Honeywell

# INSTALLATION MANUAL

BENDIX/KING®

# KAP 140

## FLIGHT CONTROL SYSTEM

MANUAL NUMBER 006-00991-0006
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WARNING

Prior the export of this document, review for export license requirement is needed.

## REVISION HISTORY

| REV | DATE | CHANGES |
|---|---|---|
| 4 | August, 1998 | Add unit versions |
| 5 | March, 2002 | Add unit versions -2603, -5403, -7703 |
| 6 | October, 2002 | Add unit versions -2704, -5504, -7904 |

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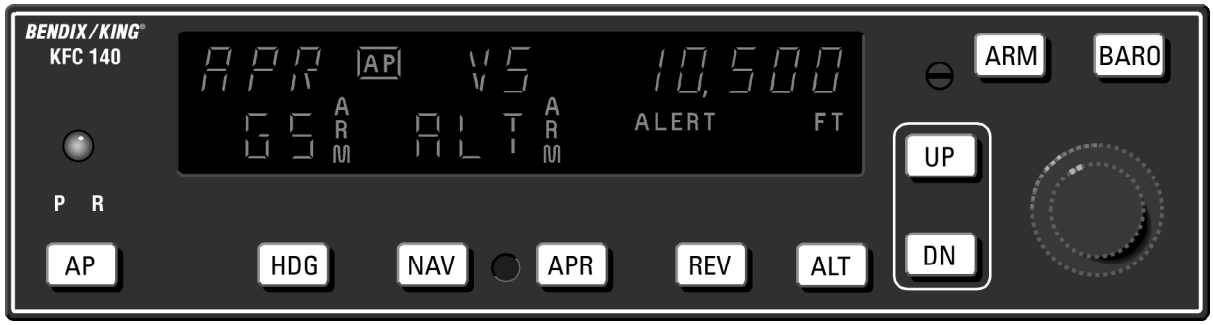
# SECTION I

# GENERAL INFORMATION

## 1.1 KAP 140 FLIGHT CONTROL SYSTEMS

The KAP 140 Flight Control System was developed in 1996 to provide up to two axis digital flight control to the entry level General Aviation market. This system is designed with several options for customer flexibility.

The KAP140 is offered as a single-axis (roll) and as a two-axis (pitch and roll) system. Manual Electric Trim can be added to any system. Autotrim can be added to a two-axis system. Altitude alerting is also availble for two-axis systems.



## 1.2 EQUIPMENT DESCRIPTION

The system modes for the KAP 140 Flight Control System is as follows:

| | |
|---|---|
| Pitch Modes: | Vertical Speed (Default) (-5001 & up) † |
| | Altitude Hold (-5001 & up) † |
| | Glideslope (-5001 & up) † |
| | Altitude Select Capture (-7501 & up) † |

| | |
|---|---|
| Roll Modes : | Wings Level (Default) |
| | Heading Select (-2501 & up) † |
| | Nav (-2501 & up) † |
| | Approach (-2501 & up) † |
| | Reverse Localizer (-2501 & up) † |

| | |
|---|---|
| Other: | Manual Trim |
| | Automatic Trim (-5001 & up) † |
| | Self Test |
| | Control Wheel Steering |

The KAP 140 Flight Control System for a two axis with trim configuration consists of the following units:

| UNIT | DESCRIPTION |
|---|---|
| KC 140 | Flight Computer |
| KCM 100 | Configuration Module |
| KS 270C | Pitch Axis Servo Actuator |
| KS 271C | Roll Axis Servo Actuator |
| KS 272C | Elevator Trim Servo Actuator |
| Supplied by Mid Continent | Rate Gyro |
| Supplied by SIGMA-TEK | DG |
| KM 275 or KM 277 (Total of 3 Required) | Servo Mount |

† Number refers to flight computer version number

The KAP 140 Flight Control System for a two axis configuration consists of the following units:

| UNIT | DESCRIPTION |
|---|---|
| KC 140 | Flight Computer |
| KCM 100 | Configuration Module |
| KS 270C | Pitch Axis Servo Actuator |
| KS 271C | Roll Axis Servo Actuator |
| Supplied by Mid-Continent | Rate Gyro |
| Supplied by SIGMA-TEK | DG |
| KM 275 or KM 277 (Total of 2 Required) | Servo Mount |

The KAP 140 Flight Control System for a single axis configuration consists of the following units:

| UNIT | DESCRIPTION |
|---|---|
| KC 140 | Flight Computer |
| KCM 100 | Configuration Module |
| KS 271C | Roll Axis Servo Actuator |
| KS 272C (Required if MET installed) | Elevator Trim Servo Actuator |
| KM 275 or KM 277<br>(1 required for roll; 2 required if MET installed) | Servo Mount |
| Supplied by Mid-Continent | Rate Gyro |
| Supplied by SIGMA-TEK | DG |

NOTE: The KCS55A (HSI) can be installed in place of the DG in any of the systems above.

## 1.2.1 MODES OF OPERATION

| MODE | FUNCTION PROVIDED |
|---|---|
| Vertical Speed(VS) | Pitch default mode to hold and track vertical speed reference. |
| Heading Select(HDG) | Roll command to the heading selected on the heading indicator (DG or HSI). |
| NAV | Roll command to capture and track a navigation course provided by a NAV, GPS, or Localizer (w/o GS tracking). |
| Approach(APR) | Roll and Pitch commands to capture and track LOC and GS Beams, VOR and GPS Approach course. |
| Reverse Localizer(REV) | Roll command to capture and track a reverse LOC course. |
| Altitude Hold(ALT) | Pitch command to hold a selected altitude. |
| Vertical Trim | Function to modify engaged Altitude or Vertical Speed reference. |
| Altitude Capture | Pitch Command to select and capture an altitude |
| ROL | Roll default mode to hold wings level. |

## 1.3 TECHNICAL CHARACTERISTICS

### 1.3.1 System Technical Characteristics (In smooth air)

| | |
|---|---|
| Maximum Bank Angles | Limited to standard rate turn. |
| Heading Stability | ± 2° |
| VOR Crosswind Compensation | Up to 30° right or left |
| NAV/APR/REV Capture Capability | All angles |
| NAV/APR/REV Capture Computation | Scheduled by beam closure rate |
| NAV Track Computation | Scheduled by beam rate and deviation |
| APR/REV Track Computation | Scheduled by beam rate and deviation |
| NAV Tracking | System will track without large bank angles keeping beam deviation to less than 1.0° of VOR. Actual performance will depend upon quality of VOR beam being received. |
| LOC Tracking | System will track without large bank angles keeping beam deviation to less than .25° of LOC. Actual performance will depend upon quality of LOC beam being received. |
| Vertical Speed Stability | ± 150 feet per minute |
| Altitude Range | - 1000 to 35,000 ft |
| Altitude Hold Stability | ± 50ft |
| Altitude Overshoot | System will limit overshoot to less than 100 feet of selected altitude across the altitude range of the aircraft. When armed prior to the capture point. |

Vertical Trim

| Mode | Continuous | Discrete |
|---|---|---|
| ALH | 500 FPM | 20 Feet |
| VS | 300 FPM/SEC | 100 FPM |

| | |
|---|---|
| Glideslope Capture Computation | Scheduled by beam rate and deviation |
| Autopilot Disconnect Alerting | External Sonalert, 500Ω audio with voice messaging. |

1.3.2 System Components Technical Characteristics

| KC 140 | |
|---|---|
| TSO Compliance: | See Appendix A |
| Physical Dimensions (Nominal):<br>Width:<br>Height:<br>Length: | Including Rack & Mating Connector<br>6.306 in (16.02 cm)<br>1.665 in (4.229 cm)<br>11.35 in (28.829 cm) + 1.71 (4.343 cm) (-7XXX)<br>11.35 in (28.829 cm) + .75 (1.91 cm) (-2XXX, -5XXX) |
| Weight Including mounting rack and mating connectors: (Nominal) | (-2XXX) 2.5 lbs. (1.1 kg)<br>(-5XXX) 2.6 lbs. (1.2 kg)<br>(-7XXX) 2.6 lbs. (1.2 kg) |
| Mounting: | Panel with supplied rack |
| Mating Connectors: | Subminiature<br>PN 030-01175-0000 37 pin<br>PN 030-01176-0000 50 pin |
| 20 Awg Crimp Contacts | PN 030-01157-0011 |
| Temperature: | -45° C to +70° C |
| Altitude Range: | -1,000 to 35,000 Ft |
| Power Inputs: | +28VDC at 0.5A, 14V DC at 1.0A (nominal) |
| Power Outputs: | +15VDC at 30ma<br>-15VDC at 30ma<br>+5VDC at 80ma<br>+4VDC at 50ma |
| Signal Inputs:<br>Directional Reference: | 2 Wire Heading Datum, 550mV DC/Degree |
| Course Datum: | 2 Wire Course Datum, 210mV DC/Degree |
| VOR/LOC Receiver: | 15mV per Deg/VOR |
| LOC Energize Sense: | Ground for LOC Enable and GPS Approach |
| Glideslope Receiver: | 214mV/Deg |

| | |
|---|---|
| Glideslope Valid: | >180mV for Valid |
| NAV Valid: | >180mV for Valid |
| Middle Marker Sense: | 1 Wire, 3VDC Minimum for MKR on |
| Pitch Trim Servo Voltage: | 2 Wire, DC Differential voltage |
| Trim Sense: | 2 Wire, DC Differential voltage |
| DG Valid: | Open = Invalid, Ground = Valid |
| Pitch Servo Drive: | 2 Wire DC Differential, -10 to +10 VDC max. |
| Roll Servo Drive: | 2 Wire DC Differential, -10 to +10 VDC max. |
| Pitch Trim Servo Drive: | 2 Wire DC Differential, -10 to +10 VDC max. |
| Servo Clutch Engages: | 1 Wire, Ground to Engage(Each Axis) |
| Roll Steering Valid: | >11VDC=Valid, Open=Invalid |
| Roll Steering: | 2 Wire DC differential voltage<br>2 VDC/Degree |

| KS 270/1/2 C | |
|---|---|
| TSO Compliance: | See Appendix A |
| Physical Dimensions(Nominal): | |
| Length: | 4.605 in (11.70 cm) without KM275 or KM277 |
| Height: | 4.675 in (11.87 cm) |
| Width: | 3.925 in (9.97 cm) |
| Weight: (Nominal) | |
| KS 270C: | 2.5 lbs (1.09 kg) |
| KS 271C: | 2.2 lbs (1.00 kg) |
| KS 272C: | 2.1 lbs (0.95 kg) |
| KM 275 Servo Mount | 1.0lbs (.45 Kg) |
| KM 277 Servo Mount | " " |
| Mounting: | Two (2) AN 3 bolts |
| Mating Connector: | 030-03248-0000 |
| Power Inputs: | +28VDC at 4.0 amps |
| Signal Inputs: | |
| Servo Drive Command: | -10VDC to +10VDC |
| Clutch Engage Signals: | +28VDC(Active high input) and Ground(Active low input) |
| Signal Outputs: | |
| Trim Voltage | -28VDC to +28VDC |
| Trim Sense | -3VDC to +3VDC |

## 1.4 UNIT INSTALLATION

### 1.4.1 Unit Flavors

#### 1.4.1.1 KC 140

The KC 140 is available in the following versions:

| Part Number | Description |
|---|---|
| 065-00176-2501,-2602, -2603 | Roll Axis with Heading Select (1 Axis) |
| 065-00176-2704 | Roll Axis with Heading Select (1 Axis) and DC Roll Steering |
| 065-00176-5001,-5101, -5201,-5302,-5402,-5403 | Pitch and Roll system (2 Axis) |
| 065-00176-5504 | Pitch and Roll system (2 Axis) and DC Roll Steering |
| 065-00176-7501,-7601, -7701,-7702,-7703,-7802 | Pitch and Roll with Altitude Preselect |
| 065-00176-7904 | Pitch and Roll with Altitude Preselect and DC Roll Steering |

#### 1.4.1.2 KS 270C/271C/272C

The KS270C/271C/272C is available in the following versions:

| Unit | Part Number | Speed |
|---|---|---|
| KS 270C | 065-00178-0100 | 3.6 RPM |
| | 065-00178-0200 | 2.4 RPM |
| | 065-00178-0300 | 4.7 RPM |
| | 065-00178-2100 | 3.6 RPM |
| | 065-00178-2200 | 2.4 RPM |
| | 065-00178-2300 | 4.7 RPM |
| | 065-00178-2400 | 1.2 RPM |
| | 065-00178-2500 | 1.9 RPM |
| KS 271C | 065-00179-0100 | 3.6 RPM |
| | 065-00179-0200 | 4.7 RPM |
| | 065-00179-0300 | 1.2 RPM |
| | 065-00179-0400 | 14.6 RPM |
| | 065-00179-0500 | 2.4 RPM |
| | 065-00179-0600 | 14.6 RPM |
| KS 272C | 065-00180-0400 | 2.4 RPM |
| | 065-00180-0600 | 14.6 RPM |
| | 065-00180-1400 | 22 RPM |
| | 065-00180-2700 | 3.6 RPM |
| | 065-00180-3500 | 4.7 RPM |

1.4.1.3 KM 275

The KM 275 is available in the following versions:

| Part Number | Slip Clutch Used | Preset Torque (in-lbs) |
|---|---|---|
| 065-0030-00 | 200-01678-0000 (Standard) | Variable |
| 065-0030-02 | 200-02380-0000 | Variable |

1.4.1.4 KM 277

The KM 277 is available in the following versions:

| Part Number | Slip Clutch Used | Preset Torque (in-lbs) |
|---|---|---|
| 065-0041-00 | 200-02085-0000 | Variable |

1.4.1.5 KCM 100

The KCM 100 is available in the following versions:

| Part Number | Description |
|---|---|
| 071-00073-5000 | Configuration Module |

1.4.2 Installation Kits

1.4.2.1 KC 140

The KC 140 Installation Kit (PN 050-03375-0000/0001) consists of the following items:

KC140 -2XXX requires 050-03375-0000 Kit.

KC140 -5XXX and -7XXX require kit 050-03375-0001.

| Symbol | CAS PN | Standard Description | UOM | -0000 | -0001 |
|---|---|---|---|---|---|
| ITM 1 | 030-01157-0011 | SOCKET CRMP 20G | EA | 80 | 80 |
| ITM 2 | 030-02351-0023 | CONN HOOD SIZE 37 | EA | 1 | 1 |
| ITM 3 | 033-00230-0000 | TELEPHONE JACK 4C | EA | 1 | 1 |
| ITM 4 | 047-10881-0001 | MNTG RACK W/FIN | EA | 1 | 1 |
| ITM 5 | 047-11030-0002 | END PLATE, RACK W HARDWARE | EA | 1 | 1 |
| ITM 6 | 089-02353-0001 | NUT CLIP 6-32 | EA | 8 | 8 |
| ITM 7 | 089-05903-0008 | SCR PHP 4-40x1/2 | EA | 4 | 4 |
| ITM 8 | 089-06012-0006 | SCR FHP 6-32x3/8 | EA | 8 | 8 |
| ITM 9 | 030-02351-0024 | CONN HOOD SIZE 50 | EA | 1 | 1 |
| ITM 10 | 089-06415-0006 | SCR PHP 4-20x3/8 | EA | 4 | 4 |
| J 1401 | 030-01175-0000 | CONN SUB-D HSG 37S | EA | 1 | 1 |
| J 1402 | 030-01176-0000 | CONN SUB-D HSG 50S | EA | 1 | 1 |
| ITM 11 | 076-02988-0002 | RACK PORT W/FIN | EA | 0 | 1 |
| ITM 12 | 089-06636-0004 | SCR FHP 4-40 X 1/4 | EA | 0 | 2 |
| ITM 13 | 089-02147-0022 | NUT LOCK 6-32 | EA | 2 | 2 |

1.4.2.2 KS 270C/271C/272C

The Installation Kit (PN 050-00398-0000) for the KS270C, KS 271C and KS272C consists of the following items:

| Symbol | CAS PN | Standard Description | UOM | QTY |
|---|---|---|---|---|
| | 030-01008-0000 | LVR/PVT ASSY | EA | 2 |
| | 030-01009-0000 | HOOD CONN | EA | 1 |
| | 030-01280-0001 | CONNECTOR SOCKET | EA | 16 |
| | 030-03248-0000 | CONN RCPT HOUSING | EA | 1 |
| | 057-01739-0000 | INSTALLATION TAGS | EA | 1 |
| | 089-05899-0003 | SCR PHP 2-56X3/16 | EA | 4 |
| | 090-00731-0000 | NUT ANCHOR CORNER | EA | 2 |
| | 090-00348-0000 | GUIDE PILOT/SCKT | EA | 1 |
| | 090-00348-0001 | GUIDE PILOT/SCKT | EA | 1 |

1.4.2.3 KM 275 Servo Mount Installation Kit

The KM 275 Installation Kit (PN 050-01716-0000/0001) consists of the following items:

Refer to the appropriate STC installation manual to determine what version of kit, if any is required for a particular aircraft type.

| Symbol | CAS PN | Standard Description | UOM | -0000 | -0001 |
|---|---|---|---|---|---|
| | 047-04678-0001 | CBL GRD | EA | 2 | |
| | 047-06758-0000 | PLATE ASSY | EA | | 1 |
| | 047-06760-0001 | CABLE GUARD W/F | EA | | 1 |
| | 089-02344-0003 | NUT LOCK 10-32 | EA | 2 | |
| | 089-07023-0005 | SCR FLHP 8-32X5/16 | EA | | 1 |
| | 089-08227-0008 | WSHR FLT 10X.438 | EA | 2 | |
| | 090-00252-0004 | PULLEY GUARD PIN | EA | | 4 |
| | 200-02428-0000 | CAPSTAN IDLER | EA | 1 | |

1.4.2.4 KCM 100 Configuration Module Installation Kit

The KCM 100 Installation Kit (PN 050-03245-0000) consists of the following items:

| SYMBOL | CAS PART NBR | DESCRIPTION | [UOM] | -0000 |
|---|---|---|---|---|
| _ | 030-01157-0011 | SOCKET CRMP 20G | [EA] | 10 |
| _ | 030-02351-0005 | HOOD/LVR ASSY SD E | [EA] | 1 |
| P 1010 | 030-01171-0000 | CONN SUB-D HSG 9S | [EA] | 1 |

1.4.2.5 KM 277 Servo Mount Installation Kit

The KM 277 does not require an installation kit.

