FAA APPROVED

FLIGHT MANUAL

FOR

PIPER TWIN COMANCHE

Applicable to Serial No. 30-1 thru 30-1716 and
30-1718 thru 30-1744

THIS MANUAL MUST BE KEPT IN THE AIRPLANE AT ALL TIMES.

MANUFACTURER'S MODEL - PA-30

MANUFACTURER'S SERIAL NO. - 30-138

REGISTRATION NO. - N7119Y

FAA Approved By:

J. W. McNary
Piper Aircraft Corporation
D.O.A. No. EA-1
Lock Haven, Pennsylvania

Date of Original Approval: February 5, 1963

Approval Basis: CAR 3 and Reg. of Admin. 410

Date of Approved Reissue : November 15, 1969

Approval Basis : CAR 3 and FAR Part 21, Subpart J

Piper Report No. 1269
Section 1
FAA Approved

I. LIMITATIONS

The following limitations must be observed in the operation of this airplane:

Engine	Two Lycoming IO-320-B1A Series
Engine Limits	For all operations 2700 RPM, 160 HP (See Maneuvers)
Fuel	91/96 Minimum Octane Aviation Gasoline
Propeller	Two Hartzell HC-E2YL-2 Constant Speed Full Feathering, Blades 7663-4. Pitch Settings at 30 in. Station: High 78°, Low 12°. Diameter: Not Over 72 Inches Not Under 70 Inches (No further reduction permitted)
Cowl Flaps	Cowl flaps are provided to allow manual control of engine temperatures. The cowl flaps should be open during ground operations and in climbs. In no case should the cylinder-head temperatures be allowed to exceed 500°F and the oil temperatures allowed to exceed 245°F.
Power Instruments	Oil Temperature: Green Arc (Normal operating Range) 120° to 245° F; Yellow Arc (Caution), 60° to 120°F; Red Line (Max.) 245°F. Oil Pressure: Green Arc (Normal Operating Range) 60 to 90 PSI; Yellow Arc (Caution) 25 to 60 PSI and 90 to 100 PSI; Red Line (Min.) 25 PSI; Red Line (Max.) 100 PSI. Tachometer: Green Arc (Normal Operating Range) 500 to 2700 RPM; Red Line (Max.) 2700 RPM. Fuel Flow: Green Arc (Normal Operating Range) 0 to 16 GPH; Red Line (Maximum at Sea Level) 16 GPH (7 PSI). Cylinder Head Temperature: Green Arc (Normal Range) 200° to 500°F, Red Line (Maximum) 500°F.
Airspeed Limits (Calibrated Airspeed)	Never Exceed (Smooth air) — 245 MPH (Red Line) S/N 30-1 through 30-852 and 30-854 through 30-901.

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Airspeed Limits (Calibrated Airspeed) (Continued)	Never Exceed (Smooth air)	230 MPH (Red Line) S/N 30-853 and 30-902 and up
	Caution Range (Smooth air)	194 to 245 MPH (Yellow Arc) S/N 30-1 through 30-852 and 30-854 through 30-901
	Caution Range (Smooth air)	194 to 230 MPH (Yellow Arc) S/N 30-853 and 30-902 and up
	Normal Operating Range	76 to 194 MPH (Green Arc)
	Flap Extended	69 to 125 MPH (White Arc)
	Max.-Structural Cruising	194 MPH
	Max. Gear Extended	150 MPH
	Maneuvering Speed (Min.) 2450 lb.	135 MPH
	(Max.) 3600 lb.	162 MPH
	Minimum Control Speed (Single Engine)	90 MPH
	Stalling Speed Gear & Flaps Up	76 MPH
	Gear & Flaps Dn	69 MPH
Flight Load Factors	Maximum Positive	3.8g
	Maximum Negative	No inverted maneuvers approved.

Maximum Weight

IT IS THE RESPONSIBILITY OF THE AIRPLANE OWNER AND THE PILOT TO ASSURE THAT THE AIRPLANE IS PROPERLY LOADED. MAXIMUM ALLOWABLE GROSS WEIGHT 3600 POUNDS. SEE WEIGHT AND BALANCE SECTION FOR PROPER LOADING INSTRUCTIONS.

C.G. Range

Datum is 79" ahead of the wing leading edge at spanwise Station 97.0 (First leading edge skin lap outboard of engine nacelle).

C.G. Range (Cont'd.)

WEIGHT	FORWARD LIMIT IN. AFT OF DATUM	AFT LIMIT IN. AFT OF DATUM
3600	86.5	92
3200	83.0	92
2450	81.0	92

Straight line variation between the points given.

Maneuvers

All intentional acrobatic maneuvers (including spins) are prohibited.
Avoid abrupt maneuvers.
When performing power on stalls do not exceed 2100 RPM.

Wing Flap Settings

Take-Off 0° or 15°, Landing 27°

The flaps are electrically operated and the deflection is displayed on a flap position indicator. Take-off range indicated by White Arc on flap indicator.

Unusable Fuel

The unusable fuel in this aircraft has been determined as 3 gallons in each inboard tank in critical flight attitudes.

Usable Fuel

Inboard tanks - 27 gal. each
Auxiliary tanks (outboard) for use in level flight only - 15 gal. each.

Placards

(a) On pedestal in full view of the pilot:

"THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE AIRPLANE FLIGHT MANUAL. ACROBATIC MANEUVERS (INCLUDING SPINS) PROHIBITED."

(b) On the baggage compartment door:

"MAXIMUM BAGGAGE 200 POUNDS". (SERIAL NO. 30-1 THRU 30-852 AND 30-854 THRU 30-901)

"EMERGENCY EXIT

HOLD KNOB UP

TURN LATCH CLOCKWISE"

(SERIAL NO. 30-853 AND 30-902 AND UP)

Placards (Cont'd.)

(c) On landing gear operating motor access door:

"EMERGENCY GEAR EXTENSION. REMOVE COVER. EXTENSION INSTRUCTIONS ON REVERSE SIDE."

(d) On instrument panel:

"MAXIMUM GEAR DOWN SPEED 150 MPH."

(e) On instrument panel:

"STALL WARNING"

The stall warning system is inoperative when the master switch is off.

(f) At the fuel strainer compartment:

"FUEL STRAINERS DRAIN ONLY TANK INDICATED BY FUEL SELECTOR. ALLOW SUFFICIENT DRAIN TIME."

(g) On the instrument panel in full view of the pilot:

"MANEUVERING SPEED 162 MPH."

(h) On circuit breaker access door:

"CIRCUIT BREAKER ACCESS DOOR."

(i) On right rear window moulding in baggage area:

"MAXIMUM BAGGAGE AND/OR PASSENGER WEIGHT 250 LBS. IN BAGGAGE AREA INCLUDING SEATS SEE WEIGHT AND BALANCE" (SERIAL NO. 30-853 and 30-902 AND UP).

(j) On the instrument panel:

MIN. SINGLE ENGINE CONTROL SPEED

90 MPH CAS

(k) On the instrument panel:

"WARNING - UNCOORDINATED MANEUVERS, INCLUDING LONG SIDE SLIPS AND FAST TAXI TURNS JUST PRIOR TO TAKEOFF, MAY CAUSE LOSS OF POWER, ESPECIALLY IF FUEL TANKS IN USE ARE LESS THAN ONE QUARTER FULL."

Instrument Markings

Wing Flap Setting
Take-Off (White Arc 0° to 15°)
Landing (Down 27°)

Landing Gear Down Light

The green gear down light on the instrument panel indicates the landing gear is down and locked. When the instrument panel light is turned on the intensity of the gear down light is reduced, and may be invisible during daylight.

II. PROCEDUR

WARNING

The rudder pedals are suspended from a torque tube which extends across the fuselage. The pilot should become familiar with the proper positioning of his feet on the rudder pedals so as to avoid interference with the torque tube when moving the rudder pedals or operating the toe brakes. 757 436

A. Fuel System

1. Normal Operation

a. Take-off and landing

(1) Fuel valve "ON" main tanks.

(2) Electric fuel pumps "ON".

b. Cruising

(1) Fuel valves "ON" (main or Auxiliary)

(2) Electric fuel pumps "OFF"

2. Emergency Operation - Single Engine

A crossfeed is provided to increase the range during single engine emergency operating conditions. Fuel system operation is as follows:

a. Cruising

(1) When using fuel from tanks on the same side as the operating engine the following will apply:

(a) Fuel Valve "ON" (main or auxiliary) on Operating engine side.

(b) Fuel Valve "OFF" on Inoperative engine side.

(c) Electric fuel pumps "OFF" (except in case of engine driven pump failure, electric fuel pump on operating engine side must be used).

a. Cruising (Cont'd.)

(2) When using fuel from tanks on the opposite side of the operating engine the following will apply:

(a) Fuel Valve "ON" (main or auxiliary) on Inoperative engine side.

(b) Electric fuel pumps "OFF" (except in case of engine driven pump failure, electric fuel pump on operating engine side must be used).

(c) "CROSSFEED ON" on Operative engine side.

Warning: Do not attempt to put both Fuel Selector Valves on Crossfeed.

b. Landing

(1) Fuel Valve "ON" main tank on operating engine side.

(2) Fuel Valve "OFF" on inoperative engine side.

(3) Electric fuel pump "ON" on operating engine side.

B. Feathering Procedure

1. "Open Throttle" on Operating Engine to maintain altitude and airspeed above 97 MPH.
2. "Close Throttle" on Inoperative Engine.
3. Pull mixture control on inoperative engine to "Idle Cut-Off".
4. Pull prop control on Inoperative engine to the "Feather" position.
5. Ignition switches "OFF" on inoperative engine.
6. Electric fuel pumps "OFF".
7. Main fuel valve on inoperative engine "OFF". See Fuel System Emergency Operation Sec. II.A.2. for fuel scheduling.

C. Unfeathering Procedure

1. Turn fuel valve "ON" on inoperative engine side.
2. Turn electric fuel pump "OFF".

C. Unfeathering Procedure - (Cont'd.)

3. "OPEN" throttle 1/4 inch.

4. Advance propeller to "HIGH RPM".

5. Advance mixture to "FULL RICH".

6. Turn ignition switches "ON".

7. Engage starter and hold until engine is started.

8. Reduce propeller control to cruise RPM.

9. Advance throttle to desired power.

D. Landing Gear Extension - Emergency

1. Reduce power-airspeed not to exceed 100 MPH.

2. Place landing gear selector switch in center "OFF" position on aircraft equipped with center "OFF" position.

OR

Place landing gear selector switch in "GEAR DOWN LOCKED" position on aircraft equipped with no center "OFF" position.

3. Disengage motor-raise motor release arm and push forward through full travel.

4. Remove gear extension handle from stowage. If left socket is not in clear position, place handle in right socket. Engage slot and twist clockwise to lock handle. Extend handle and rotate forward until left socket is in clear position. Remove handle and place in left socket, lock and extend handle. Rotate handle Full travel to extend landing gear. Green light on panel indicates landing gear down and locked.

NOTES: 1. Do not retract with handle in slot.
2. Do not re-engage motor in flight.
3. Reducing power and rocking the gear extension handle will aid in manually extending the landing gear.

E. Circuit Breakers

All circuit breakers are grouped in one panel in floor immediately aft the nose wheel well under door marked "CIRCUIT BREAKER ACCESS DOOR".

E. Circuit Breakers - (Cont'd.)

To reset the circuit breakers push in on the reset button.

F. Stopping Engines

When operating under high ambient temperature conditions engine shutdown by mixture alone may not be positive.

Shutting down the engine under these conditions should be as follows:

1. Pull the mixture control to idle cut-off.
2. Depress button on left side of quadrant.
3. Pull back the throttles and hold until engines stop.

G. Warning

1. Maneuvers: This airplane is certified as a normal category airplane and must be operated in compliance with the Airplane Flight Manual. Acrobatic Maneuvers (including spins) are prohibited. Stalls and slow flight should be performed only in accordance with the Airplane Flight Manual.

   Avoid abrupt maneuvers. Maneuvers at speeds and weights in excess of the maneuvering speeds and loadings listed under Limitations Section of this Flight Manual may subject the airplane to load factors beyond which it is certificated.

   Maintain at least 5000 ft. of terrain clearance when practicing stalls.

2. Spins:

   All spins are prohibited; however in the event an unintentional spin is encountered recovery can be accomplished by immediately using the following procedures:

   a. Retard both throttles to the idle position.

   b. Apply full rudder in the opposite direction to the spin.

3. Spins: (Cont'd.)

c. Push control wheel full forward. While it is not necessary for recovery, the use of ailerons against the turn (i.e. right aileron if spin is to the left) will expedite recovery.

d. Maintain controls in these positions until the spin stops. Then neutralize rudder and ailerons.

e. Recover from dive with smooth back pressure on the control wheel. No abrupt control movement should be used during recovery from the dive, as the maneuvering load factor may be exceeded.

III. PERFORMANCE

The loss of altitude during a power off stall with gear and flaps retracted is 280 ft.

See Paragraph II.G.1. for recommended terrain clearance when practicing stalls.

98-04-27 - Severe Icing Conditions

Piper:

Category - Airframe

Effective Date - 03/13/98 **Recurring** - No

Supersedes - N/A **Superseded by** - N/A

See *PREAMBLE*

THE NEW PIPER AIRCRAFT CORPORATION:

Amendment 39-10339; Docket No. 97-CE-61-AD.

Applicability: Models PA-23, PA-23-160, PA-23-235, PA-23-250, PA-E23-250, PA-30, PA-39, PA-40, PA-31, PA-31-300, PA-31-325, PA-31-350, PA-34-200, PA-34-200T, PA-34-220T, PA-42, PA-42-720, PA-42-1000 airplanes (all serial numbers), certificated in any category.

NOTE 1: This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (d) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as indicated, unless already accomplished.

To minimize the potential hazards associated with operating the airplane in severe icing conditions by providing more clearly defined procedures and limitations associated with such conditions, accomplish the following:

(a) Within 30 days after the effective date of this AD, accomplish the requirements of paragraphs (a)(1) and (a)(2) of this AD.

NOTE 2: Operators should initiate action to notify and ensure that flight crewmembers are apprised of this change.

(1) Revise the FAA-approved Airplane Flight Manual (AFM) by incorporating the following into the Limitations Section of the AFM. This may be accomplished by inserting a copy of this AD in the AFM.

"WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

• During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.

- Unusually extensive ice accumulation on the airframe and windshield in areas not normally observed to collect ice.
- Accumulation of ice on the upper surface of the wing, aft of the protected area.
- Accumulation of ice on the engine nacelles and propeller spinners farther aft than normally observed.

• Since the autopilot, when installed and operating, may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

• All wing icing inspection lights must be operative prior to flight into known or forecast icing conditions at night. [NOTE: This supersedes any relief provided by the Master Minimum Equipment List (MMEL).]"

(2) Revise the FAA-approved AFM by incorporating the following into the Normal Procedures Section of the AFM. This may be accomplished by inserting a copy of this AD in the AFM.

"THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

• Visible rain at temperatures below 0 degrees Celsius ambient air temperature.

• Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT:

These procedures are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature. While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues specified in the Limitations Section of the AFM for identifying severe icing conditions are observed, accomplish the following:

• Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.

• Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.

• Do not engage the autopilot.

• If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.

• If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.

• Do not extend flaps when holding in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.

• If the flaps are extended, do not retract them until the airframe is clear of ice.

• Report these weather conditions to Air Traffic Control."

(b) Incorporating the AFM revisions, as required by this AD, may be performed by the owner/operator holding at least a private pilot certificate as authorized by section 43.7 of the Federal Aviation Regulations (14 CFR 43.7), and must be entered into the aircraft records showing compliance with this AD in accordance with section 43.9 of the Federal Aviation Regulations (14 CFR 43.9).

