

Honeywell

Bill Gill

Air Safety Investigator



Mr. Michael Folkerts
Senior Air Safety Investigator
National Transportation Safety Board, Central Region
4760 Oakland Street, Suite 500
Denver, CO 80239

June 12, 2019

Re: NTSB ID: CEN19FA088, N428CD, Piper PA-46-350P JetProp Conversion; Honeywell examination

Dear Mr. Folkerts,

The equipment identified below from N428CD was examined at our facility in Olathe, Kansas, on May 22, 2019. Inspector Arno Boyle with the FAA Kansas City FSDO hand carried the components to the Honeywell site in a sealed box. Parties present during the inspection included: Mr. Michael Folkerts, NTSB IIC; 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 sealed for return shipment.

1. KS 270C Pitch Servo, P/N 065-00178-2200, S/N 9298
2. KM 275 Pitch Servo Mount, P/N 065-00030-0000, S/N 45299
3. KS 271C Roll Servo, P/N 065-00179-0500, S/N 5795
4. KM 275 Roll Servo Mount, P/N 065-00030-0000, S/N 45300
5. KS 271C Yaw Servo, P/N 065-00179-0600, S/N 2813
6. K M 275 Yaw Servo Mount, P/N 065-00030-0000, S/N 44827
7. KCM 100 Configuration Module, P/N 071-00073-5000, S/N 5157
8. KC 225 Flight Computer, P/N 065-00183-2501, S/N 1277



As received – sealed box and contents well packed

1. KS 270C Pitch Servo, P/N 065-00178-2200, S/N 9298

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

- The plastic servo cover attach plate is bent and not allowing the cover to fit properly.
- The cover was removed to allow visual inspection. Traces of dried dirt/mud present on electrical and mechanical assemblies – removed the debris as necessary to allow electrical testing.
- The servo was subjected to acceptance testing per maintenance manual, 006-15618-000. The unit failed two tests with minor out of tolerance measurements as noted below. Neither failure would adversely affect proper servo function. A copy of the test data sheet can be found in appendix A of this report.
 - o Test Step S: Strain Gauge sensing CCW Trim Sense, failed with reading of 1.21V (limit = $1 \pm .2V$).
 - o Test Step S: Null, failed with a reading of .089V (limit = $-.05V$ to $+.05V$).



Cover attach bracket bent causing poor cover fitment



KS 270C Pitch Servo dataplate



Dried dirt/mud present on electrical and mechanical assemblies

2. KM 275 Pitch Servo Mount, P/N 065-00030-0000, S/N 45299

The KM 275 Pitch Servo Mount was visually inspected and subjected to mechanical testing. The following observations were noted:

- The KM 275 Pitch Servo Mount was received attached to associated aircraft bracket. They were separated to facilitate testing.
- Traces of dried dirt/mud present.
- The slip clutch was tested in the clockwise and counter-clockwise directions. The clutch slipped at 30 in-lbs. in both the CW and CCW directions. The specified limit is 22 +/- 2 in-lbs.



KM 275 Pitch Servo Mount – front and back views

3. KS 271C Roll Servo, P/N 065-00179-0500, S/N 5795

The KS 271C Roll Servo was subjected to visual and electrical testing. The following observations were noted:

- The cover was removed to allow visual inspection. Traces of dried dirt/mud present on electrical and mechanical assemblies – removed the debris as necessary to allow electrical testing.
- The servo was subjected to acceptance testing per procedure 924-01337-0000, rev 25. The unit failed two tests with minor out of tolerance measurements as noted below. Neither failure would adversely affect proper servo function. A copy of the test data sheet can be found in appendix A of this report.
 - Proc step 5.3: Solenoid engage pulling against gravity – solenoid engages/disengages at 27.3 volts (limit = 20.6 volts max). Note: dirt/sand present in solenoid assembly.
 - Proc step 5.7: Torque characteristics – solenoid disengages in the CW direction in 3 seconds (limit = 2 seconds max).



KS 271C Roll Servo – side view



KS 271C Roll Servo dataplate



Dried dirt/mud on pinion gear and bearing



Dried dirt/mud present on servo electrical and mechanical assemblies

4. KM 275 Roll Servo Mount, P/N 065-00030-0000, S/N 45300

The KM 275 Roll Servo Mount was visually inspected and subjected to mechanical testing. The following observations were noted:

- Minor traces of dried dirt/mud present.
- The slip clutch was tested in the clockwise and counter-clockwise directions. The clutch slipped at 30 in-lbs. in both the CW and CCW directions. The specified limit is 22 +/- 2 in-lbs.



KM 275 Roll Servo Mount – front and back views



KM 275 Roll Servo Mount dataplate

5. KS 271C Yaw Servo, P/N 065-00179-0600, S/N 2813

The KS 271C Yaw Servo was subjected to visual and electrical testing. The following observations were noted:

- The KS 271C Yaw Servo was received attached to servo mount and aircraft bracket. They were separated to facilitate testing.
- The cover was removed to allow visual inspection. Traces of dried dirt/mud present on electrical and mechanical assemblies – removed the debris as necessary to allow electrical testing.
- The servo was subjected to acceptance testing per procedure 924-01337-0000, rev 25. The unit failed two tests with minor out of tolerance measurements as noted below. Neither failure would adversely affect proper servo function. A copy of the test data sheet can be found in appendix A of this report.
 - o Proc step 5.4: Motor breakout CW input – measured 1.0 volts (limit = 0.3 volts max).
 - o Proc step 5.4: Motor breakout CCW input – measured -0.7 volts (limit = -0.3 volts max).



KS 271C Yaw Servo with associated aircraft bracket and cover



KS 271C Yaw Servo – front and back views



KS 271C Yaw Servo – dried dirt/mud/sand present

6. KM 275 Yaw Servo Mount, P/N 065-00030-0000, S/N 44827

The KM 275 Yaw Servo Mount was visually inspected and subjected to mechanical testing. The following observations were noted:

- Minor traces of dried dirt/mud present.
- The slip clutch was tested in the clockwise and counter-clockwise directions. The clutch slipped and chattered at approximately 40 in-lbs. in both the CW and CCW directions (limit is 40 +/- 4 in-lbs.)



KM 275 Yaw Servo Mount – front and back views

7. KCM 100 Configuration Module, P/N 071-00073-5000, S/N 5157

Following visual inspection, the KCM 100 was connected to test equipment to recover the stored error codes. The equipment included a KC 225 test panel and a KC 225 flight computer containing special write-inhibit software. When power is applied to the equipment, the KC 225 begins preflight testing and the power cycle is incremented. During our test, power cycle number 75 was generated; therefore, the previous power cycle (number 74) is associated with the accident flight. There were three errors recorded during power cycle number 74 shown as follows:

#	Power cycle	Delta Time	Error	Description
31	74	00:10:20	172	MET fail
32	74	00:10:32	151	roll monitor fail
33	74	00:10:58	180	yaw fail

Error code 172 (*MET fail*) was logged 10 minutes and 20 seconds after power was applied to the KFC 225 autopilot system. This error indicates a possible latent failure of the Manual Electric Trim Switches was detected. When *MET fail* is detected, manual electric trim is disabled. The autopilot will automatically disengage, but all flight director modes will remain active. The autopilot will remain unavailable until a successful preflight test occurs. The autopilot does not have to be engaged for an *MET fail* to be logged.

Error code 151 (*roll monitor fail*) was logged at 10 minutes, and 32 seconds after power was applied to the KFC 225 autopilot system. The *roll monitor fail* is logged when the aircraft experiences roll rates in excess of +/- 14 degrees per second or a roll attitude of +/- 45 degrees. The autopilot automatically disconnects when the roll monitor is tripped (logged as *roll monitor fail*) and all Flight Director (FD) modes are disengaged (set-up option). Twenty-six seconds later, error code 180 (*yaw fail*) was recorded, indicating that a yaw rate in excess of 12 degrees per second existed. When yaw fail is logged, YD mode becomes inactive without affecting other autopilot modes. Additionally, either of these failures may be logged because of a hardware failure (noted below) and the autopilot does NOT have to be engaged for these monitor trips to be logged. The Flightline Maintenance Manual (FMM), P/N 006-15557-0001, is located in Appendix A and describes these errors as follows:

MET fail (reference page 5-18 of the FMM)

A possible latent failure of the Manual Electric Trim Switches was detected. Check the control wheel for a stuck switch. MET operation will be disallowed until the stuck switch condition is removed.

Roll Monitor Fail (reference page 5-16 of the FMM)

The AP has been deactivated due to a roll attitude or rate monitor failure.

The roll rate monitor has failed without CWS being pressed for 0.75 seconds

or the roll attitude monitor has failed without CWS being pressed for 1.25

seconds. AP operation will be disallowed.

Possible failed unit(s) installed that may cause error: KC 225, KI 256, harness wiring

Yaw Fail (reference page 5-19 of the FMM)

The yaw damper has been deactivated due to a yaw rate monitor failure while

CWS was not pressed. YD operation will be disallowed until the yaw rate monitor

failure disappears.

