

## TABLE OF CONTENTS

<b>CHAPTER 1 - INTRODUCTION</b>	<b>Page 1</b>
1.1 FUNCTIONAL DESCRIPTION	Page 1
1.2 THEORY OF OPERATION	Page 2
<b>CHAPTER 2 - BASIC OPERATION</b>	<b>Page 2</b>
2.1 FRONT PANEL INDICATORS AND SWITCHES	Page 2
2.2 REAR PANEL CONNECTORS AND FUSES	Page 2
2.3 CLOCKING MODES	Page 2
2.4 ELECTRICAL INTERFACE	Page 3
2.5 SUBCHANNEL SERVICE MODES	Page 3
2.6 ANTI-STREAMING	Page 3
2.7 INTERNAL CLOCK SELECTION	Page 3
2.8 MANUAL DTE/DCE REMOVAL	Page 4
2.9 FALL BACK TIMING	Page 4
2.10 CASCADING OR CONCATENATION	Page 4
2.11 INDICATE (I) LEAD (PORTS 1 - 4)	Page 5
2.12 CONTROL (C) LEAD (PORTS 1 - 4)	Page 5
2.13 DCE / DTE SWITCHES	Page 5
2.14 FIFO GENERAL OPERATION (J14)	Page 5
2.15 MASTER CHANNEL FIFO (J15)	Page 5
2.16 SUB-BHANNEL PORT FIFO OPERATION (J16 - J19)	Page 5
<b>CHAPTER 3 - INSTALLATION</b>	<b>Page 6</b>
3.1 VOLTAGE SELECTION	Page 6
3.2 VOLTAGE SELECTION FUSES	Page 6
3.3 POWER CONNECTION	Page 6
3.4 DEFAULT CONFIGURATION SWITCH SETTINGS	Page 7
3.5 MODEM (DCE) AND TERMINAL (DTE) CONNECTION	Page 7
<b>4.0 - APPENDIX</b>	<b>Page 8</b>
4.1 X.21 INTERFACE CHART	Page 8
4.2 FACTORY DEFAULT CHART	Page 8
4.3 ADDRESSES OF STANDARDS ORGANIZATIONS	11

# OPERATIONS MANUAL

## DIGITAL MIXING MODULE

### DMM-X21

14 March 1997

FOR TECHNICAL SUPPORT CALL:  
East Coast Datacom, Inc.  
571 Haverty Court, STE N  
Rockledge, FL 32955 USA  
TEL: (800) 240-7948 or (407) 637-9922  
FAX: (407) 637-9980  
Email: [ecdata@ix.netcom.com](mailto:ecdata@ix.netcom.com)  
Web Site: [www.ecdata.com](http://www.ecdata.com)

*Manufactured By:*

**East Coast Datacom, Inc.**

PT # 719006-A

## **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**

The information contained herein is proprietary to East Coast Datacom, Inc. Any reproduction or redistribution of this publication, in whole or in part, is expressly prohibited unless written authorization is provided by East Coast Datacom, Inc.

## **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

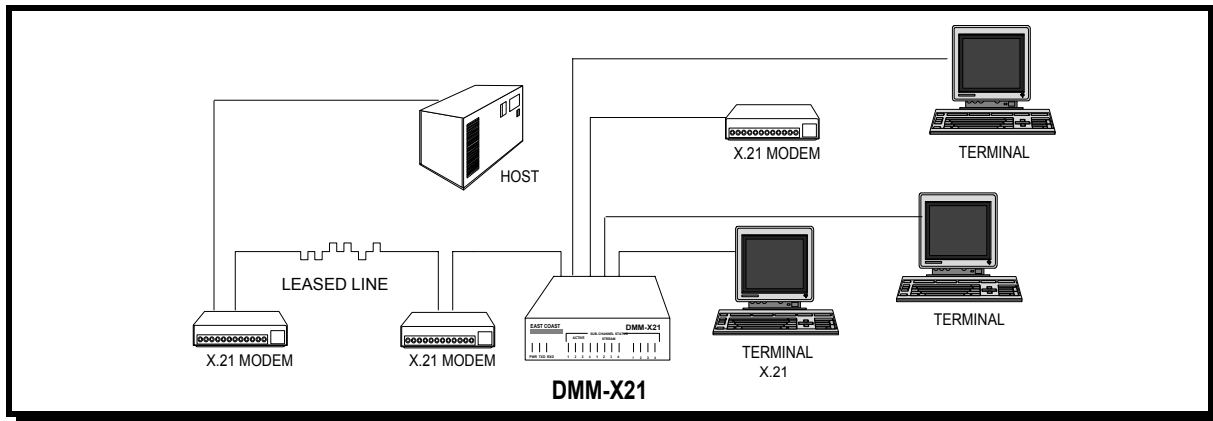
The Digital Mixing Module (DMM-X21) is a network expansion device for X.21 modem sharing or port sharing applications in broadcast, polled or contention environments. The DMM-X21 allows up to four X.21 devices to share a modem or computer port. Any combination of terminals and modems may be used in a network environment. Each port of the DMM-X21 conforms to the ITU X.21 standard and may be selected as a DCE or DTE interface.

