TKS ANTI-ICE FLUID TANK COMPONENTS - ADJUSTMENT/TEST
(Cargo Pod Installation)

1. General

A. This section contains the test procedures that are necessary to do after TKS anti-ice fluid tank component replacement.

B. For the purge and test procedures of the leading edge porous panels, refer to TKS Leading Edge Porous Panel - Adjustment/Test.

C. For the test procedures for the tail bracket assembly (low pressure switches), refer to TKS Anti-Ice Fluid Distribution System - Maintenance Practices.

D. To calibrate the fluid level sender, refer to Fluid Level Sender Calibration in this section.

E. Recommended maintenance to keep the TKS fluid at its correct viscosity is as follows:

- Operate the pumps monthly, or as necessary, in the HIGH mode until the air is removed from the fluid system.
- Keep the TKS system operational at all times to keep air pockets out of the system.
- If the fluid tank is removed and installed or replaced, do the porous panel purge and test procedures.

NOTE: If the fluid is too thick, the porous panels can become blocked or clogged.

F. Some Airplanes with the TKS anti-ice system have the G1000 avionic system installed. On those Airplanes you can ignore all references to the ANTI-ICE ON, CAUT, and WARN annunciators. Table 501 shows the TKS-related circuit breakers and their reference designators.

G. Some Airplanes with the TKS anti-ice system do not have the G1000 avionic system installed. On those Airplanes you can ignore all references to CAS messages. Table 501 shows the TKS-related circuit breakers and their reference designators.

Table 501. TKS Circuit Breakers

Airplanes With G1000		**Airplanes Without G1000**	
TKS Circuit Breaker	Reference Designator	TKS Circuit Breaker	Reference Designator
PRIMARY ANTI-ICE	(HC005)	PRIMARY ANTI-ICE	(CB309)
W/S	(HC015)	W/S	(CB409)
BACKUP ANTI-ICE	(HC016)	BACKUP ANTI-ICE	(CB410)
ENG INTFC	(HI013)	ANTI-ICE GAUGE	(CB310)

2. Tools and Equipment

A. For a list of tools and equipment, refer to Ice and Rain Protection - General.

3. TKS Anti-Ice Fluid Tank Component Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

NOTE: For the tests that follow, you can disconnect the airplane supply tube from the filter manifold outlet and connect a drain tube, which will let you contain the fluid more easily, and that is how these procedures are written. Or, you can keep the airplane supply tube connected to the filter manifold outlet and use clean, dry cloths to absorb the anti-ice fluid and to clean the airplane surfaces and floor as necessary. Or, you can fabricate a fluid collector system and install it on and below the porous panels, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

NOTE: Although you can do one or more of the tests that follow, as applicable, it is necessary to do all of the

tests after you have installed the fluid tank, timer box, and/or wire bundle.

NOTE: It is easier for two persons to do these tests. One to monitor the cockpit and one to monitor the equipment pack.

A. Prepare To Do the Fluid Tank Component Tests.

(1) Remove external electrical power from the airplane.

(2) Open the aft-center cargo pod door to get access to the equipment pack and aft bulkhead.

(3) Disengage the ANTI-ICE GAUGE circuit breaker, if applicable.

(4) Disengage the ENG INTFC circuit breaker, if applicable.

(5) Disengage the PRIMARY ANTI-ICE, W/S, and BACKUP ANTI-ICE circuit breakers.

(6) Remove the screw and nut that attaches the bonding jumper to the bulkhead.

(7) Turn the quarter-turn fasteners that attach the aft bulkhead to the drip pan and the cargo pod.

NOTE: On airplanes that have the TAS antenna installed, it is necessary to disconnect the coaxial cable and remove the screws and conduit.

(8) Remove the aft bulkhead from the cargo pod.

(9) Find the drain tube opening in the bottom of the cargo pod below the fluid tank.

(a) Put a container below the drain tube.

(10) If you will do tests of the metering pumps, the high pressure switch, or the timer box, disconnect the airplane supply tube from the filter manifold outlet.