(c) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(d) An alternative method of compliance or adjustment of the compliance time that provides an equivalent level of safety may be approved by the Manager, Small Airplane Directorate, FAA, 1201 Walnut, suite 900, Kansas City, Missouri 64106. The request shall be forwarded through an appropriate FAA Maintenance Inspector, who may add comments and then send it to the Manager, Small Airplane Directorate.

NOTE 3: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Small Airplane Directorate.

(e) All persons affected by this directive may examine information related to this AD at the FAA, Central Region, Office of the Regional Counsel, Room 1558, 601 E. 12th Street, Kansas City, Missouri 64106.

(f) This amendment (39-10339) becomes effective on March 13, 1998.

FOR FURTHER INFORMATION CONTACT:

Mr. John P. Dow, Sr., Aerospace Engineer, Small Airplane Directorate, Aircraft Certification Service, 1201 Walnut, suite 900, Kansas City, Missouri 64106; telephone (816) 426-6932; facsimile (816) 426-2169.

Weight and Balance

N7119Y	PA-30	S/N:30-138	04-09-2021

Weighing Data:

	Weight		Arm		Moment	
LH Wheel	856.0	lbs.	108.70	in.	93,047.20	in-lbs
RH Wheel	838.0	lbs.	108.70	in.	91,090.60	in-lbs
Nose Wheel	607.0	lbs.	21.70	in.	13,171.90	in-lbs
Totals:	2301.0	lbs.	85.75	in.	197,309.70	in-lbs

Datum: 79" Forward First leading skin lap outboard of engine nacelle
Leveling means: screws over baggage door

Weighed with Zero Fuel								
Fuel 6 lbs/gal.	6	gal		51	in		1,836.00	in-lbs

Zero Fuel need to add 6 gallons as unusable fuel

Gross Weight:	3600.0	lbs.
Empty Weight:	2337.0	lbs.
Usefull Load:	1263.0	lbs.
Empty CG:	85.21	in

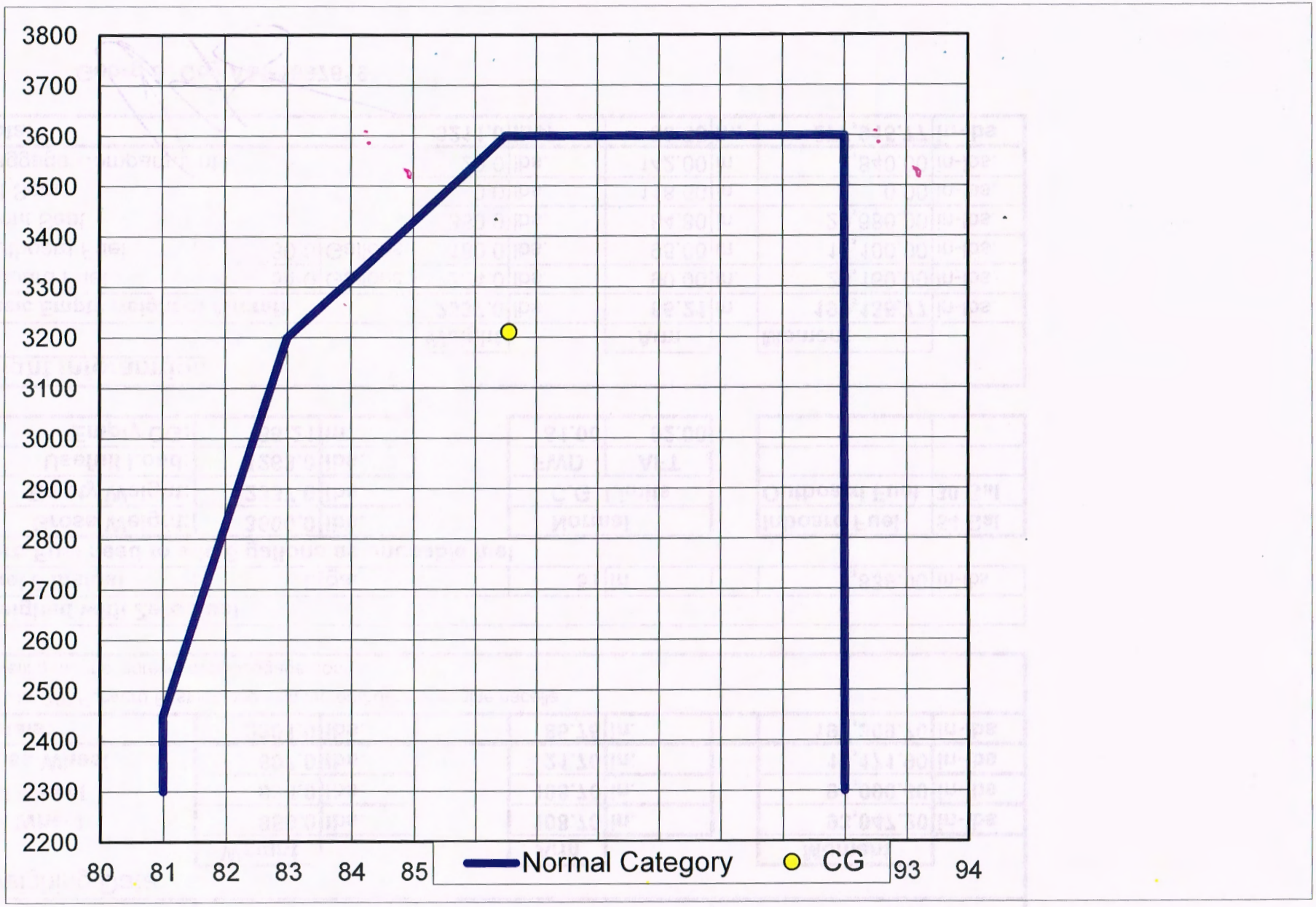
Normal C.G. Limits	
FWD	AFT
81.00	92.00

Inboard Fuel	54 Gal
Outboard Fuel	30 Gal

Flight Inforamtion

			Weight		Arm		Moment	
Basic Empty weight of Aircraft			2337.0	lbs.	85.21	in.	199,135.77	in-lbs.
Inboard Fuel	54.0	Gallons	324.0	lbs.	90.00	in.	29,160.00	in-lbs.
Outboard Fuel	30.0	Gallons	180.0	lbs.	95.00	in.	17,100.00	in-lbs.
Front Seat			350.0	lbs.	84.80	in.	29,680.00	in-lbs.
Aft Seat			0.0	lbs.	118.50	in.	0.00	in-lbs.
Baggage Compartment			20.0	lbs.	142.00	in.	2,840.00	in-lbs.
Total			3211.0	lbs.	86.55	in.	277,915.77	in-lbs

Georg S. Coy A&P1637619

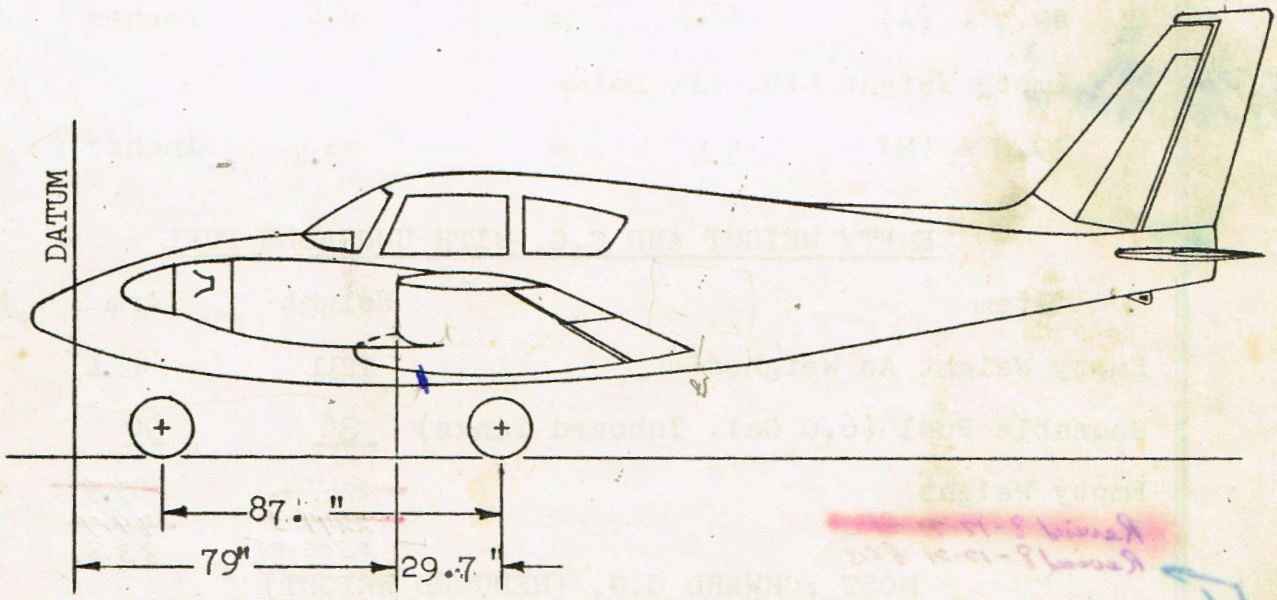

3800
3700
3600
3500
3400
3300
3200
3100
3000
2900
2800
2700
2600
2500
2400
2300
2200
80
81
82
83
84
85
93
94
Normal Category
CG

PIPER AIRCRAFT CORPORATION

LOCK HAVEN, PENNA.

REPORT NO. 1269
ACTUAL WEIGHT AND BALANCE
MODEL PA-30

SERIAL NO. 30-138 IDENTIFICATION NO. N7119Y DATE: 10-11-63



Empty Weight as Weighed (Includes Items checked on Equipment List)

Left Wheel	782
Right Wheel	786
Nose Wheel (N)	643
TOTAL (T)	2211

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570 008

414 710

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LOCK HAVEN, PENNA.

EMPTY WEIGHT C.G. AS WEIGHED

Empty Weight C.G. Forward Main Wheel Centerline:

A. $\frac{(N)}{(T)}$ $\frac{643}{2211}$ x 87. = 25.3 Inches

Empty Weight C.G. Aft of Wing Leading Edge at Wing Station 97.0:

B. 29.7 - (A) 25.3 = 4.4 Inches

Empty Weight C.G. Aft Datum:

C. 79.0 + (B) 4.4 = 83.4 Inches

EMPTY WEIGHT AND C.G. WITH UNUSABLE FUEL

Item	Weight	Arm	Moment
Empty Weight As Weighed	2211	83.4	184397
Unusable Fuel (6.0 Gal. Inboard Tanks)	36	90	3240
Empty Weight	~~2247~~	~~83.5~~	~~187637~~
Revised 8-17-71 GRB.	~~2249.3~~	~~84.7~~	~~190466~~
Revised 8-17-71 GRB	2306.05	83.8	193137.99

MOST FORWARD C.G. (REDUCED WEIGHT)

Superseded 10-21-71

Item	Weight	Arm	Moment
Empty Weight	2247	83.5	187637
Oil (4 Gal.)	30	51	1530
Fuel (10.0 Gal. Inboard Tanks)	60	90	5400
Pilot	170	84.8	14416
Total	2507	83.4	208983

MOST FORWARD C.G. (REDUCED WEIGHT) IS 83.4 INCHES AFT DATUM.

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LOCK HAVEN, PENNA.

MOST FORWARD C.G. (ALTERNATE WEIGHT)

Item	Weight	Arm	Moment
Empty Weight	2247	83.5	187637
Oil (4 Gal.)	30	51	1530
Fuel (54.0 Gal. Inboard Tanks)	324	90	29160
Fuel (30 Gal. Outboard Tanks)	180	95	17100
Pilot and Passenger (F. Seat)	340	84.8	28832
Total	3121	84.7	264259

Most Forward C.G. (Alternate Weight) is 84.7 Inches Aft Datum.

MOST FORWARD C.G. (MAXIMUM WEIGHT)

Item	Weight	Arm	Moment
Empty Weight	2247	83.5	187637
Oil (4 Gal.)	30	51	1530
Fuel (54.0 Gal. Inboard Tanks)	324	90	29160
Fuel (30.0 Gal. Outboard Tanks)	180	95	17100
Pilot and Passenger (F. Seat)	340	84.8	28832
Passenger (2 Rear Seat)	340	118.5	40290
Total	3461	88.0	304549

Most Forward C.G. (Maximum Weight) is 88.0 Inches Aft Datum.

MOST REARWARD C.G.

Item	Weight	Arm	Moment
Empty Weight	2247	83.5	187637
Oil (4 Gal.)	30	51	1530
Fuel (54.0 Gal. Inboard Tanks)	324	90	29160
Fuel (30.0 Gal. Outboard Tanks)	180	95	17100
Pilot	170	84.8	14416
Passenger (2 Rear Seat)	340	118.5	40290
Baggage	200	142	28400
Total	3491	91.2	318533

Most Rearward C.G. is 91.2 Inches Aft Datum.

83.5 055

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GROSS WEIGHT C.G.

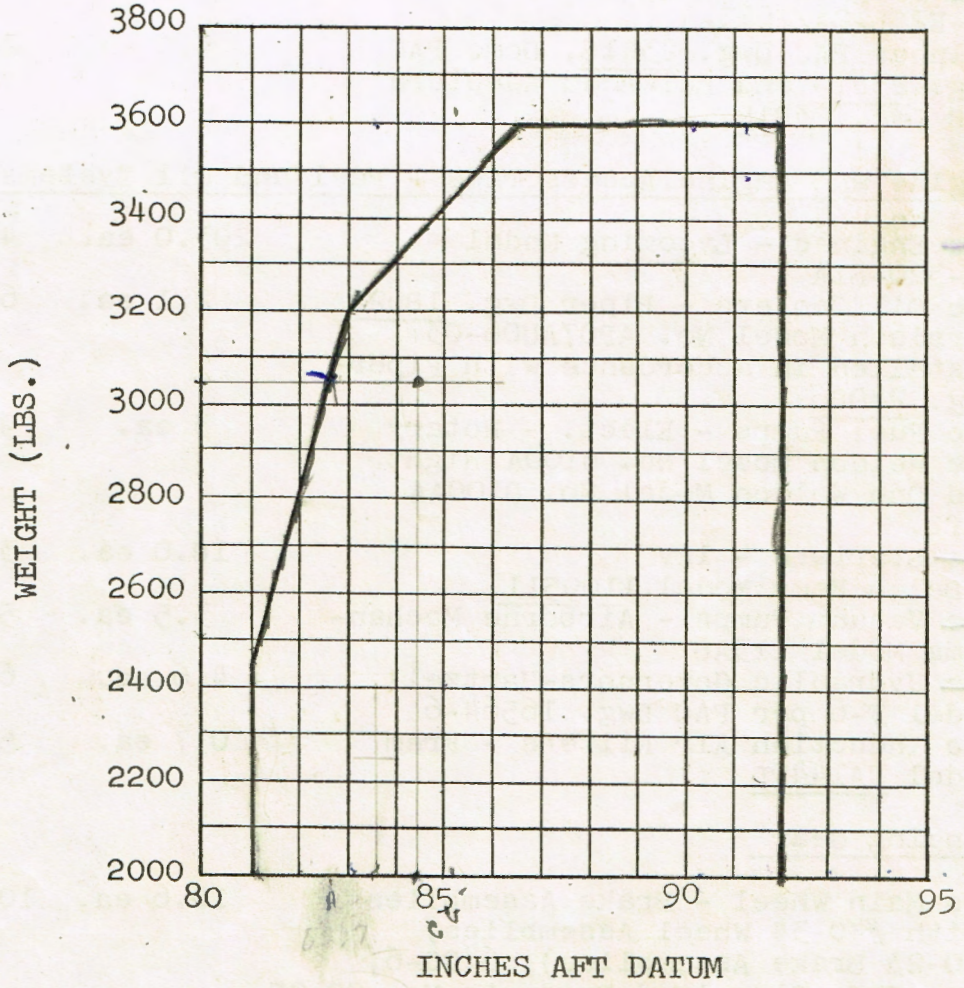
Item	Weight	Arm	Moment
Empty Weight	2247	83.5	187637
Oil (4 Gal.)	30	51	1530
Fuel (54.0 Gal. Inboard Tanks)	324	90	29160
Fuel (30 Gal. Outboard Tanks)	180	95	17100
Pilot & Passenger	340	84.8	28832
Passengers (2 Rear Seat)	340	118.5	40290
Baggage	139	142	19738
Total	3600	90.1	324287

Gross Weight C.G. is 90.1 Inches Aft Datum.

