

Honeywell

Bill Gill

Air Safety Investigator

Olathe, Kansas



Mr. Timothy W. Monville
Senior Air Safety Investigator
National Transportation Safety Board
45065 Riverside Parkway
Ashburn, VA 20147

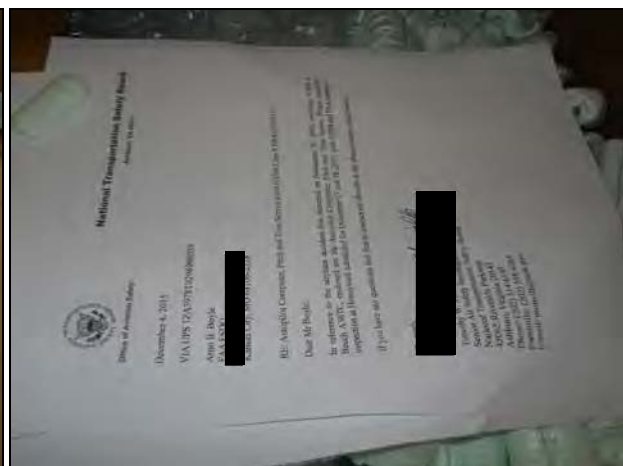
November 16, 2016

Re: NTSB ID: ERA16FA043, N7FG, Beech A36TC; Honeywell examination

Dear Mr. Monville,

The equipment identified below from N7FG was examined at our facility in Olathe, Kansas, on December 17/18, 2015. Inspector Arno Boyle with the FAA Kansas City FSDO and Mr. Tim Monville, NTSB IIC, hand carried the components to the Honeywell site in sealed boxes. Parties present during the inspection included: Mr. Bryan Weber, Textron Aviation; Mr. Mike Council, Continental Motors; Mr. Mike Foster, Honeywell; Mr. Bill Gill, Honeywell; Mr. Arno Boyle, FAA; and Honeywell Repair & Overhaul support personnel. Following the examination, the components were boxed and remained in the NTSB/FAA's custody.

1. KS 270 Pitch Servo, P/N 065-00027-0002, S/N 9445
2. KM 275 Pitch Servo Mount, P/N 065-00030-0000, S/N 15810
3. KS 272 Pitch Trim Servo, P/N 065-00029-0013, S/N 7412
4. KM 276 Pitch Trim Servo Mount, P/N 065-00031-0000, S/N 5638
5. KC 295 Flight Computer, 065-00034-0000, S/N 7262 (inspection 12/2015)
6. KC 295 Flight Computer, 065-00034-0000, S/N 7262 (inspection 06/2016)
7. KC 295 Adapter Card, P/N 065-05009-0060, S/N 10760
8. KI 256 Flight Command Indicator, P/N 060-00017-0000, S/N 23409
9. KC 290 Mode Controller, P/N 065-00033-0001, S/N unknown



Items hand-carried by the FAA to Honeywell

Honeywell

The items inspected were removed from N7FG approximately 72 hours after the aircraft crashed into Clear Lake in Orlando, Florida. The aircraft and its components were submerged in the fresh-water lake for about 30 hours. After the aircraft was recovered, it was moved to a storage facility in Jacksonville, Florida. The components to be inspected at Honeywell were removed, rinsed in de-mineralized water, and shipped to the NTSB Lab in Washington D.C. where the components were cleaned and dried.

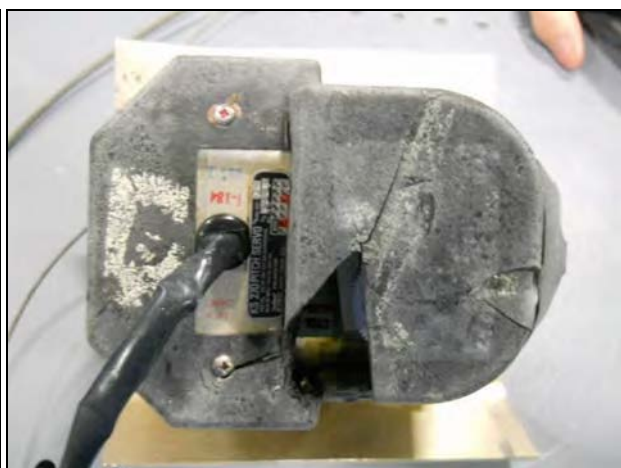
1. KS 270 Pitch Servo, P/N 065-00027-0002, S/N 9445

The KS 270 Pitch Servo was subjected to visual and electrical testing. The following observations were noted:

- The KS 270 Pitch Servo was received attached to servo mount and aircraft bracket. They were separated to facilitate testing.
- The plastic servo cover was loose and partially broken away, exposing internal components.
- The cover was removed to allow visual inspection. A screw was found inside the unit that was installed to secure a bracket containing the motor drive transistors. The threads of the screw contain material with an "aluminum" color. The hole where the screw was installed was absent of threads. Minor traces of corrosion/oxidation present.
- The bracket that attaches the tach motor to the servo motor was bent, preventing gear engagement between the tach motor and servo motor. The bracket was straitened to allow gear engagement.
- The servo was subjected to acceptance testing per maintenance manual, 006-05557-0008. The unit failed few tests with minor out-of tolerance measurements as noted below. None of the failures would adversely affect proper servo function. A copy of the test procedure with data and Service Aid SA KS 270/A-105 can be found in appendix A of this report.
 - Test 5.3.3.2(C) (1) (a) Chassis Ground: chassis ground measured 1.2 ohms – limit is 1 ohm max. The missing screw noted above impacts this test.
 - Test 5.3.3.6 Motor Breakout and Direction: initial measurement of -4.6 volts caused capstan movement. Limit is capstan movement should occur before negative going ramp reads -3.65 volts. Retesting was acceptable with a reading of -3.5 volts.
 - Test 5.3.3.7 Autotrim Torque Limit Switch: fails in the clockwise direction with a reading of 6.2 in-lbs. Limit is 6.5 in-lbs minimum. Removing the torque should cause the CW and CCW lamps to extinguish less than 4 in-lbs from initial readings of 6.5 in-lbs CW and 6.2 in-lbs CCW -- unit failed with readings of 1.8 in-lbs CW and 1.7 in-lbs CCW (limit 2.5 and 2.2 in-lbs respectively).
 - Test 5.3.3.8 Capstan Speed: failed capstan speed with measurements of 56.13 seconds CCW and 56.47 seconds CW. Limit is 2 revolutions in 50 +5/-6 seconds. Fails tach voltage output with a reading of 2.35V CCW – limit is 2.4 volts minimum -- see Service Aid SA KS 270/A-105.
- The KS 270 Pitch Servo was inserted into a KFC 200 bench system for functional testing. The servo engaged/disengaged normally, servo operation satisfactory when commanded for CW and CCW operation, and produces an auto trim command when CW or CCW torque is applied to the capstan of engaged servo. The Pitch Servo passes functional testing.



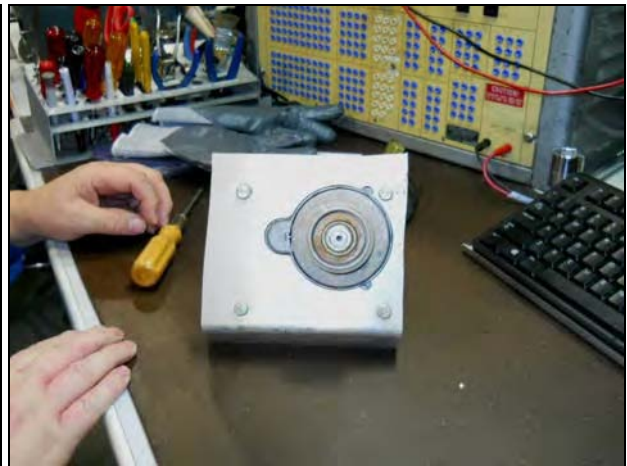
KS 270 Pitch Servo Dataplate: P/N 065-0027-02, S/N 9445



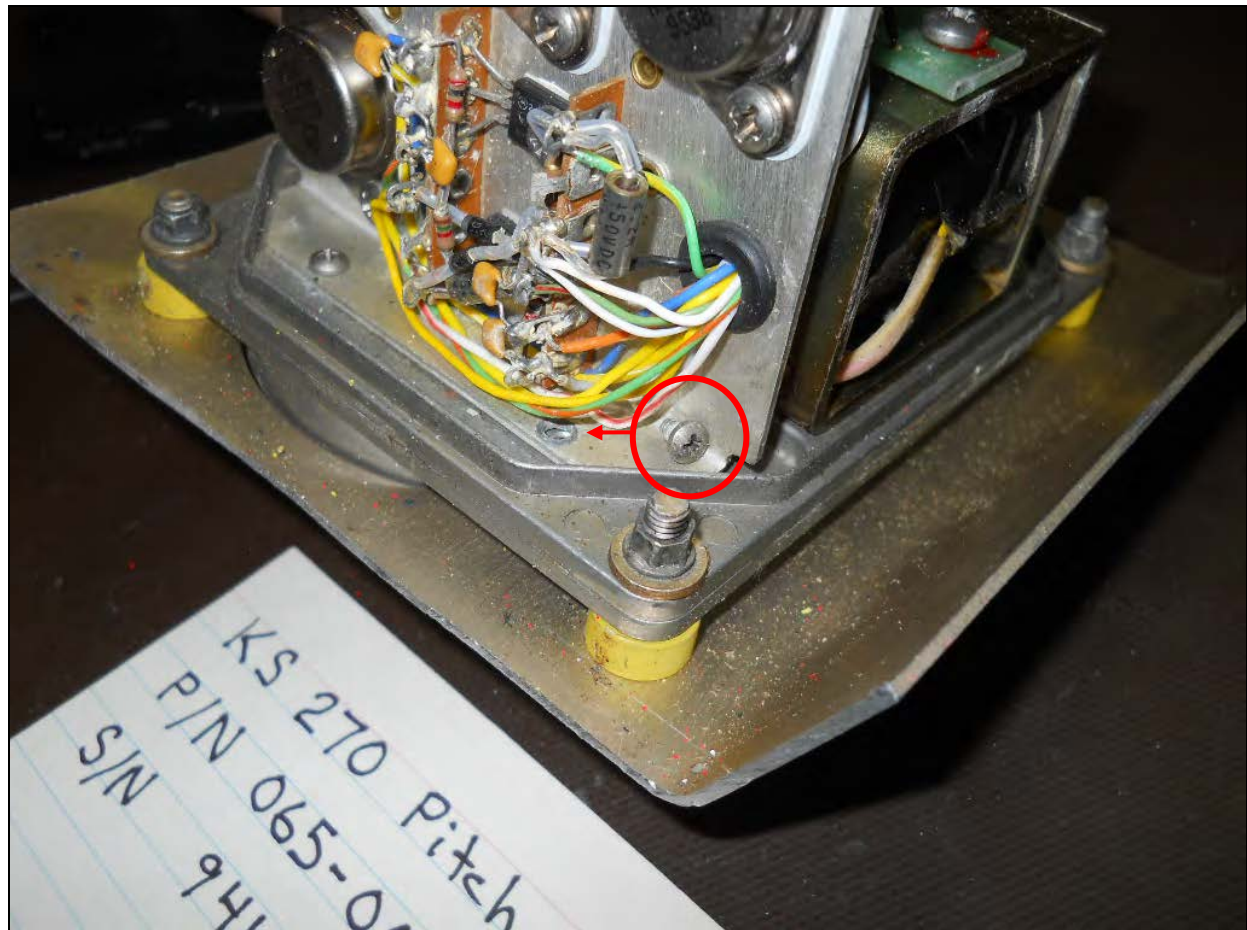
KS 270 Pitch Servo: cover impact damaged, internal damage



KS 270 Pitch Servo: internal damage – bracket bent, gears don't mesh



KS 270 Pitch Servo received with servo mount and aircraft bracket



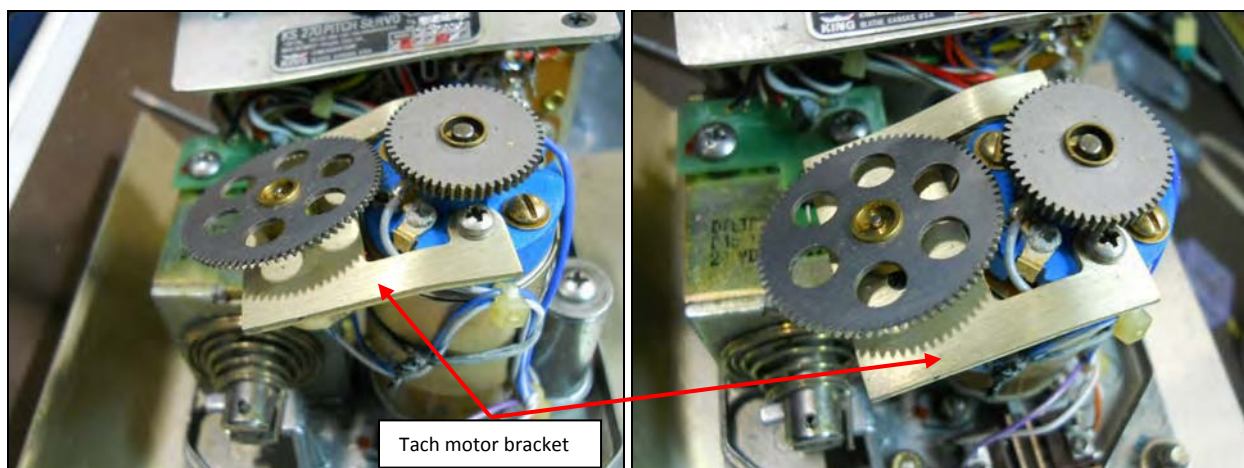
KS 270 Pitch Servo: Cover removed to allow visual inspection. Found a screw loose inside, containing aluminum colored material in threads. The screw(s) secures the circuit module assembly, P/N 200-1671-03 to the baseplate assembly -- screw installs where indicated in the photo above. Visual inspection also revealed that the threads in the baseplate missing/damaged where the screw installs. The following photos depict the thread damage.



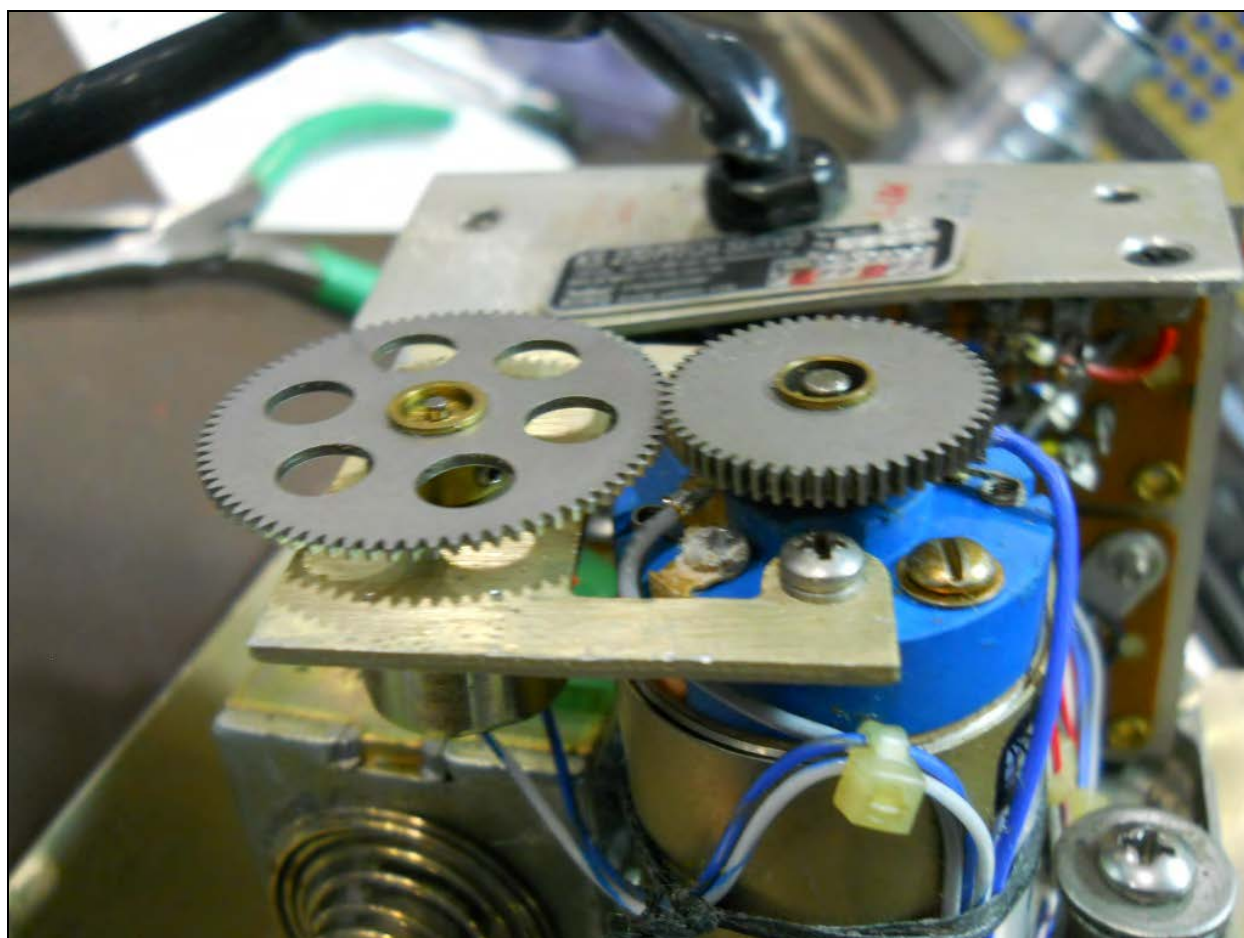
Screw securing circuit module assembly to the base plate assembly. Aluminum colored material located in the threads. The screw installs in the servo baseplate location shown in the following photo – notice damage or absence of threads.



