Published By

RAYTHEON AIRCRAFT COMPANY

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NOTE

Where Beech Aircraft Corporation or Beechcraft is referred to in this publication, it will be taken to read Raytheon Aircraft Company.

Raytheon Aircraft

Beech

Hawker

Member of GAMA

GAMA General Aviation Manufacturers Association

Beechcraft®

SIERRA®

C24R

Pilot's Operating Handbook
and
FAA Approved Airplane Flight Manual

FAA Approved in Normal Category based on CAR 3. This document must be carried in the airplane at all times and be kept within reach of the pilot during all flight operations.

This handbook includes the material required to be furnished to the pilot by CAR 3.

Airplane Serial Number: MC 755

Airplane Registration Number: N38566

FAA Approved:

A. C. Jackson
Beech Aircraft Corporation
DOA CE-2

This handbook supersedes all BEECH published owner's manuals, flight manuals, and check lists issued for this airplane with the exception of FAA Approved Airplane Flight Manuals.

P/N 169-590025-15B
Reissued: November, 1980

P/N 169-590025-15B4
Revised: July, 1994

Raytheon Aircraft

C24R

Log of Temporary Changes to the Pilot's Operating Handbook *and* FAA Approved Airplane Flight Manual P/N 169-590025-15B

Changes to this Pilot's Operating Handbook and FAA Approved Airplane Flight Manual must be in the airplane for all flight operations.

Part Number	Subject	Date
169-590025 -15BTC1	Fuel Selector Placard Installation	8/26/97

Note: This page should be filed in the front of the *Pilot's Operating Handbook and FAA Approved Airplane Flight Manual* immediately following the *Title* page. This page replaces any *Log of Temporary Changes* page dated prior to the date in the lower right corner of this page.

SIERRA C24R
(MC-449, MC-452 AND AFTER)
PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

B4 Revision .... July, 1994

LOG OF REVISIONS

Page	Description
Title Page	Updated
Page A (B4)	New
10-1 thru 10-48	Revised Section X, Safety Information (May, 1994)

B4

SIERRA
C24R
(MC-449, MC-452 AND AFTER)

PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

B3 Revision . . . . October, 1990

LOG OF REVISIONS

Page	Description
Title Page	Updated
Page A (B3)	New
10-1 thru 10-48	Revised Section X, Safety Information (October, 1990)

B3

B2 ....June, 1984

LOG OF REVISIONS

Page	Description
Title Page	Revised
Page A (B2)	New
"a" and "b" Pages	Revised "Introduction" and Shifted Material
"c" Page	Added New Page
1-1	Revised "Table of Contents"
1-2	Revised Folio
1-5, 1-6, 1-6A and 1-6B	Revised "Use of the Handbook" and Shifted Material
4-1	Revised "Table of Contents"
4-10	Revised "Before Takeoff" and "Takeoff" and Shifted Material
4-11	Revised "Cruise" and "Leaning Mixture Using the Exhaust Gas Temperature Indicator (EGT)" and Shifted Material
4-12	Revised "Before Landing" and Shifted Material
4-12A and 4-12B	Revised "Shutdown" and Shifted Material
4-13	Shifted Material

B2

SIERRA C24R
PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

B1 ....December, 1982

LOG OF REVISIONS

Page	Description
Title Page	Added Revision Date
Logo Page	Added
Page A (B1)	Updated
5-1	Revised "Table of Contents"
5-22	Added "Cruise Power Settings - 2700 RPM-Full Throttle" Table
5-23	Revised Shaded Area on "Cruise Power Settings - 2700 RPM-75% MCP (or Full Throttle)" Table
5-24 thru 5-26	Shifted Material
5-27	Revised "Cruise Speeds"
5-28	Deleted "Fuel Flow vs Brake Horsepower" and Shifted Material
7-1	Revised "Table of Contents"
7-3	Revised "Table of Contents"
7-10 & 7-11	Revised "Flight Instruments", "Ground Control", and Shifted Material
7-12	Shifted Material
7-29	Revised "Alternator" and Shifted Material
7-30	Revised "External Power Receptacle" and Shifted Material
7-31	Revised "Interior Lighting" and Shifted Material
7-33	Shifted Material

B1

98-38307

LOG OF REVISIONS

Page	Description
7-34	Revised "Ventilation"
7-35	Shifted Material
7-36	Added New Page and Shifted Material
8-11	Revised "External Power Receptacle"

B1

98-38307

SIERRA C24R

PILOT'S OPERATING HANDBOOK
and
FAA APPROVED AIRPLANE FLIGHT MANUAL

LOG OF REVISIONS

B Reissue .... November, 1980

Page	Description
Title Page	Reissue
"A" Page	Reissue
a and b	Reissue
1-1 thru 1-19	Reissue
2-1 thru 2-29	Reissue
3-1 thru 3-13	Reissue
4-1 thru 4-16	Reissue
5-1 thru 5-34	Reissue
6-1 thru 6-19	Reissue
7-1 thru 7-35	Reissue
8-1 thru 8-43	Reissue
Section 9	See Log of Supplements
10-1 thru 10-30	Reissue

10 - 1 Thru 10 - 67
Revised Safety Section
Dated March 1981.

B

98-38307

INTRODUCTION

The format and contents of this Pilot's Operating Handbook and FAA Approved Airplane Flight Manual conform to GAMA (General Aviation Manufacturers Association) Handbook Specification Number 1. Use of this specification by all manufacturers will provide the pilot with the same type of data in the same place in all handbooks.

In recent years, BEECHCRAFT handbooks contained most of the data now provided. However, the new handbooks contain more detailed data and some entirely new data.

For example, attention is called to Section X (SAFETY INFORMATION). BEECHCRAFT feels that it is highly important to have Safety Information in a condensed form in the hands of the pilots. The Safety Information should be read and studied. Periodic review will serve as a reminder of good piloting techniques.

WARNING

Use only genuine BEECHCRAFT or BEECHCRAFT approved parts obtained from BEECHCRAFT approved sources, in connection with the maintenance and repair of Beech airplanes.

Genuina BEECHCRAFT parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than BEECHCRAFT, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Salvaged airplane parts, reworked parts obtained from non-BEECHCRAFT approved sources, or parts, components, or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by BEECHCRAFT, unsuitable and unsafe for airplane use.

BEECHCRAFT expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-BEECHCRAFT approved parts.

SIERRA C24R

PILOT'S OPERATING HANDBOOK

AND

FAA APPROVED AIRPLANE FLIGHT MANUAL

TABLE OF CONTENTS

SECTION I

GENERAL

TABLE OF CONTENTS

SUBJECT *PAGE*

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THANK YOU . . . for displaying confidence in us by selecting a BEECHCRAFT airplane. Our design engineers, assemblers and inspectors have utilized their skills and years of experience to ensure that the BEECHCRAFT meets the high standards of quality and performance for which BEECHCRAFT airplanes have become famous throughout the world.

IMPORTANT NOTICE

This handbook must be read carefully by the owner and operator in order to become familiar with the operation of the airplane. Suggestions and recommendations have been made within it to aid in obtaining maximum performance without sacrificing economy. Be familiar with, and operate the airplane in accordance with the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, and/or placards which are located in the airplane.

As a further reminder, the owner and operator of this airplane should also be familiar with the Federal Aviation Regulations applicable to the operation and maintenance of the airplane and FAR Part 91 General Operating and Flight Rules. Further, the airplane must be operated and maintained in accordance with FAA Airworthiness Directives which may be issued against it.

The Federal Aviation Regulations place the responsibility for the maintenance of this airplane on the owner and the operator who should ensure that all maintenance is done by qualified mechanics in conformity with all airworthiness requirements established for this airplane.

All limits, procedures, safety practices, time limits, servicing, and maintenance requirements contained in this handbook are considered mandatory for continued airworthiness to maintain the airplane in a condition equal to that of its original manufacture.

Authorized BEECHCRAFT Aero or Aviation Centers or International Distributors or Dealers can provide recommended modification, service, and operating procedures issued by both the FAA and Beech Aircraft Corporation, which are designed to get maximum utility and safety from the airplane.

USE OF THE HANDBOOK

The Pilot's Operating Handbook is designed to maintain documents necessary for the safe and efficient operation of the airplane. The handbook has been prepared in loose leaf form for ease in maintenance and in a convenient size for storage. The handbook has been arranged with quick reference tabs imprinted with the title of each section and contains ten basic divisions:

Section I	General
Section II	Limitations
Section III	Emergency Procedures
Section IV	Normal Procedures
Section V	Performance
Section VI	Weight and Balance/Equipment List
Section VII	Systems Description
Section VIII	Handling, Servicing and Maintenance
Section IX	Supplements
Section X	Safety Information

NOTES

Except as noted, all airspeeds quoted in this handbook are indicated airspeeds (IAS) and assume zero instrument error.

Due to the large variety of airplane configurations available through optional equipment, it should be noted that in describing and illustrating the handbook, optional equipment may not be designated as such in every case. Through variations provided by custom designing, the illustrations in this handbook will not be typical of every airplane.

The owner/operator should always refer to all supplements, whether STC Supplements or Beech Supplements, for possible placards, limitations, normal, emergency and other operational procedures for proper operation of the airplane with optional equipment installed.

NOTICE

The following information may be provided to the holder of this manual automatically:

1. Original issues and revisions of BEECHCRAFT Service Bulletins

2. Original issues and revisions of FAA Approved Airplane Flight Manual Supplements

3. Reissues and Revisions of FAA Approved Airplane Flight Manuals, Flight Handbooks, Owner's Manuals, Pilot's Opereting Manuals, and Pilot's Operating Handbooks

This service is free and will be provided only to holders of this handbook who are listed on the FAA Aircraft Registration Branch List or the BEECHCRAFT International Owner's Notification Service List, end then only if you are listed by airplane serial number for the model for which this handbook is applicable. For detailed information on how to obtain "Revision

Service" applicable to this handbook or other BEECHCRAFT Service Publications, consult a BEECHCRAFT Aero or Aviation Center or International Distributor or Dealer, or refer to the latest revision of BEECHCRAFT Service Bulletin No. 2001.

NOTICE

Beech Aircraft Corporation expressly reserves the right to supersede, cancel, and/or declare obsolete, without prior notice, any part, part number, kit, or publication referenced in this manual.

REVISING THE HANDBOOK

Immediately following the "Title Page" is the "Log of Revisions" page(s). The Log of Revisions pages are used for maintaining a listing of all effective pages in the handbook (except the SUPPLEMENTS section), and as a record of revisions to these pages. In the lower right corner of the outlined portion of the Log of Revisions is a box conteining a capitel letter which denotes the issue or reissue of the handbook. This letter may be suffixed by a number which indicates the numerical revision. When a revision to any information in the handbook is made, a new Log of Revisions will be issued. All Logs of Revisions must be retained in the handbook to provide a current record of material status until a reissue is made.

WARNING

When this handbook is used for airplane operational purposes it is the pilot's responsibility to maintain it in current status.

SUPPLEMENTS REVISION RECORD

Section IX contains supplements and a Log of Supplements page. On the "Log" page is a listing of supplemental equipment available for installation on the BEECHCRAFT airplane.

Upon receipt of a new or revised supplement, compare the "Log" page just received with the existing "Log" page in the manual. Retain the "Log" page with the latest date on the bottom of the page (this log will usually have the greater number of entries) and discard the other log.

VENDOR-ISSUED STC SUPPLEMENTS

When a new airplane is delivered from the factory, the handbook will contain either an STC (Supplemental Type Certificate) Supplement or a Beech Flight Manual Supplement for all items requiring a supplement. If a new handbook is purchased at a later dete for operation of the airplane, it is the responsibility of the owner/operator to see that all required STC Supplements (as well as weight and balance and other pertinent data) are retained for use in the new handbook.

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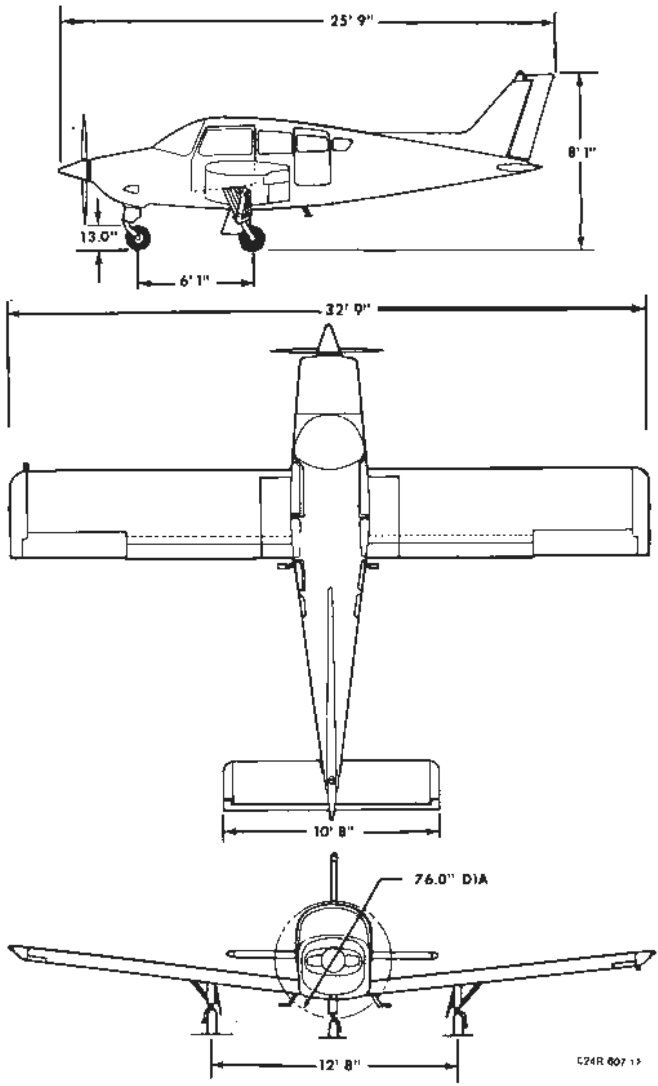
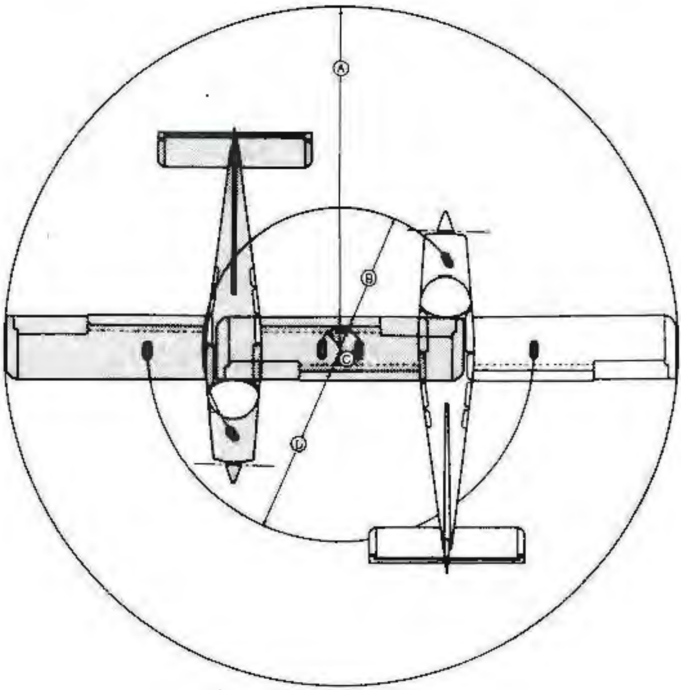


THREE VIEW



Ⓐ Radius for Wing Tip .... 26 feet 10 inches
Ⓑ Radius for Nose Wheel .... 12 feet 1 inch
Ⓒ Radius for Inside Gear .... 4 feet 1 inch
Ⓓ Radius for Outside Gear .... 16 feet 9 inches

TURNING RADII ARE CALCULATED USING FULL STEERING, ONE BRAKE AND PARTIAL POWER

GROUND TURNING CLEARANCE

DESCRIPTIVE DATA

NOTE

MC-449, MC-452 thru MC-673 are 14-volt systems. The battery switch is placarded BATTERY & ALT and the alternator switch is placarded ALT (or ALT FIELD). 28-volt systems MC-674 and after, are placarded BATTERY for the battery switch and ALT FIELD for the alternator switch. All items throughout this handbook that refer to battery switch refer to either BATTERY & ALT switch or BATTERY switch depending upon configuration.

ENGINE

One Avco Lycoming engine model IO-360-A1B6. It is a fuel-injected, direct-drive, air-cooled, horizontally opposed, 4-cylinder, 200-horsepower-rated engine.

Take-off and Maximum Continuous
Power.. Full Throttle at 2700 RPM

PROPELLER

Hartzell constant-speed, two-blade, aluminum-alloy propeller using HC-M2YR-1BF hub with F7666A blades and an A2298-2P spinner. Diameter is 76 inches, no cutoff permitted.

FUEL

Aviation Gasoline Grade 100 (green), or 100LL (blue) minimum.

FUEL TANKS

Total Capacity...59.8 Gallons*
Total Usable..57.2 Gallons
Each tank has provisions for partial filling to:

20 gallons each tank ....37.4 gallons usable

15 gallons each tank ....27.4 gallons usable

*Value given is nominal. Tank capacity will vary with temperature and manufacturing tolerances.

OIL

OIL CAPACITY
Total ....8 Quarts

APPROVED OIL TYPES

Avco Lycoming Specification Number 301E approves for use lubricating oils which conform to both MIL-L-6082B straight mineral type and MIL-L-22851 ashless dispersant lubricants for airplane engines. Refer to the Approved Engine Oils table in the HANDLING, SERVICING AND MAINTENANCE section for a list of approved products.

MAXIMUM CERTIFICATED WEIGHTS

Maximum Ramp Weight..2758 lbs
Maximum Take-off Weight.......................................2750 lbs
Maximum Landing Weight ....2750 lbs
Maximum Zero Fuel Weight..................... No Structural Limit
Maximum Weight in Baggage Compartment...............270 lbs

CABIN AND ENTRY DIMENSIONS

Cabin Width (maximum) .... 3 ft 8 in.
Cabin Length (maximum).. 7 ft 11 in.
Cabin Height (maximum) ....4 ft
Cabin Door.. 36 in. x 38 in.

BAGGAGE SPACE AND ENTRY DIMENSIONS

Compartment Volume... 19.5 cu ft
Door Width (minimum) ....22 in.
Door Height (minimum)...33 in.

SPECIFIC LOADINGS

Wing Loading at Maximum Take-off Weight......18.84 lbs/sq ft
Power Loading at Maximum Take-off Weight...... 13.75 lbs/hp

SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

The following Abbreviations and Terminologies have been listed for convenience and ready interpretation where used within this handbook. Whenever possible, they have been categorized for ready reference.

GENERAL AIRSPEED

CAS	Calibrated Airspeeds is the indicated speed of an airplane, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in knots.
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed is the speed of an airplane as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
KIAS	Indicated Airspeed expressed in knots.
TAS	True Airspeed is the airspeed of an airplane relative to undisturbed air, which is the CAS corrected for altitude, temperature, and compressibility.

V_A	Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not over-stress the airplane.
V_{FE}	Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
V_{LE}	Maximum Landing Gear Extended Speed is the maximum speed at which an airplane can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{NE}	Never Exceed Speed is the speed limit that may not be exceeded at any time.
V_{NO} or V_C	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.
V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
V_{SO}	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.

V_X	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.
Cruise Climb	Recommended Climb Speed for enroute climb.

METEOROLOGICAL

ISA	International Standard Atmosphere in which: (1) The air is a dry perfect gas; (2) The temperature at sea level is 15° Celsius (59° Fahrenheit); (3) The pressure at sea level is 29.92 inches Hg (1013.2 millibars); (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 (−0.003566°F) per foot and zero above that altitude.
OAT	Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications adjusted for instrument error and compressibility effects, or ground meteorological sources.

Indicated Pressure Altitude — The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013.2 millibars).

Pressure Altitude — Altitude measured from standard sea level pressure (29.92 in. Hg) by a pressure (barometric) altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero. Position errors may be obtained from the Altimeter Correction graph.

Station Pressure — Actual atmospheric pressure at field elevation.

Wind — The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

POWER

Take-off and Maximum Continuous — Highest power rating not limited by time.

ENGINE CONTROLS AND INSTRUMENTS

Throttle Control — Used to control power by introducing fuel-air mixture into the intake passages of the engine. Settings are reflected by readings on the manifold pressure gage.

Propeller Control	This control requests the propeller governor to maintain engine/propeller rpm at a selected value by controlling propeller blade angle.
Mixture Control	This control is used to set fuel flow in all modes of operation and cuts off fuel completely for engine shut down.
EGT (Exhaust Gas Temperature) Indicator	This indicator is used to identify the lean and best power fuel flow mixtures for various power settings.
Tachometer	Indicates the rpm of the engine/propeller.
Propeller Governor	Regulates the rpm of the engine/propeller by increasing or decreasing the propeller pitch through a pitch change mechanism in the propeller hub.

AIRPLANE PERFORMANCE AND FLIGHT PLANNING

Climb Gradient	The 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 demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during take off and landing was actually demonstrated during certification tests.

MEA Minimum enroute IFR altitude.

Route Segment A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

GPH U.S. Gallons per hour.

PPH Pounds per hour.

WEIGHT & BALANCE

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

Station A location along the airplane fuselage usually given in terms of distance from the reference datum.

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

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

Airplane Center of Gravity (CG) The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.

CG Arm — The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.

CG Limits — The extreme center of gravity locations within which the airplane must be operated at a given weight.

Usable Fuel — Fuel available for flight planning.

Unusable Fuel — Fuel remaining after a runout test has been completed in accordance with governmental regulations.

Standard Empty Weight — Weight of a standard airplane including unusable fuel, full operating fluids and full oil.

Basic Empty Weight — Standard Empty Weight plus optional equipment.

Payload — Weight of occupants, cargo and baggage.

Useful Load — Difference between Take-off Weight (or Ramp Weight, if applicable) and Basic Empty Weight.

Maximum Ramp Weight — Maximum weight approved for ground maneuvering. (It includes weight of start, taxi, and take-off fuel.)

Maximum Take-off Weight — Maximum weight approved for liftoff.

Maximum Landing Weight — Maximum weight approved for the landing touchdown.

Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.
Tare	The weight of chocks, blocks, stands, etc., used on the scales when weighing an airplane.
Jack Points	Points on the airplane identified by the manufacturer as suitable for supporting the airplane for weighing or other purposes.

SECTION II

LIMITATIONS

TABLE OF CONTENTS

The limitations included in this section have been approved by the Federal Aviation Administration and must be observed in the operation of this airplane.

AIRSPEED LIMITATIONS

SPEED	CAS KTS	CAS MPH	IAS KTS	IAS MPH	REMARKS
Never Exceed V_{NE}	168	193	168	193	Do Not Exceed This Speed in Any Operation.
Maximum Structural Cruising V_{NO} or V_C	143	165	143	165	Do Not Exceed This Speed Except in Smooth Air and Then Only With Caution.
Maneuvering V_A	125	144	125	144	Do Not Make Full or Abrupt Control Movements Above This Speed.
Maximum Flap Extension/ Extended V_{FE}	96	110	96	110	Do Not Extend Flaps or Operate With Flaps Extended Above This Speed.
Maximum Landing Gear Operating/Extended V_{LO}/V_{LE}	135	155	135	155	Do Not Extend, or Operate With Gear Extended Above This Speed, except in Emergency.
Maximum Landing Gear Retraction	113	130	113	130	Do Not Retract Landing Gear Above This Speed.

*AIRSPEED INDICATOR MARKINGS

MARKING	CAS		IAS		SIGNIFICANCE
	KTS	MPH	KTS	MPH	
White Arc	55-96	63-110	60-96	69-110	Full Flap Operating Range
Green Arc	62-143	71-165	65-143	75-165	Normal Operating Range
Yellow Arc	143-168	165-193	143-168	165-193	Operate With Caution, Only In Smooth Air
Red Line	168	193	168	193	Maximum Speed For ALL Operations

*The limits of the arcs on the airspeed indicator are marked in CAS values.

POWER PLANT LIMITATIONS

ENGINE

One Avco Lycoming engine model IO-360-A1B6

Take-off and Maximum Continuous
Power .... Full Throttle at 2700 RPM

OPERATING LIMITATIONS

Oil Temperature .... 245°F
Oil Pressure
  Minimum .... 25 psi
  Maximum .... 100 psi
Fuel Pressure
  Minimum .... 0.5 psi
  Maximum .... 12.0 psi
  Mixture - set per leaning instructions on Performance Graphs.

FUEL GRADES

Aviation Gasoline grade 100 (green) or 100LL (blue) minimum.

FUEL ADDITIVES

ALCOR TCP concentrate, or equivalent, mixed according to instructions provided by Alcor, Inc.

OIL SPECIFICATIONS

Avco Lycoming Specification Number 301E approves for use lubricating oils which conform to both MIL-L-6082B straight mineral type and MIL-L-22851 ashless dispersant lubricants for airplane engines. Refer to the Approved Engine Oils table in the HANDLING, SERVICING AND MAINTENANCE Section for a list of approved products.

PROPELLER SPECIFICATIONS

Hartzell constant speed, two-blade aluminum alloy propeller using HC-M2YR-1BF hub with F7666A blades and A2298-2P spinner. Pitch settings at 30-inch station, Low 13° ± .1°, High 27° to 31°. Diameter is 76 inches, no cutoff permitted. No extended operation is permitted between 2100 and 2350 rpm.

POWER PLANT INSTRUMENT MARKINGS

OIL TEMPERATURE
- Caution (Yellow Arc) .... 60° to 120°F
- Operating Range (Green Arc) .... 120° to 245°F
- Maximum (Red Line) .... 245°F

OIL PRESSURE
- Minimum Pressure (Red Line) .... 25 psi
- Minimum Pressure (Yellow Arc) .... 25 to 60 psi
- Operating Range (Green Arc) .... 60 to 90 psi
- Maximum Pressure (Red Line) .... 100 psi

FUEL FLOW
- Minimum (Red Line) .... 0.5 psi
- Operating Range (Green Arc) .... 4.0 to 16.6 gph
- Maximum (Red Line) .... 12.0 psi

TACHOMETER
- No Extended Operation (Red Arc) .... 2100 to 2350 rpm
- Operating Range (Green Arc) .... 2350 to 2700 rpm
- Maximum RPM (Red Line) .... 2700 rpm

MANIFOLD PRESSURE
- Operating Range (Green Arc) .... 15 to 28.7 in. Hg

MISCELLANEOUS INSTRUMENT MARKINGS

INSTRUMENT AIR
Operating Range (Green Arc) .... 4.3 to 5.9 in. Hg

FUEL QUANTITY
Yellow Arc .... E to 3/8 Full

WEIGHT LIMITS

Maximum Ramp Weight.. 2758 lbs
Maximum Take-off Weight .... 2750 lbs
Maximum Landing Weight .... 2750 lbs
Zero Fuel Weight ....No Structural Limitation
Maximum Baggage Compartment Load .... 270 lbs

CG LIMITS (Gear Down)

Forward: 110 inches aft of datum to 2375 pounds with straight line variation to 113 inches at 2750 pounds
Aft: 118.3 inches aft of datum at all weights

REFERENCE DATUM

Datum is 103 inches forward of wing leading edge.
MAC length is 52.7 inches.

MANEUVER LIMITS

This is a normal category airplane. Spins are prohibited. No acrobatic maneuvers are approved except those listed below. Maximum slip duration is 30 seconds.

APPROVED MANEUVERS (2750 POUNDS)

MANEUVER — *ENTRY SPEED*
(Bank angles, no more than 60°)

Chandelle .... 125 knots/144 mph
Steep Turn .... 125 knots/144 mph
Lazy Eight .... 125 knots/144 mph
Stall (Except Whip) ....Use slow deceleration

FLIGHT LOAD FACTORS (2750 POUNDS)

Flight maneuvering load factor, flaps up.............. + 3.8 - 1.9G
Flight maneuvering load factor, flaps down .... + 1.9G

TAKEOFF

Set 15° Flaps for Takeoff.

MINIMUM FLIGHT CREW

One (1) Pilot

KINDS OF OPERATION LIMITS

1. VFR day and night
2. IFR day and night

EQUIPMENT REQUIRED FOR VARIOUS CONDITIONS OF FLIGHT

Federal Aviation Regulations (91.3(a), 91.24, 91.25, 91.32, 91.33, 91.52, 91.90, 91.97, 91.170) specify the minimum numbers and types of airplane instruments and equipment which must be installed and operable for various kinds of flight conditions. This includes VFR day, VFR night, IFR day, and IFR night.

Regulations also required that all airplanes be certificated by the manufacturer for operations under various flight conditions. At certification, all required equipment must be in operating condition and should be maintained to assure continued airworthiness. If deviations from the installed equipment were not permitted, or if the operating rules did not provide for various flight conditions, the airplane could not be flown unless all equipment was operable. With appropriate limitations, the operation of every system or component installed in the airplane is not necessary, when remaining operative instruments and equipment provide for continued safe operation. Operation in accordance with limitations established to maintain airworthiness can permit continued or uninterrupted operation of the airplane temporarily.

For the sake of brevity, the Required Equipment Listing does not include obviously required items such as wings, rudders, flaps, engine, landing gear, etc. Also the list does not include items which do not affect the airworthiness of the airplane such as entertainment systems, passenger convenience items, etc. However, it is important to note that ALL ITEMS WHICH ARE RELATED TO THE AIRWORTHINESS OF THE AIRPLANE AND NOT INCLUDED ON THE LIST ARE AUTOMATICALLY REQUIRED TO BE OPERATIVE.

To enable the pilot to rapidly determine the FAA equipment requirements necessary for a flight into specific conditions, the following equipment requirements and exceptions are presented. It is the final responsibility of the pilot to determine whether the lack of, or inoperative status of a piece of equipment on the airplane, will limit the conditions under which the pilot may operate the airplane.

WARNING

FLIGHT IN KNOWN ICING CONDITIONS IS PROHIBITED.

LEGEND
Numbers refer to quantities required
(-) Indicates that the item may be inoperative for the specified condition.
(*) Refers to the REMARKS AND/OR EXCEPTIONS column for explicit information or reference.

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INTENTIONALLY LEFT BLANK

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
GENERAL					
OVERWATER FLIGHT	*	*	*	*	- *Per FAR 91.33
COMMUNICATIONS					
VHF communications system	*	*	*	*	- *Per FAR 91.33
ELECTRICAL POWER					
Battery System	1	1	1	1	-
Alternator	1	1	1	1	-
Starter Engaged Warning Light (MC-731 and after)	1	1	1	1	- May be inoperative provided ammeter is operative and monitored

EQUIPMENT AND FURNISHING					
Seat belts and Shoulder harnesses	1	1	1	1	- Per Person or Per FAR 91.33
Emergency locator transmitter	1	1	1	1	- Per FAR 91.52
FIRE PROTECTION					
Portable fire extinguisher	*	*	*	*	- *Optional

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
FLIGHT CONTROLS					
Stabilator trim tab indicator	1	1	1	1	- May be inoperative for ferry flight provided tabs are visually checked in the neutral position prior to takeoff and checked for full range of operation.
Flap position indicator (On electric flap system)	1	1	1	1	- May be inoperative providing flap travel is visually inspected prior to takeoff.
Stall warning	1	1	1	1	-

FUEL EQUIPMENT					
Auxiliary fuel pump	1	1	1	1	-
Engine driven fuel pump	1	1	1	1	-
Fuel quantity indicator	2	2	2	2	- One may be inoperative provided other side is operational and amount of fuel on board can be established to be adequate for the intended flight.
Fuel flow indicator	1	1	1	1	-
ICE AND RAIN PROTECTION					
Emergency static air source	*	*	*	*	- *Optional
Pitot heater	*	*	1	1	- *Optional

SYSTEM and/or COMPONENT	*VFR Day*	*VFR Night*	*IFR Day*	*IFR Night*	*Remarks and/or Exceptions*
LANDING GEAR					
Landing gear motor	1	1	1	1	- May be inoperative provided operations are continued only to a point where repairs can be accomplished. Gear must be left down.
Landing gear position lights	4	4	4	4	-
Landing gear warning horn	1	1	1	1	-

LIGHTS					
Cockpit and instrument lights	-	*	-	*	- *Lights must be operative.
Taxi light	-	-	-	-	-
Landing light	-	*	-	*	- *Per FAR 91.33
Rotating beacon	*	1	*	1	- *Optional
Position light	-	3	-	3	
NAVIGATION INSTRUMENTS					
Altimeter	1	1	1	1	-
Airspeed indicator	1	1	1	1	-
Vertical speed	-	-	-	-	-
Magnetic compass	1	1	1	1	-
Attitude indicator	-	-	1	1	-
Turn and slip indicator	-	-	1	1	-
Directional gyro	-	-	1	1	-
Clock	-	-	1	1	-
Transponder	*	*	*	*	- *Per FAR 91.24, 91.90, 91.97
Navigation equipment	-	-	*	*	- *Per FAR 91.33

SYSTEM and/or COMPONENT	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
PNEUMATIC					
Vacuum system for instrument air	-	-	1	1	-
Vacuum gage	-	-	1	1	-
ENGINE INDICATING INSTRUMENTS					
Engine tachometer indicator	1	1	1	1	-
Exhaust gas temperature indicator	*	*	*	*	- *Optional
Manifold pressure indicator	1	1	1	1	-

ENGINE OIL INSTRUMENTS						
Oil pressure indicator	1	1	1	1	-	
Oil temperature indicator	1	1	1	1	-	

FUEL

TOTAL FUEL with left and right wing fuel systems full:

Capacity..59.8 gallons*
Usable .... 57.2 gallons

*Value given is nominal. Tank capacity will vary with temperature and manufacturing tolerances.

FUEL MANAGEMENT

Do not take off when Fuel Quantity indicators indicate in the yellow band on either indicator.

Maximum slip duration is 30 seconds.

PLACARDS

On Left Cabin Door (MC-533, MC-537 and after, CAS):

THIS AIRPLANE MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.

NORMAL CATEGORY

MAXIMUM DESIGN WEIGHT	2750 LBS
REFER TO WEIGHT AND BALANCE DATA FOR LOADING INSTRUCTIONS	
FLIGHT MANEUVERING LOAD FACTOR	FLAPS UP +3.8 −1.9 DOWN +1.9
MAXIMUM MANEUVERING SPEED	125 KTS/144 MPH

NO ACROBATIC MANEUVERS
INCLUDING SPINS APPROVED

NO ACROBATIC MANEUVERS APPROVED
EXCEPT THOSE LISTED BELOW:

MANEUVER, BANK ANGLES NO MORE THAN 60°	MAXIMUM ENTRY SPEED
CHANDELLES	125 KTS/144 MPH
LAZY EIGHTS	125 KTS/144 MPH
STEEP TURNS	125 KTS/144 MPH
STALLS (EXCEPT WHIP STALLS)	SLOW DECELERATION
NOTE: MAXIMUM ALTITUDE LOSS DURING STALL	300 FT

LANDING GEAR

MAXIMUM GEAR EXTENDED SPEED		135 KTS/155 MPH
MAXIMUM GEAR OPERATING SPEED	EXTENSION	135 KTS/155 MPH
	RETRACTION	113 KTS/130 MPH

On Flap Extension Handle (MC-533, MC-537 and after, CAS):

FLAPS PULL TO EXTEND, MAX SPEED 96 KTS/110 MPH

RETRACTED . . . . 0°
FIRST NOTCH . . . . 15°
SECOND NOTCH . . . . . 25°
THIRD NOTCH . . . . . . 35°

On Left Cabin Door (CAS):
(MC-449, MC-452 thru MC-536, except MC-533)

THIS AIRPLANE MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.

NORMAL CATEGORY

MAXIMUM DESIGN WEIGHT		2750 LBS
REFER TO WEIGHT AND BALANCE DATA FOR LOADING INSTRUCTIONS		
FLIGHT MANEUVERING LOAD FACTOR	FLAPS UP	+3.8 −1.9
	DOWN	+1.9
MAXIMUM MANEUVERING SPEED		144 MPH

NO ACROBATIC MANEUVERS
INCLUDING SPINS APPROVED

NO ACROBATIC MANEUVERS APPROVED
EXCEPT THOSE LISTED BELOW:

MANEUVER BANK ANGLES NO MORE THAN 60

	MAXIMUM ENTRY SPEED
CHANDELLES	144 MPH
LAZY EIGHTS	144 MPH
STEEP TURNS	144 MPH
STALLS (EXCEPT WHIP STALLS)	SLOW DECELERATION
NOTE MAXIMUM ALTITUDE LOSS DURING STALL	300 FT

LANDING GEAR

MAXIMUM GEAR EXTENDED SPEED		155 MPH
MAXIMUM GEAR OPERATING SPEED	EXTENSION	155 MPH
	RETRACTION	130 MPH

On Flap Extension Handle (CAS):
(MC-449, MC-452 thru MC-536, except MC-533)

FLAPS PULL TO EXTEND, MAX SPEED 110 MPH

RETRACTED . . . . 0°
FIRST NOTCH . . . . 15°
SECOND NOTCH . . . . . 25°
THIRD NOTCH . . . . . . 35°

On Inside of Emergency Gear Extension Access Door:

(MC-533, MC-537 and after)

EMERGENCY LANDING GEAR EXTENSION

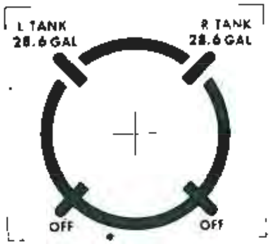
1. Landing Gear Motor Circuit Breaker—OFF(Pull)
2. Gear Position Switch—DOWN
3. Throttle—MAXIMUM 12 inches of mercury (Manifold Press.)
4. Indicated Airspeed—87 KTS/100 MPH
5. Emergency Extension Valve—OPEN (Use Handle—Turn Counter Clockwise)

(MC-449, MC-452 thru MC-536, except MC-533)

EMERGENCY LANDING GEAR EXTENSION

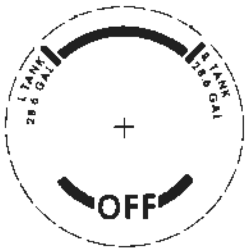
1. Landing Gear Motor Circuit Breaker—OFF (Pull)
2. Gear Position Switch—DOWN
3. Throttle—MAXIMUM 12 inches of mercury (Manifold Press)
4. Indicated Airspeed—100 MPH
5. Emergency Extension Valve—OPEN (Use Handle—Turn Counter Clockwise)

On Fuel Selector Panel (prior to MC-696):



OR

On Fuel Selector Panel (Serials MC-696 and after, or earlier airplane serials which have complied with BEECHCRAFT Service Instructions No. 1095):



Adjacent to Engine Instrument Cluster:

DO NOT TAKE OFF WHEN FUEL QUANTITY GAUGE INDICATES IN YELLOW ON EITHER GAUGE. MAXIMUM SLIP DURATION 30 SEC

On Upper Right Instrument Panel:

RAISE FLAPS

TO INCREASE BRAKE EFFECTIVENESS

Raytheon Aircraft

Temporary Change to the Pilot's Operating Handbook *and* FAA Approved Airplane Flight Manual

P/N 169-590025-15BTC1

Publication Affected	C24R Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (P/N 169-590025-15B, Reissued November, 1980 or Subsequent)
Airplane Serial Numbers Affected	MC-449, MC-452 and After
Description of Change	The addition of a placard to the fuel selector to warn of the no-flow condition that exists between the fuel selector detents.
Filing Instructions	Insert this temporary change into the C24R Pilot's Operating Handbook and FAA Approved Airplane Flight Manual immediately following page 2-24 (Section II, LIMITATIONS) and retain until rescinded or replaced.

LIMITATIONS

PLACARDS

Located On The Face Of The Fuel Selector Valve, For Those Airplanes In Compliance With S.B. 2670:

WARNING - POSITION SELECTOR IN DETENTS ONLY - NO FUEL FLOW TO ENGINE BETWEEN DETENTS

Approved:

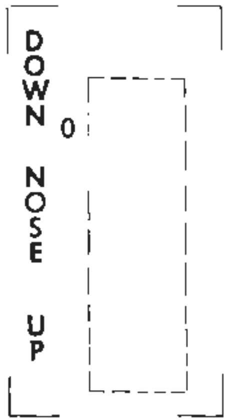
A. C. Jackson

A.C. Jackson
Raytheon Aircraft Company
DOA CE-2

Adjacent to Flap Switch or Left of Quadrant Control Panel:

USE 15° FLAPS
FOR TAKE OFF

On Pedestal Between Front Seats:



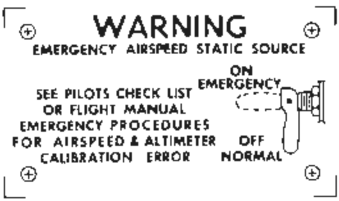
On Floorboard in Front of Pilot's Seat:

EMERGENCY
GEAR EXTENSION
—ACCESS DOOR—

On Left Cabin Door:

**EMERGENCY GEAR
EXTENSION HANDLE**

Lower Sidewall Adjacent to Pilot (when installed):



On Upper Right Instrument Panel:

IN CASE OF FIRE IN ENGINE
COMPARTMENT CLOSE
DEFROST & CABIN AIR VALVE

On Lower Left Sidewall Panel:

TO LEVEL AIRCRAFT — LEVEL
BAGGAGE COMPARTMENT FLOOR

On Baggage Compartment Door:

BAGGAGE COMPARTMENT

270 POUNDS

MAXIMUM CAPACITY

On Aft Cabin Bulkhead:

HAT SHELF

NO HEAVY OBJECTS

On Bulkhead Below Hat Shelf When 5th and 6th Seats are Installed:

MAXIMUM FIFTH AND SIXTH SEAT
STRUCTURAL CAPACITY 250 POUNDS
REFER TO WEIGHT AND BALANCE FOR
LOADING INSTRUCTIONS
NO SMOKING IN FIFTH AND SIXTH SEAT

On Upper Aft Corner of Each Cabin Door (Prior to MC-633), or on window (MC-633 and after):

INSTRUCTION-SHOULDER STRAP

1. OCCUPANTS SHORTER THAN 4 FT. 7 IN. **DO NOT** USE SHOULDER STRAP.
2. PLACE SEAT BACK IN THE UPRIGHT POSITION DURING TAKEOFF AND LANDING.

Adjacent to 5th and 6th Seats When Installed:

INSTRUCTION-SHOULDER STRAP

1. OCCUPANTS SHORTER THAN 4 FT. 7 IN. **DO NOT** USE SHOULDER STRAP.

On Right Sidewall Below Third Window:

NO SMOKING IN FIFTH AND SIXTH SEAT

On Second Window Frame on Right Side When Required by Weight and Balance Data:

BAGGAGE, CARGO OR FAMILY SEATS
LOAD IN ACCORDANCE
WITH WEIGHT & BALANCE DATA
MAXIMUM SEAT CAPACITY ______________ POUNDS

On Baggage Door Adjacent to Handle:

PULL PIN
ROTATE
HANDLE
TO OPEN

SECTION III

EMERGENCY PROCEDURES

TABLE OF CONTENTS

SUBJECT *PAGE*

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All airspeeds quoted in this section are indicated airspeeds (IAS).

EMERGENCY AIRSPEEDS

Emergency Descent ....135 KTS/155 MPH

Glide ....91 KTS/105 MPH

Emergency Landing Approach......................74 KTS/85 MPH

Stall warning horn is inoperative when the battery and alternator switches are turned off.

NOTE

On serials MC-696 and after, or on airplanes which have complied with BEECHCRAFT S.I. No. 1095, a fuel selector stop has been added to the selector valve guard. The fuel selector stop minimizes the possibility of inadvertently turning the fuel selector valve to the OFF detent position. The stop is a spring which must be depressed before the selector valve handle can be rotated to the OFF position.

The following information is presented to enable the pilot to form, in advance, a definite plan of action for coping with the most probable emergency situations which could occur in the operation of the airplane. Where practicable, the emergencies requiring immediate corrective action are treated in check list form for easy reference and familiarization. Other situations, in which more time is usually permitted to decide on and execute a plan of action, are discussed at some length.

ENGINE FAILURE

DURING TAKE-OFF GROUND ROLL

1. Throttle - CLOSED
2. Braking - MAXIMUM

NOTE

Conduct the following procedures immediately if it appears certain that the airplane will run off the runway. (Otherwise, conduct these procedures at the pilot's discretion.)

3. Fuel Selector Valve - OFF
4. Battery switch, Alternator switch and Magneto/Start switch - OFF

AFTER LIFTOFF AND IN FLIGHT

Landing straight ahead is usually advisable. If sufficient altitude is available for maneuvering, accomplish the following:

1. Mixture - FULL RICH
2. Fuel Boost Pump - ON
3. Fuel Selector Valve - SELECT OTHER TANK (feel for detent, and check visually)
4. Magnetos - CHECK LEFT AND RIGHT, THEN BOTH

NOTE

The most probable cause of engine failure would be loss of fuel flow or improper functioning of the ignition system.

If No Restart:

1. Establish Maximum Glide Configuration
2. Throttle - CLOSED
3. Fuel Selector Valve - OFF
4. Mixture - IDLE CUT-OFF
5. Magneto/Start Switch - OFF

When certain of reaching the selected landing site:

6. Airspeed - NORMAL APPROACH SPEED
7. Flaps - AS REQUIRED
8. Landing Gear - DOWN or UP (depending on terrain)
9. Battery switch, alternator switch, and Fuel Boost Switch - OFF

ENGINE DISCREPANCY CHECKS

CONDITION: ROUGH RUNNING ENGINE

1. Mixture - FULL RICH, then LEAN as required
2. Magneto/Start Switch - CHECK LEFT, RIGHT, THEN BOTH

CONDITION: LOSS OF ENGINE POWER

1. Fuel Flow Gage - CHECK

If fuel flow is abnormally low:

a. Mixture - FULL RICH
b. Auxiliary Fuel Pump - ON (Lean as required)
c. Auxiliary Fuel Pump - OFF if performance does not improve in a few moments

2. Fuel Quantity Indicator - CHECK for fuel supply in tank being used

If tank being used is empty:

Fuel Selector Valve - SELECT OTHER FUEL TANK (feel for detent, and check visually)

AIR START PROCEDURE

1. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL (Check to feel detent and check visually.)
2. Throttle - AS REQUIRED
3. Mixture - FULL RICH
4. Propeller - AS REQUIRED
5. Fuel Boost Pump - ON OR OFF as required
6. Magneto/Start Switch - BOTH

NOTE

When engine starts, adjust throttle, propeller, and mixture controls.

ENGINE FIRE

IN FLIGHT

The red FIREWALL AIR controls must be closed to shut off all heating system outlets so that smoke and fumes will not enter the cabin. The control labeled CABIN AIR, on the left of the power control quadrant, must be pulled aft to close. The control labeled DEFROST, to the right of the power control quadrant, must be pushed forward to close. In the event of an engine fire, shut down the engine as follows and make a landing:

1. Fuel Selector Valve - OFF
2. Mixture - IDLE CUT-OFF
3. Propeller - FULL FORWARD (High rpm position)
4. Throttle - CLOSE
5. Cabin Air Control (Red Knob) - pull OFF
6. Defrost Valve (Red Knob) - push OFF
7. Alternator Switch - OFF
8. Battery Switch - OFF (Extending the gear can be accomplished manually if desired)
9. Magneto/Start Switch - OFF
10. Do not attempt to restart engine

ON THE GROUND

1. Fuel Selector Valve - OFF
2. Throttle - CLOSE
3. Mixture - IDLE CUT-OFF
4. Battery Switch and Alternator Switch - OFF
5. Magneto/Start Switch - OFF
6. Fire Extinguisher - USE TO EXTINGUISH FIRE

EMERGENCY DESCENT

1. Propeller - FULL FORWARD (High rpm position)
2. Throttle - IDLE
3. Landing Gear - DOWN
4. Airspeed - ESTABLISH 135 KTS/155 MPH

MAXIMUM GLIDE CONFIGURATION

1. Landing Gear - UP (Landing gear safety switch OFF if system is installed)
2. Flaps - UP
3. Propeller - FULL AFT (Low rpm position)
4. Airspeed - Establish 91 KTS/105 MPH

Glide distance is approximately 1.7 nautical miles (2 statute miles) per 1000 feet above the terrain.

LANDING EMERGENCIES

LANDING WITHOUT POWER

When assured of reaching the landing site selected, and on final approach:

1. Airspeed - EMERGENCY APPROACH SPEED
2. Fuel Selector Valve - OFF
3. Mixture - IDLE CUT-OFF
4. Flaps - AS REQUIRED
5. Landing Gear - DOWN or UP, DEPENDING ON TERRAIN
6. Battery Switch and Alternator Switch - OFF

LANDING GEAR RETRACTED - WITH POWER

If possible, choose firm sod or foamed runway. Make a normal approach, using flaps as necessary. When sure of reaching the selected landing spot:

1. Throttle - CLOSED
2. Airspeed - NORMAL APPROACH SPEED
3. Fuel Selector Valve - OFF
4. Mixture - IDLE CUT-OFF
5. Flaps - AS REQUIRED
6. Battery Switch and Alternator Switch - OFF
7. Keep wings level during touchdown
8. Get clear of airplane as soon as possible after it stops:

SYSTEMS EMERGENCIES

PROPELLER OVERSPEED

1. Throttle - RETARD TO MINIMUM CRUISE RPM
2. Airspeed - REDUCE (Initiate climb to load propeller if time permits.)
3. Oil Pressure - CHECK

WARNING

If loss of oil pressure was the cause of overspeed, the engine may seize after a short period of operation. IF ENGINE FAILS:

4. Land - SELECT NEAREST SUITABLE SITE and follow ENGINE FAILURE AFTER LIFTOFF AND IN FLIGHT procedures.

STARTER ENGAGED WARNING LIGHT ILLUMINATED (If Installed)

The STARTER ENGAGED warning light illuminates whenever the starter is engaged. If this light remains illuminated after the Magneto/Start Switch is released from the START position, the starter relay is still energized. Consequently, electrical power is still being supplied to the starter, and it remains engaged. Continuing to supply power to the starter will eventually result in the complete loss of electrical system power, substantial starter damage, and possible damage to other electrical system components.

If light remains illuminated on the ground:

1. BATTERY & ALT and ALT Switches - OFF
2. Do Not Take Off.

If light remains illuminated in flight after air start:

1. BATTERY & ALT and ALT Switches - OFF
2. Land As Soon As Practical.

ALTERNATOR-OUT PROCEDURE

An inoperative alternator will place the entire electrical operation of the airplane on the battery. Alternator malfunction will be indicated by a fluctuation of the ammeter needle, or by a discharge indication. If this condition develops:

1. ALT Switch - OFF MOMENTARILY, THEN ON (this resets overvoltage relay)

If alternator-out condition persists:

2. ALT Switch - OFF
3. Nonessential Electrical Equipment - OFF to conserve battery power.

WARNING

Deactivation of the battery switch, alternator switch, or alternator circuit breaker during flight is prohibited, except as required by an actual emergency.

UNSCHEDULED ELECTRIC STABILATOR TRIM

1. Airplane Attitude - MAINTAIN using stabilator control
2. Stabilator Trim Thumb Switch (on Control Wheel) - DEPRESS AND MOVE IN DIRECTION OPPOSITE UNSCHEDULED PITCH TRIM.
3. Stabilator Trim ON-OFF Switch (on instrument panel) - OFF
4. Manual Stabilator Trim Control Wheel - RETRIM AS DESIRED

NOTE

Do not attempt to operate the electric trim system until the cause of the malfunction has been determined and corrected.

LANDING GEAR EMERGENCY EXTENSION

Emergency extension of the landing gear can be facilitated by first reducing airspeed to 87 KTS/100 MPH.

Then proceed as follows:

1. LDG GEAR MOTOR Circuit Breaker - OFF (PULL OUT)
2. Landing Gear Switch Handle - DOWN position
3. Throttle - 12 in. Hg (or less) of manifold pressure
4. Indicated Airspeed - 87 KTS/100 MPH
5. Emergency Extension Valve - OPEN (Use Emergency Gear Extension Wrench - Turn Counterclockwise)

WARNING

After landing do not move any landing gear controls or reset any switches or circuit breakers until airplane is on jacks, since failure may have been in the GEAR UP circuit and gear might retract on ground.

RETRACTING LANDING GEAR AFTER PRACTICE EMERGENCY EXTENSION

1. Emergency Extension Valve - CLOSE (Use Emergency Extension Wrench - Turn Clockwise)
2. LDG GEAR MOTOR Circuit Breaker - PUSH IN
3. Landing Gear Switch Handle - UP

EMERGENCY STATIC AIR SOURCE SYSTEM

THE EMERGENCY STATIC AIR SOURCE SHOULD BE USED FOR CONDITIONS WHERE THE NORMAL STATIC SOURCE HAS BEEN OBSTRUCTED. When the airplane has been exposed to moisture and/or icing conditions (ground obstructions not properly corrected may cause inflight obstruction), the possibility of obstructed static ports should be considered. Partial obstruction will result in the rate-of-climb indication being sluggish during a climb or descent. Verification of suspected obstruction is possible by switching to the emergency system and noting a sudden sustained change in rate of climb. This may be accompanied by abnormal indicated airspeed and altitude changes beyond normal calibration differences.

Whenever any obstruction exists in the Normal Static Air System, or the Emergency Static Air System is desired for use:

1. Pilot's Emergency Static Air Source - Switch to ON EMERGENCY (lower sidewall adjacent to pilot)
2. For Airspeed Calibration and Altimeter Correction, refer to PERFORMANCE Section

NOTE

The Emergency Static Air valve should be in the OFF-NORMAL position except in an emergency.

UNLATCHED DOOR IN FLIGHT

If the cabin door latch is not fully engaged, it may come unlatched in flight. This usually occurs during or just after takeoff. The door will trail in a position approximately 3 inches open. A buffet may be encountered with the door open in flight. Return to the field in a normal manner. If practicable, during the landing flare-out have a passenger hold the door to prevent it from swinging open.

SPINS

SPINS ARE PROHIBITED. If a spin is entered inadvertently:

Immediately move the control column full forward and simultaneously apply full rudder opposite to the direction of the spin; continue to hold this control position until rotation stops and then neutralize all controls and execute a smooth pullout. Ailerons should be neutral and throttle in idle position at all times during recovery.

EMERGENCY SPEED REDUCTION

In an emergency, the landing gear may be used to create additional drag. Should disorientation occur under instrument conditions, the lowering of the landing gear will reduce the tendency for excessive speed buildup. This procedure would also be appropriate for a non-instrument rated pilot who unavoidably encounters instrument conditions or in other emergencies such as severe turbulence.

If the landing gear is used at speeds higher than the maximum extension speed, the gear should be left down until landing. Inspection of the gear doors is required, in accordance with maintenance procedures, with repair if necessary.

SECTION IV

NORMAL PROCEDURES

TABLE OF CONTENTS

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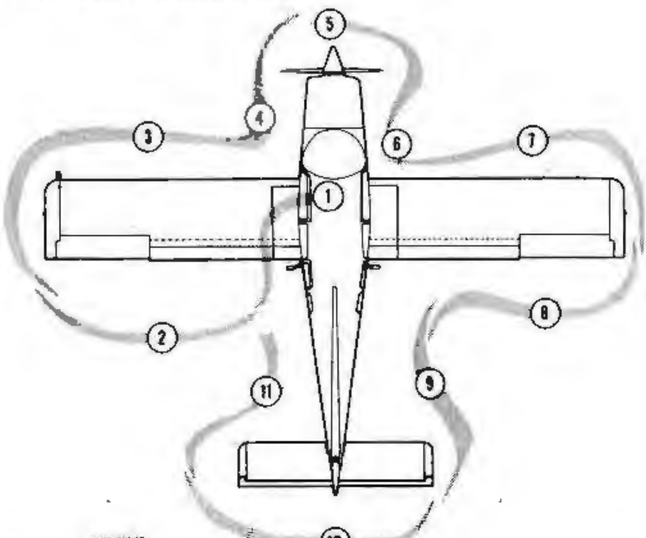
Airspeeds quoted in this section are indicated airspeeds (IAS)

SPEEDS FOR SAFE OPERATION

Cruise Climb	96 KTS/110 MPH
Best Angle-of-Climb (V_X)	71 KTS/82 MPH
Best Rate-of-Climb (V_Y)	85 KTS/98 MPH
Landing Approach	70 KTS/81 MPH
Balked Landing Climb	70 KTS/81 MPH
Maximum Demonstrated Crosswind Component	17 KTS/20 MPH
Maximum Turbulent Air Penetration Speed	125 KTS/144 MPH
Take-off Speeds	
Liftoff	66 KTS/76 MPH
50 Feet Above Runway	71 KTS/82 MPH

PREFLIGHT INSPECTION



1. *CABIN:*
   a. Parking Brake - SET
   b. Control Lock - REMOVE
   c. Landing Gear Handle - DOWN
   d. All Switches - OFF
   e. Flush-type Fuel Drain Tool - OBTAIN (refer to SYSTEMS DESCRIPTION Section for information pertaining to flush-type fuel drains)

2. *LEFT WING TRAILING EDGE:*
   a. Flap - CHECK
   b. Fuel Vent Line - UNOBSTRUCTED
   c. Aileron - CHECK
   d. Wing Tip - CHECK
   e. Position Light - CHECK

3. *LEFT WING LEADING EDGE:*
   a. Pitot Tube - CHECK, (Remove Cover)
   b. Landing Light - CHECK
   c. Tie Down and Chocks - REMOVE
   d. Stall Warning - CHECK, for movement of vane
   e. Fuel Tank - CHECK QUANTITY; Cap - SECURE

4. *LEFT LANDING GEAR:*
   a. Tire, Wheel and Brake - CHECK
   b. Fuel Sump - DRAIN (use fuel-drain tool)

5. *NOSE SECTION:*
   a. Left Cowl - SECURE
   b. Induction Air Intake - CLEAR; Filter - CHECK condition and security of attachment.
   c. Propeller - CHECK
   d. Tire and Nose Gear - CHECK
   e. Engine Oil - CHECK, Cap - SECURE
   f. Right Cowl - SECURE
   g. Fuel Strainer - DRAIN
   h. Nose Wheel Chocks - REMOVE

6. RIGHT LANDING GEAR:

a. Fuel Sump - DRAIN (use fuel-drain tool)
b. Wheel Well, Tire and Brake - CHECK

7. RIGHT WING LEADING EDGE:

a. Fuel Tank - CHECK QUANTITY; Cap - SECURE
b. Tie Down and Chocks - REMOVE
c. Wing Tip - CHECK
d. Position Light - CHECK

8. RIGHT WING TRAILING EDGE:

a. Aileron - CHECK
b. Flap - CHECK
c. Fuel Tank Vent Line - UNOBSTRUCTED

9. RIGHT FUSELAGE:

a. Static Pressure Button - UNOBSTRUCTED
b. Emergency Locator Transmitter - ARMED

10. EMPENNAGE:

a. Control Surfaces - CHECK
b. Tie Down - REMOVE
c. Position Light - CHECK

11. LEFT FUSELAGE:

a. Static Pressure Button - UNOBSTRUCTED
b. All Antennas - CHECK
c. Baggage Door - SECURE

BEFORE STARTING

1. Seats - POSITION AND LOCK; Seat Backs - UPRIGHT
2. Seat Belts and Shoulder Harnesses - FASTEN
3. Parking Brake - SET
4. All Avionics - OFF
5. Circuit Breakers - IN

6. Landing Gear Switch Handle - DOWN
7. Flaps - UP
8. Light Switches - AS REQUIRED
9. Electric Trim Switch - OFF
10. Battery Switch - ON
11. Alternator Switch - ON (If external power is used, turn Alternator Switch - OFF)
12. Fuel Selector Valve - ROTATE thru 360° and check for freedom of movement; set on tank more nearly full (feel for detent and check visually)

NOTE

On serials MC-696 and after, or on airplanes which have complied with BEECHCRAFT S.I. No. 1095, a fuel selector stop has been added to the selector valve guard. The fuel selector stop minimizes the possibility of inadvertently turning the fuel selector valve to the OFF detent position. The stop is a spring which must be depressed before the selector valve handle can be rotated to the OFF position.

WARNING

Do not take off if either fuel quanity gage indicates in yellow arc.

EXTERNAL POWER

The following precautions shall be observed while using external power:

1. The Battery Switch shall be ON and all avionics and electrical switches OFF. This protects the voltage regulator and associated electrical equipment from power fluctuations.

2. The airplane has a negative ground system. Connect the positive and negative leads of the external power cable to the corresponding positive and negative terminals of the auxiliary power source.
3. In order to prevent arcing, no power shall be supplied while the connection is being made.

STARTING ENGINE USING AUXILIARY POWER UNIT

1. Alternator, Electrical, and Avionics Equipment - OFF
2. Auxiliary Power Unit - CONNECT
3. Auxiliary Power Unit - SET OUTPUT (*13.75 to 14.25 volts for 14-volt system and 27.75 to 28.25 volts for 28-volt system)
4. Auxiliary Power Unit - ON
5. Engine - START using normal procedures
6. Auxiliary Power Unit - OFF (after engine has been started)
7. Auxiliary Power Unit - DISCONNECT
8. Alternator Switch - ON

*NOTE - MC-449, MC-452 thru MC-673 are 14-volt systems. MC-674 and after are 28-volt systems.

ENGINE STARTING

1. Propeller - FULL FORWARD (high rpm)
2. Engine Start

CAUTION

Starter cranking period should be limited to a maximum of 30 seconds, with at least 2 minutes between cranking periods.

Cold Start:

a. Mixture - FULL RICH

b. Throttle - FAST IDLE position
c. Fuel Boost Pump - ON (Maximum 3 seconds, then OFF)
d. Magneto/Start Switch - START position (release to BOTH position when engine fires)

Hot Start:

a. Mixture - IDLE CUT-OFF
b. Throttle - FAST IDLE position
c. Magneto/Start Switch - ENGAGE
d. Mixture - ADVANCE MIXTURE SLOWLY until engine starts firing regularly.

Flooded Engine:

a. Mixture - IDLE CUT-OFF
b. Throttle - FULL OPEN
c. Magneto/Start Switch - ENGAGE
d. Mixture - ADVANCE MIXTURE SLOWLY as engine starts firing regularly.
e. Throttle - RETARD (to fast idle position)

3. External Power (if used) - DISCONNECT
4. Alternator Switch - ON
5. Oil Pressure - ABOVE RED RADIAL WITHIN THIRTY SECONDS
6. Warm-up - 1000 to 1200 RPM
7. Starter Engaged Warning Light (if installed) - CHECK; should be illuminated during start, and extinguished after start.

CAUTION

If the STARTER ENGAGED Warning Light is inoperative (or not installed), ensure that the ammeter indication is less than 25% of full charge at 1000 or 1200 rpm within two minutes with no additional electrical equipment on. If not, turn off the BATTERY & ALT and ALT Switches and do not take off.

8. Engine Instruments - CHECK
9. Throttle - IDLE
10. Parking Brakes - RELEASE

AFTER STARTING, AND TAXI

1. Brakes - RELEASE AND CHECK
2. Avionics Equipment - ON, AS REQUIRED
3. Lights - AS REQUIRED

CAUTION

Detuning the counterweight system of the engine can occur by rapid throttle operation, high rpm (low pitch) and low manifold pressure, or propeller feathering. (See latest revision of Lycoming Service Bulletin No. 245.)

BEFORE TAKEOFF

1. Parking Brake - SET
2. Seat Belts and Shoulder Harnesses - CHECK
3. Avionics - CHECK
4. Engine Instruments - CHECK
5. Flight Instruments - CHECK and SET
6. Starter Engaged Warning Light (if installed) - CHECK (should not be illuminated). If light is not installed or is inoperative, the ammeter indication should be less than 25% of full charge at 1000 to 1200 rpm and should show some decrease from the initial indication.
7. Throttle - 2000 RPM
8. Magnetos - CHECK at 2000 rpm, maximum drop of 100 rpm on each magneto, variance between individual magnetos should not exceed 25 rpm.

9. Propeller - EXERCISE to obtain 300 to 400 rpm drop; return to high rpm.
10. Throttle - FAST IDLE
11. Stabilator Trim - TAKE-OFF RANGE (within indicator band)
12. Flaps - CHECK and SET (15°)
13. Controls - CHECK FREE and for proper direction of travel
14. Mixture - FULL RICH (or as required by field elevation)
15. Doors and Window - SECURE
16. Parking Brake - RELEASE
17. Instruments - CHECK (Make final check of manifold pressure, fuel flow, and rpm at the start of the take-off run.)

TAKEOFF

Take-Off.. Full Throttle - 2700 RPM
Cruise Climb.................................... Full Throttle - 2700 RPM

NOTE

Do not take off or land with the Fuel Boost Pump ON. The Fuel Boost Pump should be used only for starting and in the event of an emergency.

1. Power - SET take-off power and mixture before brake release.
2. Airspeed - ACCELERATE to and maintain take-off speed.
3. Landing Gear - RETRACT when airplane is positively airborne and insufficient runway remains for a landing.
4. Airspeed - ESTABLISH DESIRED CLIMB SPEED when clear of obstacles.

CLIMB

1. Flaps - UP
2. Power - AS REQUIRED
3. Mixture - LEAN AS REQUIRED
4. Temperature - MONITOR

CRUISE

1. Power - SET AS DESIRED (Use tables in Performance Section)
2. Mixture - LEAN AS REQUIRED

LEANING MIXTURE USING THE EXHAUST GAS TEMPERATURE INDICATOR (EGT)

For level flight at 75% power or less, the EGT unit should be used in the following manner:

1. Lean the mixture and note the point on the indicator at which the temperature peaks and starts to fall.

   a. CRUISE (LEAN) MIXTURE - Enrich mixture (push mixture control forward) until EGT indicator shows a drop of 25°F to 50°F on rich side of peak.

   b. BEST POWER MIXTURE - Enrich mixture (push mixture control forward) until EGT indicator shows a drop of 75°F to 100°F on rich side of peak.

CAUTION

Do not continue to lean mixture beyond the point necessary to establish peak temperature. Continuous operation is recommended at 25°F or below peak EGT only on rich side of peak.

2. Changes in altitude and power setting require EGT to be rechecked and mixture reset.

3. A mixture resulting in an EGT 25°F on the rich side of peak should also result in fuel flow and TAS values approximately equal to those presented in the Cruise Power Settings tables in the PERFORMANCE Section. If not, the values derived from the Range, Endurance, and Cruise Speeds charts must be revised accordingly. In very cold weather, EGT's 25°F rich of peak may not be obtainable.

DESCENT

1. Altimeter - SET
2. Power - AS REQUIRED (avoid prolonged idle settings and low cylinder head temperatures)
3. Mixture - ENRICH AS REQUIRED

BEFORE LANDING

1. Seat Belts and Shoulder Harnesses - SECURE

NOTE

All reclining seats must be in the upright position during landing.

2. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL (feel for detent and check visually).
3. Mixture - FULL RICH (or as required by field elevation)
4. Landing Gear - DOWN and CHECK. (Observe maximum extension speed.)
5. Landing and Taxi Lights - AS REQUIRED
6. Flaps - DOWN (Observe maximum extension speed)

WARNING

> The distance for a flaps-up landing will be greater than for a flaps-down landing.

7. Airspeed - ESTABLISH LANDING APPROACH SPEED
8. Propeller - FULL FORWARD (High rpm position)

BALKED LANDING

1. Mixture - FULL RICH (or as required by field elevation).
2. Propeller - FULL FORWARD (High rpm)
3. Power - FULL THROTTLE, 2700 RPM
4. Landing Gear - UP
5. Airspeed - 70 KTS/81 MPH until clear of obstacles, then TRIM TO BEST RATE-OF-CLIMB SPEED
6. Flaps - UP

AFTER LANDING

1. Landing and Taxi Lights - AS REQUIRED
2. Flaps - UP
3. Trim Tab - SET TO 0°

SHUTDOWN

1. Parking Brakes - SET
2. Electrical and Avionics Equipment - OFF
3. Throttle - CLOSE
4. Mixture - IDLE CUT-OFF
5. Magneto/Start Switch - OFF, after engine stops
6. BATTERY & ALT Switch - OFF
7. ALT Switch - OFF
8. Control Lock - INSTALL
9. Install wheel chocks and release parking brakes if the airplane is to be left unattended.

INTENTIONALLY LEFT BLANK

ENVIRONMENTAL SYSTEMS

HEATING AND VENTILATION

Refer to the SYSTEMS DESCRIPTION Section for operation of heating and ventilation controls.

COLD WEATHER OPERATION

PREFLIGHT INSPECTION

All accumulations of ice, snow and frost must be removed from the wings, tail, control surfaces and hinges, propeller, windshield, fuel cell filler caps, crankcase vents, and fuel vents. If such accumulations are not removed completely, the airplane shall not be flown. The deposits will not blow off in flight. While an adverse weight factor is clearly involved in the case of heavy deposits, it is less obvious that even slight accumulations will disturb or completely destroy the designed aerodynamic properties of the airfoils.

The normal preflight procedures should then be completed, with particular attention given to check of flight controls for complete freedom of movement.

ENGINE

Use engine oil in accordance with Consumable Materials in the HANDLING, SERVICING AND MAINTENANCE Section

WARNING

> Ascertain that magneto switch and battery master switch are off before moving propeller by hand.

Always pull the propeller through by hand, opposite the direction of rotation, several times to clear the engine and "limber up" the cold, heavy oil before using the starter. This will also lessen the load on the battery if external power is not used.

Under very cold conditions, it may be necessary to preheat the engine prior to a start. Particular attention should be given to the oil cooler, engine sump and propeller hub to ensure proper preheat. A start with congealed oil in the system may produce an indication of normal pressure immediately after the start, but then the oil pressure may decrease when residual oil in the engine is pumped back with the congealed oil in the sump. If an engine heater capable of heating both the engine sump and cooler is not available, the oil should be drained while the engine is hot and stored in a warm area until the next flight.

If there is no oil pressure within the first 30 seconds of running, or if oil pressure drops after a few minutes of ground operation, shut down and check for broken oil lines, oil cooler leaks or the possibility of congealed oil.

NOTE

It is advisable to use external power for starting in cold weather.

During warm-up, monitor engine temperatures closely, since it is quite possible to exceed the cylinder head temperature limit in trying to bring up the oil temperature. Exercise the propeller several times to remove cold oil from the pitch change mechanism. The propeller should also be cycled occasionally in flight.

During letdown and landing, give special attention to engine temperatures, since the engine will have a tendency toward overcooling.

ICING CONDITIONS

Flight in Known Icing Conditions Prohibited.

ENGINE BREAK-IN INFORMATION

See Systems Description section.

NOISE CHARACTERISTICS

Approach to and departure from an airport should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas. Avoidance of noise-sensitive areas, if practical, is preferable to overflight at relatively low altitudes.

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

NOTE

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

Flyover noise level established in compliance with FAR 36 is:

71.7 dB(A)

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

SECTION V

PERFORMANCE

TABLE OF CONTENTS

SUBJECT *PAGE*

SUBJECT *PAGE*

INTRODUCTION TO PERFORMANCE AND FLIGHT PLANNING

The graphs and tables in this section present performance information for flight planning at various parameters of weight, power, altitude and temperature. Examples have been presented on all performance graphs. In addition, the calculations for flight time, block speed and fuel required for a proposed flight are detailed below. All examples and calculations utilize the following conditions:

CONDITIONS

At Denver:

Outside Air Temperature .... 15°C (59°F)
Field Elevation .... 5330 ft
Altimeter Setting .... 29.60 in. Hg
Wind .... 270° at 10 kts
Runway 26L length .... 10,010 ft

Route of Trip

★DEN-V81-AMA

For VFR Cruise at 11,500 feet

ROUTE SEGMENT	MAGNETIC COURSE	DIST NM	WIND 11,500 FEET DIR/KTS	OAT 11,500 FEET °C	ALT SETTING IN. HG
DEN-COS	161°	55	010/30	-5	29.60
COS-PUB	153°	40	010/30	-5	29.60
PUB-TBE	134°	74	100/20	0	29.56
TBE-DHT	132°	87	200/20	9	29.56
DHT-AMA	125°	65	200/20	10	29.56

★REFERENCE: Enroute Low Altitude Chart L-6

At Amarillo:

Outside Air Temperature .... 25°C (77°F)
Field Elevation .... 3605 ft
Altimeter Setting .... 29.56 in. Hg
Wind .... 180° at 14 kts
Runway 21 Length .... 13,500 ft

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

Pressure Altitude at DEN:

29.92 - 29.60 = .32 in. Hg
The pressure altitude at DEN is 320 feet above the field elevation.
5330 + 320 = 5650 ft

Pressure Altitude at AMA:

29.92 - 29.56 = .36 in. Hg
The pressure altitude at AMA is 360 feet above the field elevation.
3605 + 360 = 3965 ft

NOTE

For flight planning, the difference between cruise altitude and cruise pressure altitude has been ignored.