Possible failed unit(s) installed that may cause error: KC 225, KRG 331, harness wiring

KC 225 error log (KCM 100 Config Module, S/N 5157)

Current power cycle and delta time: 75 00:06:36

#	Power cycle	Delta Time	Error	Description
1	3	00:00:00	29	Roll svo tst below upper lower lmt
2	4	00:00:00	29	Roll svo tst below upper lower lmt
3	5	00:00:00	29	Roll svo tst below upper lower lmt
4	8	00:00:00	29	Roll svo tst below upper lower lmt
5	9	00:00:00	29	Roll svo tst below upper lower lmt
6	10	00:00:00	29	Roll svo tst below upper lower lmt
7	12	00:00:00	29	Roll svo tst below upper lower lmt
8	13	00:00:00	29	Roll svo tst below upper lower lmt
9	14	00:00:00	29	Roll svo tst below upper lower lmt
10	15	00:00:00	29	Roll svo tst below upper lower lmt
11	16	00:00:00	29	Roll svo tst below upper lower lmt
12	17	00:00:00	29	Roll svo tst below upper lower lmt
13	18	00:00:00	29	Roll svo tst below upper lower lmt
14	19	00:00:00	29	Roll svo tst below upper lower lmt
15	20	00:00:00	29	Roll svo tst below upper lower lmt
16	21	00:00:00	29	Roll svo tst below upper lower lmt
17	28	01:31:26	172	MET fail
18	34	00:01:29	172	MET fail
19	36	01:23:51	172	MET fail
20	37	00:44:30	172	MET fail
21	38	00:13:07	172	MET fail
22	40	01:58:42	180	yaw fail
23	43	00:30:39	172	MET fail
24	47	03:15:54	172	MET fail
25	54	00:00:38	82	Acc HP has low gain
26	55	00:25:21	172	MET fail
27	64	01:51:42	172	MET fail
28	65	01:17:59	172	MET fail
29	69	01:31:06	172	MET fail
30	72	00:03:44	172	MET fail
31	74	00:10:20	172	MET fail
32	74	00:10:32	151	roll monitor fail
33	74	00:10:58	180	yaw fail

End of error log

Stop Text Transfer, then press <CR> to continue



KCM 100 Configuration Module



Last preselected altitude by the flight crew was 2000 feet

8. KC 225 Flight Computer, P/N 065-00183-2501, S/N 1277

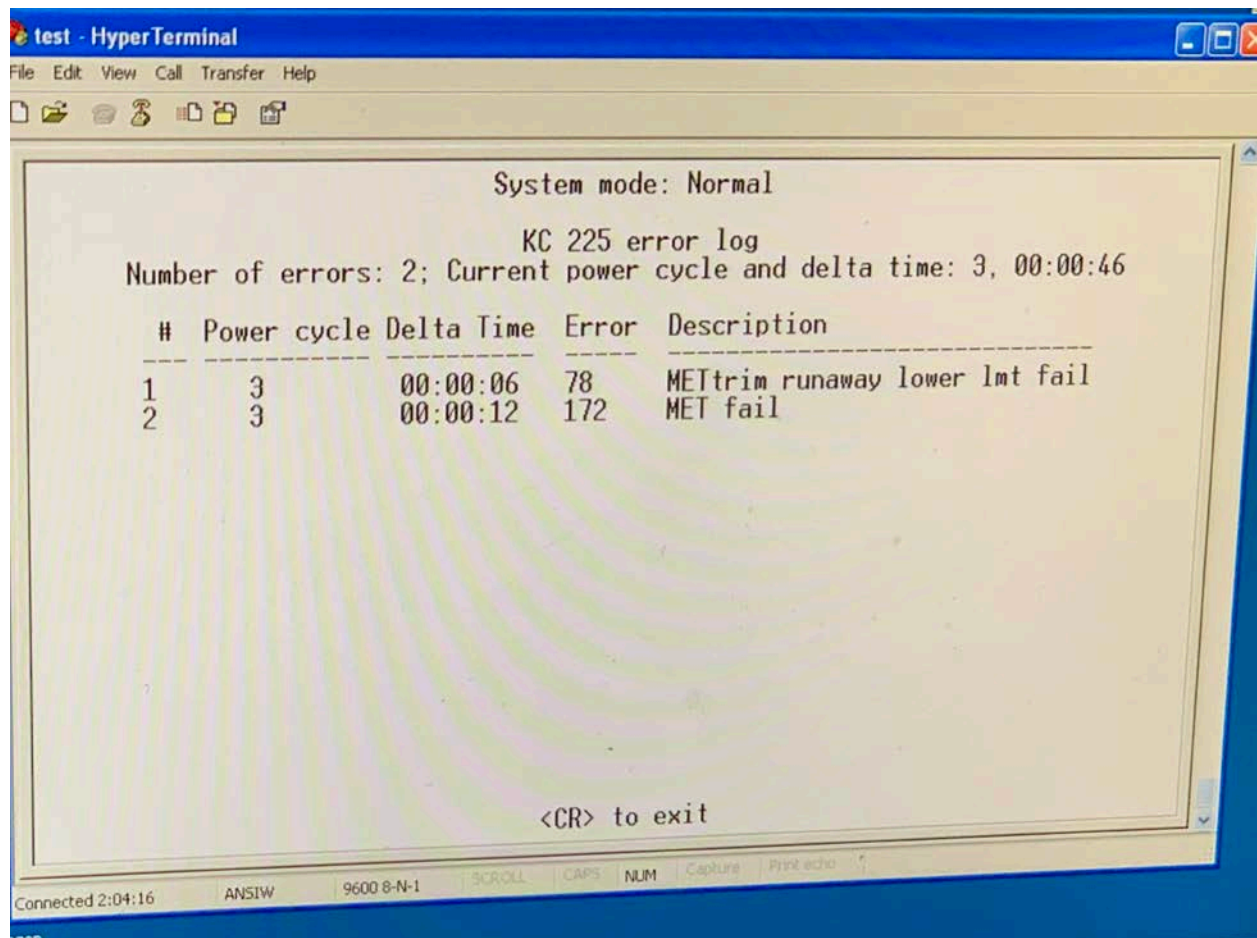
The KC 225 Flight Computer was received installed into its associated rack. The outside of the unit was contaminated with dried dirt/mud/sand, consistent with being recovered from a river bottom. The unit was removed from the rack and opened to inspect for internal damage. The circuit boards were found covered/caked with dried dirt/mud/sand – see photos below. The boards were removed, cleaned, and re-installed. The unit was then connected to a KC 225 test panel and power was applied. No abnormal current draw was observed and the unit started preflight testing. The unit failed preflight test with a trim fault illuminated on the front of the test panel and error codes 78 (*MET trim runaway*) and 172 (*MET fail*) were produced. Error 172 was logged during the accident flight, but error 178 was not.

MET trim runaway lower limit fail (reference page 5-12 of the FMM)

Preflight test failed due to lack of response of the trim runaway monitor to a simulated trim voltage below the lower threshold. This indicates a probable failure of the trim runaway monitor circuitry of the flight computer. AP and MET operation will be disallowed.

MET fail (reference page 5-18 of the FMM)

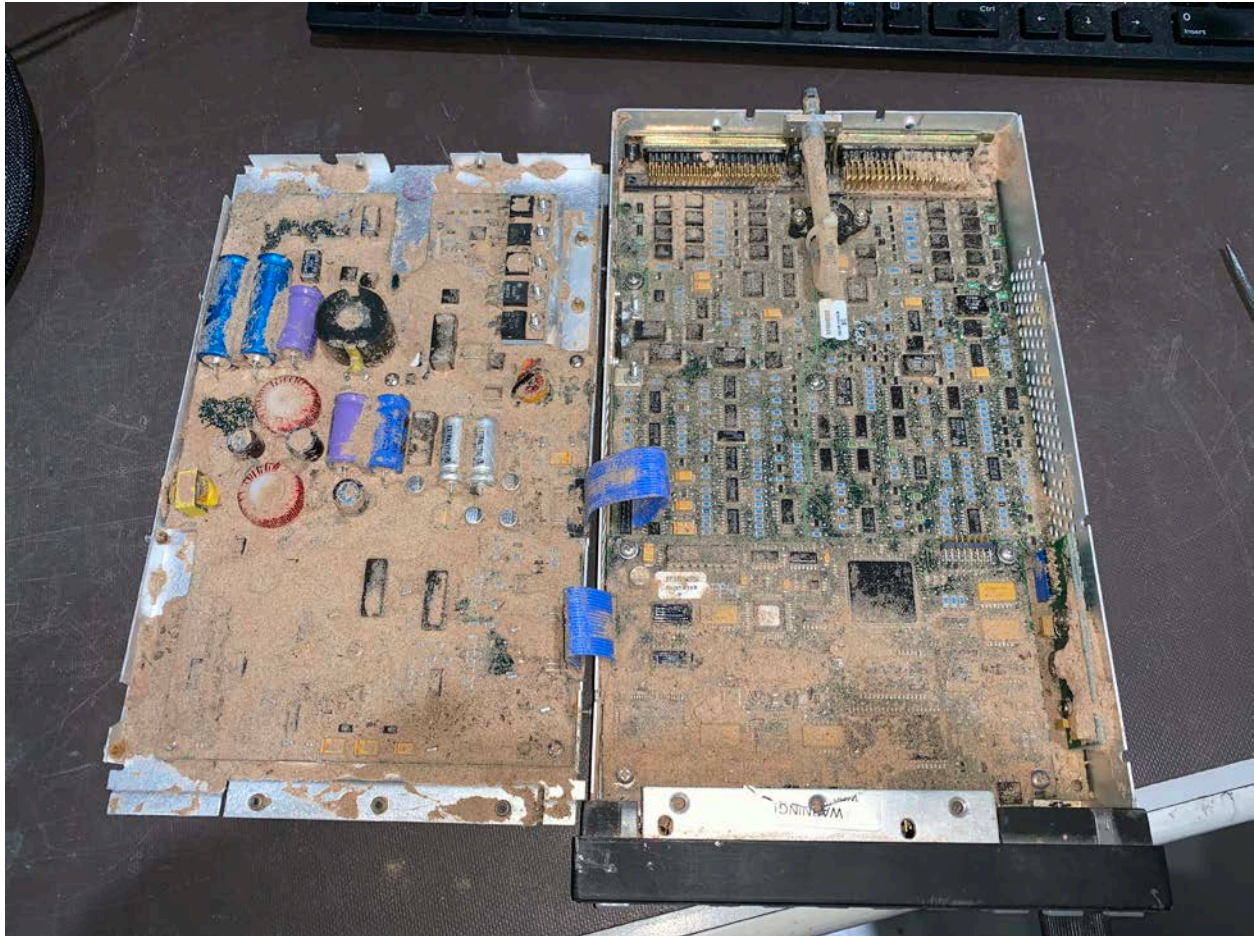
A possible latent failure of the Manual Electric Trim Switches was detected. Check the control wheel for a stuck switch. MET operation will be disallowed until the stuck switch condition is removed.



