Chapter 3: Front Panel Operation

Overview

This chapter describes the function and operation of the front panel user interface.

The front panel user interface can be used to:

- Change unit configuration
- Check status/faults
- Issue commands

For a compete description of the commands, refer to *Chapter 4: Remote Monitor and Control Operation.*

Keypad Definitions

Select

Press to select the next submenu or parameter.

Increase/Decrease

Press INCREASE to increment the selected parameter to its next valid value. Press DECREASE to decrement the selected parameter to its next valid value.

Enter

Press to enter the selected submenu or to register a parameter change.

Menu

Press to change to the next available submenu.

Escape

Press at any time to return to the main menu.

0-9/- (minus)/. (period)

In some cases it is quicker to enter a parameter value directly using the numerical keypad instead of incrementing or decrementing.

Operation

Main Menu

After power-up, an initialization message appears. Press any key to enter the main menu. The word System will blink to indicate it is selected.

System-Mod-Faults Menus

To navigate through the menu structure follow these steps:

1. Press ENTER to enter the system submenu structure.
2. To enter the modulator submenu structure, press SELECT to make the word "Mod" blink, then press ENTER.
3. To enter the fault submenu structure, press Select until the word "Faults" blinks, then press ENTER.

Pressing ESCAPE at any time will return you to the main menu.

LCD Contrast Control

When in the main menu, press INCREASE or DECREASE to adjust the front panel LCD display contrast.

No-Activity Mode

After five minutes of no front panel activity, the display will automatically switch to the modulator submenu #1 (output power control/monitor).

System Commands

System submenu 1

- Type
- Protocol
- Addr
- Echo

System submenu 2

- Bits
- Parity
- Baud

System submenu 3

- Lock
- Reset

System submenu 4

- Date
- Time
- Temp

Table 3-1 lists system command parameters and descriptions.

Table 3-1. System Command Parameters

Command	Parameters	Description
Type	RS232, RS-485[1]	Remote interface type
Protocol	ASCII, PACKET	Remote interface protocol
Addr	1, 2...32	Address for packet protocol
Echo	ON, OFF	Echo enable for ASCII protocol
Bits	7, 8	Bits per character
Parity	NONE, ODD, EVEN	Parity
Baud	300,600,1200,2400,4800,9600,19200	Baud rate
Lock	OFF, ON	Front panel lockout
Reset	OFF, ON	System Reset
Date	XX.XX.XX	Date
Time	XX.XX	Time
Temp[2]	0 to 50	Ambient Temperature

[1] Bold indicates factory default settings.
[2] Query Only

Modulator Commands

Modulator submenu 1

- PwrEn
- PwrLvl
- PwrMon

Modulator submenu 2

- DataRate
- QAM
- SymRate

Fault Commands

Fault submenu 1

- Current
- History
- Clear

Table 3-3 lists modulator command parameters and descriptions.

Table 3-3. Fault Command Parameters

Command	Parameters	Description
Current[2]	Verbose	Current Faults
History[2]	Verbose	Fault History
Clear	**OFF**[1], ON	Clear Fault History

[1] Bold indicates factory default settings.
[2] Query Only

Fault Lights

Current Fault

If the red fault light is lit, there exists at least one current fault. To determine what the fault is, press Select until "Current" is blinking, then press Enter. Press Increase to display the next fault (if any).

NOTE: Whenever the red fault light is lit, the orange fault light will also be lit.

Fault History

If just the orange fault light is lit, there exists at least one logged fault. This means that a fault has occurred since the last fault clear command, but is no longer present. To determine what the fault is, and when it first occurred, press Select until "History" is blinking, then press Enter. Press Increase to display the next fault (if any).

NOTE: The date/time stamp corresponds only to the first occurrence of the logged fault.

Modulator submenu 3

- Scram
- Encod
- Inter
- Diff

Modulator submenu 4

- Pure
- Bert
- DataClock

Modulator submenu 5

- ClrChn
- Filter

Table 3-2 lists modulator command parameters and descriptions.

