Pilot's Operating Handbook and FAA Approved Airplane Flight Manual

(DOCUMENT NO: 100-000-904)

KODIAK

100 SERIES AIRCRAFT

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY QUEST AIRCRAFT COMPANY.

This handbook meets GAMA Specification No. 1, Specification for Pilot's Operating Handbook, Issued February 15, 1975 and revised October 18, 1996.

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FOR TITLE: MANAGER, SEATTLE AIRCRAFT CERTIFICATION OFFICE DATE: 8-31-09

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Log of Revisions

Revision No.	Pages Affected	Description of Revision	FAA-Approved By	Date
IR	Initial Release	Initial Release	[illegible]	8-31-09
1	PRFC-3, PRFC-6, 2-9, 2-21, 2-26 thru 2-30, 2-37, 2-38, 3-28, 7-1 thru 7-4, 7-38, 7-42, 7-44, 7-112, 7-114 thru 7-117, 8-18, 8-19	Ch. 2 - 2-9: Figures updated, 2-21: addition of Note, 2-26: Fire Extinguisher placards removed and placard 29 moved, 2-27: placard 31 moved and addition of Liters in Note, 2-28: placard 32a added and placard 33 moved, 2-29: placard 33a added, 2-30: placard 37a added, 2-37: text clarification, 2-38: addition of placards Ch. 3 - 3-28: addition of Warning Ch. 7 - updated TOC, 7-38: added MFD section, 7-42: additions to XM Satellite Weather, 7-44: text clarification and addition of Note, 7-112: text clarification and "Message Advisory Alerts" section added, 7-114 thru 7-117: "TAS Annunciations" moved, Caution added, footnotes added to Figures, "Comparator Annunciations" added, "Static Dischargers" moved up a page Ch. 8 - 8-18 and 8-19: clarified text about compressor washes	Jeffrey T. Morfitt SMALL AIRPLANE PROGRAM MANAGER SEATTLE ACO	9-29-09
2	PRFC-3, PRFC-6, 2-3, 2-28 thru 2-30, 7-100	Ch. 2 - 2-3: addition of text in NOTE, 2-28 thru 2-30: Placard "a" numbers added Ch. 7 - 7-100: PITOT FL L-R annunciation corrected	Jeffrey T. Morfitt SMALL AIRPLANE PM SEATTLE ACO	10-2-09
3	PRFC-3, PRFC-6, 2-9, 7-42, 7-44, 7-114	Ch. 2 - 2-9: Figures changed Ch. 7 - 7-42: text removed, 7-44: Note removed, 7-114: Caution removed	Jeffrey T. Morfitt SMALL AIRPLANE PM SEATTLE ACO	10-16-09
4	PRFC-3, PRFC-6, 2-9, 7-42, 7-44, 7-114	Ch. 2 - 2-9: Figures changed Ch. 7 - 7-42: additions to XM Satellite Weather, 7-44: Note added, 7-114: Caution added	Jeffrey T. Morfitt SMALL AIRPLANE PM SEATTLE ACO	10-29-09
5	PRFC-3, PRFC-5 thru PRFC-6, 1-4 thru 1-6, 1-9, 2-9, 2-21, 5-21, 5-25, 6-4, 6-11	**NOTE:** Revision 5 included a compacting process of the POH/AFM to a smaller version, which resulted in page numbers and figure references being updated. Please note that pages, figures, and formatting will not necessarily coincide with previous versions of this manual. PRFC - Removed Supplement information from Preface and added to individual Supplements Ch. 1 - 1-4: Figure updated, 1-5 and 1-6: text converted to table formatting, 1-9: Symbol formatting corrected and V_{REF} definition added Ch. 2 - 2-9: Figure moved to correct reference, 2-21: Minimum Operating OAT information added Ch. 5 - 5-21 and 5-25: "Standard Tires Installed" changed to "Large Tires Installed" Ch. 6 - 6-4: Math error corrected, 6-11: "Arm" column added	[illegible]	1-8-10

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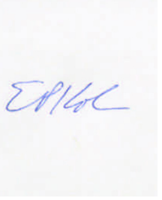
Revision No.	Pages Affected	Description of Revision	FAA-Approved By	Date
6	1-8, 1-13, 2-38, 3-1 thru 3-3,3-10, 3-32A-B,4-5, 4-9, 4-12 thru 4-13, 4-15, 4-17, 4-19A-B, 4-26, 5-1, 5-2, 5-16 thru 5-18B, 6-8 thru 6-14,6-20 thru 6-23, 6-33, 7-75 thru 7-75B, 7-101, 7-110, 7-121 thru 7-123, 8-15 thru 8-16.	1-8 Corrected Cargo Door dimensions. 1-13 Added MZFW abbreviation. 2-38 Added placard for Stall Horn Test Btn. 3-1 thru 3-3 Updated table of contents. 3-10, Changed order of Engine Fire in Flight checklist. 3-32 ,3-32A-B Dual IPS annunciations trouble-shooting table added. 4-5 Added step for Stall Warning System test. 4-9 Added autopilot preflight and prop pitch latch step. 4-12, 4-13 Dual IPS check added. Incorporated **TR-AFM-05-01.** 4-15 Added checklist step for yaw damper. 4-17 Added pitch latch step for shutdown. 4-19A-B Added SIPS and DIPS 1st flight of the day check. 4-26 Added text for DIPS. 5-1 and 5-2 Updated table of contents. 5-16, 5-17, 5-18 New torque charts. 5-18a and 5-18b Added torque charts for 140 KIAS and 160 KIAS 6-8 thru 6-14, New W&B form and information clarified. Separated seat and occupant C.G. Minor typographic errors corrected. 6-20 thru 6-23, Added information regarding mandatory cargo strap usage. 6-33, Adjusted seat arm moments. 7-75, 7-75A, 7-75B, Dual IPS information. 7-101 Incorporated **TR-AFM-05-02.** 7-110 Lift Transducer Stall Horn information. 7-121 New Advisory annunciation added. 7-122 New Caution Advisory annunciation added. 7-123 New Warning Advisory annunciation added. 8-15, 8-16 Anti-ice/de-ice procedures removed.		9-7-10
7	Preface-4, Preface-6, 2-20, 4-9, 4-12, 6-8 thru 6-13, 8-28.	Preface-4 and Preface-6 Added new Rev 07 Information. 2-20 Added approved biocidal fuel additive. 4-9 and 4-12 Added information regarding seat position locking prior to starting engines and takeoff. 6-8 thru 6-13 Modified current seat loading configurations by making the current configuration (A) and added a new seat loading configuration (B) which is 6 inches forward of configuration A. 8-28 Corrected typographical error.		11-18-10

List of Effective Pages

List of Effective Pages

The List of Effective Pages in this manual is used to ensure that the aircraft has the most up-to-date and current Pilot Operating Handbook and Flight Manual available. Quest Aircraft recommends that each operator performs a quarterly review of this manual to ensure that all pages are intact and up-to-date. **Figure LEP-1** below illustrates the use of the List of Effective Pages.

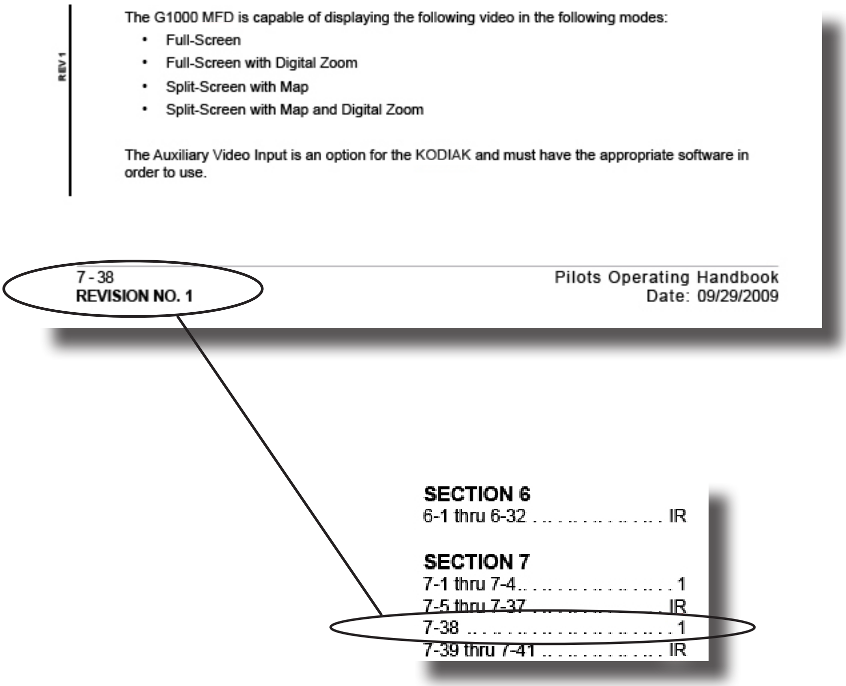


FIGURE LEP-1: Use of List of Effective Pages

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List of Effective Pages

Dates of issue for original and changed pages are:

Original......IR......08/31/09
Revision......1......09/29/09
Revision......2......10/02/09
Revision......3......10/16/09
Revision......4......10/29/09
Revision......5......01/08/10
Revision......6......09/07/10
Revision......7......11/17/10

NOTE: Revision dates may not reflect the date of approval indicated in the Log of Revisions.

**Refer to Section 9 for individual Supplements and their revisions.*

*** NOTE: Pages that are not annotated with a revision indicator are Initial Release (IR).**

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TABLE OF SECTIONS

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SECTION 1
GENERAL
Table of Contents

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1-1 GENERAL

Section 1 of the Pilot's Operating Handbook provides basic data and information of general interest to the pilot which is useful in loading, hangaring, handling, and accomplishing routine preflight inspections of the airplane. This section also provides definitions and explanations of symbols, abbreviations and terminology used in this handbook.

1-2 INTRODUCTION

This handbook contains 9 sections and includes the material required to be furnished to the pilot by the Federal Aviation Regulations and additional information provided by Quest Aircraft Company. This handbook constitutes the FAA Approved Flight Manual. Refer to the **Handbook Table of Sections** for a complete listing of the sections contained in this handbook.

1-3 THREE VIEW DRAWING

See **Figure 1-1**.

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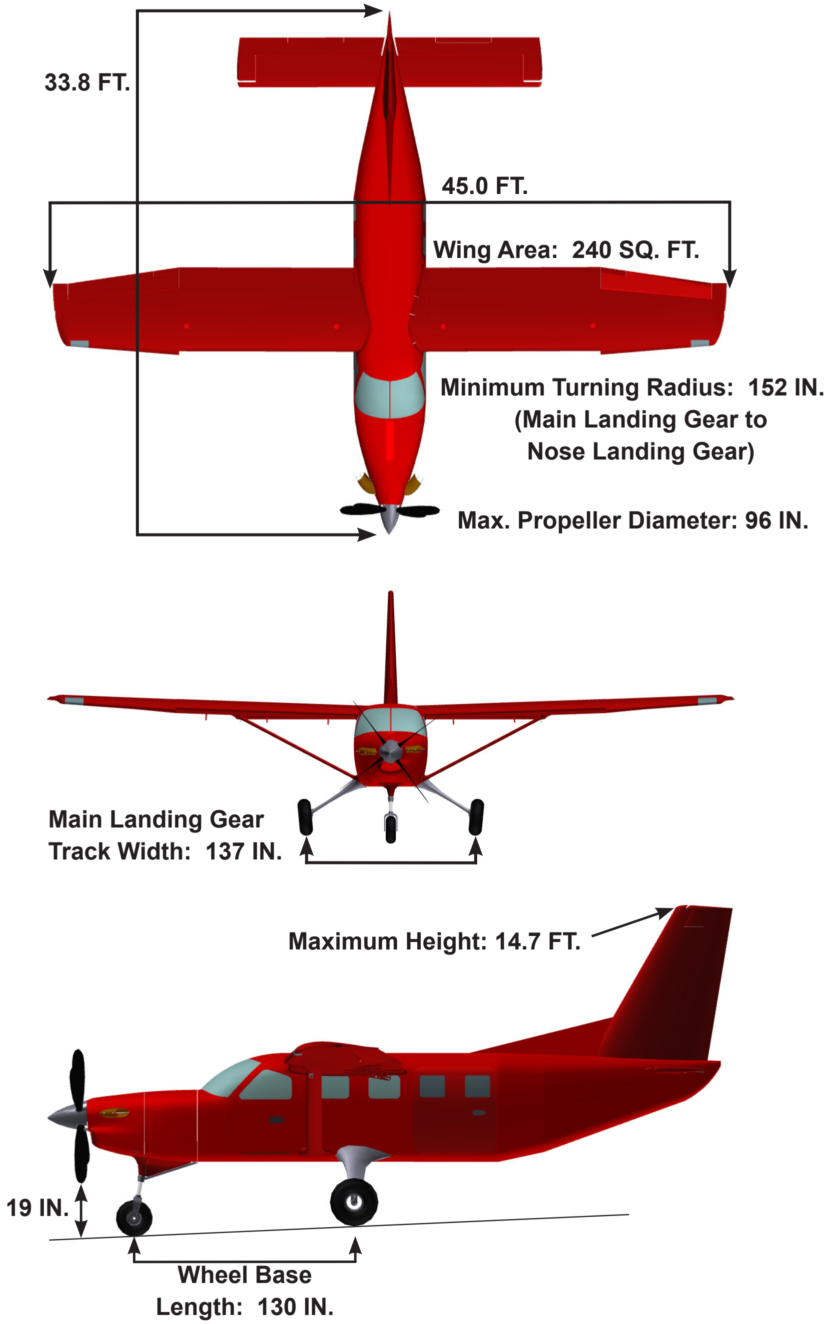

Figure 1-1 – Three View Drawing

1-4 DESCRIPTIVE DATA

ENGINE

Number of Engines: 1

Engine Manufacturer: Pratt and Whitney Canada, Inc.

Engine Model Number: PT6A-34

Engine Type: The PT6A series engine is a free power, two-shaft turbine engine. The engine uses a three-stage axial and one-stage centrifugal compressor section, an annular reverse-flow combustion chamber, single stage compressor turbine, single stage power turbine. The exhaust gas is directed through an annular exhaust plenum to the atmosphere via twin opposed exhaust ports provided in the exhaust duct.

Horsepower Rating:

Type of Engine Power	Shaft Horsepower (SHP)
Takeoff	750
Maximum Continuous Emergency	750
Maximum Normal Operating	700
Maximum Climb	700
Maximum Cruise	700

Figure 1-2 – Horsepower Rating

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NOTE: *Horsepower ratings are for 2200 RPM (propeller).*

PROPELLER

Number of Propellers: 1

Propeller Manufacturer: Hartzell Propeller Inc.

Propeller Model Number: HC-E4N-3P / D9511FSB

Number of Propeller Blades: 4

Propeller Diameter: 95 - 96 inches

Propeller Type: Constant speed, full feathering, reversible, hydraulically actuated aluminum-bladed propeller, with a feathered blade angle of 86°, a low pitch blade angle of 17.5°, and a maximum reverse pitch of -10° (at the 30-inch radius).

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FUEL

Approved Fuel Grade (Specification)	Color
JET A (ASTM D1655)	Straw
JET A-1 (ASTM-D1655)	Straw
JP-1 (MIL-T-5616)	Straw
JP-5 (MIL-T-5624)	Straw
JP-8 (MIL-T-83133A)	Straw

Figure 1-3 – Fuel Grade and Color

Required Fuel Additive:

To lower the freezing temperature of water droplets contained in the fuel while operating in cold temperatures, **Diethylene Glycol Monomethyl Ether (MIL-DTL-85470B)** additive is required for fuels that do not already contain anti-icing additives.

CAUTION: *JP-5 and JP-8 fuels contain anti-icing additives. Do not add additional additives to these fuels.*

Fuel Capacity (in U.S. Gallons):

- Total Capacity: 320
- Capacity Each Tank: 160
- Total Capacity to Inboard Filler Caps: 193
- Total Usable Fuel: 315

OIL

Oil Grade (Specification): Engine oil must conform to the current revision of **Pratt and Whitney Service Bulletin No. 1001**. Refer to **Section 8** for a listing of approved oils.

Total Oil Capacity (Including oil in filter, cooler, and hoses): Approximately 13 US quarts

Drain and Refill Quantity: Approximately 9 US quarts

Oil Quantity Operating Range: Keep filled to within 1 1/2 quarts of the maximum indication on the dipstick. Graduations on the dipstick indicate the oil level in U.S. quarts below the maximum capacity of the oil tank.

WARNING: *Ensure the oil dipstick/cap is latched down securely. Operating the engine with the dipstick/cap unlatched will result in excessive oil loss leading to eventual engine stoppage.*

NOTE: *In order to obtain an accurate oil level reading, it is necessary to either check the oil within 10 - 20 minutes after engine shutdown – referencing the max hot markings while the oil is still hot or reference the max cold markings prior to the first flight of the day. If more than 10 - 20 minutes have elapsed since engine shutdown and the engine oil is still warm, perform an engine motoring run before checking the oil level and reference the max hot markings.*

MAXIMUM CERTIFICATED WEIGHTS

Ramp......6800 lb
Takeoff......6750 lb
Landing......6690 lb

NOTE: *Refer to* **Section 6** *for recommended loading arrangements.*

TYPICAL AIRPLANE WEIGHTS

Standard Empty Weight......3530 lb
Maximum Standard Useful Load......3270 lb

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CABIN, CARGO, AND ENTRY DIMENSIONS

Maximum Cabin Width ....54.0 IN
Maximum Cabin Height ....57.0 IN
Cabin Length ....190 IN (Forward Doorpost to Aft Bulkhead)

Crew Door Width ....31 IN (Minimum)
Crew Door Height ....51 IN (Minimum)
Crew Door Sill Height ....43 IN (Maximum)

BAGGAGE/CARGO COMPARTMENT DIMENSIONS

Cargo Volume...248 CU FT (Total Aft of Crew Seats)

Aft Cargo Shelf Volume ....38 CU FT
Cargo Door Width...49.25 IN (Minimum)
Cargo Door Height..49.25 IN (Minimum)
Cargo Door Sill Height..38 IN (Maximum)

SPECIFIC LOADINGS

Wing Loading..28 LB/SQ FT
Power Loading..9.00 LB/SHP

1-5 SYMBOLS, ABBREVIATIONS, AND TERMINOLOGY

GENERAL AIRSPEED TERMINOLOGY AND ABBREVIATIONS

KCAS - *Knots Calibrated Airspeed* – The indicated airspeed of an aircraft expressed in knots, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in a standard atmosphere at sea level.

GS - *Ground Speed* – The speed of an aircraft relative to the ground.

KIAS - *Knots Indicated Airspeed* – The speed of an aircraft as shown on the airspeed indicator.

KTAS - *Knots True Airspeed* – The airspeed, expressed in knots, relative to undisturbed air, which is KCAS corrected for non-standard temperature and altitude.

V_{CLIMB} - *Enroute Climb Speed* – The regulatory climb speed at which the performance data in **Section 5** of this handbook is based upon.

V_{FE} - *Maximum Flap Extended Speed* – The highest speed permissible with the wing flaps placed in a prescribed extended position.

V_{MO} - *Maximum Operating Airspeed* – The speed that may not be deliberately exceeded in normal flight operations.

V_A - *Maximum Operating Maneuvering Speed* – The maximum speed at which application of full or abrupt control movements may be used without overstressing the aircraft. At speeds less than or equal to maneuvering speed, the aircraft will stall before the maximum load limits are reached.

V_S - *Stalling Speed or the minimum steady flight speed* at which the airplane is controllable in the clean configuration.

V_{SO} - *Stalling Speed or the minimum steady flight speed* at which the airplane is controllable in the landing configuration at max weight and forward C.G.

V_X - *Best Angle-of-Climb Speed* – The speed which results in the greatest gain of altitude in a given horizontal distance.

V_Y - *Best Rate-of-Climb Speed* – The speed which results in the greatest gain of altitude in a given time and changes with altitude.

V_{REF} - *Landing Reference Speed or the threshold crossing speed* – The base speed used for reference and calculations.

V_{NE} - *Never Exceed Speed* – The airspeed which should never be exceeded during flight operations.

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METEOROLOGICAL TERMINOLOGY

ISA - *International Standard Atmosphere* - Atmospheric conditions in which:

1. The air is a dry, perfect gas.
2. The temperature at sea level is 15° Celsius (59° Fahrenheit).
3. The pressure at sea level is 29.92 inches of mercury (1013.2 mb)
4. The temperature gradient from sea level to the altitude at which the temperature is -56.5°C (-69.7°F) is -0.00198°C (-0.003564°F) per foot and zero above that altitude. This translates to -1.98°C (-3.56°F) per thousand feet in altitude.

OAT - *Outside Air Temperature* – The free air static temperature, obtained either from in-flight temperatures or ground meteorological sources, adjusted for instrument error and compressibility effects.

Pressure Altitude - *Pressure Altitude* is the altitude read from a pressure altimeter when the altimeter's barometric scale has been set to 29.92 inches of mercury or 1013.2 mb.

ENGINE POWER TERMINOLOGY

Beta Mode - The engine operational mode in which both the propeller blade angle and the engine power are controlled by the power lever. Beta mode may only be used during ground operations.

Flameout - The unintentional loss of combustion chamber flame during engine operation.

Gas Generator RPM (Ng) - Indicated in percent of gas generator RPM based on a scale of which 100% equals 37,500 RPM.

Hot Start - An engine start, or an attempted engine start, which results in an ITT that is more than 1090°C.

ITT - Inter-turbine temperature is a measurement of the temperature between the compressor turbine and the power turbine stator.

Maximum Climb Power - The maximum power approved for a normal climb. Use of this power setting is limited to climb operations. This setting relates to the power developed at the maximum torque limit relative to propeller RPM, ITT (765°C), or Ng limit of 101.6%, whichever occurs first.

Maximum Continuous Power – The maximum power rating, limited to emergency or abnormal conditions only, which require maximum aircraft performance, for example, extreme icing conditions or excessive downdrafts. This power is developed at the maximum torque limit of 1970 lb.ft., ITT of 790°C, or an Ng limit of 101.6%, whichever occurs first.

Maximum Cruise Power – The maximum power approved for cruise; maximum cruise power is not time limited. This power setting relates to the power developed at the maximum cruise torque from the Max Torque for Cruise Chart in **Section 5**, ITT of 740°C or the Ng limit of 101.6%, ... whichever occurs first.

Maximum Takeoff Power – The maximum power rating, limited to a maximum of 5 minutes for normal operations. Use of this power setting should be limited to normal takeoff operations. This power setting is defined by the limitations of the maximum torque of 1970 ft.lb., 790°C ITT or the Ng limit of 101.6%.

Ng – Represents the gas generator (compressor turbine) RPM. 100% Ng represents 37,500 RPM.

Np – Represents Propeller RPM and is an indication of the propeller speed in RPM.

Reverse Thrust – is the thrust produced when the propeller blades are rotated beyond a flat pitch and into a reverse angle.

RPM – Revolutions Per Minute.

SHP – Shaft Horsepower and is the power available at the propeller shaft.

$$\text{SHP} = \frac{\text{Propeller RPM x Foot Pounds of Torque}}{5252}$$

Torque – A measurement of the rotational force exerted by the engine on the propeller shaft.

Windmill – Propeller rotation powered by relative airflow only.

AIRPLANE PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

Climb Gradient – The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.

Demonstrated Crosswind Velocity – The velocity of the crosswind component at which adequate control of the aircraft and landing was actually demonstrated during certification testing. This value is not considered to be a performance limitation for the aircraft.

g – Acceleration equal to that produced by the force of gravity.

NMPP - *Nautical Miles Per Pound* – The attainable distance per pound of fuel consumption.

PPH – Pounds Per Hour, the amount of fuel consumed per hour.

Unusable Fuel – The quantity of fuel which may not be safely used in flight.

Usable Fuel – The fuel available for engine operation and flight planning purposes.

WEIGHT AND BALANCE TERMINOLOGY

Arm – The horizontal distance from the reference datum to the center of gravity (C.G.) of a given item.

Basic Empty Weight – The standard empty weight of an aircraft plus the weight of any optional equipment.

Center of Gravity (C.G.) – The point at which an object (airplane) would balance if it were suspended. The C.G. distance from the reference datum is determined by dividing the total moment by the total weight of the airplane.

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

C.G. Limits - *Center of Gravity Limits* – The extreme center-of-gravity locations within which the airplane must be operated at a given weight.

MAC - ***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 actual wing.

Maximum Landing Weight – is the maximum weight approved for the landing touchdown.

Maximum Ramp Weight – is the maximum weight approved for ground operations. This includes the weight of fuel used for starting, taxi, and runup.

Maximum Takeoff Weight – is the maximum weight approved for the start of takeoff roll.

Maximum Zero Fuel Weight (MZFW) - is the maximum allowable weight of the airplane and all its contents, minus the total weight of the fuel on board.

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Moment – is the product of weight of an item multiplied by its arm. (The actual moment divided by a constant of 1000 is used to simplify balance calculations by reducing the number of digits.)

Ramp Condition – is the weight and moment of the aircraft prior to taxi.

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

Residual Fuel – is another name for undrainable fuel and is the fuel remaining when the airplane is defueled. Residual fuel is considered to be a part of the empty weight of the aircraft.

Standard Empty Weight – is the weight of a standard airplane including any residual fuel, full operating fluids and full engine oil.

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

WARNINGS, CAUTIONS, AND NOTES DEFINED

WARNING: *An operating procedure, technique, or maintenance practice which may result in personal injury or death if not carefully followed.*

CAUTION: *An operating procedure, technique, or maintenance practice which may result in damage to equipment if not carefully followed.*

NOTE: *An operating procedure, technique, or maintenance condition which is considered essential or beneficial to emphasize.*

MEANING OF "SHALL," "WILL," "SHOULD," AND "MAY"

The words "shall" and "will" are used to denote a mandatory requirement. The word "should" denotes something that is recommended but not mandatory. The word "may" is permissive in nature and suggests something which is optional.

MEANING OF "LAND AS SOON AS POSSIBLE" OR "PRACTICABLE"

The use of these two terms relates to the urgency of the situation. When it is suggested to **land as soon as possible**, this means to land at the nearest suitable airfield after considering weather conditions, ambient lighting, approach facilities, and landing requirements. When it is suggested to **land as soon as practicable**, this means that the flight may be continued to an airport with superior facilities, including maintenance support, and weather conditions.

1-6 CONVERSION CHARTS

A series of charts and graphs are provided on the following pages for conversion to and from U.S. weights and measures to metric and imperial equivalents. The charts and graphs are included as an aide to pilots who are located in countries other than the United States or pilots from the United States who are traveling to or within other countries.

KILOGRAMS AND POUNDS

NOTE: *To convert 87 kilograms to pounds, locate the 80 in the first column and then move right, horizontally to column number 7 and read the solution (191.80).*

Example: *87 Kilograms = 191.80 Pounds*

Converting Kilograms to Pounds										
Kilograms	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0		2.205	4.409	6.614	8.818	11.023	13.228	15.432	17.637	19.842
10	22.046	24.251	26.455	28.660	30.865	33.069	35.274	37.479	39.683	41.888
20	44.092	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	207.23	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
1000	2204.6	2226.7	2248.7	2270.8	2292.8	2314.9	2336.9	2359.0	2381.0	2403.0

Figure 1-4 – Kilograms to Pounds

NOTE: *To convert 60 pounds to kilograms, locate the 60 in the first column and then move right, horizontally to column number 0 and read the solution (27.216).*

Example: *60 Pounds = 27.216 Kilograms*

Converting Pounds to Kilograms										
Pounds	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0		0.454	0.907	1.361	1.814	2.268	2.722	3.175	3.629	4.082
10	4.563	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	10.866	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	17.236	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	26.308	26.762
60	27.216	27.669	28.123	28.576	29.030	29.483	29.937	30.391	30.844	31.298
70	31.751	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	41.730	42.184	42.638	43.091	43.545	43.998	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
1000	453.59	458.13	462.66	467.20	471.74	476.27	480.81	485.34	489.88	494.42

Figure 1-5 – Pounds to Kilograms

NAUTICAL MILES, STATUTE MILES, AND KILOMETERS

Nautical Miles	Statute Miles	Kilometers	Nautical Miles	Statute Miles	Kilometers	Nautical Miles	Statute Miles	Kilometers
5	6	9	175	202	324	345	397	639
10	12	19	180	207	333	350	403	648
15	17	28	185	213	343	355	409	657
20	23	37	190	219	352	360	415	667
25	29	46	195	225	361	365	420	676
30	35	56	200	230	370	370	426	685
35	40	65	205	236	380	375	432	695
40	46	74	210	242	389	380	438	704
45	52	83	215	248	398	385	443	713
50	58	93	220	253	407	390	449	722
55	63	102	225	259	417	395	455	732
60	69	111	230	265	426	400	461	741
65	75	120	235	271	435	405	466	750
70	81	130	240	276	444	410	472	759
75	86	139	245	282	454	415	478	769
80	92	148	250	288	463	420	484	778
85	98	157	255	294	472	425	489	787
90	104	167	260	299	482	430	495	796
95	109	176	265	305	491	435	501	806
100	115	185	270	311	500	440	507	815
105	121	194	275	317	509	445	512	824
110	127	204	280	322	519	450	518	833
115	132	213	285	328	528	455	524	843
120	138	222	290	334	537	460	530	852
125	144	232	295	340	546	465	535	861
130	150	241	300	345	556	470	541	870
135	155	250	305	351	565	475	547	880
140	161	259	310	357	574	480	553	889
145	167	269	315	263	583	485	559	898
150	173	278	320	369	593	490	564	907
155	178	287	325	374	602	495	570	917
160	184	296	330	380	611	500	576	926
165	190	306	335	386	620	505	582	935
170	196	315	340	392	630	510	587	945

Figure 1-6 – Convert Between Miles and Kilometers

LITERS, IMPERIAL GALLONS, AND U.S. GALLONS

NOTE: *See* **Figures 1-4** *and* **1-5** *for examples of how to use these types of tables.*

Converting Liters to Imperial Gallons										
Liters	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0.00	0.22	0.44	0.66	0.88	1.10	1.32	1.54	1.76	1.98
10	2.20	2.42	2.64	2.86	3.08	3.30	3.52	3.74	3.96	4.18
20	4.40	4.62	4.84	5.06	5.28	5.50	5.72	5.94	6.16	6.38
30	6.60	6.82	7.04	7.26	7.48	7.70	7.92	8.14	8.36	8.58
40	8.80	9.02	9.24	9.46	9.68	9.90	10.12	10.34	10.56	10.78
50	11.00	11.22	11.44	11.66	11.88	12.10	12.32	12.54	12.76	12.98
60	13.20	13.42	13.64	13.86	14.08	14.30	14.52	14.74	14.96	15.18
70	15.40	15.62	15.84	16.06	16.28	16.50	16.72	16.94	17.16	17.38
80	17.60	17.82	18.04	18.26	18.48	18.70	18.92	19.14	19.36	19.58
90	19.80	20.02	20.24	20.46	20.68	20.90	21.12	21.34	21.56	21.78
100	22.00	22.22	22.44	22.66	22.88	23.10	23.32	23.54	23.76	23.98

Figure 1-7 – Liters to Imperial Gallons

Converting Imperial Gallons to Liters										
Imperial Gallons	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0.00	4.55	9.09	13.64	18.18	22.73	27.28	31.82	36.37	40.91
10	45.46	50.01	54.55	59.10	63.64	68.19	72.74	77.28	81.83	86.37
20	90.92	95.47	100.01	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	186.39	190.93	195.48	200.02	204.57	209.12	213.66	218.21	222.75
50	227.30	231.85	236.39	240.94	245.48	250.03	254.58	259.12	263.67	268.21
60	272.76	277.31	281.85	286.40	290.94	295.49	300.04	304.58	309.13	313.67
70	318.22	322.77	327.31	331.86	336.40	340.95	345.50	350.04	354.59	359.13
80	363.68	368.23	372.77	377.32	381.86	386.41	390.96	395.50	400.05	404.59
90	409.14	413.69	418.23	422.78	427.32	431.87	436.42	440.96	445.51	450.05
100	454.60	459.15	463.69	468.24	472.78	477.33	481.88	486.42	490.97	495.51

Figure 1-8 – Imperial Gallons to Liters

NOTE: *See* **Figures 1-4** *and* **1-5** *for examples of how to use these types of tables.*

Converting Liters to U.S. Gallons										
Liters	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0.00	0.26	0.53	0.79	1.06	1.32	1.59	1.85	2.11	2.38
10	2.64	2.91	3.17	3.43	3.70	3.96	4.23	4.49	4.76	5.02
20	5.28	5.55	5.81	6.08	6.34	6.60	6.87	7.13	7.40	7.66
30	7.93	8.19	8.45	8.72	8.98	9.25	9.51	9.77	10.04	10.30
40	10.57	10.83	11.10	11.36	11.62	11.89	12.15	12.42	12.68	12.94
50	13.21	13.47	13.74	14.00	14.27	14.53	14.79	15.06	15.32	15.59
60	15.85	16.11	16.38	16.64	16.91	17.17	17.44	17.70	17.96	18.23
70	18.49	18.76	19.02	19.28	19.55	19.81	20.08	20.34	20.61	20.87
80	21.13	21.40	21.66	21.93	22.19	22.45	22.72	22.98	23.25	23.51
90	23.78	24.04	24.30	24.57	24.83	25.10	25.36	25.62	25.89	26.15
100	26.42	26.68	26.95	27.21	27.47	27.74	28.00	28.27	28.53	28.79

Figure 1-9 – Imperial Gallons to Liters

Converting U.S. Gallons to Liters										
U.S. Gallons	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0.00	3.79	7.57	11.36	15.14	18.93	22.71	26.50	30.28	34.07
10	37.85	41.64	45.42	49.21	52.99	56.78	60.56	64.35	68.13	71.92
20	75.70	79.49	83.27	87.06	90.84	94.63	98.41	102.20	105.98	109.77
30	113.55	117.34	121.12	124.91	128.69	132.48	136.26	140.05	143.83	147.62
40	151.40	155.19	158.97	162.76	166.54	170.33	174.11	177.90	181.68	185.47
50	189.25	193.04	196.82	200.61	204.39	208.18	211.96	215.75	219.53	223.32
60	227.10	230.89	234.67	238.46	242.24	246.03	249.81	253.60	257.38	261.17
70	264.95	268.74	272.52	276.31	280.09	283.88	287.66	291.45	295.23	299.02
80	302.80	306.59	310.37	314.16	317.94	321.73	325.51	329.30	333.08	336.87
90	340.65	344.44	348.22	352.01	355.79	359.58	363.36	367.15	370.93	374.72
100	378.50	382.29	386.07	389.86	393.64	397.43	401.21	405.00	408.78	412.57

Figure 1-10 – Imperial Gallons to Liters

NOTE: *See* **Figures 1-4** *and* **1-5** *for examples of how to use these types of tables.*

Converting Imperial Gallons to U.S. Gallons										
Imperial Gallons	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0.00	1.20	2.40	3.60	4.80	6.01	7.21	8.41	9.61	10.81
10	12.01	13.21	14.41	15.61	16.81	18.02	19.22	20.42	21.62	22.82
20	24.02	25.22	26.42	27.62	28.82	30.03	31.23	32.43	33.63	34.83
30	36.03	37.23	38.43	39.63	40.83	42.04	43.24	44.44	45.64	46.84
40	48.04	49.24	50.44	51.64	52.84	54.05	55.25	56.45	57.65	58.85
50	60.05	61.25	62.45	63.65	64.85	66.06	67.26	68.46	69.66	70.86
60	72.06	73.26	74.46	75.66	76.86	78.07	79.27	80.47	81.67	82.87
70	84.07	85.27	86.47	87.67	88.87	90.08	91.28	92.48	93.68	94.88
80	96.08	97.28	98.48	99.68	100.88	102.09	103.29	104.49	105.69	106.89
90	108.09	109.29	110.49	111.69	112.89	114.10	115.30	116.50	117.70	118.90
100	120.10	121.30	122.50	123.70	124.90	126.11	127.31	128.51	129.71	130.91

Figure 1-11 – Imperial Gallons to U.S. Gallons

Converting U.S. Gallons to Imperial Gallons										
U.S. Gallons	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0.00	0.83	1.67	2.50	3.33	4.16	5.00	5.83	6.66	7.49
10	8.33	9.16	9.99	10.82	11.66	12.49	13.32	14.16	14.99	15.82
20	16.65	17.49	18.32	19.15	19.98	20.82	21.65	22.48	23.32	24.15
30	24.98	25.81	26.65	27.48	28.31	29.14	29.98	30.81	31.64	32.47
40	33.31	34.14	34.97	35.81	36.64	37.47	38.30	39.14	39.97	40.80
50	41.63	42.47	43.30	44.13	44.96	45.80	46.63	47.46	48.30	49.13
60	49.96	50.79	51.63	52.46	53.29	54.12	54.96	55.79	56.62	57.45
70	58.29	59.12	59.95	60.79	61.62	62.45	63.28	64.12	64.95	65.78
80	66.61	67.45	68.28	69.11	69.95	70.78	71.61	72.44	73.28	74.11
90	74.94	75.77	76.61	77.44	78.27	79.10	79.94	80.77	81.60	82.44
100	83.27	84.10	84.93	85.77	86.60	87.43	88.26	89.10	89.93	90.76

Figure 1-12 – U.S. Gallons to Imperial Gallons

TEMPERATURE CONVERSION CHART

- Conversion values are rounded. For brevity, only even values are given in the center columns. Odd values may be approximated. Color coding is only intended to assist the user by generally suggesting temperature range: blue is at or below freezing; yellow includes some freezing and relatively moderate to very hot temperatures; red includes warmer to extremely hot temperatures.
- To convert from degrees Celsius (°C) to degrees Fahrenheit (°F), in the appropriate shaded center column, locate the number of the temperature in degrees Celsius (°C) to be converted. The equivalent temperature in degrees Fahrenheit is read to the right. Example: 38°C = 100°F
- To convert from degrees Fahrenheit (°F) to degrees Celsius (°C), in the appropriate shaded center column, locate the number of the temperature value in degrees Fahrenheit (°F) to be converted. The equivalent temperature in degrees Celsius is read to the left. Example: 38°F = 3°C

TEMP TO CONVERT °C or °F			TEMP TO CONVERT °C or °F			TEMP TO CONVERT °C or °F		
°C	< >	°F	°C	< >	°F	°C	< >	°F
-50	**-58**	-72	-17	2	36	17	62	144
-49	-56	-69	-16	4	39	18	64	147
-48	-54	-65	-14	6	43	19	66	151
-47	-52	-62	-13	8	46	20	68	154
-46	-50	-58	-12	**10**	50	21	70	158
-44	-48	-54	-11	12	54	22	72	162
-43	-46	-51	-10	14	57	23	74	165
-42	-44	-47	-9	16	61	24	76	169
-41	-42	-44	-8	18	64	26	78	172
-40	-40	-40	-7	20	68	27	80	172
-39	-38	-36	-6	22	72	28	82	180
-38	-36	-33	-4	24	75	29	84	183
-37	-34	-29	-3	26	79	30	86	187
-36	-32	-26	-2	28	82	31	88	190
-34	-30	-22	-1	30	86	32	90	194
-33	-28	-18	0	32	90	33	92	198
-32	-26	-15	1	34	93	34	94	201
-31	-24	-11	2	36	97	36	96	205
-30	-22	-8	3	38	100	37	98	208
-29	-20	-4	4	40	104	38	100	212
-28	-18	0	6	42	108	39	102	216
-27	-16	3	7	44	111	40	104	219
-26	-14	7	8	46	115	41	106	223
-24	-12	10	9	48	118	42	108	226
-23	-10	14	10	50	122	43	110	230
-22	-8	18	11	52	126	44	112	234
-21	-6	21	12	54	129	46	114	237
-20	-4	25	13	56	133	47	116	241
-19	-2	28	14	58	136	48	118	244
-18	0	32	16	60	140	49	120	248

Figure 1-13 – Converting Between Degrees Centigrade and Degrees Fahrenheit

SECTION 2
LIMITATIONS
Table of Contents

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2-1 INTRODUCTION

Section 2 includes the operating limitations, instrument markings and standard placards necessary for the safe operation of this aircraft, its engine, standard systems and standard equipment.

WARNING: *The limitations included in this section have been approved by the Federal Aviation Administration. Observance of these operating limitations is required by the Federal Aviation Regulations.*

NOTE:

- *Operation in countries other than the United States of America may require observance of different limitations, procedures, or performance data. The Federal Aviation Regulations and references to these regulations may not be applicable in these countries. The aircraft must be equipped and operated in accordance with the applicable national requirements.* ***NOTE:*** *The Kinds of Operating Equipment List (KOEL) may not apply in these countries.*
- *Refer to* ***Section 9*** *of this handbook for amendments to operating limitations, procedures, performance data and other necessary information for supplement systems.*
- *The airspeeds listed in this section are based on airspeed calibration data shown in* ***Section 5*** *of this handbook.*

REV 2

Your Kodiak is certificated under FAA Type Certificate Number A00007SE as a Quest Aircraft Company – Kodiak 100.

2-2 GARMIN G1000 LIMITATIONS

OPERATIONAL BOUNDARIES

Navigation using the GARMIN G1000 is not authorized in the following regions due to unsuitability of the magnetic fields near the Earth's poles.

1. North of 72° North latitude at all longitudes.
2. South of 70° Latitude at all longitudes.
3. North of 65° North latitude between longitude 75° W and 120° W. (Northern Canada)
4. North of 70° North latitude between longitude 70° W and 128° W. (Northern Canada)
5. North of 70° North latitude between longitude 85° E and 114° E. (Northern Russia)
6. South of 55° South latitude between longitude 120° E and 165° E. (Region south of Australia and New Zealand)

2-3 AIRSPEED LIMITATIONS

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

SYMBOL	NAME	KIAS	KCAS	REMARKS
V_{MO}	Maximum Operating Speed	182	180	Do not exceed this speed in any operation.
V_A	Maximum Operating Maneuvering Speed	142	144	Do not make full or abrupt control movements above this speed.
V_{FE}	Maximum Flap Extended Speed: 0° - 10° of Flaps 10° - 20° of Flaps 20° - 35° of Flaps	 138 120 108	 139 120 108	Do not exceed these speeds with the flaps configured as listed.

Figure 2-1 – Airspeed Limitations

2-4 AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their operational significance are provided in **Figure 2-2**.

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
Red Band	20 - 47	Low airspeed warning.
White Band	47 - 108	Full Flap Operating Range – Lower limit represents the stall speed at maximum gross weight with the flaps extended (V_{SO}). The upper limit of the white arc represents the maximum permissible speed with the flaps fully extended.
Light Blue Band	108 - 120	20^o Flap Airspeed Operating Range - Light blue band visually indicates the operating range with 20^0 degrees of flaps.
Blue	120 - 138	10^0-20^0 Flap Airspeed Operating Range - Dark blue band visually indicates the operating range with 10^0 to 20^0 degrees of flaps.
Green Band	68 - 182	Normal Operating Range – The lower limit represents the stall speed at maximum gross weight at the most forward C.G. with flaps retracted (V_S). The upper limit is the maximum operating speed.
Barber Pole Band	≥182	182 KIAS is the maximum speed for normal flight operations.

Figure 2-2 – PFD Airspeed Indicator Markings

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	47-108	Full Flap Operating Range – Lower limit represents the stall speed at maximum gross weight with the flaps extended (V_{SO}). The upper limit of the white arc represents the maximum permissible speed with the flaps fully extended.
Green Arc	68 -182	Normal Operating Range – The lower limit represents the stall speed at maximum gross weight at the most forward C.G. with flaps retracted (V_S). The upper limit is the maximum operating speed.
Red Line	182	Maximum speed for normal flight operations.

Figure 2-2 (continued) – PFD Airspeed Indicator Markings

NOTE: *At lower airspeeds the calibrated and indicated airspeeds diverge (47 KIAS = 60 KCAS). KIAS values are approximate and may not be accurate at the stall.*

2-5 POWERPLANT LIMITATIONS

Number of Engines 1
Engine Manufacturer .... Pratt and Whitney Canada Inc
Engine Model Number PT6A-34
Engine Operating Limits .... See **Figure 2-4**
Fuel Grade and Approved Fuel Additives .... See **Figures 2-17** and **Figure 2-18**

Oil Grade (Specification):

Oil to be used must conform to the current revision of Pratt and Whitney Canada Service Bulletin Number 1001. Refer to Section 8 of this handbook for a general listing of approved engine oils. When adding oil, service the engine with the type and brand of oil which is currently being used in the engine.

CAUTION: *Do not mix different types or brands of oil.*

Number of Propeller Blades 4
Propeller Manufacturer .... Hartzell Propeller Inc
Propeller Model Number (Hub / Blades) .... HC-E4N-3P(Y)/ D9511FS(B)
Propeller Diameter (Min-Max) .... 95-96 inches
Propeller Blade Angles @ 30 inch station:

Feathered .... 86.1° ± 0.5°
Low Pitch .... 17.5° ± 0.1°
Reverse Pitch .... -10° ± 0.5°

PROPELLER SYSTEM OPERATING LIMITATIONS

An overspeed governor test must be performed prior to the first flight of the day and following engine control system maintenance or adjustments.

Stabilized ground operation is prohibited between 450 and 1050 RPM. The propeller may be operated when feathered at or below 450 RPM.

ENGINE CONTROL OPERATING LIMITATION

Flight operation with the engine power lever retarded below idle (beta mode) is prohibited. Flight operation in beta mode may result in an engine overspeed condition and consequent loss of engine power or loss of airplane control. Operating in beta mode quickly produces high amounts of drag which could result in a rapid loss of altitude or complete loss of control.

ENGINE STARTING CYCLE LIMITATIONS

Starting cycles with use of the airplanes batteries shall be limited to the following intervals and sequence.

HI START: 15 seconds ON – 60 seconds OFF

LO START: 30 seconds ON – 60 seconds OFF

LO START: 30 seconds ON – 30 minutes OFF

Repeat the above cycle as necessary.

Starting cycles with use of external power shall be limited to the following intervals and sequence.

HI START: 15 seconds ON – 60 seconds OFF

HI START: 15 seconds ON – 60 seconds OFF

HI START: 15 seconds ON – 60 minutes OFF

Repeat the above cycle as necessary.

Operation	Max Torque	Maximum ITT°C	Gas Generator RPM (%Ng)	Propeller RPM	Oil Pressure PSIG (1)	Oil Temp. °C (2)	SHP (8)
Takeoff	1790 1970 (3)	790	101.6	2200 2000	85 to 105	10 to 99	750 @ <31.0°C
Max Climb	1670 1840 (3)	765	101.6	2200 2000	85 to 105	0 to 99	700 @ <28.3°C
Max Cruise	1670 1840 (3)	740	101.6	2200 2000	85 to 105	0 to 99	700 @ <19.4°C
Idle	---	685 (5)	53.0 (Typ.)	---	40 (min)	-40 to 99	---
Max Reverse (6)	1875	790	101.6	2100	85 to 105	0 to 99	750 @ <31.0°C
Transient	2100 (7)	850 (4)	102.6 (4)	2420 (9)	85 to 105	0 to 99	---
Starting	---	1090 (10)	---	---	---	-40 (min)	---
Max Continuous Emergency (11)	1790 1970 (3)	790	101.6	2200 2000	85 to 105	10 to 99	750 @ <31.0°C

NOTE (1): The minimum oil pressure is 85 PSI at gas generator speeds above 72% with the oil temperature between 60°C and 70°C. Oil pressures below 85 psi are considered critical and should only be tolerated for the minimum amount of time to complete the flight while operating under a reduced power setting. Oil pressure indications below 85 psi should be reported as a discrepancy and corrected prior to the next flight. Oil pressure indications below 40 PSI are unsafe and require engine shutdown or a landing be made as soon as possible using the minimum power required to sustain flight.

NOTE (2): For increased oil service life, an oil temperature between 74°C and 80°C is recommended. A minimum oil temperature of 55°C is required for proper operation of the fuel heater prior to attaining takeoff power.

NOTE (3): Propeller RPM must be set at or below 2000 RPM when achieving this maximum torque value.

NOTE (4): These values are time limited to two (2) seconds.

NOTE (5): Increase Ng to keep within this limit.

NOTE (6): Reverse thrust operation is limited to 1 minute.

NOTE (7): This value is limited to twenty (20) seconds.

NOTE (8): The maximum shaft horsepower for takeoff/max continuous is 750. The maximum shaft horsepower for climb and cruise is limited to 700. The engine may not produce these maximum ratings under certain temperature and altitude combinations as reflected in the takeoff, climb and cruise performance charts.

NOTE (9): In the event of failure of the main propeller governor, causing an overspeed condition, it is permissible to complete a flight with the propeller controlled via the overspeed governor, provided this limit is not exceeded.

NOTE (10): This value is time limited to 2 seconds. Starting temperatures above 850°C should be investigated for cause of problem.

NOTE (11): Use of this rating is intended for emergency or abnormal conditions (i.e., maintaining altitude in extreme wind-shear or icing conditions).

Figure 2-3 – PT6A-34 Engine Operating Limits

2-6 POWERPLANT INSTRUMENT MARKINGS

Marking designations for the power plant instruments are provided in **Figures 2-4** through **2-13**.

Instrument	Red Line	Green Arc	Yellow Arc	Red Line
	Minimum Limit	Normal Operating	Caution Range	Maximum Limit
Torque Indicator (2)	----	0 -1670 ft-lb Variable to 1840 (1)	1670 -1790 ft-lb Variable to 1970 (1)	1790 ft-lb Variable to 1970 (1)
Inter-Turbine Temperature (ITT) Indicator	----	400-740°C (3)	740-790°C (3)	790°C (3)
Propeller RPM Indicator	----	1900-2200 RPM	450-1050 RPM	2200 RPM
Gas Generator %RPM Indicator (4)	----	53-101.6%	----	101.6%
Oil Pressure Gage	40 PSI	85-105 PSI	40-85 PSI	105 PSI
Oil Temperature Gage	-40°C	+10 to +99°C	-40°C to +10°C	+99°C

NOTE (1): The torque indicator operating ranges and red line vary according to the corresponding propeller RPM.

NOTE (2): A placard is installed indicating cruise torque limits of 1670 ft-lb @ 2200 RPM and 1840 ft-lb @ 2000 RPM; takeoff torque limits are also listed as 1790 ft-lb. @ 2200 RPM and 1970 ft-lb. @ 2000 RPM.

NOTE (3): During engine start, the ITT indicator indicates a normal operating range from 200°C to 1090°C with a red radial line at 1090°C. No caution range is provided during engine start.

NOTE (4): 100% Gas Generator RPM is 37,500 RPM.

Figure 2-4 – Power Plant Instrument Markings as Displayed on the G1000

Figure 2-5 – Torque Indicator

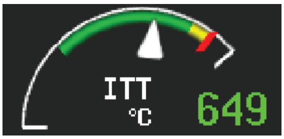


Figure 2-6 – ITT Indicator (Normal Operation)

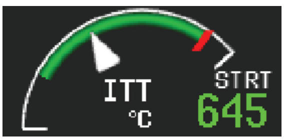


Figure 2-7 – ITT Indicator (Engine Start)

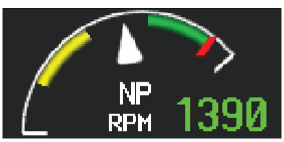


Figure 2-8 – Propeller RPM Indicator

Figure 2-9 – Gas Generator RPM Indicator

Figure 2-10 – Oil Pressure Indicator

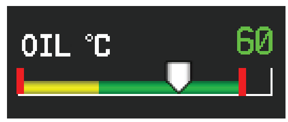


Figure 2-11 – Oil Temperature Indicator

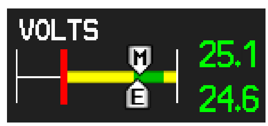


Figure 2-12 – Battery 1 (M) and Battery 2 (E) Voltage

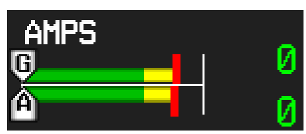


Figure 2-13 – Generator and Alternator Amps

REV 5

2-7 MISCELLANEOUS INSTRUMENT MARKINGS

Miscellaneous instrument markings and their color code significance are provided in **Figure 2-14**.

Instrument	Red Line (Minimum Limit)	Green Band (Normal Operating)	Yellow Band (Caution Range)	Red Line (Maximum Limit)
Fuel Quantity Indicators	Empty	175 lb to 1080 lb	Empty to 175 lb	----
Generator Amps	----	0 - 300 A	240 - 300 A	300 A
Alternator Amps	----	0 - 40 A	32 - 40 A	40 A
Battery 1 Voltage	<10 V	24 V - 30 V	Low Range 10 V - 24 V High Range 30 V - 33 V	----
Battery 2 Voltage	<10 V	24 V - 30 V	Low Range 10 V - 24 V High Range 30 V - 33 V	----
Oxygen Supply Pressure	Empty	400 - 2000 psig	----	----
Oxygen Outlet Pressure	0 - 59 psig	59 - 80 psig	≥81 psig	----

Figure 2-14 – Miscellaneous Instrument Markings

2-8 WEIGHT LIMITS

Maximum Ramp Weight .... 6800 lb
Maximum Takeoff Weight .... 6750 lb
Maximum Landing Weight .... 6690 lb

NOTE: *Refer to* **Section 6** *of this handbook for cabin zone loading limits of the Kodiak 100. Refer to* **Section 5** *of this handbook for takeoff limits based on weight, altitude and temperature.*

2-9 CENTER OF GRAVITY LIMITS

CENTER OF GRAVITY RANGE

Forward C.G. Limit (5,000 lb or less) .... 63.90 inches aft of datum *(14.00% MAC)*

Forward C.G. Limit (6,750 lb) .... 69.42 inches aft of datum
(Linear variation from 5,000 lb to 6,750 lb) *(22.50% MAC)*

Aft Limit, up to 6,750 lb .... 80.78 inches aft of datum *(40.00% MAC)*

Reference Datum .... Forward face of the firewall

MEAN AERODYNAMIC CHORD (MAC)

Leading Edge MAC .... 54.81 inches aft of datum
MAC Length .... 64.92 inches

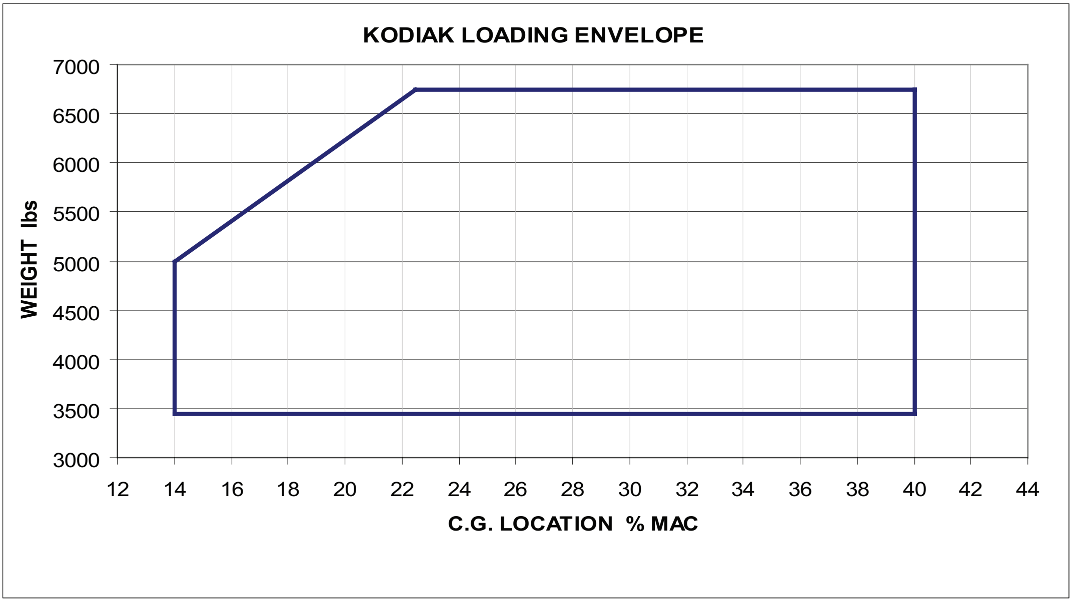


Figure 2-15 – Kodiak Loading Envelope

2-10 MANEUVER LIMITS

This airplane is certified in the normal category. The normal category is applicable to aircraft not intended for aerobatic operations. The normal category includes maneuvers incidental to normal flying, stalls (except whip stalls), lazy eights, chandelles, and turns in which the bank angle does not exceed 60°.

Aerobatic Maneuvers, including spins, are prohibited.

2-11 FLIGHT LOAD FACTOR LIMITS

Flight Load Factors:
Flaps Up .... +3.53 g, -1.41 g
Flaps Full Down.. +2.0 g

2-12 FLIGHT CREW LIMITS

One pilot required in the left seat.

2-13 KINDS OF OPERATION LIMITS

This airplane is equipped for day and night VFR and IFR operations. The operating limitations placard reflects the limits applicable to the airplane at the time its Airworthiness Certificate is issued.

The following **Kinds of Operations Equipment List (KOEL)** identifies the systems and equipment required to be operational in the listed kind of operations for airplane airworthiness according to **14 CFR Part 23**. These systems and equipment items must be installed and in proper condition for the particular type of operation desired. The equipment list furnished with the airplane should be referenced for additional equipment information. The pilot in command is the final authority for determining the airworthiness of the airplane for each flight and for assuring compliance with all Federal Aviation Regulations.

The zeros (0) used in the following list mean that the system and/or equipment was not required for type certification for that kind of operation. Other numbers specify the quantity of the system and/or equipment required for type certification for that kind of operation. When A/R appears for the number required it indicates As Required.

Deviations from this KOEL may be approved for the operation of a specific aircraft if a proper **MEL (Minimum Equipment List)** has been authorized by the appropriate regulatory agency.

Kinds of Operation Equipment List					
System, Instrument, Equipment and/or Function.	**VFR DAY**	**VFR NIGHT**	**IFR DAY**	**IFR NIGHT**	**Comments**
PLACARDS AND MARKINGS					
Kodiak 100 POH/AFM	1	1	1	1	Accessible to pilot in flight.
Garmin G1000™ Cockpit Reference Guide	1	1	1	1	Accessible to pilot in flight.
AUTOFLIGHT					
Autoilot	0	0	0	0	
Yaw Damper	0	0	0	0	
Flight Director	0	0	0	0	
ENVIRONMENTAL SYSTEMS					
Avionics Cooling Fans	2	2	2	2	
COMMUNICATIONS					
VHF COM	0	0	1	1	
Emergency Locator Transmitter	1	1	1	1	
Static Discharge Wicks	9	9	9	9	Only one static discharge wick may be missing from a single flight control and a maximum of 3 total missing from the airplane.
ELECTRICAL POWER					
24V Main Batteries	2	2	2	2	
40 Amp Alternator	0	0	1	1	
300 Amp Starter/Generator	1	1	1	1	
Generator Ammeter	0	1	1	1	
Alternator Ammeter	0	1	1	1	
Bus 1 Voltmeter	0	1	1	1	
Bus 2 Voltmeter	0	1	1	1	
Standby Attitude Indicator Battery	0	0	1	1	
Circuit Breakers	1	1	1	1	Required for all operational equipment.

Kinds of Operation Equipment List					
System, Instrument, Equipment and/or Function.	**VFR DAY**	**VFR NIGHT**	**IFR DAY**	**IFR NIGHT**	**Comments**
EQUIPMENT AND FURNISHINGS					
Seat Belt Assembly	1	1	1	1	For each seat occupant.
Shoulder Harness	1	1	1	1	For each occupant.
Inertia Reel	1	1	1	1	For each front seat.
FIRE PROTECTION					
Fire Extinguishers	3	3	3	3	
FLIGHT CONTROLS					
Flap Position Indicator	1	1	1	1	
Flap Operating System	1	1	1	1	
Elevator Trim System (Electric and Manual Backup)	1	1	1	1	
Elevator Trim Indicator	1	1	1	1	
Electric Aileron Trim System and Indicator	1	1	1	1	
Electric Rudder Trim System and Indicator	1	1	1	1	
Flap/Trim Compensation Unit	1	1	1	1	
FUEL SYSTEM					
Electric Auxiliary Fuel Pump	1	1	1	1	
Ejector Pump	1	1	1	1	
LH Tank Fuel Quantity Indicator	1	1	1	1	
RH Tank Fuel Quantity Indicator	1	1	1	1	
Fuel Selectors OFF Warning System	1	1	1	1	
ICE AND RAIN PROTECTION					
Inertial Air Particle Separator	1	1	1	1	
Pitot/Static Heat System	1	1	2	2	
Stall Warning System Heater	0	0	0	0	
Wing and Empennage Leading Edge TKS System	0	0	0	0	
Windshield TKS System	0	0	0	0	
Propeller TKS System	0	0	0	0	

Kinds of Operation Equipment List					
System, Instrument, Equipment and/or Function.	**VFR DAY**	**VFR NIGHT**	**IFR DAY**	**IFR NIGHT**	**Comments**
INDICATING AND RECORDING SYSTEMS					
Stall Warning System	1	1	1	1	
Terrain Avoidance Warning System	1	1	1	1	14 CFR 91.223
Skywatch Traffic Advisory System	0	0	0	0	
XM Datalink Traffic Information System (TIS)	0	0	0	0	
XM Datalink Weather Information System	0	0	0	0	
Outside Air Temperature Indicators	1	1	1	1	
G1000 ANNUNCIATIONS					
ALTERNATR FL (Amber)	1	1	1	1	
AUX PUMP ON (White)	0	0	0	0	
AUX PWR ON (White)	0	0	0	0	
AVN FAN 1 FAIL (White)	1	1	1	1	
AVN FAN 2 FAIL (White)	1	1	1	1	
BLEED AIR ON (White)	0	0	0	0	
BETA (White)	1	1	1	1	
CARGO DOOR (Red or Amber)	1	1	1	1	
EMER PWR LVR (Amber)	0	0	0	0	
ENG INLET BP (White)	1	1	1	1	
ENG INLET NORM (Green)	1	1	1	1	
FLAP FAIL (Amber)	0	0	0	0	
FLAP OVERSPEED (RED)	0	0	0	0	
FUEL PRESS LOW L, FUEL PRESSLOW R, FUEL PRESS LOW L-R (Amber)	3	3	3	3	
FUEL LOW L, FUEL LOW R, FUEL LOW L-R (Amber)	3	3	3	3	
FUEL OFF L (White)	0	0	0	0	
FUEL OFF R (White)	0	0	0	0	
FUEL OFF L-R (Red)	1	1	1	1	
ITT (RED)	0	0	0	0	
NG OVERSPEED (RED)	0	0	0	0	
NP OVERSPEED (RED)	0	0	0	0	
TORQUE (RED)	0	0	0	0	

Kinds of Operation Equipment List					
System, Instrument, Equipment and/or Function.	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	Comments
G1000 ANNUNCIATIONS (Continued)					
FUEL OFF LED Warning Light	1	1	1	1	
GEN FAIL (Amber)	1	1	1	1	
IGNITION ON (White)	1	1	1	1	
OIL PRESS LOW (Red)	1	1	1	1	
OVERSPD WARN (Red)	1	1	1	1	
Overspeed Warning Aural Warning	1	1	1	1	
PITOT FL L, PITOT FL R, PITOT FL L-R (Amber)	3	3	3	3	
PITOT OFF L, PITOT OFF R PITOT OFF L-R (Amber)	3	3	3	3	
RESERVOIR FUEL (Red)	1	1	1	1	
STARTER ON (White)	1	1	1	1	
VOLTAGE LOW (Amber)	1	1	1	1	
LIGHTING					
PFD Bezel Lighting	0	1	0	1	
PFD Backlighting	0	1	1	1	
MFD Bezel Lighting	0	1	0	1	
MFD Backlighting	0	1	1	1	
Switch and Circuit Breaker Panel Lighting	0	1	0	1	
Standby Airspeed Indicator Internal Lighting	0	1	0	1	
Standby Altimeter Internal Lighting	0	1	0	1	
Magnetic Compass Internal Lighting	0	1	0	1	
Standby Attitude Indicator Internal Lighting	0	1	0	1	
Glareshield Flood Light	0	1	0	1	

Kinds of Operation Equipment List					
System, Instrument, Equipment and/or Function.	**VFR DAY**	**VFR NIGHT**	**IFR DAY**	**IFR NIGHT**	**Comments**
LIGHTING (Continued)					
Aircraft Position (NAV) Lights	0	3	0	3	
Anticollision Strobe Lights	2	2	2	2	
Red Flashing Beacon	0	0	0	0	
Taxi Light	0	0	0	0	
Landing Light	0	1	0	1	Operations at night for hire only.
Pulse Light System	0	0	0	0	
NAVIGATION AND PITOT-STATIC SYSTEM					
G1000 Airspeed Indicator	1	1	1	1	
Standby Airspeed Indicator	0	0	1	1	
G1000 Altimeter	1	1	1	1	
Standby Altimeter	0	0	1	1	
G1000 Vertical Speed Indicator	0	0	0	0	
G1000 Attitude Indicator	0	0	1	1	
Standby Attitude Indicator	0	0	1	1	
G1000 Directional Indicator (HSI)	0	0	1	1	
G1000 Turn Coordinator	1	1	1	1	
Magnetic Compass	1	1	1	1	
VHF Navigation Radio	0	1	0	1	
(VOR, LOC, GS)	0	0	AR	AR	As required per procedure.
GPS Receiver/Navigator	0	0	AR	AR	As required per procedure.
Marker Beacon Receiver	0	0	AR	AR	As required per procedure.
Altitude Encoding Transponder	AR	AR	1	1	As required per 14CFR 91.215
Clock	0	0	1	1	
Pitot-Static System	1	1	2	2	

Kinds of Operation Equipment List					
System, Instrument, Equipment and/or Function.	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	Comments
PROPELLER SYSTEM					
Propeller Overspeed Governor	1	1	1	1	
ENGINE FUEL AND CONTROL					
Fuel Flow Indicator	0	0	0	0	
Fuel Pressure Indicator	1	1	1	1	
IGNITION SYSTEM					
Engine Ignition System	1	1	1	1	
ENGINE INDICATING					
Torque Indicator	1	1	1	1	
Interturbine Temperature Indicator	1	1	1	1	
Propeller RPM Indicator	1	1	1	1	
Gas Generator RPM (Ng) Indicator	1	1	1	1	
Oil Pressure Indicator	1	1	1	1	
Oil Temperature Indicator	1	1	1	1	
ENGINE OIL					
Engine Oil Dipstick	1	1	1	1	

2-14 FUEL LIMITATIONS

TOTAL FUEL

Both Tanks.. 320 U.S. Gallons (2177 Pounds)
Each Tank.. 160 U.S. Gallons (1089 Pounds)
Capacity to Inboard Filler Ports (Both Tanks).. 193 U.S. Gallons (1313 Pounds)

USABLE FUEL

Both Tanks ON .... 315 U.S. Gallons (2143 Pounds)

UNUSABLE FUEL

Both Tanks ON .... 5 U.S. Gallons (34 Pounds)

UNDRAINABLE FUEL

Both Tanks ON .... (1 Pound)

NOTE: *The fuel tanks are considered to be full when the fuel level in each tank slightly covers the upper surface of the anti-siphon flapper valve in each outboard fuel filler port.*

With the **FUEL LOW L-R** annunciator ON, continuous operation of the aircraft in an uncoordinated manner with the turn coordinator "ball" more than one-quarter ball width out of the centered position is prohibited. The unusable fuel quantities increase when more severe sideslips are maintained.

Due to the possibility of fuel starvation, the maximum allowable full rudder sideslip duration is 30 seconds.

Maximum Allowable Fuel Imbalance in flight is 250 pounds.

FUEL GRADE (SPECIFICATION) AND FUEL ADDITIVES

Approved Fuel Grades and Specifications are provided in **Figure 2-16**. All fuels used must contain fuel system ice inhibitor. Refer to **Figure 2-17** for approved additives and concentration levels.

Type of Fuel	Issuing Authority	Freezing Point °C (°F)
Jet A	ASTM D 1655	-40 (-40)
Jet A-1	DEF STAN 91-91	-47 (-53)
JP-5	US MIL-PRF-5624	-46 (-51)
JP-8	US MIL-DTL-83133	-50 (-58)
JP-1	US MIL-T-5616	-60 (-76)

Figure 2-16 – Approved Fuels

NOTE: *JP-5 and JP-8 contain Fuel System Icing Inhibitor and no other anti-icing additives should be mixed with these fuels.*

FUEL LIMITATIONS (CONTINUED)

Anti-Icing Additive Name	Maximum Concentration Allowed (Percentage by Volume)
DiEthylene Glycol Monomethyl Ether (DiEGME) conforming to MIL-DTL-85470B	0.15%

Figure 2-17 – Approved Anti-Icing Additive

NOTE: *All fuels used must contain anti-icing fuel additive conforming to* **MIL-I-27686** *or* **MIL-DTL-85470B**.

NOTE: *JP-5 and JP-8 contain Fuel System Icing Inhibitor and no other anti-icing additives should be mixed with these fuels.*

REV 7

If additional biocidal protection is desired, the following additive is permitted for use:

Biocidal Additive	Maximum Concentration Allowed (Percentage by Volume)
Biobor JF	0.02% (270 ppm)

Figure 2-17a - Approved Biocidal Additive

2-15 MAXIMUM OPERATING ALTITUDE LIMITATION

Certificated Maximum Operating Altitude: .... 25,000 feet

2-16 OUTSIDE AIR TEMPERATURE LIMIT

MINIMUM OUTSIDE AIR TEMPERATURE LIMIT:

-54°C from sea level to a pressure altitude of 25,000 feet.

NOTE: *The landing lights are limited to operations at temperatures above -40°C. Do not operate the landing lights at temperatures colder than -40°C.*

NOTE: *Flap operation is limited to operation at temperatures above -25°C. Do not operate the flaps at temperatures colder than -25°C.*

MAXIMUM OUTSIDE AIR TEMPERATURE LIMIT:

Ground Operations: +53°C from sea level to 5000 feet. ISA +37°C above 5000 feet.
Flight Operations: ISA +35°C from sea level to 25,000 feet.

2-17 MAXIMUM PASSENGER SEATING LIMIT

Up to ten seats may be installed. The right front seat may be occupied by either a passenger or a second crew member. Refer to **Section 6** for seat locations.

2-18 OTHER LIMITATIONS

FLAP LIMITATIONS

Approved Takeoff Range .... 0 to 20 Flap Degrees
Approved Landing Range.. 0 to 35 Flap Degrees
Minimum Operating OAT .... **See Below

Minimum Operating OAT **-55°C for aircraft Serial Numbers 100-0018 and on and Serial Numbers 100-0001 thru 100-0017 that have complied with Quest KODIAK Service Bulletin SB-016 (*FLAP SYSTEM, Flap Drive Actuator Replacement*). Minimum Operating OAT **-25°C** for Aircraft 100-0001 thru 100-0017 that have not complied with Quest KODIAK Service Bulletin SB-016 (*FLAP SYSTEM, Flap Drive Actuator Replacement*).

REV 5

CREW SEATBELT LIMITATION

Crew inertia reel levers must be placed in the locked position prior to takeoff and landing.

ELECTRICAL LOAD LIMITATIONS

MAXIMUM ALLOWABLE STARTER/GENERATOR ELECTRICAL LOAD LIMITATION	
MINIMUM Ng ENGINE SPEED (%)	MAX. GENERATOR LOAD (AMPS)
53 (Ground)	80
61 (Flight)	300

MAXIMUM ALLOWABLE ALTERNATOR ELECTRICAL LOAD LIMITATION	
MINIMUM Ng ENGINE SPEED (%)	MAX. ALTERNATOR LOAD (AMPS)
53 (Ground)	25
61 (Flight)	40

Figure 2-18 – Electrical Load Limitations

NOTE: *Maximum alternator load at ground idle may exceed 25 AMPS for approximately 5 minutes after start up.*

REV 1

2-19 PLACARDS

WARNING: *The following information must be displayed in the form of placards or markings.*

1. Located in full view of the pilot on the instrument panel on airplanes NOT equipped for flight into known icing conditions:

> This aircraft is certified in the Normal Category. The markings and placards installed in this airplane must be complied with when operating this airplane. Additional operating limitations which must also be complied with when operating this airplane are contained in the FAA Approved Flight Manual and Pilot's Operating Handbook.
>
> • Aerobatic maneuvers, including spins are PROHIBITED.
> • Flight into known icing conditions is PROHIBITED.
>
> This airplane is certified for the following flight operations as of the date of issuance of the original airworthiness certificate.
>
> DAY – NIGHT – VFR – IFR

2. Located on the Control Lock:

> **WARNING!**
> **REMOVE CONTROL LOCK PRIOR TO STARTING ENGINE**

3. Located near the left PFD:

> MAX WEIGHT OPERATING MANEUVERING SPEED 142 KIAS REFER TO THE POH FOR V_O AT OTHER WEIGHTS.

4. Located above the left edge of the MFD:

	TORQUE LIMITS	
	2200 RPM	2000 RPM
CLIMB & CRUISE	1670 FT LB	1840 FT LB
TAKEOFF	1790 FT LB	1970 FT LB

5. A compass calibration card must be provided near the magnetic compass to indicate the accuracy of the magnetic compass in 30° increments. This compass card is provided with the compass.

6. Located on the instrument panel and in the passenger area in clear view of the crew and passengers:

NO SMOKING

7. Located on each crew door and headliner:

NO SMOKING
IN AIRCRAFT

8. Located at the LED light on the instrument panel forward of the pilot:

WARNING!
WHEN ILLUMINATED
BOTH FUEL SELECTOR VALVES ARE
OFF

9. Located above the Garmin MFD left edge or at the gas generator tachometer:

MIN NG START
14.0 %

10. Located near the forward cabin curtain:

CURTAIN MUST BE STOWED
DURING TAXI, TAKEOFF, TUR-
BULENCE AND LANDING

11. Located near the cargo door steps:

STEPS MUST BE STOWED AND
SECURED PRIOR TO TAKEOFF,
TURBULENCE AND LANDING

12. Located on each crew door:

FASTEN SEATBELTS AND
SHOULDER RESTRAIN WHILE
SEATED

13. Located on each crew seat back:

FASTEN SEATBELTS WHILE
SEATED

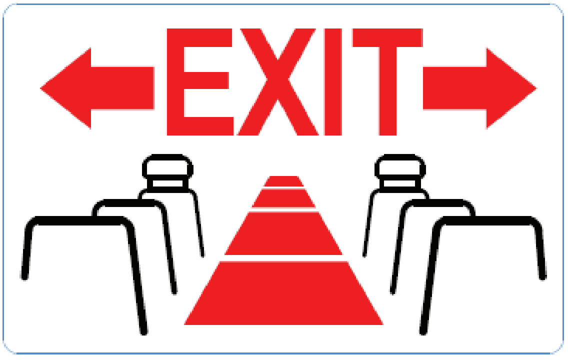
14. Located on each passenger seat back:

FASTEN SEATBELTS WHILE
SEATED
NO STOWAGE UNDER SEAT

15. Located on each crew seat (front):

NO STOWAGE UNDER SEAT

16. Located in the forward cabin headliner:



17. Located above the cargo door exit:

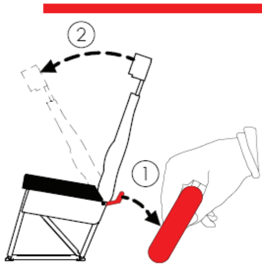
EXIT

18. Located at each fire extinguisher:

FIRE EXTINGUISHER

19. Located on each crew seat back:

EMERGENCY SEATBACK RELEASE



1 PULL HANDLE

2 PUSH SEATBACK FORWARD

20. Located on each cabin sidewall:

SECURE CARGO IN ACCORDANCE
WITH AIRCRAFT FLIGHT MANUAL

21. Located near the overspeed governor test button:

OVERSPEED
GOVERNOR
PRESS TO TEST

22. Located below the power lever:

CAUTION!
USE BETA AND REVERSE ONLY
WITH THE ENGINE RUNNING AND THE
PROPELLER OUT OF FEATHER.

23. Located near the firewall fuel shutoff valve:

FIREWALL FUEL SHUTOFF
PULL OFF

24. Baggage capacity - located at the baggage area (rear stepped area):

MAX BAGGAGE 200 LB. REFER TO
WEIGHT AND BALANCE DATA FOR
BAGGAGE/CARGO LOADING

25. Emergency locator transmitter, located on the aft cabin bulkhead:

ELT
REMOVE BULKHEAD
FOR ACCESS

REV 1

26. (Placard Removed)
27. Located on the instrument panel near the fresh air shutoff valve:

FIREWALL AIR
SHUTOFF
DEPRESS BUTTON
& PULL KNOB

REV 1

28. (Placard Removed)
29. Located next to the pilot shoulder harness inertia reel lever.

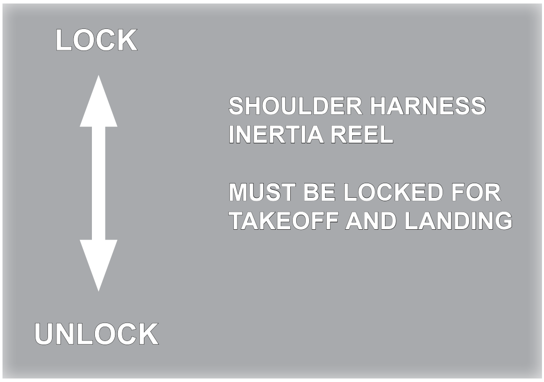
LOCK

SHOULDER HARNESS
INERTIA REEL

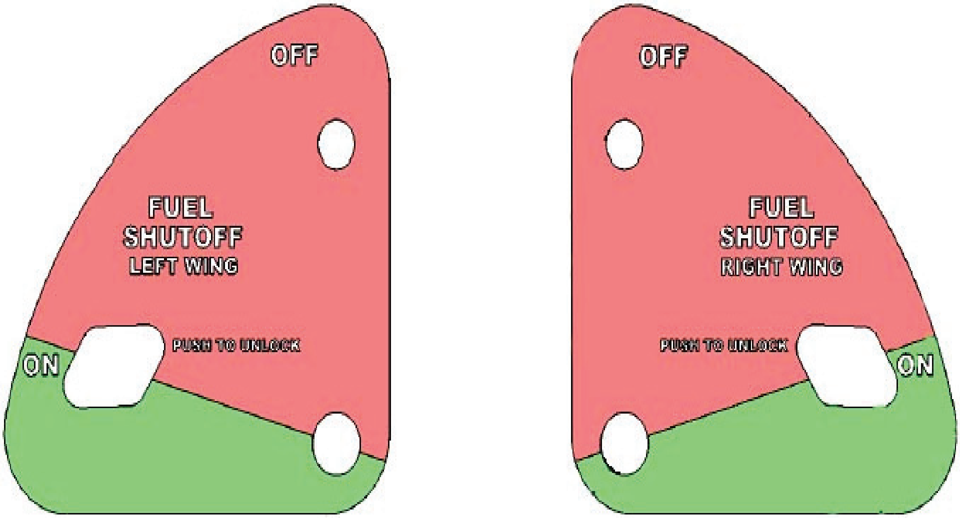
MUST BE LOCKED FOR
TAKEOFF AND LANDING

UNLOCK

30. Located next to the right crew shoulder harness inertia reel lever:



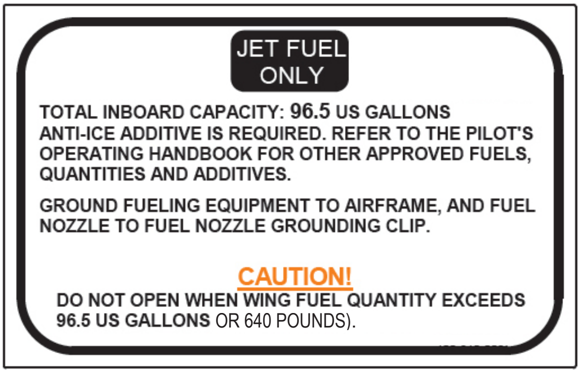
31. Located on the fuel tank selectors:



NOTE: *This placard must also show 157.5 gal (596.2 L) for each tank, 315 gal (1192.4 L) usable, and 250 lb maximum fuel imbalance.*

REV 1

32. Located adjacent to each inboard fuel tank filler cap:



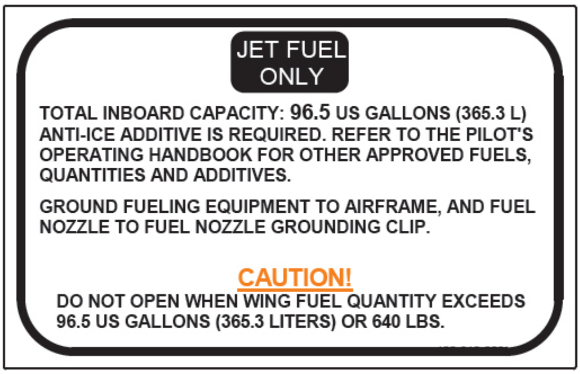
REV 1

NOTE: *The following placard is also acceptable:*

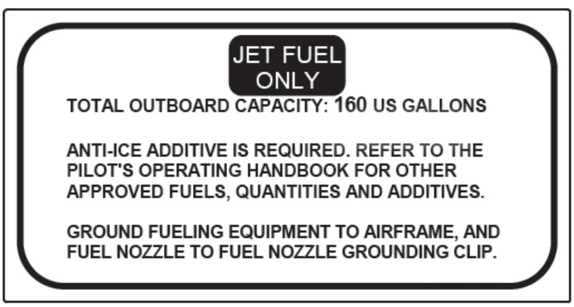
REV 2

32a.

REV 1



33. Located adjacent to each outboard fuel tank filler cap:



NOTE: *The following placard is also acceptable:*

33a.

JET FUEL ONLY

TOTAL OUTBOARD CAPACITY: 160 US GALLONS (605.6 LITERS)

ANTI-ICE ADDITIVE IS REQUIRED. REFER TO THE PILOT'S OPERATING HANDBOOK FOR OTHER APPROVED FUELS, QUANTITIES AND ADDITIVES.

GROUND FUELING EQUIPMENT TO AIRFRAME, AND FUEL NOZZLE TO FUEL NOZZLE GROUNDING CLIP.

34. Located adjacent to the firewall mounted fuel filter drain point:

FUEL FILTER DRAIN DAILY

35. Located adjacent to the EPA can drain points:

EPA & OIL/FUEL RESERVOIRS – DRAIN DAILY & PROPERLY DISPOSE

36. Located on the brake fluid reservoir:

MAX

BRAKE FLUID RESERVOIR
FILL WITH MIL-H-5606 FLUID

MIN

37. Located near the oil dipstick / filler cap (On the underside of the left upper cowl door):

ENGINE OIL

TOTAL CAPACITY: 13 US QUARTS
DRAIN AND FILL QTY: 9 US QUARTS

OIL TYPE: REFER TO THE PILOT'S OPERATING HANDBOOK FOR APPROVED OILS. DO NOT MIX BRANDS.

SERVICED WITH: ___________

REV 1

> **NOTE:** *The following placard is also acceptable:*

REV 2

REV 1

37a.

ENGINE OIL

TOTAL CAPACITY: 13 US QUARTS (12.3 L)
DRAIN AND FILL QTY: 9 US QUARTS (8.5 L)

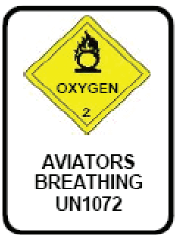
OIL TYPE: REFER TO THE PILOT'S OPERATING HANDBOOK FOR APPROVED OILS. DO NOT MIX BRANDS.

SERVICED WITH: ___________

38. Oil quantity indicator: an oil dipstick, suitably calibrated, is supplied with the engine.
39. Located on the oxygen bottle:

WARNING: FILL WITH AVIATORS OXYGEN ONLY!
MAXIMUM FILL RATE: 200 psi / min.
MAXIMUM TANK FILL: 2000 psi.
FILL PORT: MS22066-3
KEEP OIL AND GREASE AWAY. USE ONLY EQUIPMENT CLEANED FOR OXYGEN SERVICE AND RATED FOR CYLINDER PRESSURE. REPLACE CAP AFTER FILLING
REFER TO FLIGHT MANUAL
DO NOT REMOVE THIS SAFETY PRODUCT LABEL
100-910-0032

40. Located on the oxygen bottle:



41. Located on the side of the oil-to-fuel heater near the oil filler cap:

WARNING!

PRESSURIZED OIL TANK

VERIFY OIL DIPSTICK IS SECURED PROPERLY

42. Located on the battery trays:

CAUTION!
24 VOLTS DC

THIS AIRCRAFT IS EQUIPPED WITH A NEGATIVE GROUND SYSTEM.

ENSURE PROPER POLARITY

REVERSE POLARITY WILL CAUSE DAMAGE TO ELECTRICAL COMPONENTS.

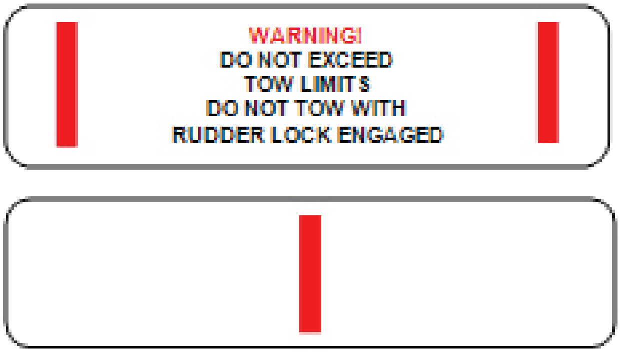
43. Located near the ground power service receptacle:

EXTERNAL POWER
28 VOLTS DC NOMINAL
800 AMPS
MIN. STARTING CAPACITY
DO NOT EXCEED 1700 AMPS

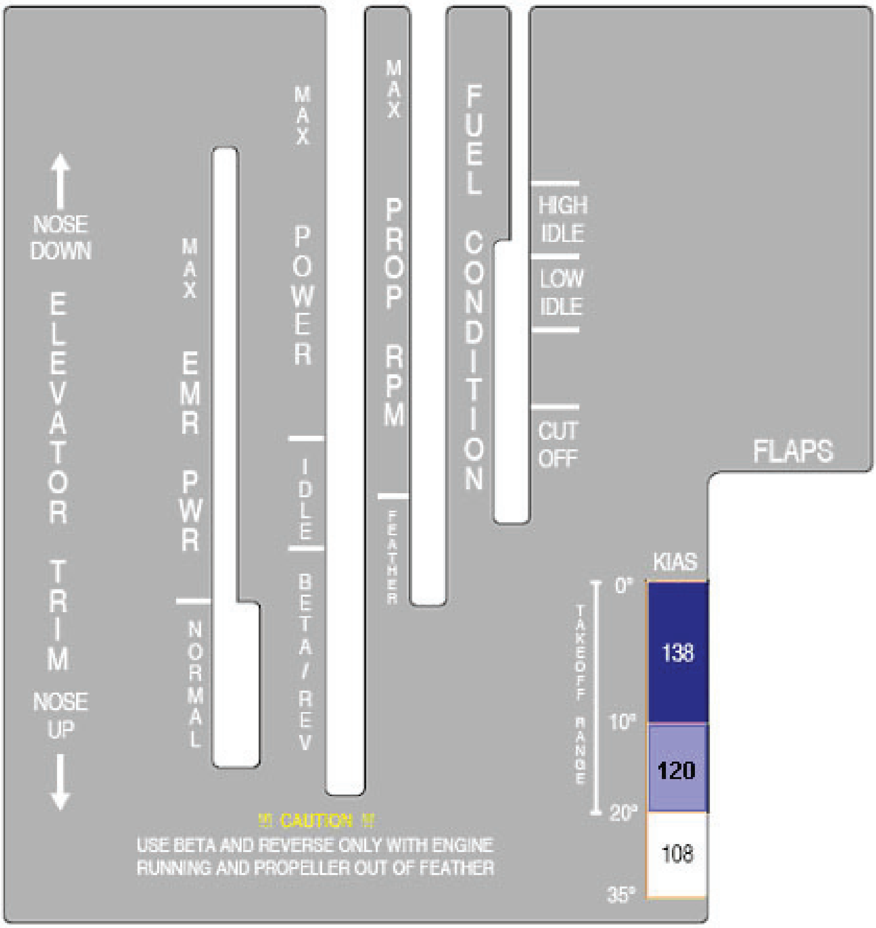
44. Located on the lower portion of each wing just outboard of the pitot tube:

MAGNETOMETER –
USE NON-MAGNETIC TOOLS
AND SCREWS.

