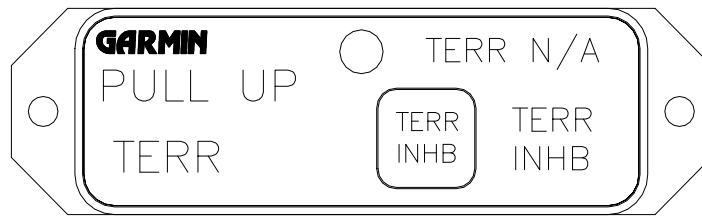




**INSTALLATION MANUAL AND
OPERATING INSTRUCTIONS**

**MD41-1000 SERIES TERRAIN AWARENESS ANNUNCIATION CONTROL UNIT
FOR GARMIN TAWS SYSTEMS**

MD41-1028	28vdc	Horizontal Mount
MD41-1038	28vdc	Vertical Mount (shown on page 12)
MD41-1028(5V)	28vdc	Horizontal Mount
MD41-1038(5V)	28vdc	Vertical Mount (shown on page 12)
MD41-1024	14vdc	Horizontal Mount
MD41-1034	14vdc	Vertical Mount (shown on page 12)



FOREWORD

This manual provides information intended for use by persons who, in accordance with current regulatory requirements, are qualified to install or repair this equipment. If further information is required, please contact:

Mid-Continent Instruments and Avionics
Attn: Customer Service Dept.
9400 E. 34th ST North
Wichita, KS 67226 USA
Phone 316-630-0101 Fax 316-630-0723

We welcome your comments concerning this manual. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the manual part number, the paragraph/figure/table number, and the page number. Send your comments to:

Mid-Continent Instruments and Avionics
Attn: Technical Publications
9400 E. 34th ST North
Wichita, KS 67226 USA
Phone 316-630-0101 Fax 316-630-0723

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Revision Detail

ECO	Rev.	Date	Detail
	N/R	04/22/04	Complete issue
	A	01/21/05	Added "otherwise connect pin 7 to bright/dim switch on aircraft dimming bus" to note 2 of fig. 3-3 and 3-4.
	B	07/02/12	Removed schematics, Figure 3.5
6051	C	10/28/13	Updated Technical Specifications to include compatible Garmin TAWS Systems

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-1028(5v), -1038(5V)

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SECTION 1: GENERAL DESCRIPTION

1.1 INTRODUCTION

The MD41-1024, -1034, -1028, -1038 is a compact, self-contained Annunciation and Control unit. The fully integrated, control unit provides annunciation and mode selection for TAWS (Terrain Awareness Warning System). It combines all the necessary functions required to interface a wide range of TAWS systems for FAA approval.

Other features include dual 20,000 hour lamps used for all annunciations, internally lighted selection switches and choice of manual or automatic photocell dimming. An external annunciation dimming adjustment is provided for balancing low level light conditions.

1.2 SPECIFICATIONS, TECHNICAL

Mid-Continent Instruments Co., Inc. certifies that the model MD41-() series, Annunciation Control Unit has been tested to and meets or exceeds the functional and environmental requirements of the following FAA Technical Standard Order (TSO):

- FAA/TSO-C151a: TERRAIN AWARENESS AND WARNING SYSTEM

We also certify we meet the requirements of Part 21, Subpart 0 of the Code of Federal Regulations.

The MD41-() series, Annunciation Control Unit conforms to all pertinent documented design and internal manufacturing standards. This includes, but is not limited to: component drawings, specifications, testing criteria, inspection requirements, quality processes, manufacturing instructions, and handling procedures. It shall be manufactured in accordance with Mid-Continent Instruments FAA-approved Production Approval Holder-Quality System Manual, Revision M, dated April 14, 2011 or later.