Screw hole in the servo baseplate – thread damage



KS 270 Pitch Servo tach motor bracket bent/damaged not allowing gears to mesh

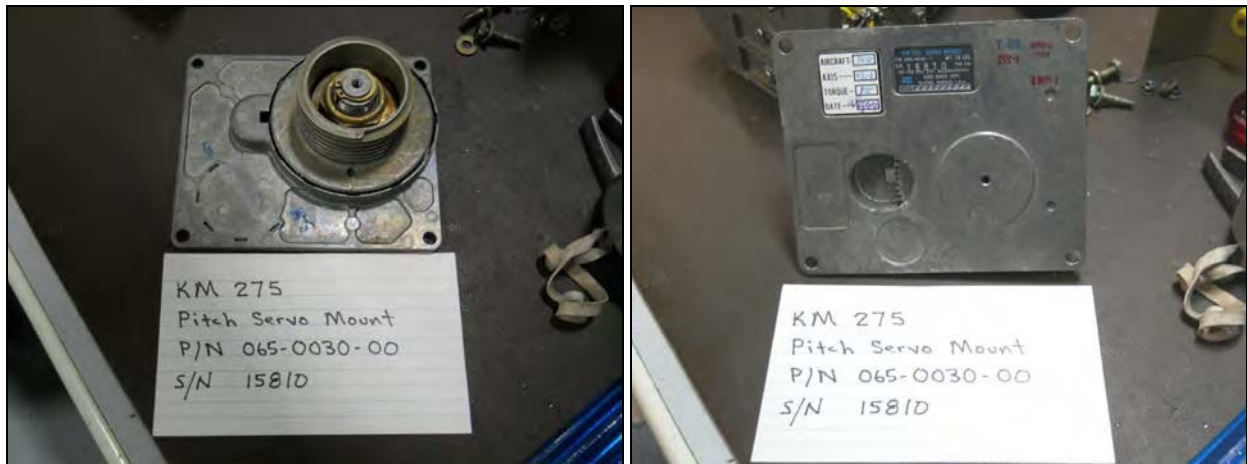


KS 270 tach motor bracket straightened to allow testing -- tach motor function satisfactory.

2. **KM 275 Pitch Servo Mount, P/N 065-00030-0000, S/N 15810**

The KM 270 Pitch Servo Mount was visually inspected and subjected to mechanical testing. The following observations were noted:

- The KM 270 Pitch Servo Mount was received attached to associated servo and aircraft bracket. They were separated to facilitate testing.
- Traces of rust/oxidation present.
- Small foreign particulate debris present.
- The slip clutch was tested in the clockwise and counter-clockwise directions. Initial test in the CW direction measured 19 in-lbs. Subsequent testing measured of 15 in-lbs in both CW and CCW directions. The specified limit is 13 +/- 2 in-lbs.



KM 275 Pitch Servo Mount: front and rear views – no obvious damage detected

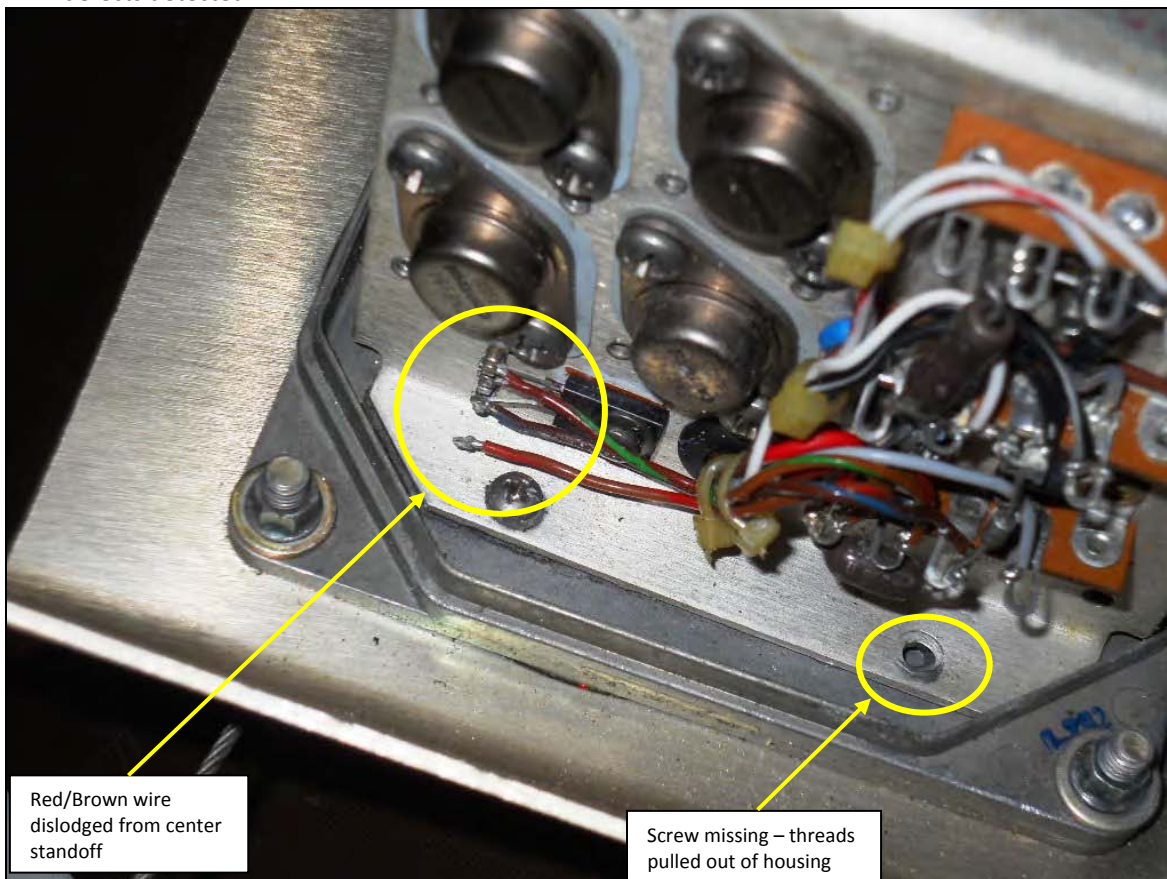


KM 275 Pitch Servo Mount dataplate: P/N 065-0030-00, S/N 15810

3. KS 272 Trim Servo, P/N 065-00029-0013, S/N 7412

The KS 272 Trim Servo was visually inspected and subjected to electrical testing. The following observations were noted:

- The KS 272 Trim Servo was received attached to servo mount and aircraft bracket. They were separated to facilitate testing.
- The plastic servo cover was loose and partially broken away, exposing internal components.
- Removed cover to allow visual inspection. The bracket that the cover attaches to is loose – one screw not installed (found screw in servo bag) and another screw partially backed out. The threads of the screw contain material with an “aluminum” color. The hole where the screw was installed was absent of threads. A red/brown wire is broken away from a standoff (manual electric trim circuit, collector lead of Q106).
- Jumper wires were installed to achieve chassis ground and connect the dislodged red/brown wire to facilitate electrical testing. The unit passed final acceptance testing except the regulator current foldback test per test step 5.3.3.6 and Manual Trim Torque test step 5.3.3.8 of test procedure 006-05557-0008. Further inspection revealed that the Current Foldback circuitry was not designed into production at the time this unit was manufactured; therefore, unit should not have been subjected to this test. Performing the Current Foldback test damaged the manual trim circuit component(s), providing no manual trim output. As a result, the Manual Trim Torque test could not be performed. The current foldback circuit makes the servo more robust, but does not affect proper operation of the servo. The servo functioned correctly prior to the circuit damage, including manual electric trim (tested with a slip clutch set at 7.5 in-lbs). A copy of the test procedure with data is located in appendix B of this report.
- The KS 272 Trim Servo was inserted into a KFC 200 bench system for functional testing. The servo engaged/disengaged normally, servo operation satisfactory when autotrim commanded for CW and CCW operation. Manual trim could not be performed due to the damaged manual trim circuit. No pre-impact defects detected.



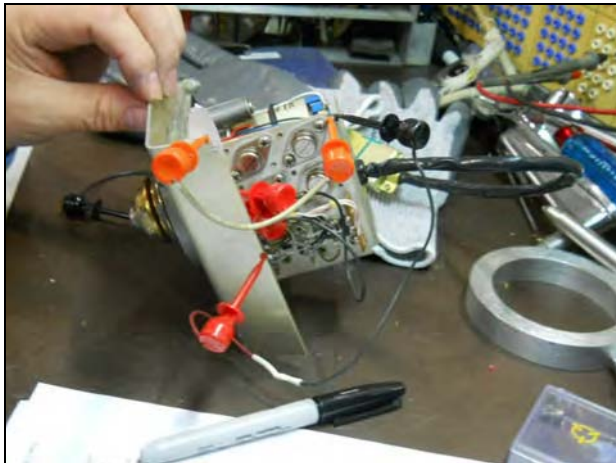
Visual inspection revealed a dislodged wire and missing screw. The screw was found in the bag the servo was packaged into.



KS 272 Trim Servo dataplate



KS 272 Trim Servo received with associated mount and aircraft bracket



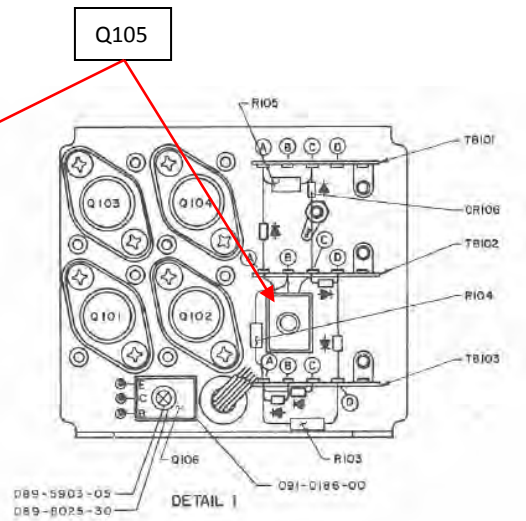
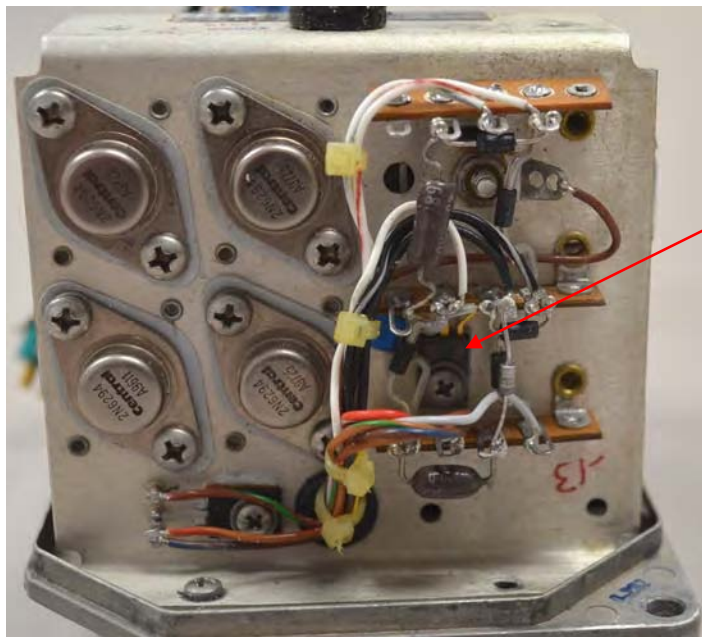
Jumpers used to achieve chassis ground and connect red/brown wire



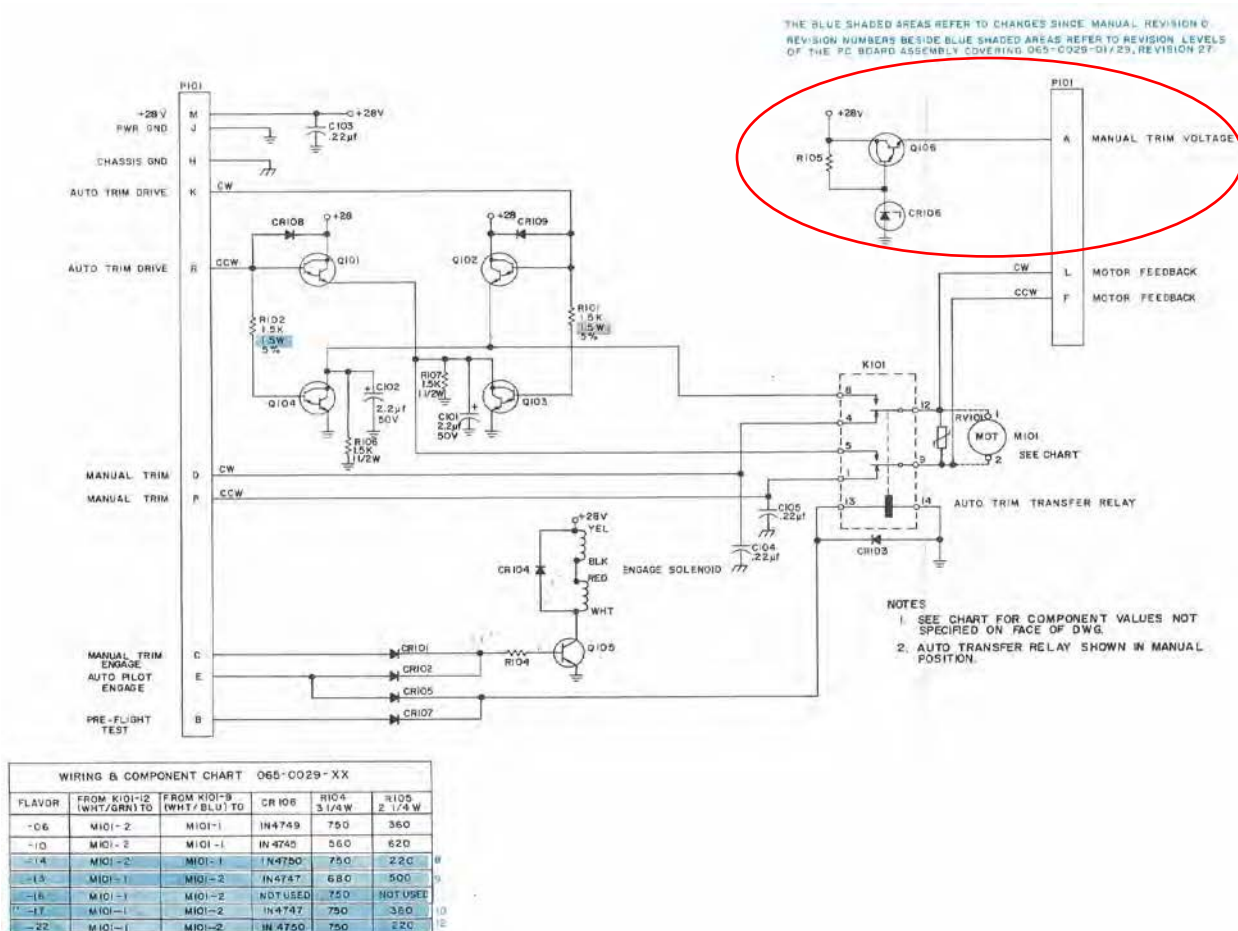
Rust/oxidation present



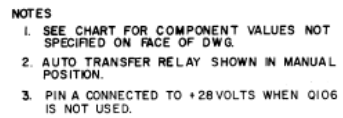
Screw securing circuit module assembly to the base plate assembly. Aluminum colored material in the threads.



