Instructions for Continuing Airworthiness for the TKS Ice Protection System Installed on the Hawker Beechcraft Bonanza A36 and Bonanza G36 Aircraft

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Revision History

Revision	Revision Description	Affected Pages	Date
IR	Original Release	All	14Sept10
A	Manual Update per AEG Comments emailed 11/19 Error reference corrected Typo corrected – Was: 1µm, Is: 0.6µm Typo corrected – Was: 1.2.3, Is: 2.2.3 Added B&C Specialty Products Inc STC reference Updated location of instruments and title in Figure 7 Changed AC43.13-2B to 14 CFR Part 43 Appendix D Added specific reference to 30-09-46 Updated Section 2.6.5 Typo corrected – Was: 1.6.6, Is: 2.6.6 Added Section 2.6.9, 2.6.10 Updated Troubleshooting Diagrams to reference specific locations in documents. Added fastener torque references Added aircraft opening procedures to Section 4.1 – 4.3, 4.7 – 4.9, 4.15 – 4.21 Added Section 2.6.9 and 2.6.10 reference Added specific reference to Section 4.7, 4.8, 4.13, 4.22, 4.25 Replaced drawing references in Section 4.22 Panel damage tolerances updated from active area to the entire panel Added Steps 12 – 14 for Section 4.28 Added Section 5	 6 6 8, 9 9 10 21 21 28 29, 30 30 32 – 56 58 59, 60, 62, 63, 67 - 71 61, 63-72 62, 66, 72, 73 71 74 75 77	04Dec10
B	Updated Section 4.28 for min dispatch level check	75	10Jan11
C	Updated Section 2.2 in regards to dimming Updated Section 2.2.2 in regards to dimming Updated Figure 7 to include TKS dimming knob Updated Section 2.4.1, Figure 13 – to be applicable for both aircraft Updated Section 4.2 for repair and replacement of dimming knob	8 10 10 16 59 – 60	27Jan11

Note: The cover page and this page are updated with each revision.

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List of Figures

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Section 1 – Manuals

In addition to the instructions included within this document, the following additional manuals are required for installation of TKS Ice Protection on the HBC Bonanza A36 and G36 series of aircraft:

1) Instructions for Nylon Tube Coupling Assembly,
TKS Procedure Manual 30-09-46

2) Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair,
FAA Advisory Circular 43.13-1B

3) Acceptable Methods, Techniques and Practices - Aircraft Alterations,
FAA Advisory Circular 43.13-2B

4) TKS Ice Protection Panel Flow Check Procedure Using the TKS System Test Cart,
AS&T Document 09100OPS

5) 33, 35, 36 Maintenance Manual,
Hawker Beechcraft Corporation, Document 36-590001-9C

   G36 Maintenance Manual Supplement for A/C with Garmin G1000 Equipment Installed, Hawker Beechcraft Corporation, Document 36-590001-11B

6) A36 Bonanza Pilots Operating Handbook/Airplane Flight Manual,
Hawker Beechcraft Corporation, Document 36-590002-37B

   G36 FAA Approved Flight Manual/Pilot's Operating Handbook With Garmin Avionics, Hawker Beechcraft Corporation, Document 36-590002-71

7) Bonanza TKS Ice Protection TKS System Installation Top Level Drawing,
CAV Aerospace Inc., Document 10353-01

8) Parts List for the Bonanza "Known Ice" TKS Ice Protection System,
CAV Aerospace Inc., Document 10300PL

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Section 2 – System Care, Service, and Maintenance

2.1 System Description

2.1.1 TKS Fluid

The fundamental concept of a TKS system is freezing point depression. For a given water catch during an icing encounter, a specific volume of ice protection fluid is required to mix with the water catch and depress the freezing point below the local temperature. Under ideal circumstances, the required volume of fluid would be matched to the ice condition. In reality, this approach is used for the Maximum Continuous Icing envelope but is impractical and unnecessary for the Maximum Intermittent Icing envelope.

If the required volume of fluid is mixed with the water catch, freezing point depression will occur. When the catch starts to exceed the supplied volume, however, little change in performance will be noted. TKS systems transition from freezing point depression to "natural de-icing". Natural deicing is identified as a small scale building and shedding of ice from the protected surface. When the water catch is slightly above the freezing point depression threshold, the change will hardly be noticeable. As the catch becomes more intense, the local ice accumulations will become larger prior to departure from the airframe. The upper limit of natural de-icing is reached when a continuous strip of ice accretes on a protected surface before it sheds.

For a large portion of the natural de-icing range of performance of a TKS porous panel, the end result will still appear as basically an anti-icing operation to the operator. Icing wind tunnel research and flight experience has proven that a flow rate of 80%, of the required freezing point depression volume, will still result in an anti-icing like build and shed performance. This performance allows the system to be designed with discrete flow rates that provide enough performance resolution to cover the entire Maximum Continuous envelope, yet overlap in ice protection performance to allow protection beyond the regulatory icing envelope.

In addition, the build and shed capability provides a means to deal with the intermittent maximum icing encounter, both from a practical and a certification standpoint. From a theoretical standpoint, an intermittent maximum icing condition would require 6 times the fluid volume used in the Maximum Continuous Icing envelope to provide freezing point depression. However, wind tunnel testing has demonstrated that one third of this flow rate will provide adequate performance to remove and continue removing ice from TKS protected surfaces.

2.1.2 TKS Fluid Reservoir

The system is provided with a fluid reservoir that ensures the endurance guidelines of AC 23.1419-2D are met. The tank is serviced through a single filler located on the right wing behind the main spar, and has a total capacity of 7.5 gallons. The unusable volume is 0.5 gallons. A minimum of 3.5 U.S. gallons (Bonanza A36) or 5.5 indicated U.S. gallons (Bonanza G36) of fluid is required before takeoff if the system is to be considered operational for icing conditions. Fluid quantity is measured by a float-operated sensor which transmits an electrical signal to the indicator located on the ice protection control panel. Fluid level is displayed though an LCD on the control panel in gallons with a resolution of 0.1 of a gallon. The display automatically dims for night operation on the Bonanza A36, while a manual adjustment is available adjacent to the TKS Control Panel for dimming.

2.1.3 Leading Edge Protection

Leading edge protection is achieved by mounting panels to the leading edges of the wings, horizontal and vertical stabilizers. The outer skin of the ice protection panels are manufactured with 0.9 mm thick titanium; providing excellent strength, durability, light weight, and corrosion resistance.

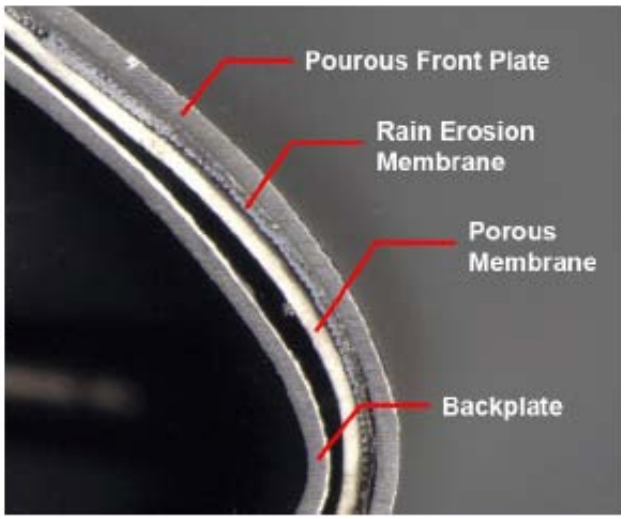


Figure 1 – Section View of Porous Panel

The outer skin of the ice protection panels are manufactured with 0.9mm thick titanium. The panel skin is perforated by laser drilling holes, 0.0025 of an inch in diameter, 800 per square inch. The porous area of the titanium panels is designed to assure fluid coverage from the best rate of climb speed to maximum operational speed.

The back plate of a typical panel is 0.7mm thick manufactured stainless steel or titanium. It is formed to create a reservoir for the ice protection fluid, allowing fluid supply to the entire porous area. A porous membrane between the outer skin and the reservoir is designed to assure even flow and distribution through the entire porous area of the panel.

2.1.4 Porous Panel Configuration

The porous panels are bonded or attached as a cuff over a leading edge. Panels are bonded to the airframe with a two-part, flexible adhesive. Most high performance general aviation singles and twins utilize the cuff method.

The design philosophy of the initial panel configuration was to blend both the practical and aesthetic attributes of the system. Panel lengths are designed to bridge areas on the aircraft between distinct visual discontinuities. This visual philosophy tends to apply directly to practical panel designs, yielding the simplest and most cost effective results. The greatest limiting physical factor is panel length.

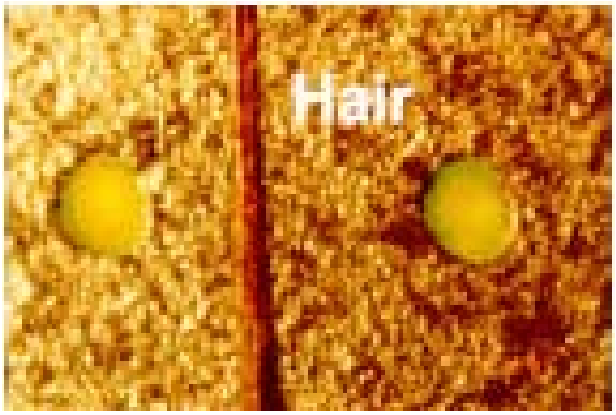


Figure 2 – Magnified View of Laser-Drilled Holes

The porous panels have been located in the same airframe areas that would be afforded protection by a boot system. This enables the system to provide full coverage of the leading edge of the wings, and horizontal and vertical stabilizers, excluding the dorsal fin.

Figure 3 illustrates the panel configuration for the Hawker Beechcraft Bonanza A36 and Bonanza G36 model aircraft.

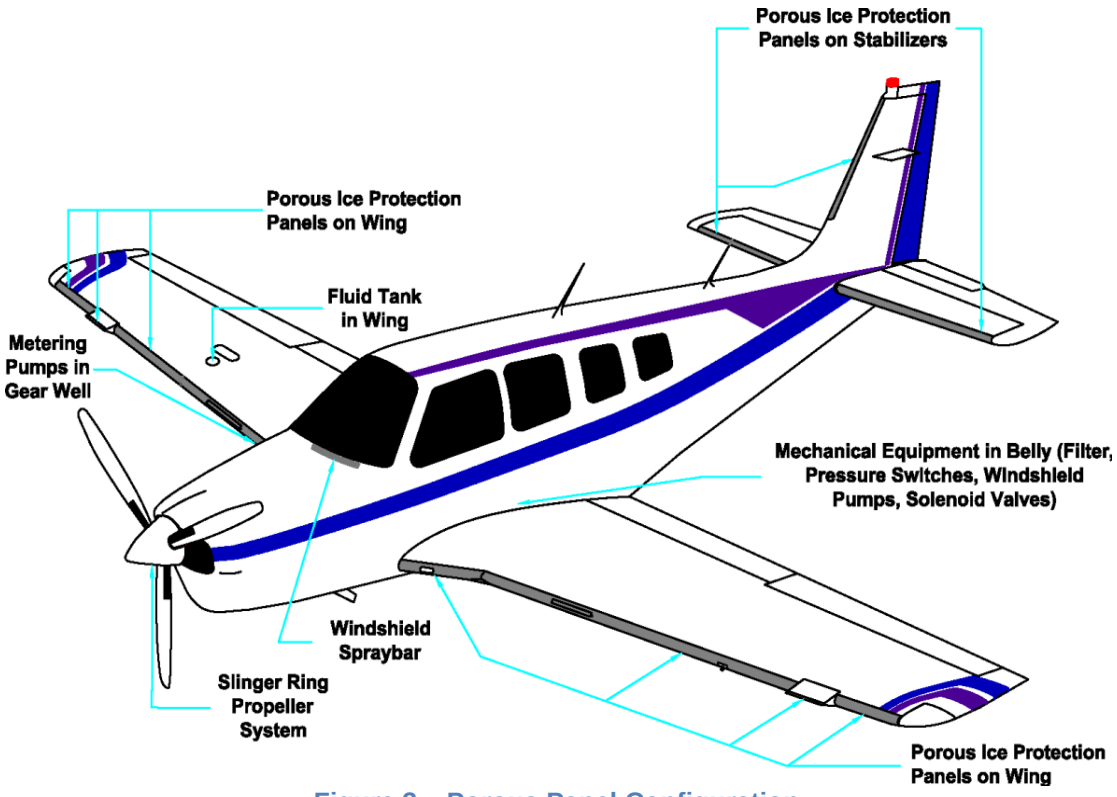


Figure 3 – Porous Panel Configuration

2.1.5 Propeller Protection

A predetermined flow of TKS ice-protection fluid is metered into a propeller slinger ring through an injection nozzle. Once the fluid enters the slinger ring, centrifugal force directs the fluid to the outermost portion of the ring. Holes mounted in the slinger ring provide a path for the fluid to travel, ultimately coming out of a tube positioned on the leading edge of the propeller. The propeller blade leading edges are fitted with a channeled boot, providing a flow path for the TKS fluid. The fluid passes out of the feed tube and onto the ribbed boot. Centrifugal force directs the fluid outward.

2.1.6 Windshield Protection

Windshield ice protection provided by the TKS system is designed to keep the pilot's view optimal during icing conditions. The TKS fluid is dispersed across the windshield out of the small holes found along the spraybar. The spraybar is mounted near the base of the windshield on the left side, providing the pilot an unobstructed view, at all times.

Adding to the already redundant windshield protection is the fluid coming from the propeller wash. The propeller is fed any time the TKS system is on. Any fluid coming off of the propeller is directed backward over the fuselage. The windshield receives a majority of this fluid, often times making the windshield spraybar and pumps unnecessary.

2.1.7 Fluid Motivation and Delivery

Fluid is supplied to the panels and propeller by a single positive displacement, constant volume metering pump. The pump provides various flow rates to the panels and propeller. The single two speed pump provides a range of flow rates for different icing conditions. Figure 4 and Figure 5 show the fluid schematics for the two different aircraft models.

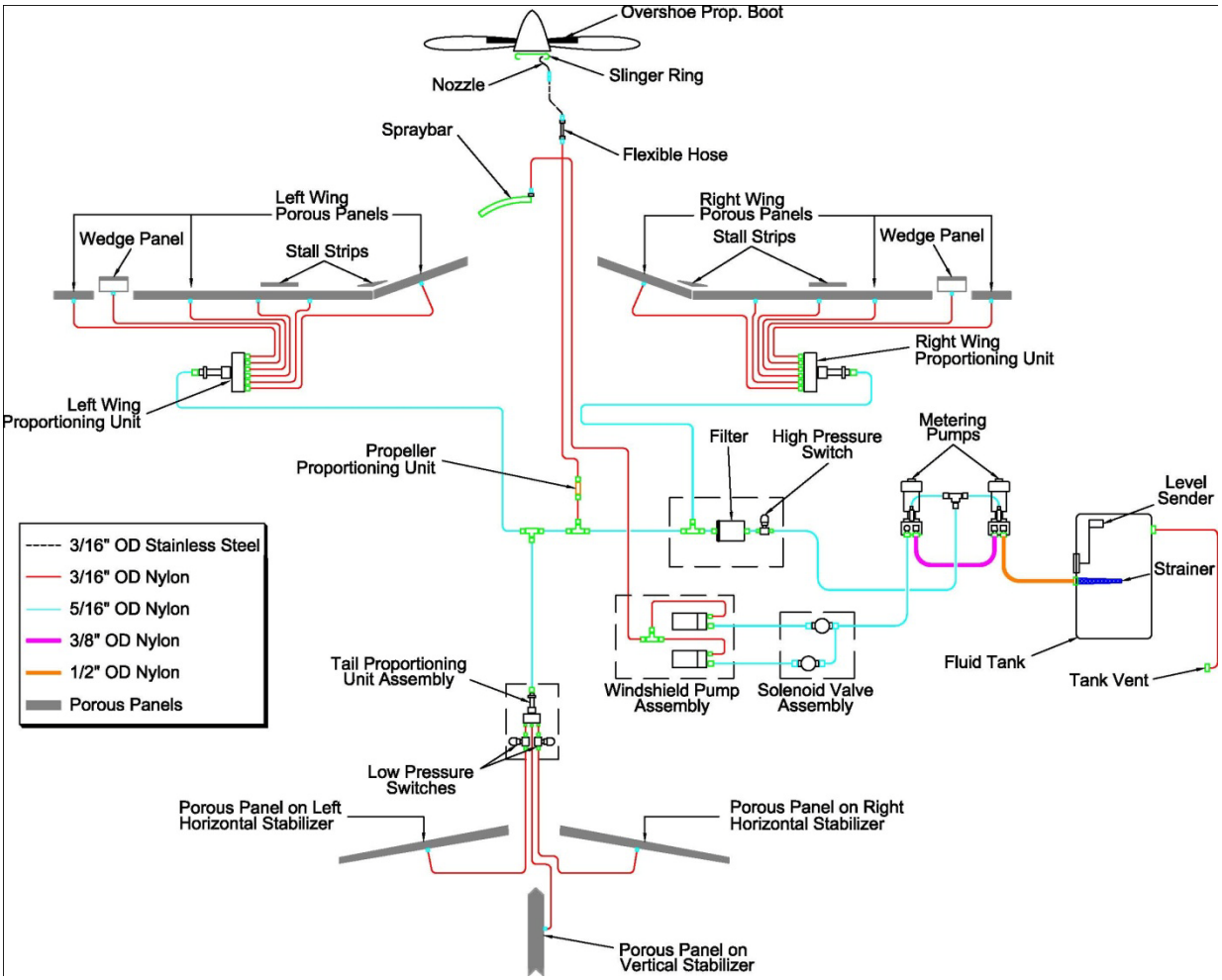


Figure 4 – Bonanza A36 TKS Sytem Fluid Schematic

The fluid passes through a 0.6µm – filter prior to distribution to the porous panels and propeller. The filter assures all contaminants are removed from the fluid and prevents panel blockage. A network of nylon tubing carries the fluid to proportioning units located in the wings and tail of the aircraft. The proportioning units divide the flow into the volumetric requirements of each panel or device supplied through the unit. Each panel and device is fed again with nylon tubing.

For the sake of redundancy, the system is configured with two metering pumps, each of which can be independently operated as the primary source of fluid delivery via a toggle switch on the control panel. Both pumps operate identically; however, for Bonanza G36 model aircraft, pump 2 has a separate wire harness that ties to a backup switch. This is provided as an additional means of redundancy in the event of a primary system failure.

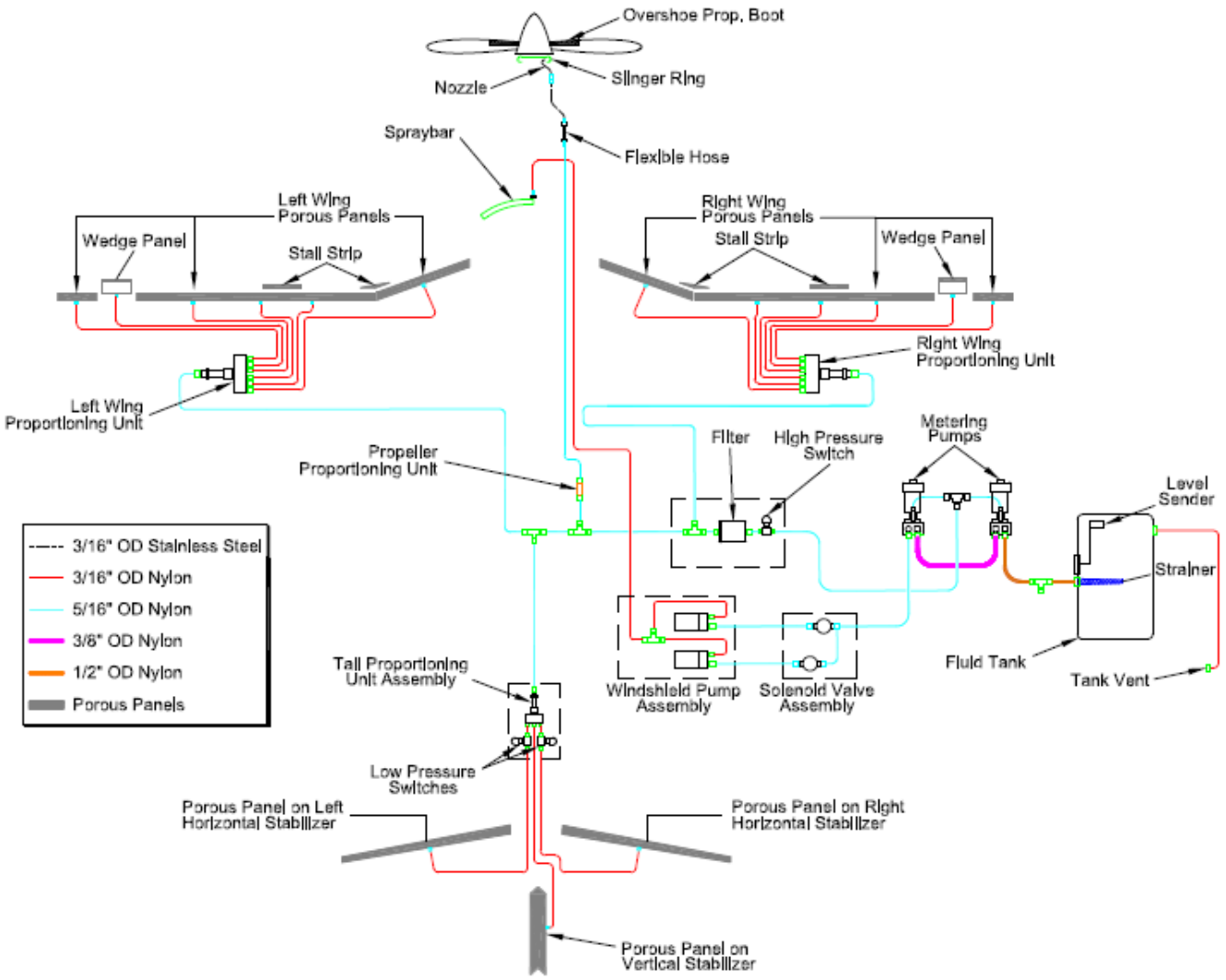


Figure 5 – Bonanza G36 TKS Sytem Fluid Schematic

There are two modes of operation for Bonanza A36 models, and four modes of operation for Bonanza G36 models. Those modes which have been certified under Title 14 CFR Part 25, Appendix C are common between both model aircraft, and are identified as NORMAL and MAXIMUM. Normal mode represents the design flow rate for the system and is achieved by running one pump continuously in its normal setting. Maximum mode is provided as a means to navigate the maximum intermittent icing envelope, and is enabled by running one pump continuously in its maximum setting. Maximum is twice the flow rate of Normal. The third and fourth settings provided on the Bonanza G36 TKS System are utilized by selecting pump 1 on the ice protection control panel, and selecting either NORMAL or MAXIMUM, and turning on the TKS Backup switch. By doing so, the TKS Backup runs pump 2 in its maximum setting, while pump 1 runs in its selected state. Running the system in these states provides flow rates of 3 times and 4 times the flow rate of normal mode respectively.

Fluid for the windshield spraybar system is provided by an on-demand gear pump. The spraybar may be activated as needed to clear forward vision through the windshield. To ease the pilot's duties in the cockpit, the pump is activated by a self-centering switch located in the control panel. After depressing the switch, the windshield pump cycles for four seconds, which provides enough fluid to clear the windshield.

2.2 System Operation, Indication and Annunciation

All configurations of the TKS Ice Protection System for the HBC Bonanza A36 & G36 model aircraft operate on the same principles. Normal mode (NORM / NORMAL) is the lowest fluid flow rate of the system. Economy of fluid usage may be achieved by using the NORM position (down) of the airframe/propeller switch. The flow rate is achieved by running the metering pump of the system through a speed controller, which supplies a flow rate at half that of Maximum mode while continuously running the pump.

Maximum mode (MAX / MAXIMUM) is achieved by running the metering pump at twice the RPM of NORM, and flows at twice the flow rate of Normal mode. MAX should initially be selected if ice has accreted on flight surfaces or until the severity of the icing condition has been determined.

Operation and annunciation of the TKS ice protection system are identical regardless of the model aircraft. Differences between the two aircraft include location of the TKS control panel, annunciation of the pitot/stall vane heat, operation of the secondary alternator, manual TKS Control Panel Dimming for Bonanza G36 models, and the inclusion of a TKS backup switch for G36 models.

The system is operated and monitored through a control panel interface. All modes of operation and selection for the metering and windshield pumps are controlled through this device. Coupled to a sensor in the reservoir, the remaining quantity of fluid is displayed on a digital display.

The operational state of the system may also be monitored by annunciators on the control panel. Indications of normal running state, cautionary state, and warning conditions will be provided and displayed when required.

2.2.1 Bonanza A36 Model Aircraft

The system is operated through the TKS control panel, which can be located in any available instrument hole cutout below the primary flight instruments, and above the EL panel on the left hand side of the instrument panel as shown in Figure 6. Additional locations for placement of the control panel include any available slot in the radio stack, located in the center of the instrument panel, or in any available spot to the right of the radio stack. Details on the operation of the TKS Control Panel are provided in Section 2.2.3, TKS Control Panel Operations and Annunciations.

Annunciation of the PITOT HEAT is provided through an amber light, located either to the left or above the primary flight instruments. The light illuminates when the pitot heater fails. A dimming switch is provided to allow for proper daytime and nighttime lighting. Selecting BRIGHT allows for the annunciator to be visible during daytime operations while selecting DIM allows for decreased illumination for nighttime operations.