The MD41-10XX series complies with the manufacturers' specifications and has been verified and approved for use with the following systems:

Mid-Continent Instruments and Avionics Model Number(s):	Designed for use with TAWS System:
MD41-1028 MD41-1028(5V) MD41-1038 MD41-1038(5V) MD41-1024 MD41-1034	Manufacturer: Garmin International Model: GXX500 Series Part Numbers: GPS 500 011-00863-00 011-00863-01 011-00863-10 011-00863-11

	<p>GNS 530 011-00940-00 011-00940-01 011-00940-10 011-00940-11 011-00940-31</p> <p>GNS 530A 011-00864-00 011-00864-01 011-00864-10 011-00864-11</p> <p>Model: GTN 6XX/7XX Series Part Numbers:</p> <p>GTN 6XX 011-02254-00 011-02255-00 011-02256-00 011-02256-50</p> <p>GTN 7XX 011-02281-00 011-02282-00 011-02282-50</p>
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1.2.1 PHYSICAL CHARACTERISTICS

Mounting:	Panel
Width:	2.75 Inches
Height:	0.80 Inches
Depth:	3.22 Inches
Weight:	0.50 lbs.

1.2.2 ENVIRONMENTAL CHARACTERISTICS

TSO Compliance:	TSO C151a
Applicable Documents:	RTCA DO-160D
Operating Temperature Range:	-55°C to +70°C
Humidity:	95% Non-Condensing
Altitude Range:	0 to 55,000 ft
Operational Shock:	Rigid Mounting, 6 G Operational 20 G Crash Safety

1.2.3 SPECIFICATIONS, ELECTRICAL

Design	All Solid State
MD41-1024, -1034	0.30 Amps
MD41-1028, -1038	0.40 Amps
MD41-1028(5V), -1038(5V)	0.42 Amps

1.2.4 FRONT PANEL CONTROLS AND ANNUNCIATIONS

1.2.4.1 CONTROLS

TERR/INHB	Momentary switch, when pressed, will toggle the 'Inhibit' mode. When active, the 'Inhibit' mode will inhibit certain TAWS alerts.
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1.2.4.2 ANNUNCIATIONS

TERR/NA (Amber)	Terrain information is not available.
TERR (Amber)	The current flight trajectory brings the aircraft in close proximity to the terrain. Extreme caution should be exercised.
PULL UP (Red)	The current flight trajectory brings the aircraft in extremely close proximity to the terrain. The aircraft is in imminent danger and actions should be taken to rectify the situation.
TERR/ INHB (White)	The TAWS system has been placed in the 'Inhibit' mode.

1.2.5 EQUIPMENT LIMITATIONS

The MD41-1000 series control units contain specific dash numbers to be used with various Terrain Awareness Warning Systems. The installer must match the correct controller part number with the system that is being installed.

The MD41-1028, -1028(5V), -1038, -1038(5V), -1024, -1034 is TSO'D and certified for use with the Garmin International GNS 500, 500A, 530, 530A Terrain Awareness Warning System (TAWS). Any attempt to install the listed units in an installation other than above system is prohibited. **This will void the TSO.**

NOTE: If the MD41-() is disconnected or removed from the aircraft, there will be no effect in the operation of the TAWS system.

1.2.7 MAJOR COMPONENTS

This system is comprised of one major component, the MD41-1000 series TAWS 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 MD41-1024, -1034, -1028, -1038 is not located near any high heat source or crowded next to other equipment. Means of providing a gentle airflow will be a plus.

2.2 EQUIPMENT LOCATION

The MD41-1028 must be mounted as close to the pilot's field of view as possible. Please reference the TAWS installation manual for approved locations. 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 MD41-1024, -1034, -1028, -1038 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 MD41-1024, -1034, -1028, -1038. 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. MD41-1024 (14V) or MD41-1028 (28V) Horiz. Mount
MD41-1034 (14V) or MD41-1038 (28V) Vert. Mount
MD41-1028(5V), (28volt) 5 volt button lighting Horiz. Mount
MD41-1038(5V), (28volt) 5 volt button lighting Vert. Mount
2. J1 Connector Kit (25 pin). MCI P/N 7014517
3. Installation Manual. MCI P/N 9015308

3.3 MOUNTING THE MD41-()

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 drive screws.