KS 272 Trim Servo, S/N 7412 (manufactured prior to current foldback circuit incorporation)



Manual Trim circuit without the current foldback circuit incorporated circled above (KS 272, S/N 7412)



4. KM 276 Pitch Trim Servo Mount, P/N 065-00031-0000, S/N 5638

The KM 276 Trim Servo Mount was visually inspected and subjected to mechanical testing. The following observations were noted:

- The KM 276 Trim Servo Mount was received attached to associated servo and aircraft bracket. They were separated to facilitate testing.
- Cable guard leg damaged and out of position.
- The slip clutch was tested in the clockwise and counter-clockwise directions and found to meet specification. The clutch slipped at 28 in-lbs in the CW direction and 26.6 in-lbs in the CCW direction. The specified limit is 26 +/- 2 in-lbs.



KM 276 Servo Mount attached to trim servo and aircraft bracket



KM 276 Trim Servo Mount dataplate



KM 276 Trim Servo Mount (back view)

5. KC 295 Flight Computer, 065-00034-0000, S/N 7262

- The KC 295 Flight was received from the NTSB Lab in Washington DC in a disassembled state. The unit power supply remained in the chassis. The chassis and power supply were too big to go into the NTSB's special chamber for drying. All other circuit boards were subjected to a special cleaning and drying process by the NTSB.
- The power supply board contained several areas of oxidation which were cleaned by Honeywell's technician using isopropyl alcohol.
- The power supply was powered-up. All supply voltages (10V, 15V, -15V) were checked and found to meet specification.
- The KC 295 was assembled using a test adapter board to facilitate testing. The unit was connected to Automatic Test Equipment (ATE) and subjected to acceptance testing. The unit failed many tests – pitch drive tests were not functional. No determination was made as to source of failures. A copy of the ATE data is located in appendix C of this report.
- The KC 295 accident unit was inserted into an engineering system harness. The unit:
 - Passes preflight test per section IV, paragraph 7 of the Airplane Flight Manual Supplement (AFMS).
 - FD and AP modes engage/disengage normally.
 - Manual electric trim and autotrim satisfactory.
 - Roll servo responds when the KI 256 gyro is rotated left or right
 - Pitch servo does not respond when commanded via the vertical trim switch on the KC 290 mode controller or when the KI 256 gyro is tilted up or down. Also, no command bar action noted on the KI 256 gyro for pitch command.
 - The KS 270 Pitch Servo from the accident aircraft was inserted into the KFC 200 engineering harness. The pitch servo engaged/disengaged normally. When engaged and a CW or CCW torque is applied to the pitch servo capstan, a corresponding trim servo operation occurs – autotrim functions satisfactory.
 - The KS 272 Trim Servo was then inserted into the KFC 200 engineering harness. The trim servo engaged/disengaged normally. The trim servo functioned satisfactory when commanded for autotrim. Manual electric trim did not function (manual electric trim circuit damaged during previous testing noted during acceptance testing).
- The KC 295 accident unit was removed from the KFC 200 engineering harness and an exemplar KC 295 was inserted into the harness.
 - The KS 270 Pitch Servo was retested using the exemplar KC 295 Flight Computer. The pitch servo engaged/disengaged normally, responds to KI 256 gyro when tilted up or down, responds to up or down command from the vertical trim switch on the KC 290 mode controller, and provides an autotrim command to the trim servo when a CW or CCW torque is applied to the capstan when the servo is engaged. The KS 270 Pitch Servo, S/N 9445, passes functional testing.



KC 295 at the NTSB Lab, Washington DC



KC 295 Flight Computer as-received from the NTSB Lab – disassembled chassis on the left, circuit boards on the right

6. KC 295 Flight Computer, 065-00034-0000, S/N 7262 (inspection continued on 6/21/2016 – 6/23/2016)

The KC 295 Flight Computer was previously inspected in December, 2015. That inspection found that the pitch axis and Approach lateral modes were inoperative. During the inspection on 6/21, the pitch board was removed for microscopic visual examination – no faults were noted. The pitch board was then reinstalled and the KC 295 was powered-up. Several of the ATE tests did not meet the Minimum Performance Specifications (MPS) in December, 2015, were manually tested and now meet the specification.

The KC 295 was then subjected to ATE acceptance testing. The unit passed all pitch related tests except Pitch High Pass, step 10.9.1.0.8, where it did not meet the MPS limit of 0 volt +/- 0.1V with a reading of 2.45V. This condition would cause a minor altitude offset in Altitude Hold mode, but would not adversely affect proper autopilot function. The KC 295 also failed the same Approach lateral mode tests as in December, 2015 – HDG and Nav lateral modes ok.

On 6/22, the pitch board and associated chassis socket were visually inspected to address installation/alignment questions from the NTSB IIC. The pitch board interface is “keyed” to preclude misalignment or improper installation.

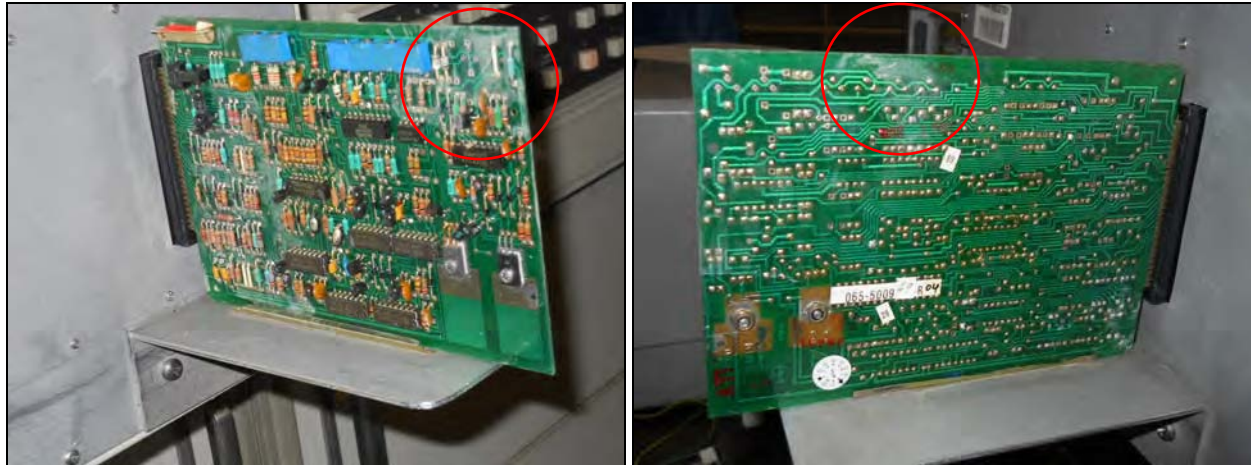
The KC 295 lateral board was removed for microscopic visual examination. Several white-chalky areas were detected and removed using a brush with isopropyl alcohol. The board was then placed in an oven at 55°C for fifteen minutes to dry the board from the alcohol clean. The KC 295 lateral board is “keyed” to preclude improper installation/misalignment. The KC 295 lateral was inserted into the KC 295 to allow trouble shooting of the failed Approach lateral mode. Troubleshooting found that I113 operational amplifier to be bad. I113 only affects Approach mode operation – HDG and Nav were ok. I113 was replaced and the KC 295 was again subjected to ATE acceptance testing. The KC 295 passed all tests except Pitch High Pass, step 10.9.1.0.8, where it did not meet the MPS limit of 0 volt +/- 0.1V with a reading of 2.32V. The Pitch High Pass tests an output to decay to 0 +/- 0.1V over an 80-second period. This condition would cause a minor altitude offset in Altitude Hold mode, but would not adversely affect proper autopilot function.

On 6/23, the KC 295 was inserted into a KFC 200 engineering test harness. The KC 295 passed preflight test. The KC 295 was then functionally tested to include NAV/HDG/APR modes engagement trim sense, auto trim, HDG and ALT hold. The KC 295 passed all functional tests. The op-amp, I113, which was installed during troubleshooting was removed following testing.

7. KC 295 Adapter Card, P/N 065-05009-0060, S/N 10760

The KC 295 Adapter Card was removed from the KC 295 Flight Computer and subjected to ATE acceptance testing. There were fourteen tests that did not meet the Minimum Performance Specification (MPS). The Adapter Board was NOT aligned as specified during the ATE testing as instructed by the NTSB IIC; therefore, the results were not unexpected. There are six potentiometers on the Adapter Board that require adjustment during aircraft installation or ATE acceptance testing. The technician reviewed the data and indicated that the Adapter Board would meet specification if allowed to align the board by adjusting the six potentiometers as required during ATE testing. ATE test report can be found in the appendix of this report.

Following ATE testing, the Adapter Board was reinstalled into the KC 295 Flight Computer. The KC 295 was then inserted into a KFC 200 engineering harness for functional testing. The KC 295 (and Adapter Card) passed functional testing.



KC 295 Adapter Card under test on ATE. White foreign material on board in areas circled above.



The six potentiometers were not adjusted during ATE testing to preserve post-accident condition

8. KI 256 Flight Command Indicator, P/N 060-00017-0000, S/N 23409

The KI 256 is impact damaged and cannot be functionally tested. The unit was disassembled and the gyro rotor and capsule assembly were visually inspected. Both rotor and capsule contain corrosion/oxidation. Rotor turns freely and exhibits minor roughness when spun. The rotor shaft endplay is slightly excessive. The bearings in the capsule are properly positioned and appear normal. The two fast erection vanes were dislodged from impact forces. No rotation scoring detected. No pre-impact anomalies observed.



KI 256 dataplate



KI 256: disassembling for visual inspection



KI 256: removing the capsule and rotor assembly





KI 256: rotor and capsule corroded



KI 256: no rotation scoring observed on the rotor or capsule

9. KC 290 Mode Controller, P/N 065-00033-0001, S/N unknown

The KC 290 mode controller is impact damaged and cannot be functionally tested. Crushing and deformation present, loose and broken parts observed, case broken and blocking view of serial number (dataplate). Careful visual inspection found the Auto pilot “bat switch” is in the off position.



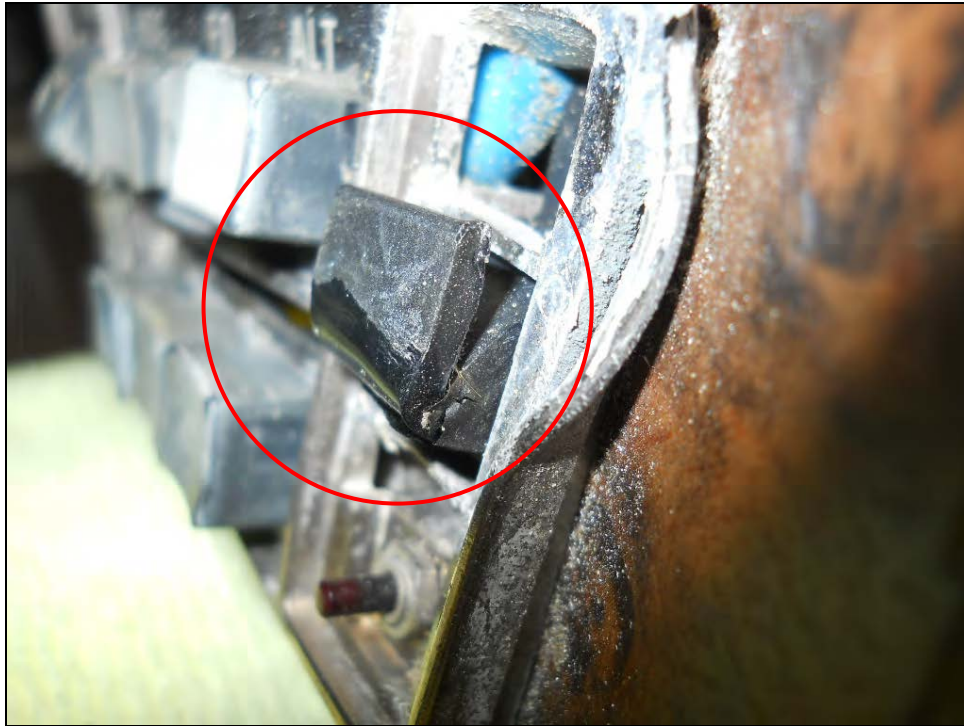
KC 290 Mode Controller is impact damaged which precludes functional testing



KC 290 accident unit



KC 290 exemplar unit



The AP on-off “bat switch” is circled above. The bat portion of the switch is bent upwards while the switch body is in the down, or off position.

The KM 276 Trim Servo Mount passed acceptance testing.

The KS 272 Pitch Trim Servo passed functional testing when inserted into a KFC 200 engineering system harness. This servo was then subjected to final acceptance testing where it passed all tests except Manual Trim Torque. The servo was electrically damaged before the Manual Trim Torque test could be conducted.

The KS 270 Pitch Servo and the KM 275 Pitch Servo Mount testing revealed some minor out-of-tolerance conditions, none of which would adversely affect proper autopilot function.

The KC 295 Flight Computer passed all acceptance testing except Pitch High Pass, which was marginally out-of-specification. This condition could cause a slight altitude offset in altitude hold mode, but would not affect proper autopilot function.

The KC 295 Adapter Card was tested without aligning the board as instructed by the NTSB. As expected, several tests were slightly out-of-tolerance. The test technician indicated that the out-of-tolerance conditions were due to not aligning the board as required for ATE testing, would have passed if aligned.

The KI 256 Flight Director and KC 290 Mode controller were impact damaged and could not be functionally tested.

Thank you for inviting Honeywell to assist with your investigation. No pre-impact defects were noted during this inspection. Please contact me should you have questions/comments.

Sincerely,

[Redacted Signature]

Bill Gill, Air Safety Investigator

Appendix

KS 270

Pitch Servo

5.3 TEST AND ALIGNMENT (KTS 151)

5.3.1 REQUIRED TEST EQUIPMENT

DESCRIPTION	CHARACTERISTICS REQUIRED	REPRESENTATIVE TYPE
KTS 151 Component Bench Tester		P/N 071-05030-0000
Multimeter	Capable of measuring VAC, VDC, Amps. and Ohms.	Fluke 8000A
Torque Wrench	TEP-1FUA, TEC-1FUA or TE25FUA.	Snap On
Torqur Wrench	TEP-6FUA or Equivalent	Snap On
Stop Watch		

5.3.2 KTS 151 BENCH TESTER

The KTS 151 has been designed to bench check a number of components in the KFC 200 Flight Control System. The KS 270 Servo is included in this group.

The tester is constructed around a main frame which contains the DC and AC signal sources, lamps which are used to annunciate modes and special situations, and the Pin Outs for the KS 270. Figure 5-3 shows the basic connection of the KS 270 to the KTS 151 Bench Tester. Portions of the tester used with the KS 270 are shaded in.

Further information concerning the KTS 151 Flight Control System Test Set can be found in the KTS 151 Maintenance Manual.

5.3.3 TEST PROCEDURES USING THE KTS 151

5.3.3.1 General

This section contains the test procedures to be used in conjunction with the Troubleshooting Chart in Section 5.5.

The procedures are divided into sections and are herein presented for quick access to specific tests.

KS 270 TEST PROCEDURE INDEX

5.3.3.2	Initial Setup Procedure
5.3.3.3	Solenoid Engage External Strapping Test
5.3.3.4	Solenoid Adjustment
5.3.3.5	Solenoid Low Voltage Engage
5.3.3.6	Motor Breakout and Direction
5.3.3.7	Autotrim Torque Limit Switch
5.3.3.8	Capstan Speed
5.3.3.9	Torque Characteristics
5.3.3.10	Tach Feedback

Section 5.3.3.2 contains the procedures necessary to prepare the KTS 151 Tester and the KS 270 Unit for troubleshooting. The section containing the KS 270 Unit preparation should be completed each time a new Unit is connected to the tester.