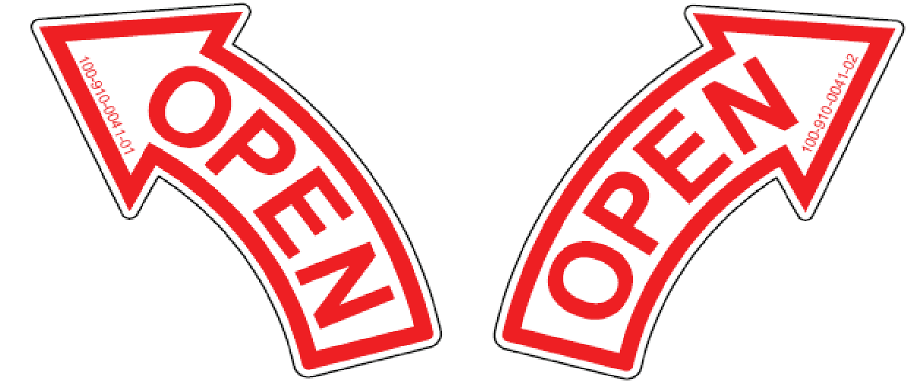
45. Located on the nose gear strut:



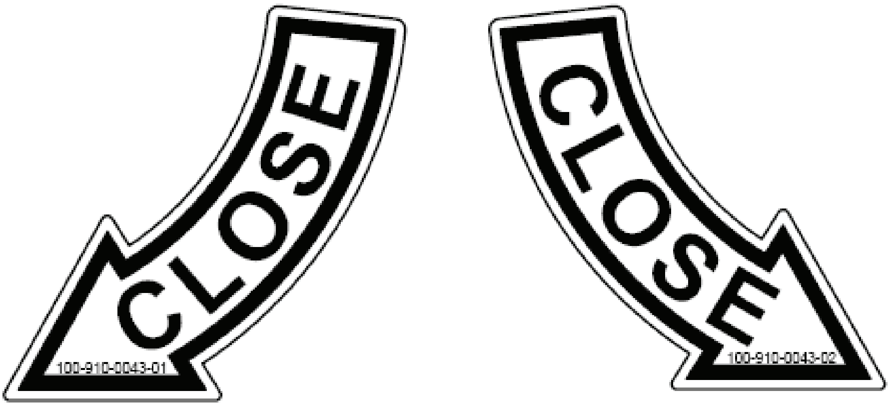
46. Located on the engine control pedestal:



47. Located on the exterior of each door as appropriate:



48. Located on the exterior of each crew door as appropriate:



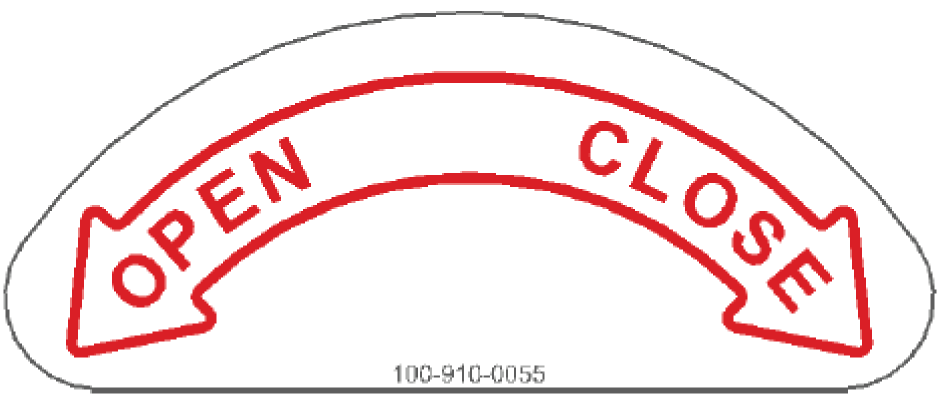
49. Located near each trim disconnect switch:

50. Located near the parking brake lever:

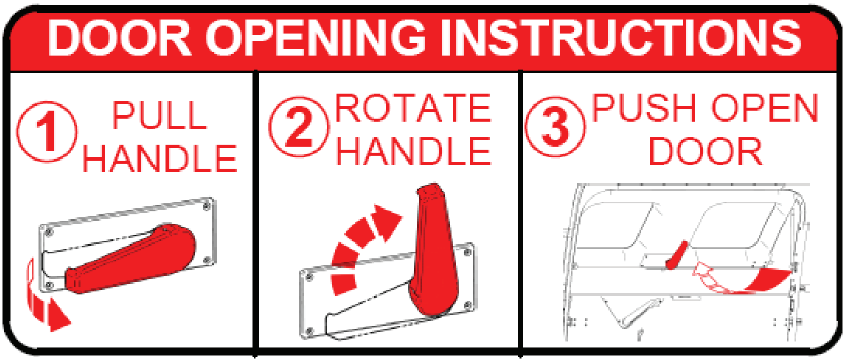
51. Located on the exterior of the cargo door:

52. Located on the exterior of the crew doors (left and right shown):

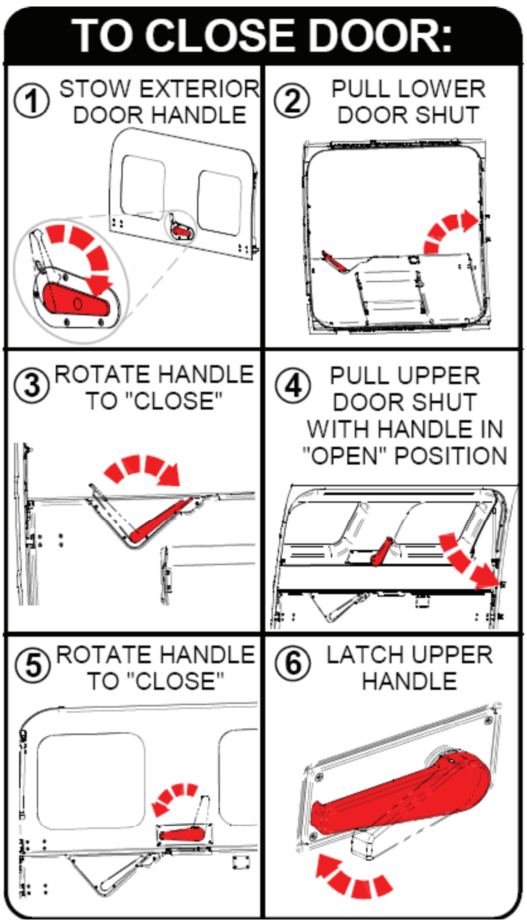
53. Located on the lower cargo door:



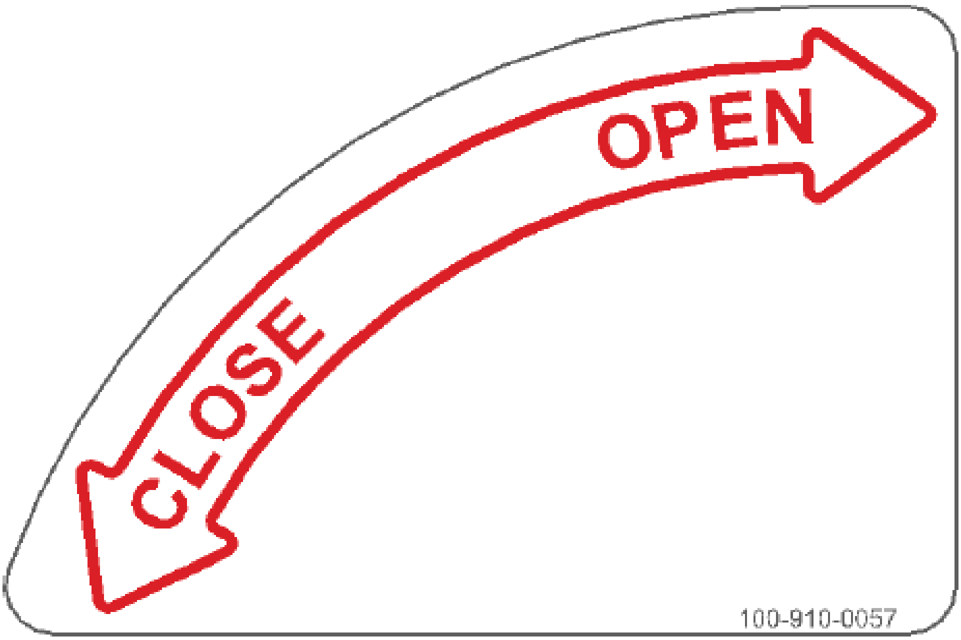
54. Located on the interior of the upper cargo door:



55. Located on the interior just aft of the cargo door at a height greater than the top of the passenger seat:

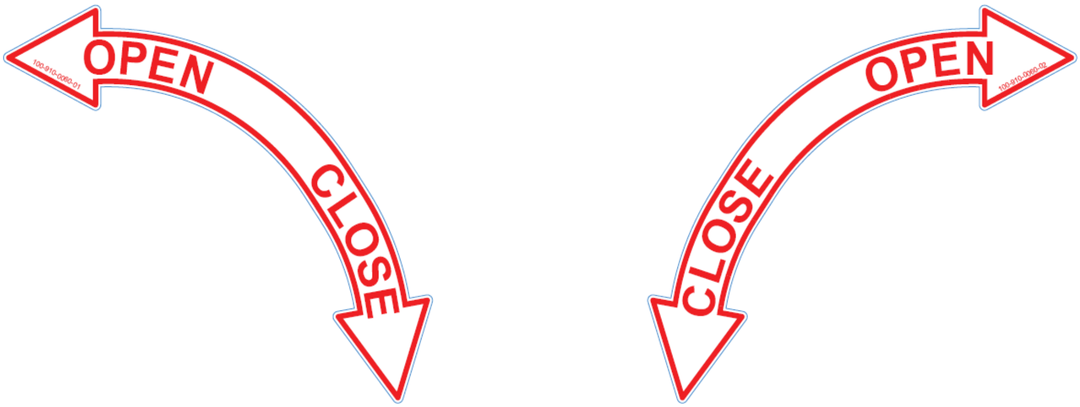


56. Located on the interior of the upper cargo door:

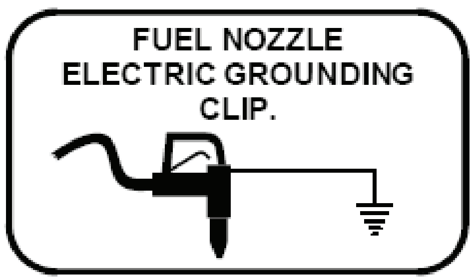


57. Located near the cargo door on the interior of the airplane:

58. Located on each crew door interior:



59. Located near each grounding clip:



60. Located in the cockpit near the Pulse Light toggle switch, if aircraft is equipped with Stormscope: REV 1

**TURN PULSE LIGHTS OFF
WHEN UTILIZING STORMSCOPE**

61. Located below the MFD, above the top Hobbs meter:

FLIGHT

62. Located below the MFD, above the bottom Hobbs meter:

ENGINE

REV 1

63. Located near the top of the control pedestal, above the Aileron switch:

L AILERON TRIM R

64. Located near the bottom of the control pedestal, above the Rudder switch:

L RUDDER TRIM R

65. Stall Warning Horn Press to Test Placard.
Serial Numbers 100-0043 and on and Ice Protection System Equipped Aircraft. This placard is located above the Lift Transducer Stall Warning System Press to Test button on the Pilots side instrument panel left of the backup Attitude Display Indicator.

REV 6

STALL
WARNING
PRESS TO TEST

SECTION 3
EMERGENCY PROCEDURES
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3-1 GENERAL

This section of the Pilot's Operating Handbook describes the recommended procedures for coping with various types of emergencies or critical situations that may occur. Emergencies caused by airplane or powerplant malfunctions are extremely rare if proper preflight inspections and maintenance procedures are accomplished. En route weather emergencies can be eliminated with proper preflight planning and the use of good judgment when unexpected weather is encountered. However, if an emergency should take place, the basic procedures outlined in this section should be considered and applied as required to remedy the problem.

WARNING: *There is no substitute for proper and thorough preflight planning action along with continual use of the information gathered during the preflight planning process. Be thoroughly knowledgeable of possible hazards and dangerous conditions, and be aware of the capabilities and limitations of the airplane.*

3-2 AIRSPEEDS FOR EMERGENCY OPERATIONS

OPERATING MANEUVERING SPEED (V_O)

6750 Pounds .... 142 KIAS
6000 Pounds .... 136 KIAS
5000 Pounds .... 124 KIAS

BEST GLIDE SPEED (PROPELLER FEATHERED)

6750 Pounds .... 97 KIAS
6000 Pounds .... 92 KIAS
5000 Pounds .... 86 KIAS

ENGINE FAILURE AFTER TAKEOFF

Flaps 0° .... 100 KIAS
Flaps 20° .... 85 KIAS

PRECAUTIONARY LANDING WITH ENGINE POWER

Flaps 35° .... 80 KIAS

LANDING WITHOUT ENGINE POWER

Flaps 0° .... 100 KIAS
Flaps 35° .... 80 KIAS

3-3 OPERATIONAL CHECKLISTS

Bold-faced items in this section are immediate action items which should be committed to memory in preparation for potential emergency situations.

3-4 ENGINE FAILURES

ENGINE FAILURE DURING TAKEOFF ROLL

1. Power Lever .... BETA Range
2. Brakes .... Apply
3. Wing Flaps .... Retract
If the airplane cannot be stopped on the remaining length of runway:
4. Fuel Condition Lever .... CUTOFF
5. Firewall Fuel Shutoff .... FUEL OFF (Pull Out)
6. Fuel Selector Valves...... OFF (Red LED warning light will be shown on panel)
7. Master Switch .... OFF

ENGINE FAILURE IMMEDIATELY FOLLOWING TAKEOFF

1. Airspeed .... 85 KIAS with 20° of Flaps
2. Propeller .... FEATHER
3. Wing Flaps .... FULL DOWN
4. Fuel Condition Lever .... CUTOFF
5. Firewall Fuel Shutoff .... FUEL OFF (Pull Out)
6. Fuel Selector Valves................ OFF (Red LED warning light will be shown on instrument panel)
7. Master Switch .... OFF
8. Landing .... MAKE AS STRAIGHT AHEAD AS POSSIBLE

CATASTROPHIC ENGINE FAILURE DURING FLIGHT

1. Airspeed .... 97 KIAS
2. Power Lever .... IDLE
3. Propeller Control Lever .... FEATHER
4. Fuel Condition Lever .... CUTOFF
5. Wing Flaps .... UP
6. Auxiliary Fuel Pump .... OFF
7. Firewall Fuel Shutoff .... OFF (Pull Out)
8. Ignition Switch .... OFF
9. Generator .... OFF
10. Alternator .... OFF
11. Electrical Load .... REDUCE
12. Landing ....Refer to the **Engine Out Emergency Landing Checklist**

3-5 ENGINE FAILURES (CONTINUED)

ENGINE FLAMEOUT DURING FLIGHT

If Ng is above 52%:

1. Power Lever .... IDLE
2. Ignition Switch .... ON
3. Power Lever .... AS REQUIRED
   (Following successful relight as indicated by normal ITT and Ng)
4. Ignition Switch .... AS REQUIRED
   (Shut off – if cause of flameout has been eliminated)

If Ng is below 52%:

1. Fuel Condition Lever .... CUTOFF
2. Refer to the **Airstart Checklist** for engine restart. (*Next Page*)

3-6 AIRSTART

STARTER ASSISTED AIRSTART (Preferred Method)

1. Electrical Load .... REDUCE
2. Generator Switch .... OFF
3. Alternator Switch .... OFF
4. AUX BUS Switch .... OFF
5. Emergency Power Lever .... NORMAL
6. Power Lever .... IDLE
7. Propeller Control Lever .... 2000 RPM
8. Fuel Condition Lever .... CUTOFF
9. Firewall Fuel Shutoff .... ON (Push In)
10. Fuel Selector Valves .... BOTH ON
11. Master Switch .... ON
12. Auxiliary Fuel Pump .... ON
    - Check **AUX PUMP ON** annunciator shown on PFD
13. Altitude .... 16,000 Feet Maximum
14. Starter Switch .... HI START and NOTE-
    - Check **IGNITION ON** annunciator shown on PFD
    - Check Engine Oil Pressure – Rising
    - Ng to 14% minimum
15. Fuel Condition Lever .... LOW IDLE
    - Check ITT (1090°C maximum)
    - Check Ng – 50% minimum
16. Starter Switch .... OFF
17. Ignition Switch .... AS REQUIRED

WARNING: *If operating with nearly empty fuel tanks or in heavy precipitation, turn the Ignition Switch ON.*

18. Fuel Condition Lever .... HIGH IDLE
19. Propeller Control Lever .... AS DESIRED
20. Power Lever .... AS DESIRED
21. Auxiliary Fuel Pump .... STBY
    - If AUX pump cycles on and off – leave the AUX Fuel Pump ON
22. Generator Switch .... ON
23. Alternator Switch .... ON
24. Electrical Equipment .... AS REQUIRED

3-7 AIRSTART (CONTINUED)

NOT STARTER ASSISTED AIRSTART

1. Generator Switch .... OFF
2. Alternator Switch .... OFF
3. AUX BUS Switch .... OFF
4. Emergency Power Lever .... NORMAL
5. Power Lever .... IDLE
6. Propeller Control Lever .... 2000-2200 RPM
7. Fuel Condition Lever .... CUTOFF
8. Firewall Fuel Shutoff .... ON (Push In)
9. Fuel Selector Valves .... BOTH ON
10. Master Switch .... ON
11. Auxiliary Fuel Pump .... ON
    - Check **AUX PUMP ON** annunciator shown on PFD
12. Ignition Switch .... ON
    - Check **IGNITION ON** annunciator shown on PFD
13. Airspeed .... 120 KIAS Minimum
14. Altitude .... 16,000 Feet Maximum
15. Ng Indication .... CHECK STABLE

NOTE: *The minimum demonstrated Ng speed for attempting a non starter assisted air start is 10 percent.*

16. Fuel Condition Lever .... LOW IDLE
    - Check ITT – 1090°C maximum
    - Check Ng – 50% minimum
17. Ignition Switch .... OFF (Unless in Heavy Precipitation or Low on Fuel)

WARNING: *If operating with nearly empty fuel tanks or in heavy precipitation, turn the Ignition Switch ON.*

18. Fuel Condition Lever .... HIGH IDLE
19. Propeller Control Lever .... AS DESIRED
20. Power Lever .... AS DESIRED
21. Auxiliary Fuel Pump .... STBY
    - If AUX pump cycles on and off – leave the AUX Fuel Pump Switch ON
22. Generator Switch .... ON
23. Alternator Switch .... ON
24. Electrical Equipment .... AS REQUIRED

3-8 SMOKE AND FIRE

REV 6

ENGINE FIRE IN FLIGHT

1. Power Lever .... IDLE
2. Propeller Control Lever .... FEATHER
3. Fuel Condition Lever .... CUTOFF
4. Firewall Fuel Shutoff .... OFF (Pull Out)
5. Firewall Air Shutoff .... OFF (Pull Out)
6. AUX BUS Switch .... OFF
7. Airspeed .... AS REQUIRED TO EXTINGUISH FLAMES
8. Overhead Vents .... OPEN
9. Wing Flaps .... SET APPROPRIATELY FOR AIRSPEED
10. Engine Out Emergency Landing .... EXECUTE

ELECTRICAL FIRE IN FLIGHT

1. Master Switch .... OFF
2. AVN BUS Switch .... OFF
3. AUX BUS Switch .... OFF
4. Generator Switch .... OFF
5. Alternator Switch .... OFF
6. Vents .... CLOSED
7. Fire Extinguisher .... ACTIVATE
8. All Other Electrical Switches .... OFF

NOTE: *If fire appears to be out and electrical power is required to safely continue the flight, continue with the following procedures.*

9. Circuit Breakers.......... CHECK FOR FAULTY CIRCUIT BUT DO NOT RESET
10. Master Switch .... ON
11. Avionics Master Switch .... ON
12. Generator .... ON
13. Alternator .... ON
14. Other Electrical Switches .... TURN ON MIN. REQUIRED ONE AT A TIME
- Until the short circuit is identified, then secure offending component.

15. Vents .... (When certain that the fire is completely extinguished) OPEN

WARNING: *If available, oxygen masks should be donned until smoke clears. After fire extinguishers are discharged, the cabin should be ventilated to remove smoke or CO2 residue.*

3-9 SMOKE AND FIRE (CONTINUED)

CABIN FIRE

1. Master Switch .... OFF
2. Avionics Master Switch .... OFF
3. AUX Bus Switch .... OFF
4. Generator .... OFF
5. Alternator .... OFF
6. Vents .... CLOSED
7. Forward OR Aft Fire Extinguishers .... ACTIVATE

CAUTION: *In order to reduce exposure to toxic residue from extinguishing agents, do not activate all three fire extinguishers simultaneously. If the large aft fire extinguisher is activated, do not activate either of the forward extinguishers until the cabin has been ventilated.*

8. Emergency Descent .... PERFORM
9. Cabin .... VENTILATE
(Open all ventilation outlets, pilot storm window, and slightly open right crew door)

NOTE: *Once fire is out, oxygen masks may be donned until smoke clears.*

WING FIRE

1. Pitot-Static Heat .... OFF
2. Stall Warning Heat .... OFF
3. Strobe Lights .... OFF
4. NAV Lights .... OFF
5. Landing/Recognition Lights .... OFF
6. Taxi Lights .... OFF

WARNING: *Perform a sideslip as necessary to keep the flames away from the cabin and fuel bays. Land the airplane as soon as possible.*

CABIN FIRE DURING GROUND OPERATIONS

1. Power Lever .... IDLE
2. Brakes .... STOP THE AIRCRAFT (if taxiing)
3. Propeller Control Lever .... FEATHER
4. Fuel Condition Lever .... CUTOFF
5. Master Switch .... OFF
6. Airplane .... EVACUATE
7. Fire .... EXTINGUISH

3-10 SMOKE AND FIRE (CONTINUED)

ENGINE FIRE DURING START

1. Fuel Condition Lever .... CUTOFF
2. Auxiliary Fuel Pump .... OFF
3. Ignition Switch .... OFF
4. Starter Switch .... LO / MOTOR (Observe Starting Cycle Limits)
5. Firewall Fuel Shutoff .... OFF (Pull Out)

CAUTION: *If the fire persists, indicated by continued high ITT indications, continue motoring the engine.*

6. Starter Switch .... OFF
7. Master Switch .... OFF
8. Airplane .... EVACUATE
9. Fire .... EXTINGUISH

3-11 EMERGENCY DESCENT

EMERGENCY DESCENT (LOW ALTITUDE)

1. Propeller Lever .... MAX RPM
2. Power Lever .... IDLE
3. Flaps .... FULL DOWN
4. Airspeed .... 108 KIAS

EMERGENCY DESCENT (HIGH ALTITUDE)

1. Propeller Lever .... MAX RPM
2. Power Lever .... IDLE
3. Flaps .... 0°
4. Airspeed .... 182 KIAS

3-12 GLIDE

GLIDE

1. Propeller .... FEATHER
2. Flaps .... UP
3. Airspeed .... 97 KIAS

NOTE: *The glide ratio with the aircraft in this configuration is approximately 2 nautical miles of gliding distance for each 1000 feet of altitude above the terrain at 97 KIAS with the propeller feathered in a zero wind condition.*

3-13 LANDING EMERGENCIES

ENGINE-OUT EMERGENCY LANDING

1. Radio .... TRANSMIT MAYDAY on 121.5 MHz or with ATC
   • Give Location and Intentions and SQUAWK 7700
2. Heavy Objects in Cabin .... SECURE (with passenger assistance)
3. Seats/Seat Belts/Shoulder Harnesses .... SECURE
4. Inertial Reel Levers .... LOCKED
5. Airspeed .... 100 KIAS (Flaps UP)
   80 KIAS (Flaps DOWN)
6. Power Lever .... IDLE
7. Propeller Control Lever .... FEATHER
8. Fuel Condition Lever .... CUTOFF
9. Auxiliary Fuel Pump .... OFF
10. Ignition Switch .... OFF
11. AUX BUS .... OFF
12. Firewall Fuel Shutoff .... OFF (Pull Out)
13. Fuel Selector Valves .... OFF
14. Wing Flaps .... FULL DOWN
15. Crew Doors .... UNLATCH
16. Generator .... OFF
17. Alternator .... OFF
18. Master Switch .... OFF (When landing area is assured)
19. Touchdown .... As Slow as Possible
20. Nose Landing Gear .... HOLD OFF as Long as Possible
21. Brakes .... APPLY HEAVY PRESSURE

POWERED PRECAUTIONARY LANDING

1. Heavy Objects in Cabin .... SECURE (with passenger assistance)
2. Seats/Seat Belts/Shoulder Harnesses .... SECURE
3. Inertia Reel Levers .... LOCKED
4. Wing Flaps .... 10°
5. Airspeed .... 90 KIAS
6. Landing Area .... FLY OVER, check terrain and obstructions
7. All Electrical Switches (Except Master and Generator) .... OFF
8. Wing Flaps .... FULL DOWN (On Final)
9. Airspeed .... 80 KIAS
10. Crew Doors .... UNLATCH
11. Generator Switch .... OFF
12. Master Switch .... OFF (When landing area is assured)
13. Touchdown .... As Slow as Possible
14. Fuel Condition Lever .... CUTOFF
15. Brakes .... APPLY HEAVY PRESSURE

3-14 LANDING EMERGENCIES (CONTINUED)

DITCHING

1. Radio .... TRANSMIT MAYDAY on 121.5 MHz
   - Give Location and Intentions
   - Transponder - SQUAWK 7700
2. Heavy Objects in Cabin .... SECURE (If Passenger Available to Assist)
3. Seats/Seat Belts/Shoulder Harnesses .... SECURE
4. Inertia Reel Levers .... LOCKED
5. Wing Flaps .... FULL DOWN
6. If Engine Power is Available .... Establish 300ft/min descent @ 76 KIAS
7. Final Approach:
   - High Winds .... Land INTO WIND
   - Light Winds/Heavy Swells .... Land PARALLEL TO SWELLS
8. Doors .... UNLATCH
9. Head .... CUSHION at touchdown
10. Touchdown .... SLOWEST POSSIBLE SPEED
11. Airplane .... EVACUATE
12. Life Vests and Raft .... INFLATE – Only after having exited the airplane

WARNING: *This airplane has not been tested in actual ditchings. The above procedure is only a recommendation based on estimations.*

LANDING WITH A FLAT MAIN TIRE

1. Fuel Selectors .... Position the valve corresponding to the side opposite the flat tire to OFF
2. Airplane .... FLY as desired to lighten the fuel load
3. Seats/Seatbelts/Shoulder Harnesses .... SECURE
4. Inertia Reel Levers .... LOCKED
5. Approach .... FULL FLAPS
6. Touchdown .... INFLATED TIRE FIRST
   - Hold the airplane off the flat tire as long as possible using aileron and rudder control.
7. Directional Control .... MAINTAIN
   - Using rudder, nosewheel steering and brake on inflated tire.

LANDING WITH A FLAT NOSE TIRE

1. Passengers and Baggage .... If possible, move aft (remain in CG limits)
2. Seats/Seatbelts/Shoulder Harnesses .... SECURE
3. Inertia Reel Levers .... LOCKED
4. Approach .... FULL FLAPS (Normal)
5. Touchdown .... MAIN LANDING GEAR
   - Hold the nose wheel off the runway as long as possible during rollout.
6. Brakes .... Minimum Required

3-15 ENGINE EMERGENCIES

LOSS OF OIL PRESSURE

(OIL PRESS LOW Annunciator Shown on PFD)

1. Oil Pressure Indicator...CHECK
   - Cross reference the oil pressure indicator. If the oil pressure gage confirms a low oil pressure condition, proceed as outlined in the **Engine Failures** checklists or under pilot's discretion; to maintain safety – continue operating the engine in preparation for an emergency landing as soon as possible.

FUEL CONTROL UNIT PNEUMATIC/GOVERNING PORTION FAILURE

(Engine Power Remains at Idle)

1. Power Lever .... IDLE
2. Emergency Power Lever.. AS DESIRED
   - Maintain a minimum Ng of 65% during flight
   - Advance emergency power lever slowly to prevent engine damage

NOTE: *When using the emergency power lever, closely monitor the gas generator RPM when reducing power to idle. Keep the Ng from decreasing below 65% in flight.*

CHIP DETECTOR ANNUNCIATION (GEARBOX CONTAMINATION)

ON GROUND BEFORE ENGINE START:

1. DO NOT START ENGINE

ON GROUND AFTER ENGINE START:

1. Return to parking area.
2. Shut down engine.
3. Inspect chip detector and engine, if required.

IN FLIGHT

1. Engine Gages: CAREFULLY MONITOR engine gages for abnormal oil pressure, oil temperature, or power indications.
2. If engine gages are normal, proceed to destination and determine cause of chip detector annunciation prior to next flight.
3. If engine gages confirm gear box contamination, proceed in accordance with Engine Failures checklists or at the discretion of the pilot and consistent with safety, continue engine operation in preparation for an emergency landing as soon as possible.
4. Inspect chip detector and engine, if required.

3-16 FUEL SYSTEM EMERGENCIES

LOSS OF FUEL PRESSURE

(FUEL PRESS LOW Annunciator Shown on PFD)

1. AUX FUEL Pump ....ON
2. Fuel Pressure Indication .... CHECK

- If the Fuel Pressure Indication shows approximately 20 PSI:
  - Monitor the fuel quantity gages and the cabin for fuel odor and signs of fuel leakage.
  - Land as soon as practicable to determine cause for failure of the motive flow system prior to the next flight.
- If the Fuel Pressure Indication shows less than 5 PSI:
  - Check the fuel quantity gages for possible fuel starvation.
  - Land as soon as possible.

INTERRUPTION OF FUEL FLOW TO FUEL RESERVOIR

(RESERVOIR FUEL Annunciator Shown on PFD and Aural Chime Sounding)

1. Fuel Selector Valves ....ENSURE LEFT ON and RIGHT ON
2. Ignition Switch..ON
3. Auxiliary Fuel Pump...ON
4. If RESERVOIR FUEL annunciator remains and usable fuel is available in the wing tanks:
   - Monitor the engine gages and the FUEL PRESS LOW annunciator for signs of fuel starvation.
   - Attempt a steady heading sideslip for 10 seconds to the left and then to the right to clear the vent lines of fuel.
   - Land as soon as possible to determine the cause of the problem.
   - If there are signs of fuel starvation, prepare for an emergency landing as outlined in the **Engine-Out Emergency Landing Checklist**.

NOTE: *If the RESERVOIR FUEL annunciator is shown as the result of fuel starvation, approximately 3 minutes of fuel is remaining in the reservoir at max continuous power or 12 minutes of fuel at flight idle from the time the annunciator is shown.*

FUEL TANK SELECTORS OFF

(FUEL OFF Annunciator Shown on PFD, LED Instrument Panel Light Illuminated, and Aural Chime Sounding)

1. Fuel Selector Valves ....BOTH ON

3-17 FLAP SYSTEM MALFUNCTION PROCEDURES

FLAPS FAIL TO EXTEND OR RETRACT

(FLAP FAIL Annunciation Shown on PFD)

1. FLAP Circuit Breaker...CHECK IN
2. If Circuit Breaker Is IN ....MOVE THE FLAP LEVER TO ITS PREVIOUS POSITION

   If the flaps move to their previous position:
3. Flight .... CONTINUE USING NORMAL PROCEDURES

   If the flaps do not move to their previous position:
4. FLAP Circuit Breaker.................................CYCLE (Wait 30 seconds between pulling CB and Resetting)

   If the flaps then function properly:
5. Flight .... CONTINUE USING NORMAL PROCEDURES

   If the flaps still fail to move:
6. Airspeed .... APPROPRIATE FOR FLAP POSITION

FLAP INDICATION FAILURE OR MISLEADING FLAP INDICATION

(FLAP FAIL Annunciation Shown on PFD and/or Red X Through Flap Indication)

1. FLAP IND Circuit Breaker ....CHECK IN
2. If Circuit Breaker Is IN .... CYCLE CIRCUIT BREAKER
3. If Circuit Breaker Pops Back Out .... DO NOT RESET
4. Flap Position .... VERIFY VISUALLY
5. Airspeed .... APPROPRIATE FOR FLAP POSITION

FLAP OVERSPEED

1. **AIRSPEED........... REDUCE TO BELOW CURRENT FLAP POSITION LIMIT**
2. VISUALLY CHECK THE FLAPS AND FLAP TRACKS FOR NORMAL CONDITION
3. If flap system is normal, position the flaps as desired and continue flight.
4. If flap system appears damaged, leave the flaps in their current position, maintain airspeed below the limit for the current position and land at the nearest suitable airport for repairs.

3-18 ENGINE EMERGENCIES (CONTINUED)

ITT

(ITT Annunciation Shown on PFD)

1. **Power Lever: REDUCE POWER to within limits and carefully monitor engine gages for abnormal oil pressure, oil temperature or power indications.**
2. If engine gages are normal, proceed to destination and determine if an engine inspection is required prior to next flight.
3. If engine gages suggest imminent engine failure, proceed in accordance with **Engine Failures** checklists or at the discretion of the pilot and consistent with safety, continue engine operation in preparation for an emergency landing as soon as possible.

NG OVERSPEED

1. **Power Lever: REDUCE POWER to within limits and carefully monitor engine gages for abnormal oil pressure, oil temperature or power indications.**
2. Proceed to destination and determine if an engine inspection is required prior to next flight.

3-19 ENGINE EMERGENCIES (CONTINUED)

NP OVERSPEED

1. **Propeller Lever ....REDUCE NP to within limits**
   (If propeller RPM continues to overspeed, reduce power to minimum possible)
2. **Airspeed.. Reduce to 100 KIAS or less**
3. **Aircraft ....Land at nearest suitable airfield**
   If possible, always retain glide capability to the selected landing airfield in case of total propeller failure. In the event of heavy vibration or uncontrolled propeller speed runaway, be prepared to shut down engine.

TORQUE

1. **Power Lever: REDUCE POWER to within limits and carefully monitor engine gages for abnormal oil pressure, oil temperature or power indications.**
2. If engine gages are normal, proceed to destination and determine if an engine inspection is required prior to next flight.
3. If engine gages suggest imminent engine failure, proceed in accordance with **Engine Failures** checklists or at the discretion of the pilot and consistent with safety, continue engine operation in preparation for an emergency landing as soon as possible.

3-20 ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

GENERATOR FAILURE

(VOLTAGE LOW and/or GEN FAIL Annunciators Shown on PFD)

1. Generator and Alternator Switches .... CHECK ON
2. Engine Gauges ....CHECK GEN AMPS
   - Check GEN AMPS to determine if generator is off line (0 amps displayed)

IF GEN AMPS DISPLAYS ZERO AMPS

3. Generator Switch .... OFF, THEN ON
4. If the generator output remains at zero:
   - Generator Switch ....OFF
   - Electrical Load .... REDUCE LOAD to less than 40 amps as follows:
     a. AVN Bus Switch...OFF
     b. Environmental Control System..OFF
     c. AUX BUS Switch ....OFF
     d. Flashing Beacon..OFF
     e. Strobe Lights ....OFF
     f. All Ice Prevention Equipment (if equipped) ....OFF if non-essential
5. Flight .... CONTINUE with caution and discretion to destination airport

ALTERNATOR FAILURE

(VOLTAGE LOW and/or ALTERNATR FL Annunciators Shown on PFD)

1. Generator and Alternator Switches .... CHECK ON
2. Engine Gauges .... CHECK ALT AMPS
   - Check ALT AMPS to determine if the alternator is off line (0 amps displayed)

IF ALT AMPS DISPLAYS ZERO

3. Alternator Switch ....OFF THEN ON
4. If the alternator output remains at zero:
   - Alternator Switch..OFF
   - Generator Load............................... REDUCE TO LESS THAN 300 AMPS
5. Flight .... CONTINUE with caution and discretion to destination airport

NOTE: *The generator will carry the entire electrical load with the alternator off line.*

3-21 ATTITUDE HEADING REFERENCE SYSTEM (AHRS) FAILURES

SINGLE AHRS FAILURE

1. BOTH ON AHRS 1 or BOTH ON AHRS 2 ... VERIFY ANNUNCIATED ON PFD
2. In Flight Corrective Action ... NONE NEEDED

DUAL AHRS FAILURE (RED X – HDG and ATTITUDE INDICATIONS)

1. AHRS Circuit Breakers ... CHECK IN
2. If Open ... RESET (Close) CIRCUIT BREAKERS
3. If Circuit Breakers Open Again ... DO NOT RESET
4. Standby Attitude Indicator ... USE for attitude information
5. Magnetic Compass ... USE for heading information

3-22 AIR DATA COMPUTER (ADC) SYSTEM FAILURES

SINGLE ADC FAILURE

1. BOTH ON ADC 1 or BOTH ON ADC 2 ... VERIFY ANNUNCIATED ON PFD
2. In-Flight Corrective Action ... NONE NEEDED

DUAL ADC FAILURE (RED X – ALL AIR DATA INDICATIONS)

1. ADC Circuit Breakers ... CHECK IN
2. If Open ... RESET (Close) CIRCUIT BREAKERS
3. If Circuit Breakers Open Again ... DO NOT RESET
4. Standby Airspeed Indicator ... USE for airspeed information
5. Standby Altimeter ... USE for altitude information

3-23 GPS/NAV COMPUTER SYSTEM FAILURES

#1 GPS/NAV FAILURE

1. BOTH ON GPS 2 ....VERIFY ANNUNCIATED ON PFD
2. TAWS FAIL ....VERIFY ANNUNCIATED ON PFD
3. In-Flight Corrective Action ....MAINTAIN VISUAL SEPARATION FROM TERRAIN

NOTE: *TAWS fails because it relies on the #1 GPS for position information.*

#2 GPS/NAV FAILURE

1. BOTH ON GPS 1 ....ANNUNCIATED ON PFD
2. In Flight Corrective Action ....NONE NEEDED

DUAL GPS/NAV FAILURE

Annunciations Shown:

- NAV 1&2 – RED X
- COM 1&2 – RED X
- TAWS FAIL
- HSI/GPS INTEG
- XPDR FAIL
- NO GPS POSITION
- NO TRFC DATA
- ALL ENGINE GAUGES and EIS – RED X
- CLOCK – RED X

1. GPS/NAV Circuit Breakers ....CHECK IN
2. If Open .... RESET (Close) CIRCUIT BREAKERS
3. If Circuit Breakers Open Again .... DO NOT RESET
4. COM 1 .... USE to transmit on 121.5 MHz (Automatically Defaults to This Freq.)

NOTE: *Even though the COM 1 frequency box no longer displays a frequency (RED X SHOWN), the radio will transmit on 121.5 MHz (Guard).*

5. If VFR .... Maintain VFR to Destination
6. If IFR ....REQUEST ATC for Vectors to VFR Conditions

3-24 PRIMARY FLIGHT DISPLAY (PFD) FAILURE

#1 PFD FAILURE

Annunciations Shown on MFD:

- NAV 1 / COM 1 – RED X
- TAWS FAIL
- HDG NO COMP
- ROL NO COMP
- PIT NO COMP
- IAS NO COMP
- ALT NO COMP
- BOTH ON GPS 2
- BOTH ON AHRS 2
- BOTH ON ADC 2

1. #1 PFD Circuit Breaker ....CHECK IN
2. If Open ....RESET (Close) CIRCUIT BREAKER
3. If Circuit Breaker Opens Again... DO NOT RESET
4. Multi Function Display .... VERIFY Placed in Reversionary Mode
5. Multi Function Display .... USe Flight Instruments
6. Radio Transmissions.......................... USE COM 2 for ALL TRANSMISSIONS

NOTE: *The alerts box will display GMA 1 FAILURE (audio panel). This failure message is due to the COM 1 automatically switching to 121.5 MHz, and the GMA 1 not being able to communicate with the #1 PFD. If COM 1 is used, transmissions will be broadcast on 121.5 MHz.*

7. Navigation ....USE NAV 2 and GPS

3-25 MULTI–FUNCTION DISPLAY (MFD) FAILURE

MFD FAILURE

1. MFD Circuit Breaker...CHECK IN
2. If Open ....RESET (Close) CIRCUIT BREAKER
3. If Circuit Breaker Opens Again... DO NOT RESET
4. Primary Flight Display .... VERIFY Placed in Reversionary Mode
5. Primary Flight Display ....Use Engine Instruments

3-26 INADVERTENT OPENING OF DOORS IN FLIGHT

RIGHT OR LEFT CREW DOOR OPEN

1. Airspeed ....LESS THAN 120 KIAS
2. Door .... PULL CLOSED AND LATCH PROPERLY

NOTE: *If the right crew door opens in flight and your aircraft is equipped with autopilot, it may help to engage the autopilot before attempting to close the door.*

AFT PASSENGER/CARGO DOOR OPEN

1. Airspeed ....LESS THAN 100 KIAS
2. Wing Flaps ....FULL DOWN
3. If practical and another crewmember is available, have them close the door.
4. If a door open landing is required: make a NORMAL approach and landing.

3-27 ICING

INADVERTENT ICING ENCOUNTER

1. Ignition Switch ....ON
2. Engine Inlet ....BYPASS
3. L-R Pitot Heat...ON
4. Propeller Lever .... MAX RPM
5. Flight .... CHANGE COURSE and/or ALTITUDE as Necessary to Exit Icing Conditions
6. Cabin Heat/Defrost...ON
7. Wing Flaps ....UP
8. Approach to Landing ....100 KIAS

AMPLIFIED EMERGENCY PROCEDURES

The following Amplified Emergency Procedures elaborate upon information contained in the **Emergency Checklists** portion of this section. These amplified procedures provide information not readily adaptable to a checklist format. Pilots should become familiar with the amplified procedures to have a better understanding of why certain steps are performed in the checklists and to assist in troubleshooting emergencies.

3-28 ENGINE FAILURE

If an engine failure occurs during the takeoff roll, the most important thing to do is to control the airplane and get it stopped on the remaining runway. The extra items included in the checklist provide additional safety after a failure of this type occurs.

WARNING: *Intentional shutdown and securing of the engine in flight for training purposes is not recommended, due to the high risk involved.*

If an engine failure occurs shortly after takeoff (less than 1000 feet AGL), the most important thing to do is to maintain control of the airplane by immediately lowering the nose and maintaining airspeed. Feathering the propeller will reduce drag substantially, resulting in an increase in glide distance. In most situations, the landing should be executed straight ahead or within 45° left or right of the runway heading as necessary to avoid obstructions. The checklist format provides steps for securing the fuel and electrical systems on the assumption there is enough time to accomplish these items.

Following an engine failure in flight, establish the best glide speed as soon as possible. Feathering of the propeller should be accomplished at the discretion of the pilot and is dependent upon individual circumstances. Selection of maximum RPM will result in an increased gas generator windmilling speed for emergency restarts without the use of the starter. Feathering the propeller, on the other hand, will provide the maximum glide distance.

While established in a proper glide toward a suitable landing zone, an effort should be made to identify what caused the loss of engine power. A complete engine failure may be identified by abnormal engine temperatures, excessive vibration or mechanical noise accompanied by the loss of engine power. An engine flameout can be identified by a drop in ITT, Torque, and %Ng. An engine rollback (malfunction in the fuel control unit governing section causes the Ng to rollback to minimum idle, 48-53%) may have similar symptoms as a flameout, but a rollback can be corrected by using the Emergency Power Lever to bypass the fuel control unit.

CAUTION: *Do not attempt to restart an engine which is known to have completely failed.*

A flameout may be the result of the engine running out of fuel, heavy rain conditions, or unstable engine operation. Unstable engine operation, such as compressor surge, may be identified by an audible popping noise just prior to flameout. Once the fuel supply has been restored to the engine, ignition is provided or the cause of unstable engine operation is eliminated, the engine may be successfully restarted.

The best method for restarting the engine in flight is to initiate the relight procedure immediately after flameout occurs. Restarts should only be initiated if the pilot is certain the flameout was not the result of a malfunction which could cause a hazard after relight. Regardless of airspeed and altitude, it is possible for the engine to be restarted by merely turning on the ignition switch. In an emergency, turn the ignition switch on immediately after flameout, provided the gas generator speed remains above 52%. Under these circumstances, it is not necessary to shut off fuel to the engine or feather the propeller. The power lever should however be retarded to the IDLE position.

If a flameout has occurred and the gas generator speed falls below 52%, bring the fuel condition lever to the CUTOFF position prior to attempting an airstart.

CAUTION: *The pilot should determine the reason for power loss prior to attempting an airstart.*

Feathering of the propeller depends on individual circumstances and should be accomplished at the discretion of the pilot. However, if the engine oil pressure falls below 15 PSI, the propeller should be feathered.

If an airstart is to be attempted, the checklist procedures should be followed. The Starter Assisted procedure is the preferred method since it results in cooler starting temperatures. Successful starter assisted airstarts may be accomplished at all normal operating airspeeds and up to an altitude of 16,000 feet. If the engine starter is inoperative, follow the **Not Starter Assisted Airstart** checklist for an airstart.

CAUTION: *It takes approximately 15 seconds and 300 feet in altitude to accomplish a Starter Assisted Airstart (using the HI-START feature) when established in a glide at 97 KIAS with the propeller feathered.*

CAUTION: *When starting the engine, if a rise in Ng and ITT are not indicated within 10 seconds, bring the fuel condition lever into the CUTOFF position and abort the start. Refer to the Engine Failure During Flight and Power Off Emergency Landing checklists.*

CAUTION: *Do not attempt a Not Starter Assisted Airstart with 0%Ng.*

NOTE: *The fuel condition lever may be moved briefly to the CUTOFF position and then returned to LOW IDLE if over-temperature conditions occur. This momentarily interrupts the fuel flow to the engine combustion chamber.*

3-29 FORCED LANDINGS

If all attempts to restart the engine fail and a forced landing is imminent, choose a suitable landing area and prepare for the landing as outlined in the **Engine-Out Emergency Landing** checklist.

Prior to executing an “off airport” landing with engine power available, fly over the landing area at a safe but low altitude and inspect the terrain for obstructions and undesirable surface conditions. Proceed as outlined in the **Powered Precautionary Landing** checklist.

NOTE: *The overhead fuel selector valve handles control the fuel shutoff valves at the outlets of the fuel tanks. To minimize fire hazards, these selectors should be turned OFF during the final stages of an “off airport” approach to landing. With the fuel selectors turned OFF, there will be sufficient fuel in the reservoir tank for approximately 3 minutes of maximum continuous power or approximately 9 minutes of operation at idle power.*

WARNING: *If the precautionary landing is aborted, return the fuel tank selectors to the ON position while initiating the Go-Around.*

For ditching the aircraft, if possible, secure or jettison heavy objects located in the cabin or baggage areas and collect folded coats for face protection at touchdown. Transmit a Mayday message on 121.5 MHz providing the location and intentions and Squawk 7700. At night, flaring the aircraft should be avoided because of possible difficulty in judging the aircraft’s height above water surfaces.

3-30 LANDING WITHOUT ELEVATOR CONTROL

Use engine power and elevator trim to produce a long shallow approach at approximately 300 feet per minute descent with 20° of flaps and 85 KIAS. Control the glide path by adjusting the engine power and airspeed can be controlled with small trim adjustments.

The landing flare can be accomplished with a gentle reduction of power accompanied by nose up trim. With forward C.G. loadings, it may be necessary to increase the power slightly in the final portion of the flare to bring the nose up and prevent a nose-first landing. Following touchdown, move the power lever to IDLE.

3-31 SMOKE AND FIRE

In the event of fire or smoke in the cabin, the following information will be of assistance in dealing with the emergency as quickly and safely as possible.

The preflight checklist in **Section 4** is provided as an aid to the pilot in detecting conditions which could possibly lead to an aircraft fire. Fires require a combustible material, oxygen and a source of ignition. Close attention should be given during the preflight inspection to locate potential fire hazards, especially in the engine compartment and the underside of the wing and fuselage. Leaks in the fuel or oil systems can lead to a ground or in-flight fire.

WARNING: *Do not attempt to fly the aircraft with known fuel or oil leaks. The presence of fuel or unusual oil stains may be an indication of system leaks and should be remedied prior to flight.*

Engine fires may be caused by a malfunction with the fuel control unit and improper starting techniques. Improper procedures such as starting with the emergency power lever out of its NORMAL position or providing fuel to the engine when the gas generator speed is below 14% RPM will tend to cause a hot start which may result in an engine fire. In the event of an engine fire, refer to the **Engine Fire During Start** checklist.

If an aircraft fire is discovered on the ground or on takeoff prior to committing to flight, the aircraft should be stopped as soon as possible and evacuated.

Engine fires originating in flight must be controlled as quickly as possible in order to prevent major structural damage. Immediately shut off all fuel to the engine and shut it down. An engine restart should not be attempted following an engine fire.

Fire or smoke in the cabin should be controlled by identifying the faulty system and shutting it down. Cabin smoke may be removed by opening the cabin ventilation controls. If the smoke is intense, the door may be slightly opened and/or a storm window may be opened to draw out the smoke. If the fire gains intensity after opening the door, it should be closed immediately. Use the cabin fire extinguishers as necessary to extinguish the cabin fire. If either the forward or aft cabin fire extinguishers have been activated, ventilate the cabin prior to activating the other extinguisher(s). This is to prevent excessive build-up of toxic residue from the extinguishing agent.

The first indication of an electrical fire is often the smell of burning wire insulation. Following the **Electrical Fire In Flight** checklist should eliminate the electrical fire.

REV 1

WARNING: *In the event of smoke or fire, prepare to land the aircraft without delay while completing fire suppression and/or smoke evacuation procedures. If it cannot be visually verified that the fire has been completely extinguished, whether the smoke has cleared or not, land immediately at the nearest suitable airfield or landing site.*

3-32 INADVERTENT FLIGHT INTO ICING CONDITIONS

Flight into known icing conditions is prohibited unless the aircraft is equipped with the complete flight into known icing equipment package and all of the equipment is operative. However, during flights into Instrument Meteorological Conditions, icing conditions may be encountered inadvertently, and action should be taken to exit those conditions as soon as possible. Initiation of a climb is usually the best action to take for avoiding icing. Course reversal and accomplishing a descent into known warmer air are viable alternatives.

3-33 SPINS

This airplane is certified in the normal category and intentional spinning of the aircraft is prohibited. Should a spin be entered inadvertently, the following recovery technique should be used.

1. Bring the power lever to the IDLE position.
2. Place the ailerons in the NEUTRAL position.
3. Apply and **HOLD** full rudder opposite to the direction of rotation.
4. Immediately after the rudder reaches its stop, move the control wheel briskly forward, far enough to break the stall. (Full down elevator may be required to break the stall in an aft C.G. loading.)
5. Hold these control inputs until the rotation completely stops.
6. As the rotation stops, return the rudder to neutral and make a smooth recovery from the resulting dive. If the flaps were extended as the spin was entered, retract the flaps to prevent a flap overspeed condition.

3-34 ENGINE EMERGENCIES

LOSS OF ENGINE OIL PRESSURE

The OIL PRESS LOW annunciator will display on the PFD when the oil pressure falls below 45 PSI. Complete loss of engine oil pressure will read out on the oil pressure indicator. Complete loss of oil pressure will eventually result in the loss of propeller control, since the propeller springs and centrifugal counterweights will drive the propeller into the feathered position. Finally, the engine will eventually seize. Therefore, it is not recommended for the pilot to continue to operate the engine following a complete loss of oil pressure. Engine and propeller operation should be monitored closely for indications of the onset of propeller feathering and engine seizure. The **Engine Failure** checklist should be completed as soon as possible. Operating the engine at the minimum power required to sustain flight will normally prolong the time until loss of engine and propeller thrust.

Operating the engine with the oil pressure indicating in the yellow range is not considered to be critical, but is a definite cause for concern and should be tolerated only for the purpose of completing the immediate flight. Do not attempt a takeoff with the oil pressure indicating in the yellow range.

FUEL CONTROL UNIT PNEUMATIC OR GOVERNING MALFUNCTIONS

A malfunction in the pneumatic or governing section of the fuel control unit may cause the engine power to decrease to a low idle condition. Fuel control unit pneumatic or governing malfunctions can be identified by an ITT indication in the idle range of 500° to 600°C, an Ng indication of approximately 48-52% (this figure increases with altitude), and the engine will not respond to power lever input. If it is determined this type of malfunction has occurred the emergency power lever (fuel control unit manual override) should be used to restore power to the engine. To use the fuel control unit manual override system, place the engine power lever in the IDLE position and slowly move the emergency power lever forward of its IDLE gate and advance as desired. Any time the emergency power lever is moved forward of its NORMAL position, EMER PWR LVR will be annunciated.

CAUTION: *When using the fuel control manual override system, engine acceleration may be more rapid than when using the engine power lever. Additional caution should be exercised to avoid exceeding the engine operating limitations.*

NOTE: *When using the emergency power lever, closely monitor the gas generator RPM when reducing power to idle. Keep the Ng from decreasing below 65% in flight.*

FUEL SYSTEM MALFUNCTION/INADVERTENT FUEL FLOW INTERRUPTION PROCEDURES

Fuel flows by gravity from the wing tanks, through the fuel tank shutoff/selector valves at the inboard portion of each wing tank, to the reservoir located under the center cabin floorboard. Once the engine is started, the main ejector pump, located inside the fuel reservoir, provides fuel flow to the engine-driven fuel pump at pressures ranging from approximately 4.5 PSI at idle to 18 PSI at maximum power.

If the main ejector pump should fail, a pressure switch located near the reservoir tank will cause the **FUEL PRESS LOW** annunciator to display on the PFD and will automatically turn on the auxiliary fuel pump (if the switch is placed in the STBY position) anytime the fuel pressure falls below approximately 4.5 PSI.

The red **RESERVOIR FUEL** annunciator will illuminate anytime the fuel level in the reservoir falls below approximately 1/2 full. If this should occur, the pilot should immediately verify both fuel selectors are in the ON position and turn both the ignition switch and auxiliary fuel pump ON.

WARNING: *Once the RESERVOIR FUEL annunciator illuminates, there will be only about 3 minutes of fuel available in the reservoir for engine operation at maximum continuous power.*

If the fuel selector valves have been left in the OFF position, returning them to the ON position will quickly fill the reservoir and thus extinguish the **RESERVOIR FUEL** annunciator. Once the cause of the problem has been corrected, the ignition switch may be turned OFF and auxiliary fuel pump switch may be returned to its STBY position. Another possible cause of the **RESERVOIR FUEL** annunciator being shown is an air bubble being trapped in the reservoir. To help clear out fuel from the vent lines and eliminate the air bubble in the reservoir, attempt a steady heading sideslip for 10 seconds in each direction.

A fuel selectors off warning system is provided to warn the pilot if both fuel selectors are placed in the OFF position. Included in the G1000 warning system is a red annunciator labeled **FUEL OFF**, and a warning chime. In addition, a red LED warning light located near the pilot's PFD will illuminate. The LED warning light is labeled:

WARNING!
WHEN ILLUMINATED
BOTH FUEL SELECTOR VALVES ARE OFF

REV 6

ENGINE INLET BYPASS FAILURE

The **INLET NOT BP** annunciation will display on the PFD when the Engine Inlet Bypass fails to reach the **BYPASS** position. If this annunciation appears, move the Engine Inlet Override Switch to **BYPASS**. The override actuator will force the system to **BYPASS** and the **INLET NOT BP** annunciation will disappear and **ENG INLET BP** annunciation will appear. In the unlikely event that both actuators fail to move the Engine Inlet to **BYPASS**, **EXIT ICING CONDITIONS IMMEDIATELY**.

ENGINE INLET DOES NOT RETURN TO NORMAL

The **INLET NOT NRM** annunciation will display on the PFD when the Engine Inlet does not reach the **NORMAL** position within 18 seconds after being switched to **NORMAL** from **BYPASS** mode. If this occurs, move the Engine Inlet back to the **BYPASS** position, using the Engine Inlet Override Switch if necessary and inspect the system after landing.

ENGINE INLET SWITCH FAULT

In the event that **INLET SW FAULT** annunciation is displayed in flight, the pilot must verify that the Inertial Separator is operating properly, or take corrective action. The table on the next page lists two scenarios that could lead to **INLET SW FAULT** annunciation, along with corrective action.

ENGINE INLET MISCOMPARE TROUBLESHOOTING TABLE		
SCENARIO	**IN-FLIGHT CORRECTIVE ACTION**	**DIAGNOSIS**
1. Primary ENG INLET Switch in BYPASS position. 2. **ENG INLET BP** and **INLET SW FAULT** CAS messages shown.	None. Engine inlet is in the BYPASS position (as indicated by **ENG INLET BP** annunciation).	Either one BYPASS position sensor has failed in the OFF position, or the NORMAL position sensor is stuck (failed) in the ON position.
1. Primary ENG INLET Switch in NORMAL position. 2. Only **INLET SW FAULT** CAS message shown.	1. Move Primary ENG INLET Switch to BYPASS position. 2. Verify **INLET SW FAULT** CAS message is no longer shown and **ENG INLET BP** is now shown. 3. Engine inlet is now in the BYPASS position.	One BYPASS position sensor is stuck (failed) in the ON position.

REV 6

REV 6

3-35 ELECTRICAL POWER SUPPLY MALFUNCTIONS

LOSS OF ELECTRICAL POWER

For system redundancy, the electrical system includes two 24 volt batteries, a starter/generator and an alternator; all of which may provide electrical power to the master control unit. If one or more of the power sources should fail, the remaining operational power source(s) is capable of providing sufficient electrical power for most situations. If the **VOLTAGE LOW** annunciator should appear on the PFD, the EICAS page should be cross referenced to determine bus voltages. If there is an actual system malfunction, nonessential electrical equipment on the malfunctioned bus should be turned off and a landing should be made at the nearest airport to determine the cause of the problem before further flight.

3-36 ATTITUDE HEADING REFERENCE SYSTEM (AHRS) FAILURES

SINGLE AHRS FAILURE

If a failure occurs in a single AHRS system, the other AHRS system will automatically provide attitude and heading information to both displays if the aircraft ground speed is greater than 30 Kts. If the aircraft ground speed is less than 30 Kts, the G1000 system will not automatically revert to the secondary source and will need to be switched manually. Check the AHRS circuit breakers to ensure they are both in. If one is open, try resetting it (push it in). If it pops back out, DO NOT reset it.

The following annunciations will display on the PFD:

HDG NO COMP – Only one source for heading information, not able to compare to 2nd source.

ROL NO COMP – Only one source for roll information, not able to compare to 2nd source.

PIT NO COMP – Only one source for pitch information, not able to compare to 2nd source.

BOTH ON AHRS 2 (or 1) – Both PFDs are receiving AHRS 2 (or 1) information.

HDG FAULT – AHRS 1 (or 2) magnetometer fault has occurred.

Figure 3-1 – No. 1 AHRS Failure (No. 1 PFD Shown, with Optional SVS System On)

DUAL AHRS FAILURE (RED X – HDG AND ATTITUDE INDICATORS)

If both AHRS systems fail, check that both AHRS circuit breakers are pushed in. If one or both are open, try resetting them (push in). If they pop back out DO NOT reset them. Attitude and heading information will not be displayed on the PFD; therefore, the standby attitude indicator and magnetic compass will have to be referenced for attitude and heading information. The NAV CDI will still function, and may be used for navigation. Utilize the MFD for additional situational awareness.

The following annunciations will be shown on the PFD:

HDG NO COMP – No source for heading information, not able to compare to 2nd source.

ROL NO COMP – No source for roll information, not able to compare to 2nd source.

PIT NO COMP – No source for pitch information, not able to compare to 2nd source.

BOTH ON AHRS 2 (or 1) – Both PFDs were receiving AHRS 2 (or 1) information when the other AHRS failed.

BOTH ON ADC2 – Both PFDs were only receiving ADC 2 information when the other AHRS failed.

HDG FAULT – AHRS 1 (or 2) magnetometer fault has occurred.

Figure 3-2 – Dual AHRS Failure (No. 1 PFD Shown)

3-37 AIR DATA COMPUTER (ADC) SYSTEM FAILURES

SINGLE ADC FAILURE

If a failure occurs in a single ADC system, the other ADC system will automatically provide attitude and heading information to both displays if the aircraft ground speed is greater than 30 Kts. If the aircraft ground speed is less than 30 Kts, the G1000 system will not automatically revert to the secondary source and will need to be switched manually. Check the ADC circuit breakers to ensure they are both in. If one is open, try resetting it (push in). If it pops back out, DO NOT reset it.

The following annunciations will be shown on the PFD:

IAS NO COMP – Only one source for airspeed information, not able to compare to 2nd source.

ALT NO COMP – Only one source for altitude information, not able to compare to 2nd source.

BOTH ON ADC 2 (or 1) – Both PFDs are only receiving ADC 2 (or 1) information.

AHRS1 TAS – AHRS 1 is not receiving airspeed information.

Figure 3-3 – No. 1 ADC Failure (No. 1 PFD Shown, with Optional SVS System On)

DUAL ADC FAILURE (RED X – ALL AIR DATA INDICATIONS)

If both ADC systems fail, check that both ADC circuit breakers are pushed in. If one or both are open, try resetting them (push in). If they pop back out DO NOT reset them. Airspeed and altitude information will not be displayed on the PFD; therefore, the standby airspeed indicator and standby altimeter will have to be referenced for airspeed and altitude information. Utilize the MFD for additional situational awareness.

The following annunciations will be shown on the PFD:

IAS NO COMP – Only one source for airspeed information, not able to compare to 2nd source.

ALT NO COMP – Only one source for altitude information, not able to compare to 2nd source.

BOTH ON ADC 2 (or 1) – Both PFDs were only receiving ADC 2 (or 1) information when the other ADC failed. (This annunciation is still shown even though both ADCs are failed)

AHRS 1&2 TAS – AHRS 1 & 2 are not receiving airspeed information.

Figure 3-4 – Dual ADC Failure (No. 1 PFD Shown)

3-38 GPS/NAV COMPUTER SYSTEM FAILURES

#1 GPS/NAV FAILURE

If a failure occurs in the #1 GPS/NAV system (GIA), the other GPS/NAV system will automatically provide GPS information to both displays. Check the ADC circuit breakers to ensure they are both in. If one is open, try resetting it (push in). If it pops back out, DO NOT reset it.

#1 NAV and #1 COM frequency information will not be displayed on any of the flight displays. If COM #1 is used, all transmissions will be broadcast on 121.5 MHz. 121.5 MHz is automatically selected when a failure occurs in the system. COM #2 and NAV #2 may be used as normal.

TAWS will also fail since it receives GPS position from the #1 GPS. Use extra caution to maintain visual separation from terrain.

The following annunciations will be shown on the PFD:

TAWS FAIL – Terrain Avoidance Warning System has failed.

BOTH ON GPS 2 – Both PFD units are receiving GPS data from the No. 2 GIA unit.

GMA 1 FAIL – GMA 1 is inoperative. A communication failure with GMA 1 (Pilot's Audio Panel) has occurred. If COM 1 is selected on the pilot's audio panel, the pilot's transmissions will be broadcast on 121.5 MHz.

BACKUP PATH – XPDR 1 using backup data path. The transponder is using a backup data path.

AHRS 2 GPS – AHRS 2 not receiving backup GPS information.

WARNING: *The following caution and warning annunciations will not be able to be displayed if the #1 GPS/NAV computer has failed:*

RESERVOIR FUEL
PITOT OFF L-R
FUEL LOW L-R

Figure 3-5 – No. 1 GPS/NAV Computer Failure (No. 1 PFD Shown, with Optional SVS System On)

#2 GPS/NAV FAILURE

If a failure occurs in the #2 GPS/NAV system (GIA), the other GPS/NAV system will automatically provide GPS information to both displays. Check the ADC circuit breakers to ensure they are both in. If one is open, try resetting it (push in). If it pops back out, DO NOT reset it.

#2 NAV and #2 COM frequency information will not be displayed on any of the flight displays. If COM #2 is used, all transmissions will be broadcast on 121.5 MHz. 121.5 MHz is automatically selected when a failure occurs in the system. COM #1 and NAV #1 may be used as normal.

The following annunciations will be shown on the PFD:

BOTH ON GPS 1 – Both PFD units are receiving GPS data from the No. 1 GIA unit.

AHRS 1 GPS – AHRS 2 not receiving backup GPS information.

TRAFFIC FAIL – Traffic device has failed.

Figure 3-6 – No. 2 GPS/NAV Computer Failure (No. 1 PFD Shown)

DUAL GPS/NAV FAILURE

If both GPS/NAV (GIA) systems fail, check that both GPS/NAV circuit breakers are pushed in. If one or both are open, try resetting them (push in). If they pop back out DO NOT reset them.

Navigation, Communication, Transponder, and Engine information will not be displayed on any of the Garmin displays. No traffic or weather avoidance information will be available either.

Even though the COM Frequency Boxes are marked with red X's, with COM 1 selected on the pilot's audio panel, the pilot's transmissions will be broadcast on 121.5 MHz. It is recommended that if in VMC conditions, the pilot should maintain VFR. If in IMC conditions, it is recommended that the pilot request Air Traffic Control for vectors to VFR conditions.

The following annunciations will be shown on the PFD:

TAWS FAIL – Terrain Avoidance Warning System has failed.

BOTH ON GPS 1 – Both PFD units were receiving GPS data from the No.1 GIA unit when the 1st GPS/NAV failure occurred. GPS information is not being received when both GPS/NAV systems fail.

Figure 3-7 – Dual GPS/NAV (GIA) Failure

3-39 PRIMARY FLIGHT DISPLAY (PFD) FAILURE

#1 PFD FAILURE

If a failure occurs in the #1 Primary Flight Display (Pilot's PFD) the MFD will automatically enter Reversionary Mode and provide Flight, Navigation, Communication, and Engine information on the display. Verify the MFD automatically entered Reversionary Mode. If it did not enter Reversionary Mode automatically, press the red button on the bottom of the left audio panel.

Check the #1 PFD circuit breaker to ensure it is pushed in. If it is open, try resetting it (push in). If it pops back out, DO NOT reset it.

The COM 1 and NAV 1 Frequency Boxes are blanked out with red x's. If a transmission is made on COM 1, it will be broadcast on 121.5 MHz. COM 1 and NAV 1 may be used as normal though. Use NAV 2 or GPS for navigation.

The following annunciations will be shown on the PFD:

TAWS FAIL – Terrain Avoidance Warning System has failed.

HDG NO COMP – Only one source for heading information, not able to compare to 2nd source.

ROL NO COMP – Only one source for roll information, not able to compare to 2nd source.

PIT NO COMP – Only one source for pitch information, not able to compare to 2nd source.

IAS NO COMP – Only one source for airspeed information, not able to compare to 2nd source.

ALT NO COMP – Only one source for altitude information, not able to compare to 2nd source.

BOTH ON GPS 2 – Both PFD units are receiving GPS data from the No. 2 GIA unit.

BOTH ON AHRS 2 – Both PFDs are receiving AHRS 2 information.

BOTH ON ADC 2 – Both PFDs are only receiving ADC 2 information.

GMA 1 FAIL – GMA 1 is inoperative. A communication failure with GMA 1 (Pilot's Audio Panel) has occurred. If COM 1 is selected on the pilot's audio panel, the pilot's transmissions will be broadcast on 121.5 MHz.

NOTE: *The alerts box will display GMA 1 FAILURE (audio panel). This failure message is due to the COM 1 automatically switching to 121.5 MHz, and the GMA 1 not being able to communicate with the #1 PFD. If COM 1 is used, transmissions will be broadcast on 121.5 MHz. Although GMA 1 FAILURE is annunciated, some functions of the #1 GMA will still be operational.*

Figure 3-8 – Primary Flight Display Failure (MFD Shown)

3-40 MULTI – FUNCTION DISPLAY (MFD) FAILURE

MFD FAILURE

If a failure occurs in the Multi-Function Display (MFD) both PFD units will automatically enter Reversionary Mode and provide Flight, Navigation, Communication, and Engine information on the displays. Verify the PFD units have automatically entered Reversionary Mode. If they did not enter Reversionary Mode automatically, press the red button on the bottom of the audio panels.

Check the MFD circuit breaker to ensure it is pushed in. If it is open, try resetting it (push in). If it pops back out, DO NOT reset it.

Figure 3-9 – Multi-Function Display Failure (PFD Shown)

3-41 INADVERTENT OPENING OF A DOOR IN FLIGHT

If the aft passenger/cargo door should open in flight, slow the airplane to less than the full flaps operating speed of 108 KIAS and lower the flaps to the fully extended position. Lowering the flaps may bring the upper aft door near its closed position, and with assistance the door can then be properly latched closed. If no assistance is available, land when practical, and close the door.

If one of the crew doors should open inadvertently in flight, the affected door may be closed by properly latching it shut.

SECTION 4
NORMAL PROCEDURES
Table of Contents

4-1 GENERAL

Included in **Section 4** are procedures for conducting normal operations in checklist format. Normal procedures related to optional systems can be found in **Section 9** of this handbook.

WARNING: *There is no substitute for proper and thorough preflight planning coupled with continuous review in preventing emergencies. Become thoroughly familiar with the capabilities and limitations of the aircraft and be aware of hazards and conditions which present potential dangers.*

4-2 AIRSPEEDS FOR NORMAL OPERATIONS

The following speeds are based on a maximum weight of 6750 pounds for takeoff and landing and may be used for any weight less than that. However, to achieve the specified performance calculations in **Section 5** for takeoff distance, climb performance and landing distance, the speed appropriate for that particular weight must be used.

Rotate:

Normal Takeoff (Flaps 20°) .... 60-65 KIAS
Short Field Takeoff (Flaps 20°) .... 50 KIAS
Takeoff (Flaps 0°) .... 90 KIAS

Takeoff @ 50 Foot Obstacle:

Normal Climb-Out .... 85-95 KIAS
Short Field Takeoff (Flaps 20°) .... 72 KIAS
Takeoff (Flaps 0°) .... 110 KIAS

Enroute Climb (Flaps Up):

Cruise Climb .... 110-120 KIAS
V_{CLIMB} .... 101 KIAS
V_Y (S.L.) .... 99 KIAS
V_Y (10,000 FT) .... 93 KIAS
V_Y (20,000 FT) .... 86 KIAS

Approach to Landing:

Normal Approach – Flaps 35° .... 80-85 KIAS
Normal Approach – Flaps 0° .... 100-105 KIAS
Short Field Approach Flaps 35° (V_{REF}) .... 76 KIAS

Balked Landing/Go Around:
Takeoff Power – Flaps 20° .... 80 KIAS

Maximum Recommended Turbulent Air Penetration Speed:
6750 Pounds .... 142 KIAS
5500 Pounds .... 136 KIAS
4000 Pounds .... 124 KIAS

Maximum Demonstrated Crosswind Velocity:
Takeoff or Landing .... 16 Knots

4-3 PREFLIGHT INSPECTION

WARNING: *Visually inspect the airplane for general condition while performing a walk-around inspection and remove any propeller, engine inlet, exhaust and pitot covers. It may be necessary to use a ladder to gain access to the wing for visual inspection, refueling and checking the stall warning vane and pitot-tube heat.*

It is the pilot-in-command's responsibility to ensure the airplane's fuel supply is free of debris or contamination before flight. Any traces of solid contaminants such as rust, sand, pebbles, dirt, and bacterial growth must be considered hazardous and removed from the fuel system prior to flight. In addition to debris in the fuel, liquid contamination must also be removed; this includes water, incorrect fuel types, or unapproved additives. Fuel samples should be taken from all of the fuel drain locations during each preflight inspection and following every refueling of the aircraft.

During cold weather operations, it is essential to remove even small traces of frost, ice or snow from the wings, tail and control surfaces. Ensure the control surfaces and flap tracks do not contain internal ice or debris accumulations. If these requirements are not performed, a noticeable degradation of performance may occur, possibly to the extent where a safe takeoff and climb may not be possible. Prior to any flight into instrument meteorological conditions, check the pitot static source and stall warning heaters for proper heating within 30 seconds of activating the proper switches.

4-4 CHECKLIST PROCEDURES

PREFLIGHT INSPECTION

Bold-faced items in this section are immediate action items which should be committed to memory in preparation for potential emergency situations.

CABIN

1. FAA Approved Flight Manual .... ACCESSIBLE TO PILOT
2. Garmin G1000™ Cockpit Reference Guide .... ACCESSIBLE TO PILOT
3. Control Lock.. REMOVE
4. Parking Brake .... SET
5. All Electrical Switches ....OFF
6. All Circuit Breakers .... IN (or Collared)
7. Fuel Selector Valves .... BOTH ON and CHECK AGAINST STOPS
8. Emergency Power Lever ....NORMAL
9. Firewall Fuel Shutoff .... FUEL ON (Pushed In)
10. Fire Extinguishers .... CHECK
11. Master Switch ....ON
12. Left Primary Flight Display.. CHECK ON
13. Avionics Master Switch ....ON
14. Both Avionics Cooling Fans .... CHECK ON (Audibly)
15. MFD.............. CHECK SYSTEM ID and JEPPESEN DATABASE CURRENCY
16. Fuel Quantity (L & R) .... CHECK
17. GEN FAIL Annunciator .... CHECK SHOWN ON PFD
18. FUEL PRESS LOW Annunciator .... CHECK SHOWN ON PFD
19. PITOT OFF L-R Annunciator.................................. CHECK SHOWN ON PFD
20. ALTERNATR FL Annunciator.................................. CHECK SHOWN ON PFD
21. ENG INLET NORM Annunciator............................. CHECK SHOWN ON PFD
22. FUEL LOW L-R Annunciator.......................... CHECK NOT SHOWN ON PFD
23. RESERVOIR FUEL Annunciator..................... CHECK NOT SHOWN ON PFD
24. EMER PWR LVR Annunciator .... CHECK NOT SHOWN ON PFD
25. Avionics Master Switch ....OFF
26. Standby Attitude Indicator Battery Test...PERFORM
27. Wing Flaps...FULL DOWN
28. Trim Controls .... SET FOR TAKEOFF
29. Engine Inlet Switch ....BYPASS
30. Pitot/Static and Stall Warning Heat .... ON (30 Seconds) then OFF
    (Ensure pitot/static covers are removed)
31. Stall Warning Vane ....CHECK Proper Function and Freedom of Movement

31a. Stall Warning Horn System Test (if equipped) ....PRESS TO TEST
    (Ensure Audible Warning Horn Sounds)

32. Pitot/Static Tubes..CHECK for Heat
33. Oxygen Control Panel..ON and CHECK
    SUPPLY and OUTLET PRESSURES
34. Oxygen Masks (If Equipped) ....CHECK AVAILABILITY /FUNCTION
35. Oxygen Control Panel...OFF
36. Master Switch ....OFF

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LEFT SIDE

1. Fuselage Fuel Reservoir Sump Valves....................DRAIN
   (Check for contamination or debris. Take further samples until all contamination or debris is removed.)

NOTE: *Dispose of fuel samples in a proper manner, as turbine fuel will cause damage to asphalt surfaces.*

2. Left Main Landing Gear .... CHECK
   (Check for proper tire inflation and general condition of the landing gear and brake system)
3. Wing Tank Fuel Sump Valve.................... DRAIN and SAMPLE FUEL
4. Direct Reading Fuel Quantity Indicator.................... CHECK FUEL QUANTITY

LEFT WING LEADING EDGE

WARNING: *During cold weather operations, it is essential to remove even small traces of frost, ice or snow from the wings and control surfaces. Ensure the control surfaces do not contain internal ice or debris accumulations. Prior to any flight into potential icing conditions, check the pitot-static tubes for proper heating within 30 seconds of activating the necessary switches.*

1. Fuel Quantity ....CHECK VISUALLY
2. Fuel Filler Caps....................SECURE
3. Wing Tie Downs.................... DISCONNECT
4. Left Pitot/Static Tube....................CHECK for Security and Obstructions
5. Landing and Taxi Lights ....CHECK Proper Condition and Cleanliness
6. Navigation and Strobe Lights....................CHECK Proper Condition and Cleanliness

LEFT WING TRAILING EDGE

1. Aileron and Trim Tab ....CHECK Proper Position, Freedom of Movement, Tab Free-Play, and Condition
2. Static Wicks .... CHECK Proper Condition and Security (1 Required)
3. Fuel Tank Vent ....CHECK for Obstructions
4. Flap and Flap Tracks .... CHECK Condition and Security

EMPENNAGE

WARNING: *During cold weather operations, it is essential to remove even small traces of frost, ice or snow from the tail and control surfaces. Ensure the control surfaces do not contain internal ice or debris accumulations.*

1. Baggage and Cargo .... CHECK SECURE
2. Aft Fire Extinguisher .... CHECK for Proper Charge
3. Aft Door .... CLOSED and LATCHED
4. Tail Tie Down .... DISCONNECT
   (Ensure tail stand removed)
5. Horizontal Stabilizer .... CHECK for Proper Security and Condition
6. Vertical Stabilizer .... CHECK for Proper Security and Condition
7. Control Surfaces and Elevator Trim Tabs .... CHECK
   (Check proper condition, position for takeoff, security, tab free-play, and freedom of movement)
8. Static Wicks .... CHECK Proper Condition (6 Required)
9. Antennas .... CHECK Security of Installation and Condition
10. Aft Nav Light .... CHECK Proper Condition and Cleanliness

RIGHT WING TRAILING EDGE

1. Flap and Flap Tracks .... CHECK Condition and Security
2. Aileron .... CHECK Freedom of Movement and Condition
3. Static Wicks .... CHECK Proper Condition and Security (1 Required)
4. Fuel Tank Vent .... CHECK for Obstructions

WARNING: *During cold weather operations, it is essential to remove even small traces of frost, ice or snow from the wings and control surfaces. Ensure the control surfaces do not contain internal ice or debris accumulations. Prior to any flight into potential icing conditions, check the pitot-static tubes for proper heating within 30 seconds of activating the necessary switches.*

RIGHT WING LEADING EDGE

1. Navigation and Strobe Lights .... CHECK Proper Condition and Cleanliness
2. Landing and Taxi Lights .... CHECK Proper Condition and Cleanliness
3. Pitot/Static Tube .... CHECK for Security and Obstructions
4. Wing Tie Downs .... DISCONNECT
5. Fuel Quantity .... CHECK VISUALLY
6. Fuel Filler Caps .... SECURE

RIGHT SIDE

1. Direct Reading Fuel Quantity Indicator................................ CHECK QUANTITY
2. Wing Tank Fuel Sump Valve.................................... DRAIN and SAMPLE FUEL
3. Right Main Landing Gear.. CHECK
   (Check for proper tire inflation and general condition of the landing gear and brake systems)
4. Right Side Crew Door...CLOSED and LATCHED

NOSE

WARNING: *During cold weather operations, it is essential to remove even small traces of frost, ice or snow from the propeller blades, spinner and engine inlets.*

1. Right Engine Cowling ....OPEN and CHECK SECURITY and CONDITION
2. Right Side of Engine ....CHECK for Leaks and General Condition
3. Right Battery ....CHECK Security and Condition of Battery and Cables
4. Firewall Fuel Filter ....CHECK BYPASS FLAG for Proper Position (FLUSH)
5. Firewall Fuel Filter .... DRAIN and SAMPLE FUEL
6. Right Engine Cowling .... CLOSED and SECURE
7. Lower Cowling Outlet Vents..................................CHECK for OBSTRUCTIONS
8. NACA Duct (Right)...CHECK for OBSTRUCTIONS
9. Nose Wheel Strut and Tire... CHECK
   (Check for proper condition, strut extension, signs of damage and proper inflation)
10. Intake/Exhaust Cover and Propeller Anchor..................................... REMOVE
11. Exhaust Stubs..CHECK for OBSTRUCTIONS
12. Engine Intake...CHECK for OBSTRUCTIONS
13. Inertial Air Particle Separator.........CHECK OPEN (BYPASS) and NO DEBRIS
14. Propeller .... CHECK
    (Check blades for nicks, gouges, excessive erosion, security and cracks. Inspect blades for lightning strike – indicated by a darkened area near the tips. Check the propeller for security, condition and signs of grease or oil leaks.)
15. Propeller Spinner .... CHECK for Security and Condition
16. Oil Cooler Inlet ....CHECK for OBSTRUCTIONS
17. Left Engine Cowling.............OPEN and CHECK SECURITY and CONDITION
18. Oil Cooler..............................CHECK Condition, Security and for Obstructions
19. Engine Compartment........................CHECK for Leaks and General Condition
20. Brake Fluid Reservoir ....CHECK Proper Level
21. Oil Dipstick/Filler Cap ....CHECK Oil Level; Close and Secure
    (Fill to within 1-1/2 quarts of MAX HOT or MAX COLD as appropriate for engine condition. Markings represent US quarts low if oil is hot - within 10 -15 min. from engine shutdown.)

WARNING: *Ensure the oil dipstick / cap is latched down securely. Operating the engine with the dipstick / cap unlatched will result in excessive oil loss leading to eventual engine stoppage.*

NOSE (Continued)

NOTE: *In order to obtain an accurate oil level reading, it is necessary to either check the oil within 10 to 15 minutes after engine shutdown – referencing the max hot markings while the oil is still hot, or reference the max cold markings prior to the first flight of the day. If more than 10 minutes has elapsed since engine shutdown and the engine oil is still warm, perform an engine motoring run for approximately 5 seconds before checking the oil level while referencing the maximum hot markings.*

22. Left Engine Cowling .... CLOSED and SECURE
23. EPA Fuel Reservoir .... DRAIN
24. Oil/Fuel Reservoir .... DRAIN
25. Windshield .... CLEAN – and Check for Damage

4-5 BEFORE STARTING ENGINE

BEFORE STARTING ENGINE

1. Preflight Inspection and Weight and Balance Checks .... COMPLETE
2. Passenger Briefing .... COMPLETE
3. Cabin Doors .... LATCHED (Check Aft Door)
4 All Seats, Seatbelts and Shoulder Harnesses .... ADJUSTED and SECURE

WARNING: *Failure to ensure seats are securely locked in the seat tracks and failure to properly utilize the seatbelts and shoulder harnesses could result in serious injury or death should an accident occur.*

5. Master Switch .... ON
6. Avionics Master Switch .... ON
7. Parking Brake .... SET
8. Engine Inlet .... AS REQUIRED

NOTE: *Select BYPASS if visible moisture is present and OAT is less than 4°C.*

9. Fuel Selector Valves .... LEFT and RIGHT ON
10. Firewall Fuel Shutoff .... FUEL ON (PUSHED IN)
11. Emergency Power Lever .... NORMAL
12. Power Lever .... IDLE
13. Propeller Control Lever .... FEATHER
14. Fuel Condition Lever .... CUTOFF
15. Wing Flaps .... UP
16. Circuit Breakers .... IN
17. Cabin Heat .... OFF
18. Takeoff Torque Limit .... DETERMINE from **Max Torque for Takeoff** Chart in **Section 5**
19. Autopilot (if equipped) .... PERFORM PREFLIGHT CHECK
20. Pitch Latch Propeller Blade Pitch (if equipped) .... SEE SUPPLEMENT 2

REV 7

REV 6

4-6 ENGINE STARTS

BATTERY POWERED ENGINE START

1. Buss Voltages .... CHECK 24V Minimum
2. Flashing Beacon .... ON
3. Emergency Power Lever NORMAL – Check **EMER PWR LVR** not Shown on PFD

CAUTION: *If the emergency power lever is not secured in the NORMAL (full aft detent) position for starting, an engine over-temperature condition (hot-start) may result.*

4. Propeller Area .... CLEAR
5. Auxiliary Fuel Pump .... ON and NOTE-
   - **AUX PUMP ON** Annunciator .... SHOWN ON PFD
   - Fuel Flow .... ZERO
6. Ignition Switch .... AS REQUIRED-
   - ON for LO/MOTOR START
   - OFF for HI START
7. Starter Switch .... HI or LO/MOTOR as Required and NOTE-
   - **IGNITION ON** Annunciator .... SHOWN ON PFD
   - Engine Oil Pressure .... CHECK RISING
   - Ng .... ACCELERATING THROUGH 14% MINIMUM
8. Fuel Condition Lever .... LOW IDLE and NOTE-
   - Fuel Flow .... CHECK at 80 to 110 lb/hr
   - ITT .... MONITOR (1090°C Maximum – Limited to 2 sec.)
   - Ng .... 52% MINIMUM

CAUTION: *If the ITT rises rapidly towards 1090°C, be prepared to bring the fuel condition lever to CUTOFF to prevent a hot-start.*

9. Starter Switch .....OFF – Check **STARTER ON** Annunciator Not Shown on PFD
10. Ignition Switch... OFF – Check **IGNITION ON** Annunciator Not Shown on PFD
11. Propeller Lever .... MAX RPM
12. Engine Instruments .... CHECK
13. Auxiliary Fuel Pump .... STBY
14. Generator .... ON
15. Alternator .... ON
16. Exterior Lights .... AS REQUIRED
17. Cabin Heat, Ventilation and Defrost .... AS REQUIRED
18. Radios / Avionics .... SET
19. Preflight Procedure for the GMA 1347 Audio Panels .... PERFORM

4-7 ENGINE STARTS (CONTINUED)

EXTERNAL POWER ENGINE START (24-28 VOLTS, 800 AMPS Min / 1700 AMPS Max)

1. External Power .... CONNECT then ON
2. Battery Master Switch .... ON
3. Buss 1 Voltage .... CHECK 24V Minimum
4. Flashing Beacon .... ON
5. Emergency Power Lever . NORMAL – Check EMER PWR LVR Not Shown on PFD

CAUTION: *If the emergency power lever is not secured in the NORMAL (full aft detent) position for starting, an engine over-temperature condition (hot-start) may result.*

6. Propeller Area .... CLEAR
7. Auxiliary Fuel Pump .... ON and NOTE-
   - AUX PUMP ON Annunciator .... SHOWN ON PFD
   - Fuel Flow .... ZERO
8. Ignition Switch .... AS REQUIRED-
   - ON for LO/MOTOR START
   - OFF for HI START
9. Starter Switch .... HI or LO/MOTOR as Required and NOTE-
   - IGNITION ON Annunciator .... SHOWN ON PFD
   - Engine Oil Pressure .... CHECK RISING
   - Ng .... STABLE (14% Minimum)
10. Fuel Condition Lever .... LOW IDLE and NOTE-
    - Fuel Flow .... CHECK at 80 to 110 lb/hr
    - ITT .... MONITOR (1090°C Maximum – Limited to 2 sec.)
    - Ng .... 52% MINIMUM

CAUTION: *If the ITT rises rapidly towards 1090°C, be prepared to bring the fuel condition lever to CUTOFF to prevent a hot-start.*

11. Starter Switch.....OFF – Check STARTER ON Annunciator Not Shown on PFD

12. Ignition Switch.... OFF – Check IGNITION ON Annunciator Not Shown on PFD

13. Propeller Lever .... MAX RPM
14. Engine Instruments .... CHECK
15. Auxiliary Fuel Pump .... STBY
16. External Power .... DISCONNECT
17. Generator .... ON
18. Alternator .... ON
19. Exterior Lights .... AS REQUIRED
20. Cabin Heat, Ventilation and Defrost .... AS REQUIRED
21. Radios / Avionics .... SET
22. Preflight Procedure for the GMA 1347 Audio Panels .... PERFORM

4-8 TAXIING

TAXIING

1. Brakes .... CHECK
2. Flight Controls .... POSITIONED ACCORDING TO WIND DIRECTION
3. Flight Instruments .... CHECK

NOTE: *For improved brake life, propeller BETA range may be used during ground operations to prevent excessive taxi speeds.*

4-9 BEFORE TAKEOFF

BEFORE TAKEOFF

REV 7

1. Parking Brake .... SET
2. All Seats, Seatbelts and Shoulder Harnesses .... LOCKED and SECURE
3. Inertia Reel Levers .... LOCKED

WARNING: *Failure to properly utilize the seat track locks, seatbelts, shoulder harnesses, and inertia reel locks could result in serious injury or death should an accident occur.*

4. Flight Controls .... FREE and CORRECT
5. Flight Instruments .... CHECK and SET
6. Auxiliary Fuel Pump .... ON
7. Fuel Selectors .... RECHECK LEFT and RIGHT ON
8. Firewall Fuel Shutoff .... RECHECK FUEL ON (FULL IN)
9. Fuel Quantity .... CHECK and SET FUEL TOTALIZER
10. Wing Flaps .... SET FOR TAKEOFF
11. Aileron and Elevator Trim .... SYSTEM CHECKS (1st Flight of Day)
12. Elevator, Aileron and Rudder Trim .... SET FOR TAKEOFF
13. Engine Inlet .... SYSTEM CHECK on 1st Flight of the day
14. Power Lever .... 300 FT LB
    - Bus Voltages .... CHECK 26 Volts Minimum
    - Engine Instruments .... CHECK
15. Overspeed Governor .... SYSTEM CHECK on 1st Flight of the Day (Stabilized at 2070 ± 50 RPM)
16. Power Lever .... IDLE
17. Quadrant Friction Lock .... ADJUST as Necessary

REV 6

BEFORE TAKEOFF CHECKLIST CONTINUED ON NEXT PAGE...

