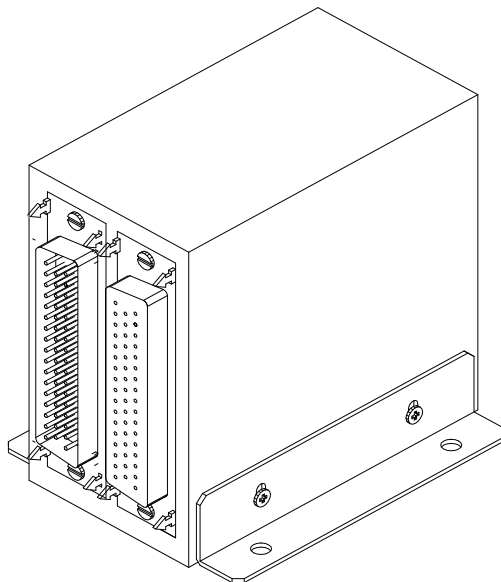




## INSTALLATION MANUAL AND OPERATING INSTRUCTIONS

### MD41-24P() RELAY UNIT

MD41-24P(14)	14vdc	24 Pole, 14 volt operation
MD41-24P(28)	28vdc	24 Pole, 28 volt operation



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**Manual Number 7019129**  
**Rev. C Oct. 12, 2020**

## REVISION DETAIL

<b>ECO</b>	<b>Rev.</b>	<b>Date</b>	<b>Detail</b>
	0	03/11/99	Initial Release.
5566	B	03/09/11	Revise Sec. 1.1 & 1.2.4 to indicate relay pairing and interlock failure monitoring by means of power being applied to activating coils. Add section 2.4 Limitations to describe MOD 0 & MOD 1. Revise Fig. 3.3 to reflect MOD 1 schematic.
7283	C	10/12/20	Deleted marketing statement in Sec 1.1. Updated trademark symbol on cover page, edited spelling, added to footer.

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## SECTION 1 GENERAL DESCRIPTION

### 1.1 INTRODUCTION

The MD41-24P( ) is a bulkhead mounted remote transfer relay unit specifically designed for switching a CDI or HSI Indicator between two aircraft radio navigation systems. The remote switching unit is designed to be used with the companion MD41-1XXX series Annunciation Control Unit (ACU). This pertains to GPS systems where the user desires to share a common CDI or HSI between an existing NAV system and a GPS system.

The 24 pole unit features eight relay pairs consisting of 3 poles per relay pair. Each relay pair can be activated individually by either voltage or ground keying or as a group by ground keying.

Other design features include:

- Interlocking of transfer relays utilizing one pole per relay pair for failure monitoring. (This feature provides indication that all relays have power applied to their activating coils. It does not monitor all relay contacts or coils.)
- A special ILS override that will automatically force the MD41-24P( ) to switch to NAV mode when the NAV (VOR) receiver is tuned to an ILS frequency (optional connection).
- An adjustable dimming regulator is included to provide dimmed voltage to an external annunciation (750ma max).

Two versions of the MD41-24P( ) series relay units are available:

- MD41-24P(14), 24 pole relay for 14 volt operation.
- MD41-24P(28), 24 pole relay for 28 volt operation.

### 1.2 SPECIFICATIONS, TECHNICAL

#### 1.2.1 PHYSICAL CHARACTERISTICS

Mounting:	Bulkhead
Width:	2.86 Inches
Height:	1.52 Inches
Depth:	2.60 Inches
Weight:	0.75 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
MD41-24P(14) (14VDC)	2 amps max.
MD41-24P(28) (28VDC)	2 amps max.
Relay contact current rating:	2 amps DC, not to exceed 30 volts

## 1.2.4 INTERFACE

ILS Override J1 Pin 16	Receives a logic low from the NAV (VOR) receiver when tuned to an ILS frequency. This will force the MD41-24P( ) into NAV mode, regardless of the NAV/GPS selection. This connection is optional.
Dimming Output J2 Pin 33	Provides an adjustable dim voltage to be used with a remote mounted annunciation unit. 750 ma max.
GPS annunciation interlock J2 Pins 16 and 17	Pins 16 and 17 will short together when all transfer relays are energized. This can be used to complete the GPS annunciation circuit to monitor that power has been applied to each relay coil.

### 1.2.5 EQUIPMENT LIMITATIONS

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 MD41-24P( ) relay unit **MUST** be installed with a TSO approved MD41-1XXX series Annunciation Control Unit (ACU) in order to be approved as a complete TSO system. These items will not be TSO'd if one is installed without the other.

