Installation and Operation Manual

OM 1000
Out-of-band Modulator
Software Version 3.5

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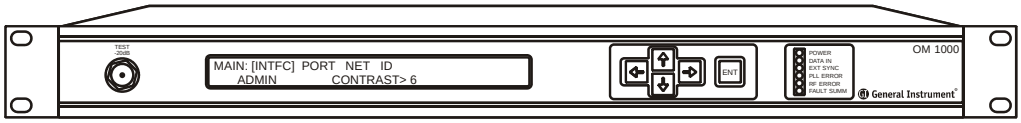
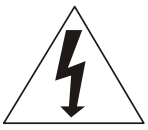


Caution

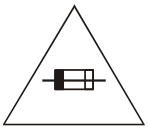
These servicing instructions are for use by qualified personnel only. To reduce the risk of electrical shock, do not perform any servicing other than that contained in the Installation and Troubleshooting Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

Special Symbols That Might Appear on the Equipment



This symbol indicates that dangerous voltage levels are present within the equipment. These voltages are not insulated and may be of sufficient strength to cause serious bodily injury when touched. The symbol may also appear on schematics.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important installation, servicing, and operating instructions in the documents accompanying the equipment.



For continued protection against fire replace all fuses only with fuses having the same electrical ratings marked at the location of the fuse.

Electrostatic discharge (ESD) can damage the unit and circuit card assemblies. Wear an antistatic wrist strap attached to a chassis ground to prevent ESD damage.

This equipment operates over the marked Voltage and Frequency range without requiring manual setting of any selector switches. Different types of line cord sets may be used for connections to the mains supply circuit and should comply with the electrical code requirements of the country of use. This equipment requires a grounding conductor in the line cord.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. THE APPARATUS SHALL NOT BE EXPOSED TO DRIPPING OR SPLASHING AND NO OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, SHALL BE PLACED ON THE APPARATUS.

CAUTION: TO PREVENT ELECTRICAL SHOCK, IF THIS UNIT IS PROVIDED WITH A POLARIZED PLUG, DO NOT CONNECT THE PLUG INTO AN EXTENSION CORD, RECEPTACLE, OR OTHER OUTLET UNLESS THE PLUG CAN BE FULLY INSERTED WITH NO PART OF THE BLADES EXPOSED.

CAUTION: TO ENSURE REGULATORY AND SAFETY COMPLIANCE, USE ONLY THE PROVIDED POWER CABLES.

It is recommended that the customer install an AC surge arrestor in the AC outlet to which this device is connected. This is to avoid damaging the equipment by local lightning strikes and other electrical surges.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Installation Manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. Any changes or modifications not expressly approved by Motorola could void the user's authority to operate this equipment under the rules and regulations of the FCC.

Canadian Compliance

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

FDA Compliance

This product meets the requirements of the Code of Federal Regulations, Title 21, Chapter I, Subchapter J, Sections 1010.2, 1010.3, 1040.10, and 1040.11.

International Declaration of Conformity

We

Motorola, Inc.
101 Tournament Drive
Horsham, PA 19044, U.S.A.

declare under our sole responsibility that the

Out-of-Band-Modulator Model OM 1000

to which this declaration relates is in conformity with one or more of the following standards:

EMC Standards

EN55022 EN55024 EN55013 EN50083-2 CISPR-22 CISPR-24 CISPR-13

Safety Standards

EN60065 EN60825 EN50083-1 EN60950 IEC 60950 + A1: 1992 + A2: 1993 + A3: 1995 + A4: 1996

IEC60065

following the provisions of the Directive(s) of the Council of the European Union:

EMC Directive 89/336/EEC Directive 93/68/EEC Low Voltage Directive 73/23/EEC

Use only main line cord that complies with the country's product safety requirements.

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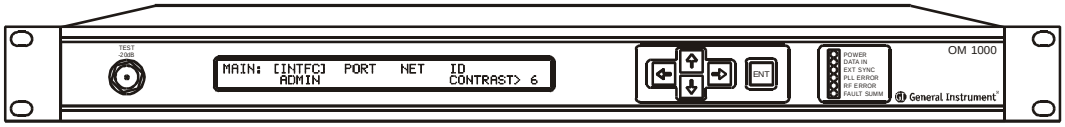
Section 1

Introduction

The Motorola OM 1000 Out-of-band Modulator links the digital headend equipment with the distribution system by combining the various out-of-band inputs into a quadrature phase shift key (QPSK)-modulated signal. It converts multiple digital input streams into a RF output signal for transmission over the cable system.

Figure 1-1 illustrates the OM 1000:

Figure 1-1
OM 1000



The OM 1000:

- Receives Ethernet User Datagram Protocol (UDP) packets from a controlling processor
- Multiplexes downstream data from multiple sources
- Provides forward error correction (FEC) encoding of the bitstream, as well as interleaving and randomization
- Provides downstream QPSK-modulated output within the 71 to 129 MHz range
- Provides industry-standard Ethernet 10Base-T connectivity for operation, administration, maintenance, and provisioning (OAM&P)
- Performs periodic insertion of internally stored messages
- Controls and provides status/alarm reporting using Simple Network Management Protocol (SNMP)

Using this Manual

The following sections provide information and instructions to install, configure, and operate the OM 1000:

Section 1	**Introduction** provides a product description, related documentation, the technical helpline, and repair/return information.
Section 2	**Overview** describes functions of the OM 1000.
Section 3	**Installation** provides instructions on how to install the OM 1000.
Section 4	**Setup and Operation** provides instructions on how to set up and operate the OM 1000.
Section 5	**Troubleshooting** provides problem solving, testing, and maintenance information.
Appendix A	**Specifications** provides the technical specifications for the OM 1000.
Appendix B	**Cabling Specifications** provides cabling requirements.
Appendix C	**Initialization Information** provides special information on the OM 1000 initialization process, such as BOOTP.
Glossary	The **Glossary** provides the full spelling of abbreviations and acronyms and definitions of the special terms used in this manual.

Related Documentation

Although these documents provide information that may be of interest to you, they are not required to install or operate the OM 1000:

- *C6U Commander 6® Upconverter Installation Manual*
- *HCT 1000 Headend Configuration Tool (HCT) User Guide*

Document Conventions

Before you begin using the OM 1000, familiarize yourself with the stylistic conventions used in this manual:

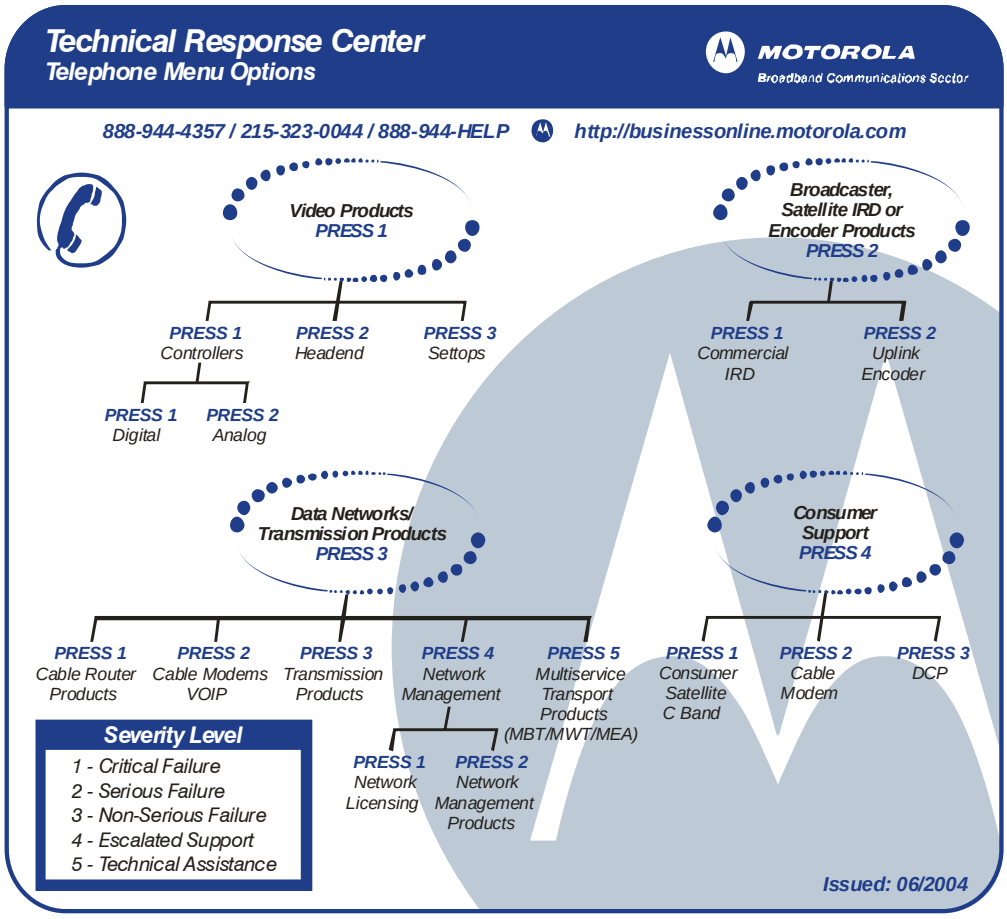
SMALL CAPS	Denotes silk screening on the equipment, typically representing front and rear-panel controls, input/output (I/O) connections, and LEDs
*** (asterisk)**	Indicates that several versions of the same model number exist and the information applies to all models; when the information applies to a specific model, the complete model number is given
Italic type	Used for emphasis
`Courier font`	Displayed text
`Bold`	Indicates text you must type exactly as it appears, a selection item, or a default value.

If You Need Help

If you need assistance while working with the OM 1000, contact the Motorola Technical Response Center (TRC):

- Inside the U.S.: **1-888-944-HELP** (**1-888-944-4357**)
- Outside the U.S.: **215-323-0044**
- Motorola Online: http://businessonline.motorola.com

The TRC is on call 24 hours a day, 7 days a week. In addition, Motorola Online offers a searchable solutions database, technical documentation, and low-priority issue creation and tracking.



Calling for Repairs

If repair is necessary, call the Motorola Repair Facility at **1-800-642-0442** for a Return for Service Authorization (RSA) number before sending the unit. The RSA number must be prominently displayed on all equipment cartons. The Repair Facility is open from 7:00 AM to 4:00 PM Pacific Time, Monday through Friday.

When calling from outside the United States, use the appropriate international access code and then call **52-631-311-1100** to contact the Repair Facility.

When shipping equipment for repair, follow these steps:

1. Pack the unit securely.
2. Complete and enclose the checklist provided with the unit.
3. Enclose a copy of the invoice that verifies the warranty status.
4. Ship the unit **PREPAID** to the following address:

   Motorola, Inc.
   Broadband Communications Sector
   c/o Excel
   Attn: RSA #_____
   6908 East Century Park Drive
   Suite 100
   Tucson, AZ 85706

Section 2
Overview

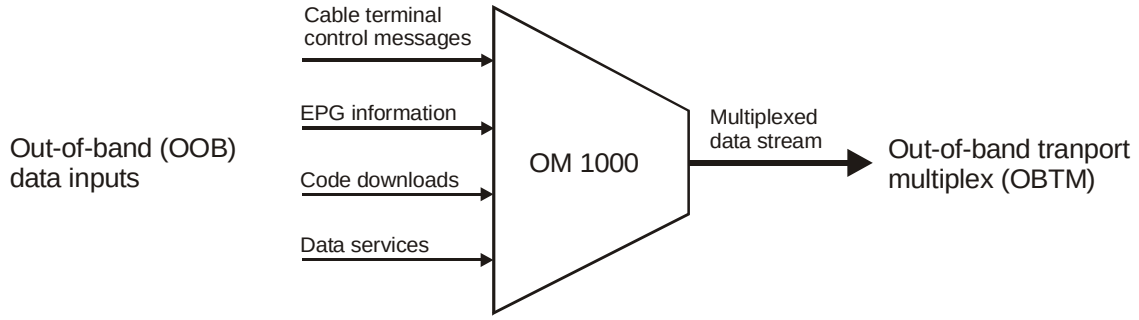
The Motorola OM 1000 creates a QPSK-modulated signal to carry the out-of-band (OOB) datastream of a digital CATV system from the headend set-tops installed in subscribers' homes. The OOB datastream is the control link through which the headend transmits the commands and authorization messages that control the set-tops distributed throughout the CATV system. The headend can also use the OOB datastream to deliver other types of information, including:

- Electronic program guide (EPG) information
- Application code downloads
- Control messages for emergency situations
- Data services
- Executable code downloads to fix or upgrade cable terminal operation

Other devices in the headend create the specific commands, messages, and downloadable code that make up the information contained in the OOB datastream. The OM 1000 accepts this information and processes it for delivery on the OOB channel by combining it into a Motion Picture Expert Group-2 (MPEG-2) compliant transport multiplex and outputting that transport multiplex as an RF signal. Other output formats are also available to support specific application requirements.

Figure 2-1 illustrates the operational flow through the OM 1000:

Figure 2-1
OM 1000 operational flow diagram



Functional Overview

The primary function of the OM 1000 is to combine multiple OOB data inputs into a single datastream that is transmitted over the OOB channel as an RF signal. The OM 1000 also provides serial data communications to transmit and receive baseband digital data over various serial data ports.

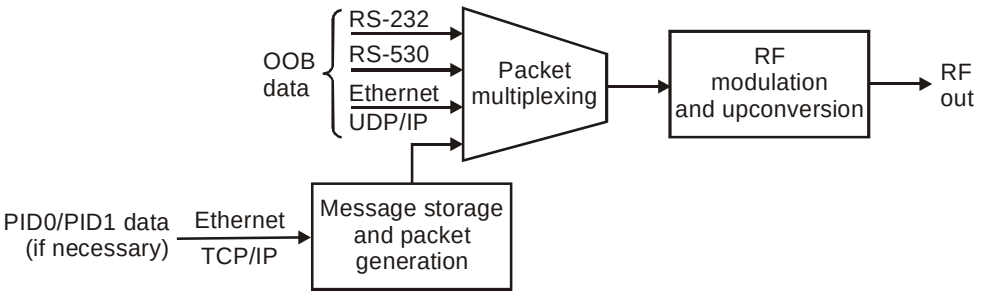
OOB Signal Processing

In converting the OOB data inputs into an RF signal, the OM 1000 performs the following OOB signal processing functions:

- Receives the cable terminal control stream and other OOB data from multiple input sources.
- Multiplexes the information into a single, packet-based, MPEG-2-compliant transport stream.
- Inserts Packet Identifier 0 (PID 0) and PID 1 control streams into the transport stream if necessary.
- Modulates the digital transport stream onto a 1.5 MHz-wide RF carrier using QPSK modulation.
- Upconverts the resulting signal into an RF output with a center frequency in the 71 through 129 MHz range. (An IF output is available for optional external upconversion to other frequencies.)

Figure 2-2 shows the typical flow of OOB data from the input port(s) through the packet multiplexer to the RF modulator:

Figure 2-2
OOB data flow through the OM 1000



Receiving OOB Data Inputs

The OM 1000 can receive OOB data through multiple input ports. All data ports are located on the back panel and each has a unique numeric identifier. Table 2-1 describes the OM 1000 input ports:

Table 2-1
OM 1000 input ports

Port Type	Description
RS-232 DB9 serial data	A standard RS-232 serial data port (asynchronous only) receives EPG information, code download, and other OOB data types. In some systems, an RS-232 port is configured to receive cable-terminal control-stream information instead of, or in conjunction with, the Ethernet port.
Ethernet	The standard Ethernet port is the primary input to the OM 1000. Because it is an Ethernet connection, it supports communication with multiple devices over the same physical port.
Generator port	The MPEG message generator is a virtual input-only port that supplies MPEG messages at periodic intervals to the output ports configured by the datapipe. The control interface sets the insertion interval, availability status, and the message data.
RS-232 or RS-530 DB25 serial data	The optional RS-232 and/or RS-530 serial data ports are expansion ports. These ports are used in the same way as the RS-232 serial port and can be configured for input or output operation. Refer to the operate.txt file in Appendix C, “Initialization Information” for configuration information.

In general, OOB data input to the OM 1000 must be in MPEG-2 transport packets. Data sent to configure, control, and boot the OM 1000 need not conform to MPEG-2 format.

Multiplexing the OOB Data

The packet multiplexer combines OOB data from the Ethernet and serial input ports into a single MPEG-2-compliant transport multiplex, and then routes this multiplex to the RF modulator. The multiplexer can also accept input data from special internal sources (for example, PID 0 and PID 1 control data) if necessary.

CAUTION

The aggregate input rate of all data to be combined into the RF output must not exceed 2.005 Mbps. If the rate is lower than 2.005 Mbps, the multiplexer will add null packets to achieve the correct data rate. If the aggregate input rate is higher than 2.005 Mbps, the multiplexer will drop packets.

The main destination for most OOB data is the RF modulator; however, the multiplexer can route data to other output destinations. Each input packet stream can be routed to up to three different output destinations. Table 2-2 lists the available destinations:

Table 2-2
Multiplexer output destinations

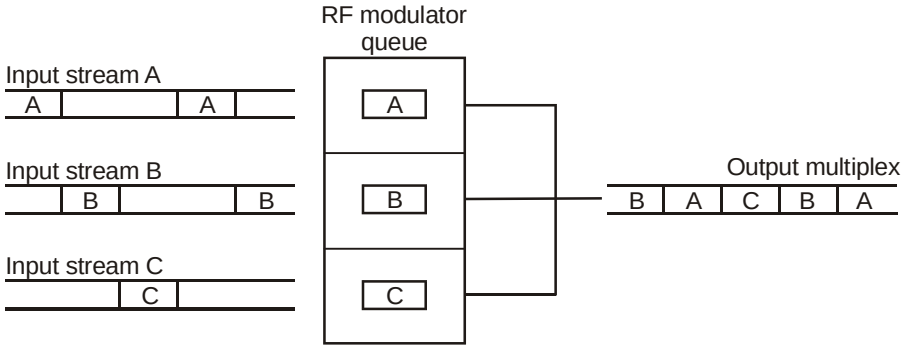
Destination	Description
RF modulator	The RF modulator uses QPSK modulation to convert an MPEG-2-compliant transport multiplex into a 1.5 MHz-wide RF signal with a center frequency from 71 through 129 MHz. Data directed to this destination is output from the RF OUT and IF OUT connectors on the OM 1000 back panel.
Serial data ports	Data directed to a serial data port is output as a serial datastream. The serial data ports are valid destinations only when configured as output or bi-directional ports.
User Datagram Protocol (UDP) connections over the Ethernet port	Data directed to a UDP port is output as a serial datastream. The UDP connections are valid destinations only when configured as output ports. A legal UDP port number must be assigned to each connection, and the IP address of the receiving device must be configured.
Null port	The null port is a conceptual destination equivalent to routing a packet to nowhere (that is, discarding the packet).

Because of the number of possible input sources and output destinations, the OM 1000 relies on a collection of data-handling specifications called PID maps to support the proper multiplexing and routing of data through the packet multiplexer. One set of PID maps is defined for each input port to control how the multiplexer handles packets from those streams. Within the set for a port, a single PID map controls the handling of one packet stream, and each set includes a default PID map to control the handling of packet streams having no explicit PID mapping.

The multiplexer uses a queuing scheme to transfer packets from input ports to output buffers. Each destination has a dedicated queue composed of multiple data buffers set up to handle packets from particular input packet streams. As an input packet enters a given input port, the packet multiplexer reads the stream PID map and transfers the packet to the correct output destination queue. To generate the output multiplex for a given destination, the multiplexer extracts packets from the destination queue by taking one packet from each buffer in a round-robin fashion.

Figure 2-3 illustrates how the packet multiplexer uses a destination queue to create an output multiplex:

Figure 2-3
Creating an output multiplex



In this example, the multiplexer routes three different input packet streams labeled A, B, and C to the RF modulator for output. As a packet from stream A enters the queue, the multiplexer transfers it to its associated buffer in the RF modulator destination queue. The multiplexer handles packets from streams B and C in the same way.

The multiplexer then builds the output multiplex for the RF modulator by extracting packets from each buffer in the RF modulator queue in sequence (that is, one packet from the A buffer, one from the B buffer, and so on).

The input devices that supply the data control the PID numbers assigned to incoming packet streams. As a result, it is possible that packet streams received from two different devices use the same PID number. To avoid collision of these packets when multiplexed for output, the OM 1000 re-assigns the PID numbers of streams routed to the same destination. PID numbers can be re-assigned to any value or left unchanged, as necessary, to guarantee PID uniqueness in the output. PID number re-assignment for a packet stream is defined in the PID map for that stream.

Inserting PID 0 and PID 1 Control Streams

Depending on your system configuration, the Digital Consumer Terminal (DCT) control-stream input to the OM 1000 can include the PID 0 and PID 1 control streams required to define the OOB transport multiplex. If not, these streams are added to the multiplex before it is input to the RF modulator.

The internal MPEG message stores the PID 0 and PID 1 control streams received from the DAC 6000 and inserts packets containing messages from these streams into the multiplexer at defined intervals. The messages are input to the internal MPEG message generator through the Ethernet and they include data to PID 0 and PID 1 packets, as well as commands specifying how often the generator should insert the packets into the multiplexer.

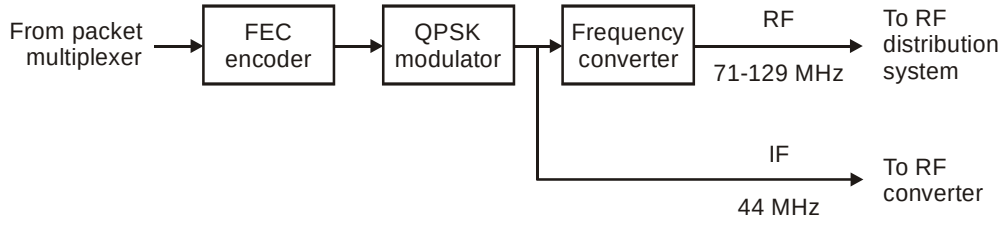
Generating the RF Output

The RF modulator receives the OOB data transport multiplex created by the packet multiplexer and performs the following functions to convert it for RF transmission:

Forward error correction (FEC) encoding	An FEC encoder performs Reed/Solomon encoding, data interleaving, and data randomization to reduce transmission errors.
QPSK modulation	A QPSK modulator converts the digital information in the OOB transport multiplex into a synthesized analog waveform. The waveform is a 1.5 MHz-wide signal with a carrier frequency centered at 44 MHz (IF).
Frequency upconversion	A frequency-agile converter processes the QPSK-modulated 44 MHz IF signal to an RF output frequency configurable from 71 through 129 MHz.