The remaining sections of 5.3.3 contain the procedures for testing the KS 270. Prior to the start of each procedure, all Test Set Controls should be positioned in accordance with Procedure 5.3.3.2. The only exception is Test Set Power which may be left ON if another procedure has just been completed. When these instructions are followed, any test procedure may be run independently without concern for the order of procedures previously run.

5.3.3.2 Initial Setup Procedure

A. Test Set Initialization

1. Place the Power Selector Switch to the OFF position.
2. Remove the KS 270 Test Cable. All other cables may remain stored inside the tester.
3. Place all pushbutton controls in the OUT position on the KTS 151 Tester.
4. Connect the DC Power Supply to the KTS 151 Tester Input Power Jacks.

WARNING

DO NOT CONNECT MORE THAN ONE UNIT TO THE KTS 151 AT ANY TIME

B. KS 270 Initialization

1. Connect the KS 270 to the Test Panel.

C. Test Set Power ON

1. Chassis Ground (Resistance Tests)

- a. Measure the resistance between pin N of the KS 270 Input Connector and the Servo Actuator metal case. The resistance should be less than one ohm. *1.2 Ω*
- b. Measure the resistance between pin J and C. The resistance should be greater than 200Kohms. Measure the resistance between pin R and C. The resistance should be greater than 200Kohms. *above 200K Ω*

2. The KS 270 should now be connected to the Servo Mount Stand which was supplied with the KTS 151 Component Test Set. When mounting the KS 270 to the test stand, tighten all four mounting bolts securely. Do not leave bolts loose or it will result in breakage of the guide pin on the KS 270 Base Plate. (See Figure 5-3). Do not install the Autotrim Setting Tool (PN 071-06021-0003) at this time. Adjust the slip clutch for 80 ± 5 in./lbs. *Mount Later*

3. Adjust the External DC Supply to +14 volts. Connect the KS 270 cable from the tester to the mating connector on the KS 270 Servo. Rotate the Power Input Select Switch to the +14VDC position. All buttons should be OUT, all switches shall be OPEN or OFF and all lamps shall be OFF with the exception of the +14V ON Lamp. *okay*

5.3.3.3 Solenoid Engage

External Strapping Test

Depress the AP Clutch Engage Button. The Solenoid on the KS 270 should engage smoothly and without hesitation. The Solenoid should disengage immediately when the AP Clutch Engage Button is again depressed. *okay*

Rotate the Power Input Select Switch to OFF and adjust the External DC Supply to +28VDC. Rotate the Power Input Select Switch to the +28VDC position. The +28V ON Lamp should illuminate. *okay*

With the Voltage Select Switch in the +28V position, depress the AP Clutch Engage Button. The Solenoid on the KS 270 should engage smoothly and without hesitation. The Solenoid should disengage immediately when the AP Clutch Engage Button is again depressed. *okay*

BENDIX/KING

KS 270
PITCH SERVO

5.3.3.4 Solenoid Adjustment

Depress the AP Clutch Engage Button and observe the position of the Servo Drive Gear with respect to the large gear on the Servo Mount. The Capstan should be able to rotate one quarter of a degree. If the rotation is greater than this or if there is no backlash at all, the Solenoid may be adjusted using the four screws which hold the Solenoid in place. Figure 5-5 shows the proper gear mesh between the Servo and the Mount. *within Limits*

5.3.3.5 Solenoid Low Voltage Engage

Turn Unit so the Solenoid must pull against gravity. Rotate Power Select Switch to OFF. Adjust External DC Power Supply to +14VDC. Rotate Power Select Switch to the +14VDC position. Connect a voltmeter to the AP Engage Input (pin E) and Power Ground (pin C). Slowly lower the +14VDC Power alternately engaging and disengaging the AP Engage Button. The Solenoid should engage and disengage smoothly and without hesitation. Determine the lowest voltage at which the Solenoid will engage. The voltage should be less than +9.1VDC. This test should be performed with the Solenoid at room temperature. *engages at 9.1*

Turn Unit so the Solenoid must pull against gravity. Rotate Power Select Switch to OFF. Adjust External DC Power Supply to +28VDC. Rotate Power Select Switch to the +28VDC position. Connect a voltmeter to the AP Engage Input (pin E) and Power Ground (Pin C). Slowly lower the +28VDC Power alternately engaging and disengaging the AP Engage Button. The Solenoid should engage and disengage smoothly and without hesitation. Determine the lowest voltage at which the Solenoid will engage. The voltage should be less than +20.6VDC. This test should be performed with the Solenoid at room temperature. *engages 20.6V*

5.3.3.6 Motor Breakout and Direction

Place the following controls in their corresponding position:

External Supply Voltage	+28VDC
Voltage Select Switch	+28V ON
Misc Selector	KS 270/271 Input Volts
Master Selector	Misc TP (Voltage)
AP Clutch Engage	IN

Depress the Stimulus 1 Engage Button and adjust the Stimulus 1 Control for 0.0VDC as read at the Master Selector Voltage Jacks. *-4.6 vol*

Depress the Ramp Button and monitor the input voltage as it begins to ramp negative. Depress the HOLD Button at the first indication of the Output Capstan beginning to turn. The Output Capstan should begin to rotate counterclockwise before the input voltage reads -3.65VDC. After the voltage measurement has been made, depress the Ramp Button again causing the input voltage to go to zero, and the HOLD button to the OUT position. Reverse the direction of the ramp by depressing the Invert Switch. Depress the Ramp Button and monitor the input voltage as it begins to ramp up. Depress the HOLD button at the first indication of the Output Capstan beginning to turn. The Output Capstan should begin to rotate clockwise before the input voltage reads +3.65VDC. Return all buttons to the OFF (OUT) position. *-4.6 initially then 3.5 then -3. +3.2 volts EJB*

5.3.3.7 Autotrim Torque Limit Switch

Place the Autotrim Setting Tool (provided with the test set) over the Capstan and secure it with the pin as referred to in (paragraph 5.3.3.2.). Engage the Solenoid by depressing the AP Clutch Engage Switch. Check the resistance between Pins J and C, and R and C. The resistance should be higher than 200Kohm. Using a 0 to 5 in/lb. Torque Wrench or Torque Wrench TE6FUA to rotate the Capstan in a clockwise direction, note the torque required to cause the Torque Limit CW Lamp to illuminate. The torque reading shall be within the value set up in Table 5-1.

J to C above 200K Ω

R to C above 200K Ω

6.5 in/lb CW

6.2 in/lb CCW

BENDIX/KING
KS 270
PITCH SERVO

KS 270	TORQUE
-01	6 + 1.0 in/lbs - 0.5 in/lbs
-02	6 + 1.0 in/lbs - 0.5 in/lbs
-03	11 ± 1.0 in lbs
-04	11 ± 1.0 in/lbs
-05	3 + 1.0 in/lbs - 0.5 in/lbs
-06	15 ± 1.5 in/lbs

TABLE 5-1 TORQUE READINGS

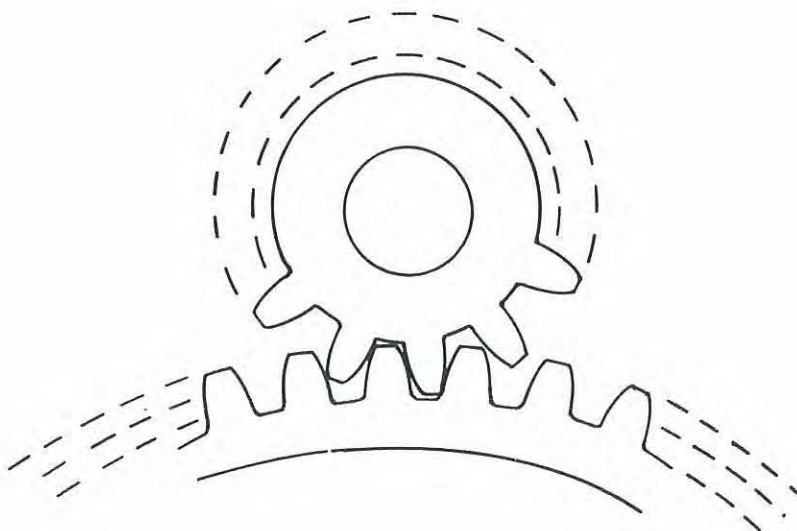


FIGURE 5-5 SERVO GEAR MESH

BENDIX/KING

KS 270
PITCH SERVO

If the torque reading is not within the value specified, adjust the switch position accordingly until the torque reading agrees with Table 5-1. Rotate the Torque Wrench slowly in a counterclockwise direction until the Torque Limit CW Lamp extinguishes. Note the torque at this point and observe that it is less than 4 in/lbs from the first torque reading. For the -05 Servo the torque reading shall be less than 1.5 in/lbs from the first torque reading.

Rotate the Torque Wrench in a counterclockwise direction noting the torque required to cause the Torque Limit CCW Lamp to illuminate. The torque reading shall be in accordance with the value set up in Table 5-1. If the torque reading is not within the value specified, adjust the switch position accordingly. Rotate the Torque Wrench slowly in a clockwise direction until the Torque Limit CCW Lamp extinguishes. Note the torque at this point and observe that it is less than 4 in/lbs. from the first torque reading. For the -05 Servo the torque reading shall be less than 1.5 in/lbs from the first torque reading.

If either switch has been adjusted, it will be necessary to check the switch limit positions in this paragraph.

Remove the cover from the KS 270 Servo.

In the event that it is necessary to adjust either of the Autotrim Sense Switches, the Limit Screws for the clockwise and counterclockwise direction should be readjusted. Check resistance between pins J and C. The resistance should be higher than 200Kohms. Rotate the Capstan clockwise just to the point which causes the Torque Limit CW Lamp to illuminate. Turn the CW Limit Screw (refer to Figure 5-2) inward until the Torque Limit CW Lamp extinguishes. Release the Capstan and then rotate the limit screw outward a quarter of a turn. Check resistance between pins R and C. The resistance should be higher than 200Kohms. Repeat the adjustment in the counterclockwise direction using the Torque Limit CCW Lamp to determine switch activation.

Apply glyptal to both limit switch screws and limit screws.

Remove the Autotrim Setting Tool from the Capstan before proceeding.

5.3.3.8 Capstan Speed

Place the following controls in their corresponding positions:

External DC Supply	+28VDC
Voltage Select	+28V ON
TP Selector	KS 270/271 Input Volts
Master Selector	Misc TP (Voltage)
Tach FB	IN
AP Clutch Engage	ON

Depress the Stimulus 1 ENG Button and adjust the Stimulus 1 Control for $-11\text{VDC} \pm .4$ volt as read at the Master Selector Voltage Jacks. The Capstan should be rotating counterclockwise.

Measure the time required for the specific number of Capstan revolutions in Table 5-2. The time shall be within the tolerance specified. Rotate the Misc Selector to the KS 270/271 Motor Sense position. The voltage shall be positive.

Rotate the Misc Selector to the KS 270/271 Input Volts position. Depress the Invert Switch Stimulus 1 Adjust for a reading of $+11\text{V} \pm .4$ volt as read at the Master Selector Voltage Jacks. The Capstan should be rotating clockwise.

Measure the time required for the specific number of Capstan revolutions in Table 5-2. The time shall be within the tolerance specified. Rotate the Misc Selector to the KS 270/271 Motor Sense position. The voltage should be negative. Return all switches to the OFF (OUT) position.

BENDIX/KING
KS 270
PITCH SERVO

5.3.3.9 Torque Characteristics

CAUTION

DO NOT RUN THE SERVO IN THE STALLED CONDITION FOR MORE THAN FIVE SECONDS. IF MOUNTING BOLTS ARE NOT SECURE, DAMAGE COULD RESULT TO GUIDE PIN ON BASE PLATE.

The Slip Clutch should be set for 80 ± 5 in/lbs. Set the Torque Wrench Adapter Tool into position. See Figure 5-4. Use the long shaft for securing the adapter to the test stand.

Place the following controls in their corresponding positions:

External DC Supply	+28VDC
Voltage Select	+28V ON
Misc Selector	KS 270/271 Input Volts
Master Selector	Misc TP (Voltage)
Tach FB	IN

*Slips at 75 in/LBS
CW and CCW*

Depress the Stimulus 1 ENG Button and adjust the Stimulus 1 Control for $-12\text{VDC} \pm .4$ volts as read at the TP Selector Voltage Jacks.

The Motor Drive Gear should be rotating clockwise at this time. Remove the Input Signal by depressing the Stimulus #1 ENG Button and observe that the Motor stops turning. Depress the AP Clutch ENG Button and after the Clutch has engaged, apply the Input Drive Signal with the Stimulus #1 ENG Button. The Capstan should begin to turn and the Clutch should begin to slip. When the Clutch begins to slip, quickly remove the Drive Signal by depressing the Stimulus 1 ENG Button.

Release the Solenoid by depressing the AP Clutch Engage Switch. Delay one minute before proceeding.

Depress the Stimulus 1 ENG Button to an ON condition.

Depress the Invert Button and, if necessary, adjust Stimulus 1 for a reading of $+12\text{VDC}$ as read at the Master Selector Voltage Jacks. The Motor Drive Gear should be rotating counterclockwise at this time. Remove the Input Signal by depressing the Stimulus 1 ENG Button and observe that the Motor stops turning. Depress the AP Clutch ENG Button and after the Clutch has engaged, apply the Input Drive Signal with the Stimulus 1 ENG Button. The Capstan should begin to turn and the Clutch will begin to slip. When the Clutch begins to slip, quickly remove the Drive Signal by depressing the Stimulus 1 ENG Button.

Return all switches to the OFF (OUT) position. Remove the Torque Wrench Adapter Tool.

5.3.3.10 Tach Feedback

Place the following controls in their corresponding positions:

External DC Supply	+28VDC
Voltage Select	+28V ON
Tach Feedback	OUT
Misc Selector	KS 270/271 Input Volts
Master Selector	Misc TP (Voltage)
Invert	IN
AP Clutch Eng	IN

BENDIX/KING

KS 270
PITCH SERVO

Depress the Stimulus #1 ENG Button and adjust the Stimulus #1 Control to obtain a reading of $+11.0 \pm .4\text{VDC}$ as read at the Master Selector Test Jacks. Rotate the Misc Selector to the KS 270/271 Motor Sense position. The voltage reading should be within the tolerance for the particular Servo being tested and negative.

Rotate the Misc Selector to the KS 270/271 Input Volts position.

Repeat the test for the Counterclockwise Tach Voltage Output by depressing the Invert Button and, if necessary, adjusting the Stimulus 1 Control for a reading $-11 \pm .4\text{VDC}$ with the TP Selector in the KS 270/271 Input Volts position. Rotate the TP Selector to the KS 270/271 Motor Sense position and confirm that the voltage reading is within the tolerance set up in Table 5-2 and positive.

Return all switches to the OFF (OUT) position.

FLAVOR	AUTOTRIM THRESHOLD	SPEED CHARACTERISTICS	TACH VOLTAGE	
			CW	CCW
-01	$6 + 1.0 \text{ in-lbs}$ $- 0.5 \text{ in-lbs}$	5 rev. in $63 \pm 9 \text{ sec}$	$-5.44 \pm .85$	$+5.44 \pm .85$
-02	$6 + 1.0 \text{ in-lbs}$ $- 0.5 \text{ in-lbs}$	2 rev. in $47 \pm 6 \text{ sec}$	$-2.91 \pm .40$	$+2.91 \pm .40$
-03	$11 \pm 1.0 \text{ in-lbs}$	5 rev. in $63 \pm 9 \text{ sec}$	$-5.44 \pm .85$	$+5.44 \pm .85$
-04	$11 \pm 1.0 \text{ in-lbs}$	2 rev. in $47 \pm 6 \text{ sec}$	$-2.91 \pm .40$	$+2.91 \pm .40$
-05	$3 + 1.0 \text{ in-lbs}$ $- 0.5 \text{ in-lbs}$	5 rev. in $63 \pm 9 \text{ sec}$	$-5.44 \pm .85$	$+5.44 \pm .85$
-06	$15 \pm 1 \frac{1}{2} \text{ in-lbs}$	5 rev. in $63 \pm 9 \text{ sec}$	$-5.44 \pm .85$	$+5.44 \pm .85$

incorrect
see
serv. (r) A
B01-01490
0054
KS270
SA105

TABLE 5-2 KS 270 TEST PARAMETERS

Model	Formula	Optimum Tach Voltage *
-01, -05	$68.5 + T \text{ (Sec)} = V \text{ Tach}$	+ or - 5.71VDC
-02, -04, -07, -08	$68.5 + T \text{ (Sec)} = V \text{ Tach}$	+ or - 2.70VDC
-03, -06	$68.5 + T \text{ (Sec)} = V \text{ Tach}$	+ or - 5.71VDC

TABLE 5.3 ROTATION FORMULA

* Optimum Tach Voltage given only as a guide to correct value.

