lean Mixture  
Cowl Flaps Closed

RPM	MP	20°C BELOW STANDARD TEMP -53°C			STANDARD TEMPERATURE -33°C			20°C ABOVE STANDARD TEMP -13°C		
		% BPH	KTAS	GPH	% BPH	KTAS	GPH	% BPH	KTAS	GPH
2400	30	---	---	---	---	---	---	---	---	---
	28	72	163	18.4	68	160	17.3	63	155	16.2
	26	67	157	17.2	64	153	16.2	60	147	15.2
	24	62	149	15.9	58	144	15.0	55	137	14.0
	22	58	142	14.9	55	137	14.1	52	129	13.2
2300	20	54	133	13.7	51	127	12.9	47	117	12.2
	30	---	---	---	---	---	---	---	---	---
	28	68	158	17.5	64	155	16.4	60	149	15.4
	26	64	152	16.3	60	147	15.4	56	141	14.4
	24	59	143	15.0	55	137	14.1	52	130	13.2
2200	22	55	135	14.0	52	129	13.2	48	121	12.4
	30	---	---	---	---	---	---	---	---	---
	28	65	153	16.6	61	149	15.6	57	143	14.6
	26	60	145	15.4	57	140	14.5	53	133	13.6
	24	55	136	14.1	52	130	13.3	49	122	12.5
2100	22	51	128	13.1	48	121	12.4	45	110	11.6
	30	---	---	---	---	---	---	---	---	---
	28	64	151	16.2	60	147	15.3	56	140	14.4
	26	59	144	15.1	56	139	14.3	52	131	13.4
	24	54	134	13.8	51	128	13.0	48	118	12.3
2000	30	---	---	---	---	---	---	---	---	---
	28	62	149	15.9	59	144	15.0	55	138	14.1
	26	58	142	14.9	55	137	14.0	51	129	13.2
	24	53	132	13.5	50	125	12.8	47	115	12.0

NOTE:

1. For best fuel economy, operate at 1 gph leaner than shown in this chart or at peak T.I.T.
2. Some power settings may not be obtainable, but are listed to aid interpolation.
3. Power settings not approved for cruising are indicated by dashes.

Figure 5-9. Cruise Performance (Sheet 12)

### RANGE PROFILE 45 MINUTES RESERVE 65 GALLONS USABLE FUEL

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture for Cruise  
Standard Temperature  
Zero Wind

NOTE:  
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb up to 20,000 feet and maximum climb above 20,000 feet.

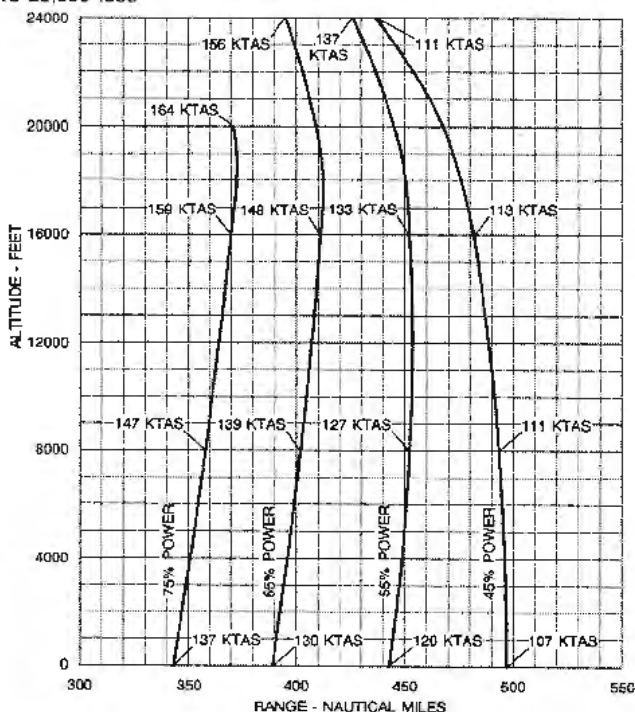


Figure 5-10. Range Profile (Sheet 1 of 4)  
Serials T20608001 thru T20608361.

**RANGE PROFILE**  
**45 MINUTES RESERVE**  
**88 GALLONS USABLE FUEL**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture for Cruise  
Standard Temperature  
Zero Wind

**NOTE:**  
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb up to 20,000 feet and maximum climb above 20,000 feet.

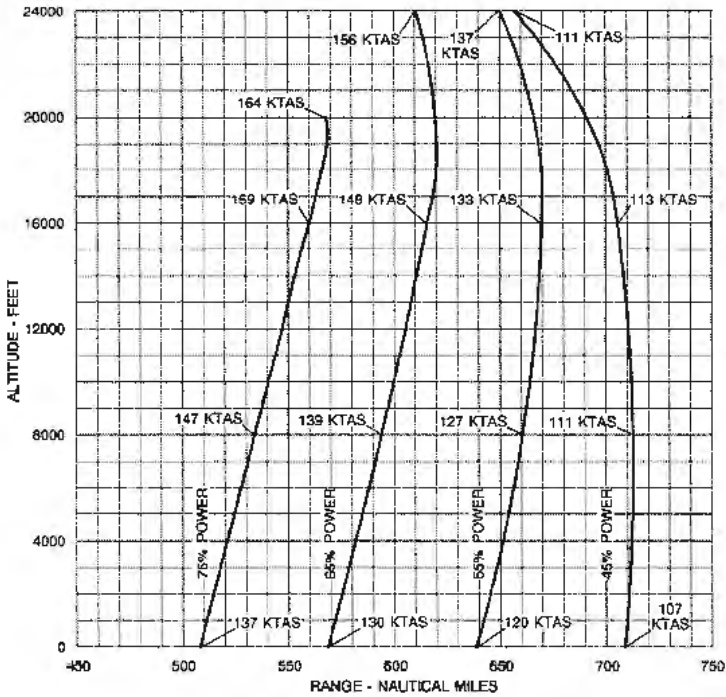


Figure 5-10. Range Profile (Sheet 2)  
Serials T20608001 thru T20608361.

**RANGE PROFILE**  
45 MINUTES RESERVE  
64 GALLONS USABLE FUEL

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture for Cruise  
Standard Temperature  
Zero Wind

NOTE:  
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb up to 20,000 feet and maximum climb above 20,000 feet.

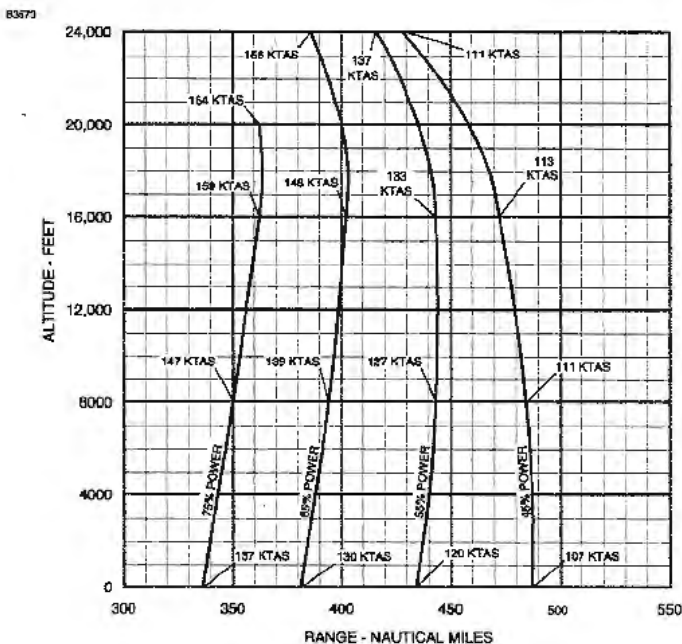


Figure 5-10. Range Profile (Sheet 3)  
Serials T20608362 and on.

**RANGE PROFILE**  
**45 MINUTES RESERVE**  
**87 GALLONS USABLE FUEL**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture for Cruise  
Standard Temperature  
Zero Wind

**NOTE:**  
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb up to 20,000 feet and maximum climb above 20,000 feet.

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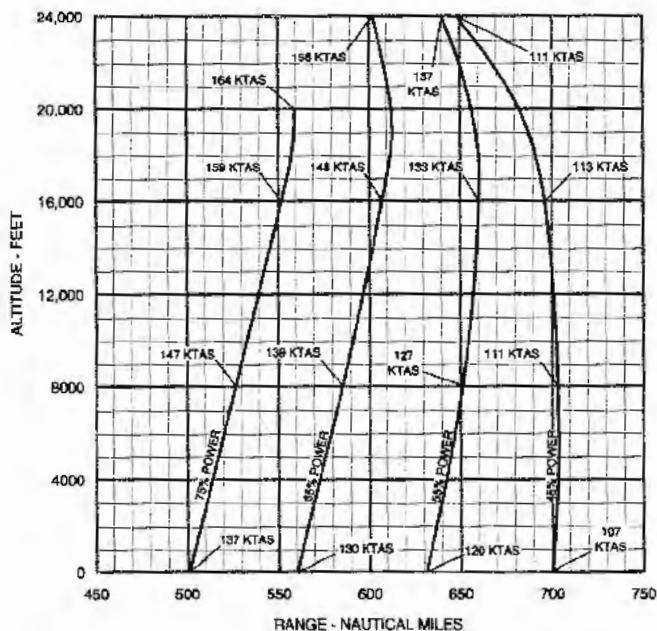


Figure 5-10. Range Profile (Sheet 4)  
Serials T20608362 and on.

**ENDURANCE PROFILE**  
**45 MINUTES RESERVE**  
**65 GALLONS USABLE FUEL**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture for Cruise  
Standard Temperature  
Zero Wind

NOTE:  
This chart allows for the fuel used for engine start, taxi, takeoff and climb,  
and the distance during a normal climb up to 20,000 feet and maximum  
climb above 20,000 feet.

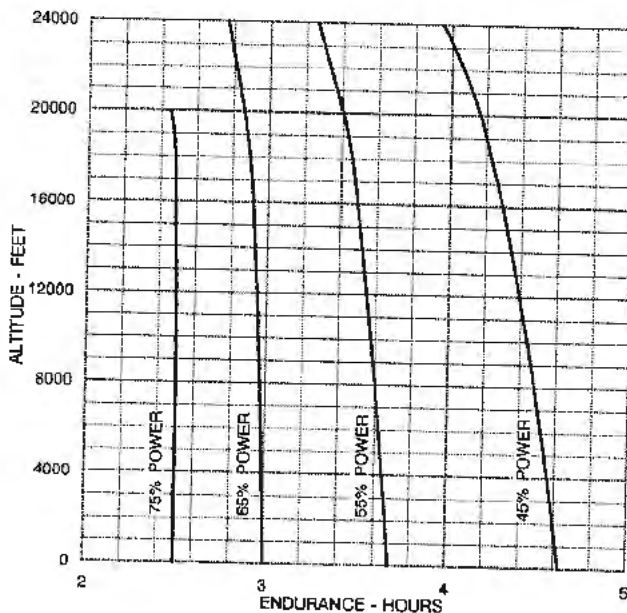


Figure 5-11. Endurance Profile (Sheet 1 of 4)  
Serials T20608001 thru T20608361.



### ENDURANCE PROFILE 45 MINUTES RESERVE 88 GALLONS USABLE FUEL

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture for Cruise  
Standard Temperature  
Zero Wind

**NOTE:**  
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb up to 20,000 feet and maximum climb above 20,000 feet.

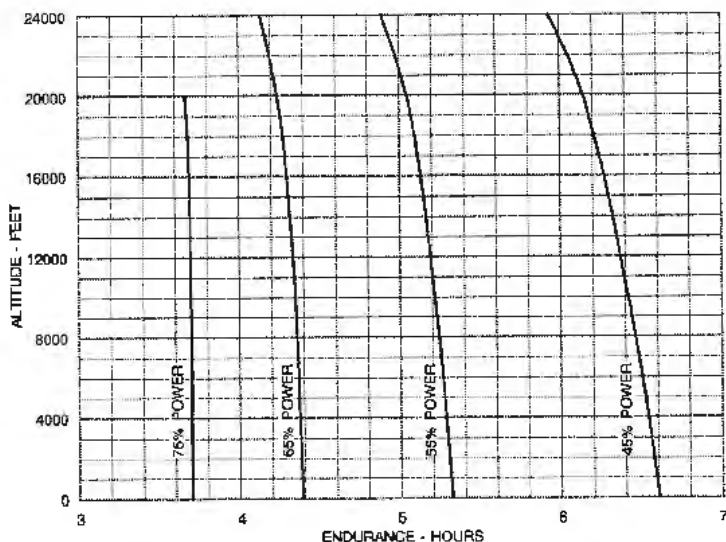


Figure 5-11. Endurance Profile (Sheet 2)  
Serials T20608001 thru T20608361.

**ENDURANCE PROFILE**  
**45 MINUTES RESERVE**  
**64 GALLONS USABLE FUEL**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture for Cruise  
Standard Temperature  
Zero Wind

**NOTE:**  
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb up to 20,000 feet and maximum climb above 20,000 feet.

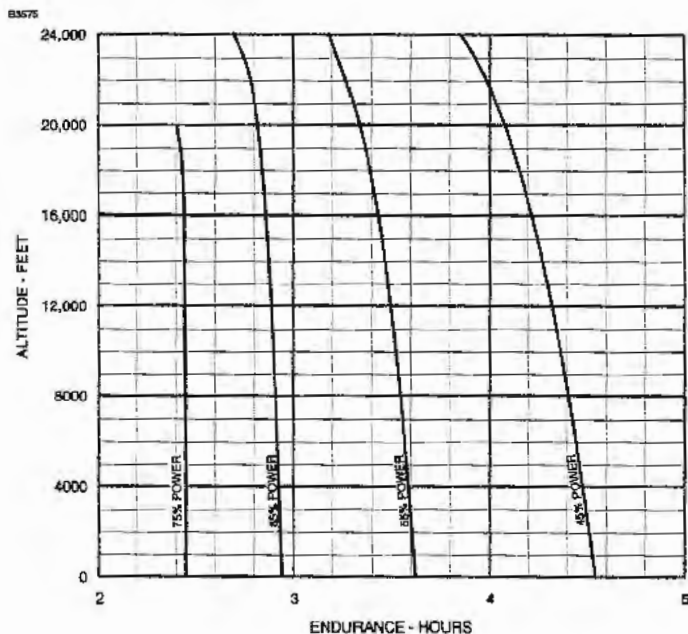


Figure 5-11. Endurance Profile (Sheet 3)  
Serials T20608362 and on.

**ENDURANCE PROFILE**  
**45 MINUTES RESERVE**  
**87 GALLONS USABLE FUEL**

CONDITIONS:  
3600 Pounds  
Recommended Lean Mixture for Cruise  
Standard Temperature  
Zero Wind

NOTE:  
This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb up to 20,000 feet and maximum climb above 20,000 feet.

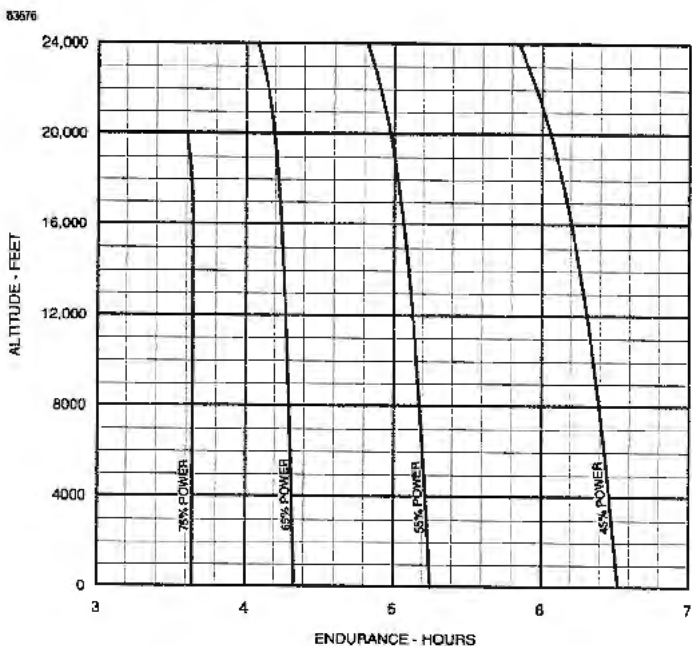


Figure 5-11. Endurance Profile (Sheet 4)  
Serials T20608362 and on.

### SHORT FIELD LANDING DISTANCE AT 3600 POUNDS

CONDITIONS:

Flaps 40°  
Power Off  
Maximum Braking  
Paved, level, dry runway  
Zero Wind  
Speed at 50 Ft: 64 KIAS

Press Alt In Feet	0°C		10°C		20°C		30°C		40°C	
	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst
S. L.	695	1340	720	1375	750	1415	775	1450	800	1490
1000	720	1375	750	1415	775	1450	800	1490	830	1530
2000	750	1415	775	1455	805	1495	830	1530	860	1575
3000	775	1455	805	1495	835	1540	865	1580	890	1615
4000	805	1495	835	1540	865	1580	895	1625	925	1665
5000	835	1540	870	1585	900	1630	930	1675	960	1715
6000	870	1590	900	1630	935	1680	965	1725	995	1770
7000	905	1635	935	1680	970	1730	1000	1775	1035	1825
8000	940	1690	970	1730	1005	1780	1040	1830	1075	1880

NOTES:

1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 10 knots headwind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2.5 knots.
3. For operation on dry, grass runway, increase distances by 40% of the "ground roll" figure.
4. If a landing with flaps up is necessary, increase the approach speed by 9 KIAS and allow for 45% longer distances.

Figure 5-12. Landing Distance

## SECTION 6 WEIGHT & BALANCE/ EQUIPMENT LIST

TABLE OF CONTENTS	Page
Introduction .....	6-3
Airplane Weighing Procedures .....	6-3
Weight And Balance .....	6-8
Baggage and Cargo Tie-Down .....	6-10
Comprehensive Equipment List .....	6-22

## INTRODUCTION

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

It should be noted that specific information regarding the weight, arm, moment and installed equipment for this airplane as delivered from the factory can only be found in the plastic envelope carried in the back of this handbook.

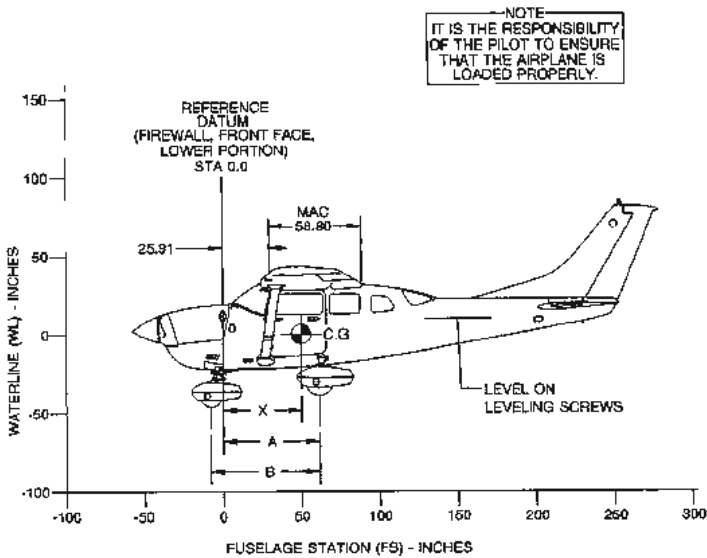
### WARNING

**IT IS THE RESPONSIBILITY OF THE PILOT TO ENSURE THE AIRPLANE IS LOADED PROPERLY. OPERATION OUTSIDE OF PRESCRIBED WEIGHT AND BALANCE LIMITATIONS COULD RESULT IN AN ACCIDENT AND SERIOUS OR FATAL INJURY.**

## AIRPLANE WEIGHING PROCEDURES

1. Preparation:
  - a. Inflate tires to recommended operating pressures.
  - b. Defuel airplane. Refer to the Maintenance Manual.
  - c. Service engine oil as required to obtain a normal full indication (11 quarts on dipstick).
  - d. Move sliding seats to the most forward position.
  - e. Raise flaps to the fully retracted position.
  - f. Place all control surfaces in neutral position.
  - g. Remove all non-required items from airplane.
2. Leveling:
  - a. Place scales under each wheel (minimum scale capacity, 1000 pounds).
  - b. Deflate the nose tire and/or lower or raise the nose strut to properly center the bubble in the level (Refer to Figure 6-1).

(Continued Next Page) 



1285T1027

Figure 6-1. Airplane Weighing Form (Sheet 1 of 3)

**LOCATING CG WITH AIRPLANE ON LANDING GEAR**

FORMULA for Longitudinal CG:

$$(X) = (A) \frac{(\text{NOSE GEAR NET WEIGHT}) ( ) \times (B)}{\text{NOSE AND MAIN LANDING GEAR WEIGHT TOTALED ( )}} = ( ) \text{ INCHES AFT OF DATUM}$$

**LOCATING PERCENT MAC**

FORMULA for Percent MAC:

$$\text{CG Percent MAC} = \frac{(\text{CG Arm of Airplane}) - 25.91}{0.5880}$$

**MEASURING A AND B**

MEASURE A AND B PER PILOT'S OPERATING HANDBOOK INSTRUCTIONS TO ASSIST IN LOCATING CG WITH AIRPLANE WEIGHED ON LANDING GEAR.

**LEVELING PROVISIONS**

LONGITUDINAL - LEFT SIDE OF TAILCONE AT FS 108.00 & 142.00

**AIRPLANE AS WEIGHED TABLE**

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

**BASIC EMPTY WEIGHT AND CENTER-OF-GRAVITY TABLE**

ITEM	WEIGHT POUNDS	CG ARM (INCHES)	MOMENT (INCH-POUNDS /1000)
AIRPLANE (CALCULATED OR AS WEIGHED) (INCLUDES ALL UNDRAINABLE FLUIDS AND FULL OIL.)			
DRAINABLE UNUSABLE FUEL AT 6.0 POUNDS PER GALLON - 4 GALLONS	24.0	48.0	1.2
BASIC EMPTY WEIGHT			

Figure 6-1. Airplane Weighing Form (Sheet 2)  
Serials T20608001 thru T20608361.



**LOCATING CG WITH AIRPLANE ON LANDING GEAR**

FORMULA for Longitudinal CG:

$$(X) = (A) \cdot \frac{(\text{NOSE GEAR NET WEIGHT}) ( ) \times (B)}{\text{NOSE AND MAIN LANDING GEAR WEIGHT TOTALED} ( )} = ( ) \begin{matrix} \text{INCHES} \\ \text{AFT OF} \\ \text{DATUM} \end{matrix}$$

**LOCATING PERCENT MAC**

FORMULA for Percent MAC:

$$\text{CG Percent MAC} = \frac{(\text{CG Arm of Airplane}) - 25.91}{0.5880}$$

**MEASURING A AND B**

MEASURE A AND B PER PILOT'S OPERATING HANDBOOK INSTRUCTIONS TO ASSIST IN LOCATING CG WITH AIRPLANE WEIGHED ON LANDING GEAR.

**LEVELING PROVISIONS**

LONGITUDINAL - LEFT SIDE OF TAILCONE AT FS 108.00 & 142.00

**AIRPLANE AS WEIGHED TABLE**

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

**BASIC EMPTY WEIGHT AND CENTER-OF-GRAVITY TABLE**

ITEM	WEIGHT POUNDS	CG ARM (INCHES)	MOMENT (INCH-POUNDS /1000)
AIRPLANE (CALCULATED OR AS WEIGHED) (INCLUDES ALL UNDRAINABLE FLUIDS AND FULL OIL)			
DRAINABLE UNUSABLE FUEL AT 6.0 POUNDS PER GALLON - 5 GALLONS	30.0	48.0	1.4
<b>BASIC EMPTY WEIGHT</b>			

Figure 8-1. Airplane Weighing Form (Sheet 3)  
Serials T20608362 and on.

1lbs = 0,453592 kg  
 1 inch = 0,0254 m

	inch	(m)
A	61,42	1,56
B	72,05	1,83

Scale Position	Scale Reading	Tare	Symbol	Net Weight	Wáha v kg
left Wheel			L	808,66	366,8
Right Wheel			R	836,43	379,4
Nose Wheel			N	759,27	344,4
Sum of Net Weights (As Weight)				W	2404,36

	Weight (W)	C.G. (X)	Moment
Airplane Basic Empty Weight	2404,36	38,67	92966,06

$$C.G. Arm (X) = A - \frac{(N * B)}{W}$$

Item	Moment/1000		
	Weight (Lbs) X C.G. ARM (In.)= (Lbs.-In)		
Airplane Weight (from item 5, page 6-3)			
Add Unusable Fuel:			
Standart Tanks (3 Gal at 6 Lbs/Gal)			
Long Range Tanks (5 Gal at 6 Lbs/Gal)			
Equipment Chages			
Airplane Basic Empty Weight	2404,36	38,67	92966,06

19.12.2014

**TomiAIR s.r.o.**  
 Skuteckého 1086/5  
 Praha 6, 163 00  
 IČO: 28968093 ©  
 DIČ: CZ28968093

# SAMPLE WEIGHT AND BALANCE RECORD

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

AIRPLANE MODEL			SERIAL NO.	PAGE NUMBER								
DATE	ITEM NO.		DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE						RUNNING BASIC EMPTY WEIGHT		
	IN	OUT		ADDED (+)			REMOVED (-)			WT. (LB.)	MOMENT /1000	
				WT. (LB.)	ARM (IN.)	MOMENT /1000	WT. (LB.)	ARM (IN.)	MOMENT /1000			
			AS DELIVERED									
19-12	2014									2404	92.76	

0585C1009

Figure 6-2. Sample Weight and Balance Record

## **AIRPLANE WEIGHING PROCEDURES** (Continued)

3. Weighing:
  - a. Weigh the airplane in a closed hangar to avoid errors caused by air currents.
  - b. With the airplane level and brakes released, record the weight shown on each scale. Deduct the tare, if any, from each reading.
4. Measuring:
  - a. Obtain measurement A by measuring horizontally (along the airplane centerline) from a line stretched between the main wheel centers to a plumb bob dropped from the firewall.
  - b. Obtain measurement B by measuring horizontally and parallel to the airplane centerline, from center of nose wheel axle, left side, to a plumb bob dropped from the line between the main wheel centers. Repeat on right side and average the measurements.
5. Using weights from item 3 and measurements from item 4, the airplane weight and C.G. can be determined.
6. Basic Empty Weight may be determined by completing Figure 6-1.

## **WEIGHT AND BALANCE**

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

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

(Continued Next Page)

## WEIGHT AND BALANCE (Continued)

### NOTE

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

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

### NOTE

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

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

(Continued Next Page)

## **WEIGHT AND BALANCE** (Continued)

### **NOTE**

Each loading should be figured in accordance with the above paragraphs. When the loading is light (such as pilot and copilot, and no oxygen system, rear seats or cargo), be sure to check the forward balance limits. When loading is heavy (near gross weight), be sure to check the aft balance limits.

To avoid time consuming delays in cargo and/or passenger shifting, plan your load so that the heaviest cargo and/or passengers are in the forward part of the airplane or cargo pack and the lightest in the rear. Always plan to have any vacant space at the rear of the airplane or pack. For example, do not have passengers occupy the aft seat unless the front and center seats are to be occupied.

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

### **BAGGAGE AND CARGO TIE-DOWN**

A nylon baggage net having four tie-down straps is provided as standard equipment to secure baggage/cargo in cargo area D. Two floor-mounted "D" ring tie-downs and two "D" ring tie-downs located in the aft cabin top, serve as the attaching points for the net in cargo area "D". The "D" rings which serve as the attachments for the forward tie-down straps are mounted in the floor near each sidewall approximately at station 123. The two "D" rings for the aft tie-down straps are installed at the aft edge of the top rear windows approximately at station 135.

(Continued Next Page)

**WEIGHT AND BALANCE** (Continued)**BAGGAGE AND CARGO TIE-DOWN** (Continued)

It will be necessary to properly secure cargo loads before flight. To supplement the standard "D" rings provided for tie-down, additional "D" rings are available from any Cessna Dealer. If more tie-down points are needed, the shoulder harness attaching points may be used. Rope, strap, or cable used for tie-down should be rated at a minimum of ten times the load weight capacity of the tie-down fittings used.

Refer to Figure 6-3 for additional information concerning the use of tie-down blocks and other attachments in restraining cargo.

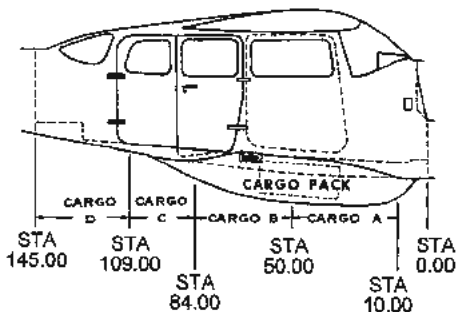
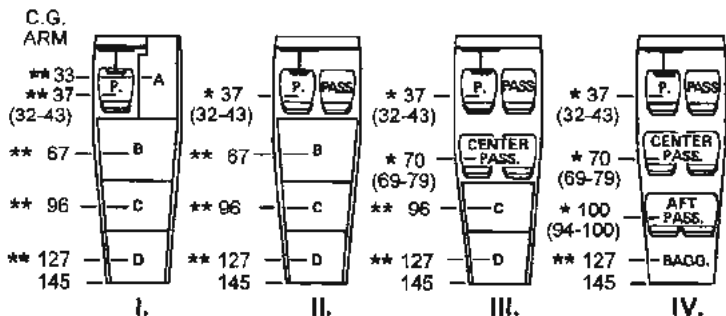
ITEM	LOCATION	MAXIMUM RATED LOAD (POUNDS)
"D" Rings	Floor and Aft Cabin Top	60
Shoulder Strap	Cabin Top	175

Only the total rated load of tie-downs located aft of the cargo load are to be considered when determining adequate restraint of cargo. Tie-downs are also required forward of the load to prevent the load from shifting. The type of tie-downs available, and the sum of their individual rated loads, are the determining factors in selecting the number of tie-downs needed.

**FOR EXAMPLE:**

A 400-pound load would require that a minimum of four (4) tie-downs rated at 100 pounds each be located aft of the load for proper restraint. Additional tie-downs forward of the load would be needed to prevent the load from shifting.

LOADING ARRANGEMENTS



- \* Pilot or passenger center of gravity on adjustable seats positioned for average occupant. Numbers in parentheses indicate forward and aft limits of occupant center of gravity range.
- \*\* Arms measured to the center of the areas shown.

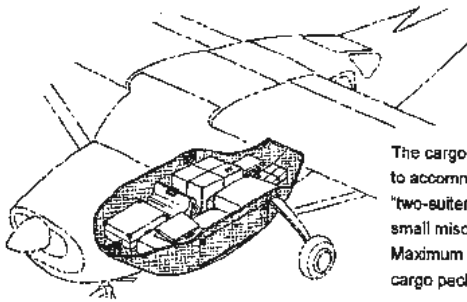
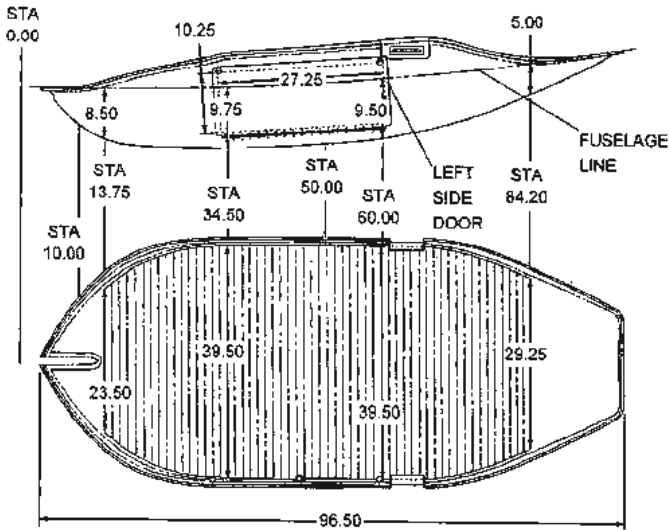
**NOTE 1:** The usable fuel C.G. arm is located at station 46.50.

**NOTE 2:** The aft baggage wall (approximate station 145.00) can be used as a convenient interior reference point for determining the location of baggage area fuselage stations.

1285X1003

Figure 6-4. Loading Arrangements





The cargo pack was designed to accommodate three "two-suiters", plus other small miscellaneous articles. Maximum loading for cargo pack is 300 pounds.

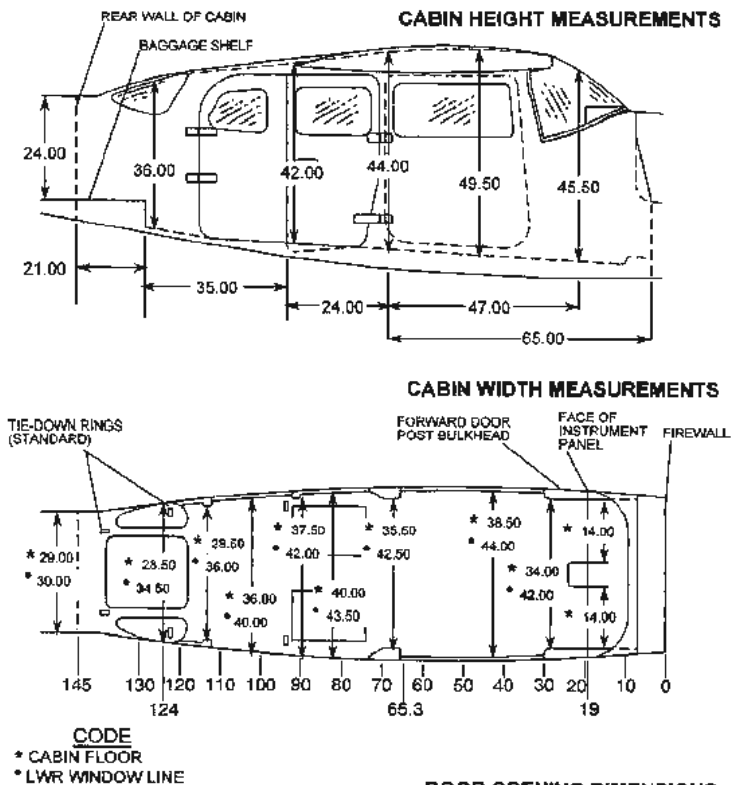
**NOTE 1:** STATION LOCATION AND C.G. ARM ARE IDENTICAL.

Figure 6-5. Cargo Pack

1226X1011

SECTION 6  
WEIGHT & BALANCE / EQUIPMENT LIST

CESSNA  
MODEL T206H



**DOOR OPENING DIMENSIONS**

	WIDTH (TOP)	WIDTH (BOTTOM)	HEIGHT (FRONT)	HEIGHT (REAR)
CABIN DOOR	32.50	37.00	41.00	39.00
CARGO DOORS	43.00	40.00	39.25	37.50

- NOTE 1:** Use the forward face of the rear door post as a reference point to locate C.G. arms. For example, a box with its center of weight located 13.00 inches aft of the rear door post would have a C.G. arm of (65.30 + 13.00 = 78.30) 78.30 inches.
- NOTE 2:** Maximum allowable floor loading: 200 pounds/square foot. However, when items with small or sharp support areas are carried, the installation of a .25 inch plywood floor is highly recommended to protect the aircraft structure.
- NOTE 3:** All dimensions shown are in inches.

12B5X1005

Figure 6-6. Internal Cabin Dimensions

ITEM DESCRIPTION	WEIGHT AND MOMENT TABULATION			
	SAMPLE AIRPLANE		YOUR AIRPLANE	
	Weight (lbs.)	Moment (Lb.-ins. /1000)	Weight (lbs.)	Moment (Lb.-ins. /1000)
1. Basic Empty Weight (Use the data pertaining to your airplane as it is presently equipped. Includes unusable fuel and full oil)	2359	91.3		
2. Usable Fuel (At 6 Lbs./Gal.)				
Std Fuel (88 Gallons Maximum)	528	24.6		
Reduced Fuel (65 Gallons)				
3. Pilot and Front Passenger (Station 32 to 43)	340	12.6		
4. Center Passengers (Sta 69 to 79)	340	23.8		
Aft Passengers (Sta. 94 to 100)				
Baggage IV or V (Sta. 109 to 145; 180 Lbs. Max.)	50	6.3		
5. *Cargo "A" (Station 10 to 50)				
*Cargo "B" (Station 50 to 84)				
*Cargo "C" (Station 84 to 109)				
*Cargo "D" (Station 109 to 145)				
6. Cargo Pack (Station 10 to 84; 300 lbs. Max.)				
<b>7. RAMP WEIGHT AND MOMENT</b>	<b>3617</b>	<b>158.6</b>		
8. Fuel allowance for engine start, taxi and runup	-17	-.7		
<b>9. TAKEOFF WEIGHT AND MOMENT (Subtract Step 8 from Step 7)</b>	<b>3600</b>	<b>157.9</b>		
10. Locate this point (3600 at 157.9) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable.				
* Maximum allowable cargo loads will be determined by the type and number of tie-downs used, as well as by the airplane weight and C.G. limitations. Floor loading must not exceed 200 lbs. per square foot.				

Figure 6-7. Sample Loading Problem (Sheet 1 of 3)  
Serials T20608001 thru T20608361.

SECTION 6  
WEIGHT & BALANCE / EQUIPMENT LIST

CESSNA  
MODEL T206H

ITEM DESCRIPTION	WEIGHT AND MOMENT TABULATION			
	SAMPLE AIRPLANE		YOUR AIRPLANE	
	Weight (lbs.)	Moment (Lb-ins. /1000)	Weight (lbs.)	Moment (Lb-ins. /1000)
1. Basic Empty Weight (Use the data pertaining to your airplane as it is presently equipped. Includes unusable fuel and full oil)	2365	91.6		
2. Usable Fuel (At 6 Lbs./Gal.)				
Std Fuel (87 Gallons Maximum)	522	24.3		
Reduced Fuel (65 Gallons)				
3. Pilot and Front Passenger (Station 32 to 43)	340	12.6		
4. Center Passengers (Sta 69 to 79)	340	23.8		
Aft Passengers (Sta. 94 to 100)				
Baggage IV or V (Sta. 109 to 145; 180 Lbs. Max.)	50	6.3		
5. *Cargo "A" (Station 10 to 50)				
*Cargo "B" (Station 50 to 84)				
*Cargo "C" (Station 84 to 109)				
*Cargo "D" (Station 109 to 145)				
6. Cargo Pack (Station 10 to 84; 300 lbs. Max.)				
7. <b>RAMP WEIGHT AND MOMENT</b>	<b>3617</b>	<b>158.6</b>		
8. Fuel allowance for engine start, taxi and runup	-17	-.7		
9. <b>TAKEOFF WEIGHT AND MOMENT</b> (Subtract Step 8 from Step 7)	<b>3600</b>	<b>157.9</b>		
10. Locate this point (3600 at 157.9) on the Center of Gravity Moment Envelope, and since this point falls within the envelope, the loading is acceptable.				
* Maximum allowable cargo loads will be determined by the type and number of tie-downs used, as well as by the airplane weight and C.G. limitations. Floor loading must not exceed 200 lbs. per square foot.				

Figure 6-7. Sample Loading Problem (Sheet 2)  
Serials T20608362 and on.

YOUR AIRPLANE		YOUR AIRPLANE		YOUR AIRPLANE	
Weight (lbs.)	Moment (Lb-ins, /1000)	Weight (lbs.)	Moment (Lb-ins, /1000)	Weight (lbs.)	Moment (Lb-ins, /1000)

When several loading configurations are representative of your operations, it may be useful to fill out one or more of the above columns so that specific loadings are available at a glance.

Figure 6-7. Sample Loading Problem (Sheet 3)

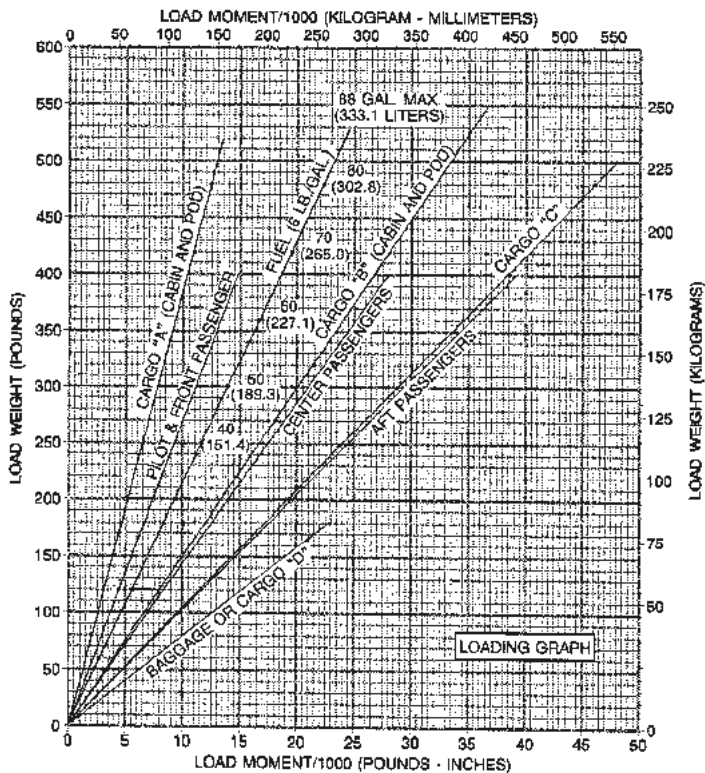
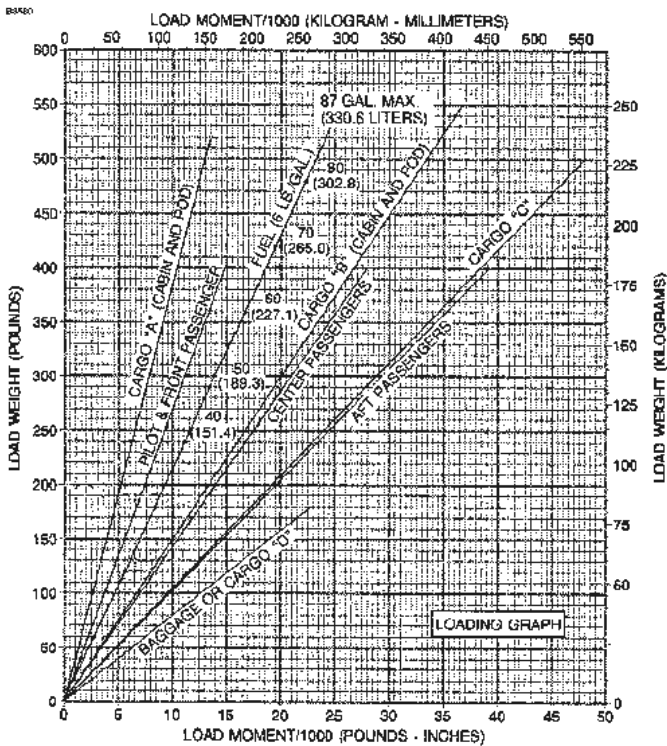


Figure 6-8. Loading Graph (Sheet 1 of 2)  
Serials T20608001 thru T20608361.



1285T1001

Figure 6-8. Loading Graph (Sheet 2)  
Serials T20608362 and on.

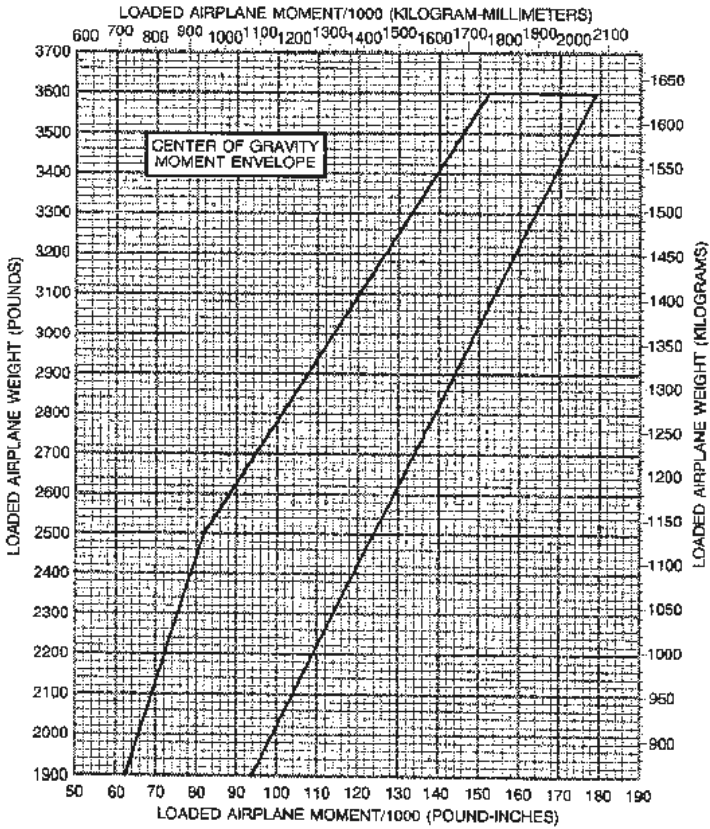


Figure 6-9. Center of Gravity Moment Envelope



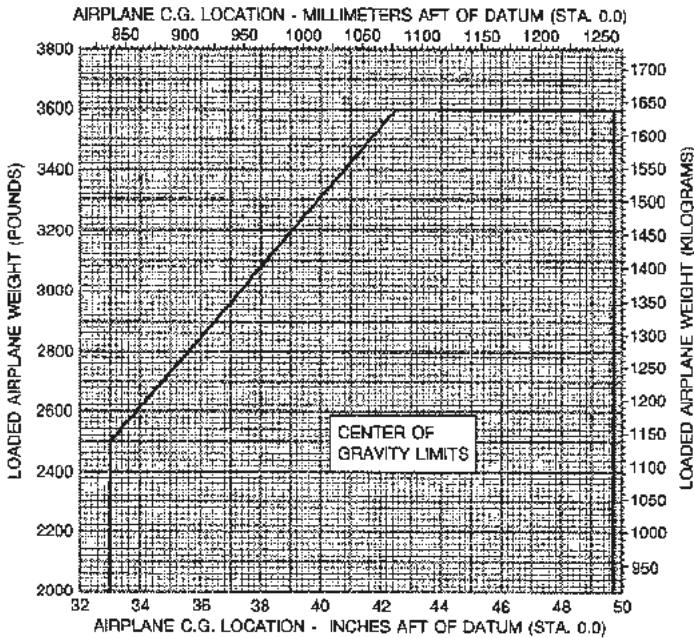


Figure 6-10. Center of Gravity Limits

## COMPREHENSIVE EQUIPMENT LIST

The following figure (Figure 6-11) is a comprehensive list of all Cessna equipment which is available for the Model T206H airplane. This comprehensive equipment list provides the following information in column form:

In the **ITEM No.** column, each item is assigned a coded number. The first two digits of the code represent the assignment of the item within the Air Transport Association Specification 100 breakdown (11 for Paint and Placards; 24 for Electrical Power; 77 for Engine Indicating, etc.). These assignments also correspond to the Maintenance Manual chapter breakdown for the airplane. After the first two digits (and hyphen), items receive a unique sequence number (01, 02, 03, etc.). After the sequence number (and hyphen), a suffix letter is assigned to identify equipment as a required item, a standard item or an optional item. Suffix letters are as follows:

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

In the **EQUIPMENT LIST DESCRIPTION** column, each item is assigned a descriptive name to help identify its function.

In the **REF DRAWING** column, a Cessna drawing number is provided which corresponds to the item.

### NOTE

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

In the **WT LBS** and **ARM INS** columns, information is provided on the weight (in pounds) and arm (in inches) of the equipment item.

### NOTES

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

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

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
<b>11 - PLACARDS AND MARKINGS</b>				
11-01-R	IFR DAY & NIGHT LIMITATIONS PLACARD	0505087-24	0.0	19.2
11-02-S	PAINT, OVERALL EXTERIOR WHITE	1204053	20.6	89.0
11-03-O	PAINT, OVERALL WHITE W/COLOR STRIPE	1204053	21.4*	90.8*
	- OVERALL WHITE COVER		20.6	89.0
	- COLOR STRIPING		0.8	135.9
11-04-O	MILLENNIUM EXTERIOR STYLING (WHEN AVAILABLE) (NET CHANGE SHOWN)	1204055-3, -4	0.0	90.8
	- PAINT (METALIC OR GLOSS)		0.0	89.0
	- COLOR STRIPING		0.8	135.9
<b>21 - AIR CONDITIONING</b>				
21-01-S	VENTILATORS, ADJUSTABLE, CABIN AIR	1250500-8	1.7	52.0
21-02-S	CABIN HEATER SYSTEM, SHROUDED MUFFLER TYPE	1215209-1	2.5	-10.0
<b>22 - AUTO FLIGHT</b>				
22-01-S	SINGLE AXIS AUTOPILOT	3900013-1	8.0*	36.7*
	- KAP 140 SINGLE AXIS AUTOPILOT	057-05628-2802	2.5	14.6
	- COMPUTER	065-00176-2501	2.0	15.0
	- ROLL SERVO INSTALLATION	3940415-1	1.6	49.2
	- CABLE ASSY, ROLL ACTUATOR	1222150-2, -3	0.9	56.0
	- CABLE ASSY, KAP 140 AUTOPILOT	3924107	0.9	12.0
	- CONFIGURATION MODULE	071-00073-5000	0.1	18.0
	- KS-271C ROLL SERVO	065-00179-0100	2.1	53.1
22-02-O	DUAL AXIS AUTOPILOT	3900014-1	17.0*	133.1*
	- KAP 140 DUAL AXIS AUTOPILOT	065-00176-2501	2.0	15.0
	- COMPUTER WITH ELECTRIC ELEVATOR (REPLACES 22-01-S)			
	- KS-270C PITCH SERVO INSTL.	1201989-1	5.1	219.7
	- KS-272C PITCH TRIM SERVO INSTL.	1201994-1	5.2	198.9
	- ROLL SERVO INSTALLATION	3940415-1	4.4	54.5
	- KAP 140 COMPUTER/CONTROLLER	065-00176-5402	2.6	14.3
22-03-O	DUAL AXIS AUTOPILOT	3900042	20.5*	103.0*
	- KAP 140 COMPUTER WITH ALTITUDE PRESELECT	065-00176-7702	2.6	15.0
	- KAP 140 CABLE ASSY	3924135	4.7	62.8
	- KS-271C ROLL SERVO INSTALLATION	3940415-1	3.6	54.2
	- ROLL SERVO INST CABLE ASSY	3924137-3	0.4	66.0
	- ROLL ACTUATOR CABLE ASSY	3924111-2	0.9	56.0
	- KS-270C PITCH SERVO INSTL.	1201989-1	4.1	170.6
	- KS-272C PITCH TRIM SERVO INSTL.	1201994-1	4.1	195.7
	- KMC 100 CONFIGURATION MODULE	071-00073-5000	0.1	15.0

Figure 6-11. Equipment List Description (Sheet 1 of 12)

SECTION 6  
WEIGHT & BALANCE / EQUIPMENT LIST

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ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
22-04-A	ALTITUDE PRESELECT OPTION FOR 2-AXIS AUTOPILOT (SYSTEM CONSISTS OF CONTROLLER EXCHANGED) (WEIGHT SHOWN IS NET CHANGE)	3910299	0.0	---
	<b>23 - COMMUNICATIONS</b>			
23-01-S	STATIC DISCHARGE WICKS	1201140-1	0.3	168.9
23-02-S	BASIC AVIONICS KIT INSTALLATION	3930412	7.4*	33.0*
	- SUPPORT STRAPS INSTALLATION	1270101-5	0.2	12.2
	- AVIONICS COOLING FAN INSTL	3940417-1	1.2	10.0
	- AVIONICS GROUND INSTALLATION	3940359-1	0.1	18.0
	- CIRCUIT BREAKER PANEL INSTL	3930416-1	0.7	18.4
	- CABIN SPEAKER	C59604-0101	1.7	40.0
	- AUDIO WIRING, FUSELAGE	3921117	2.1	54.1
	- MICROPHONE, HAND HELD	62800-007	0.2	19.0
23-03-S	BASIC AVIONICS KIT INSTALLATION	3900042-3	4.0*	24.7*
	- SUPPORT STRAPS INSTALLATION	1270101-5	0.2	12.2
	- AVIONICS COOLING FAN INSTL	3940417-1	1.2	10.0
	- AVIONICS GROUND INSTALLATION	3940359-1	0.1	18.0
	- CIRCUIT BREAKER PANEL INSTL	393041-1	0.5	18.4
	- CABIN SPEAKER	C59604-0101	1.7	40.0
	- MICROPHONE, HAND HELD	62800-007	0.3	19.0
23-04-S	AUDIO/INTERCOM/MARKER BEACON INSTL	3900042-3	6.7*	55.9*
	- KMA 28 AUDIO/INTERCOM/MARKER BEACON PANEL	066-01176-0101	1.5	17.1
	- MARKER BEACON ANTENNA CI-102	3960200-1	0.5	200.9
	- HARDWARE & CABLE ASSY	3921146-9	4.7	52.8
23-05-S	AUDIO/INTERCOM/MARKER BEACON INSTL	3930013-1	3.5*	68.6*
	- KMA 28 AUDIO/INTERCOM/MARKER BEACON PANEL	066-01155-0101	1.8	17.1
	- MARKER BEACON ANTENNA CI-102	3960200-1	0.5	200.9
	- HARDWARE & CABLE ASSY	3960200-1	1.0	95.0
23-06-S	NAV/COM INSTALLATION (RQS 23-02-S)	3900042-3	8.4*	49.1*
	- KX 155A BENDIX/KING NAV/COM WITH GS	069-01032-0101	4.0	16.2
	- CI-128 COM ANTENNA	3960113-9	0.5	61.2
	- OMNI ANTENNA	C598504-0201	0.8	245.5
	- KI 209 INDICATOR HEAD (VOR/ILS)	066-03056-0011	1.2	16.4
	- HARDWARE AND CABLE ASSEMBLY	3921138-1	1.9	50.3
23-07-S	NAV/COM WITH VOR/LOC (2ND UNIT)	3960412	6.2*	22.9*
	- KX 155A BENDIX/KING NAV/COM WITHOUT GS	069-01032-0201	3.5	16.2
	- KI 208 CDI INDICATOR	066-03056-0002	1.0	16.4
	- ANTENNA COUPLER	S2472-1	0.2	3.5
	- CI-128 COM ANTENNA	3960113	0.5	61.2
	- WIRING & MISC. HARDWARE		1.0	36.3

Figure 6-11. Equipment List Description (Sheet 2)

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
23-08-S	NAV/COM INSTALLATION (RQS 23-02-S)	3900042-3	8.4*	49.1*
	- KX-155A BENDIX/KING NAV/COM W/GS	069-01032-0101	4.0	16.2
	- KI-209A INDICATOR HEAD (VOR.ILS)	066-03056-0011	1.2	16.4
	- CABLE ASSEMBLY	3921138-1	1.9	50.3
	- CI-128A COM ANTENNA	3960113-9	0.5	61.2
	- OMNI ANTENNA AND CABLE INST	C598504-0201	0.8	246.6
23-09-A	NAV/COM #2 INSTALLATION	3900043-5	6.8*	19.7*
	- KX-155A BENDIX/KING NAV/COM W/GS	069-01032-0101	4.0	16.2
	- KI-209 CDI INDICATOR	066-03056-0003	1.2	16.4
	- ANTENNA COUPLER	S2474-1	0.2	3.5
	- CI-128A COM ANTENNA	3960113-9	0.5	61.2
23-10-A	- CABLE ASSEMBLY	3921141-1	0.9	18.8
	HEADSET INSTL., (WEIGHT EACH) 6 PLACES AVAILABLE (USE ACTUAL WEIGHT AND PASSENGER C.G. WHEN USED)	300048-100	1.1	—
<b>24 - ELECTRICAL POWER</b>				
24-01-R	POWER JUNCTION BOX (PRECISION AIRMOTIVE CORP.) INCLUDES:	MC01-2A	6.4*	0.0
	- ALTERNATOR CONTROL UNIT	ACC2101	0.2	0.0
	- MASTER CONTACTOR	X61-0007	0.7	0.0
	- STARTER CONTACTOR	X61-0012	0.7	0.0
	- AMMETER TRANSDUCER		0.1	0.0
24-02-R	ALTERNATOR, 28 VOLT, 60 AMP	9910591-12	10.3	-32.3
24-03-O	ALTERNATOR, 28 VOLT, 95 AMP (NET WT. CHANGE OVER 24-02-R)	9910591	5.4	-32.3
24-04-R	BATTERY, 24 VOLT, 12.75 AMP HR (5 HR RATE)	1250982-1	23.2	-0.5
24-06-O	BATTERY, 24 VOLT, HEAVY DUTY	1218025	27.2	3.0
<b>25 - EQUIPMENT/FURNISHINGS</b>				
25-01-R	SEAT, PILOT, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., CLOTH COVER	0514211-3	34.5	40.8
25-02-O	SEAT, PILOT, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., VINYL COVER	0514211-4	35.0	40.8
25-03-O	SEAT, PILOT, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., LEATHER COVER	0514211-7	35.2	40.8
25-04-O	SEAT, PILOT, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., LEATHER/VINYL COVER	0514211-10	35.1	40.8
25-05-O	SEAT, PILOT, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., MILLENNIUM COVER (WHEN AVAILABLE)	0514211-13		40.8

Figure 6-11. Equipment List Description (Sheet 3)

SECTION 6  
WEIGHT & BALANCE / EQUIPMENT LIST

CESSNA  
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ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
25-06-S	SEAT, FRONT PASSENGER, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., CLOTH COVER	0514211-3	34.5	40.8
25-07-O	SEAT, FRONT PASSENGER, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., VINYL COVER	0514211-4	35.0	40.8
25-08-O	SEAT, FRONT PASSENGER, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., LEATHER COVER	0514211-7	35.2	40.8
25-09-O	SEAT, FRONT PASSENGER, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., LEATHER/VINYL COVER	0514211-10	35.1	40.8
25-10-O	SEAT, FRONT PASSENGER, ADJUSTABLE WITH RECLINING BACK & VERTICAL ADJUST., MILLENNIUM COVER (WHEN AVAILABLE)	0514211-13		40.8
25-11-S	SEAT, 3RD & 4TH, ADJUSTABLE FORE & AFT WITH RECLINING BACK, CLOTH COVER	1214189-1	55.8	78.0
25-12-O	SEAT, 3RD & 4TH, ADJUSTABLE FORE & AFT WITH RECLINING BACK, VINYL COVER	1214189-2	56.8	78.0
25-13-O	SEAT, 3RD & 4TH, ADJUSTABLE FORE & AFT WITH RECLINING BACK, LEATHER COVER	1214189-3	57.2	78.0
25-14-O	SEAT, 3RD & 4TH, ADJUSTABLE FORE & AFT WITH RECLINING BACK, LEATHER/VINYL COVER	1214189-4	57.2	78.0
25-15-O	SEAT, 3RD & 4TH, ADJUSTABLE FORE & AFT WITH RECLINING BACK, MILLENNIUM COVER (WHEN AVAILABLE)	1214189-5		78.0
25-16-S	SEAT, REAR, BENCH WITH RECLINING BACK, CLOTH COVER	1214193-1	34.0	105.2
25-17-O	SEAT, REAR, BENCH WITH RECLINING BACK, VINYL COVER	1214193-2	35.3	105.2
25-18-O	SEAT, REAR, BENCH WITH RECLINING BACK, LEATHER COVER	1214193-3	35.3	105.2
25-19-O	SEAT, REAR, BENCH WITH RECLINING BACK, LEATHER/VINYL COVER	1214193-4	36.5	105.2
25-20-O	SEAT, REAR, BENCH WITH RECLINING BACK, MILLENNIUM COVER (WHEN AVAILABLE)	1214193-5		105.2
25-21-R	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, AUTO ADJUST, PILOT	504516-401	2.6	66.0
25-22-O	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, MANUAL ADJUST, PILOT	504851-401	2.0	66.0
25-23-R	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, AUTO ADJUST, FRONT PASSENGER	504516-401	2.6	66.0

Figure 6-11. Equipment List Description (Sheet 4)

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
25-24-O	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, MANUAL ADJUST, FRONT PASSENGER.	504851-401	2.0	66.0
25-25-S	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, AUTO ADJUST, 3RD & 4TH SEAT (EACH)	504516-405	5.2	90.0
25-26-O	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, MANUAL ADJUST, 3RD & 4TH SEAT (EACH)	504851-405	4.0	90.0
25-27-S	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, AUTO ADJUST REAR SEAT (EACH)	504516-403	5.2	110.0
25-28-O	SEAT BELT AND SHOULDER HARNESS, INERTIA REEL, MANUAL ADJUST REAR SEAT (EACH)	504851-403	4.0	110.0
25-29-S	SUN VISORS (SET OF 2)	0514166-1	1.2	33.0
25-30-O	SUN VISORS MILLENIUM (SET OF 2) (WHEN AVAILABLE)	0519004-3		
25-31-S	APPROACH PLATE HOLDER	0715083-2	0.1	22.0
25-32-S	BAGGAGE RETAINING NET	1215038-3	0.5	127.0
25-33-S	CARGO TIEDOWN RINGS (10 TIE DOWNS) (INSTALLED ARM SHOWN)	1201123-2	2.5	71.5
25-34-S	CARPET, WALL TO WALL	1215212-2	16.8	67.0
25-35-O	UTILITY FLOOR COVERING	1215213-1	13.4	67.0
25-36-O	UTILITY COVERED SIDEWALLS (NET CHG)	1215207-6	-7.0	64.0
25-37-R	PILOT'S OPERATING CHECKLIST (STOWED IN INSTRUMENT PANEL MAP CASE)	1200901	0.3	0.0
25-38-R	PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL (STOWED IN PILOT'S SEAT BACK)	1200901	1.6	49.5
25-39-S	FUEL SAMPLING CUP (STOWED IN PILOT'S SEAT BACK)	S2107-1	0.1	49.5
25-40-S	MOLDED HEADLINER INSTALLATION	1215211	14.9	64.5
25-41-S	TOWBAR, NOSE GEAR (STOWED)	0501019-1	1.7	127.0
25-42-S	EMERGENCY LOCATOR TRANSMITTER INSTL	3940428-1	3.1*	137.7*
	- ELT TRANSMITTER	3000-11	1.9	158.8
	- ANTENNA AND CABLE ASSY	3001-12,3002-12	0.3	171.7
	- WIRING AND MISC. HARDWARE		0.9	78.9
	<b>26 - FIRE PROTECTION</b>			
26-01-S	FIRE EXTINGUISHER INSTALLATION	0501011-7	5.3*	43.6*
	- FIRE EXTINGUISHER, HAND TYPE	A352GS	4.8	44.0
	- MOUNTING CLAMP & HARDWARE		0.5	40.0

Figure 6-11. Equipment List Description (Sheet 5)

SECTION 6  
WEIGHT & BALANCE / EQUIPMENT LIST

CESSNA  
MODEL T206H

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
<b>27 - FLIGHT CONTROLS</b>				
27-01-S	DUAL CONTROLS INSTL, RIGHT SEAT	1260004-14	6.9*	15.6*
	- CONTROL WHEEL, COPILOT	0760149-10	2.6	31.7
	- RUDDER & BRAKE PEDAL INSTL, COPILOT	0760149-7	4.3	5.9
27-02-O	RUDDER PEDAL EXTENSION INSTL. SET OF 2 (INSTALLED ARM SHOWN)	050182-1	2.9	8.0
<b>28 - FUEL</b>				
28-01-R	FUEL QUANTITY INDICATORS, LEFT & RIGHT	S3317-3	0.7	17.5
28-02-R	FUEL PUMP, AUXILIARY, ELECTRIC	A-10056-B	13.0	13.1
<b>30 - ICE &amp; RAIN PROTECTION</b>				
30-01-A	ELECTRIC HEATED BOOTS, PROPELLER (ANTI-ICE) (REQUIRES 24-03-O AND 24-05-O)	1201991-2	5.1	-43.0
30-02-S	HEATING SYSTEM, STALL SENSOR & PITOT HEAT (NET CHANGE)	1220804-5	0.7	28.0
<b>31 - INDICATING/RECORDING SYSTEM</b>				
31-01-S	INDICATOR CLOCK & OAT INDICATOR	AT43200	0.3	17.5
	OAT PROBE	CNP100-001	0.1	49.0
31-02-S	INDICATOR CLOCK & OAT INDICATOR	M803B-20/28V-B	0.3	17.5
	OAT PROBE	C307PRF-11	0.1	49.0
31-03-S	HOURMETER, "HOBBS TIME"	C664503-0103	0.5	9.0
31-04-R	ANNUNCIATOR PANEL	CSEWCA-01	0.3	19.0
31-05-R	STALL WARNING INDICATOR	0718007-1	0.5	36.0
<b>32 - LANDING GEAR</b>				
32-01-R	WHEEL BRAKE AND TIRE, 8.00 X 6 MAIN (2)	1241116-5, -6	39.6*	61.4*
	- WHEEL ASSY, CLEVELAND 40-75B (EA)	C163001-0301	7.8	62.1
	- BRAKE ASSY, CLEVELAND 30-52 (LH)	C163030-0303	2.8	57.8
	- BRAKE ASSY, CLEVELAND 30-52 (RH)	C163030-0304	2.8	57.8
	- TIRE, 6-PLY (EACH)	C262003-0204	7.9	62.1
	- TUBE (EACH)	C262023-0102	1.3	62.1
32-02-O	WHEEL BRAKE & TIRE 8.00 X 6 MAIN (2)	0540000-6	48.4*	61.5*
	- WHEEL ASSY, CLEVELAND 40-75D (EA)	040-07518-1	7.8	62.1
	- BRAKE ASSY, CLEVELAND 30-52N (LH)	C163030-0313	2.9	57.8
	- BRAKE ASSY, CLEVELAND 30-52N (RH)	C163030-0314	2.9	57.8
	- TIRE, 6-PLY (EACH)	C262003-0207	11.6	62.1
	- TUBE (EACH)	C262023-0104	1.9	62.1
32-03-R	WHEEL AND TIRE ASSY, 5.00 X 5 NOSE	0640000-2	8.8*	-7.7*
	- WHEEL ASSY, CLEVELAND 40-77	1241156-12	2.8	-7.7
	- TIRE, 6-PLY	C262003-0202	4.6	-7.7
	- TUBE	C262023-0101	1.4	-7.7
32-04-O	WHEEL AND TIRE ASSY, 8.00 X 6 NOSE	0540000-4	13.6*	-8.1*
	- WHEEL ASSY, CLEVELAND 40-77	1241156-43	3.9	-8.1
	- TIRE, 4-PLY	C262003-0101	7.9	-8.1

Figure 6-11. Equipment List Description (Sheet 6)



ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
	- TUBE	C262023-0102	1.3	-8.1
	- NOSE GEAR STRUT INSTL. OVERSIZE WHEEL (NET CHANGE)	1243615-16	0.5	-7.4
32-05-A	WHEEL FAIRING INSTALLATION - STANDARD TIRES	1241118-1	19.4*	44.8*
	- WHEEL FAIRING, MAIN (EACH)	0541223-24, -25	5.6	62.0
	- BRAKE FAIRING, MAIN (EACH)	1241113-1, -2	0.6	61.4
	- WHEEL FAIRING, NOSE	0543079-7	3.8	-5.2
	- MOUNTING PLATE, LH & RH	1241114-1, -2	0.9	61.6
32-06-A	WHEEL FAIRING INSTALLATION - OVERSIZE TIRES	1241231-4	25.3*	51.6*
	- WHEEL FAIRING, MAIN (EACH)	1241229-1, -2	8.0	62.0
	- BRAKE FAIRING, MAIN (EACH)	1241232-1, -2	0.8	61.4
	- WHEEL FAIRING, NOSE	1243045-12	4.7	-5.6
	- MOUNTING PLATE, LH & RH	1241661-1, -2	0.9	61.6
32-07-O	PREMIUM TIRES, 6.00 X 6 EXCHANGE WITH STANDARD TIRES (NET WT CHANGE)	0501166-1	4.1	46.4
32-08-S	HUB CAPS, WHEEL	0741048-8	0.1	62.1
	<b>33 - LIGHTS</b>			
33-01-S	MAP LIGHT IN CONTROL WHEEL	0760149-9	0.2	22.5
33-02-S	COURTESY LIGHTS UNDER WING	1201054-5	0.7	61.9
33-03-S	NAVIGATION LIGHT DETECTORS	1221201-3, -4	0.0	0.0
33-04-S	FLASHING BEACON ON VERTICAL FIN TIP	0701042-5	0.8	256.1
33-05-S	STROBE LIGHT INSTL. ON WING TIPS	0501027-6	3.2	47.0
33-06-S	LANDING AND TAXI LIGHT INSTL.	1221059-7, -8	2.2	33.0
	<b>34 - NAVIGATION</b>			
34-01-R	INDICATOR, TRUE AIRSPEED	S3325-7	0.9	17.0
34-02-S	ALTERNATE STATIC AIR SOURCE	1201121-3	0.2	15.4
34-03-R	ALTIMETER, 35,000 FT., SENSITIVE WITH 20 FT. MARKINGS, INCHES OF MERCURY	S3350-1	0.9	16.6
34-04-O	ALTIMETER, 35,000 FT., SENSITIVE WITH 20 FT. MARKINGS, MILLIBARS	S3372-1	0.9	16.5
34-05-S	BLIND ALTITUDE ENCODER INSTALLATION	3940413-3,-5	0.8	15.0
34-06-R	COMPASS INSTL., MAGNETIC	1213679-4	0.5	21.1
34-07-S	GYRO, INSTALLATION (REQUIRES 37-01-S)	1201990-1	6.7*	15.2*
	- DIRECTIONAL GYRO	S3330-2	2.8	15.8
	- ALTITUDE GYRO	S3326-1	2.1	15.9
	- HOSES AND MISC. HARDWARE	1201990-2	1.9	8.7
34-08-O	GYRO, INSTALLATION WITH HSI (REQUIRES 37-01-S)	1201997-2	19.5*	45.7*
	- ALTITUDE INDICATOR		2.1	15.9
	- AMMETER/VACUUM GAUGE		0.6	16.9
	- HOSES AND MISC. HARDWARE FOR GYROS		1.1	11.9
	- HSI & NAV INDICATOR		4.8	14.9

Figure 6-11. Equipment List Description (Sheet 7)

SECTION 6  
WEIGHT & BALANCE / EQUIPMENT LIST

CESSNA  
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ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.	
34-09-O	- HSI SLAVING AMPLIFIER		0.7	148.4	
	- HSI/NAV CONVERTER		2.0	159.4	
	- HSI FLUX DETECTOR (LH WING)		0.6	44.1	
	- WIRING & HARDWARE FOR HSI		7.8	41.2	
	HSI INSTALLATION (RQS 37-01-S)	3900044-5	11.7	91.4	
	- STANDARD GYROS REMOVED		-13.7	5.5	
	- NAV INDICATOR REMOVED		-1.2	16.4	
	- GYRO SYSTEM FOR HSI	1201997-2	11.1	4.7	
	- HSI & NAV INDICATOR		3.4	14.9	
	- HSI SLAVING AMPLIFIER	3940425-1	0.7	148.4	
34-10-S	- HSI FLUX DETECTOR (LH WING)	3940437-1	0.6	44.1	
	WIRE & HARDWARE FOR HSI		5.8	43.9	
	TURN COORDINATOR INDICATOR	1394T100-10RA	1.2	16.8	
	VERTICAL SPEED INDICATOR	S3327-1	0.8	16.5	
	34-12-A	ADF INSTALLATION	3900043-6	9.4*	89.2*
		- KR-87 RECEIVER	066-01072-0014	3.2	14.9
		- KI227 INDICATOR	066-03063-0000	0.7	17.9
		- KA-44B ADF ANTENNA	071-01234-0000	4.2	170.5
	34-13-S	- ADF CABLE ASSEMBLY	3922105-1	1.3	51.1
		GPS KLN 89 INSTALLATION	3930412-1	4.6*	16.7*
- KLN 89 GPS RECEIVER		066-01148-1111	3.3	14.9	
- KA-92 GPS ANTENNA		3960198-1	0.3	39.0	
34-14-O	- GPS CABLE ASSEMBLY & HARDWARE		1.0	16.8	
	GPS KLN 89B INSTALLATION	3930412-1	4.6*	16.7*	
	- KLN 89B GPS RECEIVER (EXCHANGE FOR KLN 89)	S3100-104	3.3	14.9	
	- MD-41 GPS CONTROL PANEL	MD41-228	0.2	18.0	
34-15-A	- KA-92 GPS ANTENNA	3960198-1	0.3	39.0	
	- GPS CABLE ASSEMBLY	3928103-1	1.0	16.6	
	GPS INSTALLATION	3900043-5	5.0*	17.7*	
	- KLN 04 GPS RECEIVER	066-01034-0101	3.7	14.8	
34-16-S	- KA-92 GPS ANTENNA	3960198-1	0.3	39.0	
	- GPS CABLE ASSEMBLY & HARDWARE		1.0	21.8	
	MODE C TRANSPONDER INSTALLATION	3930042-3	3.6*	28.6*	
	- KT 76C TRANSPONDER	066-01156-0101	2.4	14.3	
34-17-A	- TRANSPONDER ANTENNA	3960199-1	0.2	133.2	
	- HARDWARE AND CABLE ASSEMBLY	3923112-1	1.0	41.8	
	MULTI-FUNCTION DISPLAY INSTALLATION	3900043-5	8.1*	13.1*	
	- KMD 540 MFD	066-04035-0101	5.1	13.1	
34-18-A	- CABLE ASSY AND MOUNT HARDWARE	3927100-1	1.0	13.1	
	STORMSCOPE INSTALLATION	3900044-9	5.7*	130.1*	
	- WX 500 STORMSCOPE PROCESSOR	805-11500-001	1.9	158.0	
	- MOUNTING TRAY AND HARDWARE	805-11590-001	0.7	158.0	

Figure 6-11. Equipment List Description (Sheet 6)

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
<b>35 - OXYGEN</b>				
35-01-S	OXYGEN PARTIAL INSTALLATION	1200416-41	5.7	79.7
35-02-S	OXYGEN BOTTLE INSTALLATION	1200416-40	31.4*	163.7*
	- OXYGEN CYLINDER AND VALVE - EMPTY	C168001-0701	23.2	171.1
35-03-S	OXYGEN MASKS		1.4	67.2
	- PILOT	C166005-0609		
	- COPILOT AND PASSENGERS	C166005-0207		
35-04-S	OXYGEN, 76 CU. FT., (1800 PSI) @ 0.0832 LB./CU. FT.		6.3	171.1
<b>37 - VACUUM</b>				
37-01-S	DUAL VACUUM SYSTEM, ENGINE DRIVEN	1201990-1	7.1*	-4.2*
	- VACUUM PUMP, AIRBORNE 211CC	E211CC	1.9	-11.2
	- VACUUM PUMP, AIRBORNE 212CW	E212CW	1.9	-11.2
	- COOLING SHROUD, AIRBORNE 2CDH	2CDH-A	0.3	-11.2
	- VACUUM RELIEF VALVE	2H3-48	0.5	4.5
	- MANIFOLD	1H5-25	0.5	3.0
	- VACUUM GAUGE/AMMETER	S3280-1	0.6	16.9
<b>53 - FUSELAGE</b>				
53-01-S	REFUELING STEPS AND HANDLE INSTL.	1201168-1	2.1	13.6
53-02-S	STEPS, CABIN ENTRANCE, FIXED	1201020-1	1.0	88.0
53-03-O	JACK PAD INSTALLATION UNDER WING	10004-98	0.2	33.7
53-04-A	STABILIZER, ABRASION BOOTS	0500041-3	2.2	206.0
53-05-A	CARGO PACK, EXTERNAL BELLY MOUNTED	1200641-51	35.0	51.0
53-06-A	TOW HOOK INSTALLTION (INSTALLED ARM SHOWN)	0712643-1	0.5	231.0
53-07-S	DOORS, FORWARD AND AFT CARGO	1211670-19	22.2	90.4
53-08-A	SPOILER (REQUIRES REMOVAL OF 53-07-S) (INSTALLED ARM SHOWN)	1200197-1	1.0	67.3
53-09-A	SKY DIVING KIT, INCLUDES 53-09-A AVAILABLE THRU CESSNA SPARES	1201008	2.1	69.9
53-09-A	HEAVY DUTY FUSELAGE OPTION INSTALLATION (FLOATPLANE PROVISIONS)	12010019-1	3.6*	29.8*
	- HOISTING RINGS	1201142-2	1.4	54.1
	- U-BRACE ASSEMBLY	1242001-2	1.3	24.4
	- HEAVY DUTY FUSELAGE STRUCTURE	1210651-28	0.8	0.0
53-11-A	MORTUARY KIT AVAILABLE THRU CESSNA SPARES	1210059-1	84.9	91.2
53-12-A	AMBULANCE KIT (WITH OXYGEN BOTTLE) AVAILABLE THRU CESSNA SPARES	1210080-21	68-1	76.0
53-13-A	STRETCHER (BOXED) USE ACTUAL WT. & ARM	0700164-5	—	—
53-14-A	PHOTOGRAPHIC PROVISIONS INSTL.	1201107-35	9.5	77.0

Figure 6-11. Equipment List Description (Sheet 9)

SECTION 6  
WEIGHT & BALANCE / EQUIPMENT LIST

CESSNA  
MODEL T206H

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
<b>56 - WINDOWS</b>				
56-01-S	WINDOW, HINGED RIGHT SIDE (NET CHANGE)	0711050-48	2.3	48.0
56-02-S	WINDOW, HINGED LEFT DOOR (NET CHANGE)	0711050-47	2.3	48.0
<b>61 - PROPELLER</b>				
61-01-R	PROPELLER ASSY, 3-BLADE, OIL FILLED HUB AND SWEEP TIPS	P4327345-02	76.0	-44.0
61-02-R	SPINNER INSTALLATION 3-BLADE PROP	1250987-2	3.5	-44.5
61-03-O	POLISHED SPINNER - MILLENNIUM INSTL. (WHEN AVAILABLE) (NET CHANGE)	1251019-1	0.0	-44.5
61-04-R	GOVERNOR, PROPELLER	C161031-120	3.0	-33.5
<b>71 - POWERPLANT</b>				
71-01-R	FILTER, INDUCTION AIR	P197268	0.8	-27.0
<b>72 - ENGINES</b>				
72-01-R	ENGINE, LYCOMING TIO-540-AJ1A9734 (INCLUDES TURBO & EXHAUST SYSTEM)	1250983	509.0	-17.5
72-02-O	MILLENNIUM ENGINE, LYCOMING TIO-540-AJ1A9921 (WHEN AVAILABLE) (EXCHANGE WITH 72-01-R, NET CHANGE)	1251021-1	0.0	-17.5
<b>73 - ENGINE FUEL &amp; CONTROL</b>				
73-01-R	FUEL FLOW/MANIFOLD PRESSURE	S3374-1	0.7	17.5
73-02-R	T.I.T./CYLINDER HEAD TEMP INDICATOR	S3318-2	0.6	17.5
73-03-S	ANNUNCIATOR PANEL	3930412-1	0.3	18.2
73-04-R	FUEL QUANTITY INDICATOR, LEFT & RIGHT	S3317-3	0.6	17.5
<b>77 - ENGINE INDICATING</b>				
77-01-R	TACHOMETER INSTALLATION, RECORDING	S3329-7	1.0	17.5
77-02-S	TURBINE INLET TEMP/CHT INDICATOR	S3318-4	0.6	17.5
<b>78 - EXHAUST</b>				
78-01-R	EXHAUST OVERBOARD STACK	1250992	3.5*	-5.0*
78-02-R	EXHAUST STACK RETAINING CABLE ASSY	1250998-1	0.2	-9.0
	- LH EXHAUST SYSTEM	2254030-1	10.9	-14.6
	- RH EXHAUST SYSTEM	2254030-2	6.6	-10.4
<b>79 - OIL</b>				
79-01-R	OIL COOLER INSTALLATION, STEWART WARNER 10865B	1256026-1	5.5	-18.0
79-02-R	OIL PRESSURE & TEMPERATURE INDICATORS	S3279-1	0.8	18.8

Figure 6-11. Equipment List Description (Sheet 10)

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
<b>99 - MISCELLANEOUS</b>				
90-01-A	FLOAT INSTALLATION INFORMATION (CESSNA PROVIDES 53-10-A ONLY). THE FOLLOWING IS PROVIDED FOR YOUR CONVENIENCE AND FOR REFERENCE USE ONLY			
	- STINGER, FLOATPLANE NET CHANGE	1212800-7	0.5	270.0
	- VERTICAL FIN NET DECREASE	1231065	-0.4	230.0
	- RUDDER & FLASHING BEACON (NET CHANGE)	1231034	5.0	263.5
	- TAIL DUAL TIEDOWN RINGS	1242013	0.1	229.6
	- COWL FLAP, EXTENDED LENGTH	1213624	0.6	-4.9
	- EXHAUST PIPE EXTENSIONS	1242013	1.2	2.0
	- STEERING BUNGEE, FLOATPLANE	1260644	3.1	-9.0
	- VERTICAL FIN	1233000	4.5	213.9
	- WATER RUDDER BELLCRANKS (EACH)	1242004	1.3	-4.3
	- NOSE GEAR COVER PLATE	1242012	0.3	0.0
90-02-A	LANDING GEAR DELETION (APPROX.)		149.5*	53.5*
	- NOSE GEAR, FORK & TIRE ASSY	1280100-4	43-2	-4.5
	- MAIN GEAR SPRING & WHEEL ASSEMBLY (PER SIDE)		53-2	62.7
90-03-A	MILLENNIUM EQUIPMENT OPTION	1201300-3, -4		
	- 25-30-O SUNVISOR INSTL.	0519004-3		
	- MILLENNIUM EXTERIOR STYLING (NET CHANGE)	1204055-3, -4	0.0	90.8
	- MILLENNIUM UPHOLSTERY OPTION	1219004-1		
	25-XX-O LEATHER/MYNYL SEATS			
	- SIDEWALL UPHOLSTERY INSERTS	1219007-1		
	- MILLENNIUM FLOOR MATS	1219004-1		
	- JEPP STORAGE CONSOLE INSTL.	1219004-2		
	- POLISHED SPINNER INSTL. (61-03-O) (NET CHANGE)	1251019-1	0.0	-44.5
	- ENGINE INSTALLATION (72-02-O)	1251021-1	0.0	-17.5
	- POLISHED FASTENER INSTL.	1252828-1	0.0	
	- MILLENNIUM CONTROL WHEEL PAD	1219012-1		
<b>98 - AVIONICS PACKAGE OPTIONS</b>				
98-01-S	STANDARD AVIONICS PACKAGE	3900013-1, -2	46.7*	42.4*
	- 23-02-S BASIC AVIONICS (REQUIRED WITH FIRST NAV/COM)		7.4	33.0
	- 23-07-S NAV/COM WITH ILS FIRST UNIT		6.6	44.8
	- 23-04-S AUDIO PANEL/MARKER BEACON		3.5	66.6
	- 22-01-S SINGLE AXIS AUTOPILOT		8.0	36.7
	- 23-05-S NAV/COM VOR/LOC 2ND UNIT	3900013	6.2	22.9
	- 25-22-R ELT INSTL.	3900013	3.2	135.9

Figure 6-11. Equipment List Description (Sheet 11)

SECTION 8  
WEIGHT & BALANCE / EQUIPMENT LIST

CESSNA  
MODEL T206H

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF DRAWING	WT LBS	ARM INS.
98-02-S	- 34-10-S GPS KLN 89 INSTL	3900013	4.6	16.7
	- 34-12-S MODE "C" TRANSPONDER	3900013	3.3	28.6
	STANDARD AVIONICS PACKAGE	3900042-3	46.3*	76.2*
	- 22-01-S DUAL AXIS AUTOPILOT		20.5	103.0
	- 23-02 BASIC AVIONICS INSTALLATION		4.0	24.7
	- AUDIO PNL/MKR BEACON		6.7	55.9
	- NAV/COM WGS		8.4	49.1
	- ELT		3.1	137.7
	- MODE "C" TRANSPONDER		3.6	28.3
	98-03-A	AVIONICS NAV 1 PACKAGE (NET CHANGE OVER THE STANDARD AVIONICS PKG)	3900020	18.4*
98-03-A	- 22-02-O TWO AXIS AUTOPILOT		17.0	133.1
	- 34-12-A ADF INSTALLATION	3900020	9.4	82.7
	- 22-01-S SINGLE AXIS AUTOPILOT REMOVAL		-8.0	36.7
98-04-A	AVIONICS NAV 1 PACKAGE (NET CHANGE OVER THE STANDARD AVIONICS PKG)	3900043-5	26.2*	39.7*
98-04-A	- 23-05-A NAV/COM #2 INSTALLATION		6.8	19.7
	- 34-14-A GPS INSTALLATION		5.0	17.7
	- 34-17-A MFD INSTALLATION		6.1	15.1
98-05-A	AVIONICS NAV 1 PACKAGE (NET CHANGE OVER THE STANDARD AVIONICS PKG)	3900043-5	26.2*	39.7*
98-05-A	- 23-08-A NAV/COM #2 INSTALLATION		6.8	19.7
	- 34-14-A GPS INSTALLATION		5.0	17.7
	- 34-12-A ADF INSTALLATION		6.1	15.1
	- KMH-880 MHAS PROVISIONS & HWARE	3927106	8.1	89.9
	- KR-510 FIS PROVISIONS		0.1	15.0
98-06-A	NAV 1 PACKAGE WITH HSI (REPLACING STANDARD DIRECTIONAL GYRO & NAV INDICATOR)		30.0*	117.2*
98-06-A	- 34-09-O HSI SYSTEM ADDED		19.5	45.7
	- 34-06-S STANDARD GYROS REMOVED		-6.7	15.2
	- 23-04-S NAV ILS INDICATOR REMOVED		-1.2	16.4
	- 98-03-A NAV 1 PACKAGE ADDED		18.4	149.3
98-07-A	NAV I PACKAGE WITH ADF	3900043-6	35.6	52.8
98-07-A	- 98-04-A NAV I AVIONICS		26.2	39.7
	- 34-12-A ADF INSTALLATION		9.4	89.2
	NAV II AVIONICS PACKAGE	3900044-9	44.4	65.3
98-08-A	- 98-04-A NAV I AVIONICS		26.2	39.7
	- 34-09-O HSI INSTALLATION		11.7	91.4
	- 34-18-A STORMSCOPE INSTALLATION		6.5	121.5
98-09-A	NAV II AVIONICS PACKAGE WITH ADF	3900044-10	53.8	69.
98-09-A	- 98-04-A NAV II AVIONICS		44.4	65.3
	- 34-12-A ADF INSTALLATION		9.4	89.2

Figure 6-11. Equipment List Description (Sheet 12)

## SECTION 7 AIRPLANE & SYSTEMS DESCRIPTION

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## INTRODUCTION

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

## AIRFRAME

The airplane is an all metal, six-place, high wing, single engine airplane equipped with tricycle landing gear and is designed for general utility purposes.

The construction of the fuselage is of conventional aluminum bulkhead, stringer and skin design commonly known as "semi-monocoque". Major components of the structure include the front and rear carry-thru spars (to which the wings attach); these form the top element of the forward and aft doorpost bulkhead assemblies. The lower member of the forward doorpost bulkhead assembly is below the cabin floor and provides the fuselage attachment for the wing struts. The lower member of the aft doorpost bulkhead assembly is also below the floor and serves as the forward web of the landing gear carry-thru structure. The main landing gear attaches to the fuselage on each side at an inner and outer forged bulkhead that attaches at the front to the lower member of the aft doorpost bulkhead and at the rear to another transverse bulkhead below the floorboard. The engine mount structure is supported by a keel beam assembly that also supports the lower cowling, passes aft through the firewall into the cabin below the floorboard and attaches to the lower member of the forward doorpost bulkhead assembly. The keel beam assembly also provides the attachments for the nose landing gear.

The externally braced wings, containing integral fuel tanks, are constructed of a front and rear spar with formed sheet metal ribs, doublers, and stringers. The entire structure is covered with aluminum skin. The front spars are equipped with wing-to-fuselage and wing-to-strut attach fittings. The aft spars are equipped with wing-to-fuselage attach fittings, and are partial span spars.

Frise-type ailerons and single-slot type flaps are attached to the trailing edge of the wings. The ailerons are constructed of a forward spar, formed sheet metal ribs, a "V" type corrugated aluminum skin joined together at the trailing edge, and a formed leading edge containing balance weights. The flaps are constructed basically the same as the ailerons, with the exception of the balance weights, aft spars and the addition of a trailing edge stiffener.

