



**Model DM-1 Discharge System
INSTRUCTION MANUAL**

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Specifications and operational characteristics of the System are subject to change.
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4. CheckSum will repair the product and return it postage-paid. Repairs are typically completed within two working days of receipt.

In the event that expedited repair is necessary, call CheckSum for information. In many cases a replacement module can be provided immediately.

Introduction

This instruction manual is for the CheckSum Model DM-1 Discharge System as it is used with the In-Circuit Test/Manufacturing Defects Analyzer (ICT/MDA) Test System. The Model DM-1 Discharge System isolates and protects the test system electronics (MPX module test points) from an electrically charged unit-under-test (UUT).

Normally, electronic assemblies do not become electrically charged during the manufacturing process, however, functional or system testing may leave an electrical charge on a UUT. For example, functional or system test of power supply assemblies often leaves the capacitors charged. If a charged assembly is placed on a fixture connected to the MPX test points, the instantaneous connection can provide sufficient power to exceed the MPX test point input specification and damage the circuitry in the test system switching electronics. The DM-1 can protect the test system from a UUT that may have become electrically charged with up to 250 volts. The CheckSum DM-1 also protects the test system from severe static charges on a UUT.

The Model DM-1 has connectors on the front and rear of the unit. The front connectors on the DM-1 are used to connect to the fixture receiver system, see *Figure 1*.

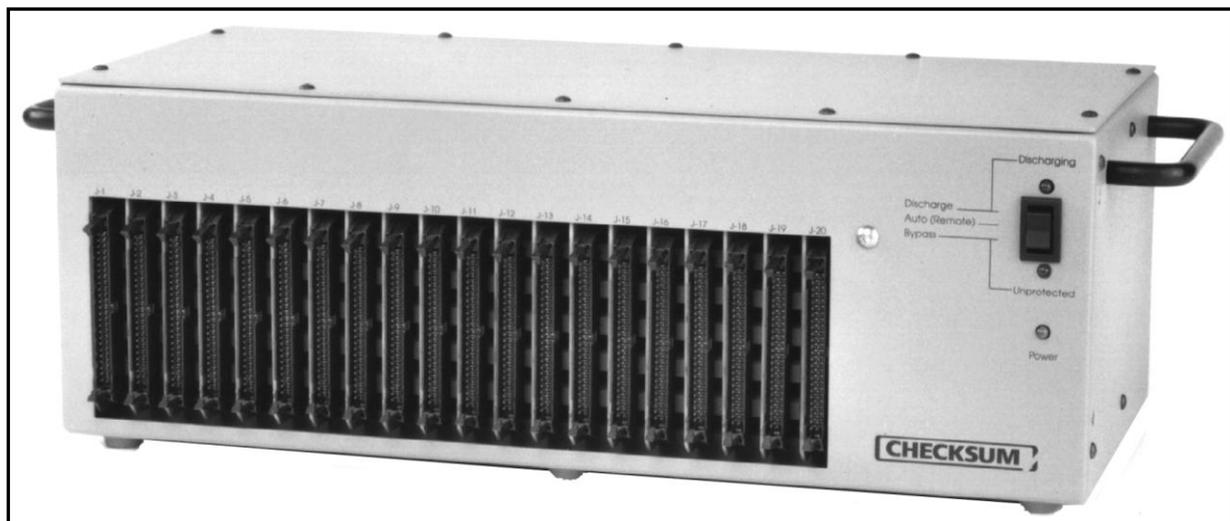


Figure 1. Model DM-1 Front Panel with Fixture Cable Connectors

The rear connectors on the Model DM-1 are used to connect to the MPX test points, see *Figure 2*. The standard CheckSum test system MPX multiplexer cables connect to the rear of the DM-1. A second test cable is provided with each 50-pin discharge module to connect to the fixture.