5.4 OVERHAUL

This section provides the information necessary to maintain and repair the KS 270 Servo. The Servos have been designed to be maintenance-free except in the case of a malfunction. When troubleshooting the Servos, disassemble the Units only to the point where the malfunction can be corrected by repair, cleaning or adjustment. Do not disassemble any parts or wiring unnecessarily as repeated overhauls can be detrimental to the life of the Units.

If the source of the malfunction is not evident when the Servo is brought in for repair, it is recommended that it be tested using the instructions contained herein, to isolate the problem.

5.4.1 DISASSEMBLY/ASSEMBLY (Refer to appropriate figures in Section 6)

The purpose of this section is to aid in the assembly and disassembly of the KS 270. After the Unit has been properly disassembled, inspection of components as described in Section 5.4.3 can more readily take place.

Disassembly of KS 270: Reference should be made to Figure 6-2, 6-3, or 6-4 when using the following procedures:

Removal of Dust Cover

The Dust Cover can be removed from the Servo by removing the two screws (089-05903-0004) which hold the Dust Cover on. Slip the Dust Cover off.

Removal of Solenoid

The Solenoid can be removed from the Servos by removing the four screws (089-05990-0005) which hold the Solenoid to the Chassis. Carefully lift the Solenoid Plunger and Spring Assembly over the Chassis edge and slide the Solenoid away from the Arm of the Engage Plate. Disconnect the Solenoid leads from the appropriate tiepoints on the terminal strips.

Removal of Motor

Remove the Circuit Module from the Main Chassis by removing the two screws (089-05903-0003) which fasten the Circuit Module to the Chassis.

Unsolder the wires which connect the Trim Threshold Switches into the wire harness. Remove the two nuts (089-02154-0022) and washers (089-08084-0030) to the front of the Engage Plate Subassembly and the large screw (089-06129-0004) to the rear of the Engage Plate Subassembly. Be careful not to lose any of the shims associated with this screw. Carefully lift the Engage Plate Subassembly straight up until it disengages from the Threshold Switch Levers. Continue lifting straight up until the subassembly is free from the Rear Mounting Stud. Remove the three screws (089-06067-0005) which fasten the motor to the Subassembly and remove the Motor from its mounting on the subassembly. Remove the Tach Holding Plate from the Motor by unscrewing the two screws (089-05903-0009) from the top of the Motor. Removal of the Motor is complete when the two power leads are unsoldered from the Motor. Replacement of the Motor should be accomplished only after the Pinion has been placed on the Output Shaft.

Removal of Trim Threshold Switches

The Trim Threshold Switches can be removed by turning the Servo so that the Output Pinion is pointing down with the Motor and Solenoid facing toward the Technician. Remove the two screws (089-06119-0008) which hold the Threshold Switch to the Engage Plate. Care should be taken not to lose the small Nut Plate beneath the Engage Plate. If it becomes necessary to remove the Trim Threshold Switch Arm, the Servo must be turned on its side and the two screws (089-06119-0003) located on the outside of the Servo should be removed. Actual removal of the Switch Arms necessitates the removal of the Engage Plate as described in a previous section.

Removal of Transistors

Transistor replacement on the KS 270 is easily accomplished without removal of the Circuit Module. Simply remove the screws which fasten the Transistors to the sockets. There is no need for unsoldering leads when replacing any of the large Power Transistors.

5.4.2 REASSEMBLY OF THE KS 270 SERVOS

The reassembly of the Servo is accomplished by reversing the disassembly process. Whenever the Solenoid has been removed, it must be realigned per the testing procedures in Section 5.2 and 5.3. If an Engage Plate is changed, it may be necessary to vary the number of shims used on the hold down screws. Shimming procedures are noted on Figures 6-2 and 6-3.

Service Aid

SERVICE AID: KS 270/A-105
Servo Actuator for KAP 150/KFC 150/
KAP 200/KFC 200 Flight Control Systems

SUBJECT: Tach Feedback Generator Discontinued by Vendor

The vendor for servo tach feedback generator P/N 148-05011-0000 has discontinued manufacturing this part. A new source has been chosen whose tach feedback generator carries a different part number, 148-05187-0100. These parts are not interchangeable mechanically.

A modification kit is available to install the new type generator, P/N 148-05187-0100, into a servo originally manufactured with generator P/N 148-05011-0000. Modification Kit P/N 050-02754-0000 contains the following:

Part Number	Qty	Description
029-00462-0003	1	GEAR W/HUB
047-09092-0001	1	TACH PLATE
089-06642-0004	2	SCREW
148-05187-0100	1	MOTOR

NOTE

The installation of a new tach generator P/N 148-05187-0100 incorporates Mod 10 in a KS 270 or Mod 4 in a KS 270A, which changes the tolerance of the tach output voltage to +/-5%. Service Bulletin KS 270-10/KS 270A-4/KS 271-8/KS 271A-3, P/N 600-01491-000X.

Be sure to use the proper mounting screws, or damage to the generator could occur.

To Change a Tach Feedback Generator:

1. Refer to Servo Manual P/N 006-05288-0003, Figure 6-2 on Page 6-11.
2. Remove the servo cover by removing the two screws P/N 089-05903-0004, located on the rear.
3. Assemble the new tach generator, P/N 148-05187-0100, to mounting bracket P/N 047-09092-0001 with the two screws P/N 089-06642-0004.
4. Unsolder the two wires from the tach generator. Record the wiring color code for future reference.
5. Loosen the two set screws P/N 089-05853-0004 which will hold the TFB gear on motor M201. Remove this small gear, and keep it for future use.
6. Remove the two set screws P/N 089-05853-0006 from the tach generator gear, and keep for these future use.
7. Remove the two screws P/N 089-05903-0009 that hold the tach generator bracket onto the motor.
8. The existing tach generator, bracket, and gear may now be removed and discarded.
9. Assemble the bracket and tach generator to the motor with two screws P/N 089-05903-0009.
10. Reconnect the wires to the tach generator. The wire removed from the red terminal should be connected to the terminal on the new generator marked either with a red dot or a plus (+).
11. Reinstall the small gear, P/N 029-00463-0002, on the motor. Install the new larger gear, P/N 029-00462-0003, on the tach generator using the required set screws.

NOTE

.015 inch $\pm$.005 inch clearance is required between the new gear hub, P/N 029-00463-0002, and the motor.

12. Insure that the tach gears mesh properly and that the gear set screws are tight.
13. Reassemble the unit.

TESTING PROCEDURE

Complete a final test of the unit. The unit final test remains the same with one exception: the tolerance for the tach output voltage will now be +/-5% instead of +/-15%.

KS 270/A Version	Autotrim Threshold (in./lbs.)	Speed Characteristics (revs / seconds)	*Tach Voltage Formula	*Optimum Tach Voltage	
				CW	CCW
-01	6 +1/-0.5	5 in 63 ±9	68.5 / T = TV	-5.44	+5.44
-02	6 +1/-0.5	2 in 50 +5/-6	68.5 / T = TV	-2.91	+2.91
-03	11 ±1	5 in 63 ±9	68.5 / T = TV	-5.44	+5.44
-04	11 ±1	2 in 50 +5/-6	68.5 / T = TV	-2.91	+2.91
-05	3 +1/-0	5 in 63 ±9	68.5 / T = TV	-5.44	+5.44
-06	15 ±1.5	5 in 63 ±9	68.5 / T = TV	-5.44	+5.44
-07	6 +1/-0.5	2 in 58 +5/-6	68.5 / T = TV	-2.91	+2.91
-08	11 +1/-0.5	2 in 58 +5/-6	68.5 / T = TV	-2.91	+2.91
-18	6 +1/-0.5	2 in 50 +5/-6	68.5 / T = TV	-2.91	+2.91
-19	11 ±1	1 in 45 ±7	72.0 / T = TV	-1.60	+1.60
-23	11 ±1	1 in 33 ±5	49.9 / T = TV	-1.53	+1.53
-25	11 ±1	2 in 32 ±6	54.4 / T = TV	-3.40	+3.40

2.44 CCW
2.42 CW

NOTE

In the Tach Voltage Formula, T is the time in seconds for one revolution of the capstan. Multiply T by the constant in the formula to derive the correct tach voltage (TV). The Optimum Tach Voltage is only approximate and is to be used as a guide. The actual Tach Voltage must be calculated using the formula.

KS 272

Trim Servo

5.3 TEST AND ALIGNMENT (KTS 151)

The following is a procedure to determine if the performance of the KS 272 is satisfactory. If it is not, the alignment procedures are given in order to bring the unit up to its minimum performance specifications. It is important that this be done as far as possible before troubleshooting is attempted.

5.3.1 REQUIRED TEST EQUIPMENT

DESCRIPTION	CHARACTERISTICS REQUIRED	REPRESENTATIVE TYPE
Bendix/King KTS 151 Component Bench Tester		P/N 071-5030-00
Stopwatch		
Multimeter	Capable of measuring AC, DC volts	Fluke 8000A
Torque Wrench	Capable of measuring 30 in-lbs	Snap-On Tool TE6FUA or Equivalent

5.3.2 KTS 151 BENCH TESTER

The KTS 151 has been designed to bench check a number of components in BENDIX/KING Flight Control Systems. The KS 272 Servo is included in this group.

The tester is constructed around a main frame which contains the DC and AC signal sources, lamps which are used to annunciate modes and special situations and the pin outs for the KS 272. Figure 5-1 shows the basic connection of the KS 272 to the KTS 151 Bench Tester. Portions of the tester used with the KS 272 are shaded in.

Further information concerning the KTS 151 Flight Control System Test Set can be found in the KTS 151 Maintenance Manual.

5.3.3 TEST PROCEDURES USING THE KTS 151

5.3.3.1 General

This section contains the test procedures to be used in conjunction with the troubleshooting chart in Section 5.5.

The procedures are divided into sections and are herein presented for quick access to specific tests.

KS 272 TEST PROCEDURE INDEX

- 5.3.3.2 Initial Setup Procedure
- 5.3.3.3 Solenoid Engage
- 5.3.3.4 Solenoid Adjustment
- 5.3.3.5 Solenoid Low Voltage Engage
- 5.3.3.6 Manual Trim Characteristics
- 5.3.3.7 Auto Trim Characteristics
- 5.3.3.8 Torque Test
- 5.3.3.9 Pre-Flight Test



5.3.3.3 Solenoid Engage

This test checks the parallel (+14V) and series (+28V) Solenoid configurations.

All units except -01 through -05, -18, -19

The Solenoid should engage smoothly and without hesitation when the AP Engage Button is depressed. The Solenoid should disengage immediately when the AP Engage Button is depressed a second time. The Solenoid should engage smoothly and without hesitation when the Manual Trim Engage Button is depressed. The Solenoid should disengage immediately when the Manual Engage Button is depressed a second time. The Solenoid should not engage when the Self Test Button is depressed. Disengage Self Test by again depressing the Self Test Button.

testers okay

Units -01 through -05, -18, -19

The Solenoid should engage smoothly and without hesitation when the Autopilot Engage Button is depressed. The Solenoid should disengage immediately when the AP Engage Button is depressed a second time. The Solenoid should engage smoothly and without hesitation when the Manual Trim Switch is placed in the CW and CCW position. The Solenoid should disengage when the Manual Trim Switch is in the OFF position.

5.3.3.4 Solenoid Adjustment

Proper Solenoid adjustment insures adequate gear mesh and prevents slippage or hang-up on release.

Depress the AP Engage Button and observe the position of the Servo Drive Gear with respect to the large gear on the Servo Mount. The Capstan should be able to rotate one quarter of a degree. If the rotation is greater than this or if there is no backlash at all, the Solenoid may be adjusted using the four screws which hold the Solenoid in place. Figure 5-3 shows the proper gear mesh between the Servo and the Mount.

No freeplay

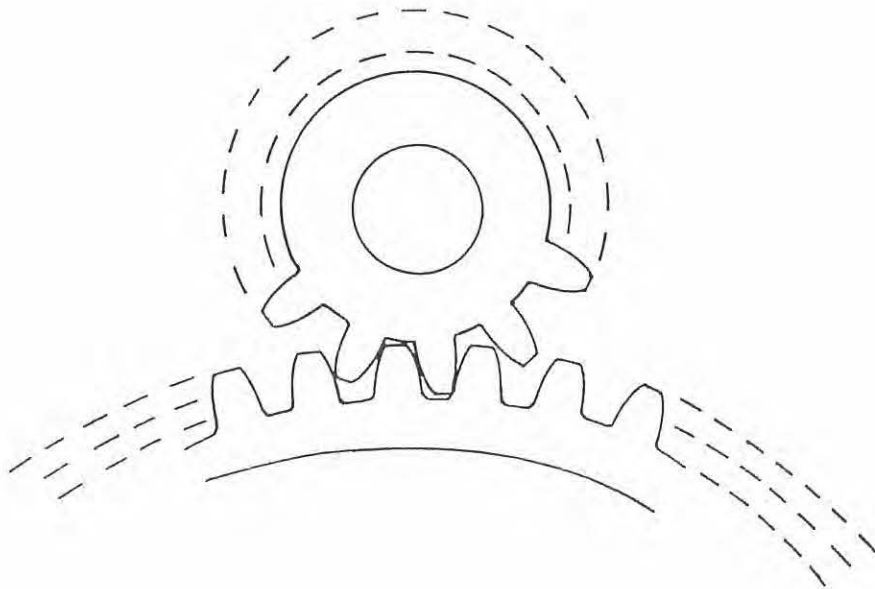


FIGURE 5-3 SERVO GEAR MESH

BENDIX/KING

KS 272
TRIM SERVO

5.3.3.5 Solenoid Low Voltage Engage

This test insures sufficient Solenoid holding force for all installation configurations.

14V units

Turn Unit so the Solenoid must pull against gravity. Rotate Power Select Switch to off. Adjust external DC power supply to +14V. Rotate Power Select Switch to the 14V position. Connect a voltmeter to the AP Engage input (pin E) and power ground (pin J). Slowly lower the 14VDC power alternately engaging and disengaging the AP Engage Button. The Solenoid should engage and disengage smoothly and without hesitation. Determine the lowest voltage at which the Solenoid will engage. The voltage should be less than 9.1VDC. This test should be performed with the Solenoid at room temperature.

28V units

Turn unit so the Solenoid must pull against gravity. Rotate Power Select Switch to off. Adjust external DC power supply to +28V. Rotate Power Select Switch to the 28V position. Connect a voltmeter to the AP Engage input (pin E) and power ground (pin J). Slowly lower the 28VDC power alternately engaging and disengaging the AP Engage Button. The Solenoid should engage and disengage smoothly and without hesitation. Determine the lowest voltage at which the Solenoid will engage. The voltage should be less than 20.6VDC. This test should be performed with the Solenoid at room temperature.

OK at 20.1V

5.3.3.6 Manual Trim Characteristics

With the KS 272 mounted to the test fixture set the External Power Supply and the Voltage Select Switch to the appropriate value for the KS 272 being tested (See Table 5-1).

Regulator Voltage

Measure the voltage at pin A with respect to pin J. The voltage shall be as specified in Table 5-1. Install the proper Slip Clutch Load to the Servo Test Stand (See Table 5-1). Install the Torque Wrench Adapter and the Torque Wrench to the Stand as shown in Figure 5-4.

Regulator Current Foldback

The following versions (04, 06, 07, 10, 13, 17, 24, 32, 36, 37, 38, 39, and 40) are to withstand a short circuit on pin A for up to one minute, and return to original output voltage when short circuit is removed.

CAUTION

OKay with wire not Attache

DO NOT LEAVE PIN A SHORTED FOR MORE THAN 5 MINUTES.

BENDIX/KING

KS 272 TRIM SERVO

Section 5.3.3.2 contains the procedures necessary to prepare the KTS 151 tester and the KS 272 unit for troubleshooting. The section containing the KS 272 Unit preparation should be completed each time a new unit is connected to the tester.

The remaining sections of 5.3.3 contain the procedures for testing the KS 272. Prior to the start of each procedure, all test set controls should be positioned in accordance with Procedure 5.3.3.2. The only exception is Test Set Power which may be left on if another procedure has just been completed. When these instructions are followed, any test procedure may be run independently without concern for the order of procedures previously run.

