UNITY4600

Professional Media Receiver

User's Manual

A proven world leader in digital video, audio & broadcast data systems, WEGENER's management system is certified to ISO 9001:2000.

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Correspondence regarding this publication,

The Wegener Unity 4600 is approved under FCC Part 15B Class A, UL/C-UL1950 3rd Edition, and CE [EN60950, EN55022(94), and EN55024(98)].

$$C \epsilon$$

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

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.
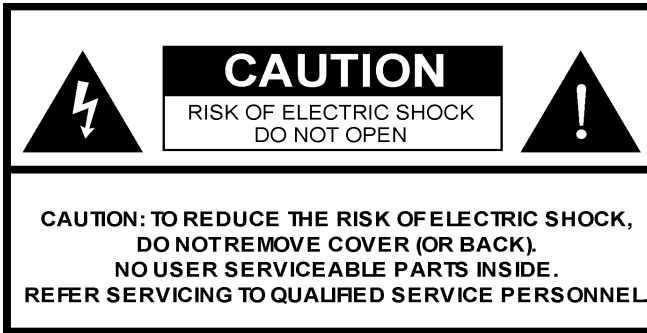
CAUTION

As this unit is intended to interface with other electrical/electronic systems, proper engineering practices must be adhered to during installation and check-out.

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.

All RF interconnections must be properly shielded to prevent ingress or egress of potential interfering sources to existing services.

Any damage to this unit caused by improper wiring/interconnections will void any warranty extended.

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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 Unity 4600 Professional Media Receiver**, referred to throughout this manual as the **Model U4600** or **U4600**.

The manual is divided into the following chapters:

1   **General Information** - a description of the **U4600** unit, its functions and specifications, and a glossary of terms.

2   **Installation** - procedures and information for the correct and safe installation of your **U4600** unit.

3   **Operation** - instructions for starting and operating the **U4600** unit.

4   **Maintenance and Troubleshooting** - information about maintaining the **U4600** unit and resolving possible operating difficulties.

5   **Customer Service** - Our warranty and guide to obtaining additional help.

An **Index** of keywords is also provided to help you quickly locate needed information.

Please e-mail any suggestions or comments about 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, we preferthat you copy the page(s) in question, mark your changes on the copy, and fax or mail us the copy. We always appreciate constructive criticism.

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1.2 Product Overview

Functional Description

The **Wegener Unity 4600 Professional Media Receiver** is a fully DVB-compliant satellite video IRD. The U4600 receives an L-band RF carrier from an external LNB, demodulates the carrier, extracts the MPEG transport stream, and provides the decompressed program or programs to DVB-ASI, composite video, and/or stereo audio outputs.

Features include:

- Control by local user or remote COMPEL® system

- Download of software application upgrades via satellite

- Supports COMPEL®/CA Conditional Access at transport level or by program

- Supports receiver card options using either DVB-QPSK or Advanced Turbo-Modulations (Turbo-QPSK, T-8PSK, or T-16QAM)

- DVB-ASI transport stream output with network-controlled program mapping

- Supports ISO 13818-1 transport rates from 2.5 to 55 Mbps (with local decompression) or up to 86.25 Mbps (to program-mapped ASI transport only)

- Local decompression of MPEG-2 video and MPEG-2 (L1 and L2) and/or Dolby AC-3 audio

- Auto-recognition and support of 525-line NTSC or 625-line PAL

- Audio-only mode option for radio networks

- Alarm relay

- Cueing relays and DTMF cue tone outputs standard

- Optional SCTE 35 DPI message filter for network control of local ad avails

- Optional front-panel audio and video monitors

- Web browser control (to be released August 2005)

Physical Description

The **U4600** is housed in a standard, 1 RU, rack-mountable chassis. Its front panel provides a user interface with six push buttons and an LCD window that displays two lines of text. Remote monitoring is also available through both the audio and video ports.

The rear panel holds connectors for input and output signals, LNB power supply, serial and Ethernet monitoring and control, alarm and user relays, and AC input power. The unit also includes two Unity expansion module slots.

Figure 1.1 The Unity 4600 Professional Media Recorder

1.3   Unity 4600 Product Specifications

Table 1.1:   Technical Specifications

Characteristic	Specification
power	
Voltage	90-132 or 175-264 VAC auto-detect/selected
Frequency	60/50 Hz ± 2%
Consumption	< 35 watts typical with full LNB DC load & QPSK receiver
Transport-In Options	See **Table 1.2: Transport-In Options** on page 6.
Conditional Access	
Wegener COMPEL®/CA	Transport-level or by program
PIN Scrambling	
Turnaround option to bypass scrambled streams to ASI output	(Contact factory)
Transport Demultiplexing	
Aggregate MPEG Transport Rate	2.5 to 86.25 Mbps (55 Mbps in Release 1) if not limited by symbol-rate limits of installed receiver card. This rate is guaranteed for reception and transmission to ASI port only. For local decompression of audio and video, the maximum transport rate remains 55 Mbps.
Number of Programs	Unlimited
PSI Recognition	Automatic
DVB ASI Output	
Physical Layer	270 Mbaud signaling on coaxial cable per EN 50083-9 Annex B
Levels	~1.1 V_{p-p} into 75 Ω unbalanced
Stream Padding	Minimum of one K28.5 null character padding in inter-byte gaps, strategy after that is to add equal pad amounts between bytes before adding extra padding between TS packets
Stream Processing (network-controlled)	Program mapping (routing of incoming program content to up to 16 virtual programs at output) and/or conditional DPI filtering.
Program Decompression	
Video	MPEG-2, 4:2:0 Chroma sampling
Audio	MPEG-1 Layers 1 & 2
Audio	Dolby AC-3 (optional), L/R downmix only
Composite Video Output	
Output Level	1.0 V_{p-p}, ± 2%
Output Impedance	75 Ω
Multiburst	NTSC: From 0.5 to 4.2 MHz: ≤ ±0.8 dB
	PAL-B: From 0.5 to 4.8 MHz: ≤ ±1.2 dB
Differential Gain	≤ 4 IRE
Differential Phase	≤ 1.5°
L/C Gain Inequality	≤ ±4 IRE

Table 1.1: Technical Specifications

Characteristic	Specification
Composite Video Output (Cont.)	
L/C Delay Inequality	≤ ±26 ns
Line Time W-form Distortion	≤ 1.0 IRE p-p
Field Time W-form Distortion	≤ 3 IRE p-p
Video SNR Weighted	≥ 56 dB
VBI Data Re-insertion	EIA 608 closed captioning & XDS from ATSC and also Harmonic and Tandberg proprietary protocols
Audio Output	
Output Level-MAX PPL	+18.0 dBm into 600 ohms @ 0 dB attenuation + 24.0 dBm is optional
Output level adjust range	0 to 20 dB attenuation in 2 dB steps from Output Levels above
Output Impedance	Balanced: < 60 Ω
Frequency Response	20Hz to 20 kHz, + 0.5/-1.5 dB 50 Hz to 15 kHz, ± 0.5 dB
Phase Accuracy	50 Hz to 15 kHz, ≤ ±2° from linear phase
SNR	≥ 80 dB (22 Hz to 20 kHz) unweighted
Dynamic Range	24 bits
DTMF Output	
Type	Low-Z balanced output
DTMF tones	16 tone-pairs, std. telco DTMF
Tone Timing	< 230 ms to generate 4 tone-pair sequence
Output Level Range	+8 to –2 dBm into 600 Ω; software adjustable in step increments of 6% of full-scale voltage
Front Panel Monitors	(actively-isolated from, but otherwise buffered copies of the standard analog outputs)
Video	Composite video; 1 V_{p-p}, 75 Ω
Audio	One stereo pair (user-selectable from audio port 1 or 2), Level: ~ -13 dB below main audio output (if set for +18 dBu output PPL) Impedance: < 60 Ω, unbalanced
Serial Ports	
Standard	RS232, DCE
Handshaking	None
Selectable Services	Terminal monitoring and control Modem dial-in Auxiliary async data output (Release 2 or later) COMPEL® E-mail character-based async output Local COMPEL control input (testing only)
Baud Rates	Up to 38.4 kilobaud
Formatting	8 data bits, one start, one stop-bit, half-duplex. Parity selection set by unit software.

Table 1.1:   Technical Specifications

Characteristic	Specification
Ethernet Ports	
Physical Layer	Full-duplex, auto-negotiating 10baseT, 100baseT (twisted pair) on RJ45 jack
Media Access and Link Layers	Per IEEE 802.3 (Ethernet)
Network and Transport Layers	Binds to TCP/IP stack which enables Telnet control and Web-based status monitoring (Release 4 or later).
Alarm/Cuing Relays	One relay dedicated to indicate unit ALARMS and two relays dedicated to user control (such as cueing). The ALARM relay automatically de-energizes for alarm conditions so that power loss to the unit indicates as an alarm. The user-cue relays may also be placed in a nonvolatile "Follow Warning" setting such that the relay is ON for unit warning states and OFF when there is no warning. When in "Follow Warning", the relay will not respond to volatile settings, the Pulse command, or any nonvolatile commands sent to "all" relays. An individual relay must be addressed directly to set it back to ON or OFF.
Type	Form C, wiper contacts NC contact when de-energized and NO contact when energized
Polarity	Common, NC and NO contacts supplied externally
Rating	30VDC open circuit, 100 mA max current closed
Front Panel E-Mails	Up to 512-character messages from COMPEL$^{®}$· New messages over-write older messages. May also be cleared by local user.
Chassis	
Height	Std. 1RU 1.75 inches (4.45cm)
Width	EIA std. 19 inches (48.26cm)
Depth	Back of rack-ears to rear panel: 14.9 inches (37.85 cm)
	Back of rack-ears to end of connectors: 15.7 inches (39.88 cm)
Weight	~10.5 lb. (with Receiver card & AV monitor option only)
Cooling	Fan-cooled with left-side inlet and right-side exhaust (viewed from front). Fan is activated after unit reaches specific temperature.
Environmental	
Operating Temperature	+10°C to +50°C (+50°F to +122°F) Unit gives warning indication for over-temperature conditions
Storage Temperature	-20°C to +70°C (-4°F to 158°F)
Agency Approvals	
UL	UL1950, 3rd Edition
FCC	Part 15B Class A, per Title 47 CFR (FCC rules)
CE	EN60950, EN55022(94), and EN55024(98)—tested per EN61000-4-2(95), -4-3(02), -4-4(95), -4-5(95), -4-6(96), and –4-11(94)

Table 1.2: Transport-In Options

Characteristic	Specification
DVB-QPSK Receiver Option (No RF Switch)	
RF Input	
Input Impedance	75Ω unbalanced
Input VSWR, 75-Ω system	< 2.1:1 (9.0 dB R.L. min), 950-1450 MHz < 3.0:1 (6.0 dB R.L. min), 1450-2150 MHz
Surge Resistance	Guaranteed survival from up to 10 direct-coupled 8kV discharges (per IEC 801-2)
RF Tuning	
Input Frequency Range	950 to 2150 MHz
LO Leakage at Input	$\leq$ -50 dBm
Symbol-rate Range	2 to 45 Msps (may be limited by Transport Rate limits)
Tuning Resolution	10 kHz
Input Signal Level Range	-25 to -65 dBm
Signal Level Warning Limits	warns within +10/-5 dB of upper limit and +5/-10 dB of lower limit
Maximum Aggregate Input Power	-5 dBm min
Demodulator/FEC	
Modulation	QPSK (α =.35) per DVB (EN 300 421)
Carrier acquisition range	±1 MHz or ± 10% of symbol-rate QPSK, whichever is greater
Max E_b/N_0 @ Quasi-error-free threshold (less than one uncorrected error-event per hour)	Per EN300 421: QPSK R=1/2: 4.5 dB, QPSK R=2/3: 5.0 dB, QPSK R=3/4: 5.5 dB, QPSK R=5/6: 6.0 dB, QPSK R=7/8: 6.4 dB
RF Power Level Estimator (locked to carriers or not)	Unitless metric SIGNAL corresponds to input power as follows: above -25dBm: Extrapolated from 90 up to 100+ -25dBm: 90 -55dBm: 30 -35dBm: 70 -65dBm: 10 -45dBm: 50 no signal: <0 below -65dBm: Extrapolate from 10 down to <0 Accuracy: unit to unit <±5 dBm; over frequency <±10 dBm
LNB DC Power	(supplied on RF center conductor)
Activation	User- or network-controlled selectable: ON or OFF
Voltage	~ +18.7 VDC nominal at no loading, +18.0 VDC min. at max loading
Current (full load)	350 mA max
Short-circuit protection	Thermal fuse, tripping at ~500 mA.
European "Universal LNB"	Software may be upgraded for "Universal Single LNB" palarization and freq-band control per ASTRA recommendations

Table 1.2: Transport-In Options

Characteristic	Specification
DVB-QPSK Receiver with 4-Port RF Switch Option	
Switched RF Inputs	
Input Impedance	75Ω unbalanced
Isolation, port-to-port	> 45 dB, 950-1450 MHz > 40 dB, 1450-2150 MHz
Input VSWR, 75-Ω system, selected port	< 2.6:1 (7 dB R.L. min), 950-1450 MHz Not guaranteed, 1450-2150 MHz
Input VSWR, 75-Ω system, unselected port	< 2.0:1 (10 dB R.L min), 950-1450 MHz Not guaranteed, 1450-2150 MHz
RF Tuning	Same as QPSK option described above
Demodulator/FEC	Same as QPSK option described above
LNB DC Power	Supplied on separate 2-pin header. Performance otherwise the same as QPSK option described above
Turbo PSK Receiver Option, Broadcom Protocols	
RF Input	
Input Impedance	75Ω unbalanced
Input VSWR, 75-Ω system	<1.9:1 (10 dB R.L. min), 950-1450 MHz < 1.9:1 (10 dB R.L. min), 1450-2150 MHz
Surge Resistance	Guaranteed survival from up to 10 direct-coupled 8kV discharges (per IEC 801-2) whether port is selected or not
RF Tuning	
Input Frequency Range	950 to 2150 MHz
LO Leakage at Input	$\leq$ -60 dBm
Symbol-rate Range	1 to 30 Msps (may be limited by Transport Rate limits)
Tuning Resolution	10 kHz
Input Signal Level Range	-25 to -65 dBm
Signal Level Warning Limits	warns within +10/-5 dB of upper limit and +5/-10 dB of lower limit
Maximum Aggregate Input Power	0 dBm max
Demodulator/FEC	
Modulation	1. DVB-QPSK (α =.35) per EN 300 421 2. Advanced "Turbo-QPSK" (α =.20 default; R=½, ¾) per Broadcom proprietary protocol 3. Advanced "Turbo-8PSK" (α =.20 default; R=2/3, 5/6, 8/9) per Broadcom proprietary protocol. [R=¾ Type I and II; contact factory.] 4. Advanced "Turbo-16QAM" (α =.20 default; R=¾) per Broadcom proprietary protocol
Carrier acquisition range	±1 MHz or ± 10% of symbol-rate QPSK, whichever is greater

Table 1.2: Transport-In Options

Characteristic	Specification
Demodulator/FEC (Cont.)	