1.4.3 Certification Diskettes

Installation of the KAP 140 Automatic Flight Control System requires the use of a certification diskette. This certification diskette contains files that define certain parameters that are uploaded to the KCM 100 configuration module and then used by the KC 140. These files are aircraft specific and each aircraft certification will have three separate files. The first eight characters of the filename for each of these files corresponds to the last eight digits of the 722-0XXXX-XXXX software archive number for that certification. The three digit extension will be one of the following: .CER, .DAT and .TXT. The .CER file is the certification file that contains the data that is uploaded to the KCM 100. The .DAT file lists the data that is uploaded to the KCM 100 in a decoded ("human readable") form. The .TXT file describes which aircraft the data pertains to and the expected aircraft harness strap code.

The following diskettes have been approved for use with the KAP 140 system:

Refer to the appropriate STC installation manual to determine which diskette is required for a particular aircraft type.

| Part Number | Description |
|---|---|
| 225-00028-XXXX | KAP 140 AFCS Certification Data |
| 225-00035-XXXX | KAP 140 AFCS Certification Data |

**NOTE**

Specify only the first 9 characters of the part number when ordering certification diskettes. The last 5 characters will be changed as software updates are made.

**225-XXXXX-XXXX**

## 1.5 ACCESSORIES REQUIRED BUT NOT SUPPLIED

Some of the following accessories are required, but not supplied as a part of the KAP 140 Flight Control System. Consult the appropriate STC data for requirements pertaining to your aircraft.

A. KI 525A (PN 066-3046-XX) Horizontal Situation Indicator and installation kit (PN 050-01344-XXXX).

B. KA 51B (PN 071-1242-XX) Compass Slaving Accessory and installation kit (PN 050-01928-XXXX).

C. KMT 112 (PN 071-1052-XX) Compass Flux Valve and installation kit (PN 050-01361-0000).

D. KG 102A (PN 060-0015-00) Directional Gyro and installation kit (PN 050-01410-XXXX).

E. Sigma-Tek DG model 1U262-042-2 or 1U262-041-1.

F. Mid Continent Turn Coordinator models 1394T100-10RZ, 1394T100-11RZ or 1394T100-12RZ

## 1.6 LICENSE REQUIREMENTS

None.

# SECTION II
# INSTALLATION

## 2.1 GENERAL INFORMATION

This section contains general suggestions and information to consider before installation of the KAP 140 Flight Control System. Close adherence to these suggestions will assure optimum performance from the equipment. Specific installation requirements are contained in the STC Installation Manual that pertains to the particular type of aircraft which the equipment is to be installed.

NOTE

"The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install the article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. If not within the TSO standards, the article may be installed only if further evaluation by the applicant documents an acceptable installation and is approved by the Administrator."

## 2.2 UNPACKING AND INSPECTING EQUIPMENT

Exercise extreme care when unpacking the equipment. Make a visual inspection of the unit for evidence of damage incurred during shipment. If a claim for damage is to be made, save the shipping container to substantiate the claim. The claim should be promptly filed with the transportation company. It would be advisable to retain the container and packaging material after all equipment has been removed in the event that equipment storage or reshipment should become necessary.

## 2.3 EQUIPMENT INSTALLATION

### 2.3.1 Avionics Cooling requirements for Panel Mounted Equipment

The greatest single contributor to increased reliability of all modern day avionics is to limit the maximum operating temperature of the individual units whether panel mounted or remote mounted. While modern day individual circuit designs consume much less electrical energy, watts per cubic inch dissipated within the avionics unit remains much the same due to high density packaging techniques utilized. Consequently, the importance of providing cooling to the avionics stack is still with us today.

While the KC140 does not require forced air cooling, the combined heat load of several units operating in a typical avionics location will significantly degrade the reliability of the avionics if provisions for cooling are not incorporated in the initial installation. Failure to provide cooling to the equipment will lead to increased avionics maintenance costs and may also void the AlliedSignal Inc warranty.

2.3.2 KC 140 Installation

The KC 140 installation will conform to standards designated by the customer, installing agency, and existing conditions as to the unit location and type of installation. However, the following instructions will assure a more satisfactory performance from the equipment. Mounting locations are provided near the front and rear of the mounting rack. It is necessary to utilize both the front and rear mounting locations when installing the KC140 mounting rack.

CAUTION

For two axis installations the static port on the rear of the KC140 is designed to float to ensure alignment with the static port on the mounting rack. Do not attempt to tighten the mounting screws for the KC140 static port.

WARNING

FOR TWO AXIS INSTALLATIONS REMOVAL OF THE KC 140 FROM ITS MOUNTING RACK IN THE AIRCRAFT PANEL OPENS THE STATIC AIR SYSTEM TO THE AIRCRAFT CABIN. AFTER REINSTALLATION OF THE KC140, VERIFY THAT THE STATIC AIR SYSTEM COMPLIES WITH F.A.R. 91.411.

**NOTE**

The following information is provided in the event that the o-ring on the KC140 static port requires replacement. The o-ring is 70 durometer EPDM material, AS568A-006 size. The AlliedSignal part number is 187-01004-0013. The o-ring should be greased with AlliedSignal part number 016-01210-0000, Dow Corning 55 o-ring Lubricant (Mil-G-4343) or equivalent grease.

2.3.3 Installation Procedures

Refer to the appropriate STC installation manual.

The first time the AFCS is turned on in a new installation, the FCC must be configured through an RS232 interface. The FCC provides an RS232 interface for diagnostic and installation capabilities.

2.3.3.1 RS232 Interface

The RS232 interface to the computer is through a Remote Terminal Interface (RTI) connector located in the cockpit. A terminal or PC with terminal emulation must be connected to this port. Set the communication parameters as follows: 9600 baud rate, no parity , 8 data bits, and one stop bit. IMPORTANT: System configuration cannot be accomplished without using the RTI. Use computer cable assembly PN 155-02794-0001, to connect PC communications port to the RTI connector.

2.3.3.1.1 RTI Main Menu

Apply power to the flight computer. Preflight test will attempt to run, but will fail if the unit has not been previously installed. After a few seconds, the main menu should appear on the terminal. If it does not, press CTRL-W to refresh the screen. If communications cannot be established, check the RS232 interconnect and terminal setup.

2.3.3.1.2 RTI Menu Operation

The main menu provides selection of entering diagnostic mode, displaying the error log, displaying the Software Identification number, or configuring the installation. The following sections provide specific instructions on using these capabilities to perform the required installation and ground checkout procedures. NOTE: Selection of diagnostics will inhibit normal operation of the flight computer.

2.3.3.1.3 Configuration Procedure

1. To configure/install the flight computer, the following must be completed:

   AFCS system harness installation checked (ring test).
   Aircraft ground power applied.
   Avionics power applied.
   Sensors operating (Turn Coordinator, DG/HSI, nav's).
   RS232 communications established with FCC.

   The remote terminal should now display the following menu:

**System Mode: Normal ( or Diagnostics)**

**KC 140 Flight Computer**

**----------**

**D – Diagnostics**

**L – Error Log**

**S – Display SW ID**

**N – Installation**

**Press any key for desired option:**

2. Press "N" to enter the installation menu. The terminal should display a menu with, "1. Installation Setup". Press "1". Now the terminal should display the message: "Upload installation file or press <ESC> to abort". Use the terminal program of the PC to send the correct certification file. When the file transfer is complete, the terminal should display the message, "Installation data have been saved in nonvolatile memory". Press <CR> to return to the installation options page. Set the audio volume to the desired value and select the other options, as appropriate. The options displayed will depend upon the aircraft certification and the version of the FCC. The following describes all available options and their meaning.

NOTE

The Certification files for existing KAP140 certifications is distributed on diskette from the factory (See Section 1.4.3). Insert this diskette into the PC and select the floppy drive to view the contained files. Certifications files are named for the target aircraft and have a ".CER" filename extension. Use the file transfer ability of the terminal program to "send text file", using the selected certification file.

A volume setting of "0" is the minimum level and "7" is the maximum.

A "1" for "Voice Msg Enabled" will enable voice messages for AP disconnect and altitude alerting, in addition to the normal tones produced for these events. (This option is not available on the -2501 (MOD1) -5XX1, -7XX1 versions of the KC140).

A “1” for “Remote Baro” will cause the system to use the baro set input from the altimeter and disable the ability to change baro set from the FCC (although it will still display baro set when the BARO button is pressed).

A “1” for “HSI/DG” will select the proper operation for a system with an HSI. A “0” is the proper selection for a DG installation.

A “1” for “Trim Installed” will configure the system to provide Manual Electric Trim. Autotrim will also be provided in a two-axis system.

A “1” for “NAV Force Valid” will cause the system to always treat the NAV deviation as valid, ignoring the NAV Valid input. This option should be chosen only if NAV Valid is not available in the installation.

3. After selecting the desired options, press <CR> to return to the main menu. Now cycle power to force the system to perform a preflight test. The PFT should now pass. If not, check the error log and determine problem.

2.3.3.2 System Offset Adjustments

After the system has been installed, sensor offsets need to be nulled for optimum system performance. These adjustments are stored in the configuration module and may be repeated, as desired, without performing installation setup again. Adjustments of the pitch and roll axis nulls are made with the single-turn potentiometer on the front panel of the flight computer (right-hand side of the display).

WARNING

A MINIMUM OF 10 MINUTES SHOULD BE ALLOWED FOR THE FCC TO FULLY COMPUTE AND STORE VERTICAL ACCELERATION NULL DATA TO THE KCM 100 CONFIGURATION MODULE. WHEN INSTALLING A NEW FCC AND/OR A NEW KCM 100 CONFIGURATION MODULE, THE FCC AUTOPILOT SYSTEM MUST ESTABLISH VERTICAL ACCELERATION NULLS BEFORE ANY MANUAL ADJUSTMENTS CAN BE MADE.

Apply power to the aircraft and to the KAP 140 autopilot system, allow the FCC to store the vertical acceleration offsets to the KCM 100 configuration module. The aircraft should be stable during the alignment, with no movement or jarring. No FCC modes should be engaged until the alignment process has been completed.

This procedure is required whenever the FCC and/or KCM 100 configuration module is/are removed from the aircraft for servicing and reinstalled, or whenever either component is replaced.

NOTE

For the roll and pitch axis null adjustments, adjust the pot until 0 ± .020 volts DC is measured across the servo drive pins D and L of the roll servo and the pitch servo harness connectors. This is accomplished as follows: First, allow the FCC to pass pre-flight test; then unplug the servo connector from the aircraft harness. Next apply an aircraft ground to pin K of the harness connector. Now connect the digital multimeter across the harness connector pins D and L to monitor the servo drive voltage.

1. Engage the autopilot by pressing the "AP" button on the FCC. The default ROL mode must be selected, i.e. the HDG, NAV, or APR modes are not engaged. Using a DMM, measure the DC voltage across pins D and L of the roll servo harness connector. Adjust the pot until a value of 0 ± .020 volts is measured. If you reach the end of the pot travel before nulling the servo drive, disengage the autopilot, turn the pot fully to the opposite stop, and re-engage the autopilot. The roll null adjustment emulates a four-turn pot by allowing this method of "resetting" the pot adjustment range. This adjustment compensates for offsets in the roll axes, including the turn indicator. Continue turning the pot to null the voltage.

2. In a two axis system, the pitch axis must also be adjusted. This is accomplished by pressing the "ALT" button (engaging the altitude hold mode). Now, press and hold the "ALT" button (engaging the vertical speed mode VS) and then press and hold the "DN" button while still pressing and holding the "ALT" button. In this state, the pot should be used to adjust the pitch servo drive to a null. Using a DMM, measure the DC voltage across pins D and L of the pitch servo harness connector. Adjust the pot until a value of 0 ± .020 volts is measured.

3. Reconnect the servo harness connectors(s) to the servo(s) before proceeding any further.

The rest of the sensor offsets are compensated by a different method, using the remote terminal interface. From the top-level menu on the terminal, enter the installation menu by pressing "N". Now press "2" and "ENTER" to enter the Installation Offset page. From this page, the remaining offsets can be compensated. For each parameter listed, after entering the associated number, zero the input to the flight computer and press "ENTER". This can be done without engaging the autopilot. The null values will be stored in the configuration module and used to compensate the input value when the autopilot is engaged. The following paragraphs detail this procedure.

Turn the heading bug (and course pointer, if HSI installation) to the lubber line. For a KI 525A, alignment should be done with the aircraft or compass card pointing north(Slew Compass). Select Heading Datum on the installation offset page and press "ENTER". Do the same for Course Datum. This compensates for offsets in the DG/HSI.

Using a test generator, create a valid VOR signal and adjust until the deviation displayed on the CDI or HSI is centered. Select VOR Deviation on the installation offset page and press "ENTER". This compensates for offsets in the VOR deviation signal. If a GPS is installed, select GPS and perform the same procedure for GPS deviation. Select an ILS frequency and perform the same procedure for the Localizer deviation.

In a two-axis installation, create a valid Glideslope signal and null the deviation display. Now select the GS Deviation and press “ENTER”. This will compensate for any offsets in the glideslope tracking.

This completes the installation offset adjustments. Now return to the top-level menu by pressing “ENTER” twice, to prevent accidental changes in the offset parameters.

2.3.3.2.1 Display Brightness adjustments

The display uses a photocell to automatically adjust the brightness under a wide range of ambient conditions. The unit contains a default brightness curve to track ambient changes. If necessary, the brightness curve of the display can be adjusted. The display brightness adjustment is accomplished by engaging the autopilot and keeping the AP button pressed. While holding the AP button, adjust the pot to obtain the desired display brightness. NOTE: This adjustment controls two independent settings -- at moderate to bright ambient conditions, it controls the slope of the brightness vs. ambient curve. In darker ambient conditions, it controls the minimum display brightness. Therefore, for optimum alignment, first adjust the display in a dark ambient to achieve the desired brightness under these conditions. Then adjust it again, as required, under moderate-to-full brightness ambient conditions.

2.3.3.2.2 Switch Backlighting adjustments.

The switch backlighting brightness is controlled by the dim bus input to the flight computer. However, the minimum backlighting level can be adjusted, if desired. This adjustment is made by disengaging the autopilot with the AP switch while continuing to hold the switch. The adjustment is also made with the front panel pot.

2.3.3.3 Ground Checkout Procedure

If the system has been successfully adjusted as described above, the following ground checkout should be performed.

Engage the autopilot in the HDG mode and move the heading bug left and right of the lubber line. The control wheel should follow the heading bug direction and should stop moving when the bug is under the lubber line.

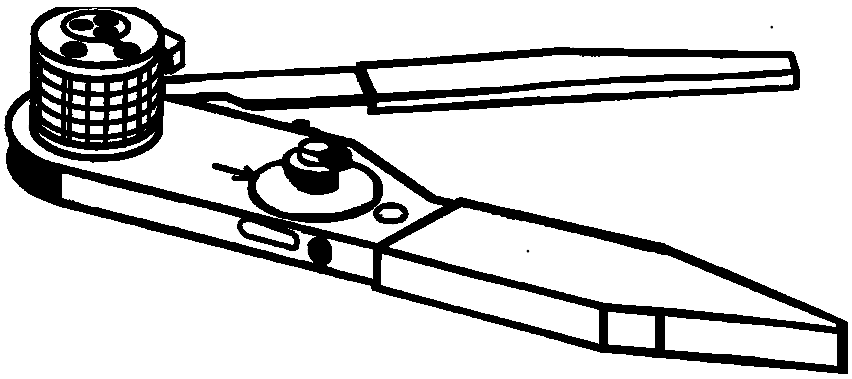
Engage APR mode with an ILS signal and watch for proper response to deviations in LOC (and GS in a two-axis system). If a GPS is installed, select this sensor and use NAV mode to check autopilot response to the GPS deviation.

