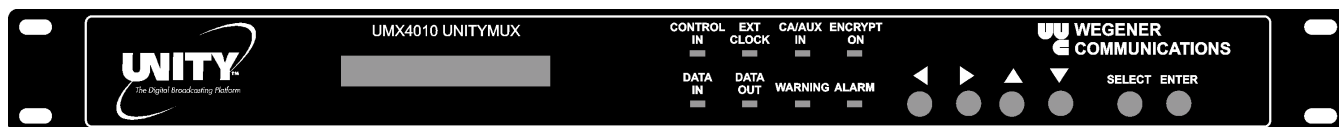


MODEL UMX4010x-1y

UNITY MUX™

User's Manual



WEGENER®

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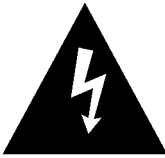
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| | | |
|--|---|---|
|  | CAUTION RISK OF ELECTRIC SHOCK DO NOT OPEN |  |
| <p>CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL</p> | | |



| |
|---|
| CAUTION |
| <p>As this unit is intended to interface with other electrical/electronic systems, proper engineering practices must be adhered to during installation and checkout.</p> <p>All AC power and ground must be installed in accordance with National Electric Code Standards as to conductor size and limitations (see NFPA 70, articles 200-280, as amended, if required), and lightning protection must be provided.</p> <p>All RF interconnections must be properly shielded to prevent ingress or egress of potentially interfering sources to existing services.</p> <p>Any damage to this unit caused by improper wiring/interconnections will void any warranty extended.</p> |

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Chapter 1 General Information

1.1 Manual Overview

This manual provides instructions and reference information for the proper installation and operation of the Wegener Model UMX4010x-1y Unity MUX, referred to throughout this manual as the UMX4010 or Unity MUX.

The manual is divided into the following chapters:

- 1 General Information** - a description of your UMX4010, its functions and specifications, and a glossary of terms.
- 2 Installation** - procedures and information for the correct and safe installation of your UMX4010.
- 3 Operation** - instructions for starting and operating your UMX4010.
- 4 Maintenance and Troubleshooting** - information about maintaining your UMX4010 and resolving possible operating difficulties.
- 5 Customer Service** - Our warranty and information on obtaining help.

Please e-mail any suggestions or comments concerning this manual to manuals@wegener.com. If you prefer to post them through the mail, please send your comments to the address below. If you have substantial or complex changes to recommend, our preference is that you copy the page(s) in question, mark your changes on that copy, and fax or mail us the copy. We always appreciate constructive criticism.

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1.2 UMX4010 Overview

Functional Description

The Wegener Model UMX4010x-1y Unity Mux formats Wegener's Compel data stream and an optional encryption data stream (necessary for decryption at receive sites), and inserts them into a broadcast-standard MPEG data stream. This allows central control of individual receivers, as well as receiver groups.

Features include:

- Control by local user or remote COMPEL[®] system
- Upload of software application upgrades via terminal port
- Supports COMPEL[®]/CA Conditional Access
- DVB-ASI transport stream output
- Alarm relay
- Contact closures standard

WARNING

The UMX4010 MUST be 'reset' each time the input MPEG mux stream is changed (e.g. change in aggregate data rate, or switching from one source to another). Be sure to 'Reset' only AFTER the mux input has been verified as stable. Also, if the MPEG stream is switched remotely, the UMX4010 must be reset remotely via Compel, a modem, or by the terminal reset command.

Physical Description

The UMX4010 is housed in a standard, 1 RU, rack-mountable chassis. Its front panel (see **Figure 1.1 UMX4010 UnityMux** below) provides a user interface through six push buttons and an LCD as well as eight LED indicators. The rear panel holds connectors for input and output signals, serial monitoring and control, alarm and user relays, and AC input power.

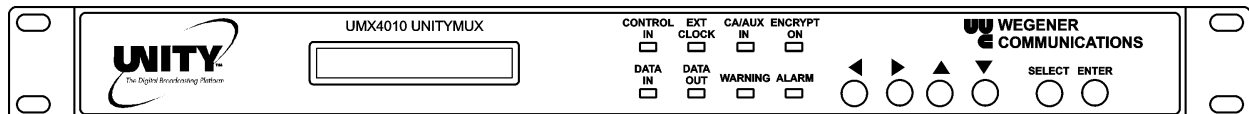


Figure 1.1 UMX4010 UnityMux

**UMX4010
Options**

The UMX4010 Unity Mux is available in several configurations to meet specific applications. Input/output type, encryption, line cord type, and motherboard options can be varied to create the model best suited for your specific needs.

The UMX4010 part number is structured as follows to describe the options on each Unity Mux:

UMX4010(A) - BC - D - EFG
Table 1: UMX4010 Options Key

| Part Number Position | Option Name | Designator Description |
|----------------------|--|---|
| UMX4010 | This prefix simply means that the unit is a UMX4010 Unity Mux. | |
| (A) | Encryption | Omitted - None A - Customer #1 B - Customer #2 Z - Wegener Default |
| B | Motherboard Option | 0 - Original version, SPI transport only 1 - SPI, M2P or ASI ready 2 - Wegener Serial-in only; no Compel |
| C | Conditioner I/O | 0 - Parallel TS in, Parallel TS Out, DVB-SPI 1 - M2P I/O Only (Modulator Clock) 2 - Selectable SPI or M2P I/O 3 - DVB-ASI I/O Only 4 - Wegener Serial Program In, M2P Out (W=2) 5 - Selectable SPI, M2P I/O, DVB-ASI |
| D | Line Cord | 0 - USA 1 - European 2 - British 3 - Australian |

1.3 UMX4010 Specifications

Table 2: Technical Specifications

| Characteristic | Specification |
|--|--|
| <p>POWER</p> <p>Voltage</p> <p>Frequency</p> <p>Current Draw</p> | <p>90-132 or 175-264 VAC auto-detect/selected</p> <p>50/60 Hz ± 2%</p> <p>0.4 A at 115 VAC, 0.3 A at 230 VAC</p> |
| <p>DVB ASI OUTPUT</p> <p>Physical Layer</p> | <p>270 Mbaud signaling on coaxial cable</p> |
| <p>SERIAL PORTS</p> <p>Standard</p> <p>Services</p> <p>Baud Rates</p> | <p>Asynchronous RS232, DCE</p> <p>Terminal monitoring and control</p> <p>Netcon data in</p> <p>Netcon echo data out</p> <p>CA/Aux data input (encryption)</p> <p>Up to 38.4 kilobaud</p> |
| <p>ALARM/CLOSURES</p> <p>Type</p> <p>Polarity</p> <p>Rating</p> | <p>One form C relay dedicated to indicate unit ALARMS and two solid-state contact closures. The ALARM relay automatically de-energizes for alarm conditions so that power loss to the unit indicates as an alarm.</p> <p>On the contact closure connector, pins 1+ and 1- have a short between them during normal operation, unless the encryption option is "Clear." When that condition occurs, these pins "open" or go to a high impedance state. (Contact closure 2 is not enabled in the current equipment configuration.)</p> <p>Relay number 1 may be used by the customer as an "Encryption Off" alarm. This relay is open or high impedance whenever the current encryption state is "Off."</p> <p>Form C, wiper contacts NC contact when de-energized and NO contact when energized</p> <p>Common, NC and NO contacts supplied externally</p> <p>30VDC open circuit, 100 mA max current closed</p> |

Table 2: Technical Specifications

| Characteristic | Specification |
|-----------------------|----------------------------------|
| CHASSIS | |
| Height | Std. 1RU 1.75 inches (4.45cm) |
| Width | EIA std. 19 inches (48.26cm) |
| Depth | 14.0 inches (35.6 cm) |
| ENVIROMENTAL | |
| Operating Temperature | +10°C to +40°C (+50°F to +104°F) |

1.4 Safety Summary

The UMX4010 is designed for safe use with few special precautions required of the user. The following items are basic precautions to use when installing and working with your UMX4010:

Do not open the UMX4010 chassis cover.



The UMX4010 incorporates security labels over some of the screws. There are no user-serviceable components within the UMX4010. Tampering with these security labels or opening the unit will void your warranty. If you have questions, contact Wegener's Customer Service Department at the address or numbers listed in **Chapter 5 Customer Service** on page 49.