BEFORE TAKEOFF CONTINUED

18. Engine Inlet.......AS REQUIRED and Verify Proper Annunciation Shown on PFD
19. Pitot/Static Heat.......ON When OAT is Less than 4°C and Visible Moisture Present
20. Avionics Equipment .... CHECK and SET
21. Transponder....... SET
22. CDI .... SET
23. Annunciators .... CHECK
24. Strobe Lights....... AS REQUIRED
25. Parking Brake .... RELEASE
26. Propeller Lever .... MAX RPM
27. Fuel Condition Lever....... HIGH IDLE

REV 6

4-10 TAKEOFF

NORMAL TAKEOFF

1. Wing Flaps....... 0°-20°
2. Elevator Trim....... RECHECK Set for Takeoff

CAUTION: *The Flap/Trim Compensation Unit is disabled on the ground through an airspeed switch. The airspeed switch activates the Flap/Trim Compensation Unit above approximately 35 knots. If the airplane is positioned into winds in excess of approximately 35 knots while the flaps are being set for takeoff, the trim will move from its previously set position and could result in an out-of-trim condition on takeoff.*

3. Power .... SET FOR TAKEOFF (Observe Takeoff Torque, ITT, and Ng Limits)
4. Annunciators .... CHECK
5. Engine Instruments....... CHECK
6. Rotate .... 60-65 KIAS
7. Climb Speed .... 85-95 KIAS
8. Wing Flaps....... RETRACT
   (Retract to 10° after reaching 85 KIAS and 0° after reaching 95 KIAS)

SHORT FIELD TAKEOFF

1. Wing Flaps....... 20°
2. Elevator Trim....... Set for Takeoff
3. Power .... SET FOR TAKEOFF (Observe Takeoff Torque, ITT, and Ng Limits)
4. Annunciators .... CHECK
5. Engine Instruments....... CHECK
6. Brakes....... RELEASE
7. Rotate .... 50 KIAS
8. Climb Speed .... 72 KIAS Until Clear of Obstacles
9. Wing Flaps....... RETRACT
   (Retract to 10° after reaching 85 KIAS and 0° after reaching 95 KIAS)

REV 6

4-11 ENROUTE CLIMB

CRUISE CLIMB

1. Auxiliary Fuel Pump .... STBY
2. Pitot/Static Heat ... ON when OAT is Less than 4°C and Visible Moisture Present
3. Engine Inlet .... AS REQUIRED
4. Airspeed .... 110-120 KIAS
5. Torque .... SET (Refer to **Maximum Torque for Climb** Chart in **Section 5**)
6. Propeller .... 2000-2200 RPM
7. ITT and Ng Limits .... OBSERVE

NOTE: *Use of 740°C ITT is recommended for improved engine life.*

MAXIMUM PERFORMANCE CLIMB (Non-Emergency)

1. Auxiliary Fuel Pump .... STBY
2. Pitot/Static Heat ... ON when OAT is Less than 4°C and Visible Moisture Present
3. Engine Inlet .... AS REQUIRED
4. Airspeed .... 101 KIAS
5. Propeller .... 2000-2200 RPM
6. Torque .... Set (Refer to **Maximum Torque for Climb** Chart in **Section 5**)
7. ITT and Ng Limits .... OBSERVE

4-12 CRUISE

NORMAL CRUISE

1. Pitot/Static Heat ... ON when OAT is Less than 4°C and Visible Moisture Present
2. Propeller .... 2000-2200 RPM
3. Power .... SET per Cruise Power Tables
   (Observe Max Cruise ITT and Ng Limits)

4-13 DESCENT

NORMAL DESCENT

1. Engine Inlet .... AS REQUIRED
2. Pitot/Static Heat .... ON when OAT is Less than 4°C and Visible Moisture Present
3. Altimeter .... SET
4. CDI .... SET APPROPRIATELY
5. Power .... AS REQUIRED to Provide the Desired Rate of Descent
6. Seats, Seatbelts and Shoulder Harnesses .... ADJUSTED and SECURE
7. Inertial Reel Levers .... LOCKED

WARNING: *Failure to properly utilize the seatbelts, shoulder harnesses, and inertia reel locks could result in serious injury or death should an accident occur.*

4-14 BEFORE LANDING

BEFORE LANDING

1. Fuel Selector Valves .... LEFT AND RIGHT – ON
2. Auxiliary Fuel Pump .... ON
3. Firewall Fuel Shutoff .... FUEL ON (PUSHED IN)
4. Fuel Condition Lever .... HIGH IDLE
5. Propeller Lever .... MAXIMUM RPM
6. Wing Flaps .... AS DESIRED
   (10° below 138 KIAS, 20° below 120 KIAS, 35° below 108 KIAS)
7. Landing/Taxi Lights .... AS REQUIRED
8. Yaw Damper .... OFF

REV 6

4-15 LANDINGS

NORMAL LANDING

1. Wing Flaps .... FULL DOWN
2. Airspeed .... 80-85 KIAS
3. Touchdown .... MAIN WHEELS FIRST
4. Power Lever .... BETA RANGE After Touchdown
5. Brakes .... AS REQUIRED

4-16 LANDINGS (CONTINUED)

SHORT FIELD LANDING

1. Wing Flaps..FULL DOWN
2. Airspeed..76 KIAS
3. Power Lever..SMOOTHLY REDUCE TO IDLE
from Obstacles to Touchdown
4. Touchdown..MAIN WHEELS FIRST
5. Power Lever..BETA RANGE After Touchdown

NOTE: *Landing roll may be further reduced with use of reverse thrust. Refer to* **Section 5***.*

6. Brakes..APPLY HEAVY PRESSURE
7. Elevator Control..FULL AFT
8. Wing Flaps ....RETRACT for Maximum Brake Effectiveness

BALKED LANDING

1. Power Lever..ADVANCE to TAKEOFF POWER
2. Climb Speed ....80 KIAS Until Clear of Obstacles
3. Wing Flaps..RETRACT to 20°
4. Wing Flaps .... FULLY RETRACT Upon Reaching Safe Altitude and Airspeed

4-17 AFTER LANDING

AFTER LANDING

1. Wing Flaps..UP
2. Fuel Condition Lever..LOW IDLE
3. Auxiliary Fuel Pump..OFF
4. Strobe Lights..OFF
5. Landing and Taxi Lights ....AS REQUIRED
6. Pitot Heat (L&R)..OFF

WARNING: *Accidental moving of the fuel condition lever aft of the LOW IDLE position causing the Ng to fall below 52% and then moving the fuel condition lever back to LOW IDLE can result in an ITT over-temperature condition. If the engine begins to shutdown in this situation, allow the engine to complete its shutdown process. Then, perform a normal engine start using the* **Engine Start** *checklist.*

4-18 ENGINE SHUTDOWN AND AIRPLANE SECURING

SHUTDOWN AND SECURING

1. Parking Brake .... SET
2. Environmental Control Systems .... OFF
3. AUX BUS Switch .... OFF
4. Power Lever .... IDLE
5. Propeller Control Lever .... FEATHER
   (See Supplement 2 for shutdown procedures for Pitch-Latched Propellers (*If Equipped*)) REV 6
6. Generator .... OFF
7. Alternator .... OFF
8. ITT ....STABILIZED at Minimum Obtainable Temperature for One Minute
9. Fuel Condition Lever .... CUTOFF
10. Oxygen Supply Control Switch (If On) .... OFF
11. Light Switches .... OFF
12. Fuel Selector .... OFF if Parked on a Sloped Surface
    (Turn off the fuel valve of the higher wing to prevent fuel transfer)
13. Avionics Master Switch .... OFF
14. Master Switch .... OFF
15. Controls .... LOCK
16. Tie-Downs and Wheel Chocks .... AS REQUIRED
17. External Covers .... INSTALL
18. Firewall Fuel Filter .... CHECK FILTER BYPASS FLAG (Normal – Flush)
19. Oil Dipstick/Filler Cap .... CHECK HOT LEVEL
20. Oil Dipstick/Filler Cap .... CLOSED and SECURE

NOTE: *If the airplane is parked on a sloped surface, it may be desirable to turn the fuel selector valve of the higher fuel tank to the OFF position in order to help prevent fuel transfer between tanks due to gravity.*

4-19 SYSTEMS CHECKS / PROCEDURES

PROPELLER OVERSPEED GOVERNOR CHECK

NOTE: *Accomplish a propeller overspeed governor check prior to the first flight of the day and following maintenance.*

1. Propeller Control Lever .... MAX RPM
2. Overspeed Governor Test Switch .... PRESS AND HOLD
3. Power Lever .... ADVANCE
   (Propeller should stabilize at 2000 RPM ± 60 RPM)
4. Power Lever .... IDLE
5. Overspeed Governor Test Switch .... RELEASE

AILERON TRIM SYSTEM CHECK

NOTE: *Accomplish an aileron trim system check prior to the first flight of the day and following maintenance.*

1. Forward Aileron Trim Switch .... ACTUATE – Verify Trim Tab and Indicator Do Not Move
2. Aft Aileron Trim Switch .... ACTUATE – Verify Trim Tab and Indicator Do Not Move
3. Both Aileron Trim Switches .... ACTUATE to the LEFT and-
4. Aileron Trim Indication .... VERIFY Pointer Moves to Left for 1 sec. and Stops
5. Aileron Trim Tab .... VERIFY Tab Moves Down for 1 Second and Stops
6. Both Aileron Trim Switches .... ACTUATE to the RIGHT and-
7. Aileron Trim Indication .... VERIFY Pointer Moves to Right for 1 sec. and Stops
8. Aileron Trim Tab .... VERIFY Tab Moves Up for 1 Second and Stops
9. Trim Disconnect Switch .... OFF and Verify Trim Does Not Move when Switch is Pressed

ELEVATOR TRIM SYSTEM CHECK

NOTE: *Accomplish an elevator trim system check prior to the first flight of the day and following maintenance.*

1. Left Elevator Trim Switch .... ACTUATE – Verify Indicator Does Not Move
2. Right Elevator Trim Switch .... ACTUATE – Verify Indicator Does Not Move
3. Both Elevator Trim Switches .... ACTUATE Nose Down and-
   (Verify trim indication moves towards the DN position)
4. Both Elevator Trim Switches .... ACTUATE Nose Up and-
   (Verify trim indication moves towards the DN position)
5. Trim Disconnect SwitchOFF and Verify Trim Does Not Move when Switch is Pressed

GMA 1347 AUDIO PANEL PREFLIGHT PROCEDURE

NOTE: *Accomplish the following procedure prior to each flight to ensure audio function and aural annunciations will operate properly.*

1. PILOT and COPLT Annunciators .... VERIFY EXTINGUISHED
   (Bottom of GMA 1347)
2. MAN SQ Annunciator .... VERIFY EXTINGUISHED
3. Individual Headset Volume Controls .... SET TO MAXIMUM VOLUME
4. PILOT/PASS Knobs .... TURN CLOCKWISE TWO FULL TURNS

NOTE: *This will set the headset audio level to max volume (least amount of attenuation)*

5. COM/NAV Radio Volume Levels .... ADJUST TO A SUITABLE LEVEL
6. PILOT/PASS Knobs .... ADJUST VOLUMES TO DESIRED INTERCOM LEVEL

STANDBY ATTITUDE INDICATOR BATTERY TEST

1. Turn on the indicator with aircraft power and allow the unit to spin up for a minimum of 3 minutes.
2. Press and hold the STBY PWR button. After several seconds, the amber LED will start flashing, indicating the unit has latched into Battery Test Mode. The test runs for approximately one minute, during which time the amber LED flashes continuously and either a red or green light is displayed under the word TEST.
3. Visually monitor the test lights until the amber LED stops flashing, signaling the end of the test.
4. A green light throughout the test indicates the standby battery pack is healthy and should be able to function normally. A red light at any time during the test means that the standby battery is at least in need of charging, and possible replacement.

NOTE: *A green light throughout this short test does not guarantee that a full hour of operation time is available. Actual battery operation time may vary considerably depending on temperature, charge status, and battery condition.*

ENTERING OR MODIFYING A FLIGHT PLAN

1. There are multiple ways to enter a flight plan into the G1000 system. Refer to the **G1000 Cockpit Reference Guide for the Kodiak 100** for information on entering a flight plan.
2. If it becomes necessary to modify or enter a new flight plan into the system, it is required that the pilot remove the active flight plan prior to entering a new one. This procedure is to prevent a possible glitch in the software from causing a mismatch in navigation information displayed on the PFD and MFD. If a mismatch in navigation information occurs when changing or entering a new flight plan, remove the flight plan and re-enter it into the MFD.

SYSTEMS CHECKS / PROCEDURES CONTINUED...

ENGINE INLET 1ST FLIGHT OF THE DAY CHECK

For Aircraft with Single Actuator (SIPS):

1. Engine Inlet.................. BYPASS and VERIFY **ENG INLET BP** is Shown on PFD

For Aircraft with Dual Actuators (DIPS):

1. Engine Inlet... PERFORM ACTUATOR CHECK BELOW
    1. PRIMARY SWITCH TO BYPASS
       (Verify **ENG INLET BP** Annunciation on PFD)
    2. PRIMARY SWITCH TO NORMAL
       (Verify **ENG INLET NRM** Annunciation on PFD)
    3. OVERRIDE SWITCH TO BYPASS
       (Verify **ENG INLET BP** Annunciation on PFD)
    4. RETURN THE OVERRIDE SWITCH DOWN TO THE LOCKED POSITION
       (Verify **ENG INLET NRM** Annunciation on PFD)

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Page Reserved for Additional System Checks and Procedures.

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4-20 AMPLIFIED PROCEDURES

PREFLIGHT INSPECTION

The preflight inspection checklist is recommended for utilization prior to each flight. If the airplane has been in storage for an extended amount of time, has had recent major maintenance work, or has been operated from rough or unimproved surfaces; a more extensive exterior inspection is recommended.

Flights taking place at night or in cold weather involve careful preflight inspection of other specific areas which are outlined in this section.

Following the accomplishment of major maintenance procedures on the airplane, the preflight inspections should be modified to pay extra attention to the flight controls and trim tabs to ensure freedom of movement and actuation in the correct direction. Also, check all inspection panels on the airplane to ensure proper security of installation.

If the airplane has been exposed to ground handling, especially in a crowded hangar, it should be checked carefully for dents and scratches on the wings, fuselage, propeller, flight controls and empennage. Also check for damage to navigation lights, strobe lights and antennas. If the airplane has been parked outside in high wind conditions or exposed to propeller/jet wash, carefully inspect the flight control surface stops, hinges and brackets for signs of wind damage.

If the airplane has been operated into an unimproved runway/taxiway, check the propeller blade tips and the leading edges of the propeller blades and horizontal tail for abrasions. Airplanes operated in and out of unimproved strips, especially at high altitudes, are subjected to high loads on the landing gear. Accomplish frequent inspections of the landing gear, tires and brakes.

Outside storage may result in water accumulation in the pitot/static system and fuel tanks. Dust and dirt can also enter the engine air inlet and exhaust areas. If any water is expected in the static line, open the static source drain valve and drain completely. Ensure the static source drain valve is returned to the closed position prior to flight.

If any water is found to be present in the fuel system, the inboard fuel tank sump quick drain valves, fuel reservoir quick drain valve and the firewall fuel filter quick drain valve should all be thoroughly drained and checked until there is no further sign of water or debris contamination of the fuel system.

Prolonged storage of the aircraft may result in considerable water buildup in the fuel system due to water separating from fuel additives. This is indicated by excessive amounts of water accumulating in the fuel tank sumps. Refer to **Section 8** of this handbook for fuel system servicing procedures.

To prevent inadvertent loss of fuel in flight, ensure the fuel tank filler caps are tightly sealed following visual checks of the fuel quantity or servicing. The fuel system vents should be inspected for obstructions, ice or water, especially following flights into cold weather.

The interior inspection will vary according to the type of flight plan and the optional equipment installations. Prior to flights at high altitudes, it is important to check the oxygen supply equipment for proper operation and availability of face masks and hose assemblies.

4-21 BEFORE STARTING ENGINE

WARNING: *The pilot in command is responsible for ensuring the airplane is properly loaded within the center of gravity limits and weight limits established in this handbook prior to takeoff.*

WARNING: *Failure to properly utilize the seatbelts, shoulder harnesses and inertia reel locks could result in serious injury or death should an accident occur.*

The **Before Starting Engine** Checklist is mostly self-explanatory and should be followed very closely to ensure proper starting of the engine. Those items from the checklist which may require further explanation are described in the following paragraphs.

When setting the electrical switches prior to starting the engine, both the MASTER, and AVN BUS switches should be turned on to allow the avionics systems to accomplish their initialization and self-test processes. The electronic checklist provided through the MFD is also available only with the AVN BUS on. The beacon should also be turned on to provide an indication to ground personnel of engine operations being accomplished. All other electrical component switches should be turned off during engine starts to provide the highest amount of voltage to the starter as possible.

CAUTION: *Ensure the Emergency Power Lever is stowed in its NORMAL position prior to starting the engine. If the Emergency Power Lever is out of its normal gate during engine start, excessive fuel will be supplied to the engine, resulting in a hot start.*

Before starting the engine the power lever is placed against the BETA gate in the IDLE position, the propeller control lever is placed full aft in the FEATHER position and the fuel condition lever is placed full aft in the CUTOFF position.

CAUTION: *Damage could occur to the propeller reversing linkage if the power lever is moved aft of the IDLE position and into BETA range when the engine is not running and the propeller is feathered.*

4-22 ENGINE STARTING

The recommended method for starting the engine is to use the HI START mode. Selecting HI START will result in faster light off, cooler starting temperatures and lower stresses on the engine. The aircraft is equipped with two 24 volt batteries. During a HI START, the Master Control Unit (MCU) initiates the start with the two batteries in parallel and then as the starter current decays to a pre-determined value, the batteries are switched into series to feed the starter. The resultant 48 volts only appears at the starter and nowhere else in the electrical system. The inrush current and impact torque on the accessory gears is significantly reduced and the engine acceleration is faster, which results in reduced peak Inter-Turbine Temperatures at startup.

If a ground power unit is available, an external power start should be performed on the first flight of the day or if maintenance has been performed on the aircraft involving the use of the aircraft electrical system. Even if 24 volts is shown on the voltmeter, the battery condition may be less than desired.

If a ground power unit is not available, a LO/MOTOR START should be selected on the first flight of the day, or if maintenance has been performed on the aircraft involving the use of the aircraft electrical system. LO/MOTOR START should also be selected and is recommended if a HI START is attempted without successful light-off and no external power is available. The LO START cycle does not consume as much battery power for continued attempts to start the engine.

The **Engine Starting Checklist** procedures must be followed closely to assure satisfactory starting of the engine. With the Battery Master Switch ON, check the buss voltages for a reading of 24 volts minimum. If the battery voltage is lower than 24 volts, external power should be used to start the engine. If the low-voltage problem persists, the problem should be determined and remedied prior to attempting an engine start. Verify the Emergency Power Lever is secured in its NORMAL position. Actuate the Auxiliary Fuel Pump switch and verify the **AUX PUMP ON** annunciator is shown on the PFD, the **FUEL PRESS LOW** annunciator is not shown on the PFD, and there is no indication of fuel flow. The ignition switch may be placed in the OFF position when starting the engine in HI START mode, as the igniters are automatically excited when the starter switch is actuated. The ignition switch must be placed in the ON position for a LO/MOTOR start. Actuate the starter switch to HI for a HI START or LO/MOTOR for a LO START. Verify the **IGNITION ON** Annunciator is illuminated, Engine Oil Pressure is rising and the gas generator RPM (Ng) accelerates through a minimum of 14%. Once all of those conditions are met, bring the fuel condition lever to the LOW IDLE position. Verify the fuel flow is between 80 and 110 pounds per hour, the ITT remains below 1090°C (1090°C ITT is time limited to 2 seconds) and the Ng reaches idle RPM of approximately 52%.

CAUTION: *If the ITT rises rapidly towards 1090° or if no ITT rise is observed within 10 seconds after moving the fuel condition lever to LOW IDLE, bring the fuel condition lever to CUTOFF and perform the engine clearing procedure described in this section to prevent a hot start.*

NOTE: *Typically, the ITT temperature during start will be substantially lower than 1090°C (approximately 500°C for HI START and 700°C for LO START).*

Once the engine stabilizes at idle (52% Ng), release the starter switch to the OFF position and verify the **STARTER ON** annunciator is not shown on the PFD. When the engine is cold or if there is a high load on the generator, it may be necessary to advance the power lever slightly forward of the idle detent to maintain a minimum idle RPM of 52% Ng. To prevent the idle RPM from dropping below 52% Ng, the power lever may be advanced to obtain 55% Ng prior to turning the generator switch ON.

CAUTION: *Operating the engine under high OAT and higher ground elevations may cause the ITT to exceed the idle limitation of 685°C. To prevent an over-temperature condition during ground operations, it may be necessary to advance the power lever slightly to cause an increase in Ng and/or reduce engine accessory loads to maintain the ITT within its limits.*

NOTE: *If the* **STARTER ON** *annunciator remains shown on the PFD after the starter switch has been returned to the OFF position, the starter contactor may be closed and the generator will not function. Perform an engine shutdown.*

The engine may be started with airplane battery power or with a ground power unit (GPU). However, it is recommended that a GPU be used to start the engine when Outside Air Temperatures are less than 0°F (-18°C). Refer to the **Cold Weather Operations** description in this section when ambient temperatures are lower than 0°F (-18°C).

CAUTION: *When a Ground Power Unit is used, ensure the unit is negatively grounded and regulated at 28 volts DC. The GPU must be able to provide a minimum of 800 amperes during the starting cycle and must not exceed 1700 amperes.*

Prior to starting the engine with battery power, check the bus voltages for a minimum of 24 volts. As with all turbine engines, the operator must monitor the ITT during each start to take corrective action if signs of a “hot start” are present. The operator must be prepared to immediately terminate the start if the ITT exceeds 1090°C or is rapidly approaching this limit. Hot starts are not a common occurrence if the proper starting procedures are followed. A “hot start” is an over-temperature condition caused by excessive fuel flow at normal engine RPM or normal fuel flow with low engine RPM. The latter is the more common situation and is usually caused by attempting an engine start with a partially discharged or weak battery system.

CAUTION: *A minimum battery voltage of 24 volts is not always a proper indication of the battery being fully charged or in good condition. Therefore, during the early stages of performing an engine start, if the gas generator acceleration is noticeably lower than normal, return the fuel condition lever to the CUTOFF position and discontinue the start. Recharge the batteries or use an auxiliary power unit to start the engine.*

Following a terminated start for any reason, it is essential to allow a 30 second draining period to drain off the residual fuel prior to attempting the next start. Failure to drain all of the residual fuel from the engine could lead to a hot start, a hot streak damaging the hot section, or torching of residual fuel in the engine exhaust on the next successful ignition.

After the residual fuel has drained for 30 seconds, perform a dry motoring run for 15 seconds - observing the starter limitations. This will ensure that no fuel is trapped prior to accomplishing the next start. If the engine fails to start after attempting a HI START, follow the Engine Starting Cycle Limitations provided in Section 2 of this handbook.

4-23 DRY MOTORING RUN / ENGINE CLEARING PROCEDURES

The following procedure should be used any time it is necessary to remove internally trapped fuel and vapors, or if there is sign of a fire within the engine. The dry motoring run is accomplished to pass fresh air through the engine to purge any fuel, vapors, or fire from the combustion section, gas generator turbine, power turbine and exhaust system.

1. Fuel Condition Lever... CUTOFF
2. Ignition Switch...OFF
3. Master Switch ....ON – to Supply Power to the Starter
4. Auxiliary Fuel PumpOFF if Fire is Suspected – ON if No Fire, for Pump Lubrication
5. Starter Switch ....LO MOTOR

CAUTION: *Do not exceed the starter limitations set forth in* ***Section 2****.*

CAUTION: *Should a fire persist, as indicated by sustained high ITT, close the firewall fuel shutoff valve and continue motoring the engine.*

6. Starter Switch ....OFF
7. Auxiliary Fuel Pump...OFF
8. Firewall Fuel Shutoff...FUEL OFF
9. Master Switch ....OFF

Allow the required cooling period for the starter to pass prior to attempting any further starter operation.

4-24 ENGINE IGNITION PROCEDURES

For most operations, the ignition switch should be left in the OFF position. With the switch left in the OFF position, the igniters will automatically be excited when the starter switch is in the HI START position.

NOTE: *Leaving the ignition switch in the ON position for extended periods of time will reduce the life of the ignition system components.*

However, the ignition switch should be turned ON to provide a continuous source of ignition during the following conditions:

a. Operation on water or slush covered runways.

b. Flight into heavy precipitation.

c. During inadvertent encounters of icing conditions until the inertial air particle separator has been left on for at least 5 minutes. Refer to **Section 3** for more information.

d. When the RESERVOIR FUEL annunciator is illuminated, indicating a near fuel exhaustion condition.

Refer to **Section 7** for further information regarding the ignition system.

4-25 ENGINE INLET – INERTIAL SEPARATOR PROCEDURES

Installed in the engine air inlet duct is an inertial air particle separator (inertial separator). The inertial separator system is provided to prevent ice buildups on the compressor inlet screen while operating in icing conditions and to minimize the ingestion of foreign particles during ground operations or takeoffs with dusty, sandy field conditions.

The inertial separator (switch labeled ENG INLET) should be placed in BYPASS mode prior to operating the engine on the ground or in flight when the Outside Air Temperature is less than 4°C and visible moisture (clouds, rain, snow or ice crystals) is present.

The inertial separator should also be placed in the BYPASS mode for ground operations and takeoffs in dusty or sandy field conditions to help minimize engine ingestion of dust, sand and debris.

The NORMAL mode should be selected for all other engine operating conditions, since it provides a substantial inlet ram recovery, resulting in more efficient engine operation. Refer to **Section 7** for more information concerning the inertial air particle separator.

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Aircraft Serial Numbers 100-0043 and on and Ice Protection System equipped aircraft are equipped with an additional override actuator and is referred to as "DIPS" (***Dual Actuated Inertial Particle Separator***). See **Section 07** for more information.

4-26 TAXIING

The power lever may be placed into BETA range during taxi to improve brake life and increase stopping performance during landing. BETA range is selected by lifting up on the BETA lever and moving the power lever aft - over a gate. With the power lever moved into this BETA range position, the propeller is at a fine pitch and produces nearly zero thrust in a static 52% Ng idle condition. A leaf spring is installed in the control quadrant which the power lever contacts and provides the pilot with an indication of reaching the REVERSE range. Moving the power lever further aft from this position in REVERSE range will result in a negative blade angle and an increase in engine power to produce reverse thrust from the blades.

CAUTION: *The use of reverse thrust should be limited to use on prepared surfaces to protect the propeller from damage caused by small rocks or pebbles being lifted into the propeller blades.*

PROPELLER RPM LIMITATION

Stabilized ground operation is prohibited between 450 and 1050 RPM. The propeller may be operated when feathered at or below 450 RPM. BETA may be used to increase N_P without causing excessive taxi speeds.

4-27 BEFORE TAKEOFF

Both fuel tank selector valves should always be placed in the ON position prior to engine start and takeoff. It is permissible to turn one side OFF as necessary to balance the fuel load if an out of balance condition exists. This should be performed either on the ground or during cruise at a safe altitude.

WARNING: *Do not exceed a fuel imbalance of greater than 250 pounds in flight.*

Prior to the first flight of the day, perform an operational check of the engine inlet / inertial separator system. Cycle the ENG INLET switch and check that the position is annunciated appropriately on the PFD.

A takeoff index range is provided on the elevator trim tab position indicator. As the aircraft is loaded to an aft or forward C.G. condition, the elevator trim setting should be adjusted to compensate for the condition for which the aircraft is loaded. The pointer on the rudder trim indicator normally moves slightly during taxi and when the rudder pedals are being moved. To achieve a steady and accurate indication for setting the rudder trim for takeoff, set the rudder trim with the aircraft stopped and the nose wheel centered, parking brake set and feet off of the rudder pedals.

Refer to the **Systems Checks / Procedures** following the Checklist Procedures portion of this section for procedures to follow when checking the overspeed governor, aileron trim, elevator trim and audio panel equipment.

The automatic trim compensation system is disabled on the ground through an airspeed switch to prevent accidental placing of the aircraft in an out-of-trim condition before takeoff, i.e. the pilot sets the pitch trim for takeoff, then selects the flaps to takeoff position (20°) and the auto trim system runs the pitch trim nose down. The airspeed switch activates the automatic trim system at approximately 35 knots. In high wind conditions, the airspeed switch may allow the auto-trim system to operate on the ground. Before taxiing onto the runway for takeoff, double check the elevator trim indication to ensure it is positioned properly for takeoff.

Prior to takeoff, move the fuel condition lever forward to the HIGH IDLE position. Leave the fuel condition lever in this position until after landing. The HIGH IDLE gas generator speeds allow for faster engine acceleration when adding power from an idle condition.

ENGINE INLET – INERTIAL SEPARATOR PROCEDURES

Installed in the engine air inlet duct is an inertial particle separator (inertial separator). The inertial separator system is provided to prevent ice buildup around the compressor inlet screen while operating in icing conditions and to minimize the ingestion of foreign particles during ground operations or takeoffs with dusty, sandy field conditions.

The inertial separator (switch labeled ENG INLET) should be placed in BYPASS mode prior to operating the engine on the ground or in flight when the Outside Air Temperature is less than 4°C and visible moisture (clouds, rain, snow or ice crystals) is present.

The inertial separator should also be placed in the BYPASS mode for ground operations and takeoffs in dusty or sandy field conditions to help minimize engine ingestion of dust, sand and debris.

The NORMAL mode should be selected for all other engine operating conditions, since it provides a substantial inlet ram recovery, resulting in more efficient engine operation. Refer to **Section 7** for more information concerning the inertial air particle separator.

4-28 TAKE OFF

TAKEOFF POWER SETTING

Refer to the Maximum Torque for Takeoff table in **Section 5** to determine the torque value corresponding to the runway altitude and temperature conditions. At higher altitudes and/or higher temperatures, the maximum allowable torque is less than the instrument's redline. This torque should be obtainable without exceeding the 790°C ITT and 101.6%Ng takeoff limitations.

To accomplish a smooth takeoff roll, hold the brakes while smoothly advancing the power until the propeller RPM reaches 2200. Smoothly release the brakes and continue to advance the power until the takeoff torque derived from **Section 5** is reached.

NOTE: *As the airspeed increases during takeoff, a resultant increase in torque may be noted and is a normal condition. No reduction of torque is required provided the torque limit of 1790 (at 2200 RPM) at low density altitude or the limiting torque from the Maximum Torque for Takeoff Chart in* **Section 5** *is not exceeded.*

TAKEOFF WING FLAP SETTINGS

A flap setting of 20° is recommended for all takeoffs unless a strong crosswind is present; in that case 10° of flaps may be preferred. The use of 20° of flaps is recommended due to the decreased takeoff roll, lower liftoff speed and a decrease in the total distance to clear obstacles compared to using 10° of flaps.

A flap setting of greater than 20° is not recommended for takeoff use due to the increased drag with the flaps deflected to 35°.

SHORT FIELD TAKEOFF

If obstacles dictate the use of a steep climb angle after liftoff, accelerate to and climb out at 72 KIAS with 20° of flaps. The takeoff performance data outlined in **Section 5** is based on this speed and configuration.

After clearing the obstacle, and reaching a safe operating altitude, the flaps may be gradually retracted as the airplane accelerates to the normal climb-out speed.

Minimum ground roll (soft field) takeoffs are accomplished by using 20° of flaps and lifting the nose wheel off the ground as soon as practical and lifting off of the ground in a slightly tail low attitude. Once the airplane is airborne, the nose should be lowered and the airplane accelerated in ground effect to a safe climb speed.

CROSSWIND TAKEOFF

Takeoffs into strong crosswinds may be performed with 10° or 20° of flaps. The ailerons should be deflected fully into the wind when takeoff power is first applied. As the airplane is accelerated the aileron deflection should be adjusted (decreased) appropriately. The airplane should be rotated at a speed slightly higher than normal and pulled off abruptly to prevent it from settling back to the runway while it is drifting. When the airplane is clear of the ground, a coordinated turn should be made into the wind for drift correction. Using 10° of flaps will improve directional control and stability in performing crosswind takeoffs, although the takeoff distance and rotation speed will be increased.

4-29 CLIMB

ENROUTE CLIMB

Under normal conditions, maximum climb power may be maintained throughout the climb to the cruising altitude. Adjust the power lever as required to remain within the maximum climb engine operating limits for maximum climb ITT, maximum climb torque and maximum climb Ng% identified in **Section 2** of this handbook and the required placards.

At density altitudes lower than approximately 7500 feet, the engine will reach the torque limit prior to reaching the ITT or Ng limit. Refer to the Max Torque for Climb charts in **Section 5**. As the airplane continues to climb and the power lever is adjusted to maintain the desired torque, the ITT and Ng will increase until one or the other will be established as the limiting engine parameter. While the climb ITT limit is 765°C, it is recommended that 740° C be used as the ITT limit in normal operations. Doing so increases the life of the engine. Once reaching either the ITT or Ng limits, the power lever should be adjusted accordingly to not exceed these limits. When operating the engine near its ITT limit, use caution when advancing the power lever, as the ITT indication system has some lag time. Even when monitoring the ITT indicator, the limits could be exceeded if the power lever is advanced rapidly.

Climb performance is tabulated in **Section 5** with a climb speed of 1.3 V_{S_1} (101 KIAS). If circumstances dictate some improvement in climb rate, particularly at high altitude, the use of V_Y is recommended. V_Y varies almost linearly from 100 KIAS at sea level to 80 KIAS at 25,000 feet.

A cruise climb speed of 110-120 KIAS may be used for improved visibility over the engine cowling at altitudes up to approximately 15,000 feet. For improved passenger comfort, the propeller RPM may be reduced to a recommended 2000 RPM. Prior to decreasing propeller RPM, the power lever should first be adjusted to prevent an over-torque condition. When an increase in power is desired, the propeller RPM should be increased first and then followed by an increase of torque with the power lever. All engine limitations must be continuously monitored to prevent conditions which exceed those limits.

NOTE: *To achieve the maximum horsepower ratings, use a minimum of 2000 RPM.*

4-30 CRUISE

During the cruise phase of flight, power may be set at any desired setting up to the maximum cruise power. Do not exceed the maximum cruise torque provided in the Cruise Performance Charts in **Section 5**, or the ITT, and Ng limitations.

Cruise performance tables are provided in **Section 5** and should be utilized in conjunction with winds aloft forecasts for preflight planning. There are noticeable advantages to selecting higher cruise altitudes. The cooler inlet temperatures and greater NG speeds attainable at higher altitudes cause an increase in specific range with altitude, resulting in an increase in the nautical miles covered per pound of fuel burn.

Anytime the Outside Air Temperature is lower than 4°C (40°F) and visible moisture is present, the pitot static heat and stall warning heat should be turned on. Also, the inertial air particle separator should be placed in BYPASS mode.

The fuel tank quantity should be monitored to assure a fuel unbalance condition in excess of 250 pounds does not occur. Normally, both fuel tank selector valves should be left in the ON position and fuel will flow equally from each tank. If the fuel loading is approaching an unbalanced condition of 250 pounds, the fuel selector valve corresponding to the wing with the lower fuel quantity should be turned OFF. Once the two tanks are returned to a balanced condition, both selector valves should be placed in the ON position.

WARNING: *The ignition switch should be turned ON when operating in heavy precipitation. Refer to the* **Ignition Procedures** *in this section for more information concerning the use of the ignition system.*

CAUTION: *Prolonged zero or negative "g" maneuvers could starve the engine oil pump of oil, resulting in serious engine damage.*

Supplemental oxygen should be used by all occupants when operating at cruising altitudes greater than 12,500 feet. It is advisable to use supplemental oxygen at cruising altitudes less than 12,500 feet when operating at night or when experiencing fatigue or emotional stress. Excessive use of tobacco products or alcohol will normally necessitate the use of supplemental oxygen even at altitudes lower than 10,000 feet.

WARNING: *Supplemental oxygen must be available and used as specified by 14 CFR 91.211 to attain the maximum allowable operating altitude of 25,000 feet.*

WARNING: *Oil, grease, soap, lipstick, lip balm, and other petroleum based substances constitute a serious fire hazard when in contact with aviation oxygen. Ensure hands, face and clothing are all oil-free prior to handling oxygen equipment.*

4-31 STALLS

The stall characteristics of this airplane are conventional and aural warning is provided in the form of a stall warning horn which is at a minimum of 5 KCAS prior to stall in all loading configurations. The application of ailerons is recommended to counteract any wing-drop that may occur during the stall. Idle-power stall speeds at maximum weight for both forward and aft C.G. are provided in **Section 5**.

NOTE: *Stalls should be practiced in a conservative manner and at a sufficient altitude to allow for a safe recovery.*

4-32 LANDING

NORMAL LANDING

Normal approaches to landing may be accomplished using any desired flap setting. The preferred procedure is to extend flaps fully to minimize the touchdown speed and subsequent rollout, lower the stall speed and allow for a steeper descent if obstacle clearance is required. Surface winds, turbulence, wind shear and possible ice accretion are the primary factors in determining the safest approach speed and flap setting.

Touchdowns should be accomplished slightly above stall speed with idle power and on the main wheels first. The nose wheel should then be lowered slowly to the runway and the power lever brought into the BETA range; brakes should then be applied as required. When the airplane is taxied clear of the runway, the fuel condition lever may be moved into the LOW IDLE position. This will reduce the cabin and exterior noise levels as well as the braking pressure required. Landings may be accomplished on rough or unimproved surfaces in a similar manner except the nose wheel should be held off as long as practicable and lowered slowly to prevent excessive nose gear loads.

WARNING: *In flight operation with the engine power lever retarded below idle (beta mode) is prohibited. In flight operation in beta mode may result in an engine overspeed condition and consequent loss of engine power or loss of airplane control. Operating in beta mode quickly produces high amounts of drag which could result in a rapid loss of altitude or complete loss of control.*

NOTE: *The use of BETA range following touchdown is recommended to reduce brake wear. Generally, the use of BETA range will not cause substantial propeller erosion from loose debris on runways or taxiways.*

SHORT FIELD LANDING

Short field approach to landings should be powered approaches at a speed of 76 KIAS with the propeller control lever positioned full forward (Max RPM) and full flaps. Once clear of all obstacles, the power should be slowly reduced to IDLE and the nose lowered to maintain an approach speed of 76 KIAS. Touchdown should be accomplished with the power lever at IDLE and on the main wheels first. Immediately after touchdown, the nose wheel should be lowered to the runway and the power lever brought into BETA range; apply heavy braking as required.

For maximum brake effectiveness the flaps may be raised and the elevator control pulled full aft. This process allows maximum weight to be placed on the tires to help prevent tire skidding. Additional stopping power is available with the use of reverse thrust. Using reverse thrust on landing rollout will normally reduce rollout distance by approximately 10%. Bringing the propeller into reverse thrust range produces a negative blade angle and increased power from the gas generator.

WARNING: *Flight operation with the engine power lever retarded below idle (beta mode) is prohibited. Flight operation in beta mode may result in an engine overspeed condition and consequent loss of engine power or loss of airplane control. Operating in beta mode quickly produces high amounts of drag which could result in a rapid loss of altitude or complete loss of control.*

CAUTION: *In an effort to minimize propeller blade erosion or possible blade damage, reverse thrust should only be used when necessary to shorten ground roll. The propeller should be brought out of reverse range prior to slowing to approximately 25 knots.*

CROSSWIND LANDING

For crosswind approaches to landing, a crab method may be used to maintain runway centerline track; a transition to a wing-low slip configuration should be made just prior to touchdown. A flap setting between 10° and 35° is recommended depending on runway length. After touchdown, the nose should be lowered to allow directional control. Maintain a straight course using the steerable nose wheel, aileron deflection into the wind, and differential braking as necessary.

4-33 AFTER SHUTDOWN

Upon completion of the last flight of the day or if dusty conditions exist, install the engine inlet cover and exhaust covers to protect the engine from debris. It may be appropriate to wait for the engine to cool down. Since no oil pressure is available for the engine when the engine is not running, the propeller blades should be secured to prevent windmilling.

4-34 COLD WEATHER OPERATIONS

Proper preflight draining and sampling of the fuel system is especially important during the winter season or prior to flights into cold temperatures in order to remove any water accumulation. The use of a fuel anti-ice additive is required for ice protection. Refer to **Section 8** of this handbook for information concerning the proper use of fuel additives.

Cold weather often causes adverse conditions which require special attention prior to flight. The elevator and aileron trim tabs should be actuated through their full range of motion to ensure proper operation and to loosen any stiff components resulting from cold weather. Even the slightest amounts of frost, ice or snow must be removed from the aircraft prior to flight. Special attention must be given to the wings, tail and flight control surfaces to ensure there is no accumulation of frozen moisture.

An external engine pre-heater should be utilized during cold weather operations to reduce wear on the engine and electrical system. Preheating the engine lowers the viscosity of the oil and allows it to flow through the engine more freely; it also prevents it from being trapped in the oil cooler in extremely low temperatures.

The use of external power is recommended when ambient temperatures drop below 0°F

(-18°C). Allow the engine oil temperature to reach a minimum of 10°C prior to commencing takeoff.

If the runway surface is covered with snow or slush, allowances must be made based on pilot judgment. Takeoff distances will be increased as the snow or slush depth increases. In some instances, the depth and consistency of the snow may prevent airplane takeoff.

4-35 NOISE CHARACTERISTICS

An effort should be made to minimize the adverse effect of airplane noise on the public. As pilots, we have the opportunity to build public support for aviation and demonstrate our concern for improving the environment. United application of the following suggested procedures can be the first step in conquering the barriers between the aviation community and the general public.

1. Pilots operating aircraft under VFR over noise sensitive areas such as outdoor assemblies and recreational park areas, weather permitting, should make every effort to not fly less than 2000 feet above ground level, even though the federal regulations permit such operations.
2. While operating in and out of airports, climbs and descents should be made in a manner as to avoid prolonged flight at low altitudes near noise-sensitive areas.
3. Shortly after takeoff, power and propeller RPM should be reduced to allow for quieter engine/propeller operation.
4. Whenever published traffic patterns and noise abatement procedures exist, those procedures should be followed while not compromising the safety of the flight.

NOTE: *The above recommended procedures do not apply where they would interfere with air traffic control clearances or otherwise cause an adverse affect on the safety of the flight.*

The corrected noise level of this airplane is 84.4 dB determined by flight tests when operated at Takeoff/Maximum Continuous Power (1790 ft lb Torque at 2200 RPM). No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable for operation at, into or out of any airport.

The above statement notwithstanding, the noise level stated above has been verified by and approved by the Federal Aviation Administration in noise level flight tests conducted in accordance with **FAR Part 36, Appendix G, Amendment 28, Noise Standards: Airplane Type and Airworthiness Certification**. The airplane noise is in compliance with all **FAR Part 36** noise standards applicable to this type.

SECTION 5
PERFORMANCE
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5-1 INTRODUCTION

This section of the Pilot's Operating Handbook contains all of the performance information required by the Federal Aviation Regulations and additional information provided by Quest Aircraft Company. The performance data charts on the following pages are presented so that the pilot may know what type of performance to expect from the airplane under various conditions. The charts provided in this section should be utilized in order to facilitate accurate planning of flights. The data contained in the charts is compiled from actual flight tests using normal piloting techniques with an airplane and engine in good operating condition.

WARNING: *In order to duplicate the performance data provided in this section, the airplane and engine must be in good operating condition. Good piloting technique and proper preflight planning involving the use of the performance data for all phases of flight are also required to attain the expected performance and assure ample margins of safety.*

The performance information provided in the range and endurance profile charts includes the required IFR fuel reserve of 45 minutes at the specified cruise power setting and altitude. When compiling information for preflight planning, it is important to be aware of conditions which may affect airplane performance such as engine and propeller condition along with turbulent weather conditions.

Various graphs include notes concerning the approximate effects of operating the engine with the inertial separator in BYPASS mode. The degree of effect on performance will vary, depending upon airspeed, temperature and altitude. At lower altitudes, where engine power will normally be limited by the maximum torque limits, the effect of operating with the inertial separator in BYPASS will normally be less.

5-2 FLIGHT PLANNING

The performance tables provided in this section provide sufficient information to facilitate reasonably accurate calculation of performance data when considering different variables. Reasonable preflight planning accuracy can be attained from the performance figures if conservative values are selected from the detailed information provided in the tables. However, variations in engine and propeller condition, air turbulence and other variables encountered curing a particular flight may account for variations of 10% or more in range and endurance.

5-3 SAMPLE PROBLEM

The following sample flight problem uses information derived from the airplane performance tables to calculate the predicted performance for a typical flight.

The first step in flight planning is to determine the aircraft weight and center of gravity, as well as information concerning the flight profile. For this sample problem, the following information is known.

Airplane Configuration:

- Takeoff weight.....................................6750 Pounds
- Usable fuel...315 Gallons

Takeoff Conditions:

- Field Pressure Altitude........................2150
- Temperature.......................................+20°C (ISA + 4°C)
- Runway Headwind Component..........11 knots
- Runway Condition..............................Dry, level, grass
- Field Length.......................................2000

Cruise Conditions:

- Total Distance.....................................658 Nautical Miles
- Cruising Pressure Altitude..................11,500 Feet
- Temperature.......................................+5°C (ISA +13°C)
- Expected Average Wind En Route.....12 Knot Tailwind

Landing Conditions:

- Field Pressure Altitude........................6100
- Temperature.......................................+14°C
- Runway Condition..............................Dry, level, paved
- Field Length.......................................6691

5-4 TAKEOFF

The takeoff distance tables, **Figure 5-15** through **Figure 5-17**, provide information concerning the takeoff ground roll and horizontal distance required to reach 50 feet above ground level. The distances shown are based on utilizing the short field takeoff technique.

Conservative distances may be established by reading the next higher value for height, altitude and temperature. For example, in this particular sample problem, the takeoff distance information may be derived from a weight of 6750 pounds, takeoff field pressure altitude of 3000 feet, and a temperature of 20°C. Using conservative values results in the following:

- Zero Wind, Dry Paved Runway Ground Roll..............1000 Feet
- Total to clear 50 foot obstacle.....................................1593 Feet

Since the takeoff distance tables do not provide for wind components or field conditions, a correction for the effect of winds must be made. Use the wind components chart, **Figure 5-7** to determine the crosswind and headwind (or tailwind) component of the reported winds. Also, an increase of 15% must be added to the ground roll calculation to provide the necessary adjustment for the dry grass surface.

Row	Takeoff Component Description	Retrieval Process	Result
1.	Zero-Wind Ground Roll (Dry, Paved Runway)	Calculated From Figure 5-15	1000’
2.	Zero-Wind Lift Off to Clear 50 Foot Obstacle	Calculated From Figure 5-15 (1593’ - 1000’)	593’
3.	Ground-Roll Headwind Correction (10% decrease (-) for each 12 knots)	11kts÷12kts x -.1 Answer x 1000’	-92’
4.	Lift Off to Clear 50 Foot Obstacle Headwind Correction (10% decrease (-) for each 12 knots)	11kts÷12kts x -.1 Answer x 593	-54’
5.	Ground Roll Tailwind Correction (10% increase (+) for each 2 knots tailwind)	0÷2 x .10 (Answer) x 500	+0
6.	Lift Off to Clear 50 Foot Obstacle Tailwind Correction (10% increase (+) for each 2 knots tailwind)	0÷2 x .10 (Answer) x 50	+0
7.	Dry Grass Strip (Increase wind-corrected ground-roll 15%)	1000’ - 92’ x .15	+136
8.	Corrected Ground-Roll Rows (1, 3, 5, 7)	1000 – 92 + 0 + 136	1044
9.	Corrected Lift-Off to Clear 50 Foot Obstacle Rows (2, 4, 6)	593’ – 54’ + 0	539
10.	Corrected Total to Clear 50 Foot Obstacle Rows (8, 9)	1044+539	1583

Figure 5-1 – Sample Takeoff Distance Calculation

5-5 CRUISE

Cruising altitude should be selected based upon considerations for the distance of the trip, winds aloft and airplane performance. A cruising altitude and the forecasted winds aloft for the route have been provided for this sample problem. However, the cruise power setting selection should be determined based on several factors.

The Range Profile Chart shows the range at both maximum cruise power and maximum range power. For this sample problem, maximum cruise power and 2000 RPM will be used.

The Cruise Performance chart for 12,000 feet pressure altitude is used with 5°C as the reference temperature. These reference values most closely correspond to the planned altitude and forecasted temperature conditions. The torque setting for maximum cruise power at the selected altitude and temperature is 1300 foot-pounds of torque at 2000 RPM. This cruise power setting results in the following performance:

- True Airspeed ....174 Knots
- Cruise Fuel Flow.......................................297 Pounds Per Hour

5-6 FUEL REQUIRED

The total fuel required for the flight may be estimated using the performance information outlined in **Figure 5-21, Figure 5-24** and the **Cruise Performance** charts. The longer detailed method of calculation will be utilized for this sample problem, although, using the abbreviated version with **Figure 5-22** and **Figure 5-23** will provide the desired information required for the majority of flights.

Assuming maximum climb power is used for the climb, **Figure 5-21** may be used to determine the time, fuel and distance to climb for a weight of 6750 pounds and a temperature of 20°C above standard. The difference between the takeoff elevation value of 3000 feet and the cruise altitude of 12,000 feet results in the following calculations.

- Time...8.2 Minutes
- Fuel..53 Pounds
- Distance..15.8 Nautical Miles

Calculating the descent from 12,000 feet to 6000 feet from **Figure 5-24** results in the following calculations:

- Time...7.5 Minutes
- Fuel..34 Pounds
- Distance..20 Nautical Miles

NOTE: *The distance required to climb is based on a no wind condition. The cruise distance may then be determined by subtracting the distance during climb and the distance during descent from the total distance.*

- Total Distance..658 Nautical Miles
- Distance covered during climb and descent.......-35.8 Nautical Miles
- Cruise Distance...622.2 Nautical Miles

With a forecasted average tailwind of 12 knots, the cruise ground speed is predicted to be:

- True Airspeed .... 174 Knots
- Average Tailwind.. +12 Knots
- Average Groundspeed................................ 186 Knots

With this information, the time required for the cruise portion of the flight can be calculated as:

- Cruise Distance .... 622.2 Nautical Miles
- Average Groundspeed................................ ÷186 Knots
- Cruise Time... 3.3 Hours (3 Hours and 20 Minutes)

Therefore, the fuel required for the cruise portion of the trip is calculated as:

- Cruise Time... 3.3 Hours
- Cruise Fuel Burn.. x 297 PPH
- Fuel Required for Cruise............................. 980 Pounds

A 45 minute reserve is calculated as:

- 45 minutes ÷ 60 minutes x 297 Pounds Per Hour = 223 Pounds

The total estimated fuel required for the flight is calculated as follows:

- Engine start, taxi and takeoff .... 50 pounds
- Climb... 53 pounds
- Cruise .... 980 pounds
- Descent... 34 pounds
- Reserve .... +223 pounds

Total Fuel Required: 1340 pounds

During flight, the actual ground speed should be checked to provide a more accurate basis for estimating the time enroute and the corresponding fuel required to complete the trip with a minimum of 45 minutes reserve.

5-7 LANDING

Similar to the takeoff distance calculations, the landing performance should be calculated using **Figure 5-27**. The landing weight is calculated as follows:

- Takeoff Weight...6750 pounds
- Actual fuel required for climb, cruise and descent.............-1150 pounds
- Landing Weight...5600 pounds

Figure 5-27 presents the landing distance calculations as performed using the short field technique. Conservative landing distances can be derived using a landing weight of 6000 pounds, field pressure altitude of 8000 feet and a temperature of +20°C as follows:

- Ground Roll...1001 Feet
- Total Distance to Clear a 50-Foot Obstacle........................1914 Feet

Wind corrections may be applied based on the notes included in the landing distance chart using the same procedure as previously outlined for takeoffs.

5-8 AIRSPEED CALIBRATION

Conditions:

- Power for level flight or maximum power for descent, whichever is less.
- Weight....................................6750 pounds

Example:

- Flaps......................................20°
- Indicated Airspeed..................100 KIAS
- Calibrated Airspeed................99 KCAS

NOTES:

- *Indicated airspeed values assume zero instrument error.*
- *KIAS = Knots Indicated Airspeed*
- *KCAS = Knots Calibrated Airspeed*
- *Where airspeeds have been replaced by shaded areas, the airspeed would either be below the maximum weight stall speed or above the maximum approved operating limits speed for the aircraft configuration.*

KIAS	KCAS			
	Flaps 0°	Flaps 10°	Flaps 20°	Flaps 35°
60		69	63	63
70	78	73	72	72
80	81	80	82	82
90	91	90	91	92
100	100	100	100	101
110	110	111	110	
120	120	121	120	
130	130	131		
140	141			
150	151			
160	162			
170	171			
180	179			

Figure 5-2 – Airspeed Calibration

5-9 ALTITUDE CORRECTION

Conditions:

- Power for level flight or maximum power for descent, whichever is less.
- Weight................................. 6750 pounds

Example:

- Flaps.....................................0°
- Indicated Airspeed..................100 KIAS
- Desired Altitude......................10,000 Feet
- Altitude Correction..................-11 Feet

Altitude to Fly: 9,989 Feet

NOTES:

- *Indicated airspeed values assume zero instrument error.*
- *KIAS = Knots Indicated Airspeed*
- *Where airspeeds have been replaced by shaded areas, the airspeed would either be below the maximum weight stall speed or above the maximum approved operating limits speed for the aircraft configuration.*

FLAPS	PRESS ALT (FT)	CORRECTION TO BE ADDED NORMAL STATIC SOURCE - KIAS						
		60	80	100	120	140	160	180
0°	S.L.		+7	-9	+1	+8	+2	-24
	10000		+10	-11	+2	+10	+3	-38
	20000		+18	-20	+3	+18	+4	-62
10°	S.L.		+7	+1	+3	+7		
	10000		+8	+1	+3	+8		
	20000		+9	+1	+4	+9		
20°	S.L.		+11	-2	0			
	10000		+13	-2	0			
	20000		+17	-3	0			
35°	S.L.	+12	+10	+8				
	10000	+14	+12	+9				
	20000	+18	+15	+10				

Figure 5-3 – Altitude Correction

5-10 TEMPERATURE CONVERSION CHART

- To convert from degrees Celsius (°C) to degrees Fahrenheit (°F), locate, in the shaded columns, the number representing the temperature value in degrees Celsius (°C) to be converted. The equivalent temperature in degrees Fahrenheit is read to the right.

  Example: 38°C = 100°F

- To convert from degrees Fahrenheit (°F) to degrees Celsius (°C), locate, in the shaded columns the number representing the temperature value in degrees Fahrenheit (°F) to be converted. The equivalent temperature in degrees Celsius is read to the left.

  Example: 38°F = 3°C

TEMP TO CONVERT °C or °F			TEMP TO CONVERT °C or °F			TEMP TO CONVERT °C or °F		
°C	< >	°F	°C	< >	°F	°C	< >	°F
-50	-58	-72	-17	2	36	17	62	144
-49	-56	-69	-16	4	39	18	64	147
-48	-54	-65	-14	6	43	19	66	151
-47	-52	-62	-13	8	46	20	68	154
-46	-50	-58	-12	10	50	21	70	158
-44	-48	-54	-11	12	54	22	72	162
-43	-46	-51	-10	14	57	23	74	165
-42	-44	-47	-9	16	61	24	76	169
-41	-42	-44	-8	18	64	26	78	172
-40	-40	-40	-7	20	68	27	80	172
-39	-38	-36	-6	22	72	28	82	180
-38	-36	-33	-4	24	75	29	84	183
-37	-34	-29	-3	26	79	30	86	187
-36	-32	-26	-2	28	82	31	88	190
-34	-30	-22	-1	30	86	32	90	194
-33	-28	-18	0	32	90	33	92	198
-32	-26	-15	1	34	93	34	94	201
-31	-24	-11	2	36	97	36	96	205
-30	-22	-8	3	38	100	37	98	208
-29	-20	-4	4	40	104	38	100	212
-28	-18	0	6	42	108	39	102	216
-27	-16	3	7	44	111	40	104	219
-26	-14	7	8	46	115	41	106	223
-24	-12	10	9	48	118	42	108	226
-23	-10	14	10	50	122	43	110	230
-22	-8	18	11	52	126	44	112	234
-21	-6	21	12	54	129	46	114	237
-20	-4	25	13	56	133	47	116	241
-19	-2	28	14	58	136	48	118	244
-18	0	32	16	60	140	49	120	248

Figure 5-4 – Temperature Conversion Chart

5-11 OUTSIDE AIR TEMPERATURE

For ISA Conditions

Conditions:

- Pressure Altitude..8000 Feet
- Outside Air Temperature ....48°F

ISA Condition: ISA + 10°C

PRESS ALT. (FT)	ISA - 40°C		ISA - 20°C		ISA		ISA +10°C		ISA +20°C		ISA +35°C	
	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
S.L.	-25	-13	-5	23	15	59	25	77	35	95	50	122
2000	-29	-20	-9	16	11	52	21	70	31	88	46	115
4000	-33	-27	-13	9	7	45	17	63	27	81	42	108
6000	-37	-34	-17	2	3	38	13	56	23	74	38	101
8000	-41	-42	-21	-6	-1	30	10	48	20	66	34	93
10000	-45	-49	-25	-13	-5	23	5	41	15	59	30	86
12000	-49	-56	-29	-20	-9	16	1	34	11	52	26	79
14000	-53	-63	-33	-27	-13	9	-3	27	7	45	22	72
16000	-57	-71	-37	-34	-17	2	-7	20	3	38	18	65
18000	-61	-45	-41	-25	-21	-5	-11	5	-1	15	14	58
20000	-65	-52	-45	-32	-25	-12	-15	-2	-5	8	10	51
22000	-69	-59	-49	-39	-29	-19	-19	-9	-9	1	6	44
24000	-73	-67	-53	-47	-33	-27	-23	-17	-13	-7	2	36
25000	-77	-70	-57	-50	-37	-30	-27	-20	-17	-10	-2	33

Figure 5-5 – Outside Air Temperature for ISA Conditions

5-12 STALL SPEEDS

Conditions:

- Weight..6750 Pounds
- C.G ....Noted
- Power...IDLE
- Bank Angle..Noted

Example:

- Flaps ....0°
- Bank Angle..30°
- C.G ....Forward

Stall Speed: 78 KIAS / 82 KCAS

NOTES:

- *Maximum altitude loss during wings level stall is approximately 500 feet.*
- *KIAS values are approximate and may not be accurate at stall.*

WEIGHT C.G.	BANK ANGLE (DEG.)	STALL SPEEDS							
		FLAPS 0°		FLAPS 10°		FLAPS 20°		FLAPS 35°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
6750 LB Most FWD	0	68	77	56	67	51	61	47	60
	30	78	82	60	72	55	66	54	64
	45	87	91	67	80	61	73	59	71
	60	103	108	79	95	72	87	71	85
6750 LB Most AFT	0	69	73	53	64	49	59	48	58
	30	74	78	57	69	53	63	52	63
	45	82	87	63	76	58	70	57	69
	60	98	103	75	91	69	84	68	82
6000 LB Most FWD	0	69	73	53	64	49	59	48	58
	30	74	78	57	69	52	64	51	62
	45	82	86	63	77	58	71	56	69
	60	97	102	74	91	68	84	67	82
5000 LB Most FWD	0	63	68	48	61	44	57	43	55
	30	67	72	52	66	47	61	46	59
	45	75	80	58	73	53	68	51	66
	60	89	95	68	85	62	80	61	77

Figure 5-6 – Stall Speeds

5-13 WIND COMPONENTS

(Refer to the Figure on the following page)

Conditions:

- Runway Heading..10°
- Wind Direction and Velocity..70° @ 25 knots

Example:

- Angle Between Wind Direction and Flight Path.....................60°
- Crosswind Component...20 knots
- Headwind Component..12 knots

NOTE: *The maximum demonstrated crosswind is 15 knots. This value is not limiting.*

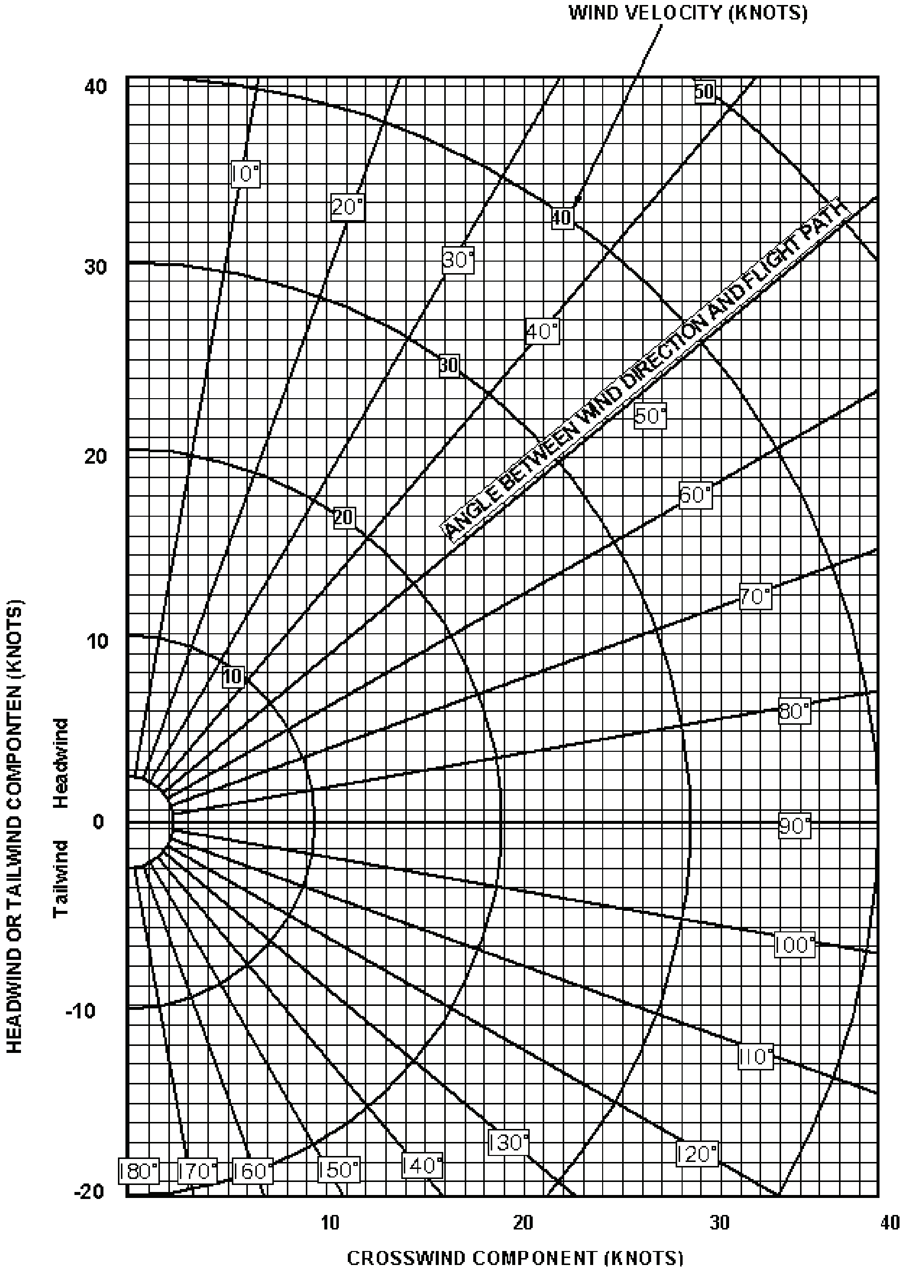

Figure 5-7 – Wind Components

5-14 MAXIMUM ENGINE TORQUE FOR TAKEOFF

Conditions:

- 2200 RPM
- 60 KIAS
- Inertial Separator - Normal

NOTES:

- *Torque increases approximately 30 LB FT during takeoff ground roll.*
- *Torque on this chart shall be achieved without exceeding 790°C ITT or 101.6% Ng.*
- *With the takeoff power setting specified below the 1790 LB FT limit, decrease the takeoff torque setting for each system as follows:*

CONDITION	POWER REDUCTION
Inertial Separator in BYPASS	**50** FT-LB
Bleed Air Heat ON	**30** FT-LB
Pitot or Stall Heat ON	**10** FT-LB
Electric Cabin Heat ON	**20** FT-LB

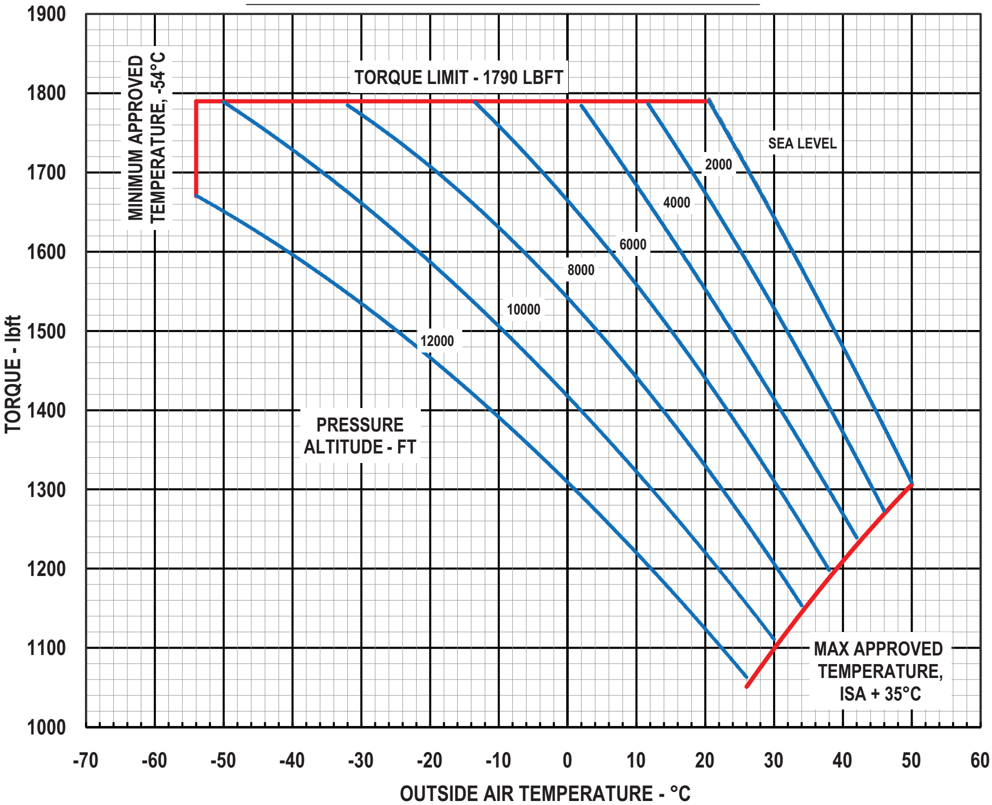

Figure 5-8 – Maximum Torque for Takeoff

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5-15 MAXIMUM ENGINE TORQUE FOR CLIMB

Conditions:

- 2200 RPM
- 101 KIAS
- Inertial Separator - Normal (Solid **BLUE** Line) BYPASS (Dashed **GREEN** Line)

NOTES:

- *Torque on this chart shall be achieved without exceeding 765°C ITT or 101.6% Ng.*
- *For pilot convenience, use of an initial climb ITT setting of 740°C when climb performance is not critical is recommended if torque and Ng limits are also observed.*
- *With the climb power setting specified below the 1670 LB FT limit, decrease the climb torque setting for each system as follows:*

CONDITION	POWER REDUCTION
Inertial Separator in BYPASS	Sea Level: **140** FT-LB | Higher Altitudes: See Below
Bleed Air Heat ON	Below 15,000 FT **40** FT-LB | 15,000 FT or Above: **60** FT-LB
Pitot or Stall Heat ON	**10** FT-LB
Electric Cabin Heat ON	**20** FT-LB

An alternate method in lieu of using this chart is to maintain power at or below maximum continuous. (All engine gages in green arc.)

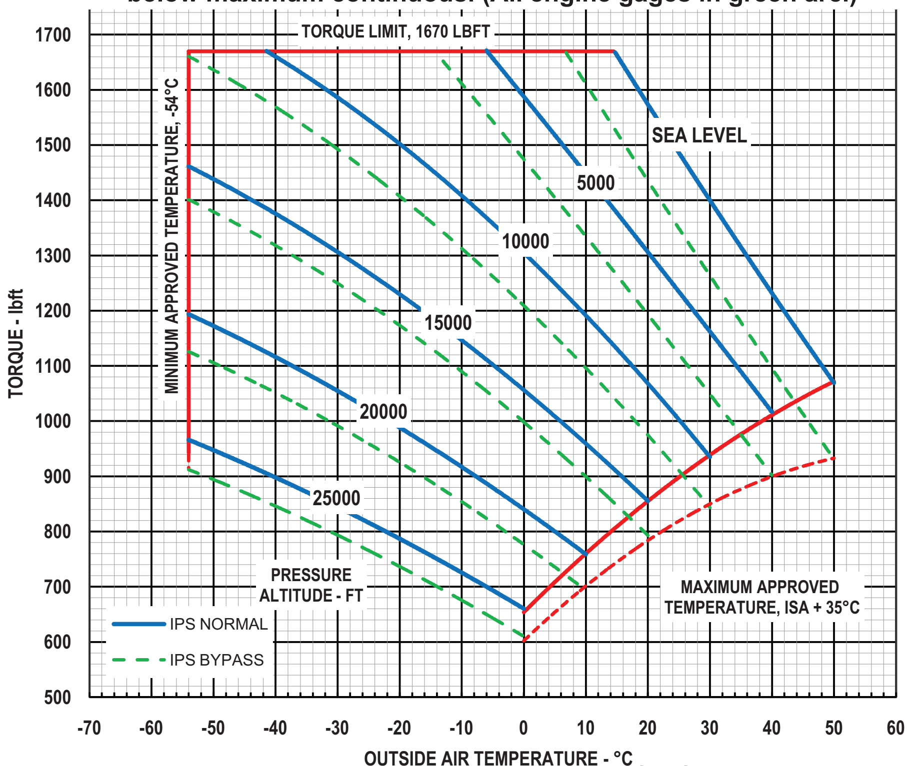

Figure 5-9 – Maximum Engine Torque for Climb

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5-16 MAXIMUM ENGINE TORQUE FOR CRUISE (120 KIAS)

Conditions:

- 2200 RPM
- Inertial Separator - Normal
- 120 KIAS

NOTES:

- *Torque on this chart shall be achieved without exceeding 740°C ITT or 101.6% Ng.*
- *With the cruise power setting specified below the 1670 LB FT limit, decrease the cruise torque setting for each system as follows:*

CONDITION	POWER REDUCTION
Inertial Separator in BYPASS	**60** FT-LB
Bleed Air Heat ON	Below 15,000 FT **40** FT-LB | 15,000 FT or Above: **60** FT-LB
Pitot or Stall Heat ON	**10** FT-LB
Electric Cabin Heat ON	**20** FT-LB

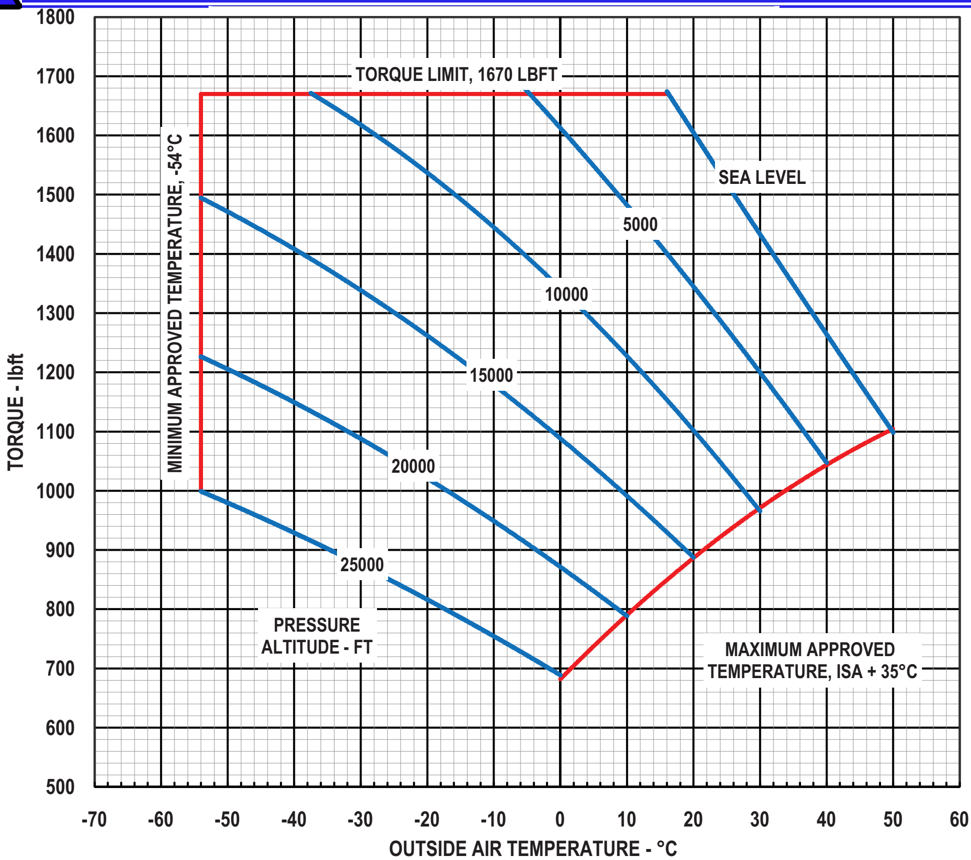

Figure 5-10 – Maximum Engine Torque for Cruise

5-16A MAXIMUM ENGINE TORQUE FOR CRUSE (140 KIAS)

Conditions:

- 2200 RPM
- Inertial Separator - Normal
- 140 KIAS

NOTES:

- *Torque on this chart shall be achieved without exceeding 740°C ITT or 101.6% Ng.*
- *With the cruise power setting specified below the 1670 LB FT limit, decrease the cruise torque setting for each system as follows:*

CONDITION	POWER REDUCTION
Inertial Separator in BYPASS	**80** FT-LB
Bleed Air Heat ON	Below 15,000 FT **40** FT-LB | 15,000 FT or Above: **60** FT-LB
Pitot or Stall Heat ON	**10** FT-LB
Electric Cabin Heat ON	**20** FT-LB

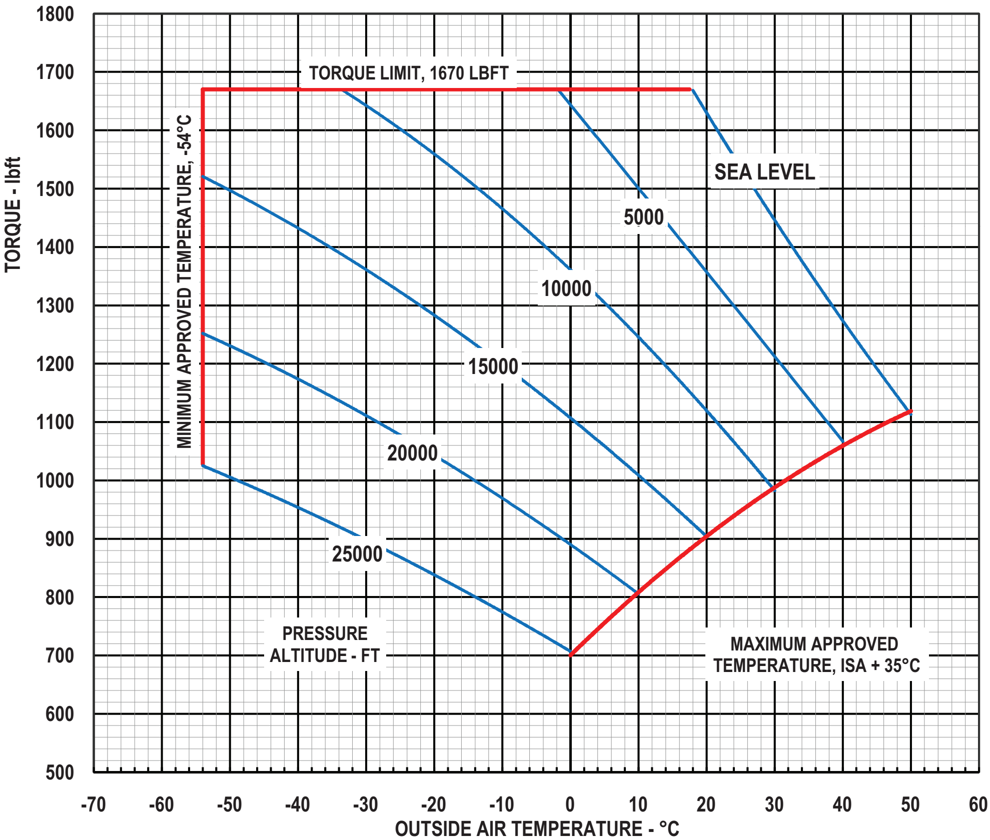

Figure 5-10a -Maximum Engine Torque for Cruise

REV 6

5-16B MAXIMUM ENGINE TORQUE FOR CRUSE (160 KIAS)

Conditions:
- 2200 RPM
- Inertial Separator - Normal
- 160 KIAS

NOTES:
- *Torque on this chart shall be achieved without exceeding 740°C ITT or 101.6% Ng.*
- *With the cruise power setting specified below the 1670 LB FT limit, decrease the cruise torque setting for each system as follows:*

CONDITION	POWER REDUCTION
Inertial Separator in BYPASS	**100** FT-LB
Bleed Air Heat ON	Below 15,000 FT **40** FT-LB | 15,000 FT or Above: **60** FT-LB
Pitot or Stall Heat ON	**10** FT-LB
Electric Cabin Heat ON	**20** FT-LB

REV 6

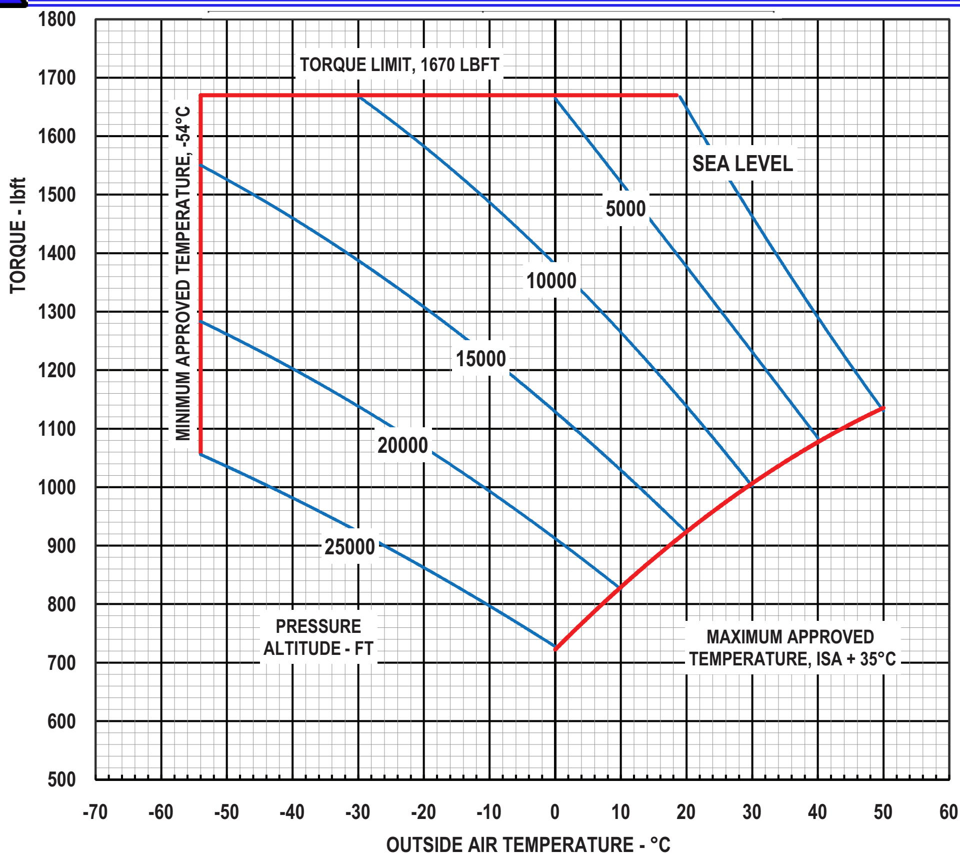

Figure 5-10b -Maximum Engine Torque for Cruise

5-17 MAXIMUM TAKEOFF WEIGHTS (BASE AIRPLANE)

(Refer to the Table on the following page)

Conditions:

- Standard Tires Installed
- Maximum Takeoff Power
- Flaps 20°

Altitude	Climb Speed – V_Y (KIAS)
S.L.	89
2000	89
4000	88
6000	87
8000	87
10000	86
12000	85

NOTES:

- *These weights assure the availability of a steady gradient of climb of at least 243 FT/NM with the flaps at 20°.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*
- *Takeoff weight is not limited by altitude or temperature with the airplane in this configuration.*

OAT (°C)	OAT (°F)	PRESSURE ALTITUDE (FEET)												
		0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
-3	26.6	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
-1	30.2	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
1	33.8	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
3	37.4	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
5	41.0	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
7	44.6	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
9	48.2	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
11	51.8	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
13	55.4	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
15	59.0	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
17	62.6	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
19	66.2	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
21	69.8	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
23	73.4	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
25	77.0	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
27	80.6	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
29	84.2	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	-
31	87.8	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	-	-
33	91.4	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	-	-	-
35	95.0	6750	6750	6750	6750	6750	6750	6750	6750	6750	-	-	-	-
37	98.6	6750	6750	6750	6750	6750	6750	6750	6750	-	-	-	-	-
39	102.2	6750	6750	6750	6750	6750	6750	6750	-	-	-	-	-	-
41	105.8	6750	6750	6750	6750	6750	6750	-	-	-	-	-	-	-
43	109.4	6750	6750	6750	6750	6750	-	-	-	-	-	-	-	-
45	113.0	6750	6750	6750	6750	-	-	-	-	-	-	-	-	-
47	116.6	6750	6750	6750	-	-	-	-	-	-	-	-	-	-
50	120.2	6750	6750	-	-	-	-	-	-	-	-	-	-	-

Figure 5-11 – Maximum Takeoff Weight (Standard Tires)

5-18 MAXIMUM TAKEOFF WEIGHTS (OPTIONAL LARGE TIRES INSTALLED)

(Refer to the Table on the following page)

REV 5

Conditions:

- Large Tires Installed
- Maximum Takeoff Power
- Flaps 20°

Altitude	Climb Speed – V_Y (KIAS)
S.L.	89
2000	89
4000	88
6000	87
8000	87
10000	86
12000	85

NOTES:

- *These weights assure the availability of a steady gradient of climb of at least 243 FT/NM with the flaps at 20°.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*
- *Takeoff weight is not limited by altitude or temperature with the airplane in this configuration.*

OAT (°C)	OAT (°F)	PRESSURE ALTITUDE (FEET)												
		0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
-3	26.6	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
-1	30.2	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
1	33.8	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
3	37.4	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
5	41.0	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
7	44.6	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
9	48.2	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
11	51.8	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
13	55.4	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
15	59.0	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
17	62.6	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
19	66.2	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
21	69.8	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
23	73.4	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6740
25	77.0	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6640
27	80.6	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6540
29	84.2	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6695	-
31	87.8	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	-	-
33	91.4	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	-	-	-
35	95.0	6750	6750	6750	6750	6750	6750	6750	6750	6750	-	-	-	-
37	98.6	6750	6750	6750	6750	6750	6750	6750	6750	-	-	-	-	-
39	102.2	6750	6750	6750	6750	6750	6750	6750	-	-	-	-	-	-
41	105.8	6750	6750	6750	6750	6750	6750	-	-	-	-	-	-	-
43	109.4	6750	6750	6750	6750	6750	-	-	-	-	-	-	-	-
45	113.0	6750	6750	6750	6750	-	-	-	-	-	-	-	-	-
47	116.6	6750	6750	6750	-	-	-	-	-	-	-	-	-	-
50	120.2	6750	6750	-	-	-	-	-	-	-	-	-	-	-

Figure 5-12 – Maximum Takeoff Weight (Large Tires)

5-19 MAXIMUM LANDING WEIGHTS (BASE AIRPLANE)

(Refer to the Table on the following page)

Conditions:

- Standard Tires Installed
- Maximum Takeoff Power
- Flaps 35°
- Climb Speed – 76 KIAS (V_{REF})

NOTES:

- *These weights assure the availability of a steady gradient of climb of at least 152 FT/NM with the flaps at 35°.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*
- *Landings are prohibited when airport altitude and temperature fall in the red shaded areas below at weights above those shown.*

OAT (°C)	OAT (°F)	PRESSURE ALTITUDE (FEET) 0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
-3	26.6	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
-1	30.2	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
1	33.8	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
3	37.4	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
5	41.0	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
7	44.6	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
9	48.2	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
11	51.8	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
13	55.4	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
15	59.0	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
17	62.6	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
19	66.2	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
21	69.8	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6660
23	73.4	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6525
25	77.0	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6380
27	80.6	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6610	6230
29	84.2	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6460	-
31	87.8	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6675	-	-
33	91.4	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	-	-	-
35	95.0	6690	6690	6690	6690	6690	6690	6690	6690	6690	-	-	-	-
37	98.6	6690	6690	6690	6690	6690	6690	6690	6690	-	-	-	-	-
39	102.2	6690	6690	6690	6690	6690	6690	6690	-	-	-	-	-	-
41	105.8	6690	6690	6690	6690	6690	6690	-	-	-	-	-	-	-
43	109.4	6690	6690	6690	6690	6690	-	-	-	-	-	-	-	-
45	113.0	6690	6690	6690	6690	-	-	-	-	-	-	-	-	-
47	116.6	6690	6690	6690	-	-	-	-	-	-	-	-	-	-
50	120.2	6690	6690	-	-	-	-	-	-	-	-	-	-	-

Figure 5-13 – Maximum Landing Weight (Standard Tires)