A fly right deviation should cause the control wheel to turn to the right, while a fly left deviation should cause the control wheel to turn left. For the GS, a fly up deviation should cause a rearward control motion; a fly down deviation should cause the control to move forward. It is not necessary to stop or center the control wheel with the deviations, since the offset adjustment procedure has already been performed.

In a two-axis system, engage VS (default) mode and check for rearward control wheel movement after pressing the UP button twice (to change the VS reference) Check for nose down control by pressing the DN button three times (to establish a nose down VS reference). The control wheel should now move forward. Press CWS on the control wheel and check that the control wheel stops moving. Release CWS and the control wheel should still not move in the pitch axis. If trim is installed, check autotrim operation by slowly pushing the control wheel forward. After a few seconds, the trim should run in the UP direction. Now, slowly pull back on the wheel and check for trim in the DN direction after a few seconds.

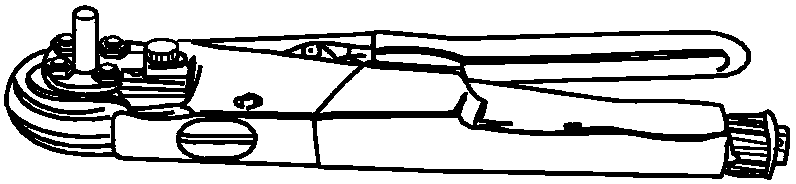
If trim is installed, check Manual Electric Trim by pressing the switches in the UP direction (with ARM). The trim should run in the UP direction. Check again with the DN switch (and ARM). Now

press the UP switch without pressing ARM and check for no trim response. Do the same with the DN switch. NOTE: An active UP or DN switch without ARM will trip a latent switch failure monitor after three seconds. For SW MOD 01/05 software or later, “PT” will be annunciated on the KC 140 and MET operation will be disabled until all three MET switch inputs are inactive. For earlier versions, “PT” will be annunciated on the KC 140 and MET operation will be disabled until the fault is cleared and unit power is cycled.



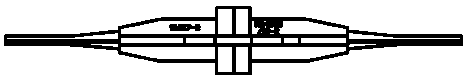
CRIMPING TOOL
AlliedSignal P/N 005-02012-0017
Daniels Mfg. P/N M22520/1-01
Positronic P/N 9501

POSITIONER
AlliedSignal P/N 005-02012-0018
Daniels Mfg. P/N M22520/1-03
Positronic P/N 9502-1

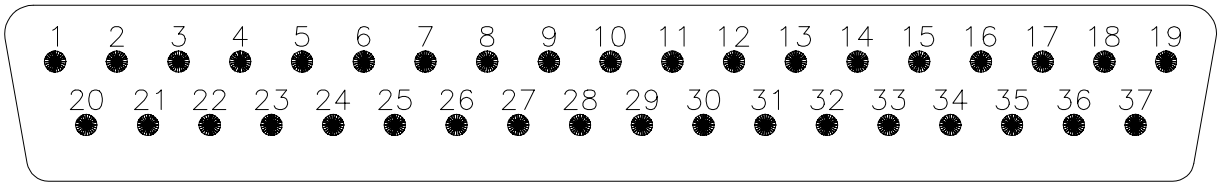


**CRIMPING TOOL P/N: 005-02012-0021**
**BUCHANAN P/N 612118**
**POSITRONIC P/N: 9508**

**POSITIONER P/N: 005-02012-0023**
**BUCHANAN P/N 612513**
**POSITRONIC P/N: 9502-7**



**INSERTION/EXTRACTION TOOL P/N: 005-02012-0025**
**AMP P/N 91067-2**
**MIL SPEC P/N: M24308/18-12**

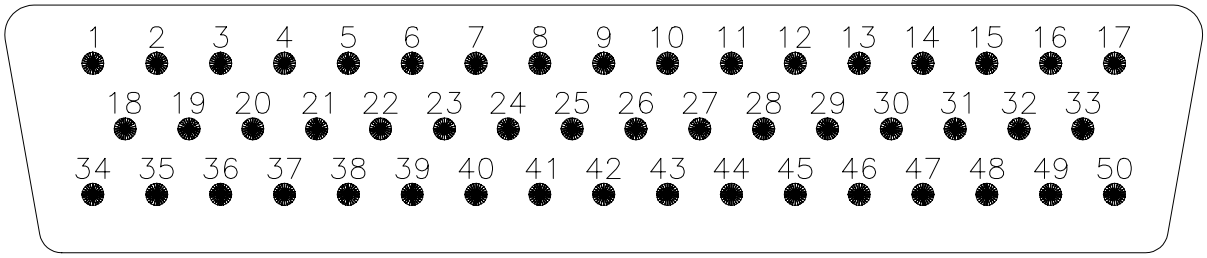



FACE VIEW
INPUT=> OUTPUT=<

**TABLE 2-1 KC 140 CONNECTOR J1401 PIN FUNCTIONS**

| Pin | I/O | Description |
|---|---|---|
| 1 | < | ROLL CLUTCH |
| 2 | > | HDG DATUM + |
| 3 | > | ROLL RATE - |
| 4 | < | CFG_+5V |
| 5 | > | ROLL SERVO VALID |
| 6 | < | AUDIO ALERT |
| 7 | > | ILS |
| 8 | <> | CFG DATA |
| 9 | > | AP DISCONNECT |
| 10 | > | RATE VALID |
| 11 | > | DG VALID |
| 12 | > | DIM BUS |
| 13 | < | CFG ENABLE |
| 14 | > | AUDIO POWER |
| 15 | > | CHASSIS GROUND |
| 16 | > | AIRCRAFT POWER |
| 17 | > | STRAP 5 |
| 18 | < | ROLL SERVO CMD |
| 19 | < | ROLL SERVO CMD REF |
| 20 | < | TONE ALERT |
| 21 | > | ROLL RATE + |
| 22 | > | NAV + FLAG |
| 23 | > | NAV - FLAG |
| 24 | > | NAV DEV + LEFT |
| 25 | > | NAV DEV + RIGHT |

| Pin | I/O | Description |
|---|---|---|
| 26 | > | CWS |
| 27 | > | CRS/HDG DATUM REF |
| 28 | < | TXD RS232 |
| 29 | > | RXD RS232 |
| 30 | < | CFG CLK |
| 31 | > | STRAP 1 |
| 32 | > | STRAP 2 |
| 33 | > | STRAP 3 |
| 34 | > | STRAP 4 |
| 35 | > | GROUND |
| 36 | > | STRAP 6 |
| 37 | < | VISUAL ALERT |




FACE VIEW
INPUT=> OUTPUT=<

**TABLE 2-2 KC 140 CONNECTOR J1402 PIN FUNCTIONS**

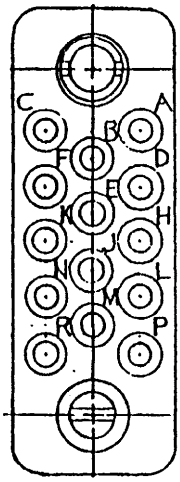
| Pins | I/O | Description |
|---|---|---|
| 1 | < | TRIM CLUTCH |
| 2 | > | TRIM VOLTAGE - |
| 3 | > | C2 |
| 4 | > | TRIM VOLTAGE - |
| 5 | > | C4 |
| 6 | > | TRIM SENSE + |
| 7 | < | PITCH SERVO CMD |
| 8 | < | PITCH CLUTCH |
| 9 | > | GS + UP |
| 10 | > | GS + DN |
| 11 | > | A1 |
| 12 | > | GS - FLAG |
| 13 | > | A2 |
| 14 | > | A4 |
| 15 | > | CHASSIS GROUND |
| 16 | > | BARO SET |
| 17 | > | CRS DATUM + |
| 18 | < | DG +15 VDC |
| 19 | < | DG -15 VDC |
| 20 | > | B4 |
| 21 | > | C1 |
| 22 | > | TRIM UP |

| Pins | I/O | Description |
|---|---|---|
| 23 | > | TRIM SENSE |
| 24 | < | PITCH SERVO CMD REF |
| 25 | > | TRIM ARM |
| 26 | > | GPS SELECT |
| 27 | > | TRIM DOWN |
| 28 | > | PITCH SERVO VALID |
| 29 | > | D4 |
| 30 | > | STALL WARNING |
| 31 | > | GS + FLAG |
| 32 | < | TRIM SERVO CMD |
| 33 | > | B1 |
| 34 | > | B2 |
| 35 | > | XPNDR REF |
| 36 | < | TRIM SERVO CMD REF |
| 37 | < | BARO REF SUPPLY |
| 38 | > | MIDDLE MARKER |
| 39 | | SPARE |
| 40 | > | ROLL STEER VALID *** |
| 41 | > | ROLL STEER + *** |
| 42 | > | ROLL STEER - *** |
| 43 | > | PFT CONTROL EN |
| 44 | < | TRIM FAIL ANN |
| 45 | > | FLAPS + UP SENSE |
| 46 | > | FLAPS + DN SENSE |
| 47 | > | TACH + ** |
| 48 | > | TACH - ** |
| 49 | > | AUDIO LOAD RESISTOR* |
| 50 | | SPARE |

*For -2501 units, Mod 1 and above only

**For -5201, -5402, -7702 units only

***For XX04 units only

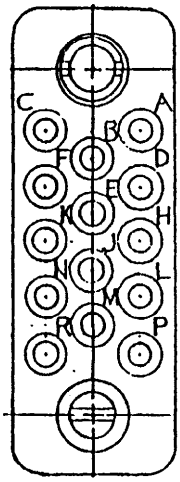



P270C1

| | |
|---|---|
| A | TACH +* |
| B | VALID TP |
| C | POWER GND |
| D | COMMAND REF |
| E | AP DISCONNECT |
| F | CLUTCH LOW |
| H | +28V |
| J | TRIM SENSE + |
| K | VALID BAR |
| L | COMMAND |
| M | VALID TP |
| N | CHASSIS GROUND |
| P | VREF (REFERENCE VOLTAGE), TACH -* |
| R | TRIM SENSE - |

*For -2X00 servos only

**TABLE 2-3 KS 270C CONNECTOR PIN FUNCTIONS**



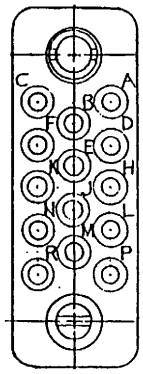

P271C1

| | |
|---|---|
| A | TACH TEST |
| B | VALID TP |
| C | POWER GND |
| D | COMMAND REF |
| E | AP DISCONNECT |
| F | CLUTCH LOW |
| H | +28V |
| J | SPARE |
| K | VALID BAR |
| L | COMMAND |
| M | VALID TP |
| N | CHASSIS GROUND |
| P | VREF (REFERENCE VOLTAGE) |
| R | SPARE |

**TABLE 2-4 KS 271C CONNECTOR PIN FUNCTIONS**

| TOP VERSION # | CLUTCH LOW CONNECTION ONLY (PIN LETTER) |
|---|---|
| 065-00180-0400 | B |
| 065-00180-0600 | K |
| 065-00180-1400 | P |
| 065-00180-2700 | F |
| 065-00180-3500 | M |

**TABLE 2-5 CLUTCH LOW KEYING**

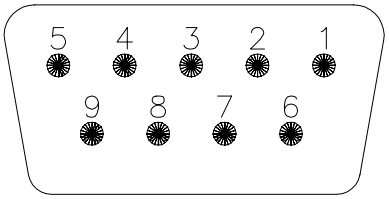



*P272C1

*SEE TABLE 2-5 FOR CLUTCH LOW KEYING PER UNIT VERSION NUMBER

| | |
|---|---|
| A | DISABLE BAR |
| B | SEE TABLE 1 |
| C | POWER GND |
| D | COMMAND REF |
| E | AP DISCONNECT |
| F | SEE TABLE 1 |
| H | +28V |
| J | MOTOR FEEDBACK 1 |
| K | SEE TABLE 1 |
| L | COMMAND |
| M | SEE TABLE 1 |
| N | CHASSIS GROUND |
| P | SEE TABLE 1 |
| R | MOTOR FEEDBACK 2 |

**TABLE 2-6 KS 272C CONNECTOR PIN FUNCTIONS**




FACE VIEW
INPUT=>  OUTPUT=<

| Pin | I/O | Description |
|---|---|---|
| 1 | > | + 5VDC IN |
| 2 | <> | GROUND |
| 3 | > | CFG ENABLE |
| 4 | > | CFG CLOCK |
| 5 | <> | CFG DATA |
| 6 | | SPARE |
| 7 | | SPARE |
| 8 | | SPARE |
| 9 | | SPARE |

**TABLE 2-7 KCM 100 CONNECTOR J1010 PIN FUNCTIONS**

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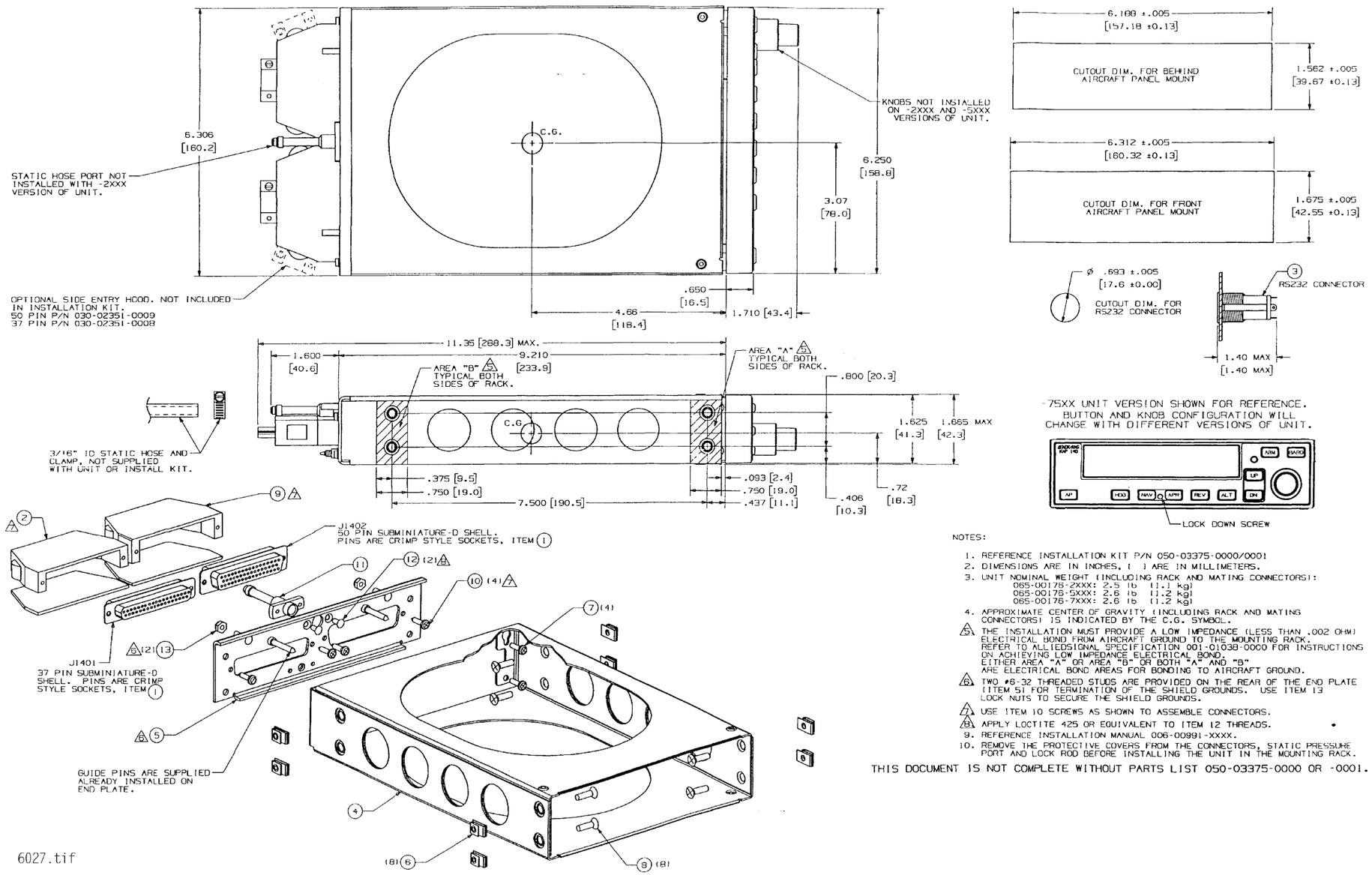





-75XX UNIT VERSION SHOWN FOR REFERENCE. BUTTON AND KNOB CONFIGURATION WILL CHANGE WITH DIFFERENT VERSIONS OF UNIT.