Max E_b/N_0 @ Quasi-error-free threshold (less than one uncorrected error-event per hour)	1. DVB-QPSK: QPSK R=1/2: 4.5 dB,
	                          QPSK R=2/3: 5.0 dB,
	                          QPSK R=3/4: 5.5 dB,
	                          QPSK R=5/6: 6.0 dB,
	                          QPSK R=7/8: 6.4 dB
	
	2. Turbo-QPSK: R=1/2: 2.4 dB
	                          R=3/4: 3.6 dB
	
	3. Turbo-8PSK: R=2/3: 4.8 dB
	                          R=3/4(I): 5.4 dB
	                          R=3/4(II): 5.8 dB
	                          R=5/6: 6.8 dB
	                          R=8/9: 8.2 dB
	
	4. Turbo-16QAM: R=3/4: 6.6 dB

RF Power Level Estimator (locked to carriers or not)	Unitless metric SIGNAL corresponds to input power as follows: above -25dBm Extrapolated from 90 up to 100+ -25dBm 90 -55dBm 30 -35dBm 70 -65dBm 10 -45dBm 50 no signal <0 below -65dBm Extrapolate from 10 down to <0 Accuracy: unit to unit <±5 dBm; over frequency <±10 dBm
LNB DC Power	(supplied on RF center conductor)
Activation	User- or network-controlled selectable: ON or OFF
Voltage	~ +18.7 VDC nominal at no loading, +18.0 VDC min. at max loading
Current (full load)	350 mA max
Short-circuit protection	Thermal fuse, tripping at ~500 mA.
European "Universal LNB"	Software may be upgraded for "Universal Single LNB" polarization and freq-band control per ASTRA recommendation
Turbo Receiver with 4-Port Switch Option	
RF Switch Input	4-port, single-throw switch
Input Impedance	75Ω unbalanced
Isolation, port-to-port	> 45 dB, 950-1450 MHz > 40 dB, 1450-2150 MHz
Input VSWR, 75-Ω system, selected port	< 1.9:1 (10 dB R.L. min), 950-1450 MHz < 1.9:1 (10 dB R.L. min), 1450-2150 MHz
Input VSWR, 75-Ω system, unselected port	< 1.9:1 (10 dB R.L. min), 950-1450 MHz < 1.9:1 (10 dB R.L. min), 1450-2150 MHz
Surge Resistance	Guaranteed survival from up to 10 direct-coupled 8kV discharges (per IEC 801-2) whether or not port is selected
RF Tuning	Same as Turbo PSK option described (above)
Demodulator/FEC	Same as Turbo PSK option described (above)
LNB DC Power	Supplied on RF Input Port 4 - same electrical characteristics as described for single-input Turbo PSK option (above)

Table 1.2: Transport-In Options

Characteristic	Specification
ASI Transport Input Option	
DVB-ASI Input	One input per DVB ASI per EN50083-9 Annex B
Physical layer	270 Mbaud signaling on 75Ω coax cable
Minimum byte gaps	Down to 0-byte interbyte gaps
Transport data rate	Limited to rates allowed by parent IRD

1.4   Safety Summary

The **U4600** 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 **U4600**:

Do not open the **U4600** chassis cover.

This **U4600** unit incorporates security labels over some of the screws. There are no user-serviceable components within the **U4600** unit. 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 under **Customer Service**.

1.5   Glossary of Terms and Abbreviations

Table 1.3:   Glossary of Terms

Term	Definition
Ad avail, digital	The opportunity for a local program splicer to insert local content in the MPEG PES streams in substitution for "regular" network-distributed programming. The avail is bounded by "splice out" and "splice in" points. "Splice points" are seamless insertion points (located for the splicer by DPI messages) where the compressed stream may be broken and substituted without frame-by-frame interruption of video.
Ad avail, analog	The opportunity for local users to switch from the network-supplied programming to locally-generated content (commercials). This is signaled by use of DTMF tones or closures of cue relays.
Alarm	A condition or notification of a condition that prevents proper U4600 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.

Table 1.3:   Glossary of Terms

Term	Definition
Automated Recovery (or Recovery)	The mechanism used when the U4600 is unable to acquire a valid transport stream, loses network control or detects an invalid control stream, or is unable to deliver the required services using its current settings. The unit automatically begins attempting operations under "backup" unit settings stored in the presets table until it can return to normal operation or is stopped by local user command.
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 ^{â}	Wegener's network control software that may be used to manage your U4600 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.
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 U4600 may be connected to an Ethernet LAN.
LCD	Liquid crystal display. The front-panel screen on your U4600 is a liquid crystal display.
LED	Light-emitting diode. The front-panel indicator lights on your U4600 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)

Table 1.3:   Glossary of Terms

Term	Definition
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.)
Network Protection Mode	A non-volatile setup parameter whose value is "Shared" or "Protected" (or "not Shared"). Similarly, each network control stream has a "Share" status field as part of the COMPEL packet framing. A network control stream is considered "invalid" to the U4600 if the network ID in the stream differs from that of the IRD and if either the network stream or the U4600 are set to be "Protected". For test purposes only, there is a generic network ID that the COMPEL system may transmit which is always considered to be "valid" by all IRDs.
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.
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

Table 1.3: Glossary of Terms

Term	Definition
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, Last Commanded	The most recent Unit Setting requested by a user (local or network) command. This value is non-volatile.
Setting, Last Successful	The most recent Unit Setting, which is NOT a Temporary Setting, at which the IRD was able to deliver services while free of alarms. This may also be the Last Commanded setting or it may be the attempted (Transient) setting at which auto-recovery was successful. This value is non-volatile.
Setting, Permanent	That non-volatile Unit Setting which the IRD will attempt, if in Normal Operation, after a unit reset. This will be the Last Commanded setting unless, since that command was issued, the IRD had executed an Auto-Recovery and successfully acquired at one of the Preset settings. In other words, the Permanent Setting is the most recent of the Last Commanded and Last Successful Settings.
Setting, Temporary	A special volatile unit setting with a timed expiration period. The command to invoke this special setting and the subsequent success of the IRD to find services at this setting does not affect the non-volatile value of the Last Commanded or Last Successful Settings. Also, if the compliant IRD receives a command to change its Permanent Setting while in a Temporary Setting, the Temporary Setting will *not* be aborted, but the new Permanent Setting will be recorded in NVRAM as the Last Commanded setting and the Permanent Setting pointer will refer to that.
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 U4600; 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 U4600 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 **U4600** 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 the **U4600**.

FCC-Mandated Suppression of Radio Frequency Emissions

If the Ethernet port has a cable connected to it, that cable *must* be properly shielded and grounded to minimize RF emissions that 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 the **U4600** unit and other equipment, or personal injury, the following items should be strictly observed.

Elevated Ambient Operating Temperatures in Rack-Mounted Units

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

Reduced Air Flow

Equipment should be installed such that the airflow required for safe operation of the equipment is not compromised. The **U4600** may be arranged in a rack without empty spaces between units if heat buildup is prevented by ensuring that its side vents remain unblocked and that there is adequate clearance around the vent holes.

Mechanical Loading

Rack-mounted equipment should be installed in such a way that a hazardous condition is not produced by uneven loading. The **U4600** unit is not very heavy, but total rack loading must be considered. Also, do not rest any unsupported equipment on a rack-mounted **U4600** unit.

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   the **U4600** is sized as 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 **U4600** on its supports and use four anchor screws or bolts and nuts to secure the **U4600** front brackets to the rack.

WARNING

The front brackets must be secured to the rack. If the 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 **U4600** in a desktop environment, place the **U4600** 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 13.) so that the unit's operating ambient temperature range is not exceeded.

WARNING

Locate the **U4600** and its cables to avoid impacts, spills, and pulling cables and to ensure sufficient air flow. Failure to locate the **U4600** in a proper environment may result in damage to the equipment.

2.3   U4600 Connections

Figure 2.1 shows the connector locations on the **U4600** rear panel.

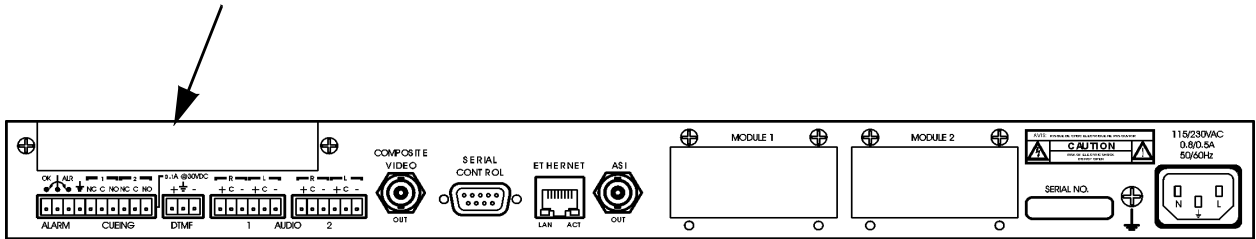**See Figure 2.2 for Transport In Options for this slot.**

Figure 2.1: U4600 Rear-Panel Connector Locations

Figure 2.2 Unity 4600 Transport-In Options below shows rear-panel views of the five available receiver modules.
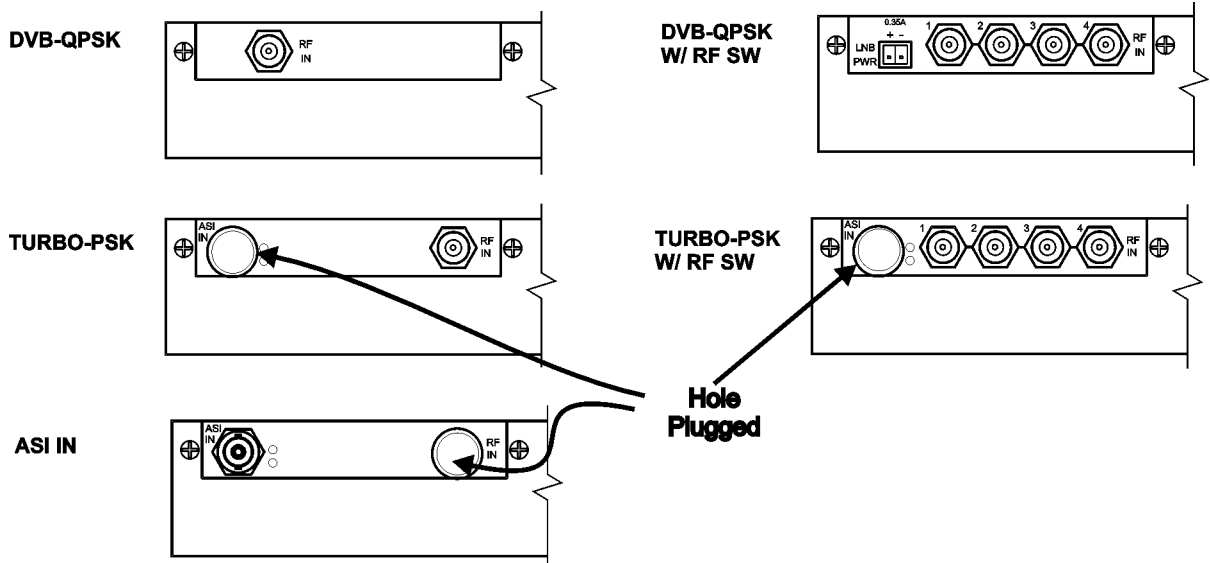

Figure 2.2: Unity 4600 Turbo Transport-In Options

Table 2.4: Rear Panel Connectors below lists the U4600 connectors on the rear panel, their types and pinout information. See Interpreting LEDs on page 43 for descriptions of rear-panel indicators.

