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**SECTION 9
SUPPLEMENTS**

9.1 GENERAL

This section provides information in the form of supplements which are necessary for the various optional systems and equipment not approved with the standard airplane.

All of the supplements provided in this section are FAA approved and consecutively numbered as a permanent part of this handbook. The information contained in each supplement applies only when the related equipment is installed in the airplane.

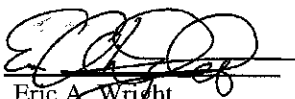
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**PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL**

**SUPPLEMENT NO. 1
FOR
APPAREO VISION 1000 UNIT**

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the optional Appareo Vision 1000 unit is installed in accordance with Piper Drawing 107422. This information supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. This supplement has been FAA Approved as a permanent part of this handbook and must remain in this handbook at all times when the optional Appareo Vision 1000 unit is installed.

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DATE OF APPROVAL: November 3, 2016

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the optional Appareo Vision 1000 unit is installed. The information contained within this supplement is to be used in conjunction with the complete handbook.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

OPERATION

This system does not require flight crew interface during aircraft operation. The flight crew need only insure that an Appareo SD card is in the Vision 1000 prior to use.

NOTE

During low light operations, quality of images may be reduced.

To insert memory card:

1. Open access door on Vision 1000
2. Ensure proper orientation of SD memory card and insert, (push in to secure)
3. Check status of LED (see table below)
4. Close Vision 1000 access door

To remove memory card:

1. Open access door on Vision 1000
2. Push on SD memory card to release and remove
3. Close Vision 1000 access door

SECTION 4 - NORMAL PROCEDURES (continued)**Status Indicators:**

Table 1: LED Status		
Item	LED Status	Configuration
1	Red	Fault detected: Refer to ICA
2	Blue	Booting
3	Green	Operating
4	Yellow	SD card not inserted: insert SD card and verify Green LED SD card not formatted correctly: format SD to NTFS, verify Green LED GPS lock not received: Allow 15 minutes to clear, if problem persists contact Appareo
5	NO LED	Not functioning: Refer to ICA

SECTION 5- PERFORMANCE

No change.

SECTION 6- WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook.

SECTION 7- DESCRIPTION AND OPERATION

The Vision 1000 system is a data acquisition and recording system. It records aircraft attitude, rate, acceleration, GPS position, and cockpit audio and video.

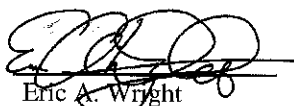
The Vision 1000 system is protected via an in-line fuse located behind the instrument panel. Power may be removed from the Vision 1000 system by selecting AVION MASTER OFF or by unplugging the cannon plug on the camera.

**PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL**

**SUPPLEMENT NO. 2
FOR
FLIGHTCOM MODEL 403 INTERCOM**

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the optional Flightcom model 403 intercom is installed in accordance with Piper Drawing 107423. This information supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual. This supplement has been FAA Approved as a permanent part of this handbook and must remain in this handbook at all times when the optional Flightcom model 403 intercom is installed.

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SECTION 1 - GENERAL

This supplement supplies the information necessary for operation of the airplane when the optional Flightcom model 403 intercom is installed. The information in this supplement is to be used in conjunction with the complete handbook.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

Intercom Failsafe Feature

In the event of a power supply interruption to the intercom, a failsafe mode in the intercom will connect the copilot's headset directly to the Garmin GMA1347 copilot input.

The Flightcom model 403 intercom does not have a dedicated circuit breaker but is protected via an in-line fuse located behind the instrument panel.

SECTION 4 - NORMAL PROCEDURES

Adjusting the Intercom and Headsets

To adjust the intercom and headsets:

1. Plug headsets into the co-pilot and passenger jacks in the aircraft.
2. If you are using monaural headsets, place the toggle switch next to the headphone jack in the Mono setting.

NOTE

Using stereo headphones without a Mono setting will cause only one earphone to be active.

3. Turn on the aircraft BATT MASTR switch to turn on the intercom.
4. Set the intercom Volume control knob to the 11 o'clock position.
5. Set the intercom Squelch control knob to the 3 o'clock position.
6. Turn up each headset volume to 1/2 the available volume control.
7. Position the headset boom microphone 1/8" from the mouth.

SECTION 4 - NORMAL PROCEDURES (Continued)**Adjusting the Intercom and Headsets (Continued)****NOTE**

Noise canceling microphones will not operate correctly if they are more than 1/8" from the mouth.

8. While speaking loudly, adjust the ICS volume controls on the Garmin audio panel to set the pilot and copilot volumes to a comfortable level. The Flightcom 403 ICS volume should then be adjusted to set passenger ICS volumes.

Adjusting the Squelch Control

To adjust the squelch control:

1. While no one is talking, turn the intercom Squelch control knob as far clockwise as possible while still blocking background noise.
2. Re-adjust the setting in flight to compensate for different noise levels.

NOTE

If you set the squelch too high by turning the Squelch control knob counterclockwise, your voice will be cut out unless you talk very loudly; if you set the squelch too low by turning the Squelch control knob clockwise, the background noise will be heard occasionally. The intercom will not interfere with normal use of the radio and will allow passengers to hear the aircraft radio and sidetone.

Radio Transmission

To transmit on the radio as the co-pilot and/or passengers, push the PTT switch associated with your headset plug-in panel. Only the person whose push-to-talk switch is depressed will be heard over the radio. No other intercom conversations will be transmitted over the radio at that time.

NOTE

If your push-to-talk switch fails, you can use a handheld microphone to talk on the radio while listening over the intercom.

SECTION 4 - NORMAL PROCEDURES (Continued)

Isolate Switch

For normal intercom and transmit operations, place the Isolate switch in the ICS position. To isolate the passengers from transmitting and receiving radio communications, place the Flightcom 403 Isolate switch in the Isolate position. Placing the Isolate switch in this position will allow continued use of the intercom between copilot and passengers. Isolation of the the pilot ICS and radio transmission/reception will be controlled through use of the Garmin audio panel ICS isolation intercom controls.

SECTION 5- PERFORMANCE

No change.

SECTION 6- WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook.

SECTION 7- DESCRIPTION AND OPERATION

See Flightcom Model 403 Panel-Mount Intercom Installation/Operation Manual for a complete description of the Flightcom model 403 system (www.Flightcom.net).

The Flightcom 403 panel-mount intercom is installed in the aircraft to provide radio communication capability to the aft seat passengers. The Flightcom 403 system is interfaced with the copilot and both aft passenger headset plug-in panels. The aft seat passengers may transmit on the radio by pressing the press to talk (PPT) switch on their associated headset plug-in panel. Pilot radio transmissions will have priority over the passengers. The pilot is not effected by the configuration of the Flightcom 403 system and is independently controlled by the Garmin GMA 1347 audio panel. Isolation of the ICS and radio transmissions is performed using a combination of Garmin GMA 1347 audio panel and Flightcom 403 system isolation switches. See section 4 of this supplement for normal operating procedures.

SECTION 4 - NORMAL PROCEDURES (Continued)**Adjusting the Intercom and Headsets (Continued)****NOTE**

Noise canceling microphones will not operate correctly if they are more than 1/8" from the mouth.

8. While speaking loudly, adjust the ICS volume controls on the Garmin audio panel to set the pilot and copilot volumes to a comfortable level. The Flightcom 403 ICS volume should then be adjusted to set passenger ICS volumes.

Adjusting the Squelch Control

To adjust the squelch control:

1. While no one is talking, turn the intercom Squelch control knob as far clockwise as possible while still blocking background noise.
2. Re-adjust the setting in flight to compensate for different noise levels.

NOTE

If you set the squelch too high by turning the Squelch control knob counterclockwise, your voice will be cut out unless you talk very loudly; if you set the squelch too low by turning the Squelch control knob clockwise, the background noise will be heard occasionally. The intercom will not interfere with normal use of the radio and will allow passengers to hear the aircraft radio and sidetone.

Radio Transmission

To transmit on the radio as the co-pilot and/or passengers, push the PTT switch associated with your headset plug-in panel. Only the person whose push-to-talk switch is depressed will be heard over the radio. No other intercom conversations will be transmitted over the radio at that time.