Calculations for flight time, block speed and fuel requirement:

Cruise Climb:

Enter the graph for TIME, FUEL, AND DISTANCE TO CLIMB at 15°C to 5650 ft and to 2750 lbs. Enter at −5°C to 11,500 ft and to 2750 lbs. Read:

Time to Climb = 23-8 = 15 min
Fuel Used to Climb = 28.5-11.5 = 17.0 lbs
Distance Traveled = 40-13 = 27 N.M.

The temperatures for cruise are presented for a standard day (ISA); 20°C (36°F) above a standard day (ISA + 20°C); and 20°C (36°F) below a standard day (ISA − 20°C). These should be used for flight planning. The IOAT values are true temperature values which have been adjusted for the compressibility effects. IOAT should be used for setting cruise power while enroute.

Enter the graph for ISA CONVERSION at 11,500 feet and the temperature for the route segment:

DEN-PUB	OAT	=	−5°C
	ISA Condition	=	ISA + 3°C
PUB-TBE	OAT	=	0°C
	ISA Condition	=	ISA + 8°C
TBE-DHT	OAT	=	9°C
	ISA Condition	=	ISA + 17°C
DHT-AMA	OAT	=	10°C
	ISA Condition	=	ISA + 18°C

Enter the CRUISE POWER SETTINGS table for 75 percent maximum continuous power (or full throttle) – 2700 RPM, at 11,000 ft, 12,000 ft, ISA and ISA + 20°C

	TEMPERATURE					
	ISA			ISA + 20°C		
ALTI-TUDE FEET	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS
11000	20.0	9.8	136	20.0	9.5	136
12000	19.2	9.7	134	19.2	9.3	134

Interpolate for 11,500 feet and the temperature for the appropriate route segment. Results of the interpolations are:

ROUTE SEGMENT	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS
DEN-PUB	19.6	9.7	135
PUB-TBE	19.6	9.6	135
TBE-DHT	19.6	9.5	135
DHT-AMA	19.6	9.4	135

NOTE

The above are exact values for the assumed conditions.

Time and fuel used were calculated as follows:

$$\text{Time} = \frac{\text{Distance}}{\text{Ground Speed}}$$

$$\text{Fuel Used} = (\text{Time})\ (\text{Fuel Flow})$$

Results are:

ROUTE SEGMENT	DISTANCE NM	EST GROUND SPEED KNOTS	TIME AT CRUISE ALTITUDE HRS: MIN	FUEL USED FOR CRUISE GAL
DEN-COS	*28	163	:10	1.6
COS-PUB	40	162	:15	2.4
PUB-TBE	74	121	:37	5.9
TBE-DHT	87	123	:42	6.7
DHT-AMA	65	125	:31	4.9

* Distance required to climb has been subtracted from segment distance.

TIME - FUEL - DISTANCE			
ITEM	TIME HRS: MINS	FUEL GAL	DISTANCE NM
Start, Runup, Taxi and Take-off acceleration	0:00	1.3	0
Climb	:15	2.8	27
Cruise	2:15	21.5	294
Total	2:30	25.6	321

Total Flight Time: 2 hours, 30 minutes

Block Speed: 321 NM ÷ 2 hours, 30 minutes = 128 knots

Reserve Fuel (45 minutes at 55 percent maximum continuous power)

> Enter the CRUISE POWER SETTINGS table for 55 percent MCP @ 2400 RPM. The fuel flow of 55 percent MCP is 8 gallons per hour.
> Reserve Fuel = (45 min) (8 GPH) = 6 gallons

Total Fuel = 25.6 + 6 = 31.6 gallons

The estimated landing weight is determined by subtracting the fuel required for the trip from the ramp weight:

> Assumed ramp weight = 2758 lbs
>
> Estimated fuel from DEN to AMA = (25.6 gal) (6 lbs/gal) = 153.6 lbs
>
> Estimated landing weight = 2758 − 154 = 2604 lbs

Examples have been provided on the performance graphs. The above conditions have been used throughout. Rate of climb was determined for the initial cruise altitude conditions.

COMMENTS PERTINENT TO THE USE OF PERFORMANCE GRAPHS

1. The example, in addition to presenting an answer for a particular set of conditions, also presents the order in which the graphs should normally be used, i.e., if the first item in the example is OAT, then enter the graph at the known OAT.

2. The reference lines indicate where to begin following guide lines. Always project to the reference line first, then follow the guide lines to the next known item.

3. Indicated airspeeds (IAS) were obtained by using the AIRSPEED CALIBRATION-NORMAL SYSTEM Graph.

4. The associated conditions define the specific conditions from which performance parameters have been determined. They are not intended to be used as instructions; however, performance values determined from charts can only be achieved if the specified conditions exist.

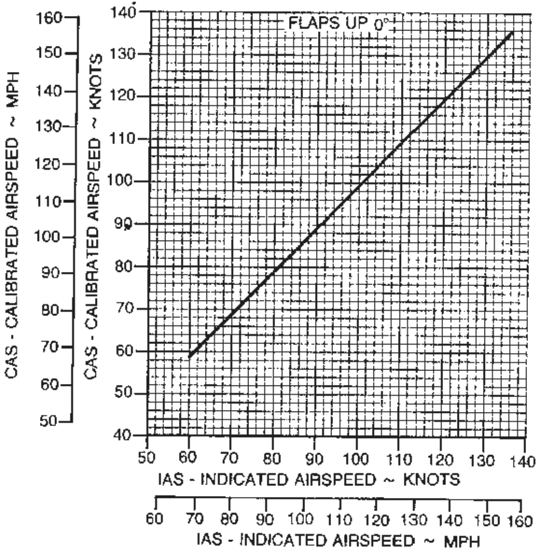
5. The full amount of usable fuel is available for all approved flight conditions.

6. Engine and component cooling has been demonstrated for temperatures up to 100°F at sea level with a 3.67°F per 1000 ft lapse rate. (ISA + 41°F).

AIRSPEED CALIBRATION - NORMAL SYSTEM

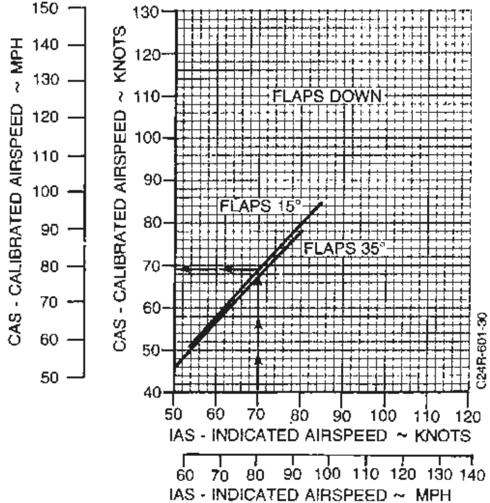
NOTE:

INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.



EXAMPLE:

IAS	70 KTS (81MPH)
FLAPS	15°
CAS	69 KNOTS (79MPH)

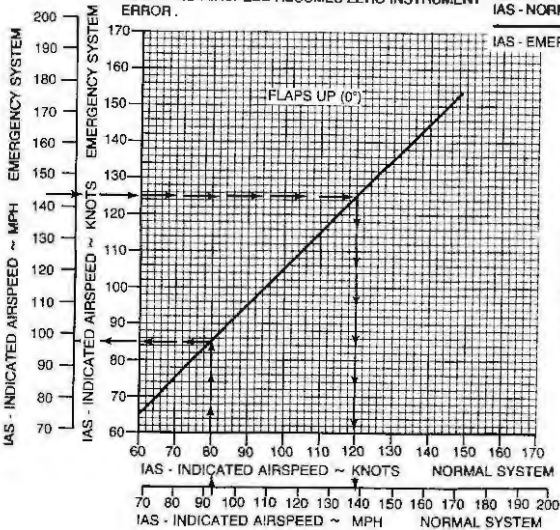


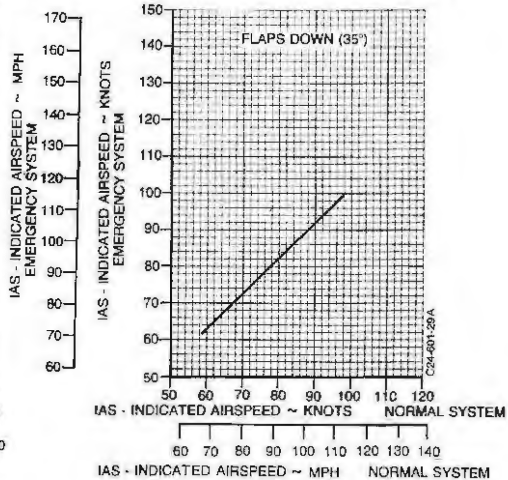
AIRSPEED CALIBRATION-EMERGENCY SYSTEM

EXAMPLE

FLAPS	UP
IAS - EMERGENCY SYSTEM	125 KTS (144 MPH)
IAS - NORMAL SYSTEM	120 KTS (138 MPH)
CAS - (SEE AIRSPEED CALIBRATION NORMAL SYSTEM.)	120 KTS (138 MPH)
FLAPS	UP
IAS - NORMAL SYSTEM	80 KTS (92 MPH)
IAS - EMERGENCY SYSTEM	85 KTS (98 MPH)

NOTE
INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.



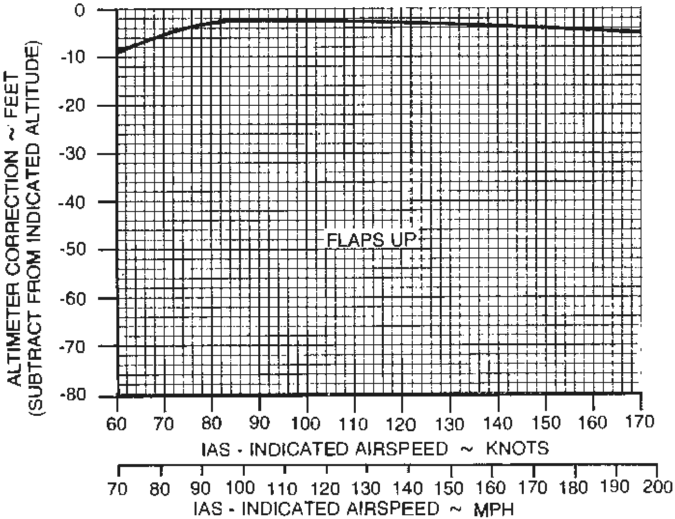


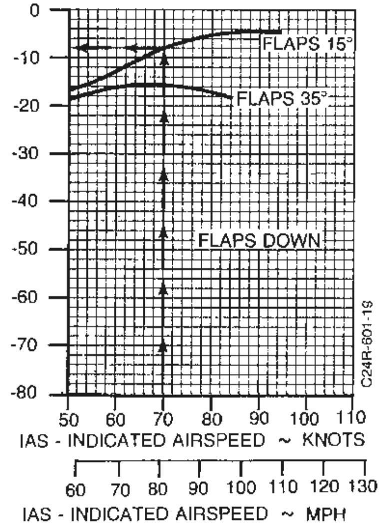
ALTIMETER CORRECTION—NORMAL SYSTEM

NOTE:
INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR

EXAMPLE:

IAS	70 KTS (81 MPH)
FLAPS	15°
PRESSURE ALTITUDE	6000 FT
ALTIMETER CORRECTION	-8 FT
CORRECTED ALTITUDE	5992 FT





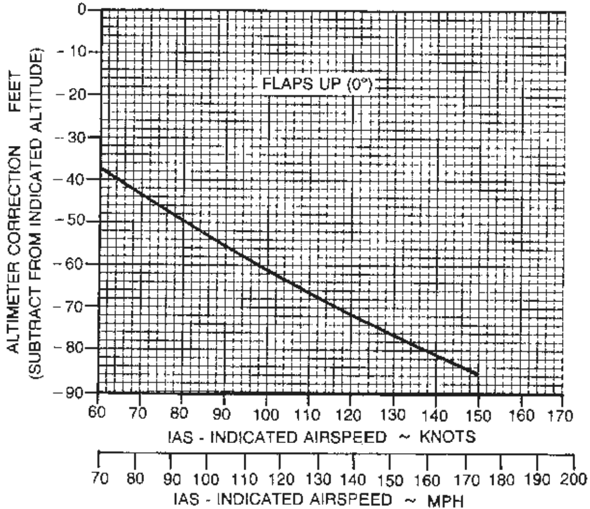
ALTIMETER CORRECTION - EMERGENCY SYSTEM

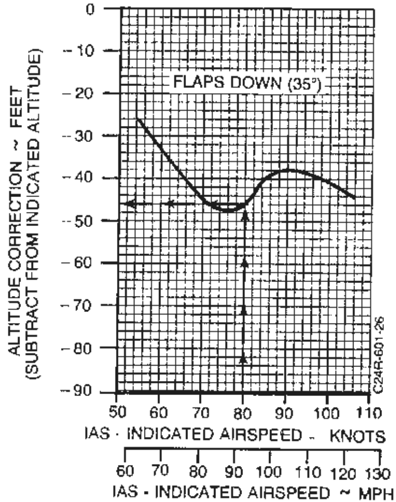
NOTE

INDICATED AIRSPEED AND INDICATED ALTITUDE ASSUME ZERO INSTRUMENT ERROR.

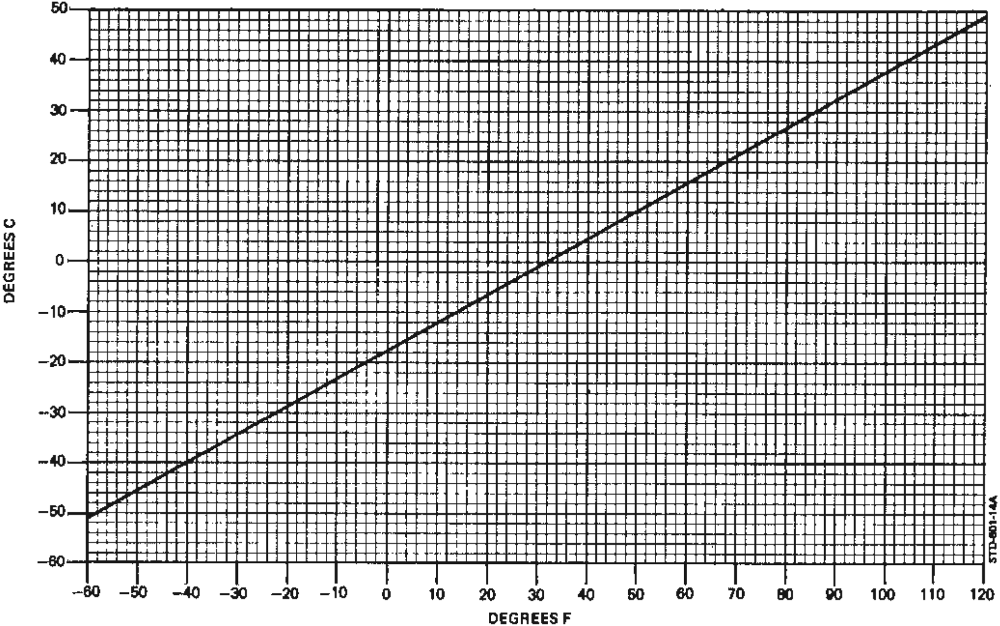
EXAMPLE:

IAS	80 KTS (92 MPH)
FLAPS	DOWN (35°)
INDICATED ALTITUDE	6256 FT
ALTIMETER CORRECTION	-46 FT
CORRECTED ALTITUDE	6210 FT



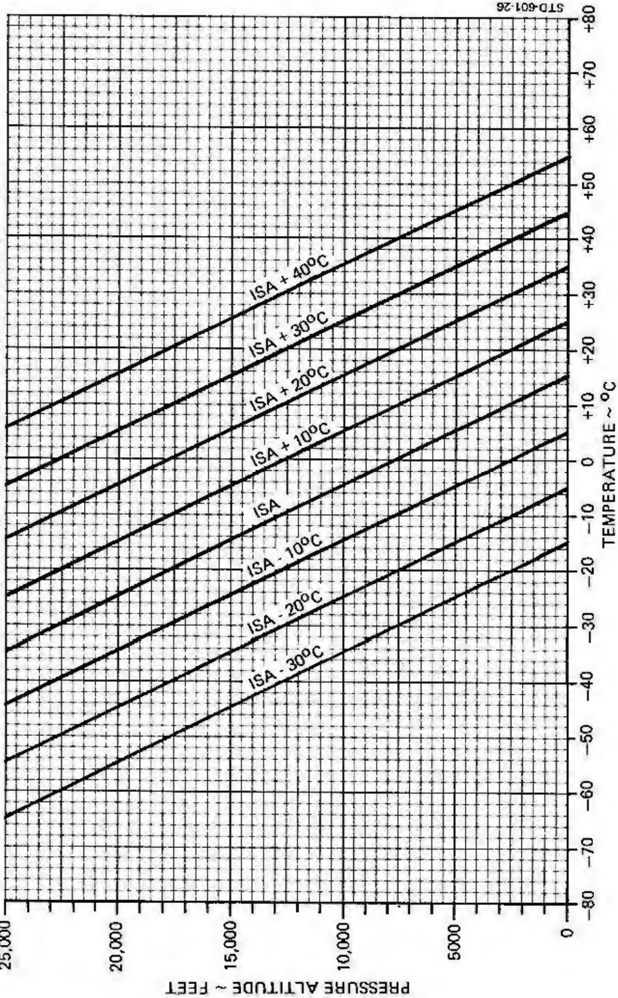


FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION



ISA CONVERSION

PRESSURE ALTITUDE vs OUTSIDE AIR TEMPERATURE



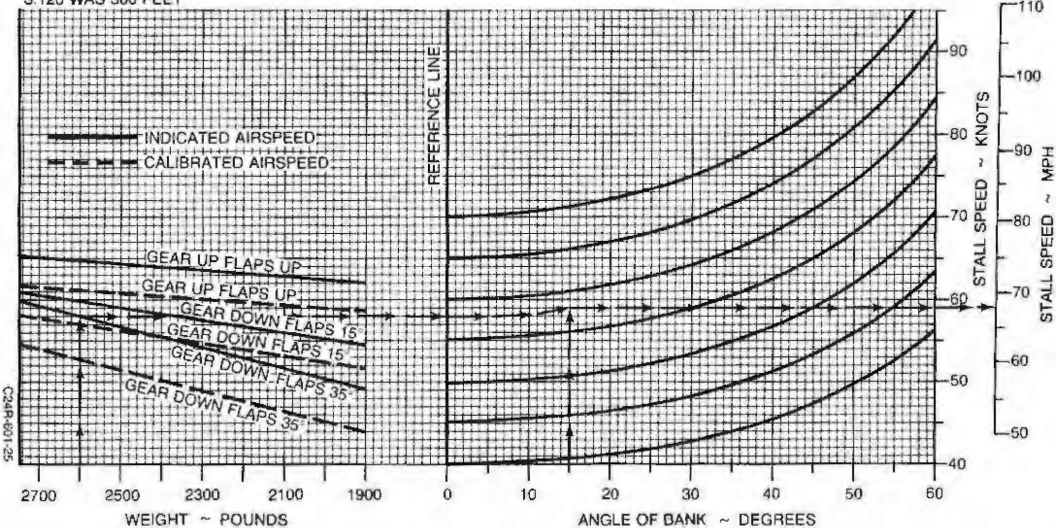
STALL SPEEDS
POWER IDLE

NOTE:

MAXIMUM ALTITUDE LOSS EXPERIENCED WHILE CONDUCTING STALLS IN ACCORDANCE WITH CAM 3.120 WAS 300 FEET

EXAMPLE

WEIGHT	2606 LBS
FLAPS	DN (35°)
ANGLE OF BANK	15°
STALL SPEED (IAS)	59 KTS (68 MPH)

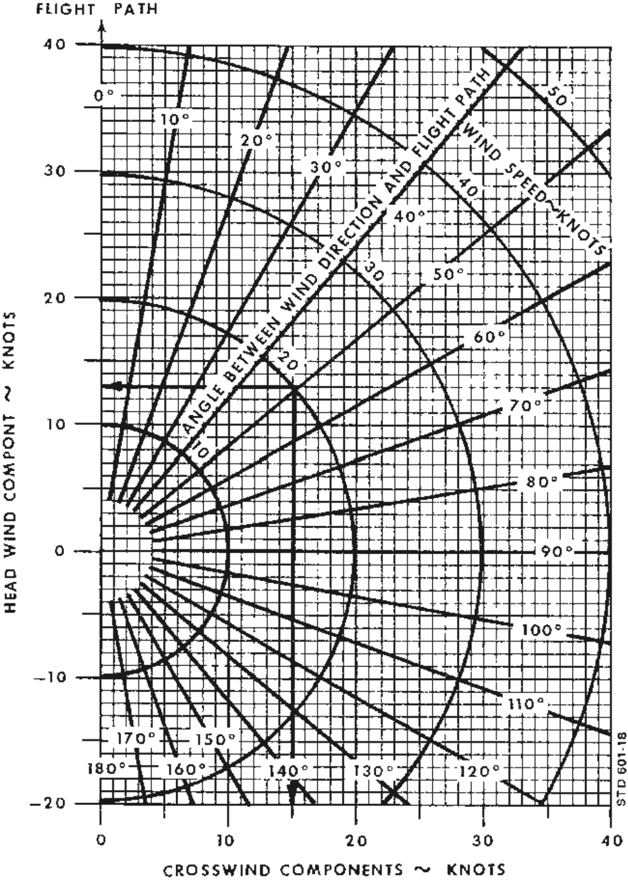


WIND COMPONENTS

Demonstrated Crosswind Component is 17 kts

EXAMPLE:

WIND SPEED	20 KTS
ANGLE BETWEEN WIND DIRECTION AND FLIGHT PATH	50°
HEADWIND COMPONENT	13 KTS
CROSSWIND COMPONENT	15 KTS



TAKE-OFF DISTANCE - HARD SURFACE

LIFT-OFF SPEED 66 KNOTS (76 MPH)
50 FT SPEED 71 KNOTS (82 MPH)

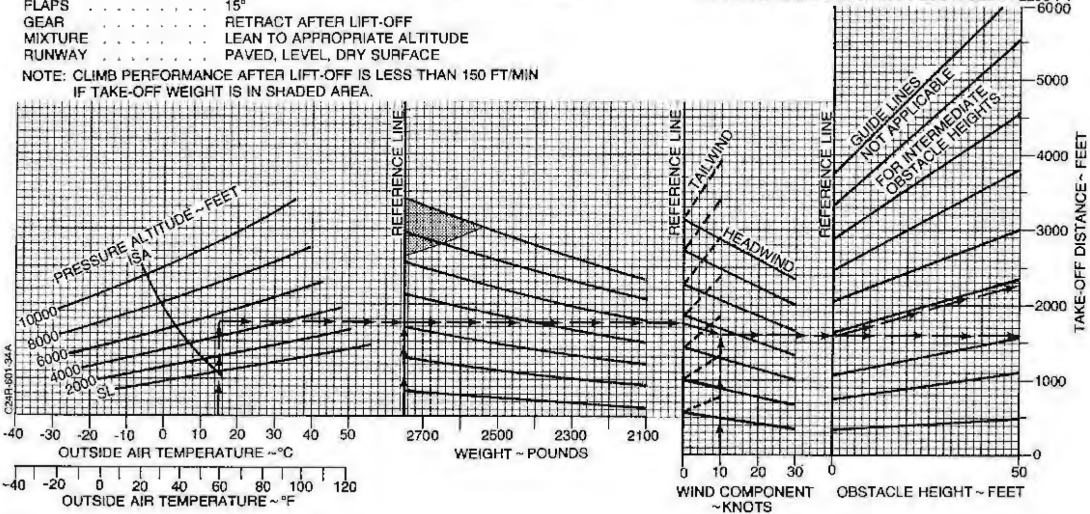
ASSOCIATED CONDITIONS:

POWER	TAKE-OFF POWER SET BEFORE BRAKE RELEASE
FLAPS	15°
GEAR	RETRACT AFTER LIFT-OFF
MIXTURE	LEAN TO APPROPRIATE ALTITUDE
RUNWAY	PAVED, LEVEL, DRY SURFACE

NOTE: CLIMB PERFORMANCE AFTER LIFT-OFF IS LESS THAN 150 FT/MIN IF TAKE-OFF WEIGHT IS IN SHADED AREA.

EXAMPLE:

OAT	15°C (59°F)
PRESSURE ALTITUDE	5650 FT
TAKE-OFF WEIGHT	2750 LBS
HEADWIND COMPONENT	9.5 KTS
GROUND ROLL	1600 FT
TOTAL DISTANCE OVER A 50 FT OBSTACLE	2290 FT



TAKE-OFF DISTANCE - GRASS SURFACE

LIFT-OFF SPEED 66 KNOTS (76 MPH)
50 FT SPEED 71 KNOTS (82 MPH)

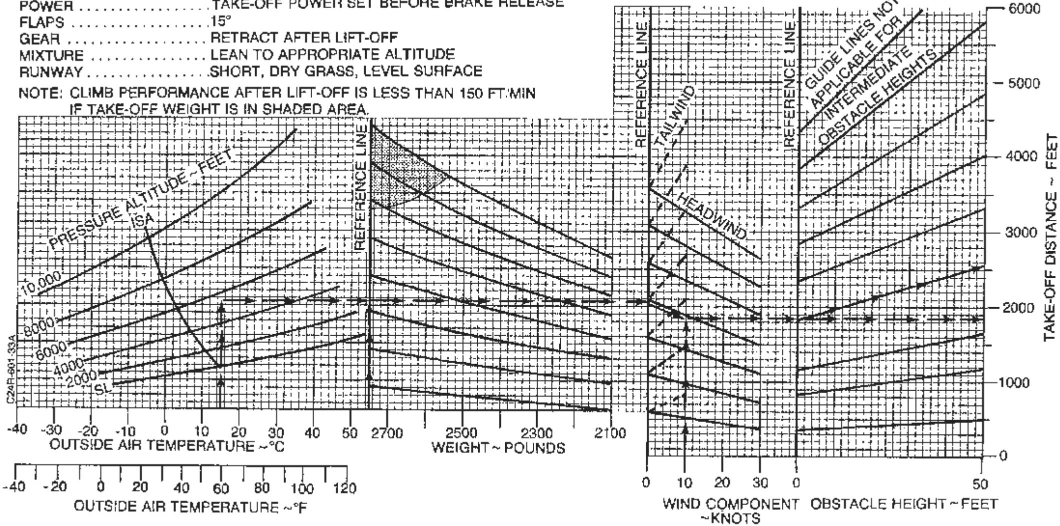
EXAMPLE:

OAT	15°C (59°F)
PRESSURE ALTITUDE	5650 FT
TAKE-OFF WEIGHT	2750 LBS
HEADWIND COMPONENT	9.5KTS
GROUND ROLL	1850 FT
TOTAL DISTANCE OVER A 50 FT OBSTACLE	2580 FT

ASSOCIATED CONDITIONS:

POWER	TAKE-OFF POWER SET BEFORE BRAKE RELEASE
FLAPS	15°
GEAR	RETRACT AFTER LIFT-OFF
MIXTURE	LEAN TO APPROPRIATE ALTITUDE
RUNWAY	SHORT, DRY GRASS, LEVEL SURFACE

NOTE: CLIMB PERFORMANCE AFTER LIFT-OFF IS LESS THAN 150 FT/MIN IF TAKE-OFF WEIGHT IS IN SHADED AREA.



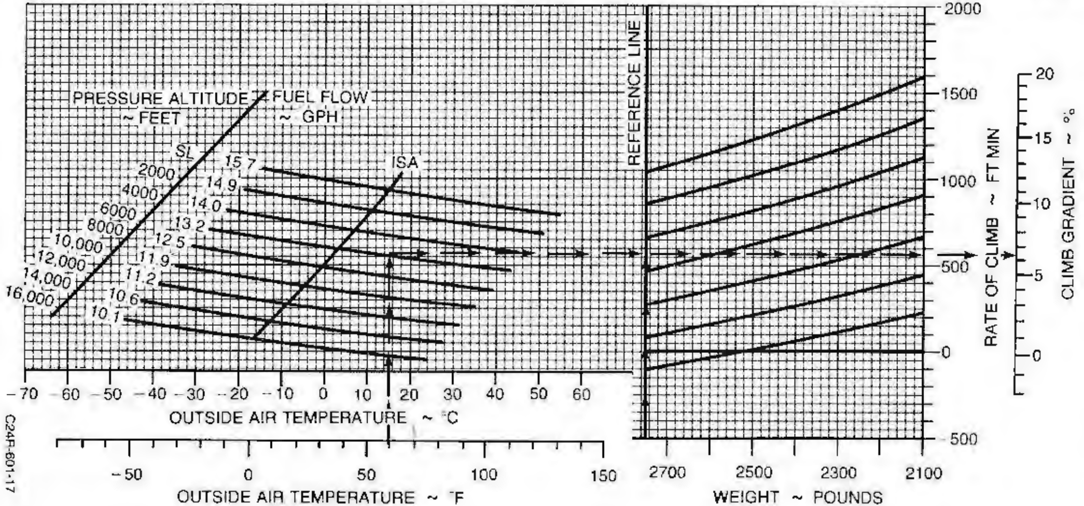
NORMAL CLIMB
CLIMB SPEED - 85 KNOTS (98 MPH)

ASSOCIATED CONDITIONS:

POWER .... FULL THROTTLE AT 2700 RPM
FLAPS .... UP (0°)
LANDING GEAR...... UP
MIXTURE .... LEAN TO APPROPRIATE FUEL FLOW

EXAMPLE:

OAT .... 15°C (59°F)
PRESSURE ALTITUDE 5650 FT
WEIGHT .... 2750 LBS
RATE OF CLIMB ..... 570 FT/MIN
CLIMB GRADIENT ... 6.2%
CLIMB SPEED... 85 KTS (98 MPH)



TIME, FUEL AND DISTANCE TO CLIMB

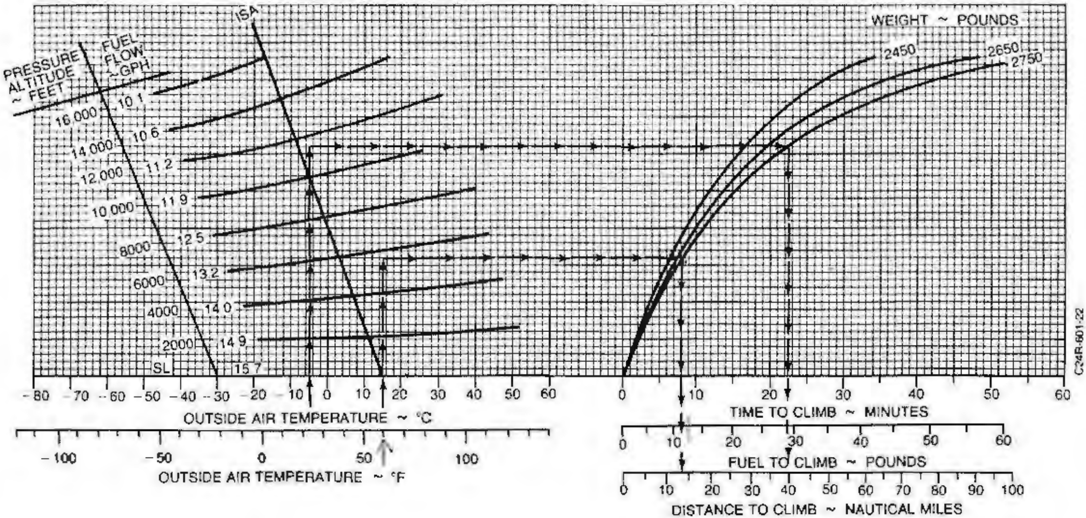
CLIMB SPEED - 96 KNOTS (110 MPH)

ASSOCIATED CONDITIONS

PROPELLER SPEED	2700 RPM
POWER	FULL THROTTLE
FUEL DENSITY	6.0 LBS PER GALLON
FLAPS	UP
GEAR	UP
MIXTURE	LEAN TO APPROPRIATE FUEL FLOW

EXAMPLE

OAT AT TAKE-OFF	15°C (59°F)
OAT AT CRUISE	−5°C (23°F)
AIRPORT PRESSURE ALTITUDE	5650 FT
CRUISE ALTITUDE	11,500 FT
INITIAL CLIMB WEIGHT	2750 LBS
TIME TO CLIMB	23 - 8 = 15 MIN
FUEL TO CLIMB	28.5 - 11.5 = 17 LBS
DISTANCE TO CLIMB	40 - 13 = 27 NM



CRUISE POWER SETTINGS - 2700 RPM

FULL THROTTLE - 2600 POUNDS

	ISA -36°F (-20°C)							STANDARD DAY (ISA)							ISA +36°F (+20°C)						
PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS	
FEET	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH
SL (3)	27	-3	29.7	102	16.9	144	166	63	17	29.7	98	16.4	145	167	99	37	29.7	95	15.8	146	168
1000	23	-5	28.6	99	16.5	143	165	59	15	28.6	96	15.9	144	166	95	35	28.6	92	15.4	145	167
2000	19	-7	27.6	96	16.0	143	165	56	13	27.6	93	15.4	144	166	92	33	27.6	89	14.9	145	167
3000	16	-9	26.6	93	15.5	142	163	52	11	26.6	90	15.0	143	165	88	31	26.6	86	14.4	144	166
4000	12	-11	25.7	90	14.9	141	162	48	9	25.7	87	14.4	142	163	84	29	25.7	83	13.9	143	165
★ 5000	9	-13	24.7	87	14.5	141	162	45	7	24.7	84	14.0	142	163	81	27	24.7	81	13.5	142	163 ★
6000	5	-15	23.9	84	14.0	140	161	41	5	23.9	81	13.5	141	162	77	25	23.9	78	13.0	141	162
7000	1	-17	23.0	81	13.5	139	160	37	3	23.0	79	13.0	140	161	74	23	23.0	75	12.6	140	161
8000	-2	-19	22.2	76	13.1	138	159	34	1	22.2	76	12.6	139	160	70	21	22.2	68	11.4	139	160
9000	-6	-21	21.5	73	12.2	137	158	30	-1	21.5	68	11.4	138	159	66	19	21.5	64	10.6	137	158
10,000	-9	-23	20.7	69	11.4	136	157	27	-3	20.7	61	10.2	137	168	63	17	20.7	59	9.8	137	158
11,000	-13	-25	20.0	64	10.7	134	154	23	-5	20.0	59	9.8	136	157	59	15	20.0	57	9.5	136	157
12,000	-17	-27	19.2	59	9.8	134	154	19	-7	19.2	58	9.7	134	154	55	13	19.2	56	9.3	134	154
13,000	-20	-29	18.5	58	9.7	133	153	16	-9	18.5	56	9.3	133	153	52	11	18.6	54	9.0	132	152
14,000	-24	-31	17.9	56	9.3	131	151	12	-11	17.9	54	9.0	131	151	48	9	17.9	53	8.8	130	150

NOTES: 1) Shaded area represents operation with full throttle.
2) Manifold Pressure values are approximate.
3) Engine will be operating at 5% above rated power, based on a manifold pressure increase of 1 in. Hg due to ram rise.
★Leaning not approved in dashed area; use full-rich only.

CRUISE POWER SETTINGS - 2700 RPM

75% MCP (or FULL THROTTLE) - 2600 POUNDS

	ISA -36°F (-20°C)							STANDARD DAY (ISA)							ISA +36°F (+20°C)						
PRESS ALT	IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS	
FEET	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH
SL	25	-4	22.4	61	10.2	123	142	61	16	23.0	61	10.2	125	144	99	37	23.6	61	10.2	128	147
1000	21	-6	22.1	61	10.2	124	143	57	14	22.7	61	10.2	126	145	95	35	23.3	61	10.2	129	148
2000	18	-8	21.8	61	10.2	125	144	55	13	22.4	61	10.2	128	147	91	33	23.0	61	10.2	130	150
3000	14	-10	21.6	61	10.2	126	145	52	11	22.2	61	10.2	129	148	88	31	22.8	61	10.2	131	151
4000	12	-11	21.3	61	10.2	127	146	48	9	22.0	61	10.2	130	150	84	29	22.5	61	10.2	133	153
5000	9	-13	21.1	61	10.2	128	147	45	7	21.7	61	10.2	131	151	81	27	22.3	61	10.2	134	154
6000	5	-15	20.9	61	10.2	129	148	41	5	21.5	61	10.2	132	152	77	25	22.1	61	10.2	135	155
7000	1	-17	20.7	61	10.2	131	151	37	3	21.3	61	10.2	133	153	73	23	21.9	61	10.2	136	157
8000	-2	-19	20.5	61	10.2	132	152	34	1	21.1	61	10.2	135	155	70	21	21.8	61	10.2	137	158
9000	-6	-21	20.3	61	10.2	133	153	30	-1	20.9	61	10.2	136	157	66	19	21.5	60	10.2	137	158
10,000	-9	-23	20.2	61	10.2	134	154	27	-3	20.7	61	10.2	137	158	63	17	20.7	59	9.8	137	158
11,000	-13	-25	20.0	60	10.2	134	154	23	-5	20.0	59	9.8	136	157	59	15	20.0	57	9.5	136	157
12,000	-17	-27	19.2	59	9.8	134	154	19	-7	19.2	58	9.7	134	154	55	13	19.2	56	9.3	134	154
13,000	-20	-29	18.5	58	9.7	133	153	16	-9	18.5	56	9.3	133	153	52	11	18.5	54	9.0	132	152
14,000	-24	-31	17.9	56	9.3	131	151	12	-11	17.9	54	9.0	131	151	48	9	17.9	53	8.8	130	150

NOTES: 1. Shaded area represents operation with full throttle.
2. Full throttle manifold settings are approximate.

CRUISE POWER SETTINGS - 2500 RPM
75% MCP (or FULL THROTTLE) - 2600 POUNDS

PRESS. ALT	ISA −36°F (−20°C)								STANDARD DAY (ISA)								ISA +36°F (+20°C)							
	IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS	
FEET	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH
SL	25	-4	23.8	61	10.2	123	142	61	16	24.4	61	10.2	126	145	99	37	25.1	61	10.2	129	148
1000	21	-6	23.5	61	10.2	124	143	59	15	24.1	61	10.2	127	146	95	35	24.8	61	10.2	130	150
2000	18	-8	23.3	61	10.2	125	144	55	13	23.9	61	10.2	128	147	91	33	24.5	61	10.2	131	151
3000	16	-9	23.0	61	10.2	127	146	52	11	23.6	61	10.2	129	148	83	31	24.2	61	10.2	132	152
4000	12	-11	22.7	61	10.2	128	147	48	9	23.4	61	10.2	130	150	84	29	24.0	61	10.2	133	153
5000	9	-13	22.5	61	10.2	129	148	45	7	23.1	61	10.2	131	151	81	27	23.7	61	10.2	134	154
6000	5	-15	22.3	61	10.2	130	150	41	5	22.9	61	10.2	132	152	77	25	23.5	61	10.2	135	155
7000	1	-17	22.1	61	10.2	131	151	37	3	22.7	61	10.2	134	154	73	23	23.2	60	10.0	135	155
8000	-2	-19	21.8	61	10.2	132	152	34	1	22.4	60	10.0	134	154	70	21	22.4	59	9.8	134	154
9000	-6	-21	21.6	60	10.0	132	152	30	-1	21.6	59	9.8	133	153	66	19	21.6	57	9.5	133	153
10,000	-9	-23	20.8	59	9.8	131	151	27	-3	20.8	57	9.5	132	152	63	17	20.8	56	9.3	131	151
11,000	-13	-25	20.1	57	9.5	130	150	23	-5	20.1	56	9.3	130	150	59	15	20.1	54	9.0	130	150
12,000	-17	-27	19.3	55	9.2	129	148	19	-7	19.3	54	9.0	128	147	55	13	19.3	53	8.8	127	146
13,000	-20	-29	18.6	54	9.0	127	146	16	-9	18.6	53	8.8	127	146	52	11	18.6	51	8.5	125	144
14,000	-24	-31	17.9	53	8.8	126	145	12	-11	17.9	52	8.7	125	144	48	9	17.9	50	8.3	123	142

NOTES: 1. Shaded area represents operation with full throttle.
2. Full throttle manifold settings are approximate.

CRUISE POWER SETTINGS - 2400 RPM

65% MCP (or FULL THROTTLE) - 2600 POUNDS

	ISA −36°F (−20°C)							STANDARD DAY (ISA)							ISA +36°F (+20°C)						
PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS	
FEET	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH
SL	25	-4	22.3	54	9.0	116	134	61	16	22.9	54	9.0	118	136	97	36	23.5	54	9.0	120	138
1000	21	-6	22.0	54	9.0	117	135	57	14	22.6	54	9.0	119	137	93	34	23.2	54	9.0	121	139
2000	18	-8	21.7	54	9.0	118	136	54	12	22.3	54	9.0	120	138	90	32	23.0	54	9.0	122	140
3000	14	-10	21.5	54	9.0	118	136	50	10	22.1	54	9.0	121	139	86	30	22.7	54	9.0	123	142
4000	10	-12	21.2	54	9.0	119	137	46	8	21.8	54	9.0	122	140	84	29	22.4	54	9.0	124	143
5000	7	-14	20.9	54	9.0	120	138	43	6	21.5	54	9.0	123	142	81	27	22.2	54	9.0	125	144
6000	3	-16	20.7	54	9.0	121	139	41	5	21.3	54	9.0	124	143	77	25	22.0	54	9.0	126	145
7000	1	-17	20.5	54	9.0	122	140	37	3	21.1	54	9.0	125	144	73	23	21.7	54	9.0	126	145
8000	-2	-19	20.3	54	9.0	123	142	34	1	20.9	54	9.0	125	144	70	21	21.5	54	9.0	127	146
9000	-6	-21	20.1	54	9.0	124	143	30	-1	20.7	54	9.0	126	145	66	19	21.3	54	9.0	127	146
10,000	-9	-23	19.9	54	9.0	125	144	27	-3	20.5	54	9.0	127	146	63	17	20.8	53	8.8	127	146
11,000	-13	-25	19.8	54	9.0	125	144	23	-5	20.1	53	8.8	126	145	59	15	20.1	52	8.7	126	145
12,000	-17	-27	19.3	54	9.0	125	144	19	-7	19.3	52	8.7	125	144	55	13	19.3	51	8.5	123	142
13,000	-20	-29	18.6	52	8.7	124	143	16	-9	18.6	51	8.5	123	142	52	11	18.6	49	8.2	120	138
14,000	-24	-31	17.9	51	8.5	121	139	12	-11	17.9	49	8.2	120	138	48	9	17.9	48	8.0	117	135

NOTES: 1. Shaded area represents operation with full throttle.
2. Full throttle manifold settings are approximate.

CRUISE POWER SETTINGS - 2400 RPM

55% MCP - 2600 POUNDS

	ISA −36°F (−20°C)							STANDARD DAY (ISA)							ISA +36°F (+20°C)						
PRESS. ALT	IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS		IOAT		MAN. PRESS.	FUEL FLOW		TAS	
FEET	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH	°F	°C	IN. HG	PPH	GPH	KTS	MPH
SL	25	-4	19.7	48	8.0	106	122	61	16	20.3	48	8.0	108	124	97	36	20.8	48	8.0	110	127
1000	21	-6	19.6	48	8.0	107	123	57	14	20.1	48	8.0	108	124	93	34	20.6	48	8.0	110	127
2000	18	-8	19.3	48	8.0	107	123	54	12	19.8	48	8.0	109	125	90	32	20.3	48	8.0	111	128
3000	14	-10	19.1	48	8.0	108	124	50	10	19.6	48	8.0	110	127	86	30	20.1	48	8.0	112	129
4000	10	-12	18.9	48	8.0	109	125	46	8	19.4	48	8.0	111	128	82	28	19.9	48	8.0	113	130
5000	7	-14	18.6	48	8.0	110	127	43	6	19.1	48	8.0	112	129	79	26	19.7	48	8.0	113	130
6000	3	-16	18.4	48	8.0	111	128	39	4	18.9	48	8.0	113	130	75	24	19.4	48	8.0	114	131
7000	0	-18	18.2	48	8.0	111	128	36	2	18.7	48	8.0	113	130	72	22	19.2	48	8.0	115	132
8000	-4	-20	18.0	48	8.0	112	129	32	0	18.5	48	8.0	114	131	68	20	19.1	48	8.0	115	132
9000	-8	-22	17.8	48	8.0	113	130	28	-2	18.3	48	8.0	114	131	64	18	18.9	48	8.0	116	134
10,000	-11	-24	17.6	48	8.0	114	131	25	-4	18.1	48	8.0	115	132	61	16	18.7	48	8.0	116	134
11,000	-15	-26	17.5	48	8.0	114	131	21	-6	18.0	48	6.0	116	134	57	14	18.5	48	8.0	117	135
12,000	-18	-28	17.3	48	8.0	115	132	18	-8	17.8	48	8.0	116	134	55	13	18.3	48	8.0	117	135
13,000	-22	-30	17.1	48	8.0	115	132	14	-10	17.6	48	8.0	116	134	50	10	18.1	48	8.0	117	135
14,000	-26	-32	16.8	48	8.0	116	134	10	-12	17.4	48	8.0	117	135	46	8	18.0	48	8.0	117	135

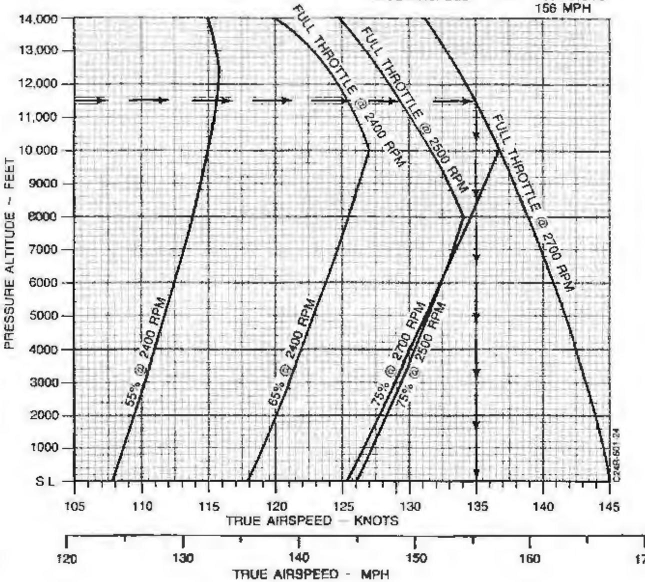
CRUISE SPEEDS

ASSOCIATED CONDITIONS

AVERAGE CRUISE WEIGHT	2600 LBS
TEMPERATURE	STANDARD DAY (ISA)

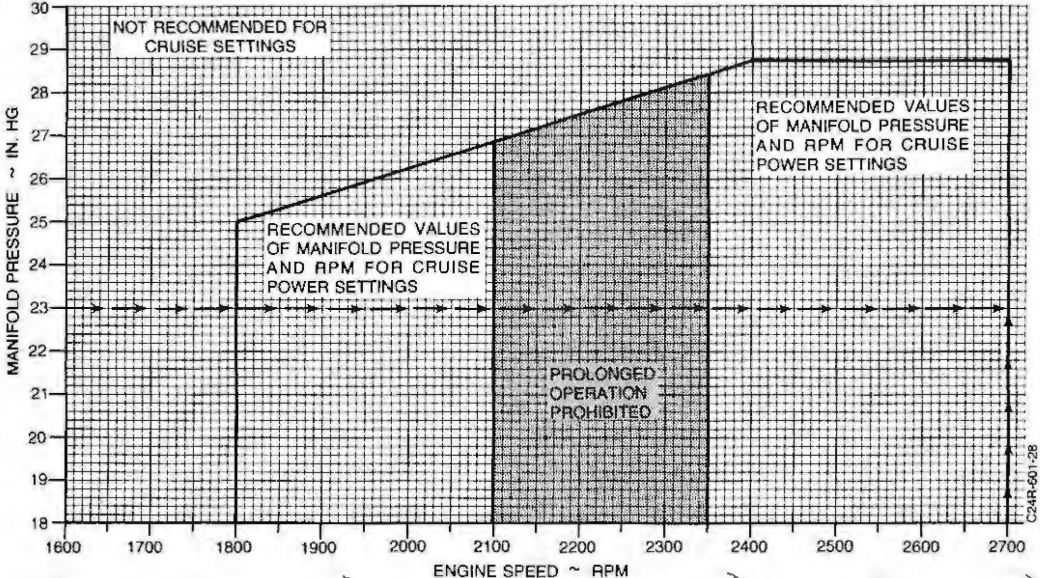
EXAMPLE

PRESSURE ALTITUDE	11,500 FT
POWER SETTING	FULL THROTTLE 2700 RPM
TRUE AIRSPEED	135 KNOTS 156 MPH



MANIFOLD PRESSURE vs RPM

EXAMPLE
ENGINE SPEED .... 2700 RPM
MANIFOLD PRESSURE .... 23 IN. HG
WITHIN RECOMMENDED LIMITS



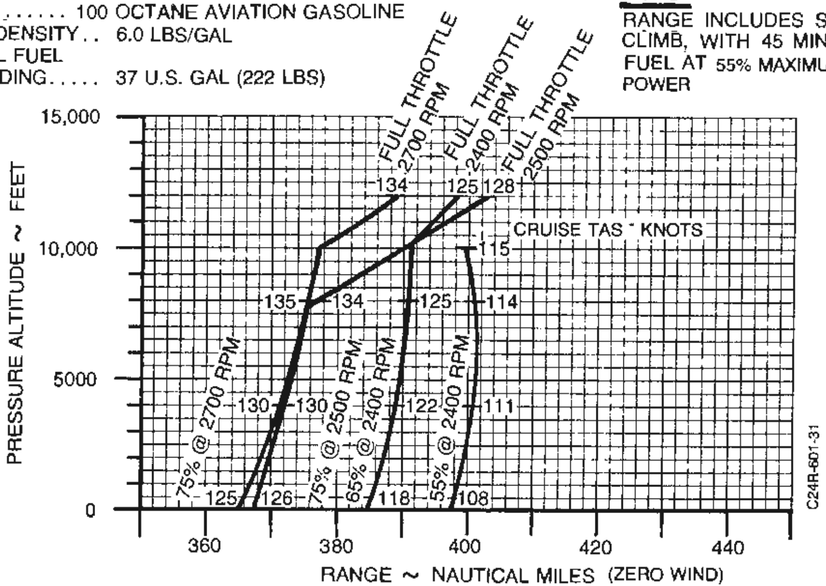
RANGE PROFILE - 37 GALLONS

STANDARD DAY

ASSOCIATED CONDITIONS:

WEIGHT . . . . . 2758 LBS BEFORE ENGINE START
FUEL . . . . 100 OCTANE AVIATION GASOLINE
FUEL DENSITY . . 6.0 LBS/GAL
INITIAL FUEL
LOADING . . . . . 37 U.S. GAL (222 LBS)

NOTE:
RANGE INCLUDES START, TAXI, CLIMB, WITH 45 MINUTES RESERVE FUEL AT 55% MAXIMUM CONTINUOUS POWER



RANGE PROFILE—57 GALLONS

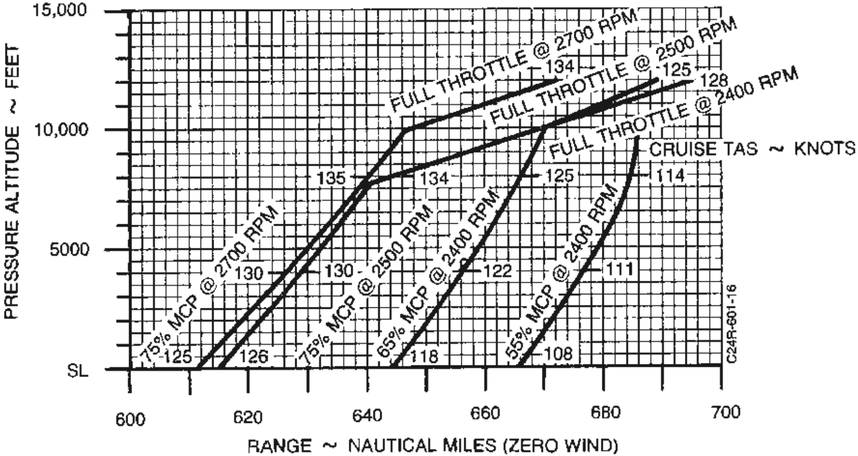
STANDARD DAY

ASSOCIATED CONDITIONS:

WEIGHT . . . . 2758 LBS BEFORE ENGINE START
FUEL . . . . 100 OCTANE AVIATION GASOLINE
FUEL DENSITY . . . . 6.0 LBS/GAL
INITIAL FUEL LOADING . . 57 U.S. GAL (342 LBS)

NOTE:

RANGE INCLUDES START, TAXI, AND CLIMB, WITH 45 MINUTES RESERVE FUEL AT 55% MAXIMUM CONTINUOUS POWER



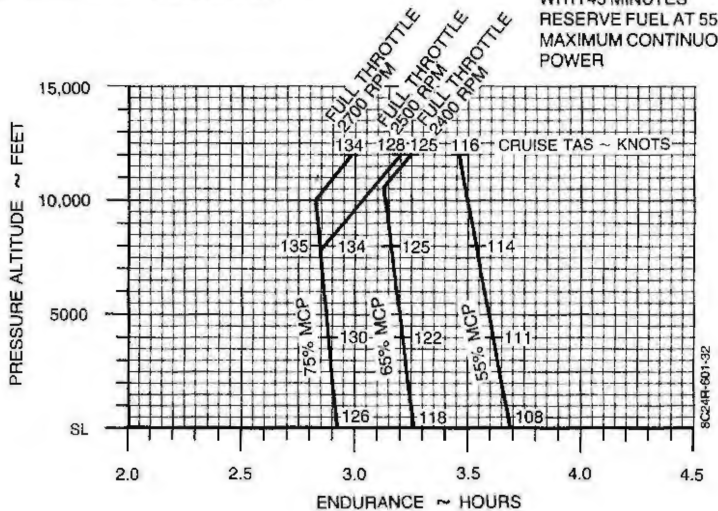
ENDURANCE PROFILE—37 GALLONS

STANDARD DAY

ASSOCIATED CONDITIONS:

WEIGHT .... 2758 LBS BEFORE ENGINE START
FUEL .... 100 OCTANE AVIATION GASOLINE
FUEL DENSITY ....6.0 LBS/GAL
INITIAL FUEL
LOADING .... 37 U.S. GALS (222 LBS)

NOTE:
ENDURANCE INCLUDES START, TAXI, AND CLIMB, WITH 45 MINUTES RESERVE FUEL AT 55% MAXIMUM CONTINUOUS POWER



ENDURANCE PROFILE—57 GALLONS

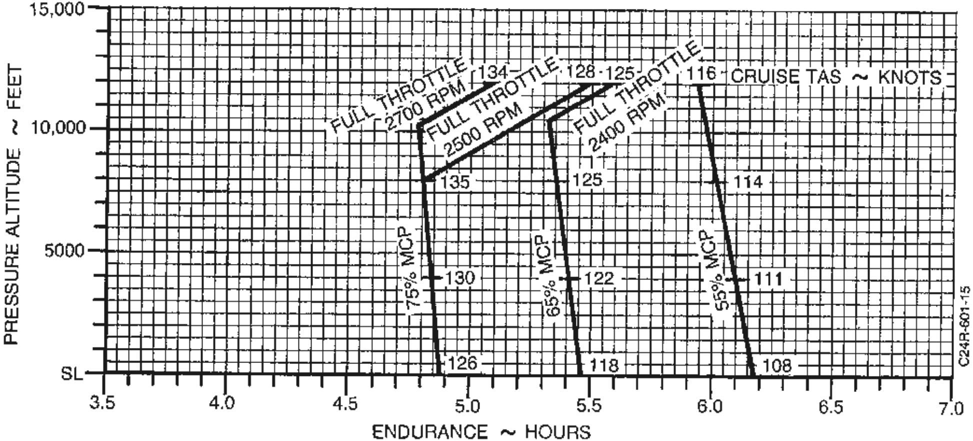
STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

WEIGHT	2758 LBS BEFORE ENGINE START
FUEL	100 OCTANE AVIATION GASOLINE
FUEL DENSITY	6.0 LBS/GAL
INITIAL FUEL LOADING	57 U.S. GAL (342 LBS)

NOTE:

ENDURANCE INCLUDES START, TAXI, AND CLIMB, WITH 45 MINUTES RESERVE FUEL AT 55% MAXIMUM CONTINUOUS POWER



LANDING DISTANCE—HARD SURFACE

ASSOCIATED CONDITIONS:

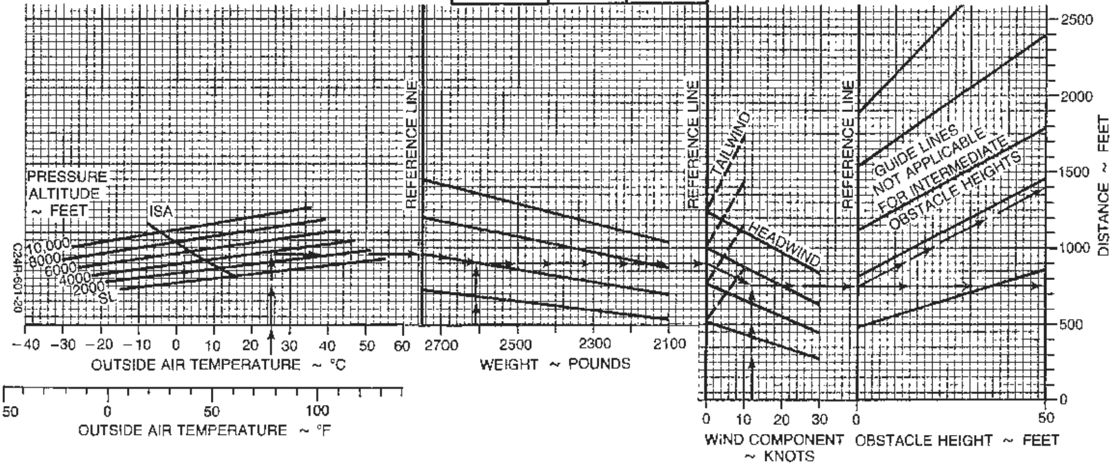
POWER............RETARD TO MAINTAIN 800 FT/MIN. ON FINAL APPROACH
FLAPS.............DOWN (35°)
RUNWAY...........PAVED, HARD, DRY SURFACE
APPROACH SPEED...IAS AS TABULATED
BRAKING ....MAXIMUM

WEIGHT ~ POUNDS	APPROACH SPEED	
	KNOTS	MPH
2750	70	81
2500	66	75
2300	62	71
2100	58	67

EXAMPLE:

OAT .... 25°C (77°F)
PRESSURE ALTITUDE .... 3925 FT
LANDING WEIGHT .... 2606 LBS
HEADWIND COMPONENT .... 12 KTS

GROUND ROLL .... 750 FT
TOTAL OVER 50 FT OBSTACLE .... 1400 FT
APPROACH SPEED .... 68 KTS (78 MPH)



LANDING DISTANCE—GRASS SURFACE

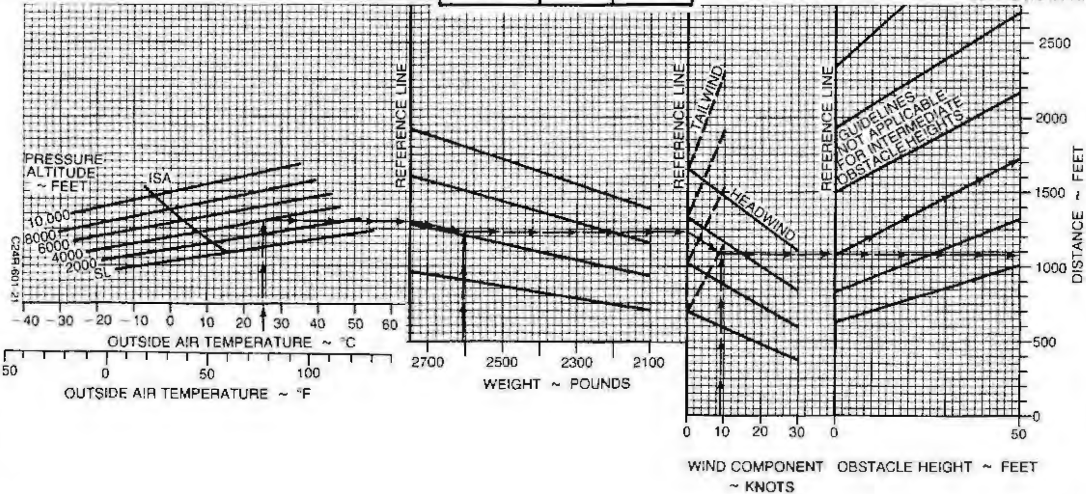
ASSOCIATED CONDITIONS

POWER	RETARD TO MAINTAIN 800 FT/MIN ON FINAL APPROACH
FLAPS	DOWN (35°)
RUNWAY	SHORT, DRY, GRASS
APPROACH SPEED	IAS AS TABULATED
BRAKING	MAXIMUM

WEIGHT ~ POUNDS	APPROACH SPEED	
	KNOTS	MPH
2750	70	81
2500	66	75
2300	62	71
2100	58	67

EXAMPLE

OAT	25°C (77°F)
PRESSURE ALTITUDE	3925 FT
LANDING WEIGHT	2606 LBS
HEAD WIND COMPONENT	8.7 KTS
GROUND ROLL	1080 FT
TOTAL OVER 50 FT OBSTACLE	1730 FT
APPROACH SPEED	68 KTS (78 MPH)



SECTION VI

WEIGHT AND BALANCE/ EQUIPMENT LIST

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INTRODUCTION TO WEIGHT AND BALANCE

The necessity for proper computation of the airplane's weight and balance cannot be overemphasized. In the basic design, it is planned that under normal loading the weight distribution of pilot, passengers, baggage, and fuel will balance the airplane for flight. Since these items are all variables, it is possible to concentrate weight in such a way as to make the airplane unsafe for flight. The factors which must be considered in the weight and balance of the airplane are the installation of equipment after the airplane has been weighed, trapped or unusable fuel, engine oil, usable fuel, pilot and passenger weights, and baggage or cargo.

In order to simplify the computation of the weight and balance, Beech Aircraft Corporation has devised a form called Basic Empty Weight and Balance. When the airplane is delivered from the factory it will first be weighed and the data recorded on this form. Provision has been made on the form for listing additions of items to be installed before the delivery or subtractions of items to be removed before delivery from the "as weighed" condition. This then represents the empty weight of the airplane.

When the airplane is first fueled, a certain amount of fuel is trapped in the fuel lines and cells which cannot be drained. Also, in some regimes of flight there are certain amounts of fuel that cannot be used. The combination of these fuel amounts is classified as unusable fuel. Also, it has been found that all operators bring the oil level near full before each flight. Thus, these items are computed along with the empty weight, giving a Basic Empty Weight as a starting point to the pilot for each flight computation.

Once the Basic Empty Weight for a given airplane has been established, the pilot is then only concerned with the variable items which will comprise his useful load. These items which are of a changing nature are: Pilot and Passengers (computed on an individual weight and the seat occupied), Baggage and/or Cargo (computed on weight and location within the airplane), and Usable Fuel (the remaining fuel after subtracting the unusable fuel from the measured fuel on board).

WEIGHING INSTRUCTIONS

Periodic weighing of the airplane may be required to keep the Basic Empty Weight current. All changes to the airplane affecting weight and balance are the responsibility of the airplane's operator.

1. Three jack points are provided for weighing: two on the wing front spar at Fuselage Station 129.2 and one on the aft fuselage at Fuselage Station 285.9 (tail tie-down ring).

2. Fuel should be drained preparatory to weighing. Tanks are drained from the regular drain ports with the airplane in static ground attitude. The unusable fuel to be added to a Basic Empty Weight is 15.6 pounds at Fuselage Station 125.0.

3. Engine oil must be at the full level or completely drained. Total engine oil when full is 15 pounds at Fuselage Station 50.

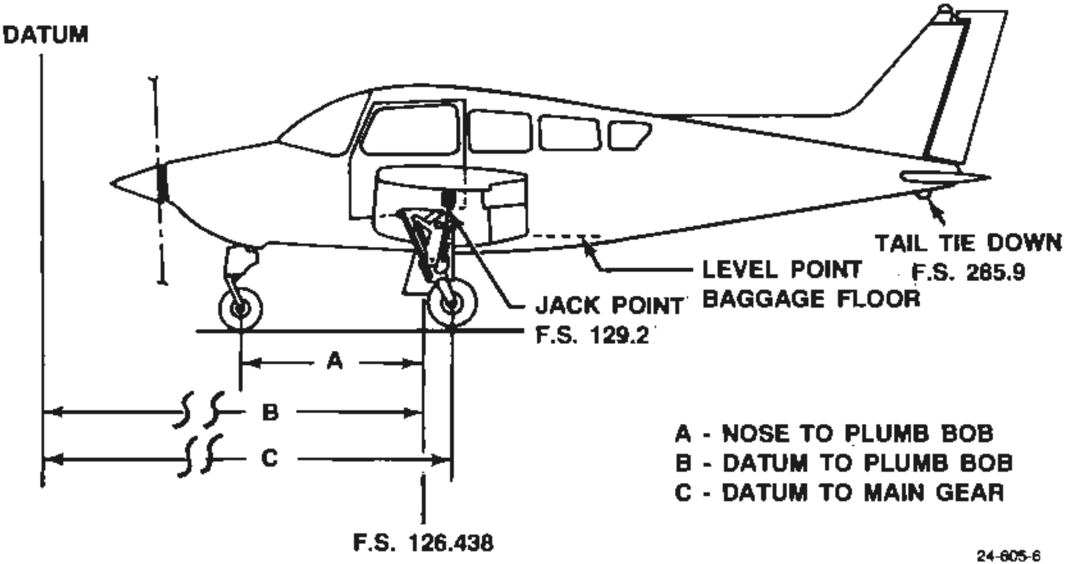
4. To determine airplane configuration at time of weighing, installed equipment is checked against the airplane equipment list or superseding forms. All installed equipment must be in its proper place during weighing.

5. At the time of weighing, the airplane must be level both longitudinally and laterally, and the landing gear must be fully extended. Longitudinal and lateral level is determined with a level on the baggage compartment floor.

6. Measurement of the reaction arms for a wheel weighing is made using a steel measuring tape. Measurements are taken, with the airplane level on the scales, from the reference (a plumb bob dropped from centerline of airplane at F. S. 126.438, forward screw in spar access cover, approximately 8 to 10 inches forward of centerline drain hole) to the axle centerline of the main gear and then to the nose wheel axle centerline. The main wheel axle centerline is best located by stretching a string across from one main wheel to the other. All measurements are to be taken with the tape level with the hangar floor and parallel to the fuselage centerline. The locations of the wheel reactions will be approximately at Fuselage Station 129.5 for main wheels and Fuselage Station 57.6 for the nose wheel.

7. Jack point weighings are accomplished by placing scales on the jack points specified in step 1 above. Since the center of gravity of the airplane is forward of Fuselage Station 129.2 the tail reaction of the airplane will be in an up direction. This can be measured on regular scales by placing ballast of approximately 200 pounds on the scales to which the aft weighing point is attached by cable of adjustable length. The up reaction will then be total ballast weight minus the scale reading and is entered in the weighing form as a negative quantity.

8. Weighing should always be performed in an enclosed area which is free from air currents. The scales used should be properly calibrated and certified.


DATUM
TAIL TIE DOWN
F.S. 285.9
LEVEL POINT
BAGGAGE FLOOR
JACK POINT
F.S. 129.2
A
B
C
F.S. 126.438
A - NOSE TO PLUMB BOB
B - DATUM TO PLUMB BOB
C - DATUM TO MAIN GEAR
24-605-6

BASIC EMPTY WEIGHT AND BALANCE

SIERRA 200 C24R SER. NO. ______ REG. NO. ______ DATE ______

JACK POINT LOCATION

FORWARD 129.2
AFT 285.9

PREPARED BY

Company ______
Signature ______

REACTION WHEEL - JACK POINTS	SCALE READING	TARE	NET WEIGHT	ARM	MOMENT
LEFT MAIN					
RIGHT MAIN					
NOSE OR TAIL					
TOTAL (AS WEIGHED)					
Space below provided for additions and subtractions to as - weighed condition					
LESS 6 QT OIL			−15.0	50	−750
EMPTY WEIGHT					
ENGINE OIL			15.0	50.0	750
UNUSABLE FUEL			15.6	125.0	1950
BASIC EMPTY WEIGHT					

NOTE

Each new airplane is delivered with a completed sample loading, basic empty weight and center of gravity, and equipment list, all pertinent to that specific airplane. It is the owner's responsibility to ensure that changes in equipment are reflected in a new weight and balance and in an addendum to the equipment list. There are many ways of doing this; it is suggested that a running tally of equipment changes and their effect on basic empty weight and CG is a suitable means for meeting both requirements.

The current equipment list and basic empty weight and CG information must be retained with the airplane when it changes ownership. Beech Aircraft Corporation cannot maintain this information; the current status is known only to the owner. If these papers become lost, the FAA will require that the airplane be re-weighed to establish the basic empty weight and CG and that an inventory of installed equipment be conducted to create a new equipment list.

It is recommended that duplicate copies of the Basic Empty Weight and Balance sheet and the Equipment List be made and kept in an alternate location in the event the original handbook is misplaced.

WEIGHT AND BALANCE RECORD

SERIAL NO. ____________ REGISTRATION NO. ____________ PAGE NO. ____________

DATE	ITEM NO.		DESCRIPTION OF ARTICLE OR CHANGE	WEIGHT CHANGE ADDED (+) OR REMOVED (-)			RUNNING BASIC EMPTY WEIGHT	
	IN	OUT		WT (LBS)	ARM (IN.)	MOM/100	WT (LBS)	MOM/100

WEIGHT AND BALANCE RECORD

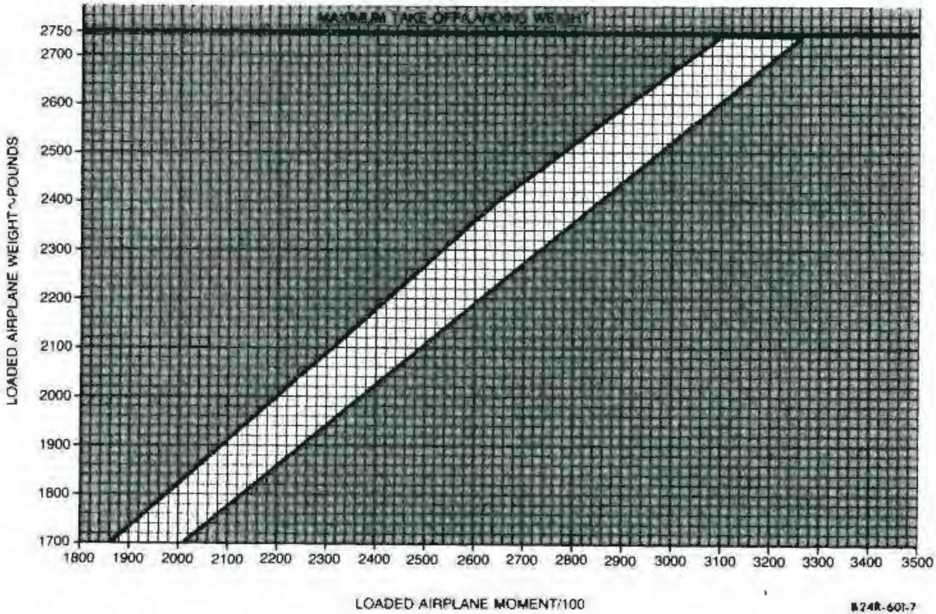
SERIAL NO. ____________ REGISTRATION NO. ____________ PAGE NO. ____________

DATE	ITEM NO.		DESCRIPTION OF ARTICLE OR CHANGE	WEIGHT CHANGE ADDED (+) OR REMOVED (-)			RUNNING BASIC EMPTY WEIGHT	
	IN	OUT		WT (LBS)	ARM (IN.)	MOM/100	WT (LBS)	MOM/100

WEIGHT AND BALANCE RESPONSIBILITIES

The Basic Empty Weight and Moment of the airplane at the time of delivery are shown on the Aircraft Basic Empty Weight and Balance form. Useful load items which may be loaded into the airplane are shown on the Useful Load Weights and Moments tables. The minimum and maximum moments are shown on the Moment Limits vs Weight table and can also be plotted on the Moment Limits vs Weight graph as visual indication that the limit is within the operational envelope. These moments correspond to the forward and aft center-of-gravity flight limits for a particular weight. The airplane must be loaded in such a manner to keep the center of gravity within these limits.