Figure 2-4 shows a block diagram of the RF modulator:

Figure 2-4
RF modulator block diagram



Generating Serial Data Outputs

Depending on the routing, multiplexing, and PID re-assignment definitions contained in the PID maps, the packet multiplexer directs input packets to serial data port destination queues and multiplexes them into output datastreams in the same way it routes and multiplexes data for the RF modulator.

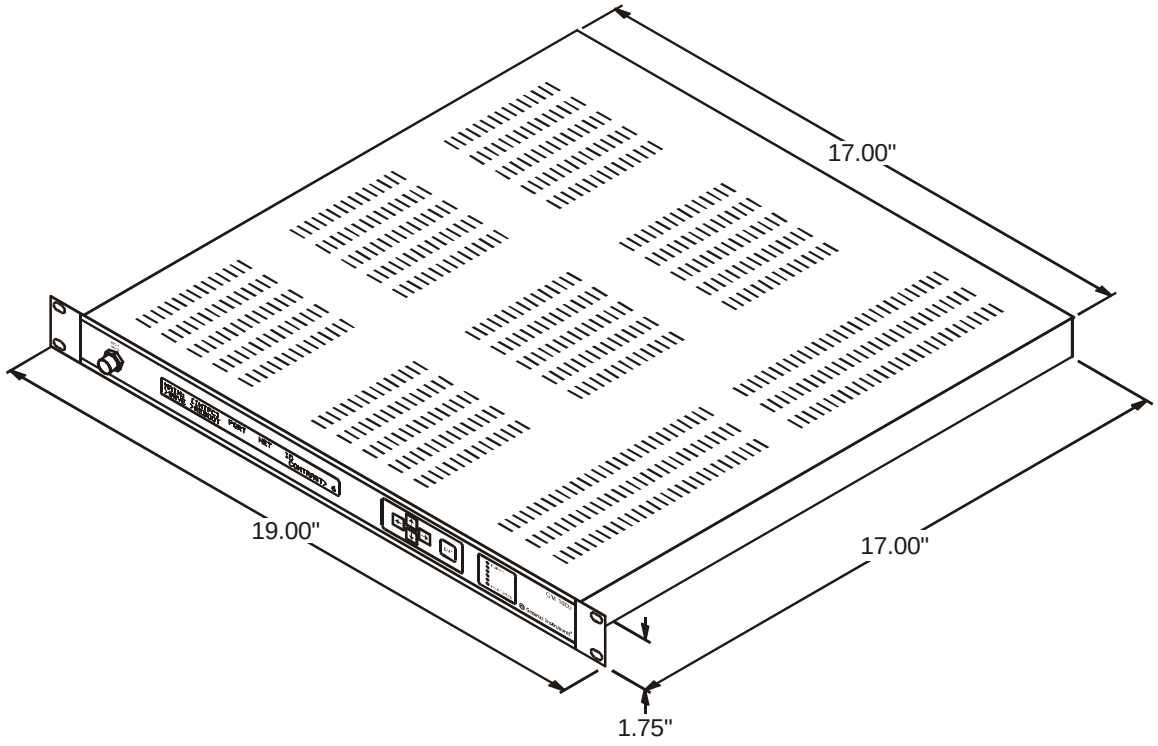
Serial data ports must be configured as output ports to be valid output destinations.

Physical Overview

The OM 1000 chassis mounts in a standard 19-inch equipment rack in a digital headend, network hub office, or network end office. It occupies one rack unit (1.75 vertical inches) and requires a blank panel with one rack unit of space above and below it for cooling airflow.

Figure 2-5 illustrates the OM 1000 and its physical dimension:

Figure 2-5
OM 1000 dimensions



Refer to Appendix A, “Specifications” for complete physical, electrical, and environmental specifications.

Controls and Indicators

The OM 1000 controls and indicators, as well as the RF monitor jack, are located on the front panel. Figure 2-6 illustrates the front-panel controls and indicators:

Figure 2-6
OM 1000 front panel

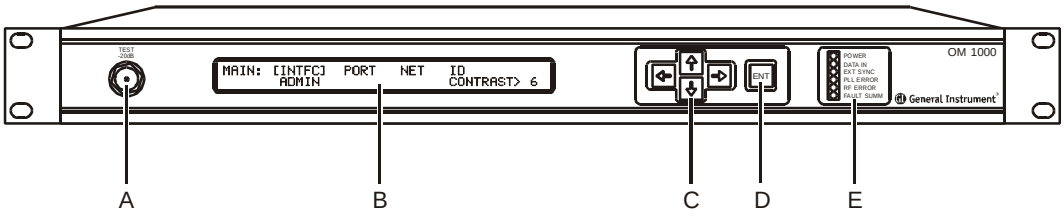


Table 2-3 summarizes the function of the RF monitor jack and each control/indicator:

Table 2-3
OM 1000 front panel RF monitor jack, controls, and indicators

Key	Control/Indicator	Description
A		–20 dB TEST RF monitor jack enables convenient monitoring of the RF output at the front panel. This is an F-type connector.
B		The status display is a two-line, 40-character-per-line, dot-matrix, high-contrast backlit LCD.
C		The menu select keys are a four-button cluster of up/down and left/right keys that enable configuration and setup of OM 1000 operating modes. The keys are set flush with the level of the front panel to minimize the potential for accidental operation.
D		The ENT key enables activation of keypad data. It adds security by preventing single-button operation from changing the unit configuration.
E		The LEDs indicate OM 1000 operating status and error conditions. Refer to Section 5, “Troubleshooting”, for details on each status LED.

Input/Output and Power Connections

All input, output, and power connections to and from the OM 1000 are made at the rear panel, which is illustrated in Figure 2-7:

Figure 2-7
Rear-panel

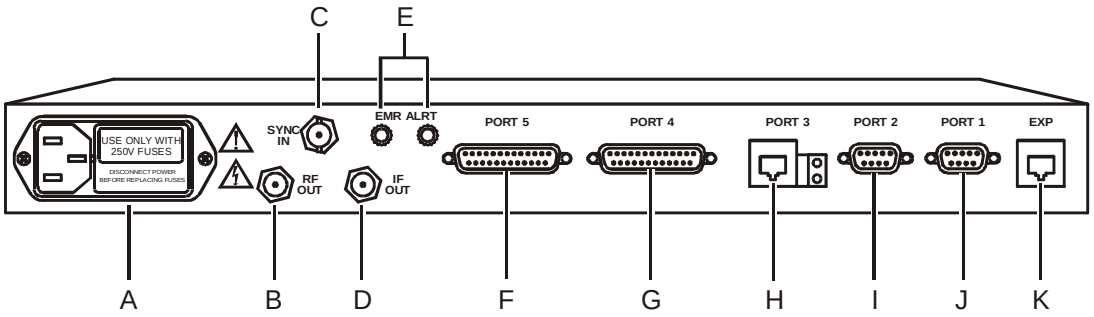
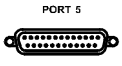
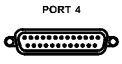


Table 2-4
OM 1000 input/output and power connections

Key	Connector	Description
A		The ac power input accepts any input from 100 through 240 Vac at 50 through 60 Hz. The fuse is a 2 amp slow blow, 250 Vac.
B		The RF OUT provides 71 through 129 MHz RF output for distribution. This is an F-type connector.
C		The sync in BNC connector provides for symbol rate sync input from an external source. The required input frequency is 4.096 MHz ± 0.01%. The input signal level is 6 through 8 V p-p.
D		THE IF OUT provides a 44 MHz IF output signal that can be used with an external upconverter to generate any other desired center frequency for RF distribution.
E		The EMR ALRT connectors are of the binding post type and part of the emergency alert system circuitry. This circuitry enables civil authorities to deliver emergency warnings to cable subscribers. The black post connects to ground. The red post connects to an emergency alert remote control unit.
F		PORT 5 is an optional DB25 male (DTE) connector. This RS-530 or RS-232 port that connects to an optional module within the unit, permitting interface of the OM 1000 with additional signals.
G		PORT 4 is an optional DB25 male (DTE) connector. This RS-530 or RS-232 port that connects to an optional module within the unit permitting interface of the OM 1000 with additional signals.
H		PORT 3 is an RJ-45 connector for Ethernet 10Base-T IEEE 802.3. This Ethernet port is for input/output data communications. Receipt or transmission of data is indicated by blinking LEDs.
I		PORT 2 is a DB9-pin RS-232 communications port used for data input/output.

Key	Connector	Description
J		PORT 1 is a DB9-pin RS-232 communications port used for console terminal (diagnostic) communications. Reserved for future use.
K		EXP is an RJ-45 type connector. The use of this port is not currently supported.

Section 3
Installation

This section provides step-by-step instructions to install the OM 1000 in a digital CATV headend. To complete this process, you must:

- Mount the OM 1000
- Connect the interface cables
- Apply power to the unit
- Confirm that the front-panel LEDs indicate correct installation

Before You Begin

Before you begin the installation, take a few minutes to review the installation information, gather special tools, and complete the tasks listed below to make the installation as quick and easy as possible.

1 Verify that you received the following items with the OM 1000 shipment:

Item	Quantity	Description
OM 1000	1	Cabinet containing the RF modulator and related equipment
Mounting screws with plastic washers	4	Provided to mount the unit in the rack

2 Acquire the following items that are not included with the OM 1000, but are necessary to complete the installation:

Item	Description
Ethernet cable with RJ-45 connectors	Required to connect to the Ethernet connector; this cable must use shielded twisted pair (Category 5 STP)
RF coaxial cable with F-type connectors	Required to connect to the RF OUT and IF OUT connectors
Serial data cable with female DB-9 connectors	Required to connect to the RS-232 I/O port (optional)
Serial data cables with female DB-25 connectors	Required to connect to OPT 1 and OPT 2 ports (optional)
Power cord with a male IEC 320-1 connector	Required to connect to the ac-power circuit

CAUTION!

The power cord must use 18-AWG, stranded-wire cable with a 3-conductor plug appropriate for your ac-power outlet. Using the wrong power cord will damage the OM 1000.

3 Obtain or fabricate any necessary cables. Check the cabling guidelines provided in Appendix B, "Cabling Specifications," for the length restrictions, connector, and cable or wire type for each connection required for your system.

4 Brace the unit with optional rear supports for improved stability when mounting the OM 1000 into the equipment rack.

Mounting the OM 1000

Mount the OM 1000 in a standard 19-inch rack. Provide an open space of 1.75 inches above and below the unit to allow the free flow of air. If the equipment operates continuously in a closed cabinet, use forced-air circulation to ensure maximum equipment life and optimum performance.

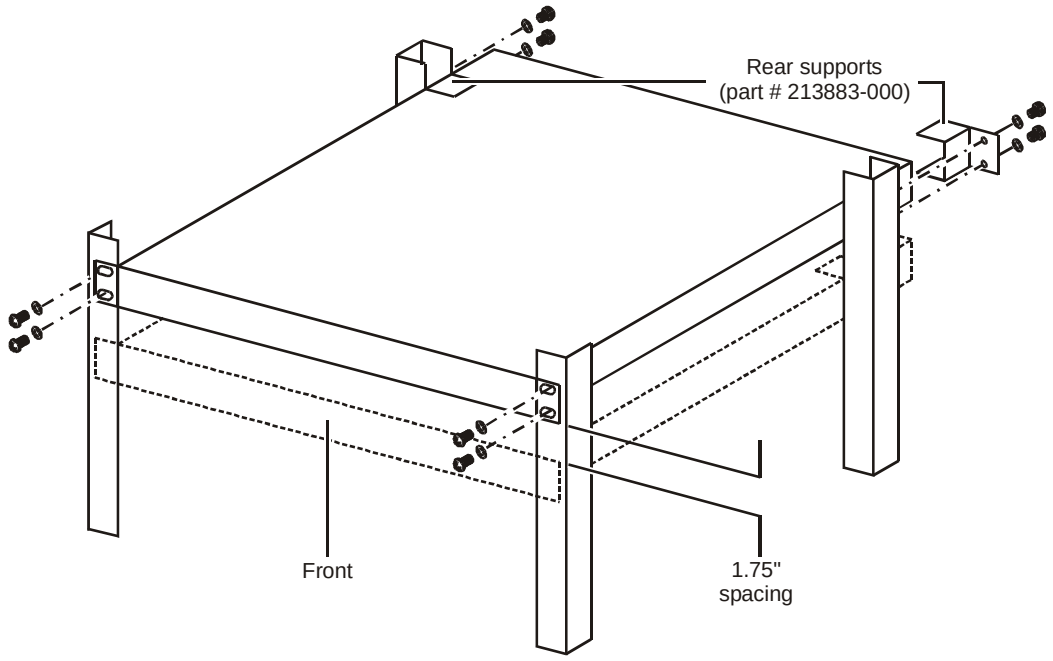
CAUTION!

Improper grounding may damage the OM 1000. Refer to the national guidelines or local standards for the OM 1000 proper grounding to equipment racks and to the building grounding system.

To mount the unit in the rack:

1 Insert the four screws with the washers through the four mounting holes in the front panel and into the mounting holes in the rack, as illustrated in Figure 3-1:

Figure 3-1
Rack mounting



2 Install the optional rear supports, if desired, (part # 213883-000) to improve stability.

3 Tighten all screws.

Connecting the Interface Cables

The following standard cabling is required:

- The Ethernet interface to the headend LAN
- RF or IF output to the distribution system

Depending on your site configuration, you may need additional cabling to:

- The RS-232 DB9 interface to the serial data source or destination device
- The DB25 interfaces, either RS-232 or RS-530, to the serial data source or destination device
- Optional ground wire connection

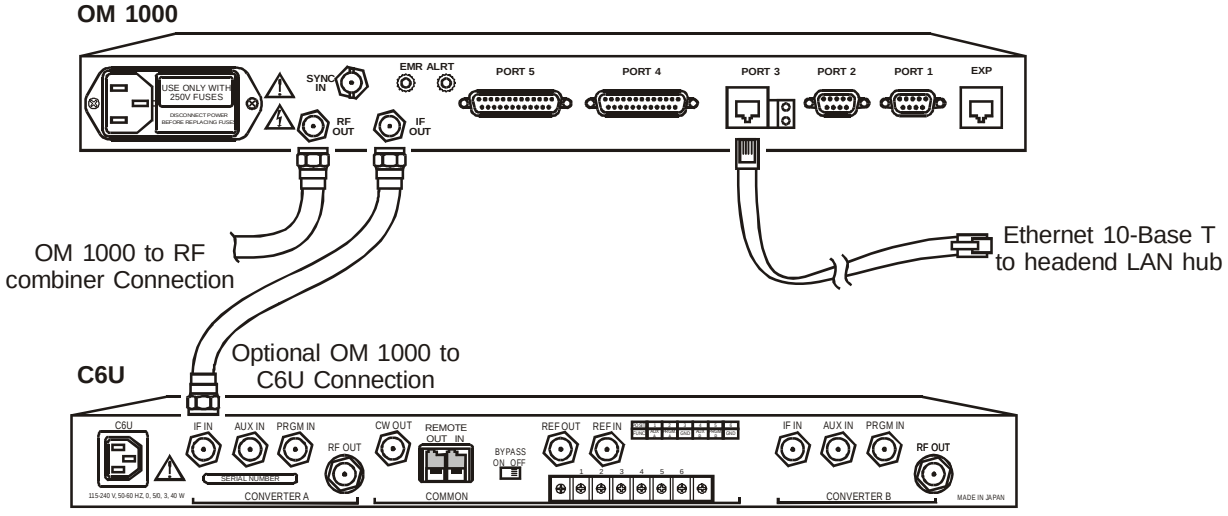
CAUTION!

> To avoid possible damage to the OM 1000, ensure that the ac-power cord is disconnected before connecting any I/O cables.

Connecting Ethernet and Modulator Output Cables

For most applications, the RF modulator must be connected to the distribution system. Figure 3-2 illustrates a typical connection for Ethernet and modulator output. In the illustration, the IF output is connected to a C6U; however, other upconverters can be used:

Figure 3-2
OM 1000 Ethernet and modulator output connection



To connect the Ethernet and RF-modulator output cables:

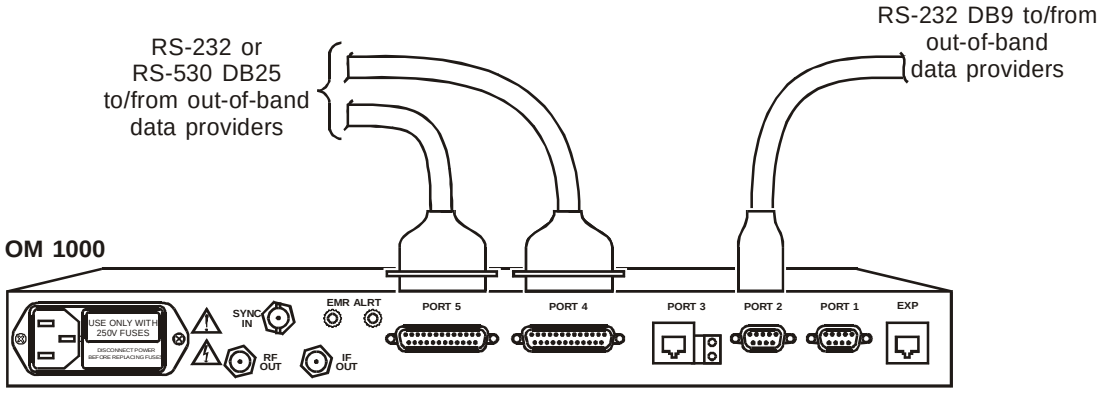
- Connect the Ethernet cable to the rear-panel connector marked ETHERNET.
- Connect the RF combiner to the rear-panel connector marked RF OUT using standard coaxial cable with F-type connectors.
- Connect the upconverter to the IF OUT connector using standard coaxial cable with F-type connectors.

Connecting Optional Serial Port Cables

To connect to a serial port:

1 Align the male pins on the DB9 connector with the female connector marked RS-232 I/O as illustrated in Figure 3-3:

Figure 3-3
OM 1000 optional serial and interface output connection



2 Push the cable in until the connector is fully engaged. Do not bend the pins.

3 Align the captive screws on the connector with the threaded standoffs and then tighten the screws.

4 Align the male pins on the DB25 connector with the female connector marked OPT1.

5 Push the cable in until the connector is fully engaged. Do not bend the pins.

6 Align the captive screws on the connector with the threaded standoffs on the back of the unit and then tighten the screws.

7 Repeat steps 4 through 6 for the female connector marked OPT2.

Connecting the Optional Ground

Connect a ground wire from the OM 1000 to the rack frame using a #10-32 screw.

Connecting the Power Cable

Use only an AC-power cord that complies with the country's product safety requirements.

CAUTION!

To prevent electrical shock, do not use the polarized power cord with an extension cord, receptacle, or other outlet unless all blades can be fully inserted to prevent blade exposure.

Connect the AC-power cord *after* all I/O connections are complete. The power supply automatically senses and adapts to any input from 85 through 264 Vac, at 47 through 63 Hz. The OM 1000 meets all specifications with an AC input from 100 through 240 Vac, 50 through 60 Hz.

Confirming Correct Installation

After applying power to the OM 1000, there is short initialization period. If the installation is correct, verify:

- The green POWER indicator is on and the LCD displays the MAIN menu.
- The PLL ERROR, RF ERROR, and FAULT SUMM LEDs may illuminate red to indicate the RF modulator is not set up in the INTFC menu and enabled in the PORT menu.

When the above sequence is observed, the unit can be configured. Refer to Section 4, "Setup and Operation" for information on preparing the unit for operation. If the above conditions do not occur, refer to Section 5, "Troubleshooting."

Section 4
Setup and Operation

At power-up, the OM 1000 operating parameters are set either by data stored internally in flash memory or by data downloaded from a Bootstrap Protocol (BOOTP) server on the headend LAN. The method used depends on your system configuration.

After you set the initial operating parameters, you can modify the configuration by:

- Entering new parameter settings at the OM 1000 front panel
- Forcing a reboot to download a new configuration from the BOOTP server
- Sending commands from a Simple Network Management Protocol (SNMP) network manager

This section provides information to help you configure the OM 1000 from the front-panel controls. For information on downloading data from a BOOTP server, refer to Appendix C, "Initialization Information."

Using the Front-Panel Interface

The OM 1000 front-panel interface includes an LCD and a set of cursor control keys that enable you to set and change operating parameters. The LCD provides a series of menus showing specific OM 1000 parameter settings. The menus provide:

- Display-only information that you cannot select or change
- Parameter settings that you can select and modify
- Navigational aids that enable access to other menus

Figure 4-1 illustrates a typical display. The menu name, OAM&P, is display-only; the SUBNET and IP options are changeable parameters.

Figure 4-1
Sample OM 1000 configuration menu

To branch to other menus, use the UP and MORE (not shown) options as navigation aids.

In general, changeable parameters are preceded by a greater than symbol (>). Scroll lists and directly editable fields display available options. Navigate from option to option on a menu using the left (←) and right (→) arrow keys on the cursor-control keypad. To select an option, press ENT. Use the up (↑) and down (↓) arrow keys to scroll through the selections and then press ENT to enable the option.

CAUTION!

Any changes you make to operate parameters apply only to the current OM 1000 operating cycle and will be lost when you power down the unit. To save changes to flash memory as default settings at subsequent power ups, select SAVE from the ADMIN menu and then press ENT. At OK, press ENT to confirm.

