



SERVICE BULLETIN

Beech Bonanza

TKS ICE PROTECTION SYSTEM

Main Metering Pump

Continuing Airworthiness Flow Rate Check

Issue	Date	Compiled	Checked	CAV Approved	Description
1	November 7, 2019	DMW			New Document



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1. Planning Information

A. Effectivity

This Service Bulletin is applicable to the following models of Bonanza aircraft fitted with an Inadvertent TKS Ice Protection System: 35-33, 35-A33, 35-B33, 35-C33, 35-C33A, E33, E33A, F33, F33A, G33, 36, A36 except E-1946 and E-2104, G36, A36TC, B36TC, S35, V35, V35A, and V35B

Components Affected

Part Numbers: 9511AF248-124-14V, 9511AF248-124-28V, 9511AF268-134-28V, 9511AAF248-124-14V, 9511AAF248-134-28V, 9511AAF268-134-28V, 9511AAL248-124-14V, 9511AAL248-124-28V, 9511AAL268-134-28V, 9511AL248-124-14V, 9511AL248-124-28V, 9511AL268-134-28V

Mod Number: *N/A*

Description: *Metering Pump*

Qty per aircraft: *1*

B. Concurrent Requirements

None

C. Reason

To validate pump performance is still within acceptable standards for those pumps that have been in service for more than 5 years or 2000 flight hours of service. History shows that complete pump failure is rare, but flow rate decline with pump age is common. Pumps left in service that perform below their design specification may compromise the overall performance of the system.

D. Compliance

Mandatory:

This Service Bulletin should be complied with no later than the next annual aircraft inspection and is part of the TKS Ice Protection System Continuing Airworthiness.



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E. Manpower

Pump flow output test: Approximately 120 minutes per aircraft.

Corrective action: 120 minutes (note: only applies if initial test fails).

F. Weight and Balance

No effect on weight and balance.

G. Electrical Load Data

No effect on electrical load data.

H. Software Accomplishment

Not applicable.

I. Publications Affected

No CAV Ice Protection publications affected.

J. Interchangeability or Intermix ability of Parts

Not applicable.

2. Material Information

A. Material – Price and Availability

Overhauled and Consumable parts, if required, are available from CAV Ice Protection. Price on application.

(Address): CAV Ice Protection Inc., 30 Leawood Drive, New Century, Kansas, 66031 U.S.A, (Telephone): (913) 738-5390

(Address): CAV Ice Protection Ltd., Unit 1, No.1 Industrial Estate, Consett, Co. Durham, DH8 6SR, U.K, (Telephone): 01207 582811

B. Industry Support Information

Remaining warranty unaffected



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C. Material Necessary for Continuing Airworthiness Pump Flow Rate Check

Table 1: Materials necessary for Testing

Part Number	Description	Qty
TTF135134	5/16" Nylon Tubing	2ft
MN101-20	5/16" Olive	1
MN4855	5/16" Nut	2
S1201-20	5/16" Seal	2
T300-120A	5/16" Clenching Tool	1
03-151-7	7/16" Nylon Ball	1
MN4852	5/16" Coupler	1
30-09-06	Tube and Coupling Manual	1

D. Reidentified Parts

Not applicable.

E. Tools in Addition to those Required for Annual Inspection

- (1) 2 – 5 Gallon Bucket
- (2) 500ml measuring Cup with 5 ml resolution
- (3) Voltmeter
- (4) Stopwatch



CAV Ice Protection Inc.

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3. Accomplishment Instructions

A. Gaining Access to the Main Metering Pump

- (1) Reference the appropriate aircraft maintenance manual, to elevate the aircraft 4 – 6 inches off the ground.
- (2) With one person in the cockpit and another outside the aircraft, raise the landing gear by first pulling the gear motor circuit break out, selecting gear up, and then “bumping” the gear breaker so that the inboard main landing gear door drops approximately 45°. Turn off the aircraft master switch and place a lock-out collar on the gear circuit breaker.
- (3) Refer to installation manual 4500INS, installation drawings (4500-90), or Figure 1 to locate main metering pump within right hand gear well.