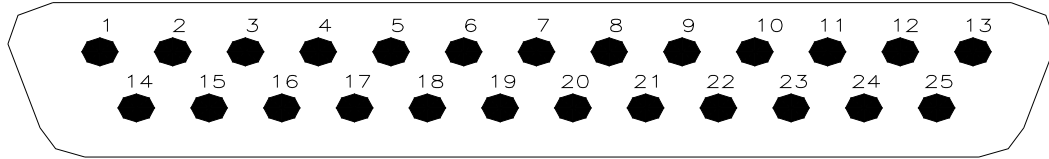
3.4 INSTALLATION LIMITATIONS

Wire the aircraft harness according to figure 3-3 or 3-4. 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. Also see equipment limitations, section 1.2.5.

“The TSO identifies the minimum performance standards, tests and other conditions applicable for issuance of design and production approval of the article. The TSO does not specifically identify acceptable conditions for installations of the article. The TSO applicant is responsible for documenting all limitations and conditions suitable for installation of the article. An applicant requesting approval for installation of the article within a specific type or class of product is responsible for determining environmental and functional compatibility.”

This Annunciation Control Unit is part of an incomplete system. The intended function is to provide required or optional annunciation and mode selection for Class B TAWS systems.

J1 CONNECTOR

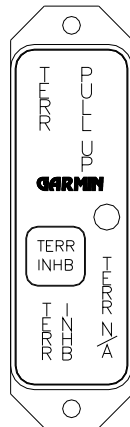
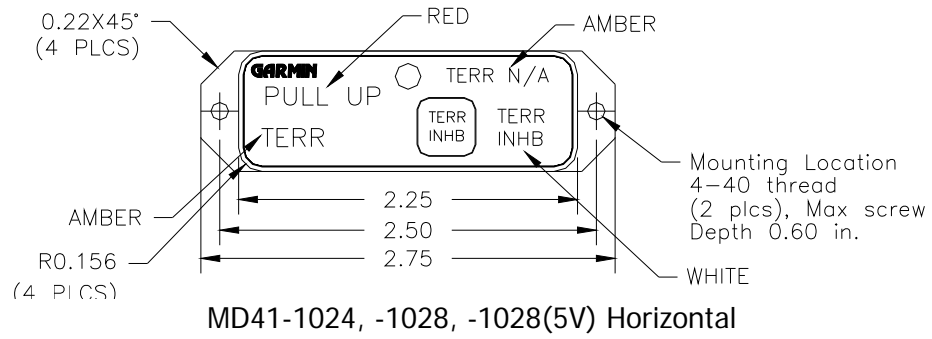
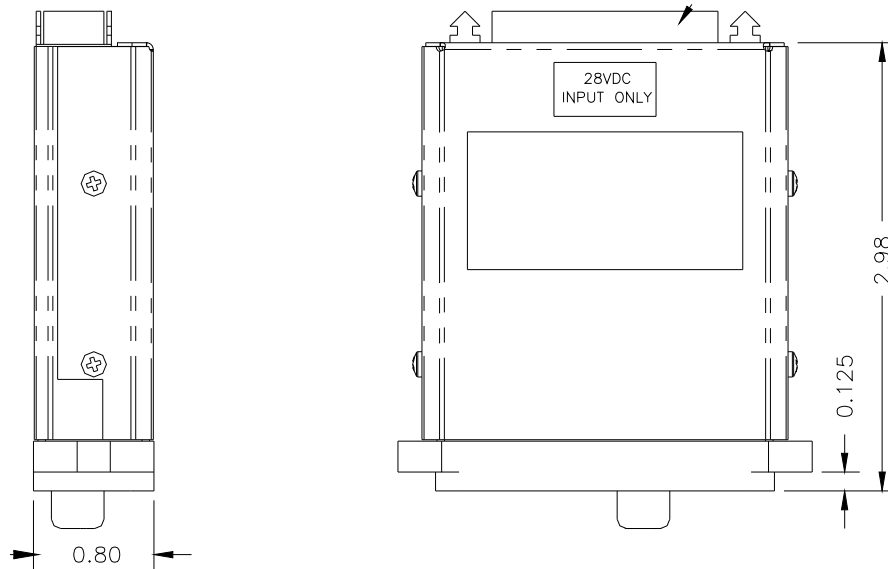


