# WEGENER®

## Advanced Digital Technologies

**Instruction Manual**
**UNITY4422™**
**MPEG VIDEO**
**INTEGRATED**
**RECEIVER DECODER**

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*When ordering parts from Wegener Communications, Inc., be sure to include the equipment model number, equipment serial number, and a description of the part.*

*In all correspondence with Wegener Communications, Inc., regarding this publication, please refer to UTY4422-001G.*

*Note: Features of the product described herein are covered by U.S. Patent # 4,985,895.*

*First Edition:    April 1999*
*Revised:          August 2002*

## WEGENER®

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**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.**
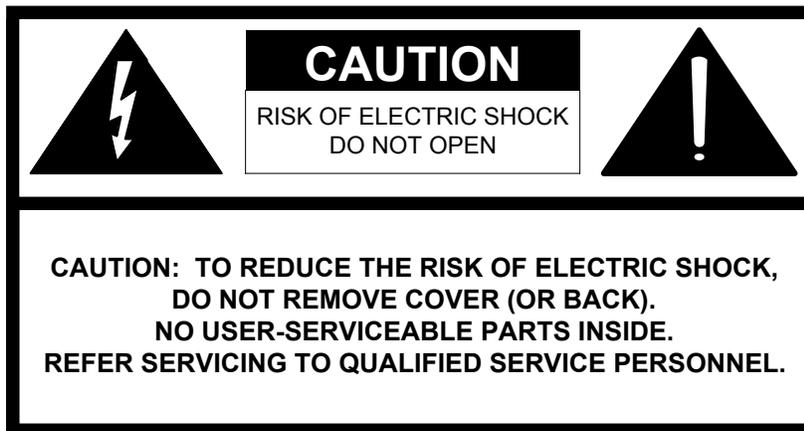
## CAUTION

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 ingression or egression of potential interfering sources to existing services.

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

## WARRANTY

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# SECTION 1

# GENERAL INFORMATION

## 1.1    GENERAL

The purpose of this manual is to describe the proper installation and operation of the Wegener Communications UNITY4422 MPEG Video Integrated Receiver Decoder.

## 1.2    INTRODUCTION

The UNITY 4422 IRD is an integrated receiver/decoder designed to receive SCPC or MCPC DVB-compliant digital video signals transmitted by satellite.  These include the new 4:2:0 and 4:2:2 chroma formats, as well as the traditional 4:3 and new 16:9 aspect ratios.  The input to the IRD is an L-band (950-2150 MHz) RF signal which is processed to produce NTSC or PAL video, audio, e-mail output, and electronic-relay cueing signals.  The IRD is fully network-controlled via the Wegener Communications, Inc. (WCI) COMPEL™ control system.

The optional decryption feature for the IRD allows for use of WCI conditional access. Authorization of each IRD is under network control.

In addition to network control, the IRD features a front-panel LCD interface for gathering local status information.  In addition, limited control of the IRD *(if allowed by the COMPEL™ network)* may be implemented via serial port, connecting either to a local terminal (or via phone modem) to a remote terminal.

The IRD has expansion ports for up to two add-in modules.  Contact the Wegener Sales Department about available options.

## 1.3    UNPACKING AND INSPECTION

Carefully unpack the unit and inspect it for obvious signs of physical damage which 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.

## 1.4    INSTALLATION INSTRUCTIONS

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

### 1.4.1    Elevated Operating Ambient

If equipment is installed in a closed or multi-unit rack assembly, the operating ambient of the rack may be greater than the room ambient.  Therefore, considerations should be given to the TMRA, or Temperature inside the Mounting Rack, and not just inside the roomThe statements on the second line tell which devices can be connected to Serial Port 2 when the device on the top line is connected to Serial Port 1.

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### 1.4.2    Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

### 1.4.3    Mechanical Loading

Mounting of equipment in a rack should be such that a hazardous condition is not achieved due to uneven loading.

### 1.4.4    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. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

### 1.4.5    Reliable Earthing

Reliable earthing of rack-mounted equipment should be maintained.  Particular attention should be given to supply connections other than direct connection to the Branch (use of power strips).

### 1.5    PHYSICAL ENVIRONMENT

See specific statements in Section 1.4.

Mount the UNITY4422 IRD in a standard EIA 19-inch equipment rack located in a clean, dry environment, and do not place unsupported equipment on the unit.  Make sure that total rack power consumption does not exceed the limits of the AC branch circuit, and that a reliable earth safety ground is maintained.  The unit will meet the full 10-40°C operating temperature specification only if adequate clearance around vent-holes is provided. The units may be arranged without empty space between them, as long as enough rack ventilation is provided to prevent severe heat buildup.  Please note the maximum per-unit power dissipation of 45 watts.

### 1.6    SECURITY LABELS

The UNITY4422 uses security labels over some of the screws. There are no user serviceable components within the unit, and tampering with the security labels or opening the units will void your warranty. If you have questions, contact Wegener's customer service department at the address, phone, or fax numbers listed in Section 1.8 of this manual.

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## * * * WARNING * * *

When connecting cables to "F" type connectors apply a force of no more than 12 inch lb. (Finger tight).  Avoid connecting adapters directly to "F" type connectors.  Use at minimum a 1 foot flexible extension cable between "F" type connectors and adapters.

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## 1.7   PHYSICAL SPECIFICATIONS

The operating temperature of the IRD is +10°C to +40°C in still air with *unblocked* side vents. (The unit is fan-cooled.)

**Table 1.  Physical Specifications**

| Parameter | Description |
|---|---|
| Size | 19"W x 1.75"H x 13.75"D |
| Weight | 10.5 Pounds |
| Operating Temperature | +10°C to +40°C |
| Power Requirements | 115VAC, 60Hz, 0.8A Typ., or 230VAC, 50Hz, 0.5A Typ. |

## 1.8   TECHNICAL SUPPORT

In the event the unit fails to perform as described, 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:**

1.  Obtain a Return Material Authorization (RMA) number by completing and faxing a copy of the RMA Form (See Appendix D, Page 67.) to (678) 624-0294.  You may e-mail the same information instead to:

> **service@wegener.com**

2.  Plainly write the RMA number on the <u>outside</u> of the product shipping container.

> *NOTE:  Writing the RMA number on the outside of the shipping container will help us to return your equipment to you sooner.  Thank you.*

3.  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.*

Please contact Customer Service at one of the numbers above if you have any questions regarding service procedures.

## 1.9     MANUALS

If you have any suggestions concerning this, or any Wegener Manual, please E-mail them to **manuals@wegener.com**.  If you would rather mail them, please do so to the address shown below.  Our preference is that you copy the page in question, mark it up, and fax or mail us the copy.  We do appreciate constructive criticism.  The Fax Number is 770-497-0411.

> Attn: Manuals
> Wegener Communications, Inc.
> 11350 Technology Circle
> Duluth, GA 30097

# SECTION 2

# SYSTEM CONFIGURATION

## 2.1 UNIT OVERVIEW

The UNITY 4422 IRD features several separate hardware components: The DC switching power supply, the main motherboard, an L-band DVB receiver, front-panel keypad controller card, a front-panel LCD assembly, and the optional L-band RF switch. The DC switching power supply provides all internal regulated DC power. When present, the L-band RF switch is installed in the Module 2 expansion slot, and provides network or (if allowed by the network) local user selection of up to four separate feeds. The selected RF feed output is connected to the DVB-compliant L-band receiver card. This card tunes and demodulates the input QPSK carrier, and then applies two layers of error correction decoding. Its output is the original multiplex MPEG transport stream which was input to the uplink IF modulator. This stream then feeds the main motherboard, which demultiplexes out the selected video and audio elemental streams. These are, in turn, de-compressed and converted back to the original analog source material for output. Meanwhile, the user may query the IRD using the front-panel keypad for input and the LCD to read the returned status information.

## 2.2 BLOCK DIAGRAM DISCUSSION

Refer to Figure 1 (Page 14) for the following discussion.

The DVB-compliant receiver card demodulates the incoming QPSK carrier. It implements one of five possible FEC rates. The resulting bit stream is parsed back into a byte stream and the MPEG sync is detected. This aligns a de-interleaver and then the following Reed-Solomon FEC decoder. The decoded byte stream is output to the main board.

The input to the main board is the multiplexed MPEG2 transport stream. If encryption is active, then the decryption function is executed. The resulting "clear" transport stream is then fed to the transport demultiplexer. This device selects the component elemental stream for selected video and audio programs, as well as the network control data streams. The selected video data is passed to an MPEG video decoder, which converts the signal to linear digital video. This is then converted to analog NTSC/PAL in a final encoder for output. Meanwhile, the selected MPEG compressed audio stream is also routed to a combined decompression and digital-to-analog converter IC. The output is one stereo pair of audio signals (L and R) on Channel 1 at the back panel. In addition to the first stereo pair, a digital signal processor monitors and demultiplexes out another selected digital audio stream, which is also decoded and output as the stereo pair on Channel 2 at the back panel.

## Figure 1.  UNITY4422 BLOCK DIAGRAM
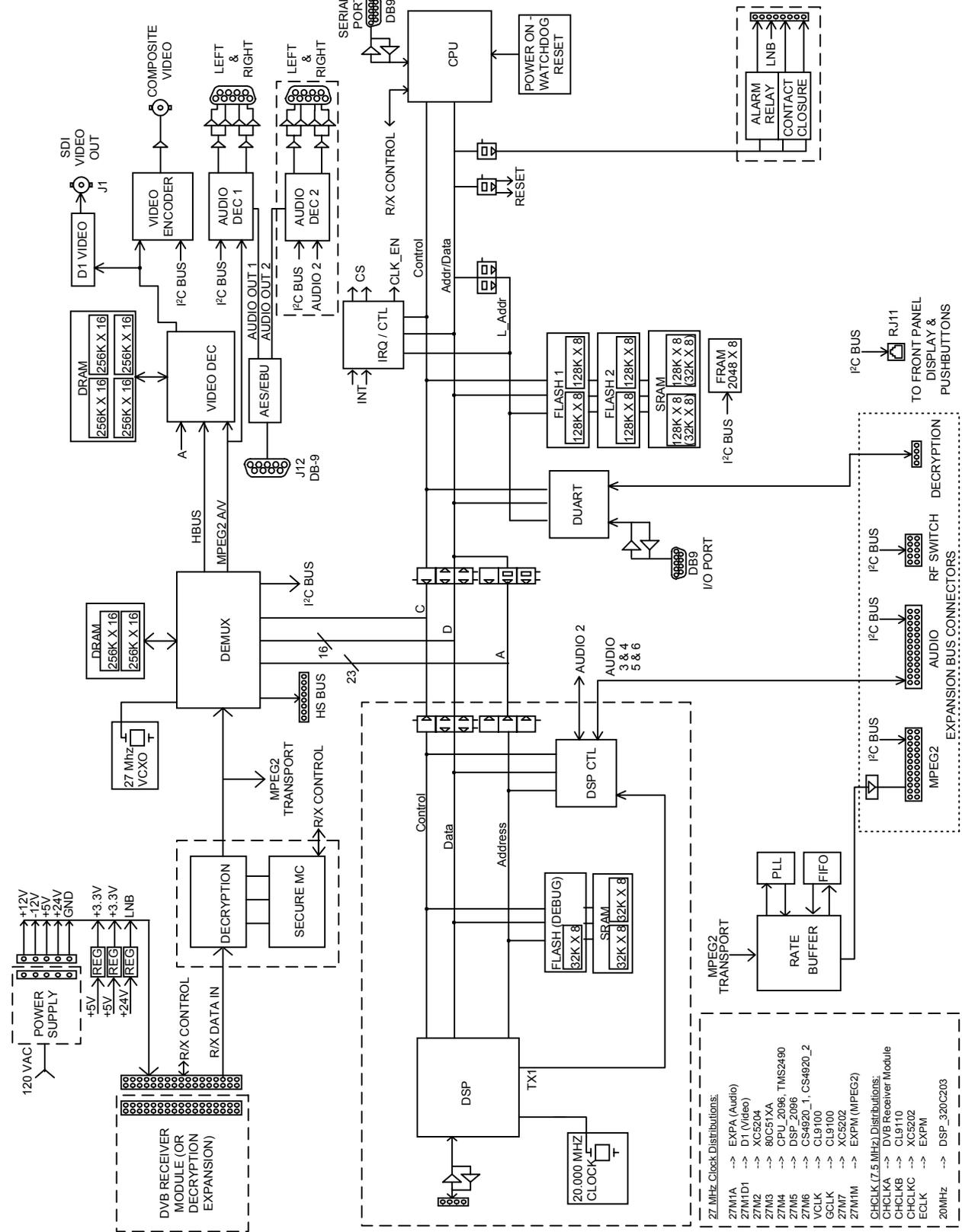
The control system on the main board is run by the main host processor. This processor interfaces with the COMPEL™ network as well as local users and then controls and monitors the unit's operations. To do its job, this processor accesses the control data streams recovered from the main transport demultiplexer. One of these may be a conditional access data stream (if used). The main processor sends this data to a separate secure microprocessor, which looks to see if its unit serial number is authorized to receive the broadcast signal and, if so, recovers the secret keys for decrypting the incoming encrypted transport stream. Meanwhile, the main host processor also communicates with several peripheral devices. It manages the data passed to/from the front-panel keypad controller (which lights status LED's, manages an LCD display, and reads back keypresses). It manages two serial ports that allow for use of a terminal, modem, printer, or auxiliary data device as well as the display and printing of local e-mail. Additionally, it controls the L-band receiver daughtercard and any installed options Modules (such as the RF switch).