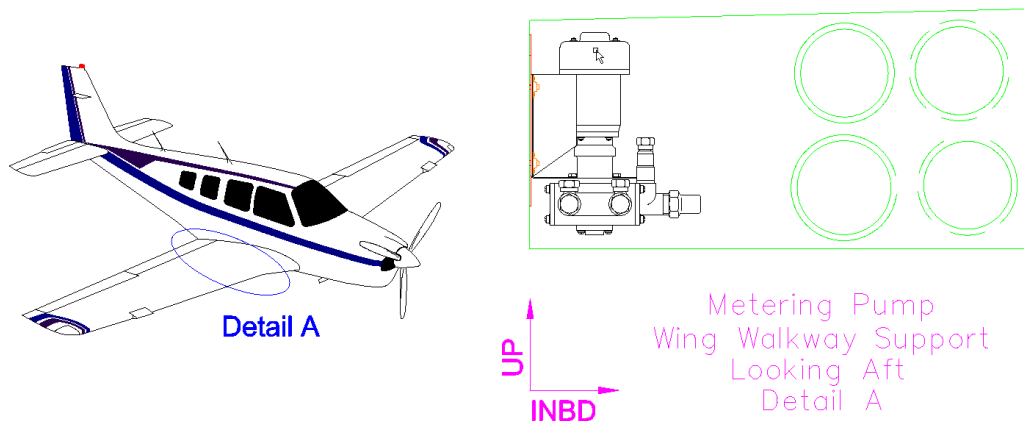


Figure 1: Pump Location

B. Main Metering Pump Flow Rate Test Set-Up

- (1) Disconnect outlet line, circled in Figure 2, from the pump and cap the disconnected line using the following items:

Table 2: Line Cap

Part Number	Description	Qty
03-151-8	1/2" Nylon Ball	1
MN4852	5/16" Coupler	1
MN4855	5/16" Nut	1



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Figure 2: Pump Outlet Location

- (2) Using the following items and manual 30-09-46, assemble a line to attach to the outlet of the pump.

Table 3: Outlet Flow Rate Test Line

Part Number	Description	Qty
TTF135134	5/16" Nylon Tubing	2ft
MN101-20	5/16" Olive	1
MN4855	5/16" Nut	1
S1201-20	5/16" Seal	1
03-151-8	5/16" Clenching Tool	1

- (3) Connect line, assembled in step 2, to the pump outlet.
- (4) Place a bucket under the line attached to the pump in step 3.
- (5) Connect Voltmeter to the pump wiring. Positive to the red wire (labeled LO when performing an "Anti-ice" flow rate test or labeled HI when performing a "De-ice" flow rate test), and negative to the white wire labeled G.



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C. Preform Anti-Ice Pump Flow Test

Note: Use the following steps in conjunction with Table 4 and Anti-ice Flow Rate Worksheet found in Appendix A.

- (1) Turn on master aircraft power.
- (2) Place open end of pump outlet test tube into bucket.
- (3) Select 'Anti-Ice' mode on the TKS Control Panel.
- (4) Record pump voltage (at the pump) on Line 1 of the worksheet.
- (5) Allow fluid to run for a minimum of 30 seconds.
- (6) Quickly switch the outlet flow to the the 500ml measuring cup and start the stopwatch.
- (7) Capture fluid for one minute.
- (8) During the one minute period record the pump voltage (at the pump) on Line 2 of the worksheet.
- (9) At the one-minute mark quickly move the outlet fluid flow from the measuring cup to the bucket.
- (10) Select 'Off' on the TKS Control Panel.
- (11) Record fluid amount from measuring cup on Line 3 of the worksheet.
- (12) Follow the remaining worksheet steps (Lines 4 through Lines 11b).



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D. Perform De-Ice Pump Flow Test

Note: Use the following steps in conjunction with Table 5 and De-ice Flow Rate Worksheet found in Appendix B

- (1) Turn on master aircraft power.
- (2) Place open end of pump outlet tube into bucket.
- (3) Select 'De-Ice' mode on the TKS Control Panel.
- (4) Record pump voltage (at the pump) on Line 1 of the worksheet.
- (5) Allow fluid to run for a minimum of 30 seconds.
- (6) Quickly switch the outlet flow to the the 500ml measuring cup and start the stopwatch.
- (7) Capture fluid for one minute.
- (8) During the one minute period record the pump voltage (at the pump) on Line 2 of the worksheet.
- (9) At the one minute mark quickly move the outlet fluid flow from the measuring cup to the bucket.
- (10) Select 'Off' on the TKS Control Panel.
- (11) Record fluid amount from measuring cup on Line 3 of the worksheet.
- (12) Follow the remaining worksheet steps (Lines 4 through Lines 11b).



