MALIBU
PA-46-310P

SN 8408001
THRU 4608007
(8608074)

PILOT'S OPERATING HANDBOOK

AND

FAA APPROVED AIRPLANE FLIGHT MANUAL

AIRPLANE SERIAL NO. 46-8508402

AIRPLANE REGIST. NO. _____

PA-46-310P
REPORT: VB-1200 FAA APPROVED BY: [redacted]

WARD EVANS
D.O.A. NO. SO-1
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VERO BEACH, FLORIDA

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THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE FEDERAL AVIATION REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER AND CONSTITUTES THE FAA APPROVED AIRPLANE FLIGHT MANUAL. THIS HANDBOOK MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.

2.32 ICING INFORMATION

"WARNING"

Severe icing may result from environmental conditions outside of those for which the airplane is certified. 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 cowling and propeller spinner 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).]

2.33 PLACARDS

In full view of the pilot:

The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the normal category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the airplane flight manual. No acrobatic maneuvers, including spins, approved.

This aircraft approved for V.F.R., I.F.R., day and night icing flight when equipped in accordance with the Airplane Flight Manual.

In full view of the pilot, the following takeoff and landing checklists will be installed:

TAKEOFF CHECKLIST

Fuel on Proper Tank	Flaps Set
Engine Gauges Checked	Trim Set
Induction Air - Primary	Controls Free
Seat Backs Erect	Door Secured
Mixture Set	Air Conditioner Off
Propeller Set	Pressurization System - Set
Fasten Belts/Harnesses	

LANDING CHECKLIST

Fuel on Proper Tank	Gear Down
Seat Backs Erect	Flaps Set
Fasten Belts/Harnesses	Air Conditioner Off
Mixture - Rich	Cabin Pressure - Depressurized
Propeller - Set	

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 Airplane Flight Manual.

SECTION 7 - DESCRIPTION AND OPERATION OF PROP HEAT, HEATED WINDSHIELD PANEL AND WING ICE DETECTION LIGHT

The presence of one or more items of de-icing equipment does not imply the capability to fly into forecast or known icing. The equipment is provided to enlarge the options available to the pilot as he takes appropriate action to avoid icing that is inadvertently encountered.

Controls for the components are located to the right of the control quadrant on the auxiliary switch panel (Figure 7-1).

WING ICE DETECTION LIGHT

Wing icing conditions may be detected during night flight by use of an ice detection light installed on the left side of the forward fuselage. The light is controlled by an ICE LIGHT switch (Figure 7-1) located on the de-ice switch panel. Circuit protection is provided by an ICE circuit breaker located in the LIGHT section of the circuit breaker panel.

PROP HEAT

Electrothermal propeller heat pads are bonded to a portion of the leading edges of the propeller blades. The system is controlled by an ON-OFF type PROP HEAT switch (Figure 7-1) located on the auxiliary switch panel. Power for the prop heat is supplied by the aircraft electrical system through a PROP HEAT circuit breaker on the circuit breaker panel. When the PROP HEAT switch is actuated, power is applied to a timer through the PROP HEAT ammeter which monitors the current through the prop heat system.

Power from the timer is cycled to brush assemblies which distribute power to slip rings. The current is then supplied from the slip rings directly to the electrothermal propeller heat pads.

The Hartzell propeller is heated in a cycle which applies power to the heat pads for approximately 90 seconds and then shuts off for approximately 90 seconds. Once begun, cycling will proceed in the above sequence and will continue until the system is turned off. The PROP HEAT ammeter should indicate within the green shaded area during the portion of the cycle when power is being applied. This indicates proper operation of the system.

The propeller designation is: BHC-C2YF-1BF/F8052( )

ELECTRIC WINDSHIELD PANEL

An electrically heated windshield panel is installed on the exterior of the pilot's windshield. The panel is heated by current from the aircraft electrical system and controlled by an ON-OFF type W SHLD HEAT switch located on the auxiliary switch panel.

The panel is equipped with a temperature sensing device which automatically turns the panel on and off during operation to maintain the desired operating characteristics. This feature also prevents activation of the panel at ambient temperatures above approximately 75°F. With ambient temperatures above 75°F an operational check must be performed in flight after the temperature has decreased.

The ammeter must be observed for an increase in load when the W SHLD HEAT switch is activated to indicate proper operation of the panel.

WARNING

Flight into known or forecast icing is not approved. If icing is encountered, take avoidance action immediately.