1.5 Glossary of Terms and Abbreviations

Table 3: Glossary of Terms

| Term | Definition |
|---------------------------|---|
| Alarm | A condition or notification of a condition that prevents proper UMX4010 functioning. |
| Application Software | The main host software which sets up the unit hardware, runs the process of acquiring transport stream sources, sets up and monitors the demux and decompression processes, monitors unit operations, and interfaces with the network and local users. |
| ASI (or DVB-ASI) | An "asynchronous" bit-serial physical interface for transport streams. Transmitting and receiving functions are designed such that the time relationships between all packets and their timing references are unchanged. |
| Audio Language Descriptor | Legacy 3-character MPEG descriptor applied to a program's audio streams. It was originally allocated to designate languages, but is now used for generic identification. |
| Boot loader | Software residing in non-writable zone of flash which executes at unit reset. It will verify and load the preselected application. |
| CA | See "Conditional Access". |
| COMPEL [®] | Wegener's network control software that may be used to manage your UMX4010 as well as other hardware. |
| Conditional Access | Wegener's system for securing the transmitted transport stream from unauthorized access. It features distribution of ciphered authorizing messages within a special PID. Upon deciphering in secure processors within the IRD, these messages continuously update the IRD with the current descrambling key. |
| DPI | Digital Program Insert. A special message, borne in an MPEG PID associated with a particular program, that signals the boundaries of ad avails. |
| DTMF | Dual-Tone Multi-Frequency. Tone signaling system used by the legacy telephone system. Tone pairs represented each of the keyboard items 0-9, *, and #. This system may be used to control external cueing equipment. |
| DVB | Digital Video Broadcast working group. This is a shorthand designation for a group of industry standards that provide enhancements in the use of MPEG transport streams. (For example, one DVB standard defined the standard way QPSK-modulated carriers would convey these streams over satellite world-wide.) |
| E_b/N_0 | Energy-per-bit per Noise density-per-Hertz. This is a unitless ratio that expresses signal-to-noise ratio in carrier transmission systems that convey digital data. A quality measurement for any such system is the E_b/N_0 needed to just convey the digital data within acceptable error rates. This is called the " E_b/N_0 threshold". |
| Ethernet | The widely-used LAN technology specified by IEEE standard 802.3 |
| IRD | Integrated Receiver-Decoder. A product which features a "receiver" to extract transport streams from satellite-borne carriers and a companion "decoder" to decompress MPEG elementary streams (from within said transport streams) in order to recreate the original audio/video/data signals. The Unity 4600 is an IRD. |

Table 3: Glossary of Terms

| Term | Definition |
|----------------------|--|
| Keep-alives (COMPEL) | Simple COMPEL network messages, addressed to "all", bearing date and time. These are transmitted regularly (every 5 seconds, for example) so that IRDs may quickly and continuously verify their network connection. |
| KMS | Key Management System. The sub-system within the Wegener Conditional Access system that creates and ciphers the scrambling keys and then distributes them to the uplink UMX5010 and all downlinked IRDs conveyed in a special PID within the transport stream. |
| LAN | Local area network. Your UMX4010 may be connected to an Ethernet LAN. |
| LCD | Liquid crystal display. The front-panel screen on your UMX4010 is a liquid crystal display. |
| LED | Light-emitting diode. The front-panel indicator lights on your UMX4010 are LEDs |
| Mbps, kbps or Msps | Units of data transport rate - Megabits per second (1 million bits per second), kilobits per second (1 thousand bits per second), or million symbols per second (1 million symbols per second) |
| MPEG | Moving Picture Experts Group - refers to the method of video compression established by this group. (The Unity 4600 utilizes the MPEG2 format for video.) |
| NTSC | National Television System Committee. The composite color video standard used domestically (and in a few countries outside US) based on 525-line 59.97 Hz field rate (with 2:1 interlace). |
| PAL | Phase-Alternating-Line. A set of composite color video standards used worldwide (outside US) which implements a line-by-line reversal of phase of one of the orthogonal color components. For our use, all PAL signals are assumed to be 625-line 50 Hz field-rate systems with varying chroma and luma bandwidths and color subcarrier frequencies. |
| PAT | Program Allocation Table. A PSI table within an MPEG transport stream which cross-references all available programs to a PID for its PMT. This table is always present in legal transport streams and must always be in the clear (not scrambled) even when Conditional Access scrambling is used. |
| PCR | Program Clock Reference. A time-base signal used to synchronize the IRDs internal timing to the same timing in the MPEG encoder for the received program. Multiple programs may share a PCR, depending on the multiplexer used to create the final transport stream. |
| PES Stream | Packetized Elementary Stream. The MPEG designation for a compressed component of a Program (such as audio or video) which includes the timing information necessary for synchronization (e.g. - synchronizing audio to video). |
| PID (or Packet ID) | The unique transport stream packet identifier assigned to each constituent data stream within the transport stream. Also, in this document, "PID" is used to designate the stream itself. |
| PMT | Program Map Table. A PSI table within an MPEG transport stream which cross-references a program (or programs) against all the PIDs that bear its component streams (such as audios, video, DPI, PCR, etc.). IRDs need this table to decode the compressed components of that program. |

Table 3: Glossary of Terms

| Term | Definition |
|---|--|
| Presets Table | A non-volatile table of unit presets. This table is used for either automatic recoveries or as a shorthand method to quickly reconfigure the unit. The presets table may be programmed at the factory and edited by the customer, either locally or via network control. |
| Program | A single media stream (combination of audio, video, data, etc.) tied to a common time base. |
| Program Number | A numerical code representing a program. |
| PSI Tables | A group of information-bearing tables, each borne by well-known PIDs, regularly transmitted in the transport stream. See also "PAT" and "PMT". Also, ISO 13818-1 gives a thorough description of these and other Tables. |
| PTS | Presentation Time Stamp. A marker signal associated with audio and video streams within a program conveyed in MPEG transport stream. This signal allows the audio and video to be presented in synchronism to each other. |
| RAM | Random access memory. A general term for all volatile memory types out of which application software executes and into which its variables, state information, and messages are stored. RAM is also used to designate the volatile storage used by the Transport Demux and decompression devices. |
| RF | Radio frequency |
| Service Descriptor | Service Descriptors are text entries in the Service Descriptor table (SDT, defined per a DVB standard). Service Descriptors are used to give text names to the Programs within transport streams. |
| Service settings | That part of the Unit Settings which allow for the local detection, decompression, and output (or "display") of a program's services. |
| Setting, Transient | A volatile Unit Setting used for immediate acquisition of services. Transient settings are either Temporary settings (see above) or Presets used for attempted acquisition during Auto-Recovery. If, in the case of Presets, the attempt is successful, those settings become Permanent Settings. |
| T _{MRA} | Maximum Recommended Ambient Temperature, the highest operating temperature for which the unit is rated |
| Transport Stream (or MPEG Transport Stream) | A multiplex of several data streams, each of which is borne in transport packets, 188-byte blocks containing a sync word, header information (including a PID), and payload data. This multiplex includes PSI data tables, programs, padding, and floating PIDs such as those used by COMPEL [®] network control. |
| Warning | A condition or notification of (1) a condition that may compromise the proper performance of your UMX4010; or (2) any non-alarm condition that should be brought to local user's attention. |

Chapter 2 Installation

This chapter provides instructions on unpacking, mounting, and connecting your UMX4010 as well as connector information including detailed pinouts.

2.1 Unpacking and Inspection

Carefully unpack the unit and its ac power cord and inspect for obvious signs of physical damage that might have occurred during shipment. Any damage claims must be reported to the carrier immediately. Be sure to check the package contents carefully for important documents and materials.

NOTE: Please save the packing materials and original shipping containers in case you must later return the unit for repair. Packing these units in other containers in such a way that they are damaged will void your warranty.

2.2 Location and Mounting

The UMX4010 may be mounted in a standard 19-inch equipment rack or set up for desktop operation. In either location, maintain a clean, dry environment for your UMX4010.

FCC- mandated suppression of radiated emissions

If the Ethernet port has a cable connected to it, that cable **MUST** be properly shielded and grounded. This must be done to minimize RF emissions which could interfere with nearby equipment.

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference for which the user may need to take mitigating action.

DANGER

To avoid damage to this and other equipment, or personal injury, the following items should be strictly observed.

Elevated Operating Ambient

When equipment is installed in a closed or multi-unit rack assembly, the operating ambient of the rack environment may be greater than the room ambient. Therefore, consideration should be given to the ambient air temperature within the rack, and not just inside the room, when deciding if the maximum recommended ambient operating temperature (T_{MRA}) is being met.

Reduced Air Flow

Equipment should be installed such that airflow required for safe operation of the equipment is not compromised. The UMX4010 may be arranged in a rack without forced-air ventilation if a single rack-unit space is left empty between it and adjacent units and if the room ambient is cool (<75°F). For higher rack mounting densities or room ambient temperatures, forced-air ventilation is strongly recommended. Please note the average per-unit power dissipation of 25 watts and plan accordingly.

Mechanical Loading

Mounting of the equipment in a rack should be such that a hazardous condition is not produced by uneven loading. This unit is not very heavy, but total rack loading must be considered. Also, do not rest any unsupported equipment on your UMX4010.

Circuit Overloading

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits could have on overcurrent protection and supply wiring. Ensure that the total rack or breaker power consumption does not exceed the limits of the AC branch circuit. Appropriate consideration of equipment ratings should be used when addressing this concern.

Reliable Earthing

Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (use of power strips, chassis ground lugs, etc.).

**Rack
Mounting**

Your UMX4010 is sized at a single RU and will fit an EIA-standard, 19-inch-wide equipment rack.

- a) First install angle brackets or cross-supports capable of supporting both the unit and its connecting cables. Screw or bolt the supports securely to the equipment rack.
- b) Place the UMX4010 on its supports and use four anchor screws or bolts and nuts to secure the UMX4010 front brackets to the rack.

WARNING

The front brackets must be secured to the rack. If front brackets are left unsecured, the unit may shift forward and fall from the rack during installation or operation. Failure to secure the front brackets may result in personal injury and/or damage to the equipment.

**Desktop
Installation**

To set up the UMX4010 in a desktop environment, place the UMX4010 on a flat surface where it will not be subject to spills or impacts. Also route cables to the unit so that they will not be hit or pulled causing damage to the connectors or to the unit itself. Ensure a sufficient flow of cool air (See “Reduced Air Flow” on page 16.) so that the unit's operating ambient temperature range is not exceeded.

WARNING

Locate the UMX4010 and its cables to avoid impacts, spills, and pulling cables and to ensure sufficient air flow. Failure to locate the UMX4010 in a proper environment may result in damage to the equipment.