Table 2.4:   Rear Panel Connectors

Connector Designation	Type	Pin	Signal Name
Alarm Cuing	10-pin male header (mates to removable terminal-strip)	1 (on left as viewed from rear of unit)	OK (COM closes here when OK)
		2	COM:
		3	Alarm (COM closes here on alarm or if power is off)
		4	GND
		5	Cue Relay #1: N.C. contact
		6	Cue Relay #1: Common contact
		7	Cue Relay #1: N.O. contact
		8	Cue Relay #2: N.C. contact
		9	Cue Relay #2: Common contact
		10	Cue Relay #2: N.O. contact
DTMF	3-pin male header (mates to removable terminal-strip)	1 (on left as viewed from rear of unit)	DTMF tone, non-inverted output
		2	GND
		3	DTMF tone, inverted output
Audio (same for both ports 1 and 2)	6-pin male header (mates to removable term strip)	1 (on left as viewed from rear of unit)	Right '+'
		2	Right GND
		3	Right '-'
		4	Left '+'
		5	Left GND
		6	Left '-'
Composite Video Out	BNC Jack		Composite Video Out
Serial Control	RS232, 9-pin D female jacks	1	DCD (internally pulled to +5V)
		2	RxD (data output)
		3	TxD (data input)
		4	DTR (not connected)
		5	GND
		6	DSR (internally pulled to +5V)
		7	RTS (internally pulled to +5V, may be upgraded for handshaking)
		8	CTS (not used presently, may be upgraded for handshaking)
		9	RI (internally pulled to +5V, with weak current limiting)

Table 2.4:   Rear Panel Connectors

Connector Designation	Type	Pin	Signal Name
Ethernet	RJ45 Jack	1 (on left as viewed from rear of unit)	TXDO +
		2	TXDO -
		3	RXDI +
		4	Shorted together, then terminated into an AC ground.
		5	
		6	RXDI -
		7	Shorted together, then terminated into an AC ground.
		8	
ASI OUT	BNC Jack		DVB-ASI Transport Output
115/230 VAC	Std. IEC Receptacle		AC line in
DVB-QPSK Transport In Option			
RF IN	Type F coax jack		L-band RF Input from external LNB (with LNB DC on center pin)
DVB-QPSK with 4-way RF Switch Transport In Option			
RF IN – 1 through 4	Type F coax jacks		4-way RF Switch Inputs (with DC block)
LNB PWR*	2-pin male header (mates to removable terminal-strip)	1 (on left as viewed from rear of unit)	LNB DC Output positive leg
		2	LNB DC Output return leg
Turbo-PSK Transport In Option			
ASI IN	<plugged>		Not used
RF IN	Type F coax jack		L-band RF Input from external LNB (with LNB DC on center pin)
Turbo-PSK with 4-way RF Switch Transport In Option			
ASI IN	<plugged>		Not used
RF IN – 1 through 3	Type F coax jacks		4-way RF Switch Inputs (with DC block)
RF IN 4	Type F coax jack		4-way RF Switch Input (with LNB DC on center pin)
ASI Transport In Option			
ASI IN	BNC Jack		DVB-ASI Input
RF IN	<plugged>		Not used
* LNB DC power may be locked to OFF by network.			

Table 4 below lists the **U4600** front-panel connectors, their types and pinout information.

Table 2.5: Front-Panel Connectors

Connector Designation	Type	Pin	Signal Name
Video Monitor	BNC jack		Composite Video monitor
Audio Monitor	¼" stereo phone jack		Stereo audio headphone monitor, selectable between audio ports 1 or 2

2.4   Serial Port Configuration

Device assignments

The **U4600** has one external serial port. A "device" must be assigned once to the serial port, but no "device" may be assigned more than once. In addition, more than one device may be assigned at one time but only one device which accepts input may be assigned. (If multiple devices are assigned to the serial port, the port's settings are controlled by the device with higher priority according to the list below.) Device port assignment and device configuration (see below) may be controlled only from the unit front panel and the network may disable this capability. The possible devices are:

1. Terminal

2. Modem ("modem" being remote terminal via modem)

3. Local COMPEL®

4. Auxiliary Data

5. Printer (including COMPEL® e-mail and reports)

Device configurations

When a serial port configuration command is received, the specified configuration is immediately stored for the specified device (e.g. for the "Terminal" device). If a serial port is currently assigned another device, then its output buffer is immediately flushed and the port re-configured. Communication is fixed at 1 start, 1 stop, and 8 data bits, with no hardware handshaking. No provision for software handshaking is made in this Release. The serial port's behavior for each of its device types is described in the following table.
:

Table 2.6: Device Configurations

Device	Serial Port Behavior (Italics are Programmable, Bold are Fixed)
Terminal	Configured to 19.2k, N, 8, 1. The unit responds to the terminal commands as described in 3.4 Operation from Local/Remote Terminal on page 59.
Modem	Configured to B, P, 8, 1. The unit responds to the commands as described in 3.4 Operation from Local/Remote Terminal on page 59.
Aux Data	Configured to B, P, 8, 1. This is an output only (all inputs ignored).
Local COMPEL	Configured to B, P, 8, 1. This is an input for testing only.
Printer	Configured to B, P, 8, 1. This is an output only.
The legal values for B are: 1200, 2400, 4800, 9600, 19.2k, or 38.4 kilobaud. The legal values for P are: 'O', 'E', or 'N' for Odd, Even, or No parity.	

Device Handling <u>Terminal I/O</u>

The **Terminal** option is used for command and control of the **U4600**. The **Terminal** option provides a basic VT100-like terminal emulation. All I/O is prompted by user-input text strings terminated in carriage-returns. The **Terminal**, whether local or remote (via modem or telnet over TCP/IP), should be set to **Local Echo On**. The unit only echoes a carriage-return/linefeed and then a '**>**' prompt after user entry.

<u>Modem I/O</u>

The **Modem** option operates in a similar manner to the **Terminal** option. Where the **Terminal** option is limited to one specific configuration, the **Modem** option may be set to one of several. The **Modem** option does not use special handshaking or special control characters, and only supports auto-answer modems.

To access the **Modem** command interface, the serial-port device must first be set to **Modem**. The "Terminal/IO" discussion above on emulation and echoing would then apply. When a user sends the **U4600** unit a carriage return, it returns a prompt to "**Enter modem password**". Modem access is enabled if the correct password is entered. The **U4600** outputs a welcome banner when modem access is enabled. After that, Modem I/O is indistinguishable from normal terminal access, and has the same restrictions on local user access that the Network has set for Terminal I/O.

Modem access is disabled when one of the following occurs:

1. A new input serial-port device is selected.

2. When no user input occurs for 10 minutes.

3. The **OH** command is received, or

4. The unit is reset.

<u>Aux Data</u>

The **Aux Data** option is defined to allow for async data streams to be carried within the transport stream and their raw payload output on an IRD serial port. The PID of these streams may or may not be assigned to a program number within a PMT. To recover the data, the IRD need only be given the PID and baud rate. The range of legal PIDs is established by ISO 13818 standard as 20 to 1ffe (hex). This may be performed either by COMPEL[a] command or by the local user (if local control is enabled).

<u>COMPEL[a]</u>

This option is defined to allow for input of the COMPEL control stream (for testing only). There is no output.

<u>Printer Ouput</u>

The **Printer** is an output-only option. There are three legal types of output for the **Printer** option: **COMPEL-Requested Reports**, **COMPEL E-mail**, and **Raw COMPEL** (binary) **Data**.

1. **COMPEL-Requested Reports** are IRD status reports identical to those that the local user may request. These are always available for the Printer option.

2. **COMPEL E-mail** output type must be enabled by a non-volatile control.

3. The last type, **Raw COMPEL Data**, must also be enabled by a non-volatile control. (Actually, it is a factory setting that can only be modified with debug access.) When this type of **COMPEL** data stream is being processed normally by the IRD host processor, it is also output as-is (in binary witn non-printing characters) to the **Printer**. While **Raw COMPEL Data** is being dumped, it has exclusive access to the Printer device, and no other outputs can access the printer until the dump has completed.

2.5   Installation Testing

The **U4600** has a number of installation tests that may be performed from the front panel. From the **Home** screen, press the right arrow until the **Installation Testing** screen is displayed.

RF Input Check — This test is used to verify an RF connection to a properly functioning LNB at any RF port. Perform the check as follows:

a. Press **ENT** from the **Installation Testing** screen to bring up the **RF Input Check** screen.

b. Press **ENT** again to display the input level estimate at **RF Port 1**. This will be an average of the estimated levels at each of the twenty-four domestic transponder center frequencies.

c. Press the right-arrow button repeatedly to display the input levels at **RF Ports 2**, **3**, and **4** as well.

d. Press **ESC** to return to the **RF Input Check** screen.

Audio/Video Check — This test puts out a video test pattern and audio test tones to allow verification of video and audio connections. The video pattern is vertical color bars. On **Port 1**, the audio is a slowly pulsing (triangle-wave) tone with a higher frequency on Right than on Left. On **Port 2**, the audio is a slowly pulsing (sine-wave) tone also with higher frequency on Right than on Left. On each port, the audio tones alternately pulse (~1 second) left then right, then repeat. Use the following steps to enable or disable this audio/video test mode:

a. From the **RF Input Check** screen, press the right-arrow button to bring up the **Audio/Video Check** screen.

b. The **Audio/Video Check** screen will indicate that the test mode is either "**Enabled**" or "**Disabled**".

c. Press **ENT** to switch the test mode between "**Enabled**" and "**Disabled**".

d. Press the left-arrow button to return to the **RF Input Check** screen or **ESC** to return to the I**nstallation Testing** screen.

DTMF Setup   This test allows the setup of DTMF tone levels and verification of connections to cue equipment. Use the following steps to set the DTMF level:

a.   From the **Audio/Video Check** screen, press the right-arrow button to display the **DTMF Setup** screen.

b.   Press **ENT** to display the **DTMF Test Tone** screen and begin output of the DTMF test tones. The tones (actually tone-pairs) are played out at about one-second intervals from 1 through 9, 0, *, #, A, B, C, D, and then repeating.
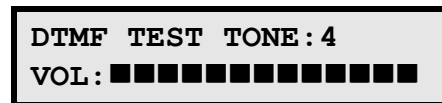
```
DTMF TEST TONE:4
VOL:██████████████
```
- currently played test tone-pair
- volume

c.   Press the arrow buttons to adjust the volume. Up-arrow or right-arrow to increase volume, down-arrow or left-arrow to decrease volume. The number of black squares on the LCD indicates the current volume.

d.   Press **ESC** to return to the **DTMF Setup** screen or **ESC** to return to the **Installation Testing** screen.

Relay Pulse Check   This test may be used to verify connections to the alarm or cue relays. Each relay, as it is tested, will energize and de-energize about once per second. Use the following steps to check these connections:

a.   First, verify that each relay is set either to **On** or **Off**. Relays placed in the nonvolatile "**Follow Warning**" setting will not respond to the **Pulse** command used in this test.

b.   From the **DTMF Level Set** screen, press the right-arrow button to display the **Relay Pulse Check** screen.

c.   Press **ENT** to display the **Relay 1 Check** screen.

d.   The **Relay Check** screen will indicate that the relay is **On** or **Off** as it switches on and off about once per second. At the same time, a user should see the ohm-meter reading between the output contacts alternate between zero and (virtually) infinite.

e.   Press the right-arrow button to test the remaining cue relays and the alarm relay.

f.   Press **ESC** to return to the **Relay Check** screen.

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Chapter 3 Operation

This chapter provides an overview of **Unity 4600** operation, details of controls and indicators, the alarm/warning system, and user interface details.

3.1 Theory of Operation

Functional Summary

From one selected RF input feed, the **Unity 4600** receives an L-band RF carrier from an external antenna LNB. It then demodulates the carrier and extracts the transmitted MPEG transport stream. If the stream is scrambled and the unit is properly authorized, it applies the descrambling algorithm to re-generate that transport stream as it appeared at the multiplexer in the uplink compression system. (Alternately, if using per-program viewing access, only the authorized programs will be descrambled.) This transport stream is then supplied to the ASI transport output, perhaps with program re-mapping or conditional DPI filtering (under network control). The **U4600** also decompresses the components of a selected program and provides the audio, video, and/or data services for output.

NOTE: **The user or network may wish to have a null program assignment if no attempt at local decompression is desired. This is required for the new HD programming.**

As needed, auxiliary functions are also provided, such as re-insertion of vertical blanking interval data (closed captioning for example) in the video output. **Figure 3.1** presents a logical block diagram of **U4600** operation.

Available outputs from the **U4600** include:

- DVB-ASI transport output with program (number and descriptor) mapping
- Decompressed MPEG video as composite video output (NTSC or PAL)
- Two independent, decompressed audio streams (MPEG or Dolby AC-3 downmix) to balanced analog audio outputs
- Re-insertion of VBI line data from various proprietary and ATSC protocols
- Alarm relay
- User control relays for cueing
- DTMF cueing tones
- Front-panel audio (one stereo pair) and composite video monitor outputs

Automated Recovery

If unable to deliver required services to predetermined standards, or if unable to detect a required network control stream (COMPEL®), the **U4600** attempts to resume normal operation through a process called Automated Recovery. Referring to an internal, non-volatile list of "presets", the **U4600** will attempt to restore either services or network control, depending on what caused the recovery. A "preset" is a list of unit settings, and the list of these presets is called the Preset Table. Automated Recovery will attempt to restore the unit according to each preset (one at a time) in the order in which they are listed in the table. The process continues (repeating attempts if necessary) until the unit successfully resumes normal operation or is halted by local user command. If successful with a preset, the settings in that preset become the permanent unit settings. Later, the local user (or the network, if available) may abort the results of the Automated Recovery and force the unit back to its last commanded setting.

Several user- or network-programmable objects control the Automated Recovery. In addition to the contents of the Preset Table, these objects include the Services Recovery Timeout, the Network Recovery Timeout, the Recovery Iteration Time, and the Local Control Re-enable Timeout. The first two timeouts control how long the unit will wait after loss of services or network control, respectively, before entering Automated Recovery. The Recovery Iteration Time sets the maximum time the unit will spend attempting recovery at each preset. The last is a special timeout for disaster recovery, such as loss of a satellite, where units whose local control was previously disabled by the network are re-enabled so that local users may implement more complex recovery plans.