Rear View of J1 Mating Connector

PIN	PIN NAME	IO
		Out
1	ANNUNCIATOR FULL BRIGHT #1	Out
2	ANNUNCIATOR FULL BRIGHT #2	Out
3	TERRAIN WARNING BRT/DIM	In
4	INTERNAL DIMMING PROGRAM #1	Out
5	TERRAIN CAUTION ANNUNCIATE* IN	In
6	TERRAIN TEST* IN	In
7	ANNUNCIATOR DIMMING IN	In
8	28 V PANEL LIGHTING BUS HI	In
9	PANEL LIGHTING BUS LO	In
10	TERRAIN NOT AVAILABLE ANNUNCIATE IN	In
11	TERRAIN PULL UP ANNUNCIATE* IN	In
12	INTERNAL DIMMING PROGRAM #2	Out
13	28 V AIRCRAFT POWER	In
14	SPARE	---
15	SPARE	---
16	SPARE	---
17	SPARE	---
18	SPARE	---
19	TAWS ANNUNCIATE INHIBIT * IN	In
20	TAWS INHIBIT * OUT	Out
21	AIRCRAFT GROUND	---
22	AIRCRAFT GROUND	---
23	AIRCRAFT GROUND	---
24	AIRCRAFT GROUND	---
25	AIRCRAFT GROUND	---

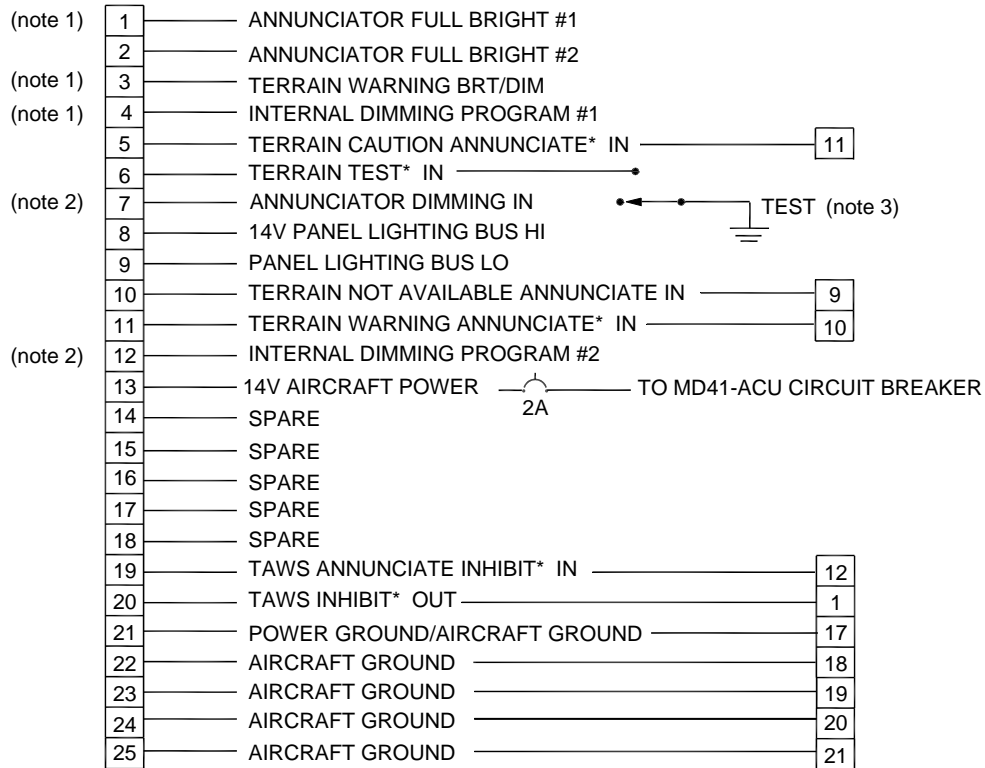
* Designates an active low signal.