2.3 UMX4010 Connections

Figure 2.1 shows the connector locations on the UMX4010 rear panel. **Table 4: Rear-panel Connectors** lists the UMX4010 rear-panel connectors, their types and pinout information.

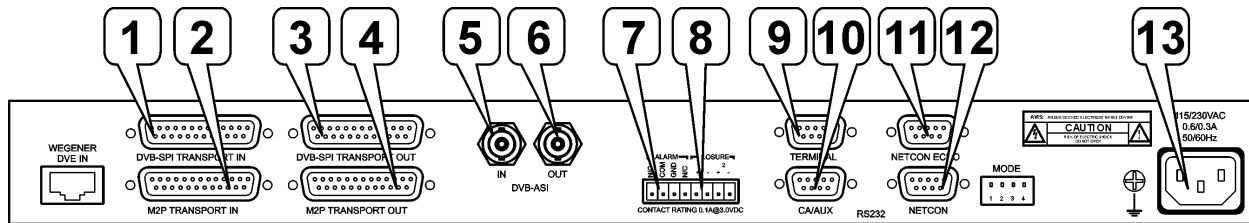


Figure 2.1 UMX4010 Rear-panel Connector Locations

WARNING

The UMX4010 **MUST** be 'reset' each time the input MPEG mux stream is changed (e.g. change in aggregate data rate, or switching from one source to another). Be sure to 'Reset' only **AFTER** the mux input has been verified as stable. Also, if the MPEG stream is switched remotely, the UMX4010 must be reset remotely via Compel, a modem, or by the terminal reset command.

WARNING

Metal-hooded connectors on shielded cables should be used for all DB9 and DB25 connectors to suppress electromagnetic interference.

Table 4: Rear-panel Connectors

| Item | Connector Designation | Type | Pin | Signal Name |
|------|-----------------------|------|-----|-------------|
| 1 | DVB-SPI TRANSPORT IN | DB25 | 1 | DVB_IC+ |
| | | | 2 | N.C. |
| | | | 3 | DVB_ID7+ |
| | | | 4 | DVB_ID6+ |
| | | | 5 | DVB_ID5+ |
| | | | 6 | DVB_ID4+ |
| | | | 7 | DVB_ID3+ |
| | | | 8 | DVB_ID2+ |
| | | | 9 | DVB_ID1+ |
| | | | 10 | DVB_ID0+ |
| | | | 11 | DVB_IV+ |
| | | | 12 | DVB_IS+ |
| | | | 13 | GNDD |
| | | | 14 | DVB_IC- |
| | | | 15 | N.C. |
| | | | 16 | DVB_ID7- |
| | | | 17 | DVB_ID6- |
| | | | 18 | DVB_ID5- |
| | | | 19 | DVB_ID4- |
| | | | 20 | DVB_ID3- |
| | | | 21 | DVB_ID2- |
| | | | 22 | DVB_ID1- |
| | | | 23 | DVB_ID0- |
| | | | 24 | DVB_IV- |
| | | | 25 | DVB_IS- |

Table 4: Rear-panel Connectors

| Item | Connector Designation | Type | Pin | Signal Name |
|----------|-----------------------|------|-----|-------------|
| 2 | M2P TRANSPORT IN | DB25 | 1 | M2P_ICO+ |
| | | | 2 | M2P_IC+ |
| | | | 3 | M2P_IS+ |
| | | | 4 | M2P_IV+ |
| | | | 5 | M2P_ID0+ |
| | | | 6 | M2P_ID1+ |
| | | | 7 | M2P_ID2+ |
| | | | 8 | M2P_ID3+ |
| | | | 9 | M2P_ID4+ |
| | | | 10 | M2P_ID5+ |
| | | | 11 | M2P_ID6+ |
| | | | 12 | M2P_ID7+ |
| | | | 13 | N.C. |
| | | | 14 | M2P_ICO- |
| | | | 15 | M2P_IC- |
| | | | 16 | M2P_IS- |
| | | | 17 | M2P_IV- |
| | | | 18 | M2P_ID0- |
| | | | 19 | M2P_ID1- |
| | | | 20 | M2P_ID2- |
| | | | 21 | M2P_ID3- |
| | | | 22 | M2P_ID4- |
| | | | 23 | M2P_ID5- |
| | | | 24 | M2P_ID6- |
| | | | 25 | M2P_ID7- |

Table 4: Rear-panel Connectors

| Item | Connector Designation | Type | Pin | Signal Name |
|----------|--------------------------|----------|-----|-------------|
| 3 | DVB-SPI TRANSPORT OUT | BNC Jack | 1 | DVB_OC+ |
| | | | 2 | GNDD |
| | | | 3 | DVB_OD7+ |
| | | | 4 | DVB_OD6+ |
| | | | 5 | DVB_OD5+ |
| | | | 6 | DVB_OD4+ |
| | | | 7 | DVB_OD3+ |
| | | | 8 | DVB_OD2+ |
| | | | 9 | DVB_OD1+ |
| | | | 10 | DVB_OD0+ |
| | | | 11 | DVB_OV+ |
| | | | 12 | DVB_OS+ |
| | | | 13 | GNDD |
| | | | 14 | DVB_OC- |
| | | | 15 | GNDD |
| | | | 16 | DVB_OD7- |
| | | | 17 | DVB_OD6- |
| | | | 18 | DVB_OD5- |
| | | | 19 | DVB_OD4- |
| | | | 20 | DVB_OD3- |
| | | | 21 | DVB_OD2- |
| | | | 22 | DVB_OD1- |
| | | | 23 | DVB_OD0- |
| | | | 24 | DVB_OV- |
| | | | 25 | DVB_OS- |

Table 4: Rear-panel Connectors

| Item | Connector Designation | Type | Pin | Signal Name |
|----------|-----------------------|----------|-----|------------------------|
| 4 | M2P TRANSPORT OUT | DB25 | 1 | M2P_OC1+ |
| | | | 2 | M2P_OC+ |
| | | | 3 | M2P_OS+ |
| | | | 4 | M2P_OV+ |
| | | | 5 | M2P_OD0+ |
| | | | 6 | M2P_OD1+ |
| | | | 7 | M2P_OD2+ |
| | | | 8 | M2P_OD3+ |
| | | | 9 | M2P_OD4+ |
| | | | 10 | M2P_OD5+ |
| | | | 11 | M2P_OD6+ |
| | | | 12 | M2P_OD7+ |
| | | | 13 | N.C. |
| | | | 14 | M2P_OCO- |
| | | | 15 | M2P_OC- |
| | | | 16 | M2P_OS- |
| | | | 17 | M2P_OV- |
| | | | 18 | M2P_OD0- |
| | | | 19 | M2P_OD1- |
| | | | 20 | M2P_OD2- |
| | | | 21 | M2P_OD3- |
| | | | 22 | M2P_OD4- |
| | | | 23 | M2P_OD5- |
| | | | 24 | M2P_OD6- |
| | | | 25 | M2P_OD7- |
| 5 | DVB-ASI IN | BNC jack | | ASI Transport Data In |
| 6 | DVB-ASI OUT | BNC jack | | ASI Transport Data Out |

Table 4: Rear-panel Connectors

| Item | Connector Designation | Type | Pin | Signal Name |
|------|--|--------------------------|--|----------------------------------|
| 7 | ALARM | Form C Alarm Relay | 1 (on left as viewed from rear of unit) | ALARM N/O |
| | | | 2 | COM: |
| | | | 3 | GND |
| | | | 4 | ALARM N/C |
| 8 | CLOSURE | Two Solid-state Closures | 1 (on left as viewed from rear of unit) | CLOSURE 1 + |
| | | | 2 | CLOSURE 1 - |
| | | | 3 | CLOSURE 2 + |
| | | | 4 | CLOSURE 2 - |
| 9 | TERMINAL | DB9, RS232 | 1 | DCD (Data Carrier Detect) |
| | | | 2 | RXD (Receive Data) ¹ |
| | | | 3 | TXD (Transmit Data) ¹ |
| | | | 4 | DTR (Data Terminal Ready) |
| | | | 5 | GND (Signal Ground) |
| | | | 6 | DSR (Data Set Ready) |
| | | | 7 | RTS (Request To Send) |
| | | | 8 | CTS (Clear To Send) |
| | | | 9 | RI (Ring Indicator) |
| 10 | CA/AUX CA/AUX Data In (Encryption) | DB9, RS232 | 1 | DCD (Data Carrier Detect) |
| | | | 2 | RXD (Receive Data) ¹ |
| | | | 3 | TXD (Transmit Data) ¹ |
| | | | 4 | DTR (Data Terminal Ready) |
| | | | 5 | GND (Signal Ground) |
| | | | 6 | DSR (Data Set Ready) |
| | | | 7 | RTS (Request To Send) |
| | | | 8 | CTS (Clear To Send) |
| | | | 9 | RI (Ring Indicator) |

Table 4: Rear-panel Connectors

| Item | Connector Designation | Type | Pin | Signal Name |
|-----------|-------------------------|------------------------|-----|----------------------------------|
| 11 | NETCON ECHO Data Out | DB9, RS232 | 1 | DCD (Data Carrier Detect) |
| | | | 2 | RXD (Receive Data) ¹ |
| | | | 3 | TXD (Transmit Data) ¹ |
| | | | 4 | DTR (Data Terminal Ready) |
| | | | 5 | GND (Signal Ground) |
| | | | 6 | DSR (Data Set Ready) |
| | | | 7 | RTS (Request To Send) |
| | | | 8 | CTS (Clear To Send) |
| | | | 9 | RI (Ring Indicator) |
| 12 | NETCON Data In | DB9, RS232 | 1 | DCD (Data Carrier Detect) |
| | | | 2 | RXD (Receive Data) |
| | | | 3 | TXD (Transmit Data) |
| | | | 4 | DTR (Data Terminal Ready) |
| | | | 5 | GND (Signal Ground) |
| | | | 6 | DSR (Data Set Ready) |
| | | | 7 | RTS (Request To Send) |
| | | | 8 | CTS (Clear To Send) |
| | | | 9 | RI (Ring Indicator) |
| 13 | 115/230 VAC | Std. IEC Receptacle | | AC line in |

¹As this is a DCE connection, "RXD" is an output and "TXD" is an input.