(11) Put a cap or plug in the open tube end.

(12) Connect a length of tubing to the filter manifold outlet.

(a) Put the open tube end in the container.

(13) If you will do the windshield pump test, disconnect the windshield pump outlet tube at the belly connector and place the end of the tube in the bucket.

(14) Engage the ANTI-ICE GAUGE circuit breaker, if applicable.

(15) Engage the ENG INTFC circuit breaker, if applicable.

(16) Engage the PRIMARY ANTI-ICE, W/S, and BACKUP ANTI-ICE circuit breakers.

(17) Do the test procedures as applicable.

B. Do a Test of Metering Pump 1.

(1) Make sure that there is enough fluid in the tank to keep the pump from running dry during the test procedure.

(2) Supply external electrical power to the airplane.

(3) Put the EXTERNAL POWER switch on the pilot's switch panel in the BUS position.

(4) Put the PRIMARY switch on the ANTI-ICE FLUID CONTROL switch panel in the HIGH position to start pump 1.

(a) Make sure that pump 1 operation starts.

(b) Make sure that 1000 ml, +100 or - 100 ml discharges in the bucket in one minute.

(5) Disengage the PRIMARY ANTI-ICE circuit breaker.

(a) Make sure that pump 1 operation stops.

(6) Make sure that there is no fluid leakage from the couplings.

(7) Put the PRIMARY switch in the OFF position.

(8) Put the EXTERNAL POWER switch on the pilot's switch panel in the OFF position.

(9) Engage the PRIMARY ANTI-ICE circuit breaker.

(10) Do the Return to Service procedures or continue the applicable test(s).

C. Do a Test of Metering Pump 2.

(1) Make sure that there is enough fluid in the tank to keep the pump from running dry during the test procedure.

(2) Supply external electrical power to the airplane.

(3) Put the EXTERNAL POWER switch on the pilot's switch panel in the BUS position.

(4) Put the BACKUP switch on the ANTI-ICE FLUID CONTROL switch panel in the ON position to start pump 2.
  (a) Make sure that pump 2 operation starts.
  (b) Make sure that 1000 ml, +100 or - 100 ml discharges in the bucket in one minute.
(5) Disengage the BACKUP ANTI-ICE circuit breaker.
  (a) Make sure that pump 2 operation stops.
(6) Make sure that there is no fluid leakage from the couplings.
(7) Put the BACKUP switch in the OFF position.
(8) Engage the BACKUP ANTI-ICE circuit breaker.
(9) Put the EXTERNAL POWER switch on the pilot's switch panel in the OFF position.
(10) Do the Return to Service procedures or continue the applicable test(s).

D. Do a Test of the Windshield Pump.
(1) Make sure that there is enough fluid in the tank to keep the pump from running dry during the test procedure.
(2) Supply external electrical power to the airplane.
(3) Put the EXTERNAL POWER switch on the pilot's switch panel in the BUS position.

CAUTION: Do not operate the windshield pump for more than 10 seconds continuously, and wait 10 seconds between pump operations before you operate the pump again. Damage to the windshield pump can occur if the pump is operated for more than the specified limit.

(4) Put the MAX FLOW switch on the ANTI-ICE FLUID CONTROL switch panel in the WINDSHIELD position, then release the switch.

NOTE: The windshield pump will start when you put the spring-loaded MAX FLOW switch in the WINDSHIELD position and it will spray fluid on the windshield for four seconds after you release it.

  (a) Make sure that the windshield pump starts.
  (b) When the pump stops make sure that a minimum of 25 ml was discharged in the collection bucket.
(5) After the windshield pump stops, disengage the W/S ANTI-ICE circuit breaker.
(6) Put the MAX FLOW switch in the WINDSHIELD position, then release the switch.
  (a) Make sure that the windshield pump does not operate.
(7) Make sure that there is no fluid leakage from the couplings.
(8) Engage the W/S ANTI-ICE circuit breaker.
(9) Remove external electrical power from the airplane.
(10) Do the Return to Service procedures or continue the applicable test(s).