5-20 MAXIMUM LANDING WEIGHTS (OPTIONAL LARGE TIRES INSTALLED)

(Refer to the Table on the following page)

Conditions:

REV 5

- Large Tires Installed
- Maximum Takeoff Power
- Flaps 35°
- Climb Speed – 76 KIAS (V_{REF})

NOTES:

- *These weights assure the availability of a steady gradient of climb of at least 152 FT/NM with the flaps at 35°.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*
- *Landings are prohibited when airport altitude and temperature fall in the red shaded areas below at weights above those shown.*

OAT (°C)	OAT (°F)	PRESSURE ALTITUDE (FEET) 0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
-3	26.6	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
-1	30.2	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
1	33.8	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
3	37.4	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
5	41.0	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
7	44.6	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
9	48.2	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
11	51.8	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
13	55.4	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
15	59.0	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
17	62.6	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690
19	66.2	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6655
21	69.8	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6520
23	73.4	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6385
25	77.0	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6615	6245
27	80.6	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6485	6090
29	84.2	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6635	6320	-
31	87.8	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	6535	-	-
33	91.4	6690	6690	6690	6690	6690	6690	6690	6690	6690	6690	-	-	-
35	95.0	6690	6690	6690	6690	6690	6690	6690	6690	6690	-	-	-	-
37	98.6	6690	6690	6690	6690	6690	6690	6690	6690	-	-	-	-	-
39	102.2	6690	6690	6690	6690	6690	6690	6690	-	-	-	-	-	-
41	105.8	6690	6690	6690	6690	6690	6690	-	-	-	-	-	-	-
43	109.4	6690	6690	6690	6690	6690	-	-	-	-	-	-	-	-
45	113.0	6690	6690	6690	6690	-	-	-	-	-	-	-	-	-
47	116.6	6690	6690	6690	-	-	-	-	-	-	-	-	-	-
50	120.2	6690	6690	-	-	-	-	-	-	-	-	-	-	-

Figure 5-14 – Maximum Landing Weight (Large Tires)

5-21 TAKEOFF DISTANCE

(Refer to the Tables on the following pages)

Conditions:

- Winds...Zero
- Runway...Dry, Level, Grass
- Flaps..20°
- Power...Maximum Torque
- Propeller..2200 RPM
- Inertial Air Particle Separator......................Normal

Example:

- Outside Air Temperature............................20°C
- Weight...6750 Pounds
- Field Pressure Altitude...............................2150
- Headwind Component...............................11 Knots
- Runway...Dry Grass
- Propeller..2200 RPM

Results:

- Rotation Speed..50 KIAS
- 50 Foot Obstacle Speed.............................72 KIAS
- Takeoff Ground Roll...................................1035 Feet
- Total Distance Over 50 Foot Obstacle........1569 Feet

NOTES:

- *Headwind – Subtract 10% from the calculated distance for each 12 knots headwind.*
- *Tailwind – Add 10% for each 2 knots of tailwind (up to 10 knots).*
- *Grass Runway – Add 15% to the ground roll distance.*
- *Brakes – If the brakes are not held while applying power for takeoff, the published distances apply from the point where full engine power is reached.*
- *Temperature – Use extreme caution when operating from fields where the outside air temperature is warmer than those published in this table.*
- *Sloped Runway – Increase the table distances by 22% of the ground roll distance at Sea Level, 30% of the ground roll distance at 5000 feet, 43% of the ground roll distance at 10,000 feet for each 1% of upslope. Decrease the table distances by 7% of the ground roll distance at Sea Level, 10% of the ground roll distance at 5000 feet, and 14 % of the ground roll distance at 10,000 feet for each 1% of downslope.*
- *Inertial Air Particle Separator – If maximum takeoff power is not achieved due to employment of the inertial air particle separator in BYPASS, increase the distance (both ground roll and total distance to clear 50 foot obstacle) by 1%.*

CAUTION: *The takeoff correction factors for runway slope, located on the previous page, are required to be provided. These corrections are applicable to runway slopes up to 3% and should be applied with caution since the published runway slope figures are usually the net slope from one end of the runway to the other. Certain portions of some runways have greater or lesser slopes than the published slope. If the takeoff roll is performed on a portion of the runway that differs from the published slope, the takeoff performance will be greatly affected.*

PRESS ALT (FT)	0° C		10° C		20° C		30° C		40° C		50° C	
	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS
S.L.	691	1089	735	1150	779	1212	890	1384	1035	1612	1223	1913
1000	728	1153	774	1218	842	1319	969	1519	1130	1775	1341	2114
2000	767	1221	815	1290	917	1449	1057	1671	1233	1952	---	---
3000	809	1294	874	1392	1000	1593	1154	1840	1348	2153	---	---
4000	852	1372	954	1533	1092	1753	1260	2026	1473	2374	---	---
5000	920	1493	1042	1689	1191	1928	1374	2228	1609	2615	---	---
6000	1007	1648	1138	1860	1299	2122	1503	2457	---	---	---	---
7000	1100	1816	1244	2050	1421	2342	1648	2718	---	---	---	---
8000	1204	2005	1363	2267	1560	2593	1809	3010	---	---	---	---
9000	1320	2218	1497	2511	1713	2873	1984	3332	---	---	---	---
10000	1445	2450	1640	2777	1880	3182	2182	3699	---	---	---	---
11000	1586	2712	1801	3078	2067	3533	---	---	---	---	---	---
12000	1743	3010	1982	3419	2279	3931	---	---	---	---	---	---

Figure 5-15 – Takeoff Distance (6750 Pounds)

PRESS ALT (FT)	0° C		10° C		20° C		30° C		40° C		50° C	
	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS
S.L.	509	812	541	858	574	904	655	1032	762	1202	901	1426
1000	536	860	570	908	620	984	716	1133	832	1323	987	1576
2000	565	911	600	962	675	1080	778	1245	907	1456	---	---
3000	595	965	643	1038	736	1187	850	1372	992	1605	---	---
4000	628	1023	703	1143	804	1307	928	1510	1085	1769	---	---
5000	678	1113	767	1259	876	1437	1012	1660	1185	1949	---	---
6000	742	1229	838	1386	957	1582	1106	1831	---	---	---	---
7000	810	1354	916	1527	1046	1745	1213	2025	---	---	---	---
8000	886	1494	1004	1689	1148	1932	1332	2243	---	---	---	---
9000	972	1652	1102	1871	1261	2141	1461	2483	---	---	---	---
10000	1064	1825	1208	2069	1384	2371	1607	2756	---	---	---	---
11000	1167	2021	1326	2293	1522	2632	---	---	---	---	---	---
12000	1283	2242	1459	2547	1678	2928	---	---	---	---	---	---

Figure 5-16 – Takeoff Distance (6000 Pounds)

PRESS ALT (FT)	0° C		10° C		20° C		30° C		40° C		50° C	
	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS	GRND ROLL (FT)	Total Feet to Clear 50' OBS
S.L.	317	516	337	545	357	574	408	656	474	764	561	906
1000	334	546	355	577	386	625	444	719	518	841	614	1001
2000	352	579	374	611	420	686	484	791	565	925	---	---
3000	371	613	401	659	458	754	529	871	618	1019	---	---
4000	391	650	437	726	500	830	578	959	675	1124	---	---
5000	422	706	478	799	546	912	630	1054	738	1237	---	---
6000	462	780	522	880	595	1004	689	1162	---	---	---	---
7000	504	859	570	969	651	1107	755	1285	---	---	---	---
8000	552	948	625	1072	715	1226	829	1423	---	---	---	---
9000	605	1048	686	1187	785	1358	909	1575	---	---	---	---
10000	662	1158	752	1313	861	1504	1000	1748	---	---	---	---
11000	727	1282	825	1454	947	1669	---	---	---	---	---	---
12000	799	1422	908	1615	1044	1857	---	---	---	---	---	---

Figure 5-17 – Takeoff Distance (5000 Pounds)

5-22 TAKEOFF RATE OF CLIMB

Conditions:

- Flaps……………….20°
- Power....................Maximum Takeoff
- Inertial Separator….Normal
- Airspeed……………Best Rate of Climb

Example:

- Outside Air Temp............20°C
- Weight...........................6000 LB
- Pressure Altitude............4000 FT MSL

Climb Airspeed: 88 KIAS
Rate of Climb: 1427 FT/MIN

NOTES:

- *Do not exceed the placarded maximum takeoff torque, ITT (790°C) and NG (101.6%) limits or the charted max takeoff torque from **Figure 5-8**.*
- *This power setting is time limited to 5 minutes.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*
- *On a standard day at Sea Level, the enroute rate of climb at 6750 lb is 1541 ft/min.*

WT (LB)	Press Alt. (FT)	Climb Speed (KIAS)	RATE OF CLIMB – Feet per Minute				
			Temperature – (°C)				
			-20	0	20	40	50
6750	SL	89	1505	1480	1456	1074	842
	2000	89	1475	1449	1298	908	683
	4000	88	1442	1414	1124	744	---
	6000	86	1397	1244	955	576	---
	8000	85	1306	1100	817	---	---
	10000	84	1135	917	637	---	---
6000	SL	89	1831	1808	1786	1361	1103
	2000	89	1804	1779	1616	1182	932
	4000	88	1773	1748	1427	1005	---
	6000	86	1731	1565	1246	825	---
	8000	85	1638	1413	1100	---	---
	10000	84	1455	1217	908	---	---
5000	SL	89	2388	2368	2349	1846	1539
	2000	89	2363	2342	2153	1640	1343
	4000	88	2336	2314	1938	1439	---
	6000	86	2297	2107	1732	1235	---
	8000	85	2198	1937	1570	---	---
	10000	84	1992	1715	1355	---	---

Figure 5-18 – Takeoff Rate of Climb

5-23 TAKEOFF CLIMB GRADIENT

Conditions:

- Flaps……………........20°
- Power………….........Maximum Takeoff
- Inertial Separator…..Normal
- Airspeed…………….Best Rate of Climb
- Winds ……………..Zero

Example:

- Outside Air Temp............40°C
- Weight............................6750
- Pressure Altitude............2000 FT

Climb Airspeed: 89 KIAS
Gradient: 652 FT/NM

NOTES:

- *Do not exceed the maximum climb power torque, ITT and Ng limits.*
- *This table represents the gain in altitude for the horizontal distance traveled and is expressed as Feet per Nautical Mile.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*

WT (LB)	Press Alt. (FT)	Climb Speed (KIAS)	CLIMB GRADIENT – Feet Per Nautical Mile				
			Temperature – (°C)				
			-20	0	20	40	50
6750	SL	89	1255	1185	1123	795	612
	2000	89	1193	1125	969	652	481
	4000	88	1135	1070	816	520	---
	6000	86	1075	918	677	393	---
	8000	85	981	792	565	---	---
	10000	84	832	645	431	---	---
6000	SL	89	1543	1462	1390	1013	804
	2000	89	1472	1394	1215	851	658
	4000	88	1408	1333	1041	704	---
	6000	86	1343	1162	887	565	---
	8000	85	1240	1023	764	---	---
	10000	84	1073	859	616	---	---
5000	SL	89	2058	1955	1864	1390	1131
	2000	89	1971	1872	1644	1192	954
	4000	88	1894	1798	1432	1015	---
	6000	86	1817	1588	1245	850	---
	8000	85	1692	1420	1100	---	---
	10000	84	1489	1223	924	---	---

Figure 5-19 – Takeoff Climb Gradient

5-24 ENROUTE RATE OF CLIMB

Conditions:

- Flaps……………….0°
- Power....................Maximum Climb
- Inertial Separator….Normal
- Airspeed……………V_{CLIMB}

Example:

- Outside Air Temp...........20°C
- Weight..........................6000 LB
- Pressure Altitude...........10000 FT

Climb Airspeed: 101 KIAS
Rate of Climb: 697 FT/MIN

MAXIMUM CLIMB POWER – FLAPS 0°

NOTES:

- *Do not exceed the placarded maximum climb torque, ITT (765°C) and Ng (101.6%) limits or the charted max climb torque from* ***Figure 5-9****.*
- *For operation in temperatures colder than provided in this table, use the coldest data shown.*
- *For operation in temperatures warmer than provided in this table, use extreme caution.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*

WT (LB)	Press Alt. (FT)	Climb Speed (KIAS)	Rate of Climb - Feet Per Minute				
			Temperature – (°C)				
			-20	0	20	40	50
6750	SL	101	1645	1627	1395	848	559
	5000	101	1599	1398	939	419	---
	10000	101	1251	920	500	---	---
	15000	101	762	432	17	---	---
	20000	101	337	18	---	---	---
6000	SL	101	1956	1939	1682	1071	748
	5000	101	1913	1692	1180	599	---
	10000	101	1533	1165	697	---	---
	15000	101	995	629	168	---	---
	20000	101	531	178	---	---	---
5000	SL	101	2491	2477	2174	1446	1061
	5000	101	2454	2195	1586	895	---
	10000	101	2013	1579	1023	---	---
	15000	101	1385	953	407	---	---
	20000	101	848	432	---	---	---

Figure 5-20 – Enroute Rate of Climb

5-25 TIME FUEL AND DISTANCE TO CLIMB

Conditions:

- Flaps .... 0°
- Power... Maximum Climb Power
- Inertial Separator .... Normal
- Airspeed.. V_{CLIMB}
- Weight... 6750 lb
- Winds... Zero

NOTES:

- *Taxi Fuel: Add 50 pounds of fuel for start, taxi and takeoff.*
- *Temperature: Add 10% to calculated values for each 10°C above standard.*

Press Alt (FT)	ISA OAT (°C)	Climb Speed (KIAS)	Rate of Climb (FPM)	Time, Fuel & Distance – From Sea Level		
				Time (Minutes)	Fuel (LB)	Distance (NM)
SL	15	101	1545	0	0	0
1000	13	101	1494	.67	4.7	1.1
2000	11	101	1443	1.4	9.8	2.4
3000	9	101	1390	2.1	14.6	3.6
4000	7	101	1337	2.8	19.4	4.9
5000	5	101	1284	3.6	24.9	6.3
6000	3	101	1229	4.4	30.5	7.8
7000	1	101	1174	5.3	36.5	9.5
8000	-1	101	1117	6.2	42.4	11.2
9000	-3	101	1060	7.1	48.0	13.0
10000	-5	101	1002	8.1	54.1	15.0
11000	-7	101	943	9.17	60.0	17.1
12000	-9	101	883	10.3	66.4	19.4
13000	-11	101	822	11.5	73.1	21.9
14000	-13	101	760	12.8	80.1	24.7
15000	-15	101	697	14.3	87.9	27.9
16000	-17	101	632	15.9	95.9	31.4
17000	-19	101	566	17.6	104.3	35.2
18000	-21	101	499	19.6	113.8	39.7
19000	-23	101	430	22.0	124.8	45.1
20000	-25	101	359	24.7	136.8	51.4
21000	-27	101	287	28.2	151.7	59.6
22000	-29	101	213	32.9	171.2	70.8
23000	-31	101	137	40.2	200.3	82.2
24000	-33	101	58	57.5	267.5	124.6
25000	-35	101	0	77.8	344.6	175.0

Figure 5-21 – Time, Fuel, and Distance to Climb

5-26 CRUISE PERFORMANCE

(Refer to the Tables on the following pages)

The following information is applicable to all Cruise Performance Charts contained in this section.

NOTES:

- *The highest torque value for each temperature and RPM value represents the maximum allowable cruise power. Do not exceed this torque value, 740°C ITT, or 101.6% Ng, whichever occurs first.*
- *The lowest torque value provided for each temperature and RPM represents the recommended torque setting to attain best range in zero wind conditions. With the inertial air particle separator placed in BYPASS and the power set below the cruise torque limit of 1840 foot-pounds, decrease the maximum cruise torque by 55 foot-pounds. Do not exceed 740°C ITT or 101.6% Ng.*

5-27 CRUISE PERFORMANCE (PRESSURE ALTITUDE SEA LEVEL)

Conditions:

- Weight..6750 Pounds
- Engine Inlet...NORMAL

NOTE: *Do not exceed maximum cruise torque or 740°C ITT.*

TEMP °C	2200 RPM			2000 RPM		
	TRQ LBFT	FUEL FLOW PPH	TAS KTS	TRQ LBFT	FUEL FLOW PPH	TAS KTS
50	1050	325	149	1170	326	151
	1000	315	146	1000	298	141
	800	279	132	800	264	127
	600	242	110	625	234	110
40	1210	350	157	1370	355	160
	1000	312	145	1200	328	152
	800	276	131	1000	295	140
	600	239	109	800	262	126
	590	239	108	615	230	108
30	1390	378	165	1570	386	168
	1200	344	155	1400	356	160
	1000	309	144	1200	324	150
	800	273	130	1000	292	139
	600	236	109	800	259	125
	580	232	107	600	224	106
20	1560	405	170	1750	413	173
	1400	376	163	1600	387	167
	1200	341	154	1400	353	159
	1100	323	148	1200	321	149
	1000	306	143	1000	289	138
	800	270	129	800	256	124
	600	234	109	600	222	106
	570	228	104	590	222	105
10	1670	421	173	1840	425	175
	1600	408	170	1800	418	173
	1400	373	162	1600	383	165
	1200	338	152	1400	349	157
	1000	303	141	1200	317	147
	800	267	128	1000	286	137
	600	231	109	800	253	124
	560	223	103	600	219	106
				575	215	103
0	1670	417	171	1840	420	173
	1600	404	168	1800	413	171
	1400	369	160	1600	379	164
	1200	331	151	1400	346	155
	1000	300	140	1200	314	146
	800	263	127	1000	282	135
	600	228	108	800	250	122
	545	218	101	600	217	105
				560	210	101

TEMP °C	2200 RPM			2000 RPM		
	TRQ LBFT	FUEL FLOW PPH	TAS KTS	TRQ LBFT	FUEL FLOW PPH	TAS KTS
-10	1670	413	169	1840	416	171
	1600	401	166	1800	409	169
	1400	366	158	1600	374	162
	1200	331	149	1400	342	154
	1000	297	138	1200	311	144
	800	261	125	1000	279	134
	600	226	109	800	247	121
	520	211	99	600	214	105
				550	205	99
-20	1670	409	167	1840	411	169
	1600	397	164	1800	404	167
	1400	362	156	1600	370	160
	1200	327	147	1400	339	152
	1000	293	137	1200	307	143
	800	258	125	1000	276	132
	600	223	108	800	244	120
	510	207	97	600	211	104
				540	201	98
-30	1670	405	165	1840	406	167
	1600	393	162	1800	400	165
	1400	358	154	1600	366	158
	1200	324	145	1400	335	150
	1000	290	135	1200	304	141
	800	255	124	1000	273	131
	600	221	107	800	241	119
	500	203	95	600	209	103
				520	195	95
-40	1670	402	163	1840	402	165
	1600	390	160	1800	395	163
	1400	355	152	1600	362	156
	1200	321	144	1400	331	148
	1000	287	134	1200	300	139
	800	253	122	1000	270	130
	600	218	107	800	238	118
	485	198	93	600	206	103
				510	191	93
-50	1670	398	161	1840	397	162
	1600	386	158	1800	390	161
	1400	352	150	1600	359	154
	1200	318	142	1400	328	146
	1000	284	132	1200	297	138
	800	248	121	1000	267	128
	600	215	106	800	236	117
	475	194	91	600	203	102
				510	189	93

5-28 CRUISE PERFORMANCE (PRESSURE ALTITUDE 2000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet...NORMAL

NOTE: *Shaded torques may produce calibrated speeds in excess of V_{MO}, and may have to be reduced slightly.*

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
46	1030	311	151	1150	313	153
	1000	305	149	1000	288	144
	800	269	134	800	255	129
	620	236	113	645	229	113
35	1200	337	160	1350	342	162
	1000	302	148	1200	318	154
	800	266	133	1000	285	143
	605	231	111	800	252	128
				635	224	111
25	1400	370	168	1540	371	169
	1200	334	158	1400	347	163
	1000	299	146	1200	314	153
	800	264	132	1000	282	141
	600	227	110	800	249	127
	595	227	109	625	220	109
15	1560	395	174	1720	400	175
	1400	366	166	1600	378	170
	1200	330	156	1400	344	161
	1000	296	145	1200	311	151
	900	279	138	1000	279	140
	800	261	131	800	247	126
	600	225	110	610	215	108
	585	222	107			
5	1670	412	176	1840	417	178
	1600	399	173	1800	409	176
	1400	362	165	1600	373	168
	1200	327	155	1400	340	160
	1000	293	144	1200	308	150
	800	258	130	1000	276	139
	605	223	105	800	244	125
				600	211	106
				590	209	105
-5	1670	407	174	1840	413	176
	1600	395	171	1800	405	174
	1400	359	163	1600	369	166
	1200	325	153	1400	337	158
	1000	290	142	1200	304	148
	800	255	129	1000	273	137
	600	220	110	800	241	124
	555	211	103	600	208	106
				580	205	104

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
-15	1670	404	172	1840	408	174
	1600	391	169	1800	401	172
	1400	356	161	1600	366	165
	1200	322	151	1400	333	156
	1000	287	141	1200	301	147
	800	252	128	1000	270	136
	600	217	109	800	238	123
	545	207	101	600	206	106
				560	199	101
-25	1670	401	170	1840	404	172
	1600	388	167	1800	396	170
	1400	352	159	1600	362	163
	1200	318	150	1400	329	154
	1000	284	139	1200	297	145
	800	250	127	1000	267	135
	600	215	109	800	236	122
	530	202	100	600	203	105
				550	195	100
-35	1670	397	168	1840	399	170
	1600	384	165	1800	392	168
	1400	349	157	1600	358	161
	1200	315	148	1400	326	152
	1000	281	137	1200	294	143
	800	247	125	1000	264	133
	600	212	108	800	234	121
	520	198	98	600	201	104
				535	190	98
-45	1670	393	166	1840	395	167
	1600	381	163	1800	387	166
	1400	346	155	1600	354	158
	1200	312	146	1400	322	150
	1000	278	136	1200	291	142
	800	244	124	1000	261	132
	600	209	108	800	230	120
	505	193	96	600	198	104
				530	186	97
-54	1670	390	163	1840	391	165
	1600	377	161	1800	383	164
	1400	343	153	1600	350	157
	1200	310	144	1400	319	149
	1000	275	134	1200	289	140
	800	241	123	1000	258	130
	600	207	107	800	227	118
	490	188	93	600	196	103
				510	181	94

5-29 CRUISE PERFORMANCE (PRESSURE ALTITUDE 4000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet..NORMAL

	2200 RPM			2000 RPM		
TEMP °C	TRQ LBFT	FUEL FLOW PPH	TAS KTS	TRQ LBFT	FUEL FLOW PPH	TAS KTS
42	1010	298	152	1120	299	154
	800	261	136	1000	279	146
	640	232	117	800	246	131
				670	225	117
30	1180	324	161	1330	330	164
	1000	292	150	1200	308	157
	800	258	135	1000	276	145
	625	226	114	800	243	130
				655	219	115
20	1340	349	168	1510	357	171
	1200	324	161	1400	338	166
	1000	290	149	1200	305	156
	800	255	134	1000	273	144
	615	222	113	800	241	129
				640	214	113
10	1500	375	174	1680	385	177
	1400	357	169	1600	370	173
	1200	322	159	1400	335	164
	1000	287	147	1200	302	154
	800	252	133	1000	270	142
	600	217	110	800	238	128
				625	209	110
0	1640	398	178	1840	411	181
	1600	390	177	1800	404	179
	1400	353	168	1600	366	171
	1200	319	158	1400	331	162
	1000	284	146	1200	299	152
	800	249	132	1000	267	141
	590	212	108	800	235	127
				615	205	109
-10	1670	400	177	1840	412	179
	1600	386	175	1800	399	177
	1400	350	166	1600	362	169
	1200	316	156	1400	328	161
	1000	281	144	1200	295	151
	800	247	131	1000	264	140
	600	212	110	800	233	126
	575	207	106	600	200	107

	2200 RPM			2000 RPM		
TEMP °C	TRQ LBFT	FUEL FLOW PPH	TAS KTS	TRQ LBFT	FUEL FLOW PPH	TAS KTS
-20	1670	396	175	1840	402	177
	1600	383	172	1800	394	175
	1400	347	164	1600	358	167
	1200	313	154	1400	324	159
	1000	278	143	1200	292	149
	800	243	130	1000	261	138
	600	209	110	800	230	125
	560	202	104	600	198	106
				585	195	105
-30	1670	392	173	1840	397	175
	1600	380	170	1800	390	173
	1400	343	162	1600	354	165
	1200	309	152	1400	321	157
	1000	275	141	1200	289	147
	800	241	128	1000	258	137
	600	207	109	800	228	124
	550	198	103	600	196	106
				570	191	102
-40	1670	388	171	1840	395	172
	1600	376	168	1800	386	171
	1400	340	160	1600	350	163
	1200	306	150	1400	317	155
	1000	272	140	1200	286	146
	800	239	127	1000	255	135
	600	204	109	800	225	123
	525	191	100	600	193	106
				555	186	101
-50	1670	387	168	1840	393	170
	1600	372	166	1800	382	169
	1400	337	157	1600	346	161
	1200	306	148	1400	314	153
	1000	270	138	1200	283	144
	800	236	126	1000	252	134
	600	201	108	800	222	121
	515	187	98	600	191	105
				540	181	98

5-31 CRUISE PERFORMANCE (PRESSURE ALTITUDE 6000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet..NORMAL

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
38	980	284	153	1090	285	155
	800	252	138	1000	271	149
	660	227	120	800	238	133
				690	220	120
25	1180	320	164	1310	319	166
	1200	316	165	1200	300	160
	1000	283	153	1000	267	147
	800	249	137	800	235	132
	645	221	118	670	214	117
15	1310	336	170	1470	343	172
	1200	316	164	1400	331	169
	1000	281	151	1200	297	158
	800	246	136	1000	264	146
	630	216	115	800	233	131
				655	209	115
5	1460	360	176	1640	372	178
	1400	349	173	1600	364	176
	1200	313	162	1400	327	167
	1000	278	150	1200	294	157
	800	244	135	1000	261	145
	620	212	114	800	230	130
				645	205	114
-5	1600	384	180	1790	398	182
	1400	345	171	1600	359	174
	1200	310	160	1400	324	165
	1000	275	148	1200	291	155
	800	241	134	1000	258	143
	605	207	112	800	228	129
				630	200	111
-15	1670	396	181	1840	411	182
	1600	380	178	1800	398	181
	1400	342	169	1600	355	172
	1200	307	159	1400	320	163
	1000	273	147	1200	288	153
	800	239	132	1000	256	142
	600	204	111	800	225	128
	590	202	110	620	196	110

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
-25	1670	395	178	1840	406	180
	1600	376	176	1800	397	178
	1400	339	167	1600	352	170
	1200	304	157	1400	316	162
	1000	270	145	1200	285	152
	800	236	131	1000	253	140
	600	202	110	800	222	127
	580	198	107	605	191	108
-35	1670	394	176	1840	399	178
	1600	374	173	1800	394	176
	1400	336	165	1600	347	168
	1200	301	155	1400	313	160
	1000	267	144	1200	281	150
	800	234	130	1000	250	139
	600	199	110	800	220	125
	570	194	106	600	188	107
				585	186	105
-45	1670	390	174	1840	392	175
	1600	373	171	1800	388	174
	1400	333	162	1600	344	166
	1200	298	153	1400	309	158
	1000	265	142	1200	278	148
	800	231	129	1000	247	137
	600	197	109	800	217	124
	555	194	103	600	186	106
				570	181	103
-54	1670	384	172	1840	385	173
	1600	373	169	1800	382	172
	1400	330	160	1600	340	164
	1200	296	151	1400	306	156
	1000	263	140	1200	275	146
	800	229	127	1000	245	136
	600	195	109	800	215	123
	545	185	101	600	184	106
				560	177	102

5-32 CRUISE PERFORMANCE (PRESSURE ALTITUDE 8000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet..NORMAL

	2200 RPM			2000 RPM		
TEMP °C	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**
34	950	270	153	1060	273	156
	800	244	140	1000	263	151
	680	123	124	800	231	134
				710	216	124
25	1070	290	161	1200	294	163
	1000	277	156	1000	260	150
	800	242	139	800	229	134
	670	220	122	700	213	122
15	1200	309	168	1350	317	170
	1000	274	155	1200	291	162
	800	240	138	1000	258	149
	655	215	120	800	226	133
				685	208	120
5	1320	328	173	1480	337	175
	1200	306	166	1400	222	171
	1000	272	153	1200	288	160
	800	237	137	1000	255	148
	645	211	118	800	224	132
				670	203	118
-5	1470	354	178	1650	368	181
	1400	340	175	1600	356	179
	1200	303	164	1400	318	169
	1000	269	152	1200	284	159
	800	235	136	1000	252	146
	630	206	116	800	221	131
				660	199	116
-15	1590	381	182	1780	392	184
	1400	336	173	1600	352	177
	1200	301	162	1400	315	167
	1000	267	150	1200	281	157
	800	232	135	1000	250	145
	615	201	113	800	219	130
				645	194	114

	2200 RPM			2000 RPM		
TEMP °C	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**
-25	1670	388	183	1840	399	184
	1600	381	180	1800	389	183
	1400	333	171	1600	349	174
	1200	298	160	1400	312	165
	1000	264	149	1200	278	155
	800	230	134	1000	247	143
	605	197	112	800	216	129
				630	190	112
-35	1670	384	181	1840	394	182
	1600	374	178	1800	386	180
	1400	330	169	1600	347	172
	1200	295	159	1400	308	163
	1000	261	147	1200	275	153
	800	227	132	1000	244	142
	600	194	111	800	214	128
	590	192	109	615	185	109
-45	1670	380	178	1840	390	180
	1600	367	175	1800	381	178
	1400	327	166	1600	345	170
	1200	292	157	1400	305	161
	1000	258	145	1200	272	152
	800	225	131	1000	242	140
	600	191	110	800	211	127
	580	188	107	600	180	107
-54	1670	377	176	1840	386	177
	1600	362	173	1800	378	176
	1400	324	164	1600	343	168
	1200	290	155	1400	302	159
	1000	256	143	1200	270	150
	800	223	130	1000	239	139
	600	189	110	800	209	125
	565	183	105	600	178	107
				580	175	104

5-30 CRUISE PERFORMANCE (PRESSURE ALTITUDE 10000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet...NORMAL

	2200 RPM			2000 RPM		
TEMP °C	TRQ LBFT	FUEL FLOW PPH	TAS KTS	TRQ LBFT	FUEL FLOW PPH	TAS KTS
30	920	258	153	1020	259	156
	800	237	141	1000	256	154
	700	220	128	800	224	136
				730	212	128
20	1060	280	163	1160	280	164
	1000	270	159	1000	253	153
	800	234	141	800	221	135
	690	215	126	720	209	126
10	1180	299	170	1320	306	172
	1000	267	157	1200	284	165
	800	232	140	1000	251	152
	675	211	123	800	219	135
				705	204	124
0	1300	318	175	1450	327	177
	1200	299	169	1400	317	174
	1000	264	156	1200	281	163
	800	230	139	1000	248	150
	660	206	121	800	216	134
				690	199	121
-10	1410	336	179	1590	359	181
	1400	334	178	1400	313	172
	1200	296	167	1200	278	161
	1000	262	154	1000	246	149
	800	227	138	800	214	133
	650	202	119	680	195	119
-20	1510	359	181	1710	374	185
	1400	331	176	1600	355	180
	1200	294	165	1400	310	170
	1000	259	153	1200	275	160
	800	225	137	1000	243	147
	635	197	117	800	211	132
				665	191	117

	2200 RPM			2000 RPM		
TEMP °C	TRQ LBFT	FUEL FLOW PPH	TAS KTS	TRQ LBFT	FUEL FLOW PPH	TAS KTS
-30	1600	370	183	1810	393	187
	1400	330	174	1800	391	186
	1200	291	163	1600	349	178
	1000	257	151	1400	307	168
	800	223	136	1200	272	158
	620	192	115	1000	240	146
				800	209	131
				650	186	115
-40	1670	382	184	1840	397	185
	1600	366	181	1800	386	184
	1400	329	172	1600	342	175
	1200	288	161	1400	303	166
	1000	254	149	1200	269	156
	800	220	134	1000	237	144
	605	188	112	800	207	130
				635	182	112
-50	1670	379	181	1840	392	183
	1600	363	178	1800	382	181
	1400	328	169	1600	337	173
	1200	286	159	1400	299	164
	1000	252	148	1200	266	154
	800	218	133	1000	235	142
	600	185	111	800	204	128
	585	182	110	615	177	110

5-33 CRUISE PERFORMANCE (PRESSURE ALTITUDE 12000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet...NORMAL

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
26	890	246	153	980	246	155
	800	230	143	800	217	138
	725	217	132	755	210	132
15	1050	272	165	1150	273	166
	1000	262	161	1000	247	155
	800	227	142	800	214	137
	710	212	130	740	205	130
5	1170	291	172	1300	297	174
	1000	259	160	1200	278	168
	800	225	142	1000	244	154
	695	207	127	800	212	136
				730	201	128
-5	1280	309	177	1420	319	178
	1200	293	172	1400	313	177
	1000	257	159	1200	275	166
	800	223	141	1000	241	153
	685	204	126	800	209	135
				715	197	126
-15	1360	327	179	1520	336	181
	1200	290	170	1400	311	175
	1000	255	157	1200	272	164
	800	221	140	1000	239	151
	670	199	123	800	207	135
				700	192	123
-25	1460	340	183	1630	356	184
	1400	330	179	1600	349	183
	1200	287	168	1400	309	173
	1000	253	155	1200	269	162
	800	219	139	1000	236	150
	655	194	121	800	205	134
				685	187	121

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
-35	1540	355	184	1720	374	186
	1400	324	177	1600	344	181
	1200	285	166	1400	307	171
	1000	250	154	1200	266	161
	800	217	137	1000	233	148
	640	190	118	800	202	132
				670	183	118
-45	1630	374	186	1820	394	188
	1600	367	184	1800	389	187
	1400	320	175	1600	340	179
	1200	282	164	1400	306	169
	1000	248	152	1200	263	159
	800	214	136	1000	231	146
	625	185	116	800	200	131
				650	178	115
-54	1670	379	185	1840	395	186
	1600	363	182	1800	384	185
	1400	318	173	1600	337	176
	1200	280	162	1400	202	167
	1000	245	150	1200	261	157
	800	212	135	1000	229	145
	610	181	113	800	198	130
				635	174	113

5-34 CRUISE PERFORMANCE (PRESSURE ALTITUDE 14000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet..NORMAL

	2200 RPM			2000 RPM		
TEMP °C	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**
22	860	234	152	940	220	154
	740	213	135	780	207	137
10	990	254	163	1090	257	165
	730	209	134	765	202	134
0	1100	272	170	1230	280	173
	720	205	132	750	198	132
-10	1200	288	175	1340	304	177
	705	201	129	735	193	129

	2200 RPM			2000 RPM		
TEMP °C	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**
-20	1290	308	179	1440	316	181
	690	196	127	720	187	127
-30	1380	320	182	1560	341	185
	670	191	123	705	184	124
-40	1450	333	183	1640	356	186
	660	187	122	690	180	122
-50	1530	350	185	1740	377	188
	650	183	120	675	176	119

5-35 CRUISE PERFORMANCE (PRESSURE ALTITUDE 16000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet..NORMAL

	2200 RPM			2000 RPM		
TEMP °C	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**
18	820	221	149	910	224	154
	770	213	141	805	206	141
10	910	235	159	1000	237	161
	760	209	140	795	203	140
0	1010	251	167	1110	255	168
	745	205	137	780	198	137
-10	1100	266	173	1220	277	174
	730	200	134	765	194	135

	2200 RPM			2000 RPM		
TEMP °C	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**	**TRQ LBFT**	**FUEL FLOW PPH**	**TAS KTS**
-20	1190	285	177	1340	296	180
	715	196	132	750	189	132
-30	1280	298	181	1430	313	183
	700	191	129	735	184	130
-40	1340	309	182	1510	329	184
	690	188	127	715	179	126
-50	1420	325	184	1600	347	186
	670	182	124	700	175	124

5-36 CRUISE PERFORMANCE (PRESSURE ALTITUDE 18000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet...NORMAL

NOTE: *Asterisks (*) indicate that maximum approved power is also approximately maximum range power at that temperature.*

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
14	790	211	145	870	212	151
	*	*	*	830	205	146
5	860	221	156	960	226	160
	780	207	144	820	201	144
-5	960	237	165	1060	242	167
	765	202	141	805	198	142
-15	1040	253	171	1170	264	174
	750	198	138	790	192	139

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
-25	1120	264	176	1250	276	177
	740	194	136	775	188	136
-35	1200	279	179	1350	297	181
	720	189	133	755	182	133
-45	1260	291	181	1420	309	183
	710	185	131	740	178	131
-54	1320	302	182	1460	315	183
	690	180	128	725	174	128

5-37 CRUISE PERFORMANCE (PRESSURE ALTITUDE 20000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet...NORMAL

NOTE: *Asterisks (*) indicate that maximum approved power is also approximately maximum range power at that temperature.*

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
10	750	199	134	820	199	145
	*	*	*	*	*	*
0	830	211	153	920	215	158
	800	205	148	845	201	149
-10	920	226	164	1010	231	166
	800	203	148	1000	228	165
	790	202	146	830	196	146
-20	1000	242	171	1100	245	172
	800	201	147	1000	227	163
	770	196	143	815	192	144

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
-30	1065	251	175	1170	258	175
	1000	238	169	1000	225	162
	800	199	147	800	187	141
	760	193	141	795	186	140
-40	1130	263	178	1250	274	179
	1000	234	167	1200	262	175
	800	197	146	1000	224	160
	740	187	137	800	185	140
				775	181	137
-50	1190	274	180	1310	285	180
	1000	232	166	1200	259	173
	800	196	145	1000	222	159
	725	183	134	800	182	140
				760	176	134

5-38 CRUISE PERFORMANCE (PRESSURE ALTITUDE 22000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet...NORMAL

NOTES:

- *Dashes signify conditions where the airplane cannot maintain level flight at 6750 lb.*
- *Asterisks (*) indicate that maximum approved power is also approximately maximum range power at that temperature.*

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
6	710	187	---	780 *	189 *	137 *
-5	810 *	204 *	150 *	900 870	208 203	157 153
-15	890 810	221 201	163 150	990 855	225 197	166 151
-25	960 795	229 196	169 148	1070 840	239 192	172 148

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
-35	1040 780	245 192	176 145	1150 820	256 187	177 145
-45	1100 765	257 187	179 142	1220 800	269 181	180 142
-54	1140 750	263 183	180 139	1270 785	278 177	181 139

5-39 CRUISE PERFORMANCE (PRESSURE ALTITUDE 24000 FT)

Conditions:

- Weight..6750 Pounds
- Engine Inlet...NORMAL

NOTES:

- *Dashes signify conditions where the airplane cannot maintain level flight at 6750 lb.*
- *Asterisks (*) indicate that maximum approved power is also approximately maximum range power at that temperature.*

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
2	670	176	---	730	176	---
-10	770 *	194 *	134 *	840 *	204 *	150 *
-20	840 835	206 205	157 156	920 880	216 215	161 156
-30	890 820	213 200	164 153	990 865	223 210	168 153

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
-40	960 805	227 195	171 150	1060 845	235 192	173 150
-50	1020 785	238 190	175 146	1120 825	246 187	176 146

5-40 CRUISE PERFORMANCE (PRESSURE ALTITUDE 25000 FT)

Conditions:

- Weight...6750 Pounds
- Engine Inlet...NORMAL

NOTES:

- *Dashes signify conditions where the airplane cannot maintain level flight at 6750 lb.*
- *Asterisks (*) indicate that maximum approved power is also approximately maximum range power at that temperature.*

TEMP °C	2200 RPM TRQ LBFT	2200 RPM FUEL FLOW PPH	2200 RPM TAS KTS	2000 RPM TRQ LBFT	2000 RPM FUEL FLOW PPH	2000 RPM TAS KTS
0	650	171	---	720	174	---
-10	720	182	---	790 *	187 *	136 *
-20	790 *	196 *	144 *	870 *	198 *	155 *
-30	850	204	159	940	211	164
	835	201	156	880	198	156
-40	910	216	167	1000	223	169
	820	196	153	865	192	153
-50	960	225	171	1060	234	173
	800	190	150	1000	220	167
				845	186	150

5-41 RANGE / ENDURANCE PROFILE

Conditions:

- Weight..6750 LB
- Propeller ....2000 RPM
- Temperature..ISA
- Winds..Zero
- Total Fuel ....320 GAL

Example:

- Power...Maximum Cruise
- Takeoff Press Alt ....2000 FT
- Cruise Press Alt ....10000 FT

Fuel to Climb: 42.4 LB
Cruise Fuel Flow: 343 LB/HR
Endurance: 5.6 HR
Range: 987 NM
True Airspeed: 179 KIAS

NOTES:

- *Fuel Remaining For Cruise is equal to 2110 pounds usable, less fuel required for climb from sea level at maximum climb power, less 153 pounds for 45 minutes IFR reserve fuel at Maximum Range Power (ISA @10,000 ft PA), less fuel for descent to sea level, less 50 pounds for fuel used prior to takeoff.*
- *Range and endurance values include descent to final destination at approximately 140 KIAS above 16,000 feet and 160 KIAS below 16,000 feet.*

Maximum Cruise Power							
Press Alt (FT)	Climb Fuel (LB)	Fuel Remaining For Cruise (LB)	Airspeed (KTAS)	Fuel Flow (PPH)	Endurance (Hours)	Total Range (NM)	Total Specific Range (NM/LB)
SL	0	1907	174	419	4.6	792	.42
2000	9.8	1886	176	409	4.7	821	.43
4000	19.4	1864	178	390	4.9	869	.46
6000	30.5	1843	178	375	5.1	903	.47
8000	42.4	1820	178	353	5.4	956	.50
10000	54.1	1798	179	343	5.6	987	.52
12000	66.4	1776	179	327	5.9	1032	.54
14000	80.1	1751	179	308	6.2	1089	.57
16000	95.9	1725	179	293	6.5	1139	.60
18000	113.8	1699	177	271	7.0	1208	.63
20000	136.8	1668	176	252	7.4	1281	.67
22000	171.2	1626	175	247	7.6	1394	.68
24000	267.5	1521	171	225	8.2	1357	.71
25000	344.6	1440	169	219	8.4	1363	.71

Figure 5-22 – Maximum Cruise Profile

Maximum Range Power							
Press Alt (FT)	Climb Fuel (LB)	Fuel Remaining For Cruise (LB)	Airspeed (KTAS)	Fuel Flow (PPH)	Endurance (Hours)	Total Range (NM)	Total Specific Range (NM/LB)
SL	0	1907	104	219	8.7	906	.47
2000	9.8	1886	107	212	9.0	961	.50
4000	19.4	1864	110	207	9.1	1009	.53
6000	30.5	1843	114	204	9.2	1058	.55
8000	42.4	1820	117	201	9.3	1097	.58
10000	54.1	1798	120	197	9.5	1144	.60
12000	66.4	1776	124	194	9.6	1195	.63
14000	80.1	1751	128	191	9.7	1245	.65
16000	95.9	1725	133	190	9.7	1292	.68
18000	113.8	1699	138	190	9.6	1333	.70
20000	136.8	1668	142	189	9.7	1370	.72
22000	171.2	1626	147	189	9.6	1363	.71
24000	267.5	1521	152	193	9.4	1399	.73
25000	344.6	1440	154	194	9.2	1395	.73

Figure 5-23 – Maximum Range Profile

5-42 TIME, FUEL AND DISTANCE TO DESCEND

Conditions:

- Weight...6750 LB
- Flaps...0°
- Airspeed...140 KIAS Above 16,000 Feet
  160 KIAS Below 16,000 Feet
- Power...Set for 800 FPM Descent
- Propeller ....2200 RPM

NOTE: *Distances provided are based on a zero wind condition.*

Press Alt (FT)	DESCENT TO SEA LEVEL		
	Time (MIN)	Fuel (LB)	Distance (NM)
24000	30.0	118	76.6
22000	27.5	110	70.8
20000	25.0	102	65.0
18000	22.5	94	59.1
16000	20.0	86	53.3
14000	17.5	76	46.7
12000	15.0	65	40.0
10000	12.5	55	33.3
8000	10.0	45	26.7
6000	7.5	34	20
4000	5.0	23	13.3
2000	2.5	11	6.6
SL	0	0	0

Figure 5-24 – Time, Fuel, and Distance to Descend

5-43 BALKED LANDING CLIMB GRADIENT

(Refer to the Table on the following page)

Conditions:

- Power..............................Max Takeoff
- Flaps...............................35° (Down)
- Climb Airspeed................V_{REF}
- Winds..............................Zero

Example:

- Outside Air Temp............20°C
- Weight............................6690 LB
- Pressure Altitude............6000 FT

Climb Airspeed: 76 KIAS
Climb Gradient: 489 FT/NM

NOTES:

- *Balked Landing Climb Gradients shown represent the gain in altitude for the horizontal distance traveled and is expressed as Feet per Nautical Mile.*
- *For operation in air colder than provided in this table, use the coldest charted data.*
- *For operation in air warmer than provided in this table, use extreme caution.*
- *This chart is required data for aircraft certification. However, significantly better performance may be achieved by climbing at the Best Rate of Climb speeds with the flaps positioned at 20° or following the Go-Around / Balked Landing procedure outlined in **Section 4**.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*

Weight (LB)	Press Alt (FT)	Climb Speed (KIAS)	CLIMB GRADIENT – Feet Per Nautical Mile				
			-20 °C	0 °C	20 °C	40 °C	50 °C
6690	SL	76	1074	1005	944	617	437
	2000	76	1006	943	789	470	303
	4000	76	943	879	632	338	---
	6000	76	881	727	489	207	---
	8000	76	761	572	346	---	---
	10000	76	605	417	215	---	---
6000	SL	76	1329	1250	1180	806	602
	2000	76	1251	1178	1002	640	451
	4000	76	1178	1105	823	490	---
	6000	76	1107	931	660	342	---
	8000	76	970	755	499	---	---
	10000	76	792	579	351	---	---
5000	SL	76	1780	1680	1592	1128	878
	2000	76	1681	1590	1370	924	694
	4000	76	1590	1498	1149	741	---
	6000	76	1500	1282	949	562	---
	8000	76	1330	1065	752	---	---
	10000	76	1111	849	572	---	---

Figure 5-25 – Balked Landing Climb Gradient

5-44 BALKED LANDING RATE OF CLIMB

(Refer to the Table on the following page)

Conditions:

- Power..............................Max Takeoff
- Flaps...............................35° (Down)
- Climb Airspeed................76 KIAS

Example:

- Outside Air Temp............20°C
- Weight............................6690 LB
- Pressure Altitude............6000 FT

Climb Airspeed: 76 KIAS
Climb Gradient: 712 FT/MIN

NOTES:

- *Balked Landing Rates of Climb shown represent the gain in altitude for the horizontal distance traveled and is expressed as feet per minute.*
- *For operation in air colder than provided in this table, use the coldest charted data.*
- *For operation in air warmer than provided in this table, use extreme caution.*
- *This chart is required data for aircraft certification. However, significantly better performance may be achieved by climbing at the Best Rate of Climb speeds with the flaps positioned at 20° or following the Go-Around / Balked Landing procedure outlined in **Section 4**.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*

Weight (LB)	Press Alt (FT)	Climb Speed (KIAS)	RATE OF CLIMB – Feet Per Minute				
			-20 °C	0 °C	20 °C	40 °C	50 °C
6690	SL	76	1287	1254	1222	830	599
	2000	76	1253	1221	1062	658	432
	4000	76	1220	1183	886	491	---
	6000	76	1185	1019	712	314	---
	8000	76	1066	835	525	---	---
	10000	76	884	634	339	---	---
6000	SL	76	1580	1548	1517	1081	823
	2000	76	1546	1517	1343	893	641
	4000	76	1515	1479	1149	711	---
	6000	76	1480	1300	960	517	---
	8000	76	1352	1099	755	---	---
	10000	76	1153	878	553	---	---
5000	SL	76	2079	2047	2017	1501	1194
	2000	76	2045	2017	1815	1282	983
	4000	76	2014	1979	1591	1071	---
	6000	76	1980	1771	1372	847	---
	8000	76	1834	1538	1134	---	---
	10000	76	1603	1282	899	---	---

Figure 5-26 – Balked Landing Rate of Climb

5-45 LANDING DISTANCE (MAXIMUM WEIGHT 6690 LB SHORT FIELD)

(Refer to the Table on the following page)

Conditions:

- Winds.................ZERO
- Runway..............Dry, Level, Paved
- Flaps..................35° (FULL)
- Powered 3° Powered Approach to 50 FT obstacle, then a smooth reduction to IDLE at touchdown. BETA range (Lever against spring) after touchdown.

Example:

- Outside Air Temp................20°C
- Weight................................6690 LB
- Pressure Altitude................2000 FT
- Headwind...........................ZERO

Obstacle Speed(VREF): 76 KIAS
Landing Ground Roll: 986 FT
Total Dist. Over 50' Obs.: 1807

NOTES:

- *Short field technique utilized as outlined in* ***Section 4****.*
- *Decrease distances 10% for each 13 knots headwind.*
- *Increase distances 10% for each 2 knots tailwind up to 10 knots.*
- *For operation on a dry, grass runway, increase distances by 40% of the ground roll calculation.*
- *Use of maximum reverse thrust after touchdown reduces ground roll by approximately 15%.*
- *For sloped runways (up to 3% slope), increase the distances by 27% of the ground roll distance for each 1% of downslope. Decrease distances by 9% of the ground roll distance for each 1% of upslope.*
- *Dashed entries correspond to outside air temperatures beyond the aircraft operating limits.*

WT (LB)	50' Speed (KIAS)	Press Alt (FT)	0°C		20°C		40°C	
			GRD ROLL (FT)	Total Feet to Clear 50' OBS	GRD ROLL (FT)	Total Feet to Clear 50' OBS	GRD ROLL (FT)	Total Feet to Clear 50' OBS
6690	76	SL	867	1603	931	1681	994	1760
		2000	918	1719	986	1807	1053	1896
		4000	973	1849	1045	1947	1116	2047
		6000	1033	1994	1109	2104	---	---
		8000	1097	2156	1177	2279	---	---
		10000	1165	2336	1251	2475	---	---
6000	72	SL	737	1355	791	1419	845	1484
		2000	781	1452	838	1524	895	1597
		4000	827	1560	888	1640	949	1722
		6000	878	1679	943	1769	---	---
		8000	932	1813	1001	1914	---	---
		10000	991	1962	1063	2075	---	---
5000	65	SL	574	1038	616	1086	658	1134
		2000	608	1111	653	1164	697	1218
		4000	645	1191	692	1251	739	1312
		6000	684	1281	734	1348	---	---
		8000	727	1381	780	1455	---	---
		10000	772	1492	828	1576	---	---

Figure 5-27 – Landing Distance

SECTION 6
WEIGHT & BALANCE/EQUIPMENT LIST
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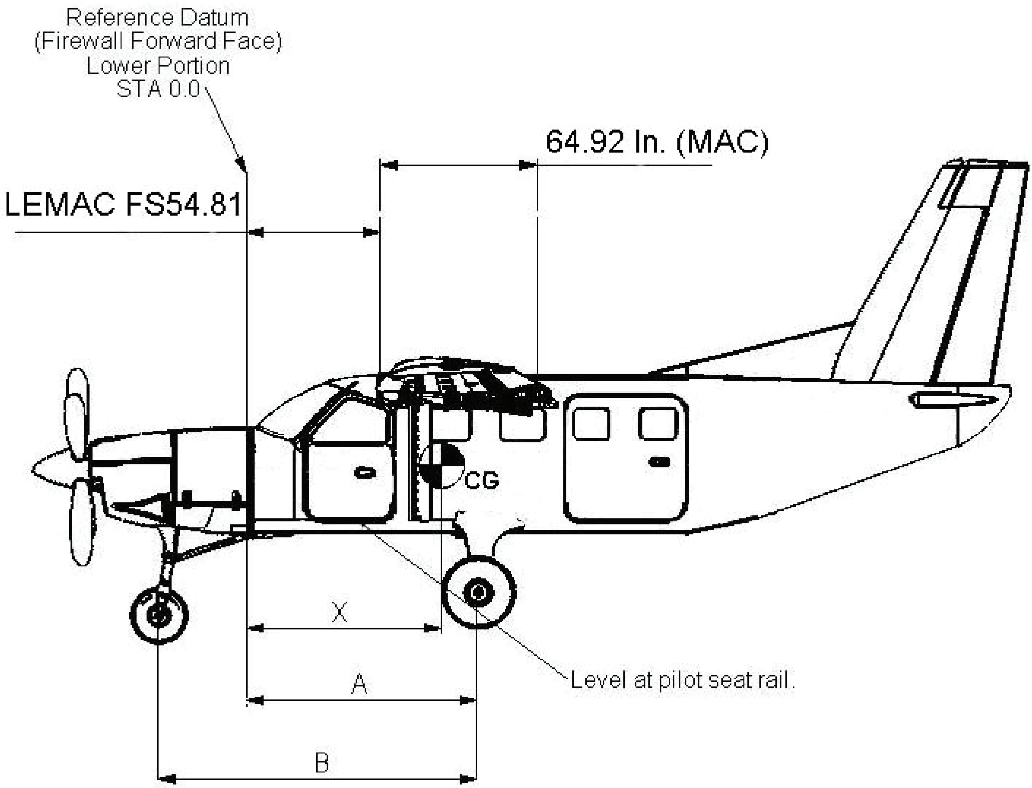
6-1 INTRODUCTION

This section describes the procedure for establishing the basic empty weight and moment of the airplane. Sample weight and balance forms are provided for reference. Procedures for calculating the loaded weight and moment of the aircraft are also included in this section. A comprehensive list of all equipment available for this airplane is included at the end of this section.

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 attached to the back of this handbook.

It is the responsibility of the pilot in command to ensure that the airplane is loaded within the established limits set forth in this section.

6-2 AIRPLANE WEIGHING FORM



Weighing Point	Scale Reading	- Tare	= Net Weight	x Arm	= Moment	
L Main		0		A =		
R Main		0		A =		
Nose		0		A - B =		
Total As Weighed				CG =		
CG = Total Moment ÷ Total Weight Space below provided for additions or subtractions to as weighed condition.						
Empty Weight (Including Undrainable Fluids and Full Oil				CG =		
+ Drainable Unusable Fuel			33	83.4	2752.2	
Basic Empty Weight						

Figure 6-1 – Airplane Weighing Form

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6-3 AIRPLANE WEIGHING PROCEDURES

Preparation:

1. Remove all snow, ice, or water from the aircraft surfaces.
2. Inflate the tires to the recommended inflation pressures.
3. Drain all fuel from the aircraft by locking open the fuel reservoir and fuel tank sump quick drain valves. Drain the firewall fuel filter and EPA cans.
4. Service the engine with oil to obtain a normal full indication, either MAX HOT or MAX COLD, as appropriate, on the dipstick.
5. Move the pilot and copilot seats to their full forward position and the passenger seats to their recommended locations as outlined in **Figure 6-4**.
6. Raise the flaps to the fully retracted position.
7. Place all control surfaces in their neutral position.
8. Verify equipment installations and locations in comparison to the equipment list.

Leveling (Reference **Figure 6-1**):

1. Place the aircraft wheels on top of weighing scales. The scales should have a minimum capacity of 2000 pounds for the nose and 4000 pounds for each main wheel. The main landing gear must be elevated approximately 2-1/2 inches higher than the nose gear with small sheets of plywood placed beneath the scales. This initial elevated position is to compensate for the difference in waterline station between the main and nose gear and fine adjustments can be made from that position by releasing air from the nose wheel tire.
2. Level longitudinally with a spirit level placed on the seat track and laterally with a spirit level placed perpendicular to (across) the seat tracks.
3. Deflate the nose tire to properly center the bubble in the spirit level.

Weighing:

1. Weigh the airplane in a closed hangar to prevent errors caused by air currents.
2. With the airplane level, doors closed and the parking brake released, record the weight shown on each scale. Deduct the tare weight, if any, from each reading.

Measuring (See **Figure 6-1**):

1. Obtain measurement “A” by measuring horizontally along the airplane centerline from the mid point of a line stretched between the centers of the main wheels to a plumb bob lowered from the forward side of the firewall (FS 0.00). This measurement is dimension “A” and is normally approximately 94 inches.
2. Obtain measurement “B” by measuring horizontally and parallel to the airplane centerline from the center of the nose wheel axle, on the left side, to the line stretched between the centers of the main wheels. Repeat this process on the right side of the nose wheel axel and average the two measurements. Subtract this averaged measurement from dimension “A” to obtain the nose wheel weighing point arm. This will be a negative number since the nose wheel is forward of the firewall datum point.
3. Determine and record the moment for the main and nose gear weighing points using the following formula:

Moment = Net Weight x Arm

4. Calculate and record the as-weighed weight and moment by totaling the appropriate columns.
5. Determine and record the as-weighed Center or Gravity in inches aft of datum using the following formula:

C.G. = Total Moment ÷ Total Weight

6. To determine the Empty Weight C.G., add or subtract any items not included in the as-weighed condition to determine the empty condition. Application of the above C.G. formula with empty weight and moment values will determine the Empty Weight C.G.
7. If the airplane was weighed with the oil drained, add the (negative number) correction for engine oil. Add the correction for undrainable fuel (1.0 lb at FS 83.4) to determine the Basic Empty Weight and Moment. Calculate and record the Basic Empty Weight C.G. by applying the above C.G. formula.
8. Record the new weight and C.G. values on the weight and balance record (**Figure 6-2**).
9. The above procedure determines the airplane Basic Empty Weight, Moment and Center or Gravity, expressed in inches aft of datum. The Center of Gravity location can also be expressed as a percentage of the airplane’s Mean Aerodynamic Cord (MAC) using the following formula:

C.G. (%MAC) = 100 x (C.G. Inches – LEMAC) ÷ MAC

- LEMAC = 54.8073
- MAC = 64.919

6-4 WEIGHT AND BALANCE RECORD

Use this form to maintain a continuous history of changes and modifications to the airplane's structure or equipment installations which may affect the weight and balance.

Registration No.			Serial No.	Page of				
Date	Item No.			Added (+) or Removed (-)			Running Basic Empty Weight	
	In	Out		Wt. (LB)	Arm (In.)	Mom./1000	Wt. (LB)	Mom./1000
			As Delivered					

Figure 6-2 – Weight and Balance Record

6-5 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

It is the responsibility of the pilot in command to ensure the airplane is properly loaded and operated within the prescribed weight and center of gravity limits. The following information is provided to assist the pilot in calculating the total weight and moment for the aircraft as it is loaded. The calculated weight and moment is then compared to the Moment Limits chart or table to determine if the aircraft is loaded within its operating limits.

Calculating Weight and Balance (See Figure 6-5):

Airplane loading calculations are performed using the Weight and Balance Loading Form (**Figure 6-5**), the Fuel Weights and Moments (**Figure 6-19**) and the Weight and Moment Limits (**Figure 6-20** and **Figure 6-21**).

1. **Basic Empty Weight** – Enter the current Basic Empty Weight and Moment/1000 from the Weight and Balance Record.
2. **Fuel Loading** – Enter the weight and moment of the usable fuel loaded in the aircraft from the Fuel Weights and Moments chart (**Figure 6-19**).
3. **Pilot and Front Seat Occupants** – Enter the total weight and moment/1000 for personnel occupying the front seats.
4. **Aft Passenger Seat Occupants** – Enter the individual weight and moments/1000 for each occupied aft passenger seat in the row corresponding to the seat which is occupied.
5. **Baggage / Cargo** – Enter the weight and moment/1000 for the baggage and cargo.
6. **Ramp Weight and Moment** – Subtotal the weights and moments/1000 acquired in steps 1 through 5 and insert number on row 4 of the weight and balance form.
   - Subtotal the weight and moment/1000. These values represent the Ramp Condition or the weight and moment of the aircraft prior to taxi.
   - The ramp condition must not exceed the maximum ramp weight of 6800 pounds and must remain within the CG limits established in the Weight and Moment Limits Chart (**Figure 6-20** and **Figure 6-21**).
7. **Fuel Used for Start, Taxi and Runup** – This value is pre-entered on the form. Normally, fuel used for start, taxi and runup is approximately 50 pounds at an average moment/1000 of 4.17.
8. **Takeoff Weight and Moment** – Subtract the weight and moment/1000 for the fuel used for start, taxi and run-up from the Ramp Condition values to determine the Takeoff Condition weight and moment/1000.
   - The total weight at takeoff must not exceed the maximum takeoff weight of 6,750 pounds unless aircraft is certified for increased gross weight up to 7,255 pounds.
   - The total moment/1000 must not exceed the C.G. limits established in the Moment Limits Chart (**Figure 6-20** and **Figure 6-21**).

NOTE: *The original aircraft weight and balance from the factory is performed with the equipment installed as ordered by the customer. Refer to the installed equipment list for the current configuration of the aircraft. For each flight, the aircraft weight and balance must be calculated using the number of seats and seat locations as installed for that particular flight. Refer to the Passenger and Crew Seat Weight and Balance instructions on the following page for determining the passenger seat center of gravity (arm) in calculating the aircraft weight and balance.*

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6-6 PASSENGER AND CREW SEAT WEIGHT AND BALANCE

The KODIAK is equipped with passenger and crew seats which are able to be removed and installed by the pilot. A maintenance log book entry is not required when the seats are removed and installed, but the aircraft weight and balance must be calculated to reflect the seat configuration for each flight.

NOTE: *Seats may not be installed in any position except as defined in this section. Crew Seat Rear Stops must be installed in the location defined by the configurations below. Failure to install the seat stop in the defined location could result in seat positioning that does not meet the minimum seat pitch requirements. Seats must be installed using a single configuration.*

Refer to the installed equipment list for the current aircraft configuration weight and balance record which is located in the front of the POH/AFM. For weight and balance calculations regarding the removal or installation of seats, refer to the following Configurations.

STANDARD SEATING POSITIONING - (CONFIGURATION A)			
Seat Row	**Ref. Point (FS), IN.**	**Empty Seat CG, IN.**	**Occupant CG, IN.**
1	40.0 (Crew Seat Rear Stop Located at FS 50.0)	41.0	35.0
2	84.0	79.3	73.2
3	115.0	110.3	104.2
4	146.0	141.3	135.2
5	177.0	172.3	166.2

Figure 6-3 – Weight and Balance Calculations (Configuration A)

STANDARD SEATING POSITIONING - (CONFIGURATION B)			
Seat Row	**Ref. Point (FS), IN.**	**Empty Seat CG, IN.**	**Occupant CG, IN.**
1	40.0 (Crew Seat Rear Stop Located at FS 44.0)	41.0	35.0
2	78.0	73.3	67.2
3	109.0	104.3	98.2
4	140.0	135.3	129.2
5	171.0	166.3	160.2

Figure 6-3a - Weight and Balance Calculations (Configuration B)

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NOTE: *The KODIAK seat tracks are marked with station identification markings every 10 inches starting at **FS 50.0**. These markings will assist the operator to quickly install seats. **EXAMPLE:** To install a seat in Row 3 (**FS 115.0**), locate fuselage station marking **FS 110.0** and count 5 seat track notches AFT. Insert the seat lock paw into **FS 115.0** and move the seat 1/2 inch AFT and engage the seat track lock. This is the location for the center of the seats track lock pin. For pictures and instructions regarding Passenger and Crew seat installation and removal, refer to **SECTION 8** of this POH/AFM.*

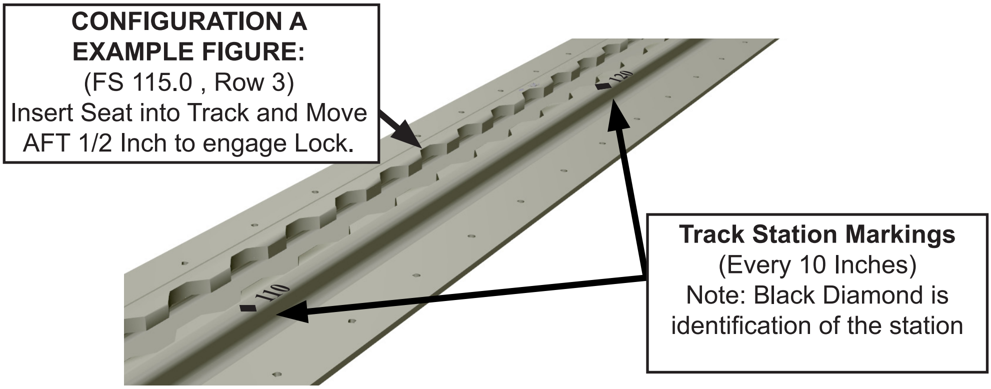

Figure 6-4 – Seat Track Marking Example

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If the seats are moved from the above locations, the individual seat weights and seat CG locations are provided below for calculations:

Crew Seat (with Belts)

Weight...See Seat Weights on W&B form.
Seat Reference Point ....Center of Track Lock Pin and Rear Foot Pivot
FS of Crew Seat Rear Stop ....Configuration A - 50.0 in.
Configuration B - 44.0 in.
Seat CG (occupied and unoccupied)....................See **Figure 6-3 and 6-3a**.

Minimum Seat Pitch* Between Crew Seats Rear Stop and Passenger Seats (2nd Row) ....34.0 in.

Passenger Seat (with Belts)

Weight...See Seat Weights on W&B form.
Seat Reference Point ....Center of Track Lock Pin
Seat CG (occupied and unoccupied)....................See **Figure 6-3 and 6-3a**.
Minimum Seat Pitch* Between Rows ....31.0 in.

*Seat pitch is the distance between the AFT locking mechanism of the seat to the AFT locking mechanism of the seat behind it. For the 2nd row of passenger seating (Row 2), seat pitch is the distance between the center of the Crew Seat Rear Stop and the AFT locking mechanism of the seat behind it.

6-7 WEIGHT AND BALANCE LOADING FORM - (CONFIGURATION A)

(Instructions listed on **Page 6-8**).

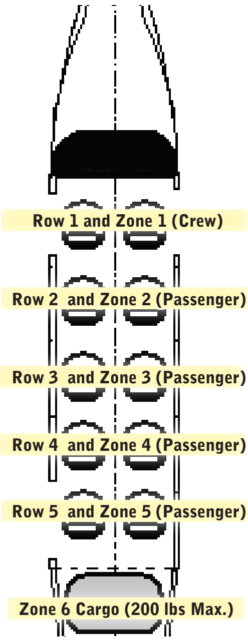
STANDARD SEATING POSITIONING - (CONFIGURATION A)

Visual Aid and Seat Weights

SEAT WEIGHTS:

STANDARD SEATS:
Crew: 31.6 lbs
Passenger: 28.1 lbs

TIMBERLINE SEATS:
Crew: 33.6 lbs
Passenger: 29.2 lbs



	Registration No.:			**Date:**
	Serial No.:			**Initials:**
	Description	**WEIGHT (LB)**	**ARM (IN)**	**MOMENT / 1000**
1.	**BASIC EMPTY WEIGHT:** *Includes full oil and unusable fuel. Use data pertaining to your airplane as it is presently equipped.* ***NOTE:*** *The basic weight of the aircraft is as defined by the installed equipment list. If a seat is removed from the aircraft that was installed in the basic configuration, subtract the weight of the seat using the form below.*		--	
2.	**FUEL LOADING:** (**FS 83.4**) *315 Gallons Usable @ 6.7lb/gal (Max Capacity)*		**83.4**	
3. Seats, Occupants, and Cargo Loading	**ROW 1 AND ZONE 1 (CREW):**	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Crew Seats, (see seat weights) (**FS 41.0**)		**41.0**	
	Occupants Actual Weight (**FS 35.0**)		**35.0**	
	Zone 1 Cargo, Baggage, or Equipment (**FS 40.0**)		**40.0**	
	ROW 2 AND ZONE 2 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 79.3**)		**79.3**	
	Occupants Actual Weight (**FS 73.2**)		**73.2**	
	Zone 2 Cargo, Baggage, or Equipment (**FS 71.0**)		**71.0**	
	ROW 3 AND ZONE 3 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 110.3**)		**110.3**	
	Occupants Actual Weight (**FS 104.2**)		**104.2**	
	Zone 3 Cargo, Baggage, or Equipment (**FS 102.0**)		**102.0**	
	ROW 4 AND ZONE 4 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights)(**FS 141.3**)		**141.3**	
	Occupants Actual Weight (**FS 135.2**)		**135.2**	
	Zone 4 Cargo, Baggage, or Equipment (**FS 133.0**)		**133.0**	
	ROW 5 AND ZONE 5 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 172.3**)		**172.3**	
	Occupants Actual Weight (**FS 166.2**)		**166.2**	
	Zone 5 Cargo, Baggage, or Equipment (**FS 164.0**)		**164.0**	
	ZONE 6 (CARGO): MAXIMUM 200 LBS			
	Zone 6 Cargo, Baggage, or Equipment (**FS 194.0**)		**194.0**	
4.	**TOTAL RAMP WEIGHT AND MOMENT:** *Add items 1 through 3* **TOTAL:**		(--)	
5.	**STARTING, TAXI, AND RUN-UP FUEL:** *Normally 50 LB (moment of 4170)*		**83.4**	
6.	**TAKEOFF WEIGHT AND MOMENT:** *Subtract item 5 from item 4* **TOTAL:**		(--)	

Figure 6-5 – Weight and Balance Loading Form (Configuration A)

6-8 WEIGHT AND BALANCE LOADING FORM - (CONFIGURATION B)

(Instructions listed on **Page 6-8**).

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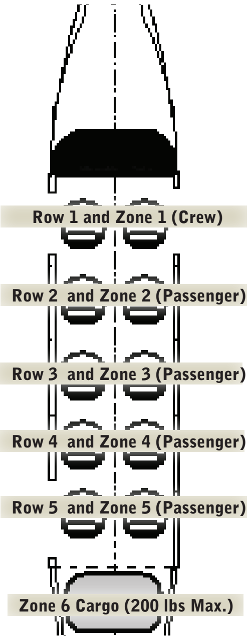
STANDARD SEATING POSITIONING - **(CONFIGURATION B)**

Visual Aid and Seat Weights

SEAT WEIGHTS:

STANDARD SEATS:
Crew: 31.6 lbs
Passenger: 28.1 lbs

TIMBERLINE SEATS:
Crew: 33.6 lbs
Passenger: 29.2 lbs



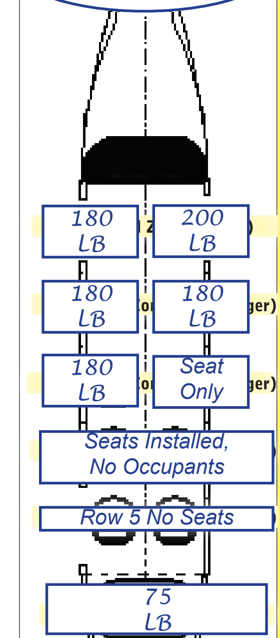
	Registration No.:			Date:
	Serial No.:			Initials:
	Description	**WEIGHT (LB)**	**ARM (IN)**	**MOMENT / 1000**
1.	**BASIC EMPTY WEIGHT:** *Includes full oil and unusable fuel. Use data pertaining to your airplane as it is presently equipped. **NOTE:** The basic weight of the aircraft is as defined by the installed equipment list. If a seat is removed from the aircraft that was installed in the basic configuration, subtract the weight of the seat using the form below.*		--	
2.	**FUEL LOADING:** (**FS 83.4**) *315 Gallons Usable @ 6.7lb/gal (Max Capacity)*		**83.4**	
3. Seats, Occupants, and Cargo Loading	**ROW 1 AND ZONE 1 (CREW):**	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Crew Seats, (see seat weights) (**FS 41.0**)		**41.0**	
	Occupants Actual Weight (**FS 35.0**)		**35.0**	
	Zone 1 Cargo, Baggage, or Equipment (**FS 40.0**)		**40.0**	
	ROW 2 AND ZONE 2 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 73.3**)		**73.3**	
	Occupants Actual Weight (**FS 67.2**)		**67.2**	
	Zone 2 Cargo, Baggage, or Equipment (**FS 71.0**)		**71.0**	
	ROW 3 AND ZONE 3 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 104.3**)		**104.3**	
	Occupants Actual Weight (**FS 98.2**)		**98.2**	
	Zone 3 Cargo, Baggage, or Equipment (**FS 102.0**)		**102.0**	
	ROW 4 AND ZONE 4 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights)(**FS 135.3**)		**135.3**	
	Occupants Actual Weight (**FS 129.2**)		**129.2**	
	Zone 4 Cargo, Baggage, or Equipment (**FS 133.0**)		**133.0**	
	ROW 5 AND ZONE 5 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 166.3**)		**166.3**	
	Occupants Actual Weight (**FS 160.2**)		**160.2**	
	Zone 5 Cargo, Baggage, or Equipment (**FS 164.0**)		**164.0**	
	ZONE 6 (CARGO): MAXIMUM 200 LBS			
	Zone 6 Cargo, Baggage, or Equipment (**FS 194.0**)		**194.0**	
4.	**TOTAL RAMP WEIGHT AND MOMENT:** *Add items 1 through 3* **TOTAL:**		(--)	
5.	**STARTING, TAXI, AND RUN-UP FUEL:** *Normally 50 LB (moment of 4170)*		**83.4**	
6.	**TAKEOFF WEIGHT AND MOMENT:** *Subtract item 5 from item 4* **TOTAL:**		(--)	

Figure 6-5a - Weight and Balance Loading Form (Configuration B)

WEIGHT AND BALANCE EXAMPLE FORM

Visual Aid and Seat Weights

SEAT WEIGHTS:
STANDARD SEATS:
Crew: 31.6 lbs
Passenger: 28.1 lbs
TIMBERLINE SEATS:
Crew: 33.6 lbs
Passenger: 29.2 lbs



	Registration No.: NXXXXX			Date: X/X
	Serial No.: 100-00XX			Initials: RLM
	Description	**WEIGHT (LB)**	**ARM (IN)**	**MOMENT / 1000**
1.	**BASIC EMPTY WEIGHT:** *Includes full oil and unusable fuel. Use data pertaining to your airplane as it is presently equipped.* ***NOTE:*** *The basic weight of the aircraft is as defined by the installed equipment list. If a seat is removed from the aircraft that was installed in the basic configuration, subtract the weight of the seat using the form below.*	3893	--	281.4
2.	**FUEL LOADING:** (**FS 83.4**) *315 Gallons Usable @ 6.7lb/gal (Max Capacity)*	1100	83.4	91.7
3. Seats, Occupants, and Cargo Loading	**ROW 1 AND ZONE 1 (CREW):**	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Crew Seats, (see seat weights) (**FS 41.0**)	Included In Basic	41.0	Included In Basic
	Occupants Actual Weight (**FS 35.0**)	380	35.0	13.3
	Zone 1 Cargo, Baggage, or Equipment (**FS 40.0**)	0	40.0	0.0
	ROW 2 AND ZONE 2 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 79.3**)	58.4	79.3	4.6
	Occupants Actual Weight (**FS 73.2**)	360	73.2	26.4
	Zone 2 Cargo, Baggage, or Equipment (**FS 71.0**)	0	71.0	0.0
	ROW 3 AND ZONE 3 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 110.3**)	58.4	110.3	6.4
	Occupants Actual Weight (**FS 104.2**)	180	104.2	18.8
	Zone 3 Cargo, Baggage, or Equipment (**FS 102.0**)	0	102.0	0.0
	ROW 4 AND ZONE 4 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights)(**FS 141.3**)	58.4	141.3	8.3
	Occupants Actual Weight (**FS 135.2**)	0	135.2	0.0
	Zone 4 Cargo, Baggage, or Equipment (**FS 133.0**)	0	133.0	0.0
	ROW 5 AND ZONE 5 (PASSENGER):	*WEIGHT (LB)*	*ARM (IN)*	*MOMENT / 1000*
	Installed Passenger Seats, (see seat weights) (**FS 172.3**)	0	172.3	0.0
	Occupants Actual Weight (**FS 166.2**)	0	166.2	0.0
	Zone 5 Cargo, Baggage, or Equipment (**FS 164.0**)	0	164.0	0.0
	ZONE 6 (CARGO): MAXIMUM 200 LBS			
	Zone 6 Cargo, Baggage, or Equipment (**FS 194.0**)	75	194.0	14.6
4.	**TOTAL RAMP WEIGHT AND MOMENT:** *Add items 1 through 3* **TOTAL:**	6163.2	(--)	465.5
5.	**STARTING, TAXI, AND RUN-UP FUEL:** *Normally 50 LB (moment of 4170)*	50	83.4	4.2
6.	**TAKEOFF WEIGHT AND MOMENT:** *Subtract item 5 from item 4* **TOTAL:**	6113.2	(--)	461.3

Figure 6-6 – Sample Weight and Balance

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6-10 CREW AND PASSENGER QUICK CALCULATION CHART (REMOVED)

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Chart Removed and Page Reserved.

Figure 6-7 – Removed

6-11 CABIN ZONE LOADING LIMITS

The following figure defines the loading limits for the various cargo zones.

NOTE:

1. *The load in a zone may not exceed the maximum load rating for that zone.*
2. *With the front passenger seat removed, the maximum load in Zone 1 (not including the pilot or his seat) is 300 LB.*
3. *Maximum cargo density is 260 pounds per square foot.*

Zone	FS (Inches)	Maximum Load (Pounds)
1 (Copilot)	40.0	300
2	71.0	1200
3	102.0	1200
4	133.0	800
5	164.0	594
6 (Aft Cargo Shelf)	195.0	200

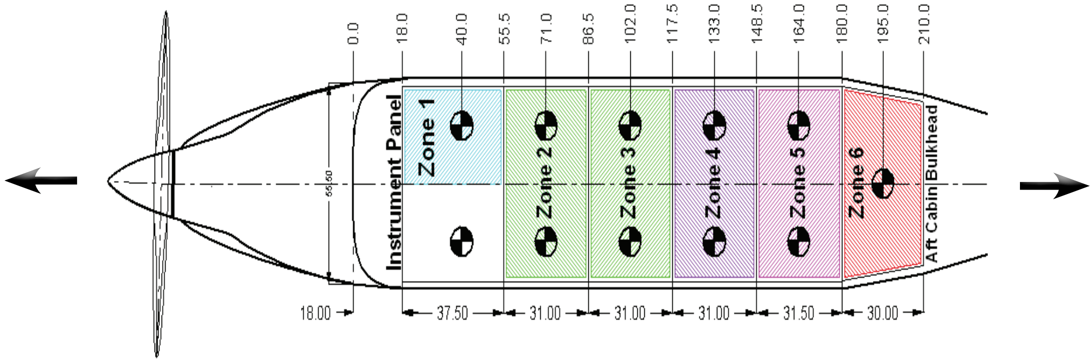

Figure 6-8 – Cabin Zone Loading Limits

6-12 CARGO POD BAY LOADING LIMITS

The following figure defines the loading limits for the various cargo pod zones.

Bay	FS (Inches)	Maximum Load (Pounds)
1	26.0	290
2	75.25	280
3	110.75	180

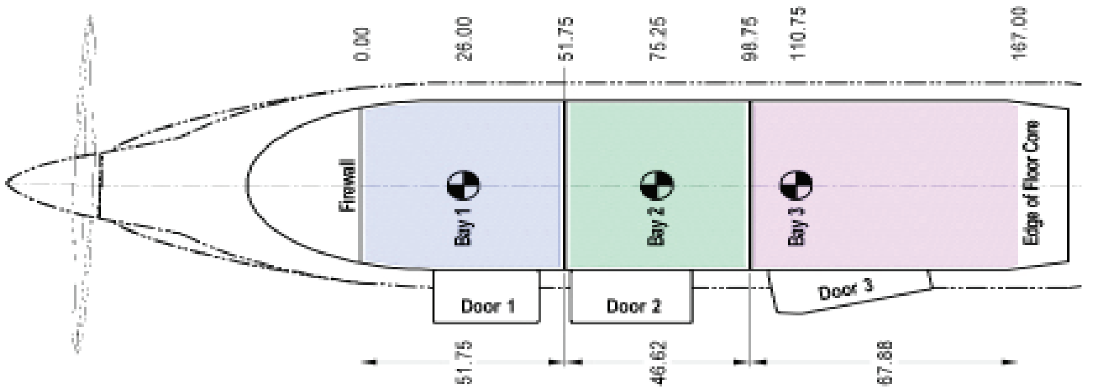

Figure 6-9 – Cargo Pod Bay Loading Limits

6-13 CABIN LOADING CONFIGURATIONS

With the exception of the cockpit, each of the six zones is equipped with tie-down points just behind the forward edge of the zone. The sixth zone also has tie-down points at the rear of the zone, in the aft cabin bulkhead. These tie-down points, along with the seat tracks in the floor allow the operator to fasten straps to the interior of the fuselage.

ACCEPTABLE LOADING CONFIGURATIONS

The acceptable loading configurations for the Kodiak are established to provide occupant safety in flight and allow emergency egress through both crew doors and the cargo door. The illustrations below represent different loading scenarios by showing an overhead view of the fuselage with grey areas representing areas where cargo is loaded.

> **WARNING:** *There may be configurations that are geometrically possible and allowed as shown in the following illustrations, but care must be taken to also observe the loading rules regarding strap and tie-down use. It is likely that the availability of tie-down points will limit the cargo to be carried - particularly for heavy loads that span multiple zones.*

Generally, the rear zone (Zone 6) is not equipped for seats and may be used for cargo with any seating configuration.
Seats must be removed beginning at the rear of the cabin to make room for cargo when the aircraft is loaded with a combination of cargo and passengers as illustrated in **Figure 6-10**. There must be at least 8″ of clearance between cargo and the back of seats.

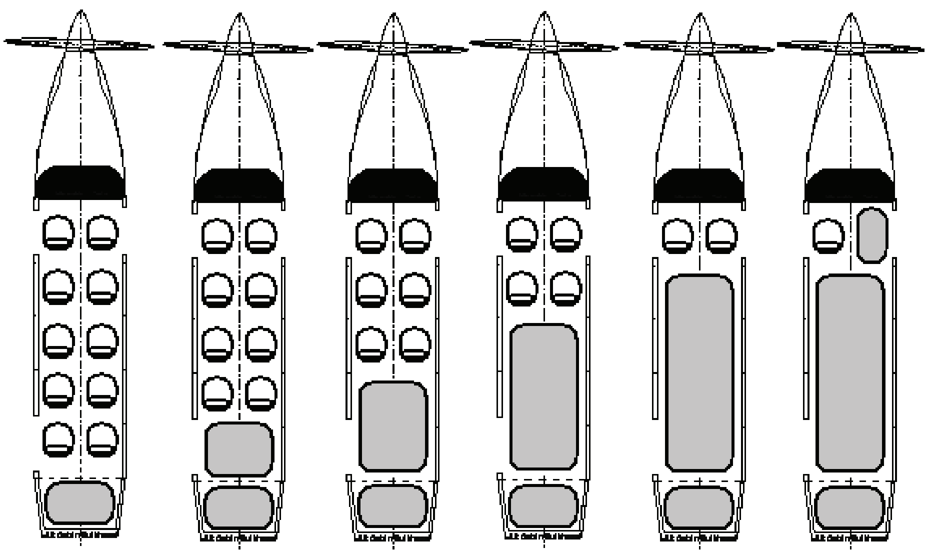

Figure 6-10 – Placement of Cargo Aft of Passengers

ACCEPTABLE LOADING CONFIGURATIONS (CONTINUED)

Placement of cargo along side passengers is acceptable as long as a 12″ aisle is left for passenger egress to the crew doors. This general configuration is illustrated in **Figure 6-11**.

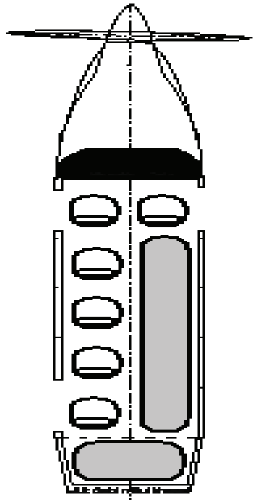

Figure 6-11 – Loading and Securing Cargo Next to Passengers

A combination of aft and side placement of cargo is also permissible. Examples of this are shown in **Figure 6-12.** As with side loading, a combination of aft and side placement of cargo must allow for a 12″ passenger egress isle forward to the crew doors.

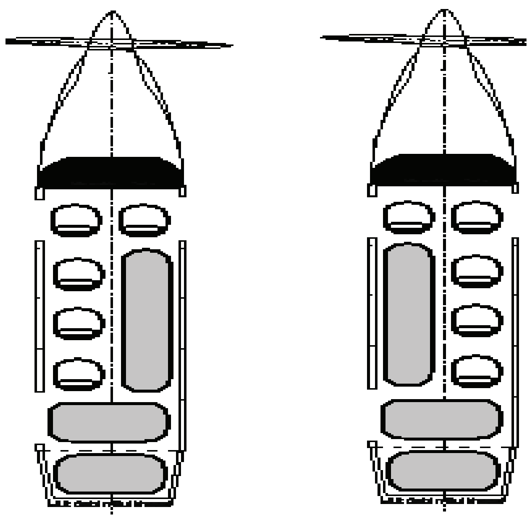

Figure 6-12 – Combination Side/Aft Cargo Placement

PROHIBITED LOADING CONFIGURATIONS

Cargo may not be placed in front of passengers. This would block access to the right side emergency exit.

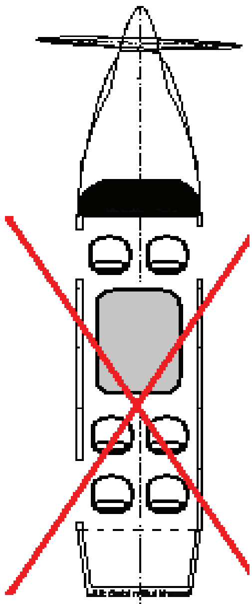

Figure 6-13 – Prohibited Loading Configuration

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6-14 SECURING CARGO

It is the responsibility of the operator to use approved cargo straps and cargo attach fittings to ensure that cargo is properly restrained. The use of the approved cargo straps and cargo attach fittings must be in accordance with the Strap Usage requirements below.

APPROVED CARGO ATTACH FITTINGS

The following cargo attach fittings are the only fittings approved for use on the KODIAK:

APPROVED CARGO ATTACH FITTINGS		
MANUFACTURER	PART NO.	ATTACH TYPE
ANCRA INTERNATIONAL, LLC	40340-20	SINGLE-STUD
ANCRA INTERNATIONAL, LLC	40340-21	SINGLE-STUD
ANCRA INTERNATIONAL, LLC	40340-22	SINGLE-STUD
ANCRA INTERNATIONAL, LLC	40340-23	SINGLE-STUD
ANCRA INTERNATIONAL, LLC	40340-24	SINGLE-STUD
ANCRA INTERNATIONAL, LLC	40340-25	SINGLE-STUD
ANCRA INTERNATIONAL, LLC	47556-10	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-11	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-12	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-14	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-16	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-20	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-21	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-22	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-24	DOUBLE-STUD
ANCRA INTERNATIONAL, LLC	47556-26	DOUBLE-STUD
CARGO SYSTEMS, INC	78101	DOUBLE-STUD

APPROVED CARGO STRAPS

The following straps are the only straps approved for use on the KODIAK:

APPROVED CARGO STRAPS			
MANUFACTURER	PART NO.	ATTACH TYPE	COMPATIBLE FITTING(S) [BY ROW#]
CARGO SYSTEMS, INC	41842-80	HOOK (X2)	1 - 17
CARGO SYSTEMS, INC	S3E120E24N07	SNAP HOOK (X2)	1 - 17
CARGO SYSTEMS, INC	S3E180E24N07	SNAP HOOK (X2)	1 - 17
CARGO SYSTEMS, INC	S3E240E24N07	SNAP HOOK (X2)	1 - 17
<ANY>	CGU-1/B (per MIL-PRF-27260C)	HOOK (X2)	1 - 17

STRAP USAGE

There must be one dedicated strap for every:
100 lb of cargo to restrain the cargo from shifting forward
800 lb of cargo to restrain the cargo from shifting upward
500 lb of cargo to restrain the cargo from sideward shifting

An article of cargo that weights 800 lb will require 8 straps restraining forward movement, 1 strap restraining upward movement and 4 straps restraining sideward movement (2 in each direction), for a total of 13 straps. The method of calculating the number of straps required is shown in following equations:

Strap Calculation for Forward Restraint

$$\left(\frac{800\ lb}{100\ lb}\right) = 8\ Straps$$

Strap Calculation for Upward Restraint

$$\left(\frac{800\ lb}{800\ lb}\right) = 1\ Strap$$

Strap Calculation for Sideward Restraint

$$\left(\frac{800\ lb}{500\ lb}\right) = 1.6 \longrightarrow 2\ Straps\ (In\ Each\ Direction)$$

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TIE-DOWN POINTS

The ratings for the tie-down points in the fuselage of the KODIAK are provided in **Figure 6-14** below.