Chapter 3 Operation

This chapter provides an overview of UMX4010 operation, details of controls and indicators, the alarm/warning system, and user interface details.

3.1 Theory of Operation

Functional summary

The Model UMX4010 receives an input data signal from an MPEG encoder or multiplexer. It buffers and conditions that input, multiplexes various other inputs into the transport stream, and sends that stream to a modulator for transmission. Multiplexed inputs include data, clock, synchronization, control data, and optional KMS data. Figure 3.1 on page 26 provides a functional block diagram of the UMX4010.

A control processor is included for multiplex and buffer maintenance. A front-panel liquid crystal display (LCD), push buttons, LEDs, and three rear-panel RS-232 ports provide inputs to, or are under the control of, the microprocessor.

Input and output

Depending on the unit configuration (and options), input to the UMX4010 can be either an ASI, SPI, or a Divicom-proprietary M2P input from a digital multiplexer. The multiplexer formats a data stream conforming to the Digital Video Broadcast (DVB) protocol. For M2P and SPI inputs, this data stream (transport stream) has control lines, and provides an input clock to the unit. The clock must be continuous with no timing gaps.

A few examples of possible input/output combinations are given in **Table 5: Input, Output, and Clock Combination Examples**.

Table 5: Input, Output, and Clock Combination Examples

| I/O Preset | Input | Output | Clock | UMX4010x-13 | UMX4010x-15 |
|------------|-------|--------|-------|-------------|-------------|
| #01 | ASI | ASI | ASI | YES | YES |
| #02 | SPI | SPI | ENC | NO | YES |
| #03 | M2P | M2P | MOD | NO | YES |

The output is a transport stream compatible with the original MPEG input. This format is a common one containing a byte serial packet of 188 bytes beginning with the SYNC byte. The data stream is then buffered before reaching the modulator.

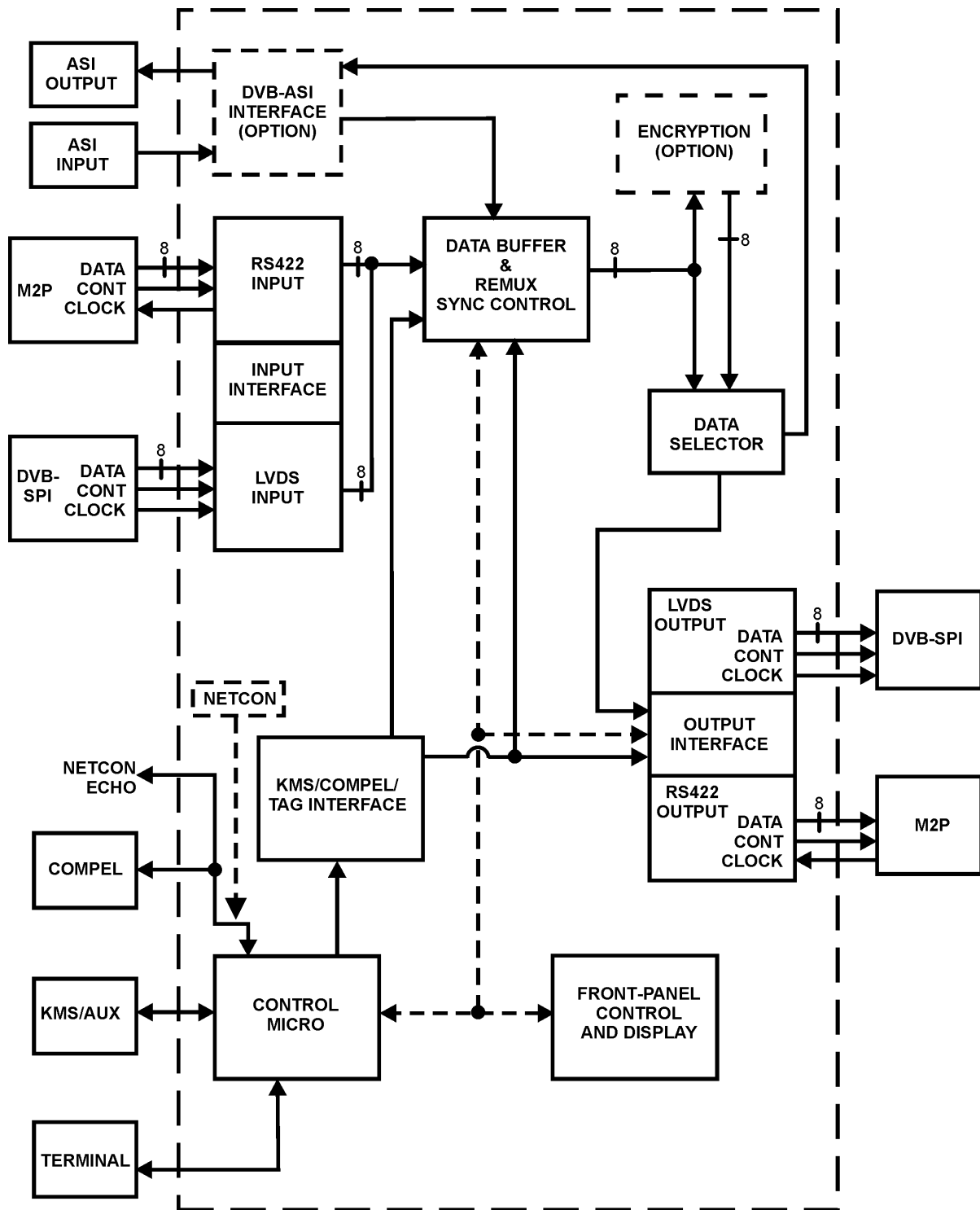


Figure 3.1 UMX4010 Functional Block Diagram

The UMX4010 continuously accepts the asynchronous COMPELControl and (optionally) KMS data streams, formats these data into MPEG packets, and multiplexes the packets into the overall MPEG output stream. Additionally, the unit generates "tags" and similarly multiplexes them into the MPEG stream.

The MPEG packets that contain COMPEL and tag information have a packet ID (or PID) initially set to 1026 while those containing the KMS stream have a different PID - initially set to 1028. These nonvolatile PIDs may be set by the user through various interfaces.

Tag function

As an aid to receive-tuning, the UMX4010 maintains an internal Tag Table. The software generates tag packets from this table (nominally 10 times per second), forms these into MPEG packets, and multiplexes them into the composite MPEG output stream described above. The contents of the tag entries may be set by the user through various interfaces. The contents of the Tag Table are also nonvolatile.

Encryption (optional)

WARNING

The UMX4010 MUST be 'reset' each time the input MPEG mux stream is changed (e.g. change in aggregate data rate, or switching from one source to another). Be sure to 'Reset' only AFTER the mux input has been verified as stable. Also, if the MPEG stream is switched remotely, the UMX4010 must be reset remotely via Compel, a modem, or by the terminal reset command.

The UMX4010 may be shipped with an optional encryption package. If included, when the system's encryption state is set to ON, selected portions of the transport stream are scrambled within the UMX4010 using a pseudo-random sequence of numbers. This sequence is defined by a specific starting seed (sometimes called a "key"). The same seed is simultaneously distributed to the UMX and all downstream IRDs so that the scrambling done in the UMX may be de-scrambled in those IRDs. The external COMPEL/CA computer system creates and distributes these seeds. The seeds are contained in a CA data stream brought to the UMX through the CA/Aux serial port. The UMX4010, while reading that stream, also packetizes it and drops those packets into the transport stream in place of incoming NULL packets (whose PIDs equal 0x1fff). This CA stream is assigned a floating PID (not assigned to a specific program) and is left in the clear (not scrambled). At each receiving IRD, the seeds are then extracted and used for de-scrambling. However, the seeds themselves are actually encrypted by separate secret algorithm and must be decrypted by a special "secure microprocessor" implanted in both the UMX4010 and that network's IRDs. If your UMX4010 does not have this secure microprocessor, it cannot support encryption.

In normal operation, the standard encryption option scrambles all transport packets whose PIDs fall within the range of 20 to 1ffe (hex). However, a fac-

tory-enabled option to the standard encryption option is Segmented Encryption. In this system, all transport packets whose PID values fall within specific ranges, which would normally have been scrambled, are *not* scrambled. (Consult factory for currently allowed ranges.) Those packets' encryption bits are also not manipulated within the UMX. Thus, transport packets encrypted by third-party systems (with PIDs in those ranges) will not be affected by the UMX4010.