FIGURE 3-1 SCHEMATIC PINOUT, 25 PIN DSUB



MD41-1034, -1038, -1038(5V) Vertical
 Note 1: Use two 4-40 X 3/8" Flat Head Phillips Screws for Mounting

FIGURE 3-2 OUTLINE DRAWING



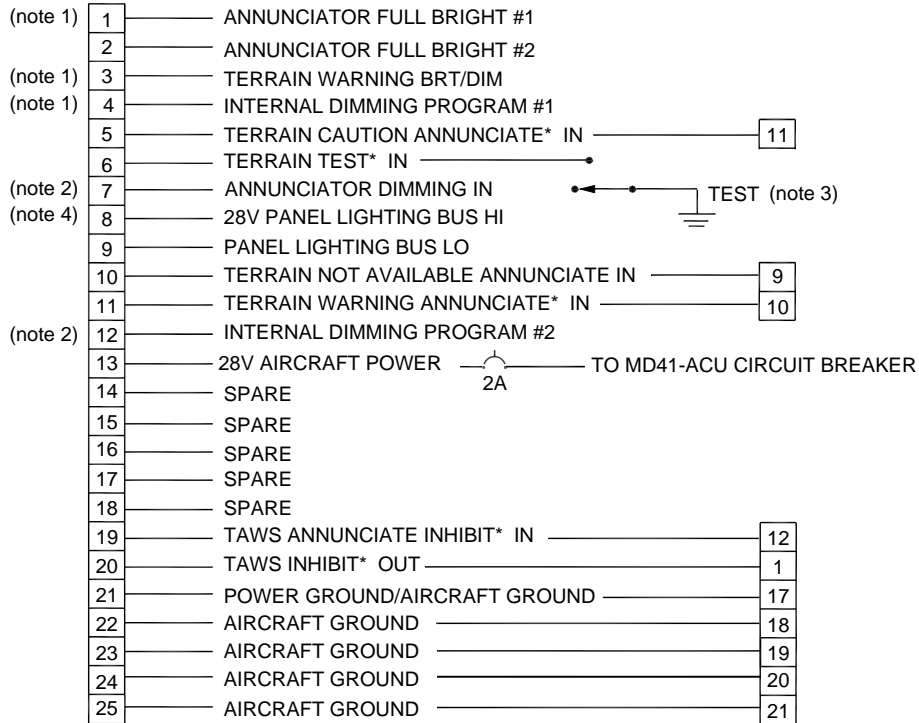
NOTES:

- 1) JUMPER 3 TO 1 FOR FULL BRIGHT TERRAIN WARNING.
JUMPER 3 TO 4 FOR TERRAIN WARNING BRIGHTNESS TO BE CONTROLLED BY INTERNAL PHOTOCELL.
- 2) JUMPER 7 TO 12 FOR ANNUNCIATION BRIGHTNESS TO BE CONTROLLED BY INTERNAL PHOTOCELL,
OTHERWISE CONNECT PIN 7 TO AIRCRAFT BRIGHT/DIM SWITCH.
- 3) MOMENTARY SWITCH FOR ANNUNCIATION LAMP TEST. (optional connection)
- 4) REFER TO GARMIN INSTALLATION MANUAL FOR ACTUAL INSTALLATION.
- * DESIGNATES AN ACTIVE LOW SIGNAL.
- 5) REFER TO ACU SCHEMATIC IN THIS MANUAL FOR DETAILED CIRCUIT.

