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OPERATIONS MANUAL

RS-232 DIGITAL MIXING MODULE

DMM-4

June 21, 2007

FOR TECHNICAL SUPPORT CALL:

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Manufactured By:
East Coast Datacom, Inc.

PT # 719006-C

SAFETY WARNING

Always observe standard safety precautions during installation, operation and maintenance of this product. To avoid the possibility of electrical shock, be sure to disconnect the power cord from the power source before you remove the IEC power fuses or perform any repairs.

PROPRIETARY NOTICE

WARRANTY NOTICE

WARRANTIES: East Coast Datacom, Inc. (hereafter referred to as E.C.D.) warrants that its equipment is free from any defects in materials and workmanship. The warranty period shall be three (3) years from the date of shipment. E.C.D.'s sole obligation under its warranty is limited to the repair or replacement of defective equipment, provided it is returned to E.C.D., transportation prepaid, within a reasonable period. This warranty will not extend to equipment subjected to accident, misuse, alterations or repair not made by E.C.D. or authorized by E.C.D. in writing.

PUBLICATION NOTICE

This manual has been compiled and checked for accuracy. The information in this manual does not constitute a warranty of performance. E.C.D. reserves the right to revise this publication and make changes from time to time in the content thereof. E.C.D. assumes no liability for losses incurred as a result of out-of-date or incorrect information contained in this manual.

CHAPTER 1 - INTRODUCTION

1.1 FUNCTIONAL DESCRIPTION

The Digital Mixing Module (DMM-4) is a network expansion device for modem sharing or port sharing applications in polled or contention environments. The DMM-4 allows up to four devices to share a modem / DSU or computer port. Any combination of terminals and modems may be used in a network environment.

Each port of the DMM-4 may be selected as a DCE or DTE interface. Sub-Channel port switching is selectable by the user for RTS, DCD or Data Transitions.

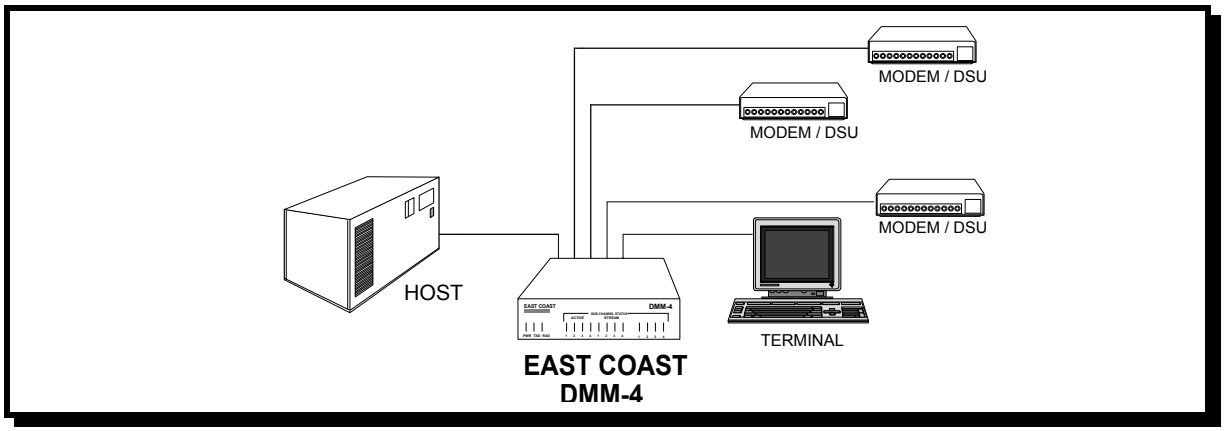
Once installed, system and network efficiency are increased through higher host processor utilization coupled with the significant decrease in idle time between host / terminal traffic sessions.

Ideal for either synchronous or asynchronous network environments, the DMM-4 is protocol transparent at data rates up to 128Kbps. The DMM-4 may be configured to provide clocking for the entire network. To prevent data transmission errors caused by clock differentials throughout the network, a 8 bit buffer is provided. In applications where the master port and the selected port provide their own clocks, data is clocked into the buffer at the receive clock rate of the active port and clocked out using the master port transmit clock.

In applications where the Clear To Send control signal is not provided by the master port, an option for forced CTS is available. Additionally, several RTS/CTS delay settings are available.