For maximum flexibility, and to make value-added upgrades easily possible, the operating unit software is stored in flash memory and may be dynamically replaced via the local serial port or from the satellite network control channel.

## 2.3    SPECIFICATIONS

The receiver uses an integrated tuner and QPSK demodulator assembly.

### 2.3.1    L-Band Tuner

The tuner specifications are shown below.

**Table 2.  Tuner Specifications**

| Parameter | Specification |
|---|---|
| Input Frequency Range | 950 - 2150 MHz |
| Input Level Range | -20 dBm total signal power down to -135 dBm/Hz signal power spectral density |
| Maximum Aggregate Input Power | -5 dBm |
| Input Impedance | 75 ohms, unbalanced |
| Input VSWR | < 2.5:1, typ. 2.0 |
| Input Noise Figure | 8 dB MAX at minimum input level |
| L.O. Leakage at Input | -55 dBm |

### 2.3.2    QPSK Demodulator

The QPSK demodulator's input data rate is variable over the range shown in Table 3 (Page 16), with a minimum transport-rate step size of 1 kbps. In Table 3, "Threshold Eb/No" is that value of Eb/No at which the average number of uncorrected FEC frames exceeds one per minute.

**Table 3. QPSK Demodulator Requirements**

| Inner Code Rate | Symbol Rate | Transport Rate | Threshold Eb/No |
|:---:|:---:|:---:|:---:|
| 1/2 | 2.71-30 Msps | 2.5-27.647 Mbps | 4.0 |
| 2/3 | 2.04-30 Msps | 2.5-36.863 Mbps | 5.0 |
| 3/4 | 1.81-30 Msps | 2.5-41.471 Mbps | 5.5 |
| 5/6 | 1.63-30 Msps | 2.5-46.078 Mbps | 6.0 |
| 7/8 | 1.55-30 Msps | 2.5-48.382 Mbps | 6.4 |

### 2.3.3 Transport DEMUX

The transport demux is used to extract the desired video and audio streams from the multiplexed data stream.

### 2.3.4 System Processor

The main system processor is an extended architecture processor, and uses flash memory for microcode storage with download capability via either terminal or satellite channel.

The unit also has an MPEG2 video processor ASIC, and an audio processor ASIC.

### 2.3.5 Auxiliary Data Processing

An asynchronous user-data stream embedded in the transport stream may be routed to SERIAL 1 or SERIAL 2 ports under user or network control.

### 2.3.6 Composite Video Encoder

The IRD supports the following video resolutions:

**Table 4. Video Resolution Requirements**

| NTSC | PAL |
|---|---|
| 720H x 480V  (Full Resolution) | 720H x 576V |
| 544H x 480V  (3/4 Resolution) | 544H x 576V |
| 480H x 480V | 480H x 576V |
| 352H x 480V  (1/2 Resolution) | 352H x 576V |
| 352H x 240V | 352H x 288V |

### 2.3.7 Video Specifications

NTSC video performance is specified below at a 9 Mbps video PES rate, 720Hx480V resolution.

**Table 5. Video Specifications**

| Parameter | Production Specification | |
|---|---|---|
| Signal Type | NTSC | PAL |
| Output Level | 1.0 Vp-p, ± 2% | 1.0 Vp-p, ± 2% |
| Output Impedance | 75 Ohms | 75 Ohms |
| Multiburst NTSC | From 0.5 to 4.2 MHz: ≤+0/−1.0 dB | From 0.5 to 4.8 MHz: ≤+0/−1.2 dB |
| Differential Gain | ≤ 4 IRE | ≤ 4 IRE |
| Differential Phase | ≤ 1.5° | ≤ 1.5° |
| L/C Gain Inequality | ≤ ± 4 IRE | ≤ ± 4 IRE |
| L/C Delay Inequality | ≤ ± 26 nS | ≤ ± 26 nS |
| Line Time W-form Distortion | ≤ 1 IRE p-p | ≤ 1 IRE p-p |
| Field Time W-form Distortion | ≤ 3 IRE p-p | ≤ 3 IRE p-p |
| Video S/N Weighted | ≥ 56 dB | ≥ 56 dB |

### 2.3.8 Audio Specifications

Audio performance is specified below at a compressed-audio PES rate of 256 kbps.

**Table 6. Audio Specifications**

| Parameter | Specification (each channel of stereo pair) |
|---|---|
| Output Level-MAX PPL | +18.0 ±0.5 dBm into 600 ohms, *at 0 dB attenuation level* |
| Impedance | Balanced: < 60 Ohms |
| Frequency Response | 20Hz to 20 kHz, + 0.5/-1.5 dB<br>50Hz to 15 kHz, ± 0.5 dB |
| Phase accuracy | 50 Hz to 15 kHz, ≤± 2°from linear phase |
| Harmonic Distortion (1 kHz test-tone, 1 dB below PPL) | ≤ 0.5 % |
| S/N Ratio | ≥ 80 dB (22 Hz to 20 kHz) unweighted |
| Dynamic Range | 16 bits |
| A/V Sync | ≤± 50 mS error |

### 2.3.9 Serial ASYNC Data, Monitor and Control of IRD

Two serial ports (SERIAL 1 and 2) for data to/from the IRD have the following characteristics:

**Table 7.  Serial ASYNC Port Requirements**

| Parameter | Specification |
| --- | --- |
| Signal Type | Serial Asynchronous Character Data |
| Levels | RS-232 |
| Mode | Always 8 data-bits, one start, one stop-bit, half-duplex. |
| Pin-outs | DCE to AT-compatible serial port, 3-wire subset (Rxd, Txd, and Ground) without handshake lines |

### 2.3.10 Option Modules for Expansion Ports

The IRD has two expansion slots - one high speed and one low speed.  The high speed expansion port provides the transport layer multiplexed stream while the low speed expansion port provides the filtered packet data.  An I$^2$C bus provides control for option modules.  The specifications for individual modules are included in documentation for the module.

### 2.3.11 AC Power

The unit features a universal-input power supply.  AC line is fed into a standard IEC jack.  The nominal inputs are 115 or 230 VAC ± 10% at 50-60 Hz ± 2%.  The total AC current consumption with the 4:1 RF switch option and max LNB DC load is 0.8A at 115 VAC, and 0.5A at 230 VAC.

### 2.3.12 LNB DC Power

The unit may feed DC power to an external antenna-mounted LNB using either the RF-In connector's center-pin or a terminal on the rear-panel terminal strip (with an external DC power inserter).  The nominal voltage supplied is +17 to +24 VDC, while the maximum load current is 250 mA.  The output is short-circuit protected by a thermal fuse.  An internal jumper (J27) is used to enable/disable DC power on the RF-In center-pin.  Once that jumper has been set, the LNB power can be turned on via the front panel menu.

### 2.3.13 Four Input / One Output RF Switch (Optional)

#### 2.3.13.1 Description

The module is normally installed into the MODULE 2 option-slot position on the back of the parent IRD.  It allows the IRD to select one of four antenna / LNB inputs when its RF OUTPUT jack is connected via a 75-ohm coax cable to the IRD RF INPUT.  There is no power pass for LNB DC power.  (DC for the LNB is provided on the UTY4422 rear terminal strip and requires an external DC power inserter.  No DC voltage is applied to any F connector.)  The input and output RF connectors are Type-F jacks, and they are located on the option module rear panel.

No user-accessible controls or indicators are located on the module.

## 2.3.13.2  Electrical Characteristics

The characteristics described in Table 8 are measured at a -25 dBm input level.

**Table 8.  RF Switch Characteristics**

| Parameter | Specification |
|---|---|
| Input Isolation, Port to Port (all ports terminated) | ≥ 35 dB, 950-1450 MHz<br>≥ 24 dB, >1450-2150 MHz |
| Input VSWR (selected port, 75-ohm system) | ≤ 2.5:1, 950-1450 MHz<br>≤ 3.5:1, >1450-2150 MHz |
| Insertion Loss | ≤ 1.5 dB, 950-1450 MHz<br>≤ 4 dB, >1450-2150 MHz |

## 2.4      LOCAL CONTROLS AND INDICATORS

## 2.4.1    Front Panel

See Figure 3 (Page 25) for a view of the front panel.

## 2.4.1.1  Front Panel Display

The front-panel includes a 2-line by 20-character display to support the local user monitor/control interface.  See Table 24 (Page 40), and Appendix B for details on the messages displayed there, as well as the menus supporting the keypad interface described in Section 2.4.1.2.

## 2.4.1.2  Front Panel Keypad

The front-panel includes a keypad for user input.  The keys are right, left, up, down arrows and SELECT, and ENTER.  See Sections 2.4.1.2 and 3.9, and Appendix B for details on their use.

### 2.4.1.3 Indicator LED's

**Table 9.  Front Panel LED's***

| Label Mnemonic | Meaning (See Section 3.2) | Color |
|---|---|---|
| CARRIER | Carrier Tracking indication | Green |
| MPEG | Main MPEG mux indication | Green |
| CUE | Contact-closure activation | Green |
| AUTH | Authorized to receive COMPEL-CA  program | Green |
| RF LEVEL | Signal Level Warning | Green |
| COMPEL™ | Network control indication | Green |
| WARNING | General warning indication | Yellow |
| ALARM | Link lost or other major alarm indication | Red |

**\*For an explanation of the Front Panel LED's, see Section 3.2**

## 2.4.2    Rear Panel

See Figure 4 (Page 25) for a view of the rear panel, where the following controls are located.

### 2.4.2.1 Standard DVB Synchronous Interface

**Table 10.  Serial 1 and Serial 2 Port Pin-outs**

| SERIAL 1 | | SERIAL 2 | |
|---|---|---|---|
| **Pin #** | **Signal** | **Pin #** | **Signal** |
| B1 | DCD (Internally pulled high) | A1 | DCD (Internally pulled high) |
| B2 | RXD (Output | A2 | RXD (Output) |
| B3 | TXD (Input) | A3 | TXD (Input) |
| B4 | DTR (Not connected) | A4 | DTR (Not connected) |
| B5 | GNDS | A5 | GNDS |
| B6 | DSA (Internally pulled high) | A6 | DSA (Internally pulled high) |
| B7 | RTS (Not connected) | A7 | RTS (Not connected) |
| B8 | CTS (Internally pulled high) | A8 | CTS (Internally pulled high) |
| B9 | RI | A9 | RI |

## 2.5    EXTERNAL INPUTS AND OUTPUTS

### Table 11.  Input and Output Connectors

| Name | Description |
|---|---|
| RF Switch *(Optional)* | Four female Type-F RF INPUTS (1-4) and one female Type-F RF OUTPUT (no powered ports) |
| RF IN | Female Type F, L-band input, 950-2150 MHz |
| VIDEO OUT | 75 ohm female BNC, NTSC composite video output |
| BALANCED AUDIO CH1 L & R | Female 9 pin D Connector |
| BALANCED AUDIO CH2 L & R | Female 9 pin D Connector |
| SDI (D1) VIDEO | Female BNC |
| AES/EBU | Female 9 pin D Connector |
| SERIAL 1 | Female 9 pin D Connector (Printer, Modem or Terminal) (See Table 12 for pin-outs.) |
| SERIAL 2 | Female 9 pin D Connector (Printer, Modem or Terminal)  (See Table 12 for pin-outs.) |
| LNB (J27 required) | Plug-in terminal strip, LNB DC |
| GND | Plug-in terminal strip, LNB DC current return |
| ALARM | Plug-in terminal strip, alarm relay contacts |
| CLOSURE 1 | Plug-in terminal strip, network-controlled solid-state relay contacts |
| CLOSURE 2 | Plug-in terminal strip, network-controlled solid-state relay contacts |
| AC Input | AC power connected through a standard IEC connector |

## Table 12.  Analog Audio Channel 1 and Channel 2 Connector Pinouts

| Channel 1, J5, DB9 | | Channel 2, J6, DB9 | |
|---|---|---|---|
| Pin # | Signal | Pin # | Signal |
| 1 | AUDIO1R+ | 1 | AUDIO2R+ |
| 2 | GNDD | 2 | GNDD |
| 3 | AUDIO1R- | 3 | AUDIO2R- |
| 4 | AUDIO1L+ | 4 | AUDIO2L+ |
| 5 | GNDD | 5 | GNDD |
| 6 | AUDIO1L- | 6 | AUDIO2L- |
| 7 | NC | 7 | NC |
| 8 | NC | 8 | NC |
| 9 | NC | 9 | NC |

### 2.5.1   Balanced Audio Outputs

There are two audio channel outputs on the rear panel.  Each Channel (Ch1 & Ch2) has a right and left pair.  Each of these pairs is a balanced, low-impedance audio output.  These are accessed through DB-9 connectors, which plug through the rear panel into the main PWB.