Tie-Down Location & Type & Location	Rating (Pounds)
Ceiling	75
Floor, Zone 6	75
Walls	100
Floor, Single Lug	100

Figure 6-14 – KODIAK Tie-Down Point Ratings

The number of tie-down points required for the example 800 lb article of cargo will depend upon which tie-down points are used. If the minimum of 13 straps are used and 2 tie-down points are utilized for each strap for a total of 26 tie-down points, the operator will need to ensure that the capacity of the tie-down points sum to at least 800 lb as shown in the equation below. The equation calculates the total capacity of the 26 tie-down points assuming the use of 10 wall tie-down points and 16 floor tie-down points and the individual ratings taken from **Figure 6-14** above.

(10 X100 LB) {10 X *WALL*} + (16 X 100 LB) {16 X *FLOOR* } = 2,600 LB => *Adequate Tiedown Points*

6-15 GENERAL SECURING OF CARGO

There are several rules in place to protect the occupants from free or shifting cargo during all phases of ground and flight operations. While operating according to the previous guidelines, the operator will be required to abide by the following rules when securing cargo in the aircraft.

WARNING: *These rules are intended to ensure safe transport of passengers and cargo while maintaining flexibility in configuring the interior for travel. The loading rules presented here prohibit configurations of cargo and passengers that could be dangerous. If a particular combination of cargo weight and configuration does not satisfy all of the loading rules presented here it may not be carried in the Kodiak 100.*

- Cargo must be firmly immobilized in all directions and secured by straps and tie-down points of adequate strength.
- The number of tie-down points must be selected so that the sum of their capacity is equal to, or greater than, the weight of the article of cargo.
- Loads must be secured in a “down and back” manner.
- Straps must be attached and secured in a manner that prevents them from becoming unfastened, opened or released while in use.
- Multiple straps securing common cargo must all be securely tightened to the same tension to ensure that load is carried by all straps. When tightening multiple straps care must be taken to ensure that tightening one strap (or set of straps) does not loosen another strap (or set of straps).

- If multiple straps are used to restrain an article of cargo in a particular direction the straps shall be spaced evenly about the center of gravity of the cargo.
- Only one strap may be attached to each cargo tie-down fitting.
- Fittings installed in the seat tracks must have a spacing of at least 8″ from each other.
- There must be at least 4″ of clearance between the sides of the fuselage (or windows) and articles of cargo.
- There must be at least 8″ of clearance between cargo and the back of seats.
- Cargo spanning more than one zone may have a total weight greater than the maximum loading for individual zones (zone load ratings may be added together); but care must be taken to ensure that the maximum zone ratings are not violated in any individual zone.
- Items that are difficult to bundle or stack with other cargo must be secured separately using adequate straps and tie-down points.
- All equipment used to secure cargo must be in proper condition when used to perform that function with no damage or weakened components that could adversely affect its performance.

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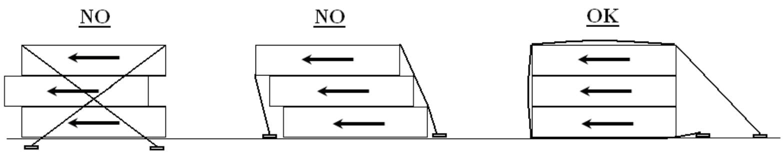

Figure 6-15 – Securing Stacked Cargo

SECURING CARGO USING WALL AND CEILING TIE-DOWNS

The walls and ceiling of the fuselage are less capable of restraining cargo than the seat tracks and therefore require the following considerations:

- When securing cargo to prevent upward movement, the cargo must be positioned so that the straps create an angle of at least 45° with the floor (viewed from front or rear) when using tie-down points in the walls of the fuselage. This is illustrated in **Figure 6-16**.

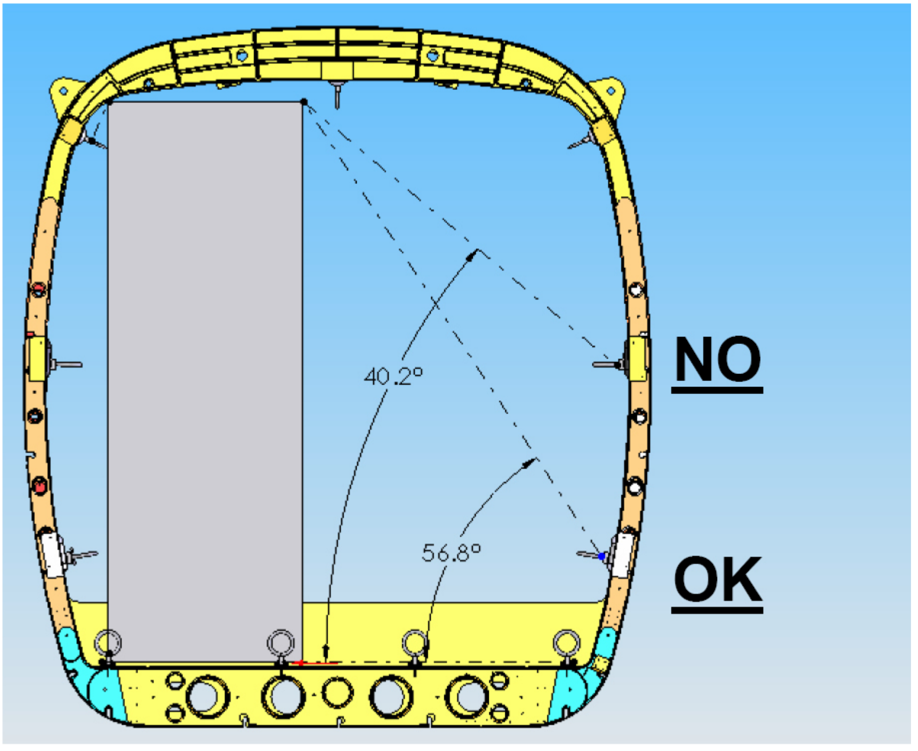

Figure 6-16 – Upward Restraint with Straps

- When securing cargo to prevent forward movement, the cargo must be positioned so that the straps create an angle of at least 45° with the leading edge of the cargo (viewed from above) when using tiedown points in the walls of the fuselage. This is illustrated in **Figure 6-17**. The exception is when two straps are used together to prevent forward movement and pass over the top of the cargo as well as in front of the cargo. This is illustrated in **Figure 6-18**.

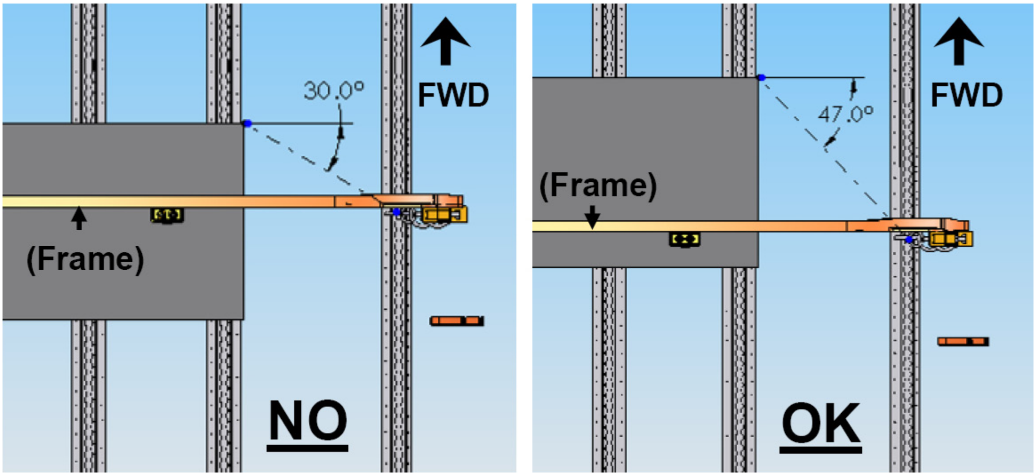

Figure 6-17 – Forward Restraint with Straps

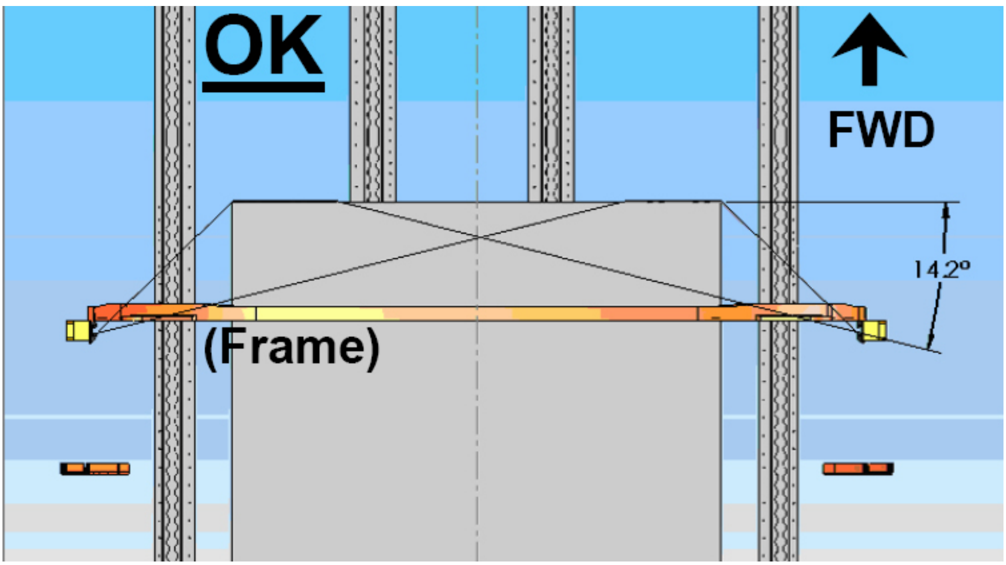

Figure 6-18 – Combination Forward and Upward Restraint

NET USAGE

If a cargo net is used, tie it securely to itself along front and sides so that cargo cannot escape from under the net. While the net bundles the load together, straps shall be added in accordance with the total weight of the cargo following the rules discussed previously.

Do not fasten cargo nets to tie-downs or seat tracks under or at the rear of seats. This would give minimal protection for the occupants due to strap stretch. The net should be pulled under the cargo and tied back – pulling the load away from the seats with at least 8″ between the cargo and the back of a seat.

While it is permissible for straps to be weaved into nets (to prevent the net from sliding under the strap), each end of a strap that is being used to secure the load must be fastened to tie-down points in the aircraft.

CARGO ALONGSIDE OCCUPANTS

When it is necessary to have cargo alongside an occupant, it must be secured away from the occupant as well as down and back.

When the pilot is the only occupant, and the copilot seat has been removed to carry cargo, the cargo must be at least 6″ in any direction from the copilot flight controls when in their most aft position (including rudder pedals) and must not be higher than the door handle.

6-16 FUEL WEIGHTS AND MOMENTS

USABLE FUEL (Jet A, Jet A-1, JP-1 and JP-8) WEIGHT AND MOMENT TABLE With density of 6.7 pounds per gallon at 60°F					
Gallons	Weight (LB)	Moment / 1000	Gallons	Weight (LB)	Moment / 1000
5	33	2.8	165	1105	92.2
10	67	5.6	170	1139	95.0
15	100	8.4	175	1172	97.8
20	134	11.2	180	1206	100.6
25	167	14.0	185	1239	103.4
30	201	16.8	190	1273	106.2
35	234	19.6	195	1306	109.0
40	268	22.4	200	1340	111.8
45	301	25.1	205	1373	114.6
50	335	27.9	210	1407	117.3
55	368	30.7	215	1440	120.1
60	402	33.5	220	1474	122.9
65	435	36.3	225	1507	125.7
70	469	39.1	230	1541	128.5
75	502	41.9	235	1574	131.3
80	536	44.7	240	1608	134.1
85	569	47.5	245	1641	136.9
90	603	50.3	250	1675	139.7
95	636	53.1	255	1708	142.5
100	670	55.9	260	1742	145.3
105	703	58.7	265	1775	148.1
110	737	61.5	270	1809	150.9
115	770	64.6	275	1842	153.7
120	804	67.1	280	1876	156.5
125	837	69.8	285	1909	159.3
130	871	72.6	290	1943	162.0
135	904	75.4	295	1976	164.8
140	938	78.2	300	2010	167.6
145	971	81.0	305	2043	170.4
150	1005	83.8	310	2077	173.2
155	1038	86.6	315	2110	176.0
160	1072	89.4	320	2144	178.8

Figure 6-19 – Fuel Weights and Moments

6-17 WEIGHT AND MOMENT LIMITS

Use the following chart or table to determine if the weight and moment calculations from the Weight and Balance Loading Form are within limits.

Figure 6-20 – Weight and Moment Limits Chart

Weight (LB)	Moment / 1000		Weight (LB)	Moment / 1000	
	Minimum	Maximum		Minimum	Maximum
3250	209	264	5100	356	414
3300	212	268	5200	363	422
3400	218	276	5300	370	430
3500	224	284	5400	377	438
3600	231	292	5500	384	446
3700	237	300	5600	391	454
3800	244	308	5700	398	462
3900	250	316	5800	405	470
4000	257	324	5900	412	479
4100	263	333	6000	419	487
4200	269	341	6100	425	495
4300	276	349	6200	432	503
4400	282	357	6300	439	511
4500	289	365	6400	446	519
4600	295	373	6500	453	527
4700	301	381	6600	460	535
4800	308	389	6700	467	543
4900	314	397	6750	471	547
5000	321	406	6800	474	552

Figure 6-21 – Weight and Moment Limits Table

6-18 CENTER OF GRAVITY LIMITS

The figure below illustrates the airplane's center of gravity envelope in inches aft of datum.

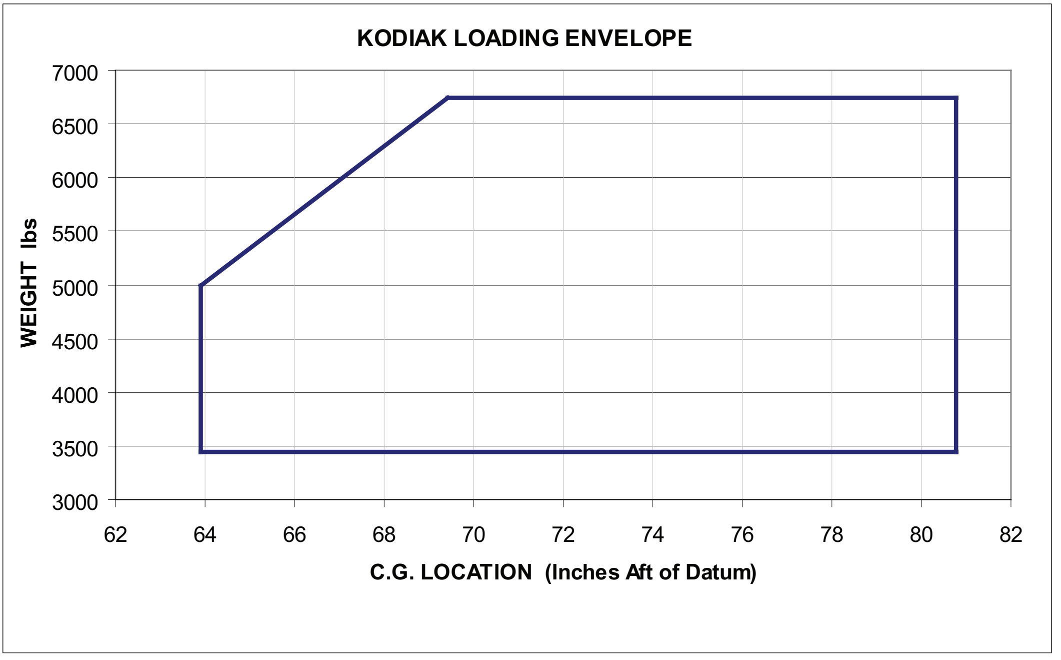

Figure 6-22 – Center of Gravity Limits

6-19 COMPREHENSIVE EQUIPMENT LIST

The **Comprehensive Equipment List** provides a list of all equipment which is available for the Kodiak 100 airplane. This comprehensive equipment list provides the following information:

- In the Item No. column, each item is assigned a code number. The first two digits of the code represent the identification of the item within the **GAMA Specification No. 2**. These assignments also correspond to the Maintenance Manual chapter the items would be categorized under. After the first two digits, items are assigned a sequence number. After the sequence number, a suffix letter is assigned to identify the item as a required item, standard item or an optional item.
- The suffix letters are provided as follows:
  (R) – Required items or equipment for FAA certification (**14 CFR Part 23 or Part 91**)
  (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 described to help identify its function.
- In the Installation Drawing No. column, a Quest Aircraft Company drawing number is provided which corresponds to the item.

NOTE: *If additional equipment is to be installed on the aircraft, it must be done in accordance with the installation drawing, service bulletin or a separate FAA approval.*

- In the Wt. (LB) and Arm (In.) columns, information is provided on the weight in pounds and arm in inches of the equipment item.

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

NOTE: *Asterisks (*) in the weight and arm column indicate complete assembly installations. Some major components of the assembly will be 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	Installation Drawing No.	Wt. (LB)	Arm (In.)
11 – Placards and Markings				
11-01-S	Paint, Overall Basecoat W/ Color Trim			
	• Overall Base Coat		69.6	109.0
21 – Air Conditioning				
	Ventilators, Adjustable			
21-01-S	• 4ea. Panel Mounted	100-715-0000	0.2 ea	17.9
21-02-A	• 8ea. Cabin Overhead	100-720-0000	0.2 ea	130.0
21-03-S	Cabin Heating, Electric			
	• 8ea. Cabin Heaters	100-821-5000	0.4 ea	115.7
21-04-A	Cooling System			
21-041-R	Forward Blower	100-821-2000	39.2	8.1
24-042-O	Aft Blower	100-821-3000	14.5	220.7
21-05-S	Bleed Air Metering Valve	100-175-0000	2.0	-30.5
21-06-S	Bleed Air On/Off Valve	100-175-0000	1.2	-1.0
21-07-R	Avionics Cooling Fan, Left	100-210-4200	0.7	13.8
21-08-R	Avionics Cooling Fan, Right	100-210-4400	0.7	13.8
22 – Auto Flight				
22-01-A	Three Axis Autopilot System	100-630-0000		
	• STEC 55X Two Axis Autopilot Computer with GPS Steering		2.5	17.2
	• Yaw Damper Computer		0.9	292.0
	• Yaw Servo		2.9	239.0
	• Absolute Pressure Transducer		0.2	16.8
	• Pitch Servo		2.9	245.0
	• Roll Servo		2.9	85.3
22-02-R	Flap/Trim Compensation Unit	100-210-5000	0.9	22.9
22-03-R	Trim Servo		2.9	25.3

Item No.	Equipment List Description	Installation Drawing No.	Wt. (LB)	Arm (In.)
23 – Communications				
23-01-S	Static Discharge Wicks (Set of 12)	100-827-7000	0.02	244.5
23-02-R	Audio/Intercom/Marker Beacon			
	• GMA 1347 Audio Panels (2ea.)	100-820-2000	1.7ea	15.3
	• Marker Beacon Antenna	100-820-2003	0.6	239.0
23-03-R	NAV/COM/GPS #1 Computer			
	• GIA 63 Integrated Avionics Unit	100-820-2000	4.9	12.4
	• VHF Com/GPS Antenna	100-820-2003	1.3	74.0
23-04-S	NAV/COM/GPS #2 Computer			
	• GIA 63 Integrated Avionics Unit	100-820-2000	4.9	12.4
	• VHF Com/GPS/XM Antenna	100-820-2003	1.25	144.0
24 – Electrical Power				
24-01-R	Starter/Generator, 28V, 300 Amp	100-171-6000	34.0	-7.1
24-02-R	Alternator, 28V, 40 Amp	100-171-6000	6.56	-11.3
24-03-R	Batteries (2ea) 24V, 14 Amp Hour	100-824-3201	27.9 ea	-4.4
24-04-R	Master Control Unit w/ High Start	100-820-2100	16.4	-4.3
25 – Equipment / Furnishings				
25-01-R	Seat, Pilot, 6-Way Adjustable	100-825-0000	For Seat Weight and installed ARM, Refer to the W/B Loading Form	
25-02-R	Seat, Front Passenger, 6-Way Adjustable	100-825-0000		
25-03-A	Seats, 2nd Row Passenger w/ Seat Belt (2ea)	100-825-0000		
25-04-A	Seats, 3rd Row Passenger w/ Seat Belt (2ea)	100-825-0000		
25-05-A	Seats, 4th Row Passenger w/ Seat Belt (2ea)	100-825-0000		
25-06-A	Seats, 5th Row Passenger w/ Seat Belt (2ea)	100-825-0000		
25-07-R	Seat Belt and Shoulder Harness, Inertia Reel Manual Adjustable, Pilot and Front Passenger	100-825-0000	5.0 ea	52.5
25-08-S	Sun Visor (Set of 2)	100-715-0000	0.1 ea	37.8
25-09-A	Cargo Tie-Down Brackets • Extended Anchor Plate (12x) • Anchor Plate (24x) • Anchor Plate (8x)	 100-720-0000 100-720-0000 100-730-0000	 .2 ea .1 ea .1 ea	 99.3 144.1 201.0
25-10-R	Pilot's Operating Handbook and FAA Approved Flight Manual (Stowed in Pilot Door Pocket)		2.5	60.0
25-11-R	ME406 Emergency Locator Transmitter • ELT Transmitter • Antenna and Cable Assembly	100-820-2000	 2.1 0.6	 227.6 217.7

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Item No.	Equipment List Description	Installation Drawing No.	Wt. (LB)	Arm (In.)
25 – Equipment / Furnishings (continued)				
25-12-O	C406N Emergency Locator Transmitter • ELT Transmitter • Antenna and Cable Assembly	100-820-2007	4.63 0.5	228.9 217.7
25-13-R	Garmin G1000 Cockpit Reference Guide (Stowed in Pilot Seatback)	N/A	2.5	60.0
25-22-A	Jump Plane Static Line	100-294-0000	20.6	150.0
26 – Fire Protection				
26-01-R	Crew Fire Extinguishers • Crew Fire Extinguisher, Hand Type (2ea) • Mounting Clamp and Hardware (2ea)	100-260-1020 100-260-1020	1.6 ea 0.3 ea	26.2 26.2
26-02-R	Aft Fire Extinguisher • Aft Fire Extinguisher, Hand Type • Mounting Clamp and Hardware	100-260-1020 100-260-1020	4.9 0.5	205.7 206.9
27 – Flight Controls				
27-02-R	Flap Controller	100-330-0000	5.2	104.7
28 - Fuel				
28-01-R	Pump, Electric Auxiliary Fuel	100-828-2700	3.4	39.7
28-02-R	Fuel Filter, Firewall Mounted (Dry)	100-828-1700	2.3	-5.4
28-03-S	Fuel Quantity Indicators, Magnetic (2ea)	100-828-3000	.3	85.1
28-04-R	Capacitance Type Fuel Probes (4ea)	100-828-3000	0.5	81.0
28-05-R	Pump, Ejector Type	100-828-2700	0.2	48.4
28-06-R	Switch, Low Fuel Pressure	100-828-2700	0.3	43.2
30 – Ice and Rain Protection				
30-01-R	Heated Pitot/Static Tubes (2ea)	100-834-4100	0.9	40.4
30-02-R	Heated Stall Warning Sensor	100-834-5000	0.7	55.4
31 – Indicating / Recording Systems				
31-01-S	Recording Hourmeter (Engine)	100-210-4700	0.2	17.5
31-02-S	Recording Hourmeter (Flight)	100-210-4700	0.2	17.5
31-03-R	GEA 71 Engine/Airframe Interface	100-820-2000	2.2	12.8
31-04-R	GTP 59 Outside Air Temperature Probes (2ea)	100-820-2200	.1ea	33.0

Item No.	Equipment List Description	Installation Drawing No.	Wt. (LB)	Arm (In.)
32 – Landing Gear				
32-00-R	Main Gear Assembly (Without Wheels)	100-420-1000	219.2	93.7
32-01-R	Main Wheel Assembly	100-450-0000	14.0 ea	93.7
32-02-R	Brake Assembly (Each)	100-832-1000	13.1	91.8
32-03-S	Main Tire, 8-Ply, 8.5x10.0	100-450-0000	24.4	93.7
32-04-S	Tube, 8.5x10.0	100-450-0000	3.0	93.7
32-05-O	Main Tire, 10-Ply, 29x11.00-10.0	100-450-0000	34.8	93.7
32-06-O	Main Tube, 29x11.00-10.0	100-450-0000	4.4	93.7
32-07-R	Nose Gear Assembly (Without Wheels)	100-410-0000	81.3	-39.4
32-08-R	Nose Wheel Assembly	100-450-0000	7.6	-39.4
32-09-S	Nose Tire, 6-Ply, 6.50x8.0	100-450-0000	13.0	-39.4
32-10-S	Nose Tube, 6.50x8.0	100-450-0000	2.2	-39.4
32-11-O	Nose Tire, 6-Ply, 22x8.0-8.0	100-450-0000	13.0	-39.4
32-12-O	Nose Tube, 22x8.0	100-450-0000	3.0	-39.4
33 – Lights				
33-01-R	Wingtip Anticollision Strobe/Navigation Lights	100-250-0197	0.5	83.6
33-02-S	Landing Lights	100-833-4001	.7	65.6
33-03-S	Taxi Lights	100-833-4001	.3	61.5
33-04-S	Flashing Beacon	100-820-2003	1.2	156.5
33-06-R	Tail Navigation Light, LED	100-250-0097	0.2	313.0
33-07-S	Pedestal Overhead Light	100-820-7151	0.1	42.0
33-08-S	Instrument Panel Flood Light	100-715-1400	.1	23.5
33-09-S	Crew Overhead Dome Lights	100-715-1710	.4	46.0
33-11-S	Cabin Overhead Dome Lights	100-720-3000	0.3	136.5
33-12-S	Recognition Light Flasher Assembly	100-210-5400	0.4	25.9

Item No.	Equipment List Description	Installation Drawing No.	Wt. (LB)	Arm (In.)
34 – Navigation				
34-01-R	Standby Airspeed Indicator	100-820-4203	0.7	17.0
34-02-S	Pitot/Static Drain Valves	100-834-4300	0.03	10.0
34-03-R	Standby Altimeter	100-820-4202	0.9	15.6
34-04-R	Magnetic Compass	100-715-0000	0.3	26.1
34-05-R	Transponder • Transponder Antenna • GTX-33 Transponder	 100-820-2000 100-820-2003	 0.2 3.0	 27.0 11.6
34-06-R	GDU 1040 PFD Displays (2ea)	100-820-2000	6.3	17.6
34-07-R	GDU 1040 MFD Display	100-820-2000	6.3	17.6
34-08-R	Attitude Heading Reference Sensors (AHRS) • GRS 77 AHRS (2ea) • GMU 44 Magnetometers (2ea)	 100-834-6000 100-313-6100	 2.4 0.4	 133.8 72.0
34-09-R	GDC 74A Air Data Computers (2ea)	100-820-2000	1.7	11.9
34-10-A	WX 500 Stormscope • Processor • Antenna	 100-820-2001	 2.5 0.8	 215.5 272.4
34-11-S	GDL-69A Datalink	100-820-2005	1.9	12.9
34-12-A	Skywatch Traffic Avoidance System (TAS) • Processor • Antenna	 100-820-2002	 8.9 2.3	 217.8 55.3
34-13-R	Standby Attitude Indicator	100-820-4200	1.0	14.0
35 – Oxygen				
35-01-S	2 Port Oxygen System • 50 Cu. Ft. Oxygen Bottle/Regulator (Full)	100-835-1000	 14.6	 213.3
35-02-S	Cockpit Mounted Oxygen System Display	100-210-4700	0.6	19.1
35-02-O	10 Port Oxygen System • 115 Cu. Ft. Oxygen Bottle/Regulator (Full)	100-835-2000	 28.3	 213.4
52 – Doors				
52-01-S	Cargo Door Assembly	100-261-2000	38.3	154.0
52-02-S	Cargo Door Steps	100-261-2042	10.0	154.0
52-03-S	Pilot Door Assembly	100-260-0000	21.8	40.5
52-04-S	Front Passenger Door Assembly	100-260-0000	21.6	40.5
53 – Fuselage				
53-01-S	Crew Steps	100-270-3700	3.4 ea	48.8

Item No.	Equipment List Description	Installation Drawing No.	Wt. (LB)	Arm (In.)
61 – Propeller				
61-01-R	Propeller, Hartzell, Aluminum Constant Speed, Reversible, Feathering, 96” 4 Blade	100-161-0100	134.9	-70.3
	• Spinner	100-161-0100	10.3	-75.8
	• Overspeed Governor	100-171-6000	3.1	-61.6
	• Beta Indicating Switch	100-171-6000	.2	-65.6
	• Propeller Tachometer Generator	100-171-6000	1.2	-61.0
71 – Powerplant				
71-01-R	Engine, Pratt & Whitney PT6A-34	100-181-0000	346.2	-37.5
71-02-R	Inertial Separator	100-172-0000	18.8	-33.0
73 – Engine Fuel and Control				
73-01-R	Fuel Control Unit (Included in Engine)	100-181-0000		
73-02-R	Fuel Flow Transducer	100-171-6000	0.7	-13.0
73-03-S	Fuel Pressure Transducer	100-828-1700	0.4	-7.5
73-04-R	Oil-to-Fuel Heater (Included in Engine)	100-181-0000		
73-05-R	Engine Driven Fuel Pump (Included in Engine)	100-181-0000		
74 – Ignition				
74-01-R	Ignition Exciter Box (Included in Engine)	100-181-0000		
74-02-R	Spark Igniters (2ea) (Included in Engine)	100-181-0000		
74-03-R	Ignition Cables (2ea) (Included in Engine)	100-181-0000		
77 – Engine Indicating				
77-01-R	Inter-Turbine Temperature Probe (Included in Engine)	100-181-0000		
77-02-R	Gas Generator Compressor (Ng) RPM Tachometer Generator	100-171-6000	1.2	-11.3
77-03-R	Electric Torque Transducer	100-171-6000	0.6	-63.0
77-04-R	Tach Generator Adapter	100-820-2000	0.5	0.6
78 – Exhaust				
78-01-S	Exhaust Stacks (L & R)	100-171-0000	-6.6ea	-50.9
78-02-S	Turn Down Stacks		6.7	
79 – Oil				
79-01-R	Oil Cooler (Wet)	100-179-0001	24.2	-13.2
79-02-R	Oil Pressure Transducer	100-171-6000	0.4	-15.0
79-03-R	Oil Temperature Transducer	100-171-6000	0.1	-15.5

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SECTION 7
AIRPLANE AND SYSTEM DESCRIPTION
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7-1 INTRODUCTION

This section provides basic descriptions and operation procedures for the standard airplane and its systems. Optional equipment described within this section is identified as optional.

> **NOTE:** *Some optional equipment, primarily avionics, may not be described in this section. For descriptions and operation procedures for equipment not provided in this section, refer to* **Section 9***, Supplements.*

7-2 AIRFRAME

FUSELAGE

The KODIAK's semi-monocoque fuselage is constructed of aluminum bulkheads, stringers, and skins. It is designed to be lightweight, rugged, aerodynamically efficient, and capable of hauling 9 passengers and/or cargo into remote locations. The fuselage contains forward and aft carry-through spars which provide connection fittings for the wings, landing gear, and wing struts.

WINGS

The externally braced wing structure is constructed of aluminum front and rear spars, ribs, doublers, and stringers. The wing cross section is a blend of several high performance airfoils. The outboard cross section of each wing is designed with a lower angle of incidence to improve roll control near stall. This design also incorporates a discontinuous leading edge which acts as a stall fence to help maintain aileron control near stall. The wings contain integral fuel bays, each providing a capacity of 160 gallons. The integral fuel bays are formed by the forward and aft spars, upper and lower skins, and the inboard and outboard closeout ribs. The forward spar provides wing to fuselage attach fittings and wing to strut attach fittings. The aft spar provides a wing to fuselage attach fitting.

EMPENNAGE

The empennage consists of a horizontal stabilizer, elevator, vertical tail, and a rudder. All of the empennage components are of conventional construction containing aluminum spars, ribs, and skins. A dorsal fin is attached to the forward spar of the vertical stabilizer and the upper structure of the fuselage. The rudder is attached to the vertical stabilizer at three hinge points. The elevator is constructed as two pieces, connected with a torque tube and attached to the aft spar of the horizontal stabilizer at seven hinge points.

7-3 PRIMARY FLIGHT CONTROLS

The Kodiak uses conventional flight controls for the ailerons, rudder and elevator. The control surfaces are pilot actuated through input from either of two conventional control yokes, located directly forward of each crew seat. The control system uses a combination of push-rods, cables, sectors, and bellcranks to control the surfaces.

Roll, pitch, and yaw trim are available through controls mounted on the control pedestal, and on the left and right control yokes. Manual elevator trim is available through a trim wheel located on the left side of the quadrant. Electric elevator trim is operated by a switch located on the outboard side of the left control yoke. Electric rudder and aileron trim are operated by switches located on the control pedestal.

ELEVATOR SYSTEM

The two-piece elevator provides pitch control for the aircraft. The elevator is of conventional aluminum construction with skins, a spar and ribs. Each elevator is attached to the aft spar of the horizontal stabilizer at three hinge points and to the aft fuselage with the elevator control sector.

Elevator motion is generated through the pilot's control yokes by sliding the yoke tubes forward or aft. A push-pull linkage is connected to a cable sector, from which cables are routed through a series of pulleys to a sector located in the tailcone. The tailcone sector actuates a push/pull rod which is attached to the elevator sector and elevator torque-tube.

AILERON SYSTEM

The ailerons provide roll control for the airplane. The ailerons are of conventional aluminum construction consisting of skins, spars and ribs. Each aileron is attached to the aft spar of the wing at two hinge points.

The left and right control columns contain control wheels, control tubes, bearings and quadrants. An interconnect cable attaches the left control wheel to the right control wheel. The aileron cable is divided into two loops; the low tension loop and the high tension loop.

The low tension loop, located in the fuselage, is routed via a series of pulleys from the left control wheel, under the floorboards and up the left sidewall to a loop connecting bracket in the cabin overhead. The loop then runs from the loop connecting bracket across the cabin to the second loop connecting bracket, to the right sidewall, down the sidewall, under the floorboards, and back to the left quadrant.

The high tension loop is located in the upper portion of the cabin and left and right wings. It interconnects the loop connecting brackets in the cabin top with the left and right aileron sectors installed in the wings. Aileron pushrods connect the wing aileron sectors to the ailerons and provide aileron actuation.

RUDDER SYSTEM

The rudder provides yaw control for the aircraft. The rudder is of conventional aluminum construction consisting of skins, a spar and ribs. The rudder is attached to the aft spar of the vertical stabilizer at three hinge points, one attach point being the rudder sector.

Rudder motion is transferred from the pilot and copilot rudder pedals, connected to each other by a pair of torque tubes. A forward sector is connected to the rudder pedal torque tubes via two push-pull rods. The rudder cables are routed from the forward sector under the floorboard via a series of pulleys to a second rudder sector mounted aft of the vertical stabilizer. Depressing the left or right rudder pedal deflects the rudder in the corresponding direction.

7-4 TRIM SYSTEMS

Aileron, elevator, and rudder trim systems are provided as standard equipment. Aileron trim is accomplished by an electrically operated aileron trim tab installed on the left aileron. Dual (split) aileron trim switches are installed on the upper surface of the control pedestal; when both switches are depressed simultaneously to the right the right wing will be trimmed down; conversely, depressing the trim switches to the left will trim the left wing down. To provide additional redundancy in preventing a trim runaway, a 1-second timer is incorporated, which limits continuous operation of the aileron trim system to 1 second. If more than 1 second's worth of trim is needed, cycle the switches off and on as necessary.

Elevator trim is accomplished through two elevator trim tabs by operating the vertically-mounted elevator trim control wheel on the upper left side of the control pedestal. Forward rotation of the trim wheel will result in trimming towards a nose-down attitude. Aft rotation of the trim wheel will result in trimming the airplane towards a nose high attitude. The airplane is also equipped with an electric elevator trim system. The electric elevator trim is controlled by a dual switch installed on the left side of the pilot's control yoke. The purpose of the dual switch is to lessen the chances of a trim runaway condition. Both halves of the switch must be pressed in order to activate the trim. The Kodiak is equipped with an automatic pitch trim system to compensate for trim changes with varying flap positions. For more information regarding this system refer to the description of the **Automatic Trim System** in this section.

Rudder trim is accomplished through the nose wheel steering bungee spring connected to the rudder control system, an electric bungee adjuster assembly, and a rudder trim switch installed on the aft face of the control pedestal. The rudder trim switch may be pressed either left or right to achieve the desired yaw trim position. Pressing the rudder trim switch to the right will trim the nose to the right; conversely, pressing it to the left will trim the nose to the left. The Kodiak incorporates design features which reduce the need for rudder trim during climbs and descents.

7-5 FLIGHT DECK ARRANGEMENT

The following paragraphs and illustrations provide a general description of the flight deck, instruments and controls. Detailed information concerning the instruments, switches, circuit breakers and controls on the instrument panel and control pedestal can be found within the individual description of the related system.

INSTRUMENT PANEL

The instrument panel is of all metal construction and is installed in sections to allow equipment to be easily removed and installed for maintenance. The instrument panel contains a glare shield which limits undesirable reflections on the windshield from lighted equipment and displays mounted in the instrument panel. The instrument panel is designed primarily for piloting from the left seat. However, the instrument panel is equipped with two primary flight displays, one for each front seat, with a multi-function display installed between them to allow piloting from either position.

The Kodiak 100 instrument panel contains two Garmin GDU 1040 Primary Flight Displays (PFDs), one Garmin GDU 1040 Multifunction Display (MFD), two Garmin GMA 1347 Audio Panels, and standby flight instruments. For specific details regarding the instruments, switches, and controls on the instrument panel, refer to **each related topic** in this section.

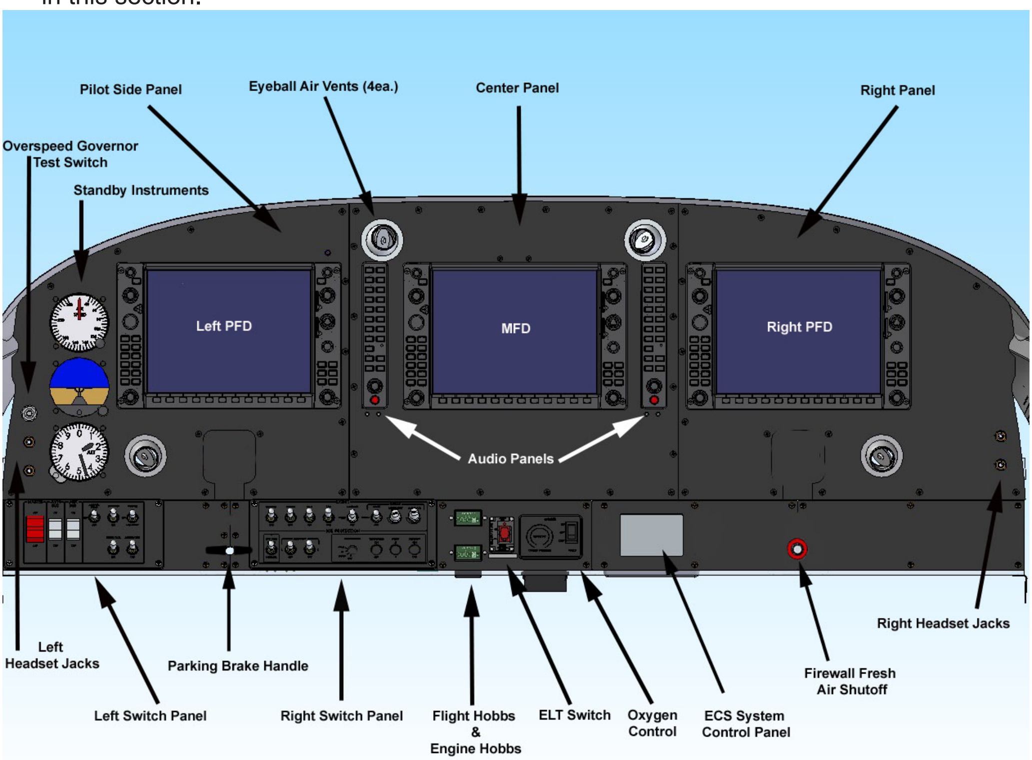


Figure 7-1 – Instrument Panel Layout

PILOT SIDE (LEFT) PANEL LAYOUT

The GDU 1040 Primary Flight Display (PFD), centered on the instrument panel in front of the pilot, displays the primary flight instruments during normal operation. During reversionary operation (MFD failure) or when the DISPLAY BACKUP switch is selected, the Engine Indication Crew Alert System (EICAS) is shown on the PFD. Refer to the **Garmin G100 Cockpit Reference Guide** for specific operating information.

The standby instrument cluster is located on left portion of the pilot side instrument panel. A conventional (mechanical type) airspeed indicator and a sensitive aneroid altimeter are installed above and below the electric powered attitude indicator. The standby pitot-static instruments share the left pitot/static tube with the number 1 GDC 74A Air Data Computer. The standby attitude indicator features a STBY PWR button, three LED lights, a PULL TO CAGE knob, a gyro warning flag and a symbolic airplane adjustment knob.

The battery master switch is located on the lower left portion of the pilot instrument panel. Located to the right of the master switch are switches for the airplane electrical systems and equipment. Each switch is labeled for its function and is ON when the switch handle is in the up position. Refer to the **ELECTRICAL EQUIPMENT** descriptions in this section for further information.

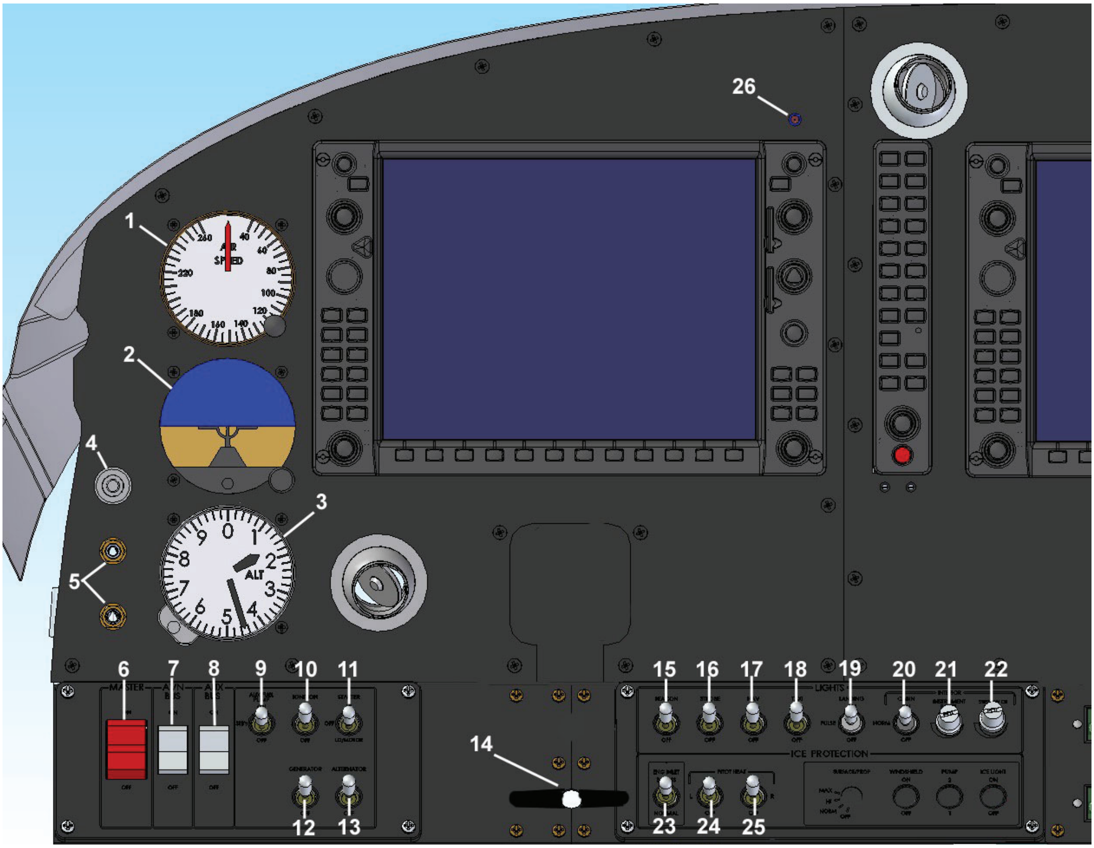


Figure 7-2 – Left Panel Layout

1. Standby Airspeed Indicator
2. Standby Attitude Indicator
3. Standby Altimeter
4. Overspeed Governor Test Button
5. Pilot's Headset Jacks
6. Battery Master Switch
7. Avionics Bus Switch
8. Auxiliary Bus Switch
9. Auxiliary Fuel Pump Switch
10. Ignition Switch
11. Starter Switch
12. Generator Switch
13. Alternator Switch
14. Parking Brake Handle
15. Flashing Beacon Switch
16. Strobe Lights Switch
17. Navigation Lights Switch
18. Taxi Lights Switch
19. Landing Lights Switch
20. Cabin Lights Switch
21. Instrument Panel Lighting Rheostat (Dual)
22. Switch / Circuit Breaker Panel Lighting Rheostat
23. Engine Inlet Inertial Separator Switch
24. Left Pitot Heat Switch
25. Right Pitot Heat Switch
26. Fuel Selectors OFF Warning Light

CENTER PANEL LAYOUT

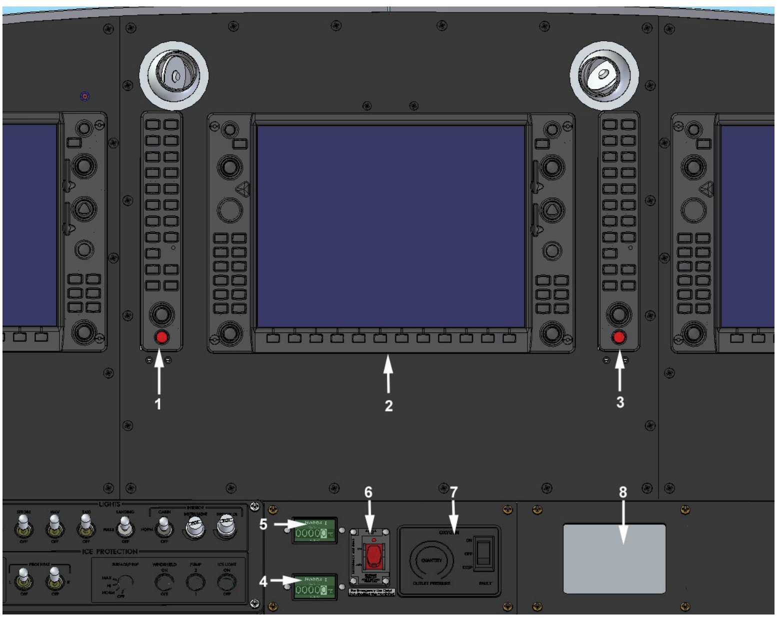
The GDU 1040 Multifunction Display (MFD) is located on the center instrument panel. The MFD depicts Engine Indication System information along the left portion of the display and shows navigation, terrain, weather, lightning and traffic data on the moving map. Flight management or display configuration information can be shown on the MFD in place of the moving map pages. Refer to the **Garmin G1000 Integrated Flight Deck Pilot's Guide** for operating information.

The center panel contains two GMA 1347 audio panels (one installed on each side of the MFD). A red push button switch labeled "DISPLAY BACKUP" to manually select display reversion mode is located on the lower portion of the GMA 1347. Refer to the **GMA 1347 Pilot's Guide** for operating information.

The Emergency Locator Transmitter (ELT) mode switch (ON/AUTO/RESET) is located on the lower center instrument panel beneath the MFD. Refer to the **EMERGENCY LOCATOR TRANSMITTER** description in this section for operating information.

The Flight and Engine Hour (Hobbs) meters are located to the left of the ELT mode switch. The Engine Hobbs meter records the hours of engine use, and is activated by an oil pressure switch in the engine compartment. The Flight Hobbs meter records the hours of flight time. The meter is activated by an airspeed switch located forward of the instrument panel behind the lower left portion of the MFD.

The oxygen supply pressure gage and oxygen system switch are located to the right of the Hobbs Meters. For operating information regarding the oxygen system refer to the **oxygen system description** contained in this section of the handbook.



1. Left Audio Panel (GMA 1347)
2. MFD (GDU 1040)
3. Right Audio Panel (GMA 1347)
4. Engine Hobbs Meter
5. Flight Hobbs Meter
6. ELT Switch
7. Oxygen Control Panel
8. ECS Control Panel

Figure 7-3 – Center Panel Layout

RIGHT PANEL LAYOUT

A second Primary Flight Display (PFD) is installed in the right instrument panel. This PFD displays the primary flight instruments during normal operation. During reversionary operation (MFD failure) or when the DISPLAY BACKUP button on the right side GMA 1347D Audio Panel is pressed, the engine instruments are also shown on the display.

A fresh air shutoff valve is installed on the lower portion of the right panel just below the right control wheel. The shutoff valve is provided primarily for emergency shutoff of fresh air that enters the cabin from forward of the firewall. This would be used if an engine fire should occur or if smoke is entering the cabin through the firewall mounted fresh air inlet. The fresh air shutoff valve should be left in the normal (pushed in) position for all normal operations.

The GDU 1040 Primary Flight Display (PFD), centered on the instrument panel in front of the right crew seat, displays the primary flight instruments during normal operation. During reversionary operation (MFD failure) or when the DISPLAY BACKUP switch is selected, the Engine Indication System (EIS) is shown on the PFD. Refer to the **Garmin G1000 Pilot's Guide** for specific operating information.

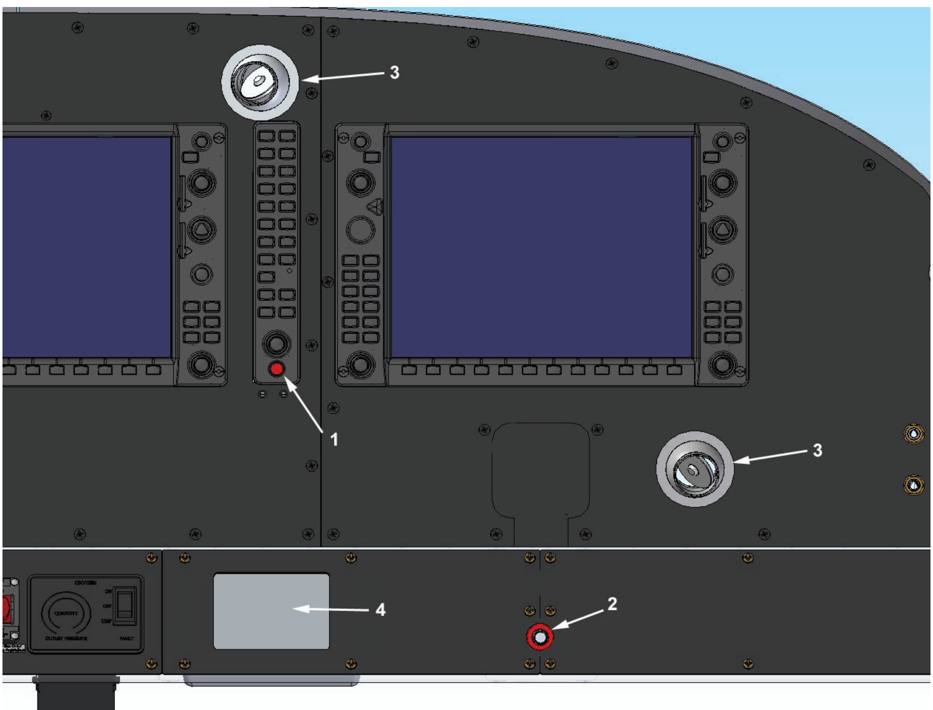


Figure 7-4 – Right Panel Layout

1. Right Display Backup Button
2. Firewall Fresh Air Shutoff Control
3. Eyeball Air Vents
4. ECS Control Panel

CONTROL PEDESTAL LAYOUT

A control pedestal is installed between the pilot and front passenger seats. The control pedestal contains the emergency power lever, power lever, propeller control lever, fuel condition lever, wing flap selector, elevator trim wheel, rudder and aileron trim switches, firewall fuel shutoff valve control, microphone, engine control lever friction knob, and the circuit breaker panel.

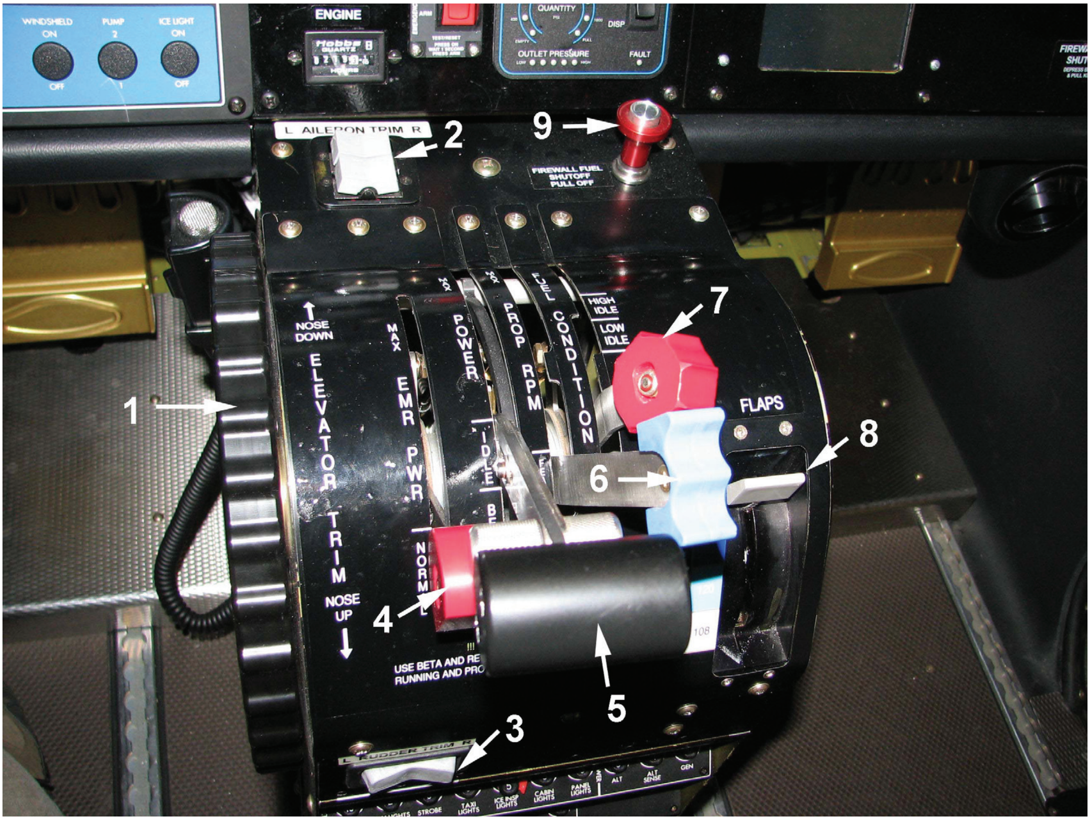


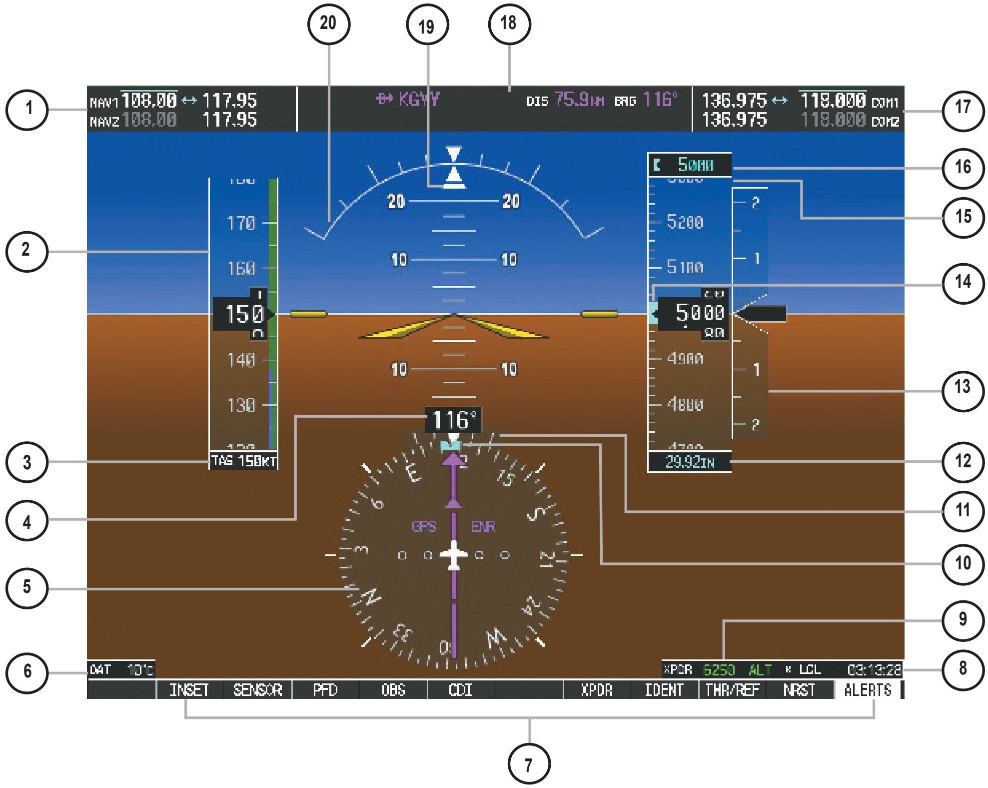
Figure 7-5 – Control Pedestal Layout

1. Pitch Trim Wheel
2. Aileron Trim Switches
3. Rudder Trim Switch
4. Emergency Power Lever
5. Power Lever
6. Propeller Control Lever
7. Fuel Condition Lever
8. Wing Flap Selector
9. Firewall Fuel Shutoff Valve Control

7-6 FLIGHT INSTRUMENTS

The G1000 Integrated Cockpit System primary flight instrument indications are shown on two GDU 1040 Primary Flight Displays (PFD). The primary flight instruments are arranged on the PFD in the basic “T” configuration. The attitude indicator (AI) and horizontal situation indicator (HSI) are centered vertically on the PFD and are conventional in appearance and operation. Vertical-Tape style (scrolling scale) indicators with fixed pointers and digital displays show airspeed and altitude. Vertical speed is indicated with a fixed scale and moving pointer. The pointer also shows a digital readout of the vertical speed within the pointer.

Knobs, knob sets (two knobs on a common shaft) and membrane type push button switches are located on the bezel surrounding each GDU 1040 display. These knobs and knob sets control COM, NAV, XPDR, and GPS avionics, set BARO (barometric pressure), CRS (course), HDG (heading), and various flight management functions. Some pushbutton switches are dedicated to certain functions (keys) while other switches have functions defined by software (softkeys). A softkey may perform various operations or functions at various times based on software definition. The softkeys are located along the lower bezel of each GDU 1040 display.



1	NAV Frequency Box	11	Turn Rate Indicator
2	Airspeed Indicator	12	Barometric Altimeter Setting
3	True Airspeed	13	Vertical Speed Indicator (VSI)
4	Current Heading	14	Reference Altitude Bug
5	Horizontal Situation Indicator (HSI)	15	Altimeter
6	Outside Air Temperature (OAT)	16	Reference Altitude
7	Softkeys	17	COM Frequency Box
8	System Time	18	Navigation Status Box
9	Transponder Data Box	19	Slip/Skid Indicator
10	Heading Bug	20	Attitude Indicator

Figure 7-6 – G1000 Primary Flight Display (Default)

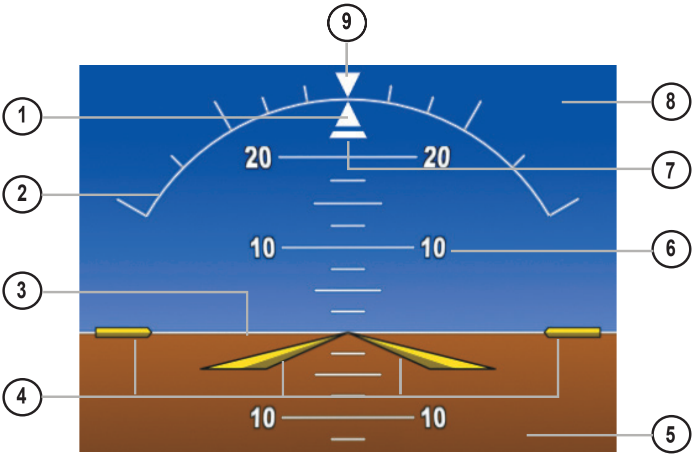
1 Traffic Annunciation
2 Selected Heading
3 Wind Data Box
4 Inset Map
5 Bearing Information Windows
6 Minimum Descent Altitude/ Decision Height
7 Flight Plan Window
8 Annunciation Window
9 Selected Course
10 Required Vertical Speed Indicator
11 Vertical Deviation Indication
12 Comparator Window
13 VNV Target Altitude

Figure 7-7 – G1000 Primary Flight Display (Additional Information)

NOTE: *The selected heading and selected course windows (2 and 9) close after being shown for 3 seconds.*

ATTITUDE INDICATOR

Attitude information is displayed over a virtual blue sky and brown ground with a white horizon line. The Attitude Indicator displays the pitch, roll, and slip/skid information.



1. Roll Pointer
2. Roll Scale
3. Horizon Line
4. Aircraft Symbol
5. Land Representation
6. Pitch Scale
7. Slip/Skid Indicator
8. Sky Representation
9. Roll Scale Zero

Figure 7-8 – G1000 Attitude Indicator

The horizon line is part of the pitch scale. Above and below the horizon line, major pitch marks and numeric labels are shown for every 10˚, up to 80˚. Minor pitch marks are shown for intervening 5˚ increments, up to 25˚ below and 45˚ above the horizon line. Between 20˚ below to 20˚ above the horizon line, minor pitch marks occur every 2.5˚.

The inverted white triangle indicates zero on the roll scale. Major tick marks at 30˚ and 60˚ and minor tick marks at 10˚, 20˚, and 45˚ are shown to the left and right of the zero. Angle of bank is indicated by the position of the pointer on the roll scale.

The Slip/Skid Indicator is the bar beneath the roll pointer. One bar displacement is equal to one ball displacement on a traditional inclinometer. The indicator bar moves with the roll pointer and moves laterally away from the pointer to indicate uncoordinated flight. Slip (inside the turn) or skid (outside the turn) is indicated by the location of the bar relative to the pointer.

Figure 7-9 – Slip/Skid Information

STANDBY ATTITUDE INDICATOR

A standby electric powered attitude indicator is located on the left portion of the pilot-side instrument panel. In the event aircraft electrical power is lost, the indicator will switch to an internal backup power source (rechargeable sealed lead acid battery) to permit continued operation of the indicator. If aircraft electrical power is lost, the attitude indicator will automatically operate on battery power with the amber status LED flashing rapidly indicating a Power Loss Warning. With no further action from the pilot, the unit will turn off automatically (Gyro Warning Flag in view) after approximately one minute. This is to prevent battery discharge at the end of a flight when the master power switch is placed in the off position.

When the instrument switches to Power Loss Warning, the amber LED flashes for approximately one minute. This is intended to attract the pilot's attention and indicate that there has been a loss of primary power to the Attitude Indicator. Pushing the STBY PWR button on the face of the instrument will allow the unit to continue operating on the standby battery until battery power is exhausted. A full capacity standby battery will power the instrument for approximately one (1) hour, depending upon conditions.

Any time aircraft power is absent, with the unit in either Power Loss Warning or shut off, pushing the STBY PWR button will put the unit in standby power mode. The unit will run on standby power until the standby battery is exhausted. If the unit is running on the standby battery, pushing the STBY PWR button again will restore standby power and standby lighting.

Restoring aircraft power will clear any standby operation and resume automatic battery charging.

The control panel on the front of the instrument incorporates a manual test feature. This test feature places the standby pack under load for approximately one minute while displaying either a red or green light under the word TEST on the front panel.

To initiate the standby battery test:

1. Turn on the indicator with aircraft power and allow the unit to spin up for a minimum of 3 minutes.
2. Press and hold the STBY PWR button. After several seconds, the amber LED will start flashing, indicating the unit has latched into Battery Test Mode. The test runs for approximately one minute, during which time the amber LED flashes continuously and either a red or green light is displayed under the word TEST.
3. Visually monitor the test lights until the amber LED stops flashing, signaling the end of the test.
4. A green light throughout the test indicates the standby battery pack is healthy and should be able to function normally. A red light at any time during the test means that the standby battery is at least in need of charging, and possible replacement.

NOTE: *A green light throughout this short test does not guarantee that a full hour of operation time is available. Actual battery operation time may vary considerably depending on temperature, charge status, and battery condition.*

Figure 7-10 – Standby Attitude Indicator

The standby attitude indicator contains a symbolic airplane adjustment knob. The symbolic airplane adjustment knob may be used to manually position the symbolic airplane in the pitch direction. This feature enables the pilot to align the symbolic airplane with the horizon for ease of use.

The standby attitude indicator also contains a caging knob which, when pulled, manually erects the gyro vertical to the case orientation.

The indicator is equipped with a red Gyro Warning Flag which will come into view if loss of operating voltage should occur.

AIRSPEED INDICATOR

The Airspeed Indicator displays airspeed on a moving tape rolling number gauge. The true airspeed is displayed in knots below the Airspeed Indicator. The numeric labels and major tick marks on the moving tape are marked at intervals of 10 knots. The minor tick marks on the moving tape are marked at intervals of five knots. Speed indication starts at 20 knots, with 60 knots of airspeed viewable at any time. The indicated airspeed is displayed inside the black pointer. The pointer remains black until reaching maximum operating speed (V_{MO}), at which point it turns red.

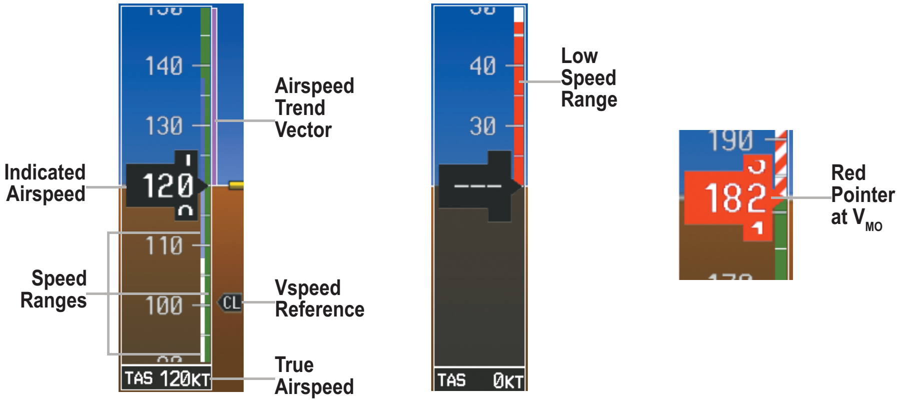


Figure 7-11 – Airspeed Indicator Ranges

Color coded stripes appear on the Airspeed Indicator to show the operating ranges. The low speed range stripe is red and extends to the flap operating range. Normal operating range is green and the maximum operating speed (V_{MO}) begins with a red and white barber pole. The flap operating range is indicated by a white and two shades of blue stripe.

The Airspeed Trend Vector is a vertical magenta line that appears to the right of the color-coded speed range strip when airspeed is either accelerating or decelerating. One end of the magenta line is anchored to the tip of the airspeed pointer while the other end moves continuously up or down corresponding to the rate of acceleration or deceleration. For any constant rate of acceleration or deceleration, the moving end of the line shows approximately what the indicated airspeed value will be in six seconds. If the trend vector crosses V_{NE}, the number in the indicated airspeed pointer changes to yellow. The trend vector is absent if the speed remains constant or if any data needed to calculate airspeed is not available due to a system failure.

ALTIMETER

The Altimeter displays 600 feet of barometric altitude values at a time on a moving tape rolling number gauge. Numeric labels and major tick marks are shown at intervals of 100 feet. Minor tick marks are at intervals of 20 feet. The indicated altitude is displayed inside the black pointer.

The Selected Altitude is displayed above the Altimeter in the box indicated by a selection bug symbol. A bug corresponding to this altitude is shown on the tape. If the Selected Altitude exceeds the range shown on the tape, the bug appears at the upper or lower edge of the tape. When the metric value is selected it is displayed in a separate box above the Selected Altitude.

A magenta Altitude Trend Vector extends up or down the left of the altitude tape, the end resting at the approximate altitude to be reached in six seconds at the current vertical speed. The trend vector is not shown if altitude remains constant or if data needed for calculation is not available due to a system failure.

Setting the Selected Altitude:

Turn the **ALT** Knob to set the Selected Altitude (large knob for 1000-ft increments, small knob for 100-ft increments (increments reduce to 10 feet for approach).

If set, the Minimum Descent Altitude/Decision Height (MDA/DH) value is also available for the Selected Altitude.

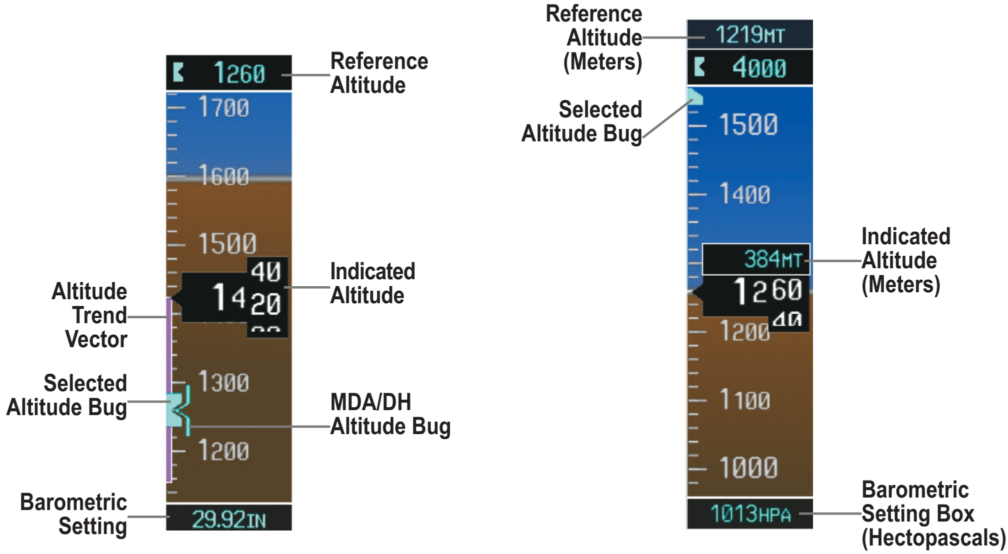


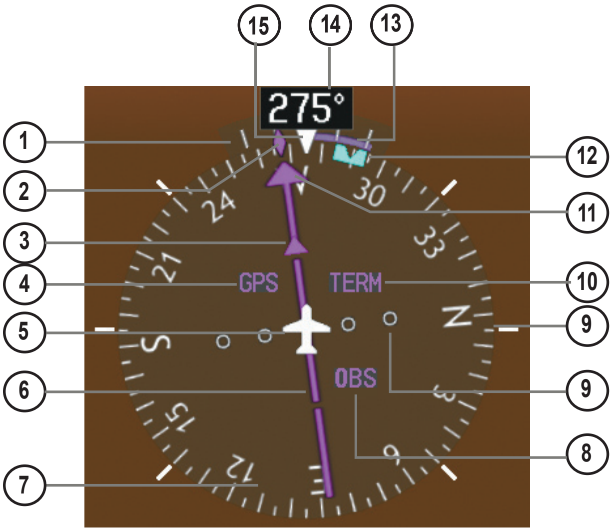
Figure 7-12 – G1000 Altitude Indicator

The standby (aneroid) sensitive altimeter is located on the lower left portion of the pilot-side instrument panel.

HORIZONTAL SITUATION INDICATOR

The Horizontal Situation Indicator (HSI) displays a rotating compass card in a heading-up orientation. Letters indicate the cardinal points with numeric labels every 30˚. Major tick marks are at 10˚ intervals and minor tick marks are at 5˚ intervals. A digital reading of the current heading appears on top of the HSI, and the current track is represented on the HSI by a magenta diamond. The HSI also presents turn rate, course deviation, bearing, and navigation source information. The HSI is available in two formats, a 360˚ compass rose and a 140˚ arc.

The 360˚ HSI contains a Course Deviation Indicator (CDI), with a Course Pointer, To/From Indicator, and a sliding deviation bar and scale. The course pointer is a single line arrow (GPS, VOR1, and LOC1) or a double line arrow (VOR2 and LOC2) which points in the direction of the set course. The To/From arrow rotates with the course pointer and is displayed when the active NAVAID is received.



1 Turn Rate Indicator
2 Current Track Indicator
3 To/From Indicator
4 Navigation Source
5 Aircraft Symbol
6 Course Deviation Indicator (CDI)
7 Rotating Compass Card
8 OBS Mode Active
9 Lateral Deviation Scale
10 Flight Phase
11 Course Pointer
12 Heading Bug
13 Turn Rate and Heading Trend Vector
14 Current Heading
15 Lubber Line

Figure 7-13 – Horizontal Situation Indicator (360˚ HSI)

The Arc HSI is a 140˚ expanded section of the compass rose. The Arc HSI contains a Course Pointer, combined To/From Indicator and a sliding deviation indicator, and a deviation scale. Upon station passage, the To/From Indicator flips and points to the tail of the aircraft, just like a conventional To/From flag. Depending on the navigation source, the CDI on the Arc HSI can appear in two different ways, an arrowhead (GPS, VOR, OBS) or a diamond (LOC).

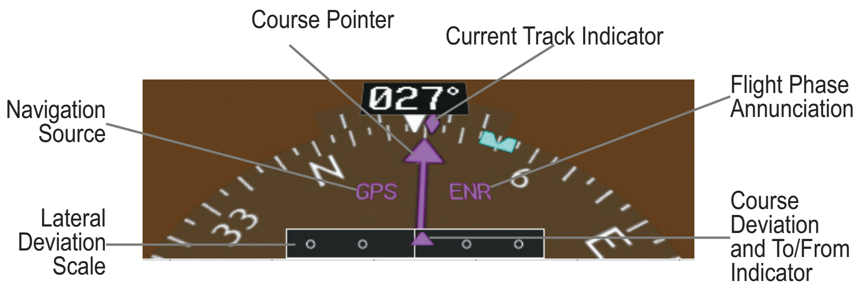


Figure 7-14 – Arc HSI

The Selected Heading is shown to the upper left of the HSI for 3 seconds after being adjusted The light blue bug on the compass rose corresponds to the Selected Heading. While the HSI is displayed as an arc, if the Heading Bug is adjusted off the shown portion of the compass rose, the digital reading is displayed.

The Selected Course is shown to the upper right of the HSI for 3 seconds after being adjusted. While the HSI is displayed as an arc, the Selected Course is displayed whenever the Course Pointer is not within the 140˚ currently shown.

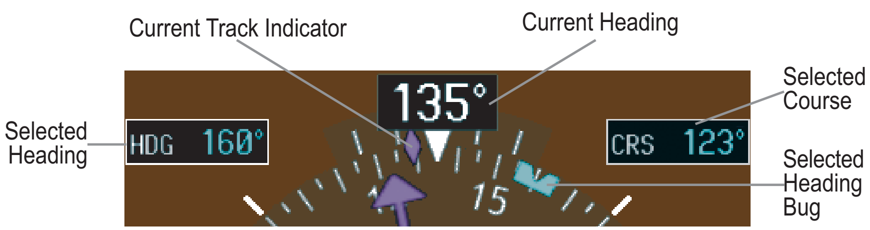


Figure 7-15 – Heading and Course Indications

Navigation angles (track, heading, course, bearing) are corrected to the computed magnetic variation (Mag Var) or referenced to true north (T), set on the AUX - System Setup Page. When an approach referenced to true north has been loaded into the flight plan, the system generates a message to change the navigation angle setting to True at the appropriate time.

Figure 7-16 – Heading and Course Indications (True)

Turn Rate Indicator

The Turn Rate Indicator is located directly above the rotating compass card. Tick marks to the left and right of the lubber line denote half-standard and standard turn rates. A magenta Turn Rate Trend Vector shows the current turn rate. The end of the trend vector gives the heading predicted in 6 seconds, based on the present turn rate. A standard-rate turn is shown on the indicator by the trend vector stopping at the standard turn rate tick mark, corresponding to a predicted heading of 18˚ from the current heading. At rates greater than 4 deg/sec, an arrowhead appears at the end of the magenta trend vector and the prediction is no longer valid.

Figure 7-17 – Turn Rate Indicator and Trend Vector

Bearing Pointers and Information Windows

NOTE: *When the Arc HSI is displayed, the Bearing Information windows and pointers are disabled.*

Two bearing pointers and associated information can be displayed on the HSI for NAV and GPS sources by pressing the **PFD** Softkey then a **BRG** Softkey. The bearing pointers are light blue and are single-line (BRG1) or double-line (BRG2). A pointer symbol is shown in the information window to indicate the navigation source. The bearing pointers never override the CDI and are visually separated from the CDI by a white ring. Bearing pointers may be selected but not necessarily visible due to data unavailability.

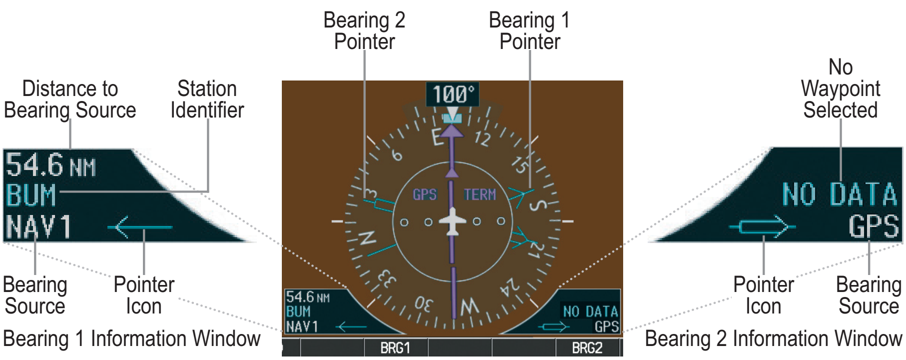


Figure 7-18 – HSI with Bearing Information

When the NAV radio is tuned to an ILS frequency the bearing source and the bearing pointer is removed from the HSI. When NAV1 or NAV2 is the selected bearing source, the frequency is replaced by the station identifier when the station is within range. If GPS is the bearing source, the active waypoint identifier is displayed instead of a frequency.

Course Deviation Indicator (CDI)

NOTE: *During a heading change of greater than 105˚ with respect to the course, the CDI on the Arc HSI switches to the opposite side of the deviation scale and displays reverse sensing.*

The Course Deviation Indicator (CDI) moves left or right from the course pointer along a lateral deviation scale to display aircraft position relative to the course. If the course deviation data is not valid, the CDI is not displayed.

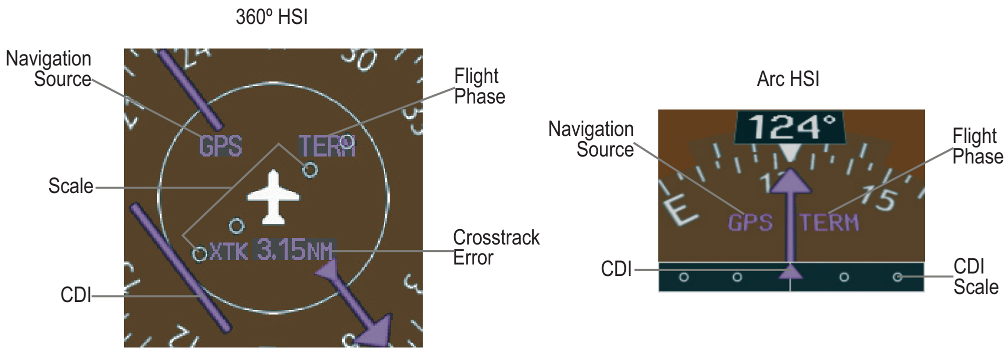


Figure 7-19 – Course Deviation Indicator

The CDI can display two sources of navigation, GPS or VOR/LOC. The color indicates the current navigation source, magenta for GPS and green for VOR and LOC. The full scale limits for the CDI are defined by a GPS-derived distance when navigating GPS. When navigating using a VOR or localizer (LOC), the CDI uses the same angular deviation as a mechanical CDI. If the CDI exceeds the maximum deviation on the scale (two dots) while navigating with GPS, the crosstrack error (XTK) is displayed below the white aircraft symbol.

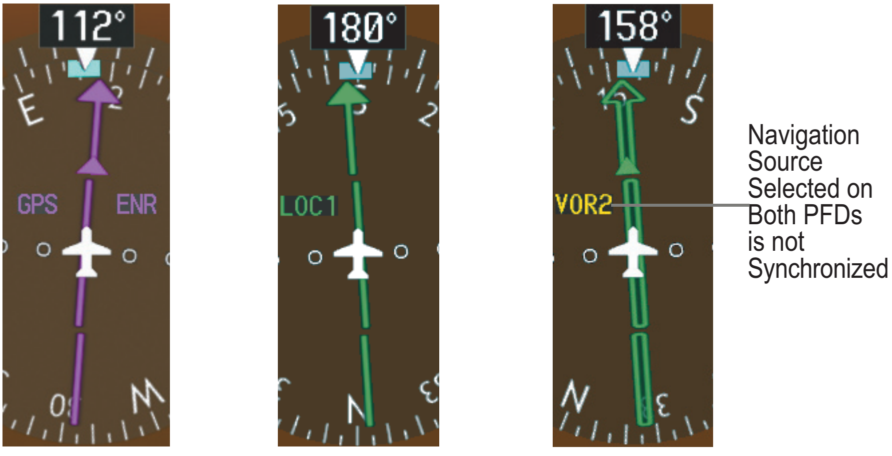


Figure 7-20 – Navigation Sources

OBS Mode

NOTE: *VNV is inhibited while automatic waypoint sequencing has been suspended.*

Enabling Omni-bearing Selector (OBS) Mode suspends the automatic sequencing of waypoints in a GPS flight plan (GPS must be the selected navigation source), but retains the current Active-to waypoint as the navigation reference even after passing the waypoint. OBS is annunciated to the lower right of the aircraft symbol when OBS Mode is selected.

While OBS is enabled, a course line is drawn through the Active-to waypoint on the moving map. If desired, the course to/from the waypoint can now be adjusted. When OBS Mode is disabled, the GPS flight plan returns to normal operation, with automatic sequencing of waypoints, following the course set in OBS Mode. The flight plan on the moving map retains the modified course line.

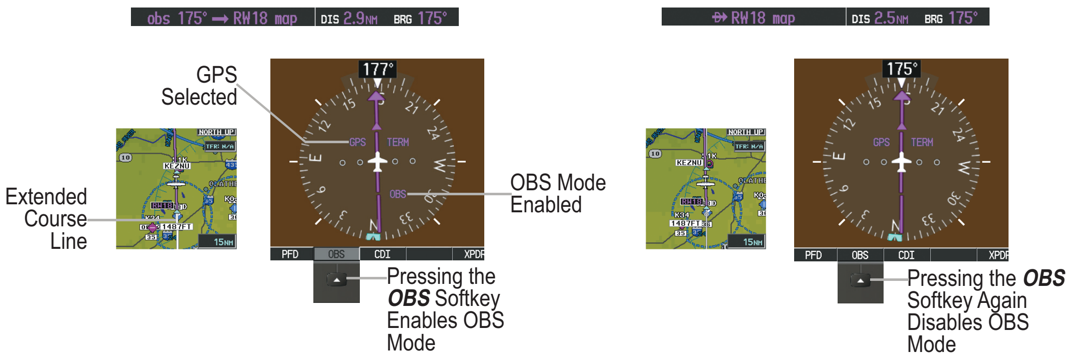


Figure 7-21 – Omni-Bearing Selector (OBS) Mode

VERTICAL SPEED INDICATOR

The Vertical Speed Indicator displays the aircraft vertical speed on a fixed scale with labels at 1000 and 2000 fpm and minor tick marks every 500 fpm. Digits appear in the pointer when the climb or descent rate is greater than 100 fpm. If the rate of ascent/ descent exceeds 2000 fpm, the pointer appears at the edge of the tape and the rate appears inside the pointer.

A magenta chevron is displayed on the VSI to indicate the Required Vertical Speed for reaching a VNV target altitude once the “TOD [Top of Descent] within 1 minute” alert has generated.

VERTICAL DEVIATION

> **NOTE:** *The Glidepath Indicator is only shown for aircraft with GIA 63W Integrated Avionics Units when WAAS is available.*

The Vertical Deviation mode indicator appears as a V above the Vertical Deviation Indicator (VDI). The Vertical Deviation Indicator is a magenta chevron indicating the baro-VNV vertical deviation when Vertical Navigation (VNV) is being used. The VDI appears in conjunction with the “TOD within 1 minute” alert. The VDI is removed from the display if vertical deviation becomes invalid.

The Glideslope mode indicator appears as a G Vertical Deviation Indicator (VDI). The Glideslope Indicator appears to the left of the Altimeter whenever an ILS frequency is tuned in the active NAV field. A green diamond acts as the Glideslope Indicator, like a glideslope needle on a conventional indicator. If a localizer frequency is tuned and there is no glideslope, “NO GS” is displayed in place of the diamond.

The glidepath is analogous to the glideslope for GPS approaches supporting WAAS vertical guidance (LNAV+V, L/VNAV, LPV). When an approach of this type is loaded into the flight plan and GPS is the selected navigation source, the Glidepath mode indicator appears as a G Vertical Deviation Indicator (VDI) and the Glidepath Indicator appears as a magenta diamond during the approach. If the approach type downgrades past the final approach fix (FAF), “NO GP” is displayed in place of the diamond.

Full-scale deflection of two dots is 1000 feet.