FIGURE 3-3 WIRING DIAGRAM, MD41-1024, -1034.

MD41-1028 ANNUNCIATION-CONTROL
J1 28 VOLT

GNS 530
P5050



NOTES:

- 1) JUMPER 3 TO 1 FOR FULL BRIGHT TERRAIN WARNING.
JUMPER 3 TO 4 FOR TERRAIN WARNING BRIGHTNESS TO BE CONTROLLED BY INTERNAL PHOTOCELL.
- 2) JUMPER 7 TO 12 FOR ANNUNCIATION BRIGHTNESS TO BE CONTROLLED BY INTERNAL PHOTOCELL,
OTHERWISE CONNECT PIN 7 TO AIRCRAFT BRIGHT/DIM SWITCH.
- 3) MOMENTARY SWITCH FOR ANNUNCIATION LAMP TEST. (optional connection)
- 4) 5 VOLT FOR MD41-1028(5V)/1038(5V)
- 5) REFER TO GARMIN INSTALLATION MANUAL FOR ACTUAL INSTALLATION.
* DESIGNATES AN ACTIVE LOW SIGNAL
- 6) REFER TO ACU SCHEMATIC IN THIS MANUAL FOR DETAILED CIRCUIT.

**FIGURE 3-4 WIRING DIAGRAM, MD41-1028, -1038
-1028(5V), -1038(5V)**

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 21 is aircraft ground.

4.2 OPERATING INSTRUCTIONS

Refer to the TAWS pilots guide or installation manual for final testing of the MD41-().

SECTION 5: INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

5.1 INTRODUCTION

This document identifies the instructions for Continued Airworthiness for the MD1000 series TAWS Annunciation Control Unit.

5.2 CONTROL, OPERATION INFORMATION

Refer to the Garmin International GNS 530 Pilots Guide and section 1.2.4 of this manual.

5.3 MAINTENANCE INSTRUCTIONS

Repair of the MD41-1000 ACU is "on condition only", periodic maintenance is not required.

Calibration and inspection intervals are not required. Service life will be a minimum of 20,000 hours.

5.4 TROUBLESHOOTING INFORMATION

Refer to the MD41-1000 series Maintenance Manual.

5.5 REMOVAL AND REPLACEMENT INFORMATION

If the unit is removed and reinstalled, a functional check of the equipment should be conducted in accordance with the Garmin International GNS 530 preflight test procedure.

5.6 DIAGRAMS

Refer to figure 3-2, 3-3 and 3-4 of this manual.

5.7 SPECIAL INSPECTION REQUIRMENTS: N/A

5.8 SPECIAL TOOLS: None

5.9 OVERHAUL PERIOD: No overhaul time limitations

ENVIRONMENTAL QUALIFICATION FORM
RTCA / DO160D

NOMENCLATURE: MD41-() TERRAIN AWARENESS ANNUNCIATION CONTROL
UNIT

MODEL NO: MD41-()

TSO C151a

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 Category A1 and F2 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 to Category B
Vibration	8.0	Aircraft type 1 (helicopter) tested to category U Aircraft type 2 through 6 tested to category S
Explosion	9.0	Equipment identified as Category X, no test required
Waterproofness	10.0	Equipment identified as Category X , no test required

Environmental Qualification (cont.)

Conditions	Section	Description of Conducted Tests
Fluids Susceptibility	11.0	Equipment identified as Category X, no test required
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 B and M
Lightning Induced Transient Susceptibility	22.0	Equipment tested to Category A3C3
Lightning Direct Effects	23.0	Equipment identified as Category X, no tests required
Icing	24.0	Equipment identified as Category X, no test required