Monitoring and Control

Most routine **U4600** operations can be performed over Wegener's COMPEL® Network Control System. Control is "broadcast" to individual units through a "ghost-PID" data component of the incoming transport stream. The **U4600** is considered disconnected from the network at any time this special stream is not being received.

In addition to the remote COMPEL network control, three methods are provided for "local" monitoring and control of the **U4600**:

1. A web browser interface (to be released August 2005);

2. a terminal interface (direct serial or via telnet over TCP/IP); and

3. a front-panel interface.

NOTE: Local control may be limited by COMPEL command.

The remainder of this chapter details these local monitor and control interfaces.

Figure 3.1:   Unity 4600 Functional Block Diagram
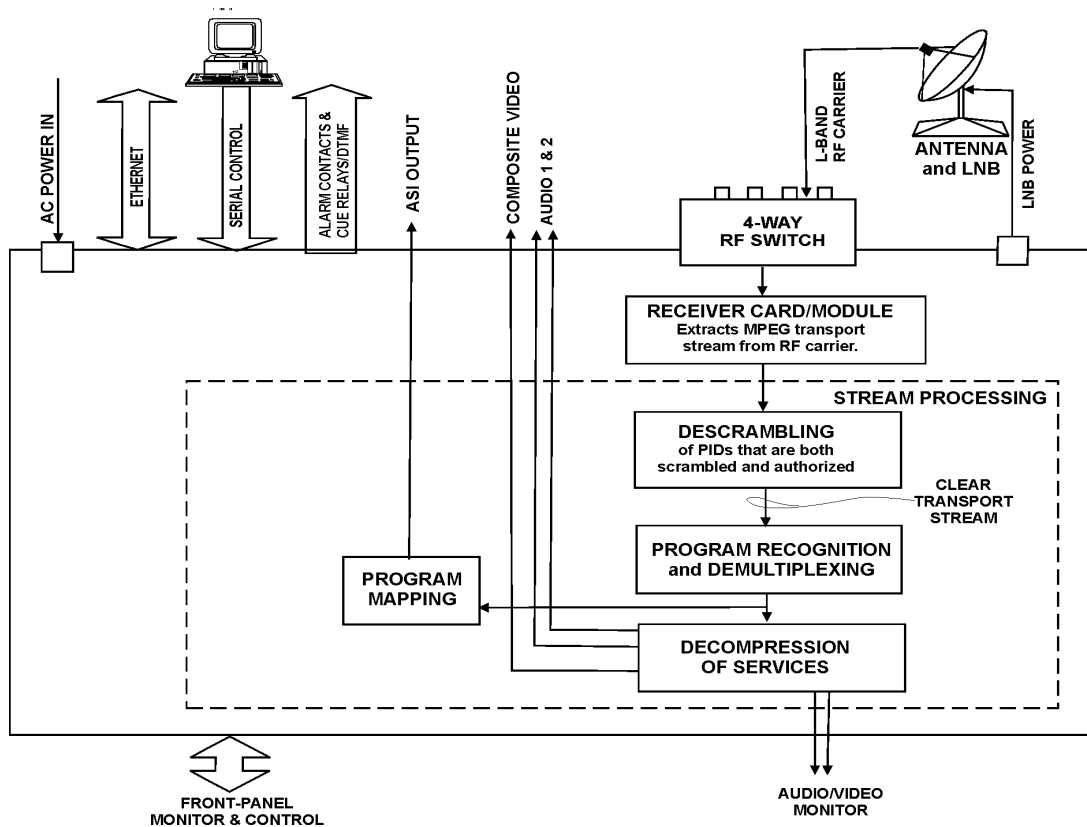
3.2 Operation from Front Panel

The U4600 front panel (**Figure 3.2**) includes the following four main parts: a liquid crystal display (LCD), six pushbuttons, eight LED indicators, and the front-panel audio and video monitor ports. Essentially all control available through the network or terminal is also available from the front panel.

The front-panel LCD (**1**) on **Figure 3.2** 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 which may cycle through multiple messages depending on the context.

The six pushbuttons (**2**) are your means of commanding the **U4600** 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 **ENT** (Enter) button to select menus (downward navigation), to open editable input fields, or to commit edited parameters to the U4600. Press **ESC** (Escape) to exit an input field without saving the entry or selection. **ESC** also provides upward navigation through the menu structure to the home screen.

The eight front-panel LEDs (**3**) provide status information about your **U4600** and its processes. See **Table 3.2: Front-Panel LED Indicator Descriptions** below for complete details. (Two additional LEDs are located on the rear panel and provide Ethernet status indications.)

At far right are the video port and audio port (**4**) included for monitoring from the front panel.

Figure 3.2   U4600 Front-Panel Layout
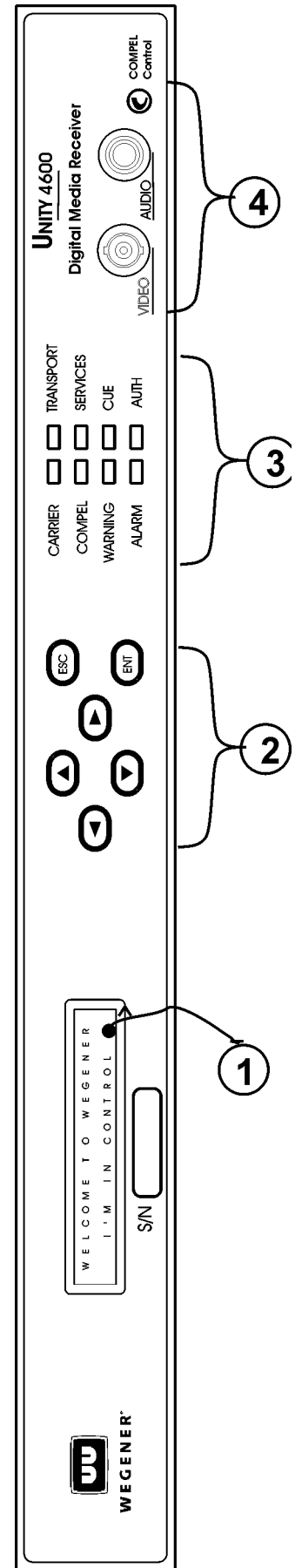
LCD Screen Relationships

Figure 3.3 below 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 **ESC** and **ENT** 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 **U4600** operation or status. Its child screens are opened by pressing **ENT** 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. The home screen may be reached by pressing and holding **ESC** (or pressing it repeatedly) from any

other LCD screen. **Appendix A Monitoring and Control Details** gives more details on screen types and using front-panel push buttons to navigate and control the **U4600**
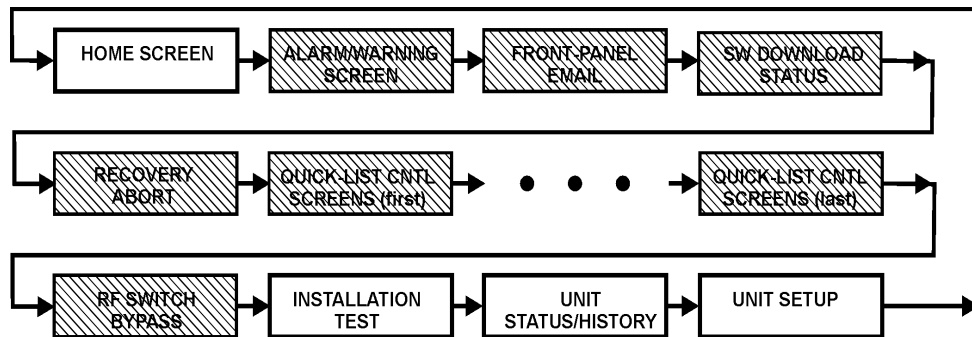
Figure 3.3   LCD Screen Relationship.
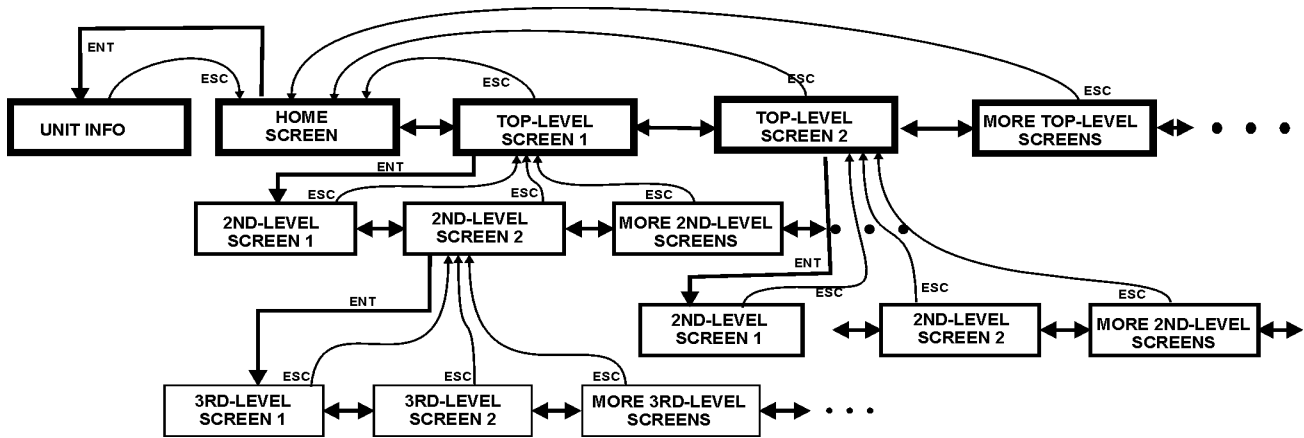
LCD Screen Content

Available top-level screens are shown in order in **Figure 3.4 Unity 4600 Top-Level Screens** below. Some screens are only available under certain unit conditions or when certain optional hardware is installed. The optional screens are represented by hatched boxes.

Figure 3.4   Unity 4600 Top-Level Screens

☐ White boxes indicate standard screens.

▨ Hatched boxes indicate optional screens that may or may not appear depending on installed hardware, selected options, or unit state.

➡ Arrows indicate the order of appearance as the right-arrow key is pressed.

A list of the top-level screens and their functions are summarized in **Figure 3.1**, which follows.

Table 3.1:   Summary of Top-Level LCD Screens and Their Functions

Screen Name	Functions/Applications
Home Screen	Shows basic receive settings and indications about special unit conditions
Unit Info (Shortcut) Screen	• Shows unit's serial number, label, and model number • Shows unit's application software version number • Shows other key unit information.
Alarm/Warning Screens (When applicable)	• Shows current alarms and warnings (if any) • Shows historic alarms • Allows user to clear historic alarm records • Allows user to acknowledge/clear certain warnings.
Recovery Abort (When applicable)	• Allows user to abort a recovery in progress or abort the result of an automated recovery - *or* - • Allows user to adopt a recovered setting as a new permanent setting
Front-Panel Email (when applicable)	Allows user to read and clear unread email sent by network control
SW Download Status (when applicable)	Allows user to monitor the progress of a software download over satellite
Quick-List Control Screens (Multiple)	A variable number of commonly-used control screens duplicated at the top level for easy access
RF Switch Bypass (When RF switch option is installed)	Allows the user to force the receiver to accept a carrier only at a designated feed port at all times
Installation Test	Allows user to implement special test modes useful at initial unit installation
Unit Status/History	Allows user to access unit status and diagnostics. *Typical* items located under this menu include: • Current unit state • Signal Quality • Last commanded and last successful unit settings • Program Analysis • Local audio/video decompression history • Network control status/history • Current LAN settings • Encryption settings • Unit internal temperature • Option module presence/status • Unit information screen (including software version) • Control to clear diagnostics

Table 3.1:   Summary of Top-Level LCD Screens and Their Functions

Screen Name	Functions/Applications
Unit Setup	Allows user to control unit. *Typical* controls located under this menu include: • Set permanent unit settings (tuning, program, audio selection) • Add/edit/move/delete Presets • NTSC Pedestal • Buffer control (PCR offset) • Audio attenuation • Audio front-panel monitor select • Muting • VBI line re-insertion enable • Recovery mode timeouts • Serial port setup • LNB LO frequency set • LNB DC power set • User cue relays • Signal quality indicator thresholds • Minimum alarm/warning indication times • LAN settings • NVRAM operations • Alarm (history) latching enable • Program Mapping Ghost PID pass list • Current unit software selection • Unit label edit • Unit reset

Home and Default Screens

The home screen appears on the LCD by default at boot up. During operation, the user may return to the home screen at any time, from any location in the menu hierarchy, by pressing the Escape (**ESC**) button repeatedly (or pressing and holding it). Regardless of the current location within the LCD menu hierarchy, if no front-panel keypress is made for more than 5 minutes, the LCD reverts to the default screen. Usually, this is the home screen. However, under some conditions (two are described below), another screen becomes the default. If more than one of these conditions exist simultaneously, priority is given in the order listed.

> **NOTE: Regardless of which screen is the current default, the user may still access all available screens using the left- and right-arrow, ENT and ESC buttons.**

Download Screen as Default

If the **U4600** is in an **ACCEPT PACKETS** Download state, then the **Download** screen becomes default.

Audio FP Monitor Selection Screen as Default

For two minutes, or until **ESC** is pressed, the **Level 2 Audio FP Monitor Selection** screen is the default if the unit features a front-panel audio monitor jack and the user plugs in a ¼" stereo phone plug.

> **NOTE: This is NOT usually a first-level screen, unlike other default examples.**

On the **Home** screen, the ➤ (right-pointing arrow) field will quickly flash (a half-second ON and a half-second OFF) to signal the user that the right arrow button is active for user control. Pressing either the left or right arrow buttons will cause the **U4600** to display the other top-level screens in succession. If there are current alarm and warning indications, the text "**See Alarms**" or "**See Warnings**" will appear before the arrow and pressing the right arrow will display the applicable alarm or warning message(s).