KC 225 error code log



KC 225 Flight Computer – dried dirt/mud/sand present



KC 225 Flight Computer opened depicting dried dirt/mud/sand caked inside



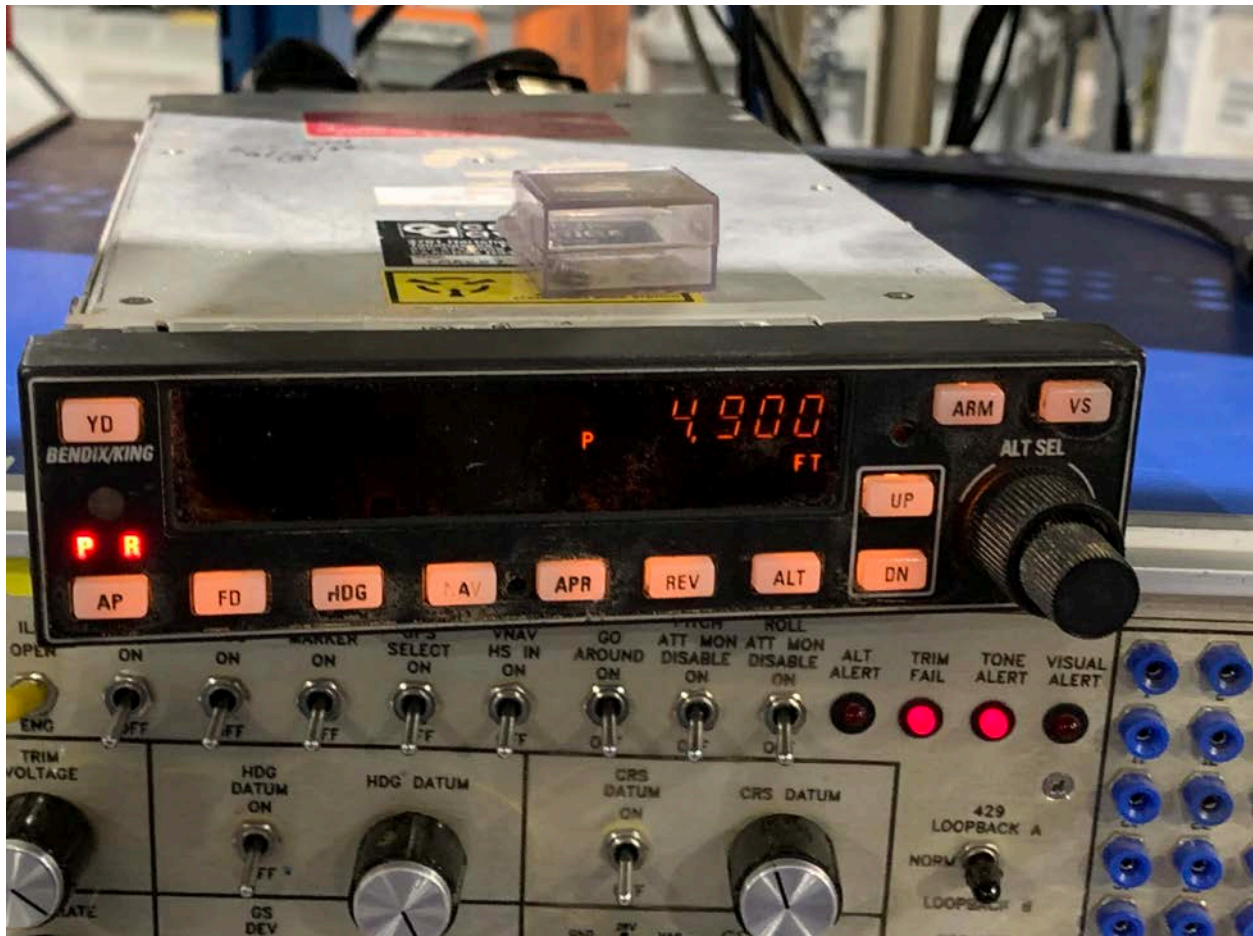
KC 225 – boards were removed for cleaning



KC 225 circuit board



KC 225 dataplate

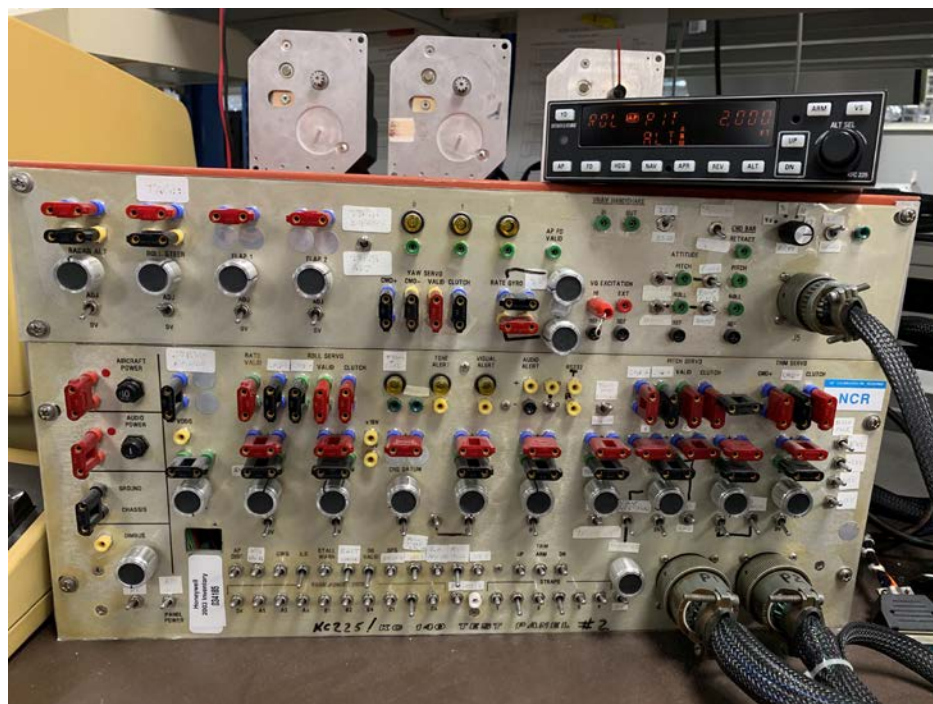


KC 225 Flight Computer – fails preflight test with trim fault illuminated on the test panel

KC 225 Demonstration of the Manual Electric Trim Switch (Arm Switch) regarding error 172, *MET fail*.



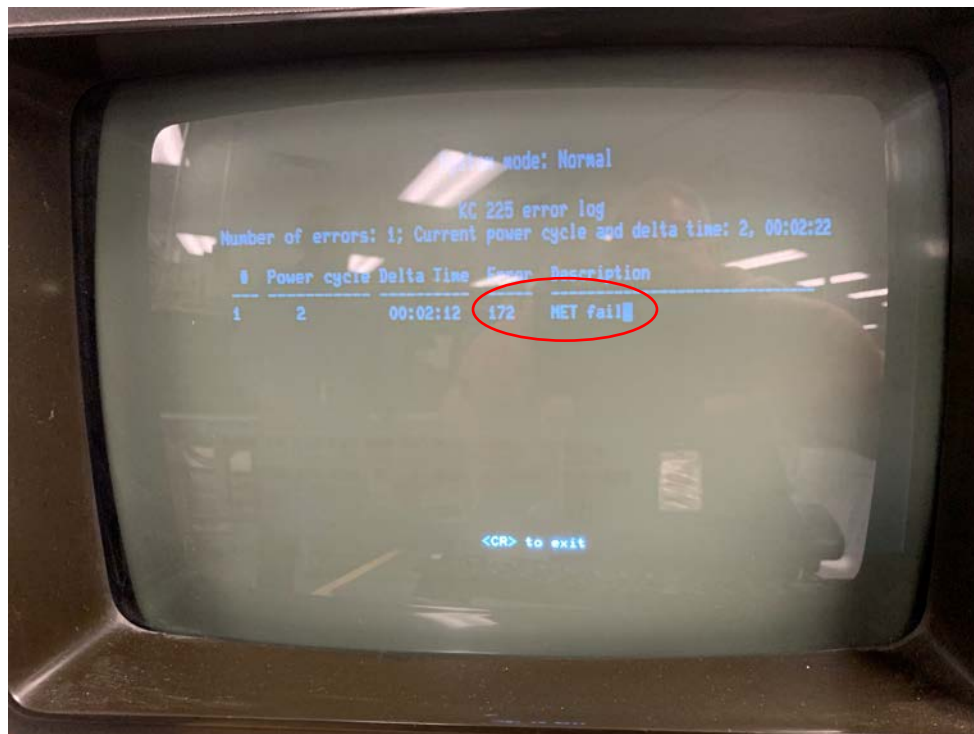
Exemplar KC 225 Flight Computer and KC 225 engineering test panel. Here, the KC 225 passed preflight test and no errors were recorded.