PREPARED.....
CHECKED.....
APPROVED.....

570 008

APPROVED C.G. RANGE AND WEIGHT



Moment due to retracting Landing Gear = +770 in.-lbs.

PREPARED
CHECKED
APPROVED

570 008

414 710

ACTUAL WEIGHT AND BALANCE
MODEL PA-30, TWIN COMANCHE
EQUIPMENT LIST

√ Item	Item	Weight	Arm Aft Datum	Cert. Basis
	Propellers and Propeller Accessories			
___	Two Propellers - Hartzell Model HC-E2YL-2/7663-4	54.5 ea.	23.0	TC P9EA
x (1)	~~Two~~ Propellers - Hartzell Model HC-E2YL-2A/7663-4	54.5 ea.	23.0	TC P9EA
x	Spinner PAC Dwg. 23818, Dome PAC Dwg. 23819 and Bulkhead Adaptors PAC Dwg. 23815.	4.0 ea.	20.1	TC A1EA
	Engine and Engine Accessories - Fuel and Oil Systems			
x (1)	~~Two~~ Engines - Lycoming Model IO-320-B1A	293.0 ea.	45.8	TC 1E12
x	Two Oil Coolers - Piper Dwg. 18622 Harrison Model No. AP07AU06-03 Installed in accordance with Piper Dwg. 24086.	2.1 ea.	62.3	TC A1EA
x	Two Fuel Pumps - Elect. - Rotary One Weldon Model No. 8100A Right and One Weldon Model No. 8100AA left.	3 ea.	90.0	TC A1EA
x (1)	~~Two~~ Starters - 12V Delco Remy Model 1109511	18.0 ea.	37.0	TC 1E12
* x (1)	~~Two~~ Vacuum Pumps - Airborne Mechanisms Model 113A8	3.5 ea.	59.3	TC A1EA
x (1)	~~Two~~ Hydraulic Governors-Hartzell Model F-6 per PAC Dwg. 16564-6	4.6 ea.	61.8	TC P9EA
x	Two Induction Air Filters - Fram Model CA144PL	0.7 ea.	57.0	TC A1EA
	Landing Gear			
x	Two Main Wheel - Brake Assemblies (With #40-34 Wheel Assemblies, #30-23 Brake Assemblies), 6.00-6, Type III, Cleveland Products No. 20-29	10.6 ea.	108.5	FAA TSO C26
x	Two Main 6-Ply Rating Tires 6.00-6, Type III, with Regular Tubes	9.4 ea.	108.5	TC A1EA

*Denotes Optional Equipment

Revised: May 1, 1963
July 9, 1963
August 13, 1963
August 14, 1963

MODEL PA-30, TWIN COMANCHE
SUPPLEMENTAL EQUIPMENT LIST

Item	Item	Weight Lbs.	Arm Aft Datum	Cert. Basis
	PROPELLERS AND PROPELLER ACCESSORIES			
X	Propeller Hartzell Model HC E2YL-2BL/ J7663-4 (Right)	54.5	23.0	TC P9EA
	ENGINE AND ENGINE ACCESSORIES - FUEL & OIL SYSTEMS			
X	Engine One Lycoming Model L10-320-B1A (Right)	293.0	45.8	TC 1E12
X	Starter - 12 V. Delco Remy #11-1923 (Right)	18.0	37.0	TC A1EA
X	Vacuum Pump Airborne Mechanisms Model 200CW (Right) PAC Dwg. 26749-5	3.5	58.9	TC A1EA
X	Hydraulic Governor Hartzell Model F-6-3AL (Right) Per PAC Dwg. 16564-8	4.6	61.8	TC P9EA
____	Engine Lycoming Model L10-320-C1A (Right) with Rajay Turbo- charger, Per STC SA787WE, Dated September 16, 1964 Revised March 10, 1970 Installed Per Piper Drawing 27126 or Rajay Dwg. RJ0601. Rajay Flight Manual Supple- ment Dated Sept. 16, 1964 Revised February 6, 1970 required.	Use Actual Wt. Chg.		STC SA787WE
X	Tachometer Drive Reverser Barbour Stockwell #1A-11,100 (Right)			TC A1EA

MODEL PA-30, TWIN COMANCHE
SUPPLEMENTAL EQUIPMENT LIST

Item	Item	Weight Lbs.	Arm Aft Datum	Cert. Basis
	MISCELLANEOUS EQUIPMENT			
X	Flow Strip Installation Per PAC Dwg. 27073	--	--	TC A1EA
X	Rudder-Aileron Interconnect System Per PAC Dwg. SK2169	2.3	123.0	TC A1EA
	INTERIOR EQUIPMENT			
X	Delegation Option Authorization EA-1 Approved Supplement No. 11 Dated January 16, 1970 to Airplane Flight Manual, Piper Report No. 1269. Required when Counter Rotating Power Plant Installed on Right Side.	--	--	TC A1EA
____	Delegation Option Authorization EA-1 Approved Supplement No. 8 Dated January 16, 1970 to Airplane Flight Manual, Piper Report No. 1515. Required when Counter Rotating Power Plant installed on Right Side.	--	--	TC A1EA

ACTUAL WEIGHT AND BALANCE - MODEL PA-30
TWIN COMANCHE, EQUIPMENT LIST (CONT'D.)

✓ Item	Item	Weight	Arm Aft Datum	Cert. Basis
	Landing Gear (Continued)			
x	One Nose Wheel 6.00-6,Type III Cleveland Aircraft Products Number 38501	6.4	21.0	FAA TSO C26
x	One Nose Wheel - 6-Ply Rating Tire 6.00-6 Type III, With Regular Tube	9.4	21.0	TC A1EA
	Electrical Equipment			
___	One Generator - 12V. 50 amp. Delco-Remy Model 1101915	18 lbs.ea.	37.0	TC 1E12
x	One Battery - 12V. 35 ampere hour	27.0	162.0	TC A1EA
	a. Wisco			
	x b. Reading R-35			
	c. Bowers B-34			
x	Two Landing Lights			
	a. G.E. Model 4509	1.0 ea.	86.0	TC A1EA
	x b. Westinghouse Model 4509	1.0 ea.	86.0	TC A1EA
x	Rotating Beacon Model WRML-12	1.4	275.0	TC A1EA
* x	Dual Generators 12V. 50 amp. Delco-Remy 1101915 with Regulator, Brackets and Relay	38.7 lbs.	38.15	TC 1E12
	Interior Equipment			
x	DMCR Approved Airplane Flight Manual Piper Report No. 1269, Dated February 5, 1963, revised July 9, 1963			TC A1EA
* x	Glar Ban Lights per PAC Dwg. 24230	Neglect Wt. Change		TC A1EA
x	Heater, Modified Stewart Warner 940-DB12 Per PAC Dwg. 23770	20.0	15.0	FAA TSO C20

* Denotes Optional Equipment

Revised: May 1, 1963
May 21, 1963
July 9, 1963

ACTUAL WEIGHT AND BALANCE - MODEL PA-30
TWIN COMANCHE, EQUIPMENT LIST (CONT'D.)

√ Item	Item	Weight	Arm Aft Datum	Cert. Basis
	Interior Equipment (Continued)			
* X	Altimatic II Auto-Pilot Inst. Mitchell AK089, in accordance with Piper Drawing 24240. DMCR Approved Supplement No. 1 to Airplane Flight Manual dated February 5, 1963 required. Eligible on airplane Serial Numbers 30-1 and up.	13.1 lbs.	56.5	TC A1EA
* X	DMCR Approved Supplement No. 1, Dated May 10, 1963, Revised July 9, 1963, to Airplane Flight Manual, Piper Report No. 1269. Required when Altimatic II Auto-Pilot Installation is installed.			TC A1EA
* x Removed 10/25/63	AutoControl II Auto-Pilot Installation Mitchell AK065-E, in accordance with Piper Drawing 24250. DMCR approved Supplement No. 2 to Airplane Flight Manual dated February 5, 1963 required. Eligible on Airplane Serial Number 30-1 and up.	4.6 lbs.	55.3	TC A1EA
* x Removed 10-25-63	DMCR Approved Supplement No. 2 Dated August 13, 1963, to Airplane Flight Manual, Piper Report No. 1269. Required when AutoControl II Auto-Pilot Installation is installed.			TC A1EA

* Denotes Optional Equipment

Revised: May 9, 1963
July 9, 1963
August 13, 1963

570 008

WEIGHT AND BALANCE

SUMMARY OF DISPOSABLE LOAD

ITEM	WEIGHT	ARM	MOMENT
Oil (4 Gal.)	30	51.0	1530
Fuel - Inboard Tanks (54 Gal.)	324	90.0	29160
Fuel - Outboard Tanks (30 Gal.)	180	95.0	17100
Fuel - Tip Tanks (30 Gal.)	180	90.5	16290
Pilot Seat #1	170	84.8	14416
Co-Pilot Seat #2	170	84.8	14416
Passenger Seat #3 (30-590 & Up)	170	120.5	20485
Passenger Seat #3 (30-1 thru 30-589)	170	118.5	20145
Passenger Seat #4 (30-590 & Up)	170	120.5	20485
Passenger Seat #4 (30-1 thru 30-589)	170	118.5	20145
Passenger Seat #5 (30-853 & 30-902 & Up)	235	148.0	34780
Passenger Seat #6 (30-853 & 30-902 & Up)			
Baggage * (30-853 & 30-902 & Up)	250	142.0	35500
Baggage (30-1 thru 30-852 & 30-854 thru 30-901)	200	142.0	28400

6 gal. of unusable fuel of inboard tanks plus oil are part of the airplane basic weight.

* Baggage replaces seats 5 & 6.

570 008

ACTUAL WEIGHT AND BALANCE - MODEL PA-30
TWIN COMANCHE, EQUIPMENT LIST (CONT'D.)

√ Item	Item	Weight	Arm Aft Datum	Cert. Basis
	Miscellaneous Equipment (Not Listed Above)			
* x	Heated Pitot Head - PAC 21301	1	99.0	TC AlEA
x	Stall Warning Indicator PAC Dwgs. 23445 and 23700	Neglect Wt.	Change	TC AlEA
*	Fire Extinguisher and Bracket Type A-20 Spec. MIL-E-5220A Per PAC Dwg. 21731	8 lbs.	84.8	TC AlEA
*	Fire Extinguisher and Bracket Type 2 1/2 DCK (Purch. Walter Kidde) Per PAC Dwg. 21731	5 lbs.	84.8	TC AlEA
	Radios			
* X	Narco Mark 12 Installation (Less Antennas)	12.1	103.8	TC AlEA
* X	Narco Mark 12 Installation (Less Antennas)	12.1	103.8	TC AlEA
* X	Motorola ADF-T12B with Antenna and Cables	10.8	80.1	TC AlEA
* X	Narco UGR-2A Glide Slope with Antenna and Cables	9.25	144.5	TC AlEA
*	Narco UD1-2 DME with Antenna and Cables	19.25	105.3	TC AlEA
* 1 ea	Narco VOA-4 Omni Head and Converter	3.25	64.0	TC AlEA
*	Narco VOA-5 Omni and G.S. Head and Converter	3.25	64.0	TC AlEA
* X	Narco MBT-12 with antenna and Cables	2.25	99.9	TC AlEA
* X	Omni Antenna Narco Type VRP-37	1.0	268.0	TC AlEA
* X	Transmitting Antenna #1 Narco No. VTP-17	1.0	~~139.5~~ 154.0	TC AlEA
* X	Transmitting Antenna #2 Narco No. VTP-17	1.0	187.5	TC AlEA
X	Narco DGO-10 Indicator	4.7	62.0	

* Denotes Optional Equipment

Revised: May 1, 1963
May 9, 1963
May 21, 1963

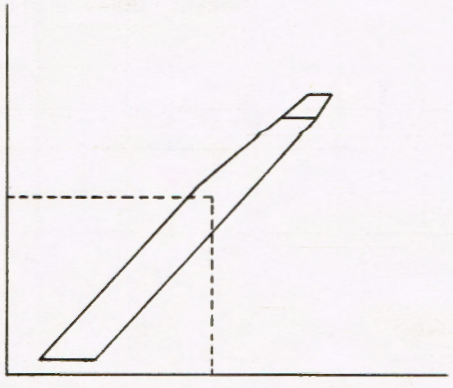
570 008

MODEL PA-30, TWIN COMANCHE
SUPPLEMENTAL EQUIPMENT LIST

Item	Item	Weight Lbs.	Arm Aft Datum	Cert. Basis
	MISCELLANEOUS EQUIPMENT			
X	Flow Strip Installation Per PAC Dwg. 27073	--	--	TC A1EA
X	Rudder-Aileron Interconnect System Per PAC Dwg. SK2169	2.3	123.0	TC A1EA
	INTERIOR EQUIPMENT			
____	Delegation Option Authorization EA-1 Approved Supplement No. 11 Dated January 16, 1970 to Airplane Flight Manual, Piper Report No. 1269. Required when Counter Rotating Power Plant Installed on Right Side.	--	--	TC A1EA
____	Delegation Option Authorization EA-1 Approved Supplement No. 8 Dated January 16, 1970 to Airplane Flight Manual, Piper Report No. 1515. Required when Counter Rotating Power Plant installed on Right Side.	--	--	TC A1EA