Menus

OM 1000 front-panel LCD functionality is partitioned into six menus as listed in Table 4-1:

Table 4-1
Menus

Menu	Title	Function
MAIN	Main	Provides access to the other menus to configure physical ports, logical ports, and the network. It also provides unit identification and access to OM 1000 administrative functions.
ADMIN	Administrative	Provides access to submenus to Save, Reboot, and Purge and Reboot the OM 1000.
INTFC	Physical Interface	Provides the submenus to view and/or configure physical port selections 1 through 7: **1** Console (RS-232) **2** RS-530/RS-232 **3** Ethernet **4** Optional RS-530/RS-232 **5** Optional RS-530/RS-232 **6** RF Modulator **7** MPEG Message Generator
PORT	Logical Ports	Provides the submenus to configure up to 16 logical ports, associate a physical input or output port to a logical port, define a PID map for an input port associated to a logical port, define a UDP for an Ethernet input port associated to a logical port, and define a destination IP address for an output Ethernet port associated to a logical port.
NET	Network	Primarily used to set the OM 1000 IP address, subnet mask, and port protocol.
ID	Identification	Provides hardware version, software version, inventory code information, and physical location (rack and shelf) of the OM 1000.

Factory Default Menu Settings

The power-up sequence configures the OM 1000 with the following factory default settings:

- MAIN - CONTRAST = 6.
  (MAIN menu contrast level is 6.)
- INTFC 2 - DATA RATE = 9600
  (Physical port 2 RS-232 I/O rear panel port is set to 9600 baud, asynchronous only.)
- INTFC 6 - FREQ = 75.25 MHz, LEVEL = 35, MODE = OPERATE
  (Physical port 6 frequency is set to 75.25 MHz, output level is 35, and in operate mode.)
- PORT [01] – INTFC = 6/MOD, OUT, UNLCKD
  (Logical port 1 RF modulator output port is enabled.)
- PORT [02] - PID GEN, IN, UNLCKD,
  PIDTBL Output Destination = 1
  (Logical port 2 MPEG message generator is enabled as an input port and routed to logical port 1.)
- PORT [03] – INTFC = 3/ETHERNET, SRC-UDP = 5157, UNLCKD,
  PIDTBL Output Destination = 1
  (Logical port 3 Ethernet is enabled as an input port, source UDP 5157, and routed to logical port 1.)
- NET OAM&P - IP and SUBNET addresses set in BOOTP configuration
  (OAM&P IP and subnet addresses are set in the BOOTP configuration.)
- NET CTRL:HOST - NOHOST (IP address 0.0.0.0, set in `OM1000.hst` file)
  (Host control status is set to no host in the `OM1000.hst` file.)
- NET CTRL SVC - DAC2OM2 = 5167/tcp (set in `OM1000.svc` file)
  (The DAC 6000-to-OM 1000 TCP/IP service connection is set to 5167 in the `OM1000.svc` file.)

To change the factory default settings, enter the changes at the front panel (or edit the configuration data in the `config.ini` file). This section provides menu procedures to set up the OM 1000 from the front panel. Some of the menu procedures are supplemental, as they do not directly alter operating settings of the OM 1000; however, proficiency with these menus is also required:

- MAIN Menu
- ADMIN Menu
  - ADMIN Menu—Saving and Implementing Changes
  - ADMIN Menu—Rebooting the OM 1000
  - ADMIN Menu—Purging the OM 1000 Software
- INTFC Menu—Modifying the Physical Port Default Settings
  - INTFC 1 Menu—Viewing Port 1 (RS-232 Console Port) Settings
  - INTFC 2 Menu—Setting Up Port 2 (RS-530/RS-232)
  - INTFC 3 Menu—Setting Up Port 3 (Ethernet)
  - INTFC 4/INTFC 5 Menu—Setting Up Ports 4 and 5 (Optional RS-530/RS-232)
  - INTFC 6 Menu—Setting Up Port 6 (RF Modulator)
    - Spectrum Analyzer Procedure—Setting the Modulator Output Signal Level in Operate Mode
    - Spectrum Analyzer Procedure—Setting the Modulator Output Signal Level in 2T Test Mode
  - INTFC 7 Menu—Viewing the Internal MPEG Message Generator Port
- PORT Menu—Setting Up Logical Ports
  - PORT Menu—Setting PID Maps (Input Ports Only)
  - PORT Menu—Setting PID Maps for Ethernet Input Ports
  - PORT Menu—Setting PID Maps for Non-Ethernet Input Ports
  - PORT Menu—Setting Logical Non-Ethernet Input Ports
  - PORT Menu—Setting Receive Multicast IP Addresses (Logical Ethernet Input Ports Only)
  - PORT Menu—Setting Up Logical Ethernet Output Ports
- NET Menu—Setting UP the Network
  - NET Menu—Setting Up OAM&P
  - NET Menu—Setting Up the CTRL (Control) Menu Options
  - NET Menu—Setting Up SNMP
- ID Menu—Displaying Unit Data
  - ID Menu—UNIT Menu Options
  - ID Menu—SW (Software) Menu Options
  - ID Menu—LOC (Location) Menu Options

MAIN Menu

The OM 1000 is shipped with generic application settings stored in flash memory. When you boot the unit from flash memory, the menu displays the initialization parameters followed by Ethernet test results.

At the end of the power-up sequence, the OM 1000 displays the MAIN menu, shown in Figure 4-2:

Figure 4-2
OM 1000 MAIN menu

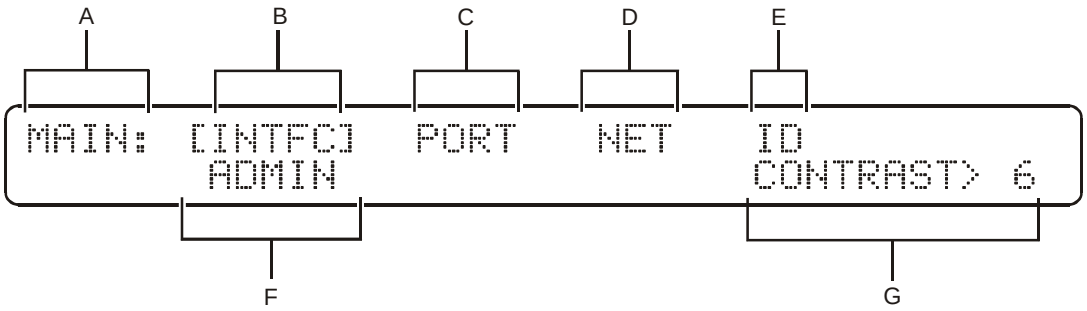


Table 4-2 describes the labels and available menu options:

Table 4-2
MAIN menu options

Key	Field	Description
A	MAIN	Identifies the menu. This option is an information-only label.
B	INTFC	Displays the physical port configuration setup menus.
C	PORT	Displays the logical port configuration setup menus.
D	NET	Displays the network setup menus.
E	ID	Displays the unit identification menu.
F	ADMIN	Displays the Administrative menu.
G	CONTRAST	Displays the contrast adjustment parameter. This option increases or decreases the contrast within a range of 0 to 16.

ADMIN Menu

The OM 1000 displays the ADMIN (Administrative) menu after selecting it on the MAIN menu, as illustrated in Figure 4-3:

Figure 4-3
ADMIN menu

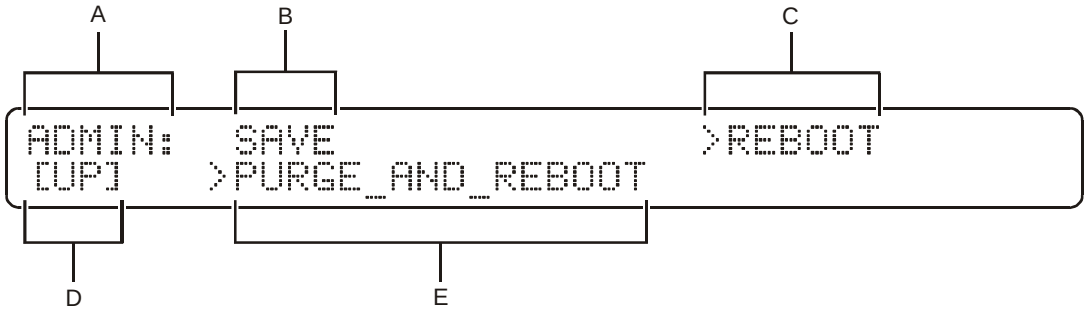


Table 4-3 defines the features and available options:

Table 4-3
ADMIN menu options

Key	Field	Description
A	ADMIN	Display-only field identifies the current menu.
B	SAVE	Saves the current configuration changes to flash memory. Select the **SAVE** option and press ↑ or ↓ to confirm that you want to save the configuration changes. When the unit displays OK, press **ENT** to save the changes.
C	REBOOT	Reboots the OM 1000. Select the **REBOOT** option and press ↑ or ↓ to confirm that you want to reboot the OM 1000. When the unit displays OK, press **ENT** to reboot.
D	UP	Returns to the MAIN OM 1000 menu.
E	PURGE AND REBOOT	Deletes the current OM 1000 software files and reboots the unit. The OM 1000 configuration file is not deleted during this process. The OM 1000 will download new software files from the BOOTP server if the OM 1000 is connected to your LAN.

CAUTION!

Do not use the PURGE AND REBOOT option unless the OM 1000 is connected to a BOOTP server on your LAN; the OM 1000 will not download new application image files and will not be rebooted if it is not connected to a BOOTP server. Using the PURGE AND REBOOT option when not connected to a valid BOOTP server will result in a nonoperating OM 1000.

ADMIN Menu—Saving and Implementing Changes

When you change a configuration parameter through the front-panel operator interface, the change is not implemented until it is saved and the OM 1000 is rebooted. Use the following method to save your configuration changes:

1. Select **ADMIN** on the MAIN menu (Figure 4-2), and then press **ENT** to display the Administrative menu.
2. Select **SAVE** on the Administrative menu (Figure 4-3), and then press **ENT**.
3. Press ↑. When the unit displays OK, press **ENT** to store the changes to flash memory.

CAUTION!

If the BOOTP server is on the local network, any configuration changes made from the front panel are overwritten by the default parameters in the dynamic configuration file after a reboot or a power cycle if the configuration file is forced to be downloaded from the BOOTP server.

ADMIN Menu—Rebooting the OM 1000

Use the following procedure to reboot your OM 1000:

1. Select **ADMIN** on the MAIN menu (Figure 4-2) and then press **ENT** to display the Administrative menu.
2. Select **REBOOT** on the Administrative menu (Figure 4-3), and then press **ENT**.
3. Press ↑. When the unit displays OK, press **ENT** to reboot the OM 1000.

   The boot process has three phases:

   - Power-on self-test
   - Mini-boot
   - Application load and execute

The power-on self-test is an internal RAM test and executes only during a power-on cold boot. The OM 1000 will not perform this test during a reboot from the front panel.

The OM 1000 initializes boot file systems during the mini-boot phase. The boot program copies the initialization files from flash memory to a RAM disk. After the boot program stores the initialization files on the RAM disk, the unit broadcasts BOOTP requests over the Ethernet for up to 10 seconds.

If the OM 1000 receives a response from the server, a new boot file transfers to the OM 1000 through the Ethernet. The information in the BOOTP response includes the unit IP address and subnet mask, the IP address of the host server, and the full path name of the boot file. The OM 1000 compares the filenames in the boot file to the files stored in internal memory. If a filename is different than the internally stored data, the unit replaces the stored boot file with the boot file from the server. If a response is not received, operation and configuration data stored in internal memory controls the OM 1000 until a power-down or until the configurations are changed at the front panel.

ADMIN Menu—Purging the OM 1000 Software

Use the following procedure to purge the OM 1000 software and reboot the unit:

1. Select **ADMIN** on the MAIN menu (Figure 4-2) and then press **ENT** to display the Administrative menu.
2. Select **PURGE AND REBOOT** on the OM 1000 Administrative menu (Figure 4-3), and then press **ENT**.
3. Press ↑. When the unit displays OK, press **ENT** to execute the purge operation of the OM 1000 (the OM 1000 will reboot as a result of this operation).

   This command is used to ensure that current software files are deleted before reloading the OM 1000 with new software. The OM 1000 software consists of multiple files; since future revisions of the OM 1000 software may not use all current files, this command ensures there is enough space in flash memory to load a new version of the software.

   This operation does not delete the configuration settings in flash memory.

CAUTION!

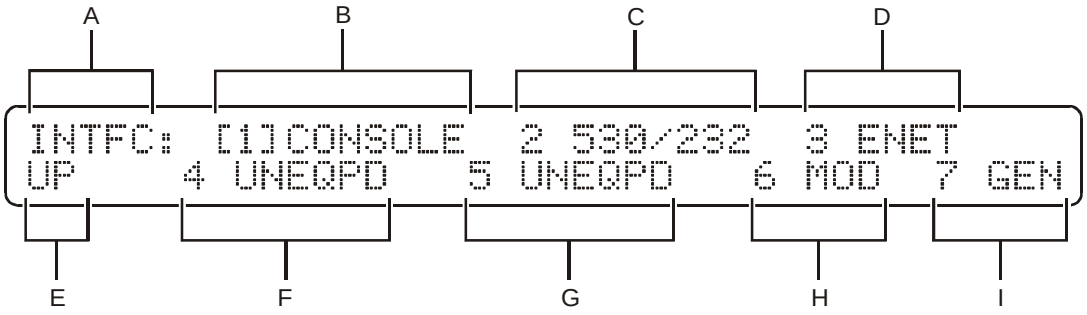
If the BOOTP server is NOT on the local network, the OM 1000 will not be reloaded with software and will not be rebooted. Erasing OM 1000 software should only be done when a new version of OM 1000 software is to be loaded onto the OM 1000.

NTFC Menu—Modifying the Physical Port Default Settings

To modify the physical port default settings:

1 Select **INTFC** on the MAIN menu and then press **ENT** to display the INTFC menu illustrated in Figure 4-4:

Figure 4-4
INTFC menu



2 Press ↑ or ↓ to select the port to configure and then press **ENT**.

3 Use Table 4-4 to set up ports 2, 4, 5, and 6. The table describes the configurable menu items for these ports.

4 After configuring the menu items, select **UP** and then press **ENT** to display the MAIN menu.

Table 4-4 describes the fields and available options:

Table 4-4
Configuring the physical ports

Key	Field	Description
A	INTFC:	Identifies the menu.
B	1 CONSOLE	Displays the internal console settings for PORT 1. The console port is accessible from the rear panel. It provides asynchronous communications at 9600 baud and cannot be reconfigured at the front panel. It is used only for maintenance.
C	2 530/232	Configures the operating parameters for PORT 2. This port is configured for asynchronous communications, and the data rate is configured from 300 bps through 19.2 Kbps.
D	3 ENET	Displays the operating parameters for PORT 3. A display-only field displays the MAC address; a selection for the Time-To-Live (TTL) setting, a selection for enabling or disabling IGMP, and a menu selection for the multicast MAC receive address assigned to the OM 1000 at the factory.
E	UP	Displays the MAIN menu.
F	4	Configures the operating parameters for optional PORT 4. Configure the data and baud options as described for PORT 2, if present. Select async or sync (internal clock, external clock, or slv on rx clock). The INTFC menu displays UNEQPD if the communications board is not present and configured. Refer to the `operate.txt` file in Appendix C, “Initialization Information.”

Key	Field	Description
G	5	Configures operating parameters for optional PORT 5. Configure the data and baud options as described for PORT 2, if present. Select async or sync (internal clock, external clock, or slv on rx clock). The INTFC menu displays UNEQPD if the communications board is not present and configured. Refer to the `operate.txt` file in Appendix C, "Initialization Information."
H	6 MOD	Displays the INTFC 6 menu. Refer to Setting up PORT 6 (the RF modulator) for instructions on setting up the modulator port.
I	7 GEN	Displays the INTFC 7 menu that shows the MPEG message generator port, for example, GEN_PORT 03 EA-PID 1503H.

INTFC 1 Menu—Viewing PORT 1 (RS-232 Console Port) Settings

To view the RS-232 console port setting, select **1 CONSOLE** and then press **ENT**. The menu displays asynchronous communications at 9600 baud.

INTFC 2 Menu—Setting Up PORT 2 (RS-530/RS-232)

To configure operating parameters for PORT 2:

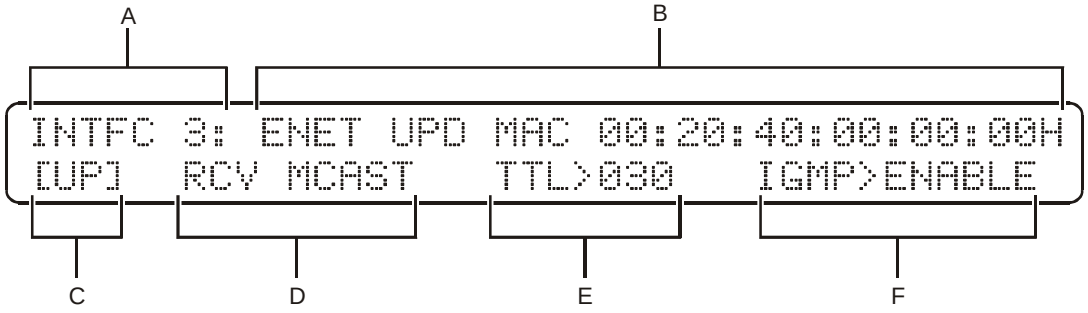
1. Select **2 530/232** and then press **ENT** to display the RS-232 menu.
2. Select the **data rate field**, press ↑ or ↓ to select the **data rate** (300, 600, 1200, 2400, 4800, 9600, 19.2K), and then press **ENT**.

INTFC 3 Menu—Setting Up PORT 3 (Ethernet)

To configure operating parameters for PORT 3:

1. Select **3 ENET** and then press **ENT** to display the fields for the MAC address, TTL settings, IGMP settings, and a menu selection for the assigned multicast MAC receive address. Figure 4-5 illustrates the INTFC 3-ENET menu:

Figure 4-5
INTFC 3 ENET menu



2 Select **RCV MCAST** to display the default multicast MAC receive address and the corresponding multicast receive IP address, as illustrated in Figure 4-6:

Figure 4-6
RCV MCAST menu

The multicast receive IP address is automatically calculated by the OM 1000 based on the default multicast MAC receive address.

The default multicast MAC address is used to receive non-standard multicast datagrams. Non-standard multicast datagrams are sent to the OM 1000 with a broadcast IP address and a multicast MAC address. The default receive multicast MAC address is configurable through the `config.ini` file only.

3 Select the **TTL field** (multicast transmit TTL setting), press ↑ or ↓ to set the **TTL**, and then press **ENT**. To apply a new **TTL** setting, save the setting and reboot the OM 1000.

4 Select the **IGMP field**, press ↑ or ↓ to select **enable or disable** and then press **ENT**. (This selection enables or disables support for IGMP version 1.) To apply a new **IGMP** setting, save the setting and reboot the OM 1000.

Table 4-5 describes the Ethernet interface menu options:

Table 4-5
Ethernet interface menu options

Key	Field	Options	Description
A	INTFC 3		Identifies this menu as the Ethernet interface menu.
B	ENET UDP MAC		Identifies the MAC address of the OM 1000.
C	UP		Displays the previous menu.
D	RCV MCAST		Displays the multicast receive menu.
E	TTL	000 through 255	Sets the multicast transmit TTL value. The OM 1000 must then be rebooted before any changes are applied.
F	IGMP	ENABLE DISABLE	Enables or Disables IGMP. The OM 1000 must then be rebooted before any changes are applied.

INTFC 4/ INTFC 5 Menu—Setting Up Ports 4 and 5 (Optional RS-530/RS-232)

Optional PORT 4 and PORT 5 modules must be installed and configured in the initialization file before being available for setup in these menus. Refer to the `operate.txt` file in Appendix C, "Initialization Information" for configuration information.

To configure operating parameters for PORT 4 and 5:

1 Select **4 (530/232)** and then press **ENT**.

2 Select **ASYNC** or **SYNC**.

3 If you select SYNC, press ↑ or ↓ to select **INTERNAL CLK**, **EXTERNAL CLK**, **SLV,** or **RX CLK**. The INTFC menu displays UNEQPD if the communications board is not present and configured.

4 Select **DATA RATE**, press ↑ or ↓ to select the **rate**, and then press **ENT**. Refer to the data (bit) rate table in Appendix A, "Specifications" for valid values.

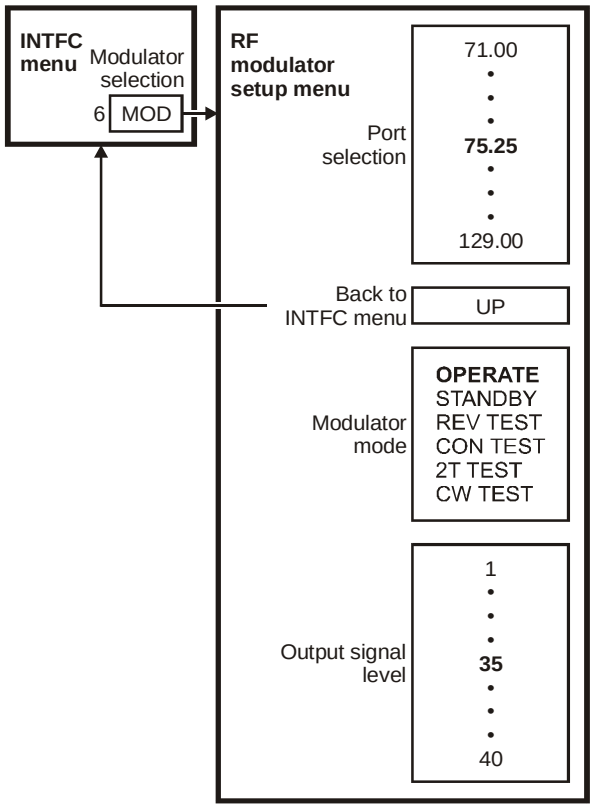
INTFC 6 Menu—Setting Up PORT 6 (RF Modulator)

To set up the RF modulator, you must:

- Enable the modulator output mode
- Set the output frequency
- Set the output signal level

Figure 4-7 illustrates the process that you must follow to set up the modulator port. Default settings are shown in bold:

Figure 4-7
Setting up the RF modulator

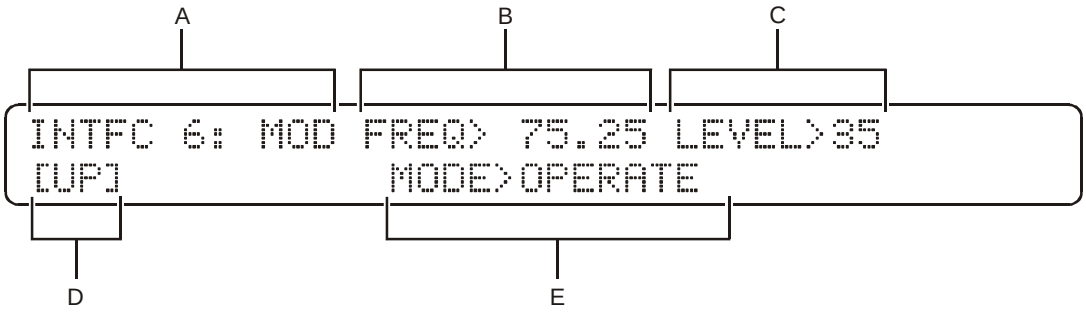


To set up the RF modulator:

1 Select **INTFC** on the MAIN menu to display the INTFC menu.

2 Select **6 MOD** to display the RF modulator setup menu illustrated in Figure 4-8:

Figure 4-8
RF modulator setup menu



3 Set the **output signal frequency level** required for your site configuration.

4 To set the RF-modulator mode:

- Select **OPERATE** to enable the modulator to receive data and transmit a QPSK-modulated signal, and then proceed to Spectrum Analyzer Procedure—Setting the Modulator Output Signal Level in Operate Mode to measure and adjust the output signal level.
- Select **2T TEST** to enable the modulator to generate and transmit a two-tone test and then proceed to Spectrum Analyzer Procedure—Setting the Modulator Output Signal Level in 2T Test Mode to measure and adjust the output signal level.