SECTION 3 - EMERGENCY PROCEDURES

WARNING

The malfunction of any required deice equipment requires immediate action to exit icing conditions. Depending on the severity of the icing encounter, failure to take immediate positive action can lead to performance losses severe enough to make level flight impossible. Therefore, upon verification of a system malfunction or failure, climb or descend out of icing conditions if this provides the shortest route. If exit must be made in level flight, consider the use of maximum power and exit by the most direct route. The effect of the additional fuel burned at higher power settings on aircraft range must be considered and an alternate airport chosen if necessary.

ALTERNATOR FAILURE IN ICING CONDITIONS (ALTERNATOR annunciator light illuminated)

Verify failure ..... observe ammeter for both alternators
Electrical loads ..... reduce below 60 amps
A/V (volt/ammeter) switch ..... cycle while observing ammeter to determine affected alternator
ALTNTR circuit breaker (affected alternator) ..... check
ALTNTR switch (affected alternator) ..... OFF (for 1 second), then ON

If unable to restore alternator:
ALTNTR switch (affected alternator) ..... OFF

Either alternator will supply sufficient current for all required deice equipment and avionics. Other equipment may be turned on but in no case may the total load exceed 60 amps. The cabin recycle blowers and the strobe position and landing lights draw considerable current and should be turned off unless required. Immediate action should be taken to exit icing conditions.

VACUUM PUMP FAILURE IN ICING CONDITIONS (VACUUM LOW annunciator light illuminated)

Verify failure ..... left side red flow button on suction gauge visible
STANDBY VAC PUMP switch ..... ON

The VACUUM LOW annunciator light will go out when the STANDBY VAC PUMP switch is turned ON. The standby vacuum pump has sufficient capacity to operate the deice boots and flight instruments in a normal manner. Immediate action should be taken to exit icing conditions.

PROP HEAT SYSTEM MALFUNCTION

Excessive vibration may be an indication that the propeller heat is not functioning properly.
Prop control ..... exercise
Prop heat ammeter ..... check for proper indications:
(a) ON (needle in green arc for approx. 90 seconds)
(b) OFF for approx. 90 seconds
A reading below the green arc during the ON cycle is an indication that the propeller blades may not be deicing properly.
PROP HEAT switch ..... OFF if failure is indicated

WARNING

It is imperative that the PROP HEAT switch be turned OFF if vibration persists. This can be a symptom of uneven blade deicing which can lead to propeller unbalance and engine failure.

Immediate action should be taken to exit icing conditions.

SURFACE DEICE MALFUNCTION

If surface deice annunciator light remains illuminated more than 30 seconds, pull the surface deice circuit breaker. Immediate action should be taken to exit icing conditions.

SECTION 4 - NORMAL PROCEDURES

The Piper Malibu is approved for flight into known icing conditions when equipped with the complete Piper Ice Protection System. Operating in icing conditions of Continuous Maximum and Intermittent Maximum as defined in FAR 25, Appendix C has been substantiated; however, there is no correlation between these conditions and forecasts of reported "Light, Moderate and Severe" conditions. **Flight into severe icing is not approved.**

Icing conditions can exist in any clouds when the temperature is below freezing; therefore it is necessary to closely monitor outside air temperature when flying in clouds or precipitation. Clouds which are dark and have sharply defined edges usually have high water content and should be avoided whenever possible. **Freezing rain must always be avoided.**

Pneumatic boots must be cleaned regularly for proper operation in icing. The exterior surfaces of the aircraft should be checked prior to flight. **Do not attempt flight with frost, ice or snow adhering to the exterior surfaces of the aircraft or landing gear.**

Prior to dispatch into forecast icing conditions all ice protection equipment should be functionally checked for proper operation.

PREFLIGHT

(a) An operational check of the heated windshield panel is accomplished by turning the WSHD HEAT switch ON for a period not exceeding 30 seconds. Proper operation is indicated by the heated panel being warm to the touch.

NOTE

A safety feature prevents activation of the panel at ambient temperatures above approximately 75°F. In this case an operational check must be performed in flight by turning the WSHD HEAT switch ON and observing the ammeter for an increase in load.

(b) A check of the heated propeller should be performed by turning the PROP HEAT switch ON and feeling the deice pads. The pads should become warm to the touch.

CAUTION

Care should be taken when an operational check of the heated pitot head and heated lift detector is being performed. The units become very hot.

(c) A check of the heated pitot head and lift detector should be performed by turning the S. WRN HEAT and PITOT HEAT switches ON and touching the units.