Bonanza A36 aircraft equipped with a TKS Known-Ice System are supplemented with a 20 amp standby alternator, as provided by B&C Specialty Products Inc. under STC SA00724WI. The installation of this alternator is provided to allow for continued operation in the event of a primary alternator failure. Two switches are provided in the left subpanel to the left of the control yoke for operation. The first of these is located to the right of the master alternator switch, which is provided to enable power to be supplied by the standby alternator to the primary bus. Selecting STBY ALT enables this function while selecting OFF turns off power flow from the standby alternator. Located to the right of this switch is the loadmeter selector switch, which allows the pilot to select which alternator load output is displayed on the loadmeter gauges, located to the right of the landing gear switch. Selecting PRIMARY shows the load on the primary, 100 amp alternator, while selecting STANDBY shows the load on the secondary, 20 amp alternator.

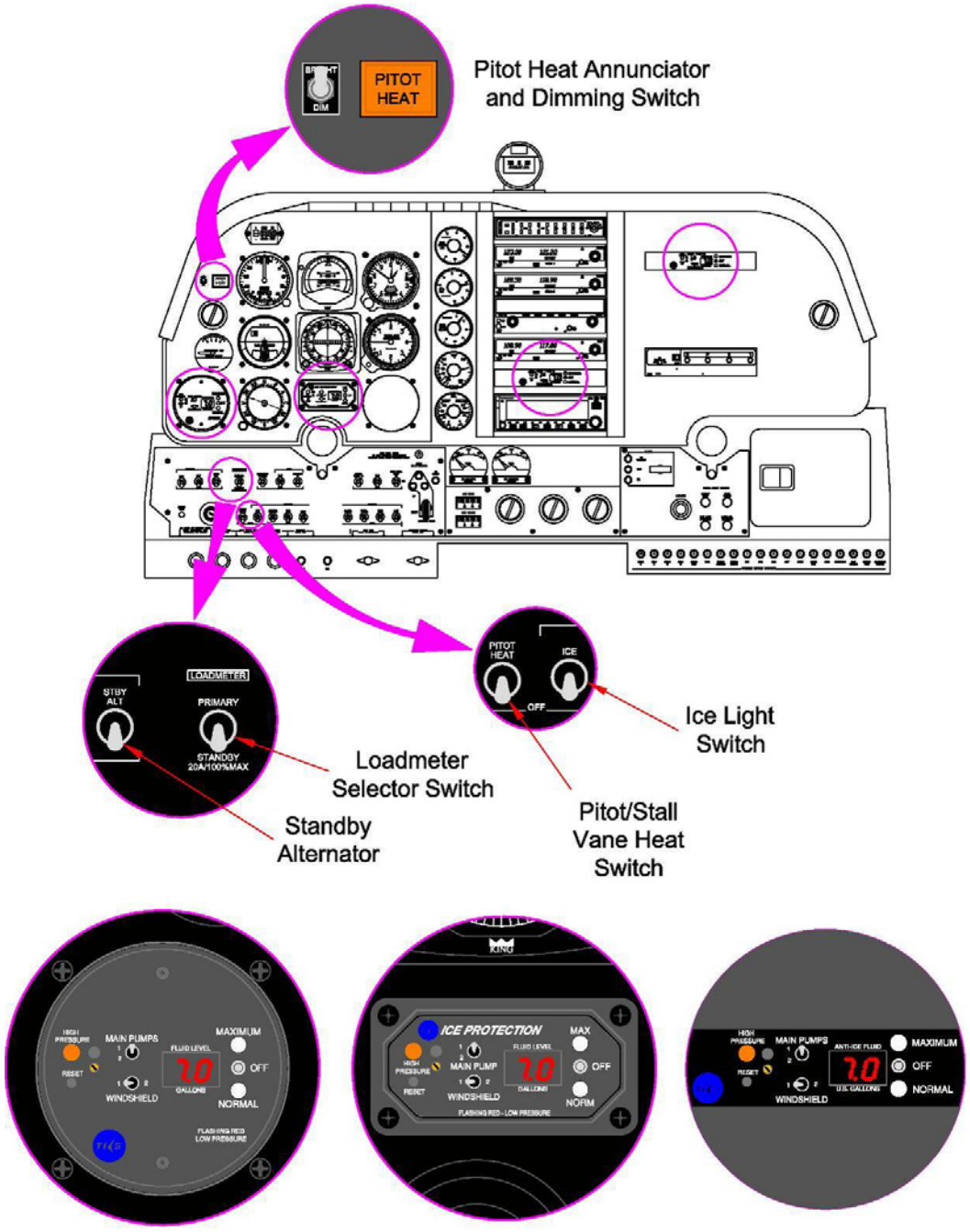


Figure 6 – A36 Instrument Panel, TKS System Integration

2.2.2 Bonanza G36 Model Aircraft

For Bonanza G36 aircraft, the TKS Known-Ice System is operated through the TKS control panel, which can be located in any available area below the Garmin G1000 PFD and MFD, above the left subpanel, and to the left of the right control yoke, as depicted in Figure 7. Details on the operation of this control panel are provided in Section 2.2.3, TKS Control Panel Operations and Annunciations.

Annunciation of the PITOT HEAT and STALL HEAT is provided through an amber colored, split lamp, Eaton style annunciator, located to the right of the left subpanel. The electrical operation of these

annunciators is independent of one another. In the event of a pitot heater or stall vane heater failure, the respective annunciator illuminates. The annunciator is wired for dimming to allow for appropriate lighting during daytime and nighttime operation. By pushing in on the annunciator, decreased illumination is provided for nighttime operations. Alternatively, pushing in on the annunciator again will fully illuminate it for daytime operations. The annunciator can be visually inspected as to its lighting condition selection. The mechanical operation of the annunciator allows for the switch to protrude farther from its housing when daytime lighting (bright) has been selected, while nighttime lighting (dim) seats the face of the annunciator almost flush with its housing.

Dimming is provided to the fluid level LED display through the use of an external dimming rheostat, located to the right of the TKS control panel. The fluid quantity display is dimmed by rotating the knob counter-clockwise. Conversely, daytime illumination is provided by rotating the knob clockwise.

Also located to the right of the TKS Control Panel is a TKS backup switch. This backup switch is provided as a means of electrical redundancy to the TKS system, which provides power to the TKS system via Bus 1 in the event of a Bus 2 and bus-tie failure. Selecting ON provides power to metering pump 2, operating the system in MAX mode. Selecting OFF turns backup mode off.

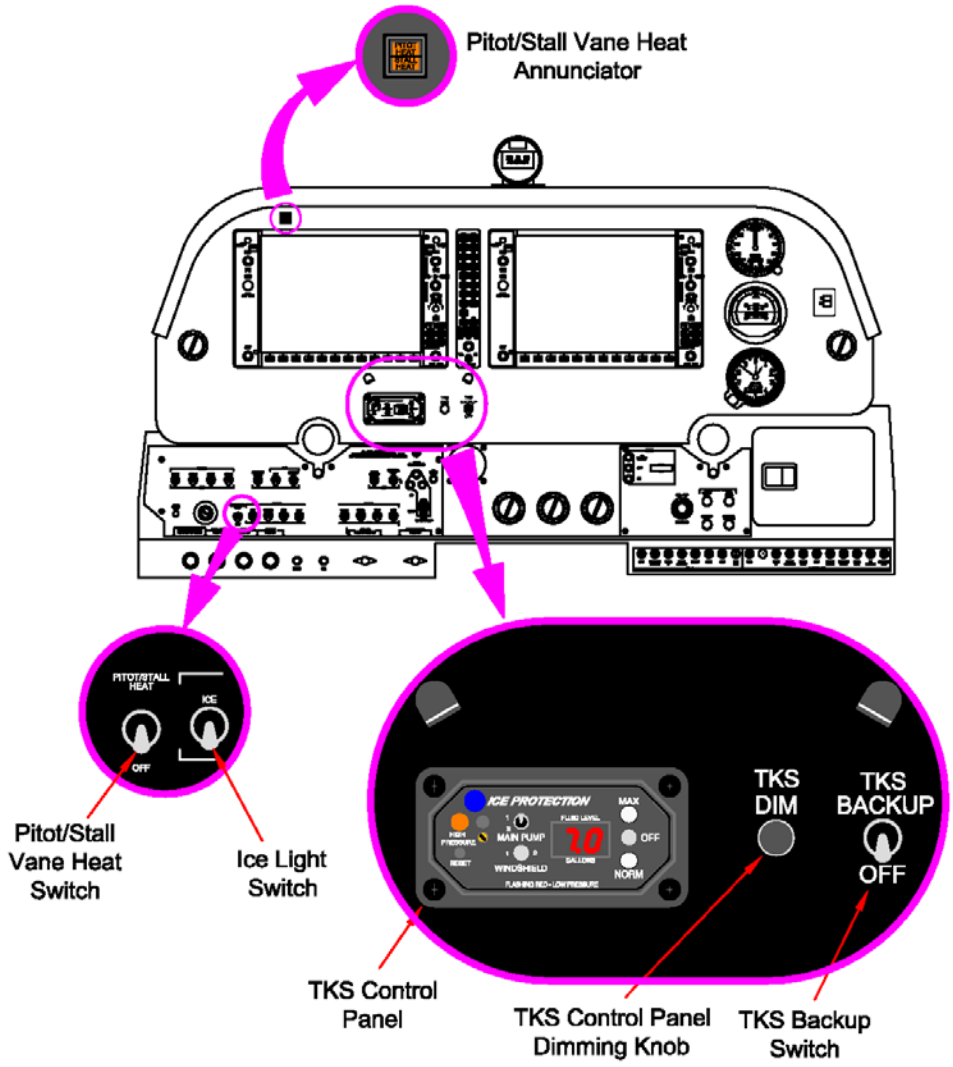


Figure 7 – G36 Instrument Panel, TKS System Integration

2.2.3 TKS Control Panel Operations and Annunciations

Normal mode may be activated by selecting the NORM position (down) of the airframe/propeller switch. Likewise, Maximum mode may be activated by selecting the MAX position (up) of the airframe/propeller switch. Normal operation of either of these modes is indicated through their respective LED lights, which illuminate green. The system is deactivated by selecting the OFF position (center). As indicated, the operational mode of the system may be determined by the position of the switch.

Both TKS Equipped Bonanza model aircraft are equipped with two identical metering pumps for system redundancy. During operation of the airframe/propeller NORM/MAX switch, the TKS system will draw fluid from either one of these pumps, and is based on the position of the MAIN PUMP switch. Selecting the switch to the 1 position will draw fluid from one pump, while selecting the switch to the 2 position will draw fluid from the other pump.

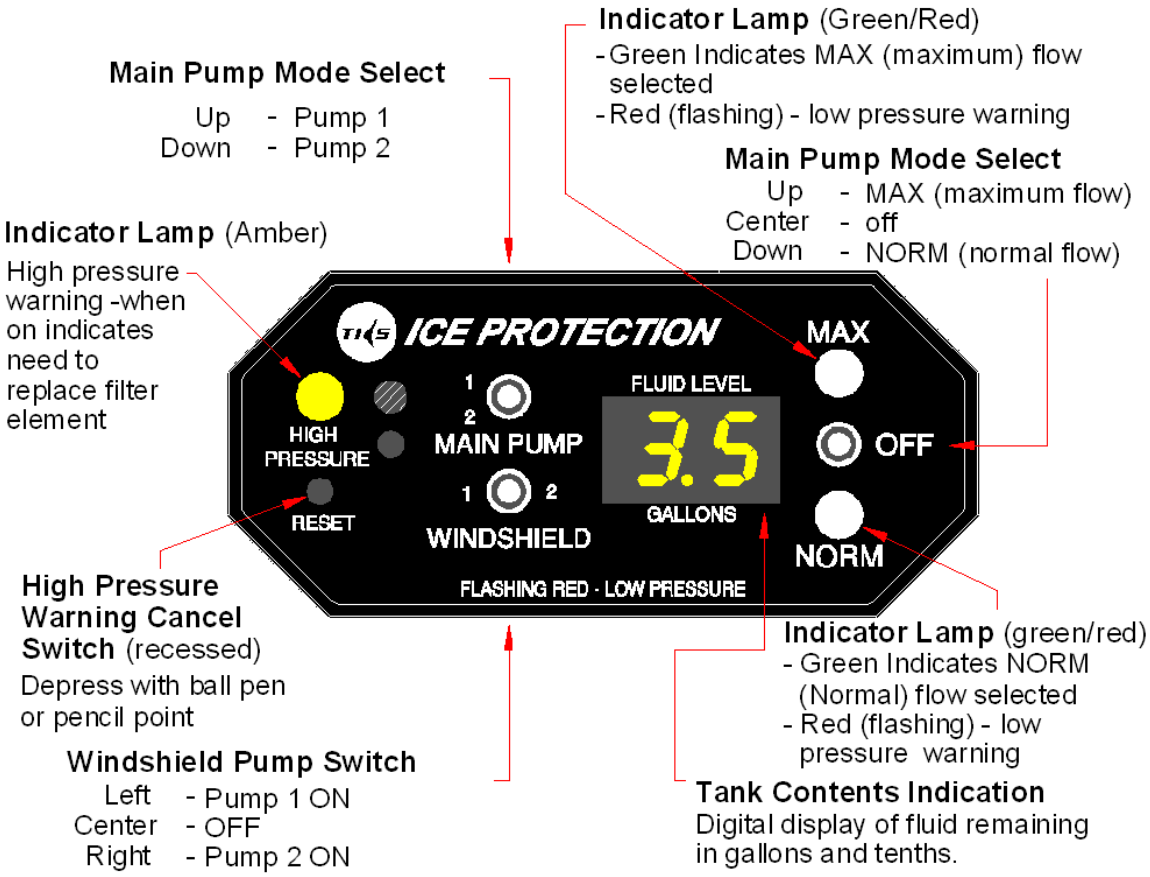


Figure 8 – TKS Control Panel

Similarly, both Bonanza model aircraft are equipped with two identical windshield pumps for system redundancy. Either of these pumps are capable of supplying a 4 second burst of fluid to the windscreen of the aircraft. Selection of either one of these pumps is provided through a self centering momentary switch on the TKS control panel labeled WINDSHIELD.

High pressure annunciation of a TKS system is provided on the TKS control panel with an amber LED light labeled HIGH PRESSURE. When a high pressure situation arises within the system (typically indicative of a blockage within the system); this LED will illuminate on the control panel. This annunciator can be reset by pushing in the RESET button. If the annunciator extinguishes, this represents an isolated case of a

pressure spike in the system, whereas, if the annunciator re-illuminates, the high pressure within the system is continuous.

Low pressure annunciation of a TKS system is provided on the TKS control panel with red LED lights. During operation of the airframe/propeller NORM/MAX switch, the selected mode will flash green when a low pressure is detected within the system. The unselected mode will flash red. When low pressure is no longer detected within the system, the unselected mode LED will extinguish and the selected mode LED will change to steady green.

FLUID LEVEL is displayed through a digital display on the TKS control panel. Units shown on the control panel are shown in gallons. Empty is indicated as 0.0 gallons, whereas full is indicated by 7.0 gallons.

2.2.4 Aircraft Icing Related Controls

In addition to the TKS System, additional provisions have been provided for the addition of a stall vane heater. For Bonanza A36 model aircraft, the stall vane heater power is tied into the pitot heater. For Bonanza G36 model aircraft, both the stall vane heater and pitot heater are controlled through the same switch, but operate from separate electrical sources. For both aircraft models, the pitot heat and stall vane heat are operated via the PITOT HEAT (Bonanza A36), PITOT / STALL HEAT (Bonanza G36) switch located on the left subpanel to the right of the aircraft key ignition switch. Selecting this switch to the up position turns both the stall vane and pitot heat on, while selecting OFF turns the stall vane and pitot heat off.

Both the Bonanza A36 and G36 model aircraft are equipped with an ice light, which is mounted forward of the firewall, on the left side of the aircraft. This gives the pilot the ability to visually inspect the left wing leading edge for ice accretion during nighttime operation of the aircraft. The ice light is operated via a switch in the light stack on the left subpanel. Selecting the up position (ICE) turns this light on, while selecting the OFF position turns the light off.

2.3 System Specifications

2.3.1 Tank Volume (Bonanza A36 & Bonanza G36)

Tank Capacity: 7.5 U.S. Gallons
Useable Volume: 7.0 U.S. Gallons
Unusable Volume: 0.5 U.S. Gallons

System Endurance and Flow

Operational Mode	Flow Rate (minimum)	Full Tank Endurance
G36 NORM / NORMAL	2.62gal/hr (165ml/min)	2 hrs. 40 mins.
G36 MAX	5.23gal/hr (330ml/min)	1 hr. 20 mins.
A36 NORM / NORMAL	1.97gal/hr (124ml/min)	3 hrs. 33 mins.
A36 MAX	3.93gal/hr (248ml/min)	1 hr. 47 mins.

2.3.2 Porous Panel Flow Rates (Bonanza A36 & Bonanza G36)

Part Number	Porous Panel Description	A36 Flow Rates (mL/min)		G36 Flow Rate (ml/min)	
		NORMAL	MAX	NORMAL	MAX
D4513T	Left Wing Outboard	5.2	11.4	6.48	12.96
D4514T	Right Wing Outboard	5.2	11.4	6.48	12.96
D4535T-05	Left Mid Wing	22.0	44.0	27.4	54.8
D4535T-06	Right Mid Wing	22.0	44.0	27.4	54.8
D4511T	Left Inboard Wing	8.70	17.4	10.84	21.68
D4512T	Right Inboard Wing	8.70	17.4	10.84	21.68
D4531T	Vertical Stabilizer	7.0	14	8.72	17.44
D4535T-11	Left Horizontal Stabilizer	10.14	20.28	12.63	25.26
D4535T-12	Right Horizontal Stabilizer	10.14	20.28	12.63	25.26
D4515T	Left Wing Wedge	2.2	4.4	2.74	5.48
D4516T	Right Wing Wedge	2.2	4.4	2.74	5.48
D4525T	Left Stall Strip	1.37	2.74	1.70	3.4
D4525T	Right Stall Strip	1.37	2.74	1.70	3..4
Propeller	Propeller Feed Nozzle	30.6	61.2	38.14	76.28

Note: Panel flow rates presented in these tables are for reference only. The rates indicated are for operational temperatures at 32°F (0°C).

2.3.3 Electrical Loads (Bonanza A36 & Bonanza G36)

Component	Load Type	Current Draw
Airframe/Propeller Pump (1 unit)	Continuous	1.30 (LO) 1.50 (HI)
TKS Control Panel	Continuous	0.20
Ice Light	Continuous	1.40
Windshield Pump (1 Unit)	Intermittent	0.60
Solenoid Valve	Intermittent	0.60
Pump Select Relay	Intermittent	0.06
Typical Continuous Load		1.50 (Day) 2.90 (Night)
Pitot Heater	Continuous	4.0
Stall Vane Heater	Continuous	5.0
Stall / Pitot Heat Annunciator	Intermittent	0.02
Typical Continuous Load		9.00
Total Continuous Load All Components		**10.50 (Day)** **11.90 (Night)**

2.4 Operational Limitations

For the TKS Ice Protection System to be considered operational, the following aircraft conditions must be satisfied.

2.4.1 Minimum Equipment

The following equipment must be installed and operational for flight into Known-Icing Conditions:

a) Placards

Operating Limitations Placard to be updated inside the cockpit:

Figure 9 – Operating Limitations Placard for Bonanza A36 and Bonanza G36

Ice Protection Tank Placard to be fitted on the top surface of the right wing adjacent to the filler cap:

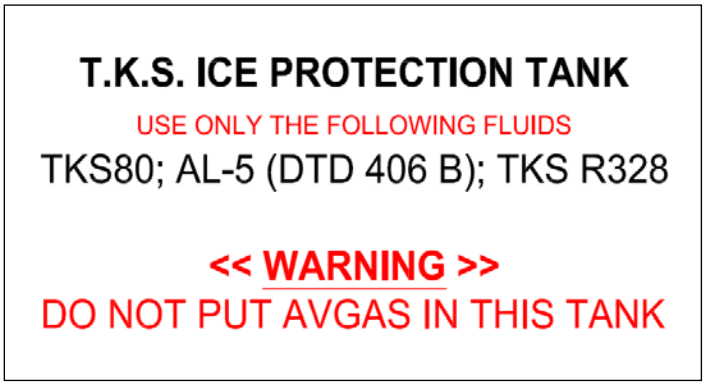


Figure 10 – Bonanza A36 Ice Protection Tank Placard

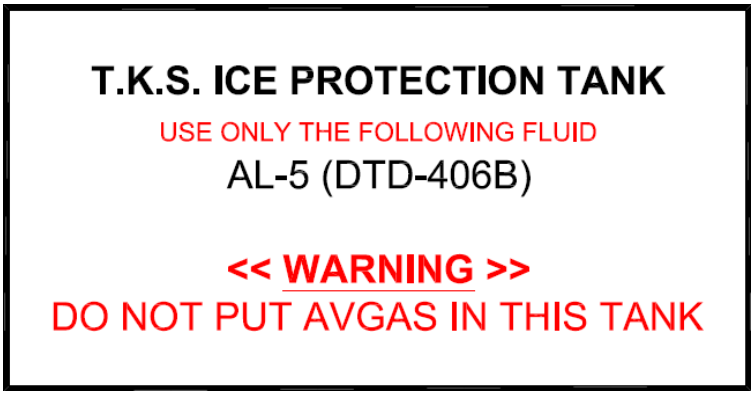


Figure 11 – Bonanza G36 Ice Protection Tank Placard

Porous Panel Caution Placard to be fitted on the top inboard surface of each wing and horizontal stabilizer adjacent to panel (4 locations):

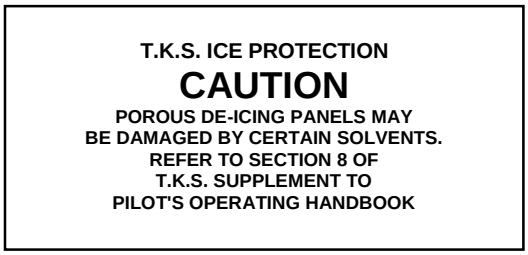


Figure 12 – Porous Panel Caution Placard

Stall Vane Warning Placard to be placed adjacent to the Pitot Heat / Stall Heat Annunciator:

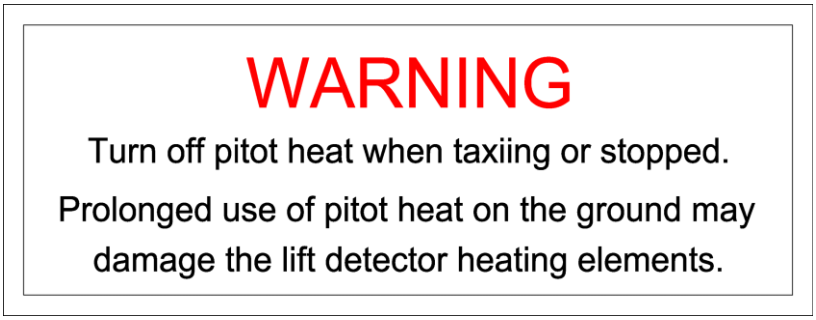


Figure 13 –Stall Vane Warning Placard

Windshield Placard to be placed above the Garmin G1000 PFD:

Figure 14 – Windshield Placard

b) Propellers

The aircraft, when equipped with TKS Ice Protection, must be equipped with one of the following propeller/ice protection combinations:

Model Number	Propeller Model Number	Description	Spinner Model Number	Description	Ice Protection
A36	D3A32C409-/X/ (hub) /X/-82NDB-2 (blades)	McCauley constant 3-bladed prop.	D5259, D5541, or D7168	Spinner Assy.	Requires installation of TKS wet prop system, part number 103PP-01 or 103PP-02
A36 / G36	PHC-C3YF-1RF/F8468A(K)6R	Hartzell constant speed 3-bladed prop.	A2995-2(P)	Spinner	Requires installation of TKS wet prop system, part number 103PP-04
			A-2476-7	Spinner Mounting kit	

2.5 System Care

The TKS Ice Protection System is a robust and durable system requiring little attention for day to day care. The basic care is cosmetic and preventive in nature, and will maintain the appearance and promote proper system operation.

2.5.1 Cleanliness Precautions

The TKS system has filtration to protect components against damage/blockage by particulate matter, but it must be remembered that these will not always be effective against liquid contaminants. For this reason and to extend the life of the filter element and strainer the following precautions are recommended:

a) Where possible, eliminate unnecessary handling by purchasing fluid in small (2.5 gallon) containers, from which it can be poured directly into the tank.

b) Always clean the top of containers before removing the cap and pouring from the container.

c) Always replace the cap on containers containing fluid, or used for the transfer of fluid.

d) If fluid is transferred from original containers to others for storage/transfer, ensure that these are clean and of suitable materials. Tin plated steel or similar containers susceptible to rusting are not suitable.

e) If not filling directly from original containers, keep a set of vessels/implements solely for use with ice protection fluid.

f) Maintain the region around the aircraft filler clean. Keep the filler/cap clean. Always replace the filler cap on the aircraft immediately after filling.

2.5.2 Porous Panel Cleaning

Caution

1) **Porous panels contain a plastic membrane that can be damaged by certain solvents, particularly methyl ethyl ketone (MEK), acetone, paint thinners, paint stripper, and other types of thinners and solvents. Do not use these materials to clean panels. Mask panels with non-porous solvent resistant material if solvents of this nature are being used on adjacent parts of the aircraft.**

2) **Do not paint the outer surface of the porous panels.**

3) **Do not polish the surface of the porous panels when polishing painted surfaces. Wax or silicone polishes impair the wetting qualities of the de-icing fluids and may degrade ice protection efficiency. Repeated or intensive polishing may also block some of the pores in the panels.**

Approved ice protection fluid has a softening effect on insect debris. It may be advantageous to operate the ice protection system for a sufficient period of time to wet the leading edges with fluid before attempting to clean them.