NOTES:

1. REFERENCE INSTALLATION KIT P/N 050-03375-0000/0001
2. DIMENSIONS ARE IN INCHES, [ ] ARE IN MILLIMETERS.
3. UNIT NOMINAL WEIGHT (INCLUDING RACK AND MATING CONNECTORS):
   065-00175-2XXX: 2.5 lb (1.1 kg)
   065-00175-5XXX: 2.6 lb (1.2 kg)
   065-00175-7XXX: 2.6 lb (1.2 kg)
4. APPROXIMATE CENTER OF GRAVITY (INCLUDING RACK AND MATING CONNECTORS) IS INDICATED BY THE C.G. SYMBOL.
5. THE INSTALLATION MUST PROVIDE A LOW IMPEDANCE (LESS THAN .002 OHM) ELECTRICAL BOND FROM AIRCRAFT GROUND TO THE MOUNTING RACK. REFER TO ALLIEDSIGNAL SPECIFICATION 001-01038-0000 FOR INSTRUCTIONS ON ACHIEVING LOW IMPEDANCE ELECTRICAL BOND. EITHER AREA "A" OR AREA "B" OR BOTH "A" AND "B" ARE ELECTRICAL BOND AREAS FOR BONDING TO AIRCRAFT GROUND.
6. TWO #8-32 THREADED STUDS ARE PROVIDED ON THE REAR OF THE END PLATE (ITEM 5) FOR TERMINATION OF THE SHIELD GROUNDS. USE ITEM 13 LOCK NUTS TO SECURE THE SHIELD GROUNDS.
7. USE ITEM 10 SCREWS AS SHOWN TO ASSEMBLE CONNECTORS.
8. APPLY LOCTITE 425 OR EQUIVALENT TO ITEM 12 THREADS.
9. REFERENCE INSTALLATION MANUAL 006-00991-XXXX.
10. REMOVE THE PROTECTIVE COVERS FROM THE CONNECTORS, STATIC PRESSURE PORT AND LOCK ROD BEFORE INSTALLING THE UNIT IN THE MOUNTING RACK.

THIS DOCUMENT IS NOT COMPLETE WITHOUT PARTS LIST 050-03375-0000 OR -0001.

**FIGURE 2-1 KC 140 OUTLINE AND INSTALLATION DRAWING**
**(Dwg No 155-06027-0001, Rev 4)**
**(Sheet 1 of 1)**

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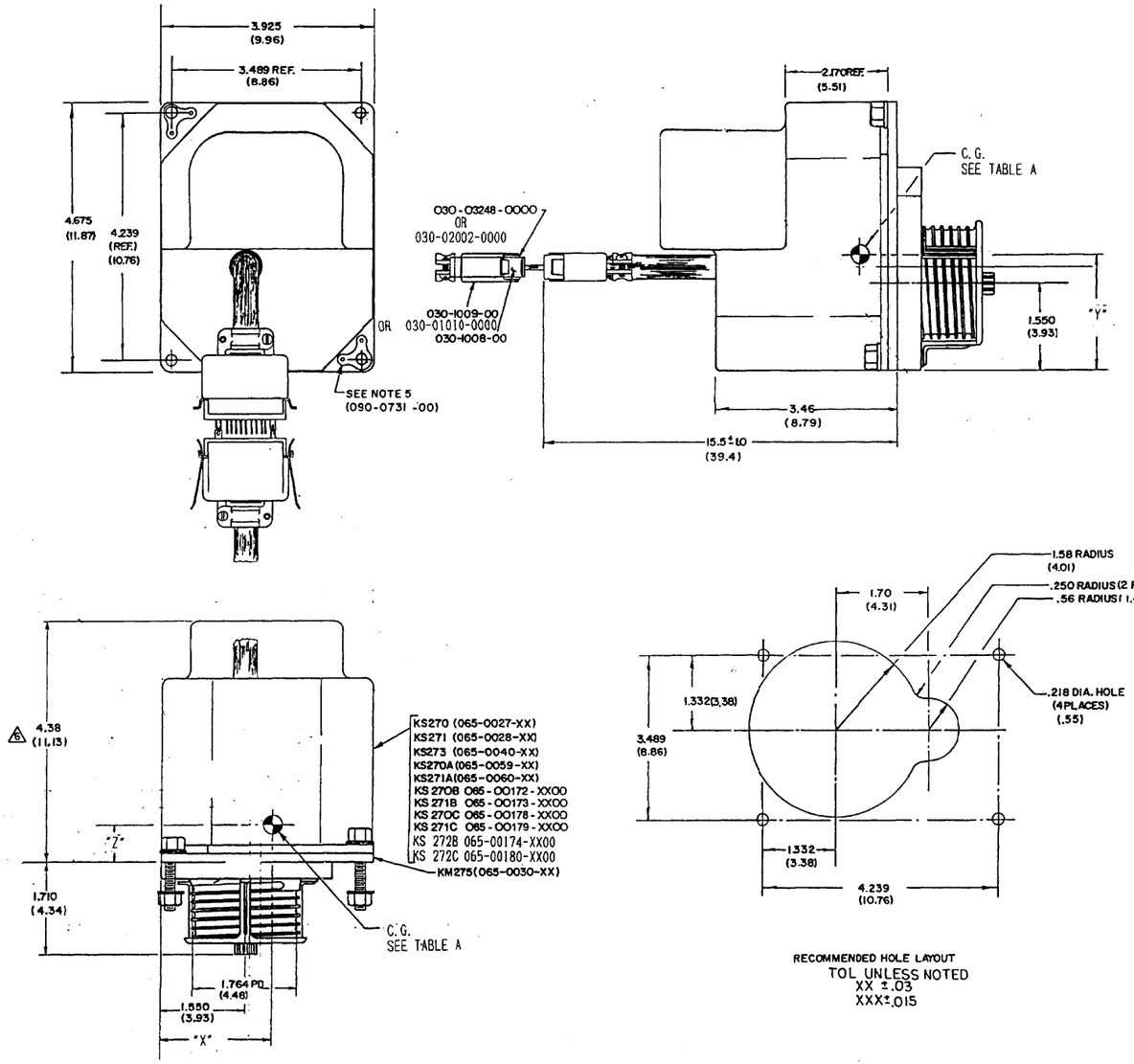


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TABLE A

| SERVO WITH KM275 C.G. LOCATION TOL. ±.12(.30) | | | |
|---|---|---|---|
| SERVO | "X" | "Y" | "Z" |
| KS270<br>KS270A<br>KS271<br>KS271A<br>KS273 | 2.05<br>(5.21) | 2.05<br>(5.21) | .43<br>(1.09) |
| KS270B<br>KS270C | 1.95<br>(4.95) | 2.00<br>(5.08) | .85<br>(2.16) |
| KS271B<br>KS271C | 1.80<br>(4.57) | 2.00<br>(5.08) | .71<br>(1.80) |
| KS272B<br>KS272C | 1.85<br>(4.70) | 2.05<br>(5.21) | .97<br>(2.46) |

NOTES:

1. MAXIMUM CABLE TRAVEL ±7.0 INCHES.
2. ALL DIMENSIONS IN ( ) ARE IN CENTIMETERS.
3. NOMINAL WEIGHT - KS 270 - 2.2 LBS. (1 KG) KS 272 2.2 LBS. (1 KG)
   KS 271 - 2.2 LBS. (1 KG) KS 270A 2.6 LBS. (1.18 KG)
   KS 275 - 1.0 LB. (.45 KG) KS 271A 2.4 LBS. (1.09 KG)
   KS 270B - 2.5 LBS. (1.13 KG) KS 270C 2.5 LBS. (1.13 KG)
   KS 271B - 2.2 LBS. (1.0 KG) KS 271C 2.2 LBS. (1.0 KG)
   KS 272B - 2.1 LBS. (.95 KG) KS 272C 2.1 LBS. (.95 KG)
4. MATING CONNECTOR HOOD AND LEVER-PIVOT ASSY ARE PART OF THE 050-00398-0000 OR 050-01450-0001.
5. NUT ANCHOR CORNER PLATES MAY BE USED IN PLACE OF NUTS AT THE OPTION OF THE INSTALLER.

6. SERVO LENGTH 4.605 ±.03 (11.70 ±.08) WITHOUT KM275. THIS LENGTH INCLUDES THE PINION GEAR.

**FIGURE 2-2 KS 270C, KS271C & KS 272C WITH KM 275 INSTALLATION DRAWING**
**(Dwg No 155-05161-0000, Rev AC)**
**(Sheet 1 of 1)**

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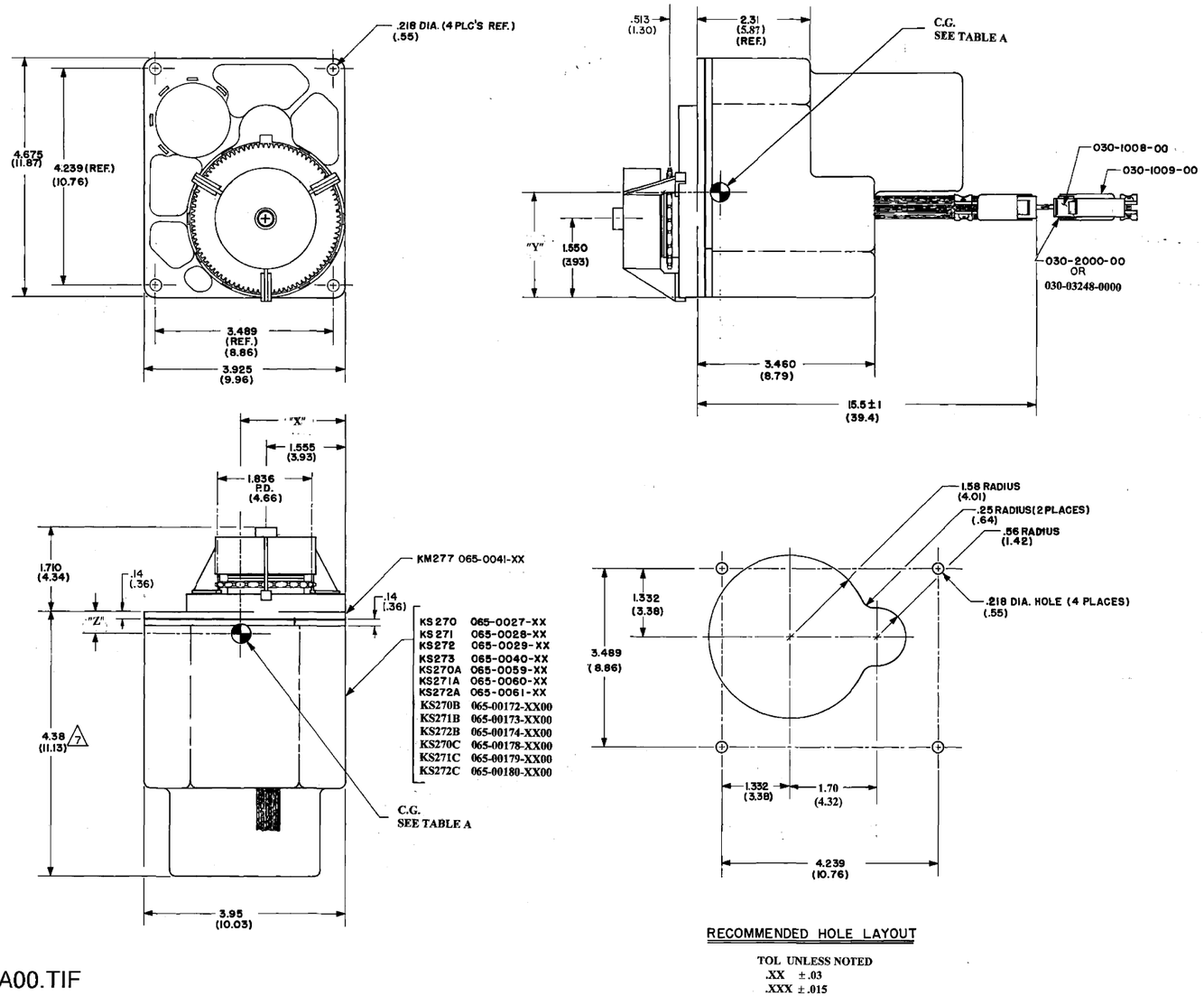


RECOMMENDED HOLE LAYOUT

TOL UNLESS NOTED
.XX ±.03
.XXX ±.015

5241AA00.TIF

TABLE A

| SERVO WITH KM277 C.G. LOCATION TOL. ± .12 (.30) | | | |
|---|---|---|---|
| SERVO | "X" | "Y" | "Z" |
| KS270<br>KS270A<br>KS271<br>KS271A<br>KS272<br>KS272A<br>KS273 | 2.05<br>(5.21) | 2.05<br>(5.21) | .43<br>(1.09) |
| KS270B<br>KS270C | 2.02<br>(5.13) | 2.10<br>(5.33) | 1.08<br>(2.74) |
| KS271B<br>KS271C | 1.90<br>(4.83) | 2.10<br>(5.33) | 1.08<br>(2.74) |
| KS272B<br>KS272C | 1.90<br>(4.83) | 2.08<br>(5.28) | 1.00<br>(2.54) |

**NOTES:**

1. CHAIN TRAVEL IS CONTINUOUS.
2. ALL DIMENSIONS IN "( )"ARE IN CENTIMETERS.
3. NOMINAL WEIGHT: KM277 1.0 LBS. (.45 KG.)
   KS270 2.2 LBS. (1 KG.)
   KS271 2.2 LBS. (1 KG.)
   KS272 2.2 LBS. (1 KG.)
   KS273 2.2 LBS. (1 KG.)
   KS270A 2.6 LBS. (1.18 KG.)
   KS271A 2.4 LBS. (1.09 KG.)
   KS272A 2.4 LBS. (1.09 KG.)
   KS270B 2.5 LBS. (1.13 KG.)
   KS270C 2.5 LBS. (1.13 KG.)
   KS271B 2.2 LBS. (1.0 KG.)
   KS271C 2.2 LBS. (1.0 KG.)
   KS272B 2.1 LBS. (.95 KG.)
   KS272C 2.1 LBS. (.95 KG.)
5. MATING CONNECTOR, HOOD, AND LEVER PIVOT ASS'Y ARE PART OF THE 050-1450-00 OR 050-00398-0000 INSTALLATION KIT.
6. THE SPROCKET ON THE KM277 SERVO MOUNT IS TO BE USED WITH SINGLE STRAND, .250 PITCH ROLLER CHAIN, P/N 090-00298-0000.
7. SERVO LENGTH 4.605 ± .03 (11.70 ± .08) WITHOUT KM277. THIS LENGTH INCLUDES THE PINION GEAR.