WEIGHT VS MOMENT LIMITS



MOMENT LIMITS vs WEIGHT

Weight	Minimum Moment/100	Maximum Moment/100	Weight	Minimum Moment/100	Maximum Moment/100	Weight	Minimum Moment/100	Maximum Moment/100
1700	1870	2011	2100	2310	2484	2500	2775	2958
1710	1881	2023	2110	2321	2496	2510	2788	2969
1720	1892	2035	2120	2332	2508	2520	2801	2981
1730	1903	2047	2130	2343	2520	2530	2814	2993
1740	1914	2058	2140	2354	2532	2540	2828	3005
1750	1925	2070	2150	2365	2543	2550	2841	3017
1760	1936	2082	2160	2376	2555	2560	2854	3028
1770	1947	2094	2170	2387	2567	2570	2867	3040
1780	1958	2106	2180	2398	2579	2580	2880	3052
1790	1969	2118	2190	2409	2591	2590	2894	3064
1800	1980	2129	2200	2420	2603	2600	2907	3076
1810	1991	2141	2210	2431	2614	2610	2920	3088
1820	2002	2153	2220	2442	2626	2620	2933	3099
1830	2013	2165	2230	2453	2638	2630	2947	3111
1840	2024	2177	2240	2464	2650	2640	2960	3123
1850	2035	2189	2250	2475	2662	2650	2973	3135
1860	2046	2200	2260	2486	2674	2660	2987	3147
1870	2057	2212	2270	2497	2685	2670	3000	3159
1880	2068	2224	2280	2508	2697	2680	3013	3170
1890	2079	2236	2290	2519	2709	2690	3027	3182
1900	2090	2248	2300	2530	2721	2700	3040	3194
1910	2101	2260	2310	2541	2733	2710	3054	3206
1920	2112	2271	2320	2552	2745	2720	3067	3218
1930	2123	2283	2330	2563	2756	2730	3081	3230
1940	2134	2295	2340	2574	2768	2740	3094	3241
1950	2145	2307	2350	2585	2780	2750	3108	3253
1960	2156	2319	2360	2596	2792			
1970	2167	2331	2370	2607	2804			
1980	2178	2342	2380	2619	2815			
1990	2189	2354	2390	2632	2827			
2000	2200	2366	2400	2645	2839			
2010	2211	2378	2410	2658	2851			
2020	2222	2390	2420	2671	2863			
2030	2233	2401	2430	2684	2875			
2040	2244	2413	2440	2697	2887			
2050	2255	2425	2450	2710	2898			
2060	2266	2437	2460	2723	2910			
2070	2277	2449	2470	2736	2922			
2080	2288	2461	2480	2749	2934			
2090	2299	2472	2490	2762	2946			

The above weight and moment limits are based on the following weight and center of gravity limit data:

NORMAL CATEGORY

WEIGHT CONDITION	FWD CG LIMIT	AFT CG LIMIT
2750 lb (Max. Take-Off or Landing)	113.0	118.3
2375 lb or less	110.0	118.3

COMPUTING PROCEDURE

1. Record the Basic Empty Weight and Moment from the Basic Empty Weight and Balance form (or from the latest superseding form) under the Basic Empty Condition block. The moment must be divided by 100 to correspond to Useful Load Weights and Moments tables.

2. Record the weight and corresponding moment from the appropriate table of each of the useful load items (except fuel) to be carried in the airplane.

3. Total the weight column and moment column. The SUB-TOTALS are the ZERO FUEL CONDITION.

4. Determine the weight and corresponding moment for the fuel loading to be used. This fuel loading includes fuel for the flight, plus that required for start, taxi, and takeoff. Add the Fuel Loading Condition to Zero Fuel Condition to obtain the SUB-TOTAL Ramp Condition.

5. Subtract the fuel to be used for start, taxi, and takeoff to arrive at the SUB-TOTAL Take-off Condition.

6. Subtract the weight and moment of fuel to be used from the take-off weight and moment. The SUB-TOTAL Condition of No. 3 and No. 5, as well as the landing condition moment, must be within the minimum and maximum moments shown on the Moment Limits vs Weight graph for that weight. If the total moment is less than the minimum moment allowed, useful load items must be shifted aft, or forward load items reduced. If the total moment is greater than the maximum moment allowed, useful load items must be shifted forward, or aft load items reduced. If the quantity or location of load items is changed, the calculations must be revised and the moments rechecked.

WEIGHT AND BALANCE LOADING FORM

MODEL *SIERRA C24R* DATE *X-X-XX*

SERIAL NO. *XXX* REG. NO. *NXXXXX*

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION	*1720*	*1912*
2. FRONT SEAT OCCUPANTS	*340*	*374*
3. 3rd & 4th SEAT OCCUPANTS	*340*	*482*
4. 5th & 6th SEAT OCCUPANTS	*130*	*222*
5. BAGGAGE	—	—
6. CARGO	—	—
7. SUB TOTAL	*2530*	*2990*
8. FUEL LOADING *(32 gal)*	*192*	*225*
9. SUB TOTAL RAMP CONDITION	*2722*	*3215*
10. *LESS FUEL FOR START, TAXI, and TAKE-OFF	*-8*	*-9*
11. SUB TOTAL TAKE-OFF CONDITION	*2714*	*3206*
12. LESS FUEL TO DESTINATION *(25 gal)*	*-150*	*-176*
13. LANDING CONDITION	*2564*	*3030*

*Fuel for start, taxi and take-off is normally 8 lbs at an average mom/100 of 9.

WEIGHT AND BALANCE LOADING FORM

MODEL *SIERRA C24R* ______ DATE ______________

SERIAL NO. ______________ REG. NO. ______________

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION		
2. FRONT SEAT OCCUPANTS		
3. 3rd & 4th SEAT OCCUPANTS		
4. 5th & 6th SEAT OCCUPANTS		
5. BAGGAGE		
6. CARGO		
7. **SUB TOTAL**		
8. FUEL LOADING		
9. **SUB TOTAL** RAMP CONDITION		
10. *LESS FUEL FOR START, TAXI, AND TAKE-OFF		
11. **SUB TOTAL** TAKE-OFF CONDITION		
12. LESS FUEL TO DESTINATION		
13. LANDING CONDITION		

*Fuel for start, taxi and take-off is normally 8 lbs at an average mom/100 of 9.

USEFUL LOAD WEIGHTS AND MOMENTS

OCCUPANTS

	FRONT SEATS			3RD AND 4TH SEATS	
	*FWD POS.		*AFT POS.	BENCH SEAT	SPLIT SEAT
	††ARM **104	†ARM **105	ARM **112	ARM **142	ARM **144
WEIGHT	MOM/100	MOM/100	MOM/100	MOM/100	MOM/100
120	125	126	134	170	173
130	135	137	146	185	187
140	146	147	157	199	202
150	156	158	168	213	216
160	166	168	179	227	230
170	177	179	190	241	245
180	187	189	202	256	259
190	198	200	213	270	274
200	208	210	224	284	288

†Effective MC-449, MC-452 thru MC-555
††Effective MC-556 and after
*Reclining seat with back in full-up position
**Values computed from a C.G. criterion based on a 170 pound male. Differences in physical characteristics can cause variation in center of gravity location.

USEFUL LOAD WEIGHTS AND MOMENTS

5th & 6th SEATS ARM 171			
Weight	Moment/100	Weight	Moment/100
80	137	140	239
90	154	150	257
100	171	160	274
110	188	170	291
120	205	180	308
130	222	190	325
		200	342

USABLE FUEL
ARM 117

GALLONS	WEIGHT	MOMENT/100
5	30	35
10	60	70
15	90	105
20	120	140
22	132	154
25	150	176
27	162	189
30	180	211
32	192	225
35	210	246
37	222	259
40	240	281
45	270	316
50	300	351
52	312	365
57	342	400

USEFUL LOAD WEIGHTS AND MOMENTS

BAGGAGE

ARM 167

Weight	Moment/100	Weight	Moment/100
10	17	140	234
20	33	150	251
30	50	160	267
40	67	170	284
50	84	180	301
60	100	190	317
70	117	200	334
80	134	210	351
90	150	220	367
100	167	230	384
110	184	240	401
120	200	250	418
130	217	260	434
		270	451

SECTION VII

SYSTEMS DESCRIPTION

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SUBJECT PAGE

SUBJECT *PAGE*

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AIRFRAME

The Sierra C24R is a 4-place airplane with an optional bench-type children's seat in the area otherwise used for baggage. It is an all-metal, single-engine airplane with retractable tricycle landing gear. It utilizes conventional flight control surfaces except for a stabilator for the horizontal empennage surface.

SEATING ARRANGEMENTS

In the standard configuration two adjustable seats and one fixed-bench seat are installed. Optional split 3rd and 4th seats and a fixed-bench children's seat are available. To adjust either of the front seats, pull the release knob below the left forward seat corner (pull to the right, then up) and slide the seat forward or aft, as desired. Make certain the seat is locked securely in place after adjustment. The backs of all individual seats can be placed in any of three positions. Outboard armrests for the front seats are attached to the cabin doors.

FLIGHT CONTROLS

CONTROL SURFACES

The control surfaces are operated with conventional cable systems terminating in bell cranks.

CONTROL COLUMN

A single control column/wheel is installed as standard equipment on the left side. The optional control column/wheel may be installed on the right side. These are provided for stabilator and aileron control.

RUDDER PEDALS

The standard installation provides pedals for rudder control on the left side only. The optional installation provides a set of rudder pedals on each side.

STABILATOR TRIM SYSTEM

MANUAL TRIM

The manual stabilator trim is actuated by a handwheel located between the front seats. A stabilator tab position indicator is located adjacent to the trim control handwheel. Forward movement of the wheel trims the airplane's nose down, aft movement of the wheel trims the airplane's nose up.

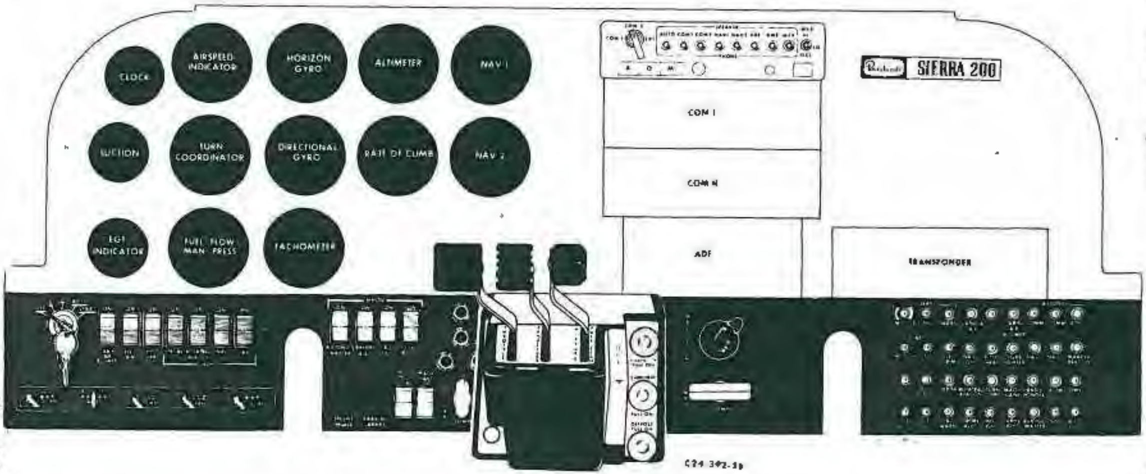
ELECTRIC TRIM

The optional electric stabilator trim system controls include the ON-OFF circuit-breaker type switch located on the instrument panel, and a thumb switch on the control wheel. The ON-OFF switch must be in the ON position to operate the system. The thumb switch must be depressed and moved forward for nose down, aft for nose up, and when released returned to the center OFF position. When the system is not being electrically actuated, the manual trim control wheel may be used.

INSTRUMENT PANEL

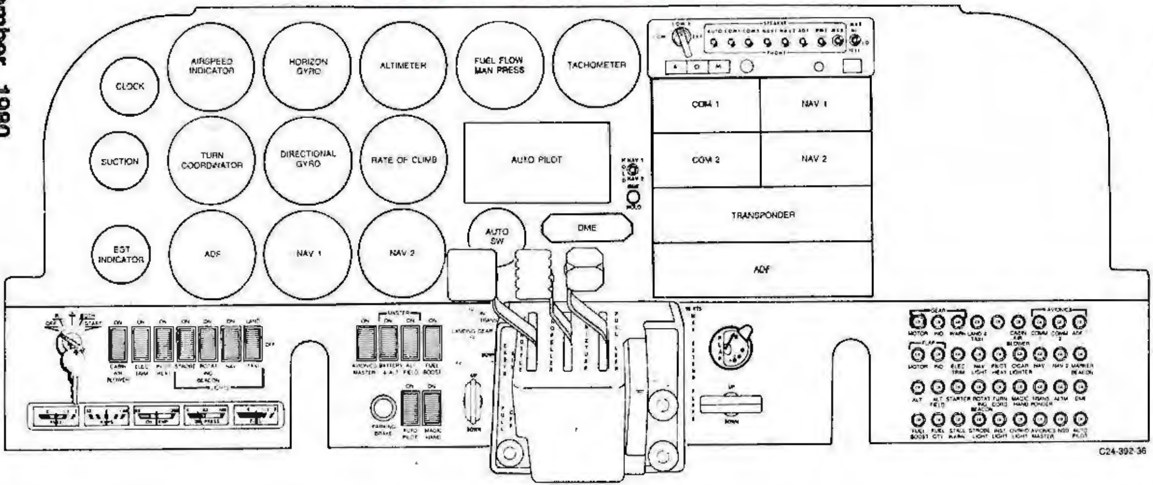
The standard instrument panel consists of flight and navigation instruments on the left, and an avionics section on the right. The switching panel and the engine gages are

TYPICAL INSTRUMENT PANEL (MC-449, MC-452 thru MC-536, except MC-533)



TYPICAL INSTRUMENT PANEL (MC-533, MC-537 through MC-570)

N38566



TYPICAL INSTRUMENT PANEL (MC-571 and after) located on the left subpanel, and the circuit breaker grouping is on the right subpanel.

SWITCHES

The magneto/start switch, and switches for the battery, alternator, pitot heat, auxiliary fuel pump, and landing gear are located on the left subpanel.

CIRCUIT BREAKERS

The circuit breakers are located on the right subpanel.

FLIGHT INSTRUMENTS

The standard flight instruments are grouped in a "T" pattern on the main panel for the best presentation for the pilot. The magnetic compass is attached to the upper center of the windshield.

Ram air pressure for the airspeed indicator enters through the pitot tube under the left wing. Static air pressure for the altimeter, vertical speed, and airspeed indicator is supplied by a static port on each side of the fuselage, just aft of the baggage area.

MC-449, MC-452 through MC-536 except MC-533:

The instruments are illuminated either by an overhead flood light or post lights. The flood light is controlled by a rheostat switch located below the power quadrant on the pedestal, while the post light installation is controlled by a rheostat switch on the left subpanel.

MC-533, MC-537 and after:

The instruments are illuminated either by an overhead flood light or post lights. The rheostat switches controlling these lights are located on the pedestal, below the power quadrant.

GROUND CONTROL

Steering is accomplished by the use of rudder pedals through a spring-loaded linkage connecting the nose gear to the rudder pedals. The nose-gear maximum travel is 28° ± 2° left and right. A hydraulic shimmy damper on the nose gear yoke compensates for any tendency to shimmy. Toe brakes may be used to aid in steering the airplane on the ground.

The minimum wing-tip turning radius, using full steering, one brake, and partial power, is 26 feet 10 inches.

WING FLAPS

MANUAL

The four-position flaps are operated by a manual lever located between the front seats. As the handle is raised to lower the flaps, a definite detent and click of the thumb release button will be felt at the 15°, 25°, and 35° flap extended positions. To retract the flaps, depress the thumb button and lower the handle to the floor. The thumb button does not need to be depressed, nor should it be, to extend the flaps.

ELECTRIC

The electric wing flaps are controlled by a three-position switch, UP, OFF, and DOWN, located to the right of the power quadrant. The switch must be pulled out of detent before it can be repositioned. An indicator, located adjacent to the flap hendle switch, has markings for UP, 10 DEGREES, 15° (green radial), 20 DEGREES, and DOWN. The green radial is placad on the indicator at the 15° position to denote. flap position for takeoffs.

Limit switches automatically interrupt power to the electric motor when the flaps reach the extremes of travel. Intermediate flap positions can be obtained by placing the three-position switch in the OFF position during flap extension or retraction.

EFFECT OF FLAPS ON FLIGHT

TAKEOFF

Retraction of take-off flaps (15° for takeoff), during climb-out, requires no change in trim and only light changes in control forces. The light forces dissipate without change in trim or significant chenge in airspead.

CAUTION

> Establish recovery altitude and recovery power before retracting flaps during slow flight, particularly during recoveries from approach configurations.

LANDING GEAR

The retractable tricycle landing gear, fabricated from magnesium casting and aluminum forgings, uses rubber disks for shock absorption. The gears are identical except for the pivoting action during retraction and the steering provisions of the nose gear. Retraction and extension of the gear is accomplishad through the use of an electric-driven hydraulic pump and hydreulic system. The landing gear may be hydrsulically extended or retracted, and may be lowered manually. (See Emergency Extension Procedures.)

CONTROL SWITCH

The landing gear is controlled by a two-position switch on the left side of the subpanel. The switch handle must be pulled out of the safety detent before it can be moved to the opposite position.

POSITION INDICATORS

The landing gear position indicator lights are located below the landing gear switch handle. Three green lights, one for each gear, are illuminated whenever the landing gears are down. The red light illuminates any time one or all of the landing gears are in transit or in any intermediate position. All of the lights will be out when the gears are up and locked. Pressing the warning light test button on the instrument panel will verify the landing gear lamps are illuminating. The intensity of the lamps can be controlled by turning the lens holder on each lamp.

TIME-DELAY RELAY (MC-674 and after)

Landing gear retraction operation is protected by a time-delay relay which will disengage electrical power to the hydraulic pump motor after 30 seconds of continuous pump operation. If the landing gear in-transit light remains illuminated, it indicates improper response of the landing gear. The time-delay relay can be reset by moving the landing gear switch handle to the down position. The landing gear and retract system should be checked before the next flight.

SAFETY RETRACTION SWITCH

To prevent inadvertent retraction of the landing gear on the ground, a safety pressure switch located in the pitot system, deactivates the hydraulic pressure pump circuit when the impact air pressure is below 68 to 72 mph, (59 to 63 kts).

WARNING

> Never rely on the safety switch to keep the gear down during taxi, take-off roll, or landing roll. Always make certain that the landing gear switch is in the down position during these operations.

WARNING HORN

With the landing gear retracted, if the throttle is retarded below approximately 12 inches mercury manifold pressure, a warning horn will sound continuously.

CIRCUIT BREAKER

The landing GEAR MOTOR circuit breaker is located on the right subpanel. This circuit breaker is a pull-and-reset type breaker. A white circle identifies this circuit breaker. The breaker will pop out under overload conditions. The remainder of the landing gear circuitry is protected by a push-to-reset circuit breaker marked GEAR IND.

WARNING

> The landing gear system will be inoperative if the GEAR IND circuit breaker is pulled.

EMERGENCY EXTENSION

The landing gear can be extended by turning the hydraulic pressure bypass valve 90° counterclockwise. The valve is located on the floor in front of the pilot's seat. When the system pressure is released the gear will fall into the down-and-locked position. This extension procedure is outlined in EMERGENCY PROCEDURES Section.

NOTE

Repeated emergency extension of the landing gear may deplete the hydraulic fluid reservoir supply.

BRAKES

The brakes on the main landing gear wheels are operated by applying toe pressure to the top of the rudder pedals. The parking brake push-pull control is located on the left subpanel. To set the parking brakes, pull the control out and pump both toe pedals until solid resistance is felt. Push the control in to release the brakes.

CAUTION

Install wheel chocks and release the parking brake if the airplane is to be left unattended. Changes in ambient temperature can cause the brakes to release or to exert excessive pressures.

LANDING GEAR SAFETY EXTENSION SYSTEM

The landing gear safety system is designed to prevent "gear up" landings. The system is to be used as a safety device only; normal usage of the landing gear position switch is mandatory.

To extend the landing gear, place the landing gear safety system ON-OFF switch in the ON position. The landing gear will be automatically extended when: (1) the airspeed is below approximately 115 mph (100 kts) IAS and (2) the engine is operating at a throttle position corresponding to approximately 18 inches or less of manifold pressure.

To retract the landing gear, place the landing gear safety system ON-OFF switch in the ON position. The landing gear will not retract unless: (1) the landing gear position switch is in the UP position, (2) the airspeed is above approximately 72 mph (63 kts) IAS and (3) the engine is operating at a throttle position corresponding to approximately 20 inches or more of manifold pressure.

If landing gear retraction is desired when the throttle position corresponds to 20 inches of manifold pressure or less, the landing gear safety system ON-OFF switch must be placed in the OFF position before placing the landing gear position switch in the UP position.

In the event of an emergency, automatic extension of the landing gear may be prevented by placing the landing gear safety system ON-OFF switch in the OFF position, thus deactivating the safety system.

BAGGAGE COMPARTMENT

A 19.5-cubic-foot baggage space is located behind the 3rd and 4th seats. In addition, a hat shelf, near the top of the cabin enclosure provides an out-of-the-way space for light miscellaneous articles. Both the baggage compartment and hat shelf are accessible in flight.

WARNING

Do not carry hazardous material anywhere in the airplane.

Do not carry children in the baggage compartment unless secured in a seat.

SEATS, SEAT BELTS, AND SHOULDER HARNESSES

SEAT ADJUSTMENT

To adjust either of the front seats, pull to the right and up on the release knob below the left seat corner and slide the seat forward or aft, as desired. Make certain the seat is locked securely in place after adjustment. The backs of the 1st, 2nd, 3rd, and 4th seats can be placed in any of 3 positions. The 5th and 6th bench-type children's seat is not adjustable. Outboard armrests for the front seats are attached to the cabin doors.

SEAT BELTS

All seats are provided with seat belts having a lever-action, quick-release, metal buckle. The seat belt length can be shortened or lengthened by allowing the excess belt to pull through the end of the buckle. Holding the buckle at a right angle to the belt releases the binding action, allowing the belt to slip.

SHOULDER HARNESSES

The shoulder harness is a standard installation for all seats and should be used with the seats in the upright position. The spring loading at the inertia reel keeps the harness snug, but will allow normal movement during flight operations. The inertia reel is designed with a locking device that will secure the harness in the event of sudden forward movement or an impact action. The strap is worn over the shoulder and down across the body, where it is fastened by a metal loop to the seat belt buckle. The inertia reels for the front and middle seats are attached to the lower cabin sidewall structure at the aft edge of the respective seat. The inertia reel is covered with an escutcheon, and the strap runs up from the reel to a looped fitting attached to the window frame just aft of the seat. For stowing these shoulder harness straps, stowage attach points are provided adjacent to the inertia reel on the cabin sidewall. For the 5th and 6th seats the strap is contained in an inertia reel attached to the aft cabin bulkhead structure behind the hat shelf.

WARNING

The seat belt is independent of the shoulder harness. However, the shoulder harness may be used only when the seat belt is fastened.

Occupants shorter than 4'7 are not to use shoulder harness.

DOORS AND EXITS

FORWARD CABIN DOORS

The airplane has a conventional cabin door on each side of the fuselage adjacent to the forward seats. When closed, the outside cabin door handle is spring-loaded to fit into a recess in the door. The door may be locked with a key. To open the door from the outside, grasp the flush handle and pull until the door opens. To close the cabin doors from the inside, grasp the armrest attached to the door and firmly pull the door closed. Opening the storm window will alleviate pressure inside the cabin as the door is being closed. Press firmly outward at the aft edge of the door. If any movement of the door is detected, completely open the door and close again following the above instructions. To open the door from the inside, grasp the flush door release handle and pull until door latch releases.

AFT UTILITY DOOR

A utility door, aft of the cabin door on the left side of the fuselage, is provided for loading cargo or passengers in the aft cabin. This door can be opened from both inside and out. To open the door from the outside, grasp the flush handle and pull until door opens. To open from the inside pull out on the pin adjacent to the door handle, then rotate the handle counterclockwise until the door opens. This door can be locked with a key.

EMERGENCY EXITS

An emergency exit can be accomplished through any of the three doors.

CONTROL LOCKS

A control lock is provided, with the loose tools, to prevent movement of the control column and impairs access to the magneto/start switch.

To install the Control Lock:

1. Rotate control wheel and move control column so the holes in the control column hanger and the control column will align to accept the pin.

2. Push the control column lock pin through the hole provided in the control column hanger and into the hole in the underside of the control column tube assembly.

3. Ensure positive retention of the lock pin by positioning the hook over the control column.

WARNING

Before starting engine, remove the control lock by reversing the above procedure.

ENGINE

The BEECHCRAFT Sierra 200 C24R is powered by a Lycoming IO-360-A1B6 four-cylinder, horizontally opposed, fuel-injected engine rated at 200 horsepower. Normal operating engine speed range is 2350 to 2700 rpm with a restricted operating range between 2100 and 2350 rpm.

ENGINE CONTROLS

The control levers are grouped along the upper face of the power quadrant. Pushing forward on a control increases, while pulling back decreases the control's appropriate function. Their knobs are shaped to government standard configuration so they can be identified by touch. The controls are centrally located for ease of operation from either the pilot's or copilot's seat. A controllable friction lever, located to the right of the control levers, is provided to prevent creeping.

ENGINE INSTRUMENTS

The engine instrument cluster is located on the lower left subpanel and includes the left fuel quantity indicator, an ammeter, oil temperature, oil pressure and the right fuel quantity indicator. The tachometer and manifold pressure/fuel flow indicators are located above the engine controls.

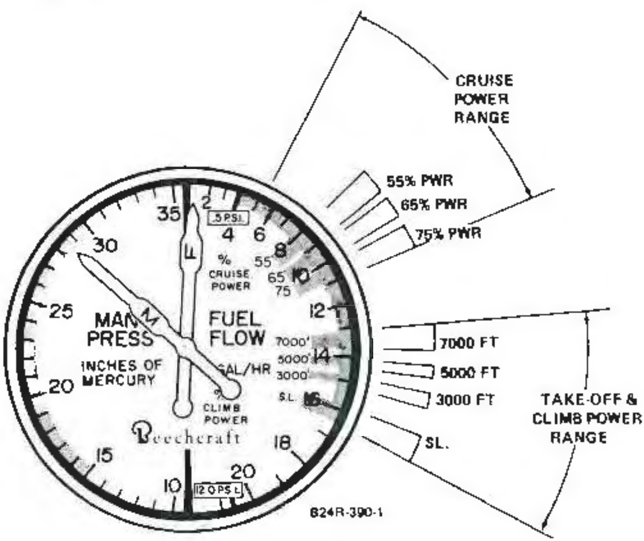
MANIFOLD PRESSURE AND FUEL FLOW INDICATOR

The manifold pressure portion of this instrument indicates the pressure of the fuel-air mixture entering the engine cylinders and is calibrated in inches of mercury. By observing the manifold pressure gage and adjusting the propeller and throttle controls, the power output of the engine can be adjusted to any of the power settings designated in the Cruise Power Setting tables in the PERFORMANCE Section.

The fuel flow portion of the indicator is calibrated in gallons per hour, the green arc indicating fuel flow for normal operating limits. Red radials are placed at the minimum and maximum allowable fuel pressures, as indicated at the fuel injection manifold valve.

In the cruise power range the green sectors cover the fuel flow required from 55% to 75% power. The lowest value of a given sector is the lean limit setting and the highest value of the sector is the best-power setting for that particular power range.

The take-off and climb range is covered by green sectors for full power at various altitudes. The full power markings represent the maximum performance mixtures for the altitudes shown, permitting leaning of the mixture for maximum power and performance during high-altitude takeoffs and full-power climbs.



EXHAUST GAS TEMPERATURE INDICATOR (EGT)

This installation provides for sensitive and rapid indication of exhaust gas temperature to assist in adjusting the fuel/air mixture during cruise.

ENGINE BREAK-IN INFORMATION

New engines have been carefully run-in by the engine manufacturer. However, the engine should be operated on straight mineral oil for a minimum of 50 hours or until oil consumption stabilizes. After the first 25 hours of operation, drain and replace the mineral oil. A change to an approved engine oil should be made after the break-in period. Refer to Lycoming Engine Operator's Manual.

NOTE

> In order to promote proper ring seating, cruise power settings of 65% to 75% should be used until a total of 50 hours has accumulated or until oil consumption has stabilized. This recommendation is applicable to in-service engines following cylinder replacement or top-overhaul of one or more cylinders, as well as to new engines.

COWLING

The cowling is the split-type and is removable to expose the engine and mount assemblies.

LUBRICATION SYSTEM

The engine oil system is the wet-sump type and has an 8-quart capacity. Oil operating temperatures are controlled by an automatic thermostat bypass control. The bypass control will limit oil flow through the oil cooler when operating temperatures are below normal, and will permit the oil to bypass the cooler if it should become blocked.

INDUCTION SYSTEM ICING

The possibility of induction system icing is reduced by the non-icing characteristics of the fuel-injected engine and automatic alternate air source. The alternate air door will open automatically if the air intake or filter becomes obstructed.

STARTER

A magneto/start switch, located on the subpanel to the left of the pilot's control column, incorporates R(right), L(left) and BOTH magneto positions in addition to the normal OFF and START positions. After activation of the starter the spring-loaded switch returns to the BOTH position when released. Battery switch and alternator switch are grouped on the subpanel to the right of the pilot's control column.

The warning light placarded STARTER ENGAGED (MC-731 and after) illuminates whenever electrical power is being supplied to the starter. If the light remains illuminated after starting, the starter relay has remained engaged, and loss of electrical power and possible equipment damage will eventually result. Turn the BATTERY & ALT and ALT Switches OFF. If in flight, land as soon as practical. If the light does not illuminate during starting, the indicator system is inoperative and the ammeter must be monitored to ensure that the starter does not remain energized after releasing the magneto/start switch.

PROPELLER

Installed as standard equipment is a constant-speed, variable-pitch, 76 -diameter propeller with two aluminum alloy blades. The pitch setting at the 30-inch station is 14.4° low and 27.0° to 31.0° high pitch. Normal operating range is 2350 to 2700 rpm with a restricted operating range between 2100 and 2350 rpm.

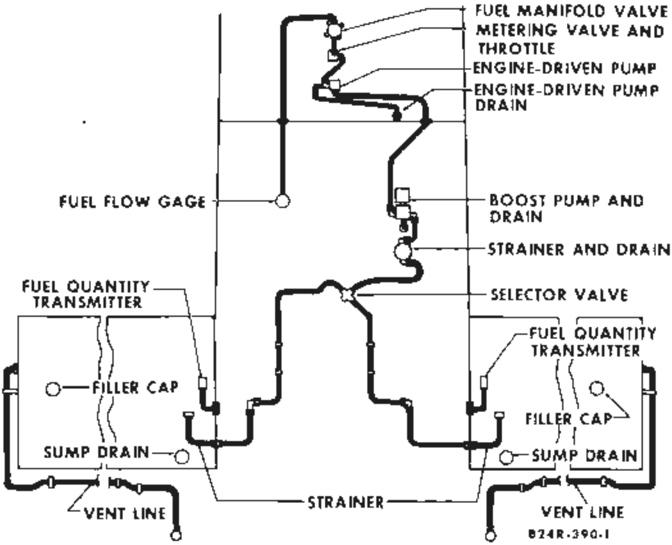
Propeller rpm is controlled by a single-action, engine-driven propeller governor which regulates hydraulic oil pressure to the hub. The propeller control on the power quadrant allows the pilot to select the governor's rpm range. Governor-boosted oil pressure holds the propeller blades in a high pitch (low rpm) position during normal cruise operation. If oil pressure is lost, the propeller will go to the full high rpm (low pitch) position.

FUEL SYSTEM

The airplane is designed for operation on grade 100 (green) or 100LL (blue) aviation gasoline.

FUEL TANKS

Fuel tanks located in each wing have a nominal capacity of 29.9 gallons each for a total of 59.8 gallons. In the filler neck of each tank is a visual measuring tab which facilitates partial filling of the fuel system. When the fuel touches the bottom of the tab it indicates 15 gallons of fuel, and when filled to the slot in the tab it indicates 20 gallons. The pilot must visually check the fuel level during preflight



FUEL SYSTEM SCHEMATIC

to ascertain desired level. Fuel is fed from the desired tank through a fuel selector valve in the center floorboard and then through a strainer to the engine-driven fuel pump.

FUEL OUANTITY INDICATORS

Fuel quantity is measured by float-operated sensors, located in each wing tank system. These transmit electrical signals to the individual indicators, which indicate fuel remaining in each tank. The indicating system reads full at 20 gallons.

FUEL DRAINS

The fuel system drains should be opened regularly to prevent the accumulation of condensation in the fuel, especially during periods of warm days and cool nights. They should also be opened before each flight not only to check for condensation but also to inspect for fuel contamination.

Wing Drains

Wing sump drains on MC-449, MC-452 through MC-536 except MC-533, protrude through the wing skin and are opened by pushing them upward to release the fuel. This type of valve can be locked open by pushing upward to open it, then rotating it clockwise to lock it. To close the valve, press upward and rotate counterclockwise. When released, the valve will close. Check for proper seating to prevent fuel loss.

On MC-533, MC-537 and after, the wing drains have flush-type valves and are opened by using the combination fuel drain/emergency landing gear extension tool provided with the loose tools. It is normally kept in the pocket on the pilot's door. To open the drain valve, insert the tab end of the tool into the opening in the center of the valve and push upward. Removing the tool will close the valve. This type of drain can be locked open by pushing upward with the tool and rotating counterclockwise. To close the valve, press upward with the tool in place and rotate clockwise before removing the tool. Make certain the valve is seated to prevent loss of fuel.

Low Spot Drain

The fuel system low spot drain in the bottom of the fuel filter should also be drained frequently. It is located on the lower portion of the firewall on the forward side and protrudes through the lower skin. This drain can be locked open by turning clockwise until it locks. To close the drain, rotate counterclockwise and the valve will snap shut.

FUEL BOOST PUMP

The electric fuel boost pump, controlled by an ON-OFF toggle switch on the pilot's subpanel, provides pressure for starting and emergency operation. The fuel boost pump provides sufficient pressure for engine operation, should the engine-driven pump fail.

FUEL TANK SELECTION

The fuel selector valve handle is located on the floorboards between the pilot and copilot seats. Takeoffs and landings should be made using the tank that is more nearly full.

NOTE

> On serials MC-696 and after, or on airplanes which have complied with BEECHCRAFT S.I. No. 1095, a fuel selector stop has been added to the selector valve guard. The fuel selector stop minimizes the possibility of inadvertently turning the fuel selector valve to the OFF detent position. The stop is a spring which must be depressed before the selector valve handle can be rotated to the OFF position.

If the engine stops because of insufficient fuel, refer to the EMERGENCY PROCEDURES Section for the Air Start procedures.

FUEL REQUIRED FOR FLIGHT

It is the pilot's responsibility to ascertain that the fuel quantity indicators are functioning and maintaining a reasonable degree of accuracy, and to be certain of ample fuel for a flight. Takeoff is prohibited if the fuel quantity indicators do not indicate above the yellow arc. The caps should be removed and fuel quantity checked to give the pilot an indication of fuel on board. The airplane must be approximately level for visual inspection of the tank. Fuel should be added so that the amount of fuel will be not less than is required for takeoff. Plan for an ample margin of fuel for any flight.

ELECTRICAL SYSTEM

The system circuitry is the single-wire, ground-return type, with the airplane structure used as the ground return. The battery, alternator, fuel boost, and magneto/start switches are located on the left subpanel. The circuit breaker panel, located on the right subpanel, contains the protective circuit breakers for the various electrical systems. Some switch-type circuit breakers are located on the left subpanel.

In addition, there is an in-line fuse in the rotating beacon wire and in the strobe light wire forward of the left subpanel, with spare fuses adjacent to the fuse holder. There is also a fuse on the left side of the quadrant pedestal for the electric clock (if installed), or an in-line fuse near the battery box.

BATTERY

14-VOLT SYSTEM

A 12-volt battery is located in the aft fuselage. Battery servicing procedures are described in the LANDING, SERVICING AND MAINTENANCE Section.

28-VOLT SYSTEM

One 24-volt battery, or two 12-volt batteries in series, are located in the aft fuselage. The two 12-volt batteries in series are of a shape and size that they will both fit in the same battery compartment which is provided for the 24-volt battery. Battery servicing procedures are described in the HANDLING, SERVICING AND MAINTENANCE Section.

ALTERNATOR

14-VOLT SYSTEM

The alternator maintains its full-rated 60-ampere output at cruise engine rpm, and uses a voltage regulator to adjust alternator output.

Since the alternator is not self-exciting, dual switches are required to activate the circuit. The switch placarded BATTERY & ALT, when placed in the ON position, will only activate the battery circuit. When this switch is on and the ALT (FIELD) switch is placed in the ON position, the alternator is excited by power from the airplane battery. When the BATTERY & ALT switch is in the OFF position, the alternator will be off regardless of the ALT (FIELD) switch position. The alternator-field circuit breaker and alternator-output circuit breaker are located on the right subpanel (MC-449, MC-452 through MC-642). On airplanes MC-643 through MC-673 (and airplanes MC-449, MC-452 through MC-642 with installation of Beech Kit No. 23-3009-1 S) the alternator circuit is protected by an alternator-field circuit breaker on the right subpanel, and an alternator-output current limiter on the firewall.

28-VOLT SYSTEM (MC-674 and after)

The 28-volt alternator is rated at 60 amps nominal output at cruise engine rpm. A self-exciting feature provides for activation of the alternator independent of battery power when the engine reaches a speed of 1200 to 1500 rpm. A switch on the pilot's subpanel placarded ALT FIELD controls the alternator circuit. Circuit breakers for the alternator are located on the right subpanel.

EXTERNAL POWER RECEPTACLE

The external power receptacle is optional on this airplane. If installed, it is located on the right side of the fuselage (MC-449, MC-452 through MC-772) or on the left side of the fuselage (MC-773 and after), aft of the wing. Airplanes equipped with a 14-volt electrical system require a power unit set to 13.75 to 14.25 volts, while those equipped with a 28-volt electrical system require a setting of 27.75 to 28.25 volts.

CAUTION

On 14-volt airplanes, the power pin for external power is connected directly to the battery and continually energized. Turn off battery and alternator switches and all electrical and avionics switches when connecting the auxiliary power unit plug. Assure correct polarity (negative ground) before connecting auxiliary power unit. Turn on the battery switch before turning on the auxiliary power unit.

On 28-volt airplanes, a reverse polarity diode protection system is between the external power receptacle and the main bus. With external power applied, the bus is powered. Turn on the battery switch only, with all other switches including avionics switches off, when connecting the auxiliary power unit. Assure correct polarity before connecting external power.

When auxiliary power is desired, connect the clamps of the power cable to the remote power source, ensuring proper polarity. Turn OFF the ALT switches and ensure that all avionics equipment is OFF, and then turn ON the BATT switch. Insert the power cable plug into the receptacle, turn on auxiliary power unit, and start engine using the normal starting procedures.

LIGHTING SYSTEMS

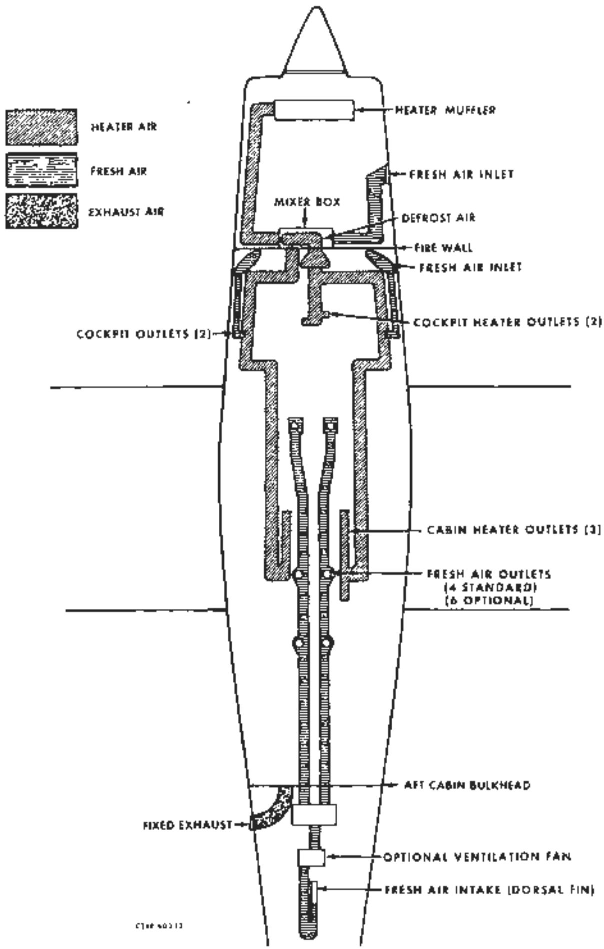
INTERIOR LIGHTING

Lighting for the instrument panel is controlled by a rheostat switch located on the pilot's subpanel to the left of the control column (MC-449, MC-452 through MC-536 except MC-533), or on the pedestal below the power quadrant (MC-533, MC-537 and after). The cabin dome light is operated by an ON-OFF switch adjacent to the light. The overhead instrument lighting and the map light (MC-689, MC-702 and after do not have a map light installed) are controlled by a rheostat switch located on the pedestal, below the power quadrant.

EXTERIOR LIGHTING

The switches for all of the exterior lights are located on the pilot's left subpanel. Each circuit is protected by a circuit breaker switch, circuit breaker, or fuse.

The exterior lights consist of navigation lights on the wing tips and rudder, a landing light on the left outboard wing, optional taxi lights on both outboard wings, and a rotating beacon on the vertical stabilizer. The landing light should be used for approach only, and the taxi lights should be used for ground maneuvering only. For longer battery and lamp life, use the landing light and taxi lights sparingly; avoid prolonged operation which could cause overheating during ground maneuvering.



ENVIRONMENTAL SCHEMATIC

NOTE

Particularly at night, reflections from rotating anti-collision lights or strobe lights on clouds, dense haze or dust can produce optical illusions and intense vertigo. Such lights, when installed, should be turned off before entering an overcast; their use may not be advisable under instrument or limited VFR conditions.

ENVIRONMENTAL SYSTEMS

CABIN HEATING

Air for warming the cabin and defrosting the windshield enters through an intake on the forward engine baffle, passes through the heater and into a mixer box where it is blended with cold air to obtain the desired cabin temperature. Hot or cold air may enter the cabin through the firewall outlets. The knob marked CABIN AIR regulates the quantity of air entering the cabin through this firewall outlet. With the CABIN AIR knob in, pull out the CABIN HEAT knob for heated air and push it in for fresh air. There are 4 outlets for cabin heat distribution in the standard installation; however, 5 outlets are provided when the optional children's seat is installed. Pull out the DEFROST knob for maximum defrost. Under extremely cold conditions, heating in the back seats can be improved by partially pulling the defrost knob.

VENTILATION

Fresh air for the cabin enters through two grill-type inlets immediately forward of the windshield and a scoop-type inlet on the dorsal fin. The two grill-type inlets supply air to the eyeball outlets on the cabin sidewalls between the instrument panel and cabin doors. The scoop-type inlet supplies air to the four or six overhead eyeball outlets. Air flow through the eyeball outlets is regulated by rotating the outlet. An optional fan, controlled by a switch below the power quadrant (MC-449, MC-452 thru MC-536, except MC-533) or on the left subpanel (MC-533, MC-537 and after), facilitates ventilation for ground operation. The fan should be off when the airplane is airborne.

EXHAUST VENT

A fixed exhaust vent is located in the aft cabin for flow-through ventilation.

PITOT AND STATIC SYSTEMS

PITOT SYSTEM

The pitot system provides a source of impact air for operation of the airspeed indicator. The pitot mast is located on the leading edge of the left wing.

PITOT HEAT

The pitot mast is provided with an electric heating element which is turned on and off with a switch on the instrument panel. The switch should be ON when flying in visible moisture. It is not advisable to operate the pitot heating element on the ground except for testing or for short intervals of time to remove ice or snow.

NORMAL STATIC AIR SYSTEM

The normal static air system provides a source of static air to the flight instruments through a flush static fitting on each side of the aft fuselage. A union located inside a cover plate on the belly of the airplane provides a drain point to remove moisture from the system.

EMERGENCY STATIC AIR SYSTEM

An emergency static air source may be installed to provide air for instrument operation should the static ports become blocked. Refer to the EMERGENCY PROCEDURES Section for procedures describing how and when to use this system.

VACUUM SYSTEM

Vacuum for air-driven gyroscopic flight instruments and other air-driven equipment is supplied by an engine-driven vacuum pump. An adjustable relief valve controls suction by bleeding outside air into the vacuum pump.

A suction gage indicates system vacuum in inches of mercury. This instrument is located on the pilot's side of the instrument panel. The vacuum should be maintained within the green arc for proper operation of the air-driven instruments.

STALL WARNING SYSTEM

WARNING

With the BATTERY & ALT switch in the OFF position the stall warning horn is inoperative. Airplane certification requires the stall warning system to be on during flight except in emergency conditions as stated in Section III.

A stall warning horn located in the overhead speaker console is factory set to sound a warning 5 to 7 mph above a stall condition and continues steadily as the airplane approaches a complete stall. The stall warning horn, triggered by a sensing vane on the leading edge of the left wing, is equally effective in all flight configurations and at all weights.

SECTION VIII

HANDLING, SERVICING AND MAINTENANCE

TABLE OF CONTENTS

INTRODUCTION

The purpose of this section is to outline the requirements for maintaining the airplane in a condition equal to that of its original manufacture. This information sets the time frequency intervals at which the airplane should be taken to a BEECHCRAFT Aero or Aviation Center or International Distributor or Dealer for periodic servicing or preventive maintenance.

The Federal Aviation Regulations place the responsibility for the maintenance of this airplane on the owner and operator, who must ensure that all maintenance is done by qualified mechanics in conformity with all airworthiness requirements established for this airplane.

All limits, procedures, safety practices, time limits, servicing and maintenance requirements contained in this handbook are considered mandatory.

Authorized BEECHCRAFT Aero or Aviation Centers or International Distributors or Dealers can provide recommended modification, service and operating procedures issued by both the FAA and Beech Aircraft Corporation, designed to get maximum utility and safety from the airplane.

If a question should arise concerning the care of the airplane, it should be directed to Beech Aircraft Corporation, Liberal Division, Box 300, Liberal, Kansas 67901. Correspondence should contain the airplane serial number, which can be found on the manufacturer's placard, located on the right side of the fuselage adjacent to the inboard end of the flap. The placard is visible when the flaps are lowered.

PUBLICATIONS

The following publications are available through BEECHCRAFT Aero or Aviation Centers or International Distributors or Dealers.

1. Shop Manual
2. Parts Catalog
3. Service Instructions
4. Various Inspection Forms

NOTE

Neither Service Publications, Reissues, nor Revisions are automatically provided to the holder of this handbook. For information on how to obtain "Revision Service" applicable to this handbook consult a BEECHCRAFT Aero or Aviation Center, or International Distributor or Dealer, or refer to the latest revision of BEECHCRAFT Service Instructions No. 0250-010.

AIRPLANE INSPECTION PERIODS

1. FAA Required Annual Inspections.
2. BEECHCRAFT Recommended Inspection Guide.
3. Continuing Care Inspection Guide.
4. See "Recommended Servicing Schedule" and "Overhaul or Replacement Schedule" for further inspection schedules.

PREVENTATIVE MAINTENANCE THAT MAY BE ACCOMPLISHED BY A CERTIFICATED PILOT

1. A certificated pilot may perform limited maintenance. Refer to FAR Part 43 for the items which may be accomplished.

To ensure that proper procedures are followed, obtain a BEECHCRAFT Shop Manual before performing any maintenance operation.

2. All other maintenance must be performed by licensed personnel.

NOTE

Pilots operating airplanes of other than U.S. registry should refer to the regulations of the registering authority for information concerning preventative maintenance that may be performed by pilots.

ALTERATIONS OR REPAIRS TO AIRPLANE

The FAA should be contacted prior to any alterations on the airplane to ensure that the airworthiness of the airplane is not violated.

NOTE

Alterations and repairs to the airplane must be made by properly licensed personnel.

GROUND HANDLING

The three-view drawing shows the minimum hangar clearances for a standard airplane. Allowances must be made for any special radio antennas and the possibility of an under inflated nose tire.

TOWING

CAUTION

> Extreme care should be used when moving with power equipment. Should the nose gear be turned in excess of the red limit marks, there is a very good possibility the nose gear steering yoke and/or linkage may be damaged.

One person can move the airplane on a smooth and level surface, using the hand tow bar furnished with the loose equipment. Attach the tow bar to the tow lugs on the nose gear lower torque knee.

Where movement is restricted, two people can pivot the airplane on the main wheels. One person should push on the wing leading edge or hold the wing tip, while the other operates the tow bar.

CAUTION

> Do not exert force on the propeller or control surfaces. Do not place weight on the stabilator to raise the nose wheel. Do not attempt to tow the airplane backward by the tail tie-down ring.

PARKING

The parking brake push-pull control is located on the left side of the lower subpanel. To set the parking brakes, pull the control out and depress each toe pedal until firm. Push the control in to release the brakes.

NOTE

The parking brake should be left off and wheel chocks installed if the airplane is to remain unattended. Changes in ambient temperature can cause the brakes to release or to exert excessive pressures.

CONTROL COLUMN LOCK PIN

1. Rotate the control wheel and move control column so the holes in the control column hanger and the control column will align to accept the pin.
2. Push the control column lock pin through the hole provided in the control column hanger and into the hole in the underside of the control column tube assembly.
3. Ensure positive retention of the lock pin by positioning the hook over the control column.

TIE-DOWN

It is advisable to nose the airplane into the wind. Three tie-down lugs are provided: one on the lower side of each wing and a third at the rear of the fuselage.

1. Install the control column lock pin.

2. Chock the main wheels fore and aft.

3. Using nylon line or chain of sufficient strength, secure the airplane at the three points provided. DO NOT OVERTIGHTEN the line at the rear of the fuselage excessively tight, because the nose may rise and produce lift due to the angle of attack of the wings.

4. Release the parking brake.

If extremely high winds are anticipated, a vertical tail post can be installed at the rear tie-down lug, and a tie-down line attached to the nose gear.

JACKING

Raise the individual gear for wheel and tire removal with a scissors jack under the axle. Also, jack pads are installed to facilitate landing gear retraction checks. Refer to the BEECHCRAFT Shop Manual for proper procedures.

CAUTION

The landing gear circuit breaker should be pulled and the emergency gear extension valve should be open to relieve pressure in the hydraulic system, in order to prevent inadvertent retraction of the landing gear when the airplane is jacked.

FLYABLE STORAGE - 7 to 30 DAYS

MOORING

If airplane cannot be placed in a hangar, tie down securely at the three points provided. Do not use hemp or manila rope. It is recommended a tail support be used to lightly compress the nose gear and reduce the angle of attack of the wings. Attach a line to the nose gear for additional tie-down.

FUEL CELLS

Fill to capacity to minimize fuel vapor.

FLIGHT CONTROL SURFACES

Lock with internal and external locks.

GROUNDING

Static-ground airplane securely and effectively.

PITOT TUBE

Install cover.

WINDSHIELD AND WINDOWS

Close all windows and window vents. It is recommended that covers be installed over the windshield and windows.

DURING FLYABLE STORAGE

WARNING

Be sure the magneto/start switch is OFF, the throttle CLOSED, and mixture control in the IDLE CUT-OFF position before turning the propeller. Do not stand in the path of propeller blades. Also, ground running the engine for brief periods of time is not a substitute for turning the engine over by hand. In fact, the practice of ground running will tend to aggravate rather than minimize corrosion formation in the engine.

In a favorable atmospheric environment the engine of an airplane that is flown intermittently can be adequately protected from corrosion by turning the engine over five revolutions by means of the propeller. This will dispel any beads of moisture that may have accumulated and spread the residual lubricating oil around the cylinder walls. Unless the airplane is flown, repeat this procedure every five days.

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

PREPARATION FOR SERVICE

Remove all covers, clean the airplane, and give it a thorough inspection, particularly landing gear, wheel wells, flaps, control surfaces, and pitot and static pressure openings.

Preflight the airplane.

PROLONGED OUT OF SERVICE CARE

The storage procedures listed are intended to protect the airplane from deterioration while it is not in use. The primary objectives of these measures are to prevent corrosion and damage from exposure to the elements.

If the airplane is to be stored longer than 30 days refer to the appropriate airplane shop manual and Avco Lycoming Service Letter L180.

EXTERNAL POWER RECEPTACLE

The external power receptacle is optional on this airplane. If installed, it is located on the right side of the fuselage (MC-449, MC-452 through MC-772) or on the left side of the fuselage (MC-773 and after), aft of the wing. Airplanes equipped with a 14-volt electrical system require a power unit set to 13.75 to 14.25 volts, while those equipped with a 28-volt electrical system require a setting of 27.75 to 28.25 volts.

CAUTION

On 14-volt airplanes, the power pin for external power is connected directly to the battery and continually energized. Turn off battery and alternator switches and all electrical and avionics switches when connecting the auxiliary power unit plug. Assure correct polarity (negative ground) before connecting auxiliary power unit. Turn on the battery switch before turning on the auxiliary power unit.

On 28-volt airplanes, a reverse polarity diode protection system is between the external power receptacle and the main bus. With external power applied, the bus is powered. Turn on the battery switch only, with all other switches including avionics switches off, when connecting the auxiliary power unit. Assure correct polarity before connecting external power.

CHECKING ELECTRICAL EQUIPMENT

Connect an auxiliary power unit as outlined above. Ensure that the current is stabilized prior to making any electrical equipment or avionics check.

CAUTION

> If the auxiliary power unit has poor voltage regulation or produces voltage transients, the equipment connected to the unit may be damaged.

SERVICING

FUEL SYSTEM

Use aviation gasoline grades 100 (green) or 100LL (blue).

CAUTION

> See Avco Lycoming Service Letter No. L185A or later revision for operation on alternate fuels.

Two 29.9-gallon fuel tanks are located in the wings just outboard of the wing root. A visual measuring tab located below the tank filler neck facilitates a fuel load of 15 gallons when the fuel reaches the bottom of the tab, or 20 gallons when the fuel reaches the top of the slot. This partial filling of the fuel tanks allows an increase in the payload. The fuel indicators on the instrument panel will indicate fuel tanks even though each tank contains only 20 gallons of fuel.

WARNING

> Connect a grounding cable from the fuel service unit to the airframe, and connect grounding cables from both the fuel service unit and the airplane to ground during fueling operations. This procedure reduces fire hazard.

Open each of the fuel drains during preflight to check for fuel contamination and to remove any condensation from the system. Large daily temperature variations in cool weather are favorable for the formation of condensation, and the valves should be opened more frequently during these periods. For description and operation of the drains, refer to FUEL DRAINS in SYSTEMS DESCRIPTION. If water is suspected to be in the fuel after the fuel system has been filled, allow at least one hour settling time before opening the drains to make an inspection.

Inspection and cleaning of the fuel strainers should be considered of the utmost importance as a regular part of preventative maintenance. The following inspection and cleaning intervals are recommendations only, since the frequency will depend upon service conditions and fuel handling cleanliness. When operating in localities where there is an excessive amount of sand or dirt, the strainers should be inspected at more frequent intervals.

The screen in the fuel strainer at the system low spot on the bottom of the fuselage should be removed and washed in fresh cleaning solvent at each 100-hour inspection of the airplane. Ordinarily, the finger strainers in the fuel tank outlets should not require cleaning unless there is a definite indication of solid foreign material in the tanks, or the airplane has been stored for an extended period.

After the fuel strainers have been reinstalled, the installations should be checked for leakage. Any fuel lines or fittings disconnected for maintenance purposes should be capped.

Frequently inspect the O-rings on the fuel filler caps for condition. Replace as required to prevent contamination of the fuel from precipitation.

OIL SYSTEM

CAUTION

> During break-in periods on new engines, oil consumption tends to be higher, therefore, maximum range flights should be avoided and oil level brought to full after each flight during this period.

Check engine oil quantity before each flight. Under normal operating conditions, the oil should be changed after each 50 hours of engine operation. More frequent changes may be required under adverse operating conditions. Use engine oil as indicated in Consumable Materials in this section. The engine oil sump capacity is eight quarts. The normal operating range is six to eight quarts.

BATTERY

14-VOLT SYSTEM

A 12-volt, 25 amp-hour, lead-acid battery, located directly aft of the cabin area may be reached by removing the rear panel.

28-VOLT SYSTEM

One 24-volt, 15.5 amp hour, lead-acid battery, or two 12-volt 25 amp hour, lead-acid batteries connected in series, are located directly aft of the cabin area and may be reached by removing the rear panel.

Check the battery regularly for fluid level and add distilled water as required. Clean, tight connections should be maintained at all times. Battery vents on Serials MC-449, MC-452 thru MC-532, MC-534 thru MC-536 should be checked periodically for obstructions and for proper protrusion (3 inches from top of chamfer to skin line). Serials MC-533, MC-537 and after have a flush vent system.

External power should be used for checking airplane electrical systems to prevent excess battery power loss, and for starting the engine during cold weather when more power is needed for cranking. Charging batteries in the airplane is discouraged. If the battery is low and needs charging and servicing, it should be removed from the airplane and serviced and charged in the manner prescribed in the shop manual.

WARNING

Always connect charging cables at the battery terminals first, then to the charging unit, to avoid sparks near the battery fumes since explosion could occur.

TIRES

The airplane is equipped with tube-type tires. Inflate the 17.50 x 6.00-6 main gear tires to 32 psi and the 14.20 x 5.00-5 nose gear tire to 35 psi. Maintaining proper tire inflation will minimize tread wear and aid in preventing tire failure caused from running over sharp stones. When inflating tires, visually inspect them for cracks and breaks.

CAUTION

Beech Aircraft Corporation cannot recommend the use of recapped tires. Recapped tires have a tendency to swell as a result of the increased temperature generated during takeoff. Increased tire size can jeopardize proper function of the landing gear retract system, with the possibility of damage to the landing gear retract mechanism, or jamming of the tire in the wheel well.

SHIMMY DAMPER

A hydraulic shimmy damper is mounted on the nose wheel strut yoke. Whenever this component develops an external leak or a skip in the damping action, it should be replaced.

BRAKES

The brake hydraulic fluid reservoir is located on the firewall in the engine compartment. Refer to Consumable Materials in this section for hydraulic fluid specification.

Since the pistons move to compensate for lining wear, the brakes require no adjustment. Complete information on brake, wheel, and tire maintenance is contained in the appropriate manual included in the loose tools and accessories kit.

INDUCTION AIR FILTER

This filter should be inspected for foreign matter at least once during each 50-hour operating period. In adverse climatic conditions, or if the airplane is stored, preflight inspection is recommended.

To remove and clean the filter:

1. Remove the filter retaining screws.
2. Remove the filter.
3. Clean and service as described in the manufacturer's instructions on the filter.
4. Reinstall the filter.

VACUUM SYSTEM

The foam-rubber suction-relief valve filter may be removed for cleaning by slipping the filter off the bottom of the valve. The filter may be cleaned with soap and water.

In addition, the airplane is equipped with a replaceable paper filter, mounted under the instrument panel on the upper left side of the firewall or mounted on the left instrument panel brace immediately under the glareshield.

PROPELLER BLADES

The daily preflight inspection should include a careful examination of the propeller blades for nicks and scratches. Each blade leading edge should receive particular attention. It is very important that all nicks and scratches be smoothed out and polished. Any BEECHCRAFT Aero or Aviation Center or International Distributor or Dealer will answer questions concerning propeller blade repair.

WARNING

> When working on a propeller, always make certain that the magneto/start switch is OFF and that the engine has cooled completely. WHEN MOVING A PROPELLER, STAND IN THE CLEAR; there is always some danger of a cylinder firing when a propeller is moved.

MINOR MAINTENANCE

RUBBER SEALS

To prevent sticking of the rubber seals around the doors, the seals should be coated with Oakite 6 compound or powdered soapstone or equivalent.

ALTERNATOR

Since the alternator and electronic voltage regulator are designed for use on only one polarity system, the following precautionary measures must be observed when working on the charging circuit, or serious damage to the electrical equipment will result:

1. When installing a battery, make certain that the ground polarity of the battery and the ground polarity of the alternator are the same.

2. When connecting a booster battery, be sure to connect the negative battery terminals together and the positive battery terminals together.

3. When using a battery charger, connect the positive lead of the charger to the positive battery terminal and the negative lead of the charger to the negative battery terminal.

4. Do not operate an alternator on open circuit. Be sure all circuit connections are secure.

5. Do not short across or ground any of the terminals on the alternator or electronic voltage regulator.

6. Do not attempt to polarize an alternator.

MAGNETOS

Ordinarily, the magnetos will require only occasional adjustment, lubrication, and breaker point replacement. This work should be done by a BEECHCRAFT Aero or Aviation Center or International Distributor or Dealer.

WARNING

> To be safe, treat the magnetos as hot whenever a switch lead is disconnected at any point; they do not have an internal automatic grounding device. The magnetos can be grounded by replacing the switch lead at the noise filter capacitor with a wire which is grounded to the engine case. Otherwise, all spark plug leads should be disconnected or the cable outlet plate on the rear of the magneto should be removed.

CLEANING

EXTERIOR PAINT FINISHES

In the standard configuration the BEECHCRAFT Sierra C24R is painted with a lacquer paint finish. Optional urethane paint finishes are available.

LACQUER PAINT FINISHES

Because wax seals the paint from the outside air, a new lacquer paint finish should not be waxed for a period of 90 days to allow the paint to cure. Wash uncured painted surfaces with only cold or lukewarm (never hot) water and a mild non-detergent soap. Any rubbing of the painted surface should be done gently and held to a minimum to avoid cracking the paint film.

CAUTION

When washing the airplane with mild soap and water, use special care to avoid washing away grease from any lubricated area. After washing with solvent, lubricate all lubrication points. Premature wear of lubricated surfaces may result if the above precautions are not taken.

Prior to cleaning, cover the wheels, making certain the brake discs are covered. Attach the pitot cover securely, and plug or mask off all other openings. Be particularly careful to mask off the static air buttons before washing or waxing.

After the paint cures, a thorough waxing will protect painted and unpainted metal surfaces from a variety of highly corrosive elements. Flush loose dirt away first with clear water, then wash the airplane with a mild soap and water. Harsh, abrasive, or alkaline soaps or detergents should never be used. Use a soft cleaning cloth or chamois to prevent scratches when cleaning and polishing. Any good grade automobile wax may be used to preserve painted surfaces. To remove stubborn oil and grease, use a soft cloth dampened with naphtha. After cleaning with naphtha, the surface should be polished or waxed.

URETHANE PAINT FINISHES

The same procedure should be followed for cleaning urethane paint finishes as for lacquer paint finishes; however, urethane paint finishes are fully cured at the time of delivery.

WINDSHIELD AND WINDOWS

Exercise extreme care to prevent scratches when cleaning the Plexiglas windshield and windows. Never wipe them when dry. Flush the surface with clean water or a mild soap solution, then rub lightly with a grit-free soft cloth, sponge, or chamois. Use trisodium phosphate completely dissolved in water to remove oil and grease film. To remove stubborn grease and oil deposits, use hexane, aliphatic naphtha, or methanol. Rinse with clean water; avoid prolonged rubbing.

CAUTION

> Do not use gasoline, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, deice fluid, or lacquer thinners on the windshield or windows, as these substances have a tendency to soften and craze the surface.

INTERIOR

The seats, rugs, upholstery panels, and headliner should be vacuum-cleaned frequently. Do not use water to clean fabric surfaces. Commercial foam-type cleaners or shampoos can be used to clean rugs, fabrics, and upholstery; however, the instructions on the container should be followed carefully.

Some plastic interior trim may be affected by ultra-violet rays from the sun over a period of time. The results of this exposure is a yellow stain that accumulates on the plastic.

It has been found that a commercial type scouring powder cleanser, used with a wet cloth, will successfully remove this stain without damaging the trim.

It must be noted that this type cleanser contains a high bleach content and should not be allowed to come in contact with any other interior material.

ENGINE

Clean the engine with kerosene, solvent, or any standard engine cleaning fluid. Spray or brush the fluid over the engine, then wash off with water and allow to dry.

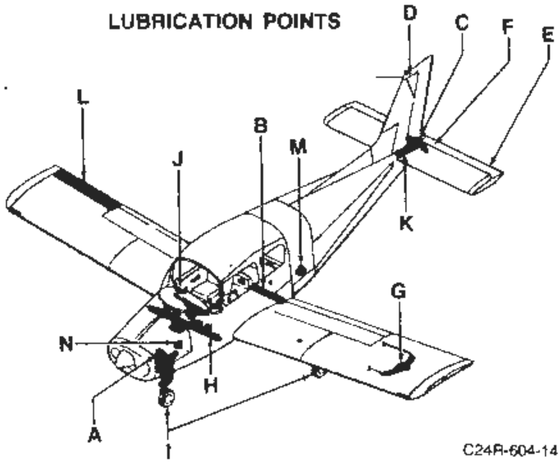
LUBRICATION

Proper lubrication is essential in keeping the airplane components in top condition. If this operation is performed thoroughly, general maintenance will be reduced and the service life of the airplane will be greatly increased.

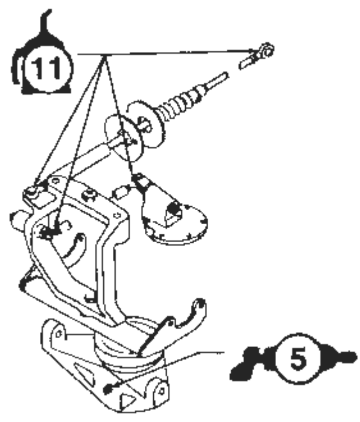
The grease fittings or parts must be wiped clean to make sure that no dirt is carried into the part when lubricated. Apply lubricant sparingly, but with assurance that the bearing surfaces are adequately covered. Wipe off excess lubricant to prevent the accumulation of dust and foreign material.

NOTE

Lubricate all pivotal points as shown on the Lubrication Diagram in the Shop Manual to ensure freedom of movement and proper functioning. More frequent lubrication may be required because of climate, or frequent usage of the airplane.



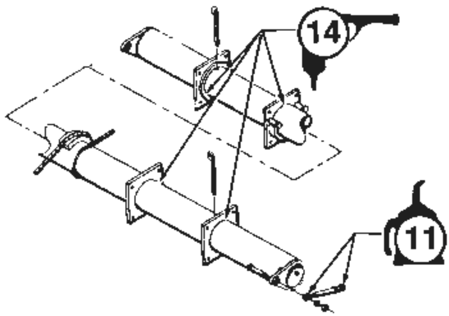
DETAIL A



NOSE GEAR STEERING

C24R-604-15

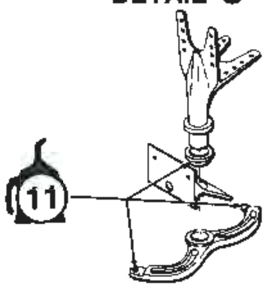
DETAIL B



FLAP MECHANISM

C24R-604-16

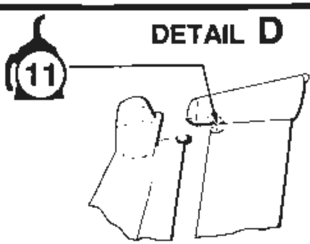
DETAIL C



RUDDER BELLCRANK

C24R-604-17

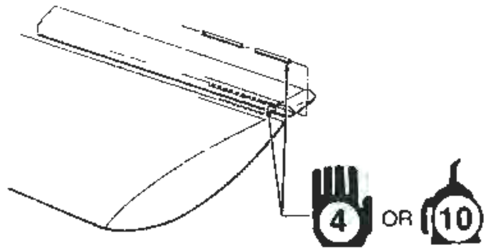
DETAIL D



RUDDER HINGE

C24R-604-18

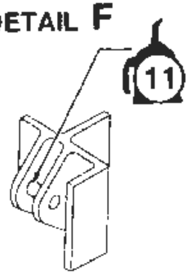
DETAIL E



ELEVATOR HINGE

C24R-604-19

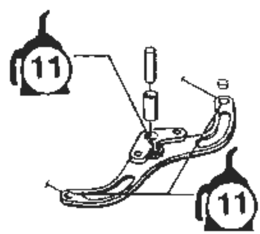
DETAIL F



STABILATOR HINGE BRACKET

C24R-604-20

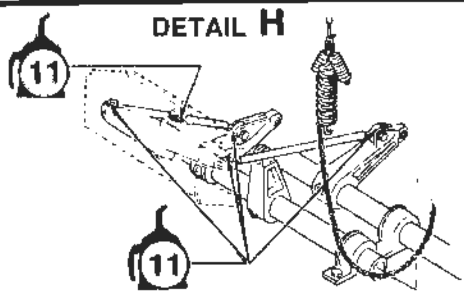
DETAIL G



AILERON BELLCRANK

C24R-604-21

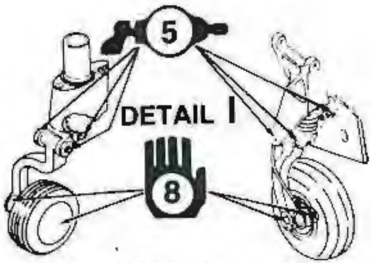
DETAIL H



RUDDER MECHANISM

C24R-604-22

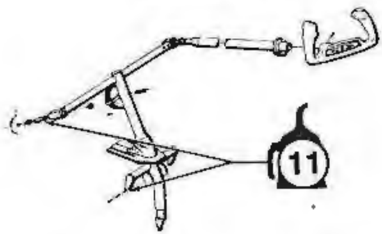
DETAIL I



LANDING GEAR

C24R-604-23

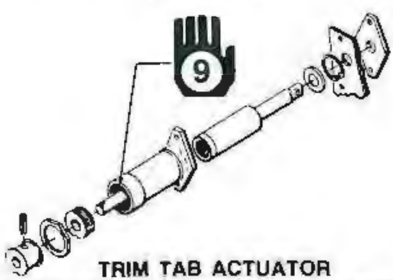
DETAIL J



CENTRAL COLUMN LINKAGE

C24R-604-24

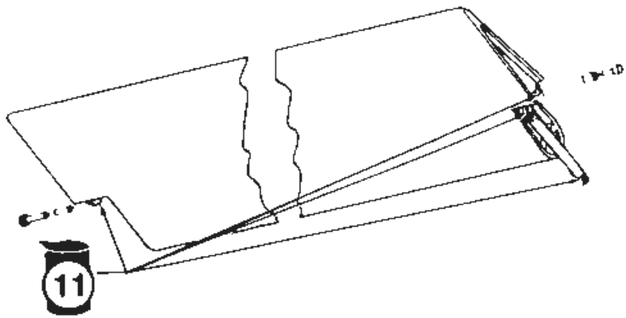
DETAIL K



TRIM TAB ACTUATOR

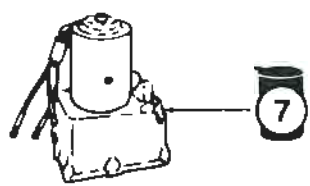
C24R-604-25

DETAIL L



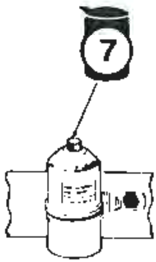
AILERON HINGE AND ROD ENDS C24R-604-26

DETAIL M



LANDING GEAR RESERVOIR C24R-604-27

DETAIL N



BRAKE FLUID RESERVOIR

C24R-604-28

NOTE

NUMBERS REFER TO ITEMS IN THE CONSUMABLE MATERIALS CHART.