Table 3-2. Modulator Command Parameters

Command	Parameters	Description
PwrEn	OFF, ON[1]	IF output power enable
PwrLvl	20.0 to 42.0	IF output power setting (dBmV)
PwrMon[2]	20.0 to 42.0	IF output power monitor (dBmV)
DataRate[2]	18666667, 28000000	Input data rate (bps)
QAM	16, 64	Modulation mode (affects DataRate)
SymRate[2]	5063830	Symbol rate (sps, fixed)
Scram	ON, OFF	Scrambler enable
Encod	ON, OFF	Reed-Solomon encoder enable
Inter	ON, OFF	Interleave enable
Diff	ON, OFF	Differential encoder enable
Pure	ON, OFF	Pure carrier enable
Bert	PN, OFF, 1S, 0S	Bert Mode Enable
DataClock[2]	0 to 3500000	Measured input data clock
ClrChn	ON, OFF	Clear Channel Enable
Filter	DVB, CUSTOM	Transmit Filter Type

[1] Bold indicates factory default settings.
[2] Query Only

Chapter 4: Remote Monitor and Control Operation

Overview

This chapter details the remote control operation of the CM720M. Complete monitoring and control of the unit is available to the user via a remote serial interface. The serial interface can be either RS-232 or RS-485 compatible, and can operate in either ASCII or PACKET mode.

This chapter is divided into several sections, each of which describes a group of commands. For each group, a summary of the command syntax is given, followed by detailed command descriptions.

Parameters shown in uppercase should be typed exactly as shown. Parameters shown in lowercase italics are numeric parameters. See the "Descriptions" section for information about numeric parameters.

If a parameter is enclosed in square brackets [ ], it is optional; if the parameter is also in italics, it is variable. If multiple choices are available for a parameter, they are separated by a vertical bar |.

Parameter Query

If a command has optional parameters, and you issue the command without supplying the parameter, the software displays the current value of the parameter.

Valid Commands

Command actions are performed if the:

- Command is valid
- Parameter value is within the valid range
- Parameter value or command is compatible with the present system configuration

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Descriptions

Table 4-3 lists system commands and descriptions.

Table 4-3. System Commands and Descriptions

System Command	Description
DEVCON	This command displays device configuration information, such as software version, serial number, etc.
DISPLAY	This command displays the current setting of the system parameters.
HELP	This command displays a list of all available commands. The list shows the full command name, the command name abbreviation, and the command description. If the user types HELP followed by a command name, the usage information for that command is displayed.
TYPE	This command is used to select between RS-232 and RS-485 electrical characteristics for the serial interface.
PROTOCOL	This command is used to select between ASCII protocol and PACKET protocol.
ADDRESS	This command sets the packet address for PACKET protocol. The packet address must be a whole number between 1 and 31. The packet address has no effect in ASCII protocol.
ECHO	This command enables/disables character echo in ASCII protocol. Echo has no effect in PACKET protocol.
BITS	This command set the number of bits per character for the serial interface. The choices are 7 or 8.
PARITY	This command sets the parity mode for the serial interface. The choices are odd, even, or none.
BAUDRATE	This command is used to set the baud rate for the serial interface. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600, and 19200.
FPLOCK	This command is used to enable/disable the front panel lockout. When the front panel lockout is enabled, configuration parameters cannot be changed and commands cannot be issued (except to turn off the lockout) from the front panel.
RESET	This command resets the system. It is equivalent to turning the unit power off and on.
DATE	This command is used to display and set the real-time calendar. The date parameter consists of a month, day, and year separated by periods, (3.23.1993). Spaces are not allowed between the numbers and the periods. To display the date, type DATE without any parameters. The factory default is the date of California, USA.
TIME	This command is used to display and set the real-time clock. The time parameter consists of an hour and minute separated by a period. The time is entered in 24-hour format (23.32). To display the time, type TIME without any parameters. The factory default is set to the time of California, USA (Pacific time).
TEMP	This command queries the estimated ambient temperature.
CONTRAST	This command controls the front panel LCD contrast. The level must be a whole number between 0 (lightest) and 63 (darkest). The factory default is 63.