**FIGURE 2-3 KS 270C, KS 271C, KS 272C WITH KM 277 INSTALLATION DRAWING**
**(Dwg No 155-05241-0000, Rev AA)**
**(Sheet 1 of 1)**

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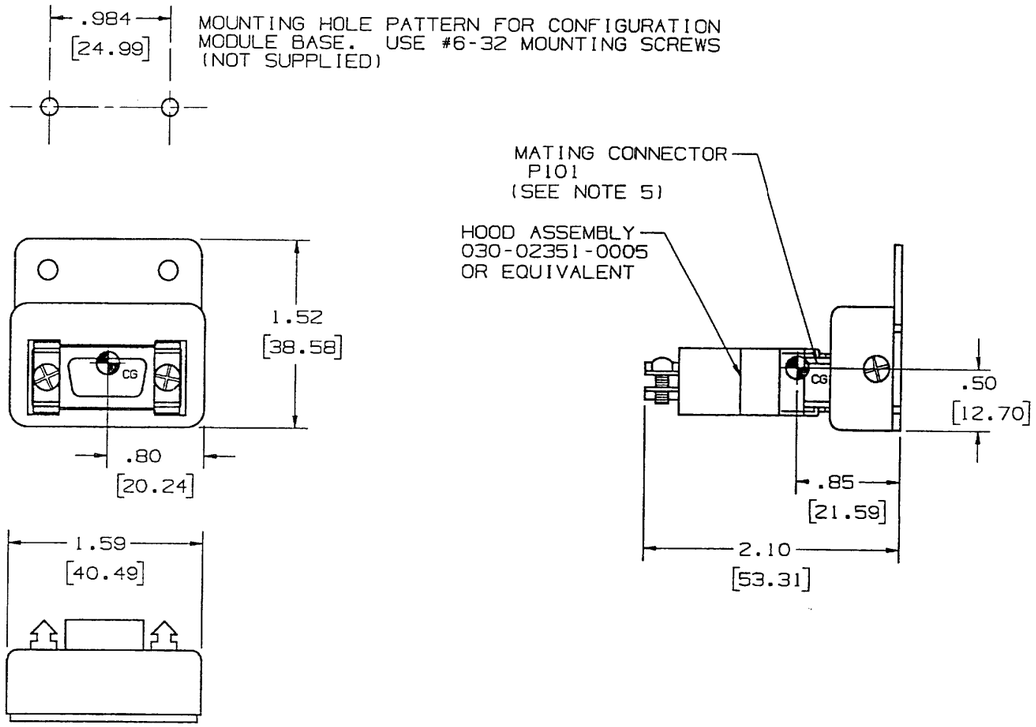


NOTES:

1. ALL DIMENSIONS IN INCHES [MILLIMETERS].
2. ⌖ DENOTES CENTER OF GRAVITY. C.G. IS THE CENTER OF GRAVITY OF UNIT WITH MATING CONNECTOR AND HOOD ASSEMBLY.
3. WEIGHT (INCLUDING MATING CONNECTOR AND HOOD ASSEMBLY):
   0.10 LBS. (.0454 kg)
4. REFERENCE: INSTALLATION KIT W/CRIMP CONTACTS - 050-03245-0000. PRODUCT STRUCTURE DIAGRAM - 000-00917-0000.
5. MATING CONNECTOR (P101):
   CRIMP - 030-01171-0000 OR EQUIVALENT
   030-01157-0011 OR EQUIVALENT (CONTACTS)

**FIGURE 2-4 KCM 100 INSTALLATION DRAWING**
**(Dwg No 155-06008-0000, Rev 1)**
**(Sheet 1 of 1)**

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**FIGURE 2-5 KC 140 INTERCONNECT**
**(Dwg No 155-01679-0000, Rev AC, Sheet 1 of 5)**

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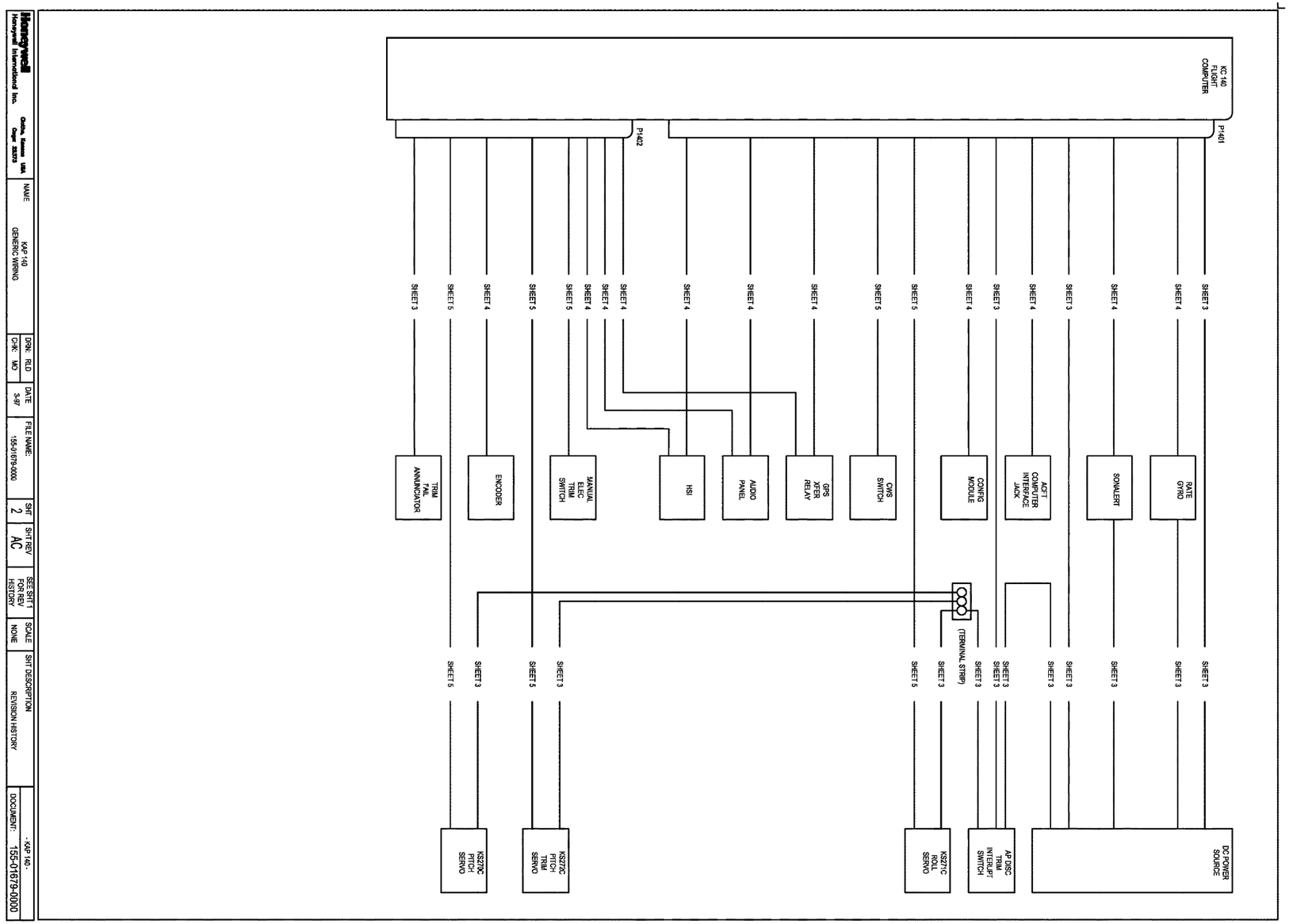



**FIGURE 2-5 KC 140 INTERCONNECT**
**(Sheet 2 of 5)**

BLANK PAGE MARKER (NEW)

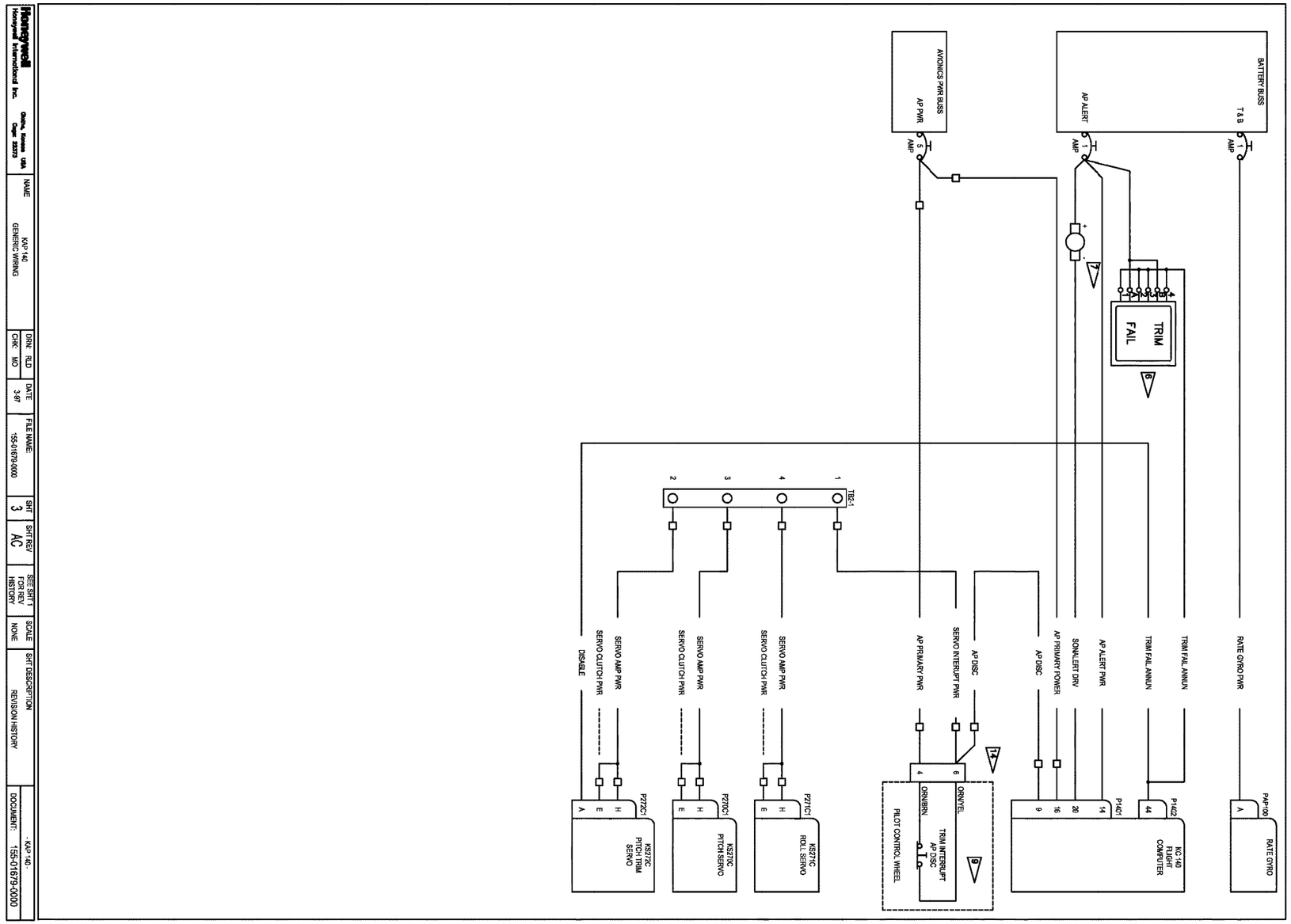



**FIGURE 2-5 KC 140 INTERCONNECT**
**(Sheet 3 of 5)**

BLANK PAGE MARKER (NEW)

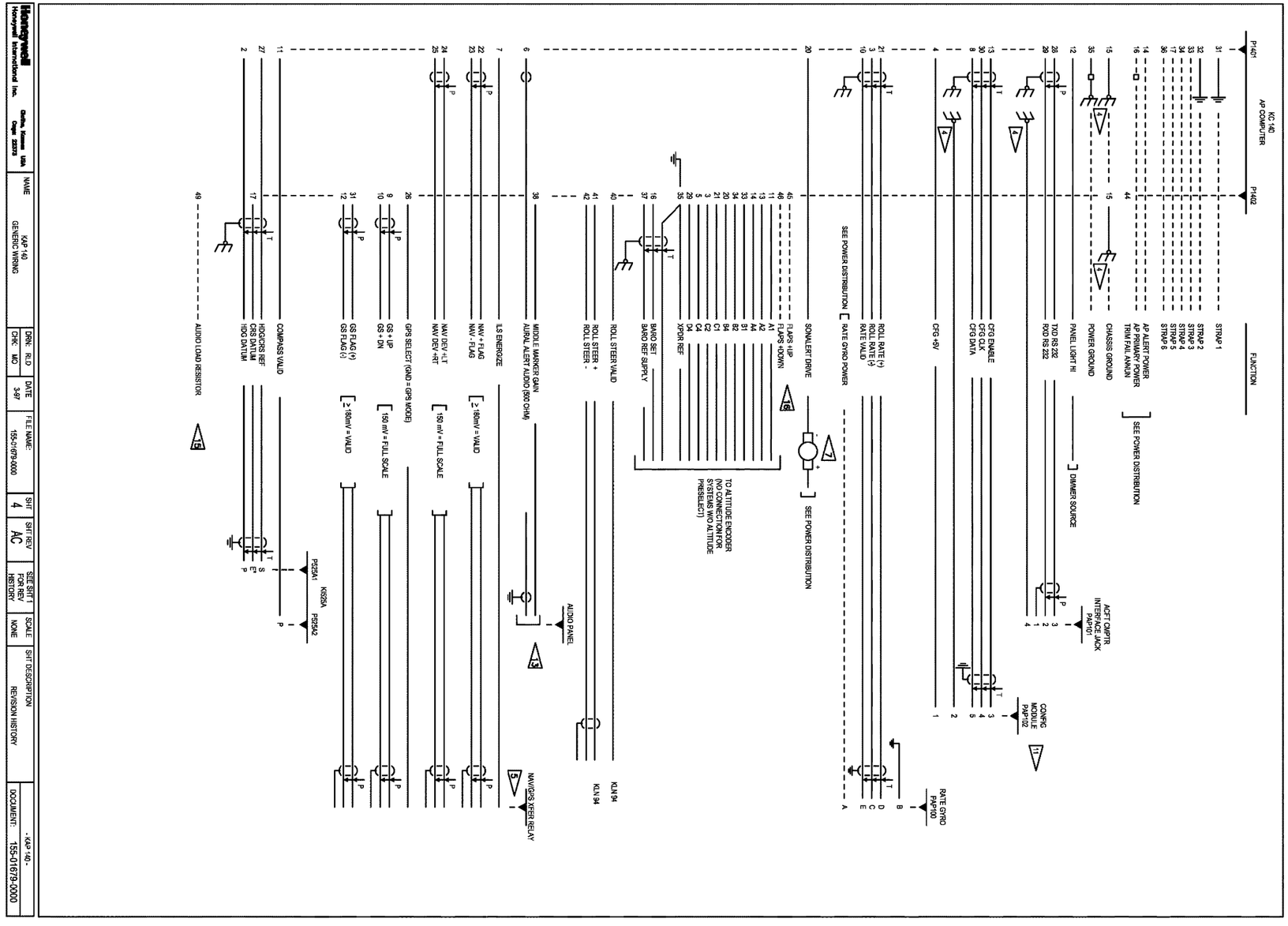



**FIGURE 2-5 KC 140 INTERCONNECT**
**(Sheet 4 of 5)**

BLANK PAGE MARKER (NEW)