LUBRICATE ALL PLAIN BEARING BUSHINGS AS REQUIRED OR EVERY 500 HOURS WITH SAE NO. 30 OIL.

APPLY SAE NO. 20 OIL TO PUSH-PULL CONTROL HOUSINGS AS REQUIRED.

LUBRICATE FLIGHT CONTROL PULLY BUSHINGS WITH SAE NO. 30 OIL EVERY 1000 HOURS.

SAE 10W/30 OIL IS AN ACCEPTABLE REPLACEMENT FOR SAE 20 OR SAE 30 OIL.

C24R-604-29

RECOMMENDED SERVICING SCHEDULE

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	MATERIALS (Numbers refer to Item on Consumable Materials)
Pre-flight	Check engine oil level	Upper right side of engine	1
	Drain fuel tank drains	Inboard bottom of wings	-
	Drain fuel system low spot	Bottom of fuselage	–
	Service fuel tanks	Top of wings	3
25 Hrs.	Check battery electrolyte	Behind aft cabin bulkhead	See Shop Manual
	Clean induction air filter	In lower forward cowl	–
	Lubricate landing gear knee pins	On landing gear (I)	5
50 Hrs.	Change engine oil	Lower side of engine	1
	Clean oil screens	Aft right side of accessory case and bottom of sump	2
	Central brake reservoir	On firewall (N)	7
	Hydraulic gear pump reservoir	Aft of rear seat bulkhead (O)	7
100 Hrs.	Clean fuel system screens and strainers	Bottom of wings and fuselage	2
	Clean suction relief valve screen	Forward of firewall	–

INTERVAL	ITEM	LOCATION (Letters refer to Lubrication Points Diagram)	MATERIALS (Numbers refer to item on Consumable Materials)
100 Hrs. (Cont'd)	Lubricate wheel bearings	Landing gear (I)	8
	Lubricate nose gear rod end bearings	On top of nose gear (A)	11
	Lubricate nose gear swivel	On aft side of nose gear (A)	5
	Lubricate flap torque tubes	Under floorboards (B)	14
	Lubricate flap rod end bearings	Under floorboards (B)	11
	Lubricate rudder bellcrank pivot points	Bottom of rudder (C)	11
	Lubricate rudder hinges	On rudder leading edge (D)	11
	Lubricate stabilator trim tab hinge and pin	On trailing edge of stabilator (E)	4, 10
	Lubricate stabilator hinge pivot point	In aft tail section (F)	11
	Lubricate aileron bell-crank	In wing forward of aileron (G)	11
	Lubricate aileron pivotal points and rod ends	Outboard trailing edge of wings (L)	11
300 Hrs.	Replace induction air filter	In front nose cowl	–

500 Hrs.	Lubricate rudder pedal bell-crank	Forward cabin floor (H)	11
	Lubricate rudder pedal rod ends	Forward cabin floor (H)	11
	Replace gyro instrument central paper filter	Behind instrument panel	–
1000 Hrs.	Lubricate control column pivot points	Behind instrument panel (J)	11
1200 Hrs.	Lubricate trim tab actuator	In aft tail section (K)	9
As Required	Clean spark plugs	In engine compartment	–

NOTES

1. Anytime the control surfaces are altered, repaired, or repainted, they must be rebalanced per the Maintenance Manual.
2. Check the wing bolts for proper torque at the first 100-hour inspection and at the first 100-hour inspection after each reinstallation of the wing attach bolts.
3. Emergency Locator Transmitter Batteries (right side of aft fuselage):

   Non-rechargeable Batteries: Replace after one cumulative hour or after 50% of the useful life.

CONSUMABLE MATERIALS

ITEM	MATERIAL	SPECIFICATION
*1	Engine Oil	SAE No. 30 (0° to 70°F) SAE No. 50 (Above 60°F) SAE No. 20 (Below 10°F)
2	Solvent	PD680
**3	Fuel, Engine	100 (green) or 100LL (blue) Grade
***4	Lubricant, Powdered Graphite	MIL-C-6711
†5	Grease (High & Low Temperature)	Aero Lubriplate
6	Corrosion Preventive, Engine	MIL-C-6529
7	Hydraulic Fluid	MIL-H-5606
††8	Grease (General Purpose, Wide Temperature)	MIL-G-81322
††9	Grease (High & Low Temperature)	MIL-G-23827
10	Lubricating Oil (Low Temperature)	MIL-L-7870
11	Lubricating Oil	SAE No. 20 or 10W/30
****12	Fuel Additive	Alcor TCP Concentrate

††††13	Lubricant, Rubber Seal	Oakite 6 Compound
††††14	Lubricant, Silicone Spray	Krylon No. 1329 (or equivalent)
15	Lubricant, Fluorosilicone	Corning FS-1292

*It is recommended that a straight mineral based (nondetergent) oil be used until the oil consumption has stabilized and then change to an ashless dispersant oil for prolonged engine life.
Avco Lycoming Specification Number 301E approves for use lubricating oils which conform to both MIL-L-6082B straight mineral type and MIL-L-22851 ashless dispersant lubricants for airplane engines.

**If grade 100 (green) fuel is not available, use 100LL (blue).
***Mix with quick-evaporating liquid naphtha and apply with a brush.

†Product of BRC Bearing Company, Wichita, Kansas.

††In extremely cold climates, MIL-G-23827 grease should be used in place of MIL-G-81322 grease. Care should be exercised when using either MIL-G-81322 or MIL-G-23827 grease, as they contain a rust-preventing additive which is harmful to paint.

†††Product of Oakite Products, Inc., 50 Valley Road, Berkley Heights, N.J., 07922

††††Product of Krylon Inc., Norristown, Pa.

****Product of Alcor, Inc., 10130 Jones-Maltsberger Rd., P.O. Box 32516 San Antonio, Texas.

APPROVED ENGINE OILS FOR LYCOMING ENGINES

VENDOR	PRODUCT IDENTIFICATION
Delta Petroleum Co.	*Global Concentrate A
Enjay Chemical Co.	*Paranox 160 and 165
Mobil Oil Corp.	RT-451, RM-173E, RM-180E
Shell Oil Co.	*Shell Concentrate A Code 60068 *Aeroshell W 120 *Aeroshell W 80
Texaco Inc.	*TX-6309 *Aircraft Engine Oil Premium AD120 *Aircraft Engine Oil Premium AD80
American Oil and Supply Co.	*PQ Aviation Lubricant 753
Chevron Oil Co.	*Chevron Aero Oil Grade 120
Exxon Oil Co.	*Exxon Aviation Oil E-120 *Exxon Aviation Oil A-100 *Exxon Aviation Oil E-80
Standard Oil Co. of California	*Chevron Aero Oil Grade 120
Castrol Oils, Inc.	**Castrolaero 113, Grade 1065 **Castrolaero 117, Grade 1100
Champlin Oil and Refining Co.	**Grade 1065 **Grade 1100

Chevron Oil Co.	**Chevron Aviation Oil 65 **Grade 1100
Continental Oil Co.	**Conoco Aero Oil 1065
Mobil Oil Corp.	**Avrex 101/1065 **Avrex 101/1100
Phillips Petroleum Co.	**Phillips 66 Aviation Engine Oil, Grade 1065 **Phillips 66 Aviation Engine Oil, Grade 1100
Shell Oil Co.	**Aeroshell Oil 65 **Aeroshell Oil 100

*Ashless Dispersant Oils

**Straight Mineral Oils

NOTE

A straight mineral oil conforming to MIL-L-6082 may be used until the oil consumption has stabilized.

Vendors listed as meeting Federal and Military Specifications are provided as reference only and are not specifically recommended by Beech Aircraft Corporation. Any product conforming to the specification may be used.

BULB REPLACEMENT GUIDE

LOCATION	NUMBER	
	14-VOLT	28-VOLT
Compass light	330	327
Dome light, cabin	89	303
Instrument flood light, overhead	89	303
Landing gear position light	330	327
Landing light, wing	4313	4596
Navigation light, tail cone	1777	1683
Navigation light, wing	1512	1524
Rotating beacon	WRM-44KA or WRM-1940	WRM-1939
Taxi light	4595	4594

OVERHAUL AND REPLACEMENT SCHEDULE

The first overhaul or replacement should be performed not later than the required period. The condition of the item at the end of the first period can be used as a criterion for determining subsequent periods applicable to the individual airplane or fleet operation, providing the operator has an approved monitoring system.

The time periods for inspections noted in this manual are based on average usage and average environmental conditions.

SPECIAL CONDITIONS CAUTIONARY NOTICE

Airplanes operated for Air Taxi or other than normal operation, and airplanes operated in humid tropics or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas periodic inspections should be performed until the operator can set his own inspection periods based on experience.

NOTE

The required periods do not constitute a guarantee the item will reach the period shown as the aforementioned factors cannot be controlled by the manufacturer.

COMPONENT	*OVERHAUL OR REPLACE*
LANDING GEAR	
Hydraulic pump, motor assembly	On Condition
(Brushes)	Inspect 500 hours, replace on condition.
Brake Assembly	On Condition
Brake Lining	On Condition
Master Cylinder	On Condition
Parking Brake Valve	On Condition
All Hose	On Condition
Retract Actuators	On Condition
Shuttle Valve (gear retract system)	On Condition
Shimmy Damper	On Condition
Wheels and Tires	On Condition

POWER PLANT

NOTE

When an engine has been overhauled, or a new engine installed, it is recommended that low power settings NOT be used until oil consumption has stabilized. The average time for piston ring seating is approximately 50 hours. Refer to Lycoming Engine Operator's Manual.

Engine IO-360-A1B6	1600 hours
Engine Controls	On Condition
Engine Vibration Isolator Mounts	Engine Change
Exhaust System	On Condition

COMPONENT	*OVERHAUL OR REPLACE*
Starter	Inspect at engine overhaul; overhaul or replace On Condition
Alternator	On Condition
Oil Cooler	On Condition (replace when contaminated)
Propeller (Hartzell) See Hartzell S.L. 61F	At engine overhaul or at unscheduled engine change but not to exceed 1500 hours or 4 years
Propeller Controls	On Condition
Propeller Governor	At engine overhaul but not to exceed 1500 hours or 4 years
Magnetos	On Condition
Engine Driven Fuel Pump	At Engine Overhaul or On Condition
Cabin Heat Muff	Inspect every 100 hours
Flap Position Indicator	On Condition
Free Air Temperature Indicator	On Condition
All hose	Hoses carrying flammable liquids; at engine overhaul or every 5 years. All other hoses on condition.
Vacuum System Filter	Every 300 Hours
Vacuum Regulator Valve	On Condition
Vacuum Pump	At Engine Overhaul or On Condition

COMPONENT	*OVERHAUL OR REPLACE*
FUEL SYSTEM	
Fuel Boost Pump	On Condition
All Hose carrying flammable liquid	At engine overhaul or every 5 years
All Hose not carrying flammable liquid	On Condition
Fuel Selector Valve	Inspect every 100 hours; overhaul on condition
Fuel Cell Drain Valve	On Condition
Wing Fuel Quantity Transmitters	On Condition
INSTRUMENTS	
Turn Coordinator	On Condition
Altimeter	Every 24 months per FAA Directive
Directional Gyro	On Condition
Gyro Pressure	On Condition
Engine Indicator Units	On Condition
Airspeed Indicator	On Condition
Rate-of-Climb Indicator	On Condition
Fuel Quantity Indicator	On Condition
Manifold Pressure/Fuel Flow Indicator	On Condition
Tachometer	On Condition
ELECTRICAL SYSTEM	
Battery Master Relay	On Condition
All other Relays	On Condition
Voltage Regulator	On Condition
Starter Relay	On Condition

COMPONENT	*OVERHAUL OR REPLACE*
FLAPS AND FLIGHT CONTROLS	
Flight Controls	On Condition
Stabilator Tab Actuator	On Condition
Flap Motor and Actuator Drive Assembly	On Condition
Flap Motor Brushes	On Condition
MISCELLANEOUS	
Seat Belts and Shoulder Harness	Inspect every 12 months, replace on condition
Hand Fire Extinguisher	Inspect every 12 months, recharge as necessary
Cabin Heating and Ventilating Ducts	On Condition, Inspect every 12 months

INSPECTIONS

The FAA requires that an airplane used for hire be inspected at each 100 hours of operation by qualified personnel. Airplanes which are not used for hire are required to have an inspection by qualified personnel on an annual basis.

Good operating practice requires that the airplane be preflighted prior to takeoff. Items found during preflight and engine run-up should be corrected on the basis of their importance to the safe operation of the airplane; however, in any event, early correction of items found is good preventative maintenance.

Although it is not a requirement that FAA qualified personnel change the oil and inspect the airplane, except at the 100-hour/annual inspection, as noted above, it is recommended the airplane be given an inspection at the recommended oil change period. Any unsatisfactory items should be corrected, either at that time or as soon as practical, depending on the nature of the item.

The inspection at the recommended oil change interval should include the following:

Operational Inspection

1. Alternator/voltage regulator functioning
2. Engine instruments
3. Flight instruments
4. Idle rpm and mixture
5. Engine controls operation
6. All lights
7. Radio operation
8. Magneto check
9. Brake operation
10. Tank selector operation
11. Heat and vent system operation
12. Starter operation
13. Electrical switches and circuit breakers
14. Power check 2650 to 2700 rpm static

Power Plant

1. Oil screens cleaned
2. Induction air filter cleaned
3. Check engine controls, wiring harness, and plumbing for clearance and security.
4. Check propeller for rock damage and spinner and spinner bulkhead for cracks and security, engine and propeller for oil leaks.

5. Check engine baffles and cowling for cracks and security.
6. Check exhaust system and air ducts for condition and security.
7. Check for indications of oil leaks, condition and security of engine accessories.
8. Check brake system reservoir.
9. Clean and gap spark plugs.

Cabin and Aft Fuselage

1. Flight control operation through full travel and proper direction of travel.
2. Storm window and door operation
3. Check interior furnishings and seat belts.
4. Check battery water level.
5. Check hydraulic pump reservoir

Exterior

1. Check flight control surfaces for condition and security.
2. Check tires, brake pucks and discs.
3. Check static ports, pitot mast and fuel vent lines for obstructions.
4. Check general condition of fuselage and wings.

SECTION IX

SUPPLEMENTS

NOTE

The supplemental data contained in this section is for equipment that was delivered on the airplane, and for standard optional equipment that was available whether or not it was installed. Supplements for equipment for which the vendor obtained a Supplemental Type Certificate were included as loose equipment with the airplane at the time of delivery. These and other Supplements for other equipment that was installed after the airplane was delivered new from the factory should be placed in this SUPPLEMENTS Section of this Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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PILOT'S OPERATING HANDBOOK
and
FAA APPROVED AIRPLANE FLIGHT MANUAL

LOG OF SUPPLEMENTS

FAA Supplements must be in the airplane for flight operation when subject equipment is installed:

~~Part~~ Number	Subject	Rev. No.	Date
SA 5254SW-D	S-TEC 50 AUTO PILOT		12/12/92
SA71GL	BRACKETT AIR FILTER		3/3/83
SA2693NM	ELECTRONICS INT. VOLT/AMP GUAGE		1/26/88
SA00068SE	ELECTRONICS INT FUEL FLOW		3/31/94
SE1779NM	PRECISE STAND-BY VAC SYS		3/23/88
SE7582SW	.010 OVERSIZE NITRIDED CYL.		8/15/88
	GARMIN GNS-430 NAVIGATION SYSTEM		06/27/2005

98-38

United States of America

Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number SA71GL

This certificate issued to Brackett Aircraft Company, Inc.

certifies that the change in the type design for the following product with the limitations and condition therefor as specified hereon meets the airworthiness requirements of Part Specified under certification basis on the applicable Data Sheets or Aircraft Specifications. Regulations

Original Product — Type Certificate Number.

Make: As shown on Approved Model List(s)

Model:

Description of Type Design Change:
Replace existing engine air filter frame assembly with Brackett Aircraft Specialties frame assembly in accordance with Approved Model List.

NOTE: FAA- Approved Model List(s) form a part of this certificate.

Limitations and Conditions: This approval should not be extended to other aircraft this model on which other previously approved modifications are incorporated unl it is determined by the installer that the interrelationship between this change and any of those other previously approved modifications will introduce no adve effect upon the airworthiness of that aircraft.

This certificate and the supporting data which is the basis for approval shall remain in effect until sur rendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: January 9, 1975

Date reissued: March 3, 1985

Date of issuance: February 21, 1975

Date amended:

By direction of the Administrator

(Signature)

Supervisor, Aircraft Modification Sectic

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or bo

This certificate may be transferred in accordance with FAR 21

FAA Form 8110-2 (10-68)

AIRPLANE MODEL	T.C. NO.	DESCRIPTION OF TYPE DESIGN CHANGE	APPROVED DATE
BRACKETT FILTER MODEL BA-7410 APPLICABILITY LIST			
Beech 535 (thru S/N D7671)	3A15	Install BA-7410 Filter Assembly in accordnace with installation instructions NO. BA-7405 dated June 17, 1976 or later FAA approved revision.	Aug. 8, 1977
BRACKETT FILTER MODEL BA-7510 APPLICABILITY LIST			
Beech C23, A24R B24R, C24R, B19, C23A	A1CE	Install BA-7510 Filter Assembly in accordance with installation instructions No. BA-7503 dated June 17, 1976 or later FAA approved revision FAA APPROVED JUN 18 1992 LOS ANGELES AIRCRAFT CERTIFICATION OFFICE	Aug. 8, 1977 Revised Feb. 4, 1983
BRACKETT FILTER MODEL BA-7610 APPLICABILITY LIST			
Beech 95-55, -A55, -B55	A23CE	Install BA-7610 Filter Assembly in accordance with installation instructions No. BA-7604 dated Jan. 26, 1978 or later FAA approved revision.	March 9, 1978

United States of America
Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number SE7582SW

This certificate, issued to

Superior Air Parts, Inc.
P. O. Box 363
Addison, TX 75001

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 13 of the Civil Air Regulations.

Original Product — Type Certificate Number: Page 2
Make: Textron Lycoming
Model: See Page 2

Description of Type Design Change:

Grinding of high compression NITRIDED Cylinders to .010 oversize, as an alternative to chrome plating or rebarreling, and the installation of SL10207 P10 Piston, SL74241 P10 Top and second compression ring, and SL73857 P10 oil control ring in accordancewith Superior Air Parts, Inc. procedure for gringing high compression NItrided cylinder barrales and installation of .010 oversize pistons and rings, dated 8/15/88, or later FAA approved revision. See Continuation Sheet

Limitations and Conditions:

Compatibility of this modification with previously installed equipment must be determined by installer.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: August 15, 1988

Date of issuance: April 11, 1989

Date reissued:

Date amended:

By direction of the Administrator

(Signature)

for L. B. Andriesen
Manager, Rotorcraft Directorate,
Aircraft Certification Service

FEDERAL AVIATION ADMINISTRATION

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

Form 8110-2 (10-68)

United States of America
Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)

Number SE7582SW

Limitations and Conditions (Continued):

The following engines and their respective Type Certificate Numbers are eligible for this installation:

Type Certificate Number 1E10 -

IO-360-A1a, A1B, A1B6, A1B6D, A1C, A1C6, A1D, A1D6, A2A, A2B, A2C, C1A, C1B, C1C, C1C6, C1D6, C1E6, C1E6D, D1A, C1F, J1A6D, K2A, A3B6D. A10-360-A1A, A1B, B1B. AEIO-360-A1A, A1B, A1B6, A1D, A1E, A2B. LIO-360-C1E, C1E6, C1E6D. HIO-360-A1A, C1A, C1B. LHIO-360-C1A.

Type Certificate Number E-275-10 -

GO-480-C1B6, C1D6, C2 SERIES, G2D6, G2F6, G1A6, G1AG(HELIO), G1B6, G1D6(HELIO), G1D6, G1E6, G1F6, G1G6, G1J6. IGO-480-A1B6(HELIO).

Type Certificate Number 1E4-11 -

IO-540-M1A5, E1B5, A1A5, G1A5, G1B5, G1C5, G1D5, G1E5, K1A5, K1B5, K1D5, K1F5, L1A5, B1A5, B1C5, E1A5, E1B5, G1F5, K1C5, K1E5, P1A5, S1A5, K1A5D, K1F5D, K1G5, K1G5D, K1H5, K1J5, K1J5D, K1K5, L1A5D. HIO-540-A1A. AEIO-540-L1B5D. IO-540-M1A5D, M1B5, M1B5D, U1A5D, U1B5D, K1E5D, S1A5.

Type Certificate Number 1 E11-5 -

IGO-540-A1A, A1C, B1A, BIC.

Type Certificate Number E-304-6 -

VO-540-C1A, C1B, C1C3, C2A, C2C.

Type Certificate Number E-11EA-2 -

IVO-540-A1A.

Type Certificate Number 1E15-5 -

IO-720-A1A, D1B, A1B, B1B, C1B, D1B, B1BD, D1C, D1CD

END

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both

This certificate may be transferred in accordance with FAR 21.47

GARMIN Ltd. or its subsidiaries
c/o GARMIN International, Inc.
1200 E. 151st Street
Olathe, Kansas 66062 U.S.A.

FAA Approved

AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL AIRPLANE FLIGHT MANUAL

for the

GARMIN G3X TOUCH ELECTRONIC FLIGHT INSTRUMENT SYSTEM

as installed in

BEECH C24R

Make and Model Airplane

Registration Number: N38566 Serial Number: MC-755

This document serves as an Airplane Flight Manual Supplement or as a Supplemental Airplane Flight Manual when the aircraft is equipped in accordance with Supplemental Type Certificate SA01899WI for the installation and operation of the Garmin G3X Touch Electronic Flight Instrument. This document must be carried in the airplane at all times.

The information contained herein supplements or supersedes the information made available to the operator by the aircraft manufacturer in the form of clearly stated placards or markings, or in the form of an FAA approved Airplane Flight Manual, only in those areas listed herein. For limitations, procedures and performance information not contained in this document, consult the basic placards or markings, or the basic FAA approved Airplane Flight Manual.

FAA approved sections of this supplement are labeled as "FAA Approved". Sections not labeled "FAA Approved" are provided for guidance information only.

FAA APPROVED BY: [signature]

Robert Murray

ODA STC Unit Administrator

GARMIN International, Inc

ODA-240087-CE

DATE 12/29/2021

Garmin International, Inc.
1200 E. 151st Street
Olathe, KS 66062 USA
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www.garmin.com

Garmin International, Inc

Log of Revisions

FAA Approved

AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL AIRPLANE FLIGHT MANUAL

for the

GARMIN G3X TOUCH ELECTRONIC FLIGHT INSTRUMENT SYSTEM

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF APPROVAL	FAA APPROVED
1	ALL	Original Issue	03/15/19	Robert Murray ODA STC Unit Administrator
2	2-2, 2-5	Added limitation for installations with an autopilot other than GFC500.	04/05/19	Paul Mast ODA STC Unit Administrator
3	1-5, 2-1	Added GPS 175 / GNX 375 as approved IFR navigators.	5/30/19	Paul Mast ODA STC Unit Administrator
4	ALL	Incorporate system software v8.60 and associated hardware changes.	12/20/19	Robert Murray ODA STC Unit Administrator
5	ALL	Formatting changes throughout document. Clarified requirements for IFR vs. VFR navigation, updated emergency procedures, annunciations, and autopilot configuration applicability. Added graphics for deviation indicators. Revised transponder mode description. Addition of Smart Glide.	SEE COVER	SEE COVER

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Table of Contents

1 GENERAL

The information in this supplement is FAA-approved and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) when the airplane has been modified by the installation of the Garmin G3X Touch Electronic Flight Instrument System in accordance with STC SA01899WI.

The information in this supplement supersedes or adds to the basic POH/AFM only as set forth below.

Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

The G3X Touch provides one or more of the following functions:

- Primary Flight Display (PFD) – Provides attitude, air data, heading, and navigation information to the pilot.
- Multi-Function Display (MFD) – Provides pilot awareness of factors that may affect the overall conduct of the flight such as advanced moving map including terrain, obstacle and traffic alerts, georeferenced FliteCharts® or Jeppesen® ChartView™ charts and SafeTaxi® airport diagrams.
- Engine Indication System (EIS) – Provides engine and airframe operating parameters to the pilot.

The G3X Touch is scalable with a variety of configurations made up of the 7" portrait GDU 470 and the 10" landscape GDU 460. Installations may consist of one or both display types in any combination from one to three displays (or up to four displays total in tandem cockpit aircraft). A minimum installation with a single display may be a standalone MFD or a PFD which can be split screened to provide both PFD and MFD functions. EIS can optionally be displayed on any GDU except a 7" portrait PFD. Only one display per cockpit can be installed as a PFD (any second or third display is an MFD).

Single 7" Portrait GDU (PFD with MFD in split mode, No EIS)

Single 10" GDU (PFD & MFD, EIS Optional)

Dual 7" Portrait GDUs (PFD & MFD, EIS Optional)

One 10" + One 7" Portrait GDU (PFD & MFD, EIS Optional)

The PFD has an internal WAAS GPS receiver for VFR operations and a touchscreen interface. The G3X Touch system also can interface with an external, IFR approved navigator for IFR operations. Aircraft without an external, IFR approved navigator are approved for VFR operations only. Refer to equipment requirements for IFR operations in Limitations Section 2.3, *Navigation Systems for IFR Operations*, and the table in Section 2.24, *Kinds of Operations*.

PFD installations require the installation of a GSU 25 ADAHRS, GMU 11 magnetometer, GTP 59 temperature probe, and the GAD 27 voltage stabilizer (14V airframes with EIS). For all PFD installations in aircraft approved for IFR operations, standby instruments and an IFR approved navigation system are required.

If the installation includes a separate PFD and MFD, reversionary backup is available should a failure of either display occur. In reversionary mode, the remaining G3X Touch display combines critical flight instrumentation with engine readouts (if installed) and navigation information in a single-screen consolidated presentation.

If EIS functions are installed, they require the installation of a remote mounted GEA 24 Engine Airframe unit and associated engine sensors.

MFD functions are supported by an internal GPS receiver or connection to an external, IFR approved GPS navigator. G3X Touch flight displays can be integrated with a variety of systems including VHF radios, transponders, audio panels, ADS-B, SiriusXM® data links, mobile devices via Garmin Connext® and autopilot systems.

Carefully review the contents of this Airplane Flight Manual Supplement before operating the airplane. Also review Pilot's Guide 190-02472-00 Rev A, or later version applicable to the approved software version of the G3X Touch system installed on the aircraft. The Pilot's Guide provides details on the features of the G3X Touch system.

USE OF THE AFMS

The following definitions apply to WARNINGS, CAUTIONS and NOTES found throughout the AFMS:

WARNING

Operating procedures, techniques, etc., which could result in personal injury or loss of life if not carefully followed.

CAUTION

Operating procedures, techniques, etc., which could result in damage to equipment if not carefully followed.

NOTE

Operating procedures, techniques, etc., which are considered essential to emphasize.

1.1 G3X Touch GNSS (GPS/SBAS) Navigation Equipment Approvals

G3X Touch is capable of IFR operations when an external, IFR approved navigation system is installed and connected to the system and when the pilot selects the **FPL Source** to **External**. Refer to equipment requirements for IFR operations in Limitations Section 2.3, *Navigation Systems for IFR Operations*, and the table in Section 2.24, *Kinds of Operations*.

When no external, IFR approved navigator is connected, or when the pilot selects **FPL Source** to **Internal**, G3X Touch provides VFR flight planning capabilities and guidance on the HSI.

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1.2 Abbreviations and Terminology

The following glossary is applicable within the airplane flight manual supplement

AC	Advisory Circular
ADAHRS	Air Data Attitude Heading Reference System
ADC	Air Data Computer
ADS-B	Automatic Dependent Surveillance-Broadcast
AFCS	Automatic Flight Control System
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
AHRS	Attitude Heading Reference System
ALT	Altitude
AML	Approved Model List
AMMD	Airport Moving Map Display
AOA	Angle of Attack
AP	Autopilot
APV	Approach with Vertical Guidance
ATC	Air Traffic Control
ATT	Attitude
Baro	Barometric
BC	Back Course
CAN	Controller Area Network
CB	Circuit Breaker
CDI	Course Deviation Indicator
CFR	Code of Federal Regulations
COM	Communication
DA	Decision Altitude
DG	Directional Gyro
ECS	Electrical Control System
EIS	Engine Indication System
ESP	Electronic Stability and Protection
GA	Go Around
GP	Glide Path
GPSS	GPS Steering
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FD	Flight Director

FIS-B	Flight Information Service – Broadcast
FPL	Flight Plan
FPM	Feet Per Minute
GAD	Garmin Adaptor Device
GDU	Garmin Display Unit
GEA	Garmin Engine and Airframe
GFC	Garmin Flight Control
GMU	Garmin Magnetometer Unit
GNC 255	Garmin Navigation and Communication Transceiver
GNS	Garmin Navigation System
GNSS	Global Navigation Satellite System
GNX	Garmin Navigator Transponder
GP	Glide Path
GPS	Global Positioning System
GS	Glide Slope or Ground Speed
GSU	Garmin Sensor Unit (ADAHRS)
GTN	Garmin Touch Navigation
GTP	Garmin Temperature Probe
HDG	Heading
HSI	Horizontal Situation Indicator
IAF	Initial Approach Fix
IAS	Indicated Airspeed
IDENT	Identification button on Transponder
IFR	Instrument Flight Rules
ILS	Instrument Landing System
INT	Internal
K factor	Fuel flow transducer calibration factor
LNAV	Lateral Navigation
LNAV+V	Lateral Navigation with Vertical Guidance
LP	Localizer Precision
LP+V	Localizer Precision with Advisory Vertical Guidance
LPV	Localizer Precision with Vertical Guidance
LOC	Localizer
LOI	Loss of Integrity
MAX	Maximum
MDA	Minimum Descent Altitude

MFD	Multi-Function Display
MIN	Minimum
MSG	Message
N/A	Not Available
NAV	Navigation
NOTAM	Notice to Airmen
NRST	Nearest
PFD	Primary Flight Display
POH	Pilot's Operating Handbook
PTRIM	Pitch Trim
OAT	Outside Air Temperature
OBS	Omni Bearing Selector
ODA	Organizational Designation Authorization
REV	Revision or Reversion
RNAV	Area Navigation
RPM	Revolutions per Minute
SBAS	Satellite Based Augmentation System
SD Card	Secure Digital Card
SFD	Standby Flight Display
SL30	Garmin nav/com transceiver
STBY	Standby
STC	Supplemental Type Certificate
SYNC	Synchronize
TAS	True Airspeed
TAWS	Terrain Alert and Warning System
VDI	Vertical Deviation Indicator
TFR	Temporary Flight Restriction
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VNAV	Vertical Navigation
VOR	VHF Omni-directional Range
VSI	Vertical Speed Indicator
WAAS	Wide Area Augmentation System
XTK	Cross Track Error
YD	Yaw Damper

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2 LIMITATIONS

2.1 System Software Requirements

The G3X Touch must use the following or later FAA approved software versions for this AFMS revision to be applicable:

Component	Software Version
G3X Touch System Software	9.0

NOTE

This section is not intended to be a comprehensive list of approved software. It is intended to provide a means to determine if this AFMS revision is applicable to the software that is installed in the aircraft. Do not use this AFMS revision if the installation has a software version less than that shown in the table above.

2.2 Standby Flight Instruments

Standby Instruments are required for aircraft approved for IFR operations. Refer to the table in Section 2.24, *Kinds of Operations*.

2.3 Navigation Systems for IFR Operations

Aircraft approved for IFR operations must use one of the following navigation systems connected to the G3X Touch system, and **FPL Source** on the PFD must be selected to **External**.

- Garmin GNC 300XL / GPS 155XL
- Garmin GPS, GNC, or GNS 4XX(W) / 5XX(W)
- Garmin GNS 480
- Garmin GTN 6XX / 7XX
- Garmin GPS 175 / GNX 375
- Garmin SL30
- Garmin GNC 255
- Garmin GNC 355/355A

OR

- A separate, non-Garmin, IFR approved GPS and/or VHF navigation system along with a dedicated Course Deviation Indicator (CDI) separate from G3X Touch.

Refer to the table in Section 2.24, *Kinds of Operations*.

NOTE

Refer to the approved Airplane Flight Manual Supplement for the non-Garmin navigation system (if installed) for information on IFR operations.

IFR operations are prohibited using G3X Touch while **FPL Source** is selected to **Internal** GPS navigation as the navigation source on G3X Touch. When the internal navigation source is selected, a cyan **INT** and magenta **VFR** annunciation is displayed on the HSI. When **INT** and **VFR** are annunciated, IFR operations are prohibited based solely on guidance provided by G3X Touch.

IFR operations are prohibited using G3X Touch for navigation when the G3X system is not connected to an external, IFR approved navigator. Installations without an external, IFR approved navigator are limited to VFR operations only and have a placard located near the pilot PFD. Refer to Section 2.25, *Placards*.

2.4 Databases

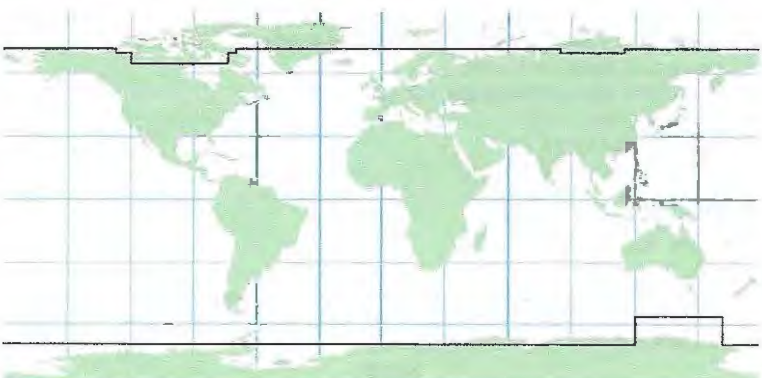
Database updates via SD card must be done while the aircraft is on the ground and stationary. Database transfers or updates are prohibited in flight.

2.5 AHRS Operational Area

IFR operations are prohibited in the following regions:

1) North of 72° North latitude, at all longitudes
2) South of 70° South 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 (A region south of Australia and New Zealand)

Loss of heading may occur when operating in these regions.



2.6 Magnetic Variation Operational Area

IFR operations are prohibited in areas where the magnetic variation is greater than 99.9 degrees East or West.

2.7 Navigation Angle

The Magnetic/True Navigation Angle (as selected on the System Units page) must match the navigation angle selected on all interfaced GPS/SBAS navigators.

2.8 ADAHRS Systems Status

Valid air data, attitude, and heading must be displayed on the G3X Touch PFD and Standby Instruments for IFR operations. Refer to Section 2.24, *Kinds of Operations*, for specific equipment requirements for VFR and IFR. IFR operations are prohibited if any of the following System Status Messages are displayed:

AHRS not receiving GPS data

AHRS not receiving air data

AHRS not receiving magnetometer data

2.9 Aerobatic Maneuvers

Do not conduct aerobatic maneuvers if uninterrupted attitude information is required on the PFD. Refer to Section 3.2, *Attitude Failure (GSU 25)*, if the amber **AHRS ALIGN** caution is displayed on the PFD.

2.10 Other Autopilots

On aircraft with an autopilot other than a GFC 500, the pilot must select **FPL Source** to **External** on the PFD when using the autopilot in navigation (NAV or APR) modes. For those aircraft, it is prohibited to use the autopilot in navigation modes when **FPL Source** is selected to **Internal** on the PFD.

NOTE

Refer to the approved Airplane Flight Manual Supplement for the non-Garmin autopilot system (if installed) for information on modes of operation.

2.11 Synthetic Vision

The synthetic vision presentation must not be used as the sole reference for aircraft control (without reference to the primary flight instruments).

The synthetic vision presentation must not be used as the sole reference for navigation or obstacle/terrain/traffic avoidance.

2.12 Moving Maps

Moving map displays (ownship position relative to map features) must not be used as the primary or sole means of navigation or course guidance.

2.13 Terrain Display

Maneuvers and navigation must not be based solely on the display of terrain or obstacles on the moving map terrain displays.

2.14 Terrain Alerts

Terrain alerts must be inhibited when landing at an airport that is not in the airport database.

2.15 Traffic Display

The display of traffic is intended as an aid to visual acquisition and must not be used as the sole basis for aircraft maneuvering.

2.16 Surface Operations

SafeTaxi or Chartview functions shall not be used as the sole basis for ground maneuvering. SafeTaxi and Chartview functions do not comply with the requirements of AC 20-159 and are not qualified to be used as an airport moving map display (AMMD). SafeTaxi and Chartview use is limited to airport surface orientation to improve flight crew situational awareness during ground operations.

2.17 Glide Range Ring

In the event of engine failure or engine malfunction, the Glide Range Ring must not be used to determine gliding distance. Refer to the airplanes' Pilot's Operating Manual / Airplane Flight Manual for engine failure emergency procedures and glide distance data.

2.18 Powerplant Gauge Markings

Aircraft that were previously equipped with a fuel flow gauge which measured metered fuel pressure may have this gauge replaced by a gauge which measures fuel flow directly. When these gauges are replaced in accordance with this STC, the fuel pressure and fuel flow markings on such gauges are replaced by equivalent fuel flow markings.

Fuel flow values may be in error by as much as 15% if the K factor calibration is improperly set. Do not depend solely on the fuel flow indication or the fuel totalizer to determine fuel used, fuel remaining, or fuel reserves.

The fuel computer functions must not be used as the primary means of determining the quantity of fuel in the tanks.

The Manifold Pressure gauge and the Propeller RPM gauge are the primary means for setting engine power. The Engine Power display is for information purposes only.

2.19 Weight and Balance

Weight and balance data provided by the G3X Touch is for flight planning purposes only. Consult the aircraft's Pilot's Operating Handbook for the official weight and balance data.

2.20 Data link Products (SiriusXM, FIS-B, and Connext)

Do not use data link weather information for maneuvering in, near, or around areas of hazardous weather. Information provided by data link weather products may not accurately depict current weather conditions.

Do not use the indicated data link weather product age to determine the age of the weather information shown by the data link weather product. Due to time delays inherent in gathering and processing weather data for data link transmission, the weather information shown by the data link weather product may be significantly older than the indicated weather product age.

Do not rely solely upon data link services to provide Temporary Flight Restriction (TFR) or Notice to Airmen (NOTAM) information. Not all TFRs and NOTAMS may be depicted.

2.21 Glove Usage

No device or apparel may cover the pilot's fingertips used to operate the G3X Touch display.

2.22 Service Required

It is prohibited to initiate flight when a "Service Required" advisory is present on the PFD, MFD, or EIS display.

2.23 Portable Electronic Devices

This STC does not relieve the operator from complying with applicable requirements regarding the operation of portable electronic devices.

Data provided to a portable electronic device from the G3X Touch Bluetooth interface is not approved to replace any aircraft display equipment, including navigation or traffic/weather display equipment.

2.24 Kinds of Operations

G3X Touch is approved for Day and Night, VFR and IFR operations when the system is appropriately inspected and maintained in accordance with applicable requirements. Aircraft with a placard that reads **AIRCRAFT LIMITED TO VFR** are limited to VFR operations. Refer to Section 2.25, *Placards*.

The tables below list the minimum fully functional equipment required for flight.

This table applicable to aircraft with a G3X PFD Installed			
Equipment	**Number Installed**	**Number Required**	
		VFR	**IFR**
Primary Flight Display	1	1	1
Approved Garmin Navigator (interfaced to a PFD) **OR** Non-Garmin IFR approved navigator with standalone dedicated CDI	1	-	1
Air data and Attitude / Heading Unit (ADAHRS)	1	1a*	1
Magnetometer (GMU)	1	-	1
Standby Attitude Indicator	1	-	1
Standby Airspeed Indicator	1	1b*	1
Standby Altimeter	1	1b*	1
Non-stabilized Magnetic Compass	1	1	1

The following notes apply where indicated:

* FAA approved aircraft operating under 14 CFR Part 91 must have at least one source of altitude and airspeed information functioning for VFR operations. The altitude and airspeed information may be displayed on the PFD or on the standby instruments. The aircraft must have all "1a" items or all "1b" items from the tables above.

NOTE

Operators of aircraft approved by an airworthiness authority other than the FAA are responsible to verify equipment requirements for VFR operations and equip the aircraft accordingly.

Engine Indicating System (EIS):

The table below lists the minimum, fully functional equipment if previously installed engine instruments are replaced by G3X Touch. Refer to Section 7.6, *Engine Indication System*.

Equipment	Number Installed	Number Required
EIS Display	1	1
Engine Adaptor Unit (GEA 24)	1	1

The following engine indications must be functional on the EIS display (if these gauges are present on the EIS display as installed): Tachometer, Manifold Pressure, Oil Pressure, Oil Temperature, Fuel Quantity, and any additional engine instruments required by the aircraft Kinds Of Equipment list as listed in the Aircraft Flight Manual.

2.25 Placards

Installations Limited to VFR

☑ This installation is not limited to VFR.

☐ This installation is limited to VFR and the following placard is required near the PFD:

AIRCRAFT LIMITED TO VFR

3 EMERGENCY PROCEDURES

3.1 ADC Failure (GSU 25)

ADC FAIL

ADC failure is indicated by:

- Red X over the airspeed and altitude tapes.
- Red X over the vertical speed tape.
- Red X over the TAS and OAT fields.

1. Use Standby Airspeed Indicator and Altimeter.

NOTE

If a Garmin G5 Electronic Flight Instrument is installed as the Standby Flight Instrument and the primary ADC fails, the G3X Touch will automatically revert and use air data from the G5. An amber ADC REVERT annunciation will automatically be displayed on the PFD and air data from the G5 will be displayed on the G3X Touch. If installed, the GFC 500 autopilot will function normally.

3.2 Attitude Failure (GSU 25)

AHRS FAIL

Attitude failure is indicated by:

- removal of the sky/ground presentation.
- Red X and ATTITUDE FAIL over the sky/ground presentation.

1. Use Standby Flight Instruments.

NOTE

If a Garmin G5 Electronic Flight Instrument is installed as the Standby Flight Instrument and the primary AHRS fails, the G3X Touch automatically reverts and uses attitude information from the G5. An amber AHRS REVERT annunciation will be displayed on the PFD and attitude information from the G5 will automatically be displayed on the G3X Touch. If installed, the GFC 500 autopilot will function normally.

3.3 Attitude Aligning / Keep Wings Level

If the ALIGNING KEEP WINGS LEVEL indication occurs during flight, the G3X Touch has detected an invalid attitude solution and will not display any attitude information.

1. Use standby instruments to maintain 1° nose up pitch and wings level flight. The system will display attitude when internal accuracy tolerances have been met.
2. Limit aircraft attitude to ±10° bank, ±5° pitch, 200 KTAS or less.
3. If attitude does not return, continue to use the standby flight instruments for aircraft attitude control.

3.4 AHRS ALIGN

The AHRS ALIGN annunciation indicates that the AHRS attitude information is still useble, but the internal sensors are trying to realign themselves. The attitude presentation behind the annunciation is still valid but should be crosschecked using the standby instruments.

1. Crosscheck aircraft attitude with standby attitude display.

3.5 Autopilot Abnormal Disconnect (GFC 500)

Red AP or AFCS flashing on PFD, Continuous high-low aural tone

1. Aircraft Attitude ....MAINTAIN/REGAIN AIRCRAFT CONTROL
2. AFCS Status Box on PFD ....PRESS
   (to cancel disconnect tone and extinguish annunciator)

3.6 G5/G3X Touch Altimeter Barometric Window Cyan

Cyan background coloring of the altimeter barometric window on either the G5 or G3X PFD altimeters indicates that the altimeter setting is automatically changing to synchronize with the other unit. This feature is called SFD **Baro Sync**.

SFD Baro Sync can be **Enabled** or **Disabled** in the G3X Touch PFD Menu. It defaults to Enabled when the system is powered on. When **SFD Baro** Sync is enabled, and the pilot changes the altimeter setting on one altimeter, the other altimeter setting changes automatically and indicates in inverse video (cyan background with black numbers).

If the system is incorrectly changing the G5 or G3X altimeter setting without the pilot manually changing either setting, disable **SFD Baro Sync** on the G3X Touch PFD using the following procedure:

1. Press MENU twice
2. Scroll down to SETUP and Select.
3. Scroll down to PFD and Select.
4. Scroll down to SFD BARO SYNC and Select.
5. Change the selection from ENABLED to DISABLED
6. Press and hold the BACK button to return to a normal PFD display.
7. Readjust the Altimeter Barometric Settings on the G5 and G3X Touch PFD to the desired setting.
8. If Altimeter Barometric Setting does not remain on the desired value for either the G5 or G3X PFD, disregard the affected altimeter and use the other altimeter.

3.7 EIS Failure

EIS failure is indicated by the loss of displayed information on the EIS, including a blank, frozen, red 'X' over the display, or unresponsive display of EIS parameters.

1. Position engine controls to ensure operation within engine limitations.

3.8 Erroneous Air Data or Attitude Information on the G3X PFD

(On installations with a G5 Standby Flight Instrument)

1. PULL the ADAHRS Circuit Breaker
2. PULL the GAD 27 Circuit Breaker

G5 air data and AHRS data will automatically revert to be displayed on the PFD on G3X Touch. ADC FAIL, AHRS FAIL, ADC REVERT, AHRS REVERT, and ECS FAIL * messages will be displayed. **This procedure will restore availability of the GFC 500 autopilot and flight director.**

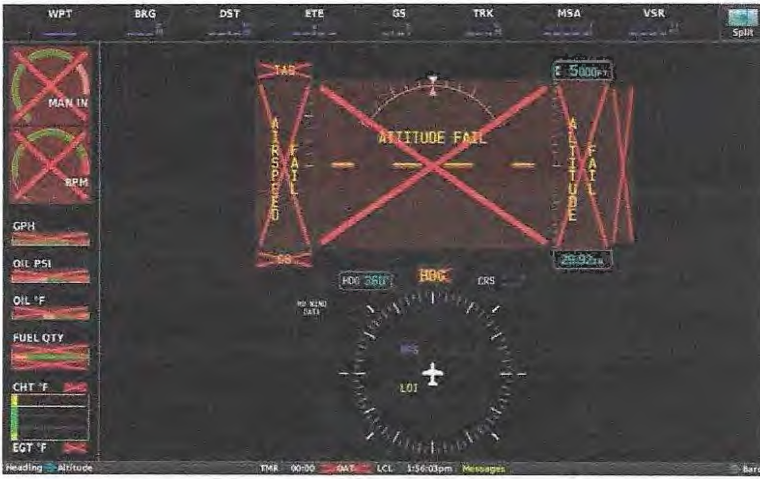
* The ECS FAIL will display when the GAD 27 circuit breaker is pulled out or the GAD 27 fails. This message is applicable only to aircraft with a 14 VDC electrical system or those with flashing (wig-wag) landing and taxi lights.

NOTE

When ECS FAIL is displayed, Landing and Taxi Lights may be inoperative if the aircraft is equipped with flashing (wig-wag) landing and taxi lights.

3.9 G3X Touch Failure Annunciations

If a G3X Touch function fails, a large red 'X' is typically displayed over the instrument(s) or data experiencing the failure. Upon G3X Touch power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged the G3X Touch should be serviced by a Garmin-authorized repair facility.



G3X Failure Annunciations

3.10 Heading Failure, Loss of Magnetometer Data, or Magnetic Field Error

A heading failure, loss of magnetometer data, or magnetic field error is indicated by removal of the digital heading readout, a red X, and an amber "HDG" on the display.

1. Use standby magnetic compass.

NOTE

If the G3X Touch DG/HSI has a valid GPS signal the G3X Touch DG/HSI instrument will display the GPS track information in magenta.

3.11 PFD Failure

PFD failure is indicated by the loss of displayed information on the PFD, including a blank, frozen, or unresponsive display.

1. If IFR, use standby flight instruments for attitude, airspeed, altitude, and heading reference and land as soon as practical.
2. If VFR, use visual references and standby flight instruments (if installed) for attitude, airspeed, altitude, and heading reference and land as soon as practical.
3. Refer directly to the navigation source for navigation information (such as GPS).
4. If the autopilot is engaged, verify autopilot mode and cross check against visual references and standby flight instruments (if installed) and navigation data.

3.12 Navigation Data Failure (GPS/VOR/LOC/GS)

Navigation data failure may be indicated by any or all of the following:

- Loss of course deviation information on PFD
- Loss of glideslope/glidepath information on PFD
- Loss of bearing pointer on HSI

1. Select an alternate navigation source on the external navigator's CDI Key.

   Or

2. Use the internal GPS navigator in G3X by changing **FPL Source** from **External** to **Internal** on the PFD. When the external GPS navigation source has failed, an amber **REV** and amber **VFR** annunciation are displayed on the HSI. When **REV** and **VFR** are annunciated, IFR operations are prohibited based solely on guidance provided by G3X Touch. Refer to Limitations, Section 2.3, *Navigation Systems for IFR Operations* for VFR operations using the G3X Touch internal navigator.

If No Alternate Navigation Sources Are Available and 'REV' is Displayed on HSI:

1. Use the CDI for course information.
2. Fly toward known visual conditions.

NOTE

In the event that all configured external GPS navigators fail, the G3X Touch reverts to its internal VFR GPS for navigation and flight plan modifications

3.13 TERRAIN ALERTS

Aural Alert	Visual Alert	Action
"Terrain Ahead! Pull Up!" "Terrain, Terrain Pull up! Pull Up!" "Obstacle Ahead! Pull Up!" "Obstacle, Obstacle Pull Up! Pull Up!" "Sink Rate, Pull Up!" "Pull Up!"	TERRAIN -OR- OBSTACLE -OR- TERRAIN → NOTE: The arrow indicates the terrain is outside the Synthetic Vision field of view.	Disconnect autopilot and initiate maximum performance climb (maximum takeoff power and best angle of climb airspeed) NOTE: Only the climb maneuver is recommended, unless operating in VMC or it is determined, based on all available information, that turning in addition climbing is the safest course of action.
"CAUTION, Terrain" "Caution, Terrain Ahead" "CAUTION, Obstacle" "CAUTION, Obstacle Ahead" "CAUTION, Sink Rate"	TERRAIN -OR- OBSTACLE -OR- ← OBSTACLE NOTE: The arrow indicates the obstacle is outside the Synthetic Vision field of view.	Take corrective action until the alert ceases. Using all available information to determine the appropriate action, alter the flight path away from the threat by stopping descent, climbing, and/or turning.

3.14 WARNINGS, CAUTIONS, and ADVISORIES

The following tables show the color and significance of the warning, caution, and advisory messages which m appear on the G3X Touch display.

WARNING Annunciations – Red		
Annunciation	*Pilot Action*	*Cause*
Red X	Reference the data source or alternate equipment.	A red X through any display field indicates that display field is not receiving data or is corrupted.
Red Engine Parameter on EIS (if EIS is installed)	Take appropriate action to correct condition causing engine parameter exceedance.	The engine parameter has exceeded the warning threshold.
AP	Manually fly the airplane. Silence the autopilot disconnect tone and extinguish the annunciation by pressing the AP annunciation in the AFCS Status Box.	GFC 500 Autopilot has failed or is inoperative.
AFCS	Manually fly the airplane.	GFC 500 Flight Director and Autopilot have failed
	Manually fly the airplane.	GFC 500 Autopilot Failure
PTRIM	Manually trim the airplane using the pitch trim wheel.	Electric pitch trim is inoperative. (if installed and interfaced with the GFC 500 autopilot)
	Select full screen mode on display to view WARNING annunciations.	Display is in split screen mode and WARNING annunciations are not displayed.

CAUTION Annunciations – Amber

Annunciation	*Pilot Action*	*Cause*
AP	Manually fly the airplane	Pilot has disconnected the GFC 500 autopilot
YD	NONE	GFC 500 Yaw Damper has disconnected
↑ TRIM UP ↑	Move the elevator trim in the nose up direction until the annunciation extinguishes.	The GFC 500 autopilot is holding excessive force due to the aircraft being out of trim due to changes in airspeed or power.
↓TRIM DOWN↓	Move the elevator trim in the nose down direction until the annunciation extinguishes.	The GFC 500 autopilot is holding excessive force due to the aircraft being out of trim to changes in airspeed or power.
MIN SPEED	Add maximum available power. Autopilot will lower aircraft nose to increase airspeed.	Airspeed is too slow, approaching stall speed (GFC 500 autopilot).
MAX SPEED	Reduce power. Autopilot will raise aircraft nose to reduce airspeed.	Airspeed is approaching maximum airspeed limit (GFC 500 autopilot).
HDG (amber background)	Use standby compass	Displayed heading is outside of the inte accuracy limits.
	Select full screen mode on display to view CAUTION annunciations.	Display is in split screen mode and CAUTION annunciations are not displayed.
AHRS ALIGN – Keep Wings Level	Fly aircraft manually and crosscheck attitude indication with standby attitude indicator and other sources of attitude information. Limit aircraft attitude to ±10° bank and ±5° pitch as AHRS Aligns - OK to taxi.	Attitude and Heading Reference System is aligning. AHRS may not align with excessive pitch/bank angles.
AHRS ALIGN	Fly aircraft manually and crosscheck attitude indication with standby attitude indicator and other sources of attitude information (airspeed, heading, altitude, etc.)	The AHRS monitors have detected a possible AHRS malfunction or an error with the attitude presentation. The AHRS is attempting to realign itself. The GFC 500 autopilot may automatically disconnect.
ATT MISCOMP HDG MISCOMP	Cross-check the flagged information against other sources to identify erroneous information.	Difference detected between the G3X Touch attitude or heading display and the G5 attitude or heading display.
AHRS FAIL ATTITUDE FAIL	Use standby attitude source, or, if AHRS REVERT message is also displayed, continue to use the G3X Touch. Attitude will be from the G5.	The GSU 25 AHRS has failed.
AHRS REVERT	Continue to use the G3X Touch.	The GSU 25 AHRS has failed and attitu from the G5 is being displayed on the G Touch.
ALT MISCOMP IAS MISCOMP	Cross-check the flagged information against other sources to identify erroneous information.	Difference detected between the G3X Touch airspeed or altitude and the G5 airspeed or altitude.

CAUTION Annunciations – Amber		
Annunciation	*Pilot Action*	*Cause*
ADC FAIL	Use standby airspeed and altimeter indicator, or, if ADC REVERT message is also displayed, continue to use the G3X Touch.	The GSU 25 air data computer has failed.
ADC REVERT	Continue to use the G3X Touch.	The GSU 25 air data computer has failed and air data from the G5 is being displayed on the G3X Touch.
(Flashing) MESSAGE	Press the flashing message annunciation to view a new system message.	A new system message has annunciated.
Amber engine Parameter on EIS (if EIS is installed)	Take appropriate action to correct condition causing engine parameter exceedance.	The engine parameter has exceeded the caution threshold.
GPSS	De-select GPSS on the G3X Touch and select desired alternate autopilot lateral mode.	The GPS Steering command to the autopilo has been lost.
TRAFFIC	Visually acquire the traffic to see and avoid.	The interfaced traffic system has determined that nearby traffic may be a threat to the aircraft.
TAWS N/A, TAWS FAIL	Use vigilance, terrain depiction and TAWS alerting is no longer provided.	Database errors or lack of required GPS position.
ECS FAIL	Landing and Taxi lights may be inoperative if the aircraft is equipped with flashing (wig-wag) landing and taxi lights. At night, consider a well-lighted runway.	The GAD 27 has lost power or has failed.
GLIDE	Smart Glide is active	Follow the Smart Glide procedures in the GTN Xi AFMS.

ADVISORY Annunciations – White		
Annunciation	*Pilot Action*	*Cause*
NO COMP	Cross check information between the G5 and the PFD to determine which unit is in error.	The unit will not be able to perform the miscompare monitor function.

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4 NORMAL PROCEDURES

4.1 Before Starting Engine

1. Database Acknowledgement..(PFD) Press "CONTINUE' button

NOTE

The data link weather advisory and current database information are displayed during power-up including valid operating dates, cycle number, and database type. When this information has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to continue.

4.2 After Starting Engine

1. Avionics Master Switch..ON
2. Database Acknowledgment (All other displays and NAV units) ...... Press "CONTINUE" button
3. Flight Plan Source (FPL) ....Select EXTERNAL or INTERNAL navigation source
4. G3X Touch CDI source ....Touch the HSI display on the PFD. PFD Options window opens.
5. In the CDI Source window..........Select GPS 1 or GPS 2 (if installed) for IFR or VFR flight, or, Select Internal GPS for VFR flight
6. Touch the HSI display on the PFD to return to normal PFD display
7. Enter a Flight Plan ....For IFR or VFR Flight, into the External GPS Navigator, or, For VFR flight only, into the PFD Internal Flight Plan

WARNING

Do not use the approach information provided by the VFR navigation database residing within the G3X Touch as a means of navigating any instrument approach. The G3X Touch VFR navigation database is limited to present only the waypoints for the final approach leg of a published procedure. These waypoints and associated course line are made available for monitoring purposes only.

8. Altimeters...Set (PFD and Standby Altimeter)
   - Touch the Barometric Pressure Display on the PFD.
   - Enter the desired pressure using the keypad and touch ENTER.
   - Verify Barometric setting on the Standby Altimeter matches the G3X Touch.

4.3 COM Radio Tuning (Optional)

The COM Frequency Box is composed of two fields; one active frequency is on the left side and the standby frequency is on the right.

To tune the COM radio:

1. Touch STBY COM display window
2. Enter the frequency using the keypad or dual concentric knob
3. Touch ENTER to enter the frequency in the STBY window, or,
4. Touch ⬌ to transfer the entered frequency directly into the COM window.

To transfer STBY frequency to Active frequency:

1. Touch the Active COM frequency field

4.4 Lateral Navigation

Procedures below involve the Garmin GFC 500 autopilot. Information regarding a non-Garmin autopilot are provided in the G3X Touch Pilot's Guide and Airplane Flight Manual Supplement for the non-Garmin autopilot.

Changing the Navigation Source

When an external navigator that supports both GPS and VOR/ILS capabilities (i.e., GTN or GNS Series) is selected, the external navigator's **CDI** Key is used to switch the G3X Touch HSI between GPS and VOR/ILS navigation.

VOR

1. Tune a VOR station in the external navigator.
2. Navigation Source ....Select VOR on the external navigator
3. G3X Touch CDI source ....Touch the HSI display on the PFD. PFD Options window opens.
4. Select the external navigator from the CDI Source window (VOR 1 or 2).
5. Press and Hold **BACK** Button to return to normal PFD display.
6. Set the CDI to the desired course .... Touch the Selected Course window on the PFD
7. Enter the desired VOR course, press ENTER
8. Establish Intercept Heading
9. Select GFC 500 autopilot modes for intercepting or tracking the selected course............. VOR will be displayed on the AFCS Status Box.

NOTE

VOR will be annunciated in WHITE if the mode is armed or in GREEN if VOR is the active lateral mode.

GPS DIRECT TO

1. Navigation Source .... Select GPS on the external navigator
2. Select waypoint and execute the Direct-TO on the external navigator
3. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
4. Select the external navigator from the CDI Source window (GPS).
5. Press and Hold **BACK** Button to return to normal PFD display.

GPS OBS

1. Navigation Source .... Select GPS on the external navigator
2. Select waypoint and make it the active waypoint.
3. Set external navigator to OBS mode
4. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold **BACK** Button to return to normal PFD display.
7. Set the CDI to the desired course .... Touch the Selected Course (OBS) window on the PFD.
8. Enter the desired GPS course, press ENTER
9. Establish Intercept Heading
10. Select GFC 500 autopilot modes for intercepting or tracking the selected course .... GPS will be displayed on the FD mode bar.

4.5 Approaches

ILS

1. Load the approach into the External navigator .... Verify external navigator tunes the proper frequency. Select it as the active frequency.
2. Navigation Source .... Select LOC on the external navigator
3. Approach Minimums... Set the barometric minimums alert bug
   - On the PFD, Touch the **HSI.**
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (LOC 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator, verify CDI changes to LOC and slews to the inbound course,

   OR

   - If using a VHF navigation receiver, set the CDI to the desired course ....Touch the Selected Course window on the PFD.
   - Enter the desired LOC course, press ENTER.

8. Establish Intercept Heading.
9. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
10. Upon reaching the LOC course, turn inbound and follow the ILS course and vertical guidance.
11. Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the missed approach altitude.
12. At Decision Altitude (DA), continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source .... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure. When the airplane is inbound towards the final approach course, the CDI will automatically switch from GPS navigation to LOC navigation.

13. Verify .... Course pointer slews to the front course.
14. Upon reaching the LOC course .... Turn inbound and follow the ILS course and vertical guidance.
15. Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the missed approach altitude.
16. At Decision Altitude (DA), Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

ILS GLIDE SLOPE INOPERATIVE

1. Load the approach into the External navigator .... Verify external navigator tunes the proper frequency. Select it as the active frequency.
2. Navigation Source .... Select LOC on the external navigator
3. Approach Minimums .... Set the barometric minimums alert bug:
   - On the PFD, Touch the HSI.
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (LOC 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator, Verify CDI changes to LOC and slews to the inbound course,

   OR

   - If using a VHF navigation receiver, set the CDI to the desired course .... Touch the Selected Course window on the PFD
   - Enter the desired LOC course, press ENTER.

8. Establish Intercept Heading.
9. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
10. Upon reaching the LOC course, turn inbound and follow the LOC course.
11. Set Minimum Descent Altitude (MDA)............................ Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
12. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
13. At the Minimum Descent Altitude, Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
14. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source .... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure. When the airplane is inbound towards the final approach course, the CDI will automatically switch from GPS navigation to LOC navigation.

13. Verify..Course pointer slews to the front course.
14. Upon reaching the LOC course, turn inbound and follow the LOC course.
15. Set Minimum Descent Altitude (MDA)........................... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
16. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
17. At the Minimum Descent Altitude, Set Missed Approach Altitude ....Touch the Reference Altitude display. Enter the Missed Approach Altitude.
18. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

RNAV (GPS) OR RNAV (GNSS) – (LPV, LP+V, LNAV/VNAV, or LNAV+V)

NOTE

Some RNAV (GPS) or (GNSS) approaches provide a vertical descent angle as an aid in flying a stabilized approach. These approaches are NOT considered Approaches with Vertical Guidance (APV). Approaches that are annunciated on the HSI as LP+V, LNAV, or LNAV+V are considered Non-precision Approaches (NPA) and are flown to an MDA even though vertical glidepath (GP) information may be provided. LP approaches may not be available outside of the United States.

1. Load the approach into the External navigator.
2. Navigation Source ....Select GPS on the external navigator
3. Approach Minimums.. Set the barometric minimums alert bug:
    - On the PFD, Touch the HSI.
    - Touch the Highlight Minimums window.
    - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source ....Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator .... Verify CDI slews to the inbound course.

8. Establish Intercept Heading.
9. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
10. Upon reaching the GPS course, turn inbound and follow the GPS course and GP vertical guidance.
11. Verify on the HSI the Navigation mode indicates the approach being flown, (LPV, LP+V, LNAV/VNAV, or LNAV+V)
12. Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the missed approach altitude.
13. At Decision Altitude (DA or MDA for an LNAV+V), Continue visually for a normal landing.

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator.

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source .... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure. When the airplane is inbound towards the final approach course, the CDI will automatically slew to the inbound course.

13. Verify...Course pointer slews to the front course
14. Upon reaching the GPS course, turn inbound and follow the GPS course and GP vertical guidance.
15. Verify on the HSI the Navigation mode indicates the approach being flown, (LPV, LP+V, LNAV/VNAV, or LNAV+V)
16. Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the missed approach altitude.

17. At Decision Altitude (DA or MDA for a LPV+V or LNAV+V), continue visually for a normal landing,

OR

Press GO AROUND button and fly the missed approach procedure.

RNAV (GPS) OR RNAV (GNSS) – (LNAV, LP)

NOTE

Some RNAV (GPS) or (GNSS) approaches provide a vertical descent angle as an aid in flying a stabilized approach. These approaches are NOT considered Approaches with Vertical Guidance (APV). Approaches that are annunciated on the HSI as LP+V, LNAV, or LNAV+V are considered Non-precision Approaches (NPA) and are flown to an MDA even though vertical glidepath (GP) information may be provided. Approaches that are annunciated on the HSI as LP will not have vertical glidepath (GP) information provided. LP approaches may not be available outside of the United States.

1. Load the approach into the External navigator.
2. Navigation Source .... Select GPS on the external navigator
3. Approach Minimums .... Set the barometric minimums alert bug:
   - On the PFD, Touch the HSI.
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator .... Verify CDI slews to the inbound course.
8. Establish Intercept Heading.
9. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
10. Upon reaching the GPS course, turn inbound and follow the GPS course.
11. Verify on the HSI the Navigation mode indicates the approach being flown, (LNAV or LP)
12. Set Minimum Descent Altitude (MDA).......................... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
13. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
14. At the Minimum Descent Altitude, Set Missed Approach Altitude ....Touch the Reference Altitude display. Enter the Missed Approach Altitude.
15. At Missed Approach Point, Continue visually for a normal landing,

OR

Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source .... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure. When the airplane is inbound towards the final approach course, the CDI will automatically slew to the inbound course.

13. Verify .... Course pointer slews to the front course
14. Upon reaching the GPS course, turn inbound and follow the GPS course.
15. Verify on the HSI the Navigation mode indicates the approach being flown, (LNAV or LP)
16. Set Minimum Descent Altitude (MDA) .... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
17. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
18. At the Minimum Descent Altitude, Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
19. At Missed Approach Point, Continue visually for a normal landing,

OR

Press GO AROUND button and fly the missed approach procedure.

VOR APPROACH

1. Load the approach into the External navigator .... Verify external navigator tunes the proper frequency. Select it as the active frequency.
2. Navigation Source .... Select GPS on the external navigator
3. Approach Minimums.. Set the barometric minimums alert bug:
   - On the PFD, Touch the HSI.
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator, Verify CDI slews to the appropriate course.
8. Navigation Source .... Select VOR on the external navigator.
9. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (VOR 1 or 2).
11. Verify the selected course .... Touch the Selected Course window to adjust if needed.
12. Establish Intercept Heading.
13. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
14. Upon reaching the VOR course, turn inbound and follow the VOR course.
15. Set Minimum Descent Altitude (MDA).......................... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
16. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
17. At the Minimum Descent Altitude, Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
18. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source .... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source .... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure.

13. When established inbound to the FAF .... Navigation Source, Select VOR on the external navigator.
14. Verify .... VOR is annunciated in the HSI.
15. Verify .... Course pointer is on the FAF inbound course.
16. Set Minimum Descent Altitude (MDA) .... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
17. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
18. Adjust VOR course if needed inside the FAF.
19. At the Minimum Descent Altitude, Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
20. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

BACK COURSE (BC)

1. Load the approach into the External navigator .... Verify external navigator tunes the proper frequency. Select it as the active frequency.
2. Navigation Source .... Select GPS on the external navigator
3. Approach Minimums .... Set the barometric minimums alert bug:

- On the PFD, Touch the HSI.
- Touch the Highlight Minimums window.
- Enter Barometric Altitude Minimums and touch ENTER

4. G3X Touch CDI source ....Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator, Verify CDI changes slews to the localizer front course.
8. Navigation Source .... Select LOC on the external navigator.
9. G3X Touch CDI source ....Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (LOC 1 or 2).
11. Verify the selected front course..........Touch the Selected Course window to adjust if needed.
12. Establish Intercept Heading.
13. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
14. Upon reaching the BC course, turn inbound and follow the BC course guidance.
15. Set Minimum Descent Altitude (MDA)............................ Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
16. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
17. At the Minimum Descent Altitude, Set Missed Approach Altitude ....Touch the Reference Altitude display. Enter the Missed Approach Altitude.
18. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source ....Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator

9. G3X Touch CDI source ....Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure.

13. When established inbound to the FAF.....................................Navigation Source, Select LOC on the external navigator.
14. Verify...BC is annunciated in the HSI.
15. Verify..Course pointer is on the front course.
16. Set Minimum Descent Altitude (MDA)........................... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
17. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
18. At the Minimum Descent Altitude, Set Missed Approach Altitude ....Touch the Reference Altitude display. Enter the Missed Approach Altitude.
19. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

GO AROUND (GA)

1. Control Wheel...GRASP FIRMLY
2. GO AROUND button ....PUSH
3. Rotate to Go Around attitude
4. Go Around ....EXECUTE

NOTE

If using a Garmin external navigator and an instrument approach is loaded, the HSI will automatically change to GPS course guidance, and the flight plan will automatically sequence onto the missed approach portion of the flight plan.

5. Verify the HSI changes to the GPS navigation.
6. Verify that leg sequencing has unsuspended. If not, unsuspend leg sequencing.
7. Fly Published Missed Approach Procedure,

OR

Fly ATC Assigned Missed Approach Heading

NOTE

The pilot is responsible for initial missed approach guidance in accordance with published procedure. The G3X Touch may not provide correct guidance until the airplane is established on a defined leg of the procedure.

8. Set Missed Approach Altitude .... Touch the Reference Altitude display. Enter the Missed Approach Altitude.

4.6 Barometric Minimums Alert

A barometric minimums alert is provided in the G3X Touch to enhance the pilot's awareness of approaching altitude minimums while flying an instrument approach procedure.

Setting the barometric minimums alert bug:

1. On the PFD, Touch the HSI.
2. Touch the Highlight Minimums window.
3. Enter Barometric Altitude Minimums and touch ENTER

CAUTION

If a new approach is loaded into an *external* IFR capable navigator, the pilot will need to update the Barometric Minimums Alert in the G3X Touch with the new approach's altitude minimums.

4.7 Transponder Operation (Optional)

Entering Transponder Code

1. Touch the transponder data box.
2. Use the keypad to enter a code and touch ENTER.

IDENT

1. Touch IDENT, the green bar illuminates momentarily.

4.8 Disable Electronic Stability Protection (ESP)

(If Installed, GFC 500 Autopilot)

To disable ESP for flight training purposes or aerobatic maneuvers:

1. Touch the AFCS Status Box at the top of the PFD. Automatic Flight Control System window opens.
2. Highlight and Select ESP. The green ESP status bar extinguishes. ESP is disabled.

3. Press and Hold the BACK button to close the Automatic Flight Control System window and return to PFD display.

To reenable ESP:

1. Touch the AFCS Status Box at the top of the PFD. Automatic Flight Control System window opens.
2. Highlight and Select ESP. The green ESP status bar illuminates. ESP is enabled.
3. Press and Hold the BACK button to close the Automatic Flight Control System window and return to PFD display.

5 PERFORMANCE

No change.

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6 WEIGHT AND BALANCE

See current weight and balance data.