5.3.3.2 INITIAL SETUP PROCEDURE

A. Test Set Initialization

Place the Power Selector switch to the OFF position.

Remove the KS 272 test cable. All other cables may remain stored inside the tester.

Place all push button controls in the out positions on the KTS 151 tester.

Connect the DC power supply to the KTS 151 tester input power jacks.

CAUTION

DO NOT CONNECT MORE THAN ONE UNIT TO THE KTS 151 AT A TIME.

B. KS 272 Initialization

Connect the KS 272 to the Test panel.

UnitTests

Chassis Ground (Ohmmeter Tests)

Measure the resistance between pin H of the KS 272 input connector and the servo actuator metal case. The resistance should be less than one ohm. *7-2*

Reference should be made to Table 5-1 before proceeding any further. The following parameters should be checked for each servo.

Input Power Voltage

Use this to set the External Power Voltage and the Voltage Select switch on the KTS 151.

Bench Test Mating Servo Mount

Use this to select the proper slip clutch and gear assembly for the particular servo under test. FOR TEST PURPOSES ONLY, use 200-1678-01 for 10 tooth Versions and 200-1678-02 for 42 tooth Versions as specified in Table 5-1.

Version

Use this to determine what tests to run. Major differences are present between versions -01 to -05, -18, -19 as compared to -06 to -40.

The KS 272 should now be connected to the Servo Mount stand and the appropriate Bench Test Mating Servo Mount which were supplied with the KTS 151 Component Test Set.

When mounting KS 272 on the test stand, tighten all four mounting bolts securely. Do not leave bolts loose or it will result in breakage of the guide pin on the KS 272 Base Plate (See Figure 5-3). Do not install the torque wrench adapter (PN 071-06021-0002/0003) at this time.

Adjust external power voltage to the input power voltage as specified in Table 5-1 for the specific servo being tested. Rotate the Power Input Select switch to the proper input voltage.

BENDIX/KING
KS 272
TRIM SERVO

VERSION	BENCH TEST MATING SERVO MOUNT TYPE	LOAD	* INPUT POWER VOLTAGE	VOLTAGE AT PIN A	MANUAL SPEED CHARACTERISTICS	MAXIMUM CLUTCH SETTING TORQUE TEST	R111
065-0061-01	200-1678-01	7.5 in-lbs	+28VDC	28.0 $\pm$.5	2 Rev. in 39.5 $\pm$ 8.5 sec	31.25 in-lbs	
065-0061-02	200-1678-02	12.5 in-lbs	+14VDC	6.9 $\pm$ 1.3	5 Rev. in 58.5 $\pm$ 7.5 sec	21.875 in-lbs	
065-0061-03	200-1678-02	12.5 in-lbs	+14VDC	13 $\pm$ 1.0	5 Rev. in 21.5 $\pm$ 4.5 sec	31.25 in-lbs	
065-0061-04	200-1678-01	7.5 in-lbs	+28VDC	15.5 $\pm$ 1.5	2 Rev. in 59 $\pm$ 11 sec	31.25 in-lbs	
065-0061-05	200-1678-02	12.5 in-lbs	+14VDC	10.0 $\pm$ 1.0	2 Rev. in 65 $\pm$ 10 sec	31.25 in-lbs	
065-0061-06	200-1678-01	6.25 in-lbs	+28VDC	21.25 $\pm$ 4.25	5 Rev. in 22.05 $\pm$ 3.15 sec	31.25 in-lbs	
065-0061-07	200-1678-01	7.5 in-lbs	+14VDC	12.0 $\pm$ 1.0	5 Rev. in 19 $\pm$ 4 sec	31.25 in-lbs	
065-0061-08	200-1678-02	7.5 in-lbs	+14VDC	14 $\pm$.5	10 Rev. in 14 $\pm$ 4 sec	21.875 in-lbs	
065-0061-09	200-1678-01	7.5 in-lbs	+14VDC	11 $\pm$.6	1 Rev. in 19.5 $\pm$ 4 sec	31.25 in-lbs	
065-0061-10	200-1678-01	6.25 in-lbs	+28VDC	14.55 $\pm$ 2.25	3 Rev. in 21.5 $\pm$ 2.5 sec	31.25 in-lbs	
065-0061-11	200-1678-01	12.5 in-lbs	+14VDC	14 $\pm$.5	5 Rev. in 17 $\pm$ 4 sec	31.25 in-lbs	
065-0061-12	200-1678-01	12.5 in-lbs	+14VDC	14 $\pm$ 1.0	3 Rev. in 38 $\pm$ 6 sec	31.25 in-lbs	
065-0061-13	200-1678-01	7.5 in-lbs	+28VDC	20 $\pm$ 1.0	2 Rev. in 45 $\pm$ 5 sec	31.25 in-lbs	
065-0061-14	200-1678-01	12.5 in-lbs	+28VDC	27 $\pm$ 1.5	5 Rev. in 13.5 $\pm$ 4 sec	31.25 in-lbs	
065-0061-15	200-1678-02	7.5 in-lbs	+14VDC	9.1 $\pm$.5	5 Rev. in 11.5 $\pm$ 2.5 sec	21.875 in-lbs	
065-0061-16	200-1678-01	12.5 in-lbs	+28VDC	28 $\pm$.5	2 Rev. in 23 $\pm$ 4 sec	31.25 in-lbs	
065-0061-17	200-1678-01	12.5 in-lbs	+28VDC	20 $\pm$ 1.0	2 Rev. in 28 $\pm$ 5 sec	31.25 in-lbs	
065-0061-18	200-1678-01	12.5 in-lbs	+14VDC	10 $\pm$ 1.0	1 Rev. in 42 $\pm$ 6 sec	31.25 in-lbs	
065-0061-19	200-1678-02	7.5 in-lbs	+28VDC	15 $\pm$.8	5 Rev. in 53.5 $\pm$ 10.5 sec	21.875 in-lbs	
065-0061-21	200-1678-01	12.5 in-lbs	+14VDC	10 $\pm$.7	2 Rev. in 40 $\pm$ 8 sec	31.25 in-lbs	
065-0061-22	200-1678-01	12.5 in-lbs	+28VDC	27 $\pm$ 1.5	2 Rev. in 33 $\pm$ 5 sec	31.25 in-lbs	
065-0061-24	200-1678-01	7.5 in-lbs	+28VDC	24.10 $\pm$ 1.4	5 Rev. in 29 $\pm$ 5 sec	31.25 in-lbs	
065-0061-25	200-1678-01	7.5 in-lbs	+14VDC	13 $\pm$ 1.0	2 Rev. in 21 $\pm$ 4 sec	31.25 in-lbs	
065-0061-26	200-1678-02	7.5 in-lbs	+14VDC	11.5 $\pm$ 2.5	6 Rev. in 10 $\pm$ 2 sec	21.875 in-lbs	
065-0061-27	200-1678-01	12.5 in-lbs	+28VDC	15 $\pm$ 1.0	2 Rev. in 40 $\pm$ 8 sec	31.25 in-lbs	
065-0061-28	See NOTE 1	7.5 in-lbs	+14VDC	14 $\pm$.5	5 Rev. in 10 $\pm$ 2 sec	31.25 in-lbs	
065-0061-29	200-1678-01	12.5 in-lbs	+28VDC	20 $\pm$ 1.0	2 Rev. in 28 $\pm$ 5 sec	31.25 in-lbs	
065-0061-30	200-1678-01	12.5 in-lbs	+14VDC	14 $\pm$.5	2 Rev. in 29 $\pm$ 5 sec	31.25 in-lbs	
065-0061-31	200-1678-01	12.5 in-lbs	+28VDC	28 $\pm$.5	2 Rev. in 29 $\pm$ 5 sec	31.25 in-lbs	
065-0061-32	200-1678-01	12.5 in-lbs	+28VDC	24 $\pm$ 1.2	2 Rev. in 28 $\pm$ 4 sec	31.25 in-lbs	
065-0061-33	200-1678-01	12.5 in-lbs	+28VDC	20 $\pm$ 1.0	2 Rev. in 43 $\pm$ 6 sec	31.25 in-lbs	
065-0061-34	200-1678-01	12.5 in-lbs	+28VDC	24 $\pm$ 1.5	2 Rev. in 28 $\pm$ 4 sec	31.25 in-lbs	
065-0061-35	200-1678-01	12.5 in-lbs	+14VDC	14 $\pm$.5	2 Rev. in 23 $\pm$ 4 sec	31.25 in-lbs	
065-0061-36	200-1678-01	12.5 in-lbs	+28VDC	22 $\pm$ 1.25	2 Rev. in 25 $\pm$ 4 sec	31.25 in-lbs	
065-0061-37	200-1678-01	12.5 in-lbs	+28VDC	17.5 $\pm$ 3.5	4 Rev. in 31.25 $\pm$ 3.75 sec	31.25 in-lbs	
065-0061-38	200-1678-01	12.5 in-lbs	+14VDC	8.5 $\pm$ 2.0	4 Rev. in 31.25 $\pm$ 3.75 sec	31.25 in-lbs	
065-0061-39	200-1678-01	6.5 in-lbs	+28VDC	18 $\pm$ 1.0	5 rev. in 23.55 $\pm$ 2.34 sec	31.25 in-lbs	
065-0061-40	200-1678-01	7.5 in-lbs	+28VDC	20 $\pm$ 1.0	5 rev. in 34 $\pm$ 5.0 sec	31.25 in-lbs	

* To be used as appropriate voltage in test procedures.

NOTE 1: This Version uses a special load and must be returned to Bendix/King for repair and testing.

TABLE 5-1 KS 272A TEST PARAMETERS

BENDIX/KING

KS 272
TRIM SERVO

Manual Trim Speed and Operation and Torque Testing.

This test insures the ability of the Servo to drive at the proper speed and torque.

All units except -01 through -05, -18, -19

Depress the Manual Trim Engage Switch. The Solenoid should engage without hesitation. Place the Manual Trim Switch in the CW position and observe that the Capstan rotates in the CW direction. With a stopwatch, measure the time required for the number of rotations in Table 5-1. The measured time should be within the limits specified in Table 5-1.

The voltage at pin L with respect to pin F should be positive. $\pm 2V$ with wire separated / $\pm 19.05V$ w/ wire jumper

Place the Manual Trim Switch in the CCW position and observe that the Capstan rotates in CCW direction.

Place the Manual Trim Switch in the Open position and remove the Manual Trim Engage voltage from pin C. The Capstan should stop rotating and the Solenoid should disengage without hesitation.

-01, -02, -03, -04, -05, -18, -19 units only

Place the Manual Trim Switch to the CW position and observe that the Solenoid engages and that the Capstan rotates in the CW direction. With the stopwatch, measure the time required for the number of rotations specified in Table 5-1. The measured time should be within the limits specified in Table 5-1.

Place the Manual Trim Switch in the CCW position and observe that the Capstan rotates in the CCW direction.

Place the Manual Trim Switch in the Open position. The Capstan should stop rotating and the Solenoid should disengage.

Remove the Slip Clutch Cover and Torque Wrench.

5.3.3.7 Auto Trim Characteristics (All Units)

Depress the AP Engage Switch. The Solenoid should engage without hesitation. Place the Auto Trim Switch to the CW position and observe that the Capstan rotates in a CW direction.

The voltage at pin L with respect to pin F should be positive. check good

Place the Auto Trim Switch to the CCW position and observe that the Capstan rotates in a CCW direction. check good

Place the Auto Trim Switch in the OFF position and release the AP Engage Switch. The Capstan should stop rotating and the Solenoid should disengage without hesitation. check good

5.3.3.8 Torque Test (Manual Trim).

Adjust the Slip Clutch on the Bench Test Mating Servo Mount to the Maximum Clutch Settings as specified in Table 5-1 for the Version being tested. Depress the Manual Trim Engage Switch and place the Manual Trim Switch in both CW and CCW positions observing the KS 272 does NOT stall. Disengage the Clutch after each reading has been made. The Clutch should disengage smoothly and within 2 seconds.

5.3.3.9 Pre-Flight Test

(All units except -01 through -05, -18, -19)

Place the Auto Trim Switch to the CW position and depress the Self-Test Switch. The Capstan should not rotate and the voltage at pin L with respect to pin F should be positive. Depress the Self Test Switch and observe that the voltage at pin L with respect to pin F is zero.

BENDIX/KING
KS 272
TRIM SERVO

5.4 OVERHAUL

This section provides the information necessary to maintain and repair the KS 272 Servo. The servos have been designed to be maintenance-free except in the case of a malfunction. When troubleshooting the servos, disassemble the units only to the point where the malfunction can be corrected by repair, cleaning or adjustment. Do not disassemble any parts or wiring unnecessarily as repeated overhauls can be detrimental to the life of the units.

If the source of the malfunction is not evident when the servo is brought in for repair, it is recommended that it be tested using the instructions contained herein, to isolate the problem.

5.4.1 DISASSEMBLY/ASSEMBLY (Refer to appropriate figures in Section VI)

The purpose of this section is to aid in the assembly and disassembly of the KS 272. After the units have been properly disassembled, inspection of components as described in Section 5.4.2 can more readily take place.

5.4.2 DISASSEMBLY OF KS 272

Removal of Dust Cover

The dust covers can be removed from the servos by removing the two screws (089-05903-0004) which hold the dust cover on. Slip the dust cover off.

Removal of Solenoid

The solenoid can be removed from the servos by removing the four screws (089-05990-0005) which hold the solenoid to the chassis. Carefully lift the solenoid plunger and spring assembly over the chassis edge and slide the solenoid away from the arm of the engage plate. Disconnect the solenoid leads from the appropriate tiepoints on the terminal strips.

Removal of Circuit Board

Remove the circuit board from the main chassis by removing the two screws (089-06123-0005) which fasten the circuit board to the chassis. Be careful not to lose the insulators (091-00286-0000) and spacers (090-00027-0001) which are located between the PC board and the servo base.

Removal of Motor

Remove the solenoid from the chassis by using the preceding procedures. This will enable the engage plate to be removed. Unscrew the three engage plate bracket hold down screws (089-06129-0004) and remove the engage plate bracket (047-05941-0001) from the servo base plate. Be careful not to lose any of the shims associated with the screws. Lift the engage plate straight up until it becomes disengaged with the pivot stud. The motor may be removed from the engage plate by removing the three screws (089-06067-0005) which hold the motor to the engage plate. Remove the power leads to the motor. Replacement of the motor should be accomplished only after the pinion has been placed on the output shaft.

Removal of Auto Trim Transfer Relay

Removal of the Auto Trim Transfer relay is accomplished by removal of the large nut (089-02191-0022) located on bracket (047-05996-0001) which is attached to the clutch solenoid. Be careful when moving the components necessary to gain access to the nut. If necessary, remove one or more tie-raps to loosen the wire bundle.

Removal of Transistors

Transistor replacement on the KS 272 is easily accomplished without extensive unit disassembly. Simply remove the screws which fasten the transistors to the sockets. There is no need for unsoldering leads when replacing any of the power transistors.

5.4.3 INSPECTION

This section contains instructions to assist in determining, by inspection, the condition of the KS 272 assemblies. Defects resulting from wear, physical damage, deterioration, or other causes can be found by these inspection procedures. To aid inspection, detailed procedures are arranged in alphabetical order.

At least once each calendar year, or 1000 hrs of operation, whichever occurs first, remove the KS 272 from the aircraft. Remove the unit cover and visually inspect for evident of corrosion, and/or build-up of dirt or other particulate matter which may interfere with servo operation, particularly in the area of the engage solenoid.