The DMM-4 provides optional Anti-Streaming circuitry. Once enabled, Anti-Streaming will automatically remove a defective terminal or modem from service if the Data / Control criteria is present for the user predefined selection period.

Housed in a sturdy metal enclosure and equipped with an internal 110/220VAC switch selectable linear power supply, the DMM-4 will provide in excess of 100,000 hours of reliable service.



TYPICAL APPLICATION

Figure 1.1

1.2 THEORY OF OPERATION

The DMM-4 allows up to four DCEs or DTEs to share one DCE or DTE communications link. In a broadcast, polled or contention environment, the typical DMM-4 operation is as follows:
Data arriving at the DMM-4's master port is continually broadcast to all subchannel ports. When one of attached DCE or DTE devices answers a poll from the host site, that device will raise RTS (Request To Send for terminals) or DCD (Data Carrier Detect for modems). When RTS or DCD is raised, the DMM-4 will lock on to that port and allow that device to communicate to the Host Site. The DMM-4 will remain locked onto that port until RTS or DCD is dropped. After RTS or DCD has dropped, the DMM-4 will automatically begin scanning the ports until another port raises RTS or DCD. An additional switching option is with the presence of Data on a sub channel.

CHAPTER 2 - BASIC OPERATION

2.1 FRONT PANEL INDICATORS AND SWITCHES

A *Green* LED illuminates when AC Power has been applied. Two adjacent *Green* LEDs illuminate in union with individual *Green* subchannel port activity LEDs and identify Transmit and Receive data transmissions. Yellow LEDs provide the user with a visual indication of a streaming DTE (ref. 2.6) Positive latching switches are provided for each DTE port for isolating or removing a streaming terminal. Each DTE port has its own switch and operates independently. To disable a subchannel, simply push the switch. A channel is disabled when the switch is in the outer most position.

2.2 REAR PANEL CONNECTORS AND FUSES

Located on the back or rear of the product you will find an IEC Power receptacle. The supplied power cord plugs into this receptacle. The receptacle also contains a fuse drawer. Two (2) fuses are located in this compartment. For 110 VAC +/- 10% operation the unit is equipped with slow blow 160ma Fuses, Part # 714000. For 220 VAC +/- 10% operation the unit is equipped with slow blow 80ma Fuses, Part # 714001. Additionally, you will find the Master and Subchannel female DB-25 connectors.

2.3 CLOCKING, INTERNAL AND EXTERNAL

Three modes of clocking are available to the DMM-4 user. 1) Clocking may be set as *Internal Timing* utilizing the internal Baud Rate Generator. 2) Clocking may be set as *External Timing* utilizing a DCE device attached to the Master Port. 3) Clocking may be set as *Telco Timing* from an attached DCE via Port 1. *Internal Timing* mode will facilitate user defined operational speeds from 450bps to 76.8Kbps. Networks such as DDS (Digital Circuits) should be timing via Port 1.

2.4 ELECTRICAL INTERFACE

The DMM-4 is EIA RS-232 compliant, utilizing female DB-25 connectors. Refer to the interface chart in the Appendix for detailed interface information.

2.5 SUBCHANNEL SERVICE MODES

The DMM-4 incorporates circuitry that enables the user to scan each sub-channel port. When a sub-channel port is set as a DCE via the internal slide switches the channel will respond to RTS and lock onto that channel. When a sub-channel port is set as a DTE via the internal slide switches the channel will respond to DCD and lock onto that channel. The user may also select Switch on Data and the channel will respond to Data Transitions.

2.5.1 SUBCHANNEL SCANNING

Subchannel *Scanning* will allow equal access to the communications link for all connected DCE or DTE devices. The subchannels are *scanned* in sequence (1 - 2 - 3 - 4) and the attached subchannel DCE that raises DCD or DTE that raises RTS will have access to the communications link. After dropping RTS the DMM-4 will continue *scanning* in sequential order.

2.5.2 SUBCHANNEL RTS TO CTS DELAY

RTS to CTS delays of 0, 5, 10 and 20ms are user selectable.

2.6 ANTI-STREAMING

2.6.1 AUTOMATIC DTE REMOVAL

The DMM-4 incorporates circuitry that will (when enabled) *automatically* remove a streaming DCE or DTE from service. A streaming terminal is defined as a terminal that has RTS *high* longer than the user predefined anti-stream timer has been set. Upon installation, the user can set or actually fine tune the timer to your network requirements. Each channel has a Green and a Yellow LED to indicate subchannel activity. Green indicates an active subchannel and Yellow indicates a streaming subchannel. Once a terminal has gone into the streaming condition (RTS continually high) the DTE will automatically be removed from service until the DTE fault has been corrected by the user. All other DTE's will continue to be serviced.