Invalid Command Error Responses

Commands that do not follow these guidelines will return one of the error messages in Table 4-1.

Table 4-1. Command Error Messages

Error	Action
Unrecognized command	Enter the command "HELP" to get a list of valid commands.
Too many/few arguments	Enter the command "HELP XXXX" (where XXXX represents the command) to see how many arguments are expected.
No match for 1 of *n* parameters	Enter the command "HELP XXXX" to see what are valid parameters for this command.
Parameter out of range	Enter the command "HELP XXXX" to see what the valid parameter range is.

System Commands

Table 4-2 details the system command summary.

Table 4-2. System Command Summary

Mnemonic	Command	Parameters	Description
DC	DEVCON	—	Device Configuration
DP	DISPLAY	[SYSTEM | MOD]	Display parameters
HP	HELP	[cmdname]	Display command names
RT	TYPE	[RS232 | RS485][1]	Remote interface type
RP	PROTOCOL	[ASCII | PACKET]	Remote interface protocol
RA	ADDRESS	[*address*]	Remote packet address
RE	ECHO	[ON | OFF]	Remote echo enable
BT	BITS	[7 | 8]	Remote bits per character
PR	PARITY	[NONE | ODD | EVEN]	Remote parity
RB	BAUDRATE	[*rate*]	Remote baud rate
FPL	FPLOCK	[ON | OFF]	Enable / Disable Lockout
RS	RESET	—	System reset
DT	DATE	[XX.XX.XX]	Display/set current date
TI	TIME	[XX.XX]	Display/set current time
TM	TEMP[2]	—	Display temperature
LC	CONTRAST	[*level*]	LCD contrast control

[1] Bold indicates factory default setting
[2] Query only

Modulator Commands

Summary

Table 4-4 lists a summary of the modulator commands.

Table 4-4. Modulator Commands Summary

Mnemonic	Command	Parameters	Description
PE	PWREN	[ON | OFF][1]	Output power enable
PL	PWRLVL	[level]	Set output power level
PM	PWRMON[2]	—	Displays measured output power level
DR	DATARATE[2]	—	Query data rate
Q	QAM	[16 | 64]	Set QAM mode
SR	SYMRATE[2]	—	Displays symbol rate
BY	BYPASS	[SCRAM | ENCODE | INTRLV | DIFF]	Enable / disable features
PR	PURE	[ON | OFF]	Pure carrier output enable
BER	BERT	[PN | ONE | ZERO | OFF]	BERT Mode
DCK	DATACLOCK[2]	—	Measured input clock (bytes/sec)
CC	CLRCHN	[ON | OFF]	Clear Channel Enable
FLT	FILTER	[DVB | CUSTOM]	Transmit Filter Type

[1] Bold indicates factory default setting
[2] Query only

Table 4-8 is a summary of the packet mode fault bit maps for remote control.

Table 4-8. Fault Bit Maps

Bit Map	Fault
0x00000001	System Fault
0x00000002	Data In clock too slow
0x00000004	Data In clock too fast
0x00000008	Data In clock gone
0x00000010	Data in parity error
0x00000020	Data in sync loss
0x00000040	Data in frame loss
0x00000080	Input card error
0x00000100	Cooling fan failure
0x00000200	Ambient temperature too hot
0x00000400	Ambient temperature too cold
0x00000800	Loss of power detected
0x00001000	Output power level fault
0x00002000	Not defined
.	.
.	.
0x80000000	Not defined

RS-485 Interface and Packet Protocol

The RS-485 interface may be used to control multiple modulators simultaneously using the ComStream packet protocol.