The empennage (tail assembly) consists of a conventional vertical stabilizer, rudder, horizontal stabilizer, and elevator. The vertical stabilizer consists of forward and aft spar, formed sheet metal ribs and reinforcements, four skin panels, formed leading edge skins and a dorsal fin.

The rudder is constructed of a forward and aft spar, formed sheet metal ribs and reinforcements, and a wrap-around skin panel. The top of the rudder incorporates a leading edge extension which contains a balance weight.

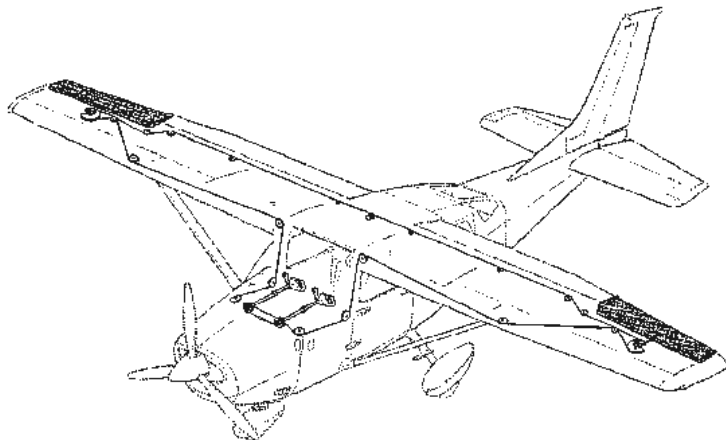
The horizontal stabilizer is constructed of a forward and aft spar, ribs and stiffeners, center upper and lower skin panels, and two left and two right wrap-around skin panels which also form the leading edges. The horizontal stabilizer also contains the elevator trim tab actuator.

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

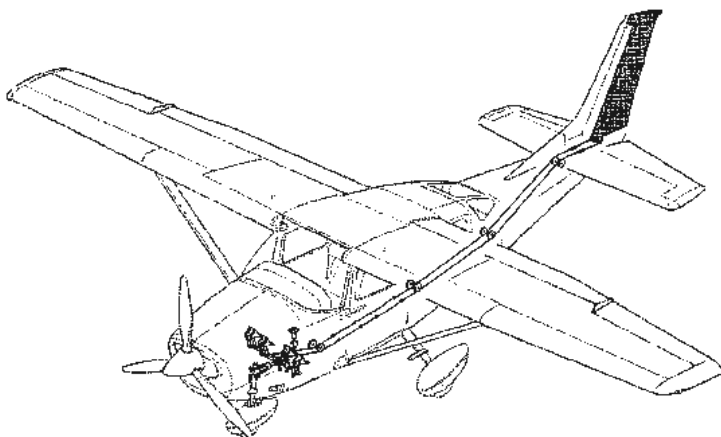
## FLIGHT CONTROLS

The airplane's flight control system (Refer to Figure 7-1) consists of conventional aileron, elevator and rudder control surfaces. The control surfaces are manually operated through mechanical linkage using a control wheel for the ailerons and elevator, and rudder/brake pedals for the rudder. The elevator control system is equipped with downsprings which provide improved stability in flight.

**AILERON CONTROL SYSTEM**



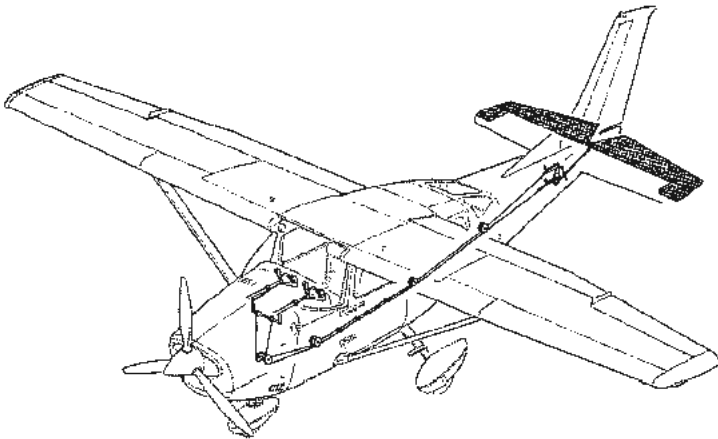
**RUDDER AND RUDDER TRIM CONTROL SYSTEMS**



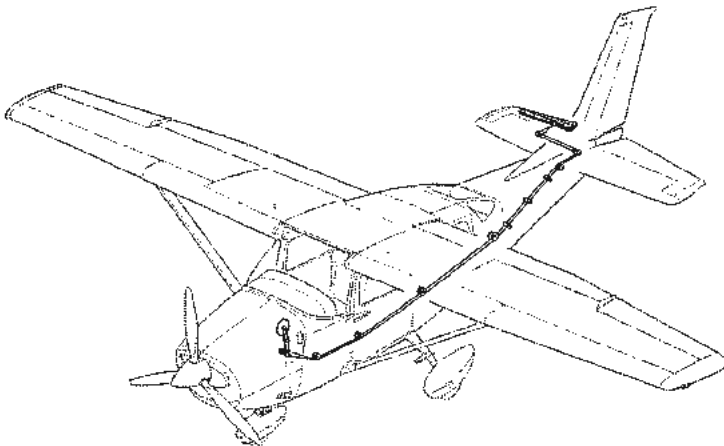
1285X1008  
1285X1009

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

**ELEVATOR CONTROL SYSTEM**



**ELEVATOR TRIM CONTROL SYSTEM**



1285x1006  
1285x1007

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

## TRIM SYSTEMS

A manually-operated rudder and elevator trim is provided (refer to Figure 7-1). Rudder trimming is accomplished through a bungee unit connected to the rudder control system and a trim control wheel mounted on the control pedestal. Rudder trimming is accomplished by rotating the horizontally mounted trim control wheel either left or right to the desired trim position. Rotating the trim wheel to the right, will trim nose-right; conversely, rotating it to the left will trim nose-left. Elevator trimming is accomplished through the elevator trim tab by utilizing the vertically mounted trim control wheel. Forward rotation of the trim wheel will trim nose-down, conversely, aft rotation will trim nose-up.

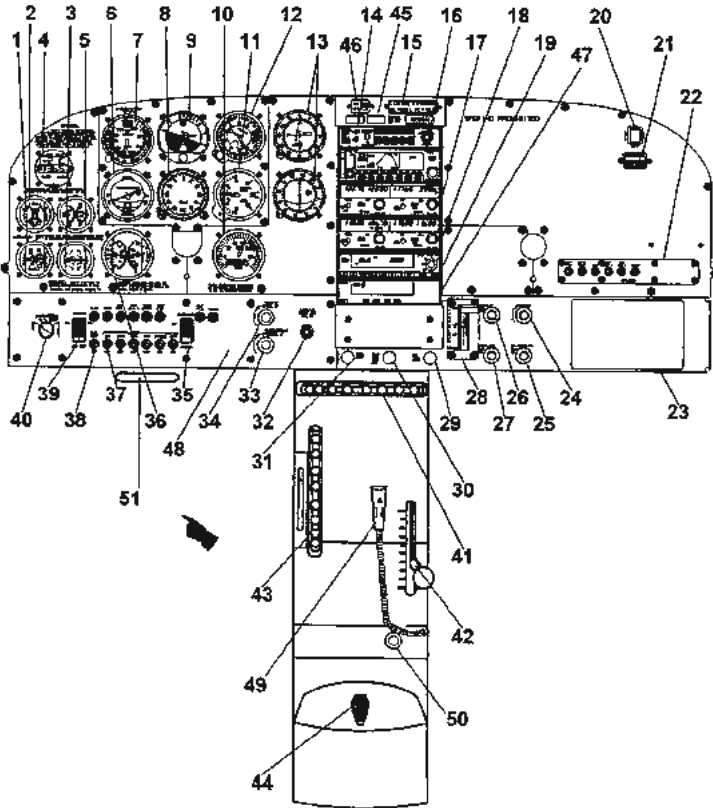
## INSTRUMENT PANEL

The instrument panel (Refer to Figure 7-2) is of all-metal construction, and is designed in segments to allow related groups of instruments, switches and controls to be removed without removing the entire panel. For specific details concerning the instruments, switches, circuit breakers, and controls on the instrument panel, refer to related topics in this section.

## PILOT PANEL LAYOUT

Flight instruments are contained in a single panel located in front of the pilot. These instruments are designed around the basic "T" configuration. The gyros are located immediately in front of the pilot, and arranged vertically over the control column. The airspeed indicator and altimeter are located to the left and right of the gyros, respectively. The remainder of the flight instruments are clustered around the basic "T".

Below the flight instruments is a sub panel which contains the engine tachometer and the manifold pressure/fuel flow gauge. Various navigational instruments are located to the right. To the left of the flight instruments is a sub panel which contains a left/right fuel quantity indicator unit, an oil temperature/oil pressure indicator, a vacuum gauge/ammeter, a T.I.T./CHT indicator, a clock/OAT indicator and the avionics circuit breaker panel.



1218T1012

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

- |   |   |
|---|---|
| 1. Oil Temperature and Oil Pressure Indicator                 | 26. Cabin Heat Control                            |
| 2. Fuel Quantity Indicators                                   | 27. Cabin Air Control                             |
| 3. Vacuum Gauge/Ammeter                                       | 28. Flap Switch Lever and Flap Position Indicator |
| 4. Digital Clock/O.A.T. Indicator                             | 29. Mixture Control                               |
| 5. T.I.T. and CHT Indicator                                   | 30. Propeller Control                             |
| 6. Turn Coordinator   | 31. Throttle Control                              |
| 7. Airspeed Indicator   | 32. Alternate Static Air Control                  |
| 8. Heading Indicator  | 33. Glareshield and Pedestal Dimming Control      |
| 9. Attitude Indicator   | 34. Radio and Panel Dimming Control               |
| 10. Tachometer  | 35. Avionics Master Switch                        |
| 11. Vertical Speed Indicator                                  | 36. Manifold Pressure/Fuel Flow Indicator         |
| 12. Altimeter   | 37. Circuit Breakers and Switch/Breakers          |
| 13. Nav #1/Nav #2 Course Deviation and Glide Slope Indicators | 38. Auxiliary Fuel Pump Switch                    |
| 14. Audio Control Panel                                       | 39. Master Switch                                 |
| 15. Annunciator Panel   | 40. Ignition Switch                               |
| 16. GPS Receiver  | 41. Rudder Trim                                   |
| 17. Nav/Com Radio #1  | 42. Cowl Flap Control Lever                       |
| 18. Nav/Com Radio #2  | 43. Elevator Trim Control                         |
| 19. Transponder   | 44. Fuel Selector                                 |
| 20. ELT Remote Switch/Annunciator                             | 45. Optional Prop De-ice Annunciator              |
| 21. Hour Meter  | 46. NAV/GPS Selector                              |
| 22. Avionics Circuit Breaker Panel                            | 47. Autopilot Computer                            |
| 23. Glove Box   | 48. Optional Prop De-ice Switch                   |
| 24. Cabin Defrost   | 49. Hand Mic.                                     |
| 25. Auxiliary Cabin Air Control                               | 50. 12-Volt Power Port                            |
|   | 51. Parking Brake                                 |

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



Below the flight and engine instruments are the circuit breakers and switches for most of the airplane systems and equipment. The master switch, avionics master switch, ignition switch, and lighting controls are located in this area of the panel. The parking brake control is mounted below the switch and circuit breaker panel.

### **CENTER PANEL LAYOUT**

The center panel contains various avionics equipment arranged in a vertical rack. This arrangement allows each component to be removed without having to access the backside of the panel. Below the panel are the throttle, propeller, mixture and alternate static air controls.

A multi-function annunciator is located above the radio stack and provides caution and warning messages for low fuel quantity, low oil pressure, low vacuum, low voltage and autopilot pitch trim situations.

### **COPILOT PANEL LAYOUT**

The copilot panel contains the hour meter, ELT switch, avionics equipment, avionics circuit breakers and room for expansion of indicators and other avionics equipment. Below this sub panel are the glove box, cabin heat, defroster and cabin air controls, and wing flap lever.

### **CENTER PEDESTAL LAYOUT**

The center pedestal, located below the center panel, contains the elevator and rudder trim control wheels and position indicators, and provides a bracket for the microphone. The fuel selector valve handle is located at the base of the pedestal.

## GROUND CONTROL

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

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

The minimum turning radius of the airplane, using differential braking and nose wheel steering during taxi, is approximately 27 feet. To obtain a minimum radius turn during ground handling, the airplane may be rotated around either main landing gear by pressing down on a tailcone bulkhead just forward of the horizontal stabilizer to raise the nose wheel off the ground. Care should be exercised to ensure that pressure is exerted only on the bulkhead area and not on skin between the bulkheads. Pressing down on the horizontal stabilizer to raise the nose wheel off the ground is not recommended.

## WING FLAP SYSTEM

The single slot-type wing flaps (Refer to Figure 7-3), are extended or retracted by positioning the wing flap switch lever on the instrument panel to the desired flap deflection position. The switch lever is moved up or down in a slotted panel that provides mechanical stops at the 10°, 20°, and FULL (40°) positions. To change flap setting, the flap lever is moved to the right to clear mechanical stops at the 10° and 20° positions. A scale and pointer to the left of the flap switch indicates flap travel in degrees. The wing flap system circuit is protected by a 10-ampere circuit breaker, labeled FLAP, on the left side of the control panel.

### NOTE

A flap interrupt switch, on the upper sill of the forward cargo door opening, will stop flap operation regardless of flap position anytime the forward cargo door is unlatched. The switch is intended to prevent lowering the flaps into the cargo door when it is open.

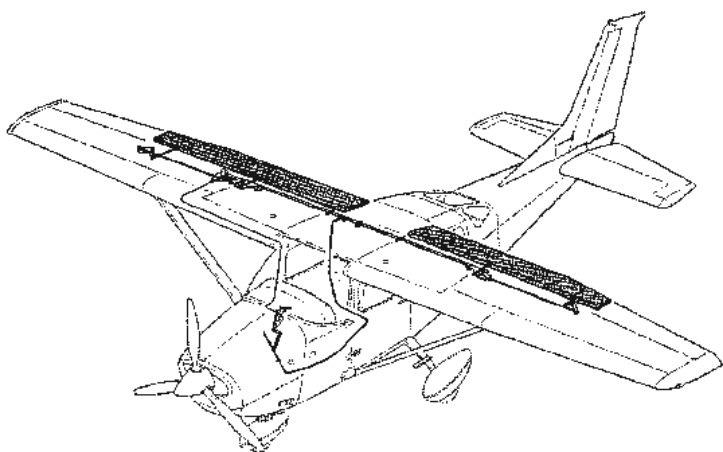


Figure 7-3. Wing Flap System

## LANDING GEAR SYSTEM

The landing gear is of the tricycle type, with a steerable nose wheel and two main wheels. Wheel and main gear brake fairings are standard for both the main and nose wheels. Shock absorption is provided by the leaf spring steel main landing gear struts and the air/oil nose gear shock strut. Each main gear wheel is equipped with a hydraulically-actuated disc-type brake on the inboard side of each wheel. Oversized wheels are available to facilitate operations from unimproved runways.

## BAGGAGE COMPARTMENT

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

## SEATS

The airplane is equipped with the conventional style six seat arrangement. Conventional seating consists of four separate forward facing seats and the rear seat which is a fixed one-piece seat bottom and a three-position, reclining back.

Seats used for the pilot and front seat passenger are adjustable fore and aft, and up and down. Additionally, the angle of the seat back is infinitely adjustable.

Seats used for the 3rd. and 4th. seat passenger are adjustable fore and aft. Additionally, the angle of the seat back is infinitely adjustable.

Fore and aft adjustment is made using the handle located below the center of the seat frame. To position the seat, lift handle, slide the seat into position, release the handle and check that the seat is locked in place. To adjust the height of the seat, rotate the large crank under the right hand corner of the seat until a comfortable height is obtained. To adjust the seat back angle, pull up on the release button, position the seat back to the desired angle, and release the button. When the seat is not occupied, the seat back will automatically fold forward whenever the release button is pulled up.

The rear passenger seat consists of fixed, one piece seat bottom and a three position, recycling back. The recycling back is adjusted by a lever located below the center of the seat frame. To adjust the seat back, raise the lever, position the seat back to the desired angle, release the lever and check that the back is locked in place.

Headrests are installed on both the front and rear seats. To adjust the headrest, apply enough pressure to it to raise or lower it to the desired level.

## **INTEGRATED SEAT BELT/SHOULDER HARNESS**

All seat positions are equipped with integrated seat belts/shoulder harness assemblies (Refer to Figure 7-4). The design incorporates an overhead inertia reel for the shoulder portion, and a retractor assembly for the lap portion of the belt. This design allows for complete freedom of movement of the upper torso area while providing restraint in the lap belt area. In the event of a sudden deceleration, reels lock up to provide positive restraint for the user.

In the front and center seats, the inertia reels are located on the centerline of the roof area. In the rear seats, the inertia reels are located outboard of each passenger in the roof area.

To use the integrated seat belt/shoulder harness, grasp the link with one hand, and, in a single motion, extend the assembly and insert into the buckle. Positive locking has occurred when a distinctive "snap" sound is heard.

## LANDING GEAR SYSTEM

The landing gear is of the tricycle type, with a steerable nose wheel and two main wheels. Wheel and main gear brake fairings are standard for both the main and nose wheels. Shock absorption is provided by the leaf spring steel main landing gear struts and the air/oil nose gear shock strut. Each main gear wheel is equipped with a hydraulically-actuated disc-type brake on the inboard side of each wheel. Oversized wheels are available to facilitate operations from unimproved runways.

## BAGGAGE COMPARTMENT

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

## SEATS

The airplane is equipped with the conventional style six seat arrangement. Conventional seating consists of four separate forward facing seats and the rear seat which is a fixed one-piece seat bottom and a three-position, reclining back.

Seats used for the pilot and front seat passenger are adjustable fore and aft, and up and down. Additionally, the angle of the seat back is infinitely adjustable.

Seats used for the 3rd. and 4th. seat passenger are adjustable fore and aft. Additionally, the angle of the seat back is infinitely adjustable.

Fore and aft adjustment is made using the handle located below the center of the seat frame. To position the seat, lift handle, slide the seat into position, release the handle and check that the seat is locked in place. To adjust the height of the seat, rotate the large crank under the right hand corner of the seat until a comfortable height is obtained. To adjust the seat back angle, pull up on the release button, position the seat back to the desired angle, and release the button. When the seat is not occupied, the seat back will automatically fold forward whenever the release button is pulled up

The rear passenger seat consists of fixed, one piece seat bottom and a three position, recycling back. The recycling back is adjusted by a lever located below the center of the seat frame. To adjust the seat back, raise the lever, position the seat back to the desired angle, release the lever and check that the back is locked in place.

Headrests are installed on both the front and rear seats. To adjust the headrest, apply enough pressure to it to raise or lower it to the desired level.

## **INTEGRATED SEAT BELT/SHOULDER HARNESS**

All seat positions are equipped with integrated seat belts/shoulder harness assemblies (Refer to Figure 7-4). The design incorporates an overhead inertia reel for the shoulder portion, and a retractor assembly for the lap portion of the belt. This design allows for complete freedom of movement of the upper torso area while providing restraint in the lap belt area. In the event of a sudden deceleration, reels lock up to provide positive restraint for the user.

In the front and center seats, the inertia reels are located on the centerline of the roof area. In the rear seats, the inertia reels are located outboard of each passenger in the roof area.

To use the integrated seat belt/shoulder harness, grasp the link with one hand, and, in a single motion, extend the assembly and insert into the buckle. Positive locking has occurred when a distinctive "snap" sound is heard.

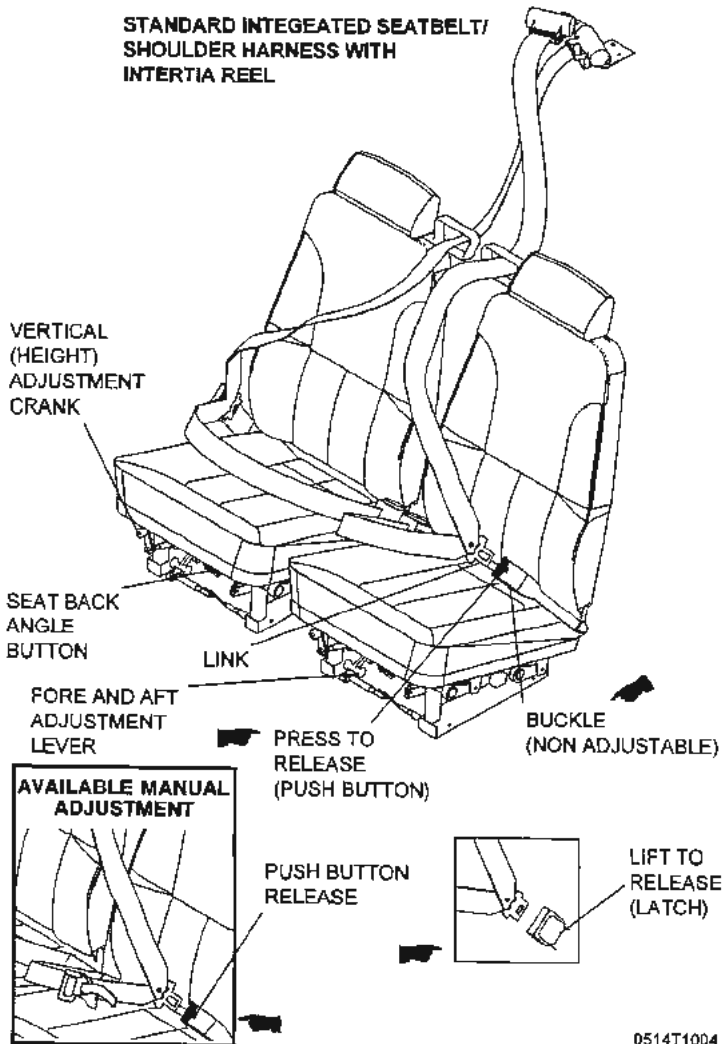


Figure 7-4. Crew Seats, Seat Belts and Shoulder Harnesses



Proper locking of the lap belt can be verified by ensuring that the belts are allowed to retract into the retractors and the lap belt is snug and low on the waist as worn normally during flight. No more than one additional inch of belt should be able to be pulled out of the retractor once the lap belt is in place on the occupant. If more than one additional inch of belt can be pulled out of the retractor, the occupant is too small for the installed restraint system and the seat should not be occupied until the occupant is properly restrained.

Removal is accomplished by lifting the release mechanism on the buckle or by pressing the release button on the buckle and pulling out and up on the harness. Spring tension on the inertia reel will automatically stow the harness.

A manually adjustable seat belt/shoulder harness assembly is available for all seats.

To use the manually adjustable seat belt/shoulder harness, fasten and adjust the seat belt/shoulder harness first. Lengthen the seat belt as required by pulling on the release strap on the belt. Snap the connecting link firmly into the buckle, then adjust to length. A properly adjusted harness will permit the occupant to lean forward enough to sit erect, but prevent excessive forward movement and contact with objects during sudden deceleration. Also, the pilot must have the freedom to reach all controls easily.

Disconnecting the manually adjustable seat belt/shoulder harness is accomplished by pushing the button on the buckle to release the connecting link.

## **ENTRANCE DOORS AND CABIN WINDOWS**

Entry to, and exit from the airplane is accomplished through an entry door on the left side of the cabin at the pilot's seat position and through double cargo doors on the right side of the cabin at the center and rear seat passenger's positions (refer to Section 6 for cabin and cabin door dimensions). The left entry door incorporates a recessed exterior door handle, a conventional interior door handle, a key-operated door lock, and a door stop mechanism and the openable window.

The left door is equipped with an openable window which is held in the closed position by a detent equipped latch on the lower edge of the window frame. To open the window, rotate the latch upward. The window utilizes a spring-loaded retaining arm which will help rotate the window outward and hold it there. An openable window is also installed for the right front passenger's seat position, and functions in the same manner as the window in the entry door. If required, either window may be opened at any speed up to 162 KIAS. All other cabin windows are fixed and cannot be opened.

**NOTE**

The door latch design on this model requires that the outside door handle on the pilot's door be extended out whenever the doors are open. When closing the door, do not attempt to push the door handle in until the door is fully shut.

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

**NOTE**

Accidental opening of the cabin door in flight due to improper closing does not constitute a need to land the airplane. The best procedure is to set up the airplane in a trimmed condition at approximately 90 KIAS, momentarily shove the door outward slightly, and forcefully close and lock the door.

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

**NOTE**

If the forward cargo door should come unlatched and open slightly in flight, it is suggested that a landing be made at a suitable airport to close and latch the door, unless a passenger is available to close it. It cannot be reached by the pilot. The wing flaps will not operate with the cargo door open, even slightly, and the landing should be planned accordingly.

**NOTE**

A flap interrupt switch, on the upper sill of the forward cargo door opening, will stop flap operation regardless of flap position any time the forward cargo door is unlatched. The switch is intended to prevent lowering the flaps into the cargo door when it is open.

Although with flaps extended, the forward cargo door can only be opened approximately four inches, the aft cargo door will still open fully, if required, once the forward door is unlatched.

If necessary, the outside door handle can be used to latch the forward cargo door. Simply lift the handle out of its recess and grasp the vertical tab of the connecting link behind the handle. Pull the tab outboard until the connecting link engages a detent at its aft end. Push the handle back into its recess while observing the inside handle rotating toward the locked position through the cargo door window. The inside handle must be rotated into the LOCK position from inside the airplane.

 CAUTION

**IF THE CARGO DOOR IS CLOSED FROM THE OUTSIDE WITH PASSENGERS OCCUPYING THE MIDDLE OR REAR SEAT ROWS, THE INSIDE DOOR HANDLE MUST BE ROTATED FULLY FORWARD TO DISENGAGE THE OUTSIDE CLOSING MECHANISM AND ALLOW THE DOOR TO BE OPENED FROM THE INSIDE.**

The left entry door and the forward cargo door have key-operated locks which may be used to secure the aircraft during parking.

**NOTE**

Since the key-operated outside lock engages the door handle only, the forward cargo door cannot be secured for flight using only the key lock.

For airplane serial numbers T20608438 and On, the forward cargo door uses an external handle that rotates to open or close and latch the door. The new exterior door handle eliminates the keyed-lock for locking the cargo door from the exterior of the airplane. The cargo door is now locked using a locking pin inserted into the forward cargo door operating mechanism from inside the cabin. The cargo door locking pin must be removed and stowed before takeoff.

## CONTROL LOCKS

A control lock is provided to lock the aileron and elevator control surfaces to prevent damage to these systems by wind buffeting while the airplane is parked. The lock consists of a shaped steel rod and flag. The flag identifies the control lock and cautions about its removal before starting the engine. To install the control lock, align the hole on the side of the pilot's control wheel shaft with the hole on the side of the shaft collar on the instrument panel and insert the rod into the aligned holes. Installation of the lock will secure the ailerons in a neutral position and the elevators in a slightly trailing edge down position. Proper installation of the lock will place the flag over the ignition switch. In areas where high or gusty winds occur, a control surface lock should be installed over the vertical stabilizer and rudder. The control lock and any other type of locking device should be removed prior to starting the engine.

## ENGINE

The airplane is powered by a horizontally opposed, six-cylinder, overhead valve, turbocharged, air-cooled, fuel-injected engine with a wet sump lubrication system. The engine is the Lycoming Model TIO-540-AJ1A and is rated at 310 horsepower at 2500 RPM and 39 inches of manifold pressure. Major accessories include a propeller governor on the front of the engine, starter, a belt driven alternator mounted on the front of the engine, dual magnetos on the rear of the engine, dual vacuum pumps, and a full flow oil filter mounted on the rear of the engine accessory case.

Other major accessories include a turbocharger connected to the induction air and exhaust systems, and associated components.

## ENGINE CONTROLS

Engine manifold pressure is set using the throttle control, a smooth black knob, which is located at the center of the instrument panel below the radios. The throttle control is configured so that the throttle is open in the forward position, and closed in the full aft position. A friction lock is located at the base of the throttle control shaft and is operated by rotating the knurled disk clockwise to increase friction or counterclockwise to decrease it.

Engine speed is controlled by the propeller control. The propeller control is a fluted, blue knob located immediately to the right of the throttle control. This system is described under "Propeller" in this section.

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

### ENGINE INSTRUMENTS

Engine operation is monitored by the following instruments: oil temperature/oil pressure indicator, turbine inlet temperature (T.I.T.)/cylinder head temperature indicator, manifold pressure gauge/fuel flow indicator, and tachometer.

Oil pressure signals are generated from a pressure transducer. An oil pressure line is routed from the upper front of the engine case to the rear engine baffle. At the baffle, the oil pressure line is connected to the transducer. This transducer produces an electrical signal which translates into a pressure reading at the indicator.

In addition, a separate low oil pressure indication is provided through the panel annunciator. This annunciator is wired to a pressure switch located on the rear of the engine accessory case. When oil pressure is below 20 PSI, the switch grounds and completes the annunciator circuit, illuminating the red OIL PRESS annunciator. When pressure exceeds 20 PSI, the ground is removed and the OIL PRESS annunciator extinguishes.

### NOTE

The low oil pressure switch is also wired into the hour (Hobbs) meter. When pressure exceeds 20 PSI, a ground is supplied to the hour meter, completing the hour meter circuit.

Oil temperature signals are generated from a resistance-type probe located in the accessory case. As oil temperature changes, the probe resistance changes. This resistance is translated into oil temperature readings on the indicator.

The T.I.T./CHT indicator unit, located on the left side of the instrument panel, is activated by electrical signals originating in the engine compartment. Markings for the turbine inlet temperature portion of the indicator are in 25°F increments, with normal range (green arc) between 1350°F and 1675°F and the maximum (red line) at 1675°F. Marking for the cylinder head temperature portion of the indicator are in 50°F increments, with numbers at 200°F, 300°F, 400°F and 500°F. Normal operating temperatures (green arc) for the CHT gauge are 200°F to 480°F, with red line at 480°F.

T.I.T. signals are generated from a thermocouple probe in the exhaust system. The probe generates a voltage potential with respect to temperature. This voltage potential registers as a temperature change in the indicator.

CHT signals are generated from a resistance-type probe screwed into the cylinder head of the number 5 (copilot side aft) cylinder. The resistance of the probe changes in proportion to the temperature, and is registered on the indicator as a change in temperature.

The engine-driven mechanical tachometer is located on the lower right side of the pilot's instrument panel. The instrument is marked in increments of 100 RPM, and indicates both engine and propeller speed. A recording meter in the lower section of the dial records elapsed engine time in hours and tenths based on a record speed of 2400 RPM. Instrument markings include the normal operating range (green arc) of 2000 to 2400 RPM, and a maximum (red line) of 2500 RPM.



The manifold pressure gauge is the left half of a dual-indicating instrument located on the lower left side of the instrument panel. The gauge is direct reading and indicates induction air manifold pressure in inches of mercury. It has a normal operating range (green arc) of 15 to 30 in. Hg and a maximum (red line) of 39 in. Hg. The fuel flow indicator is the right half of a dual-indicating instrument located on the lower left side of the instrument panel. The fuel flow is measured by a transducer mounted on the aft engine baffle. The fuel goes from the engine driven fuel pump through the transducer by a line to the throttle body. The transducer receives a voltage from the indicator and returns a signal depending on the flow through the transducer. The indicator is marked in gallons per hour and has a green arc from 5 to 20 gal/hr and a maximum (red line) fuel flow of 34 gph. There may be some atmospheric conditions that would result in fuel flow rates that exceed the maximum marked value on the indicator (i.e. very low density altitude and full throttle). If the indicator is pegged out, the mixture control should be used to adjust for the desired value. The fuel flow indicator may indicate low fuel flow rates when the fuel injector(s) become blocked or partially blocked.

### **NEW ENGINE BREAK-IN AND OPERATION**

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

The airplane is delivered from the factory with corrosion preventive oil in the engine. If, during the first 25 hours, oil must be added, use only ashless dispersant oil conforming to specification MIL-L-22851 or SAE1899.

## ENGINE LUBRICATION SYSTEM

The engine utilizes a full pressure, wet sump type lubrication system. The capacity of the engine sump (located on the bottom of the engine) is 11 quarts (one additional quart is contained in the engine oil filter). Oil is drawn from the sump through a filter screen on the end of a pickup tube to the engine-driven oil pump. Oil from the pump passes through a full flow oil filter, a pressure relief valve at the rear of the right oil gallery, and a thermostatically controlled remote oil cooler. Oil from the remote cooler is then circulated to the left oil gallery and propeller governor. The engine parts are then lubricated by oil from the galleries. After lubricating the engine, the oil returns to the sump by gravity. The filter adapter in the full flow filter is equipped with a bypass valve which will cause lubricating oil to bypass the filter in the event the filter becomes plugged, or the oil temperature is extremely cold.

An oil dipstick/filler tube is located on the right side of the engine case. The dipstick and oil filler are accessible through a door on the right side of the engine cowling. The engine should not be operated on less than 6 quarts of oil. For extended flight, fill to eleven quarts (dipstick indication only). For engine oil grade and specifications, refer to Section 8 of this handbook.

## IGNITION AND STARTER SYSTEM

Engine ignition is provided by two engine driven magnetos, and two spark plugs in each cylinder. The right magneto fires the lower left and upper right spark plugs, and the left magneto fires the lower right and upper left spark plugs. Normal operation is conducted with both magnetos due to the more complete burning of the fuel/air mixture with dual ignition.

Ignition and starter operation is controlled by a rotary type switch located on the left switch and control panel. The switch is labeled clockwise, OFF, R, L, BOTH, and START. The engine should be operated on both magnetos (BOTH position) except for magneto checks.

The R and L positions are for checking purposes and emergency use only. When the switch is rotated to the START position, (with the master switch in the ON position), the starter contactor is energized and the starter will crank the engine. When the switch is released, it is spring-loaded to return to the BOTH position.

#### **AIR INDUCTION SYSTEM**

The engine air induction system receives ram air through an intake on the lower front portion of the engine cowling. The intake is covered by an air filter which removes dust and other foreign matter from the induction air. Airflow passing through the filter enters an air box. The air box has a spring-loaded alternate air door. If the air induction filter should become blocked, suction created by the engine will open the door and draw unfiltered air from inside the lower cowl area. An open alternate air door can result in manifold pressure losses of up to 15 in. Hg at full throttle above 8,000 feet. After passing through the air box, induction air enters a compressor then to a fuel/air control unit on top of the engine, and is then ducted to the engine cylinders through intake manifold tubes.

#### **EXHAUST SYSTEM**

Exhaust gas from each cylinder passes through riser assemblies to a heat exchanger, then turbocharger and single tailpipe. Shrouds are constructed around the outside of the heat exchanger to form a heating chamber which supplies heat to the cabin.

#### **FUEL INJECTION SYSTEM**

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

Fuel is delivered by the engine-driven fuel pump to the fuel/air control unit on top of the engine. The fuel/air control unit correctly proportions the fuel flow to the induction air flow. After passing through the control unit, induction air is delivered to the cylinders through the intake manifold tubes and metered fuel is delivered to a fuel manifold (flow divider). The fuel manifold, through spring tension on a diaphragm and valve, evenly distributes the fuel to an air-bleed type injector nozzle in the intake valve chamber of each cylinder. A fuel flow transducer is also installed upstream of the fuel/air control unit which attaches to the rear baffle, and is connected to a fuel flow indicator on the instrument panel.

### COOLING SYSTEM

Ram air for engine cooling enters through two intake openings in the front of the engine cowling. The cooling air is directed from above the engine, around the cylinders and other areas of the engine by baffling, and then exits through cowl flaps on the lower aft edge of the cowling. The cowl flaps are mechanically operated from the cabin by means of a cowl flap lever on the right side of the control pedestal. Before starting the engine, during takeoff or high power operation, the cowl flap lever should be placed in the OPEN position for maximum cooling. This is accomplished by moving the lever to the right to clear the detent, then moving the lever up to the OPEN position.

While in cruise flight, cowl flaps should be closed unless hot day conditions require them to be adjusted to keep the cylinder head temperature at approximately two-thirds of the normal operating range (green arc). During extended let-downs, it may be necessary to completely close the cowl flaps by moving the cowl flap lever to the CLOSED position.

During ground operations, position the aircraft into the wind for optimal engine cooling.

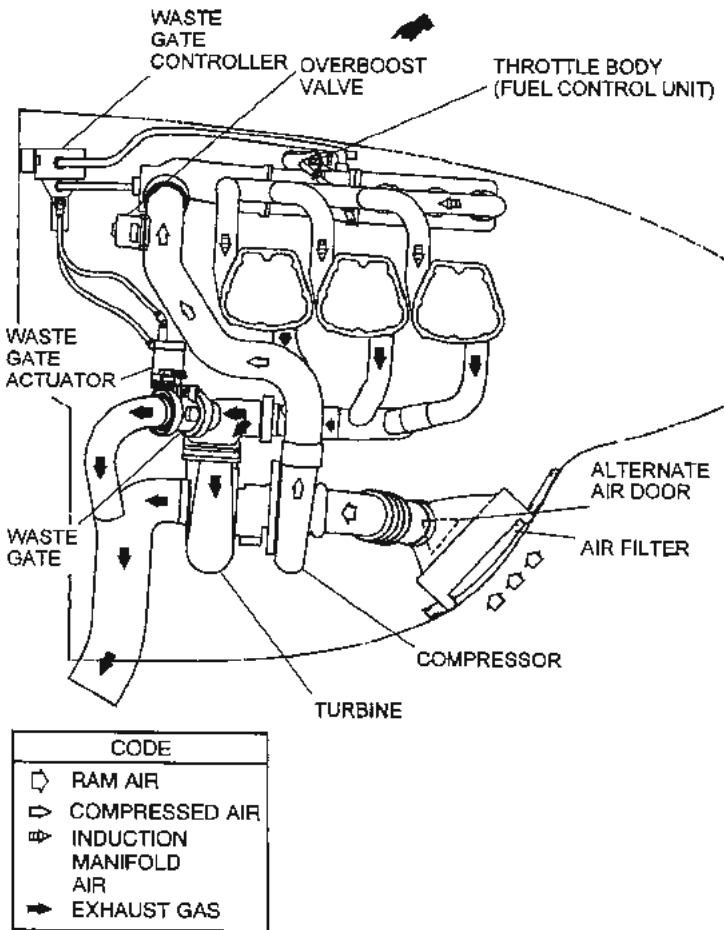
## TURBOCHARGING SYSTEM

Because the engine is turbocharged, some of its characteristics are different from a normally aspirated engine. The following information describes the system and points out some of the items that are affected by turbocharging. Section 4 contains the normal operating procedures for the turbocharged engine.

The following steps, when combined with the turbocharger system schematic (Figure 7-5), provide a better understanding of how the turbocharger system works. The steps follow the induction air as it enters and passes through the engine until it is expelled as exhaust gases.

1. Engine induction air is supplied through an opening in the lower cowl, ducted through a filter and into the compressor where it is compressed.
2. The pressurized induction air then passes through the throttle body and induction manifold into the cylinders.
3. The air and fuel are burned and exhausted through the turbine.
4. The exhaust gases drive the turbine which, in turn, drives the compressor, thus completing the cycle.

The compressor has the capability of producing manifold pressure in excess of the takeoff maximum of 39 inches Hg. In order not to exceed 39 inches of manifold pressure, a waste gate is used so that some of the exhaust will bypass the turbine and be vented into the tailpipe.



1250T1008

Figure 7-5. Turbocharger Schematic

It can be seen from studying Steps 1 through 4 that anything that affects the flow of induction air into the compressor or the flow of exhaust gases into the turbine will increase or decrease the speed of the turbocharger. This resultant change in flow will have no effect on the engine if the waste gate is still open because the waste gate position is changed to hold compressor discharge pressure constant. A waste gate controller automatically maintains maximum allowable compressor discharge pressure any time the turbine and compressor are capable of producing that pressure.

At high altitude, part throttle, or low RPM, the exhaust flow is not capable of turning the turbine and compressor fast enough to maintain maximum compressor discharge pressure, and the waste gate will close to force all of the exhaust flow through the turbine.

When the waste gate is fully closed, any change in turbocharger speed will mean a change in engine operation. Thus, any increase or decrease in turbine speed will cause an increase or decrease in manifold pressure and fuel flow. If turbine speed increases, the manifold pressure increases; if the turbine speed decreases, the manifold pressure decreases. Since the compression ratio approaches 3 to 1 at high altitude, any change in exhaust flow to the turbine or ram induction air pressure will be magnified proportionally by the compression ration and the change in flow through the exhaust system.

#### MANIFOLD PRESSURE VARIATION WITH ENGINE RPM

When the waste gate is open, the turbocharged engine will react the same as a normally aspirated engine when the engine RPM is varied. That is, when the RPM is increased, the manifold pressure will decrease slightly. When the engine RPM is decreased, the manifold pressure will increase slightly.

However, when the waste gate is closed, manifold variation with engine RPM is just opposite of the normally aspirated engine. An increase in engine RPM will result in an increase in manifold pressure, and a decrease in engine RPM will result in a decrease in manifold pressure.

### MANIFOLD PRESSURE VARIATION WITH ALTITUDE

At full throttle, the turbocharger has the capability of maintaining the maximum continuous manifold pressure of 39 inches Hg. to well above 17,000 feet depending on engine and atmospheric conditions. However, engine operating limitations establish the maximum manifold pressure that may be used. Manifold pressure should be reduced above 17,000 feet, as noted on the operating placard in the airplane (subtract 1 inch Hg. from 39 inches Hg. for each 1000 feet above 17,000 feet).

At part throttle, the turbocharger is capable of maintaining cruise climb power of 2400 RPM and 30 in. Hg. from sea level to 22,000 feet in standard temperatures, and from sea level to 17,000 feet under hot day conditions without changing the throttle position, once the power setting is established after takeoff. Under hot day conditions, this climb power setting is maintained above 17,000 feet by advancing the throttle as necessary to maintain 30 inches of manifold pressure in the same manner as a normally aspirated engine during climb.

### MANIFOLD PRESSURE VARIATION WITH AIRSPEED

When the waste gate is closed, manifold pressure will vary with variations in airspeed. This is because the compressor side of the turbocharger operates at pressure ratios of up to 3 to 1 and any change in pressure at the compressor inlet is magnified at the compressor outlet with a resulting effect on the exhaust flow and turbine side of the turbocharger.

### FUEL FLOW VARIATIONS WITH CHANGES IN MANIFOLD PRESSURE

The engine-driven fuel pump output is regulated by engine speed and compressor discharge pressure. Engine fuel flow is regulated by fuel pump output and the metering effects of the throttle and mixture control. When the waste gate is open, fuel flow will vary directly with manifold pressure, engine speed, mixture, or throttle control position. In this case, manifold pressure is controlled by throttle position and the waste gate controller, while fuel flow varies with throttle movement and manifold pressure.



## **ENGINE** (Continued)

### **TURBOCHARGING SYSTEM** (Continued)

#### **FUEL FLOW VARIATIONS WITH CHANGES IN MANIFOLD PRESSURE** (Continued)

When the waste gate is closed and manifold pressure changes are due to turbocharger output, as discussed previously, fuel flow will follow manifold pressure even though the throttle position is unchanged. This means that fuel flow adjustments required of the pilot are minimized to (1) small initial adjustments on takeoff or climb-out for the proper rich climb setting, (2) lean-out in cruise, and (3) return to full rich position for approach and landing.

#### **MANIFOLD PRESSURE VARIATION WITH INCREASING OR DECREASING FUEL FLOW**

When the waste gate is open, movement of the mixture control has little or no effect on the manifold pressure of the turbocharged engine.

When the waste gate is closed, any change in fuel flow to the engine will have a corresponding change in manifold pressure. That is, increasing the fuel flow will increase the manifold pressure and decreasing the fuel flow will decrease the manifold pressure. This is because an increased fuel flow to the engine increases the mass flow of the exhaust. This turns the turbocharger faster, increasing the induction air flow and raising the manifold pressure.

#### **MOMENTARY OVERSHOOT OF MANIFOLD PRESSURE**

Under some circumstances (such as rapid throttle movement, especially with cold oil), it is possible that the engine can be overboosted slightly above the maximum takeoff manifold pressure of 39 inches Hg. This would most likely be experienced during the takeoff roll or during a change to full throttle operation in flight. The induction air pressure relief valve will normally limit the overboost to 2 to 3 inches.

(Continued Next Page)

## **ENGINE** (Continued)

### **TURBOCHARGING SYSTEM** (Continued)

#### **MOMENTARY OVERSHOOT OF MANIFOLD PRESSURE** (Continued)

A slight overboost of 2 to 3 inches of manifold pressure is not considered detrimental to the engine as long as it is momentary. No corrective action is required when momentary overboost corrects itself and is followed by normal engine operation. However, if overboosting of this nature persists when oil temperature is normal or if the amount of overboost tends to exceed 3 inches or more, the throttle should be retarded to eliminate the overboost and the controller system, including the waste gate and relief valve, should be checked for necessary adjustment or replacement of components.

### **ALTITUDE OPERATION**

Because a turbocharged airplane will climb faster and higher than a normally aspirated airplane, fuel vaporization may be encountered. When fuel flow variations of  $\pm 1$  GPH or more are observed (as a "nervous" fuel flow needle), or if a full rich mixture setting doesn't provide the desired fuel flow, placing the auxiliary fuel pump switch in the ON position will control vapor. However, it will also increase fuel flow, making it necessary to adjust the mixture control for the desired fuel flow. The auxiliary fuel pump should be left on for the remainder of the climb. It can be turned off whenever fuel flow will remain steady with it off, and the mixture must be adjusted accordingly. The auxiliary fuel pump should be turned off and the mixture reset prior to descent.

### **HIGH ALTITUDE ENGINE ACCELERATION**

The engine will accelerate normally from idle to full throttle with full rich mixture at any altitude below 22,000 feet. At higher altitudes, it is usually necessary to lean the mixture to get smooth engine acceleration from idle to maximum power. At altitudes above 25,000 feet, and with temperatures above standard, it takes up to two minutes for the turbine to accelerate from idle to maximum RPM although adequate power is available in 20 to 30 seconds.

## PROPELLER

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

The propeller control knob in the lower center of the instrument panel is used to set the governor and control engine RPM as desired for various flight conditions. The knob is labeled PROP PUSH INCR RPM. When the control knob is pushed in, blade pitch will decrease, giving a higher RPM. When the control knob is pulled out, the blade pitch increases, thereby decreasing RPM. The propeller control knob is equipped with a vernier feature which allows slow or fine RPM adjustments by rotating the knob clockwise to increase RPM, and counterclockwise to decrease it. To make rapid or large adjustments, depress the button on the end of the control knob and reposition the control as desired.

An optional propeller de-ice system is available for the airplane. Details of this system are presented in the Supplements section.

## FUEL SYSTEM

The airplane fuel system (Refer to Figure 7-6) consists of two vented integral fuel tanks (one tank in each wing), two reservoir tanks (underneath the cockpit floor), a four-position selector valve, an electrically-driven auxiliary fuel pump, and a fuel strainer. The engine-mounted portion of the system consists of the engine-driven fuel pump, a fuel/air control unit, a fuel distribution valve (flow divider) and fuel injection nozzles.

### Serials T20608362 and on:

The fuel system also incorporates a fuel return system that returns fuel from the fuel/air control unit (servo) back to each integral wing tank. The system includes a flexible fuel hose assembly between the servo and the firewall. Aluminum fuel lines return the fuel to the top portion of the selector valve and then to the aircraft integral tanks. One drain is added to properly drain the fuel return system.

### WARNING

**UNUSABLE FUEL LEVELS FOR THIS AIRPLANE WERE DETERMINED IN ACCORDANCE WITH FEDERAL AVIATION REGULATIONS. FAILURE TO OPERATE THE AIRPLANE IN COMPLIANCE WITH FUEL LIMITATIONS SPECIFIED IN SECTION 2 MAY FURTHER REDUCE THE AMOUNT OF FUEL AVAILABLE IN FLIGHT.**

### NOTE

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

(Continued Next Page)

**FUEL SYSTEM** (Continued)

Serials T20608001 thru T20608361:

FUEL TANKS	FUEL LEVEL (QUANTITY EACH TANK)	TOTAL FUEL	TOTAL UNUSABLE	TOTAL USABLE ALL FLIGHT CONDITIONS
Two	Full (46.0)	92.0	4.0	88.0
Two	Reduced (34.5)	69.0	4.0	65.0

Serials T20608362 and on:

FUEL TANKS	FUEL LEVEL (QUANTITY EACH TANK)	TOTAL FUEL	TOTAL UNUSABLE	TOTAL U6ABLE ALL FLIGHT CONDITIONS
Two	Full (46.0)	92.0	5.0	87.0
Two	Reduced (34.5)	69.0	5.0	64.0

Figure 7-6. Fuel Quantity Data in U.S. Gallons

**FUEL DISTRIBUTION**

Fuel flows by gravity from the two wing tanks to two reservoir tanks to a four position selector valve. From the selector valve, fuel flows through the auxiliary fuel pump, the fuel strainer, and to the engine driven fuel pump. From the engine driven fuel pump, fuel is delivered to the fuel/air control unit on the top of the engine. The fuel/air control unit (fuel servo) meters fuel flow in proportion to induction air flow. After passing through the control unit, metered fuel goes to a fuel distribution valve (flow divider) located on top of the engine. From the fuel distribution valve, individual fuel lines are routed to air bleed type injector nozzles located in the intake chamber of each cylinder.

(Continued Next Page)

## **FUEL SYSTEM** (Continued)

### **FUEL INDICATING SYSTEM**

Fuel quantity is measured by two float-type fuel quantity transmitters (one in each tank) and indicated by an electrically operated fuel quantity indicator on the left side of the instrument panel. The indicators are marked in gallons of fuel. An empty tank is indicated by a red line and the number "0". When an indicator shows an empty tank, approximately 2 gallons (Serials T20608001 thru T20608361) or 2.5 gallons (T20608362 and on) remain in a tank as unusable fuel. The indicators should not be relied upon for accurate readings during skids, slips, or unusual attitudes.

The fuel quantity indicators also incorporate warning circuits which can detect low fuel conditions and erroneous transmitter signals. Anytime fuel in the tank drops below approximately 8 gallons (and remains below this level for more than 60 seconds), the amber LOW FUEL message will flash on the annunciator panel for approximately 10 seconds and then remain steady. The annunciator cannot be turned off by the pilot. If the left tank is low, the message will read L LOW FUEL. If the right tank is low, the message will read LOW FUEL R. If both tanks are low, the message will read L LOW FUEL R.

In addition to low fuel annunciation, the warning circuitry is designed to report failures with each transmitter caused by shorts or opens. If the circuitry detects any one of these conditions, the fuel level indicator needle will go to the OFF position (below the "0" mark on the fuel indicator), and the amber annunciator will illuminate. If the left tank transmitter has failed, the message will read L LOW FUEL. If the right tank transmitter has failed, the message will read LOW FUEL R. If both tanks transmitters have failed, the message will read L LOW FUEL R.

Fuel flow is measured by use of a fuel transducer (flowmeter) mounted on the rear engine baffle. This flowmeter produces an electrical signal which is translated in the cockpit-mounted indicator as gallons-per-hour. Normal operating (green arc) range is from 5 to 20 gallons-per-hour.

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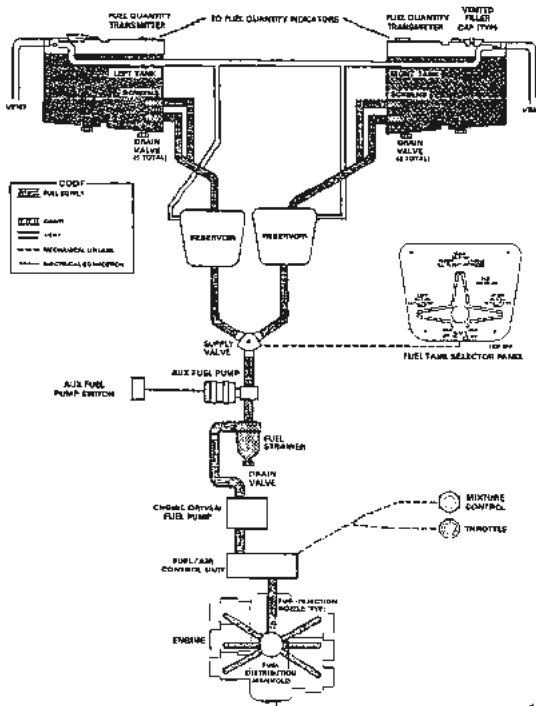
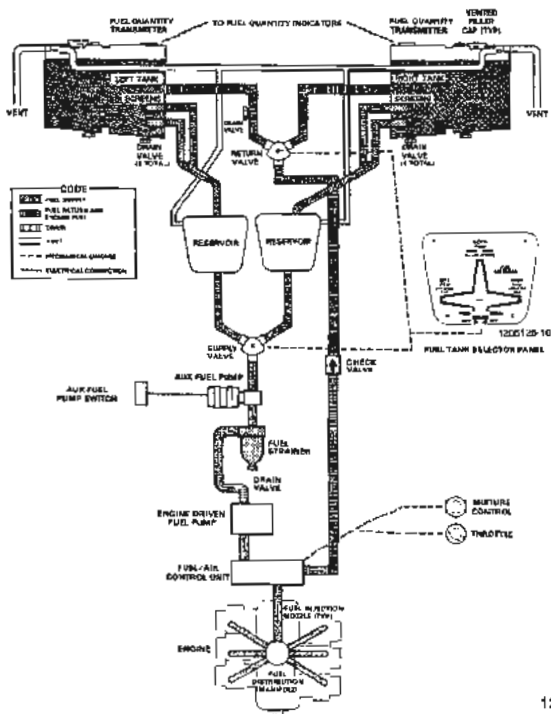


Figure 7-7. Fuel System Schematic (Sheet 1 of 2)  
Serial T20608001 thru T20608361.

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NOTE: Fuel returns to the tank selected.

Figure 7-7. Fuel System Schematic (Sheet 2)  
 Serials T20608362 and on.



## **FUEL SYSTEM** (Continued)

### **AUXILIARY FUEL PUMP OPERATION**

The auxiliary fuel pump is used primarily for priming the engine before starting. Priming is accomplished through the fuel injection system. If the auxiliary fuel pump switch is accidentally placed in the ON position for prolonged periods (with master switch turned on and mixture rich) with the engine stopped, the engine may be flooded.

The auxiliary fuel pump is also used for vapor suppression in hot weather. Normally, momentary use will be sufficient for vapor suppression; however, continuous operation is permissible if required. Turning on the auxiliary fuel pump with a normally operating engine pump will result in only a very minor enrichment of the mixture.

It is not necessary to operate the auxiliary fuel pump during normal takeoff and landing, since gravity and the engine driven pump will supply adequate fuel flow. In the event of failure of the engine driven fuel pump, use of the auxiliary fuel pump will provide sufficient fuel to maintain flight at maximum continuous power.

Under hot day, high altitude conditions, or conditions during a climb that are conducive to fuel vapor formation, it may be necessary to utilize the auxiliary fuel pump to attain or stabilize the fuel flow required for the type of climb being performed. In this case, turn the auxiliary fuel pump on, and adjust the mixture to the desired fuel flow. If fluctuating fuel flow (greater than 1 GPH) is observed during climb or cruise at high altitudes on hot days, place the auxiliary fuel pump switch in the ON position to clear the fuel system of vapor. The auxiliary fuel pump may be operated continuously in cruise.

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## **FUEL SYSTEM** (Continued)

### **FUEL RETURN SYSTEM**

#### **Serials T20608362 and on:**

A fuel return system is incorporated to improve engine operation during extended idle operation in hot weather environments. The major components of the system include an restrictor fitting located in the top of the fuel servo, a dual stack fuel selector valve, and a drain valve assembly. The system is designed to return fuel/vapor back to the main tanks at approximately 7 gallons per hour. The dual-stack selector valve ensures that fuel returns only to the tank that is selected as the feed tank. For example, if the fuel selector is positioned to use fuel from the left hand tank, the fuel return system is returning fuel to the left hand tank only.

### **FUEL VENTING**

Fuel system venting is essential to system operation. Complete blockage of the venting system will result in decreasing fuel flow and eventual engine stoppage. Venting consists of an interconnecting vent line between the tanks, and check valve equipped overboard vents in each tank. The overboard vents protrude from the bottom surfaces of the wings behind the wing struts, slightly below the upper attach points of the struts. The fuel filler caps are vacuum vented. The vents will open and allow air to enter the fuel tanks in case the overboard vents become blocked.

### **FUEL SELECTOR VALVE**

The fuel selector is a four-position selector valve, labeled BOTH, RIGHT, LEFT and OFF. The selector handle must be pushed down before it can be rotated from RIGHT or LEFT to OFF.

The fuel selector valve should be in the BOTH position for takeoff, climb, landing, and maneuvers that involve prolonged slips or skids of more than 30 seconds. Operation from either LEFT or RIGHT tank is reserved for cruising flight.

(Continued Next Page)

**FUEL SYSTEM** (Continued)

**FUEL SELECTOR VALVE** (Continued)

**NOTE**

When the fuel selector valve handle is in the BOTH position in cruising flight, unequal fuel flow from each tank may occur if the wings are not maintained exactly level. Resulting wing heaviness can be alleviated gradually by turning the selector valve handle to the tank in the "heavy" wing.

**NOTE**

It is not practical to measure the time required to consume all of the fuel in one tank, and, after switching to the opposite tank, expect an equal duration from the remaining fuel. The airspace in both fuel tanks is interconnected by a vent line and, therefore, some transferring of fuel between tanks can be expected when the tanks are nearly full and the wings are not level.

**NOTE**

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

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## **FUEL SYSTEM** (Continued)

### **FUEL DRAIN VALVES**

The fuel system is equipped with multiple drain valves to provide a means for the examination of fuel in the system for contamination and grade. The system should be examined before each flight and after each refueling by using the sampler cup provided to drain fuel from each wing tank sump and the fuel strainer. If any evidence of fuel contamination is found, it must be eliminated in accordance with the Preflight Inspection checklist and the discussion in Section 8 of this publication. If takeoff weight limitations for the next flight permit, the fuel tanks should be filled after each flight to prevent condensation.

### **BRAKE SYSTEM**

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

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

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

## ELECTRICAL SYSTEM

The airplane is equipped with a 28-volt, direct current electrical system (Refer to Figure 7-8). The system is powered by a belt driven, 60-amp alternator and a 24-volt battery, located in the engine compartment, just forward of the firewall on the right hand side. An optional 95-amp alternator is available with the prop de-ice option. Power is supplied to most general electrical circuits through a split primary bus bar, with an essential bus wired between the two primaries to provide power for the master switch and annunciator circuits.

Each primary bus bar is also connected to an avionics bus bar via a single avionics master switch. The primary buses are on anytime the master switch is turned on, and are not affected by starter or external power usage. The avionics buses are on when the master switch and avionics master switch are in the ON position.

### CAUTION

**PRIOR TO TURNING THE MASTER SWITCH ON OR OFF, STARTING THE ENGINE OR APPLYING AN EXTERNAL POWER SOURCE, THE AVIONICS MASTER SWITCH, SHOULD BE TURNED OFF TO PREVENT ANY HARMFUL TRANSIENT VOLTAGE FROM DAMAGING THE AVIONICS EQUIPMENT.**

The airplane uses a power distribution module, located on the left forward side of the firewall, to house all relays used throughout the airplane electrical system. In addition, the alternator control unit and the external power connector are housed within the module.

## ANNUNCIATOR PANEL

An annunciator panel (with integral toggle switch) is located above the avionics slack and provides caution (amber) and warning (red) messages for selected portions of the airplane systems. The annunciator is designed to flash messages for approximately 10 seconds to gain the attention of the pilot before changing to steady on. The annunciator panel cannot be turned off by the pilot.

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## **ELECTRICAL SYSTEM** (Continued)

### **ANNUNCIATOR PANEL** (Continued)

Inputs to annunciator come from each fuel transmitter, low oil pressure switch, the vacuum transducers and the alternator control unit (ACU). Highly reliable individual LED bulbs illuminate each message. Illumination intensity can be controlled by placing the toggle switch to either the DIM or BRT position.

The annunciator panel can be tested by turning the master switch On and holding the annunciator panel switch in the TST position. All amber and red messages will flash until the switch is released.

#### **NOTE**

When the master switch is turned ON, some annunciators will flash for approximately 10 seconds before illuminating steadily. When the annunciator panel switch is toggled up and held in the TST position, all remaining annunciators will flash until the switch is released.

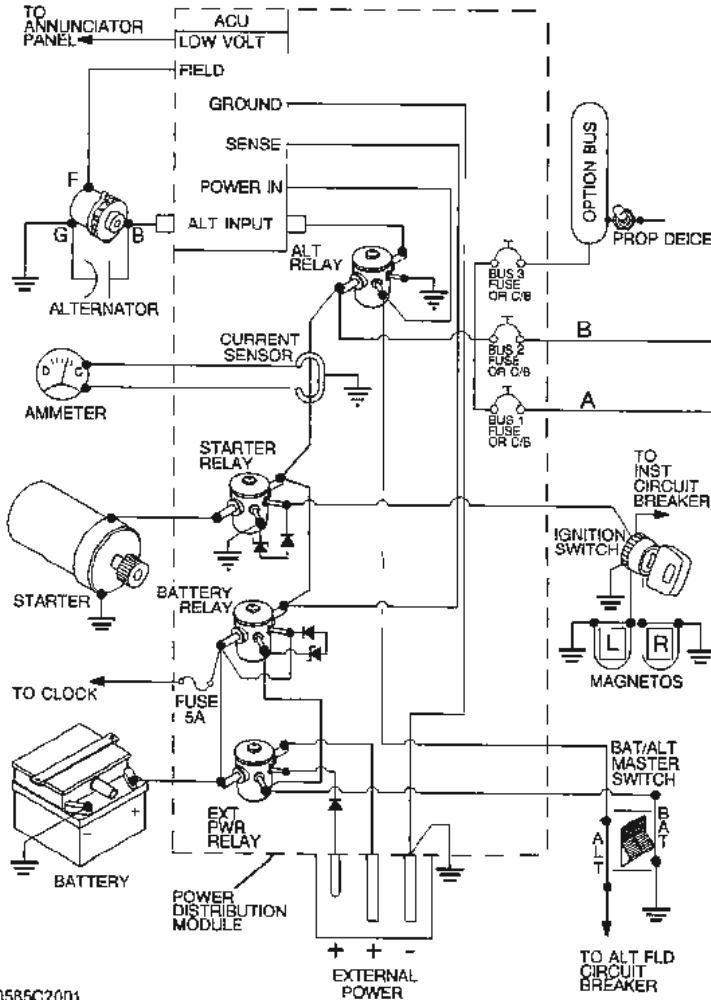
#### **NOTE**

When holding the annunciator panel switch in the TST position, with the optional prop de-ice on, the prop de-ice annunciator will change from green to amber and return to green when the switch is released.

### **MASTER SWITCH**

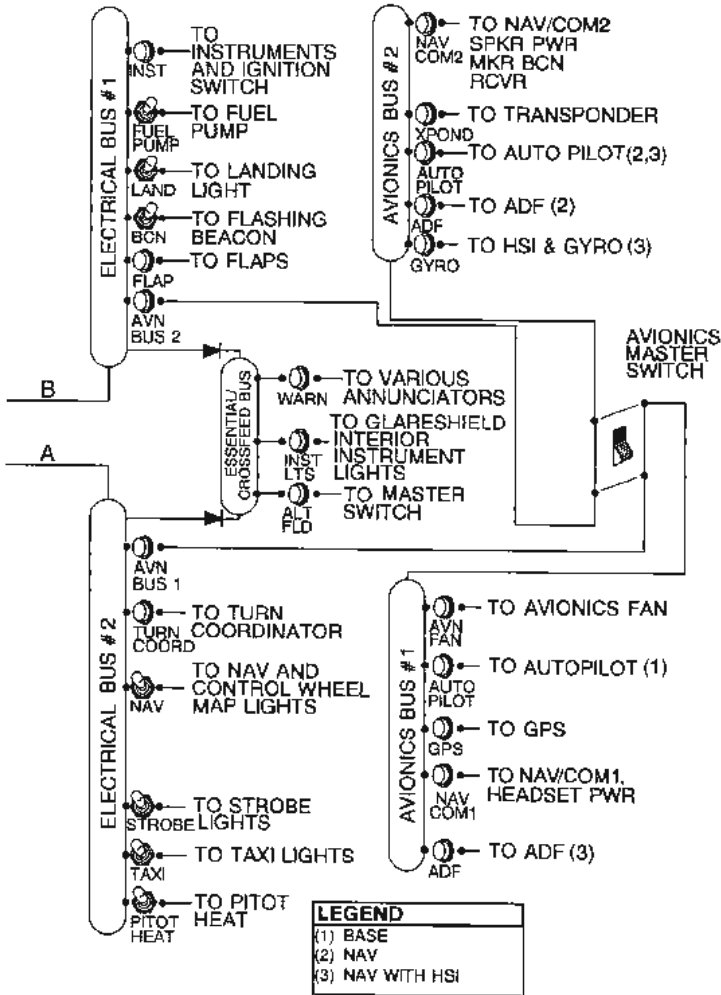
The master switch is a split rocker type switch labeled MASTER, and is ON in the up position and OFF in the down position. The right half of the switch, labeled BAT, controls all electrical power to the airplane. The left half, labeled ALT, controls the alternator.

(Continued Next Page)



0585C2001

Figure 7-8. Electrical Schematic (Sheet 1 of 2)  
Serials T20608001 thru T20608259.



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Figure 7-8. Electrical Schematic (Sheet 2)  
 Serials T20608001 thru T20608259.



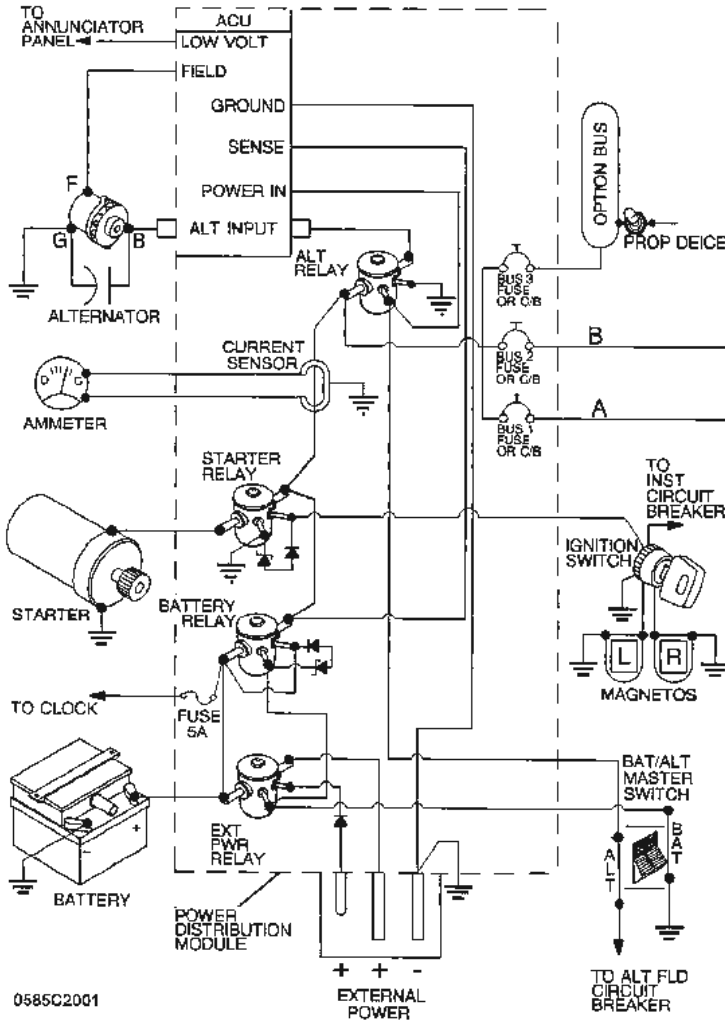
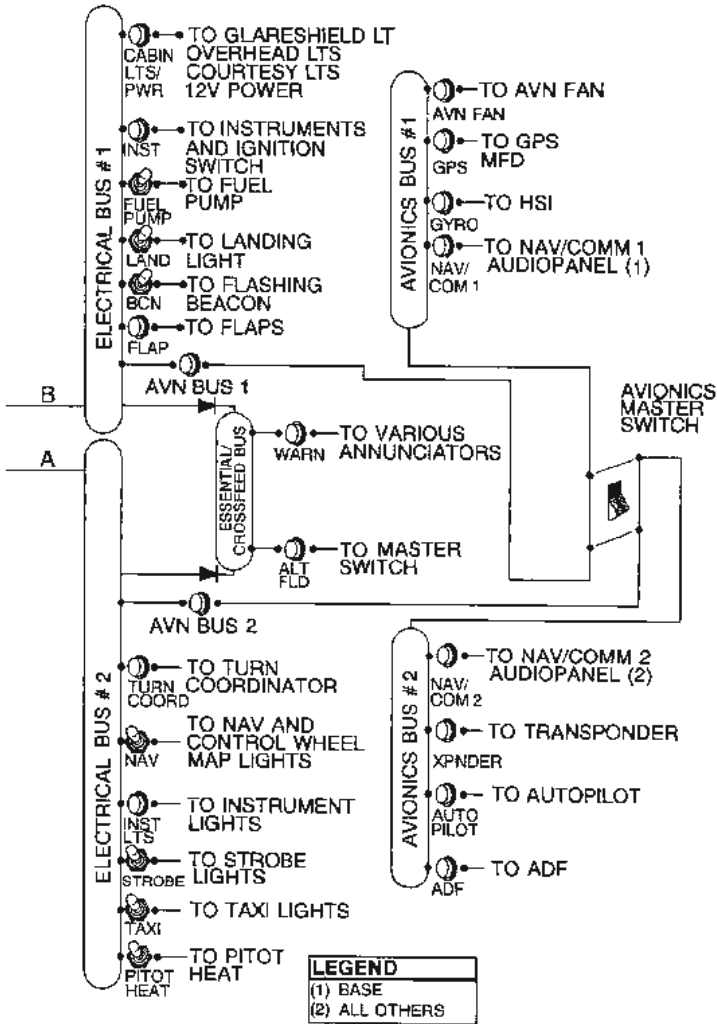


Figure 7-9. Electrical Schematic (Sheet 1 of 2)  
Serials T20608260 and on.



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Figure 7-9. Electrical Schematic (Sheet 2)  
Serials T20608260 and on.

## **ELECTRICAL SYSTEM** (Continued)

### **MASTER SWITCH** (Continued)

#### **⚠ CAUTION**

**PRIOR TO TURNING THE MASTER SWITCH ON OR OFF, STARTING THE ENGINE OR APPLYING AN EXTERNAL POWER SOURCE, THE AVIONICS MASTER SWITCH, SHOULD BE TURNED OFF TO PREVENT ANY HARMFUL TRANSIENT VOLTAGE FROM DAMAGING THE AVIONICS EQUIPMENT.**

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. To check or use avionics equipment or radios while on the ground, the avionics master switch must also be turned on. The ALT side of the switch, when placed in the off position, removes the alternator from the electrical system. With this switch in the OFF position, the entire electrical load is placed on the battery. Continued operation with the alternator switch in the OFF position will reduce battery power low enough to open the battery contactor and prevent alternator restart.

### **AVIONICS MASTER SWITCH**

The avionics master switch, labeled AVIONICS MASTER, is located below the control wheel on the pilot's electrical subpanel. The avionics master switch (Refer to Figure 7-9) is a split rocker-type switch; one side controls power from Primary Bus 1 to Avionics Bus 1 while the other side controls power from Primary Bus 2 to Avionics Bus 2.

#### **NOTE**

On earlier serial number airplanes (Refer to Figure 7-7), the avionics master switch is a rocker switch that controls power to both Avionics Bus 1 and Avionics Bus 2 simultaneously. Some earlier serial number airplanes certified outside the United States may have the split avionics master switch installed.

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## **ELECTRICAL SYSTEM** (Continued)

### **AVIONICS MASTER SWITCH** (Continued)

No electrical power will be supplied to the avionics equipment with the avionics master switch in the OFF position (regardless of the position of the master switch or the individual equipment switches). The avionics master switch should be placed in the OFF position prior to turning the master switch on or off.

Each avionics bus has a circuit breaker installed between the primary bus and the avionics master switch. In the event of an electrical malfunction, this breaker will trip and take the affected avionics bus off-line.

### **AMMETER**

The vacuum gage/ammeter is located on the lower left side of the instrument panel. It indicates the amount of current, in amperes, from the alternator to the battery or from the battery to the airplane electrical system. When the engine is operating and the master switch is turned on, the ammeter indicates the charging rate applied to the battery. In the event the alternator is not functioning or the electrical load exceeds the output of the alternator, the ammeter indicates the battery discharge rate.

### **LOW VOLTAGE ANNUNCIATION**

The low voltage warning annunciator is incorporated in the annunciator panel and activates any time voltage falls below 24.5 volts. If low voltage is detected, the red annunciator VOLTS will flash for approximately 10 seconds before illuminating steadily. The pilot cannot turn off the annunciator.

In the event an overvoltage condition occurs, the alternator control unit automatically trips the ALT FLD circuit breaker, removing alternator field current and shutting down the alternator. The battery will then supply system current as shown by a discharge rate on the ammeter. Under these conditions, depending on electrical system load, the low voltage warning annunciator will illuminate when system voltage drops below normal.

(Continued Next Page)

## **ELECTRICAL SYSTEM** (Continued)

### **LOW VOLTAGE ANNUNCIATION** (Continued)

The alternator control unit may be reset by resetting the circuit breaker. If the annunciator extinguishes, normal alternator charging has resumed; however, if the annunciator illuminates again, a malfunction has occurred, and the flight should be terminated as soon as practical.

#### **NOTE**

Illumination of the low voltage annunciator and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system, such as during a low RPM taxi. Under these conditions, the annunciator will go out at higher RPM.

### **CIRCUIT BREAKERS AND FUSES**

All circuit breakers inside the airplane are of the "push to reset" or "switch/breaker" type. The power distribution module (J-Box) uses either "push to reset" circuit breakers or spade type (automotive style) fuses. One glass type fuse is also used to provide power to the clock.

On aircraft using spade type fuses in the power distribution module (J-Box), a spare fuse is also included. If the spare fuse is used, a replacement spare should be obtained and reinstalled before the next flight.

### **GROUND SERVICE PLUG RECEPTACLE**

A ground service receptacle plug is integral to the power distribution module and allows the use of an external power source for cold weather starting, and during lengthy maintenance work on electrical and avionics equipment. The receptacle is located on the left side of the airplane near the firewall. Access to the receptacle is gained by removing the cover plate.

(Continued Next Page)

## **ELECTRICAL SYSTEM** (Continued)

### **GROUND SERVICE PLUG RECEPTACLE** (Continued)

The ground service plug receptacle incorporates a circuit which will close the battery contactor when external power is applied with the master switch turned on. This circuit is intended as a servicing aid when battery power is too low to close the contactor, and should not be used to avoid performing proper maintenance procedures on a low battery.

#### **NOTE**

Use of the ground service plug receptacle for starting an airplane with "dead" battery or charging a "dead" battery in the airplane is not recommended. The battery should be removed from the airplane and serviced in accordance with Maintenance Manual procedures. Failure to observe this precaution could result in loss of electrical power during flight.

#### **NOTE**

If no avionics equipment is to be used or worked on, the avionics master switch should be turned off. If maintenance is required on the avionics equipment, it is advisable to utilize a regulated external power source to prevent damage to the avionics equipment by transient voltage. Do not crank or start the engine with the avionics master switch turned on.

#### **NOTE**

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

(Continued Next Page)

## **ELECTRICAL SYSTEM** (Continued)

### **GROUND SERVICE PLUG RECEPTACLE** (Continued)

If there is any question as to the condition of the battery and/or alternator, the following check should be made after engine has been started and external power source has been removed.

1. Master Switch -- OFF.
2. Taxi and Landing Light Switches -- ON.
3. Engine RPM -- REDUCE to idle.
4. Master Switch -- ON (with taxi and landing lights turned on).
5. Engine RPM -- INCREASE to approximately 1500 RPM.
6. Ammeter and Low Voltage Annunciator -- CHECK.

#### **NOTE**

If the ammeter does not show a charge or the low voltage warning annunciator does not go out, the battery should be removed from the airplane and properly serviced prior to flight.

## **LIGHTING SYSTEMS**

### **EXTERIOR LIGHTING**

Exterior lighting consists of navigation lights on the wing tips and tip of the stinger, landing/taxi lights located in the left wing leading edge, a flashing beacon mounted on top of the vertical fin, and a strobe light on each wing tip. In addition, two courtesy lights are recessed into the lower surface of each wing and provide illumination for each cabin door area.

The exterior courtesy lights are turned on by pressing the courtesy light switch located in the pilot's overhead console. Pressing the courtesy light switch again will extinguish the lights. The remaining exterior lights are operated by switch/breakers located on the lower left instrument panel. To activate these lights, place switch in the ON position. To deactivate light, place in the OFF position.

(Continued Next Page)

## **LIGHTING SYSTEMS** (Continued)

### **EXTERIOR LIGHTING** (Continued)

#### **NOTE**

The strobes and 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.

### **INTERIOR LIGHTING**

Interior lighting is controlled by a combination of overhead flood lighting, glareshield lighting, pedestal lighting, panel lighting, radio lighting and pilot control wheel lighting.

Flood lighting is accomplished using two lights in the front and two dome lights in the rear. These lights are contained in the overhead console. The two rear lights are turned on and off with push-type switches located near each light and are fixed position lights that provide for general illumination in the rear cabin area. The two front lights are individually dimmable from two knobs located next to the lights, rotating the knob clockwise for maximum brightness. These two lights provide lighting for the pilot and front passenger.

Glareshield lighting is accomplished using a fluorescent light molded into the glareshield. This light is controlled by rotating the GLARESHIELD LT dimmer, located below the pilot's panel. Rotating the dimmer clockwise increases light intensity, and rotating the dimmer counterclockwise decreases light intensity.

(Continued Next Page)



## LIGHTING SYSTEMS (Continued)

### INTERIOR LIGHTING (Continued)

Pedestal lighting consists of a single, hooded light located above the fuel selector and two lights located above the trim wheels. These lights are controlled by rotating the PEDESTAL LT dimmer, located below the pilot's panel. Rotating the dimmer clockwise increases light intensity, and rotating the dimmer counterclockwise decreases light intensity.

Panel lighting is accomplished using individual lights mounted in each instrument and gauge. These lights are wired in parallel and are controlled by the PANEL LT dimmer, located below the pilot's panel. Rotating the dimmer clockwise increases light intensity, and rotating the dimmer counterclockwise decreases light intensity. Back lighting intensity for radios and instrument lighting for the RH nav indicators, in the pilot's panel, is controlled by the TST (TEST) - BRT (DAY) - DIM (NIGHT) switch. When the switch is in the BRT (DAY) position, this lighting may be off regardless of the RADIO LT dimmer position. Some earlier aircraft will always have this lighting controlled by the RADIO LT dimmer.

Pilot control wheel lighting is accomplished by use of a rheostat and light assembly, located underneath the pilot control wheel yoke. The light provides downward illumination from the bottom of the yoke to the pilot's lap area. Rotating the dimmer clockwise (as viewed from below the wheel) increases light intensity, and rotating the dimmer counterclockwise decreases light intensity.

Regardless of the light system in question, the most probable cause of a light failure is a burned out bulb. However, in the event any of the lighting systems fail to illuminate when turned on, check the appropriate circuit breaker. If the circuit breaker has tripped, and there is no obvious indication of a short circuit (smoke or odor), turn off the light switch of the affected lights, reset the breaker, and turn the switch on again. If the breaker opens again, do not reset it until maintenance has been performed.

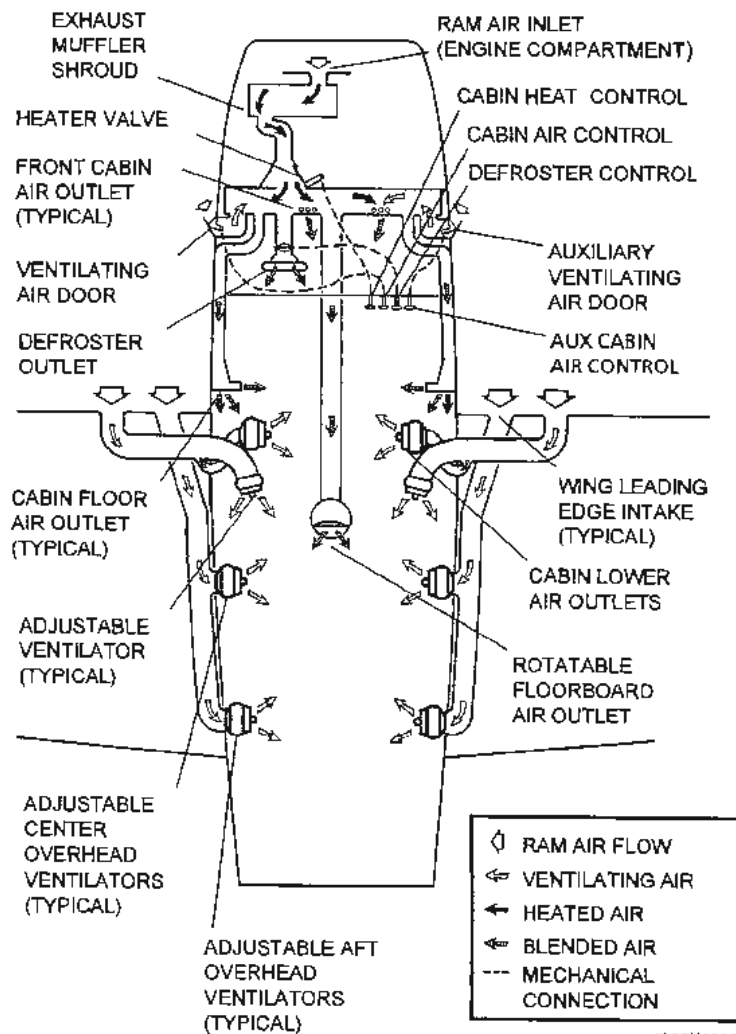
## **CABIN HEATING, VENTILATING AND DEFROSTING SYSTEM**

The temperature and volume of airflow into the cabin can be regulated by manipulation of the push-pull CABIN HT and CABIN AIR controls (Refer to Figure 7-8). When partial cabin heat is desired, blending warm and cold air will result in improved ventilation and heat distribution throughout the cabin. Additional outside air for summer ventilation is provided through the heat and vent system by operation of the push-pull AUX CABIN AIR knob. All three control knobs are the double button type with locks to permit intermediate settings.

Front cabin heat and ventilating air is supplied by outlet holes spaced across a cabin manifold just forward of the pilot's and copilot's feet. Rear cabin heat and air is supplied by three ducts from the manifold, one outlet at each front doorpost area at floor level and one extending under the center of the cabin floor to an outlet in the floor behind the pilot and copilot seats. The cabin floor outlet is flush mounted, with a removable airflow diverter. Windshield defrost air is also supplied by a duct from the cabin manifold an outlet on top of the glareshield; therefore, the temperature of the defrosting air is the same as heated cabin air. A rotating control knob, labeled DEFROST, regulates the volume of air to the windshield. Turn the knob clockwise to ON and counterclockwise to OFF. Earlier serial airplanes have a push - pull control to regulate the volume of defrost air.

Additional cabin ventilation can be obtained from separate adjustable ventilators, one near each upper corner of the windshield and one near each forward cabin sidewall area just below the windshield sill area for the pilot and copilot. Four adjustable ventilators are in the cabin ceiling adjacent to the center and rear seat passengers.

(Continued Next Page)



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Figure 7-10. Cabin Heating, Ventilating, and Defrosting System

## **OXYGEN SYSTEM** (Continued)

A six-place oxygen system provides the supplementary oxygen necessary for continuous flight at high altitude. In this system, a 76 cubic foot oxygen cylinder, located in the fuselage tailcone, supplies the oxygen. Cylinder pressure is reduced to an operating pressure of 70 PSI by a pressure regulator attached to the cylinder. A shutoff valve is included as part of the regulator assembly. An oxygen cylinder filler valve is located on the left side of the fuselage tailcone (under a cover plate). Cylinder pressure is indicated by a pressure gauge located in the overhead oxygen console above the pilot's and front passenger's seats.

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

### **NOTE**

The hose provided for the pilot is of a higher flow rate than those for the passengers; it is color-coded with a red band adjacent to the plug-in fitting. The passenger hoses are color-coded with an orange band. If the airplane owner prefers, he may provide higher flow hoses for all passengers. In any case, it is recommended that the pilot use the larger capacity hose. The pilot's mask is equipped with a microphone to facilitate use of the radio while using oxygen. An adapter cord is furnished with the microphone-equipped mask to mate the mask microphone lead to the auxiliary microphone jack located on the left side of the instrument panel.

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## **OXYGEN SYSTEM** (Continued)

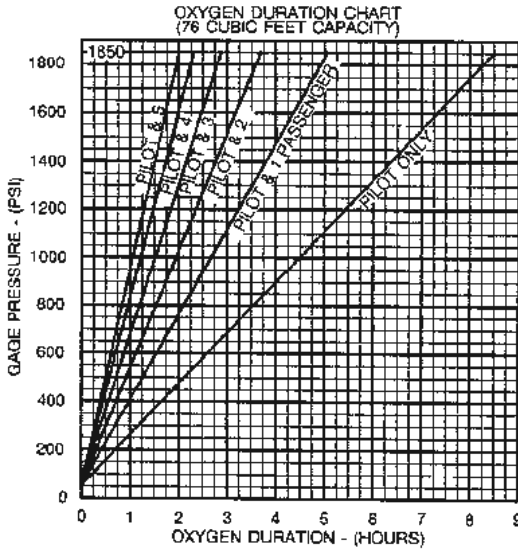
To connect the oxygen mask microphone, connect the mask lead to the adapter cord and plug the cord into the auxiliary microphone jack. (If an optional microphone-headset combination has been in use, the microphone lead from this equipment is already plugged into the auxiliary microphone jack. It will be necessary to disconnect this lead from the auxiliary microphone jack so that the adapter cord from the oxygen mask microphone can be plugged into the jack.) A switch is incorporated on the left hand control wheel to operate the microphone.

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

### **WARNING**

**OIL, GREASE OR OTHER LUBRICANTS IN CONTACT WITH OXYGEN CREATE A SERIOUS FIRE HAZARD, AND SUCH CONTACT MUST BE AVOIDED WHEN HANDLING OXYGEN EQUIPMENT.**

(Continued Next Page)



NOTE: THIS CHART IS BASED ON A PILOT WITH A RED COLOR - CODED OXYGEN LINE FITTING AND PASSENGERS WITH ORANGE COLOR - CODED LINE FITTINGS.

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Figure 7-11. Oxygen Duration Chart

## OXYGEN SYSTEM (Continued)

The Oxygen Duration Chart (Figure 7-11) should be used in determining the usable duration (in hours) of the oxygen supply in your airplane. The following procedure outlines the method of finding the duration from the chart.

1. Note the available oxygen pressure shown on the pressure gauge.
2. Locate this pressure on the scale on the left side of the chart, then go across the chart horizontally to the right until you intersect the line representing the number of persons making the flight. After intersecting the line, drop down vertically to the bottom of the chart and read the duration in hours given on the scale.
3. As an example of the above procedure, 1800 PSI of pressure will safely sustain the pilot only for 8 hours and 15 minutes. The same pressure will sustain the pilot and three passengers for approximately 2 hours and 50 minutes.

### NOTE

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

(Continued Next Page)

## **IOXYGEN SYSTEM** (Continued)

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

1. Mask and Hose – **SELECT**. Adjust mask to face and adjust metallic nose strap for snug mask fit.

### **⚠ WARNING**

**PERMIT NO SMOKING WHEN USING OXYGEN. OIL, GREASE, SOAP, LIPSTICK, LIP BALM, AND OTHER FATTY MATERIALS CONSTITUTE A SERIOUS FIRE HAZARD WHEN IN CONTACT WITH OXYGEN. BE SURE HANDS AND CLOTHING ARE OIL FREE BEFORE HANDLING OXYGEN EQUIPMENT.**

2. Delivery Hose – **PLUG INTO OUTLET** nearest to the seat you are occupying.

### **NOTE**

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

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

(Continued Next Page)



## **OXYGEN SYSTEM** (Continued)

For FAA requirements concerning supplemental oxygen, refer to FAR 91.32. Supplemental oxygen should be used by all occupants when cruising above 12,500 feet. It is often advisable to use oxygen at altitudes lower than 12,500 feet under conditions of night flying, fatigue, or periods of physiological or emotional disturbances. Also, habitual and excessive use of tobacco or alcohol will usually necessitate the use of oxygen at less than 10,000 feet.