2.7 SYNC AND ASYNC SELECTION

The DMM-4 incorporates circuitry that allows the user to select *Synchronous* or *Asynchronous* operation.

2.8 MANUAL DTE/DCE REMOVAL

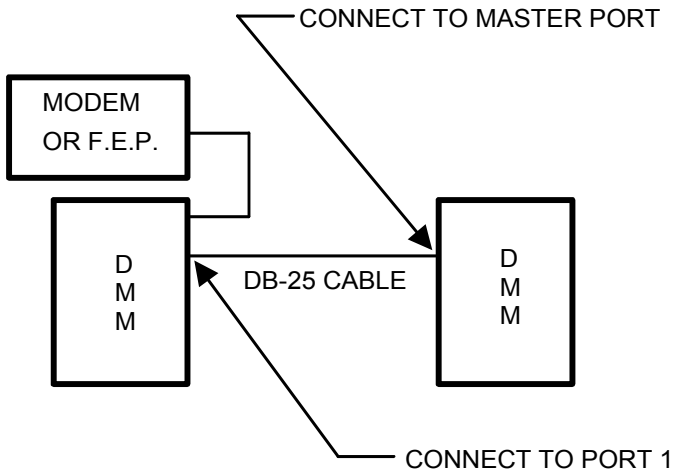
The DMM-4 incorporates circuitry that will (when enabled) *manually* remove a streaming terminal from service. A streaming terminal is defined as a terminal that has RTS continually *high*. With Anti-streaming disabled, the associated streaming DTE will *NOT* illuminate a Yellow LED on the front of the MSD. If the automatic anti-streaming circuitry is disabled and a streaming condition occurs, the other DTE devices will be blocked from accessing the communications link. To correct this condition, simply push the associated push-button switch for the subchannel that is streaming. All other DTE's will now continue to be serviced by the DMM-4. However, you still need to fix the offending DTE or DCE device that has RTS or DCD continually raised.

2.9 UNEXPLAINED STREAMING TERMINALS

Many different types of terminals have been manufactured over the years. A typical problem is unexplained lockup or lockout problems. The most common cause is when, four terminals are running just fine and when one of the terminals is powered down, the remaining terminals are locked out of service. This may be explained by a missing or incorrect Termination Resistor that has been overlooked by your terminal manufacturer. This is the main reason that Anti-Streaming circuitry has been designed into the DMM-4 and we encourage the user to take advantage of this feature. An additional feature is a 4.7k Pull Down resistor tied to the RTS or DCD control leads.

2.10 CASCADING OR CONCATENATION

The DMM-4 supports cascading by utilizing DB-25 Male-to-Male straight through shielded cables. *Subchannel Port 1* should be used as the concatenation port.



CASCADING DIAGRAM

2.11 SUBCHANNEL CONTENTION MODES (PORTS 1 - 4) JP6, JP7, JP8, JP9

The DMM-4 has internal jumpers for Sub-channel contention modes. When a sub-channel port is set as a DCE via the internal slide switches the channel will respond to RTS and lock onto that channel. When a sub-channel port is set as a DTE via the internal slide switches the channel will respond to DCD and lock onto that channel. The user may also select Switch on Data and the channel will respond to Data Transitions.


Switches on RTS or DCD


Switches on Data

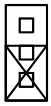
JP6, JP7, JP8, JP9

2.12 NORMAL OR FORCED CLEAR TO SEND (CTS) (PORTS 1 - 4)

The DMM-4 has internal jumpers for *Normal or Forced Clear To Send (CTS)*. This option will allow attached sub-channel devices that do not receive CTS control signals from the attached DMM-4 Master Port to have CTS selectively Forced High to the attached sub-channel device. To *Force CTS,* move the jumper as indicated below on the printed wiring board.

