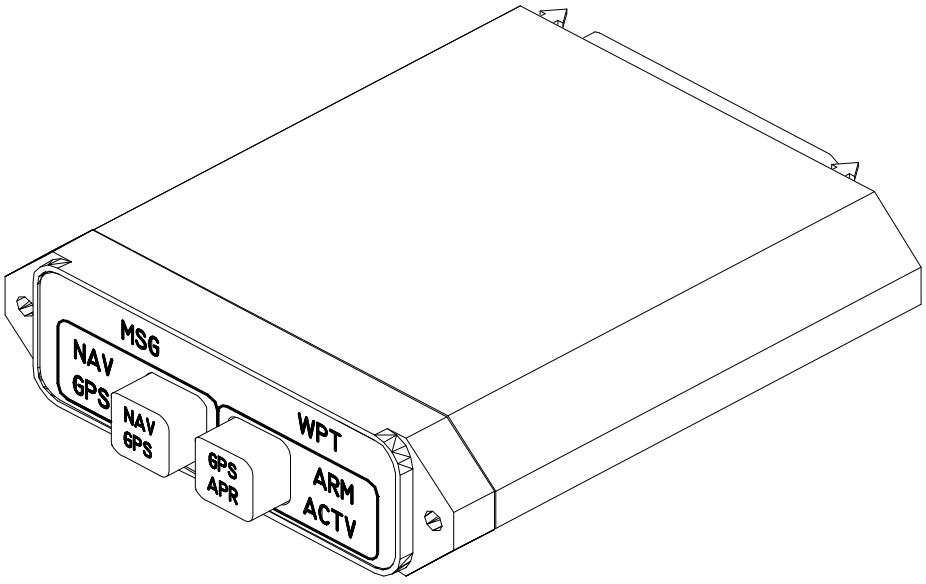
INSTALLATION MANUAL AND OPERATING INSTRUCTIONS

MD41-( ) Series GPS ANNUNCIATION CONTROL UNIT FOR ALLIED SIGNAL KLN 89B

MD41-228	28vdc	Horizontal Mount
MD41-228(5v)	28vdc	Horizontal Mount (5 volt lighting)
MD41-224	14vdc	Horizontal Mount



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SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The MD41-( ) is a self -contained GPS Annunciation and Control unit. It combines all the necessary functions required to interface the Allied Signal KLN 89B approach-certified GPS receiver with a 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 40,000 hour lamps used for GPS, NAV, APR and ACTV annunciations, and Light Emitting Diodes (LED) for MSG and WPT annunciations.

1.2 SPECIFICATIONS, TECHNICAL

1.2.1 PHYSICAL CHARACTERISTICS

Mounting:	Panel
Width:	2.75 Inches
Height:	.80 Inches
Depth:	3.22 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
MD41-224	(14VDC)	0.40 Amps
MD41-228	(28VDC)	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) GPS presentation on HSI/CDI.
GPS/APR	Momentary switch, when pressed, will arm GPS Approach Mode.

1.2.4.2 ANNUNCIATIONS

NAV	NAV (VOR) information presented on the HSI or CDI.
GPS	GPS information presented on the HSI or CDI.
ARM	GPS is armed for automatic transition to approach mode.
ACTV	GPS is actively engaged in the approach mode.
MSG	GPS message alert, from the GPS receiver.
WPT	GPS waypoint alert, from the GPS receiver.

1.2.5 INTERFACE

NAV annunciation J1 Pin 16	Receives ground from transfer relay when relays are in NAV mode.
GPS annunciation J1 Pin 2	Receives ground from transfer relay when relays are in GPS mode.
Lamp Test J1 Pin 7	Receives ground from remote test switch to light all annunciations.
Dimmer input J1 Pin 5	Connects to aircraft instrument dimming bus.
Dimmer Select J1 Pin 17	Receives ground from remote dimming switch Grounded in dim mode.