(d) The surface boots should be checked prior to flight for damage and cleanliness. If necessary, damage should be repaired and boots cleaned prior to flight. An operational check of the boot system should be performed during engine run-up at 2000 RPM as follows:

(1) Actuate the momentary SURF DEICE switch - the boots will inflate through three phases: empennage, lower wing and upper wing with a duration of approximately six seconds per phase. The surface boot system then remains off until the switch is activated again. A green SURFACE DEICE annunciator light will remain on for approximately eighteen seconds.

(2) Visually check to insure that the boots have fully deflated to indicate proper operation of the vacuum portion of the pneumatic boot pump system.

(e) The dual alternators should be checked by cycling the A/V (volt/ammeter) switch and observing for indication of output from both alternators on the ammeter.

(f) The standby vacuum pump should be checked during engine run-up by turning the STANDBY VAC PUMP switch ON and observing that the right side red flow button on the gyro suction gauge disappears.

INFLIGHT

Icing conditions of any kind should be avoided whenever possible, since any minor malfunction which may occur is potentially more serious in icing conditions. Continuous attention of the pilot is required to monitor the rate of ice build-up in order to effect the boot cycle at the optimum time. Boots should be cycled when ice has built to between and inch thickness on the leading edge to assure proper ice removal. Repeated boot cycles at less

than 1/4 inch can cause a cavity to form under the ice and prevent removal; boot cycles at thicknesses greater than 1/2 inch may also fail to remove ice.

(a) INDUCTION AIR..... ALTERNATE
(b) PITOT HEAT switch..... ON
(c) S. WRN HEAT switch..... ON
(d) WSHD HEAT switch..... ON
(e) PROP HEAT switch..... ON
(f) DEFROST knob..... OUT
(g) VENT/DEFOG switch..... ON, if additional defrost is desired
(h) SURF DEICE switch..... activate after 1/4 to 1/2 inch accumulation

(i) Relieve propeller unbalance (if required) by exercising propeller control briefly. Repeat as required.

WARNINGS

Do not cycle surface boots with less than 1/4 inch of ice accumulation. Operation of boots with less than 1/4 inch of ice accumulation can result in failure to remove ice. Do not hold the momentary SURF DEICE switch on.

Elevator movement should be periodically checked prior to the first surface boot inflation in order to prevent an ice cap from forming between the elevator and stabilizer.

CAUTION

Operation of the pneumatic deice system is not recommended in temperatures below -40°C. Such operation may result in damage to the deicer boots.

NOTE

For accurate magnetic compass readings, turn the WSHD HEAT, PROP HEAT and PITOT HEAT switches OFF momentarily.

NOTE

Prolonged operation of the stall warning vane heater in temperatures greater than 5°C will reduce the operational life of the stall warning vane.

The aircraft ammeter should be monitored whenever the deice equipment is in use. Excessive ammeter indications show excessive electrical load, which may cause a battery discharging condition that could eventually lead to battery depletion. Non-essential electrical equipment should be turned off to correct or prevent this condition.

When ice has accumulated on the unprotected surfaces of the airplane, aerodynamic buffet commences 5 to 10 knots before the stall. A substantial margin of airspeed should be maintained above the normal stall speed, since the stall speed will increase in prolonged icing encounters. For the same reason stall warning devices are not accurate and should not be relied upon.

If ice is remaining on the unprotected surfaces of the airplane at the termination of the flight, the landing should be made using full flaps and carrying a slight amount of power whenever practical. If ice removal from the protected surfaces cannot be accomplished (ie. due to a failure of the surface deice system) prior to the approach the flaps must be left in the full up position. Approach speeds should be increased by 10 to 15 knots. Allow for increased landing distance due to the higher approach speeds.

CAUTION

If cruise airspeed drops below 130 knots in icing conditions increase power to maintain 130 knots. If maximum continuous power is required to maintain 130 knots immediate action should be taken to exit icing conditions.

NOTE

An icing encounter can render the aircraft radar unreliable due to beam reflection off of the ice layer on the radome. Also there may be a degradation of communication and navigation equipment due to ice accumulation on antennas.

SECTION 5 - PERFORMANCE

Climb speed should be increased to 130 knots when icing conditions are encountered during climb.

Cruise speeds are reduced approximately 5 knots when the surface boots are installed.

CAUTION

Ice accumulation on the unprotected surfaces can result in significant performance loss. During cruise, loss of airspeed can be as much as 30 knots or more.

NOTE

When icing conditions are encountered, loss of cruise airspeed and increased fuel flow resulting from higher than normal power settings to maintain altitude will reduce the aircraft range significantly. The use of an alternate airport should be considered if fuel quantity appears marginal.