JP1, JP2, JP3, JP4

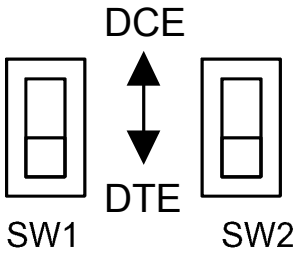

NORMAL CTS


FORCED CTS

2.13 DCE / DTE SWITCHES

Located internally are five sets of two (2) DCE/DTE slide switches directly in front of each RS-232 port. Silkscreened on the Printed Wiring Board are **DCE** and **DTE**. Slide *BOTH* switches to the same position to configure each of the RS-232 ports as a DTE or a DCE interface.

When set to DCE, the RS-232 port *MUST* connect to a DTE device.
When set to a DTE, the RS-232 port *MUST* connect to a DCE device.



CHAPTER 3 - INSTALLATION

CAUTION: Disconnect Power Before Servicing
ATTENTION: Couper Le Courant Avant l' Entretien
VORSICHT: Befor Deckung Abnehmen Mach Strom Zu

3.1 VOLTAGE SELECTION

It is *very* important to check that the unit is set to the correct voltage setting for your application before applying AC power. Located on the rear of the unit you will find a rotary 110/220 VAC switch. Using a coin or small screwdriver, *gently* turn the switch to the appropriate power position as required for your installation (110 or 220 VAC).

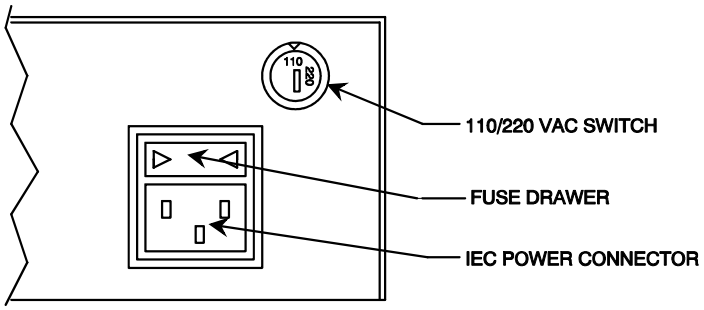
3.2 VOLTAGE SELECTION FUSES

Located on the back or rear of the product you will find an IEC Power receptacle. This receptacle contains a fuse drawer. Two (2) fuses are located in this compartment. For 110 VAC +/- 10% operation the unit is equipped with slow blow 5 x 20mm 160ma Fuses, E.C.D. Part # 714000. For 220 VAC +/- 10% operation the unit is equipped with slow blow 5 x 20mm 80ma Fuses, E.C.D. Part # 714001. Spare fuses may be purchased by calling East Coast Datacom or by calling the fuse manufacturer: Little Fuse at (312) 824-3024 or Shurter, Inc. at (707) 778-6311
Little Fuse Part #'s are: 160ma = 218.160 and 80ma = 218.080
Shurter, Inc. Part #'s are: 160ma = 034.3109 and 80ma = 034.3106

3.3 POWER CONNECTION

Before connecting the DMM-4 to an AC power source the top cover should be installed with the supplied #8-32 screws. AC power is supplied to the DMM-4 through a 2.3m (6.6 ft) cord terminated by a grounded 3-prong plug. Select an appropriate location accessible to and within four to five feet of an AC outlet. The AC Power source MUST be grounded or the DMM-4 Warranty will be void.

Power Connection
Figure 3-1



3.4 DEFAULT CONFIGURATION SWITCH SETTINGS

The DMM-4 is configured prior to shipping with the Internal Switches set as follows:

1) Master Port - *DCE*
2) Sub-channel Ports - *DTE*
3) Timing - *Internal*
4) CTS, Ports 1 through 4 - *Normal*
5) Switch on data, Ports 1 through 4 - *Disabled*
6) CTS Delay - *0ms*
7) Anti-Streaming - *Disabled*
8) Clock Select - *9600*
9) Async/Sync Selection - *Sync*

If your system application requires one or more of the default settings to be changed, it will be necessary to remove the top cover of the DMM-4. Remove the AC Power source or Disconnect the AC Power before servicing the unit. Removal of the top cover is accomplished by using a small Philips screwdriver and removing the four outside screws. After setting the switches, replace the top cover before applying AC power.

3.5 MODEM (DCE) AND TERMINAL (DTE) CONNECTION

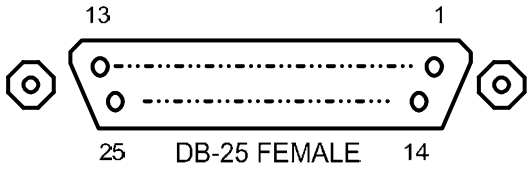
Before applying AC Power to the unit, the DCE and DTE cabling should be connected. Straight through Male-to-Male DB-25 shielded cables, no longer than 50 feet in any direction should be used.