1.2.5 INTERFACE (cont.)

APR ARM Select J1 Pin 6	Provides a momentary logic low to the GPS receiver when approach arm is selected.
APR ARM J1 Pin 10	Receives a logic low from the GPS receiver to annunciate ARM.
GPS APR ACTV J1 Pin 9	Receives a logic low from the GPS receiver when a transition is made from arm to active.
MSG and WPT annunciation	A logic low will cause the appropriate annunciation to illuminate. GPS receiver must be able to accept 100ma.
GPS DISPLAYED J1 pin 17	Provides a ground to the GPS receiver when NAV is selected on the MD41-( ).
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.

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 MD41-224/228/228(5V) is TSO'D and certified for use with the Bendix/King KLN 89B system. Any attempts to install the MD41-224/228/228(5V) in an installation other than the Bendix/King KLN 89B is prohibited. **This will void the TSO.**

NOTE: Anytime the MD41-( ) is disconnected or removed from the aircraft, the HSI/CDI will be inoperative in both NAV (VOR) and GPS.

1.2.7 MAJOR COMPONENTS

The system is comprised of one major component, the MD41-( ) GPS 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-( ) 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-( ) 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.

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. MD41-224 (14 volt) or MD41-228 (28 volt) Horiz. Mount
   MD41-228(5V) (28volt) 5 volt button lighting Horiz. Mount
2. J1 Connector Kit (25 pin). MCI PN 7014517
3. Installation Manual. MCI PN 7017874

3.3 MOUNTING THE MD41-( )

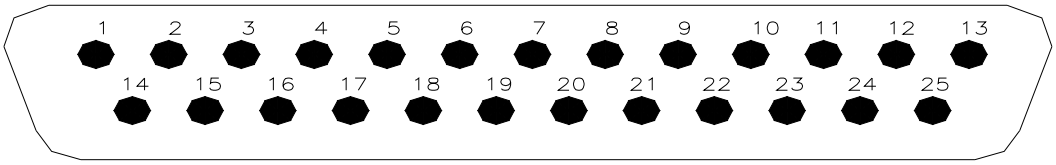
Plan a location in the aircraft for the MD41-( ) to be mounted as close to the pilot's field of view as possible. The preferable location is near the HSI/CDI that will be displaying the GPS information. Avoid mounting close to heater vents or other high heat sources. Allow a clearance of at least 3 inches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