Ideal for either synchronous or asynchronous network environments, the DMM-X21 is protocol transparent at data rates up to 1.024Mbps. The DMM-X21 has several user defined modes to configure clocking for the network and also provides fallback clocking. To prevent or minimize data transmission errors caused by clock differences throughout the network, 512bit optional FIFO buffers are provided for each channel. 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.

The Control(C) and Indicate(I) leads may be individually selected to follow the modem or forced active on a per port basis. Fallback timing circuitry is also provided in the DMM-X21.

The DMM-X21 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 rack mount metal enclosure and equipped with a 110/220 VAC switch selectable linear power supply, the DMM-X21 will provide in excess of 100,000 hours of reliable service.



TYPICAL APPLICATION

Figure 1.1

## 1.2 THEORY OF OPERATION

The DMM-X21 allows up to four DCEs or DTEs to share one DCE or DTE communications link. In a broadcast, polled or contention environment, the typical Polled Network DMM-X21 operation is as follows:

Data arriving at the DMM-X21's master port is continually broadcast to all subchannel ports. When one of the DCE or DTE devices answers a poll from the host site, that device will raise Control (C) or Indicate (I). When (C) is raised, the DMM-X21 will lock on to that port and allow that DTE device to talk to the modem link. The DMM-X21 will remain locked onto that port until (C) is dropped. After (C) has dropped, the DMM-X21 will automatically begin scanning the ports until another port raises (C) or (I).

## **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 unison 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

Set the **110/220 volt select switch** for your power requirement. The supplied power cord plugs into the IEC 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 320ma Fuses. For 220 VAC +/- 10% operation the unit is equipped with slow blow 160ma Fuses. Additionally, you will find the Master and Subchannel female DB-15 connectors.

### 2.3 CLOCKING MODES

Clocking may be set as *Master Channel (Set to DTE)* or *Channel 4 (Set to DTE)* from the attached DCE. *Internal Timing* will facilitate user defined operational speeds from 48Khz to 256Khz. Fallback Timing may also be used when the Master Port is connected to a Front End Processor (FEP) or other DTE device. In this mode, connect Port 1 to the main clock source. If Port 1 clock fails, fallback to Port 2 clock source will occur. If Port 2 clock source fails, fallback to internal clock will occur. If Port 1 or 2 clock returns, the DMM-X21 will fall forward to the active DCE clock source with Port 1 having the highest priority.

## 2.4 ELECTRICAL INTERFACE

The DMM-X21 is ITU V.11, X.21 compliant, utilizing female DB-15 connectors. Refer to the interface chart in the Appendix for detailed interface information.

## 2.5 SUBCHANNEL SERVICE MODES

The DMM-X21 incorporates circuitry that enables the user to scan each sub-channel port. An option is also provided for forcing sub-channel 4 constantly active. In the forced active mode, data will continue to be broadcast to ports 1, 2 and 3.

### 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 that raises Control (C) or Indicate (I) will have access to the communications link. After dropping (C) or (I) the DMM-X21 will continue *scanning* in sequential order.

### 2.5.2 SUBCHANNEL CONTROL(C) TO INDICATE(I) DELAY

*Control to Indicate delays* of 0, 6.5, 13 and 26ms are user selectable.