RS-485 Line Settings

The RS-485 signal levels and electrical characteristics are in accordance with the EIA RS-485 full-duplex, tri-state interface bus standards. This bus is configured as a party-line with a maximum of 32 devices connected to a single bus. The connector pinout is described in Appendix A. A positive differential voltage presented at RCV (the voltage at RCV+ is greater than the voltage at RCV-), also known as space, will be interpreted as a TTL low. This is considered a start bit per EIA specification.

Fault Commands

Summary

Table 4-6. lists a summary of the fault commands.

Table 4-6. Fault Command Summary

Mnemonic	Command	Description
FP	FLTPRES	Display present faults
FH	FLTHIST	Display fault history
FC	FLTCLR	Clear fault history

Descriptions

Table 4-7 lists a summary of the fault commands and how they function.

Table 4-7. Fault Commands Descriptions

Fault Command	Description
FLTPRES	This command displays a list of the currently active faults. In ASCII mode the faults are listed in text. In packet mode a bit map of the faults is returned.
FLTHIST	This command displays a list of faults that have occurred since power-up or since the last FLTCLR command. In ASCII mode the faults are listed in text. In packet mode a bit map of the faults is returned.
FLTCLR	This command clears the fault history.

Byte Count

The byte count represents the total number of characters in the packet, including the STX and ETX. The minimum count is six; the maximum count is 127. The minimum packet has no data field (for example, STX, Byte Count, Address, Control, Checksum, ETX).

Device Address

This field indicates the destination of a packet and is bit mapped as shown in Table 4-9.

Table 4-9. Device Address Bit Map

Bit	Description
Bit 0-4	Signify the slave address
Bit 5	Always 1
Bit 6	Always 0

Control Byte

This byte provides control information to the receiving device and is bit mapped as shown in Table 4-10.

Table 4-10. Control Byte Bit Map

Purpose	Bit	Description
For host-to-slave communications:	Bit 0	Packet Acknowledgment request
	Bit 1-6	Always 0
For slave-to-host communications:	Bit 0-5	Always 0
	Bit 6	Always 1; signifies a response packet

Packet Protocol

Each ComStream packet protocol device can be controlled via the RS-485 bus interface. Each device residing on the bus has an address from 1 to 30 and responds to remote control commands containing their specific address. In the party-line configuration there is one host controller and multiple slaves.

Messages are sent between the host controller and individually addressable slaves via information packets. Each packet consists of:

- Opening character
- Byte count
- Device address
- Control information
- Data field
- Checksum
- Closing character

Received packets that do not meet the appropriate format are discarded.

A packet sent from the host may request an acknowledgment packet from the slave. The acknowledgment packet indicates whether the command just issued has been executed and provides appropriate error and/or status messages. In addition, the acknowledgment packet is an indication that the slave can receive and process another packet.

The CM720M is always an addressable slave.

Packet Format and Content

All host- or slave-generated packets have a maximum length of 127 bytes, including delimiters and checksum. Any packet with a length exceeding 127 bytes will be discarded. The packet protocol format is shown in Figure 4-1.

STX	Byte Count	Device Address	Control Byte	Data	Checksum	ETX

Figure 4-1. Packet Protocol Format

STX\ETX

These characters signify the beginning and end of a packet, respectively. Their ASCII values are STX=02h and ETX=03h.

Chapter 5: Maintenance, Operation Faults, and Troubleshooting

Overview

This chapter provides maintenance information for the CM720M. It also provides a listing of fault conditions that can occur with the CM720M.

The last section of this chapter presents information that can help troubleshoot any problems that can occur with the CM720M.

Maintenance

The CM720M does not require periodic or preventive maintenance. There are no adjustments or configuration switches or jumpers external or internal to the unit.

The power input is protected with an in-line fuse located within the power supply inside the receiver. The fuse is designed to protect the unit from internal damage in the event of a severe power line condition or internal failure.

NOTE: This fuse is NOT serviceable by the user.

A lithium battery is used to power the nonvolatile memory while power is off. The lifetime of the battery is 10 years.