Spread the fluid over the insect encrusted area with a cloth or sponge while the ice protection system is operating, then switch the system off and leave the fluid standing for about ten minutes before continuing with porous panel cleaning.

From the functional aspect porous panels are self cleaned by the "back flushing" action of the de-icing fluid when the system is operated. Dirt and insect debris may be cleaned from the panels during normal aircraft cleaning as described in above. Deposits of oils, greases, adhesives, paint, etc. May be removed by use of the following solvents ONLY:

Water (Soaps and detergents permitted)

DTD406B Ice Protection Fluid

Gasoline* or Avgas*

Kerosene* or Jet Fuel*

Isopropyl Alcohol*

Ethyl Alcohol*

Industrial Methylated Spirit*.

* Take appropriate precautions to prevent fire.

In several cases removal of the deposit may be assisted by the use of "Scotch-Brite™" and/or careful scraping.

2.5.3 Polishing of Porous Panels

Do not use any form of polish on porous panels. The panels may be restored to their original condition by the use of "Scotch-Brite™". Where necessary, mask the aircraft skin adjacent to the panel to avoid damage to the paint. Polish in a chordwise direction to obtain a matching texture to the original. Use very Fine grade if necessary for initial cleaning/polishing, followed by Ultra Fine grade.

Scotch-Brite™ grades and their application are:

Grade No.	Description	Recommended Usage
7440	Heavy Duty	Use very sparingly on deep scores
7447	Very Fine	Cleaning of difficult deposits. Initial polishing
7448	Ultra Fine	Normal Cleaning/ Final Polishing

2.6 Serviceability Checks and Inspections

This subsection provides guidance for general inspection and routine schedule service tests.

Caution

Always clean up any Ice Protection Fluid spills immediately, particularly from the floor. DTD 406B contaminated floors are very slick and constitute a slippage hazard.

Consult the Material Safety Data Sheet (MSDS) for proper handling of DTD-406B and disposal of waste fluid.

2.6.1 General Inspection

General inspection of the TKS system follows the standard practice of 14 CFR Part 43 Appendix D. For scheduled inspection of 100 hours or greater, system inspection should follow, but are not limited, to the following guidelines. Refer to the installation drawings of drawing 10353-01, "Bonanza TKS Ice Protection TKS System Installation Top Level Drawing" for component location.

- Inspect electrical wire harnesses for proper routing and security. Inspect for evidence of chafing, wear, arching, or interference with other components/assembly of the airframe. If evidence of one of these conditions exists, replace the wire harness with the appropriate replacement procedure of this manual.
- Inspect fluid tubing for proper routing and security. Inspect for evidence of chafing, wear, kinking or leaks. If evidence of one of these conditions exists, replace the tube with the appropriate replacement procedure of this manual.
- Inspect the system fluid couplings for evidence of leaks. If leaks exist, check the fitting for proper tightness in accordance with, "TKS (Aircraft De-Icing) LTD, Nylon Tubing & Couplings General Practices Manual," 30-09-46, Section 11. If the leak persists, replace attached fluid run (fittings and tube) in accordance with Procedure 4.22 of this manual.
- Inspect the porous ice protection panels for condition and fit. If the panels show evidence of dents, refer to Procedure 4.27 for evaluation of the condition.

  The panels should fit tight to the associated leading edge. The trailing edges of the panels should be in contact with the surface. If the panel fit is not appropriate, refer to Procedure 4.27 for replacement.
- Each panel should have a continuous edge seal of polysulfide seal. If the seal is damaged, trim and peel away the seal 1" either side of the damage and replace seal in accordance with the procedure from drawing 10351-44.
- Inspect the propeller boot trim paint for wear and adhesion. Pay particular attention to the leading edge tip area of each boot. This area has the highest wear rate of the boot trim. If the trim area is worn, repaint the affected area in accordance with drawing 10351-38. Lap the new paint over the old paint at least 1" in each direction of the affected area.
- Inspect the propeller boots for condition, wear, and adhesion to the propeller blades. If the boot shows signs of cracking, crazing, or the boot is deteriorated, replace the boot in accordance with Procedure 4.26.

Check the boots for signs of adhesive de-bonding, particularly around the edges of the boot. If de-bonding is evident, replace the boot in accordance with Procedure 4.26.

Note

If trim or boot replacement has occurred on the propeller, the propeller must be dynamically balanced.

- Assure that all placards are installed in accordance with drawing 10351-43. Each placard must be clearly visible and readable. Assure no placards are delaminating from their installed location. Any placard not meeting these requirements must be replaced in accordance with drawing 10351-43.
- Inspect TKS Equipment in Aircraft Floor and Wings.

Location and Attachment of Equipment (Refer to Drawing 10351-01)

1) Attachment of the Windshield Pump and Solenoid Valve Assemblies – Refer to Drawings: Bonanza A36: (10351-05, -26, & -27), Bonanza G36: (10351-05, -49, & -50).

   a) Check condition of the windshield pumps and solenoid valves, and their associated line routing, specifically for loosening, cracks, and general condition. Replace as necessary.

   b) Check condition of the attachment bolts and clamps to the seat track supports and the pallets, specifically for loosening, cracks, and general condition. Tighten or replace as necessary.

   c) Check condition of the wiring of each of these assemblies, specifically for cracking, chaffing, and general condition. Replace as necessary.

   d) Check condition of system connections to each of these assemblies, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

2) Attachment of the Filter Assembly – Refer to Drawings: Bonanza A36: (10351-06, & -26), Bonanza G36: (10351-48, & -49).

   a) Check condition of the filter, high pressure switch, and their associated line routing, specifically for loosening, cracks, and general condition. Replace as necessary.

   b) Check condition of the attachment bolts and clamps to the seat track supports and the pallets, specifically for loosening, cracks, and general condition. Tighten or replace as necessary.

   c) Check condition of the wiring for the high pressure switch, and relay, specifically for cracking, chaffing, and general condition. For Bonanza G36 Aircraft, additionally check condition of the wiring for the power resistor, reed switch, and airspeed safety switch, specifically for cracking, chaffing, and general condition. Replace as necessary.

d) Check condition of system connections to each of these assemblies, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

3) Attachment of the Tail Bracket Assembly – Refer to Drawings: Bonanza A36: (10351-07, & -27), Bonanza G36: (10351-07, & -50).

a) Check condition of the tail proportioning unit and low pressure switches, and their associated line routing, specifically for loosening, cracks, and general condition. Replace as necessary.

b) Check condition of the attachment screws and doubler rivets to the belly of the aircraft, aft of the rear bulkhead, specifically for loosening, cracks, and general condition. Tighten or replace as necessary.

c) Check condition of the wiring for the low pressure switches, specifically for cracking, chaffing, and general condition. Replace as necessary.

d) Check condition of system connections to each of these assemblies, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

4) Attachment of the Metering Pumps – For all Aircraft Models Refer to Drawings: 10351-08, & -25.

a) Check condition of the two metering pumps, and their associated line routing, specifically for loosening, cracks, and general condition. Replace as necessary.

b) Check condition of the attachment bolts to the main gear well and doubler rivets, specifically for loosening, cracks, and general condition. Tighten or replace as necessary.

c) Check condition of the wiring, specifically for cracking, chaffing, and general condition. Replace as necessary.

d) Check condition of system connections to each of the pumps, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

5) Attachment of the Feed Nozzle, Feed Nozzle Supply Line, and TKS Flex Hose Assemblies – For all Aircraft Models Refer to Drawings: 10351-09, -33 thru -38.

a) Check condition of the feed nozzle, supply line, TKS flex hose, and their associated line routing, specifically for loosening, cracks, and general condition. Tighten and/or Replace as necessary.

b) Check condition of the attachment bolts and clamps to the engine block, engine baffle, and firewall, specifically for loosening, cracks, and general condition. Tighten or replace as necessary.

c) Check condition of system connections to each of these assemblies, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

d) Check that the fluid feed nozzle is oriented such that fluid will flow directly into the fluid slinger assembly, mounted on the spinner bulkhead.

6) Attachment of the Windshield Spraybar Assembly – Refer to Drawings: Bonanza A36: (10351-10, & -26), Bonanza G36: (10351-10, & -49).

a) Check condition of the windshield spraybar, its associated line routing, and spraybar deflector, specifically for loosening, cracks, and general condition. Replace as necessary.

b) Check condition of the attachment rivets to the upper surface of the forward fuselage, specifically for loosening, cracks, and general condition. Replace as necessary.

c) Check condition of system connections to the windshield spray bar, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

7) Attachment of the Ice Light Assembly – For all Aircraft Models Refer to Drawing 10351-11.

a) Check condition of the ice light, specifically for loosening, cracks, and general condition. Replace as necessary.

b) Check condition of the attachment screws and doubler rivets, specifically for loosening, cracks, and general condition. Tighten or replace as necessary.

c) Check condition of the wiring for the ice light, specifically for cracking, chaffing, and general condition. Replace as necessary.

8) Attachment of the Tank Assembly – For all Aircraft Models Refer to Drawings: 10351-12 thru -16.

a) Check condition of the attachment screws to the upper surface of the wing skin, specifically for deformation, cracks, and general condition. Replace as necessary.

b) Check condition of attachment bushings and hardware (specifically, the level sender, vent assembly, fluid outlet assembly, and filler assembly), specifically for cracks, deformation, and de-lamination. Replace as necessary.

c) Check condition of the wiring for the level sender, specifically for cracking, chaffing, and general condition. Replace as necessary.

d) Check condition of system connections to each of the components, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

9) Attachment of the Wing Proportioning Unit Assemblies – For all Aircraft Models Refer to Drawings: 10351-17, -28, & -30.

a) Check condition of the wing proportioning unit and its associated line routing, specifically for loosening, cracks, and general condition. Replace as necessary.

b) Check condition of the attachment brackets, bolts, and rivets, specifically for loosening, cracks, deformation, and general condition. Tighten or replace as necessary.

c) Check condition of system connections to the proportioning unit, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

10) Attachment of the Inline Proportioning Unit Assembly – Refer to Drawings: Bonanza A36: (10351-26), Bonanza G36: (10351-49).

a) Check condition of the inline proportioning unit, and its associated line routing, specifically for loosening, cracks, and general condition. Replace as necessary.

b) Check condition of system connections, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

11) Attachment of the Fluid Slinger Assembly – For all Aircraft Models Refer to Drawings: 10351-09, -33 thru -37.

a) Check condition of the fluid slinger assembly and propeller feed tubes, specifically for loosening, cracks, deformation, and general condition. Replace as necessary.

b) Check condition of the attachment bolts, screws, and rivets, specifically for loosening, cracks, and general condition. Tighten or replace as necessary.

c) Check the alignment of the propeller feed tubes in that they are properly oriented appropriately with each propeller blade.

d) Check condition of system connections from the fluid slinger assembly to the propeller feed tubes, specifically for cracking, chaffing, and general condition. There should be no signs of fluid leaks with any of the associated connections.

12) Attachment of the Propeller Fluid Boots – For all Aircraft Models Refer to Drawing 10351-38.

a) Check condition of the propeller fluid boots, specifically for, cracks, general wear, and de-lamination. Replace as necessary.

b) Check condition of the attachment brackets, specifically for deformation, cracks, and rivet condition. Replace as necessary.

c) Check condition of attachment bushings and hardware, specifically for cracks and deformation. Replace parts as necessary.

d) Check all equipment packs for condition. Assure all components are secure and that attachment of the equipment conforms to the installation instructions of 10351-01.

- Inspect the system connections to the equipment. Assure the main wiring harness is connected according to drawing 10351-42 and -53.

- Assure the supply lines to the wing, the propeller, and the tail are connected according to drawings: For Bonanza A36 Aircraft: 10351-01, For Bonanza G36 Aircraft: 10351-46. There should be no signs of fluid leaks with the connections.

- Inspect the tank filler. The Filler cap should operate freely. Check cap seal condition and remove any foreign material.

2.6.2 Daily Usage Checks

1) Check that fluid flows evenly from the porous, active zone of all porous panels.
2) Check that fluid is discharged into the propeller slinger ring from the nozzle fitted at the front of the engine.
3) Ensure all critical areas of the aircraft are de-iced before flight.

2.6.3 100 Hour Serviceability Checks (if Required)

1) With engine cowlings open, check security and condition of visible components. Inspect components attached to the propeller; inspect propeller boots and propeller feed tubes for damage. Inspect TKS fire hoses for security and evidence of fluid leakage.
2) Ensure the propeller nozzle (aircraft to propeller slinger) is oriented to direct a stream of fluid into the propeller slinger with system operating on Normal mode.
3) Annunciation and Functionality Tests of Cockpit Items

a) Bonanza G36 G1000-Equipped Aircraft

1. Verify the TKS system switch is off. Turn on power to the aircraft. Select MAXIUM mode on the control panel.
2. Verify both PITOT HEAT / STALL HEAT annunciators are illuminated. Select the PITOT / STALL HEAT switch to the up position and verify that both annunciators extinguish. Turn the PITOT / STALL HEAT switch off.
3. With MAXIUM and pump one selected on the control panel, the MAXIMUM LED should flash green and the NORMAL LED should flash red/off as the system pressure rises. The LEDs will not change their annunciation state if the system pressure does not rise above the set pressure of the low pressure switches, which is indicative of low flowing pumps, or a testing environment which is too warm. If adequate system pressure is developed the NORMAL LED will extinguish and the MAXIMUM LED will show steady green.
4. Turn the system off for 2 minutes, then select NORMAL. The NORMAL LED should flash green and the MAXIMUM LED should flash red/off as the system pressure rises. The LEDs will not change their annunciation state if the system pressure does not rise above the set pressure of the low pressure switches, which is indicative of low flowing pumps, or a testing environment which is too warm. If adequate system pressure is developed the NORMAL LED will extinguish and the MAXIMUM LED will show steady green. Turn the system off.

5. Turn the TKS System Backup switch on and verify that pump 2 is running. This can be indicated by a gentle vibration in the floor or a low frequency humming from the right main landing gear well. Turn the TKS System Backup switch off.

6. The HIGH PRESSURE INDICATOR LAMP is a latching device and will illuminate amber if the filter element requires replacement. It should not illuminate during testing, but may on occasion be tripped during aircraft electrical system spikes. If this occurs, it may be canceled by depressing the RESET switch (using a ball point pen tip or similar instrument.

7. Test the HIGH PRESSURE LED by depressing the RESET switch. The amber LED should illuminate while the switch is depressed, then extinguish when the switch is released.

b) Bonanza A36 Analog Flight Instrument-Equipped Aircraft

1. Verify the TKS system switch is off. Turn on power to the aircraft. Select MAXIUM mode on the control panel.

2. Verify the PITOT HEAT annunciator is illuminated. Select the PITOT HEAT switch to the up position and verify that the annunciator extinguishes. Do not leave the PITOT HEAT switch on for longer than 5 seconds, as this could damage the stall vane heating element.

3. With MAXIUM and pump one selected on the control panel, the MAXIMUM LED should flash green and the NORMAL LED should flash red/off as the system pressure rises. The LEDs will not change their annunciation state if the system pressure does not rise above the set pressure of the low pressure switches, which is indicative of low flowing pumps, or a testing environment which is too warm. If adequate system pressure is developed the NORMAL LED will extinguish and the MAXIMUM LED will show steady green.

4. Turn the system off for 2 minutes, then select NORMAL. The NORMAL LED should flash green and the MAXIMUM LED should flash red/off as the system pressure rises. The LEDs will not change their annunciation state if the system pressure does not rise above the set pressure of the low pressure switches, which is indicative of low flowing pumps, or a testing environment which is too warm. If adequate system pressure is developed the NORMAL LED will extinguish and the MAXIMUM LED will show steady green.

5. The HIGH PRESSURE INDICATOR LAMP is a latching device and will illuminate amber if the Filter Element requires replacement. It should not illuminate during testing, but may on occasion be tripped during aircraft electrical system spikes. If this occurs, it may be canceled by depressing the RESET switch (using a ball point pen tip or similar instrument.

6. Test the HIGH PRESSURE LED by depressing the RESET switch. The yellow LED should illuminate while the switch is depressed, then go off as the switch is released.

2.6.4 Annual Serviceability Checks

Prior to completion of the annual serviceability test, 100 hour serviceability tests should be completed

1) Remove inspection panels. Check security and condition of components, pipelines and wiring, paying particular attention to those components close to control runs.

2) Drain the TKS fluid reservoir (see Procedure 2.6.5). Turn power on the aircraft and allow the TKS fluid level gauge to stabilize. Assure the gauge reads 0.0 U.S. gallons. Turn aircraft power off.

Note

Do not run the TKS Ice Protection System while the TKS fluid reservoir is empty. This will result in air being introduced into the system. In the event the system is run, refer to Section 2.6.6 for system priming.

3) Fill the system with approved ice protection fluid. Turn aircraft power on and allow the TKS fluid level gauge to stabilize. Assure the gauge reads 7.0 U.S. gallons. Turn aircraft power off.

4) Check fluid delivery rate from pumps. This can be accomplished by the following procedure: Fill the system fluid tank with approved ice protection fluid. Operate on MAXIMUM for a timed period, not to exceed 20 minutes. Refill tank, measuring quantity of fluid required to replenish tank back to its previously filled level. Calculate flow rate. Permitted limits are: 330 mL/min -0 / +20 mL/min. Pump fluid output is affected by low aircraft battery voltage. Use of an auxiliary power unit is recommended.

2.6.5 System Draining

1) Locate the TKS tee drain fitting by removing the outboard flap actuator circle access panel on the right wing.

2) With a dedicated TKS fluid container positioned under the fluid supply line, remove the nut and blanking cap from the tee.

3) Once the tank has been drained, reassemble the nut and blanking cap to the tee as previously installed.

If the system has been completely drained of fluid and is to be returned to active, flyable status, complete the system priming instructions of Section 2.6.6.

2.6.6 System Priming

If allowed to run dry, the metering pump may fail to prime because of air trapped in the pump body. If no ice protection fluid is evident during the pre-flight inspection, or the system has been drained of ice protection fluid for maintenance, perform the following maintenance procedure.

1) Power up the aircraft.

2) Select WINDSHIELD 1 on the TKS Control Panel. Allow 3 to 5 seconds for the pump to time out, and then select WINDSHIELD 2. Repeat this process as necessary until fluid flows from the windshield spray bar onto the windshield. Allow for at least 10 seconds prior to re-running each pump.

3) Select MAIN PUMP 1 and MAXIMUM on the TKS Control Panel. Verify fluid flow from all porous panels and the slinger ring.

4) Repeat Steps 2 and 3 as necessary until fluid flow is verified from all TKS components.

2.6.7 Panel Purging

If allowed to run dry, the porous panels may take a prolonged period of time to properly prime due to air trapped in the panel reservoir. If a panel is suspected of not operating properly, perform the following maintenance procedure.

1) Open up the aircraft as necessary to gain access to the proportioning unit associated with the panel.

2) Reference CAV Drawing 10351-29 or 10351-30 for proportioning unit port details.

3) Disconnect the 3/16 line from the applicable port from the proportioning unit which is associated with the panel in question.

4) Connect a TKS Test Cart to the line disconnected in Step 3 using the 3/16 outlet from the Test Cart.

5) Verify that the fluid test bottle on the TKS Test Cart contains at least 2 U.S. gallons of fluid meeting the DTD-406B specification.

6) Connect shop air to the TKS Test Cart air supply connector. Select TKS Fluid, and 3/16 Outlet on the Test Cart control panel.

8) Increase air pressure on the TKS Test Cart until the pressure gauge reads 70psi.

9) Observe the flow of fluid across the active areas of the panel, and continue to purge until there is no evidence of air bubbles purging from the panel.

10) Upon completion of purging, disconnect the TKS Test Cart from the line disconnected in Step 3 and re-connect the line to the proportioning unit in accordance with the drawings referenced in Step 2.

11) Close out the aircraft for return to service.

2.6.8 Prolonged Out of Service Care

Verify that the ice protection fluid tank is filled to the minimum dispatch level, and that all system components are filled with fluid. If necessary, operate the pump until all air is dispelled from components and pipelines (see Section 2.6.6). Recheck tank contents.

It is also advisable to run the system at least once a month during flight for at least 15 minutes. Running the system assures that it is operational, flushes any dirt or debris from the porous panels, and exercises the pump. This activity will assure the system is functional and available for use.

2.6.9 Airframe System Leak Check

The following procedures shall be performed following any maintenance that involves the disconnection of a TKS Line on the primary airframe system:

1) Power up the aircraft.
2) On the TKS Control Panel, select Main Pump 1 and Maximum Mode.
3) Turn on TKS Backup Switch.
4) Observe the area(s) where the maintenance work was performed and verify that no fluid is leaking from the system.
5) If fluid leaks are observed, refer to CAV Document 30-09-46, Section 6 for troubleshooting techniques.

2.6.10 Windshield System Leak Check

The following procedures shall be performed following any maintenance that involves the disconnection of a TKS Line on the windshield system:

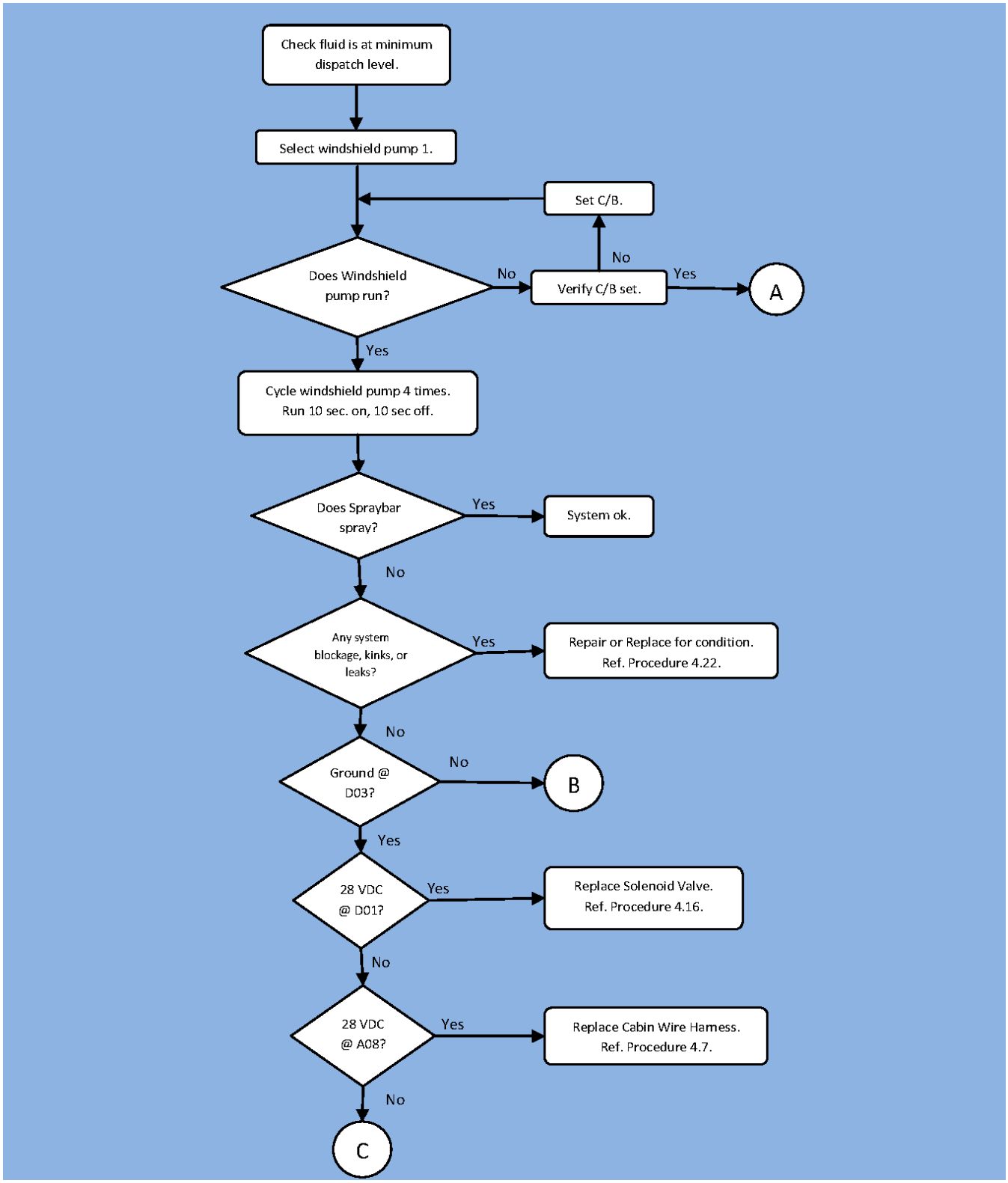
1) Power up the aircraft.
2) On the TKS Control Panel, select Windshield 1.
3) Repeat Step 2, waiting 10 seconds between each pump cycle until fluid is sprayed onto the windshield of the aircraft.
4) Inspect the area(s) where the maintenance work was performed and verify that no fluid is leaking from the system.
5) If fluid leaks are observed, refer to CAV Document 30-09-46, Section 6 for troubleshooting techniques.