Interpreting Front Panel LEDs

Table 3.2: Front-Panel LED Indicator Descriptions provides the meaning of the color and state of each LED in **Figure 3.5** below.
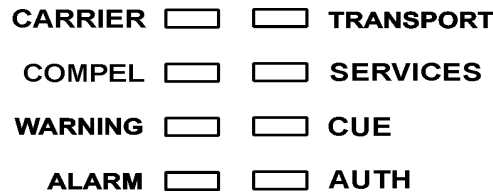
Figure 3.5: LED Indicators.

CARRIER ▭ ▭ TRANSPORT

COMPEL ▭ ▭ SERVICES

WARNING ▭ ▭ CUE

ALARM ▭ ▭ AUTH

Table 3.2: Front-Panel LED Indicator Descriptions

Indicator Label	Color and State＊	Meaning
CARRIER	GREEN constant	Unit has demod and FEC lock on the RF carrier
	Off	Unit does not have demod and FEC lock on the RF carrier
TRANSPORT	GREEN constant	Unit recognizes a valid transport stream
	Off	Unit does not recognize a valid transport stream
COMPEL[â]	GREEN constant	COMPEL control stream received within last two minutes (including keep-alives) while locked continuously on the current transport stream for >2 minutes
	GREEN flash	Unit has had a verified transport stream for >2 minutes and COMPEL is required but no valid COMPEL
	GREEN flutter	COMPEL has been addressed to unit within last 5 seconds (excluding keep-alives)
	Off Otherwise.	Note that this LED must be OFF when there is no valid Transport stream OR COMPEL
SERVICES	GREEN constant	Unit is processing services for delivery
	Off	Unit is not processing services
WARNING	YELLOW constant	One or more warning indications exist, usually the failure of a non-essential item, or to warn of an impending failure of an essential item
	Off	No warning conditions

Table 3.2: Front-Panel LED Indicator Descriptions

Indicator Label	Color and State*	Meaning
CUE	GREEN constant	A user cue relay is closed (energized).
	GREEN flutter	During a user relay "pulse" activation on any relay.
	Off	All user cue relays are open (de-energized).
ALARM	RED constant	One or more current alarm indications.
	RED blink	An alarm event has occurred in the past and has not been acknowledged and cleared by the user. Note that this state may exist together with a current alarm (RED constant). In that case, the blink state is defined as quickly cycling OFF-ON-OFF (~100ms each) approximately every 2 seconds.
	Off	No alarm condition currently exists.
AUTH	GREEN constant	Unit has transport MPEG sync and the stream is not scrambled (in the clear). Streams that are "clear" are always presumed to be "authorized". OR: Unit is authorized for current scrambled transport stream (or selected program) and has transport MPEG sync. When using Wegener CA ('97 Version), being "authorized" means being addressed with current and valid ciphered keystream messages. In a PIN system, if the transport stream is scrambled, and the unit has been programmed with any key other than the null '00000', then it presumes that it is "authorized".
	GREEN flutter	Unit has successfully deciphered a valid descrambling seed in the last five seconds. Normal behavior in functioning CA system.
	Off	Unit has transport sync, the transport stream is scrambled, and the unit is NOT authorized. Also OFF if no transport sync.* 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.

* 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.

Rear-Panel LEDs The **U4600** also has two LED (light-emitting diode) indicators on the rear panel. They provide the following indications:

LAN Green LED: ON if active LAN connection detected. OFF otherwise.

ACT Yellow LED: Flashing ON if ethernet packets are output or addressed packets are input. OFF otherwise.

Front Panel Audio Monitor To monitor audio output from the front panel, insert a 1/4-inch stereo phone plug into the audio monitor port. The U4600 will detect the phone plug and immediately display the Audio FP (front-panel) Monitor Selection screen. This second-level menu screen allows the user to select and monitor the desired audio stream. After two minutes without a keypress from the front panel, the U4600 will revert to the default LCD screen.

3.3   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[a].**

NOTE: **Generally, any command that can control a unit setting may be entered *without parameters* to show the current value of that setting.**

Table 3.3: Command Directory for U4600 Terminal Commands

ABORT
Insert is terminated. See **TEMP** command.

ABORTREC *x*
x: **C** - make the unit's permanent setting equal to the last commanded setting   **S** - make the unit's permanent setting equal to the last successful setting
Command either 1) aborts an ongoing automated recovery; 2) aborts the successful results of an automated recovery; or 3) accepts the successful results of an automated recovery. With either value for *x*, this command is interpreted as a direct local user command to establish/confirm the unit's permanent settings.

Table 3.3: Command Directory for U4600 Terminal Commands

ADDE *location COMPEL-req [tags-req] [aud1] [aud1_rt] [aud2] [aud2_rt] [margin]*	
location:	Value from **1** up to *max* (highest entry #) indicating location in Preset table.
COMPEL-req:	Values are **REQ**, **NR**, or **GL**. Forces COMPEL® to be temporarily required, not required, or left as normal global unit setting (respectively) when attempting this Preset during Recovery.
tags-req:	Values are **REQ**, **NR**, or **GL**. Forces Carrier ID Tags to be temporarily required, not required, or left as normal global unit setting (respectively) when attempting this Preset during Recovery.
aud1:	Language descriptor (or wildcard '*****') for audio stream to be assigned to Audio port 1.
aud1_rt:	**S** - Stereo (left and right components routed as connected at original MPEG encoder) **1** - Original left component to both L and R outputs **2** - Original right component to both L and R outputs **M** - Sum of left and right components to both L and R outputs **R** - Reverse of "Stereo" above (if allowed by hardware)
aud2:	Language descriptor (or wildcard '*') for audio stream to be assigned to Audio port 2.
aud1_rt:	Same as *aud1_rt* above
margin:	Margin offset in dB. Ranges between **0** and **N dB**. (See **MARGIN** command for **N**.)
This command augments the **ADDS** command to populate the extended Preset Entry. Note that if this Preset is used to acquire services (through Recovery or user command), these temporary COMPEL and Tags-required parameters, if used, will be adopted as the permanent global unit parameters.	
ADDS *location [format] [feed #] [carrier freq] [data rate] [FEC] [Tag Site] program# [label]*	
location:	Value from **1** up to *max* (highest entry #) indicating location in settings table.
For *format*, *feed #*, *carrier freq*, *data rate*, *FEC*, *tag site*, *program #*, and *label* see **PERM** command.	
This command adds entries to the **U5000**-style preset table at the entry number given. If entry at location was already in use, it will be overwritten.	
APPSTAT	
Forces IRD to report the status of the two application storage spaces, showing current and backup application software (if any). A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).	
APPSWITCH	
Unloads the currently executing application software and, instead, loads and runs the backup software.	
AUDATTEN *port# atten*	
port#:	Either **1** or **2** for audio ports 1 or 2.
atten:	Must be a numeric value for attenuation in dB. Legal values are given in individual IRD specifications.
This command sets audio attenuation, where **0** gives **0dB** attenuation (maximum level). A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).	

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Table 3.3: Command Directory for U4600 Terminal Commands

AUDIOMODES
Lists all the supported audio decompression or pass-through modes (e.g., MPEG1 Layer 2, Dolby AC-3, MP3, SMPTE302, etc.)

AUDMON *port#*
***port#*:**   Either **1** or **2** for audio ports 1 or 2.
Connects a sample of audio port *port#* to the single audio monitor jack (where available). A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

AUXPID *[PID]*
PID*:**   Selects the PID (in hex) for the transport packets carrying the desired data stream. Must be **20** to **1FFE** inclusive. If ***PID is omitted, the current value is displayed.
Sets the PID used for Aux Data extraction.

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

CLRIND
Clears both current "Acknowledged" Alarm and Warning indications and (past) Latched Alarm indications. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

DELS *entry*
entry*:**   Value from **1** up to ***max (given in section 2.1) indicating entry number in settings table.
Deletes an entry in the Preset Table.

DPAT
Command reports current Program Allocation Table (PAT) from incoming transport stream.

DPSI
Command reports complete PSI information tracing all programs and their components to MPEG PIDs. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

DTMFTST *[level] [tone]*
***level*:**   Integer between **0** and **100** inclusive.
***tone*:**   Tone code (**0**-**15** signifying digits 1-9,0,*,#,A-C).
Volatile test command for DTMF output, if supplied. Tones will be output at the percentage of full-scale voltage indicated by level. If tone is supplied, then that tone is output continuously. If tone is omitted, then the IRD cycles endlessly through all tones, 1 second per tone. Disable with TESTOFF command. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

Table 3.3: Command Directory for U4600 Terminal Commands

DTMFVOL *percent*
percent: Integer between **0** and **100** inclusive.
Command to set DTMF output tone levels. Immediately after entry of the command, the IRD will play out all 16 tones (at a rate where they are individually identifiable) at the commanded level. If *percent* is '0', output is essentially OFF. If *percent* is '100', level is maximum spec level. Entering command without parameters still plays out the tone sequence and then reports current level setting. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

EMAIL *x*
x: Either **E** for Enabled, or **D** for Disabled.
Command to enable COMPEL® printed email. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

ERRORS *type threshold*
type: Either **E** for Error'd Seconds or **C** for Continuity-count errors.
threshold: Integer between **1** and **255**.
Command to set either Error'd-seconds-rate or Continuity-count Alarm threshold. Unit will show an alarm if, over any previous 60 second interval, the number of type events which are detected exceeds threshold. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

EXIT
Command ends telnet sessions. Same as **QUIT** command.

FORCERF *port*
port: Either **OFF** or the numbers **1**, **2**, **3**, or **4**.
Command to either disable or enable effective RF switch bypassing. If *port* is a number, then all subsequent carrier reception is sought at that RF feed port, regardless of the current Unit Setting. If *port* is **OFF**, then normal RF switch function is restored. Entering the command without parameters gives current status, either **Normal RF Switch**, or **Forced RF Feed Port n** where **n** is either **1**, **2**, **3**, or **4**. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

GHOSTLIST *action PID*
action: **A** for Add or **D** for Delete.
PID: Hex number between **1** and **1FFE** (except **11**, reserved for **SDT**).
Command to add or delete entries in the list of ghost PIDs to pass to the ASI transport output (while Program Mapping is enabled). Entering command without the *action* or *pid* parameter dumps the current list.

Table 3.3: Command Directory for U4600 Terminal Commands

H [*command*]
command: Any of the terminal command names (PC, R, PORT, etc.).
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).

INDPERS *indication time*
indication: **A** or Alarm or **W** for Warning.
time: Time in seconds.
Command to set the minimum indication-time persistence for either Alarms or Warnings, per the value of indication, for the time period given by time. Entering command without parameters shows the current settings. A Local Control Command (available from the terminal regardless of "Local Control Enable/ Disable" commands from the network).

IPCONFIG
Command requests report of all current IP parameters (IP address, Gateway address, subnet mask) and assignment mode (static or DHCP). A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

LAN GATEWAY *addr*
addr: IP address formatted as **n1:n2:n3:n4** where **n1**, **n2**, **n3**, and **n4** are integers between **0** and **255**.
Command sets the IRD's static internet Gateway IP address. No protection is offered against entry of non-standard addresses (e.g. 0:0:0:0). Omitting the *addr* parameter shows the current static Gateway IP. This will not be the current Gateway IP address if dynamically assigned. Use the **IPCONFIG** command for that. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

LAN IP *addr*
addr: IP address formatted as **n1:n2:n3:n4** where **n1**, **n2**, **n3**, and **n4** are integers between **0** and **255**.
Command sets the IRD's static IP address. No protection is offered against entry of non-standard addresses (e.g., 0:0:0:0). Omitting the *addr* parameter shows the current static IP. This will not be the current IP address if dynamically assigned. Usethe **IPCONFIG** command for that. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

Table 3.3: Command Directory for U4600 Terminal Commands

LAN MODE *mode*	
mode:	**DHCP**, **WEG**, or **STATIC**.
Command sets the IP configuration to either dynamic DHCP, "Wegener" mode, or static IP addresses. If static, see **LAN IP**, **LAN GATEWAY**, and **LAN SUBNET** commands. Omitting the *mode* parameter shows the current mode. This is a Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).	
Assigning "Wegener" mode IP address forces the assignment of a static IP address for testing. This address is of the form: 172.16.xy.yy. The x is the one- or two-decimal-digit Product ID (also called the COMPEL download ID). 'yyy' are the last (least significant) digits of the unit serial number (most significant to left). The presumed subnet mask is 255.255.0.0 but the gateway is not defined. As an example, if a **Unity 4600** with product ID=9 and SN=260050 is set to "Wegener" IP address mode, it's new static IP address becomes 172.16.90.50.	
To fix possible address contention, the IRD, when the application initializes, attempts to detect an IP address conflict (using ARP). If a conflict is detected, the unit adds one hundred (decimal) to the last field of the attempted IP address and tries again. Using the above example, if 172.16.90.50 has already been assigned on that LAN, then the IRD re-attempts with an IP address equal to 172.16.90.150.	

LAN SUBNET *addr*	
addr:	IP address formatted as **n1:n2:n3:n4** where **n1**, **n2**, **n3**, and **n4** are integers between **0** and **255**. Note that not all values can be legal.
Command sets the IRD's static subnet mask address. Command entries that do not assert legal IP address masks will be rejected. Omitting the *addr* parameter shows the current static subnet mask. This will not be the current subnet mask if dynamically assigned. Use IPCONFIG command for that. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).	

LATCHALARMS *x*	
x:	Either **E** for Enable, or **D** for Disable.
Command enables or disables the latching of unit alarms.	