NOTE


If your push-to-talk switch fails, you can use a handheld microphone to talk on the radio while listening over the intercom.

**PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 3
FOR
BENDIX/KING KR-87 DIGITAL ADF
WITH GARMIN PFD INDICATOR**

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Bendix/King KR-87 Digital ADF with the Garmin Primary Flight Display (PFD) is installed per the Equipment List. The information contained herein supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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SECTION 1 - GENERAL

The Bendix/King Digital ADF is a panel mounted, digitally tuned, automatic direction finder. It is designed to provide continuous 1 kHz digital tuning in the frequency range of 200 kHz to 1799 kHz and eliminates the need for mechanical band switching. The system is comprised of a receiver, a built-in electronic timer, a bearing indicator and a KA-44B combined loop and sense antenna.

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

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

The built-in electronic timer has two separate and independent timing functions: (1) An automatic flight timer that starts whenever the unit is turned on. This timer functions up to 59 hours and 59 minutes. (2) An elapsed timer which will count up or down for up to 59 minutes and 59 seconds. When a preset time interval has been programmed and the countdown reaches :00, the display will flash for 15 seconds. Since both the flight timer and elapsed timer operate independently, it is possible to monitor either one without disrupting the other. The pushbutton controls and the bearing indicator are internally lighted.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES**To Operate as an Automatic Direction Finder:**

1. OFF/VOL Control - ON.
2. Frequency Selector Knobs - SELECT desired frequency in the standby frequency display.
3. FRQ Button - PRESS to move the desired frequency from the standby to the active position.
4. ADF Button (on audio panel) - PRESS to activate ADF audio through headset.
5. SPKR Button (on audio panel) - PRESS to activate ADF audio through cockpit speaker.
6. OFF/VOL Control - SET to desired volume level.
7. ADF Button - PRESS to select ADF mode.
8. ADF Bearing - Display ADF bearing on PFD by selecting the PFD softkey, then pressing the BRG1 or BRG2 softkey until "ADF" is displayed in the appropriate Bearing 1 or Bearing 2 information window and bearing pointer is displayed on the HSI.

ADF Test (Pre-flight or In-flight):

1. ADF Button - SELECT ANT mode and note pointer moves to 90° position and then disappears.
2. ADF Button - SELECT ADF mode and note the pointer moves without hesitation to the station bearing. Excessive pointer sluggishness, wavering or reversals indicate a signal that is too weak or a system malfunction.

SECTION 4 - NORMAL PROCEDURES (continued)

NOTE

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

To Operate Elapsed Time Timer-Count Down Mode:

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

NOTE

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

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

NOTE

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

SECTION 4 - NORMAL PROCEDURES (continued)**ADF Operation NOTES:***Erroneous ADF Bearing Due to Radio Frequency Phenomena:*

In the U.S., the FCC, which assigns AM radio frequencies, occasionally will assign the same frequency to more than one station in an area. Certain conditions, such as Night Effect, may cause signals from such stations to overlap. This should be taken into consideration when using AM broadcast station for navigation.

Sunspots and atmospheric phenomena may occasionally distort reception so that signals from two stations on the same frequency will overlap. For this reason, it is always wise to make positive identification of the station being tuned, by switching the function selector to ANT and listening for station call letters.

Electrical Storms:

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

Night Effect:

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

Mountain Effect:

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

Coastal Refraction:

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

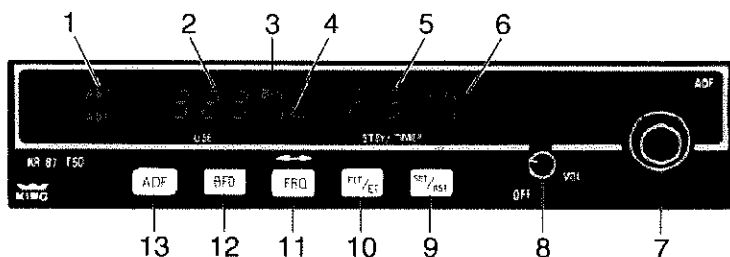
SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook and Airplane Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION



KR-87 Digital ADF



ADF Displays in Garmin PFD

King Digital ADF Operating Controls and Indicators

Figure 1

SECTION 7 - DESCRIPTION AND OPERATION (continued)

Legend - Figure 1

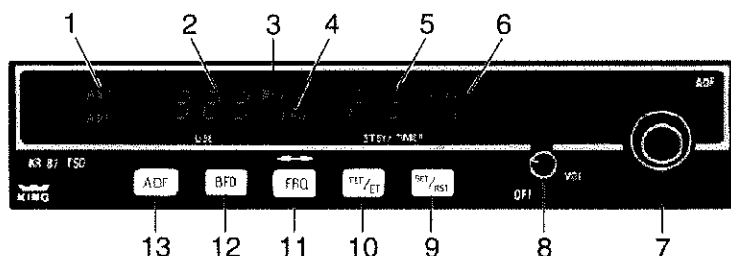
1. Mode Annunciation - Antenna (ANT) is selected by the "out" position of the ADF button. This mode improves the aural reception and is usually used for station identification. The bearing pointer is deactivated and will park in the 90° relative position. Automatic Direction Finder (ADF) mode is selected by the depressed position of the ADF button. This mode activates the bearing pointer. The bearing pointer will point in the direction of the station relative to the aircraft heading.
2. Active Frequency Display - The frequency to which the ADF is tuned is displayed here. The active ADF frequency can be changed directly when either of the timer functions are selected.
3. Beat Frequency Oscillator (BFO) - The BFO mode, activated and annunciated when the "BFO" button is depressed, permits the carrier wave and associated morse code identifier broadcast on the carrier wave to be heard.

NOTE

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

4. Standby Frequency Annunciation (FRQ) - When FRQ is displayed, the STANDBY frequency is displayed in the right display. The STANDBY frequency is selected using the frequency select knobs. The selected STANDBY frequency is put into the ACTIVE frequency window by pressing the frequency transfer button.
5. Standby Frequency Display - Either the standby frequency, the flight timer, or the elapsed time is displayed in this position. The flight timer and elapsed timer are displayed replacing the standby frequency which goes into "blind" memory to be called back at any time by depressing the FRQ button. Flight time or elapsed time are displayed and annunciated alternatively by depressing the FLT/ET button.

SECTION 7 - DESCRIPTION AND OPERATION



KR-87 Digital ADF



ADF Displays in Garmin PFD

King Digital ADF Operating Controls and Indicators

Figure 1

SECTION 7 - DESCRIPTION AND OPERATION (continued)**Legend - Figure 1 (continued)**

6. Timer Mode Annunciation - Either the elapsed time (ET) or flight time (FLT) mode is annunciated here.
7. Frequency Selector Knobs - Selects the standby frequency when FRO is displayed and directly selects the active frequency whenever either of the timer functions is selected. The frequency selector knobs may be rotated either clockwise or counterclockwise. The small knob is pulled out to tune the 1's. The small knob is pushed in to tune the 10's. The outer knob tunes the 100's with rollover into the 1000's. These knobs are also used to set the desired time when the elapsed timer is used in the countdown mode.
8. Off/Volume Control (OFF/VOL) - Controls primary power and audio output level. Clockwise rotation from OFF position applies primary power to receiver; further clockwise rotation increases audio level. Audio muting causes the audio output to be muted unless the receiver is locked on a valid station.
9. Set/Reset Button (SET/RST) - The set/reset button, when pressed, resets the elapsed timer whether it is being displayed or not.
10. Flight Time/Elapsed Time Mode Selector Button (FLT/ET) - The Flight Timer/Elapsed Time mode selector button, when pressed, alternatively selects either Flight Timer mode or Elapsed Timer mode.
11. Frequency Transfer Button (FRQ) - The FRQ transfer button, when pressed, exchanges the active and standby frequencies. The new frequency becomes active and the former active frequency goes into standby.
12. BFO Button - The BFO button selects the BFO mode when in the depressed position (see Note under item 3).
13. ADF Button - The ADF button selects either the ANT mode or the ADF mode. The ANT mode is selected with the ADF button in the out position. The ADF mode is selected with the ADF button in the depressed position.
14. Bearing Pointer (on PFD) - The cyan arrow indicates magnetic bearing to the station, in degrees.