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Troubleshooting

This troubleshooting section is provided to aid in isolating equipment problems and suggesting appropriate actions toward solving those problems. If a particular problem cannot be resolved after reviewing the following material, or if a ComStream equipment failure is suspected, seek further assistance by contacting your ComStream distributor. If equipment is purchased directly from ComStream, contact ComStream Customer Service for assistance.

Before Troubleshooting

Before troubleshooting the unit, answer the following questions:

- Have there been any power or bad weather problems in the area?
- Is the CM720M rack-mounted or free-standing?
- Is the CM720M near a heat-generating source?
- What is the ambient temperature? Does it exceed 50° C?
- Is the unit connected to an uninterruptible power source (UPS)?

Symptoms and Actions

Table 5-2 has been developed to help you diagnose and correct minor problems in the unlikely event that you experience difficulties with your CM720M.

Table 5-2. Troubleshooting Symptoms and Actions

Symptom	Action
Seven segment LEDs not illuminated	1. Ensure the unit is plugged into an active AC outlet and the power cord is firmly plugged into the rear panel receptacle. 2. Verify the AC power source is supplying 90 to 264 VAC, 47 to 63 Hz. 3. Ensure the power cord is not at fault by replacing it with a known working cord. 4. Ensure the power supply is functional by observing that the fans turn on. 5. If the problem persists, it indicates a possible internal fuse failure. Do NOT attempt to repair it. Contact ComStream Customer Service for technical support.

Operational Fault Messages

Table 5-1 provides a detailed description of each operational fault condition to aid in troubleshooting.

Table 5-1. Faults and Conditions

Fault	Condition
Data In Clock Too Slow	The input clock frequency is below spec. No further action has been taken. The measured input clock frequency may be queried using the DCK command.
Data In Clock Too Fast	The input clock frequency is above spec. No further action has been taken. The measured input clock frequency may be queried using the DCK command.
Data In Clock Gone	The input clock frequency is below 78 kHz. The unit has immediately switched over to internal timing (with scrambling forced on) to preserve an output spectrum.
Data In Parity Errors	At least one parity error on the incoming data has occurred. The incoming data may be noisy or the cable faulty.
Data In Sync Loss	At least one sync pattern was incorrect. The incoming data may be noisy or the cable faulty.
Data In Frame Loss	Unable to synchronize on input data. Incoming data is very noisy or cable is faulty.
Input Card Fault	At least one TAXI violation has occurred. The incoming data may be noisy or the cable faulty.
Cooling Fan Failure	This indicates that one or both fans has failed. If only one fan has failed the unit should be removed for service as soon as possible. If both fans have failed, the unit must be immediately powered down to prevent equipment damage.
Ambient Temperature Too Hot	The ambient temperature is too hot. To prevent possible operational problems and equipment damage, the ambient temperature needs to be lowered.
Ambient Temperature Too Cold	The ambient temperature is too cold. To prevent possible operational problems and equipment damage, the ambient temperature needs to be raised.
Loss of Power Detected	This fault indicates that the unit has lost power since the last time faults were cleared.
Output Power Level Fault	The measured output power level is at least 3 dB more or less than the desired level. The unit requires service. Call ComStream Customer Service.
System Failure	The unit requires service. Call ComStream Customer Service.

