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

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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