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**PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL**

**SUPPLEMENT NO. 4
FOR
BENDIX/KING KN-63 DME**

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Bendix/King KN-63 DME is installed per the Equipment List. The information contained herein supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

FAA APPROVED:



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DATE OF APPROVAL: November 3, 2016

SECTION 1 - GENERAL

The Bendix/King KN-63 DME supplies continuous slant range distance information from a fixed ground station to an aircraft in flight.

The equipment consists of Garmin Primary Flight Display (PFD) which contains all the operating controls and displays, and a remotely mounted KN-63 Receiver-Transmitter.

SECTION 2 - LIMITATIONS

No change.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

DME Operation

1. NAV 1 and NAV 2 VHF Navigation Receivers - ON; TUNE FREQUENCY to VOR/DME station frequencies, as required.

NOTE

When the VORTAC or VOR/DME frequency is selected, the appropriate DME frequency is automatically channeled.

2. DME IDENTIFICATION - select DME button on audio panel (audio ID will always come through the headset and will come through the cockpit speaker if SPKR is selected on the audio panel).

SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the certified weight and balance data in Section 6 of the Pilot's Operating Handbook and Airplane Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION

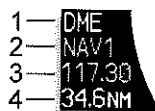


DME Display on Garmin PFD

Figure 1

Legend - Figure 1

1. DME Information Window
2. DME MODE ANNUNCIATOR
Displays the DME operating mode; NAV 1 or NAV 2 or HOLD as selected in the DME TUNING window.
3. FREQUENCY
Displays the frequency of the VOR/DME or VORTAC selected on the associated navigation radio or the frequency being held (HOLD) that was previously selected.
4. DISTANCE DISPLAY (NM)
DME distance to VOR/DME or VORTAC displayed in .1 nautical mile increments up to 99.9 NM, then in increments of one nautical mile to up to 389 NM.



SECTION 7 - DESCRIPTION AND OPERATION (continued)

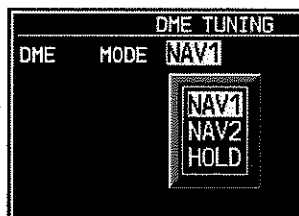
Legend - Figure 1 (continued)

5. DME TUNING Window (NAV1, NAV2, HOLD)

Allows access to the DME operating mode as follows:

NAV 1 Selects DME operation with No. 1 VHF navigation set; enables channel selection by NAV 1 frequency selector controls.

5



NAV 2 Selects DME operation with No. 2 VHF navigation set; enables channel selection by NAV 2 frequency selector controls.

HOLD Selects DME memory circuit; DME remains channeled to station which was last channeled when HOLD was selected and will continue to display information relative to this channel. Allows both the NAV 1 and NAV 2 navigation receivers to be set to new operational frequencies without affecting the previously selected (HOLD) DME operation.

NOTE

In the HOLD mode, the frequency being held remains in the DME Information Window and does not update when NAV1 or NAV2 frequencies are being updated.

NOTE

If NAV1 or NAV2 are yellow X'd on the PFD, the associated DME indication will be valid if it was the active DME when the NAV failure occurred. Switching to the DME associated with the failed NAV will not be possible.

SUPPLEMENT 5

CARBURETED O-360/ LO-360 ENGINE INSTALLATION

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the carbureted O-360/ LO-360 engines are installed. The information contained herein supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

This supplement has been FAA Approved as a permanent part of this handbook and must remain in this handbook at all times when the carbureted O-360/ LO-360 engines are installed.

FAA APPROVED:



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ODA-510620-CE
Piper Aircraft, Inc.
Vero Beach, Florida

DATE OF APPROVAL: December 15, 2017

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the carbureted O-360/ LO-360 engines are installed. The information contained within this supplement is to be used "as described" in conjunction with the complete handbook.

1.3 ENGINES

- | | |
|-------------------------|--|
| (c) Engine Model Number | |
| Left | O-360-A1H6 |
| Right | LO-360-A1H6 |
| (j) Engine Type | Carbureted, Four Cylinder, Direct Drive,
Horizontally Opposed, Air Cooled |

SECTION 2 - LIMITATIONS

2.7 POWERPLANT LIMITATIONS

- | | |
|----------------------|-------------|
| (c) Engine Model No. | |
| Left | O-360-A1H6 |
| Right | LO-360-A1H6 |

2.33 PLACARDS

In full view of the pilot when the oil cooler winterization kit is installed:

**OIL COOLER WINTERIZATION PLATE
TO BE REMOVED WHEN AMBIENT
TEMPERATURE EXCEEDS 50°F.**

SECTION 3 - EMERGENCY PROCEDURES

3.5 EMERGENCY PROCEDURES CHECK LIST

NOTE

Only those emergency procedures that are specific to a carbureted engine, are provided in this supplement. Refer to Pilot Operating Handbook Section 3 for all emergency procedures.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)**3.5a Engine Inoperative Procedures**

Engine Failure During Flight (Speed Above VMCA)	
Inoperative Engine	IDENTIFY
Operating Engine	ADJUST POWER AS REQUIRED
Airspeed	ATTAIN AND MAINTAIN AT LEAST 88 KIAS
Before securing inoperative engine:	
FUEL QTY	CHECK (XFEED AS REQUIRED)
FUEL PUMP	ON
MIXTURE	FULL RICH
CARB HEAT	ON
MAG LEFT/RIGHT Switches	CHECK
OIL °F	CHECK
OIL PSI	CHECK
If engine does not restart, complete Engine Securing Procedure.	
Power (Operating Engine)	AS REQUIRED
FUEL Selector (Operating Engine)	ON (XFEED AS REQUIRED)
FUEL PUMP (Operating Engine)	AS REQUIRED
COWL FLAP (Operating Engine)	AS REQUIRED
Establish Bank	2° to 3° INTO OPERATING ENGINE
Airspeed	ATTAIN AND MAINTAIN AT LEAST 88 KIAS
Rudder Trim	TOWARD OPERATING ENGINE TO APPROXIMATELY 1/2 TRAPEZOID ON THE SLIP INDICATOR
Electrical Load	DECREASE TO MIN. REQUIRED
CAUTION	
<i>If engine failure is due to fuel starvation and a fuel leak is suspected, carefully monitor remaining fuel quantity if XFEED is used.</i>	
Land as soon as practical.	

If oil temperature is high and oil pressure is zero, suspect loss of oil and do not attempt to restart the engine.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5a Engine Inoperative Procedures (continued)

If an engine failure is caused by fuel starvation, both engines may be operated from one fuel tank using XFEED as appropriate. If a fuel leak is suspected, select XFEED OFF and complete the Engine Securing Procedure.

3.5c Air Starting Procedure

Unfeathering Procedure/ Starter Assisted	
FUEL Selector (Inoperative Engine)	ON
MAG LEFT/RIGHT Switches (Inoperative Engine)	ON
FUEL PUMP (Inoperative Engine)	ON
MIXTURE (Inoperative Engine)	FULL RICH
THROTTLE (Inoperative Engine)	Two full strokes and then open 1/4 inch
PROPELLER (Inoperative Engine)	INCREASE (to cruise setting)
ENG START (Inoperative Engine)	ENGAGE UNTIL PROP WINDMILLS
ENG PRIMER (Inoperative Engine)	AS REQUIRED
THROTTLE	REDUCE POWER until engine is warm
ALTR	ON (after restart)
FUEL PUMP	As Required (after restart)

3.5d Engine Roughness

Engine Roughness**NOTE**

Partial carburetor heat may be worse than no heat at all, since it may melt part of the ice which will refreeze in the intake system. Therefore, when using carburetor heat always use full heat; and, when ice is removed, return the control to the full cold position.

CARB HEAT ON

If roughness continues after one minute:

CARB HEAT OFF

MIXTURE..... Adjust for maximum smoothness

FUEL PUMP ON

Engine Gauges CHECK

MAG LEFT/RIGHT Switches.....Individually select OFF than ON

If operation is satisfactory on either magneto, continue on that magneto at reduced power and full RICH mixture to first airport.