The UMX4010 alone does not control the encryption state of the system. The UMX itself may be set to "Normal" or "Clear". "Normal" means that the UMX4010 will scramble the transport stream if so commanded by the external COMPEL/CA computer. "Clear" locks out encryption regardless of COMPEL/CA computer requests. Note that even if encryption is OFF, the CA stream of current encrypted seeds, if so supplied to the UMX4010, will still be inserted into the transport stream and distributed to the network. This ensures, at the moment encryption is turned ON, that the UMX and all receiving IRDs will have the current seed and can begin scrambling and de-scrambling immediately.

Whichever encryption option is installed, when the UMX4010 encryption state is "Clear", non-NULL transport packets passing through will *not* have their encryption bits manipulated by the unit. This allows third-party encryption systems to be employed.

As shown in **Table 8: Front-panel LED Indicator Descriptions**, two LEDs are used to indicate the encryption state of the unit and the system. They are **CA/AUX IN** and **ENCRYPTION ON**. Additionally, solid-state relay closure #1 on the rear panel activates (closes or "shorts") when encryption is ON.

Monitoring and control

Monitoring and control of the UMX4010 can be performed over four separate interfaces - the front panel, a terminal connection, Wegener's COMPEL[®] Network Control System, and KMS (if the encryption option is installed).

Functions available from the front panel are detailed in **3.3 Operation from Front Panel** on page 30. Terminal commands are listed in **3.4 Operation from Local/Remote Terminal** on page 37

Some operating parameters may be controlled by COMPELControl and/or KMS which is "broadcast" to the unit through a "ghost-PID" data component of the incoming transport stream. When processing these incoming transport streams, the UMX4010 examines them to detect any command packets directed to the unit itself. See the COMPEL manual for a complete description of the Compel System.

Alarms/Warnings

During both power up and normal operation, the software monitors several conditions. If a serious failure is detected, an alarm state is declared. When in

an alarm state, the unit lights the front-panel **ALARM** LED and asserts the alarm relay. If a less serious condition is detected, a warning state is declared and the **WARNING** LED is lit. Information regarding alarm and warning conditions is also made available via a terminal report.

In both alarm and warning states, the unit attempts to continue operation as normally as possible. Also, the conditions which caused the alarm or warning are periodically monitored to determine whether or not they persist. If the condition goes away, the LED and relay indications are turned off.

Solid state relay number 1 may be used by the customer as an "Encryption Off" alarm. This relay is open or high impedance whenever the current encryption state is "Off."

The alarm relay is configured such that power failure and a unit alarm look the same to external monitoring equipment. The alarm relay is in the NORMAL state when the unit power is OFF or there is an Alarm condition. When the unit is ON and there is NO alarm (unit OK), then the relay is activated. **Table 6: Alarm Relay Indications** shows these graphically.

Table 6: Alarm Relay Indications

| Unit State | COM Pin Connects To | COM Pin Disconnects From |
|------------|---------------------|--------------------------|
| Power OFF | N/C | N/O |
| Alarm | N/C | N/C |
| OK | N/O | N/C |

3.2 Operation from the Rear Panel

The only rear panel control is the "Mode" set of DIP switches. Their operation is shown in **Table 7: DIP Switch Settings** below.

Table 7: DIP Switch Settings

| Switch Number | Mode Description (ON is the up position) |
|---------------|--|
| 1 | Perform processor test at power up - reset if fail |
| 2 | Perform Phase-Lock Loop (PLL) test continuously |
| 3 | Allow code uploads at power up |
| 4 | Spare |

3.3 Operation from Front Panel

Front-panel layout

The UMX4010 front panel (Figure 3.2 on page 30) includes the following three main parts: a liquid crystal display (LCD), eight LED indicators, and six push buttons.

The front-panel LCD (1, see **LCD screen relationships** on page 30) supports unit monitoring and control by displaying screens containing status information, menu navigation pointers, and parameter input fields. Each LCD screen has a label or heading on the first row and information, parameters, or prompts on the second row.

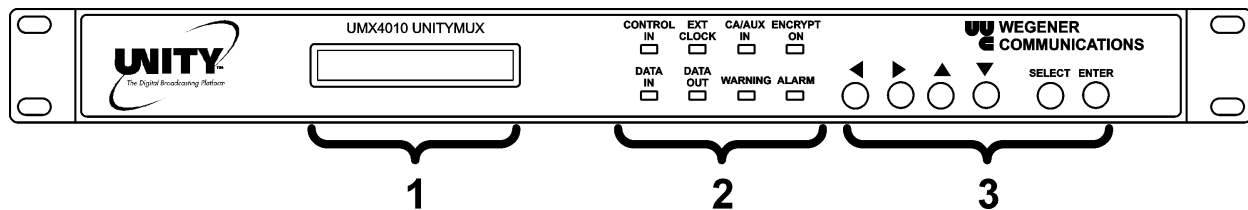


Figure 3.2 UMX4010 Front-panel Layout

The eight front-panel LEDs (2) provide status information about your UMX4010 and its processes. See **Table 8: Front-panel LED Indicator Descriptions** on page 36 for complete details.

The six pushbuttons (3) are your means of commanding the UMX4010 from the front panel. Use the four arrow buttons to navigate through menu screens and parameter selections and to scroll through available choices or characters when editing an input field. Press the **SELECT** button to open menus (downward navigation) or to open editable input fields (to check or change parameters). Press **ENTER** to commit edited parameters to the UMX4010.

Pressing **SELECT** again without pressing **ENTER** will exit the current field or menu without saving any changes. Most menus also have a provision for returning to a higher menu by pressing **SELECT** when the display shows: **RETURN PRESS <SELECT>**.

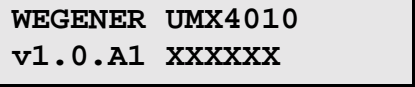
LCD screen relationships

Figure 3.3 on page 32 shows LCD screen relationships from the top level downward. These screens are structured in two dimensions, reflecting their relationships as peers, as parents, and as children of other screens. The up-and-down dimension represents the parent-child screen relationships (navigated with the **SELECT** and up- and down-arrow buttons). The side-to-side dimension is the peer relationship (navigated with the right- and left-arrow buttons). A parent screen is usually a menu screen covering some category of UMX4010 operation or status. Its child screens are opened by pressing **SELECT** at the parent screen. These child screens then provide access to finer details of unit

monitoring and control. Multiple child screens of a parent menu screen are all peers to each other. However, the most significant set of peer screens are the top-level screens that have no parent and that include the home screen. **Appendix A Front-panel Menus and Control** gives more details on screen types and using front-panel push buttons to navigate and control the UMX4010.

Banner or home screen

The Wegener banner or home screen is a read-only screen showing the model (Wegener UMX4010), the installed firmware version, and the unit's serial number.



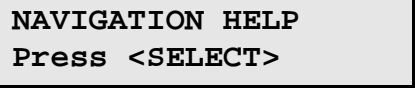
```

WEGENER UMX4010
v1.0.A1 XXXXXX
    
```

From this screen, press ► to reach the Navigation Help screen.

Navigation Help screen

This menu item is a read-only list of commands and options you can use when navigating through the front panel display menus.



```

NAVIGATION HELP
Press <SELECT>
    
```

Press **SELECT** followed by ► or ◀ to scroll through the list. To exit this menu, scroll until the display shows **RETURN Press <SELECT>**. Press **SELECT** to return to Navigation Help.

From Navigation Help, press ► to reach the Hardware Setup screen.