**NOTE:** Any time the MD41-24P( ) relay transfer unit is disconnected or removed from the aircraft, the HSI/CDI will be inoperative in both NAV (VOR) and GPS modes.

### 1.2.6 MAJOR COMPONENTS

The system is comprised of two major components, the MD41-24P( ) relay unit and the MD41-1XXX series annunciation control unit.

## SECTION 2 INSTALLATION CONSIDERATIONS

### 2.1 COOLING

No direct cooling is required. As with any electronic equipment, overall reliability may be increased if the MD41-24P( ) is not located near any high heat source or crowded next to other equipment.

### 2.2 EQUIPMENT LOCATION

The MD41-24P( ) is provided with mounting rails that will allow mounting on side, rear or flat side down. Rails for end mount are an optional item. Order p/n 8011991 (2 required). Locate an area large enough to facilitate mounting of unit with connector and back shell in place. Ensure area is clear of mechanical obstructions and is not impeding movement of any other aircraft systems. 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 MD41-24P( ) Relay Unit. This has allowed for a smaller size ACU which now provides more options for panel mounting.

### 2.3 ROUTING OF CABLES

Care must be taken not to bundle the MD41-24P( ) 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.

### 2.4 LIMITATIONS

The MOD 0 relay unit interlock functionality has the capability of monitoring 1 contact per relay to indicate power has been applied to the activating coil.

The MOD 1 relay unit interlock functionality has the capability of monitoring 1 contact per relay pair to indicate power has been applied to the pair of activating coils.

In either MOD 0 or MOD 1 there is no guarantee of individual relay contact for the interlock functionality. This is only an indicator that relays have power applied to their activating coils.

Refer to Fig. 3.3 for MOD 1 schematic diagram.

## SECTION 3 INSTALLATION PROCEDURES

### 3.1 GENERAL INFORMATION

This section contains interconnect diagrams, mounting dimensions and other information pertaining to the installation of the MD41-24P( ). 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. MD41-24P(14) (14volt, 24 pole)  
MD41-24P(28) (28volt, 24 pole)
2. J1 Connector Kit (50 pin, sockets) MCIA PN 7014509
3. J2 Connector Kit (50 pin, pins) MCIA PN 8012247
4. Vertical and horizontal mounting brackets MCIA PN 7018658 (2 required)
5. Installation Manual (this document) MCIA PN 7019129

**Optional parts:**

Mounting brackets for rear mount. MCIA PN 8012379 (2 required)