Engine roughness is usually due to carburetor icing which is indicated by a drop in RPM, and may be accompanied by a slight loss of airspeed or altitude. If too much ice is allowed to accumulate, restoration of full power may not be possible; therefore, prompt action is required. Upon completion of this checklist, if roughness persists, consider a precautionary landing.

3.5 EMERGENCY PROCEDURES CHECK LIST (continued)

3.5q Emergency Descent

Emergency Descent	
CARB HEAT	ON
THROTTLES	CLOSED
PROPELLERS	FULL INCREASE
MIXTURES	AS REQUIRED
GEAR (Below 140 KIAS)	DOWN
Airspeed	140 KIAS

SECTION 4 - NORMAL PROCEDURES

NOTE

Only those Normal Procedures that are specific to a Carbureted engine, are provided in this supplement. Refer to Pilot Operating Handbook Section 4 for all Normal Procedures.

4.5a Preflight Checklists

No change.

SECTION 4 - NORMAL PROCEDURES (continued)

4.5b Before Starting Engine Checklists

BEFORE STARTING ENGINE

Preflight CheckCOMPLETED
Flight Planning.....COMPLETED
Cabin Door..... CLOSE & LATCH (Lower then Upper)
SeatsADJUSTED & LOCKED
Seatbelts and HarnessFASTEN/ADJUST
CHECK INERTIA REEL
PARK BRAKESET
GEAR DOWN
THROTTLES.....IDLE
PROPELLERSFULL INCREASE
MIXTURES CUT-OFF
Friction HandleAS DESIRED
CARB HEAT..... OFF
COWL FLAPS..... OPEN
Stabilator & Rudder Trim.....SET
FUEL Selectors ON
LEFT/RIGHT ALTR Switches..... ON
EMERG BATTARM
E VOLTS Indication 23.3 VOLTS (minimum)
AVION MASTER Switch OFF
STROBE LIGHTSFIN STROBE
All Other Electrical Switches OFF
CABIN HEAT Switch OFF
Circuit Breakers CHECK
Proceed with appropriate Engine Start Checklist.

NOTE

The EMERG BATT should remain ON after checking for proper bus operation, allowing the PFD to remain powered for engine start. Avoid delays between this check and engine starting to preserve emergency battery power.

If the E VOLTS indication is less than 23.3 VOLTS, the voltage should be checked again at the end of the GROUND CHECK checklist (after being charged for some time by the primary electrical system). If E VOLTS is still less than 23.3 volts, determine the cause and correct the issue prior to flight.

4.5c Engine Start Checklists

ENGINE START - GENERAL

WARNING

The L START ENGD or R START ENGD warning CAS message will illuminate after 30 seconds of continuous engine cranking. If the CAS message illuminates after the engine is running, stop the engine and determine the cause.

NOTE

When starting at ambient temperatures +20°F and below, operate first engine started with alternator ON (at max charging rate not to exceed 1500 RPM) for 5 minutes minimum before initiating start on second engine.

NOTE

Starter manufacturer recommends starter cranking periods be limited to 10 seconds with a 20 second rest period between cranking attempts. Maximum of 6 start periods allowed. If a start is not achieved on sixth attempt allow starter to cool for 30 minutes before attempting additional starts. Do not engage the starter immediately after releasing it. This practice may damage the starter mechanism.

SECTION 4 - NORMAL PROCEDURES (continued)

4.5c Engine Start Checklists (continued)

NORMAL START - COLD ENGINE

- BATT MASTR Switch ON
- Gear Position Indications 3 GREEN
- CAS Messages CONSIDER ANY ILLUMINATED
- PFD Annunciations CONSIDER ANY ILLUMINATED
- THROTTLES 1/4 inch OPEN
- PROPELLERS FULL INCREASE
- MIXTURES FULL RICH
- *FUEL PUMP..... ON
- *MAG LEFT/RIGHT Switches..... ON
- *ENG PRIMER AS REQUIRED
- *Propeller Area CLEAR
- *ENG START..... ENGAGE
- *THROTTLE ADJUST WHEN ENGINE
STARTS TO 1000 RPM
- *OIL PSI CHECK

Repeat above procedure (*) for second engine start

- VOLTS CHECK
- ALTR AMPS CHECK
- FUEL PUMPS..... OFF

When the engine starts, adjust the throttle and monitor the oil pressure. If no oil pressure is indicated within 30 seconds, shut down the engine and have it checked. In cold weather it may take somewhat longer for an oil pressure indication.

4.5c Engine Start Checklists (continued)

NORMAL START - HOT ENGINE

BATT MASTR Switch ON
 Gear Position Indications 3 GREEN
 CAS Messages CONSIDER ANY ILLUMINATED
 PFD Annunciations CONSIDER ANY ILLUMINATED
 THROTTLES 1/2 inch OPEN
 PROPELLERS FULL INCREASE
 *MIXTURE FULL RICH
 *FUEL PUMP ON
 *MAG LEFT/RIGHT Switches ON
 *Propeller Area CLEAR
 *ENG START ENGAGE
 *THROTTLE ADJUST to LOW RPM
 *OIL PSI CHECK

If engine does not start, add small amount of prime and repeat above.

Repeat above procedure (*) for second engine start

VOLTS CHECK
 ALTR AMPS CHECK
 FUEL PUMPS OFF

ENGINE START - COLD WEATHER (BELOW 10°F)**WARNING**

Ensure all magneto (MAG LEFT/RIGHT) and master switches (BATT MASTR) are OFF and mixture controls are in cut-off before turning propeller manually.

If available, preheat should be considered. Rotate each propeller through 10 blades manually during preflight inspection.

BATT MASTR Switch OFF
 LEFT/RIGHT ALTR Switches OFF
 External Power CONNECTED
 CAS Messages CONSIDER ANY ILLUMINATED
 PFD Annunciations CONSIDER ANY ILLUMINATED

SECTION 4 - NORMAL PROCEDURES (continued)

4.5c Engine Start Checklists (continued)

ENGINE START - COLD WEATHER (BELOW 10°F) (continued)

- THROTTLES..... 1/4 inch OPEN
- PROPELLERS..... FULL INCREASE
- MIXTURES..... FULL RICH
- *FUEL PUMP..... ON
- *MAG LEFT/RIGHT Switches..... ON
- *ENG PRIMER AS REQUIRED
- *Propeller Area.....CLEAR
- *ENG START..... ENGAGE
- *OIL PSI..... CHECK

If engine does not start, add prime and repeat above. When engine fires, prime as required until engine is running smoothly.

Repeat above procedure (*) for second engine start

- THROTTLES..... LOWEST POSSIBLE RPM
- BATT MASTR Switch..... ON
- External Power Plug DISCONNECT
- LEFT/RIGHT ALTR Switches..... ON
- VOLTS..... CHECK
- ALTR AMPS CHECK
- FUEL PUMPS..... OFF

After engine start and the throttle is set as desired, the oil pressure should be checked for a positive indication. If no oil pressure is indicated within 30-seconds, shut down the engine and have it checked. In cold weather it may take somewhat longer for an oil pressure indication.

NOTE

When starting at ambient temperatures +20°F and below, operate first engine started with alternator ON (not to exceed 1500 RPM) for 5 minutes minimum before initiating start on second engine.

4.5c Engine Start Checklists (continued)**ENGINE START WHEN FLOODED**

BATT MASTR Switch ON
Gear Position Indications 3 GREEN
CAS Messages CONSIDER ANY ILLUMINATED
PFD Annunciations CONSIDER ANY ILLUMINATED
THROTTLES OPEN FULL
PROPELLERS FULL FORWARD
MIXTURES CUT-OFF
*FUEL PUMP OFF
*MAG LEFT/RIGHT Switches ON
*Propeller Area CLEAR
*ENG START ENGAGE
*MIXTURE ADVANCE
*THROTTLE RETARD
*OIL PSI CHECK

Repeat above procedure (*) for second engine start

VOLTS CHECK
ALTR AMPS CHECK
FUEL PUMPS OFF

SECTION 4 - NORMAL PROCEDURES (continued)

4.5c Engine Start Checklists (continued)

ENGINE START WITH EXTERNAL POWER SOURCE

BATT MASTR Switch OFF
ALTR LEFT/RIGHT OFF

NOTE

The EMERG BATT switch may remain in ARM while using external power. The emergency bus does not receive power from external power.