E. Do a Test of the Fluid Level Sender.
(1) Supply external electrical power to the airplane.
(2) Put the EXTERNAL POWER switch on the pilot's switch panel in the BUS position.
(3) For airplanes with the G1000 do the steps that follow:
  (a) Put the AVIONICS 1 switch to the ON position.
  (b) Put the AVIONICS 2 switch to the ON position.
(4) Drain the tank.
(5) Make sure that there is a fluid quantity indication of E GAL on the ANTI-ICE QTY gage or that the A-ICE GAL 0.0 indication shows on the MFD display as applicable.

NOTE: You must calibrate the level sender if it does not read zero when the tank is empty.

(6) Fill the tank.
(7) Make sure that there is a fluid quantity indication of 20 GAL on the ANTI-ICE QTY gage or that the A-ICE GAL 20.8 indication shows on the MFD display as applicable.
(8) Put the PRIMARY switch to the OFF position.
(9) To calibrate the fluid level sender, if necessary, refer to Fluid Level Sender Calibration in this section.

(10) Do the Return to Service procedures or continue the applicable test(s).

F. Do a Test of the Low Level Switch.

(1) Remove the anti-ice fluid from the tank. Refer to TKS Anti-Ice Fluid Tank Components - Maintenance Practices.

(2) Supply external electrical power to the airplane.

(3) Put the EXTERNAL POWER switch on the pilot's switch panel in the BUS position.

(4) For airplanes with the G1000 do the steps that follow:

(a) Put the AVIONICS 1 switch to the ON position.

(b) Put the AVIONICS 2 switch to the ON position.

(5) Put the PRIMARY switch on the ANTI-ICE FLUID CONTROL switch panel in the NORM position.

(6) Make sure that the A-ICE LOW FLUID (amber) CAS message shows on the EICAS display or the TKS annunciator shows WARN (amber) , as applicable.

(7) Put the PRIMARY switch in the OFF position

(8) Add 4.0 gallons of fluid to the tank.

(9) Put the PRIMARY switch on the ANTI-ICE switch panel in the NORM position.

(10) Make sure that the A-ICE LOW FLUID (amber) CAS message does not show on the EICAS display or the TKS annunciator does not show WARN, as applicable.

(11) Make sure that there is no fluid leakage from the couplings.

(12) Put the PRIMARY switch in the OFF position

(13) Do the Return to Service procedures or continue the applicable test(s).

G. Do a Test of the High Pressure Switch.

(1) Supply external electrical power to the airplane.

(2) Put the EXTERNAL POWER switch on the pilot's switch panel in the BUS position.

(3) For airplanes with the G1000 do the steps that follow:

(a) Put the AVIONICS 1 switch to the ON position.

(b) Put the AVIONICS 2 switch to the ON position.

(4) Connect a pressure gage and shutoff valve to the filter manifold outlet tube.

(a) Close the shutoff valve.

(5) Put the PRIMARY switch on the ANTI-ICE FLUID CONTROL switch panel in the HIGH position.

(6) Monitor the pressure gage.

(a) Wait until the pressure gage shows a 150 psi indication.

NOTE: This makes sure that the high pressure switch is operating correctly.

(7) Put the PRIMARY switch in the OFF position.

(8) Put the EXTERNAL POWER switch on the pilot's switch panel in the OFF position.

(9) Slowly open the shutoff valve.

(10) Disconnect the pressure gage and shutoff valve from the tube.

(11) Do the Return to Service procedures or continue the applicable test(s).

H. Do a Test of the Timer Box.

(1) Make sure that there is enough fluid in the tank to keep the pump from running dry during the test procedure.

(2) Supply external electrical power to the airplane.

(3) Put the EXTERNAL POWER switch on the circuit breaker switch panel in the BUS position.

(4) Put the ANTI-ICE-FLUID CONTROL, PRIMARY switch (SI022) on the left switch panel in the NORM position.

(a) Make sure that each of the two pumps operate for 20 seconds, +3 or - 3 seconds.

(5) Make sure that there is no fluid leakage from the fittings.