Table 4-6 describes the fields and available options:

Table 4-6
RF modulator setup menu options

Key	Field	Options	Description
A	INTFC 6: MOD		Identifies the port to which this setup menu applies.
B	FREQ	71.00 . 75.25 . 129.00	Sets the RF output frequency in MHz. Scroll through the list of supported frequencies from 71.00 through 129.00 MHz.
C	LEVEL	1 . 35 . 40	Sets the RF output signal level. The scale from 1 through 40 corresponds to an output signal level range from +30 dBmV through +50 dBmV.
D	UP		Displays the MAIN menu.
E	MODE	OPERATE STANDBY REV TEST CON TEST 2T TEST CW TEST	Sets RF modulator function. Scroll through the list of supported modes: ▪ OPERATE enables receipt of packets from the multiplexer and transmission of QPSK-modulated output. ▪ STANDBY disables both receipt of packets from the multiplexer and transmission of a QPSK-modulated output. ▪ REV TEST enables both receipt of packets from the multiplexer and transmission of a QPSK-modulated output with reversed I and Q channels. ▪ CON TEST enables both receipt of packets from the multiplexer and transmission of a QPSK-modulated output with modified digital filter coefficients. ▪ 2T TEST disables receipt of packets from the multiplexer and enables transmission of a two-tone test signal. ▪ CW TEST disables receipt of packets from the multiplexer and enables generation and transmission of a CW carrier. In general, the test modes are reserved for factory testing; however, some are useful for troubleshooting specific equipment faults. Refer to Section 5, "Troubleshooting," for more information on modulator test modes.

Spectrum Analyzer Procedure—Setting the Modulator Output Signal Level in Operate Mode

When combining the RF modulator output signal with other headend signals that use analog carriers, you must set the modulator output signal level to approximately 15 dBmV below the level of the analog carriers.

Set the RF-modulator output-signal level by incrementing or decrementing the signal-level parameter from 0 through 40. This range corresponds to an actual output level ranging from +30 through +50 dBmV. The default level setting is 35, approximately 45 dBmV.

To set the RF-modulator output-signal level with the modulator in OPERATE mode:

1. Measure and record the signal level of the analog carriers by observing the level of the carriers during sync tip. During sync tip, the full power of the signal is concentrated in the carrier.
2. Connect the RF OUT of the OM 1000 to a spectrum analyzer configured as follows:

Configuration	Setting	Comments
Resolution bandwidth	300 kHz	The bandwidth of the RF-modulator output signal is about 1.5 MHz, which is wider than the maximum resolution bandwidth of most spectrum analyzers. For spectrum analyzers that do support a higher-resolution bandwidth, adjacent channel signals can interfere with measurement of a 1.5 MHz bandwidth signal. A 300 kHz resolution bandwidth measures a portion of the output signal total bandwidth.
Video averaging	ON	Because the modulator-output signal is QPSK modulated, the signal level changes constantly over time, resulting in a noise-like signal. Video averaging smoothes out the variations in the signal to provide an average signal level. Alternatively, you can observe the signal-power average by reading the level that corresponds to the center or average of the noise line rather than its peak.

3. Measure the power of the modulator-output signal.

4 Observe the measured signal power and apply the appropriate correction factors from Table 4-7 to obtain the true signal power:

Table 4-7
Correction factors for modulator output power measured in OPERATE mode

Criteria	Correction Factor	Comments
300 kHz resolution bandwidth	4 dB	Because the RF-modulator output is a QPSK-modulated waveform, its signal power is spread throughout the entire signal bandwidth. The power measured in a 300 kHz portion of the signal represents only a portion of the true power. At 300 kHz resolution bandwidth, a correction factor of 4 dB is required for compensation.
Spectrum analyzer with sampled or average-responding detector	4 dB	Because different spectrum-analyzers detectors respond differently to noise-like signals, the measured signal power can vary. Sampled or averaged-responding detectors indicate a lower power level than peak detectors. A correction factor of 4 dB is required to compensate for the difference in measurement when using a sampled or average-responding detector.

5 Adjust the RF-modulator output level relative to the analog-carrier level as necessary by incrementing or decrementing the signal-level value on the modulator setup menu.

Spectrum Analyzer Procedure—Setting the Modulator Output Signal Level in 2T Test Mode

In the 2T TEST mode, the RF modulator generates two test tones, one 1.024 MHz higher and one 1.024 MHz lower than the specified RF-modulator output frequency. These tones are CW carriers whose signal level is equal to the level of the QPSK-modulated signal normally output in OPERATE mode. By adjusting the signal level of these tones, you can accurately set the RF-modulator output signal.

To set the RF-modulator output-signal level with the modulator in 2T Test mode:

1 Measure and record the analog-carriers signal level by observing the level of the carriers during sync tip. During sync tip, the full signal power is concentrated in the carrier.

2 Connect the RF OUT of the OM 1000 to a spectrum analyzer and measure the power of the modulator-output signal using a 300 kHz resolution bandwidth. Because this test mode generates CW carriers, no correction factor need be applied to the measured power level.

3 Adjust the output level of the tone signal to approximately 15 dBmV below the analog-carriers level. Change the signal level by incrementing or decrementing the signal level value on the INTFC 6 (modulator setup) menu ranging from 0 through 40. This range corresponds to an actual output-level range from +30 through +50 dBmV. The default level setting is 35, approximately 45 dBmV.

4 Reset the RF-modulator mode to OPERATE enabling normal operation after you adjust the output level of the tone signals.

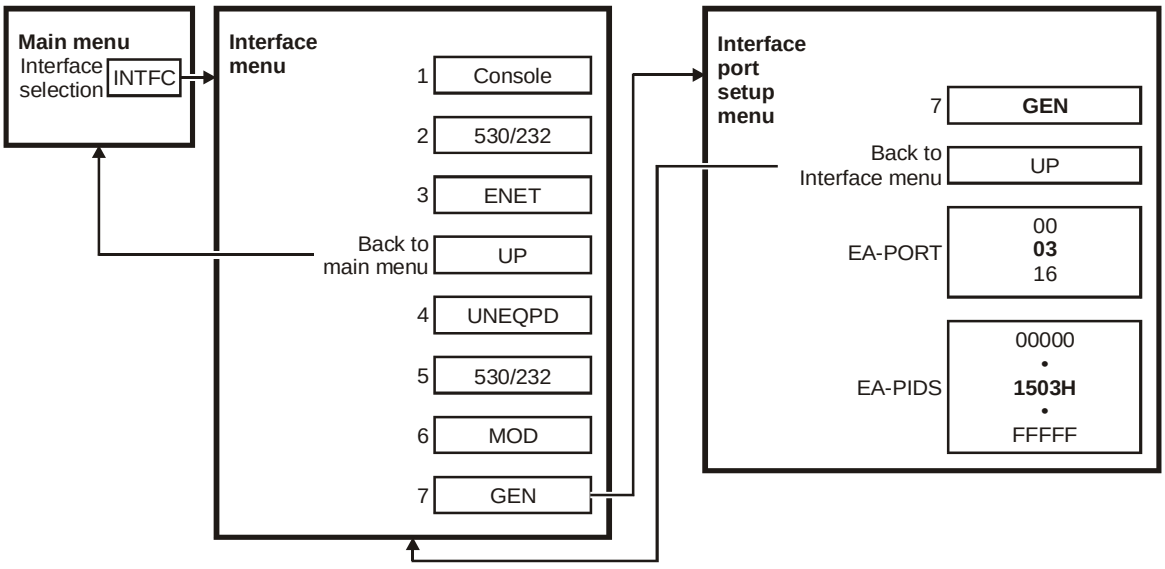
5 Select UP to display the MAIN menu if this is your final setup step.

INTFC 7 Menu—Viewing the Internal MPEG Message Generator Port

The internal MPEG message generator port is configured according to the values found in the `OM1000.ini` file. The default values are set to PORT 3, PID 1503H to match the DAC 6000 datastream. You can modify these values by editing and downloading the `OM1000.ini` file. Refer to Appendix C, "Initialization Information" for more information on this file.

Figure 4-9 provides a diagram summarizing the factory configuration. Default settings are shown in bold. Detailed procedures for viewing these settings follow the diagram:

Figure 4-9
Setting up the internal MPEG message generator port



Select **7 GEN** from the INTFC menu to view the Internal MPEG message generator port display menu shown in Figure 4-10:

Figure 4-10
Internal MPEG message generator port display menu

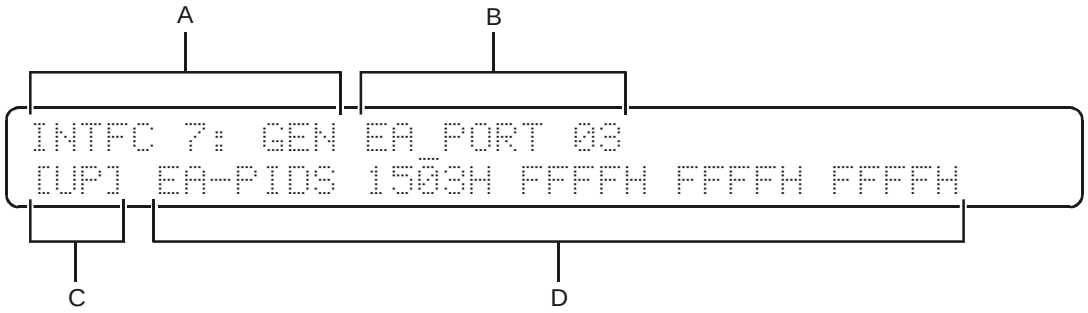


Table 4-8 describes the labels and available options:

Table 4-8
Internal MPEG generator port setup menu options

Key	Options/ Default value	Description
A	INTFC 7: GEN	Interface 7 Generator Port Identification label. This option is an information-only label identifying the menu.
B	03	EA_PORT Generator Port function parameter. This option displays the logical port from which the EA-PID is blocked during an emergency alert condition. 03 is the default value. 0-16 is the valid range of values for this field.
C	UP	Up option. This option returns to the MAIN menu.
D	1503H FFFFH FFFFH FFFFH	EA-PIDS map option. This option displays the EA-PIDs that are blocked during an emergency alert condition. Up to four EA-PIDs can be blocked. 1503H is the default value. 0000H to 1FFFH is the valid MPEG PID range for these fields. A value of FFFFH (invalid) in any of the four fields indicates that no EA-PID is blocked for that field. These fields are edited in the `OM1000.ini` file.

Emergency Alert (EA) functionality is not required outside the United States.

Setting Up PID Maps

You must set the routing for the PID map default entry and set the PID re-assignment and packet routing for each individual PID to be remapped or reassigned.

CAUTION

When setting up the PID maps for the GEN port, ensure that the input PID values are different. For the internal generator, the buffer used to store PID values is static and is used repetitively. If a mapped value enters the GEN port that matches an existing PID value, the value is overwritten, which forces the default entry to take effect and nullifies the mapped value.

Refer to Setting PID Maps to set up PID mapping for the internal generator port.

PORT Menu—Setting Up Logical Ports

The OM 1000 supports up to 16 logical ports, designated as 1 through 16.

To set up a logical port:

- Select the logical port number to configure.
- Select the physical interface associated with the logical port.
- Select the port type: input or output. For input ports, a PID map must also be defined (refer to the Setting PID Maps section for details on setting up an input port PID map).
- For Ethernet input ports, a unique source UDP port must be defined. Each Ethernet UDP port defined will receive singlecast or broadcast data. If the UDP port is to receive multicast data, then up to five multicast IP host addresses can be defined for each UDP port. Refer to the Setting Receive Multicast IP Addresses section for more details.
- For Ethernet output ports, a destination IP address and port must also be defined. The IP address can be a singlecast address, broadcast address, or a multicast address.

PORT Menu—Setting PID Maps (Input Ports Only)

When a logical port is configured as an input, it has an associated PID map to control how the packet multiplexer processes input datastreams received by the port. Output ports do not have PID maps. Each PID map specifies processing for an individual input PID stream.

A PID map has 28 available slots with five entries for each slot, as shown in Table 4-9:

Table 4-9
Example of PID table

Slot	PID IN	PID OUT	Destination Port 1	Destination Port 2	Destination Port 3
1	X	X	0	0	0
2	6	3	1	0	0
3	FFFFH	FFFFH	0	0	0
.	.	.	.	.	.
.	.	.	.	.	.
28	FFFFH	FFFFH	0	0	0

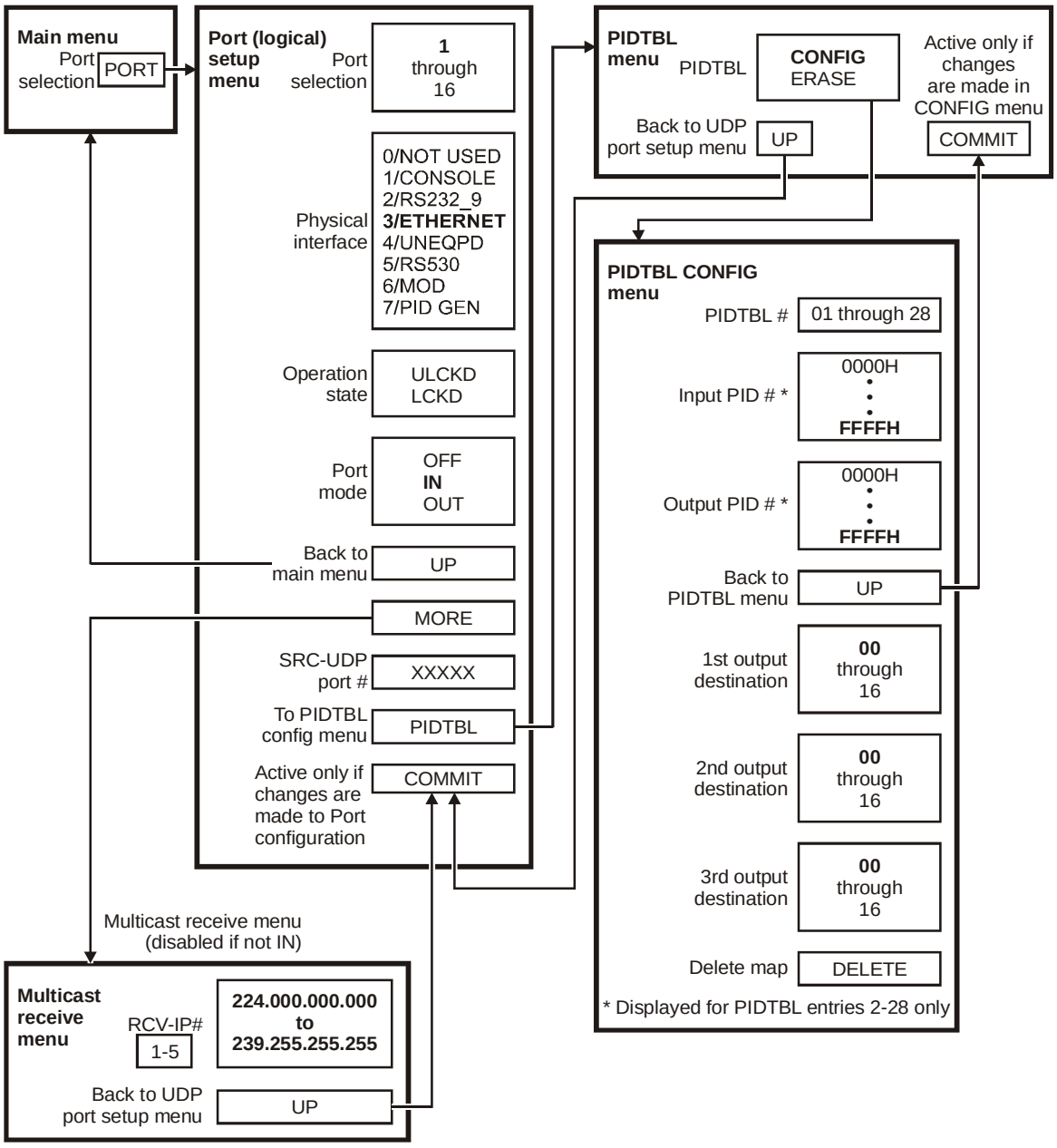
The first slot represents the default value. The PID table determines the routing of incoming PIDs to destination ports 1, 2, and 3. You can designate as many as three destination ports simultaneously.

Slot 1 is the default slot. Any PID not remapped in slots 2 through 28 uses the port routing setup of slot 1. For slots 2 through 28, you can remap an input PID (PID-IN) as a different output PID (PID-OUT). In the example, slot 2 is remapping PID 6 to become PID 3, with the remapped PID 3 sent to a single destination port, logical port 1. All other PID inputs use the default slot 1 setup. In this case, all input PIDs, other than PID 6, are sent to logical port 0 (the bit bucket).

PORT Menu—Setting PID Maps for Ethernet Input Ports

Figure 4-11 illustrates setting the PID maps for a logical Ethernet input port from the front panel:

Figure 4-11
Setting PID maps for Ethernet input ports



To setup the PID table for a logical Ethernet input port:

1 Select the **PORT** option on the MAIN menu.

2 Select a **logical Ethernet input port** (1 through 16) at the PORT ##: prompt to display the logical Ethernet input port menu illustrated in Figure 4-12.

Figure 4-12 illustrates the PORT setup menu for an Ethernet input port:

Figure 4-12
PORT setup menu

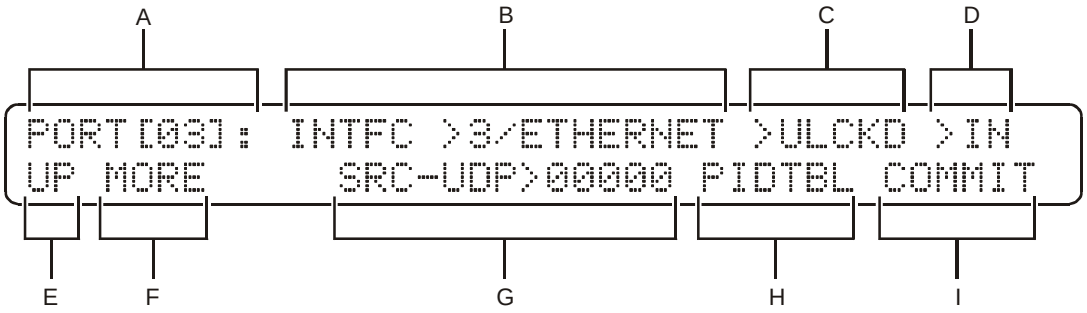


Table 4-10 describes the fields and available options:

Table 4-10
Logical port setup menu options

Key	Field	Options	Description
A	PORT *nn*	1 through 16	Sets the logical port from which the MPEG generator receives data.
B	INTFC		Selects the physical input port.
		0	NOT USED
		1	CONSOLE
		2	RS232_9
		3	ETHERNET
		4	UNEQPD
		5	RS530
		6	MOD
		7	PID GEN
C		LCKD UNLCKD	Sets the port to the locked (disabled) or unlocked (enabled) position.
D			Selects the port mode.
		OFF IN OUT	▪ IN - configures an input port to receive data ▪ OUT – transmits data
E	UP		Displays the MAIN menu.
F	MORE		Selects the logical Ethernet input port for the MORE menu. The MORE menu allows the user access to the RCV MCAST IP menu.
G	SRC-UDP	05000 through 65535	The UDP port number must be unique across the entire OM 1000.

Key	Field	Options	Description
H	PIDTLL		Selects the PID table Config/Erase menu.
I	COMMIT		Commits the current settings to the OM 1000 database. To store the settings permanently, display the ADMIN menu and save the settings. This is displayed only when a change is made. The OM 1000 must then be rebooted before any changes are applied.

3 Select the **PIDTBL** option and then press **ENT** to display the Port PIDTBL Config/Erase menu illustrated in Figure 4-13. If setting up an existing PID table, skip to step 6.

4 Select the **ERASE** and **COMMIT** if setting up a new PID table. This ensures that any previous settings are cleared.

5 Select **CONFIG** and then press **ENT** to display the PIDTBL setup menu illustrated in Figure 4-15.

6 After all changes are made, select the **COMMIT** field on the Port PIDTBL Config/Erase menu to apply the changes. To save the changes to flash memory, select **SAVE** from the ADMIN menu.