**Please note that audio should be terminated with 600-ohm loads for correct output levels.**

### 2.5.2   FCC-Mandated Suppression of Radiated Emissions

**In order to comply with the requirements of FCC Part 15 Subpart B, Class A emissions, please read the following instructions on the protection of all output wiring and cabling:**

**For each alarm or user-controlled relay output THAT IS USED, a single ferrite core must be used for EMI emission suppression.  The ferrite cores are supplied in the shipping container along with the Unity4422 IRD.  Details on assembly of the ferrite cores on the wiring are shown in Figure 2.  Note that each pair of wires must pass through the core twice.  Be sure that this is done as close to the removable screw-terminal strip as possible.  If minimal slack is used in the outer "turn," the ferrite core should be properly restrained by the wiring alone.**

**In addition to the above precautions for the wiring to the screw-terminal strips, the user is cautioned to only use high-quality shielded cabling for the SERIAL 1 and SERIAL 2 connectors.**

### 2.5.3   Alarm Relay and Addressable Contact Closures

The rear panel has an alarm relay and two solid-state contact closures addressable from the COMPEL™ uplink computer.  This  relay's "alarm" conditions are the same as the front-panel ALARM LED.  The alarm relay is factory-set so that an alarm condition or the loss of unit power

will cause the rear panel alarm outputs to short together (alarm relay closed).  Ratings for the alarm relay and network-controlled closures are 100 mA at 30 VDC.

The two contact closures are controlled via the COMPEL command stream from the uplink.  See the COMPEL™ Manual for the commands and structure for the relay closures.

### 2.5.4    AES/EBU Connector Pinout

The AES/EBU digital audio is output on a DB-9 connector on the rear of the unit.  The pinouts are shown below.

**Table 13.  AES/EBU Digital Audio Pinouts**

| PIN | SIGNAL |
|-----|--------|
| 1 | POS1 |
| 2 | POS2 |
| 3 | GND |
| 4 | GND |
| 5 | GND |
| 6 | NEG1 |
| 7 | NEG2 |
| 8 | GND |
| 9 | GND |

**Figure 2.  Ferrite Bead Installation**
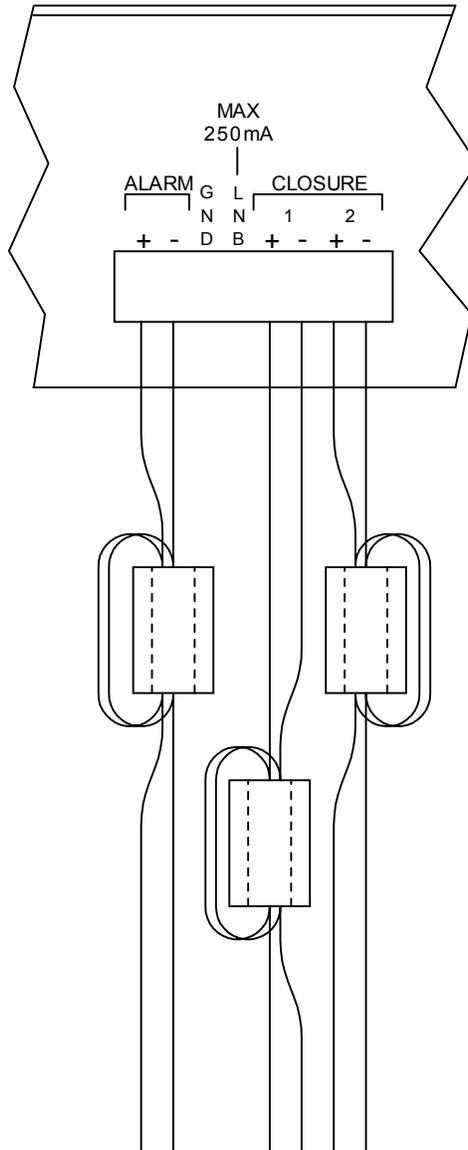


> ## * * * CAUTION * * *
>
> **To meet FCC requirements, the alarm and contact closures must have a ferrite bead installed on each pair of wires leading from them.  See Section 2.5.2 and Figure 2-2 for instructions on their installation. There are 3 ferrite beads packed with the unit. One of these is for the alarm relay output, and two are for the contact closures.**

**Figure 3. UTY4422 Front Panel**

WEGENER
COMMUNICATIONS

SELECT   ENTER

CARRIER   MPEG   CUE   AUTH

RF  LEVEL   COMPEL   WARNING   ALARM

UNITY4422   MPEG-2 IRD

MPEG 4:2:2 & 4:2:0

UNITY
The Digital Broadcasting Platform
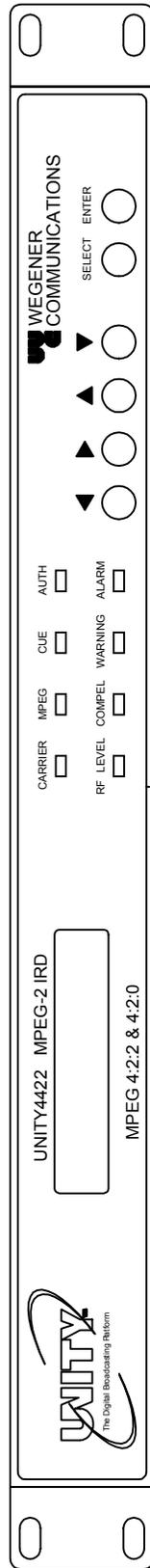
**Figure 4. UTY4422 Rear Panel**

115/230VAC
0.8/0.5A
50/60Hz

COMPOSITE
VIDEO          AES/EBU
                AUDIO          SDI
                               VIDEO

OUT            OUT            OUT

SERIAL 1

SERIAL 2

ALARM
+ - D B   + - N  1 - 2 -
         MAX
         250mA      CLOSURE

CONTACT RATING 0.1A @ 30VDC

AVIS: RISQUE DE CHOC ÉLECTRIQUE NE PAS OUVRIR

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

RF IN

BALANCED AUDIO

CH 1

CH 2

MODULE 1

MODULE 2
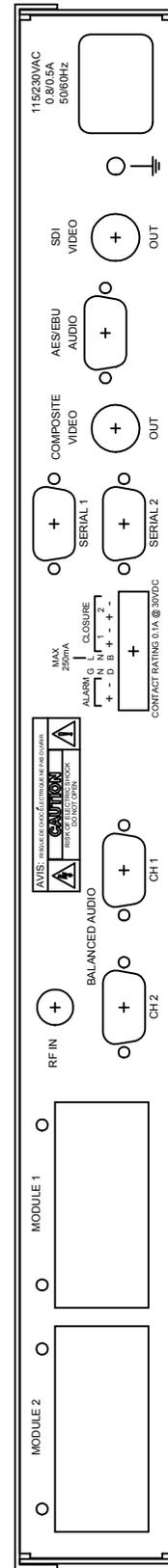
## 2.6 EXPANSION CARD CONFIGURATION

The purpose of this section is to detail the jumper settings and labeling instructions for the Unity Expansion Cards.

### 2.6.1 Balanced Audio Expansion Card

#### 2.6.1.1 Audio Card Jumper Configuration

Jumper settings – Dotted and Non-dotted.  The headers used here have 3 pins, so a jumper connecting 2 of these pins can connect pins 1 & 2 or pins 2 & 3.  The "Normal" position of this jumper is marked by a dot on the silkscreen near either pin 1 or pin 3.

**Dotted Position** - Jumpering pin 2, the center pin, to the pin nearest the dot.

**Non-Dotted Position** - Jumpering pin 2 to the pin furthest from the dot.

Installing one audio expansion card enables audio channels 3 and 4.  You should set jumpers J2, J3, J4, J6, J7, and J8 on this Audio Card to the "dotted" position.

Installing a second audio expansion card enables audio channels 5 and 6.  Set jumpers J2, J3, J4, J6, J7, and J8 on this Audio Card to the "non-dotted" position.  Leave the jumpers on the first audio expansion card in the "dotted" position, which will continue to enable channels 3 and 4 on that card.

### * * * Caution! * * *

When 2 audio expansion cards are installed, one must have the jumpers in the dotted position, and the other must have them in the non-dotted position.  Failure to correctly configure the jumpers WILL cause operational problems.

Either available module slot may be used with the "non-dotted" card, but that card will be the Channel 5 & 6 card.  The "dotted" card will be the Channel 3 & 4 card.  Each card should also be labeled appropriately.  (See the following section.)

#### 2.6.1.2 Audio Card Label Instructions

When a single balanced audio expansion card is installed (In either Module 1 or Module 2 slot), channels 3 and 4 are used.  You should set the jumpers on that card to the "dotted" position, and label the Audio Card Bracket as [CH4   CH3].  To label it:

1. Peel the [CH4   CH3] label from the backing.
2. Press the label onto the rear of the Audio Card Bracket, within the blank rectangle provided, or cover existing silkscreen text.

When a second balanced audio expansion card is installed, channels 5 and 6 are used. The second card is installed in the vacant module slot and connected to the first card and the motherboard by a 3-connector cable, rather than the 2-connector cable used with a single card.

The second card enables Channels 5 & 6 when the jumpers are set to the "Non-dotted" position. Labeling this card is done like the first card, except it will be labeled [CH 6  CH5].

### 2.6.2  Sync or ASI Output Data Card Jumper Configuration

### * * * Caution! * * *

When 2 SYNC or ASI expansion cards are installed, one must have the jumpers in the dotted position, and the other must have them in the non-dotted position. Failure to correctly configure the jumpers WILL cause operational problems.

When you install one SYNC or ASI expansion card, set jumper J9 on that card to the "dotted" position. See Section 2.6.1 for details on "Dotted" and "Non-dotted" jumper positions.

When installing a second SYNC or ASI expansion card, jumper J9 on that card must be set to the "non-dotted" position. Leave jumper J9 on the first data expansion card set to the dotted position.

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# SECTION 3

# OPERATION

## 3.1    MODES OF OPERATION

### 3.1.1    Power Up

At power up, the unit does a quick checksum test on the EEPROM.   If the test passes, the unit then initializes various devices and configures itself according to the EEPROM settings.   It then waits for the receiver board to complete its boot-up.   When the receiver board boots up, the IRD sends a tune request to the receiver board and the Welcome Banner to the serial port. The IRD then enters alarm mode until all of the alarm conditions are cleared.  Total boot-up time is approximately 25 seconds, but may vary somewhat.

*Also, while in power up mode, each of the Unity 4422's LED's will FLASH (See Table 14, Page 30.).*

### 3.1.2    Boot Fail

If any of the boot fail conditions occur, the unit will enter "boot fail" mode.  While in this mode, the unit is essentially dead.  All audio and video is muted, the alarm relay is closed, the general purpose relays are all open, and the unit does not attempt carrier acquisitions, etc.

### 3.1.3    Alarm, Warning, & Normal

See Sections 3.2.7 and 3.2.8 for a complete list of alarm/warning conditions and for information on the LED's during these modes.   The overall behavior of the IRD is very similar for any of these modes, and the following is a list of their differences:

- Alarm and User Relays.   See Section 3.3 for details.

- Video is alarm frozen if No MPEG Data for less than 5 seconds, No Video for less than five seconds, or in fade mode for less than 10 seconds.

- Video is muted for all alarm conditions except Alarming Eb/No.

- Audio is muted for all alarm conditions except Alarming Eb/No and No Video Data.

- LED's are unique for each of these modes.

## 3.2     LED & ALARM / WARNING CONDITIONS

The following definitions apply throughout this section:

### Table 14.  LED and Alarm Conditions

| Blink | LED is OFF for 1 second, and then blinks on count times (ON for 250 mS and OFF for 250 mS).   This overall pattern is continued. |
|---|---|
| Flash | ON for 100mS, OFF for 100mS, … |
| Flutter | ON for 50 mS, OFF for 50 mS, … |
| AMBER | RED and GREEN turned ON at the same time. |

The UNITY4422 has eight front panel LED's, each of which is described below.

### 3.2.1    Carrier (Green)

ON if receiver board is tracking.

### 3.2.2    RF LEVEL (Green)

ON if RF level is OK and receiver board is tracking a carrier.  FLASH if RF level is HIGH or LOW and receiver board is tracking. Otherwise OFF (receiver board is not tracking).

### 3.2.3    MPEG (Green)

ON if synced on MPEG stream. FLASH if no MPEG sync but locked on carrier. Otherwise OFF.

### 3.2.4    Cue (Green)

ON while any relay is closed. Also, relay must be ON for a minimum of 1 second. Otherwise, OFF.

### 3.2.5    COMPEL™ (Green)

FLUTTER if COMPEL addressed to unit within last 5 seconds (keep alive commands are not considered to be addressed to unit). ON if COMPEL Received within last 2 minutes. OFF if COMPEL is not required or unit is not in Tracking mode. Otherwise, FLASH (unit is in Tracking and no COMPEL within last 2 minutes).

The COMPEL light will also be on for approximately 2 minutes when the unit is first turned on or reset.

### 3.2.6    Authorized (Green)

ON if authorized for current program and have MPEG sync.  This LED will also be ON if program being received is unencrypted.  It will FLASH if not authorized for the current program. It will be OFF if no program is available.

### 3.2.7    Alarm (Red)

FLASH if any of following: (see Table 14, Page 30)

1. EEPROM Boot Failure.
2. Receiver board diagnostics Boot failure.
3. Receiver board communications Boot failure.
4. Secure micro / host ID mismatch Boot failure.

ON if any of the following:

1. Receiver board run-time failure.
2. Fade mode > 10 seconds.
3. Installation mode > 10 seconds.
4. Carrier table search mode.
5. Header search mode.
6. Satellite search mode.
7. Alarming Eb/No.
8. No MPEG data > 5 seconds and locked on carrier.
9. No video data > 5 seconds and have MPEG sync.
10. Not authorized for current program.
11. Selected program not available.
12. Overheating.