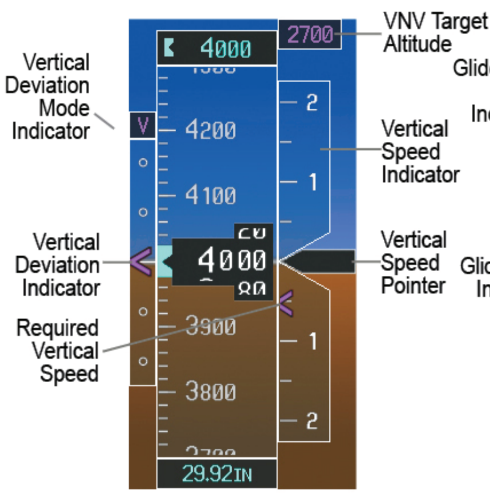


Figure 7-22 – Vertical Speed and Deviation Indicator (VSI and VDI)

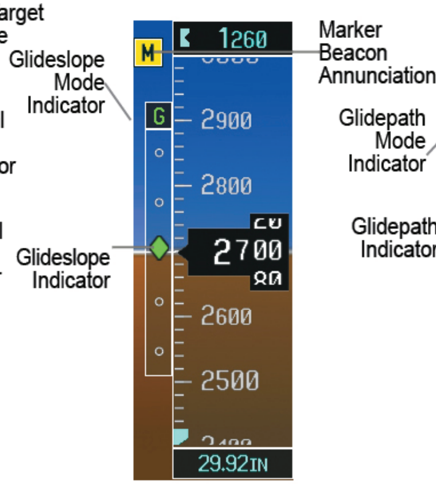


Figure 7-23 – Glideslope Indicator

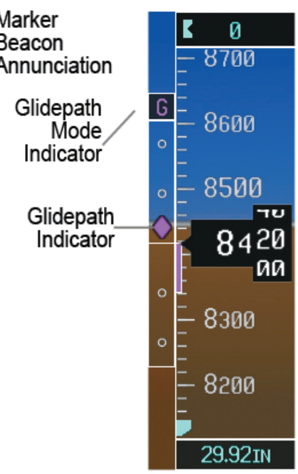


Figure 7-24 – Glidepath Indicator

SUPPLEMENTAL FLIGHT DATA

NOTE: *Pressing the* **DFLTS** *Softkey turns off metric Altimeter display, the Inset Map and wind data display.*

In addition to the flight instruments, the PFDs also display various supplemental information, including temperatures, wind data, and Vertical Navigation (VNV) indications.

Temperature Displays

The Outside Air Temperature (OAT) is displayed in degrees Celsius (°C) or Fahrenheit (°F) as selected by the pilot, in the lower left of the PFD under normal display conditions. Temperature is displayed below the true airspeed in reversionary mode.

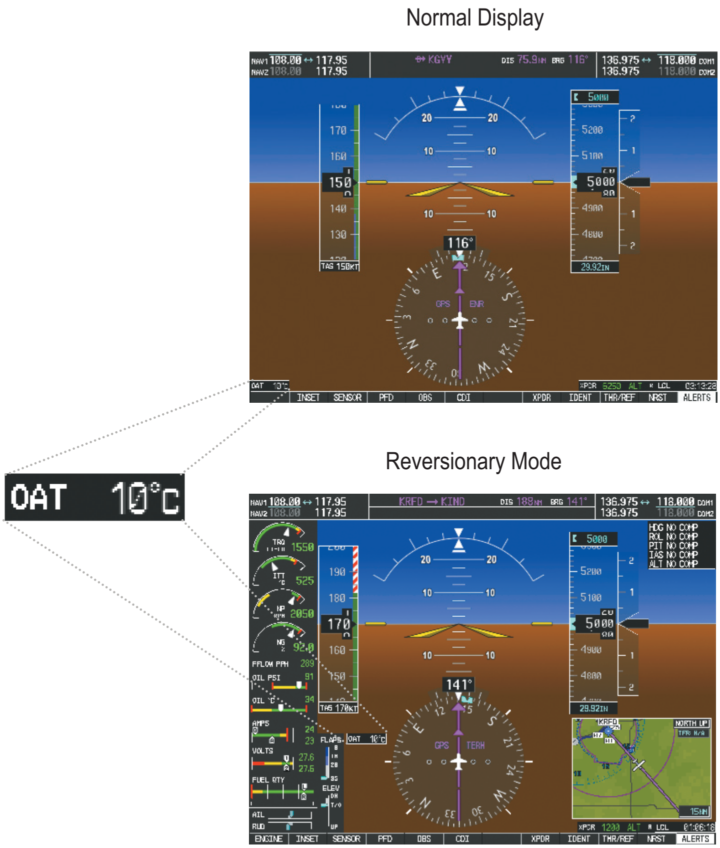


Figure 7-25 – Outside Air Temperature

Wind Data

Wind direction and speed in knots can be displayed relative to the aircraft in a window to the upper left of the HSI. When the window is selected for display, but wind information is invalid or unavailable, the window displays NO WIND DATA. Wind data can be displayed in three different ways.

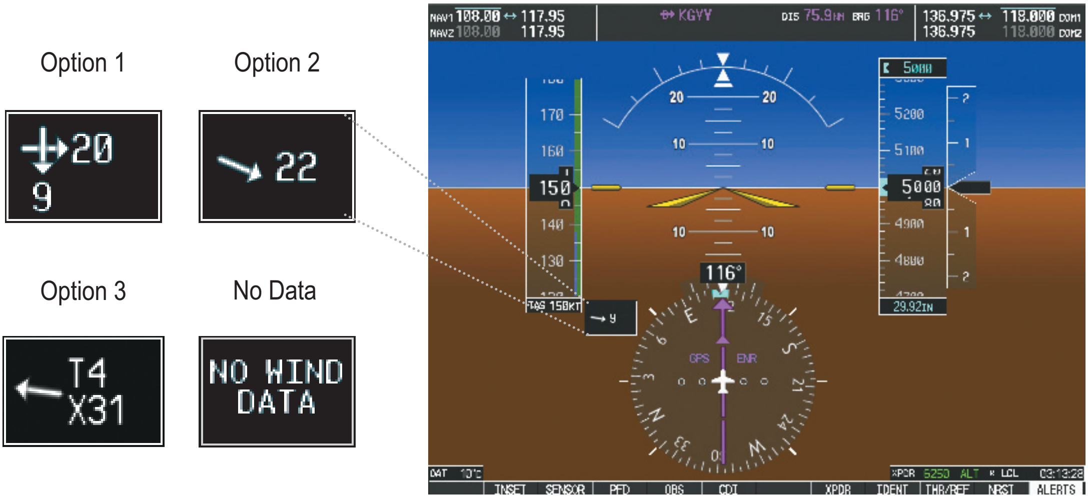


Figure 7-26 – Wind Data

Vertical Navigation (VNV) Indications

When a VNV flight plan has been activated, VNV indications (VNV Target Altitude, RVSI, VDI) appear on the PFD in conjunction with the “TOD within 1 minute” message and “Vertical track” voice alert. See the **Flight Management** and **AFCS** sections for details on VNV features. VNV indications are removed from the PFD according to the criteria listed in the table.

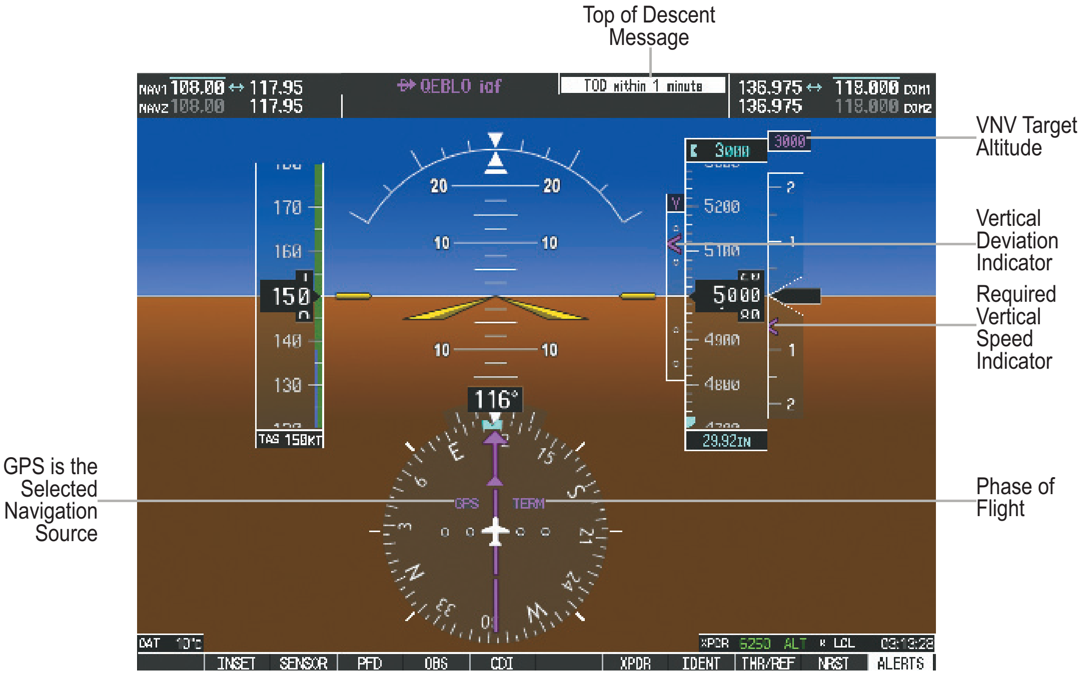


Figure 7-27 – Vertical Navigation Indications (PFD)

Criteria	VNV Indication Removed		
	Required Vertical Speed (RVSI)	Vertical Deviation (VDI)	VNV Target Altitude*
Aircraft > 1 min before the next TOD due to flight plan change.	X	X	X
VNV cancelled (**CNCL VNV** Softkey pressed on MFD).	X	X	X
Distance to active waypoint cannot be computed due to unsupported flight plan leg type (see Flight Management Section).	X	X	X
Aircraft > 250 feet below active VNV Target Altitude.	X	X	X
Current crosstrack or track angle error has exceeded limit.	X	X	X
Active altitude-constrained waypoint can not be reached within maximum allowed flight path angle and vertical speed.	X	X	

Figure 7-28 – VNV Indication Removal Criteria

PFD ANNUNCIATIONS AND ALERTING FUNCTIONS

The following annunciations and alerting functions are displayed on the PFD. Refer to the **GARMIN Cockpit Reference Guide (190-00590-01).**

System Alerting

Messages appear in the Alerts Window in the lower right corner of the PFD when a warning, caution, advisory alert, or G1000 message advisory occurs. System alert messages are provided for awareness of G1000 system problems or status and may or may not require pilot action.

The Alerts Window allows system alerts to be displayed simultaneously. The **FMS** Knob is used to scroll through the alert messages. The Alerts Window is enabled/disabled by pressing the **ALERTS** Softkey. If the window is already open when a new message is generated, pressing the **ALERTS** Softkey to acknowledge the message turns the softkey gray.

The **ALERTS** Softkey label changes to display the appropriate annunciation when an alert is issued. The annunciation flashes and the appropriate aural alert sounds until acknowledged by pressing the softkey. The softkey then reverts to the **ALERTS** label, and when pressed again opens the Alerts Window to display a descriptive message of the alert.

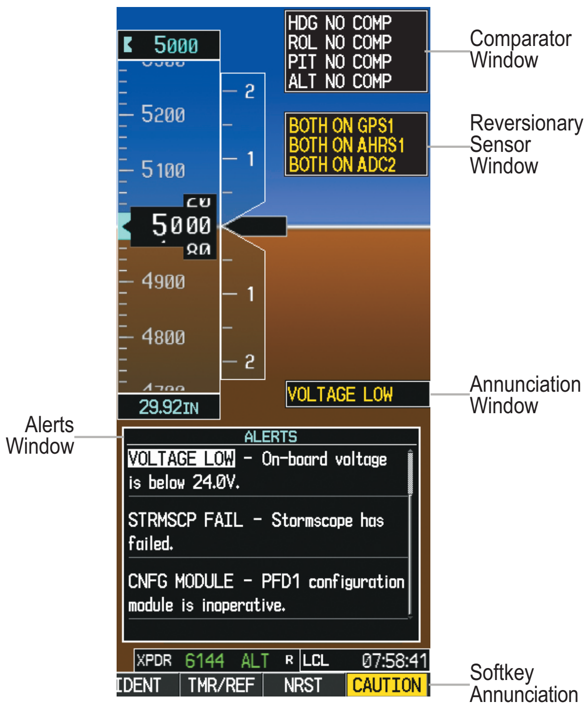


Figure 7-29 – G1000 Alerting System

The Annunciation Window appears to the right of the Vertical Speed Indicator and displays abbreviated annunciation text for aircraft alerts. Warnings appear in red, cautions in yellow, advisory alerts in white, and safe operating annunciations in green. New alerts are displayed at the top of the Annunciation Window, regardless of priority. Once acknowledged, they are sequenced based on priority.

Critical values generated by redundant sensors are monitored by comparators. If differences in the sensors exceed a specified amount, the Comparator Window appears in the upper right corner of the PFD and the discrepancy is annunciated in the Comparator Window as a MISCOMP (miscompare). If one or both of the sensed values are unavailable, it is annunciated as a NO COMP (no compare).

Reversionary sensor selection is annunciated in a window on the right side of the PFD. These annunciations reflect reversionary sensors selected on one or both PFDs. Pressing the **SENSOR** Softkey accesses the **ADC1**, **ADC2**, **AHRS1**, and **AHRS2** softkeys. These softkeys allow switching of the sensors being viewed on each PFD. With certain types of sensor failures, the system may make some sensor selections automatically. The GPS sensor cannot be switched manually.

Marker Beacon Annunciations

Marker Beacon Annunciations are displayed on the PFD to the left of the Selected Altitude. Outer marker reception is indicated in blue, middle in yellow, and inner in white. Refer to the **Audio Panel and CNS** Section for more information on Marker Beacon Annunciations.

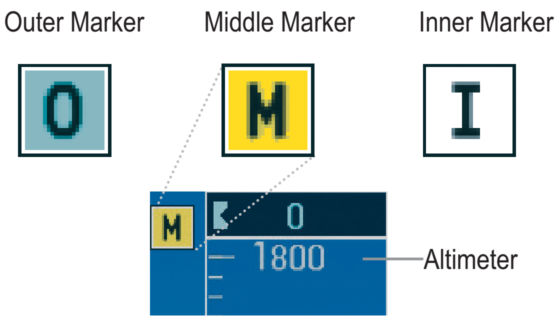


Figure 7-30 – Marker Beacon Annunciations

TRAFFIC AVOIDANCE SYSTEMS

The KODIAK 100 is capable of displaying traffic advisories. Depending on the configuration of the aircraft, the KODIAK 100 is equipped with either TRAFFIC INFORMATION SERVICE (TIS) or TRAFFIC ADVISORY SYSTEM (TAS). Each system has annunciations that vary in definition and symbology. For operational guidance of the traffic avoidance systems, refer to the **GARMIN Cockpit Reference Guide.**

NOTE: *TIS is disabled if a Traffic Advisory System (TAS) is installed.*

Traffic Information Service (TIS)

Traffic Information Service (TIS) is designed to help in detection and avoidance of other aircraft. TIS uses the Mode S transponder for the traffic data link. TIS receives traffic information from ground stations, and is updated every 5 seconds. The G1000 displays up to eight traffic targets within a 7.5-nm radius, from 3000 feet below to 3500 feet above the requesting aircraft. Traffic is displayed according to TCAS symbology.

Traffic Advisories (TA) alert the crew to intruding aircraft. When traffic meets the advisory criteria for the TA, a solid yellow circle symbol is generated. A TA which is detected but is outside the range of the map on which traffic is displayed are indicated with a message in the lower left corner of the map.

TIS also provides a vector line showing the direction in which the traffic is moving, to the nearest 45°. Traffic information for which TIS is unable to determine the bearing (non-bearing traffic) is displayed in the center of the Traffic Map Page or in a banner at the lower left corner of maps other than the Traffic Map Page on which traffic can be displayed.

The altitude difference between the requesting aircraft and other intruder aircraft is displayed above/below the traffic symbol in hundreds of feet. If the other aircraft is above the requesting aircraft, the altitude separation appears above the traffic symbol; if below, the altitude separation appears below. Altitude trend is displayed as an up/down arrow (for speeds greater than 500 fpm in either direction) to the right of the target symbol. Traffic symbols for aircraft without altitude reporting capability appear without altitude separation or climb/descent information.

WARNING: *The Traffic Information Service (TIS) is intended for advisory use only. TIS is intended to help the pilot locate traffic visually. It is the responsibility of the pilot to see and maneuver to avoid traffic.*

NOTE: *TIS is available only when the aircraft is within the service volume of a TIS-capable terminal radar site. Aircraft without an operating transponder are invisible to both Traffic Advisory Systems (TAS) and TIS. Aircraft without altitude reporting capability are shown without altitude separation data or climb descent indication.*

Traffic is displayed symbolically on the PFD Inset Map, the MFD Navigation Map Page, and various other MFD page maps. Refer to the **GARMIN Cockpit Reference Guide** for more details about the Traffic Information Service (TIS) and optional Traffic Advisory Systems (TAS). When a traffic advisory (TA) is detected, the following automatically occur:

- The PFD Inset Map is enabled and displays traffic
- A flashing black-on-yellow TRAFFIC annunciation appears to the top left of the Attitude Indicator for five seconds and remains displayed until no TAs are detected in the area
- A single “TRAFFIC” aural alert is heard, unless an optional Traffic Advisory System (TAS) is installed. Refer to the applicable **TAS documentation** for alerts generated by TAS equipment.

If additional TAs appear, new aural and visual alerts are generated.

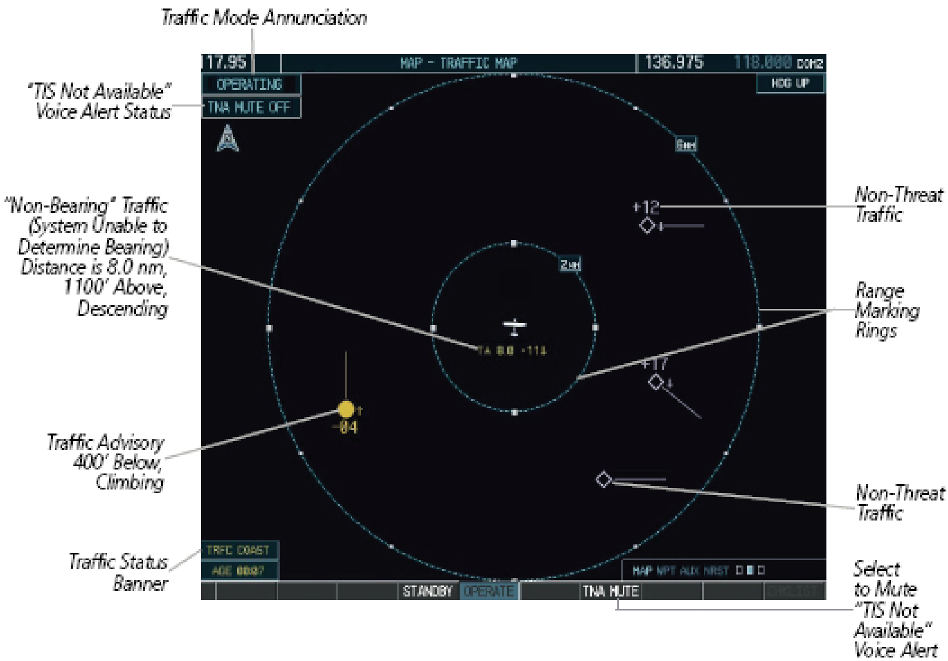


Figure 7-31 – Traffic Annunciation and Inset Map with Traffic Displayed (TIS)

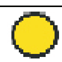
TIS Symbol	Description
	Non-Threat Traffic
	Traffic Advisory (TA)
	Traffic Advisory Off Scale

Figure 7-32 – Traffic Annunciations (TIS)

Traffic Advisory System (TAS) (if equipped)

Traffic Advisory System (TAS) is designed to help in detection and avoidance of other aircraft. TAS uses an on-board interrogator-processor and an altitude reporting transponder for the air-to-air traffic data link. Traffic is displayed according to TCAS symbology using four different symbols.

TAS Symbol	Description
	Non-Threat Traffic
	Proximity Advisory (PA)
	Traffic Advisory (TA)
	Traffic Advisory Off Scale

Figure 7-33 – Traffic Annunciations (TAS)

A Non-threat Advisory, shown as an open white diamond, indicates that an intruding aircraft is at greater than ±1200 feet relative altitude or the distance is beyond 5 nm.

A Proximity Advisory indicates that the intruding aircraft is within ±1200 feet and is within 5 nm range, but is still not considered a threat.

A Traffic Advisory (TA) alerts the crew to a potentially hazardous intruding aircraft. Closing rate, distance, and vertical separation meet TA criteria.

A Traffic Advisory that is beyond the selected display range is indicated by a half TA symbol at the edge of the screen at the relative bearing of the intruder.

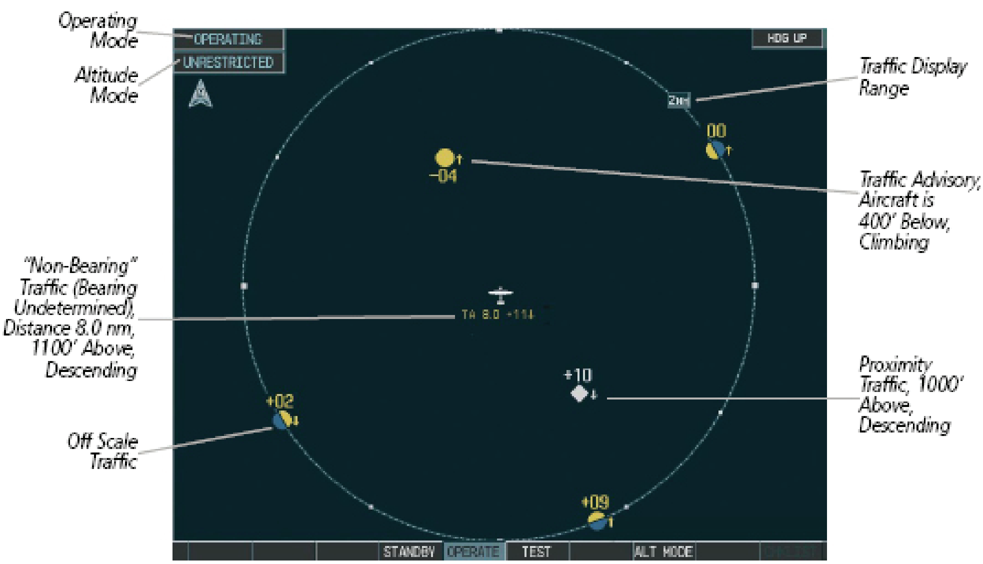


Figure 7-34 – Traffic Annunciations on Traffic Map Page (TAS)

TAWS Annunciations

Terrain Awareness and Warning System (TAWS) annunciations appear on the PFD at the top left of the Altimeter. Refer to the **GARMIN Cockpit Reference Guide** for information on TAWS alerts and annunciations.

Figure 7-35 – Traffic and Example TAWS Annunciations

Altitude Alerting

Altitude Alerting provides the pilot with a visual alert when approaching the Selected Altitude. Whenever the Selected Altitude is changed, the Altitude Alerter is reset. The following occur when approaching the Selected Altitude:

• When the aircraft passes through 1000 feet of the Selected Altitude an aural tone is heard. The Selected Altitude changes to black text on a light blue background and flashes for five seconds.

• When the aircraft passes within 200 feet of the Selected Altitude, the Selected Altitude changes to light blue text on a black background and flashes for five seconds.

• Upon reaching the Selected Altitude, if the pilot flies outside the deviation band (± 200 feet of the Selected Altitude) an aural tone is heard. The Selected Altitude changes to yellow text on a black background and flashes for five seconds.

Figure 7-36 – Altitude Alerting Visual Annunciations

Low Altitude Annunciation

NOTE: *A Low Altitude Annunciation is available only when WAAS is available. This annunciation is not shown, unless TAWS is inhibited.*

When the Final Approach Fix (FAF) is the active waypoint in a GPS WAAS approach using vertical guidance, a Low Altitude Annunciation may appear if the current aircraft altitude is at least 164 feet below the prescribed altitude at the FAF. A black-on-yellow LOW ALT annunciation appears to the top right of the Altimeter, flashing for several seconds, then remaining displayed until the condition is resolved.

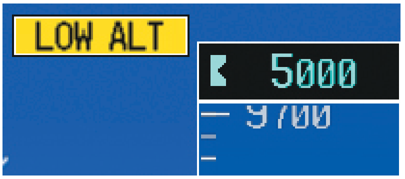


Figure 7-37 – Low Altitude on GPS WAAS Approach

MINIMUM DESCENT ALTITUDE/DECISION HEIGHT ALERTING

For altitude awareness, a barometric Minimum Descent Altitude (MDA) or Decision Height (DH) can be set in the Timer/References Window and is reset when the power is cycled. When active, the altitude setting is displayed to the bottom left of the Altimeter. Once the altitude is within the range of the tape, a bug appears at the reference altitude on the Altimeter. The following visual annunciations occur when approaching the MDA/DH:

- When the aircraft altitude descends to within 2500 feet of the MDA/DH setting, the BARO MIN box appears with the altitude in light blue text. The bug appears on the altitude tape in light blue once in range.
- When the aircraft passes through 100 feet of the MDA/DH, the bug and text turn white.
- Once the aircraft reaches MDA/DH, the bug and text turn yellow and the aural alert, “Minimums. Minimums”, is heard.

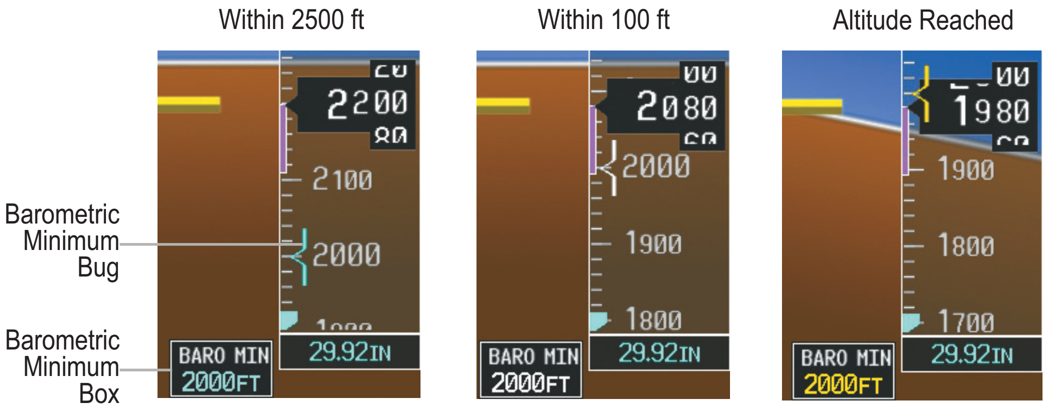


Figure 7-38 – Barometric MDA/DH Alerting Visual Annunciations

Alerting is inhibited while the aircraft is on the ground and until the aircraft reaches 150 feet above the MDA. If the aircraft proceeds to climb after having reached the MDA, once it reaches 50 feet above the MDA, alerting is disabled.

The MDA/DH may be set from either PFD and is synchronized on both PFDs. The function is reset when the power is cycled.

Figure 7-39 – Barometric MDA/DH

ADDITIONAL GARMIN 1000 FEATURES (EQUIPPED ONLY AS SELECTED OPTIONS)

The G1000 system is equipped with many options that increase the users situational awareness in the cockpit. These options can be purchased by contacting Quest Aircraft. If your aircraft is equipped with any of the additional features listed, please refer to the **GARMIN Cockpit Reference Guide** for additional information and user instructions.

Additional features of the G1000 include the following:

- Synthetic Vision System (SVS)
- SafeTaxi® diagrams
- ChartView and FliteCharts® electronic charts
- XM Radio entertainment
- XM Weather

The optional **Synthetic Vision System (SVS)** provides a three-dimensional forward view of terrain features on the PFD. SVS imagery shows the pilot's view of relevant features in relation to the aircraft attitude.

SafeTaxi diagrams provide detailed taxiway, runway, and ramp information at more than 700 airports in the United States. By decreasing range on an airport that has a SafeTaxi diagram available, a close up view of the airport layout can be seen.

The optional **ChartView and FliteCharts** provide on-board electronic terminal procedures charts. Electronic charts offer the convenience of rapid access to essential information. Either ChartView or FliteCharts may be configured in the system, but not both.

The optional **XM Radio** entertainment audio feature of the GDL 69A Data Link Receiver handles more than 170 channels of music, news, and sports. XM Radio offers more entertainment choices and longer range coverage than commercial broadcast stations.

> **NOTE:** *With the availability of SafeTaxi, ChartView, or FliteCharts in electronic form, it is still advisable to carry another source of charts on board the aircraft.*

MULTI-FUNCTION DISPLAY (MFD) AUXILIARY VIDEO INPUT (IF ACTIVATED)

REV 1

The G1000 MFD is equipped with an Auxiliary Video Input. The G1000 system provides a control and display interface to the auxiliary video system. The video system is capable of displaying video for up to two inputs.

The G1000 MFD is capable of displaying the following video in the following modes:

- Full-Screen
- Full-Screen with Digital Zoom
- Split-Screen with Map
- Split-Screen with Map and Digital Zoom

The Auxiliary Video Input is an option for the KODIAK and must have the appropriate software in order to use.

GARMIN SYNTHETIC VISION SYSTEM (SVS) (IF EQUIPPED)

The optional Synthetic Vision System (SVS) is a visual enhancement to the G1000 Integrated Flight Deck. SVS depicts a forward-looking attitude display of the topography immediately in front of the aircraft. The field of view is 30 degrees to the left and 35 degrees to the right. SVS information is shown on the Primary Flight Display (PFD), or on the Multifunction Display (MFD) in Reversionary Mode (**Figure 7-40**). The depicted imagery is derived from the aircraft attitude, heading, GPS three-dimensional position, and a nine arc-second database of terrain, obstacles, and other relevant features. The terrain data resolution of nine arc-seconds, meaning that the terrain elevation contours are stored in squares measuring nine arc-seconds on each side, is required for the operation of SVS. Loss of any of the required data, including temporary loss of the GPS signal, will cause SVS to be disabled until the required data is restored.

The SVS terrain display shows land contours (colors are consistent with those of the topographical map display), large water features, towers, and other obstacles over 200' AGL that are included in the obstacle database. Cultural features on the ground such as roads, highways, railroad tracks, cities, and state boundaries are not displayed even if those features are found on the MFD map. The terrain display also includes a north–south east–west grid with lines oriented with true north and spaced at one arc-minute intervals to assist in orientation relative to the terrain. The Terrain Awareness and Warning System (TAWS) is integrated within SVS to provide visual and auditory alerts to indicate the presence of terrain and obstacle threats relevant to the projected flight path. Terrain alerts are displayed in red and yellow shading on the PFD.

The terrain display is intended for situational awareness only. It may not provide the accuracy or fidelity on which to base decisions and plan maneuvers to avoid terrain or obstacles. Navigation must not be predicated solely upon the use of the TAWS terrain or obstacle data displayed by the SVS.

For operational guidance of the G1000 SVS system, refer to the **GARMIN Cockpit Reference.**

WARNING: *Use appropriate primary systems for navigation, and for terrain, obstacle, and traffic avoidance. SVS is intended as an aid to situational awareness only and may not provide either the accuracy or reliability upon which to solely base decisions and/or plan maneuvers to avoid terrain, obstacles, or traffic.*

Figure 7-40 – Synthetic Vision System (SVS)

SAFE TAXI (IF EQUIPPED)

SafeTaxi is an enhanced feature that gives greater map detail when viewing airports at close range. The maximum map ranges for enhanced detail are pilot configurable. When viewing at ranges close enough to show the airport detail, the map reveals taxiways with identifying letters/numbers, airport Hot Spots, and airport landmarks including ramps, buildings, control towers, and other prominent features. Resolution is greater at lower map ranges. When the MFD display is within the SafeTaxi ranges, the airplane symbol on the airport provides enhanced position awareness.

Designated Hot Spots are recognized at airports with many intersecting taxiways and runways, and/or complex ramp areas. Airport Hot Spots are outlined to caution pilots of areas on an airport surface where positional awareness confusion or runway incursions happen most often. Hot Spots are defined with a magenta circle or outline around the region of possible confusion.

During ground operations the aircraft's position is displayed in reference to taxiways, runways, and airport features. In the example shown, the aircraft is on taxiway Bravo inside the High Alert Intersection boundary on KGEG airport. Airport Hot Spots are outlined in magenta. When panning over the airport, features such as runway holding lines and taxiways are shown at the cursor.

Figure 7-41 – SafeTaxi Depiction on the Navigation Map Page

CHARTVIEW AND FLITECHARTS® ELECTRONIC CHARTS (IF EQUIPPED)

ChartView resembles the paper version of Jeppesen terminal procedures charts. The charts are displayed in full color with high-resolution. The MFD depiction shows the aircraft position on the moving map in the plan view of approach charts and on airport diagrams. Airport Hot Spots are outlined in magenta.

FliteCharts resemble the paper version of National Aeronautical Charting Office (NACO) terminal procedures charts. The charts are displayed with high-resolution and in color for applicable charts. FliteCharts database subscription is available from Garmin.

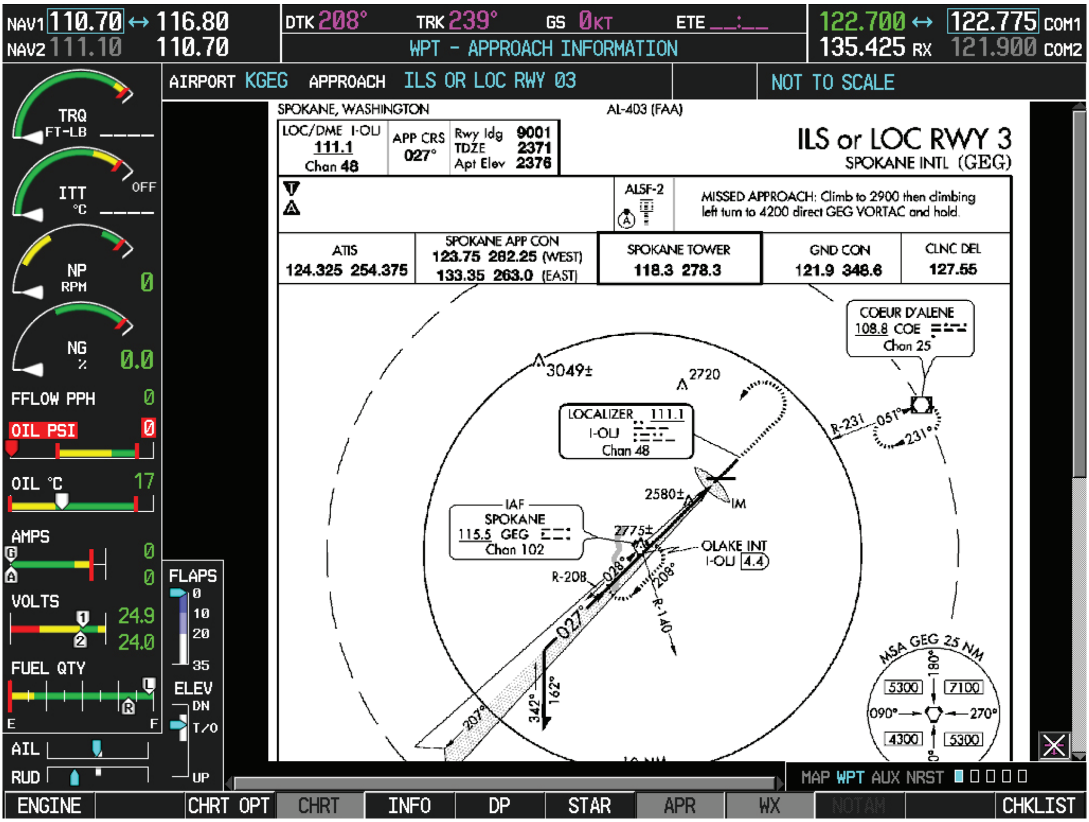


Figure 7-42 – Flight Charts

XM RADIO ENTERTAINMENT (IF EQUIPPED)

The optional XM Radio entertainment feature of the GDL 69A Data Link Receiver is available for the pilot's and passengers' enjoyment. The GDL 69A can receive XM Satellite Radio® entertainment services at any altitude throughout the Continental U.S. Entertainment audio is available only on the GDL 69A Data Link Receiver, not the GDL 69. XM Satellite Radio offers a variety of radio programming over long distances without having to constantly search for new stations. Based on signals from satellites, coverage far exceeds land-based transmissions. XM Satellite Radio services are subscription-based.

For operational guidance of the XM Radio system and instructions on how to activate XM Radio service, refer to the **GARMIN Cockpit Reference Guide.**

XM SATELLITE WEATHER (IF EQUIPPED)

XM Satellite Weather is provided through the GDL 69A, a remote-mounted data-link satellite receiver. Received graphical weather information and associated text is displayed on the Multi Function Display (MFD) and the Primary Flight Display (PFD) Inset Map. The GDL 69A can also receive XM Satellite Radio® entertainment services. Both weather data and entertainment programming operate in the S-band frequency range to provide continuous reception capabilities at any altitude throughout North America.

XM Satellite Radio services are subscription-based.

For operational guidance of the XM Satellite Weather system and instructions on how to activate XM Satellite Weather service, refer to the **GARMIN Cockpit Reference Guide.**

The G1000 System is capable of displaying the following information:

- PIREPS
- AIREPS
- Turbulence
- Current Icing Product (CIP)
- Super Cooled Liquid Droplet (SLD)

REV 4

WARNING: *XM Satellite Weather data provides information for avoiding hazardous weather. Do not utilize XM Weather information to penetrate hazardous weather.*

Figure 7-43 – XM Satellite Weather Page

WX-500 STORMSCOPE (IF EQUIPPED)

The Stormscope WX-500 Series II Weather Mapping Sensor detects electrical discharges associated with thunderstorms within 200 nm radius of the aircraft. This information is then sent to the G1000 multifunction display (MFD) that plots the location of the associated thunderstorms.

For operational guidance of the WX-500 Stormscope system, refer to the **GARMIN Cockpit Reference Guide.**

> **NOTE:** *The Stormscope system is not intended for hazardous thunderstorm penetration. Weather information on the G1000 MFD is approved for weather avoidance only. Refer to the* **WX-500 User's Guide** *for a detailed description of Stormscope operation.*

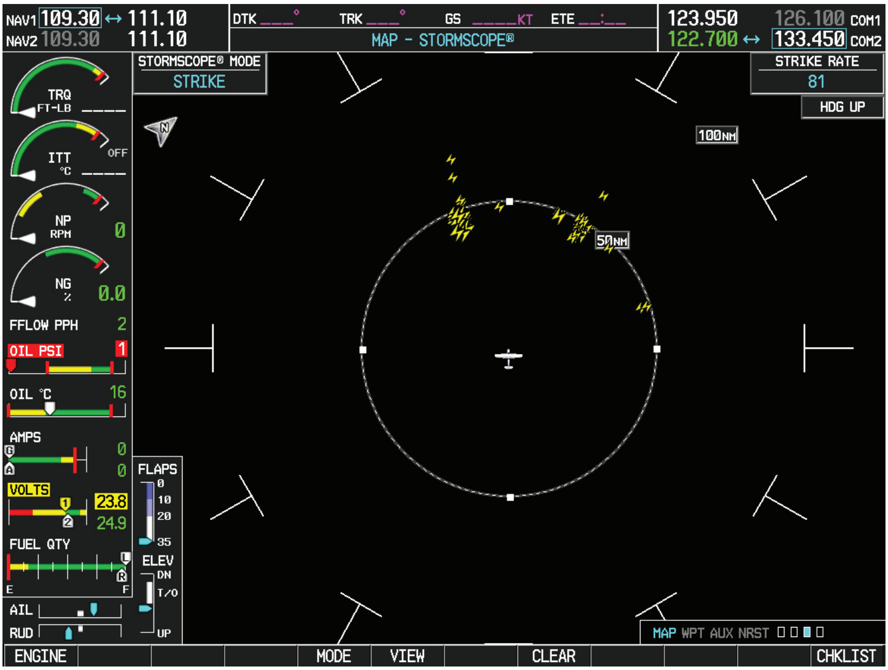


Figure 7-44 – WX-500 Stormscope

> **NOTE:** *Using the WX-500 Stormscope while the pulse lights are on could cause erroneous lightning indications. To prevent the possibility of erroneous lightning indications while utilizing the WX-500 Stormscope,* **DO NOT** *use the PULSE position of the LANDING LIGHT toggle switch.*

7-7 FLIGHT MANAGEMENT

G1000 WEIGHT PLANNING

REV 4

The GARMIN G1000 is equipped with a tool that allows the crew to quickly determine the gross weight of the KODIAK 100. This tool can be accessed on the MFD. On power-up, the MFD defaults to the Weight Planningpage. The Weight Planning tool will not compute the aircraft Center of Gravity nor will it produce any moments for Center of Gravity computations. The Weight Planning tool has two sections, Payload (LB) and Fuel (LB). The fields are described below as an entry field or a calculation field. An entry field is selectable data that is entered by the crew. A calculation field is not selectable by the crew and is automatically calculated by the G1000 from the data entered. For operational guidance of the Weight Planning tool, refer to the **GARMIN Cockpit Reference Guide.**

REV 4

NOTE: *When returning from Reversionary mode, the MFD will default to the map page and not the weight planning page.*

NOTE: *All weight planning page data fields display data rounded to the nearest 10 pounds or 5 kilograms.*

PAYLOAD (LB) ENTRY SECTION

The Payload (LB) section allows the crew to enter the weight of crew, passengers, and cargo. Listed below are the fields listed in the Payload (LB) section with short definitions:

Basic Empty Weight (Entry Field) - The basic empty weight is the aircraft weight not including passengers, fuel, crew, or cargo. The Basic Empty Weight number is retained and stored in the system after each flight. Refer to **Section 6** Weight and Balance of the KODIAK POH/AFM to obtain a current Basic Empty Weight.

Pilot and Stores (Entry Field) - This is the weight if the pilot, copilot, and flight gear (charts, additional gear).

Basic Operating Weight (Calculation Field) - Automatic calculation of Basic Empty Weight and Pilot and Stores.

Passenger(s) Weight (Entry Field) - The crew has the ability to select up to 9 passengers. The Weight Planning tool allows the crew to specify the average weight of the passengers in a range of 0 LB to 990 LB. The crew has the discretion of adding the weight of the bags to each passenger of add them in the Cargo Weight entry field.

Cargo Weight (Entry Field) - This is the weight of the total cargo on-board.

Zero Fuel Weight (Calculation Field) - Automatic calculation of all items listed in the Payload (LB) section. The Zero Fuel Weight number will be displayed in amber if the Zero Fuel Weight is greater than the maximum allowable Zero Fuel Weight. See **Figure 7-45.**

A/C Payload Calculator
Basic Empty Weight Entry -
Pilot and Stores Weight Entry -
Basic Operating Weight Calculation -
Passenger(s) Weight Entry -
Cargo Weight Entry -
Zero Fuel Weight Calculation -

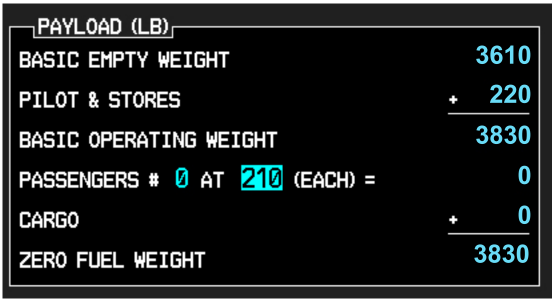


Figure 7-45 – Payload (LB) Section

FUEL (LB) ENTRY SECTION

The Payload (LB) section allows the crew to enter the weight of crew, passengers, and cargo. Listed below are the fields listed in the Fuel (LB) section with short definitions:

> **NOTE:** *If the aircraft is on the ground or a destination waypoint has not been entered, the following fields display invalid values consisting of six dashes:*
> - Estimated landing weight
> - Estimated landing fuel
> - Excess fuel

Zero Fuel Weight (Calculation Field) - This is the weight that is calculated in the Payload (LB) section.

Fuel Onboard (Entry of Sync Field) - This field is the total weight of the fuel onboard the aircraft. The total weight of the fuel onboard can be manually inserted by the crew. On power up, the Fuel Onboard displays the total fuel quantity as referenced to the aircraft fuel quantity indicators. To sync the fuel totalizer to this field, press the FOB SYNC soft key on the bottom of the MFD.

Aircraft Weight (Calculation Field) - The aircraft weight calculation is a total weight of the zero fuel weight and fuel onboard.

Estimated Landing Weight (Calculation Field) - When the aircraft is in the air and a destination waypoint has been entered, the fuel calculations can be completed. Landing weight is automatically calculated based on the following information: [*Estimated landing weight = zero fuel weight + estimated landing fuel*]. If the estimated landing weight is greater than the allowable landing or takeoff weight, then the estimated landing weight will be displayed in amber.

Estimated Landing Fuel (Calculation Field) - When the aircraft is in the air and a destination waypoint has been entered, the estimated landing fuel calculations can be completed. The estimated landing fuel weight calculation is based on the following information: [*Estimated landing fuel = fuel on board - (fuel flow x ETE)*]. This estimated landing fuel calculation is the estimated fuel remaining after landing. If the estimated landing fuel weight is positive, but less than or equal to the fuel reserves weight, the following values are displayed in amber:

- Estimated landing fuel
- Excess fuel weight

If the estimated landing fuel weight is zero or negative, then the following values are displayed in red:

- Estimated landing fuel
- Excess fuel

Fuel Reserves (Entry Field) - This field allows the crew to subtract any reserve fuel that may not be included in fuel onboard entry field.

Excess Fuel (Calculation Field) - When the aircraft is in the air and a destination way point has been entered, the estimated excess fuel calculation can be completed. The estimated excess fuel calculation is based on the following information: [*Excess fuel weight = estimated landing fuel - fuel reserves*]. The estimated excess fuel is the calculated fuel remaining after landing.

Fuel Calculator
Zero Fuel Weight Calculation -
Fuel Onboard Entry -
Aircraft Weight Calculation -
Estimated Landing Weight Calculation -
Estimated Landing Fuel Calculation -
Fuel Reserves Entry -
Excess Fuel Calculation -

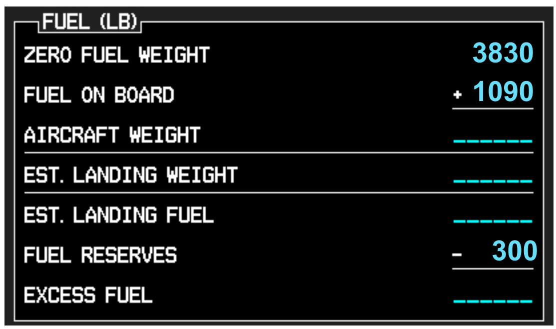


Figure 7-46 – Fuel (LB) Section

Figure 7-47 – Weight Planning Page

7-8 GROUND OPERATION

Ground control while taxiing is accomplished through nose wheel steering by using the rudder pedals. The left rudder pedal is pressed to steer left and the right rudder pedal is pressed to steer right. When a rudder pedal is depressed, a spring-loaded steering bungee (which is connected to the nose wheel steering bellcrank and rudder bars) will turn the nose wheel through an arc of approximately 17.5 degrees each side of center. By applying either left or right brake, the degree of turn may be increased up to approximately 55° each side of center.

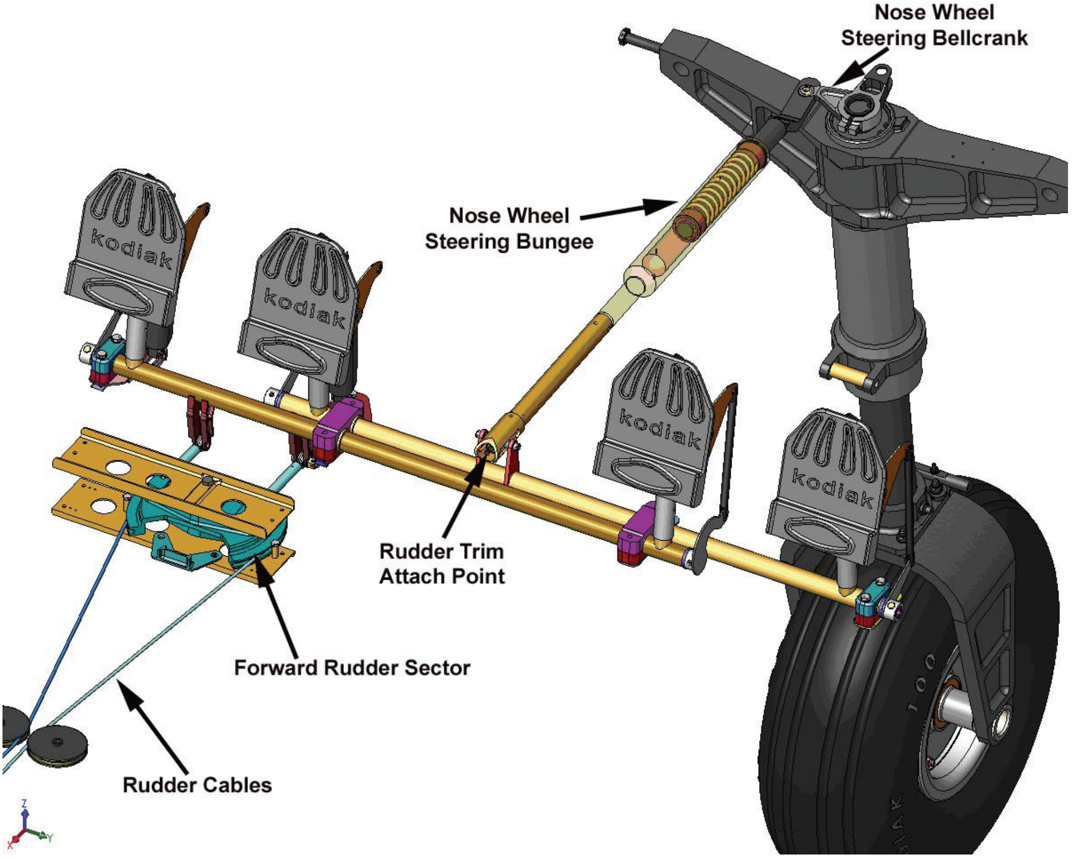


Figure 7-48 – Nose Wheel Steering System

Moving the airplane by hand is most easily accomplished by attaching a tow bar to the nose gear tow pins. If a tow bar is not available, or pushing is required, use the wing struts as push locations. Do not use the propeller blades or spinner to push or pull the airplane. If the airplane is to be towed by a vehicle, use caution as to avoid exceeding the turning limits marked either side of center.

7-9 WING FLAPS

The electrically controlled, slotted fowler flaps enhance the low speed lift characteristics of the airplane. Each flap is connected to the wing structure at three flap track assemblies. Each flap track assembly contains two grooves in which the flap rollers operate. The flaps may be positioned at 0°, 10°, 20° and 35° by selecting the desired position on the flap control switch. As the flap position switch is placed in a given position, sensors in the flap power system provide input to the flap motor and gearbox; the flap motor and gearbox drives flexible shafts which actuate worm gear assemblies and position the flaps as selected in the cockpit. Three asymmetry sensors are installed along each flap assembly to ensure flap symmetry. If a malfunction occurs within the flap or between the two flaps, the asymmetry sensors will immediately discontinue flap movement. Flap position indication is provided on the multifunction display.

7-10 LANDING GEAR SYSTEM

The landing gear is of the tricycle type with a steerable nose wheel and two main wheels. Shock absorption is provided through the tubular spring steel main landing gear struts with two interconnecting steel cross tubes and the air and oil-filled nose gear shock strut. The landing gear system is designed for operations from unimproved runways. To improve the operation from unimproved runways, the optional oversize tires may be installed. This option provides greater propeller ground clearance and a wider footprint for better performance on soft surfaces.

7-11 BAGGAGE/CARGO COMPARTMENT

In the passenger version, the space normally used for carrying baggage is the raised area aft of the cargo door to the aft cabin bulkhead. Access to the baggage area is gained through the cargo door or from within the cabin. Quick-release cargo tie-down straps and a cargo net are provided for securing baggage and are attached to the compartment floor anchor points. When operating the airplane as a cargo carrier, refer to Section 6 for complete cargo loading details. Any material that could possibly be hazardous to the airplane or its occupants should not be placed anywhere in the airplane. Refer to **Section 6** for baggage and cargo area dimensions.

7-12 SEATS

Standard seating for the airplane consists of six-way adjustable pilot and front passenger seats. Additional passenger seating is available in the passenger versions. The utility configuration consists of four rows of single-place, fixed position collapsible seats on each side of the cabin.

WARNING: *None of the standard equipment airplane seats is approved for installation facing aft.*

PILOT AND FRONT PASSENGER SEATS

The pilot and front passenger seats are adjustable in six directions. They may be moved forward or aft, adjusted up or down and the seat back angle may be changed. Position the seat forward and aft by raising one of the small levers on the left or right sides of the seat. Once a lever is raised, position the seat as desired and release the lever. Ensure the seat is properly locked into position by trying to move the seat forward and aft. The seat may be raised or lowered by rotating the crank under the front center of the seat. The seat back angle may be adjusted by raising the lever on the outboard or inboard aft side of the seat and positioning the seatback as desired. Ensure the seatback is properly locked into position by trying to move the seatback forward and aft. The pilot and front passenger seats are equipped with non-adjustable headrests.

AFT PASSENGER SEATS – UTILITY PASSENGER VERSION

Individual collapsible seats are available for the eight aft passenger stations. The seats may be folded into a compact space and stowed in the aft baggage area when not in use. When necessary, the seats can then be unfolded and installed in the passenger area. The seats are equipped with quick-release fasteners which allow them to be readily fastened to the seat tracks in any one of the eight passenger seat stations.

7-13 SEAT BELTS AND SHOULDER HARNESSES

All seat positions are equipped with seat belts and shoulder harnesses. The shoulder harnesses on the pilot and front passenger seats are equipped with inertia reels.

WARNING: *Failure to properly utilize the seat belts, shoulder harnesses and inertia reels could result in serious injury or death in the event of an accident.*

PILOT AND FRONT PASSENGER SEAT BELTS AND SHOULDER HARNESSES

Both the pilot and front passenger seats are equipped with a four-point restraint system which combines the function of conventional lap-belts, and inertia reel equipped double strap shoulder harness in a single assembly. The lap belts attach to fittings on each side of the lower aft portion of the seat frames. The shoulder harness and inertia reel assemblies attach to the upper portion of the forward carry-through spar. The inertia reels are equipped with levers mounted overhead the pilot and front passenger seats to lock the reels and prevent any upper body movement whatsoever. Pushing the inertia reel lever to the forward position locks the inertia reel. Placing the inertia reel lever in its full aft position unlocks the inertia reel and allows freedom of movement of the upper body except in the event of sudden deceleration, in which case, the inertia reel will automatically engage and prevent movement. The inertia reel levers must be placed in the locked position prior to takeoff or landing.

The left half of the lap belt contains the buckle, which is the connection point for the right half of the lap belt, and both shoulder harnesses. The right lap belt and shoulder harnesses are fitted with links which insert into the buckle. Both halves of the seat belt and shoulder harnesses have adjusters with narrow straps to enable the belt halves to be lengthened or shortened as necessary. The shoulder harnesses must be routed between the headrest supports.

To use the restraint system, place the inertia reel lever in the unlocked position, lengthen each half of the seat belt as required by pulling the buckle or connecting link towards the lap with one hand while pulling outward on the narrow adjuster strap with the other hand. Insert the right connecting link into the lower right slot of the buckle. Position each shoulder harness strap over the shoulders and insert their links into the upper slots in the buckle. The seat belts and shoulder harnesses should be tightened to a snug-fit by grasping the free end of each belt and pulling it away from the buckle. If desired, place the inertia reel lever in the locked position.

To release the lap belts and shoulder harnesses, simply twist the front section of the buckle in either direction and pull all connecting links free.

PASSENGER VERSION SEAT BELTS AND SHOULDER HARNESSES

All seat belts attach to fittings installed on the seat frame. The belts consist of a buckle-half and a link-half on each seat. To use the seat belts, lengthen the link side and buckle side of the lap belts and shoulder harnesses as necessary by grasping the sides of the link or buckle and pulling against the belt. The shoulder harnesses are equipped with a narrow strap to aid in lengthening the strap. Simply pull on the narrow strap to lengthen the straps as required. Position each shoulder harness strap over the shoulders and insert the lap/shoulder harness link into the lap/shoulder harness buckle. The seat belts and shoulder harnesses should be tightened to a snug-fit by grasping the free end of each belt and pulling it away from the buckle.

7-14 CABIN ENTRY DOORS

Entering and exiting the airplane is accomplished through an entry door on each side of the forward fuselage at the pilot and front passenger positions. A cargo door on the left side of the aft fuselage may also be used for cabin entry.

CREW ENTRY DOORS

Both crew entry doors incorporate a conventional exterior door handle, a key-operated door lock, a conventional interior door handle, lock override and a fixed window. The pilot window includes a storm window which may be opened. To open either crew entry door from outside the airplane (when unlocked); press on the forward portion of the handle to expose the handle, and rotate it upward toward the OPEN position. To close the door from the inside of the airplane, use the conventional armrest handle. Place the inside door handle in the OPEN position and pull the door shut; then, rotate the handle forward to the LATCHED position. When the handle is rotated to the LATCHED position, an over-center condition will hold it in that position.

CAUTION: *Failure to properly close and latch the crew doors may cause them to open in flight.*

Both crew doors should be in the LATCHED position prior to flight, and should not be intentionally opened during flight. If it is necessary to lock the aircraft when leaving it unattended, both crew doors must be locked from the outside of the airplane with the conventional key locks.

CARGO/AFT PASSENGER DOOR

A cargo/aft passenger door is installed on the left side of the airplane just aft of the wing trailing edge. The door is a clamshell type with stairs built into the lower half for easy access for the passenger/cargo area. With the cargo door open, the large opening facilitates the loading of bulky cargo into the cabin. A conventional handle is installed on the exterior of the door.

To open the door from the outside, press the forward portion of the handle to expose the handle; rotate the handle up toward the OPEN position to unlatch the door. The upper half of the door has two telescoping door lifts which raise the door to the fully-open position. Once the upper half of the door is opened, the lower half may be unlatched by moving its lever aft.

To close the door from the outside, ensure the lower door handle is in the UNLATCHED position, and shut the door. Hold the lower door closed and rotate the handle forward to the LATCHED position. Pull the upper door down and while holding it in the closed position, rotate the lever down to latch the upper door in place.

To open the door from the inside, grasp the upper door handle and rotate it upward to the open position. Once the upper door is open, move the lower door handle aft to unlatch the door. The lower door may then be carefully lowered to the open position.

To close the door from the inside, ensure the lower door handle is in the OPEN (aft) position and pull the door shut. With the door pulled closed tightly, move the handle forward to the LATCHED position. Once the lower door is closed, pull the upper door shut while ensuring the door handle is in the OPEN (up) position. Hold the upper door shut and move the handle aft to the latched position.

As a safety feature, the airplane is equipped with a cargo door warning system. If the cargo/aft passenger door is not properly latched, annunciation through the G1000 will alert the pilot of the situation.

CAUTION: *Failure to properly latch the cargo door will result in illumination of the CARGO DOOR annunciator. This annunciation will appear in amber if the aircraft is on the ground and red if the aircraft is airborne (as determined by GPS groundspeed). Ignoring the amber CARGO DOOR annunciation on the ground may result in the cargo door coming open in flight.*

7-15 CABIN WINDOWS

The airplane is equipped with a two-piece acrylic windshield reinforced with a metal center strip. The two crew door windows are constructed of clear polycarbonate. The pilot’s door contains a storm window, which is able to be opened. The six aft cabin windows and cargo/aft passenger door windows are constructed of grey tinted polycarbonate.

7-16 CONTROL LOCK

To prevent damage to the ailerons, elevator, and rudder systems caused by wind buffeting while the airplane is parked, a control lock is provided to lock the ailerons, elevator, and rudder in place. The lock consists of a steel pin which is inserted through holes in the control tube and a locking mechanism for the rudder pedals. The steel pin has a flag that identifies it as a control lock and provides a warning statement for removal prior to starting the engine.

To install the control lock, align the hole in the upper portion of the pilot's control wheel shaft with the hole in the shaft collar on the instrument panel and insert the rod into the aligned holes. Installation of the lock will secure the ailerons in their neutral position and the elevators in the full trailing edge down position. Proper installation of the lock will place the flag directly in front of the pilot's view of the instrument panel.

To install the rudder gust lock, position the pedal sleeves over the top of the rudder pedals and then lock the seat track anchor into the anchor point.

7-17 ENGINE

The Pratt and Whitney Canada PT6A-34 powerplant is a lightweight, reverse flow, free power turbine engine. It utilizes two independent turbines; one driving the compressor in the gas generator section and the second driving the propeller through a reduction gearbox.

Inlet air enters near the rear of the engine through an annular plenum chamber formed by the compressor inlet case where it is directed to the compressor section. The compressor consists of three axial stages and a single centrifugal stage, all assembled as an integral unit. A row of stator vanes, located between each stage of compression, diffuses the air, raises its static pressure and directs it to the next stage of compression. The compressed air passes through diffuser tubes which turn the air through ninety degrees in direction and converts velocity to static pressure. The resultant compression ratio of the engine is 7.0:1.

The diffused air then passes through straightening vanes to the annulus surrounding the combustion chamber liner. The combustion chamber liner consists of an annular weldment having perforations of various sizes that allow entry of compressor delivery air. The flow of air changes direction 180 degrees as it enters and mixes with fuel. The fuel/air mixture is ignited and the resultant expanding gases are directed to the turbines. The location of the liner eliminates the need for a long shaft between the compressor and the compressor turbine, thus reducing the overall length and weight of the engine.

Fuel is injected into the combustion chamber liner through 14 simplex nozzles arranged in two sets of seven for ease of starting. Fuel is supplied by a dual manifold consisting of primary and secondary transfer tubes and adapters. The fuel/air mixture is initially ignited during starting by two spark igniters which protrude into the liner. The resultant gases expand from the liner, reverse direction in the exit duct zone and pass through the compressor turbine inlet guide vanes to the compressor turbine. The guide vanes ensure that the expanding gases impinge on the turbine blades at the correct angle, with minimum loss of energy. The still expanding gases are then directed forward to drive the power turbine.

The compressor and power turbines are located in the approximate center of the engine with their respective shafts extending in opposite directions. This feature provides for simplified installation and inspection procedures. The exhaust gas from the power turbine is directed through an annular exhaust plenum to atmosphere via twin opposed exhaust ports provided in the exhaust duct.

Interturbine temperature (ITT) is monitored by a cold junction thermocouple system comprising a bus-bar, probes and harness assembly installed between the compressor and power turbines with the probes projecting into the gas path. A terminal block mounted in the gas generator case provides a connection point to cockpit instrumentation and to an ITT trim thermocouple mounted externally in the air inlet zone.

The engine is rated at 750 shaft horsepower for takeoff and maximum continuous emergency power (1790 foot pounds of torque at 2200 RPM, varying linearly to 1970 foot pounds of torque at 2000 RPM; below 2000 RPM, the maximum takeoff/emergency power torque setting remains constant at 1970 foot pounds).

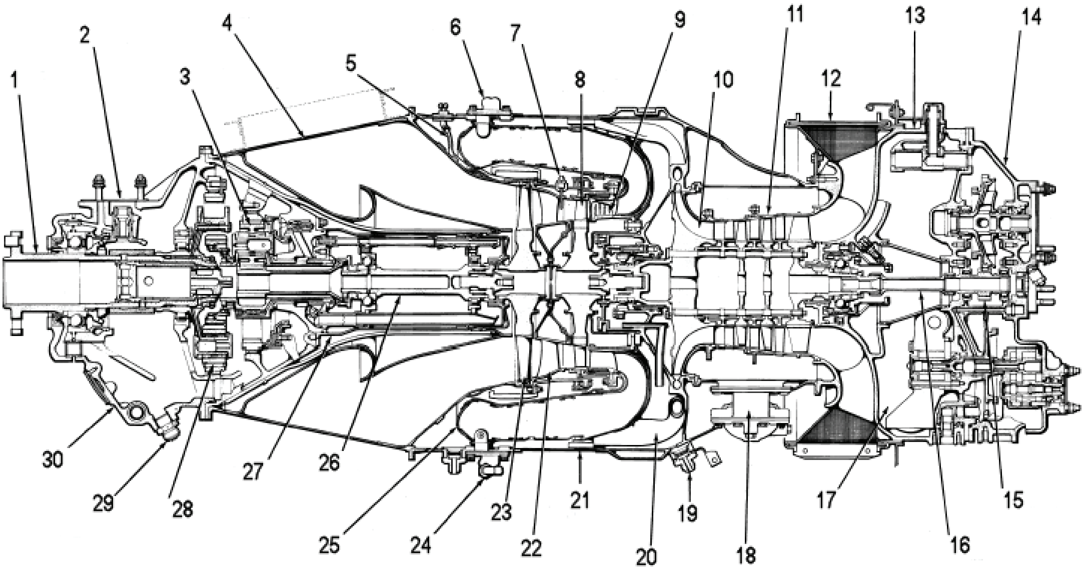
The engine is rated at 700 shaft horsepower for maximum climb and maximum cruise (1670 foot-pounds of torque at 2200 RPM, varying linearly to 1840 foot pounds of torque at 2000 RPM; below 2000 RPM, the maximum climb and cruise power torque setting remains constant at 1840 foot pounds).

The gas generator (compressor) turbine speed is 37,500 RPM at 100%Ng. The maximum permissible gas generator speed is 38,100 RPM or 101.6% Ng. The power turbine speed is 33,000 RPM at a propeller shaft speed of 2200 RPM (a reduction gear ratio of .0663:1)

All of the engine-driven accessories, with the exception of the propeller tachometer-generator and the propeller governors, are mounted on the accessory gearbox at the rear of the engine. The accessory gearbox is driven by the compressor turbine with a coupling shaft which extends from the compressor section through a conical tube in the center of the oil tank.

The engine is self-sufficient since its gas generator driven oil system provides lubrication for all areas of the engine, pressure for the torquemeter and power for propeller pitch control. The engine oil supply is contained in an integral tank which forms part of the compressor inlet case. The tank has a capacity of 9.5 US quarts and is equipped with a dipstick/filler cap and drain plug.

The power turbine drives the propeller shaft through a two-stage planetary reduction gearbox on the front of the engine. The gearbox incorporates an integral torquemeter device which provides an accurate indication of the engine power output to the cockpit.



1. Propeller Shaft
2. Propeller Governor Mounting Pad
3. First-Stage Reduction Gear
4. Exhaust Duct
5. ITT Wiring Harness
6. Fuel Nozzle
7. ITT Bus-Bar and Probe Assembly
8. Compressor Turbine
9. Compressor Turbine Vane Ring
10. Centrifugal Compressor Impeller
11. Axial-Flow Compressor Impellers (3)
12. Compressor Air Inlet
13. Compressor Inlet Case
14. Accessory Gearbox
15. Accessory Gearbox Driveshaft
16. Gearbox Coupling Shaft
17. Integral Oil Tank
18. Compressor Bleed Valve
19. Fuel Drain Valve
20. Diffuser Tube
21. Gas Generator Case
22. Power Turbine Vane Ring
23. Power Turbine
24. Flow Divider & Dump Valve
25. Combustion Chamber Liner
26. Power Turbine Shaft
27. Power Turbine Shaft Housing
28. Second-Stage Reduction Gear
29. Magnetic Chip Detector
30. Propeller Reduction Gearbox

Figure 7-49 – PT6 Engine Diagram

ENGINE CONTROLS

The engine is operated using four separate controls consisting of an emergency power lever, power lever, propeller control lever and a fuel condition lever. The power and fuel condition levers are engine controls and the propeller control lever controls propeller speed and feathering.

POWER LEVER

The power lever is connected, through linkages, to a cam assembly mounted on the fuel control unit at the rear of the engine. The power lever controls engine power through its full range from maximum takeoff to full reverse. The power lever also controls the pitch of the propeller when placed in BETA range. The power lever has MAX, IDLE, BETA and REVERSE range positions. The range from the MAX position through IDLE allows selection of the desired engine power output. The BETA range enables control of propeller blade angle from idle thrust, through a zero thrust condition to maximum reverse thrust.

PROPELLER CONTROL LEVER

The propeller control lever is connected, through linkages to the propeller governor mounted on top of the propeller reduction gearbox. The propeller control lever controls the governor settings from the maximum RPM position to full feather. The lever has two main positions: MAX and FEATHER. The MAX position is used when a high RPM is desired and governs the propeller speed at 2200 RPM. The FEATHER position is used during normal shutdown of the engine to assist in stopping the rotation of the power turbine and front section of the engine. Rotation of the forward section of the engine is not desirable when the engine is shutdown, since lubrication is not available after the gas generator section of the engine comes to a stop. With the propeller feathered when the engine is shut down, propeller windmilling in gusty wind conditions can also be minimized. A mechanical stop built into the pedestal slot of the propeller control lever makes it necessary to move the propeller lever to the left prior to moving the lever into or out of FEATHER. This stop is conveniently positioned for easy selection of 2000 RPM for cruise.

FUEL CONDITION LEVER

The fuel condition lever in the cockpit is connected through airframe linkage to a combined lever and stop mechanism at the top of the fuel control unit (FCU); this is connected by the FCU linkage to the cut-off lever on the side of the unit. The lever and stop also function as a hi-idle stop. The fuel condition lever performs the function of CUTOFF, LOW-IDLE and FLIGHT-IDLE. The CUTOFF position shuts off all fuel to the engine fuel nozzles. LOW-IDLE positions the control rod stop to provide a gas generator RPM of 52% Ng. FLIGHT IDLE positions the control rod stop to provide a gas generator RPM of approximately 68% Ng.

EMERGENCY POWER LEVER

The emergency power lever is connected, through linkages, to the manual override lever on the fuel control unit and allows manual governing of the engine fuel flow should a malfunction occur in the fuel control unit's pneumatic governing system.

When the engine is operating, a failure of any fuel control unit pneumatic governing signal input will result in the fuel flow decreasing to minimum idle (approximately 48% Ng at sea level and increasing with altitude). The emergency power lever allows restoration of engine power in the event of such a failure. NORMAL and MAX positions are provided for the emergency power lever. The NORMAL position is used for all normal engine operations when the fuel control unit is functioning normally and engine power is selected through the power lever. The range from NORMAL to MAX governs engine power and is used when a malfunction has occurred in pneumatic governing system of the fuel control unit and the power lever is ineffective. A mechanical stop in the lever slot requires that the emergency power lever be moved to the left to clear the stop before it can be moved forward, out of the NORMAL (full aft) position, and into the override position.

CAUTION: *The emergency power lever/manual override system is considered as an emergency system and should only be used in the event of a fuel control unit governing malfunction. When attempting a normal start, ensure the emergency power lever is in the NORMAL (full aft) position; otherwise, an over-temperature (hot-start) condition may result.*

CAUTION: *When the fuel control manual override system is in use, engine response may be more rapid compared to using the normal power lever. Additional care should be taken during engine acceleration to avoid exceeding the engine limitations.*

NOTE: *The* **EMER PWR LVR** *annunciator will illuminate whenever the lever is unstowed from its NORMAL position. This precaution is provided to prevent starting the engine with the emergency power lever inadvertently placed in any position other than NORMAL.*

CONTROL QUADRANT FRICTION LOCK

A quadrant friction lock is installed on the right side of the control pedestal. It is provided to help minimize creeping of the engine controls once they have been set. The lock is a knurled knob which increases friction on the engine controls when it is rotated clockwise.

ENGINE INSTRUMENTS

The G1000 Engine Indication and Crew Alerting System (EICAS) provides graphical indicators and numeric values for engine, oil, fuel, electrical, flap and trim system parameters to the pilot. The EICAS is shown in a vertical strip on the MFD during normal operation. In all cases, green indicates normal operation, yellow indicates caution, and red indicates warning. If either of the PFDs or the MFD fail during flight, the EICAS will be shown on the remaining displays. The EICAS consists of three pages that are selected using the ENGINE softkey.

The default ENGINE page provides indicators for Engine Torque, Inter-Turbine Temperature (ITT), Propeller RPM, Gas Generator RPM, Fuel Flow, Oil Pressure, Oil Temperature, Ammeter, Voltmeter, and Fuel Quantity Indicator. Aileron Trim, Rudder Trim, Elevator Trim, and Flap Position are shown on each EICAS page.

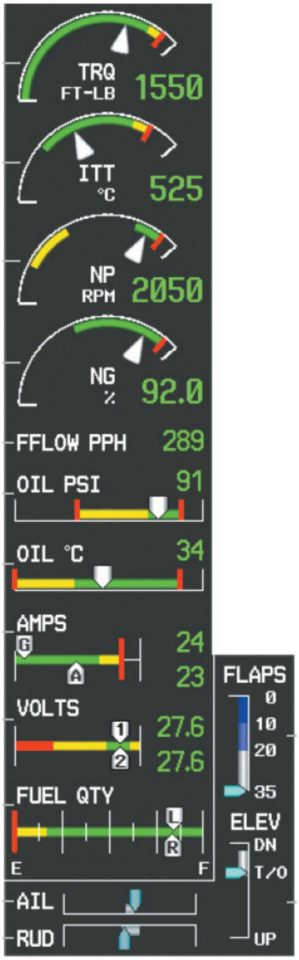


Figure 7-50 – Default ENGINE Page

The **SYSTEM** page provides numerical values for Fuel Pressure and Fuel Quantity (in pounds) along with all of the parameters shown on the ENGINE page. Pressing the SYSTEM softkey displays the SYSTEM engine page.

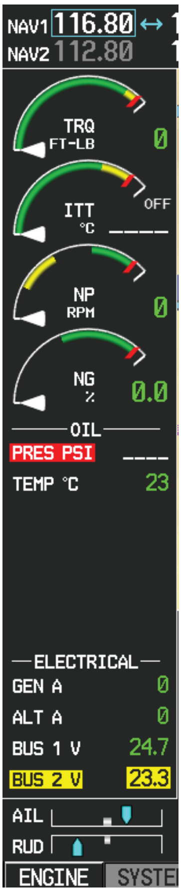


Figure 7-51 – SYSTEM Engine Page

The **FUEL** page shows a fuel totalizer which provides the following fuel calculations based on initial manual entering of fuel quantity into the calculator: Fuel Remaining (Pounds), Fuel Used (Pounds), Endurance (Hours:Minutes), and Range (Nautical Miles). The FUEL page is similar to the SYSTEM page except the electrical system information is replaced by the Fuel Totalizer information. Pressing the FUEL softkey displays the FUEL engine page.

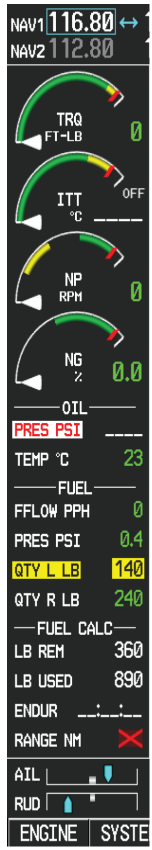


Figure 7-52 – FUEL Engine Page

NOTE: *When the fuel quantity is less than 175 pounds, the title and digits are highlighted in amber.*

TORQUE INDICATOR

Engine torque (TRQ) is shown by the torque indicator found on each EICAS page. The torque indicator uses a circular scale with a moving pointer and a digital value indicating the torque being produced by the engine. The pointer moves through a range of 0 to 2100 foot pounds.

The PT6A-34 engine is limited to 750 SHP for takeoff and emergencies, and 700 SHP for climb and cruise. Shaft horsepower is determined using the following equation:

$$\text{SHP} = \frac{\text{Torque X Propeller RPM}}{5252}$$

For Example:

$$750 \text{ SHP} = \frac{1790 \text{ (TRQ) X } 2200 \text{ (RPM)}}{5252}$$

The red line on the torque indicator is a dynamic marking depending upon propeller RPM and represents 751 SHP. If engine torque reaches the red line limit for longer than 5 seconds or greater than 2100 foot pounds at any time, the pointer, digital value, and label (TRQ) turn red to show engine torque is more than the established limits. The digital value and label (TRQ) will flash. The torque indicator is displayed in the same configuration and location on the default, SYSTEM and ENGINE pages.

The amber arc on the torque indicator is also a dynamic marking depending upon propeller RPM and represents a shaft horsepower range from 701 SHP to the upper limit of 750 SHP. If the engine torque and propeller RPM are generating between 700 SHP and 750 SHP, the torque indicator title, pointer and digits will be amber.

The top of the green arc on the torque indicator is also a dynamic marking depending upon propeller RPM and represents 700 SHP.

The indicator operates in conjunction with a transmitter located on the top of the reduction gearbox front case. The transmitter senses the difference between the engine torque pressure and the pressure in the engine case. The transmitter relays this data to the GEA 71 Engine/Airframe Interface Unit which processes and outputs torque data to the EICAS. A red X through the torque indicator shows the indicating system is inoperative.

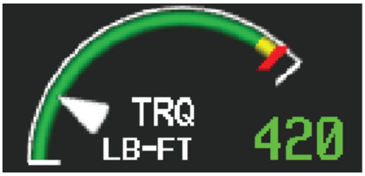


Figure 7-53 – Torque Indicator

PROPELLER RPM INDICATOR

Propeller RPM is shown by the NP RPM indicator found on each EICAS page. The propeller RPM indicator uses a circular scale with a moving pointer and a digital value indicating propeller revolutions per minute in increments of 10 RPM. The pointer moves through a range from 0 to 2300 RPM with an amber range from 450 to 1050 RPM, a green arc from 1900 to 2200 RPM, and a red radial line at 2200 RPM. When propeller RPM reaches the red line limit, the pointer, digital value, and label (NP RPM) turn red to show propeller RPM is more than the limit. The digital value and label (NP RPM) will flash. The amber range represents the propeller operating limitation prohibiting stabilized ground operation between 450 and 1050 RPM.

The instrument is electrically operated from the propeller tachometer-generator which is mounted on the right side of the propeller reduction gearbox. The propeller RPM indicator is displayed in the same configuration and location on the default, SYSTEM and ENGINE pages.

The indicator operates in conjunction with a speed sensor and transmitter located on the right side of the propeller reduction gearbox. The speed sensor provides a signal to the GEA 71 Engine and Airframe Interface Unit which processes and outputs propeller RPM data to the EICAS. A red X through the NP RPM indicator shows the indicating system is inoperative.

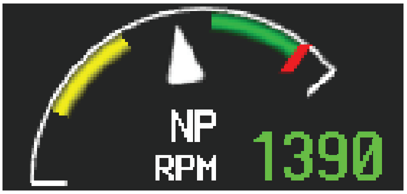


Figure 7-54 – Propeller RPM Indicator

ITT INDICATOR

Inter-Turbine Temperature (ITT or T5) is shown by the ITT indicator found on each EICAS page. The instrument shows the gas temperature between the compressor and power turbines. The ITT indicator uses a circular scale with a moving pointer and a digital value indicating Inter-Turbine Temperature in degrees Celsius with 1°C increments. The pointer moves through a range from 0 to 1200°C.

During engine start, the instrument markings indicate a normal operating range (green arc) from 200°C to 924°C, caution range (yellow arc) from 925°C to 1089°C and a red radial line at 1090°C. In addition to the change in markings, the indicator will show **STRT** directly above the ITT digits, signifying the indicator is in *start mode*. If the ITT is 1090°C or greater, the title, pointer, and digits will flash red. If the ITT is 925°C , for longer than 2 seconds, the title, pointer and digits will flash amber. Otherwise, the title and pointer are white and the digits are green.

During normal operation, the instrument markings indicate a normal operating range (green arc) from 400°C to 739°C, caution range (yellow arc) from 740°C to 789°C and a red radial line at 790°C (max takeoff ITT). If the ITT is greater than 790° for more than 2 seconds, the title, pointer, and digits flash red. When the ITT is between 740°C and 790°C, the title, pointer, and digits are amber. Otherwise, the title and pointer are white, and the digits are green.

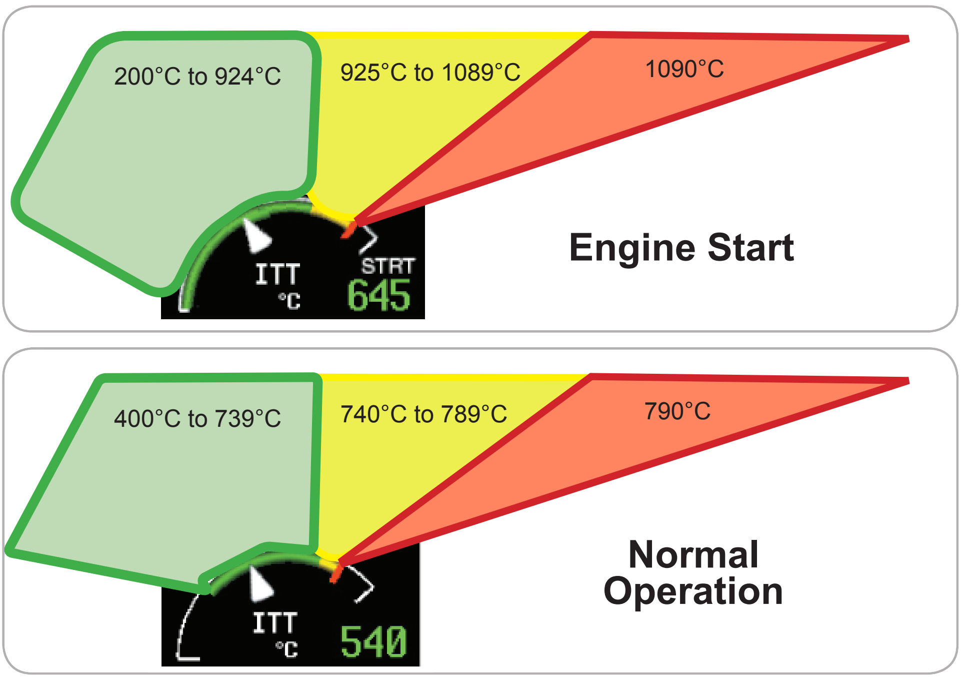


Figure 7-55 – ITT Indicator

Ng % RPM INDICATOR

The Ng % RPM indicator is shown by the Ng indicator found on each EICAS page. The instrument shows the percent of gas generator RPM based on a figure of 100% at 37,500 RPM. The instrument is electrically-operated from the compressor turbine tachometer-generator mounted on the lower right portion of the engine accessory gearbox. The Ng Indicator uses a circular scale with a moving pointer and a digital value indicating Gas Generator Percent RPM in increments of 0.1%. The pointer moves through a range of 0.0% to 110.0%.

The instrument markings indicate a normal operating range (green arc) from 52.0% to 101.6%, and a red line at 101.6%. If the NG speed is greater than 101.6% for longer than 2 seconds, the title, pointer and digits will flash red. Otherwise, the title and pointer are white and the digits are green.

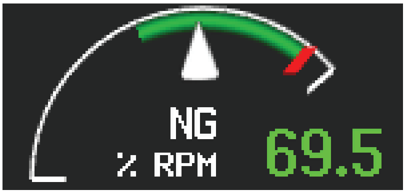


Figure 7-56 – Ng % RPM Indicator

FUEL FLOW INDICATOR

A digital value for FLOW PPH is included on both the SYSTEM and FUEL EICAS pages.

The fuel flow transducer is located in the fuel line between the fuel control unit and the flow divider.

Figure 7-57 – Fuel Flow Indicator

OIL PRESSURE INDICATOR

Engine oil pressure is displayed on the default ENGINE page by the OIL PSI horizontal bar indicator. The indicator range is 0-120 PSI with a red line at 40 PSI, an amber band from 40 to 85 PSI (caution range), a green band from 85 to 105 PSI (normal operating range), and a red line at 105 PSI. A white pointer indicates actual oil pressure. Oil pressure is also indicated adjacent to the horizontal bar indicator digitally. Oil pressure is also displayed digitally on the SYSTEM and FUEL EICAS pages.

When oil pressure is less than 40 PSI or greater than 105 PSI, the title, pointer and digits flash red. When oil pressure is between 40 and 85 PSI, the title, pointer and digits are amber. Otherwise, the title and pointer are white and the digits are green.

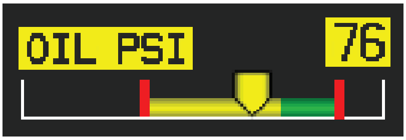


Figure 7-58 – Oil Pressure Indicator

OIL TEMPERATURE INDICATOR

An indication of oil temperature is provided through the Garmin G1000. The instrument provides an electrical indication of the oil temperature in degrees Celsius. The oil temperature sensor is located near the upper right portion of the engine accessory gearbox. The instrument markings illustrate the minimum operating temperature (red line) of -40°C, a caution range (yellow band) from -40 to +10°C, a normal operating range (green band) from 10°C to 99°C and a maximum temperature (red line) at 99°C.

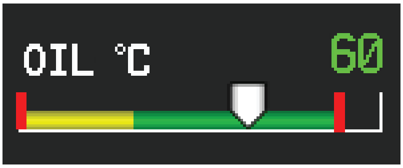


Figure 7-59 – Oil Temperature Indicator

NEW ENGINE BREAK-IN AND OPERATION

There are no specific break-in procedures required for the Pratt and Whitney Canada PT6A-34 turboprop engine. The engine may be operated safely throughout the normal ranges established by the manufacturer at the time the aircraft is delivered.

ENGINE LUBRICATION SYSTEM

With components rotating at speeds of over 37,500 RPM, the engine lubrication system is vital to proper engine operation. The lubrication system consists of a pressure system, scavenge system and a breather system. The main components of the lubrication system include an integral oil tank at the rear of the engine, an oil pressure pump at the bottom of the oil tank, an external double-element scavenge pump located on the back of the accessory gearbox, an internal double-element scavenge pump located inside the accessory gearbox, an oil-to-fuel heater located on the upper portion of the accessory gearbox, an oil filter located on the right side of the oil tank and a large capacity oil cooler mounted on the left side of the engine.

PRESSURE OIL SYSTEM

Oil is drawn from the bottom of the oil tank through a filter screen where is passes through a pressure relief valve for oil pressure regulation. Pressure oil is delivered from the main oil pump to the oil filter where foreign matter is removed from the oil, precluding further circulation. Oil then exits the oil filter outlet and divides into several paths. Lubrication of the accessory drives and bearings is accomplished through cored passages in the compressor inlet case, accessory diaphragm and gearbox housing and into the gearbox bearing areas. The No. 1 bearing is lubricated by pressure oil from the filter outlet through a cored passage in the compressor inlet case, to a nozzle at the center-bore and to the rear of the compressor rear hub. The nozzle, incorporating a fine strainer, directs the calibrated oil flow into a collector ring mounted on the rear of the compressor rear hub and through passages in the split inner race to the bearing. A cored passage at the main oil filter outlet conducts a portion of the pressure oil to a minimum pressurizing valve installed in the compressor inlet case at the 2 o'clock position. Oil is then applied to the oil-to-fuel heater where, depending upon temperature of the fuel, the oil is utilized to preheat the fuel. Oil from the heater is returned to the oil tank via a check valve and adapter at the 12 o'clock position on the compressor inlet case. A common supply is provided to lubricate the No. 2 bearing, the reduction gearbox and front accessories, power turbine No. 3 and 4 bearings, and the propeller installation. Oil from the filter outlet is directed through a cored passage and transfer tube to an outlet boss at the 4 o'clock position on the compressor inlet case. An external oil transfer tube connected to the boss directs the oil forward to a tee coupling at the gas generator case. An internal oil transfer tube directs the oil to an oil transfer gallery in the No. 2 bearing compartment. The gallery houses two nozzles which are protected by a fine strainer. The nozzles direct the oil flow on to the front and rear faces of the bearing. A second external oil transfer tube directs the oil forward from the tee coupling on the gas generator case to a boss on the front case of the reduction gearbox. From the boss, the oil is directed internally via cored passages and transfer tubes to three areas. One, to the first-stage reduction gears, the torquemeter, and the No. 3 and 4 bearings. Oil to the torquemeter flows through a metering valve which controls the flow into the torquemeter chamber. The position of the metering valve is controlled by the torquemeter piston which reacts in direct proportion to engine torque. Oil is directed to three nozzles in the No. 3 bearing oil tube in the power turbine shaft housing via a transfer tube in the rear case of the reduction gearbox. Two nozzles direct oil to the front and rear faces of the No. 3 roller bearing, while the third nozzle directs the oil flow to the rear face of the No. 4 bearing. The second oil delivery line directs oil to the propeller shaft front roller and ball thrust bearings, the second-stage reduction gears and the No. 4 bearing.

