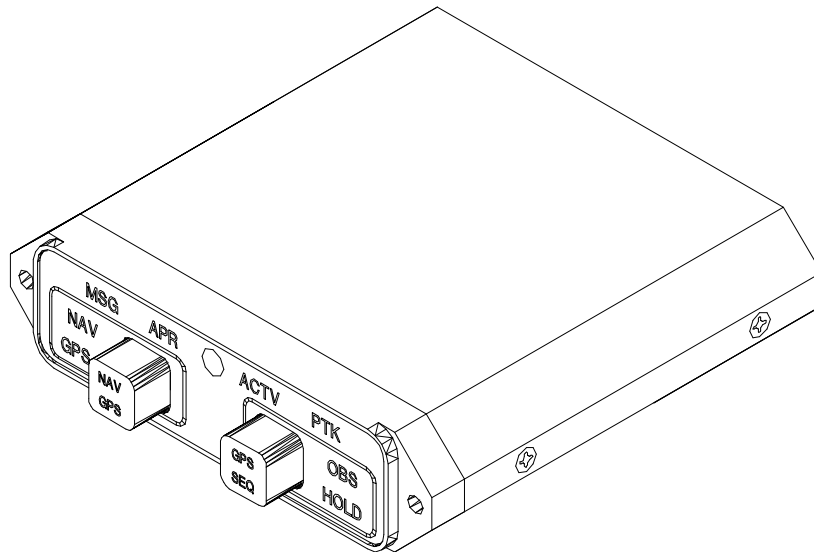




INSTALLATION MANUAL AND OPERATING INSTRUCTIONS

MD41-() Series GPS ANNUNCIATION CONTROL UNIT FOR II MORROW APOLLO 2001TSO / 2001GPS / 2101 GX50 /GX60

MD41-1728	28vdc	Horizontal Mount
MD41-1738	28vdc	Vertical Mount (shown on page 10)
MD41-1724	14vdc	Horizontal Mount
MD41-1734	14vdc	Vertical Mount (shown on page 10)



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ENVIRONMENTAL QUALIFICATION FORM

SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The MD41-172X/173X is a compact, self-contained GPS Annunciation and Control unit. It combines all the necessary functions required to interface the II Morrow Apollo 2001TSO / 2001GPS / 2101 /GX50 and GX60 approach-certified GPS receivers with the MD41-244/248 remote mounted relay transfer system. In addition, the MD41-() contains several GPS status annunciations used to indicate modes selected by the front panel switches and various inputs from the GPS receiver.

A special ILS override feature has been incorporated to cause the MD41-() to automatically switch to the NAV mode when the NAV (VOR) receiver is tuned to an ILS frequency. Other features include dual 20,000 hour lamps used for all annunciations, internally lighted selection switches and automatic photocell dimming. A external annunciation dimming adjustment is provided for balancing low level light conditions.

The MD41-172X/173X series annunciation control unit must be installed with the companion MD41-244/248 series Relay Unit or the AlliedSignal KI 208A/209A course deviation indicator to be approved as a complete TSO'd system.

1.2 SPECIFICATIONS, TECHNICAL

1.2.1 PHYSICAL CHARACTERISTICS

Mounting:	Panel
Width:	3.25 Inches
Height:	.80 Inches
Depth:	3.20 Inches
Weight:	0.50 lbs.

1.2.2 ENVIRONMENTAL CHARACTERISTICS

TSO Compliance:	TSO C129
Applicable Documents:	RTCA DO-160C, DO-208
Operating Temperature Range:	-55°C to +70°C
Humidity:	95% Non-Condensing
Altitude Range:	0 to 55,000 ft.
Vibration:	Cat. M and N
Operational Shock:	Rigid Mounting, 6 G Operational 15 G Crash Safety

1.2.3 SPECIFICATIONS, ELECTRICAL

Design	All Solid State
MD41-1724/1734 (14VDC)	0.40 Amps
MD41-1728/1738 (28VDC)	0.30 Amps
MD41-1728(5V)/1738(5V) (28DC)	0.30 Amps

1.2.4 FRONT PANEL CONTROLS AND ANNUNCIATIONS

1.2.4.1 CONTROLS

NAV/GPS	Alternate action switch, when pressed, will select NAV (VOR) or GPS presentation on HSI/CDI.
GPS/SEQ	Momentary action switch, when pressed, will select between waypoint sequencing and waypoint hold mode. In hold mode, this will enable OBS selection input from the Apollo GPS system.