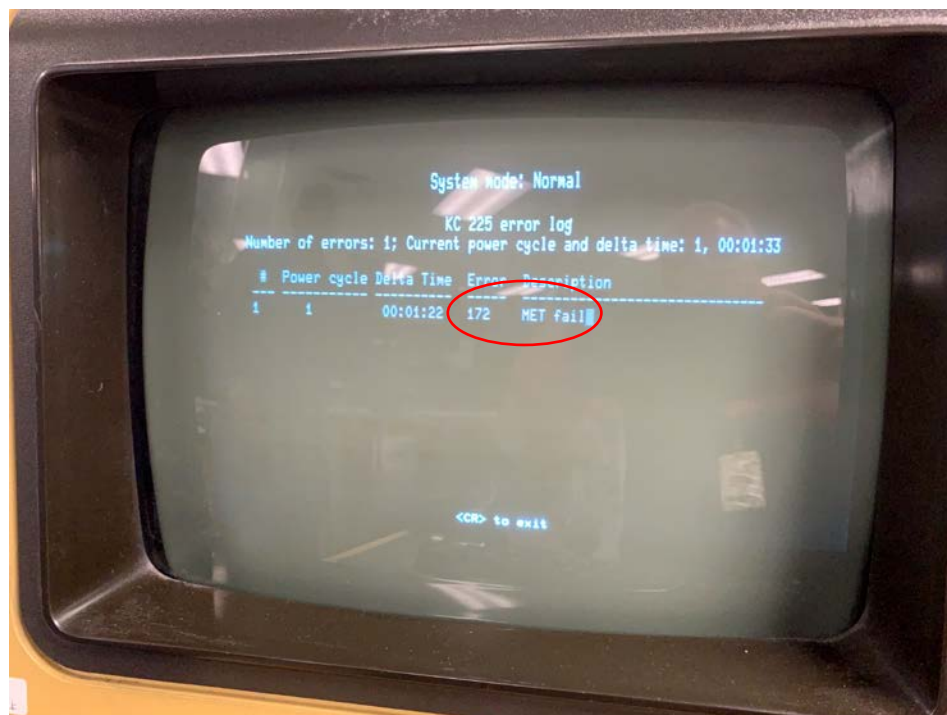
KC 225 Flight Computer and engineering test panel – Autopilot is engaged



When the “Arm” switch is activated or moved to the down position, the autopilot automatically disengages and error 172 *MET fail* is logged. All FD that were active before disengagement remain active. Notice the absence of the “AP” notation where circled above.



Error 172 *MET fail* logged when “Arm” switch on panel was activated, causing AP disengagement



If the “Arm” switch on the test panel is activated prior to switching AP power on, the KC 225 passes preflight testing after power is applied, then the monitor detects the active “Arm” switch, annunciating a “PT” (Pitch Trim) fault on the KC 225 screen and logging error 172 *MET fail*. FD modes are available; however Manual Electric Trim operation and AP modes are inhibited. This demonstrates that the Manual Electric Trim monitor is always active when AP power is applied.

The KM 275 Roll Servo Mount functioned correctly; however, the clutch slipped at 30 in-lbs. against a limit of 22 +/- 2 in/lbs. The KM 275 Pitch Servo Mount functioned correctly; however, the clutch slipped at 30 in-lbs. against a limit of 22 +/- 2 in/lbs. The KM 275 Yaw Servo Mount functioned correctly; however, the clutch chatters -- slipped at 40 in-lbs. against a limit of 40 +/- 4 in/lbs. The out of tolerance conditions of these three servo mounts would not have an adverse impact on proper operation. The Airplane Flight Manual Supplement provides preflight instructions to confirm proper operation and ability to overpower the autopilot clutches. No pre-impact faults were detected.

The KS 270C Pitch Servo, KS 271C Roll Servo, and KS 271C Yaw Servo each had two tests marginally out of specification. The out of tolerance conditions of these three servos would not have an adverse impact on proper operation.

The KCM 100 Config Module recorded three error codes during the accident flight – error 172 *MET fail*, error 151 *roll monitor fail*, and error 180 *yaw fail*. The error 172 *MET fail* would inhibit the manual electric trim operation and automatically disengage the autopilot if it was engaged; however, the Flight Director modes that were active prior to AP disengagement would remain active. If the error 172 *MET fail* occurs after a successful KC 225 preflight test, but prior to AP engagement, Manual Electric Trim (MET) operation and Autopilot mode are inhibited; however, Flight Director modes are available. If the error later clears, MET and AP operation are restored. If a condition exists that would cause error 172 *MET fail* to be present before commencing preflight test (before applying power to the autopilot system), then power is applied to the autopilot system, the KC 225 will pass preflight testing after power is applied, the monitor then promptly detects the *MET fail* condition, annunciating a “PT” fault on the KC 225 screen and logging error 172 *MET fail*. The FD modes are available, but MET operation and AP modes are inhibited. The *roll monitor fail* and *yaw fail* could be produced because of a stall/spin operation. Since these monitors are active anytime the KFC 225 autopilot system is powered up, it is not known if the autopilot was engaged during the accident flight.

The KC 225 failed preflight test and produced two errors – error 78 *MET runaway* and error 172 *MET fail*. Error 78 was not logged during the accident flight. This indicates that the error 172 *MET fail* that was logged during the accident flight is not related to the Manual Electric Trim switches on the pilot’s yoke and indicates that the fault is within the KC 225 Flight Computer. When automatic autopilot disengagement occurs as a result of error 172 *MET fail*, it is communicated to the pilot via an audible tone, voice alert “AUTOPILOT” is announced if enabled, and the AP annunciation disappears on the KC 225 Flight Computer display; however, all Flight Director modes active at the time of disengagement remain active. The autopilot use is disallowed until the error clears or successfully completes preflight testing. No determination was made regarding the source of the KC 225 preflight test failure (error 172 *MET fail*).

Please contact me if you require additional assistance or information. Thank you for allowing Honeywell to assist you with this investigation.

Sincerely,

[REDACTED]

Bill Gill

Air Safety Investigator

[REDACTED]

Cc: Arno Boyle, Kansas City Flight Standards District Office
Accident File

Appendix

A

KS 270C

Pitch Servo

KS 270C FINAL DATA SHEET
FOR -0200/2200 FLAVORSERIAL # 9298

PROC STEP	MPS REF.	TEST DESCRIPTION	LIMITS	DATA
K	4.1	Ohm Meter Measurement	(NMT 2 ohms)	<u>✓</u> VOK
L	4.2.1	External Strapping Test Input @ 27.5	(Solenoid engages & disengages)	<u>✓</u> VOK
M	4.2.2	Solenoid Engage - Pulling against gravity Input NMT @ 20.6v	(Solenoid engages & disengages)	<u>✓</u> VOK
N	4.3	Motor Breakout and Direction CW Input = +0.20 CCW Input = -0.20	(CCW Pinion Gear & Positive Tach Voltage) (CW Pinion Gear & Negative Tach Voltage)	<u>✓</u> VOK <u>✓</u> VOK
O	4.5/4.7	Speed Characteristics, Phasing & Tach Scale Factor CCW Tach Output CCW Speed (-8.0V) CCW Tach Output Voltage CCW Speed (-4.0V) CCW Tach Output Voltage (OFF) CW Tach Output CW Speed (+8.0V) CW Tach Output Voltage CW Speed (+4.0V) CW Tach Output Voltage (OFF)	(CCW Capstan & Negative Tach Voltage) (21.0 to 29.0 Seconds) (See Table 2) (42.0 to 58.0 Seconds) (-0.1 to +0.1 Vdc) (CW Capstan & Positive Tach Voltage) (21.0 to 29.0 Seconds) (See Table 2) (42.0 to 58.0 Seconds) (-0.1 to +0.1 Vdc)	<u>✓</u> VOK <u>25.0</u> Sec <u>-4.6</u> Vdc <u>50.3</u> Sec <u>✓</u> VOK <u>✓</u> VOK <u>25.2</u> Sec <u>4.6</u> Vdc <u>50.3</u> Sec <u>✓</u> VOK
P	4.8	Tach Time Constant (-0X00 Flavors only) Time to 63% of Maximum Output	(442 to 598 mSec)	<u>NA</u> mSec
Q	4.9	Valid Output VLDTST NRML VLDTST LO VLDTST NRML VLDTST HI	(Valid-L "ON") (Valid-L "OFF") (Valid-L "ON") (Valid-L "OFF")	<u>✓</u> VOK <u>✓</u> VOK <u>✓</u> VOK <u>✓</u> VOK
R	4.6	Torque Characteristics CW CCW	(Disengages) (Disengages)	<u>✓</u> VOK <u>✓</u> VOK
S	4.4	Strain Gauge Sensing CW TRIM Sense CCW TRIM Sense Trim Sense (-0X00 Flavors) J-M (-2X00 Flavors) R-M (-2X00 Flavors)	(1.0 ±0.20 Vdc) (-1.0 ±0.20 Vdc) (-0.07 to +0.07 Vdc) (-0.05 to +0.05 Vdc) (-0.05 to +0.05 Vdc)	<u>✓</u> VOK <u>✓</u> VOK <u>NA</u> VOK <u>✓</u> VOK <u>✓</u> VOK <u>89 mV</u>