## 2.6 ANTI-STREAMING

### 2.6.1 AUTOMATIC REMOVAL

The DMM-X21 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 Control (C) *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 (Control 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 INTERNAL CLOCK SELECTION

The DMM-X21 incorporates circuitry that allows the user to select *Internal Clocks*. The selectable rates are 48Khz, 56Khz, 64Khz, 128Khz, 192Khz and 256Khz. Though X.21 is externally timed by the telco provider, the internal clock rates are very useful for testing and diagnostic purposes.

## 2.8 MANUAL DTE/DCE REMOVAL

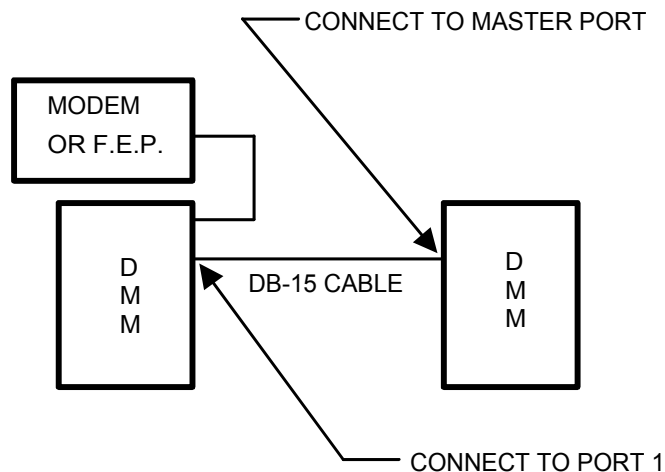
The DMM-X21 incorporates circuitry that will (when enabled) *manually* remove a streaming terminal from service. A streaming terminal is defined as a terminal that has Control (C) continually *high*. With Anti-streaming disabled, the associated streaming DTE will *NOT* illuminate a Yellow LED on the front of the DMM-X21. 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-X21. However, you still need to fix the offending DTE or DCE device that has Control (C) or Indicate (I) continually raised.

## 2.9 FALL BACK TIMING

The DMM-X21 incorporates circuitry that allows the user to provide *Fall Back Timing* to the network. The circuitry allows the user to enable or disable this function via Dip Switch. To enable fall back Timing, go to the dip switch marked S11 and move position 8 to ON. This will provide Port 1 as the main timing source. If Port 1 clock fails, the unit will automatically switch to Port 2 as the timing source. If Port 2 fails, the unit will automatically fall back to internal clock as the timing source. If Port 1 clock returns to service, the unit will automatically switch back to Port 1 timing.

## 2.10 CASCADING OR CONCATENATION

The DMM-X21 supports cascading by utilizing DB-15 Male-to-Male straight through shielded cables. *Subchannel Port 1* should be used as the concatenation port.



**CASCADING DIAGRAM**

### 2..11 INDICATE (I) LEAD

The DMM-X21 has internal jumpers for the *Indicate (I) Lead*. This option will allow Indicate(I) to follow Control(C) or to be forced active when the port is set to DCE.

### 2..12 CONTROL (C) LEAD

The DMM-X21 has internal jumpers for *Normal or Forced Control (C)*. This option will allow Control(C) to operate normally or to be forced inactive when the port is set to DTE.

### 2.13 DCE / DTE SWITCHES

Located internally are five sets of two (2) DCE/DTE slide switches directly in front of each 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 port *MUST* connect to a DTE device.  
When set to a DTE, the port *MUST* connect to a DCE device.

### 2..14 FIFO GENERAL OPERATION (J15)

This option allows the user to set the internal buffers to operate in two(2) modes; **Mode A**) FIFOs nearly fill after underrun and nearly empty after overflow (for asynchronous clocks) **Mode B**) FIFOs self-center after overrun or overflow (for isochronous clocks)

### 2..15 MASTER CHANNEL FIFO (J14)

This option allows the user to set the internal buffers to operate in two(2) modes; **Mode A**) FIFO (If present) and ring buffer data path is enabled. **Mode B**) fifo and ring buffer are bypassed (for synchronous clocks) or overflow (for isochronous clocks)

### 2..16 SUB-BHANNEL PORT FIFO OPERATION (J16 - J19)

This option allows the user to set the internal buffers to operate in two(2) modes; **Mode A**) FIFO data path is enabled. **Mode B**) FIFO data path is bypassed (for synchronous clocks or if no FIFO chip is present).