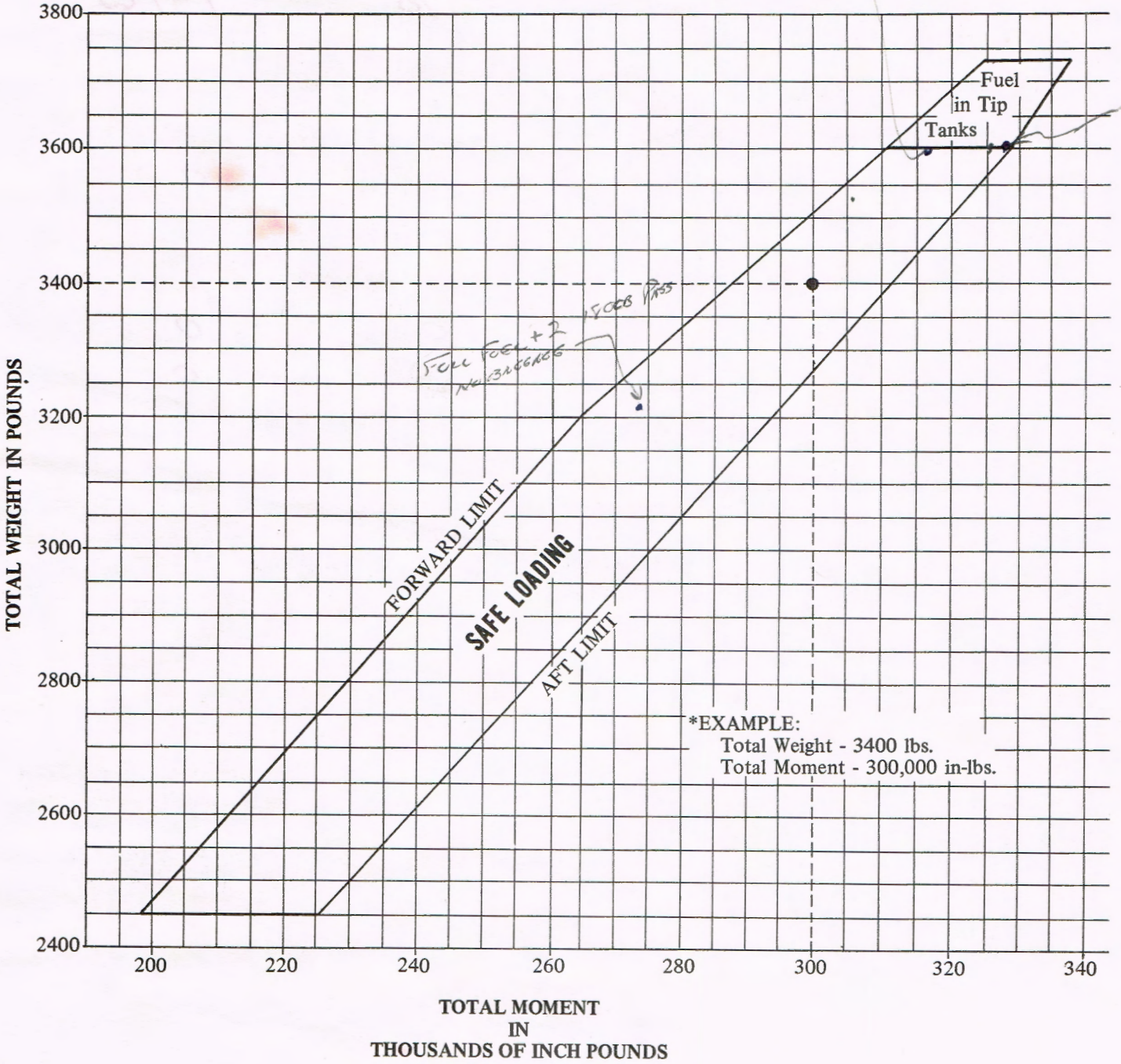
WEIGHT AND BALANCE COMPUTATION

		Weight (lbs.)	x	Arm (in.)	=	Moment (in.-lbs.)
A.	Empty aircraft	2303.75	x	83.7	=	192,855
B.	Unusable fuel (6 gals.)	36	x	90	=	3240
C.	Oil (4 gal.)	30	x	51	=	1530
1.	Basic Weight and Moment (A+B+C) (May be given in Wt. & Bal. Report)	2370				197,625
2.	Inboard fuel (54 gal., 324 lbs. max.)		x	90	=	
3.	Outboard fuel (30 gal., 180 lbs. max.)		x	95	=	
4.	Tip tank fuel (30 gal., 180 lbs. max.)	0	x	90.5	=	0
5.	Seats 1 & 2		x	84.8	=	
6.	Seats 3 & 4 (S/N 30-1 thru 30-589)		x	118.5	=	
	Seats 3 & 4 (S/N 30-390 and up)	0	x	120.5	=	0
7.	Seats 5 & 6 (235 lbs. max. if seats installed)	0	x	148	=	0
8.	Baggage (250 lbs. max. S/N 30-902 and up if seats removed) (200 lbs. max. S/N 30-1 thru 30-901)		x	142	=	
		Total Weight				Total Moment



1. Locate coordinates of Total Weight and Total Moment.
2. If point lies within envelope loading is satisfactory.

PA-30 LOADING ENVELOPE



LOG OF PA-30 FLIGHT MANUAL SUPPLEMENTS

NOTE

A flight manual supplement is required to be in the manual only if the equipment which is the subject of the supplement is installed.

No.	Subject	Date
1	Altimatic II	May 10, 1963
2	Autocontrol II	July 6, 1964
3	Altimatic II with Altimatic Trim	July 6, 1964
4	Icing Equipment	Oct. 13, 1966
5	Mixture Monitor	Feb. 1, 1965
6	Oxygen System	Apr. 30, 1965
7	Autocontrol III	Feb. 9, 1966
8	Altimatic III	Dec. 9, 1966
9	Mixture Control Indicator	June 29, 1967
10	Brittain Tip Tanks	Nov. 22, 1967

Nov. 15, 1969

Report: 1269
Model : PA-30
Supplement Sect.

SUPPLEMENT NO. 1 TO PIPER MODEL PA-30 FLIGHT MANUAL

THIS DOCUMENT MUST BE ATTACHED TO THE BASIC AIRPLANE FLIGHT MANUAL AND KEPT IN THE AIRPLANE WHEN THE ITEM OF EQUIPMENT DESIGNATED BELOW IS INSTALLED.

Approval Basis CAR 3 and 410
Dated May 10, 1963
Piper Model PA-30
Equipped with Piper Altimatic II'
Normal Category Only

Rev.: 7/9/63

FAA IDENTIFICATION NO._____

INSTALLATION OF PIPER ALTIMATIC PILOT II (MODEL AK089)

Placards:

(1) Below the directional gyro:

PULL TO SELECT HEADING

(2) To the right of the control console:

PIPER ALTIMATIC PILOT INSTRUCTIONS

LIMITATIONS:

1. Pilot off during take-off and landing.

2. Pilot off during single engine operation.

NORMAL OPERATION:

REFER TO FLIGHT MANUAL.

EMERGENCY:

1. Disengage Altimatic controls

2. Altimatic pilot may be overpowered manually.

(3) & (4) Adjacent to the pitch control knob:

UP PULL

ALT.

DN. HOLD

Operating Instructions:

Prior to operating the Altimatic Pilot, check the vacuum and ascertain that the directional gyro and artificial horizon are functioning properly. For daytime operation, the dim switch must be pushed in for trim indication on the trim or servo effort lights. This switch also controls the dial lights of the altitude scale.

SECTION I - AUTOMATIC HEADING SELECTOR

1. Adjust directional trim.
2. Set the directional gyro with the magnetic compass. Uncage by pulling fully out and engaging with the heading selector card.

   NOTE: Spinning or excessive precession will result if D.G. is not fully uncaged.
3. Select the desired heading at the top of the heading selector card index line.
4. Subsequent course changes may be made by turning the heading select knob.
5. After reaching a safe altitude, turn the "ROLL" engage knob clockwise to engage the roll portion of the Autopilot. At this time, a pitch servo effort light may come on. This has no effect on the aircraft until the pitch servo is engaged. See Section II or III.

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APPROVED

SECTION I - AUTOMATIC HEADING SELECTOR (CONTINUED)

6. The TURN TRIM knob located on the control console should be used to bring the exact heading, shown on the D. G. card, into agreement with the Course Selector.

7. Steeper banks (additional 4 deg.) may be obtained by adding any portion of the TURN TRIM knob,but it must be re-positioned at termination of the turn.

SECTION II - MANUAL PITCH CONTROL

1. Trim the aircraft for hands-off flight after a safe altitude is attained. (If in a climb, trim to 125-135 MPH) (109-117 KNOTS)

2. Push in the PITCH CONTROL knob. If a servo effort light comes on, rotate the PITCH CONTROL knob in the proper direction, until the light goes out.

3. When the servo effort lights are both out, engage the PITCH Engage knob.

4. Subsequent changes in pitch attitude may be made by rotating the PITCH CONTROL knob in the appropriate direction.

NOTE:

(1) Always keep the aircraft in trim by adjusting mechanical trim "Nose Up" when the "Up" effort light is on and "Nose Down" when the "Down" effort light is on.

(2) The aircraft should be in proper trim before disengaging the Autopilot.

(3) NEVER disengage pitch servo without having a firm grip on the control wheel.

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APPROVED

SECTION III - AUTOMATIC ALTITUDE SELECT

1. Trim the aircraft for "hands-off" flight.

   If in a climb, trim at approximately 125 to 135 MPH.

2. Select the desired altitude on the console dial.

3. Center the PITCH CONTROL knob and pull out.

4. If an effort light appears, rotate the PITCH CONTROL knob in the proper direction until the light goes out.

5. When the servo effort lights are both out, engage the PITCH Engage knob, rocking the wheel gently fore and aft, if necessary.

6. The PITCH CONTROL knob may be used to allow the AutoPilot to:

   (a) Compensate for loading. With C.G. forward, climb and descent speeds will be normal with knob centered. With C.G. rearward, about 10° downward rotation of the knob will allow normal climb and descent airspeeds.

   (b) Change climb and descent speeds. Airspeed can be effected by as much as ± 10 MPH if aircraft is in trim with knob centered.

7. Climbs and descents may be made by selecting a new altitude on the console scale. The Altitude Selector knob should be turned very slowly at first to avoid an abrupt change of attitude. When it is evident that further movement of the knob will produce no further attitude change, the knob may then be rotated more quickly.

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CHECKED
APPROVED

Rev.: 7/9/63

SECTION III - AUTOMATIC ALTITUDE SELECT (CONTINUED)

8. One complete revolution of the Altitude Selector knob will result in an altitude change of about 500 feet.

NOTE:

(1) NEVER disengage pitch servo without having a firm grip on the control wheel.

(2) ALWAYS keep the aircraft trimmed (effort lights out).

SECTION IV - EMERGENCY PROCEDURES

1. In event of malfunction, turn both pitch and roll servo knobs completely counterclockwise, disengaging both axes of altimatic from the control system.

2. Altimatic may be overpowered by exertion of 16 ± 3 pounds of force on either control wheel for roll servo, and 20 ± 3 pounds fore or aft on either control wheel for pitch servo.

3. In case of pitch control interference, a replaceable break-away link is installed under the floorboard which will break at $40 \begin{smallmatrix}+5\\-3\end{smallmatrix}$ lbs. push or pull. This break-away feature will completely isolate the pitch servo from the aircraft control system.

4. In cruise configuration, altimatic malfunction with a 3 second recovery delay results in a 27 bank and 165 ft. altitude loss.

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SECTION IV - EMERGENCY PROCEDURES (CONTINUED)

5. In approach configuration, Altimatic malfunction with a 1 second recovery delay results in an 8° bank and 70 ft. altitude loss.

J. W. McNary
Asst. Chief Engineer
Piper Aircraft Corporation
Lock Haven, Pennsylvania
DMCR 1-1
Approval Basis CAR 3 and 410
May 10, 1963

PREPARED
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APPROVED

SUPPLEMENT NO. 11 TO PIPER MODEL PA-30 FLIGHT MANUAL

THIS DOCUMENT MUST BE ATTACHED TO THE BASIC AIRPLANE FLIGHT MANUAL AND KEPT IN THE AIRPLANE WHEN THE ITEM OF EQUIPMENT DESIGNATED BELOW IS INSTALLED.

Approval Basis CAR 3 and Part 21 Subpart J
January 16, 1970
Piper Model PA-30
Equipped with counter rotating power plant on right side, flow strips on wing leading edges, and Rudder-Aileron System interconnection.
Normal Category Only

FAA IDENTIFICATION NO. N7119Y

INSTALLATION OF COUNTER ROTATING POWER PLANT ON RIGHT SIDE

The information in this document supersedes the basic Airplane Flight Manual only where covered in the items contained in this supplement. For limitations and procedures not contained in this supplement, consult the manual proper.

I. LIMITATIONS SECTION

Same as the prescribed in appropriate FAA approved Airplane Flight Manual except:

A. Engines — One Lycoming LIO-320-B1A (Right)
One Lycoming IO-320-B1A (Left)

Engine Limits — For all operation 2700 RPM, 160 HP

B. Fuel — 100/130 Minimum Octane Aviation Gasoline

C. Propellers — One Hartzell HC-E2YL-2 (Left) Series
Constant Speed
Full Feathering; Blades 7663-4
Pitch Settings at 30 in.
Station : High 76° - 77°, Low 12°
Diameter: Not over 72 inches
Not under 70 inches
(No further reduction permitted)

I. LIMITATIONS SECTION - (Continued)

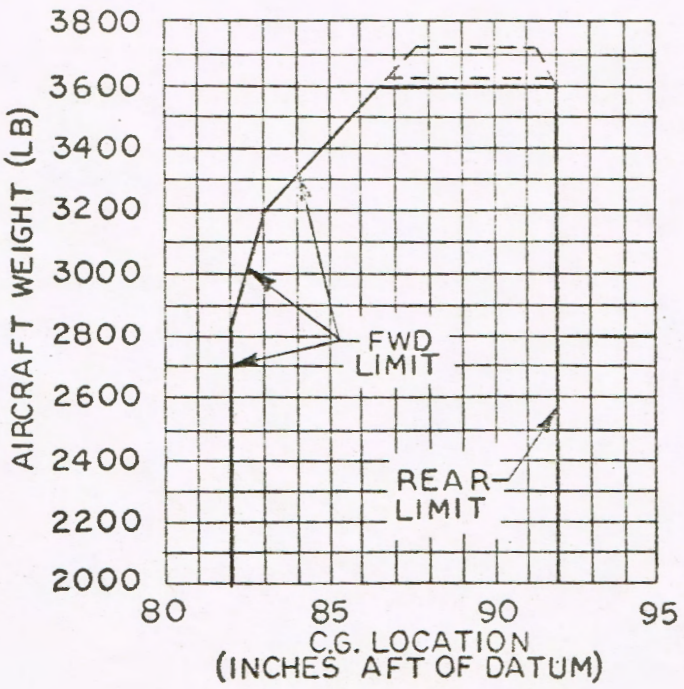
C. Propellers (Cont.)

One Hartzell HC-E2YL-2BL(Rt.) Series
Constant Speed
Full Feathering; Blades J7663-4
Pitch Settings at 30 in.
Station : High 76°-77°, Low 12°
Diameter: Not over 72 inches
Not under 70 inches
(No further reduction permitted)

D. Airspeed Limits (Calibrated Airspeed)

Flap Extended	70 to 125 MPH
Minimum Control Speed (Single Engine) (Red Radial Line)	80 MPH
One Engine Inoperative (Best Rate of Climb Speed) (Blue Radial Line)	105 MPH
Stall Speed	
Gear & Flaps Down	70 MPH
Gear & Flaps Up	76 MPH
Never Exceed Speed	230 MPH

E. C.G. Range



Weight	Forward Limit In. Aft of Datum	Aft Limit In. Aft of Datum
3600	86.5	92.0
3200	83.0	92.0
2825	82.0	92.0

Straight line variations between the points given.

NOTE

Dotted area may be used only when tip tanks are installed. Weight in excess of 3600 lbs. must be symmetrically loaded fuel in tip tanks.

I. LIMITATIONS SECTION - (Continued)

F. Placards

On Instrument Panel:

Min. Single Engine Control Speed	80 MPH
Maneuvering Speed	162 MPH
Max. Gear Down Speed	150 MPH

On Each Fuel Filler Door:

100/130 Min. Grade Aviation Gasoline

II. PERFORMANCE

Performance is the same as prescribed in appropriate FAA Approved Airplane Flight Manual except the loss of Altitude during a power off stall with gear and flap retracted is 500 ft..

FAA Approved by:

J. W. McNary
Asst. Chief Engineer
Piper Aircraft Corporation
Lock Haven, Pennsylvania
DOA No. EA-1
Approval Basis CAR 3
and Part 21 Subpart J
January 16, 1970

SUPPLEMENT NO. 12 TO PIPER MODEL PA-30 FLIGHT MANUAL

THIS DOCUMENT MUST BE ATTACHED TO THE BASIC AIRPLANE FLIGHT MANUAL AND KEPT IN THE AIRPLANE WHEN THE ITEM OF EQUIPMENT DESIGNATED BELOW IS INSTALLED.

Approval Basis CAR 3 and Part 21 Subpart J
June 10, 1970
Piper Model PA-30
Equipped with Air Flow Modification Kit.
Normal Category Only

FAA IDENTIFICATION NO. N7119Y

INSTALLATION OF AIR FLOW MODIFICATION KIT

The information in this document supersedes the basic Airplane Flight Manual only where covered in the items contained in this supplement. For limitations and procedures not contained in this supplement, consult the manual proper.

I. PERFORMANCE

Performance is the same as prescribed in appropriate F.A.A. Approved Airplane Flight Manual except the loss of altitude during a power-off stall is 300 feet.