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7 SYSTEM DESCRIPTION

The G3X Touch EFIS is scalable with a variety of configurations supported. The functions described in this section may not be available in all aircraft depending on installed equipment and interfaces. A minimum installation with a single display may be a standalone MFD or a PFD which can be split screened to provide both PFD and MFD functions. Optional functions include EIS, datalink traffic and weather, AOA, autopilot interface, remote audio panel, GPS/NAV/COM interface, transponder interface, and others.

7.1 Primary Flight Instruments

When a PFD is installed, attitude information is displayed over a virtual blue sky and synthetic ground with a white horizon line. The Attitude Indicator displays the pitch (indicated by the Amber symbolic aircraft on the pitch scale), roll, and slip/skid information.

The horizon line is part of the pitch scale. Pitch markings occur at 2.5˚ intervals through all pitch ranges.

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.

Slip/skid is indicated by the location of the ball.

Bezel Overview (GDU 460)

Bezel Overview (GDU 470)

NRST Key	Press to display the Nearest Page for viewing the nearest airports, intersections, NDBs, VORs, waypoints, frequencies, and airspaces
Direct-To Key	Press to activate the Direct-To function, enter a destination waypoint establish a direct-to course to the selected destination
MENU Key	Press once to view the Page Menu Press twice to view the Main Menu Press a third time to clear the Main Menu enabled.
BACK Key	Press to return to the previous screen Press and hold to return to the default MFD Page

The Standard Rate Turn Bank Angle Pointers are green pointers displayed on the roll scale that show the bank angle corresponding to a standard rate turn.

Standard Rate Turn Bank Angle Pointers

The Turn Rate Indicator is located at the top of the HSI. Tick marks to the left and right of the displayed heading denote standard turn rates (3 deg/sec). 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.

The Airspeed Indicator may be displayed as a vertical tape or a round dial. When the Airspeed Indicator is displayed as a tape, it displays a range of 70 knots on a rolling number gauge using a vertical tape. Numeric labels and major tick marks are shown at intervals of 10 knots. Minor tick marks are at intervals of 5 knots. The current airspeed is displayed in the black pointer. The True Airspeed (TAS) is displayed above the scale in white digits and the Ground Speed (GS) is displayed below the scale in magenta digits.

The Altimeter may be displayed as a vertical tape or a round dial. When the Altimeter is displayed as a tape, it displays 400 feet of barometric altitude values at a time on a rolling number gauge using a moving tape. Numeric labels and major tick marks are shown at intervals of 100 feet. Minor tick marks are at intervals of 20 feet. The current altitude is displayed in the black pointer. The barometric pressure setting is displayed below the Altimeter in inches of mercury (in Hg) or hectopascals (hPa) when metric units are selected.

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 altimeter; if the Selected Altitude exceeds the range shown on the tape, the bug appears at the corresponding edge of the tape.

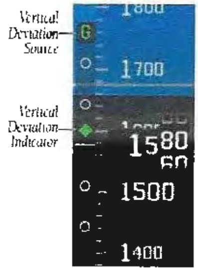
The Altitude Alerting function provides the pilot with visual and aural alerts when approaching the Selected Altitude. Whenever the Selected Altitude is changed, the Altitude Alerter is reset. The following will occur when approaching the Selected Altitude:

- Passing within 1000 feet of the Selected Altitude, the Selected Altitude (shown above the Altimeter) flashes for 5 seconds and an aural tone is generated.
- When the aircraft passes within 200 feet of the Selected Altitude, the Selected Altitude flashes for 5 seconds and an aural tone is generated to indicate that the aircraft is approaching the selected altitude.
- After reaching the Selected Altitude, if the pilot flies outside the deviation band (±200 feet of the Selected Altitude), the Selected Altitude changes to Amber text on a black background, flashes for 5 seconds, and an aural tone is generated.

The Vertical Speed Indicator (VSI) may be displayed as a tape or an arc segment. The VSI displays the aircraft vertical speed using a non-moving tape labeled at 500, 1000 and every 1000 fpm up to the maximum with minor tick marks every 100 feet up to 1000 fpm. The current vertical speed is displayed using a white arrow along the scale.

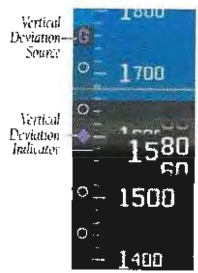
7.2 Vertical Deviation Indicators

The Vertical Deviation (Glideslope) Indicator (VDI) appears to the left of the altimeter whenever an ILS frequency is tuned in the active NAV field of an external navigator. A green diamond acts as the VDI Indicator. The green 'G' indicates an external glideslope source. If a localizer frequency is tuned and there is no glideslope signal, "NO GS" is annunciated.



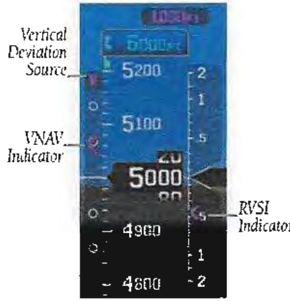
Vertical Deviation Indicator (Glideslope – ILS Source)

The Vertical Deviation (Glidepath) Indicator (VDI) also appears to the left of the altimeter during a GPS approach. The glidepath is analogous to the glideslope for GPS approaches supporting WAAS vertical guidance (LNAV+V, L/VNAV, LPV). The Glidepath Indicator appears on the G3X Touch as a magenta diamond. The magenta 'G' indicates a GPS source. If the approach type downgrades past the final approach fix (FAF), "NO GP" is annunciated.



Vertical Deviation Indicator (Glidepath – GPS Source)

An external navigation source is not required to receive VNAV indications. A magenta chevron (VNAV Indicator) to the left of the altimeter on the Vertical Deviation Scale shows the VNAV profile, and a magenta chevron (Required Vertical Speed Indicator (RVSI)) on the Vertical Speed Indicator indicates the required vertical speed to reach the target altitude. The magenta 'V' indicates a VNAV profile is active.



VNAV Indicator

7.3 HSI Annunciations

Some or all HSI annunciations may appear in the four quadrants of the G3X Touch HSI depending on the external navigator(s) configured.

Amber **LOI** – Loss of GPS integrity

Amber or Magenta **VFR** – An external GPS source is configured but there is not enough guidance data for IFR use.

Amber **REV** – External navigation source failed. Reverted to internal VFR GPS for navigation.

Amber **MSG** – External navigation source has a pending message

Cyan **INT** – The pilot has elected to use the internal GPS navigation source instead of the external GPS navigation source.

7.4 Course Deviation Indicator (CDI)

The 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 (GPS1, VOR1, and LOC1) or a double line arrow (GPS2, 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.

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.

Another Lateral Deviation Scale and combination Course Deviation and To/From Indicator is located below the slip/skid indicator.

CDI and Lateral Deviation Indication

The CDI can display two sources of navigation: GPS or NAV (VOR, localizer) depending on the external navigator(s) configured. Color indicates the current navigation source: magenta (for GPS) or green (for VOR and LOC). The full-scale limits for the CDI are defined by a GPS-derived distance when coupled to GPS. When coupled to a VOR or localizer (LOC), the CDI has the same angular limits as a mechanical CDI. If the CDI exceeds the maximum deviation on the scale (two dots) while coupled to GPS, the crosstrack error (XTK) is displayed below the white aircraft symbol.

In addition to the flight instruments, the PFD also displays supplemental information, including the Outside Air Temperature (OAT), wind data, User Timer, and G-Meter.

7.5 Display of PFD information on MFD

MFDs installed as part of the G3X touch system can display PFD information if manually selected by the pilot, or will automatically do so if the installed PFD display fails. The display of PFD information on an MFD is a duplication of the original PFD information and is not an independent compilation of data from other sources.

To manually display backup PFD information on an MFD:

1. On the MFD, press the MENU button twice.
2. Select Setup.
3. Select Display.
4. On a 7" GDU 470, set Full MFD/PFD Toggle to Enabled. On a 10" GDU 460, set MFD Split Screen Page to PFD.
5. Press and hold the BACK button to close the Display Setup window and return to MFD display.
6. On a 7" MFD, touch the PFD button in the upper corner to select the backup PFD display. On a 10" MFD, touch the Split button in the upper corner to select the backup PFD display.

7.6 Engine Indication System

The G3X Touch EIS (if installed) displays engine, electrical, and other system parameters. Gauges required to be displayed full time are located on the Main Engine Display which is always in view. Additional EIS information can be viewed on the Eng Page which can be selected by touching the Main Engine Display or by turning the 'Select Page' knob to the right on an MFD window.

Green bands on the instruments indicate normal ranges of operation; amber and red bands indicate caution and warning, respectively. When unsafe operating conditions occur, the corresponding caution readout will display solid amber and the warning readout will flash red. Most EIS caution and warning conditions also generate an alert message on the PFD, including gauges that may appear only on the Eng Page. An aural alert is also issued with a flashing red warning. If sensor data for an instrument becomes invalid or unavailable, a red "X" is displayed across the instrument.

7.7 Communication / Navigation / Surveillance System

The Communication/Navigation/Surveillance (CNS) system includes the audio interface, communication radios, navigation radios, and Mode S transponder. These functions can be accessed from the boxes that make up the CNS Data Bar located at the top of the PFD and/or MFD.

CNS Data Bar

7.8 Remote Transponder Interface

The G3X Touch is capable of interfacing with several remote transponders providing Mode S interrogation and reply capabilities. Transponder tuning for panel mount transponders is also supported.

Ground and Altitude Modes

Most Garmin transponders automatically transition between on-ground and in-air and operate in the appropriate mode at all times. No pilot action is required to manage modes unless there is a need to manually select STBY or ON modes.

G3X displays a green GND indication and transponder code in the Transponder Data Box while on-ground, and a green ALT indication when in-air, when not set to STBY or ON.

NOTE

Some panel mount transponders may indicate ALT on their dedicated display at all times, even while on-ground. As a result, in some installations, the transponder display and G3X display will indicate different modes while on the ground, although they are functionally equivalent.

Standby Mode (Manual)

When Standby mode is selected, the transponder does not reply to interrogations, but new codes can be entered. A white STBY indication and transponder code appear in the Transponder Data Box. Some transponders will automatically transition from STBY to ALT mode when the aircraft transitions from on-ground to in-air.

On Mode (Manual)

ON Mode can be selected at any time. ON Mode generates Mode A and Mode S replies, but Mode C altitude reporting is inhibited. In ON Mode, a green ON indication and transponder code appear in the Transponder Data Box.

Reply Status

When the transponder sends replies to interrogations, a green R indication appears momentarily in the Transponder Data Box.

IDENT Function

Touching IDENT sends a distinct identity indication to Air Traffic Control (ATC). The indication distinguishes the identing transponder from all the others on the air traffic controller's screen. After touching IDENT the bar on the button turns green momentarily.

7.9 Minimum Altitude Display and Alerting

When enabled by the pilot, an altitude minimums bug will be displayed in cyan on the barometric altitude tape.

Altitude minimums are accessed under the PFD Options Menu → Minimums sub menu and can be set by touchscreen keypad or dual-concentric knob.

Both visual and aural altitude minimums alerts are provided. During a descent to minimums, the minimums bug will change from cyan to white when the aircraft descends to within 100 ft of minimums. An aural "Minimums, Minimums" alert will be triggered when the aircraft's altitude descends through minimums and the minimums bug will change to Amber. As the aircraft altitude climbs back above minimums, the minimums bug will change to white 50 ft above minimums and cyan 150 ft above minimums. Alerting is rearmed once the aircraft is 150 ft or more above the minimum's altitude.

If a new approach is loaded into the external navigator, the Minimums Altitude display is not automatically updated with the new approach minimums. The pilot must update the Minimums Altitude Display with the MDA/DH for the approach loaded into the navigator.

7.10 AOA Probe

The G3X Touch PFD will display angle of attack from the GAP 26 AOA probe if installed. The GSU 25 uses the pressure from the GAP 26 probe and the pitot/static pressures it already receives from the existing aircraft pitot/static system to determine the aircraft's angle of attack (AOA).

The AOA indications and warnings presented on the G3X system are for reference only and are not intended as replacements for the aircraft's original stall warning system. The AOA stall warning margin and indications may not be the same at different flap settings and are only supported for positive G flight.

7.11 GAD 27 Wig Wag

The GAD 27 module (if installed) provides a feature that provides the ability to flash the Landing and Taxi lights of the airplane in an alternating fashion, otherwise known as "Wig Wag". Two 3-position switches control this feature, one for the landing lights and one for the taxi lights:

- ON – Respective light is on
- FLASH – Respective light will flash
- OFF – Respective light is off

When both switches are in the FLASH position, the landing and taxi lights alternate off and on with each other to produce the 'Wig-Wag' effect.

Before landing, switch to ON for steady landing lights.

7.12 EIS Caution / Warning Lights

If the G3X EIS display is outside the pilot's primary field of view and a PFD is not installed to provide EIS annunciations, discreet Caution/Warning lights are installed. The lights are installed in the primary field of view and are labeled ENGINE. Only a G3X EIS exceedance from a gauge on the Main EIS Display triggers the EIS Caution/Warning lights. EIS gauges that are not on the Main EIS Display do not alert.

7.13 Smart Glide

When installed with a Garmin GTN Xi with Smart Glide enabled, the G3X Touch will provide Smart Glide map indications, annunciation of GLIDE, and Emergency Page data for the Smart Glide feature. If displayed, the G3X Touch Glide Range Ring will be removed when Smart Glide is active. Refer to GTN Xi glide range ring display. For more details on the Smart Glide function, refer to the GTN Xi Pilot's Guide (190-02327-03, revision D or later) and GTN Xi AFMS (P/N 190-01007-C2 or 190-01007-C3, revision 4 or later).

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FAA Approved

AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL AIRPLANE FLIGHT MANUAL

for the

GARMIN G5 ELECTRONIC FLIGHT INSTRUMENT

as installed in

BEECH C24R

Make and Model Airplane

Registration Number N38566 Serial Number MC-755

This document serves as an Airplane Flight Manual Supplement or as a Supplemental Airplane Flight Manual when the aircraft is equipped in accordance with Supplemental Type Certificate SA01818WI for the installation and operation of the Garmin G5 Electronic Flight Instrument. This document must be carried in the airplane at all times.

The information contained herein supplements or supersedes the information made available to the operator by the aircraft manufacturer in the form of clearly stated placards or markings, or in the form of an FAA approved Airplane Flight Manual, only in those areas listed herein. For limitations, procedures and performance information not contained in this document, consult the basic placards or markings, or the basic FAA approved Airplane Flight Manual.

FAA APPROVED BY: David G Armstrong

David G Armstrong
ODA STC Unit Administrator
GARMIN International, Inc
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DATE: 7/19/19

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Log of Revisions

FAA Approved AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL AIRPLANE FLIGHT MANUAL

GARMIN G5 ELECTRONIC FLIGHT INSTRUMENT

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF APPROVAL	FAA APPROVED
1	ALL	Original Issue	7/22/2016	Robert Murray ODA STC Unit Administrator
2	ALL	Added information regarding G5 DG/HSI.	4/28/2017	Robert Murray ODA STC Unit Administrator
3	ALL	Added interface to 3rd party autopilots.	10/18/2017	Robert Murray ODA STC Unit Administrator
4	ALL	Added note to General section.	10/26/17	Paul Mast ODA STC Unit Administrator
5	ALL	Reformatted document. Updated system messages interface. Added DG/HSI reversion description.	12/20/17	Robert Murray ODA STC Unit Administrator
6	ALL	Added interface description to GAD 13. Added information regarding multiple NAV source inputs.	See Cover	See Cover

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Table of Contents

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SECTION 1 – GENERAL

The G5 Electronic Flight Instrument can display the following information to the pilot depending on the installation and location of the G5 instrument.

- Primary attitude
- Primary slip and turn rate information
- Primary heading
- Secondary airspeed
- Secondary altimeter
- Secondary ground track

When installed in place of the attitude indicator, the primary function of the G5 is to provide attitude information to the pilot. When installed in place of the rate of turn indicator, the primary function of the G5 is to provide turn rate and slip ball information to the pilot. When installed in place of the directional gyro, the primary function of the G5 is to provide directional information to the pilot.

NOTE:

The pilot is reminded to perform appropriate flight and navigation instrument cross checks for the type of operation being conducted.

In case of a loss of aircraft electrical power, a backup battery (optional when installed as a DG/HSI) sustains the G5 Electronic Flight Instrument for up to four hours.

An optional GAD 29B may be installed to provide course and heading datum to an autopilot based on the data selected for display on the HSI.

An optional GAD 13 and OAT probe may be installed to provide measured outside air temperature (OAT) to the G5 for display of true airspeed (TAS), outside air temperature, winds, and density altitude.

This STC allows the removal of the aircraft's vacuum system if it is not required to support any other airframe system.

Abbreviations and Terminology

The following glossary is applicable within the airplane flight manual supplement

ADI	Attitude Direction Indicator
AFMS	Airplane Flight Manual Supplement
ATT	Attitude
CDI	Course Deviation Indicator
DG	Directional Gyro
DR	Dead Reckoning
FAA	Federal Aviation Administration
GPS	Global Positioning System
GPSS	GPS Roll Steering
HDG	Heading
HSI	Horizontal Situation Indicator
ILS	Instrument Lending System
LOC	Localizer (no glideslope available)
LOI	Loss of Integrity
OAT	Outside Air Temperature
TAS	True Airspeed
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Omni-directional Range

SECTION 2 – LIMITATIONS

System Software Requirements

The G5 must utilize the following or later FAA approved software versions for this AFMS revision to be applicable:

Component	Software Version
G5 Electronic Flight Instrument	6.20

Use of Secondary Instruments

The original type design approved instruments for airspeed, altitude and vertical speed remain the primary indications for these parameters.

If the G5 Electronic Flight Instrument is installed in place of the rate of turn indicator, the original type design approved instrument for attitude remains in the primary indication for attitude.

If the G5 Electronic Flight Instrument is installed in place of the directional gyro, the original type design approved instruments for attitude remains the primary indication for attitude.

NOTE:

For aircraft approved for VFR-only operations, the G5 Electronic Flight Instrument may be installed as an attitude indicator and rate of turn indicator.

Kinds of Operations

No Change except for the following:

- When a portable navigation source is selected on the G5, it shall not be used for the primary means of navigation for IFR operations.

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SECTION 3 – EMERGENCY PROCEDURES

G5 Failure Indications

If a G5 function fails, a large red 'X' is typically displayed over the instrument(s) or data experiencing the failure. Upon G5 power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged and it is not likely an installation related problem, the G5 should be serviced by a Garmin-authorized repair facility.

Attitude Failure

Attitude failure is indicated by removal of the sky/ground presentation, a red X, and a yellow "ATTITUDE FAIL" on the display.

Rate-of-turn and slip information will not be available.

1. Use standby instruments.
2. Seek VFR conditions or land as soon as practical.

Heading Failure, Loss of Magnetometer Data, or Magnetic Field Error

A heading failure, loss of magnetometer data, or magnetic field error is indicated by removal of the digital heading readout, a red X, and a yellow "HDG" on the display.

1. Use standby magnetic compass.

NOTE:

If the G5 DG/HSI has a valid GPS signal the G5 DG/HSI instrument will display the GPS track information in magenta.

GPS Failure

If GPS navigation receivers and/or navigation information are not available or invalid, the G5 will display Dead Reckoning mode (DR) or Loss of Integrity mode (LOI) on the HSI in the lower left corner.

If Alternate Navigation Sources (ILS, LOC, VOR) Are Available:

1. Use alternate navigation source.

If No Alternate Navigation Sources Are Available:

If DR is Displayed on HSI:

1. Use the amber CDI for course information.
2. Fly toward known visual conditions.

If LOI is Displayed on HSI:

1. Fly toward known visual conditions.

For aircraft equipped with a GAD 29B interfaced to an autopilot, GPSS will be displayed in amber text when GPSS emulation has been selected from the G5 menu.

1. Deselect GPSS from the G5 menu and select a different autopilot mode.

Attitude Aligning

During system initialization, the G5 displays the message 'ALIGNING' over the attitude indicator. The G5 will typically display valid attitude within the first minute of power-up. The G5 can also align itself while taxiing and during level flight.

If the "ALIGNING" indication occurs during flight and attitude remains displayed, the attitude display is acceptable for use for flight in instrument conditions. Tha message will clear when the attitude solution is within the systems internal accuracy tolerances. It is recommended to maintain wings level to reduce the time for the system to align.

Attitude Aligning / Keep Wings Level

If the "ALIGNING KEEP WINGS LEVEL" indication occurs during flight, the G5 has detected an invalid attitude solution and will not display any attitude information.

1. Use standby instruments to maintain wings level flight. The system will display attitude when internal accuracy tolerances have been met.
2. If attitude does not return, seek VFR conditions or land as soon as practical.

Loss of Electrical Power to the G5 Display

In the event of a loss of aircraft electrical power to the G5 attitude display, the indicator will continue to function on its internal battery. If an internal battery is installed on the optional G5 HSI, the indicator will continue to function on the internal battery if aircraft power is lost. Internal battery endurance is indicated on the G5 display in hours and minutes. The charging symbol will be removed and the internal battery will not be charged.

In the event the G5 attitude display powers down, the optional G5 HSI will automatically revert to displaying attitude information. It will not revert back to the DG/HSI format if the G5 attitude unit regains power. The DG/HSI presentation may be selected from the G5 menu on the G5 DG/HSI unit after reversion to the attitude display.

Loss of Electrical Power to the GAD 29B (If Installed)

In the event of a loss of aircraft electrical power to the optional GAD 29B, the heading and course datum will be unavailable to the autopilot and the autopilot may deviate from the intended path or may disconnect. GPS flight plan course information may be displayed on the HSI and VFR will be displayed in amber text on the HSI. GPSS will be displayed in amber text, if GPSS mode is selected.

1. Deselect GPSS from the G5 menu and select a different autopilot mode.
2. Lateral GPS course guidance may only be used in VFR conditions.

Loss of Electrical Power to the GAD 13 (If Installed)

In the event of a loss of aircraft electrical power to the optional GAD 13, the OAT and TAS indications will be replaced with a red X. The Density Altitude indication will be removed, and "No Wind Data" will be displayed in the wind field.

1. Use an alternate source of outside air temperature to calculate true airspeed, density altitude, and winds.

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SECTION 4 – NORMAL PROCEDURES

G5 Power Button and Knob

The G5 display will power on with the application of aircraft power. The G5 power button is used to turn the display on and off. Press and hold the power button to turn the display off.

The knob performs the following functions:

Press	Press to access the Menu. From the Menu, press to select the desired menu item. Press to accept the displayed value when editing numeric data or selecting from a list. Press to sync the heading or track bug for the HSI.
Turn	From the Menu, turn the Knob to move the cursor to the desired menu item. For the ADI, rotate to adjust the baro setting on the secondary altitude display. For the HSI, rotate to adjust the heading or track bug. Turn to select the desired value when editing numeric data or selecting from a list.

Backlight Intensity Adjustment

The power up state of the G5 backlight is in Auto adjustment mode.

To adjust the backlighting:

To select Manual mode from Auto mode:

1. While the unit is turned on, press the Power button.
2. Turn the knob to manually adjust the backlight intensity.
3. Press the knob to close the backlight page.

To select Auto mode from Manual mode:

1. While the unit is turned on, press the Power button.
2. Press the Power button again to select Auto.
3. Press the knob to close the backlight page.

Prior to Flight in Instrument Meteorological Conditions

1. Press the Power button on the G5 attitude indicator.
2. Verify the battery status indicator is green on the G5 attitude indicator.

Autopilot Operations with the G5 HSI

The G5 and optional GAD 29B offer various integration capabilities dependent upon the type of autopilot installed in a particular aircraft.

The G5 Electronic Flight Instrument installation in this aircraft provides the following autopilot functions (appropriate boxes will be checked):

- ☐ This installation does not interface with the autopilot (basic wing leveling autopilot or no autopilot is installed in the aircraft).
- ☐ A GAD 29B Adapter is installed in this aircraft.
  - ☐ Course / NAV Selection coupling to the autopilot.
  - ☐ Heading Bug coupling capability to the autopilot.
  - ☐ Roll Steering (GPSS) emulated via heading mode

    OR
  - ☐ Roll Steering capable autopilot (GPSS menu function for emulation not applicable).

Course / NAV Selection Coupling to the Autopilot (If Configured)

When operating the autopilot in NAV mode, the deviation information from the installed navigation sources (i.e. GPS or NAV) is switched via the navigation source. The NAV source displayed on the HSI is the NAV source the autopilot is following. Many autopilots also use the course datum to determine the best intercept angles when operating in NAV mode.

Heading Bug Coupling Capability to the Autopilot (If Configured)

When operating the autopilot in HDG mode, the difference between the HDG bug location on the HSI and the actual aircraft heading creates an error signal which the autopilot will minimize by turning in the direction of the bug. If the bug is turned more than 180 degrees, the autopilot may turn the airplane in the opposite direction of the desired turn.

Roll Steering (GPSS) Emulated via HDG Mode (If Configured)

For autopilots that do not support digital GPSS signals, GPSS functionality may be emulated by operating the autopilot in HDG mode and selecting GPSS from the G5 menu. If the autopilot is already designed to receive roll steering information, the data is transmitted digitally from the navigator to the autopilot.

When GPSS is selected on the G5 menu, the heading bug on the HSI changes to a hollow outline and a crossed-out heading bug appears on the G5 HSI display indicating that the autopilot is not coupled to the heading bug. The bug is still controllable and may still be used for reference.

When GPSS is selected on the G5, GPSS turn commands are converted into a heading error signal to the autopilot. When the autopilot is operated in HDG mode, the autopilot will fly the turn commands from the GPS navigator. If the GPSS data is invalid (for example, if there is no active GPS leg) or the selected HSI source on the G5 HSI is not GPS, the annunciated GPSS text will be yellow and a zero turn command will be sent to the autopilot.

HSI Source Selection (If Configured)

For aircraft configured with two navigation inputs to the G5, the desired source may be selected using the G5 knob and menu selection. Press the G5 knob to cycle between the NAV1 and NAV2 input.

HSI Portable Navigation Device GPS VFR Annunciation (If Configured)

For aircraft configured for a portable navigation device input to the G5, a GPS VFR indicated in magenta will be displayed on the HSI. When the G5 with a portable navigation device is interfaced there is not enough guidance data for IFR use.

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SECTION 5 – PERFORMANCE

No change.

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SECTION 6 – WEIGHT AND BALANCE

See current weight and balance data.

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SECTION 7 – SYSTEM DESCRIPTION

Refer to Garmin G5 Electronic Flight Instrument Pilot's Guide for Certified Aircraft, part number 190-01112-12 Rev A (or later approved revisions), for a description of the G5 electronic flight instrument. This reference material is not required to be on board the aircraft but does contain a more in depth description of all the functions and capabilities of the G5.

The ATT circuit breaker supplies power to the G5 instrument for normal power operation and to charge the internal battery.

The DG circuit breaker supplies power to the G5 instrument for normal power operation when configured as a DG, and to charge the internal battery (if installed).

The HSI circuit breaker supplies power to the G5 instrument for normal power operation when configured as an HSI, and to charge the internal battery (if installed).

The GAD circuit breaker supplies power to the optional GAD 29 adapter and optional GAD 13 adapter for normal power operation.

System Messages

The G5 has the capability to display system messages to the crew along the bottom of the display. A system message is indicated through a white ! indication on the G5.

Messages can be displayed by pressing the G5 knob, and selecting the Message menu item.

(For Reference Only)

The following table shows the meaning of each message. System messages are displayed in white text.

Message	Meaning
External Power Lost	Aircraft power has been removed from the G5.
Critical battery fault! Powering off	Battery has critical fault condition and the unit is about to power off to avoid damage to the battery.
Battery fault	Battery has a fault condition – unit needs service.
Battery charger fault	Battery charger has a fault condition – unit needs service.
Low battery	Battery charge level is low.
Hardware fault	Unit has a hardware fault – unit needs service.
Power supply fault	Unit power supply fault detected – unit needs service.
Unit temperature limit exceeded	Unit is too hot or too cold.
Network address conflict	Another G5 with the same address is detected on the network (most commonly a wiring error on one of the units).
Communication error	General communication error (most commonly appears in conjunction with Network Address Conflict message).
Factory calibration data invalid	Unit calibration data not valid – unit needs service.
Magnetic field model database out of date	Internal magnetic field database is out of date - software update required.
Magnetometer Hardware fault	The magnetometer has detected a fault – unit needs service. Heading data may not be available.
Using external GPS data	GPS data from another network LRU is being used. The unit's internal GPS receiver is enabled, but unable to establish a GPS fix.
Not receiving RS-232 data	The G5 is not receiving RS-232 data from the GPS navigator – system needs service.
Not receiving ARINC 429 data	The G5 is not receiving ARINC 429 data from the navigation source – system needs service.
GPS receiver fault	The G5 on-board GPS receiver has a fault.
ARINC 429 interface configuration error	The G5 ARINC 429 port is receiving information from an incorrect source – system needs service.
Software version mismatch	The G5 attitude indicator and the G5 HSI units have different software. Cross fill of baro, heading and altitude bugs is disabled.

These messages remain while the condition persists.

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FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL AIRPLANE FLIGHT MANUAL

for the

Garmin GTN 625, 635, 650, 725, or 750 GPS/SBAS Navigation System

as installed in

BEECH C24R

Make and Model Airplane

Registration Number: ______________ Serial Number: ______________

This document serves as an Airplane Flight Manual Supplement or as a Supplemental Airplane Flight Manual when the aircraft is equipped in accordance with Supplemental Type Certificate SA02019SE-D for the installation and operation of the Garmin GTN 625, 635, 650, 725, or 750 GPS/SBAS Navigation System. This document must be incorporated into the FAA Approved Airplane Flight Manual or provided as an FAA Approved Supplemental Airplane Flight Manual.

The information contained herein supplements the information in the FAA Approved Airplane Flight Manual. For limitations, procedures, loading and performance information not contained in this document, refer to the FAA Approved Airplane Flight Manual, markings, or placards.

FAA Approved by: Erik Frisk

Erik Frisk
ODA STC Unit Administrator
Garmin International, Inc.
ODA-240087-CE

Date: 23-JUL-2021

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1	03/18/11	All	Complete Supplement	*Robert Grove* ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date: *03/18/2011*
2	12/18/12		See Revision 3	*Michael Warren* ODA STC Unit Administrator Garmin International, Inc ODA-240087-CE Date: *12/18/2012*
3	03/26/13		See Revision 4	*Michael Warren* ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date: *04/12/2013*
4	11/24/14	7	<u>Table 1</u> • Added new functions	*Michael Warren* ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date : *11/25/2014*
		11	<u>Section 1.4</u> • New section	
		16	<u>Section 2.7</u> • Modified limitation	
		18	<u>Section 2.12</u> • Added wire obstacles	
		20	<u>Section 2.21</u> • Modified limitation	
		20 & 21	<u>Section 2.22 & 2.23</u> • Added limitations	
		26	<u>Section 3.2.10</u> • Added Flight Stream 210 to procedure	
		27	<u>Section 4.1</u> • Removed telephone audio deactivation procedure	
		32	<u>Section 7.5</u> • Added wire obstacles	
		34	<u>Section 7.9</u> • Added Flight Stream 210	

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		34 37	Section 7.10 • Added wire obstacles Section 7.17 • Added section	
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			• Added GWX 70 turbulence detection note • Added GTN crossfill information	
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		6-8	Section 1.5 • Added definitions	
		9	Section 2.1 • Updated CRG Revisions	
		12	Table 3 • Added Flight Stream 510 line	
		12	Section 2.7 • MMC additions	
		12	Section 2.8 • Added reference to section 2.29	
		18	Section 2.28 • Fixed error	
		18	Sections 2.29-2.31 • New Sections	
		22	Section 3.2.8 • Reworded and added additional text	
		23	Sections 3.2.9-3.2.13 • New Sections • Renumbered sections	
		27	Section 4.7 • New section	
		29	Section 7.1 • New revision numbers	

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		32	Section 7.9 • Added Flight Stream 510	
		33	Section 7.10 • Reworded	
		34	Table 4 • Added PTC	
		38	Section 7.19 • Flight Stream 510 content added	
		41-42	Sections 7.25-7.26 • New sections	
7	10/17/17	6-8	Sections 1.5 • New definitions	*Erik Frisk* ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date *11-01-2017*
		9	Section 2.1 • Updated CRG Revisions	
		10	Section 2.4 • Updated FDE compliance text	
		12	Section 2.6 • Updated software grid	
		13	Section 2.10 • Renamed section	
		19-20	Section 2.32-2.33 • New sections	
		22	Section 3.2.1-2 • Updated text	
		32	Section 7.27 • Updated PG Revisions	
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		14	Section 2.9 • Changed approach requirements for VOR or ADF approaches	
		15	Section 2.11 • All text updated	
		16	Section 2.14 • Title change Section 2.15 • User airport text added	
		19	Section 2.30 • Updated charts text	
		20	Section 2.32 • Added new text	
		25	Section 3.2.11 • New text Section 3.2.14 • New section added	
		26	Section 3.2.15 • New section added	
		30	Section 4.6 • New section added	
		31	Section 4.9 • New section added	
		33	Section 7.1 • Updated PG versions	
		34	Section 7.5 • Additional options	
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		44	Section 7.23 • Updated text add bullet	
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9	01/03/20	12 13 33 44 46	Section 2.5 • Added statement to clarify when CDI key is enabled. Section 2.6 • Updated applicable software. Section 7.3 • Added language to clarify when CDI auto-switching will occur Section 7.23 • Added Default FPA to list of crossfilled items Section 7.28 • Removed recommendation to manually sync FPA	*Erik Frisk* ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date : *01-03-2020*
10	12/11/20	6 10 11 13 14	Section 1.3 • Updated reference to AC 120-76D Section 2.1 • Updated Cockpit Reference Guide revisions Section 2.4 • Replaced references to Garmin WFDE Program with Garmin RAIM Prediction tool. Section 2.6 • Updated software versions Section 2.10 • Removed VOR from list of approaches not approved with GPS guidance.	*Erik Frisk* ODA STC Unit Administrator Garmin International, Inc ODA-240087-CE Date : *12-11-2020*

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		20	Section 2.32 • Clarified function of OBS mode	
		33	Section 7.1 • Updated Pilot's Guide revisions • Removed sentence to improve clarity	
		48	Section 7.32 • New section added	
11	07/23/21	47	Section 7.28 • Updated wording to improve clarity	See Page i
		48	Section 7.32 • Corrected reference from GTN Xi to GTN	

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Section 1. General

1.1 Garmin GTN Navigators

The Garmin GTN navigation system is a GPS system with a Satellite Based Augmentation System (SBAS), comprised of one or more Garmin TSO-C146c GTN 625, 635, 650, 725, or 750 navigator(s) and one or more Garmin approved GPS/SBAS antenna(s). The GTN navigation system is installed in accordance with AC 20-138A.

	GTN 625	GTN 635	GTN 650	GTN 725	GTN 750
GPS SBAS Navigation: • Oceanic, enroute terminal, and non-precision approach guidance • Precision approach guidance (LP, LPV)	X	X	X	X	X
VHF Com Radio, 118.00 to 136.990, MHz, 8.33 or 25 kHz increments		X	X		X
VHF Nav Radio, 108.00 to 117.95 MHz, 50 kHz increments			X		X
LOC and Glideslope non-precision and precision approach guidance for Cat 1 minimums, 328.6 to 335.4 MHz tuning range			X		X
Moving map including topographic, terrain, aviation, and geopolitical data	X	X	X	X	X
Display of datalink weather products, SiriusXM, FIS-B, Connext (all optional)	X	X	X	X	X
Control and display of airborne weather radar (optional)				X	X
Display of terminal procedures data (optional)				X	X
Display of traffic data, including ADS-B (optional)	X	X	X	X	X
Display of StormScope® data (optional)	X	X	X	X	X
Display of marker beacon annunciators (optional)	X*	X*	X*	X	X
Remote audio panel control (optional)				X	X
Remote transponder control (optional)	X	X	X	X	X
Remote audio entertainment datalink control (optional)	X	X	X	X	X
TSO-C151c Class B TAWS (optional)	X	X	X	X	X
Supplemental calculators and timers	X	X	X	X	X
Control of GSR 56 Iridium Satellite Phone and SMS Text	X	X	X	X	X
Control of Flight Stream 210 (optional)	X	X	X	X	X
Control of Flight Stream 510 (optional)	X	X	X	X	X

* Display of marker beacon annunciations on the GTN 6XX is only possible when installed with a Garmin GMA 350 audio panel.

Table 1 – GTN Functions

The GPS navigation functions and optional VHF communication and navigation radio functions are operated by dedicated hard keys, a dual concentric rotary knob, or the touchscreen.

Figure 1 - GTN 750 Control and Display Layout

Figure 2 - GTN 635/650 Control and Display Layout

1.2 System Capabilities

This Flight Manual Supplement documents the installed capabilities of the GTN specific to the aircraft for which this manual is created.

NOTE

In sections which contain a square checkbox (□) the installer will have placed an "X" in the boxes next to the capabilities applicable to the installation.

The GTN system and associated navigation interface in this aircraft have the following capabilities, in addition to the core multifunction display capability:

- ☒ VHF Communication Radio
- ☒ Primary VHF Navigation
- ☑ Primary GPS Navigation (Enroute) and Approach Capability (LP/LNAV) – See below
- ☑ Primary GPS Approach Capability with Vertical Guidance (LNAV/VNAV, LPV) – See below
- □ TSO-C151c Terrain Awareness and Warning System – See section 2.15
- ☒ Enroute Baro-VNAV

GPS/SBAS TSO-C146c Class 3 Operation

The GTN complies with AC 20-138A and has airworthiness approval for navigation using GPS and SBAS (within the coverage of a Satellite Based Augmentation System complying with ICAO Annex 10) for IFR enroute, terminal area, and non-precision approach operations (including those approaches titled "GPS", "or GPS", and "RNAV (GPS)" approaches). The Garmin GNSS navigation system is composed of the GTN navigator and antenna, and is approved for approach procedures with vertical guidance including "LPV" and "LNAV/VNAV" and without vertical guidance including "LP" and "LNAV"

The Garmin GNSS navigation system complies with the equipment requirements of AC 90-105 and meets the equipment performance and functional requirements to conduct RNP terminal departure and arrival procedures and RNP approach procedures including procedures with RF legs subject to the limitations herein. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval from the FAA.

The Garmin GNSS navigation system complies with the equipment requirements of AC 90-100A for RNAV 2 and RNAV 1 operations. In accordance with AC 90-100A, Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-100A are authorized to fly RNAV 2 and RNAV 1 procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval from the FAA.

Applicable to dual installations consisting of two Garmin GNSS units: The Garmin GNSS navigation system has been found to comply with the requirements for GPS Class II oceanic and remote navigation (RNP-10) without time limitations in accordance with AC 20-138A and FAA Order 8400.12A. The Garmin GNSS navigation system can be nsed without reliance on other long-range navigation systems. This does not constitute an operational approval.

The Garmin GNSS navigation system has been found to comply with the navigation requirements for GPS Class II oceanic and remote navigation (RNP-4) in accordance with AC 20-138A and FAA Order 8400.33. The Garmin GNSS navigation system can be used without reliance on other long-range navigation systems. Additional equipment may be required to obtain operational approval to utilize RNP-4 performance. This does not constitute an operational approval.

The Garmin GNSS navigation system complies with the accuracy, integrity, and continuity of function, and contains the minimum system functions required for P-RNAV operations in accordance with JAA Administrative & Guidance Material Section One: General Part 3: Temporary Guidance Leaflets, Leaflet No 10 (JAA TGL-10 Rev 1). The GNSS navigation system consists of one or more TSO-C146c Class 3 approved Garmin GTN Navigation Systems. The Garmin GNSS navigation system complies with the accuracy, integrity, and continuity of function, and contains the minimum system functions required for B-RNAV operations in accordance with EASA AMC 20-4. The Garmin GNSS navigation system complies with the equipment requirements for P-RNAV and B-RNAV/RNAV-5 operations in accordance with AC 90-96A CHG 1. This does not constitute an operational approval.

Garmin International holds an FAA Type 2 Letter of Acceptance (LOA) in accordance with AC 20-153 for database integrity, quality, and database management practices for the navigation database. Flight crew and operators can view the LOA status at FlyGarmin.com then select "Type 2 LOA Status."

Navigation information is referenced to the WGS-84 reference system.

Note that for some types of aircraft operation and for operation in non-U.S. airspace, separate operational approval(s) may be required in addition to equipment installation and airworthiness approval.

Advanced RNP Capabilities

The GTN includes 3 out of 6 of the features required for operations in airspace requiring Advance RNP based on the *ICAO document 9613 Performance Based Navigation (PBN) Manual, fourth edition, 2013* and is therefore not approved for Advanced RNP operations. The following table describes the six Advanced RNP capabilities and the GTN capabilities.

Advanced RNP Feature	GTN Capability
RF legs	Available if enabled for installation. See Section 2.12 for limitations.
Parallel offsets	Available.
Scalable RNP	GTN provides CDI scalability in compliance with TSO-C146c. RNP scalability is not available.
RNAV holding	Available.
Fixed radius transitions	Not available in GTN.
Time of arrival control (TOAC)	Not available in GTN.

1.3 Electronic Flight Bag

The GTN 750/725 are operationally suitable as installed equipment, Type B EFB applications in accordance with AC 120-76D when using current FliteChart or ChartView data.

Use of the Flight Stream interface and data for the purpose of Electronic Flight Bag applications is not approved as part of this STC. Additional approval may be required to obtain operational approval for use of the Flight Stream and supplied data to supplement EFB systems.

1.4 Electronic Checklists

The GTN checklist functions are designed to DO-178B software design assurance level B and support a minor failure classification. While this STC does not grant operational approval for operators requiring such approval, there are no limitations precluding operators from obtaining their own operational approval for the checklist function.

1.5 Definitions

The following terminology is used within this document:

ADF:	Automatic Direction Finder
ADS-B:	Automatic Dependent Surveillance Broadcast
AEG:	Aircraft Evaluation Group (FAA)
APR:	Approach
ASR:	Automated Speech Recognition
ATK:	Along TracK
CDI:	Course Deviation Indicator
DME:	Distance Measuring Equipment
ECAC:	European Civil Aviation Conference
EFB:	Electronic Flight Bag
EGNOS:	European Geostationary Navigation Overlay Service
EHSI:	Electronic Horizontal Situation Indicator
FPA:	Flight Path Angle
FIS-B:	Flight Information Services Broadcast
GAGAN:	GPS Aided GEO Augmented Navigation
GDU:	Garmin Display Unit
GMA:	Garmin Multimedia Audio
GNSS:	Global Navigation Satellite System
GPA:	Glidepath Angle
GPS:	Global Positioning System
GPSS:	GPS Roll Steering
GTN:	Garmin Touchscreen Navigator

HOT: Hazardous Obstacle Transmission wires

HSI: Horizontal Situation Indicator

IAP: Instrument Approach Procedure

IFR: Instrument Flight Rules

ILS: Instrument Landing System

IMC: Instrument Meteorological Conditions

LDA: Localizer Directional Aid

LNAV: Lateral Navigation

LNAV +V: Lateral Navigation with advisory Vertical Guidance

L/VNAV: Lateral/Vertical Navigation

LOC: Localizer

LOC-BC: Localizer Backcourse

LP: Localizer Performance

LPV: Localizer Performance with Vertical Guidance

LP +V: Localizer Performance with Advisory Vertical Guidance

MLS: Microwave Landing System

MMC: Multi-Media Card

NOTAM: Notice to Airmen

OBS: Omni Bearing Selector

PED: Portable Electronic Device

PTC: Push-To-Command

RAIM: Receiver Autonomous Integrity Monitoring

RF Leg: Radius-To-Fix Leg of a Charted Instrument Procedure

RFL: Reverse Freqnency Lookup

RMT: Remote

RNAV: Area Navigation

RNP: Required Navigational Performance

SAR: Search and Rescue

SBAS: Satellite Based Augmentation System

SD: Secure Digital

SDF: Simplified Directional Facility

SUSP: Suspend

TACAN: Tactical Air Navigation System

TAS: Traffic Awareness System

TAWS: Terrain Awareness and Warning System

TCAS: Traffic Collision Avoidance System

TCH: Threshold Crossing Height

TFR: Temporary Flight Restriction

TIS: Traffic Information Service

VHF: Very High Frequency

VFR: Visual Flight Rules

VGSI: Visual Glide-Slope Indicator

VLOC: VOR/Localizer

VMC: Visual Meteorological Conditions

VNAV:	Vertical Navigation
VOR:	VHF Omnidirectional Range
VRP:	Visual Reporting Point
WAAS:	Wide Area Augmentation System
WFDE:	WAAS Fault Data Exclusion
XFR:	Transfer

2.1 Cockpit Reference Guide

The Garmin GTN 6XX or GTN 7XX Cockpit Reference Guide, part number and revision listed below (or later revisions), *must* be immediately available to the flight crew whenever navigation is predicated on the use of the GTN.

- GTN 6XX Cockpit Reference Guide P/N 190-01004-04 Rev N
- GTN 7XX Cockpit Reference Guide P/N 190-01007-04 Rev M

2.2 Kinds of Operation

This AFM supplement does not grant approval for IFR operations to aircraft limited to VFR operations.

2.3 Minimum Equipment

The GTN must have the following system interfaces fully functional in order to be used for primary navigation during IFR operations:

Interfaced Equipment	Number installed	Number Required for IFR
External HSI/CDI/EHSI	1 or more	1
External GPS Annunciator	See Note 1	1

Table 2 – Required Equipment

Note 1: Certain installations require an external GPS annunciator panel. If installed, this annunciator must be fully functional to use the GTN GPS navigation for IFR operations.

Single engine piston aircraft under 6,000 lbs. maximum takeoff weight:
Required Equipment for IFR operations utilizing GPS navigation: Single GTN Navigator

All other aircraft:
Required Equipment for IFR operations utilizing GPS navigation: Single GTN Navigator plus a second source of GPS navigation or a separate source of VHF navigation. The separate source of VHF navigation must not be the primary GTN, but it may be a secondary GTN.

Operation in remote or oceanic operatinn requires two sources of GPS navigation.

2.4 Flight Planning

For flight planning purposes, in areas where SBAS coverage is not available, the flight crew must check RAIM availability. An acceptable means of compliance for FDE prediction programs is to use a certified service which meets the requirements of FAA AC 20-138 and FAA AC 90-105A for prediction.

The following table describes some of the available RAIM prediction programs.

Prediction Program	Internet address or program details	Coverage Area
Garmin RAIM Prediction Tool	https://fly.garmin.com/fly-garmin/support/raim/	Worldwide
FAA Service Availability Prediction Tool	http://sapt.faa.gov	US Only
Flight Service Station	1-800-WXBRIEF https://www.1800wxbrief.com	US Only
AUGER GPS RAIM Predicrion Tool	http://augur.ecacnav.com/augur/app/home	ECAC Airspace Only

This RAIM availability requirement is not necessary if SBAS coverage is confirmed to be available along the entire route of flight.

For flight planning purposes, for operations within the U.S. National Airspace System on RNP and RNAV procedures when SBAS signals are not available, the availability of GPS RAIM shall be confirmed for the intended route of flight. In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended route of flight, the flight shall be delayed, canceled, or rerouted on a track where RAIM requirements can be met. The flight may also be re-planned using non-GPS based navigational capabilities.

For flight planning purposes for operations within European B-RNAV/RNAV-5 and P-RNAV airspace, if more than one satellite is scheduled to be out of service, then the availability of GPS RAIM shall be confirmed for the intended flight (route and time). In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended flight, the flight shall be delayed, canceled, or rerouted on a track where RAIM requirements can be met.

Applicable to dual installations consisting of two Garmin GNSS units:

For flight planning purposes, for operations where the route requires Class II navigation the aircraft's operator or flight crew must use the Garmin RAIM Prediction Tool to demonstrate that there are no outages on the specified route that would prevent the Garmin GNSS navigation system to provide GPS Class II navigation in oceanic and remote areas of operation that requires RNP-10 or RNP-4 capability. If the Garmin WFDE Prediction program indicates fault exclusion (FDE) will be unavailable for more than 34 minutes in accordance with FAA Order 8400.12A for RNP-10 requirements, or 25 minutes in accordance with FAA Order 8400.33 for RNP-4 requirements, then the operation must be rescheduled when FDE is available.

Both Garmin GPS navigation receivers must be operating and providing GPS navigation guidance for operations requiring RNP-4 performance.

North Atlantic (NAT) Minimum Navigational Performance Specifications (MNPS) Airspace operations per AC 91-49 and AC 120-33 require both GPS/SBAS receivers to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. Each display computes an independent navigation solution based on its internal GPS receiver.

Whenever possible, RNP and RNAV routes including Standard Instrument Departures (SIDs), Standard Terminal Arrival (STAR), and enroute RNAV "Q" and RNAV "T" routes should be loaded into the flight plan from the database in their entirety, rather than loading route waypoints from the database into the flight plan individually. Selecting and inserting individual named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted. Manual entry of waypoints using latitude/longitude or place/bearing is prohibited.

It is not acceptable to flight plan a required alternate airport based on RNAV(GPS) LP/LPV or LNAV/VNAV approach minimums. The required alternate airport must be flight planned using an LNAV approach minimums or available ground-based approach aid.

Navigation information is referenced to the WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

2.5 System Use

In installations with two GTNs and an external GPS annunciator (See Table 2) the GTN connected to the external GPS annunciator must be used as the navigation source for all IFR operations.

The only approved sources of course guidance are on the external CDI, HSI, or EHSI display. The moving map and CDI depiction on the GTN display are for situational awareness only and are not approved for course guidance.

If the GTN is interfaced with an external indicator capable of performing its own source selection, the GTN CDI Key will be disabled. The GTN will display "GPS" even when the external indicator has VLOC selected.

2.6 Applicable System Software

This AFMS/AFM is applicable to the software versions shown in Table 3.

The Main and GPS software versions are displayed on the start-up page immediately after power-on. All software versions displayed in Table 3 can be viewed on the System – System Status or Connext Setup pages.

Software Item	Software Version *(or later FAA Approved versions for this STC)*
Main SW Version	6.71
GPS SW Version	5.3
Com SW Version	2.30
Nav SW Version	6.03
Flight Stream 210	2.90
Flight Stream 510	2.6X

Table 3 - Software Versions

2.7 MMC / SD Database Cards

It is required that the SD database card or Flight Stream 510 (MMC) be present in the GTN at all times. The SD or MMC device must not be removed or inserted during flight or while the GTN is powered on.

NOTE

Removal of the SD or MMC device will result in certain features and databases not being available and may slow system performance.

2.8 Navigation Database

GPS/SBAS based IFR enroute, oceanic, and terminal navigation is prohibited unless the flight crew verifies and uses a valid, compatible, and current navigation database or verifies each waypoint for accuracy by reference to current approved data.

"GPS", "or GPS", and "RNAV (GPS)" instrument approaches using the Garmin navigation system are prohibited unless the flight crew verifies and uses the current navigation database GPS based instrument approaches must be flown in accordance with an approved instrument approach procedure that is loaded from the navigation database.

Discrepancies that invalidate a procedure should be reported to Garmin International. The affected procedure is prohibited from being flown using data from the navigation database until a new navigation database is installed in the aircraft and verified that the discrepancy has been corrected. Navigation database discrepancies can be reported at FlyGarmin.com by selecting "Aviation Data Error Report." Flight crew and operators can view navigation database alerts at FlyGarmin.com then select "NavData Alerts."

If the navigation database cycle will change during flight, the flight crew must ensure the accuracy of navigation data, including suitability of navigation facilities used to define the routes and procedures for flight. If an amended chart affecting navigation data is published for the procedure, the database must not be used to conduct the procedure.

See Section 2.29 for limitations regarding database update procedures.

2.9 Ground Operations

Do not use SafeTaxi or ChartView functions as the basis for ground maneuvering. SafeTaxi and ChartView functions do not comply with the requirements of AC 20-159 and are not qualified to be used as an airport moving map display (AMMD). SafeTaxi and ChartView are to be used by the flight crew to orient themselves on the airport surface to improve flight crew situational awareness during ground operations.

2.10 Instrument Approaches

a) Instrument approaches using GPS guidance may only be conducted when the GTN is operating in the approach mode. (LNAV, LNAV +V, L/VNAV, LPV, LP, or LP +V)
b) When conducting instrument approaches referenced to true North, the NAV Angle on the System -Units page must be set to **True**.
c) The navigation equipment required to join and fly an instrument approach procedure is indicated by the title of the procedure and notes on the IAP chart. Navigating the final approach segment (that segment from the final approach fix to the missed approach point) of an ILS, LOC, LOC-BC, LDA, SDF, MLS, TACAN approach, or any other type of approach not approved for GPS, is not authorized with GPS navigation guidance. GPS guidance can only be used for approach procedures with GPS or RNAV in the procedure title. When using the Garmin LOC/GS receivers to fly the final approach segment, LOC/GS navigation data must be selected and presented on the CDI of the pilot flying. When using the VOR or ADF receiver to fly the final approach segment of a VOR or NDB approach, GPS may be the selected navigation source so long as the VOR or NDB station is operational and the signal is monitored for final approach segment alignment.
d) Advisory vertical guidance deviation is provided when the GTN annunciates LNAV + V or LP +V. Vertical guidance information displayed on the VDI in this mode is only an aid to help flight crews comply with altitude restrictions. When using advisory vertical guidance, the flight crew must use the primary barometric altimeter to ensure compliance with all altitude restrictions.
e) Not all published Instrument Approach Procedures (IAP) are in the navigation database. Flight crews planning to fly an RNAV instrument approach must ensure that the navigation database contains the planned RNAV Instrument Approach Procedure and that approach procedure must be loaded from the navigation database into the GTN system flight plan by its name. Pilots are prohibited from flying any approach path that contains manually entered waypoints.

f) IFR approaches are prohibited whenever any physical or visual obstruction (such as a throw-over yoke) restricts pilot view or access to the GTN and/or the CDI.

2.11 QFE Barometric Setting

When flying procedures requiring the use of QFE barometric settings, the pilot must ensure that the barometric setting for the source interfaced with the GTN is set to QFE as appropriate. GTN does not support barometric VNAV for QFE operations.

2.12 RF Legs

This STC does not grant operational approval for RF leg navigation for those operators requiring operational approval. Additional FAA approval may be required for those aircraft intending to use the GTN as a means to provide RNP 1 navigation in accordance with FAA Advisory Circular AC 90-105.

The following limitations apply to procedures with RF legs:

- Aircraft is limited to 180 KIAS while on the RF leg
- RF legs are limited to RNP 1 procedures. RNP AR and RNP <1 are not approved
- Primary navigation guidance on RF legs must be shown on an EHSI indicator with auto-slew capability turned ON
- GTN Moving Map, EHSI Map, or Distance to Next Waypoint information must be displayed to the pilot during the RF leg when flying without the aid of the autopilot or flight director.
- The active waypoint must be displayed in the pilot's primary field of view.

2.13 Autopilot Coupling

The flight crew may fly all phases of flight based on the navigation information presented to the flight crew; however, not all modes may be coupled to the autopilot. All autopilots may be coupled in Oceanic (OCN), Enroute (ENR), and Terminal (TERM) modes.

This installation is limited to:

☐ Lateral coupling only for GPS approaches. Coupling to the vertical path for GPS approaches is not authorized.

It is possible to create flight plan waypoint sequences, including Search and Rescue patterns, which exceed the autopilot's bank angle capabilities. The pilot shall monitor autopilot performance with regard to flight path deviation.

2.13.1 RNP 1.0 RF Leg Types

AC 90-105 states that procedures with RF legs must be flown using either a flight director or coupled to the autopilot.

This STC has demonstrated acceptable crew workload and Flight Technical Error for hand flown procedures with RF legs when the GTN installation complies with limitation set forth in Section 2.12 of this document. It is recommended to couple the autopilot for RF procedures, if available, but it is not required to do so. See section 4.5 of this manual to determine if this capability is supported in this installation.

2.14 Terrain Alerting Function (All Units)

Terrain, point obstacle, and wire obstacle information appears on the map and terrain display pages as red and amber terrain, obstacles, or wires and is depicted for advisory use only. Aircraft maneuvers and navigation must not be predicated upon the use of the terrain display. Terrain, obstacle and wire information is advisory only and is not equivalent to warnings provided by TAWS.

The terrain display is intended to serve as a situational awareness tool only. By itself, it may not provide either the accuracy or the fidelity on which to base decisions and plan maneuvers to avoid terrain or obstacles.

NOTE

Terrain and TAWS are separate features and mutually exclusive. If "TAWS B" is shown on the bottom right of the dedicated terrain page, then TAWS is installed.

2.15 TAWS Function (Optional)

Flight crews are authorized to deviate from their current ATC clearance to the extent necessary to comply with TAWS warnings. Navigation must not be predicated upon the use of TAWS.

TAWS shall be inhibited when landing at an airport that is not included in the airport database, or is not designated as a User Airport in the GTN.

If an external TAWS annunciator panel is installed in the aircraft, this annunciator panel must be fully functional in order to use the TAWS system.

NOTE

Terrain and TAWS are separate features and mutually exclusive. If "TAWS B" is shown on the bottom right of the dedicated terrain page, then TAWS is installed.

2.16 Polar Operations

Use of the GTN for primary navigation for latitudes above 89.00° N and below 89.00° S is prohibited.

2.17 Datalink Weather Display (Optional)

This limitation applies to datalink weather products from SiriusXM via a GDL 69/69A, FIS-B via a GDL 88 or GTX 345, and Connext via a GSR 56.

Do not use data link weather information for maneuvering in, near, or around areas of hazardous weather. Information provided by data link weather products may not accurately depict current weather conditions.

Do not use the indicated data link weather product age to determine the age of the weather information shown by the data link weather product. Due to time delays inherent in gathering and processing weather data for data link transmission, the weather information shown by the data link weather product may be significantly older than the indicated weather product age.

Do not rely solely upon data link services to provide Temporary Flight Restriction (TFR) or Notice to Airmen (NOTAM) information. Not all TFRs and NOTAMS can be depicted on the GTN.

Datalink text weather is decoded for the convenience of the pilot, however it is possible that the decoding may be affected by anomalies in the data or differences in the units of measure between the decoding system and the text weather source. All text weather displayed on the GTN also includes the raw weather text for pilot review.

2.18 Traffic Display (Optional)

Traffic may be displayed on the GTN when connected to an approved optional TCAS I, TAS, TIS, or ADS-B traffic device. These systems are capable of providing traffic monitoring and alerting to the flight crew. Traffic shown on the display may or may not have traffic alerting available. The display of traffic is an aid to visual acquisition and may not be utilized for aircraft maneuvering.

Traffic is displayed in feet regardless of the unit settings for altitude. If the units for altitude are different than feet, a "FT" label will appear on the traffic icon on and main map page, and the dedicated traffic page will include an "ALT IN FT" notification.

2.19 StormScope® Display (Optional)

StormScope® lightning information displayed by the GTN is limited to supplemental use only. The use of the StormScope® lightning data on the display for hazardous weather (thunderstorm) penetration is prohibited. StormScope® lightning data on the display is intended only as an aid to enhance situational awareness of hazardous weather, not penetration. It is the flight crew's responsibility to avoid hazardous weather using official weather data sources.

When the GTN StormScope® page is operating without a heading source, as indicated by the "HDG N/A" label at the upper right corner of the StormScope® page, strikes must be cleared after each heading change.

2.20 Flight Planner/Calculator Functions

The Fuel Planning page uses Fuel on Board or Fuel Flow as received from an on board fuel totalizer, as entered by the pilot at system startup, or as entered by the pilot when on the Fuel Planning page. This *is not* a direct indication of actual aircraft fuel flow or fuel on board and those values are only used for the Fuel Planning page. The fuel required to destination is only a calculated and predicted value based on the data entered into the planner. It is not a direct indication of how much fuel the aircraft will have upon reaching the destination.

2.21 Fuel Range Rings

The fuel range rings displayed on the moving map are intended for situational awareness and do not represent a direct indication of endurance or fuel remaining. The distance between the segmented green reserve ring and the yellow zero fuel ring is 45 minutes by default. The reserve value can be changed from the GTN map setup menu.

Fuel range data is derived by the interfaced fuel totalizer data. Data entered in the Fuel Planning pages will not update the fuel range ring.

2.22 Glove Use / Covered Fingers

No glove or covered fingers may be used to operate the GTN unless the Glove Qualification Procedure located in the Pilot's Guide/Cockpit Reference Guide has been successfully completed. The Glove Qualification Procedure is specific to a pilot / glove / GTN 725, 750 or GTN 625, 635, 650 combinations.

2.23 Demo Mode

Demo mode may not be used in flight under any circumstances.

2.24 Active Weather Radar

Radar is broadcasting energy while in Weather or Ground mapping modes. If the GTN 750/725 system is configured to control an airborne weather radar unit, observe all safety precautions, including:

- Do not operate in the vicinity of refueling operations.
- Do not operate while personnel are in the vicinity (approximately 20 feet) of the radar sweep area.

CAUTION

If a radar system is installed, it generates microwave radiation and improper use, or exposure, may cause serious bodily injury. Do not operate the radar equipment until you have read and carefully followed the safety precautions and instructions in the weather radar user manual and/or pilot's guide.

2.25 Telephone Audio

Telephone audio must not be distributed to the pilot or co-pilot unless a phone call is active.

CAUTION

Failure to turn off telephone audio when the telephone is not in use may result in telephone ringer or text message aural notifications being received during critical phases of flight.

2.26 Multi Crew Aircraft (GMA 35 Only)*

For aircraft type certified with more than one required pilot, or operations requiring more than one pilot, the "Group Co-Pilot with Passenger" audio panel option shall not be activated. This option is found in the Intercom Setup Menu when a Garmin GMA 35 audio panel is installed.

2.27 Wire Obstacle Database

Only the "Obstacle/HOT Line" database may be used. Use of the "Obstacle/Wire" database is prohibited. The database version can be viewed on the start-up database verification or System- System Status pages.

2.28 Portable Electronic Devices

This STC does not relieve the operator from complying with the requirements of 91.21 or any other operational regulation regarding portable electronic devices.

The Flight Stream interface and data provided to a portable electronic device is not approved to replace any aircraft display equipment, including navigation or traffic/weather display equipment.

2.29 Database Updates

Database updates via MMC / SD card or Flight Stream wireless transfers must be done while the aircraft is on the ground and stationary. In-flight database transfers or updates are prohibited in flight unless part of the Database SYNC function that occurs in the background to move databases from one LRU to another.

2.30 Charts Database (Dual GTN7XX and TXi GDU)

When the aircraft installation includes 2 GTNs capable of displaying charts (GTN 700, 725 or 750) and crossfill is enabled between the GTNs, the GTNs must have identical charts types (ChartView or FliteCharts) and charts cycles installed. Failure to have identical charts could affect the chart lookup features and automatic chart selection.

Additionally, when the GTN and TXi are installed in the same cockpit, it is required that the GTN and TXi have the same chart types and cycles to ensure appropriate lookup and chart syncing/streaming functionality. If Chart Streaming or Database Sync functions are disabled, this limitation does not apply.

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* Includes GMA 35 and GMA 35c Audio Panels

2.31 Automatic Speech Recognition

Pilots may not use the ASR function to operate the GTN/GMA unless they have completed the ASR Qualification Procedure located in the GTN Cockpit Reference Guide successfully. The ASR Qualification Procedure is specific to each pilot / headset / aircraft combination.

2.32 OBS Mode

OBS mode allows the pilot to navigate to a waypoint along a course. On a single GTN, press the OBS button and use the OBS or Course knob on the interfaced CDI, HSI, or EHSI to select the desired course. The GTN will annunciate OBS while OBS mode is active. Once the course has been selected, press the OBS button again to exit OBS mode. In a dual GTN installation, the OBS course will crossfill to the other GTN after exiting OBS mode if crossfill is enabled. Use of OBS mode for flight plan segments greater than 250NM is prohibited.
OBS Mode is not available between the FAF and MAP of any instrument approach.

2.33 Advisory Visual Approaches

All advisory visual approaches shall be conducted in VMC. Advisory visual approaches are intended to be used as an aid to situational awareness and do not guarantee terrain or obstruction clearance along the approach path. Use of advisory visual approaches in IMC is prohibited.

Section 3. EMERGENCY PROCEDURES

3.1 Emergency Procedures

3.1.1 TAWS WARNING

Red annunciator and aural "PULL UP":
Autopilot..**DISCONNECT**
Aircraft Controls............................ **INITIATE MAXIMUM POWER CLIMB**
Airspeed...**BEST ANGLE OF CLIMB SPEED**

After Warning Ceases:
Altitude ....**CLIMB AND MAINTAIN SAFE ALTITUDE**
Advise ATC of Altitude Deviation, if appropriate.

NOTE

Only vertical maneuvers are recommended, unless either operating in visual meteorological conditions (VMC), or the flight crew determines, based on all available information, that turning in addition to the vertical escape maneuver is the safest course of action, or both.

NOTE

TAWS annunciators external to the GTN may not indicate the exact threat causing the alert. Example: WIRE alerts may be annunciated as TERR or OBSTACLE on external devices.

3.2 Abnormal Procedures

3.2.1 LOSS OF GPS/SBAS NAVIGATION DATA

When the GPS/SBAS receiver is inoperative or GPS navigation information is not available or invalid, the GTN will enter one of two modes: Dead Reckoning mode (DR) or Loss Of Integrity mode (LOI). The mode is indicated on the GTN by an amber "DR" and/or "LOI".

If the LOI annunciation is displayed, revert to an alternate means of navigation appropriate to the route and phase of flight. If LOI occurs while the GTN is in the ENR or OCN phase of flight, it may also display DR.

If the DR annunciation is displayed, the map will continue to be displayed with an amber "DR" overwriting the ownship icon. Course guidance will be removed on the CDI. Aircraft position will be based upon the last valid GPS position, then estimated by Dead Reckoning methods. Changes in true airspeed, altitude, heading, or winds aloft can affect the estimated position substantially.

If Alternate Navigation Sources (ILS, LOC, VOR, DME, ADF) Are Available:

Navigation.. **USE ALTERNATE SOURCES**

If No Alternate Navigation Sources Are Available:

DEAD RECKONING (DR) MODE:

Navigation.. USE GTN

NOTE

All information normally derived from GPS will become less accurate over time.

LOSS OF INTEGRITY (LOI) MODE (no DR annunciated on the GTN):

Navigation..................... **FLY TOWARDS KNOWN VISUAL CONDITIONS**

NOTE

All information derived from GPS will be removed.

NOTE

The airplane symbol is removed from all maps. The map will remain centered at the last known position. "NO GPS POSITION" will be annunciated in the center of the map.

3.2.2 GPS APPROACH DOWNGRADE

During a LPV, LP +V, LNAV/VNAV, or LNAV +V approach, if GPS accuracy requirements cannot be met by the GPS receiver, the GTN will downgrade the approach. The downgrade will remove vertical deviation indication from the VDI and change the approach annunciation to LNAV. The approach may be continued using the LNAV only minimums. If the VISUAL approach is downgraded, the GTN will remove the vertical deviation indication from the VDI, but continue to annunciate VISUAL in amber.

During a GPS approach in which GPS accuracy requirements cannot be met by the GPS receiver for any GPS approach type, the GTN will flag all CDI guidance and display a system message "ABORT APPROACH-GPS approach no longer available". Immediately upon viewing the message, the unit will revert to Terminal navigation mode alarm limits. If the position integrity is within these limits lateral guidance will be restored and the GPS may be used to execute the missed approach, otherwise alternate means of navigation must be utilized.

3.2.3 LOSS OF COM RADIO TUNING FUNCTIONS

If alternate COM is available:
Communications .... **USE ALTERNATE COM**

If no alternate COM is available:
COM RMT XFR key (if installed)....... **PRESS AND HOLD FOR 2 SECONDS**

NOTE

This procedure will tune the active COM radio the emergency frequency 121.5, regardless of what frequency is displayed on the GTN. Certain failures of the tuning system will automatically tune 121.5 without flight crew action.

3.2.4 LOSS OF AUDIO PANEL FUNCTIONS (GMA 35 Only)†

Audio Panel Circuit Breaker .... **PULL**

NOTE

This procedure will force the audio panel into fail safe mode which provides only the pilot with communications and only on a single COM radio. If any non GTN 750 COM is installed, communication will be only on that radio. If only a GTN 750 is installed in the aircraft, then the pilot will have only the GTN 750 COM available. No other audio panel functions including aural alerting and the crew and passenger intercom will function.

† Includes GMA 35 and GMA 35c Audio Panels

3.2.5 TAWS CAUTION (Terrain or Obstacle Ahead, Sink Rate, Don't Sink)

When a TAWS CAUTION occurs, take corrective action until the alert ceases. Stop descending or initiate either a climb or a turn, or both as necessary, based on analysis of all available instruments and information.

NOTE

TAWS annunciators external to the GTN may not indicate the exact threat causing the alert. Example: WIRE alerts may be annunciated as TERR or OBSTACLE on external devices.

3.2.6 TAWS INHIBIT

The TAWS Forward Looking Terrain Avoidance (FLTA) and Premature Descent Alerts (PDA) functions may be inhibited to prevent alerting, if desired. Refer to GTN Cockpit Reference Guide for additional information.

To Inhibit TAWS:

Home Hardkey .... **PRESS**
Terrain Button .... **PRESS**
Menu Button .... **PRESS**
TAWS Inhibit Button .... **PRESS TO ACTIVATE**

3.2.7 TER N/A and TER FAIL

If the amber **TER N/A** or **TER FAIL** status annunciator is displayed, the system will no longer provide TAWS alerting or display relative terrain and obstacle elevations. The crew must maintain compliance with procedures that ensure minimum terrain and obstacle separation.

3.2.8 DATA SOURCE - HEADING SOURCE INOPERATIVE OR CONNECTION TO GTN LOST MESSAGE

Without a heading source to the GTN, the following limitations apply:

- Roll steering will not be provided to the autopilot for heading legs. The autopilot must be placed in HDG mode for heading legs.
- Map cannot be oriented to Heading Up.
- Overlaying traffic data from a TAS/TCAS I or Garmin ADS-B-IN unit interfaced to an on board traffic system will not be displayed on the main map display. The flight crew must use the dedicated traffic page on the GTN system to display TAS/TCAS I or Garmin ADS-B-IN traffic data.
- All overlaying StormScope® data on the main map display will be removed. The flight crew must use the dedicated StormScope® page on the GTN system to display StormScope® data.
- Onboard weather radar overlay on the main map will not be displayed. The flight crew must utilize the dedicated weather radar page on the GTN system to view weather radar data from the onboard weather radar.

StormScope® must be operated in accordance with Section 7.8 when no heading is available.

3.2.9 ASR (VOICE COMMAND) SYSTEM FAILURES

In the event the ASR system fails and there is a need to disable the voice command inputs to the GTN:

To Disable ASR:

Home Hardkey .... **PRESS**
System Button .... **PRESS**
Voice Commands Button .... **PRESS**
Voice Commands Enable Button .... **TOGGLE OFF**

3.2.10 LOSS OF GTN TOUCH CONTROL

In the event the GTN becomes unusable due to uncommanded page changes, the ASR function may be the source.

To Disable ASR:

Audio Panel Circuit Breaker .... **PULL**
Home Hardkey .... **PRESS**
System Button .... **PRESS**
Voice Commands Button .... **PRESS**
Voice Commands Enable Button .... **TOGGLE OFF**
Audio Panel Circuit Breaker .... **PUSH**

3.2.11 DATA SOURCE – PRESSURE ALTITUDE SOURCE INOPERATIVE OR CONNECTION TO GTN LOST MESSAGE

If the GTN is being used to forward pressure altitude to a transponder, the transponder will not be receiving pressure altitude from the GTN while that message is present.

3.2.12 UNRECOVERABLE LOSS OF ALL ELECTRICAL GENERATORS OR ALTERNATORS

Remove power from all equipment which is not necessary for flight, including GTN #2 (NAV/GPS 2, COM 2) and the Flight Stream 210 (BT LINK), if installed.

3.2.13 IN-AIR RESTART OF GTN

In the event of a GTN restart in the air, the crew should utilize the CANCEL button if presented with the database update screen after the GTN is restarted. This will ensure restoration of the navigation functions as soon as possible.