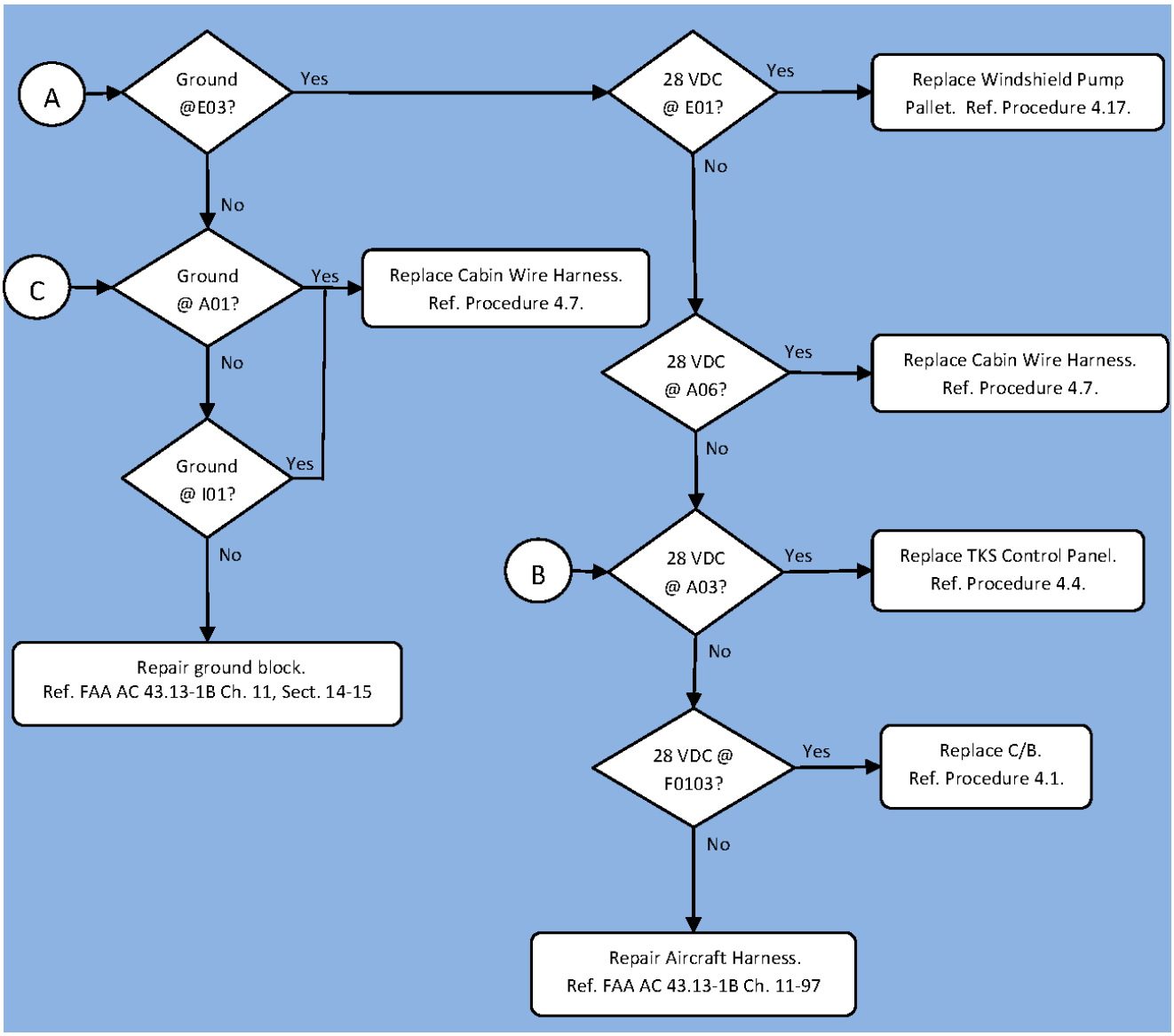
Section 3 – System Troubleshooting

Fault Isolation/Troubleshooting may be accomplished by reference to the troubleshooting procedures of this section. The following table provides direction to the appropriate procedure for likely system faults. The charts provide reference to appropriate repair/replacement procedures in the next section once the faults have been identified. Use the following two sections in conjunction with CAV Documents 10353-01 and 10300PL.

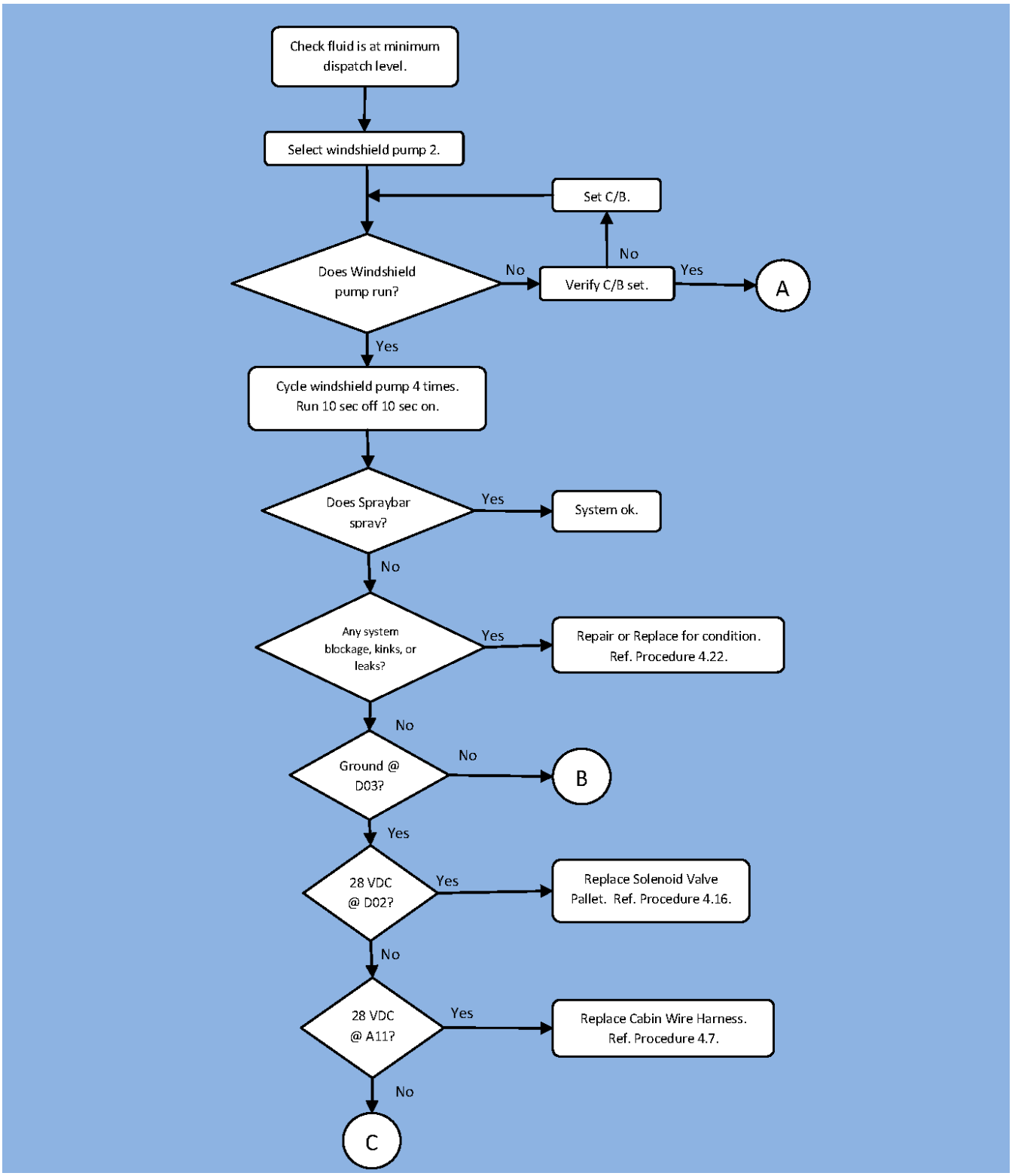
Fault Description	Troubleshooting Procedure
Equipment Faults	
Windshield Pump 1 Fails to Operate	3.1
Windshield Pump 2 Fails to Operate	3.2
Metering Pump 1 Normal Mode Fails to Operate	3.3
Metering Pump 1 Maximum Mode Fails to Operate	3.4
Metering Pump 2 Normal Mode Fails to Operate	3.5
Metering Pump 2 Maximum Mode Fails to Operate	3.6
TKS Backup Switch Fails to Operate	3.7
Bonanza A36 Stall Vane Fails to Operate	3.8
Fluid Delivery Faults	
Little or No Flow From Individual Panel	3.9
Little or No Flow From Propeller	3.10
Little or No Flow From Tail	3.11
Little or No Flow From Wings	3.12
Annunciation Faults	
Metering Pump 1 Normal Mode Fails to Illuminate	3.13
Metering Pump 1 Maximum Mode Fails to Illuminate	3.14
Metering Pump 2 Normal Mode Fails to Illuminate	3.15
Metering Pump 2 Maximum Mode Fails to Illuminate	3.16
TKS Control Panel High Pressure Remains Illuminated	3.17
TKS Control Panel High Pressure Fails to Illuminate	3.18
TKS Control Panel Low Pressure Warning Remains Illuminated	3.19
TKS Control Panel Low Pressure Warning Fails to Illuminate	3.20
Bonanza G36 Pitot Heat Remains Illuminated	3.21
Bonanza G36 Pitot Heat Fails to Illuminate	3.22
Bonanza A36 Pitot Heat Remains Illuminated	3.23
Bonanza A36 Pitot Heat Fails to Illuminate	3.24
Bonanza G36 Stall Heat Remains Illuminated	3.25
Bonanza G36 Stall Heat Fails to Illuminate	3.26

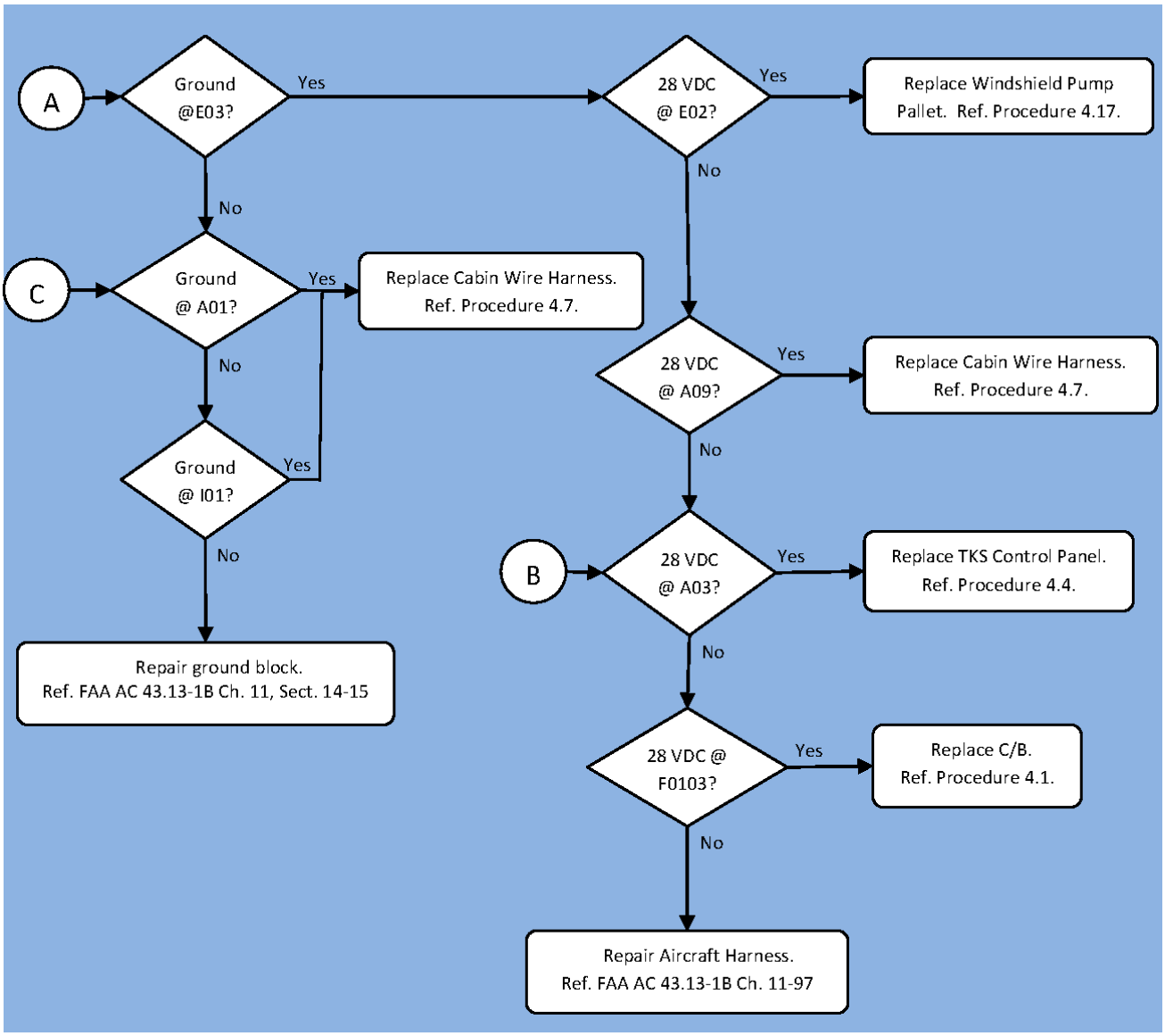
3.1 Windshield Pump 1 Fails to Operate



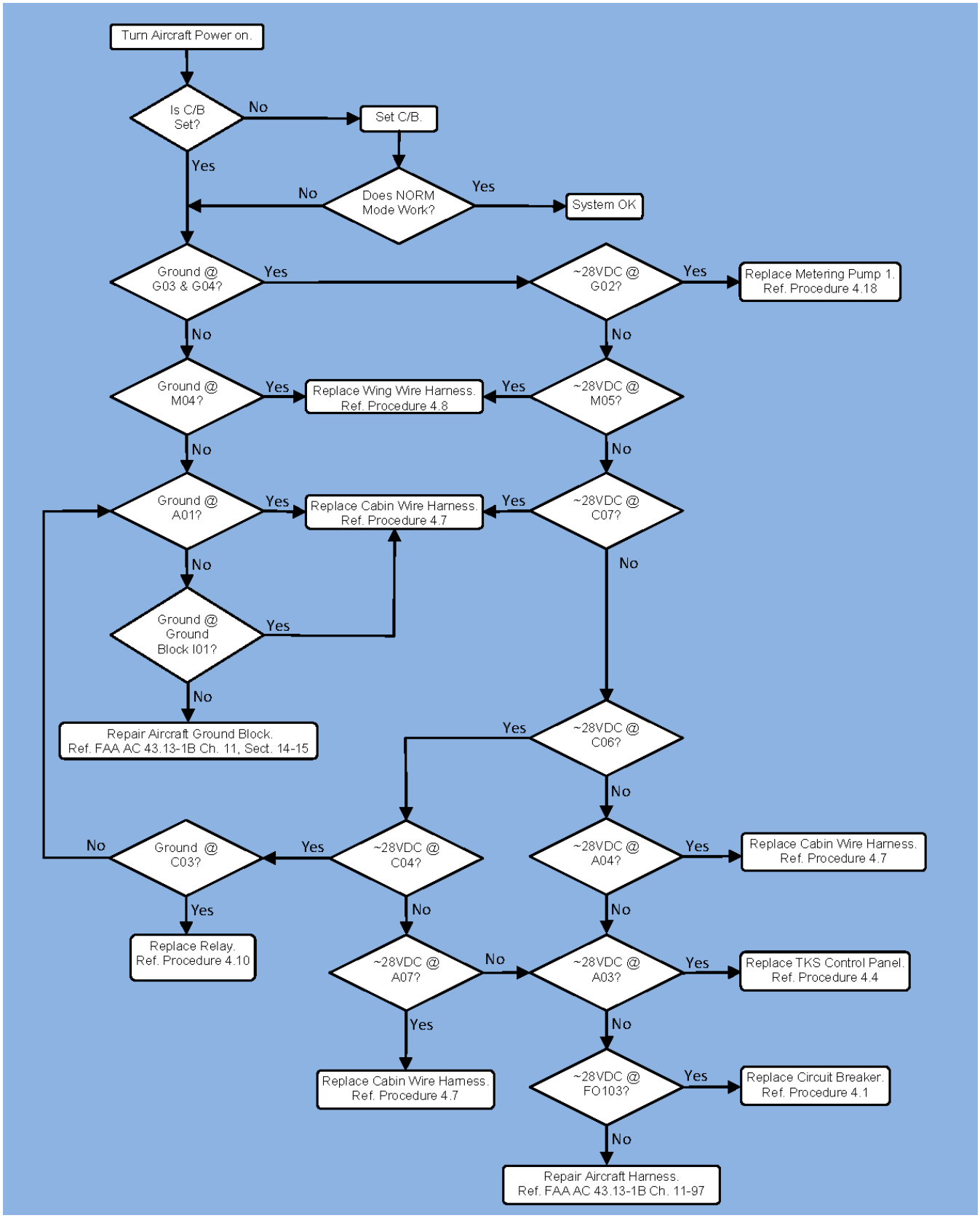

A
Ground @E03?
Yes
28 VDC @ E01?
Yes
Replace Windshield Pump Pallet. Ref. Procedure 4.17.
No
No
C
Ground @ A01?
Yes
Replace Cabin Wire Harness. Ref. Procedure 4.7.
28 VDC @ A06?
Yes
Replace Cabin Wire Harness. Ref. Procedure 4.7.
No
No
Ground @ I01?
Yes
No
B
28 VDC @ A03?
Yes
Replace TKS Control Panel. Ref. Procedure 4.4.
No
Repair ground block. Ref. FAA AC 43.13-1B Ch. 11, Sect. 14-15
28 VDC @ F0103?
Yes
Replace C/B. Ref. Procedure 4.1.
No
Repair Aircraft Harness. Ref. FAA AC 43.13-1B Ch. 11-97

3.2 Windshield Pump 2 Fails to Operate

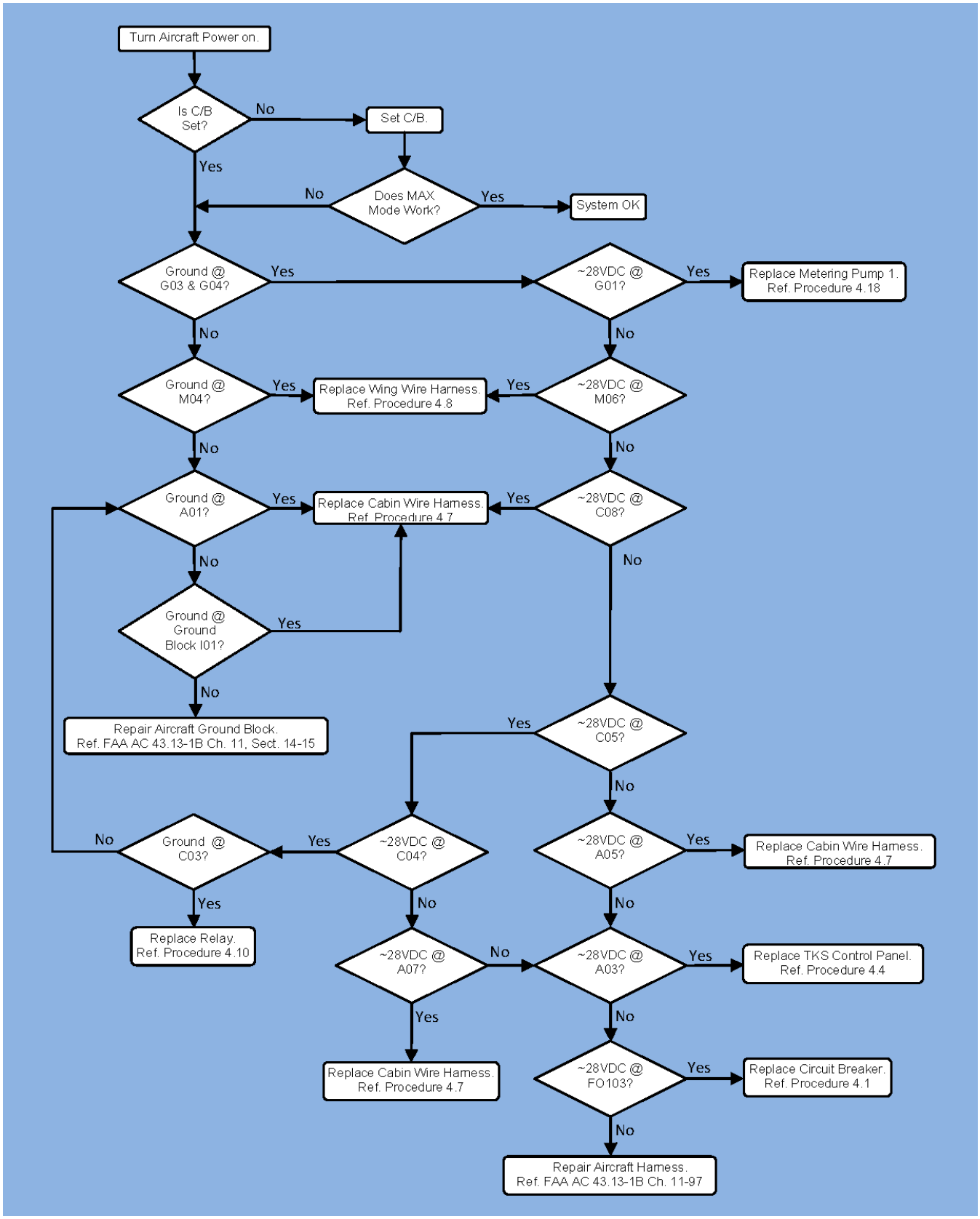



A
Ground @E03?
Yes
28 VDC @ E02?
Yes
Replace Windshield Pump Pallet. Ref. Procedure 4.17.
No
No
C
Ground @ A01?
Yes
Replace Cabin Wire Harness. Ref. Procedure 4.7.
No
28 VDC @ A09?
Yes
Replace Cabin Wire Harness. Ref. Procedure 4.7.
No
Ground @ I01?
Yes
No
B
28 VDC @ A03?
Yes
Replace TKS Control Panel. Ref. Procedure 4.4.
No
Repair ground block. Ref. FAA AC 43.13-1B Ch. 11, Sect. 14-15
28 VDC @ F0103?
Yes
Replace C/B. Ref. Procedure 4.1.
No
Repair Aircraft Harness. Ref. FAA AC 43.13-1B Ch. 11-97

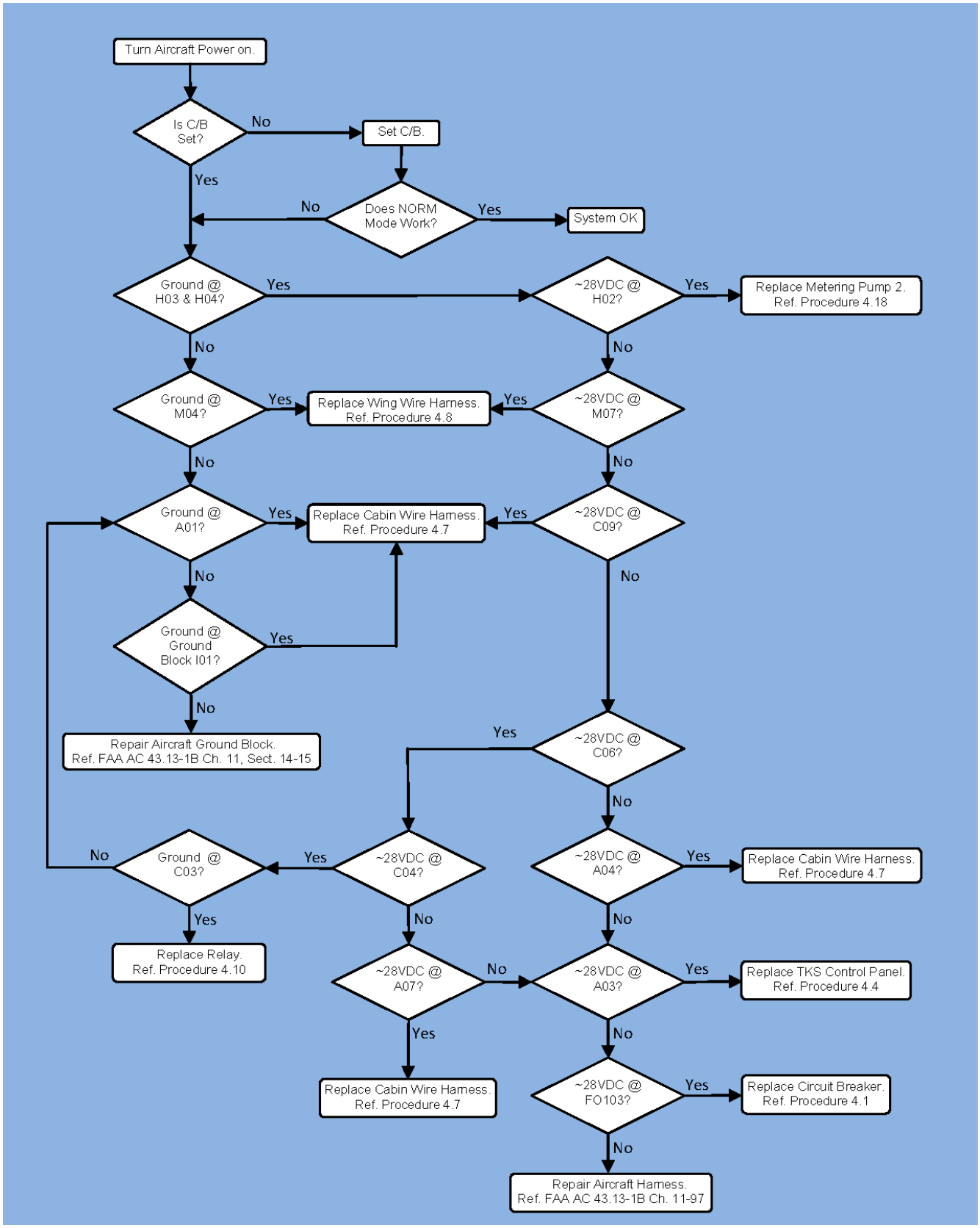
3.3 Metering Pump 1 Normal Mode Fails to Operate