1.2.4.2 ANNUNCIATIONS

NAV	NAV (VOR) information presented on the HSI or CDI.
GPS	GPS information presented on the HSI or CDI.
MSG	On indicates message(s) active.
PTK	On indicates parallel track is enabled.
AUTO	Automatic sequencing of waypoints is active.
OBS/HLD	On indicates waypoint sequencing is in hold. Also OBS Selection input from the Apollo GPS system has been enabled.
APR	On indicates the approach has been enabled.
ACTV	On indicates the approach is active.

1.2.5 INTERFACE

NAV annunciation J1 Pin 2	Receives a ground from the transfer relay when relays are in NAV mode.
GPS annunciation J1 Pin 1	Receives ground from the transfer relay when relays are in GPS mode.

1.2.5 INTERFACE (cont.)

Lamp Test J1 Pin 7	Receives ground from remote rest switch to light all annunciators. (optional connection)
GPS/SEQ Select J1 Pin 10	Provides a momentary logic low to the GPS receiver when GPS/SEQ is selected.
OBS/HLD annunciation J1 Pin 23	Receives a logic low to from the GPS receiver to annunciate OBS/HLD.
APR annunciation J1 Pin 4	Receives a logic low from the GPS receiver when approach has been enabled.
ACTV annunciation J1 Pin 8	Receives a logic low from the GPS receiver when a transition is made from APR to active.
PTK annunciation J1 Pin 9	Receives a logic low from the GPS receiver to indicate parallel track is enabled.
ILS Override JI Pin 11	Receives a logic low from the NAV (VOR) receiver when tuned to an ILS frequency. This will force the MD41-() into NAV mode regardless of the NAV/GPS selection. This connection is optional.
MSG annunciation J1 Pin 3	Receives a logic low from the GPS receiver to indicate message(s) is active.
FCS LOC ENGAGE J1 pin 11	Logic low when GPS is in ACTIVE mode. Used to provide a ILS ground to the flight control system when the GPS is approach active.

1.2.6 EQUIPMENT LIMITATIONS

The MD41-() series control units contain specific dash numbers to be used with various GPS receivers. The installer must match the correct controller part number with the GPS receiver being installed.

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are 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.

The MD41-1724/1734/1728/1738/1728(5V)/1738(5V) ACU **MUST** be installed with the Mid-Continent Instruments and Avionics MD41-244/248 remote transfer relay or the AlliedSignal KI 208A/209A course deviation indicator in order to be approved as a complete TSO system. These items will not be TSO'd if one is installed without the other.

The MD41-1724/1734/1728/1738/1728(5V)/1738(5V) is TSO'D and certified for use with the II Morrow Apollo 2001TSO / 2001GPS / 2101 / GX50 / GX60 system. Any attempts to install the listed units in an installation other than the II Morrow Apollo 2001TSO / 2001GPS / 2101 / GX50 / GX60 is prohibited. **This will void the TSO.**

NOTE: Anytime the MD41-() is disconnected or removed from the aircraft, the HSI/CDI will default to NAV (VOR) mode.

1.2.7 MAJOR COMPONENTS

This system is comprised of two major components, the MD41-1700 series GPS Annunciation Control Unit and the MD41-244/248 Remote Relay or the AlliedSignal KI 208A/209A course deviation indicator.

SECTION 2 INSTALLATION CONSIDERATIONS

2.1 COOLING

No direct cooling is required. As with any electronic equipment, overall reliability may be increased if the MD41-() is not located near any high heat source or crowded next to other equipment. Means of providing a gentle air flow will be a plus.

2.2 EQUIPMENT LOCATION

The MD41-() annunciation control unit must be mounted as close to the pilot's field of view as possible. The preferable location is near the HSI/CDI that will be displaying the GPS information. The unit depth, with connector attached, must also be taken into consideration. Note: Unlike previous versions of the MD41 Annunciation Control Units (ACU), the transfer relays have been removed and are now remotely mounted in a separate package designated as the MD41-244/248 Relay Unit. This has allowed for a smaller size ACU which now provides more options for panel mounting. For systems that utilize the AlliedSignal KI208A/209A, the transfer relays are internal to the indicator.