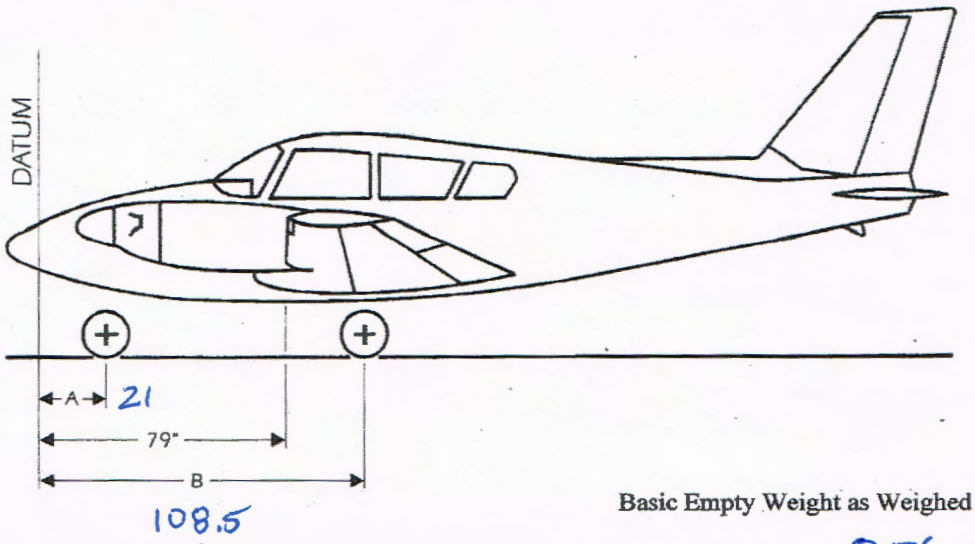
FAA Approved by:

J. W. McNary
Asst. Chief Engineer
Piper Aircraft Corporation
Lock Haven, Pennsylvania
DOA No. EA-1
Approval Basis CAR 3
and Part 21 Subpart J
June 10, 1970

WEIGHT AND BALANCE

PA-30 * 3600/3725 POUNDS GROSS WEIGHT

SERIAL NO: 30 - 138 REGISTRATION NO: N - 7119Y DATE: 4/9/2021



Basic Empty Weight as Weighed

Left Wheel	(L)	856
Right Wheel	(R)	838
Nose Wheel	(N)	607
Total	(T)	2,301

APPROVED C.G. RANGE AND WEIGHT

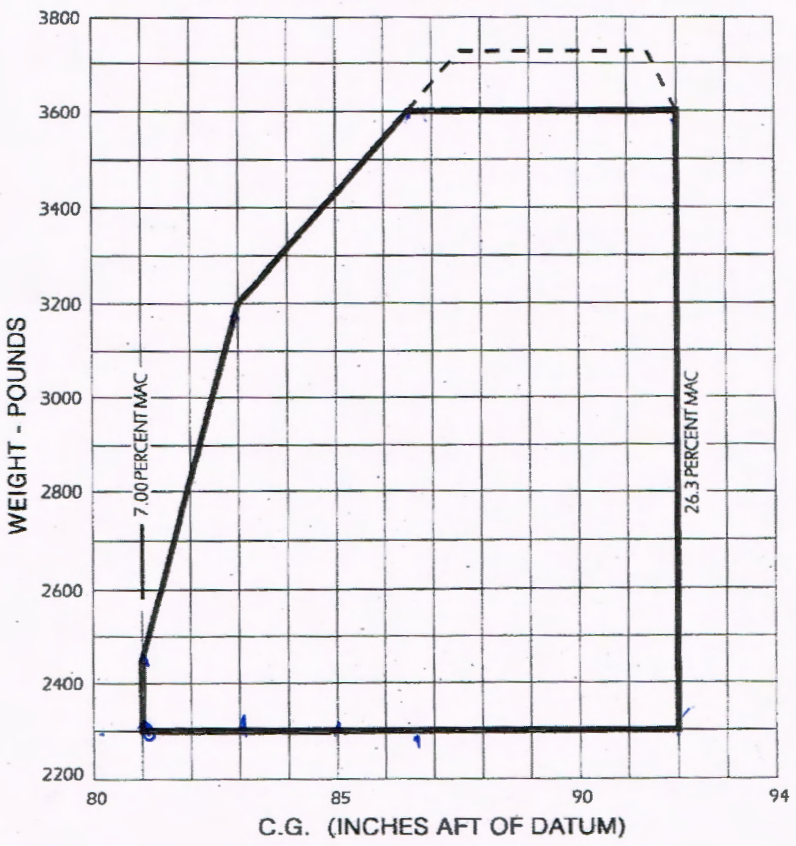


FIGURE 6-01

EQUIPMENT LIST (Cont.)

	Mark If Installed	Weight (lbs)	Arm (Aft of Datum)	Moment (in lb)
4.) Landing Gear:				
Two Main Wheel Brake Assemblies				
6:00 X 6 Type III				
Wheel, Cleveland 40-34				
Brake, Cleveland 30-23	____	10.6 ea.	108.5	2300.2
6:00 X 6 Type III				
Wheel, Cleveland 40-90				
Brake, Cleveland 30-23	____	10.6 ea.	108.5	2300.2
Two Main Wheel Tires (W/Tubes)	____	9.4 ea.	108.5	2039.8
One Nose Wheel 6:00 X 6 Type III				
Wheel, Cleveland 38501 (Less Drum)	____	6.4	21.0	134.4
One Nose Wheel Tire (W/Tube)	____	9.4	21.0	197.4
5.) Electrical Equipment:				
Generator				
Delco Remy 12 Volt - 50 Ampere	____	18.0	37.0	666.0
Dual Generators				
Delco Remy 12 Volt - 50 Ampere	____	38.7	38.2	1478.3
Dual Alternators				
Prestolite 12 Volt - 70 Ampere	____	32.0	38.1	1219.2
Battery - Forward Mount				
12 Volt - 35 Ampere Hour	____	27.0	16.8	453.6
Battery - Aft Mount				
12 Volt - 35 Ampere Hour	____	27.0	162.0	4374.0
Two Landing Lights				
GE Model 4509	____	1.0 ea.	86.0	172.0
Rotating Beacon				
Whelen No. WRML-12	____	1.4	275.0	385.0
Anti-Collision Lights				
Whelen Red Strobe Model HS	____	3.1	175.2	543.1
Whelen White Strobe Model HD-T2	____	4.8	134.4	645.1
Heaters				
Janitrol Model No. 20D35	____	29.0	15.0	435.0
Southwind Model No. 94C-DC12	____	24.5	15.0	367.5
6.) Autopilots:				
Piper Auto Control II (W/O Gyros)	____	4.6	55.3	254.4
Piper Auto Control III (W/O Gyros)	____	4.0	113.0	452.0
Piper Altimatic II (W/O Gyros)	____	13.1	56.5	740.2
Piper Altimatic II (W/O Gyros)	____	17.1	81.4	1391.9
Piper Altimatic III (W/O Gyros)	____	18.9	119.5	2258.6

AIRCRAFT WEIGHT AND BALANCE 2-23-96
PIPER PA-30 S# 30-138 R# N7119P

AIRCRAFT WEIGHED IN A CLOSED HANGER.
SCALES CALIBRATED 11-21-95 AT DICKEY SCALES, ORLANDO FL.

CATEGORY-NORMAL
GROSS WEIGHT-3600 lb
EW-2416 lb
UL-1184 lb
CG-86.8 in

SCALE READINGS
NOSE-794 lb
RIGHT-1069 lb
LEFT-1093 lb

FULL FUEL CG:
CG=[794x30.7) + (1069+1093)108.7]/2956=87.7

EMPTY WT CG:
CG=[2956(87.7)-360(90)-180(95)]/2416=86.8

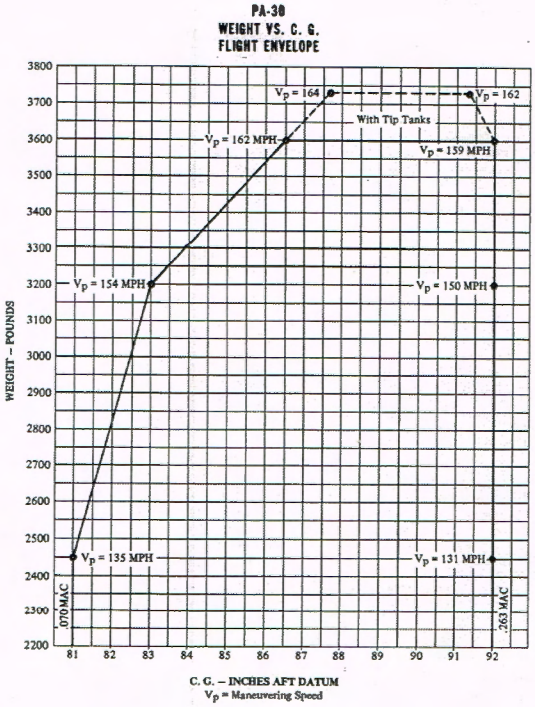
BRENDAN LARMER A&P153561620

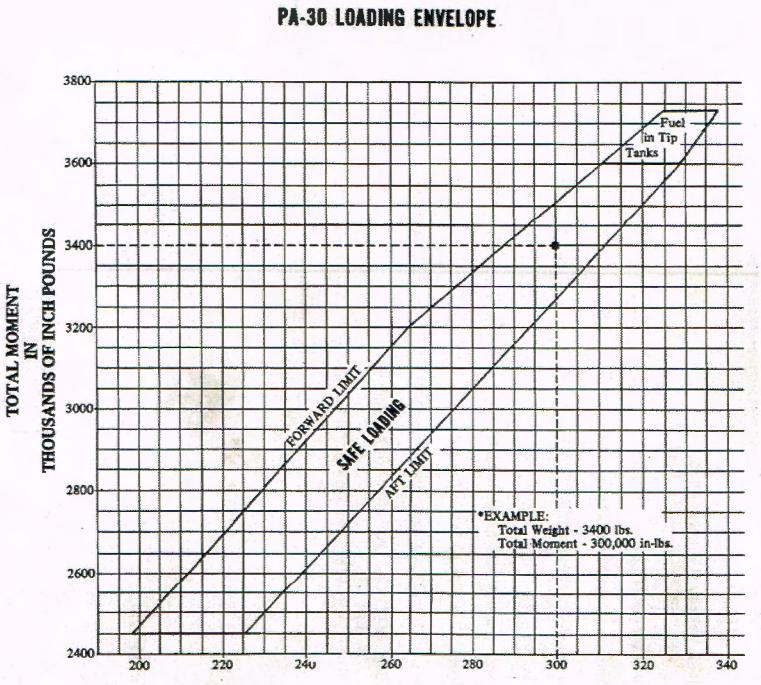
N7119Y 1963 PA30CR S/N 30-138 Revised 3/14/99

Speeds	Stall Gear & Flaps Down		70 mph
	Stall Clean		76
	VNE		230
	Vmc		80
	Vx		90
	Vy		112
	Vy Single Engine		105
	Maneuvering Speed	2450 lbs	135
		3600 lbs	162

Gross Weight	3600		
Full Fuel Weight*	2956	87.7	+259,241
Minus Fuel Main	-___	90.0	-_____
Aux	____	95.0	-_____
Plus Pilot - Dammon	170	84.8	+ 14,416
Plus Pass Seat #2	____	84.8	+_____
Plus Pass Seat #3	____	118.5	+_____
Plus Pass Seat #4	____	118.5	+_____
Plus Baggage 190 Max	____	142.0	+_____
Totals	_____	_____	_____

* Includes all equipment normally carried in N7119Y (tool box, cover, headsets, underseat materials, etc).





WEIGHT AND BALANCE

Piper PA-30
S/N 30-138
N#7119Y

February 5, 1982
Supersedes Computations
June 11, 1980

		WEIGHT	ARM	MOMENT
Aircraft:		2332.65	84.00	195958.1
Equipment Removed:				
Piper Altimeter II Auto Pilot Sys.	-	13.1	+ 56.5	- 740.15
Narco MK-12 Nav-Com System (dual)	-	24.2	+103.8	- 2511.96
Bendix T12B ADF System	-	10.8	+ 80.1	- 865.08
Narco DGO-10 HSI	-	4.7	+ 62.0	- 291.4
Narco UGR-2A Glideslope	-	2.1	+ 42.0	- 88.2
Narco MBT Marker	-	2.25	+ 99.9	- 224.78
Audio Panel	-	1.5	+ 70.0	- 105.0
Equipment Installed:				
King KMA-2Y Audio Panel	+	1.7	+ 64.0	+ 108.8
King KY-197 Com	+	3.2	+ 62.0	+ 198.4
King KY-197 Com	+	3.2	+ 62.0	+ 198.4
King KN-53 Nav	+	2.8	+ 62.5	+ 175.0
King KNS-80 Rnav	+	6.0	+ 62.5	+ 375.0
King KI-525A HSI Indicator	+	3.9	+ 62.0	+ 241.8
King KA-52 Adapter	+	.4	+166.5	+ 66.6
King KMT-112A Flux Valve	+	.3	+193.0	+ 57.9
King KG-102A Gyro	+	4.3	+166.5	+ 715.9
King KA-51 Slaving Unit	+	.3	+ 66.5	+ 19.9
King KR-87 ADF Receiver	+	3.2	+ 62.5	+ 200.0
King KA-44B ADF Antenna	+	2.0	+120.0	+ 240.0
King KI-227 ADF Indicator	+	.7	+ 65.0	+ 45.5
Ryan WX-10 Processor	+	4.3	+169.5	+ 728.9
Ryan WX-10 Display	+	3.4	+ 62.5	+ 212.5
Ryan WX-10 Antenna	+	2.0	+145.0	+ 290.0
Avionics West EC-100 Stereo	+	3.8	+ 63.0	+ 239.4
Edo-Aire 52D66 Horizon	+	2.7	+ 64.0	+ 172.8
Edo-Aire IC385 Console	+	1.0	+ 64.5	+ 64.5
Edo-Aire IC363-1 Servo	+	2.5	+132.5	+ 331.3
Edo-Aire IC388-3 Radio Coupler	+	1.0	+ 66.0	+ 66.0
Edo-Aire G-502 D.G.	+	2.6	+ 64.0	+ 166.4
Sigtronics Stereo Com 400 Intercom	+	.5	+ 56.0	+ 28.0
Davtron 902A VOR Indicator	+	.5	+ 66.0	+ 33.0
Airborne Instrument Air Filter	+	.5	+ 35.0	+ 17.5
Stereo Antenna	+	.5	+ 3.0	+ 1.5
Panel Light Dimmer Unit	+	.3	+ 30.0	+ 9.0
TOTAL		2331.6		196135.53

GROSS WEIGHT: 3600.00

NEW EMPTY WEIGHT: 2331.6

NEW USEFUL LOAD: 1268.4

NEW EMPTY WEIGHT C.G.: 84.12

NEW MOMENT: 196135.53

SUPERCEDED 11-12-90 LAFAYETTE AVIONICS, INC.