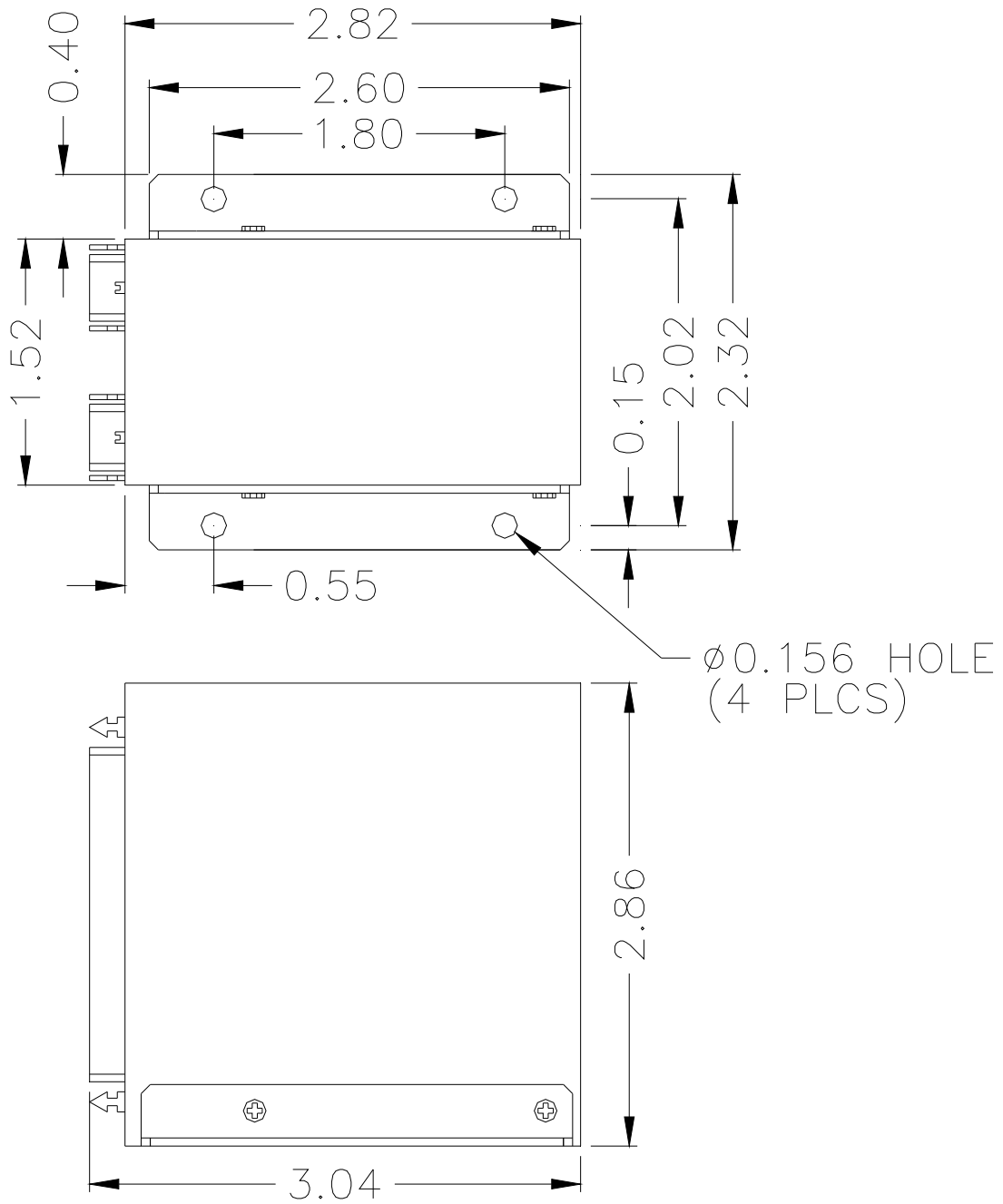
### 3.3 MOUNTING THE MD41-24P( )

The MD41-24P( ) is provided with mounting rails that will allow mounting on the side, rear or with flat side down. Locate an area large enough to facilitate mounting of unit with connector and back shell in place. Ensure area is clear of mechanical obstructions and is not impeding movement of any other aircraft systems. Avoid mounting close to heater vents or other high heat sources. Allow a clearance of at least 3 inches from front of unit for plug removal.