LNBPWR *output*	
output:	Either **ON** or **OFF**.
Non-volatile command enables or disables LNB DC power independently of any other settings. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).	

LNBTST *voltage_range tone*	
voltage_range:	Either **H** or **L** (for High and Low).
tone:	Either **ON** or **OFF**.
Volatile test command to force use of the ASTRA Universal LNB functions. Disable with **TESTOFF** command. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).	

Table 3.3: Command Directory for U4600 Terminal Commands

LOADNV *source*	
source:	**B** for Backup (by user), **C** for Original Customer-configuration, or **P** for Production-default settings. Key security parameters (e.g., serial number) are not affected by the **C** or **P** loads.
Command reloads NVRAM memory from Flash memory defaults. **Note:** The unit must reset after execution of this command.	
MARGIN *margin_offset*	
margin_offset:	Integer values between **0** and **N** in the form of **x.x**, representing dB (to tenths of a dB). **N** is defined by individual IRD specifications for every modulation/FEC combination.
Command sets the Margin Warning point. This provides warning to local users that their Eb/No's are approaching the error-threshold where system performance will collapse. (Supersedes **SNR** command.) A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).	
MOVEP *source destination*	
source:	Preset Table entry number which will source Unit settings.
destination:	Preset Table entry number to which the Unit settings will be moved.
Command moves the Unit settings at the *source* entry to the *destination* entry. The setting data at the original *source* entry is deleted and that entry position is now considered unused. The setting data at the original *destination* entry is then moved to the next lower unused Preset position. (One will always be available because the entry that held the original *source* settings was made "unused".)	
MUTE *[source][source][source] [...]*	

source:	Source can be any of the following:
	    ASI - to indicate the DVB-ASI transport output.
	    V - to indicate Video.
	    A[specifier] - to indicate Audio.
	    An **A** without the specifier indicates all audio outputs.
	    If present, The specifier consists of one or two characters. The first character specifies the audio port number and the second character specifies either the right or left channel, as in **A1L** (audio 1, left channel) or **A2R** (audio 2, right channel).
	    If the second character is omitted, this indicates both stereo channels are included.

Example:	**MUTE V A1L A4 A3R** mutes the video, audio Port 1 left channel, audio port 4 (both channels), and audio port 3 right channel
Note:	If no *source* is specified then video and all audios are selected.
Mutes the specified outputs. **Note:** The **MUTE** command is only allowed when local control is enabled by the network..	
OH	
On hook. Disables modem access. Modem access is only re-enabled by successful modem password entry. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).	

Table 3.3: Command Directory for U4600 Terminal Commands

PARTPID *pid*
pid: Hex value between **20** and **1FFE** to set a value, and **0** to disable.
Command sets the borderline (or "partition") PID at, and above which, the IRD may expect compatible scrambling against which it may apply the proper descrambler. PIDs below this point may be scrambled with an alien, 3rd party system. See individual IRD specs for more detail on unit behavior. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

PC *device baud parity*
device: One of **MODEM**, **TERMINAL**, **AUXDATA**, **CA**, or **COMPEL**®.
baud: **1200**, **2400**, **4800**, **9600**, **19200**, or **38400**.
parity: **N**, **E**, or **O**.
Configures communication parameters for any serial device. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

PERM *[format] [pol/feed#] [carrier freq] [data rate] [FEC] [Tag Site] [program#] [label]*
format: If an **RF** input, one of the legal modulation formats: **QPSK** for **DVB-QPSK**; **8PSK** for **DVB-8PSK**;**TQPSK** for **Turbo-QPSK**); **T8PSK** for **Turbo-8PSK**;**T16QAM** for **Turbo-16-QAM**; or **16QAM** for **DVB 16QAM**. May be omitted if **DVB-QPSK**. For an **ASI Transport** input, specify **ASI**. If this parameter is set to **OK**, then the current setting, if a Transient setting, becomes the new Permanent setting.
pol/feed#:   If an **RF** input, one of four possible RF feeds, **1**, **2**, **3** or **4**. If an **ASI** input, one of two possible ASI feeds, **1** or **2**. If no RF option, this field may be used for **ASTRA** polarization, **H** or **V**. This field may be omitted if no RF switch option is installed.
carrier freq: If an RF input, the downlink carrier frequency in MHz (precision to two decimal places OK). Field is omitted for an ASI input only.
data rate: If an RF input, the Transport data rate in Mbps (precision to two decimal places OK). Field is omitted for an ASI input only.
FEC: If an RF input, the inner FEC ratio. Field is omitted for an ASI input only. The legal options are: for **QPSK**- **1/2**, **2/3**, **3/4**, **5/6**, and **7/8**; for **8PSK**- **2/3**, **5/6**, **8/9**; and for **16 QAM**- **3/4**, and **7/8**. Other legal values may be defined for new modulation formats.
tag site: If an RF input, the tag site for Carrier ID tag. Field is omitted for an ASI input only.
program#:   Program number, '*****' for wildcard, or null (for no program assigned).
label: Channel Label (optional, may be omitted).
Command to establish new Permanent Unit Setting with the parameter values given. If the format is set to **OK**, no other parameters are accepted or required.

Table 3.3: Command Directory for U4600 Terminal Commands

PERMCH *value*	
value:	Either the value of a settings table entry number OR the Channel Label of an entry, priority given to Label if any ambiguity. If an entry number, legal values range from **1** up to **N** (where **N** is number of Preset support this product).
	Unit Settings set to equal those in the Preset Table entry specified by *value*.

PING *[-t] [-n count] [-l size] [-w timeout] addr*	
-t:	If supplied as shown, **PING** specified host until interrupted by console-entry of 'control-C'.
-n count:	Integer substituted for *count* is number of echo requests to send.
-l size:	Send buffer specified as *size* bytes.
-w timeout:	Wait for each reply the number of milliseconds specified by *timeout*.
addr:	IP address formatted as **n1:n2:n3:n4** where n**n1**, **n2**, **n3**, and **n4** are integers between **0** and **255**.
	Traditional Unix **PING** command with verbatim Unix syntax. Response from IRD will indicate success or failure. User will be warned if **PING** cannot be attempted because no local IP address has been set. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

PORT *device*	
device:	Device assigned to the Aux/Term port, either **TERMINAL**, **MODEM** or **AUXDATA**.
	Assigns the given device to the Aux/Term port. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

PW *password*	
password:	One to six alphanumeric characters.
	Changes the modem password to the designated password. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

QUIT	
	Command ends telnet sessions. Same as **EXIT** command.

R *type* **[***page***]** (Continued on next page.)	
type:	Indicates the type of report as follows: **C** - Carrier Status **P** - Parameters **G** - Group Status **GL** - Genlock system (if installed and applicable) **M** - MPEG PSI Status **NC** - Network Controller Status **R** - Relay Status **RTLOG** - non-volatile log of last 10 "tuning" type commands **S** - Settings Status **ST** - Settings Table **SP** - Serial Port Configuration See also parameters for **RP** and **RD** commands

Table 3.3: Command Directory for U4600 Terminal Commands

R *type* [*page*] (Continued)

[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).

RD *group*

***group*:**	Indicates group of status/diagnostic information to report, as follows:
	AUD - Audio service diagnos.
	AW - Alarm/Warning status
	CA - Conditional Access diagnostics
	DPI - Conditional Digital Program Insertion (DPI)
	GL - Genlock system (if installed and applicable)
	LAN - IP/Ethernet diagnostics
	NTW - COMPEL[â] network control diagnostics
	PRGMP - Program mapping at ASI output
	MSC - Miscellaneous diagnostics
	REC - Automated Recovery status
	RF - Carrier Acquisition/Tracking diagnostics
	RPA - Return Path diagnostics
	SW - Software download/self-test status
	TS - Transport Stream diagnostics
	VID - Video service diagnostics

Expanded report on unit volatile diagnostic and status information. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

RE *state [number]*

***state*:**	**ON**, **OFF**, or **W**
***number*:**	**1** or **2**, or **E1** thru **En** (for **n**-relay expansion option module, if installed) indicating the affected user relay.

This non-volatile command sets the user (or expansion) relay addressed by number to the **ON/OFF** or "Follow-Warn" (if '**W**') state specified.   **Note:** The **W** value for the state parameter is only accepted for the native relays (**1** or **2**).   If state is specified, but number is omitted, then the command is applied to ALL installed relays, with one exception. The exception is that the command to ALL relays will not be accepted by a native user cue relay already set in the logical "Follow-warn" state. (It MUST be individually addressed to return it to the **ON** or **OFF** non-volatile state. Entering this command without parameters shows the state of installed relays.

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RP *group*

group:	Indicates group of parameters to report, as follows:	
	AUD	- Audio service diagnos.
	AW	- Alarm/Warning status
	CA	- Conditional Access diagnostics
	DPI	- Conditional Digital Program Insertion (DPI)
	GL	- Genlock system (if installed and applicable)
	LAN	- IP/Ethernet diagnostics
	NTW	- COMPEL[a] network control diagnostics
	PRGMP	- Program mapping at ASI output
	MSC	- Miscellaneous diagnostics
	REC	- Automated Recovery status
	RF	- Carrier Acquisition/Tracking diagnostics
	RPA	- Return Path diagnostics
	SW	- Software download/self-test status
	TS	- Transport Stream diagnostics
	VID	- Video service diagnostics

Expanded report on unit NV operating parameters. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

RESET

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

RPATH

Command to display all return path non-volatile settings. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network). A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

RPATH FROM *domain*

domain:	Legal string of keyboard characters in proper domain-name format (e.g., string1.string2.string3…)

Domain name portion of "from" email address in Return Path reporting. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

RPATH RELAY *addr*

addr:	IP address formatted as **n1:n2:n3:n4** where n**n1**, **n2**, **n3**, and **n4** are integers between **0** and **255**.

IP address of local Mail Relay server, if any. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

RPATH SEND

Command ordering IRD to immediately send a Return Path report. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

Table 3.3: Command Directory for U4600 Terminal Commands

RPATH TO *username@addr*
username: Legal string of keyboard characters without white space.
addr: IP address formatted as **n1:n2:n3:n4** where n**n1**, **n2**, **n3**, and **n4** are integers between **0** and **255**.
Email address destination for Return Path reporting. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

SAVENV
Saves all the current global and Unit Setting NV parameters (in NVRAM) to the Flash memory space designated as **BACKUP**. **Note:** Some unit-set parameters, which would not make sense to "back up", may not be saved. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

SAVEP *[entry#] [channel_label]*
entry#: A Preset Table Entry number or the text, **PERM**. If a preset entry, must be equal to a number between **1** and **N** inclusive, where **N** is the highest entry number.
channel_label: Channel Label associated with a unit setting or a Preset Table entry. If attempting to supply the *channel_label* parameter alone, a value of **PERM** is not legal. Parameter must be a string of continuous non-white-space keyboard characters. Unit will truncate user input to 10 characters.
Command saves current Unit Settings to a Preset Table entry, or if *entry#* is **PERM**, a current Transient Setting is loaded into the unit's Permanent unit setting. Those metadata fields in the extended Preset Entry that have no analog in the current Unit setting will be populated with spec defaults. User must use **ADDE** command to set those fields. If *entry#* is supplied alone, current unit settings are written to that entry, overwriting existing data if it had been in use. If *channel_label* is supplied alone, and if that same Label already appears at a used Preset Table entry, then the current unit settings overwrite that old Preset data. If *channel_label* is supplied alone and no used Preset has that Label, then the current settings are written to the lowest empty Preset Table entry and then given that same Label. If both *entry#* and *channel_label* parameters are supplied, then the current unit settings are written at that Entry (overwriting existing data if any) and that entry is supplied that same Label (equal to *channel_label*).

SERVICE *video_pid [pcr_pid] [audio1_pid] [audio2_pid]*
video_pid: Hex value between **20** and **1FFE**.
audio1_pid: Hex value between **20** and **1FFE**.
audio2_pid: Hex value between **20** and **1FFE**.
pcr_pid: Hex value between **20** and **1FFE**.
Command selects A/V services directly by PID number only. This changes Unit Setting #11 to "By PID" if not already set that way.

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Table 3.3: Command Directory for U4600 Terminal Commands

SET *parameter value*

SET TO *destination [time]*

SET FROM *source*

parameter:	One of *format*, *feed*, *freq* [for "carrier freq"], *rate* [for "data rate"], *FEC*, *tag* [for "tag site"], *prog* [for "program"], *margin* [for "Eb/No margin warning zone"], *aud1*, or *aud2* [for "descriptors assigned to audio ports 1 and 2"]. See **PERM** and **ADDE** commands for definitions and limits.
value:	Value of the parameter as in any settings command (**PERM**, **TEMP**, **ADDS**, etc.)
destination:	**PERM**, **TEMP**, number or *label* of a Preset table entry.
time:	Length of insert in either **HH:MM:SS** format (valid range is **0:00:00** to **18:00:00**, leading zeros OK to omit on hours) OR in number of seconds. (A one-hour **TEMP** could have a parameters: of **1:00:00** or **3600**.)
source:	**PERM**, **CURR**, number or *label* of a Preset table entry.
	SET sets the value of individual parameters in a 'scratch pad' settings group. **SET TO** will store the scratch pad settings to a search table entry or to the permanent or temporary settings (requires an insert time as a second parameter). **SET FROM** loads the scratch pad settings from a search table entry or from the current or permanent settings.