4.0 - APPENDIX

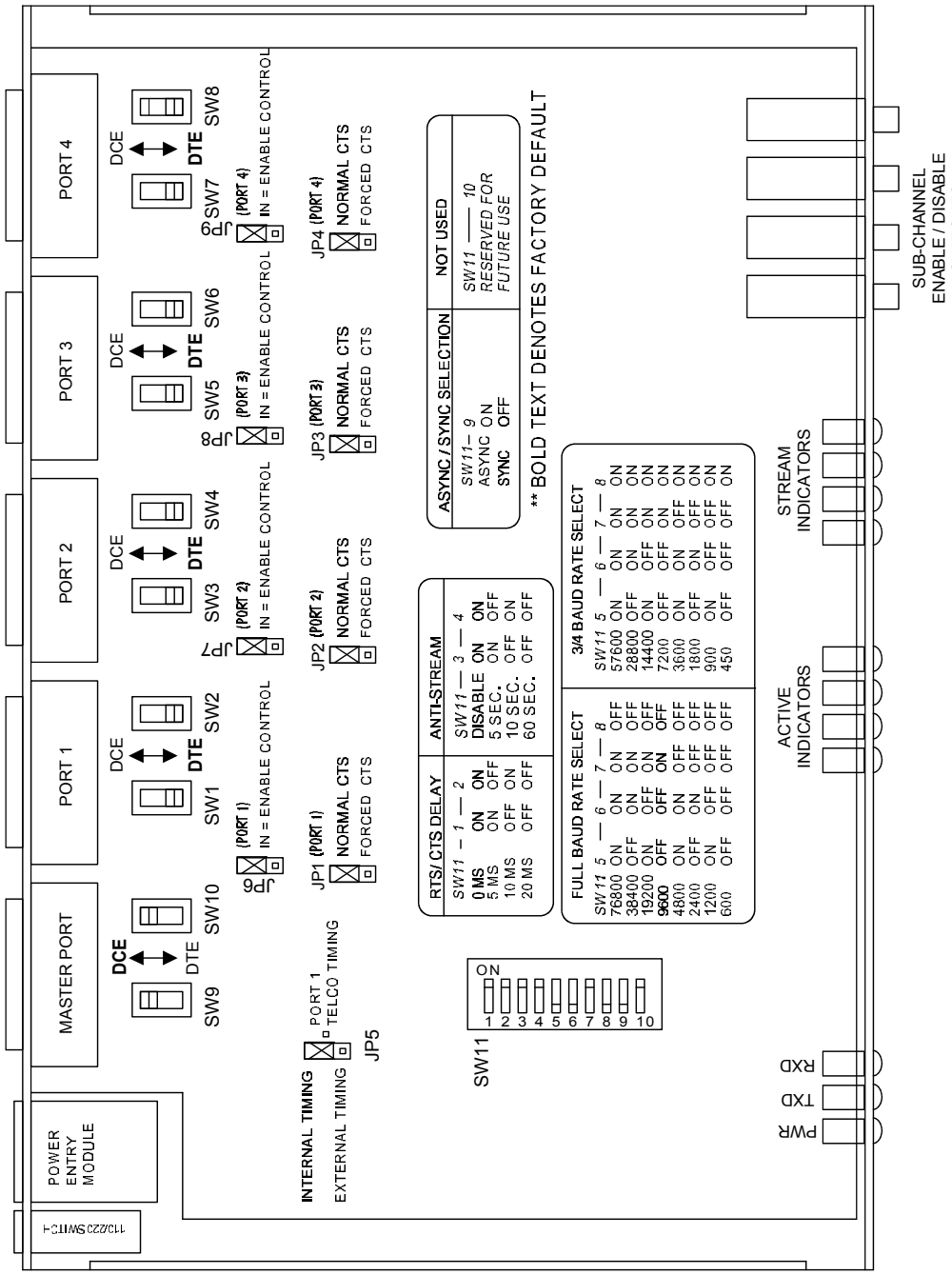
4.1 EIA INTERFACE CHART

EIA RS-232-D INTERFACE CHART (DB-25 CONNECTOR)