TESTED BY: _____ DATE _____

KS 271C

Roll Servo

Roll Servo

FINAL DATA SHEET FOR FLAVOR 0500

KS 271C

SERIAL # 5795

ALL EQUIPMENT HAS CURRENT CALIBRATION

PROC STEP	TEST DESCRIPTION	LIMITS	DATA
5.1	Ohm Meter Measurement	(NMT 2 ohm)	(MPS REF 4.1) <u>✓</u> OK
5.2	External Strapping Test Input @ 27.5 V solenoid	(Engages & Disengages)	(MPS REF 4.2.1) <u>✓</u> OK
5.3	Solenoid Engage - Pulling against gravity Input NMT 20.6 V solenoid	(Engages & Disengages) <u>at 26.3</u>	(MPS REF 4.2.2) <u>✓</u> OK
5.4	Motor Breakout and Direction CW Input = +0.20 (CCW Pinion Gear & Positive Tach Voltage) CCW Input = -0.20 (CW Pinion Gear & Negative Tach Voltage)		(MPS REF 4.3) <u>✓</u> OK
5.5	Speed Characteristics, Phasing & Tach Scale Factor CCW Tach Output (CCW Capstan & Negative Tach Voltage) CCW Speed -8 Vdc input (21.0 to 29.0 Sec) CCW Tach Output Voltage (See Table 2) CCW Speed -4 Vdc input (42.0 to 58.0 Sec) CCW Tach Output Voltage (OFF) (-0.020 to +0.020 Vdc) CW Tach Output (CW Capstan & positive Tach Voltage) CW Speed +8 Vdc input (21.0 to 29.0 Sec) CW Tach Output Voltage (See Table 2) CW Speed +4 Vdc input (42.0 to 58.0 Sec) CW Tach Output Voltage (OFF) (-0.020 to +0.020 Vdc)		(MPS REF 4.5/4.6) <u>✓</u> OK 22.8 Sec -4.6 Vdc 45.6 Sec 0.00 Vdc 22.7 Sec 4.6 Vdc 45.5 Sec 0.00 Vdc
5.6	Valid Output VLDTST NRML (Valid-L "ON") VLDTST LO (Valid-L "OFF") VLDTST NRML (Valid-L "ON") VLDTST HI (Valid-L "OFF")		(MPS REF 4.7) <u>✓</u> OK <u>✓</u> OK <u>✓</u> OK <u>✓</u> OK
5.7	Torque Characteristics CW (Solenoid Disengages) CCW (Solenoid Disengages)		(MPS REF 4.6) <u>✓</u> OK <u>✓</u> OK

TESTED BY: [REDACTED]

DATE: 5-22-2019

*Disengages
@ 3 sec*

KS 271C

Yaw Servo

Yaw Servo

FINAL DATA SHEET FOR FLAVOR 0600

KS 271C

SERIAL # 2813

ALL EQUIPMENT HAS CURRENT CALIBRATION

✓ VOK

PROC STEP	TEST DESCRIPTION	LIMITS	DATA
5.1	Ohm Meter Measurement	(NMT 2 ohm)	(MPS REF 4.1) <u>✓</u> VOK
5.2	External Strapping Test Input @ 27.5 V solenoid	(Engages & Disengages)	(MPS REF 4.2.1) <u>✓</u> VOK
5.3	Solenoid Engage - Pulling against gravity Input NMT 20.6 V solenoid	(Engages & Disengages)	(MPS REF 4.2.2) <u>✓</u> VOK
5.4	Motor Breakout and Direction CW Input = NMT +0.30 Vdc CCW Input = NMT -0.30 Vdc	CCW Pinion Rotation CW Pinion Rotation	(MPS REF 4.3) <u>✓</u> VOK <u>9/16</u> 1.0 <u>✓</u> VOK <u>-0.7</u>
5.5	Speed Characteristics, Phasing & Tach Scale Factor CCW Rotation CCW Speed -8 Vdc input CCW Speed -4 Vdc input CW Rotation CW Speed +8 Vdc input CW Speed +4 Vdc input	(CCW Capstan) (17.0 to 23.0 Sec) (34.0 to 46.0 Sec) (CW Capstan) (17.0 to 23.0 Sec) (34.0 to 46.0 Sec)	(MPS REF 4.5/4.6) <u>✓</u> VOK <u>19.3</u> Sec <u>39.4</u> Sec <u>✓</u> VOK <u>19.3</u> Sec <u>39.4</u> Sec
5.6	Valid Output VLDTST NRML VLDTST LO VLDTST NRML VLDTST HI	(Valid-L "ON") (Valid-L "OFF") (Valid-L "ON") (Valid-L "OFF")	(MPS REF 4.7) <u>✓</u> VOK <u>✓</u> VOK <u>✓</u> VOK <u>✓</u> VOK
5.7	Torque Characteristics CW CCW	(Solenoid Disengages) (Solenoid Disengages)	(MPS REF 4.6) <u>✓</u> VOK <u>✓</u> VOK

TESTED BY: 

DATE: 5-22-2019

KFC 225

Error Codes

(Extracted from the KFC 225 Flightline Maintenance Manual, P/N 006-15557-0001)