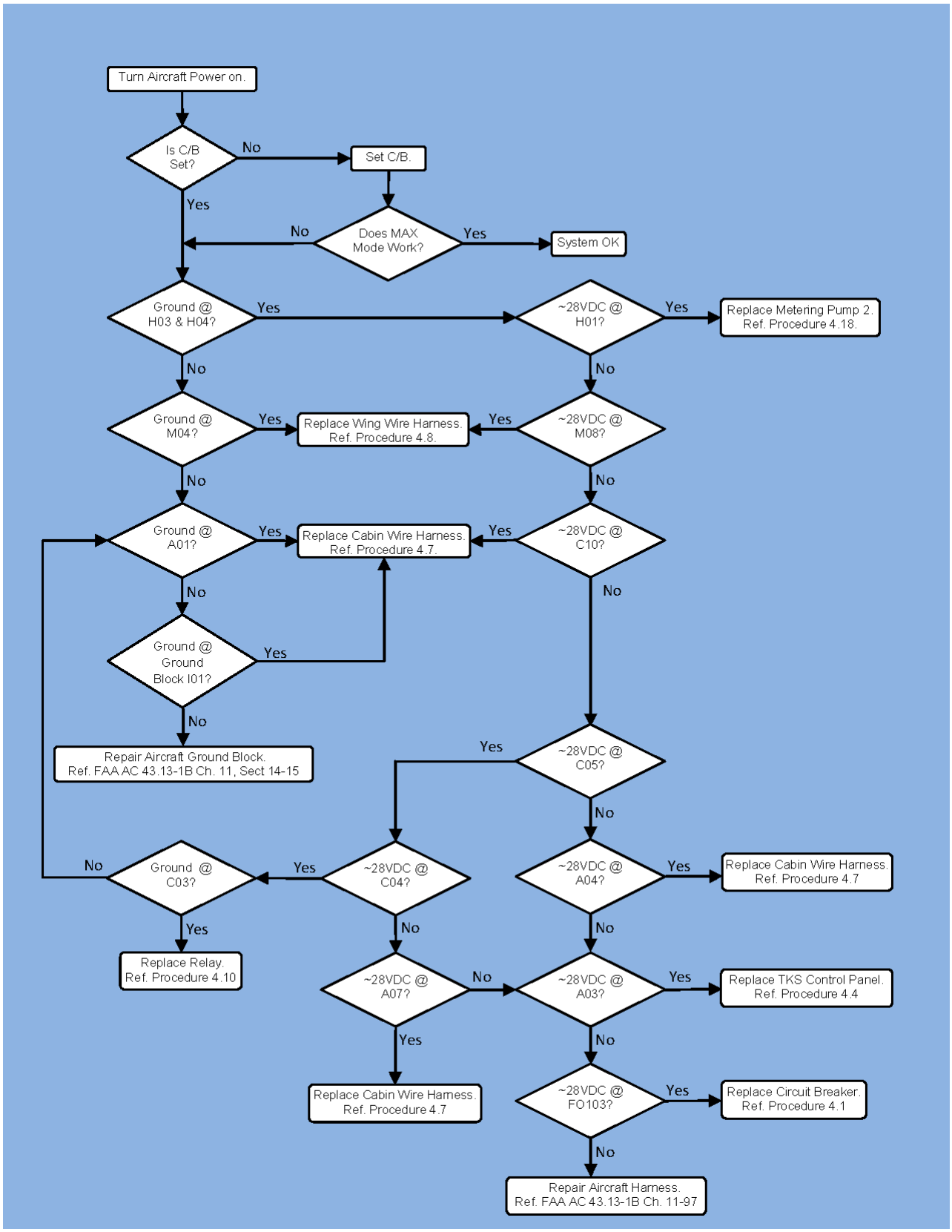
3.4 Metering Pump 1 Maximum Mode Fails to Operate



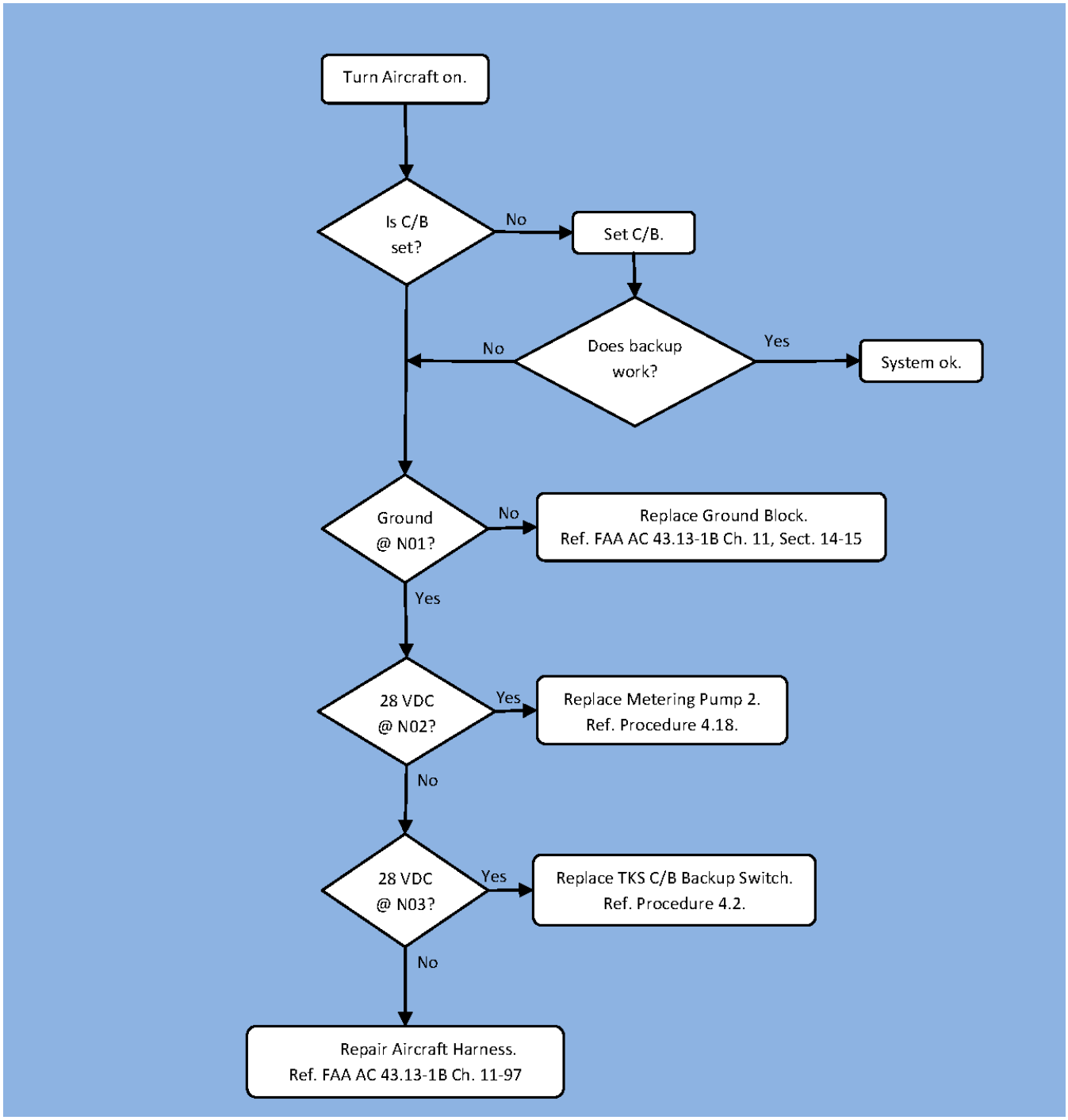
3.5 Metering Pump 2 Normal Mode Fails to Operate



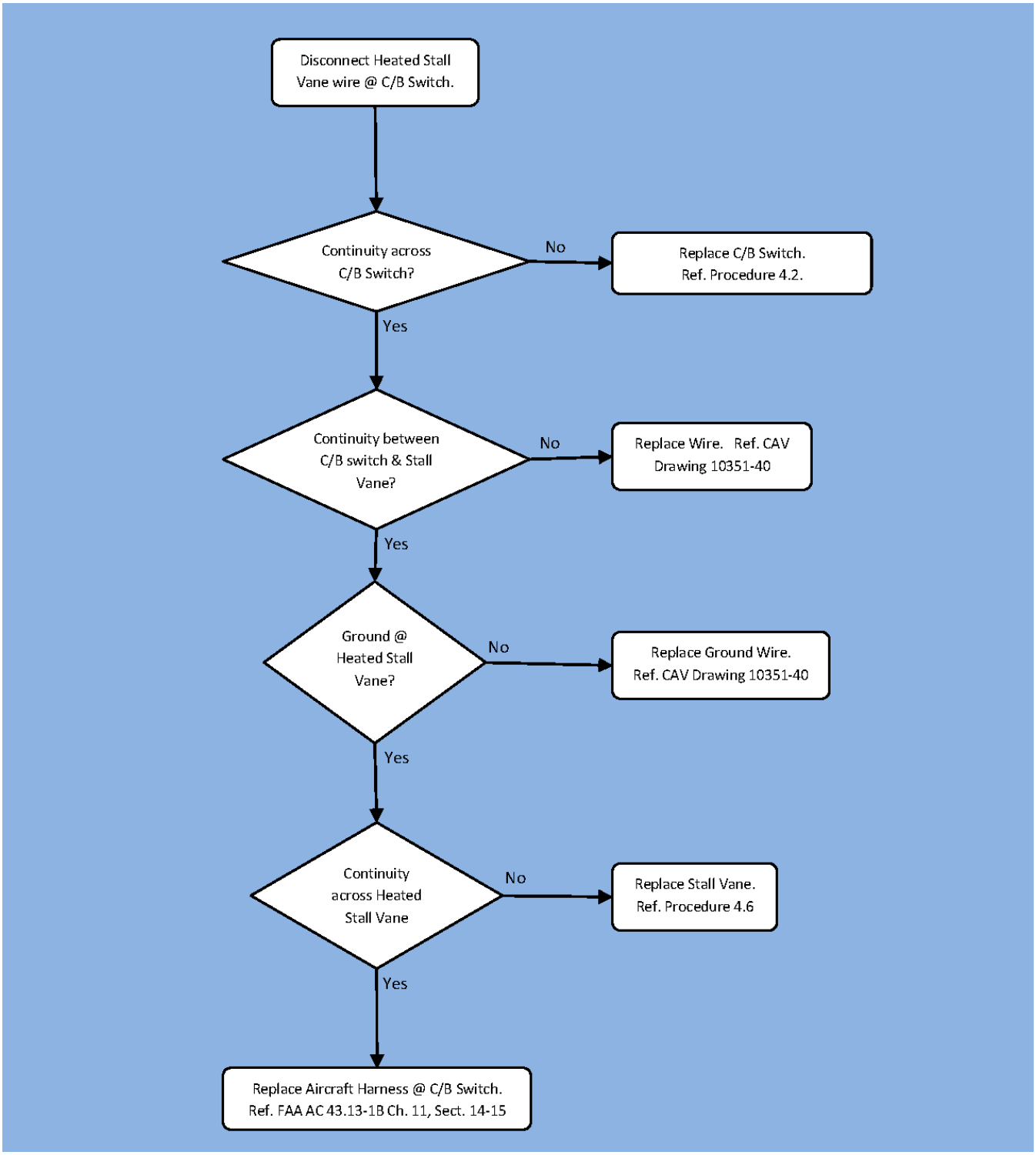
3.6 Metering Pump 2 Maximum Mode Fails to Operate



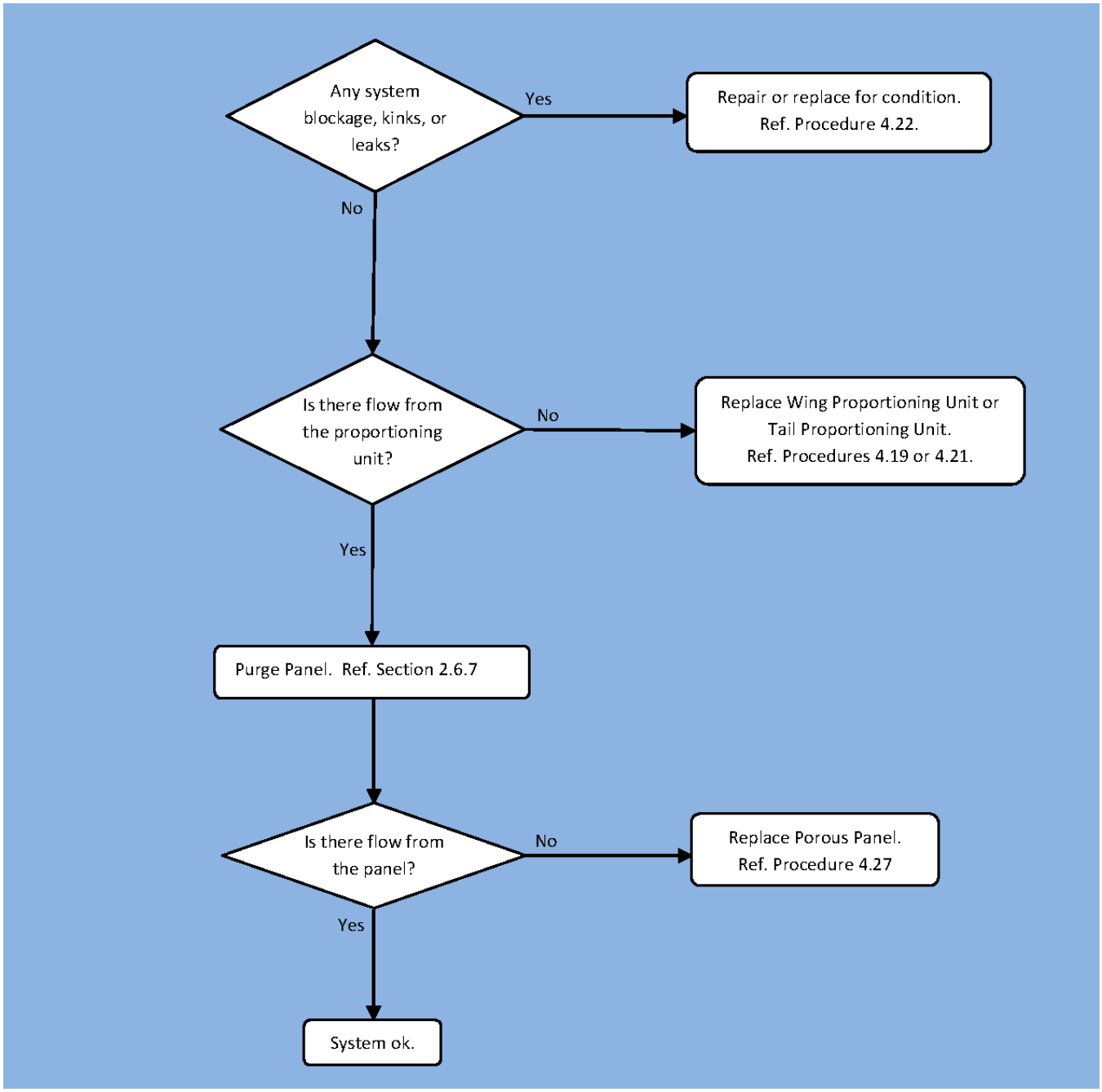
3.7 TKS Backup Switch Fails to Operate



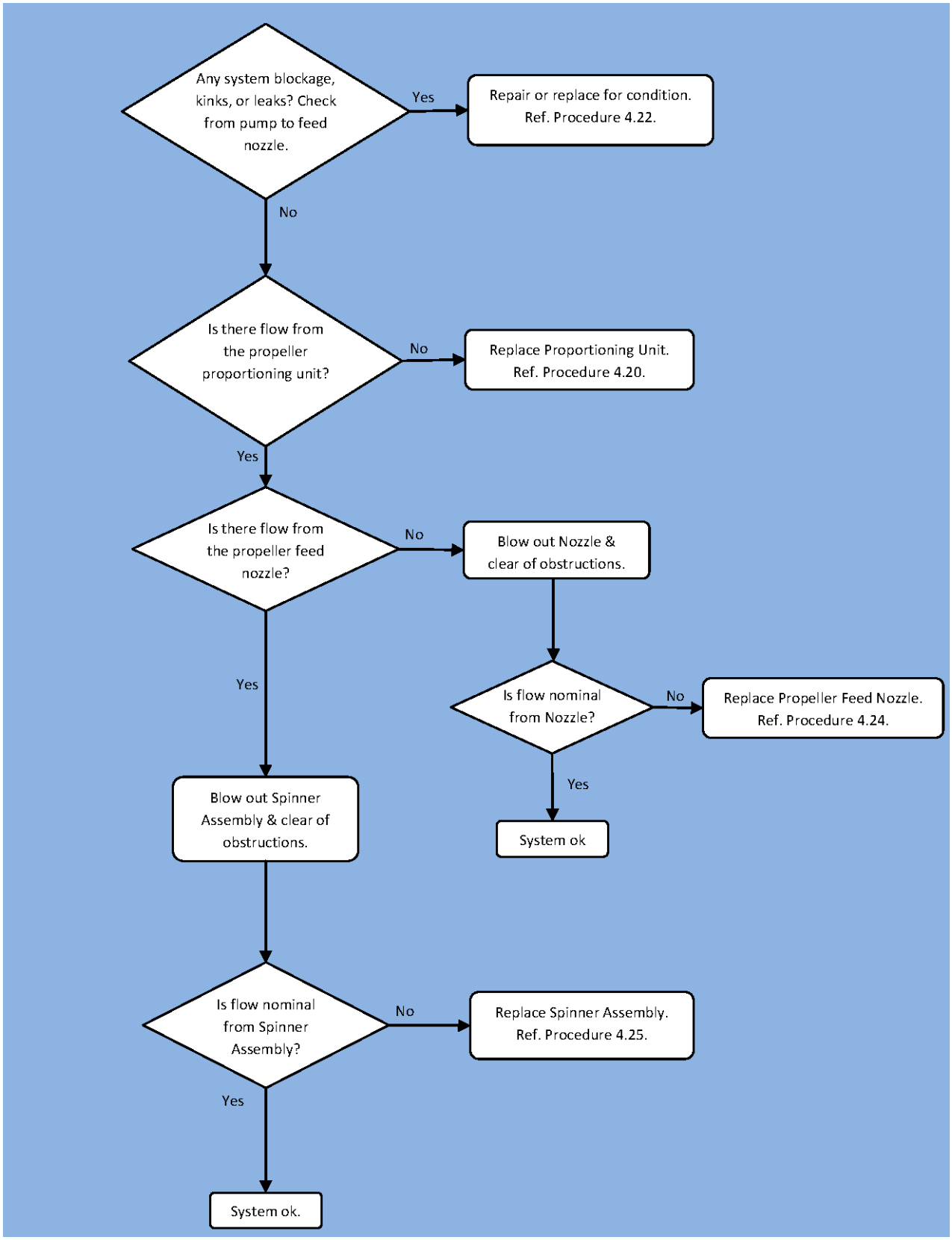
3.8 Bonanza A36 Stall Vane Fails to Operate



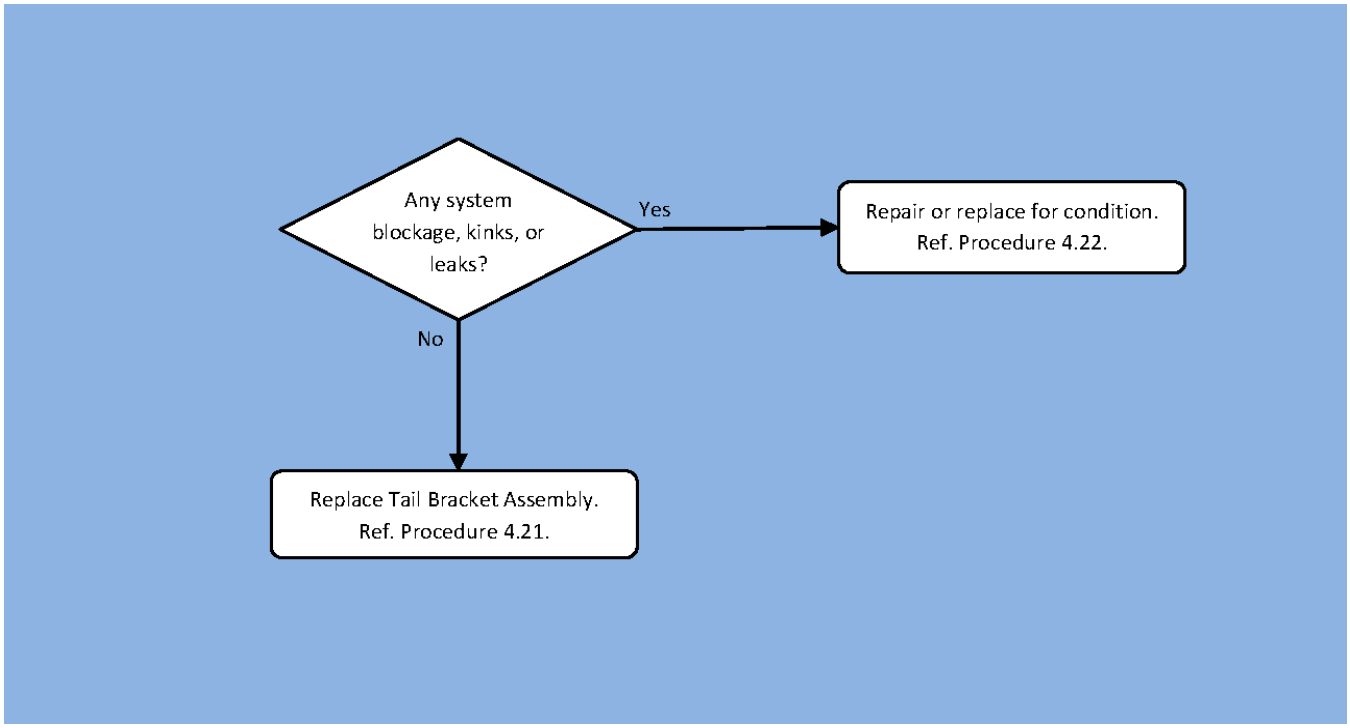
3.9 Little or No Flow From Individual Panel