## **PITOT-STATIC SYSTEM AND INSTRUMENTS**

The pitot-static system supplies dynamic air pressure to the airspeed indicator and static pressure to the airspeed indicator, vertical speed indicator and altimeter. The systems are composed of a heated pitot tube mounted on the lower surface of the left wing, two external static ports on the lower left and right sides of the forward fuselage, an alternate static source valve and the associated plumbing necessary to connect the instruments to the sources.

The heated pitot system consists of a heating element in the pitot tube, a 10-amp switch/breaker labeled PITOT HEAT, and associated wiring. The switch/breaker is located on the lower left side of the instrument panel. When the pitot heat switch is turned on, the element in the pitot tube is heated electrically to maintain proper operation in possible icing conditions.

A static pressure alternate source valve is installed above the throttle, and can be used if the external static source is malfunctioning. This valve supplies static pressure from inside the cabin instead of the external static port.

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

(Continued Next Page)

## **PITOT-STATIC SYSTEM AND INSTRUMENTS**

(Continued)

Pressures within the cabin will vary with open heater/vents and windows. Refer to Section 5 for the configuration applicable to the use of the alternate static source and the correction charts.

### **AIRSPEED INDICATOR**

The airspeed indicator is calibrated in knots. It incorporates an internal, rotatable ring which allows true airspeed to be read off the face of the dial. The indicator incorporates windows at the six and twelve o'clock positions. The window at the six o'clock position displays true airspeed, and the window at the twelve o'clock position displays pressure altitude overlaid with a temperature scale.

Limitation and range markings (in KIAS) include the white arc (47 to 100 knots), green arc (59 to 149 knots), yellow arc (149 to 182 knots), and a red line (182 knots).

To find true airspeed, first determine pressure altitude and outside air temperature. Using this data, rotate the lower left knob until pressure altitude aligns with outside air temperature in the twelve o'clock window. True airspeed (corrected for pressure and temperature) can now be read in the six o'clock window. For maximum accuracy the true airspeed should be read opposite the calibration airspeed.

### **VERTICAL SPEED INDICATOR**

The vertical speed indicator depicts airplane rate of climb or descent in feet per minute. The pointer is actuated by atmospheric pressure changes resulting from changes of altitude as supplied by the static source.

### **ALTIMETER**

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

## VACUUM SYSTEM AND INSTRUMENTS

The vacuum system (Refer to Figure 7-12) provides vacuum necessary to operate the attitude indicator and directional indicator. The system consists of two engine driven vacuum pumps, two switches for measuring vacuum available through each pump, a vacuum relief valve, a vacuum system air filter, vacuum operated instruments, a vacuum gage, a low vacuum warning on the annunciator, and a manifold with check valves to allow for normal vacuum system operation if one of the vacuum pumps should fail.

### ATTITUDE INDICATOR

The attitude indicator is a vacuum/air-driven gyro that gives a visual indication of flight attitude. Bank attitude is presented by a pointer at the top of the indicator relative to the bank scale which has index marks at 10°, 20°, 30°, 60°, and 90° either side of the center mark. Pitch and roll attitudes are presented by a miniature airplane superimposed over a symbolic horizon area divided into two sections by a white horizon bar. The upper "blue sky" area and the lower "ground" area have pitch reference lines useful for pitch attitude control. A knob at the bottom of the instrument is provided for in-flight adjustment of the miniature airplane to the horizon bar for a more accurate flight attitude indication.

### DIRECTIONAL INDICATOR

The directional indicator is a vacuum/air - driven gyro that displays airplane heading on a compass card in relation to a fixed simulated airplane image and index. The indicator will precess slightly over a period of time. Therefore, the compass card should be set with the magnetic compass just prior to takeoff and readjusted as required throughout the flight. A knob on the lower left edge of the instrument is used to adjust the compass card to correct for precession. A knob on the lower right edge of the instrument is used to move the heading bug.

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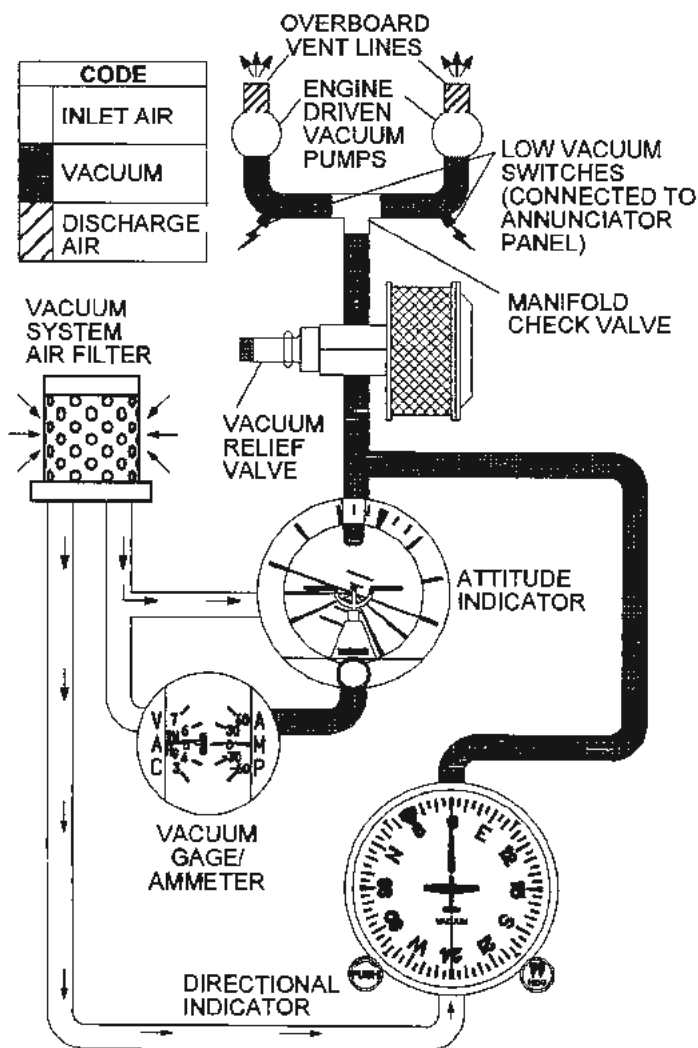


Figure 7-12. Vacuum System Schematic

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## VACUUM SYSTEM AND INSTRUMENTS (Continued) I

### VACUUM GAGE

The vacuum gage is part of the vacuum gage/ammeter, located on the lower left corner of the instrument panel. It is calibrated in inches of mercury and indicates vacuum air available for operation of the attitude and directional indicators. During operation at altitudes below 15,000 feet, the desired vacuum range is 4.5 to 5.5 inches of mercury. A vacuum reading out of this range at altitudes below 15,000 feet may indicate a system malfunction or improper adjustment, and in this case, the indicators should not be considered reliable. At 15,000 feet and above, the vacuum gage may indicate below 4.5 in. Hg. and still be adequate for normal vacuum system operation. A minimum vacuum gage reading of 4.5 in. Hg. is acceptable at 15,000 feet; for each additional 5000 foot altitude increment, up to 30,000 feet, a decrease of 0.5 in. Hg. is acceptable.

### LOW VACUUM ANNUNCIATION

Each engine driven vacuum pump is plumbed to a common tee, located forward of the firewall. From the tee, a single line runs into the cabin to operate the various vacuum system instruments. This tee contains check valves to prevent back flow into a pump if it fails. Transducers are located just upstream of the tee and measure vacuum output of each pump.

If output of the left pump falls below 3.0 in. Hg., the amber L VAC message will flash on the annunciator panel for approximately 10 seconds before turning steady on. If output of the right pump falls below 3.0 in. Hg., the amber VAC R message will flash on the annunciator panel for approximately 10 seconds before turning steady on. If output of both pumps falls below 3.0 in. Hg., the amber L VAC R message will flash on the annunciator panel for approximately 10 seconds before turning steady on.

## CLOCK/O.A.T. INDICATOR

An integrated clock/O.A.T./voltmeter is installed in the upper left side of the instrument panel as standard equipment. For a complete description and operating instructions, refer to the Supplements, Section 9.

## STALL WARNING SYSTEM

The airplane is equipped with a vane-type stall warning system, in the leading edge of the left wing, which is electrically connected to a stall warning horn located in the headliner above the left cabin door. A 5-amp push-to-reset circuit breaker labeled WARN, on the right side of the switch and control panel, protects the stall warning system. The vane in the wing senses the change in airflow over the wing, and operates the warning horn at airspeeds between 5 and 10 knots above the stall in all configurations.

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

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

## STANDARD AVIONICS

Standard avionics for the Model T206H airplanes include the following equipment:

- Nav/Com Radio with Glide Slope Indicator Head
- Transponder
- Audio Panel
- Emergency Locator Transmitter (ELT)
- Global Positioning System (GPS)
- Single Axis Autopilot

(Continued Next Page)

## **STANDARD AVIONICS** (Continued)

For complete operating instructions on the standard and optional avionics systems, refer to the Supplements, Section 9.

## **AVIONICS SUPPORT EQUIPMENT**

Avionics operations are supported by the avionics cooling fan, microphone and headset installations and static discharge wicks.

### **AVIONICS COOLING FAN**

An avionics cooling fan is installed on the left side of the interior firewall. The system utilizes a single electric fan and associated ductwork to force-cool the center stack radios.

Power to the electric fan is supplied through the AVN FAN circuit breaker. The fan operates whenever the master and avionics master switches are ON.

### **MICROPHONE AND HEADSET INSTALLATIONS**

Standard equipment for the airplane includes a handheld microphone, an overhead speaker, two remote-keyed microphone switches on the control wheel, and provisions for boom mic/headsets at each pilot and passenger station.

The handheld microphone contains an integral push-to-talk switch. This microphone is plugged into the center pedestal and is accessible to both the pilot and front passenger. Depressing the push-to-talk switch allows audio transmission on the Com radios.

The overhead speaker is located in the center overhead console. Volume and output for this speaker is controlled through the audio panel.

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## **AVIONICS SUPPORT EQUIPMENT** (Continued)

### **MICROPHONE AND HEADSET INSTALLATIONS** (Continued)

Each control wheel contains a miniature push-to-talk switch. This switch allows the pilot or front passenger to transmit on the Com radios using remote mics.

Each station of the airplane is wired for aviation-style headsets. Mic and headphone jacks are located on each respective arm rest and allow for communications between passengers and pilot. The system is wired so that microphones are all voice-activated. Additional wiring provisions inside the audio panel ensure that only the pilot or front passenger can transmit through the Com radios.

#### **NOTE**

To ensure audibility and clarity when transmitting with the handheld microphone, always hold it as closely as possible to the lips, then key the microphone and speak directly into it. Avoid covering opening on back side of microphone for optimum noise canceling.

### **STATIC DISCHARGERS**

Static wicks (static dischargers) are installed at various points throughout the airframe to reduce interference from precipitation static. Under some severe static conditions, loss of radio signals is possible even with static dischargers installed. Whenever possible, avoid known severe precipitation areas to prevent loss of dependable radio signals. If avoidance is impractical, minimize airspeed and anticipate temporary loss of radio signals while in these areas.

Static dischargers lose their effectiveness with age, and therefore, should be checked periodically (at least at every annual inspection) by qualified avionics technicians, etc.



## **CABIN FEATURES**

### **EMERGENCY LOCATOR TRANSMITTER (ELT)**

A remote switch/annunciator is installed on the top center location of the copilot's instrument panel for control of the ELT from the flight crew station. The annunciator, which is in the center of the rocker switch, illuminates when the ELT transmitter is transmitting. The ELT emits an omni-directional signal on the international distress frequencies of 121.5 MHz and 243.0 MHz. General aviation and commercial aircraft, the FAA and CAP monitor 121.5 MHz, and 243.0 Mhz is monitored by the military. For a basic overview of the ELT, refer to the Supplements, Section 9.

### **CABIN FIRE EXTINGUISHER**

A portable Halon 1211 (Bromochlorodifluoromethane) fire extinguisher is installed on the floorboard between the pilot's and copilot's seats where it is accessible in case of fire. The extinguisher has an Underwriters Laboratories classification of 5B:C. The extinguisher should be checked prior to each flight to ensure that its bottle pressure, as indicated by the gauge on the bottle, is within the green arc (approximately 125 psi) and the operating lever lock pin is securely in place.

To operate the fire extinguisher:

1. Loosen retaining clamp(s) and remove extinguisher from bracket.
2. Hold extinguisher upright, pull operating lever lock pin, and press lever while directing the discharge at the base of the fire at the near edge. Progress toward the back of the fire by moving the nozzle rapidly with a side to side sweeping motion.

(Continued Next Page)

## **I**CABIN FEATURES (Continued)

### **I**CABIN FIRE EXTINGUISHER (Continued)

#### **▲ WARNING**

**VENTILATE THE CABIN PROMPTLY AFTER SUCCESSFULLY EXTINGUISHING THE FIRE TO REDUCE THE GASES PRODUCED BY THERMAL DECOMPOSITION.**

3. Anticipate approximately eight seconds of discharge duration.

Fire extinguishers should be recharged by a qualified fire extinguisher agency after each use. Such agencies are listed under "Fire Extinguisher" in the telephone directory. After recharging, secure the extinguisher to its mounting bracket; do not allow it to lie loose on shelves or seats.

## SECTION 8

# AIRPLANE HANDLING, SERVICE & MAINTENANCE

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## INTRODUCTION

This section contains factory recommended procedures for proper ground handling and routine care and servicing of your airplane. It also identifies certain inspection and maintenance requirements which must be followed if your airplane is to retain that new airplane performance and dependability. It is important to follow a planned schedule of lubrication and preventive maintenance, based on climatic and flying conditions encountered in your local area.

Keep in touch with your local Cessna Service Station and take advantage of their knowledge and experience. Your Cessna Service Station knows your airplane and how to maintain it, and will remind you when lubrications and oil changes are necessary, as well as other seasonal and periodic services.

The airplane should be regularly inspected and maintained in accordance with information found in the airplane maintenance manual and in company issued service bulletins and service newsletters. All service bulletins pertaining to the aircraft by serial number should be accomplished and the airplane should receive repetitive and required inspections. Cessna does not condone modifications, whether by Supplemental Type Certificate or otherwise, unless these certificates are held and/or approved by Cessna. Other modifications may void warranties on the airplane since Cessna has no way of knowing the full effect on the overall airplane. Operation of an airplane that has been modified may be a risk to the occupants, and operating procedures and performance data set forth in the operating handbook may no longer be considered accurate for the modified airplane.

## IDENTIFICATION PLATE

All correspondence regarding your airplane should include the Serial Number. The Serial Number, Model Number, Production Certificate Number (PC) and Type Certificate Number (TC) can be found on the Identification Plate, located on the aft left tailcone. A secondary identification plate is also installed on the lower part of the left forward doorpost. Located adjacent to the secondary Identification Plate is a Finish and Trim Plate which contains a code describing the exterior paint combination of the airplane. The code may be used in conjunction with an applicable Illustrated Parts Catalog if finish and trim information is needed.

## **CESSNA OWNER ADVISORIES**

Cessna Owner Advisories are sent to Cessna Aircraft FAA registered owners of record at no charge to inform them about mandatory and/or beneficial aircraft service requirements and product changes. Copies of the actual bulletins are available from Cessna Service Stations and Cessna Customer Service.

### **UNITED STATES AIRPLANE OWNERS**

If your airplane is registered in the U.S., appropriate Cessna Owner Advisories will be mailed to you automatically according to the latest aircraft registration name and address which you have provided to the FAA. Therefore, it is important that you provide correct and up-to-date mailing information to the FAA.

If you require a duplicate Owner Advisory to be sent to an address different from the FAA aircraft registration address, please complete and return an Owner Advisory Application (otherwise no action is required on your part).

### **INTERNATIONAL AIRPLANE OWNERS**

To receive Cessna Owner Advisories, please complete and return an Owner Advisory Application.

Receipt of a valid Owner Advisory Application will establish your Cessna Owner Advisory service for one year, after which you will be sent a renewal notice. It is important that you respond promptly to update your address for this critical service.

## PUBLICATIONS

Various publications and flight operation aids are furnished in the airplane when delivered from the factory. These items are listed below.

- Customer Care Program Handbook
- Pilot's Operating Handbook and FAA Approved Airplane Flight Manual
- Pilot's Checklist
- Passenger Briefing Card
- Cessna Sales and Service Directory

To obtain additional publications or owner advisory information, you may contact Cessna's Product Support Department at (316) 517-5800. Fax (316) 942-9006 or write to Cessna Aircraft Company, P.O. Box 7706, Wichita, KS 67277, Dept 751C.

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

- Information Manual (contains Pilot's Operating Handbook Information)
- Maintenance Manual, Wiring Diagram Manual and Illustrated Parts Catalog

Your local Cessna Service Station has a Customer Care Supplies and Publications Catalog covering all available items, many of which the Service Station keeps on hand. The Service Station can place an order for any item which is not in stock.

### NOTE

A Pilot's Operating Handbook and FAA Approved Airplane Flight Manual which is lost or destroyed may be replaced by contacting your local Cessna Service Station. An affidavit containing the owner's name, airplane serial number and reason for replacement must be included in replacement requests since the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual is identified for specific serial numbered airplanes only.

## AIRPLANE FILE

There are miscellaneous data, information and licenses that are a part of the airplane file. The following is a checklist for that file. In addition, a periodic check should be made of the latest Federal Aviation Regulations to ensure that all data requirements are met.

To be displayed in the airplane at all times:

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

To be carried in the airplane at all times:

1. Current Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
2. Weight and Balance, and associated papers (latest copy of the Repair and Alteration Form, FAA Form 337, if applicable).
3. Equipment List.

To be made available upon request:

1. Airplane Log Book.
2. Engine Log Book.

Most of the items listed are required by the United States Federal Aviation Regulations. Since the Regulations of other nations may require other documents and data, owners of airplanes not registered in the United States should check with their own aviation officials to determine their individual requirements.

Cessna recommends that these items, plus the Pilot's Checklists, Customer Care Program Handbook and Customer Care Card, be carried in the airplane at all times.



## **AIRPLANE INSPECTION PERIODS**

### **FAA REQUIRED INSPECTIONS**

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

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

### **CESSNA INSPECTION PROGRAMS**

In lieu of the 100 hour and annual inspection requirements, an airplane may be inspected in accordance with a Progressive Care Inspection Program or a PhaseCard Inspection Program. Both programs allow the work load to be divided into smaller operations that can be accomplished in shorter time periods.

The Cessna Progressive Care Inspection Program allows an airplane to be inspected and maintained in four operations. The four operations are recycled each 200 hours and are recorded in a specially provided Aircraft Inspection Log as each operation is conducted.

The PhaseCard Inspection Program offers a parallel system for high-utilization flight operations (approximately 600 flight hours per year). This system utilizes 50 hour intervals (Phase 1 and Phase 2) to inspect high-usage systems and components. At 12 months or 600 flight hours, whichever occurs first, the airplane undergoes a complete (Phase 3) inspection.

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

### **CESSNA CUSTOMER CARE PROGRAM**

Specific benefits and provisions of the Cessna Warranty plus other important benefits for you are contained in the Customer Care Program Handbook supplied with your airplane. The Customer Care Program Handbook should be thoroughly reviewed and kept in the airplane at all times.

You will also want to return to your Cessna Service Station either at 50 hours for your first Progressive Care Operation, or at 100 hours for your first 100 hour inspection depending on which program you choose to establish for your airplane. While these important inspections will be performed for you by any Cessna Service Station, in most cases you will prefer to have the Cessna Service Station from whom you purchased the airplane accomplish this work.

### **PILOT CONDUCTED PREVENTIVE MAINTENANCE**

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

#### **NOTE**

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

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

## ALTERATIONS OR REPAIRS

It is essential that the FAA be contacted prior to any alterations to the airplane to ensure that airworthiness of the airplane is not violated. Alterations or repairs to the airplane must be accomplished by licensed personnel, utilizing only FAA Approved components and FAA Approved data, such as Cessna Service Bulletins.

## GROUND HANDLING

### TOWING

The airplane is most easily and safely maneuvered by hand with the tow bar attached to the nose wheel (the tow bar is stowed behind the rear passenger seats). When towing with a vehicle, do not exceed the nose gear turning angle of 35° either side of center, or damage to the nose landing gear will result.

### CAUTION

#### **REMOVE ANY INSTALLED RUDDER LOCK BEFORE TOWING.**

If the airplane is towed or pushed over a rough surface during hangaring, watch that the normal cushioning action of the nose strut does not cause excessive vertical movement of the tail and the resulting contact with low hangar doors or structure. A flat nose tire or deflated strut will also increase tail height.

## **PARKING**

When parking the airplane, head into the wind and set the parking brake. Do not set the parking brake during cold weather when accumulated moisture may freeze the brakes, or when the brakes are overheated. Close the cowl flaps, install the control wheel lock and chock the wheels. In severe weather and high wind conditions, tie the airplane down as outlined in the following paragraph.

## **TIE-DOWN**

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

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

## **JACKING**

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

Individual main gear may be jacked by using the jack pad which is incorporated in the main landing gear strut step bracket. When using the individual gear strut jack pad, flexibility of the gear strut will cause the main wheel to slide inboard as the wheel is raised, tilting the jack. The jack must then be lowered for a second jacking operation. Do not jack both main wheels simultaneously using the individual main gear jack pads.

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

**⚠ CAUTION**

**DO NOT APPLY PRESSURE ON THE ELEVATOR OR HORIZONTAL STABILIZER SURFACES. WHEN PUSHING ON THE TAILCONE, ALWAYS APPLY PRESSURE AT A BULKHEAD TO AVOID BUCKLING THE SKIN.**

To assist in raising and holding the nose wheel off the ground, ground anchors should be utilized at the tail tie down point.

**NOTE**

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

**LEVELING**

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

**FLYABLE STORAGE**

Engines in airplanes that are flown only occasionally may not achieve normal service life because of internal corrosion. Corrosion occurs when moisture from the air and the products of combustion combine to attack cylinder walls and bearing surfaces during periods when the airplane is not flown.

The minimum recommended operating frequency for the engine is one continuous flight hour (not counting taxi, takeoff and landing time) with oil temperatures of 165°F to 200°F every 30 days or less (depending on location and storage conditions). Airplanes operated close to oceans, lakes, rivers and in humid regions are in greater need of engine preservation than airplanes operated in arid regions. Appropriate engine preservation procedures must be practiced by the owner or operator of the airplane based on present environmental conditions and the frequency of airplane activity.

#### NOTE

The engine manufacturer does not recommend pulling the engine through by hand during storage periods.

If the airplane is to remain inactive for more than 30 days, consult the latest revision of Textron Lycoming Service Letter L180 ([www.lycoming.textron.com](http://www.lycoming.textron.com)).

## SERVICING

In addition to the Preflight Inspection covered in Section 4 of this handbook, complete servicing, inspection and test requirements for your airplane are detailed in the Maintenance Manual. The Maintenance Manual outlines all items which require attention at specific intervals plus those items which require servicing, inspection, and/or testing at special intervals.

Since Cessna Service Stations conduct all service, inspection, and test procedures in accordance with applicable Maintenance Manuals, it is recommended that you contact your local Cessna Service Stations concerning these requirements and begin scheduling your airplane for service at the recommended intervals.

Cessna Progressive Care ensures that these requirements are accomplished at the required intervals to comply with the 100 hour or annual inspection as previously covered.

Depending on various flight operations, your local Government Aviation Agency may require additional service, inspections, or tests. For these regulatory requirements, owners should check with local aviation officials where the airplane is being operated.

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

## OIL

### OIL SPECIFICATION

MIL-L-22851 or SAE J1899 Aviation Grade Ashless Dispersant Oil: Oil conforming to Textron Lycoming Service Instructions No. 1014, and all revisions and supplements thereto.

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

### RECOMMENDED VISCOSITY FOR TEMPERATURE RANGE

Multiviscosity or straight grade oil may be used throughout the year for engine lubrication. Refer to the following table for temperature verses viscosity ranges.

Temperature	MIL-L-22851 or SAE J1899 Ashless Dispersant Oil SAE Grade
Above 27°C (80°F)	60
Above 16°C (60°F)	40 or 50
-1°C (30°F) to 32°C (90°F)	40
-18°C (0°F) to 21°C (70°F)	30, 40 or 20W-40
Below -12°C (10°F)	30 or 20W-30
-18°C (0°F) to 32°C (90°F)	20W-50 or 15W-50
All Temperatures	15W-50 or 20W-50

### CAPACITY OF ENGINE SUMP

The engine has a total capacity of 12 quarts, with the oil filter accounting for approximately one quart of that total. The engine oil sump has a capacity of 11 quarts. The engine must not be operated on less than 6 quarts (as measured by the dipstick). For extended flights, the engine should be filled to capacity.

### OIL AND OIL FILTER CHANGE

After the first 25 hours of operation, drain the engine oil sump and replace the filter. Refill sump with aviation grade ashless dispersant oil. Ashless dispersant oil (and oil filter) should be changed at time intervals set forth by the engine manufacturer.

### NOTE

During the first 25 hour oil and filter change, a general inspection of the overall engine compartment is required. Items which are not normally checked during a preflight inspection should be given special attention. Hoses, metal lines and fittings should be inspected for signs of oil and fuel leaks, and checked for abrasions, chafing, security, proper routing and support, and evidence of deterioration. Inspect the intake and exhaust systems for cracks, evidence of leakage, and security of attachment. Engine controls and linkages should be checked for freedom of movement through their full range, security of attachment and evidence of wear. Inspect wiring for security, chafing, burning, defective insulation, loose or broken terminals, heat deterioration, and corroded terminals. Check the alternator belt in accordance with Maintenance Manual instructions, and retighten if necessary. A periodic check of these items during subsequent servicing operations is recommended.



## FUEL

### APPROVED FUEL GRADES (AND COLORS)

100LL Grade Aviation Fuel (Blue).  
100 Grade Aviation Fuel (Green).

#### NOTE

Isopropyl alcohol or diethylene glycol monomethyl ether (DiEGME) may be added to the fuel supply in quantities not to exceed 1% (alcohol) or 0.15% (DiEGME) of total volume. Refer to Fuel Additives in later paragraphs for additional information.

### FUEL CAPACITY

92.0 U.S. Gallons Total: 46.0 U.S. Gallons per tank.

#### NOTE

To ensure maximum fuel capacity when refueling and minimize cross feeding, the fuel selector valve should be placed in either the LEFT or RIGHT position and the airplane parked in a wings level, normal ground attitude. Refer to Figure 1-1 for a definition of normal ground attitude.

Service the fuel system after each flight, and keep fuel tanks full to minimize condensation in the tanks.

### FUEL ADDITIVES

Strict adherence to recommended preflight draining instructions as called for in Section 4 will eliminate any free water accumulations from the tank sumps. While small amounts of water may still remain in solution in the gasoline, it will normally be consumed and go unnoticed in the operation of the engine.

One exception to this can be encountered when operating under the combined effect of: (1) use of certain fuels, with (2) high humidity conditions on the ground (3) followed by flight at high altitude and low temperature. Under these unusual conditions, small amounts of water in solution can precipitate from the fuel stream and freeze in sufficient quantities to induce partial icing of the engine fuel system.

While these conditions are quite rare and will not normally pose a problem to owners and operators, they do exist in certain areas of the world and consequently must be dealt with, when encountered.

Therefore, to help alleviate the possibility of fuel icing occurring under these unusual conditions, it is permissible to add isopropyl alcohol or diethylene glycol monomethyl ether (DiEGME) compound to the fuel supply.

The introduction of alcohol or DiEGME compound into the fuel provides two distinct effects: (1) it absorbs the dissolved water from the gasoline and (2) alcohol has a freezing temperature depressant effect.

#### NOTE

When using fuel additives, it must be remembered that the final goal is to obtain a correct fuel-to-additive ratio in the tank, and not just with fuel coming out of the refueling nozzle. For example, adding 15 gallons of correctly proportioned fuel to a tank which contains 20 gallons of untreated fuel will result in a lower-than-acceptable concentration level to the 35 gallons of fuel which now reside in the tank.

Alcohol, if used, is to be blended with the fuel in a concentration of 1% by volume. Concentrations greater than 1% are not recommended since they can be detrimental to fuel tank materials.

The manner in which the alcohol is added to the fuel is significant because alcohol is most effective when it is completely dissolved in the fuel. To ensure proper mixing, the following is recommended:

1. For best results, the alcohol should be added during the fueling operation by pouring the alcohol directly on the fuel stream issuing from the fueling nozzle.

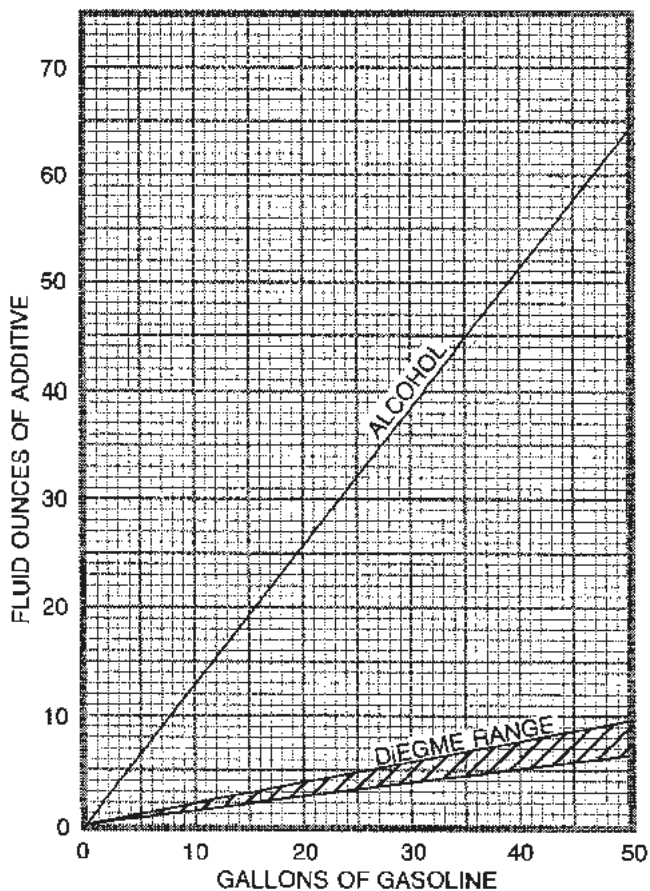


Figure 8-1. Fuel Mixing Ratio

2. An alternate method that may be used is to premix the complete alcohol dosage with some fuel in a separate clean container (approximately 2-3 gallon capacity) and then transferring this mixture to the tank prior to the fuel operation.

Diethylene glycol monomethyl ether (DiEGME) compound must be carefully mixed with the fuel in concentrations between 0.10% (minimum) and 0.15% (maximum) of total fuel volume. Refer to Figure 8-1 for a DiEGME-to-fuel mixing chart.

**⚠ WARNING**

**ANTI-ICING ADDITIVE IS DANGEROUS TO HEALTH WHEN BREATHED AND/OR ABSORBED INTO THE SKIN.**

**⚠ CAUTION**

**MIXING OF DIEGME WITH FUEL IS EXTREMELY IMPORTANT. A CONCENTRATION IN EXCESS OF THAT RECOMMENDED (0.15% BY VOLUME MAXIMUM) WILL RESULT IN DETRIMENTAL EFFECTS TO THE FUEL TANKS, AND SEALANT, AND DAMAGE TO O-RINGS AND SEALS USED IN THE FUEL SYSTEM AND ENGINE COMPONENTS. A CONCENTRATION OF LESS THAN THAT RECOMMENDED (0.10% BY TOTAL VOLUME MINIMUM) WILL RESULT IN INEFFECTIVE TREATMENT. USE ONLY BLENDING EQUIPMENT THAT IS RECOMMENDED BY THE MANUFACTURER TO OBTAIN PROPER PROPORTIONING.**

Prolonged storage of the airplane will result in a water buildup in the fuel which "leeches out" the additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. The concentration can be checked using a differential refractometer. It is imperative that the technical manual for the differential refractometer be followed explicitly when checking the additive concentration.

## FUEL CONTAMINATION

Fuel contamination is usually the result of foreign material present in the fuel system, and may consist of water, rust, sand, dirt, microbes or bacterial growth. In addition, additives that are not compatible with fuel or fuel system components can cause the fuel to become contaminated.

Before each flight and after each refueling, use a clear sampler cup and drain at least a cupful of fuel from each fuel tank drain location and from the fuel strainer quick-drain valve to determine if contaminants are present, and to ensure the airplane has been fueled with the proper grade of fuel.

If contamination is detected, drain all fuel drain points again, including the fuel reservoir and the fuel selector quick drain valves, and then gently rock the wings and lower the tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If, after repeated sampling, evidence of contamination still exists, the airplane should not be flown. Tanks should be drained and system purged by qualified maintenance personnel. All evidence of contamination must be removed before further flight. If the airplane has been serviced with the improper fuel grade, defuel completely and refuel with the correct grade. Do not fly the airplane with contaminated or unapproved fuel.

In addition, Owners/Operators who are not acquainted with a particular fixed base operator should be assured that the fuel supply has been checked for contamination and is properly filtered before allowing the airplane to be serviced. Fuel tanks should be kept full between flights, provided weight and balance considerations will permit, to reduce the possibility of water condensing on the walls of partially filled tanks.

To further reduce the possibility of contaminated fuel, routine maintenance of the fuel system should be performed in accordance with the airplane Maintenance Manual. Only the proper fuel, as recommended in this handbook, should be used, and fuel additives should not be used unless approved by Cessna and the Federal Aviation Administration.

## OXYGEN FILLING PRESSURES

The oxygen cylinder, when fully charged, contains approximately 76 cubic feet of aviator's breathing oxygen (Spec. No. MIL-O-27210), under a pressure of 1850 PSI at 21°C (70°F). Filling pressures will vary, however, due to ambient temperature in the filling area, and the temperature rise resulting from compression of the oxygen. Because of this, merely filling to 1850 PSI will not result in a properly filled cylinder. Fill to pressures indicated on the table below for ambient temperature.

AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG	AMBIENT TEMPERATURE °F	FILLING PRESSURE PSIG
0	1850	50	1875
10	1700	60	1925
20	1725	70	1975
30	1775	80	2000
40	1825	90	2050

Figure 8-2. Oxygen Filling Pressures

### WARNING

**OIL, GREASE OR OTHER LUBRICANTS IN CONTACT WITH OXYGEN CREATE A SERIOUS FIRE HAZARD, AND SUCH CONTACT MUST BE AVOIDED WHEN HANDLING OXYGEN EQUIPMENT.**

### NOTE

Verify that a complete oxygen system installation (not just a partial system) is in the airplane before attempting to service the oxygen system.

## LANDING GEAR

Consult the following table for servicing information on the landing gear.

COMPONENT	SERVICING CRITERIA
Nose Wheel (5.00-5, 6-Ply Rated Tire)	49.0 PSI
Main Wheel (6.00-6, 6-Ply Rated Tire)	42.0 PSI
Nose Wheel (6.00-6, 6-Ply Rated Tire)	29.0 PSI
Main Wheel (8.00-6, 6-Ply Rated Tire)	35.0 PSI
Brakes	MIL-H-5606
Nose Gear Shock Strut	MIL-H-5606; 80.0 PSI *

- \* Keep strut filled with MIL-H-5606 hydraulic fluid per filling instructions placard, and with no load on the strut, inflate with air to 80.0 PSI. Do not over inflate.

## CLEANING AND CARE

### WINDSHIELD AND 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.

### CAUTION

**NEVER USE GASOLINE, BENZENE, ALCOHOL, ACETONE, FIRE EXTINGUISHER, ANTI-ICE FLUID, LACQUER THINNER OR GLASS CLEANER TO CLEAN THE PLASTIC. THESE MATERIALS WILL ATTACK THE PLASTIC AND MAY CAUSE IT TO CRAZE.**

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

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.

Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent. Take special care to make sure that the exterior graphics are not touched by the solvent. For complete care of exterior graphics, refer to the Maintenance Manual.

To seal any minor surface chips or scratches and protect against corrosion, the airplane should be waxed regularly with a good automotive wax applied in accordance with the manufacturer's instructions. If the airplane is operated in a seacoast or other salt water environment, it must be washed and waxed more frequently to assure adequate protection. Special care should be taken to seal around rivet heads and skin laps, which are the areas most susceptible to corrosion. A heavier coating of wax on the leading edges of the wings and tail and on the cowl nose cap and propeller spinner will help reduce the abrasion encountered in these areas. Reapplication of wax will generally be necessary after cleaning with soap solution or after chemical deicing operations.



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. Isopropyl alcohol will satisfactorily remove ice accumulations without damaging the paint. However, keep the isopropyl alcohol away from the windshield and cabin windows since it will attack the plastic and may cause it to craze.

### **STABILIZER ABRASION BOOT CARE**

If the airplane is equipped with stabilizer abrasion boots, keep them clean and free from oil and grease which can swell the rubber. Wash them with mild soap and water, using Form Tech AC cleaner or naphtha to remove stubborn grease. Do not scrub the boots, and be sure to wipe off all solvent before it dries. Boots with loosened edges or small tears should be repaired. Your Cessna Service Station has the proper materials and experience to do this correctly.

### **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 blade life. Small nicks on the propeller, particularly near the tips and on the leading edges, should be dressed out as soon as possible since these nicks produce stress concentrations, and if ignored, may result in cracks or failure of the propeller blade. Never use an alkaline cleaner on the blades; remove grease and dirt with Stoddard solvent.

### **ANTI-ICE BOOT CARE**

The optional propeller anti-ice boots have a special electrically-conductive coating to bleed off static charges which cause radio interference and may perforate the boots. Servicing operations should be done carefully to avoid damaging this conductive coating or tearing the boots.

To prolong the life of anti-ice boots, they should be washed and serviced on a regular basis. Keep the boots clean and free from oil, grease and other solvents which cause rubber to swell and deteriorate. Outlined below are recommended cleaning and servicing procedures.

**⚠ CAUTION**

**USE ONLY THE FOLLOWING INSTRUCTIONS WHEN CLEANING BOOTS. DISREGARD INSTRUCTIONS WHICH RECOMMEND PETROLEUM BASE LIQUIDS (MEK, NON-LEADED GASOLINE, ETC.) WHICH CAN HARM THE BOOT MATERIAL.**

1. Clean boots with mild soap and water, then rinse thoroughly with clean water.

**NOTE**

Isopropyl alcohol can be used to remove grime which cannot be removed using soap. If isopropyl alcohol is used for cleaning, wash area with mild soap and water, then rinse thoroughly with clean water.

2. Allow the boots to dry, then apply a coating of Age Master No. 1 to the boots in accordance with application instruction on the container.

**NOTE**

Age Master No. 1 is beneficial for its ozone and weather resistance features.

3. After the boots have been treated with Age Master No. 1, apply a coating of ICEX to the boots in accordance with applicable instructions on the ICEX container.

**NOTE**

ICEX may be beneficial as an ice adhesion depressant. Both Age Master No. 1 and ICEX are distributed by the B.F. Goodrich Company.

**⚠ CAUTION**

**ICEX CONTAINS SILICONE, WHICH LESSENS PAINT ADHESION. USE CARE WHEN APPLYING ICEX, AND PROTECT ADJACENT SURFACES FROM OVERSPRAY, SINCE OVERSPRAY OF ICEX WILL MAKE TOUCH-UP PAINTING ALMOST IMPOSSIBLE.**

Age Master No. 1 and ITEX coatings last approximately 15 hours on propeller anti-ice boots.

### ENGINE CARE

The engine may be cleaned, using a suitable solvent, in accordance with instructions in the airplane Maintenance Manual. Most efficient cleaning is done using a spray type cleaner. Before spray cleaning, ensure that protection is afforded for components which might be adversely affected by the solvent. Refer to the Maintenance Manual for proper lubrication of controls and components after engine cleaning. The induction air filter should be replaced when its condition warrants, not to exceed 500 hrs.

### 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.

For complete information related to interior cleaning, refer to the Maintenance Manual.

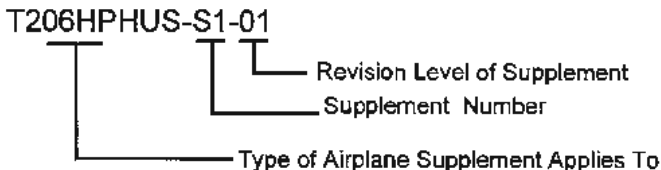
## SUPPLEMENTS

### INTRODUCTION

The supplements in this section contain amended operating limitations, operating procedures, performance data and other necessary information for airplanes equipped with specific options. Operators should refer to each supplement to ensure that all limitations and procedures appropriate for their airplane are observed.

A Log Of Approved Supplements is provided, for convenience only, beginning on page Log-1 and is a numerical list of all supplements applicable to this airplane by name, number and revision level. This log should be used as a checklist to ensure all applicable supplements have been placed in the Pilot's Operating Handbook (POH). Supplements may be removed from the POH provided the equipment is not installed on the airplane. If equipment is installed on the airplane, however, the supplement(s) must be retained and updated as revisions to each supplement are issued.

Each individual supplement contains its own Log of Effective Pages. This log lists the page number and effective date of every page in the supplement. The log also lists the dates on which revisions to the supplement occurred. Additionally, the part number of the supplement provides information on the revision level. Refer to the following example:



## LOG OF APPROVED SUPPLEMENTS

### NOTE

IT IS THE AIRPLANE OWNER'S RESPONSIBILITY TO MAKE SURE THAT HE OR SHE HAS THE LATEST REVISION TO EACH SUPPLEMENT OF A PILOT'S OPERATING HANDBOOK AND THE LATEST ISSUED "LOG OF APPROVED SUPPLEMENTS." THIS "LOG OF APPROVED SUPPLEMENTS" WAS THE LATEST REVISION AS OF THE DATE IT WAS SHIPPED BY CESSNA; HOWEVER, SOME CHANGES MAY HAVE OCCURRED AND THE OWNER SHOULD VERIFY THIS IS THE LATEST, MOST UP-TO-DATE VERSION BY CONTACTING CESSNA CUSTOMER SUPPORT AT (316) 517-5800.

SUPP. NO.	SUPPLEMENT NAME	REVISION LEVEL	EQUIPMENT INSTALLED
1	Bendix/King KX 155A VHF NAV/COMM with KI 208 or KI 209A Indicator Head	0	_____
2	Bendix/King KT 76C Transponder with Blind Encoder	1	_____
3	Bendix/King KMA 26 Audio Selector Panel	0	_____
4	Pointer Model 3000-11 or Model 4000-11 Emergency Locator Transmitter (ELT)	2	_____
5	Bendix/King KLN 89B Global Positioning System (GPS)	2	_____
6	Bendix/King KR 87 Automatic Direction Finder (ADF)	0	_____
7	Bendix/King KAP 140 Single Axis Autopilot	2	_____
8	Reserved INSTRUMENT PANEL		184 7010
9	Davtron Model 803 Clock/OAT	0	_____
10	Bendix/King KLN 89 VFR Global Positioning System (GPS)	1	_____
11	Reserved		_____

**LOG OF APPROVED SUPPLEMENTS**

SUPP. NO.	SUPPLEMENT NAME	REVISION LEVEL	EQUIPMENT INSTALLED
12	Canadian Supplement	1	_____
13	Bendix/King KCS-55A Slaved Compass with KI-525A Horizontal Situation Indicator (HSI)	0	_____
14	Reserved		_____
15	Bendix/King KAP 140 2 Axis Autopilot	6	_____
16	Cargo Pack	0	_____
17	Propeller De-ice	0	_____
18	Century Horizontal Situation Indicator (HSI)	0	_____
19	Bendix/King KLN 94 Global Positioning System (IFR)	4	_____
20	Bendix/King KMA 28 Audio Selector Panel	0	_____
21	Bendix/King KMD 550 Multi-Function Display	0	_____
22	12 Volt Cabin Power System	0	_____
23	BFGoodrich WX-500 Stormscope®	0	_____
24	Astrotech Model TC-2 Clock/OAT/Volt Indicator	0	_____
25	Bendix/King KX 165A VHF NAV/COMM	0	_____
26	Bendix/King KDR 510 Flight Information Services (FIS)	0	_____
27	KMH 880 Multi-Hazard Awareness System	0	_____
28	Bendix/King KT 73 Mode S Transponder	0	_____

T206HUSLOG13



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON**

**SUPPLEMENT 1**

**BENDIX/KING KX 155A  
VHF NAV/COMM  
with KI 208 or KI 209A INDICATOR HEAD**

SERIAL NO.	T20608172
REGISTRATION NO.	OK-HCP

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the VHF/NAV COMM with Indicator Head is installed.

FAA APPROVAL
<b>FAA APPROVED UNDER FAR 21 SUBPART J</b>
The Cessna Aircraft Co
Delegation Option Manufacturer CE-1
<i>Richard D. Whiting</i> Executive Engineer
Date: 19 December 1998

 Member of GAMA

**9 November 1998**

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WICHITA, KANSAS, USA

T206HPHUS-S1-00

S1-1

## SUPPLEMENT 1

### BENDIX/KING KX 155A VHF NAV/COMM with KI 208 or KI 209A INDICATOR HEAD

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision.

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Nov. 9, 1998

#### LOG OF EFFECTIVITY PAGES

<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S1-1)	Nov 9/98	S1-9	Nov 9/98
S1-2	Nov 9/98	S1-10	Nov 9/98
S1-3	Nov 9/98	S1-11	Nov 9/98
S1-4	Nov 9/98	S1-12	Nov 9/98
S1-5	Nov 9/98	S1-13	Nov 9/98
S1-6	Nov 9/98	S1-14	Nov 9/98
S1-7	Nov 9/98	S1-15	Nov 9/98
S1-8	Nov 9/98	S1-16 blank	Nov 9/98

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## **SUPPLEMENT**

### **BENDIX/KING KX 155A VHF NAV/COMM with KI 208 or KI 209A INDICATOR HEAD**

#### **SECTION 1 GENERAL**

The Bendix/King KX 155A VHF Nav/Comm, shown in Figure 1, consists of a panel-mounted receiver-transmitter and a KI 208 or KI 209A Indicator.

The set includes a 760-channel VHF communications receiver-transmitter and a 200-channel VHF navigation receiver. A 40-channel glide- slope receiver is also included if the KI 209A indicator is used. The communications receiver-transmitter receives and transmits signals between 118.00 and 136.975 MHz with 25-kHz spacing. Optional 8.33 kHz (2280 channel) Comm is available. The navigation receiver receives VOR and localizer signals between 108.00 and 117.95 MHz in 50-kHz steps. The glide slope receiver is automatically tuned when a localizer frequency is selected. The circuits required to interpret the VOR and localizer signals are also an integral part of the Nav receiver.

Large self-dimming gas discharge readouts display both the communications and navigation operating frequencies. The KX-155A's "flip-flop" preselect feature enables you to store one frequency in the standby display while operating on another and then interchange them instantly with the touch of a button. Both the active (COMM) and the standby (STBY) frequencies may be displayed at all times and are stored in nonvolatile memory without drain on the aircraft battery. KX 155A has 32 programmable comm channels, a stuck microphone alert and transmitter shutdown, Bearing To/From radial mode, course deviation indicator mode and an elapsed timer mode.

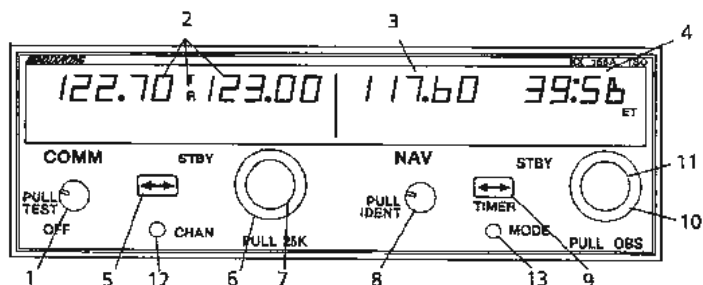
The Comm portion incorporates an automatic squelch. To override the automatic squelch, the Comm volume control knob is pulled out. Push the knob back in to reactivate the automatic squelch. A "T" will be displayed during transmit and "R" during valid signal reception.

The Nav portion uses the pull out feature of the Nav volume control to receive the Nav signal Ident. Pull the volume control knob out to hear the Ident signal plus voice. Push the knob in to attenuate the Ident signal and still hear Nav voice.

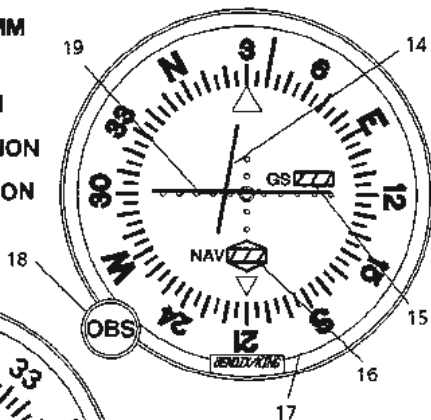
All controls for the Nav/Comm, except those for navigation course selection, are mounted on the front panel of the receiver-transmitter. Control lighting is provided by NAV/COMM interior lighting and the instrument panel flood lighting system. Operation and description of the audio selector panel used in conjunction with this radio is shown and described in Supplement 3 in this section.

#### NOTE

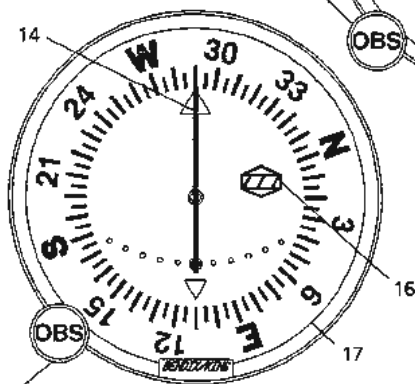
The unit has a stuck microphone alert feature. If the microphone is keyed continuously for greater than 33 seconds, the transmitter stops transmitting and the active Comm frequency flashes to alert the pilot of the stuck mic condition.



**KX 155A VHF NAV/COMM**



**KI 209A INDICATOR**

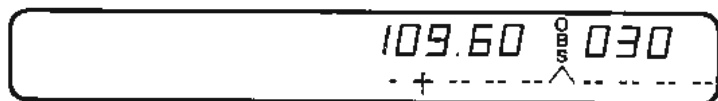


**KI 208 INDICATOR HEAD**

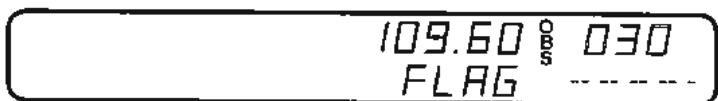
0585C1045  
0585C1046  
0585C1047

Figure 1. Bendix/King KX 155A VHF NAV/COMM with KI 208 or KI 209A Indicator Head (Sheet 1 of 7)

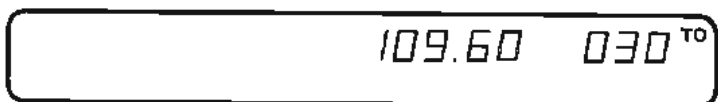
NAV FUNCTION DISPLAYS



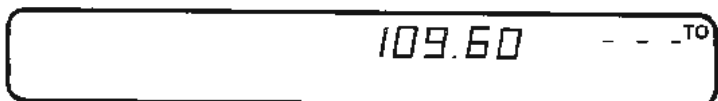
VOR MODE: ACTIVE/BEARING, CDI FORMAT



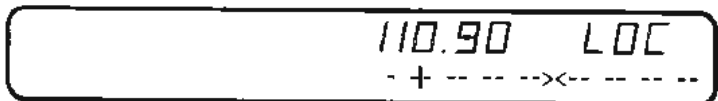
VOR MODE: ACTIVE/BEARING, FLAG DISPLAY



VOR MODE: ACTIVE "BEARING TO" FUNCTION DISPLAY



VOR MODE: ACTIVE/BEARING, FLAG DISPLAY



LOCALIZER MODE: FREQUENCY/CDI FORMAT

Figure 1. Bendix/King KX 155A VHF NAV/COMM with KI 208 or  
KI 209A Indicator Head (Sheet 2 of 7)

1. **COMM VOLUME CONTROL (OFF/PULL/TEST)** -- Rotate the VOL knob clockwise from the OFF position. Pull the VOL knob out and adjust for desired listening level. Push the VOL knob back in to actuate the automatic squelch. The VOL knob may also be pulled out to hear particularly weak signals.
2. **OPERATING COMM FREQUENCY DISPLAY** -- Displays COMM ACTIVE and COMM STANDBY frequencies with a "T" between them to indicate TRANSMIT and an "R" to indicate RECEIVE modes of operation.
3. **OPERATING NAV FREQUENCY DISPLAY** -- The right portion of the display is allocated to NAV receiver ACTIVE and STANDBY information. The frequency channeling is similar to the COMM when operating in the frequency mode. The NAV ACTIVE and STANDBY frequencies are stored in the memory on power down and return on power up.
4. **NAV STANDBY/OBS/Bearing/Radial/Timer Display** -- The right side of the NAV display is controlled by the MODE SELECTOR BUTTON (see #13 below). With an active VOR frequency, this portion of the display shows the STANDBY frequency, OBS setting for the internal CDI, the bearing to the VOR station, radial from the VOR station, or a count-up/count-down timer. With an active localizer frequency, this portion of the display shows the standby frequency, the letters "LOC", or count-up/count-down timer.
5. **COMM FREQUENCY TRANSFER BUTTON (  $\longleftrightarrow$  )** -- Interchanges the frequencies in the USE and STANDBY displays. To tune the radio to the desired operating frequency, the desired frequency must be entered into the standby display and then the transfer button must be pushed. This will trade the contents of the active and standby displays. The operating frequency can also be entered by accessing the ACTIVE ENTRY (direct tune) mode which is done by pushing the COMM TRANSFER button for 2 or more seconds. In the direct tune mode, only the active part of the display is visible. The desired frequency can be directly entered into the display. Push the COMM TRANSFER button again to return to the active/standby display.

Figure 1. Bendix/King KX 155A VHF NAV/COMM with KI 208 or KI 209A Indicator Head (Sheet 3 of 7)

The transceiver is always tuned to the frequency appearing in the ACTIVE display. It is, therefore, possible to have two different frequencies stored in the ACTIVE and STANDBY displays and to change back and forth between them at the simple push of the transfer button.


6. COMM FREQUENCY SELECTOR KNOB (OUTER) – The outer, larger selector knob is used to change the MHz portion of the frequency display. At either band-edge of the 118-136 MHz frequency spectrum, an offscale rotation will wrap the display around to the other frequency band-edge (i.e., 136 MHz advances to 118 MHz).
7. COMM FREQUENCY SELECTOR KNOB (INNER) – This smaller knob is designed to change the indicated frequency in steps of 50-kHz when it is pushed in, and in 25-kHz steps when it is pulled out. For 8.33 kHz versions, channels are incremented in 25 kHz steps with the knob pushed in and 8.33 kHz with the knob pulled out.
8. NAV/VOLUME CONTROL (PULL IDENT) – Adjusts volume of navigation receiver audio. When the knob is pulled out, the Ident signal plus voice may be heard. The volume of voice/ident can be adjusted by turning this knob.
9. NAV/FREQUENCY TRANSFER BUTTON (  ) – Interchanges the NAV Active and STANDBY frequencies. Depressing the NAV frequency transfer button for 2 seconds or more will cause the display to go into the ACTIVE ENTRY mode. Only the ACTIVE frequency will be displayed and it can be directly changed by using the NAV inc/dec knobs. The display will return to the ACTIVE/STANDBY mode when the NAV frequency transfer button is pushed.

Figure 1. Bendix/King KX 155A VHF NAV/COMM with KI 208 or KI 209A Indicator Head (Sheet 4 of 7)

10. NAV FREQUENCY SELECTOR KNOB (OUTER) -- Operates in 1 MHz steps. The frequency inc/dec operates the STANDBY frequency display. A clockwise rotation will increase the previous frequency while a counterclockwise rotation will decrease the previous frequency. Exceeding the upper limit of the frequency band will automatically return to the lower limit and vice versa.
11. NAV FREQUENCY SELECTOR KNOB (INNER) -- Operates in 50 kHz steps. The NAV receiver's lower and upper frequency limits are 108.00 MHz and 117.95 MHz. Exceeding the upper limit of frequency band will automatically return to the lower limit and vice versa. A clockwise rotation will increase (inc) the previous frequency while a counterclockwise rotation will decrease (dec) the previous frequency.
12. CHANNEL BUTTON -- Pressing the CHAN button for 2 or more seconds will cause the unit to enter the channel program (PG) mode. Upon entering the channel program mode, the channel number will flash indicating that it can be programmed. The desired channel can be selected by turning the comm kHz knob. The channel frequency can be entered by pushing the comm transfer button which will cause the standby frequency to flash. The comm frequency knobs are then used to enter the desired frequency. If dashes (located between 136 MHz and 118 MHz) are entered instead of a frequency, the corresponding channel is skipped in channel selection mode. Additional channels may be programmed by pressing the COMM transfer button and using the same procedure. The channel information is saved by pushing the CHAN button which will also cause the unit to return to the previous frequency entry mode.

The channel selection mode (CH) can then be entered by momentarily pushing the CHAN button. The comm frequency knobs can be used to select the desired channel. The unit will automatically default to the previous mode if no channel is selected within 2 seconds after entering the channel selection mode. The unit is placed in the transmit mode by depressing a mic button.

Figure 1. Bendix/King KX 155A VHF NAV/COMM with KI 208 or KI 209A Indicator Head (Sheet 5 of 7)

13. **MODE SELECTOR BUTTON** -- Depressing the mode button will cause the NAV display to go from the ACTIVE/STANDBY format to the ACTIVE/CDI (Course Deviation Indicator) format. In the CDI mode, the frequency inc/dec knob (pushed in) channels the ACTIVE frequency. When the ACTIVE window is tuned to a VOR frequency, the standby frequency area is replaced by a three digit OBS (Omni Bearing Selector) display. The desired OBS course can be selected by pulling out the inner NAV frequency knob and turning it. This OBS display is independent of any OBS course selected on an external CDI. An "OBS" in the middle of the NAV display will flash while the inner NAV frequency knob is pulled out. The CDI is displayed on the line below the frequency/OBS. When the ACTIVE window is tuned to a localizer frequency, the standby frequency area is replaced by "LOC". When the received signal is too weak to ensure accuracy the display will "FLAG".

Depressing the mode button again will cause the NAV display to go from the ACTIVE/CDI format to the ACTIVE/BEARING format. In the BEARING mode, the frequency inc/dec knob channels the ACTIVE frequency window. Depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display. In bearing mode, the right hand window of the NAV display shows the bearing TO the station. When a too weak or invalid VOR signal is received the display flags (dashes).

Another push of the mode button will cause the NAV display to go from the ACTIVE/BEARING format to the ACTIVE/RADIAL format. In the RADIAL mode, the frequency inc/dec knobs channel the ACTIVE frequency window and depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display. In radial mode of operation, the right hand window of NAV display shows the radial FROM the station. When a too weak or invalid VOR signal is received the display flags (dashes).

Figure 1. Bendix/King KX 155A VHF NAV/COMM with KI 208 or KI 209A Indicator Head (Sheet 6 of 7)



Another push of the mode button will cause the unit to go into the TIMER mode. When the unit is turned on, the elapsed timer (ET) begins counting upwards from zero. The timer can be stopped and reset to zero by pushing the NAV frequency transfer button for 2 seconds or more causing the ET on the display to flash. In this state, the timer can be set as a countdown timer or the elapsed timer can be restarted. The countdown timer is set by using the NAV frequency inc/dec knobs to set the desired time and then pushing the NAV frequency transfer button to start the timer. The large knob selects minutes, the small knob in the "in" position selects 10 second intervals, and the small knob in the "out" position selects individual seconds. After the countdown timer reaches zero, the counter will begin to count upwards indefinitely while flashing for the first 15 seconds. When the elapsed timer is reset to zero it may be restarted again by momentarily pushing the NAV frequency transfer button.

14. VOR/Localizer Needle or CDI needle.
15. Glideslope Flag
16. TO-FROM-NAV FLAG
17. Azimuth Card
18. OBS Knob
19. Glideslope Needle

Figure 1. Bendix/King KX 155A VHF NAV/COMM with KI 208 or KI 209A Indicator Head (Sheet 7 of 7)

## **SECTION 2 LIMITATIONS**

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

## **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when this avionic equipment is installed. However, if the frequency readouts fail, the radio will remain operational on the last frequency selected. If either frequency transfer button is pressed and held while power is applied to the unit, the unit wakes up with 120.00 MHz in the COMM use frequency and 110.00 MHz in the NAV active frequency, with both COMM and NAV in the active entry mode. This will aid the pilot in blind tuning the radio.

## **SECTION 4 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 mode.

- 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 control 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 under the lubber line. 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 channeled 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.

## GLIDESLOPE OPERATION

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

## PILOT CONFIGURATION

This mode can be accessed by pressing and holding the NAV Mode Button for more than 2 seconds and then pressing the Nav Frequency Transfer Button for an additional 2 seconds, while continuing to hold the NAV Mode Button. When the Pilot Config Mode is entered the unit will show the "SWRV" mnemonic which is the unit software revision level. Adjustment pages can be accessed by MODE button presses.

The pilot may adjust two parameters in the pilot configuration, the display minimum brightness and sidetone volume level. Minimum Brightness (BRIM) will have a range of 0-255. The dimmest is 0 and the brightest is 255. Sidetone volume level is adjusted when SIDE is displayed. Values from 0-255 may be selected with 0 being least volume, 255 being the greatest.

<b>Adjustment</b>	<b>Mnemonic</b>	<b>Min Level</b>	<b>Max Level</b>
Software Revision Number	SWRV	---	---
Minimum Display Brightness	BRIM	0	255
Sidetone Level	SIDE	0	255

Subsequent presses of the MODE button sequences through SWRV, BRIM, SIDE, and then back to SWRV.

Pressing the NAV Transfer Button momentarily exits Pilot configuration mode. The NAV returns to its pre-Pilot Config state with the new brightness and sidetone levels stored in nonvolatile memory.

## SECTION 5 PERFORMANCE

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

**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON  
SUPPLEMENT 2  
BENDIX/KING KT 76C  
TRANSPONDER WITH BLIND ENCODER**

SERIAL NO. \_\_\_\_\_

REGISTRATION NO. \_\_\_\_\_

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the KT 76C Transponder with Blind Encoder is installed.

FAA APPROVAL  
FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co  
Delegation Option Manufacturer CE-1  
*Michael W. Welby* Executive Engineer  
Date: 19 December 1998

## SUPPLEMENT 2

### BENDIX/KING KT 76C TRANSPONDER with BLIND ENCODER

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

**Revision Level    Date of Issue**

0 (Original)      Nov. 9, 1998  
 1                    May 30, 2001

**FAA APPROVAL**

FAA APPROVED UNDER PART 21 SUBPART J  
 The Cessna Aircraft Co.  
 Delegation of Pilot Authorization DOA-102232-02  
*Richard W. Hickey*      Executive Engineer

**LOG OF EFFECTIVITY PAGES**

Date: 20 June 2001

PAGE	DATE	PAGE	DATE
Title (S2-1)	May 30/01	S2-6	Nov 9/98
S2-2	May 30/01	S2-7	Nov 9/98
S2-3	May 30/01	S2-8	Nov 9/98
S2-4	Nov 9/98	S2-9	Nov 9/98
S2-5	Nov 9/98	S2-10 blank	Nov 9/98

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## **SUPPLEMENT**

### **BENDIX/KING KT 76C TRANSPONDER with BLIND ENCODER**

#### **SECTION 1**

#### **GENERAL**

The Bendix/King Transponder (Type KT 76C), shown in Figure 1, is the airborne component of an Air Traffic Control Radar Beacon System (ATCRBS). The transponder enables the ATC ground controller to "see" and identify more readily the aircraft on the radarscope. The blind encoder enables the transponder to automatically report aircraft altitude to ATC.

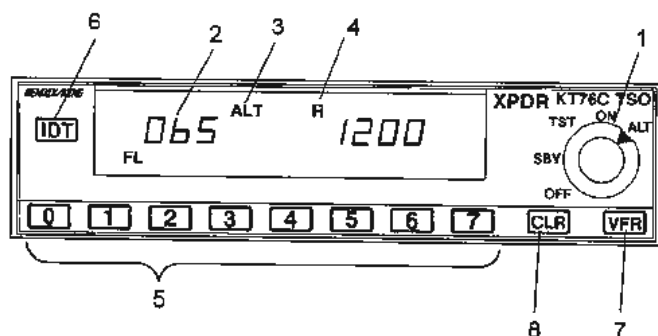
The Bendix/King Transponder system consists of a panel-mounted unit and an externally-mounted antenna. The transponder receives interrogating pulse signals on 1030 MHz and transmits coded pulse-train reply signals on 1090 MHz. It is capable of replying to Mode A and also to Mode C (altitude reporting) interrogations on a selective reply basis on any of 4096 information code selections. A sidewall-mounted Blind Encoder is included in the avionic configuration, the transponder can provide altitude reporting in 100-foot increments between -1000 and +35,000 feet.

The KT 76C features microprocessor and LSI (Large Scale Integrated) control. Mode and code selection are performed using the rotary knob and numeric buttons and all functions including the flight level altitude are presented on a gas discharge display. All display segments are automatically dimmed by a photocell type sensor.



A VFR programming sequence, described in Section 4, allows the pilot to preprogram any single code such as "1200" into the KT 76C. Pressing the VFR button instantly returns the KT 76C to the preprogrammed code without having to manually enter "1200".

All Bendix/King Transponder operating controls are located on the front panel of the unit. Functions of the operating controls are described in Figure 1.



1. MODE SELECTOR KNOB - Controls application of power and selects transponder operating mode as follows:
  - OFF - Turns set off.
  - SBY - Turns set on for standby power and code selection. "SBY" is annunciated.
  - TST - Self-test function. The transmitter is disabled. All display segments will illuminate.
  - ON - Turns set on and enables transponder to transmit Mode A reply pulses. ON is annunciated.
  - ALT - Turns set on and enables transponder to transmit either Mode A reply pulses and Mode C pulses selected automatically by the interrogating signal. ALT is annunciated.

Figure 1. Bendix/King KT 76C Transponder with Blind Encoder  
(Sheet 1 of 2)

2. **ALTITUDE DISPLAY** - Displays the pressure altitude on the left side of the display. The display is in hundreds of feet. "FL" is annunciated to indicate Flight Level altitude. Flight Level is a term to indicate that the altitude is not true altitude, but barometric altitude which is not corrected for local pressure. For Example, "FL-040" corresponds to an altitude of 4000 feet, meaning sea level pressure of 29.92 inches of mercury.

The Flight Level altitude is only displayed when the altitude reporting is enabled, i.e. in Altitude mode. If an invalid code from the altimeter is detected dashes will appear in the altitude window. Altitude reporting is disabled if the altitude window is blank or has dashes.

3. **MODE ANNUNCIATORS** - Displays the operating mode of the transponder.
4. **REPLY INDICATOR (R)** - "R" is illuminated momentarily when the transponder is replying to a valid interrogation and during the  $18 \pm 2$  seconds following the initiation of an Ident.
5. **NUMERIC KEYS 0-7** - Selects transponder reply (SQUAWK) code. The new code will be transmitted after a 5-second delay.
6. **IDENT BUTTON (IDT)** - When depressed, selects special identifier pulse to be transmitted with transponder reply to effect immediate identification of the airplane on the ground controller's display. ("R" will illuminate steadily for approximately 18 seconds. Button illumination is controlled by the avionic light dimming rheostat.
7. **VFR CODE BUTTON (VFR)** - Pressing the VFR Button will cause a pre-programmed reply code to supersede whatever reply code was previously in use. Button illumination is controlled by the RADIO LT dimming rheostat
8. **CLEAR BUTTON (CLR)** -- Pressing the CLR button will delete the last code digit entered.

Figure 1. Bendix/King KT 76C Transponder with Blind Encoder  
(Sheet 2 of 2)

## **SECTION 2 LIMITATIONS**

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

## **SECTION 3 EMERGENCY PROCEDURES**

TO TRANSMIT AN EMERGENCY SIGNAL:

1. Mode Selector Knob -- ALT.
2. Numeric Keys 0-7 -- SELECT 7700 operating code.

TO TRANSMIT A SIGNAL REPRESENTING LOSS OF ALL COMMUNICATIONS (WHEN IN A CONTROLLED ENVIRONMENT):

1. Mode Selector Knob -- ALT.
2. Numeric Keys 0-7 -- SELECT 7600 operating code.

## **SECTION 4 NORMAL PROCEDURES**

BEFORE TAKEOFF:

1. Mode Selector Knob -- SBY.

TO TRANSMIT MODE A CODES IN FLIGHT:

1. Numeric Keys 0-7 -- SELECT assigned code..

2. Mode Selector Knob -- ON.

**NOTES**

- During normal operation with Mode Selector Knob in ON position, reply indicator flashes, indicating transponder replies to interrogations.
- Mode A replies are transmitted in ALT also; however, Mode C replies are suppressed when the Mode Selector Knob is positioned to ON.

3. IDT Button -- DEPRESS momentarily when instructed by ground controller to "squawk IDENT" ("R" will illuminate steadily indicating IDENT operation).

TO TRANSMIT MODE C CODES IN FLIGHT:

1. Numeric Keys 0-7 -- SELECT assigned code.
2. Mode Selector Knob -- ALT.

**NOTES**

- When directed by ground controller to "stop altitude squawk", turn Mode Selector Knob to ON for Mode A operation only.
- Altitude transmitted by the transponder for altitude squawk and displayed on the KT 76C panel is pressure altitude (referenced to 29.92") and conversion to indicated altitude is done in the ATC computers.

TO SELF-TEST TRANSPONDER OPERATION:

1. Mode Selector Knob -- TST Check all displays.
2. Mode Selector Knob -- SELECT desired function.

TO PROGRAM VFR CODE:

1. Mode Selector Knob -- SBY.
2. Numeric Keys 0-7 -- SELECT desired VFR code.
3. IDT Button -- PRESS AND HOLD.
  - a. VFR Code Button -- PRESS (while still holding IDT button) to place new VFR code in nonvolatile memory for subsequent call up.

## SECTION 5 PERFORMANCE

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



Cessna  
A Textron Company

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## Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

### CESSNA MODEL T206H AIRPLANES T20608001 AND ON

#### SUPPLEMENT 3

#### BENDIX/KING KMA 26 AUDIO SELECTOR PANEL

SERIAL NO.	T20608172
REGISTRATION NO.	OK-MCP

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the KMA 26 Audio Selector Panel is installed.

FAA APPROVAL FAA APPROVED UNDER FAR 21 SUBPART J The Cessna Aircraft Co Delegation Option Manufacturer CE-1 <i>Richard W. Hedley</i> Executive Engineer Date: 19 December 1998
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Member of GAMA

## 9 November 1998

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WICHITA, KANSAS, USA

T206MPHUS-S3-00

S3-1

## SUPPLEMENT 3

### BENDIX/KING KMA 26 AUDIO SELECTOR PANEL

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Nov. 9, 1998

#### LOG OF EFFECTIVITY PAGES

<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S3-1)	Nov 9/98	S3-5	Nov 9/98
S3-2	Nov 9/98	S3-6	Nov 9/98
S3-3	Nov 9/98	S3-7	Nov 9/98
S3-4	Nov 9/98	S3-8	Nov 9/98

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## SUPPLEMENT

### BENDIX/KING KMA 26 AUDIO SELECTOR PANEL

#### SECTION 1 GENERAL

The Bendix/King KMA 26 Audio Selector Panel is a combination audio amplifier, an audio distribution panel intercom, and a marker beacon receiver. The audio amplifier is for amplification of the audio signals for the speaker system. All receiver audio distribution functions are controlled by two rows of pushbuttons. A rotary selector switch on the right side of the console connects the microphone to either EMG, Com 1, Com 2, Com 3 or PA (Unused position). All operating controls are shown and described in Figure 1.

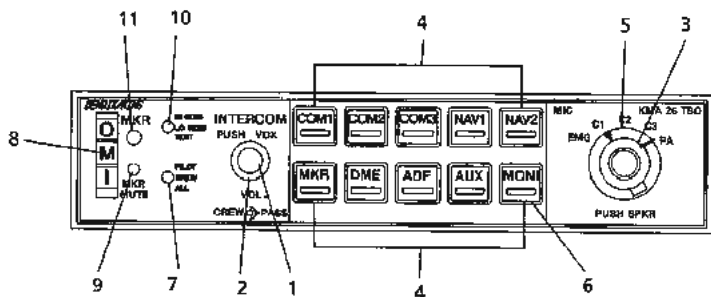
A crystal-controlled superheterodyne marker beacon receiver with 3-light presentation is incorporated within the unit. Dimming circuitry for the marker lamps automatically adjusts brightness appropriate to the cockpit ambient light level. Hi and Lo sensitivity and lamp test functions are also provided.

Light dimming for the audio control panel is manually controlled by the RADIO light rheostat knob.

#### MARKER FACILITIES

MARKER	IDENTIFYING TONE	LIGHT*
Inner, Airway & Fan	Continuous 6 dots/sec (3000 Hz)	White
Middle	Alternate dots and dashes (1300 Hz)	Amber
Outer	2 dashes/sec (400 Hz)	Blue

\*When the identifying tone is keyed, the respective indicating light will blink accordingly.



1. CREW INTERCOM VOLUME (VOL CREW) KNOB and INTERCOM VOX SENSITIVITY SET (INTERCOM PUSH VOX) SWITCH -- Inside knob adjusts Pilot and Copilot intercom volume. Intercom operation is voice activated (VOX), where intercom becomes active automatically when a crew member or passenger begins to speak. Set the intercom VOX squelch by momentarily pressing and releasing the left inner knob when no one is speaking.
2. PASSENGER INTERCOM VOLUME (VOL PASS) KNOB -- Adjusts passenger intercom volume.
3. SPEAKER SELECT (PUSH SPKR) SWITCH -- With the Speaker Select Switch pushed in, both headphone and cabin speaker audio will be heard. Headphone audio is active full-time. Headphone audio cannot be deselected.
4. AUDIO SELECT BUTTONS -- Push button audio selection is available for three Communications receivers ("COM 1", "COM 2", and "COM 3"), two Navigation receivers ("NAV 1" and "NAV 2"), the internal Marker Beacon receiver ("MKR"), one DME, one ADF, and one additional auxiliary receiver ("AUX"). The "AUX" position could be used, for example, for a second DME or ADF. When a receiver's audio is selected, the green annunciator illuminates at the bottom of the button. Push the button again to deselect the receiver's audio.

Figure 1. Bendix/King KMA 26 Audio Selector Panel (Sheet 1 of 3)

5. MICROPHONE SELECTOR SWITCH (MIC) -- Used to select the desired transmitter for the cockpit microphones. The "C1", "C2", and "C3" positions are for transmitting on the Com 1, Com 2, and Com 3 communications transceivers, respectively. The "EMG" (emergency) position is used to bypass the KMA 26's audio amplifier and directly connects Com 1 to the pilot's microphone and headphones. This provides a fail-safe method of communication should the unit fail. The "PA" position may be selected when the aircraft is configured with a passenger address capability. The "Auto Com" feature always provides automatic headphone audio selection to match the Com transmitter in use. To add speaker audio, simply push the Speaker Select Switch (inner right knob) to the "in" position. Pulling the switch to the "out" position removes speaker audio.
6. MONITOR SELECT (MONI) BUTTON -- When activated, if Com 1 is selected on the Microphone Selector Switch then Com 2 audio is automatically routed to the speaker. Or if Com 2 is selected on the Microphone Selector Switch, then Com 1 is routed to the speaker. Pressing the "MONI" button again will disable the feature. Initially when "MONI" is selected the green annunciators in the button flash for approximately 5 seconds, then remains steady while the Com annunciation returns to its previous state.
7. INTERCOM MODE SELECT SWITCH -- Has three modes "ALL", "CREW", AND "PILOT" which are selected with the toggle switch on the lower left side on the faceplate. In the "ALL" position the pilot, copilot, and passengers are all on the same intercom "loop" and everyone hears the radios. In the "CREW" position the pilot and copilot are on one intercom loop and can hear the radios while the passengers have their own dedicated intercom and do not hear the radios. In the "PILOT" mode the pilot hears the radios but is isolated from the intercom while the copilot and passengers are on the same intercom loop and do not hear the radios.

When either the "ALL" or "CREW" intercom modes are selected, the pilot's and copilot's intercom volume is controlled by rotating the Crew Intercom Volume Knob (left inner knob) while the passenger's volume is controlled by rotating the Passenger Intercom Volume Knob (left outer knob). When the "PILOT" intercom mode is selected, the copilot's and passenger's volume is controlled with the Passenger Intercom Volume Knob. Remember, the volume knobs on the KMA 26 control intercom volume only, not the receiver's volume.

Figure 1. Bendix/King KMA 26 Audio Selector Panel (Sheet 2 of 3)

8. **MARKER BEACON ANNUNCIATOR LIGHTS** -- The three-light marker beacon receiver built into the KMA 26 gives a visual and aural signal when the ship's antenna passes over a 75 MHz beacon. The blue, amber, and white lights on the faceplate, as well as the audio tones, identify the beacon type.  
  
INNER, AIRWAY and FAN -- Light illuminates white to indicate passage of ILS inner, airway or fan marker beacons.  
  
OUTER -- Light illuminates blue to indicate passage of outer marker beacon.  
  
MIDDLE -- Light illuminates amber to indicate passage of middle marker beacon.
9. **MARKER MUTE BUTTON** -- Mutes currently active marker beacon audio.
10. **MARKER BEACON SENSITIVITY LAMP AND TEST SWITCH** --The "MKR" Audio Select button must be pushed so that the green annunciator is illuminated for the marker beacon to receive to provide an audio signal at beacon passage. When this switch is on "HI SENS" (upper) position, the high sensitivity is selected which permits you to hear the outer marker tone about a mile out. At this point you may select the the "LO SENS" (middle) position to temporarily silence the tone. It will start to sound again when you are closer to the marker, giving you a more precise indication of its location.
11. **PHOTOCELL FOR AUTOMATIC DIMMING OF MARKER BEACON LIGHTS AND SELECT BUTTON** -- The photocell in the faceplate automatically dims the marker lights as well as the green annunciators in the Speaker Audio Select Buttons for night operation.

Figure 1. Bendix/King KMA 26 Audio Selector Panel (Sheet 3 of 3)

## **SECTION 2 LIMITATIONS**

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

## **SECTION 3 EMERGENCY PROCEDURES**

In the event of an audio amplifier failure in the KMA 26, as evidenced by the inability to transmit in COM 1, 2 or 3.

1. MIC Selector Switch – EMG.

### **NOTE**

This action bypasses the KMA 26 audio amplifier and connects the pilot's mic/head set directly to COM 1.

## **SECTION 4 NORMAL PROCEDURES**

AUDIO CONTROL SYSTEM OPERATION:

1. MIC Selector Switch – Turn to desired transmitter.
2. SPEAKER and Audio Select Button(s) -- SELECT desired receiver(s).

### **NOTES**

Rotation of the MIC selector switch selects the Com audio automatically.

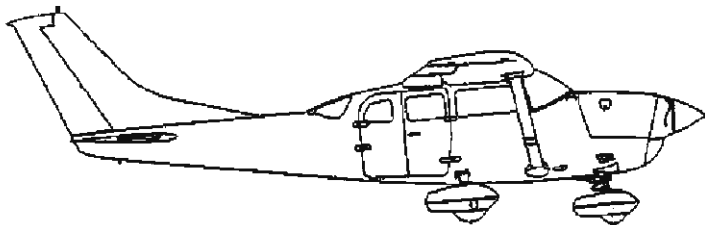
**MARKER BEACON RECEIVER OPERATION:**

1. TEST Position -- HOLD toggle down momentarily to verify all lights are operational.
2. SENS Selections -- Select HI sensitivity for airway flying or LO for ILS/LOC approaches.

**SECTION 5  
PERFORMANCE**

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

# Pilot's Operating Handbook and FAA Approved Airplane Flight Manual



THIS DOCUMENT MUST BE  
CARRIED IN THE AIRPLANE  
AT ALL TIMES.

The Cessna Aircraft  
Company

Model T206H

Serial No. T20608172

Registration No. \_\_\_\_\_

This publication includes the material required to be furnished to the pilot by FAR Part 23 and constitutes the FAA Approved Airplane Flight Manual.

FAA APPROVAL

FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co  
Delegation Option Manufacturer CE-1

*Walter P. Hedley* Executive Engineer

Date: 19 December 1998

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The Cessna Aircraft Company  
Wichita, Kansas USA



Member of GAMA

Original Issue - 9 November 1998

CESSNA  
MODEL T206H

PUBLICATION PART NUMBER

**Pilot's Operating Handbook  
and**

**FAA Approved Airplane Flight Manual**

**Model T206H Serials T20608001 and On**

**Original Issue - 9 November 1998**

Revision 6 - 12 January 2004

PART NUMBER: T206HPHUS06



## CONGRATULATIONS . . . .

Congratulations on your purchase and welcome to Cessna ownership! Your Cessna has been designed and constructed to give you the most in performance, value and comfort.

This Pilot's Operating Handbook has been prepared as a guide to help you get the most utility from your airplane. It contains information about your airplane's equipment, operating procedures, performance and suggested service and care. Please study it carefully and use it as a reference.

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We urge all Cessna owners/operators to utilize the benefits available within the Cessna Organization.



## SECTION 1 GENERAL

The Artex ME 406 series transmits on 2 emergency frequencies (121.5 and 406.025 MHz.) The ELT automatically activates during a crash and transmits the standard swept tone on 121.5MHz. It also transmits a 406.025 MHz encoded digital message to the COSPAS/SARSAT satellite system, which allows for rapid identification and reduces search and rescue response time. ME 406 series has been tested to meet the rigorous requirements of TSO C126 including 500 G shock, 1000 pound crush as well as flame and vibration tests.

## SECTION 2 OPERATING LIMITATIONS

No change.

## SECTION 3 EMERGENCY PROCEDURES

In a crash, an acceleration activated crash sensor (G-switch) turns the ELT 'on' automatically when the ELT experiences a change in velocity (or deceleration) of 4.5 fps  $\pm$ 0.5 fps. Activation is also accomplished by means of the cockpit mounted remote switch or the panel (local) switch on the ELT.

After emergency landing, if the rescue assistance is required, should be the ELT used as follows:

1. Check the ELT functionality:
  - set the remote switch to 'ON' position (the red LED starts blinking)
  - If the communication radio is working and it's usable, tune the frequency 121.5 MHz. If you can hear the ELT, it works correctly.
2. During waiting on the rescue airplane:
  - Save the airborne battery. Don't turn on the radio communication.
3. Contact the rescue plane
  - Set the remote switch to 'ARM' position. Try to contact the rescue plane using the communication radio tuned on the frequency 121.5 MHz. If the contacting is not successful, set the remote switch back to 'ON' position.
4. After finishing the rescue
  - Set the remote switch to 'ARM' position.

### NOTE

**The ELT can be activated automatically during hard landing or advanced turbulence. To deactivate the ELT set either switch to the 'ON' position, then back to 'ARM'.**



# POH / AFM Supplement

## Artex ME-406

### ELT

Aircraft model:	Cessna 206
Aircraft Serial No.	T206-08172
Registration No.:	OK-NCP

This supplement must be attached to the FAA approved POH/AFM. The information contained in this document supplements or supersedes the basic manual only in those areas listed. For limitations, procedures, performance, and loading information not contained in this supplement, consult the basic POH/AFM.

This flight manual supplement is EASA approved under Approval Number 0010002203-001.

Date:

15-12-2009



Log of Revisions

Revision No.	Pages Affected	Description	Date



## SECTION 4 NORMAL PROCEDURES

No change.

## SECTION 5 PERFORMANCE

No change.

## SECTION 6 WEIGHT AND BALANCE/EQUIPMENT LIST

Cancel old item and insert new item listed below into the equipment list:

Item	Weight [lb]		Arm [inch]	Static moment [lb.in]
	IN	OUT		
1. ELT ME 406	2,1		145	304,5
Total:	2,1			304,5

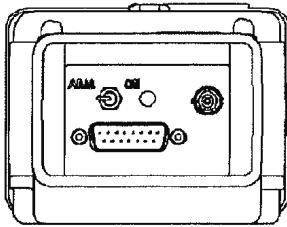
## SECTION 7 AIRPLANE AND SYSTEMS DESCRIPTION

### Switch Operation:

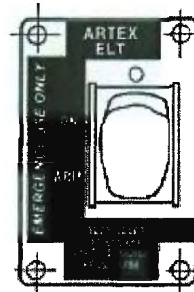
In a crash, an acceleration activated crash sensor (G-switch) turns the ELT 'on' automatically when the ELT experiences a change in velocity (or deceleration) of 4.5 fps  $\pm$ 0.5 fps. Activation is also accomplished by means of the cockpit mounted remote switch or the panel (local) switch on the ELT. To deactivate the ELT set either switch to the 'ON' position, then back to 'ARM'. The ELT does not have an 'OFF' position. Instead, a jumper between two pins on the front D-sub connector must be in place for the G-switch to activate the unit. The jumper is installed on the mating half of the connector so that when the connector is installed, the beacon is armed. This allows the beacon to be handled or shipped without 'nuisance' activation (front connector removed).

### NOTE

The ELT can still be manually activated using the local switch on the front of the ELT. Care should be taken when transporting or shipping the ELT not to move the switch or allow packing material to become lodged such as to toggle the switch.



Panel switch



Remote switch

### Self Test mode:

Upon turn-off, the ELT automatically enters a self-test mode that transmits a 406 MHz test coded pulse that monitors certain system functions before returning to the 'ARM'ed mode.

The 406 MHz test pulse is ignored by any satellite that receives the signal, but the ELT uses this output to check output power and correct frequency. If the ELT is left activated for approximately 50 seconds or greater, a distress signal is generated that is accepted by one or more SAR satellites. Therefore, when the self-test mode is required, the ELT must be activated, then, returned to 'ARM' within about 45 seconds otherwise a "live" distress message will be transmitted.

### NOTE

All activations of the ELT should be kept to a minimum. Local or national regulations may limit testing of the ELT or special requirements or conditions to perform testing. For the "self test", Artex recommends that the ELT be "ON" for no more than 5 seconds during the first 5 minutes after the hour.

In addition to output power of the 121.5/406 MHz signals and 406 MHz frequency, other parameters of the ELT are checked and a set of error codes generated if a problem is found. The error codes are displayed by a series of pulses of the ELT LED, remote LED and alert buzzer. Codes displayed with the associated conditions are as follows:

**1 Flash** – Indicates that the system is operational and that no error conditions were found.

**3 Flashes** – Bad load detect. Detects open or short condition on the antenna output or cable. These problems can probably be fixed by the installer. Check that the RF cable is connected and in good condition. Perform continuity check of center conductor and shield. Check for a shorted cable. Check for intermittent connection in the RF cable. If this error code persists there may be a problem with the antenna installation. This can be checked with a VSWR meter. Check the antenna for opens, shorts, resistive ground plane connection.

**4 Flashes** – Low power detected. Occurs if output power is below about 33 dBm (2 watts) for the 406 signal or 17 dBm (50 mW) for the 121.5 MHz output. Also may indicate that 406 signal is off frequency. For this error code the ELT must be sent back for repair or replacement.

**5 Flashes** – Indicates that the ELT has not been programmed. Does not indicate erroneous or corrupted programmed data.



**6 Flashes** – Indicates that G-switch loop between pins 5 and 12 at the D-sub connector is not installed. ELT will not activate during a crash. Check that the harness D-sub jumper is installed by verifying less than 1 ohm of resistance between pins 5 and 12.

**7 Flashes** – Indicates that the ELT battery has too much accumulated operation time ( $> 1\text{ hr}$ ). Battery may still power ELT, however, it must be replaced to meet FAA specifications. May also indicate damage to the battery circuit.

**Power**

ELT is powering by own battery pack, placed inside the ELT.

## SECTION 8 HANDLING, SERVICE AND MAINTENANCE

**NOTE**

It's required to monitor the battery pack rating life and replace them before passing the battery life rating.



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H**

**AIRPLANES T20608001 AND ON**

**SUPPLEMENT 5**

**BENDIX/KING KLN 89B  
GLOBAL POSITIONING SYSTEM (IFR)**

SERIAL NO. \_\_\_\_\_

REGISTRATION NO. \_\_\_\_\_

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the KLN 89B Global Positioning System is installed.