The oil flow is directed through the rear annulus of an oil transfer sleeve mounted on the propeller shaft, and, via the rear section of the propeller oil transfer tube in the shaft, to the No. 4 bearing oil nozzle installed at the rear end of the transfer tube. The oil is sprayed into the hollow front section of the power turbine shaft; centrifugal force directs the oil through a drilled annulus in the shaft to passages between the No. 4 bearing inner races and into the sun gear coupling. Oil from the rear section of the propeller shaft oil transfer tube is also directed via drilled holes in the propeller shaft and cored passages in the second-stage gear carrier, to the shaft/second-stage gear-pins and propeller shaft roller bearing. The third oil delivery line directs oil via an internal annulus and cored passages to the externally mounted propeller governor, the accessory drive gears and the propeller thrust bearing. Oil pressure from the propeller governor is directed via a port in the mounting flange and cored passages in the front case of the reduction gearbox to a transfer tube which connects to the front annulus in the oil transfer sleeve mounted on the propeller shaft. The oil in the annulus is then directed into the propeller shaft center-bore via the front section of the propeller oil transfer tube.

SCAVENGE OIL SYSTEM

The scavenge system incorporates two double-element gear-type pumps contained in cast housings, and are driven by the accessory gearbox driveshafts. One pump is mounted within the accessory gearbox, while the other is externally mounted at the rear of the gearbox. Oil from the No. 1 bearing compartment is returned by gravity via an internal cored passage to the bottom of the compressor inlet case. From there, it is directed through the oil tank compartment by a transfer tube and a port in the accessory diaphragm and is then discharged into the gearbox. The No. 2 bearing oil drains via internal tubes to a boss at the 5 o’clock position on the gas generator case. A flanged transfer tube directs the oil rearward to a boss at the 6 o’clock position on the compressor inlet case; the oil then passes through cored passages and a transfer tube to the front element of the internal scavenge pump. Scavenged oil is dumped into the accessory gearbox. Oil from the Nos. 3 and 4 bearings drains into the power turbine shaft housing, where in normal flight attitude, it drains and passes through holes in the rear case of the reduction gearbox. The oil is also partially scavenged by the front element of the external scavenge pump and ejected into the accessory gearbox sump. When the engine is in a nose-up attitude, the oil collects at the rear section of the power turbine shaft housing and is totally scavenged by the front element of the scavenge pump, via the No. 3 bearing scavenge oil tube and one of the external scavenge oil tubes. When the engine is in a nose-down attitude, all the oil drains forward into the reduction gearbox sump. Oil is supplied to the propeller governor, front thrust bearing, reduction gearbox accessory-drives and torquemeter bleed-orifice and drains into the gearbox sump. From the sump, oil is scavenged by the rear element of the external scavenge pump via a strainer in the front case of the reduction gearbox and a second external oil transfer tube. The rear element of the scavenge pump forces the oil to an airframe-mounted cooler from where it is returned to the oil tank via an inlet adapter located at the 12 o’clock position on the compressor inlet case. Oil flows from the adapter into a de-aerator tray installed at the top of the tank, and drains into the tank.

Oil from the centrifugal breather, accessory gear shafts and bearings, input gear shaft and bearing drains into the accessory gearbox sump where it is scavenged by the rear element of the internal scavenge pump which forces the oil into an externally mounted cooler. All oil supplied to the cooler is returned to the oil tank.

BREATHER SYSTEM

Breather air from the engine bearing compartments and the accessory and reduction gearboxes is vented overboard through the centrifugal breather installed in the accessory gearbox. The bearing compartments are connected to the accessory gearbox by cored passages and existing scavenge oil return lines.

The No. 1 bearing compartment vents rearward through the rear bearing housing and oil tank center tube and into the accessory gearbox. The No. 2 bearing compartment is vented via the scavenge oil transfer tube. A bypass valve, immediately upstream of the front element of the internal scavenge pump, allows oil and air to be vented into the accessory gearbox under certain transient operating conditions to prevent over pressurizing the No. 2 bearing area. Under normal operating conditions, the valve is closed to prevent oil flooding back into the tube assembly. The No. 3 and 4 bearing compartment and the reduction gearbox areas vent to the accessory gearbox and oil tank respectively through their scavenge oil lines. The oil tank is vented to the accessory gearbox through the anti-flooding arrangement installed at the 11 o'clock position in the oil tank.

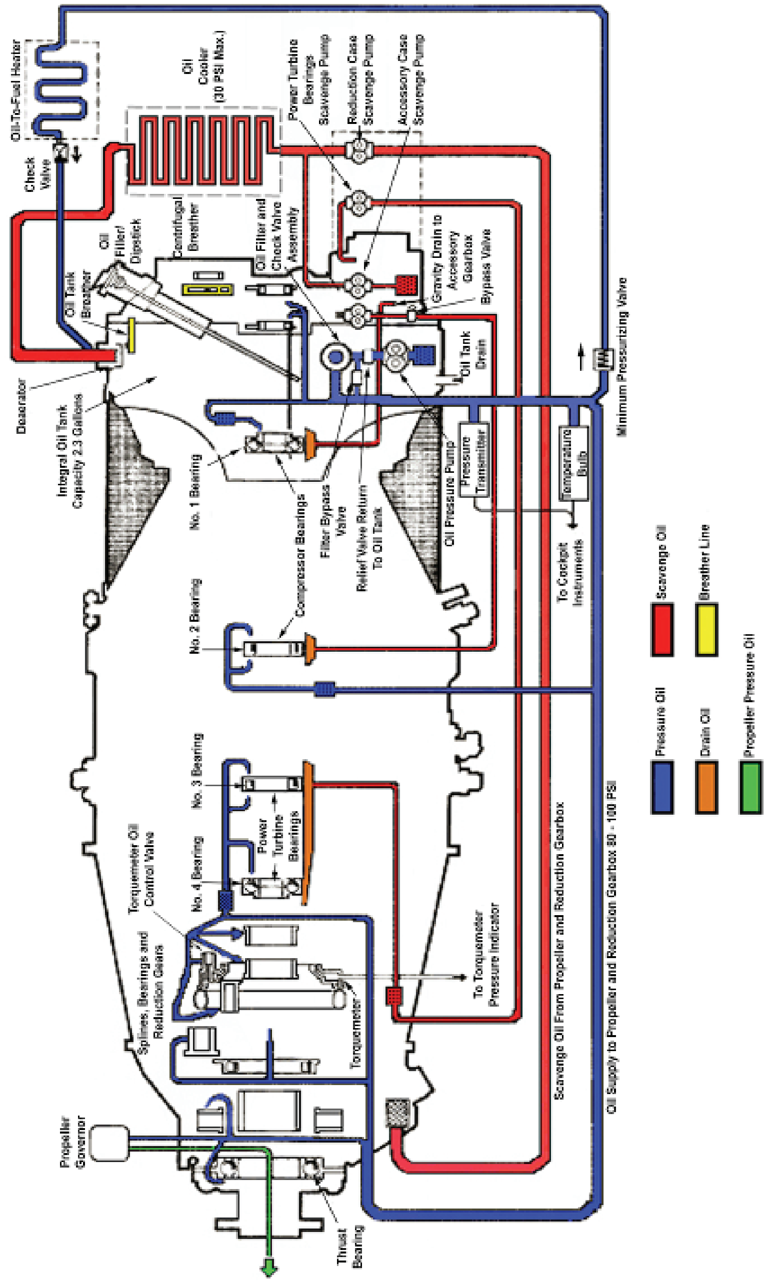


Figure 7-60 – Engine Lubrication Schematic

IGNITION SYSTEM

The ignition system consists of two spark igniters, an ignition exciter, two high tension leads, an ignition annunciator light, an ignition switch, and a starter switch. Engine ignition is provided through two igniters located at the 4 o'clock and 9 o'clock positions in the engine combustion chamber. The igniters are energized by the ignition exciter mounted on a bracket attached to the left side of the accessory gearbox. Electrical energy is transmitted from the ignition exciter to the spark igniters via two high tension leads. Normally, the ignition system is only energized during engine start.

Ignition is controlled by an ignition switch and a starter switch located on the lower left portion of the instrument panel. The ignition switch has two positions, ON and OFF. When the ignition switch is placed in the OFF position, the ignition system will only be activated when HI START is selected on the starter switch. In this mode of starting, the ignition system is automatically activated. The ignition system may be manually activated by selecting the ON position on the ignition switch for LO START operations, air starts without starter assistance, for operation on water-covered runways, during operations in heavy precipitation, during inadvertent icing encounters until the inertial air particle separator has been placed in BYPASS for 5 minutes and when operating near fuel exhaustion as indicated by illumination of the RESERVOIR FUEL annunciator.

The main function of the starter switch is to control the operation of the starter for rotating the gas generator portion of the engine during the starting process. However, it also controls ignition during starting operations. The starter switch includes three positions, OFF, HI START and LO/MOTOR. The OFF and LO/MOTOR positions have no direct effect on the ignition system. When selected, the HI START position automatically energizes the ignition system.

An advisory annunciation is provided through the G1000 when electrical power is being applied to the spark igniters and is displayed as follows:

IGNITION ON

AIR INDUCTION SYSTEM

The engine air inlet is located at the lower forward section of the engine nacelle. Ram air entering the inlet flows through ducting and an inertial air particle separator system and then enters the engine through a circular plenum chamber where it is directed by inlet guide vanes to the compressor section. A screen is installed on the compressor air inlet which prevents larger debris from entering the engine, but does not filter the inlet air.

SINGLE ACTUATED INERTIAL SEPARATOR SYSTEM (SIPS)

(SERIAL NUMBERS 100-0001 THRU 100-0042 NOT EQUIPPED WITH THE KODIAK TKS ICE PROTECTION SYSTEM)

REV 6

An inertial air particle separator system (Inertial Separator) is installed in the air inlet duct to prevent moisture and dust particles from entering the engine when placed in BYPASS mode. The inertial separator consists of two electrically actuated vanes and a fixed airfoil which, during NORMAL operation, route the inlet air through a gentle turn into the compressor air inlet plenum. When operating in dusty or moisture filled environments, the BYPASS mode may be selected. When the inertial separator is placed in the BYPASS mode, the moveable vanes are placed in a position to force the air to make a sharp turn prior to entering the inlet plenum. This sharp turn causes any moisture or debris to separate from the inlet air and discharge overboard through two louvered outlets on the lower portion of the engine nacelle.

Operation of the inertial separator system is controlled by a switch mounted on the right switch panel in the ice protection cluster of switches. The switch is labeled ENG INLET and has positions for NORMAL and BYPASS. The inertial separator should be placed in BYPASS prior to operating the engine when visible moisture is present (clouds, rain, snow, ice crystals, etc.) with outside air temperatures below 4°C. The inertial separator system may also be used for ground operations or takeoffs from dusty, sandy field conditions to minimize the ingestion of foreign particles and debris into the compressor. The NORMAL position should be used for all other operations.

An advisory annunciation is provided through the G1000 to indicate whether the inertial separator system is in the NORMAL or BYPASS position as follows:

ENG INLET NRM

ENG INLET BP

NOTE: *When the BYPASS mode is selected, a slight reduction of engine torque occurs.*

REV 6

DUAL ACTUATED INERTIAL SEPARATOR SYSTEM (DIPS)

(SERIAL NUMBERS 100-00043 AND ON AND/OR AIRCRAFT EQUIPPED WITH THE KODIAK TKS ICE PROTECTION SYSTEM)

The Dual Actuated Inertial Particle Separator (DIPS) system employs two mechanically linked moveable doors, a fixed turning vane, and an ice shedder, all housed in a fiberglass composite intake duct. The first door pivots about the top forward edge of the duct and the trailing edge comes to rest on the upper surface of the turning vane in its deployed position. When stowed, the first door retracts to serve as the upper surface of the intake duct immediately prior to the exit from the diffuser section of the air intake system. The basic function of the rear door (also termed the bypass door) is to block off the bypass ducts during NORMAL operation (thereby increasing the ram air recovery), and to direct debris and bypass airflow overboard in BYPASS mode. **Figure 7-60a** shows the basic features of the IPS.

FIGURE KEY:
1. Dual Actuators
2. Three position switches, one limit switch
3. Interconnecting rod
4. Adjustable FOD Door Actuating Arm
5. Adjustable length Bypass Door Actuating Arm
6. Two-Piece Ice Shedder
7. Slider Mechanism

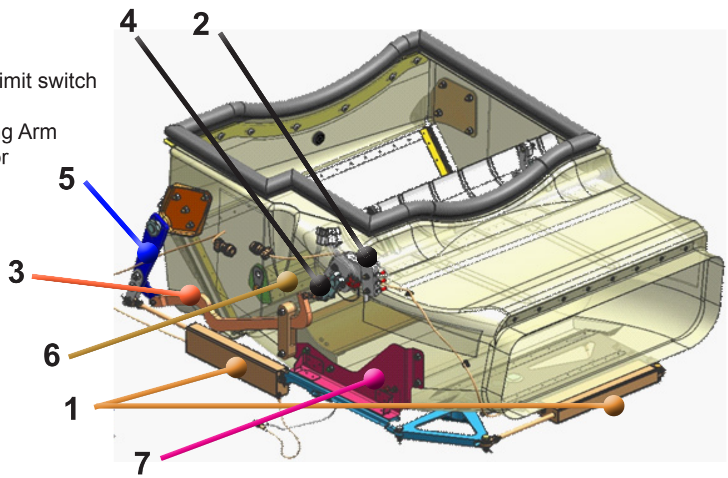


Figure 7-60a: Dual Actuated IPS

MANUAL ACTUATOR OVERRIDE SWITCH FOR DUAL ACTUATED IPS

The Inertial Separator on your aircraft is equipped with a actuator override. This actuator override allows the pilot to advance the system to BYPASS in the event of a failure of the normal engine inlet BYPASS function.

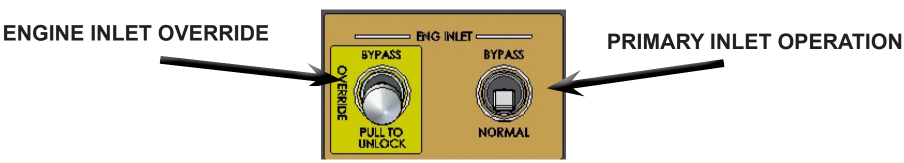


Figure 7-60a: Dual Actuated IPS

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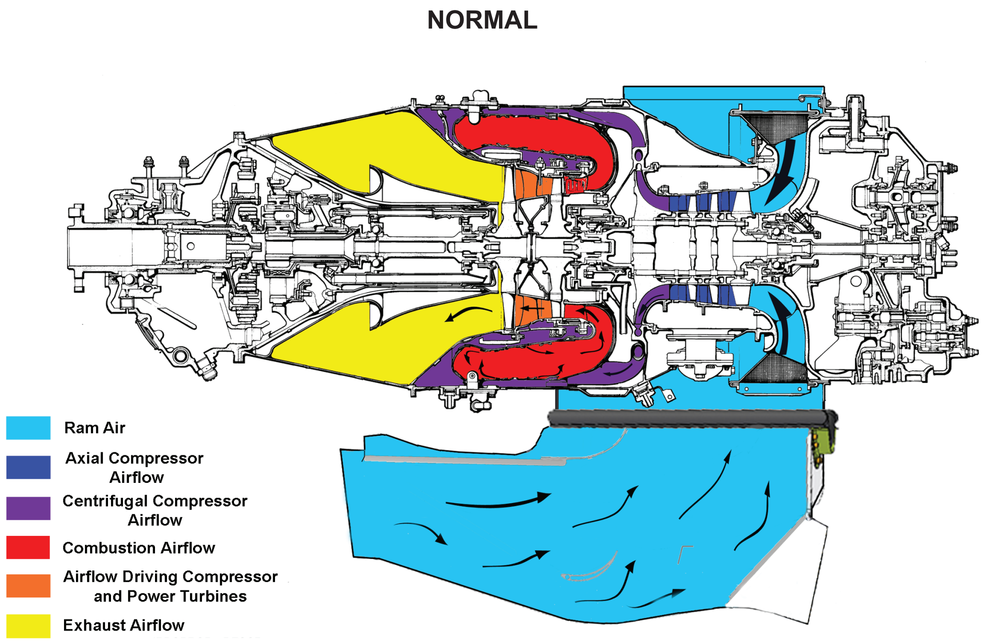

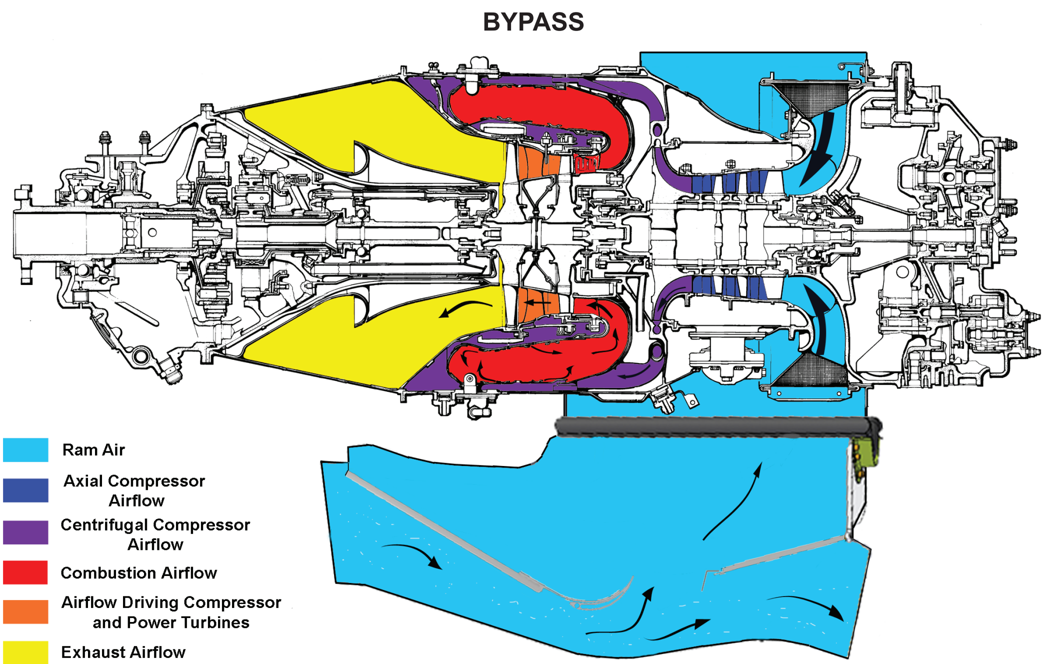

Figure 7-61 – Engine Airflow

EXHAUST SYSTEM

The exhaust system consists of two exhaust stubs attached to the left and right sides of the forward section of the engine. The exhaust stubs are designed to provide the most efficient removal of exhaust gas possible.

ENGINE FUEL SYSTEM

The engine fuel system consists of an oil-to-fuel heater, an engine driven fuel pump, a fuel control unit, a flow divider and dump valve, a dual fuel manifold with 14 simplex nozzles, and two fuel drain lines. The engine fuel system provides the necessary fuel flow to accommodate the speed and power demands of the engine.

Fuel is delivered from the fuel reservoir to the oil-to-fuel heater which utilizes heat from the engine lubricating oil system to preheat the fuel prior to entering the fuel control unit. A bypass valve in the heater regulates the fuel temperature by either allowing oil to flow through the heater or bypassing it back to the engine oil tank.

Fuel from the oil-to-fuel heater then enters the engine-driven fuel pump through a 74 micron inlet screen. The inlet screen is spring loaded to allow unfiltered fuel to flow into the pump chamber should the filter become blocked. The engine driven fuel pump increases the fuel pressure and delivers it to the fuel control unit through a 10 micron filter in the pump outlet. A bypass valve and passages in the pump body allows unfiltered pressurized fuel to be delivered to the fuel control unit should the filter become blocked.

The fuel control unit consists of a fuel metering section, a temperature compensating section, and a gas generator pneumatic governor. The fuel control unit determines the proper fuel schedule to provide the required power as selected by input from the power lever. This is accomplished by controlling the speed of the compressor turbine. The temperature compensating section alters the acceleration fuel schedule to compensate for variances in fuel density at differing fuel temperatures, especially during engine start. The power turbine governor, installed in the propeller governor housing, provides power turbine overspeed protection in the event of propeller governor failure. The temperature compensator portion alters the acceleration fuel schedule from the fuel control unit to compensate for variations in the compressor inlet air temperature (T1). Engine characteristics vary with differing compressor inlet temperatures, and the acceleration fuel schedule must be altered to prevent compressor stall and/or excessive Interturbine Temperatures.

The flow divider takes metered fuel from the fuel control unit and schedules the flow between the primary and secondary fuel manifolds. The fuel manifold assembly delivers fuel to the combustion chamber through 10 primary and 4 secondary fuel nozzle assemblies. During engine start, metered fuel is delivered initially by the primary fuel nozzles. The secondary fuel nozzles are enabled above a preset value. All of the fuel nozzles become operative at and above idle power. When the fuel cutoff valve in the fuel control unit closes during engine shutdown, residual fuel in the manifolds is allowed to drain through a dump valve port into the firewall mounted EPA fuel reservoir where the residual fuel should be drained daily. If the reservoir is not drained on a regular basis, it will overflow onto the ground at engine shutdown.

COOLING SYSTEMS

No external cooling systems are incorporated on this PT6A-34 engine installation. However, the engine incorporates an extensive internal air system which provides for sealing of the bearing compartments and for compressor and power turbine disk cooling. For additional information concerning the engine's internal air systems, refer to the **Pratt and Whitney Canada PT6A-34 Maintenance Manual.**

STARTING SYSTEM

The starting system consists of a starter/generator, a starter switch and a **STARTER ON** annunciation through the G1000. The starter/generator functions as a motor for engine starting and motors the gas generator section until the engine stabilizes at idle speed and the starter switch is returned to the OFF position. The starter is controlled by a three position starter switch located on the lower left portion of the instrument panel. The switch provides selection of OFF, HI START and LO/MOTOR. The switch is spring loaded to the OFF position and is the normal switch position except when starting or motoring of the engine.

HI START

Starting the engine in the HI START mode will result in faster, cooler and softer starting conditions. When the HI START mode is selected on the starter switch, the following starting sequence is initiated through the Master Control Unit.

1. Ignition system automatically energized.
2. One battery provides 24 volts to starter for initial motoring of the compressor section.
3. Once the engine reaches a predetermined speed, the Master Control Unit places the other battery in series to supply 48 volts to the starter/generator, thus increasing the rotational speed of the starter/generator.
4. Once the engine stabilizes at idle RPM, the starter switch is returned to the OFF position and the starter/generator is now able to function as a generator.

LO/MOTOR

The LO/MOTOR function of the starter switch is provided for an alternate method of starting the engine when battery condition is poor, clearing fuel from the engine, dry-motoring of the engine for compressor washes and other maintenance-related procedures. The ignition system is not automatically energized when LO/MOTOR is selected, and the batteries remain in parallel with each other to maintain 24 volts to the starter/generator while the switch is placed in this position. An advisory annunciation is provided through the G1000, indicating power is being supplied to the starter. Annunciation is displayed as follows:

STARTER ON

NOTE: *It is recommended to use the LO/MOTOR function to start the aircraft for the first flight of the day.*

ENGINE ACCESSORIES

All engine-driven accessories, with exception to the propeller tachometer-generator and the propeller governors, are mounted on the accessory gearbox at the rear of the engine. These accessories are driven from the compressor turbine by a coupling shaft extending through a conical tube in the center section of the integral oil tank. The propeller tachometer generator and the propeller governors are mounted on the propeller reduction gearbox.

OIL PUMP

Pressure oil is circulated from the integral oil tank through the engine lubrication system by a self-contained, gear-type pressure pump located in the low point of the oil tank. The oil pump is installed in a cast housing which is bolted to the forward face of the accessory diaphragm, and is driven by the accessory gear drive shaft. The body of the oil pump incorporates a circular mounting boss to accommodate a check valve, located in the end of the filter housing. A second mounting boss on the pump includes a pressure relief valve.

FUEL PUMP

The engine-driven fuel pump is mounted on the accessory gearbox at the 2 o'clock position. The pump is driven through an accessory drive shaft and splined coupling. The coupling splines are lubricated by an oil mist from the auxiliary gearbox through a hollowed-out section of the accessory gear drive shaft. Another splined coupling extends the drive to the fuel control unit, which is installed on the rear face of the engine driven fuel pump. Fuel is routed from the oil-to-fuel heater into the fuel pump through a 74-micron inlet screen. Then, fuel enters the pump gear chamber where it is boosted to a high pressure and delivered to the fuel control unit through a 10-micron pump outlet filter. A bypass valve and cored passages in the pump casing allow unfiltered high pressure fuel to flow from the pump to the fuel control unit should the outlet filter become clogged. An internal passage beginning at the mating surface with the fuel control unit returns bypass fuel from the fuel control unit to the pump inlet downstream of the inlet screen. A pressure regulating valve is installed in this internal passage to accomplish pressurization of the pump gear bushings.

Ng TACHOMETER GENERATOR

The Ng tachometer-generator produces an electric current which is used by the gas generator % RPM indicator to indicate gas generator RPM. The Ng tachometer-generator drive and mount pad is located at the 5 o'clock position on the accessory gearbox and is driven from the internal scavenge pump. Rotation is counterclockwise with a drive ratio of 0.1121:1.

PROPELLER TACHOMETER-GENERATOR

The propeller tachometer-generator produces an electric current which is used by the propeller RPM indicator to indicate propeller RPM. The propeller tachometer-generator drive and mount pad is located on the right side of the propeller reduction gearbox case and has a clockwise rotation at a ratio of 0.1264:1.

TORQUEMETER

The torquemeter is a hydro-mechanical torque measuring device located inside the first stage of reduction gear housing. The torquemeter provides an accurate indication of engine power output in foot-pounds of torque. The difference between the torquemeter pressure and the reduction gearbox internal pressure accurately indicates torque production. The two pressures are routed to a pressure transducer which is electrically connected to the G1000 which provides an accurate indication of engine torque pressure.

STARTER/GENERATOR

The starter/generator is installed on the top of the accessory gearbox at the rear of the engine. The starter/generator is a 28 volt, 300 amp. direct drive unit that acts as a motor for engine starting and as a generator for the airplane electrical system. The starter/generator is cooled by an internal fan in addition to ram air ducted from the right side of the engine cowling.

INTERTURBINE TEMPERATURE SENSING SYSTEM

The inter-turbine temperature sensing system is designed to provide the pilot with an accurate indication of the engine operating temperatures taken between the compressor turbine disk and power turbine stator. The system consists of two bus bars, twin leads and eight individual chromel-alumel thermocouple probes connected in parallel. Each probe protrudes through a threaded boss on the power turbine stator housing into an area adjacent to the leading edge of the power turbine vanes. The probe is secured to the boss by means of a floating, threaded fitting which is an integral part of the thermocouple probe assembly. Shielded leads connect each bus bar assembly to a terminal block which provides a means of connecting the external leads to the ITT indicator on the instrument panel.

PROPELLER GOVERNOR

The propeller governor is located in the 12 o'clock position on the front case of the reduction gearbox. Under normal conditions, the governor acts as a constant speed unit and maintains the propeller speed selected at the propeller RPM control by varying the propeller blade angle to match the propeller load to the engine torque. The propeller governor also contains an integral power turbine governor section. Its function is to protect the engine against a possible power turbine overspeed condition in the event of a propeller governor failure. If such an overspeed condition should occur, a governing orifice in the propeller governor is opened by flyweights to bleed off compressor discharge pressure through the governor and computing section of the fuel control unit. When this occurs, compressor discharge pressure acting on the fuel control unit bellows decreases and brings the metering valve to a closed direction and reduces fuel flow to the flow divider.

PROPELLER OVERSPEED GOVERNOR

The propeller overspeed governor is installed at the 10 o'clock position on the front case of the propeller reduction gearbox. The governor acts a backup to the propeller governor, preventing an overspeed condition should the main propeller governor fail to properly limit propeller RPM. The propeller overspeed governor regulates the oil flow to the propeller pitch-change mechanism by means of a flyweight and speeder spring arrangement similar to the primary propeller governor. Since it has no mechanical controls, the overspeed governor is equipped with a test solenoid to reset the overspeed governor below its normal overspeed setting for ground testing of the unit. The overspeed governor test switch is located on the upper left portion of the instrument panel.

ENGINE MOUNT

The engine mount is a 13-element welded frame fabricated from 4130 steel. The frame attaches to the firewall at four points and contains an engine mounting bracket providing 3 engine attach-points.

PROPELLER REDUCTION GEARBOX

The reduction gears and propeller shaft are housed in two magnesium alloy castings which are bolted together at the exhaust duct flange. The gearbox contains a two-stage planetary gear train, three accessory drives and the propeller shaft. The first-stage reduction gear is contained in the rear case, while the second-stage reduction gear, accessory drives and propeller shaft are contained in the front case. Torque from the power turbine is transmitted to the first-stage reduction gear, from there to the second-stage reduction gear and then to the propeller shaft. The reduction ratio of .0663:1 provides a maximum propeller speed of 2200 RPM from a power turbine speed of approximately 33,200 RPM.

The accessories, located on the front case of the reduction gearbox, are driven by a bevel gear mounted at the rear of the propeller shaft thrust bearing assembly. Drive shafts from the bevel drive gear transmit rotational power to the three pads located at the 12, 3 and 9 o'clock positions.

Propeller thrust loads are absorbed by a flanged ball bearing assembly located in the center bore at the forward face of the reduction gearbox. The bevel drive gear adjusting spacer, thrust bearing and seal runner are stacked and secured to the propeller shaft by a key-washer and spanner nut. A thrust bearing cover assembly is secured by bolts at the front flange of the reduction gearbox front case.

CHIP DETECTOR

A chip detector is installed on the bottom of the propeller reduction gearbox. The chip detector should be checked by a maintenance technician at regular intervals to help detect abnormal engine wear.

The G1000 software will show an annunciation if their are any metallic chips detected in the gearbox. The chip detection annunciation will appear as:

CHIP DETECTOR

If the chip detection annunciation appears, follow the procedures described in **Section 3, Emergency Procedures**.

OIL / FUEL RESERVOIR

An oil / fuel reservoir is mounted on the lower left portion of the firewall. This reservoir collects any engine oil or fuel discharge coming from the Fuel Control Unit, accessory pads for the alternator, starter/generator and the propeller shaft seal. This reservoir should be drained after each flight. A drain valve on the bottom left side of the engine cowling allows the reservoir to be drained easily into a suitable container for proper disposal. The normal quantity of oil and fuel discharge per hour of engine operation is 12 cc into the oil / fuel reservoir. If the quantity of oil and fuel discharge per hour of operation is greater than that specified, the source of excessive leakage should be identified and corrected prior to initiating further operations.

NOTE: *If the oil / fuel reservoir is not drained on a regular basis, the contents will overflow onto the ground.*

7-18 PROPELLER

The Kodiak is equipped with a Hartzell aluminum four-bladed, reversing single-acting governor-regulated propeller. The propeller control lever establishes the propeller speed through the governor and uses a single oil supply from the governor to hydraulically actuate a change in blade angle.

A two piece aluminum hub retains each propeller blade on a thrust bearing. A cylinder is attached to the hub and contains a feathering spring and piston. The hydraulically actuated piston transmits linear motion through a pitch change rod and fork to each blade, resulting in a change of blade angle.

While the propeller is operating, the following forces are constantly present, spring force, counterweight force, centrifugal twisting moment of each blade and blade aerodynamic twisting forces. The spring and counterweight forces attempt to bring the blades to a higher blade angle (low RPM or feather); while the centrifugal twisting moment of each blade attempts to bring the blades to a lower blade angle (high RPM). Blade aerodynamic twisting force is generally very slight in comparison to the other forces and will generally tend to increase the propeller blade angle.

Summation of the propeller forces results in bringing the propeller blades to a higher pitch (low RPM or feather) and is opposed by a variable force toward a low pitch (high RPM). The variable force is engine oil under pressure from the propeller governor's integral oil boost pump. The engine-driven propeller governor is mounted on an accessory mounting pad at the 12 o'clock position of the propeller reduction gearbox. The oil from the governor is supplied to the propeller and hydraulic piston through a hollow engine/propeller shaft. Increasing the volume of oil within the piston and cylinder will decrease the blade angle and increase propeller RPM. By changing the blade angle, the governor can maintain a constant RPM independent of where the power lever is set and with variances in engine loads. The governor uses engine speed sensing mechanisms to determine if oil should be supplied or drained as necessary to maintain constant engine speed (RPM).

If governor supply oil is lost during operation, the propeller will increase pitch to the feather position. Feathering occurs because the summation of internal propeller forces causes the oil to drain out of the propeller until the feather stop position is reached.

Normal in-flight feathering is accomplished when the pilot retards the propeller control lever beyond the FEATHER tab. When this is accomplished the oil is allowed to drain from the propeller and return to the engine sump. The engine is normally shutdown with the propeller in feather.

Normal in-flight unfeathering is accomplished by positioning the propeller control lever forward of the FEATHER tab with the engine started. As engine speed increases, the governor supplies oil pressure to the propeller, resulting in a decrease in blade angle.

Reverse propeller pitch is available for decreasing ground roll during landing. In the reverse mode of operation, the governor operates in an underspeed condition to act strictly as a source of pressurized oil, without directly controlling propeller RPM. Control of the propeller blade angle in reverse is accomplished with the power lever, beta valve, beta ring and carbon block.

The propeller is reversed by manually positioning the power lever deep into beta range, causing the beta valve to supply oil from the governor pump to the propeller. Several external propeller mechanisms, including the beta ring and carbon block assembly, communicate propeller blade angle position to the beta valve.

When the propeller reaches its desired reverse position, movement of the beta ring and carbon block assembly initiated by the propeller piston, causes the beta valve to shut off the flow of oil to the propeller. Any additional unwanted movement of the propeller toward reverse, or any forward movement of the power lever to bring the propeller out of feather will cause the beta valve to drain oil from the propeller and increase pitch.

CAUTION: *The propeller reversing linkage may be damaged if the power lever is moved aft of the IDLE position when the propeller is in the feathered position.*

OPTIONAL PITCH LATCH PROPELLER

For water operations, it is undesirable to feather the propeller when the engine is stopped after landing the aircraft. If the engine is subsequently started with the propeller in the feathered position, residual thrust complicates docking and handling of the aircraft.

To prevent feathering the propeller as during normal engine shutdown, the propeller incorporates spring-energized latch pins, called auto high pitch stop units. Two units are installed on the propeller cylinder. When the propeller RPM is approximately 800 or above, centrifugal force disengages the latch pins from the piston allowing it to move as needed between the reverse and feather stops. When the RPM falls below this value, a spring in each auto high pitch stop unit overcomes the centrifugal force on the latch pin, causing it to retract into the cylinder and engage the piston, preventing it from moving in the feather direction. To engage the stop units upon engine shutdown, the propeller control must be placed into the reverse thrust position before stopping the engine. Upon stopping, a large spring in the propeller moves it toward the feathered position, but as the RPM decays below approximately 800, the retracted latch pins engage the piston, preventing the propeller from feathering.

Upon starting the engine, the propeller is already in flat pitch. What little thrust is generated while starting the engine does not present a handling problem for the aircraft. To disengage the latches before taxi and flight, the power lever must be placed momentarily in the reverse thrust position while at low power. This removes the lateral friction force from the latch pins and prevents them from being damaged by application of power. After adding sufficient power to advance the RPM above 800, the latch pins move to an outward position and remain there, allowing full control of the propeller.

OVERSPEED GOVERNOR TEST SWITCH

An overspeed governor test switch is installed on the upper left portion of the instrument panel. The switch is a push-to-test type and is used to test the overspeed governor during engine run-up. When the switch is depressed, a solenoid is actuated on the propeller overspeed governor which restricts propeller RPM when the power lever is advanced. To check for proper operation of the overspeed governor, during engine run-up, press and hold the push-to-test switch and advance the power lever until the propeller RPM stabilizes. The propeller RPM should stabilize at 2000 ± 60 RPM.

7-19 FUEL SYSTEM

The airplane fuel system consists of two vented, integral fuel tanks, shutoff valves, a fuel selectors off warning system, fuel reservoir, ejector fuel pump (jet pump), electric powered auxiliary fuel boost pump, firewall fuel shutoff valve, firewall mounted fuel filter, oil-to-fuel heater, engine driven fuel pump, fuel control unit, flow divider, dual fuel manifolds, and 14 fuel nozzle assemblies. An oil/fuel reservoir drain is also installed. Refer to **Section 2 – Fuel Limitations** fuel quantity data for the system.

WARNING: *Unusable fuel levels were determined for this airplane in accordance with the Federal Aviation Regulations. Failure to operate the airplane according to the Fuel Limitations outlined in* **Section 2** *of this handbook may further reduce the amount of fuel available for flight.*

Fuel flows from the tanks through the two fuel tank shutoff/selector valves at each tank. The fuel tank shutoff valves are mechanically controlled by two fuel shutoff valve controls, labeled LEFT, ON and OFF and RIGHT, ON and OFF. The fuel tank shutoff/selector valve controls are installed on the overhead panel. By actuating the controls, the pilot can select either the left or right fuel tank or both at the same time. Normal operations are conducted with both selector valves in the ON position. Fuel flows by gravity from the shutoff valves in each tank to the fuel reservoir. The reservoir is located in the bilge area of the fuselage, and is at the low point of the fuel system. The reservoir maintains a head of fuel around the ejector pump which is contained in the reservoir. This head of fuel helps prevent engine driven fuel pump cavitation in low-fuel quantity situations, especially while maneuvering the aircraft in flight. The ejector pump is driven by motive flow from the fuel control unit and provides fuel flow from the reservoir to the engine driven pump when the engine is running. The auxiliary fuel pump is installed just outside of the fuel reservoir and is used to supply fuel to the engine during starting or if fuel pressure is reduced below approximately 4.5 psi. Fuel from the ejector pump and auxiliary fuel pump flows into a fuel manifold. From the fuel manifold, the fuel then flows through a firewall fuel shutoff valve located on the aft side of the firewall. This shutoff valve allows the pilot to cut off all fuel to the engine.

After passing through the firewall fuel shutoff valve, the fuel is routed through a filter mounted on the forward side of the firewall. The fuel filter incorporates a bypass feature which allows fuel to bypass the filter in the event the filter becomes clogged with foreign debris. The filter is equipped with a red filter bypass flag on top of the filter which protrudes upward when the filter is bypassing fuel. Fuel from the filter is then routed through the oil-to-fuel heater to the engine-driven fuel pump where fuel is delivered under pressure to the fuel control unit. The fuel control unit meters the fuel and directs it to the flow divider which distributes the fuel to the dual manifolds and 14 fuel nozzles located in the combustion chamber. Fuel remaining in the engine at shutdown drains into a fireproof fuel can located on the lower, forward left portion of the firewall. The can should be drained during preflight inspection of the aircraft to prevent can overflow.

Fuel system ventilation is critical to system operation. Complete blockage of the vent system will result in a decrease in fuel flow and eventual stoppage of the engine. Fuel system ventilation is provided by vent lines at each fuel tank. The vent lines are equipped with check valves, and pressure valves to help prevent fuel from flowing out of the vent lines during maneuvering of the aircraft. The vent lines protrude from the lower outboard portion of the wings just forward of the ailerons. The fuel reservoir is also vented through both wing tank vent lines.

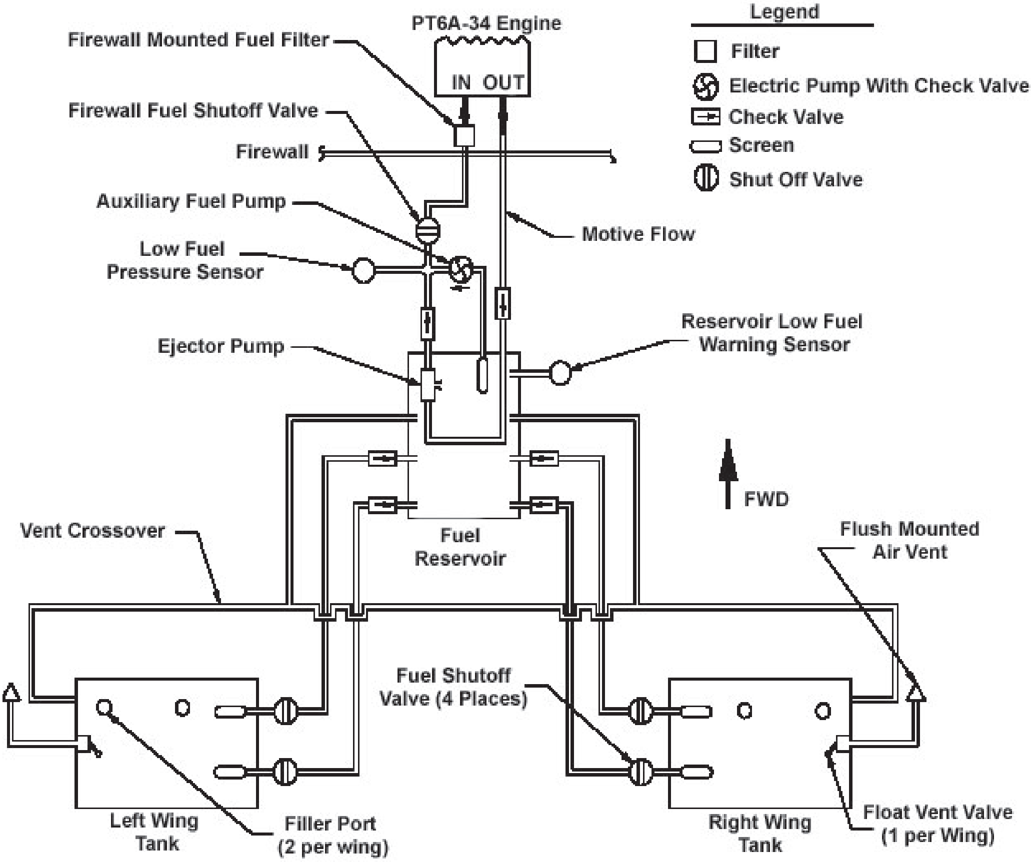

Figure 7-62 – Fuel System Schematic

FIREWALL FUEL SHUTOFF VALVE

A manual firewall fuel shutoff valve is installed on the aft side of the firewall. The shutoff valve enables the fuel from the reservoir to be shutoff completely from the engine. The shutoff valve is controlled by a red push-pull knob installed on the upper portion of the control pedestal. The firewall fuel shutoff valve is labeled FUEL SHUTOFF – PULL OFF. The knob has a press to release button in the center which locks the knob in place when the button is released.

FUEL TANK SELECTORS

Two fuel tank selectors, one for each wing tank, are located on the overhead panel. The selectors are labeled LEFT, ON and OFF and RIGHT ON and OFF and provide mechanical position control of the two fuel tank shutoff valves at the root of each wing tank. When placed in the ON position, both shutoff valves in that tank are open, allowing fuel from that tank to flow freely to the reservoir. When a fuel tank selector is placed in the OFF position, the shutoff valves for that tank are closed, and prevent fuel from flowing to the reservoir. Normal fuel management is accomplished with both fuel tank selectors in the ON position.

FUEL SELECTORS OFF WARNING SYSTEM

A fuel selectors off warning system is provided to alert the pilot if the fuel selector valves for both the left and right wing tanks are placed in the OFF position. If both selector valves are placed in the OFF position, a red LED light installed directly above the left PFD will illuminate, FUEL OFF L-R will be displayed in the annunciation windows of the PFDs, and an aural warning chime will sound through the aircraft speakers and headsets.

AUXILIARY FUEL PUMP

An auxiliary fuel pump switch, located on the lower left portion of the instrument panel, is labeled AUX FUEL PUMP and has three positions; OFF, STBY and ON. When the switch is placed in the OFF position, the auxiliary fuel pump is rendered inoperative. When the switch is placed in the STBY position, the auxiliary fuel pump is armed and will automatically provide fuel pressure when the fuel pressure in the fuel manifold assembly falls below 4.5 PSI. This switch position is used for normal engine operations when the main flow of fuel is provided through the ejector boost pump and the auxiliary fuel pump is used as a standby device. When the auxiliary fuel pump switch is placed in the ON position, the auxiliary fuel pump will operate continuously. This position is used for engine start, takeoff, and landing. Place the switch in the ON position any time when the auxiliary fuel pump cycles on and off with the switch placed in the STBY position.

FUEL FLOW INDICATOR

A fuel flow indicator is installed within the Garmin G1000 Flight Displays and provides an indication of engine fuel consumption in pounds per hour based on Jet-A fuel. The indicator measures the flow of fuel downstream from the fuel control unit prior to being routed to the flow divider.

ELECTRIC FUEL QUANTITY INDICATORS

Fuel quantity is measured in each tank by two capacitive-type fuel level probes, one at the inboard and one at the outboard portion of the tanks. The probes do not have any moving parts and, therefore, do not have any of the failure mechanisms of a resistive type fuel level sensor. Fuel quantity is displayed on each Engine Indicating Crew Alert System (EICAS) page. The indicator on the default EICAS page shows a horizontal gage presenting left and right fuel quantity. The SYSTEM and FUEL EICAS pages show the fuel quantity in pounds as digits. When an individual tank quantity reaches 175 pounds or less, the title, pointer and digits become amber in color. If the fuel quantity is less than 10 pounds the title, pointer and digits flash red. Otherwise, the title, and pointer are white and the digits are green.

DIRECT READING FUEL QUANTITY INDICATORS

The airplane is equipped with two direct reading fuel quantity indicators, one installed on each wing. The indicators provide a method for checking the fuel quantity up to approximately 90 gallons (600 pounds) during the preflight inspection of the aircraft. The direct reading fuel quantity indicators are installed on the inboard portion of the wings on the lower surfaces. The direct reading fuel quantity indicators operate with a float and magnet mechanism to provide a direct indication of fuel quantity.

NOTE: *Due to wing dihedral, the direct reading fuel quantity indicators are limited to indicating a maximum of 90 gallons.*

WING TANK LOW FUEL WARNING SYSTEM

The wing tank low fuel warning system consists of two optical sensors (one located in each wing tank) which provide visual and aural annunciation through the G1000. The warning system will activate when the fuel level in either wing tank falls below approximately 100 pounds.

Visual annunciation is shown as follows:

FUEL LOW L – Indicates the fuel level in the left wing tank is below approximately 100 pounds.

FUEL LOW R – Indicates the fuel level in the right wing tank is below approximately 100 pounds.

FUEL LOW L-R – Indicates the fuel level in both wing tanks is below approximately 200 pounds.

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NOTE: *For aircraft using GARMIN G1000 GDU software 006-B0552-09 and later, there is a 20 second delay in the display of the Fuel Low annunciations to prevent erroneous indications.*

RESERVOIR FUEL LOW ANNUNCIATOR

A reservoir fuel low warning system is provided and consists of one optical sensor in the fuel reservoir bladder which provides visual and aural annunciation through the G1000. The warning system is activated when the fuel level in the reservoir decreases. Visual annunciation is displayed as follows:

RESERVOIR FUEL

FUEL PRESSURE LOW ANNUNCIATOR

A fuel pressure low warning system warns the pilot if the fuel pressure falls below approximately 4 PSI. The warning system consists of a pressure switch installed between the airframe fuel pumps and the engine driven fuel pump. Visual and aural annunciation is provided through the G1000. Visual annunciation is displayed as follows:

FUEL PRESS LOW

AUXILIARY FUEL PUMP ON ANNUNCIATOR

An AUX PUMP ON advisory annunciation is provided through the G1000. The annunciator will illuminate any time power is supplied to the auxiliary fuel pump. The auxiliary fuel pump will automatically activate when the pressure in the fuel manifold falls below approximately 4 PSI. If the AUX PUMP ON annunciator continues to cycle on and off when the auxiliary fuel pump switch is placed in the STBY position, the auxiliary fuel pump switch should be moved to the ON position. Visual annunciation is displayed as follows:

AUX PUMP ON

DRAIN VALVES

A total of eleven drain valves are installed on the airplane. Drain valves are located on the lower portion of the wings near the root, on the lower surface of the fuselage, at the firewall mounted fuel filter and the two engine drain cans on the lower left side of the firewall. The drain valves provide a means for the examination of fuel in the system for proper grade and signs of contamination, and for draining reservoirs to prevent overflow of residual fuel and oil seepage from the engine. The wing tank drain valves and fuselage drain valves are constructed so that the Phillips screwdriver on the fuel sampler cup can be used to depress the valve and then twist it to lock the valve in the open position for draining larger quantities of fuel. For normal fuel sampling from the drain valves, the valve merely needs to be pushed in to draw enough fuel from the sumps as required for sampling purposes. The fuel filter drain valve consists of a drain pipe which can be depressed upward to drain fuel from the filter. The fuel sampler can be used in conjunction with these drain valves for fuel sampling and purging debris from the system. The fuel tanks should be refilled after each flight when practical in an effort to minimize condensation in the fuel tanks.

Prior to each flight and following each refueling, use a clear sampler and drain fuel from the inboard fuel tank sump quick drain valves to determine if contamination is present in the fuel system and to verify the aircraft was fueled with the proper fuel. If contamination is present, drain fuel from ALL of the fuel drain points again. Repeatedly take samples from ALL of the fuel drain points until all of the contamination has been removed. If after repeated sampling, there is still evidence of contamination, the fuel tanks should be completely drained and the fuel system must be cleaned. **DO NOT** fly the aircraft with contaminated or unapproved fuel.

EPA FUEL RESERVOIR DRAIN VALVE

Upon engine shutdown, residual fuel in the engine drains into a firewall mounted fuel reservoir on the lower left portion of the firewall. This fireproof reservoir should be drained once a day or at intervals not exceeding six engine shutdowns. A drain valve for the EPA fuel reservoir is accessible from the bottom left side of the cowling to enable the pilot to drain the contents of the fuel reservoir into a suitable container for proper disposal.

OIL/FUEL RESERVOIR DRAIN

Another reservoir, located just outboard of the EPA fuel reservoir, collects oil seepage from the accessory gearbox drive pads and fuel seepage from the engine driven fuel pump/fuel control unit. This reservoir should be drained after each flight. A drain valve on the bottom left side of the engine cowling allows the reservoir to be drained easily into a suitable container for proper disposal. The normal quantity of oil and fuel discharge per hour of engine operation is 12 cc into the oil / fuel reservoir. If the quantity of oil and fuel discharge per hour of operation is greater than that specified, the source of excessive leakage should be identified and corrected prior to initiating further operations.

NOTE: *If the oil/fuel reservoir is not drained on a regular basis, the contents will overflow onto the ground.*

7-20 BRAKE SYSTEM

The airplane is equipped with single disc, hydraulically-actuated brakes on each main landing gear wheel. Each brake is connected, via a hydraulic line, to a master cylinder attached to each of the pilot’s rudder pedals. Since the rudder pedals are interconnected, the brakes may be operated by applying pressure to the upper portion of either the pilot or front passenger rudder pedals. When the airplane is parked, the parking brake may be set by applying brake pressure and pulling the parking brake handle aft. The parking brake handle is installed on the lower portion of the instrument panel in front of the pilot seat just below the control wheel. A parking brake release button is located on the face of the parking brake handle. To release the parking brake, press and hold the release button in and push the handle forward completely.

A brake fluid reservoir is installed on the forward left side of the firewall and provides additional brake fluid for the brake master cylinders. The fluid contained in the clear acrylic reservoir should be checked for proper level prior to each flight.

The brake system should be maintained properly to ensure maximum brake life. The Kodiak is equipped with metallic brake linings which have different brake maintenance techniques from brakes with organic linings. When conditions permit, hard application of the brakes is beneficial in that the resulting higher brake temperatures tend to maintain the proper brake glazing and will actually prolong the life expectancy of the brakes. Conversely, consistent light and conservative brake application is detrimental to the metallic-type brakes.

Some of the symptoms of impending brake failure are: a gradual decrease in braking action when applying brake pressure, noisy or dragging brakes, a soft or spongy feel to the brake pedals, and excessive travel with weak braking action. If any of these conditions exist, the brake system needs immediate servicing. If braking action decreases during taxi or landing rollout, release pressure on the brake pedals and then re-apply the brakes with heavy pressure. If the brakes become spongy or pedal travel increases, pumping the brakes should build up brake pressure. If one brake becomes weak or fails completely, use light brake pressure on the effective brake while applying opposite rudder, as required to offset the turning tendency produced by the good brake.

7-21 ELECTRICAL SYSTEM

The Kodiak is equipped with a 28-volt direct-current electrical system. The system utilizes two 24 volt sealed lead-acid batteries mounted on the left and right sides of the lower, forward portion of the firewall. A 300-Amp engine-driven starter/generator and a 40-Amp alternator are used to maintain the state of charge of the batteries. Power is supplied to electrical circuits through two main buses, an avionics buss, an essential buss, and an auxiliary buss. The two main buses and essential buss are on anytime the battery master switch is turned on. All busses are energized when the battery master switch, avionics switch and auxiliary buss switches are turned on. The auxiliary buss is provided for ease of load shedding should an electrical power failure occur.

MASTER CONTROL UNIT

The Master Control Unit (MCU) is installed on the forward left portion of the firewall. The MCU provides the electrical control functions necessary for operation of the starter generator. It controls the LO/MOTOR function of the starter generator and the sequencing of the HI/START function. The MCU provides voltage regulation, over-voltage protection and reverse-current protection. In the event of an over-voltage or reverse-current condition, the starter/generator is automatically disconnected from the busses. The Generator Control Unit (GCU), contained in and controlled by the MCU, connects the generator output to the airplane buses. If any MCU function causes the GCU contactors to de-energize, disconnecting the generator from the system, visual and aural annunciation will be provided through the G1000. Visual annunciation is displayed as follows:

GEN FAIL

ALTERNATOR CONTROL UNIT

The Alternator Control Unit (ACU) is installed on the forward left portion of the firewall. The ACU controls the output of the standby alternator and connects the alternator output to the airplane busses. Alternator failure is detected through the ACU and is annunciated as follows:

ALTERNATR FL

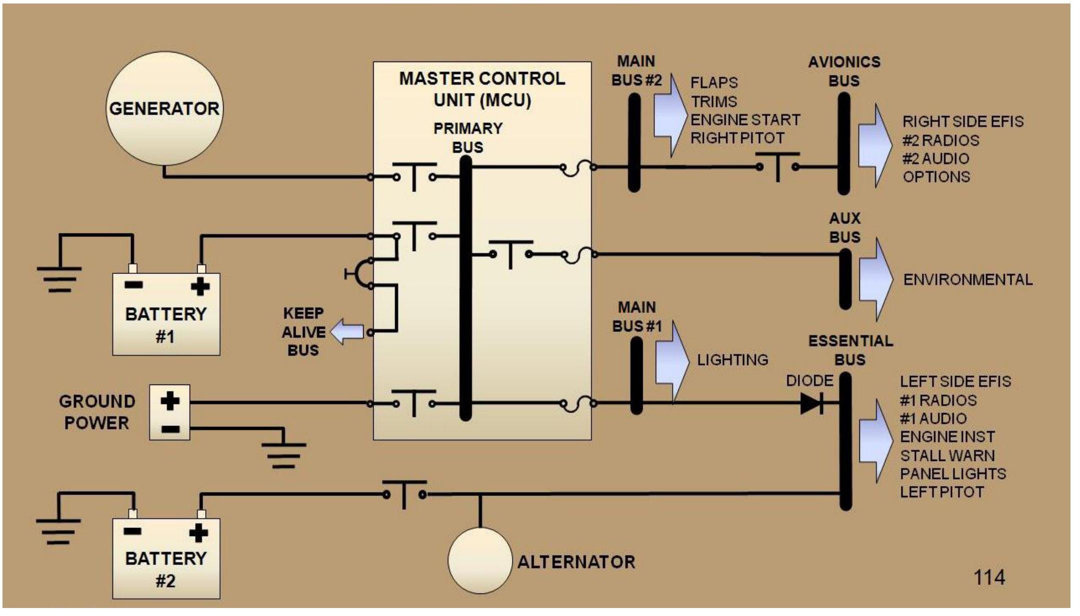

Figure 7-63 – Electrical System Block Diagram

BATTERY MASTER SWITCH

The red, two-position battery master switch is located on the lower left corner of the instrument panel and is labeled MASTER. The battery master switch is ON when the upper portion of the switch is pushed in. Conversely, the battery master switch is OFF when the lower portion of the switch is pushed in. When the battery master switch is placed in the ON position, battery power is supplied to the two main busses and the essential buss. The OFF position cuts off battery power to all busses.

AVIONICS MASTER SWITCH

The white, two-position avionics master switch is located on the lower left corner of the instrument panel adjacent to the Battery Master Switch and is labeled AVN BUS. The avionics master switch is ON when the upper portion of the switch is pushed in. Conversely, the avionics master switch is OFF when the lower portion of the switch is pushed in. When the MASTER and AVN BUS switches are placed in the ON position, battery power is supplied to the avionics bus.

The avionics master switch may be placed in the ON position for engine starting to allow the use of the checklist provided through the G1000 MFD.

AUXILIARY BUS SWITCH

The white, two-position auxiliary bus switch is located on the lower left corner of the instrument panel adjacent to the Avionics Master Switch and is labeled AUX BUS. The auxiliary bus switch is ON when the upper portion of the switch is pushed in. Conversely, the auxiliary bus switch is OFF when the lower portion of the switch is pushed in. When the MASTER and AUX BUS switches are placed in the ON position, battery power is supplied to the auxiliary bus. The environmental control systems are powered by the auxiliary bus. The AUX BUS switch is provided for ease of load shedding should an electrical power failure occur.

An advisory annunciation is provided through the G1000 to indicate to the pilot that the auxiliary bus is ON. This annunciation is shown as follows:

AUX BUS ON

STARTER SWITCH

The starter switch is a three-position toggle-type switch labeled STARTER and is located on the lower left corner of the instrument panel. The switch provides positions for OFF, LO/MOTOR and HI START.

IGNITION SWITCH

The ignition switch is a two-position toggle-type switch, labeled IGNITION and is located on the lower left corner of the instrument panel. The switch has positions for OFF and ON. For additional information concerning the ignition switch, refer to the **Ignition System** paragraph contained in this section.

GENERATOR SWITCH

The generator switch is a two-position toggle-type switch labeled GENERATOR and is located on the lower left corner of the instrument panel. The switch has positions for OFF and ON. When the generator switch is placed in the ON position, the Master Control Unit will automatically control the generator line contactor for normal operation of the generator. When the switch is placed in the OFF position, the Master Control Unit will disconnect the generator from the electrical system.

ALTERNATOR SWITCH

The alternator switch is a two-position toggle-type switch labeled ALTERNATOR and is located on the lower left corner of the instrument panel adjacent to the GENERATOR switch. The switch has positions for OFF and ON. When the alternator switch is placed in the ON position, the Alternator Control Unit will automatically control the control the line contactor for normal operation of the alternator and the alternator will supply power to the essential bus. When the switch is placed in the OFF position, the Alternator Control Unit will disconnect the alternator from the essential bus.

Figure 7-64 – Left Switch Panel

7-22 CIRCUIT BREAKERS

Most of the electrical circuits in the airplane are protected by push/pull type circuit breakers installed on the aft face of the control pedestal. Should an overload occur in any circuit, the applicable circuit breaker will trip, causing an "open" in the circuit. After allowing the circuit breaker to cool for approximately three minutes, it may be reset. If the circuit breaker repeatedly trips when reset, there is likely a fault in the system and the circuit breaker should be left in the open position.

WARNING: *Verify all circuit breakers are engaged (IN) prior to making any flight. Never operate the aircraft with disengaged circuit breakers without a thorough knowledge of the problem and possible consequences.*

GROUND SERVICE PLUG RECEPTACLE

A ground service plug receptacle is provided on the lower left portion of the engine cowling, near the firewall. The ground service plug receptacle allows for the use of an external power source for starting the engine in cold environments and during maintenance procedures requiring lengthy work on the electrical and avionics equipment.

The MCU provides circuit protection against polarity reversal and over-voltage conditions from external power sources. If the plug is accidentally connected backwards or the ground power voltage is too high, no power will be connected to the electrical system, thereby protecting electrical equipment from possible damage.

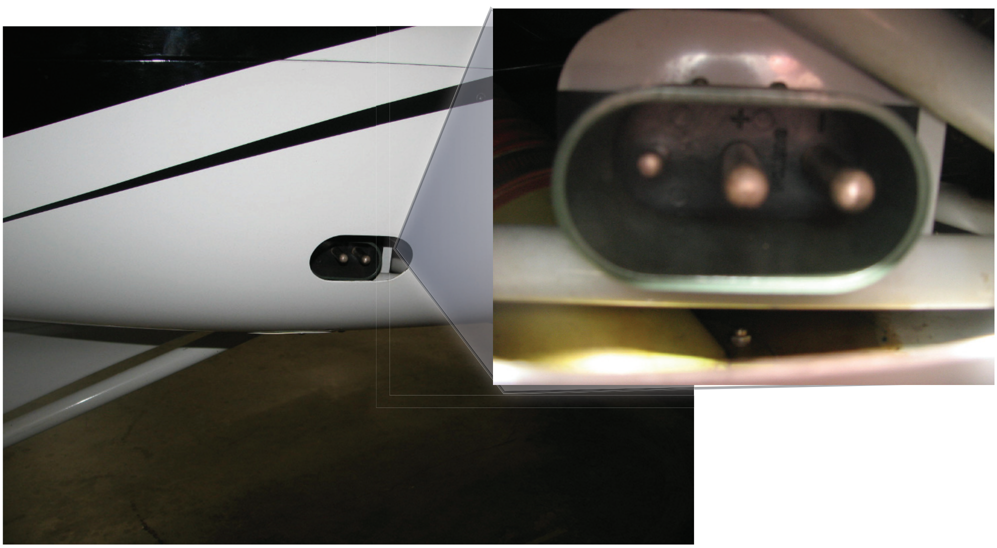

Figure 7-65 – Ground Service Receptacle

Figure 7-66 – Circuit Breaker Panel

7-23 LIGHTING SYSTEMS

EXTERNAL LIGHTING

External lighting is provided through three navigation lights, two landing/recognition lights, two taxi lights, two strobe lights and a flashing beacon. All of the external lights are controlled by two-position toggle switches located on the lower portion of the instrument panel forward of the pilot seat. The lighting toggle switches are ON when placed in the up position and OFF in the down position.

NAVIGATION LIGHTS

LED navigation lights are installed on the wing tips and the tailcone stinger. The navigation lights are protected by a circuit breaker labeled NAV LIGHT.

LANDING LIGHTS

Two high intensity discharge (HID) xenon landing lights are installed on the airplane, one in each outboard wing leading edge. The xenon lamps operate at half the power draw of a standard 100 Watt landing light, and the light intensity is over seven times brighter with 750,000 candle power. The lights provide illumination forward and downward for accomplishing night takeoffs and landings. The lights are protected by a circuit breaker labeled LANDING LIGHTS.

The landing lights are also utilized as pulsing recognition lights. When the landing light switch is placed in the PULSE position, the landing lights initiate an alternating pulsing sequence, providing great visual recognition by other aircraft. The landing lights are limited to an operating temperature range of -40°C to +85°C and should not be turned on outside of that temperature range.

NOTE: *Use common courtesy when operating the landing lights. The landing lights may cause temporary loss of night vision to other pilots. The landing lights should be turned off when directed towards other approaching aircraft, especially aircraft approaching to land.*

TAXI LIGHTS

Two taxi lights are installed on the airplane, one in each outboard wing leading edge. The lights are positioned to provide adequate lighting for taxi operations. The taxi lights are protected by a circuit breaker labeled TAXI LIGHT.

STROBE LIGHTS

A high intensity LED strobe light system is installed on the airplane. The system includes two white strobe lights, one on each wingtip. The lights enhance the anti-collision protection for the airplane and meet the FAA requirements for night operations. The strobe lights are protected by a circuit breaker, labeled STROBE.

WARNING: *The strobe lights should be turned off when taxiing. Utilization of the high intensity strobe lights while performing ground operations at night can be of considerable nuisance and distraction to ground personnel and other pilots. Do not operate the strobe lights while in fog, clouds or haze. The reflection of the beams of light can cause vertigo or disorientation.*

FLASHING BEACON LIGHT

An aviation red flashing beacon is installed on the top of the fuselage near the vertical tail. The flashing beacon is utilized as an additional source for anti-collision protection in flight and for recognition during ground operations. The flashing beacon is protected by a circuit breaker, labeled NAV LIGHT.

WARNING: *The flashing beacon should not be used when flying through fog, clouds or haze. The reflection of the light may cause vertigo or disorientation.*

Figure 7-67 – Right Switch Panel

INTERIOR LIGHTING

Lighting for the interior of the airplane consists of cabin overhead lights, instrument panel lights and backlit switch panels and backlit circuit breaker panels. The interior lights are controlled by switches located on the right switch panel.

CABIN OVERHEAD LIGHTS

Cabin overhead lighting consists of 4 main cabin lights and two cockpit reading lights. The cabin overhead lights are controlled by a three position (ON-NORM-OFF) switch labeled CABIN. In addition to the cockpit switch, a rocker switch is provided on the interior of the forward door post of the aft passenger/cargo door. The rocker switch has two positions; pressing up on the switch will turn on the cabin lights. When the cabin lights have been turned on using the cargo door rocker switch, they will automatically turn off after 30 minutes of operation, when the engine is started, or the bottom portion of the rocker switch (OFF) is pressed. When the CABIN light switch is placed in the NORM position, the optional cabin overhead reading lights may be turned on at each individual reading light throughout the cabin. The CABIN light switch also controls the lighting for the No Smoking/Fasten Seatbelts signs. The No Smoking/Fasten Seatbelt signs will be illuminated when the CABIN light switch is placed in either the NORM or ON positions.

INSTRUMENT PANEL LIGHTING

The instrument panel light consists of an LED-type rope light mounted on the lower surface of the glare shield and is controlled by a variable (potentiometer) switch labeled INSTRUMENT PANEL. The instrument panel light switch also controls the backlighting for the G1000 softkeys, autopilot and standby flight instruments.

SWITCH/CIRCUIT BREAKER PANEL LIGHTS

The circuit breaker panel and switch panels are backlit to provide the desired panel lighting while operating at night or in low light conditions. The circuit breaker panel and switch panel lighting are controlled by a variable (potentiometer) switch labeled SWITCH/ CB PANEL.

CONTROL PEDESTAL LIGHT

A control pedestal light is installed in the crew overhead panel to illuminate the control pedestal. The light is controlled by a dimmer knob on the overhead panel just aft of the light.

7-24 CABIN HEATING, VENTILATION AND DEFROSTING

The environmental control system for the aircraft consists of forward cabin bleed air heat/defrost, aft cabin electric heat, and a forced air ventilation system. All environmental controls systems are activated and controlled through a touch screen display located on the instrument panel below the right audio panel.

Figure 7-68 – ECS Touch Screen Display/Controller

FORWARD CABIN HEAT AND DEFROST

Forward cabin heat and defrost is provided through bleed air from the engine. The hot bleed air is routed through a line into a mixer box where it is automatically mixed with fresh air from the outside of the aircraft or recycled air from the cabin (depending on what source would provide the best air for the function being performed). From the mixer box, the hot air is routed to a blower unit. The blower accelerates the air to the eyeball air vents located on the instrument panel and the defrost vents at the base of the windshield.

An emergency firewall fresh air shutoff valve is provided for shutting off the supply of fresh air forward of the firewall. The valve is controlled by a red knob located just below the right control wheel. To shut off the supply of firewall forward fresh-air to the cabin, pull the red knob out fully. The knob may also be pulled out slightly to decrease the amount of fresh air entering the system. This allows for a warmer outlet temperature for operating in cold environments.

MAIN CABIN HEAT

Main cabin heat is provided through electric heating units located throughout the main cabin area. The heating units may be selected individually through the touch screen display located on the instrument panel.

CABIN VENTILATION

Cabin ventilation is provided through two external fresh air inlets. One inlet is located on the right side of the engine cowling and the other is located on the right side of the dorsal fin just forward of the vertical tail. Each source of ventilation contains a blower unit to provide forced air primarily for ground operations.

7-25 OXYGEN SYSTEM

The oxygen system for the aircraft consists of either a 115 or 50 cubic foot oxygen bottle, a regulator/valve assembly with an integral filler port and overpressure protection device, a display/logic controller, and associated lines, fittings and sensors to provide supplemental oxygen throughout the cabin.

Oxygen is required to be used by the pilot for flight time in excess of 30 minutes above 12,500 feet and above 14,000 feet for the duration of the flight above 14,000 feet. If climbing to an altitude where oxygen is required, it is recommended that at approximately 10,000 feet, the pilot should begin using oxygen. Passengers are required to be supplied with oxygen above 15,000 feet.

OXYGEN REGULATOR / BOTTLE ASSEMBLY

The regulator / bottle assembly is located in the aft fuselage and may be accessed by removing the aft bulkhead panel. Depending upon confi guration, a 50 cubic foot or 115 cubic foot bottle may serve the standard 2-place oxygen system, and a 115 cubic foot bottle is used for the 10-place oxygen system. The bottles consist of a composite wrapped construction and are manufactured to DOT-3AL/2015 with a maximum cylinder pressure of 1850 PSI at room temperature (76°F). The high pressure side of the regulator includes the charging valve, pressure gauge, pressure transducer, and the overpressure burst disc assembly. The low-pressure side of the regulator includes a valve assembly for reducing bottle pressure to low-pressure for distribution. An ON-OFF switch is provided on the oxygen display panel to electrically activate, through a solenoid, the valve assembly for turning on and off the flow of oxygen to the cabin low pressure dispensing systems. A pressure transducer is attached to the high pressure manifold of the regulator. This pressure transducer is electrically connected to the oxygen control panel pressure indication.

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COCKPIT DISPLAY / CONTROLLER

The control panel/display pressure indication shows bottle oxygen pressure, which is directly related to the quantity of oxygen available for use. The cockpit display allows the pilot to monitor the system performance and oxygen quantity. The display/control includes a two-position master switch with ON, OFF modes. The ON position engages the regulator solenoid to enable use of the oxygen system; bottle pressure is displayed on the indicator when the switch is in the ON position. The OFF position disengages the solenoid which shuts off the supply of oxygen to the cabin outlets and nothing will be displayed on the gauge. The O2 REQ'D LED will light when the aircraft is at a pressure altitude greater than 12,000 feet until the oxygen system is turned ON.

The fault LED annunciator light indicates potential problems with the oxygen system directly relating to the delivery of oxygen to the cabin. A steady light indicates low power (below 4.0 Volts) to the system or possible grounding/shorting conditions. When a steady fault indication is present, the system is disabled and will not reset until power is cycled to the controller. A flashing FAULT LED indication specifies an oxygen pressure fault to the distribution manifold.

NOTE: *When the system is first engaged, the FAULT light may briefly flash until proper pressure is sensed at the overhead distribution manifold. This is normal, as pressure may bleed off when not in use.*

NOTE: *In the event of an electrical failure on Main Bus 2, oxygen will remain on in the cabin. Aircraft electrical power is required ONLY to turn the System ON and OFF. The system is designed to remain ON during an electrical failure, but oxygen quantity indication will be lost. Disconnecting the lines from the manifold will prevent the free flow of oxygen in the cabin.*

Figure 7-69 – Oxygen Control Panel/Display

OXYGEN LINES AND OUTLETS

Low pressure oxygen lines are routed, above the headliner, from the low pressure port off of the regulator to the cabin area where the dispensing systems are attached to deliver the supplemental oxygen. Oxygen outlet ports are installed in the aircraft's headliner. Depending on what option is installed either 2 or 10 ports may be provided. To engage the mask into the outlet, simply align the bayonet plug with the slots in the outlet, press the plug completely into the outlet and rotate the plug clockwise 1/4 turn and ensure the plug locks into place. To remove the plug from the outlet, press the plug in and rotate it counterclockwise 1/4 turn and remove it from the outlet.

FILLER PORT

The oxygen filler port is attached directly to the bottle regulator and can be accessed by removing the aft bulkhead panel. A pressure gauge is provided on the bottle/regulator assembly for reference while servicing the oxygen system.

OVERPRESSURE BURST ASSEMBLY

To prevent the high pressure side of the oxygen system from reaching a dangerously high value, an emergency burst assembly is provided which dumps the oxygen overboard if the pressure reaches 3000 PSI. This assembly utilizes a single burst disk mounted in the regulator assembly. The burst disk will bleed all oxygen into the aft fuselage and overboard if high pressure fails the disk due to over-filling or pressure increases due to extreme temperature changes. If the burst assembly releases the oxygen no oxygen will be available for flight.

OXYGEN MASKS

Two masks are provided for the pilot and front passenger/copilot. These masks are equipped with a built-in microphone and have an adjustable flowmeter built into the oxygen line to provide the appropriate flow of oxygen for the selected altitude on the flowmeter up to 25,000 feet. Several options are available for passenger oxygen masks. All masks have attached placarding for the proper method of donning, use, and safety precautions. When using nasal cannula devices, breathing exclusively through the mouth, extremely light breathing, or nasal blockage will inhibit proper flow of oxygen.

WARNING: *Do not handle or use oxygen when wearing lipstick, lip balm, petroleum jelly, or any other product containing oil or grease. These substances become highly flammable in oxygen rich environments.*

NOTE: *Breathing through the nose, and limiting conversation is required in order to achieve proper oxygenation when using nasal cannula breathing devices.*

PREFLIGHT TESTING

Verify the oxygen valve opens and the system delivers appropriate low pressure oxygen by checking the system annunciations on the oxygen control panel. The low pressure reading should be in the green – normal operating range. Verify the appropriate quantity of oxygen is available for the flight. Verify the proper flow of oxygen is delivered to each mask prior to flight. When the preflight check of the oxygen system is complete, the oxygen system may be turned OFF and then turned back on as required during flight.

BEFORE STARTING ENGINE

When departing on a flight which requires the use of supplemental oxygen, brief any passengers on the proper method of donning masks, adjusting flowmeters, and connecting the mask line to the oxygen outlet.

EN ROUTE

Check the flowmeter at intervals of less than every 10 minutes to ensure proper settings. The flowmeter must be held vertically when adjusting flow rate or reading. The reading is taken at the midpoint of the ball. The pilot and the passengers should limit their conversation to conserve oxygen. When wearing either a face mask or cannula, the user should breathe through their nose for most effective use of the oxygen.

SYSTEM SHUTDOWN

To turn the oxygen system off, place the oxygen control switch in the OFF position. Leave the flowmeters open until the low pressure side is relieved (in approximately 5-10 seconds) and stow the lines, flowmeters and masks in a safe place.

> **NOTE:** *The master switch must be in the ON position to actuate the oxygen regulator solenoid (to the ON or OFF position). If the oxygen control switch is left in the ON position when the master switch is turned off, the regulator will remain open and oxygen will flow out of the masks until the bottle is emptied.*

USAGE DURATION

Oxygen duration charts are provided for the 115 cubic foot and 50 cubic foot bottles. Refer to these charts for flight planning purposes.

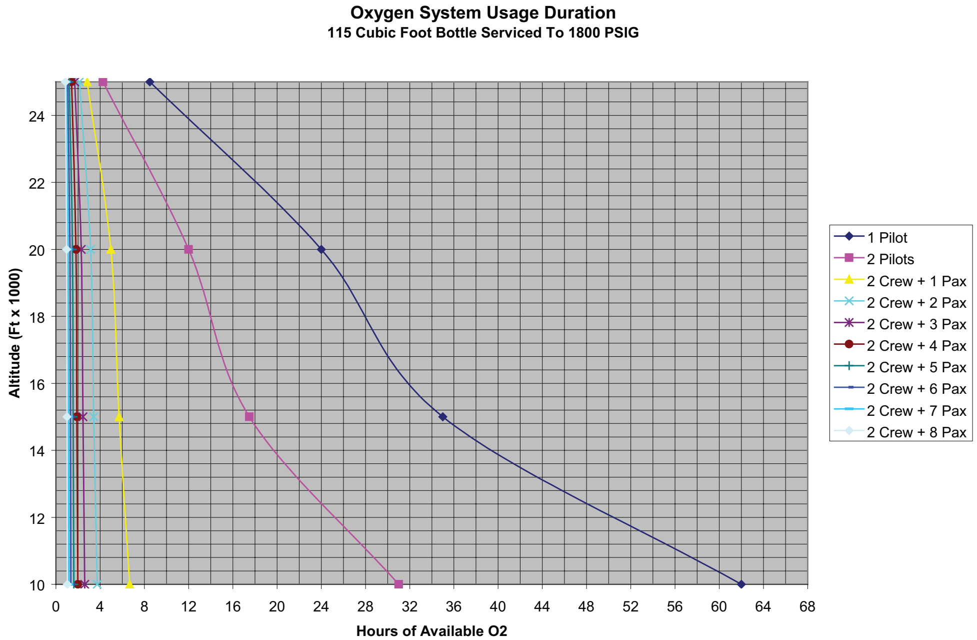


Figure 7-70 – Oxygen Usage Duration Chart (115 Cu Ft Bottle)

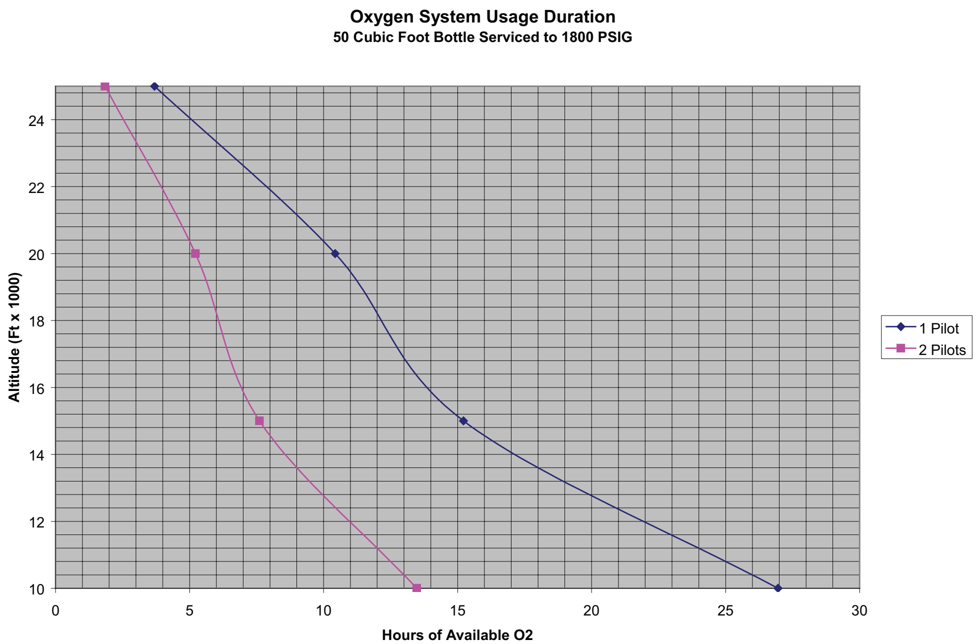


Figure 7-71 – Oxygen Usage Duration Chart (50 Cu Ft Bottle)

7-26 PITOT-STATIC SYSTEM AND INSTRUMENTS

The pitot-static system supplies dynamic (ram) pressure to the airspeed indicator and static pressure to the airspeed indicator, altimeter and vertical speed indicator. The system contains dual heated pitot-static tubes mounted on the leading edge of each wing, an airspeed pressure switch located forward of the instrument panel, two GDC 74A Air Data Computers, and the associated plumbing required to connect the instruments to their sources.

The pitot-static heat system consists of a heating element in each pitot-static tube, two two-position toggle switches, labeled PITOT HEAT (L&R). The switches are mounted on the lower portion of the instrument panel in the right switch panel. The pitot/static heat systems are protected by two circuit breakers labeled LEFT PITOT HEAT and RIGHT PITOT HEAT. When the pitot-static heat is turned on, the element in the pitot-static tube is heated electrically to allow proper operation in potential and actual icing conditions.

An airspeed pressure switch is installed in the pitot system and is used to actuate the flight hobbs meter and the flap/trim compensation unit.

AIR DATA COMPUTER

The GDC 74A is the Air Data Computer (ADC) for the Garmin G1000 system and receives the standard inputs from the pitot-static system as well as outside air temperature (OAT) inputs. The GDC 74A allows the system to automatically perform most E6B calculations including true airspeed, winds aloft and density altitude. Refer to **Figure 7-81**.

AIRSPEED INDICATORS

Airspeed information is provided within the Garmin G1000 Primary Flight Displays. The airspeed information is displayed in digital format as well as an electronic airspeed “tape”. For more information concerning the airspeed indication through the Garmin G1000 system, refer to the **Garmin G1000 Cockpit Reference Guide** for the Kodiak 100.

A backup airspeed indicator is also standard equipment on the Kodiak. The backup airspeed indicator is of standard configuration and is calibrated in knots. Limitation and range markings (in KIAS) include the white arc – full flap operating range of 47 to 108 knots, green arc – normal operating range of 68 to 182 knots, and a red line – maximum operating speed of 182 knots.

VERTICAL SPEED INDICATORS

Vertical speed information is provided within the Garmin G1000 Primary Flight Displays. The vertical speed information is displayed in digital format as well as an electronic “tape” format. The vertical speed indicator needles have an operating range of +2000 fpm and – 2000 fpm. When the aircraft vertical speed is greater than that range, the needle will peg at the 2000 fpm mark but continue to show a digital readout of the vertical speed within the needle.

ALTIMETERS

Altitude information is also provided within the Garmin G1000 Primary Flight Displays. The Altitude information is displayed in digital format as well as electronic “tape” format.

A backup altimeter is also installed on the Kodiak as standard equipment. Airplane altitude is depicted on the altimeter and includes a knob near the lower left portion of the indicator to provide adjustment of the instrument’s barometric scale to match the current altimeter setting.

7-27 AUTOMATIC TRIM SYSTEM

To compensate for pitch trim changes when varying flap position, an automatic trim system is provided. The automatic trim system consists of an electric pitch trim actuator, an airspeed switch, the flap position potentiometer, the pitch trim potentiometer, the trim disconnect switch, and an electrical flap/trim compensation unit. This system automatically engages the electric pitch trim servo in the appropriate direction when the flaps are in transit. For example, when the flaps are transitioning from 20° to 10°, nose up trim is applied automatically. Also, when the flaps are transitioning in the opposite direction, 10° to 20°, nose-down trim is automatically applied. The automatic trim system is active when the flaps are in transit between 5° and 35°.

The automatic trim system may be overridden by manual electrical inputs of pitch trim in the opposite direction of the automatic trim. For example; if the automatic trim system is trimming the aircraft nose down, and the pilot selects nose-up trim with the electric trim switch on the control yoke, the servo will operate in the nose-up direction and will override the automatic trim system. The automatic trim system may also be manually overridden by grasping the trim wheel by hand.

The automatic trim system is disabled any time the autopilot system is engaged to prevent the two systems from interfering with each other. The autopilot has its own automatic trim system to compensate for pitch trim changes with varying flap settings.

The automatic trim system references flap position through the flap position indicator signal coming from the flap drive system. The flap position indicator signal is a variable voltage signal which varies from approximately 0-3.5 volts. 0 volts represents a flap position of 0° and 3.5 volts represents 35° of flaps. A comparator in the automatic trim system senses when the flap position voltage is changing (either increasing or decreasing). When the comparator senses an increasing voltage (flaps lowering), the pitch trim runs in the nose-down direction. Also, when the comparator senses a decreasing voltage (flaps retracting), the pitch trim runs in the nose-up direction.

The automatic trim system is disabled on the ground through an airspeed switch to prevent accidental placing of the aircraft in an out-of-trim condition before takeoff, i.e. the pilot sets the pitch trim for takeoff, then selects the flaps to takeoff position (20°) and the auto trim system runs the pitch trim nose down. The airspeed switch activates the automatic trim system at approximately 35 knots. For maintenance/ground testing of the automatic trim system, a push to test button is provided. The push-to-test button bypasses the airspeed switch and allows the automatic trim system to function on the ground. The push to test button is located on the flap/trim compensation unit inside the control pedestal.

The automatic trim system operates the elevator trim tab through a range of 7° nose-up trim to full nose-down trim tab deflection (15°). The aircraft does not require any trim compensation with varying flap position beyond this range of elevator trim tab travel. Disabling of the automatic trim system between 7° nose-up and full nose-up is accomplished through a voltage comparator in the flap/trim compensation unit which monitors the trim tab position though the potentiometer which provides elevator trim position to the G1000.

As with any electric trim system, a trim disconnect switch is provided for disabling all trim systems on the aircraft (including the automatic trim system and autopilot). If a trim runaway condition occurs, move the trim disconnect switch to the DISCONNECT position (aft). The airplane may then be retrimmed using the manual trim wheel located on the control pedestal.

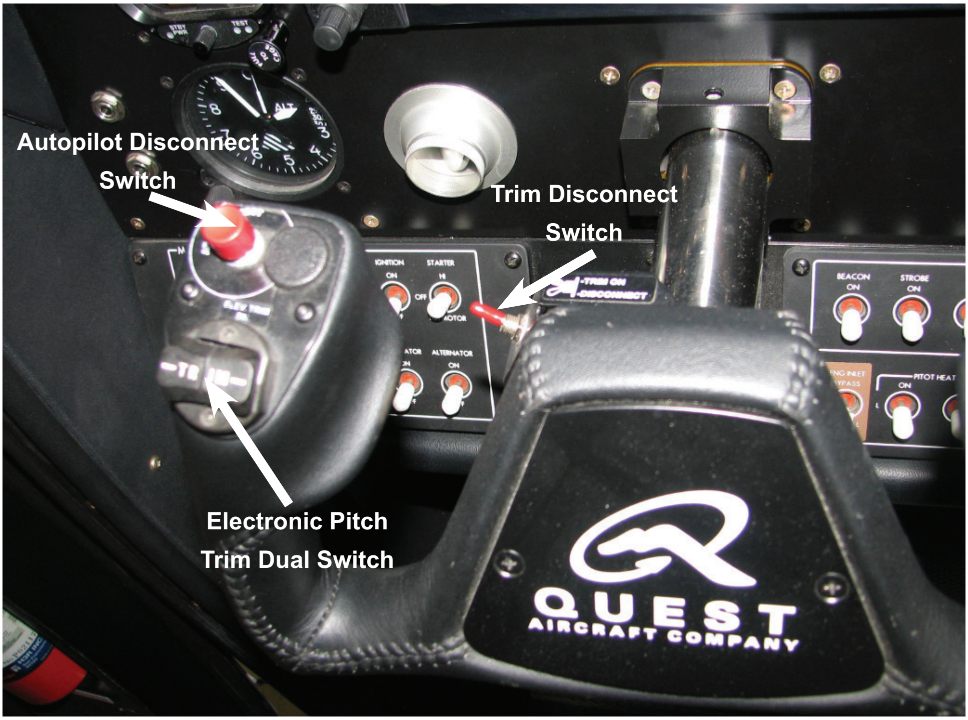


Figure 7-72 – Autopilot and Trim Disconnect Switches

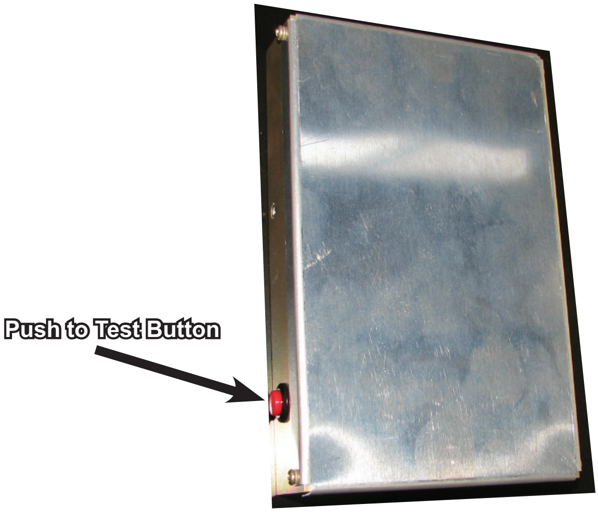


Figure 7-73 – Flap/Trim Compensation Unit

7-28 STALL WARNING SYSTEM

Serial Numbers 100-0001 thru 100-0042:

For the serial numbers listed above, the aircraft is equipped with a vane-type stall warning sensor, installed in the leading edge of the left wing. The vane is connected to a stall warning horn located in the overhead panel above the pilot seat. The vane in the wing senses the change in airflow over the wing occurring at or near stall. The warning horn will activate at airspeeds between 5 and 10 knots above the stall in all airplane configurations for wings level unaccelerated stalls.