Chapter 6: Technical Specifications and Port Information

IF Modulator

Data Rates	18.67 Mbps, 28 Mbps ±20 ppm	
Symbol Rates	5.06383 Msps ±20 ppm	
Modulation Types	16, 64 QAM	
Code Types and Rates	Reed-Solomon 188/204, synchronous with MPEG-2 packets	
Interleaver	Convolutional, 17 x 204 bytes, synchronous with MPEG-2 packets	
Scrambling	IBS IESS-309, modified for compatibility with MPEG-2 TS packets	
IF Output		
	Frequency	44 MHz ±440 Hz
	Impedance	75 ohms
	Return Loss	> 17 dB (41 MHz ≤ f ≤ 47 MHz)
Out-of-Band (adjacent channels)		
	35 ≤ f ≤ 41 MHz	55 dB down
	47 ≤ f ≤ 53 MHz	55 dB down
Out-of-Band (non-adjacent channels)		
	23 ≤ f ≤ 35 MHz	55 dB down
	53 ≤ f ≤ 65 MHz	55 dB down
	DC ≤ f ≤ 23 MHz	40 dB down
	65 ≤ f ≤ 1,000 MHz	40 dB down
Spurious		
	35 ≤ f ≤ 53 MHz	< 57 dB
	23 ≤ f ≤ 35 MHz	< 52 dB
	53 ≤ f ≤ 65 MHz	< 52 dB
	DC ≤ f ≤ 23 MHz	< 42 dB
	65 ≤ f ≤ 1,000 MHz	< 42 dB

Table 5-2. Troubleshooting Symptoms and Actions (continued)

Symptom	Action
Unable to remotely communicate with the unit	1. Use the front panel to confirm the mode (RS-232/RS-485) of the remote interface. 2. Use the front panel to confirm that baud rate, parity, and data bits are all correct. 3. Ensure the correct terminal and cable are being used: a. Ensure an ASCII terminal or a PC with a terminal emulator program, such as PROCOMM®, is being used. b. Ensure the RS-232 cable is connected to the M&C port via the DB-9-to-DB-25 adapter cable supplied with the receiver. If the adapter cable is too short, extend it with a straight-thru cable. NOTE: If a DB-9-to-DB-9 cable is being used, the pin assignment is straight-thru. c. Verify the connection between pins 2 and 3 at both ends of the cable. 4. Once the terminal has been connected and configured, type DC followed by the enter key. If the device configuration: a. Does not display on the remote terminal, contact ComStream. b. Displays, but the DC command is not echoed to the display, ensure the command echo is enabled by entering `RE ON`. If they do not display after enabling the echo feature, contact ComStream Customer Service for technical support.
Front panel LCD display is too soft, too dark, or not visible	Adjust front panel LCD contrast.
Front panel changes are not being accepted	Check if front panel lockout is enabled.
Frame sync error, parity error, input card fault, or sync loss error reported	Integrity of input data stream is questionable. Possible cable/connector problem. Possible noise on interface. Confirm that cable is shielded.
Data In clock too slow/fast error reported	Check input clock frequency using the DCK command (DataClock on the front panel). This error is reported if the clock is more than 100 ppm off. Refer to the DATARATE command description in Chapter 4 for the relationship between symbol clock and data clock.
Clock gone error reported	Probably indicates that there is no data input. Possible cable problem.
Input data is not being transmitted	Check if BERT mode is disabled.
No input faults are being reported	Check if BERT mode is disabled.
No IF output	Check if transmit power is enabled.
IF output power level is too high/low	Check transmit power level setting. Check power monitor level.
Power monitor fault reported, power monitor reading 3 dB off	Confirm there is a 75 ohm load on the rear IF output.
Spectrum on IF test output is distorted	Confirm there is a 75 ohm load on the rear IF output.
IF output is a tone	Check if pure carrier is disabled. Check if scrambling is enabled.

Environmental

Temperature		
	Operating	0 to 50°C
	Nonoperating	-20 to 70°C
Humidity		
	Operating	5 to 95% non-condensing
	Nonoperating	5 to 95% non-condensing
Atmospheric Pressure		
	Operating	0 to 10,000 feet above sea level
	Nonoperating	0 to 10,000 feet above sea level
Electrostatic Discharge	ANSI T1.308-1990	
Vibration	Bellcore specification TR-NWT-000063, issue 4, section 4.5	
Safety/Emissions	UL 1950; CSA 950; FCC Part 15B Class A	

Rear Panel Ports

M&C Port

Interface type	Asynchronous RS-232 and addressable RS-485 multidrop using ComStream's packet protocol
Connector	DB-9, female
Default parameters	9600, 7 data bits, odd parity, 1 stop bit, RS-232
Functions	Unit configuration, diagnostics, and status; connects to ASCII terminal