### 3.4 INSTALLATION LIMITATIONS

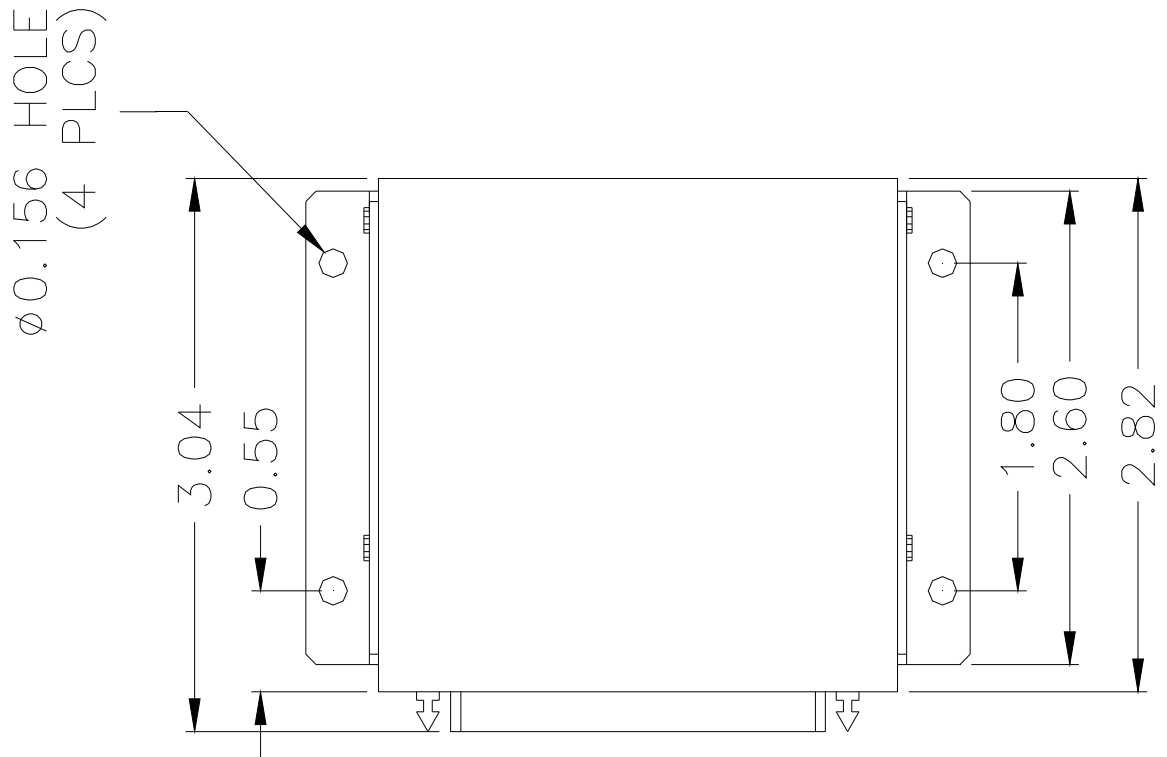
Wire the aircraft harness according to figure 3-3. Use at least 24 AWG wire for all connections. You MUST use shielded wire where shown. Avoid sharp bends and routing cable near high energy sources. Care must be taken to tie the harness away from aircraft controls and cables. Normal installation techniques should be applied. Also see equipment limitations, Section 1.2.5.