2.3 ROUTING OF CABLES

Care must be taken not to bundle the MD41-() logic and low level signal lines with any high energy sources. Examples of these sources include 400 HZ AC, Comm, DME, HF and transponder transmitter coax. Always use shielded wire when shown on the installation print. Avoid sharp bends in cabling and routing near aircraft control cables.

SECTION 3 INSTALLATION PROCEDURES

3.1 GENERAL INFORMATION

This section contains interconnect diagrams, mounting dimensions and other information pertaining to the installation of the MD41-(). After installation of cabling and before installation of the equipment, ensure that power is applied only to the pins specified in the interconnect diagram.

3.2 UNPACKING AND INSPECTING EQUIPMENT

When unpacking equipment, make a visual inspection for evidence of damage incurred during shipment. The following parts should be included:

1. MD41-1724 (14volt) or MD41-1728 (28 volt) Horiz. Mount
MD41-1734 (14volt) or MD41-1738 (28volt) Vert. Mount
MD41-1728(5V) (28volt) 5 volt button lighting Horiz. Mount
MD41-1738(5V) (28volt) 5 volt button lighting Vert. Mount
2. J1 Connector Kit (25 pin). MCI PN 7014517
3. Installation Manual. MCI PN 8013641

3.3 MOUNTING THE MD41-()

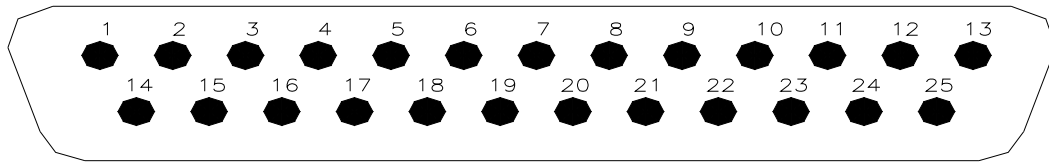
Plan a location in the aircraft for the MD41-() to be mounted as close to the pilot's field of view as possible. The preferable location is near the HSI/CDI that will be displaying the GPS information. Avoid mounting close to heater vents or other high heat sources. Allow a clearance of at least 3 inches from back of unit for plug removal.

The indicator is secured in place behind the panel since it is designed for rear mount only. Make a panel cutout as shown in Figure 3-2. Secure the indicator in place with two 4-40 x 3/8 flat head phillips screws.

3.4 INSTALLATION LIMITATIONS

Wire the aircraft harness according to figure 3-3. Use at least 24 AWG wire for all connections. Avoid sharp bends and routing cable near high energy sources. Care must be taken to tie the harness away from aircraft controls and cables. Normal installation techniques should be applied. Also see equipment limitations, section 1.2.6.