FAA APPROVAL  
FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co  
Delegation Option Manufacturer CE-1

*Michael D. Hilday* Executive Engineer

Date: 19 December 1998

 Member of GAMA

**9 November 1998**

Revision 2 - 30 May 2001

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T206HPHUS-S5-02

S5-1



## SUPPLEMENT 5

### BENDIX/KING KLN 89B GLOBAL POSITIONING SYSTEM (IFR)

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

**Revision Level   Date of Issue**

0 (Original)	Nov. 9, 1998
1	June 2, 1999
2	May 30, 2001

FAA APPROVAL

FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co.  
Delegation Option Authorization DCA-10028-02  
*Richard W. Hickey* Executive Engineer

#### LOG OF EFFECTIVITY PAGES

Date: 20 June 2001

PAGE	DATE	PAGE	DATE
Title (S5-1)	May 30/01	S5-11	June 2/99
S5-2	May 30/01	S5-12	June 2/99
S5-3	Nov 9/98	S5-13	Nov 9/98
S5-4	Nov 9/98	S5-14	Nov 9/98
S5-5	Nov 9/98	S5-15	Nov 9/98
S5-6	June 2/99	S5-16	Nov 9/98
S5-7	Nov 9/98	S5-17	Nov 9/98
S5-8	Nov 9/98	S5-18	May 30/01
S5-9	Nov 9/98		
S5-10	Nov 9/98		

## SUPPLEMENT 5

### BENDIX/KING KLN 89B GLOBAL POSITIONING SYSTEM (IFR)

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated in Airplane</u>
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## **SUPPLEMENT**

### **BENDIX/KING KLN 89B GPS NAVIGATION SYSTEM (IFR)**

#### **SECTION 1**

#### **GENERAL**

#### **WARNING**

**THE KLN 89B IS NOT AUTHORIZED FOR INSTRUMENT APPROACHES UNLESS THE OPERATIONAL REVISION STATUS IS UPGRADED TO "ORS 02" OR LATER, AS READ ON THE POWER-ON PAGE, AND THE HOST SOFTWARE IS UPGRADED TO "HOST 00880-0004" OR LATER, AS READ ON THE KLN 89B OTH 6 PAGE.**

The KLN 89B GPS (Global Positioning System) is a three-dimensional precision navigation system based on 24 earth orbiting satellites. Receiver Autonomous Integrity Monitoring (RAIM) is a function that every IFR-certified GPS receiver must continuously perform to assure position accuracy. RAIM is available when 5 or more of these satellites are in view, or 4 satellites are in view and a barometrically corrected altitude input from the airplane's altimeter is made. Annunciation is provided if there are not enough satellites in view to assure position integrity.

Operational guidance for the KLN 89B GPS Navigation System is provided with the Bendix/King KLN 89B Pilot's Guide (supplied with the airplane). This Pilot's Guide should be thoroughly studied and VFR operations conducted so that you are totally familiar with the GPS system of navigation before actually using this equipment in IFR conditions.

The database card is an electronic memory containing information on airports, nav aids, intersections, SID's, STAR's, instrument approaches, special use airspace, and other items of interest to the pilot.

Every 28 days, Bendix/King receives new database information from Jeppesen Sanderson for the North American database region. This information is processed and downloaded onto the database cards. Bendix/King makes these database card updates available to KLN 89B GPS users.

 **CAUTION**

**THE DATABASE MUST BE UPDATED ONLY WHILE THE AIRCRAFT IS ON THE GROUND. THE KLN 89B DOES NOT PERFORM ANY NAVIGATION FUNCTION WHILE THE DATABASE IS BEING UPDATED.**

**NOTE**

A current database is required by regulation in order to use the KLN 89B GPS system for nonprecision approaches.

Provided the KLN 89B navigation system is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications of: VFR/IFR en route oceanic and remote, en route domestic, terminal, and instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) operation within the U.S. National Airspace System, North Atlantic Minimum Navigation Performance Specifications (MNPS) Airspace and latitudes bounded by 74° North and 60° South using the WGS-84 (or NAD 83) coordinate reference datum in accordance with the criteria of AC 20-138, AC 91-49, and AC 120-33. Navigation data is based upon use of only the global positioning system (GPS) operated by the United States.

**NOTE**

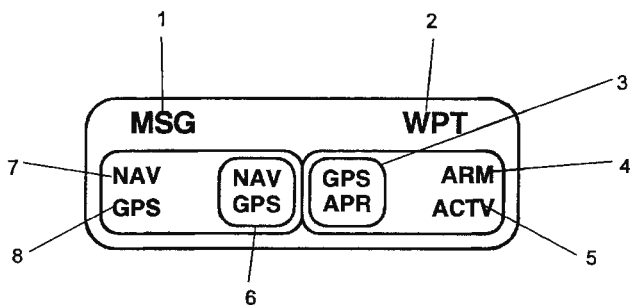
Aircraft using GPS for oceanic IFR operations may use the KLN 89B to replace one of the other approved means of long range navigation. A single KLN 89B GPS installation may also be used on short oceanic routes which require only one means of long-range navigation.

**NOTE**

FAA approval of the KLN 89B does not necessarily constitute approval for use in foreign airspace.

**NOTE**

When the KLN 89B contains receiver software RCVR 01621-0001 (or higher dash number), as verified on the **OTH 6** page, the unit is qualified for BRNAV (Basic Area Navigation) operation in the European region in accordance with the criteria of AC 90-96. (Reference ICAO Doc 7030 Regional Supplementary Procedures, JAA Technical Guidance Leaflet AMJ20X2 and Eurocontrol RNAV Standard Doc 003-93 Area Navigation Equipment Operational Requirements and Functional Requirements (RNAV).)



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1. **GPS MESSAGE (MSG) ANNUNCIATOR LIGHT** -- **MSG** will begin flashing whenever the message prompt (a large "M" on the left side of the screen) on the KLN 89B GPS unit begins flashing to alert the pilot that a message is waiting. Press the **Message (MSG)** key on the GPS to display the message. If a message condition exists which requires a specific action by the pilot, the message annunciator will remain on but will not flash.
2. **GPS WAYPOINT (WPT) ANNUNCIATOR LIGHT** -- **GPS WAYPOINT** annunciator will begin to flash approximately 36 seconds prior to reaching a Direct-To waypoint. Also, when turn anticipation is enabled in the KLN 89B GPS unit, the annunciator will begin to flash 20 seconds prior to the beginning of turn anticipation, then illuminate steady at the very beginning of turn anticipation.

Figure 1. GPS Annunciator/Switch (Sheet 1 of 3)

 **WARNING**

**TURN ANTICIPATION IS AUTOMATICALLY DISABLED FOR FAF WAYPOINTS AND THOSE USED EXCLUSIVELY IN SID/STARS WHERE OVERFLIGHT IS REQUIRED. FOR WAYPOINTS SHARED BETWEEN SID/STARS AND PUBLISHED EN ROUTE SEGMENTS (REQUIRING OVERFLIGHT IN THE SID/STARS), PROPER SELECTION ON THE PRESENTED WAYPOINT PAGE IS NECESSARY TO PROVIDE ADEQUATE ROUTE PROTECTION ON THE SID/STARS.**

3. **GPS APPROACH (GPS, APR) SWITCH** – Pressing the GPS APPROACH switch manually selects or disarms the approach **ARM** mode and also cancels the approach **ACTV** mode after being automatically engaged by the KLN 89B GPS system. The white background color of the GPS APPROACH annunciator makes it visible in daylight.
4. **ARM ANNUNCIATOR LIGHT** -- **ARM** annunciator will illuminate when the KLN 89B GPS system automatically selects the approach ARM mode or when the approach ARM mode is manually selected. The approach ARM mode will be automatically selected when the airplane is within 30 NM of an airport, and an approach is loaded in the flight plan for that airport. The approach ARM mode can manually be selected at a greater distance than 30 NM from the airport by pressing the GPS APPROACH switch; however, this will not change the CDI scale until the airplane reaches the 30 NM point. The approach ARM mode can also be disarmed by pressing the GPS APPROACH switch.
5. **ACTIVE (ACTV) ANNUNCIATOR LIGHT** – **ACTV** annunciator will illuminate when the KLN 89B GPS system automatically engages the approach ACTV mode (the ACTV mode can only be engaged by the KLN 89B GPS system which is automatic.) To cancel the approach ACTV mode, press the GPS APPROACH switch; this will change the mode to the approach ARM mode and illuminate the **ARM** annunciator.

Figure 1. GPS Annunciator/Switch (Sheet 2 of 3)

6. **NAV/GPS SWITCH** -- Toggles from Nav 1 to GPS and vice versa to control the type of navigation data to be displayed on the CDI (Course Deviation Indicator). The No. 1 CDI Omni Bearing Selector (OBS) provides analog course input to the KLN 89B in OBS mode when the **NAV/GPS** switch/annunciator is in **GPS**. When the **NAV/GPS** switch annunciation is in **NAV**, GPS course selection in OBS mode is digital through the use of the controls and display at the KLN 89B.

**NOTE**

Manual CDI course centering in **OBS** mode using the control knob can be difficult, especially at long distances. Centering the Course Deviation Indicator (CDI) needle can best be accomplished by pressing the Direct-To button and then manually setting the No. 1 CDI course to the course value prescribed in the KLN 89B displayed message.

**NOTE**

The Heading Indicator (HI) heading (HDG) bug must also be set to provide proper course datum to the autopilot if coupled to the KLN 89B in **LEG** or **OBS**. (When the optional HSI is installed, the HSI course pointer provides course datum to the autopilot.)

7. **NAVIGATION SOURCE (NAV) ANNUNCIATOR** -- The **NAV** annunciator will illuminate steady to inform the pilot that NAV 1 information is being displayed on the NAV 1 CDI.
8. **NAVIGATION SOURCE (GPS) ANNUNCIATOR** -- The **GPS** annunciator will illuminate steady to inform the pilot that GPS information is being displayed on the NAV 1 CDI.

Figure 1. GPS Annunciator/Switch (Sheet 3 of 3)



## **SECTION 2 LIMITATIONS**

1. The KLN 89B GPS Pilot's Guide, P/N 006-08786-0000, dated May, 1995 (or later applicable revision) must be available to the flight crew whenever IFR GPS navigation is used. The Operational Revision Status (ORS) of the Pilot's Guide must match the ORS level annunciated on the Self Test page.
2. IFR Navigation is restricted as follows:
  - a. The system must utilize ORS level 01 or later FAA approved revision.
  - b. The data on the self test page must be verified prior to use.
  - c. IFR en route and terminal navigation is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.
  - d. The system must utilize ORS Level 02 or later FAA approved revision to conduct nonprecision instrument approaches. In addition, the software level status found on page OTH 6 must be "HOST 00880-0004" or later. Instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the KLN 89B database. The KLN 89B database must incorporate the current update cycle.
    - 1) The KLN 89B Quick Reference, P/N 006-08787-0000, dated 5/95 (or later applicable to revision) must be available to the flight crew during instrument approach operations.
    - 2) Instrument approaches must be conducted in the approach mode and RAIM must be available at the Final Approach Fix.

- 3) APR ACTV mode must be annunciated at the Final Approach Fix.
  - 4) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, and MLS approaches are not authorized.
  - 5) 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.
  - 6) The KLN 89B can only be used for approach guidance if the reference coordinate datum system for the instrument approach is WGS-84 or NAD-83. (All approaches in the KLN 89B database use the WGS-84 or the NAD-83 geodetic datum).
- e. For BRNAV operations in the European region:
- 1) With 23 (24 if the altitude input to the KLN 89B is not available) or more satellites projected to be operational for the flight, the aircraft can depart without further action.
  - 2) With 22 (23 if the altitude input to the KLN 89B is not available) or fewer satellites projected to be operational for the flight, the availability of the GPS integrity (RAIM) should be confirmed for the intended flight (route and time). This should be obtained from a prediction program run outside of the aircraft. The prediction program must comply with the criteria of Appendix 1 of AC90-96. In the event of a predicted continuous loss of RAIM of more than 5 minutes for any part of the intended flight, the flight should be delayed, cancelled, or rerouted on a track where RAIM requirements can be met.

#### NOTE

AlliedSignal's Preflight, Version 2.0 or later computer based prediction program may be used for the RAIM prediction. Alternate methods should be submitted for approval in accordance with Advisory Circular AC90-96.

- f. The aircraft must have other approved navigation equipment appropriate to the route of flight installed and operational.

### **SECTION 3 EMERGENCY PROCEDURES**

There are no changes to the basic airplane emergency procedures when the KLN 89B GPS is installed.

1. If the KLN 89B GPS information is not available or invalid, utilize remaining operational navigation equipment as required.
2. If a "RAIM NOT AVAILABLE" message is displayed while conducting an instrument approach, terminate the approach. Execute a missed approach if required.
3. If a "RAIM NOT AVAILABLE" message is displayed in the en route or terminal phase of flight, continue to navigate using the KLN 89B or revert to an alternate means of navigation appropriate to the route and phase of flight. When continuing to use the KLN 89B for navigation, position must be verified every 15 minutes using another IFR approved navigation system.
4. Refer to the KLN 89B Pilot's Guide, Appendices B and C, for appropriate pilot actions to be accomplished in response to annunciated messages.

### **SECTION 4 NORMAL PROCEDURES**

#### **OPERATION**

Normal operating procedures are outlined in the KLN 89B GPS Pilot's Guide, P/N 006-08786-0000, dated May, 1995, (or later applicable revision). A KLN 89B Quick Reference, P/N 006-08787-0000, dated May, 1995 (or later applicable revision) containing an approach sequence, operating tips and approach related messages is intended as well for cockpit use by the pilot familiar with KLN 89B operations when conducting instrument approaches.

**⚠ WARNING**

TO PREVENT THE POSSIBILITY OF TURN ANTICIPATION CAUSING POTENTIALLY MISLEADING NAVIGATION WHEN THE AIRCRAFT IS NOT ON COURSE, VERIFY THE CDI COURSE AND CDI NEEDLE PRESENTATION IS PROPER PRIOR TO TAKEOFF AND DO NOT SWITCH FROM OBS TO LEG WITH GREATER THAN 1 NM CROSS TRACK ERROR (XTK).

IF MISLEADING DATA IS SUSPECTED, A DIRECT-TO OPERATION TO YOUR DESIRED WAYPOINT WILL CLEAR ANY PREVIOUS OBS COURSE, AND CANCEL TURN ANTICIPATION.

**NOTE**

After the above Direct-To operation, further reorientation to the nearest leg of the active flight plan may be accomplished by pressing the Direct-To button followed by pressing the Clear button and finally the Enter Button.

Refer to the Pilot's Guide section 4.2.2 for an explanation of turn anticipation, and Appendix A - Navigation Terms for the definition of cross track error (XTK).

**AUTOPILOT COUPLED OPERATION**

The KLN 89B may be coupled to the KAP 140 autopilot by first selecting **GPS** on the NAV/GPS switch. Manual selection of the desired track on the pilot's HI heading bug is required to provide course datum to the KAP 140 autopilot. (Frequent course datum changes may be necessary, such as in the case of flying a DME arc.) The autopilot approach mode (APR) should be used when conducting a coupled GPS approach.

**NOTE**

Select HDG mode for DME arc intercepts. NAV or APR coupled DME arc intercepts can result in excessive overshoots (aggravated by high ground speeds and/or intercepts from inside the arc).

APPROACH MODE SEQUENCING AND RAIM PREDICTION

 **WARNING**

**FAMILIARITY WITH THE EN ROUTE OPERATION OF THE KLN 89B DOES NOT CONSTITUTE PROFICIENCY IN APPROACH OPERATIONS. DO NOT ATTEMPT APPROACH OPERATIONS IN IMC (INSTRUMENT METEOROLOGICAL CONDITIONS) PRIOR TO ATTAINING PROFICIENCY IN THE USE OF THE KLN 89B.**

**NOTE**

The special use airspace alert will automatically be disabled prior to flying an instrument approach to reduce the potential for message congestion.

1. Prior to arrival, select a STAR if appropriate from the **APT 7** page. Select an approach and an initial approach fix (IAF) from the **APT 8** page.

**NOTE**

Using the outer knob, select the **ACT** (Active Flight Plan Waypoints) pages. Pull the inner knob out and scroll to the destination airport, then push the inner knob in and select the **ACT 7** or **ACT 8** page.

To delete or replace a SID, STAR or approach, select **FPL 0** page. Place the cursor over the name of the procedure, press **ENT** to change it, or **CLR** then **ENT** to delete it.

2. En route, check for RAIM availability at the destination airport ETA on the **OTH 3** page.

**NOTE**

RAIM must be available at the FAF in order to fly an instrument approach. Be prepared to terminate the approach upon loss of RAIM.

3. At or within 30 nm from the airport:
  - a. Verify automatic annunciation of APRARM.
  - b. Note automatic CDI needle scaling change from  $\pm 5.0$  nm to  $\pm 1.0$  nm over the next 30 seconds.
  - c. Update the KLN 89B altimeter baro setting as required.
  - d. Internally the KLN 89B will transition from en route to terminal integrity monitoring.
4. Select **NAV 4** page to fly the approach procedure.
  - a. If receiving radar vectors, or need to fly a procedure turn or holding pattern, fly in OBS until inbound to the FAF.

**NOTE**

OBS navigation is TO-FROM (like a VOR) without waypoint sequencing.

 **WARNING**

**TO PREVENT THE POSSIBILITY OF TURN ANTICIPATION CAUSING POTENTIALLY MISLEADING NAVIGATION WHEN THE AIRCRAFT IS NOT ON COURSE, DO NOT SWITCH FROM OBS TO LEG WITH GREATER THAN 1 NM CROSS TRACK ERROR (XTK).**

- b. **NoPT** routes including DME arc's are flown in LEG. LEG is mandatory from the FAF to the MAP.

**NOTE**

Select HDG mode for DME arc intercepts. NAV or APR coupled DME arc intercepts can result in excessive overshoots (aggravated by high ground speeds and/or intercepts from inside the arc).

**⚠ WARNING**

**FLYING FINAL OUTBOUND FROM AN OFF-AIRPORT VORTAC ON AN OVERLAY APPROACH; BEWARE OF THE DME DISTANCE INCREASING ON FINAL APPROACH, AND THE GPS DISTANCE-TO-WAYPOINT DECREASING, AND NOT MATCHING THE NUMBERS ON THE APPROACH PLATE.**

5. At or before 2 nm from the FAF inbound:
  - a. Select the FAF as the active waypoint, if not accomplished already.
  - b. Select LEG operation.
6. Approaching the FAF inbound (within 2 nm):
  - a. Verify APR ACTV.
  - b. Note automatic CDI needle scaling change from  $\pm 1.0$  nm to  $\pm 0.3$  nm over the 2 nm inbound to the FAF.
  - c. Internally the KLN 89B will transition from terminal to approach integrity monitoring.
7. Crossing the FAF and APR ACTV is not annunciated:
  - a. Do not descend.
  - b. Execute the missed approach.
8. Missed Approach:
  - a. Climb.
  - b. Navigate to the MAP (in APRARM if APR ACTV is not available).

**NOTE**

There is no automatic LEG sequencing at the MAP.

- c. After climbing in accordance with the published missed approach procedure, press the Direct To button, verify or change the desired holding fix and press **ENT**.

#### GENERAL NOTES

- The database must be up to date for instrument approach operation.
- Only one approach can be in the flight plan at a time.
- Checking RAIM prediction for your approach while en route using the **OTH 3** page is recommended. A self check occurs automatically within 2 nm of the FAF. **APR ACTV** is inhibited without RAIM.
- Data cannot be altered, added to or deleted from the approach procedures contained in the database. (DME arc intercepts may be relocated along the arc through the **NAV 4** or the **FPL 0** pages).
- **Some approach waypoints do not appear on the approach plates (including in some instances the FAF).**
- Waypoint suffixes in the flight plan:
  - i -- IAF
  - f -- FAF
  - m -- MAP
  - h -- missed approach holding fix.

•The DME arc IAF (arc intercept waypoint) will be on your present position radial off the arc VOR when you load the IAF into the flight plan, or the beginning of the arc if currently on a radial beyond the arc limit. To adjust the arc intercept to be compatible with a current radar vector, bring up the arc IAF waypoint in the **NAV 4** page scanning field or under the cursor on the **FPL 0** page, press **CLR**, then **ENT**. Fly the arc in LEG. Adjust the heading bug (if autopilot coupled) and CDI course with reference to the desired track value on the **NAV 4** page (it will flash to remind you). Left/right CDI needle information is relative to the arc. Displayed distance is not along the arc but direct to the active waypoint. (The DME arc radial is also displayed in the lower right corner of the **NAV 4** page.)



- The DME arc IAF identifier may be unfamiliar. Example: D098G where 098 stands for the 098° radial off the referenced VOR, and G is the seventh letter in the alphabet indicating a 7 DME arc.
- APRARM to APR **ACTV** is automatic provided that:
  - a. You are in APRARM (normally automatic).
  - b. You are in LEG mode.
  - c. The FAF is the active waypoint.
  - d. Within 2 nm of the FAF.
  - e. Outside of the FAF.
  - f. Inbound to the FAF.
  - g. RAIM is available.
- Direct-To operation between the FAF and MAP cancels APR **ACTV**. Fly the missed approach in APRARM.
- Flagged navigation inside the FAF may usually be restored (not guaranteed) by pressing the GPS APR button changing from **ACTV** to **ARM**. Fly the missed approach.
- The instrument approach using the KLN 89B may be essentially automatically started 30 nm out (with a manual baro setting update) or it may require judicious selection of the OBS and LEG modes.
- APRARM may be canceled at any time by pressing the GPS APR button. (A subsequent press will reselect it.)

## SECTION 5 PERFORMANCE

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



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON  
SUPPLEMENT 6**

**BENDIX/KING KR87  
AUTOMATIC DIRECTION FINDER (ADF)**

SERIAL NO.	<i>170608172</i>
REGISTRATION NO.	<i>OK-4CP</i>

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Automatic Direction Finder is installed.

FAA APPROVAL
FAA APPROVED UNDER FAR 21 SUBPART J
The Cessna Aircraft Co
Delegation Option Manufacturer CE-1
<i>Richard W. Hickey</i> Executive Engineer
Date: 10 December 1998

 Member of GAMA

**9 November 1998**

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WICHITA, KANSAS, USA

T206HPLUS-SB-00

SB-1

## SUPPLEMENT 6

### BENDIX/KING KR 87 AUTOMATIC DIRECTION FINDER (ADF)

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Nov. 9, 1998

#### LOG OF EFFECTIVITY PAGES

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<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S6-1)	Nov 9/98	S6-7	Nov 9/98
S6-2	Nov 9/98	S6-8	Nov 9/98
S6-3	Nov 9/98	S6-9	Nov 9/98
S6-4	Nov 9/98	S6-10	Nov 9/98
S6-5	Nov 9/98	S6-11	Nov 9/98
S6-6	Nov 9/98	S6-12	Nov 9/98

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated in Airplane</u>
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## **SUPPLEMENT**

### **BENDIX/KING KR 87AUTOMATIC DIRECTION FINDER (ADF)**

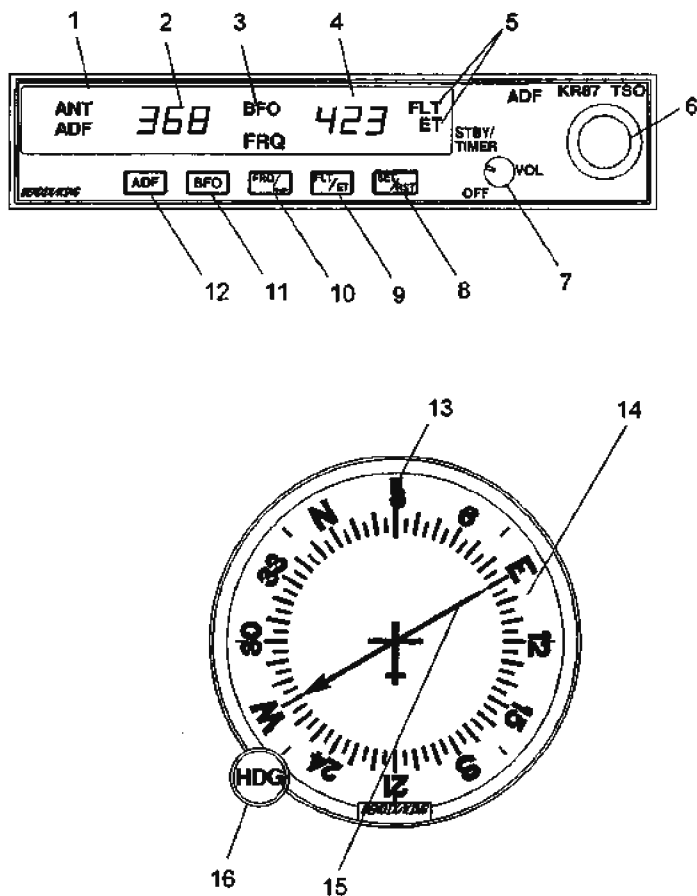
#### **SECTION 1 GENERAL**

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 built-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 3 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 numerics. 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. This timer functions up to 59 hours and 59 minutes. 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.



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0585C1044

Figure 1. KR 87 Automatic Direction Finder (ADF) (Sheet 1 of 4)

1. 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.
2. 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.
3. 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.

4. 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.

Figure 1. KR 87 Automatic Direction Finder (ADF) (Sheet 2 of 4)

5. FLIGHT TIMER AND ELAPSED TIMER MODE ANNUNCIATION -- Either the elapsed time (ET) or flight time (FLT) mode is annunciated here.
6. 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. These knobs are also used to set the desired time when the elapsed timer is used in the countdown mode.
7. 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.
8. SET/RESET ELAPSED TIMER BUTTON (SET/RST) -- The set/reset button when pressed resets the elapsed timer whether it is being displayed or not.
9. FLIGHT TIMER/ELAPSED TIMER MODE SELECTOR BUTTON (FLT/ET) -- The Flight Timer/Elapsed Time mode selector button when pressed alternatively selects either Flight Timer mode or Elapsed Timer mode.

Figure 1. KR 87 Automatic Direction Finder (ADF) (Sheet 3 of 4)

10. 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.
11. BFO (Beat Frequency Oscillator) BUTTON – The BFO button selects the BFO mode when in the depressed position. (See note under item 3).
12. 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.
13. LUBBER LINE – Indicates relative or magnetic heading of the aircraft. The heading must be manually input by the pilot with the heading (HDG) knob.
14. COMPASS CARD – Manually rotatable card that indicates relative or magnetic heading of aircraft, as selected by HDG knob.
15. 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.
16. HEADING KNOB (HDG) –Rotates card to set in relative or magnetic heading of aircraft.

Figure 1. KR 87 Automatic Direction Finder (ADF) (Sheet 4 of 4)



## **SECTION 2 LIMITATIONS**

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

## **SECTION 3 EMERGENCY PROCEDURES**

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

## **SECTION 4 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 – ON.
2. FLT/ET Mode Button – PRESS (once or twice) until ET is annunciated.
3. SET/RST Button – PRESS until the ET annunciation begins to flash.
4. FREQUENCY SELECTOR KNOBS – SET desired time in the elapsed time display. 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 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:**

In the U.S., the FCC, which assigns 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 5 PERFORMANCE**

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



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON  
SUPPLEMENT 7**

**BENDIX/KING KAP 140  
SINGLE AXIS AUTOPILOT**

SERIAL NO.	<u>770608172</u>
REGISTRATION NO.	<u>DL-41P</u>

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the KAP 140 Single Axis Autopilot is installed.

<p>FAA APPROVAL FAA APPROVED UNDER FAR 21 SUBPART J The Cessna Aircraft Co Delegation Option Manufacturer CE-1 <i>Michael D. Kelly</i> Executive Engineer Date: 28 December 1999</p>
--

 Member of GAMA

**28 DECEMBER 1999**

Revision 2 - 31 October 2002

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WICHITA, KANSAS, USA

T206H-FHUS-S7-02

S7-1

# SUPPLEMENT 7

## BENDIX/KING KAP 140 SINGLE AXIS AUTOPILOT

Use the Log of Effective Pages to determine the current status of this supplement. Pages affected by the current revision are indicated by an asterisk (\*) preceeding the page number.

Supplement Status	Date
Original Issue	28 December 1999
Revision 1	30 May 2001
Revision 2	31 October 2002

### LOG OF EFFECTIVE PAGES

Page	Page Status	Revision Number
* Title (S7-1)	Revised	2
* S7-1 thru S7-19	Revised	2
* S7-20	Added	2

APPROVED BY

FAA APPROVED UNDER PART 21 SUBPART J  
The Cessna Aircraft Co.  
Integration/Quality Presentation (DCA-140)S7-02

*Richard W. Hickey*      *Donald R. [Signature]*

DATE OF APPROVAL 10-31-02

## SUPPLEMENT 7

### BENDIX/KING KAP 140 SINGLE AXIS AUTOPILOT

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
KC-140-M1 (Honeywell Service Bulletin)	KAP 140 AP		Revision 2	



## **SUPPLEMENT 7**

### **BENDIX/KING KAP 140 SINGLE AXIS AUTOPILOT**

#### **SECTION 1**

#### **GENERAL**

The Bendix/King KAP 140 is an all-electric, single-axis (aileron control) autopilot system that provides lateral and directional control. Components are a computer, a turn coordinator, an aileron actuator, a course deviation indicator, and a directional indicator or HSI (if installed).

Roll and yaw motions of the airplane are sensed by the turn coordinator gyro. The computer computes the necessary correction and signals the actuator to move the ailerons to maintain the airplane in the commanded lateral attitude.

The KAP 140 will provide wing leveler, heading hold, NAV track, and approach and backcourse lateral modes.

A lockout device prevents autopilot engagement until the system has been successfully preflight tested. Automatic preflight self-test begins with initial power application to the autopilot.

The following conditions will cause the autopilot to disengage:

- A. Electric power failure.
- B. Internal autopilot system failure.
- C. Turn coordinator failure (flagged gyro).
- D. Computer autopilot monitor that detects the R (ROLL) axis annunciator.

The AVIONICS MASTER switch supplies power to the avionics bus bar at the radio circuit breakers and the autopilot circuit breaker. The AVIONICS MASTER switch also services as an emergency autopilot (AP) shutoff.

The following circuit breakers are used to protect the listed elements of the KAP 140 single axis autopilot:

**LABEL**

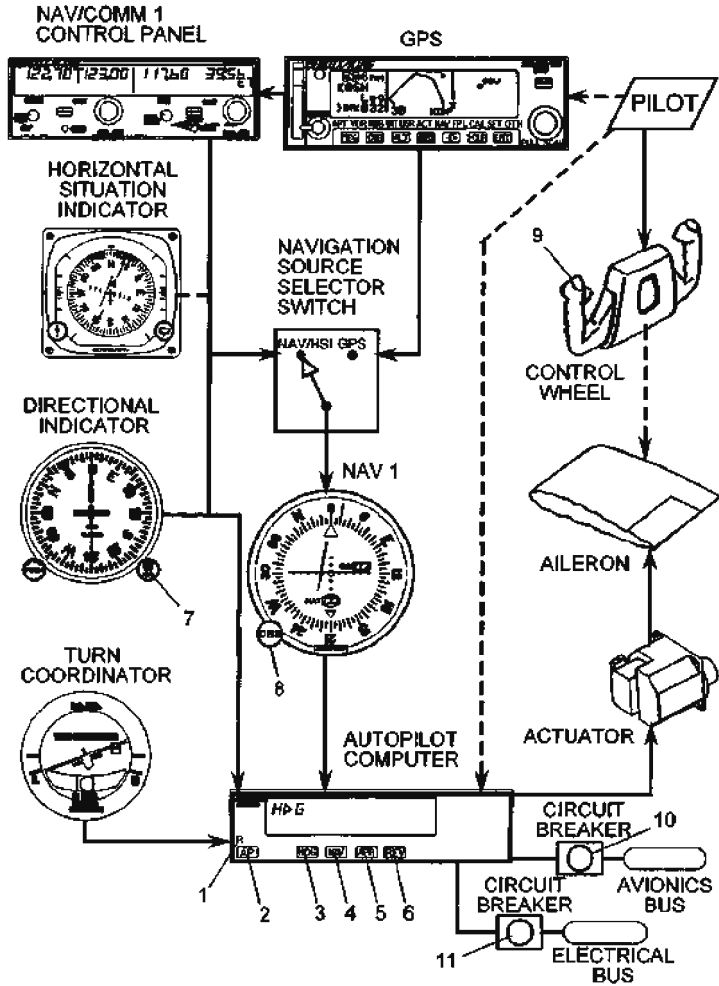
**FUNCTIONS**

AUTO  
PILOT

Supplies power to the KC 140  
Computer and the autopilot.

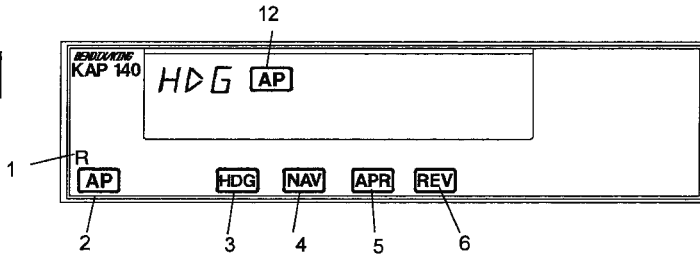
WARN

Supplies power to the autopilot  
disconnect tone.



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Figure 1. Bendix/King KAP 140 Single Axis Autopilot, Operating Controls and Indicators (Sheet 1 of 3)



1. ROLL (R) AXIS ANNUNCIATOR – When illuminated, indicates a failure in the roll axis and prevents engagement or disengages the autopilot.
2. AUTOPILOT ENGAGE/DISENGAGE (AP) BUTTON -- When pushed\* or pressed and held (approx 0.25 seconds)\*\*, engages autopilot if all preflight self test conditions are met. The autopilot will engage in the basic ROL mode which functions as a wings leveler. The AP button can also be used to disengage the autopilot.
3. HEADING (HDG) MODE SELECTOR BUTTON -- When pushed, will select the Heading mode, which commands the airplane to turn to and maintain the heading selected by the heading bug on the Directional Gyro or HSI (if installed). A new heading may be selected at any time and will result in the airplane turning to the new heading. The button can also be used to toggle between HDG and ROL modes. This button can also be used to engage the autopilot in HDG mode. For airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC140-M1, this button will also engage the autopilot in HDG mode.

\* Airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC140-M1.

\*\* Airplane serials T20608001 thru 20608383 incorporating Honeywell Service Bulletin KC140-M1, and airplane serials T20608384 and on.

Figure 1. Bendix/King KAP 140 Single Axis Autopilot, Operating Controls and Indicators (Sheet 2 of 3)

4. NAVIGATION (NAV) MODE SELECTOR BUTTON -- When pushed, will select the Navigation mode. This mode provides automatic beam capture and tracking of VOR, LOC, or GPS signals as selected for presentation on the NAV#1 CDI or HSI (if installed).
5. APPROACH (APR) MODE SELECTOR BUTTON -- When pushed, will select the Approach mode. This mode provides automatic beam capture and tracking of VOR, LOC, or GPS signals as selected for presentation on the NAV #1 CDI or HSI (if installed). The greater tracking sensitivity of the APR mode is recommended for instrument approaches.
6. BACK COURSE APPROACH (REV) MODE SELECTOR BUTTON -- This button is active only when the coupled navigation receiver is tuned to a LOC/ILS frequency. When pushed, it will select the Back Course (BC) approach mode. This mode functions identically to the approach mode except that the autopilot response to LOC signals is reversed.
7. HEADING SELECT KNOB (HDG) -- Positions the heading pointer ("bug") on the compass card. Note that the position of the heading bug also provides course datum to the autopilot when tracking in NAV, APR, or REV (BC) modes. This is in addition to its more intuitive use in the HDG mode.
8. OMNI BEARING SELECT KNOB (OBS) -- Selects the desired course radial to be tracked by the autopilot. (Note that the HDG bug must also be positioned to the proper course to capture and track the selected radial).
9. AUTOPILOT DISCONNECT (A/P DISC) SWITCH -- When depressed will disengage the autopilot. The autopilot disconnect will be annunciated by a continuous two-second tone accompanied by a flashing "AP" displayed on the autopilot computer.
10. AUTOPILOT CIRCUIT BREAKER -- A 5-amp circuit breaker supplying 28 VDC to the KAP 140 system.

Figure 1. Bendix/King KAP 140 Autopilot, Operating Controls and Indicators (Sheet 3 of 3)

11. WARN C/B -- Power to the autopilot disconnect horn.

12. AUTOPILOT ENGAGE **AP** Annunciation\*\* -- Illuminates whenever the autopilot is engaged. Flashes during pilot initiated or automatic disengagement.

\* Airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC140-M1.

\*\* Airplane serials T20608001 thru 20608383 incorporating Honeywell Service Bulletin KC140-M1, and airplane serials T20608384 and on.

## SECTION 2 LIMITATIONS

The following autopilot limitations must be adhered to:

1. The autopilot must be OFF during takeoff and landing.
2. During autopilot operation, the pilot, with seat belt fastened, must be seated in the left front seat.
3. Continued autopilot system use is prohibited following abnormal or malfunctioning operation, and prior to corrective maintenance.
4. The entire PREFLIGHT procedure, outlined under Section 4, including steps 1 through 6, must be successfully completed prior to each flight. Use of the autopilot is prohibited prior to completion of these tests.
5. KMA 28 audio amplifier PUSH OFF/EMG operation is prohibited during normal operations.

### NOTE

During emergency operation of the audio amplifier, the PUSH OFF/EMG state of the KMA 28 will prevent flight control system alerts from being heard.

### **SECTION 3 EMERGENCY PROCEDURES**

The two step procedure listed under paragraph 1 should be among the basic airplane emergency procedures that are committed to memory. It is important that the pilot be proficient in accomplishing both steps without reference to this manual.

1. In case of Autopilot malfunction (accomplish Items a. and b. simultaneously):
  - a. Airplane Control Wheel – GRASP FIRMLY and regain aircraft control.
  - b. A/P DISC Switch – PRESS and HOLD throughout recovery.

#### **NOTE**

The AVIONICS MASTER switch may be used as an alternate means of removing power from the autopilot. In addition to the above, power may be removed with the Engage/Disengage button or the airplane MASTER switch. If necessary perform steps a. and b. above, then turn off the AVIONICS MASTER switch. Primary attitude, airspeed, directional and altitude control instruments will remain operational with either master switch OFF.

#### **WARNING**

- **DO NOT ATTEMPT TO RE-ENGAGE THE AUTOPILOT FOLLOWING AN AUTOPILOT MALFUNCTION.**
- **THE PILOT IN COMMAND MUST CONTINUOUSLY MONITOR THE AUTOPILOT WHEN IT IS ENGAGED, AND BE PREPARED TO DISCONNECT THE AUTOPILOT AND TAKE IMMEDIATE CORRECTIVE ACTION - INCLUDING MANUAL CONTROL OF THE AIRPLANE AND/OR PERFORMANCE OF EMERGENCY PROCEDURES - IF AUTOPILOT OPERATION IS NOT AS EXPECTED OR IF AIRPLANE CONTROL IS NOT MAINTAINED.**

### **AMPLIFIED EMERGENCY PROCEDURES**

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action for an emergency situation.

#### **WARNING**

**DO NOT ATTEMPT TO RE-ENGAGE THE AUTOPILOT FOLLOWING AN AUTOPILOT MALFUNCTION UNTIL CORRECTIVE SERVICE ACTION HAS BEEN PERFORMED ON THE SYSTEM.**

An autopilot malfunction occurs when there is an uncommanded deviation in the airplane flight path or when there is abnormal control wheel movement. The main concern in reacting to an autopilot malfunction, or to an automatic disconnect of the autopilot, is in maintaining control of the airplane. Immediately grasp the control wheel and press and hold down the A/P DISC switch throughout the recovery. Manipulate the controls as required to safely maintain operation of the airplane within all of its operating limitations. The AVIONICS MASTER switch may be used as required to remove all power from the Autopilot. With the AVIONICS MASTER switch off, all flight instruments will remain operational; however, communications, navigation, and identification equipment will be inoperative.

Note that the emergency procedure for any malfunction is essentially the same: immediately grasp the control wheel and regain airplane control while pressing and holding the A/P DISC switch down.

It is important that all portions of the autopilot system are preflight tested prior to each flight in accordance with the procedures published herein in order to assure their integrity and continued safe operation during flight.

A flashing mode annunciation on the face of the autopilot is normally an indication of mode loss.



**NOTE**

An exception to this is HDG annunciation which will flash for 5 seconds along with steady NAVARM, APRARM, or REVARM annunciation to remind the pilot to set the HDG bug for course datum use.

1. Flashing HDG – Indicates a failed heading. PRESS HDG button to terminate flashing. ROL will be displayed.
2. Flashing NAV, APR or REV – Indicates a flagged navigation source. If no NAV source is flagged, a failed heading mode can be the cause. PRESS NAV, APR or REV button to terminate flashing. ROL will be displayed.

**NOTE**

At the onset of mode annunciator flashing, the autopilot has already reverted to a default mode of operation, (i.e., ROL mode). An immediate attempt to reengage the lost mode may be made if the offending navigation flag has cleared.

Effects of instrument losses upon autopilot operation:

1. Loss of the artificial horizon – no effect on the autopilot.
2. Loss of the turn coordinator – autopilot inoperative.
3. Loss of the Directional Gyro (DG) – The directional gyro does not provide any system valid flag. If the DG fails to function properly the autopilot heading and navigation mode will not function correctly. Under these conditions, the only useable lateral mode is ROL.
4. Loss of Horizontal Situation Indicator (HSI) (if installed) – If the HSI fails to function properly the autopilot heading and navigation mode will not function correctly. Under these conditions, the only usable lateral mode is ROL.

## SECTION 4 NORMAL PROCEDURES

### PREFLIGHT (PERFORM PRIOR TO EACH FLIGHT):

1. GYROS -- Allow time for the turn coordinator to come up to speed, as evidenced by the turn coordinator flag being pulled from view.
2. AVIONICS MASTER -- ON.
3. POWER APPLICATION AND SELF TEST  
A self test is performed upon power application to the computer. This test is a sequence of internal checks that validate proper system operation prior to allowing normal system operation. The sequence is indicated by "PFT" (pre-flight test) with an increasing number for the sequence steps. Successful completion of self test is identified by all display segments being illuminated (Display Test) and the disconnect tone sounding.
4. AUTOPILOT -- ENGAGE by pressing AP button.
5. FLIGHT CONTROLS -- MOVE left and right to verify that the autopilot can be overpowered.

### NOTE

Normal use will not require the autopilot to be overpowered.

6. A/P DISC Switch -- PRESS. Verify that the autopilot disconnects and tone sounds.

### BEFORE TAKEOFF:

1. Autopilot -- OFF.

### AUTOPILOT ENGAGEMENT:

1. AP Button -- PRESS. Note ROL annunciator on. If no other modes are selected the autopilot will operate in the ROL mode.

### NOTE

Aircraft heading may change in ROL mode due to turbulence.

#### AUTOPILOT ENGAGEMENT:

1. AP Button -- PRESS. Note ROL annunciator on. If no other modes are selected the autopilot will operate in the ROL mode.

#### NOTE

Aircraft heading may change in ROL mode due to turbulence.

#### HEADING HOLD

1. Heading Selector Knob -- SET bug to desired heading.
2. HDG Mode Selector Button -- PRESS. Note HDG mode annunciator ON. Autopilot will automatically turn the aircraft to the selected heading.

#### COMMAND TURNS (HEADING HOLD MODE ENGAGED)

1. Heading Selector Knob -- MOVE bug to the desired heading. Autopilot will automatically turn the aircraft to the new selected heading.

#### NAV COUPLING

1. When equipped with DG:
  - a. **NAV#1 OBS** Knob -- **SELECT** desired course.
  - b. **NAV** Mode Selector Button -- **PRESS**. Note **NAVARM** annunciated.
  - c. Heading Selector Knob -- **ROTATE BUG** to agree with **OBS** course.

#### NOTE

When NAV is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the OBS course. If HDG mode was in use at the time of NAV button selection, a 45° intercept angle will then be automatically established based on the position of the bug.

**NOTE**

All angle intercepts compatible with radar vectors may be accomplished by selecting ROL mode PRIOR to pressing the NAV button. The HDG bug must still be positioned to agree with the OBS course to provide course datum to the autopilot when using a DG (Directional Gyro).

- 1) If the CDI needle is greater than 2 to 3 dots from center, the autopilot will annunciate **NAV<sub>ARM</sub>**. When the computed capture point is reached, the **ARM** annunciator will go out and the selected course will be automatically captured and tracked.
  - 2) If the CDI needle is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting NAV mode. The **NAV** annunciator will then illuminate and the capture/track sequence will automatically begin.
2. When equipped with HSI:
- a. Course Bearing Pointer - **SET** to desired course.
  - b. Heading Selector Knob -- **SET BUG** to provide desired intercept angle and engage HDG mode.
  - c. **NAV Mode Selector Button -- PRESS.**
- 1) If the Course Deviation Bar (D-Bar) is greater than 2 to 3 dots from center, the autopilot will annunciate **NAV<sub>ARM</sub>**. When the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked.
  - 2) If the D-Bar is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting NAV mode; the **NAV** annunciator will illuminate and the capture/track sequence will automatically begin.

APPROACH (APR) COUPLING: (To enable glideslope coupling on an ILS and more precise tracking on instrument approaches).

1. When equipped with DG:

- a. **NAV #1 OBS** Knob -- **SELECT** desired approach course. (For a localizer, set it to serve as a memory aid.)
- b. **APR Mode Selector Button** -- **PRESS**. Note **APR<sub>ARM</sub>** annunciated.
- c. **Heading Selector Knob** -- **ROTATE BUG** to agree with desired approach.

**NOTE**

When APR is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the approach course. If HDG mode was in use at the time of APR button selection a 45° intercept angle will then be automatically established based on the position of the bug.

**NOTE**

All angle intercepts compatible with radar vectors may be accomplished by selecting ROL mode PRIOR to pressing the APR button. The HDG bug must still be positioned to agree with the desired approach course to provide course datum to the autopilot when using a DG.

- 1) If the CDI needle is greater than 2 to 3 dots from center, the autopilot will annunciate **APR<sub>ARM</sub>**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked.

- 2) If the CDI needle is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting APR mode; the **APR** annunciator will illuminate and the capture/track sequence will automatically begin.
2. When equipped with HSI:
- a. Course Bearing Pointer -- **SET** to desired course.
  - b. Heading Selector Knob -- **SET BUG** to provide desired intercept angle.
  - c. **APR Mode Selector Button -- PRESS.**
- 1) If the D-Bar is greater than 2 to 3 dots from center, the autopilot will annunciate **APR<sub>ARM</sub>**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked.
- 2) If the D-Bar is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting APR mode; the **APR** annunciator will illuminate and the capture/track sequence will automatically begin.
- d. Airspeed -- **MAINTAIN** 90 KIAS during autopilot approaches (recommended).

BACK COURSE (REV) APPROACH COUPLING (i.e., reverse localizer):

1. When equipped with DG:
- a. **NAV #1 OBS** Knob -- **SELECT** the localizer course to the front course inbound (as a memory aid).
  - b. **REV Mode Selector Button -- PRESS.**
  - c. Heading Selector Knob -- **ROTATE BUG** to the heading corresponding to the localizer front course bound.

**NOTE**

- When REV is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the localizer FRONT COURSE INBOUND heading. If heading mode was in use at the time of REV button selection, a 45° intercept angle will then be automatically established based on the position of the bug.
  - All angle intercepts compatible with radar vectors may be accomplished by selecting ROL mode PRIOR to pressing the REV button. The HDG bug must still be positioned to the localizer FRONT COURSE INBOUND heading to provide course datum to the autopilot when using a DG.
- 1) If the CDI needle is greater than 2 to 3 dots from center, the autopilot will annunciate **REV<sub>ARM</sub>**; when the computed capture point is reached the ARM annunciator will go out and the selected back course will be automatically captured and tracked.
  - 2) If the CDI needle is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting REV mode; the REV annunciator will illuminate and the capture/track sequence will automatically begin.
2. When equipped with HSI:
- a. Course Bearing Pointer -- **SET** to the ILS front course inbound heading.
  - b. Heading Selector Knob -- **SET BUG** to provide desired intercept angle and engage HDG mode.
  - c. **REV Mode Selector Button -- PRESS.**
- 1) If the D-Bar is greater than 2 to 3 dots from center, the autopilot will annunciate **REV<sub>ARM</sub>**; when the computed capture point is reached the **ARM** annunciator will go out and the selected back course will be automatically captured and tracked.

2) If the D-Bar is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting **REV** mode; the **REV** annunciator will illuminate and the capture/track sequence will automatically begin.

d. Airspeed -- **MAINTAIN** 90 KIAS during autopilot approaches (recommended).

#### MISSED APPROACH

1. A/P DISC -- PRESS to disengage AP.
2. MISSED APPROACH -- EXECUTE.
3. AP Button -- PRESS (if AP operation is desired). Note ROL annunciator ON. Select optional lateral modes as desired.

#### BEFORE LANDING

1. A/P DISC Switch -- PRESS to disengage AP.

## SECTION 5 PERFORMANCE

There is no change to the airplane performance when the KAP140 Autopilot is installed.





# POH / AFM Supplement

## Instrument Panel

Aircraft model:	Cessna 206
Aircraft Serial No.	T206 - 08172
Registration No.:	OK-DLP

This supplement must be attached to the FAA approved POH/AFM. The information contained in this document supplements or supersedes the basic manual only in those areas listed. For limitations, procedures, performance, and loading information not contained in this supplement, consult the basic POH/AFM.

The technical content of this document is approved under authority of DOA No.EASA.21J.337.

Date: 18 -04- 2010

23 -



Log of Revisions

Revision No.	Pages Affected	Description	Date



**SECTION 1  
GENERAL**

No change.

**SECTION 2  
OPERATING LIMITATIONS**

No change.

**SECTION 3  
EMERGENCY PROCEDURES**

No change.

**SECTION 4  
NORMAL PROCEDURES**

No change.

**SECTION 5  
PERFORMANCE**

No change.

**SECTION 6  
WEIGHT AND BALANCE/EQUIPMENT LIST**

See weight and balance sheet and/or equipment list of basic Aircraft Flight Manual for information regarding the installation of this system.

## SECTION 7 AIRPLANE AND SYSTEMS DESCRIPTION

### INSTRUMENT PANEL

INSTRUMENT PANEL, OK-MCP  
April, 2010



ELT ME 406 Control Unit



## SECTION 8 HANDLING, SERVICE AND MAINTENANCE

No change.



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON  
SUPPLEMENT 9**

**DAVTRON MODEL 803  
CLOCK / O.A.T.**

SERIAL NO.	T20608172
REGISTRATION NO.	OK-MCP

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Clock/O.A.T. gauge is installed.

FAA APPROVAL FAA APPROVED UNDER FAR 21 SUBPART J The Cessna Aircraft Co Delegation Option Manufacturer CE-1 <i>Michael D. Walsh</i> Executive Engineer Date: 19 December 1998
--

 Member of GAMA

**9 November 1998**

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WICHITA, KANSAS, USA

S9-1

T206-IPH-US-S9-00

## SUPPLEMENT 9

### DAVTRON MODEL 803 CLOCK/O.A.T.

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Nov. 9, 1998

### LOG OF EFFECTIVITY PAGES

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<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S9-1)	Nov 9/98	S9-5	Nov 9/98
S9-2	Nov 9/98	S9-6	Nov 9/98
S9-3	Nov 9/98		
S9-4	Nov 9/98		

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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# **SUPPLEMENT**

## **DIGITAL CLOCK/O.A.T.**

### **SECTION 1 GENERAL**

The Davtron Model 803 digital clock combines the features of a clock, outside air temperature gauge (O.A.T.) and voltmeter in a single unit. The unit is designed for ease of operation with a three button control system. The upper button is used to control sequencing between temperature and voltage. The lower two buttons control reading and timing functions related to the digital clock. Temperature and voltage functions are displayed in the upper portion of the unit's LCD window, and clock/timing functions are displayed in the lower portion of the unit's LCD window.

The digital display features an internal light (back light) to ensure good visibility under low cabin lighting conditions and at night. The intensity of the back light is controlled by the PANEL LT rheostat. In addition, the display incorporates a test function which allows checking that all elements of the display are operating.

### **SECTION 2 LIMITATIONS**

There is no change to the airplane limitations when the digital clock/O.A.T. is installed.

### **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when the digital clock/O.A.T. is installed.

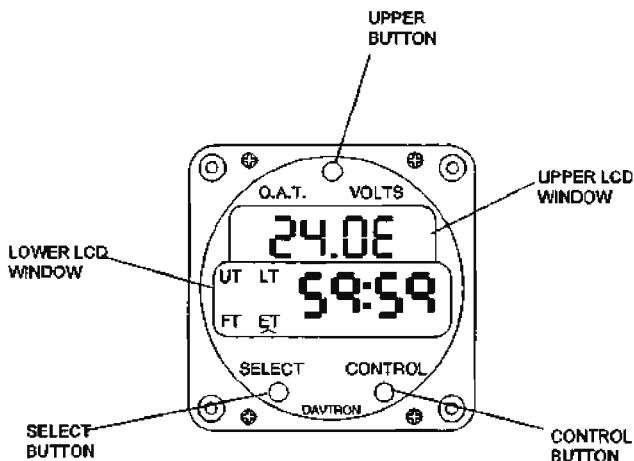


Figure 1. Davtron Model 803 Digital Clock

## SECTION 4 NORMAL PROCEDURES

### TEST MODE

The unit may be tested by holding the SELECT button down for three seconds. Proper operation is indicated by the display 88:88 and activation of all four annunciators.

### O.A.T. / VOLTMETER OPERATION

The upper portion of the LCD window is dedicated to O.A.T. and voltmeter operations. The voltmeter reading is preselected upon startup and is indicated by an "E" following the display reading. Pushing the upper button will sequence the window from voltage to fahrenheit ("F") to centigrade ("C"), and back again to voltage.

## **CLOCK OPERATIONS**

The lower portion of the LCD window is dedicated to clock and timing operations. Pushing the SELECT button will sequence the window from universal time (UT) to local time (LT) to flight time (FT) to elapsed time (ET), and back again to universal time. Pushing the CONTROL button allows for timing functions within the four SELECT menus. Setting procedures are as follows:

### **SETTING UNIVERSAL TIME**

Use the SELECT button to select universal time (UT). Simultaneously press both the SELECT and the CONTROL buttons to enter the set mode. The tens of hours digit will start flashing. The CONTROL button has full control of the flashing digit, and each button push increments the digit. Once the tens of hours is set the SELECT button selects the next digit to be set. After the last digit has been selected and set with the CONTROL button, a final push of the SELECT button exits the set mode. The lighted annunciator will resume its normal flashing, indicating the clock is running in universal time mode.

### **SETTING LOCAL TIME**

Use the SELECT button to select local time (LT). Simultaneously press both the SELECT and the CONTROL buttons to enter the set mode. The tens of hours digit will start flashing. The set operation is the same as for UT, except that minutes are already synchronized with the UT clock and cannot be set in local time.

### **FLIGHT TIME RESET**

Use the SELECT button to select flight time (FT). Hold the CONTROL button down for 3 seconds, or until 99:59 appears on the display. Flight time will be zeroed upon release of the CONTROL button.

### **SETTING FLIGHT TIME FLASHING ALARM**

Use the SELECT button to select flight time (FT). Simultaneously press both the SELECT and the CONTROL buttons to enter the set mode. The tens of hours digit will start flashing. The set operation is the same as for UT. When actual flight time equals the alarm time, the display will flash. Pressing either the SELECT or CONTROL button will turn the flashing off and zero the alarm time. Flight time is unchanged and continues counting.

### SETTING ELAPSED TIME COUNT UP

Use the SELECT button to select elapsed time (ET). Press the CONTROL button and elapsed time will start counting. Elapsed time counts up to 59 minutes, 59 seconds, and then switches to hours and minutes. It continues counting up to 99 hours and 59 minutes. Pressing the CONTROL button again resets elapsed time to zero.

### SETTING ELAPSED TIME COUNT DOWN

Use the SELECT button to select Elapsed Time (ET). Simultaneously press both the SELECT and the CONTROL buttons to enter the set mode. The tens of hours digit will start flashing. The set operation is the same as for UT, and a count down time can be set from a maximum of 59 minutes and 59 seconds. Once the last digit is set, pressing the SELECT button exits the set mode and the clock is ready to start the countdown. Pressing the CONTROL button now will start the countdown. When countdown reaches zero, the display will flash. Pressing either the SELECT or CONTROL button will reset the alarm. After reaching zero, the elapsed time counter will count up.

### BUTTON SELECT DISABLE

When there is no airplane power applied to the unit, the CONTROL and SELECT buttons are disabled.

## SECTION 5 PERFORMANCE

There is no change to the airplane performance when this equipment is installed. However, installation of this OAT probe will result in a minor reduction in cruise performance.



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON  
SUPPLEMENT 10**

**BENDIX/KING KLN 89 GLOBAL  
VFR POSITIONING SYSTEM (GPS)**

SERIAL NO.	<i>T20608172</i>
REGISTRATION NO.	<i>N44-HCP</i>

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the KLN 89 Global Positioning System is installed.

FAA APPROVAL
FAA APPROVED UNDER FAR 21 SUBPART J
The Cessna Aircraft Co
Delegation Option Manufacturer CE-1
<i>Richard W. Welby</i> Executive Engineer
Date: 19 December 1998

 Member of GAMA

**9 November 1998**

Revision 1 - 30 May 2001

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T206HPHUS-S10-01

S10-1

## SUPPLEMENT 10

### BENDIX/KING KLN 89 VFR GLOBAL POSITIONING SYSTEM (GPS)

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

**Revision Level**   **Date of Issue**

0 (Original)      Nov. 9, 1998  
 1                      May 30, 2001

FAA APPROVAL

FAA APPROVED UNDER FAR 21 SUBPART J  
 The Cessna Aircraft Co.  
 Delegation of Authority DCA-1015B-CR  
*Mark A. Hickey*      Executive Engineer

**LOG OF EFFECTIVITY PAGES**

Date: 26 June 2001

PAGE	DATE	PAGE	DATE
Title (S10-1)	May 30/01		
S10-2	May 30/01		
S10-3	May 30/01		
S10-4	Nov 9/98		

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated in Airplane</u>
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S10-2

May 30/01

## **SUPPLEMENT**

### **BENDIX/KING KLN 89 VFR GLOBAL POSITIONING SYSTEM (GPS)**

#### **SECTION 1 GENERAL**

The Bendix/King KLN 89 is a navigation system based on the Global Positioning Satellite network. It contains a database cartridge which may be updated by subscription. Complete descriptive material on the KLN 89 may be found in the Bendix/King KLN 89 Pilot's Guide supplied with the unit. This pilot guide must be available during operation of the KLN 89 unit.

#### **SECTION 2 LIMITATIONS**

Use of the KLN 89 is limited to VFR operations only. The following information must be presented in the form of placards when the airplane is equipped with a KLN 89 unit:

1. On the instrument panel near the KLN 89 unit:

<p><b>GPS NOT APPROVED FOR IFR NAVIGATION</b></p>
---

#### **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when the KLN 89 GPS is installed.

## **SECTION 4 NORMAL PROCEDURES**

There is no change to basic airplane normal operating procedures with the KLN 89 GPS installed.

## **SECTION 5 PERFORMANCE**

There is no change to the airplane performance when the KLN 89 GPS is installed. However, installation of an externally-mounted antenna or related external antennas will result in a minor reduction in cruise performance.





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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON  
SUPPLEMENT 12**

**CANADIAN  
SUPPLEMENT**

SERIAL NO. \_\_\_\_\_  
REGISTRATION NO. \_\_\_\_\_

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when used for Canadian Operation.



 Member of GAMA

**19 March 1999**

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WICHITA, KANSAS, USA

REVISION 1

25 February 2003

S12-1

T206HFHUS-S12-01

## SUPPLEMENT 12

### CANADIAN SUPPLEMENT

Use the Log of Effective Pages to determine the current status of this supplement. Pages affected by the current revision are indicated by an asterisk (\*) preceding the page number.

Supplement Status	Date
Original Issue	19 March 1999
Revision 1	25 February 2003

#### LOG OF EFFECTIVE PAGES

Page	Page Status	Revision Number
* Title (S12-1)	Revised	1
* S12-2 thru S12-4	Revised	1
* S12-5 thru S12-6	Added	1

#### APPROVED BY

FAA APPROVED UNDER PART 21 SUBPART J  
The Cessna Aircraft Co.  
Delegation of Authority Authorization DCA-100708-02

*Michael W. Hickey*      *[Signature]*

DATE OF APPROVAL 02-25-03

## SUPPLEMENT 12

### CANADIAN SUPPLEMENT

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## SUPPLEMENT 12

### CANADIAN SUPPLEMENT

#### SECTION 1 GENERAL

This supplement is required for Canadian operation of Cessna Model T206H.

#### SECTION 2 LIMITATIONS

##### WARNING

THE SEATING CAPACITY OF THIS AIRPLANE IS LIMITED TO 5 OCCUPANTS. ONE OF THE CENTER SEATS MUST BE REMOVED WHEN ANY AFT SEAT IS OCCUPIED. REFER TO SECTION 6 OF THE PILOT'S OPERATING HANDBOOK FOR LOADING ARRANGEMENTS WITH ONE OR MORE SEATS REMOVED.

The following placards must be installed.

1. Near the fuel tank filler cap:

**Serials T20608001 thru T20608361:**

FUEL  
100LL/ 100 MIN. GRADE AVIATION GASOLINE  
CAP. 44.0 U.S. GAL. (166 LITRES) USABLE  
CAP 32.5 U.S. GAL. (123 LITRES) USABLE  
TO BOTTOM OF FILLER INDICATOR TAB

**Serials T20608362 and On:**

FUEL  
100LL/ 100 MIN. GRADE AVIATION GASOLINE  
CAP. 43.5 U.S. GAL. (164 LITRES) USABLE  
CAP 32.0 U.S. GAL. (121 LITRES) USABLE  
TO BOTTOM OF FILLER INDICATOR TAB

**2. Above Pilot door frame:**

OPERATING THIS AIRCRAFT WITH MORE THAN FIVE  
OCCUPANTS IS PROHIBITED.  
ONE CENTER SEAT MUST BE REMOVED WHEN ANY AFT  
SEAT IS OCCUPIED.  
FLOOR AREA EXPOSED DUE TO ABSENCE OF ONE  
CENTER SEAT SHALL BE KEPT CLEAR.  
FOR ADDITIONAL LOADING INSTRUCTIONS SEE  
WEIGHT AND BALANCE DATA.

**3. On the left hand cabin wall below the aft side window and on  
the right hand aft cargo door below the window:**

OCCUPANCY OF THE AFT SEATS IS PROHIBITED WHEN  
BOTH CENTER SEATS ARE INSTALLED.

### **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when used for Canadian operation.

### **SECTION 4 NORMAL PROCEDURES**

There is no change to basic airplane normal operating procedures when used for Canadian operation.

### **SECTION 5 PERFORMANCE**

There is no change to the airplane performance when used for Canadian operation.



**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608362 AND ON  
SUPPLEMENT 13**

**BENDIX/KING KCS-55A SLAVED COMPASS SYSTEM  
WITH KI-525A  
HORIZONTAL SITUATION INDICATOR (HSI)**

SERIAL NO. _____
REGISTRATION NO. _____

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when Horizontal Situation Indicator is installed.

<p style="text-align: center;"><b>FAA APPROVAL</b></p> <p style="text-align: center;"><small>FAA APPROVED UNDER PART 21 SUBPART J The Cessna Aircraft Co. Delegation Order Authorization DCA-100428-02</small></p> <p style="text-align: center;"><i>Michael D. Hestley</i>      <small>Executive Engineer</small></p> <p style="text-align: center;">Date: 6 December 2001</p>
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 Member of GAMA

**10 October 2001**

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T206HPHUS-S13-00

S13-1

## SUPPLEMENT 13

### BENDIX/KING KCS-55A SLAVED COMPASS SYSTEM WITH KI-525A HORIZONTAL SITUATION INDICATOR (HSI)

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

**Revision Level   Date of Issue**

0 (Original)      Oct 10, 2001

#### LOG OF EFFECTIVITY PAGE

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<b>PAGE</b>	<b>DATE</b>	<b>PAGE</b>	<b>DATE</b>
Title (S13-1)	Oct 10/01	S13-5	Oct 10/01
S13-2	Oct 10/01	S13-6	Oct 10/01
S13-3	Oct 10/01	S13-7	Oct 10/01
S13-4	Oct 10/01	S13-8	Oct 10/01

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<b><u>Number</u></b>	<b><u>Title</u></b>	<b><u>Airplane Unit Effectivity</u></b>	<b><u>Revision Incorporation</u></b>	<b><u>Incorporated In Airplane</u></b>
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## **SUPPLEMENT 13**

### **BENDIX/KING KCS-55A SLAVED COMPASS SYSTEM WITH KI-525A HORIZONTAL SITUATION INDICATOR (HSI)**

#### **SECTION 1 GENERAL**

The Bendix/King KCS-55A Slaved Compass System with KI-525A HSI Indicator is an additional navigation indicator option. The KCS-55A compass system includes a slaving control and compensator unit, magnetic slaving transmitter and a remote directional gyro. The information obtained from the KCS-55A compass system is displayed on the KI-525A Indicator.

The panel-mounted KI-525A indicator combines the display functions of both the standard Directional Gyro (Heading Indicator) and the Course Deviation Indicator's VOR/LOC/Glideslope information to provide the pilot with a single visual presentation of the complete horizontal navigation situation.

This system also incorporates a slaving accessory and compensator unit. This unit indicates any difference between the displayed heading and the magnetic heading. Up deflection indicates a clockwise error of the compass card. Down deflection indicates a counterclockwise error of the compass card. Whenever the aircraft is in a turn and the compass card rotates, it is normal for this meter to show a full deflection to one side or the other.

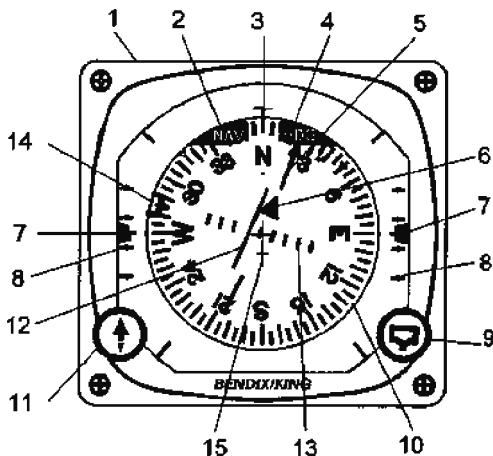


Figure 1. Horizontal Situation Indicator System (Sheet 1 of 2)

1. **HORIZONTAL SITUATION INDICATOR (HSI)** – Provides a pictorial presentation of aircraft deviation relative to VOR/GPS radials and localizer beams. It also displays glide slope deviations and gives heading reference with respect to magnetic north. The gyro is remote-mounted and electrically-driven
2. **NAV FLAG** – Flag is in view when the NAV receiver signal is inadequate.
3. **HEADING REFERENCE (LUBBER LINE)** – Magnetic heading appears under this line when the compass card is slaved or slewed to the aircraft's magnetic heading.
4. **HEADING WARNING FLAG (HDG)** -- When flag is in view, the heading display is invalid.
5. **COURSE SELECT POINTER** -- Indicates VOR/Localizer or GPS course on the compass card. The selected VOR radial or localizer heading remains set on the compass card when the compass card rotates.




6. TO/FROM INDICATOR – Indicates direction of VOR station relative to the selected course. Displays TO when a LOC frequency is selected.
7. DUAL GLIDE SLOPE POINTERS – Displays deviation of airplane from an ILS glideslope. Full scale deflection of the glideslope pointers represents  $\pm 0.7$  degrees. Pointers will be out of view if an invalid glideslope signal is received.
8. GLIDE SLOPE SCALES – Indicates displacement from glide slope beam center. A glide slope deviation bar displacement of 2 dots represents full-scale ( $0.7^\circ$ ) deviation above or below glide slope beam centerline.
9. HEADING SELECTOR KNOB () – Positions the heading bug on compass card by rotating the heading selector knob. The bug rotates with the compass card.
10. COMPASS CARD -- Rotates to display heading of airplane with reference to lubber line on HSI.
11. COURSE SELECTOR KNOB () – Positions the course bearing pointer on the compass card by rotating the course selector knob.
12. COURSE DEVIATION BAR (D-BAR) - The center portion of the omni bearing pointer moves laterally to pictorially indicate the relationship of airplane to the selected course. It indicates degrees of angular displacement from VOR radials and localizer beams, or displacement in nautical miles from GPS desired course.
13. COURSE DEVIATION SCALE -- A course deviation bar displacement of 5 dots represents full scale (VOR =  $\pm 10^\circ$ , LOC =  $\pm 2-1/2^\circ$ , GPS = 5nm enroute, GPS APR = .3nm) deviation from beam centerline.
14. HEADING BUG – Moved by () knob to select desired heading.
15. SYMBOLIC AIRCRAFT – Provides pictorial presentation of the airplane position and intercept angle relative to selected VOR Radial or localizer course.

Figure 1. Horizontal Situation Indicator System (Sheet 2 of 2)

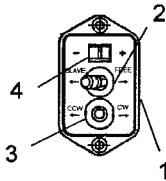


Figure 2. KA-51B Slaving Accessory and Compensator Unit

1. KA-51B SLAVING ACCESSORY AND COMPENSATOR UNIT – Controls the KCS-55A Compass System.
2. MANUAL/AUTOMATIC (FREE/SLAVE) COMPASS SLAVE SWITCH – Selects either the manual or automatic slaving mode for the Compass System.
3. CW/CCW COMPASS MANUAL SLAVE SWITCH – With the manual/automatic compass slave switch in the FREE position, allows manual compass card slaving in either the clockwise or counterclockwise direction. The switch is spring loaded to the center position.
4. SLAVING METER – Indicates the difference between the displayed heading and the magnetic heading. Up deflection indicates a clockwise error of the compass card. Down deflection indicates a counterclockwise error of the compass card.

## **SECTION 2 LIMITATIONS**

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

## **SECTION 3 EMERGENCY PROCEDURES**

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

## **SECTION 4 NORMAL PROCEDURES**

### **CAUTION**

**ELECTRICAL POWER MUST BE SUPPLIED TO THIS INSTRUMENT FOR PROPER FUNCTIONING. ABSENCE OF WHICH WILL RESULT IN UNRELIABLE HEADING INFORMATION.**

Normal procedures for operation of this system differ little from those required for the more conventional Course Deviation Indicators. However, several small differences are worth noting.

The rectilinear movement of the course deviation bar in combination with the rotation of the compass card in response to heading changes, provides an intuitive picture of the navigation situation at a glance when tuned to an omni station. When tuned to a localizer frequency, the course select pointer must be set to the inbound front course for both front and back-course approaches to retain this pictorial presentation.

For normal procedures with autopilots, refer to the Autopilot Supplements in the Supplement section of this handbook. A description of course datum and autopilot procedures for course datum are incorporated in the appropriate autopilot supplements.

## **SECTION 5 PERFORMANCE**

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



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON**

**SUPPLEMENT 15**

**BENDIX/KING KAP 140  
2 AXIS AUTOPILOT**

SERIAL NO.	<u>T20608142</u>
REGISTRATION NO.	<u>OK-MCP</u>

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the KAP 140 2 Axis Autopilot System is installed.

FAA APPROVAL
<b>FAA APPROVED UNDER FAR 21 SUBPART J</b>
The Cessna Aircraft Co
Delegation Option Manufacturer CE-1
<i>Richard D. Hubby</i> Executive Engineer
Date: 22 December 1998

 Member of GAMA

**9 November 1998**

Revision 6 - 4 June 2003

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T206HPHUS-S15-06

S15-1

# SUPPLEMENT 15

## BENDIX/KING KAP 140

### 2 AXIS AUTOPILOT

Use the Log of Effective Pages to determine the current status of this supplement. Pages affected by the current revision are indicated by an asterisk (\*) preceding the page number.

Supplement Status	Date
Original Issue	9 November 1998
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Revision 2	22 December 1999
Revision 3	30 December 2000
Revision 4	28 June 2002
Revision 5	31 October 2002
Revision 6	4 June 2003

#### LOG OF EFFECTIVE PAGES

Page	Page Status	Revision Number
* S15-1 thru S15-20	Revised	6
* S15-20A thru S15-20B	Deleted	6
* S15-21 thru S15-32	Revised	6
* S15-33 thru S15-36	Added	6

#### APPROVED BY

FAA APPROVED UNDER PAR 21 SUBPART J  
The Cessna Aircraft Co.  
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*Richard W. Hickey* Executive Engineer

DATE OF APPROVAL

06-04-03



## SUPPLEMENT 15

### BENDIX/KING KAP 140 2 AXIS AUTOPILOT

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
KC-140-M1 (Honeywell Service Bulletin)	KAP 140 AP		Revision 3	

## **SUPPLEMENT 15**

### **BENDIX/KING KAP 140 2 AXIS AUTOPILOT**

#### **SECTION 1 GENERAL**

■ The KAP 140 2 Axis Autopilot provides the pilot with the following features: Vertical Speed mode (VS); Altitude hold (ALT); Wing Level (ROL); Heading select (HDG); Approach (APR); ILS coupling to Localizer (LOC) and Glideslope (GS); and backcourse (REV) modes of operation. The optional KAP 140, 2 Axis Autopilot with Altitude Preselect (if installed) adds Altitude Alerter and Altitude Preselect capabilities.

■ The KAP 140 2 Axis Autopilot has an electric trim system which provides autotrim during autopilot operation and manual electric trim (MET) for the pilot when the autopilot is not engaged. The electric trim system is designed to be fail safe for any single inflight trim malfunction. Trim faults are visually and aurally annunciated.

A lockout device prevents autopilot or MET engagement until the system has successfully passed preflight self-test. Automatic preflight self-test begins with initial power application to the autopilot.

The following conditions will cause the autopilot to disengage:

- A. Electric Power failure.
- B. Internal Autopilot System failure.
- C. Pitch accelerations in excess of +1.4g or less than +0.6g only when produced by a failure causing servo runaway. The pilot cannot maneuver the airplane and trip the monitor.
- D. Turn coordinator failure (small square red flag visible on instrument).
- E. Computer autopilot monitor that detects either the R (ROLL) or P (PITCH) axis annunciator.

Activation of A/P DISC/TRIM INT control wheel switch will also disconnect the autopilot.

The AVIONICS MASTER switch supplies power to the avionics bus bar of the radio circuit breakers and the autopilot circuit breaker. The AVIONICS MASTER switch also serves as an emergency AP/MET shutoff.

The following circuit breakers are used to protect the KAP 140 2 Axis Autopilot:

<u>LABEL</u>	<u>FUNCTIONS</u>
AUTO PILOT	Pull-off circuit breaker supplies power to the KC 140 Computer and the autopilot pitch, roll and pitch trim servos.
WARN	Supplies separate power for autopilot alerting (PITCH TRIM) on the airplane's annunciator panel.

At T206H serial number T20608404 and On, automated Roll Steering functionality has been added to the Bendix/King KLN 94 GPS Navigation System and the KAP 140 2 Axis Autopilot System. Roll Steering coupling between the GPS and the Autopilot provides area navigation with automatic course changes at flight plan waypoints similar to Flight Management System (FMS) operations, but without vertical navigation capability. The Roll Steering function is similar to "turn anticipation" for the autopilot.

At the noted serial effectivity, the KLN 94 GPS (ORS 03 or later) has an added Roll Steering signal output. In order for the GPS Roll Steering output to be utilized, the KAP 140 Autopilot (-7904 or later) has an added input for the Roll Steering signal and additional system wiring has been added to the airplane to connect the Roll Steering signal output from the KLN 94 GPS to the Roll Steering input of the KAP 140 Autopilot.

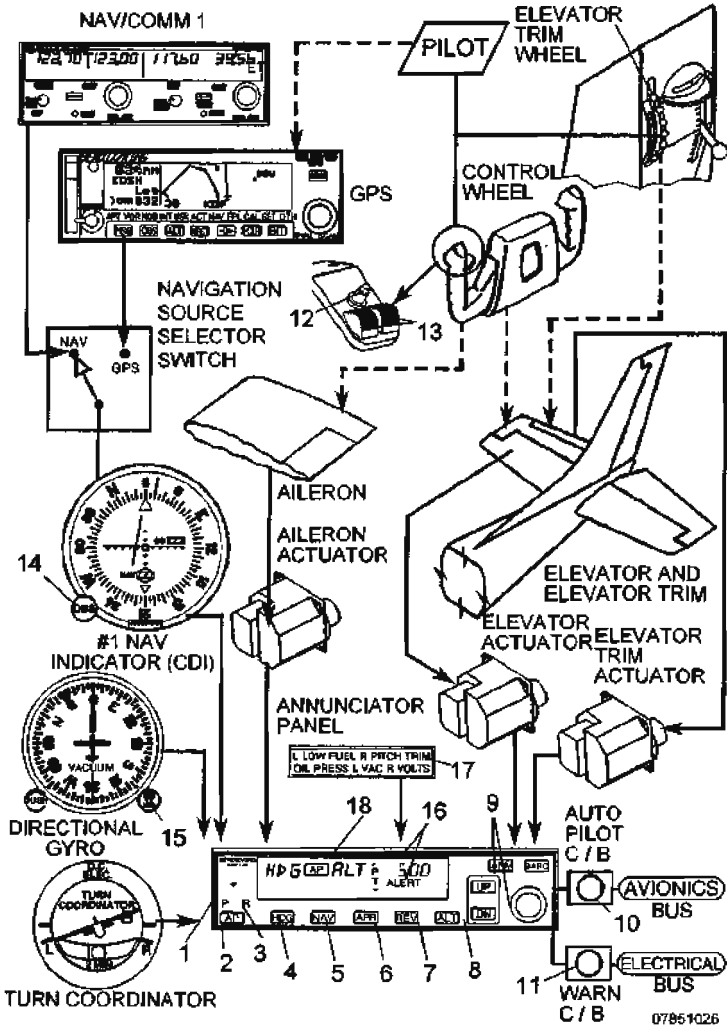


Figure 1. Bendix/King KAP 140 2 Axis Autopilot Schematic  
 (Serials T20608001 thru T20608403) (Sheet 1 of 2)

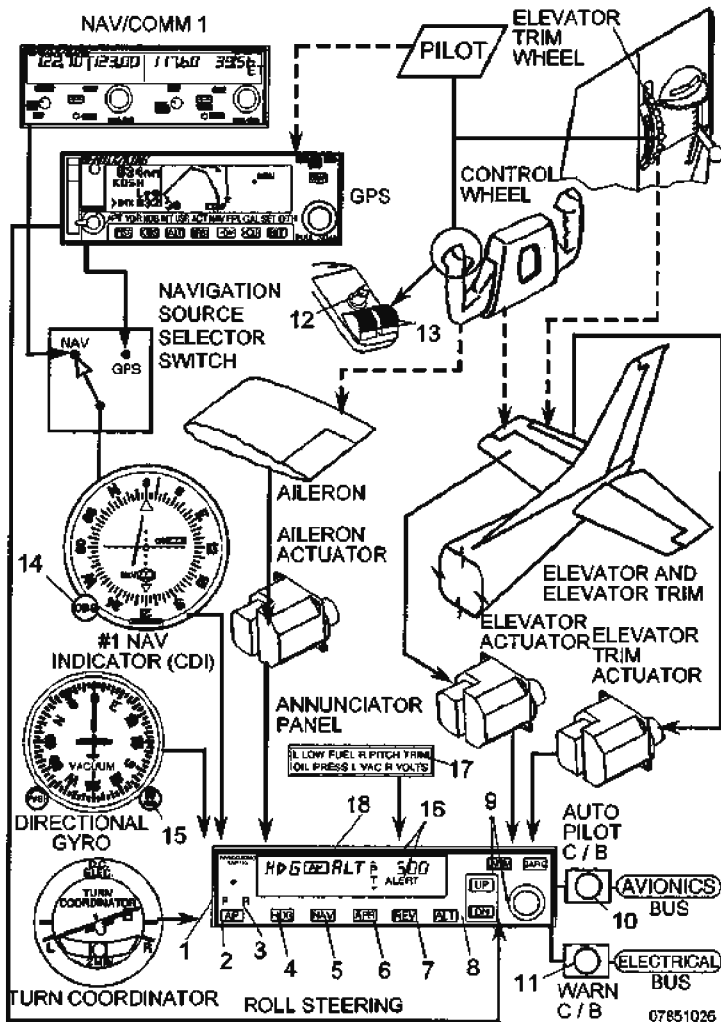
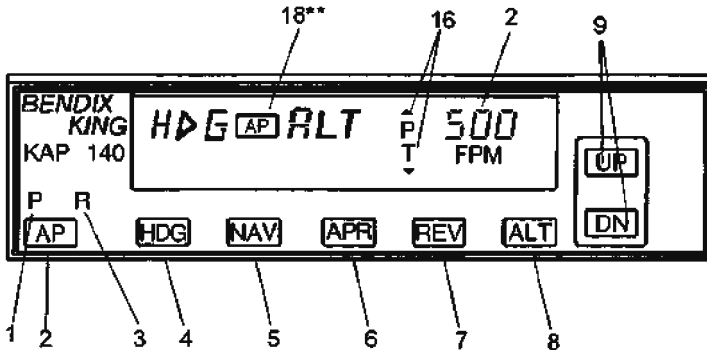


Figure 1. Bendix/King KAP 140 2 Axis Autopilot Schematic  
(Serials T20608404 and On) (Sheet 2)



**KAP 140 WITHOUT ALTITUDE PRESELECT**

1. PITCH AXIS (P) ANNUNCIATOR -- When illuminated, indicates failure of pitch axis and will either disengage the autopilot or not allow engagement of the pitch axis. In turbulent air, will illuminate during abnormal vertical/accelerations.
2. AUTOPILOT ENGAGE/DISENGAGE (AP) BUTTON -- When pushed\*, or pressed and held (approx. 0.25 seconds)\*\*, engages autopilot if all preflight self-test conditions are met. The autopilot will engage in the basic roll (ROL) mode which functions as a wing leveler and the pitch axis vertical speed (VS) mode. The commanded vertical speed will be displayed in the upper right corner of autopilot display area. The captured VS will be the vertical speed present at the moment the AP button is pressed. The button may also be used to disengage the autopilot.
3. ROLL AXIS (R) ANNUNCIATOR -- When illuminated, indicates failure of the roll axis and disengages the autopilot.

\* Airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC-140-M1.

\*\* Airplane serials T20608001 thru T20608383 incorporating Honeywell Service Bulletin KC-140-M1, and airplane serials T20608384 and On.

Figure 2. Bendix/King KAP 140 2 Axis Autopilot, Operating Controls and Indicators (Sheet 1 of 4)

4. **HEADING (HDG) MODE SELECTOR BUTTON** -- When pushed, will select the Heading mode, which commands the airplane to turn to and maintain the heading selected by the heading bug on the Directional Gyro or HSI (if installed). A new heading may be selected at any time and will result in the airplane turning to the new heading. The button can also be used to toggle between HDG and ROL modes. For airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC140-M1, this button can also be used to engage the autopilot in HDG mode.
5. **NAVIGATION (NAV) MODE SELECTOR BUTTON** -- When pushed, will select the Navigation mode. This mode provides automatic beam capture and tracking of VOR, LOC, or GPS signals as selected for presentation on the #1 CDI. NAV mode is recommended for enroute navigation tracking.
6. **APPROACH (APR) MODE SELECTOR BUTTON** -- When pushed, will select the Approach mode. This mode provides automatic beam capture and tracking of VOR, GPS, LOC and Glideslope (GS) on an ILS, as selected for presentation on #1 CDI. APR mode tracking sensitivity is recommended for instrument approaches.
7. **BACK COURSE APPROACH (REV) MODE BUTTON** -- This button is active only when the coupled navigation receiver is tuned to a LOC/ILS frequency. When pushed will select the Back Course approach mode. This mode functions identically to the approach mode except that the autopilot response to LOC signals is reversed. Glideslope is locked out with REV mode.
8. **ALTITUDE HOLD (ALT) MODE SELECT BUTTON** -- When pushed, will select the altitude hold mode. This mode provides capture and tracking of the selected altitude. The selected altitude is the airplane altitude at the moment the ALT button is pressed. If the ALT button is pressed with an established VS rate present, there will be about a 10% (of VS rate) overshoot. The airplane will return positively to the selected altitude. For airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC140-M1, this button can also be used to engage the autopilot in ALT mode.

Figure 2. Bendix/King KAP 140 2 Axis Autopilot,  
Operating Controls and Indicators (Sheet 2)

9. VERTICAL SPEED (UP/DN) MODE BUTTONS – The action of these buttons depends on the vertical mode present when pressed. If VS mode is active (AP plus any lateral mode) and the UP button is pressed, the autopilot will modify the displayed VS command (FPM) in the up direction. Single momentary cycles on either the UP or DN button will increment the VS command by 100 FPM per cycle. When either button is continuously held in, it will modify the vertical speed command by 300 fpm per second.

If ALT mode is active, pressing the UP/DN buttons will modify the captured altitude by 20 feet per cycle, or if held continuously will command the airplane up or down at the rate of 500 FPM, synchronizing the ALT reference to the actual airplane altitude upon button release.

10. AUTO PILOT CIRCUIT BREAKER – A 5-amp pull-off circuit breaker supplying 28 VDC to the KAP 140 system.

11. WARN C/B – Power to the autopilot disconnect horn and the airplane's annunciator panel (PITCH TRIM).

12. AUTOPILOT DISCONNECT (A/P DISC/TRIM INT) SWITCH – When depressed will disengage the autopilot and interrupt manual electric trim (MET) power. An autopilot disconnect will be annunciated by a continuous 2 second tone accompanied by flashing "AP" annunciations on the autopilot computer display.

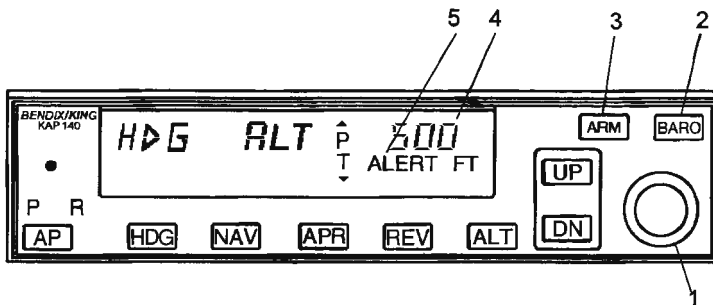
13. MANUAL ELECTRIC TRIM (MET) SWITCHES – When both switches are pressed in the same direction, the trim system will provide pitch trim in the selected direction. Use of manual electric trim during autopilot operation will disengage the autopilot.

Figure 2. Bendix/King KAP 140 2 Axis Autopilot,  
Operating Controls and Indicators (Sheet 3)



14. OMNI BEARING SELECT (OBS) KNOB -- Selects the desired course to be tracked by the autopilot. (Note: The HDG bug must also be positioned to the proper course to capture and track the selected radial or desired track).
  15. HEADING SELECT KNOB (HDG) -- Positions the heading pointer ("bug") on the compass card. Note that the position of the heading bug also provides course datum to the autopilot when tracking in NAV, APR, or REV (BC) modes. This is in addition to its more intuitive use in the HDG mode.
  16. PITCH TRIM (PT) Annunciator -- Indicates the direction of required pitch trim. The annunciation will flash if auto trim has not satisfied the request for trim for a period of 10 seconds. A solid  $\frac{P}{T}$  without an arrowhead is an indication of a pitch trim fault. Refer to the EMERGENCY PROCEDURES for proper response to a pitch trim fault.
  17. PITCH TRIM Annunciation (located on instrument panel or glare shield) -- Illuminates whenever the automated preflight self test detects a pitch trim fault or the continuous monitoring system detects a pitch trim fault in flight. Refer to the EMERGENCY PROCEDURES for proper response to a pitch trim fault.
  - \*\*18. AUTOPILOT ENGAGE AP Annunciation -- Illuminates whenever the autopilot is engaged. Flashes during pilot initiated or automatic disengagement.
- \*\* Airplane serials T20608001 thru T20608383 incorporating Honeywell Service Bulletin KC140-M1, and airplane serials T20608384 and On.

Figure 2. Bendix/King KAP 140 2 Axis Autopilot,  
Operating Controls and Indicators (Sheet 4)



**KAP 140 WITH ALTITUDE PRESELECT**

**NOTE**

Numbered items apply to the KAP 140 with Altitude Preselect. Other controls and indicators shown are the same as those on the KAP 140 without Altitude Preselect (refer to Figure 2).