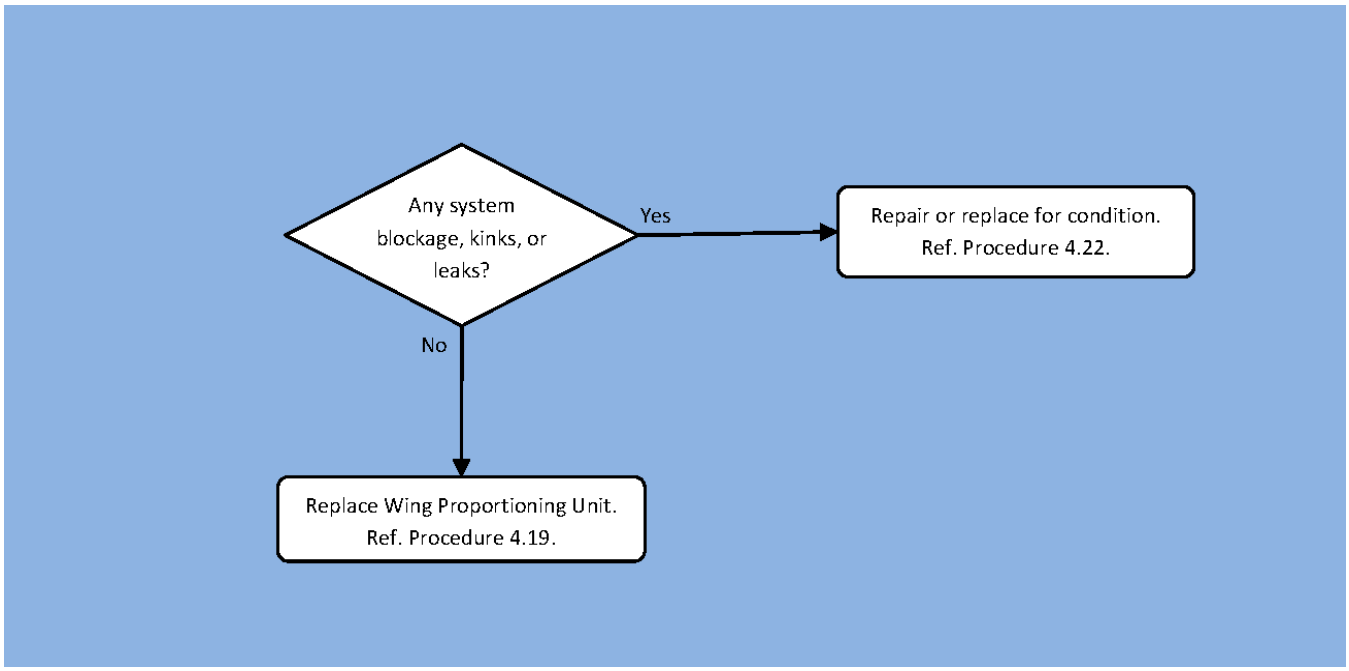
3.10 Little or No Flow From Propeller



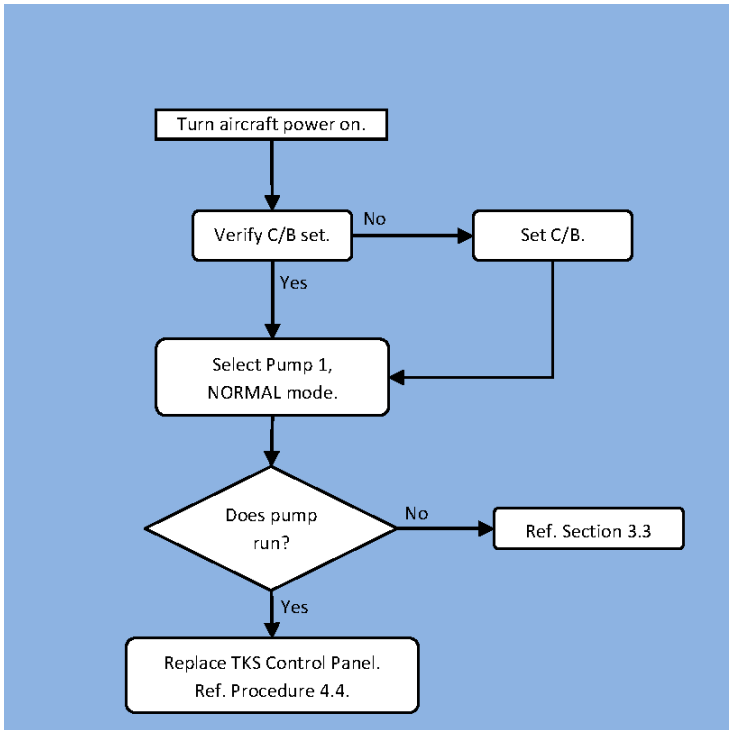
3.11 Little or No Flow From Tail



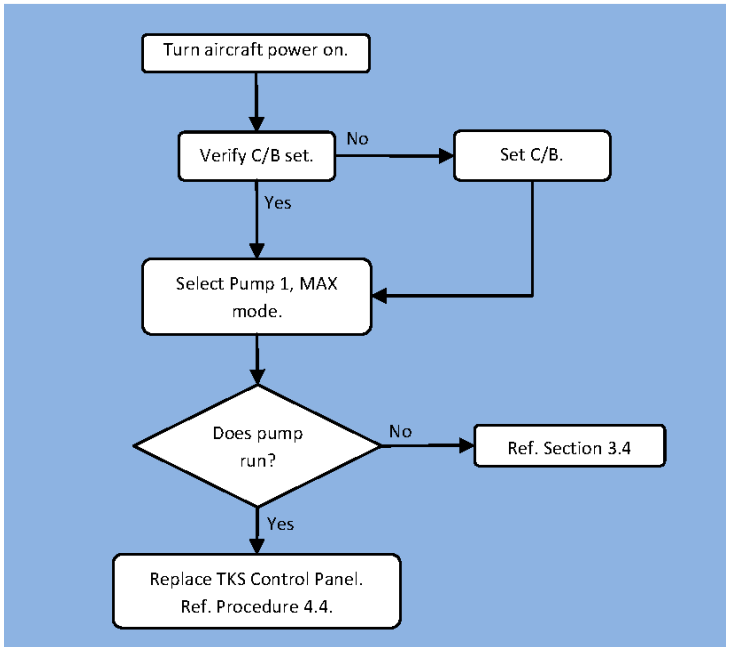
3.12 Little or No Flow From Wings



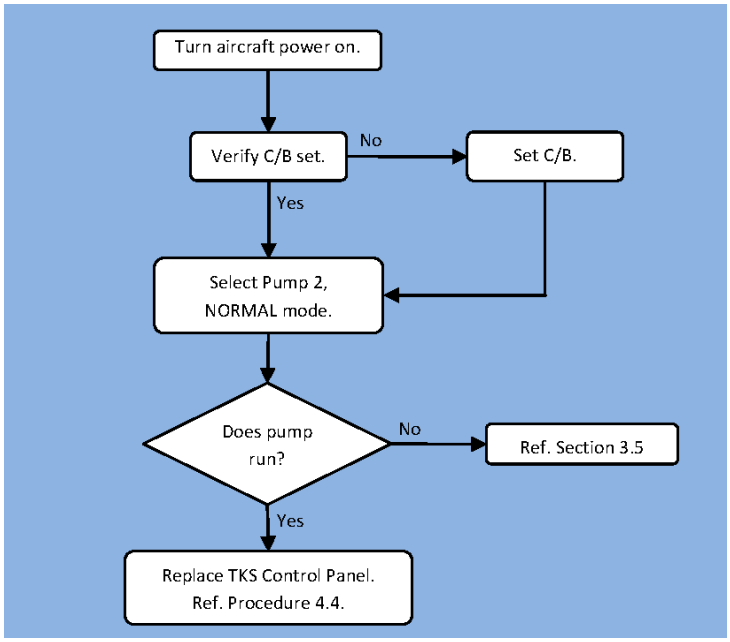
3.13 Metering Pump 1 Normal Mode Fails to Illuminate



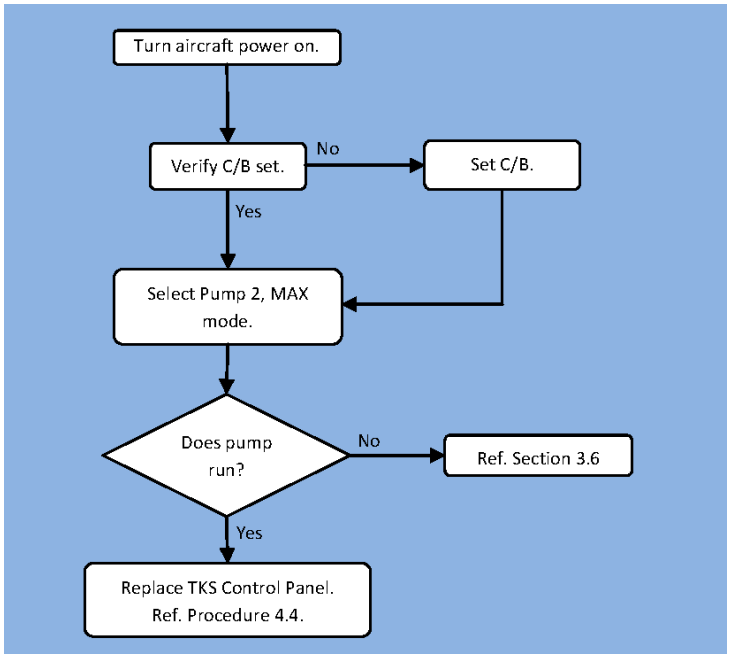
3.14 Metering Pump 1 Maximum Mode Fails to Illuminate



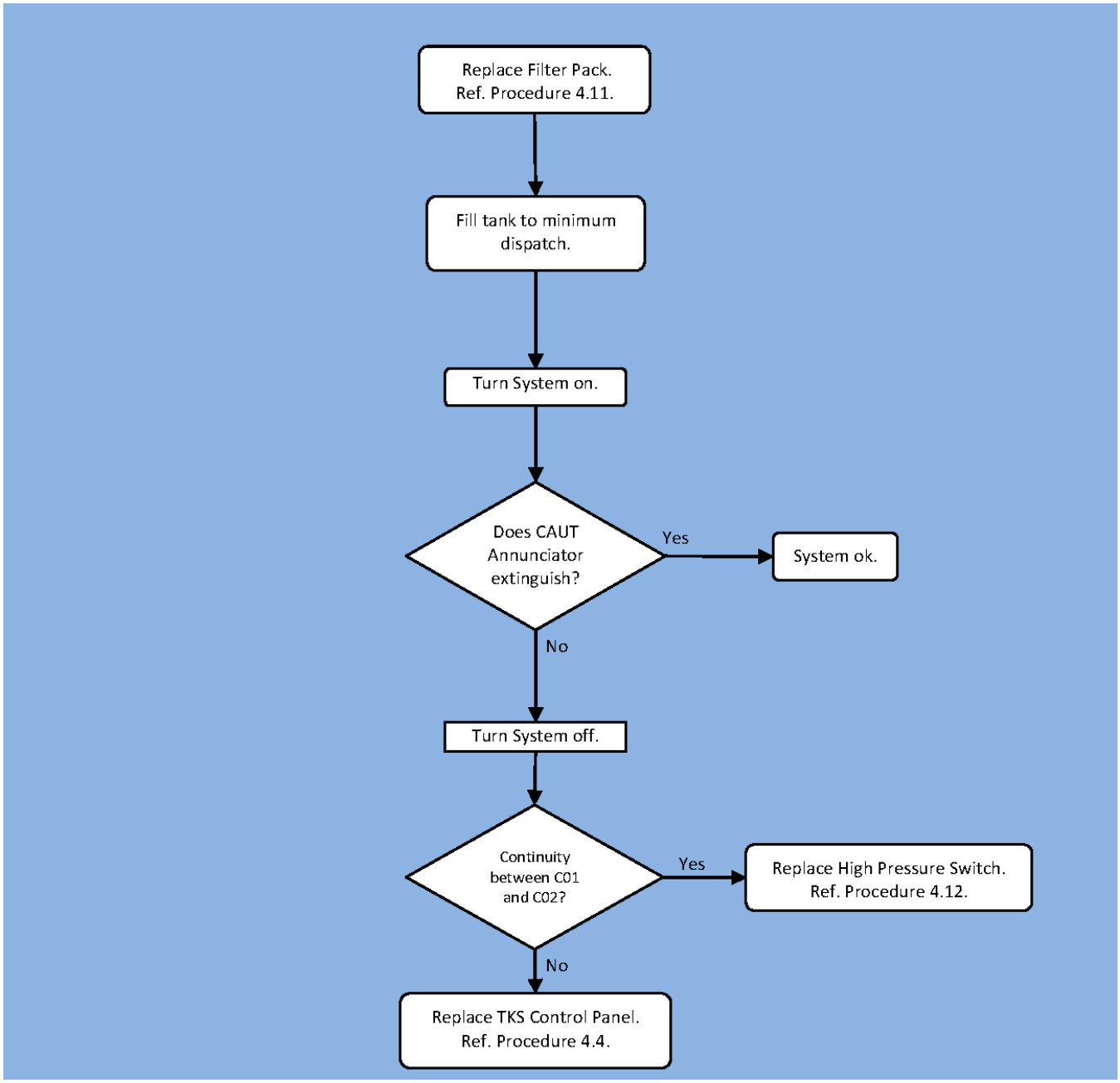
3.15 Metering Pump 2 Normal Mode Fails to Illuminate



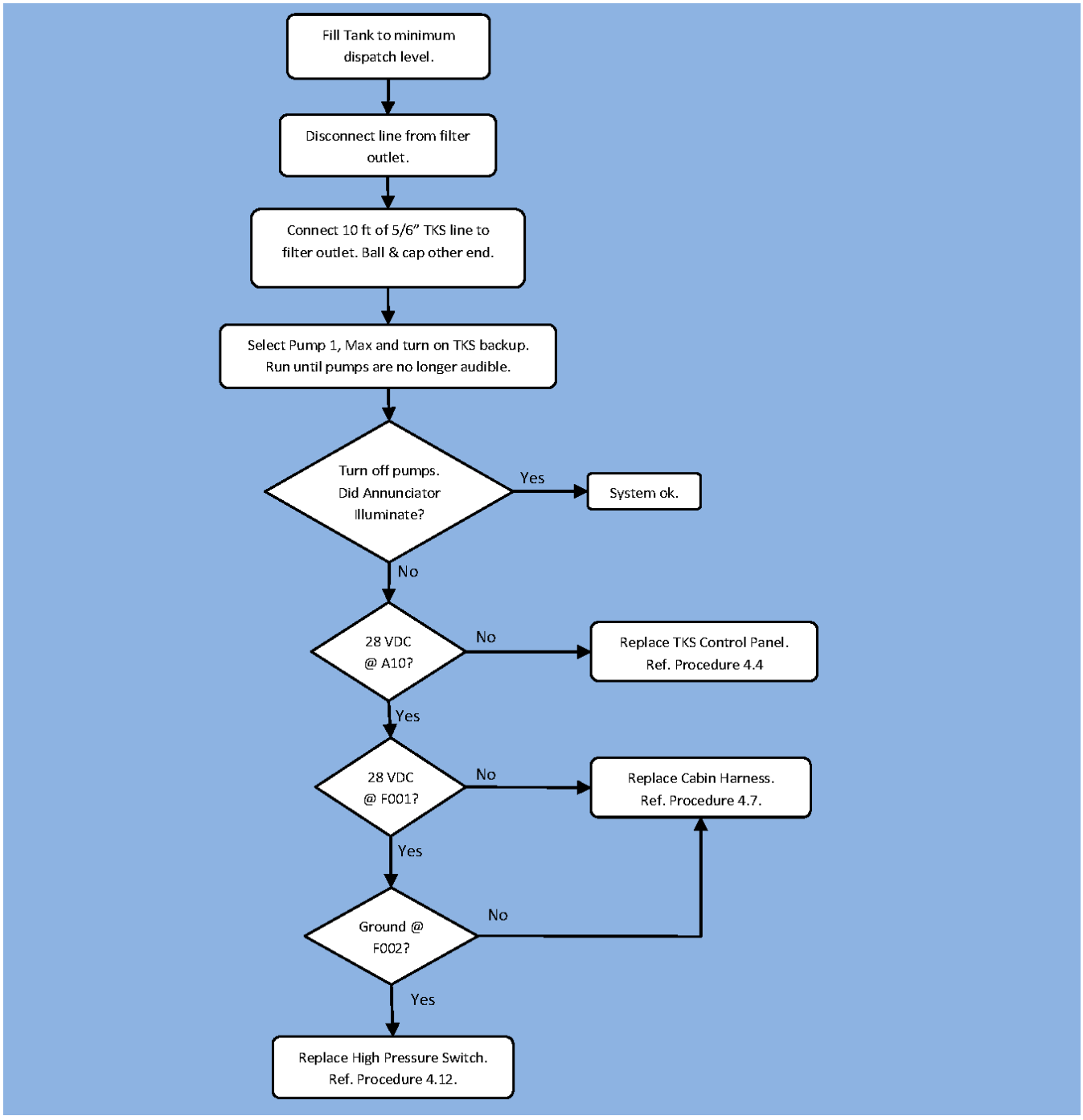
3.16 Metering Pump 2 Maximum Mode Fails to Illuminate



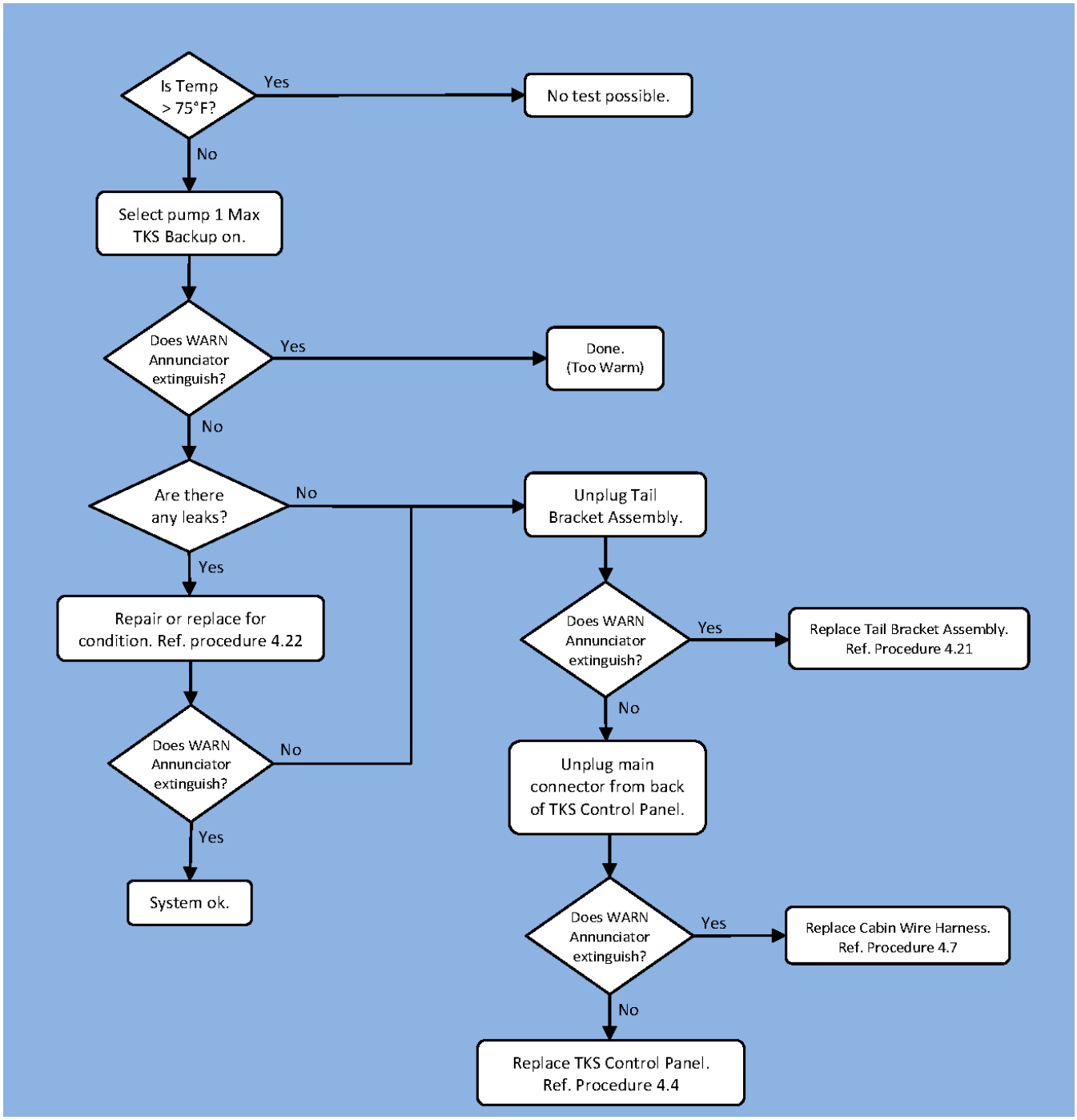
3.17 TKS Control Panel High Pressure Remains Illuminated



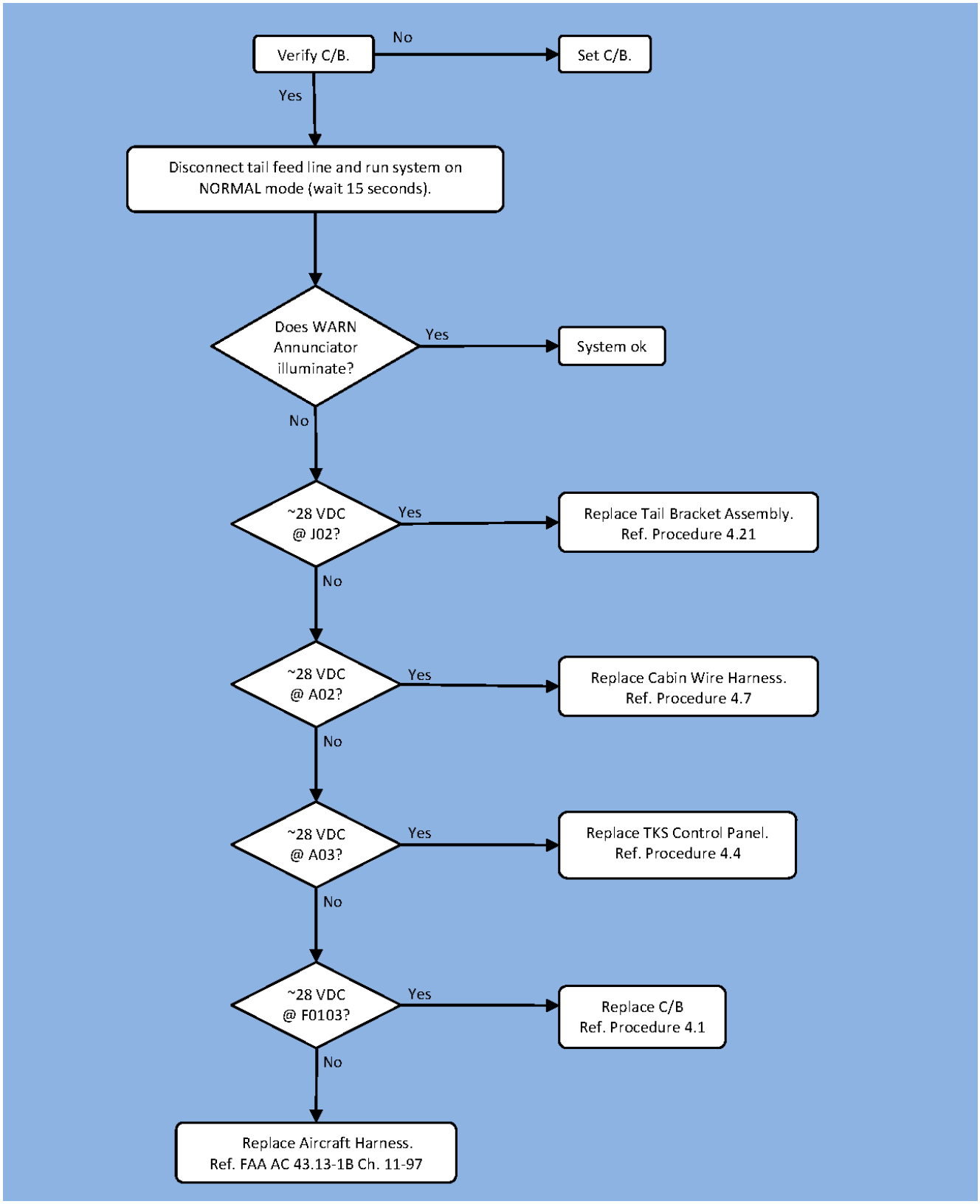
3.18 TKS Control Panel High Pressure Fails to Illuminate



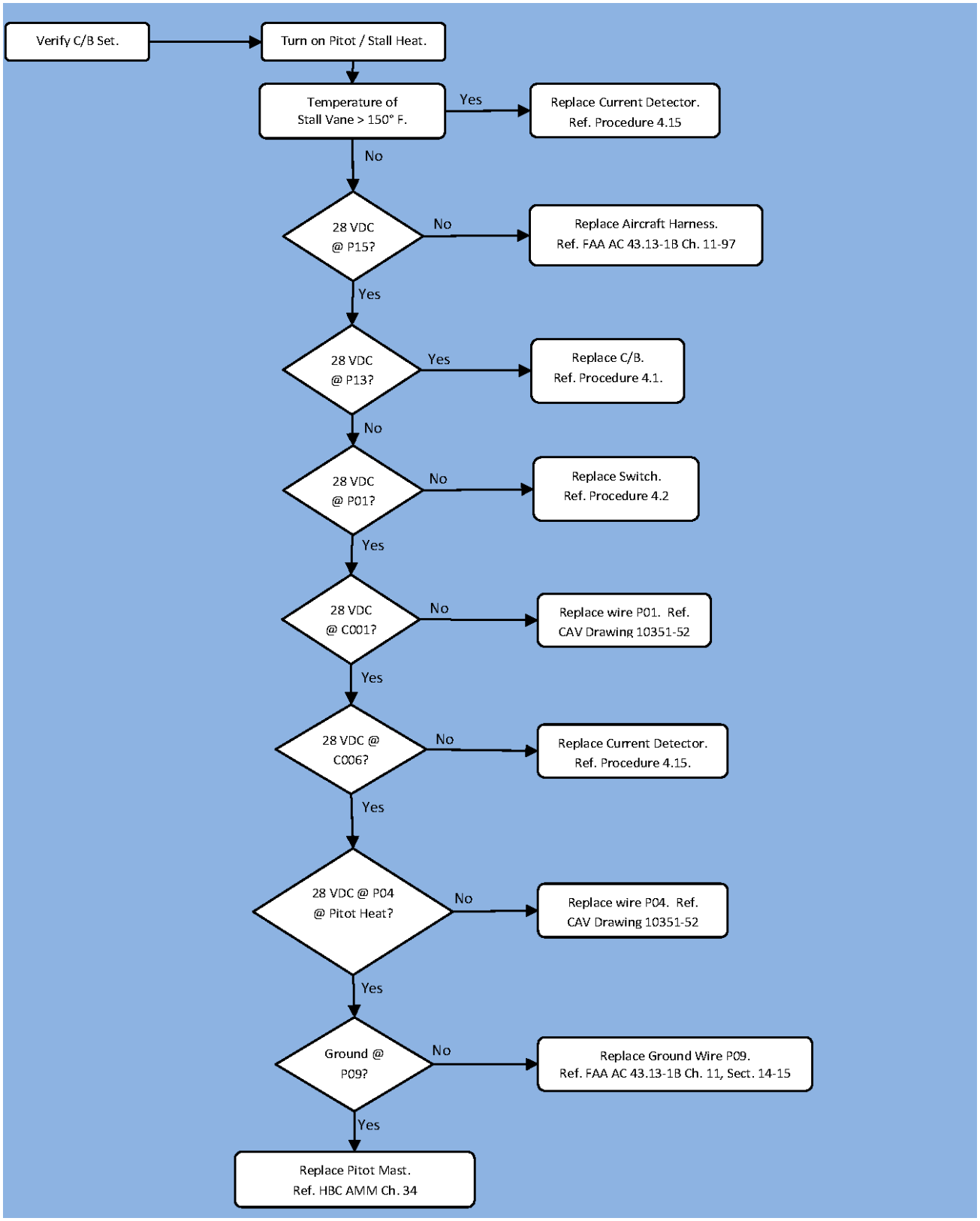
3.19 TKS Control Panel Low Pressure Warning Remains Illuminated