Pin No.	CCITT Circuit No.	Circuit Name	Signal Description	To DTE	To DCE
1	---	---	Shield	---	---
2	103	BA	Send Data		X
3	104	BB	Receive Data	X	
4	105	CA	Request To Send		X
5	106	CB	Clear To Send	X	
6	107	CC	DCE Ready	X	
7	102	AB	Signal Ground	---	---
8	109	CF	Receive Line Detector	X	
15	114	DB	Send Timing	X	
17	115	DD	Receive Timing	X	
20	108.2	CD	Terminal Ready		X
24	113	DA	External Timing		X



4.2 FACTORY DEFAULT CHART



DMM-4 FACTORY DEFAULT / SWITCH GUIDE

4.3 ADDRESSES OF STANDARDS ORGANIZATIONS

ANSI
American National Standards Institute
1430 Broadway
New York, NY 10018
Telephone: (212) 354-3300

EIA
Electronic Industries Association
2001 Eye Street, N.W.
Washington, DC 20006
Telephone: (202) 457-4966

FED-STD
General Services Administration
Specification Distribution Branch
Building 197
Washington Navy Yard
Washington, DC 20407
Telephone: (202) 472-1082

FIPS
U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650

CCITT
Outside the United States
General Secretariat
International Telecommunications Union
Place des Nations
1121 Geneva 20, Switzerland
Telephone +41 22 995111

In the United States
United States Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650

ISO
Outside the United States
International Organization for Standardization
Central Secretariat
1 rue de Varembe
CH-1211 Geneva, Switzerland
Telephone +41 22 34-12-40

Inside the United States
American National Standards Institute
1430 Broadway
New York, NY 10018
Telephone: (212) 354-3300

IEEE
The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street
New York, NY 10017
Telephone: (212) 705-7900

NBS
National Bureau of Standards
Institute for Computer Sciences and Technology
Technology Building, Room B-253
Gaithersburg, MD 20899
Telephone: (301) 921-2731

CCITT documents may be reached by calling (800) 553-6847
V.35 is a CCITT specification and is implemented per ISO 2593
The ISO documents are attainable by calling (212) 354-3300

AT&T Bell Publications documents may be reached by calling (800) 344-0223 or (800) 432-6600

5.0 - TECHNICAL SPECIFICATIONS

Application
Multiple Sync/Async DCE/DTE devices operating in a polled or contention environment, to share one DCE/DTE port

Capacity
One to Four RS-232 Sync/Async devices

Interface
EIA RS-232, CCITT V.24 using DB-25 female connectors

Data Rates
Internal: 450bps to 76.8Kbps
External: Up to 128Kbps

Data Format
Data transparent at all data rates

Timing
Internal or External

Anti-Streaming
Automatic…Selectable time out intervals
Disable……Selectable via dip switch

Terminal Service Modes
Sequential scanning for RTS, DCD control signal or Switch on Data

Front Panel
Indicators....Power, Transmit Data, Receive Data, Channel Active, Channel Stream
Switches.....Enable/Disable of each Subchannel

Power Source
100-120 to 200-220VAC @10%, 50/60Hz, 0.16/0.08A, external 110/220 volt select switch, IEC Power Inlet, (2) 5mm Fuses

Approvals
CE, UL and CSA

Environmental
Operating Temperature....32º to 122º F (0º to 50º C)
Relative Humidity.....5 to 95% Non-Condensing
Altitude.....0 to 10,000 feet

Dimensions
DMM-4
Height ..... 1.75 inches (4.44 cm)
Width ..... 17.00 inches (43.18 cm)
Length ..... 9.00 inches (22.86 cm)

Weight
4.5 pounds (2.1Kg)

Warranty
Three Years, Return To Factory

ORDERING INFORMATION
Part Number: 107000
Model: DMM-4
Description: RS-232, Digital Mixing Module

INCLUDED WITH EACH UNIT:
1) Operations Manual
2) U.S.A. Grounded Power Cord, Part # 713015
3) Optional Power Cords
   A) United Kingdom, Part # 713016
   B) Continental Europe, Part # 713017
   C) Other: Specify Country on Purchase Order

OPTIONAL ACCESSORIES
1) Spare Data Center Fuses
   A) 160ma Fuse, Qty (2) Part # 714000
   B) 80ma Fuse, Qty (2) Part # 714001