The stall warning system should be checked during the preflight inspection of the aircraft by actuating the vane in the wing while the battery master switch is ON. The system is functioning properly if the warning horn sounds as the vane is pushed upward.

The stall warning system is protected by a circuit breaker labeled STALL WRN. The circuit breaker may be pulled to deactivate the stall warning horn should the vane stick in the ON position.

Serial Numbers 100-0043 and on and Ice Protection System Equipped Aircraft:

For the serial numbers listed above, the aircraft is equipped with a Safe Flight Lift Transducer Stall Warning system which consists of a lift transducer mounted on the left wing and a stall warning computer which is mounted overhead in the forward cabin. The stall warning computer monitors the signal from the vane and the flap position signal and schedules the stall warning to provide consistent warning margins to the stall regardless of flap setting. The flap 0° setting is on one schedule and flaps 10-35° are on a separate schedule. This provides approximately 6 KCAS of stall warning margin at all flap settings.

The vane and sensor unit in the leading edge of the wing is equipped with a heating element which is only activated in aircraft which have the optional TKS Ice Protection System Installed. For information regarding the heating element, refer to the KODIAK TKS Ice Protection System Supplement.

Additional Components of the Safe Flight Lift Transducer System:

WEIGHT ON WHEELS SWITCH

The aircraft is equipped with a weight on wheels switch. This switch prevents the stall warning horn from sounding while performing ground operations.

STALL WARNING HORN SYSTEM TEST (PRESS TO TEST)

The Safe Flight Lift Transducer Stall Warning system is equipped with a Press to Test button which will test functionality of the system during any phase of operation. The Press to Test button is located on the Pilots side instrument panel left of the backup Attitude Display Indicator. If the system is functioning normally and the Press to Test is pressed, the Stall Warning Horn will sound. If the Stall Warning Horn is not heard while pressing the Press to Test button, the Safe Flight Lift Transducer Stall Warning system is not functioning properly and is considered inoperative.

REV 6

7-29 ICING EQUIPMENT

The aircraft is standard equipped with dual heated pitot/static tubes, heated stall warning sensor, and an inertial separator for the engine inlet. Both left and right pitot/static heat are protected by separate circuit breakers (Labeled: LEFT PITOT HEAT and RIGHT PITOT HEAT) and are controlled by individual switches located on the right switch panel. Stall warning heat is controlled by the L – PITOT HEAT switch and is protected by a circuit breaker labeled STALL HEAT. The inertial separator is controlled by a two position switch labeled ENG INLET. The switch places the inertial separator in bypass when it is moved up to the BYPASS position and places it in the normal condition when moved down to the NORMAL switch position.

The pitot heat and stall warning heat should be turned on anytime the outside air temperature is less than 4°C and visible moisture is present to prevent the formation of ice on those systems. As required by Federal Regulations, amber annunciation is provided to notify the pilot when pitot heat is turned off and is displayed through the G1000 as follows:

PITOT OFF L-R

Also, **PITOT FL L-R** annunciation is provided through the G1000 to alert the pilot if the pitot heat switch is turned on but no current is getting to the pitot/static heating element. A current sensing device, located behind the right switch panel, detects current flow in the system. If a pitot heat switch is placed in the ON position and no current is flowing in the circuit, **PITOT FL L-R** will be shown on the PFD.

REV 2

The inertial separator should be placed in BYPASS prior to operating the engine when visible moisture is present (clouds, rain, snow, ice crystals, etc.) with outside air temperatures below 4°C. The inertial separator system may also be used for ground operations or takeoffs from dusty, sandy field conditions to minimize the ingestion of foreign particles and debris into the compressor. The NORMAL position should be used for all other operations.

An advisory annunciation is provided through the G1000 to indicate whether the inertial separator system is in the NORMAL or BYPASS position as follows:

ENG INLET NRM

ENG INLET BP

NOTE: *When the BYPASS mode is selected, a slight reduction of engine torque occurs. Refer to Section 5 for those specifications.*

7-30 AVIONICS – GARMIN G1000 INTEGRATED COCKPIT

The following is a general description of the Garmin G1000 Integrated Cockpit System. For operating instructions on the features of the G1000 system, refer to the **Garmin G1000 Cockpit Reference Guide** for the KODIAK 100. The G1000 Cockpit Reference Guide must be available to the pilot in flight.

G1000 SYSTEM DESCRIPTION

The Garmin G1000 includes the following Line Replaceable Units (LRU's):

- GDU 1040 Primary Flight Displays (PFD) (2)
- GDU 1040 Multi-Function Display (MFD)
- GIA 63 Integrated Avionics Units (2)
- GDL 69A Data Link Receiver
- GEA 71 Engine/Airframe Unit
- GDC 74A Air Data Computers (ADC) (2)
- GRS 77 Attitude and Heading Reference Systems (AHRS) (2)
- GMU 44 Magnetometers (2)
- GMA 1347D (Dual) Audio System with Integrated Marker Beacon Receiver
- GTX 33 Mode S Transponder

All LRU's have a modular design, which eases troubleshooting and maintenance of the G1000 system.

GDU 1040 PFD'S AND MFD

The GDU 1040 Multi-Function Display and Primary Flight Displays each have a 10.4 inch LCD display with 1024x768 resolution. The MFD is flanked on the left and right by a PFD, with a GMA 1347D Audio Panel located between the MFD and each PFD. Both displays provide control and display of nearly all functions of the G1000 integrated cockpit system. They communicate with each other through a High-Speed Data Bus (HSDB) Ethernet connection. Each PFD is also paired with an Ethernet connection to the GIA 63 Integrated Avionics Units.

Figure 7-74 – GDU 1040

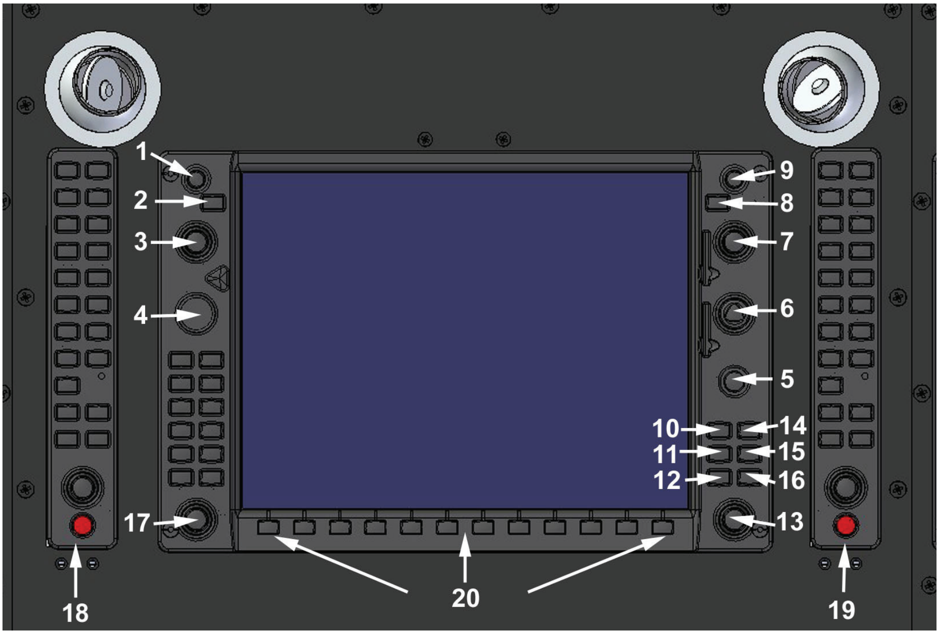


Figure 7-75 – GDU 1040 Display Layout

1. NAV VOL/ID Knob – Controls the NAV audio level. Press to toggle the Morse code identifier ON and OFF. Volume level is shown in the field as a percentage.
2. NAV Frequency Toggle Key – Toggles the standby and active NAV frequencies.
3. Dual NAV Knob – Tunes the MHz (large knob) and kHz (small knob) standby frequencies for the NAV receiver. Press to toggle the tuning cursor (light blue box) between the NAV1 and NAV2 fields.
4. Heading Knob – Turn to manually select a heading on the HSI. When pressed, it synchronizes the heading bug with the current aircraft heading.
5. Joystick – Changes the map (distance top to bottom of map display) when rotated. Activates the map pointer when pressed.
6. CRS/BARO Knob – The large knob sets the altimeter barometric pressure and the small knob adjusts the course. The course is only adjustable when the HSI is in VOR1, VOR2 or OBS/SUSP mode for GPS navigation. Pressing this knob centers the CDI on the currently selected VOR or GPS source.
7. Dual COM Knob – Tunes the MHz (large knob) and kHz (small knob) standby frequencies for the COM transceiver. Pressing this knob toggles the tuning cursor (light blue box) between the COM1 and COM2 fields.
8. COM Frequency Toggle Key – Toggles the standby and active COM frequencies. Pressing and holding this key for two seconds automatically tunes the emergency frequency (121.50 MHz) in the active frequency field.

9. COM VOL/SQ Knob – Controls COM audio level. Pressing this knob turns the COM automatic squelch ON and OFF. Audio volume level is shown in the field as a percentage.
10. Direct-To Key – Allows the user to enter a destination waypoint and establish a direct course to the selected destination (specified by the identifier, chosen from the active route, or taken from the map cursor position).
11. FPL Key – Displays the active Flight Plan Page for creating and editing the active flight plan, or accessing stored flight plans.
12. CLR Key (DFLT MAP) – erases information, cancels an entry, or removes page menus. To display the Navigation Map Page immediately, press and hold CLR (MFD only).
13. Dual FMS Knob – Used to select the page to be viewed (MFD only). The large knob selects a page group (MAP, WPT, AUX, NRST), while the small knob selects a specific page within the page group. Pressing the small knob turns the selection cursor ON and OFF.
14. MENU Key – Displays a context-sensitive list of options. This list allows the user to access additional features, or to make setting changes that relate to certain pages.
15. PROC Key – Selects approaches, departures, and arrivals from the flight plan. If a flight plan is used, available procedures for the departure and/or arrival airport are automatically suggested. If a flight plan is not used, the desired airport and the desired procedure may be selected. This key selects IFR departure procedures (DPs), arrival procedures (STARs) and approaches (IAPs) from the database and loads them into the active flight plan.
16. ENT Key – Accepts a menu selection or data entry. This key is used to approve an operation or complete data entry. It is also used to confirm selections and information entries.
17. Dual ALT Knob – Sets the reference altitude in the box located above the Altimeter. The large knob selects the thousands, while the small knob selects the hundreds.
18. Left Display Backup Button – Pressing the left Display Backup button activates/deactivates reversionary mode on the left PFD.
19. Right Display Backup Button – Pressing the right Display Backup button activates/deactivates reversionary mode on the right PFD.
20. Softkeys – The softkeys are located along the bottoms of the displays. They are used to select items shown on the display.

REVERSIONARY MODE

In reversionary mode, critical flight instrumentation is combined with engine instrumentation on the display. Reversionary mode can also be manually activated on any of the flight displays if the system fails to detect a display problem. The reversionary mode is activated manually by pressing the red DISPLAY BACKUP button on the bottom of the appropriate audio panel (pressing the left GMA 1347D audio panel DISPLAY BACKUP button activates reversionary mode on the pilot's PFD and the MFD). Pressing the red DISPLAY BACKUP button again deactivates reversionary mode.

Figure 7-76 – Reversionary Mode

MFD MAP SCALE

The MFD map scale is shown in the lower right corner of the display and represents the total distance from the bottom of the moving map to the top of the map. It does not represent the total distance from the airplane symbol to the top of the moving map.

MFD HOLDING PATTERN DEPICTION

The depiction of the holding pattern on the MFD is sized according to the groundspeed of the aircraft. The G1000 calculates the appropriate size of the hold to provide 1 minute legs in the hold. Changes in the groundspeed of the aircraft will cause the size of the holding pattern to change in size. However, the holding pattern does not depict the protected airspace of the published holding pattern.

VOR FREQUENCY DISPLAY ON THE MFD

If the Nearest VOR page is selected, the fields on the page may be highlighted to select data. The VOR frequency displayed may be selected and changed on the page. However, changing this field will not replace the information in the database and subsequent use of the VOR data page will show the correct database frequency.

GMA 1347 AUDIO PANELS

The GMA 1347 Audio Panels integrate NAV/COM digital audio, intercom system, and marker beacon controls. The GMA 1347 units also control manual display reversionary mode (red DISPLAY BACKUP buttons) and are installed between each PFD and the MFD. The GMA 1347 units communicate with both GIA 63's using an RS-232 interface.

GIA 63W INTEGRATED AVIONICS UNITS

The GIA 63W's are the Integrated Avionics Units of the G1000 system. The GIA 63W is the main communications hub, linking all LRU's with the PFD's and the MFD displays. Each GIA 63W contains a WAAS certified GPS receiver, VHF COM/NAV/GS receivers, and system integration microprocessors. Each GIA 63W is paired with a GDU 1040 PFD. The GIA's do not communicate with each other directly.

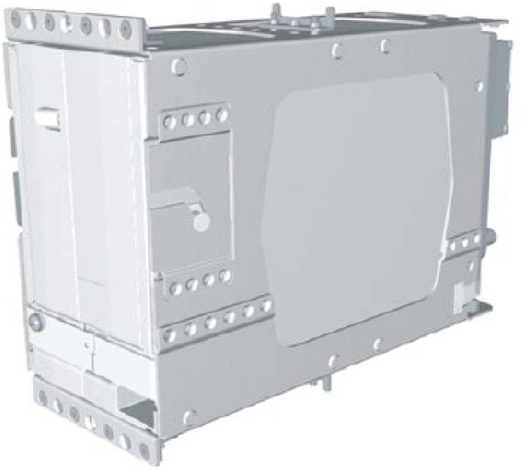


Figure 7-77 – GIA 63W Integrated Avionics Unit

GDL 69A DATA LINK RECEIVER

The GDL 69A is an XM Satellite Radio data link receiver with the addition of XM Satellite Radio audio entertainment. For display of weather information and control of audio channel and volume, the GDL 69A is interfaced to the GDU 1040 Multi-Function Display via an Ethernet link. Audio volume and channel changes may also be controlled with remotely mounted switches located on the sidewalls of the passenger seating area. The GDL 69A is also interfaced to the audio panel for amplification and distribution of the audio signal. The GA 55 XM Satellite Radio Antenna receives the XM Satellite Radio data signal and passes it to the GDL 69A.

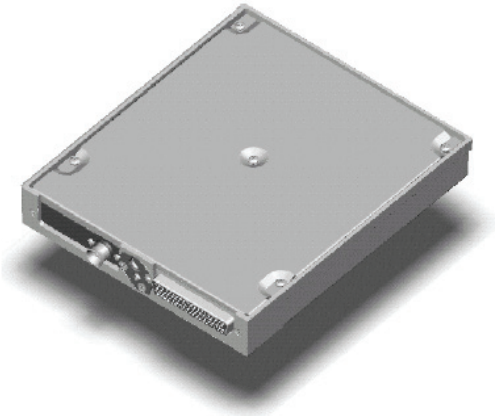


Figure 7-78 – GDL 69A Data Link Receiver

GRS 77 ATTITUDE AND HEADING REFERENCE SYSTEMS (AHRS)

The GRS 77 units are Attitude and Heading Reference Systems (AHRS) that provide aircraft heading and attitude information to the G1000 displays and the GIA 63's. The units contain advanced sensors, accelerometers, and rate sensors. In addition, the GRS 77 units interface with the GDC 74A Air Data Computers and the GMU 44 Magnetometers. The GRS 77 units also utilize two GPS signal inputs sent from the GIA 63 units. Attitude and heading information is sent using an ARINC 429 digital interface to the GDU 1040 displays and the GIA 63 units. The GRS 77 AHRS units are installed in the floor of the airplane.

Figure 7-79 – GRS 77AHRS

GMU 44 MAGNETOMETERS

The GMU 44 magnetometer units measure local magnetic field information. Data is sent to the GRS 77 AHRS for processing to determine aircraft magnetic heading. These units receive power directly from the GRS 77 units and communicate with the GRS 77 units using RS-485 digital interface.

Figure 7-80 – GMU 44 Magnetometer

GDC 74A AIR DATA COMPUTER

The GDC 74A Air Data Computers process information received from the pitot/static systems and Outside Air Temperature (OAT) Sensors. The GDC 74A units provide pressure altitude, airspeed, vertical speed, and OAT information to the G1000 system. The GDC 74A ADC units communicate with GIA 63 units, GDU 1040 displays, and the GRS 77 AHRS using ARINC 429 digital interface.

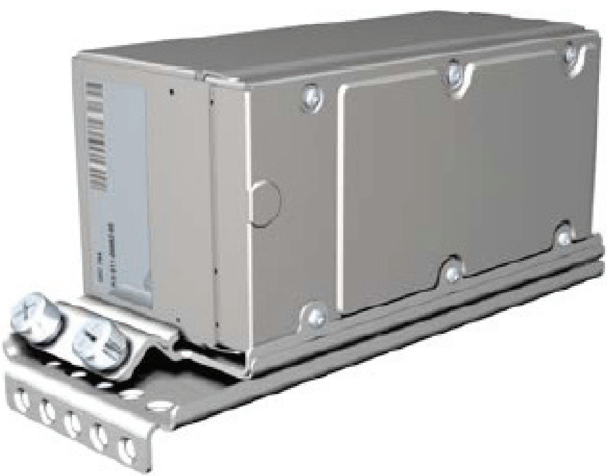


Figure 7-81 – GDC 74A Air Data Computer

GEA 71 ENGINE/AIRFRAME INTERFACE

The GEA 71 receives and processes signals from engine and airframe sensors. Sensor types include engine temperature and pressure sensors as well as fuel measurement and pressure sensors. The GEA 71 communicates with both GIA 63 units using an RS-485 digital interface.

Figure 7-82 – GEA 71 Engine/Airframe Interface

GTX 33 MODE S TRANSPONDER

The GTX 33 is a solid-state Mode S transponder providing Mode A, C, and S functions. The GTX 33 is controlled through either PFD, and communicates with both GIA 63 units through an RS-232 digital interface.

Figure 7-83 – GTX 33 Mode S Transponder

7-31 G1000 ANNUNCIATIONS AND ALERTS

For a more detailed description of the annunciations and alerts provided through the PFDs and/or the MFD, refer to the **Garmin G1000 Cockpit Reference Guide** for the Kodiak 100.

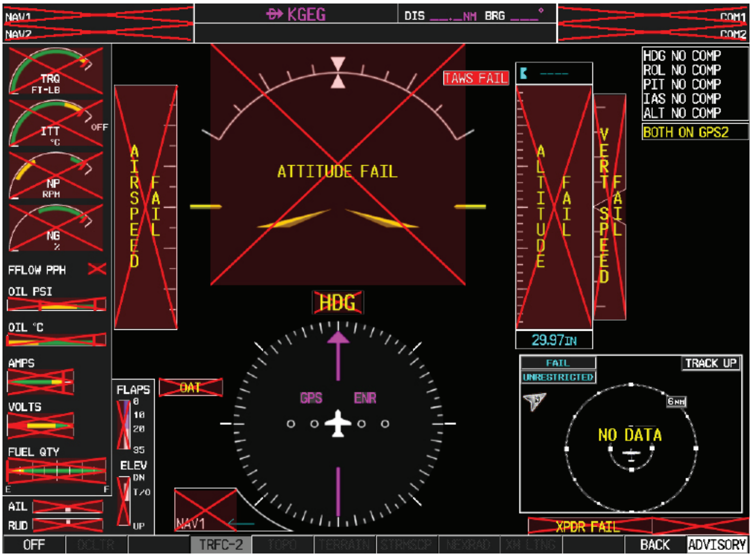


Figure 7-84 – Annunciations and Alerts Windows

ANNUNCIATION WINDOW

All system advisories, alerts, cautions and warnings are shown on the right side of each PFD (or the MFD if the system is in reversionary mode) screen adjacent to the vertical speed indicator. Up to 12 annunciations can be displayed simultaneously. A white horizontal line separates annunciations that are acknowledged from annunciations that have not yet been acknowledged. Acknowledged annunciations are always above the line. Annunciations are displayed in order of priority from top to bottom. The highest priority annunciation is displayed at the top of the annunciation window.

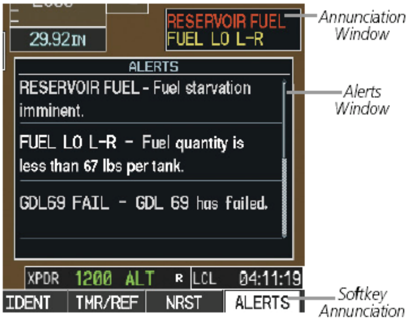


Figure 7-85 – Alert Window

NORMAL ANNUNCIATIONS

Normal annunciations are shown in GREEN and advise a normal operating condition.

Annunciation Window Text	Annunciation Description
ENG INLET NRM	Advises the pilot that the inertial separator is placed in the normal position.

REV 6

ADVISORY ANNUNCIATIONS

Advisory annunciations are shown in WHITE and advise the pilot of a system function.

Annunciation Window Text	Annunciation Description
AUX PUMP ON	Advises the pilot that the auxiliary fuel pump in ON.
AUX BUS ON	Advises the pilot that the auxiliary bus is active.
STARTER ON	Advises the pilot that the starter switch is placed in the HI START or LO/MOTOR position and power is being supplied to the starter.
IGNITION ON	Advises the pilot that the ignition switch is in the ON position.
BETA	Advises the pilot that the propeller system is in BETA mode.
ENG INLET BP	Advises the pilot that the inertial separator is placed in the bypass position.
BLEED AIR ON	Advises the pilot that the bleed air heat is activated. The pilot action is to ensure the engine power is set below the limits specified in Section 5 of the POH.
FUEL OFF L	Advises the pilot that the left fuel selector is in the OFF position. The pilot action is to ensure the valve is returned to the ON position prior to takeoff or landing.
FUEL OFF R	Advises the pilot that the right fuel selector is in the OFF position. The pilot action is to ensure the valve is returned to the ON position prior to takeoff or landing.
ENG INLET BP	Advises the pilot that the Engine Inlet is in the BYPASS position.

REV 6

CAUTION ANNUNCIATIONS

Caution annunciations are shown in AMBER and are accompanied by an aural alert, which chimes once when the caution is first displayed on the PFD. A caution annunciation indicates the possible need for corrective action and a potential threat to the continued flight of the aircraft.

REV 6

Annunciation Window Text	Annunciation Description
CARGO DOOR	Cautions the pilot that the Cargo Door is not closed and locked (on ground).
EMER PWR LVR	Cautions the pilot that the emergency power lever is not in it's normal operating position and is bypassing the pneumatic governing section of the fuel control unit.
GEN FAIL	Cautions the pilot that the generator is not delivering power to the aircraft electrical system.
ALTERNATR FL	Cautions the pilot that the alternator is either off-line or is not providing power to the essential bus.
VOLTAGE LOW	Cautions the pilot that bus voltage is below 24.0 volts.
FUEL PRESS LOW	Cautions the pilot that the low fuel pressure limits have been crossed. These limits are 6.0 PSI with increasing fuel pressure and 4.0 PSI with decreasing fuel pressure.
FUEL LOW L	Cautions the pilot that the left fuel tank quantity is low.
FUEL LOW R	Cautions the pilot that the right fuel tank quantity is low.
FUEL LOW L-R	Cautions the pilot that less than 10 minutes of fuel is remaining.
FLAP FAIL	Cautions the pilot that the flap control system has identified a failure and that the flaps will remain in that position.
PITOT FL L	Cautions the pilot that the left pitot heater is inoperative.
PITOT FL R	Cautions the pilot that the right pitot heater is inoperative.
PITOT FL L-R	Cautions the pilot that both pitot/static heat systems have failed.
PITOT OFF L	Cautions the pilot that the left pitot heater is OFF.
PITOT OFF R	Cautions the pilot that the right pitot heater is OFF.
PITOT OFF L-R	Cautions the pilot that both pitot/static heat systems are OFF. This annunciation is triggered if the pitot heat is OFF and the OAT is less than 4° C.
INLET NOT NRM	Cautions the pilot that the engine inlet has failed to reach the NORMAL position after 18 seconds or more has passed since the Inertial Particle Separator was switched to NORMAL, indicating that either the actuator failed, or the normal position indicating sensor has failed.
INLET SW FAULT	Cautions the pilot of a miscompare between the Engine Inlet Position Sensors. Refer to the Engine Inlet Miscompare Troubleshooting Table in **Section 3**, Emergencey Procedures.

REV 6

WARNING ANNUNCIATIONS

Warning annunciations are displayed in RED and are accompanied by an aural alert which chimes intermittently until the pilot acknowledges it by pressing the ADVISORY softkey. A warning annunciation requires immediate corrective action and threatens the continued flight of the aircraft.

Annunciation Window Text	Annunciation Description
OIL PRESS LOW	Activation warns that the low oil pressure threshold has been crossed. The threshold for activation is 43 PSI with decreasing pressure. The annunciation will continue to be shown until the pressure increases to above 75 PSI.
FUEL OFF L-R	Warns the pilot that both fuel selector valves are in the OFF position. A red LED light located above the pilot's PFD will also illuminate and remain illuminated until one or both fuel selector valves are returned to the ON position.
OVERSPD WARN	Warns the pilot that Vmo has been exceeded. The overspeed warning limits are 182 KIAS with an increasing airspeed and 181 KIAS with decreasing airspeed.
CARGO DOOR	Warns the pilot that the cargo door is not fully closed while the aircraft is in the air with a groundspeed of at least 30 knots (GPS) or airspeed of at least 50 knots (TAS).
RESERVOIR FUEL	Warns that the fuel level in the fuel reservoir is low and fuel starvation is imminent.
CHIP DETECTOR	Warns the pilot that a metallic chip has been detected in the reduction gearbox. Pilot action is to continue flight with reduced power to the nearest available airport.
FLAP OVERSPEED	Warns the pilot that the maximum flap speed for the current flap position is being exceeded. Pilot action is to reduce airspeed below the current flap position.
ITT	Warns the pilot that the ITT limit is being exceeded. 790°C during flight or 1090°C during start. Pilot action is to reduce power or bring the fuel condition lever to CUTOFF (during start).
NG OVERSPEED	Warns the pilot that the NG limit of 101.6 % is being exceeded. Pilot action is to reduce power.
NP OVERSPEED	Warns the pilot that the NP limit of 2200 RPM is being exceeded. Pilot action is to reduce propeller RPM.
TORQUE	Warns the pilot that the takeoff torque limit is being exceeded. Pilot action is to reduce torque.
INLET NOT BP	Warns the pilot that the engine inlet has failed to reach the BYPASS position after 18 seconds or more has passed since the Inertial Particle Separator was switched to BYPASS, indicating either that the actuating system failed, or that both bypass position indicating sensors have failed.

REV 6
REV 1
REV 1
REV 6

MESSAGE ADVISORY ALERTS

Annunciation Window Text	Annunciation Description
AVN FAN 1 FAIL	Avionics cooling fan #1 is inoperative.
AVN FAN 2 FAIL	Avionics cooling fan #2 is inoperative.

REV 1

ALERTS WINDOW

The alerts window displays alert text messages. Up to 64 alerts can be displayed in the Alerts window. New alerts are placed on top of the stack and older ones are cycled down. Alerts that are no longer valid are grayed out and then subsequently removed after the window is refreshed. Pressing the ALERTS softkey displays the Alerts window. Pressing the ALERTS softkey again removes the Alerts window from the display. When the Alerts window is displayed, the pilot may use the large FMS knob to scroll through the alert list. Higher priority alerts are displayed at the top of the window. Lower priority alerts are displayed at the bottom of the window.

ALERTS SOFTKEY ANNUNCIATION

When the Alerting System issues an alert, the ALERTS softkey is used as a flashing annunciation to accompany an alert. During the alert, the ALERTS softkey provides a new label consistent with alert level (WARNING, CAUTION, or ADVISORY). Pressing the softkey annunciation acknowledges that the pilot is aware of the alert. The softkey then returns to the previous ALERTS label. The pilot can then press the ALERTS softkey again to view alert text messages.

SYSTEM ANNUNCIATIONS

Typically, a large red ‘X’ appears in a window when a related LRU fails or detects invalid data.

TAWS ALERTS

Annunciations are shown on all three flight displays. Pop-up alerts are shown only on the MFD.

Alert Type	PFD/MFD Alert Annunciation	MFD Pop-Up Alert	Aural Message
Excessive Descent Rate Warning (EDR)	PULL UP	PULL-UP	"Pull Up"
Reduced Required Terrain Clearance Warning (RTC)	PULL UP	TERRAIN AHEAD - PULL-UP * or TERRAIN - PULL-UP	"Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" * or "Terrain, Terrain; Pull Up, Pull Up"
Imminent Terrain Impact Warning (ITI)	PULL UP	TERRAIN AHEAD - PULL-UP * or TERRAIN - PULL-UP	"Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" * or "Terrain, Terrain; Pull Up, Pull Up"
Reduced Required Obstacle Clearance Warning (ROC)	PULL UP	OBSTACLE AHEAD - PULL-UP * or OBSTACLE - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" * or "Obstacle, Obstacle; Pull Up, Pull Up"
Imminent Obstacle Impact Warning (IOI)	PULL UP	OBSTACLE AHEAD - PULL-UP * or OBSTACLE - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" * or "Obstacle, Obstacle; Pull Up, Pull Up"
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	TERRAIN AHEAD * or CAUTION - TERRAIN	"Terrain Ahead; Terrain Ahead" * or "Caution, Terrain; Caution, Terrain"
Imminent Terrain Impact Caution (ITI)	TERRAIN	TERRAIN AHEAD * or CAUTION - TERRAIN	"Terrain Ahead; Terrain Ahead" * or "Caution, Terrain; Caution, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	OBSTACLE AHEAD * or CAUTION - OBSTACLE	"Obstacle Ahead; Obstacle Ahead" * or "Caution, Obstacle; Caution, Obstacle"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	OBSTACLE AHEAD * or CAUTION - OBSTACLE	"Obstacle Ahead; Obstacle Ahead" * or "Caution, Obstacle; Caution, Obstacle"
Premature Descent Alert Caution (PDA)	TERRAIN	TOO LOW - TERRAIN	"Too Low, Terrain"
Altitude Callout "500"	None	None	"Five-Hundred"
Excessive Descent Rate Caution (EDR)	TERRAIN	SINK RATE	"Sink Rate"
Negative Climb Rate Caution (NCR)	TERRAIN	DON'T SINK * or TOO LOW - TERRAIN	"Don't Sink" * or "Too Low, Terrain"

* *Alerts with multiple messages are configurable at installation and are installation-dependent. Alerts for the default configuration are indicated with asterisks.*

Figure 7-86 – TAWS Alerts

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
TAWS System Test Fail	TAWS FAIL	None	"TAWS System Failure"
TAWS Alerting is disabled	TAWS INHB	None	None
No GPS position or excessively degraded GPS signal	TAWS N/A	None	"TAWS Not Available" "TAWS Available" will be heard when sufficient GPS signal is re-established.
System Test in progress	TAWS TEST	None	None
System Test pass	None	None	"TAWS System Test OK"

Figure 7-87 – TAWS System Status Annunciations

REV 4

CAUTION: *The "TAWS NOT AVAILABLE" aural annunciation is inhibited on the ground to prevent repeated nuisance annunciations when taxiing, where the GPS signal can be intermittent. The pilot shall visually ensure that TAWS N/A is not shown on the PFD prior to departure.*

REV 1

TRAFFIC ADVISORY SERVICE (TAS) ANNUNCIATIONS

Traffic Map Page Annunciation	Description
NO DATA	Data is not being received from the TAS unit
DATA FAILED	Data is being received from the TAS unit, but the unit is self-reporting a failure
FAILED	Incorrect data format received from the TAS unit

Figure 7-88 – TAS System Annunciations

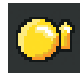
Mode	Traffic Mode Annunciation (Traffic Map Page)	Traffic Display Enabled Icon (Other Maps)
TAS Self-test Initiated	TEST (also shown in white in center of page)	
TAS Operating	OPERATING	
TAS Standby	STANDBY (also shown in white in center of page)	
TAS Failed	FAIL	

Figure 7-89 – TIS System Annunciations

TRAFFIC INFORMATION SERVICE (TIS) ANNUNCIATIONS

Traffic Map Page Annunciation	Description
NO DATA	Data is not being received from the transponder*
DATA FAILED	Data is being received from the transponder, but a failure is detected in the data stream*
FAILED	The transponder has failed*
UNAVAILABLE	TIS is unavailable or out of range

** Contact a service center or Garmin dealer for corrective action*

Figure 7-90 – TIS System Annunciations

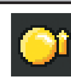
Mode	Traffic Mode Annunciation (Traffic Map Page)	Traffic Display Enabled Icon (Other Maps)
TIS Operating	OPERATING	
TIS Standby	STANDBY (also shown in white in center of page)	
TIS Failed	FAIL	

Figure 7-91 – TAS System Status Annunciations

Traffic Status Banner Annunciation	Description
TA OFF SCALE	A Traffic Advisory is outside the selected display range.* Annunciation is removed when traffic comes within the selected display range.
TA X.X ± XX ↕	System cannot determine bearing of Traffic Advisory.** Annunciation indicates distance in nm, altitude separation in hundreds of feet, and altitude trend arrow (climbing/descending).
AGE MM:SS	Appears if traffic data is not refreshed within 6 seconds. If after another 6 seconds data is not received, traffic is removed from the display. The quality of displayed traffic information is reduced as the age increases.
TRFC COAST	The displayed data is not current (6 to 12 seconds since last message). The quality of displayed traffic information is reduced when this message is displayed.
TRFC RMVD	Traffic is removed because it is too old for coasting (12 to 60 seconds since last message). Traffic may exist within the selected display range, but it is not displayed.
TRFC FAIL	Traffic data has failed.
NO TRFC DATA	Traffic has not been detected.
TRFC UNAVAIL	The traffic service is unavailable or out of range.

**Shown as a symbol on Traffic Map Page*

***Shown in center of Traffic Map Page*

Figure 7-92 – TIS Traffic Status Annunciations

COMPARATOR ANNUNCIATIONS

Comparator Window Text	Condition
ALT MISCOMP	Difference in altitude sensors is > 200 ft.
IAS MISCOMP	If both airspeed sensors detect < 35 knots, this is inhibited.
	If either airspeed sensor detects > 35 knots, and the difference in sensors is > 10 knots.
	If either airspeed sensor detects > 80 knots, and the difference in sensors is > 7 knots.
HDG MISCOMP	Difference in heading sensors is > 6 degrees.
PIT MISCOMP	Difference in pitch sensors is > 5 degrees.
ROL MISCOMP	Difference in roll sensors is > 6 degrees.
ALT NO COMP	No data from one or both altitude sensors.
IAS NO COMP	No data from one or both airspeed sensors.
HDG NO COMP	No data from one or both heading sensors.
PIT NO COMP	No data from one or both pitch sensors.
ROL NO COMP	No data from one or both roll sensors.

Figure 7-93 – Comparator Annunciations

OTHER ANNUNCIATIONS

For other Garmin G1000 system annunciations and message advisories refer to the **Garmin G1000 Cockpit Reference Guide** for the Kodiak 100.

7-32 CLOCK/OAT INDICATOR

A digital indication of time and outside air temperature is provided along the lower edge of the Primary Flight Displays. The clock is located on the lower right portion of each PFD and is based on GPS time. The OAT indicators (2) are located on the lower left portion of each PFD and use air temperature probes located on the top of the cabin just aft of the windshields.

7-33 AVIONICS SUPPORT EQUIPMENT

Avionics support equipment is installed in the airplane to aid in the function of the avionics suite. This support equipment includes an avionics cooling fan, microphone/speaker, headset jacks, and control surface static dischargers.

COOLING FANS

An avionics cooling fan system is installed in the airplane to supply internal cooling air to the avionics equipment. This supply of cooling air prolongs the life of the avionics equipment and prevents overheating in certain applications. The cooling fans are turned on when the avionics master switch is ON. One cooling fan provides cooling air to the pilots PFD and the LRUs installed behind it. The other fan provides cooling air to the left PFD and the MFD. The avionics cooling fans are protected by a circuit breaker labeled AVN FAN. If the avionics cooling fans should malfunction, the circuit breaker may be pulled out (OFF) to remove power from the fan.

MICROPHONE/SPEAKER AND HEADSET JACKS

Primarily, radio communications are accomplished by the use of a headset and microphone plugged into the headset jacks on the left side of the instrument panel for the pilot and the right side of the instrument panel for the co-pilot/front passenger. Headset jacks are also provided for each passenger seat.

A microphone and overhead speaker are also installed to perform radio communications. The microphone stows in a hanger on the left side of the control pedestal and plugs into the microphone jack located on the left side of the pedestal. The airplane speakers are located above the crew seats in the overhead panel.

REV 1

STATIC DISCHARGERS

To improve radio communications during IFR flights through dust or various forms of precipitation, wick-type static dischargers are installed. Under these conditions, the build-up and discharge of static electricity from the trailing edges of the wings, rudder, elevator, propeller tips and radio antennas may result in interrupted radio signals for all communication and navigation radio equipment.

The static dischargers are installed to reduce interference from precipitation static, but it is possible to encounter severe precipitation static conditions which might cause the loss of radio signals, even with the static wicks installed. Whenever possible, avoid areas of known severe precipitation to prevent the loss of adequate radio signals. If avoidance is not practical, a reduction of airspeed should help reduce the degree of precipitation static, but expect some degradation of radio performance.

Static dischargers lose their effectiveness as they age, and should be checked annually by a qualified maintenance technician. If testing equipment is not available, it is recommended that the static wicks be replaced every two years, especially if the aircraft is operated frequently in instrument meteorological conditions. The static discharger wicks are designed to allow them to unscrew from their mounting bases, facilitating ease of replacement.

7-34 CABIN FEATURES

CABIN FIRE EXTINGUISHERS

A portable fire extinguisher is installed in each crew door and on the aft bulkhead. The crew fire extinguishers are readily accessible to the crew in case of a fire and the aft fire extinguisher may be used by aft passengers or another crewmember. The extinguishers should be checked periodically to ensure their bottle pressure is within limits and the operating lever lock pin is in place and secure.

To operate the fire extinguisher:

1. Loosen the retaining clamp/clamps and remove the extinguisher from the mounting bracket.
2. Hold the extinguisher upright, pull the lock pin, and press the lever while directing the discharge at the base of the fire near the edge. Sweep the discharge back and forth across the edge of the fire, progressing to the back of the fire as it extinguishes.
3. Use caution as to not direct the initial discharge directly at the burning material at close range (less than 5-8 feet). The high velocity of the extinguishing agent may cause splashing and/or scattering of the burning material.
4. Discharge duration of approximately ten seconds may be expected for each of the crew extinguishers and the aft bulkhead extinguisher.

WARNING: *Promptly ventilate the cabin with fresh air and open the storm window after successfully extinguishing of the fire to reduce inhalation of toxic by-products.*

NOTE: *Fire extinguishers should be recharged by a qualified fire extinguisher agency after each use. After recharging the extinguisher, secure it to the mounting bracket. Do not allow the fire extinguisher to lie loose on the floor or seats.*

SECTION 8
AIRPLANE HANDLING, SERVICE AND MAINTENANCE
Table of Contents

CONTENTS	PAGE

8-1 INTRODUCTION

This section contains information regarding the factory-recommended procedures for proper ground handing and routine care and servicing of your Kodiak. It also outlines certain inspection and maintenance requirements which must be followed if your airplane is to retain its performance and reliability. It is wise to adhere to a planned lubrication and routine maintenance schedule based on climatic and operating conditions encountered day to day.

WARNING: *The airplane must be regularly inspected and maintained in accordance with information contained in the Airplane Maintenance Manual and Quest Aircraft Company issued Service Bulletins and Service Letters. All recommendations for product improvements called out by Service Bulletins should be accomplished and the airplane should receive the required repetitive and required inspections. Quest Aircraft Company does not condone modifications to the aircraft, whether by Supplemental Type Certificate or otherwise, unless these certificates are held and/or approved by Quest Aircraft Company. Other modifications may void airplane warranties since Quest Aircraft has no way of knowing the full effect on the airplane. Operating a modified airplane may impose a risk to the occupants. The operating procedures and performance data outlined in the operating handbook may no longer be considered as accurate information for the modified airplane.*

8-2 IDENTIFICATION PLATE

All correspondence and record keeping regarding your airplane should include the serial number. The Serial Number, Model Number, Type Certificate Number (TC), Production Certificate Number (PC), and Date of Manufacture can all be found on the Identification Plate, located on the left side of the tailcone below the horizontal stabilizer.

8-3 QUEST AIRCRAFT OWNER ADVISORIES

Quest Aircraft Owner Advisories are sent to owners of Quest Airplanes at no charge to inform them about mandatory and/or beneficial aircraft service requirements and product improvements.

United States Registered Aircraft Owners

If your aircraft is registered in the United States, applicable Quest Aircraft Owner Advisories will be mailed to you automatically according to the latest aircraft registration name and address information provided to the Federal Aviation Administration.

If you request a duplicate Owner Advisory to be sent to an address other than the one provided to the FAA for aircraft registration, please complete and return an Owner Advisory Application.

Internationally Registered Aircraft Owners

To receive Quest Aircraft Owner Advisories, please complete and return an Owner Advisory Application. Receipt of a valid Owner Advisory Application will establish your Quest Aircraft Owner Advisory service for one year. Each year a renewal notice will be sent to you to update your information.

PUBLICATIONS

Various publications and flight operation tools are furnished in the airplane when it is delivered from the factory. These items include:

- Quest Aircraft Customer Care Program Handbook
- Pilot's Operating Handbook and FAA Approved Airplane Flight Manual
- Laminated Pilot's Checklists
- Quest Aircraft Authorized Service Center Directory
- Electronic Maintenance Manual and Illustrated Parts Catalog
- Garmin G1000 Cockpit Reference Guide
- Kodiak 100 Training Guide

NOTE: *If a Pilot's Operating Handbook and FAA Approved Airplane Flight Manual should become lost or destroyed, a replacement may be ordered by contacting Quest Aircraft Company. An affidavit containing the owner's name, airplane serial number and registration number must be included in the replacement request form. The reason for this is the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual is identified for specific airplanes only.*

8-4 AIRPLANE FILE

The airplane file is composed of miscellaneous data, information and licenses. The following is a checklist for that file. In addition, a periodic check should be made of the latest Federal Aviation Regulations to verify that all the file requirements are met.

NOTE: *Owners of aircraft registered outside of the United States should check with the registering authority for additional requirements specific to that country.*

Required Documents	Note	
A	Airworthiness Certificate FAA Form 8100-2	Must be displayed in the aircraft at all times.
R	Registration Certificate FAA Form 8050-3	Must be displayed in the aircraft at all times.
R	Radio Station License	Required only for flight operations outside the United States.
O	Operating Limitations	The FAA Approved Flight Manual and Pilot's Operating Handbook fulfills this requirement and must be accessible to the pilot at all times.
W	Weight and Balance Data	Included in the FAA Approved Flight Manual and Pilot's Operating Handbook. The data must include the current empty weight, CG, and equipment list.

Other Documents	Note
Airplane Logbook	Must be made available upon request.
Engine Logbook	Must be made available upon request
Pilot's Checklist	Must be accessible to the pilot in flight.
Garmin G1000 Operating Handbook	Must be accessible to the pilot in flight.

Figure 8-1 – Document Checklists

8-5 AIRPLANE INSPECTION RECORDS

14 CFR Part 91.409 requires that all aircraft must undergo a thorough annual inspection meeting the requirements set forth in **14 CFR Part 43**. Annual inspections are based upon calendar months and are due on the last day of the twelfth month following the last annual inspection accomplished. For example, if an annual inspection was performed on May 19, 2005, the next annual inspection will be due May 31, 2006. Annual inspections must be accomplished regardless of the number of hours it was flown in the previous year and may only be performed by a licensed Airframe and Powerplant (A&P) mechanic holding an Inspection Authorization (IA). All Quest Authorized Service Centers are capable of performing annual inspections. The inspection items are outlined, in detail, in **Chapter 5** of the Kodiak 100 Maintenance Manual.

If the airplane is operated commercially, the regulations require the airplane to undergo a 100-hour inspection each 100 hours of flight operation in addition to an annual inspection. The scope of the 100-hour inspection is identical to an annual inspection except it may be performed by an A&P mechanic without an Inspection Authorization. The 100-hour interval may be exceeded by no more than 10 flight hours in order to reach a location where the inspection may be performed. Any flight hours used to reach the location of inspection must be deducted from the next 100-hour interval.

In lieu of the 100-Hour and Annual inspection requirements, an airplane may be inspected in accordance with a progressive inspection schedule. A progressive inspection program must be approved by the FAA Flight Standards District Office (FSDO) having jurisdiction over the area in which the applicant is located.

PROGRESSIVE INSPECTION PROGRAM

Under the progressive inspection program, your airplane is inspected and maintained in four basic operations. The four operations are recycled every 400 hours and are recorded in a special Aircraft Inspection Logbook as each operation is accomplished.

Quest Aircraft Company recommends the Progressive Inspection Program for aircraft being operated more than 400 hours per year and the 100-Hour/ Annual Inspection for all other aircraft. The procedures for the Progressive Inspection Program and the 100-Hour inspection have been determined by the factory and are followed by Quest Aircraft Company Kodiak 100 Service Stations. The highest level of service is attained by Quest Approved Service Stations utilizing factory/approved procedures, tools and equipment.

ENGINE CONDITION TREND MONITORING

Pratt & Whitney Canada New Generation Condition Engine Condition Trend Monitoring System is a system of recording engine instrument reading, correcting the readings for ambient conditions, and comparing actual engine operation to typical engine operating characteristics.

Engine instrument recording is provided through the Garmin G1000. The G1000 records the following engine parameters:

- Inter Turbine Temperature (ITT)
- Torque
- Gas Generator RPM (Ng)
- Propeller RPM (Np)

- Fuel Flow
- Indicated Outside Air Temperature
- Altitude
- Indicated Airspeed (KIAS)

The recorded engine parameters may be downloaded periodically from the top card slot of the PFD and uploaded to Pratt & Whitney Canada's WebECTM System for trend monitoring.

For more information concerning engine condition trend monitoring refer to **Pratt & Whitney Canada Service Information Letter No. PT6A-122**.

ALTERATIONS OR REPAIRS

It is important the FAA is contacted prior to any alterations on the airplane to ensure that the airworthiness is not violated. Major alterations or repairs to the airplane must be accomplished by FAA authorized personnel.

8-6 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 may be stowed in the aircraft cabin baggage compartment. Moving the airplane by hand requires one individual to steer the airplane with the tow-bar, assisted by personnel pushing at the wing struts.

CAUTION: *Do not push or pull the airplane using the propeller blades or flight control surfaces.*

During any towing operation, especially when conducted with the assistance of a powered vehicle, do not exceed the nose gear turning limits of 55° either side of center as shown by the steering limit marks.

PARKING

When parking the airplane, face the aircraft into the wind and set the parking brakes. Do not set the parking brakes during cold weather when accumulated moisture may freeze the brakes or when the brakes are overheated. Install the control wheel lock, and chock the wheels (if the parking brake is not utilized) to prevent airplane movement. In severe weather or high wind conditions, secure the airplane as outlined in the following paragraph

CAUTION: *Anytime the airplane is loaded heavily, the footprint pressure (pressure of the tires on the ramp or runway) will be extremely high. Surfaces such as hot asphalt or sod may not support the airplane adequately. Precautions should be taken to avoid parking or moving the airplane in these areas.*

TIE-DOWN

The best precaution against damage to the aircraft when it is parked in gusty or strong winds is to follow proper tie-down procedures. To securely tie-down the airplane, proceed with the following directions.

1. If possible, point the aircraft into the wind.
2. Set the parking brake
3. Install the control wheel lock.
4. Set the aileron and elevator trim tabs in the neutral position so the tabs are even with the control surfaces.
5. Install the pitot tube cover, if available.
6. Securely attach anchored tie down ropes or chains to the wing and tail tie-down fittings.
7. If the last flight of the day has been completed or if dusty conditions are present or forecasted, install the engine inlet covers to protect the engine from debris. The covers should be installed after the engine has cooled down.
8. To prevent propeller wind-milling, install the propeller anchor on one of the propeller blades and secure its anchor strap around the nose gear.

JACKING

A series of jack adapters are provided as a tool kit for jacking the airplane. One adapter fits into the drag brace fitting on the fuselage for jacking the nose gear. Two adapters (one for each main wheel) fit onto the existing axle assemblies for jacking the main wheels. Two additional adapters screw into the belly of the airplane at the main landing gear carry through structure for jacking the airplane to remove the main landing gear.

LEVELING

Longitudinal leveling of the airplane is required for weighing and determining the empty weight center of gravity. Refer to **Section 6, Weight and Balance and Equipment List** for Leveling procedures.

8-7 SERVICING

LUBRICATING SYSTEM

Oil Specifications

Oil conforming to the current revision or supplement of Pratt & Whitney Canada Engine Service Bulletin Number 1001 must be used. The following table lists some of the approved synthetic engine lubricating oils for the PT6A-34.

Brand	Specification / Type	Temperature Limits
Aeroshell Turbine Oil 750	CPW202 / Type 1	Above 0°F (-18°C)
Royco Turbine Oil 750	CPW202 / Type 1	Above 0°F (-18°C)
Castrol 98	CPW202 / Type 1	Above 0°F (-18°C)
Turbo Oil 274	CPW202 / Type 1	Above 0°F (-18°C)
Turbonycoil 35M	CPW202 / Type 1	Above 0°F (-18°C)
Aeroshell Turbine Oil 500	PWA 521 / Type 2 MIL-PRF-23699F	Above -40°F(-40°C)
Royco Turbine Oil 500	PWA 521 / Type 2 MIL-PRF-23699F	Above -40°F(-40°C)
Mobile Jet Oil II	PWA 521 / Type 2 MIL-PRF-23699F	Above -40°F(-40°C)
Castrol 5000	PWA 521 / Type 2 MIL-PRF-23699F	Above -40°F(-40°C)
BP Turbo Oil 2380	PWA 521 / Type 2 MIL-PRF-23699F	Above -40°F(-40°C)
Turbonycoil 525-2A	PWA 521 / Type 2 MIL-PRF-23699F	Above -40°F(-40°C)
Turbonycoil 600	PWA 521 / Type 2 MIL-PRF-23699F	Above -40°F(-40°C)
Mobile Jet Oil 254	PWA 521 / Type 2 3rd Generation MIL-PRF-23699F	Above -40°F(-40°C)
Aeroshell Turbine Oil 560	PWA 521 / Type 2 3rd Generation MIL-PRF-23699F	Above -40°F(-40°C)
Royco Turbine Oil 560	PWA 521 /Type 2 3rd Generation MIL-PRF-23699F	Above -40°F(-40°C)

Figure 8-2 – Approved Engine Oils

NOTE: *The Type 2 or Type 2 "3rd Generation" oils should be used when operation of the aircraft results in frequent cold soaking at ambient temperatures of 0°F (-18°C) or less. Refer to the current revision of* **Pratt & Whitney Service Bulletin No. 1001** *for additional oils which may be approved.*

CAUTION: *Do not intermix different viscosities or specifications of oil as their different chemical structures can make them incompatible.*

NOTE: *Do not mix types of oil unless otherwise specifically approved. Refer to* **P&WC Service Bulletin Number 1001** *for information concerning changing brands, viscosities or specifications of oils.*

If one or more of the following conditions exist, the accessory gearbox scavenge pump inlet screen and any drained oil should be inspected for the presence of carbon particles, as outlined in the airplane and engine maintenance manual procedures and the engine manufacturer's applicable engine and oil service bulletins.

1. The engine oil was accidentally switched to a "third generation" lubricant at any time other than at engine overhaul.
2. Abnormally high oil consumption.
3. Oil leaking from the engine intake.

If carbon particles are found, refer to the above referenced maintenance manuals and service bulletins for the corrective actions to be taken.

OIL CAPACITIES

Total Oil Capacity .... Approximately 13 US Quarts
Drain and Refill Quantity.. Approximately 9 US Quarts

OIL QUANTITY OPERATING RANGE

Fill to within 1-1/2 quarts of the MAX HOT or MAX COLD markings (as appropriate) on the dipstick. The quart markings indicate US quarts low when the oil is hot. For example, a dipstick reading of 3 indicates the system is within 3 quarts of MAX if the oil is hot and within 2 quarts of Max if the oil is cold.

WARNING: *Ensure the oil dipstick cap is securely latched down. Operating the engine with the dipstick unlatched will result in excessive loss of oil and eventual engine seizure. Operating the engine with less than the recommended oil level may also lead to eventual engine seizure.*

OIL SYSTEM SERVICING INTERVALS

If the aircraft is operated less than 50 hours per month, the oil should be changed and inspected every 400 hours or 1 year, whichever occurs first. For airplanes operated in excess of 50 hours per month, an oil change interval of 1200 hours or one year, whichever occurs first, is recommended. Regardless of the degree of utilization, if the airplane is operated in sandy or dusty environments, the oil change interval should be adjusted to at least every 6 months.

FUEL

APPROVED FUEL GRADES (SPECIFICATION)

Jet A **(ASTM-D1655)**
Jet A-1 **(ASTM-D1655)**
JP-1 **(MIL-L-5616)**
JP-5 **(MIL-T-5624)**
JP-8 **(MIL-T-83133A)**

FUEL ADDITIVES

Regardless of what grade of fuel is selected for operating the aircraft, each must include an anti-icing additive complying to **MIL-85470(B) (DIEGME)**, incorporated or added into the fuel during the refueling process.

NOTE: *JP-5 fuel per MIL-T-5624 and JP-8 fuel per* **MIL-T-83133A** *already contain the correct premixed quantity of an approved type of anti-icing fuel additive and no additional anti-icing compounds should be added.*

CAUTION: *It is extremely important to attain the proper mixture ratio of anti-icing within the fuel. A concentration in excess of that recommended (0.15% maximum by volume) will result in detrimental effects to the fuel tanks. Damage could occur to fuel system components such as deterioration of the protective primer and sealants and damage to the o-rings and seals. Use only manufacturer recommended blending equipment to obtain proper proportioning.*

FUEL ON-LOADING

CAUTION: *Verify the proper grade and type of fuel is being used to service the aircraft.*

NOTE: *When utilizing a proportioner installed on refueling equipment, follow the directions provided by the manufacturer.*

Tank Filling Procedure:

1. Connect the fueling nozzle ground to the tie-down ring on the aircraft’s strut.
2. Place a protective mat on the wing near the fuel filler and remove the filler cap.
3. Service with fuel as follows:
   a. If the Jet Fuel is premixed with icing inhibitor, fill the wing tanks with the required amount.
   b. If the Jet Fuel does not contain pre-mixed icing inhibitor, select a fuel system icing inhibitor complying with **MIL-85470(B)** DIEGME and blend manually as outlined in the following paragraph.
4. Remove the fuel nozzle, protective-pad, ground-cable and install the fuel filler cap. Check to ensure the filler cap is installed securely.

MANUAL BLENDING OF FUEL ANTI-ICING ADDITIVE

When the airplane is being refueled, use the following procedure to blend anti-icing additive with fuels not already containing anti-icing additive:

1. Attach the additive to the refueling nozzle; ensure the blender tube discharges into the refueling stream.
2. Begin refueling while simultaneously fully depressing and slipping the ring over the trigger of the blender.

CAUTION:

- *Diethylene Glycol Monomethyl Ether (DIEGME) is slightly toxic if swallowed and may cause eye redness, swelling and irritation. It is also combustible. Before using this material, refer to all safety information provided on the container.*
- *Assure the additive is directed into the stream of flowing fuel. The stream of fuel must be started prior to beginning to add the anti-icing additive, and the flow of additive must stop prior to stopping the flow of fuel from the refueling nozzle.*
- *Do not allow the concentrated additive to come in contact with the coated interior of the fuel tank or painted surfaces of the airplane.*
- *Do not use less than 20 fluid ounces of additive per 156 gallons of fuel.*
- *Do not use more than 20 fluid ounces of additive per 104 gallons of fuel.*
- *If the fuel additive concentration falls below 0.035% by volume, the airplane should be defueled and refueled with the proper concentration level of anti-ice additive.*

PROCEDURE FOR CHECKING FUEL ADDITIVE CONCENTRATION LEVELS

Prolonged storage of the airplane will result in a buildup of water in the fuel tanks which leaches out the additive. This condition is indicated by excessive amounts of water accumulating in the fuel tank sumps. The concentration of the additive may be checked using an anti-icing additive concentration test kit. For additional information about this kit, refer to **Chapter 12** of the **Kodiak Maintenance Manual**. It is imperative that the instructions for the test kit be followed closely when checking the concentration level of the additive. The additive concentration by volume for DIEGME must be 0.10% minimum and 0.15% maximum. When fuel is added to the tanks, the concentration level must be a minimum of 0.10% by volume.

FUEL CONTAMINATION

Fuel contamination is usually caused by the presence of foreign material in the fuel system, consisting of water, rust, sand, dirt, microbes or bacterial growth. In addition, additives not compatible with fuel or fuel system components may cause the fuel to become contaminated.

Prior to each flight and following each refueling of the airplane, use a clear fuel sampler and draw at least one fuel sampler cup full from each of the inboard fuel tank sump drain valves, the fuel reservoir drain valve, and the firewall mounted fuel filter drain valve to determine if the airplane was fueled with the proper grade of fuel or if contaminants are present.

If contamination is detected, draw fuel from all of the fuel drain points again. Take repeated samples from all of the fuel drain points until all of the contamination has been removed. If after repeated sampling, evidence of contamination still exists; the fuel tanks should be completely drained, cleaned and inspected. Do not fly the airplane with contaminated or unapproved fuel. Anytime the firewall mounted fuel filter becomes clogged, the red filter bypass warning button will extend. When this condition exists, the filter must be disassembled and the filter element cleaned. Check the fuel system to determine the cause of contamination prior to initiating flight.

WARNING: *It is the responsibility of the pilot in command to ensure the airplane's fuel supply is clean prior to initiating flight. Any traces of solid or liquid contaminants must be considered hazardous and properly removed from the fuel system. Carefully sample the fuel from all of the drain locations during each preflight inspection and following every refueling of the aircraft.*

LANDING GEAR

NOTE: *The standard and optional sizes of tires may not be intermixed. For example, when the optional large main tires are installed on the airplane the optional large nose tire must also be installed.*

NOSE WHEEL TIRE PRESSURE

51 ± 3 PSI on 6.50x8, 6 – Ply Rated Tire

35 ± 3 PSI on 22x8.0-8, 8 – Ply Rated Tire

MAIN WHEEL TIRE PRESSURE

40 ± 3 PSI on 8.5x10, 8 – Ply Rated Tire

27 ± 3 PSI on 29x11.00-10, 10 – Ply Rated Tire

NOSE GEAR SHOCK STRUT

Keep filled with **MIL-H-5606** hydraulic fluid per filling instructions placard. Maintain 45 PSI air pressure in shock strut. (Use only clean, dry compressed air or nitrogen when servicing)

BRAKES

Service the brake fluid reservoir with **MIL-H-5606** hydraulic fluid within the placarded limits posted on the reservoir. Maintain the fluid level between the MIN and MAX markings.

OXYGEN

AVIATOR'S BREATHING OXYGEN

MIL-O-27210

MAXIMUM CYLINDER PRESSURE (temperature stabilized after filling)

1850 PSI at 21°C (70°F)

REFILLING PROCEDURE

1. Turn the MASTER SWITCH on and ensure the Oxygen Cockpit Control is in the OFF position.
2. Turn the MASTER SWITCH off.
3. Gain access to the oxygen bottle by removing the aft bulkhead in the tailcone.
4. Access the filler port and pressure gauge and remove the cap.

CAUTION: *Clean both the oxygen supply line and the filler port to ensure it is clear of oils, dirt, etc., that may create a fire hazard during refilling. Check threads and ensure the filler port fitting threads are not damaged.*

5. Connect the oxygen cart or supply line to the AN filler port fitting.
6. Open the oxygen supply and slowly, at a rate of 200 PSI per minute, fill the bottle to 1850 PSI maximum.

CAUTION: *Excessive fill rates create heat build up in the high pressure parts of the system, especially the bottle. Excessive heat build up will result in damage to the bottle, and possibly fire. Care must be taken while refilling the oxygen system.*

7. Close the oxygen supply line.
8. Bleed pressure from the supply line.
9. Remove the oxygen supply line.
10. Reinstall the cap to the filler port on the aircraft bottle.
11. Reinstall the aft bulkhead in the tailcone.

8-8 GROUND OPERATION DEICE/ANTI-ICE PROCEDURES

DEICE/ANTI-ICE PROCEDURES REMOVED IN REVISION 06

REV 6

DEICE/ANTI-ICE PROCEDURES REMOVED IN REVISION 06

REV 6

8-9 CLEANING AND CARE

CLEANING EXTERIOR SURFACES

CAUTION: *For airplanes equipped with flight into known icing equipment, do not wax the leading edge porous panels. Refer to* **Section 9, Supplements** *for specific servicing information concerning the known-icing system.*

NOTE: *Prior to cleaning, place the airplane in a shaded area to allow the surfaces to cool.*

NOTE: *Equal substitutes may be used in lieu of the following items:* **(See table below)**

Cleaning Product	Application	Supplier
Prist Acrylic, Plastic and Glass Window Cleaner	Windshield and Windows	Prist Aerospace http://csdinc.org/prist/
Naphtha	Removing grease/stubborn stains	Available Commercially
Simple Green Aircraft and Precision Cleaner	Aircraft Exterior and General Cleaning	Available Commercially www.simplegreen.com
Dawn Ultra-Concentrated Dish Soap	General Exterior Cleaning	Available Commercially

Figure 8-3 – Approved Exterior Cleaning Products

The airplane should be washed with a solution of mild soap and water. Harsh abrasives or alkaline soaps and detergents could create surface scratches, or facilitate corrosive action. Cover areas of the aircraft where cleaning solutions could cause damage. To wash the airplane, use the following procedure.

1. Flush away loose dirt with water.
2. Apply cleaning solution with a soft cloth, sponge or soft bristle brush.
3. To remove exhaust soot, allow the solution to remain on the surface for a longer period of time prior to scrubbing.
4. To remove stubborn grease or oil stains, use a cloth dampened with naphtha.
5. Thoroughly rinse all surfaces.

Any high quality silicone free automotive wax may be used to preserve painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing. A heavier coating of wax on the leading surfaces will reduce abrasion problems in these areas.

The frequency and method of washing is determined by the operating environment. If the aircraft is operated in a continuous salt laden environment, a desalination wash is recommended following the last flight of the day and should be accomplished as a motoring wash. Occasional operation in salt laden environments may necessitate a weekly desalination wash accomplished with the motoring method. Less severe and more general operating environments are not as conducive to rapid buildup of deposits, but may eventually lead to deterioration in performance, necessitating a performance recovery wash at intervals of 100-200 hours. In these general operating environments, a motoring wash is recommended for light soil and multiple motoring or a running wash is suggested for heavy soil accumulation.

WINDSHIELD AND WINDOWS

When cleaning the acrylic or polycarbonate windows, rinse away all dirt particles before applying a cloth or chamois. Never rub dry acrylic or polycarbonate surfaces. Dull or scratched windows may be polished using a special acrylic polishing compound.

CAUTION: *When cleaning acrylic or polycarbonate windows, only use a solvent free, none abrasive, antistatic acrylic cleaner. Do not use gasoline, alcohol, benzene carbon tetrachloride, thinners, acetone, or glass window cleaning sprays.*

CAUTION: *Use only a nonabrasive cotton cloth or genuine chamois to clean acrylic or polycarbonate windows. Newspaper type products, and some paper towels are highly abrasive and will cause fine scratches.*

1. *Remove grease or oil using a soft cloth saturated with kerosene; then, rinse with clean, fresh water.*
2. *To prevent the formation of glare rings, wipe the windows clean in the same direction as the normal airflow.*
3. *To prevent scratches caused by dirt accumulation on the cloth, fold the cloth to expose a clean area after each pass.*
4. *Using a moist cloth or chamois, gently wipe the windows clean of all contaminates.*
5. *Apply acrylic cleaner to one area at a time, then wipe away with a soft, cotton cloth.*
6. *Dry all windows using a dry, nonabrasive cotton cloth or chamois.*

8-10 ENGINE CARE

ENGINE COMPARTMENT CLEANING

The engine compartment may be cleaned using a suitable solvent. The most efficient cleaning is accomplished by using a spray-type cleaner. Prior to performing a spray cleaning, ensure that protection is provided for components which might be adversely affected by the solvent. Refer to the **Kodiak 100 Maintenance Manual** for proper lubrication of controls and components after engine cleaning.

ENGINE COMPRESSOR WASH

Instituting a regular compressor wash program will result in an increase in performance and service life of the hot section components. A compressor wash ring is installed on the top of the engine adjacent to the air inlet screen to facilitate regular washing of the compressor section.

REV 1

Compressor washes may be performed by motoring the engine with the starter. Depending on the nature of the operating environment and the type of deposits in the engine gas path, different compressor wash methods may be used to remove salt, dirt, or other baked-on deposits which accumulate over a period of time and cause deterioration in engine performance. A desalination wash is performed solely for the purpose of removing salt deposits. A performance recovery wash removes baked-on deposits and improves engine performance. A motoring wash is performed at a gas generator RPM of 14% Ng. The water, cleaning solution, and rinsing solution are injected at different pressures depending on the ambient temperature and the type of wash method being accomplished.

The frequency and method of washing is determined by the operating environment. If the aircraft is operated in a continuous salt laden environment, a desalination wash is recommended following the last flight of the day and should be accomplished as a motoring wash. Occasional operation in salt laden environments may necessitate a weekly desalination wash accomplished with the motoring method. Less severe and more general operating environments are not as conducive to rapid buildup of deposits, but may eventually lead to deterioration in performance, necessitating a performance recovery wash at intervals of 100-200 hours. REV 1

CAUTION: *Always observe starting cycle limitations when conducting a compressor motoring wash.*

A variety of cleaning agents are recommended for mixing with water to form the cleaning solution to be used for compressor washes. The mixture proportion is not identical for all cleaning solutions. Depending on the prevailing ambient temperature, aviation kerosene and methanol must be added to the cleaning solution in varying proportions. Quality drinking water should be used when performing a motoring wash. For more information concerning compressor washes, refer to the **Pratt Whitney Canada PT6A-34 Maintenance Manual**. REV 1

COMPRESSOR TURBINE BLADE WASH

Pratt & Whitney Canada has developed a procedure for performing a compressor turbine blade motoring wash. This technique facilitates the removal of contaminants from the compressor turbine blade surfaces, which increases the blade service life. With this method, a water or water and methanol solution is injected directly into the combustion chamber through a special spray tube installed in one of the igniter plug ports. This method of engine wash does not replace the need for accomplishing regular engine compressor washes for performance recovery or desalination purposes.

Compressor turbine blade washing is accomplished using potable water at ambient temperatures of 2°C (36°F) and greater. Water/methanol solutions may be used at temperatures lower than 2°C (36°F). Refer to the **Pratt & Whitney PT6A-34 Maintenance Manual** for solution strengths, washing procedures and limitations.

8-11 INTERIOR CARE

The seats, carpet, upholstery panels, and headliners should be vacuumed at regular intervals to remove surface dirt and dust. While vacuuming, use a fine bristle nylon brush to help loosen particles.

CAUTION: *Remove any sharp objects from pockets or clothing to avoid causing damage to the interior panels or upholstery.*

NOTE: *Equal substitutes may be used in lieu of the following items:* **(See table below)**

Cleaning Product	Application	Supplier
Prist Acrylic, Plastic and Glass Window Cleaner	Interior Windscreen and Windows	Prist Aerospace - http://csdinc.org/prist
OptiMax	Flight Display Screens	PhotoDon - www.photodon.com
Leather Care Kit	Leather Upholstery	Quest Aircraft Company
Leather Cleaner	Leather Upholstery	Quest Aircraft Company
Ink Remover	Leather Upholstery	Quest Aircraft Company
Leather Conditioner	Leather Upholstery	Quest Aircraft Company
Spot and Stain Remover	Leather Upholstery	Quest Aircraft Company
Vinyl Finish Cleaner	Vinyl Panels	Quest Aircraft Company
Vinyl and Leather Cleaner	Vinyl and Leather Upholstery	Quest Aircraft Company

Figure 8-4 – Approved Interior Cleaning Products

WINDSHIELDS AND WINDOWS

Never rub dry acrylic or polycarbonate windows. Dull or scratched windows may be polished with a special polishing compound.

CAUTION:
- *When cleaning acrylic or polycarbonate windows, use only solvent-free, non-abrasive, anti-static cleaners. Do not use gasoline, alcohol, benzene carbon tetrachloride, thinners, acetone, or glass window cleaning sprays.*
- *Use only non-abrasive cotton cloth or genuine chamois to clean acrylic or polycarbonate windows. Newspaper type products, and some paper towels are highly abrasive and will cause hairline scratches.*

NOTE:
- *Wiping with a circular motion may cause glare rings. Wipe in the same direction as the normal flow of wind to help prevent this condition.*
- *To prevent scratching from dirt accumulated on the cloth, fold the cloth to expose a clean area after each use.*

1. Using a moist cloth or chamois, gently wipe the windows clean of all contaminates.
2. Apply acrylic/polycarbonate cleaner to one area at a time, then wipe away with a soft, cotton cloth.
3. Dry the windows using a dry, nonabrasive cotton cloth or chamois.

INSTRUMENT PANEL AND ELECTRONIC DISPLAY SCREENS

The instrument panel, control knobs, and plastic trim only require cleaning with a soft damp cloth. The primary flight displays and multi-function display and other electronic display screens should be cleaned with an eyeglass cleaning solution as follows:

CAUTION:
• To avoid dripping solution on the display and possible damage to internal portions of the component, apply the cleaning solution to the cloth, not directly on the display screen.
• Use only a lens cloth or non-abrasive cotton cloth to clean the display screens. Paper towels, tissue, or camera lens paper may scratch the display screens.
• Clean the display screens with the power OFF.

1. Gently wipe the display with a clean, dry cotton cloth.
2. Moisten the clean, cotton cloth with the cleaning solution.
3. Wipe the soft cotton cloth across the display in one direction, moving from the top of the display to the bottom. Do not rub harshly.
4. Gently wipe the display with a clean, dry cotton cloth.

HEADLINER AND TRIM PANELS

The airplane interior may be cleaned with a mild detergent or soap and water. Harsh abrasives, alkaline soaps, or detergents should be avoided. Solvents and alcohols may damage or discolor vinyl or urethane parts and should also be avoided. Cover areas where cleaning solutions could cause damage. Use the following procedures for cleaning the headliner and trim panels:

CAUTION: *Solvent cleaners and alcohol should not be used on interior surfaces. If cleaning solvents are used on cloth, cover the areas where cleaning solvents could cause damage.*
• Clean the headliner and side panels with a stiff bristle brush, and vacuum where necessary.
• Soiled upholstery may be cleaned using quality upholstery cleaner suitable for the type of material. Carefully follow the manufacturer's recommendations. Avoid soaking or harsh rubbing.

LEATHER UPHOLSTERY AND SEATS

For routine maintenance, leather upholstery should be wiped with a soft, damp cloth. For more thorough cleaning, begin with a solution of mild detergent and water; then, if necessary, utilize one of the more potent products available from Quest to remove the more stubborn marks and stains. Do not use soaps as they contain alkaline which will alter the pH balance of the leather, causing it to age prematurely. Cover areas where cleaning solution could cause damage. Use the following procedure for cleaning leather:

CAUTION: *Solvent cleaners and alchohol should not be used on leather upholstery.*
• Clean leather upholstery with a soft bristle brush, and vacuum where necessary.
• Wipe the leather upholstery with a soft, damp cloth.
• Soiled upholstery may be cleaned with the approved products available from Quest Aircraft Company. Avoid soaking or harsh rubbing.

CARPETS

To clean carpets, first remove loose dirt by use of a vacuum. For soiled spots and stubborn stains, use a nonflammable, dry cleaning fluid. Floor carpeting may be cleaned in the same manner as any household carpet.

8-12 SEAT REMOVAL AND INSTALLATION

NOTE: *The Passenger and Crew Seat installation and removal instructions contained in this section can be performed by a pilot without a logbook entry. If any seats are removed, a weight and balance for flight must be calculated using the procedures defined in* **Section 6, Weight and Balance***. Approved seating configurations and loading limitations can also be found in* **Section 6, Weight and Balance***.*

PASSENGER AND CREW SEATS - DESCRIPTION AND OPERATION

1. General:
   a. Standard seating for the airplane consists of six-way adjustable pilot and copilot seats. Additional passenger seating is available in the passenger configurations. The utility passenger configuration consists of four rows of single-place, fixed position collapsible seats.

WARNING: *None of the standard equipment airplane seats are approved for installation facing aft.*

   b. The pilot and copilot seats are adjustable in six directions. They may be moved forward or aft, adjusted up or down and the seat back angle may be changed. Position the seat forward and aft by raising one of the small levers on the left or right sides of the seat. Once a lever is raised, position the seat as desired and release the lever. Ensure the seat is properly locked into position by trying to move the seat forward and aft. The seat may be raised or lowered by rotating the crank under the front center of the seat. The seat back angle may be adjusted by raising the lever on the outboard or inboard aft side of the seat and positioning the seatback as desired. Ensure the seatback is properly locked into position by trying to move the seatback forward and aft. The pilot and copilot seats are equipped with non-adjustable headrests.

TOOLS REQUIRED TO REMOVE THE PASSENGER AND CREW SEATS

1. The passenger and crew seats can be removed using the following tool(s):
   a. Standard Flat Head Screw Driver (Passenger Seats)
   b. Standard Phillips Head Screw Driver (Crew Seats)

SEAT TRACK IDENTIFICATION MARKINGS (IF EQUIPPED)

The inboard seat tracks on the KODIAK are marked with station identification numbers that indicate the position of the forward station. Seat track markings start at FS 50.0 and continue to FS 170.0 in increments of 10.

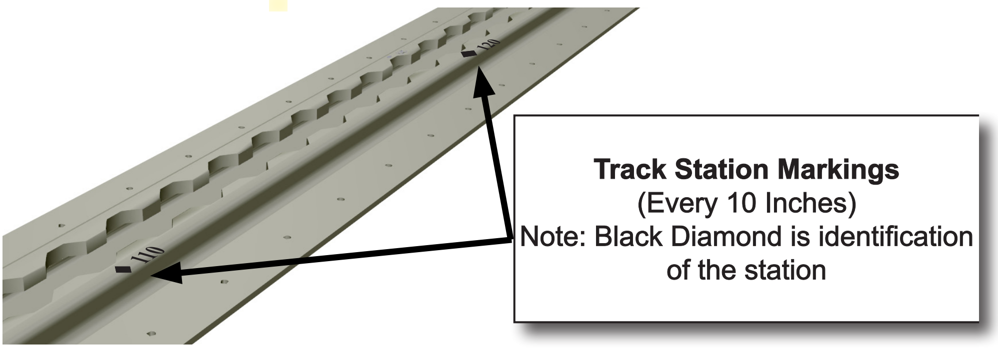
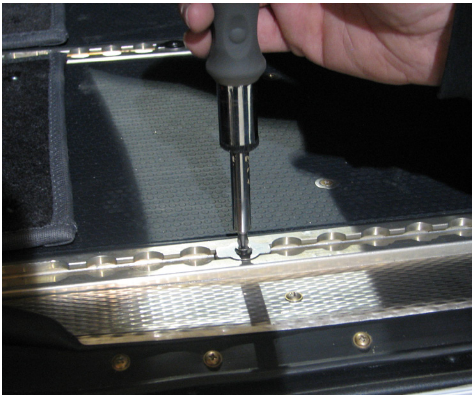
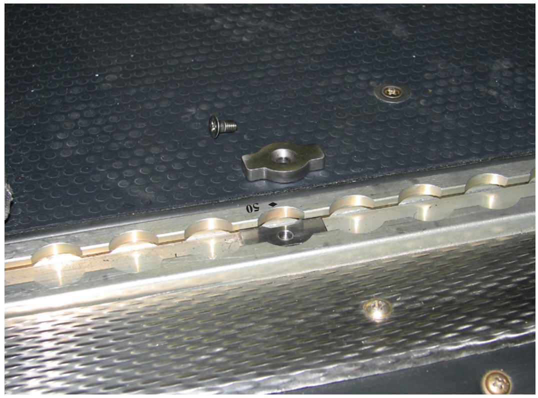


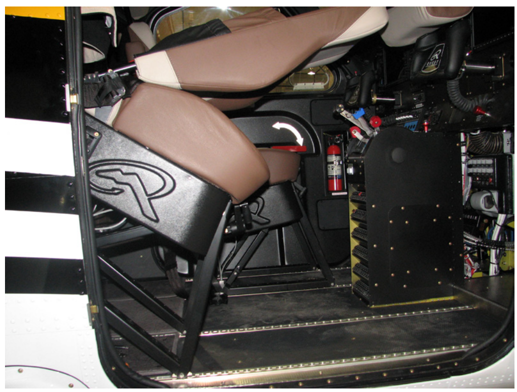
Figure 8-5 – Seat Track Station Markings

CREW SEAT REMOVAL AND INSTALLATION

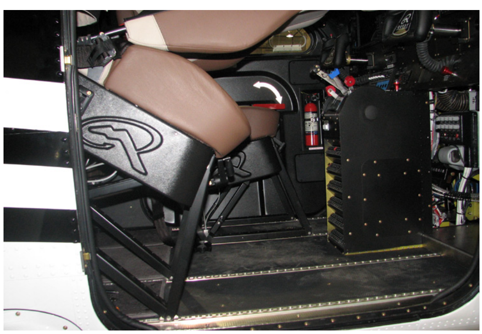
1. Crew Seat Removal:
   a. Using a Phillips Head Screw Driver, locate and remove the seat stops.

   b. Slide the seat AFT which will allow the AFT portion of the seat to clear through the removal notch in the seat track.

   c. Slide the seat AFT which will allow the FWD portion of the Seat to clear through the removal notch in the seat track.



d. After the seat has been removed, unhook the shoulder harness from the inertia reel using the quick disconnect.

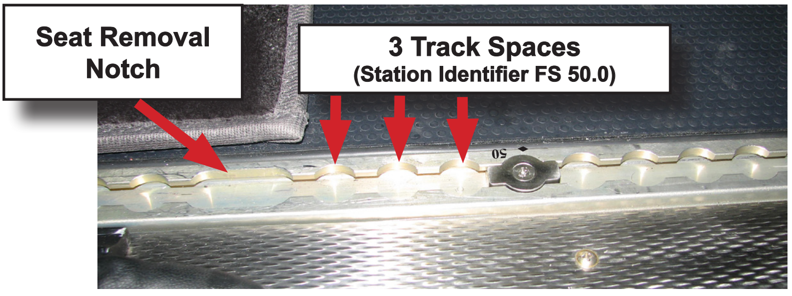
e. Update the aircraft weight and balance using the procedures defined in **Section 6, Weight and Balance.**

2. Crew Seat Installation:
   a. Connect the shoulder harness to the inertia reel using the quick connect.

b. Place the seat in the cockpit inserting the FWD frame tracks into the seat tracks as shown.

c. Slide the seat forward and insert the AFT seat frame tracks into the seat tracks as shown.

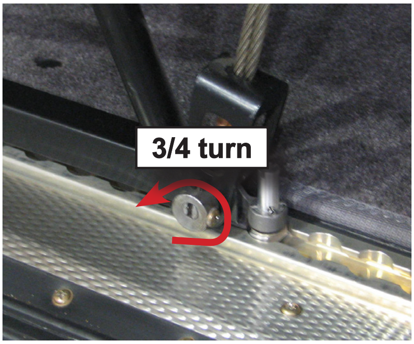
d. Install the seat stops as shown. The seat stops should be 50 in. from the firewall or count 4 notches from the seat removal hole in the track. Ensure the weight and balance for the next flight reflects the new seat configuration using the procedures defined in **Section 6, Weight and Balance**.

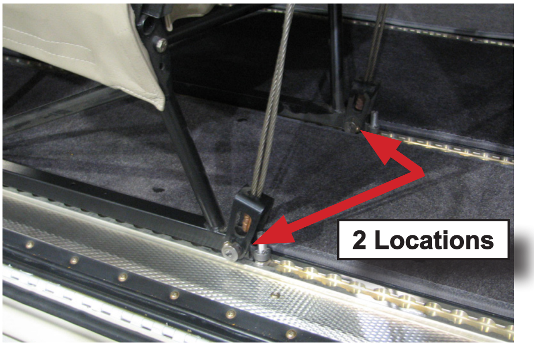


PASSENGER SEATS REMOVAL AND INSTALLATION

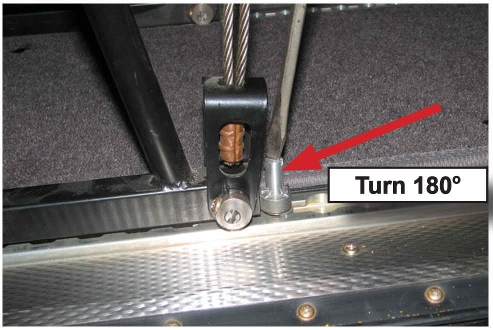
1. Passenger Seat Removal:

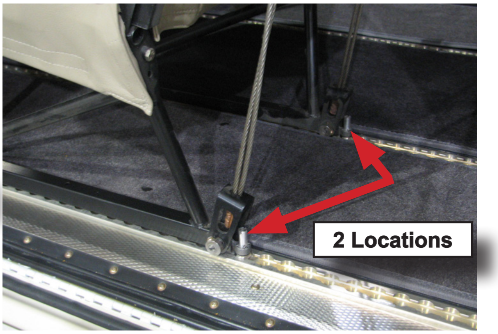
   a. Using a flat head screw driver, locate and loosen the cable tensioners (x2) by rotating counterclockwise 3/4 turn.



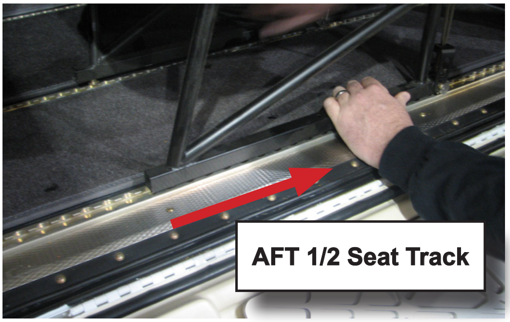


   b. Using a flat head screw driver, locate and unlock the seat foot by rotating it 180 degrees as shown below.



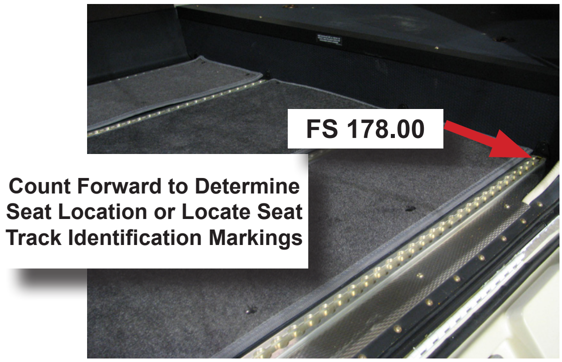


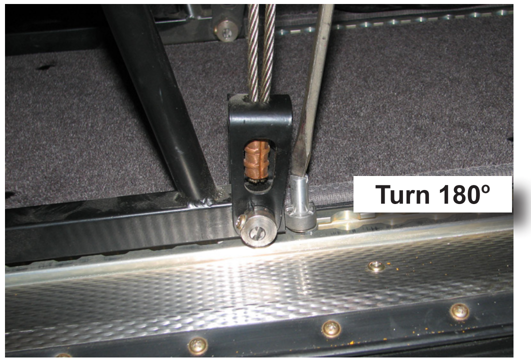
   c. Once the feet are unlocked, slide the seat AFT 1/2 of a track notch to allow the feet to exit the track. Once moved AFT, lift up the seat and the seat will clear the rails. The seat is now ready for storage. **Note:** Seats will fold for ease of storage. Update the aircraft weight and balance for flight using the procedures defined in **Section 6, Weight and Balance**.



2. Passenger Seat Installation:
   a. Locate the correct position of the seat based on the approved configurations in **Section 6, Weight and Balance.** To determine the correct position for the seat, locate the station identification marking on the seat tracks and use them to quickly locate the seat position by counting forward or AFT of the seat track identification markings.

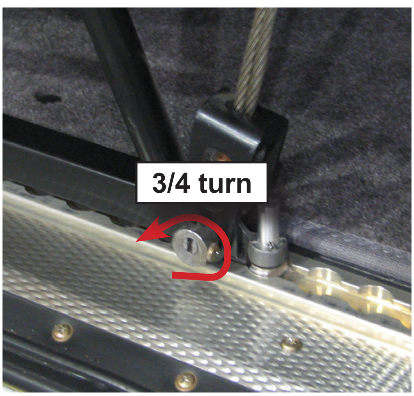
> **NOTE:** *The seat position defined in **Section 6** is the position of the seats feet (locks). EXAMPLE: To install a seat in Row 3 (**FS 115.0**), locate fuselage station marking **FS 110.0** and count 5 seat track notches AFT. Insert the seat lock paw into **FS 115.0** and move the seat 1/2 inch AFT and engage the seat track lock. This is the location for the center of the seats track lock pin.*

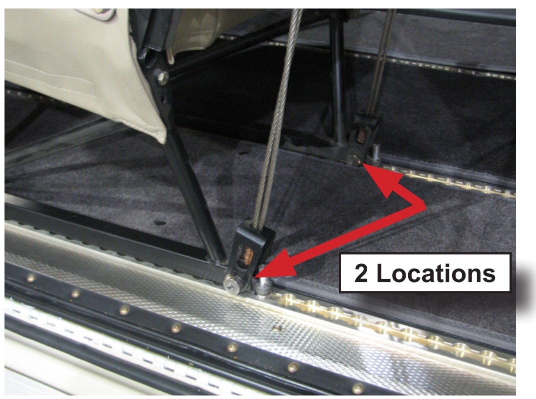




REV 7

   b. Using a Flat Head Screw Driver, locate and tighten the cable tensioners (x2) by rotating clockwise 3/4 turn.





   c. Update the aircraft weight and balance for flight using the procedures defined in **Section 6, Weight and Balance**.

SECTION 9
SUPPLEMENTS

INTRODUCTION

This section of the handbook contains FAA Approved Supplements necessary to safely and efficiently operate the Kodiak when it is equipped with optional systems or equipment not provided with the standard airplane, or for special operations not included in the handbook. Supplements are miniature versions of the main POH and contain information corresponding to most sections of the handbook. Information contained in a supplement adds to, supersedes, or replaces similar data in the basic handbook.

A Log of Supplements is provided and can be used as a "Table of Contents" for this section. It is the owner's responsibility to ensure any equipment installed on the aircraft is accomplished in accordance with an approved STC or other approval method and that the proper supplement, if applicable, is contained in the handbook and the supplement is properly recorded in the Log of Supplements.

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