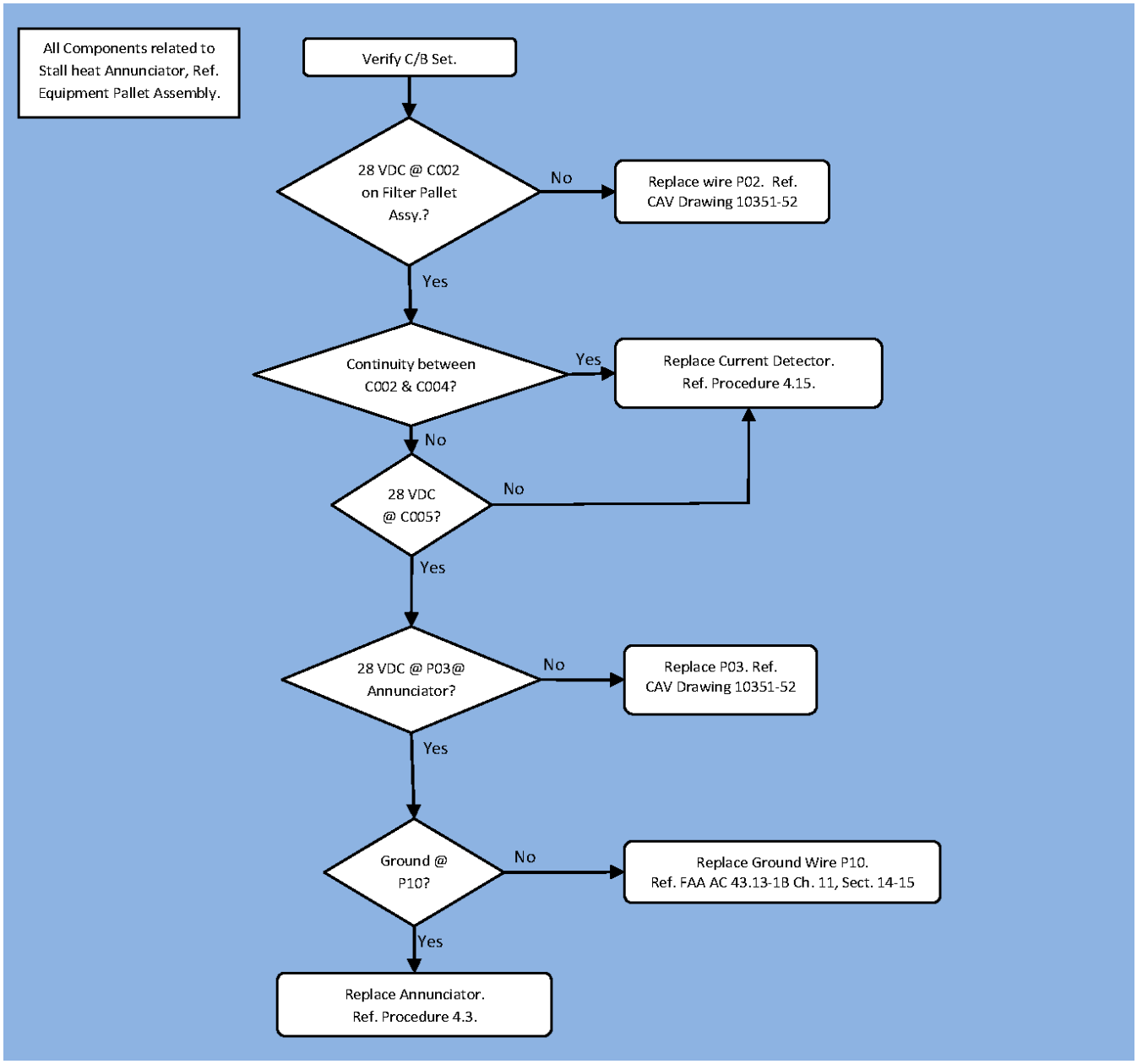
3.20 TKS Control Panel Low Pressure Warning Fails to Illuminate



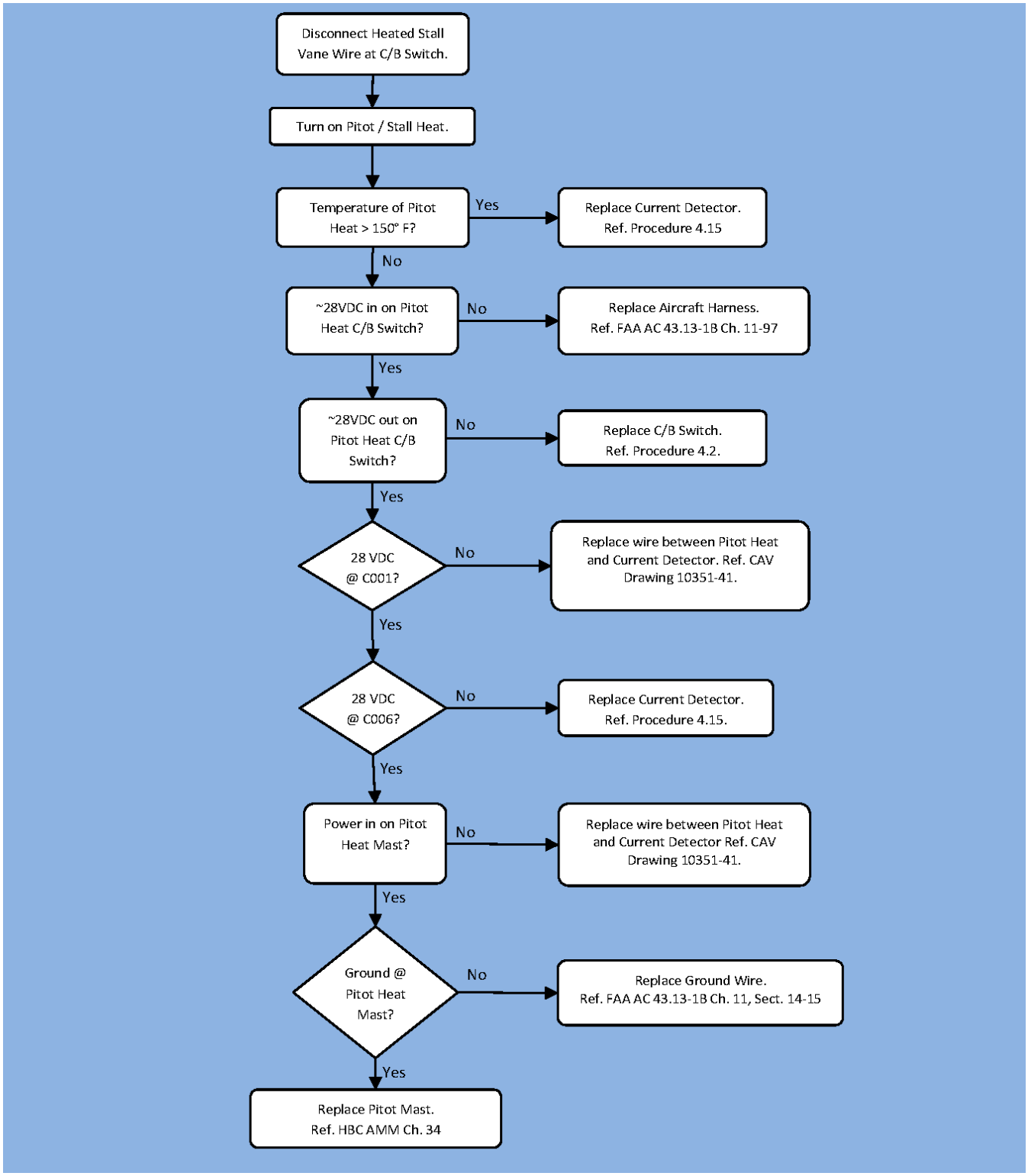
3.21 Bonanza G36 Pitot Heat Remains Illuminated



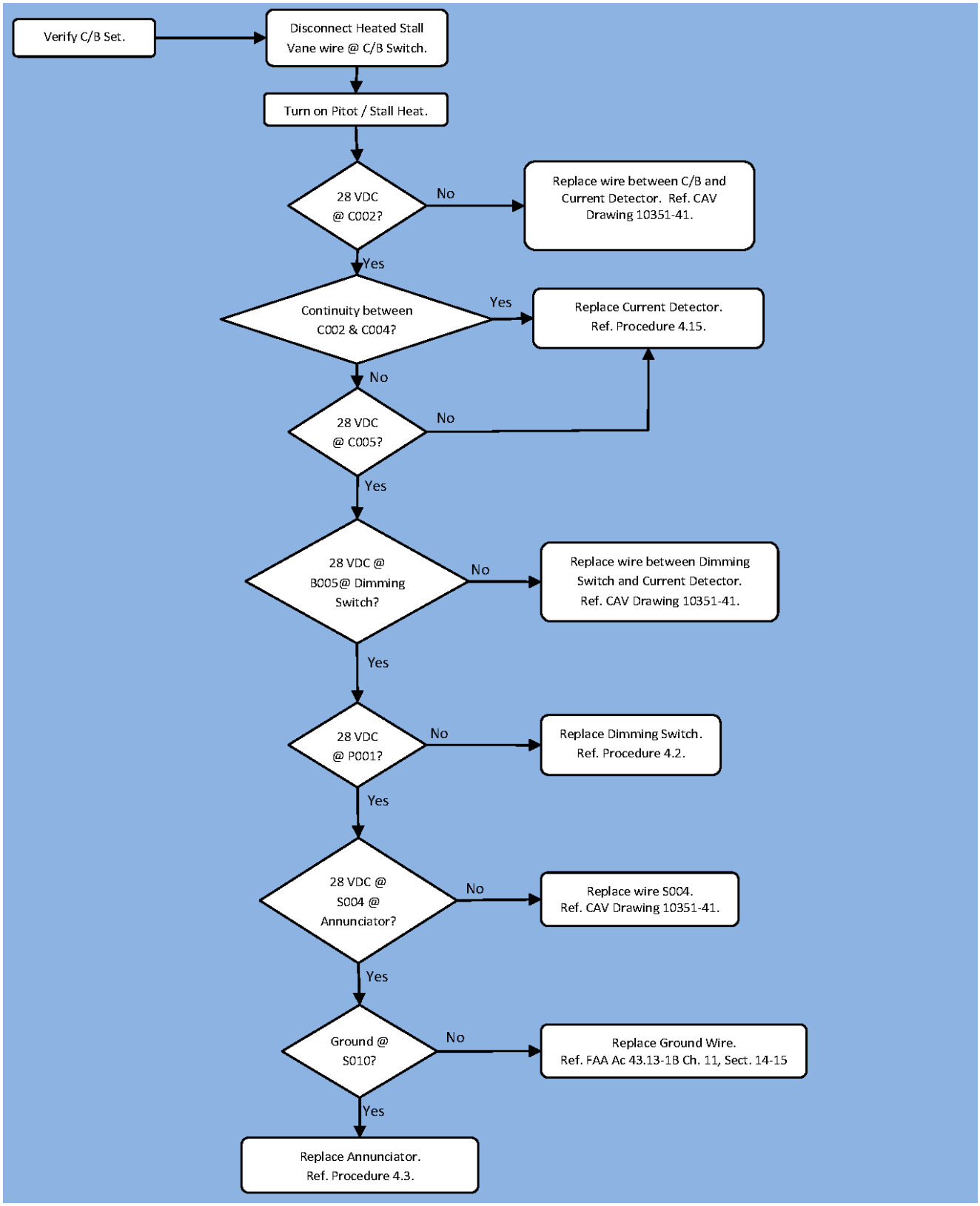
3.22 Bonanza G36 Pitot Heat Fails to Illuminate



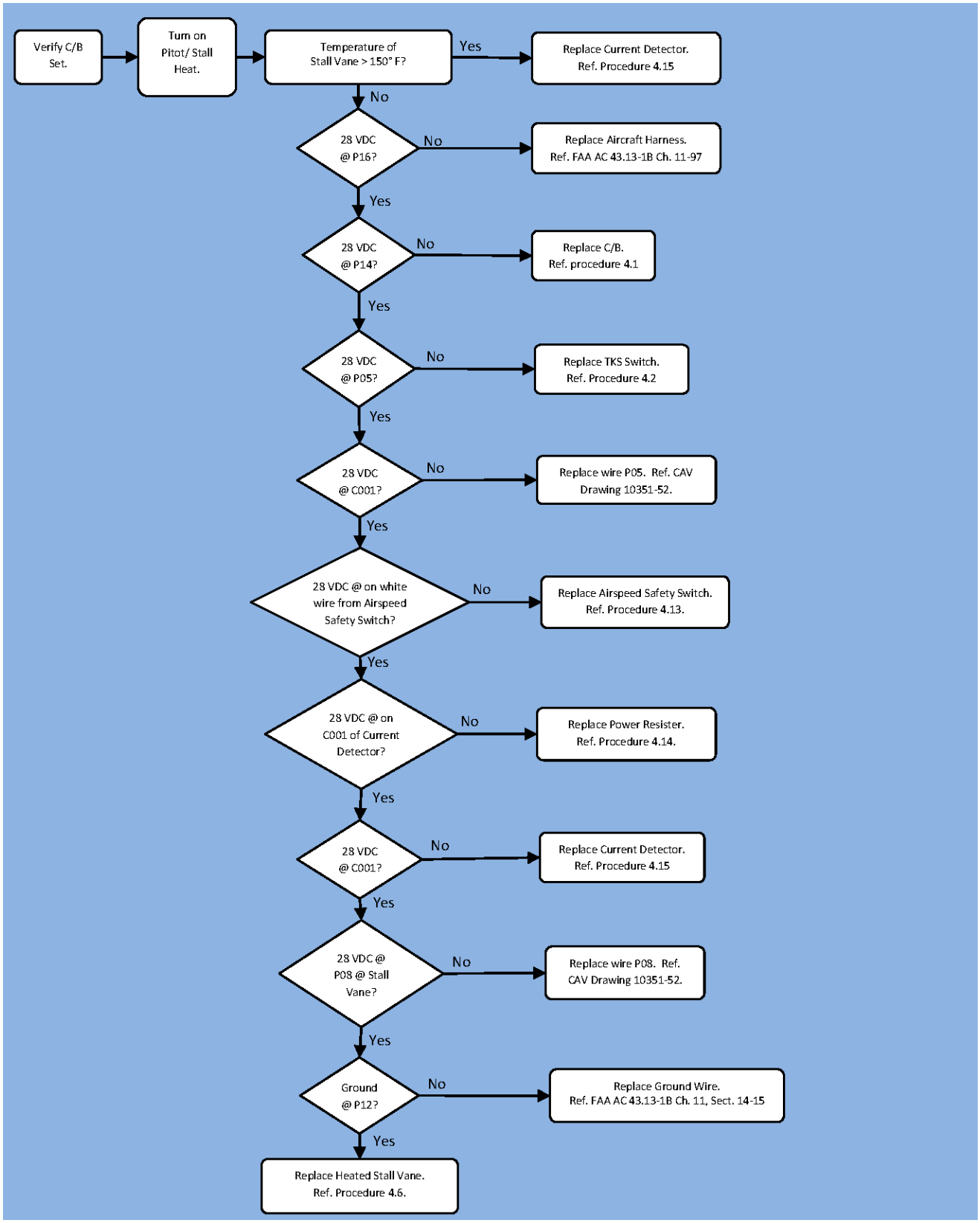
3.23 Bonanza A36 Pitot Heat Remains Illuminated



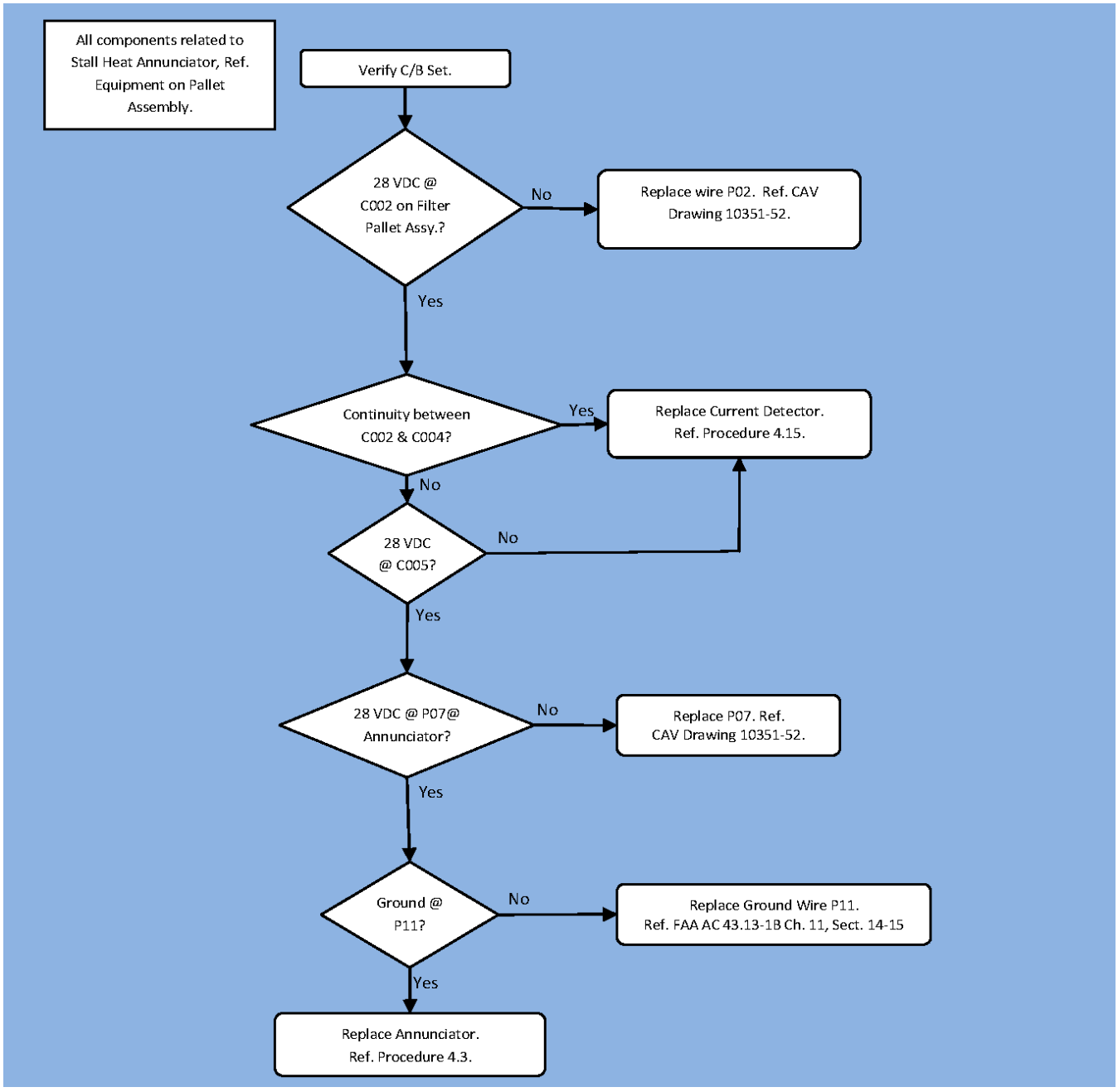
3.24 Bonanza A36 Pitot Heat Fails to Illuminate



3.25 Bonanza G36 Stall Heat Remains Illuminated



3.26 Bonanza G36 Stall Heat Fails to Illuminate



Section 4 – Component Replacement / Repair

The basic overhaul replacement guide for the Hawker Beechcraft Bonanza A36 & Bonanza G36:

Overhaul or Replacement Guide

Component	Overhaul or Replace	Replacement Procedure
Metering Pumps	On Condition or every 2,000 flight hours, whichever comes first.	4.18
Filter	3 calendar years or 1500 hours	4.11
Instrument Panel Hardware	On Condition	4, 4.2, 4.3, 4.4
Windshield Spraybar	On Condition	4.5
Stall Switch	On Condition	4.6
Wiring Harness	On Condition	4.7, 4.8
Filter Pallet Assembly, Components	On Condition	4.9, 4.10, 4.12, 4.13, 4.14, 4.15
Solenoid Valves	On Condition	4.16
Windshield Pump	On Condition	4.17
Wing Proportioning Unit	On Condition	4.19
Propeller Proportioning Unit	On Condition	4.20
Tail Bracket Assembly	On Condition	4.21
Pipelines and Couplings	On Condition	4.22
Propeller and Spinner Mounted Equipment	On Condition	4.23, 4.24, 4.25
Propeller Boots	On Condition	4.26
Panels	On Condition	4.27
Level Indication System	On Condition	4.28

All components listed in this table cannot be repaired or overhauled in the field. On condition indicates that the component has failed the serviceability tests or has failed to perform as prescribed during operation. The components must be replaced or exchanged with:

CAV Aerospace Inc.
2734 Arnold Court
Salina, Kansas 67401
Phone: (785) 493-0946

Removal and installation of items comprising the TKS ice protection system is straightforward, and follows normal aeronautical practices. Installation of the major components should be accomplished by the techniques and procedures indicated in the appropriate areas outlined in top level drawing 10353-01and/or procedures within this section.

Component damage may simply be evaluated during inspection. If a particular component functions normally and passes the serviceability tests of Section 2 of this manual, then the component may be deemed airworthy useable. If the component does not meet the requirements, then it must be replaced.

The following procedures provide detailed steps for removing and replacing components. Prior to executing any of the following procedures, the airframe must be prepared appropriately:

- All electrical power must be removed from the aircraft prior to the execution of any repair/replacement procedures. The battery must be disconnected.
- Verify that the aircraft has set with no power applied for at least 10 minutes to allow for all fluid pressure to bleed from the system.
- Verify appropriate cleanup materials are available prior to disconnecting any fluid components (rags, absorbing material, etc.)
- Always clean up any ice protection fluid spills immediately, particularly from the floor. DTD-406B contaminated floors are very slick and constitute a slippage hazard.
- Consult the Material Safety Data Sheet (MSDS) for proper handling of DTD-406B, and disposal of waste fluid.

The following references should be used in conjunction with all repair / replacement work:

- Reference FAA AC 43.13-1B, Chapter 7, Paragraph 40, Table 7-1 on pp 7-9, and Table 7-2 on pp 7-12 for appropriate information on fastener torque values.
- Reference CAV Aerospace Document 30-09-46, Section 11 for appropriate information on fastener torque values for TKS component assembly and hardware installation.

If porous panels have been replaced, or feed lines to panels disconnected, procedures of Section 2.6.6 must be completed in their entirety. If the porous panels have not been replaced or feed lines to the panels disconnected, the priming procedures of Section 2.6.6 may be ignored.

4.1 Replace Circuit Breaker

For Bonanza A36:

1. Reference Drawing 10351-04, Step 10 and remove the left circuit breaker panel on the left side of cockpit to gain access to the backside of the TKS circuit breaker.
2. For circuit breaker replacement, the following part is required:

Part Number	Description	Quantity Required
MS24510-5	TKS Circuit Breaker	1

3. Mark wires for reference per drawings 10351-03, and remove leads from circuit breaker.
4. Remove circuit breaker from panel.
5. Install replacement circuit breaker into circuit breaker panel and replace panel.

For Bonanza G36:

1. Reference Drawing 10351-04, Step 10 and remove the left circuit breaker panel on the left side of cockpit to gain access to the backside of the circuit breakers.
2. For circuit breaker replacement, one of the following parts are required:

Part Number	Description	Quantity Required
MS24510-5	TKS Circuit Breaker	1
MS24510-7 ½	Pitot Heat C/B	1
MS24510-7 ½	Stall Vane C/B	1

3. Mark wires for reference per drawing 10351-47 or 10351 -52 as applicable and remove leads from circuit breaker.
4. Remove circuit breaker from panel.
5. Install replacement circuit breaker into circuit breaker panel and replace panel.

4.2 Replace Switches / Knobs

For Bonanza A36:

1. Reference Drawing 10351-04, Step 11 and open up instrument panel as necessary to gain access to the back of the switch. Refer to drawings 10351-11, -41, and -51 as applicable.
2. For switch replacement, one of the following parts are required:

Part Number	Description	Quantity Required
35-380132-41	Ice Light C/B Switch	1
10347-01	Dimming Switch	1

3. Mark wires for reference per drawings 10351-03 and remove leads from switch.
4. Remove proper switch from panel.
5. Install replacement switch per the previously stated drawings as applicable. Close out aircraft for return to service.

For Bonanza G36:

1. Reference Drawing 10351-04, Step 11 and open up the instrument panel as necessary to gain access to the back of the switch. Refer to drawings 10351-11 or -52 as applicable.
2. For switch replacement, one of the following parts are required:

Part Number	Description	Quantity Required
35-380132-41	Ice Light C/B Switch	1
W31-X2M1G-5	TKS Backup C/B Switch	1
MS35059-22	Pitot/Stall Heat Switch	1
PE30L0FG472MAB	Dimming Knob	1

3. Mark wires for reference per drawings 10351-47 and remove leads from switch.
4. Remove proper switch from panel.
5. Install replacement switch per the previously stated drawings as applicable. Close out aircraft for return to service.

4.3 Replace Annunciator

For Bonanza A36 & Bonanza G36:

1. Reference Drawing 10351-04, Step 7 and open up the instrument panel as necessary to gain access to the back of the annunciator. Refer to CAV installation drawings: Bonanza A36 – 10351-41, Bonanza G36 – 10351-52.
2. For replacement of the annunciator, one of the following parts are required based on the aircraft model:

Part Number	Description	Quantity Required
09047-06	A36 Pitot Heat Annunciator	1
10347-03	G36 Pitot / Stall Heat Annunciator	1

3. Disconnect the annunciator at the knife connections and remove the annunciator from the instrument panel.

4. Install replacement annunciator per the previously stated drawings as applicable. Close out aircraft for return to service.