AVIONICS UNLIMITED, INC.
CRS #3041
HANGAR #4, PURDUE AIRPORT
W. LAFAYETTE, IND. 47906
BY Robert L. Walgren

Revision No.	Description	Affected Pages	Approval
Original	Complete Flight Manual Supplement for EDM-760	1 thru 4	Mgr. Special Certification Branch, ANM-190S FAA, Seattle ACO Transport Airplane Directorate Date August 31 1999

J.P.INSTRUMENTS
PO BOX 7033
1
HUNTINGTON BEACH CA 92646

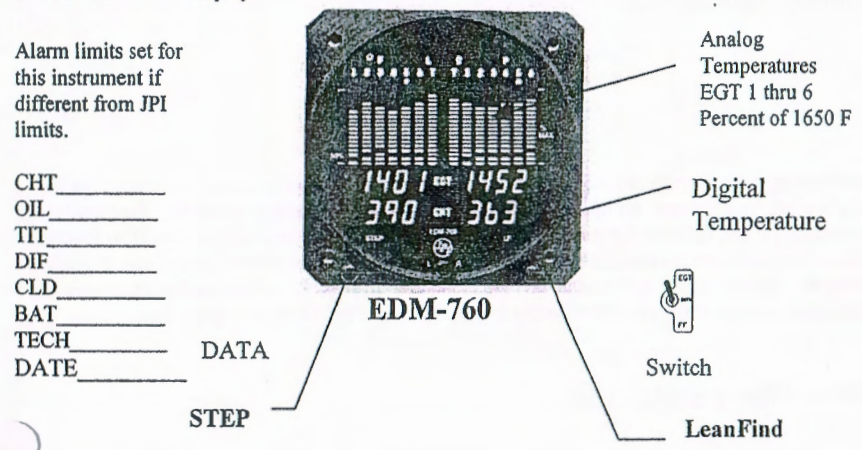
Airplane Flight Manual Supplement
Document No. 760-

Rev NC

I GENERAL

The EDM-760 twin temperature indicator displays temperature digitally and in analog format for both Left and Right engines simultaneously. The EGT as displayed is based on probes located near the exhaust outlet for each cylinder and the TIT probe, if installed, in the turbo charger inlet. Before each flight during the run-up the pilot should verify that the left engine is displayed on the left display and the right engine on the right. . These probes are not necessarily collocated with the primary probes therefore, EDM-760 may not indicate the same as the aircraft primary instruments. The analog display is an electronic bar graph (vertical columns, one per cylinder) of EGT & TIT temperatures presented as a percentage of TIT. Below the vertical columns the specific value for EGT and CHT are displayed digitally. The dot over the column indicates which cylinder's digital information is presently displayed. The missing bars at the base of the columns indicates the hottest and coldest Cylinder Head temperature trend . Within a four bar range at the base of the column a trend is formed showing the hottest and the coldest cylinder with respect to the others. Depressing the LF and STEP button simultaneously brings up the adjustable Scan Rate, OAT in °F or °C. Depress the LF button until the desired scan time is ...hed. Exit by Depressing STEP.

If the EDM-760 buttons are not depressed for 10 minute the system will start scanning automatically. Depressing the STEP button will stop the automatic scan and index through all the functions available. During constant power cruise, if the LF button is depressed for five seconds the bar graph will level at mid scale and the letter "N" (normalize) will illuminate. The leveled bars represent the peaks of each column. Each bar represents 10 °F and now acts as an EGT & TIT trend monitor, quickly showing an increase or decrease in temperature. Depress again to return to normal illuminating the "P"(percentage); nothing else is affected. With the fuel flow option there is a three position toggle switch. The positions are: 1) **EGT**, digital and Bargraph display of temperatures, 2) **FF**, digital display of GPH, REM and USED Fuel. Temperature Bargraph remains. 3) **Both** , cycles through everything installed. The data port output, sends RS232 serial data every 6 sec.
Options of Fuel Flow, TIT, OAT, IAT (induction air temp. Carb temp.), OIL, BAT (voltage) are only displayed digitally with headlines after the number, as "230 OIL" or "14 GPH". A large value (50 +) of "CLD" indicates shock cooling usually associated with rapid descents at low power. Optional functions not installed will not display.



FAA APPROVED August 31 1999

GENERAL (cont.)

An alarm causes the digital function to flash as soon as the particular limit is exceeded. Factory set alarm limits for CHT (450 °F) and OIL (230°F) are lower than the actual aircraft limits and can not be set by the pilot. The values may be adjusted to suit individual preference by a qualified technician. Other factory set alarm limits are: "BAT" Voltage 15.5/11.0 or 31.0/22.0 Hi/Lo as appropriate; "DIF" (differential Hi/Lo EGT) 500 °F, "TIT" 1650 °F Hi; "OIL" Lo 90 °F; "CLD" (Rate of change of cylinder head temperature in degrees per minute) -60 degrees/minute. The pilot should be aware of the setting of each alarm for his particular aircraft. An alarm is "Canceled" by holding the step button in for 5 seconds and seeing the word "OFF". Then, only that particular alarm is canceled. Canceled alarms will not appear again until the power has been removed and reapplied to the EDM-760. The entire display dims automatically depending on the ambient lighting.

The Cylinder Head with the Gasket probe and oil temperature will indicate generally higher temperatures than instruments provided by the aircraft manufacturer because the EDM-760 sensing thermocouples are not collocated with the primary instrument sensing probes. Therefore, airplane flight manual limitations based on primary instrument indication take precedence over those of the EDM-7

II OPERATING LIMITATIONS

A. The EDM-760 may not replace any existing instrument or indicator required by the aircraft type design or operating limits.

B. The EDM-760 display may not be used in lieu of, or to supersede, engine operating limitations established by the airframe or engine manufacturer during certification.

III. EMERGENCY PROCEDURES

No change

IV. NORMAL PROCEDURES

CAUTION
Comply with manufacturer's Airplane
Flight Manual leaning procedure.
Do not exceed applicable engine
or aircraft limitations.

After establishing desired cruise power depress the LF button to activate the Lean Find Mode. As the mixture is leaned, one column on the EDM-760 display will begin blinking, indicating the exhaust gas temperature for that cylinder has peaked showing its digital value along with the fuel flow (option) at that time. Continue with the leaning procedure as recommended by the aircraft manufacturer while monitoring the primary engine instruments and the EDM-760 display. Once the leaning procedure has been completed, depress the Step button briefly to exit the Lean Find Mode and enter the Monitor Mode.

FAA APPROVED August 31 1999

FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT OR
SUPPLEMENTAL AIRPLANE FLIGHT MANUAL (INCLUDING POH AND FAA AFM)
(FOR THOSE AIRCRAFT WITHOUT A BASIC AIRPLANE FLIGHT MANUAL)

EDM-760 TEMPERATURE INDICATOR
FOR

Twin Reciprocating Engine Powered Aircraft as listed on Approved Model List of

STC SA00729SE.

REG. NO. N7119Y

SER. NO. 30-138

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the J.P. Instruments EDM-760 is installed in accordance with Supplemental Type Certificate SA00729SE. For those airplanes without a basic Airplane Flight Manual, the Supplemental AFM must be in the aircraft when the EDM-760 is installed.

The information contained in this Airplane Flight Manual Supplement/ Supplemental Aircraft Flight Manual supplements or supersedes the basic manual/ placards only in those areas listed. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight manual, Markings and Placards.

FAA APPROVED:

Manager, Special Certification Branch, ANM-190S
Federal Aviation Administration
Seattle Aircraft Certification Office
Transport Airplane Certification Directorate

August 31,1999

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 GPS 175/GNX 375/GNC 355 GPS/XPDR/COM Navigation System

as installed in

PIPER PA-30
Make and Model Airplane

Registration Number: N7119Y Serial Number: 30-138

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 Page 20 Page 34 Page 36 Page 37	Added information for GNC 355. Updated Software Versions Removed Narco 4 and 5 Indicators. Updated Pilot Guide references Added circuit breaker label for GNC 355	*JR Brownell* ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date : *07/25/2019*
3	03/03/20	Page 3 Page 19 Page 21 Page 25 Page 37 Page 46	Added new FIS-B Weather Products Updated RAIM check wording. Updated software versions table Added Database Sync Exception to Database Updates Updated revision of Pilot's Guide Added Database Sync Discussion	*See page i*

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.

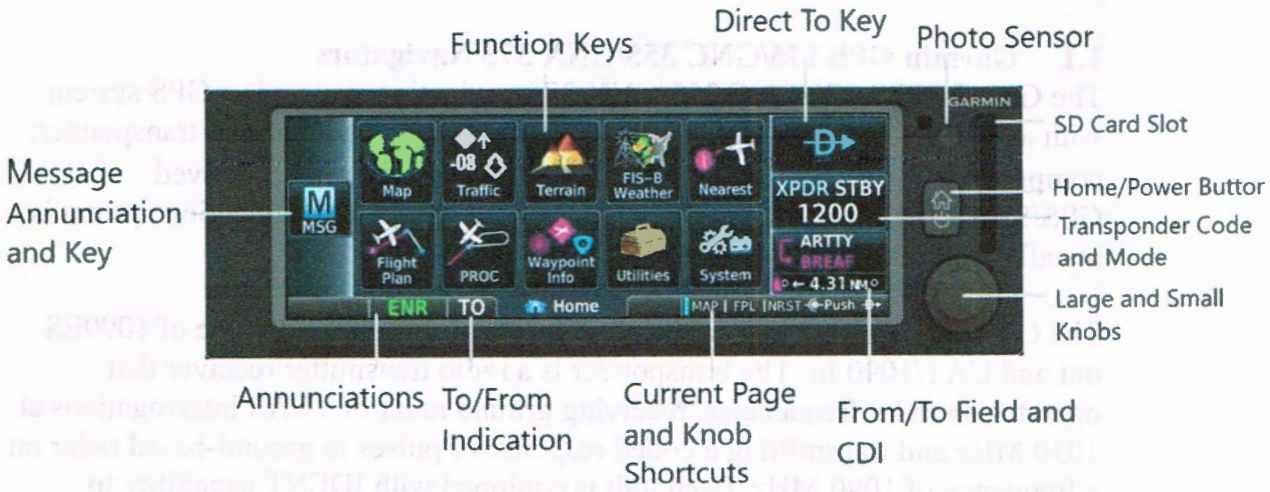


Figure 1 - GNX 375 Control and Display Layout

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		Notes
			Item 10a Code	Item 18 PBN/	
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.

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 when 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 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 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. 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 2.22 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.

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 information.

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.

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.

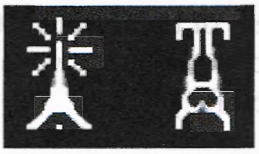


Figure 4 – Obstacle Overlay Icon (Left), Wire Overlay Icon (Right)

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 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.

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.

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.

ASPEN AVIONICS

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Albuquerque, NM 87110 USA

FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT
or
SUPPLEMENTAL AIRPLANE FLIGHT MANUAL
for the
ASPEN AVIONICS
EFD1000 E5

The information contained in this Supplement must be attached to the FAA Approved Airplane Flight Manual or placed with the Pilot's Operating Handbook or other operating information when the Aspen Avionics EFD1000 E5 is installed in accordance with AML STC SA10822SC. This document must be carried in the aircraft at all times.

The information in this Supplement supplements or supersedes the information in the FAA Approved Airplane Flight Manual or other operating information only as set forth herein.

For limitations, procedures, and performance data not contained in this Supplement, consult the Airplane Flight Manual or other operating information.

Airplane Make: PIPER

Airplane Model: PA-30

Airplane Registration Number: N7119Y

Airplane Serial Number: 30-138

FAA APPROVED for Monica Medcott

Manager, Southwest Flight Test Section, AIR 713
Federal Aviation Administration
Fort Worth, TX

Date 12/18/19

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LOG OF REVISIONS

Revision No.	Pages Affected	Description	FAA-Approved	Date	Aspen ECO
C	All	Initial Release	Not released		5523
D	All	Updated Section 3.2.8	Charles Wilcox	10 DEC 2018	5590
E	All	Added information for airplanes limited to VFR	Charles Wilcox	6 JUNE 2019	5720
F	All	Revision F supports upgrade to E5 2.11 Software that changes the NAV display from CDI to HSI format, adds BC function, and an optional GPS annunciations and Data Bar that includes True Airspeed, Wind Direction and Speed, and OAT. Updated Table 1 to specify the software version. Updated Table 5 to add the GPS and back course annunciations. Modified Sections 4.5 and 7.4 to describe back course logic. Added Section 7.9 for Data Bar system description.	Not released		5859
G	All	Added a note to the Attitude Degraded Abnormal Procedure. Updated Acronyms. Clarified Table 1. Added sentence in sections 3.2.2, 3.2.3, 3.3, 7.2.1 and 7.2 and 7.9 linking potential airspeed anomalies to TAS and Winds anomalies. Change marks are shown for Revisions F and G.	CMW	18 DEC 2019	5896

Prepared By:	Penny Heinz	*Reviewed By:*	David Bibby	**See ECO Record For Release Authorization**

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1 General

1.1 System Overview

The EFD1000 E5 is a flat-panel LCD that provides display of attitude, airspeed, altitude, vertical speed, turn rate, slip/skid and direction of flight. Depending on the optional navigation equipment connected, the EFD1000 E5 can also provide display of lateral and vertical navigation deviations. The internal battery provides 30 minutes of operation of the EFD1000 E5 in the event of loss of power to the system.

When interfaced with a compatible autopilot, the EFD1000 E5 provides heading and course information to the autopilot, which enables the autopilot to follow the Course and GPSS values set by the pilot on the display. When interfaced with an EA100 A/P AHRS, the EFD1000 E5 is the source for attitude input to the autopilot.

1.2 Installed Equipment List

Table 1 shows the list of Aspen Equipment installed in this aircraft. Use the table to determine the parts of the AFMS that are applicable to this aircraft.
This table is to be completed during installation by the installation facility.

Table 1 - Installed Equipment List

Available Equipment	Installed Equipment ✓	Remarks
EFD1000 E5 with Internal Battery	✓	
MAP Software E5 2.11 or subsequent. The E5 with software version E5 2.11 features an HSI.		When this row is unchecked, the MAP Software version is E5 2.10. The E5 with software version E5 2.10 features a CDI.
GPS annunciations and optional Data Bar features enabled.		This row applies to Software Version E5 2.11 only.
EA100 A/P AHRS		
VLOC1 integrated with the EFD1000 E5 System		
GPS1 integrated with the EFD1000 E5 System		This must be an authorized GPS integration.

Table 2 is used to identify the backup instruments.
This table is to be completed during installation by the installation facility.

Table 2 - Backup Instruments Configuration for the EFD1000 E5

Standby Equipment	Installed Equipment ✓	Remarks
Electric Turn and Slip indicator or Turn Coordinator		Not required for airplanes limited to VFR. See the placard installed in the Cockpit
Standby Attitude Indicator		Not required for airplanes limited to VFR. See the placard installed in the Cockpit
Standby Altimeter	✓	This instrument is always required.
Standby Airspeed Indicator	✓	This instrument is always required.
Magnetic Compass	✓	This instrument is always required.

1.3 List of Acronyms and Abbreviations

A	Auto
A/P	Autopilot
ACU	Analog Converter Unit
ADAHRS	Air Data Attitude Heading Reference System
AHRS	Attitude Heading Reference System
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
APPR	GPS Approach Mode
ALT	Altitude
AML	Approved Model List
ATC	Air Traffic Control
BARO	Barometric Pressure Setting
BAT	Battery
BC1	Back Course
C	Celsius or Centigrade
CDI	Course Deviation Indicator
CM	Configuration Module
Config.	Configuration
CRS	Course
ECO	Engineering Change Order
EFD	Evolution Flight Display
EXT PWR	External Power
FAA	Federal Aviation Administration
GPS	Global Positioning System
GPSS	GPS Steering
GS	Groundspeed
HDG	Heading
Hot Key	Any one of the five diagonal-marked buttons arranged on the right side of the E5
HSI	Horizontal Situation Indicator
IAS	Indicated Airspeed
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
In	Inches
Inc.	Incorporated
INIT	Initialization
INTEG	GPS Integrity Indication
IOP	Input-Output Processor
KIAS	Knots Indicated Airspeed
KOEL	Kinds of Operations Equipment List
KT	Knots
LCD	Liquid Crystal Display
LDI	Lateral Deviation Indicator
LOC	Localizer
MAP	Main Application Processor
MSG	GPS Message
N/A	Not Applicable
NAV	Navigation
NM	New Mexico
OAT	Outside Air Temperature
OPS	Operations
REM	Remaining
REV	Reversion
RSM	Remote Sensor Module
SAFM	Supplemental Airplane Flight Manual
STC	Supplemental Type Certificate
SW	Software
TAS	True Airspeed
UNAV	Unavailable
V	Volts
VDI	Vertical Deviation Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omni-directional Radio Range
VLOC1	VOR / Localizer
WPT	GPS Waypoint

2 Limitations

The following limitations pertain to the installed equipment in the aircraft. See Table 1 and Table 2 for the lists of installed equipment in this aircraft.