SETAUDIO *port route [program] [atten]*

port:	Value of **1** to **6** indicating an audio port
route:	**S** - Stereo (Left and Right components routed as connected at original MPEG encoder) **1** - Original Left component to both L and R outputs **2** - Original Right component to both L and R outputs **M** - Sum of Left and Right components to both L and R outputs **R** - Reverse of "Stereo" above (if allowed by hardware)
program:	Can be a three character name or an '*****'. If the 3-character name is specified, the unit will route the audio PES stream with the specified name to the port. If "*****' is specified, the unit will default to the first audio program in the PMT that is not routed to another port.
atten:	Must be a numeric value for attenuation in dB. Legal values are given in **Table 1.1** on page 3. This programs the net audio attenuation, where '0' gives 0dB attenuation (maximum level). If field omitted, attenuation remains unchanged on that audio port.
	The audio PES stream, with the language descriptor *program*, is decompressed in the *port* audio port, and then its components are routed to the Left and Right outputs according to *route*. That ports attenuation is changed to *atten*, if supplied.

SETLABEL *label*

label:	Unit label. Field entry is truncated at 10 characters.
	Sets Unit Label displayed on IRD home LCD screen (and Terminal Welcome Banners), if supported in this IRD.

Table 3.3: Command Directory for U4600 Terminal Commands

SETLNB *{Rf_feed} LO_freq*	
Rf_feed:	If the RF Switch expansion option is installed, this is one input to that switch (1 through 4). If no RF Switch option is installed, then it is an error to enter data here!
LO_freq:	Either a number or mnemonic. If a number, this value represents the **LNB LO** frequency in MHz. It can have up to two decimal places and its valid range is from **0** to **14000.00**. The legal mnemonics are **C** (for Standard C-band, 5150 MHz default), **KU** (for US Ku-band, 10750 MHz default), **EHKU** (for European Hi Ku-band, 10600 MHz default), or **ELKU** (for European Low Ku-band, 9750 MHz default).

(1) If the current LNB mode selected is **Universal:** This command is legal only when entered without parameters. In this case, the IRD returns the current calculated setting command sent to the LNB (either "9.75 GHz" or "10.60 GHz").

(2) If the current LNB mode selected is **LO:** This command sets the assumed LNB LO frequency to the value entered in MHz OR the MHz value represented by the mnemonic. If there is an optional RF switch installed, then the *rf_feed* field data must be entered. Entering the command without parameters returns the current setting.

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

SETPEDEST *xxx*	
xxx:	**E** for enable or D for disable.

Enables or disables the "pedestal" setup, the addition of +7.5 IRE to the luminance level of active NTSC video, if NTSC is in use. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

SETPIN *value*	
value:	Decimal representation of PIN key, between **0** and **16777215.**

Command sets the PIN scrambling key number.

SETTIMEOUT *source time*	
source:	**1** - Not used. (In legacy IRDs, this was Fade timeout.)
	2 - Services Recovery Timeout. (In legacy IRDs, this was Installation timeout.)
	3 - Network Recovery Timeout. (In legacy IRDs, this was No COMPEL® timeout.
	4 - Recovery Iteration Time. (In legacy IRDs, this was Header Seek timeout.)
	5 - Local Control Re-enable Timeout. (In legacy IRDs this was Local (Control) Recovery timeout.)
time:	Time-out value in seconds or **HHHH:MM:SS** format. Minimum value is **1**, and maximum value **35999999 (9999:59:59** hms) for all others.

Command sets Automated Recovery timeout specified by *source* to the value specified by *time*.

SETUID *[id]*	
id:	Unit ID number between **00** and **99** inclusive.

Command for assigning the unit ID number for gaining "talker" access on a shared serial bus. The factory default setting for id is '00', which also disables terminal daisy-chain capability. If the parameter is omitted, then this command returns the current unit ID setting. Command is only applicable to products that feature serial "daisy-chain".

Table 3.3: Command Directory for U4600 Terminal Commands

SP *program*
***program*:**   Either an integer between **1** and **65,535** (representing a number) or an alphanumeric string (representing a name), preference being on a number to resolve ambiguity.
Command changes selected *program* by Program Number (from PAT) or SDT descriptor. This command works similarly to a **PERM** command.
TEMP *[format] [feed #] [carrier freq] [data rate] [FEC] [Tag Site] program# time*
For ***format***, ***feed #***, ***carrier freq***, ***data rate***, ***FEC***, ***tag site***, and ***program #***, see **PERM** command.
***time*:**   Length of insert in either **HH:MM:SS** format (valid range is **0:00:00** to **18:00:00**, leading zeros OK to omit on hours) OR in number of seconds. (A one-hour **TEMP** could have a parameters: of **1:00:00** or **3600**.)
Command which performs a volatile temporary insert for an amount of time given by *time*. Unit sets its temporary Unit Settings to the values given. **Note:** No label may be applied using this terminal command.
TEMPCH *value time*
***value*:**   Either the value of a Preset table entry number OR the Channel Label of an entry, priority given to Label if any ambiguity. If an entry number, legal values range from **1** up to **N** (where **N** is number of Preset support this product).
***time*:**   Same as for **TEMP**.
Volatile command which sets volatile temporary Unit Settings to those retrieved from the Preset table according to *value* for time given by *time*. Similar to TEMP command.
TEMPSENS
Command displays internal unit temperature if available.
TEST *group value*
***group*:**   Mnemonic for a test group: Either **RF**, **AV**, **DTMF**, or **REL**.
***value*:**   Parametric value which has meaning depending on the test *group* selected.
Command to activate Installation Test Modes. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network). If *group* is **RF**, the legal *values* are **1**, **2**, **3**, **4**, and **OFF**. Entering numbers for value cause the IRD to report the RF level (not locked to carrier) at that RF Feed Port every few seconds. Entering **OFF** stops the measurement. If *group* is **AV**, the legal *values* are **ON** and **OFF**. If **ON**, a test pattern is activated on the video output and test tones activated on the audio output, the same as the generic **TESTMODE** command. If *group* is **DTMF**, the legal *values* are **ON** and **OFF.** If **ON**, the command behaves like the **DTMFVOL** command entered with no parameters If *group* is **REL**, the legal *values* are **ON** and **OFF**. If **ON**, both user cue relays are alternately energized and de-energized.
TESTOFF
Command stops all volatile test functions as if unit were reset. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).

Table 3.3: Command Directory for U4600 Terminal Commands

UNMUTE *[source][source][source][...]*
source: Same as the **MUTE** command.
Identical to **MUTE** except specified services are unmuted.
VER
Displays the boot-up Welcome banner and the versions of hardware and software components within the IRD. Should include the unit serial number, model number, and customer ID. A Local Control Command (available from the terminal regardless of "Local Control Enable/Disable" commands from the network).
VBI *enable line field*
enable: **E** for Enable or **D** for Disable.
line: Line # where VBI data is normally to be re-inserted. Values *below* **7** or *above* **22** are illegal.
field: Field # where VBI data is normally to be re-inserted. Values are **1** or **2** for upper and lower.
Command enables or disables VBI data re-insertion on the line and field indicated for those IRDs that support that function.

CHAPTER 4 MAINTENANCE AND TROUBLESHOOTING

4.1 Maintenance

Maintenance of the **Unity 4600** is limited to keeping the chassis clean and ensuring that all the cables remain firmly connected. Occasionally wipe the exterior with a soft, damp cloth to remove any accumulated dust and dirt, and check that the cables are securely attached.

AVIS: RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR		
⚡	**CAUTION** RISK OF ELECTRIC SHOCK DO NOT OPEN	⚠

The **Unity 4600** incorporates security labels over some of the screws. There are no user-serviceable components within the **U4600**. 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 a list 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 **U4600** front panel. See **Table 3.2: Front-Panel LED Indicator Descriptions** on page 29 for details about the LED indicators. Note that during typical operation, the green **CARRIER**, **TRANSPORT**, **COMPEL**, **SERVICES**, and **AUTH** LEDS should be **on**.

No Output, LCD, or LED Indications

If the unit provides no output and neither the LCD nor any LEDs are lit, there is either 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.

No Audio, Video, or ASI Output

<u>Alarm LED On and Carrier LED Off</u>

1.   If the first front-panel alarm message is "**No RF Signal**", then the **U4600** is unable to lock to an RF carrier at the selected RF port. Check the following items:

    a.   Either the outdoor antenna LNB is not operating or is not connected to the IRD at the selected RF port. To rule these out, verify that the LNB (and any

intermediate line amplifiers) has DC power and trace the connection from the LNB to the IRD or try replacing the LNB. If a spectrum analyzer is available, look for the carrier at the L-band intermediate frequency. (For domestic C-band satellites, this is 5150 minus the downlink frequency in MHz.)

b. The selected IRD RF port has failed. To rule out this possibility, try connecting the RF cable to another RF port and select that port (or use the RF Switch Bypass to force that other port).

c. The IRD receiver card has failed. To rule this out, try using another IRD.

2. If the first alarm message is "**No Carrier Lock"**, verify the **RF Feed Port**, **Carrier Frequency**, **Data Rate**, **FEC Ratio**, and **ID Tag** (if Tags are in use) settings. Also verify that the **LNB LO** frequency setting (in the IRD) is correct for the selected RF feed port.

3. If the alarm message is "**RF Signal Overload**", then reduce the carrier power entering the **U4600**. Either add in-line attenuation (a splitter will do) or remove line amplification in the RF circuit between the LNB and the IRD.

Alarm and Carrier LEDs Both On

The **U4600** may not be authorized for the network's Conditional Access. If the **AUTH** LED is Off and the alarm message, "**Unauthorized for CA**" appears, contact your network provider to gain authorization in its Conditional Access database.

Missing an Audio, Video, or ASI Output With Other Outputs Okay

Alarm or Warning LED On

Check the front-panel display for alarm or warning messages. **Table 4.1: Alarm and Warning Descriptions** on page 49 describes **U4600** alarm and warning messages. If the message definitions are too technical to help debug the problem, report the messages to your network provider.

Alarm and Warning LEDs Off

If no alarms or warnings are shown, suspect a bad connection or mis-programming of the **U4600**:

1. If audio or video are missing, check the front-panel monitor jacks. If the front monitor connections are OK, check the signal connections from the rear of the unit to the destination. If an audio is missing from the rear-panel outputs and cannot be detected at the front-panel monitors, check that a valid audio stream is selected for that port and that the network provider has supplied non-quiet programming on that audio.

2. If the ASI output is missing, check the signal connections from the rear of the unit to the destination. If okay, check with the network provider to verify what Program Mapping (Release 2 or later) may be in effect.

4.3 Alarms and Warnings

The alarm and warning system is intended to alert the local user of a present or impending loss of services. **Table 4.1** below lists many (but not all) of the possible alarm and warning messages that the **U4600** may display. For problems you cannot resolve on your own, please contact Wegener Customer Service (see Chapter 5), and be prepared to describe your signal setup, **U4600** configuration, and any displayed alarm and warning messages.

Alarms

An alarm is asserted when the unit is unable (or presumed to be unable) to perform a required function or deliver required services.

Warnings

A warning is asserted when an alarm condition is imminent or to indicate other conditions requiring user attention.

Table 4.1: Alarm and Warning Descriptions

LCD Alarm or Warning Message	Meaning / Possible Cause
App Self-Testing	New application software was recently promoted from the backup to primary executing position and is now performing its initial self-test. This is a Warning for normal behavior and is not a fault.
App SW d-load Fail	Download of application software to backup flash space has failed. Contact network TOC and advise.
App SW Switch Fail	Unable to switch to backup software from network command, usually because that software image is not available or corrupted.
ASI TS Muted	ASI Transport output has been muted per user or network command.
Aud N bad PES data (N=audio port number)	Requested audio PES stream for port N is invalid or cannot be decompressed or processed. There may be a problem in the hardware for that audio port or in the uplink Encoder.
Aud N Buff Overflow (N=audio port number)	Audio port N PES data buffer overflow. Audio PES data being delivered faster than can be decompressed. There may be a problem with the STC at uplink Mux or in the IRD.
Aud N Data Lost (N=audio port number)	Audio port N PES data not available (buffer underflow). here may be a problem in the hardware for that audio port or in the uplink encoder. Check that PTS values in the audio stream do not grossly lead PCR.
Aud N LD Not in PMT (N=audio port number)	No audio PID found in PMT with assigned language descriptor for hard-assigned port N. Check that the language descriptor requested by the user or network is actually assigned to an existing audio stream.
Aud N PID Not Found (N=audio port number)	Audio PID found in PMT with requested language descriptor but no PES data detected. Check uplink encoder.
Aud N Type Invalid (N=audio port number)	Audio PES stream type not supported.

Table 4.1: Alarm and Warning Descriptions

LCD Alarm or Warning Message	Meaning / Possible Cause
Auto-Recovery	Auto-recovery in progress. This may be caused by any of the following problems on a previously commanded or successfully acquired transport stream: 1. IRD unable to deliver services for time exceeding Services Recovery Time-out; 2. IRD required to maintain connection to COMPEL® and IRD has not detected COMPEL for time exceeding Network Recovery Timeout; or 3. IRD detects invalid incoming COMPEL header.
Bad Audio N PTS (N=audio port number)	Excessive jumps or jitter in Audio port N PTS values
Bad PMT	One or more Program Map Tables are corrupted. See "No PMT" indication.
Bad Sec Micro SN	Serial number read from secure processor does not match unit. There may be a an attempt at piracy, a defective NVRAM memory, or a defective secure processor.
Bad VBI Data FN LM (N=field number; M=line number)	VBI data for field N, line M is unrecognized or in an unsupported format. Contact TOC to confirm that the version of application code in your IRD is current.
Bad Video Data	Video PES stream appears to be invalid. Check if other IRDs see similar problem on the same program.
Bad Video PTS	Excessive jumps or jitter in video PTS values. There may be a defective uplink encoder or mux.
Content for ASI N/A	Program content requested to route to ASI output cannot be found in over-satellite transport mux. Contact network TOC and advise.
Content Routing Problem	ASI transport output bears no program content because a Content Routing Table has not been loaded from the network or is corrupt. Contact network TOC.
E_b/N_0 Margin Warning	E_b/N_0 value less than sum of Threshold + Margin—evaluated over 10 sec. intervals. Unless the margin setting is incorrect, this indicates a marginal downlink.
FP Email Fail	An FP Email message was received which was corrupt or invalid. User should acknowledge the warning to clear, and then notify the network TOC.
High Error Rate	High errored seconds rate, presumably useless signal—evaluated over 60 sec. intervals. Signal-to-noise ratio is insufficient or there is severe terrestrial or antenna cross-pol interference.
High RF Level	There is carrier lock, but the RF signal level is too high.
ID Tag Mismatch	Carrier ID frequency text mismatch. User or network has entered carrier frequency text or tag site ID incorrectly or unit is on the wrong carrier.
ID Tags Lost	Carrier ID tags disappeared. There may be a failure at the uplink inserter (UMX5010) or loss of COMPEL[a] PID. See "ID Tag Mismatch" indication.