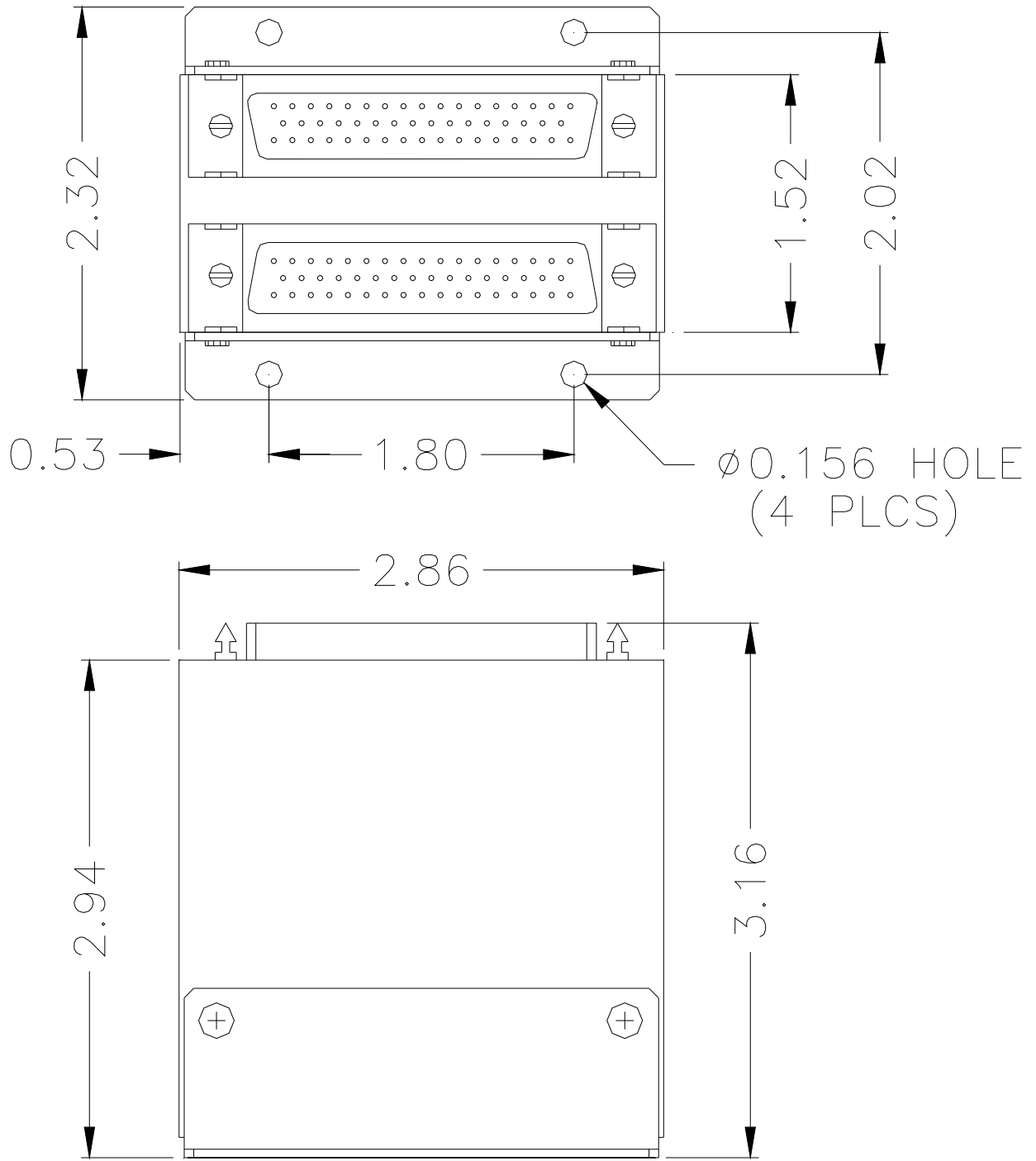
VERTICAL MOUNT

**FIGURE 3-1A OUTLINE DRAWING  
VERTICAL MOUNT**



HORIZONTAL MOUNT

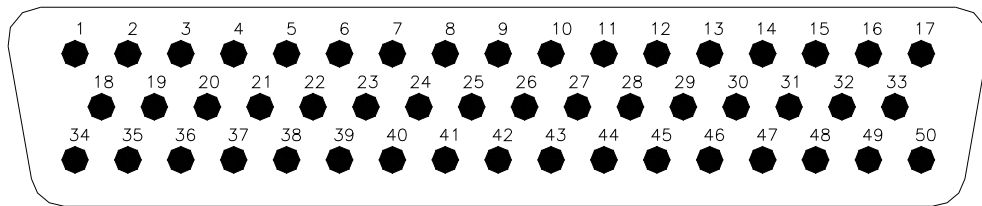
**FIGURE 3-1B OUTLINE DRAWING  
HORIZONTAL MOUNT**



REAR MOUNT

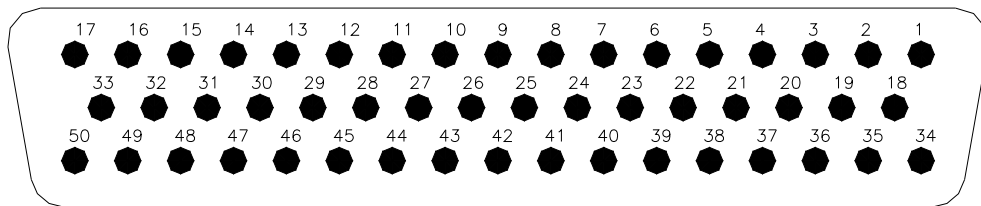
**FIGURE 3-1C OUTLINE DRAWING  
REAR MOUNT**