2.1 Kinds of Operation for the EFD1000 E5

The Aspen EFD1000 E5 may replace (or supplement, depending on installation) the attitude and heading/navigational instruments. Refer to the basic airplane KOEL for the required equipment for the planned flight operation. If the basic airplane does not have a KOEL, refer to the applicable flight regulations for the appropriate equipment requirements.

Use of the EFD1000 E5 display as required equipment is predicated on having all the operational equipment in column 1 or 2 of Table 3 for IFR flight, if the airplane is approved for IFR Flight. See the placard in the cockpit to determine if this airplane is approved for IFR flight.

Table 3 - Minimum Operational Equipment Required for IFR Flight

Equipment	Column 1 IFR* Minimum Equipment		Column 2 IFR* Minimum Equipment
EFD1000 E5 with Internal Battery	✓		✓
Magnetic Compass	✓	Or	✓
Electric Turn and Slip indicator or Turn Coordinator			✓
Standby Attitude Indicator	✓		
Standby Airspeed Indicator	✓		✓
Standby Altimeter	✓		✓
GPS1 integrated with the EFD1000 E5 System	✓		✓

For VFR, the minimum operational equipment for flight (in addition to the basic required equipment) is shown in column 1 of Table 4.

Table 4- Minimum Operational Equipment Required for VFR Flight

Equipment	Column 1 VFR* Minimum Equipment
EFD1000 E5 with Internal Battery	Optional
Magnetic Compass	✓
Electric Turn and Slip indicator or Turn Coordinator	
Standby Attitude Indicator	
Standby Airspeed Indicator	✓
Standby Altimeter	✓
GPS1 integrated with the EFD1000 E5 System	

* See the cockpit placard to determine if this aircraft is approved for IFR flight or is restricted to VFR.

2.2 EFD1000 E5 System Limitations

1. Use of the EFD1000 E5 for IFR flight in the region within 750 nautical miles of the magnetic North or South Pole, based solely upon the attitude and heading data provided by the EFD1000 E5, is NOT AUTHORIZED.

2. For seaplane operation, if the ADAHRS is unable to align due to wave action, departure under IMC or IFR is PROHIBITED.

3. Takeoff for IFR flight with aircraft voltage (as indicated on the EFD1000 E5) below 12.3V (14V electrical system) or 24.6V (28V electrical system) is NOT AUTHORIZED.

4. When the battery charge status on the EFD1000 E5 is less than 80% or has failed, takeoff for IFR flight is NOT AUTHORIZED.
5. When the cabin temperature is below -20C, takeoff for IFR flight is NOT AUTHORIZED.
6. When the "ON BAT" annunciation is shown on the EFD1000 E5 takeoff for IFR flight is NOT AUTHORIZED.
7. IFR flight is not authorized if the GPS that is integrated with the EFD1000 E5 is invalid as shown by an amber GPS1 indication and/or no groundspeed indication on the EFD1000 E5.
8. When IFR, do not power-cycle the EFD1000 E5 in flight.
9. For **ATTITUDE DEGRADED** mode operations in IMC, do not exceed a half standard rate turn or pitch more than ±5° relative to level flight.
10. For airplanes limited to VFR without GPS Integration: If airspeed fails to zero in flight the attitude and heading indications are unreliable.

2.3 Placard

1. The following placard is installed when IFR operation is authorized:

ON BAT Dispatch Limit is 80% See EFD1000 E5 AFMS

2. The following placard is installed if this airplane is limited to VFR:

Operation of This Aircraft is Limited to VFR Only

3 Emergency/Abnormal Procedures

3.1 Emergency Procedures: Electrical Fire or Smoke in the Cockpit

3.1.1 The EFD1000 E5 *IS* the Source of Electrical Fire or Smoke in the Cockpit (i.e. the EFD1000 is not operating)

1. EFD1000 E5 on/off Switch..... OFF

3.1.2 The EFD1000 E5 *IS NOT* the Source of Electrical Fire or Smoke in the Cockpit (i.e. the EFD1000 is operating)

1. Aircraft Electrical Power..... Follow the AFM or Standard Operating Procedures.
2. The EFD1000..... Automatically presents the "ON BAT" annunciation when the Master switch is turned off. See paragraph 3.2.5 below.

3.2 Abnormal Procedures

3.2.1 EFD1000 E5 Failure, IFR operation in IMC

1. ATTITUDE ..... Fly by reference to turn and slip, altimeter and airspeed (partial panel techniques) or backup attitude indicator (if available).
2. GPS and Compass..... Refer to the GPS for positional awareness and the compass for navigation heading information.

3. AUTOPILOT..... If the airplane is equipped with the EA100 A/P AHRS (see Table 1) the autopilot will automatically disconnect. If not equipped with an EA100, verify proper autopilot operation and cross-check against available attitude and navigation information.

4. Exit IMC

3.2.2 ATTITUDE DEGRADED Mode - Pitot Tube Blockage resulting in Erroneous Airspeed Indication (GPS Operational)

1. PITOT HEAT.....ON, in the event that the cause is Pitot Icing.

2. AUTOPILOT.....If the airplane is equipped with the EA100 A/P AHRS (see Table 1) the autopilot will automatically disconnect. If not equipped with an EA100, verify proper autopilot operation and cross-check against available attitude and navigation information.

3. ATTITUDE.....EFD1000 E5 attitude is presented. Follow the limitations for ATTITUDE DEGRADED mode operations. See Section 2.2 item 9.

4. Exit IMC unless the condition is corrected.

NOTE: When flying an instrument approach in Degraded Mode it is recommended to advise ATC that you are operating with limited bank and pitch capabilities. ATC coordination along with planning and anticipation can lessen rates of turn and intercept angles to comply with operational limitations. See Section 2.2 item 9.

CAUTION: If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.

3.2.3 Pitot Tube Blockage resulting in Erroneous Airspeed Indication (Integrated GPS not Operational)

1. PITOT HEAT.....ON, in the event that the cause is Pitot Icing.

2. AUTOPILOT.....If the airplane is equipped with the EA100 A/P AHRS (see Table 1) the autopilot will automatically disconnect. If not equipped with an EA100, verify proper autopilot operation and cross-check against available attitude and navigation information.

3. ATTITUDE.....EFD1000 E5 presents a Red X. Fly by reference to turn and slip, altimeter and airspeed (partial panel techniques) or backup attitude indicator if available.

4. Exit IMC.

Operation under IFR without an operational GPS is not authorized. See Section 2.1. When the airspeed function is restored, the EFD1000 E5 will return to normal operation, but without the ATTITUDE DEGRADED Mode availability.

CAUTION: If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.

3.2.4 Invalid GPS as shown by an amber "GPS1" indication and/or no groundspeed indication on the EFD1000 E5

1. Exit IMC.

Operation under IFR with an invalid GPS is not authorized. See Section 2.1.

3.2.5 Airplane Electrical Failure: "ON BAT" Annunciation

The "ON BAT annunciation is an indication that the airplane alternator or generator has failed and the E5 is operating on internal battery power.

1. Aircraft Electrical Power ..... Follow AFM Procedures to restore power. If unable to restore power, proceed as follows:
2. EFD1000 E5 on/off Switch ..... Turn Off to isolate the EFD1000 E5 from the rest of the electrical system.
3. MENU ..... Press, then press and turn the left knob to manually reduce the Display brightness to 40 or less.
4. Exit IMC.

The EFD1000 E5 is designed to remain operational for at least 30 minutes when the battery level shows 80% remaining. If the battery level shows less than 80% then the remaining operational time may be less. Change the flight plan accordingly.

The Battery level indication decreases in increments of 5%.

3.2.6 Attitude and Heading Reference System (AHRS) Reset

1. AUTOPILOT ..... MANUALLY DISCONNECT
2. MENU ..... Select the first page, titled "GENERAL SETTINGS"
3. "AHRS: RESET?" LINE SELECT KEY ..... Press
4. "AHRS: RESET?" LINE SELECT KEY ..... Press again to confirm reset
5. MENU ..... Press to return to normal operation

3.2.7 Turn Off the EFD1000 E5 in Flight

1. EFD1000 E5 on/off Switch ..... OFF
2. REV Button ..... Push and hold until the display turns off

3.2.8 Turn On the EFD1000 E5 in Flight (only permitted if airspeed and/or the integrated GPS is operational)

1. Verify that airspeed and/or the GPS that is integrated with the EFD1000 E5 is operational (See Table 1).
2. EFD1000 E5 on/off Switch ..... ON
6. REV Button ..... Push and hold for several seconds until the Aspen Avionics logo display appears, then release the button.

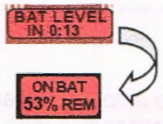
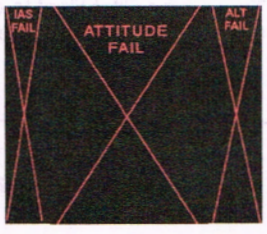
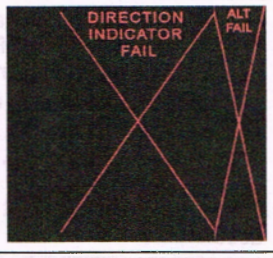
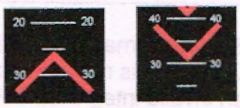
Turning on the EFD1000 E5 in flight with both a Pitot blockage and an invalid integrated GPS system will result in unannunciated erroneous attitude information.

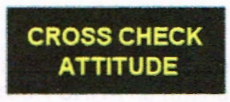
3.3 Warnings, Cautions and Advisories

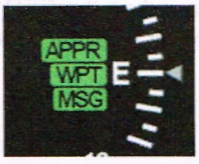
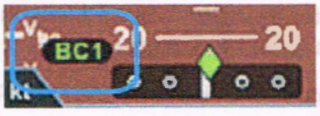
The following table shows the Warning, Caution and Advisory indications on the EFD1000 E5 and identifies the appropriate pilot action. Several Warning, Caution and Advisory messages are dependent on the options and equipment installed in the airplane. Refer to Table 1 to determine the options and equipment installed in this airplane.

Table 5 - Warning, Caution and Advisory Annunciations

Warning	W	Caution	C	Advisory	A

	Annunciation	Description	Pilot Action
W		Presented when the EFD1000 E5 is operating on the internal battery. The countdown timer appears first and is then replaced by the ON BAT and % charge remaining annunciation.	Reduce the screen brightness to maximize battery duration. See Section 3.2.5 Airplane Electrical Failure: "ON BAT" Annunciation.
W	 	The EFD1000 E5 is inoperative.	Use the standby instruments. Perform an AHRS Reset if practical.
W		Red chevrons displayed on the Attitude Indicator's pitch scale to indicate extreme pitch up and down attitudes.	Pitch the aircraft in the direction of the chevrons to restore level flight.
W		A red slash through any navigation source means the source is not available.	Activate a flight plan or tune an appropriate VOR.

	Annunciation	Description	Pilot Action
C	**Panel Mounted Indicator Lamp**  **A/P AHRS Fail** or 	The attitude input provided to the autopilot is inoperative. This is a function of the EA100. See Table 1 to determine if this airplane has an EA100.	Fly manually. The autopilot will disconnect and cannot be re-engaged until the fault is cleared.
C		ATTITUDE DEGRADED mode. The Pitot input has failed (perhaps due to icing), and GPS aiding is used for the attitude indication. The attitude indication can be in error and maneuvering limitations are to be followed. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	The autopilot will automatically disconnect. If IMC, fly within the limitations in Section 0 item 5. Turn on the Pitot Heat to clear the condition if icing is the cause.
C		The attitude indication could be in error. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	Cross check attitude and heading indications against alternate sources.
C		Possible Pitot Obstruction. The annunciation appears when the integrated GPS is invalid and the Pitot input has failed. Accompanied by Red X attitude and heading. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	Use an alternate attitude and heading source. Turn on Pitot Heat to clear the condition if icing is the cause. If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.
C		GPS Invalid indications. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	Select alternate navigation. Operation is not authorized with an invalid integrated GPS.
C		Indicates the GPSS source is invalid (e.g. the flight plan was deleted). The autopilot will fly wings-level until valid GPSS signal is available and GPSS is re-engaged. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	No immediate action. Activate a new flight plan to permit GPSS re-engagement. After activating a new flight plan, press the hotkey labeled GPSS to re-engage GPSS.
C		Annunciation presented on the HSI when the magnetic heading cannot be resolved. After 4 minutes of free gyro operation the attitude and heading indications will be removed.	Cross check attitude and heading indications against alternate sources. Expect attitude and heading loss after six minutes.
C		Annunciation presented in the menus when the EFD1000 E5 internal battery is inoperative.	Takeoff is not authorized when the EFD1000 E5 is required. See Section 2.2.

	Annunciation	Description	Pilot Action
C	MAP Software E5 2.11 and subsequent: INTEG	GPS Integrity indication. This indication is only available if an authorized GPS is integrated with the EFD1000 E5, the MAP software version is E5 2.11 or subsequent and the feature is enabled. See Table 1.	The GPS in use is degraded. See the applicable GPS AFMS for more information.
A		GPSS is operational. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	No action. GPSS can be used if desired.
A	MAP Software E5 2.11 and subsequent: 	GPS annunciations that are provided by the GPS source. TERM can also be displayed in the same location as APPR. This indication is only available if an authorized GPS is integrated with the EFD1000 E5, the MAP software version is E5 2.11 or subsequent and the feature is enabled. See Table 1.	No action. See the GPS AFMS for additional information on the meaning of these annunciations.
A	MAP Software E5 2.11 and subsequent: 	"BC1" is presented as the nav annunciation when the airplane is established on the localizer back course and the HSI course needle is properly set to the front course. This indication is only available if the MAP software version is E5 2.11 or subsequent. See Table 1.	The LDI indications are normal and match the HSI left/right deviations. Fly the approach.

4 Normal Procedures

4.1 Exterior Inspection

1. RSM (when mounted externally) — Check for condition and security, and the Vent Hole is clear of obstructions.
2. RSM Lightning Tape on the front of the RSM (when mounted on top of the airplane) .. Check for condition and security.

4.2 Taxi Checks Before IFR Departure

1. Electric Turn and Slip indicator or Turn Coordinator
   a. During taxi turns ..... The slip ball must move freely to the outside of the turn and the turn indicator must show a smooth turn in the proper direction.
2. GPS1 Annunciation ..... Verify that groundspeed is displayed on the EFD1000 E5 when taxiing, and there is no Amber GPS1 Invalid indication.

4.3 Before Take-Off Checks Before IFR Departure

4.3.1 Check the Internal Battery Level Before Departure

1. MENU ..... Turn the right knob to select the POWER SETTINGS page.
2. Observe the "EXT PWR" line item ..... Check that the input voltage is greater than 13 Volts and less than 14.6 volts for 14-volt airplane electrical systems, or greater than 26 Volts and less than 30 volts for 28-volt airplane electrical systems.
3. Observe the BAT line item ..... Verify battery status is "CHARGING" or "READY"
4. Select "Battery" ..... After a few seconds, verify the red "ON BAT indication is more than 80% REM.

   If the EFD1000 E5 internal temperature is low, the battery percentage may initially go below 80% and then increase and stabilize within approximately five minutes.
5. Select EXT PWR ..... To return the system to normal power.
6. MENU ..... Press to return to normal operation.
7. Verify ..... The red "ON BAT" indication is not displayed.

Any condition other than that described above indicates an internal battery failure and dispatch is not authorized.

8. Heading ..... Compare against a known heading (runway heading).

4.4 Adjusting Screen Brightness

1. Press MENU ..... To enable the left knob to control the display brightness
2. Push then twist the left knob ..... To brighten or darken the display.
3. MENU ..... Press to return to normal operation

4.5 Localizer Back Course Operation

For MAP software E5 2.10:
When operating on a Localizer Back Course approach, the Lateral Deviation Indicator (LDI) presents Back Course deviations (reverse sensing).