J1 CONNECTOR

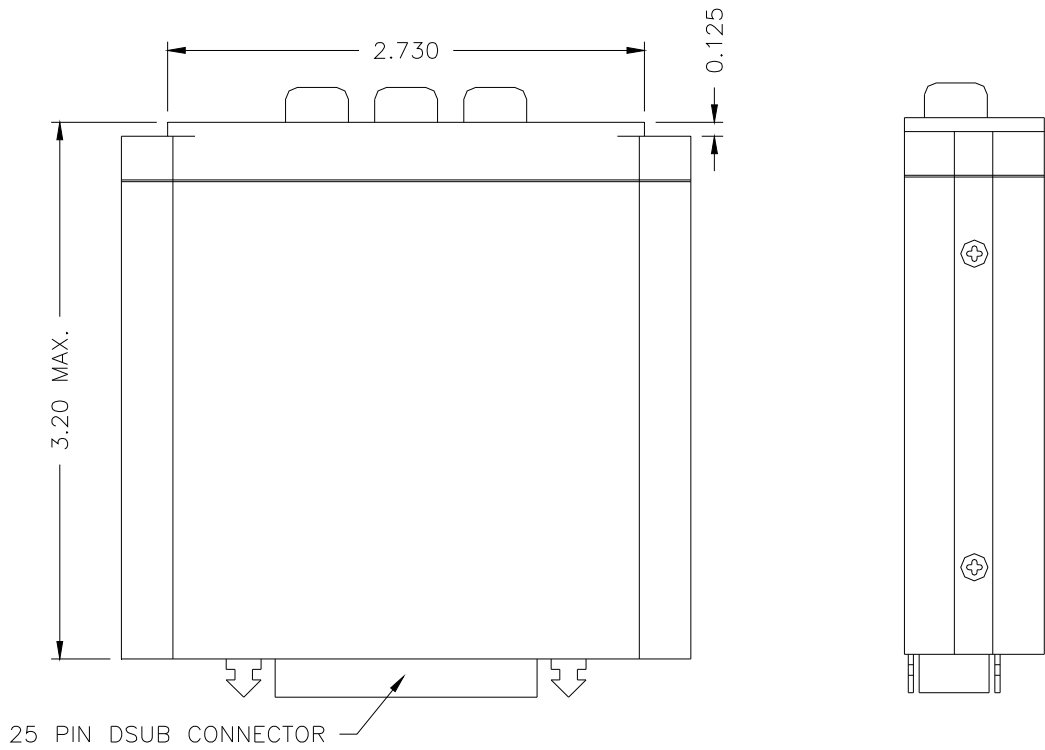


REAR VIEW OF J1 CONNECTOR

J1
PIN NO.

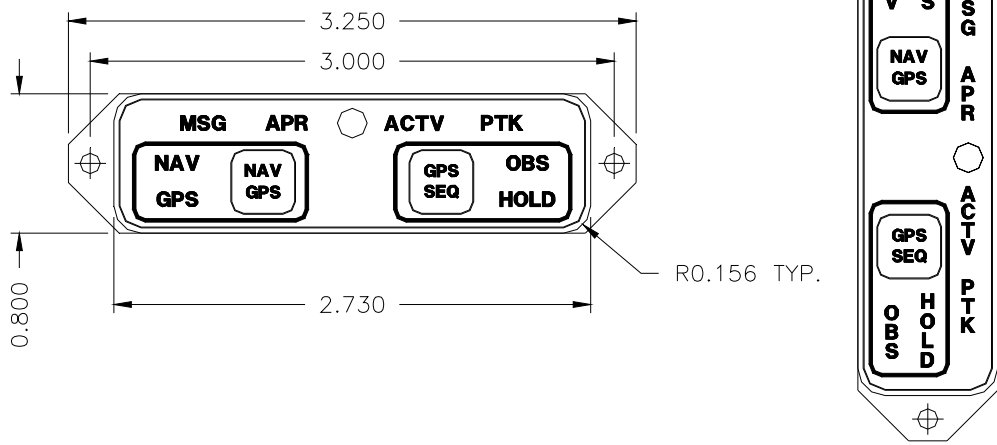
1 -----	GPS ANNUNCIATION (receives ground from remote transfer relays)
2 -----	NAV ANNUNCIATION (receives ground from remote transfer relays)
3 -----	MSG ANNUNCIATION (receives logic low from GPS receiver)
4 -----	APR ANNUNCIATION (receives logic low from GPS receiver)
5 -----	DIMMER IN (from aircraft dimming bus for push-button lighting)
6 -----	SPARE
7 -----	LAMP TEST (receives ground from remote test switch)(optional conn.)
8 -----	ACTV ANNUNCIATION (receives logic low from GPS receiver)
9 -----	PTK ANNUNCIATION (receives logic low from GPS receiver)
10 -----	OBS MODE SELECT (logic low sent to GPS receiver)
11 -----	FCS LOC ENGAGE (ground when GPS is in active mode)(for autopilot)
12 -----	TO NAV CIRCUIT BREAKER (for fault monitoring)
13 -----	14 or 28 VDC UNIT POWER (depends on dash number)
14 -----	EXTERNAL RELAY ENERGIZE (ground to energize remote transfer relays when GPS is selected)
15 -----	SPARE
16 -----	SPARE
17 -----	SPARE
18 -----	SPARE
19 -----	SPARE
20 -----	SPARE
21 -----	SPARE
22 -----	SPARE
23 -----	OBS HOLD ANNUNCIATION (receives logic low from GPS_
24 -----	SPARE
25 -----	POWER GROUND