Table 4.1: Alarm and Warning Descriptions

LCD Alarm or Warning Message	Meaning / Possible Cause
Invalid COMPEL Hdr	Invalid COMPEL header detected in incoming COMPEL messages. This will cause the unit to immediately attempt automatic recovery to a backup preset. The IRD is not set up for connection to this COMPEL system.
Invalid VBI Data Fmt	VBI data found in PID or video user data in unrecognized or unsupported format (protocol).
Invalid Video Format	Video format in requested program is not supported.
IP Address Conflict	LAN detected but cannot use because of IP address conflict.
KMS Stream Lost	KMS stream lost after initially detected in this transport stream. There could be an uplink problem. See also "No KMS stream" indication.
Lost COMPEL PID	Data traffic at designated packet ID (PID) for COMPEL has been lost for more than two minutes. See "No COMPEL" indication.
Lost VBI Data FN LM (N=field number; M=line number)	VBI data for field N, line M has disappeared. If any is expected, contact network TOC.
Low RF Level	There is carrier lock, but the RF signal level is too low.
New PAT with Changes	The version number on the Program Allocation table has changed and a new program lineup has been submitted. Changes have been made on uplink transport mux.
New PMT with Changes	The version number on one or more of the Program Map Tables has changed with a new PID lineup submitted. Changes have been made on uplink transport mux.
No ASI Stream	Corrupt or missing input ASI stream. Only applicable if ASI input is available and selected. Check connection and source.
No Audio for Port N (N=audio port number)	No "free" otherwise-unassigned audio can be allocated to wildcard-assigned port N. There may be fewer audio PES streams than installed audio ports. If so, explicitly assign a desired language descriptor to this audio port.
No Carrier Lock	Carrier lock cannot (or has not) been acquired and maintained. Check that requested settings are correct. Check RF level indication and RF connection. For new installations, check antenna pointing and polarization.
No COMPEL	Data traffic is detected at designated packet ID (PID) for COMPEL[a]. However, no valid COMPEL messages have been detected during the last two minutes. There may be no connection to the network. If required to maintain a connection, the unit will eventually attempt an automatic recovery to a backup preset. To debug, check that the COMPEL system at the uplink is functional and that the data connection to inserter (such as UMX5010) is good. Also check for fault indications or functional problems at UMX5010.
No COMPEL PID	No traffic detected at designated packet ID (PID) for COMPEL, so no connection is made to the network. The COMPEL PID setting in the unit may be incorrect. Also see "No COMPEL indication".

Table 4.1: Alarm and Warning Descriptions

LCD Alarm or Warning Message	Meaning / Possible Cause
No Def for Mapping	ASI transport output bears no program content because an Output Definition Table has not been loaded from the network. Contact network TOC.
No DHCP Server Found	IRD is required to get IP settings from DHCP server but none are detected on the LAN.
No Genlock Sync	IRD supports and has genlock option installed and enabled, but no video reference sync is detected.
No ID Tag Found	No carrier ID tags in COMPEL[a] stream. Set IRD not to expect ID tags or check uplink UMX5010.
No KMS Stream	No KMS stream detected since transport stream acquisition. Unit will not be authorized if not connected to the KMS stream. Check that KMS PID is set correctly in unit. If okay, check the uplink.
No LAN Detected	No Ethernet LAN connection. Check LEDs on rear and check other devices on the LAN.
No PAT	No Program Allocation Table detected in input carrier (or terrestrial interface). Check that legal ISO transport is available from uplink mux. Often, this indication may appear when the connection between the uplink transport mux and the DVB modulator is lost.
No PCR	No Program Clock Reference found, either in video or stand-alone PID. Check uplink mux or that program's encoder.
No PMT	No Program Map Table found for a program listed in PAT. This could be a fault in the uplink mux.
No RF Signal	No carrier lock with low RF signal power indication. There may be a disconnected RF signal. Check connection and check that LNB has DC power.
No SDT Entry	No Service Descriptor Table, or the table is corrupt or missing proper entries. Uplink mux may not support this DVB feature or may have fault.
No Valid Software	No valid application software available in either the primary or backup flash positions. Unit will need service.
No VBI Data FN LM (N=field number; M=line number)	VBI data not found in video user data or PID for Field N line M If any is expected, contact network TOC.
PAT Disappeared	Formerly valid Program Allocation Table ceases to be received or becomes corrupt. See "No PAT" indication.
PAT Version Changed	Version number in Program Allocation Table has changed but no change to program lineup.
PCR Disappeared	Formerly valid Program Clock Reference ceases to be received or becomes corrupt. See "No PCR" indication.
PCR Jitter	Excessive jitter in Program Clock Reference values. This may degrade timing of output video signals. Check uplink encoder for that program.

Table 4.1: Alarm and Warning Descriptions

LCD Alarm or Warning Message	Meaning / Possible Cause
PCR Value Jump	Unrecoverable transition in incoming Program Clock Reference values. This has forced re-initialization of services. Check uplink encoder for that program.
PMT Disappeared	Formerly valid Program Map Table ceases to be received or becomes corrupt. See "No PMT" indication.
PMT Version Changed	Version number on one or more of the Program Map Tables has changed but no change to PID lineup.
Prog Blackout on ASI	Some services available from satellite not routed to IRD ASI output per program mapping instructions from COMPEL[a]. This is not necessarily a fault.
Program in Backout	Selected program not available for local decompression because this program content was blocked to ASI transport output by network. Contact network TOC.
Program Not Found	Program selected for local decompression (to local audio/video outputs) not available-invalid Program number for this Transport.
Reverted to B-up App	User-requested application failed self-test and Unit reverted to Backup application. Notify your network TOC.
RF Signal Overload	No carrier lock with RF signal power above specification range. There may be too much line amplification in RF feed.
SDT Disappeared	Formerly valid Service Descriptor Table ceases to be received or becomes corrupt. See "No SDT entry" indication.
Sec Micro No Resp	Secure processor does not respond to local host or may be missing. SIM card may be mis-installed, loose, or defective.
Ser Pt N Fail (N=audio port number)	Unknown or miscellaneous hardware failure on serial port N.
Ser Pt N Input Fail (N=audio port number)	Input buffer overflow on serial port N. Send device at uplink may be set too fast compared to IRD serial port device, especially if sending data constantly with only one stop bit. Try changing to 1.5 stop bits.
Ser Pt N Output Fail (N=audio port number)	Output buffer overflow on serial port N. Send device at uplink may be set too fast compared to IRD serial port device, especially if sending data constantly with only one stop bit. Try changing to 1.5 stop bits.
Setting Out of Range	Current unit setting combination is illegal for installed receiver card. Unit will be unable to acquire a carrier and transport stream until corrected by the user.
Test Mode in Use	One of the installation test modes is being used. This may interfere with normal unit operation.
Unauthorized for CA	Unit unauthorized for Conditional Access in use. Contact network provider. Also see "No KMS stream" & "KMS stream lost" indications.
Unit Overheating	Unit overheating. Check that unit vents are not blocked and that internal fan is connected and operating.
Unread FP Email	Unread Front-Panel email message present. Warning should clear after user opens the screen containing the email.

Table 4.1: Alarm and Warning Descriptions

LCD Alarm or Warning Message	Meaning / Possible Cause
Using Backup Settings	Current permanent unit settings derived from successful Auto-Recovery. User should review settings and restore to primary if desired.
Video Buff Overflow	Video PES data buffer overflow. Video PES data is being delivered faster than can be decompressed. There may be a problem with the STC at uplink mux or in the IRD.
Video CMD Muted	Video output muted by command from network or local user.
Video Not Found	Video PES data cannot be found at PID declared by PMT. There may be an uplink mux or encoder failure.
Video PES Data Lost	Video PES data in selected program is unavailable. There may be an uplink encoder failure.

CHAPTER 5 CUSTOMER SERVICE

5.1 Warranty

The following warranty applies to all Wegener Communications products including the **Unity 4600**:

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 Unity 4600, or for questions about obtaining service for your Unity 4600, 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 MONITORING AND CONTROL DETAILS

A.1 Basic Navigation

Monitoring and control of the U4600 from the front panel is accomplished by first navigating to the appropriate screen for the desired function (see **Figure 3.2 U4600 Front-Panel Layout on page 25** and **LCD Screen Content on page 26** for screen structure and contents). Press **ENT** to move downward through menus and screen levels and **ESC** to return upward through the screen structure. Press the right- and left-arrow buttons to move between peer screens. The home screen may always be reached by pressing and holding the **ESC** button or by pressing it repeatedly.

A.2 Info Screens

Info screens are read-only and display information that cannot be edited. The home screen is this type of screen. Other screens of this type display status or navigation help information.

For info screens like the **Software Application Version** screen shown below, the text on the second row will contain the current information (the software version in this example). If no key presses are made, after a brief delay, the second row begins alternating between this content and the following navigation prompts:

```
◄ Other Screens? ►
Menu Up? Press <ESC>
Home? Hold In <ESC>
```

(to move to other screens at the same level),
(to move to the parent menu screen), and
(to return to the Home screen).

first row:
second row:

```
APPLICATION CURRENT:
V100
```

- information label
- content

after brief
delay

```
APPLICATION CURRENT:
◄ Other Screens? ►
```

```
APPLICATION CURRENT:
Menu Up? Press <ESC>
```

```
APPLICATION CURRENT:
Home? Hold In <ESC>
```

A.3 Menu Screens

Menu screens are also read-only and display the menu name for a group of screens. For example, the **Miscellaneous Setups** screen is a menu screen. The child screens "beneath" a menu screen (reached by pressing **ENT**) may be any of the screen types (i.e., other menus, information screens, etc.

For menu screens like the Miscellaneous Setups screen below, the text on the second row will cycle between the following prompts:

```
 Press <ENTER>          (to move to the child screens),
◄ Other Screens? ►      (to move to other screens at the same level),
 Menu Up? Press <ESC>   (to move to the parent menu screen), and
 Home? Press <ESC>      (to return to the Home screen).
```

```
first row:    MISC SETUPS              - information label
second row:          Press <ENTER>    - navigation prompt
```

after brief delay

```
MISC SETUPS              MISC SETUPS                MISC SETUPS
◄ Other Screens? ►       Menu Up?  Press <ESC>      Home? Hold In <ESC>
```
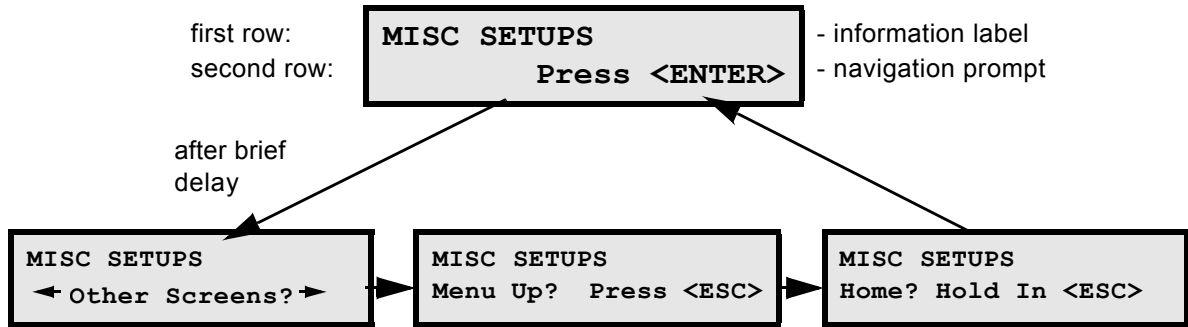
A.4 Parameter Screens

Parameter screens display a specific parameter that *can* be edited (if the correct authority has been established). Such screens contain an alphanumeric or list-select field. There are no carries or borrows when wrapping on a numeric field (i.e., to go from 0999 to 1000, all 4 digits must be edited).

For parameter screens like the Unit Label screen below, the second row contains the current value of the parameter. Upon pressing **ENT**, a blinking underscore appears under the first character to be edited (Only for editable alphanumeric fields. List-select fields will not display a cursor). Use the arrow buttons to scroll through characters or list selections. After making the desired change, press **ENT** again to commit the entry to the **U4600**. Press **ESC** if you wish to cancel the change. If no key presses are made, after a brief delay, the second row begins alternating between the following prompts:

```
 Change? Press<ENTER>    (to begin editing the parameter),
◄ Other Screens? ►       (to move to other screens at the same level),and
 Home? Hold In <ESC>     (to return to the Home screen).
```

```
first row:    UNIT LABEL:              - information label
second row:   Unity4600                - editable parameter
```

after brief delay

```
UNIT LABEL:              UNIT LABEL:                UNIT LABEL:
Change? Press<ENTER>     ◄ Other Screens? ►         Home? Hold In <ESC>
```

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