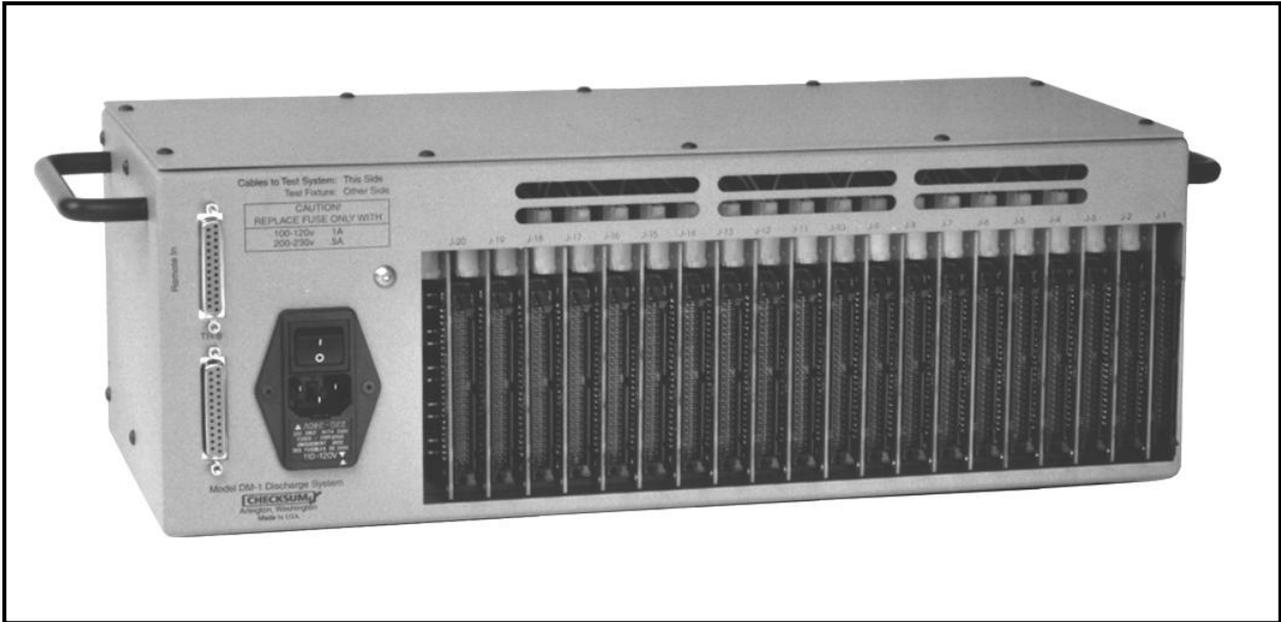


Figure 2. Model DM-1 Rear Panel with 50-Pin Cable Connectors

Special internal circuitry in the DM-1 prevents the ICT/MDA electronics from being connected if a charge exists. The CheckSum test system software can detect a charged UUT and wait for the discharge. The over-voltage charge is automatically discharged. Once the UUT voltage has been discharged to a safe level, normal testing with the ICT/MDA test system can proceed.

The Model DM-1 Discharge System is installed between the test controller containing the ICT/MDA test electronics and the fixture system. This allows the Model DM-1 to protect the system electronics by isolating and discharging an electrically charged unit-under-test (UUT).

Installing additional discharge modules in the Discharge System is described in the *DM-1-SW Module Installation* section on page 19. Each DM-1-SW plug-in card protects 50 test points in the test system. The DM-1 can accommodate twenty DM-1-SW Switch Modules. A completely configured DM-1 Discharge System allows isolation and protection of 1000 test points. Additional Discharge Systems can be daisy-chained for higher pin-count systems.

DM-1 Operating Characteristics

The DM-1 connects the most positive UUT voltage to the most negative UUT voltage through a 250-ohm load. This protects the ICT/MDA system MPX test point electronics, however depending on UUT circuit topology, this could potentially damage the UUT.