1. **ROTARY KNOBS** – Used to set the altitude alerter reference altitude; or may be used immediately after pressing the **BARO** button, to adjust the autopilot baro setting to match that of the airplane's altimeter when manual adjustment is required. (In some systems, the baro setting may be automatically synched to that of the altimeter.)
2. **BARO SET (BARO) BUTTON** – When pushed and released, will change the display from the altitude alerter selected altitude to the baro setting display (either IN HG or HPA) for 3 seconds. If pushed and held for 2 seconds, will change the baro setting display from IN HG to HPA or vice versa. Once the baro setting display is visible the rotary knobs may be used to adjust the baro setting.

Figure 3. Bendix/King KAP 140 2 Axis Autopilot with Altitude Preselect, Operating Controls and Indicators (Sheet 1 of 2)

3. **ALTITUDE ARM (ARM) BUTTON** -- When pushed, will toggle altitude arming on or off. When ALT ARM is annunciated, the autopilot will capture the altitude alerter displayed altitude (provided the airplane is climbing or descending in VS to the displayed altitude). ALT hold arming when the autopilot is engaged is automatic upon altitude alerter altitude selection via the rotary knobs. Note that the alerter functions are independent of the arming process thus providing full time alerting, even when the autopilot is disengaged.
4. **ALTITUDE ALERTE/VERTICAL SPEED/BARO SETTING DISPLAY** -- Normally displays the altitude alerter selected altitude. If the UP or DN button is pushed while in VS hold, the display changes to the command reference for the VS mode in FPM for 3 seconds. If the BARO button is pushed, the display changes to the autopilot baro setting in either IN HG or HPA for 3 seconds.

**NOTE**

This display may be dashed for up to 3 minutes on start up if a blind encoder is installed which requires a warm-up period.

5. **ALTITUDE ALERT (ALERT) ANNUNCIATION** -- Illuminates continuously in the region of from 200 to 1000 feet from the selected altitude if the airplane was previously outside of this region. Flashes (1) for two seconds the first time the airplane crossed the selected altitude and (2) continuously in the 200 to 1000 feet region if the airplane was previously inside of this region (i.e. at the selected altitude). Associated with the visual alerting is an aural alert (5 short tones) which occurs 1000 feet from the selected altitude upon approaching the altitude and 200 feet from the selected altitude on leaving the altitude.

Figure 3. Bendix/King KAP 140 2 Axis Autopilot with Altitude Preselect, Operating Controls and Indicators (Sheet 2)

## SECTION 2 LIMITATIONS

The following autopilot limitations must be adhered to:

1. The entire preflight test procedure outlined under Section 4, paragraph A of this supplement, including steps 1 through 7, must be successfully completed prior to each flight. Use of the autopilot or manual electric trim system is prohibited prior to completion of these tests.
2. During autopilot operation, a pilot with seat belt fastened must be seated at the left pilot position.
3. The autopilot must be OFF during takeoff and landing.
4. KMA 28 audio amplifier PUSH OFF/EMG operation is prohibited during normal operations.

### NOTE

During emergency operation of the audio amplifier, the PUSH OFF/EMG state of the KMA 28 will prevent flight control system alerts from being heard.

5. The system is approved for Category I operation only (Approach mode selected).
6. Autopilot maximum airspeed limitation – 160 KIAS.  
Autopilot minimum airspeed limitation – 90 KIAS.
7. Maximum flap extension – 10°.
8. Maximum fuel in balance with autopilot engaged – 100 lbs.
9. The autopilot must be disengaged below 200 feet AGL during approach operations and below 800 feet AGL for all other phases of flight.
10. Overriding the autopilot to change pitch or roll attitude is prohibited. (Disengage with A/P DISC/TRIM INT or AP select button.)
11. The AUTO PILOT circuit breaker must be pulled following any in-flight illumination of the red "PITCH TRIM" warning annunciator (located on the airplane annunciator panel), but only after first completing the Emergency Procedures (Section 3, paragraph 1.). The manual electric trim and autopilot autotrim systems will be disabled with the AUTO PILOT circuit breaker pulled.

### SECTION 3 EMERGENCY PROCEDURES

The four step procedure (steps A thru D) listed under paragraph 1 should be among the basic airplane emergency procedures that are committed to memory. It is important that the pilot be proficient in accomplishing all four steps without reference to this manual.

1. In case of Autopilot, Autopilot Trim, or Manual Electric Trim malfunction (accomplish Items A and B simultaneously):
  - A. Airplane Control Wheel -- **GRASP FIRMLY** and regain aircraft control.
  - B. **A/P DISC/TRIM INT** Switch -- **PRESS** and **HOLD** throughout recovery.
  - C. **AIRCRAFT** -- **RE-TRIM** Manually as Needed.
  - D. **AUTO PILOT** Circuit Breaker -- **PULL**.

#### NOTE

The **AVIONICS MASTER** Switch may be used as an alternate means of removing all electric power from the autopilot and electric trim systems. If necessary perform steps 1A thru 1C above, then turn the **AVIONICS MASTER** Switch OFF before locating and pulling the **AUTO PILOT** Circuit Breaker. Turn the **AVIONICS MASTER** Switch ON as soon as possible to restore power to all other avionics equipment. Primary attitude, airspeed, directional compass, and altitude instruments will remain operational at all times.

#### **WARNING**

**DO NOT ATTEMPT TO RE-ENGAGE THE AUTOPILOT FOLLOWING AN AUTOPILOT, AUTOTRIM, OR MANUAL ELECTRIC TRIM MALFUNCTION UNTIL THE CAUSE FOR THE MALFUNCTION HAS BEEN CORRECTED.**

Maximum Altitude losses due to autopilot malfunction:

CONFIGURATION	ALT. LOSS
Cruise, Climb, Descent	550 ft.
Maneuvering	100 ft.
Approach	50 ft.

### AMPLIFIED EMERGENCY PROCEDURES

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action for an emergency situation.

1. An autopilot or autotrim malfunction occurs when there is an uncommanded deviation in the airplane flight path or when there is abnormal control wheel or trim wheel motion. In some cases, and especially for autopilot trim, there may be little to no airplane motion, yet the red **PITCH TRIM** annunciator (airplane annunciator panel) may illuminate and an alert tone may sound.

The primary concern in reacting to an autopilot or autopilot trim malfunction, or to an automatic disconnect of the autopilot, is in maintaining control of the airplane. Immediately grasp the control wheel and press and hold down the A/P DISC/TRIM INT switch throughout the recovery. Manipulate the controls as required to safely maintain operation of the airplane within all of its operating limitations. Elevator trim should be used manually as needed to relieve control forces. **Locate and pull the AUTO PILOT circuit breaker** on the right hand circuit breaker panel to completely disable the autopilot system.

2. A manual electric trim malfunction may be recognized by illumination of the red **PITCH TRIM** annunciator, accompanied by an alert tone, or by unusual trim wheel motions with the autopilot OFF, without pilot actuation of the manual electric trim switches. As with an autopilot malfunction, the first concern following a manual electric trim malfunction is maintaining control of the airplane. Grasp the control wheel firmly and press and hold down the A/P DISC/TRIM INT switch. **Locate and pull the AUTO PILOT circuit breaker** on the right hand breaker panel.

3. Note that the emergency procedure for any malfunction is essentially the same: immediately grasp the control wheel and regain airplane control while pressing and holding the A/P DISC/TRIM INT switch down, and retrim the airplane as needed. After these steps have been accomplished secure the autopilot electric trim system by pulling the autopilot (AUTO PILOT) circuit breaker. As with any other airplane emergency procedure, it is important that the 4 steps of the emergency procedure located on Page 15 be committed to memory.
4. The AVIONICS MASTER switch may be used to remove all electric power from the Autopilot and Electric Trim systems while the circuit breaker is located and pulled. Return the AVIONICS MASTER switch to the ON position as soon as possible. With the AVIONICS MASTER switch off, all avionics and autopilot equipment will be inoperable.
5. It is important that all portions of the autopilot and electric trim system are preflight tested prior to each flight in accordance with the procedures published herein in order to assure their integrity and continued safe operation during flight.

 **WARNING**

**DO NOT RESET AUTOPILOT CIRCUIT BREAKER FOLLOWING AN AUTOPILOT/AUTOTRIM OR MANUAL ELECTRIC TRIM MALFUNCTION UNTIL THE CAUSE FOR THE MALFUNCTION HAS BEEN CORRECTED.**

A flashing  $\frac{P}{T}$  auto trim annunciation on the face of the autopilot indicates a failure of the auto trim function to relieve pitch servo loading in a timely manner. This condition should be temporary.

1. FLASHING  $\frac{P}{T}$  ANNUNCIATION -- **OBSERVE** airplane pitch behavior. If pitch behavior is satisfactory, wait 5-10 seconds for the annunciation to stop.

2. If annunciation continues, Airplane Control Wheel -- **GRASP FIRMLY**, disengage the autopilot and check for an out of pitch trim condition. Manually retrim as required.
3. **AUTOPILOT OPERATION -- CONTINUE** if satisfied that the out of trim indication was temporary. **DISCONTINUE** if evidence indicates a failure of the auto trim function.

A red **P** or **R** on the face of the autopilot computer:

1. A red **P** is an indication that the pitch axis of the autopilot has been disabled and cannot be engaged. **DO NOT ENGAGE INTO A ROLL AXIS ONLY SYSTEM.**

#### NOTE

If the red **P** lamp was the result of some abnormal accelerations on the airplane, the annunciation should go out within approximately one minute and normal use of the autopilot will be re-established.

2. A red **R** is an indication that the roll axis of the autopilot has been disabled and cannot be engaged. The autopilot cannot be engaged again.

Flashing mode annunciation in the display of the autopilot computer:

1. Flashing **HDG** -- Indicates a failed heading. **PRESS HDG** button to terminate flashing. **ROL** will be displayed.
2. Flashing **NAV**, **APR** or **REV** -- Usually an indication of a flagged navigation source. **PRESS** the **NAV**, **APR** or **REV** button to terminate flashing. **ROL** will be displayed. (Select a valid navigation source.)

#### NOTE

A flashing **NAV**, **APR** or **REV** annunciation can also be caused by a failed heading valid input.



3. Flashing **GS** -- Indication of a flagged glideslope. (GS will rearm automatically if a valid GS signal is received.)

**NOTE**

- To continue tracking the localizer, observe the appropriate minimums for a nonprecision approach. (Press ALT twice in rapid succession to terminate the flashing. Control the pitch axis in the default VS mode.)
- At the onset of mode annunciator flashing, the autopilot has already reverted to a default mode of operation, i.e., ROL and or VS mode. An immediate attempt to reengage to lost mode may be made if the offending navigation, glideslope or compass flag has cleared.

**EXCEPTION**

The HDG annunciation will flash for 5 seconds upon selection of NAV, APR, or REV modes to remind the pilot to set the HDG bug for use as course datum.

Effects of instrument losses upon autopilot operation:

1. Loss of the artificial horizon -- no effect on the autopilot.
2. Loss of the turn coordinator -- autopilot inoperative.
3. Loss of the Directional Gyro (DG) -- The directional gyro does not provide any system valid flag. If the DG fails to function properly the autopilot heading and navigation mode will not function correctly. Under these conditions, the only usable lateral mode is ROL.
4. Loss of Horizontal Situation Indicator (HSI) (if installed) -- If the HSI fails to function properly the autopilot heading and navigation mode will not function correctly. Under these conditions, the only usable lateral mode is ROL.
5. Loss of Blind Altitude Encoder -- Altitude Alerter and Altitude Preselect function inoperative.

### NOTE

The following procedures apply to airplane serials T20608001 thru T20608383 incorporating Honeywell Service Bulletin KC140-M1, and serials T20608384 and On.

The following voice messages will be annunciated as conditions warrant:

1. **"TRIM IN MOTION"** - Elevator trim running for more than 5 seconds, message repeats every 5 seconds.
2. **"CHECK PITCH TRIM"** - An out of trim condition has existed for approximately 20 seconds, take immediate corrective action.
  - a. Airplane Control Wheel -- GRASP FIRMLY and regain aircraft control.
  - b. **A/P DISC/TRIM INT** Switch -- PRESS and HOLD throughout recovery.
  - c. AIRPLANE -- **RETRIM** Manually as Needed.
  - d. **AUTO PILOT** Circuit Breaker -- PULL.

## SECTION 4 NORMAL PROCEDURES

### A. PREFLIGHT (PERFORM PRIOR TO EACH FLIGHT):

1. **AVIONICS MASTER SWITCH** -- ON.
2. **POWER APPLICATION AND SELF-TEST** -- A self-test is performed upon power application to the computer. This test is a sequence of internal checks that validate proper system operation prior to allowing normal system operation. The sequence is indicated by "PFT" with an increasing number for the sequence steps. Successful completion of self-test is identified by all display segments being illuminated (Display Test), external "Pitch Trim" (A/C System Annunciator Panel) being illuminated, and the disconnect tone sounding.

**NOTE**

Upon applying power to the autopilot, the red P warning on the face of the autopilot may illuminate indicating that the pitch axis cannot be engaged. This condition should be temporary, lasting approximately 30 seconds. The P will extinguish and normal operation will be available.

**⚠ WARNING**

**IF PITCH TRIM LIGHT STAYS ON, THEN THE AUTOTRIM DID NOT PASS PREFLIGHT TEST. THE AUTOPILOT CIRCUIT BREAKER MUST BE PULLED. MANUAL ELECTRIC TRIM AND AUTOPILOT ARE INOPERATIVE.**

**3. MANUAL ELECTRIC TRIM -- TEST as follows:**

- a. LH SWITCH -- PUSH FORWARD to DN position and hold. OBSERVE NO MOVEMENT of Elevator Trim Wheel. Release switch to Center OFF Position.

**NOTE**

If movement of the elevator trim wheel is observed during a check of either LH or RH Switch, the manual electric trim system has malfunctioned. The flight may be continued if the AUTOPILOT Circuit Breaker is pulled to the OFF position and secured until repairs can be made.

- b. LH SWITCH -- PULL AFT to UP position and hold. OBSERVE NO MOVEMENT of the Elevator Trim Wheel. Release switch to center OFF position.
- c. RH SWITCH -- PUSH FORWARD to DN position and hold for 5 seconds. OBSERVE NO MOVEMENT of Elevator Trim Wheel. Verify red  $\frac{P}{T}$  light on the autopilot display. Release switch to center OFF position.

**NOTE**

- If red  $\frac{P}{T}$  light is not observed after holding RH switch for 5 seconds, the trim monitor system has failed. The flight may be continued if the AUTOPILOT Circuit Breaker is pulled to the OFF position until repairs can be made.
- d. RH SWITCH -- PULL AFT to UP position and hold for 5 seconds. OBSERVE NO MOVEMENT of Elevator Trim Wheel. Verify red  $\frac{P}{T}$  on the autopilot display. Release switch to center OFF position.
- e. LH and RH Switch -- PUSH FORWARD SIMULTANEOUSLY and HOLD. OBSERVE MOVEMENT of Elevator Trim Wheel in proper direction (nose down). While holding LH and RH Switches forward, PRESS and HOLD A/P DISC/TRIM INT Switch. OBSERVE NO MOVEMENT of Elevator Trim Wheel. Continue to hold LH and RH Switches forward and RELEASE A/P DISC/TRIM INT Switch. OBSERVE MOVEMENT of Elevator Trim Wheel in proper direction. Release LH and RH Switches to center OFF position.

**NOTE**

- During Steps e. and f., verify movement of elevator trim tab in proper direction (the elevator trim tab will move up for nose down trim). If movement of Elevator Trim Wheel is observed while the A/P DISC/TRIM INT Switch is pressed, the manual electric trim system has failed. The flight may be continued if the AUTOPILOT Circuit Breaker is pulled to the OFF position until repairs can be made.
- f. LH and RH Switch -- PULL AFT SIMULTANEOUSLY and HOLD. OBSERVE MOVEMENT of Elevator Trim Wheel in proper direction (nose up). While holding LH and RH Switches aft, PRESS and HOLD A/P DISC/TRIM INT Switch. OBSERVE NO MOVEMENT of Elevator Trim Wheel. Continue to hold LH and RH Switches aft and RELEASE A/P DISC/TRIM INT Switch. OBSERVE MOVEMENT of Elevator Trim Wheel in proper direction. Release LH and RH Switches to center OFF position.

4. **FLASHING BARO SETTING** (if installed) – **SET** proper baro setting manually (or press BARO to accept the present value).
5. **AUTOPILOT – ENGAGE** by pressing\*, or pressing and holding\*\* AP button.
6. **FLIGHT CONTROLS -- MOVE** fore, aft, left and right to verify the autopilot can be overpowered.
7. **A/P DISC/TRIM INT Switch – PRESS.** Verify that the autopilot disconnects.
8. **TRIM – SET** to take off position manually.

**⚠ WARNING**

- **THE PILOT IN COMMAND MUST CONTINUOUSLY MONITOR THE AUTOPILOT WHEN IT IS ENGAGED, AND BE PREPARED TO DISCONNECT THE AUTOPILOT AND TAKE IMMEDIATE CORRECTIVE ACTION -- INCLUDING MANUAL CONTROL OF THE AIRPLANE AND/OR PERFORMANCE OF EMERGENCY PROCEDURES -- IF AUTOPILOT OPERATION IS NOT AS EXPECTED OR IF AIRPLANE CONTROL IS NOT MAINTAINED.**
- **DURING ALL AUTOPILOT COUPLED OPERATIONS, THE PILOT IN COMMAND MUST USE PROPER AUTOPILOT COMMANDS AND USE THE PROPER ENGINE POWER TO ENSURE THAT THE AIRPLANE IS MAINTAINED BETWEEN 90 AND 160 KIAS, AND DOES NOT EXCEED OTHER BASIC AIRPLANE OPERATING LIMITATIONS.**

\* Airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC140-M1.

\*\* Airplane serials T20608001 thru T20608383 incorporating Honeywell Service Bulletin KC140-M1, and airplane serials T20608384 and On.

**NOTE**

Autopilot tracking performance will be degraded in turbulence.

At T206H Serial number T20608404 and On, Roll Steering functionality enables the GPS navigation computer to control the autopilot and automatically perform course changes (turns) and intercept the course to the next active waypoint (when GPS is selected as the autopilot navigation source). The GPS navigation computer uses ground speed, track, and turn rate data to calculate the required bank angle for waypoint course changes. The GPS Roll Steering output will command the autopilot to turn and intercept the course to the new active waypoint without directly overflying the immediate waypoint (except designated flyover waypoints). Distance from the waypoint for the GPS to initiate the turn will vary with groundspeed, etc., but will usually be within one nautical mile of the waypoint. Sequencing to the next waypoint will occur approximately at the midpoint of the turn (transition segment).

Roll Steering is the default operating mode for the autoflight system when all of the following conditions are met:

1. The autopilot is engaged in NAV or APR mode.
2. GPS is selected as the autopilot navigation source.
3. The GPS navigation computer is executing an active flight plan.
4. The GPS is operating in LEG mode.

1. BEFORE TAKEOFF:

- a. **A/P DISC/TRIM INT** Switch – **PRESS**.
- b. **BARO** setting (if installed) -- **CHECK**.

**⚠ CAUTION**

**CONTINUE TO SET MANUALLY THROUGHOUT THE FLIGHT EACH TIME THE ALTIMETER BARO SETTING REQUIRES ADJUSTMENT. NO FURTHER REMINDERS (FLASHING) WILL BE GIVEN.**

- c. **ALTITUDE SELECT KNOB** (if installed) – **ROTATE** until the desired altitude is displayed.

**NOTE**

An altitude alert is annunciated 1000 ft. prior to arrival at the selected altitude. Airplane deviations greater than 200 feet above or below the selected altitude will produce an altitude alert. The alert annunciation is accompanied by a series of short tones.

2. AFTER TAKEOFF:

- a. Elevator Trim -- **VERIFY** or **SET** to place the airplane in a trimmed condition prior to autopilot engagement.

**NOTE**

Engaging the autopilot into a mistrim condition may cause unwanted attitude changes and a "TRIM FAIL" annunciation.

- b. Airspeed and Rate of Climb -- **STABILIZED**.

**NOTE**

Avoid autopilot engagement into a climb condition that either cannot be maintained, or is on the performance limits of the airplane for its power and weight configuration.

- c. **AP Button – PRESS\*, or PRESS and HOLD\*\*.** Note ROL and VS annunciator on. If no other modes are selected the autopilot will operate in the ROL and VS modes.

**⚠ WARNING**

- **WHEN OPERATING AT OR NEAR THE BEST RATE OF CLIMB AIRSPEED, AT CLIMB POWER SETTINGS, AND USING VERTICAL SPEED (VS) MODE, CONTINUED OPERATION IN VERTICAL SPEED MODE CAN RESULT IN AN AIRPLANE STALL. IF NECESSARY, DISCONNECT THE AUTOPILOT AND RETURN THE AIRPLANE TO A STABILIZED CLIMB PRIOR TO RE-ENGAGEMENT.**
- **WHEN OPERATING AT OR NEAR THE MAXIMUM AUTOPILOT SPEED, IT WILL BE NECESSARY TO REDUCE POWER IN ORDER TO MAINTAIN THE DESIRED RATE OF DESCENT AND NOT EXCEED THE MAXIMUM AUTOPILOT SPEED.**
- **DO NOT HELP THE AUTOPILOT OR HAND-FLY THE AIRPLANE WITH THE AUTOPILOT ENGAGED AS THE AUTOPILOT WILL RUN THE PITCH TRIM TO OPPOSE CONTROL WHEEL MOVEMENT. A MISTRIM OF THE AIRPLANE, WITH ACCOMPANYING LARGE ELEVATOR CONTROL FORCES, MAY RESULT IF THE PILOT MANIPULATES THE CONTROL WHEEL MANUALLY WHILE THE AUTOPILOT IS ENGAGED.**

\* Airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC140-M1.

\*\* Airplane serials T20608001 thru T20608383 incorporating Honeywell Service Bulletin KC140-M1, and airplane serials T20608384 and On.



3. CLIMB OR DESCENT:

- a. **BARO** setting (if installed) -- **CHECK**.
- b. Using Vertical Trim:
  - 1) **VERTICAL SPEED** Control -- **PRESS** either the **UP** or **DN** button to select aircraft vertical speed within the  $\pm 2000$  ft./min command limits.
  - 2) **VERTICAL SPEED** Control -- **RELEASE** when desired vertical speed is displayed. The autopilot will maintain the selected vertical speed.

**NOTE**

Avoid selecting a climb rate that either cannot be maintained or is on the performance limit of the airplane for its power and weight configuration.

4. ALTITUDE HOLD:

- a. Capture preselected altitudes (if installed):
  - 1) **ALTITUDE SELECT** knob -- **ROTATE** until the desired altitude is displayed. Note **ARM** annunciation occurs automatically with altitude selection when the autopilot is engaged.
  - 2) **ALTITUDE SELECT MODE (ARM)** button -- **PUSH** to alternately disarm or arm altitude capture.
  - 3) Airplane -- **ESTABLISH** vertical speed necessary to intercept the selected altitude.

**NOTE**

It may be possible to observe minor difference between the autopilot's selected altitude and the airplane altimeter after an altitude capture. These discrepancies are attributed to the autopilot and altimeter using different static sources combined with autopilot system tolerances. Not inputting the proper barometric setting into the autopilot computer will produce inaccuracies.

**NOTE**

Altitude preselect captures are not recommended on nonprecision approaches to capture the MDA. Glideslope coupling will preclude a preselect altitude capture on an ILS.

b. Altitude (ALT) Hold Button:

- 1) ALT Hold Selector Button -- **PRESS**. Note ALT hold annunciator **ON**. Autopilot will maintain the selected altitude.

**NOTE**

It is recommended by the FAA (AC00-24B) to use basic "PITCH ATTITUDE HOLD" mode during operation in severe turbulence. However, since this autopilot does not use the attitude gyro as a pitch reference, it is recommended that the autopilot be disconnected and that the airplane be flown by hand in severe turbulence.

c. Changing altitudes:

- 1) Using Vertical Speed (Recommended for altitude changes less than 100 ft.)
  - a) **VERTICAL SPEED** Control -- **PRESS** and **HOLD** either the **UP** or **DN** button. Vertical Speed will seek a rate of change of about 500 fpm.
  - b) **VERTICAL SPEED** Control -- **RELEASE** when desired altitude is reached. The autopilot will maintain the desired altitude.

**NOTE**

As an alternative, a series of quick momentary presses on the **UP** or **DN** button will program either an increase or decrease of the altitude reference, 20 feet each time the button is pressed.

5. HEADING HOLD:

- a. Heading Selector Knob -- **SET BUG** to desired heading.
- b. **HDG** Mode Selector Button -- **PRESS**. Note **HDG** mode annunciator **ON**. Autopilot will automatically turn the airplane to the selected heading.

**NOTE**

Airplane heading may change in ROL mode due to turbulence.

- c. Heading Selector Knob -- **MOVE BUG** to the desired heading. Autopilot will automatically turn the airplane to the new selected heading.

6. NAV COUPLING:

- a. When equipped with DG:
  - 1) **OBS** Knob -- **SELECT** desired course.
  - 2) **NAV** Mode Selector Button -- **PRESS**. Note **NAVARM** annunciated.
  - 3) Heading Selector Knob -- **ROTATE BUG** to agree with **OBS** course.

**NOTE**

- When NAV is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the OBS course. IF HDG mode was in use at the time of NAV button selection, a 45° intercept angle will then be automatically established based on the position of the bug.
- All angle intercepts compatible with radar vectors may be accomplished by selecting ROL mode PRIOR to pressing the NAV button. The HDG bug must still be positioned to agree with the OBS course to provide course datum to the autopilot when using a DG (Directional Gyro).

- a) If the CDI needle is greater than 2 to 3 dots from center, the autopilot will annunciate **NAVARM**. When the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked.
  - b) If the CDI needle is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting NAV mode. The **NAV** annunciator will then illuminate and the capture/track sequence will automatically begin.
- b. When equipped with HSI:
- 1) Course Bearing Pointer - **SET** to desired course.
  - 2) Heading Selector Knob – **SET BUG** to provide desired intercept angle and engage HDG mode.
  - 3) **NAV** Mode Selector Button -- **PRESS**.
    - a) If the Course Deviation Bar (D-Bar) is greater than 2 to 3 dots from center, the autopilot will annunciate **NAVARM**. When the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked.
    - b) If the D-Bar is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting NAV mode. The **NAV** annunciator will then illuminate and the capture/track sequence will automatically begin.

When Roll Steering is in operation, adjusting or changing the position of the heading bug or the course pointer will have no effect on heading or course. It is recommended that both the heading bug and the course pointer (or NO 1. OBS) always be set to the current course to enhance situational awareness, especially in the event of an unexpected autoflight equipment failure. GPS signal loss requires that the pilot immediately select an alternate autopilot operating mode (such as HDG) or select NAV (NAV1) as the autopilot navigation source. If autopilot function is lost, the pilot is required to resume manual control of the airplane. Keeping the heading bug and course pointer set to the present course makes immediate recovery easier.

Roll Steering will not function when the GPS is in OBS mode, when the autopilot is in HDG or ROL mode or when the autopilot is in NAV mode with NAV selected as the autopilot navigation source.

7. APPROACH (APR) COUPLING: (To enable glideslope coupling on an ILS and more precise tracking on instrument approaches).

Roll Steering will operate on instrument approach procedures selected from a current GPS aeronautical database **only** when:

- The autopilot is engaged in either NAV or APR mode.
- AND
- GPS is selected as the autopilot NAV input.

Ensure that the appropriate GPS mode (LEG or OBS) is selected during each portion of the approach procedure.

- a. When equipped with DG:
- 1) **BARO** setting -- **CHECK** (if installed).
  - 2) **OBS** Knob -- **SELECT** desired approach course. (For a localizer, set it to serve as a memory aid.)
  - 3) **APR** Mode Selector Button -- **PRESS**. Note **APR<sub>ARM</sub>** annunciated.
  - 4) Heading Selector Knob -- **ROTATE BUG** to agree with desired approach.

**NOTE**

- When APR is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the approach course. If HDG mode was in use at the time of APR button selection, a 45° intercept angle will then be automatically established based on the position of the bug.
  - All angle intercepts compatible with radar vectors may be accomplished by selecting ROL mode **PRIOR** to pressing the APR button. The HDG bug must still be positioned to agree with the desired approach course to provide course datum to the autopilot when using a DG.
    - a) If the CDI needle is greater than 2 to 3 dots from the center, the autopilot will annunciate **APRARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked.
    - b) If the CDI needle is less than 2 to 3 dots from the center, the HDG mode will disengage upon selecting APR mode; the **APR** annunciator will illuminate and the capture/track sequence will automatically begin.
- b. When equipped with HSI:
- 1) **BARO** Setting (if installed) – **CHECK**.
  - 2) Course Bearing Pointer – **SET** to desired course.
  - 3) Heading Selector Knob – **SET BUG** to provide desired intercept angle.

- 4) **APR Mode Selector Button – PRESS.**
  - a) If the D-Bar is greater than 2 to 3 dots from center, the autopilot will annunciate **APRARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected course will be automatically captured and tracked.
  - b) If the D-Bar is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting APR mode; the **APR** annunciator will illuminate and the capture/track sequence will automatically begin.
- 5) Airspeed – **MAINTAIN 100 KIAS** minimum during coupled autopilot approaches (recommended).
8. **BACK COURSE (REV) APPROACH COUPLING** (i.e., reverse localizer):
  - a. When equipped with DG:
    - 1) **BARO** setting (if installed) – **CHECK**.
    - 2) **OBS** Knob – **SELECT** the localizer course to the front course inbound (as a memory aid).
    - 3) **REV** Mode Selector Button – **PRESS**.
    - 4) Heading Selector Knob – **ROTATE BUG** to the heading corresponding to the localizer front course inbound.

**NOTE**

- When REV is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the localizer FRONT COURSE INBOUND heading. If heading mode was in use at the time of REV button selection, a 45° intercept angle will then be automatically established based on the position of the bug.
  - All angle intercepts compatible with radar vectors may be accomplished by selecting ROL mode PRIOR to pressing the REV button. The HDG bug must still be positioned to the localizer FRONT COURSE INBOUND heading to provide course datum to the autopilot when using a DG.
    - a) If the CDI needle is greater than 2 to 3 dots from center, the autopilot will annunciate **REVARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected back course will be automatically captured and tracked.
    - b) If the CDI needle is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting **REV** mode; the **REV** annunciator will illuminate and the capture/track sequence will automatically begin.
- b. When equipped with HSI:
- 1) **BARO** Setting (if installed) – **CHECK**.
  - 2) Course Bearing pointer – **SET** to the ILS front course inbound heading.
  - 3) Heading Selector Knob – **SET BUG** to provide desired intercept angle and engage HDG mode.
  - 4) **REV** Mode Selector Button – **PRESS**.



- a) If the D-Bar is greater than 2 to 3 dots from center, the autopilot will annunciate **REARM**; when the computed capture point is reached the **ARM** annunciator will go out and the selected back course will be automatically captured and tracked.
  - b) If the D-Bar is less than 2 to 3 dots from center, the HDG mode will disengage upon selecting **REV** mode; the **REV** annunciator will illuminate and the capture/track sequence will automatically begin.
- 5) Airspeed -- **MAINTAIN** 100 KIAS minimum during autopilot coupled approaches (recommended).

#### 9. GLIDESLOPE COUPLING

- a. **APR** Mode -- **ENGAGED**, Note **GS<sub>ARM</sub>** annunciated.

##### NOTE

Glideslope coupling is inhibited when operating in NAV or REV modes. With NAV 1 selected to a valid ILS, glideslope armed and coupling occurs automatically in the APR mode when tracking a localizer.

- b. At Glideslope centering -- note **ARM** annunciator goes out.

##### NOTE

Autopilot can capture glideslope from above or below the beam.

- c. Airspeed -- **MAINTAIN** 100 KIAS minimum during autopilot coupled approaches (recommended).

#### 10. MISSED APPROACH

- a. **A/P DISC/TRIM INTER** Switch - **PRESS** to disengage AP.
- b. **MISSED APPROACH - EXECUTE.**
- c. If autopilot is desired:
  - 1) Elevator Trim – **VERIFY** or **SET.**
  - 2) Airspeed and Rate of Climb – **STABILIZED.**

#### NOTE

Avoid autopilot engagement into a climb condition that either cannot be maintained, or is on the performance limits of the airplane for its power and weight configuration.

- 3) AP Button – **PRESS.** Note **ROL** and **VS** annunciators on. If no other modes are selected the autopilot will operate in the **ROL** and **VS** modes. Verify that the airplane Vertical Speed Indicator (VSI) and the Autopilot VS agree.

#### NOTE

If tracking the ILS course outbound as part of the missed approach procedure is desired, use the **NAV** mode to prevent inadvertent **GS** coupling.

#### 11. BEFORE LANDING

- a. **A/P DISC/TRIM INT** Switch -- **PRESS\*** or **PRESS** and **HOLD\*\*** to disengage AP.

## SECTION 5 PERFORMANCE

There is no change to the airplane performance when the KAP 140 2 Axis Autopilot is installed.

\* Airplane serials T20608001 thru T20608383 not incorporating Honeywell Service Bulletin KC140-M1.

\*\* Airplane serials T20608001 thru T20608383 incorporating Honeywell Service Bulletin KC140-M1, and airplane serials T20608384 and On.



**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON  
SUPPLEMENT 16**

**CARGO PACK**

SERIAL NO.	T20608172
REGISTRATION NO.	OK-MCP

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Cargo Pack is installed.

FAA APPROVAL
FAA APPROVED UNDER FAR 21 SUBPART J
The Cessna Aircraft Co
Delegation Option Manufacturer CE-1
<i>Richard D. Holby</i> Executive Engineer
Date: 3 May 1999

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T206HPHUS-S16-00

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**31 March 1999**

S16-1

## SUPPLEMENT 16

### CARGO PACK

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	March 31, 1999

### LOG OF EFFECTIVITY PAGES

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<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S16-1)	Mar 31/99		
S16-2	Mar 31/99		
S16-3	Mar 31/99		
S16-4	Mar 31/99		

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## **SUPPLEMENT**

### **CARGO PACK**

#### **SECTION 1 GENERAL**

The cargo pack provides additional cargo and baggage space. The basic shell of the cargo pack, including the loading door, is fabricated from fiberglass. Corrugated aluminum forms the inner floor of the pack. A loading door is located on the left side of the pack, and is hinged at the bottom. It is secured in the closed position by two quick-release fasteners, and has a key-operated lock.

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

The pack is attached to the bottom of the fuselage with screws and, after the initial installation, can readily be removed or installed. Complete instructions for installation of the cargo pack, and required modifications to the nose gear access panels, fuel pump vent line and exhaust stack are contained in the Accessory Kit and Service Manual.

#### **SECTION 2 LIMITATIONS**

The following information must be presented in the form of a placard, located on the inside of the cargo pack door:

<p>REFER TO WEIGHT &amp; BALANCE DATA FOR BAGGAGE/CARGO LOADING. NEVER EXCEED 300 LBS. CARGO WEIGHT.</p>
--

### **SECTION 3 EMERGENCY PROCEDURES**

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

### **SECTION 4 NORMAL PROCEDURES**

Consideration should be given to loading of the cargo pack and the necessary weight and balance computations outlined in Section 6 of the basic handbook. All other normal procedures specified in the basic handbook are applicable when the cargo pack is installed.

### **SECTION 5 PERFORMANCE**

The climb performance of the airplane equipped with the cargo pack is approximately 80 fpm less than shown in the climb performance charts in Section 5 of the basic handbook. The cruise speeds are approximately 5 KTAS lower than shown in the cruise charts in Section 5 of the basic handbook.

#### **DEMONSTRATED OPERATING TEMPERATURE**

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



**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608001 and ON**

**SUPPLEMENT 17**

**PROPELLER DE-ICE**

SERIAL NO.	<u>T20608072</u>
REGISTRATION NO.	<u>OK-MCP</u>

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Prop De-Ice System is installed.

FAA APPROVAL FAA APPROVED UNDER FAR 21 SUBPART J The Cessna Aircraft Co Delegation Option Manufacturer OE-1 <i>Markus W. Nulley</i> Executive Engineer Date: 19 December 1998
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 Member of GAMA

**7 December 1998**

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T206HPLUS-S17-00

S17-1

## SUPPLEMENT 17

### PROPELLER HEAT SYSTEM

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Dec. 7, 1998

### LOG OF EFFECTIVITY PAGES

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<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S17-1)	Dec 7/98		
S17-2	Dec 7/98		
S17-3	Dec 7/98		
S17-4	Dec 7/98		

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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# **SUPPLEMENT**

## **PROPELLER DE-ICE SYSTEM**

### **SECTION 1**

#### **GENERAL**

The propeller de-ice system provides a measure of protection for the propeller blade surfaces if unexpected icing conditions are encountered. The system is operated by a 20 amp switch breaker labeled PROP DE-ICE located on the circuit breaker and control switch panel. When the switch is placed to the ON position, electric current flows to a propeller de-ice timer which cycles the current on and off for 90-second periods to the heated boots located on each of the propeller blades. The timer monitors the system current draw during the on periods and checks the system for open and short-circuit conditions. When the system conditions are normal, a green PROP HEAT annunciator is illuminated in the center instrument panel above the radio rack. If the timer detects faulty system wiring or a heated boot failure, it removes the current supply to the boots, extinguishes the green PROP HEAT light and illuminates an amber PROP HEAT light adjacent to the green one.

The timer will continue to monitor the status of the system during the fault condition and will return the system to normal operation automatically if the detected faults are cleared. When the system is on and operating normally the monitor circuits of the timer can be tested by placing the master warning test/brt/dim switch located on the top of the center instrument panel above the radio rack to TEST. The test switch simulates a propeller de-ice system fault and the timer will extinguish the green PROP HEAT light and illuminate the amber PROP HEAT light. Upon release of the test switch the system will return to normal operation.

## SECTION 2

### LIMITATIONS

There is no change to the airplane limitations when the propeller de-ice system is installed; intentional flight into known icing conditions is prohibited, regardless of installed ice protection equipment.

## SECTION 3

### EMERGENCY PROCEDURES

Flight into known icing conditions is prohibited. If unexpected icing conditions are encountered, the Inadvertent Icing Encounter checklist in Section 3 of the basic handbook should be followed. In addition, the following procedure is recommended.

1. Master Switch -- ON.
2. PROP DE-ICE Switch -- ON. CHECK green PROP HEAT light illuminated.

#### NOTE

For accurate magnetic compass readings, turn the PITOT HEAT and PROP DE-ICE switches OFF momentarily.

3. PROP DE-ICE Switch -- Cycle OFF then ON when amber PROP HEAT light illuminated. If amber PROP HEAT light illuminates again, place PROP DE-ICE switch to OFF and advise maintenance.

**DO NOT RUN THE PROP HEAT SYSTEM MORE THAN 15 SECONDS ON THE GROUND WITHOUT ENGINE POWER.**

4. PROP DE-ICE Switch -- OFF when DE-ICE is no longer required.

## **SECTION 4 NORMAL PROCEDURES**

There is no change to the airplane normal procedures when the propeller heat system is installed.

Refer to Section 8 of the basic handbook for care and maintenance of the propeller heated boots.

## **SECTION 5 PERFORMANCE**

There is no change to the airplane performance when the propeller heat system is installed.



**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608147 AND ON  
SUPPLEMENT 18  
CENTURY  
HORIZONTAL SITUATION INDICATOR (HSI)**

SERIAL NO. <u>770608147</u>
REGISTRATION NO. <u>OK-MCP</u>

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when this Horizontal Situation Indicator is installed.

FAA APPROVAL FAA APPROVED UNDER FAR 21 SUBPART J The Cessna Aircraft Co Delegation Option Manufacturer CE-1 <i>Richard W. Hedley</i> Executive Engineer Date: 20 December 1999
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**20 December 1999**

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S18-1

T206HPHUS-S18-00

## SUPPLEMENT 18

### CENTURY HORIZONTAL SITUATION INDICATOR (HSI)

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Dec. 20, 1999

#### LOG OF EFFECTIVITY PAGES

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<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S18-1)	Dec 20/99	S18-5	Dec 20/99
S18-2	Dec 20/99	S18-6	Dec 20/99
S18-3	Dec 20/99	S18-7	Dec 20/99
S18-4	Dec 20/99	S18-8	Dec 20/99

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## **SUPPLEMENT**

### **CENTURY HORIZONTAL SITUATION INDICATOR (HSI)**

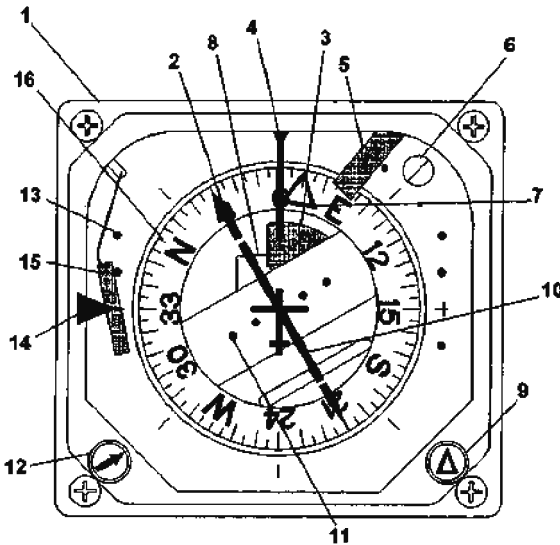
#### **SECTION 1 GENERAL**

The Century Horizontal Situation Indicator (HSI) is an additional navigation indicator option available with various Bendix/King KX155A Nav/Comm Radios and autopilot options. When dual Nav/Coms are installed, the HSI is coupled to the first Nav/Com and a VOR/LOC indicator is coupled to the second Nav/Com.

This system consists of a Horizontal Situation Indicator (HSI), a remote HSI control switch, a remote magnetic flux detector and a remote VOR/LOC converter. The HSI features the modified ARINC face presentation, providing a slaved gyro heading display with a built-in slaving indicator and full ILS navigation capability. Each control and indicator function is described in Figure 1.

#### **SECTION 2 LIMITATIONS**

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



1. **HORIZONTAL SITUATION INDICATOR (HSI)** – Provides a pictorial presentation of aircraft deviation relative to VOR radials, localizer beams and GPS courses. It also displays glide slope deviations and gives heading reference with respect to magnetic north.
2. **OMNI BEARING POINTER** – Indicates selected VOR course or localizer course on compass card (16). The selected VOR radial or localizer heading remains set on the compass card when the compass card (16) is rotated.
3. **NAV FLAG** – When flag is in view, indicates that the NAV receiver signal being received is not reliable.
4. **HEADING REFERENCE (LUBBER LINE)** – Indicates aircraft magnetic heading on compass card (16).

Figure 1. Horizontal Situation Indicator (HSI) (Sheet 1 of 3).

5. HEADING WARNING FLAG (HDG) -- When flag is in view the heading display is invalid due to interruption of electrical power.
6. GYRO SLAVING INDICATOR -- Displays visual indication of heading indicator and flux detector synchronization. When slaving needle is aligned with the HSI 45° right index, it shows that the heading indicator agrees with the aircraft magnetic heading. Off-center pointer deflection show the direction of heading indicator error relative to aircraft magnetic heading. The compass CARD SET knob (9) may be used at any time to more rapidly accomplish synchronization of the heading indicator reading with magnetic heading as indicated by the slaving indicator.
7. HEADING BUG -- Indicates selected reference heading relative to the compass card (16).
8. TO / FROM INDICATOR FLAG -- Indicates direction of VOR station relative to selected course.
9. HEADING SELECTOR AND CARD SET KNOB (PUSH  $\Delta$  CARD SET) -- When rotated in normal (out) position, positions heading "bug" (7) on compass card (16) to indicate selected heading for reference or for autopilot tracking. When pushed in and rotated, sets compass card (16) to agree with magnetic compass. The omni bearing pointer (2), heading bug (7), and deviation bar (10) rotate with the compass card (16).
10. COURSE (OMNI) DEVIATION BAR -- Bar is center portion of omni bearing pointer and moves laterally to pictorially indicate relationship of aircraft to selected course. It relates in degrees of angular displacement from VOR radials or localizer beam center.
11. COURSE DEVIATION DOTS -- Indicates aircraft displacement from VOR, or localizer beam center. A course deviation bar displacement of 2 dots represents full scale (VOR =  $\pm 10^\circ$ , Loc =  $\pm 2^\circ$  or GPS=displacement in nautical miles) deviation from beam centerline.

Figure 1. Horizontal Situation Indicator (HSI) (Sheet 2 of 3).




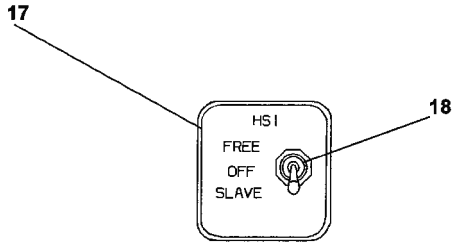
12. COURSE SELECTOR  ) KNOB -- When rotated, positions omni bearing pointer (2) on the compass card (16) to select desired VOR radial, localizer course or GPS course.
13. GLIDE SLOPE SCALE -- Indicates displacement from glide slope beam center. A glide slope deviation bar displacement of 2 dots represents full scale (0.7°) deviation above or below glide slope beam centerline.
14. GLIDE SLOPE POINTER -- Indicates on glide slope scale (13) aircraft displacement from glide slope beam center.
15. GLIDE SLOPE FLAG -- When in view, indicates glide slope receiver signal is not reliable.
16. COMPASS CARD -- Rotates to display heading of airplane with reference to lubber line (4).

Figure 1. Horizontal Situation Indicator (HSI) (Sheet 3 of 3).



17. MD 189-1 HSI CONTROL UNIT -- Controls power and slaving to the HSI.

18. HSI CONTROL SWITCH -- A three position toggle switch that selects between FREE, OFF and SLAVE operational modes.

FREE -- The HSI system is powered but magnetic slaving is disabled. Requires manual HSI compass card adjustment at the HEADING SELECTOR and CARD SET KNOB.

OFF -- All power is removed from the HSI system.

SLAVE -- The HSI system is powered and automatic slaving of the COMPASS CARD from the left wing mounted flux detector is enabled.

Figure 2. HSI Control Switch.

### **SECTION 3 EMERGENCY PROCEDURES**

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

### **SECTION 4 NORMAL PROCEDURES**

**ELECTRICAL POWER MUST BE SUPPLIED TO THIS INSTRUMENT FOR PROPER FUNCTIONING. ABSENCE OF ELECTRICAL POWER WILL RESULT IN UNRELIABLE HEADING INFORMATION.**

Normal procedures for operation of this system differ little from those required for the more conventional Course Deviation Indicators. However, several small differences are worth noting.

The rectilinear movement of the omni deviation bar in combination with the rotation of the compass card in response to heading changes, provides an intuitive picture of the navigation situation at a glance when tuned to an omni station. When tuned to a localizer frequency, the omni bearing pointer must be set to the inbound front course for both front and back-course approaches to retain this pictorial presentation.

For normal procedures with autopilots, refer to the autopilot supplements in this handbook. A description of course datum and autopilot procedures for course datum are incorporated in the appropriate autopilot supplements.

### **SECTION 5 PERFORMANCE**

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



**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608173  
AND ON**

**SUPPLEMENT 19**

**BENDIX/KING KLN 94  
GLOBAL POSITIONING SYSTEM (IFR)**

SERIAL NO.	<u>T20608173</u>
REGISTRATION NO.	<u>OK-MCP</u>

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Global Positioning System is installed.

<b>FAA APPROVAL</b>	
<small>FAA APPROVED UNDER PART 21 SUBPART J The Cessna Aircraft Co. Delegation Order Authorization DCA-10018-08</small>	
<i>Michael W. Kelly</i>	<small>Executive Engineer</small>
Date: 14 December 2000	

 Member of GAMA

**6 November 2000**

Revision 4 - 4 June 2003

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T206HPHUS-S19-04

S19-1

# SUPPLEMENT 19

## BENDIX/KING KLN 94 GLOBAL POSITIONING SYSTEM (IFR)

Use the Log of Effective Pages to determine the current status of this supplement. Pages affected by the current revision are indicated by an asterisk (\*) preceding the page number.

Supplement Status	Date
Original Issue	6 November 2000
Revision 1	18 December 2000
Revision 2	30 December 2000
Revision 3	22 January 2001
Revision 4	4 June 2003

### LOG OF EFFECTIVE PAGES

Page Number	Page Status	Revision Number
* S19-1 thru S19-20	Revised	Revision 4
* S19-21/S19-22	Added	Revision 4

**APPROVED BY**

FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co.  
Delegation Option Authorization DCA-100124-02  
*Michael W. Kelly* Executive Engineer

**DATE OF APPROVAL**      06-04-03

# SUPPLEMENT 19

## BENDIX/KING KLN 94 GLOBAL POSITIONING SYSTEM (IFR)

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## SUPPLEMENT

### BENDIX/KING KLN 94 GLOBAL POSITIONING SYSTEM (IFR)

#### SECTION 1

#### GENERAL

The KLN 94 Global Positioning System (GPS) is a three-dimensional precision navigation system based on 24 earth orbiting satellites. Receiver Autonomous Integrity Monitoring (RAIM) is a function that every IFR-certified GPS receiver must continuously perform to assure position accuracy. RAIM is available when 5 or more of these satellites are in view, or 4 satellites are in view and a barometrically corrected altitude input from the airplane's altimeter is made. Annunciation is provided if there are not enough satellites in view to assure position integrity.

Operational guidance for the KLN 94 GPS Navigation System is provided with the Bendix/King KLN 94 Pilot's Guide (supplied with the airplane). This Pilot's Guide should be thoroughly studied and VFR operations conducted so that you are totally familiar with GPS navigation before actually using this equipment in IFR conditions.

At T206H serial number T20608404 and On, automated Roll Steering functionality has been added to the Bendix/King KLN 94 GPS Navigation System and the KAP 140 2 Axis Autopilot System. Roll Steering coupling between the GPS and the Autopilot provides area navigation with automatic course changes at flight plan waypoints similar to Flight Management System (FMS) operations, but without vertical navigation capability. The Roll Steering function is similar to "turn anticipation" for the autopilot.

At the noted serial effectivity, the KLN 94 GPS (ORS 03 or later) has an added Roll Steering signal output. In order for the GPS Roll Steering output to be utilized, the KAP 140 Autopilot (-7904 or later) has an added input for the Roll Steering signal and additional system wiring has been added to the airplane to connect the Roll Steering signal output from the KLN 94 GPS to the Roll Steering input of the KAP 140 Autopilot.

Every 28 days, Bendix/King receives new aeronautical database information from Jeppesen Sanderson for each database region. This information is processed and downloaded onto the database cards. Bendix/King makes these database card updates available to KLN 94 GPS users.

The database card is an electronic memory containing information on airports, nav aids, intersections, DPs, STARs, instrument approaches, special use airspace, and other items of interest to the pilot.

**⚠ CAUTION**

**THE DATABASE MUST BE UPDATED ONLY WHILE THE AIRPLANE IS ON THE GROUND. THE KLN 94 DOES NOT PERFORM ANY NAVIGATION FUNCTION WHILE THE DATABASE IS BEING UPDATED.**

**NOTE**

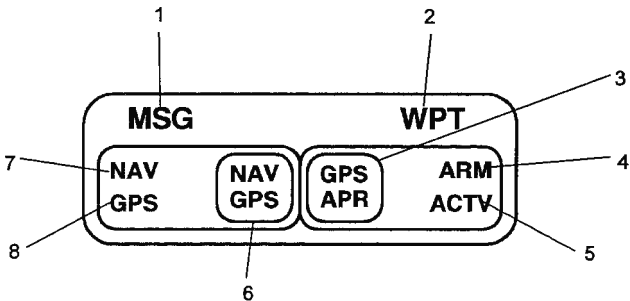
A current database is required by regulation in order to use the KLN 94 GPS system for non-precision approaches.

Provided the KLN 94 navigation system is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications of: VFR/IFR enroute oceanic and remote, enroute domestic, terminal, and instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) operation within the U.S. National Airspace System, North Atlantic Minimum Navigation Performance Specifications (MNPS) Airspace and latitudes bounded by 74° North and 60° South using the WGS-84 (or NAD 83) coordinate reference datum in accordance with the criteria of AC 20-138, AC 91-49, and AC 120-33. Navigation data is based upon use of only the global positioning system (GPS) operated by the United States.



**NOTE**

- Airplanes using GPS for oceanic IFR operations may use the KLN 94 to replace one of the other approved means of long range navigation. A single KLN 94 GPS installation may also be used on short oceanic routes which require only one means of long-range navigation.
- FAA approval of the KLN 94 does not necessarily constitute approval for use in foreign airspace.
- The KLN 94 is qualified for BRNAV (Basic Area Navigation) operation in the European region in accordance with the criteria of AC 90-96. (Reference ICAO Doc 7030 Regional Supplementary Procedures, JAA Technical Guidance Leaflet AMJ20X2 and Eurocontrol RNAV Standard Doc 003-93 Area Navigation Equipment Operational Requirements and Functional Requirements (RNAV).)



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1. **GPS MESSAGE (MSG) ANNUNCIATOR LIGHT** – **MSG** will begin flashing whenever the message prompt (a large "M" on the left side of the screen) on the KLN 94 GPS unit begins flashing to alert the pilot that a message is waiting. Press the **Message (MSG)** key on the GPS to display the message. If a message condition exists which requires a specific action by the pilot, the message annunciator will remain on but will not flash.
2. **GPS WAYPOINT (WPT) ANNUNCIATOR LIGHT** – GPS WAYPOINT annunciator will begin to flash approximately 36 seconds prior to reaching a Direct-To waypoint. Also, when turn anticipation is enabled in the KLN 94 GPS unit, the annunciator will begin to flash 20 seconds prior to the beginning of turn anticipation, then illuminate steady at the very beginning of turn anticipation.

Figure 1. GPS Annunciator/Switch  
(Serials T20608173 thru T20608259) (Sheet 1 of 3)

**▲ WARNING**

**TURN ANTICIPATION IS AUTOMATICALLY DISABLED FOR FAF WAYPOINTS AND THOSE USED EXCLUSIVELY IN DP/STARS WHERE OVERFLIGHT IS REQUIRED. FOR WAYPOINTS SHARED BETWEEN DP/STARS AND PUBLISHED ENROUTE SEGMENTS (REQUIRING OVERFLIGHT IN THE DP/STARS), PROPER SELECTION ON THE PRESENTED WAYPOINT PAGE IS NECESSARY TO PROVIDE ADEQUATE ROUTE PROTECTION ON THE DP/STARS.**

3. **GPS APPROACH (GPS, APR) SWITCH** – Pressing the GPS APPROACH switch manually selects or disarms the approach **ARM** mode and also cancels the approach **ACTV** mode after being automatically engaged by the KLN 94 GPS system. The white background color of the GPS APPROACH annunciator makes it visible in daylight.
4. **ARM ANNUNCIATOR LIGHT** -- **ARM** annunciator will illuminate when the KLN 94 GPS system automatically selects the approach ARM mode or when the approach ARM mode is manually selected. The approach ARM mode will be automatically selected when the airplane is within 30 NM of an airport, and an approach is loaded in the flight plan for that airport. The approach ARM mode can manually be selected at a greater distance than 30 NM from the airport by pressing the GPS APPROACH switch; however, this will not change the CDI scale until the airplane reaches the 30 NM point. The approach ARM mode can also be disarmed by pressing the GPS APPROACH switch.
5. **ACTIVE (ACTV) ANNUNCIATOR LIGHT** – **ACTV** annunciator will illuminate when the KLN 94 GPS system automatically engages the approach ACTV mode (the ACTV mode can only be engaged by the KLN 94 GPS system which is automatic). To cancel the approach ACTV mode, press the GPS APPROACH switch; this will change the mode to the approach ARM mode and illuminate the **ARM** annunciator.

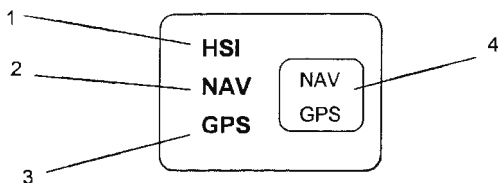
Figure 1. GPS Annunciator/Switch  
(Serials T20608173 thru T20608259) (Sheet 2 of 3)

6. **NAV/GPS SWITCH** – Toggles from Nav 1 to GPS and vice versa to control the type of navigation data to be displayed on the Course Deviation Indicator (CDI). The No. 1 CDI Omni Bearing Selector (OBS) provides analog course input to the KLN 94 in OBS mode when the **NAV/GPS** switch/annunciator is in **GPS**. When the **NAV/GPS** switch annunciation is in **NAV**, GPS course selection in OBS mode is digital through the use of the controls and display at the KLN 94.

**NOTE**

- Manual CDI course centering in **OBS** mode using the control knob can be difficult, especially at long distances. Centering the Course Deviation Indicator (CDI) needle can best be accomplished by pressing the Direct-To button and then manually setting the No. 1 CDI course to the course value prescribed in the KLN 94 displayed message.
  - The Directional Indicator heading (HDG) bug must also be set to provide proper course datum to the autopilot if coupled to the KLN 94 in **LEG** or **OBS**. (When the optional HSI is installed, the HSI course pointer provides course datum to the autopilot.)
7. **NAVIGATION SOURCE (NAV) ANNUNCIATOR** – The **NAV** annunciator will illuminate steady to inform the pilot that NAV 1 information is being displayed on the NAV 1 CDI.
  8. **NAVIGATION SOURCE (GPS) ANNUNCIATOR** – The **GPS** annunciator will illuminate steady to inform the pilot that GPS information is being displayed on the NAV 1 CDI.

Figure 1. GPS Annunciator/Switch  
(Serials T20608173 thru T20608259) (Sheet 3 of 3)



1. **HSI ANNUNCIATOR LIGHT** – This label is present when the optional HSI is installed. The HSI course pointer provides course datum to the autopilot.
2. **NAVIGATION SOURCE (NAV) ANNUNCIATOR** – The **NAV** annunciator will illuminate steady to inform the pilot that NAV 1 information is being displayed on the NAV 1 CDI.
3. **NAVIGATION SOURCE (GPS) ANNUNCIATOR** – The **GPS** annunciator will illuminate steady to inform the pilot that GPS information is being displayed on the NAV 1 CDI.
4. **NAV/GPS SWITCH** – Toggles from Nav 1 to GPS and vice versa to control the type of navigation data to be displayed on the CDI (Course Deviation Indicator). The No. 1 CDI Omni Bearing Selector (OBS) provides analog course input to the KLN 94 in OBS mode when the **NAV/GPS** switch/annunciator is in **GPS**. When the **NAV/GPS** switch annunciation is in **NAV**, GPS course selection in OBS mode is digital through the use of the controls and display at the KLN 94.

Figure 2. GPS Annunciator/Switch  
(Serials T20608260 and On) (Sheet 1 of 2)

**NOTE**

- Manual CDI course centering in **OBS** mode using the control knob can be difficult, especially at long distances. Centering the Course Deviation Indicator (CDI) needle can best be accomplished by pressing the Direct-To button and then manually setting the No. 1 CDI course to the course value prescribed in the KLN 94 displayed message.
- The Directional Indicator heading (HDG) bug must also be set to provide proper course datum to the autopilot if coupled to the KLN 94 in **LEG** or **OBS**. (When the optional HSI is installed, the HSI course pointer provides course datum to the autopilot.)

Figure 2. GPS Annunciator/Switch  
(Serials T20608260 and On) (Sheet 2 of 2)

## SECTION 2 LIMITATIONS

1. The KLN 94 GPS Pilot's Guide, P/N 006-18207-0000, dated September 2000 (or later applicable revision) must be available to the flight crew whenever IFR GPS navigation is used. The Operational Revision Status (ORS) of the Pilot's Guide must match the ORS level annunciated on the Self-Test page.
2. Navigation is prohibited within 60 nautical miles of the North and South Poles (i.e., at greater than 89° north and south latitude).
3. IFR Navigation is restricted as follows:
  - a. The system must utilize ORS level 01 or later FAA approved revision.
  - b. The data on the Self-Test page must be verified prior to use.
  - c. IFR enroute and terminal navigation is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.
  - d. Instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the KLN 94 database. The KLN 94 aeronautical database must incorporate the current update cycle.
    - 1) The KLN 94 Quick Reference, P/N 006-18228-0000, Revision 1, dated August 2000 (or later applicable revision) must be available to the flight crew during instrument approach operations.
    - 2) Instrument approaches must be conducted in the approach mode and RAIM must be available at the Final Approach Fix.

**NOTE**

Honeywell's Preflight, Version 2.0 or later computer based prediction program may be used for the RAIM prediction. Alternate methods should be submitted for approval in accordance with Advisory Circular AC 90-96.

- g. The airplane must have other approved navigation equipment appropriate to the route of flight installed and operational.

**SECTION 3  
EMERGENCY PROCEDURES**

There are no changes to the basic airplane emergency procedures when the KLN 94 GPS is installed.

1. If the KLN 94 GPS information is not available or invalid, utilize remaining operational navigation equipment as required.
2. If a "RAIM NOT AVAILABLE" message is displayed while conducting an instrument approach, terminate the approach. Execute a missed approach if required.
3. If a "RAIM NOT AVAILABLE" message is displayed in the en route or terminal phase of flight, continue to navigate using the KLN 94 or revert to an alternate means of navigation appropriate to the route and phase of flight. When continuing to use the KLN 94 for navigation, position must be verified every 15 minutes (or as required by applicable country's operating rules) using another IFR approved navigation system.
4. Refer to the KLN 94 Pilot's Guide, Appendices B and C, for appropriate pilot actions to be accomplished in response to annunciated messages.



## SECTION 4 NORMAL PROCEDURES

### OPERATION

Normal operating procedures are outlined in the KLN 94 GPS Pilot's Guide, P/N 006-18207-0000, dated September 2000 (or later applicable revision). A KLN 94 Quick Reference, P/N 006-18228-0000, dated August 2000 (or later applicable revision) containing an approach sequence, operating tips and approach related messages is intended as well for cockpit use by the pilot familiar with KLN 94 operations when conducting instrument approaches.

### AUTOPILOT COUPLED OPERATION

The KLN 94 may be coupled to the KAP 140 autopilot when engaged in NAV mode by selecting **GPS** on the NAV/GPS switch. Manual selection of the desired course on the NO. 1 OBS or HSI course pointer is required to provide course datum to the KAP 140 autopilot. (Frequent course datum changes may be necessary, such as in the case of flying a DME arc.) The autopilot approach mode (APR) should be used when conducting a coupled GPS approach.

### NOTE

NAV or APR coupled DME arc intercepts can result in excessive overshoots (aggravated by high ground speeds and/or intercepts from inside the arc).

At T206H serial number T20608404 and On, Roll Steering functionality enables the GPS navigation computer to control the autopilot and automatically perform course changes (turns) and intercept the course to the next active waypoint (when GPS is selected as the autopilot navigation source). The GPS navigation computer uses ground speed, track and turn rate data to calculate the required bank angle for waypoint course changes. The GPS Roll Steering output will command the autopilot to turn and intercept the course to the new active waypoint without directly overflying the immediate waypoint (except designated flyover waypoints). Distance from the waypoint for the GPS to initiate the turn will vary with ground speed, etc., but will usually be within one nautical mile of the waypoint. Sequencing to the next waypoint will occur approximately at the midpoint of the turn (transition segment).

Roll Steering is the default operating mode for the autoflight system when all of the following conditions are met:

1. The autopilot is engaged in NAV or APR mode.
2. GPS is selected as the autopilot navigation source.
3. The GPS navigation computer is executing an active flight plan.
4. The GPS is operating in LEG mode.

When Roll Steering is in operation, adjusting or change in the position of the heading bug or the course pointer will have no effect on heading or course. It is recommended that both the heading bug and the course pointer always be set to the current course to enhance situational awareness, especially in the event of unexpected autoflight equipment failure. GPS signal loss requires that the pilot immediately select and alternate autopilot navigation source. If autopilot function is lost, the pilot is required to resume manual control of the airplane. Keeping the heading bug and course pointer set to the present course makes immediate recovery easier.

Roll Steering will not function when the GPS is in OBS mode, when the autopilot is in HDG or ROL mode or when the autopilot is in NAV mode with NAV selected as the autopilot navigation source.

#### APPROACH MODE SEQUENCING AND RAIM PREDICTION

#### WARNING

**FAMILIARITY WITH THE ENROUTE OPERATION OF THE KLN 94 DOES NOT CONSTITUTE PROFICIENCY IN APPROACH OPERATIONS. DO NOT ATTEMPT APPROACH OPERATIONS IN IMC (INSTRUMENT METEOROLOGICAL CONDITIONS) PRIOR TO ATTAINING PROFICIENCY IN THE USE OF THE KLN 94.**

**NOTE**

The special use airspace alert will automatically be disabled prior to flying an instrument approach to reduce the potential for message congestion.

Roll Steering will operate on instrument approach procedures selected from a current GPS aeronautical database only when:

- The autopilot is engaged in either NAV or APR mode

AND

- GPS is selected as the autopilot NAV input. Ensure that the appropriate GPS mode (LEG or OBS) is selected during each portion of the approach procedure.

1. Prior to arrival, select a STAR if appropriate from the **APT 7** page. Select an approach and an initial approach fix (IAF) from the **APT 8** page. The most efficient means of getting to these pages is initiated by pressing the **PROC** (PROCEDURE) button on the **CLN 94**.
  - a. Press **PROC** button.
  - b. Select **Approach, Arrival or Departure**.
  - c. Select the airport from the list or enter the desired airport identifier.
  - d. The **APT 7** or **APT 8** page will be displayed as appropriate.

**NOTE**

To delete or replace a DP, STAR or approach, select **FPL 0** page. Place the cursor over the name of the procedure, press **ENT** to change it, or **CLR** then **ENT** to delete it.

2. En route, check for **RAIM** availability at the destination airport **ETA** on the **OTH 3** page.

**NOTE**

**RAIM** must be available at the **FAF** in order to fly an instrument approach. Be prepared to terminate the approach upon loss of **RAIM**.

3. At or within 30 nm from the airport:
  - a. Verify automatic annunciation of APRARM.
  - b. Note automatic CDI needle scaling change from  $\pm 5.0$  nm to  $\pm 1.0$  nm over the next 30 seconds.
  - c. Update the KLN 94 altimeter baro setting as required.
  - d. Internally the KLN 94 will transition from en route to terminal integrity monitoring.
4. Select **NAV 4** page to fly the approach procedure.
  - a. If receiving radar vectors, or need to fly a procedure turn or holding pattern, fly in OBS until inbound to the FAF.

**NOTE**

OBS navigation is TO-FROM (like a VOR) without waypoint sequencing.

- b. If receiving radar vectors, choose **VECTORS** as the IAF, activate vectors when the first vector for the approach is received and leave the unit in **LEG** mode.
- c. **NoPT** routes including DME arc's are flown in **LEG**. **LEG** is mandatory from the FAF to the MAP.

**NOTE**

NAV or APR coupled DME arc intercepts can result in excessive overshoots (aggravated by high ground speeds and/or intercepts from inside the arc).

**⚠ WARNING**

**FLYING FINAL OUTBOUND FROM AN OFF-AIRPORT VORTAC ON AN OVERLAY APPROACH; BEWARE OF THE DME DISTANCE INCREASING ON FINAL APPROACH, AND THE GPS DISTANCE-TO-WAYPOINT DECREASING, AND NOT MATCHING THE NUMBERS ON THE APPROACH PLATE.**

- 3) APR ACTV mode must be annunciated at the Final Approach Fix.
  - 4) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, and MLS approaches are not authorized.
  - 5) 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.
  - 6) The KLN 94 can only be used for approach guidance if the reference coordinate datum system for the instrument approach is WGS-84 or NAD-83. (All approaches in the KLN 94 database use the WGS-84 or the NAD-83 geodetic datum.)
- e. For BRNAV operations in the European region:
- 1) With 23 (24 if the altitude input to the KLN 94 is not available) or more satellites projected to be operational for the flight, the airplane can depart without further action.
  - 2) With 22 (23 if the altitude input to the KLN 94 is not available) or fewer satellites projected to be operational for the flight, the availability of the GPS integrity (RAIM) should be confirmed for the intended flight (route and time). This should be obtained from a prediction program run outside of the airplane. The prediction program must comply with the criteria of Appendix 1 of AC 90-96. In the event of a predicted continuous loss of RAIM of more than 5 minutes for any part of the intended flight, the flight should be delayed, cancelled, or rerouted on a track where RAIM requirements can be met.
- f. If a "RAIM NOT AVAILABLE" message is displayed in the enroute or terminal phase of flight, continue to navigate using the KLN 94 or revert to an alternate means of navigation appropriate to the route and phase of flight. When continuing to use the KLN 94 for navigation, position must be verified every 15 minutes (or as required by applicable country's operating rules) using another IFR approved navigation system.

5. At or before 2 nm from the FAF inbound:
  - a. Select the FAF as the active waypoint, if not accomplished already.
  - b. Select LEG operation.
6. Approaching the FAF inbound (within 2 nm):
  - a. Verify APR ACTV.
  - b. Note automatic CDI needle scaling change from  $\pm 1.0$  nm to  $\pm 0.3$  nm over the 2 nm inbound to the FAF.
  - c. Internally the KLN 94 will transition from terminal to approach integrity monitoring.
7. Crossing the FAF and APR ACTV is not annunciated:
  - a. Do not descend.
  - b. Execute the missed approach.
8. Missed Approach:
  - a. Climb.
  - b. Navigate to the MAP (in APR ARM if APR ACTV is not available).

**NOTE**

There is no automatic LEG sequencing at the MAP.

- c. After climbing in accordance with the published missed approach procedure, press the Direct To button, verify or change the desired holding fix and press ENT.

GENERAL NOTES

- The aeronautical database must be up to date for instrument approach operation.
- Only one approach can be in the flight plan at a time.
- Checking RAIM prediction for your approach while enroute using the **AUX 3** page is recommended. A self check occurs automatically within 2 nm of the FAF. **APR ACTV** is inhibited without RAIM.
- Data cannot be altered, added to or deleted from the approach procedures contained in the database. (DME arc intercepts may be relocated along the arc through the **NAV 4** or the **FPL 0** pages.)
- **Some approach waypoints do not appear on the approach plates (including in some instances the FAF).**
- Waypoint suffixes in the flight plan:
  - i -- IAF
  - f -- FAF
  - m -- MAP
  - h -- missed approach holding fix.
- The DME arc IAF (arc intercept waypoint) will be on your present position radial off the arc VOR when you load the IAF into the flight plan, or the beginning of the arc if currently on a radial beyond the arc limit. To adjust the arc intercept to be compatible with a current radar vector, bring up the arc IAF waypoint in the **NAV 4** page scanning field or under the cursor on the **FPL 0** page, press **CLR**, then **ENT**. Fly the arc in **LEG**. Adjust the heading bug (if autopilot coupled) and CDI course with reference to the desired track value on the **NAV 4** page (it will flash to remind you). Left/right CDI needle information is relative to the arc. Displayed distance is not along the arc but direct to the active waypoint. (The DME arc radial is also displayed in the lower right corner of the **NAV 4** page.)

- The DME arc IAF identifier may be unfamiliar. Example: D098G where 098 stands for the 098° radial off the referenced VOR, and G is the seventh letter in the alphabet indicating a 7 DME arc.
- APRARM to APR **ACTV** is automatic provided that:
  - a. You are in APRARM (normally automatic).
  - b. You are in **LEG** mode.
  - c. The FAF is the active waypoint.
  - d. Within 2 nm of the FAF.
  - e. Outside of the FAF.
  - f. Inbound to the FAF.
  - g. RAIM is available.
- Direct-To operation between the FAF and MAP cancels APR **ACTV**. Fly the missed approach in APRARM.
- Flagged navigation inside the FAF may automatically bring up the message page stating:

PRESS **PROC** BUTTON NOW FOR NAVIGATION

Pressing the **PROC** button will usually restore navigation (not guaranteed) by changing from APR **ACTV** to APR **ARM**. Fly the missed approach.

- The instrument approach using the KLN 94 may be essentially automatic starting 30 nm out (with a manual baro setting update) or it may require judicious selection of the OBS and LEG modes.

## SECTION 5 PERFORMANCE

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





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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608260 AND ON**

**SUPPLEMENT 20**

**BENDIX/KING KMA 28  
AUDIO SELECTOR PANEL**

SERIAL NO. \_\_\_\_\_

REGISTRATION NO. \_\_\_\_\_

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

**FAA APPROVAL**

FAA APPROVED UNDER FAR 21 (SUBPART J)  
The Cessna Aircraft Co.  
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*Richard W. Hickey* Executive Engineer

Date: January 9, 2001

 Member of GAMA

**30 December 2000**

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## SUPPLEMENT 20

### BENDIX/KING KMA 28 AUDIO SELECTOR PANEL

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Dec. 30, 2000

#### LOG OF EFFECTIVITY PAGES

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<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S20-1)	Dec 30/00	S20-7	Dec 30/00
S20-2	Dec 30/00	S20-8	Dec 30/00
S20-3	Dec 30/00	S20-9	Dec 30/00
S20-4	Dec 30/00	S20-10	Dec 30/00
S20-5	Dec 30/00	S20-11	Dec 30/00
S20-6	Dec 30/00	S20-12	Dec 30/00

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## **SUPPLEMENT**

### **BENDIX/KING KMA 28 AUDIO SELECTOR PANEL**

#### **SECTION 1 GENERAL**

The Bendix/King KMA 28 Audio Selector Panel is a combination audio selector panel, cabin intercom, audio amplifier and marker beacon receiver. The audio amplifier powers the cockpit overhead speaker when selected.

Receiver audio is selected using ten back-lit pushbutton switches. Selected receivers can be identified by the illuminated green LED on the appropriate switch pushbutton. The rotary microphone selector switch automatically supplies the audio for the transceiver selected; The Com 1 and Com 2 switches permit the user to monitor or "guard" the audio from the other transceiver. All operating controls are shown and described in Figure 1.

An unamplified and unswitched stereo audio input is provided for an entertainment audio source (Walkman or similar Portable Electronic Device (PED)). The Entertainment audio input is located on the lower half of the cockpit center pedestal; the 3.5 mm stereo jack is labeled "AUX AUDIO IN". The KMA 28 includes the Soft Mute feature that lowers the audio level of the entertainment signal whenever radio or intercom audio is present. Refer to 14 CFR Part 91.21 and Advisory Circular No. 91.21-1() "Use of Portable Electronic Devices Aboard Aircraft" for further information and requirements regarding the use of portable electronic devices in aircraft.

The cabin intercom uses the Intellivox™ automatic squelch circuit to minimize non-voice signals. The intercom audio level is set using the front-mounted intercom volume control; audio levels for the receivers and entertainment are controlled at the source.

### NOTE

In this stereo installation, all headset locations are wired in parallel. If a monaural headset is plugged in at any location, one intercom channel will be shorted. Although no damage to the intercom will result, all stereo headset users will lose one audio channel. The monaural headset will perform normally.

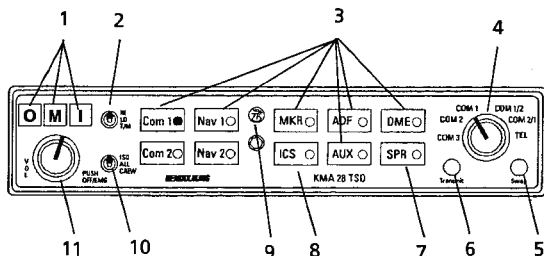
A crystal-controlled superheterodyne marker beacon receiver with 3-light presentation is incorporated within the unit. Dimming circuitry for the marker beacon lamps automatically adjusts brightness appropriate to the cockpit ambient light level. HI and LO sensitivity and lamp test/receiver audio mute (T/M) functions are also provided.

Light dimming for the audio control panel is manually controlled by the RADIO light rheostat knob.

### MARKER FACILITIES

MARKER	IDENTIFYING TONE	LIGHT*
Inner, Airway & Fan	Continuous 6 dots/sec (3000 Hz)	White
Middle	Alternate dots and dashes (1300 Hz)	Amber
Outer	2 dashes/sec (400 Hz)	Blue

\*When the identifying tone is keyed, the respective indicating light will blink accordingly.



1. MARKER BEACON ANNUNCIATOR LIGHTS – The three-light marker beacon receiver built into the KMA 28 gives a visual and aural signal when the ship's antenna passes over a 75 MHz beacon. The blue, amber, and white lights on the faceplate, as well as the audio tones, identify the beacon type.

OUTER [O] – Light illuminates blue to indicate passage of outer marker beacon.

MIDDLE [M] – Light illuminates amber to indicate passage of middle marker beacon.

INNER, AIRWAY and FAN [I] – Light illuminates white to indicate passage of ILS inner, airway or fan marker beacons.

2. MARKER BEACON SENSITIVITY & TEST/MUTE SELECT SWITCH -- The three-position switch is used to set the receiver sensitivity and to test the annunciator lamps. When this switch is on "HI" (upper) position, the high sensitivity is selected which permits you to hear the outer marker tone about a mile out. At this point you may select the "LO" (middle) position to give you a more accurate location of the Marker. When used only for approach markers, many pilots choose to leave the switch in the LO sensitivity position. The "T/M" (bottom) position is a momentary switch that will illuminate all three lamps simultaneously to assure they are in working order. This switch also has a Marker Beacon "mute" function. Pushing the switch to the T/M position while receiving a marker beacon signal will cause the audio to be temporarily silenced. No action is required to restore the audio in time for the next beacon.

Figure 1. Bendix/King KMA 28 Audio Selector Panel (Sheet 1 of 5)

3. RECEIVE AUDIO SELECT BUTTONS – Push button audio selection is available for two Communications receivers ("COM 1", "COM 2"), two Navigation receivers ("NAV 1" and "NAV 2"), the internal Marker Beacon receiver ("MKR"), one DME, one ADF, one additional auxiliary receiver ("AUX") and a speaker amplifier ("SPR"). The "AUX" position could be used, for example, for a second DME or ADF. When a receiver's audio is selected, the green annunciator illuminates at the side of the button. Push the button again to deselect the receiver's audio. These buttons are "latched" type switches. When one of these buttons is pressed, it will stay in the "in" position until the button is pressed again and it will be put in the "out" position and removes that receiver from the audio. To provide additional feedback for button operation, activate the key "click" by pushing and holding both COM 1 and COM 2 receiver buttons for five seconds, and release. Repeat to defeat the click.
  
4. MICROPHONE SELECTOR SWITCH (MIC) – Used to select the desired transmitter for the cockpit microphones. The "COM 1", "COM 2", and "COM 3" positions are for transmitting on the Com 1, Com 2, and Com 3 communications transceivers, respectively. When the mic selector switch is in the COM 1 position, both pilot and copilot will be connected to the COM 1 transceiver. Only the person who presses their Push-to-Talk (PTT) switch, will be heard over the aircraft radio. Turning the rotary switch to the COM 2 position will place pilot and copilot on COM 2. The KMA 28 gives priority to the pilot's PTT. If the copilot is transmitting, and the pilot presses his PTT, the pilot's microphone will be heard over the selected COM transmitter. Turning the mic selector counterclockwise to COM 3 places both the pilot and copilot on COM 3. Com 3 receiver audio is automatically placed in the headset (and speaker if selected). COM 1 and/or COM 2 receiver audio can be selected to monitor those transceivers. Audio from the selected transceiver is automatically heard in the headsets. This function can be checked by switching from COM 1 to COM 2 and watching the selected audio light on the selector change from COM 1 to COM 2. This ensures the pilot will always hear the audio from the transceiver he is transmitting on. When transmitting, the COM 1 or COM 2 LED audio selector will blink as a further indication of the selected transmitter. When switching the mic selector switch from COM 1 to COM 2, if the COM 1 audio has been selected, COM 1 audio will continue to be heard. When switching from COM 1 to COM 2 if COM 1 has NOT been selected, COM 1 audio will be switched off.

Figure 1. Bendix/King KMA 28 Audio Selector Panel (Sheet 2 of 5)

TELEPHONE MODE (TEL) - The telephone mode is not available on this installation.

SPLIT MODE (COM 1/2 OR COM 2/1) -- Moving the mic selector switch to COM 1/2 places the KMA 28 into "split mode". This places the pilot on Com 1 and the copilot on Com 2. Switching to COM 2/1 will reverse the "split mode" radio selection. For more information regarding split mode operations, consult the Bendix/King Silver Crown Plus Avionics Systems Pilot's Guide, P/N 006-18110-0000.

5. SWAP INDICATOR -- The swap function is not available on this installation.
6. TRANSMIT INDICATOR -- This indicator illuminates when either Push-to-Talk (PTT) switch is pressed.
7. SPEAKER SWITCH (SPR) -- This switch will place all selected audio on the cockpit speaker when selected.
8. CREW ICS/MUSIC 1 MUTE BUTTON (ICS) -- The front panel ICS button controls muting of the entertainment source. Pushing this button places the ICS in Karaoke (or sing along) mode, which inhibits the soft mute feature. The soft mute feature assures that the aircraft radio transmissions will not be missed due to entertainment playing. When there is radio reception or intercom conversation, the music level is dropped to background level. When the radio or intercom traffic ceases, the level gradually returns to normal. Karaoke allows the music to continue uninterrupted by intercom or radio traffic when cockpit workload is appropriate. Pushing the button again will release the mute inhibit function.

In split mode, the pilot and copilot are isolated from each other on the intercom, simultaneously using their respective radios. Depressing the ICS button in split mode will activate VOX intercom between the pilot and copilot positions. This permits intercommunication when desired between the crew. Pressing the ICS button again disables the crew intercom function.

9. PHOTOCCELL FOR AUTOMATIC DIMMING OF MARKER BEACON LIGHTS AND SELECT BUTTON -- The photocell in the faceplate automatically dims the marker lights as well as the green annunciators in the Speaker Audio Select Buttons for night operation.

Figure 1. Bendix/King KMA 28 Audio Selector Panel (Sheet 3 of 5)

10. INTERCOM MODE SELECT (ISO-ALL-CREW) – A three-position mode switch that allows the pilot to tailor the intercom function to best meet the current cockpit situation.

ISO – (Up Position ) The pilot is isolated from the intercom and is connected only to the aircraft radio system. The pilot will hear the aircraft radio reception (and sidetone during radio transmissions). The copilot will hear passenger's intercom and Entertainment, while passengers will hear copilot intercom and Entertainment. Neither will hear aircraft radio receptions or pilot transmissions.

ALL – (Middle Position) All parties will hear the aircraft radio and intercom. Crew will hear Entertainment, passengers will hear Entertainment. During any radio or intercom communications, the music volume automatically decreases. The music volume increases gradually back to the original level after communications have been completed.

CREW – (Down Position) Pilot and copilot are connected on one intercom channel and have exclusive access to the aircraft radios. They may also listen to Entertainment. Passengers can continue to communicate among themselves without interrupting the crew and also may listen to Entertainment. Anytime the KMA 28 is in either the COM 1/2 or COM 2/1 split modes, the pilot and copilot intercom is controlled with the ICS button. The passengers will maintain intercommunications, but never hear aircraft radios.

MODE	PILOT HEARS	COPILOT HEARS	PASSENGER HEARS	COMMENTS
Isolate	A/C Radios Pilot Sidetone (during radio transmission) Entertainment is Muted	Copilot and passenger intercom Entertainment	Passenger and Copilot intercom Entertainment	This mode allows the pilot to communicate without the others bothered by the conversations. Copilot and passengers can continue to communicate and listen to music.
All	Pilot Copilot A/C Radio Passengers Entertainment	Copilot Pilot A/C Radio Passengers Entertainment	Passengers Pilot Copilot A/C Radio Entertainment	This mode allows all to hear radio reception as well as communicate on the intercom. Music and intercom is muted during intercom and radio communications.
Crew	Pilot Copilot A/C Radio Entertainment	Copilot Pilot A/C Radio Entertainment	Passengers Entertainment	This mode allows the pilot and copilot to concentrate on flying while the passengers can communicate amongst themselves.

Figure 1. Bendix/King KMA 28 Audio Selector Panel (Sheet 4 of 5)



11. VOLUME CONTROL/POWER SWITCH/EMERGENCY OPERATION KNOB – The KMA 28 unit is turned on and off by pushing the volume knob. In the OFF or EMG (Emergency) position, the pilot is connected directly to Com 1. This allows communication capability regardless of unit condition. Any time power is removed or turned off, the audio selector will be placed in the emergency mode. The power switch also controls the audio selector panel functions, intercom, and marker beacon receiver. Unless the mic selector is in Com 3 mode, at least one of the selected audio LED's will be on (Com 1 or Com 2). Turn the outer area of the knob to adjust the loudness of the intercom for the pilot and copilot only. It has no effect on selected radio levels, music input levels or passenger's volume level. Adjust the radios and intercom volume for a comfortable listening level for the pilot. Passenger volume can be adjusted at the headset. All passenger headsets are connected in parallel. Therefore, if a monaural headset is plugged into a stereo KMA 28 installation, one channel will be shorted. Although no damage to the unit will occur, all passengers will lose one channel.

**NOTE**

During KMA 28 operation in the OFF or EMG position, the audio is disabled preventing installed system alerts (autopilot disconnect tone) from being heard. The marker beacon receiver audio and annunciator lights will be inoperative.

Figure 1. Bendix/King KMA 28 Audio Selector Panel (Sheet 5 of 5)

## **SECTION 2 LIMITATIONS**

1. PUSH OFF/EMG operation is prohibited during normal operations.
2. Use of the Entertainment audio input (and PED) is prohibited during takeoff and landing.
3. Use of the Entertainment audio input (and PED) is prohibited under IFR unless the operator of the aircraft has determined that the use of the 12 VDC power supply and the connected portable electronic device(s) will not cause interference with the navigation or communication system of the airplane.

### **NOTE**

During KMA 28 operation in the OFF or EMG position, the audio is disabled preventing installed system alerts (autopilot disconnect tone) from being heard. The marker beacon receiver audio and annunciator lights will be inoperative.

## **SECTION 3 EMERGENCY PROCEDURES**

In the event of a failure of the KMA 28, as evidenced by the inability to transmit in COM 1, 2 or 3.

1. Volume Control/Power Switch/Emergency Operation Knob -- Push OFF.

### **NOTE**

This action bypasses the KMA 28 and connects the pilot's mic/headset directly to COM 1.

## SECTION 4 NORMAL PROCEDURES

### AUDIO CONTROL SYSTEM OPERATION:

1. MIC Selector Switch -- Turn to desired transmitter.
2. SPEAKER and Audio Select Button(s) -- SELECT desired receiver(s).

### NOTES

Rotation of the MIC selector switch selects the Com audio automatically.

### MARKER BEACON RECEIVER OPERATION:

1. TEST Position -- HOLD toggle down momentarily to verify all lights are operational.
2. SENS Selections -- Select HI sensitivity for airway flying or LO for ILS/LOC approaches.

The Entertainment audio input ("AUX AUDIO IN") is unswitched, so there is no means of deselecting the entertainment source except by unplugging the Audio Input connector. In the event of failure of the "Soft Mute" function or during periods of high pilot workload and/or heavy radio traffic, it may be wise to disable the Entertainment audio to eliminate a source of distraction for the flight crew.

### NOTE

Use caution with audio cables in the cabin to avoid entangling occupants or cabin furnishings and to prevent damage to cables.

**NOTE**

Disconnect the audio cable from the Entertainment audio input jack whenever the PED is not in use.

**NOTE**

Passenger briefing should specify that Entertainment audio input (and PED) use is permitted only during the enroute phase of flight.

**SECTION 5  
PERFORMANCE**

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



## POH / AFM / OM

### Supplement

# BendixKing KT 73 Transponder (Elementary Surveillance only)

Aircraft model:	CESSNA T206
Aircraft Serial No.	T206 0817Z
Registration No.:	OK-MCP

This supplement must be attached to the approved POH / AFM / OM when the optional KT 73 system is installed. The information contained in this document supplements or supersedes the basic manual only in those areas listed. For limitations, procedures, performance, and loading information not contained in this supplement, consult the basic POH / AFM / OM.

This Flight Manual Supplement is EASA approved under the Approval No.

**10051896, dated 14 January 2015**



Log of Revisions

Revision No.	Pages Affected	Description	Date	Approved

## SECTION 1 General

The KT 73 Mode S Transponder is a panel mounted transponder that fulfills the role of the airborne beacon equipment according to the requirements of the Air Traffic Radar Beacon System (ATCRBS). Its functionality includes replying to ATCRBS Mode A and C, Intermode and Mode S interrogations as well as handling Comm A and B Mode S Data Link protocols. The basic surveillance capability of the KT 73 satisfies the European Mode S mandate. KT 73 has ETSO approval No.EASA.210.063.