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
1	Exception vector error	KC 225	The system attempted to respond to an unintended interrupt. This indicates a probable fault in the flight computer. AP, FD, YD, and MET operation is disallowed.
2	Frame overrun	KC 225	The flight computer did not finish processing the last frame computations before the frame time expired. AP, FD, YD, and MET operation is disallowed.
5	Inst checksum mismatch	KC 225, KCM 100, harness wiring	The checksum for the installation data in the configuration module is in error or the module has not been setup. AP, FD, YD, and MET operation is disallowed.
6	Inst strap mismatch	KC 225, KCM 100, harness wiring	The strap code in the configuration module does not match the harness strap code. AP, FD, YD, and MET operation is disallowed. Check installation setup. If this error code is recorded, the KC 225 certification gains file may need to be installed again.
7	Inst parity mismatch	KC 225, KCM 100, harness wiring	The parity associated with the installer options is not correct. The configuration module has failed or has not been setup. AP, FD, YD, and MET operation is disallowed.
10	RAM test failed	KC 225	The processor failed the RAM test on power up. AP, FD, YD, and MET operation is disallowed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
11	ROM test failed	KC 225	The processor failed the ROM (CRC) test on power up. AP, FD, YD, and MET operation is disallowed.
12	CPU failed	KC 225	The processor failed the CPU test on power up. AP, FD, YD, and MET operation is disallowed.
13	Watchdog timer failed	KC 225	The processor failed the watchdog timer test on power up. AP, FD, YD, and MET operation is disallowed.
14	Bus error	KC 225	The processor detected a fault on its bus, indicating a probable hardware failure. AP, FD, YD, and MET operation is disallowed.
15	Sys clock failed	KC 225	Processor system clock has lost its crystal input signal, indicating a possible malfunction in the crystal oscillator. AP, FD, YD, and MET operation is disallowed.
16	Timer failed	KC 225	The processor failed the timer test on power up. AP, FD, YD, and MET operation is disallowed.
20	Watchdog timed out	KC 225	The watchdog was not reset in the allowed time period. This indicates a probable hardware fault in the flight computer. AP, FD, YD, and MET operation is disallowed.
21	Certification data in FCC invalid	KC 225	Certification data in the FCC was invalid or different from the configuration module. Data in the configuration module will be used. Use installation menu to reprogram FCC. NOTE: Reserved for future use.
22	CFG cert data programmed from FCC	KC 255	Configuration module data was invalid and were programmed from the FCC data. NOTE: Reserved for future use.
23	Install options in the FCC invalid	KC 225	Installation options in the FCC was invalid or different from the configuration module. Data in the configuration module will be used. Use installation menu to reprogram FCC. NOTE: Reserved for future use.
24	CFG inst opt programmed from FCC.	KC 225	Configuration module data from installation options was invalid and were programmed from the FCC data. NOTE: Reserved for future use.
25	Norm accel self-test fail	KC 225	Preflight test failed due to improper response of the accelerometer during self test. This indicates a probable failure in the accelerometer or the associated circuitry of the flight computer. AP operation is disallowed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
26	Norm accel over 1g upper limit	KC 225	Preflight test failed due to improper response of the accelerometer after self test. If this error occurs in flight, it should be ignored. Otherwise, this indicates a probable failure in the accelerometer or the associated circuitry of the flight computer. AP operation is disallowed.
27	Norm accel below 1g upper limit	KC 225	Preflight test failed due to improper response of the accelerometer after self test. If this error occurs in flight, it should be ignored. Otherwise, this indicates a probable failure in the accelerometer or the associated circuitry of the flight computer. AP operation is disallowed.
28	Roll svo tst over upper upper limit	KC 225	Preflight test failed due to improper response to roll servo command wraparound signal. This indicates a probable failure in the roll servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
29	Roll svo tst below upper lower limit	KC 225	Preflight test failed due to improper response to roll servo command wraparound signal. This indicates a probable failure in the roll servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
30	Pitch svo tst over upper upper limit	KC 225	Preflight test failed due to improper response to pitch servo command wraparound signal. This indicates a probable failure in the pitch servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
31	Pitch svo tst below upper lower limit	KC 225	Preflight test failed due to improper response to pitch servo command wraparound signal. This indicates a probable failure in the pitch servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
32	Trim svo tst over upper upper limit	KC 225	Preflight test failed due to improper response to trim servo command wraparound signal. This indicates a probable failure in the trim servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
33	Trim svo tst below upper lower limit	KC 225	Preflight test failed due to improper response to trim servo command wraparound signal. This indicates a probable failure in the trim servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
34	Roll svo tst over lower upper limit	KC 225	Preflight test failed due to improper response to roll servo command wraparound signal. This indicates a probable failure in the roll servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
35	Roll svo tst below lower lower limit	KC 225	Preflight test failed due to improper response to roll servo command wraparound signal. This indicates a probable failure in the roll servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
36	Pitch svo tst over lower upper limit	KC 225	Preflight test failed due to improper response to pitch servo command wraparound signal. This indicates a probable failure in the pitch servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
37	Pitch svo tst below lower lower limit	KC 225	Preflight test failed due to improper response to pitch servo command wraparound signal. This indicates a probable failure in the pitch servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
38	Trim svo tst over lower upper limit	KC 225	Preflight test failed due to improper response to trim servo command wraparound signal. This indicates a probable failure in the trim servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
39	Trim svo tst below lower lower limit	KC 225	Preflight test failed due to improper response to trim servo command wraparound signal. This indicates a probable failure in the trim servo command circuit or the analog to digital input circuitry of the flight computer. AP, YD, and MET operation is disallowed.
40	Accel mon upper limit fail	KC 225	Preflight test failed due to lack of response of the acceleration monitor to a simulated positive acceleration above the upper threshold. This indicates a probable failure of the acceleration monitor circuitry of the flight computer. AP operation is disallowed.
41	Accel mon upper limit roll clutch	KC 225	Preflight test failed due to lack of roll clutch disengagement by the acceleration monitor to a simulated positive acceleration above the upper threshold. This indicates a probable failure of the roll clutch control circuitry of the flight computer. AP operation is disallowed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
42	Accel mon upper limit pitch clutch	KC 225	Preflight test failed due to lack of pitch clutch disengagement by the acceleration monitor to a simulated positive acceleration above the upper threshold. This indicates a probable failure of the pitch clutch control circuitry of the flight computer. AP operation is disallowed.
43	Accel mon upper limit trim clutch	KC 225	Preflight test failed due to lack of trim clutch disengagement by the acceleration monitor to a simulated positive acceleration above the upper threshold. This indicates a probable failure of the trim clutch control circuitry of the flight computer. AP operation is disallowed.
44	Accel mon lower limit fail	KC 225	Preflight test failed due to lack of response of the acceleration monitor to a simulated negative acceleration below the lower threshold. This indicates a probable failure of the acceleration monitor circuitry of the flight computer. AP operation is disallowed.
49	Yaw rate mon upper limit fail	KC 225	Preflight test failed due to lack of response of the yaw rate monitor to a simulated positive yaw rate above the upper threshold. This indicates a probable failure of the yaw rate monitor circuitry of the flight computer. YD operation is disallowed..
50	Yaw rate mon upper limit yaw clutch	KC 225	Preflight test failed due to lack of yaw clutch disengagement by the yaw rate monitor to a simulated positive yaw rate above the upper threshold. This indicates a probable failure of the yaw clutch control circuitry of the flight computer. YD operation is disallowed.
51	Yaw rate mon lower limit fail	KC 225	Preflight test failed due to lack of response of the yaw rate monitor to a simulated negative yaw rate below the lower threshold. This indicates a probable failure of the yaw rate monitor circuitry of the flight computer. YD operation is disallowed.
52	Yaw rate mon clu not engaged	KC 225, KS 271C, harness wiring	Preflight test failed due to lack of current sensed in yaw engage clutch. This indicates: a possible failure of the yaw clutch current sense circuitry of the flight computer, interruption of the solenoid current in the harness, or no yaw servo installed. YD operation is disallowed. NOTE: Pressing AP DISC switch during PFT can also cause this fault.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
53	Trim sense compare upper limit fail	KC 225	Preflight test failed due to lack of response of the trim sense monitor to a simulated trim sense miscompare above the upper threshold. This indicates a probable failure of the trim sense monitor circuitry of the flight computer. AP operation will be disallowed.
54	Trim sense compare lower limit fail	KC 225	Preflight test failed due to lack of response of the trim sense monitor to a simulated trim sense miscompare below the lower threshold. This indicates a probable failure of the trim sense monitor circuitry of the flight computer. AP operation will be disallowed.
55	Roll att mon upper limit fail	KC 225	Preflight test failed due to lack of response of the roll attitude monitor to a simulated roll attitude above the upper threshold. This indicates a probable failure of the roll attitude monitor circuitry of the flight computer. AP operation is disallowed. NOTE: This monitor is enabled by a harness strap.
56	Roll att mon upper limit roll clutch	KC 225	Preflight test failed due to lack of roll clutch disengagement by the roll attitude monitor to a simulated roll attitude above the upper threshold. This indicates a probable failure of the roll clutch control circuitry of the flight computer. AP operation is disallowed. NOTE: This monitor is enabled by a harness strap.
57	Roll att mon lower limit fail	KC 225	Preflight test failed due to lack of response by the roll attitude monitor to a simulated roll attitude below the lower threshold. This indicates a probable failure of the roll attitude monitor circuitry of the flight computer. AP operation is disallowed. NOTE: This monitor is enabled by a harness strap.
58	Pitch att mon upper limit fail	KC 225	Preflight test failed due to lack of response by the pitch attitude monitor to a simulated pitch attitude above the upper threshold. This indicates a probable failure of the pitch attitude monitor circuitry of the flight computer. AP operation is disallowed. NOTE: This monitor is enabled by a harness strap.
59	Pitch att mon upper limit pitch clu	KC 225	Preflight test failed due to lack of pitch clutch disengagement by the pitch attitude monitor to a simulated pitch attitude above the upper threshold. This indicates a probable failure of the pitch clutch control circuitry of the flight computer. AP operation is disallowed. NOTE: This monitor is enabled by a harness strap.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
60	Pitch att mon lower limit fail	KC 225	Preflight test failed due to lack of response by the pitch attitude monitor to a simulated pitch attitude below the lower threshold. This indicates a probable failure of the pitch attitude monitor circuitry of the flight computer. AP operation is disallowed. NOTE: This monitor is enabled by a harness strap.
61	Roll rate mon upper limit fail	KC 225	Preflight test failed due to lack of response of the roll rate monitor to a simulated roll attitude rate above the upper threshold. This indicates a probable failure of the roll rate monitor circuitry of the flight computer. AP operation is disallowed.
62	Roll rate mon upper limit roll clu	KC 225	Preflight test failed due to lack of roll clutch disengagement by the roll rate monitor to a simulated roll attitude rate above the upper threshold. This indicates a probable failure of the roll clutch control circuitry of the flight computer. AP operation is disallowed.
63	Roll rate mon lower limit fail	KC 225	Preflight test failed due to lack of response of the roll rate monitor to a simulated roll attitude rate below the lower threshold. This indicates a probable failure of the roll rate monitor circuitry of the flight computer. AP operation is disallowed.
64	Roll rate mon clu not engaged	KC 225, KS 271C, har- ness wiring	Preflight test failed due to lack of current sensed in roll engage clutch. This indicates: a possible failure of the roll clutch current sense circuitry of the flight computer, interruption of the solenoid current in the harness, or no roll servo installed. AP operation is disallowed. NOTE: Pressing AP DISC switch during PFT can also cause this fault.
65	Pitch rate mon upper limit fail	KC 225	Preflight test failed due to lack of response of the pitch rate monitor to a simulated pitch attitude rate above the upper threshold. This indicates a probable failure of the pitch rate monitor circuitry of the flight computer. AP operation is disallowed.
66	Pitch rate mon upper limit pitch clu	KC 225	Preflight test failed due to lack of pitch clutch disengagement by the pitch rate monitor to a simulated pitch attitude rate above the upper threshold. This indicates a probable failure of the pitch clutch control circuitry of the flight computer. AP operation is disallowed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
67	Pitch rate mon lower limit fail	KC 225	Preflight test failed due to lack of response of the pitch rate monitor to a simulated pitch attitude rate below the lower threshold. This indicates a probable failure of the pitch rate monitor circuitry of the flight computer. AP operation is disallowed.
68	Pitch rate mon clu not engaged	KC 225, KS 270C, harness wiring	Preflight test failed due to lack of current sensed in pitch engage clutch. This indicates: a possible failure of the pitch clutch current sense circuitry of the flight computer, interruption of the solenoid current in the harness, or no pitch servo installed. AP operation is disallowed. NOTE: Pressing AP DISC switch during PFT can also cause this fault.
69	Autotrim runaway upper limit fail	KC 225, KS 272C, harness wiring	Preflight test failed due to lack of response of the trim runaway monitor to a simulated trim voltage above the upper threshold during pitch (autopilot) engagement. This indicates a probable failure of the trim runaway monitor circuitry of the flight computer. AP and MET operation will be disallowed. Additionally preflight test may have failed due to the autotrim timer taking too long to trip. This could occur if the autotrim monitor timer value on the factory offsets menu was incorrectly entered. AP and MET operations will be disallowed. Note: Only the -0104 software and above allows the autotrim monitor timer value to be set in the factory offsets menu.
70	Autotrim runaway upper trim clu	KC 225, KS 272C, harness wiring	Preflight test failed due to lack of trim clutch disengagement by the trim runaway monitor to a simulated trim voltage above the upper threshold during pitch (autopilot) engagement. This indicates a probable failure of the trim clutch control circuitry of the flight computer. AP and MET operation will be disallowed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
71	Autotrim runaway lower limit fail	KC 225, KS 272C, harness wiring	Preflight test failed due to lack of response of the trim runaway monitor to a simulated trim voltage below the lower threshold during pitch (autopilot) engagement. This indicates a probable failure of the trim runaway monitor circuitry of the flight computer. AP and MET operation will be disallowed. Additionally preflight test may have failed due to the autotrim timer taking too long to trip. This could occur if the autotrim monitor timer value on the factory offsets menu was incorrectly entered. AP and MET operations will be disallowed. Note: Only the -0104 software and above allows the autotrim monitor timer value to be set in the factory offsets menu.
72	Autotrim runaway clu not engaged	KC 225, KS 272C, harness wiring	Preflight test failed due to lack of trim clutch disengagement by the trim runaway monitor to a simulated trim voltage below the lower threshold during pitch (autopilot) engagement. This indicates a probable failure of the trim clutch control circuitry of the flight computer. AP and MET operation will be disallowed.