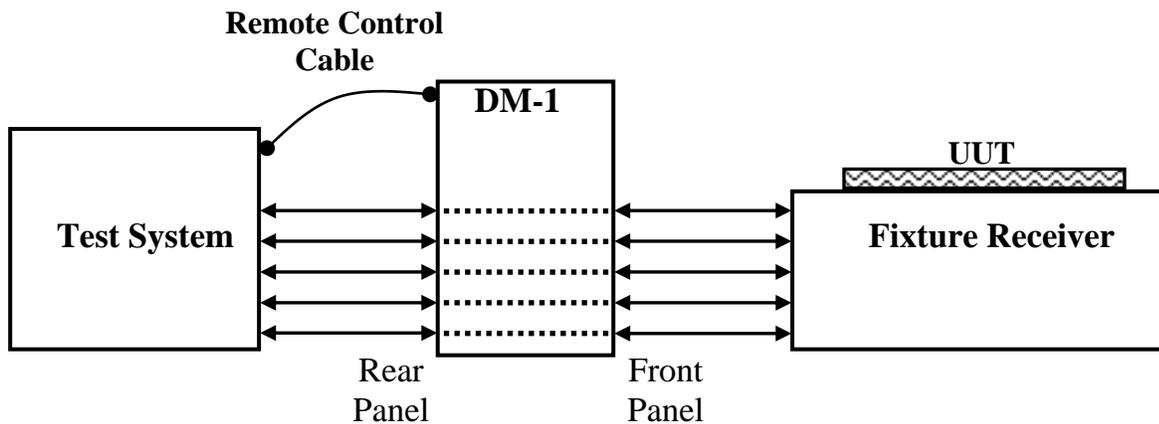
Under normal conditions, the DM-1 will not allow the TEST system to be connected to the fixture until all voltages are less than approximately 5 volts.

If the UUT contains a battery, the DM-1 will attempt to discharge it to approximately 5 volts. Therefore, batteries should be removed or not probed.

The additional cables and discharge modules add additional capacitance to the UUT. The measured value of capacitors on the UUT will appear slightly higher with the DM-1 connected.

Installation

The DM-1 Discharge System must be connected between the UUT and the test system. This is accomplished by connecting the cables from the test system to the DM-1 rear panel connectors and the cables from the UUT fixture receiver to the DM-1 front panel connectors.



The cables from the test system multiplexer modules can be connected to any of the DM-1 rear panel connectors, the signals carry through directly to the front panel connector of the same designation (e.g. J1).

Remote Control Cable Connection

Connect the DM-1 25-pin remote control cable between the TR-10/TR-8 system module and the DM-1 rear panel connector marked “Remote In”. This control cable connector is located above the ON/OFF switch on the DM-1. If a cable is plugged into the TR-10/TR-8 system module 25-pin back-panel connector, such as a cable from the operator’s keypad, transfer it to the remaining lower connector on the DM-1.

Power Connection

You should connect power from a standard 110/120V 60-Hz source. It requires less than 1A at this voltage. Insure that the arrows on the power-entry module that indicate 110-120V are pointing together.

– **CAUTION** –

Before removing the fuse block, insure that the power cord has been removed from the power-entry module.

If you will be using a 220-240V source, it is necessary to reconfigure the power supply. To do so, pull out the fuse block on the back panel (just below the power cord). Replace the fuses with 0.5A fuses, and reinstall the fuse block. Orient the fuse block with the arrows pointing together that indicate 220-240V.

Finally, insure that the power switch is off (down, towards "0"), then install the power cord.

Controlling the Model DM-1

Front Panel Switch

The front panel switch has three positions.

- Discharge** The DM-1 is set to discharge any voltages on the UUT. The test system test points are not connected to the UUT in this position. Remote control is disabled.
- Auto (Remote)** **The middle position of the switch is the normal setting to use the DM-1.** In this switch setting, the test controller controls the DM-1, see the *Software Control* section on page 15. If the DM-1 detects a stored charge on the UUT, the DM-1 will not connect the test system test points to the UUT until after it has discharged the UUT. If the DM-1 does not detect a stored charge from the UUT, it will immediately connect the test points to the UUT when commanded.
- Bypass** The DM-1 will not discharge the UUT and the test points are unprotected and always connected to the UUT. Remote control is disabled. This switch setting is used during program development to connect the test points to the fixture without the need to execute a FixCt command.