The KT 73 also provides Mode "C" or altitude reporting information. When the KT 73 is operated in the "ALT" Mode and used in conjunction with an encoding altimeter, the flight level (pressure altitude) is displayed in addition to the 4096 code, and the altitude information is transmitted to the ground in response to Mode "C" interrogations.

The Mode S function of the KT 73 will allow the ground station to individually select the aircraft by its Aircraft Address assigned to the aircraft by the Certification Aircraft Authority.

The installed transponder system is able to respond to interrogations in Modes A, C and S and is fully compliant with the requirements of CS ACNS.D.ELS.

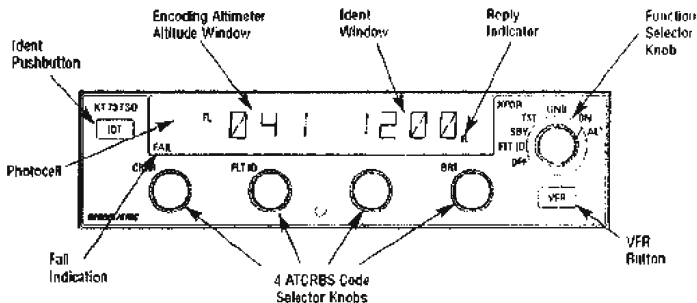


Figure 1 - KT 73

## SECTION 2 Limitations

KT 73 transponder operates in ELS (Elementary Surveillance) only.



## SECTION 3 Emergency Procedures

Special A mode codes for air emergencies:

(1) Special A mode codes, which depend on the type of incident, are stipulated for certain air emergencies:

- 7500 Hijacking
- 7600 Loss of communications
- 7700 Emergency on board which constitutes an immediate danger to the aircraft

(2) The code evaluation devices of the radar systems automatically alarm the controllers at the radar screens immediately if one of the se special codes is received.



## SECTION 4 Normal Procedures

### Switching on the unit (pre-flight check)

(1) Check that the circuit breaker is set and switch on the aircraft power supply.

**CAUTION:** Do not switch on the transponder before the aircraft engines are started. Switch off the transponder before the engines are shut down.

(2) Using Function Selector Knob, switch the transponder from OFF to SBY.

The following Circuit Breaker is associated with the XPDR system

C/B NAME	AMPS	LOCATION	BUS
XPDR	5	Main C/B panel	+28 VDC

### Function Selector Knob

The Function Selector Knob on the right side of the KT 73 enables you to choose from among the following operating modes:

**OFF** - The unit is not receiving power. When the unit is turned to another mode, it will reply or squitter within two seconds, according to the selected mode.

**FLT ID (FLIGHT ID)** - The Flight ID should be the aircraft identification employed in the flight plan. When no flight plan is available, the registration marking of the aircraft should be used. When the FLT ID mode is selected, the KT 73 is inhibited from replying to any interrogation, "FLT ID" is annunciated on the display and the flight ID is displayed. The Flight ID is modified by rotating the CRSR knob to position the cursor ( ) under the character to be changed then rotating the FLT ID knob to select the desired character. Once the CRSR and FLT ID knobs have been idle for 5 seconds or the mode select knob has been turned to the SBY position the flight ID will be saved.

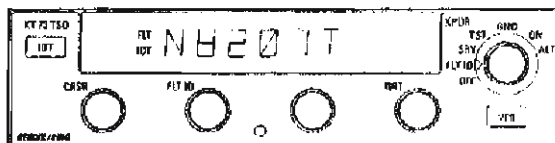


Figure 2 - FLT ID mode

**SBY (STANDBY)** - In Standby, the unit is energized but is inhibited from replying to any interrogation. "SBY" is shown on the left side of the display and the ID code is shown on the right.

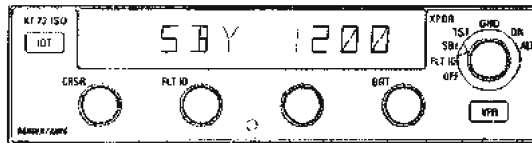


Figure 3 - KT 73 SBY mode

**TST (TEST)** - Replies are disabled and all display segments are illuminated for at least four seconds. A series of internal tests is performed to check the KT 73's integrity, verifying all aircraft specific configuration data and make hardware and squitter checks. If no faults are detected, "TEST OK" is displayed and an audio message "TEST OK" is announced.

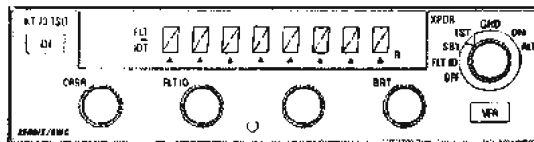


Figure 4 - KT 73 TST mode

Should a fault be detected, "SBY" will be displayed on the left and the display on the right will cycle through all the detected faults. If the faults are associated with external data, an audio message "CHECK FAULT CODES" will be announced. Faults internal to the KT 73 will announce an audio message "TRANSPONDER TEST FAIL". Internal faults will also cause "FAIL" to be announced in the lower left of the display in any mode of operation.

The fault codes are as follows:

- F1YY\* - Squitter (Internal)
- F2YY\* - Internal or External EEPROM (Internal)
- F3YY\* - Hardware (Internal)
- F401 - Mode S address/Max Airspeed (Internal)
- F5YY\* - Gilham or Executive (External)
- F6YY\* - Interface (External)

- YY denotes the specific fault.

**GND (GROUND)** - The KT 73 will inhibit ATCRBS (Air Traffic Control Radar Beacon System), ATCRBS/Mode S All Call and Mode S-only All Call replies. However, the unit will continue to generate Mode S squitter transmissions and reply to discretely addressed Mode S interrogations. The ID code is shown on the right side of the display and the letters "GND" are shown on the left side.



Figure 5- KT 73 GND mode

**ON** - The KT 73 is able to reply to all valid Mode A, C and S interrogations. However, the altitude information will not be transmitted. In the ON mode, the altitude window is left blank and the ID code is shown on the right side of the display.

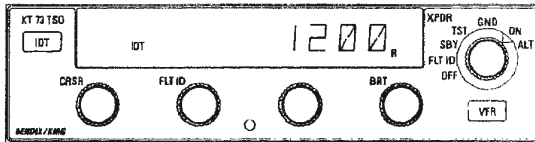


Figure 6 - KT 73 ON mode

**ALT (ALTITUDE)** - The KT 73 replies to all valid Mode A, C and S interrogations. The ID code is displayed in the right window and altitude information (in hundreds of feet) is shown on the left. The letters "FL" will be illuminated, indicating Flight Level. If altitude information is unavailable or invalid, the left portion of the display will be dashed.

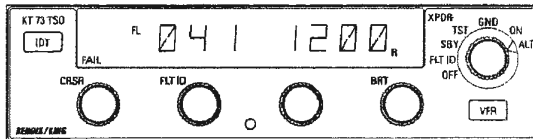


Figure 7 - KT 73 ALT mode

## IDENT BUTTON

Marked IDT, the KT 73's Ident button is pressed when ATC requests an "Ident" or "Squawk Ident" from your aircraft. When the Ident button is pressed while in the GND, ON or ALT modes, "IDT" will be illuminated on the display for approximately 18 seconds. An optional Remote Ident switch may also be installed to perform the same function.



## **ID CODE**

The ATCRBS Transponder Identification code (squawk code) for the aircraft is displayed in the Ident Window on the right side of the display. Each of the four Transponder Code Selector Knobs selects a separate digit of the identification code.

## **REPLY INDICATOR**

When the KT 73 is replying to a valid ground Mode S interrogation, the reply nomenclature "R" will be illuminated twice per second. When the KT 73 is replying to a valid ATCRBS or airborne Mode S interrogation, the reply nomenclature "R" will be illuminated once per second.

## **Altitude Display**

When the ALT mode is selected, the KT 73 displays the current Flight Level, marked by the letters "FL" and a number in hundreds of feet. This is shown on the left side of the display. For example, if "FL 071" is displayed, this corresponds to a reported pressure altitude of 7,100 feet. Note that the displayed Flight Level, or pressure altitude, may not agree with the aircraft's baro-corrected altitude under non-standard conditions. The Flight Level, or pressure altitude, reported by the KT 73 will be corrected as required by the ATC facility.

A fault in the altitude interface or an invalid altitude input to the KT 73 will cause the display to show a series of dashes when the KT 73 is in the ALT mode.



## VFR

Momentarily pressing the VFR Pushbutton recalls the reprogrammed VFR code, superseding whatever code was previously entered. If the VFR Pushbutton is pressed inadvertently, the previous code may be retrieved by pressing the VFR button and holding it for two seconds.

## DISPLAY BRIGHTNESS ADJUSTMENT

The KT 73's display brightness is controlled by an ambient light sensor. In addition, it has a manual adjustment to allow for matching to the brightness of other lighted displays that may be in the cockpit. The display is adjusted in the test (TST) mode.

To manually adjust the display brightness, perform the following operations:

1. Turn the Function Selector Knob to "TST".
2. Turn the BRT knob clockwise to increase the display brightness, or counterclockwise to decrease the display brightness.

The eight carets below the alphanumeric display characters indicate the brightness setting (relative to the photocell reading). Maximum brightness is indicated by all eight carets being illuminated. Minimum brightness is indicated by no carets being illuminated. The factory default setting is represented by four carets being illuminated. Pressing the IDT button will return the brightness to the default factory value.

3. Turn the Function Selector Knob from TST to store the display brightness settings.

**NOTE:** If power is removed from the KT 73 while still in the test code, the brightness setting will be lost and the unit will revert to the last known setting.



## SECTION 5 Performance

No change

## SECTION 6 Weight and Balance/Equipment List

Cancel old item and insert new item listed below into the equipment list:

Item	Weight [lb]		Arm [inch]	Static moment [lb.inch]
	IN	OUT		
1. KT 73	4.1		18.4	75.44
<b>Total:</b>	<b>4.1</b>			<b>75.44</b>

## SECTION 7 Airplane & Systems Description

No change

## SECTION 8 Airplane Handling, Service & Maintenance

No change



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608260 AND ON**

**SUPPLEMENT 21  
BENDIX/KING KMD 550  
MULTI-FUNCTION DISPLAY**

SERIAL NO. \_\_\_\_\_  
REGISTRATION NO. \_\_\_\_\_

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the KMD 550 Multi-Function Display is installed.

**FAA APPROVAL**

PMA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co.  
Delegated Type Authorization DCA-100129-02

*Richard A. Kelly* Executive Engineer

Date: January 9, 2001

 Member of GAMA

**30 December 2000**

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T206HPLUS-S21-00

S21-1

## SUPPLEMENT 21

### BENDIX/KING KMD 550 MULTI-FUNCTION DISPLAY

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Dec. 30, 2000

#### LOG OF EFFECTIVITY PAGES

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<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
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S21-3	Dec 30/00	S21-8	Dec 30/00
S21-4	Dec 30/00	S21-9	Dec 30/00
S21-5	Dec 30/00	S21-10 blank	Dec 30/00

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## SUPPLEMENT

### BENDIX/KING KMD 550 MULTI-FUNCTION DISPLAY

#### SECTION 1 GENERAL

 **WARNING**

**NEVER REMOVE THE DATABASE CARD WHILE THE UNIT IS SWITCHED ON AND NEVER ATTEMPT TO SWITCH THE UNIT ON WHEN THERE IS NO DATABASE CARD INSTALLED.**

The KMD 550 is a multi-function display that combines an internal aeronautical and cartographic database with external GPS data to display current aircraft position on a 5-inch diagonal screen. In addition to position, the KMD 550 can display weather avoidance information when optional sensor equipment is installed. The KMD 550 is powered from the AVIONICS MASTER BUS 1 switch and is current-protected by the GPS circuit breaker.

The KMD 550 is operated via a joystick, a series of five Power Keys that are located along the right side of the unit, a series of Function Select Keys located along the bottom, and an inner and outer Control Knob. The joystick allows movement of the pointer in MAP mode and is used to select and change setup fields. The appropriate key labels for a particular page are configured in software and displayed alongside the appropriate key. The rotary brightness control is used for adjusting the brightness of the screen.

Operational guidance for the KMD 550 Multi-function Display is provided with the Bendix/King KMD 550 Pilot's Guide (supplied with the airplane). This Pilot's Guide provides a detailed explanation of each of the display screen pages, with a step-by-step tutorial on each of them.

### NOTE

The KMD 550 is designed to be used as a supplemental navigation system. You should always carefully compare indications from your KMD 550 unit with the information available from all other navigation sources including NDB's, VOR's, DME's, visual sightings, charts, etc. For safety, any discrepancies observed should be resolved immediately.

### CAUTION

**THIS EQUIPMENT IS NOT A REPLACEMENT FOR YOUR CHART. IT IS INTENDED AS AN AID TO NAVIGATION ONLY.**

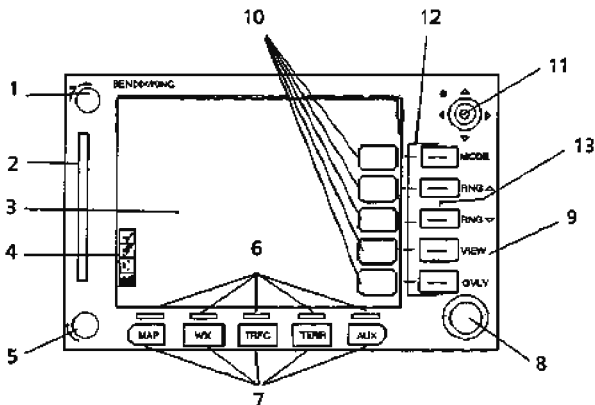
### WARNING

**NEVER USE THE WEATHER DISPLAYED ON THIS EQUIPMENT AS YOUR SOLE REFERENCE FOR WEATHER AVOIDANCE.**

### CHANGING THE DATABASE CARD

To change the data card follow these simple steps:

1. Turn off the KMD 550.
2. Grasp the data card and pull it straight out of its socket.
3. With the card facing upward, as indicated on its label, insert the new data card being careful to align the card with the socket then press the new card firmly into place.
4. Turn the unit on and check for correct operation. If the new data card contains a newer version of operating software the unit will update the operating system to this newer version. Status bars will be displayed during the update process.



1. **BRIGHTNESS CONTROL** -- Clockwise rotation will increase the brightness of the display. Counter-clockwise rotation decreases the display brightness.
2. **DATABASE CARD** -- The database card contains the aeronautical and topographical database for the KMD 550. Updated database cards are available by subscription every 28 days. The KMD 550 is not an IFR primary-means-of-navigation system. Therefore, its use as an advisory navigation system does not mandate that the database be current. However, it is strongly recommended from a safety viewpoint that you continue to keep your database current.
3. **DISPLAY** -- The KMD 550 utilizes a 5" diagonal, color active matrix liquid crystal display.
4. **AVAILABLE FUNCTIONS LEGEND** -- These icons indicate what functions are available and their current status. The icons shown depend on what optional sensor equipment is installed and how it is configured.

Figure 1. Bendix/King KMD 550 Multi-Function Display  
(Sheet 1 of 3)

5. ON/OFF CONTROL -- Rotating clockwise to the "ON" position provides power to the KMD 550. Rotating counter-clockwise to the "OFF" position removes power from the unit.
6. FUNCTION SELECT INDICATORS -- When a function key is pressed, the Function Select Indicator above it will illuminate to show that this function is presently being displayed.
7. FUNCTION SELECT KEYS -- These keys are used to select available data sources (as indicated on the key) for display. Pressing the same key multiple times will sequence through the available pages associated with that function.
8. CONTROL KNOB -- The inner and outer Control Knobs, located in the lower right of the unit are not functional in this installation.
9. POWER LABELS -- When the Power Label is illuminated on the right side of the key, that key's function is dedicated to the function described by the label and that function is active. The following is a list of the dedicated functions:
  - MODE -- Pressing this key will sequence through all available modes associated with the displayed page.
  - RNG△ -- Pressing this key will increase the range scale one level on the displayed page. Range scales on other pages will not be affected.
  - RNG▽ -- Pressing this key will decrease the range scale one level on the displayed page. Range scales on other pages will not be affected.
  - VIEW -- Pressing this key will sequence through the available views associated with the displayed page.

Figure 1. Bendix/King KMD 550 Multi-Function Display  
(Sheet 2 of 3)

- OVLY – Pressing the Overlay Key allows data from more than one source to be displayed simultaneously on the screen. Soft labels will indicate which data sources are available for overlay.
10. **SOFT LABELS** – Soft Labels are located to the left of the Power Keys in the display area. The description indicated in the label describes the key's present function related to the displayed page. Whenever a new function is selected, by pressing a key with a Soft Label, a new display is shown along with its new key labels.
  11. **JOYSTICK** – This is a pointing device that moves a mouse-like pointer around the display. It is primarily used for pointing at items on the map for further information and for measuring range and bearing to specific points. The joystick is also used to modify configuration settings on the AUX setup pages.
  12. **POWER KEYS** -- These five keys are used to manipulate the page being displayed. Their present functionality can be indicated by the use of Soft Labels on the left side of the key or Power Labels on the right side of the key.
  13. **FAULT INDICATOR** – The Fault Indicator is located between the Range buttons. If this small "F" is illuminated, a system hardware problem exists. This could be caused by the unit failing a self-test or an improper installation configuration. If the Fault Indicator appears, cycle the unit power. If the fault reoccurs, the unit needs to be taken to an authorized service center to correct the configuration or repair the unit.

**NOTE**

If the fault indicator is lit, refer to KMD 550 Pilot's Guide for service instructions.

Figure 1. Bendix/King KMD 550 Multi-Function Display  
(Sheet 3 of 3)

## **STARTUP DISPLAY**

This display will be seen after power-up. The Stormscope logo will be present if a Stormscope is installed and enabled. The self-test results are also displayed. Pressing the OK soft key will show the next display. The expiration date of the Jeppesen database must be acknowledged by again pressing the OK soft key.

## **POP-UP HELP DISPLAYS**

Pop-up status displays are shown if a Function Key or available Power Key is pressed and held for longer than two seconds. These can help provide a reference for monitoring the status of selected functions and overlays.

## **GPS DATA SOURCES**

The KMD 550 accepts GPS data from the KLN 94. The active flight plan and waypoints are imported directly from the KLN 94.

## **DISPLAY ICONS**

When showing any map screen - airports, nav aids, towns, intersections, user waypoints and many other data classes are represented by symbols or icons, some of which are user selectable in the Map Setup Screens. Please refer to Map Setup in the Getting Started section of the KMD 550 Pilot's Guide for further details.

## **SECTION 2 LIMITATIONS**

The KMD 550 Multi-Function Display Pilot's Guide must be readily available to the flight crew when operating the KMD 550.

### **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when the KMD 550 Multi-Function Display is installed.

### **SECTION 4 NORMAL PROCEDURES**

There is no change to the airplane normal procedures when the KMD 550 Multi-Function Display is installed.

### **SECTION 5 PERFORMANCE**

There is no change to the airplane performance when the KMD 550 Multi-Function Display is installed.



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608260 AND ON  
SUPPLEMENT 22  
12 VOLT CABIN POWER SYSTEM**

SERIAL NO. \_\_\_\_\_

REGISTRATION NO. \_\_\_\_\_

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the 12 Volt Cabin Power System is installed.

**FAA APPROVAL**

FAA APPROVED UNDER PART 21 SUBPART J  
The Cessna Aircraft Co.

Delegation of Authority Letter No. 2001-01-01

*Michael W. Buckley*

Executive Engineer

Date: January 9, 2001



Member of GAMA

**30 December 2000**

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T206HPLUS-S22-00

S22-1



## SUPPLEMENT 22

### 12 VOLT CABIN POWER SYSTEM

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Dec. 30/00

#### LOG OF EFFECTIVITY PAGES

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Title (S22-1)	Dec 30/00	S22-5	Dec 30/00
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S22-3	Dec 30/00	S22-7	Dec 30/00
S22-4	Dec 30/00	S22-8 blank	Dec 30/00

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## SUPPLEMENT

### 12 VOLT CABIN POWER SYSTEM

#### SECTION 1 GENERAL

The 12 Volt Cabin Power System provides passenger access to a fixed direct current (DC) voltage for powering portable electronic devices (PED). The remote power outlet (RPO), labeled "CABIN PWR 12V", is located on the lower portion of the cockpit center pedestal (See Figure 1). The RPO conforms to ARINC 628 Part 2 requirements for commercial airline in-seat power connectors, except that the Cabin Power System supplies automotive-type 12 VDC, in lieu of the 15 VDC provided by the airlines.

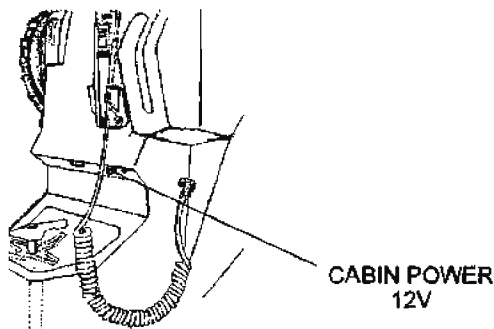


Figure 1. 12 Volt Cabin Power System Connector

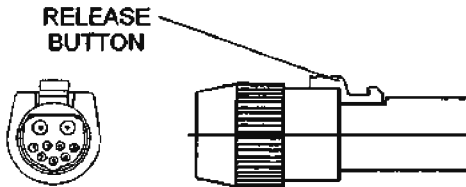


Figure 2. Mating Plug

The mating plug is a plastic 9-pin circular connector with a quick disconnect push button release (Hypertronics D02PBMRTH-0025 or equivalent) (See Figure 2). Adapter cable assemblies are available that feature the ARINC 628 plug with a standard automotive cigarette lighter socket (Radio Shack, Cat. No. 270-1580 or similar). Most laptop computer manufacturers and a number of accessory manufacturers (Absolute Battery, Mobility Electronics, USI, Extended Microdevices, etc.) can provide suitable power cables for these devices. A light-colored mating plug is preferred for visibility.

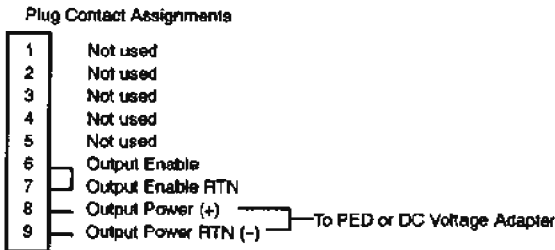


Figure 3. Mating Plug Wiring

Power is supplied to the 12-volt Cabin Power System from a DC to DC power converter located in the tailcone of the aircraft. The power converter receives 28 VDC power from the "CABIN LTS/PWR" circuit breaker located on the electrical switch/circuit breaker panel. By using two small signal pins located in the Cabin Power System connector, the power converter will not supply power to the Cabin Power connector when there is nothing plugged in.

Refer to 14 CFR 91.21 and Advisory Circular No. 91.21-1() "Use of Portable Electronic Devices Aboard Aircraft" for further information and requirements regarding the use of portable electronic devices in aircraft.

## **SECTION 2 LIMITATIONS**

The following limitations must be adhered to:

1. The 12 Volt Cabin Power System is not certified for supplying power to flight-critical communications or navigation devices.
2. Use of the 12 Volt Cabin Power System is prohibited during takeoff and landing.
3. Use of the 12 Volt Cabin Power System is prohibited under IFR unless the operator of the aircraft has determined that the use of the 12 VDC power supply and the connected portable electronic device(s) will not cause interference with the navigation or communication systems of the airplane.

## **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when the 12 Volt Cabin Power System is installed. The system is disabled by unplugging the power or adapter cable from the 12 Volt Cabin Power System connector. In the event of an alternator failure, load shedding of nonessential auxiliary equipment may be accomplished by simply unplugging equipment from the connector.

## SECTION 4 NORMAL PROCEDURES

The pilot must be familiar with the location of the 12 Volt Cabin Power System connector and with the operation of locking and release features common to the connector and power/adaptor cables.

### CAUTION

**USE CAUTION WITH POWER/ADAPTER CABLES IN THE CABIN TO AVOID ENTANGLING OCCUPANTS OR CABIN FURNISHINGS AND TO PREVENT DAMAGE TO CABLES SUPPLYING LIVE ELECTRIC CURRENT.**

1. 12 volt power shall be limited to a maximum of 10 amps. If a load in excess of this limit is applied to the Cabin Power System connector the "CABIN LTS/PWR" circuit breaker may open or the protection circuitry in the DC to DC power converter may limit the excess power by lowering the supplied voltage below 12 volts.
2. The 12 volt Cabin Power System may not be used to charge lithium batteries.

### CAUTION

**CHARGING OF LITHIUM BATTERIES MAY CAUSE THE LITHIUM BATTERIES TO EXPLODE.**

### NOTE

Take care to observe the manufacturer's power requirements prior to plugging any device into the 12 volt Cabin Power System connector.

**NOTE**

During passenger briefing, it must be explained that use of the PED (portable electronic device) is not permitted during takeoffs and landings.

**NOTE**

Disconnect the power/adapter cable from the Cabin Power System connector whenever the PED (portable electronic device) is not in use.

**SECTION 5  
PERFORMANCE**

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



**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608260 AND ON**

**SUPPLEMENT 23**

**BFGoodrich  
WX-500 Stormscope®**

SERIAL NO. _____
REGISTRATION NO. _____

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the WX-500 Stormscope® is installed.

<p style="text-align: center;"><b>FAA APPROVAL</b></p> <p style="text-align: center;"><small>FAA APPROVED UNDER FAR 21 SUBPART J The Cessna Aircraft Co. Delegation Order Authorization DCA-00189-02</small></p> <p style="text-align: center;"><i>Michael W. Hickey</i>      Executive Engineer</p> <p style="text-align: center;">Date: January 9, 2001</p>
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T206HPHUS-S23-00

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**30 December 2000**

S23-1

## SUPPLEMENT 23

### BFGoodrich WX-500 Stormscope®

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

<u>Revision Level</u>	<u>Date of Issue</u>
0 (Original)	Dec. 30, 2000

### LOG OF EFFECTIVITY PAGES

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<u>PAGE</u>	<u>DATE</u>	<u>PAGE</u>	<u>DATE</u>
Title (S23-1)	Dec 30/00	S23-4	Dec 30/00
S23-2	Dec 30/00	S23-5	Dec 30/00
S23-3	Dec 30/00	S23-6	Dec 30/00

### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Unit Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## SUPPLEMENT

### BFGoodrich WX-500 Stormscope®

#### SECTION 1 GENERAL

The BFGoodrich WX-500 Stormscope® Series II Weather Mapping Sensor is a "black-box" type weather sensor/processor that uses an external controller/display unit for control input and output display functions. In this aircraft, the WX-500 is integrated with the Honeywell KMD 550 Multifunction Display (MFD) for the control and display of all Stormscope® functions. See the KMD 550 Pilot's Guide for more information regarding operation of the KMD 550 Multifunction Display.

#### CAUTION

**THE WX-500 STORMSCOPE® IS APPROVED FOR USE ONLY IN AVOIDING HAZARDOUS WEATHER (THUNDERSTORMS); USE OF THE WX-500 TO PENETRATE HAZARDOUS WEATHER IS PROHIBITED.**

The Stormscope® sensor detects electrical discharge (lightning) activity through a dedicated antenna mounted on the bottom of the airplane. The Stormscope® processor continuously acquires electrical discharge data and performs self-test functions to ensure that the data presented to the pilot is always current and reliable when displayed. The system is heading-stabilized, so that the proper orientation of displayed data relative to the airplane position during maneuvering is maintained.

The WX-500 Stormscope® maps electrical discharge activity that ranges up to 200 nautical miles (nm) and displays that activity map to the flight crew, either centered on the airplane position (360° view) or ahead of the airplane position through 60° on either side of the airplane heading (120° view).

No dedicated external power control for the WX-500 is provided. The WX-500 is powered through the AVIONICS MASTER BUS 2 switch and is current-protected by the STRMSCOPE circuit breaker. At startup, the WX-500 will perform self-tests and provide error messages, if necessary, through the KMD 550 display. See the WX-500 User's Guide for recommended actions if an error message appears.

WX-500 availability is confirmed at startup by the appearance of the Stormscope® logo at the upper right hand corner of the startup screen for the KMD 550 display. WX-500 weather data availability is signaled during operation by the small lightning bolt icon shown at the lower left hand corner of the KMD 550 display. A yellow lightning bolt on a light blue background signifies that Stormscope® data is being displayed. A black lightning bolt on a gray background indicates that Stormscope® data is not being displayed. A black lightning bolt on a gray background with a red slash and circle (international "NO" symbol) indicates that there is a problem with the WX-500 unit.

The WX-500 System Menu may be accessed by selecting the AUX Function Key on the KMD 550 and the Smart Key next to the WX SETUP label. This screen permits the user to select a system self-test, noise check, strike test or to view and edit system installation settings. As with most sophisticated electronic devices, the user should defer changes to the system setup and installation settings to a qualified and experienced avionics technician.

WX-500 weather data can be displayed exclusively or may be displayed (overlaid) on the moving map display. Selecting the WX Function Key on the KMD 550 provides for exclusive display of Stormscope® weather data. The user may select the desired view (360° or 120°) by pressing the VIEW Smart Key. The range (25 to 200 nautical miles) may be selected by using the RNG  $\Delta$  or RNG  $\nabla$  Smart Keys; the 25 nautical mile range ring is displayed regardless of the range selected. The user may also choose between Strike or Cell display modes using the MODE Smart Key. See the WX-500 User's Guide for information regarding Strike and Cell mode display differences.

To overlay weather data on the Map Mode display of the KMD 550, while in Map Mode, select the OVLY Function Key and then the Smart Key next to the STORMSCOPE label. Lightning strikes will be depicted on the Map Mode display as red lightning bolts. The Stormscope® display mode (Strike or Cell) will be as selected on the WX display page. View and Range settings will be as set for the Map Mode page.

#### **NOTE**

In evaluating lightning strike data, it may be useful to clear the accumulated strike points on the display from time to time by moving the KMD 550 joystick control and then monitoring the reappearance of strike activity on the cleared display.

## **SECTION 2 LIMITATIONS**

The WX-500 Stormscope® is approved only as an aid to hazardous weather (thunderstorm) avoidance; use for hazardous weather penetration is prohibited.

The Honeywell Bendix/King® KMD 550 Multi-Function Display Pilot's Guide must be available to the flight crew when operating the WX-500 Stormscope®.

The BFGoodrich WX-500 Stormscope® Series II Weather Mapping Sensor User's Guide must be available to the flight crew when operating the WX-500 Stormscope®.

## **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when the BFGoodrich WX-500 Stormscope® is installed.

## **SECTION 4 NORMAL PROCEDURES**

Static discharge from the static wicks on the tail may cause false indications of lightning strikes at the 6 o'clock position with the 200 nm range selected.

Refer to the WX-500 User's Guide under "Error Message Recommended Actions" for discontinuing use of the Stormscope® if a Stormscope® error message appears.

## **SECTION 5 PERFORMANCE**

There is no change to the airplane performance when the BFGoodrich WX-500 Stormscope® is installed.



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608362 AND ON  
SUPPLEMENT 24**

**ASTROTECH MODEL TC-2  
CLOCK/OAT/VOLT INDICATOR**

SERIAL NO. _____
REGISTRATION NO. _____

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Astrotech Clock/OAT/Volt Indicator is installed.

<p style="text-align: center;"><b>FAA APPROVAL</b></p> <p style="text-align: center;"><small>FAA APPROVED UNDER PART 21 SUBPART J The Cessna Aircraft Co. Delegation Option Authorization DOA 890228-02</small></p> <p style="text-align: center;"><i>Richard M. Hally</i>      Executive Engineer</p> <p style="text-align: center;">Date: 31 January 2002</p>
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**31 January 2002**

S24-1

## SUPPLEMENT 24

### ASTROTECH MODEL TC-2 CLOCK/OAT/VOLT INDICATOR

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision.

<u>Revision Level</u>	<u>Date of Issue</u>
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#### LOG OF EFFECTIVITY PAGES

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S24-2	Jan 31/02	S24-5	Jan 31/02
S24-3	Jan 31/02	S24-6	Jan 31/02

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## **SUPPLEMENT**

### **DIGITAL CLOCK/OAT/VOLT INDICATOR**

#### **SECTION 1 GENERAL**

The Astrotech Model TC-2 digital clock combines the features of a clock, outside air temperature gauge (OAT) and voltmeter in a single unit. The unit is designed for ease of operation with a four button control system. The upper button is used to control sequencing between temperature and voltage. The lower three buttons control reading and timing functions related to the digital clock. Temperature and voltage functions are displayed in the upper portion of the unit's LCD window, and clock/timing functions are displayed in the lower portion of the unit's LCD window.

The digital display features an internal light (back light) to ensure good visibility under low cabin lighting conditions and at night. The intensity of the back light is controlled by the PANEL LT rheostat.

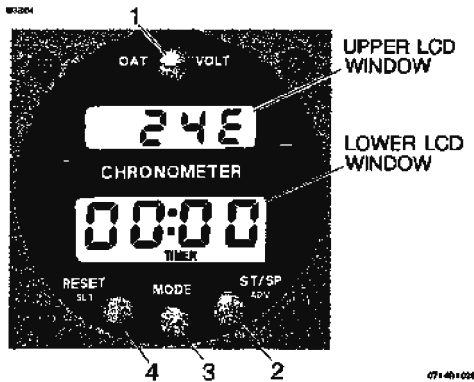


Figure 1. Astrotech Model TC-2 Clock/OAT/Volt Indicator

1. **OAT/VOLT BUTTON** - Volts are displayed at power up. When the button is pressed, the display switches to outside air temperature in °F. Pressing the button again selects outside air temperature in °C. Pressing the button a third time selects voltage.
2. **ST/SP (ADV) BUTTON** - When the ST/SP (Start/Stop) button is pressed in the Clock Mode, the date is displayed for 1.5 seconds and then the display returns to the clock. During the set function the button is used to advance the count of the digit currently being set. When in the Timer Mode, the button alternately starts and stops the elapsed counter with each push.
3. **MODE BUTTON** - The MODE button toggles between clock and timer. Each time the button is pressed the mode changes. While in the Timer Mode the word "TIMER" is displayed below the digits (as shown in Figure 1).
4. **RESET (SET) BUTTON** - When the RESET button is pressed in the Timer Mode, it resets the timer to 00:00. In the Clock Mode, the button initiates the set function for setting the date and time of day. The set function can be recognized by the Month (left two) digits flashing. If the set function is not desired the MODE button may be pressed to exit from the set operation.



## **SECTION 2 LIMITATIONS**

There is no change to the airplane limitations when the digital clock/OAT/volt indicator is installed.

## **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when the clock/OAT/volt indicator is installed.

## **SECTION 4 NORMAL PROCEDURES**

### **OAT/VOLTMETER OPERATION**

The upper LCD window is dedicated to OAT and voltmeter operations. The voltmeter reading is preselected upon startup and is indicated by an "E" following the display reading. Pushing the OAT/VOLT button will sequence the window from voltage to Fahrenheit ("F") to Celsius ("C"), and back again to voltage.

### **CLOCK OPERATIONS**

The lower LCD window is dedicated to clock and timing operations. Pushing the MODE button toggles between clock and timer. Each time the button is pushed the mode changes. Time of day is displayed in hours and minutes in the 24-hour format. Setting procedures are as follows:

While in the Clock Mode, press the SET (RESET) button and the left two digits will flash; these are the month digits. Press the ADV (ST/SP) button to change to the current month. Then press the SET (RESET) button and the right two digits will flash; these are the day of the month digits. Press the ADV (ST/SP) button to change to the current day. Then press the SET (RESET) button and both the month and day will be displayed.

Press the SET (RESET) button and the left two digits will flash, these are the hour digits. Press the ADV (ST/SP) button to change to the current hour. Press the SET (RESET) button and the right two digits will flash; these are the minute digits. Press the ADV (ST/SP) button to change to the current minute. Then press the SET (RESET) button and both the hour and minutes will be displayed. If the minutes were changed, the clock is stopped and holding. When the time reference being used to set the clock reaches the exact minute shown on the display, press the ST/SP button. The display will show the date and start the clock running. If the minutes were not changed, the minutes will continue to run and not need to be restarted.

When operating in the Timer Mode the word "TIMER" is shown on the display directly below the digits and indicates that the elapsed time is being displayed. The timer can be reset to 00:00, started, stopped, or restarted. It counts in minutes and seconds for the first hour and then counts in hours and minutes to 23:59. The timer continues to keep elapsed time when the display is in the clock mode. Pushing the ST/SP (ADV) button alternately starts and stops the elapsed counter with each push. The RESET (SET) button when pushed resets the timer to 00:00.

## **SECTION 5 PERFORMANCE**

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



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608362 AND ON**

**SUPPLEMENT 25**

**BENDIX/KING KX 165A  
VHF NAV/COMM**

SERIAL NO. _____
REGISTRATION NO. _____

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the VHF NAV/COMM with Indicator Head is installed.

<p style="text-align: center;"><b>FAA APPROVAL</b></p> <p style="text-align: center;"><small>FAA APPROVED UNDER FAR 21 SUBPART J The Cessna Aircraft Co. Delegation Option Authorization DQA-100129-02</small></p> <p style="text-align: center;"><i>Richard D. Hickey</i>      Executive Engineer</p> <p style="text-align: center;">Date: 31 January 2002</p>
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**31 January 2002**

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T206HPHUS-S25-00

S25-1

## SUPPLEMENT 25

### BENDIX/KING KX 165A VHF NAV/COMM

The following Log of Effective Pages provides the date of issue for original and revised pages, as well as a listing of all pages in the Supplement. Pages which are affected by the current revision will carry the date of that revision

**Revision Level   Date of Issue**

0 (Original)      Jan. 31, 2002

#### LOG OF EFFECTIVITY PAGES

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S1-3	Jan 31/02	S1-10	Jan 31/02
S1-4	Jan 31/02	S1-11	Jan 31/02
S1-5	Jan 31/02	S1-12	Jan 31/02
S1-6	Jan 31/02	S1-13	Jan 31/02
S1-7	Jan 31/02	S1-14(blank)	Jan 31/02

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## **SUPPLEMENT**

### **BENDIX/KING KX 165A VHF NAV/COMM**

#### **SECTION 1 GENERAL**

The KX 165A VHF Nav/Comm Transceiver is very similar to the KX 155A VHF Nav/Comm Transceiver except, the KX 165A has a built in VOR/LOC converter, enabling it to directly drive a horizontal situation indicator (HSI). The KX 165A will only be installed with an HSI. For detailed information of the HSI refer to the HSI supplement in this section of the POH (refer to Section 9 index).

The KX 165A includes a 760-channel VHF communications receiver-transmitter, a 200-channel VHF navigation receiver, and a 40-channel glideslope receiver. The communications receiver-transmitter receives and transmits signals between 118.00 and 135.975 MHz with 25-kHz spacing. The navigation receiver receives VOR and localizer signals between 108.00 and 117.95 MHz in 50-kHz steps. The glideslope receiver is automatically tuned when a localizer frequency is selected. The circuits required to interpret the VOR and localizer signals are also an integral part of the Nav receiver.

Large self-dimming gas discharge readouts display both the communications and navigation operating frequencies. The KX 165A's "flip-flop" preselect feature enables you to store one frequency in the standby display while operating on another and then interchange them instantly with the touch of a button. Both the active (COMM) and the standby (STBY) frequencies may be displayed at all times and are stored in nonvolatile memory without drain on the aircraft battery. The KX 165A has 32 programmable comm channels, a stuck microphone alert and transmitter shutdown, Bearing To/From radial mode, course deviation indicator mode and an elapsed timer mode.

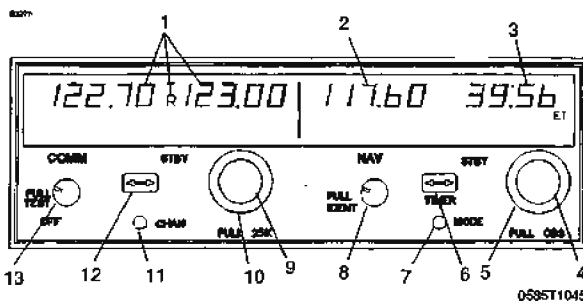
The Comm portion incorporates an automatic squelch. To override the automatic squelch, the Comm volume control knob is pulled out. Push the knob back in to reactivate the automatic squelch. A "T" will be displayed during transmit and "R" during valid signal reception.

The Nav portion uses the pull out feature of the Nav volume control to receive the Nav signal Ident. Pull the volume control knob out to hear the Ident signal plus voice. Push the knob in to attenuate the Ident signal and still hear Nav voice.

All controls for the Nav/Comm, except those for navigation course selection, are mounted on the front panel of the receiver-transmitter. Control lighting is provided by NAV/COMM interior lighting and the instrument panel flood lighting system. For detailed information of the audio selector panel used in conjunction with this radio refer to the audio selector panel supplement in this section of the POH (refer to Section 9 index).

**NOTE**

The unit has a stuck microphone alert feature. If the microphone is keyed continuously for greater than 33 seconds, the transmitter stops transmitting and the active Comm frequency flashes to alert the pilot of the stuck mic condition.

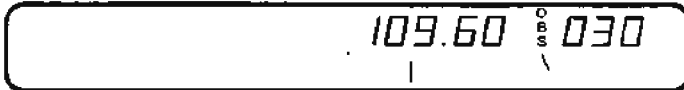


**KX 165A VHF NAV/COMM**

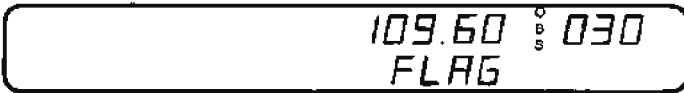
Figure 1. Bendix/King KX165A VHF NAV/COMM (Sheet 1 of 2)

NAV FUNCTION DISPLAYS

82276



VOR MODE: ACTIVE/BEARING, CDI FORMAT



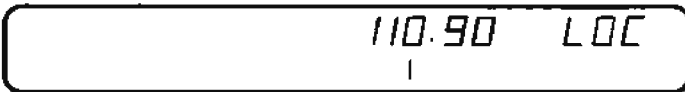
VOR MODE: ACTIVE/BEARING, FLAG DISPLAY



VORE MODE: ACTIVE "BEARING TO" FUNCTION DISPLAY



VOR MODE: ACTIVE/BEARING, FLAG DISPLAY



LOCALIZER MODE: FREQUENCY/CDI FORMAT

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Figure 1. Bendix/King KX 165A VHF NAV/COMM (Sheet 2 of 2)

1. OPERATING COMM FREQUENCY DISPLAY -- Displays COMM ACTIVE and COMM STANDBY frequencies with a "T" between them to indicate TRANSMIT and an "R" to indicate RECEIVE modes of operation.
2. OPERATING NAV FREQUENCY DISPLAY -- The right portion of the display is allocated to NAV receiver ACTIVE and STANDBY information. The frequency channeling is similar to the COMM when operating in the frequency mode. The NAV ACTIVE and STANDBY frequencies are stored in the memory on power down and return on power up.
3. NAV STANDBY/OBS/Bearing/Radial/Timer Display -- The right side of the NAV display is controlled by the MODE SELECTOR BUTTON (see #7 below). With an active VOR frequency, this portion of the display shows the STANDBY frequency, OBS setting for the internal CDI, the bearing to the VOR station, radial from the VOR station, or a count-up/count-down timer. With an active localizer frequency, this portion of the display shows the standby frequency, the letters "LOC", or count-up/count-down timer.
4. NAV FREQUENCY SELECTOR KNOB (SMALL) -- Operates in 50-kHz steps. The NAV receiver's lower and upper frequency limits are 108.00 MHz and 117.95 MHz. Exceeding the upper limit of frequency band will automatically return to the lower limit and vice versa. A clockwise rotation will increase (inc) the previous frequency while a counterclockwise rotation will decrease (dec) the previous frequency.
5. NAV FREQUENCY SELECTOR KNOB (LARGE) -- Operates in 1-MHz steps. The frequency inc/dec operates the STANDBY frequency display. A clockwise rotation will increase the previous frequency while a counterclockwise rotation will decrease the previous frequency. Exceeding the upper limit of the frequency band will automatically return to the lower limit and vice versa.



6. NAV/FREQUENCY TRANSFER BUTTON (↔) -- Interchanges the NAV ACTIVE and STANDBY frequencies. Depressing the NAV frequency transfer button for 2 seconds or more will cause the display to go into the ACTIVE ENTRY mode. Only the ACTIVE frequency will be displayed and it can be directly changed by using the NAV inc/dec knobs. The display will return to the ACTIVE/STANDBY mode when the NAV frequency transfer button is pushed.
7. MODE SELECTOR BUTTON -- Depressing the mode button will cause the NAV display to go from the ACTIVE/STANDBY format to the ACTIVE/CDI (Course Deviation Indicator) format. In the CDI mode, the frequency inc/dec knob (pushed in) channels the ACTIVE frequency. When the ACTIVE window is tuned to a VOR frequency, the standby frequency area is replaced by a three digit OBS (Omni Bearing Selector) display. The desired OBS course can be selected by pulling out the inner NAV frequency knob and turning it. This OBS display is independent of any OBS course selected on an external CDI. An "OBS" in the middle of the NAV display will flash while the inner NAV frequency knob is pulled out. The CDI is displayed on the line below the frequency/OBS. When the ACTIVE window is tuned to a localizer frequency, the standby frequency area is replaced by "LOC". When the received signal is too weak to ensure accuracy the display will "FLAG".

Depressing the mode button again will cause the NAV display to go from the ACTIVE/CDI format to the ACTIVE/BEARING format. In the BEARING mode, the frequency inc/dec knob channels the ACTIVE frequency window. Depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display. In bearing mode, the right hand window of the NAV display shows the bearing TO the station. When a too weak or invalid VOR signal is received the display flags (dashes).

Another push of the mode button will cause the NAV display to go from the ACTIVE/BEARING format to the ACTIVE/RADIAL format. In the RADIAL mode, the frequency inc/dec knobs channel the ACTIVE frequency window and depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display. In radial mode of operation, the right hand window of NAV display shows the radial FROM the station. When a too weak or invalid VOR signal is received the display flags (dashes).

Another push of the mode button will cause the unit to go into the TIMER mode. When the unit is turned on, the elapsed timer (ET) begins counting upwards from zero. The timer can be stopped and reset to zero by pushing the NAV frequency transfer button for 2 seconds or more causing the ET on the display to flash. In this state, the timer can be set as a countdown timer or the elapsed timer can be restarted. The countdown timer is set by using the NAV frequency inc/dec knobs to set the desired time and then pushing the NAV frequency transfer button to start the timer. The large knob selects minutes, the small knob in the "in" position selects 10 second intervals, and the small knob in the "out" position selects individual seconds. After the countdown timer reaches zero, the counter will begin to count upwards indefinitely while flashing for the first 15 seconds. When the elapsed timer is reset to zero it may be restarted again by momentarily pushing the NAV frequency transfer button.

8. NAV/VOLUME CONTROL (PULL IDENT) -- Adjusts volume of navigation receiver audio. When the knob is pulled out, the Ident signal plus voice may be heard. The volume of voice/ident can be adjusted by turning this knob.
9. COMM FREQUENCY SELECTOR KNOB (INNER) -- This smaller knob is designed to change the indicated frequency in steps of 50-kHz when it is pushed in, and in 25-kHz steps when it is pulled out.

10. COMM FREQUENCY SELECTOR KNOB (OUTER) – The outer, larger selector knob is used to change the MHz portion of the frequency display. At either band-edge of the 118-136 MHz frequency spectrum, an offscale rotation will wrap the display around to the other frequency band-edge (i.e., 136 MHz advances to 118 MHz).
11. CHANNEL BUTTON -- Pressing the CHAN button for 2 or more seconds will cause the unit to enter the channel program (PG) mode. Upon entering the channel program mode, the channel number will flash indicating that it can be programmed. The desired channel can be selected by turning the comm kHz knob. The channel frequency can be entered by pushing the COMM TRANSFER button which will cause the standby frequency to flash. The comm frequency knobs are then used to enter the desired frequency. If dashes (located between 136 MHz and 118 MHz) are entered instead of a frequency, the corresponding channel is skipped in channel selection mode. Additional channels may be programmed by pressing the COMM TRANSFER button and using the same procedure. The channel information is saved by pushing the CHAN button which will also cause the unit to return to the previous frequency entry mode.

The channel selection mode (CH) can then be entered by momentarily pushing the CHAN button. The comm frequency knobs can be used to select the desired channel. The unit will automatically default to the previous mode if no channel is selected within 2 seconds after entering the channel selection mode. The unit is placed in the transmit mode by depressing a mic button.

12. **COMM FREQUENCY TRANSFER BUTTON (↔)** – Interchanges the frequencies in the USE and STANDBY displays. To tune the radio to the desired operating frequency, the desired frequency must be entered into the standby display and then the COMM TRANSFER button must be pushed. This will trade the contents of the active and standby displays. The operating frequency can also be entered by accessing the ACTIVE ENTRY (direct tune) mode which is done by pushing the COMM TRANSFER button for 2 or more seconds. In the direct tune mode, only the active part of the display is visible. The desired frequency can be directly entered into the display. Push the COMM TRANSFER button again to return to the active/standby display.

The transceiver is always tuned to the frequency appearing in the ACTIVE display. It is, therefore, possible to have two different frequencies stored in the ACTIVE and STANDBY displays and to change back and forth between them at the simple push of the COMM TRANSFER button.

13. **COMM VOLUME CONTROL (OFF/PULL/TEST)** – Rotate the VOL knob clockwise from the OFF position. Pull the VOL knob out and adjust for desired listening level. Push the VOL knob back in to actuate the automatic squelch. The VOL knob may also be pulled out to hear particularly weak signals.

## **SECTION 2 LIMITATIONS**

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

### **SECTION 3 EMERGENCY PROCEDURES**

There is no change to the airplane emergency procedures when this avionic equipment is installed. However, if the frequency readouts fail, the radio will remain operational on the last frequency selected. If either frequency transfer button is pressed and held while power is applied to the unit, the unit wakes up with 120.00 MHz in the COMM use frequency and 110.00 MHz in the NAV active frequency, with both COMM and NAV in the active entry mode. This will aid the pilot in blind tuning the radio.

### **SECTION 4 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 mode.

- 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 control 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 under the lubber line. 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 channeled 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.

**GLIDESLOPE OPERATION:**

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

**PILOT CONFIGURATION:**

This mode can be accessed by pressing and holding the NAV Mode Button for more than 2 seconds and then pressing the Nav Frequency Transfer Button for an additional 2 seconds, while continuing to hold the NAV Mode Button. When the Pilot Config Mode is entered, the unit will show the "SWRV" mnemonic which is the unit software revision level. Adjustment pages can be accessed by MODE button presses.

The pilot may adjust two parameters in the pilot configuration, the display minimum brightness and sidetone volume level. Minimum Brightness (BRIM) will have a range of 0-255. The dimmest is 0 and the brightest is 255. Sidetone volume level is adjusted when SIDE is displayed. Values from 0-255 may be selected with 0 being least volume, 255 being the greatest.

<b>Adjustment</b>	<b>Mnemonic</b>	<b>Min Level</b>	<b>Max Level</b>
Software Revision Number	SWRV	---	---
Minimum Display Brightness	BRIM	0	255
Sidetone Level	SIDE	0	255

Subsequent presses of the MODE button sequences through SWRV, BRIM, SIDE, and then back to SWRV.

Pressing the NAV Transfer Button momentarily exits Pilot configuration mode. The NAV returns to its pre-Pilot Config state with the new brightness and sidetone levels stored in nonvolatile memory.

## **SECTION 5 PERFORMANCE**

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



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**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608388 AND ON  
SUPPLEMENT 26  
BENDIX/KING KDR 510  
FLIGHT INFORMATION SERVICES (FIS)**

SERIAL NO. _____
REGISTRATION NO. _____

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the airplane is equipped with the Bendix/King KDR 510 Flight Information Services (FIS).

**APPROVED BY**

FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co.  
Delegation of Authority Authorization DCA-10072P-CB

*Richard W. Hickey* Executive Engineer

DATE OF APPROVAL 11-17-02

 Member of GAMA

**12 NOVEMBER 2002**

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WICHITA, KANSAS, USA

T206HPHUS-S26-00

S26-1



## SUPPLEMENT 26

### BENDIX/KING KDR 510 FLIGHT INFORMATION SERVICES (FIS)

Use the Log of Effective Pages to determine the current status of this supplement. Pages affected by the current revision are indicated by an asterisk (\*) preceding the page number.

Supplement Status	Date
Original Issue	12 November 2002

#### LOG OF EFFECTIVE PAGES

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Page	Page Status	Revision Number
Title (S26-1)	Original Issue	0
S26-2 thru S26-6	Original Issue	0

## SUPPLEMENT 26

### BENDIX/KING KDR 510 FLIGHT INFORMATION SERVICES (FIS)

#### SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated in Airplane</u>
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## **SUPPLEMENT**

### **BENDIX/KING KDR 510 FLIGHT INFORMATION SERVICES (FIS)**

#### **SECTION 1 GENERAL**

The Bendix/King KDR 510 Flight Information Services (FIS) installation provides weather information and other flight advisory information to pilots to enhance situational awareness. The services rely on a network of ground based VHF transmitters that continuously broadcast data to any aircraft within line-of-sight of the transmitter. The aircraft must be equipped with a dedicated VHF antenna and receiver for FIS. Data is then presented to the pilot using the KMD 550 Multi-function display. FIS information is intended to be used as a strategic planning tool to help the pilot avoid inclement weather areas that are beyond his visual range. FIS lacks the sufficient resolution and update rate necessary for severe weather penetration.

#### **NOTE**

Cessna Aircraft Company does not guarantee the quality, accuracy, or availability of FIS data. Some data is available to all KDR 510 installations while other data is available only by subscription. The network of transmitters may not cover the entire area where the aircraft is operated, and the aircraft may need to be above 5000 feet AGL to receive FIS data in areas where coverage does exist.

#### **SECTION 2 LIMITATIONS**

Use of the Bendix/King KDR 510 Flight Information Services (FIS) for severe weather penetration is prohibited.

### **SECTION 3**

#### **EMERGENCY PROCEDURES**

No additional emergency procedures are required when the KDR 510 Flight Information Services (FIS) equipment is installed in the airplane.

### **SECTION 4**

#### **NORMAL PROCEDURES**

Press the WX function select key of the KMD 550 Multi-function display to toggle through weather related systems installed on the aircraft that display on the KMD 550. The MODE button toggles between different weather related information displays such as switching between METARs and PIREPs. It is highly recommended that the pilot read the Bendix/King subscription agreement and the FIS addendum to the KMD 550/850 Pilot's Guide to understand the entire range of information available. It is possible that data availability and subscription services may change over time.

### **SECTION 5**

#### **PERFORMANCE**

Airplane performance does not change when the KDR 510 Flight Information Services (FIS) equipment is installed.



A Textron Company

**Pilot's Operating Handbook and  
FAA Approved Airplane Flight Manual**

**CESSNA MODEL T206H  
AIRPLANES T20608438 AND ON  
SUPPLEMENT 27**

**KMH 880 MULTI-HAZARD  
AWARENESS SYSTEM**

SERIAL NO. _____
REGISTRATION NO. _____

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the KMH 880 Multi-Hazard Awareness System is installed.

**APPROVED BY**

FAA APPROVED UNDER FAR 21 SUBPART J  
The Cessna Aircraft Co.  
Delegation of Authority Authorization DGA-168128-CR

*Michael W. Kelly* Executive Director



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T206HPLUS-S27-00

DATE OF APPROVAL 01-21-04

**21 JANUARY 2004**

S27-1

## SUPPLEMENT 27

### KMH 880 MULTI-HAZARD AWARENESS SYSTEM

Use the Log of Effective Pages to determine the current status of this supplement. Pages affected by the current revision are indicated by an asterisk (\*) preceding the page number.

Supplement Status	Date
0 (Original)	21 January 2004

#### LOG OF EFFECTIVE PAGES

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Page Number	Page Status	Revision Number
S27-1 thru S27-16	Original	0

## SUPPLEMENT 27

### KMH 880 MULTI-HAZARD AWARENESS SYSTEM SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporation</u>	<u>Incorporated In Airplane</u>
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## **SUPPLEMENT**

### **KMH 880 MULTI-HAZARD AWARENESS SYSTEM**

#### **SECTION 1 GENERAL**

The Bendix/King KMH 880 Multi-Hazard Awareness System supplied with the Cessna Model T206H provides the pilot with supplemental flight information through the Bendix/King KMD 550 Multi-Function Display (MFD), glareshield annunciator lights and aural warnings. The KMH 880 system includes a Traffic Advisory System (TAS) for air traffic and an Enhanced Ground Proximity Warning System (EGPWS) for terrain. The traffic and terrain information provided by the KMH 880 system is intended only to enhance the pilot's situational awareness.

Refer to the Bendix/King KTA 870/KMH 880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell part number 006-18265-0000, Revision 1, dated 03/2002, or later revision, for information regarding the specific operating details of the KMH 880.

Refer to the KMD 550/850 Terrain Function (EGPWS) Pilot's Guide Addendum, Honeywell part number 006-18236-0000, Revision 2, dated Sept/2001, or later revision, for information regarding the operating details of the EGPWS.

Refer to the KMD 550/850 Traffic Avoidance Function Pilot's Guide Addendum, Honeywell part number 006-18238-0000, Revision 2, dated Nov/2002, or later revision, for information regarding the operating details of the Traffic Advisory System.



## **SECTION 2 LIMITATIONS**

1. The Bendix/King KTA 870/KMH 880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell part number 006-18265-0000, Revision 1, dated 03/2002, or later revision, must be readily accessible to the pilot when operating the KMH 880 system.
2. The Bendix/King KMD 550/850 Pilot's Guide, Honeywell part number 006-18222-0000, Revision 2, dated Nov/2001, or later revision, the KMD 550/850 Terrain function (EGPWS) Pilot's Guide Addendum, Honeywell part number 006-18236-0000, Revision 2, dated Sept/2001, or later revision, and the KMD 550/850 Pilot's Guide Traffic Avoidance Function Pilot's Guide Addendum, Honeywell part number 006-18238-0000, Revision 2, dated Nov/2002, or later revision, must be readily accessible to the pilot when operating the KMH 880 system.
3. The Traffic Advisory function is not to be used to maneuver the airplane to avoid other traffic. The traffic display is intended to assist in visually locating traffic. The traffic display lacks the resolution necessary for use in evasive maneuvering.
4. The Terrain Awareness function is not to be used for navigation. The terrain awareness display is intended to serve as a situational awareness tool only, and may not provide the accuracy and/or fidelity on which to solely base terrain or obstacle avoidance maneuvering decisions.

## **SECTION 3 EMERGENCY PROCEDURES**

For ditching or other off airport landings, inhibit the Terrain Awareness Alerting and Display (TAAD) and Terrain Clearance Floor (TCF) functions by selecting the TERR mode key on the KMD 550 MFD and holding the MODE soft key in for a few seconds until TERR INHBT is annunciated on the MFD and the TERR N/A annunciator on the glareshield illuminates.

## **SECTION 4 NORMAL PROCEDURES**

### **SYSTEM ACTIVATION**

#### **TRAFFIC ADVISORY SYSTEM (TAS) FUNCTION**

Normal operation of the TAS is described in the Bendix/King KTA 870/KMH 880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell part number 006-18265-0000, Revision 1, dated 03/2002, or later revision.

Test the TAS function before takeoff by selecting the TRFC (traffic) function select button on the KMD 550 MFD and then selecting the TST position using the outer control knob located in the lower right corner of the MFD. The test pattern is best viewed at a range selection of 5 nm.

Use of the self-test function while in flight will inhibit the TAS operation for up to twelve seconds, depending on the number of targets being tracked.

#### **NOTE**

The KMH 880 TAS is unable to detect an intruding aircraft if the intruder is not equipped with an operating transponder. TAS can detect and track aircraft with either Mode A, Mode C, or Mode S transponders.

Due to aircraft geometry, the relative bearing to a Mode A (non-altitude reporting) aircraft may appear erratic when the intruding aircraft is at close horizontal range with a large vertical separation. In this case, the non-altitude reporting traffic symbol may momentarily disappear or move rapidly around the TAS display. Continue to use visual scan techniques to scan for this and all other intruding aircraft.

(Continued Next Page)

## **SECTION 4** **NORMAL PROCEDURES** (Continued)

### **ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) FUNCTION**

The EGPWS (TERR) function is active when electrical power is supplied, the amber TERR N/A annunciator is extinguished and the following systems are operational:

- Multi-Hazard Warning Processor
- Altitude Encoder

If the horizontal position derived from the GPS receiver is invalid, the EGPWS will not be available.

Test the EGPWS function before takeoff by selecting the TERR (terrain) function select button on the KMD 550 MFD. The pilot must put the rotary knob in the TST position using the outer control knob located in the lower right corner of the MFD.

## **INDICATORS AND CONTROLS**

### **TRAFFIC ADVISORY SYSTEM (TAS) FUNCTION**

All of the TAS indication and control is via the KMD 550 MFD. Refer to the Bendix/King KTA 870/KMH 880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell part number 006-18265-0000, Revision 1, dated 03/2002, or later revision.

Refer to the KMD 550/850 Traffic Avoidance Function Pilot's Guide Addendum, Honeywell part number 006-18238-0000, Revision 2, dated Nov/2002, or later revision.

(Continued Next Page)

### SECTION 4 NORMAL PROCEDURES (Continued)

#### ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) FUNCTION

All of the EGPWS indication and control is through the KMD 550 MFD. Refer to the Bendix/King KTA 870/KMH 880 Traffic Advisory System/Multi-Hazard Awareness System Pilot's Guide, Honeywell part number 006-18265-0000, Revision 1, dated 03/2002, or later revision.

Refer to the KMD 550/850 Terrain Function (EGPWS) Pilot's Guide Addendum, Honeywell part number 006-18236-0000, Revision 2, dated Sept/2001, or later revision.

An amber TERR N/A lamp is provided in the annunciator panel located in the instrument panel glareshield. The TERR N/A lamp illuminates when the terrain function is not available.

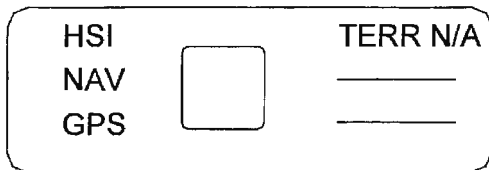


Figure S27-1

(Continued Next Page)

**SECTION 4**  
**NORMAL PROCEDURES** (Continued)

**ALERT PRIORITIES**

**TRAFFIC ADVISORY SYSTEM (TAS) FUNCTION**

TAS Traffic Annunciations (TAs) are shown in the following table:

<b>AURAL</b>	<b>VISUAL</b>	<b>PILOT RESPONSE</b>
"TRAFFIC, TRAFFIC"	A filled in yellow circle on the traffic display.	Conduct visual search for the intruder. If successful, maintain visual acquisition to ensure safe operation.

**NOTE**

- In most situations, no maneuvering will be necessary to maintain safe separation from traffic. Maneuver only if it becomes apparent safe operation will not be maintained.
- Attempt to visually acquire the intruder aircraft and achieve or maintain safe separation in accordance with regulatory requirements and good operating practice.
- If the intruder aircraft is not in view, air traffic control should be contacted to obtain any information that may assist concerning the intruder aircraft.
- Minor adjustments to the vertical flight path consistent with air traffic requirements are not considered evasive maneuvers.

(Continued Next Page)

**SECTION 4**  
**NORMAL PROCEDURES** (Continued)

**ALERT PRIORITIES** (Continued)

**TRAFFIC ADVISORY SYSTEM (TAS) FUNCTION** (Continued)

**WARNING**

**MANEUVERING BASED UPON THE TRAFFIC DISPLAY INFORMATION ONLY MAY ACTUALLY RESULT IN A REDUCED SEPARATION FROM AN INTRUDER AIRCRAFT.**

**NOTE**

- Traffic Advisories (TAs) can be expected to occur during normal flight operation. Generally, TAs will occur more frequently in terminal areas during arrival, and less frequently during departure and enroute operations. In the vast majority of these cases, the aircraft displayed will be safely separated and there will be no need for pilots to initiate any avoidance maneuvers.
- Evasive maneuvers (rapid change in pitch, roll, normal acceleration thrust or speed) should only be conducted after visual acquisition of the intruder and then only when necessary to achieve or assure safe separation.
- Minor adjustments to the vertical flight path that are consistent with an existing ATC clearance, instruction, or restriction are not considered evasive maneuvers.

(Continued Next Page)

## **SECTION 4** **NORMAL PROCEDURES** (Continued)

### **ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) FUNCTION**

When any of the aural EGPWS messages are in progress, all aural TAS alert messages are inhibited.

### **SYSTEM SELF-TEST**

#### **TRAFFIC ADVISORY SYSTEM (TAS) FUNCTION**

Proper operation of the TAS system can be verified as follows:

1. Select the TRFC display mode on the KMD 550 MFD.
2. Select 5 nm range.
3. Select TST using the MFD control.
4. Note normal traffic display sequence (Normal Traffic display defined in the Pilot's Guide).
5. The aural announcement "TAS SYSTEM TEST OK" is enunciated over the cockpit speaker.

#### **NOTE**

Use of the TAS self-test function in flight will inhibit normal TAS operation for up to twelve seconds.

### **ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) FUNCTION**

Proper operation of the Enhanced Ground Proximity Warning System can be verified when the aircraft is on the ground as follows:

1. Select the TERR display mode on the MFD.
2. Select TST via the MFD control.
3. The amber TERR N/A light comes on.
4. The aural announcement "EGPWS SYSTEM TEST OK" is enunciated over the cockpit speaker.
5. A terrain self-test pattern appears on the MFD.
6. The terrain self-test pattern disappears after several sweeps of the terrain display.
7. The amber TERR N/A light goes out.

(Continued Next Page)

**SECTION 4**  
**NORMAL PROCEDURES** (Continued)

**RESPONSE TO GROUND PROXIMITY WARNINGS/  
ALERTS**

Respond to Ground Proximity warnings as follows:

When an aural "PULL UP" warning occurs, the following procedure should be followed:

1. Level the wings and simultaneously apply maximum power.
2. Smoothly pitch up at a rate of 2 to 3 degrees per second towards an initial target pitch attitude of 15 degrees nose up.
3. Adjust pitch attitude to ensure terrain clearance, while respecting the stall warning. If flaps are extended, retract flaps to the UP position.
4. Continue climb at best angle of climb speed ( $V_X$ ) until terrain clearance is assured.

**NOTE**

- Only vertical maneuvers are recommended unless operating in VMC or the pilot determines, using all available information and instruments, that a turn, in addition to the vertical escape maneuver, is the safest course of action.
- Pilots are authorized to deviate from their current air traffic control clearance to the extent necessary to comply with an EGPWS warning.

When an aural alert other than "PULL UP" occurs, initiate corrective action to remove the cause of the alert. The following aural alert can occur:

Mode 1: "SINK RATE"

Mode 2: "DON'T SINK"

**NOTE**

During operations at certain locations, warning thresholds may be exceeded due to specific terrain or operating procedures. During day VFR, these expected warnings may be considered as cautionary and the approach continued.

(Continued Next Page)



## **SECTION 4** **NORMAL PROCEDURES** (Continued)

### **ADVISORY CALLOUTS**

The following advisory callouts are provided in this installation:

"FIVE HUNDRED" - Approach height callout based on present airplane position determined by GPS and compared to the on-board terrain database, occurs at 500 feet AGL.

### **RESPONSE TO TERRAIN/OBSTACLE AWARENESS ALERTS**

#### **CAUTION ALERT**

When an aural "CAUTION TERRAIN" or a "CAUTION OBSTACLE" alert occurs, take positive corrective action until the alert ceases. Stop descending, or initiate a climb and/or turn as necessary, based on analysis of all available instruments and information.

If the EGPWS issues a caution when the terrain display page is not selected, a pop up message will appear on the active display page of the MFD. The pilot must acknowledge the pop up message by pressing the POWER key next to the "OK" soft label to clear it.

#### **WARNING ALERT**

When an aural "TERRAIN TERRAIN, PULL UP" or "OBSTACLE OBSTACLE, PULL UP" warning occurs, the following procedure should be followed:

1. Level the wings and simultaneously apply maximum power.
2. Smoothly pitch up at a rate of 2 to 3 degrees per second towards an initial target pitch attitude of 15 degrees nose up.
3. Adjust pitch attitude to ensure terrain clearance, while respecting the stall warning. If flaps are extended, retract flaps to the UP position.
4. Continue climb at best angle of climb speed ( $V_X$ ) until terrain clearance is assured.

If the EGPWS issues a warning when the terrain display page is not selected, a pop up message will appear on the active display page of the MFD. The pilot must acknowledge the pop up message by pressing the POWER key next to the OK soft label to clear it.

(Continued Next Page)

## **SECTION 4** **NORMAL PROCEDURES** (Continued)

### **USE OF TERRAIN AWARENESS DISPLAY**

The Terrain Awareness display is selected by pressing the TERR function key on the KMD 550 MFD. The display is intended to enhance situational awareness with respect to separation from terrain or obstacles.

#### **WARNING**

**THE TERRAIN AWARENESS DISPLAY IS NOT  
INTENDED TO BE USED FOR NAVIGATION  
PURPOSES.**

Color and intensity variations are used to show terrain/obstacle heights relative to the airplane. Refer to the KTA 870/KMH 880 Pilot's Guide.

The 500/250 foot green to yellow boundary is below the airplane in order to account for altimetry and/or terrain/obstacle height errors. For situational awareness with respect to terrain/obstacles shown on the display, the pilot should assume that the yellow or red terrain or obstacle is at or above the airplane, green terrain is below the airplane. These boundary levels are biased upwards by half of the aircraft's descent rate greater than 1000 feet per minute.

If there is no terrain data in the database for a particular area, that portion of the display is indicated by a magenta dot pattern. Terrain is not shown (black) if it is below the lowest band and/or is within 400 feet of the runway elevation nearest the aircraft.

Two elevation numbers indicate the highest and lowest terrain currently displayed on the screen. The elevation numbers indicate terrain in hundreds of feet above sea level ("125" is 12,500 feet MSL) and are color matched to the display. In the event that there is no appreciable difference between the highest and lowest elevations (flat terrain or over water), only the highest numeric value is displayed.

(Continued Next Page)

## **SECTION 4** **NORMAL PROCEDURES** (Continued)

### **USE OF TERRAIN AWARENESS DISPLAY** (Continued)

Geometric altitude, which is displayed on the upper left corner of the terrain display, is an additional feature incorporated into the EGPWS. Based on GPS altitude, geometric altitude is a computed pseudo-barometric altitude designed to reduce or eliminate errors potentially induced in corrected barometric altitude by temperature extremes, non-standard pressure altitude conditions, and wrong altimeter settings. This ensures an optimal EGPWS terrain display and alerting capability. Geometric altitude also allows continuous EGPWS operations in QFE environments without custom inputs or special operational procedures.

Geometric altitude requires a GPS altitude input with its associated Vertical Figure Of Merit (VFOM) and RAIM failure indication, standard (uncorrected) altitude, and aircraft position (latitude and longitude). Additionally, corrected barometric altitude, GPS mode, and the number of satellites tracked are used, if available.

The geometric altitude is computed by blending a calculated non-standard altitude, runway calibrated altitude (determined during takeoff), GPS calibrated altitude, and barometric altitude (if available). Estimates of the VFOM for each of these are determined and applied in order to determine its weight in computing the final altitude. The blending algorithm gives the most weight to altitudes with a higher estimated accuracy, reducing the effect of less accurate altitudes. Each component altitude is also checked for reasonableness using a value computed from GPS altitude and its VFOM. Altitudes that are invalid, not available, or fall outside the reasonableness window are not included in the final geometric altitude.

The geometric altitude algorithm is designed to allow continued operation when one or more of the altitude components are not available. If all component altitudes are invalid or unreasonable, the GPS altitude is used directly. If GPS altitude fails or is not present, then the EGPWS reverts to using corrected barometric altitude alone.

## **SECTION 4** **NORMAL PROCEDURES** (Continued)

### **USE OF TERRAIN AWARENESS DISPLAY** (Continued)

The geometric altitude function is fully automatic and requires no pilot action other than properly setting the corrected barometric altitude on the altimeter.

#### **NOTE**

An indication of MSL altitude appears in the left corner of the MFD. This altitude is the reference altitude for the display and the terrain awareness algorithm. This reference altitude is based on internally calculated geometric altitude and not corrected barometric altitude. It represents the aircraft's calculated true height above sea level (MSL) and serves as the reference altitude for color coding of the terrain display and the altitude input to the look-ahead algorithm. Because it is primarily comprised of GPS altitude, this reference altitude will often differ from cockpit displayed corrected barometric altitude. This altitude is not to be used for navigation. It is presented to provide the crew with additional situational awareness of true height above sea level, upon which terrain alerting and display is based.

### **SYSTEM CONSTRAINTS**

1. If there is no terrain data in the database for a particular area, then terrain/obstacle awareness alerting is not available for that area. The affected display area is color with a magenta dot pattern.
2. If the terrain/obstacle awareness features of the KMH 880 have been inhibited (e.g. selected OFF due to excessive navigation system position error), the EGPWS will not give aural alerts. A WARNINGS INHIBITED message will be annunciated on the MFD.

## **SECTION 5** **PERFORMANCE**

There is no change to the airplane performance when the KMD 880 Multi-Hazard Awareness System is installed.

**SUPPLEMENT  
ORIGINAL ISSUE**

**MODEL T206H**

**PILOT'S OPERATING HANDBOOK  
AND FAA APPROVED  
AIRPLANE FLIGHT MANUAL**

**ORIGINAL ISSUE**

**22 DECEMBER 2004**

**PART NUMBER:**

**T206HPHUS-S28-00**

**INSERT THE FOLLOWING PAGES INTO  
THE SUPPLEMENT SECTION OF THE PILOT'S  
OPERATING HANDBOOK**



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**Pilot's Operating Handbook  
and  
FAA Approved Airplane Flight Manual  
CESSNA MODEL T206H  
AIRPLANES T20608001 AND ON  
SUPPLEMENT 28  
BENDIX/KING KT 73 MODE S TRANSPONDER**

SERIAL NO. _____
REGISTRATION NO. _____

This supplement must be inserted into Section 9 of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when a Bendix/King KT 73 Mode S Transponder is installed.

**APPROVED BY**

FAA APPROVED UNDER 14 CFR PART 21 SUBPART J  
Cessna Aircraft Co.  
Continental Operations Approval Form 2101-210104-02

*Richard D. [Signature]*

**DATE OF APPROVAL**

12-22-04



**Member of GAMA**

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T206H-PHUS-S28-00

**22 DECEMBER 2004**

U.S. S28-1

## SUPPLEMENT 28

### BENDIX/KING KT 73 MODE S TRANSPONDER

Use the Log of Effective Pages to determine the current status of this supplement. Pages affected by the current revision are indicated by an asterisk (\*) preceding the page number.

Supplement Status	Date
Original Issue	22 December 2004

#### LOG OF EFFECTIVITY PAGES

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S28-1 thru S28-11/S28-12	Original	0

## SERVICE BULLETIN CONFIGURATION LIST

The following is a list of Service Bulletins that are applicable to the operation of the airplane, and have been incorporated into this supplement. This list contains only those Service Bulletins that are currently active.

<u>Number</u>	<u>Title</u>	<u>Airplane Serial Effectivity</u>	<u>Revision Incorporated</u>	<u>Incorporated in Airplane</u>
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## **SUPPLEMENT**

### **BENDIX/KING KT 73 MODE S TRANSPONDER**

#### **SECTION 1 GENERAL**

The Bendix/King Mode S Transponder (KT 73), shown in Figure S28-1, is the airborne component of the Air Traffic Control Radar Beacon System (ATCRBS). The transponder enables the ATC ground controller to accurately identify the airplane on the radarscope.

The KT 73 Transponder system consists of a transponder unit mounted in the instrument panel, an analog pressure altitude encoder, and an externally-mounted L-Band antenna. The KT 73 Transponder system installation uses the same antenna, altitude encoder and mounting hardware as the Bendix/King KT 76C Mode A/C Transponder. The KT 73 Transponder operates in Mode A ("SQUAWK"), Mode C (altitude reporting), and Mode S (elementary surveillance/selective interrogation). The transponder receives interrogating signals on 1030 MHz and transmits coded reply signals on 1090 MHz. In Mode C operation, the KT 73 provides altitude information automatically to ATC ground stations. The transponder reports altitude in 100-foot increments between -1000 and +20,000 feet MSL. Mode S allows the ground station to individually interrogate the airplane by the unique 24-bit address assigned to the airplane.

The KT 73 Transponder features an all solid-state transmitter with microprocessor controls. Rotary control knobs are used to control the operating mode and to set the squawk code. The gas discharge display shows all functions including the flight level (pressure altitude), airplane identification (SQUAWK), and surveillance interrogator (SI) code (airplane call sign). A photocell dims all display segments automatically.

(Continued Next Page)

**GENERAL** (Continued)

**BENDIX/KING KT 73 MODE S TRANSPONDER**

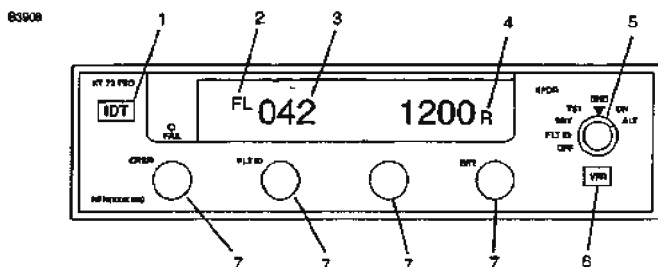


Figure S28-1

- 1. IDENT BUTTON (IDT)** - When pushed, a pulse is transmitted for identification of the airplane on ATC radar display. IDT will be displayed steadily and R will flash for approximately 18 seconds when the Function Selector Knob is set to GND, ON, or ALT. Button brightness is controlled by the avionics light dimming rheostat.
- 2. MODE ANNUNCIATOR** - Displays "FL" on the transponder when "ALT", "SBY", or "GND" is selected on the Mode Selector Switch. Displays "IDT" when the IDT button is pushed.
- 3. ALTITUDE DISPLAY (FL)** - The Flight Level altitude is shown on the left side of the display only when the Mode Selector Switch is set to Altitude mode (ALT). In ALT mode, the KT 73 shows the pressure altitude on the left side of the display area. The altitude is shown in hundreds of feet. Dashes will appear in the altitude display instead of numbers if an invalid code is received from the encoder.

(Continued Next Page)

**GENERAL** (Continued)

4. **REPLY INDICATOR (R)** - The R will illuminate on the display panel when the transponder is replying to a valid interrogation during the following conditions:
  1. Twice per second with valid interrogation on the ground in Mode S (GND).
  2. Once per second with valid interrogation from ATCRBS in airborne Mode S (ON or ALT).
  3. During the 18 seconds after pushing the ident button (IDT).
5. **MODE SELECT SWITCH** - Controls application of power and selects transponder operating mode as follows:

**OFF** - De-energizes the KT 73 Transponder.

**FLT ID** - The KT 73 shows the airplane's flight identification code and allows it to be changed. The Flight ID should be the airplane identification assigned in the flight plan. When no flight plan is available, the registration marking of the airplane should be used. FLT ID is modified by turning the CRSR Knob to position the cursor under the character to be changed then turning the FLT ID Knob to select the desired character. When the CRSR and FLT ID Knobs have not been turned for 5 seconds or the Mode Select Switch has been turned to the SBY position, the FLT ID will be saved. The unit does not transmit in SBY mode.

**SBY** - (Standby) Sets the KT 73 to standby power. While in the standby mode the transponder identification code may be selected. SBY is shown on the left side of the display. The airplane identification code is shown on the right side of the display. SBY should be used only when the airplane is parked.

(Continued Next Page)

**GENERAL** (Continued)

- TST - Self-test function. The transmitter is disabled. All display segments will come on for a minimum of 4 seconds. If no faults have been detected "TEST OK" will be displayed. Refer to the KT 73 Transponder section of the Bendix/King Silver Crown Plus Pilot's Guide.
  
  - GND - Sets the transponder to inhibit ATCRBS, ATCRBS/Mode S All Call and Mode S-only replies. The KT 73 Transponder will continue to generate Mode S squitter transmissions and reply to selective interrogations. The KT 73 Transponder should be set to the GND position when the airplane is in operation on the ground before or after flight.
  
  - ON - Sets transponder to transmit Mode A/S (airplane identification) reply pulses with altitude information suppressed. Transponder identification code is annunciated on the right side of the display.
  
  - ALT - Sets transponder to transmit Mode A (squawk), Mode C (altitude squawk) and Mode S (airplane identification) reply pulses after receiving the interrogation signal. FL is shown on the left side of the display with the pressure altitude in hundreds of feet. The airplane identification code is shown on the right side of the display.
6. VFR CODE BUTTON (VFR) - Pushing the "VFR" Button will replace the current Mode A reply code with a pre-programmed Mode A reply code (usually 1200).
  
  7. CODE SELECTOR KNOBS - Selects assigned Mode A (squawk) code. Each knob sets a digit of the 4-character code. The new code will be transmitted after a 5 second delay.

Refer to the KT 73 Transponder section of the Bendix/King Silver Crown Plus Pilot's Guide for additional information.

## **SECTION 2 LIMITATIONS**

The Bendix/King KT 73 Mode S Transponder is not approved for operation above 20,000 feet MSL.

## **SECTION 3 EMERGENCY PROCEDURES**

### **TO TRANSMIT AN EMERGENCY SIGNAL**

1. Mode Selector Switch - ALT.
2. Transponder Code Selector Knobs - SELECT 7700 operating code.

### **TO TRANSMIT A SIGNAL REPRESENTING LOSS OF ALL COMMUNICATIONS (WHEN IN A CONTROLLED ENVIRONMENT)**

1. Mode Selector Switch - ALT.
2. Transponder Code Selector Knobs - SELECT 7600 operating code.

### **TO PROGRAM FLIGHT IDENTIFICATION CODE**

1. Mode Selector Switch - ALT
2. Transponder Code Selector Knobs - SET assigned SQUAWK code.

## **SECTION 4 NORMAL PROCEDURES**

### **DURING TAXI**

1. Mode Selector Switch - GND.

(Continued Next Page)

## **NORMAL PROCEDURES** (Continued)

### **TO TRANSMIT MODE A/S (AIRPLANE IDENTIFICATION) CODES IN FLIGHT**

1. Transponder Code Selector Knobs - SET assigned code.
2. Mode Selector Switch - ON.

#### **NOTE**

- During normal operation with Mode Selector Switch in ON position, reply indicator flashes, indicating transponder replies to interrogations.
  - Mode A reply codes are transmitted in ALT also; however, Mode C codes are suppressed when the Mode Selector Switch is positioned to ON.
3. IDT Button - PUSH when instructed by ground controller to "SQUAWK IDENT" (R will come on steadily indicating IDENT operation).

### **TO TRANSMIT MODE A/C/S (ALTITUDE REPORTING) CODES IN FLIGHT**

1. Transponder Code Selector Knobs - SELECT assigned code.
2. Mode Selector Switch - ALT.

#### **NOTE**

- When directed by ground controller to "STOP ALTITUDE SQUAWK", turn Mode Selector Switch to ON for Mode A/S operation only.
- Altitude transmitted by the transponder and displayed on the KT 73 panel is pressure altitude (referenced to 29.92 inches Hg (1013 hPa)). The conversion to indicated altitude is done in the ATC computer.

(Continued Next Page)

## **NORMAL PROCEDURES** (Continued)

### **TO SELF-TEST TRANSPONDER OPERATION**

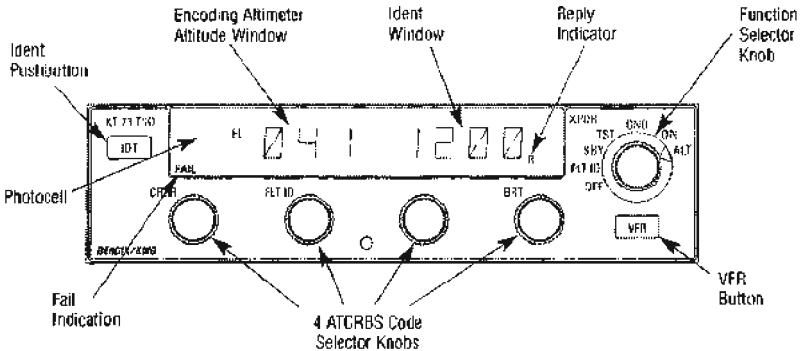
1. Mode Selector Switch - TST.
2. Check all displays come on.
3. TEST OK displayed. If not refer to the KT 73 Transponder section of the Bendix/King Silver Crown Plus Pilot's Guide.
4. Mode Selector Switch - SELECT desired function.

## **SECTION 5 PERFORMANCE**

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

## KT 73 Mode S, Datalink Transponder

### Operating the KT 73



#### IDENT Button

Marked IDT, the KT 73's Ident button is pressed when ATC requests an "Ident" or "Squawk Ident" from your aircraft. When the Ident button is pressed while in the GND, ON or ALT modes, "IDT" will be illuminated on the display for approximately 18 seconds. An optional Remote Ident switch may also be installed to perform the same function.

#### ID CODE

The ATCRBS Transponder Identification code (squawk code) for the aircraft is displayed in the Ident Window on the right side of the display. Each of the four Transponder Code Selector Knobs selects a separate digit of the identification code.

#### REPLY INDICATOR

When the KT 73 is replying to a valid ground Mode S interrogation, the reply nomenclature "R" will be illuminated twice per second. When the KT 73 is replying to a valid ATCRBS or airborne Mode S interrogation, the reply nomenclature "R" will be illuminated once per second.

#### ALTITUDE DISPLAY

When the ALT mode is selected, the KT 73 displays the current Flight Level, marked by the letters "FL" and a number in hundreds of feet. This is shown on the left side of the display. For example, if "FL 071" is displayed, this corresponds to a reported pressure altitude of 7,100 feet. Note that the displayed Flight Level, or pressure altitude, may not agree with the aircraft's baro-corrected altitude under non-standard conditions. The Flight Level, or pressure altitude, reported by the KT 73 will be corrected as required by the ATC facility.

A fault in the altitude interface or an invalid altitude input to the KT 73 will cause the display to show a series of dashes when the KT 73 is in the ALT mode.

#### VFR

Momentarily pressing the VFR Pushbutton recalls the preprogrammed VFR code, superseding whatever code was previously entered. If the VFR Pushbutton is pressed inadvertently, the previous code may be retrieved by



## Silver Crown Plus Pilot's Guide

pressing the VFR button and holding it for two seconds.

If a preset VFR code other than the factory-set 1200 is desired, a new code may be programmed as follows:

1. Place the unit in Standby (SBY)
2. Select the desired VFR code
3. While holding the IDT (Ident) button in, momentarily press the VFR button.

### FUNCTION SELECTOR KNOB

The Function Selector Knob on the right side of the KT 73 enables you to choose from the following operating modes:

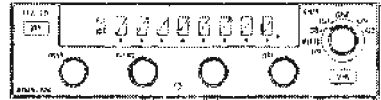
**OFF** - The unit is not receiving power. When the unit is turned to another mode, it will reply or squitter within two seconds, according to the selected mode.



**FLT ID (FLIGHT ID)** - The Flight ID should be the aircraft identification employed in the flight plan. When no flight plan is available, the registration marking of the aircraft should be used. When the FLT ID mode is selected, the KT 73 is inhibited from replying to any interrogation, "FLT ID" is annunciated on the display and the flight ID is displayed. The Flight ID is modified by rotating the CRSR knob to position the cursor (▲) under the character to be changed then rotating the FLT ID knob to select the desired character. Once the CRSR and FLT ID knobs have been idle for 5 seconds or the mode select knob has been turned to the SBY position the flight ID will be saved.



**SBY (STANDBY)** - In Standby, the unit is energized but is inhibited from replying to any interrogation. "SBY" is shown on the left side of the display and the ID code is shown on the right.



**TST (TEST)** - Replies are disabled and all display segments are illuminated for at least four seconds. A series of internal tests is performed to check the KT 73's integrity, verifying all aircraft specific configuration data and make hardware and squitter checks. If no faults are detected, "TEST OK" is displayed and an audio message "TEST OK" is annunciated, if the audio function is installed.

The audio volume is set during installation. Contact your avionics installer to adjust the volume level to your personal preference.

Should a fault be detected, "SBY" will be displayed on the left and the display on the right will cycle through all the detected faults. If the faults are associated with external data, an audio message "CHECK FAULT CODES" will be annunciated. Faults internal to the KT 73 will annunciate an audio message "TRANSPONDER TEST FAIL". Internal faults will also cause "FAIL" to be annunciated in the lower left of the display in any mode of operation.