73	Trim sense reference fail	KC 225	Preflight test failed due to lack of response of the trim sense reference monitor to a simulated reference voltage below the threshold. This indicates a probable failure of the trim sense reference monitor circuitry of the flight computer. AP operation will be disallowed.
74	Trim voltage over certified value	KC 225, KS 272C, harness wiring	Preflight test failed due to excessive trim motor voltage during a full speed command. This indicates a possible failure of the motor voltage regulator circuitry of the trim servo or wrong trim servo flavor installed. AP and MET operation will be disallowed. NOTE: Be sure the correct installation file has been uploaded.
75	Trim voltage below min	KC 225, KS272C, harness wiring	Preflight test failed due to lack of response of the trim motor voltage. This indicates a possible failure of the trim servo or interconnect AP and MET operation will be disallowed. NOTE: Pressing AP DISC switch during PFT can also cause this fault.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
76	MET trim runaway upper limit fail	KC 225, KS 272C, harness wiring	Preflight test failed due to lack of response of the trim runaway monitor to a simulated trim voltage above the upper threshold. This indicates a probable failure of the trim runaway monitor circuitry of the flight computer. AP and MET operation will be disallowed.
77	MET trim runaway upper trim clu	KC 225, KS 272C, harness wiring	Preflight test failed due to lack of trim clutch disengagement by the trim runaway monitor to a simulated trim voltage above the upper threshold. This indicates a probable failure of the trim clutch control circuitry of the flight computer. AP and MET operation will be disallowed.
78	MET trim runaway lower limit fail	KC 225, KS 272C, harness wiring	Preflight test failed due to lack of response of the trim runaway monitor to a simulated trim voltage below the lower threshold. This indicates a probable failure of the trim runaway monitor circuitry of the flight computer. AP and MET operation will be disallowed.
79	Acc HP fails self test	KC 225	Preflight test failed due to improper response from the high passed acceleration value during self test. The input should have been saturated, but was below the minimum saturation voltage. AP operation will be disallowed.
80	Acc HP does not settle	KC 225	Preflight test failed due to the high passed acceleration value not settling in the flight computer. AP operation will be disallowed.
81	Acc HP has high gain	KC 225	Preflight test failed due to the gain of the high passed acceleration being too high in the flight computer. AP operation will be disallowed.
82	Acc HP has low gain	KC 225	Preflight test failed due to the gain of the high passed acceleration being too low in the flight computer. AP operation will be disallowed.
83	Acc HP has short time constant	KC 225	Preflight test failed due to the time constant of the high passed acceleration being too short in the flight computer. AP operation will be disallowed.
84	Acc HP has long time constant	KC 225	Preflight test failed due to the time constant of the high passed acceleration being too long in the flight computer. AP operation will be disallowed.
85	MET trim runaway disable fail	Harness, KC 225, KS 272C	The trim servo motor voltage was not removed when the trim runaway monitor was failed during PFT. NOTE: This error code is present in -0103 software and above.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
86	Autotrim mon tripped too soon.	KC 225	Preflight test failed due to the autotrim monitor tripping too soon. This indicates a possible misentry of autotrim monitor timer on the Factory Offsets menu. AP and MET operations will be disallowed. Note: This error code is available in -0104 software and above.
100	GPS armed w/ other snsr req	KC 225	An error has occurred in the mode logic.
101	LOC armed w/ other snsr req	KC 225	An error has occurred in the mode logic.
102	VOR armed w/ other snsr req	KC 225	An error has occurred in the mode logic.
103	Lat armed illegal xsit mode	KC 225	An error has occurred in the mode logic.
104	Lat armed illegal mode detail	KC 225	An error has occurred in the mode logic.
110	GPS tracked w/ other snsr req	KC 225	An error has occurred in the mode logic.
111	LOC tracked w/ other snsr req	KC 225	An error has occurred in the mode logic.
112	VOR tracked w/ other snsr req	KC 225	An error has occurred in the mode logic.
113	GPS tracked w/ GPS track req	KC 225	An error has occurred in the mode logic.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
114	LOC tracked w/ LOC track req	KC 225	An error has occurred in the mode logic.
115	VOR tracked w/ VOR track req	KC 225	An error has occurred in the mode logic.
116	Lat cpld illegal xsit mode	KC 225	An error has occurred in the mode logic.
120	GS tracked w/ GS track req	KC 225	An error has occurred in the mode logic.
121	GS tracked w/ alt capture req	KC 225	An error has occurred in the mode logic.
122	Alt hold w/ alt capture req	KC 225	An error has occurred in the mode logic.
123	Vert cpld illegal xsit mode	KC 225	An error has occurred in the mode logic.
124	Vert armed #1 illegal xsit mode	KC 225	An error has occurred in the mode logic.
125	GS armed w/ GS arm req	KC 225	An error has occurred in the mode logic.
126	Vert armed #2 illegal xsit mode	KC 225	An error has occurred in the mode logic.
130	Roll illegal xsit mode	KC 225	An error has occurred in the mode logic.
131	Pitch illegal xsit mode	KC 225	An error has occurred in the mode logic.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
132	Trim illegal xsit mode	KC 225	An error has occurred in the mode logic.
133	Alt calc illegal xsit mode	KC 225	An error has occurred in the mode logic.
140	Lat armed invalid	KC 225, Nav Sensor, Hdg Sensor, harness wiring	The roll arm mode has been deactivated due to invalid inputs that prevent proper algorithm calculation. If GPS is the selected arm mode, loss of GPS valid for 30 seconds or HDG valid for 5 seconds will cancel the roll arm mode. If LOC is the selected arm mode, loss of NAV valid for 30 seconds or HDG valid for 5 seconds will cancel the roll arm mode. If VOR is the selected arm mode, loss of NAV valid for 30 seconds or HDG valid for 5 seconds will cancel the roll arm mode.
141	Lat cpld invalid	KC 225, Nav Sensor, Hdg Sensor, harness wiring	The roll coupled mode has been deactivated due to invalid inputs that prevent proper algorithm calculation. If the selected mode is HDG hold, loss of HDG valid for 3 seconds will cancel the roll mode. If the selected mode is GPS TRK, loss of GPS valid for 5 seconds or HDG valid for 5 seconds will cancel the roll mode. If the selected mode is LOC TRK, loss of NAV valid for 5 seconds or HDG valid for 5 seconds will cancel the roll mode. If the selected mode is VOR TRK, loss of NAV valid for 15 seconds or HDG valid for 5 seconds will cancel the roll mode.
142	Vert armed #1 invalid	KC 225, Encoding Altimeter, harness wiring	The altitude arm mode has been deactivated due to invalid inputs that prevent proper algorithm calculation. If the Altitude Valid input and the Pressure Sensor are invalid or the accelerometer reasonability check fails, the Altitude Arm mode will be cancelled.
143	Vert armed #2 invalid	KC 225, Nav Sensor, harness wiring	The Glideslope arm mode has been deactivated due to invalid inputs that prevent proper algorithm calculation. If the Glideslope (GS) valid signal is invalid for 10 seconds or the accelerometer monitor has failed or the pressure sensor is invalid or the accelerometer reasonability check has failed, the glideslope arm mode will be cancelled.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
144	Vert cpld invalid	KC 225, Nav Sensor, Encoding Altimeter, harness wiring	The pitch coupled mode has been deactivated due to invalid inputs that prevent proper algorithm calculation. If the selected mode is GS TRK, a loss of the GS valid signal for 3 seconds or failure of the accelerometer monitor or failure of the accelerometer reasonability check or invalidity of the pressure sensor will cancel the GS TRK mode. If the selected mode is ALT HLD, a failure of the accelerometer reasonability check or an invalid pressure sensor will cancel the ALT HLD mode. If the selected mode is ALT CAP, a failure of the accelerometer reasonability check or an invalid pressure sensor or an invalid signal for Altitude Valid or an invalid Baro Set reading will cancel the ALT CAP mode. If the selected mode is VS HLD, an invalid pressure sensor or a failure of the accelerometer reasonability check will cancel the VS HLD mode.
145	Trim invalid	KC 225	The trim axis has been deactivated due to invalid inputs that prevent proper algorithm calculation.
146	Alt calc invalid	KC 225	The altitude calculation has been deactivated due to invalid inputs that prevent proper algorithm calculation.
147	FD CMD calc invalid	KC 225, KI 256, KVG 350, harness wiring	The FD has been deactivated due to invalid inputs that prevent proper algorithm calculation. The invalid inputs are one of the following either the -12V supply in the KC 225 has been out of tolerance for 0.5 seconds or the KI 256/KVG 350 excitation has been out of tolerance for 0.5 seconds or the VG VALID (KVG 350 installation only) input has been invalid for 0.5 seconds. AP and FD operation will be disallowed.
150	Roll servo invalid	KC 225, KS 271C, harness wiring	The AP has been deactivated due to an invalid roll servo. The default roll attitude hold mode will be cancelled if the KS 271C roll valid signal is invalid for 1 second. AP operation will be disallowed.
151	Roll monitor fail	KC 225, KI 256, KVG 350, harness wiring	The AP has been deactivated due to a roll attitude or rate monitor failure. The roll rate monitor has failed without CWS being pressed for 0.75 seconds or the roll attitude monitor has failed without CWS being pressed for 1.25 seconds. AP operation will be disallowed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
152	Pitch servo invalid	KC 225, KS 270C, harness wiring	The AP has been deactivated due to an invalid pitch servo. The default pitch attitude hold mode will be cancelled if the KS 270C pitch valid signal is invalid for 1 second. AP operation will be disallowed.
153	Pitch monitor fail	KC 225, KI 256, KVG 350, harness wiring	The AP have been deactivated due to pitch attitude or rate monitor failure. The pitch rate monitor has failed without CWS being pressed for 0.75 seconds or the pitch attitude monitor has failed without CWS being pressed for 1.25 seconds. AP operation will be disallowed. Note: This error code can be caused if AP engagement is attempted with the vertical gyro in a position that exceeds the attitude limits of the FCC. This typically occurs on ground checkouts with vacuum not applied to the KI 256.
154	Accel fail	KC 225	The AP been deactivated due to excessive normal acceleration for 1.4 seconds. AP operation will not be disengaged due to excessive normal acceleration when CWS is pressed. AP operation will be disallowed.
160	HDG denied	KC 225, Hdg Sensor, harness wiring	The HDG mode was requested but not allowed due to invalid sensor inputs. If the HDG valid signal is invalid, the HDG mode will be disallowed.
161	NAV denied	KC 225, Nav Sensor, Hdg Sensor, harness wiring	The NAV mode was requested but not allowed due to invalid sensor inputs. If the NAV valid or GPS Deviation inputs are invalid (for GPS installations) or HDG valid signals are invalid, the NAV mode will be disallowed.
162	APR denied	KC 225, Nav Sensor, Hdg Sensor, harness wiring	The NAV mode was requested but not allowed due to invalid sensor inputs. If the HDG sensor and NAV sensor validity signals or GPS Deviation inputs are invalid (for GPS installations) are invalid, the APR mode will be disallowed.
163	REV denied	KC 225, Nav Sensor, Hdg Sensor, harness wiring	The REV mode was requested but not allowed due to invalid sensor inputs. If the HDG sensor and NAV sensor validity signals or GPS Deviation inputs are invalid (for GPS installations) are invalid, the REV mode will be disallowed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
164	ALT denied	KC 225	The ALT mode was requested but not allowed due to invalid sensor inputs or failed monitors. If the acceleration monitor has failed or the accelerometer reasonability check is invalid or the pressure sensor output is invalid, the ALT mode will be disallowed.
165	ALT ARM denied	KC 225, Encoding Altimeter, harness wiring	The ALT ARM mode was requested but not allowed due to invalid sensor inputs or failed monitors. If the acceleration monitor has failed or the accelerometer reasonability check has failed or the baro correction is invalid or the Altitude Valid input is invalid or the Gilham code is invalid or the pressure sensor output is invalid, the ALT ARM mode will be disallowed.
166	VS denied	KC 225, KI 256, KVG 350, Encoding Altimeter, harness wiring	The VS mode was requested but not allowed due to invalid sensor inputs or failed monitors. If the acceleration monitor has failed or the accelerometer reasonability check has failed or the KI 256/KVG 350 excitation has been out of tolerance for 0.5 seconds or the VG VALID (KVG 350 installation only) input has been invalid for 0.5 seconds or the KC 225 pressure sensor output is invalid, the VS mode will be disallowed.
167	GA denied	KC 225	The GA mode was requested but not allowed due to invalid sensor inputs.
170	Autotrim runaway	KC 225, KS 270C, KS 272C, harness wiring	The trim servo was detected in opposition to the primary servo command. This may indicate an autotrim failure. This failure will disallow autotrim operation, but the AP mode will remain engaged. If the autopilot is disengaged, AP and MET operation will be disallowed until AP power is cycled and the KC 225 successfully passes pre-flight test.
171	MET runaway	KC 225, KS 272C, harness wiring	A trim servo voltage was detected without the corresponding MET switch active. This failure will disallow autotrim operation, but the AP mode will remain engaged. If the autopilot is disengaged, AP and MET operation will be disallowed until AP power is cycled and the KC 225 successfully passes pre-flight test.
172	MET fail	KC 225, MET switches, harness wiring	A possible latent failure of the Manual Electric Trim switches was detected. Check the control wheel for a stuck switch. MET operation will be disallowed until the stuck switch condition is removed.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
180	Yaw fail	KC 225, KRG 331, KRG 332, harness wiring	The yaw damper has been deactivated due to a yaw rate monitor failure while CWS was not pressed. YD operation will be disallowed until the yaw rate monitor failure disappears.
181	Yaw rate fail	KC 225, KRG 331, KRG 332, harness wiring	The yaw damper has been deactivated due to an invalid yaw rate. YD operation will be disallowed until the yaw rate signal is once again valid.
182	Yaw servo fail	KC 225, KS 271C, harness wiring	The yaw damper was disengaged due to an invalid yaw servo. YD operation will be disallowed until the yaw servo valid signal is once again valid.
190	ECAL Node error	KC 225	An error has occurred in the mode algorithm calculation.
191	ECAL Type error	KC 225	An error has occurred in the mode algorithm calculation.
192	ECAL FIFO error	KC 225	An error has occurred in the mode algorithm calculation.
193	ECAL Stack error	KC 225	An error has occurred in the mode algorithm calculation.
194	ECAL Initial Condition error	KC 225	An error has occurred in the mode algorithm calculation.
195	ECAL Index error	KC 225	An error has occurred in the mode algorithm calculation.
196	ECAL Block error	KC 225	An error has occurred in the mode algorithm calculation.
197	ECAL Bad sign input to summer	KC 225	An error has occurred in the mode algorithm calculation.
198	ECAL Not enough node inputs	KC 225	An error has occurred in the mode algorithm calculation.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
199	ECAL Filtering out of range	KC 225	An error has occurred in the mode algorithm calculation.
200	ECAL Default error	KC 225	An error has occurred in the mode algorithm calculation.
201	ECAL Bad Node Record	KC 225	An error has occurred in the mode algorithm calculation.
202	ECAL Bad Block Pointer	KC 225	An error has occurred in the mode algorithm calculation.
203	ECAL Mode Index out of range	KC 225	An error has occurred in the mode algorithm calculation.
205	aircraft voltage below threshold	KC 225, sagging aircraft voltage bus	The aircraft input voltage went below the specified operation voltage and the autopilot, flight director, and yaw damper were disconnected. AP, FD, YD, and MET operation will be disallowed. Note: This error is only present in software flavor -0101.
206	+/- 12-Volt out of range	KC 225	The power supply in the flight computer was not working and the autopilot, flight director, and yaw damper were disconnected. AP, FD, YD, and MET operation will be disallowed.
210	RS232 status reg error	This error code is reserved, but not reported.	An error has occurred in the serial interface. There may be an intermittent in the remote terminal interconnect or an erroneous transient occurred during terminal powerup. Unless this error occurs after normal serial communications have been established, it can probably be ignored.
215	Error in Encoding Altimeter Input	Encoding Altimeter, KC225, harness wiring	The parallel altitude information from the altimeter is not a valid Gilham code. The altimeter may be powered off or there may be a broken wire in the harness. The ALT ARM mode will be disconnected if this occurs. There will be no Altitude Alerting.
216	Error in remote baro input	KC 225, Encoding Altimeter, harness wiring	The remote baro input is outside the valid operating range. The KC 225 reverts to using its baro knob. The ALT ARM mode will be disconnected. There will be no Altitude Alerting.