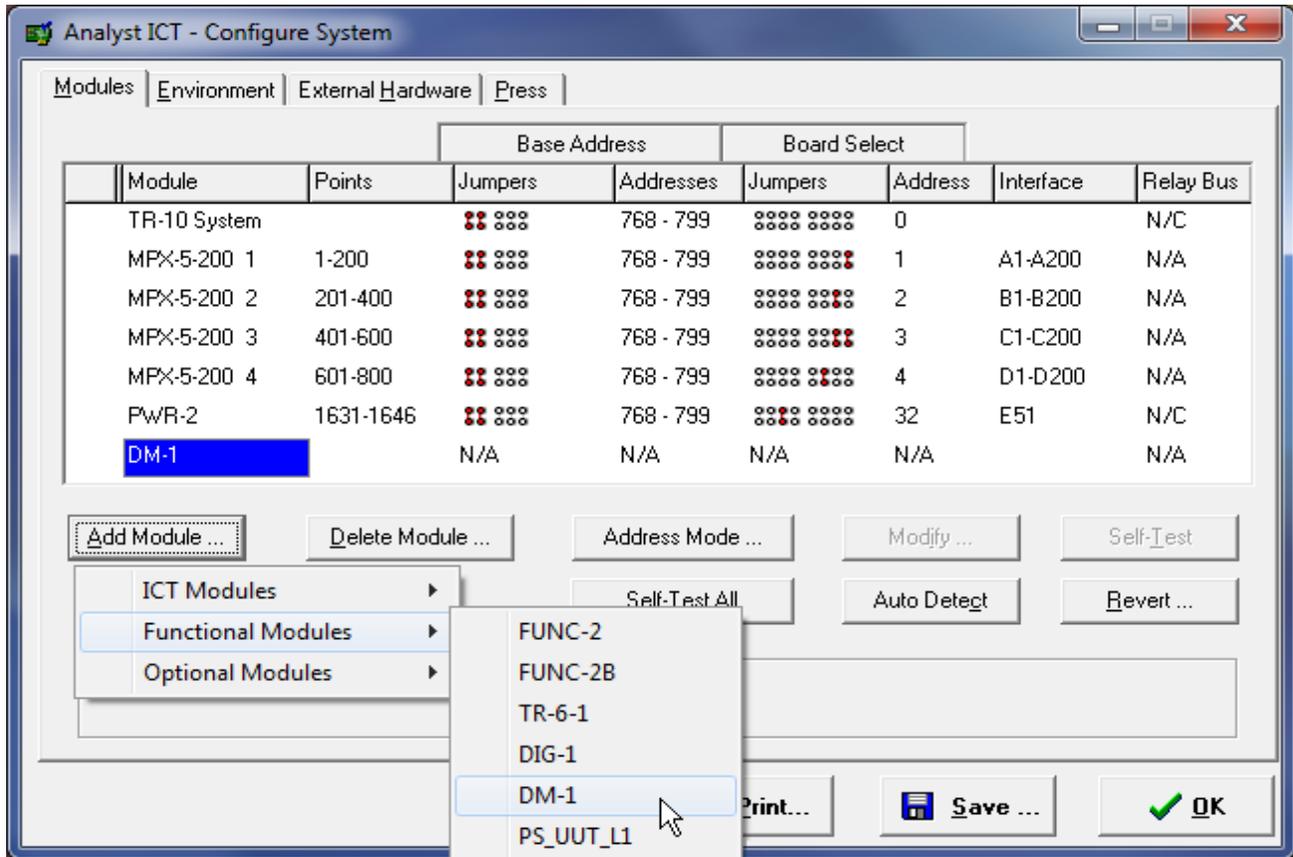
Front Panel LEDs

The three LEDs on the DM-1 front panel indicate the status of the DM-1:

- Discharging** The UUT has a stored charge and the DM-1 is discharging the UUT. This LED will turn-off when the stored charge on the UUT has reached a low voltage (approximately 5V or less).
- Unprotected** **This LED blinks on and off. It indicates the DM-1 will not discharge the UUT and the MPX test points are unprotected and connected to the fixture receiver. The LED will blink anytime a test program is running and the MPX test points are unprotected. The MPX test points are unprotected when the front panel switch is set to Bypass. *Note:* If the test controller is turned OFF, the DM-1 is bypassed and the LED indicates this unprotected condition.**
- Power** The AC power is connected and the rear power switch is ON.