J1 CONNECTOR

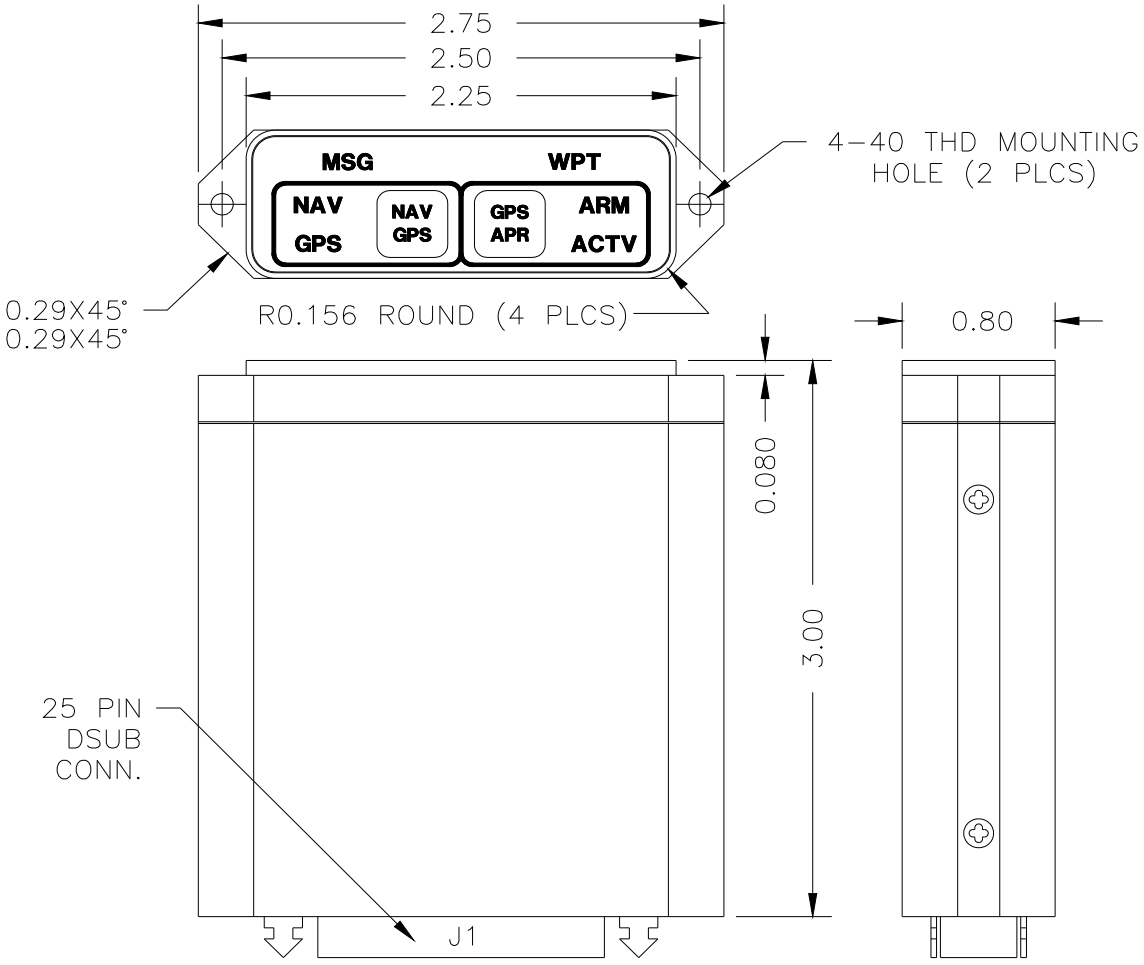


REAR VIEW OF J1 (bottom) CONNECTOR

J1
PIN NO.

1 ----------	TO NAV CIRCUIT BREAKER (for fault monitoring)
2 ----------	GPS ANNUNCIATION (receives ground from remote transfer relays)
3 ----------	MSG ANNUNCIATION (receives logic low from GPS receiver)
4 ----------	WPT ANNUNCIATION (receives logic low from GPS receiver)
5 ----------	DIMMER IN (from aircraft dimming bus)
6 ----------	GPS APR ARM SELECT (logic low sent to GPS)
7 ----------	LAMP TEST (receives ground from remote test switch)
8 ----------	SPARE
9 ----------	ACTV ANNUNCIATION (receives logic low from GPS receiver)
10 ----------	ARM ANNUNCIATION (receives logic low from GPS receiver)
11 ----------	ILS ENERGIZE
12 ----------	SPARE
13 ----------	14 or 28 VDC UNIT POWER (depends on dash number)
14 ----------	GPS ANNUNCIATION INTERLOCK
15 ----------	GPS ANNUNCIATION INTERLOCK
16 ----------	NAV ANNUNCIATION (receives ground from remote transfer relays)
17 ----------	DIM SELECT (receives ground from remote dim switch)
18 ----------	SPARE
19 ----------	SPARE
20 ----------	SPARE
21 ----------	SPARE
22 ----------	SPARE
23 ----------	SPARE
24 ----------	EXTERNAL RELAY ENERGIZE (ground to energize remote transfer relays when GPS is selected)
25 ----------	POWER GROUND