CAUTION

If cruise airspeed drops below 130 knots in icing conditions increase power to maintain 130 knots. If maximum continuous power is required to maintain 130 knots immediate action should be taken to exit icing conditions.

NOTE

For additional general information on inflight icing refer to FAA Advisory Circular 91-51, Airplane Deice and Anti-ice Systems.

SECTION 6 - WEIGHT AND BALANCE

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

SECTION 7 - DESCRIPTION AND OPERATION OF THE ICE PROTECTION SYSTEM AND EQUIPMENT

For flight into known icing conditions (FIKI), a complete ice protection system is required on the Malibu.

The complete ice protection system consists of the following components: Pneumatic wing and empennage boots, wing ice detection light, electrothermal propeller deice pads, electrothermal windshield panel, heated lift detector(s), heated pitot head, dual alternators, dual vacuum pumps and the alternate static source. Alternator and vacuum pump controls are located on the main switch panel on the left side of the instrument panel. Controls for the ice protection components are located to the right of the control quadrant on the deice switch panel (Figure 7-1).

A single component or a combination of components may be installed. However, the warning placard specified in Section 2 of this supplement is required when the complete system is not installed. Such a placard is also required if any component is inoperative.

The aircraft is designed to allow operation in the meteorological conditions of the FAR 25 envelopes for continuous maximum and intermittent maximum icing. **The airplane is not designed to operate for an indefinite period of time in every icing condition encountered in nature.** Activation of the ice protection system prior to entering icing conditions and attempting to minimize the length of the icing encounter will contribute significantly to the ice flying capabilities of the airplane.

WING AND EMPENNAGE BOOTS

Pneumatic deice boots are installed on the leading edges of the wing, the vertical stabilizer and the horizontal stabilizer. During normal operation, when the surface deice system is turned off, the engine driven vacuum pump applies a constant suction to the boots to provide smooth, streamlined leading edges. The boots are inflated by a momentary ON type SURF DEICE switch (Figure 7-1) located on the deice switch panel. Actuation of the SURF DEICE switch activates a pressure regulator valve which energizes three (tail, lower wing & upper wing) deice flow valves for approximately six seconds. The boot solenoid valves are activated and air pressure is released to the boots, sequentially inflating the surface deicers. A SURFACE DEICE indicator light, located on the annunciator panel illuminates when the boots inflate. When the cycle is complete, the deicer solenoid valves permit automatic overboard exhaustion of pressurized air. Suction is then reapplied to the boots.

Circuit protection for the surface deice system is provided by a SURF DEICE circuit breaker located on the circuit breaker panel.

WING ICE DETECTION LIGHT

Wing icing conditions may be detected during night flight by use of an ice detection light installed on the left side of the forward fuselage. The light is controlled by an ICE LIGHT switch (Figure 7-1) located on the deice switch panel. Circuit protection is provided by an ICE circuit breaker located in the LIGHT section of the circuit breaker panel.

ELECTRIC PROPELLER DEICE

Electrothermal propeller deice pads are bonded to a portion of the leading edges of the propeller blades. The system is controlled by an ON-OFF type PROP HEAT switch (Figure 7-1) located on the deice switch panel. Power for the propeller deicers is supplied by the aircraft electrical system through a PROP HEAT circuit breaker on the circuit breaker panel. When the PROP HEAT switch is actuated, power is applied to a timer through the PROP HEAT ammeter which monitors the current through the propeller deice system.

Power from the timer is cycled to brush assemblies which distribute power to slip rings. The current is then supplied from the slip rings directly to the electrothermal propeller deice pads.

The Hartzell propeller is deiced in a cycle which applies power to the deice pads for approximately 90 seconds and then shuts off for approximately 90 seconds. Once begun, cycling will proceed in the above sequence and will continue until the system is turned off. The PROP HEAT ammeter should indicate within the green shaded area during the portion of the cycle when power is being applied. This indicates proper operation of the system.

The propeller designation is: BHC-C2YF-1BF/F8052-0.

The heat provided by the deice pads reduces the adhesion between the ice and the propeller so that centrifugal force and the blast of the airstream cause the ice to be thrown off the propeller blades in small pieces.

ELECTRIC WINDSHIELD PANEL

An electrically heated windshield panel is installed on the exterior of the pilot's windshield. The panel is heated by current from the aircraft electrical system and controlled by an ON-OFF type WSHD HEAT switch located on the deice switch panel.