4.4 Replace Control Panel

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings 10351-31. Locate control panel attachment screws
2. For replacement of the control panel, one of the following parts are required:

Part Number	Description	Quantity Required
CT464	Rectangular Control Panel	1
CT465	Circular Control Panel	1
CT469	Octagonal Control Panel	1

3. Remove legend plate and pull control panel from instrument panel.
4. Remove electrical connectors from backside of control panel.
5. Install replacement control panel per drawing 10351-31.

4.5 Replace Windshield Spraybar

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings: 10351-10, Bonanza A36 - 10351-26, Bonanza G36 - 10351-49.
2. Access engine cowling from the right-hand side and disconnect hose assembly from spraybar assembly per drawing 10351-26, or -49.
3. For replacement of the windshield spraybar, the following parts are required:

Part Number	Description	Quantity Required
4581	Spraybar Assembly	1
CS3204B	Sealant- General	1

4. Remove backnut and washer from spraybar assembly and set aside for re-use.
5. Lift spraybar nozzle from aircraft.
6. Install replacement windshield spraybar per drawing 10351-10.
7. Perform the procedures outlined in Section 2.6.10 of this manual.
8. Close out aircraft for return to service.

4.6 Replace Stall Switch

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings: Bonanza A36: 10351-40, Bonanza G36: 10351-51.
2. Remove four screws securing switch to wing. Set aside for re-use.
3. For replacement of the Stall Switch, the following part is required:

Part Number	Description	Quantity Required
C-98307-1	Stall Switch	1

4. Remove Stall switch and unplug from connector.
5. Install replacement stall switch per the previously stated drawing as applicable. Close out aircraft for return to service.

4.7 Replace Main Wiring Harness

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings: Bonanza A36 – (10351-03, and -42), Bonanza G36 – (10351-47, and -53).
2. Reference Section 4.4 for removal of the TKS Control Panel. Reference drawing 10351-04, Steps 4 – 10, 12, and 14 to open up the aircraft. Disconnect main wire harness at the TKS Control Panel, the Wing Wire Harness, the Filter Assembly, and the Tail Bracket Assembly.
3. Replace harness per previously stated drawings as applicable and secure to comply with FAA AC 43.13-1B, Chapter 11, Section 11.
4. Closeout aircraft for return to service.

4.8 Replace Wing Wiring Harness

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings: Bonanza A36 – (10351-03, and -42), Bonanza G36 – (10351-47, and -53).
2. Reference Section 4.18, Steps 2 and 3 to gain access to the pumps. Reference drawing 10351-04, Steps 5 and 6 for aircraft interior removal. Remove right wing access panels as necessary to gain access to the routing paths of the wing wire harness. Disconnect wing wire harness at the TKS Main Wire Harness, the Tank Level Sender, and each of the metering pumps.
3. Replace harness per previously stated drawings as applicable and secure to comply with FAA AC 43.13-1B, Chapter 11, Section 11.
4. Closeout aircraft for return to service.

4.9 Replace Filter Assembly

For Bonanza A36:

1. Refer to CAV installation drawings 10351-06, and 10351-26. Reference Drawing 10351-04, Step 4 for aircraft interior removal.
2. Disconnect 3 main lines from assembly marking locations with tape; refer to CAV plumbing installation drawing 10351-26 and fluid schematic 10351-02. Cut safety wire as necessary.
3. For replacement of the filter assembly, the following parts are required:

Part Number	Description	Quantity Required
S1201-20	5/16 Seals	3
10320-05	Filter Assembly	1

4. Disconnect connector from electrical harness. Remove Filter Assembly by removing four bolts: two from clamps on track support and two from support bracket; see CAV installation drawing 10351-06.
5. Replace all components in accordance with the previously stated drawings using new tubing seals.
6. Perform the procedures outlined in Section 2.6.9 of this manual.

For Bonanza G36:

1. Refer to CAV installation drawings 10351-48 and 10351-49. Reference Drawing 10351-04, Step 4 for aircraft interior removal.
2. Disconnect hoses 3 main lines from assembly marking locations with tape; refer to CAV plumbing installation drawing 10351-49 and fluid schematic10351-46. Cut safety wire as necessary.
3. For replacement of the filter pallet assembly, the following parts are required:

Part Number	Description	Quantity Required
S1201-20	5/16 Seals	3
10333-01	Filter Pallet Assembly	1

4. Disconnect Pitot and Static lines from the air speed safety switch.
5. Disconnect two electrical connectors from the pallet. Remove Pallet Assembly from clamps on track supports by removing four bolts; see CAV installation drawing 10351-48.
6. Replace all components in accordance with previously stated drawings using new tubing seals.
7. Perform the procedures outlined in Section 2.6.9 of this manual.

4.10 Replace Relay

For Bonanza A36 & Bonanza G36:

1. Remove Bonanza A36 Filter Assembly, part number 10320-05, or Bonanza G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
2. For replacement of the relay, the following parts are required:

Part Number	Description	Quantity Required
ES0012	Relay	1

3. Cut wire tie from existing relay.
4. Remove Relay from relay base, do not unscrew screws or disconnect any wires.
5. Replace all components to the previously assembled state, making sure to re-wire tie relay and relay base together.
6. Replace Bonanza A36 Filter Assembly, part number 10320-05, or Bonanza G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
7. Perform the procedures outlined in Section 2.6.9 of this manual.

4.11 Replace Filter

For Bonanza A36 & Bonanza G36:

1. Remove Bonanza A36 Filter Assembly, part number 10320-05 or Bonanza G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
2. For replacement of the filter, the following parts are required:

Part Number	Description	Quantity Required
S1201-20	5/16" Seal	2
F909	A36 Filter Assembly	1
F910	G36 Filter Assembly	1

3. Disconnect the fluid lines from the filter; Cut safety wire as needed.
4. Remove the four AN3-3A bolts that secure the filter to the base assembly, and the AN960-10L washers and set aside for re-use.
5. Remove the filter assembly identifying the flow direction of the filter and discard.
6. Replace all components in reverse order of removal; making sure to place filter flow direction correctly, applying new seals to tubes, and wire locking both nuts.
7. Replace Bonanza A36 Filter Assembly, part number 10320-05 or Bonanza G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
8. Perform the procedures outlined in Section 2.6.9 of this manual.

4.12 Replace High Pressure Switch

For Bonanza A36 & Bonanza G36:

1. Remove A36 Filter Assembly, part number 10320-05 or G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
2. For replacement of the high pressure switch, the following parts are required:

Part Number	Description	Quantity Required
S1201-20	5/16" Seal	2
EK0033	Socket Inserts, Size 20	2
P041BD850	High Pressure Switch	1

3. Disconnect the fluid lines from the high pressure switch, cutting safety wire as needed.
4. Remove socket inserts, in socket positions 1 and 2, from electrical connector.
5. Remove the two AN526-832R20 screws, MS20365-862A nuts, AN960-8L washers, 4778 spacer, and set aside for re-use.
6. Remove high pressure switch.
7. Attach socket inserts to ends of high pressure switch wire and insert into electrical connector. Note: wires F001 and F002 go into sockets 1 and 2 respectively.
8. Replace all components in reverse order of removal; applying new seals to tubes, and wire locking both nuts.
9. Replace A36 Filter Assembly, part number 10320-05 or G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
10. Perform the procedures outlined in Section 2.6.9 of this manual.

4.13 Replace Airspeed Safety Switch

For Bonanza G36:

1. Remove Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
2. For replacement of the airspeed safety switch, the following parts are required:

Part Number	Description	Quantity Required
EK4032	Pin Inserts	1
MS7928/5-2	Butt Splice	2
10333-02	Airspeed Safety Switch	1

3. Disconnect splice points from existing airspeed safety switch and power resistor wires.
4. Remove pin insert from position #1 in the 9-way plug.

5. Remove eight nuts on bottom of pallet and 16 washers, set aside for re-use. Note: Do not remove nuts or washers attached to airspeed safety switch.
6. Remove airspeed safety switch.
7. Re-attach wire leads using butt splice. Note: make sure to re-attach wires white-to-white, and blue-to-blue. Attach pin insert to red wire lead and insert into the #1 position of the 9-way plug.
8. Replace all components in reverse order of removal.
9. Replace G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
10. Perform a static leak check of the system per FAA AC43.13-1B, Chapter 12, Paragraph 57.

4.14 Replace Power Resister

For Bonanza G36:

1. Remove Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9
2. For replacement of the power resister, the following parts are required:

Part Number	Description	Quantity Required
MS7928/5-2	Butt Splice	3
10333-03	Power Resister	1

3. Disconnect butt splices, from existing power resister and airspeed safety switch wires.
4. Remove the two BSA218A12 screws, BSA126A66 nuts, SP10A washers, and set aside for re-use.
5. Remove power resister.
6. Attach wire leads using butt splice. Note: make sure to re-attach wires white-to-white, blue-to-blue, and C001-to-C001.
7. Replace all components in reverse order of removal.
8. Replace G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
9. Perform the procedures outlined in Section 2.6.9 of this manual.

4.15 Replace Current Detector

For all current detector installations, the following parts are required:

Part Number	Description	Quantity Required
10347-02	Current Detector	1
MS7928/5-2	G36 Butt Splice	1

For Bonanza A36:

1. Refer to CAV installation drawings 10351-41.
2. Reference drawing 10351-04, Step 7 for aircraft interior removal.
3. Detach current detector from mounted location by cutting wire ties.
4. Disconnect connector from electrical harness.
5. Replace current detector in accordance with drawing 10351-41.

For Bonanza G36 Detached Current Detector:

1. Refer to CAV installation drawings 10351-52.
2. Reference drawing 10351-04, Step 7 for aircraft interior removal.
3. Detach current detector from mounted location by cutting wire ties.
4. Disconnect connector from electrical harness.
5. Replace current detector in accordance with drawing 10351-52.

For Bonanza G36 Pallet Current Detector:

1. Remove Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
6. Disconnect butt splice from existing power resister and current detector. Remove socket inserts from locations 2-5 on the 9-way plug.
7. Remove p-clip from current detector by removing AN526-1032-R8 screw and BSA126A66 nut. Set aside for reuse.
8. Remove Current Detector from Filter Pallet Assembly.
9. Attach C001 wire lead of current detector with C001 wire lead on power resister using butt splice. Insert socket inserts into proper location on 9-way plug in accordance with drawing 10351-52.
11. Replace all components in reverse order of removal.
12. Replace G36 Filter Pallet Assembly, part number 10333-01 in accordance with Procedure 4.9.
13. Perform the procedures outlined in Section 2.6.9 of this manual.

4.16 Replace Solenoid

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings 10351-05 and for Bonanza A36: 10351-02, -27, or for Bonanza G36: 10351-46, -50. Reference drawing 10351-04, Steps 5 and 6 for aircraft interior removal.
2. Mark and disconnect the three 5/16 lines from the solenoid pallet assembly.
3. Disconnect the electrical connectors from the solenoid pallet assembly.
4. Remove solenoid assembly by removing four bolts from the clamps on the track support. Set the attaching hardware aside for re-use.
5. For replacement of the solenoid assembly pallet, the following part is required:

Part Number	Description	Quantity Required
10320-03	Solenoid Pallet Assy.	1

6. Replace the solenoid pallet assembly in accordance with the previously stated drawings as applicable using new tubing seals.
7. Perform the procedures outlined in Section 2.6.10 of this manual.

4.17 Replace Windshield Pump

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings 10351-05 and for Bonanza A36: 10351-02, -27, or for Bonanza G36: 10351-46, -50. Reference drawing 10351-04, Steps 5 and 6 for aircraft interior removal.
2. Disconnect the 3/16 line from the tee mounted on the windshield pump assembly that routs to the spraybar. Cut safety wire as necessary.
3. Disconnect the 5/16 lines from each windshield pump. Cut safety wire as necessary.
4. Disconnect the electrical connectors from the windshield pump assembly.
5. Remove windshield pump assembly by removing four bolts from the clamps on the track support. Set the attaching hardware aside for re-use.
6. For replacement of the windshield pump assembly pallet, the following part is required:

Part Number	Description	Quantity Required
10320-01	Windshield Pump Assy.	1

7. Replace the windshield pump pallet assembly in accordance with the previously stated drawings as applicable using new tubing seals.
8. Perform the procedures outlined in Section 2.6.10 of this manual.

4.18 Metering Pump

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings 10351-08 and 10351-25.
2. Reference the aircraft maintenance manual, Chapter 7 to elevate the aircraft 4 – 6 inches off the ground.
3. With one person in the cockpit and another outside the airplane, raise the landing gear. When the inboard main landing gear door drops approximately 45°, turn the power off to the aircraft.
4. Locate the pump for replacement and disconnect fluid lines from metering pump, marking locations with tape. Cut safety wire as necessary.
5. Disconnect the applicable pump from the electrical harness.
6. Remove metering pump by removing four nuts for Pump 2, or four bolts for Pump 1.
7. For replacement of the metering pump, the following parts are required:

For Pump 1
Bonanza A36: 9511ABC248-124-28
Bonanza G36: 9511AAL330-165

Part Number	Description	Quantity Required
100-011-8810	3/8 O-ring	1
100-013-8810	½ O-ring	1
S1201-20	5/16 Seals	1
9511ABC248-124-28	A36 Metering Pump	1
9511AAL330-165	G36 Metering Pump	1

For Pump 2
Bonanza A36: 9511ABB248-124-28
Bonanza G36: 9511ABB330-165

Part Number	Description	Quantity Required
100-011-8810	3/8 O-ring	1
S1201-20	5/16 Seals	2
9511ABB248-124-28	A36 Metering Pump	1
9511ABB330-165	G36 Metering Pump	1

8. Install new metering pump in accordance with the previously stated drawings as applicable using new tubing seals.
9. Perform the procedures outlined in Section 2.6.9 of this manual.

4.19 Replace Wing Proportioning Unit

For Bonanza A36 & Bonanza G36:

1. Refer to CAV installation drawings 10351-30 and for Bonanza A36: 10351-02, or for Bonanza G36: 10351-46. Remove wing access panels to access to the proportioning unit.
2. Disconnect lines from all ports, making sure to mark each line with its associated port. Cut safety wire as necessary.
3. Remove proportioning units by removing two AN3-11A bolts and six AN960-10 washers. Set hardware aside for re-use.
4. For replacement of the proportioning units, the following parts are required:

Part Number	Description	Quantity Required
S1201-12	3/16 Seals	6
S1201-20	5/16 Seals	1
PU300FW83	A36 Wing P-Unit	1
PU300FW185	G36 Right Wing P-Unit	1
PU300FW183	G36 Left Wing P-Unit	1

5. Install new Proportioning unit in accordance with the previously stated drawings as applicable using new tubing seals.
6. Perform the procedures outlined in Section 2.6.9 of this manual.

4.20 Replace Propeller Proportioning Unit

For Bonanza A36 & Bonanza G36:

1. Refer to the following CAV installation drawing – For Bonanza A36: 10351-26, or for Bonanza G36: 10351-49. Reference drawing 10351-04, Step 4 for aircraft interior removal.
2. For replacement of the propeller proportioning units, the following parts are required:

Part Number	Description	Quantity Required
S1201-12	A36 3/16 Seals	2
S1201-20	G36 5/16 Seals	2
PU314AC100	A36 Proportioning Unit	1
PU320AC193	G36 Proportioning Unit	1

3. Disconnect lines from both ends, making sure to note the orientation of the proportioning unit. Cut safety wire as necessary. Remove proportioning unit.
4. Install new proportioning unit in accordance with the previously stated drawings as applicable using new tubing seals.
5. Perform the procedures outlined in Section 2.6.9 of this manual.

4.21 Replace Tail Bracket Assembly

For Bonanza A36 & Bonanza G36:

1. Refer to the following CAV installation drawings – 10351-07, and for Bonanza A36: 10351-27, or for Bonanza G36: 10351-50.
2. Reference drawing 10351-04, Steps 5 and 12 to access to the tailcone area of the aircraft.
3. Disconnect the 5/16 line from the proportioning unit, each 3/16 line from each low pressure switch, and the 3/16 line from port 3 of the tail proportioning unit.
4. Disconnect the tail bracket assembly from the cabin wire harness by cutting the wire at the knife connector on the tail bracket assembly side. Remove the heat shrink tubing and disconnect the knife connectors from each other.
5. Remove tail bracket assembly by removing four AN525-10R10 screws from the doubler. Set the hardware aside for re-use.
6. For replacement of the Tail Bracket Assembly, the following parts are required:

Part Number	Description	Quantity Required
S1201-12	3/16 Seals	3
S1201-20	5/16 Seals	1
10332-01	A36 Tail Bracket Assy.	1
10332-02	G36 Tail Bracket Assy.	1

7. Install the new tail bracket assembly in accordance with the previously stated drawings as applicable using new tubing seals.
8. Perform the procedures outlined in Section 2.6.9 of this manual.

4.22 Nylon Tubing and Coupling Replacement

For Bonanza A36:

1. Refer to CAV fluid schematic 10351-02 and plumbing installation drawing 10351-24.

For Bonanza G36:

2. Refer to CAV fluid schematic 10351-46 and plumbing installation drawing 10351-24.

For Bonanza A36 & Bonanza G36:

3. Remove access panels as necessary to gain access to the tube and its end fittings.
4. Disconnect damaged nylon tube from system and plug open ends using a strong adhesive backed tape (such as duct tape) to minimize fluid spill.
5. Disconnect nylon tubing securing hardware as necessary and remove damaged tube from aircraft.

6. Measure the length of the removed line and cut a length of the appropriate sized tube for replacement.
7. Route new line and secure as previously installed, utilizing reusable existing hardware where applicable.
8. Attach fittings to nylon tubing per CAV Document 30-09-46, Section 10, Part B.
9. Attach tube replacement end fittings to their respective ends as previously installed.
10. Perform the procedures outlined in Sections 2.6.9 or 2.6.10 of this manual.
11. Reinstall access panels removed in Step 3 for aircraft closeout.

4.23 Replace Propeller Fire Hose

For Bonanza A36 & Bonanza G36:

1. Open the aircraft engine compartment as necessary to access TKS fluid routings in the engine compartment. Refer to CAV installation drawings – 10351-09 and for Bonanza A36: 10351-02, or for Bonanza G36: 10351-46.
2. Disconnect the flex hose from the firewall and rear baffle fittings. Remove the hose from the aircraft.
3. Install new flex hose, part number 10325-01 in accordance with the previously stated drawings as applicable.
4. Perform the procedures outlined in Section 2.6.9 of this manual.

4.24 Replace Propeller Nozzle

For Bonanza A36 & Bonanza G36:

1. Open the aircraft engine compartment as necessary to access TKS fluid routings in the engine compartment. Refer to CAV installation drawing 10351-38.

For Hartzell Propeller:

2. Refer to drawing 10351-09 for details on engine compartment fluid lines.
3. Hartzell Nozzle, part number 10325-02, is required for installation.
4. Remove and replace nozzle per instructions on drawing 10351-38.
5. Perform the procedures outlined in Section 2.6.9 of this manual.

For McCauley Propeller:

2. Refer to drawing 10351-09 for details on engine compartment fluid lines.
3. Nozzle, part number 4562, is required for installation.
4. Remove and replace nozzle per instructions on drawing 10351-38.
5. Perform the procedures outlined in Section 2.6.9 of this manual.

4.25 Replace Propeller Components

For Bonanza A36 & Bonanza G36:

1. Open up aircraft as necessary for removal of the propeller. Refer to the aircraft mainentance manual, Chapter 61, Section 10.
2. Refer to CAV installation drawings 10351-33, -34, -36, and -37 for the applicable propeller type.
3. Remove fluid slinger ring and its feed tubes in accordance the appropriate installation drawing, following the instructions in reverse order on the drawing.
4. Install new hardware in accordance with the previously stated drawings as applicable per the propeller type.
5. Reinstall the propeller with reference to the aircraft maintenance manual, Chapter 61, Section 10.

4.26 Replace Propeller Boots

For Bonanza A36 & Bonanza G36:

1. When the anti-icing boot is replaced on an assembled propeller, position the propeller blade being repaired to prevent the contamination of other propeller components.

Note
Apply masking material to the hub or clamp to prevent contamination of other propeller components.

2. Liberally apply toluene CM41 or methyl ethyl ketone (MEK) CM106 to loosen a corner of the anti-icing boot. Lift the edges of the anti-icing boot to expose the adhesive between the anti-icing boot and the blade.
3. Repeat the application of solvent and permit to soak for a few minutes.
4. Using a nonmetallic scraper, raise the loosened corner of the anti-icing boot.
5. Using pliers, grasp the raised edge of the anti-icing boot and apply a steady pull.
6. Continue applying solvent toluene CM41 or methyl ethyl ketone (MEK) CM106 along the point of anti-icing boot contact with the blade to loosen the adhesive bond.
7. Use a steady pull to remove the anti-icing boot.
8. Remove any remaining adhesive residue. For a disassembled blade, use a solvent soak or plastic media cleaning. For an assembled blade, use a solvent soak.
9. Replace boot per installation drawing 10351-38.

4.27 Porous Panels

Porous panels must be replaced when damage exceeds a specific tolerance. Damage is typically limited to impact damage, resulting in panel denting. First, a panel may be deemed conditionally operational if 1) the dent does not exceed 1 inch in diameter, and 2) the depth of the dent does not exceed 1/16" in depth. These limits apply to the entirety of the porous panel.

If the subjected panel(s) passes these criterions, then they must be subjected to a flow test, powered by either the ship TKS system or individually with the system test cart. Damaged panels must still produce uniform fluid flow over the complete porous active area. If the damaged area is dry, or high or excess flow appears at or near the damage, then the panel must be replaced.

If needed, panels may be removed by cutting the bonding agent between the panel and the airframe. The adhesive is a polysulfide material. Prior to starting the cutting process, all bonding rivets installed between the porous panel and the airframe must be removed.

Cutting may be accomplished with a sharpened, thin putty knife. The knife is worked under the trailing edge of the panels, forward of the bond line. The knife may then be tapped, at a 45 deg angle, up and down the span-wise direction of the panel to break the panel free. As the cutting is accomplished on the upper and lower surfaces, the panel may be peeled from the airplane. Similarly, the ends of the panel may be cut free with the putty knife.

Care should be taken to keep the knife parallel to the surface skin to avoid or minimize damage to the underlying paint and wing skin. A patient approach to the cutting process will free the panel and protect the airframe.

When the panel is detached from the airframe, the feed lines to the panel must be disconnected. After disconnection, the feed line ends should be temporarily plugged or covered to keep debris free of the plumbing.

Once the panel is removed, all remaining sealant or adhesive should be removed from the attachment area and the surface thoroughly cleaned. The following defines the work procedures for this process.

For Bonanza A36 & Bonanza G36:

1. Preparation for and installation of the replacement porous panel should follow the directions presented in the CAV installation drawing package (Ref. Top Drawing 10353-01).
2. Mask area around panel to protect painted surfaces during the panel removal process.
3. Remove panel using the appropriate tools for removal. (See Panel removing procedures)
4. Scrape bulk of cured sealant from structure with plastic or phenolic scraper, avoid damaging aircraft skin.
5. Continue removing remaining sealant using ScottBrite scuff pad as required, medium grit or finer.
6. Clean area with Isopropyl Alcohol or other approved cleaner.
7. Alodine areas of bare metal exposed during the removal process. Paint exposed areas with 2 coats of zinc chromate primer.
8. Refinish paint as required.
9. Remove protective tape.

4.28 Level Indication Calibration and Replacement

For Bonanza A36 & Bonanza G36:

1. Drain the TKS fluid tank. Refer to Procedure 2.6.5 of this manual.
2. Using a hooked wire (such as a wire coat hanger), carefully raise the arm of the float sender in the tank until it reaches its stopping point. Verify that the TKS Control Panel reads full, as indicated by a display of 7.0 U.S. gallons.
3. If a correct full reading is not obtained, first check that the float arm is reaching its upper stop or contacting the top of the tank. Reference drawing 10351-15 for location of level sender.
4. If this is satisfactory, go to the control panel within instrument panel and adjust potentiometer until proper reading is obtained.
5. The adjustment screw can be reached through a small dime size hole on the underside of the control panel. This can be adjusted with a small flat head screw driver rotated clockwise or counterclockwise as necessary.
6. Lower the float sender in the TKS Fluid Tank and verify that the TKS Control Panel fluid quantity indicator reads 0.0 U.S. gallons.
7. To replace level sender refer to drawing 10351-15. The following parts are required:

Part Number	Description	Quantity Required
CT419-91	Level Sender	1
10321-07	Gasket, Level Sender	1
AGS1186-3	Bonded Seals	5
AN526C1032R16	Machine Screw	5
MS35338-43	Lock Washer	5
AN315-3R	Nut	5

8. Disconnect from electrical harness and remove five AN526-1032R10 screws, washers, seals, and nuts. Discard all mounting hardware.
9. Remove existing level sender.
10. Clean the surface of cured sealant from the TKS Fluid Reservoir using a plastic or phenolic scraper. Avoid damaging the rubber bladder.
11. Install the new level sender in accordance with drawing 10351-15.
12. After the bonding sealant has cured – usually within a 24 hour time period – fill the TKS Fluid Reservoir with fluid, and verify no fluid leaks from the tank.
13. Perform Steps 1 – 6 of this section to verify proper calibration.
14. Fill the tank with 4 gallons of TKS fluid and verify the control panel indicates between 4.6 and 5.5 gallons.
15. Close out the aircraft for return to service.

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Section 5 – Airworthiness Limitations

There are no airworthiness limitations associated with the installation of the TKS Ice Protection System on the Hawker Beechcraft Bonanza A36 and Bonanza G36 model aircraft.

The Airworthiness Limitations Section is FAA approved and specifies maintenance required under 14 CFR §§43.16 and 91.403 unless an alternative program has been FAA Approved.