The PIDTBL Config/Erase menu is displayed in Figure 4-13:

Figure 4-13
PORT-PIDTBL Config/Erase menu

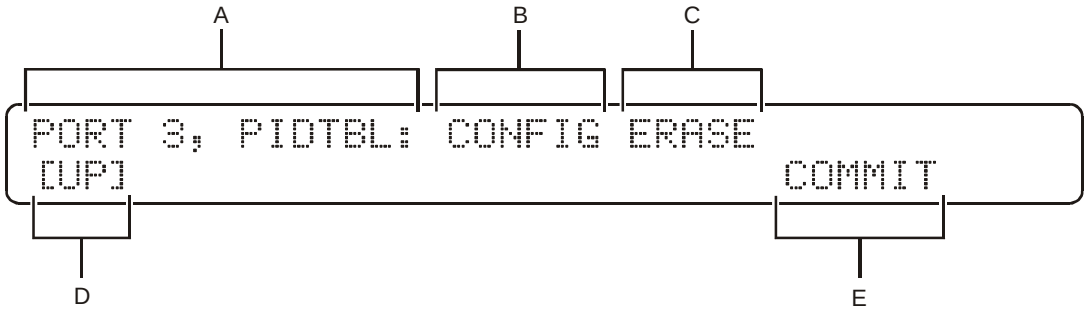


Table 4-11 describes the items displayed on the PIDTBL Config/Erase menu:

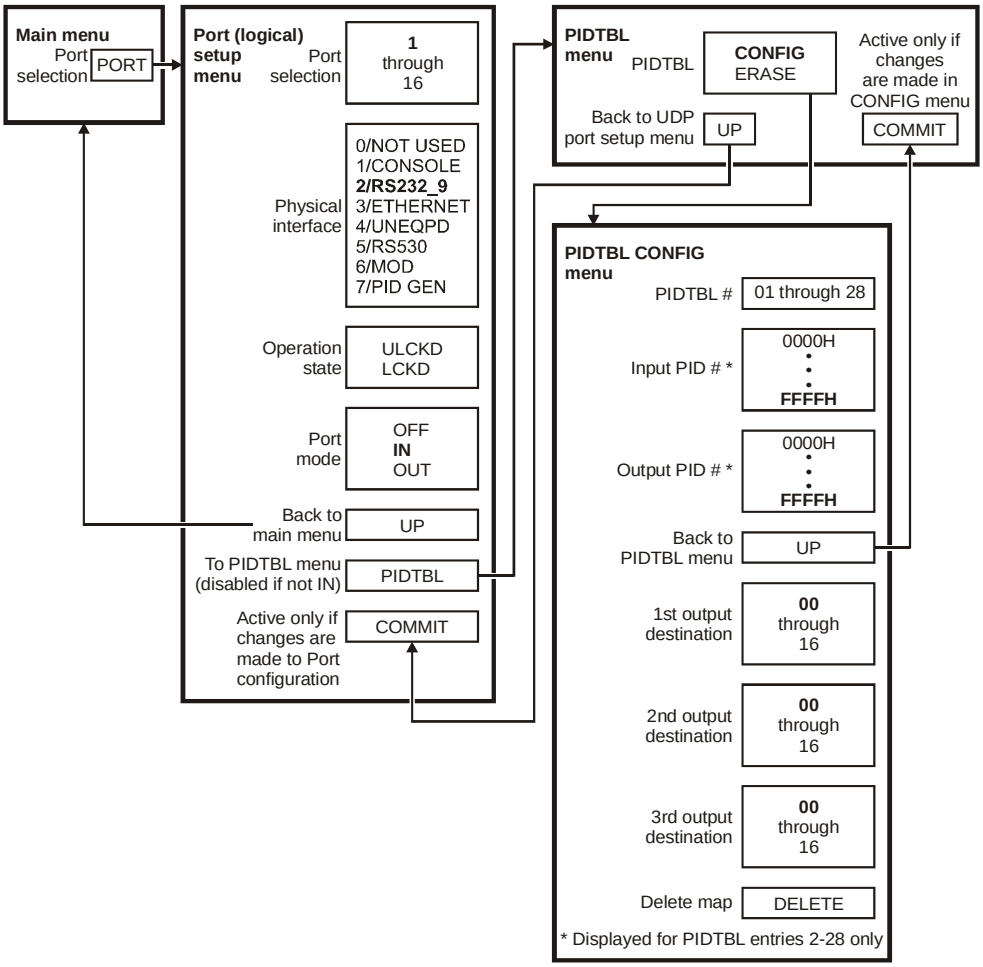
Table 4-11
PORT-PIDTBL Config/Erase menu options

Key	Field	Description
A	PORT: n PIDTBL	This display-only field identifies the menu and logical port number.
B	CONFIG	Displays the PDTBL setup menu illustrated in Figure 4-16
C	ERASE	Erases the current PID table setup for this logical port. The PID table is now ready for the user to change the configuration settings.
D	UP	Displays the previous menu
E	COMMIT	Commits the current PID table settings. This field is only displayed after the PID table is erased or configuration changes are made.

PORT Menu—Setting PID Maps for Non-Ethernet Input Ports

Figure 4-14 illustrates setting the PID maps for non-Ethernet input ports from the front panel:

Figure 4-14
Setting PID map for non-Ethernet input ports



Non-Ethernet (3) Active Display Fields	Physical Interface										
	0	1	**2**			4 and 5				6	7
PORT	Y	Y	**Y**	Y	Y	Y	Y	Y	Y	Y	Y
UNLCKD/LCKD			**Y**	Y			Y	Y		Y	Y
IN/OUT/OFF			**IN**	OUT	OFF		IN	OUT	OFF	OUT	IN
UP	Y	Y	**Y**	Y	Y	Y	Y	Y	Y	Y	Y
PIDTBL			**Y**				Y			Y	Y
COMMIT	Y	Y	**Y**	Y	Y	Y	Y	Y	Y	Y	Y

CAUTION

The UDP Port number for each logical input port must be unique across the entire OM 1000. Two logical input ports cannot share the same UDP port number. If two logical input ports are configured to use the same UDP port number, upon rebooting, the OM 1000 will only configure the first input port. A Trap error will be sent out if the trap receive address is configured. In addition, the Fault Summary LED will be lit to indicate that the OM 1000 configuration is invalid.

PORT Menu—Setting Logical Non-Ethernet Input Ports

To set logical non-Ethernet input ports:

1. Select the **PORT** option on the MAIN menu.
2. Select a **logical non-Ethernet input port** (1 through 16) at the PORT ##: prompt.
3. Select **PIDTBL** and then press **ENT**. If setting up an existing PID table, skip to step 5.
4. Select **ERASE** and **COMMIT** if setting up a new PID Table. This ensures that any previous settings are cleared.
5. Select **CONFIG** and then press **ENT** to display the PIDTBL setup menu illustrated in Figure 4-15.
6. Select a ***PIDTBL entry*** from 01 to 28.
7. Select the ***PID-IN> number*** (0000H to 1FFFH); for Entry number 2 through 28 only.
8. Select the ***PID-OUT> number*** (0000H to 1FFFH) for Entry number 2 through 28 only.
9. At the DST-PORT> prompt, select the first, second, and third ***destination output ports*** (00 through 16).

   Entry 01 is for default PIDs not otherwise identified by the PID table.

Figure 4-15
PIDTBL setup menu

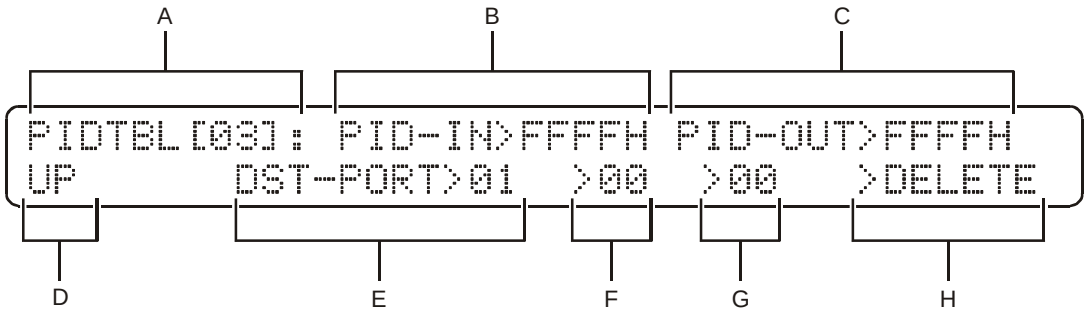


Table 4-12 describes the fields and available options:

Table 4-12
PID table setup menu options

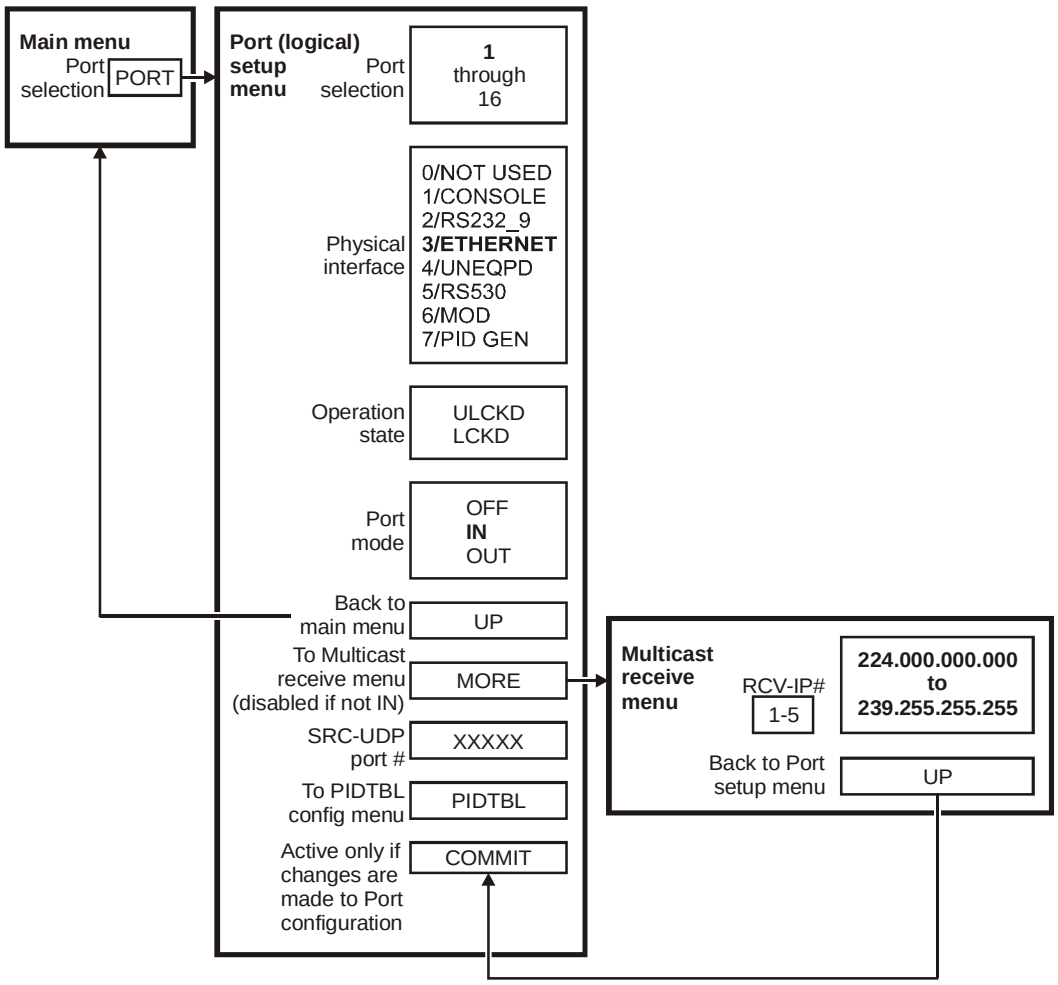
Key	Field	Options	Description
A	PIDTBL *nn*	01 through 28	Selects a port nomenclature.
B	PID-IN	0000H through 1FFFH	Specifies the hexadecimal PID number to which this map applies. Press ← or → to move from digit to digit or change the digits. This is not displayed on the menu for PID table entry number 01.
C	PID-OUT	0000H through 1FFFH	Specifies the hexadecimal number to which the specified input PID is re-assigned for output. Press ← or → to move from digit to digit or change digits. This is not displayed on the menu for PID table entry number 01.

Key	Field	Options	Description
Keys B and C apply only to PID table entry number 2 through 28.			
D	UP		Displays the Ethernet port setup menu.
E	DST-PORT *nn*	0 through 16	Selects the first logical destination port. Press ↑ or ↓ to change the port number.
F		**0** through 16	Specifies a second destination logical port to which PIDs affected by this map route. Press ↑ or ↓ to change the port number.
G		**0** through 16	Specifies a third destination logical port to which PIDs affected by this map route. Press ↑ or ↓ to change the port number.
If keys E, F, and G are set to zero, the input sent to the associated logical port for this entry is deleted.			
H	DELETE		Deletes this map from the set of PID maps for this port.

PORT Menu—Setting Receive Multicast IP Addresses (Logical Ethernet Input Ports Only)

Each logical Ethernet input port receives data that is sent to the OM 1000 as either singlecast or broadcast packets. In addition, each Ethernet input port can receive data that is sent to it as multicast data. Up to five multicast host IP addresses can be set up for each logical Ethernet input port. Figure 4-16 illustrates setting the logical Ethernet input port multicast receive IP address:

Figure 4-16
Setting up logical Ethernet input port multicast receive IP addresses

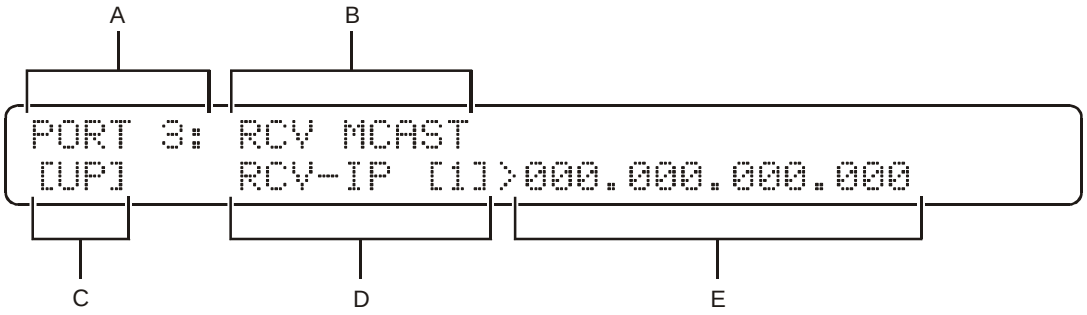


To set up the multicast IP host addresses for a logical Ethernet input port:

1. Select the **PORT option** on the MAIN menu.
2. Select a **logical Ethernet input port** (1 through 16) at the PORT ## prompt.

3 Select the **MORE** option and then press **ENT** to display the multicast receive IP Address menu illustrated in Figure 4-17:

Figure 4-17
Multicast receive IP Address menu



4 Select **RCV-IP address**. Only 000.000.000.00 or a valid class D IP address can be entered.

5 Repeat Step 4 if setting up more than one multicast receive IP address.

6 After all changes are made, select the **COMMIT** field and press **ENT**. All changes are immediately applied (the OM 1000 does not have to be rebooted). To save the changes to flash memory, select **SAVE** from the ADMIN menu.

Table 4-13 describes the fields and available options:

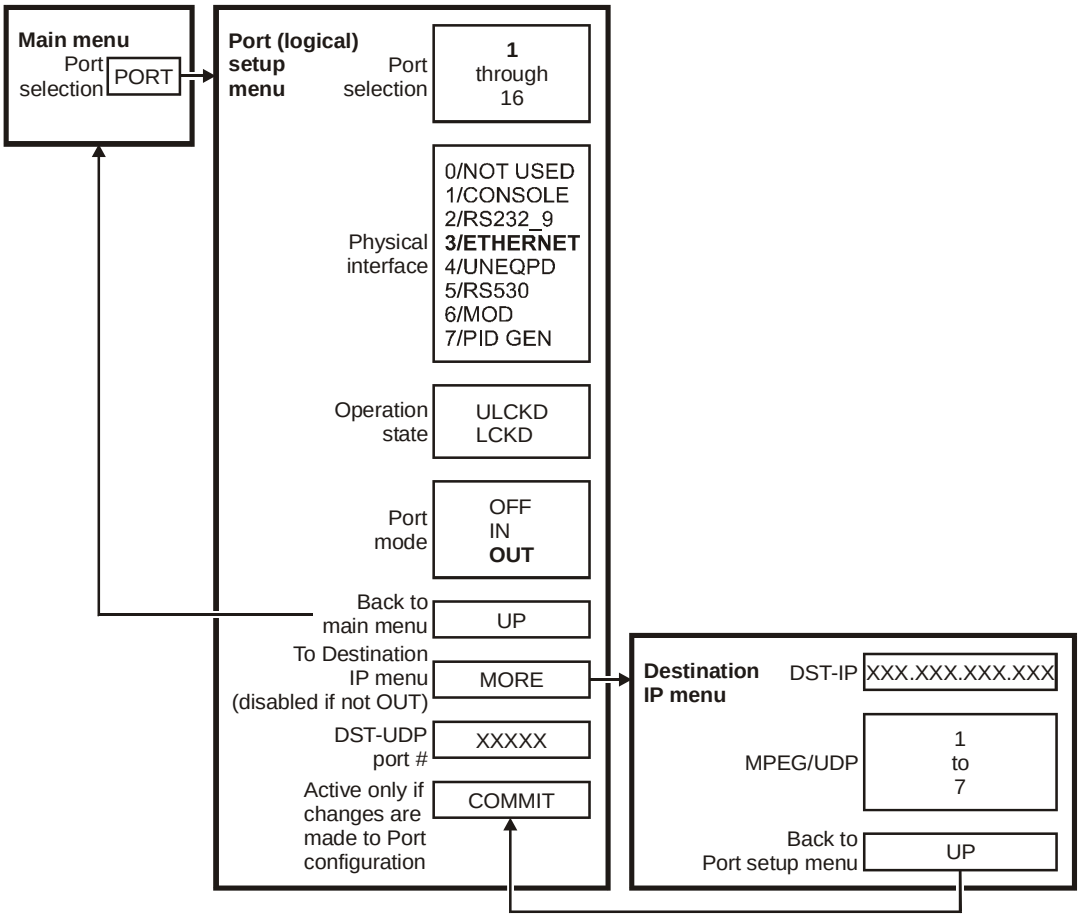
Table 4-13
Logical Ethernet input port multicast receive IP address menu options

Key	Field	Options	Description
A	PORT n		Identifies the Logical Port number being setup.
B	RCV MCAST		Identifies the menu as the receive multicast menu
C	UP		Displays the previous menu.
D	RCV-IP n	1-5	Selects the IP address table index.
E	000.000.000.000	000.000.000.000 or 224.000.000.000 through 239.255.255.255	Sets the multicast IP receive address for the selected index. The IP address is immediately applied (reboot of OM 1000 is not required). To store the settings permanently, use the ADMIN menu to save the settings.

PORT Menu—Setting Up Logical Ethernet Output Ports

Each logical Ethernet output port can transmit data via either singlecast, broadcast, or multicast. The user defines the destination UDP port and a destination IP address. If the address is a class D, multicast IP address, the user should verify that the Time-To-Live (TTL) setting is correct. Figure 4-18 illustrates setting up a logical Ethernet output port.

Figure 4-18
Setting up logical Ethernet output port



To setup a logical Ethernet output port:

1. Select the **PORT option** on the MAIN menu.
2. Select a **logical Ethernet output port** (1 through 16) at the PORT ##: prompt. If setting up a new output port, select DST-UDP and specify a destination UDP port number using the Logical Ethernet Output Port menu (Figure 4-19).
3. Select the **MORE** option and then press **ENT** to display the Logical Ethernet Destination IP Address menu (Figure 4-20).
4. Select **DST-IP** and enter a destination IP address (singlecast, broadcast, or multicast IP address).

5 Select **MPEG/UDP** and enter the desired number of MPEG packets per UDP packet to be transmitted.

6 After all changes are made, select **UP** to return to the logical Ethernet output port menu.

7 Select **COMMIT** to commit all changes to the OM 1000 database. To save the changes to flash memory, select **SAVE** from the ADMIN menu. The OM 1000 must be rebooted for these changes to take effect.

Figure 4-19
Logical Ethernet output port menu

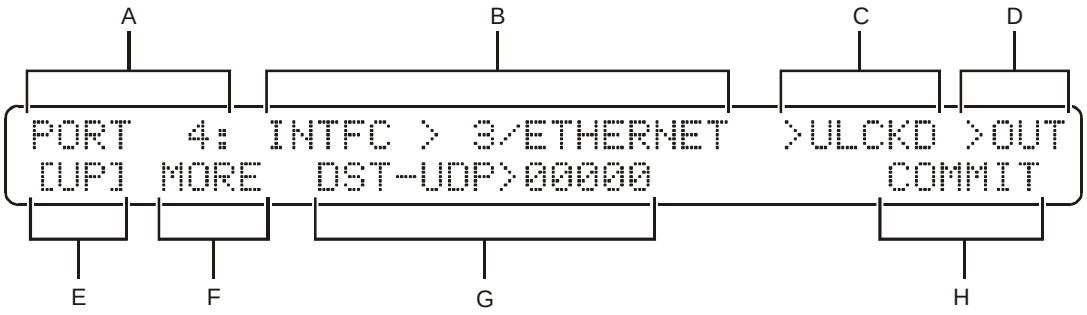


Table 4-14 describes the fields and available options:

Table 4-14
Logical Ethernet output port menu options

Key	Field	Options	Description
A	PORT nn	1 through 16	Sets the logical output port.
B	INTFC		Selects the physical input port.
		0	NOT USED
		1	CONSOLE
		2	RS232_9
		3	ETHERNET
		4	UNEQPD or RS530 or RS232-25 (hardware configuration dependent)
		5	UNEQPD or RS530 or RS232-25 (hardware configuration dependent)
		6	MOD
		7	PID GEN
C		LCKD UNLCKD	Sets the port to the locked (disabled) or unlocked (enabled) position.
D			Selects the port mode.
		OFF IN OUT	▪ Select IN to configure a port to receive data. ▪ Select OUT to configure a port to transmit data.
E	UP		Displays the previous menu.
F	MORE		Displays the logical Ethernet destination IP address menu.
G	DST-UDP		Sets the destination UDP port number.