(6) While the pumps are off, Put the ANTI-ICE-FLUID CONTROL, MAX FLOW switch in the AIRFRAME position.

(a) Make sure that each of the two pumps operate for 120 seconds, +10 or - 20 seconds, and then do not operate

for 100 seconds, +10 or -10 seconds.

(7) Put the PRIMARY switch in the OFF position.

(8) Do a test of the windshield pump. Refer to Do a Test of the Windshield Pump in this section.

(9) Put the EXTERNAL POWER switch on the circuit breaker switch panel in the OFF position.

(10) Do the Return to Service procedures or continue the applicable test(s).

I. Do the Airplane Return to Service.

NOTE: After you have completed the applicable test(s), it is necessary to put the airplane back to its initial configuration.

(1) Make sure that there is no fluid leakage from the couplings.

(2) Make sure that all applicable connectors, fasteners, and couplings are installed correctly and safetied as necessary. Refer to Chapter 20, Safetying - Maintenance Practices.

(3) Put the aft bulkhead in position in the cargo pod.

(4) Turn the quarter-turn fasteners that attach the aft bulkhead to the drip pan and the cargo pod.

(5) Install the screw and nut that attaches the bonding jumper to the bulkhead.

(a) Make sure that there is a good electrical bond. Refer to Chapter 20, Electrical Bonding - Maintenance Practices.

(6) Install the screws and connect the antenna coaxial cable and conduit, if necessary.

(7) Make sure that all circuit breakers are engaged.

(8) Make sure that all system switches are in their initial positions.

(9) Make sure that external electrical power is removed from the airplane.

(10) Make sure that the cargo pod door(s) is closed.

(11) Make sure that the floor and the airplane surfaces are clean.

4. TKS Anti-Ice Level Sender Calibration

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.

WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.

CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.

CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.

NOTE: To make sure that the level sender is calibrated correctly, you can do this calibration procedure. The voltmeter will show 0.0 VDC when the tank is empty and 5.0 VDC, +0.1 or -0.1 VDC when the tank is full.

NOTE: When the tank is empty and the EICAS display or the gage shows 0.0 gallons, calibration of the empty adjustment is not necessary. You can then fill the tank and calibrate the level sender full adjustment.

NOTE: Changes in the properties of the anti-ice fluid can occur because of differences between manufacturers, or if the fluid is new (fresh), or if the fluid has gone through the tank and TKS system, or if the fluid has been in the tank too long (the TKS system has not been operated). These fluid changes can cause different results in calibration.

A. Calibrate the Level Sender (Refer to Figure 501).

(1) Make sure that the airplane is level. Refer to Chapter 8, Leveling - Maintenance Practices.

(2) Open the forward-center cargo pod door.

(3) Connect one lead of the voltmeter to the SEND post of the level sender.

(4) Connect the other lead of the voltmeter to the NEG post of the level sender.

(5) Supply external electrical power to the airplane.

(6) To calibrate the level sender with an empty tank, do the steps that follow:

(a) Remove the protective coating from the EMPTY adjustment screw.

NOTE: This screw is on the right side (airplane's right side) of the level sender.

(b) Use a screwdriver to turn the EMPTY adjustment screw counterclockwise until the voltage on the voltmeter does not go lower. Turn the screw clockwise until 0.0 VDC, +0.1 or -0.1 VDC, shows on the voltmeter.

(7) To calibrate the level sender with a full tank, do the steps that follow:

(a) Remove the protective coating from the FULL adjustment screw.

NOTE: This screw is on the left side (airplane's left side) of the level sender.

(b) Use a screwdriver to turn the FULL adjustment screw until 5.0 VDC, +0.1 or -0.1 VDC, shows on the voltmeter.

(8) Remove external electrical power from the airplane.

(9) Disconnect the leads of the voltmeter from the level sender.

(10) Put a protective coating on the adjustment screw(s).

(11) Close the cargo pod door.

(12) Clean the floor and the airplane surfaces as necessary.

Figure 501 : Sheet 1 : Level Sender Calibration