External Power Plug INSERT in RECEPTACLE
GEAR Indications 3 GREEN
CAS Messages CONSIDER ANY ILLUMINATED
PFD Annunciations CONSIDER ANY ILLUMINATED
THROTTLES 1/4 inch OPEN
PROPELLERS FULL INCREASE
MIXTURES FULL RICH
*FUEL PUMP ON
*MAG LEFT/RIGHT Switches ON
*ENG PRIMER AS REQUIRED
*Propeller Area CLEAR
*ENG START ENGAGE
*THROTTLE ADJUST WHEN ENGINE
STARTS TO 1000 RPM
*OIL PSI CHECK

Repeat above procedure (*) for second engine start

THROTTLES LOWEST POSSIBLE RPM
BATT MASTR Switch ON
External Power Plug DISCONNECT from RECEPTACLE
ALTR LEFT/RIGHT Switches ON
VOLTS CHECK
ALTR AMP CHECK
FUEL PUMPS OFF

4.5d Warm-Up Checklist

WARM-UP

THROTTLES 1000 to 1200 RPM

BEFORE TAXIING

- External Power Source..... VERIFY REMOVED
- BATT MASTR Switch VERIFY ON
- FUEL SelectorsON, BOTH X-FEED (30 SEC), ON
- AVION MASTER Switch ON
- MFD splash screen.....Verify Database Currency
- FUEL TotalizerFOB SYNC or ENTER MANUALLY
- CAS Messages CONSIDER ANY ILLUMINATED
- PFD Annunciations CONSIDER ANY ILLUMINATED
- System Messages (Messages Softkey)..... Consider
- TRAFFIC (if installed) TEST
- Standby Flight Instrument..... VERIFY ON with no red X's
or failure annunciations
- Altimeters (Standby and PFD).....SET
- Lights..... AS REQUIRED
- CABIN HEAT.....AS DESIRED
- Radios.....CHECK & SET
- Autopilot Verify Preflight Self-Test (PFT)
completed and disconnect tone heard.
- FUEL Selectors VERIFY ON
- Passenger BriefingCOMPLETE
- PARK BRAKE RELEASE

To test the traffic system (if installed), the ADS-B softkey on the Traffic Map page must be selected off.

4.5e Taxiing Checklist

No change.

SECTION 4 - NORMAL PROCEDURES (continued)

4.5f Ground Check Checklist

GROUND CHECK

PARK BRAKESET
MIXTURES FULL RICH
PROPELLERS FULL INCREASE
Engine Instruments CHECK
THROTTLES 1500 RPM
PROPELLERS (Max. Drop - 500 RPM)FEATHER - CHECK
THROTTLES 2000 RPM
LEFT/RIGHT MAG (Max. Drop - 175 RPM:
 Max. Diff. - 50 RPM)..... CHECK
CARB HEAT CHECK
THROTTLES 2200 RPM
PROPELLERS (Max. Drop - 300 RPM)EXERCISE
THROTTLES (550 to 650 RPM) IDLE - CHECK
FUEL PUMPS..... ON
THROTTLES 1000 RPM
Friction HandleSET

If E VOLTS indication less than 23.3 VOLTS during BEFORE STARTING ENGINE checklist:

EMERG BATT Switch Verify ARM
AVION MASTER Switch OFF
ALTR LEFT / RIGHT Switches OFF
BATT MASTR Switch OFF
E VOLTS Indication23.3 VOLTS MINIMUM

If E VOLTS less than 23.3 VOLTS, determine cause and correct issue prior to flight.

If E VOLTS greater than or equal to 23.3 VOLTS:

BATT MASTR Switch ON
ALTR LEFT / RIGHT Switches ON
AVION MASTER Switch ON

Operation of an engine on one magneto should be kept to a minimum.

The governor can be checked by retarding the propeller control until a drop of 100 RPM to 200 RPM appears, then advancing the throttle to get a slight increase in manifold pressure. The propeller speed should stay the same when the throttle is advanced, indicating proper function of the governor.

Carburetor heat should also be checked prior to takeoff to be sure the control is operating properly and to purge any ice which may have formed during taxiing. Avoid prolonged ground operation with carburetor heat ON as the air is unfiltered.

4.5g Before Takeoff Checklist

BEFORE TAKEOFF

Flight Controls	FREE and CORRECT
Flight Instruments	CHECK
Engine Instruments	CHECK
FUEL QTY	SUFFICIENT
PROPELLERS	FULL INCREASE
MIXTURES	FULL RICH
CARB HEAT	OFF
COWL FLAPS	OPEN
FLAPS	CHECK & SET
Stabilator and Rudder Trims	SET
FUEL Selectors	ON
CAS Messages	CONSIDER ANY ILLUMINATED
PFD Annunciations	CONSIDER ANY ILLUMINATED
System Messages (Messages Softkey)	Consider
Transponder	AS REQUIRED
FUEL PUMPS	ON
PITOT HEAT	AS REQUIRED
STROBE LIGHTS	ON
Door	LATCHED (Lower then Upper)
PARK BRAKE	RELEASE

CAUTION

Prior to takeoff with autopilot on, verify that the autopilot servos are disengaged and that flight controls move freely.

4.5h Takeoff Checklist

No change.

SECTION 4 - NORMAL PROCEDURES (continued)

4.5i Climb Checklist

No change.

4.5j Cruise Checklist

CRUISING

Reference performance charts and Lycoming Operator’s Manual.
Power.....SET per Power Setting Chart
FUEL PUMPS..... OFF
MIXTURES ADJUST
COWL FLAPS.....As Required
TRIM.....As Required

WARNING

Flight in icing conditions is prohibited. If icing is encountered, take immediate action to exit icing conditions. Ensure PITOT HT is ON. Monitor engines and select CARB HT ON if roughness or power loss is experienced. Icing is hazardous due to greatly reduced performance, loss of forward visibility, possible longitudinal control difficulties and impaired power plant and fuel system operation.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation above 5000 ft. altitude and at pilot’s discretion at lower altitudes when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the full RICH position for all operations under 5000 feet. To lean the mixture, pull the mixture control aft.

Best economy mixture is obtained by moving the mixture control aft until peak EGT is reached. Performance Cruise mixture is obtained by leaning to peak EGT and then enrichening until the EGT is 125°F rich of the peak value. Under some conditions of altitude and throttle position, the engine may exhibit roughness before peak EGT is reached. If this occurs, the EGT corresponding to the onset of engine roughness should be used as the peak reference value.

4.5j Cruise Checklist (continued)**CRUISING (continued)**

For maximum service life, cylinder head temperature should be maintained below 435°F during high performance cruise operation and below 400°F during economy cruise operation. If cylinder head temperatures become too high during flight, reduce them by enriching the mixture, by opening cowl flaps, by reducing power, or by use of any combination of these methods.

The pilot should monitor weather conditions while flying and should be alert to conditions which might lead to icing. If induction system icing is expected, place the CARB HEAT control in the ON position.

The LEFT ALTR and RIGHT ALTR switches should be ON for normal operation. Certain regulator failures can cause the alternator output voltage to increase uncontrollably. To prevent damage, overvoltage relays will automatically shut off the alternator(s). The CAS Warning messages L ALTR FAIL and R ALTR FAIL will warn of this tipped condition.

Alternator outputs will vary with the electrical equipment in use and the state of charge of the battery. ALTR AMPS should not exceed 60 amperes on the ground or 65 amperes in flight. The VOLTS indication will flash red if bus voltage drops below minimum requirements.

IFR operation is not recommended with a single alternator.

Since the Seminole has one fuel tank per engine, it is advisable to feed the engines symmetrically during cruise so that the same approximate amount of fuel will be left in each side for the landing. The crossfeed (XFEED) can be used to balance FUEL QTY, if necessary.