3.2.14 BARO-ALT INPUT FAILURE

Barometric altitude is required for descent VNAV functionality and automatic sequencing of altitude terminated legs. If the BARO altitude input to the GTN has failed, enroute barometric VNAV will not be available. The pilot will also be required to manually sequence any altitude terminated legs.

3.2.15 TEMPERATURE INPUT FAILURE

Temperature input is required for the VNAV Transition to Approach functionality. In the event of a temperature input failure, VNAV transition to approach should be disregarded. The crew must ensure that vertical guidance from descent VNAV to approach guidance is appropriate and that if an autopilot is in use, the crew intercepts the approach vertical guidance from below.

Section 4. NORMAL PROCEDURES

Refer to the GTN Cockpit Reference Guide defined in Section 2.1 of this document or the Pilot's Guide defined in Section 7.1 for normal operating procedures and a complete list of system messages and associated flight crew actions. This includes all GPS operations, VHF communication and navigation, traffic, data linked weather, StormScope®, TAWS, and Multi-Function Display information.

The GTN requires a reasonable degree of familiarity to avoid becoming too engrossed at the expense of basic instrument flying in IMC and basic see-and-avoid in VMC. Garmin provides training tools with the Pilot's Guide and PC based simulator. Pilots should take full advantage of these training tools to enhance system familiarization.

4.1 Unit Power On

Databases .... **REVIEW DATES**
Self-Test.................................. **VERIFY OUTPUTS TO NAV INDICATORS**
Self-Test - TAWS Remote Annunciator:
- PULL UP .... **ILLUMINATED**
- TERR .... **ILLUMINATED**
- TERR N/A .... **ILLUMINATED**
- TERR INHB .... **ILLUMINATED**

Self-Test - GPS Remote Annunciator:
- VLOC .... **ILLUMINATED**
- GPS .... **ILLUMINATED**
- LOI or INTG .... **ILLUMINATED**
- TERM .... **ILLUMINATED**
- WPT .... **ILLUMINATED**
- APR .... **ILLUMINATED**
- MSG .... **ILLUMINATED**
- SUSP or OBS .... **ILLUMINATED**

4.2 Before Takeoff

System Messages and Annunciators .... **CONSIDERED**

4.3 HSI and EHSI Operation

If an HSI is used to display navigation data from the GTN the pilot should rotate the course pointer as prompted on the GTN.

If an EHSI is used to display navigation data from the GTN the course pointer may autoslew to the correct course when using GPS navigation. When using VLOC navigation the conrse pointer will not autoslew and must be rotated to the correct course by the pilot. For detailed information about the functionality of the EHSI system, refer to the FAA approved Flight Manual or Flight Manual Supplement for that system.

CAUTION

The pilot must verify the active course and waypoint for each flight plan leg. The pilot must verify proper course selection each time the CDI source is changed from GPS to VLOC.

See Section 4.5 for RF leg capabilities related to EHSI.

4.4 Autopilot Operation

The GTN may be coupled to an optional autopilot, if installed in the aircraft, when operating as prescribed in the LIMITATIONS section of this manual.

Autopilots coupled to the GTN system in an analog (NAV) mode will follow GPS or VHF navigation guidance as they would with existing VOR receivers.

Autopilots that support GPSS or GPS Roll Steering in addition to the analog course guidance will lead course changes, fly arcing procedures, procedure turns, and holding patterns if coupled in a roll steering mode.

The GTN supports autopilot roll steering for heading legs when an approved heading source is interfaced to the GTN. This heading interface can also provide map orientation, traffic and StormScope heading data and wind calculations.

CAUTION

The GTN does not provide course deviation to the autopilot for heading legs. Some autopilots do not allow the use of roll steering when course deviation is not provided.

☒ This installation *has* a heading source. The GTN will provide roll steering on heading legs for the autopilot.

☐ This installation *does not have* a heading source. The crew cannot use the GTN roll steering to fly heading legs with the autopilot.

For autopilot operating instructions, refer tu the FAA approved Flight Manual or Flight Manual Supplement for the autopilot.

4.5 Coupling the Autopilot during approaches

CAUTION

When the CDI source is changed on the GTN, autopilot mode may change. Confirm autopilot mode selection after CDI source change on the GTN. Refer to the FAA approved Flight Manual or Flight Manual Supplement for the autopilot.

Analog only autopilots shuuld use APR mode for coupling to LNAV approaches. Autopilots which support digital roll steering commands (GPSS) may utilize NAV mode and take advantage of the digital tracking during LNAV only approaches.

☒ This installation prompts the flight crew and requires the pilot to enable the approach outputs just prior to engaging the autopilot in APR mode.

To couple an approach:
Once established on the final approach course with the final approach fix as the active waypoint, the GTN will issue a flashing message indication.

Flashing Message Button .... **PRESS**
"Enable APR Output" Button.. **PRESS**

If coupled, Autopilot will revert to ROL mode at this time.

Autopilot.. **ENGAGE APPROACH MODE**

☒ This installation supports coupling to the autopilot in approach mode once vertical guidance is available.

To couple an approach:
Once established on the final approach course with the final approach fix as the active waypoint, the GTN will enable vertical guidance.

Vertical Guidance...................................**CONFIRM AVAILABLE**
Autopilot.. **ENGAGE APPROACH MODE**

☐ The installation *does not* support any vertical capture or vertical tracking.

The GTN allows for the utilization of IFR procedures that include RF (Radius to Fix) legs as part of RNP 1.0 capabilities.

- ☐ This installation is equipped to support coupled RF leg navigation up to RNP 1.0.
- ☐ This installation is equipped to support *un-coupled* RF leg navigation up to RNP 1.0.
- ☒ This installation *does not* support RF leg navigation.

4.6 Coupling the Autopilot for Descent VNAV

The GTN outputs VNAV deviations to properly configured Garmin G500/600 GDU, G500/600/700TXi GDU, or G5 displays. In order to provide autopilot coupling to the baro VNAV guidance, the interface must also include either a Garmin GFC500 or GFC600 with VNAV capability. If VNAV is enabled on the GTN in these installations, VNAV guidance may be coupled to the autopilot using the VNAV function of the GFC.

- ☒ This installation is equipped and configured to provide VNAV display and autopilot coupling.
- ☐ This installation is equipped and configured to provide VNAV *display only*.
- ☐ This installation *does not* support VNAV display or coupling.
- ☐ This installation is configured with VNAV Transition to Approach.

4.7 Coupling the Autopilot during Search and Rescue Operations

Search and Rescue (SAR) patterns created in the GTN flight plan may include turns that cannot be accomplished with standard autopilot turn rates. Monitor autopilot performance relative to the desired path if coupled when using Search and Rescue patterns.

4.8 Database Conflict Resolution

When a conflict occurs between databases on different GTNs that are utilizing Database SYNC the pilot should resolve that conflict by pressing the "Resolve Conflict" button on the GTN that has the desired databases. This would be the GTN with the newest database on the SD card or Flight Stream 510. After initiating the conflict resolution, the pilot can view the SYNC status of the database on the other GTN by viewing the System -> Standby Database page. Once the database SYNC is complete, the receiving GTN must be restarted to install the new database and complete the conflict resolution process.

NOTE

The databases on the receiving LRU will be overwritten by the databases from the LRU from which the "Resolve Conflicts" action was initiated.

4.9 Cold Weather Compensation

The GTN can compute altitudes for cold weather compensation for applicable IFR approaches. If the instrument approach chart requires temperature compensation, the pilot should enter the destination airport temperature into the GTN. Approach altitudes provided on the map and flight plan are adjusted based on the pilot entered temperature and the altitudes on the flight plan page are appended with a snowflake icon.

Pilots must coordinate with ATC when flying temperature compensated procedures.

Pilots must manually adjust the approach minimums as applicable. The GTN does not provide temperature compensated approach minimum values. Garmin G500/600/700TXi systems can provide compensated minimum values when interfaced with a GTN.

- ☐ This installation supports cold weather compensated intermediate approach and minimums altitudes.
- ☐ This installation supports cold weather compensated *intermediate approach altitudes and missed approach altitudes only.*
- ☒ This installation does not support cold weather compensation.

Section 5. PERFORMANCE

No change.

Section 6. WEIGHT AND BALANCE

See current weight and balance data.

Section 7. SYSTEM DESCRIPTIONS

7.1 Pilot's Guide

The Garmin GTN 6XX or GTN 7XX Pilot's Guide, part number and revision listed below, contain additional information regarding GTN system description, control and function.

- GTN 6XX Pilot's Guide — P/N 190-01004-03 Rev P or later
- GTN 7XX Pilot's Guide — P/N 190-01007-03 Rev R or later

7.2 Leg Sequencing

The GTN supports all ARINC 424 leg types. Certain leg types require altitude input in order to sequence (course to altitude, for example). If a barometric corrected altitude source is not interfaced to the GTN, a popup will appear prompting the flight crew to manually sequence the leg once the altitude prescribed in the procedure is reached.

☒ This installation *has* a barometric corrected altitude source. The GTN will automatically sequence altitude legs.

☐ This installation *does not have* a barometric corrected altitude source. The flight crew will be prompted to manually sequence altitude legs.

7.3 Auto ILS CDI Capture

Auto ILS CDI Capture can automatically switch the CDI from GPS to VLOC before the Final Approach fix. This feature is only available on installations that meet any of the following conditions:

- Equipped with GFC 600
- GTN CDI key enabled

On these installations the auto-switching will only occur if the following conditions are met:

- ILS Autoswitch setting enabled on GTN
- ILS/LOC approach loaded and activated
- Correct nav frequency tuned on GTN NAV radio
- Aircraft established on the final approach course

Auto ILS CDI Capture will not automatically switch from GPS to VLOC for LOC-BC or VOR approaches.

7.4 Activate GPS Missed Approach

☒ This installation *will* autoswitch from VLOC to GPS when the "Activate GPS Missed Approach" button is pressed.

- ☐ This installation *will not* autoswitch from VLOC to GPS when the "Activate GPS Missed Approach" button is pressed. The pilot must manually switch from VLOC to GPS if GPS guidance is desired after the missed approach point.

7.5 Terrain Proximity, Terrain Alerting, and TAWS

CAUTION

Not all obstacles and wires are contained in the Obstacle/HOT Line database. The system provides depiction (and alerts, if TAWS is installed) only for obstacles and wires contained in the database.

NOTE

The area of coverage may be modified as additional terrain data sources become available.

- ☒ This installation supports *Terrain Proximity. No aural or visual alerts* for terrain or obstacles are provided. Terrain Proximity *does not* satisfy the TAWS requirement of 91.223.
- ☐ This installation supports *Terrain Alerting*. Aural and visual alerts are provided. Terrain Alerting *does not* satisfy the TAWS requirement of 91.223.
- ☐ This installation supports *TAWS B*. Aural and visual alerts *will be* provided. This installation *does* support the TAWS requirement of 91.223.

Terrain on the dedicated terrain page or main map overlay is depicted in the following manner:

- Terrain more than 1,000 feet below the aircraft is not depicted or depicted as black.
- Terrain between 1,000 feet and 100 feet below the aircraft is depicted as amber.
- Terrain within 100 feet below the aircraft, or above the aircraft, is depicted as red.

Obstacles and wires on the dedicated terrain page or main map are depicted in the following manner:

- Obstacles and wires more than 2,000 feet below the aircraft are not depicted.
- Obstacles and wires between 2,000 feet and 1,000 feet below the aircraft are depicted as white.
- Obstacles and wires between 1,000 feet and 100 feet below the aircraft are depicted as amber.
- Obstacles and wires within 100 feet below the aircraft, or above the aircraft, are depicted as red.

Multiple obstacles may be depicted using a single obstacle icon and an asterisk to indicate obstacle grouping is occurring. The color of the asterisk indicates the relative altitude of the tallest obstacle in the group. The asterisk does not indicate any information about the relative altitude or number of obstacles not being displayed in the obstacle group.

The Garmin GTN 6XX or GTN 7XX Cockpit Reference Guide or Garmin GTN 6XX or GTN 7XX Pilot's Guide provides additional information regarding terrain and obstacle colors and grouped obstacle icons

7.6 GMA 35/35c Audio Panel (Optional)

The GTN 725 and 750 can interface to a GMA 35/35c remotely mounted audio panel and marker beacon receiver. Controls for listening to various radios, activating the cabin speaker, clearance playback control, and marker beacon are accessed by pressing the "Audio Panel" button on the GTN display screen. Optional Bluetooth pairing functionality can be accessed from the associated System /Connext Setup page (GMA 35c only). Volume controls for the audio panel are accessed by pressing the "Intercom" button on the GTN display screen.

Aircraft alerting audio may be routed through the GMA 35/35c audio panel. There are no pilot controls for alert audio volumes. In the event of a loss of GMA35/35c function alert audio routed through the audio panel may not be heard.

7.7 Traffic System (Optinnal)

This system is configured for the following type of traffic system. The Garmin GTN 6XX or GTN 7XX Cockpit Reference Guide or Garmin GTN 6XX or GTN 7XX Pilot's Guide provides additional information regarding the functionality of the traffic device.

- ☐ No traffic system is interfaced to the GTN.
- ☐ A TAS/TCAS I traffic system is interfaced to the GTN.
- ☐ A TIS traffic system is interfaced to the GTN.
- ☐ A TCAD traffic system is interfaced to the GTN.
- ☒ A Garmin ADS-B traffic system is interfaced to the GTN.
- ☐ A Garmin ADS-B traffic system is interfaced to the GTN. The ADS-B traffic system is also interfaced to an on-board traffic system.

7.8 StormScope® (Optional)

When optionally interfaced to a StormScope® weather detection system, the GTN may be used to display the StormScope® information. Weather information supplied by the StormScope® will be displayed on the StormScope® page of the GTN system. For detailed information about the capabilities and limitations of the StormScope® system, refer to the documentation provided with that system.

Heading Up mode:

If the GTN system is receiving valid heading information, the StormScope® page will operate in the heading up mode as indicated by the label "HDG UP" presented at the upper right corner of the display. In this mode, information provided by the StormScope® system is displayed relative to the nose of the aircraft and *is* automatically rotated to the correct relative position as the aircraft turns.

Heading Not Available mode:

If the GTN system is not receiving valid heading information, either because a compatible heading system is not installed, or the interfaced heading system has malfunctioned, the StormScope® page will continue to operate without a heading source and indicate "HDG N/A" in the upper right corner of the GTN display. In this mode, information provided by the StormScope® system is displayed relative to the nose of the aircraft but *is not* automatically rotated to the correct relative position as the aircraft turns. When operating in this mode, StormScope® strikes must be cleared after each turn the aircraft performs.

7.9 Power

- Power to the GTN is provided through a circuit breaker labeled NAV/GPS (1/2).
- Power to the optional GTN COM is provided through a circuit breaker labeled COM (1/2).
- Power to the optional GMA 35 is provided through a circuit breaker labeled AUDIO.
- Power to the optional Flight Stream 210 is provided through a circuit breaker labeled BT LINK.
- Power to the optional Flight Stream 510 is provided through the GTN MMC/SD card slot and protected via the GTN circuit breaker.

7.10 Databases and Flight Plan Waypoints/Procedures

Database versions (or cycles) and effective dates are displayed on the start-up database verification page immediately after power-on for those databases with an effective or expiration date. Databases with no effective or expiration date (e.g. - terrain database) are considered effective upon installation in the GTN. Database information can also be viewed on the System – System Status page.

The Obstacle Database has an area of coverage that includes the United States and Europe and is updated as frequently as every 56 days. The HOT Line wire database only includes the continental United States and portions of Canada/Mexico.

Only the Obstacle/HOT Line wire database may be used in accordance with the limitation found in Section 2.27.

If a stored flight plan contains a waypoint or procedure that does not correspond to a waypoint or procedure in the navigation database in use, the waypoint or procedure will become locked (depicted as "lockd") in the flight plan. Flight plans with locked waypoints may be placed in the active flight plan portion of the system but no navigation will be provided. The locked waypoint/procedure must be resolved by removing or replacing it with the correct waypoint/procedures in the flight plan before the system will provide navigation.

7.11 External Switches

External switches may be installed and interfaced to the GTN. These switches may be stand alone or integrated with a TAWS or GPS annunciator. Table 4 lists the switches and function they perform:

Switch Label	Function
CDI	Toggles between GPS / VLOC sources. This switch may be part of an external annunciator panel.
COM CHAN DN	Toggles down through the preset com frequencies.
COM CHAN UP	Toggles up through the preset com frequencies.
COM RMT XFR	Transfers the COM active / standby frequencies.
NAV RMT XFR	Transfers the NAV active / standby frequencies.
OBS	Performs an OBS or SUSP function. This switch is part of an external annunciator panel and is placarded with the following: "Green OBS indicates OBS or SUSP mode – GTN annunciator bar indicates which is active. Push OBS button to change OBS or SUSP mode."
OBS/SUSP	Performs an OBS or SUSP function.
TERR INHB	Toggles the TAWS Inhibit function on/off. This switch is part of an external annunciator panel. The terrain display is still presented if TAWS is Inhibited.
PTC	Push-to-Command switch for Voice Command input to the GMA and the GTN.

Table 4 – External Switches

7.12 Airspace Depiction and Alerts

The GTN aides the flight crew in avoiding certain airspaces with Smart Airspace and airspace alerts. Smart Airspace de-emphasizes depicted airspace that is not near the aircraft's current altitude. Airspace Alerts provide a message indication to the flight crew when the aircraft's current ground track will intercept an airspace type that has been selected for alerting.

NOTE

> Smart Airspace and Airspace Alerts are separate features. Turning on/off Smart Airspace does not affect Airspace Alerts, and vice versa.

7.13 Garmin ADS-B Traffic System Interface (Optional)

A Garmin ADS-B traffic system may be interfaced to the GTN. The *nose* of the ownship symbol on both the GTN main map page and dedicated traffic page serves as the actual location of your aircraft. The *center* of the traffic target icon serves as the reported location for the target aircraft. Motion vectors for traffic may be displayed in either absolute or relative motion. The location of the traffic targets relative to the ownship are the same, regardless of the selected motion vector.

Absolute motion vectors are colored either cyan or white, depending on unit configuration. Absolute motion vectors depict the reported track of the traffic target referenced to the ground. An absolute motion vector pointed towards your ownship symbol *does not* necessarily mean the traffic target is getting closer to your aircraft.

Relative motion vectors are always colored green and depict the motion of the traffic target relative to your ownship symbol. The direction the traffic target is pointed may vary greatly from the motion vector and a target may be getting closer to your aircraft independent of the direction the target is pointed. A green relative motion vector pointed towards your ownship indicates that the traffic target *is* converging on your aircraft.

If more than one target is occupying the same area of the screen, the GTN will combine the two or more traffic targets into one traffic group. The presence of an asterisk to the left of a target indicates that traffic has been grouped. The highest priority traffic target in the group is displayed to the pilot. When applied to airborne targets the asterisk will be displayed in white or cyan depending on the traffic depiction color used in the installation. The asterisk will be brown for grouped ground targets. The asterisk will not turn amber, even if an alerted target is included in the group.

An alerted target may be placed in the same group as non-alerted targets. In this case, the alerted target will be displayed. Two alerted targets will not be placed in the same group. All alerted targets will be displayed on the screen.

Traffic targets displayed on the dedicated traffic page may be selected in order to obtain additional information about a traffic target or to view all targets in a grouped target. When a grouped target is selected, the "Next" button on the dedicated traffic page will cycle through all targets located in close proximity to where the screen has been touched.

7.14 GWX 70/75 Weather Radar (Optional)
The GWX 70/75 Weather Radar uses Doppler technology to optionally provide advanced features to the flight crew such as turbulence detection and ground clutter suppression. Turbulence detection can detect turbulence up to 40nm from the aircraft and will be displayed at radar ranges of 160nm or less.

NOTE

Turbulence detection does not detect all turbulence especially that which is occurring in clear air. The display of turbulence indicates the possibility of severe or greater turbulence, as defined in the Aeronautical Information Manual.

7.15 Charts (Optional)
The GTN 750/725 can display both procedure charts and weather data on the main map page at the same time. When datalink NEXRAD or Precipitation is overlaid on the main map page, the weather data is displayed *below* an overlaid procedure chart. When airborne weather radar is overlaid on the main map page, the radar data is displayed *above* an overlaid procedure chart.

7.16 Transponder Control (Optional)
The GTN can be interfaced to a Garmin transponder for control and display of squawk code, mode, and additional transponder functions. The activation of the "Enable ES" button on the transponder page does not indicate the aircraft is in full compliance with an ADS-B Out solution in accordance with TSO-C166b (1090ES). Consult your transponder documentation for additional information.

7.17 Telephone Audio (Optional)
Telephone audio distribution to the crew defaults to OFF on each power cycle of the GTN. Prior to utilizing the telephone function, the crew must distribute telephone audio to the desired recipients. If the crew is utilizing the telephone function it is required that the telephone audio be turned off upon completing telephone usage.

7.18 Depiction of Obstacles and Wires

7.18.1 Dedicated Terrain Page

The dedicated Terrain page will always depict point obstacles at zoom scales of 10 nm or less and depict wire obstacles at zoom scales of 5 nm or less. The obstacle or wire overlay icon (see Figure 3) will be shown near the bottom of the display when the obstacle or wire depiction is active based on the zoom scale.

NOTE

Only obstacles and wires within 2,000 feet vertically of the aircraft will be drawn on the Terrain page. It is therefore possible to have an obstacle or wire overlay icon displayed with no obstacles or wires being depicted on the display.

Figure 3 – Obstacle Overlay Icon (Left), Wire Overlay Icon (Right)

7.18.2 Map Page

The Map page may be configured to depict point obstacles and wire obstacles at various zoom scales by the pilot by using the Map page menu. The obstacle or wire overlay icon (see Figure 4) will be shown near the bottom of the display when the obstacle or wire overlay is active based on the current zoom scale and setting selected by the pilot.

The settings chosen by the pilot on the Map page menu (including obstacle and wire display ranges) are saved over a power cycle.

NOTE

Only obstacles and wires within 2,000 feet vertically of the aircraft will be drawn on the Map page. It is therefore possible to have an obstacle or wire overlay icon displayed with no obstacles or wires being depicted on the display.

NOTE

The Map page may be configured by the pilot to not show any obstacles or wires at any zoom scale.

Figure 4 – Obstacle Overlay Icon (Left), Wire Overlay Icon (Right)

7.19 Flight Stream 210/510 (Optional)

The Flight Stream product line uses a wireless transceiver to provide data to and from a GTN to personal electronic devices (PEDs).

The Flight Stream 210 is a remotely mounted unit that provides the capability to interface Portable Electronic Devices (PEDs) to the GTN via Bluetooth. The Flight Stream 510 is mounted in the GTN SD card slot and includes a Bluetooth and Wi-Fi transceiver.

Data such as traffic, flight plan, datalink weather, entertainment audio information, and attitude information is sent from the Flight Stream to the PED. The PED is capable of sending flight plans and databases (510 only) to the Flight Stream which will then be available on the GTN. Limitations regarding database operations are found in Section 2.29.

Garmin provides a list of tested and compatible devices that can be used with the Flight Stream. Connection to the Flight Stream may be possible with devices other than those on the supported device list, but Bluetooth® and/or Wi-Fi stability and wireless data integrity cannot be guaranteed.

For details about the Garmin supported devices and apps for use with the Flight Stream product line, please visit: http://garmin.com/connext/supported_devices

7.20 Map Page

7.20.1 Configuration

The moving map and weather pages are capable of displaying a large quantity and variety of data. Map data is layered to ensure that data which is typically more critical is drawn above less critical data, however at some zoom scales and configurations the map may be cluttered with large amounts of data. Controls are provided on the Map and Weather pages for the pilot to select which data displayed, the declutter level, and the zoom scales at which data is added to or removed from the display. It is the responsibility of the pilot to select settings for the map page that will provide the display of data most appropriate to the operation being conducted.

7.20.2 Flight Plan Depiction

The map page depicts the current active flight plan. When an off-route Direct To is active the flight plan will no longer be depicted on the map.

7.20.3 Fuel Range Ring

The distance between the segmented green reserve ring and the yellow zero fuel ring is 45 minutes at the current aircraft groundspeed by default. The pilot may change the fuel reserve time value on the map setup menu. Changes to the fuel reserve time are persisted over GTN power cycles.

Visibility of the fuel range ring may be affected by the underlying map data selectable by the pilot. The pilot may make changes to the topographic or terrain data in order or more clearly observe the fuel range ring at any time.

Fuel range data is derived from the interfaced fuel totalizer data. Data entered in the Fuel Planning pages will not update the fuel range ring.

7.21 User Defined Waypoints

When a User Defined Waypoint is created, a default name will automatically be provided, and the pilot is given the option to enter a different name for the waypoint. Pages which have the autofill function will prevent some waypoint names from being used. If it is desired to name the waypoint with a subset of the name of an existing waypoint in the database then this must be accomplished on the Waypoint Info / User Waypoints page.

Waypoints which are created when a Search and Rescue pattern is created are not considered User Waypoints and therefore functions associated with User Waypoints are not provided for these waypoints.

7.22 Times and Distances

Time and Distance data to the next waypoint is always calculated from the present position to that waypoint and does not account for the path which may be flown (such as intercepting a course) to reach the waypoint.

When navigating using GPS guidance most legs are TO type legs where distance to the next waypoint decreases along the route. However, some procedures include FROM type legs. When navigating on a leg that is a FROM leg indications that it is a FROM leg include the TO/FROM flag indicating FROM and distances increasing in distance fields.

7.23 GTN-GTN Crossfill

Specific data will sync between GTNs when installed in a dual GTN configuration. If data is not included in this list, it is not crossfilled. The following data will crossfill between the two GTNs with CROSSFILL ON or OFF:

- User Waypoints
- FPL Catalog
- Traffic Alerts
- Missed Approach Popups
- Altitude Leg Popups
- Heading
- Date/Time Conventions
- CDI Scale
- Default FPA

The following unit changes will crossfill:

- Temperature
- NAV Angle
- Fuel

The following items are crossfilled only when the GTNs are set to CROSSFILL ON:

- User Holds
- Approaches
- Flight Plan Changes
- Direct-To
- Selected OBS Course Changes

7.24 Direct-To Operations

When conducting Direct-To operations the Flight Plan tab provides a list of waypoints in the flight plan for which Direct-To is available. Some entries in the flight plan such as Holds and Course Reversals are not eligible for Direct-To and the pilot must instead select the associated waypoint if Direct-To operation is desired.

7.25 Automatic Speech Recognition (ASR)

ASR allows the pilot to interact with the GMA and GTN via voice commands. Commands are constructed around the "Verb – Noun – (Suffix)" syntax for most ASR commands.

- **"SHOW"** Commands – Used to show pages or data fields on the GTN
- **"SAY"** Commands – Used to instruct the ASR engine to say certain phrases related to the flight
- **"TUNE"** Commands – Used to tune certain frequencies into the standby position of the ASR GTN (usually GTN #1)

The "Page" suffix is used in conjunction with the "Show" phrase to command pages to be displayed on the GTN. (e.g.- "Show Main Map Page")

Audio Panel commands are available to switch audio sources.

- **"SELECT"** to choose which radio the MIC will be selected
- **"TOGGLE"** to toggle the monitor of a specific NAV/COM radio
- **"DISTRIBUTE"** to change the source of audio for the respective seat positions
- **"MUTE"** to mute audio inputs on the audio panel for the respective seat positions

Supplemental commands that allow map zooming, and page navigation are also available.

- **"BACK"**
- **"CANCEL"**
- **"ZOOM IN"**
- **"ZOOM OUT"**

Each command is initiated via the Push-to-Command (PTC) switch. Aural tones will indicate to the pilot the status of the command. A positive tone (low to high) will indicate the system executed a command. A negative tone (high to low) will indicate the system did not understand the command or could not execute due to system state or configuration. "SAY" commands do not provide aural tones as feedback.

The pilot must maintain vigilance regarding ASR command information. Due to the nature of voice recognition, there are times when ASR will interpret a command differently than the pilot intended. The pilot should always cross check the ASR response to the information contained within the GTN as appropriate to ensure in-flight information is accurately understood. If a conflict exists between information gathered via ASR and that available in the GTN system, the pilot should defer to the GTN system information.

Prior to using ASR, the pilot must complete the ASR Qualification Procedure from the GTN Cockpit Reference Guide.

The Command History Page details the commands received by ASR for that power cycle. A full list of commands and guidance for using ASR can be found in the *GTN 6XX/7XX Telligence Voice Command Guide,* 190-01007-50.

When using ASR for "TUNE" commands, it is recommended that the pilot enable Reverse Frequency Lookup (RFL) on the associated GTN.

7.26 European Visual Reporting Points

If the GTN is interfaced with a G500/600 PFD/MFD, and a flight plan in the GTN contains a VRP, the G500/600 must have a database that contains the VRP in order to appropriately display the VRP on the MFD map. If the database on the PFD/MFD does not contain the VRP, the VRP will display on the MFD map as an intersection.

7.27 Advisory Visual Approaches

The GTN will provide advisory visual approaches to many runways in the aviation database. Lateral guidance for the visual approach is aligned with the runway bearing. Vertical guidance is provided for those runways with VGSI information for distances up to 4.0NM from the runway. If a terrain database is installed in the GTN, the GTN provides vertical guidance up to 28NM from the runway end unless the computed glideslope would impact terrain or obstacles from the database. If the projected impact point is under 28NM and greater than 4NM, the flight plan line for the approach is shortened to indicate where vertical guidance is active for the approach. If the terrain impact point is less than 4NM from the runway and there is no VGSI data available, vertical guidance is not provided for that approach. Lateral guidance is still available when vertical guidance is removed.

CDI and VDI indications are equivalent to those of other GPS-based approaches (e.g.- LPV or LNAV+V). The GTN annunciates "VISUAL" in the annunciator bar to indicate a visual approach is active.

When loading, or activating the approach, the GPA and TCH information for that approach will be displayed on a popup. If there is no vertical guidance available, the popup will display "(NO VERTICAL GUIDANCE)".

Visual approaches are intended to be used as an aid to situational awareness. Visual approaches are advisory in nature and do not guarantee terrain and obstacle clearance for the approach runway.

7.28 Descent VNAV

The GTN can provide multi-waypoint descent baro-VNAV guidance for the enroute and initial approach phases of flight. Altitudes associated with instrument procedures are retrieved from the navigation database when the procedure is added to the flight plan.

Altitudes in cyan on the GTN are valid VNAV guidance waypoints and the GTN will provide vertical guidance based on the displayed altitude constraints and default flight path angle (FPA). Altitude colored white are advisory only.

The following are recommendations for using descent VNAV:

- The pilot should verify all altitudes for procedures after loading the procedure into the flight plan.
- When the GTN is installed with a multiple TXi PFDs, it is highly recommended that GDU BARO SYNC be enabled and used during all VNAV operations.

In aircraft where there are multiple GDUs and two GTNs, VNAV will use the barometer setting from the pilot's side GDU for both GTNs. In the event the pilot's side GDU has failed, the GTNs will use the co-pilot's GDU barometer setting.

Descent VNAV is limited to flight path angles (FPA) between -1° and -5°, and a vertical speed required (VSR) descending at less than 4000 fpm. If a flight plan change is made during a VNAV descent, VNAV will be recalculated and could result in active VNAV path changes. If the current VNAV FPA is less than -1°, a new VNAV path may be computed during a flight plan change and result in a new Top of Descent point. This can also occur during VNAV Direct-To operations.

VNAV constraints are not allowed inside the FAF. VNAV altitudes are not saved in the flight plan catalog.

When VNAV is disabled by the pilot, it will be automatically re-enabled when the pilot initiates a lateral Direct-To to a waypoint.

7.29 Along Track Waypoints

The GTN allows for the creation of flight plan waypoints that are based off an offset distance from a waypoint in the flight and places the new along track waypoint (ATK) in the flight plan. Once placed in the flight plan, the pilot may navigate using that waypoint in the same manner as other flight plan waypoints.

Along track waypoints cannot be created on a Vectors to Final (VTF) approach and are limited to the lateral constraints of the flight plan. This means that the pilot cannot place an ATK before the first waypoint of a flight plan or after the last waypoint of a flight plan.

ATKs are fixed once placed and will not move if the referenced waypoint is changed or removed from the flight plan. ATKs are not saved in the flight plan catalog. ATKs cannot reference another ATK in the flight plan.

7.30 Database Provided Altitudes

When the GTN provides altitude data for waypoints included in IFR procedures, the altitudes provided are those shown on the procedure chart for "Turbojet" or "Jet" aircraft. If altitudes for other aircraft such as "Turboprop" or "Prop" are required, the crew must manually edit the waypoint altitude.

7.31 Database Sync with G500/600 or G500/600/700TXi GDUs

When a GTN hosts a Flight Stream 510 for database syncing to GDUs, the GTN and GDU must be configured for the same chart database type (FliteCharts or ChartView). If the GDU and GTN are not configured for the same chart type, charts database sync and Chart Streaming will not be available.

7.32 Remote Database Confirmation (Optional)

Enabling remote database confirmation allows a second GTN to skip the database and instrument panel self-test pages on startup. Two GTNs are required for remote database confirmation and the feature is not allowed when a Flight Stream 510 is installed. With this feature enabled, database updates will require restarting both GTN units to access the database page.

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FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL AIRPLANE FLIGHT MANUAL

for the

Garmin GPS 175/GNX 375/GNC 355 GPS/XPDR/COM Navigation System

as installed in

BEECH C24R

Make and Model Airplane

Registration Number N3856G Serial Number: MC-755

This document serves as an Airplane Flight Manual Supplement or as a Supplemental Airplane Flight Manual when the aircraft is equipped in accordance with Supplemental Type Certificate SA02636SE for the installation and operation of the Garmin GPS 175, GNC 355, or GNX 375 GPS/COM/XPDR Navigation System. This document must be incorporated into the FAA Approved Airplane Flight Manual or provided as an FAA Approved Supplemental Airplane Flight Manual.

The information contained herein supplements the information in the FAA Approved Airplane Flight Manual. For limitations, procedures, loading and performance information not contained in this document, refer to the FAA Approved Airplane Flight Manual, markings, or placards.

FAA Approved by: JR Brownell

JR Brownell
ODA STC Unit Administrator
Garmin International, Inc.
ODA-240087-CE

Date: 3/3/2020

LOG OF REVISIONS				
	Page			
Revision Number	Date	Number	Description	FAA Approved
1	03/22/19	All	Complete Supplement	*JR Brownell* ODA STC Unit Administrator Garmin International, Inc ODA-240087-CE Date *03-22-2019*
2	07/25/19	Through out	Added information for GNC 355.	*JR Brownell* ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date . *07 25 2019*
		Page 20	Updated Software Versions	
		Page 34	Removed Narco 4 and 5 Indicators.	
		Page 36	Updated Pilot Guide references	
		Page 37	Added circuit breaker label for GNC 355	
3	03/03/20	Page 3	Added new FIS-B Weather Products	*See page i*
		Page 19	Updated RAIM check wording.	
		Page 21	Updated software versions table	
		Page 25	Added Database Sync Exception to Database Updates	
		Page 37	Updated revision of Pilot's Guide	
		Page 46	Added Database Sync Discussion	

Table of Contents

Section 1. General

1.1 Garmin GPS 175/GNC 355/GNX 375 Navigators

The Garmin GPS 175/GNC 355/GNX 375 navigation system is a GPS system with a Satellite Based Augmentation System (SBAS) and optional transponder, comprised of a Garmin TSO-C146e navigator and a Garmin approved GPS/SBAS antenna(s). The GPS 175/GNC 355/GNX 375 navigation system is installed in accordance with AC 20-138D.

The GNX 375 also contains an ADS-B In/Out transponder capable of 1090ES out and UAT/1090 In. The transponder is a radio transmitter/receiver that operates on radar frequencies, receiving ground radar or TCAS interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. Each unit is equipped with IDENT capability to initiate the SPI (special position identification) pulse for 18 seconds and will reply to ATCRBS Mode A, Mode C, and Mode S All-Call interrogation.

The GNC 355(A) is a GPS 175 with an integrated com radio with either 8.33 or 25 kHz spacing.

	GPS 175	GNC 355	GNC 355A	GNX 375
GPS SBAS Navigation: • Oceanic, enroute, terminal, and non-precision approach guidance • Precision approach guidance (LP, LPV)	X	X	X	X
Moving map including topographic, terrain, aviation, and geopolitical data	X	X	X	X
Display of FIS-B weather products (optional for GPS 175 / GNC 355)	X	X	X	X
Display of ADS-B traffic data (optional for GPS 175 / GNC 355)	X	X	X	X
Built in transponder with 1090ES out, and1090/UAT In				X
Visual Terrain Alerting	X	X	X	X
Supplemental calculators and timers	X	X	X	X
Control of Flight Stream 510 (optional)	X	X	X	X
25 kHz Com Radio		X		
8.33 kHz Com Radio			X	

Table 1 – GPS 175/GNC 355/GNX 375 Functions

The GPS navigation functions and optional transponder and navigation radio functions are operated by dedicated hard keys, a dual concentric rotary knob, or the touchscreen.

Figure 1 - GNX 375 Control and Display Layout

Figure 2 – GPS 175 Control and Display Layout

Figure 3 – GNC 355 Display Layout

The GNX 375 transponder transmits ADS-B Out data on 1090 extended squitter (1090 MHz). It integrates data from internal and external sources to transmit the following data per 14 CFR 91.227:

- GPS Position, Altitude, and Position Integrity
- Ground Track and/or Heading, Ground Speed, and Velocity Integrity
- Air Ground Status
- Flight ID, Call Sign, ICAO Registration Number
- Capability and Status Information
- Transponder Squawk Codes between 0000-7777.
- Emergency Status
- IDENT - initiates SPI (special position identification) pulse for 18 seconds

The transponder also receives ADS-B In data on 1090 MHz, including ADS-B and ADS-R Data. ADS-B is data directly from another transmitting aircraft, and the ADS-R data which is rebroadcasted ADS-B data from a ground station. The transponder also includes ADS-B In data on UAT (978 MHz). UAT In data includes ADS-B, ADS-R, TIS-B, and FIS-B data. TIS-B Data is a broadcast of secondary surveillance radar (SSR) derived traffic information from ground stations, and FIS-B data is broadcast of aviation data from a ground station. FIS-B data includes the following products:

- Graphical and textual weather products
    - NEXRAD
    - PIREPs
    - G AIRMETs
    - METARs
    - TAFs
    - Winds Aloft
    - Lightning
    - Icing
    - Turbulence
    - Center Weather Advisories
- Aviation Data
    - TFRs
    - NOTAMs

The transponder provides ADS-B traffic information and alerting to the pilot. The alerting includes aural and visual traffic alerting information on the display, as well as on interfaced displays where supported.

1.2 System Capabilities

This Flight Manual Supplement documents the installed capabilities of the GPS 175/GNC 355/GNX 375 specific to the aircraft for which this manual is created.

NOTE

> In sections which contain a square checkbox (□) the installer will have placed an "X" in the boxes next to the capabilities applicable to the installation.

The GPS 175/GNC 355/GNX 375 system and associated navigation interface in this aircraft have the following capabilities, in addition to the core multifunction display capability:

☒ Primary GPS Navigation (Enroute) and Approach Capability (LP/LNAV) – See below

☒ Primary GPS Approach Capability with Vertical Guidance (LNAV/VNAV, LPV) – See below

☐ Built in ADS-B In/Out Transponder (GNX 375)

1.3 GNSS (GPS/SBAS) Navigation system Equipment approvals

The Garmin GPS 175/GNC 355/GNX 375 navigator installed in this aircraft is a TSO-C145c Class 3 approved GPS navigator that complies with AC 20-138D. The Garmin GPS 175/GNC 355/GNX 375 system as installed in this aircraft is approved for navigation using GPS and GPS/SBAS (within the coverage of a Satellite Based Augmentation System complying with ICAO Annex 10) for IFR en route, terminal area, non-precision approach, and approach procedures with vertical guidance operations.

The Garmin GPS 175/GNC 355/GNX 375 system as installed in this airplane complies with the equipment, performance, and functional requirements to conduct RNAV operations in accordance with the following table. This table is accurate at the time it was published. However, changes to operational rules, FAA advisory circulars, flight plan formats, etc., are possible. The pilot is responsible to ensure compliance with current operational requirements.

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
RNAV 10 RNP 10 Oceanic and Remote Areas of Operation (Class II Navigation)	GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 34 minutes.[1] Two GNSS systems required to be operational. (one GNSS system for those routes requiring only one long range navigation system). No time limit using GNSS as the primary navigation sensor. Part 91, Part 91 subpart K, 121, 125, and 135 operators require operational approval.	FAA AC 20-138D CHG 2, FAA AC 90-105A, FAA AC 91-70B, EASA AMC 20-12	R	A1	The GPS equipment as installed requires a second GNSS system for Class II navigation in oceanic and remote airspace. When installed with a second GNSS system, the GPS 175/GNC 355/GNX 375 equipment complies with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace, when used in conjunction with an FDE prediction tool that satisfies the guidance of FAA AC 20-138D and AC 90-105A (or later revision).[1] Additional equipment may be required to obtain operational approval to utilize RNP-10 performance.
B-RNAV / RNAV 5 (Europe)	This does not constitute an operational approval	FAA AC 90-96A CHG 1, EASA AMC 20-4A	R	B2	
RNP 4 Oceanic and Remote Areas of Operation (Class II Navigation).	GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 25 minutes.[1] Two operational long-range nav systems required. (or one navigation system and one GNSS sensor for those routes requiring only one	FAA AC 20-138D CHG 2. FAA AC 90-105A, FAA AC 91-70B	R	L1	The GPS equipment as installed requires a second GNSS system for Class II navigation in oceanic and remote airspace. Additional equipment may be required to obtain operational approval to utilize RNP-4 performance.

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
	long-range navigation sensor) No time limit using GNSS as the primary navigation sensor. Part 91, Part 91 subpart K, 121, 125, and 135 operators require operational approval.				
RNAV 2	The GNSS RNAV system is installed and meets the performance and functional requirements of AC 90-100A. In accordance with AC 90-100A, CHG 2, Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-100A are authorized to fly RNAV 2 procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D CHG 2. FAA AC 90-100A CHG 2	R	C2	Includes RNAV Q and T routes.

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
RNAV 1	The GNSS RNAV system is installed and meets the performance and functional requirements of AC 90-100A. In accordance with AC 90-100A, Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-100A are authorized to fly RNAV 1 procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D CHG 2, FAA AC 90-100A CHG 2	R	D2	Includes RNAV terminal departure, arrival procedures, and approach procedures up to the Final Approach Fix.
P-RNAV (Europe)	This does not constitute an operational approval.	FAA AC 90-96A CHG 1, JAA TGL 10 Rev 1	R	D2	ICAO flight plan code for P-RNAV no longer exists. P-RNAV utilizes RNAV 1 flight plan codes.

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
RNP 1	When flying a RNP procedure containing an RF leg, the AFCS must be operational At a minimum, the flight director must be displayed and utilized when conducting procedures containing radius-to-fix (RF) legs. In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP 1 procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D CHG 2, FAA AC 90-105A	R	O2	Includes RNP terminal departure and arrival procedures, including procedures with radius-to-fix (RF) legs. Also includes approach procedures to the Final Approach Fix. AC 90-105A states that procedures with RF legs must be flown using either a flight director or coupled to the autopilot Garmin has demonstrated acceptable crew workload and Flight Technical Error for hand flown procedures with RF legs when the installation complies with limitation set forth in Section 2.11 of this document. It is recommended to couple the autopilot for RF procedures, if available, but it is not required to do so. See section 4.5 of this manual to determine if this capability is supported in this installation.

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
RNP-2 (Oceanic / Remote)	GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 5 minutes.[1] Two operational long-range nav systems required. (or one navigation system and one GNSS sensor for those routes requiring only one long-range navigation sensor). No time limit using GNSS as the primary navigation sensor. Part 91, Part 91 subpart K, 121, 125, and 135 operators require operational approval.	FAA AC 20-138D CHG2, FAA AC 90-105A FAA AC 91-70B	R	TBD	The GPS equipment as installed requires a second GNSS system for Class II navigation in oceanic and remote airspace. Additional equipment may be required to obtain operational approval to utilize RNP-2 performance. Item 18 PBN flight plan code is still to-be-determined at time of publication of this AFMS
RNP-2 (Domestic / Offshore En route)	In accordance with AC 90-105A, Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-105A are authorized to fly RNP-2 domestic and offshore routes Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D CHG 2, FAA AC 90-105A FAA AC 91-70B	R	TBD	Includes RNP-2 domestic and offshore routes. Item 18 PBN flight plan code is still to-be-determined at time of publication of this AFMS

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
RNP APCH LNAV minima	When flying a RNP procedure with a radius-to-fix (RF) leg, the AFCS must be operational. At a minimum, the flight director must be displayed and utilized when conducting procedures containing RF legs. In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP APCH LNAV minima procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D CHG 2. FAA AC 90-105A, EASA AMC 20-27A	R	S1	Includes non-precision approaches based on conventional navigation aids with "or GPS" in the title and area navigation approaches titled "GPS", "RNAV-(GPS)", and "RNAV (GNSS)". This includes procedures with radius-to-fix (RF) legs. Garmin has demonstrated acceptable crew workload and Flight Technical Error for hand flown procedures with RF legs when the installation complies with limitation set forth in Section 2.11 of this document. It is recommended to couple the autopilot for RF procedures, if available, but it is not required to do so. See section 4.5 of this manual to determine if this capability is supported in this installation.

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code Item 10a Code	ICAO Flight Plan Code Item 18 PBN/	Notes
RNP APCH LNAV/VNAV minima	When flying a RNP procedure with a radius-to-fix (RF) leg, the AFCS must be operational. At a minimum, the flight director must be displayed and utilized when conducting procedures containing RF legs. In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP APCH LNAV/VNAV minima procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D CHG 2, FAA AC 90-105A, EASA AMC 20-27A with CM-AS-002	R	S2	Includes area navigation approaches titled "RNAV (GPS)" and "RNAV (GNSS)." This includes procedures with radius-to-fix (RF) legs. Garmin has demonstrated acceptable crew workload and Flight Technical Error for hand flown procedures with RF legs when the installation complies with limitation set forth in Section 2.11 of this document. It is recommended to couple the autopilot for RF procedures, if available, but it is not required to do so. See section 4.5 of this manual to determine if this capability is supported in this installation.
RNP APCH LP minima	When flying a RNP procedure with a radius-to-fix (RF) leg, the AFCS must be operational. At a minimum, the flight director must be displayed and utilized when conducting procedures containing RF legs. In accordance with AC 90-107, Part 91 operators (except subpart K), following the	FAA AC 20-138D CHG 2, FAA AC 90-107	N/A	N/A	Includes area navigation approaches titled "RNAV (GPS)" and "RNAV (GNSS)" including procedures with radius-to-fix (RF) legs. LP minima are available only when within SBAS coverage. Garmin has demonstrated acceptable crew workload and Flight Technical Error for hand flown procedures with RF legs when the installation complies with limitation set forth in Section 2.11 of this

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
	aircraft and training guidance in AC 90-107 are authorized to fly RNP APCH LP minima procedures Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.				document. It is recommended to couple the autopilot for RF procedures, if available, but it is not required to do so. See section 4.5 of this manual to determine if this capability is supported in this installation.
RNP APCH LPV minima	When flying a RNP procedure with a radius-to-fix (RF) leg, the AFCS must be operational. At a minimum, the flight director must be displayed and utilized when conducting procedures containing RF legs. In accordance with AC 90-107, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-107 are authorized to fly RNP APCH LPV minima procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.	FAA AC 20-138D CHG 2, FAA AC 90-107, EASA AMC 20-28	B	N/A	Includes area navigation approaches titled "RNAV (GPS)" and "RNAV (GNSS)", including procedures with radius-to-fix (RF) legs. LPV minima are available only when within SBAS coverage. Garmin has demonstrated acceptable crew workload and Flight Technical Error for hand flown procedures with RF legs when the installation complies with limitation set forth in Section 2.11 of this document. It is recommended to couple the autopilot for RF procedures, if available, but it is not required to do so. See section 4.5 of this manual to determine if this capability is supported in this installation.

Navigation Spec.	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
Advanced RNP See Notes for specific Advanced RNP functions.	This does not constitute an operational approval.	FAA AC 20-138D CHG 2, FAA AC 90-105A	N/A	N/A	• RNAV Holding: Supported. • RF Legs: Supported. • Parallel Offsets: RNP-4 parallel offsets as defined by AC 20-138D Chapter 10 are supported. • Advanced RNP parallel offsets as defined by AC20-138D Appendix 3 are supported. • Higher Continuity: Supported only when a second GNSS system is installed and operating. • Scalable RNP: Not supported. • Fixed Radius Transitions (FRT): Not Supported • Time of Arrival Control (TOAC): Not supported.

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1. ***FDE/RAIM availability worldwide can be determined via the following:***

   - An FDE prediction tool that satisfies the guidance of FAA AC 20-138D and AC 90-105A (or later revision), such as the Garmin WFDE Prediction program, part number 006-A0154-01 or later approved version with GPS SW >= 3.0 selected

Also, within the United States:

- Via the FAA's RAIM Service Availability Prediction Tool (SAPT) website: http://sapt.faa.gov.
- Contacting a Flight Service Station (not DUATS) to obtain non-precision approach RAIM.

Within Europe,

- Using the Garmin WFDE Prediction program.
- An FDE prediction tool that satisfies the guidance of FAA AC 20-138D and AC 90-105A (or later revision)
- Europe's AUGER GPS RAIM Prediction Tool at http://augur.ecacnav.com/augur/app/home.

This requirement is not necessary if SBAS coverage is confirmed to be available along the entire route of flight. The route planning and WFDE prediction program may be downloaded from the Fly-Garmin website on the internet (fly.garmin.com/fly-garmin/support/). For information on using the WFDE Prediction Program, refer to GARMIN WAAS FDE Prediction Program, part number 190-00643-01, 'WFDE Prediction Program Instructions'.

Garmin International holds an FAA Type 2 Letter of Acceptance (LOA) in accordance with AC 20-153A for database integrity, quality, and database management practices for the Navigation database. Flight crews and operators can view the LOA status at FlyGarmin.com then select "Aviation Database Declarations".

Navigation information is referenced to the WGS-84 reference system.

1.4 Definitions

The following terminology is used within this document:

ADF:	Automatic Direction Finder
ADS-B:	Automatic Dependent Surveillance Broadcast
APR:	Approach
APPR:	Approach
CDI:	Course Deviation Indicator
DME:	Distance Measuring Equipment
ECAC:	European Civil Aviation Conference
EHSI:	Electronic Horizontal Situation Indicator
FIS-B:	Flight Information Services Broadcast
GNSS:	Global Navigation Satellite System
GPA:	Glidepath Angle
GPS:	Global Positioning System
GPSS:	GPS Roll Steering
HOT:	Hazardous Obstacle Transmission wires
HSI:	Horizontal Situation Indicator
IAP:	Instrument Approach Procedure
IFR:	Instrument Flight Rules
ILS:	Instrument Landing System
IMC:	Instrument Meteorological Conditions
LDA:	Localizer Directional Aid
LNAV:	Lateral Navigation
LNAV +V:	Lateral Navigation with advisory Vertical Guidance
L/VNAV:	Lateral/Vertical Navigation

LOC:	Localizer
LOC-BC:	Localizer Backcourse
LP:	Localizer Performance
LPV:	Localizer Performance with Vertical Guidance
LP +V:	Localizer Performance with Advisory Vertical Guidance
MLS:	Microwave Landing System
MMC:	Multi-Media Card
NOTAM:	Notice to Airmen
OBS:	Omni Bearing Selector
PED:	Portable Electronic Device
RAIM:	Receiver Autonomous Integrity Monitoring
RF Leg:	Radius-To-Fix Leg of a Charted Instrument Procedure
RNAV:	Area Navigation
RNP:	Required Navigational Performance
SBAS:	Satellite Based Augmentation System
SD:	Secure Digital
SDF:	Simplified Directional Facility
SUSP:	Suspend
TACAN:	Tactical Air Navigation System
TAWS:	Terrain Awareness and Warning System
TCH:	Threshold Crossing Height
TFR:	Temporary Flight Restriction
TIS:	Traffic Information Service
VFR:	Visual Flight Rules
VGSI:	Visual Glide-Slope Indicator
VLOC:	VOR/Localizer
VMC:	Visual Meteorological Conditions
VOR:	VHF Omnidirectional Range
VRP:	Visual Reporting Point
WAAS:	Wide Area Augmentation System
WFDE:	WAAS Fault Data Exclusion

Section 2. LIMITATIONS

2.1 Kinds of Operation

This AFM supplement does not grant approval for IFR operations to aircraft limited to VFR operations. The following checkboxes indicate only if the navigator installation meets all STC requirements for VFR or IFR flight per the STC Installation Manual section 3.3.1.

☐ This GPS 175/GNC 355/GNX 375 navigator installation meets the STC requirements for VFR flight only

☒ This GPS 175/GNC 355/GNX 375 navigator installation meets the requirements for IFR flight

2.2 Minimum Equipment

The GPS 175/GNC 355/GNX 375 must have the following system interfaces fully functional in order to be used for primary navigation during IFR operations:

Interfaced Equipment	Number installed	Number Required for IFR
External HSI/CDI/EHSI	1 or more	1
External APPR and LOI Annunciator	See Note 1	1

Table 2 – Required Equipment

Note 1: Certain installations require an external APPR and LOI annunciator light. If installed, these annunciators must be fully functional to use the GPS 175/GNC 355/GNX 375 GPS navigation for IFR operations.

Single engine piston aircraft under 6,000 lbs. maximum takeoff weight:

Required Equipment for IFR operations utilizing GPS navigation: Single GPS 175/GNC 355/GNX 375 Navigator

All other aircraft:

Required Equipment for IFR operations utilizing GPS navigation: Single GPS 175/GNC 355/GNX 375 Navigator plus a second source of TSO-C146 approved GPS navigation or a separate source of VHF navigation.

Operation in remote or oceanic operation requires two sources of GPS navigation.

The GNX 375 must have the following system interfaces fully functional in order to be compliant with the requirements for 14 CFR 91.227 ADS-B Out operations:

Interfaced Equipment	Number Installed	Number Required
Uncorrected Pressure Altitude Source	1	1

Table 3 – Required Equipment

2.3 ADS-B Out

The GNX 375 only complies with 14 CFR 91.227 for ADS-B Out when all required functions are operational. When the system is not operational, ADS-B Out transmit failure messages will be present on the display interface.

2.4 Pressure Altitude Broadcast Inhibit (PABI)

Pressure Altitude Broadcast Inhibit shall only be enabled wheu requested by Air Traffic Control while operating within airspace requiring an ADS-B Out compliant transmitter. PABI is enabled by selecting the GNX transponder to ON mode.

2.5 Flight Planning

For flight planning purposes, in areas where SBAS coverage is not available, the flight crew must check RAIM availability. An acceptable means of compliance for FDE prediction programs is to use a certified service which meets the requirements of FAA AC 20-138D and FAA AC 90-105A for prediction.

The following table describes some of the available RAIM prediction programs.

Prediction Program	Internet address or program details	Coverage Area
Garmin RAIM Prediction Tool	https://fly.garmin.com/fly-garmin/support/raim/	Worldwide
FAA Service Availability Prediction Tool	http://sapt.faa.gov	US Only
Flight Service Station	1-800-WXBRIEF https://www.1800wxbrief.com	US Only
AUGER GPS RAIM Prediction Tool	http://augur.ecacnav.com/augur/app/home	ECAC Airspace Only

Table 4 - RAIM Prediction Sources

This RAIM availability requirement is not necessary if SBAS coverage is confirmed to be available along the entire route of flight.

For flight planning purposes, for operations within the U.S. National Airspace System on RNP and RNAV procedures when SBAS signals are not available, the availability of GPS RAIM shall be confirmed for the intended route of flight. In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended route of flight, the flight shall be delayed, canceled, or rerouted on a track where RAIM requirements can be met. The flight may also be re-planned nsing non-GPS based navigational capabilities.

For flight planning purposes for operations within European B-RNAV/RNAV-5 and P-RNAV airspace, if more than one satellite is scheduled to be out of service, then the availability of GPS RAIM shall be confirmed for the intended flight (route and time). In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended flight, the flight shall be delayed, canceled, or rerouted on a track where RAIM requirements can be met.

Applicable to dual installations consisting of two Garmin GNSS units:

> For flight planning purposes, for operations where the route requires Class II navigation the aircraft's operator or flight crew must use the Garmin RAIM Prediction program to demonstrate that there are no outages on the specified route that would prevent the Garmin GNSS navigation system to provide GPS Class II navigation in oceanic and

remote areas of operation that requires RNP-10, RNP-4, or RNP-2 oceanic/remote capability. If the Garmin RAIM Prediction program indicates fault exclusion (FDE) will be unavailable for more than 34 minutes in accordance with FAA Order 8400.12A for RNP-10 requirements, 25 minutes in accordance with FAA Order 8400.33 for RNP-4 requirements, or 5 minutes in accordance with FAA Order 8400.33 for RNP-2 oceanic/remote then the operation must be rescheduled when FDE is available.

Both Garmin GPS navigation receivers must be operating and providing GPS navigation guidance for operations requiring RNP-4, RNP-10, or RNP-2 oceanic/remote performance.

Whenever possible, RNP and RNAV routes including Standard Instrument Departures (SIDs), Standard Terminal Arrival (STAR), and enroute RNAV "Q" and RNAV "T" routes should be loaded into the flight plan from the database in their entirety, rather than loading route waypoints from the database into the flight plan individually. Selecting and inserting individual named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted. Manual entry of waypoints using latitude/longitude or place/bearing is prohibited.

It is not acceptable to flight plan a required alternate airport based on RNAV(GPS) LP/LPV or LNAV/VNAV approach minimums. The required alternate airport must be flight planned using an LNAV approach minimums or available ground-based approach aid.

Navigation information is referenced to the WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

2.6 System Use

The only approved sources of course guidance are on the external CDI, HSI, or EHSI display. The moving map and CDI depiction on the GPS 175/GNC 355/GNX 375 display are for situational awareness only and are not approved for course guidance.

2.7 Applicable System Software

This AFMS/AFM is applicable to the software versions shown in Table 5.

The Main and GPS software versions are displayed on the start-up page immediately after power-on. All software versions displayed in Table 5 can be viewed on the System – System Status or Connext Setup pages.

Software Item	Software Version *(or later FAA Approved versions for this STC)*
Main SW Version	3.10
GPS SW Version	8.0
COM SW Version	2.30
XPDR SW Version	2.54
Flight Stream 510	2.50

Table 5 - Software Versions

2.8 Navigation Database

GPS/SBAS based IFR enroute, oceanic, and terminal navigation is prohibited unless the flight crew verifies and uses a valid, compatible, and current navigation database or verifies each waypoint for accuracy by reference to current approved data.

"GPS", "or GPS", and "RNAV (GPS)" instrument approaches using the Garmin navigation system are prohibited unless the flight crew verifies and uses the current navigation database. GPS based instrument approaches must be flown in accordance with an approved instrument approach procedure that is loaded from the navigation database.

Discrepancies that invalidate a procedure should be reported to Garmin International. The affected procedure is prohibited from being flown using data from the navigation database until a new navigation database is installed in the aircraft and verified that the discrepancy has been corrected. Navigarion database discrepancies can be reported at FlyGarmin.com by selecting "Aviation Data Error Report." Flight crew and operators can view navigation database alerts at FlyGarmin.com then select "NavData Alerts."

If the navigation database cycle will change during flight, the flight crew must ensure the accuracy of navigation data, including suitabilty of navigation facilities used to define the routes and procedures for flight. If an amended chart affecting navigation data is published for the procedure, the database must not be used to conduct the procedure.

See Section 2.22 for limitations regarding database update procedures.

2.9 Ground Operations

Do not use SafeTaxi functions as the basis for ground maneuvering. SafeTaxi functions do not comply with the requirements of AC 120-76D and are not qualified to be used as an airport moving map display (AMMD). SafeTaxi is to be used by the flight crew to orient themselves on the airport surface to improve flight crew situational awareness during ground operations.

2.10 Instrument Approaches

a) Instrument approaches using GPS guidance may only be conducted when the GPS 175/GNC 355/GNX 375 is operating in the approach mode. (LNAV, LNAV +V, L/VNAV, LPV, LP, or LP +V)

b) When conducting instrument approaches referenced to true North, the NAV Angle on the System -Units page must be set to **True**.

c) The navigation equipment required to join and fly an instrument approach procedure is indicated by the title of the procedure and notes on the IAP chart. Navigating the final approach segment (that segment from the final approach fix to the missed approach point) of an ILS, LOC, LOC-BC, LDA, SDF, MLS, VOR, TACAN approach, or any other type of approach not approved for GPS, is not authorized with GPS navigation guidance. GPS guidance can only be used for approach procedures with GPS or RNAV in the procedure title. When using the VOR or ADF receiver to fly the final approach segment of a VOR or NDB approach, GPS may be the selected navigation source so long as the VOR or NDB station is operational and the signal is monitored for final approach segment alignment.

d) Advisory vertical guidance deviation is provided when the GPS 175/GNC 355/GNX 375 annunciates LNAV + V or LP +V. Vertical guidance information displayed on the VDI in this mode is only an aid to help flight crews comply with altitude restrictions. When using advisory vertical guidance, the flight crew must use the primary barometric altimeter to ensure compliance with all altitude restrictions.

e) Not all published Instrument Approach Procedures (IAP) are in the navigation database. Flight crews planning to fly an RNAV instrument approach must ensure that the navigation database contains the planned RNAV Instrument Approach Procedure and that approach procedure must be loaded from the navigation database into the GPS 175/GNC 355/GNX 375 system flight plan by its name. Pilots are prohibited from flying any approach path that contains manually entered waypoints.

f) IFR approaches are prohibited whenever any physical or visual obstruction (such as a throw-over yoke) restricts pilot view or access to the GPS 175/GNC 355/GNX 375 and/or the CDI.

2.11 RF Legs

This STC does not grant operational approval for RF leg navigation for those operators requiring operational approval. Additional FAA approval may be required for those aircraft intending to use the GPS 175/GNC 355/GNX 375 as a means to provide RNP 1 navigation in accordance with FAA Advisory Circular AC 90-105A.

The following limitations apply to procedures with RF legs:

- Aircraft is limited to 180 KIAS while on the RF leg
- RF legs are limited to RNP 1 procedures. RNP AR and RNP <1 are not approved
- Primary navigation guidance on RF legs must be shown on an EHSI indicator with auto-slew capability turned ON
- GPS 175/GNC 355/GNX 375 Moving Map, EHSI Map, or Distance to Next Waypoint information must be displayed to the pilot during the RF leg when flying without the aid of the autopilot or flight director.
- The active waypoint must be displayed in the pilot's primary field of view.

2.12 Autopilot Coupling

The flight crew may fly all phases of flight based on the navigation information presented to the flight crew; however, not all modes may be coupled to the autopilot. All autopilots may be coupled in Oceanic (OCN), Enroute (ENR), and Terminal (TERM) modes.

This installation is limited to:

☐ Lateral coupling only for GPS approaches. Coupling to the vertical path for GPS approaches is not authorized.

It is possible to create flight plan waypoint sequences, which exceed the autopilot's bank angle capabilities. The pilot shall monitor autopilot performance with regard to flight path deviation.

2.12.1 RNP 1.0 RF Leg Types

AC 90-105A states that procedures with RF legs must be flown using either a flight director or coupled to the autopilot.

Garmin has demonstrated acceptable crew workload and Flight Technical Error for hand flown procedures with RF legs when the installation complies with limitation set forth in Section 2.11 of this document. It is recommended to couple the autopilot for RF procedures, if available, but it is not required to do so. See Section 4.5 of this manual to determine if this capability is supported in this installation.

2.13 Terrain Alerting Function

Terrain, point obstacle, and wire obstacle information appears on the map and terrain display pages as red and amber terrain, obstacles, or wires and is depicted for advisory use only. Aircraft maneuvers and navigation must not be predicated upon the use of the terrain display. Terrain, obstacle and wire information is advisory only and is not equivalent to warnings provided by TAWS.

The terrain display is intended to serve as a situational awareness tool only. By itself, it may not provide either the accuracy or the fidelity on which to base decisions and plan maneuvers to avoid terrain or obstacles.

2.14 Polar Operations

Use of the GPS 175/GNC 355/GNX 375 for primary navigation for latitudes above 89.00° N and below 89.00° S is prohibited.

2.15 ADS-B Weather (Optional for GPS 175/GNC355)

This limitation applies to datalink weather products from FIS-B via a GDL 88, GTX 345, or the internal transponder in a GNX 375.

Do not use data link weather information for maneuvering in, near, or around areas of hazardous weather. Information provided by data link weather products may not accurately depict current weather conditions.

Do not use the indicated data link weather product age to determine the age of the weather information shown by the data link weather product. Due to time delays inherent in gathering and processing weather data for data link transmission, the weather information shown by the data link weather product may be significantly older than the indicated weather product age.

Do not rely solely upon data link services to provide Temporary Flight Restriction (TFR) or Notice to Airmen (NOTAM) information. Not all TFRs and NOTAMS can be depicted on the GPS 175/GNC 355/GNX 375.

Datalink text weather is decoded for the convenience of the pilot, however it is possible that the decoding may be affected by anomalies in the data or differences in the units of measure between the decoding system and the text weather source. All text weather displayed on the GPS 175/GNC 355/GNX 375 also includes the raw weather text for pilot review.

2.16 Traffic Display (Optional for GPS 175/GNC355)

Traffic is displayed on the GNX 375, and may be displayed on the GPS 175 when connected to an approved optional ADS-B traffic device. These systems are capable of providing traffic monitoring and alerting to the flight crew. Traffic shown on the display may or may not have traffic alerting available. The display of traffic is an aid to visual acquisition and may not be utilized for aircraft maneuvering.

Traffic is displayed in feet regardless of the unit settings.

2.17 Flight Planner/Calculator Functions

The Fuel Planning page uses Fuel on Board as entered by the pilot when on the Fuel Planning page. This *is not* a direct indication of actual aircraft fuel on board and those values are only used for the Fuel Planning page. The fuel required to destination is only a calculated and predicted value based on the data entered into the planner. It is not a direct indication of how much fuel the aircraft will have upon reaching the destination.

2.18 Glove Use / Covered Fingers

No device may be used to cover fingers used to operate the GPS 175/GNC 355/GNX 375 unless the Glove Qualification Procedure located in the Pilot's Guide has been successfully completed. The Glove Qualification Procedure is specific to a pilot / glove / GPS 175/GNC 355/GNX 375 combinations.

2.19 Demo Mode

Demo mode may not be used in flight under any circumstances.

2.20 Wire Obstacle Database

Only the "Obstacle/HOT Line" database may be used. Use of the "Obstacle/Wire" database is prohibited. The database version can be viewed on the start-up database verification or System- System Status pages.

2.21 Portable Electronic Devices

This STC does not relieve the operator from complying with the requirements of 91.21 or any other operational regulation regarding portable electronic devices.

The bluetooth interface and data provided to a portable electronic device is not approved to replace any aircraft display equipment, including navigation or traffic/weather display equipment.

2.22 Database Updates

Database updates via MMC / SD card or Flight Stream wireless transfers must be done while the aircraft is on the ground and stationary. In-flight database transfers or updates are prohibited unless part of the Database SYNC function that occurs in the background to move databases from one LRU to another.

2.23 OBS Mode

Use of OBS mode for flight plan segments greater than 250NM is prohibited. OBS Mode is not available between the FAF and MAP of any instrument approach.

2.24 Advisory Visual Approaches

All advisory visual approaches shall be conducted in VMC. Advisory visual approaches are intended to be used as an aid to situational awareness and do not guarantee terrain or obstruction clearance along the approach path. Use of advisory visual approaches in IMC is prohibited.

2.25 Placards

The GPS 175/GNC 355/GNX 375 STC adds placards if required per STC Installation Manual. The wording and locations of the placards are listed in the table below.

Placard	Location (If installed)
"TO/FROM FLAG WILL NOT FUNCTION CORRECTLY WHEN DISPLAYING GPS DEVIATION. USE TO/FROM INDICATION ON GPS"	Immediately adjacent to the composite CDI indicator.
"GPS LIMITED TO VFR USE ONLY"	Immediately adjacent to the GPS 175/GNC 355/GNX 375.

Table 6 - STC Placards

- ☐ A placard for composite indicators is installed.
- ☐ A placard for VFR only operations is installed.
- ☒ No placards are installed as a result of this STC.

Section 3. EMERGENCY PROCEDURES

3.1 Emergency Procedures

3.1.1 Terrain WARNING

Red annunciator "PULL UP":

Autopilot.. **DISCONNECT**
Aircraft Controls.................................... **INITIATE MAXIMUM POWER CLIMB**
Airspeed.. **BEST ANGLE OF CLIMB SPEED**

After Warning Ceases:

Altitude.................................... **CLIMB AND MAINTAIN SAFE ALTITUDE**
Advise ATC of Altitude Deviation, if appropriate.

NOTE

Only vertical maneuvers are recommended, unless either operating in visual meteorological conditions (VMC), or the flight crew determines, based on all available information, that turning in addition to the vertical escape maneuver is the safest course of action, or both.

NOTE

Terrain annunciators external to the GPS 175/GNC 355/GNX 375 may not indicate the exact threat causing the alert. Example: WIRE alerts may be annunciated as TERR or OBSTACLE on external devices.

3.2 Abnormal Procedures

3.2.1 LOSS OF GPS/SBAS NAVIGATION DATA

When the GPS/SBAS receiver is inoperative or GPS navigation information is not available or invalid, the GPS 175/GNC 355/GNX 375 will enter one of two modes: Dead Reckoning mode (DR) or Loss Of Integrity mode (LOI). The mode is indicated on the GPS 175/GNC 355/GNX 375 by an amber "DR" and/or "LOI".

If the LOI annunciation is displayed, revert to an alternate means of navigation appropriate to the route and phase of flight. If LOI occurs while the GPS 175/GNC 355/GNX 375 is in the ENR or OCN phase of flight, it may also display DR.

If the DR annunciation is displayed, the map will continue to be displayed with an amber "DR" overwriting the ownship icon. Course guidance will be removed on the CDI. Aircraft position will be based upon the last valid GPS position, then estimated by Dead Reckoning methods. Changes in true airspeed, altitude, heading, or winds aloft can affect the estimated position substantially.

With a GNX 375, loss of GPS will result in the loss of ADS-B Out transmissions.

If Alternate Navigation Sources (ILS, LOC, VOR, DME, ADF) Are Available:

Navigation .... **USE ALTERNATE SOURCES**

If No Alternate Navigation Sources Are Available:

DEAD RECKONING (DR) MODE:

Navigation .... **USE GPS 175/GNC 355/GNX 375**

NOTE

All information normally derived from GPS will become less accurate over time.

LOSS OF INTEGRITY (LOI) MODE (no DR annunciated on the GPS 175/GNC 355/GNX 375):

Navigation .... **FLY TOWARDS KNOWN VISUAL CONDITIONS**

NOTE

All information derived from GPS will be removed.

NOTE

The airplane symbol is removed from all maps. The map will remain centered at the last known position. "NO GPS POSITION" will be annunciated in the center of the map.

3.2.2 GPS APPROACH DOWNGRADE

During a LPV, LP +V, LNAV/VNAV, or LNAV +V approach, if GPS accuracy requirements cannot be met by the GPS receiver, the GPS 175/GNC 355/GNX 375 will downgrade the approach. The downgrade will remove vertical deviation indication from the VDI and change the approach annunciation to LNAV. The approach may be continued using the LNAV only minimums. If the VISUAL approach is downgraded, the GPS 175/GNC 355/GNX 375 will remove the vertical deviation indication from the VDI, but continue to annunciate VISUAL in amber.