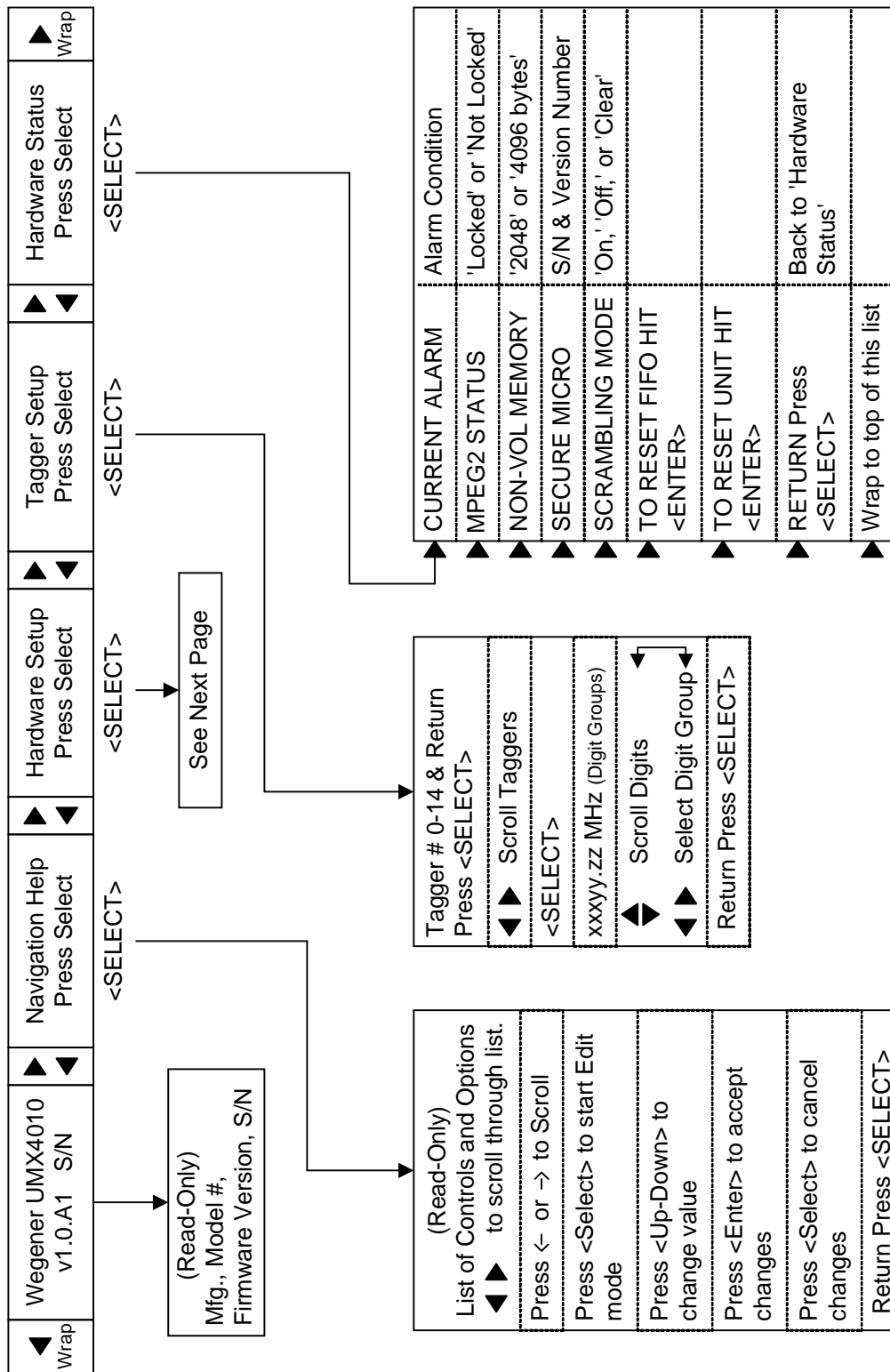


Figure 3.3 LCD Screen Relationships

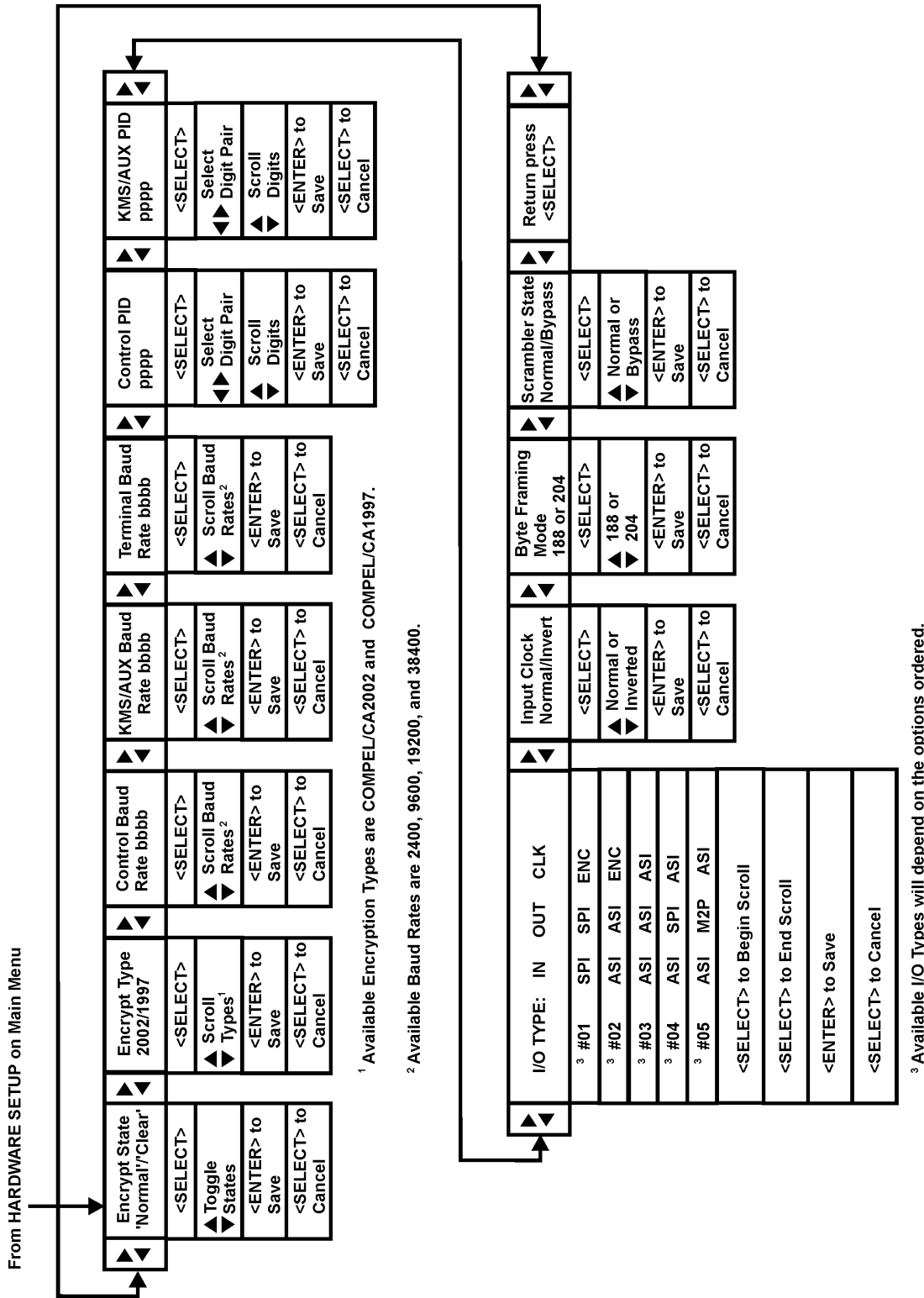


Figure 3.3 LCD Screen Relationships (continued)

**Hardware
Setup screen**

1. Press **SELECT** followed by ► or ◀ to scroll through the menu until the display shows the setting you wish to change, then press **SELECT** again to view or make changes to that item.

Encrypt State

Choose **Normal** or **Clear**. Normal means that the COMPEL/CA system will control whether scrambling is turned on or off. Clear means that the UMX4010 will not scramble the transport stream.

Encrypt Type

Choose **2002 COMPEL/CA** or **1997 COMPEL/CA**. Using 2002 COMPEL/CA, if the UMX4010 misses its seed, the transport stream will be sent "in the clear" for the remainder of that odd/even seed distribution period (typically one to two minutes). 1997 COMPEL/CA will continue encryption even if the seed is missed.

Control Baud Rate

Select the Baud Rate used by Compel Control Data by pressing ▲ or ▼.

KMS/AUX Baud Rate (Key Management System)

Select the Baud Rate used for the KMS/Aux (Compel CA) - usually 38400.

Terminal Baud Rate

Select the same baud rate and conditions selected for the terminal which is used to control the UnityMux4010 - usually 19200.

Control PID (Packet ID)

Sets the PID allocation for the Compel Control - default is 1026.

KMS/AUX PID

Sets the PID allocation for the Encryption or Aux data input - default is 1028.

I/O TYPE

Selects I/O settings. See **Table 8: Front-panel LED Indicator Descriptions** on page 36 and **Appendix A Front-panel Menus and Control**.

ASI DATA RATE

Selects Data rate. See **Appendix A Front-panel Menus and Control**.

2. Press **SELECT** to enable changes to the displayed item. To set a PID allocation, press **SELECT** when the PID you wish to change is displayed. One of the digit pairs will blink.
3. Press **▲** or **▼** to change the value of the blinking pair. Switch to the other digit pair by pressing either **▶** or **◀**. You may now change that pair if desired.
4. Press **ENTER** to accept changes when the settings are correct or press **SELECT** to cancel changes and return to the Hardware Setup menu.
5. After accepting changes, the digits will stop blinking and you can scroll through the Hardware Setup menu options.

Tagger Setup

1. Return to the main menu and scroll until **TAGGER SETUP Press <SELECT>** is displayed.
2. Press **SELECT**. **Tag #0** and its frequency in MHz will be displayed. If **DISABLED** is displayed, the tag frequency has not been set, or has been set to 0 Hz. This menu has 15 Tags (0-14) and the **RETURN Press <SELECT>** option, all in a wraparound mode.
3. Scroll until reaching the tag needing a frequency change and press **SELECT**. A group of 2 or 3 digits will blink. You may change those digits by pressing **▲** or **▼**. To select a different digit group press **▶** or **◀**.
4. When the tagger frequency is correct, press **ENTER** to save and exit the menu or press **SELECT** to cancel changes.
5. If you wish to change other tagger frequencies, press **▶** or **◀** until that tag is displayed, press **SELECT**, and change the digit groups as before. Press **ENTER** to save and exit or **SELECT** to cancel.

Hardware Status

This is a read-only status check of selected hardware items. These are listed in both Figure 3.3 on page 32 and **Appendix A Front-panel Menus and Control** on page 51.

1. To see the status items, scroll to Hardware Status and press **SELECT**. "Current Alarm" status will be shown. Scroll through the items by pressing **▶** or **◀**.
2. To exit, scroll until you see **RETURN Press <SELECT>** displayed. Press **SELECT** and the unit will exit to Hardware Status on the main menu.

Interpreting LEDs

Table 8: Front-panel LED Indicator Descriptions provides the meaning of the color and state of each LED.