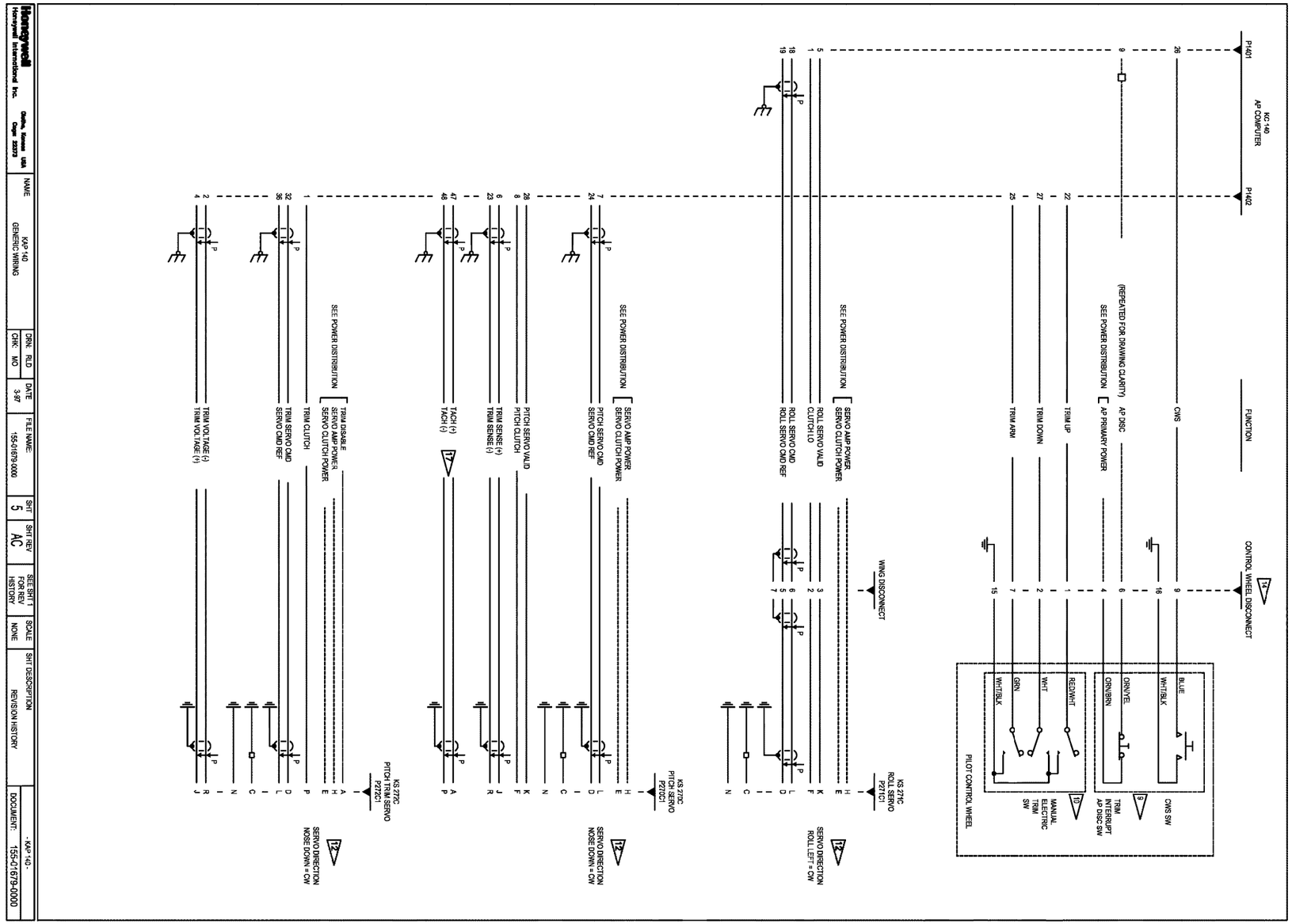
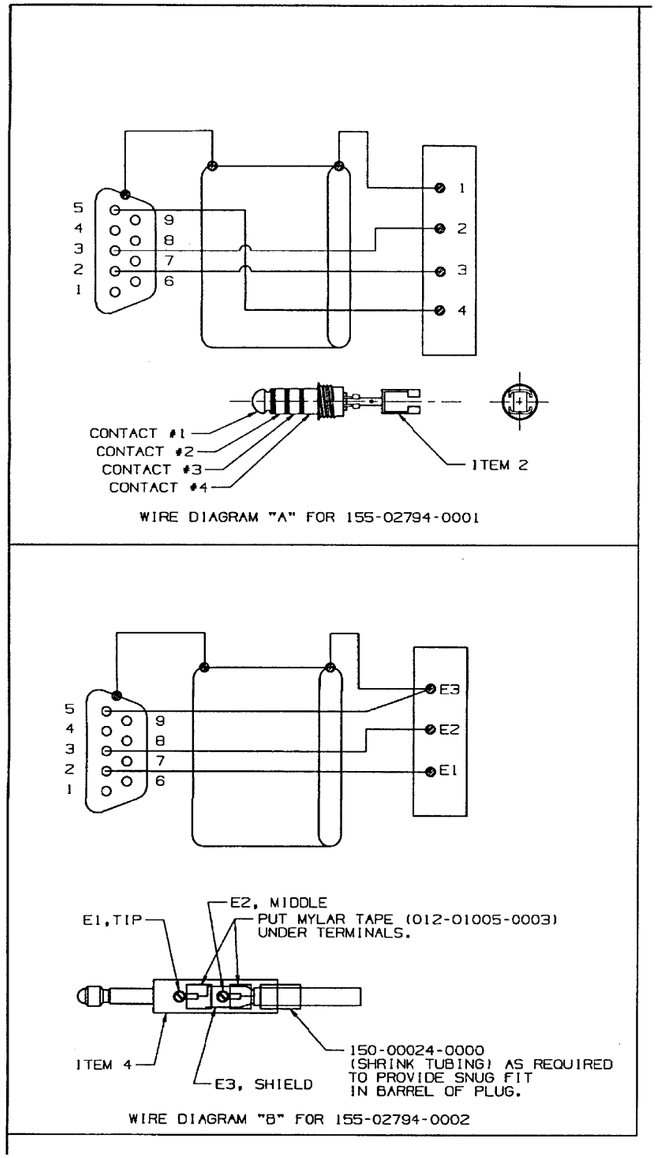
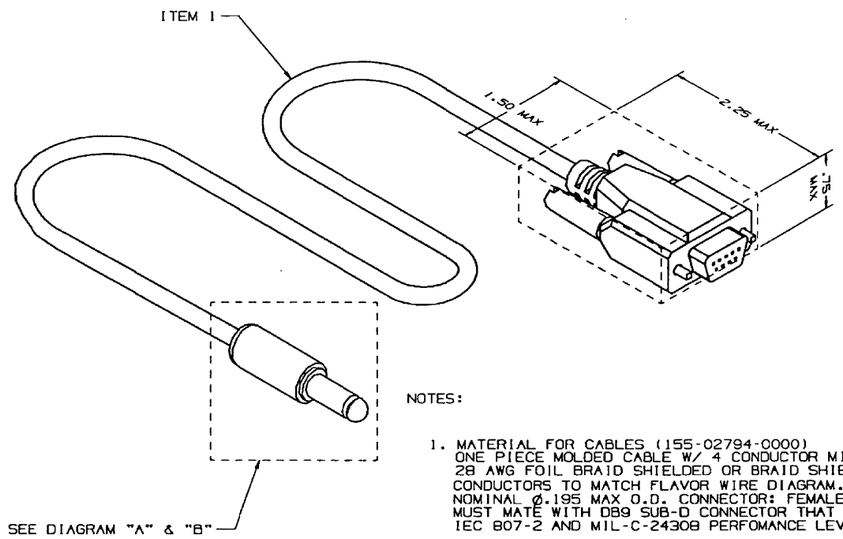



**FIGURE 2-5 KC 140 INTERCONNECT**
**(Sheet 5 of 5)**

BLANK PAGE MARKER (NEW)




NOTES:

1. MATERIAL FOR CABLES (155-02794-0000)
   ONE PIECE MOLDED CABLE W/ 4 CONDUCTOR MINIMUM
   28 AWG FOIL BRAID SHIELDED OR BRAID SHIELDED W/ DRAIN WIRE.
   CONDUCTORS TO MATCH FLAVOR WIRE DIAGRAM.PVC CABLE JACKET Ø.165
   NOMINAL Ø.195 MAX O.D. CONNECTOR: FEMALE DB9 SUB-D W/ JACK SCREWS.
   MUST MATE WITH DB9 SUB-D CONNECTOR THAT COMPLIES WITH
   IEC 807-2 AND MIL-C-24308 PERFOMANCE LEVEL 2.
2. OPERATING TEMPERATURE: -20° TO +80° C.
3. CABLE LENGTH TO BE 6'-0" ±2.00". CABLE MAY BE PURCHASED WITH CONNECTORS ON BOTH ENDS AND CUT TO USE NEW CONNECTOR.

155-02794-0000 R1 COMPUTER CABLE ASSEMBLY

**FIGURE 2-6 KC140 COMPUTER CABLE ASSEMBLY**
**(Dwg No 155-02794-0000/0002, Rev 1)**
**(Sheet 1 of 1)**

BLANK PAGE MARKER (NEW)

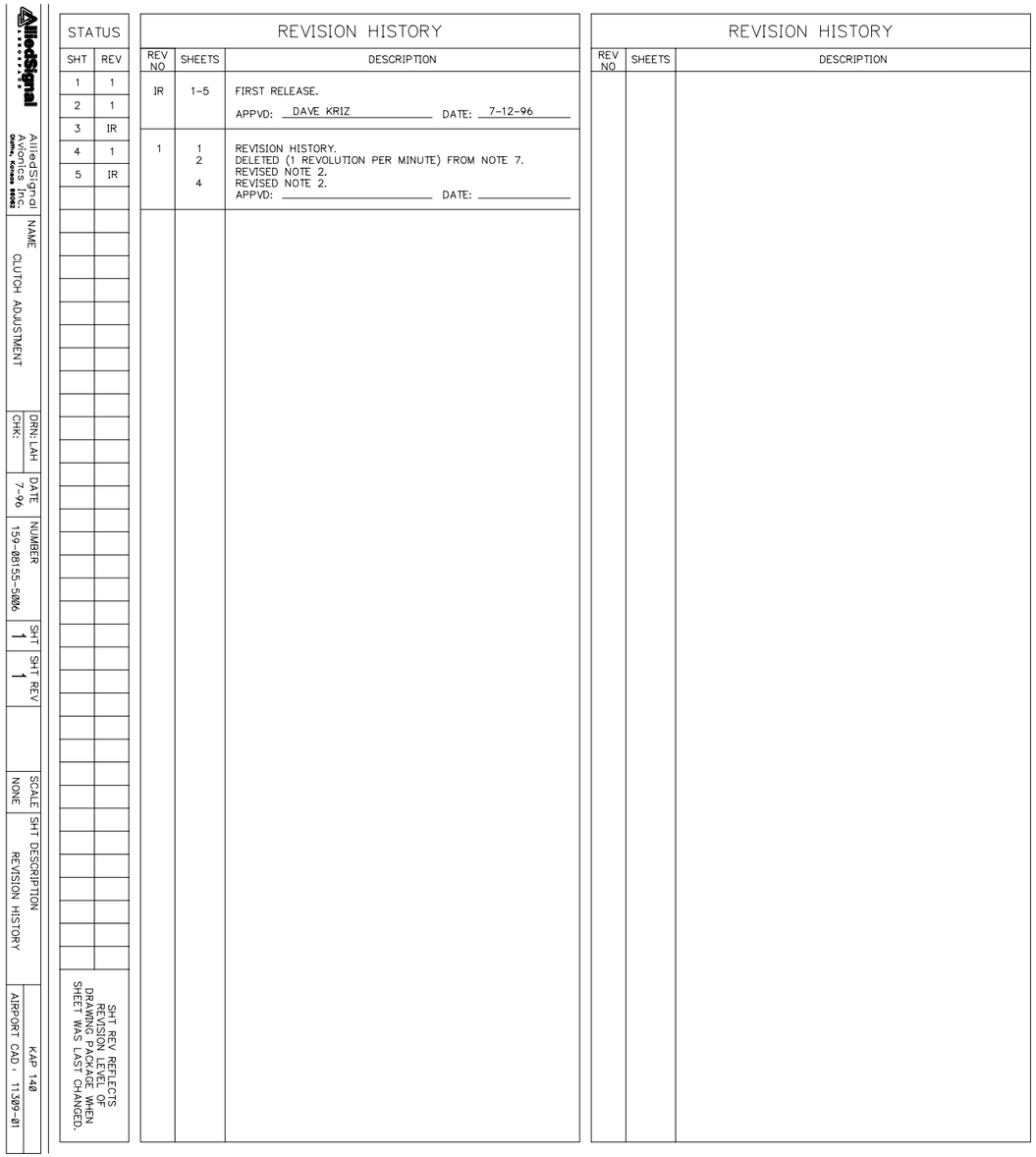



**FIGURE 2-7 CLUTCH ADJUSTMENT**
**(Dwg No 159-08155-5006, Rev 1)**
**(Sheet 1 of 5)**

BLANK PAGE MARKER (NEW)

KM 275 - CABLE CAPSTAN - CLUTCH ADJUSTMENT

1. CAPSTAN TORQUE SETTINGS ARE ADJUSTABLE AND MUST BE SET PRIOR TO INSTALLATION. THE FIXTURE AND TOOLS REQUIRED TO PERFORM THESE ADJUSTMENTS ARE LISTED IN SECTION 1 OF THE INSTALLATION MANUAL.

2. CHECK THE INSTALLATION MANUAL TO DETERMINE THE SERVO MOUNT PART NUMBER AND SETTING REQUIRED FOR EACH AXIS OF THE AIRCRAFT. THE SERVO MOUNT PART NUMBERS ARE LISTED WITH THE AUTOPILOT EQUIPMENT. THE CLUTCH ADJUSTMENT SETTINGS ARE LISTED IN A SEPARATE TABLE.

3. REMOVE THE CABLE GUARD FROM THE CAPSTAN .

4. PLACE THE ADAPTER TOOL OVER THE CAPSTAN AND INSERT THE POSITIONING PIN (FROM THE STRAIGHT-UP POSITION) TO SECURE THE ADAPTER TOOL.

5. INSERT A TORQUE WRENCH (SNAP-ON TEP-6FUA OR EQUIVALENT) AS SHOWN ON SHEET 3 OF THIS DRAWING.

6. APPLY 28 VDC (1 AMP MAX.) POWER TO THE TEST STAND JACKS.

7. USING THE CAPSTAN ROTATION SWITCH ON THE TEST STAND, TURN THE TEST STAND MOTOR ON IN THE CLOCKWISE DIRECTION AND READ THE TORQUE ON THE WRENCH REPEAT THIS STEP IN THE COUNTERCLOCKWISE DIRECTION.

NOTE

THE DESIRED TORQUE READING IS THE AVERAGE OF THE MAXIMUM AND MINIMUM READINGS OBTAINED FROM THE CLOCKWISE AND COUNTERCLOCKWISE ROTATIONS.

THIS TEST SHOULD BE REPEATED THREE (3) TIMES IN EACH DIRECTION AND THEN AVERAGE THE SIX (6) READINGS TO DETERMINE THE FINAL TORQUE READING.

8. IF THE LEVEL DETERMINED FALLS BELOW THE DESIRED VALUE, ROTATE THE CLUTCH ADJUST NUT CLOCKWISE. IF THE LEVEL DETERMINED FALLS ABOVE THE DESIRED VALUE, ROTATE THE CLUTCH ADJUST NUT COUNTERCLOCKWISE. AFTER AN ADJUSTMENT, REPEAT THE TORQUE TEST.

9. RECORD THE SLIP CLUTCH TORQUE READING, AIRCRAFT TYPE, AXIS AND DATE ON THE DECAL AFFIXED TO THE SERVO MOUNT BODY.

| | |
|---|---|
| AlliedSignal Avionics Inc. Olathe, Kansas 66062 | |
| NAME | CLUTCH ADJUSTMENT |
| DRN: LAH | |
| CHK: | |
| DATE | 7-96 |
| NUMBER | 159-08155-5006 |
| SHT | 2 |
| SHT REV | 1 |
| SEE SHT 1 FOR REV HISTORY | |
| SCALE | NONE |
| SHT DESCRIPTION | KM 275 |
| | KAP 140 |
| AIRPORT CAD - 11309-02 | |

**FIGURE 2-7 CLUTCH ADJUSTMENT**
**(Dwg No 159-08155-5006, Rev 1)**
**(Sheet 2 of 5)**

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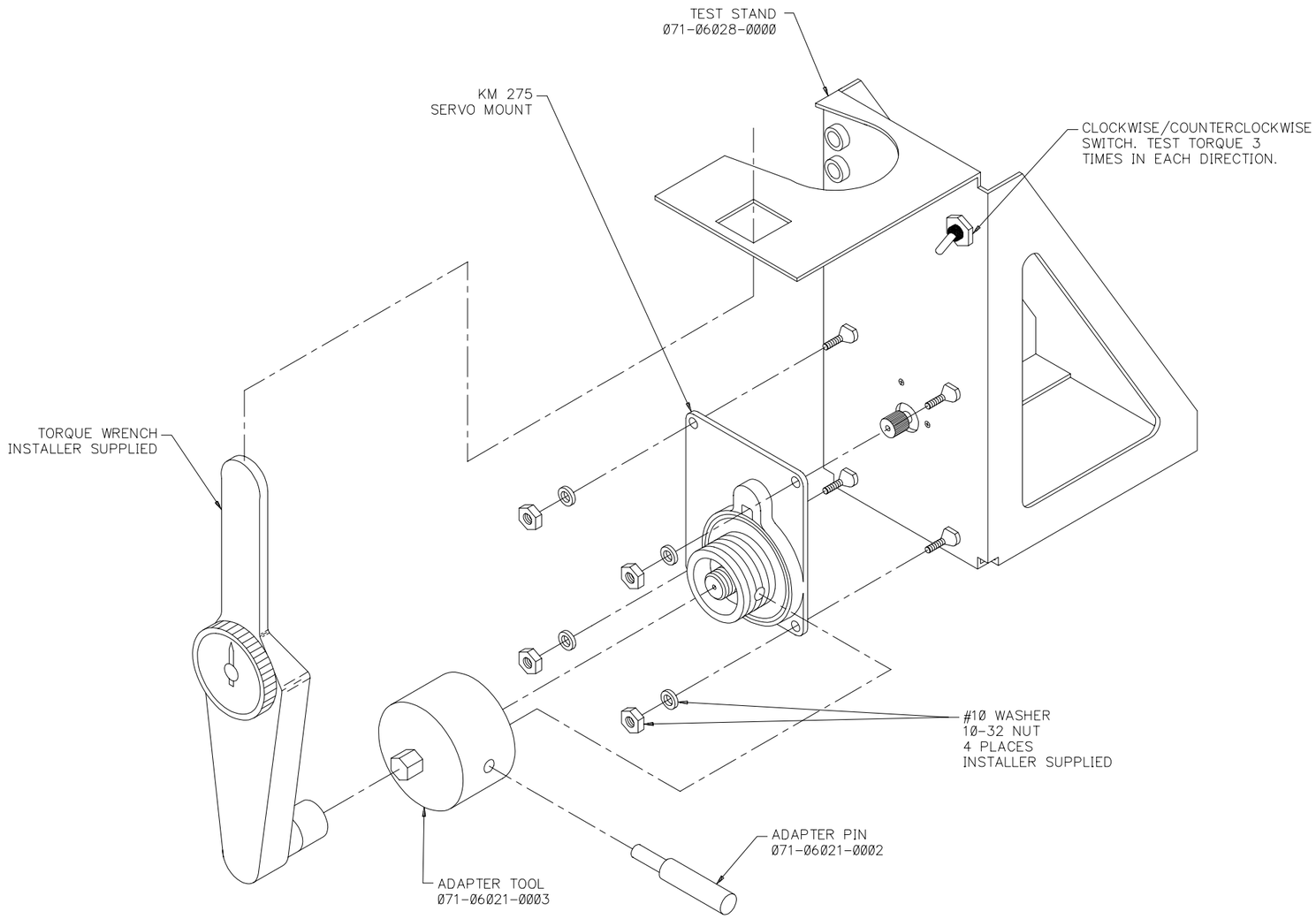


| | |
|---|---|
| AlliedSignal Avionics Inc. Olathe, Kansas 66062 | |
| NAME | CLUTCH ADJUSTMENT |
| DRN: DLK | |
| CHK: | |
| DATE | 7-96 |
| NUMBER | 159-08155-5006 |
| SHT | 3 |
| SHT REV | IR |
| SEE SHT 1 FOR REV HISTORY | |
| SCALE | NONE |
| SHT DESCRIPTION | KM 275 |
| | KAP 140 |
| AIRPORT CAD - 11309-83 | |