Key	Field	Options	Description
H	COMMIT		Commits the current Ethernet output port settings to the OM 1000 database. To store the settings permanently, display the ADMIN menu and save the settings. This is only displayed when a change is made. The OM 1000 must then be rebooted before any changes are applied.

Figure 4-20 illustrates the logical Ethernet destination IP address menu:

Figure 4-20
Logical Ethernet destination IP address menu

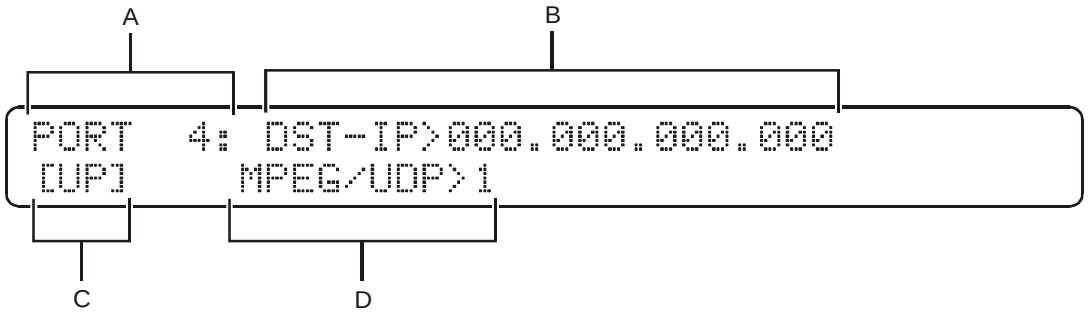


Table 4-15 describes the fields and available options:

Table 4-15
Logical Ethernet destination IP address menu options

Key	Field	Options	Description
A	PORT nn		Identifies the logical output port being setup
B	DST-IP	000.000.000.000 through 239.255.255.255 or 255.255.255.255	Sets the destination IP address. Can be either a singlecast IP address (class A, B, or C), a multicast address (class D), or a broadcast address (255.255.255.255).
C	UP		Displays the previous menu.
D	MPEG/UDP	1-7	Sets the number of MPEG packets to be transmitted per UDP packet.

NET Menu—Setting Up the Network

For the OM 1000 to function properly on the network, set the:

- IP address for the OM 1000 and the host
- Subnet mask
- Port protocol

Select NET on the MAIN menu to display the NET port setup menu illustrated in Figure 4-21:

Figure 4-21
NET port setup menu

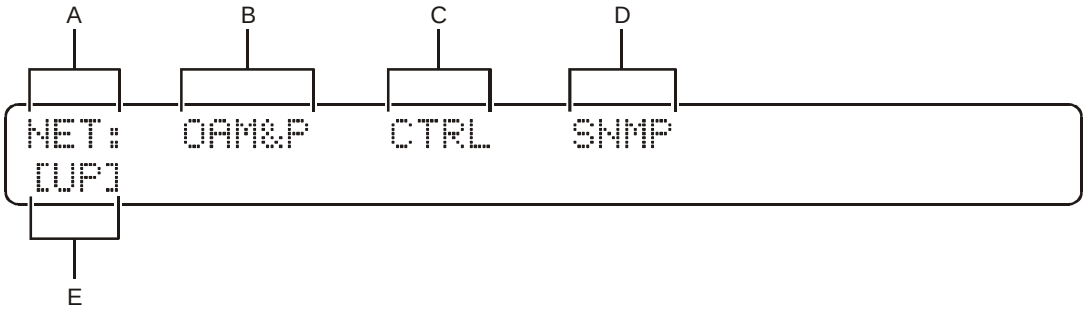


Table 4-16 describes the fields and available options:

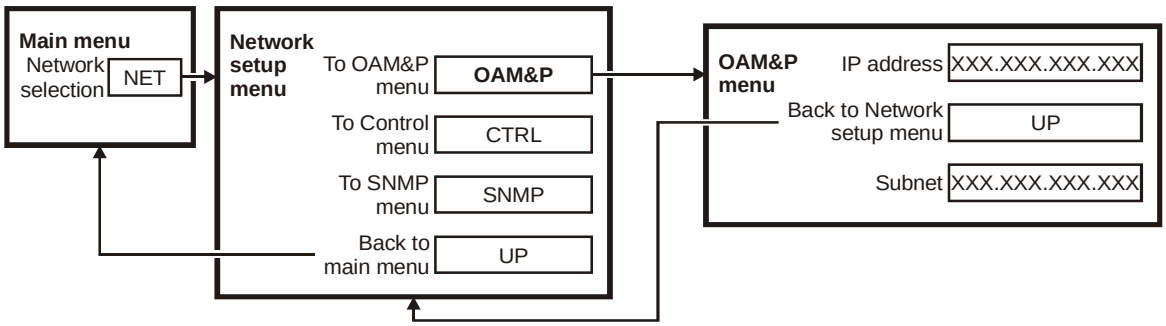
Table 4-16
NET port setup menu options

Key	Field	Description
A	NET	Identifies the menu.
B	OAM&P	Displays the OAM&P menu options.
C	CTRL	Displays the Control menu options.
D	SNMP	Displays the SNMP menu options.
E	UP	Displays the MAIN menu.

NET Menu—Setting Up OAM&P

Figure 4-22 illustrates the process that you must follow to set up OAM&P. Default settings are shown in bold. Detailed procedures to complete the process follow the diagram:

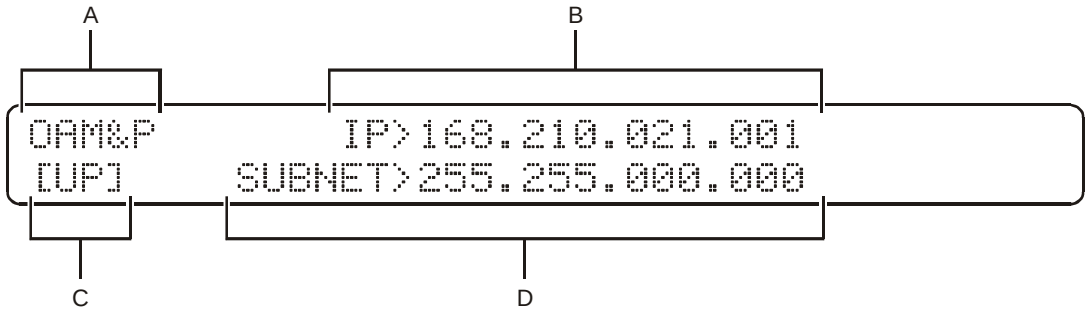
Figure 4-22
Setting up OAM&P



To set up the OAM&P:

1 Select **OAM&P** to display the OAM&P menu illustrated in Figure 4-23:

Figure 4-23
OAM&P menu



2 Select **SUBNET** and enter the value required for your configuration.

3 Select **IP** and enter the value required for your configuration.

Table 4-17 describes the fields and available options:

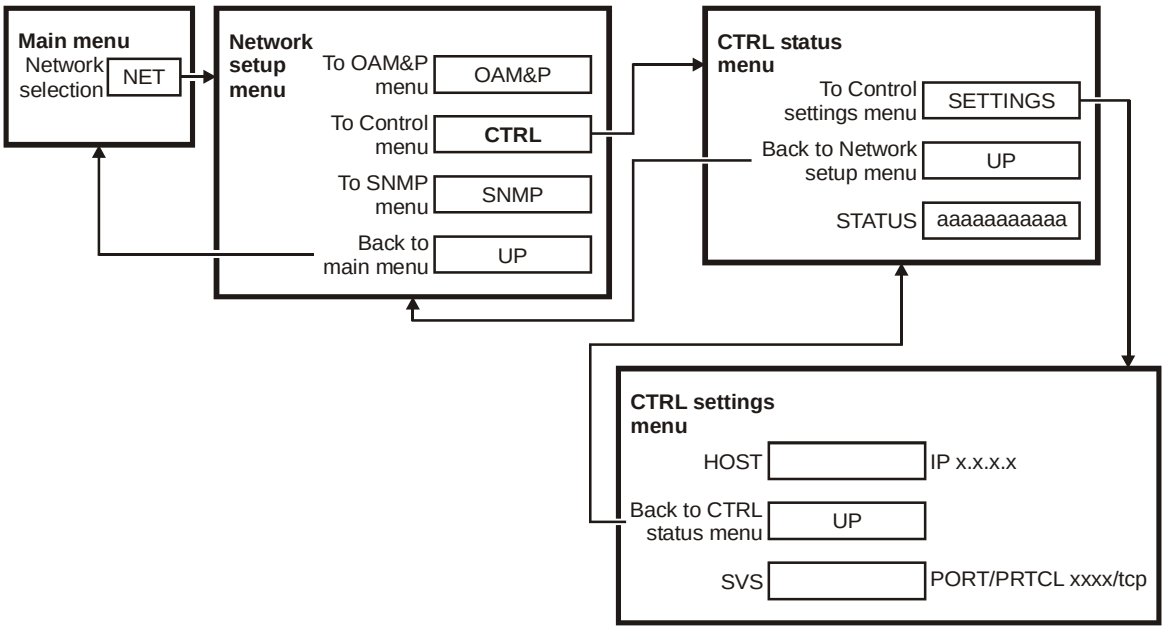
Table 4-17
OAM&P menu options

Key	Field	Options	Description
A	OAM&P		Identifies the menu.
B	IP *n*	000.000.000.000 through 255.255.255.255	Sets the OM 1000 IP address. Press ← or → to move from digit to digit or change the address.
The BOOTP server through the BOOTP response normally assigns the IP address. If the IP address is not zero in the BOOTP response, it overrides the IP address stored in the OM 1000 and displays here.			
C	UP		Displays the NET menu.
D	SUBNET *n*	000.000.000.000 through 255.255.255.255	Changes the subnet mask.
The BOOTP server through the BOOTP response normally assigns the subnet mask. If the subnet mask is not zero (0.0.0.0) in the BOOTP response, it overrides the subnet mask stored on the OM 1000 and displays here.			

NET Menu—Setting Up the CTRL (Control) Menu Options

Figure 4-24 illustrates the process that you must follow to set up CTRL menu:

Figure 4-24
Setting up CTRL



Select **CTRL** on the NET menu to display the CTRL Status menu illustrated in Figure 4-25.

Figure 4-25
Control Status menu

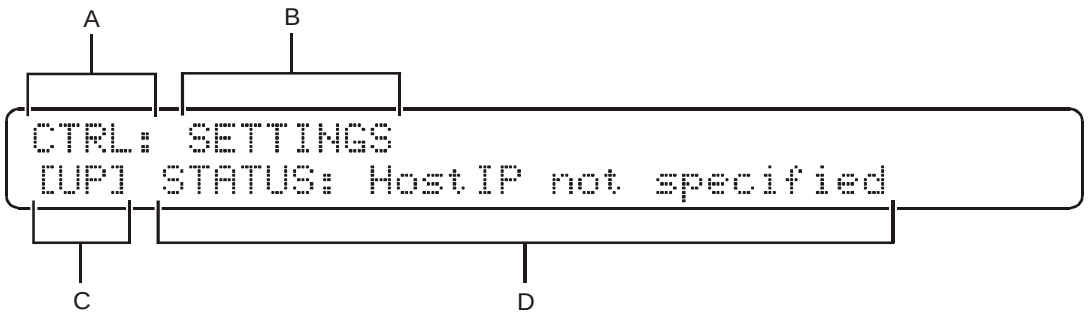


Table 4-18 describes the fields and available options:

Table 4-18
Control Status menu fields

Key	Field	Description
A	CTRL	This display-only field identifies the menu.
B	SSETTINGS	This field displays the CTRL menu.
C	UP	This field displays the previous menu.
D	STATUS x	This display-only field displays the current status of the Host to OM 1000 connection. This field informs the user if an OM Host is specified, if the specified OM Host is connected, or if the specified OM Host is not connected.

Select **SETTINGS** on the CTRL menu to display the CTRL menu illustrated in Figure 4-26:

Figure 4-26
CTRL menu

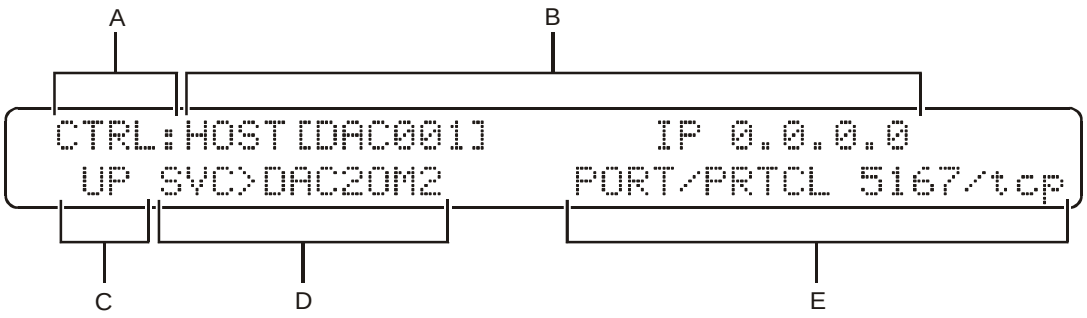


Table 4-19 describes the fields and available options:

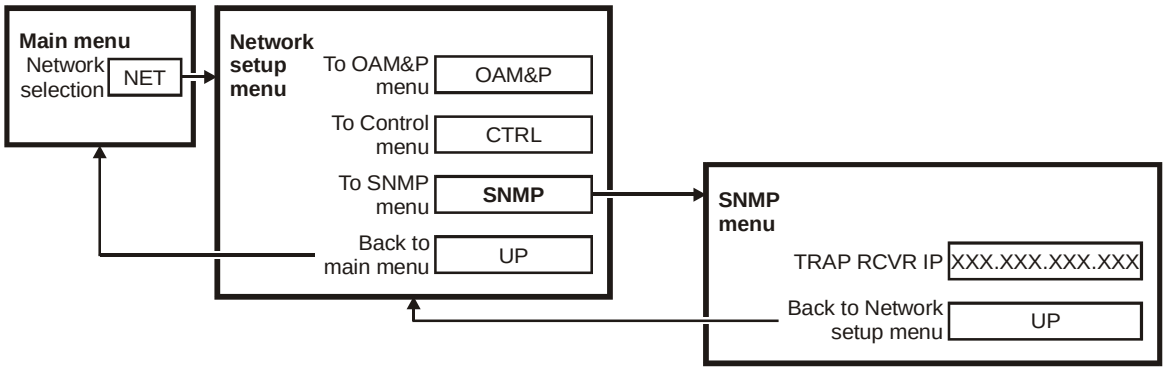
Table 4-19
CTRL menu options

Key	Field	Description
A	CTRL	This display-only field identifies the menu.
B	HOST *x*	This field enables you to select a hostname for the DAC 6000. Press ↑ or ↓ to scroll through the list of available servers by name. Select nohost if no hosts are available.
		The source for the hostname selections is the `hosts` file.
	IP *n*	This display-only field is the corresponding IP address.
C	UP	This field displays the NET menu.
D	SVC	This field enables you to select the service for the DAC 6000. Press ← or → to move to the field. Press ↑ or ↓ to scroll through the list of available ports. Select the service corresponding to the TCP/IP connection to the DAC 6000.
		The source for the services selections is the `services` file.
E	PORT/PRTCL *n*	This display only field is the corresponding port protocol.

NET Menu—Setting Up SNMP

Figure 4-27 illustrates the process that you must follow to set up SNMP:

Figure 4-27
Setting up SNMP

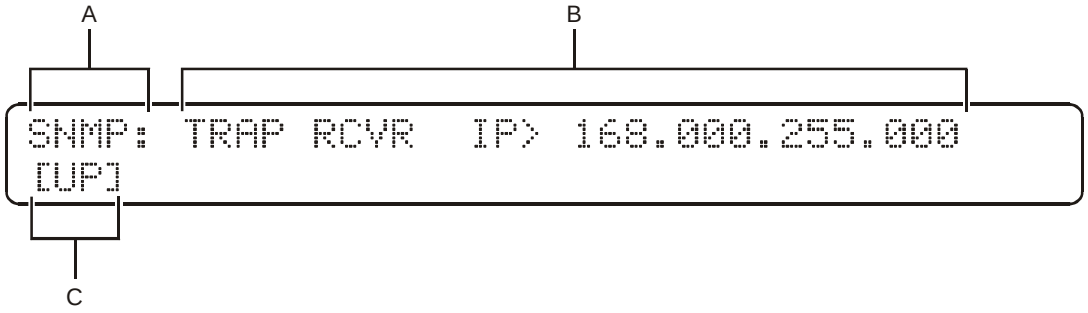


To set up SNMP:

1 Select **NET** on the OM 1000 Main menu to display the NET menu.

2 Select **SNMP** and then press **ENT** to display the SNMP menu illustrated in Figure 4-28:

Figure 4-28
SNMP port setup menu



3 Select **TRAP RCVR IP** and then program the desired IP address.

Table 4-20 describes the fields and available options:

Table 4-20
SNMP menu options

Key	Field	Description
A	SNMP	This display-only field identifies the menu.
B	TRAP RCVR IP	This trap receiver IP address corresponds to the destination where SNMP traps are sent. The IP address range is: 000.000.000.000 through 255.255.255.255 *Setting TRAP RCVR IP to 000.000.000.000 effectively disables the OM 1000 from sending SNMP traps.*
C	UP	The UP option returns you to the previous menu.

Tracking Dropped Packets

OM 1000 version 3.4.0 and later tracks the number of dropped packets for the Datapipe input and the RF output ports. The data collected is then used to send out SNMP traps based on user-defined values. The OM 1000 sends a major alarm when it has detected an overloaded condition resulting in dropped packets for a period of time. The OM 1000 is considered to be in this overloaded condition if it drops *x* packets per minute for at least *y* consecutive minutes. For example, if *x = 10* and *y = 5*, then the OM 1000 would have to drop 50 packets over a five-minute time frame to create an alarm condition. The OM 1000 calculates the number of drops approximately once every minute. The *default x value is 10* and the *default y value is five*. The OM 1000 clears the major alarm condition if no more than *z* number of packets are dropped due to an overload condition for at least *y* minutes. The *default z value is zero*. For example, if the OM 1000 is configured with default values, it would have to NOT drop any packets for five straight minutes to clear the major alarm condition.

The OM 1000 also tracks the total drops counting from the last reboot. This value can be retrieved through SNMP or by saving the `config.ini` at the front panel and then viewing it from the console port. The total drops can be cleared by SNMP or by rebooting the OM 1000.

The OM 1000 provides a high-water count of the related queue, which is the maximum number of packets that were in the queue since the last reboot. The high-water count is accessible through SNMP or by saving the `config.ini` at the front panel and then viewing it from the console port. The high-water count can be cleared by SNMP or by rebooting the OM 1000.

The OM 1000 will not start sending traps for these conditions until after the eleventh minute of operation after boot-up.

Example `config.ini`:

```
[Packet Stats Monitor]

PacketStatsTable =
#Group 1
2 1 0 0 10 5 0
#Group 2
3 2 0 0 10 5 0
```

Under Group 1:

Column 1 is the interface type:
1 = Unconfigured
2 = Datapipe
3 = RF modulator

Column 2 indicates input/output:
1 = Input
2 = Output

Column 3 is the number of dropped packets since the last reboot.

Column 4 is the high-water mark value.

Column 5 is the *x* value referenced above.

Column 6 is the *y* value referenced above.

Column 7 is the *z* value referenced above.

Tracking Discontinuous Packets (PID Basis)

The OM 1000 version 3.5.0 and later tracks the number of times MPEG messages are received out of order for a particular PID number based on the continuity count included in the MPEG message header. The number of occurrences where the continuity count is not contiguous is used as a trigger to send out SNMP traps based on user-defined thresholds. The OM 1000 sends a major alarm when it has detected that the user defined threshold for such occurrences has been exceeded. The threshold is considered exceeded if *x* number of occurrences takes place per minute for *y* consecutive minutes. *The default x value is 10 and the default y value is 5.* The OM 1000 clears the major alarm condition if no more than *z* occurrences are recorded for at least *y* minutes. *The default z value is zero*.

Example `config.ini`:

```
[Continuity Count Threshold]
MissedContCountThreshold=10;
#
[Continuity Count Reset Threshold]
MissedContCountResetThreshold=0;
#
[Continuity Count Time Period]
ContCountTimePeriod=5;
```

MissedContCountThreshold is the *x* value referenced above.
MissedContCountResetThreshold is the *y* value referenced above.
ContCountTimePeriod is the z value referenced above.

Tracking Discontinuous Packets (Overall PID Count)

The OM 1000 also tracks the total number of occurrences of the continuity count not being contiguous from the last reset. This value can be retrieved through SNMP. This value can be cleared through SNMP or by rebooting the OM 1000.

ID Menu— Displaying Unit Data

Select **ID** on the MAIN menu to display the ID menu illustrated in Figure 4-29:

Figure 4-29
ID menu

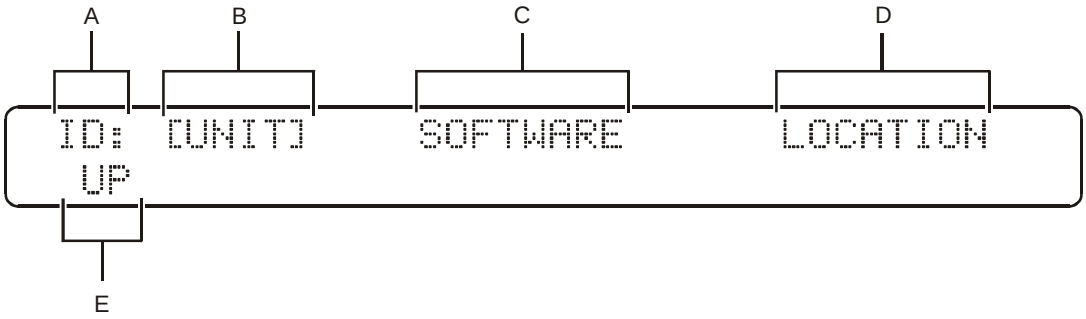


Table 4-21 describes the fields and available options:

Table 4-21
ID menu options

Key	Field	Description
A	ID	Identifies the current menu.
B	UNIT	Displays the UNIT menu.
C	SOFTWARE	Displays the SW menu.
D	LOCATION	Displays the LOC menu.
E	UP	Displays the MAIN menu.