## **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 320ma (315ma) Fuses. For 220 VAC +/- 10% operation the unit is equipped with slow blow 5 x 20mm 160ma Fuses. Spare fuses may be purchased by calling East Coast Datacom or by calling the fuse manufacturer; Shurter, Inc. at (707) 778-6311 or email: 73024.2314@compuserve.com  
Shurter, Inc. Part #s are: 315ma = 034.3112 and 160ma = 034.3109

### 3.3 POWER CONNECTION

Before connecting the DMM-X21 to an AC power source the top cover should be installed with the supplied #8-32 screws. AC power is supplied to the DMM-X21 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-X21 Warranty will be void.

Power Connection  
Figure 3-1

### 3.4 DEFAULT CONFIGURATION SWITCH SETTINGS

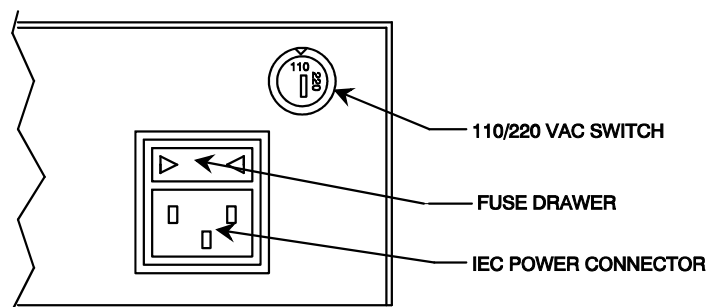
The DMM-X21 is configured prior to shipping with the Internal Switches set as follows:

- 1) Master Port - *DCE*
- 2) Sub-channel Ports - *DTE*
- 3) Timing - *External*
- 4) Control (C), Ports 1 through 4 - *Enabled*
- 5) Indicate (I), Ports 1 through 4 - *Enabled*
- 6) Control (C) to Indicate (I) Delay - *0ms*
- 7) Anti-Streaming - *Disabled*
- 8) Clock Select - *128Khz*
- 9) Fallback Timing - *Disabled*
- 10) Port 4 Mode - *Disabled* (all ports active)

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-X21. 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-15 shielded cables should be used. No crossover cables are required as each port on the unit is DCE/DTE selectable.