**FIGURE 2-7 CLUTCH ADJUSTMENT**
**(Dwg No 159-08155-5006, Rev IR)**
**(Sheet 3 of 5)**

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KM 277 - CHAIN CAPSTAN - CLUTCH ADJUSTMENT

1. THE FIXTURE AND TOOLS REQUIRED TO PERFORM THESE ADJUSTMENTS ARE LISTED IN SECTION 1 OF THE INSTALLATION MANUAL.
2. CHECK THE INSTALLATION MANUAL TO DETERMINE THE SERVO MOUNT PART NUMBER AND SETTING REQUIRED FOR EACH AXIS OF THE AIRCRAFT. THE SERVO MOUNT PART NUMBERS ARE LISTED WITH THE AUTOPILOT EQUIPMENT. THE CLUTCH ADJUSTMENT SETTINGS ARE LISTED IN A SEPARATE TABLE.
3. REMOVE THE CLUTCH-CAPSTAN ASSEMBLY FROM THE CAPSTAN PLATE. SEE SHEET 5 OF THIS DRAWING.
4. CLAMP THE CLUTCH-GEAR ASSEMBLY IN A BENCH VISE THAT HAS RUBBER-COVERED GRIPS (TO PROTECT THE ROLLER CHAIN SPROCKET TEETH).
5. PLACE THE GEAR ADAPTER 071-06018-0006 ON THE CLUTCH ASSEMBLY. SEE SHEET 5 OF THIS DRAWING.
6. USING A TORQUE WRENCH (SNAP-ON TEP-6FUA OR EQUIVALENT) WITH A 3/4 INCH SOCKET ATTACHED, CHECK THE SETTING BY ROTATING THE TORQUE WRENCH (ATTACHED TO THE GEAR ADAPTER) AND READING THE TORQUE REQUIRED TO SLIP THE CLUTCH IN BOTH THE CLOCKWISE AND COUNTERCLOCKWISE DIRECTIONS.

   NOTE

   THE TORQUE READING DESIRED IS THE CONTINUOUS ROTATION TORQUE. THIS TEST SHOULD BE REPEATED THREE (3) TIMES CLOCKWISE AND (3) TIMES COUNTERCLOCKWISE THEN AVERAGE THE SIX (6) READINGS TO DETERMINE THE FINAL TORQUE READING.

7. IF THE LEVEL DETERMINED FALLS BELOW THE DESIRED VALUE, ROTATE THE CLUTCH ADJUST NUT CLOCKWISE. IF THE LEVEL DETERMINED FALLS ABOVE THE DESIRED VALUE, ROTATE THE CLUTCH ADJUST NUT COUNTERCLOCKWISE. AFTER AN ADJUSTMENT, REPEAT THE TORQUE TEST.
8. RECORD THE SLIP CLUTCH READING, AIRCRAFT TYPE, AXIS AND DATE ON THE DECAL AFFIXED TO THE SERVO MOUNT BODY.

AlliedSignal Avionics Inc. Cedar Rapids, Iowa 52402

| NAME | DRN: LAH | DATE | NUMBER | SHT |
|---|---|---|---|---|
| CLUTCH ADJUSTMENT | CHK: | 7-96 | 159-08155-5006 | 4 |

| SHT REV | SEE SHT 1 FOR REV HISTORY | SCALE | SHT DESCRIPTION |
|---|---|---|---|
| 1 | | NONE | KM 277 |

KAP 140
AIRPORT CAD - 11309-04

**FIGURE 2-7 CLUTCH ADJUSTMENT**
**(Dwg No 159-08155-5006, Rev 1)**
**(Sheet 4 of 5)**

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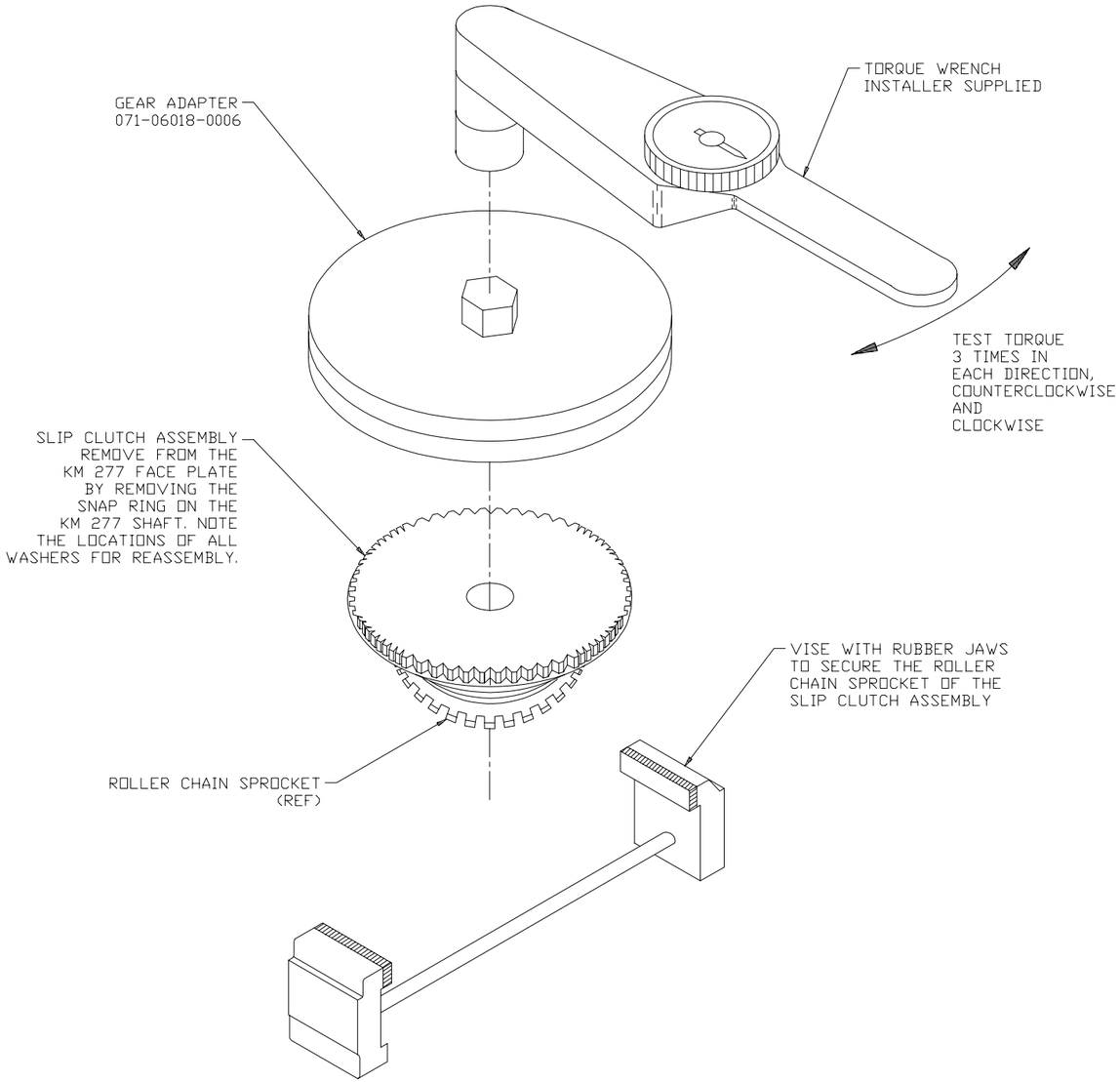


| | |
|---|---|
| AlliedSignal Avionics Inc. Olathe, Kansas 66062 | |
| NAME | CLUTCH ADJUSTMENT |
| DRN: DLK | |
| CHK: | |
| DATE | 7-96 |
| NUMBER | 159-08155-5006 |
| SHT | 5 |
| SHT REV | IR |
| SEE SHT 1 FOR REV HISTORY | |
| SCALE | NONE |
| SHT DESCRIPTION | KM 277 |
| | KAP 140 |
| AIRPORT CAD - 11309-85 | |

**FIGURE 2-7 CLUTCH ADJUSTMENT**
**(Dwg No 159-08155-5006, Rev IR)**
**(Sheet 5 of 5)**

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# SECTION 3.0
# OPERATION

## 3.1 GENERAL

Refer to the STC installation manual of the particular aircraft which the system is installed for operating procedures or the Flight Manual Supplement of the particular aircraft.

# TSO APPENDIX
# RTCA DO-160C
# ENVIRONMENTAL QUALIFICATION
# FORMS

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**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

| | |
|---|---|
| NOMENCLATURE: | KC 140 FLIGHT COMPUTER |
| PART NUMBER: | 065-00176-2602<br>065-00176-2603<br>065-00176-2704<br>065-00176-5302<br>065-00176-7802<br><br>065-00176-5402<br>065-00176-5403<br>065-00176-5504<br>065-00176-7702<br>065-00176-7703<br>065-00176-7904 |
| TSO NUMBER: | C9c |
| MANUFACTURER'S SPECIFICATION: | MPS 004-02036-4001 |
| MANUFACTURER: | Honeywell International Inc. |
| ADDRESS: | 23500 West 105th Street<br>OLATHE, KS 66061<br>U.S.A |

| Section | Condition | Category | Description |
|---|---|---|---|
| 4.0 | Temp/alt | A2/B2/C1 | Decompression , -45 deg to +70 deg C, 35,000 feet |
| 4.5.4 | Inflt cool loss | - | No forced cooling |
| 5.0 | Temp var | B | 5 deg/min |
| 6.0 | Humidity | A | Standard |
| 7.0 | Shock | - | Operational shock, crash safety |
| 8.0 | Vibration | MSB | Instrument panel, single engine (see notes) |
| 9.0 | Explosion | X | Not tested |
| 10.0 | Waterproof | X | Not tested |
| 11.0 | Fluids | X | Not tested |
| 12.0 | Sand & dust | X | Not tested |
| 13.0 | Fungus | X | Not tested |
| 14.0 | Salt Spray | X | Not tested |
| 15.0 | Magnetic | Z | Less than 0.3 meter |
| 16.0 | Power input | Z | Battery may be on line (for 28V installation) |
| 16.0 | Power input | B | Battery on line (for 14V installation) (see notes) |
| 17.0 | Voltage spike | A | High degree of protection |
| 18.0 | Audio freq | Z | Battery may be on line (for 28V installation) |
| 18.0 | Audio freq | B | Battery on line (for 14V installation) (see notes) |
| 19.0 | Ind sig susc | A | Interference free |
| 20.0 | RF susc | U | 20V/meter (see notes) |
| 21.0 | RF emission | Z | Interference level |
| 22.0 | Lightning Ind | A3XX | Moderate environment (see notes) |
| 23.0 | Lightning Dir | X | Not tested |
| 24.0 | Icing | X | Not tested |

**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

Notes:

1. Vibration Critical Frequencies:

The following critical frequencies are mechanical resonances of the unit under test that have peak acceleration amplitudes greater than twice the input acceleration amplitude. There were no observed changes in performance of the unit under test.

| Vertical (top to bottom) | Longitudinal (front to back) | Lateral (side to side) |
|---|---|---|
| 76 T0 160HZ | 327 TO 492HZ | 199 TO 495HZ |
| 204 TO 228HZ | | |
| 291 TO 351HZ | | |
| 429 TO 445HZ | | |
| 480 TO 500HZ | | |

There were no observed changes in the above resonant frequencies.

2. Pin Injection Testing :

The unit interconnect pins were tested to category A3. The following pins, however, were qualified with additional notes as follows:

P1402-49 Audio Load — Qualified to waveform 4 with a 500 ohm resistance placed in series with the generator. Qualified to waveform 3 without any resistor in series with the generator.

3. RF Susceptibility:

The effects on KAP 140 computer were present between the frequencies of 140 Mhz and 300 Mhz. The maximum effect was to cause an offset of 0.6 g's in normal accelerometer output. The effect of this offset is documented in KAP 140 fault analysis document.

4. Power Input and Audio Frequency:

The KC 140 can not be designated as electrical equipment required to operate under emergency electrical system conditions in 14V applications. The operation of KC140 is not guaranteed for voltages less than 11V.

**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

**REVISION HISTORY**

| REVISION | CHANGE ORDER NO. | DATE |
|---|---|---|
| - | PRN# 146072 | July 8, 1998 |
| A | ECO# 712231 | March 18, 2002 |
| B | ECO# 719656 | October 8, 2002 |

**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

| | |
|---|---|
| NOMENCLATURE: | KC 140 FLIGHT COMPUTER |
| PART NUMBER: | 065-00176-5001<br>065-00176-7501<br><br>065-00176-5101<br>065-00176-7601 |
| TSO NUMBER: | C9c |
| MANUFACTURER'S SPECIFICATION: | MPS 004-02036-4000 |
| MANUFACTURER: | ALLIEDSIGNAL AVIONICS INC |
| ADDRESS: | 400 NORTH ROGERS RD.<br>OLATHE, KS 66062<br>U.S.A |

| Section | Condition | Category | Description |
|---|---|---|---|
| 4.0 | Temp/alt | A2/B2/C1 | Decompression , -45 deg to +70 deg C, 35,000 feet |
| 4.5.4 | Inflt cool loss | - | No forced cooling |
| 5.0 | Temp var | B | 5 deg/min |
| 6.0 | Humidity | A | Standard |
| 7.0 | Shock | - | Operational shock, crash safety |
| 8.0 | Vibration | MSB | Instrument panel, single engine (see notes) |
| 9.0 | Explosion | X | Not tested |
| 10.0 | Waterproof | X | Not tested |
| 11.0 | Fluids | X | Not tested |
| 12.0 | Sand & dust | X | Not tested |
| 13.0 | Fungus | X | Not tested |
| 14.0 | Salt Spray | X | Not tested |
| 15.0 | Magnetic | Z | Less than 0.3 meter |
| 16.0 | Power input | Z | Battery may be on line (for 28V installation) |
| 16.0 | Power input | B | Battery on line (for 14V installation) |
| 17.0 | Voltage spike | A | High degree of protection |
| 18.0 | Audio freq | ZB | Battery may be on line |
| 19.0 | Ind sig susc | A | Interference free |
| 20.0 | RF susc | U | 20V/meter (see notes) |
| 21.0 | RF emission | Z | Interference level |
| 22.0 | Lightning Ind | A3XX | Moderate environment (see notes) |
| 23.0 | Lightning Dir | X | Not tested |
| 24.0 | Icing | X | Not tested |

**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

Notes:

1. Vibration Critical Frequencies:

The following critical frequencies are mechanical resonances of the unit under test that have peak acceleration amplitudes greater than twice the input acceleration amplitude. There were no observed changes in performance of the unit under test.

| Vertical (top to bottom) | Longitudinal (front to back) | Lateral (side to side) |
|---|---|---|
| 78 TO 179HZ | 320 TO 475HZ | 194 TO 406HZ |
| 230 TO 236HZ | | |
| 259 TO 272HZ | | |
| 293 TO 495HZ | | |

There were no observed changes in the above resonant frequencies.

2. Pin Injection Testing :

The unit interconnect pins were tested to category A3. The following pins, however, were qualified with additional notes as follows:

| | |
|---|---|
| P1402-49 Audio Load | Qualified to waveform 4 with a 500 ohm resistance placed in series with the generator. |
| | Qualified to waveform 3 without any resistor in series with the generator. |

3. RF Susceptibility:

The effects on KAP 140 computer were present between the frequencies of 140 Mhz and 300 Mhz. The maximum effect was to cause an offset of 0.6 g's in normal accelerometer output. The effect of this offset is documented in KAP 140 fault analysis document.