The panel is equipped with a temperature sensing device which automatically turns the panel on and off during operation to maintain the desired operating characteristics. This feature also prevents activation of the panel at ambient temperatures above approximately 75°F. With ambient temperatures above 75°F an operational check must be performed in flight after the temperature has decreased. The ammeter must be observed for an increase in load when the WSHLD HEAT switch is activated to indicate proper operation of the panel.

HEATED LIFT DETECTOR

A heated lift detector is installed on the left wing. It is controlled by a S. WRN HEAT switch located on the deice switch panel and is protected by a S. WARN HEAT circuit breaker located on the ice protection circuit breaker panel. The lift detector has an in-line resistor activated by the main gear squat switch which limits the ground electrical load to approximately 33 percent of the inflight load. This allows the lift detector to be ground checked and activated prior to flight without damaging the unit.

NOTE

Prolonged operation of the stall warning vane heater in temperatures greater than 5ºC will reduce the operational life of the stall warning vane

HEATED PITOT HEAD

A heated AN type head is installed under the left wing. It is controlled by an ON-OFF type PITOT HEAT switch located on the deice switch panel and is protected by a PITOT HEAT circuit breaker located on the ice protection circuit breaker panel.

CAUTION

Care should be taken when an operational check of the heated pitot head is being per-formed on the ground. The unit becomes very hot.

DUAL ALTERNATORS

Dual 28 volt, 60 amp alternators are installed as part of the complete icing package. Both alternators must be operational for flight in icing conditions. They are controlled by ON-OFF type switches labeled ALTNR NO 1 and ALTNR NO 2 located on the main switch panel (Figure 7-2). Circuit protection is provided by similarly labeled circuit breakers located on the circuit breaker panel. During normal operation both alternators must be turned ON and the system is designed so that the alternators will share the total load equally. If either ALTNR switch is turned OFF the ALTERNATOR annunciator light will remain lit.

DUAL VACUUM PUMPS

Dual vacuum pumps are installed as part of the complete icing package. The primary pump is engine driven and operates continuously when the engine is running. The standby pump is engine driven through an electrically actuated clutch and is activated either by turning ON the STANDBY VAC PUMP switch located on the main switch panel (Figure 7-2) or by depressing the SURF DEICE switch to activate the deice boots, in which case the standby pump is automatically actuated to increase the efficiency of the surface deice system. Either pump is capable of operating the surface deice system with the other pump inoperative. Therefore, the STANDBY VAC PUMP switch should only be actuated when a primary pump failure is indicated by illumination of the VACUUM LOW annunciator light and the appearance of the left side red flow button on the gyro suction gauge.

ALTERNATE STATIC SOURCE

An alternate static source control valve is located below the instrument panel to the left of the pilot. For normal operation, the lever remains down. To select alternate static source, place the lever in the up position. When the alternate static source is selected the airspeed and altimeter and vertical speed indicator are vented to the alternate static pad on the bottom aft fuselage. During alternate static source operation, these instruments may give slightly different readings. The pilot can determine the effects of the alternate sources at different airspeeds. Static source pads have been demonstrated to be non-icing; however, in the event icing does occur, selecting the alternate static source will alleviate the problem.

SECTION 1 - GENERAL

This supplement supplies information necessary for the operation of the airplane when the optional Ice Protection System is installed in accordance with "FAA Approved" Piper data.

SECTION 2 - LIMITATIONS

(a) The ice protection system was designed and tested for operation in the meteorological conditions of FAR 25, Appendix C, for continuous maximum and intermittent maximum icing conditions. **The ice protection system was not designed or tested for flight in freezing rain and/or mixed conditions or for icing conditions more severe than those of FAR 25, Appendix C. Therefore, flight in those conditions may exceed the capabilities of the ice protection system.**

(b) Equipment required for flight into known or forecast icing:
(1) Pneumatic wing and empennage boots.
(2) Wing ice detection light.
(3) Electrothermal propeller deice pads on the propeller blades.
(4) Electrothermal windshield panel.
(5) Heated lift detector.
(6) Heated pitot head.
(7) Dual alternators.
(8) Dual vacuum pumps.
(9) Alternate static source.
(10) All equipment required for night IFR flight.

(c) If all the equipment listed is not installed and operative, the following placard must be installed in full view of the pilot.

WARNING

This aircraft is not approved for flight in icing conditions.

PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

SUPPLEMENT NO. 10 FOR ICE PROTECTION SYSTEM (APPROVED FOR FLIGHT INTO KNOWN ICING CONDITIONS)

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when Ice Protection System, per Piper Drawing No. 83965-2, is installed. The information contained herein supplements or supersedes the information in the basic 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 basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

FAA APPROVED [redacted]

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