KC 295

Flight Computer

12/17/2015 16:00:27
9530 TEST SYSTEM 1
CUSTOMER SERVICE

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00

TEST OVERRIDE ENERGIZED - TEST ABORTED
TEST COMPLETED TO 10.0.0.0.0
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 1 MIN 33 SEC

KC 295
ATE
12/17/2015

12/17/2015 16:02:22
9530 TEST SYSTEM 1
CUSTOMER SERVICE

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00

TEST OVERRIDE ENERGIZED - TEST ABORTED
TEST COMPLETED TO 10.0.0.0.0
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 5 MIN 33 SEC

12/17/2015 16:08:11
9530 TEST SYSTEM 1
CUSTOMER SERVICE

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00
ADAPTER #65

FIXTURE #2

10.3.0.0.13 FAILS: MEASURED $-.6 \pm .2 = -5.11782$
10.3.0.0.20 FAILS: MEASURED $-.5 \pm .2 = .09775$
10.5.0.0.0 TADER TURN ON TIME <1 SEC OR >5.25 SECS
FADER TURN ON TIME WAS .75 SECS
10.5.0.0.1 FAILS: MEASURED $-2.25 \pm .45 = -.425485$
10.5.0.0.2 FAILS: MEASURED $2.25 \pm .45 = .088115$
10.5.0.0.5 FAILS: MEASURED $-1 \pm .2 = -.155156$
10.5.0.0.9 FAILS: MEASURED $-1 \pm .2 = -.077184$
10.5.0.0.10 FAILS: MEASURED $1 \pm .5 = .022626$
10.7.0.0.2 FAILS: MEASURED $1 \pm .2 = .016714$
10.7.0.0.3 FAILS: MEASURED $-1 \pm .2 = -.062146$
10.8.0.0.4 FAILS: MEASURED $1 \pm .2 = .015637$
10.8.0.0.5 FAILS: MEASURED $-1 \pm .2 = -.077753$
10.9.0.0.7 MEASURED VALUE = $1.27391E-02$
EXPECTED $.813 \pm .25$ IN 3000 MSEC
10.9.0.0.8 MEASURED VALUE = $8.84809E-03$
EXPECTED $.535 \pm .16$ IN 10000 MSEC
10.9.1.0.1 MEASURED VALUE = $-7.04976E-02$
EXPECTED $-.813 \pm .25$ IN 3000 MSEC
10.9.1.0.2 MEASURED VALUE = $-4.86775E-02$
EXPECTED $-.535 \pm .16$ IN 10000 MSEC
EXPECTED 0 ± 1 IN 80000 MSEC
10.9.1.0.8 MEASURED VALUE = $2.64373E-05$
10.10.0.0.3 FAILS: MEASURED $2.25 \pm .6 = .060123$

10.10.0.0.4 FAILS: MEASURED $-2.25 \pm .6 = -.221177$

10.10.1.0.2 MEASURED VALUE = $5.33344E-02$
EXPECTED $1.2 \pm .4$ IN 1200 MSEC

10.10.1.0.3 MEASURED VALUE = $4.39502E-02$
EXPECTED $1.5 \pm .5$ IN 3200 MSEC

10.10.1.0.4 MEASURED VALUE = $-6.66378E-02$
EXPECTED $.35 \pm .35$ IN 20000 MSEC

10.10.1.0.5 MEASURED VALUE = $-.121951$
EXPECTED $-1.2 \pm .4$ IN 1200 MSEC

10.10.1.0.6 MEASURED VALUE = $-.140796$
EXPECTED $-1.5 \pm .5$ IN 3200 MSEC

10.21.0.0.4 UNIT WILL NOT ADJUST FOR 3.535 VOLTS OUTPUT

10.21.0.0.5 FAILS: MEASURED $1 \pm .25 = 7.90024E-03$

10.21.0.0.6 FAILS: MEASURED $-1 \pm .25 = 1.67003E-02$

10.22.0.0.4 FAILS: MEASURED $0 \pm 1.5 = 3.5536$

10.22.0.0.5 MEASURED VALUE = $5.01680E-03$
EXPECTED $.523 \pm .16$ IN 3000 MSEC

10.22.0.0.8 MEASURED VALUE = $-5.62620E-03$
EXPECTED $-.523 \pm .16$ IN 3000 MSEC

10.22.1.0.3 FAILS: MEASURED $0 \pm 1.5 = 3.5532$

10.22.1.0.4 MEASURED VALUE = $3.43323E-04$
EXPECTED $1.85 \pm .6$ IN 2750 MSEC

10.22.1.0.5 MEASURED VALUE = $1.86920E-03$
EXPECTED $.5 \pm .4$ IN 60000 MSEC

10.22.1.0.7 MEASURED VALUE = $-3.81470E-04$
EXPECTED $-1.85 \pm .6$ IN 2750 MSEC

10.22.1.0.8 MEASURED VALUE = $-1.33514E-03$
EXPECTED $-.5 \pm .4$ IN 60000 MSEC

10.23.0.0.3 FAILS: MEASURED $0 \pm 1.8 = 3.5368$

10.23.0.0.4 FAILS: MEASURED $-1 \pm .2 = 1.31001E-02$

10.23.0.0.5 FAILS: MEASURED $1 \pm .2 = 1.45001E-02$

10.23.0.0.7 FAILS: MEASURED $-1 \pm .2 = .0151$

10.23.0.0.8 FAILS: MEASURED $1 \pm .2 = 1.49002E-02$

10.24.0.0.4 FAILS: MEASURED $0 \pm 1.5 = 3.5528$

10.24.0.0.5 MEASURED VALUE = $-2.04182E-03$
EXPECTED $-.57 \pm .17$ IN 2700 MSEC

10.24.0.0.7 MEASURED VALUE = $6.42681E-03$
EXPECTED $.57 \pm .17$ IN 2700 MSEC

10.24.0.0.9 MEASURED VALUE = $3.41320E-03$
EXPECTED $-1.85 \pm .45$ IN 9000 MSEC

10.24.0.0.10 MEASURED VALUE = $2.76470E-03$
EXPECTED $-.75 \pm .225$ IN 60000 MSEC

10.24.0.0.11 MEASURED VALUE = $7.41863E-03$
EXPECTED $1.85 \pm .45$ IN 9000 MSEC

10.24.0.0.12 MEASURED VALUE = $2.49767E-03$
EXPECTED $.75 \pm .225$ IN 60000 MSEC

10.25.0.0.3 FAILS: MEASURED $0 \pm 1.5 = 3.5459$

10.25.0.0.4 FAILS: MEASURED $1 \pm .2 = 3.60012E-03$

10.25.0.0.5 FAILS: MEASURED $-1 \pm .2 = 5.00011E-03$

10.26.0.0.3 FAILS: MEASURED $0 \pm .5 = 3.5531$

10.26.0.0.4 MEASURED VALUE = $8.30126E-03$
EXPECTED $.6 \pm .18$ IN 2400 MSEC

10.26.0.0.8 MEASURED VALUE = $-3.36400E-03$
EXPECTED $1.76 \pm .6$ IN 3600 MSEC

EXPECTED .8 +- .3 IN 15000 MSEC

10.26.0.0.10 FAILS: MEASURED .5 +- .1 = 4.00066E-04

10.26.0.0.11 MEASURED VALUE = -1.02382E-02
EXPECTED -1.76 +- .6 IN 3600 MSEC

10.26.0.0.12 MEASURED VALUE = -4.40168E-03
EXPECTED -.8 +- .3 IN 15000 MSEC

10.26.0.0.13 FAILS: MEASURED -.5 +- .1 = 2.99931E-04

10.27.0.0.3 FAILS: MEASURED 0 +- .6 = 3.5531

10.27.0.0.4 MEASURED VALUE = 7.57647E-03
EXPECTED 1.76 +- .6 IN 3600 MSEC

10.27.0.0.5 MEASURED VALUE = -5.29289E-05
EXPECTED .8 +- .3 IN 15000 MSEC

10.27.0.0.6 FAILS: MEASURED .5 +- .1 = 5.99861E-04

10.27.0.0.7 MEASURED VALUE = 9.38892E-04
EXPECTED -1.76 +- .6 IN 3600 MSEC

10.27.0.0.8 MEASURED VALUE = -5.39351E-03
EXPECTED -.8 +- .3 IN 15000 MSEC

10.27.0.0.9 FAILS: MEASURED -.5 +- .1 = 1.10006E-03

TEST COMPLETED THROUGH 10.28.2.0.3
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 92 MIN 4 SEC

12/17/2015 16:00:27
9530 TEST SYSTEM 1
CUSTOMER SERVICE

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00

TEST OVERRIDE ENERGIZED - TEST ABORTED
TEST COMPLETED TO 10.0.0.0.0
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 1 MIN 33 SEC

KC 295 ATE

Manual testing
of several tests
confirmed
ATE failures

12/17/2015 16:02:22
9530 TEST SYSTEM 1
CUSTOMER SERVICE

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00

TEST OVERRIDE ENERGIZED - TEST ABORTED
TEST COMPLETED TO 10.0.0.0.0
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 5 MIN 33 SEC

12/17/2015 16:08:11
9530 TEST SYSTEM 1
CUSTOMER SERVICE

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00
ADAPTER #65

FIXTURE #2

10.3.0.0.13 FAILS: MEASURED -.6 +- .2 = -5.11782

-716V

10.3.0.0.20 FAILS: MEASURED -.5 +- .2 = .09775

-0.483V

10.5.0.0.0 TADER TURN ON TIME <1 SEC OR >5.25 SECS
FADER TURN ON TIME WAS .75 SECS

1.68sec

10.5.0.0.1 FAILS: MEASURED -2.25 +- .45 = -.425485

-1.257V

10.5.0.0.2 FAILS: MEASURED 2.25 +- .45 = .088115

10.5.0.0.5 FAILS: MEASURED -1 +- .2 = -.155156

10.5.0.0.9 FAILS: MEASURED -1 +- .2 = -.077184

10.5.0.0.10 FAILS: MEASURED 1 +- .5 = .022626

10.7.0.0.2 FAILS: MEASURED 1 +- .2 = .016714

~~0.050V~~

~~0.049V~~

0.006V (offset subtract)

10.7.0.0.3 FAILS: MEASURED -1 +- .2 = -.062146

~~0.049V~~

-.060V

(offset subtract)

10.8.0.0.4 FAILS: MEASURED 1 +- .2 = .015637

0.005V

10.8.0.0.5 FAILS: MEASURED -1 +- .2 = -.077753

-0.064V

10.9.0.0.7 MEASURED VALUE = 1.27391E-02
EXPECTED .813 +- .25 IN 3000 MSEC

0.02V

10.9.0.0.8 MEASURED VALUE = 8.84809E-03
EXPECTED .535 +- .16 IN 10000 MSEC

0.02V

10.9.1.0.1 MEASURED VALUE = -7.04976E-02
EXPECTED -.813 +- .25 IN 3000 MSEC

-0.02V

10.9.1.0.2 MEASURED VALUE = -4.86775E-02
EXPECTED -.535 +- .16 IN 10000 MSEC
EXPECTED 0 +- 1 IN 80000 MSEC

-0.02V

10.9.1.0.8 MEASURED VALUE = 2.643736E-05 = .012703
10.10.0.0.3 FAILS: MEASURED 2.25 +- .6 = .060123

2.477V

0.048V

before turn-on,
no leakage to servo
drive, but output not
typical after engage

10.10.0.0.4 FAILS: MEASURED $-2.25 \pm .6 = -.221177$ 0.047V
 10.10.1.0.2 MEASURED VALUE = $5.33344E-02$ 0.044V
 EXPECTED $1.2 \pm .4$ IN 1200 MSEC 0.08V
 10.10.1.0.3 MEASURED VALUE = $4.39502E-02$ 0.097V
 EXPECTED $1.5 \pm .5$ IN 3200 MSEC 0.097V
 10.10.1.0.4 MEASURED VALUE = $-6.66378E-02$ 0.063V
 EXPECTED $.35 \pm .35$ IN 20000 MSEC 0.106V
 10.10.1.0.5 MEASURED VALUE = $-.121951$
 EXPECTED $-1.2 \pm .4$ IN 1200 MSEC
 10.10.1.0.6 MEASURED VALUE = $-.140796$
 EXPECTED $-1.5 \pm .5$ IN 3200 MSEC
 10.21.0.0.4 UNIT WILL NOT ADJUST FOR 3.535 VOLTS OUTPUT
 10.21.0.0.5 FAILS: MEASURED $1 \pm .25 = 7.90024E-03$
 10.21.0.0.6 FAILS: MEASURED $-1 \pm .25 = 1.67003E-02$
 10.22.0.0.4 FAILS: MEASURED $0 \pm 1.5 = 3.5536$
 10.22.0.0.5 MEASURED VALUE = $5.01680E-03$
 EXPECTED $.523 \pm .16$ IN 3000 MSEC
 10.22.0.0.8 MEASURED VALUE = $-5.62620E-03$
 EXPECTED $-.523 \pm .16$ IN 3000 MSEC
 10.22.1.0.3 FAILS: MEASURED $0 \pm 1.5 = 3.5532$
 10.22.1.0.4 MEASURED VALUE = $3.43323E-04$
 EXPECTED $1.85 \pm .6$ IN 2750 MSEC
 10.22.1.0.5 MEASURED VALUE = $1.86920E-03$
 EXPECTED $.5 \pm .4$ IN 60000 MSEC
 10.22.1.0.7 MEASURED VALUE = $-3.81470E-04$
 EXPECTED $-1.85 \pm .6$ IN 2750 MSEC
 10.22.1.0.8 MEASURED VALUE = $-1.33514E-03$
 EXPECTED $-.5 \pm .4$ IN 60000 MSEC
 10.23.0.0.3 FAILS: MEASURED $0 \pm 1.8 = 3.5368$
 10.23.0.0.4 FAILS: MEASURED $-1 \pm .2 = 1.31001E-02$
 10.23.0.0.5 FAILS: MEASURED $1 \pm .2 = 1.45001E-02$
 10.23.0.0.7 FAILS: MEASURED $-1 \pm .2 = .0151$
 10.23.0.0.8 FAILS: MEASURED $1 \pm .2 = 1.49002E-02$
 10.24.0.0.4 FAILS: MEASURED $0 \pm 1.5 = 3.5528$
 10.24.0.0.5 MEASURED VALUE = $-2.04182E-03$
 EXPECTED $-.57 \pm .17$ IN 2700 MSEC
 10.24.0.0.7 MEASURED VALUE = $6.42681E-03$
 EXPECTED $.57 \pm .17$ IN 2700 MSEC
 10.24.0.0.9 MEASURED VALUE = $3.41320E-03$
 EXPECTED $-1.85 \pm .45$ IN 9000 MSEC
 10.24.0.0.10 MEASURED VALUE = $2.76470E-03$
 EXPECTED $-.75 \pm .225$ IN 60000 MSEC
 10.24.0.0.11 MEASURED VALUE = $7.41863E-03$
 EXPECTED $1.85 \pm .45$ IN 9000 MSEC
 10.24.0.0.12 MEASURED VALUE = $2.49767E-03$
 EXPECTED $.75 \pm .225$ IN 60000 MSEC
 10.25.0.0.3 FAILS: MEASURED $0 \pm 1.5 = 3.5459$
 10.25.0.0.4 FAILS: MEASURED $1 \pm .2 = 3.60012E-03$
 10.25.0.0.5 FAILS: MEASURED $-1 \pm .2 = 5.00011E-03$
 10.26.0.0.3 FAILS: MEASURED $0 \pm .5 = 3.5531$
 10.26.0.0.4 MEASURED VALUE = $8.30126E-03$
 EXPECTED $.6 \pm .18$ IN 2400 MSEC
 10.26.0.0.8 MEASURED VALUE = $3.36089E-03$
 EXPECTED $1.76 \pm .6$ IN 3600 MSEC

EXPECTED .8 +- .3 IN 15000 MSEC

10.26.0.0.10 FAILS: MEASURED .5 +- .1 = 4.00066E-04

10.26.0.0.11 MEASURED VALUE = -1.02382E-02
EXPECTED -1.76 +- .6 IN 3600 MSEC

10.26.0.0.12 MEASURED VALUE = -4.40168E-03
EXPECTED -.8 +- .3 IN 15000 MSEC

10.26.0.0.13 FAILS: MEASURED -.5 +- .1 = 2.99931E-04

10.27.0.0.3 FAILS: MEASURED 0 +- .6 = 3.5531

10.27.0.0.4 MEASURED VALUE = 7.57647E-03
EXPECTED 1.76 +- .6 IN 3600 MSEC

10.27.0.0.5 MEASURED VALUE = -5.29289E-05
EXPECTED .8 +- .3 IN 15000 MSEC

10.27.0.0.6 FAILS: MEASURED .5 +- .1 = 5.99861E-04

10.27.0.0.7 MEASURED VALUE = 9.38892E-04
EXPECTED -1.76 +- .6 IN 3600 MSEC

10.27.0.0.8 MEASURED VALUE = -5.39351E-03
EXPECTED -.8 +- .3 IN 15000 MSEC

10.27.0.0.9 FAILS: MEASURED -.5 +- .1 = 1.10006E-03

TEST COMPLETED THROUGH 10.28.2.0.3
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 92 MIN 4 SEC