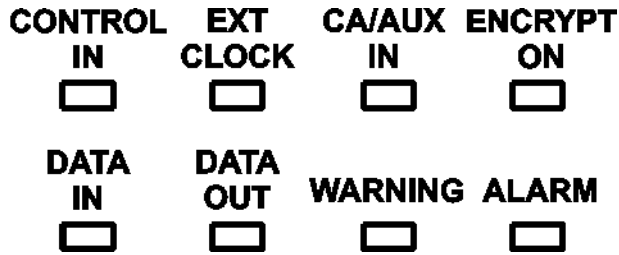


Figure 3.4 LED Indicators

Table 8: Front-panel LED Indicator Descriptions

| Indicator Label | Color and State* | Meaning |
|-------------------|------------------|--|
| CONTROL IN | GREEN constant | Data is present on the control input port. (This is typically the Compel data stream.) |
| | Off | No data present on the control input port |
| EXT CLOCK | GREEN constant | External clock is present |
| | Off | No external clock present |
| CA/AUX IN | GREEN constant | Data is present on the CA/AUX port (encrypted data). (This is typically the Compel-CA data stream carrying the encryption keys.) |
| | Off | No data present on the CA/AUX port |
| ENCRYPT ON | GREEN blinking | UMX4010 is currently scrambling the MPEG data and the Even key is being used |
| | GREEN flashing | UMX4010 is currently scrambling the MPEG data and the Odd key is being used |
| | Off | UMX4010 not currently scrambling data |
| DATA IN | GREEN constant | Data is being clocked into the UMX4010. (This shows that the input cable is connected.) |
| | Off | No data being clocked into the UMX4010 |
| DATA OUT | GREEN constant | Valid MPEG packets (188 bytes) have been detected, sync has been found, and the UMX4010 is sending that MPEG data. |
| | Off | UMX4010 is not sending MPEG data. (Valid packets undetected or sync not found.) |

Table 8: Front-panel LED Indicator Descriptions

| Indicator Label | Color and State* | Meaning |
|-----------------|------------------|--|
| WARNING | YELLOW constant | Indicates a minor alarm |
| | Off | No minor alarm condition currently exists. |
| ALARM | RED constant | Indicates a major alarm |
| | Off | No major alarm condition currently exists. |

* LED states are defined as follows: Blink - alternating ON for ~100ms and OFF for ~2 seconds; Flash - alternating ON for ~500ms and OFF for ~500ms. Flutter - like flash but with shorter ~100ms ON and OFF times.

3.4 Operation from Local/Remote Terminal

Overview and syntax

This section applies to control by both the Terminal and Modem devices. Once a user has fulfilled the password requirement for Modem access, the communication is identical to Terminal control.

Approved clients for Terminal monitoring and control via telnet include Tera Term, Windows[®] 2000 telnet, and Windows[®] XP telnet and no special login is required. VT100 and ANSI terminals are approved. To exit, use the client's exit/escape sequence or get debug access in the IRD to use the QUIT or EXIT command.

Commands listed in this section detail command syntax and action taken. Commands consist of a command field and a parameter field. Each command field and parameter field is space delimited. Optional parameters are indicated by square brackets, [], and conditional parameters are indicated by braces, { }.

For example, `COMMAND_NAME parameter1 {parameter2} [parameter3]` indicates that *parameter1* must be entered, *parameter2* entered only when a certain condition is met (certain option is installed, etc.), and *parameter3* is optional. Both commands and parameters may be entered in upper or lower case; the interface is not case-sensitive.

Incorrect or incomplete commands result in "Invalid Command" being displayed at the terminal. Parameter errors on User commands generate "Invalid *parameter name*" where *parameter name* is the name of the incorrectly entered parameter.

**User
commands**

NOTE: Any commands controlling carriers, programs, or services may be disabled from COMPEL[®].

ADDTAG *site# frequency*

site#: 0 - 14

frequency: Transmission frequency (1 - 14000 MHz).

This command adds a tag.

CLRDIAG *value#*

value#: 1 - 17 or 0 to clear all

Clears volatile counts and statistics (diagnostic values), as if the unit was reset. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

DELTAG *site#*

site#: 0 - 14 or ALL

Deletes a tag site.

H [*command*]

command: Any of the terminal command names (ADDTAG, DELTAG, SET-BAUD, CLRDIAG, SETPID, R, SET I/O, SETRATE.).

If an 'H' or any invalid command beginning with an 'H' is entered and *command* is omitted, the whole help screen will be displayed, consisting of a list of all currently available commands and a brief description of each listing. If an 'H' or any invalid command beginning with an 'H' is entered and *command* is a valid User Command Name, then detailed help for *command* is displayed. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

R *type* [*page*]

type: Indicates the type of report as follows:

- D - Diagnostic Data
- DR - Data Rate
- I/O - Input/Output Status
- M - MPEG PSI Status
- NC - Network Controller Status
- OPT - Options
- S - Serial Ports Status
- T - Tag Table

See also parameters for RP and RD commands.

[*page*]: This option can have a value of 1 to 40 and is only applicable for the group status report. Indicates the page to be reported. If omitted, all eight pages are reported and scrolls off the terminal screen.

With the **R** command, the user gets a combined report of unit non-volatile settings and status and diagnostics for each item grouping (e.g. RF for all unit settings and all status diagnostics for carrier acq/tracking). A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

R D

Reports status/diagnostic information. Typical status/diagnostic reports appear as follows (actual report data will vary):

| | | |
|------------------|--------------------|------------------|
| R D | | |
| Serial #: 010005 | | |
| DIAGNOSTIC DATA | | |
| | NAME | VALUE |
| 1 | Control In Rate | 4 |
| 2 | Control Err Rate | 0 |
| 3 | KMS/AUX In Rate | 0 |
| 4 | KMS/AUX Err Rate | 0 |
| 5 | MPEG Eff. Rate) | 374 |
| 6 | MPEG Tot. Rate | 1917 |
| 7 | Freq. Errors Now | 0 |
| 8 | Freq. Errors Total | 0 |
| 9 | I2 Errors Now | 0 |
| 10 | I2 Errors Total | 0 |
| 11 | Resets Total | 1 |
| 12 | Resets Sw. | 1 |
| 13 | MPEG Overflows | 0 |
| 14 | Idle time | 1613 |
| 15 | Total Alarms | 1 |
| 16 | No Input Alarm | 1 |
| 17 | Frame-Sync Loss | 1 |
| | ALARM | TIME SINCE ALARM |
| | DATA OVERFLOW | 00:37:56 |
| | NO DATA IN/OUT | 00:38:18 |

R DR

This non-volatile command reports the current data rate. Typical data rate reports appear as follows (actual report data will vary):

| | |
|--------------------------|------------|
| R DR | |
| Current Data Rate (ASI): | 40000 kbps |

R I/O

NOTE: For this command, ONLY ASI IS SUPPORTED.

This non-volatile command reports the current input/output status. Typical input/output status reports appear as follows (actual report data will vary):

| | | | |
|--------------------|-----|-----|-----|
| R I/O | | | |
| INTERFACE SETTINGS | | | |
| | In | Out | Clk |
| Cur. | ASI | ASI | ASI |
| 1) | ASI | ASI | ASI |
| 2) | SPI | SPI | ENC |
| 3) | M2P | M2P | MOD |

This screen will only show the options currently installed on this unit (ASI). "Clk" is clock source.

R M

This command reports the current MPEG status. Typical MPEG status reports appear as follows (actual report data will vary):

| | |
|--------------------|-------------------------------|
| R M | |
| Serial #: 010005 | |
| INTERFACE | In: ASI, Out: ASI, Clock: ASI |
| MPEG STATUS | Tracked |
| SCRAMBLER | #10005. V10 |
| ENCODING | CLEAR |
| ENCRYPT TYPE | 2002 COMPEL/CA |
| CONTROL PID | 1026 |
| KMS/AUX PID | 1028 |
| USES 27M Generator | |
| CURRENT ALARM | NONE |

RESET

Resets unit. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

R NC

Command to report network controller status. Typical network controller status reports appear as follows (actual report data will vary):

| | |
|------------------------------|----------|
| R NC | |
| STATUS OF NETWORK CONTROLLER | |
| Fixed | |
| Serial #: | 010005 |
| Variable | |
| Lock: | Locked |
| Local Control: | Disabled |
| Network Mode: | Shared |
| Total Processed: | 11233 |

R OPT

Command to report miscellaneous options. Typical miscellaneous options reports appear as follows (actual report data will vary):

| | |
|-----------------------|--------|
| R OPT | |
| MISCELLANEOUS OPTIONS | |
| Output Clock Polarity | Normal |
| Input Clock Polarity | Normal |
| Byte Framing Mode | 188 |
| Scrambler Bypass Mode | Normal |

R S

Command to report serial ports' status. Typical serial port reports appear as follows (actual report data will vary):

| | | |
|------------------|----------|-----------|
| R S | | |
| Serial #: 010005 | | |
| SERIAL PORTS | | |
| PORT | USAGE | BAUD-RATE |
| 1 | TERMINAL | 19200 |
| 2 | CONTROL | 19200 |
| 3 | KMS | 38400 |

R T

Command to report tag table. Typical tag table reports appear as follows (actual report data will vary):

| R T | |
|-------------------------|----------|
| Serial #: 010005 | |
| SITE TAG TABLE SETTINGS | |
| Site | Tag |
| 0 | 960.00 |
| 1 | 1300.00 |
| 2 | DISABLED |
| 3 | DISABLED |
| 4 | DISABLED |
| 5 | 4190.00 |
| 6 | 4050.00 |
| 7 | 3710.00 |
| 8 | 3850.00 |
| 9 | DISABLED |
| 10 | DISABLED |
| 11 | DISABLED |
| 12 | DISABLED |
| 13 | DISABLED |
| 14 | DISABLED |

SCR *scramble type*

scramble type: 02CA or 97CA (for 2002 COMPEL/CA or 1997 COMPEL/CA)

Command sets the encryption (scramble) type. Note that using 02CA, the transport stream will be sent "in the clear" if the seed is dropped, but with 97CA, encryption continues even after the seed is dropped.