During flight, keep account of time and fuel used in connection with power settings to verify the accuracy of the fuel flow and fuel quantity gauging systems.

There are no mechanical uplocks in the landing gear system. If the hydraulic system malfunctions, the landing gear will free-fall to the gear down position. True airspeed with gear down is approximately 75% of the gear retracted airspeed for any given power setting. Allowances for the reduction in airspeed and range should be made when planning extended flight between remote airfields or flight over water.

SECTION 4 - NORMAL PROCEDURES (continued)

4.5k Descent Checklist

No change.

4.5l Approach and Landing Checklist

APPROACH AND LANDING

Seat Backs..... ERECT
Seat Belts, HarnessesADJUSTED
FUEL PUMPS..... ON
FUEL Selectors ON
GEAR (Below 140 KIAS) DOWN
Gear Position Indications 3 GREEN
Nacelle Mirror CHECK NOSE GEAR DOWN
MIXTURES FULL RICH
PROPELLERS FULL INCREASE
CARB HEAT AS REQUIRED
Autopilot Disconnect (above 200 FT AGL)

NOTE

TAS aural alerts will be muted when GPS altitude is lower than ~ 400 FT AGL.

NOTE

The HSI will auto-slew during CDI transitions to LOC, LOC BC, LDA, or SDF approaches if the approach is activated in the G1000 system. The pilot should always double check the inbound course pointer prior to initiating a VHF NAV approach.

4.51 Approach and Landing Checklist (continued)

During the approach for a landing, the CHECK GEAR aural alert may sound. The mutable CHECK GEAR is triggered when the gear is not down and locked and manifold pressure(s) is less than 14 in Hg. The non-mutable CHECK GEAR is triggered when the landing gear is not down and locked and flaps are extended beyond the first notch. The severity of the CHECK GEAR CAS message is determined by proximity to the ground. A Caution message is triggered when above ~400 feet AGL, and a Warning is triggered below ~400 feet AGL. See Section 7 for additional details.

The landing gear is down and locked when three solid green circles are indicated on the MFD. The mirror on the left engine nacelle may be used to visually verify the nose landing gear position.

Operate the toe brakes to verify sufficient pressure for normal braking. Verify the parking brake is not set.

NORMAL LANDING

No change.

SHORT FIELD PERFORMANCE LANDING

No change.

4.5m Go-Around Checklist

MIXTURES	FULL RICH
PROPELLERS	FULL INCREASE
THROTTLES	FULL OPEN
Control Wheel	BACK PRESSURE TO OBTAIN POSITIVE CLIMB ATTITUDE
FLAPS	RETRACT INCREMENTALLY
GEAR	UP
COWL FLAPS	AS REQUIRED

Autopilot coupled go-around is not authorized during single engine operations.

If the aircraft is equipped with optional Underspeed Protection (USP) and an autopilot coupled go-around is desired, press the TO/GA button on the throttle handle, followed immediately by the checklist shown above. Refer to Section 7 for additional details on the autopilot coupled go-around.

AFTER LANDING

Clear of runway.

FLAPS.....RETRACT
COWL FLAPS.....FULL OPEN
CARB HEAT.....OFF
FUEL PUMPS.....OFF
LIGHTS.....AS REQUIRED
PITOT HEAT.....OFF

A spongy pedal during braking, is often an indication that the brake fluid needs replenishing.

4.5o Stopping Engine Checklist

No change.

4.5p Mooring Checklist

No change.

4.5q VSSE - Intentional One Engine Inoperative Speed

No change.

4.5r VMCA - Air Minimum Control Speed

No change.

4.5s Practice One Engine Inoperative Flight

No change.

4.5t Noise Level

No change.

4.5u Stalls

No change.

SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

No change.

SECTION 7 - DESCR/OPERATION

7.5 ENGINES AND PROPELLERS

Engines

The Seminole is powered by two Lycoming four-cylinder, direct drive, horizontally opposed carbureted engines, each rated at 180 horsepower @ 2700 RPM at sea level. The engines are air cooled and are equipped with oil coolers with low temperature bypass systems and engine-mounted oil filters. A winterization plate is provided to restrict air during winter operation. (See Winterization in Section 8.) Asymmetric thrust during takeoff and climb is eliminated by the counter-rotation of the engines: the left engine rotates in a clockwise direction when viewed from the cockpit, and the right engine rotates counterclockwise.

The engine oil dipstick is accessible through a door located on the upper cowl of each nacelle.

The engines are accessible through removable cowls. The upper cowl half is attached with quarter-turn fasteners. Engine mounts are constructed of steel tubing, with dynafocal isolators to reduce vibration.

Induction Air System

The induction air box incorporates a manually operated two-way valve, allowing either filtered induction air or unfiltered heated air into the carburetor. Selecting carburetor heat provides heated air to the carburetor in the event of carburetor icing, and also bypasses the air filter if it becomes blocked with ice, snow, freezing rain, etc. Since the air is unfiltered, carburetor heat should not be used during ground operation when dust or other contaminants might enter the system. The primary (filtered) induction source should always be used for takeoffs.

7.7 ENGINE CONTROLS (continued)

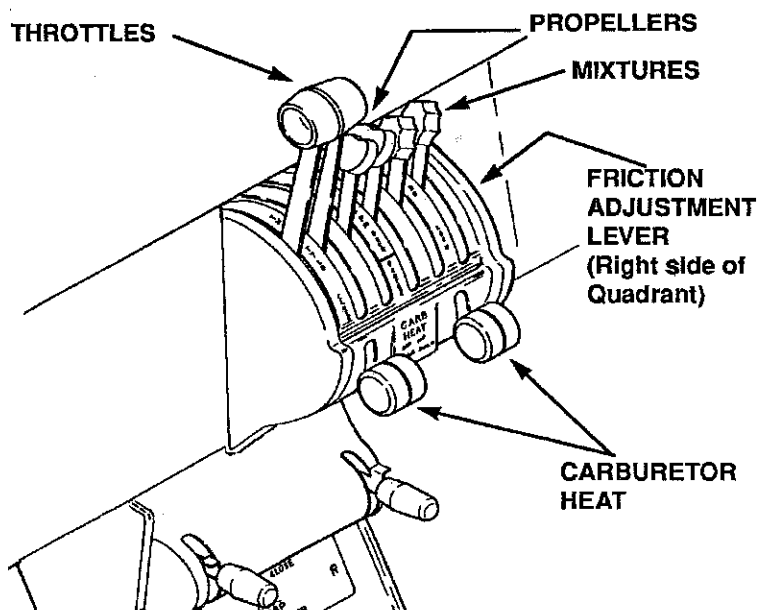
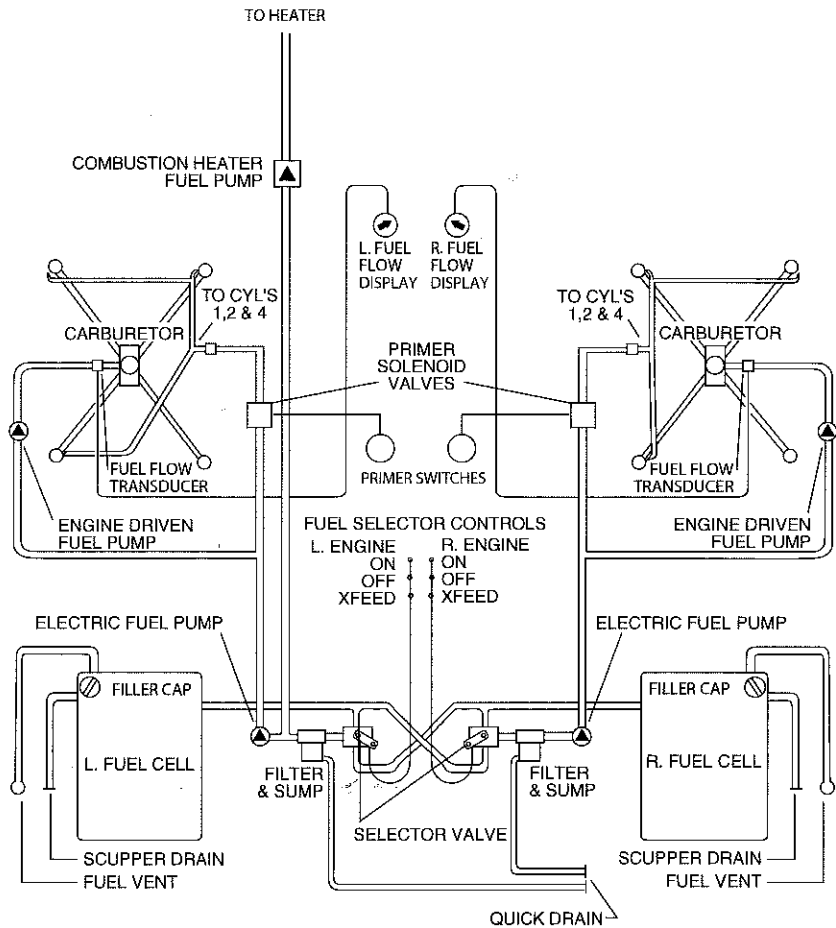
**CONTROL QUADRANT**