System Self-Test

During self-test of various modules such as the MPX modules, the DM-1 must connect the module test points to the fixture. The system software (version 6.0i6 or later) allows the DM-1 to be “Added” to the list of modules in the System Configuration window.



If the DM-1 is included in the list of modules in the System Configuration window, the system will automatically switch the DM-1 during self-test to connect the module test points to the fixture.

The DM-1 front panel switch “Bypass” position can be used to manually connect the module test points to the fixture during self-test. Be sure to set the front panel switch to Auto (Remote) after the self-test is completed.

Software Control

Note

Existing test programs must be modified to take advantage of the protection capabilities of the Model DM-1. It is necessary to control the DM-1 with Vacum or FixCt commands at the beginning and end of your test programs. These same commands control the test fixture for engage and disengage. If you have existing test programs when you install the Model DM-1, they must be modified in order to incorporate the Vacum or FixCt commands. If you do not do so, the tests will not work unless the DM-1 is in 'Unprotected' mode.

The software test type command FixCt (Fixture Control) or Vacum (Vacuum) is used to engage or disengage CheckSum Pneumatic or Vacuum fixturing Systems. The FixCt command allows the test program to control automated pneumatic fixturing systems. The Vacum command allows the test program to control automated vacuum fixture systems. The commands can interact with the DM-1 Discharge System for automatic detection and discharge of voltages on the unit under test.

				Rem		Engage			
				Rem		Fixture and			
				Rem		Wait for			
				Rem		Discharge			
				Rem					
•	•	•	•	FixCt	9	Fixture ON	1.0000K	0.0000	
				Rem					
				Rem		Start Test			
				Rem					
				Rem		End of Test			
				Rem		•			
•	•	•	•	FixCt	8	Fixture OFF	•	•	

Like the VACUUM (“Vacum”) test type, the FixCt test type controls the fixture using the two signals called Fixture 1 and Fixture 2 available on the 25-pin connector and phono jack of the TR-10/TR-8 System Module back panel, see Figure 3 on page 18.

When used with a DM-1 Discharge System, the FixCt test type uses Digital I/O Bits 1, 2 and 3 for Fixture 1 and Digital I/O bits 4, 5 and 6 for Fixture 2, shown in Figure 3 on page 18. You should be careful that this does not conflict with other custom use of these Digital I/O bits. A custom remote cable is required when using Fixture 2 control in conjunction with a Model DM-1.

Parameter	Description
Test Type	FixCt or Vacum
Title	Optional Comment Field
Range	<p>Sum of the following bits:</p> <ul style="list-style-type: none"> 0 - Disengage Fixture 1 and Fixture 2 1 - Engage Fixture 1 2 - Engage Fixture 2 8 - When combined with range 0, this entry controls the DM-1 to isolate the MPX test points and place it in discharge mode. <p>When combined with range 1, this entry controls the DM-1 Discharge System for Fixture 1. A range of 9 (1+8) sets the DM-1 to isolate the MDA test points from the Unit Under Test, waits for the voltage to be low, then connects the MPX test points to the UUT.</p> <p>16 -When combined with range 2, this entry controls the DM-1 Discharge System for Fixture 2, similar to range 8 described above.</p> <p>4 -When combined with ranges 1 or 2, and 8 or 16, this disables a warning message if the DM-1 switch is not set to AUTO.</p>
From Port	First test point connected to the fixture-down switch.
To Port	Second test point connected to the fixture-down switch.
Low Limit	Time, in milliseconds, to wait after engaging the fixture, insure the fixture-down switch is closed if appropriate, and before continuing to the next step.
High Limit	Maximum resistance (in ohms) before considering the fixture-down switch to be closed. If zero, do not measure the fixture-down switch.