**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

**REVISION HISTORY**

| REVISION | CHANGE ORDER NO. | DATE |
|---|---|---|
| 0 | Original Issue | August 6, 1996 |
| 1 | 117311 | August 21, 1996 |
| 2 | 117977 | September 12, 1996 |
| 3 | 125366 | March 17, 1997 |
| 4 | 125639 | March 20, 1997 |
| 5 | 126986 | May 2, 1997 |
| AA | 135888 | January 7, 1998 |

RTCA/DO-160C
ENVIRONMENTAL QUALIFICATION FORM

| | |
|---|---|
| NOMENCLATURE: | KS 270C Servo Actuator |
| PART NUMBER: | 065-00178-0100, 0200, 0300<br>065-00178-2100, 2200<br>065-00178-2300, 2400, 2500 |
| TSO NUMBER: | C9c |
| MANUFACTURER'S SPECIFICATION: | 004-02037-4000 |
| MANUFACTURER: | AlliedSignal Inc. |
| MANUFACTURER'S ADDRESS: | 400 N. ROGERS ROAD<br>OLATHE, KS 66062, USA |

| CONDITIONS | SECTION | CONDUCTED TESTS |
|---|---|---|
| TEMPERATURE AND ALTITUDE | 4.0 | CATEGORIES A2/F2 |
| INFLIGHT COOLING LOSS | 4.5 | NOT TESTED |
| TEMPERATURE VARIATION | 5.0 | CATEGORY B |
| HUMIDITY | 6.0 | CATEGORY A |
| SHOCK | 7.0 | OPERATIONAL SHOCK, CRASH SAFETY |
| VIBRATION | 8.0 | CATEGORIES L, M (SEE NOTE) |
| EXPLOSION | 9.0 | CATEGORY E1 |
| WATERPROOFNESS | 10.0 | CATEGORY X (NOT TESTED) |
| FLUID SUSCEPTIBILITY | 11.0 | CATEGORY X (NOT TESTED) |
| SAND AND DUST | 12.0 | CATEGORY X (NOT TESTED) |
| FUNGUS | 13.0 | CATEGORY X (NOT TESTED) |
| SALT SPRAY | 14.0 | CATEGORY X (NOT TESTED) |
| MAGNETIC EFFECT | 15.0 | CATEGORY A |
| POWER INPUT | 16.0 | CATEGORY B |
| VOLTAGE SPIKE | 17.0 | CATEGORIES A/B |
| AUDIO FREQ COND SUSCEPT | 18.0 | CATEGORY B |
| INDUCED SIGNAL SUSCEPTIBILITY | 19.0 | CATEGORY A |
| RADIO FREQ SUSCEPTIBILITY | 20.0 | CATEGORY U |
| RADIO FREQUENCY EMISSION | 21.0 | CATEGORY Z |
| LIGHTNING IND TRANS SUSCEPT | 22.0 | CATEGORY A3XX |
| LIGHTNING DIRECT EFFECTS | 23.0 | CATEGORY X (NOT TESTED) |
| ICING | 24.0 | CATEGORY A |

NOTE: Vibration Critical Frequencies are listed on page 2.

The following critical frequencies are mechanical resonances of the unit under test that have peak acceleration amplitudes greater than twice the input acceleration amplitude. There were no observed changes in the performance of the unit under test.

| Vertical (top to bottom) | Longitudinal (front to back) | Lateral (side to side) |
|---|---|---|
| 85 Hz - 87 Hz | 312 Hz - 447 Hz | 300 Hz - 351 Hz |

There were no observed changes in the above resonant frequencies.

RTCA/DO-160C
ENVIRONMENTAL QUALIFICATION FORM

REVISION HISTORY

| REVISION | CHANGE ORDER NO. | DATE |
|---|---|---|
| 0 | Original Issue | 05/31/96 |
| 1 | 116692 | 08/05/96 |
| 2 | 117105 | 08/18/96 |
| 3 | 124005 | 01/31/97 |
| AA | 135767 | 01/06/98 |
| AB | 137252 | 02/03/98 |
| AC | 143715 | 06/29/98 |

RTCA/DO-160C
ENVIRONMENTAL QUALIFICATION FORM

| | |
|---|---|
| NOMENCLATURE: | KS 271C Servo Actuator |
| PART NUMBER: | 065-00179-0100,0200,0300,<br>065-00179-0400, 0500, 0600 |
| TSO NUMBER: | C9c |
| MANUFACTURER'S SPECIFICATION: | 004-02038-4000 |
| MANUFACTURER: | AlliedSignal Avionics Inc.<br>A wholly-owned subsidiary<br>of AlliedSignal Inc. |
| MANUFACTURER'S ADDRESS: | 400 N. ROGERS ROAD<br>OLATHE, KS 66062, USA |

| CONDITIONS | SECTION | CONDUCTED TESTS |
|---|---|---|
| TEMPERATURE AND ALTITUDE | 4.0 | CATEGORIES A2/F2 |
| INFLIGHT COOLING LOSS | 4.5 | NOT TESTED |
| TEMPERATURE VARIATION | 5.0 | CATEGORY B |
| HUMIDITY | 6.0 | CATEGORY A |
| SHOCK | 7.0 | OPERATIONAL SHOCK,<br>CRASH SAFETY |
| VIBRATION | 8.0 | CATEGORIES L, M (SEE NOTE) |
| EXPLOSION | 9.0 | CATEGORY E1 |
| WATERPROOFNESS | 10.0 | CATEGORY X (NOT TESTED) |
| FLUID SUSCEPTIBILITY | 11.0 | CATEGORY X (NOT TESTED) |
| SAND AND DUST | 12.0 | CATEGORY X (NOT TESTED) |
| FUNGUS | 13.0 | CATEGORY X (NOT TESTED) |
| SALT SPRAY | 14.0 | CATEGORY X (NOT TESTED) |
| MAGNETIC EFFECT | 15.0 | CATEGORY A |
| POWER INPUT | 16.0 | CATEGORY B |
| VOLTAGE SPIKE | 17.0 | CATEGORIES A/B |
| AUDIO FREQ COND SUSCEPT | 18.0 | CATEGORY B |
| INDUCED SIGNAL SUSCEPTIBILITY | 19.0 | CATEGORY A |
| RADIO FREQ SUSCEPTIBILITY | 20.0 | CATEGORY U |
| RADIO FREQUENCY EMISSION | 21.0 | CATEGORY Z |
| LIGHTNING IND TRANS SUSCEPT | 22.0 | CATEGORY A3XX |
| LIGHTNING DIRECT EFFECTS | 23.0 | CATEGORY X (NOT TESTED) |
| ICING | 24.0 | CATEGORY A |

NOTE: Vibration Critical Frequencies are listed on page 2.

**AUTHORIZED PRINT**

The following critical frequencies are mechanical resonances of the unit under test that have peak acceleration amplitudes greater than twice the input acceleration amplitude. There were no observed changes in the performance of the unit under test.

| Vertical (top to bottom) | Longitudinal (front to back) | Lateral (side to side) |
|---|---|---|
| 85 Hz - 87 Hz | 312 Hz - 447 Hz | 300 Hz - 351 Hz |

There were no observed changes in the above resonant frequencies.

RTCA/DO-160C
ENVIRONMENTAL QUALIFICATION FORM

REVISION HISTORY

| REVISION | CHANGE ORDER NO. | DATE |
|---|---|---|
| 0 | Original Issue | 06/10/96 |
| 1 | 116692 | 08/05/96 |
| 2 | 117105 | 08/18/96 |
| 3 | 124005 | 01/31/97 |
| 4 | 124581 | 02/18/97 |
| AA | 135767 | 01/06/98 |
| AB | 137252 | 02/03/98 |
| AC | 139720 | 03/31/98 |

RTCA/DO-160C
Change Notices 1, 2, and 3
ENVIRONMENTAL QUALIFICATION FORM

| | |
|---|---|
| NOMENCLATURE: | KS 272C Servo Actuator |
| PART NUMBER: | 065-00180-0400, 1400, 2700, 3500<br>065-00180-0600, 0800 |
| TSO NUMBER: | C9c |
| MANUFACTURER'S SPECIFICATION: | 004-02039-4000 |
| MANUFACTURER: | Honeywell International Inc. |
| MANUFACTURER'S ADDRESS: | OLATHE, KS 66061, USA |

| CONDITIONS | SECTION | CONDUCTED TESTS |
|---|---|---|
| TEMPERATURE AND ALTITUDE | 4.0 | CATEGORIES A2/F2 |
| INFLIGHT COOLING LOSS | 4.5 | NOT TESTED |
| TEMPERATURE VARIATION | 5.0 | CATEGORY B |
| HUMIDITY | 6.0 | CATEGORY A |
| SHOCK | 7.0 | OPERATIONAL SHOCK, CRASH SAFETY |
| VIBRATION | 8.0 | CATEGORIES L, M (SEE NOTE) |
| EXPLOSION | 9.0 | CATEGORY E1 |
| WATERPROOFNESS | 10.0 | CATEGORY X (NOT TESTED) |
| FLUID SUSCEPTIBILITY | 11.0 | CATEGORY X (NOT TESTED) |
| SAND AND DUST | 12.0 | CATEGORY X (NOT TESTED) |
| FUNGUS | 13.0 | CATEGORY X (NOT TESTED) |
| SALT SPRAY | 14.0 | CATEGORY X (NOT TESTED) |
| MAGNETIC EFFECT | 15.0 | CATEGORY A |
| POWER INPUT | 16.0 | CATEGORY B |
| VOLTAGE SPIKE | 17.0 | CATEGORIES A/B |
| AUDIO FREQ COND SUSCEPT | 18.0 | CATEGORY B |
| INDUCED SIGNAL SUSCEPTIBILITY | 19.0 | CATEGORY A |
| RADIO FREQ SUSCEPTIBILITY | 20.0 | CATEGORY U |
| RADIO FREQUENCY EMISSION | 21.0 | CATEGORY Z |
| LIGHTNING IND TRANS SUSCEPT | 22.0 | CATEGORY A3XX |
| LIGHTNING DIRECT EFFECTS | 23.0 | CATEGORY X (NOT TESTED) |
| ICING | 24.0 | CATEGORY A |

NOTE: Vibration Critical Frequencies are listed on page 2.

The following critical frequencies are mechanical resonances of the unit under test that have peak acceleration amplitudes greater than twice the input acceleration amplitude. There was no observed changes in the performance of the unit under test.

| Vertical | Longitudinal | Lateral |
|---|---|---|
| (top to bottom) | (front to back) | (side to side) |
| 214 Hz - 310 Hz | 74 Hz - 154 Hz | 41 Hz - 160 Hz |
| | 160 Hz - 191 Hz | 472 Hz - 500 Hz |
| | 255 Hz - 430 Hz | |

There were no observed changes in the above resonant frequencies.

RTCA/DO-160C
ENVIRONMENTAL QUALIFICATION FORM

REVISION HISTORY

| REVISION | CHANGE ORDER NO. | DATE |
|---|---|---|
| 0 | Original Issue | 06/10/96 |
| 1 | 116692 | 08/05/96 |
| 2 | 117105 | 08/18/96 |
| 3 | 123691 | 01/23/97 |
| 4 | 124005 | 01/31/97 |
| AA | 139720 | 03/31/98 |
| AB | 172207 | 05/11/00 |

**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

| | |
|---|---|
| NOMENCLATURE: | KC 140 FLIGHT COMPUTER |
| PART NUMBER: | 065-00176-5201 |
| TSO NUMBER: | C9c |
| MANUFACTURER'S SPECIFICATION: | MPS 004-02036-4000 |
| MANUFACTURER: | ALLIEDSIGNAL AVIONICS INC |
| ADDRESS: | 400 NORTH ROGERS RD.<br>OLATHE, KS 66062<br>U.S.A |

| Section | Condition | Category | Description |
|---|---|---|---|
| 4.0 | Temp/alt | A2/B2/C1 | Decompression , -45 deg to +70 deg C, 35,000 feet |
| 4.5.4 | Inflt cool loss | - | No forced cooling |
| 5.0 | Temp var | B | 5 deg/min |
| 6.0 | Humidity | A | Standard |
| 7.0 | Shock | - | Operational shock, crash safety |
| 8.0 | Vibration | MSB | Instrument panel, single engine (see notes) |
| 9.0 | Explosion | X | Not tested |
| 10.0 | Waterproof | X | Not tested |
| 11.0 | Fluids | X | Not tested |
| 12.0 | Sand & dust | X | Not tested |
| 13.0 | Fungus | X | Not tested |
| 14.0 | Salt Spray | X | Not tested |
| 15.0 | Magnetic | Z | Less than 0.3 meter |
| 16.0 | Power input | Z | Battery may be on line (for 28V installation) |
| 16.0 | Power input | B | Battery on line (for 14V installation) |
| 17.0 | Voltage spike | A | High degree of protection |
| 18.0 | Audio freq | ZB | Battery may be on line |
| 19.0 | Ind sig susc | A | Interference free |
| 20.0 | RF susc | U | 20V/meter |
| 21.0 | RF emission | Z | Interference level |
| 22.0 | Lightning Ind | A3XX | Moderate environment (see notes) |
| 23.0 | Lightning Dir | X | Not tested |
| 24.0 | Icing | X | Not tested |

**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

Notes:
1. Vibration Critical Frequencies:

The following critical frequencies are mechanical resonances of the unit under test that have peak acceleration amplitudes greater than twice the input acceleration amplitude. There were no observed changes in performance of the unit under test.

| Vertical (top to bottom) | Longitudinal (front to back) | Lateral (side to side) |
|---|---|---|
| 75 TO 172 HZ | 304 TO 433 HZ | 158 TO 444 HZ |
| 202 TO 252 HZ | | 464 TO 500 HZ |
| 265 TO 275 HZ | | |
| 312 TO 384 HZ | | |
| 403 TO 471 HZ | | |
| 476 TO 500 HZ | | |

There were no observed changes in the above resonant frequencies.

2. Pin Injection Testing :
The unit interconnect pins were tested to category A3. The following pins, however, were qualified with additional notes as follows:

| | |
|---|---|
| P1402-49 Audio Load | Qualified to waveform 4 with a 500 ohm resistance placed in series with the generator. |
| | Qualified to waveform 3 without any resistor in series with the generator. |

**RTCA/DO 160C**

**ENVIRONMENTAL QUALIFICATION FORM**

**REVISION HISTORY**

| REVISION | CHANGE ORDER NO. | DATE |
|---|---|---|
| - | PRN # 135893 | January 7, 1998 |

RTCA/DO-160C

ENVIRONMENTAL QUALIFICATION FORM

| | |
|---|---|
| NOMENCLATURE: | KCM 100 CONFIGURATION MODULE |
| PART NUMBER: | 071-00073-5000 |
| TSO NUMBER: | C113, C9c, C52a, C129, C52b |
| MANUFACTURER'S SPECIFICATION: | MPS 004-00950-0000 |
| MANUFACTURER: | ALLIEDSIGNAL INC. |
| ADDRESS: | ONE TECHNOLOGY CENTER<br>23500 W. 105TH STREET<br>OLATHE, KS 66061<br>USA |

| CONDITIONS | PARA | CONDUCTED TESTS |
|---|---|---|
| TEMPERATURE AND ALTITUDE | 4.0 | CATEGORY A2 and F2 |
| TEMPERATURE VARIATION | 5.0 | CATEGORY B |
| HUMIDITY | 6.0 | CATEGORY A |
| SHOCK | 7.0 | TESTED PER DO-160C Para 7.2.1 |
| VIBRATION | 8.0 | CATEGORIES M,N, and B |
| EXPLOSION | 9.0 | CATEGORY E1 |
| WATERPROOFNESS | 10.0 | CATEGORY X (NOT TESTED) |
| FLUIDS SUSCEPTIBILITY | 11.0 | CATEGORY X (NOT TESTED) |
| SAND AND DUST | 12.0 | CATEGORY X (NOT TESTED) |
| FUNGUS | 13.0 | CATEGORY X (NOT TESTED) |
| SALT SPRAY | 14.0 | CATEGORY X (NOT TESTED) |
| MAGNETIC EFFECT | 15.0 | CLASS A |
| POWER INPUT | 16.0 | CATEGORY X (NOT TESTED) |
| VOLTAGE SPIKE CONDUCTED | 17.0 | CATEGORY X (NOT TESTED) |
| AUDIO FREQUENCY CONDUCTED SUSCEPTIBILITY | 18.0 | CATEGORY X (NOT TESTED) |
| INDUCED SIGNAL SUSCEPTIBILITY | 19.0 | CATEGORY A |
| RADIO FREQUENCY SUSCEPTIBILITY | 20.0 | CATEGORY T |
| RADIO FREQUENCY EMISSION | 21.0 | CATEGORY A |
| LIGHTNING INDUCED TRANSIENT SUSCEPTIBILITY | 22.0 | CATEGORY A3E3 |
| LIGHTNING DIRECT EFFECTS | 23.0 | CATEGORY X (NOT TESTED) |
| ICING | 24.0 | CATEGORY X (NOT TESTED) |



**AUTHORIZED PRINT**

RTCA DO-160C

ENVIRONMENTAL QUALIFICATION FORM

REVISION HISTORY

| REVISION | CHANGE ORDER NO. | DATE |
|---|---|---|
| 0 | Original Issue | May 1993 |
| 1 | ECO 98316 | June 1993 |
| 2 | ECO 98421 | June 1993 |
| 3 | ECO 113697 | June 1996 |
| AA | CO 148452 | Oct. 1998 |

THE END