Otherwise, OFF

When an alarm or warning condition is active, that condition is displayed on the LCD. The IRD will not indicate (either on LED's or LCD) multiple conditions; it will indicate only the most critical condition. Alarm conditions are considered more critical than warning conditions, and the list of alarm and warning conditions shown above and below are listed from most critical (1) to least critical (Item 4 or 12 above).

*Note that the Alarm LED is only ON when the unit is either overheating or unable to produce video.*

### 3.2.8    Warning (Amber)

ON if any of following:

1. E-mail received but not read. (See the Caution, Page 32, and Section 3.9.3, Page 42.)
2. Secure micro run-time failure.
3. Marginal Eb/No and locked on carrier.
4. RF level is HIGH.
5. RF level is LOW.
6. Fade or Installation mode < 10 seconds.
7. No MPEG data < 5 seconds and locked on carrier.

8.  No video data < 5 seconds and have MPEG sync.

9.  COMPEL required and no COMPEL within last 2 minutes.

10. Selected audio not available.

Otherwise, OFF.

---

## * * * CAUTION * * *

**E-mail messages should be read as soon as possible after receipt, because each message will be over-written by the next one.**

---

## 3.3 RELAYS

This IRD supports 1 alarm relay and 2 solid state user relays.  The user relays are controlled via COMPEL™ and the modem/terminal interface.

Note that the alarm relay is de-energized when the IRD's power is off and the relay outputs are shorted together.

## 3.4 PROGRAM SELECTION

Programs may be selected by network control and (if allowed by the network) by local user.  A multiplexed MPEG transport stream may support some number of separate programs.  Each program has a single video and some number of associated audio data streams associated with it in the main transport stream.  The programs are designated with a number, but if none is supplied by the selection command (e.g. the '*' designation) the lowest in number order will be selected by the IRD.

## 3.5 AUDIO HANDLING

The selected program (see Section 3.4) has a number of separate compressed-audio data streams associated with it.  These are assigned 3-letter mnemonic designations.  Any of these may be routed to either the Ch1 or Ch2 stereo outputs on the back of the IRD, but not both at the same time.  The selected stream is a stereo or dual-mono signal.  It may be routed to the L and R connections in a specific relationship to the original audio connections at the uplink MPEG encoder unit:

**Table 15. Audio Handling**

| Stereo | Original encoder L and R routed to corresponding L and R outputs on IRD |
|---|---|
| Reverse Stereo | Original encoder L routes to IRD R output, while original R routes to the L output |
| 1 on both | Original encoder L is routed to both L and R outputs on IRD |
| 2 on both | Original encoder R is routed to both L and R outputs on IRD |

## 3.6     SOURCES OF CONTROL

The IRD can be controlled via COMPEL™, terminal, modem, and Display / push buttons.   Each of these methods of control is explained in the following sections, but you should see the COMPEL manual for a complete explanation of the COMPEL system.

### 3.6.1   COMPEL™

The COMPEL command stream from the uplink is usually the unit's primary source of control. This asynchronous stream is mux'ed into the aggregate MPEG data stream at the uplink.

### 3.6.2   Terminal

You may access the terminal command interface by setting Serial Port 1 or Serial Port 2 "device" to "Terminal" (using front panel control, if enabled by your Network Control). Terminal default settings are 19200, N, 8, 1.  You may then access the terminal commands if you have a terminal installed.  These commands appear on a help screen and are documented in Appendix A of this manual.  With the exception of the "R" and "H" commands, they are only available if local control is enabled.

### 3.6.3   Modem

The modem command interface is similar to the terminal interface.  That is, it does not use special handshaking or special control characters for this interface, and only supports auto-answer modems.  In fact, the IRD does not distinguish between an attached terminal and a modem.  To access the modem command interface, the serial port 2 "device" must be set to "Modem" (using front panel control).  To access user commands, the user must enter the correct password at the prompt.  The user then retains access until the "OH" command is received, or two 10-minute periods pass with no user input.  As is the case for the terminal, the user commands are restricted when local control is disabled.

### 3.6.4   PAL / NTSC Selection

The UNITY4422 accepts both PAL and NTSC video.  Whether the input is PAL or NTSC is auto-detected, and the appropriate parameters are set under software control.

### 3.6.5   Display / Push Buttons

This interface supports a variety of controls and status displays, including the following:

1. Status.
2. Selecting and configuring the Serial Port devices.
3. Setting the LNB LO's.
4. Front panel email.

See the Display / Push Button Menus, Appendix A, for complete details.

### 3.7     SERIAL PORT - COMMAND SYNTAX

The UNITY4422 contains two serial ports.  These are labeled Serial Port 1 and Serial Port 2. Each can support a printer, a terminal, a modem, or an auxiliary data device.  However, there are restrictions as to what device combinations can be used at one time.  There are only 2 rules for this, and they are shown below.  (Also, see Table 16, this Page.)

1. The same device type (Printer, terminal/modem, or aux. data) cannot be configured on both ports at the same time. (Terminals and modems are considered the same device type. See Rule 2.)
2. The combination of a terminal on one port and a modem on the other is not allowed.

The statements on the second line of Table 16 tell which devices can be connected to Serial Port 2 when the device on the top line is connected to Serial Port 1.

**Table 16.  Serial Port Device Combinations**

| Serial Port 1 | Printer | Aux. Data | Terminal | Modem |
|---|---|---|---|---|
| Serial Port 2 | Any but Printer | Any but Aux. Data | Any but Terminal or Modem | Any but Terminal or Modem |

Port Communication is fixed at 1 stop bit and 8 data bits, and there is no handshaking.  The serial port's behavior for each of its device types is shown in the following table.

**Table 17.  Serial Port Settings**

| Device | Serial Port Behavior |
|---|---|
| Printer | Configured to *B, N, 8, 1* (* see note 1 below.). |
| Aux. Data | Configured to *B, N* (* See note 2 below.). |
| Terminal | Configured to *19200, N, 8, 1*.  The unit responds to the terminal/modem commands described in Sections 3.6.1 & 3.6.2, and Appendix A. |
| Modem | Configured to *B, N, 8, 1* (* see note 3 below.). The unit responds to the terminal/modem commands described in Sec. 3.6.1, 3.6.2 and Apdx A. |

Note 1.  For Printer: 'B' may be 1200, 2400, 4800, 9600, or 19.2k baud; 'P' may be 'O' for Odd, 'E' for Even, or 'N' for No parity.

Note 2.  For Aux Data: 'B' may be 1200, 2400, 4800, 9600, 19.2k, or 38.4k baud.  'P' may be 'O' for Odd, 'E' for Even, or 'N' for No parity.

Note 3.  For Modem: 'B' may be 9600, or 19.2k baud; parity is always 'N' for No parity.

\* Note:  Baud rate and parity are configurable for the Printer, but the serial ports do not support parity for modem applications.

Supported baud rates are 1200, 2400, 4800, 9600, 19200, and 38400, while supported parity types are None, Odd, and Even.  When a serial port configuration command is received from any control source, the specified configuration is immediately stored for the specified *device.*  The serial port is configured accordingly, whenever the serial_port.device is *device* when local panel control has been enabled by the satellite program provider.  If serial_port.device is *device* at the time this command is issued, and the configuration differs from the current configuration, the output_buffer is cleared and the port is reconfigured.

When connected to a Terminal, the port may also be configured for baud rate, etc.  Care should be taken when changing these settings so they agree with the internal terminal settings.  If you change the baud rate of the Terminal Port to 9600, you will have to change the terminal baud rate to 9600 before you can communicate through the Terminal Port.

The following table specifies which outputs are routed to which device for each of the valid device combinations.

**Table 18.  Serial Port Operation**

| Serial1 / Serial2 | Output (Type of Data) | Port Data Sent To & Conditions |
|---|---|---|
| Printer / Terminal | COMPEL Email | To printer if COMPEL_email is detected & raw data is **not** being processed. |
| | COMPEL Requested Reports | To printer if raw data is **not** being proecssed. |
| | Raw Uplink Data. | To printer if raw data is being processeddetected. |
| Printer / Modem | COMPEL Email | Same as for printer / terminal. |
| | COMPEL Requested Reports | Same as for printer / terminal. |
| | Raw Uplink Data | Same as for printer / terminal. |

## 3.8    RECEIVER FUNCTIONS

Note that throughout this manual, the term valid carrier means the absolute value of the difference between the LNB LO and the carrier is $\geq 950$ MHz and $\leq 2150$ MHz.

### 3.8.1  Perms, Temps, Searching & Settings

The term *settings* is used throughout this document and includes the following parameters:

**Table 19.  Settings Parameters**

| *{RF_In}* | **Value from 1 - 4, specifying the RF input (if RF Switch is installed)** |
|---|---|
| *Carrier* | The downlink frequency specified in MHz with up to two decimal places. This value's absolute difference with the LNB LO frequency must be $\geq$ 950 MHz and $\leq$ 2150 MHz. |
| *Data_rate* | The data_rate is the MPEG2 transport rate in Mbps.  (See Table 3, Page 16, for allowed ranges.)  This value can have up to three decimal places. |
| *FEC_rate* | The inner FEC code ratio, which can have one of the following values:  1/2, 2/3, 3/4, 5/6, or 7/8. |
| *Tag_site* | Value of 0-15 specifying the location of this carrier's tag frequency.  '15' is reserved for 'No Tag Required.' |
| *[program]* | The program stream. If omitted or an '*' is entered, the unit will select the first available program stream.  If the number is in the range 1-65535, the unit will use only the program stream with the corresponding PID number.  If a string is entered, the unit will use only the program with the corresponding identifier.  The unit will support a minimum of three programs.  If a carrier contains more than three programs, the unit will only use the first three. |

The IRD is acting on one of three groups of settings at any given time, each of which is described in the following table:

**Table 20.  Group Settings**

| Settings Group | Description |
|---|---|
| Temp | These settings are entered via COMPEL or the TEMP / TEMPCH terminal commands.  The unit is said to be inserting when it is configured to the temp settings.  The maximum length of an insert is approximately 18 hours (65535 seconds).  An insert terminates when (1) it times out, (2) an ABORT command is received, (3) power is cycled, or (4) an invalid header is seen.  Any Temp commands received while the receiver is currently inserting are ignored.  If a Perm command is received while inserting, the perm_settings are updated but not acted on until the insert is terminated. |
| Perm | The perm_settings are entered via COMPEL or the Terminal Commands PERM and PERMCH, or automatically from within a search mode (see below). The group perm_settings is the only settings group stored in NVRAM. |
| Search | The search_settings are active while in Carrier Search, Header Search, and Satellite Search modes.  When the unit finds what it is looking for in the search mode, it copies the search_settings to the perm_settings. These are then considered to be the active settings. |

### 3.8.2   Signal Quality Monitoring

The IRD provides the following signal quality information:

**Table 21.  IRD Signal Quality**

| | |
|---|---|
| Eb/No | An average Eb/No reading.  It is updated approximately every 500 mS, and is a 10 second running average of these updates. |
| RF Level | HIGH, LOW, OK.  See Table 2, Page 15. |
| Signal Fades | A counter is maintained for transitions from Tracking to Fade mode. |
| RF Glitches | A counter is maintained for carrier "hits".  A "hit" is when the receiver board detects one or more uncorrectable FEC frames, yet small enough not to cause a transition from Tracking to Fade mode. |
| Availability | Shows the percentage of time that the unit has been locked on a carrier since that carrier was first acquired (timer.locked / timer.since_first_acquired). |

### 3.8.3   Frequency Tagging

Under normal operation, the IRD can only acquire carriers that contain frequency tags.  These tags are inserted in the COMPEL control stream at the uplink and are used for identifying the carrier's frequency.  Tagging was mandated because, without tags the IRDs could have locked on some other nearby (adjacent) carrier while looking for the intended carrier.  The tuning can be off by a small amount due to minor offsets in the LNB and within the receiver itself.  Traditionally, the tags have been sent at a rate of every 100 or 125 mS.  The IRD supports both single and multiple tags.  The tag_site, which is part of the settings, tells the receiver which of these 17 possible tags to use.  To reduce processing overhead, the unit only looks for tags while in the Get Tag sub-mode or when tag_testing.