During a GPS approach in which GPS accuracy requirements cannot be met by the GPS receiver for any GPS approach type, the GPS 175/GNC 355/GNX 375 will flag all CDI guidance and display a system message "ABORT APPROACH-GPS approach no longer available". Immediately upon viewing the message, the unit will revert to Terminal navigation mode alarm limits. If the position integrity is within these limits lateral guidance will be restored and the GPS may be used to execute the missed approach, otherwise alternate means of navigation must be utilized.

3.2.3 Terrain CAUTION (Terrain or Obstacle Ahead, Sink Rate, Don't Sink)

When a terrain CAUTION occurs, take corrective action until the alert ceases. Stop descending or initiate either a climb or a turn, or both as necessary, based on analysis of all available instruments and information.

NOTE

Terrain annunciators external to the GPS 175/GNC 355/GNX 375 may not indicate the exact threat causing the alert. Example: WIRE alerts may be annunciated as TERR or OBSTACLE on external devices.

3.2.4 Terrain INHIBIT

The Forward Looking Terrain Avoidance (FLTA) and Premature Descent Alerts (PDA) functions may be inhibited to prevent alerting, if desired. Refer to GPS 175/GNC 355/GNX 375 Pilot's Guide for additional information.

To Inhibit Terrain Alerting:

Home Hardkey.. **PRESS**
Terrain Button.. **PRESS**
Menu Button.. **PRESS**

Terrain Inhibit Button .. .. **PRESS TO ACTIVATE**

3.2.5 TER N/A and TER FAIL

If the amber **TER N/A** or **TER FAIL** status annunciator is displayed, the system will no longer provide terrain alerting or display relative terrain and obstacle elevations. The crew must maintain compliance with procedures that ensure minimum terrain and obstacle separation.

3.2.6 DATA SOURCE - HEADING SOURCE INOPERATIVE OR CONNECTION LOST MESSAGE

Without a heading source to the GPS 175/GNC 355/GNX 375, the following limitations apply:

- Roll steering will not be provided to the autopilot for heading legs. The autopilot must be placed in HDG mode for heading legs.
- Map cannot be oriented to Heading Up.
- Overlaying traffic data from Garmin ADS-B-IN unit will not be displayed on the main map display. The flight crew must use the dedicated traffic page on the GPS 175/GNC 355/GNX 375 system to display ADS-B-IN traffic data.

3.2.7 DATA SOURCE – PRESSURE ALTITUDE SOURCE INOPERATIVE OR CONNECTION TO GNX 375 LOST MESSAGE

The GNX 375 will not be receiving pressure altitude while that message is present

3.2.8 UNRECOVERABLE LOSS OF ALL ELECTRICAL GENERATORS OR ALTERNATORS

Remove power from all equipment which is not necessary for flight.

3.2.9 IN-AIR RESTART OF GPS 175/GNC 355/GNX 375

In the event of a GPS 175/GNC 355/GNX 375 restart in the air, the crew should utilize the Back button if presented with the database update screen after the GPS 175/GNC 355/GNX 375 is restarted. This will ensure restoration of the navigation functions as soon as possible.

Section 4. NORMAL PROCEDURES

Refer to the GPS 175/GNC 355/GNX 375 Pilot's Guide defined in Section 7.1 of this document for normal operating procedures and a complete list of system messages and associated flight crew actions. This includes all GPS operations, navigation, traffic, weather, and Multi-Function Display infonnation.

The GPS 175/GNC 355/GNX 375 requires a reasonable degree of familiarity to avoid becoming too engrossed at the expense of basic instrument flying in IMC and basic see-and-avoid in VMC. Garmin provides training tools with the Pilot's Guide and PC based simulator. Pilots should take full advantage of these training tools to enhance system familiarization.

4.1 Unit Power On

Databases .... **REVIEW DATES**
Self-Test .... **VERIFY OUTPUTS TO NAV INDICATORS**
Self-Test - GPS Remote Annunciator:
LOI .... **ILLUMINATED**
APPR .... **ILLUMINATED**

For GNX 375:
Transponder Mode .... **VERIFY ALT**

4.2 Before Takeoff

System Messages and Annunciators .... **CONSIDERED**

4.3 HSI and EHSI Operation

If an HSI is used to display navigation data from the GPS 175/GNC 355/GNX 375 the pilot should rotate the course pointer as prompted on the GPS 175/GNC 355/GNX 375.

If an EHSI is used to display navigation data from the GPS 175/GNC 355/GNX 375 the course pointer may autoslew to the correct course when using GPS navigation. For detailed information about the functionality of the EHSI system, refer to the FAA approved Flight Manual or Flight Manual Supplement for that system.

CAUTION

> The pilot must verify the active course and waypoint for each flight plan leg. The pilot must verify proper course selection each time the CDI source is changed from GPS to VLOC.

See Section 4.5 for RF leg capabilities related to EHSI.

4.4 Autopilot Operation

The GPS 175/GNC 355/GNX 375 may be coupled to an optional autopilot, if installed in the aircraft, when operating as prescribed in the LIMITATIONS section of this manual.

Autopilots coupled to the GPS 175/GNC 355/GNX 375 system in an analog (NAV) mode will follow GPS navigation guidance as they would with existing VOR receivers.

Autopilots that support GPSS or GPS Roll Steering in addition to the analog course guidance will lead course changes, fly arcing procedures, procedure turns, and holding patterns if coupled in a roll steering mode.

The GPS 175/GNC 355/GNX 375 supports autopilot roll steering for heading legs when an approved heading source is interfaced to the GPS 175/GNC 355/GNX 375. This heading interface can also provide map orientation, traffic heading data, and wind calculations.

CAUTION

> The GPS 175/GNC 355/GNX 375 does not provide course deviation to the autopilot for heading legs. Some autopilots do not allow the use of roll steering when course deviation is not provided.

☒ This installation *has* a heading source. The GPS 175/GNC 355/GNX 375 will provide roll steering on heading legs for the autopilot.

☐ This installation *does not have* a heading source. The crew cannot use the GPS 175/GNC 355/GNX 375 roll steering to fly heading legs with the autopilot.

For autopilot operating instructions, refer to the FAA approved Flight Manual or Flight Manual Supplement for the autopilot.

4.5 Coupling the Autopilot during approaches

CAUTION

When the CDI source is changed on the GPS 175/GNC 355/GNX 375, autopilot mode may change. Confirm autopilot mode selection after CDI source change on the GPS 175/GNC 355/GNX 375. Refer to the FAA approved Flight Manual or Flight Manual Supplement for the autopilot.

Analog only autopilots should use APR mode for coupling to LNAV approaches. Autopilots which support digital roll steering commands (GPSS) may utilize NAV mode and take advantage of the digital tracking during LNAV only approaches.

☒ This installation prompts the flight crew and requires the pilot to enable the approach outputs just prior to engaging the autopilot in APR mode.

To couple an approach:
Once established on the final approach course with the final approach fix as the active waypoint, the GPS 175/GNC 355/GNX 375 will issue a flashing message indication.

Flashing Message Button .... **PRESS**
"Enable APR Output" Button .... **PRESS**

If coupled, Autopilot will revert to ROL mode at this time.

Autopilot.. **ENGAGE APPROACH MODE**

☒ This installation supports coupling to the autopilot in approach mode once vertical guidance is available.

To couple an approach:
Once established on the final approach course with the final approach fix as the active waypoint, the GPS 175/GNC 355/GNX 375 will enable vertical guidance.

Vertical Guidance .... **CONFIRM AVAILABLE**
Autopilot.. **ENGAGE APPROACH MODE**

☐ The installation *does not* support any vertical capture or vertical tracking.

The GPS 175/GNC 355/GNX 375 allows for the utilization of IFR procedures that include RF (Radius to Fix) legs as part of RNP 1.0 capabilities.

☐ This installation is equipped to support coupled RF leg navigation up to RNP 1.0.

☐ This installation is equipped to support *un-coupled* RF leg navigation up to RNP 1.0.

☑ This installation *does not* support RF leg navigation.

4.6 Composite Indicators

When the GPS 175/GNC 355/GNX 375 is interfaced to an existing composite CDI indicator, the TO/From Flag will not function on the indicator. A placard must be installed immediately adjacent to the indicator. The placard must read: "TO/FROM FLAG WILL NOT FUNCTION CORRECTLY WHEN DISPLAYING GPS DEVIATION. USE TO/FROM INDICATION ON GPS." The following navigation indicators require the placard:

- Narco VOA 50M
- Narco VOA 9
- Narco VOA 8
- ARC (Cessna) IN-386A
- ARC (Cessna) IN-481AC
- ARC (Cessna) IN-385AC
- Honeywell (Bendix King) KI 204
- Honeywell (Bendix King) KI 209
- Honeywell (Bendix King) KI 209A
- Bendix King KI 203
- Bendix King KI 208
- Bendix King KI 208A

These indicators will either show no To/From indication at all, or will only show the "TO" indication. Pilots must use the on screen TO/FROM indications when interfaced to these CDIs.

☐ This installation is interfaced to a composite navigation indicator and the TO/FROM flag on the indicator *will not* function correctly.

☒ This installation *is not* interfaced to a composite nav indicator.

Pilot should set the selected course on the CDI to the desired track.

Section 5. PERFORMANCE

No change.

Section 6. WEIGHT AND BALANCE

See current weight and balance data.

Section 7. SYSTEM DESCRIPTIONS

7.1 Pilot's Guide

The Garmin GPS 175/GNC 355/GNX 375 Pilot's Guides, part number and revision listed below, contain additional information regarding GPS 175/GNC 355/GNX 375 system description, control and function.

- GPS175/GNX375 Pilot's Guide P/N 190-02207-02 Rev B or later
- GPS175/GNC 355/GNX375 Pilot's Guide P/N 190-02488-01 Rev B or later

7.2 Leg Sequencing

The GPS 175/GNC 355/GNX 375 supports all ARINC 424 leg types. Certain leg types require altitude input in order to sequence (course to altitude, for example). If a barometric corrected altitude source is not interfaced to the GPS 175/GNC 355/GNX 375, a popup will appear prompting the flight crew to manually sequence the leg once the altitude prescribed in the procedure is reached.

☑ This installation *has* a barometric corrected altitude source. The GPS 175/GNC 355/GNX 375 will automatically sequence altitude legs.

☐ This installation *does not have* a barometric corrected altitude source The flight crew will be prompted to manually sequence altitude legs.

7.3 Terrain Alerting

CAUTION

Not all obstacles and wires are contained in the Obstacle/HOT Line database. The system provides depiction and alerts only for obstacles and wires contained in the database.

NOTE

The area of coverage may be modified as additional terrain data sources become available.

The GPS 175/GNC 355/GNX 375 supports Terrain Alerting. Visual alerts are provided. Terrain Alerting *does not* satisfy the TAWS requirement of 91.223.

Terrain on the dedicated terrain page or main map overlay is depicted in the following manner:

- Terrain more than 1,000 feet below the aircraft is not depicted or depicted as black.
- Terrain between 1,000 feet and 100 feet below the aircraft is depicted as amber.
- Terrain within 100 feet below the aircraft, or above the aircraft, is depicted as red.

Obstacles and wires on the dedicated terrain page or main map are depicted in the following manner:

- Obstacles and wires more than 2,000 feet below the aircraft are not depicted.
- Obstacles and wires between 2,000 feet and 1,000 feet below the aircraft are depicted as white.
- Obstacles and wires between 1,000 feet and 100 feet below the aircraft are depicted as amber.
- Obstacles and wires within 100 feet below the aircraft, or above the aircraft, are depicted as red.

Multiple obstacles may be depicted using a single obstacle icon and an asterisk to indicate obstacle grouping is occurring. The color of the asterisk indicates the relative altitude of the tallest obstacle in the group. The asterisk does not indicate any information about the relative altitude or number of obstacles not being displayed in the obstacle group.

The Garmin GPS 175/GNC 355/GNX 375 Pilot's Guide provides additional information regarding terrain and obstacle colors and grouped obstacle icons.

The terrain alerting is inhibited in the vicinity of airports in the navigation database. If an airport is not in the database, terrain alerting will still occur. Airports not in the database will not be viewable as airports in the unit. If flying into an airport that is not in the database, the inhibit terrain feature can be used to prevent alerting. The terrain inhibit option is in the menu on the terrain page, and provides a means to prevent all terrain alerts while inhibited. The bottom status bar of the GPS 175/GNC 355/GNX 375 will display TER INHB, and a message will persist in the message window indicating that the terrain alerts are inhibited.

7.4 Traffic System (Optional for GPS 175/GNC355)

This system is configured for the following type of traffic system. The Garmin Garmin GPS 175/GNC 355/GNX 375 Pilot's Guide provides additional information regarding the functionality of the traffic device.

☐ GPS 175/GNC 355 with no external traffic source.

☒ GPS 175/GNC 355 with external ADS-B In Source.

☐ GNX 375 including built in ADS-B In Source.

7.5 Power

- Power to the GPS 175 or GNC 355 is provided through a circuit breaker labeled GPS or GPS 2.
- Power to the GNX 375 is provided through a circuit breaker labeled GPS/XPDR or GPS/XPDR 2.
- Power to the COM radio in a GNC 355 is provided through a circuit breaker labeled COM or COM2.

- Power to the optional Flight Stream 510 is provided through the GPS 175/GNC 355/GNX 375 MMC/SD card slot and protected via the GPS 175/GNC 355/GNX 375 circuit breaker.

7.6 Databases and Flight Plan Waypoints/Procedures

Database versions (or cycles) and effective dates are displayed on the start-up database verification page immediately after power-on for those databases with an effective or expiration date. Databases with no effective or expiration date (e.g. - terrain database) are considered effective upon installation in the GPS 175/GNC 355/GNX 375. Database information can also be viewed on the System – System Status page.

The Obstacle Database has an area of coverage that includes the United States and Europe and is updated as frequently as every 56 days. The HOT Line wire database only includes the continental United States and portions of Canada/Mexico.

Only the Obstacle/HOT Line wire database may be used in accordance with the limitation found in Section 2.20.

If a stored flight plan contains a waypoint or procedure that does not correspond to a waypoint or procedure in the navigation database in use, the waypoint or procedure will become locked (depicted as "lockd") in the flight plan. Flight plans with locked waypoints may be placed in the active flight plan portion of the system but no navigation will be provided. The locked waypoint/procedure must be resolved by removing or replacing it with the correct waypoint/procedures in the flight plan before the system will provide navigation.

7.7 External Switches

External switches may be installed and interfaced to the GPS 175/GNC 355/GNX 375. Table 7 lists the switches and function they perform:

Switch Label	Function
TFC MUTE	Mutes the traffic alert audio (GNX 375 only)
GA	Remote Go Around
IDENT	Transponder IDENT

Table 7 – External Switches

7.8 Airspace Depiction and Alerts

The GPS 175/GNC 355/GNX 375 aides the flight crew in avoiding certain airspaces with Smart Airspace and airspace alerts. Smart Airspace de-emphasizes depicted airspace that is not near the aircraft's current altitude. Airspace Alerts provide a message indication to the flight crew when the aircraft's current ground track will intercept an airspace type that has been selected for alerting.

NOTE

Smart Airspace and Airspace Alerts are separate features. Turning on/off Smart Airspace does not affect Airspace Alerts, and vice versa.

7.9 ADS-B Traffic (Optional for GPS 175/GNC355)

The GNX 375 has a built in ADS-B In traffic system. A Garmin ADS-B traffic system may be interfaced to the GPS 175/GNC 355/GNX 375. The *nose* of the ownship symbol on the GPS 175/GNC 355/GNX 375 main map page and dedicated traffic page serves as the actual location of your aircraft. The *center* of the traffic target icon serves as the reported location for the target aircraft. Motion vectors for traffic may be displayed in either absolute or relative motion. The location of the traffic targets relative to the ownship are the same, regardless of the selected motion vector.

Absolute motion vectors are colored either cyan or white, depending on unit configuration. Absolute motion vectors depict the reported track of the traffic target referenced to the ground. An absolute motion vector pointed towards your ownship symbol *does not* necessarily mean the traffic target is getting closer to your aircraft.

Relative motion vectors are always colored green and depict the motion of the traffic target relative to your ownship symbol. The direction the traffic target is pointed may vary greatly from the motion vector and a target may be getting closer to your aircraft independent of the direction the target is pointed. A green relative motion vector pointed towards your ownship indicates that the traffic target *is* converging on your aircraft.

Traffic grouping can be enabled or disabled in the traffic page menu. If grouping is enabled, and more than one target is occupying the same area of the screen, the GPS 175/GNC 355/GNX 375 will combine the two or more traffic targets into one traffic group. The presence of an asterisk to the left of a target indicates that traffic has been grouped. The highest priority traffic target in the group is displayed to the pilot. When applied to airborne targets the asterisk will be displayed in white or cyan depending on the traffic depiction color used in the installation. The asterisk will be brown for grouped ground targets. The asterisk will not turn amber, even if an alerted target is included in the group. If traffic grouping is disabled, the traffic targets will draw on top of one another.

An alerted target may be placed in the same group as non-alerted targets. In this case, the alerted target will be displayed. Two alerted targets will not be placed in the same group. All alerted targets will be displayed on the screen.

Traffic targets displayed on the dedicated traffic page may be selected in order to obtain additional information about a traffic target or to view all targets in a grouped target. When a grouped target is selected, the "Next" button on the dedicated traffic page will cycle through all targets located in close proximity to where the screen has been touched.

7.10 Transponder Control (GNX 375 Only)
The GNX 375 has a built in transponder with on screen controls for squawk code, mode, and additional transponder functions. The transponder is a 1090ES out, and 1090/UAT In device.

7.11 Depiction of Obstacles and Wires

7.11.1 Dedicated Terrain Page
The dedicated Terrain page will always depict point obstacles at zoom scales of 10 nm or less and depict wire obstacles at zoom scales of 5 nm or less. The obstacle or wire overlay icon (see Figure 4) will be shown near the bottom of the display when the obstacle or wire depiction is active based on the zoom scale.

NOTE

Only obstacles and wires within 2,000 feet vertically of the aircraft will be drawn on the Terrain page. It is therefore possible to have an obstacle or wire overlay icon displayed with no obstacles or wires being depicted on the display.

Figure 4 – Obstacle Overlay Icon (Left), Wire Overlay Icon (Right)

7.11.2 Map Page
The Map page may be configured to depict point obstacles and wire obstacles at various zoom scales by the pilot by using the Map page menu. The obstacle or wire overlay icon (see Figure 5) will be shown near the bottom of the display when the obstacle or wire overlay is active based on the current zoom scale and setting selected by the pilot.

The settings chosen by the pilot on the Map page menu (including obstacle and wire display ranges) are saved over a power cycle.

NOTE

Only obstacles and wires within 2,000 feet vertically of the aircraft will be drawn on the Map page. It is therefore possible to have an obstacle or wire overlay icon displayed with no obstacles or wires being depicted on the display.

NOTE

The Map page may be configured by the pilot to not show any obstacles or wires at any zoom scale.

Figure 5 – Obstacle Overlay Icon (Left), Wire Overlay Icon (Right)

7.12 Flight Stream 510 (Optional)

The Flight Stream 510 is mounted in the GPS 175/GNC 355/GNX 375 SD card slot and includes a Wi-Fi transceiver. The Flight Stream product line uses a wireless transceiver to allow databases to be loaded onto the GPS 175/GNC 355/GNX 375 from a personal electronic devices (PEDs). Limitations regarding database operations are found in Section 2.22.

Garmin provides a list of tested and compatible devices that can be used with the Flight Stream. Connection to the Flight Stream may be possible with devices other than those on the supported device list, but Wi-Fi stability and wireless data integrity cannot be guaranteed.

For details about the Garmin supported devices and apps for use with the Flight Stream product line, please visit: http://garmin.com/connext/supported_devices

7.13 Built in Bluetooth

The GPS 175/GNC 355/GNX 375 have built in Bluetooth transceivers to allow PEDs to connect to the certified avionics. Data such as traffic, flight plan, datalink weather, and attitude information is sent from the GPS 175/GNC 355/GNX 375 to the PED. The PED is capable of sending flight plans to the GPS 175/GNC 355/GNX 375.

Garmin provides a list of tested and compatible devices that can be used with the GPS 175/GNC 355/GNX 375. Connection to the GPS 175/GNC 355/GNX 375 may be possible with devices other than those on the supported device list, but Bluetooth® stability and wireless data integrity cannot be guaranteed.

For details about the Garmin supported devices and apps for use with GPS 175/GNC 355/GNX 375 product line, please visit: https://fly.garmin.com/fly-garmin/support/

7.14 Map Page

7.14.1 Configuration

The moving map and weather pages are capable of displaying a large quantity and variety of data. Map data is layered to ensure that data which is typically more critical is drawn above less critical data, however at some zoom scales and configurations the map may be cluttered with large amounts of data. Controls are provided on the Map and Weather pages for the pilot to select which data displayed, the declutter level, and the zoom scales at which data is added to or removed from the display. It is the responsibility of the pilot to select settings for the map page that will provide the display of data most appropriate to the operation being conducted.

7.15 Flight Plan Depiction

The map page depicts the current active flight plan. When an off-route Direct To is active the flight plan will no longer be depicted on the map.

7.16 User Defined Waypoints

When a User Defined Waypoint is created, a default name will automatically be provided, and the pilot is given the option to enter a different name for the waypoint. Pages which have the autofill funcrion will prevent some waypoint names from being used. If it is desired to name the waypoint with a subset of the name of an existing waypoint in the database then this must be accomplished on the Waypoint Info / User Waypoints page.

7.17 Times and Distances

Time and Distance data to the next waypoint is always calculated from the present position to that waypoint and does not account for the path which may be flown (such as intercepting a course) to reach the waypoint.

When navigating using GPS guidance most legs are TO type legs where distance to the next waypoint decreases along the route. However, some procedures include FROM type legs. When navigating on a leg that is a FROM leg indications that it is a FROM leg include the TO/FROM flag indicating FROM and distances increasing in distance fields.

7.18 Direct-To Operations

When conducting Direct-To operations the Flight Plan tab provides a list of waypoints in the flight plan for which Direct-To is available. Some entries in the flight plan such as Holds and Course Reversals are not eligible for Direct-To and the pilot must instead select the associated waypoint if Direct-To operation is desired.

7.19 European Visual Reporting Points

If the GPS 175/GNC 355/GNX 375 is interfaced with a G500/600 PFD/MFD, and a flight plan in the GPS 175/GNC 355/GNX 375 contains a VRP, the G500/600 must have a database that contains the VRP in order to appropriately display the VRP on the MFD map. If the database on the PFD/MFD does not contain the VRP, the VRP will display on the MFD map as an intersection.

7.20 Advisory Visual Approaches

The GPS 175/GNC 355/GNX 375 will provide advisory visual approaches to many runways in the aviation database. Lateral guidance for the visual approach is aligned with the runway bearing. Vertical guidance is provided for those runways with VGSI information for distances up to 4.0NM from the runway. If a terrain database is installed in the GPS 175/GNC 355/GNX 375, the GPS 175/GNC 355/GNX 375 provides vertical guidance up to 28NM from the runway end unless the computed glideslope would impact terrain or obstacles from the database. If the projected impact point is under 28NM and greater than 4NM, the flight plan line for the approach is shortened to indicate where vertical guidance is active for the approach. If the terrain impact point is less than 4NM from the runway and there is no VGSI data available, vertical guidance is not provided for that approach. Lateral guidance is still available when vertical guidance is removed.

CDI and VDI indications are equivalent to those of other GPS-based approaches (e.g.- LPV or LNAV+V). The GPS 175/GNC 355/GNX 375 annunciates "VISUAL" in the annunciator bar to indicate a visual approach is active.

When loading, or activating the approach, the GPA and TCH information for that approach will be displayed on a popup. If there is no vertical guidance available, the popup will display "(NO VERTICAL GUIDANCE)".

Visual approaches are intended to be used as an aid to situational awareness. Visual approaches are advisory in nature and do not guarantee terrain and obstacle clearance for the approach runway.

7.21 Composite CDIs

When the GPS 175/GNC 355/GNX 375 is interfaced to a composite CDI indicator, the TO/From Flag will not function on the indicator, and a placard must be installed adjacent to the indicator. The placard must read: "TO/FROM FLAG WILL NOT FUNCTION CORRECTLY WHEN DISPLAYING GPS DEVIATION. USE TO/FROM INDICATION ON GPS." and follow all placard guidelines in the Installation Manual.

These indicators will either show no To/From indication at all, or will only show the "TO" indication. Pilots must use the on screen TO/FROM indications when interfaced to these CDIs.

To/From Indication

Figure 6 - To/From Indication Location

7.22 Database Sync Compatibility

The GPS 175/GNC 355/GNX 375 units are capable of utilizing database sync completely between other GPS 175/GNC 355/GNX 375 units, as well as GI275 units. The GPS 175/GNC 355/GNX 375 are capable of a limited database sync from a G500 TXi and G600 TXi. Sync from the GPS 175/GNC 355/GNX 375 to the G500 TXi and G600 TXi is not supported.

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AIRPLANE FLIGHT MANUAL SUPPLEMENT

GFC 500 Autopilot with ESP

Installed in Textron Aviation 19/23/24

Dwg. Number: 190-02291-75 Rev. 1

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the GFC 500 Autopilot system is installed in accordance with STC SA01866WI. The information contained herein supplements the information of the basic Airplane Flight Manual. For Limitations, Procedures, and Performance information not contained in this Supplement consult the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

Airplane Serial Number: MC-755

Airplane Registration Number: N38566

FAA Approved By: ________________

Robert G. Murray
ODA STC Unit Administrator
Garmin International, Inc
ODA-240087-CE

Date: 9/2/2021

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Log of Revisions

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT

GFC 500 Autopilot with ESP

Installed in Textron Aviation 19/23/24

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF APPROVAL	FAA APPROVED
1	ALL	Original Issue	See Cover	See Cover

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Table of Contents

SECTION 1 – GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) when the airplane has been modified by installation of the Garmin GFC 500 Autopilot system in accordance with Garmin International, Inc. approved data.

FAA approved sections of this supplement are labeled as "FAA APPROVED". Sections not labeled "FAA APPROVED" are provided for guidance information only.

The information in this supplement supersedes or adds to the basic POH/AFM only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

USE OF THE SUPPLEMENT

The following definitions apply to WARNINGS, CAUTIONS and NOTES found throughout the supplement:

WARNING

Operating procedures, techniques, etc., which may result in personal injury or loss of life if not carefully followed.

CAUTION

Operating procedures, techniques, etc., which may result in damage to equipment if not carefully followed.

NOTE

Operating procedures, techniques, etc., which is considered essential to emphasize.

ABBREVIATIONS AND TERMINOLOGY

The following glossary is applicable within the airplane flight manual supplement

ADI	Attitude Direction Indicator
AFCS	Automatic Flight Control System
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
AGL	Above Ground Level
AHRS	Attitude and Heading Reference System
ALT	Altitude
AP	Autopilot
APR	Approach
ATC	Air Traffic Control
BC	Back Course Approach
CDI	Course Deviation Indicator
DA	Decision Altitude
DISC	Disconnect
DWG	Drawing
ESP	Electronic Stability and Protection
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FD	Flight Director
GA	Go Around
GFC 500	Garmin Autopilot
GMC 507	Autopilot Mode Control Panel
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GS	Glideslope
GSA	Garmin Servo Actuator
HDG	AFCS heading mode
IAS	Indicated Airspeed
ILS	Instrument Landing System
INT	Interrupt
KIAS	Knots Indicated Airspeed
LNAV	Lateral Navigation
LNAV+V	Lateral Navigation with Advisory Vertical Guidance
LNAV/VNAV	Lateral Navigation / Vertical Navigation Approach
LOC	Localizer (no glideslope available)
LP	Localizer Performance
LP+V	Localizer Performance with Advisory Verfical Guidance
LPV	Localizer Performance with Verfical Guidance
LVL	Level
MDA	Minimum Descent Altitude
MPH	Miles per Hour
PFT	Preflight Test
POH	Pilot's Operating Handbook
STC	Supplemental Type Certificate
TO	Takeoff
TRK	Track
VHF	Very High Frequency
VNAV	Vertical Navigation
VOR	VHF Omni-directional Range
VS	Vertical Speed
YD	Yaw Damper

INSTALLED EQUIPMENT INTERFACES

The following is the list of installed equipment and functions associated with the GFC 500 Autopilot installation in this airplane.

Table 1-1: Table of Installed Equipment Interfaces

DEVICE TYPE	**Manufacturer / Model** If not installed, note N/A	Additional Information
GPS Navigator #1	GTN 750	Is Navigator #1 interfaced to GFC 500? ☒ YES ☐ NO
VHF Nav Radio #1	GTN 750	Is VHF Nav Radio #1 interfaced to GFC 500? ☒ YES ☐ NO
VHF Nav Radio #2	GNC-355	Yes
Pitch Trim Servo	Yes	
Yaw Damper	NO	

INSTALLED FEATURES CHECKLIST

The checked autopilot modes and features are available on this aircraft.

Basic AP Features

☒ Flight Director
☒ Electric Pitch Trim
☐ Yaw Damper
☒ Overspeed Protection
☒ Underspeed Protection

Vertical Autopilot Modes

☒ Pitch (PIT)
☒ Level (Zero vertical speed)
☒ Go Around (GA)
☒ Altitude Hold (ALT)
☒ Vertical Speed (VS)
☒ Altitude Capture via Altitude Preselect
☒ Indicated Airspeed (IAS)
☒ Vertical Navigation (VNAV)
☒ GPS Approach Glidepath
☒ ILS Glideslope

Electronic Stability and Protection

☒ Pitch/Roll Attitude
☒ High Speed Protection
☒ Low Speed Protection

Lateral Autopilot Modes

☒ Roll (ROL)
☒ Level (Wings Level)
☒ Go Around (GA)
☒ Heading
☒ Track
☒ GPS Navigation
☒ VHF Navigation
☒ Approach Mode
- ☒ GPS
- ☒ VOR/LOC

SECTION 2 – LIMITATIONS

The Garmin G5 Electronic Flight Instrument Pilot's Guide for Certified Aircraft, part number 190-01112-12 Rev G (or later approved revisions), must be immediately available to the flight crew (when G5 is installed).

The Garmin G3X Touch Pilot's Guide for Certified Aircraft, part number 190-02472-00, Rev B (or later approved revisions) must be immediately available to the flight crew (when G3X EFIS system is installed).

The Garmin GI 275 Pilot's Guide for Certified Aircraft, part number 190-02246-01, Rev F (or later approved revisions) must be immediately available to the flight crew (when GI 275 system is installed).

This AFMS is applicable to the software versions shown below:

Software Item	Software Version (or later FAA Approved version for this STC)
G5 Software Version	6.82
G3X Software Version	8.64
GI 275 Software Version	2.31

A pilot must be seated in the left pilot's seat, with seatbelt fastened, during all autopilot operations.

Do not use autopilot or yaw damper during takeoff and landing.

The GFC 500 AFCS preflight test must complete successfully prior to use of the autopilot, flight director or manual electric trim.

The maximum fuel imbalance with the autopilot engaged is 15 gallons.

Autopilot maximum engagement speed is 182 MPH (158 KIAS).

Autopilot minimum engagement speed is 81 MPH (70 KIAS).

The autopilot must be disengaged below 200 feet AGL during approach operations.

The autopilot must be disengaged below 800 feet AGL for all operations other than approach operations.

The GFC 500 autopilot is approved for Category 1 precision approaches and non-precision approaches only.

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SECTION 3 – EMERGENCY PROCEDURES

Some emergency situations require immediate memorized corrective action. These steps are printed in bold in the emergency procedures and should be accomplished without the aid of the checklist.

AUTOPILOT MALFUNCTION / PITCH TRIM RUNAWAY

If the airplane deviates unexpectedly from the planned flight path:

1. **Control Wheel .... GRIP FIRMLY**
2. **AP DISC / TRIM INT Button .... PRESS AND HOLD**

CAUTION

Be prepared for high elevator control forces.

3. **Aircraft Attitude .... MAINTAIN / REGAIN AIRCRAFT CONTROL**
4. **Elevator Trim .... RE-TRIM if necessary, using Elevator Trim Wheel**
5. Autopilot Circuit Breaker .... PULL

NOTE

Do not release the AP DISC / TRIM INT Button until after pulling the autopilot Circuit Breaker.

Pulling the autopilot circuit breaker will render the autopilot, yaw damper (if installed), electric pitch trim (if installed), and ESP inoperative.

6. AP DISC / TRIM INT Button .... RELEASE

WARNING

In flight, do not overpower the autopilot. The trim will operate in the direction opposing the overpower force, which will result in large out-of-trim forces.

Do not attempt to re-engage the autopilot or use manual electric pitch trim until the cause of the malfunction has been corrected.

AUTOPILOT FAILURE / ABNORMAL DISCONNECT

(Red AP in autopilot status box on display, continuous aural disconnect tone.)

1. AP DISC / TRIM INT Button or
    - G5 Knob
    - G3X Autopilot Status Bar
    - GI 275 Kob or Autopilot Status Button .... PRESS AND RELEASE (to cancel disconnect tone)
2. Aircraft Attitude .... MAINTAIN / REGAIN AIRCRAFT CONTROL

NOTE

The autopilot disconnect may be accompanied by a red AFCS in the autopilot status box, indicating the automatic flight control system has failed. The flight director will not be available, and the autopilot cannot be re-engaged with this annunciation present.

If the disconnect is accompanied by an amber AP with a red X, the autopilot will not be available. However, the flight director will still be functional.

In the event of a GMC failure, pressing the G5 knob, G3X Autopilot Status Bar, or GI 275 knob or autopilot status button will acknowledge the disconnect tone.

YAW AXIS FAILURE / ABNORMAL YAW DAMPER DISCONNECT

(Red YD in autopilot status box on G5 or G3X display)

This procedure applies only if the optional yaw servo is installed:

1. AP DISC / TRIM INT Button, YD Button on GMC
   G5 Knob, G3X Autopilot Status Bar, or
   GI 275 Knob or Autopilot Status Button .... PRESS AND RELEASE (to acknowledge the disconnect)
2. Aircraft Attitude .... MAINTAIN / REGAIN AIRCRAFT CONTROL

NOTE

The yaw damper disconnect may be accompanied by an amber YD with a red X in the autopilot status box. The YD is inoperative and will not be available. The autopilot may be re-engaged and disengaged normally, but the yaw damper will remain inoperative.

PITCH TRIM FAILURE

(Red PTRIM on G5, G3X, or GI 275 display)

This procedure applies only if the optional pitch trim servo is installed:

1. Indicates a failure of the pitch trim servo.
2. Control Wheel .... GRIP FIRMLY
3. AP DISC / TRIM INT Button .... PRESS and RELEASE (Be prepared for high elevator control forces)
4. Elevator Trim .... AS REQUIRED USING ELEVATOR TRIM CONTROL WHEEL

NOTE

The autopilot may be re-engaged. Refer to the normal procedures section of this AFMS, MANUAL PITCH TRIM WITH AUTOPILOT ENGAGED.

5. Yaw Damper .... ENGAGE AS REQUIRED

ESP ACTIVATION

1. **Throttle** .... **AS REQUIRED**
2. **Aircraft Attitude** .... **MAINTAIN / REGAIN AIRCRAFT CONTROL**

NOTE

If ESP is active for approximately 10 seconds, the autopilot will automatically engage in LVL mode, an aural 'ENGAGING AUTOPILOT' will be played (or a Sonalert tone will sound for installations without a supported audio panel), and the autopilot will roll the wings level and fly at zero vertical speed. Refer to Section 7, System Description for further information.

ESP will be disabled by pressing and holding the AP DISC / TRIM INT button. Releasing the button will allow ESP to function.

OVERSPEED PROTECTION (MAXSPD)

(MAXSPD displayed on G5, G3X, or GI 275, AIRSPEED – AIRSPEED Aural sounds)

1. **Throttle** .... **REDUCE**
2. **Aircraft Attitude and Altitude** .... **MONITOR**

After overspeed condition is corrected:

3. Autopilot .... RESELECT VERTICAL AND LATERAL MODES (if necessary)
4. Throttle .... AOJUST as necessary

NOTE

Overspeed protection mode provides a pitch up command to decelerate the airplane to or below the maximum autopilot operating speed.

UNDERSPEED PROTECTION (MINSPD)

(MINSPD displayed on G5, G3X, or GI 275, AIRSPEED – AIRSPEED Aural sounds)

1. **Throttle** .... **INCREASE POWER AS REQUIRED TO CORRECT UNDERSPEED**
2. **Aircraft Attitude and Altitude** .... **MONITOR**

After underspeed condition is corrected:

3. Autopilot .... RESELECT VERTICAL AND LATERAL MODES (if necessary)
4. Throttle .... ADJUST as necessary

NOTE

Autopilot Underspeed Protection Mode provides a pitch down command to maintain minimum autopilot engagement speed.

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SECTION 3A – ABNORMAL PROCEDURES

AUTOPILOT PRE-FLIGHT TEST FAIL

(Amber AP with a red X in G5, G3X, or GI 275 autopilot status box)

1. Indicates the AFCS system failed the automatic Pre-Flight test.

NOTE

The autopilot, yaw damper (if installed), ESP, and electric elevator trim will be inoperative.

LOSS OF NAVIGATION INFORMATION

This procedure applies only if the optional GPS and/or VHF navigator is installed:

(Amber GPS, VOR, LOC, or BC flashes for 10 seconds on G5, G3X, or GI 275.)

NOTE

If a navigation signal is lost while the autopilot is tracking it, the autopilot will roll the aircraft wings level and default to roll mode (ROL).

1. GMC 507 Mode Panel.................. ....SET desired heading and SELECT HDG mode
2. NAV Source .... SELECT a valid NAV source
3. NAV Key...PRESS

If on an instrument approach at the time the navigation signal is lost:

4. Missed Approach Procedure.. EXECUTE (as necessary)

LOSS OF AIRSPEED DATA

(Red X through airspeed tape on the G5, G3X, or GI 275 display, amber AP with a red X in autopilot status box)

NOTE

If airspeed data is lost while the autopilot is tracking airspeed, the flight director will default to pitch mode (PIT).

1. AP DISC / TRIM INT Button...PRESS AND RELEASE (to cancel disconnect tone)
2. Aircraft Attitude.............................. ....MAINTAIN / REGAIN AIRCRAFT CONTROL
3. Manual Elevator Trim... TRIM as required

NOTE

The autopilot cannot be re-engaged. The flight director will be available however IAS mode cannot be selected. Loss of airspeed will be accompanied by a red PTRIM indication on the G5 or G3X (if a pitch trim servo is installed).

LOSS OF ALTITUDE DATA

(Red X through altitude tape on the G5, G3X, or GI 275 display)

NOTE

If altitude data is lost while the autopilot is tracking altitude, the autopilot will default to pitch mode (PIT).

1. Autopilot .... SELECT different vertical mode

LOSS OF GPS INFORMATION

This procedure applies only if the optional GPS navigator is installed:

(GPS position information is lost to the autopilot.)

NOTE

If GPS position data is lost while the autopilot is tracking a GPS, VOR, LOC or Back Course, the autopilot will default to roll mode (ROL). The autopilot will default to pitch mode (PIT) if GPS information is lost while tracking an ILS The autopilot uses GPS aiding in VOR, LOC and BC modes.

1. Autopilot ....SELECT different lateral and vertical mode (as necessary)

If on an instrument approach:

1. AP DISC / TRIM INT button ....PRESS, Continue the approach manually

   Or

2. Missed Approach Procedure.. EXECUTE (as necessary)

HEADING DATA SOURCE FAILURE

This procedure applies only if the optional heading source to the navigator is installed:

1. Autopilot .... SELECT different lateral mode (as necessary)

NOTE

Track information will be displayed on the G5, G3X, or GI 275.

GPSS will not be provided to the autopilot for heading legs.

ELEVATOR MISTRIM

(Amber TRIM UP or TRIM DOWN displayed on the G5, G3X, or GI 275)

This annunciation indicates a mistrim of the elevator while the autopilot is engaged. If an optional pitch trim servo is installed, the autopilot will normally trim the airplane as required. However, during rapid acceleration, deceleration, configuration changes, or near either end of the elevator trim limits, momentary illumination of this message may occur. If the autopilot is disconnected while this message is displayed, high elevator control forces are possible.

If the optional pitch trim servo is not installed:

1. Refer to the Normal Procedures section of this AFMS, MANUAL PITCH TRIM WITH AUTOPILOT ENGAGED.

If the optional pitch trim servo is installed:

WARNING

Do not attempt to overpower the autopilot in the event of a pitch mistrim. The autopilot servo will oppose pilot input and will cause pitch trim to run opposite the direction of pilot input. This will lead to a significant out-of-trim condition, resulting in large control wheel force when disengaging the autopilot.

NOTE

Momentary display of the TRIM UP or TRIM DOWN message during configuration changes or large airspeed changes is normal.

1. Control Wheel ....GRIP FIRMLY

WARNING

Be prepared for significant sustained control forces in the direction of the mistrim annunciation. For example, TRIM DOWN indicates nose down control wheel force will be required upon autopilot disconnect.

2. AP DISC / TRIM INT Button..PRESS AND RELEASE
3. Manual Elevator Trim ....RE-TRIM as required

NOTE

Electric pitch trim should be considered inoperative until the cause of the mistrim has been investigated and corrected.

YAW DAMPER DISCONNECT

(Amber YD displayed in autopilot status box on display)

This failure will only occur if the optional yaw servo is installed.

1. YD Button on GMC or
   - G5 Knob
   - G3X Autopilot Status Bar
   - GI 275 Knob or Autopilot Status Button....................................PRESS AND RELEASE (to cancel disconnect tone)
2. Aircraft Attitude...MAINTAIN / REGAIN AIRCRAFT CONTROL

NOTE

A flashing amber 'YD' in the autopilot status box indicates that the yaw damper has disconnected. If the disconnect was not pilot initiated, Refer to Section 3 – Emergency Procedures, YAW AXIS FAILURE / ABNORMAL DISCONNECT, for further information.

SECTION 4 – NORMAL PROCEDURES

GFC 500 POWER UP

During the preflight test the G5, G3X, or GI 275 will display PFT in the autopilot status box. When the GFC 500 passes preflight test, PFT will be removed from the autopilot status box.

FLIGHT DIRECTOR / AUTOPILOT NORMAL OPERATING PROCEDURES

Autopilot/Flight Director mode annunciations are displayed at the top of the G5 Electronic Flight Instrument, the top of the G3X Electronic Flight Instrument System PFD, or at the bottom of the GI 275 Electronic Flight Instrument ADI. Green text indicates active autopilot/flight director modes. Armed modes are indicated in white text. Normal mode transitions will flash inverse video for 10 seconds before becoming steady. Abnormal mode transitions will flash for 10 seconds in amber text before the default mode is annunciated as the active mode in green text. Default autopilot/flight director modes are Roll (ROL) and Pitch (PIT) modes.

The autopilot status box displays the autopilot engagement status as well as armed and active flight director modes.

Autopilot Engagement with Flight Director Off — Upon engagement, the autopilot will be set to hold the current attitude of the airplane if the flight director was not previously on. In this case, 'ROL' and 'PIT' will be annunciated.

Autopilot Engagement with Flight Director On — If the flight director is on, the autopilot will smoothly pitch and roll the airplane to capture the FD command bars. The prior flight director modes remain unchanged.

Autopilot Disengagement — The most common way to disconnect the autopilot is to press and release the AP DISC / TRIM INT button located on the control wheel. An autopilot disconnect tone will sound and an amber AP will be annunciated on the G5 or G3X autopilot status box. If the optional yaw damper is installed, the AP DISC / TRIM INT button will also disconnect the yaw damper, and a disconnect tone will sound and an amber YD will be annunciated on the G5, G3X, or GI 275 autopilot status box.

Other ways to disconnect the autopilot include:

– Pressing the AP Key on the GMC 507 Mode Controller. If the optional yaw damper is installed, it will remain engaged until the YD Key is pressed, or the red AP DISC / TRIM INT button is pressed.

– Operating the Electric Pitch Trim Switch (located on the control wheel). If the optional yaw damper is installed, it will remain engaged until the YD Key is pressed, or the red AP DISC / TRIM INT button is pressed.

– Pulling the autopilot circuit breaker.

In the event of unexpected autopilot behavior, pressing and holding the AP DISC / TRIM INT button will disconnect the autopilot and remove all power to the servos.

Yaw Damper Engagement with Autopilot On — Upon engagement of the autopilot, if the yaw damper is installed, it will automatically engage to provide yaw damping and turn coordination. YD will be annunciated in the autopilot status box.

Yaw Damper Engagement with Autopilot Off — The yaw damper, if installed, may be engaged with the autopilot disengaged. This will provide yaw damping and turn coordination. YD will be annunciated in the autopilot status box.

MANUAL AUTOPILOT DISCONNECT

If necessary, the autopilot may be manually disconnected using any one of the following methods:

1. AP DISC / TRIM INT Button .... PRESS and RELEASE (Pilot's control wheel)
2. AP Key .... PRESS
3. Pitch Trim Switch .... ACTIVATE
4. Autopilot Circuit Breaker .... PULL

VERTICAL MODES

VERTICAL SPEED (VS) MODE

1. Altitude Preselect .... SET to Desired Altitude
2. VS Key .... PRESS, autopilot synchronizes to the airplane's current vertical speed
3. Vertical Speed Reference .... ADJUST using UP / DN Wheel
4. Green ALT .... VERIFY Upon Altitude Capture

INDICATED AIRSPEED (IAS) MODE

1. Altitude Preselect .... SET to Desired Altitude
2. Press IAS Key, autopilot synchronizes to the airplane's current indicated airspeed.
3. AIRSPEED Reference .... ADJUST using UP / DN Wheel
4. Throttle .... ADJUST, INCREASE POWER to climb DECREASE POWER to descend
5. Green ALT .... VERIFY Upon Altitude Capture

ALTITUDE HOLD (ALT) MODE, MANUAL CAPTURE

1. When at the desired altitude .... PRESS ALT key

NOTE

If climbing or descending at a high rate when the ALT key is pressed, the airplane will overshoot the reference altitude and then return to it. The amount of overshoot will depend on the vertical speed when the ALT key is pressed.

The altitude reference is displayed in the autopilot status box. The reference may be changed by +/- 200 FT using the UP / DN wheel.

/ERTICAL NAVIGATION (VNAV)

1. Navigation Source .... SELECT CDI to GPS
2. Vertical Navigation Profile .... LOAD into the GPS navigator's flight plan
3. Altitude Preselect .... SET to the vertical clearance limit

   When ATC clearance received.
4. GMC 507 Mode Panel .... PRESS VNAV

NOTE

Vertical navigation will not function for the following conditions:

- Selected navigation source is not GPS navigation. VNAV will not function if the navigation source is VOR or Localizer.
- VNAV is not enabled on the GPS Navigator
- If the altitude preselect is not set below the current aircraft altitude.
- No waypoints with altitude constraints in the flight plan
- Glideslope or Glidepath is the active flight director pitch mode.
- OBS mode is active
- Dead Reckoning mode is active
- Parallel track is active
- Aircraft is on the ground

Vertical navigation is not available between the final approach fix (FAF) and the missed approach point (MAP).

Vertical Navigation is for descent only.

ALTV will be the armed vertical mode during the descent if the altitude preselect is set to a lower altitude than the VNAV reference altitude. This indicates the autopilot / flight director will capture the VNAV altitude reference. ALTS will be the armed mode during the descent if the altitude preselect is set at or above the VNAV reference altitude, indicating that the autopilot / flight director will capture the altitude preselect altitude reference.

GO AROUND

1. GO AROUND button ....PRESS – Verify GA / GA on G5, G3X, or GI 275 (autopilot will not disengage)
2. Autopilot (if engaged) ....VERIFY airplane pitches up following flight director command bar
3. Throttle ....APPLY Go Around power
4. GMC 507 Mode Panel....................................PRESS NAV to couple to selected navigation source
   OR
   PRESS HDG to Fly ATC Assigned Missed Approach Heading
5. Altitude Preselect ....VERIF`
   Set to appropriate altitude.

NOTE

The pilot is responsible for initial missed approach guidance in accordance with published procedure. When the GA button is pressed the Flight Director command bars will command go-around pitch attitude and wings level. The pilot must set Go Around power, then select the CDI to the appropriate navigation source and select the desired lateral and vertical flight director modes.

MANUAL PITCH TRIM WITH AUTOPILOT ENGAGED

(Amber TRIM UP or TRIM DOWN displayed on G5, G3X, or GI 275)

NOTE

If the aircraft is not equipped with a pitch trim servo, the pilot must manually adjust the pitch trim when airspeed and aircraft configuration changes are made.

A message will be displayed on the G5, G3X, or GI 275 display to indicate the pitch servo is holding sustained force, and the pilot must manually trim the aircraft.

1. If TRIM UP message is displayed ....MANUALLY TRIM nose up until annunciation extinguishes
2. If TRIM DOWN message is displayed .... MANUALLY TRIM nose down until annunciation extinguishes

LATERAL MODES

HEADING MODE (HDG)

1. HDG/TRK Knob .... Rotate to set heading bug to desired heading.
2. HDG Key .... PRESS

   The autopilot will turn the airplane in the direction of the heading bug.

TRACK MODE (TRK)

1. HDG/TRK Knob .... Rotate to set track bug to desired track.
2. TRK Key .... PRESS

   The autopilot will turn the airplane in the direction of the track bug.

NAVIGATION (VOR)

This mode will only be available if the optional VHF navigator is installed

1. Navigation Source .... SELECT CDI to VHF NAV

   Tune and identify the station frequency
2. Course Pointer .... SET CDI to the Desired Course
3. Intercept Heading .... ESTABLISH in HDG, TRK or ROL mode
4. NAV Key .... PRESS

NOTE

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the VOR mode when the NAV key is pressed. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV key is pressed.

NAVIGATION (GPS)

This mode will only be available if the optional GPS navigator is installed.

1. Navigation Source .... SELECT CDI to GPS
2. Waypoint .... SELECT on Navigation Source
3. Course Pointer .... VERIFY CDI set to the Desired Course
4. Intercept Heading .... ESTABLISH in HDG or ROL mode
5. NAV Key .... PRESS

NOTE

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the GPS mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV key is pressed.

APPROACHES

ILS APPROACH

This mode will only be available if the optional VHF and GPS navigator is installed.

1. Navigation Source .... SELECT CDI to VHF Nav
   Tune and Identify an ILS station frequency.
2. CDI .... SET to front LOC course

NOTE

Ensure that the current heading will result in a capture of the selected course prior to the final Approach Fix.

3. APR Key .... PRESS, verify LOC and GS ARMED
4. LOC and GS Mode .... VERIFY airplane Captures and Tracks LOC and GS
5. Missed Approach Altitude .... SET in Altitude preselect.

At Decision Altitude (DA),

6. AP DISC / TRIM INT button .... PRESS, Continue visually for a normal landing
   Or
7. GO AROUND (GA) button .... PRESS, Execute Missed Approach Procedure
8. Apply GA power.

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the LOC mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the APR key is pressed.

When the selected navigation source is an ILS, glideslope coupling is automatically armed when the APR key is pressed. The glideslope cannot be captured until the localizer is captured. The autopilot can capture the glideslope from above or below the glideslope.

LOC APPROACH (GS out)

This procedure applies only if the optional VHF and GPS navigator is installed:

1. Navigation Source .... SELECT CDI to VHF Nav
   Tune and Identify an ILS station frequency.
2. Course Pointer .... SET to front LOC course

NOTE

Ensure that the current heading will result in a capture of the selected course.

3. NAV Key .... PRESS, verify LOC ARMED
4. LOC Mode .... VERIFY airplane Captures and Tracks LOC Course
5. Altitude Preselect .... SET to next required step down altitude
6. Missed Approach Altitude .... SET when in ALT mode at the MDA

At Missed Approach Point,

7. AP DISC / TRIM INT button .... PRESS, Continue visually for a normal landing

   Or

8. GO AROUND (GA) button .... PRESS, Execute Missed Approach Procedure
9. Apply GA power.

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

GPS APPROACH (LPV, LNAV/VNAV, LP+V, or LNAV+V)

This procedure applies only if the optional GPS navigator is installed:

1. Navigation Source .... SELECT CDI to GPS
2. Course Pointer .... VERIFY CDI set to the Desired Course

NOTE

Ensure that the current heading will result in a capture of the selected course.

3. APR Key .... PRESS, verify GPS and GP ARMED
4. GPS and GP Mode .... VERIFY airplane Captures and Tracks GPS and GP
5. Missed Approach Altitude .... SET after GP capture
6. ALT Key .... PRESS to level off at the MDA for a LP+V or LNAV+V approach

At DA (LPV or LNAV/VNAV approach), or MDA and Missed Approach Point (LP+V or LNAV+V),

7. AP DISC / TRIM INT button .... PRESS, Continue visually for a normal landing

   Or

8. GO AROUND (GA) button .... PRESS, Execute Missed Approach Procedure
9. Apply GA power.

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

GPS APPROACH (LP, LNAV)

This procedure applies only if the optional GPS navigator is installed:

1. Navigation Source .... SELECT GPS on the CDI
2. Course Pointer .... VERIFY CDI set on the Desired Course

NOTE

Ensure that the current heading will result in a capture of the selected course.

3. NAV Key .... PRESS, verify GPS ARMED
4. GPS Mode .... VERIFY airplane Captures and Tracks GPS Course
5. Altitude Preselect .... SET to next required step down altitude
6. Missed Approach Altitude .... SET when in ALT mode at the MDA

At Missed Approach Point,

7. AP DISC / TRIM INT button .... PRESS, Continue visually for a normal landing

   Or

8. GO AROUND (GA) button .... PRESS, Execute Missed Approach Procedure
9. Apply GA power.

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

LOC BC APPROACH

This procedure applies only if the optional VHF and GPS navigator is installed:

1. Navigation Source .... SELECT CDI to VHF Nav
   Tune and Identify an ILS station frequency
2. Course Pointer .... SET CDI to LOC Front Course

NOTE

Ensure that the current heading will result in a capture of the selected course.

3. NAV Key .... PRESS, verify BC ARMED
   (when heading is within 75 degrees of Back Course)
4. BC Mode .... VERIFY airplane Captures and Tracks Back Course
5. Altitude Preselect .... SET to next required step down altitude
6. Missed Approach Altitude .... SET when in ALT mode at the MDA

At Missed Approach Point:

7. AP DISC / TRIM INT button .... PRESS, Continue visually for a normal landing

   Or

8. GO AROUND (GA) button .... PRESS, Execute Missed Approach Procedure
9. Apply GA power.

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure

VOR APPROACH

This procedure applies only if the optional VHF navigator is installed:

1. Navigation Source..SELECT CDI to VHF Nav
   Tune and identify the station frequency
2. Course Pointer ....SET CDI to the Desired Course

NOTE

Ensure that the current heading will result in a capture of the selected course.

3. NAV Key..PRESS, verify VOR ARMED
4. VOR Mode ....VERIFY airplane Captures and Tracks VOR Course
5. Altitude Preselect ....SET to next required step down altitude
6. Missed Approach Altitude ....SET when in ALT mode at the MDA

At Missed Approach Point,

7. AP DISC / TRIM INT button ....PRESS, Continue visually for a normal landing

   Or

8. GO AROUND (GA) button ....PRESS, Execute Missed Approach Procedure
9. Apply GA power.

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

DISABLING ESP

ESP can be disabled on the G5 attitude indicator with the following procedure. ESP will default to "Enabled" on the next power cycle.

1. G5 Knob. .... PRESS
2. ESP .... SELECT
3. G5 Knob .... PRESS

ESP can be disabled on the G3X with the following procedure. ESP will default to "Enabled" on the next power cycle.

1. Autopilot Status Box .... TOUCH
2. ESP Button .... TOUCH
3. Back Button .... PRESS

ESP can be disabled on the GI 275 with the following procedure. ESP will default to "Enabled" on the next power cycle.

1. GI 275 Knob .... PRESS and HOLD
2. Options .... SELECT
3. ESP Button .... SELECT
4. Back Button .... PRESS and HOLD

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SECTION 5 – PERFORMANCE

No Change.

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SECTION 6 – WEIGHT AND BALANCE

No change to loading information. Refer to current weight and balance report and equipment list for changes to empty weight/moment and installed equipment.

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SECTION 7 – SYSTEM DESCRIPTION

AFCS OVERVIEW

The GFC 500 is a digital Automatic Flight Control System (AFCS). It is a two-axis autopilot, with optional 3rd axis yaw damper, and flight director system which provides the pilot with the following features:

G5 Outputs to Autopilot — The G5 flight instrument (when installed) provides attitude, rate, and acceleration information to the servos. Additionally, indicated airspeed, vertical speed, pressure altitude and GPS information are sent to the autopilot for mode control.

G3X Outputs to Autopilot — The G3X electronic flight instrument system provides attitude, rate, and acceleration information to the servos. Additionally, indicated airspeed, vertical speed, pressure altitude and GPS information are sent to the autopilot for mode control.

GI 275 Outputs to Autopilot — The GI 275 electronic flight instrument system provides attitude, rate, and acceleration information to the servos. Additionally, indicated airspeed, vertical speed, pressure altitude and GPS information are sent to the autopilot for mode control.

Flight Director (FD) — The flight director processing occurs in the G5, G3X, or GI 275 instrument. Selected modes for the flight director are displayed on the G5, G3X, or GI 275 autopilot status box.

The flight director provides:

- Command Bars showing pitch/roll guidance
- Vertical / lateral mode selection and processing

Autopilot (AP) — Autopilot operation occurs within the pitch, roll, and optional pitch trim servo. It also provides servo monitoring, and automatic flight control in response to flight director steering commands, attitude and rate information, and airspeed.

Optional Electric Pitch Trim — The pitch trim servo provides manual electric pitch trim capability when the autopilot is not engaged. The trim servo provides automatic pitch trim when the autopilot is engaged and the airplane is in the air. Automatic trim functionality is disabled on the ground.

Optional Yaw Damper (YD) — The yaw servo provides Dutch roll damping and turn coordination in response to yaw rate, roll angle, lateral acceleration, and airspeed.

GMC 507 — Pilot commands to the autopilot and flight director are entered through the GMC 507 autopilot mode panel. The GMC 507 contains internal sensors which calculate the aircraft attitude, attitude rate and accelerations. These inertial sensors are completely independent from the sensors within the G5, G3X, or GI 275 and the rest of the autopilot system, and are not used for the flight director, autopilot, or ESP functions. They are used solely to provide independent monitoring of the GFC 500.

Airspeed and Altitude Information — The GFC 500 requires airspeed and altitude information from the G5 instrument, the G3X system, or the GI 275 system.

Other components of the AFCS include the GSA 28 pitch, roll, and optional pitch trim servo, optional yaw servo, that also contain autopilot processors, control wheel mounted elevator trim switch (if trim servo is installed), control wheel mounted autopilot / yaw damper disconnect and trim interrupt button (AP DISC / TRIM INT), and a Go-Around (GA) button.

Underspeed Protection (USP) — The GFC 500 will provide Underspeed Protection when the autopilot is engaged.

When 81 MPH (70 KIAS) is approached, a visual MINSPD message will appear above the airspeed tape and the autopilot will lower the nose to maintain 81 MPH (70 KIAS). An aural "AIRSPEED, AIRSPEED" voice alert will sound for installations connected to an audio panel.

Underspeed Protection is exited automatically when airspeed exceeds 86 MPH (75 KIAS).

Overspeed Protection (OSP) — The GFC 500 will provide Overspeed Protection when the autopilot is engaged, and the airplane approaches the autopilot's maximum IAS Hold airspeed. When the airplane approaches the autopilot's maximum IAS Hold airspeed, a visual MAXSPD message will appear above the airspeed tape and the autopilot will raise the nose of the aircraft to avoid exceeding the maximum configured airspeed. An aural "AIRSPEED, AIRSPEED" voice alert will sound for installations connected to an audio panel. The range of IAS Hold airspeeds for specific models are shown in the AFCS VERTICAL MODES table below.

Overspeed Protection is exited automatically when airspeed decreases to an airspeed at least 5 MPH (4 KTS) below the maximum engagement speed.

Coupled Go-Around — Pressing the GA button will not disengage the autopilot. Instead, the autopilot will attempt to capture and track the flight director command bars. If insufficient airplane performance is available to follow the commands, the autopilot will enter Underspeed Protection mode at the minimum airspeed.

Electronic Stability and Protection (ESP) — The GFC 500 will provide Electronic Stability and Protection when the autopilot is not engaged.

Electronic Stability and Protection uses the autopilot servos to assist the pilot in maintaining the airplane in a safe flight condition within the airplane's normal pitch, roll and airspeed envelopes.

Electronic Stability and Protection is invoked when the pilot allows the airplane to exceed one or more conditions beyond normal flight defined below:

- Pitch attitude beyond normal flight (+20°, -15°)
- Roll attitude beyond normal flight (45°)
- High airspeed exceeding V_{NE} (For specific models, refer the ESP High Airspeed Engagement in the AFCS VERTICAL MODES table below)
- Low airspeed below normal flight (below 75 MPH (65 KIAS)

The conditions that are required for ESP to be available are:

- Pitch and Roll servos available
- Autopilot not engaged
- The GPS altitude above ground is more than 200 feet (for low airspeed mode)
- Aircraft is within the autopilot engagement envelope (+/-50° in pitch and +/-75° in roll)

Protection for excessive Pitch, Roll, and Airspeed is provided when the limit thresholds are first exceeded, which engages the appropriate servo in ESP mode at a nominal torque level to bring the airplane back within the normal flight envelope. If the airplane deviates further from the normal flight envelope, the servo torque will increase until the maximum torque level is reached in an attempt to return the airplane into the normal flight envelope. Once the airplane returns to within the normal flight envelope, ESP will deactivate the autopilot servos.

When the normal flight envelope thresholds have been exceeded for more than 10 seconds, ESP Level Mode is activated. Level Mode engages the autopilot to bring the airplane back into straight and level flight based on 0° roll angle and 0 FPM vertical speed. An aural "ENGAGING AUTOPILOT" alert (or a Sonalert tone) sounds and the Flight Director mode annunciation will indicate LVL for the pitch and roll modes.

Anytime an ESP mode is active, the pilot can interrupt ESP by using the Autopilot Disconnect (AP DISC / TRIM INT) switch, or simply override ESP by overpowering the autopilot servos. The pilot may also disable ESP through a G5, G3X, or GI 275 menu option.

The engagement and disengagement attitude limits are displayed with double hash marks on the roll indicator according to the airplane attitude and whether or not ESP is active in roll. When ESP is inactive (roll attitude within nominal limits) only the engagement limit indications are displayed in order to reduce clutter on the roll indicator.

Display symbology implemented for ESP is illustrated in the following figures.

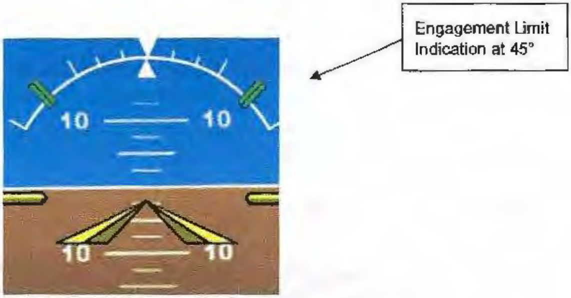

Figure 7-1: Nominal Roll Attitude ESP Engagement Limit Indications

Once ESP becomes active in roll, the engagement limit indication that was crossed (either Left or Right) will move to the lower disengagement limit indication. The opposite roll limit remains at the engagement limit.

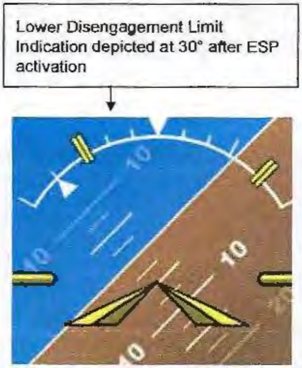

Figure 7-2: Engagement Limit Indications Upon ESP Activation

Disconnect Methods

The following conditions will cause the autopilot to automatically disconnect:

- Electrical power failure, including pulling the autopilot circuit breaker.
- Internal autopilot system failure (including internal AHRS failure).

The following pilot actions will cause the autopilot to disconnect:

- Pressing the red AP DISC / TRIM INT button on the pilot's control wheel.
- Actuating the manual electric trim switch (if installed).
- Pushing the AP Key on the GMC 507 mode controller when the autopilot is engaged.
- Pulling the autopilot circuit breaker.

The red AP DISC / TRIM INT button on the pilot's control wheel will interrupt power to the manual electric trim for as long as the switch is depressed.

AUTOPILOT CONTROL UNIT AND DISPLAY

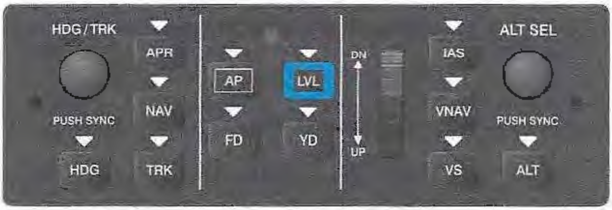

Figure 7-3: GMC 507 Control Unit (Reference Only)

Figure 7-4: G5 Display (Reference Only)

The following tables list the available AFCS vertical and lateral modes with their corresponding controls and annunciations. The UP/DN wheel can be used to change the vertical mode reference while operating in Pitch Hold, Vertical Speed, Altitude Hold, or IAS mode. Increments of change and maximum ranges of values for each of these references using the UP/DN wheel are also listed in the table.

AFCS VERTICAL MODES

Vertical Mode	Control	Annunciation	Reference Range	Reference Change Increment
Pitch Hold	(default)	PIT	20° Nose Up 15° Nose Down	0.5°
Selected Altitude Capture	(1)	ALTS		
Altitude Hold	**ALT** Key	ALT nnnnn		10 FT
Vertical Speed	**VS** Key	VS nnnn	-2000 to +2000 FPM	100 FPM
IAS Hold	**IAS** Key	IAS nnn	81 to 182 MPH (70 to 158 KIAS)	1 MPH (1 KT)
Vertical Path Tracking (VNAV)	**VNAV** Key	VNAV		
VNAV Target Altitude Capture	(2)	ALTV		
Glidepath	**APR** Key	GP		
Glideslope	**APR** Key	GS		
Takeoff or Go Around	**GA** Button	TO or GA	7°	
Level (LVL)	**LVL** Key	LVL	Zero Vertical Speed	
ESP High Pitch Engagement			ESP High Pitch Attitude engages at 20° nose up	
ESP Low Pitch Engagement			ESP Low Pitch Attitude engages at 15° nose down	
ESP High Airspeed Engagement			ESP High Airspeed engages at 194 MPH (169 KIAS)	
ESP Low Airspeed Engagement			When above 200 FT AGL, ESP Low Airspeed engages at 75 MPH (65 KIAS). (This mode only available if height above terrain is available from a compatible Garmin GPS).	

(1) ALTS arms automatically when PIT, VS, IAS, or GA is active and when VNAV is active if the Selected Altitude is to be captured instead of the VNAV Target Altitude.

(2) ALTV arms automatically if the VNAV Target Altitude is to be captured instead of the Selected Altitude.

AFCS LATERAL MODES

Lateral Mode	Control	Annunciation	Maximum Roll Command Limit
Roll Mode	(default)	ROL	30°
Heading Select	**HDG** Key	HDG	30°
Track Select	**TRK** Key	TRK	30°
Navigation, GPS Arm/Capture/Track	**NAV** Key	GPS	30°
Navigation, VOR Enroute and Approach Arm/Capture/Track		VOR	30°
Navigation, LOC Arm/Capture/Track (No Glideslope)		LOC	30°
Backcourse Arm/Capture/Track		BC	30°
Approach, GPS Arm/Capture/Track (Glidepath Mode Automatically Armed, if available)	**APR** Key	GPS	30°
Approach, ILS Arm/Capture/Track (Glideslope Mode Automatically Armed)		LOC	30°
Takeoff or Go Around	**GA** Button	TO or GA	Wings Level
LVL (Level)	**LVL** Key	LVL	Wings Level
ESP Roll Attitude Engagement	ESP Roll Attitude engages at 45°		

The autopilot may be engaged within the following ranges:

Pitch 50° nose up to 50° nose down

Roll ±75°

If the above pitch or roll limits are exceeded while the autopilot is engaged, the autopilot will disconnect. Engaging the autopilot outside of its command limits, but within its engagement limits, will cause the autopilot to return the aircraft within command limits. The autopilot is capable of commanding the aircraft in the following ranges:

Pitch 20° nose up to 15° nose down

Roll ±30°

PREFLIGHT TEST

During the preflight test the G5, G3X, or GI 275 will display PFT in the autopilot status box. At the completion of the preflight test, the PFT annunciation is removed. If GFC 500 fails the PFT, a yellow AP with a red X is displayed in the autopilot status box on the G5, G3X, or GI 275.

MESSAGES AND ANNUNCIATIONS

Autopilot Messages	
AFCS Controller Key Stuck	The system has sensed a key input on the GMC 507 for 30 seconds or longer.
AFCS Controller Audio Database Missing	The audio database is missing from the GMC 507. The aural voice alerts will not be heard.
Servo Clutch Fault	One or more autopilot servos has a stuck clutch. The servo needs service.
Servo Trim Input Fault	The inputs to the trim system are invalid. The trim system needs service.
Autopilot Annunciations	
AFCS	Autopilot has failed. Autopilot and Manual Electric Pitch Trim are inoperative and flight director is not available.
AP	Autopilot normal disconnect.
AP	Autopilot abnormal disconnect.
~~AP~~	Autopilot has failed. The autopilot is inoperative. FD modes may still be available.
MAXSPD	Autopilot Overspeed Protection mode is active. Autopilot will raise the nose to limit the aircraft's speed.
MINSPD	Autopilot Underspeed Protection mode is active. Autopilot will lower the nose to prevent the aircraft's speed from decreasing.
PFT	Autopilot preflight test is in progress.
PTRIM	Pitch Trim Fail – Manual Electric Pitch Trim is inoperative.
TRIM DOWN	Elevator Trim Down – Autopilot is holding elevator nose down force. The pitch trim needs to be adjusted nose down.
TRIM UP	Elevator Trim Up – Autopilot is holding elevator nose up force. The pitch trim needs to be adjusted nose up.
YD	Yaw Damper normal disconnect.
YD	Yaw Damper abnormal disconnect.
~~YD~~	Yaw Damper has failed. The Yaw Damper is inoperative.

LIGHTING

When the aircraft's dimming bus is selected off, or full dim, GMC 507 mode control panel lighting is controlled by integrated photocells which sense the ambient cockpit lighting. When the aircraft's dimming bus is used to control cockpit lighting, the GMC 507 mode control panel lighting is controlled by the dimming bus.

Garmin International, Inc.
1200 E. 151st Street
Olathe, Kansas 66062 U.S.A.

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL AIRPLANE FLIGHT MANUAL

for the

Garmin GTX 33X and GTX 3X5 Transponders with ADS-B

as installed in

BEECH C24R

Make and Model Airplane

Registration Number: N38566 Serial Number: MC-755

This document serves as an FAA Approved Airplane Flight Manual Supplement or Supplemental Airplane Flight Manual when the GTX 33X or GTX 3X5 with ADS-B is installed in accordance with Supplemental Type Certificate SA01714WI. This document must be incorporated into the FAA Approved Airplane Flight Manual or provided as an FAA Approved Supplemental Airplane Flight Manual.

The information contained herein supplements the FAA approved Airplane Flight Manual. For limitations, procedures, loading and performance information not contained in this document, refer to the FAA approved Airplane Flight Manual, markings, or placards.

FAA Approved By: [signature]

Michael Warren
ODA STC Unit Administrator
Garmin International, Inc.
ODA-240087-CE

Date: 08-MAR-2016

LOG OF REVISIONS				
	Page			
Revision Number	Date	Number	Description	FAA Approved
1	05/01/2013	All	Complete Supplement	Robert Murray Robert Murray ODA STC Unit Administrator Garmin International, Inc ODA-240087-CE Date: 05/01/2013
2	03/08/2016	All	New supplement format with GTX 3X5 added.	See cover page

Table of Contents

Section 1. GENERAL

1.1 GTX 33X

The Garmin GTX 33X family consists of the GTX 330 ES and GTX 33 ES (Non-Diversity Mode S Transponders) and the GTX 330D ES and GTX 33D ES (Diversity Mode S Transponders). The ES option of any of the transponders provides ADS-B extended squitter functionality.