Figure 7-1

The carburetor heat controls are located on the control quadrant just below the engine control levers. When a carburetor heat lever is in the up, or OFF, position the engine is operating on filtered air; when the lever is in the down, or ON, position the engine is operating on unfiltered, heated air.

7.17 FUEL SYSTEM



FUEL SYSTEM SCHEMATIC

Figure 7-17

FUEL PUMPS

Normally, fuel is supplied to the engines through engine-driven fuel pumps. Auxiliary electric fuel pumps serve as a back-up feature. The electric fuel pumps operate at 14 VDC (a voltage converter steps main battery voltage from 28 to 14 volts). They are controlled by rocker switches on the switch panel below and to the right of the pilot's control column. The electric fuel pumps should be ON during takeoff and landing.

NOTE

The electric fuel pumps operate on 14 VDC. An inverter converts 28 VDC aircraft power to the required fuel pump voltage.

ELECTRIC PRIMER SYSTEM

The fuel primer system is used to provide fuel to the engine during start and makes use of electric pumps mounted in each wing and solenoid controlled primer valves. Left and Right primer switches are located on either side of the starter switch.

NOTE

The electric fuel pumps must be ON to operate the electric fuel primers.

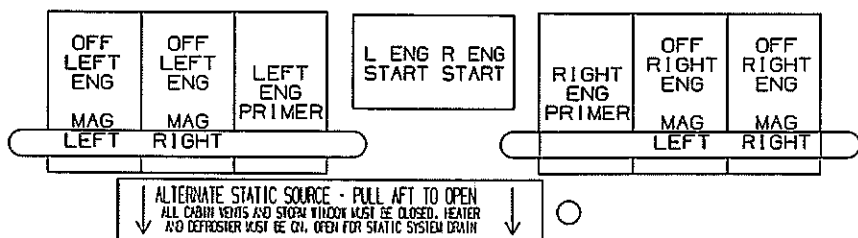
With fuel pressure available, the primer button is depressed actuating the primer solenoid valve and allowing fuel to flow through the lines to the primer jets in the intake of the number 1, 2 and 4 cylinders.

7.19 ELECTRICAL SYSTEM

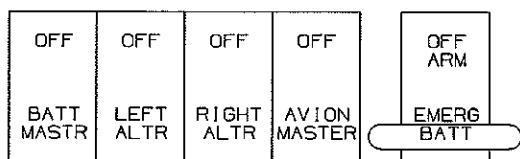
SWITCHES

A series of switch banks are located in various places on the instrument panel. Engine switches are located on the lower left corner of the panel, below the left control yoke. The left engine switches (left and right magnetos and primer) are separated from the right engine switches (left and right magnetos and primer) by the horizontally mounted engine start switch. Pushing the left or right side of this switch, engages the starter on each engine respectively. The lower part of the magneto switches are guarded, to prevent them from being turned off inadvertently.

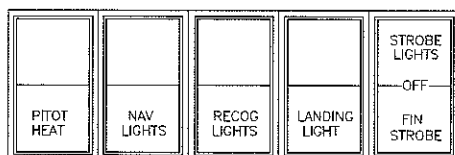
SWITCHES (continued)



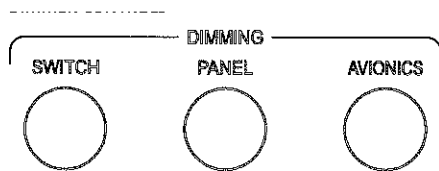
Engine Switches



Left Switch Bank



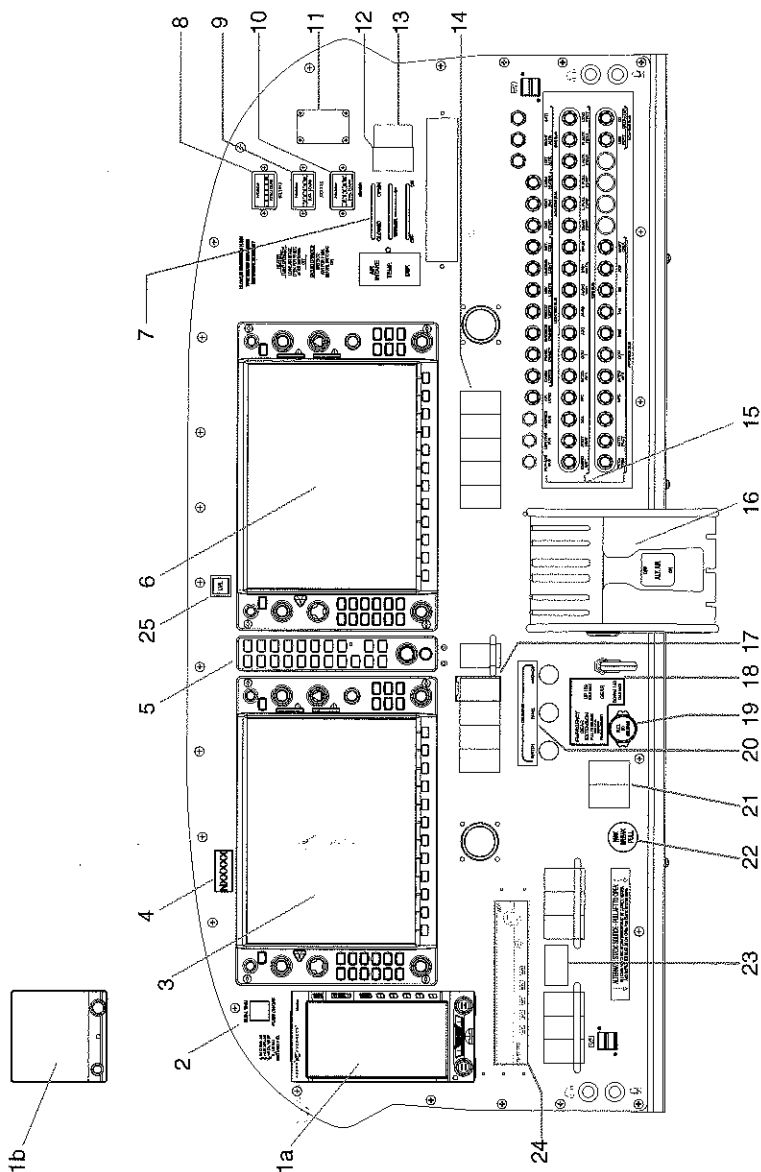
Right Switch Bank



Dimmer Controls

ELECTRICAL POWER SWITCHES

Figure 7-21



INSTRUMENT PANEL

Figure 7-33
(Sheet 1 of 2)