# J1 CONNECTOR (sockets)



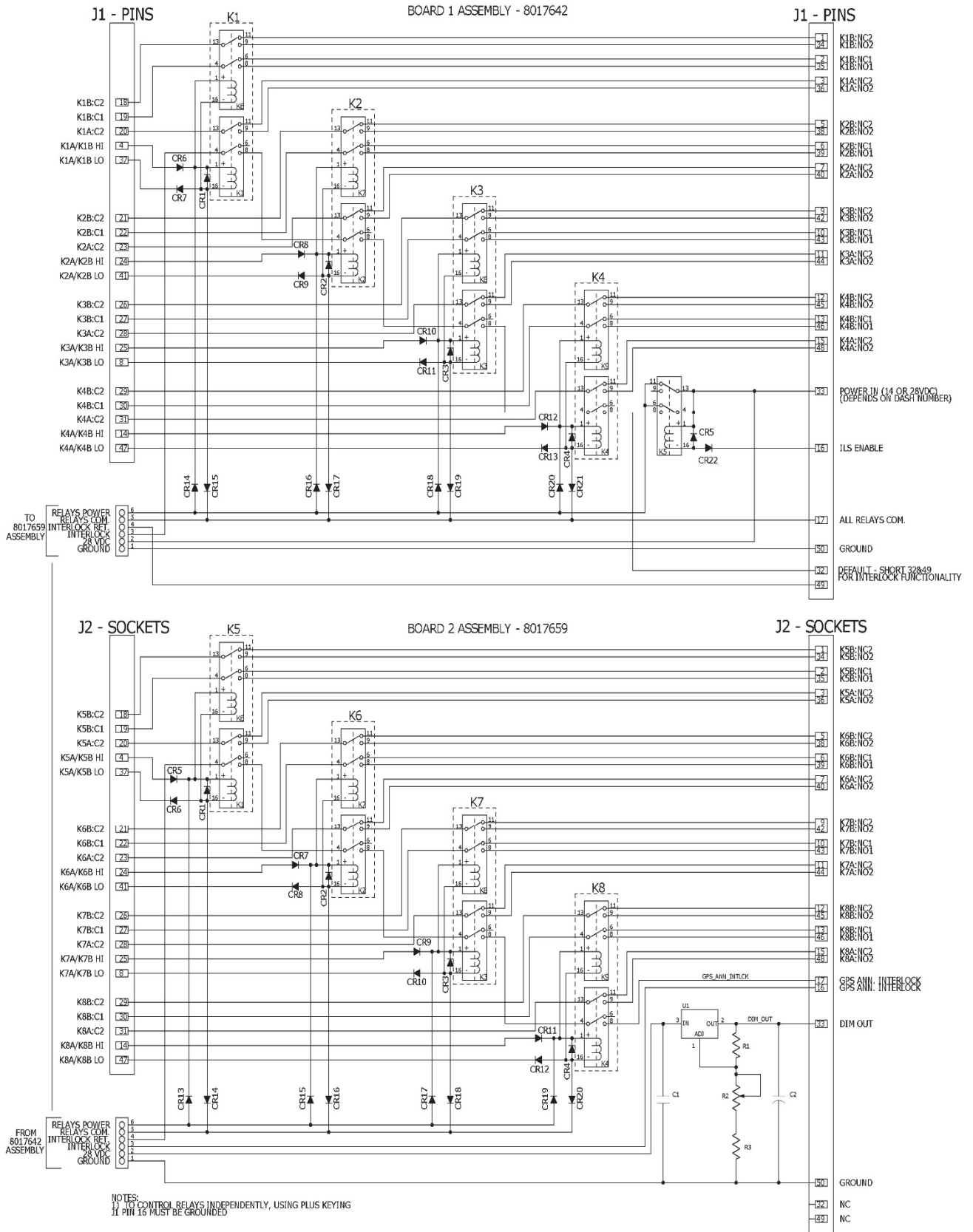
# REAR VIEW OF J1 (top) MATING CONNECTOR

# J2 CONNECTOR (pins)



# REAR VIEW OF J2 (bottom) MATING CONNECTOR

**FIGURE 3-2 MATING CONNECTOR LAYOUT**



**FIGURE 3-3 SCHEMATIC DIAGRAM, MD41-24P() 24 POLE RELAY UNIT**

## SECTION 4 POST INSTALLATION CHECKOUT

### 4.1 PRE INSTALLATION TESTS

With the MD41-24P( ) disconnected, turn on the avionics master switch and verify that aircraft power is on J1 pin 33. Using an ohm meter, verify J2 pin 50 is aircraft ground.

### 4.2 OPERATING INSTRUCTIONS

Turn off the avionics master switch and connect the mating connector to the MD41-24P( ). Turn on the avionics master switch and verify the NAV/GPS annunciators transfer correctly with the appropriate switch selection.

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 MD41-24P( ) and tune the VOR receiver to an ILS frequency. The MD41-24P( ) 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 16) was not connected at the time of installation.

Select GPS using the NAV/GPS button. Operate the GPS receiver through a self-test cycle to verify all meters are operating correctly on the HSI/CDI.

Annunciation brightness (if used) at the minimum dimming level may be adjusted by rotation of the dimmer control located on the MD41-24P( ) case. CW rotation lowers the dimming level.

No periodic maintenance or calibration is necessary for continued Airworthiness of the MD41-24P( ).

# ENVIRONMENTAL QUALIFICATION FORM

## RTCA / DO-160C

NOMENCLATURE: MD41-24P( ) RELAY UNIT

TSO C129

CLASS A1

MODEL NO: MD41-24P( )

MANUFACTURER TEST SPECIFICATION:

MPS 7015613

MANUFACTURER: Mid-Continent Instruments and Avionics

9400 E. 34<sup>th</sup> Street N.

Wichita, KS 67226

Phone (316) 630-0101

Conditions	Section	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to Categories A1 & F2 except as noted  Cooling air not required  Not Tested
Low Temperature	4.5.1	
High Temperature	4.5.2 & 4.5.3	
In-Flight Loss of Cooling	4.5.4	
Altitude	4.6.1	
Decompression	4.6.2	
Overpressure	4.6.3	
Temperature Variation	5.0	Equipment tested to Category B
Humidity	6.0	Equipment tested to Category A
Shock	7.0	Equipment tested per DO-160C Par. 7.2.1
Operational	7.2	
Crash Safety	7.3	
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