SETBAUD *port id baud rate*

port id: T, C, or K (for Terminal, Control, or KMS)

baud rate: 2400, 9600, 19200, or 38400

Command sets the serial port baud rate.

SETPID *pid id pid value*

pid id: C or K (for Control or KMS)

value: 0 - 1ffe (PID hex value)

Command assigns PID value.

3.5 Application Software Uploads

The UMX4010 software allows an upload of the main application code through the terminal port. At power up, the state of a dip switch is tested (see **Table 7: DIP Switch Settings** on page 29) and if set, the unit will accept an upload of code through the terminal port. If no upload occurs during a preset time period, the unit will time out and proceed with normal operation.

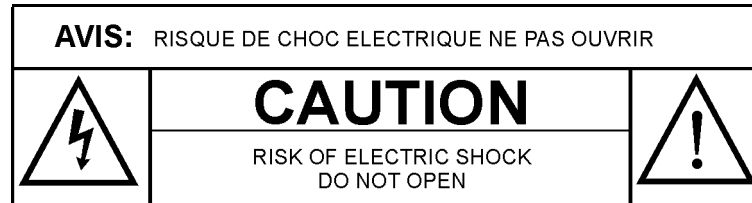
NOTE: Consult the factory for code uploads. These should not be attempted without Wegener involvement.

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Chapter 4 Maintenance and Troubleshooting

4.1 Maintenance

Maintenance of the UMX4010 is limited to keeping the chassis clean and ensuring that cables remain firmly connected. Occasionally wipe the exterior with a soft, damp cloth to remove any accumulated dust and dirt and check that cables are securely attached.



The UMX4010 incorporates security labels over some of the screws. There are no user-serviceable components within the unit. Tampering with the security labels or opening the unit will void your warranty. If you have any questions, contact Wegener's Customer Service Department at the address or numbers listed under Customer Service.

4.2 General Troubleshooting

This section is not intended as an exhaustive list of all possible situations, but presents some of the most common installation problems. Please contact us (see Chapter 5, Customer Service), with any problems you cannot resolve independently.

If you are experiencing any difficulties, first check the LED indicators on the UMX4010 front panel. See **Table 8: Front-panel LED Indicator Descriptions** on page 36 for details about the LED indicators. Note that during typical operation, at least the green **DATA IN** and **DATA OUT** LEDs should be on.

No output or indications

If the unit provides no output and neither the LCD nor any LEDs are lit, there is likely a loss of AC power or the internal power supply has failed. Do the following:

- a) Check that AC power cord is firmly connected at both ends.
- b) Check that your AC power source is supplying AC power.
- c) If both checks a) and b) are okay, contact Customer Service (see Chapter 5) before returning the unit for service.

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Chapter 5 Customer Service

5.1 Warranty

The following warranty applies to all Wegener Communications products including the UMX4010x-1y UnityMux:

All Wegener Communications products are warranted against defective materials and workmanship for a period of one year after shipment to customer. Wegener Communications' obligation under this warranty is limited to repairing or, at Wegener Communications' option, replacing parts, subassemblies, or entire assemblies. Wegener Communications shall not be liable for any special, indirect, or consequential damages. This warranty does not cover parts or equipment which have been subject to misuse, negligence, or accident by the customer during use. All shipping costs for warranty repairs will be prepaid by the customer. There are no other warranties, express or implied, except as stated herein.

5.2 Technical Support

If the unit should fail to perform as described, if you need help resolving problems with your UMX4010, or for questions about obtaining service for your UMX4010, please contact Wegener Communications Customer Service at (770) 814-4057, FAX (678) 624-0294, or e-mail service@wegener.com.

To return a product for service:

- a) Obtain a Return Material Authorization (RMA) number by completing and faxing a copy of the RMA Request Form to (678) 624-0294. You may e-mail the same information instead to: service@wegener.com
- b) To help us identify and control returned units, plainly write the RMA number on the outside of the product-shipping container. This will help us return your unit to you as quickly as possible.
- c) Return the product, freight prepaid, to the address below:
Service Department RMA# _____
Wegener Communications, Inc.
359 Curie Drive
Alpharetta, GA 30005

NOTE: All returned material must be shipped freight prepaid. C.O.D. shipments will not be accepted.

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Appendix A Front-panel Menus and Control

A.1 General

You may control and monitor the UMX4010 from the front-panel interface. This interface consists of a 2-line by 20-character LCD display and six push buttons: ◀, ▶, ▲, ▼, **SELECT**, and **ENTER**.

Operations are in nested menus. You may scroll through these menus by pressing the left or right buttons and after choosing a menu by pressing **SELECT**, a set of secondary selections (related to the primary item) become available.

The primary and secondary selection items are as follows:

| Primary | Secondary |
|--------------------------------|---|
| WEGENER "BANNER" | None |
| NAVIGATION HELP (read only) | Press ◀ or ▶ to Scroll Press SELECT to start Edit mode Press ▲ or ▼ to change value Press ENTER to accept changes Press SELECT to cancel changes |
| HARDWARE SETUP | ENCRYPT STATE: Normal / Clear CONTROL BAUD RATE (2400, 9600, 19200 , or 38400) KMS/AUX BAUD RATE (2400, 9600, 19200, or 38400) TERMINAL BAUD RATE (2400, 9600, 19200 , or 38400) CONTROL PID pppp (default = 1026) KMS/AUX PID pppp (default = 1028) I/O TYPE (Five combinations of Input, Output, and Clock) ASI DATA RATE (1540 kbps - 55,000 kbps) INPUT CLOCK (Normal or Inverted) OUTPUT CLOCK (Normal or Inverted) BYTE FRAMING MODE (188 or 204) SCRAMBLER STATE (Normal or Bypass) RETURN Press <SELECT> |
| TAGGER SETUP | TAG #n xxxyy.zz MHz / TAG #n DISABLED / RETURN Press <SELECT> (n = 0 - 14) |
| HARDWARE STATUS (read only) | CURRENT ALARM Alarm condition MPEG2 STATUS Locked / Not Locked NON-VOL MEMORY 2048 bytes / 4096 bytes SECURE MICRO Version number / Not found SCRAMBLING MODE ON / OFF / CLEAR TO RESET FIFO HIT <ENTER> TO RESET UNIT HIT <ENTER> RETURN Press <SELECT> |

A.2 Details

The Banner Message consists of the words **WEGENER UMX4010** plus the version number of the control software and the serial number of the unit. Other primary selection items display the text shown in the Primary Selection column.

Each group of Secondary Selection items also includes a **RETURN Press <SELECT>** item. If you press **SELECT** while on this item, the display will return to the Primary Selection menu where you left it. All primary and secondary items "wrap." That is, if you press **▶** when at the bottom of a list, the top item will appear next, and if **◀** is pressed when at the top, the bottom item will appear. However, most of the settings do not wrap, but have a high and low. If the display does not increment or decrement, you should press the key opposite from the one you were pressing.

For example, if the Baud rate shows 38400, and will not increment, it is at the maximum count, so you must decrement to change the setting. The numerical changes work similarly.

The **TAG #n...** secondary item actually represents a series of 16 secondary items (15 tags and an exit command). When the user presses **▶**, the **n** value increments (0, 1, 2, ... 16), with a wrap to 0. The left arrow causes a decrement with a wrap from 0 to 16.

NOTE: The **RETURN Press <SELECT>** secondary item mentioned above is shown between tag 16 and 0.

The Secondary Selection items generally display the text shown in all caps. Italicized items such as *Alarm condition* and *Version number* change depending on the current state. The lower case **nnnn**, **bbbb**, etc. represent numeric information that is input in a slightly different manner depending upon the data type. If you press **SELECT** when one of these items is being displayed, it is selected for modification.

A.3 Numeric Inputs

Under Hardware Setup, the PID allocations are set by two groups of hex digits. The first two **ps** will flash, will increment when you press ▲, and decrement when you press ▼. If you press ►, the next group of two digits begins to flash and Up/Down changes are accepted for it. Pressing ◀ causes the previous group of digits to be selected for modification. At any time, if **ENTER** is pressed, the entire numeric value is accepted. If **SELECT** is pressed rather than **ENTER**, any changes that were made since entering this field are discarded.

Tag numbers (**xxxxyy.zzz**) may be modified in the same way, except as three groups of decimal digits. The most significant three digits (**xxx**) increment as a group. The pair of digits to the left of the decimal point (**yy**) are a pair as are the pair to the right of the decimal (**zz**).

The baud rates, however, appear as discrete values: 2400, 9600, 19200 and 38400. Pressing ▲ or ▼ causes a jump from one of these values to the next.

Generally, wrapping for the most significant group of digits in any numeric entry field will not occur, and changes will be ignored which go outside of the minimum and maximum values. Wrapping occurs for other fields of digits. Also, when a less significant field of digits wraps past 99 (or FF for hex fields) the next most significant group of digits will increment. The corresponding decrement operation occurs when a wrap occurs in the other direction.

NOTE: These are general instructions, and do not attempt to cover every situation. Many hardware settings vary with location, so you should check your Local and System Operating Instructions for your particular settings.

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