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Standby instrument <ol style="list-style-type: none"> a. Aspen EBD-1000 b. Garmin G5 2. Elevator Trim switch 3. PFD 4. Registration Number plate 5. Audio Panel 6. MFD 7. Environmental controls (See Figure 7-31) 8. HOBBS meter - Billing - Optional 9. HOBBS meter - Maintenance or Flight 10. HOBBS meter - Heater 11. ELT switch 12. Cabin heater fan 13. Ventilation fan 14. Right switch bank (L to R) (See Figure 7-21) <ol style="list-style-type: none"> a. Pitot Heat b. Nav lights c. Recognition lights d. Landing light e. Strobe light 15. Circuit Breakers 16. Throttle quadrant | <ol style="list-style-type: none"> 17. Left switch bank - (L to R, See Figure 7-21) <ol style="list-style-type: none"> a. Battery Master b. Left Alternator c. Right Alternator d. Avionics Master e. Emergency Battery 18. Landing gear selector 19. Emergency gear extension knob & guard 20. Dimmer controls (L to R) <ol style="list-style-type: none"> a. Switches b. Panel c. Avionics 21. Left and right fuel pump switches 22. Parking brake 23. Engine switches (L to R) <ol style="list-style-type: none"> a. Left engine switches
(left and right magneto and primer) b. Left engine starter c. Right engine starter d. Right engine switches
(primer and left and right magneto) 24. ADF (option) 25. Level Mode (LVL) switch (optional) |
|---|--|

INSTRUMENT PANEL (continued)

Figure 7-33
(Sheet 2 of 2)

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**PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL**

**SUPPLEMENT NO. 6
FOR**

**AMSAFE INFLATABLE SEAT RESTRAINTS
(STC SA02276AK)**

The FAA approved operational supplement for the AMSAFE Inflatable Seat Restraints, installed in accordance with STC SA02276AK, is required for operation of this system. AMSAFE will be responsible to supply and revise the operational supplement. It is permitted to include the AMSAFE Inflatable Seat Restraints supplement in this location of the Pilot's Operating Handbook unless otherwise stated by AMSAFE. The information contained in the AMSAFE Inflatable Seat Restraints supplement may supersede or supplement the information in the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual with respect to the operation of the AMSAFE Inflatable Seat Restraints system. For limitations, procedures and performance information not contained in the AMSAFE supplement, consult the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.


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**PILOT'S OPERATING HANDBOOK
AND
FAA APPROVED AIRPLANE FLIGHT MANUAL
SUPPLEMENT NO. 7
FOR
SAFE FLIGHT ANGLE OF ATTACK SYSTEM**

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the Safe Flight Angle of Attack (AoA) system is installed per the Equipment List.

The information contained herein supplements or supersedes the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

FAA APPROVED:


ERIC A. WRIGHT
ODA-510620-CE
PIPER AIRCRAFT, INC.
VERO BEACH, FLORIDADATE OF APPROVAL: April 2, 2020

SECTION 1 - GENERAL

The Safe Flight Angle of Attack (AoA) Indexer, referred to as the “AoA Indicator” or simply “display” in this supplement, is a system that receives and displays angle of attack information from the lift transducer vane installed in the right wing of the aircraft.

SECTION 2 - LIMITATIONS

1. The angle of attack system provides advisory information only and does not replace the aircraft’s primary stall warning system.

SECTION 3 - EMERGENCY PROCEDURES

No change.

SECTION 4 - NORMAL PROCEDURES

4.5e BEFORE TAXIING

AVION MASTER Switch.....ON
AoA Indicator.....VERIFY SELF TEST
AoA Indication.....lights illuminated (not blank)

NOTE

If AoA indications are suspected to not be accurate,
discontinue use of the AoA Indicator.

NOTE

If the AoA Indicator screen turns off after
the power-on self-test, check that the AOA
INDICATOR circuit breaker is pushed in.

4.5i BEFORE TAKEOFF

AoA Reference MarkerSET (if desired)

SECTION 5 - PERFORMANCE

No change.

SECTION 6 - WEIGHT AND BALANCE

Factory installed optional equipment is included in the licensed weight and balance data in Section 6 of the Pilot's Operating Handbook and Airplane Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS

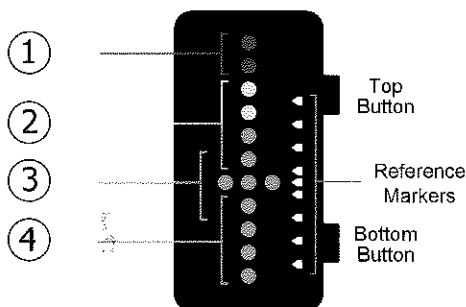
NOTE

The AoA Indicator provides advisory information only and does not replace the aircraft's primary stall warning system.

The Safe Flight AoA indicating system receives and displays Angle of Attack (AoA) information from the lift transducer on the leading edge of the right wing. The position of the lift transducer vane on the wing's leading edge is converted to AoA within the indicator computer on the glareshield. Indication of angle of attack can serve as a reliable aid for low airspeed awareness. The AoA system is completely independent of the existing stall warning system.

SYSTEM DESCRIPTION

The AoA Indicator consists of a series of red, yellow and green lights, a reference marker, and two buttons on the right side as shown in Figure 7-1 below.



AoA Indicator
Figure 7-1

**SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE
AND ITS SYSTEMS (continued)**

The lights on the display shown in Figure 7-1 are a general representation of angle of attack.

1. Stall is imminent or stall is occurring.
2. Approaching stall, such as stall warning.
3. Aircraft is operating at an angle of attack which provides adequate stall margin.
4. Aircraft is operating at a relatively low angle of attack.

The reference marker is a white triangle along the right side of the display which can be set by the pilot as a target angle of attack during specific phases of flight. Experience with various flight conditions will allow the reference marker to be set at the optimum locations.

The two buttons on the right side of the display perform multiple functions. When the upper button is pressed quickly, it raises the reference marker towards the high AoA side and when the lower button is pressed quickly, it lowers the reference marker towards the low AoA side. Immediately after either button is pressed, all lights on the display will momentarily illuminate giving the pilot awareness of where the reference marker is being set. Holding the top button for four seconds mutes or unmutes the audio. Holding the bottom button for two seconds dims or brightens the display.

Circuit protection for the Safe Flight AoA system is provided by the AOA INDICATOR circuit breaker located on the bottom right of the instrument panel, Row 3, Col. 12.

SYSTEM USAGE

After turning on the AVION MASTER switch in the BEFORE TAXIING checklist, the pilot should verify that the AoA system self-test has successfully completed. During the self-test all indicator lights will illuminate for approximately five seconds, followed by a set of lights that corresponds to the current lift transducer vane position. An audio warning will also sound for the duration of the self-test. There is no specific lighting expectation during ground operations, however, two red flashing lights at the top of the display or one green light at the bottom of the display could indicate a jammed lift transducer vane. If the red LED on the high side of the display is blinking slowly, the system must not be used until a system calibration has been completed. Refer to Section 8 of this supplement for further instructions.

**SECTION 7 - DESCRIPTION AND OPERATION OF THE AIRPLANE
AND ITS SYSTEMS (continued)**

NOTE

If AoA indications are suspected to not be accurate,
discontinue use of the AoA Indicator.

The reference marker can be set to a target angle of attack for the desired phase of flight. During the takeoff roll, as airflow increases over the wing, the AoA indication will change to a representative in-flight condition. See Figure 7-1 for representative AoA indications.

Power is removed from the AoA Indicator when the AVION MASTER switch is turned off.

**SECTION 8 - AIRPLANE HANDLING, SERVICING, AND
MAINTENANCE**

The Safe Flight AoA indicating system is not field repairable. If the operation of the system is in doubt, apply power to the system and verify that the power-on self-test has completed properly. If the power-on self-test is unsuccessful, hold the top and bottom buttons on the AoA Indicator for two seconds while power is applied. The display will illuminate all reference marker segments and then will illuminate a particular light segment on the display. Note which light segments illuminated, as this will aid in diagnosing the problem. When contacting support, have the following information available:

1. Unit part number
2. Unit serial number
3. Unit software revision
4. Fault code (which LEDs illuminated on the display)

The part number, serial number, and software revision can be found on the nameplate on the lower surface of the AoA Indicator. Detaching the unit is not necessary as the values can be seen with the aid of a mirror or by taking a picture with a slim camera.

SECTION 10 - OPERATING TIPS

No change.

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