FIGURE 3-1 SCHEMATIC PINOUT, 25 PIN DSUB



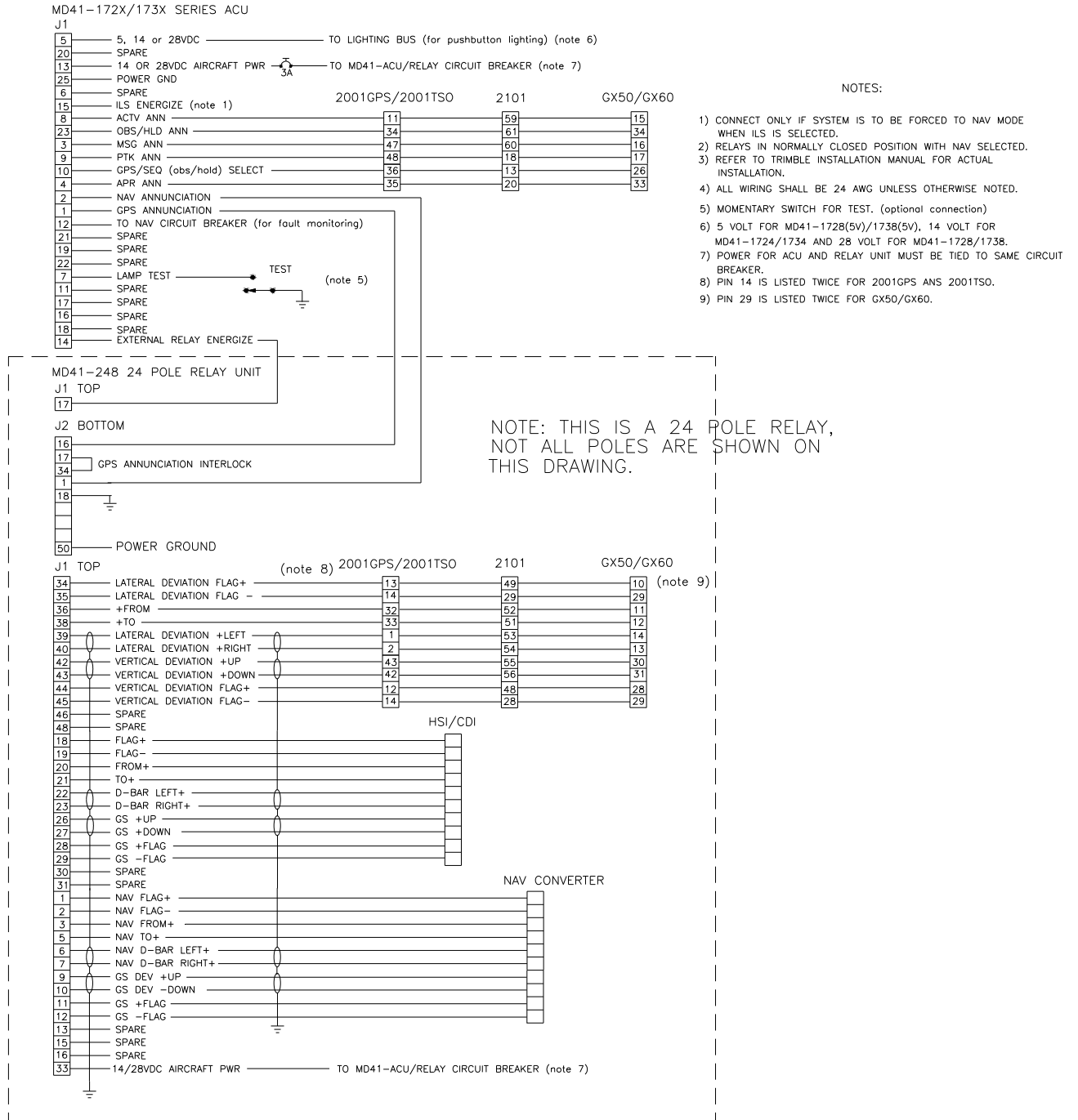
VERTICAL MOUNT

HORIZONTAL MOUNT

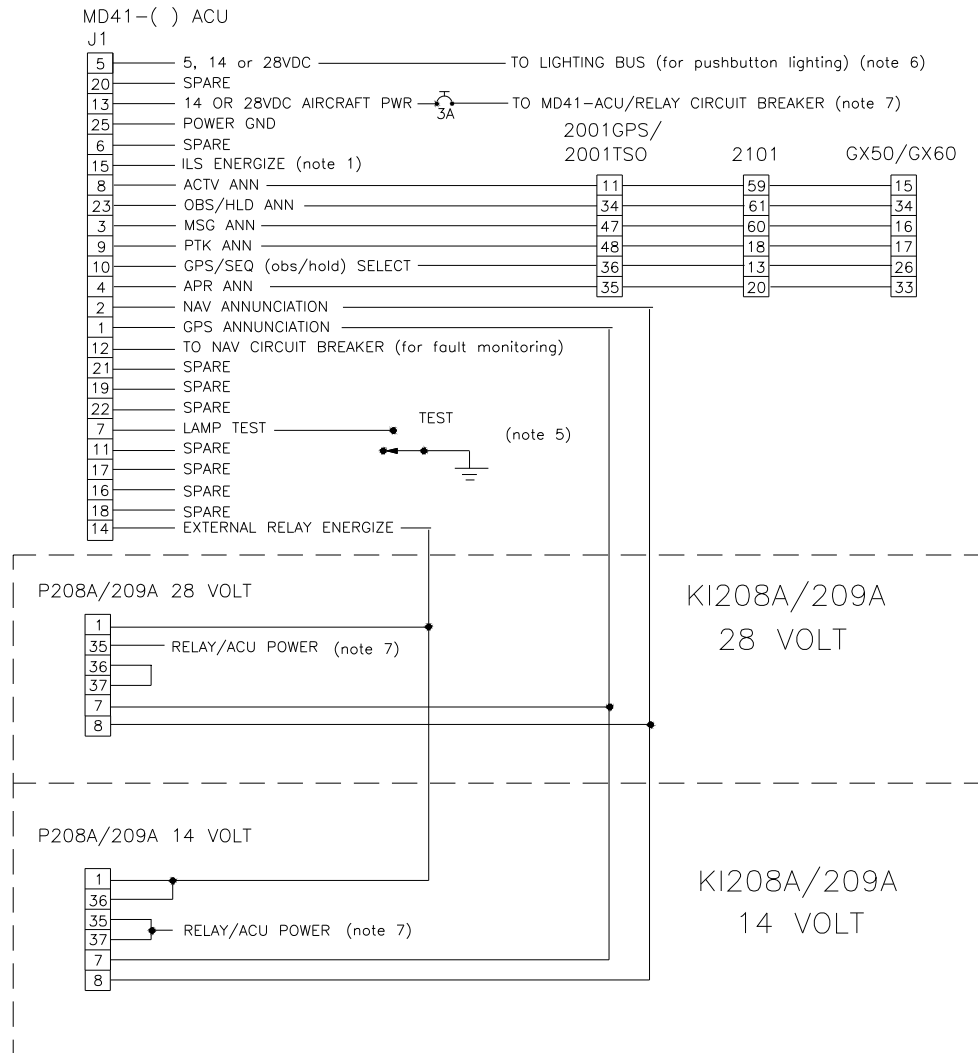


Note 1: Use two 4-40 X 3/8" Flat Head Phillips Screws for Mounting

FIGURE 3-2 OUTLINE DRAWING



**FIGURE 3-3 WIRING DIAGRAM, MD41-1728/1738/1728(5V)/1738(5V),
1724,1734
Apollo 2001GPS / 2001TSO / 2101 / GX50 / GX60**



NOTES:

- 1) CONNECT ONLY IF SYSTEM IS TO BE FORCED TO NAV MODE WHEN ILS IS SELECTED.
- 2) RELAYS IN NORMALLY CLOSED POSITION WITH NAV SELECTED.
- 3) REFER TO TRIMBLE INSTALLATION MANUAL FOR ACTUAL INSTALLATION.
- 4) ALL WIRING SHALL BE 24 AWG UNLESS OTHERWISE NOTED.
- 5) MOMENTARY SWITCH FOR TEST. (optional connection)
- 6) 5 VOLT FOR MD41-1728(5v)/1738(5v), 14 VOLT FOR MD41-1724/1734 AND 28 VOLT FOR MD41-1728/1738.
- 7) POWER FOR ACU AND RELAY UNIT MUST BE TIED TO SAME CIRCUIT BREAKER.