The fault codes are as follows:

- F1YY\* - Squitter (Internal)
- F2YY\* - Internal or External EEPROM (Internal)
- F3YY\* - Hardware (Internal)
- F401 - Mode S address/Max Airspeed (Internal)
- F5YY\* - Gilham or Executive (External)
- F6YY\* - Interface (External)

\* YY denotes the specific fault.

Except for the acquisition data fault (code 101), the KT 73 will not inhibit replies when an internal fault is identified.



**GND (GROUND)** - The KT 73 will inhibit ATRCBS (Air Traffic Control Radar Beacon System), ATRCBS/Mode S All Call and Mode S-only All Call replies. However, the unit will continue to generate Mode S squitter transmissions and reply to discretely addressed Mode S interrogations. The ID code is shown on the right side of the display and the letters "GND" are shown on the left side.

**Note:** An optional remote "air/ground" switch may be installed. This feature eliminates the need to manually place the KT 73 in the GND mode. In addition, when the aircraft is airborne, the KT 73 will function as though the Function Selector Knob is in the ALT position when it is actually in the GND position.



**ON** - The KT 73 is able to reply to all valid Mode A, C and S interrogations. However, the altitude information will not be transmitted. In the ON mode, the altitude window is left blank and the ID code is shown on the right side of the display.



**ALT (ALTITUDE)** - The KT 73 replies to all valid Mode A, C and S interrogations. The ID code is displayed in the

right window and altitude information (in hundreds of feet) is shown on the left. The letters "FL" will be illuminated, indicating Flight Level. If altitude information is unavailable or invalid, the left portion of the display will be dashed.

#### DISPLAY BRIGHTNESS ADJUSTMENT

The KT 73's display brightness is controlled by an ambient light sensor. In addition, it has a manual adjustment to allow for matching to the brightness of other lighted displays that may be in the cockpit. The display is adjusted in the test (TST) mode.

To manually adjust the display brightness, perform the following operations:

1. Turn the Function Selector Knob to "TST".
2. Turn the BRT knob clockwise to increase the display brightness, or counterclockwise to decrease the display brightness.

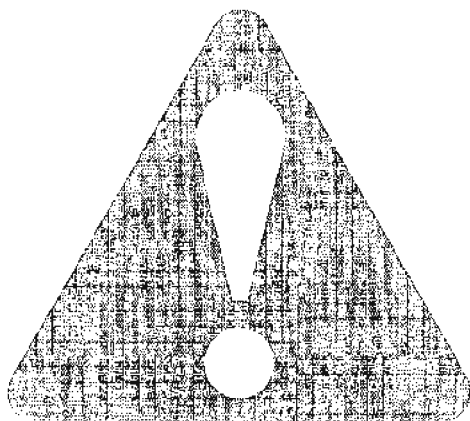
The eight carets below the alphanumeric display characters indicate the brightness setting (relative to the photocell reading). Maximum brightness is indicated by all eight carets being illuminated. Minimum brightness is indicated by no carets being illuminated. The factory default setting is represented by four carets being illuminated. Pressing the IDT button will return the brightness to the default factory value.

3. Turn the Function Selector Knob from TST to store the display brightness settings

**NOTE:** If power is removed from the KT 73 while still in the test mode, the brightness setting will be lost and the unit will revert to the last known setting.



# Pilot Safety and Warning Supplements



The information contained in this document is not intended to supersede the Owner's Manual or Pilot's Operating Handbook applicable to a specific airplane. If there is a conflict between this Pilot Safety and Warning Supplement and either the Owner's Manual or Pilot's Operating Handbook to a specific airplane, the Owner's Manual or Pilot's Operating Handbook shall take precedence. This publication replaces the original issue (D5099-13) in its entirety.

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## INTRODUCTION

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Pilots should know the information contained in the airplane's operating handbook, placards and checklists, and be familiar with service/maintenance publications, including service letters and bulletins, to ensure maximum safe utilization of the airplane. When the airplane was manufactured, it was equipped with a Pilot's Operating Handbook, Flight Manual, and/or Owner's Manual. If a handbook or manual is missing, a replacement should be obtained by contacting a Cessna Authorized Service Station.

In an effort to re-emphasize subjects that are generally known to most pilots; safety and operational information has been provided in the following Pilot Safety and Warning Supplements. As outlined in the table of contents, the Supplements are arranged numerically to make it easier to locate a particular Supplement. Supplement coverage is classified in three (3) categories: Flight Considerations, System Operational Considerations, and Maintenance Considerations. Most of the information relates to all Cessna airplanes, although a few Supplements are directed at operation of specific configurations such as multi-engine airplanes, pressurized airplanes, or airplanes certified for flight into known icing conditions.

Day-to-day safety practices play a key role in achieving maximum utilization of any piece of equipment.

## WARNING

**IT IS THE RESPONSIBILITY OF THE PILOT TO ENSURE THAT ALL ASPECTS OF PREFLIGHT PREPARATION ARE CONSIDERED BEFORE A FLIGHT IS INITIATED. ITEMS WHICH MUST BE CONSIDERED INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO, THE FOLLOWING:**

- **PILOT PHYSICAL CONDITION AND PROFICIENCY**
- **AIRPLANE AIRWORTHINESS**
- **AIRPLANE EQUIPMENT APPROPRIATE FOR THE FLIGHT**
- **AIRPLANE LOADING AND WEIGHT AND BALANCE**
- **ROUTE OF THE FLIGHT**
- **WEATHER DURING THE FLIGHT**
- **FUEL QUANTITY REQUIRED FOR THE FLIGHT, INCLUDING ADEQUATE RESERVES**
- **AIR TRAFFIC CONTROL AND ENROUTE NAVIGATION FACILITIES**
- **FACILITIES AT AIRPORTS OF INTENDED USE**

(Continued Next Page)

## **WARNING** (Continued)

- **ADEQUACY OF AIRPORT (RUNWAY LENGTH, SLOPE, CONDITION, ETC.)**
- **LOCAL NOTICES, AND PUBLISHED NOTAMS**

**FAILURE TO CONSIDER THESE ITEMS COULD RESULT IN AN ACCIDENT CAUSING EXTENSIVE PROPERTY DAMAGE AND SERIOUS OR EVEN FATAL INJURIES TO THE PILOT, PASSENGERS, AND OTHER PEOPLE ON THE GROUND.**

The following Pilot Safety and Warning Supplements discuss in detail many of the subjects which must be considered by a pilot before embarking on any flight. Knowledge of this information is considered essential for safe, efficient operation of an airplane.

Proper flight safety begins long before the takeoff. A pilot's attitude toward safety and safe operation determines the thoroughness of the preflight preparation, including the assessment of the weather and airplane conditions and limitations. The pilot's physical and mental condition and proficiency are also major contributing factors. The use of current navigation charts, the Aeronautical Information Manual, NOTAMs, airport data, weather information, Advisory Circulars and training information, etc., is important. Individuals often develop their own personal methods for performing certain flight operations; however, it is required that these do not conflict with the limitations or recommended operating procedures for a specific airplane.

The pilot should know the Emergency Procedures for the airplane, since there may not be time to review the checklist in an emergency situation. It is essential that the pilot review the entire operating handbook to retain familiarity. He or she should maintain a working knowledge of the limitations of his or her airplane. When the pilot deliberately or inadvertently operates the airplane outside the limitations, he or she is violating Federal Aviation Regulations and may be subject to disciplinary actions.

Cessna does not support modifications to Cessna airplanes, whether by Supplemental Type Certificate or otherwise, unless these certificates are approved by Cessna. Such modifications, although approved by the FAA, may void any and all Cessna warranties on the airplane since Cessna may not know the full effects on the overall airplane. Cessna does not and has not tested and approved all such modifications by other companies. Maintenance and operating procedures and performance data provided by Cessna may no longer be accurate for the modified airplane.

Airplanes require maintenance on a regular basis. As a result, it is essential that the airplane be regularly inspected and repaired when parts are worn or damaged in order to maintain flight safety. Information for the proper maintenance of the airplane is found in the airplane Service/Maintenance Manual, Illustrated Parts Catalog, and in company-issued Service Information

Letters or Service Bulletins, etc. Pilots should assure themselves that all recommendations for product changes or modifications called for by Service Bulletins, etc., are accomplished and that the airplane receives repetitive and required inspections.

Much of the subject matter discussed in the following Supplements has been derived from various publications of the U.S. Government. Since these documents contain considerably more information and detail than is contained here, it is highly recommended that the pilot also read them in order to gain an even greater understanding of the subjects related to flight safety. These publications include the following:

**AERONAUTICAL INFORMATION MANUAL (AIM).** This Federal Aviation Administration (FAA) manual is designed to provide airmen with basic flight information and Air Traffic Control (ATC) procedures for use in the National Airspace System (NAS). It also contains items of interest to pilots concerning health and medical facts, factors affecting flight safety, a pilot/controller glossary of terms used in the Air Traffic Control System, and information on safety, accident and hazard reporting. This manual can be purchased at retail dealers, or on a subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

**NOTICES TO AIRMEN (Class II).** This is a publication containing current Notices to Airmen (NOTAMS) which are considered essential to the safety of flight as well as supplemental data affecting the other operational publications listed here. It also includes current Flight Data Center (FDC) NOTAMS, which are regulatory in nature, issued to establish restrictions to flight or amend charts or published Instrument Approach Procedures. This publication is issued every 14 days and is available by subscription from the Superintendent of Documents.

**AIRPORT FACILITY DIRECTORY, ALASKA and PACIFIC CHART SUPPLEMENTS.** These publications contain information on airports, communications, navigation aids, instrument landing systems, VOR receiver checks, preferred routes, FSS/Weather Service telephone numbers, Air Route Traffic Control Center (ARTCC) frequencies, and various other pertinent special notices essential to air navigation. These publications are available by subscription from the National Ocean Service (NOS), NOAA N/ACC3 Distribution Division, Riverdale, Maryland 20737, telephone 1-800-638-8972 FAX (301) 436-6829.

**FEDERAL AVIATION REGULATIONS (FARs).** The FAA publishes the FARs to make readily available to the aviation community the regulatory requirements placed upon them. These regulations are sold as individual parts by the Superintendent of Documents. The more frequently amended parts are sold by subscription service with subscribers receiving changes automatically as they are issued. Less active parts are sold on a single-sale basis. Changes to single-sale parts will be sold separately as issued. Information concerning

## INTRODUCTION

## PILOT SAFETY AND WARNING SUPPLEMENTS

these changes will be furnished by the FAA through its Status of Federal Aviation Regulations, AC 00-44II.

**ADVISORY CIRCULARS (ACs).** The FAA issues ACs to inform the aviation public of nonregulatory material of interest. Advisory Circulars are issued in a numbered subject system corresponding to the subject areas of the Federal Aviation Regulations. AC 00-2.11, Advisory Circular Checklist contains a listing of ACs covering a wide range of subjects and how to order them, many of which are distributed free-of-charge.

AC 00-2.11 is issued every four months and is available at no cost from: U.S. Department of Transportation, Distribution requirements Section, SVC 121.21, Washington, DC 20590. The checklist is also available via the internet at <http://www.faa.gov/abc/ac-chklist/actoc.htm>.



## PHYSIOLOGICAL

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### FATIGUE

Fatigue continues to be one of the most treacherous hazards to flight safety. It generally slows reaction times and causes errors due to inattention, and it may not be apparent to a pilot until serious errors are made. Fatigue is best described as either acute (short-term) or chronic (long-term). As a normal occurrence of everyday living, acute fatigue is the tiredness felt after long periods of physical and/or mental strain, including strenuous muscular effort, immobility, heavy mental workload, strong emotional pressure, monotony, and lack of sleep. In addition to these common causes, the pressures of business, financial worries, and unique family problems can be important contributing factors. Consequently, coordination and alertness, which are vital to safe pilot performance, can be reduced. Acute fatigue can be prevented by adequate rest and sleep, as well as regular exercise and proper nutrition.

Chronic fatigue occurs when there is insufficient time for full recovery between periods of acute fatigue. Performance continues to degrade and judgment becomes impaired so that unwarranted risks may be taken. Recovery from chronic fatigue requires a prolonged period of rest. If a pilot is markedly fatigued prior to a given flight, he or she should not fly. To prevent cumulative fatigue effects during long flights, pilots should conscientiously make efforts to remain mentally active by making frequent visual and radio navigation position checks, estimates of time of arrival at the next check point, etc.

### STRESS

Stress from the pressures of everyday living can impair pilot performance, often in very subtle ways. Difficulties can occupy thought processes enough to markedly decrease alertness. Distractions can also interfere with judgment to the point that unwarranted risks are taken, such as flying into deteriorating weather conditions to keep on schedule. Stress and fatigue can be an extremely hazardous combination.

It is virtually impossible to leave stress on the ground. Therefore, when more than usual difficulties are being experienced, a pilot should consider delaying flight until these difficulties are satisfactorily resolved.

### EMOTION

Certain emotionally upsetting events, including a serious argument, death of a family member, separation or divorce, loss of job, or financial catastrophe can seriously impair a pilot's ability to fly an airplane safely. The emotions of anger, depression, and anxiety from such events not only decrease alertness

# 1 PHYSIOLOGICAL

# PILOT SAFETY AND WARNING SUPPLEMENTS

but may also lead to taking unnecessary risks. Any pilot who experiences an emotionally upsetting event should not fly until satisfactorily recovered from the event.

## ILLNESS

A pilot should not fly with a known medical condition or a change of a known medical condition that would make the pilot unable to meet medical certificate standards. Even a minor illness suffered in day-to-day living can seriously degrade performance of many piloting skills vital to safe flight. An illness may produce a fever and other distracting symptoms that can impair judgment, memory, alertness, and the ability to make decisions. Even if the symptoms of an illness are under adequate control with a medication, the medication may adversely affect pilot performance, and invalidate his or her medical certificate.

The safest approach is not to fly while suffering from any illness. If there is doubt about a particular illness, the pilot should contact an Aviation Medical Examiner for advice.

## MEDICATION

Pilot performance can be seriously degraded by both prescribed and over-the-counter medications. Many medications, such as tranquilizers, sedatives, strong pain relievers, and cough suppressant preparations, have primary effects that may impair judgment, memory, alertness, coordination, vision, and ability to make decisions. Other medications, such as antihistamines, blood pressure drugs, muscle relaxants, and agents to control diarrhea and motion sickness, have side effects that may impair the body's critical functions. Any medications that depress the nervous system, such as a sedative, tranquilizer or antihistamine, can make a pilot more susceptible to hypoxia.

FARs prohibit pilots from flying while using any medication that affects their faculties in any way contrary to safety. The safest advice is to not fly while taking medications, unless approved to do so by an Aviation Medical Examiner. The condition for which the drug is required may itself be very hazardous to flying, even when the symptoms are suppressed by the drug. A combination of medications may cause adverse effects that do not result from a single medication.

## ALCOHOL

Do not fly while under the influence of alcohol. Flying and alcohol are definitely a lethal combination. FARs prohibit pilots from flying within 8 hours after consuming any alcoholic beverage or while under the influence of alcohol. A

pilot may still be under the influence 8 hours after drinking a moderate amount of alcohol. Therefore, an excellent practice is to allow at least 24 hours between "bottle and throttle," depending on the amount of alcoholic beverage consumed.

Extensive research has provided a number of facts about the hazards of alcohol consumption and flying. As little as one ounce of liquor, one bottle of beer, or four ounces of wine can impair flying skills, with the alcohol consumed in these drinks being detectable in the breath and blood for at least three hours. Alcohol also renders a pilot much more susceptible to disorientation and hypoxia. In addition, the after effects of alcohol increase the level of fatigue significantly.

There is simply no way of alleviating a hangover. Remember that the human body metabolizes alcohol at a fixed rate, and no amount of coffee or medications will alter this rate. Do not fly with a hangover, or a "masked hangover" (symptoms suppressed by aspirin or other medication). A pilot can be severely impaired for many hours by hangover.

## **DRINKING THE RIGHT FLUIDS**

One of the main sources of pilot and passenger complaints stems from the relatively lowered humidity during air travel encountered at altitude particularly on extended flights. Even though an individual may not be physically active, body water is continuously expired from the lungs and through the skin. This physiological phenomenon is called insensible perspiration or insensible loss of water.

The loss of water through the skin, lungs, and kidneys never ceases. Water loss is increased with exercise, fever, and in some disease conditions such as hyperthyroidism. Combatting the effects of insensible water loss during flight requires frequent water intake. Unless this is done, dehydration will occur and this causes interference with blood circulation, tissue metabolism, and excretion of the kidneys. Water is vital for the normal chemical reaction of human tissue. It is also necessary for the regulation of body temperature and as an excretory medium.

Beginning a flight in a rested, healthy condition is of prime importance. Proper water balance through frequent fluid intake relieves the adverse effects produced by insensible water loss in an atmosphere of lowered humidity. Typical dehydration conditions are: dryness of the tissues and resulting irritation of the eyes, nose, and throat as well as other conditions previously mentioned plus the associated fatigue relating to the state of acidosis (reduced alkalinity of the blood and the body tissues). A person reporting for a flight in a dehydrated state will more readily notice these symptoms until fluids are adequately replaced.

Consumption of coffee, tea, cola, and cocoa should be minimized since these drinks contain caffeine. In addition, tea contains a related drug, theophylline, while cocoa (and chocolate) contain theobromine, of the same drug group. These drugs, besides having a diuretic effect, have a marked stimulating effect and can cause an increase in pulse rate, elevation of blood pressure, stimulation of digestive fluid formation, and irritability of the gastrointestinal tract.

## HYPOXIA

Hypoxia, in simple terms, is a lack of sufficient oxygen to keep the brain and other body tissues functioning properly. Wide individual variation occurs with respect to susceptibility to and symptoms of hypoxia. In addition to progressively insufficient oxygen at higher altitudes, anything interfering with the blood's ability to carry oxygen can contribute to hypoxia (e.g., anemias, carbon monoxide, and certain drugs). Also, alcohol and various other drugs decrease the brain's tolerance to hypoxia. A human body has no built-in alarm system to let the pilot know when he is not getting enough oxygen. It is difficult to predict when or where hypoxia will occur during a given flight, or how it will manifest itself.

Although a deterioration in night vision occurs at a cabin pressure altitude as low as 5000 feet, other significant effects of altitude hypoxia usually do not occur in a normal healthy pilot below 12,000 feet. From 12,000 to 15,000 feet of altitude, judgment, memory, alertness, coordination, and ability to make decisions are impaired, and headache, drowsiness, dizziness, and either a sense of well-being (euphoria) or belligerence occurs. The effects appear following increasingly shorter periods of exposure to increasing altitude. In fact, a pilot's performance can seriously deteriorate within 15 minutes at 15,000 feet. At cabin pressures above 15,000 feet, the periphery of the visual field grays out to a point where only central vision remains (tunnel vision). A blue coloration (cyanosis) of the fingernails and lips develops and the ability to take corrective and protective action is lost in 20 to 30 minutes at 18,000 feet and 5 to 12 minutes at 20,000 feet, followed soon thereafter by unconsciousness.

The altitude at which significant effects of hypoxia occur can be lowered by a number of factors. Carbon monoxide inhaled in smoking or from exhaust fumes, lowered hemoglobin (anemia), and certain medications can reduce the oxygen-carrying capacity of the blood to the degree that the amount of oxygen provided to body tissues will already be equivalent to the oxygen provided to the tissues when exposed to a cabin pressure altitude of several thousand feet. Small amounts of alcohol and low doses of certain drugs, such as antihistamines, tranquilizers, sedatives, and analgesics can, through their depressant action, render the brain much more susceptible to hypoxia. Extreme heat and cold, fever, and anxiety increase the body's demand for oxygen, and hence, its susceptibility to hypoxia.

Current regulations require that pilots use supplemental oxygen after 30 minutes of exposure to cabin pressure altitudes between 12,500 and 14,000 feet and immediately upon exposure to cabin pressure altitudes above 14,000 feet. Every occupant of the airplane must be provided with supplemental oxygen at cabin pressure altitudes above 15,000 feet.

Hypoxia can be prevented by avoiding factors that reduce tolerance to altitude, by enriching the air with oxygen from an appropriate oxygen system, and by maintaining a comfortable, safe cabin pressure altitude. For optimum protection, pilots are encouraged to use supplemental oxygen above 10,000 feet during the day, and above 5000 feet at night.

#### NOTE

When using oxygen systems that do not supply "pressure breathing", 100% oxygen cannot maintain proper blood oxygen level above 25,000 feet altitude. Pilot's must be familiar with limitations of the airplane oxygen system.

Pilots are encouraged to attend physiological training and susceptibility testing in a high-altitude chamber to experience and make note of their own personal reactions to the effects of hypoxia. These chambers are located at the FAA Civil Aeromedical Institute and many governmental and military facilities. Knowing before hand what your own early symptoms of hypoxia are will allow a greater time margin for taking corrective action. The corrective action, should symptoms be noticed, is to use supplemental oxygen and/or decrease cabin altitude. These actions must not be delayed.

## SMOKING

Smokers are slightly resistant to the initial symptoms of hypoxia. Because of this, smokers risk the possibility of delayed detection of hypoxia. Pilots should avoid any detrimental factors, such as second hand smoke, which can cause such insensitivity. The small merit of hypoxic tolerance in smokers will do more harm than good by rendering them insensitive and unaware of the hypoxic symptoms.

Smoking in the cabin of the airplane exposes other passengers to high concentrations of noxious gas and residue. Furthermore, many of the systems of the airplane are contaminated and deteriorated by long-term exposure to smoking residue. Due to the large number of known dangers and hazards, as well as those which are still the subject of research, it is strongly recommended that smoking not take place in flight.

## WARNING

**SMOKING WHILE OXYGEN SYSTEMS ARE IN USE  
CREATES AN EXTREME FIRE HAZARD.**

## **HYPERVENTILATION**

Hyperventilation, or an abnormal increase in the volume of air breathed in and out of the lungs, can occur subconsciously when a stressful situation is encountered in flight. As hyperventilation expels excessive carbon dioxide from the body, a pilot can experience symptoms of light headedness, suffocation, drowsiness, tingling in the extremities, and coolness -- and react to them with even greater hyperventilation. Incapacitation can eventually result. Uncoordination, disorientation, painful muscle spasms, and finally, unconsciousness may ultimately occur.

The symptoms of hyperventilation will subside within a few minutes if the rate and depth of breathing are consciously brought back under control. The restoration of normal carbon dioxide levels in the body can be hastened by controlled breathing in and out of a paper bag held over the nose and mouth.

Early symptoms of hyperventilation and hypoxia are similar. Moreover, hyperventilation and hypoxia can occur at the same time. Therefore, if a pilot is using oxygen when symptoms are experienced, the oxygen system should be checked to assure that it has been functioning effectively before giving attention to rate and depth of breathing.

## **EAR BLOCK**

As an airplane climbs and the cabin pressure decreases, trapped air in the middle ear expands and escapes through the eustachian tube to the nasal passages, thus equalizing with the pressure in the cabin. During descent, cabin pressure increases and some air must return to the middle ear through the eustachian tube to maintain equal pressure. However, this process does not always occur without effort. In most cases it can be accomplished by swallowing, yawning, tensing the muscles in the throat or, if these do not work, by the combination of closing the mouth, pinching the nose closed, and attempting to blow gently through the nostrils (Valsalva maneuver).

Either an upper respiratory infection, such as a cold or sore throat, or a nasal allergic condition can produce enough congestion around the eustachian tube to make equalization difficult. Consequently, the difference in pressure between the middle ear and the airplane cabin can build up to a level that will hold the eustachian tube closed, making equalization difficult, if not impossible. This situation is commonly referred to as an "ear block." An ear block produces severe pain and loss of hearing that can last from several hours to several days. Rupture of the ear drum can occur in flight or after landing. Fluid can accumulate in the middle ear and become infected. If an ear block is experienced and does not clear shortly after landing, a physician should be consulted. Decongestant sprays or drops to reduce congestion usually do not provide adequate protection around the eustachian tubes. Oral decongestants have side effects that can significantly impair pilot performance. An ear block can be prevented by not flying with an upper respiratory infection or nasal allergic condition.

## **SINUS BLOCK**

During climb and descent, air pressure in the sinuses equalizes with the airplane cabin pressure through small openings that connect the sinuses to the nasal passages. Either an upper respiratory infection, such as a cold or sinusitis, or a nasal allergic condition can produce enough congestion around the openings to slow equalization, and as the difference in pressure between the sinus and cabin increases, eventually the openings plug. This "sinus block" occurs most frequently during descent.

A sinus block can occur in the frontal sinuses, located above each eyebrow, or in the maxillary sinuses, located in each upper cheek. It will usually produce excruciating pain over the sinus area. A maxillary sinus block can also make the upper teeth ache. Bloody mucus may discharge from nasal passages. A sinus block can be prevented by not flying with an upper respiratory infection or nasal allergic condition. If a sinus block does occur and does not clear shortly after landing, a physician should be consulted.

## **VISION IN FLIGHT**

Of all the pilot's senses, vision is the most critical to safe flight. The level of illumination is the major factor to adequate in-flight vision. Details on flight instruments or aeronautical charts become difficult to discern under dimly lit conditions. Likewise, the detection of other aircraft is much more difficult under such conditions.

In darkness, vision becomes more sensitive to light, a process called dark adaptation. Although exposure to total darkness for at least 30 minutes is required for complete dark adaptation, a pilot can achieve a moderate degree of dark adaptation within 20 minutes under dim red lighting. Since red light severely distorts colors, especially on aeronautical charts, and can cause serious difficulty in focusing the eyes on objects inside the cabin, its use is advisable only where optimum outside night vision is necessary. Even so, white flight station lighting must be available when needed for map and instrument reading, especially while under IFR conditions. Dark adaptation is impaired by exposure to cabin pressure altitudes above 5000 feet, carbon monoxide inhaled in smoking and from exhaust fumes, deficiency of vitamin A in the diet, and by prolonged exposure to bright sunlight. Since any degree of dark adaptation is lost within a few seconds of viewing a bright light, pilots should close one eye when using a light to preserve some degree of night vision. In addition, use of sunglasses during the day will help speed the process of dark adaptation during night flight.

## **SCUBA DIVING**

A pilot or passenger who flies shortly after prolonged scuba diving could be in serious danger. Anyone who intends to fly after scuba diving should allow the body sufficient time to rid itself of excess nitrogen absorbed during diving. If not, decompression sickness (commonly referred to as the "bends"), due to dissolved gas, can occur even at low altitude and create a serious in-flight emergency. The recommended waiting time before flight to cabin altitudes of 8000 feet or less is at least 12 hours after diving which has not required controlled ascent (non-decompression diving), and at least 24 hours after diving which has required a controlled ascent (decompression diving). The waiting time before flight to cabin pressure altitudes above 8000 feet should be at least 24 hours after any scuba diving.

## **AEROBATIC FLIGHT**

Pilots planning to engage in aerobatic maneuvers should be aware of the physiological stresses associated with accelerative forces during such maneuvers. Forces experienced with a rapid push-over maneuver will result in the blood and body organs being displaced toward the head. Depending on the forces involved and the individual tolerance, the pilot may experience discomfort, headache, "red-out", and even unconsciousness. Forces experienced with a rapid pull-up maneuver result in the blood and body organs being displaced toward the lower part of the body away from the head. Since the brain requires continuous blood circulation for an adequate oxygen supply, there is a physiological limit to the time the pilot can tolerate higher forces before losing consciousness. As the blood circulation to the brain decreases as a result of the forces involved, the pilot will experience "narrowing" of visual fields, "gray-out", "black-out", and unconsciousness.

Physiologically, humans progressively adapt to imposed strains and stresses, and with practice, any maneuver will have a decreasing effect. Tolerance to "G" forces is dependent on human physiology and the individual pilot. These factors include the skeletal anatomy, the cardiovascular architecture, the nervous system, blood make-up, the general physical state, and experience and recency of exposure. A pilot should consult an Aviation Medical Examiner prior to aerobatic training and be aware that poor physical condition can reduce tolerance to accelerative forces.



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## CHECKLISTS

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### CONSISTENT USE

Airplane checklists are available for those persons who do not wish to use the operating handbook on every flight. These checklists contain excerpts from the operating handbook written for that particular airplane and are designed to remind pilots of the minimum items to check for safe operation of the airplane, without providing details concerning the operation of any particular system. Checklists should be used by the pilot and not placed in the seat pocket and forgotten. Even pilots who consistently carry the checklists tend to memorize certain areas and intentionally overlook these procedural references. Consequently, in time, these individuals find that operating something as complex as an airplane on memory alone is practically impossible, and eventually, could find themselves in trouble because one or more important items are overlooked or completely forgotten. The consistent use of all checklists is required for the safe operation of an airplane.

#### NOTE

Abbreviated checklists can be used in place of the airplane operating manual. However, they should be used only after the pilot becomes familiar with the airplane operating manual, and thoroughly understands the required procedures for airplane operation.

### CONTRIBUTIONS TO SAFETY

Most large airplanes in the transport category are flown by consistent use of all checklists. Experience has shown that pilots who consistently use checklists on every flight maintain higher overall proficiency, and have better safety records. The pilot should not become preoccupied inside the cockpit (such as with a checklist) and fail to remain alert for situations outside the airplane.

### CHECKLIST ARRANGEMENT (ORGANIZATION OF ITEMS)

Abbreviated checklists are written in a concise form to provide pilots with a means of complying with established requirements for the safe operation of their airplane. The checklists are usually arranged by "Item" and "Condition" headings. The item to be checked is listed with the desired condition stated. Key words or switch and lever positions are usually emphasized by capitalization in the "Condition" column. The checklist may also contain supplemental information pertinent to the operation of the airplane, such as performance data, optional equipment operation, etc., that the pilot might routinely use.

## **EMERGENCY CHECKLISTS**

Emergency checklists are provided for emergency situations peculiar to a particular airplane design, operating or handling characteristic. Pilots should periodically review the airplane operating handbook to be completely familiar with information published by the manufacturer concerning the airplane. Emergency situations are never planned and may occur at the worst possible time. During most emergency conditions, there will not be sufficient time to refer to an emergency checklist; therefore, it is essential that the pilot commit to memory those emergency procedures that may be shown in **bold-face** type or outlined with a black border, within the emergency procedures section in operating handbooks or equivalent hand-held checklists. These items are essential for continued safe flight. After the emergency situation is under control, the pilot should complete the checklist in its entirety, in the proper sequence, and confirm that all items have been accomplished. It is essential that the pilot review and know published emergency checklists and any other emergency procedures. Familiarity with the airplane and its systems and a high degree of pilot proficiency are valuable assets if an emergency should arise.

## AIRPLANE LOADING

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### AIRPLANE CENTER-OF-GRAVITY RANGE

Pilots should never become complacent about the weight and balance limitations of an airplane, and the reasons for these limitations. Since weight and balance are vital to safe airplane operation, every pilot should have a thorough understanding of airplane loading, with its limitations, and the principles of airplane balance. Airplane balance is maintained by controlling the position of the center-of-gravity. Overloading, or misloading, may not result in obvious structural damage, but could do harm to hidden structure or produce a dangerous situation in the event of an emergency under those conditions. Overloading, or misloading may also produce hazardous airplane handling characteristics.

There are several different weights to be considered when dealing with airplane weight and balance. These are defined in another paragraph in this supplement. Airplanes are designed with predetermined structural limitations to meet certain performance and flight characteristics and standards. Their balance is determined by the relationship of the center-of-gravity (C.G.) to the center of lift. Normally, the C.G. of an airplane is located slightly forward of the center of lift. The pilot can safely use the airplane flight controls to maintain stabilized balance of the airplane as long as the C.G. is located within specified forward and aft limits. The allowable variation of the C.G. location is called the center-of-gravity range. The exact location of the allowable C.G. range is specified in the operating handbook for that particular airplane.

### LOCATING THE LOAD

It is the responsibility of the pilot to ensure that the airplane is loaded properly. Operation outside of prescribed weight and balance limitations could result in an accident and serious or fatal injury.

To determine the center-of-gravity (C.G.) of an airplane, a pilot must have an understanding of the three terms used in weight and balance calculations. These terms are weight, moment, and arm. The principles associated with these terms are applied to each occupant, piece of cargo or baggage, the airplane itself, and to all fuel to determine the overall C.G. of the airplane.

The weight of an object should be carefully determined or calculated. All weights must be measured in the same units as the aircraft empty weight. The arm is the distance that the weight of a particular item is located from the reference datum line or the imaginary vertical line from which all horizontal distances are measured for balance purposes (refer to examples in Figure 1).

### 3 AIRPLANE LOADING

### PILOT SAFETY AND WARNING SUPPLEMENTS

The word "moment," as used in airplane loading procedures, is the product of the weight of the object multiplied by the arm.

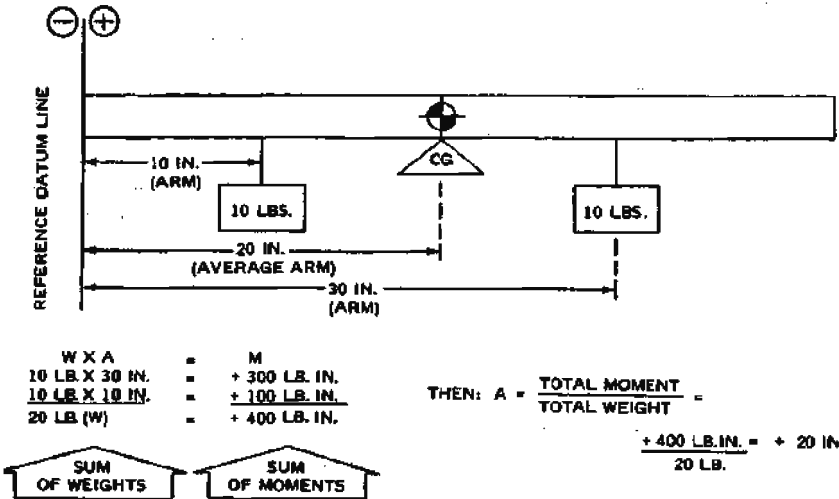


Figure 1. Computing the Center-of-Gravity

Pilots can remember and use the relationship of these terms most easily by arranging them in a mathematical triangle:



weight  $\times$  arm = moment  
 moment  $\div$  weight = arm  
 moment  $\div$  arm = weight

The relative position of any two terms indicates the mathematical process (multiplication or division) required to compute the third term.

A loading graph or loading tables, a center-of-gravity limits chart and/or a center-of-gravity moment envelope chart, as well as a sample loading problem are provided in most airplane operating handbooks. By following the narrative directions, the pilot can determine the correct airplane C.G. for any configuration of the airplane. If the position of the load is different from that shown on the loading graph or in the loading tables, additional moment

calculations, based on the actual weight and C.G. arm (fuselage station) of the item being loaded, must be performed.

## **LOAD SECURITY**

In addition to the security of passengers, it is the pilot's responsibility to determine that all cargo and/or baggage is secured before flight. When required, the airplane may be equipped with tie-down rings or fittings for the purpose of securing cargo or baggage in the baggage compartment or cabin area. The maximum allowable cargo loads to be carried are determined by cargo weight limitations, the type and number of tie-downs used, as well as by the airplane weight and C.G. limitations. Always carefully observe all precautions listed in the operating handbook concerning cargo tiedown.

Pilots should assist in ensuring seat security and proper restraint for all passengers. Pilots should also advise passengers not to put heavy or sharp items under occupied seats since these items may interfere with the seats' energy absorption characteristics in the event of a crash.

Optional equipment installed in the airplane can affect loading, and the airplane center-of-gravity. Under certain loading conditions in tricycle gear airplanes, it is possible to exceed the aft C.G. limit, which could cause the airplane to tip and allow the fuselage tailcone to strike the ground while loading the airplane. The force of a tail ground strike could damage internal structure, resulting in possible interference with elevator control system operation.

## **EFFECTS OF LOADING ON THE FLIGHT**

Weight and balance limits are placed on airplanes for three principal reasons: first, the effect of the weight on the primary and secondary structures; second, the effect on airplane performance; and third, the effect on flight controllability, particularly in stall and spin recovery.

A knowledge of load factors in flight maneuvers and gusts is important for understanding how an increase in maximum weight affects the characteristics of an airplane. The structure of an airplane subjected to a load factor of 3 Gs, must be capable of withstanding an added load of three hundred pounds for each hundred pound increase in weight. All Cessna airplanes are analyzed and tested for flight at the maximum authorized weight, and within the speeds posted for the type of flight to be performed. Flight at weights in excess of this amount may be possible, but loads for which the airplane was not designed may be imposed on all or some part of the structure.

An airplane loaded to the rear limit of its permissible center-of-gravity range will respond differently than when it is loaded near the forward limit. The stall

characteristics of an airplane change as the airplane load changes, and stall characteristics become progressively better as center-of-gravity moves forward. Distribution of weight can also have a significant effect on spin characteristics. Forward location of the C.G. will usually make it more difficult to obtain a spin. Conversely, extremely aft C.G. locations will tend to promote lengthened recoveries since a more complete stall can be achieved. Changes in airplane weight as well as its distribution can have an effect on spin characteristics since increases in weight will increase inertia. Higher weights may delay recoveries.

An airplane loaded beyond the forward C.G. limit will be nose heavy, and can be difficult to rotate for takeoff or flare for landing. Airplanes with tail wheels can be nosed over more easily.

## **LOAD AND LATERAL TRIM**

Some airplanes have a maximum limit for wing fuel lateral imbalance and/or a maximum wing locker load limitation. These limitations are required for one or both of two primary reasons. The first is to ensure that the airplane will maintain certain roll responses mandated by its certification. The other is to prevent overheating and interruption of lateral trim on certain types of autopilots caused by the excessive work required to maintain a wings level attitude while one wing is heavier than the other. Pilots should carefully observe such limitations and keep the fuel balance within the limits set forth in the respective operating handbook.

## **WEIGHT AND BALANCE TERMINOLOGY**

The following list is provided in order to familiarize pilots and owners with the terminology used in calculating the weight and balance of Cessna airplanes. (Some terminology listed herein is defined and used in Pilot's Operating Handbooks only.)

<b>Arm</b>	The horizontal distance from the reference datum to the center-of-gravity (C.G.) of an item.
<b>Basic Empty Weight</b>	The standard empty weight plus the weight of installed optional equipment.

C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center-of-gravity locations within which the airplane must be operated at a given weight.
Center-of-Gravity (C.G.)	The point at which an airplane or item of equipment would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane or item of equipment.
MAC	The mean aerodynamic chord of a wing is the chord of an imaginary airfoil which throughout the flight range will have the same force vectors as those of the wing.
Maximum Landing Weight	The maximum weight approved for the landing touchdown.
Maximum Ramp Weight	The maximum weight approved for ground maneuvers. It includes the weight of start, taxi and runup fuel.
Maximum Takeoff Weight	The maximum weight approved for the start of the takeoff roll.
Maximum Zero Fuel Weight	The maximum weight exclusive of usable fuel.
Moment	The product of the weight of an item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
Payload	The weight of occupants, cargo, and baggage.
Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Standard Empty Weight	The weight of a standard airplane, including unusable fuel, full operating fluids and full engine oil. In those manuals which refer to this weight as Licensed Empty Weight, the weight of engine oil is not included and must be added separately in weight and balance calculations.)
Station	A location along the airplane fuselage given in terms of the distance from the reference datum.



### **3**

## **AIRPLANE LOADING**

## **PILOT SAFETY AND WARNING SUPPLEMENTS**

<b>Tare</b>	The weight of chocks, blocks, stands, etc., used when weighing an airplane, and is included in the scale readings. Tare is deducted from the scale reading to obtain the actual (net) airplane weight.
<b>Unusable Fuel</b>	The quantity of fuel that cannot be safely used in flight.
<b>Usable Fuel</b>	The fuel available for flight planning.
<b>Useful Load</b>	The difference between ramp weight and the basic empty weight.

# SINGLE ENGINE FLIGHT INFORMATION (MULTI-ENGINE AIRPLANES)

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## INTRODUCTION

The following discussion is intended primarily for pilots of propeller-driven, light twin-engine airplanes, powered by reciprocating engines and certified under CAR Part 3 or FAR Part 23. This discussion is not intended to apply to specific models, but is intended, instead, to give general guidelines or recommendations for operations in the event of an engine failure during flight.

## SINGLE ENGINE TAKEOFF AND CLIMB

Each time a pilot considers a takeoff in a twin-engine airplane, knowledge is required of the Minimum Control Speed ( $V_{MC}$ ) for that particular airplane. Knowledge of this speed, is essential to ensure safe operation of the airplane in the event an engine power loss occurs during the most critical phases of flight, the takeoff and initial climb.

$V_{MC}$  is the minimum flight speed at which the airplane is directionally and laterally controllable as determined in accordance with Federal Aviation Regulations. Airplane certification conditions include: one engine becoming inoperative and windmilling; not more than a 5-degree bank toward the operative engine; takeoff power on the operative engine; landing gear retracted; flaps in the takeoff position; and the most critical C.G. (center of gravity). A multi-engine airplane must reach the minimum control speed before full control deflections can counteract the adverse rolling and/or yawing tendencies associated with one engine inoperative and full power operation on the other engine. The most critical time for an engine failure is during a two or three second period, late in the takeoff, while the airplane is accelerating to a safe speed.

Should an engine failure be experienced before liftoff speed is reached, the takeoff must be aborted. If an engine failure occurs immediately after liftoff, but before the landing gear is retracted, continue takeoff while retracting gear. Abort takeoff only if sufficient runway is available. This decision should be made before the takeoff is initiated.

The pilot of a twin-engine airplane must exercise good judgment and take prompt action in the decision whether or not to abort a takeoff attempt following an engine failure, since many factors will influence the decision.

## 4 SINGLE ENGINE FLIGHT (MULTI-ENGINE AIRPLANES)

## PILOT SAFETY AND WARNING SUPPLEMENTS

Some of these factors include: runway length, grade and surface condition (i.e., slippery, dry, etc.), field elevation, temperature, wind speed and direction, terrain or obstructions in the vicinity of the runway, airplane weight and single engine climb capability under the prevailing conditions, among others. The pilot should abort the takeoff, following an engine-out, even if the airplane has lifted off the runway, if runway conditions permit. However, under limited circumstances (i.e., short runway with obstructions) the pilot may have to continue the takeoff following a liftoff and an engine-out.

While it may be possible to continue the takeoff at light weights and with favorable atmospheric conditions following an engine failure just after liftoff, long distances are required to clear even small obstacles. Distances required to clear an obstacle are reduced under more favorable combinations of weight, headwind component, or obstacle height.

The pilot's decision to continue the takeoff after an engine failure should be based on consideration of either the single engine best angle-of-climb speed ( $V_{XSE}$ ) if an obstacle is ahead, or the single engine best rate-of-climb speed ( $V_{YSE}$ ) when no obstacles are present in the climb area. Once the single engine best angle-of-climb speed is reached, altitude becomes more important than airspeed until the obstacle is cleared. On the other hand, the single engine best rate-of-climb speed becomes more important when there are no obstacles ahead. Refer to the Owners Manual, Flight Manual or Pilot's Operating Handbook for the proper airspeeds and procedures to be used in the event of an engine failure during takeoff. Refer to the warning placard "To Continue Flight With An Inoperative Engine" in the airplane's operating handbook and/or on the instrument panel for additional information.

Should an engine failure occur at or above these prescribed airspeeds, the airplane, within the limitations of its single engine climb performance, should be maneuvered to a landing. After the airplane has been "cleaned up" following an engine failure (landing gear and wing flaps retracted and the propeller feathered on the inoperative engine), it may be accelerated to its single engine best rate-of-climb speed. If immediate obstructions so dictate, the single engine best angle-of-climb speed may be maintained until the obstacles are cleared. In no case should the speed be allowed to drop below single engine best angle-of-climb speed unless an immediate landing is planned, since airplane performance capabilities will deteriorate rapidly as the airspeed decreases. After clearing all immediate obstacles, the airplane should be accelerated slowly to its single engine best rate-of-climb speed and the climb continued to a safe altitude which will allow maneuvering for a return to the airport for landing.

To obtain single engine best climb performance with one engine inoperative, the airplane must be flown in a 3 to 5 degree bank toward the operating engine. The rudder is used to maintain straight flight, compensating for the asymmetrical engine power. The ball of the turn-and-bank indicator should not

be centered, but should be displaced about 1/2 ball width toward the operating engine.

The propeller on the inoperative engine must be feathered, the landing gear retracted, and the wing flaps retracted for continued safe flight. Climb performance of an airplane with a propeller windmilling usually is nonexistent. Once the decision to feather a propeller has been made, the pilot should ensure that the propeller feathers properly and remains feathered. The landing gear and wing flaps also cause a severe reduction in climb performance and both should be retracted as soon as possible (in accordance with the operating handbook limitations).

The following general facts should be used as a guide if an engine failure occurs during or immediately after takeoff:

1. Discontinuing a takeoff upon encountering an engine failure is advisable under most circumstances. Continuing the takeoff, if an engine failure occurs prior to reaching single engine best angle-of-climb speed and landing gear retraction, is not advisable.
2. Altitude is more valuable to safety immediately after takeoff than is airspeed in excess of the single engine best angle-of-climb speed.
3. A windmilling propeller and extended landing gear cause a severe drag penalty and, therefore, climb or continued level flight is improbable, depending on weight, altitude and temperature. Prompt retraction of the landing gear (except Model 337 series), identification of the inoperative engine, and feathering of the propeller is of utmost importance if the takeoff is to be continued.
4. Unless touchdown is imminent, in no case should airspeed be allowed to fall below single engine best angle-of-climb speed even though altitude is lost, since any lesser speed will result in significantly reduced climb performance.
5. If the requirement for an immediate climb is not present, allow the airplane to accelerate to the single engine best rate-of-climb speed since this speed will always provide the best chance of climb or least altitude loss.

## **SINGLE ENGINE CRUISE**

Losing one engine during cruise on a multi-engine airplane causes little immediate problem for a proficient, properly trained pilot. After advancing power on the operating engine and retrimming the airplane to maintain altitude, if possible the pilot should attempt to determine if the cause of the engine failure can be corrected in flight prior to feathering the propeller. The magneto/ignition switches should be checked to see if they are on, and the fuel flow and fuel quantity for the affected engine should also be verified. If the engine failure was apparently caused by fuel starvation, switching to another fuel tank and/or turning on the auxiliary fuel pump (if equipped) or adjusting the

## **4 SINGLE ENGINE FLIGHT (MULTI-ENGINE AIRPLANES)**

## **PILOT SAFETY AND WARNING SUPPLEMENTS**

mixture control may alleviate the condition. It must be emphasized that these procedures are not designed to replace the procedural steps listed in the emergency procedures section of the airplane operating handbook, but are presented as a guide to be used by the pilot if, in his or her judgment, corrective action should be attempted prior to shutting down a failing or malfunctioning engine. Altitude, terrain, weather conditions, weight, and accessibility of suitable landing areas must all be considered before attempting to determine and/or correct the cause of an engine failure. In any event, if an engine fails in cruise and cannot be restarted, a landing at the nearest suitable airport is recommended.

### **SINGLE ENGINE APPROACH AND LANDING OR GO-AROUND**

An approach and landing with one engine inoperative on a multi-engine airplane can easily be completed by a proficient, properly trained pilot. However, the pilot must plan and prepare the airplane much earlier than normal to ensure success. While preparing, fuel should be scheduled so that an adequate amount is available for use by the operative engine. All crossfeeding should be completed during level flight above a minimum altitude of 1000 feet AGL.

During final approach, the pilot should maintain the single engine best rate-of-climb speed or higher, until the landing is assured. An attempt should be made to keep the approach as normal as possible, considering the situation. Landing gear should be extended on downwind leg or over the final approach fix, as applicable. Flaps should be used to control the descent through the approach.

Consideration should be given to a loss of the other engine or the necessity to make an engine inoperative go around. Under certain combinations of weight, temperature and altitude, neither level flight nor a single engine go-around may be possible. Do not attempt an engine inoperative go-around after the wing flaps have been extended beyond the normal approach or the published approach flap setting, unless enough altitude is available to allow the wing flaps to be retracted to the normal approach or the published approach flap setting, or less.

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## PILOT PROFICIENCY

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### AIRSPPEED CONTROL

Flying other than published airspeeds could put the pilot and airplane in an unsafe situation. The airspeeds published in the airplane's operating handbook have been tested and proven to help prevent unusual situations. For example, proper liftoff speed puts the airplane in the best position for a smooth transition to a climb attitude. However, if liftoff is too early, drag increases and consequently increases the takeoff ground run. This procedure also degrades controllability of multi-engine airplanes in the event an engine failure occurs after takeoff. In addition, early liftoff increases the time required to accelerate from liftoff to either the single-engine best rate-of-climb speed ( $V_{YSE}$ ) or the single-engine best angle-of-climb speed ( $V_{XSE}$ ) if an obstacle is ahead. On the other hand, if liftoff is late, the airplane will tend to "leap" into the climb. Pilots should adhere to the published liftoff or takeoff speed for their particular airplane.

The pilot should be familiar with the stall characteristics of the airplane when stalled from a normal 1 G stall. Any airplane can be stalled at any speed. The absolute maximum speed at which full aerodynamic control can be safely applied is listed in the airplane's operating handbook as the maneuvering speed. Do not make full or abrupt control movements above this speed. To do so could induce structural damage to the airplane.

### TRAFFIC PATTERN MANEUVERS

There have been incidents in the vicinity of controlled airports that were caused primarily by pilots executing unexpected maneuvers. Air Traffic Control (ATC) service is based upon observed or known traffic and airport conditions. Air Traffic Controllers establish the sequence of arriving and departing airplanes by advising them to adjust their flight as necessary to achieve proper spacing. These adjustments can only be based on observed traffic, accurate pilot radio reports, and anticipated airplane maneuvers. Pilots are expected to cooperate so as to preclude disruption of the traffic flow or the creation of conflicting traffic patterns. The pilot in command of an airplane is directly responsible for and is the final authority as to the operation of his or her airplane. On occasion, it may be necessary for a pilot to maneuver an airplane to maintain spacing with the traffic he or she has been sequenced to follow. The controller can anticipate minor maneuvering such as shallow "S" turns. The controller cannot, however, anticipate a major maneuver such as a 360-degree turn. This can result in a gap in the landing interval and more importantly, it causes a chain reaction which may result in a conflict with other traffic and an interruption of the sequence established by the tower or

approach controller. The pilot should always advise the controller of the need to make any maneuvering turns.

## **USE OF LIGHTS**

Aircraft position (navigation) and anti-collision lights are required to be illuminated on aircraft operated at night. Anti-collision lights, however, may be turned off when the pilot in command determines that, because of operating conditions, it would be in the interest of safety to do so. For example, strobe lights should be turned off on the ground when they adversely affect ground personnel or other pilots, and in flight when there are adverse reflections from clouds.

To enhance the "see-and-avoid" concept, pilots are encouraged to turn on their rotation beacon any time the engine(s) are operating, day or night. Pilots are further encouraged to turn on their landing lights when operating within ten miles of any airport, day or night, in conditions of reduced visibility and areas where flocks of birds may be expected (i.e., coastal areas, around refuse dumps, etc.). Although turning on airplane lights does enhance the "see-and-avoid" concept, pilots should not become complacent about keeping a sharp lookout for other airplanes. Not all airplanes are equipped with lights and some pilots may not have their lights turned on. Use of the taxi light, in lieu of the landing light, on some smaller airplanes may extend the landing light service life.

Propeller and jet blast forces generated by large airplanes have overturned or damaged several smaller airplanes taxiing behind them. To avoid similar results, and in the interest of preventing upsets and injuries to ground personnel from such forces, the FAA recommends that air carriers and commercial operators turn on their rotating beacons anytime their airplane engine(s) are operating. All other pilots, using airplanes equipped with rotating beacons, are also encouraged to participate in this program which is designed to alert others to the potential hazard. Since this is a voluntary program, exercise caution and do not rely solely on the rotating beacon as an indication that airplane engines are operating.

## **PARTIAL PANEL FLYING**

All pilots, and especially instrument rated pilots, should know the emergency procedures for partial instrument panel operation included in their respective operating handbook, as well as any FAA training material on the subject. Routine periodic practice under simulated instrument conditions with a partial instrument panel can be very beneficial to a pilot's proficiency. In this case,

the pilot should have a qualified safety pilot monitoring the simulated instrument practice.

If a second vacuum system is not installed and a complete vacuum system failure occurs during flight, the vacuum-driven directional indicator and attitude indicator will be disabled, and the pilot will have to rely on the turn coordinator or the turn and bank indicator if he or she flies into instrument meteorological conditions. If an autopilot is installed, it too will be affected, and should not be used. The following instructions assume that only the electrically-powered turn coordinator is operative, and that the pilot is not completely proficient in instrument flying.

### **EXECUTING A 180° TURN IN CLOUDS**

Upon inadvertently entering a cloud(s), an immediate plan should be made to turn back as follows:

1. Note compass heading.
2. Note the time in both minutes and seconds.
3. When the seconds indicate the nearest half-minute, initiate a standard rate left turn, holding the turn coordinator (or turn and bank indicator if installed) symbolic airplane wing opposite the lower left wing index mark for 60 seconds. Then roll back to level flight by leveling the miniature airplane.
4. Assure level flight through and after the turn by referencing the altimeter, VSI, and airspeed indicator. Altitude may be maintained with cautious use of the elevator controls.
5. Check accuracy of turn by observing the compass heading which should be the reciprocal of the original heading.
6. If necessary, adjust heading primarily with skidding motions rather than rolling motions so that the compass will read more accurately.
7. Maintain altitude and airspeed by cautious application of elevator control. Avoid over-controlling by keeping the hands off the control wheel as much as possible and steering only with the rudder.

### **EMERGENCY DESCENT THROUGH CLOUDS**

If conditions preclude reestablishment of VFR flight by a 180° turn, a descent through a cloud deck to VFR conditions may be appropriate. If possible, obtain ATC clearance for an emergency descent. 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 and bank or 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. Extend the landing gear (if applicable).



2. Reduce power to set up a 500 to 800 ft/min rate of descent.
3. Adjust mixture(s) as required for smooth engine operation.
4. Adjust elevator or stabilizer, rudder and aileron trim controls for a stabilized descent.
5. Keep hands off the control wheel. Monitor turn and bank or turn coordinator and make corrections by rudder alone.
6. Check trend of compass card movement and make cautious corrections with rudder inputs to stop turn.
7. Upon breaking out of the clouds, resume normal cruising flight.

### **RECOVERY FROM A SPIRAL DIVE**

If a spiral dive is encountered while in the clouds, proceed as follows:

1. Retard the throttle(s) to idle.
2. Stop the turn by using coordinated aileron and rudder control to align the symbolic airplane in the turn coordinator with the horizontal reference line, or center the turn needle and ball of the turn and bank indicator.
  - a. With a significant airspeed increase or altitude loss while in the spiral, anticipate that the aircraft will pitch nose-up when the wings are level. Take care not to overstress the airframe as a result of this nose-up pitching tendency.
3. Cautiously apply control wheel back pressure (if necessary) to slowly reduce the airspeed.
4. Adjust the elevator or stabilizer trim control to maintain a constant glide airspeed.
5. Keep hands off the control wheel, using rudder control to hold a straight heading. Use rudder trim to relieve unbalanced rudder force, if present.
6. If the power-off glide is of sufficient duration, adjust the mixture(s), as required.
7. Upon breaking out of the clouds, resume normal cruising flight.

### **USE OF LANDING GEAR AND FLAPS**

A review of airplane accident investigation reports indicates a complacent attitude on the part of some pilots toward the use of checklists for landing gear and wing flap operation. The main confession of most pilots involved in involuntary gear-up landings is that they "forgot" to lower the gear prior to landing. Consistent use of the Before Landing Checklist would have alerted these pilots and prevented a potentially hazardous situation. Other causes of gear-up landings have been attributed to poor judgment, such as not leaving the landing gear extended while performing several landings while remaining in the traffic pattern. The following recommendations will lessen the possibility of a gear-up landing.

1. Never move the landing gear control switch, handle, or lever while the airplane is on the ground.
2. Do not deliberately disable any landing gear warning device or light unless indicated otherwise in the operating handbook.
3. Apply brakes before retraction of the landing gear to stop wheel rotation.
4. After takeoff, do not retract the landing gear until a positive rate of climb is indicated.
5. When selecting a landing gear position, whether up or down, allow the landing gear to complete the initial cycle to the locked position before moving the control switch, handle, or lever in the opposite direction.
6. Never exceed the published landing gear operating speed ( $V_{LO}$ ) while the landing gear is in transit or the maximum landing gear extended speed ( $V_{LE}$ ).
7. Prepare for landing early in the approach so that trim adjustments after lowering landing gear or flaps will not compromise the approach.
8. Leave landing gear extended during consecutive landings when the airplane remains in the traffic pattern unless traffic pattern speeds exceed the Maximum Landing Gear Extended Speed ( $V_{LE}$ ).

A rare, but serious problem that may result from a mechanical failure in the flap system is split wing flaps. This phenomenon occurs when the wing flap position on one wing does not agree with the flap position on the opposite wing, causing a rolling tendency. Split flaps can be detected and safely countered if flap control movement is limited to small increments during inflight operations from full down to full up and full up to full down. If a roll is detected during flap selection, reposition the flap selector to the position from which it was moved and the roll should be eliminated. Depending on the experience and proficiency of the pilot, the rolling tendencies caused by a split flap situation may be controlled with opposite aileron (and differential power for multi-engine aircraft). Some documented contributing factors to split flaps are:

1. Pilots exceeding the Maximum Flap Extended ( $V_{FE}$ ) speed for a given flap setting.
2. Mechanical failure.
3. Improper maintenance.

## **ILLUSIONS IN FLIGHT**

Many different illusions can be experienced in flight. Some can lead to spatial disorientation. Others can lead to landing errors. Illusions rank among the most common factors cited as contributing to fatal airplane accidents. Various complex motions and forces and certain visual scenes encountered in flight can create illusions of motion and position. Spatial disorientation from these illusions can be prevented only by visual reference to reliable, fixed points on the ground, or to flight instruments.

An abrupt correction of banked attitude, which has been entered too slowly to stimulate the motion sensing system in the middle ear, can create the illusion of banking in the opposite direction. The disoriented pilot will roll the airplane back to its original dangerous attitude or, if level flight is maintained, will feel compelled to lean in the perceived vertical plane until this illusion subsides. This phenomenon is usually referred to as the "leans" and the following illusions fall under this category.

1. **Coriolis Illusion** - An abrupt head movement in a prolonged constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of rotation or movement on an entirely different axis. The disoriented pilot will maneuver the airplane into a dangerous attitude in an attempt to stop this illusion of rotation. This most overwhelming of all illusions in flight may be prevented by not making sudden, extreme head movements, particularly while making prolonged constant-rate turns under IFR conditions.
2. **Graveyard spin** - A proper recovery from a spin that has ceased stimulating the motion sensing system can create the illusion of spinning in the opposite direction. The disoriented pilot will return the airplane to its original spin.
3. **Graveyard spiral** - An observed loss of altitude during a coordinated constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of being in a descent with the wings level. In this case, the disoriented pilot will pull back on the controls, tightening the spiral and increasing the normal load factor on the airplane.
4. **Somatogravic Illusion** - A rapid acceleration during takeoff can create the illusion of being in a nose up attitude. The disoriented pilot will push the airplane into a nose low, or dive attitude. A rapid deceleration by a quick reduction of the throttle(s) can have the opposite effect, with the disoriented pilot pulling the airplane into a nose up, or stall attitude.
5. **Inversion Illusion** - An abrupt change from climb to straight and level flight can create the illusion of tumbling backwards. The disoriented pilot will push the airplane abruptly into a nose low attitude, possibly intensifying this illusion.
6. **Elevator Illusion** - An abrupt upward vertical acceleration, usually caused by an updraft, can create the illusion of being in a climb. The disoriented pilot will push the airplane into a nose low attitude. An abrupt downward vertical acceleration, usually caused by a downdraft, has the opposite effect, with the disoriented pilot pulling the airplane into a nose up attitude.
7. **False horizon** - Sloping cloud formations, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground light can create illusions of not being aligned correctly with the horizon. The disoriented pilot will place the airplane in a dangerous attitude.

8. **Autokinesis** - In the dark, a static light will appear to move about when stared at for many seconds. The disoriented pilot will lose control of the airplane in attempting to align it with the light.

Various surface features and atmospheric conditions encountered during landing can create illusions of incorrect height above and distance away from the runway threshold. Landing errors from these illusions can be prevented by: anticipating them during approaches, aerial visual inspection of unfamiliar airports before landing, using an electronic glide slope or visual approach slope indicator (VASI) system when available, and maintaining optimum proficiency in landing procedures. The following illusions apply to this category.

1. **Runway width illusion** - A narrower than usual runway can create the illusion that the airplane is at a higher altitude than it actually is. The pilot who does not recognize this illusion will tend to fly a lower approach, with the risk of striking objects along the approach path, or land short. A wider than usual runway can have the opposite effect, with the risk of flaring high and landing hard or overshooting the runway.
2. **Runway and terrain slopes illusion** - An up sloping runway, up sloping terrain, or both, can create the illusion that the airplane is at a higher altitude than it actually is. The pilot who does not recognize this illusion will fly a lower approach. A down sloping runway, down sloping approach terrain, or both, can have the opposite effect.
3. **Featureless terrain illusion** - An absence of ground features, as when landing over water, darkened areas and terrain made featureless by snow, can create the illusion that the airplane is at a higher altitude than it actually is. The pilot who does not recognize this illusion will tend to fly a lower approach.
4. **Atmospheric illusion** - Rain on the windshield can create an illusion of greater height, and a greater distance from the runway. The pilot who does not recognize this illusion will tend to fly a lower approach. Penetration of fog can create the illusion of pitching up. The pilot who does not recognize this illusion will steepen the approach, often quite abruptly.
5. **Ground lighting illusions** - Lights along a straight path, such as a road, and even lights on trains, can be mistaken for runway and approach lights. Bright runway and approach lighting systems, especially where few lights illuminate the surrounding terrain, may create the illusion of less distance to the runway. The pilot who does not recognize this illusion will tend to fly a higher approach. Conversely, the pilot overflying terrain which has few lights to provide height cues may make a lower than normal approach.

## **SPATIAL DISORIENTATION**

Spatial disorientation is the confusion of the senses affecting balance, which occurs when a person is deprived of the normal cues upon which he or she depends for "indexing" a sense of balance. These cues include, most prominently, his or her visual reference to the earth's horizon and celestial bodies, and his or her acceptance of the force of gravity as acting vertically. When flying an airplane, the pilot may have all outside visual references obscured by clouds or complete darkness, and his interpretation of the direction of gravity may become confused by forces imposed on his or her body by centrifugal force, accelerations of maneuvering, and turbulence, which may act in any direction.

Spatial disorientation usually leads to vertigo, but is not necessarily identical to it. Vertigo is an uncertain feeling of disorientation, turning, or imbalance, which is usually accompanied by feelings of dizziness or incipient nausea.

When flying by reference to the natural horizon, the attitude of the airplane can be determined visually at all times. During instrument flight, when the natural horizon is not visible, the attitude of the airplane must be determined from the gyro horizon and other flight instruments. Sight, supported by other senses, maintains orientation in either case.

Sometimes during conditions of low visibility, the supporting senses conflict with what is seen or what the pilot believes he sees. When this happens, there is a definite susceptibility to disorientation. The degree of disorientation varies considerably with individual pilots, their proficiency, and the conditions which induced the problem. Complete disorientation, even for a short period of time, can render a pilot incapable of controlling an airplane, to the extent that he cannot maintain level flight, or even prevent fatal turns and diving spirals.

Lack of effective visual reference is common on over-water flights at night, and in low visibility conditions over land. Other contributing factors to disorientation and vertigo are reflections from outside lights, and cloud reflections of beams from rotating beacons or strobe lights.

It is important that all pilots understand the possibility of spatial disorientation, and the steps necessary to minimize the loss of control as a result of it. The following basic items should be known to every pilot:

1. Obtain training and maintain proficiency in the control of an airplane by reference to instruments before flying in visibility of less than three miles.
2. Refer to the attitude instruments frequently when flying at night or in reduced visibility conditions.

3. To maintain competency in night operations, practice should include operations in the traffic pattern, subject to the confusion caused by reflections of ground lights, as well as the control of an airplane by reference to instruments.
4. Familiarization with the meteorological conditions which may lead to spatial disorientation is important. These include smoke, fog, haze, and other restrictions to visibility.
5. Familiarity with local areas and commonly used flight routes assists in the avoidance of disorientation by permitting the pilot to anticipate and look for prominent terrain features.
6. The most important precaution for avoiding disorientation is the habit of thoroughly checking the weather before each flight, while enroute, and near the destination.

A pilot without the demonstrated competence to control an airplane by sole reference to instruments has little chance of surviving an unintentional flight into IFR conditions. Tests conducted by the U.S. Air Force, using qualified instrument pilots, indicate that it may take as long as 35 seconds to establish full control by reference to instruments after disorientation during an attempt to maintain VFR flight in IFR weather. Instrument training and certification and ongoing recurrent training in accordance with FAR Part 61, are designed to provide the pilot with the skills needed to maintain control solely by reference to flight instruments and the ability to ignore the false kinesthetic sensations inherent with flight when no outside references are available.

## MOUNTAIN FLYING

A pilot's first experience of flying over mountainous terrain (particularly if most of his or her flight time has been over flatlands) could be a never-to-be-forgotten experience if proper planning is not done and if the pilot is not aware of potential hazards. Those familiar section lines in some regions are not present in the mountains. Flat, level fields for forced landings are practically nonexistent; abrupt changes in wind direction and velocity may occur; severe updrafts and downdrafts are common during high wind conditions, particularly near or above abrupt changes of terrain, such as cliffs or rugged areas; and clouds can build up with startling rapidity. Mountain flying need not be hazardous if you follow the recommendations below:

1. For pilots with little or no mountain flying experience, always get dual instruction from a qualified flight instructor to become familiar with conditions which may be encountered before flying in mountainous terrain.
2. Plan your route to avoid topography which would prevent a safe forced landing. The route should be near populated areas and well known mountain passes. Sufficient altitude should be maintained to permit gliding to a safe landing in the event of engine failure.
3. Always file a flight plan.

4. Don't fly a light airplane when the winds aloft, at your proposed altitude, exceed 35 miles per hour. Expect the winds to be of much greater velocity over mountain passes than reported a few miles from them. Approach mountain passes with as much altitude as possible. Downdrafts of from 1500 to 2000 feet per minute are not uncommon on the leeward (downwind) side.
5. Severe turbulence can be expected near or above changes in terrain, especially in high wind conditions.
6. Some canyons run into a dead end. Don't fly so far into a canyon that you get trapped. Always be able to make a 180-degree turn, or if canyon flying is necessary, fly down the canyon (toward lower terrain), not up the canyon (toward higher terrain).
7. Plan the trip for the early morning hours. As a rule, the air starts to get turbulent at about 10 a.m., and grows steadily worse until around 4 p.m., then gradually improves until dark.
8. When landing at a high altitude airfield, the same indicated airspeed should be used as at low elevation fields. Due to the less dense air at altitude, this same indicated airspeed actually results in a higher true airspeed, a faster landing speed, and a longer landing distance. During gusty wind conditions, which often prevail at high altitude fields, a "power approach" is recommended. Additionally, due to the faster ground speed and reduced engine performance at altitude, the takeoff distance will increase considerably over that required at lower altitudes.

## **OBSTRUCTIONS TO FLIGHT**

Pilots should exercise extreme caution when flying less than 2000 feet above ground level (AGL) because of the numerous structures (radio and television antenna towers) exceeding 1000 feet AGL, with some extending higher than 2000 feet AGL. Most truss type structures are supported by guy wires. The wires are difficult to see in good weather and can be totally obscured during periods of dusk and reduced visibility. These wires can extend approximately 1500 feet horizontally from a structure; therefore, all truss type structures should be avoided by at least 2000 feet, horizontally and vertically.

Overhead transmission and utility lines often span approaches to runways and scenic flyways such as lakes, rivers, and canyons. The supporting structures of these lines may not always be readily visible and the wires may be virtually invisible under certain conditions. Most of these installations do not meet criteria which determine them to be obstructions to air navigation and therefore, do not require marking and/or lighting. The supporting structures of some overhead transmission lines are equipped with flashing strobe lights. These lights indicate wires exist between the strobe equipped structures.

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## FUEL MANAGEMENT

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### POOR TECHNIQUES

Poor fuel management is often the cause of aircraft accidents. Some airplane accident reports have listed such poor fuel management techniques as switching to another fuel tank after the before takeoff runup was completed, and then experiencing engine problems on takeoff. Other reports tell of pilots switching fuel tanks at a critical point on the approach to a landing and inadvertently selecting an empty tank when there is not enough time to compensate for the subsequent loss of power. Flying low during day cross-country, or moderately low at night, can be hazardous if a fuel tank runs dry. Too much altitude may be lost during the time it takes to discover the reason for power loss, select a different fuel tank, and restart the engine. Pilots should be thoroughly familiar with the airplane fuel system and tank switching procedures. Furthermore, it is an unsafe technique to run a fuel tank dry as a routine procedure, although there are exceptions. Any sediment or water not drained from the fuel tank could be drawn into the fuel system and cause erratic operation or even total power loss.

### FUELING THE AIRCRAFT

The aircraft should be on level ground during all fueling operations, since filling the tanks when the aircraft is not level may result in a fuel quantity less than the maximum capacity. Rapid filling of a fuel tank, without allowing time for air in the tank to escape, may result in a lower fuel quantity. Some single engine aircraft that allow simultaneous use of fuel from more than one tank have fuel tanks with interconnected vent lines. If the tanks are filled with fuel and the aircraft allowed to sit with one wing lower than the other, fuel may drain from the higher tank to the lower and subsequently out the fuel vent. This will result in loss of fuel. This fuel loss may be prevented by placing the fuel selector in a position other than "both".

Some Cessna single-engine airplanes have long, narrow fuel tanks. If your airplane is so equipped, it may be necessary to partially fill each tank alternately, and repeat the sequence as required to completely fill the tanks to their maximum capacity. This method of fueling helps prevent the airplane from settling to a wing-low attitude because of increased fuel weight in the fullest wing tank.

It is always the responsibility of the pilot-in-command to ensure sufficient fuel is available for the planned flight. Refer to the airplane operating handbook for proper fueling procedures.



## **UNUSABLE FUEL**

Unusable fuel is the quantity of fuel that cannot safely be used in flight. The amount of unusable fuel varies with airplane and fuel system design, and the maximum amount is determined in accordance with Civil or Federal Aviation Regulations (CARs or FARs). Unusable fuel is always included in the airplane's licensed or basic empty weight for weight and balance purposes. Unusable fuel should never be included when computing the endurance of any airplane.

## **FUEL PLANNING WITH MINIMUM RESERVES**

Airplane accidents involving engine power loss continue to reflect fuel starvation as the primary cause or a contributing factor. Some of these accidents were caused by departing with insufficient fuel onboard to complete the intended flight. Fuel exhaustion in flight can mean only one thing - a forced landing with the possibility of serious damage, injury, or death.

A pilot should not begin a flight without determining the fuel required and verifying its presence onboard. To be specific, during VFR conditions, do not take off unless there is enough fuel to fly to the planned destination (considering wind and forecast weather conditions), assuming the airplane's normal cruising airspeed, fly after that for at least 30 minutes during the day, or at least 45 minutes at night.

Departure fuel requirements are a little different when operating under IFR conditions. Do not depart an airport on an IFR trip unless the airplane has enough fuel to complete the flight to the first airport of intended landing (considering weather reports and forecasts) and fly from that airport to the planned alternate airport, and afterwards still fly at least 45 minutes at normal cruising speed.

## **FLIGHT COORDINATION VS. FUEL FLOW**

The shape of most airplane wing fuel tanks is such that, in certain flight maneuvers, the fuel may move away from the fuel tank supply outlet. If the outlet is uncovered, fuel flow to the engine may be interrupted and a temporary loss of power might result. Pilots can prevent inadvertent uncovering of the tank outlet by having adequate fuel in the tank selected and avoiding maneuvers such as prolonged uncoordinated flight or sideslips which move fuel away from the feed lines.

It is important to observe the uncoordinated flight or sideslip limitations listed in the respective operating handbook. As a general rule, limit uncoordinated flight or sideslip to 30 seconds in duration when the fuel level in the selected fuel tank is 1/4 full or less. Airplanes are usually considered in a sideslip anytime the turn and bank "ball" is more than one quarter ball out of the center (coordinated flight) position. The amount of usable fuel decreases with the severity of the sideslip in all cases.

## FUEL SELECTION FOR APPROACH/LANDING

On some single-engine airplanes, the fuel selector valve handle is normally positioned to the BOTH position to allow symmetric fuel feed from each wing fuel tank. However, if the airplane is not kept in coordinated flight, unequal fuel flow may occur. The resulting wing heaviness may be corrected during flight by turning the fuel selector valve handle to the tank in the "heavy" wing. On other single-engine airplanes, the fuel selector has LEFT ON or RIGHT ON positions, and takeoffs and landings are to be accomplished using fuel from the fuller tank.

Most multi-engine airplanes have fuel tanks in each wing or in wing tip tanks, and it is advisable to feed the engines symmetrically during cruise so that approximately the same amount of fuel will be left in each side for descent, approach, and landing. If fuel has been consumed at uneven rates between the two wing tanks because of prolonged single-engine flight, fuel leak or siphon, or improper fuel servicing, it is desirable to balance the fuel load by operating both engines from the fuller tank. However, as long as there is sufficient fuel in both wing tanks, even though they may have unequal quantities, it is important to switch the left and right fuel selectors to the left and right wing tanks, respectively, feeling for the detent, prior to the approach. This will ensure that adequate fuel flow will be available to each operating engine if a go-around is necessary. In the case of single-engine operation, operate from the fuller tank, attempting to have a little more fuel in the wing on the side with the operating engine prior to descent.

On all multi-engine airplanes equipped with wing tip fuel tanks, the tip tanks are the main fuel tanks on the tank selector valve controls. Refer to Supplement 12 of this Pilot Safety and Warning Supplements Manual and the applicable airplane operating handbook.

## AIRFRAME ICING

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Pilots should monitor weather conditions while flying and should be alert to conditions which might lead to icing. Icing conditions should be avoided when possible, even if the airplane is certified and approved for flight into known icing areas. A climb normally is the best ice avoidance action to take. Alternatives are a course reversal or a descent to warmer air. If icing conditions are encountered inadvertently, immediate corrective action is required.

### FLIGHT INTO KNOWN ICING

Flight into known icing is the intentional flight into icing conditions that are known to exist. Icing conditions exist anytime the indicated OAT (outside air temperature) is  $+10^{\circ}\text{C}$  or below, or the RAT (ram air temperature) is  $+10^{\circ}\text{C}$  or below, and visible moisture in any form is present. Any airplane that is not specifically certified for flight into known icing conditions, is prohibited by regulations from doing so.

Ice accumulations significantly alter the shape of the airfoil and increase the weight of the aircraft. Ice accumulations on the aircraft will increase stall speeds and alter the speeds for optimum performance. Flight at high angles of attack (low airspeed) can result in ice buildup on the underside of wings and the horizontal tail aft of the areas protected by boots or leading edge anti-ice systems. Trace or light amounts of icing on the horizontal tail can significantly alter airfoil characteristics, which will affect stability and control of the aircraft.

Inflight ice protection equipment is not designed to remove ice, snow, or frost accumulations on a parked airplane sufficiently enough to ensure a safe takeoff or subsequent flight. Other means (such as a heated hangar or approved deicing solutions) must be employed to ensure that all wing, tail, control, propeller, windshield, static port surfaces and fuel vents are free of ice, snow, and frost accumulations, and that there are no internal accumulations of ice or debris in the control surfaces, engine intakes, brakes, pitot-static system ports, and fuel vents prior to takeoff.

### AIRPLANES CERTIFIED FOR FLIGHT INTO KNOWN ICING

An airplane certified for flight into known icing conditions must have all required FAA approved equipment installed and fully operational. Certain airplanes have a flight into known icing equipment package available which, if installed in its entirety and completely operational, allows intentional penetration of areas of known icing conditions as reported in weather sequences or by PIREPS.

This known icing package is designed specifically for the airplane to provide adequate in-flight protection during normally encountered icing conditions produced by moisture-laden clouds. It will not provide total protection under severe conditions such as those which exist in areas of freezing rain, nor will it necessarily provide complete protection for continuous operation in extremely widespread areas of heavy cloud moisture content. The installed equipment should be used to protect the airplane from ice while seeking a different altitude or routing where ice does not exist. During all operations, the pilot must exercise good judgement and be prepared to alter his flight if conditions exceed the capacity of the ice protection equipment or if any component of this equipment fails.

The airplane's operating handbook will indicate the required equipment for intentional flight into known icing conditions. Such equipment may include: wing leading edge deice/anti-ice system, vertical and horizontal stabilizer leading edge deice/anti-ice system, propeller deice/anti-ice system, windshield anti-ice, heated pitot tube, heated static ports and fuel vents, heated stall warning vane/transducer or optional angle-of-attack lift sensor vane, ice detector light(s), and increased capacity electrical and vacuum systems.

If there is any doubt whether the airplane is certified or has all the required equipment, the pilot should assume that the airplane is not certified for flight into known icing and avoid any encounters with areas of icing.

## KINDS OF ICING

Airframe icing is a major hazard. It is at its worst when the supercooled (liquid below freezing temperature) water droplets are large and plentiful. Droplets of this type are usually found in cumulus clouds and are the cause of "clear ice". Clear ice is transparent ice deposited in layers, and may be either smooth or rough. This ice coats more of the wing than "rime ice" because the droplets flow back from the leading edge over the upper and lower wing surface before freezing, and the rate of accumulation is higher.

Rime ice is an opaque, granular, and rough deposit of ice that is usually encountered in stratus clouds. Small supercooled droplets freeze instantly when struck by the leading edges of the airplane. Rime ice can quickly change the drag characteristics of the airplane. Under some conditions, a large "double horn" buildup on the leading edges can occur which drastically alters the airfoil shape. Altitude changes usually work well as an avoidance strategy for rime ice. In colder temperatures, these types of supercooled water droplets quickly convert to ice crystals.

Icing in precipitation comes from freezing rain or drizzle which falls from warmer air aloft to colder air below. This results in a very rapid buildup of clear ice, and must be avoided by all means available to the pilot.

If it is snowing, the problem is not so much the snow sticking to the airplane as the icing caused by the supercooled water droplets in the clouds from which the snow is falling. The amount of ice will depend upon cloud saturation.

Pilots should report all icing conditions to ATC/FSS, and if operating under IFR conditions, request new routing or altitude if icing will be a hazard. Be sure to give type of airplane when reporting icing.

The following describe how to report icing conditions:

1. **Trace** - Ice becomes visible. Rate of accumulation is slightly greater than the rate of sublimation. Anti-ice equipment must be on and deice equipment may or may not be required.
2. **Light** - The rate of accumulation may create a problem if flight is prolonged in this environment (over 1 hour). Occasional use of deicing equipment and continuous use of anti-icing equipment removes/prevents accumulation.
3. **Moderate** - The rate of accumulation is such that even short encounters become potentially hazardous and use of deicing/anti-icing equipment and flight diversion is necessary.
4. **Severe** - The rate of accumulation is such that deicing/anti-icing equipment fails to reduce or control the hazard. Immediate flight diversion is necessary.

## RESULTS OF ICING

Airplane performance can be severely reduced by ice accumulation. Accumulation of 1/2 inch of ice on the leading edges of the wings and empennage can cause a large loss in rate of climb, a cruise speed reduction of up to 30 KIAS, as well as a significant buffet and stall speed increase. Even if the airplane is certified for flight into known icing and the equipment is working properly, ice remaining on unprotected areas of the airplane can cause large performance losses. With one inch of residual ice accumulation, these losses can double, or even triple. Ice accumulation also will increase airplane weight.

## INADVERTENT ICING ENCOUNTER

Flight into icing conditions is not recommended. However, an inadvertent encounter with these conditions is possible. The following are things to consider doing if inadvertent icing is experienced. These items are not intended to replace procedures described in any operating handbook. Instead, this list has been generated to familiarize pilots of older model Cessnas with guidelines they can use in the event of an inadvertent icing condition. The best procedure is a change of altitude, or course reversal to escape the icing conditions.

1. Turn pitot heat, stall warning heat, propeller deice/anti-ice, and windshield anti-ice switches ON (if installed).
2. Change altitude (usually climb) or turn back to obtain an outside air temperature that is less conducive to icing.
3. Increase power as necessary to maintain cruise airspeed and to minimize ice accumulation. Maintain a minimum indicated airspeed of  $V_Y + 10$  KIAS until assured that all ice is off the airframe.
4. Turn cabin heat and defroster controls full on and open defrost control to obtain maximum windshield defroster effectiveness.
5. Increase engine speed to minimize ice buildup on propeller blades. If excessive vibration is noted, momentarily reduce engine speed with the propeller control, and then rapidly move the control full forward. Cycling the RPM flexes the propeller blades and high RPM increases centrifugal force, causing ice to shed more readily.
6. Watch for signs of induction air filter ice. Regain manifold pressure by increasing the throttle setting and/or selecting alternate air or carburetor heat. If ice accumulates on the intake filter (requiring alternate air), a decrease of manifold pressure will be experienced, and the mixture should be adjusted as required.
7. If icing conditions are unavoidable, plan a landing at the nearest airport. In the event of an extremely rapid ice buildup, select a suitable "off airport" landing site.
8. Ice accumulation of 1/4 inch or more on the wing leading edges may require significantly higher power and a higher approach and landing speed, and result in a higher stall speed and longer landing roll.
9. If practical, open the window and, scrape ice from a portion of the windshield for visibility in the landing approach.
10. Approach with reduced flap extension to ensure adequate elevator effectiveness in the approach and landing.
11. Avoid a slow and high flare-out.
12. Missed approaches should be avoided whenever possible, because of severely reduced climb capability. However, if a go-around is mandatory, make the decision much earlier in the approach than normal. Apply maximum power while retracting the flaps slowly in small increments (if extended). Retract the landing gear after immediate obstacles are cleared.

## WEATHER

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### ALERTNESS

Most pilots pay particularly close attention to the business of flying when they are intentionally operating in instrument weather conditions. On the other hand, unlimited visibility tends to encourage a sense of security which may not be justified. The pilot should be alert to the potential of weather hazards, and prepared if these hazards are encountered on every flight.

### VFR JUDGMENT

Published distance from clouds and visibility regulations establish the minimums for VFR flight. The pilot who uses even greater margins exercises good judgment. VFR operation in class D airspace, when the official visibility is 3 miles or greater, is not prohibited, but good judgment would dictate that VFR pilots keep out of the approach area under marginal conditions.

Precipitation reduces forward visibility. Although it is perfectly legal to cancel an IFR flight plan whenever the pilot feels he can proceed VFR, it is usually a good practice to continue IFR into a terminal area until the destination airport is in sight.

While conducting simulated instrument flights, pilots should ensure that the weather provides adequate visibility to the safety pilot. Greater visibility is advisable when flying in or near a busy airway or close to an airport.

### IFR JUDGMENT

The following tips are not necessarily based on Federal Aviation Regulations, but are offered as recommendations for pilot consideration. They do, however, address those elements of IFR flight that are common causes of accidents.

1. All pilots should have an annual IFR proficiency check, regardless of IFR hours flown.
2. For the first 25 hours of pilot-in-command time in airplane type, increase ILS visibility minimums and raise nonprecision approach minimums.
3. An operating autopilot or wing leveler is strongly recommended for single pilot IFR operations.
4. Do not depart on an IFR flight without an independent power source for attitude and heading systems, and an emergency power source for

- at least one VHF communications radio, or a hand-held communications radio.
5. Be sure the airplane has enough fuel to fly to the destination with a headwind calculated at 125 percent of the forecast wind, and a tailwind calculated at 75 percent of forecast wind. Also, include enough fuel to miss the approach at the destination airport, climb to cruise altitude and fly an approach at an alternate airport, plus 45 minutes of fuel for low altitude holding.
  6. The IFR takeoff runway should meet the criteria of the accelerate-stop/go distances for that particular twin-engine airplane, or 200 percent of the distance to clear a 50-foot obstacle for a single.
  7. Do not enter an area of embedded thunderstorms without on-board weather detection equipment (radar and/or Stormscope<sub>TM</sub>) and unless cloud bases are at least 2000 feet above the highest terrain, terrain is essentially level, and VFR can be maintained. Avoid all cells by five miles, and severe storms by 20 miles.
  8. Do not enter possible icing conditions unless all deice and anti-ice systems are fully operational, or the weather provides at least a 1000-foot ceiling and three miles visibility for the entire route over level terrain, and the surface temperatures are greater than 5°C.
  9. Adhere to weather minimums, missed approach procedures and requirements for visual contact with the runway environment. If an approach is missed, with the runway not in sight at the appropriate time because of weather conditions, do not attempt another approach unless there is a valid reason to believe there has been a substantial improvement in the weather.
  10. Observe the minimum runway requirement for an IFR landing. The minimum IFR runway length for propeller driven airplanes should be considered 200 percent of maximum landing distance. Increase these distances 90 percent for a wet runway and 150 percent for ice on the runway.
  11. Make a missed approach if speed and configuration are not stable inside the middle marker or on nonprecision final, or if the touchdown aiming point will be missed by more than 1000 feet. If an approach is missed because of pilot technique, evaluate the reasons and options before attempting another approach.
  12. Use supplemental oxygen above a cabin altitude of 5000 feet at night, and above 10,000 feet during the day.

## **WIND**

The keys to successfully counteracting the effects of wind are proficiency, understanding the wind response characteristics of the airplane, and a thoughtful approach to the operation. Some operating handbooks indicate a maximum demonstrated crosswind velocity, but this value is not considered to be limiting. There is an ultimate limit on wind for safe operation, which varies with the airplane and pilot. The lighter the airplane and the lower the stalling speed, the less wind it will take to exceed this limit. The way an airplane rests



on its landing gear affects handling characteristics. If it sits nose down, the wing will be unloaded and the airplane will handle better in wind than an airplane which sits in a nose up attitude, creating a positive angle of attack. For the latter type, the full weight of the airplane cannot be on the wheels as the airplane is facing into the wind. Airplanes with these characteristics cause pilots to work harder to keep the airplane under control.

## **CROSSWIND**

While an airplane is moving on the ground, it is affected by the direction and velocity of the wind. When taxiing into the wind, the control effectiveness is increased by the speed of the wind. The tendency of an airplane to weathervane is the greatest while taxiing directly crosswind, which makes this maneuver difficult. When taxiing in crosswind, speed and use of brakes should be held to a minimum and all controls should be utilized to maintain directional control and balance (see Crosswind Taxi Diagram, Figure 1).

Takeoffs into strong crosswinds are normally performed with the minimum flap setting necessary for the field length. With the ailerons deflected into the wind, the airplane should be accelerated to a speed slightly higher than normal (on multi-engine airplanes, additional power may be carried on the upwind engine until the rudder becomes effective), and then the airplane should be flown off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground and any obstacle, the pilot should execute a coordinated turn into the wind to correct for drift. The pilot's ability to handle a crosswind is more dependent upon pilot proficiency than airplane limitations.

A crosswind approach and landing may be performed using either the wing-low, crab, or combination drift correction technique, depending upon the training, experience, and desires of the pilot. Use of the minimum flap setting required for the field length is recommended. Whichever method is used, the pilot should hold a straight course after touchdown with the steerable nose or tailwheel and occasional differential braking, if necessary.