All Garmin GTX 33X transponders are a radio transmitter/receiver that operates on radar frequencies, receiving ground radar or TCAS interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. Each unit is equipped with IDENT capability and will reply to ATCRBS Mode A, Mode C and Mode S All-Call interrogation. Interfaces to the GTX 33X are shown in the following block diagrams.

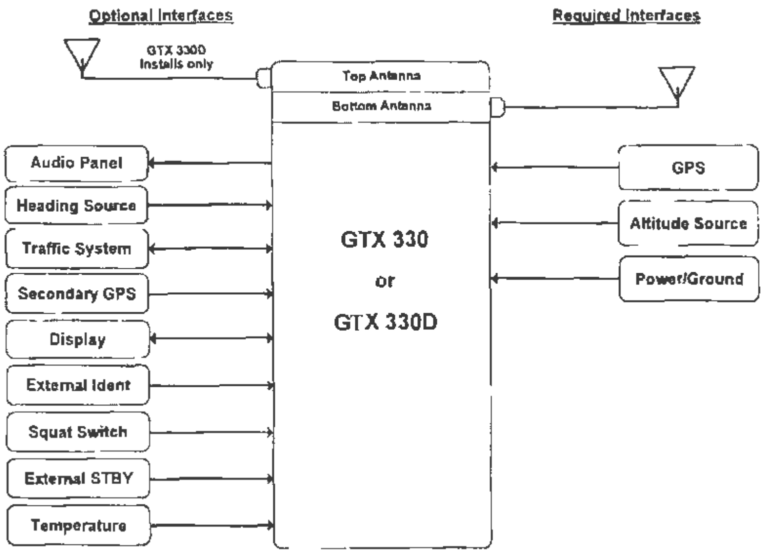

Figure 1 – GTX 330 or GTX 33D Interface Summary

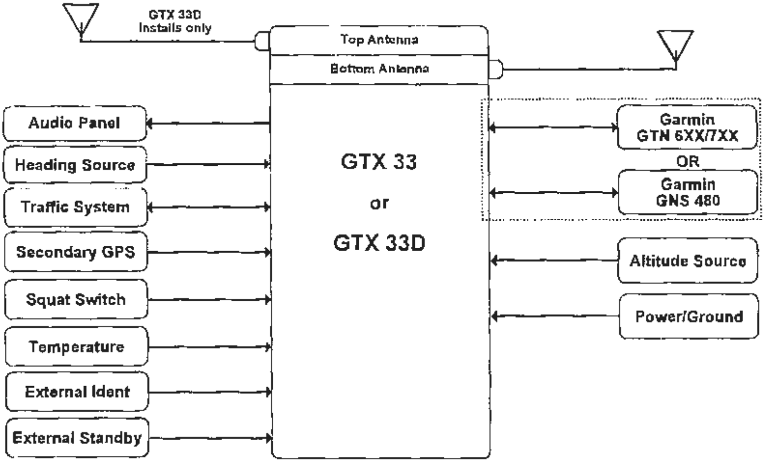

Figure 2 – GTX 33 or GTX 33D Interface Summary

The GTX 33X performs the following functions:

- Transmission of ADS-B out data on 1090 extended squitter (1090ES) (1090 MHz)
  - Integration of data from internal and external sources to transmit the following data per 14 CFR 91.227:
    - GPS Position, Altitude, and Position Integrity
    - Ground Track and/or Heading, Ground Speed, and Velocity Integrity
    - Air Ground Status
    - Flight ID, Call Sign, ICAO Registration Number
    - Capability and Status Information
    - Transponder Squawk Code, IDENT, and Emergency Status
  - Pressure Altitude Broadcast Inhibit
- Reception of TIS-A traffic data from a ground station
- Provide TIS-A traffic alerting to the pilot via interfaced display and audio output

1.2 GTX 3X5

The Garmin GTX 3X5 family consists of the GTX 335, 335R, 345, and 345R transponders. The functional differences between each of these transponders are described in Table 1.

Function	GTX 335	GTX 335 w GPS	GTX 335R	GTX 335R w GPS	GTX 345	GTX 345 w GPS	GTX 345R	GTX 345R w GPS
Panel mount	x	x			x	x		
Remote mount			x	x			x	x
Mode S	x	x	x	x	x	x	x	x
ADS-B (out)	x	x	x	x	x	x	x	x
ADS-B Traffic					x	x	x	x
FIS-B					x	x	x	x
Internal GPS		x		x		x		x
Bluetooth					x	x	x	x
Optional Garmin Altitude Encoder	x	x	x	x	x	x	x	x

Table 1 – GTX 3X5 Unit Configurations

Interfaces to the GTX 3X5 are shown in Figure 3.

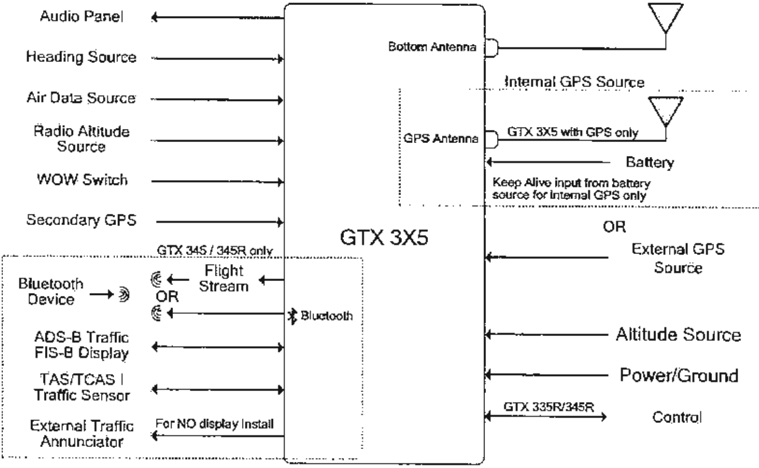

Figure 3 – GTX 3X5 Interface Summary

The GTX 3X5 performs the following functions:

- Transmission of ADS-B out data on 1090 extended squitter (1090ES) (1090 MHz)
    - Integration of data from internal and external sources to transmit the following data per 14 CFR 91.227:
        - GPS Position, Altitude, and Position Integrity
        - Ground Track and/or Heading, Ground Speed, and Velocity Integrity
        - Air Ground Status
        - Flight ID, Call Sign, ICAO Registration Number
        - Capability and Status Information
        - Transponder Squawk Code, IDENT, and Emergency Status
    - Pressure Altitude Broadcast Inhibit

The GTX 335 performs the following additional functions:

- Reception of TIS-A traffic data from a ground station
- Provide TIS-A traffic alerting to the pilot via interfaced display and audio output.

The GTX 345 performs the following additional functions:

- Reception of ADS-B In data on 1090 MHz
  - ADS-B (Data directly from another transmitting aircraft)
  - ADS-R (Rebroadcast of ADS-B data from a ground station)
- Reception of ADS-B In data on UAT (978 MHz)
  - ADS-B (Data directly from another transmitting aircraft)
  - ADS-R (Rebroadcast of ADS-B data from a ground station)
  - TIS-B (Broadcast of secondary surveillance radar) (SSR) derived traffic information from a ground station.
  - FIS-B (Broadcast of aviation data from a ground station)
- Provide ADS-B traffic information and alerting to the pilot via an interfaced display
  - Correlation and consolidation of traffic data from multiple traffic sources
  - Aural and visual traffic alerting
- Provide FIS-B data to the pilot via an interfaced display
  - Graphical and textual weather products
    - NEXRAD
    - PIREPs
    - AIRMET/SIGMETs
    - METARs
    - TAFs
    - Winds Aloft
  - Aviation Data
    - TFRs
    - NOTAMs

1.3 Capabilities

The Garmin GTX 33X and GTX 3X5 as installed in this aircraft have been shown to meet the equipment requirements of 14 CFR § 91.227 when operating in accordance with sections 2.1 and 2.2 of this supplement.

Installation Configuration

This aircraft is equipped with a GTX 33X and/or GTX 3X5 with the following interfaces/ features:

Equipment Installed:

Transponder #1	Transponder #2 (if installed)
☐ GTX 330	☐ GTX 330
☐ GTX 330D	☐ GTX 330D
☐ GTX 33	☐ GTX 33
☐ GTX 33D	☐ GTX 33D
☐ GTX 335	☐ GTX 335
☐ GTX 335R	☐ GTX 335R
☒ GTX 345	☐ GTX 345
☐ GTX 345R	☐ GTX 345R

Interfaced GPS/SBAS Position Source(s):

GPS #1	GPS #2 (if installed)
☐ Internal	☐ Internal
☑ GTN 6XX/7XX Series	☐ GTN 6XX/7XX Series
☐ GNS 400W/500W Series	☐ GNS 400W/500W Series
☐ GNS 480	☐ GNS 480
☐ GIA 63	☐ GIA 63
☐ GDL 88 (GTX 330 only)	☐ GDL 88 (GTX 330 only)

Interfaced Pressure Altitude Source:

Pressure Altitude Source #1	Pressure Altitude Source #2 (if installed)
☒ ____________________	☐ ____________________
☐ Garmin Altitude Encoder	☐ Garmin Altitude Encoder

Interfaced Remote Control Display (Required for remotely mounted GTX variants):

Transponder #1 Remote Control Display

- ☐ GTN 6XX/7XX
- ☐ GNS 480
- ☐ G950/1000 Display

Transponder #2 Remote Control Display (if installed)

- ☐ GTN 6XX/7XX
- ☐ GNS 480
- ☐ G950/1000 Display

Interfaced Active Traffic System:

- ☒ None
- ☐ TCAD
- ☐ TAS/TCAS

NOTE

If the system includes all of the following components:

- GTX 345R,
- G950/1000 Display, and
- TCAD or TAS/TCAS

Then the aircraft is no longer equipped with a TSO compliant active TCAD, TAS or TCAS system. Any operational requirement to be equipped with such system is no longer met.

The following terminology is used within this document:

ADS-B: Automatic Dependent Surveillance-Broadcast

AFM: Airplane Flight Manual

AFMS: Airplane Flight Manual Supplement

ATCRBS: Air Traffic Control Radar Beacon System

CFR: Code of Federal Regulations

ES: Extended Squitter

GNSS: Global Navigation Satellite System

GNS: Garmin Navigation System

GPS: Global Positioning System

GTX: Garmin Transponder

GTN: Garmin Touchscreen Navigator

ICAO: International Civil Aviation Organization

LRU: Line Replaceable Unit

PABI: Pressure Altitude Broadcast Inhibit

POH: Pilot Operating Handbook

SBAS: Satellite-Based Augmentation System

SW: Software

TCAS: Traffic Collision Avoidance System

TIS: Traffic Information Service

TX: Transmit

2.1 Minimum Equipment

The GTX 33X and GTX 3X5 must have the following system interfaces fully functional in order to be compliant with the requirements for 14 CFR 91.227 ADS-B Out operations:

Interfaced Equipment	Number Installed	Number Required
Uncorrected Pressure Altitude Source	1	1
GPS SBAS Position Source	1 or more	1
Remote Control Display (for remotely mounted transponders)	1 or more	1

Table 2 – Required Equipment

2.2 ADS-B Out

The GTX 33X and GTX 3X5 only comply with 14 CFR 91.227 for ADS-B Out when all required functions are operational. When the system is not operational, ADS-B Out transmit failure messages will be present on the remote control display interface, or the GTX 330 or GTX 3X5 panel display.

2.3 TIS Traffic Display with User Navigation Angle

Display of TIS traffic from a GTX 33/330 or GTX 335 is not permitted with an interfacing display configured for a navigation angle of "user".

This AFMS/AFM is applicable to the software versions shown in Table 3.

The Main GTX software version is displayed on the splash screen during start up for the GTX 330 and GTX 3X5 panel mounted units, and the External LRU or System page on the interfaced remote control display for remotely mounted GTX transponders.

Software Item	Software Version *(or later FAA Approved versions for this STC)*
GTX 33X Main SW Version	8.02
GTX 3X5 Main SW Version	2.02

Table 3 - Software Versions

2.5 Pressure Altitude Broadcast Inhibit (PABI)

Pressure Altitude Broadcast Inhibit shall only be enabled when requested by Air Traffic Control while operating within airspace requiring an ADS-B Out compliant transmitter per 14 CFR 91.227. PABI is enabled by selecting the GTX to ON mode.

2.6 Datalinked Weather Display (GTX 345 Only)

Do not use datalink weather information for maneuvering in, near, or around areas of hazardous weather. Information provided by datalink weather products may not accurately depict current weather conditions.

Do not use the indicated datalink weather product age to determine the age of the weather information shown by the datalink weather product. Due to time delays inherent in gathering and processing weather data for datalink transmission, the weather information shown by the datalink weather product may be significantly older than the indicated weather product age.

Do not rely solely upon datalink services to provide Temporary Flight Restriction (TFR) or Notice to Airmen (NOTAM) information.

2.7 Portable Electronic Devices

This STC does not relieve the operator from complying with the requirements of 91.23 or any other operational regulation regarding portable electronic devices.

3.1 Emergency Procedures

No Change.

3.2 Abnormal Procedures

3.2.1 LOSS OF AIRCRAFT ELECTRICAL POWER GENERATION

XPDR Circuit Breaker .... **PULL**

Transponder and ADS-B Out functions will no longer be available.

NOTE

> This guidance is supplementary to any guidance provided in the POH or AFM for the installed aircraft for loss of power generation.

3.2.2 LOSS OF GPS/SBAS POSITION DATA

When the GPS/SBAS receiver is inoperative or GPS position information is not available or invalid, the GTX will no longer be transmitting ADS-B Out data.

For GTX 330 installations:

NO ADSB annunciator illuminated:

Interfaced GPS position sources .... **VERIFY VALID POSITION**

For GTX 3X5 installations:

NO 1090ES TX annunciator illuminated:

Interfaced GPS position sources .... **VERIFY VALID POSITION**

For GTX 33 and GTX 3X5R installations:

Reference Display Device documentation for applicable annunciation:

Interfaced GPS position sources .... **VERIFY VALID POSITION**

If Transponder #1 fails and Transponder #2 is activated by the pilot, the G1000 display will provide nuisance alerts unless power is removed from Transponder #1.

Transponder #1 Failed, Transponder #2 Active

Transponder #1 Circuit Breaker .... **PULL**

Section 4. NORMAL PROCEDURES

The procedures described below are specific only to the panel mounted GTX 330 or GTX 3X5 transponders. Cockpit Reference Guides and Pilot Guides for interfaced remote control displays will provide additional operating information specific to the displays or other traffic systems.

ADS-B Out functionality resides within the GTX transponders thereby providing a single point of entry for Mode 3/A code, Flight ID, IDENT functionality and activating or deactivating emergency status for both transponder and ADS-B Out functions. Details on performing these procedures are located in the GTX 330/330D Pilot's Guide and GTX 3X5 Series Transponder Pilot's Guide.

4.1 Unit Power On

For GTX 330 installations:

GTX Mode .... **VERIFY ALT**
NO ADSB .... **CONSIDERED**

For GTX 3X5 installations:

GTX Mode .... **VERIFY ALT**
NO 1090ES TX .... **CONSIDERED**

NOTE

The NO ADS-B or NO 1090ES TX Annunciation (or associated display annunciations) may illuminate as the unit powers on and begins to receive input from external systems, to include the SBAS position source.

For GTX 330 installations:

ADS-B TX .... **VERIFY ON**
NO ADSB .... **EXTINGUISHED**

For GTX 3X5 installations:

1090ES TX CTL.. **VERIFY ON**
NO 1090ES TX .... **EXTINGUISHED**

NOTE

The ADS-B TX or 1090ES TX CTL must be turned on and the NO ADS-B or NO 1090ES TX Annunciation (or associated display annunciations) must be **EXTINGUISHED** for the system to meet the requirements specified in 14 CFR 91.227. This system must be operational in certain airspaces after January 1, 2020 as specified by 14 CFR 91.225.

Section 5. PERFORMANCE

No change.

Section 6. WEIGHT AND BALANCE

See current weight and balance data.

Section 7. SYSTEM DESCRIPTION

The Garmin GTX 330 and GTX 3X5 Pilot's Guides, part numbers, and revisions listed below contain additional information regarding GTX system description, control, and function.

Title	Part Number	Revision
GTX 330 Pilot's Guide	190-00207-00	Rev. G (or later)
GTX 3X5 Pilot's Guide	190-01499-00	Rev. A (or later)

Pilot's Guides for interfaced displays, part numbers and revisions listed below, provide additional operating information for the Garmin GTX 33 and GTX 3X5R.

Title	Part Number	Revision
Garmin GTN 725/750 Pilot's Guide	190-01007-03	Rev. E (or later)
Garmin GTN 625/635/650 Pilot's Guide	190-01004-03	Rev. E (or later)
GNS 480 Pilot's Guide	190-00502-00	Rev. D (or later)
GTX 3X5 Series Transponder G1000 Pilot's Guide	190-01499-01	Rev. A (or later)

7.1 GTX TIS Behavior

The TIS Standby/Operate controls for GTX 33/330 and GTX 335 units only function when the aircraft is airborne.

7.2 GTX 345R and G950/1000 No Bearing Traffic Alerts

No visual indication is provided for no bearing traffic alerts. Only an aural indication of the no bearing traffic alert is provided. If an aural alert for no bearing traffic has been previously issued, a "no bearing traffic clear" aural indication will be provided once all traffic alerts are resolved.

All aural alerts are inhibited below 500' AGL, therefore a "no bearing traffic clear" aural may not be heard in a landing or touch and go flight scenario.

SECTION X
SAFETY INFORMATION
TABLE OF CONTENTS

SUBJECT *PAGE*

SECTION X
SAFETY INFORMATION
TABLE OF CONTENTS (Continued)

INTRODUCTION

Beech Aircraft Corporation has developed this special summary publication of safety information to refresh pilots' and owners' knowledge of safety related subjects. Topics in this publication are dealt with in more detail in FAA Advisory Circulars and other publications pertaining to the subject of safe flying.

The skilled pilot recognizes that safety consciousness is an integral - and never-ending - part of his or her job. Be thoroughly familiar with your airplane. Know its limitations and your own. Maintain your currency, or fly with a qualified instructor until you are current and proficient. Practice emergency procedures at safe altitudes and airspeeds, preferably with a qualified instructor pilot, until the required action can be accomplished without reference to the manual. Periodically review this safety information as part of your recurrency training regimen.

BEECHCRAFT airplanes are designed and built to provide you with many years of safe and efficient transportation. By maintaining your BEECHCRAFT properly and flying it prudently you will realize its full potential.

. . . . Beech Aircraft Corporation

WARNING

> Because your airplane is a high performance, high speed transportation vehicle, designed for operation in a three-dimensional environment, special safety precautions must be observed to reduce the risk of fatal or serious injuries to the pilot(s) and occupant(s).

It is mandatory that you fully understand the contents of this publication and the other operating and maintenance manuals which accompany the airplane; that FAA requirements for ratings, certifications and review be scrupulously complied with; and that you allow only persons who are properly licensed and rated, and thoroughly familiar with the contents of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual to operate the airplane.

IMPROPER OPERATION OR MAINTENANCE OF AN AIRPLANE, NO MATTER HOW WELL BUILT INITIALLY, CAN RESULT IN CONSIDERABLE DAMAGE OR TOTAL DESTRUCTION OF THE AIRPLANE, ALONG WITH SERIOUS OR FATAL INJURIES TO ALL OCCUPANTS.

GENERAL

As a pilot, you are responsible to yourself and to those who fly with you, to other pilots and their passengers and to people on the ground, to fly wisely and safely.

The following material in this Safety Information publication covers several subjects in limited detail. Here are some condensed Do's and Don'ts.

DO'S

Be thoroughly familiar with your airplane, know its limitations and your own.

Be current in your airplane, or fly with a qualified instructor until you are current. Practice until you are proficient.

Preplan all aspects of your flight - including a proper weather briefing and adequate fuel reserves.

Use services available - weather briefing, inflight weather and Flight Service Station.

Carefully preflight your airplane.

Use the approved checklist.

Have more than enough fuel for takeoff, plus the trip, and an adequate reserve.

Be sure your weight and C.G. are within limits.

Use seatbelts and shoulder harnesses at all times.

Be sure all loose articles and baggage are secured.

Check freedom and proper direction of operation of all controls during preflight inspection.

Maintain the prescribed airspeeds in takeoff, climb, descent, and landing.

Avoid wake turbulence (Vortices).

Preplan fuel and fuel tank management before the actual flight. Utilize auxiliary tanks only in level cruise flight. Take off and land on the fullest main tank, NEVER use auxiliary tanks for takeoff or landing.

Practice emergency procedures at safe altitudes and airspeeds, preferably with a qualified instructor pilot, until the required action can be accomplished without reference to the manual.

Keep your airplane in good mechanical condition.

Stay informed and alert; fly in a sensible manner.

DON'TS

Don't take off with frost, ice or snow on the airplane.

Don't take off with less than minimum recommended fuel, plus adequate reserves, and don't run the tank dry before switching.

Don't fly in a reckless, show-off, or careless manner.

Don't fly into thunderstorms or severe weather.

Don't fly in possible icing conditions.

Don't fly close to mountainous terrain.

Don't apply controls abruptly or with high forces that could exceed design loads of the airplane.

Don't fly into weather conditions that are beyond your ratings or current proficiency.

Don't fly when physically or mentally exhausted or below par.

Don't trust to luck.

SOURCES OF INFORMATION

There is a wealth of information available to the pilot created for the sole purpose of making your flying safer, easier and more efficient. Take advantage of this knowledge and be prepared for an emergency in the event that one should occur.

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

You must be thoroughly familiar with the contents of your operating manuals, placards, and check lists to ensure safe utilization of your airplane. When the airplane was manufactured, it was equipped with one or more of the following: placards, Owner's Manual, FAA Approved Airplane Flight Manual, FAA Approved Airplane Flight Manual Supplements, Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. Beech has revised and reissued many of the early manuals for certain models of airplanes in GAMA Standard Format as Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals. For simplicity and convenience, all official manuals in various models are referred to as the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If the airplane has changed ownership, the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual may have been misplaced or may not be current. Replacement handbooks may be obtained from any BEECHCRAFT Authorized Outlet.

BEECHCRAFT SERVICE PUBLICATIONS

Beech Aircraft Corporation publishes a wide variety of manuals, service letters, service instructions, service bulletins, safety communiques and other publications for the various models of BEECHCRAFT airplanes. Information on how to obtain publications relating to your airplane is contained in BEECHCRAFT Service Bulletin number 2001, entitled "General - BEECHCRAFT Service Publications - What is Available and How to Obtain It."

Beech Aircraft Corporation automatically mails original issues and revisions of BEECHCRAFT Service Bulletins (Mandatory, Recommended and Optional), FAA Approved Airplane Flight Manual Supplements, reissues and revisions of FAA Approved Airplane Flight Manuals, Flight Handbooks, Owners Manuals, Pilot's Operating Manuals and Pilot's Operating Handbooks, and original issues and revisions of BEECHCRAFT Safety Communiques to BEECHCRAFT Owner addresses as listed by the FAA Aircraft Registration Branch List and the BEECHCRAFT International Owner Notification Service List. While this information is distributed by Beech Aircraft Corporation, Beech can not make changes in the name or address furnished by the FAA. The owner must contact the FAA regarding any changes to name or address. Their address is: FAA Aircraft Registration Branch (AAC250) P.O. Box 25082, Oklahoma City, OK 73125, Phone (405) 680-2131.

It is the responsibility of the FAA owner of record to ensure that any mailings from Beech are forwarded to the proper persons. Often the FAA registered owner is a bank or financing company or an individual not in possession of the airplane. Also, when an airplane is sold, there is a lag in processing the change in registration with the FAA. If you are a new owner, contact your BEECHCRAFT Authorized Outlet and ensure your manuals are up to date.

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For owners who choose not to apply for a Publications Revision Subscription Service, Beech provides a free Owner Notification Service by which owners are notified by post card of BEECHCRAFT manual reissues, revisions and supplements which are being issued applicable to the airplane owned. On receipt of such notification, the owner may obtain the publication through a BEECHCRAFT Authorized Outlet. This notification service is available when requested by the owner. This request may be made by using the owner notification request card furnished with the loose equipment of each airplane at the time of delivery, or by a letter requesting this service, referencing the specific airplane serial number owned. Write to:

Supervisor, Special Services
Dept. 52
Beech Aircraft Corporation
P.O. Box 85
Wichita, Kansas 67201-0085

From time to time Beech Aircraft Corporation issues BEECHCRAFT Safety Communiques dealing with the safe operation of a specific series of airplanes, or airplanes in general. It is recommended that each owner/operator maintain a current file of these publications. Back issues of BEECHCRAFT Safety Communiques may be obtained without charge by sending a request, including airplane model and serial number, to the Supervisor, Special Services, at the address listed above.

Airworthiness Directives (AD's) are not issued by the manufacturer. They are issued and available from the FAA.

FEDERAL AVIATION REGULATIONS

FAR Part 91, General Operating and Flight Rules, is a document of law governing operation of airplanes and the owner's and pilot's responsibilities. Some of the subjects covered are:

Responsibilities and authority of the pilot-in-command

Certificates required

Liquor and drugs

Flight plans

Preflight action

Fuel requirements

Flight rules

Maintenance, preventive maintenance, alterations, inspection and maintenance records

You, as a pilot, have responsibilities under government regulations. The regulations are designed for your protection and the protection of your passengers and the public. Compliance is mandatory.

AIRWORTHINESS DIRECTIVES

FAR Part 39 specifies that no person may operate a product to which an Airworthiness Directive issued by the FAA applies, except in accordance with the requirements of that Airworthiness Directive.

AIRMAN'S INFORMATION MANUAL

The Airman's Information Manual (AIM) is designed to provide airmen with basic flight information and ATC procedures for use in the national airspace system of the United States. It also contains items of interest to pilots concerning health and medical facts, factors affecting flight safety, a pilot/controller glossary of terms in the Air Traffic Control system, information on safety, and accident/hazard reporting. It is revised at six-month intervals and can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

This document contains a wealth of pilot information. Among the subjects are:

Controlled Airspace
Emergency Procedures
Services Available to Pilots
Weather and Icing
Radio Phraseology and Technique
Mountain Flying
Airport Operations
Wake Turbulence - Vortices
Clearances and Separations
Medical Facts for Pilots
Preflight
Bird Hazards
Departures - IFR
Good Operating Practices
En route - IFR
Airport Location Directory
Arrival - IFR

All pilots must be thoroughly familiar with and use the information in the AIM.

ADVISORY INFORMATION

NOTAMS (Notices to Airmen) are documents that have information of a time-critical nature that would affect a pilot's decision to make a flight; for example, an airport closed, terminal radar out of service, or enroute navigational aids out of service.

FAA ADVISORY CIRCULARS

The FAA issues Advisory Circulars to inform the aviation public in a systematic way of nonregulatory material of interest. Advisory Circulars contain a wealth of information with which the prudent pilot should be familiar. A complete list of current FAA Advisory Circulars is published in AC 00-2, which lists Advisory Circulars that are for sale, as well as those distributed free of charge by the FAA, and provides ordering information. Many Advisory Circulars which are for sale can be purchased locally in aviation bookstores or at FBO's. These documents are subject to periodic revision. Be certain the Advisory Circular you are using is the latest revision available. Some of the Advisory Circulars of interest to pilots are:

***00-6**	Aviation Weather
00-24	Thunderstorms
00-30	Rules of Thumb for Avoiding or Minimizing Encounters with Clear Air Turbulence
***00-45**	Aviation Weather Services
00-46	Aviation Safety Reporting Program
20-5	Plane Sense
20-32	Carbon Monoxide (CO) Contamination in Aircraft - Detection and Prevention
20-35	Tie-Down Sense
20-43	Aircraft Fuel Control
20-105	Engine Power-Loss Accident Prevention
20-113	Pilot Precautions and Procedures to be Taken in Preventing Aircraft Reciprocating Engine Induction System & Fuel System Icing Problems
20-125	Water in Aviation Fuel

21-4	Special Flight Permits for Operation of Overweight Aircraft
43-9	Maintenance Records: General Aviation Aircraft
43-12	Preventive Maintenance
60-4	Pilot's Spatial Disorientation
60-6	Airplane Flight Manuals (AFM), Approved Manual Materials, Markings and Placards - Airplanes
60-12	Availability of Industry-Developed Guidelines for the Conduct of the Biennial Flight Review
60-13	The Accident Prevention Counselor Program
*61-9	Pilot Transition Courses for Complex Single-Engine and Light Twin-Engine Airplanes
*61-21	Flight Training Handbook
*61-23	Pilot's Handbook of Aeronautical Knowledge
*61-27	Instrument Flying Handbook
61-67	Hazards Associated with Spins in Airplanes Prohibited from Intentional Spinning.
61-84	Role of Preflight Preparation
*67-2	Medical Handbook for Pilots
90-23	Aircraft Wake Turbulence
90-42	Traffic Advisory Practices at Nontower Airports

90-48	Pilot's Role in Collision Avoidance
90-66	Recommended Standard Traffic Patterns for Airplane Operations at Uncontrolled Airports
90-85	Severe Weather Avoidance Plan (SWAP)
91-6	Water, Slush and Snow on the Runway
91-13	Cold Weather Operation of Aircraft
*91-23	Pilot's Weight and Balance Handbook
91-26	Maintenance and Handling of Air Driven Gyroscopic Instruments
91-33	Use of Alternate Grades of Aviation Gasoline for Grade 80/87 and Use of Automotive Gasoline
91-35	Noise, Hearing Damage, and Fatigue in General Aviation Pilots
91-43	Unreliable Airspeed Indications
91-44	Operational and Maintenance Practices for Emergency Locator Transmitters and Receivers
91-46	Gyroscopic Instruments - Good Operating Practices
91-50	Importance of Transponder Operations and Altitude Reporting
91-51	Airplane Deice and Anti-ice Systems
91-59	Inspection and Care of General Aviation Aircraft Exhaust Systems
91-65	Use of Shoulder Harness in Passenger Seats

103-4	Hazards Associated with Sublimation of Solid Carbon Dioxide (Dry Ice) Aboard Aircraft
210-5A	Military Flying Activities

*** For Sale**

FAA GENERAL AVIATION NEWS

FAA General Aviation News is published by the FAA in the interest of flight safety. The magazine is designed to promote safety in the air by calling the attention of general aviation airmen to current technical, regulatory and procedural matters affecting the safe operation of airplanes. FAA General Aviation News is sold on subscription by the Superintendent of Documents, Government Printing Office, Washington D.C., 20402.

FAA ACCIDENT PREVENTION PROGRAM

The FAA assigns accident prevention specialists to each Flight Standards and General Aviation District Office to organize accident prevention program activities. In addition, thera are over 3,000 volunteer airmen serving as accident prevention counselors, sharing their technical expertise and professional knowledge with the general aviation community. The FAA conducts seminars and workshops, and distributes invaluable safety information under this program.

Usually the airport manager, the FAA Flight Service Station (FSS), or Fixed Base Operator (FBO), will have a list of accident prevention counselors and their phone numbers available. All Flight Standards and General Aviation District Offices have a list of the counselors serving the District.

Before flying over unfamiliar territory, such as mountainous terrain or desert areas, it is advisable for transient pilots to consult with local counselors. They will be familiar with the more desirable routes, the wind and weather conditions, and the service and emergency landing areas that are available along the way. They can also offer advice on the type of emergency equipment you should be carrying.

ADDITIONAL INFORMATION

The National Transportation Safety Board and the Federal Aviation Administration periodically issue, in greater detail, general aviation pamphlets concerning aviation safety. FAA Regional Offices also publish material under the FAA General Aviation Accident Prevention Program. These can be obtained at FAA Offices, Weather Stations, Flight Service Stations or Airport Facilities. Some of these are titled:

12 Golden Rules for Pilots
Weather or Not
Disorientation
Plane Sense
Weather Info Guide for Pilots
Wake Turbulence
Don't Trust to Luck, Trust to Safety
Rain, Fog, Snow
Thunderstorm - TRW
Icing
Pilot's Weather Briefing Guide
Thunderstorms Don't Flirt ... Skirt 'em
IFR-VFR - Either Way Disorientation Can Be Fatal
IFR Pilot Exam-O-Grams
VFR Pilot Exam-O-Grams
Tips on Engine Operation in Small General Aviation Aircraft
Estimating Inflight Visibility
Is the Aircraft Ready for Flight
Tips on Mountain Flying
Tips on Desert Flying
Always Leave Yourself An Out

Safety Guide for Private Aircraft Owners
Tips on How to Use the Flight Planner
Tips on the Use of Ailerons and Rudder
Some Hard Facts About Soft Landings
Propeller Operation and Care
Torque "What it Means to the Pilot"
Weight and Balance. An Important Safety Consideration for Pilots

GENERAL INFORMATION ON SPECIFIC TOPICS

MAINTENANCE

Safety of flight begins with a well maintained airplane. Make it a habit to keep your airplane and all its equipment in airworthy condition. Keep a "squawk list" on board, and see that all discrepancies, however minor, are noted and promptly corrected.

Schedule your maintenance regularly, and have your airplane serviced by a reputable organization. Be suspicious of bargain prices for maintenance, repair and inspections.

It is the responsibility of the owner and the operator to assure that the airplane is maintained in an airworthy condition and that proper maintenance records are kept.

Use only genuine BEECHCRAFT or BEECHCRAFT approved parts obtained from BEECHCRAFT approved sources, in connection with the maintenance and repair of Beech airplanes.

Genuine BEECHCRAFT parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than BEECHCRAFT, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Salvaged airplane parts, reworked parts obtained from non-BEECHCRAFT approved sources or parts, components, or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component, or structural assembly, even though originally manufactured by BEECHCRAFT, unsuitable and unsafe for airplane use.

BEECHCRAFT expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-BEECHCRAFT parts.

Airplanes operated for Air Taxi or other than normal operation, and airplanes operated in humid tropics, or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas, periodic inspections should be performed until the operator can set his own inspection periods based on experience.

NOTE

> The required periods do not constitute a guarantee that the item will reach the period without malfunction, as the aforementioned factors cannot be controlled by the manufacturer.

Corrosion and its effects must be treated at the earliest possible opportunity. A clean, dry surface is virtually immune to corrosion. Make sure that all drain holes remain unobstructed. Protective films and sealants help to keep corrosive agents from contacting metallic surfaces. Corrosion inspections should be made most frequently under high-corrosion-risk operating conditions, such as in areas of excessive airborne salt concentrations (e.g., near the sea) and in high-humidity areas (e.g., tropical regions).

If you have purchased a used airplane, have your mechanic inspect the airplane registration records, logbooks and maintenance records carefully. An unexplained period of time for which the airplane has been out of service, or unexplained significant repairs may well indicate the airplane has been seriously damaged in a prior accident. Have your mechanics inspect a used airplane carefully. Take the time to ensure that you really know what you are buying when you buy a used airplane.

HAZARDS OF UNAPPROVED MODIFICATIONS

Many airplane modifications are approved under Supplemental Type Certificates (STC's). Before installing an STC on your airplane, check to make sure that the STC does not conflict with other STC's that have already been installed. Because approval of an STC is obtained by the individual STC holder based upon modification of the original type design, it is possible for STC's to interfere with each other when both are installed. Never install an unapproved modification of any type, however innocent the apparent modification may seem. Always obtain proper FAA approval.

Airplane owners and maintenance personnel are particularly cautioned not to make attachments to, or otherwise modify, seats from original certification without approval from the FAA Engineering and Manufacturing District Office having original certification responsibility for that make and model.

Any unapproved attachment or modification to seat structure may increase load factors and metal stress which could cause failure of seat structure at a lesser "G" force than exhibited for original certification.

Examples of unauthorized attachments found are drilling holes in seat tubing to attach fire extinguishers and drilling holes to attach approach plate book bins to seats.

FLIGHT PLANNING

FAR Part 91 requires that each pilot in command, before beginning a flight, familiarize himself with all available information concerning that flight.

Obtain a current and complete preflight briefing. This should consist of local, enroute and destination weather and enroute navaid information. Enroute terrain and obstructions, alternate airports, airport runways active, length of runways, and takeoff and landing distances for the airplane for conditions expected should be known.

The prudent pilot will review his planned enroute track and stations and make a list for quick reference. It is strongly recommended a flight plan be filed with Flight Service Stations, even though the flight may be VFR. Also, advise Flight Service Stations of changes or delays of one hour or more and remember to close the flight plan at destination.

The pilot must be completely familiar with the performance of the airplane and performance data in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. The resultant effect of temperature and pressure altitude must be taken into account in performance if not accounted for on the charts. An applicable FAA Approved Airplane Flight Manual must be aboard the airplane at all times and include the weight and balance forms and equipment list.

PASSENGER INFORMATION CARDS

Beech has available, for most current production airplanes, passenger information cards which contain important information on the proper use of restraint systems, oxygen masks, emergency exits and emergency bracing procedures. Passenger information cards may be obtained at any BEECHCRAFT Authorized Outlet. A pilot should not only be familiar with the information contained in the cards, but should always, prior to flight, inform the passengers of the information contained in the information cards. The pilot should orally brief the passengers on the proper use of restraint systems, doors and emergency exits, and other emergency procedures, as required by Part 91 of the FAR's.

STOWAGE OF ARTICLES

The space between the seat pan and the floor is utilized to provide space for seat displacement. If hard, solid objects are stored beneath seats, the energy absorbing feature is lost and severe spinal injuries can occur to occupants.

Prior to flight, pilots should insure that articles are not stowed beneath seats that would restrict seat pan energy absorption or penetrate the seat in event of a high vertical velocity accident.

FLIGHT OPERATIONS

GENERAL

The pilot MUST be thoroughly familiar with ALL INFORMATION published by the manufacturer concerning the airplane, and is required by law to operate the airplane in accordance with the FAA Approved Airplane Flight Manual and placards installed.

PREFLIGHT INSPECTION

In addition to maintenance inspections and preflight information required by FAR Part 91, a complete, careful preflight inspection is imperative.

Each airplane has a checklist for the preflight inspection which must be followed. USE THE CHECKLIST.

WEIGHT AND BALANCE

Maintaining center of gravity within the approved envelope throughout the planned flight is an important safety consideration.

The airplane must be loaded so as not to exceed the weight and center of gravity (C.G.) limitations. Airplanes that are loaded above the maximum takeoff or landing weight limitations will have an overall lower level of performance compared to that shown in the Performance section of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. If loaded above maximum takeoff weight, takeoff distance and the landing distance will be longer than that shown in the Performance section; the stalling speed will be higher, rate of climb, the cruising speed, and the range of the airplane at any level of fuel will all be lower than shown in the Performance section.

If an airplane is loaded so that the C.G. is forward of the forward limit, it will require additional control movements for maneuvering the airplane with correspondingly higher control forces. The pilot may have difficulty during takeoff and landing because of the elevator control limits.

If an airplane is loaded aft of the aft C.G. limitation, the pilot will experience a lower level of stability. Airplane characteristics that indicate a lower stability level are; lower control forces, difficulty in trimming the airplane, lower control forces for maneuvering with attendant danger of structural overload, decayed stall characteristics, and a lower level of lateral-directional damping.

Ensure that all cargo and baggage is properly secured before takeoff. A sudden shift in balance at rotation can cause controllability problems.

AUTOPILOTS AND ELECTRIC TRIM SYSTEMS

Because there are several different models of autopilots and electric trim systems installed in Beech airplanes and different installations and switch positions are possible from airplane to airplane, it is essential that every owner/operator review his Airplane Flight Manual (AFM) Supplements and ensure that the supplements properly describe the autopilot and trim installations on his specific airplane. Each pilot, prior to flight, must be fully aware of the proper procedures for operation, and particularly disengagement, for the system as installed.

In addition to ensuring compliance with the autopilot manufacturer's maintenance requirements, all owners/operators should thoroughly familiarize themselves with the operation, function and procedures described in the Airplane Flight Manual Supplements. Ensure a full understanding of the methods of engagement and disengagement of the autopilot and trim systems.

Compare the descriptions and procedures contained in the Supplements to the actual installation in the airplane to ensure that the supplement accurately describes your installation. Test that all buttons, switches and circuit breakers function as described in the Supplements. If they do not function as described, have the system repaired by a qualified service agency. If field service advice or assistance is necessary, contact Beech Aircraft Corporation, Customer Support Department.

As stated in all AFM Supplements for autopilot systems and trim systems installed on Beech airplanes, the preflight check must be conducted before every flight. The preflight check assures not only that the systems and all of their features are operating properly, but also that the pilot, before flight, is familiar with the proper means of engagement and disengagement of the autopilot and trim system.

Autopilot Airplane Flight Manual Supplements caution against trying to override the autopilot system during flight without disengaging the autopilot because the autopilot will continue to trim the airplane and oppose the pilot's actions. This could result in a severely out of trim condition. This is a basic feature of all autopilots with electric trim follow-up.

Do not try to manually override the autopilot during flight.

IN CASE OF EMERGENCY, YOU CAN OVERPOWER THE AUTOPILOT TO CORRECT THE ATTITUDE, BUT THE AUTOPILOT AND ELECTRIC TRIM MUST THEN IMMEDIATELY BE DISENGAGED.

It is often difficult to distinguish an autopilot malfunction from an electric trim system malfunction. The safest course is to deactivate both. Do not re-engage either system until after you have safely landed. Then have the systems checked by a qualified service facility prior to further flight.

Depending upon the installation on your airplane, the following additional methods may be available to disengage the autopilot or electric trim in the event that the autopilot or electric trim does not disengage utilizing the disengage methods specified in the Supplements.

CAUTION

Transient control forces may occur when the autopilot is disengaged.

1. Turn off the autopilot master switch, if installed.
2. Pull the autopilot and trim circuit breaker(s) or turn off the autopilot switch breaker, if installed.
3. Turn off the RADIO MASTER SWITCH, if installed, and if the autopilot system and the trim system are wired through this switch.

CAUTION

Radios, including VHF COMM are also disconnected when the radio master switch is off.

4. Turn off the ELECTRIC MASTER SWITCH.

WARNING

Almost all electrically powered systems will be inoperative. Consult the AFM for further information.

5. Push the GA switch on throttle grip, if installed (depending upon the autopilot system).
6. Push TEST EACH FLT switch on the autopilot controller, if installed.

NOTE

After the autopilot is positively disengaged, it may be necessary to restore other electrical functions. Be sure when the master switches are turned on that the autopilot does not re-engage.

The above ways may or may not be available on your autopilot. It is essential that you read your airplane's AFM SUPPLEMENT for your autopilot system and check each function and operation on your system.

The engagement of the autopilot must be done in accordance with the instructions and procedures contained in the AFM SUPPLEMENT.

Particular attention must be paid to the autopilot settings prior to engagement. If you attempt to engage the autopilot when the airplane is out of trim, a large attitude change may occur.

IT IS ESSENTIAL THAT THE PROCEDURES SET FORTH IN THE APPROVED AFM SUPPLEMENTS FOR YOUR SPECIFIC INSTALLATION BE FOLLOWED BEFORE ENGAGING THE AUTOPILOT.

FLUTTER

Flutter is a phenomenon that can occur when an aerodynamic surface begins vibrating. The energy to sustain the vibration is derived from airflow over the surface. The amplitude of the vibration can (1) decrease, if airspeed is reduced; (2) remain constant, if airspeed is held constant and no failures occur; or (3) increase to the point of self-destruction, especially if airspeed is high and/or is allowed to increase. Flutter can lead to an in-flight break up of the airplane. Airplanes are designed so that flutter will not occur in the normal operating envelope of the airplane as long as the airplane is properly maintained. In the case of any airplane, decreasing the damping and stiffness of the structure or increasing the trailing edge weight of control surfaces will tend to cause flutter. If a combination of those factors is sufficient, flutter can occur within the normal operating envelope.

Owners and operators of airplanes have the primary responsibility for maintaining their airplanes. To fulfill that responsibility, it is imperative that all airplanes receive a thorough preflight inspection. Improper tension on the control cables or any other loose condition in the flight control system can also cause or contribute to flutter. Pilot's should pay particular attention to control surface attachment hardware including tab pushrod attachment during preflight inspection. Looseness of fixed surfaces or movement of control surfaces other than in the normal direction of travel should be rectified before flight. Further, owners should take their airplanes to mechanics who have access to current technical publications and prior experience in property maintaining that make and model of airplane. The owner should make certain that control cable tension inspections are performed as outlined in the applicable Beech Inspection Guide. Worn control surface attachment hardware must be replaced. Any repainting or repair of a moveable control surface will require a verification of the control surface balance before the airplane is returned to service. Control surface drain holes must be open to prevent freezing of accumulated moisture, which could craate an increased trailing-edge-heavy control surface and flutter.

If an excessive vibration, particularly in the control column and rudder pedals, is encountered in flight, this may be the onset of flutter and the procedure to follow is:

1. IMMEDIATELLY REDUCE AIRSPEED (lower the landing gear if necessary).
2. RESTRAIN THE CONTROLS OF THE AIRPLANE UNTIL THE VIBRATION CEASES.
3. FLY AT THE REDUCED AIRSPEED AND LAND AT THE NEAREST SUITABLE AIRPORT.
4. HAVE THE AIRPLANE INSPECTED FOR AIRFRAME DAMAGE, CONTROL SURFACE ATTACHING HARDWARE CONDITION/SECURITY, TRIM TAB FREE PLAY, PROPER CONTROL CABLE TENSION, AND CONTROL SURFACE BALANCE BY ANOTHER MECHANIC WHO IS FULLY QUALIFIED.

TURBULENT WEATHER

A complete and current weather briefing is a requirement for a safe trip.

Updating of weather information enroute is also essential. The wise pilot knows that weather conditions can change quickly, and treats weather forecasting as professional advice, rather than an absolute fact. He obtains all the advice he can, but stays alert to any sign or report of changing conditions.

Plan the flight to avoid areas of reported severe turbulence. It is not always possible to detect individual storm areas or find the in-between clear areas.

The National Weather Service classifies turbulence as follows:

Class of Turbulence	Effect
Extreme	Airplane is violently tossed about and is practically impossible to control. May cause structural damage.
Severe	Airplane may be momentarily out of control. Occupants are thrown violently against the belts and back into the seat. Unsecured objects are tossed about.
Moderate	Occupants require seat belts and occasionally are thrown against the belt. Unsecured objects move about.
Light	Occupants may be required to use seat belts, but objects in the airplane remain at rest.

Thunderstorms, squall lines and violent turbulence should be regarded as extremely dangerous and must be avoided. Hail and tornadic wind velocities can be encountered in thunderstorms that can destroy any airplane, just as tornadoes destroy nearly everything in their path on the ground.

Thunderstorms also pose the possibility of a lightning strike on an airplane. Any structure or equipment which shows evidence of a lightning strike, or of being subjected to a high current flow due to a strike, or is a suspected part of a lightning strike path through the airplane should be thoroughly inspected and any damage repaired prior to additional flight.

A roll cloud ahead of a squall line or thunderstorm is visible evidence of extreme turbulence; however, the absence of a roll cloud should not be interpreted as denoting that severe turbulence is not present.

Even though flight in severe turbulence must be avoided, flight in turbulent air may be encountered unexpectedly under certain conditions.

The following recommendations should be observed for airplane operation in turbulent air:

Flying through turbulent air presents two basic problems, the answer to both of which is proper airspeed. On one hand, if you maintain an excessive airspeed, you run the risk of structural damage or failure; on the other hand, if your airspeed is too low, you may stall.

If turbulence is encountered, reduce speed to the turbulent air penetration speed, if given, or to the maneuvering speed, which is listed in the Limitations section of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. These speeds give the best assurance of avoiding excessive stress loads, and at the same time provide the proper margin against inadvertent stalls due to gusts.

Beware of overcontrolling in an attempt to correct for changes in attitude; applying control pressure abruptly will build up G-forces rapidly and could cause structural damage or even failure. You should watch particularly your angle of bank, making turns as wide and shallow as possible. Be equally cautious in applying forward or back pressure to keep the airplane level. Maintain straight and level attitude in either up or down drafts. Use trim sparingly to avoid being grossly out of trim as the vertical air columns change velocity and direction. If necessary to avoid excessive airspeeds, lower the landing gear.

WIND SHEAR

Wind shears are rapid, localized changes in wind direction, which can occur vertically as well as horizontally. Wind shear can be very dangerous to all airplanes, large and small, particularly on approach to landing when airspeeds are slow.

A horizontal wind shear is a sudden change in wind direction or speed that can, for example, transform a headwind into a tailwind, producing a sudden decrease in indicated airspeed because of the inertia of the airplane. A vertical wind shear, is a sudden updraft or downdraft. Microbursts are intense, highly localized severe downdrafts.

The prediction of wind shears is far from an exact science. Monitor your airspeed carefully when flying near storms, particularly on approach. Be mentally prepared to add power and go around at the first indication that a wind shear is being encountered.

WEATHER RADAR

Airborne weather avoidance radar is, as its name implies, for avoiding severe weather–not for penetrating it. Whether to fly into an area of radar echoes depends on echo intensity, spacing between the echoes, and the capabilities of you and your airplane. Remember that weather radar detects only precipitation drops; it does not detect turbulence. Therefore, the radar scope provides no assurance of avoiding turbulence. The radar scope also does not provide assurance of avoiding instrument weather due to clouds and fog. Your scope may be clear between intense echoes; this clear area does not necessarily mean you can fly between the storms and maintain visual sighting of them.

Thunderstorms build and dissipate rapidly. Therefore, do not attempt to plan a course between echoes using ground based radar. The best use of ground radar information is to isolate general areas and coverage of echoes. You must avoid individual storms from in-flight observations either by visual sighting or by airborne radar. It is better to avoid the whole thunderstorm area than to detour around individual storms unless they are scattered.

Remember that while hail always gives a radar echo, it may fall several miles from the nearest visible cloud and hazardous turbulence may extend to as much as 20 miles from the echo edge. Avoid intense or extreme level echoes by at least 20 miles; that is, such echoes should be separated by at least 40 miles before you fly between them. With weaker echoes you can reduce the distance by which you avoid them.

Above all, remember this: never regard any thunderstorm lightly. Even when radar observers report the echoes are of light intensity, avoiding thunderstorms is the best policy. The following are some do's and don'ts of thunderstorm avoidance:

1. Don't land or take off in the face of an approaching thunderstorm. A sudden gust front of low level turbulence could cause loss of control.
2. Don't attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and wind shear under the storm could be disastrous.
3. Don't fly without airborne radar into a cloud mass containing scattered embedded thunderstorms. Embedded thunderstorms usually can not be visually circumnavigated.
4. Don't trust visual appearance to be a reliable indicator of the turbulence inside a thunderstorm.

5. Do avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
6. Do circumnavigate the entire area if the area has 6/10 or greater thunderstorm coverage.
7. Do remember that vivid and frequent lightning indicates the probability of a severe thunderstorm.
8. Do regard as extremely hazardous any thunderstorm with tops 35,000 feet or higher, whether the top is visually sighted or determined by radar.

If you cannot avoid penetrating a thunderstorm, the following are some do's BEFORE entering the storm:

9. Tighten your safety belt, put on your shoulder harness, and secure all loose objects.
10. Plan and hold your course to take you through the storm in minimum time.
11. To avoid the most critical icing, establish a penetration altitude below the freezing level or above the level of -15°C.
12. Verity that pitot heat is on and turn on carburetor heat or engine anti-ice. Icing can be rapid at any altitude and cause almost instantaneous power failure and/or loss of airspeed indication.

MOUNTAIN FLYING

Pilots flying in mountainous areas should inform themselves of all aspects of mountain flying, including the effects of topographic features on weather conditions. Many good articles have been published, and a synopsis of mountain flying operations is included in the FAA Airman's Information Manual, Part 1.

Avoid flight at low altitudes over mountainous terrain, particularly near the lee slopes. If the wind velocity near the level of the ridge is in excess of 25 knots and approximately perpendicular to the ridge, mountain wave conditions are likely over and near the lee slopes. If the wind velocity at the level of the ridge exceeds 50 knots, a strong mountain wave is probable with extreme up and down drafts and severe turbulence. The worst turbulence will be encountered in and below the rotor zone, which is usually 8 to 10 miles downwind from the ridge. This zone is sometimes characterized by the presence of "roll clouds" if sufficient moisture is present; altocumulus standing lenticular clouds are also visible signs that a mountain wave exists, but their presence is likewise dependent on moisture. Mountain wave turbulence can, of course, occur in dry air and the absence of such clouds should not be taken as assurance that mountain wave turbulence will not be encountered. A mountain wave downdraft may exceed the climb capability of your airplane. Avoid mountain wave downdrafts.

VFR - LOW CEILINGS

If you are not instrument rated, do not attempt "VFR on Top" or "Special VFR" flight or clearances. Being caught above a solid cloud layer when an emergency descent is required (or at destination) is an extremely hazardous position for the VFR pilot. Accepting a clearance out of airport control zones with no minimum ceiling and one-mile visibility as permitted with "Special VFR" is a foolish practice for the VFR pilot.

Avoid areas of low ceilings and restricted visibility unless you are instrument rated and proficient and have an instrument equipped airplane. Then proceed with caution and with planned alternates.

VFR AT NIGHT

When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain a safe minimum altitude as dictated by terrain, obstacles such as

TV towers, or communities in the area flown. This is especially true in mountainous terrain, where there is usually very little ground reference. Minimum clearance is 2,000 feet above the highest obstacle enroute. Do not depend on your ability to see obstacles in time to miss them. Flight on dark nights over sparsely populated country can be the same as IFR, and must be avoided by inexperienced or non-IFR rated pilots.

VERTIGO - DISORIENTATION

Disorientation can occur in a variety of ways. During flight, inner ear balancing mechanisms are subjected to varied forces not normally experienced on the ground. This, combined with loss of outside visual reference, can cause vertigo. False interpretations (illusions) result, and may confuse the pilot's conception of the attitude and position of his airplane.

Under VFR conditions, the visual sense, using the horizon as a reference, can override the illusions. Under low visibility conditions (night, fog, clouds, haze, etc.) the illusions predominate. Only through awareness of these illusions, and proficiency in instrument flight procedures, can an airplane be operated safely in a low visibility environment.

Flying in fog, dense haze or dust, cloud banks, or very low visibility, with strobe lights or rotating beacons turned on can contribute to vertigo. They should be turned off in these conditions, particularly at night.

All pilots should check the weather and use good judgment in planning flights. The VFR pilot should use extra caution in avoiding low visibility conditions.

Motion sickness often precedes or accompanies disorientation and may further jeopardize the flight.

Disorientation in low visibility conditions is not limited to VFR pilots. Although IFR pilots are trained to look at their instruments to gain an artificial visual reference as a replacement for the loss of a visual horizon, they do not always do so. This can happen when the pilot's physical condition will not permit him to concentrate on his instruments; when the pilot is not proficient in flying instrument conditions in the airplane he is flying; or, when the pilot's work load of flying by reference to his instruments is augmented by such factors as turbulence. Even an instrument rated pilot encountering instrument conditions, intentional or unintentional, should ask himself whether or not he is sufficiently alert and proficient in the airplane he is flying, to fly under low visibility conditions and in the turbulence anticipated or encountered.

If any doubt exists, the flight should not be made or it should be discontinued as soon as possible.

The result of vertigo is loss of control of the airplane. If the loss of control is sustained, it will result in an excessive speed accident. Excessive speed accidents occur in one of two manners, either as an inflight airframe separation or as a high speed ground impact; and they are fatal accidents in either case. All airplanes are subject to this form of accident.

For years, Beech Pilot's Operating Handbooks and FAA Approved Airplane Flight Manuals have contained instructions that the landing gear should be extended in any circumstance in which the pilot encounters IFR conditions which approach the limits of his capability or his ratings. Lowering the gear in IFR conditions or flight into heavy or severe turbulence, tends to stabilize the airplane, assists in maintaining proper airspeed, and will substantially reduce the possibility of reaching excessive airspeeds with catastrophic consequences, even where loss of control is experienced.

Excessive speed accidents occur at airspeeds greatly in excess of two operating limitations which are specified in the manuals: Maximum maneuvering speed and the "red line" or "never exceed" speed. Such speed limits are set to protect the structure of an airplane. For example, flight controls are designed to be used to their fullest extent only below the airplane's maximum maneuvering speed. As a result, the control surfaces should never be suddenly or fully deflected above maximum maneuvering speed. Turbulence penetration should not be performed above that speed. The accidents we are discussing here occur at airspeeds greatly in excess of these limitations. No airplane should ever be flown beyond its FAA approved operating limitations.

STALLS, SLOW FLIGHT AND TRAINING

The stall warning system must be kept operational at all times and must not be deactivated by interruption of circuits, circuit breakers, or fuses. Compliance with this requirement is especially important in all high performance single engine airplanes during simulated engine-out practice or stall demonstrations, because the stall speed is critical in all low-speed operation of airplanes.

Training should be accomplished under the supervision of a qualified instructor-pilot, with careful reference to the applicable sections of the FAA Practical Test Standards and FAA Pilot Transition Courses for Complex Single Engine and Light Twin Engine Airplanes (AC 61-9). In particular, observe carefully the warnings in the Practical Test Standards.

SPINS

A major cause of fatal accidents in general aviation airplanes is a spin. Stall demonstrations and practice are a means for a pilot to acquire the skills to recognize when a stall is about to occur and to recover as soon as the first signs of a stall are evident.
If a stall does not occur - A spin cannot occur.

It is important to remember, however, that a stall can occur in any flight attitude, at any airspeed, if controls are misused.

Unless your airplane has been specifically certificated in the aerobatic category and specifically tested for spin recovery characteristics, it is placarded against intentional spins.

The pilot of an airplane placarded against intentional spins should assume that the airplane may become uncontrollable in a spin, since its performance characteristics beyond certain limits specified in the FAA regulations may not have been tested and are unknown. This is why airplanes are placarded against intentional spins, and this is why stall avoidance is your protection against an inadvertent spin.

Pilots are taught that intentional spins are entered by deliberately inducing a yawing moment with the controls as the airplane is stalled. Inadvertent spins result from the same combination - stall plus yaw. That is why it is important to use coordinated controls and to recover at the first indication of a stall when practicing stalls.

Always remember that extra alertness and pilot techniques are required for slow flight maneuvers, including the practice or demonstration of stalls. In addition to the foregoing mandatory procedure, always:

- Be certain that the center of gravity of the airplane is as far forward as possible. Forward C.G. aids stall recovery, spin avoidance and spin recovery. An aft C.G. can create a tendency for a spin to stabilize, which delays recovery.
- Whenever a student pilot will be required to practice slow flight, be certain that the qualified instructor pilot has a full set of operable controls available. FAA regulations prohibit flight instruction without full dual controls.

- Conduct any maneuvers which could possibly result in a spin at altitudes in excess of five thousand (5,000) feet above ground level in clear air only.
- Remember that an airplane, at or near traffic pattern and approach altitudes, cannot recover from a spin, or perhaps even a stall, before impact with the ground. On final approach maintain at least the airspeed shown in the flight manual.
- Remember that if an airplane flown under instrument conditions is permitted to stall or enter a spin, the pilot, without reference to the horizon, is certain to become disoriented. He may be unable to recognize a stall, spin entry, or the spin condition and he may be unable to determine even the direction of the rotation.
- Finally, never forget that stall avoidance is your best protection against an inadvertent spin. MAINTAIN YOUR AIRSPEED.

In airplanes not certificated for aerobatics, spins are prohibited. If a spin is entered inadvertently:

Immediately move the control column full forward and simultaneously apply full rudder opposite to the direction of the spin; continue to hold this position until rotation stops and then neutralize all controls and execute a smooth pullout. Ailerons should be neutral and the throttle in idle position at all times during recovery.

DESCENT

In single engine piston-powered airplanes, supercharged or normally aspirated, it is necessary to avoid prolonged descents with low power, as this produces two problems: (1) excessively cool cylinder head temperatures which cause premature engine wear, and (2) excessively rich mixtures due to idle enrichment (and altitude) which causes soot and lead deposits on the spark plugs (fouling). The second of these is the more serious consideration; the engine may not respond to the throttle when it is desired to discontinue the descent. Both problems are amenable to one solution: maintain adequate power to keep cylinder head temperature in the "green" range during descent, and lean to best power mixture (that is, progressively enrich the mixture from cruise only slightly as altitude decreases). This procedure will lengthen the descent, of course, and requires some advance planning. If it is necessary to make a prolonged descent at or near idle, as in practicing forced landings, at least avoid the problem of fouled spark plugs by frequently advancing the throttle until the engine runs smoothly, and maintain an appropriate mixture setting with altitude. (Refer to pre-landing check list.)

VORTICES - WAKE TURBULENCE

Every airplane generates wakes of turbulence while in flight. Part of this is from the propeller or jet engine, and part from the wing tip vortices. The larger and heavier the airplane, the more pronounced and turbulent the wakes will be. Wing tip vortices from large, heavy airplanes are very severe at close range, degenerating with time, wind and distance. These are rolling in nature, from each wing tip. In tests, vortex velocities of 133 knots have been recorded. Encountering the rolling effect of wing tip vortices within two minutes after passage of large airplanes is most hazardous to light airplanes. This roll effect can exceed the maximum counterroll obtainable in a light airplane. The turbulent areas may remain for as long as three minutes or more, depending on wind conditions, and may extend several miles behind the airplane. Plan to fly slightly above and to the windward side of other airplanes. Because of the wide variety of conditions that can be encountered, there is no set rule to follow to avoid wake turbulence in all situations. However, the Airman's Information Manual, and to a greater extent Advisory Circular 90-23, Aircraft Wake Turbulence, provide a thorough discussion of the factors you should be aware of when wake turbulence may be encountered.

TAKEOFF AND LANDING CONDITIONS

When taking off on runways covered with water or freezing slush, the landing gear should remain extended for approximately ten seconds longer than normal, allowing the wheels to spin and dissipate the freezing moisture. The landing gear should then be cycled up, then down, wait approximately five seconds and then retracted again. Caution must be exercised to insure that the entire operation is performed below Maximum Landing Gear Operating Airspeed.

Use caution when landing on runways that are covered by water or slush which cause hydroplaning (aquaplaning), a phenomenon that renders braking and steering ineffective because of the lack of sufficient surface friction. Snow and ice covered runways are also hazardous. The pilot should also be alert to the possibility of the brakes freezing.

Use caution when taking off or landing during gusty wind conditions. Also be aware of the special wind conditions caused by buildings or other obstructions located near the runway.

MEDICAL FACTS FOR PILOTS

GENERAL

When the pilot enters the airplane, he becomes an integral part of the man-machine system. He is just as essential to a successful flight as the control surfaces. To ignore the pilot in preflight planning would be as senseless as failing to inspect the integrity of the control surfaces or any other vital part of the machine. The pilot has the responsibility for determining his reliability prior to entering the airplane for flight. When piloting an airplane, an individual should be free of conditions which are harmful to alertness, ability to make correct decisions, and rapid reaction time.

FATIGUE

Fatigue generally slows reaction time and causes errors due to inattention. In addition to the most common cause of fatigue; insufficient rest and loss of sleep, the pressures of business, financial worries, and family problems can be important contributing factors. If you are tired, don't fly.

HYPOXIA

Hypoxia, in simple terms, is a lack of sufficient oxygen to keep the brain and other body tissues functioning properly. There is a wide individual variation in susceptibility to hypoxia. In addition to progressively insufficient oxygen at higher altitudes, anything interfering with the blood's ability to carry oxygen can contribute to hypoxia (anemias, carbon monoxide, and certain drugs). Also, alcohol and various drugs decrease the brain's tolerance to hypoxia.

Your body has no built-in alarm system to let you know when you are not getting enough oxygen. It is impossible to predict when or where hypoxia will occur during a given flight, or how it will manifest itself. Some of the common symptoms of hypoxia are increased breathing rate, a lightheaded or dizzy sensation, tingling or warm sensation, sweating, reduced visual field, sleepiness, blue coloring of skin, fingernails, and lips, and behavior changes. A particularly dangerous feature of hypoxia is an increased sense of well-being, called euphoria. It obscures a person's ability and desire to be critical of himself, slows reaction time, and impairs thinking ability. Consequently, a hypoxic individual commonly believes things are getting progressively better while he nears total collapse.

The symptoms are slow but progressive, insidious in onset, and are most marked at altitudes starting above ten thousand feet. Night vision, however, can be impaired starting at an altitude of 5,000 feet. Persons who have recently overindulged in alcohol, who are moderate to heavy smokers, or who take certain drugs, may be more susceptible to hypoxia. Susceptibility may also vary in the same individual from day to day or even morning to evening. Use oxygen on flights above 10,000 feet and at any time when symptoms appear.

Depending upon altitude, a hypoxic individual has a limited time to make decisions and perform useful acts, even though he may remain conscious for a longer period. The time of useful consciousness is approximately 3-5 minutes at 25,000 feet of altitude and diminishes markedly as altitude increases.

Should symptoms occur that cannot definitely be identified as either hypoxia or hyperventilation, try three or four deep breaths of oxygen. The symptoms should improve markedly if the condition was hypoxia (recovery from hypoxia is rapid).

Pilots who fly to altitudes that require or may require the use of supplemental oxygen should be thoroughly familiar with the operation of the airplane oxygen systems. A preflight inspection of the system should be performed, including proper fit of the mask. The passengers should be briefed on the proper use of their oxygen system before flight.

Pilots who wear beards should be careful to ensure that their beard is carefully trimmed so that it will not interfere with proper sealing of the oxygen masks. If you wear a beard or moustache, test the fit of your oxygen mask on the ground for proper sealing. Studies conducted by the military and oxygen equipment manufacturers conclude that oxygen masks do not seal over beards or heavy facial hair.

Federal Aviation Regulations related to the use of supplemental oxygen by flight crew and passengers must be adhered to if flight at higher altitudes is to be accomplished safely. Passengers with significant circulatory or lung disease may need to use supplemental oxygen at lower altitudes than specified by these regulations.

HYPERVENTILATION

Hyperventilation, or overbreathing, is a disturbance of respiration that may occur in individuals as a result of emotional tension or anxiety. Under conditions of emotional stress, fright, or pain, breathing rate may increase, causing increased lung ventilation, although the carbon dioxide output of the body cells does not increase. As a result, carbon dioxide is "washed out" of the blood. The most common symptoms of hyperventilation are: dizziness, nausea, sleepiness, and finally, unconsciousness. If the symptoms persist, discontinue use of oxygen and consciously slow your breathing rate until symptoms clear, and then resume normal breathing rate. Normal breathing can be aided by talking aloud.

ALCOHOL

Common sense and scientific evidence dictate that you must not fly as a crew member while under the influence of alcohol. Alcohol, even in small amounts, produces (among other things):

- A dulling of critical judgement.
- A decreased sense of responsibility.
- Diminished skill reactions and coordination.
- Decreased speed and strength of muscular reflexes (even after one ounce of alcohol).
- Decreases in efficiency of eye movements during reading (after one ounce of alcohol).
- Increased frequency of errors (after one ounce of alcohol).
- Constriction of visual fields.
- Decreased ability to see under dim illuminations.
- Loss of efficiency of sense of touch.
- Decrease of memory and reasoning ability.

- Increased susceptibility to fatigue and decreased attention span.
- Decreased relevance of response.
- Increased self confidence with decreased insight into immediate capabilities.

Tests have shown that pilots commit major errors of judgment and procedure at blood alcohol levels substantially less than the minimum legal levels of intoxication for most states. These tests further show a continuation of impairment from alcohol up to as many as 14 hours after consumption, with no appreciable diminution of impairment. The body metabolizes ingested alcohol at a rate of about one-third of an ounce per hour. Even after the body completely destroys a moderate amount of alcohol, a pilot can still be severely impaired for many hours by hangover. The effects of alcohol on the body are magnified at altitudes, as 2 oz. of alcohol at 18,000 feet produce the same adverse effects as 6 oz. at sea level.

Federal Aviation Regulations have been amended to reflect the FAA's growing concern with the effects of alcohol impairment. FAR 91 states:

"Alcohol or drugs.

(a) No person may act or attempt to act as a crewmember of a civil aircraft -

(1) Within 8 hours after the consumption of any alcoholic beverage;

(2) While under the influence of alcohol;

(3) While using any drug that affects the person's faculties in any way contrary to safety; or

(4) While having .04 percent by weight or more alcohol in the blood.

(b) Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be intoxicated or who demonstrates by manner or physical indications that the individual is under the influence of drugs (except a medical patient under proper care) to be carried in that aircraft."

Because of the slow destruction of alcohol by the body, a pilot may still be under influence eight hours after drinking a moderate amount of alcohol. Therefore, an excellent rule is to allow at least 12 to 24 hours between "bottle and throttle," depending on the amount of alcoholic beverage consumed.

DRUGS

Self-medication or taking medicine in any form when you are flying can be extremely hazardous. Even simple home or over-the-counter remedies and drugs such as aspirin, antihistamines, cold tablets, cough mixtures, laxatives, tranquilizers, and appetite suppressors, may seriously impair the judgment and coordination needed while flying. The safest rule is to take no medicine before or while flying, except after consultation with your Aviation Medical Examiner.

SCUBA DIVING

Flying shortly after any prolonged scuba diving could be dangerous. Under the increased pressure of the water, excess nitrogen is absorbed into your system. If sufficient time has not elapsed prior to takeoff for your system to rid itself of this excess gas, you may experience the bends at altitudes even under 10,000 feet, where most light planes fly.

CARBON MONOXIDE AND NIGHT VISION

The presence of carbon monoxide results in hypoxia which will affect night vision in the same manner and extent as hypoxia from high altitudes. Even small levels of carbon monoxide have the same effect as an altitude increase of 8,000 to 10,000 feet. Smoking several cigarettes can result in a carbon monoxide saturation sufficient to affect visual sensitivity equal to an increase of 8,000 feet altitude.

DECOMPRESSION SICKNESS

Pilots flying unpressurized airplanes at altitudes in excess of 10,000 feet should be alert for the symptoms of 'decompression sickness'. This phenomenon, while rare, can impair the pilot's ability to perform and in extreme cases, can result in the victim being rendered unconscious. Decompression sickness, also known as dysbarism and aviators "bends", is caused by nitrogen bubble formation in body tissue as the ambient air pressure is reduced by climbing to higher altitudes. The symptoms are pain in the joints, abdominal cramps, burning sensations in the skin, visual impairment and numbness. Some of these symptoms are similar to hypoxia. The only known remedy for decompression sickness is recompression, which can only be accomplished in an unpressurized airplane by descending. The pilot should immediately descend if it is suspected that this condition exists, since the effects will only worsen with continued exposure to the reduced pressure environment at altitude and could result, if uncorrected, in complete incapacitation. The possibility of decompression sickness can be greatly reduced by pre-breathing oxygen prior to flight and by commencing oxygen breathing well below the altitudes where it is legally mandatory.

A FINAL WORD

Airplanes are truly remarkable machines. They enable us to shrink distance and time, and to expand our business and personal horizons in ways that, not too many years ago, were virtually inconceivable. For many businesses, the general aviation airplane has become the indispensable tool of efficiency.

Advances in the mechanical reliability of the airplanes we fly have been equally impressive, as attested by the steadily declining statistics of accidents attributed to mechanical causes, at a time when the airframe, systems and power plants have grown infinitely more complex. The explosion in capability of avionics systems is even more remarkable. Radar, RNAV, LORAN, sophisticated autopilots and other devices which, just a few years ago, were too large and prohibitively expensive for general aviation size airplanes, are becoming increasingly commonplace in even the smallest airplanes.

It is thus that this Safety Information is directed to the pilot, for it is in the area of the skill and proficiency of you, the pilot, that the greatest gains in safe flying are to be made over the years to come. Intimate knowledge of your airplane, its capabilities and its limitations, and disciplined adherence to the procedures for your airplane's operation, will enable you to transform potential tragedy into an interesting hangar story when - as it inevitably will - the abnormal situation is presented.

Know your airplane's limitations, and your own. Never exceed either.

Safe flying,

BEECH AIRCRAFT CORPORATION