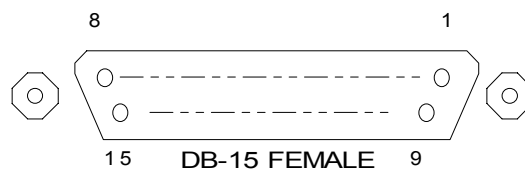


## 4.0 - APPENDIX

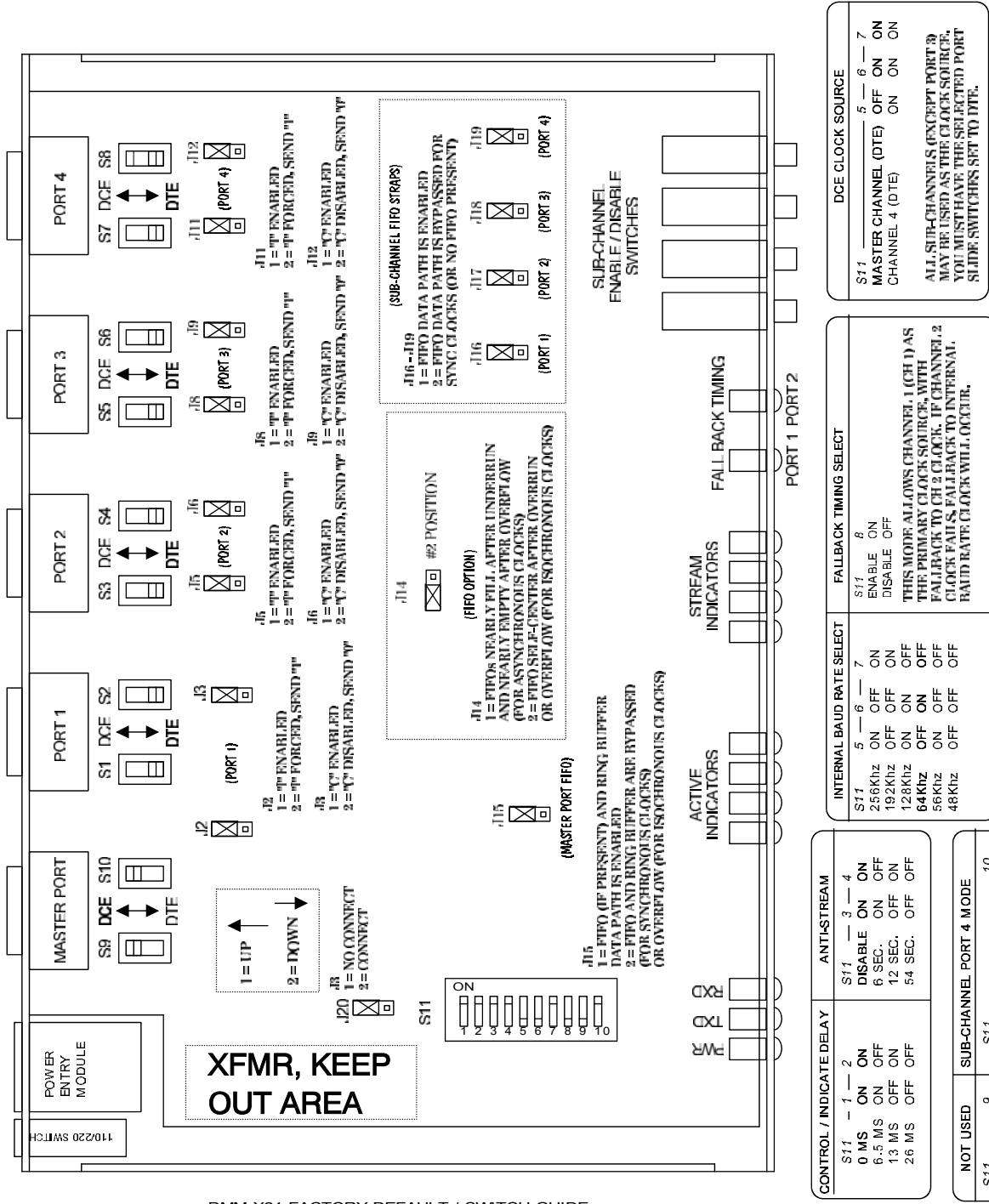
### 4.1 X.21 INTERFACE CHART

#### ITU X.21 INTERFACE CHART (DB-15 CONNECTOR)

PIN NUMBER	PIN NAME	FROM DCE	FROM DTE
1	SHIELD	-	-
2	TRANSMIT (A+)		X
3	CONTROL (A+)		X
4	RECEIVE (A+)	X	
5	INDICATE (A+)	X	
6	SIGNAL TIMING (A+)	X	
7	BYTE TIMING (A+)	X	
8	GROUND	-	-
9	TRANSMIT (B-)		X
10	CONTROL (B-)		X
11	RECEIVE (B-)	X	
12	INDICATE (B-)	X	
13	SIGNAL TIMING (B-)	X	
14	BYTE TIMING (B-)	X	
15	NOT USED		



## 4.2 FACTORY DEFAULT CHART



DMM-X21 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 X.21 Synchronous DCE or DTE devices contending in a polled environment, to share one Digital DCE or DTE interface

### Capacity

One to Four ITU X.21 devices

### Interface

ITU X.21, V.11 using DB-15 female connectors

### Data Rates

Up to 1.024Mbps

### Data Format

Data transparent at all data rates

### Timing

From Composite (Master) Port or Sub-channel Port 1

### Buffer

Up to 512 bits, FIFO principle with automatic re-centering

### Anti-Streaming

Automatic...Selectable time out intervals  
Disable.....Selectable via dip switch

### Front Panel

Indicators....Power, Send/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

### Environmental

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

### Dimensions

Height ..... 1.75 inches (4.44 cm)  
Width ..... 13.35 inches (33.09 cm)  
Length ..... 9.00 inches (22.86 cm)

### Weight

4.5 pounds (2.1Kg)

### Warranty

Three Years, Return To Factory

### ORDERING INFORMATION

Model: DMM-X11

Description: 4 Port Digital Sharing Device  
W/512bit buffers

#### 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)
  - B) 315ma Fuse, Qty (2)