## 3.9      DISPLAY / PUSH BUTTONS

### 3.9.1   Overview

The front panel consists of a 2 X 20 Display and six push buttons. Essentially all control available through the terminal is available via the front panel. The front panel can also be used to view a COMPEL down-loadable text message. This message is volatile and can contain up to 512 characters. The Display can be in one of the following modes:

**Table 22.  Display Modes**

| Mode | Description |
|---|---|
| HOME | Display shows ALARM or WARNING message (if applicable), or RF switch position, carrier frequency, program ID and TEMP (if inserting). Display returns to this screen after push buttons are inactive for 5 minutes *or if both ENTER and SELECT buttons are pressed simultaneously.* |
| SN | Unit Serial Number displayed for a few seconds if ENTER is pressed while in HOME screen. |
| MENU | Entered from Home mode.  Display shows menu for each available command group. |
| PARAMETER | Entered from Menu mode.  Display shows specific parameter associated with command group. |
| EDIT | Entered from Parameter mode.  Display blinks edit field when in this mode. |

### 3.9.2    Push Button Functions

**Table 23.  Push Button Functions**

| LCD MODE | PUSH BUTTON | FUNCTION |
|---|---|---|
| HOME | SELECT | N/A |
|  | ENTER | Shows unit serial number for approximately 2 seconds |
|  | ∧ (UP) | N/A |
|  | ∨ (DOWN) | N/A |
|  | > (RIGHT) | Enters MENU mode. |
|  | < (LEFT) | Enters MENU mode. |
| MENU | SELECT | Enters PARAMETER mode |
|  | ENTER | N/A |
|  | ∧ (UP) | N/A |
|  | ∨ (DOWN) | N/A |
|  | > (RIGHT) | Scrolls forward through MENU selections. |
|  | < (LEFT) | Scrolls backward through MENU selections. |
| PARAMETER | SELECT | Enters EDIT mode or exits EDIT mode (depending on displayed parameter) |
|  | ENTER | N/A |
|  | ∧ (UP) | N/A |
|  | ∨ (DOWN) | N/A |
|  | > (RIGHT) | Scrolls forward through PARAMETER selections. |
|  | < (LEFT) | Scrolls backward through PARAMETER selections. |
| EDIT | SELECT | Cancels changes, leaves EDIT mode, and enters PARAMETER mode. |
|  | ENTER | Enters changes. |
|  | ∧ (UP) | Increases value of number in edit field or scrolls up to next choice in list.  In number field, button increments once per button push or can be held to scroll.  Button acceleration occurs when push-button is depressed for more than 5 seconds. |
|  | ∨ (DOWN) | Decreases value of number in edit field or scrolls down to next choice in list.  In number field, button decrements once per button push or can be held to scroll.  Button acceleration occurs when push-button is depressed for more than 5 seconds. |
|  | > (RIGHT) | Advances display to next edit field (if applicable). |
|  | < (LEFT) | Displays last edit field (if applicable). |

**Table 24.  LC Display Menus**

*Note:  Screens marked by '*' are not shown if local control is disabled (either programmed into non-volatile memory at factory or set by COMPEL command).  Exception:  "Audio Settings" screen is shown but only "Attenuation" may be changed by local user.*

| MAIN LEVEL | SECOND LEVEL | THIRD LEVEL |
|---|---|---|
| Home Screen | N/A | N/A |
| EMAIL | Email Msg | |
| Hardware Setup | Current Settings* | RF Feed (Optional), Carrier Frequency and Data-rate |
| | | FEC rate, Tag Site, and Program # |
| | | Save <ENTER> / Cancel <SELECT> |
| | Select Channel* | |
| | Edit Channel* | *For each possible channel entry...* |
| | | RF Feed (Optional), Carrier Frequency and Data-Rate |
| | | FEC rate, Tag Site, and Program # |
| | Aspect Ratio Mode* | 4:3, 16:9, or Auto |
| | Audio Settings* | For each port: Route:, Lang:, and Atten: |
| | SNR Alarm Level SNR Marg Offset | |
| | Serial Ports (Both Ports MUST not be set to the same device at the same time. Modem and Terminal may not be selected at the same time.) | Select Serial1: Aux Data, Modem, Term., or Printer |
| | | Select Serial2: Aux Data, Modem, Term., or Printer |
| | | Modem Password: 6 alphanumeric char's max. Default is 'PASSWD' |
| | | Printer Settings: Baud, Parity |
| | | Modem Settings: Baud, Parity |
| | | Aux Data Settings: Pid, Baud, Parity |
| | Test Mode | For Factory Use |
| | LNB DC Power | ON or OFF |
| | LNB LO | Set Frequency |
| | Unit Reset | |
| Status Reports | Settings Status | PERM, TEMP, or SEARCH settings |
| | Carrier Status (Tracking) | RF In, Carrier, Data Rate, FEC Rate |
| | | Tag, Program |
| | | Acq. Mode / Mode Duration |
| | | RF In, Carrier Data Rate, FEC Rate |
| | | Program ID, Tag Site |
| | | EbNo / Margin / Level |
| | | Last Acq., / high-low EbNo |
| | | First Acq. / Availability |
| | | RF Level / EbNo Level Status |

**Table 24.  LC Display Menus (Continued)**

| MAIN LEVEL | SECOND LEVEL | THIRD LEVEL |
|---|---|---|
| Status Reports (Continued) | Carrier Status (Not Tracking) | Acq. Mode, Mode Duration |
| | | RF In, Carrier, Data Rate, FEC Rate |
| | | Program ID, Tag |
| | | Acquisition Submode |
| | MPEG Status | Aggregate MPEG |
| | | Program Presence |
| | | Video Muting Status |
| | | Aspect Ratio |
| | | Audio Presence |
| | | Port1 Program, Routing, Muted/Unmuted |
| | | Port2 Program, Routing, Muted/Unmuted |
| | Settings Table | For each entry in the table… |
| | | Carrier, Data Rate, FEC Rate |
| | | Tag, Program ID |
| | NC Status | Ser. No., Lock Status / COMPEL Control |
| | | Local Control / Network Mode |
| | | Last Header / Last Addressed |
| | | History / Total Processed |
| | Parameter Status | LNB LO |
| | | SNR Alarm Level / SNR Margin Offset |
| | | Fade / Install |
| | | Search / No COMPEL |
| | | COMPEL Seek / Header Search |
| | | Audio Demux / Audio Ports |
| | | Encryption / RF Switch |
| | | Sync Data |
| | | DVB – ASI / Ver., Rev. |
| | | Expansion Relay Card |
| | | D1 (SDI) Output |
| | Serial Port Status | Email |
| | | Modem / Printer (settings) |
| | DVB-ASI Status | |
| | Relay Status / 1 , 2 | |

**Table 24.  LC Display Menus (Continued)**

| MAIN LEVEL | SECOND LEVEL | THIRD LEVEL |
|---|---|---|
| Version Info | Application | |
| | Boot Code | |
| | Audio Demux (DSP) | |
| | Xilinx PLDs | |
| | Lattice PLD | |
| | Secure Micro | |
| | Video Decoder | |
| | Audio Decoder | |
| | Receiver Card | |
| | Conditional Access | |
| Navigation Help | ◄ or ► to Scroll | |
| | <SELECT> to Edit | |
| | ▲ or ▼ to Change Value | |
| | <ENTER> to Accept Changes | |
| | <SELECT> to cancel Changes | |

**NOTE**:  When moving through the front panel menus, pressing <ENTER> and <SELECT> at the same time will move you to the top-level menu.  This is an immediate move, and does not save any changes or inputs.

### 3.9.3    E-mail

E-mail messages may be sent from the uplink to the Unity4422 and displayed on the LC Display.

To view E-mail messages, follow these steps:

1.   When an E-mail message is received, the Warning light will be turned "ON" and the following message will normally be shown on the LC Display:

2.

```
WARNING:
EMAIL PRESENT
```

Press  <►> or <◄> to scroll through the top level menu until you see the E-mail screen which will allow you to view the e-mail.  See the screen representations below.

**NOTE**:  If the "Warning" message above is not shown, you may reach the E-mail menu by scrolling through the top level menu until you see the E-mail menu display.  If there is no E-mail message, you will see the following display.

```
E M A I L : N O N E
```

If there is an E-mail message, the display in Step 2 will be shown:

```
E M A I L   R E A D : < S E L E C T >
```

Press <SELECT> to view the first 20 characters of the message on the display. To view more of the message press <▶>. You may scroll in either direction by pressing <▶> or <◀>. Pressing and releasing either of these keys will scroll the message 1 character.

3. When you pass the end of the E-mail message, the following will be displayed:

```
< - - E N D   O F   E M A I L - - >
```

3. Press < ENTER >, which will end the current E-mail session, and cause the following message to display:

4.

```
R E T U R N
P r e s s   < S E L E C T >
```

5. Pressing <SELECT> will take you out of the E-mail menu, and return you to the top level menu. The following message will be displayed:

```
E M A I L   R E A D : < S E L E C T >
        C L E A R : < E N T E R >
```

6. At this point the E-mail is in the buffer, and you may leave it, scroll through it, or clear (erase) it. You are effectively back at Step 2 (Top Level Menu), with the added option of "Clearing the message." This option is not available until you have scrolled through the message once.

7.  If you press <SELECT> you can scroll through the message again.  If you stop at this point, the message remains in the buffer, but any new email message will overwrite the current one. (See the caution on this page.)

If you press <ENTER> you will erase the E-mail message and remain at the top level menu.  The following message will be displayed:

| E | M | A | I | L | : | | N | O | N | E | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | |

8.  At this point, pressing <▶> or <◀> will allow you to scroll through the top level menu.

**NOTE**:  When moving through the front panel menus, pressing <ENTER> and <SELECT> at the same time will move you to the top level menu.  This is an immediate move, and does not save any changes or inputs.

**\* \* \* CAUTION \* \* \***
**E-mail messages should be read as soon as possible after receipt,**
**because each message will be over-written by the next one.**

# APPENDIX A

# Terminal / Modem Commands

| |
|---|
| ### * * * CAUTION * * * |
| **Terminal / modem commands fall into two categories, Status Commands and Control Commands. If Local Control is disabled, the unit will accept only Status Commands. No Control Commands will be accepted until Local Control is enabled. For more information, see the commands listed below.** |

Commands described 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 the terminal displaying "Invalid Command." Parameter errors on User Commands generate "Invalid *parameter name*" where "*parameter name"* is the name of the incorrectly entered parameter.

## A1.0  STATUS COMMANDS
**These commands show status and help displays, but do not allow for changes to that status.**

### A1.0.1  H *[command]*
*command:* Any of the terminal command names (H, R, TEMP, 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 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.

### A1.0.2  R type [page]
type:  Indicates the type of report as follows:

C  - Carrier Status

P  - Parameters

G  - Group Status

NC  - Network Controller Status

M  - MPEG

R  - Relay Status

S  - Settings Status

ST  - Settings Table

SP  - Serial Port Configuration

*[page]:*  This option can have a value of 1 to 8 and is only applicable for the group status report. Indicates the page to be reported.  If omitted, all eight pages are reported and scroll off the terminal screen.

## A1.1    CONTROL COMMANDS

Again, these commands are only active when "Local Control" is enabled.  They are the commands by which you may change unit settings.

### A1.1.1  ABORT

Insert is terminated.

### A1.1.2  ADDS location settings

*location:* Value from 1 - 48 indicating location in settings_table.  This value is 1-16 for Audio-only unit, 1-24 for units using labels, and 1-48 otherwise.

*settings:  See* 'Settings Table' in Appendix B1.4.4.

The *settings* are added to the settings_table at the specified location. Will also handle data rate rounding as explained for PERM.

### A1.1.3  DELS *location*

*location:* Value from 1 - 48 indicating location in settings_table.

The entry in the settings_table at the specified location is deleted.  Ignored if only one entry in settings_table.

### A1.1.4  MUTE [source][source]

*source:*  If no source is specified then video, async data, and all audios are selected.  *Source* can be in the following style:

| V | To indicate Video. |
|---|---|
| A[/string] | To indicate Audio.  An 'A' without the string indicates all audio outputs.  The string which is contiguous, can contain one or more individual audio outputs (1L, 1R, 2L, ...6R), one or more paired audio outputs (1, 2, ...6), or any combination these.  Multiple outputs must be separated by forward slashes. |

Mutes the specified outputs.  Example:  MUTE V A/1L/2/4/6R, mutes the video,  audio Port 1 left, Ports 2 and 4 left and right, and audio Port 6 right.

### A1.1.5  *OH*

**(**Modem control only)  When in a terminal control session via a modem, this discontinues user (password-authorized) access.

### A1.1.6  PC device baud parity

*device:*  P or M, for Printer or Modem, respectively

*baud:*  9600 or 19200.

See  Section 3.7 for details.

### A1.1.7  PERM *settings*

*settings:*  See Section 3.8.1.

Unit sets its perm_settings to *settings*.  See Section 3.8.1 for more information.

### A1.1.8  PERMCH *location*

*location:* Value from 1 - 48 indicating location in settings_table.

Unit sets its perm_settings to those retrieved from the settings_table according to *location*.

### A1.1.9  PW *password*

*password:*  One to six alphanumeric characters.

Changes the modem_password to *password.*

### A1.1.10   RE state [number]

*state:*  O or C, to Open or Close, respectively.

*[number]:* 1 or 2, indicating the affected user relay.  Both are specified if omitted.

The specified relay is opened or closed accordingly.  These are opto-relays.

### A1.1.11   SETAUDIO port route [program] [atten]

*port:*  Value of 1 to 6 indicating an audio port (3 – 6 are optional).  The audio program is routed to the audio port *port's* audio switch, and is then routed to the Left and Right outputs according to *route*.

*route:* S - Stereo (ch 1 on L, ch 2 on R)

　　　1 - Ch 1 on both

　　　2 - Ch 2 on both

　　　R - Reverse stereo (ch 2 on L, ch 1 on R)

*[program]:* Can be a three character name or an '*'. If the 3-character name is specified, the unit will route the audio program with the specified name to the port. If '*' is specified, the unit will default to the first audio program that is not routed to another port.

*[atten]*:  0-14 dB or ( _ ) to leave unchanged

### A1.1.12  SETLNB *LO_freq*

*LO_freq:* 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 14422.00.

Sets lnb_lo_freq to *LO_freq*.