Programming Examples

Example 1:

Step 1 - Enter/Edit Spec Data -							
From (-)		To (+)		Test		Limits	
Point	Name	Point	Name	Type	Range	Title	Low High
30		35		FixCt	9	Fixture 1 ON	1.0000K 0.0000

FixCt with Range 9 (sum of Range bits 1 and 8; 1+8=9)

- Check the DM-1, display a warning message if the front panel switch is not set to AUTO.
- Engage Fixture 1, and begin discharging the UUT.
- Pause 1000 milliseconds (low limit value is 1.0000K which equals 1000).
- Wait for UUT discharge to reach a low voltage.
- Connect the MPX test points to the UUT.
- Since the High Limit is 0, ignore the fixture-down switch test points.

Example 2:

Step 1 - Enter/Edit Spec Data -							
From (-)		To (+)		Test		Limits	
Point	Name	Point	Name	Type	Range	Title	Low High
100		102		FixCt	13	Fixture 1 ON	500.00 10.000

FixCt with Range 13 (sum of Range bits 1, 4, and 8; 1+4+8=13)

- Engage Fixture 1, and begin discharging the UUT.
- Pause 500 milliseconds.
- Wait for UUT discharge to reach a low voltage.
- Connect the MPX test points to the UUT.
- Wait for fixture-down switch between test points 100 and 102 to be less than 10 ohms.

Example 3:

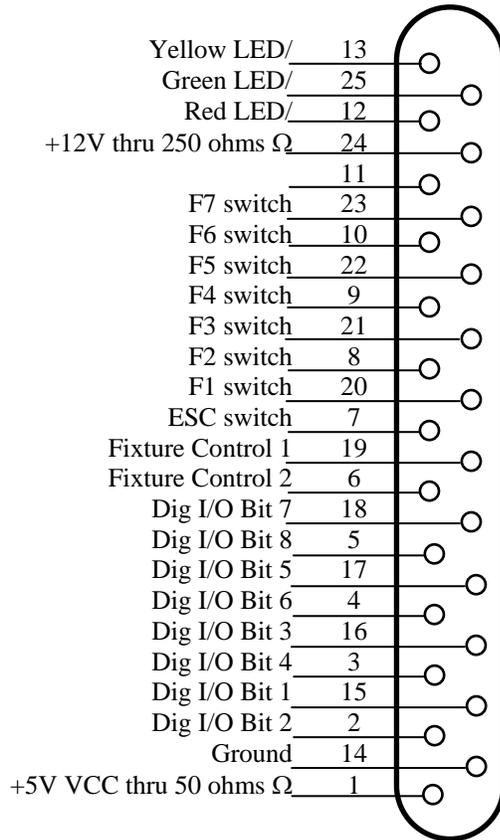
Step 1 - Enter/Edit Spec Data -							
From (-)		To (+)		Test		Limits	
Point	Name	Point	Name	Type	Range	Title	Low High
30		35		FixCt	8	Fixture 1 OFF	0.0000 0.0000

FixCt with Range 8

- Disengage Fixture 1 (and Fixture 2 if present).
- Disconnect the MPX test points from the UUT and place the DM-1 in discharge mode.



Fixture 1 Control Connector



System Probe Connector

Figure 3. TR-10/TR-8 System Module Back-Panel Connector

Options and Accessories

DM-1-SW Module Installation

The following steps describe how to add 50 channel DM-1-SW modules, see *Figure 4*:

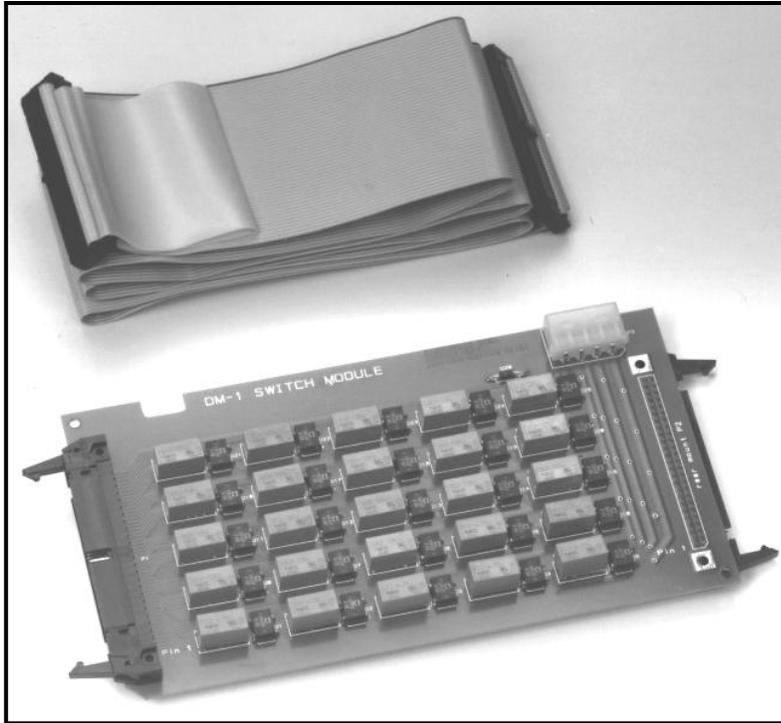


Figure 4. DM-1-SW Module and Cable

1. **Turn the power switch off (down, towards "0") and disconnect the AC power cord. Insure the Power LED on the front panel is OFF before proceeding.**
2. Remove the lid.
3. Remove the two module retaining bars inside the DM-1.
4. Slide the DM-1-SW module in from the rear of the DM-1 and connect the unused four wire connector (internal discharge cable assembly).
5. Replace the two module retaining bars.
6. Replace the lid.
7. Connect the 50-pin cables to the module (see *Installation* section on page 11).
8. Re-connect AC power.

See Installation on page 11 to review how to connect the DM-1 module cables between the MPX test points and the fixture receiver.

DM-1-RM Rack Mount Kit Installation

Note

It is recommended the rack mount kit is factory installed.

Optional rack ears can be installed on the Model DM-1 to allow it to be installed in a standard 19-inch rack.

- 1. Turn the power switch off (down, towards "0") and disconnect the AC power cord. Insure the Power LED on the front panel is OFF before proceeding.**
2. Remove the lid.
3. Remove the two side handles. You will need to remove the screws holding the power supply assembly to gain access to the front screw on the right side handle. Re-connect the power supply assembly after the side handles are removed.
4. Replace the lid.
5. Install the rack ears with the screws provided.
6. Bolt the DM-1 into the standard 19-inch EIA rack using the rack ears.
7. Connect the 50-pin cables to the module (see *Installation* section on page 11).
8. Re-connect AC power.

Specifications and Model Information

Model DM-1 Specifications:

Front Panel LEDs:	Power-on, Discharging, and Unprotected
Front Panel Control:	Discharge, Auto (Remote), and Bypass
Real Panel Control:	On/Off
Software Control:	Fixture Control, FixCt (see page 15)
Weight:	~16 lbs. (shipping wt. ~20 lbs.)
Overall Size:	17"W x 9"D x 6.25"H
Capacity:	1000 Points
Output Cables:	36 in.
Maximum Discharge Voltage:	250 volts peak
Minimum Discharge Voltage:	Approximately 5 volts
Discharge Impedance:	250 ohms between the most positive and most negative points on the UUT
AC Input:	100-120VAC 50/60Hz 200-230VAC 50/60Hz
AC Power:	75VA maximum
Warranty:	1-year limited parts/labor

Ordering Information:

Model	Description
DM-1	Discharge System (with 4 Model DM-1-SW 50-Point Discharge Switch Modules)
DM-1-SW	50-Point Discharge Switch Module
DM-1-RM	Rack Mount Kit for Model DM-1