6/21/2016 13:57:48
9530 TEST SYSTEM 1

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00
ADAPTER #65

FIXTURE #2

KC 295
ATE results
6/21/2016

10.9.1.0.8 MEASURED VALUE = 2.45046
EXPECTED 0 +- 1 IN 80000 MSEC

10.21.0.0.4 UNIT WILL NOT ADJUST FOR 3.5418 VOLTS OUTPUT

10.21.0.0.5 FAILS: MEASURED 1 +- .25 = 7.89976E-03

10.21.0.0.6 FAILS: MEASURED -1 +- .25 = 1.62997E-02

10.22.0.0.4 FAILS: MEASURED 0 +- 1.5 = 3.5602

10.22.0.0.5 MEASURED VALUE = 1.04327E-02
EXPECTED .523 +- .16 IN 3000 MSEC

10.22.0.0.8 MEASURED VALUE = 5.96952E-03
EXPECTED -.523 +- .16 IN 3000 MSEC

10.22.1.0.3 FAILS: MEASURED 0 +- 1.5 = 3.5598

10.22.1.0.4 MEASURED VALUE = 6.09398E-04
EXPECTED 1.85 +- .6 IN 2750 MSEC

10.22.1.0.5 MEASURED VALUE = 1.63937E-03
EXPECTED .5 +- .4 IN 60000 MSEC

10.22.1.0.7 MEASURED VALUE = -1.53542E-04
EXPECTED -1.85 +- .6 IN 2750 MSEC

10.22.1.0.8 MEASURED VALUE = 4.56810E-04
EXPECTED -.5 +- .4 IN 60000 MSEC

10.23.0.0.3 FAILS: MEASURED 0 +- 1.8 = 3.5435

10.23.0.0.4 FAILS: MEASURED -1 +- .2 = 1.28002E-02

10.23.0.0.5 FAILS: MEASURED 1 +- .2 = 1.41001E-02

10.23.0.0.7 FAILS: MEASURED -1 +- .2 = 1.45998E-02

10.23.0.0.8 FAILS: MEASURED 1 +- .2 = 1.45998E-02

10.24.0.0.4 FAILS: MEASURED 0 +- 1.5 = 3.559

10.24.0.0.5 MEASURED VALUE = -1.54495E-04
EXPECTED -.57 +- .17 IN 2700 MSEC

10.24.0.0.7 MEASURED VALUE = 5.94902E-03
EXPECTED .57 +- .17 IN 2700 MSEC

10.24.0.0.9 MEASURED VALUE = 6.08444E-04
EXPECTED -1.85 +- .45 IN 9000 MSEC

10.24.0.0.10 MEASURED VALUE = -2.25258E-03
EXPECTED -.75 +- .225 IN 60000 MSEC

10.24.0.0.11 MEASURED VALUE = 9.03893E-03
EXPECTED 1.85 +- .45 IN 9000 MSEC

10.24.0.0.12 MEASURED VALUE = -9.53865E-03
EXPECTED .75 +- .225 IN 60000 MSEC

10.25.0.0.3 FAILS: MEASURED 0 +- 1.5 = 3.5522

10.25.0.0.4 FAILS: MEASURED 1 +- .2 = 3.79992E-03

10.25.0.0.5 FAILS: MEASURED -1 +- .2 = 4.89998E-03

10.26.0.0.3 FAILS: MEASURED 0 +- .5 = 3.559

10.26.0.0.4 MEASURED VALUE = -8.41141E-04
EXPECTED .6 +- .18 IN 2400 MSEC

10.26.0.0.6 MEASURED VALUE = 2.05803E-03
EXPECTED -.6 +- .18 IN 2400 MSEC

10.26.0.0.8 MEASURED VALUE = 4.84276E-03
EXPECTED 1.76 +- .6 IN 3600 MSEC

10.26.0.0.9 MEASURED VALUE = 1.02806E-03
EXPECTED .8 +- .3 IN 15000 MSEC

10.26.0.0.10 FAILS: MEASURED .5 +- .1 = 1.00136E-04
10.26.0.0.11 MEASURED VALUE = -2.48146E-03
EXPECTED -1.76 +- .6 IN 3600 MSEC
10.26.0.0.12 MEASURED VALUE = -6.12259E-04
EXPECTED -.8 +- .3 IN 15000 MSEC
10.26.0.0.13 FAILS: MEASURED -.5 +- .1 = 1.00136E-04
10.27.0.0.3 FAILS: MEASURED 0 +- .6 = 3.5587
10.27.0.0.4 MEASURED VALUE = 3.69310E-03
EXPECTED 1.76 +- .6 IN 3600 MSEC
10.27.0.0.5 MEASURED VALUE = 7.17640E-04
EXPECTED .8 +- .3 IN 15000 MSEC
10.27.0.0.6 FAILS: MEASURED .5 +- .1 = 2.99931E-04
10.27.0.0.7 MEASURED VALUE = 2.98023E-04
EXPECTED -1.76 +- .6 IN 3600 MSEC
10.27.0.0.8 MEASURED VALUE = -6.93798E-04
EXPECTED -.8 +- .3 IN 15000 MSEC
10.27.0.0.9 FAILS: MEASURED -.5 +- .1 = 1.37997E-02

TEST COMPLETED THROUGH 10.28.2.0.3
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 91 MIN 21 SEC

6/21/2016 13:57:48
9530 TEST SYSTEM 1

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00
ADAPTER #65

Before bench testing, lifted positive lead
of C211 to check for resistance, found
the part measured open, as
expected, resoldered part.

FIXTURE #2

10.9.1.0.8 MEASURED VALUE = 2.45046
EXPECTED 0 +- 1 IN 80000 MSEC

10.21.0.0.4 UNIT WILL NOT ADJUST FOR 3.5418 VOLTS OUTPUT

10.21.0.0.5 FAILS: MEASURED 1 +- .25 = 7.89976E-03

10.21.0.0.6 FAILS: MEASURED -1 +- .25 = 1.62997E-02

10.22.0.0.4 FAILS: MEASURED 0 +- 1.5 = 3.5602

10.22.0.0.5 MEASURED VALUE = 1.04327E-02
EXPECTED .523 +- .16 IN 3000 MSEC

10.22.0.0.8 MEASURED VALUE = 5.96952E-03
EXPECTED -.523 +- .16 IN 3000 MSEC

10.22.1.0.3 FAILS: MEASURED 0 +- 1.5 = 3.5598

10.22.1.0.4 MEASURED VALUE = 6.09398E-04
EXPECTED 1.85 +- .6 IN 2750 MSEC

10.22.1.0.5 MEASURED VALUE = 1.63937E-03
EXPECTED .5 +- .4 IN 60000 MSEC

10.22.1.0.7 MEASURED VALUE = -1.53542E-04
EXPECTED -1.85 +- .6 IN 2750 MSEC

10.22.1.0.8 MEASURED VALUE = 4.56810E-04
EXPECTED -.5 +- .4 IN 60000 MSEC

10.23.0.0.3 FAILS: MEASURED 0 +- 1.8 = 3.5435

10.23.0.0.4 FAILS: MEASURED -1 +- .2 = 1.28002E-02

10.23.0.0.5 FAILS: MEASURED 1 +- .2 = 1.41001E-02

10.23.0.0.7 FAILS: MEASURED -1 +- .2 = 1.45998E-02

10.23.0.0.8 FAILS: MEASURED 1 +- .2 = 1.45998E-02

10.24.0.0.4 FAILS: MEASURED 0 +- 1.5 = 3.559

10.24.0.0.5 MEASURED VALUE = -1.54495E-04
EXPECTED -.57 +- .17 IN 2700 MSEC

10.24.0.0.7 MEASURED VALUE = 5.94902E-03
EXPECTED .57 +- .17 IN 2700 MSEC

10.24.0.0.9 MEASURED VALUE = 6.08444E-04
EXPECTED -1.85 +- .45 IN 9000 MSEC

10.24.0.0.10 MEASURED VALUE = -2.25258E-03
EXPECTED -.75 +- .225 IN 60000 MSEC

10.24.0.0.11 MEASURED VALUE = 9.03893E-03
EXPECTED 1.85 +- .45 IN 9000 MSEC

10.24.0.0.12 MEASURED VALUE = -9.53865E-03
EXPECTED .75 +- .225 IN 60000 MSEC

10.25.0.0.3 FAILS: MEASURED 0 +- 1.5 = 3.5522

10.25.0.0.4 FAILS: MEASURED 1 +- .2 = 3.79992E-03

10.25.0.0.5 FAILS: MEASURED -1 +- .2 = 4.89998E-03

10.26.0.0.3 FAILS: MEASURED 0 +- .5 = 3.559

10.26.0.0.4 MEASURED VALUE = -8.41141E-04
EXPECTED .6 +- .18 IN 2400 MSEC

10.26.0.0.6 MEASURED VALUE = 2.05803E-03
EXPECTED -.6 +- .18 IN 2400 MSEC

10.26.0.0.8 MEASURED VALUE = 4.84276E-03
EXPECTED 1.76 +- .6 IN 3600 MSEC

10.26.0.0.9 MEASURED VALUE = 1.02806E-03
EXPECTED .8 +- .3 IN 15000 MSEC

Step 10.9.1.0.8 pitch high pass
test

Output is to decay to
within $\pm 1V$ over 80sec
some resistance in
C221 or C222 can
cause the delay to
lengthen in duration.
A change in CR215 or
CR216 can also cause
the same to happen.

Replaced I113, found input
at 0V and output at positii
rail. (+4V)

KC 295

Troubleshooting
results

10.26.0.0.10 FAILS: MEASURED .5 +- .1 = 1.00136E-04
10.26.0.0.11 MEASURED VALUE = -2.48146E-03
EXPECTED -1.76 +- .6 IN 3600 MSEC
10.26.0.0.12 MEASURED VALUE = -6.12259E-04
EXPECTED -.8 +- .3 IN 15000 MSEC
10.26.0.0.13 FAILS: MEASURED -.5 +- .1 = 1.00136E-04
10.27.0.0.3 FAILS: MEASURED 0 +- .6 = 3.5587
10.27.0.0.4 MEASURED VALUE = 3.69310E-03
EXPECTED 1.76 +- .6 IN 3600 MSEC
10.27.0.0.5 MEASURED VALUE = 7.17640E-04
EXPECTED .8 +- .3 IN 15000 MSEC
10.27.0.0.6 FAILS: MEASURED .5 +- .1 = 2.99931E-04
10.27.0.0.7 MEASURED VALUE = 2.98023E-04
EXPECTED -1.76 +- .6 IN 3600 MSEC
10.27.0.0.8 MEASURED VALUE = -6.93798E-04
EXPECTED -.8 +- .3 IN 15000 MSEC
10.27.0.0.9 FAILS: MEASURED -.5 +- .1 = 1.37997E-02

TEST COMPLETED THROUGH 10.28.2.0.3
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 91 MIN 21 SEC

6/22/2016 13:39:37
9530 TEST SYSTEM 1

KC 295 UNIT FINAL TEST
SERIAL NUMBER 7262
FLAVOR -00
ADAPTER #65

FIXTURE #2

10.9.1.0.8 MEASURED VALUE = 2.32938
EXPECTED 0 +- 1 IN 80000 MSEC

TEST COMPLETED THROUGH 10.28.2.0.3
UNIT FAILS SPECIFICATION M904-0221-00

REV 83

TEST TIME: 90 MIN 54 SEC

KC 295
ATE results
Pitch High Pass
does not
meet the MPS

KC 295

Adapter Card

12/17/2015 18:02:48
9530 TEST SYSTEM 1
CUSTOMER SERVICE

KC 295 ADAPTER FINAL TEST
SERIAL # 10760
FLAVOR -60

065-5009-60

8.2.0.9 MEASURED 9.99999E+09 OHMS
EXPECTED 5 +- 5

8.4.0.1 R4105 WILL NOT ADJUST.
MEASURED 0 +- .01 = .0331 VDC.

8.4.0.2 R4108 WILL NOT ADJUST.
MEASURED 0 +- .01 = .4513 VDC.

8.4.0.6 MEASURED 9.3798 VDC
EXPECTED 8.8 +- .25

8.4.0.9 R479 WILL NOT ADJUST.
MEASURED 0 +- .01 = -.7121 VDC.

8.4.0.10 R485 WILL NOT ADJUST.
MEASURED 0 +- .01 = -.2017 VDC.

8.4.0.12 R471 WILL NOT ADJUST.
MEASURED 5 +- .01 = 5.2604 VDC.

8.4.0.14 MEASURED -6.6727 VDC
EXPECTED -5 +- .1

8.4.0.16 MEASURED -1.9579 VDC
EXPECTED -1 +- .1

8.4.0.18 MEASURED .53215 VDC
EXPECTED 1 +- .1

8.4.0.21 R468 WILL NOT ADJUST.
MEASURED -2 +- .01 = -2.4624 VDC.

8.4.0.23 MEASURED 2.0624 VDC
EXPECTED 2 +- .05

8.4.0.27 MEASURED -1.37896 VDC
EXPECTED -1 +- .1

8.6.0.5 SELFTEST TIME INTERVAL = 9.99999E+09 SEC
EXPECTED 1.25 +- .45 SEC

TEST COMPLETED THROUGH 8.11.0.2
BOARD FAILS SPECIFICATION M904-0284-00

REV 29

TEST TIME: 11 MIN 32 SEC

See technician
comments on
following page


11-16-2016

Gill, Bill

From: Hawkins, William
Sent: Wednesday, November 16, 2016 8:24 AM
To: Gill, Bill
Subject: RE: KC 295 adapter card

Bill,

I reviewed the test results, it appears that all steps would pass if the board was nulled (which we skipped in order to maintain the customer configuration.) That would leave the 2 typical ATE glitches which pass by manual testing. I added more detail specific to each step below.

8.2.0.9 is a regular ATE glitch, it should bench check ok
8.4.0.1 chose not to adjust, should pass if adjusted
8.4.0.2 chose not to adjust, should pass if adjusted
8.4.0.6 With R4108 not nulled above, Pitch FD CMD is still set up for the aircraft, not to match the ATE and test panel
8.4.0.9,10,12 chose not to adjust, should pass if adjusted
8.4.0.14 With R471 not nulled above, Vertical Gyro Roll Attitude is still set up for the aircraft, not to match the ATE and test panel
8.4.0.16 With R471 not nulled above, Vertical Gyro Roll Attitude is still set up for the aircraft, not to match the ATE and test panel
8.4.0.18 With R471 not nulled above, Vertical Gyro Roll Attitude is still set up for the aircraft, not to match the ATE and test panel
8.4.0.21 chose not to adjust, should pass if adjusted
8.4.0.23 With R468 not nulled above, Vertical Gyro Pitch Attitude is still set up for the aircraft, not to match the ATE and test panel
8.4.0.27 With R468 not nulled above, Vertical Gyro Pitch Attitude is still set up for the aircraft, not to match the ATE and test panel
8.6.0.5 is a regular ATE glitch, it should bench check ok

From: Gill, Bill
Sent: Tuesday, November 15, 2016 3:56 PM
To: Hawkins, William [REDACTED]
Subject: KC 295 adapter card
Importance: High

Hello Bill,

Please review the attached data for the adapter card you tested for the NTSB last December. I need help explaining these results. The data indicates that 5 resistors would not adjust. We were instructed not to adjust anything, so this is expected. As such, would that explain the failed tests? Please contact me after you have reviewed the data and I will meet with you. Thank you very much.

All the best,

Bill

Bill Gill
Air Safety Investigator
Honeywell Product Integrity
[REDACTED]

Inspector's Statement

Date: 08/31/2016

FAA Inspector Name: Arno B. Boyle

Inspector's Phone: [REDACTED]

Inspector Office: CE-FSDO-05

Inspector's Email: Arno.Boyle@faa.gov

Aircraft: N7FG

Attention: NTSB Inspector Timothy W. Monville

Statement:

On 11/30/2015 I was assigned to assist with the investigation of N7FG, a Beech A36TC aircraft that had crashed in a lake in Orlando FL. on 11/20/2015.

On 12/17/2015 I arrived at 23500 W. 105th Street, Olathe, Kansas 66061, Honeywell's Olathe site. I provided Federal Aviation Administration (FAA) oversight, during the NTSB investigation/inspection, of the components from N7FG. I returned on 12/18/2015 for the same investigation/inspection, oversight. I returned to Honeywell's Olathe site on 06/21/2016 and again on 10/19/2016 for the same investigation/inspection, oversight. I have read the Honeywell report and concur with the findings.

-----NOHTING FOLLOWS-----

1/11/2017

X

Arno B. Boyle
Aviation Safety Inspector AW GA
Signed by: Arno Bryon Boyle