### A1.1.13  SETTIMEOUT *source time*

*source:*   1 - Fade

2 - Installation

3 - Carrier Search

4 - No COMPEL

5 - Header Seek

6 - Header Search

*time:* Time-out value in HH:MM:SS format.  Valid range is 00:00:00 to 9999:59:59.

Timeout.*source* is set to *time*..

### A1.1.14   SNR *alarm_level margin_offset*

*alarm_level:* Units of dB with range from 5.0 - 14.9 and can have one decimal place.

*margin_offset:* Units of dB with range from 1.0 - 10.0 and can have one decimal place.

Sets alarm_level and margin_offset accordingly.

### A1.1.15  TEMP  *settings time*

*settings:  See* Perms/Temps/Searching & Settings, Section 3.8.1.

*time:*  Length of insert in HH:MM:SS format.  Valid range is 00:00:00 to 18:00:00.

Will handle data rate rounding as explained for PERM. Unit sets its temp_settings to *settings*. See Perms/Temps/Searching & Settings, Section 3.8.1, for more information.

### A1.1.16  TEMPCH *location time*

*location:* Value from 1 - 48 indicating location in settings_table.

*time:*  Same as for TEMP.

Unit sets it temp_settings to those retrieved from the settings_table according to *location*.

### A1.1.17  UNMUTE [source][source]

*source:*  Same as the MUTE command.

Identical to MUTE except specified services are unmuted.

# Appendix B

# FRONT PANEL DISPLAY

## B1.1    HOME SCREEN

If alarm or warning condition is active:

| A | L | A | R | M |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | s | g |   |   |   |   |   |   |   |   |   |   |   |   |   |

or

| W | A | R | N | I | N | G | : |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | s | g |   |   |   |   |   |   |   |   |   |   |   |   |   |

where *msg* is a string identifying the condition (See Section 3.2 for warning and alarm conditions.).

If  unit is inserting:

| R | F | I | N | : | 1 |   | F | R | E | Q | : | 0 | 0 | 0 | 0 | 0 | . | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | R | O | G | : | x | x | x | x | x | x | x | x | x |   | T | E | M | P |   |

or else (typical screen without alarms or warnings):

| R | F | I | N | : | 1 |   | F | R | E | Q | : | 0 | 0 | 0 | 0 | 0 | . | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | R | O | G | : | x | x | x | x | x |   |   |   |   |   |   |   |   |   |   |

where *xxxxx* is program number (5 digits) or descriptor ).

To provide easy access to the unit's serial number, press <ENTER> from the Home Screen to display the serial number for approximately 10 seconds.

## B1.2    EMAIL

At the main (first) menu level, one of three screens is displayed, depending on the status of e-mail (none, e-mail present and un-read, or e-mail present and read).  they are shown in that order below.  Also, the Warning LED will be illuminated.

If email is not received or email is cleared:

| E | M | A | I | L | : | N | O | N | E |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

If EMAIL has been received and not read, top level menu:

| E | M | A | I | L |   |   | R | E | A | D | : | < | S | E | L | E | C | T | > |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

If email has been received and read:

| E | M | A | I | L |   |   | R | E | A | D | : | < | S | E | L | E | C | T | > |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | C | L | E | A | R | : | < | E | N | T | E | R | > | |

From the screen above, press <ENTER> to clear the e-mail buffer and return to the first (no e-mail) screen. If e-mail is present, then, after pressing <SELECT> at the above second or third screen, the following screen (second level) appears:

| < | | E | M | A | I | L | | M | E | S | S | A | G | E | | | > |
| E | | Q | U | I | C | K | | B | R | O | W | N | | F | O | X | | J | U |

'<' and '>' are shown only when scrolling is necessary to view email message. To exit email screen you must scroll to end of message.

| < | - | - | | E | N | D | | O | F | | E | M | A | I | L | | - | - | > |
| E | | Q | U | I | C | K | | B | R | O | W | N | | F | O | X | | J | U |

After pressing <ENTER> the exit screen appears:

| R | E | T | U | R | N | : | | | | | | | | | | | | |
| P | r | e | s | s | | < | S | E | L | E | C | T | > | | | | |

## B1.3   HARDWARE SETUP

| H | A | R | D | W | A | R | E | | S | E | T | U | P | | | | |
| P | r | e | s | s | | < | S | E | L | E | C | T | > | | | | |

This moves the user to 2nd level screens under "Hardware Setup." In these screens, the user may make changes to the IRD setup. NOTE: If local control is disables, then changes to current settings, channel entry/selection, and audio settings are not allowed, and their screens will not be shown.

### B1.3.1   Current Settings

Tunes IRD to a new channel setting per user input. Equivalent to a PERM terminal command.

| C | U | R | R | E | N | T | | S | E | T | T | I | N | G | S | : | | |
| P | r | e | s | s | | < | S | E | L | E | C | T | > | | | | |

Moves user to 3rd level screens under "CURRENT SETTINGS."

| R | F | I | N | : | x | | F | R | E | Q | : | y | y | y | y | y | . | y | y |
| D | A | T | A | | R | A | T | E | : | | z | z | . | z | z | z | | |

Where "x" is the RF Switch Feed number (1 to 4), yyyyy.yy is the downlink carrier frequency in MHz, and zz.zzz is the transport data rate in Mbps. (If the RF Switch option is installed.)

| F | E | C | : | x | / | x | | | T | A | G | : | | y | y | | |
| P | R | O | G | : | | z | z | z | z | z | | | | | | | |

Where "x/x" is the inner FEC code ratio (1/2, 2/3, 3/4, 5/6, or 7/8); yy is the tag site. For program designator, zzzzz is a number or wildcard '*'.

```
S A V E :          < E N T E R >
C A N C E L :      < S E L E C T >
```

<ENTER> saves the entry (new setting) and returns to 2nd level screens under "HARDWARE SETUP>.  <SELECT> returns without saving the entry.

### B1.3.2  Channel Selection

Tunes IRD to a channel from settings table.  Equivalent to a PERMCH terminal command.

```
S E L E C T   C H A N N E L :        x x
```

Where "xx" is a Settings Table entry number between 1 and 48.  If the user presses "Select", then the 'xx' field flashes.  Up/down arrows may select a new value.  Pressing "Enter" tunes the IRD to the new channel settings in that Table entry.

### B1.3.3  Edit Channel

Edits an entry in the settings table.  Equivalent to ADDS and DELS terminal commands.

```
E D I T   C H A N N E L :           x x
```

Where "xx" is a Settings Table entry number.  If you press "Select", then the 'xx' field flashes.  Up/down arrows then select a new value between 1 and 48.  Pressing "Enter" starts an edit session on the Table entry.  The screens are the same as those under "Current Settings" above.

### B1.3.4  Aspect Ratio Settings

```
A S P E C T   R A T I O   M O D E
x x x x
```

Where xxxx is either 4:3, 16:9, or AUTO.  Press <SELECT> to enable changes to the aspect ratio.  Press <SELECT> again to lock in the aspect ratio showing on the LCD.  Press ◄ or ► to move among the menus.

### B1.3.5  Audio Settings

Similar to SETAUDIO terminal command.

```
A U D I O   S E T T I N G S :
P r e s s   < S E L E C T >
```

Moves user to 3rd level screens under "AUDIO SETTINGS."

Shown for each installed audio channel.  Below is shown the nth channel:

```
P O R T   # : n       R O U T E :   x
```

```
L A N G :  Y Y Y        A T T E N :  z z
```

'x' is the routing, either "S" for normal stereo, "R" for reversed stereo, "1" for original Left to both, and "2" for original Right to both.  'yyy' is the character name for audio program, any set of three alphanumeric characters.  Alternately, it may be '*' which is wildcard.  This forces the audio program with the lowest unselected PID (in PMT) associated with the selected program number (service) to be routed to this output.  Edit session begins on left-most character.  Up/down arrow scrolls through all alphanumerics as well as '*'.  'zz' is audio attenuation control level, and can be set between '0' and '14.'

```
R E T U R N :
P r e s s   < S E L E C T >
```

Returns to 2nd level screens under "HARDWARE SETUP."

### B1.3.5  SNR Alarm Threshold

This is similar to the SNR Terminal Command.

```
S N R   A L R M   L E V E L :    x . x
S N R   M A R G   O F F S E T :   y . y
```

"x.x" is the alarm level in dB, ranging from 2.0 to 7.0.  "y.y" is the margin warning offset in dB, ranging from 1.0 to 11.9, minus the value of the SNR alarm level.

### B1.3.6  Serial Ports

```
S E R I A L   P O R T S
P r e s s   < S E L E C T >
```

Moves user to 3rd level screens under "SERIAL PORTS."

```
S E R I A L 2   D E V I C E :
                    x x x x x x x
```

Where "xx...xx" may be either TERMINAL or MODEM.

```
M O D E M   P A S S W O R D
                    x x x x x x
```

Where "xx...xx" is a six-alphanumeric-character password for access via phone-modem.

```
P R I N T E R   S E T T I N G S
B A U D   x x x x    P A R I T Y   y
```

Where "xxxxx" is baud-rate, either 9600 or 19200 baud.  "y" is parity, either "O" (for Odd), "E" (for Even), or "N" (for None).

```
MODEM  SETTINGS
BAUD xxxx   PARITY  N
```

Where "xxxxx" is the baud-rate, either 9600 or 19200 baud.  Parity is always "None."

```
AUX  DATA  PID:   XXXX
BAUD xxxx   PARITY  p
```

Where Baud is 1200, 2400, 4800, 9600, 19200, or 38400.  Parity is None, Even, or Odd.

```
RETURN:
Press  <SELECT>
```

### 1.3.7    Test Mode

```
TEST  MODE:   XXXXXXX
```

Where 'xxxxxxxx' is either 'enabled' or 'disabled.'
Enabled:  Modulated Ramp Test Signal.

### 1.3.8    LNB DC Power

```
LNB  DC  POWER: xxx
```

Where 'xxx' is either 'on' or 'off.'
On:  24v.  Off: 0v.

```
RETURN
Press  <SELECT>
```

Returns to 2nd level screens under "HARDWARE SETUP."

### B1.3.9  LNB LO's

If the optional RF Switch is NOT installed, the following screen is shown:

```
LNB  LO: 00000.00
```

If the RF Switch is installed, two screens are shown, as follows.

```
LNB  LO: 00000.00     #
```

```
L N B   L O : 0 0 0 0 0 . 0 0         #
```

Where "#" equals RF Switch number, 1 through 4.

## B1.3.10 Unit Reset

```
T O   R E S E T   U N I T
P r e s s   < E N T E R >
```

```
R E T U R N
P r e s s   < S E L E C T >
```

Returns to Main level screens from "HARDWARE SETUP."

## B1.4    STATUS REPORTS

```
S T A T U S   R E P O R T S
P r e s s   < S E L E C T >
```

## B1.4.1  Settings Status

```
S E T T I N G S   S T A T U S
P r e s s   < S E L E C T >
```

```
R F I N : 1   0 0 0 0 0 . 0 0   T E M P
0 0 . 0 0 0   1 / 2     0 0 : 0 0 : 0 0
```

```
T A G : 1 2               T E M P
P R O G : x x x x     0 0 : 0 0 : 0 0
```

```
R E T U R N
P r e s s   < S E L E C T >
```

The Settings Status report displays the current conditions and provides the following information:

  Mode:  PERM settings, TEMP settings, or SRCH settings

  RF IN: 1 - 4

  FREQ (MHz) { '-' if searching }

  DATA RATE (Mbps) { '-' if searching }

  TAG SITE

  FEC Rate:  1/2, 2/3, 3/4, 5/6, 7/8  { '-' if searching }

  Program: #(5-digit number) or string descriptor, length

  Time remaining {TEMP mode}Carrier Status

### B1.4.2  Carrier Status

```
C A R R I E R   S T A T U S
P r e s s   < S E L E C T >
```

If TRACKING

```
M O D E :  T R A C K I N G
D U R A T I O N :  0 0 0 : 0 0 : 0 0
```

MODE          Always shows TRACKING

DURATION   Time Since Last Acquired

```
R F  I N : 1   0 0 0 0 0 . 0 0
0 0 . 0 0 0   1 / 2
```

RF IN          1 - 4
carrier         active_settings.carrier
data rate       active_settings.data_rate
FEC rate        active_settings.fec_rate

```
P R O G :  x x x x x
T A G   S I T E :  x x x
```

PROG           active_settings.program_number
TAG SITE     active_settings.tag_site

If carrier is lost while viewing any of the following four screens, will jump to MODE & DURATION screen under NOT TRACKING.

```
E B N O  1 0  S E C  A V E R A G E
M A R G I N : 5 . 0   A V G : 1 4 . 5
```

MARGIN      average Eb/No margin level over last 10 seconds

EBNO          average Eb/No level over last 10 seconds

```
L A S T  A C Q : 0 0 0 : 0 0 : 0 0
H I / L O  E B N O : 0 0 . 0 / 0 0 . 0
```

LAST ACQ    time.acq_mode

HI/LO EB/NO best Eb/No since last acq/worst Eb/No since last acq

```
F I R S T  A C Q : 0 0 0 : 0 0 : 0 0
A V A I L A B I L I T Y : 1 0 0 . 0 0 %
```