ID Menu—UNIT Menu Options

Select the **UNIT** menu on the ID menu to display the first of two UNIT menus, which is illustrated in Figure 4-30:

Figure 4-30
UNIT menu

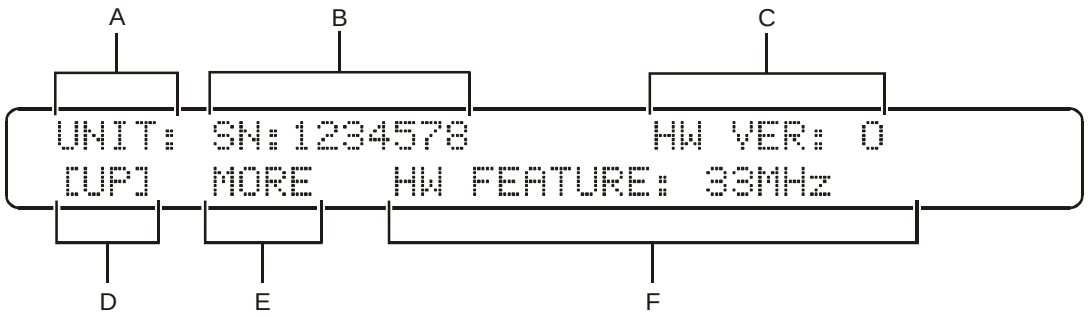


Table 4-22 describes the fields and available options:

Table 4-22
UNIT menu options

Key	Field	Description
A	UNIT	Identifies the current menu.
B	SN *n*	Identifies the serial number for the OM 1000.
C	HW VER *n*	Identifies the hardware version for the OM 1000.
D	UP	Displays the ID menu.
E	MORE	Displays the extended UNIT menu.
F	HW FEATURE	Identifies standard or customized hardware features associated with the OM 1000.

Select **MORE** and then press **ENT** to display the extended UNIT menu illustrated in Figure 4-31:

Figure 4-31
Extended UNIT menu

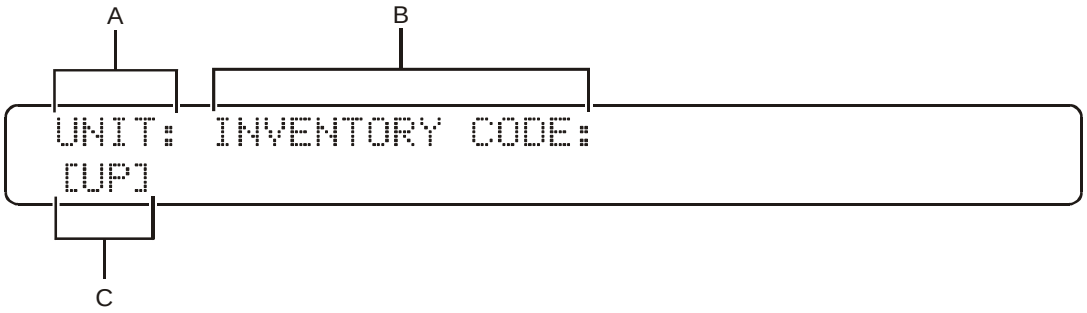


Table 4-23 describes the fields and available options:

Table 4-23
Extended UNIT menu options

Key	Field	Description
A	UNIT	Identifies the current menu.
B	INVENTORY CODE	Identifies the OM 1000 inventory code.
C	UP	Displays the UNIT menu.

The inventory code is settable in the `OM1000.ini` *file with an ASCII editor. After you set the* `OM1000.ini` *file, you must download the file to the OM 1000 through BOOTP/TFTP.*

ID Menu—SW (Software) Menu Options

Select **SOFTWARE** from the ID menu to display the SW menu illustrated in Figure 4-32:

Figure 4-32
SW menu

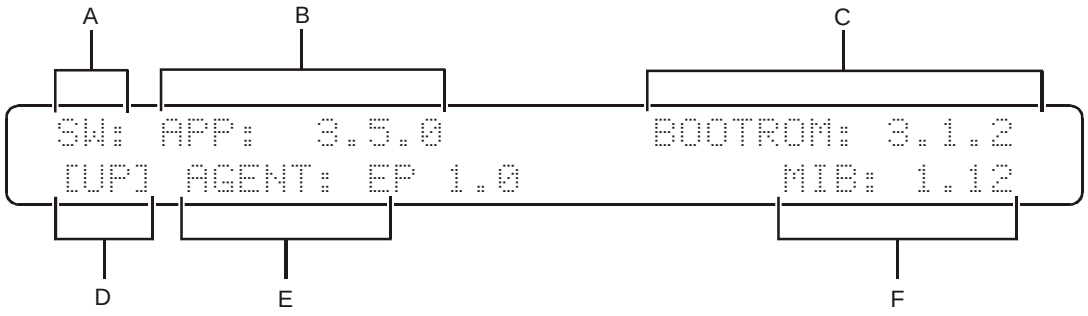


Table 4-24 describes the fields and available options:

Table 4-24
Software menu options

Key	Field	Description
A	SW	Identifies the current menu.
B	APP *n*	Identifies the software application version.
C	BOOTROM *n*	Identifies the software bootrom version.
D	UP	Displays the ID menu.
E	AGENT *x*	Identifies the OM 1000 SNMP agent version.
F	MIB *n*	Identifies the SNMP MIB version.

ID Menu—LOC (Location) Menu Options

Select **LOCATION** on the ID menu to display the LOC menu. The fields are set in the `OM1000.ini` file using an ASCII text editor. This menu provides the required rack and shelf information when using a status monitoring system.

Figure 4-33 illustrates the LOC menu:

Figure 4-33
LOC menu

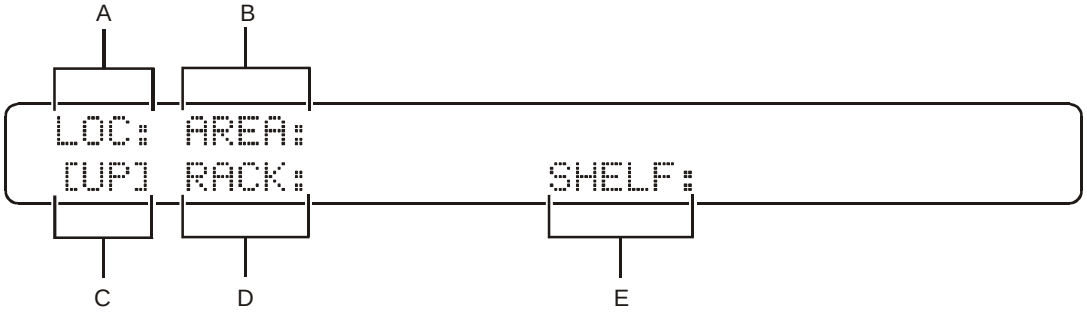


Table 4-25 describes the fields and available options:

Table 4-25
LOC menu options

Key	Field	Description
A	LOC	Identifies the current menu.
B	AREA	Identifies the area for this unit.
C	UP	Displays the ID menu.
D	RACK	Identifies the rack for this unit.
E	SHELF	Identifies the shelf for this unit.

The area, rack, and shelf fields are settable in the `OM1000.ini` file with an ASCII text editor. After you set the `OM1000.ini` file, you must download the file to the OM 1000 through BOOTP/TFTP.

Section 5

Troubleshooting

This section provides information to help you isolate and resolve common error conditions reported by the OM 1000. It also provides maintenance recommendations if the unit fails to power up. If you need assistance, contact the TRC at:

- Inside the U.S.: **1-888-944-HELP (1-888-944-4357)**
- Outside the U.S.: **215-323-0044**.

Tables 5-1 through 5-3 contain data to aid in quickly resolving problems you may encounter using the OM 1000:

- Table 5-1 describes the operating conditions indicated by the fault LEDs on the front panel.
- Table 5-2 lists common error conditions, symptoms, possible causes, and corrective actions for common OM 1000 error conditions.
- Table 5-3 lists and describes the RF modulator port testing modes.

Table 5-1
LED status indicators

Indicator	Description
POWER	The POWER indicator glows green when power is applied to the unit.
DATA IN	The DATA IN indicator glows green when the unit receives data on one or more of the physical ports or when data is being inserted by the internal PID message generator (PIDGEN).
EXT SYNC	The EXT SYNC indicator glows green when external symbol sync is applied. It is normal for this indicator to be off when no external sync is applied.
PLL ERROR	The PLL ERROR indicator glows red when the lock-detect circuit in the phase-lock loop (PLL) determines that the loop is not locked. The indicator is off during normal operation.
RF ERROR	The RF ERROR indicator glows red when the RF output level is out of specification or if the detector senses no RF at the output. The indicator is off during normal operation and on during a fault that causes a loss of RF. It is also on when the modulator port is in the STANDBY mode.
FAULT SUMM	The FAULT SUMM indicator glows red if any major or critical internal faults are detected.

Table 5-2
Common fault indications

Problem	Possible Cause	Corrective Action
POWER LED not illuminated.	No power to unit	Check the power connection. Check the fuse. Check the ac source.
	Blown ac power fuse	Replace the fuse with one rated at 2A, 250 Vac, slow-blow.
OM 1000 powers up but fails to initialize	BOOTP/TFTP configuration	Check the BOOTP configuration and all the file paths and names on the server.
	Mechanical error with unit	Repair or replace the unit.
DATA IN LED indicator fails to light	No input data received	Check the input cables and sources. Check the IP addresses. Enable the input port.
PLL ERROR LED lights	Internal failure	Repair or replace the unit.
RF ERROR LED lights	RF modulator port in Standby mode	Put the modulator in the Operate mode.
	Internal failure	Repair or replace the unit.
Main display has poor readability or blank	Improper contrast setting or bad display	Adjust the contrast until the display is optimum, or return the OM 1000 to the factory for repair or replacement.
Adjusted port settings did not take effect	Changes were not committed or saved through the front-panel display	Commit and then save the changes. Reboot the system.
	Changes are being overwritten by the `OM1000.ini` file	The `OM1000.ini` file is being force downloaded as set within the `OM1000.fof` file. See Section 4, “Setup and Operation” for steps on saving the settings.
No serial port communications available	Port not enabled	Adjust the port settings to match the settings in the headend equipment.
	The data rate, parity, start bit, or stop bit settings are not compatible with the other units in the headend	Serial port communication parameters are not compatible with other headend units.
Logical Ethernet input port does not receive data (Fault Sum LED on)	Duplicate UDP port number being used. Two logical Ethernet input ports were configured to use the same UDP port number.	Change the UDP port number to be unique across the entire OM 1000.

Testing the RF Modulator

The modulator port has several test modes that can be set through the front panel. Refer to Section 4, "Setup and Operation." Although these test modes are mainly intended for factory

testing, they can be useful in isolating specific faults. Table 5-3 summarizes the modulator port test modes.

Table 5-3
Modulator port testing modes

Mode	Description
CW test	The RF modulator generates a single CW signal. The signal frequency is exactly the same as the center frequency of the QPSK-modulated signal. The signal level is equal to the composite level of the QPSK signal. This mode is useful for rough level setting and for exact frequency measurements.
2T test	The RF modulator generates two tones 1.024 MHz above and below the carrier frequency. The level of each tone is 1 dB below the level of the modulated QPSK signal. The composite RMS level of both tones together is 2 dB above the level of the QPSK modulator signal. This mode is useful for setting levels using a spectrum analyzer with a 30 to 300 kHz resolution bandwidth to resolve the two tones. If the level of each tone is set to the desired QPSK-operating level, the actual QPSK operating level is 1 dB higher, providing 1 dB of extra margin to the link.
CON test	The RF modulator operates the same as in the Operate mode, except that the digital FIR filter coefficients are changed. In the Operate mode, the FIR filter frequency-response shape is rectangular. In the CON Test mode, the FIR filter frequency-response shape is a raised cosine with an alpha value equal to 0.5. This mode is useful for testing using a constellation or vector analyzer.

Appendix A
Specifications

RF Output

Modulation	DQPSK
Carrier symbol rate	1.024 Mbaud
Carrier suppression	–30 dB typical
Center frequency	71 through 129 MHz fixed carrier frequency
Step size	50 kHz
Level	+30 through +50 dBmV
Level steps	1 dB maximum
Spurious outputs—	
within ±1.25 MHz	–40 dBc in 30 kHz BW in CW Test mode
beyond ±1.25 MHz	–45 dBc in 300 kHz BW

IF Output

Center frequency	44 MHz ± 0.005% fixed carrier frequency
Level	+26 dBmV nominal, factory set

Electrical Specifications

Voltage, ac	100 through 240 Vac
Line frequency, ac	50 through 60 Hz
Line current, ac	0.3 A, 120 V
Power	35 W maximum

Operating Environment

Ambient temperature	0 through 50° C
Ambient humidity	0 through 90%, non-condensing
Storage temperature	–40 through +75° C
Cooling	Convection

Physical Specifications

Dimensions	17 L x 17 W x 1.75 H inches
Weight	8 lbs
Mounting	Rack mount

Performance Specifications

RF output level stability vs. temperature	± 2 dB
Accuracy of RF center frequency	± 0.01%
Accuracy of IF center frequency	± 0.005%
Transmit spectral density shape	
± 650 kHz	–3 dB maximum
± 750 kHz	–7 dB minimum
± 1 MHz	–35 dB minimum
± 1.25 MHz	–50 dB minimum
Forward error correction	Reed-Solomon (96,94)
FEC interleaving	Convolutional (8,96)
I/Q amplitude imbalance	± 0.5 dB typical
I/Q phase imbalance	± 1.0° typical

Interconnection Specifications

Ethernet port	
Network data rate	10 Mbps maximum
OM 1000 data rate	200 UDP packets per second maximum
Interface	IEEE 802.3
Impedance	120 ohms
Cable	Shielded twisted pair
Connector	RJ-45 (10Base-T)
Messaging	RPC, UDP, TCP/IP, SNMP

Data (Bit) Rate

OPT1 and OPT2 are optional ports.

When the OM 1000 is configured with the optional RS-530 interface (part number 453970-003), OPT1 must use the external clock when receiving the TCI TAC stream.

The following data rates for synchronous OPT1 or OPT2 are the only error-free rates available. Any other data rate from 300 through 57600 bps for RS-232 and 300 through 2,048,000 bps for RS-530 can be selected, however the resulting data rate is inaccurate.

Asynchronous		
RS-232		RS-530
RS-232 I/O	OPT1 or 2	OPT1 or 2
300	300	300
600	600	600
1200	1200	1200
2400	2400	2400
9600	9600	9600
19200	19200	19200
	38400	38400
	57600	57600

Synchronous		
RS-232		RS-530
RS-232 I/O	OPT1 or 2	OPT1 or 2
Not supported	300	50000
	600	52800
	1200	55000
	2400	60000
	9600	62500
	19200	66000
	38400	68750
	57600	75000
		82500
		88000
		93750
		100000
		103125
		110000
		120000
		125000
		132000
		137500
		150000
		165000
		171875
		187500
		200000
		206250
		220000
		250000
		264000
		275000
		300000
		330000
		343750
		375000
		412500
		440000
		500000
		515625
		550000
		600000
		660000
		687500
		750000
		825000
		1031250
		1100000
		1137931
		1320000
		1375000
		1500000

Appendix B

Cabling Specifications

This appendix provides interface-cabling guidelines for the OM 1000.

RS-232 DB9 Interface Cabling (PORT2)

The OM 1000 is configured as a DTE:

Connector type	DB9 male shielded connector with screw locks
Cable type	Shielded twisted pair
Baud rate	Port 1: 9,600 bps asynchronous (fixed), 8/N/1
	Port 2: 19.2K maximum asynchronous (no sync mode), 8/N/1; Port 2 supports 300, 600, 1,200, 2,400, 9,600, and 19,200 bps

Table B-1
RS-232 DB9 Interface Connector Pinout

Pin Number	Signal	Direction	Description
1	RLSD (DCD)	In	Receive Line Signal Detector (Data Carrier Detect)
2	RX	In	Receive data
3	TX	Out	Transmit data
4	DTR	Out	Data Terminal Ready
5	SG (Shield)		Signal Ground (Shield)
6	DSR	In	Data Set Ready
7	RTS	Out	Request To Send
8	CTS	In	Clear To Send
9	RI	In	Ring Indicator

DB25 RS-232 Interface Cabling (PORT 4 and PORT 5 - Optional Module)

The OM 1000 is configured as a DTE.

Connector type	DB25 male shielded connector with screw locks
Cable type	25 conductor shielded
Bit rate	56 K maximum (sync or async)
	Async: 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, or 57,600 bps
	Sync: 300 through 57,600 bps

Table B-2
DB25 RS-232 interface connector pinout

Pin Number	Signal	Direction	Description
1	Shield		Chassis ground
2	TX	Out	Transmit data
3	RX	In	Receive data
4	RTS	Out	Request to send
5	CTS	In	Clear to send
6	DSR	In	Data set ready
7	GND		Signal common, connected to chassis ground
8	RLSD	In	Receive line signal detect
9	N.C.		No connection
10	N.C.		No connection
11	N.C.		No connection
12	N.C.		No connection
13	N.C.		No connection
14	N.C.		No connection
15	TXCLK	In	Transmit signal timing clock
16	N.C.		No connection
17	RXCLK	In	Receiver signal timing clock
18	N.C.		No connection
19	N.C.		No connection
20	DTR	Out	Data terminal ready
21	RL	In	Signal quality detect (remote loopback)
22	RI	In	Ring indicator
23	RS	In	Rate selector
24	TXCLK	Out	Transmit clock
25	TM	In	Test mode

The OM 1000 can either source or sink the transmit clock; this is determined by a configuration selection. Sinking the clock is needed when sending data through a modem through a network T1 line. In this case, the modem sources a clock that is locked to the network. The OM 1000 sinks the clock and sources data to the modem to be sent to the network.

DB25 RS-530 Interface Cabling (PORT 4 and PORT 5 - Optional Module)

The OM 1000 is configured as a DTE.

Connector type	DB25 male shielded connector with screw locks
Cable type	25 conductor shielded
Bit rate	56 K maximum async/2 Mbps sync
	Async: 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, or 57,600 bps
	Sync: 300 through 2,048,000 bps (Refer to Appendix A, "Specifications")

Table B-3
DB25 RS-530 interface connector pinout

Pin Number	Signal	Direction	Description
1	SHIELD	Shield	Chassis ground
2	BA+	Out	Transmit data +
3	BB+	In	Receive data +
4	CA+	Out	Request to send +
5	CB+	In	Clear to send +
6	CC	In	DCE ready
7	AB	Ground	Chassis ground
8	CF+	In	Receive line signal detect +
9	DD	In	Receiver clock
10	CF	In	Receive line signal detect
11	DA		No connection
12	DB–	In	Transmit clock –
13	CB–	In	Clear to send –
14	BA–	Out	Transmit data –
15	DB	In	Transmit clock
16	BB–	In	Receive data –
17	DD	In	Receiver clock
18	LL	Out	Local loopback
19	CA–	Out	Request to send –
20	CD	Out	DTE ready
21	RL	Out	Remote loopback
22	CE	In	Ring indicator
23	AC	Gnd	Chassis
24	DA	Out	Transmit
25	TM	In	Test mode

The OM 1000 can either source or sync the transmit clock; this is determined by a configuration selection. Syncing the clock is needed when sending data through a modem through a network T1 line. In this case, the modem sources a clock that is locked to the network. The OM 1000 syncs the clock and sources data to the modem to be sent to the network.

Ethernet 10Base-T Interface Cabling

Refer to Amp drawing number C-557827 for cable details.

Connector type	RJ-45 connector
Cable type	STP-5 (category 5 shielded twisted pair)
Maximum cable length	150 feet

Table B-4
Ethernet 10Base-T interface connector pinout

Pin Number	Signal	Direction	Description
1	TX+	Out	Transmit data +
2	TX–	Out	Transmit data –
3	RX+	In	Receive data +
4 and 5	n/c		No connect
6	RX–	In	Receive data –
7 and 8	N/c	In	Data set ready

Appendix C

Initialization Information

On power-up or reset, the OM 1000 undergoes an automatic initialization process during which it loads the executable software and parameter settings that control its operation. Depending on the headend network configuration, the OM 1000 performs initialization either by self-booting from internal flash memory or by downloading information from an external BOOTP server.

Initializing the OM 1000 using the self-boot option enables you to operate the OM 1000:

- Without connecting it to the headend LAN
- In a headend LAN that does not include a BOOTP server

Initializing the OM 1000 using the download option enables you to:

- Modify the setup of an installed OM 1000 to accommodate changes in the digital headend configuration
- Load upgraded executable software into an installed OM 1000

Self-Boot Option

The OM 1000 begins initialization by broadcasting a BOOTP request over its Ethernet port. When initializing with the self-boot option, the OM 1000 times out waiting for a reply and then initializes itself from the information stored in its flash memory.

Download Option

To initialize the OM 1000 using the download option:

- The OM 1000 must be connected to the headend Ethernet LAN
- A BOOTP server must be present in the LAN
- The BOOTP server must know the OM 1000 MAC address

The OM 1000 begins initialization by broadcasting a BOOTP request over its Ethernet port. The BOOTP server receives the OM 1000 BOOTP request and provides a reply from which the OM 1000 initializes itself.