FIGURE 3-1 SCHEMATIC PINOUT, 25 PIN DSUB



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

FIGURE 3-2 OUTLINE DRAWING

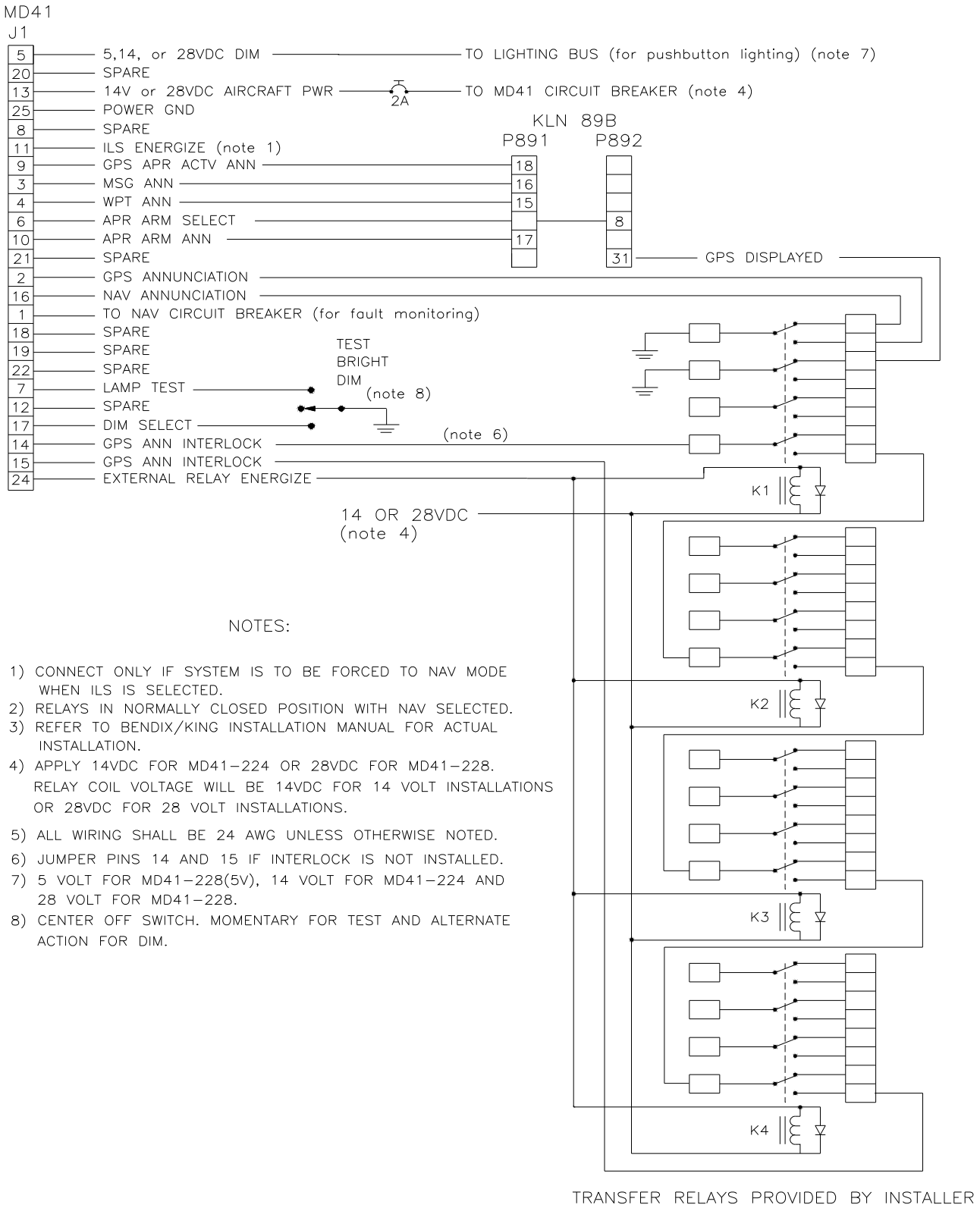


FIGURE 3-3 WIRING DIAGRAM, MD41-224/228/228(5V) for KLN 89B

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. 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 and/or WPT may be flashing depending on the status of the GPS receiver.

Select test with the remote test, bright, dim switch. All annunciations should light. Next select switch to the dim position. Turn on and rotate dimmer adjust. Nav or GPS annunciation brightness should change as the dimmer adjustment is moved.

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 14) was not connected at the time of installation.

Press the GPS/APR button and the ARM annunciation will illuminate. ARM can be canceled by pressing the GPS/APR button a second time, or by ACTV input from the GPS receiver. GPS/APR test will not work without a valid GPS signal. Please refer to section 2.4.3 of the KLN 89B 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 C
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