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E. Actions Based on Results

- (1) For pumps that pass the flow test, the pump can be returned to service. and tested again per this SB at the next annual inspection.
 - a) For return to service instruction see Section 3.F.
- (2) For pumps that do not pass the test, the pump should be overhauled or replaced to restore the system flow to specification (see 2.A. of this SB for availability of new and overhauled pumps).
 - a) Pumps that are replaced or overhauled would not need to be tested per this SB until they meet the 5 years or 2000 flight hours of service.

F. Completion

- (1) Remove the tube connected to the pump outlet in Step 3.B.(3)
- (2) Remove coupler attached to the disconnected tube in Step 3.B.(1).
- (3) Reconnect the tube that was disconnected in Step 3.B.(1) to pump outlet using.

Part Number	Description	Qty
S1201-20	5/16" Seal	1

- (4) Remove lock out collar from the gear circuit breaker. Consult the appropriate aircraft maintenance manual to ensure the landing gear is cycled and returned to the "gear down" configuration before removing the aircraft from the elevated position.
- (5) Run ice protection system until all panels have fully wetted out.



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Appendix A

Anti-Ice Mode Flow Rate Worksheet

- Line 1. Measured Voltage from Step 3.C.4 _____
- Line 2. Measured Voltage from Step 3.C.8 _____
- Line 3. Measured Flow Rate from Step 3.C.11 _____
- Line 4. Add Line 1 and Line 2 _____
- Line 5. Divide Line 4 by the number 2 _____
- Line 6. Find Aircraft model in Table 4 and enter LO Voltage _____
- Line 7. Divide Line 5 by Line 6 _____
- Line 8. Find Aircraft model in Table 4 and enter Flow Rate _____
- Line 9. Multiply result from Line 7 by Line 8 _____
- Line 10. Is Line 3 value greater than or equal to Line 9 value _____
- Line 11a. If yes, record Pass _____
- Line 11b. If no, record Fail _____

Table 4: Aircraft Pump Anti-Ice Flow Rate Cross-reference

Model	Anti-ice Flow Rate (ml)	LO Voltage (V)
35-33	124	13.8
35-A33	124	13.8
35-B33	124	13.8
35-C33	124	13.8
35-C33A	124	13.8
E33	124	13.8
E33A	124	13.8
F33	124	13.8
F33A	124	13.8/27.5*
G33	124	13.8
36	124	13.8
A36	124	13.8/27.5*
G36	124	27.5
A36TC	124	27.5
B36TC	134	27.5
S35	124	13.8
V35	124	13.8
V35A	124	13.8
V35B	124	13.8/27.5*

*1978 or later model year aircraft



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Appendix B

De-Ice Mode Flow Rate Worksheet

- Line 1. Measured Voltage from Step 3.D.4 _____
- Line 2. Measured Voltage from Step 3.D.8 _____
- Line 3. Measured Flow Rate from Step 3.D.11 _____
- Line 4. Add Line 1 and Line 2 _____
- Line 5. Divide Line 4 by the number 2 _____
- Line 6. Find Aircraft model in Table 5 and enter HI Voltage _____
- Line 7. Divide Line 5 by Line 6 _____
- Line 8. Find Aircraft model in Table 5 and enter Flow Rate _____
- Line 9. Multiply Result from Line 7 by Line 8 _____
- Line 10. Is Line 3 value greater than or equal to Line 9 value _____
- Line 11a. If yes, record Pass _____
- Line 11b. If no, record Fail _____

Table 5: Aircraft Pump De-Ice Flow Rate Cross-reference

Model	Anti-ice Flow Rate (ml)	LO Voltage (V)
35-33	248	13.8
35-A33	248	13.8
35-B33	248	13.8
35-C33	248	13.8
35-C33A	248	13.8
E33	248	13.8
E33A	248	13.8
F33	248	13.8
F33A	248	13.8/27.5*
G33	248	13.8
36	248	13.8
A36	248	13.8/27.5*
G36	248	27.5
A36TC	248	27.5
B36TC	268	27.5
S35	248	13.8
V35	248	13.8
V35A	248	13.8
V35B	248	13.8/27.5*

*1978 or later model year aircraft