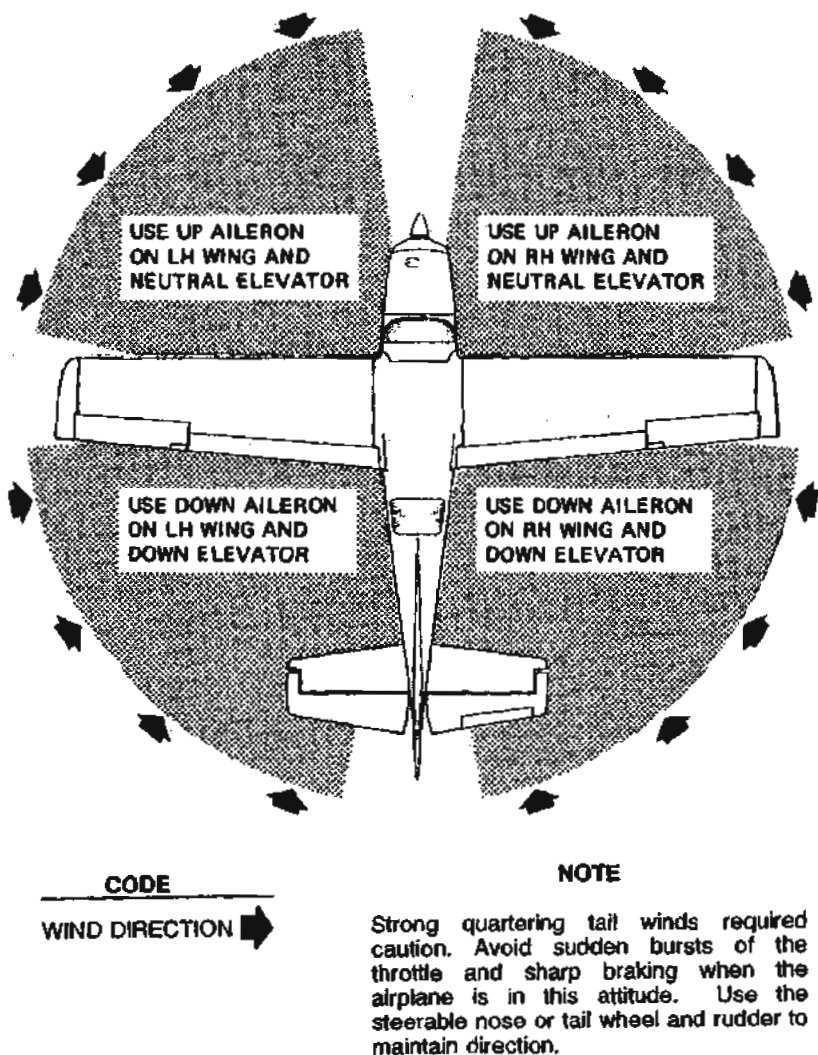


Figure 1. Crosswind Taxi Diagram

On those airplanes with a steerable tailwheel, landings may be made with the tailwheel lock (if installed) engaged or disengaged. Although the use of the lock is left to the individual pilot's preference, it should be used during strong crosswind landings on rough fields with a heavily loaded airplane. If the lock were disengaged, this condition could lead to a touchdown with a deflected tailwheel and subsequent external forces on the tailwheel that are conducive to shimmy.

## **LOW LEVEL WIND SHEAR**

Low level wind shear is the interflow of air masses near the ground, having different speeds and directions. As an airplane passes through the narrow boundary between the two air masses, large fluctuations in airspeed may be encountered depending on the difference in speed and direction of the air masses. Low level wind shear can be experienced through both the horizontal and vertical plane. One major risk with a wind shear encounter is that a sudden loss of airspeed may render the airplane out of control near the ground. Recovery depends on altitude and the magnitude of the airspeed loss.

A wind shear encounter can be reported as either positive or negative. A positive wind shear is one in which the headwind component suddenly increases. The airplane's inertia makes it tend to maintain the same velocity through space, not through air, so the first thing a pilot is likely to notice is an increase in airspeed. The opposite case, a negative wind shear, is a sudden decrease in headwind component. The airplane will begin to sink immediately, as lift is decreased by the reduced airspeed; and as the natural aerodynamics, and/or the pilot, lowers the nose, the descent rate increases.

The effects of wind shear on smaller airplanes are sometimes less severe than on large jetliners. Smaller airplanes have less mass (and therefore less inertia), and their speed can change more quickly. Thus, a smaller airplane can return to its trimmed speed, after encountering a wind shear, more rapidly than a larger, heavier one.

## **TYPES OF WIND SHEAR CONDITIONS**

Wind shear is encountered in several distinct weather scenarios. Within a frontal zone, as one air mass overtakes another, variations in wind speed and direction can be significant. Fast moving cold fronts, squall lines, and gust fronts pose the highest risk.

A temperature inversion can present a fast moving air mass directly above a very stable calm layer at the surface. Under these conditions an airplane on approach with a headwind aloft will experience a rapid loss of airspeed during descent through the boundary layer to the calm air beneath.

The most violent type of wind shear is that induced by convective activity and thunderstorms. Downdrafts created by local areas of descending air (roughly 5 to 20 miles diameter) can exceed 700 feet per minute. At times, very small areas of descending air (1 mile or so in diameter), called microbursts, can reach vertical speeds of 6000 feet per minute or more. Such downdrafts generate significant turbulence and exceed the climb capability of many airplanes. In addition, as the downdraft/microburst reaches the ground, the air spreads in all directions. The pilot entering the area at relatively low altitude will likely experience an increase in airspeed followed by a dramatic decrease in airspeed and altitude while exiting the area.

## **INDICATIONS OF WIND SHEAR**

The winds near or around the base of a thunderstorm are largely unpredictable, but there are identifiable signs that may indicate that wind shear conditions exist. Small areas of rainfall, or shafts of heavy rain are clues to possible wind shear conditions. Virga, or rain shafts that evaporate before reaching the ground, may indicate cool, dense air sinking rapidly and may contain microburst winds. On the ground, such signs as trees bending in the wind, ripples on water, or a line of dust clouds should alert the pilot.

With the presence of a strong temperature inversion, if low clouds are moving rapidly but winds are calm or from a different direction on the surface, a narrow wind shear zone might exist and the pilot may elect to use a higher climb speed until crossing the zone. Conversely, while in the landing pattern or on an approach, if the reported surface winds are significantly different than that being experienced in flight, it must be taken as a warning to the potential of wind shear.

A pilot who has been holding a wind correction angle on final approach, and suddenly finds that a change has to be made – i.e., the runway (or CDI needle) starts moving off to the side – most likely encountered wind shear. The usual techniques apply, such as an appropriate heading change, but more importantly, the pilot has been alerted to the presence of a wind shear situation and should be ready to deal with a more serious headwind to tailwind shear at any time.

## **COPING WITH WIND SHEAR**

A pilot can cope with wind shear by maintaining a somewhat higher airspeed not to exceed  $V_A$  (maneuvering speed), since the conditions conducive to wind shear are also often conducive to turbulence. Pilots should be alert for negative wind shear; if the airspeed is suddenly decreasing, the sink rate increasing, or more than usual approach power is required, a negative wind shear may well have been encountered. Also, the closer the airplane gets to

the ground, the smaller the margin for sink recovery. Be prepared to go around at the first indication of a negative wind shear. A positive wind shear may be followed immediately by a negative shear.

Some larger airports are equipped with a low-level wind shear alerting system (LLWAS). Many have ATIS, and or AWOS wind information. All elements of the weather conditions including pilot reports should be carefully considered and any pilot who experiences wind shear should warn others.

In summary, all pilots should remain alert to the possibility of low level wind shear. If wind shear is encountered on final approach, usually characterized by erratic airspeed and altimeter indications and almost always associated with uncommanded airplane attitude changes, do not hesitate to go around. If the approach profile and airspeed cannot be reestablished, it cannot be emphasized too strongly that a go-around is often the pilot's best course of action, and the earlier the decision to go around, the better the chance of recovery.

## **THUNDERSTORM AVOIDANCE**

Much has been written about thunderstorms. They have been studied for years, and while considerable information has been learned, the studies continue because questions still remain. Knowledge and weather radar have modified our attitudes toward thunderstorms. But any storm recognizable as a thunderstorm should be considered hazardous. Never regard any thunderstorm lightly, even when radar observers report the echoes are of light intensity. Avoiding all thunderstorms is the best policy.

The following are some do's and don'ts of thunderstorm avoidance:

1. Don't land or takeoff in the face of an approaching thunderstorm. A sudden gust front of low level turbulence (wind shear) could cause loss of control.
2. Don't attempt to fly under a thunderstorm, even if you can see through to the other side. Turbulence and wind shear under the storm is likely and hazardous.
3. Don't fly near clouds containing embedded thunderstorms. Scattered thunderstorms that are not embedded usually can be visually circumnavigated.
4. Don't trust the visual appearance to be a reliable indicator of the turbulence inside a thunderstorm.
5. Do avoid, by at least 20 miles, any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
6. Do circumnavigate the entire area if the area has 6/10 thunderstorm coverage.
7. Do remember that vivid and frequent lightning indicates the probability of a severe thunderstorm.

8. Do regard, as extremely hazardous, any thunderstorm with tops 35,000 feet or higher, whether the top is visually sighted or determined by radar.
9. Do check the convective outlook during weather briefings.

The following are some do's and don'ts during inadvertent thunderstorm area penetration:

1. Do keep your eyes on the instruments. Looking outside the cabin can increase the danger of temporary blindness from lightning.
2. Don't change power settings; maintain settings for the recommended turbulent air penetration speed.
3. Do maintain a generally constant attitude.
4. Don't attempt to maintain altitude. Maneuvers made in attempting to maintain an exact altitude increase the stress on the airplane.
5. Exit the storm as soon as possible.

A pilot on an IFR flight plan must not deviate from an approved route or altitude without proper clearance, as this may place him in conflict with other air traffic. Strict adherence to traffic clearance is necessary to assure an adequate level of safety.

Always remember, all thunderstorms are potentially hazardous and the pilot is best advised to avoid them whenever possible.

## **FROM WARM WEATHER TO COLD WEATHER**

Flying from warm weather to cold weather can do unusual things to airplanes. To cope with this problem, pilots must be alerted to a few preparations. If the airplane is serviced with a heavier grade of oil, such as SAE 50, the oil should be changed to a lighter grade such as SAE 30 before flying into very cold weather. If use of a multi-viscosity oil is approved, it is recommended for improved starting in cold weather. Refer to the airplane operating handbook or maintenance manual for approved oils. An engine/airplane winterization kit may be available for the airplane. It usually contains restrictive covers for the cowl nose cap and/or oil cooler and engine crankcase breather for flight in very cold weather. Proper preflight draining of the fuel system from all drains is especially important and will help eliminate any free water accumulation. The use of fuel additives, such as Prist or EGME, may also be desirable. Refer to the airplane operating handbook or maintenance manual for approved fuel additives.

In order to prevent propeller freeze-up when operating in very cold weather, it may be necessary to exercise the constant speed prop every few minutes. This can be accomplished by moving the prop controls forward or aft from their cruise position 300 RPM and back during flight.

## **ICE, SNOW, FROST, Etc.**

For any extended time, it is always best to park an airplane in a hangar, particularly during inclement weather. When this is not possible, all ice, snow, frost, etc., must be removed from the entire airframe and engine(s) prior to starting.

The presence of ice, snow, frost, etc., on the wings, tail, control surfaces (externally and internally), etc., is hazardous. Safe operation depends upon their removal. Too often, their effects on airplane performance are not completely understood or appreciated.

## **WAKE TURBULENCE**

Airplanes are significantly affected by the wake turbulence of any heavier aircraft or helicopter. Wake turbulence dissipation and displacement are functions of elapsed time and prevailing wind speed and direction. During calm conditions, severe turbulence generated by large aircraft can persist as long as 10 minutes. Delay takeoff to ensure dissipation and displacement of wake turbulence. When it is necessary to take off behind a heavier aircraft or helicopter, avoid wake turbulence, particularly wake vortices, by vertical or lateral spacing or an appropriate time delay.

Vertical avoidance is appropriate to longer runways where operations can be completed on portions of the runway not affected by the vortices of preceding aircraft and flying above areas where vortices will be present is possible. Become airborne well before the preceding aircraft rotation point and climb above its flight path, or lift off beyond the touchdown point of a landing aircraft. When it is necessary to land behind another aircraft, remain above its approach path and land beyond its touchdown point. Touchdown prior to the rotation point of a departing aircraft.

Lateral movement of wake vortices is only possible when a significant crosswind exists and is not detectable unless exhaust smoke or dust marks the vortices. Consider offsetting the takeoff path to the upwind side of the runway.

## RESTRAINT SYSTEMS

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### SEAT RESTRAINTS

Records of general aviation airplane accident injuries reveal a surprising number of instances in which the occupants were not properly using the available restraint system, indicating the presence of a complacent attitude during airplane preflight briefing inspections. An unbuckled restraint system during a critical phase of flight, such as during turbulence, could cause loss of control of the airplane and/or injuries. Although the ultimate responsibility lies with the pilot-in-command, each user of a restraint system should be cognizant of the importance of proper use of the complete restraint system.

Pilots should ensure that all occupants properly use their individual restraint systems. The system should be adjusted snug across the body. A loose restraint belt will allow the wearer excessive movement and could result in serious injuries. The wearer should not allow sharp or hard items in pockets or other clothing to remain between their body and the restraint system to avoid discomfort or injury during adverse flight conditions or accidents. Each occupant must have their own restraint system. Use of a single system by more than one person could result in serious injury.

Occupants of adjustable seats should position and lock their seats before fastening their restraint system. Restraint belts can be lengthened before use by grasping the sides of the link on the link half of the belt and pulling against the belt. Then, after locking the belt link into the belt buckle, the belt can be tightened by pulling the free end. The belt is released by pulling upward on the top of the buckle. Restraint systems must be fastened anytime the airplane is in motion. Before takeoff, the pilot should brief all passengers on the proper use, including the method of unlatching the entire restraint system, in the event that emergency egress from the airplane is necessary.

Small children must be secured in an approved child restraint system as defined in FAR 91.107 "Use of safety belts, shoulder harnesses, and child restraint systems". The pilot should know and follow the instructions for installation and use provided by the seat manufacturer. The child restraint system should be installed in an aircraft seat other than a front seat. If the child restraint system is installed in a front seat, the pilot must ensure that it does not interfere with full control movement or restrict access to any aircraft controls. Also, the pilot should consider whether the child restraint system could interfere with emergency egress. Refer to AC 91-62A, "Use of Child Seats In Aircraft" for more information.

If shoulder restraints are not installed, kits are available from Cessna or from other approved sources. Cessna strongly recommends the installation of shoulder harnesses.



## **SEAT STOPS/LATCHES**

The pilot should visually check the seat for security on the seat tracks and assure that the seat is locked in position. This can be accomplished by visually ascertaining pin engagement and physically attempting to move the seat fore and aft to verify the seat is secured in position. Failure to ensure that the seat is locked in position could result in the seat sliding aft during a critical phase of flight, such as initial climb. Mandatory Service Bulletin SEB89-32 installs secondary seat stops and is available from Cessna.

The pilot's seat should be adjusted and locked in a position to allow full rudder deflection and brake application without having to shift position in the seat. For takeoff and landing, passenger seat backs should be adjusted to the most upright position.

## **SECURITY IN AFT-FACING SEATS**

Some aft-facing seats are adjustable fore and aft, within the limits of the seat stops. Ensure the seat stop pins are engaged with the holes in the seat tracks before takeoff and landing. The restraint system should be worn anytime the seat is occupied. Assure that the seats are installed in the correct positions. Approved seat designs differ between forward-facing and rear-facing seats and proper occupant protection is dependent upon proper seat installation.



## FUEL SYSTEM CONTAMINATION

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### ADEQUATE PREFLIGHT OF THE FUEL SYSTEM

A full preflight inspection is recommended before each flight for general aviation airplanes. Inspection procedures for the fuel system must include checking the quantity of fuel with the airplane on level ground, checking the security of fuel filler caps and draining the fuel tank sumps, fuel reservoir(s), fuel line drain(s), fuel selector drains, and fuel strainer(s). To ensure that no unsampled fuel remains in the airplane, an adequate sample of fuel from the fuel strainer must be taken with the fuel selector valve placed in each of its positions (BOTH, LEFT, RIGHT, etc.). Some Cessna airplanes are equipped with a fuel reservoir(s). If so equipped, the pilot should be aware of the location of the fuel reservoir(s) and its drain plug or quick-drain. The fuel reservoir(s) on most single-engine airplanes is located near the fuel system low point where water will accumulate. Therefore, the fuel reservoir(s) must be drained routinely during each preflight inspection. Periodically check the condition of the fuel filler cap seals, pawls, and springs for evidence of wear and/or deterioration which indicates a need for replacement. Check fuel cap adapters and seals to insure that the sealing surfaces are clean and not rusted or pitted. Deformed pawls may affect the sealing capabilities of the seals and/or cause it to be exposed to detrimental weather elements. Precautions should be taken to prevent water entry into fuel tanks, due to damaged filler caps and every effort made to check and remove all water throughout the fuel system. Umbrella caps will assist in preventing water entry into the fuel tank through the fuel filler.

It is the pilot's responsibility to ensure that the airplane is properly serviced before each flight with the correct type of fuel. The pilot must take the time to inspect the airplane thoroughly, making sure all of the fuel filler caps are installed and secured properly after visually checking the fuel quantity with the airplane on level ground. During the check of the fuel tanks, observe the color and odor of the fuel while draining a generous sample from each sump and drain point into a transparent container. Check for the presence of water, dirt, rust, or other contaminants. Never save the fuel sample and risk the possibility of contaminating the system. Also, ensure that each fuel tank vent is clear of restrictions (i.e., dirt, insect nests, ice, snow, bent or pinched tubes, etc.). Refer to the airplanes Maintenance Manual for fuel tank vent removal and inspection if needed.

## **PROPER SAMPLING FROM QUICK DRAINS**

The fuel system sumps and drains should always be drained and checked for contaminants after each refueling and during each preflight inspection. Drain at least a cupful of fuel into a clear container to check for solid and/or liquid contaminants, and proper fuel grade. If contamination is observed, take further samples at all fuel drain points until fuel is clear of contaminants; then, gently rock wings and, if possible, lower the tail to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If excessive sampling is required, completely defuel, drain and clean the airplane fuel system, and attempt to discover where or how the contamination originated before the airplane flies again. Do not fly the airplane with contaminated or unapproved fuel. If an improper fuel type is detected, the mandatory procedure is to completely defuel and drain the fuel system.

Extra effort is needed for a proper preflight of all fuel drains on a float plane. If water is detected after rocking the wings and lowering the tail, the aircraft should not be flown until after the fuel system is completely drained and cleaned.

## **80 versus 100 OCTANE FUEL**

When 80 octane (red) fuel began to be replaced by 100LL (blue) there was concern about the service life expectancy of low compression engines. It was claimed that some engines experienced accelerated exhaust valve erosion and valve guide wear from the use of highly leaded 100/130 (green) avgas in engines that were rated to use a minimum grade of 80 octane fuel. Engine manufacturers have provided amended operating procedures and maintenance schedules to minimize problems resulting from the use of high lead 100/130 avgas. Experience has now proven that low-compression aircraft engines can be operated safely on 100LL avgas providing they are regularly operated and serviced in accordance with the operating handbook or other officially approved document.

## **AVGAS versus JET FUEL**

Occasionally, airplanes are inadvertently serviced with the wrong type of fuel. Piston engines may run briefly on jet fuel, but detonation and overheating will soon cause power failure. All piston-engine airplanes should have fuel filler restrictors installed to prevent jet fuel from being pumped into the fuel tanks. An engine failure caused by running a turbine engine on the wrong fuel may not be as sudden, but prolonged operation on avgas will severely damage the engine because of the lead content and differing combustion temperature of the fuel. Time limitations for use of avgas in turbine engines are listed in the operating handbook.

## **AUTOMOTIVE GASOLINE/FUEL**

Never use automotive gasoline in an airplane unless the engine and airplane fuel system are specifically certified and approved for automotive gasoline use. The additives used in the production of automotive gasoline vary widely throughout the petroleum industry and may have deteriorating effects on airplane fuel system components. The qualities of automotive gasoline can induce vapor lock, increase the probability of carburetor icing, and can cause internal engine problems.

## **FUEL CAP SECURITY**

The consequence of a missing or incorrectly installed fuel filler cap is inflight fuel siphoning. Inflight siphoning may distort the fuel cell on some airplanes with bladder-type fuel cells. This distortion will change the fuel cell capacity, and may interfere with the operation of the fuel quantity indicator sensing mechanism inside the cell. This condition will generally cause an erroneous and misleading fuel quantity reading and may result in incomplete filling for the next flight.

## **CONTAMINATION**

Solid contamination may consist of rust, sand, pebbles, dirt, microbes or bacterial growth. If any solid contaminants are found in any part of the fuel system, drain and clean the airplane fuel system. Do not fly the airplane with fuel contaminated with solid material.

Liquid contamination is usually water, improper fuel type, fuel grade, or additives that are not compatible with the fuel or fuel system components. Liquid contamination should be addressed as set forth in the section entitled "Proper Sampling from Quick Drains", and as prescribed in the airplane's approved flight manual.

## **FUEL PUMP OPERATION**

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### **AUXILIARY FUEL PUMP OPERATION - GENERAL**

The engine-driven fuel pump is designed to supply an engine with a steady, uninterrupted flow of fuel. Temperature changes, pressure changes, agitation in the fuel lines, fuel quality, and other factors can cause a release of vapor in the fuel system. Some airplanes (single and multi-engine) incorporate an auxiliary fuel pump to reduce excess fuel vapor in the fuel supply for each engine. This pump is also used to ensure that a positive supply of fuel is available in the event the engine driven fuel pump should fail.

### **FUEL VAPOR**

Under hot, high altitude conditions, or in situations during a climb that are conducive to fuel vapor formation, it may be necessary to utilize the auxiliary fuel pump(s) to attain or stabilize the fuel flow required for proper engine operation. Use the auxiliary fuel pump(s) in all conditions where there is any possibility of excessive fuel vapor formation or temporary disruption of fuel flow in accordance with operating handbook procedures.

### **SINGLE ENGINE FUEL PUMP OPERATION (CARBURETED ENGINE)**

On some carbureted, high wing, single engine airplanes, the auxiliary fuel pump should be turned on anytime the indicated fuel pressure falls below the minimum. Typically this would only occur in an extreme climb attitude following failure of the engine driven fuel pump. Consult the operating handbook of the affected model for a detailed description of the procedure.

### **SINGLE ENGINE FUEL PUMP OPERATION (PRECISION/BENDIX FUEL INJECTED ENGINE)**

The auxiliary fuel pump is used primarily for priming the engine before starting. Priming is accomplished through the regular injection system. If the auxiliary fuel pump switch is placed in the ON position for prolonged periods with the master switch turned on, the mixture rich, and the engine stopped, the intake manifolds will become flooded.

The auxiliary fuel pump is also used for vapor suppression in hot weather. Normally, momentary use will be sufficient for vapor suppression. Turning on the auxiliary fuel pump with a normally operating engine pump will result in enrichment of the mixture. The auxiliary fuel pump should not be operated during takeoff and landing, since gravity and the engine driven fuel pump will supply adequate fuel flow to the fuel injector unit. In the event of failure of the engine driven fuel pump, use of the auxiliary fuel pump will provide sufficient fuel to maintain flight at maximum continuous power.

To ensure a prompt engine restart after running a fuel tank dry, switch the fuel selector to the opposite tank at the first indication of fuel flow fluctuation or power loss. Turn on the auxiliary fuel pump and advance the mixture control to full rich. After power and steady fuel flow are restored, turn off the auxiliary fuel pump and lean the mixture as necessary.

## **SINGLE ENGINE FUEL PUMP OPERATION (TCM FUEL INJECTED ENGINE)**

The auxiliary fuel pump on single engine airplanes is controlled by a split rocker type switch labeled AUX PUMP. One side of the switch is red and is labeled HI; the other side is yellow and is labeled LO.

The LO side operates the pump at low speed, and, if desired, can be used for starting or vapor suppression. The HI side operates the pump at high speed, supplying sufficient fuel flow to maintain adequate power in the event of an engine driven fuel pump failure. In addition, the HI side may be used for normal engine starts, vapor elimination in flight, and inflight engine starts.

When the engine driven fuel pump is functioning and the auxiliary fuel pump is placed in the HI position, a fuel/air ratio considerably richer than best power is produced unless the mixture is leaned. Therefore, the auxiliary fuel pump must be turned off during takeoff or landing, and during all other normal flight conditions. With the engine stopped and the battery switch on, the cylinder intake ports can become flooded if the HI or LO side of the auxiliary fuel pump switch is turned on.

In hot, high altitude conditions, or climb conditions that are conducive to fuel vapor formation, it may be necessary to utilize the auxiliary fuel pump to attain or stabilize the fuel flow required for the type of climb being performed. Select either the HI or LO position of the switch as required, and adjust the mixture to the desired fuel flow. If fluctuating fuel flow (greater than 5 lbs/hr) is observed, place the auxiliary fuel pump switch in the HI or LO position as required to clear the fuel system of vapor. The auxiliary fuel pump may be operated continuously in cruise, if necessary, but should be turned off prior to descent. Each time the auxiliary fuel pump switch is turned on or off, the mixture should be readjusted.

## **MULTI-ENGINE FUEL PUMP OPERATION**

Cessna multi-engine, low wing airplanes utilize engine driven fuel pumps to assist the continuous flow of fuel to the engine. As a general rule, the auxiliary fuel pumps should be utilized under the following conditions:

1. Every takeoff.
2. Initial climb after takeoff (unless the operating handbook indicates that it is not necessary).
3. When switching the fuel selector(s) from one tank to another.
4. Every approach and landing.
5. Anytime the fuel pressure is fluctuating and the engine is affected by the fluctuation.
6. During hot weather, such as hot engine ground operation where fuel vapor problems cause erratic engine operation.
7. High altitude. (For auxiliary fuel pump operation at high altitude consult the operating handbook.)
8. If the engine driven fuel pump should fail.
9. On some twins when using the auxiliary fuel tanks.

If the auxiliary fuel pump is used during ground operations, such as hot day engine starts or purging fuel vapor, pilots should check the condition of the engine driven fuel pump before takeoff by turning the auxiliary fuel pump OFF briefly, and then back ON for takeoff. If the engine driven fuel pump has failed, the engine will not continue to operate.

If the battery or master switch is on while an engine is stopped on the ground or in flight, the cylinder intake ports can become flooded if the auxiliary fuel pump is turned on. If this situation occurs in excess of 60 seconds, the cylinders must be purged as follows:

1. With the auxiliary fuel pump OFF, allow the induction manifold to drain at least five minutes or until fuel ceases to flow from the drains on the bottom of the engine.
2. If natural draining has occurred, ensure that the auxiliary fuel pump is OFF, the magnetos or ignition switch is OFF, the mixture is in IDLE CUT-OFF, and the throttle is FULL OPEN, then turn the engine with the starter .
3. If natural draining has not occurred, perform maintenance as required.

A mandatory service bulletin (MEB88-3) was issued to replace the automatic fuel pressure sensing and the cockpit auxiliary fuel pump switches for each engine with three-position lever lock type toggle switches. These modifications provide direct pilot activation of the auxiliary fuel pumps.

On low wing multi-engine airplanes (except model 310, 310A, and 310B, which are not affected by this change), the switches are labeled AUX PUMP, L (left engine) and R (right engine) and switch positions are labeled LOW, OFF, and HIGH. The LOW position operates the auxiliary fuel pumps at low pressure

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# PILOT SAFETY AND WARNING SUPPLEMENTS

and can be used, when required, to provide supplementary fuel pressure for all normal operations. The switches are OFF in the middle position. The HIGH position is reserved for emergency operation, and operates the pumps at high pressure. The switches are locked out of the HIGH position and the switch toggle must be pulled to clear the lock before it can be moved to the HIGH setting. The toggle need not be pulled to return the switch to OFF.

The LOW position of the auxiliary fuel pump switches should be used whenever an original manual/handbook or checklist procedure specifies either LOW (PRIME, in 310C, 310D, 310F, 310G, 310H, 320, and 320A.) or ON. The LOW position is also used anytime there are indications of vapor, as evidenced by fluctuating fuel flow. Auxiliary fuel pumps, if needed, are to be operated on LOW in all conditions except when an engine driven fuel pump fails.

The HIGH position supplies sufficient fuel flow to sustain partial engine power and should be used solely to sustain the operation of an engine in the event its engine driven fuel pump fails. Failure of an engine driven fuel pump will be evidenced by a sudden reduction in the fuel flow indication immediately prior to a loss of power while operating from a fuel tank containing adequate fuel. In an emergency, where loss of an engine driven fuel pump is involved, pull the applicable auxiliary fuel pump switch to clear the lock and select the HIGH position. Then adjust the throttle and mixture controls to obtain satisfactory operation. At high manifold pressure and RPM, auxiliary fuel pump output may not be sufficient for normal engine operation. In this case, reduce manifold pressure to a level compatible with the indicated fuel flow. At low power settings, the mixture may have to be leaned for smooth engine operation. If HIGH auxiliary pump output does not restore adequate fuel flow, a fuel leak may exist. The auxiliary pump should be shut off and the engine secured.

If the auxiliary fuel pump switches are placed in the HIGH position with the engine-driven fuel pump(s) operating normally, total loss of engine power may occur due to flooding.

When performing single engine operations, the auxiliary fuel pump of the engine to be shutdown should be turned OFF prior to any intentional engine shutdown, to preclude fuel accumulation in the engine intake system.

In models 310, 310A, and 310B, which are equipped with pressure type carburetors, the electric fuel boost pumps in the tanks provide a positive fuel flow as emergency pumps in the event of failure of the engine driven fuel pumps. They also provide fuel pressure for priming and starting. The boost pumps are operated by two electric switches, and the up position is ON. Always take off and land with these pumps turned ON. Anytime the boost pumps are turned on without the engines running, mixture controls must be in the idle cut-off position to prevent flooding the intake manifolds.



## **CENTERLINE THRUST TWINS (FUEL PUMP OPERATION)**

The auxiliary fuel pumps on the centerline thrust models (336 and 337 Skymaster) are controlled by two split rocker type switches. The switches are labeled AUX PUMPS and F ENGINE R. One side of each switch is red and is labeled HI. The other side is yellow and is labeled LO. The LO side operates the pumps at low speed, and if desired, can be used for starting or vapor suppression. The HI side operates the pumps at high speed, supplying sufficient fuel flow to maintain adequate power in the event of an engine driven fuel pump failure. In addition, the HI side may be used for normal engine starts, vapor elimination in flight, and inflight engine starts.

When the engine driven fuel pump is functioning and the auxiliary fuel pump is placed in the HI position, a fuel/air ratio considerably richer than best power is produced unless the mixture is leaned. Therefore, these switches must be turned OFF during takeoff or landing, and during all other normal flight conditions. With the engine stopped and the battery switch ON, the cylinder intake ports can become flooded if the HI or LO side of the auxiliary fuel pump switch is turned on.

In hot, high altitude conditions, or climb conditions that are conducive to fuel vapor formation, it may be necessary to utilize the auxiliary fuel pumps to attain or stabilize the fuel flow required for the type of climb being performed. Select either the HI or LO position of the switches as required, and adjust the mixtures to the desired fuel flow. If fluctuating fuel flow (greater than 5 lbs/hr) is observed, place the appropriate auxiliary fuel pump switch in the HI or LO position as required to clear the fuel system of vapor. The auxiliary fuel pump may be operated continuously in cruise, if necessary, but should be turned off prior to descent. Each time the auxiliary fuel pump switches are turned on or off, the mixtures should be readjusted.

## AUXILIARY FUEL TANKS

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Many twin engine Cessna airplanes incorporate auxiliary fuel tanks to increase range and endurance. These tanks are usually bladder type cells located symmetrically in the outboard wing areas and contain no internal fuel pumps. When selected, the fuel from these tanks is routed to the engine driven fuel pump.

If the auxiliary fuel tanks are to be used, the pilot must first select main tank (tip tank) fuel for at least 60 minutes of flight (with use of 40-gallon auxiliary fuel tanks) or 90 minutes of flight (with use of 63-gallon auxiliary fuel tanks). This is necessary to provide space in the main fuel tanks for vapor and fuel returned from the engine driven fuel pumps when operating on the auxiliary fuel tanks. If sufficient space is not available in the main tanks for this returned fuel, the tanks can overflow through the overboard fuel vents. Since part of the fuel from the auxiliary fuel tanks is diverted back to the main tanks instead of being consumed by the engines, the auxiliary tanks will empty sooner than may be anticipated. However, the main tank volume or quantity will be increased by the returned fuel.

The fuel supply in the auxiliary fuel tanks is intended for use during cruise flight only. The shape of the auxiliary fuel tanks is such that during certain flight maneuvers, the fuel will move away from the fuel tank outlet. If the outlet is uncovered while feeding the engine, fuel flow to the engine will be interrupted and a temporary loss of power may result. Because of this, operation from the auxiliary fuel tanks is not recommended below 1000 feet AGL.

An optional auxiliary fuel tank may be installed on some centerline thrust twins (336 and 337 Skymaster). The system consists of two tanks, each containing 18 gallons (108 pounds) usable, one located in each inboard wing panel. The tanks feed directly to the fuel selector valves. The left auxiliary tank provides fuel to the front engine only and the right auxiliary tank provides fuel to the rear engine only. Fuel quantity for the auxiliary tanks is read on the same fuel quantity indicators used for the main fuel tanks. This is accomplished when the fuel selector valve handles are turned to the AUXILIARY position. As each selector valve handle is turned to this position, it depresses a gaging button, labeled PUSH TO GAGE, located in the AUXILIARY quadrant of the fuel selector valve placard. The depressed button actuates a microswitch and electrically senses auxiliary fuel rather than main fuel quantity. Auxiliary fuel quantity can be checked without changing the selector valve handle, by depressing the PUSH TO GAGE button manually. Depressing the gaging button, either manually or by rotating the selector valve handle to the AUXILIARY position, will illuminate the amber AUX FUEL ON indicator lights mounted above the engine instrument cluster. When fuel is being used from the auxiliary fuel tanks, any excess fuel and vapor from the engine driven pumps is returned to fuel line manifolds. The returned vapor passes through the fuel line manifolds to the vent lines and is routed overboard. The excess

fuel passes into the fuel line manifold and is returned to the engine driven pumps.

On some early model Skymasters, fuel vapor from the engine driven fuel pumps is returned to the main fuel tanks. When the selector valve handles are in the AUXILIARY position, the left auxiliary tank feeds only the front engine and the right auxiliary tank feeds only the rear engine. If the auxiliary tanks are to be used, select fuel from the main tanks for 60 minutes prior to switching to auxiliary tanks. This is necessary to provide space in the main tanks for vapor and fuel returned from the engine driven fuel pumps when operating on auxiliary tanks. On some models, auxiliary fuel boost pumps are not provided for the auxiliary fuel tank. Therefore it is recommended to use the auxiliary fuel tanks only in straight and level flight. When unsure of the type of auxiliary tank installation, consult the operating handbook for the respective airplane.

A few single-engine airplanes contain an auxiliary fuel tank. The system's main components include a fuel tank installed on the baggage compartment floor and an electric fuel transfer pump. The auxiliary fuel system is plumbed into the right main fuel tank.

To use the auxiliary fuel system, select the right wing fuel tank in cruise and operate on that tank until the fuel tank has adequate room for the transfer of auxiliary fuel. After selecting the left main tank, turn on the auxiliary fuel transfer pump to refill the right main fuel tank from the auxiliary tank. Transfer will take from 45 minutes to 1 hour. Prior to transfer, ensure that adequate fuel is available in the left tank to allow time for the auxiliary tank to transfer.

Do not operate the transfer pump with the fuel selector valve turned to either the BOTH or RIGHT positions. Total or partial engine stoppage will result from air being pumped into fuel lines after fuel transfer has been completed. If this should occur the engine will restart in 3 to 5 seconds after turning off the transfer pump, as the air in the fuel line will be evacuated rapidly.

After transfer is complete and the pump has been turned off, the selector may be returned to BOTH or RIGHT. Takeoff, climb, and landing should always be conducted with the selector in the BOTH position for maximum safety.

## WING LOCKER FUEL TANK USAGE

Some twins may have wing locker fuel tanks installed in the forward portion of each wing locker baggage area. These tanks are bladder type cells for storage of extra fuel to supplement the main tank fuel quantity. The fuel in these tanks cannot be fed directly to the engines. Instead, it has to be transferred to the main tanks by wing locker fuel transfer pumps. Fuel transfer should begin as soon as adequate volume is available in the main fuel tanks to hold the wing locker fuel. Waiting until the main tanks are low before transferring wing locker fuel does not allow early recognition of possible failure to transfer.

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## PILOT SAFETY AND WARNING SUPPLEMENTS

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If wing locker fuel is to be used, consult the operating handbook for the quantity of main tank fuel which must first be used in the respective main tank for the transferred wing locker fuel. This will prevent overflowing of the main tank(s) when transferring the wing locker fuel.

Wing locker fuel transfer pump switches are provided to manually control the transfer of the wing locker fuel to the main tanks. These switches should be turned ON only to transfer fuel and turned OFF when indicator lights illuminate to show that fuel has been transferred. The transfer pumps use the fuel in the wing locker tank for lubrication and cooling. Therefore, transfer pump operation after fuel transfer is complete will shorten the life of the pump. Fuel should be cross fed, as required, to maintain fuel balance.

## INSTRUMENT POWER

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### VACUUM POWER FAILURES

Many airplanes may be equipped with some type of back-up vacuum system for operation in the event the primary vacuum system becomes inoperative in flight. The backup system may be in the form of another engine-driven vacuum pump, in parallel with the primary pump, or an electric standby vacuum pump, also in parallel with the primary pump, or both. If a back-up system is not available and the attitude and directional indicators are disabled, the pilot must rely on partial instrument panel operation. This may include using the electrically-powered turn coordinator or turn and bank indicator and the magnetic compass, altimeter, airspeed indicator, and rate of climb indicator.

A suction gage, and in some airplanes a low-vacuum warning light, provides a means of monitoring the vacuum system for proper operation in flight. Operating handbooks reflect a desired suction range during normal operation of the airplane. A suction reading outside of this range may indicate a system malfunction, and in this case, the vacuum driven instruments should not be considered reliable. Whenever operation of the airplane's vacuum system is in doubt, land when practical for repairs.

In the event of a directional indicator and attitude indicator failure due to vacuum failure, the pilot must rely on partial instrument panel operation using the remaining instruments. VFR operations can generally be conducted satisfactorily without the vacuum instruments. However, instrument meteorological conditions (IMC) can be considerably more challenging. An instrument rated pilot should stay current on partial panel flying skills but both VFR and IFR pilots should maintain VFR conditions if a vacuum failure occurs while clear of clouds. All pilots should become familiar with the following procedure for executing a 180° turn in clouds with the aid of either the turn coordinator or the turn and bank indicator.

Upon inadvertently entering clouds, maintain control of the aircraft. If it is desired to turn back out of the clouds, the following action should be employed:

1. Note the compass heading.
2. Note the time in both minutes and seconds.
3. When the seconds indicate the nearest half minute, initiate a standard rate left turn, holding the turn coordinator or turn and bank indicator (if installed) symbolic airplane wing opposite the lower left index mark for 60 seconds. Then roll back to level flight by leveling the miniature airplane.
4. Check accuracy of turn by observing the compass heading which should be the reciprocal of the original heading.

5. If necessary, adjust heading primarily with skidding motions rather than rolling motions so that the compass will read more accurately.
6. Maintain altitude and airspeed by cautious application of elevator control. Avoid over controlling by keeping the hands off the control wheel as much as possible and steering only with the rudder.

If conditions dictate, a descent through a cloud deck to VFR conditions may be appropriate. 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 conditions as follows:

1. Extend landing gear (if applicable).
2. Enrichen the fuel mixture.
3. Use full carburetor heat (if applicable).
4. Reduce power to set up a 500 to 800 ft/min rate of descent.
5. Adjust the elevator trim and rudder trim (if installed) for a stabilized descent at 5 to 20 knots above the best glide speed for the airplane.
6. Keep hands off the control wheel.
7. Monitor turn coordinator and make corrections by rudder alone.
8. Check trend of compass card movement and make cautious corrections with rudder to stop the turn.
9. Upon breaking out of clouds, resume normal cruise flight.

## **ELECTRICAL POWER FAILURES**

Many operating handbooks have emergency procedures for partial or total loss of electrical power in flight. These procedures should be reviewed periodically to remain knowledgeable of what to do in the event of an electrical problem. The pilot should maintain control of the airplane and land when practical if an electrical power loss is evident.

Early detection of an electrical power supply system malfunction can be accomplished by periodically monitoring the ammeter and, if equipped, low-voltage warning light. The cause of these malfunctions is difficult to determine in flight. Common causes of alternator or generator failure are a broken drive belt, alternator or generator drive, a defective alternator control unit or voltage regulator or wiring. Problems of this nature constitute an electrical emergency and should be addressed immediately.

If alternator power cannot be restored, and a second or back up alternator is not available, the pilot must rely on the limited power of the battery only. Every effort should be made to conserve electrical power for use with the most essential equipment, such as communication and navigation radios, by turning off or not using any non-essential equipment. Electric or electro-hydraulic landing gear systems should be extended manually and flaps (if electrically



operated) should remain retracted during approach and landing to conserve battery power, especially in instrument conditions.

If an electrical power loss is experienced, continued flight is possible but should be terminated as soon as practical. Such things as fuel quantity and engine temperature indicators and panel lights may no longer work. Hand-held nav/comm radios and other such products are widely available and marketed for just such a scenario; otherwise navigation by pilotage and appropriate loss of communication procedures for the airspace involved should be conducted. The pilot should always have a flashlight available for night flights.

## **LOSS OF PITOT/STATIC SOURCES**

A thorough preflight inspection should reveal any blockage of the pitot tube, drain hole, or static port on the ground to allow corrective action to be taken prior to flight. Pilots should understand the various conditions and remedies associated with a loss of pitot-static sources.

Pitot heat should be used whenever flying in visible moisture and the temperature is near freezing. If airspeed is suspected to be in error while flying in possible icing conditions with the pitot heat on, the pitot heat switch should be cycled and the circuit breaker should be checked. If proper operation cannot be restored, the airspeed indicator must be considered unreliable.

If the pitot tube ram air inlet becomes blocked, the airspeed will drop to zero. If this blockage cannot be removed in flight, the pilot must rely on pitch attitude and power settings to maintain a safe airspeed. A slightly higher than normal power setting should be used to maintain a reasonable margin of extra airspeed on final.

When flying in clear ice conditions and pitot heat is unavailable, both the ram air inlet and the pitot drain hole could become blocked. This will cause the airspeed indicator to react like an altimeter, indicating a higher airspeed at higher altitudes and a lower airspeed at lower altitudes. The airspeed indicator must be ignored. A higher power setting appropriate to the overall icing problem should be used during the landing phase.

Many light single engine airplanes equipped with pitot heat may not be equipped with static source heat. If the static source becomes blocked, the airspeed indicator will still function, but will give erroneous indications. If the airplane climbs after the blockage occurs, the airspeed indicator will indicate lower than normal. If the airplane descends after the blockage occurs, the airspeed will indicate higher than actual. During the landing phase, this condition could deceive the pilot into thinking the airspeed is too high. The altimeter and vertical speed indicator will also be affected by a static source blockage. The altimeter will not indicate a change of altitude and the vertical speed indicator will indicate zero airspeed. Neither instrument will reflect any altitude changes.

Many airplanes are equipped with an alternate static air source vented within the cabin area. If static port blockage is suspected, the alternate static source should be selected. The cabin pressure will be slightly lower than ambient air, but will provide a reasonable level of accuracy to the pitot static system. With slightly less dense air in the cabin, the airspeed indicator and altimeter will both show slightly higher than normal indications.

If the airplane is not equipped with an alternate static source, and pitot/static instruments are essential for continued flight, the glass on the vertical speed indicator may be broken to provide cabin air to the static system lines. The vertical speed indicator will no longer be reliable, but the airspeed indicator and altimeter will be functional again, with slightly higher than normal indications.

## **GYRO SPIN UP AND SPIN DOWN**

Gyro instruments, such as attitude and directional indicators, contain a high-speed rotor assembly driven by either electric or vacuum power. These instruments normally operate at very high RPM and can take up to 10 minutes or more to spin down after power is removed. Although some gyro instruments have a "quick erect" mechanism to permit manual erection of the rotor, which effectively minimizes time required before use, some gyro instruments still require up to 5 minutes or more to spin up and stabilize after power is applied. During this spin up or spin down time, the gyro instruments should not be considered reliable. A failed gyro can be detected by first checking the suction gage and, if available, low-voltage or low-vacuum lights as applicable and, second, checking for slow or erratic indications of the gyro instruments by cross-referencing with other flight instruments for contradictory indications.

## **FAILED GYRO EFFECT ON AUTOPILOT**

Some autopilot systems receive roll and/or yaw rate inputs from the electrically-driven turn coordinator or turn and bank indicator. Other autopilot systems depend on vacuum-driven attitude and directional indicators for horizontal and azimuth reference. If a failure should occur in any of these instruments, the autopilot should be turned off. Random signals generated by a malfunctioning gyro could cause the autopilot to position the airplane in an unusual attitude. Use of the autopilot after a gyro failure may result in an out of trim condition. Be prepared to correct for this when turning off the autopilot.

## ALTERNATE AIR SYSTEM

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An alternate source of air is provided to ensure satisfactory engine operation in the event the normal induction air filter or air inlet becomes obstructed. Although alternate air controls vary from one airplane to another, the types are: carburetor heat, direct manual control, automatic control, or a combination of automatic and manual controls. In most cases, the alternate air is extracted from inside the engine cowling and is, therefore, unfiltered and hotter than normal induction air. A loss of power will be caused by the hotter air. The richer mixture may require adjustment of the mixture control. Consult the applicable airplane operating handbook for details concerning the use of the alternate air system.

### CARBURETOR HEAT AND INDUCTION ICING

Carburetor heat and manually operated alternate air valve(s) are controlled by the pilot. The carburetor heat system uses unfiltered air from inside the engine cowling. This air is drawn into a shroud around an exhaust riser or muffler and then ducted to the carburetor heat valve in the induction air manifold. The carburetor heat valve is controlled by the pilot and should be used during suspected or known carburetor icing conditions. Carburetor heat may also be used as an alternate air source should the induction air inlet or induction air filter become blocked for any reason.

The use of full carburetor heat at full throttle usually results in a 1 to 2 inch loss of manifold pressure or a loss of approximately 150 RPM, depending upon the airplane model. Application or removal of carburetor heat at higher power settings may require adjustment of the fuel mixture. It may be impractical to lean the mixture under low engine power conditions.

When a go-around or balked landing is initiated after use of carburetor heat during the landing approach, the pilot should usually advance the throttle first, then move the carburetor heat to off or cold. The throttle application must be smooth and positive. Rapid throttle advancement in some icing conditions could result in the engine failing to respond and the loss of power could become critical because of the low altitude and low airspeed.

When the relative humidity is more than 50 percent and the ambient air temperature is between 20°F to 90°F, it is possible for ice to form inside the carburetor, since the temperature of the air passing through the venturi may drop as much as 60°F below the ambient air temperature. If not corrected, ice accumulation may cause complete engine stoppage.

A drop in engine RPM on fixed pitch propeller airplanes and a drop in engine manifold pressure on constant speed propeller airplanes are indications of

carburetor ice. If the airplane is equipped with a carburetor air temperature gage, the possibility of carburetor ice may be anticipated and prevented by maintaining the recommended amount of heat during cruise and letdown. Without the indications of a carburetor air temperature gage for reference, a pilot should use only the full heat or full cold position. An unknown amount of partial heat can cause carburetor ice. This can occur when ice that would ordinarily pass through the induction system is melted by partial carburetor heat and the water droplets then refreeze upon contact with the cold metal of the throttle plate. A carburetor air temperature gage may allow partial carburetor heat use, resulting in less power loss.

## **ALTERNATE AIR FOR FUEL INJECTED ENGINE ICING**

Either an automatic alternate air system, a manually controlled alternate air system, or a combination automatic and manual system are incorporated on most fuel injected engines to address the potential of a blocked air induction system.

On engines equipped with automatic alternate air, ram air from the engine cowling inlet enters an air filter, which removes dust and other foreign matter that would be harmful to the engine. If the air inlet or the induction air filter should become blocked, suction created by the engine will open an alternate air door, allowing air to be admitted from either inside or outside the cowling, depending upon the airplane model. This air bypasses the filter and will result in a slight decrease in full throttle manifold pressure on non-turbocharged engines, and a notable decrease in manifold pressure from the selected cruise power setting on turbocharged engines. This manifold pressure may be recoverable, up to a particular altitude, with throttle and/or RPM adjustment. The alternate air doors should be kept closed on the ground to prevent engine damage caused by ingesting debris through the unfiltered air ducts. For details concerning a specific model, consult the airplane operating handbook.

Most twin engine airplanes have a manually controlled alternate air door in each engine induction air system. If a decrease in manifold pressure is experienced when flying in icing conditions, the alternate air doors should be manually opened. On most twins, this manual control has two positions. When fully in, normal filtered ram air is provided; when fully out, warm unfiltered air from inside the cowling is provided. Other twins have alternate air controls with an additional intermediate or center detent to provide cool, unfiltered ram air to the induction system in the event the induction air filter is blocked by matter other than ice.

Since the higher intake air temperature of the alternate air results in a decrease in engine power and turbocharger capability, it is recommended that the alternate induction air not be utilized until indications of induction air blockage (decreased manifold pressure) are actually observed.

If additional power is required, the pilot should increase RPM as required, move the throttles forward to maintain desired manifold pressure and readjust the fuel mixture controls as required. These recommendations do not replace the procedure in the airplane operating handbook.

Although most pilots are aware of the potential of carburetor to icing, many may think that a fuel injected engine is not subject to induction icing. Although a fuel injected engine will not form carburetor ice, other parts of the induction system such as bends in the system or the air filter can gather ice. Slush and/or snow can block the induction air filter. Induction air blockage can cause loss of manifold pressure or engine stoppage.



## **CARBON MONOXIDE**

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Carbon monoxide is a colorless, odorless, tasteless product of an internal combustion engine and is always present in exhaust fumes. Even minute quantities of carbon monoxide breathed over a long period of time may lead to dire consequences. Carbon monoxide has a greater ability to combine with the blood than oxygen. Once carbon monoxide is absorbed in the blood, it prevents the oxygen from being absorbed.

The symptoms of carbon monoxide poisoning are difficult to detect by the person afflicted and may include blurred thinking, a feeling of uneasiness, dizziness, headache, and loss of consciousness. If any of these symptoms occur, immediately open all cabin vents and turn the cabin heater off. Land as soon as possible at the nearest airport and seek medical attention if needed.

### **HEATER OPERATION**

Many cabin heaters in general aviation airplanes operate by allowing ambient air to flow through an exhaust shroud where it is heated before being ducted into the cabin. Therefore, if anyone in the cabin smells exhaust fumes when using the cabin heater, immediately turn off the cabin heater and open all cabin vents. Land as soon as possible at the nearest airport and seek medical attention if needed.

### **WINDOW VENTILATION**

If carbon monoxide is suspected in the cabin at any time, it is imperative that immediate ventilation be initiated, including the opening of cabin windows. Observe the maximum speed for window opening in flight. Opening a cabin window is probably the best means of ventilating the cabin while on the ground. However, care should be taken when parked with engine(s) operating or when in the vicinity of other airplanes that have their engines running. The exhaust gases from your airplane or the other airplane could enter the cabin through the open window. Also, engine exhaust could be forced into the cabin area during taxi operations or when taxiing downwind.

## **PRESSURIZED AIRPLANES**

Refer to the operating handbook and/or approved flight manual for appropriate ventilation procedures.

## TURBOCHARGER

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When operating turbocharged engines, any power increases should be accomplished by increasing the propeller RPM first, then increasing the manifold pressure. Power reductions should be accomplished by reducing the manifold pressure first, then the RPM.

During cold weather operation, care should be exercised to insure that overboost does not occur during takeoff as a result of congealed oil in the waste gate actuating system. Before takeoff engine checks should not be accomplished until oil temperature is at least 75°F (minimum approved operating limit). Takeoff should not be started until oil temperature is above 100°F and oil pressure below 100 psi to assure proper oil flow to the turbocharger and its actuating system. Monitor manifold pressure during takeoff so as not to exceed specified takeoff limits. Advance the throttle slowly, pausing momentarily at approximately 30" MP to permit turbine speed to stabilize, then gradually open the throttle to obtain takeoff manifold pressure.

Prior to engine shut down, operate the engine at idle RPM for approximately 5 minutes to allow the turbocharger to cool and slow down. This reduces the possibility of turbine bearing coking caused by oil breakdown. This 5 minutes may be calculated from landing touchdown.

During pilot training, simulated engine out operation requiring the engine be shut down by closing the mixture should be held to an absolute minimum.

## TURBOCHARGER FAILURE

The turbocharger system's purpose is to elevate manifold pressure and thus engine power to a level higher than can be obtained without it. A failure of the system will cause either an overboost condition or some degree of power loss. An overboost can be determined on the manifold pressure instrument and can be controlled by a throttle reduction.

If turbocharger failure results in power loss, it may be further complicated by an overly rich mixture. This rich mixture condition may be so severe as to cause a total power failure. Leaning the mixture may restore partial power. Partial or total power loss may also be caused by an exhaust system leak. A landing should be made as soon as practical for either an overboost or partial/total power loss.



## IN-FLIGHT FIRES

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### FIRES IN FLIGHT

A preflight checklist is provided to aid the pilot in detecting conditions which could contribute to an airplane fire. Flight should not be attempted with known fuel, oil, or exhaust leaks, since they can lead to a fire. The presence of fuel or unusual oil or exhaust stains may be an indication of system leaks and should be corrected prior to flight.

Fires in flight must be controlled as quickly as possible by identifying and shutting down the affected system(s), then extinguishing the fire. Until this process is complete, the pilot should assume the worst and initiate action for an immediate landing. A pilot must not become distracted by the fire to the point that control of the airplane is lost. The pilot must be able to complete a deductive analysis of the situation to determine the source of the fire. Complete familiarity with the airplane and its systems will prove invaluable should a fire occur.

### ENGINE COMPARTMENT FIRES

An engine compartment fire is usually caused by fuel contacting a hot surface, an electrical short, bleed air leak, or exhaust leak. If an engine compartment fire occurs on a single engine airplane, the first step should be to shut off the fuel supply to the engine by placing the mixture to idle cut off and the fuel selector/shutoff valve to the OFF position. The ignition switch should be left ON in order for the engine to use up the fuel which remains in the fuel lines and components between the fuel selector/shutoff valve and the engine. The airplane should be put into a sideslip, which will tend to keep the flames away from the occupants and the fuel tanks. If this procedure is ineffective, the pilot must make the most rapid emergency descent possible and an immediate landing.

In multi-engine airplanes, **both** auxiliary fuel pumps should be turned off to reduce pressure in the total fuel system (each auxiliary fuel pump pressurizes a crossfeed line to the opposite fuel selector). If equipped, the emergency crossfeed shutoff should also be activated. The engine on the wing in which the fire exists should be shut down and its fuel selector positioned to OFF even though the fire may not have originated in the fuel system. The cabin heater draws fuel from the crossfeed system on some airplanes, and should be turned off as well. The engine compartment fire extinguisher should be discharged if the airplane is so equipped.

An open foul weather window or emergency exit may produce a low pressure in the cabin. To avoid drawing the fire into the cabin area, the foul weather

window, emergency exits, or any openable windows should be kept closed. This condition is aggravated on some models, with the landing gear and wing flaps extended. Therefore, it is recommended to lower the landing gear as late in the landing approach as possible. A no flap landing should also be attempted, if practical.

## **ELECTRICAL FIRES**

The initial indication of an electrical fire is usually the distinct odor of burning insulation. Once an electrical fire is detected, the pilot should attempt to identify the effected circuit by checking circuit breakers, instruments, avionics, etc. If the affected circuit cannot be readily detected and flight conditions permit, the battery/master switch and alternator switch(es) should be turned OFF to remove the possible sources of the fire. If at night, ensure the availability of a flashlight before turning off electrical power. Then, close off ventilating air as much as practical to reduce the chances of a sustained fire. If an oxygen system is available in the airplane and no visible signs of flame are evident, occupants should use oxygen until smoke clears.

If electrical power is essential for the flight, an attempt may be made to identify and isolate the effected circuit by turning the Master Switch and other electrical (except magneto) switches off and checking the condition of the circuit breakers to identify the affected circuit. If the circuit can be readily identified, leave it deactivated and restore power to the other circuits. If the circuit cannot be readily identified, turn the Master Switch on, and select switches that were on before the fire indication, one at a time, permitting some time to elapse after each switch is turned on, until the short circuit is identified. Make sure the fire is completely extinguished before opening vents. Land as soon as possible for repairs.

## **CABIN FIRES**

Fire or smoke in the cabin should be controlled by identifying and shutting down the affected system, which is most likely to be electrical in nature, and landing as soon as possible. Smoke may be removed by opening the cabin air controls. However, if the smoke increases in intensity when the air controls are opened, they should be closed as this indicates a possible fire in the heating system, nose compartment baggage area, or that the increase in airflow is aggravating this condition.

In pressurized airplanes, the pressurization air system will remove smoke from the cabin. However, if the smoke is intense, it may be necessary to either depressurize at altitude, if oxygen is available for all occupants, or execute an emergency descent to 10,000 feet, terrain permitting. "Ram Air Dump" handle may be pulled to aid the clearing of smoke from the cabin.

The pilot may choose to expel the smoke through the foul weather window(s). The foul weather window(s) should be closed immediately if the fire becomes more intense when the window(s) are opened. If smoke is severe, and there are no visible signs of flame, use oxygen masks (if installed) and begin an immediate descent.

If a fire extinguisher is used, ventilate the cabin promptly after extinguishing the fire to reduce the gases produced by thermal decomposition. If the fire cannot be extinguished immediately, land as soon as possible.

## IN-FLIGHT OPENING OF DOORS

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The occurrence of an inadvertent door opening is not as great of a concern to the safety of the flight, as the pilot's reaction to the opening. If the pilot is overly distracted, loss of airplane control may result even though disruption of airflow by the door is minimal. While the shock of a sudden loud noise and increase in sustained noise level may be surprising, mental preparation for this event and a plan of action can eliminate inappropriate pilot reaction.

### INADVERTENT OPENING OF BAGGAGE/CARGO DOORS

The flight characteristics of an airplane will not normally be affected by an open baggage or cargo door. The aerodynamic effects on an open door can vary, depending on the location of the door on the airplane and the method used to hinge the door in relation to the slipstream. Baggage/cargo doors mounted on the side of the aft fuselage and hinged at the front will tend to stay in a nearly closed position at most airspeeds and pose no special problems as long as the airplane is not in uncoordinated flight in a direction which would permit unsecured baggage to fall out of the airplane. Because of the door location and the presence of baggage in the immediate area, the door may not be accessible for closing in flight. Passengers, especially children, should never be allowed to occupy the baggage portion of the cabin for the purpose of closing the door in flight. The pilot should slow the airplane to minimize buffeting of the door and land as soon as practical.

Top hinged baggage/cargo doors will react differently than front hinged doors if improperly latched before takeoff. Doors of this type, may pop open at rotation because of the increase in angle of attack and the slipstream pushing underneath the edge of the unsecured door. After the initial opening, a baggage door will generally tend to stay open and then may gently close as speed is reduced and the aircraft is configured for landing (the doors will probably tend to open again during flair). A top hinged door on the side of the aft fuselage of a high wing airplane can sometimes be moved to a nearly closed position by lowering the wing flaps full down (within approved airspeed limitations) so that wing downwash will act upon the door. Unlatched nose baggage doors and large cargo doors on the side of the aft fuselage cannot be closed in flight and a landing should be made as soon as practical. The pilot should avoid any abrupt airplane maneuvers in multi-engine airplanes with an open nose baggage door, as this could throw loose objects out of the baggage compartment and into the propeller.

Front hinged wing locker doors in the aft part of the engine nacelle of multi-engine airplanes will likely trail open a few inches if they become unlatched. Near stall speed just prior to landing, an unlatched door may momentarily float to a full open position.

If a door comes open on takeoff and sufficient runway remains for a safe abort, the airplane should be stopped. If the decision is made to continue the takeoff, maintain required airspeed and return for landing as soon as practical.

## **INADVERTENT OPENING OF CABIN/EMERGENCY EXIT DOORS (UNPRESSURIZED)**

If a cabin or emergency exit door should inadvertently open during unpresurized flight, the primary concern should be directed toward maintaining control of the airplane. Then, if a determination is made to close the door in flight, establish a safe altitude, trim the airplane at a reduced airspeed, and attempt to close the door. To facilitate closing the door, slide the adjacent seat aft slightly to obtain a better grasp of the door handle. The door handle must be in the close position prior to pulling the door closed, followed by rotating the handle to the locked position. Under no circumstances should the pilot leave his/her seat, or unfasten the restraint system to secure a door.

If a cabin door reopens when latched closed, the flight should be terminated as soon as practical and repairs made.

## **INADVERTENT OPENING OF CABIN/EMERGENCY EXIT DOORS (PRESSURIZED)**

An inadvertent opening of a cabin/emergency exit door while the cabin is pressurized and the aircraft is above 12,500 feet, will require the use of supplemental oxygen or an emergency descent to an altitude below 12,500 feet. The pilot may attempt to close the door after ensuring that all occupants are using supplemental oxygen or the cabin altitude is below 10,000 feet. However, the primary concern should be maintaining control of the airplane. The flight should be terminated as soon as practical and the cause of the door opening determined before pressurized flight is continued. Under no circumstances should the pilot leave his/her seat, or unfasten the restraint system to secure a door.

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## **MAINTENANCE**

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Airplanes require inspection and maintenance on a regular basis as outlined in the operating handbook, service/maintenance manuals, other servicing publications, and in Federal Aviation Regulations. A good visual inspection is a continuing maintenance procedure and should be performed by anyone who is involved with an airplane. This includes pilots, line personnel, and the maintenance department. When worn or damaged parts are discovered, it is essential that the defective parts be repaired or replaced to assure all systems remain operational. The source of information for proper maintenance is the airplane Service/Maintenance Manual and Service Letters or Service Bulletins. Cessna's Service/Maintenance Manuals are occasionally revised. Maintenance personnel should follow the recommendations in the latest revision. The owner/operator must ensure that all unacceptable conditions are corrected and the airplane receives repetitive and required inspections.

### **UNAUTHORIZED REPAIRS/MODIFICATIONS**

All repair facilities and personnel should follow established repair procedures. Cessna does not support modifications to Cessna airplanes, whether by Supplemental Type Certificate or otherwise, unless those modifications are approved by Cessna. Such modifications may void any and all warranties on the airplane, since Cessna may not know the full effects on the overall airplane. Cessna has not tested and approved all such modifications by other companies. Operating procedures and performance data specified in the operating handbook and maintenance procedures specified in the service/Maintenance Manual may no longer be accurate for the modified airplane. Operating procedures, maintenance procedures and performance data that are effected by modifications not approved by Cessna should be obtained from the STC owner.

### **AIRWORTHINESS OF OLDER AIRPLANES**

For an airplane to remain airworthy and safe to operate, it should be operated in accordance with Cessna recommendations and cared for with sound inspection and maintenance practices.

An aging airplane needs more care and attention during maintenance processes and may require more frequent inspection of structural components for damage due to the effects of wear, deterioration, fatigue, environmental exposure, and accidental damage. Typical areas requiring more frequent inspection are:

1. Wing attach points and fuselage carry-through structure.
2. Wing spar capstrips, especially the lower ones.
3. Horizontal and vertical stabilizer attach points and spar structure.
4. Control surface structure and attach points.
5. Engine mounts, beams, and cowlings.
6. Landing gear structure and attach points.
7. Structural and flooring integrity of seat and equipment attachments.
8. Pressurized structures, especially around all doors, windows, windshields and other cutouts on pressurized airplanes.
9. Exhaust and cabin heater systems.

The final responsibility for airplane care rests with the owner/operator. All airplane owners/operators should use the following steps as a minimum guideline to ensure continued airworthiness of their airplanes:

1. Always follow recommended maintenance and inspection procedures.
2. Recognize that corrosion, overloading, or damage to structure can drastically shorten fatigue life.
3. Comply with all applicable Service Bulletins, Service Letters, and FAA Airworthiness Directives.
4. Use one of Cessna's Progressive Care Inspection and maintenance programs to get the maximum utilization of your airplane at a minimum cost and downtime.

## **CORROSION**

Corrosion can cause structural failure if left unchecked. The appearance of the corrosion varies with the metal. On aluminum and magnesium, it appears as surface pitting and etching, often combined with a grey or white powdery deposit. On copper and copper alloys the corrosion forms a greenish oxide and on steel, a reddish rust. When grey, white, green or red deposits are removed, each of the surfaces may appear etched and pitted, depending upon the length of exposure and severity of the attack. If the damage is not too deep, it may not significantly alter the strength of the metal. However, the pits may become sites for crack development. Some types of corrosion can travel beneath surface coatings and spread until the part fails.

Remove corrosion as soon as possible because it attacks and holds moisture in contact with the metal, which causes more corrosion to form. Every visible trace must be removed by some mechanical or chemical means. The surface must then be chemically treated to form a film which prevents oxygen or moisture from contacting the surface. Then, the protective surface (paint) must be restored.

There are several different types of corrosion and different ways of detecting it in its early stages. Uniform surface corrosion is the most common type of corrosion. When an area of unprotected metal is exposed to the atmosphere, there will be a uniform attack over the entire unprotected area. On a polished

surface, this type of corrosion is first seen as a general dulling of the surface. If the corrosion is allowed to continue, the surface becomes rough and possibly frosted in appearance.

If surface corrosion is allowed to go untreated, it can progress into the next type of corrosion, called pitting. Pits form in localized areas and appear as white or grey powdery deposits. Metal is converted to salts, and when deposits are cleaned away, tiny pits or holes can be seen on the surface. If allowed to continue, pitting can progress completely through the metal in extreme cases.

Stress corrosion cracking is caused by the simultaneous effects of tensile stress and corrosion. Stress may be either internal or applied. Residual stress from the processes of heat treatment and forming, or sustained operating or static loads, can lead to stress corrosion.

Fretting corrosion is corrosion damage between close fitting parts which are allowed to rub together. It is the corrosive attack on one or both metals because of chafing under a load. The results of fretting are removal or pitting of the metal in the area of contact, galling, seizing, cracking or fatigue of the metal, loss of tolerance in accurately fitted parts, and loosening of bolted or clamped surfaces.

Corrosion is a universal problem that costs considerable amounts of time and money. It is essential that each airplane owner maintain his or her airplane based on the operating conditions, environment, and service experience. Corrosion can be effectively prevented and/or controlled if appropriate action is taken early.



## SEAT AND RESTRAINT SYSTEMS

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### ADJUSTABLE SEAT ASSEMBLIES

Most Cessna manually-adjustable seats are suspended on two parallel, cabin floor mounted seat tracks by roller assemblies which allow the seat to move forward and rearward along the tracks. A series of holes are provided, usually in the forward end of either or both seat tracks, to accommodate a mechanical locking pin(s) which allows intermediate positioning and locking of the seat. To prevent the seat from disengaging from the seat tracks when reaching the ends, a mechanical seat stop is installed near both ends of the track(s).

Incidents of manually-adjustable seats slipping rearward or forward during acceleration or deceleration of the airplane have been reported. The investigations following these incidents have revealed discrepancies such as gouged lockpin holes, bent lockpins, excessive clearance between seat rollers and tracks, and missing seat stops, to name a few. Also, dust, dirt, and debris accumulations on seat tracks and in the intermediate adjustment holes have been found to contribute to the problem. A close check of each seat during daily preflight, improved cabin cleanliness, and replacement of parts when necessary will help prevent accidents involving seats. Visual checks of the airplane should always include the cabin interior.

When inspections are made, examination of the following items is recommended:

1. Check the seat assembly for structural integrity.
2. Inspect the roller assemblies for separation and wear.
3. Check the locking mechanism (actuating arm, linkage, locking pin or pins) for wear.
4. Check all seat track stops for security and proper installation.
5. Inspect seat tracks for condition and security, and the locking pin holes for wear, and dirt or debris accumulation.
6. Determine that the floor structure in the vicinity of the seat tracks is not cracked or distorted.
7. Ensure that the secondary seat stop addressed in mandatory Service Bulletin SEB89-32 is installed.

Damaged or worn parts are a potential hazard which should be immediately repaired or replaced. Cessna recommends repair and/or replacement of damaged components in accordance with the airplane's service or maintenance publications and Service Bulletins.

## **RESTRAINT SYSTEMS**

While performing the cabin portion of the daily preflight, it is recommended that pilots check each restraint system installed in the airplane. This should include a functional check of the restraint belt locking and releasing mechanism. If new passengers or students are to be carried, it is a good practice to insist that they operate the restraint system to become familiar with the procedures.

During inspections, maintenance personnel should check each restraint system installation for serviceability in accordance with current publications applicable to the airplane. Special attention should be given to restraint attachment points and to the nylon bushing on the belt at the point where the shoulder restraint harness attaches. Undetected cracks or broken connections could cause a serious situation to develop when it is least expected. The restraint system webbing should be inspected for degradation. Repair or replace the restraint system per Cessna instructions if damage is detected.

## EXHAUST AND FUEL SYSTEMS

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### THE ENGINE EXHAUST SYSTEM

The primary function of an engine exhaust system is to route exhaust gases safely overboard. Other functions of the exhaust system may include use as the driving source for a turbocharger turbine and/or use as a heat source for carburetor and/or cabin heat requirements.

Heat and carbon monoxide are the unavoidable byproducts of all reciprocating engine operations. The temperatures within the exhaust system of an engine can exceed 1750°F. Consequently, if an exhaust leak should occur, heat damage can occur to the engine mounting structure, and accessories such as hoses, belts, wire bundles, etc. In some cases, the position of the leak could lead to engine stoppage and/or an engine compartment fire.

An exhaust system leak can also lead to carbon monoxide poisoning. This colorless, odorless, tasteless combustion byproduct is always present in exhaust fumes. For this reason, special seals are provided wherever cables, hoses, wire bundles, etc. pass through the engine firewall. For even greater protection from carbon monoxide, special window, door, and fuselage seals are installed. No leakage of exhaust into the cabin should be tolerated.

Exhaust systems should be checked for stains indicative of exhaust leaks at cylinder heads or cracks in the exhaust or tailpipe. The condition and security of the exhaust system in the area of the exhaust muffler shroud should be checked. Any cracks or leaks in this area could be a source for exhaust to enter the cabin.

### ENGINE COMPARTMENT TEMPERATURES

High engine compartment temperatures can degrade the operational efficiency of the engine and also accelerate the deterioration of engine components. Several conditions could cause or contribute to a higher than normal engine compartment temperature; however, improper operating techniques are found to be the most common cause. Avoid excessive operation of an engine on the ground. Prolonged ground operations should be done into the wind at rich mixture settings. If the cowling has been removed for maintenance, cooling airflow is poor and cylinder head temperature and oil temperature gages must be monitored during engine runups.

On virtually all air-cooled reciprocating engines, the engine and engine compartment are cooled by utilizing a pressure cooling baffle system with airflow as the cooling medium. The condition of these baffles and their seals is important.

Baffles should be secure and baffle seals should be positioned in a direction which would seal airflow around the engine baffles. Even a slight reduction in cooling efficiency can cause the engine to operate hotter than normal, thus increasing the potential for heat damaged components.

An inspection of the engine compartment, plus careful observation of the engine temperatures during normal flight, can be of great assistance in verifying the condition of the engine. If the pilot takes the time to record engine temperatures on a regular basis, trends within the engine can be detected early and corrected before a serious condition occurs.

## **HOSES AND WIRE HARNESS INTEGRITY**

All fuel, oil, and hydraulic components should be checked for condition, security and any evidence of leakage. All leaks should be repaired before starting the engine.

As airplanes and engines age, there is a need to re-emphasize the inspection or replacement requirements of engine hoses or lines that carry fuel, oil, or hydraulic fluid. For newer Cessnas, a replacement requirement for hoses in the engine compartment (except teflon lined) has been established at each 5 years or at engine overhaul, whichever occurs first. This is considered to include "shelf" life. All hose manufactured for airplane use is marked indicating the quarter-year in which they were manufactured. For instance, a listing of "4Q85" means the hose was manufactured in the fourth quarter of 1985. Maintenance personnel should not use hoses with a high "shelf" life age.

Like time, heat is always a detriment to hoses. The prudent pilot realizes during the daily preflight, that an engine hose might look good, but if it is wiggled, a telltale "crackle" may be heard. This means that the hose is brittle and should be replaced. Also if he slides his hand over the back side of the hose, he may find an abrasion or wear not visible from the front side.

Ignition leads/wire harnesses and spark plugs are also affected by excessive heating in the engine compartment. Overheating of the spark plug barrels, sometimes caused by damaged cylinder baffles or missing cooling air blast tubes, may seriously deteriorate the ignition leads. Any overheating of a spark plug by a defective baffle or exhaust gas leak at the exhaust pipe mounting flange can generate temperatures sufficient to cause pre-ignition and piston distress.

## RETRACTABLE LANDING GEAR

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The adjustment and rigging of a retractable landing gear system should be done by trained maintenance personnel. Continued reliability of the landing gear system is only possible if it is properly maintained in the prescribed published manner. The rigging process must be performed exactly as published in the Cessna Service/Maintenance Manual and Service Bulletins. For complete emergency procedures concerning landing gear extension, refer to the airplane operating handbook.

## PRESSURIZED AIRPLANES

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### DOOR SECURITY

The conventional and air-stair doors on pressurized airplanes have a series of pins, actuated by an overcenter locking handle, to maintain the door seal during the pressurization cycle. Some air-stair doors are sealed by pressurization air pressing against the cabin door windlace which covers the door gap. Door security can be verified by visually checking the locking indicator for the door handle safety lock, in the case of single-engine airplanes, and checking for correct locking indications provided in the door of multi-engine airplanes. It is recommended that pilots check the locking pins and door seals for cracks or damage during each preflight. Any damaged parts should be repaired prior to pressurized flight.

### WINDOWS AND WINDSHIELDS

The windows in pressurized airplanes are exposed to a fatigue cycle each time the airplane is pressurized. These cycles could lead to fatigue cracks in and around the windows. Windows should be inspected frequently for condition and serviceability. Windows or windshields having replacement life limits should be replaced prior to intervals defined in applicable service/maintenance manuals.

The windows and windshields on pressurized airplanes are particularly sensitive to crazing and scratches. Any crazing, cracks, or deep scratches cannot be tolerated for pressurized flight. Consult the airplane's operating manual when in doubt about the severity of the damage. Repairs should be completed prior to pressurized flight.

### THE PRESSURE VESSEL

There are significant structural differences between the fuselage of a non-pressurized airplane and one which is pressurized. The pressure vessel is the portion of the cabin area to be pressurized. Pressure differential is the difference between the atmospheric pressure at the altitude at which the airplane is flying and the pressure inside the cabin.

Any seam, joint, or hole where wire bundles or tubing pass through the pressure vessel must be sealed to maintain the selected pressurization. If any of these seals are deteriorated or missing, the normal cabin pressure differential may be impossible to attain. Maintenance personnel should inspect the pressure seals for serviceability. Any cracks in the skin of the pressure

## **23 PRESSURIZED AIRPLANES**

## **PILOT SAFETY AND WARNING SUPPLEMENTS**

vessel could lead to sudden depressurization. Maintenance personnel should carefully inspect the pressure vessel for cracks, corrosion, and deterioration. Any damage should be corrected before pressurized flight.

If the airplane cabin is pressurized and it becomes necessary to use the heated alternate induction air on both engines, the pressurization controls must be selected OFF to prevent nacelle fumes from entering the cabin. The cabin should be depressurized and maximum ventilation provided. Therefore, if the flight altitude is above 10,000 feet, all occupants should use oxygen, if available, or descent should be initiated.

## POTENTIAL HAZARDS

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### PROPELLERS

#### WARNING

**ALWAYS STAND CLEAR OF PROPELLER BLADE PATHS, ESPECIALLY WHEN MOVING THE PROPELLER. PARTICULAR CAUTION SHOULD BE PRACTICED AROUND WARM ENGINES.**

Review of propeller accidents indicates that most were preventable. A propeller under power, even at slow idling speed, has sufficient force to inflict fatal injuries. Pilots can be most effective in ensuring that passengers arrive and depart the vicinity of the airplane safely by stopping the engine(s) during loading and unloading.

Cessna airplanes are delivered with propellers using paint schemes to increase visibility of the blades. Owners should maintain the original paint scheme.

Pilots and Service personnel should develop the following safety habits:

1. Before moving a propeller or connecting an external power source to an airplane, be sure that the airplane is chocked, ignition switches are in the OFF position, throttle is closed, mixture is in IDLE CUT-OFF position, and all equipment and personnel are clear of the propeller. Failed diodes in airplane electrical systems have caused starters to engage when external power was applied regardless of the switch position.
2. When removing an external power source from an airplane, keep the equipment and yourself clear of the propeller.
3. Pilots should make certain that all personnel are clear of the propeller, prior to engine start.
4. Attach pull ropes to wheel chocks located close to a rotating propeller(s).
5. Before removing the wheel chocks, the pilot should hold brakes or apply the parking brake.
6. Be absolutely sure that all equipment and personnel are clear of the airplane before releasing the brakes.
7. Ground personnel should be given recurrent propeller safety training to keep them alert to the dangers of working around airplanes.

The pilot should carefully inspect the propeller during each preflight inspection. Some constant speed propellers manufactured by McCauley are subject to a requirement that they be filled with a red-dyed oil. This oil helps lubricate and



## **24 POTENTIAL HAZARDS**

## **PILOT SAFETY AND WARNING SUPPLEMENTS**

prevent corrosion of internal propeller parts and may assist in detection of cracks. If a crack is detected, the airplane should not be flown until the propeller is replaced.

### **AIR CONDITIONING FREON**

The refrigerant R- 12 (FREON) is relatively safe to handle when using proper protective safety equipment. Since at sea level the boiling point of R- 12 is - 21.6°F, any contact with bare skin will immediately burn (freeze) the area. If R-12 should contact your eye, it will burn and can cause permanent blindness. Treat spills or splashes on your body by washing with clean, cool, water, and seek immediate medical attention. R-12, when heated to a high temperature such as with an open flame or spillage on a hot manifold, generates phosgene gas (a colorless gas with an unpleasant odor). This gas is a severe respiratory irritant and should be considered as a DEADLY POISON.

### **USED ENGINE OIL**

Pilots and maintenance personnel who handle engine oil are advised to minimize skin contact with used oil, and promptly remove any used engine oil from their skin.

The following are some do's and don'ts concerning used engine oil:

1. Do follow work practices that minimize the amount of skin exposed, and the length of time used oil stays on the skin.
2. Do thoroughly wash used oil off skin as soon as possible.
3. Do wash oil-soaked clothing before wearing them again. Discard oil-soaked shoes.
4. Do use gloves made from material that oil cannot penetrate.
5. Don't use kerosene, gasoline, thinners, or solvents to remove used engine oil. These products can cause serious toxic effects.
7. Don't put oily rags in pockets, or tuck them under a belt. This can cause continuous skin contact.
8. Don't pour used engine oil on the ground, or down drains and sewers. This is a violation of Federal Law. The Environmental Protection Agency (EPA) encourages collection of used engine oil at collection points in compliance with appropriate state and local ordinances.

### **AVIATION FUEL ADDITIVE**

Ethylene glycol monomethyl ether (EGME), which is a primary ingredient in aviation fuel additives, is toxic. It creates a dangerous health hazard when breathed or absorbed into the skin. When inhaled, EGME is primarily a central nervous system depressant, and acute inhalation overexposure may cause kidney injury. The primary symptoms of inhalation overexposure include

headache, drowsiness, blurred vision, weakness, lack of coordination, tremor, unconsciousness, and even death. EGME is irritating to the eyes and skin and can be readily absorbed through the skin in toxic amounts. Symptoms of overexposure due to skin absorption are essentially the same as those outlined for inhalation.

When servicing fuel with an anti-ice additive containing EGME, follow the manufacturers instructions and use appropriate personal protective equipment. These items would include chemical safety goggles or shield, respirator with organic vapor cartridges, nonabsorbing neoprene rubber gloves and an apron and long-sleeved shirt as additional skin protection from spraying or splashing anti-ice additive.

In the event EGME contact is experienced, the following emergency and first aid procedures should be used.

1. If EGME is inhaled, remove person to fresh air. If breathing is difficult, administer oxygen. If the person is not breathing give artificial respiration. Always call a physician.
2. If eye or skin contact is experienced, flush with plenty of water (use soap and water for skin) for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Thoroughly wash contaminated clothing and shoes before reuse.
3. If ingested, drink large quantities of water and induce vomiting by placing a finger far back in throat. Contact a physician immediately. If vomiting cannot be induced, or if victim is unconscious or in convulsions, take immediately to a hospital or physician. Do not induce vomiting or give anything by mouth to an unconscious person.

Diethylene glycol monomethyl ether (DIEGME), a fuel anti-icing additive approved for use in some airplanes, is slightly toxic if swallowed and may cause eye redness, swelling and irritation. DIEGME also is combustible. Before using DIEGME, refer to all safety information on the container.

## **BIRDS, INSECTS, AND RODENTS**

Bird, insect, and mouse nests in airplanes are both hazardous and costly. They seem to find even the smallest opening on an airplane to make their nests. Evidence of nest building activities may include the following:

1. Any mud smears or droplets at pitot/static masts, fuel tank vents, crankcase breathers, stall warning vanes, cabin air vents, and any fluid drain holes are indications of mud dauber wasp activities.
2. Straw, string, or blades of grass extending from cowling openings, carburetor air intakes, blast tubes, or exhaust stacks are signs of birds at work.
3. Cotton batting, shreds of fabric, and/or paper at wheel wells and empennage openings are frequently indicators that rodents such as

mice have been or may still be on board. They may gnaw on any material in the airplane including wire bundles and rubber or plastic tubing.

If nests or building materials are found on the airplane, they must be removed before flight. It is strongly recommended that a qualified mechanic thoroughly inspect components such as pitot/static systems for remains of any nesting material after its removal and before flight to ensure complete removal. Even small amounts of foreign material can result in significant problems in flight.

Some precautions can be taken to prevent problems. Always use the pitot tube cover and any other external covers when the airplane is being stored. If the airplane is hangared, make sure the hangar is kept clean and neat to prevent insects and mice from lodging in the hangar in the first place. If need be, set traps for rodents and/or spray the area for insects. Models of predators that appear life-like such as owls or snakes may also be effective at preventing some birds from lodging in a hangar.

Removal of the nest of an insect, bird, or rodent does not prevent reconstruction elsewhere on the airplane or even in the same location again. Some creatures are not easily discouraged and may return to cause problems within a very short time period. Regardless of precautions used to prevent such problems, the pilot should be alert to the evidence of small animal activities during every preflight inspection.

## **FIRE EXTINGUISHER AGENTS**

Halon, Bromochloromethane (CB), Carbon Dioxide (CO<sub>2</sub>), and dry chemical extinguishing agents are four of the most common types of fire extinguishing agents found in and around airplanes. Prolonged exposure (5 minutes or more) to any of these agents in a confined area could cause serious injury or even death. Pilots and ground personnel should become familiar with the precautions associated with each particular agent. Adequate respiratory and eye protection from excessive exposure, including the use of oxygen when available, should be sought as soon as the primary fire emergency will permit.

The discharge of large amounts of carbon dioxide to extinguish a fire may create hazards to personnel such as oxygen deficiency and reduced visibility. The dilution of the oxygen in the air, by the carbon dioxide concentrations that will extinguish a fire, may create an atmosphere that will not sustain life. Personnel rendered unconscious under these conditions can usually be revived without any permanent ill effects when promptly removed from the adverse condition.

The discharge of large amounts of dry chemical agents may create hazards to personnel such as reduced visibility and temporary breathing difficulty. Where there is a possibility that personnel may be exposed to dry chemical agents, suitable safeguards should be provided to ensure prompt evacuation.

## **OXYGEN**

Before servicing any airplane with oxygen, consult the specific airplane service/maintenance manual to determine the proper type of servicing equipment to be used. Airplanes should not be serviced with oxygen during refueling, defueling, or other maintenance work which could provide fuel and a source of ignition. Also, oxygen servicing of an airplane should be accomplished outside, not in hangars.

Oxygen is a very reactive material, combining with most of the chemical elements. The union of oxygen with another substance is known as oxidation. Extremely rapid or spontaneous oxidation is known as combustion. While oxygen is non-combustible in itself, it strongly and rapidly accelerates the combustion of all flammable materials; some to an explosive degree.

The following are some do's and don'ts when handling or using oxygen:

1. Do check that only "aviators breathing oxygen" is going into the airplane system.
2. Don't confuse aviators breathing oxygen with "hospital/medical" oxygen. (The latter is pure enough for breathing, but the moisture content is usually higher which could freeze and plug the lines and valves of an airplane oxygen system.)
3. Do reject any oxygen that has an abnormal odor (good oxygen is odorless).
4. Do follow the published applicable instructions regarding charging, purging, and maintenance of airplane oxygen systems.
5. Don't use oil or grease (including certain lipsticks and lip balms) around oxygen systems.
6. Don't expose oxygen containers to high temperatures.

## **COMPRESSED AIR**

Compressed air is a mechanic's tool as versatile as electricity, and can be as deadly. The use of compressed air to blow dust or dirt from parts of the body or clothing is a dangerous practice. As little as 12 psi can dislocate an eyeball. Air can enter the navel through a layer of clothing and inflate and rupture the intestines. Compressed air has been known to strike a small wound on a person's hand and inflate the arm.

Never look into or point any compressed air apparatus toward any part of the body. Always wear prescribed personal protective equipment. Also, continuously check the condition of air tools and air hoses to make sure they do not show signs of damage or looseness. A loose hose carrying pressure is like a bullwhip and can cause serious injury to personnel and/or cause damage

to surrounding equipment. If a situation such as this should occur, do not attempt to catch the hose end; shut off the air source first.

## **STATIC ELECTRICITY**

Static electricity, by definition, is a negative or positive charge of electricity that an object accumulates, and creates a spark when the object comes near another object. Static electricity may accumulate on an airplane during flight or while it is on the ground, as long as air is flowing over its surfaces. Unless static electricity is carried away by ground wires, an explosion may be caused during any fueling operations.

Grounding an airplane is a good safety precaution because static electricity cannot be seen until it's too late. To properly ground an airplane, attach one end of a static ground wire to an unpainted point on the airplane and the other end to an approved grounding stake. Attaching the ground wire to the airplane first will ensure that any spark of static electricity will occur at the grounding stake and not at the airplane. Do not attach a ground wire to any antenna. Antennas are poor grounding attachment points because they are insulated from the airplane structure.

On some airplanes, wick-type static dischargers are installed to improve radio communications during flight through dust or various forms of precipitation (rain, snow or ice crystals). Under these conditions, the build-up and discharge of static electricity from the trailing edges of wings, rudder, elevator, and propeller tips can result in loss of usable radio signals on all communications and navigation radio equipment. Usually the ADF is first to be affected and VHF communication equipment is the last to be affected. Installation of static dischargers reduces interference from precipitation static, but it is possible to encounter severe precipitation static conditions which might cause the loss of radio signals, even with static dischargers installed.

Static dischargers lose their effectiveness with age, and therefore should be checked at every scheduled inspection by a qualified technician. If testing equipment is not available, it is recommended that the wicks be replaced every two years, especially if the airplane is operated frequently in IFR conditions.

## **ELT BATTERY AND GAS SPRING/DAMPER DISPOSAL**

To prevent bodily injury, do not compact (compress) or incinerate an ELT battery-pack or gas spring/damper. The ELT battery pack should be discarded in accordance with local EPA standards.

A gas spring or gas damper contains an inert gas and oil under pressure, and reacts much like an aerosol can when compressed or heated; it may explode. Therefore, all unserviceable gas springs or dampers should be depressurized, using the maintenance manual instructions.

## HEARING LOSS

Hearing loss due to overexposure to loud noise levels is a real possibility while working near operating airplane engines. Continuous exposure to excessive noise diminishes hearing acuity, with high frequency response failing first. If the overexposure continues, the middle frequencies, most important in conversation, are also lost. Earmuffs, some headset types, and earplugs are very useful to avoid hearing loss. By far, the earplug has proven to be the best protection overall. Limits have been established which relate sound level (dB) to exposure time. These limits are based on daily exposures for long intervals.

Sound Level (dB)	115	110	105	100
Maximum Time (min.)	15	30	60	120

## WEATHER RADAR EXPOSURE

The dangers of exposure to airborne weather radar operated on the ground include the possibility of damage to low tolerance parts of the human body and ignition of combustible materials by radiated energy. Low tolerance parts of the body include the eyes and testes. Airborne weather radar should be operated on the ground only by qualified personnel. The radar should not be operated while the airplane is in a hangar or other enclosure unless the radar transmitter is disconnected, or the energy is directed toward an absorption shield which dissipates the radio frequency (RF) energy.

Personnel should never stand near or directly in front of a radar antenna which is transmitting. When the antenna is transmitting and scanning, personnel should not be allowed within 15 feet of the area being scanned by the antenna.

Personnel should not be allowed at the end of an open waveguide (hollow duct work through which electromagnetic waves are conducted to and from the antenna) unless the radar is off and will remain off. Radar should not be operated with an open waveguide unless a "dummy load" is connected to the portion which is connected to the transmitter. Personnel should not look into a waveguide, or the open end of a coaxial connector or line connected to a radar transmitter.

Weather radar installed on any airplane should not be operated while that airplane, or an adjacent airplane is being refueled or defueled.