FIRST ACQ         time.first_acquired

AVAILABILITY    timer.tracking_current divided by timer.first_acquired

```
┌─────────────────────────────────────┐
│R F   L E V E L : O K                 │
│E B N O   L E V E L : G O O D         │
└─────────────────────────────────────┘
```

RF                HIGH, LOW, OK

EBNO LEVEL     GOOD,  MARGINAL, ALARMING (rx.ebno_level)

```
┌─────────────────────────────────────┐
│R E T U R N                           │
│P r e s s   < S E L E C T >           │
└─────────────────────────────────────┘
```

If NOT TRACKING

```
┌─────────────────────────────────────┐
│M O D E : C A R R I E R   S E A R C H │
│D U R A T I O N : 0 0 0 : 0 0 : 0 0   │
└─────────────────────────────────────┘
```

MODE           current acquisition mode

DURATION   Time Since Last Acquired

```
┌─────────────────────────────────────┐
│R F I N : 1   0 0 0 0 0 . 0 0         │
│0 0 . 0 0 0   1 / 2                   │
└─────────────────────────────────────┘
```

RF IN          1 - 4

carrier          active_settings.carrier
data rate       active_settings.data_rate
FEC rate        active_settings.fec_rate

```
┌─────────────────────────────────────┐
│P R O G :   X X X X                   │
│T A G   S I T E : 1 2                 │
└─────────────────────────────────────┘
```

TAG              active_settings.tag_site

PROG            active_settings.program_number

If tracking mode is entered while viewing any of the following three screens, the display will jump to MODE & DURATION screen under TRACKING.

```
┌─────────────────────────────────────┐
│S U B M O D E : G E T   C A R R I E R │
│                                      │
└─────────────────────────────────────┘
```

SUBMODE     GET CARRIER, GET MPEG, GET TAG, GET COMPEL (acq.sub_mode)

```
┌─────────────────────────────────────┐
│N O   M P E G :     5   A T T E M P T S│
│N O   T A G :       2   A T T E M P T S│
└─────────────────────────────────────┘
```

Number of times unit timed out in GET MPEG sub-mode and the DVB Receiver module was still tracking.  {if non-zero}

Number of times unit timed out in GET TAG sub-mode and the DVB Receiver module was still tracking.  {if non-zero}

```
B A D   T A G : 1 2 3 / 1 2 0 0 1 . 0 0
B A D   H D R : 1 2 3   A T T E M P T S
```

Number of times unit has seen a wrong tag in GET TAG sub-mode and the last one's value. {if non-zero}

Number of times unit has seen an invalid header in GET COMPEL sub-mode. {if non-zero}

Acquisition Problems counters cleared each time unit enters TRACKING mode.

```
R E T U R N
P r e s s   < S E L E C T >
```

### B1.4.3   MPEG Status

```
M P E G   S T A T U S
P r e s s   < S E L E C T >
```

```
A G G R E G A T E   M P E G :
T R A N S   @   1 . 5 4 4   M B P S
```

TRANSPORT stream at data_rate Mbps

```
<   P R O G R A M   P R E S E N C E   >
x x x x   x x x x   x x x x
```

Where "xxxxx" is program identifier.
<, > only if scrolling is necessary

If AUTHORIZED:

```
V I D E O :
A L A R M / C M D   M U T E D
```

video.cmd_state and video.alarm_state

If NOT AUTHORIZED:

```
V I D E O :
N O T   A U T H O R I Z E D
```

```
A S P E C T   R A T I O
x x x x
```

Where xxxx is 4:3, 16:9, AUTO, or a Message, such as "Not Available."

```
<     A U D I O   P R E S E N C E     >
x x x   x x x   x x x   x x x   x x x
```

Where "*xxx*" is audio program identifier. Must scroll to end of presence list in order to exit.

```
P O R T 1 :  x x x x        R E V E R S E
L :  A L A R M          R :  A L M / C M D
```

audio port #
audio program identifier
audio.port_routing[ port #]
audio mute status

```
R E T U R N
P r e s s    < S E L E C T >
```

## B1.4.4  Settings Table

```
S E T T I N G S   T A B L E
P r e s s    < S E L E C T >
```

Pressing <SELECT> allows for display of all valid Settings Table entries, including "Last Acquired" carrier and "Last Requested" carrier settings.  Each setting is displayed as a pair of screens.  Scroll through each pair and from pair-to-pair with the right/left arrow keys.

```
R F I N : a   b b b b b . b b    c c c
d d . d d d   e / e
```

```
T A G : f f
P R O G : x x x x x
```

```
R E T U R N
P r e s s    < S E L E C T >
```

The Settings Table report screens show the settings for each valid (used) Table where:
RF IN:  a is the (optional) RF feed.
FREQ:  bbbbb.bb is the carrier downlink frequency in MHz.
Table Entry:  ccc is either ACQ or REQ or valid Table entry #, from 1-48.
FEC Rate:  e/e is the inner FEC code ratio (either ½, 2/3, ¾, 5/6, 7/8, or '-' if searching)
TAG SITE:  ff is the tag-site, from 0-15.
Program: #:  xxxxx is up to 5-digit number which, in the PAT, points to the PID for a particular service's PMT.

## B1.4.5   NC Status

```
N C   S T A T U S
P r e s s   S e l e c t
```

```
D E L A Y I N G : 0 0 : 0 0 : 0 0
```

```
| | | | | | | | | | | | | | | | |
```

time_string (timer.delay_remaining), {if non-zero}

```
S / N :  1 2 3 4 5 6     U N L O C K E D
C O M P E L :  R E Q U I R E D
```

serial_number
COMPEL.unlocked
COMPEL.required

```
L O C A L     C T R L : E N A B L E D
N E T W R K   M O D E :
```

local_control
COMPEL.network_mode

```
L A S T   H D R : 0 0 0 : 0 0 : 0 0
L A S T   A D R : 0 0 0 : 0 0 : 0 0
```

timer.last_header

timer.last_addr_header

```
H I S T O R Y : 0 0 0 : 0 0 : 0 0
T O T L   P R O C E S S D : x x x x x
```

timer.powered_up

COMPEL_stats.processed

The following screens are shown only if non-zero:

```
I N V A L I D   H E A D R : x x x x x
I N V A L I D   C K S U M : x x x x x
```

COMPEL_stats.headers

COMPEL_stats.checksum

```
I N V A L I D   L E N G T H : x x x x x
B U F F E R   O V R F L O W : x x x x x
```

COMPEL_stats.length

COMPEL_stats.buffer

```
S Y N T A X   E R R O R : x x x x x
```

COMPEL_stats.syntax

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```
R E T U R N
P r e s s   < S E L E C T >
```

## B1.4.6  Parameter Status

```
P A R A M E T E R   S T A T U S
P r e s s   < S E L E C T >
```

If the RF switch is not installed:

```
L N B   L O : 0 0 0 0 0 . 0 0
```

freq_string (lnb_lo_freq[0])

Else:

```
L N B   L O : 0 0 0 0 0 . 0 0       #
L N B   L O : 0 0 0 0 0 . 0 0       #
```

```
L N B   L O : 0 0 0 0 0 . 0 0       #
L N B   L O : 0 0 0 0 0 . 0 0       #
```

Where '#' equals RF Switch Position

```
S N R   A L R M   L E V E L : 0 0 . 0
S N R   M A R G   O F F S E T : 0 0 . 0
```

SNR ALARM LEVEL snr.alarm_level
SNR MARGIN OFFSET        snr.margin_offset


```
F A D E :             0 0 : 0 0 : 0 0
I N S T A L L :       0 0 : 0 0 : 0 0
```

FADE timeout timeout.fade
INSTALL timeout timeout.install

```
S E A R C H :         0 0 : 0 0 : 0 0
N O   C O M P E L :   0 0 : 0 0 : 0 0
```

SEARCH timeout timeout.carrier_search
NO COMPEL timeout timeout.no_COMPEL

```
C M P L   S E E K :   0 0 : 0 0 : 0 0
H D R   S R C H :     0 0 : 0 0 : 0 0
```

COMPEL SEEK timeout timeoutCOMPELseek
HEADER SEARCH timeout timeout.header_search

```
AUD  DEMUX: INSTALLED
AUDIO  PORTS: ( x x x x )
```

value of options.program_demux

options.audio3_4, options.audio5_6

This output is dependent on the Balanced Audio Card Jumper Settings.

```
ENCRYPTION: NOT  INSTL
RF  SWITCH: INSTALLED
```

options.encryption

options.rf_switch

```
SYNC  DATA: NOT  INSTL
```

```
DVB-ASI : NOT  INSTL
```

```
EXPANSION  RELAY  CARD
NOT  INSTL
```

```
D1  OUTPUT : INSTALLED
```

```
RETURN
Press  <SELECT>
```

## B1.4.7  Port Status

```
SERIAL  PORT  STATUS
Press  <SELECT>
```

```
EMAIL: ENABLED
```

Either Enabled or Disabled.

```
MODEM:     19200  N81
```

```
P R I N T E R :       9 6 0 0   N 8 1
```

RS232 settings:
Baud:  9600 - 19200
Parity: N, E, 0
Data Bits set to 8 and stop bit set at 1.

```
R E T U R N
P r e s s   < S E L E C T >
```

## B1.4.8  Relay Status

```
R E L A Y   S T A T U S
1 : O P E N       2 : C L O S E D
```

Current state of corresponding relay.

## B1.5    VERSION

```
V E R S I O N   I N F O
P r e s s   < S E L E C T >
```

Pessing <SELECT> morves user to 2nd level screens under "VERSION."

```
A P P L I C A T I O N
V x . x x x
```

Where "x.x" is the version number of the main unit application software.

```
B O O T   C O D E :
V x . x x
```

Where "x.x" is the version number of the boot code.

```
A U D I O   D E M U X   ( D S P )
V x . x
```

Where "x.xx" is the version number of the audio demux DSP.

```
X I L I N X   P L D s :
x x x x x x
```

Where "xxxxxx" is the version string for the Xilinx PLD code.

```
L A T T I C E   P L D :
x x x x x x
```

Where "xxxxxx" is the version string for the Lattice PLD code.

```
S E C U R E   M I C R O
V x . x
```

Where "x.x" is the version number of the secure (decryption) microprocessor.

```
V I D E O   D E C O D E R :
V x . x
```

Where "x.x" is the version number of the microcode for the video decompression IC.

```
A U D I O   D E C O D E R :
V x . x
```

Where "x.x" is the version number of the microcode for the audio decoder IC.

```
R E C E I V E R   C A R D :
V x . x   ( T y p e   y y )
```

Where "x.x" is the receiver card firmware revision, and "yy" is the card's type code.