TABLE 5-3 ERROR CODE DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
217	Error in pressure sensor input	KC 225	The pressure transducer signal is outside the valid operating range. ALT ARM mode, ALT HLD mode, VS HLD mode, GS ARM mode, and GS TRK mode will be disconnected. There will be no Altitude Alerting.
218	Erroneous altimeter reading	KC 225, Encoding Altimeter, harness wiring	The pressure correction, which is calculated based on altimeter readings and various other terms, is considered to be erroneous. This error is a possible indication of broken or stuck bits from the encoding altimeter outputs. The last known good correction value is used, there should be no visible effect to the pilot. Note: This error code is present in -0102 software and above. Note: This error code can be the result of the KC 225 or altimeter being replaced (Software -0102 and -0103).
220	ARINC 429 channel 1 failed	KC 225	An error occurred during internal checks of the ARINC 429 interface. The EFIS receive channel failed to properly receive an internal transmission. Note: This error sometimes is logged during normal power up cycles without there actually being a problem in the unit.
221	ARINC 429 channel 2 failed	KC 225	An error occurred during internal checks of the ARINC 429 interface. The GPS receive channel failed to properly receive an internal transmission. Note: This error sometimes is logged during normal power up cycles without there actually being a problem in the unit.
222	ARINC 429 channel 3 failed	KC 225	An error occurred during internal checks of the ARINC 429 interface. The spare receive channel failed to properly receive an internal transmission. This is an unused input channel in the KC 225. Note: This error sometimes is logged during normal power up cycles without there actually being a problem in the unit.
223	ARINC 429 channel 4 failed	KC 225	An error occurred during internal checks of the ARINC 429 interface. The spare receive channel failed to properly receive an internal transmission. This is an unused input channel in the KC 225. Note: This error sometimes is logged during normal power up cycles without there actually being a problem in the unit.
224	ARINC 429 receive queue full	KC 225	An error has occurred in the ARINC 429 interface. The receive buffer was filled before it could be serviced.

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TABLE 5-3 ERROR CODE
DESCRIPTIONS

ERR #	TEXT MESSAGE(S)	POSSIBLE FAILED UNIT(S)	DESCRIPTION OF ERROR
225	ARINC 429 transmit queue full	KC 225	An error has occurred in the ARINC 429 interface. The transmit buffer was filled before it could be serviced.
226	ARINC 429 unknown interrupt	KC 225	An error has occurred in the ARINC 429 interface. An interrupt occurred with no known source/reason.
245	Invalid ECAL slot	KC 225	This is a development mode error and should not occur in production units. There was an error in the attempt to upload a new algorithm. An erroneous upload buffer number was passed to the algorithm loader.
251	RS232 receive queue full	KC 225	An error has occurred in the serial interface. The receive character buffer was filled before it could be serviced.
252	RS232 unknown interrupt	KC 225	An error has occurred in the serial interface. An interrupt occurred with no known source/reason.
253	SREC upload memory overrun	KC 225	There was an error in the attempt to upload a new algorithm or new software into the KC 225. The upload buffer became full before the entire file was transferred.
254	SREC upload checksum error	KC 225	There was an error in the attempt to upload a new algorithm or new software into the KC 225. The upload data does not match the checksum in the file.