Signal-to-Noise	> 47 dBc (measured in a bandwidth of 5.0638 MHz centered at 44 MHz)
Intermodulation Noise	> 50 dBc (measured in a bandwidth of 5.0638 MHz centered at 44 MHz)
Transmit Power	
Resolution	0.2 dB steps
Accuracy	±0.5 dB
On/Off Isolation	> 60 dB
Spectral Shape	Square root raised cosine 18% roll-off
Modulator Timing	External
Throughput Delay	< 3 milliseconds
MTBF	>44,000 hours (5 years)

Mechanical

Size	1.75" H x 19" W x 18" D (standard 19" rack-mount)
Weight	< 12 pounds
Shipping weight	< 24 pounds

Power

Input voltage (AC)	90 to 264 VAC
Frequency	47 to 63 Hz
Consumption	50 W (typical) 55 W (maximum) SR=5 M 58 W (typical) 63 W (maximum) SR =7 M

Appendix A: Interface Pinouts

Digital Data Input Port

The definition of the RF-45 port that is used to receive digital data is shown in Table A-1.

Table A-1. Shielded RJ-45 Jack

Pin #	I/O	Name	Description
1	I	SERIN+	Serial Data In +
2	I	SERIN-	Serial Data In -
3	—	—	Not Used
4	—	—	Not Used
5	—	—	Not Used
6	—	—	Not Used
7	—	—	Not Used
8	—	—	Not Used

M&C Port

The definition of the DB-9 connector used in the RS-232 mode of remote control is shown in Table A-2.

Table A-2. DB-9 Female, RS-232 Mode

Pin #	I/O	Name	Description
1	O	DCD	—
2	O	RXD	Receive Data
3	I	TXD	Transmit Data
4	—	—	Reserved
5	—	GND	Signal Ground
6	O	DSR	Data Set Ready
7	I	RTS	Request To Send
8	O	CTS	Clear To Send
9	—	—	Reserved

Digital Data Input Port

Interface type	AMD TAXI receiver; 10 bits per byte, 5 M reference clock
Connector	RJ-45, shielded
Default parameters	18.6667 Mbps or 28.0000 Mbps for 16 QAM or 64 QAM, respectively
Functions	Receives digital data from MPEG-2 data source

The definition of the DB-9 connector used in the RS-485 mode of remote control is shown in Table A-3.

Table A-3. DB-9 Female, RS-485 Mode

Pin #	I/O	Name	Description
1	—	GND	Signal Ground
2	—	—	Reserved
3	I	XMIT+	Transmit Data +
4	—	—	Reserved
5	O	RCV+	Receive Data +
6	—	—	Reserved
7	I	XMIT-	Transmit Data -
8	—	—	Reserved
9	O	RCV-	Receive Data -

M&C Port Adapter Cable (DB-9-to-DB-25)

The M&C Port Adapter Cable connects the CDTV720M with a 25-pin, RS-232 port as shown in Table A-4. This cable is VT-100 compatible and is supplied with the unit.

Table A-4. M&C Port Adapter Cable

Male DB-9	Female DB-25
1	8
2	3
3	2
4	20
5	7
6	6
7	4
8	5
9	22

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The instructions and procedures are easy to follow.	1	2	3	4	N/A
The illustrations are accurate.	1	2	3	4	N/A
The illustrations help clarify the text.	1	2	3	4	N/A
The number of illustrations is about right.	1	2	3	4	N/A

Please answer these questions.

What did you like about this manual? _____

What would you change in this manual? _____

What would you like to see in this manual? _____

What other comments about the manual do you have? _____

Please tell us a little about yourself.

Is this your first ComStream product? ___ Yes ___ No

How many years have you been installing, operating, or using digital satellite communications equipment? ☐ Less than 1 year ☐ 1-2 ☐ 3-5 ☐ 6-10 ☐ More than 10

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