```
C O N D I T I O N A L   A C C E S S
N O N E
```

```
R E T U R N
P r e s s   < S E L E C T >
```

## B1.6 Navigation Help

```
N A V I G A T I O N   H E L P
P r e s s   < S E L E C T >
```

```
P r e s s   < -   o r   - >   t o
S c r o l l
```

```
P r e s s   < S e l e c t >   t o
s t a r t   E d i t   m o d e
```

```
P r e s s   < U p - D o w n >   t o
c h a n g e   v a l u e
```

```
Press  <Enter>  to
accept  changes
```

```
Press  <Select>  to
cancel  changes
```

```
RETURN
Press    <SELECT>
```

# Appendix C
# Glossary of Terms

**AMBER** - An LED with the red and green both "On."

**ASIC** - Application-specific Integrated Circuit:

**BLINK** - An LED which is ON for 250 mS and OFF for 250 mS, with the pattern continuing for some time, is said to "Blink." See Table 14, Page 30. Also, see "Flash" and "Flutter."

**COMPEL™** - Wegener's patented satellite network control system. This is a system which features a control data stream embedded along with the payload services, where a single central control site may control all aspects of network operation: database management, program selection and setup by site, grouping of sites, scheduling, etc.

**DAC** - Digital-to-Analog Converter. A device that converts a sequence of numbers representing signal amplitudes in electronic binary format to actual analog signals.

**EEPROM** - **E**lectrically-**E**rasable **P**rogrammable **R**ead-**O**nly **M**emory. This acronym is used to describe any non-volatile memory device which can be read- or written-to a nearly unlimited number of times, but which retains its last written data when power is turned off.

**FEC** - Concatenated FEC: Forward Error Correction. A method of mapping digital data for transmission over a noisy, error-creating medium, and then un-mapping it, such that error-reduction is achieved. This allows for lower-power (but wider bandwidth) carriers to be used than would otherwise be required on a satellite link. Concatenated FEC means that a bit-level convolutional FEC is embedded "inside" a byte or frame-level Reed-Solomon FEC within the transmission path. This is done to create a far more powerful error-reduction system than either type of FEC alone could provide.

**FLASH** - An LED which is ON for <u>100 mS</u> and OFF for <u>100 mS</u>, with the pattern continuing for some time, is said to "Flash." See Table 14, Page 30. Also, see "Blink" and "Flutter."

**FLUTTER** - An LED which is ON for <u>50 mS</u> and OFF for <u>50 mS</u>, with the pattern continuing for some time, is said to "Flutter." See Table 14, Page 30. Also, see "Blink" and "Flash."

**MCPC -** Multiple-Channel-Per-Carrier. Means that one or more services or programs are present on a particular radio-frequency carrier.

**NVRAM –** Non-Volatile Random Access Memory – Random Access Memory which does not 'lose' its contents when power is off.

**NTSC -** National Television Standards Committee. This is a shorthand description for the standard 525-line, 30-frames-per-second analog baseband television signal format used in the US.

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**MPEG, MPEG Transport Stream** - Moving Picture Experts Group.  This catchall abbreviation is used to describe the digital compression (redundancy reduction) of linearly-digitized audio and video signals as well as the mode of multiplexing and transporting that compressed data.  The Transport stream is a packetized system consisting of a sequence of 188-byte packets, each with a sync-byte and a specific payload identified by a payload ID (or PID).  The stream contains packets not only for the compressed audio and video, but also auxiliary data, program information and allocation data, and conditional access information.

**PID** - Payload Identifier (or ID).  See "MPEG."

**PMT** – Program Map Table.  In an MPEG Data Stream, this Data Packet contains the PID's of subsequent Packets that contain each Program's compressed Video, Audio, or Data.

**QPSK** - Quadrature Phase Shift Keying.  This is a popular mode of transmitting digital information by varying the phase of a radio-frequency carrier.

**SCPC** - Single-Channel-Per-Carrier.  Only one service or program is present on a particular radio-frequency carrier.

**SETTINGS TABLE** - An internal table of alternate carrier/program settings stored in the IRDs non-volatile memory (remembered through power cycles).  This table may be used in the following ways:  (1)  If an IRD is unable to acquire the commanded carrier, then it will, after an appropriate time-delay, search for and lock onto any carriers in the table it may be able to find.  (2)  If local control is enabled, a user, may, through the front-panel or terminal command, tune the IRD to a new setting found in the table using the shorthand of the Settings Table entry number.

**TMRA –** Temperature Mounting Rack Ambient – The ambient temperature of the mounting rack where the equipment is located.  This temperature is more relevant to the operating condition of the equipment than the ambient temperature of the room where the equipment rack is located.

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# RMA  REQUEST

**Email 'service@wegener.com'**                                    **Fax 678-624-0294**

Company Name:  _____

Bill-To Address:  _____

                                              _____

                                              _____

                                              _____

Ship-To Address:  _____

                                              _____

                                              _____

Contact Name:  _____

Phone #:  (_____)  ____-_____          Fax #: (_____)  ____-_____

Complete Model #:  _____

Serial #:  _____

In Warranty?  Yes ☐     No ☐

Problem:  _____

  _____

  _____

  _____

Additional Comments:  _____

  _____

  _____

  _____

  _____

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| Date of Change | Rev. Level | Page No. | Description of Change |
|---|---|---|---|
| **Record of Revisions** (Effective from July 23, 1997) | | | |
| 4/15/99 | A | | Initial Release |
| 4/23/99 | B | 14 | Updated Figure 1 |
| 5/5/99 | C | 22 | Added Audio Connector Pinouts |
| 5/12/99 | D | 23 | Added AES/EBU Audio Connector Pinouts |
| 9/7/99 | E | 26,27 | Added Section 2.6 on expansion cards. |
| 10/1/99 | F | | Complete rewrite |
| 08/26/02 | G | 70-74 | Add Default Customer Configuration Sheet |
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## DEFAULT CUSTOMER CONFIGURATION SHEET

When customer supplied, WCI must receive this information at least two weeks before delivery to avoid additional processing charges to the customer.)

Model Number:__UTY4422_____     Release: _____
Customer:_____     Header:  ___  ___  ___  ___  (**WXXX**)
Sales Order Number:_____
Uplink Encoder Make/Model: _____     Video Format: _____

Customer Approval:_____     Date:_____

(Only required for nonstandard configuration)
Special Instructions or Clarifications:_____

_____
_____

### Equipment Settings
*(Circle or write-in requirements, default values are shown bold and underlined.  Consult Wegener Engineering about changes to default settings shown with '!' exclamation mark.)*

**1.0 LNB DC Power ( on RF-In jack )**   (**Yes** --Enabled, No --Disabled)
 1.1 If LNB DC Power Enabled: Type; ( **Domestic +18V** , Universal Switchable LNB )

**2.0 Universal LNB Configuration** *( if enabled )(only on RF-In jack)(not available if RF switch installed)*
 2.1 LO selection: ( **Local Oscillator,** Universal ) if Local Osc. then desired LO_____MHZ **5150 MHz**

**3.0 Alarm Relay-contact Polarity [Note: Relay is in "alarm" state when unit power is off]**
    ( Close-on-alarm "J8 Non-Dotted Position, **Open-on-alarm "J8 Dotted position"**)

**4.0 Initial Carrier Settings:** *( use for both RF and ASI input modes)*
 4.1 Carrier Frequency: _____MHz  ( 3700.00 to 14000.00) **3900.00 MHz**
 4.2 Feed Port *(if RF switch option is installed)* : ( **1**,  2,  3,  4)
 4.3 ASI Input Port (*if ASI Input option card installed)* : ( **1**, 2 )
 4.4 RF Input Polarity *(if Universal LNB enabled)* : ( **Horizontal ( +18v )**, Vertical ( +13v ) )
 4.5 Transport Rate : _____Mbps (2.500 to 48.382 in 0.001 Mbps steps) **6.000 Mbps** [1] *(needed for ASI input mode)*
 4.6 Program Number: _____  (default is **\*** for lowest found) *( needed for ASI input mode )*
 4.7 FEC Rate: ( 1/2,  2/3,  **3/4**,  5/6,  7/8 )
 4.8 Tag Site Number: _____ (0 -15) **15** -- Tag Site 15 designates no--COMPEL or tags
 4.9 SNR (Eb/No) Alarm Level _____dB  (2 to 7 dB) **4 dB**
 4.10 Margin Warning Offset _____dB  **2 dB**  -- sum of this and SNR Alarm level <12 dB
[1] *Check product spec for legal upper limits on aggregate Transport rate vs. FEC Rate.*

**5.0 LNB LO Settings**  (std. domestic Ku-band is 10750 MHz, C-band is 5150 MHz)
 5.1 LNB LO Frequency (if *no* RF Switch is installed): _____MHz  **5150 MHz !**
 5.2 LNB LO Freq. (for Feed Port 1 only if RF switch installed): _____MHz  **5150 MHz !**
 5.3 LNB LO Freq. (for Feed Port 2 only if RF switch installed): _____MHz  **5150 MHz !**
 5.4 LNB LO Freq. (for Feed Port 3 only if RF switch installed): _____MHz  **5150 MHz !**
 5.5 LNB LO Freq. (for Feed Port 4 only if RF switch installed): _____MHz  **5150 MHz !**

**6.0 Initial Audio Settings** *(See section 10 if addition Audio options card are installed)*
 6.1 Ch 1 Audio Routing: ( **Stereo**, Reverse Stereo, Orig. L to both, Orig. R to both)[2]
 6.2 Ch 2 Audio Routing: ( **Stereo**, Reverse Stereo, Orig. L to both, Orig. R to both)[2]
 6.3 Ch 1 Program: _____ ( need three-character code, default is **\*** for lowest found)
 6.4 Ch 2 Program: _____ ( need three-character code, default is **\*** for lowest found)
[2] *"Orig L or R" designates original L or R inputs to the MPEG encoder unit.*

**7.0 Initial Serial Ports Configuration**
  7.1 Serial Port 1 Device: ( Terminal , Modem , **Printer** , Aux. Data )
  7.2 Serial port 2 Device: ( **Terminal !** , Modem , Printer , Aux. Data )
  7.3 Modem baud/Password  B=( 9600 , **19.2k** ), P-word = ___ ___ ___ ___ ___ ___  ( **PASSWD** )
  7.4 Local Terminal/front-panel Control: ( **Enabled** / Disabled )
  7.5 Printer baud/parity:  Baud =( 9600 , **19.2 k** ) ; Parity =( odd , even , **none** )
  7.6 Aux. Data PID [hex]: ( _____, **1ffe** )
  7.7 Aux. Data Baud/Parity: B=( 1200, 2400, 4800, **9600**, 19.2k, 38.4k ); P=( odd , even , **none** )

**8.0 Misc. Audio/Video Setup Parameters**
  8.1 PCR mode ( auto-adjust to data-rate , **static !** ) -- "Auto-adjust" required with DVT2000
  8.2 PCR offset [hex]: ( _____ , **-3000 !** ) -- Applicable if "static" above is selected
  8.3 Video Pedestal Setup: ( Disabled, **Enabled !** ) -- "Enabled" matches DVT2000
  8.4 Video Aspect Ratio: ( **Auto Detect !** , 16:9, 4:3 )
  8.5 Audio delay [hex]: ( _____ , **0 !** ) – Sets A/V sync, default value is hex for '0' decimal
  8.6  Horiz Delay:  NTSC ( _____ , **34 !** ) ;  PAL ( _____ , **3e !** )
  8.7 Optional outputs home-screen alarm/warning bitmask on failure:
       Sync Data: ( **None** , Warning , Alarm ); ASI Transport: ( **None** , Warning , Alarm )
       Serial Digital Video [D1]: ( **None** , Warning , Alarm )

**9.0 Network Settings**
  9.1 COMPEL PID [hex]: ( _____ , **1026 !** ) -- Next alternate is usually 1030
  9.2 Wegener C/A PID [hex, if applicable]: ( _____ , **1028 !** ) -- Next alternate is usually 1032
  9.3 Netcon Lock: ( Locked , **Unlocked** )
  9.4 Shared Mode ( Shared , **Protected** )
  9.5 COMPEL Required ( Required , **Not required** )
  9.6 Tag Bypass: ( **No !** , Yes ) -- "Yes" is also known as "ISOG-enabled"
  9.7 Timeouts**:**

| # | Description | Allowed Range | Default | Change from Default |
|---|---|---|---|---|
| 1 | Fade | 0 - 30 seconds | **15 seconds !** | |
| 2 | Install | 0 - 4660 hours | **4660 hours !** | |
| 3 | Carrier Search | 0 - 4660 hours | **48 hours !** | |
| 4 | No COMPEL | 0 - 4660 hours | **2 hours !** | |
| 5 | COMPEL Seek | 0 – 4660 hours | **5 minutes !** | |
| 6 | Header Search | 0 – 4660 hours | **48 hours !** | |

**10.0 Information on Option Module Location:**

The following are the optional Modules cards that can be added to the UTY4422 unit.

|  | Maximum Qty.<br>each per unit | Preferred Module Location inside unit<br>(**\*** For signal option card)<br>(**\*\*** Only location available) | |
|---|---|---|---|
| A.  Balanced Audio Card | 2 | Module #1 **\*** | See configuration below |
| B.  14 Function Relay Card | 1 | Module #1 **\*** | See configuration below |
| C.  2 Port ASI Input Card | 1 | Module #1 **\*\*** | See configuration below |
| D.  ASI Output Card | 1 | Module #1 **\*** | See configuration below |

| | | | |
|---|---|---|---|
| E. Sync Data Output Card | 2 | Module #1 * | See configuration below |
| F. 4 Port RF Input Switch Card | 1 | Module #2 ** | Not configurable |

**A. Balanced Audio Card(s) Configuration**
*First Option Audio Card (Module #1 Location)*
A.1 Channel 3 Audio Routing: ( **Stereo**, Reverse Stereo, Orig. L to both, Orig. R to both)[2]
A.2 Channel 4 Audio Routing: ( **Stereo**, Reverse Stereo, Orig. L to both, Orig. R to both)[2]
A.3 Channel 3 Program: _____ ( need three-character code, default is **\*** for lowest found)
A.4 Channel 4 Program: _____ ( need three-character code, default is **\*** for lowest found)
*Second Option Audio Card (Module #2 Location)*
A.5 Channel 5 Audio Routing: ( **Stereo**, Reverse Stereo, Orig. L to both, Orig. R to both)[2]
A.6 Channel 6 Audio Routing: ( **Stereo**, Reverse Stereo, Orig. L to both, Orig. R to both)[2]
A.7 Channel 5 Program: _____ ( need three-character code, default is **\*** for lowest found)
A.8 Channel 6 Program: _____ ( need three-character code, default is **\*** for lowest found)
[2] *"Orig L or R" designates original L or R inputs to the MPEG encoder unit*

**B. 14 Function Relay Card Configuration**
All ( **Relays Open when Activated** (N.C.) , Relays Close when Activated (N.O.) , Custom)

Each relay custom setup N.C. or N.O. when activated
Relay #1_____ Relay #2_____ Relay #3_____ Relay #4_____ Relay #5_____
Relay #6_____ Relay #7_____ Relay #8_____ Relay #9_____ Relay #10_____
Relay #11_____ Relay #12_____ Relay #13_____ Relay #14_____

**11.0 Initial Search Table**

| Entry | * RF Feed RF Polarity | Carrier | Data Rate | FEC Rate | Tag Site | Program |
|---|---|---|---|---|---|---|
| * *This field used if RF Switch option installed or if Universal LNB is enabled, otherwise not shown.* | | | | | | |
| | Value from 4.2 or 4.3 | Value from section 4.1 | Value from 4.4 | Value from 4.6 | Value from 4.7 | Value from 4.5 |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | | | | |
| 22 | | | | | | |
| 23 | | | | | | |
| 24 | | | | | | |

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| Entry | * RF Feed RF Polarity | Carrier | Data Rate | FEC Rate | Tag Site | Program |
|---|---|---|---|---|---|---|
| 25 | | | | | | |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |
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| 33 | | | | | | |
| 34 | | | | | | |
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