For MAP software E5 2.11 and subsequent:
When operating on a Localizer Back Course approach, the HSI course needle arrow must be set to the inbound localizer course (opposite the back course). "BC1" is presented adjacent to the LDI. When "BC1" is shown, the LDI presents deviations that are corrected for reverse sensing and match the left/right deviations on the HSI.

See Table 1 to determine the MAP software version in this airplane.

The LDI is the left/right deviation indicator that is presented on the PFD when inbound on most approaches. It is located below the attitude indicator and above the Data Bar.

4.6 Shutdown Checks

After conducting normal Shutdown checklist items, ensure the following:

1. EFD1000 E5 Switch ..... OFF

5 Performance

NO CHANGE

6 Loading Information

NO CHANGE

7 Systems Description

The following paragraphs describe the EFD1000 E5 System.

7.1 EFD1000 E5 Supporting Documentation

The EFD1000 E5 Pilot's Guide, Aspen document 091-00086-001 Revision ( ) or subsequent revision, contains detailed information on the operation of the EFD1000 E5. The EFD1000 E5 Pilot's Guide should be carried in the aircraft and available to the pilot.

Go to aspenavionics.com/support for current Pilot Guides and Pilot Guides Errata and Addenda.

7.2 EFD1000 E5

7.2.1 ATTITUDE DEGRADED Mode

The attitude system in the EFD1000 E5 uses MEMS gyro technology. Airspeed aiding is used to support the attitude solution. If the airspeed fails from a blocked pitot tube (from icing, for example), the EFD1000 E5 will detect the condition by comparing the airspeed to the GPS groundspeed. In this condition, the EFD1000 E5 will automatically substitute GPS groundspeed aiding for the attitude solution, and the attitude indicator will be presented and can be used. The message, "ATTITUDE DEGRADED mode" will be displayed (see Section 3.3). Groundspeed is presented from the GPS.

CAUTION: If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.

Errors in pitch and roll on the attitude indicator can be expected. Keeping the pitch and roll excursions from level flight to a minimum will keep the pitch and roll errors to a minimum. There are limits to the angle of pitch and bank that are permitted during the ATTITUDE DEGRADED Mode. See Section 2.2 item 9.

Limiting bank angle may reduce the aircraft's ability to maintain its desired track and could affect the ability to satisfy ATC path expectations, especially when executing large angle turns. If operating in degraded mode, advising ATC of the reduced turn capability is recommended.

This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.

7.2.2 Internal Battery

The EFD1000 E5 contains an internal battery which can provide continued operation of the EFD1000 E5 for 30 minutes. The red "ON BAT" indication (XX% REM) presents an estimate of the amount of battery charge remaining. As the battery depletes, this percentage will decrease.

Minimizing the brightness of the display will extend the time available on battery.

At a charge of 80% or more, the battery is designed to provide sufficient power for operation of the EFD1000 E5 for 30 minutes in the event of a complete loss of electrical power to the system.

In the event of loss of power generation or an overvoltage condition on the airplane, the EFD1000 E5 will revert to internal battery power. This will be indicated by a red "BAT LEVEL" indication followed by a % REM, or % remaining. To complete the isolation of the EFD1000 E5, it is necessary to use the EFD1000 E5 power switch as indicated in the "Abnormal Procedures" Section.

It is important to assure that the battery is operating, charging, and is at sufficient charge level before IFR flight. The Normal Procedures" section describes the appropriate procedure.

7.2.3 Remote Sensor Module (RSM)

The RSM provides magnetic heading information to the EFD1000 E5 and is powered by the EFD1000 E5.

7.2.4 Airplanes Limited to VFR without GPS Integration

An airplane limited to VFR without GPS integration is dependent on airspeed aiding for proper attitude performance. If the airspeed indication fails to zero in flight (such as due to a pitot tube blockage) the attitude and heading indications are unreliable. A "Crosscheck Attitude" indication may be presented momentarily.

7.3 EA100 A/P AHRS

The EA100 accepts input from the EFD1000 E5 and outputs pitch and roll signals to the autopilot.

7.4 VHF Interface

When installed and configured, VLOC 1 can be selected by pressing the lower center button on the EFD1000 E5. With MAP software E5 2.10, the EFD1000 E5 heading indicator is presented with a CDI. With MAP software E5 2.11 and subsequent, an HSI is presented. See Table 1 to determine the MAP software version in this airplane.

7.4.1 Localizer Back Course

For MAP software E5 2.10:
When operating on a Localizer Back Course approach, the LDI presents Back Course deviations (reverse sensing).

For MAP software E5 2.11 and subsequent:
When flying the final approach course of a Localizer Back Course approach, use the normal HSI back course procedure by setting the HSI course needle to the front (inbound localizer) course (opposite the back course). When on the back course, the airplane heading is opposite the front course, and "BC1" is presented adjacent to the Lateral Deviation Indicator. When "BC1" is shown, the LDI presents deviations that are corrected for reverse sensing and match the HSI left/right deviations.

See Table 1 to determine the MAP software version in this airplane.

The LDI is the left/right deviation indicator that is presented when inbound on most approaches. It is located below the attitude indicator and above the Data Bar.

7.5 GPS Interface

GPS1 can be selected using the lower center button on the EFD1000 E5. The GPS interface supports the Attitude Degraded Mode. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.

7.6 Altitude Bug

The altitude bug can be used as an altitude reminder. The control is accessed by pressing the right knob twice. No visual or aural alerting function is provided.

7.7 Magnetometer

Very strong magnetic disturbances can affect the Magnetometer and thus the heading and attitude of the EFD1000 E5. The EFD1000 E5 is designed to provide a Cross Check Attitude annunciation when a condition like this occurs. See Table 5 - Warning, Caution and Advisory Annunciations.

7.8 Heading, Course and Barometric Pressure Adjustment

When Heading, Course or Barometric Pressure is adjusted, the adjustment value is enlarged for quick view and will return to the normal size after ten seconds. Pressing the adjustment knob will immediately return the adjustment value to the original size.

7.9 Data Bar

The Data Bar presents True Airspeed (TAS), GPS Ground Speed (GS), Outside Air Temperature (OAT), Wind Direction and Speed, and Barometric Pressure Setting. OAT is obtained from the temperature sensor located in the RSM. The optional Data Bar features are only available when enabled during installation.

CAUTION: If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.

See Table 1 to determine if the Data Bar is enabled on this airplane.

7.10 Hotkeys and Buttons

Hotkeys with no label are non-functional.

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

PIPER PA-30
Make and Model Airplane

Registration Number: N4119Y Serial Number: 30-138

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: JR Brownell

JR Brownell
ODA STC Unit Administrator
Garmin International, Inc.
ODA-240087-CE

Date: 9-9-2019

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.	*Michael Warren* Michael Warren ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date: *03/08/2016*
3	12/07/2017	All	Updated SW versions and removed section 3.2.3. Updated section 2.2 Corrected PED FAR reference and additional minor corrections.	*Erik Frisk* Erik Frisk ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date: *12/21/2017*
4	09/09/2019	4, 6, 7, 9, 11, 13, 14, 18	Added GTX diversity units, updated SW versions, expanded allowed remote control panels, and incorporated other minor changes	See cover page 1

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 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. Interfaces to the GTX 33X are shown in the following block diagrams.

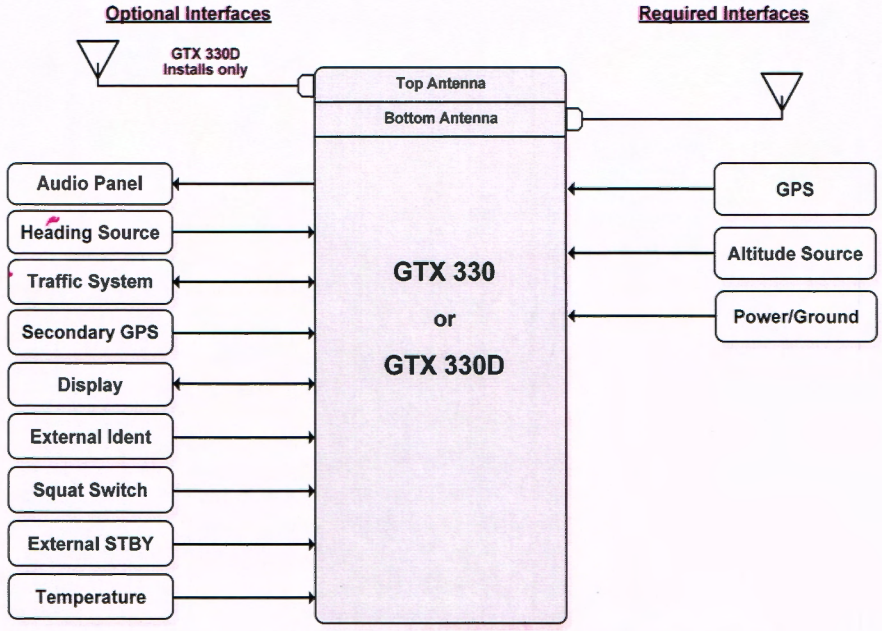


Figure 1 – GTX 330 or GTX 330D Interface Summary

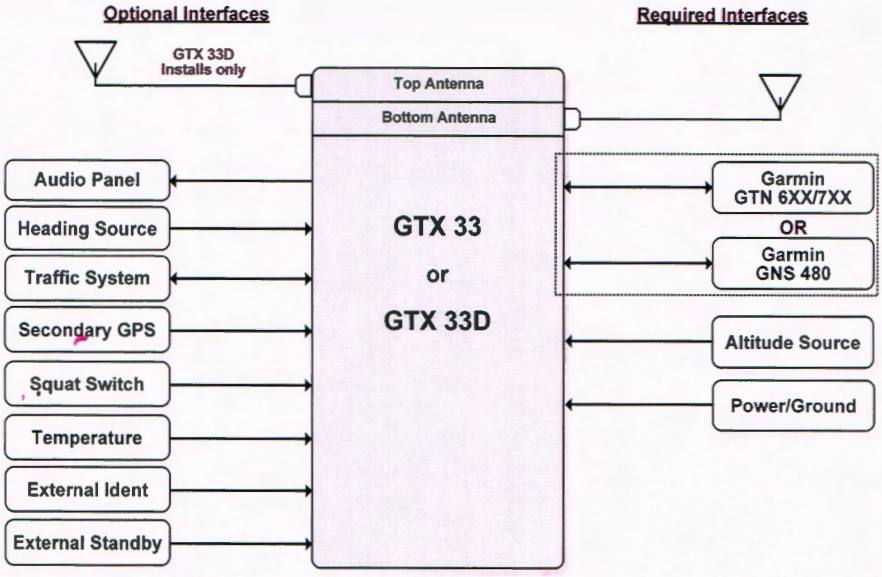


Figure 2 – GTX 33 or GTX 33D Interface Summary

The GTX 33X performs the following functions:

- Transmission of ADS-B out data on 1090 extended squitter (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 Codes between 0000-7777.
    - Emergency Status
    - IDENT - initiates SPI (special position identification) pulse for 18 seconds
  - Pressure Altitude Broadcast Inhibit
- Reception of TIS-A traffic data from a ground station
- Provides 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, 335D, 335R, 335DR, 345, 345D, 345R, and 345DR transponders. The functional differences between each of these transponders are described in Table 1. Transponder models with a "D" designation are diversity capable and support both a top fuselage and bottom fuselage antenna.

Function	GTX 335/ 335D	GTX 335 w/GPS	GTX 335R/ 335DR	GTX 335R w/GPS	GTX 345/ 345D	GTX 345 w/GPS	GTX 345R/ 345DR	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.

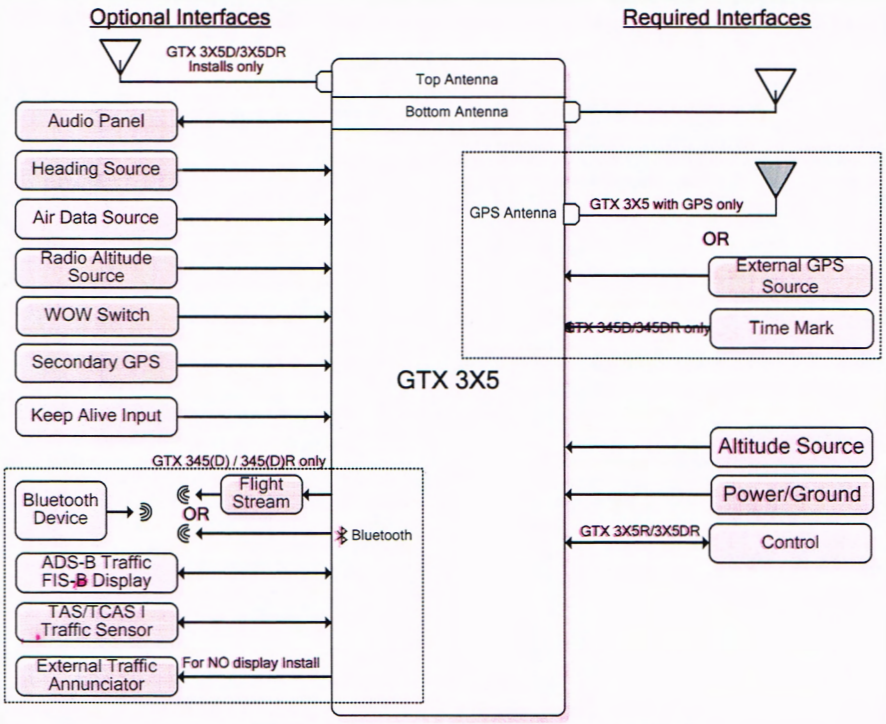


Figure 3 – GTX 3X5 Interface Summary

The GTX 3X5 performs the following functions:

- Transmission of ADS-B out data on 1090 extended squitter (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 Codes between 0000-7777.
    - Emergency Status
    - IDENT - initiates SPI (special position identification) pulse for 18 seconds
  - 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.

1.4 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 335D	☐ GTX 335D
☐ GTX 335R	☐ GTX 335R
☐ GTX 335DR	☐ GTX 335DR
☐ GTX 345	☐ GTX 345
☐ GTX 345D	☐ GTX 345D
☐ GTX 345R	☐ GTX 345R
☐ GTX 345DR	☐ GTX 345DR

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 63W	☐ GIA 63W
☐ 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	Transponder #2 Remote Control Display (if installed)
☐ GTN 6XX/7XX	☐ GTN 6XX/7XX
☐ GNS 480	☐ GNS 480
☐ G950/1000 Display	☐ G950/1000 Display
☐ Gables 7534 Controller	☐ Gables 7534 Controller
☐ Gables 7614 Controller	☐ Gables 7614 Controller
☐ CTL-92 Controller	☐ CTL-92 Controller
☐ CTL-92E Controller	☐ CTL-92E Controller

Interfaced Active Traffic System:

☐ None

☐ TCAD

☐ TAS/TCAS

NOTE

If the system includes all of the following components:

- GTX 345R or GTX 345DR,
- 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.

1.5 Definitions

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

Section 2. LIMITATIONS

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. If a Gables 7534 controller or Collins CTL-92/92E controller is being used the ADS-B equipment failure condition will be annunciated on the Gables or Collins display "Transponder Fail" while the ADS-B Out Position failure will be annunciated by the remotely installed "ADS-B POSN FAIL" Annunciator.

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".

2.4 Applicable System Software

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	8.04
GTX 3X5 Main SW Version	2.54

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. 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 91.21 or any other operational regulation regarding portable electronic devices.

Section 3. EMERGENCY PROCEDURES

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**

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.

4.2 Before Takeoff

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 335/335D units only function when the aircraft is airborne.

7.2 GTX 345R/345DR 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.