FIGURE 3-4 WIRING DIAGRAM, MD41-1700 SERIES ACU WITH AlliedSignal KI 208A/209A COURSE DEVIATION INDICATOR FOR THE Apollo 2001GPS / 2001TSO / 2101 / GX50 / GX60

SECTION 4 POST INSTALLATION CHECKOUT

4.1 PRE INSTALLATION TESTS

With the MD41-() disconnected, turn on the avionics master switch and verify that aircraft power is on pin 13 for. Using an ohm meter, verify pin 25 is aircraft ground.

4.2 OPERATING INSTRUCTIONS

Turn off the avionics master switch and connect the mating connector to the MD41-(). Turn on the avionics master switch and the MD41-() should come on with the following annunciations.

1. NAV or GPS
2. MSG may be flashing depending on the status of the GPS receiver.

Press the lamp test button, (if installed) all annunciations should light. Continue pressing the lamp test button and cover the photocell window located in the center of the front panel. All annunciations should dim.

Annunciation brightness at the minimum dimming level may be adjusted by rotation of the dimmer control located on the bottom of the MD41-() case. CW rotation lowers the dimming level.

Select NAV using the NAV/GPS button. The presentation on the HSI/CDI will now be information from the NAV (VOR) receiver. Using a VOR test generator or equivalent VOR signal, verify that the presentation and operation of the HSI/CDI is correct. This will include course resolver, left-right meter, to-from meter and nav warn flag. Now select GPS on the MD41-() and tune the VOR receiver to an ILS frequency. The MD41-() will be forced to NAV mode and ILS information will be displayed on the HSI/CDI. **NOTE**, this feature will not work if "ILS Energize" (J1 pin 15) was not connected at the time of installation. No periodic maintenance or calibration is necessary for continued airworthiness of the MD41-().

Next, verify that OBS/HOLD annunciation will cycle alternately when pressing the GPS/SEQ button two times. Please refer to the Post Installation Checkout of the Apollo 2001GPS / 2101TSO / 2101 / GX50 / GX60 installation manual for the remaining system tests.

No periodic maintenance or calibration is necessary for continued airworthiness of the MD41-().

ENVIRONMENTAL QUALIFICATION FORM

RTCA / DO160C

NOMENCLATURE: MD41-() GPS ANNUNCIATION CONTROL UNIT

MODEL NO: MD41-()

TSO NO: C129

CLASS A1

MANUFACTURER TEST SPECIFICATION:

MPS 7015613

MANUFACTURER: Mid-Continent Instruments and Avionics
 9400 E. 34th Street N.
 Wichita, KS 67226
 Phone (316) 630-0101

Conditions	Section	Description of Conducted Tests
Temperature and Altitude Low Temperature High Temperature In-Flight Loss of Cooling Altitude Decompression Overpressure	4.0 4.5.1 4.5.2 & 4.5.3 4.5.4 4.6.1 4.6.2 4.6.3	Equipment tested to Categories A1 & F2 except as noted Cooling air not required Not Tested
Temperature Variation	5.0	Equipment tested to Category B
Humidity	6.0	Equipment tested to Category A
Shock Operational Crash Safety	7.0 7.2 7.3	Equipment tested per DO-160C Par. 7.2.1
Vibration	8.0	Equipment tested without shockmounts to Categories M and N (Table 8-1)
Explosion	9.0	Equipment identified as Category X, no test required
Waterproofness	10.0	Equipment identified as Category X , no test required
Fluids Susceptibility	11.0	Equipment identified as Category X, no test required

Environmental Qualification (cont.)

Conditions	Section	Description of Conducted Tests
Sand and Dust	12.0	Equipment identified as Category X, no test required
Fungus	13.0	Equipment identified as Category X, no test required
Salt Spray	14.0	Equipment identified as Category X, no test required
Magnetic Effect	15.0	Equipment tested to Class Z
Power Input	16.0	Equipment tested to Category B
Voltage Spike	17.0	Equipment tested to Category A
Audio Frequency Susceptibility	18.0	Equipment tested to Category B
Induced Signal Susceptibility	19.0	Equipment tested to Category A
Radio Frequency Susceptibility	20.0	Equipment tested to Category T
Radio Frequency Emissions	21.0	Equipment tested to Category Z
Lightning Induced Transient Susceptibility	22.0	Equipment identified as Category X, no tests required
Lightning Direct Effects	23.0	Equipment identified as Category X, no tests required
Icing	24.0	Equipment identified as Category X, no test required