BOOTP Request and Reply Format

BOOTP request and reply messages use the same packet format. The BOOTP packet includes multiple fields divided into the following areas:

Standard Area	Contains fields for specifying basic BOOTP message information, including: Message type (request or reply) MAC address of requesting device IP address assignment of requesting device Boot file name for the requesting device Values in some standard fields that must be specified and others that are optional, depending on whether the BOOTP message is a request or reply
Vendor-Specific Area	Contains fields for use as defined by the vendor, for example: to set values for operating parameters

BOOTP packet format is defined in detail in the following specifications:

- RFC 1542, "Clarifications and Extensions for the Bootstrap Protocol," by W. Wimer (October 1993)
- RFC 2132, "DHCP Options and BOOTP Vendor Extensions," by S. Alexander and R. Droms (March 1997)

Refer to these specifications for complete information on the BOOTP packet format and field descriptions. A general discussion of the BOOTP reply and request is provided in the following subsections.

BOOTP Request

In the BOOTP request, the OM 1000 includes:

- A value indicating that the message is a BOOTP request
- The OM 1000 Ethernet MAC address

The BOOTP request is transferred using User Datagram Protocol (UDP).

BOOTP Server Reply

In the BOOTP reply to the OM 1000, the BOOTP server includes:

- A value indicating that the message is a BOOTP reply
- The IP address of the boot server
- The IP address assigned to the OM 1000 Ethernet port
- The file-of-files (FOF) name for the OM 1000
- The path for the FOF
- The network mask

The BOOTP reply is transferred using UDP.

On receipt of the BOOTP reply, the OM 1000 obtains the FOF filename and path and then downloads it from the BOOTP server. The OM 1000 then parses the FOF and compares the listed source files with those maintained in the OM 1000 local copy of the previously used FOF. If any listed source filename or path has changed, or if there is a force download flag for any listed files (an "F" at the end of the line listing the file), the listed file is then downloaded to the OM 1000. If the downloaded FOF and the OM 1000 local copy are the same and a force download flag does not exist in the FOF, the OM 1000 does not download any additional files. It continues booting using the values stored in flash memory.

The FOF and other downloaded files are transferred through Trivial File Transfer Protocol (TFTP).

Initialization is complete when the OM 1000 has finished loading the executable software and operating parameters, either from a new download or from memory.

CAUTION!

The BOOTP request, BOOTP reply, and FOF transfer all use UDP, which does not include error checking. During the download process, undetected transmission errors can cause initialization failure. Always retry the initialization at least once before searching for a specific fault.

Boot File (FOF) Format

The FOF lists the names of the following types of files containing configuration information for the OM 1000:

Code file	Contains executable software
Configuration Files	Contains various files including SNMP, OM1000.ini, MSFS, Tasks, Hosts, Services, and Gateways

The FOF filename must have an eight-character base and a three-character file extension, and all characters must be lower-case.

In the FOF all lines must be either comment or data lines and each line must be terminated with a carriage return or a carriage return + line feed. Comment lines begin with a # character in the first position. Data lines define the names of code, symbol table, or configuration files using two fields separated by any number of spaces or tabs:

First field	Identifies the file by its absolute filename as stored on the server
Second field	Identifies the file by its symbolic name as used by the OM 1000
Third field	Used for symbol flags that control the download of the associated file

CAUTION!

Do not change the second field, which is the symbolic name used by the OM 1000. Changing the name can cause an initialization failure.

Figure C-1 provides an example of an FOF file:

Figure C-1
Sample FOF file

```
#--------------------------------------------------------------------------
# OM1000 Software File-Of-Files
#
# FILE INFO:
#   $Workfile:   om1000.fof  $
#   $Revision:   1.6  $
#   $Date:   04 Jun 2002 09:34:14  $
#
# DESCRIPTION:
#   File-of-Files template for factory use.
#
# NOTES:
#   This file is read by the OM during the BOOTP process. The OM maintains
#   a local copy of this file for comparison with the BOOTP'd file during
#   initialization.
#
#   The file systems may be case sensitive. The unit file names and paths
#   shown below should be in lower case.
#
#   The ".fcf" file listed below is for factory configuration ONLY.
#   Downloading this file to an OM 1000 other than the one for which the file
#   was customized MAY CAUSE THE OM 1000 TO BECOME INOPERATIVE.  The ".fcf"
#   file entry below should be commented out or removed entirely, except when
#   it is desired to download the file during initial OM 1000 configuration.
#
#   The om1000.svc, om1000.gtw, om1000.hst, and om1000.ini release files
#   are templates that may require setup for a particular installation.
#   Although default settings are provided, these files are site specific
#   and usually require reconfiguration during headend installation.  Refer
#   to the installation procedures for further information.
#
#   An "F" flag at the end of a line denotes a forced download of the file
#   indicated on that line.  Without the "F" flag the OM 1000 will first
#   check to see if the boot server file path and name already exists on the
#   OM 1000.  If so, the file will NOT download the file from the BOOTP
#   server.  An "F" flag is not needed during initial configuration because
#   the unit has no files and therefore will download all files.
#
```

```
#-------------------------------------------------------------------------
# FORMAT:
#   -------------SOURCE-------------  -------DESTINATION-------  -FLAGS-
#   <boot server file name and path>  <unit file name and path>  <flags>
#
#   NOTE: File names must be in the standard DOS 8.3 format, i.e., the
#   "xxxxxxxx.xxx" format.  The full path and file name must be stated
#   explicitly without the use of wildcards.
#
#-------------------------------------------------------------------------

#-------------------------------------------------------------------------
# Application and OS (with symbol table included)
#-------------------------------------------------------------------------
/bootdir/om1000/03_05.000/om1000.img            /boot/gi360

#-------------------------------------------------------------------------
# Dynamic Configuration Files
#-------------------------------------------------------------------------
/bootdir/om1000/03_05.000/om1000.ini            /config/config.ini

#-------------------------------------------------------------------------
# Static Configuration Files
#-------------------------------------------------------------------------
/bootdir/om1000/03_05.000/om1000.hst            /boot/hosts
/bootdir/om1000/03_05.000/om1000.gtw            /boot/gateways
/bootdir/om1000/03_05.000/om1000.svc            /boot/services
/bootdir/om1000/03_05.000/om1000.msg            /boot/msgq.cfg
/bootdir/om1000/03_05.000/om1000.tsk            /boot/task.cfg

#-------------------------------------------------------------------------
# SNMP Files
#-------------------------------------------------------------------------
/bootdir/om1000/03_05.000/om1000.adb            /boot/agentdb.cfg

#-------------------------------------------------------------------------
# HTTP Files
#-------------------------------------------------------------------------
/bootdir/om1000/03_05.000/om1000.htm            /boot/default.htm
```

Hosts File Format

The `hosts` file, specified in the FOF, defines the names and IP addresses of all other devices in the headend LAN with which the OM 1000 must communicate.

In the `hosts` file, all lines must be either comment or data lines, and each line must be terminated with a carriage return or a carriage return plus line feed. Comment lines begin with a # character in the first position. Data lines describe hosts using three fields separated by any number of spaces or tabs:

- The first field identifies the IP address of the host
- The second field identifies the instance name of the host
- The third field identifies any aliases for the host

Figure C-2 provides an example of a `hosts` file:

Figure C-2
Sample **`hosts`** file

```
#------------------------------------------------------------------------
# OM1000 Software Host File
#
# FILE INFO:
#   $Workfile:   om1000.hst  $
#   $Revision:   1.3.1.0  $
#   $Date:   04 Jun 2002 09:34:24  $
#
# DESCRIPTION:
#   This file describes a number of hostname-to-address mappings for the
#   GI Network Elements referenced by the OM-1000
#
# NOTES:
#   This file is read by the OM during initialization. The OM uses a
#   local copy of this file unless it cannot find it or is forced to
#   download it from the boot server via a "force" command in the
#   associated file-of-files.
#
# FORMAT:
#   IP Address       Host Name
#
# EXAMPLES:
#   0.0.0.0          NOHOST
#   168.84.252.12    DAC001
#------------------------------------------------------------------------
0.0.0.0          NOHOST
```

Services File Format

The services file specified in the FOF defines the TCP/UDP ports the OM 1000 uses to communicate with other devices in the headend LAN.

Within the services file, all lines must be either comment or data lines, and each line must be terminated with a carriage return or a carriage return plus line feed. Comment lines begin with a # character in the first position. Data lines define services using three fields separated by any number of spaces or tabs:

- The first field identifies the service name
- The second field identifies the port number and protocol name, separated by a slash (/)
- The third field identifies any aliases for the service

Figure C-3 provides an example of a services file:

Figure C-3
Sample services file

```
OM1000 Software Services File
#
# FILE INFO:
#   $Workfile:   om1000.svc  $
#   $Revision:   1.3.1.0  $
#   $Date:   04 Jun 2002 09:34:44  $
#
# DESCRIPTION:
#   Services file.
#
#   This file describes a number of service name to port/protocol
#   mappings for the OM-1000. The only place where the OM uses this file
#   is to select the "control port" in the NET/CTRL menu, which must be
#   the TCP connection between the OM and DAC-6000 (i,e,, the ACC2OM2
#   entry shown below).
#
# NOTES:
#   This file is read by the OM during initialization. The OM uses a
#   local copy of this file unless it cannot find it or is forced to
#   download it from the boot server via a "force" command in the
#   associated file-of-files.
#
# FORMAT:
#   Service Name    Port Number/Protocol
#-------------------------------------------------------------------
#ACC to OM TCP Port (control port)
ACC2OM2         5167/tcp
#
#DAC to OM TCP Port (control port)
DAC2OM2         5167/tcp
```

The Service Name File

The service name file is a table that maps OM 1000 Logical Port numbers to ASCII names associated with those ports. This information is used by the DAC 6000 to determine what services are connected to the OM 1000 logical ports (ports 1 through 16). During initialization, the OM 1000 reads this file. The OM 1000 uses a local copy of this file unless it cannot find it or is forced to download it from the boot server through a "force" command in the associated FOF.

Figure C-4 provides an example of a service name file:

Figure C-4
Sample service name file

```
#------------------------------------------------------------------------
# OM1000 Software Service Name File
#
# FILE INFO:
#   $Workfile:   om1000.snm  $
#   $Revision:   1.3.1.0  $
#   $Date:   04 Jun 2002 09:34:50  $
#
# DESCRIPTION:
#   Service name file.
#
#   This file is a table that maps OM 1000 Logical Port numbers to
#   ASCII names associated with those ports.  This information is used
#   by the ACC to determine what services are connected to the OM's
#   logical ports (ports 1 through 16).
#
#   This file is read by the OM during initialization. The OM uses a
#   local copy of this file unless it cannot find it or is forced to
#   download it from the boot server via a "force" command in the
#   associated file-of-files.
#
# FORMAT:
#   The format of an entry is important. It should consist of the
#   logical port number in decimal, followed by a tab, followed by the
#   Service Name. The port numbers must be in the range of 1 to 16. The
#   Service Name must be one word (no spaces), up to 25 characters in
#   length, and should NOT be enclosed in quotes.  Following the name
#   should be a carriage return.
#------------------------------------------------------------------------
#PORT   SERVICE NAME
#----   ------------
```

The Gateway File

The gateway file describes the gateways to other networks in the headend and is used by the OM 1000 during initialization.

Figure C-5 provides an example of a gateway file:

Figure C-5
Sample gateway file

```
#-----------------------------------------------------------------------
# OM1000 Software Gateway File
#
# FILE INFO:
#   $Workfile:   om1000.gtw  $
#   $Revision:   1.3.1.0  $
#   $Date:   04 Jun 2002 09:34:40  $
#
# DESCRIPTION:
#   This file describes the gateways to other networks in the headend
#
# NOTES:
#   This file is read by the OM during initialization. The OM uses a
#   local copy of this file unless it cannot find it or is forced to
#   download it from the boot server via a "force" command in the
#   associated file-of-files.
#
# EXAMPLE:
#   net 0 gateway 168.84.248.1 metric 1 passive
#-----------------------------------------------------------------------
```

The Operate Directory

The Operate Directory contains the basic set of files required for normal OM 1000 operation. Its files and their purpose are listed below. An asterisk following the file name indicates a file that may require modification for use in a particular site. All other files should *not* be altered.

Figure C-6 provides an example of an operate.txt file:

Figure C-6
Sample operate.txt file

```
OM-1000 Release 3.4.0
Operate Directory

This directory contains the basic set of files required for normal OM-1000 operation.

The files and their purpose are listed below.  An asterisk following the file name
indicates a file that may require modification for use in a particular site installation.
All other files should NOT be altered.

      OM1000.ADB     SNMP Configuration.
      OM1000.FOF*    File-of-files.
      OM1000.GTW*    Gateways file.
      OM1000.HST*    Hosts file.
      OM1000.HTM     Default HTML file for use with HTTP.
      OM1000.IMG     OM-1000 Application Image (binary).
```

```
      OM1000.INI*    OM-1000 Dynamic Database Configuration.


      OM1000.MSG     OM-1000 Message Queue Configuration.

      OM1000.SNM*    OM-1000 Service Names.  Used by the ACC-4000D.
      OM1000.SVC*    Services file.
      OM1000.TSK     OM-1000 Task Configuration.


The following gives more detail about the files shown above that may require site specific
configuration.

      OM1000.FOF     The file name and path for the unit specific om1000.ini file
                     must be set.  Make no other changes.  Example:

                     c:/bootdir/om1000/03_04.000/om001.ini /config/config.ini
                                                    ---------

      OM1000.GTW     The IP address and host name any network gateways to be used by
                     the OM-1000 must be entered.  Format is shown in the file's
                     header.

      OM1000.HST     The OM-1000 requires IP address and host name for the associated
                     control device (usually an ACC-4000D) to be present in this
                     file.  Format is shown in the file's header.

      OM1000.INI     The Emergency Alert Broadcast Port must be specified. This is
                     the OM-1000 logical port used for EA. Example:

                            [Emergency Broadcast Port]
                            EBSLogicalPort = 3;
                                             -
                            where:  3 is the logical port number that the emergency
                                          broadcast PID is expected.

                     The Emergency Alert Broadcast PIDs must be specified. Example:

                            [Emergency Broadcast PID to Block]
                            EBSPidToBlock = 5379;

                            [Emergency Broadcast PID to Block]
                            EBSPidToBlock2 = 5372;
                                    .
                                    .
                                    .
                                    ----
                            where:  5379 (1503 hex) is the emergency broadcast PID.
                                          If less than 4 PIDs are to be blocked, put in
-1 for the remaining field(s).

                     If the Multicast Receive capability is to be activated, the
                     Multicast Receive MAC address must be specified. Example:

                            [Physical Port Configuration]
                            PhysicalTable =
                            #Group 1
                             2 0 0 0 0 0 0 0 0 0 0 0 0 0
                            #Group 2
```

```
                        8 0 0 0 1 9600 0 0 0  0 0 0 0
                       #Group 3
                        3 0 0 0 0 0 0 0 0 0 0 0 0

                          - - -

                          a b c
                       where:  (use with Group 3 (ethernet) ONLY!)
                                        ----------------------
                              a = multicast rcv MAC upper byte (in decimal)
                              b = multicast rcv MAC middle byte (in decimal)
                              c = multicast rcv MAC lower byte (in decimal)

                              example:  256 24064 543  (=01:00:5E:00:02:1F)
                                         --- ----- ---    ----- ----- -----
                                          a    b    c   (=  a     b     c  )
```

If an optional RS-530 or RS-232 module is installed, the following configuration changes must be made before the module(s) become available on the front panel menu. Use the following entry in the PhysicalTable section in place of either the Group 4 (port 4) or Group 5 (port 5) entry, depending on which slot the module is installed in. This tells the software the module is installed and setup for 9600 bps async. The module can then be configured as needed from the front panel.

Under "PhysicalTable", "Group 4" or "Group 5":

```
Default Entry (no module installed):
       1 0 0 0 0 0 0 0 0 0 0 0 0
For RS-232 cards:
       6 0 0 0 1 9600 0 0 0 0 0 0 0
For RS-530 cards:
       7 0 0 0 1 9600 0 0 0 0 0 0 0
```

OM1000.SNM — OM-1000 logical port assigments and there associated service name must be specified in this file. This is not used within the OM-1000 itself, but is passed along intact to the ACC-4000D upon registration. See file header for format. Service names must be recognizable by the ACC-4000D.

OM1000.SVC — Network services and their ethernet port and protocol are listed here. The OM-1000 uses this file to select the control device port and protocol (usually 5167/tcp). See the file header for format.

Glossary

Abbreviations and Acronyms

BNC	Bayonet, N-type, C-size connector
BOOTP	Bootstrap Protocol
C6U	Commander 6 Upconverter
CATV	Cable Access Television (originally Community Antenna Television)
c/n	carrier–to-noise
CPU	central processing unit
CW	continuous wave
DAC 6000	Digital Addressable Controller 6000
DCE	data communication equipment
DCT	digital consumer terminal
DHCP	Dynamic Host Configuration Protocol
DHEI	Digital Headend Expansion Interface
DQPSK	digital quadrature phase shift keying
DTE	Data terminal equipment
EPG	electronic program guide
ESD	electrostatic discharge
FEC	forward error correction
FIR	finite impulse response
FOF	file-of-files
HCT 1000	Headend Configuration Tool 1000
IF	intermediate frequency
INTFC	interface
I/O	Input/output
IP	Internet Protocol
IPPV	Impulse Pay-Per-View
IRT*	Integrated Receiver Transcoder 1000/2000
IRT 1000	Integrated Receiver Transcoder 1000
IRT 2000	Integrated Receiver Transcoder 2000
ISO	International Standards Organization
ITEM 1000	Integrated Transport Encryption Multiplexer 1000
LAN	local area network
LCD	liquid crystal display
LED	light-emitting diode

LNB	low noise block
MAC	media access control
MIB	management information base
MPEG-2	Motion Picture Expert Group–2
MUX	multiplex
NDTC	National Data Transmission Center
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NVMEM	non-volatile memory
NVRAM	non-volatile random-access memory
OAM&P	Operation, Administration, Maintenance, and Provisioning (Ethernet port)
OBTM	out-of-band transport multiplex (receiver)
OM 1000	Out-of-Band Modulator 1000
OOB	out-of-band
PID	packet identifier
PLL	phase-locked loop
QPSK	quadrature phase shift keyeing
RF	radio frequency
RMS (rms)	Root mean square
RPC	remote procedure call
RPD 1000	Return Path Demodulator 1000
RSA	return for service authorization
SCC	service control channel
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial File Transfer Protocol
UDP	User Datagram Protocol
UTP	unshielded twisted pair
UW	unique word

Definitions of Terms

10Base-T

The IEEE standard for twisted pair Ethernet. Uses telephone wiring and standard RJ-45 connectors. It is wired in a star configuration and requires a hub.

BOOTP

Boot protocol. The communication protocol used to transfer initialization information between digital headend network elements and a central server. At power up, network elements issue a BOOTP request. The BOOTP server receives the request and responds with a BOOTP reply that specifies startup information and operating parameters for the requesting device.

BOOTP Reply

Single-packet, multi-field boot protocol message transmitted in UDP by a BOOTP server to provide a boot image to a network device (BOOTP client).

BOOTP Request

Single-packet, multi-field boot protocol message transmitted in UDP by a network device (BOOTP client) to request a boot from a BOOTP server.

Conditional Access Table (CAT)

A table carried in the PID1 stream of a transport multiplex that lists the PID numbers of all EMM streams in a transport multiplex and indexes each EMM stream to an EMM provider ID.

DAC 6000

Motorola Digital Addressable Controller 6000 used for controlling digital cable terminals and digital wireless terminals. The name was changed from ACC 4000D in late 1997.

Forward Error Correction (FEC)

An encoding technique applied to data before transmission to reduce the number of errors introduced by transmission. The receiving device decodes the FEC to recover the original data. Data is formatted with extra error detection and correction bits at the sending end of a transmission. The received bits are used to detect and correct transmission errors.

Headend Configuration Tool (HCT 1000)

A Motorola PC-based tool for provisioning network devices in a digital CATV headend or broadband interactive network. The HCT 1000 helps set up embedded code images, assign IP addresses to network devices, and set up start-up parameters.

Initialization

The process by which digital headend network elements obtain configuration information and operating parameters at power up. This confirms that all indicators and constants are set to prescribed conditions. Data is loaded into a new set-top to customize its operation for use by a customer in a particular cable system. Typically, during this process the controller sends reset and initialize commands along with configuration and terminal control bytes.

Integrated Receiver Transcoder (IRT 1000, IRT 2000)

Motorola digital headend equipment that receives digital satellite signals and remodulates data from QPSK to QAM IF for cable plant transmission.

Internet Protocol (IP) Address

This public standard address is used for packet- and connection-type communications.

IPPV

Impulse Pay-Per-view. An ordering mechanism in which subscribers place orders directly into set-tops by remote control. Events are authorized immediately for viewing.

MAC address

Media Access Control address. A proprietary address used for upstream/downstream communications. This is the lower sub-layer of the Data Link layer in the OSI model and is used to describe the mechanisms used to arbitrate access to a shared medium.

MPEG-2 (MPEG-II)

An international standard (ISO/IEC 13818) for delivering compressed digital video. MPEG-2 broadcast quality is 704x480 pixels at 30 frames per second (fps) in North America and 704x576 pixels at 25 fps in Europe. MPEG-2 is typically compressed at higher than 5 Mbs and intended for higher quality broadcast uses.

OAM&P

A telephone industry acronym referring to operations, administration, maintenance, and provisioning. The term refers to software required to generate the reports and commands needed to control all network equipment. The OAM&P port is a network (Ethernet) port through which a device communicates with the headend network. The OAM&P port is assigned a hardware (MAC) address at the factory; this MAC address is used for communication with the bootp server before the network (IP) address is assigned to the port.

Packet Identifier (PID)

A number assigned to MPEG transport packets to identify the information stream to which they belong. The PID number is assigned in the packet header, and all packets from the same stream have the same PID number. A 13 bit number included in MPEG-2 transport packet headers.

Quadrature Phase Shift Keying (QPSK)

A digital modulation method that combines two carriers that are 90 degrees out of phase (in quadrature), resulting in four possible phase states.

Reed-Solomon encoder

A block-based encoding technique used for forward error correction.

User Datagram Protocol (UDP)

A transmission protocol that uses an IP address to identify the destination host and a port number to identify the destination application.

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