DSR-4500X DigiCipher® II Commercial Receiver/ Decoder Operator Guide

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WARNING

The unauthorized modification of any decoder and the sale and use of any such decoder is prohibited by law. Any such modification or alteration of this product or any unauthorized reception of television programming could subject the user and seller and party modifying the decoder to fines, imprisonment, and civil damages.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful, interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. This digital apparatus does not exceed the Class A limits of radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Repairs and Assistance

For assistance on return or repair see Chapter 6.

Note to CATV System Installer:

This reminder is provided to call the CATV system installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

Warning:

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

Zur sicheren Trennung des Gerates vom Netz ist der Netzsteker zu ziehen.

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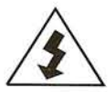
OPERATION PRECAUTIONS

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

ATTENTION:

Pour prévenir les chocs électriques ne pas utilisercette fiche polarisée avec un prolongateur, une prise de courant ou une autre sortie de courant, sauf si les lames peuvent etre insérées a fond sans en laisser aucune partie a découvert.



The lightning flash with the arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR FRONT). REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. THIS INSTALLATION SHOULD BE MADE BY A QUALIFIED SERVICE PERSON.

ATTENTION:

This commercial unit is intended for the decoding of DigiCipher®II television signals for commercial use. Possession of this device does not enable or entitle the possessor to receive DigiCipher II television signals. Contact program providers to obtain appropriate authorizations.

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QUICK INSTALL - READ THIS FIRST!

DSR-4500X DigiCipher® II Commercial Receiver/Decoder

Motorola, Inc.
6450 Sequence Dr., San Diego, CA 92121

Customer Hotline (858) 436-4678

Before starting, you must get this information from your programmer:

Programmer	Satellite	Transponder /L-Band Frequency	Polarity	Virtual Channel Table Number	Virtual Channel Number

What you should do...

The DSR-4500X is easy to use. You will notice right away from the front panel that the menu screens are arranged in an orderly manner to allow for a quick installation and set-up. The following information is provided for a normal commercial head-end installation. Certain programmers may provide additional information or specific information for their service.

The DSR-4500X has 8 RF ports (1- 8) on the back panel. Any of these ports can be used for your particular service, however they have been pre-assigned from the factory for typical C-band satellite definitions.

1. Check the packaging for the accessories included with your model.
2. Install the receiver in a 19-inch universal rack, and connect the power. With power connected some of the front panel LEDs as well as the front panel LCD screen will be lit.

   Use the menu tree in the Operator Guide to find your way through the following steps for the LCD menus.
3. Upon power-up, the LCD screen should be at the MAIN MENU with the blinking cursor pointed at "RF Ports." Note: For all LCD menu screens, the (center) bottom line of text will indicate which screen you are currently in.
4. Press the ENTER button or the SELECT button to enter the RF Ports menu. The first screen you see in this menu will be the PORT 1 SETUP screen. By continually pressing the NEXT button you can determine the preset satellite and polarity definitions for all eight ports. If one of the preset definitions matches the satellite feed you are using, it is recommended that you use that port. *Note: It is recommended that you set the unused ports to "Undefined".* This can be done by pressing the ENTER button at the "Satellite" prompt and pressing the ▲ ▼ buttons to change the setting to "Undefined".
5. If there is no satellite definition that matches your need, you can edit the satellite name by first

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pressing the ENTER button at the "Satellite" prompt then using the ◄ ► ▲ ▼ buttons.

6. Insert the L-band coax to the port on the rear panel that you programmed in step 4 or 5. Use a DC block if necessary to prevent another receiver's LNB power output from shutting down the DSR-4500X. Note: If you are using Port 1, you can disable LNB power via the PORT CONFIG screen within the RF Ports menu tree.
7. Once you have the desired satellite and polarity set, and you have connected the L-band coax, press the NEXT (hot) button until you get to the MANUAL TUNE menu. From this menu you will select the active port(s) that you wish to tune the DSR-4500X to as well as the desired frequency and symbol/code/bit rate.
8. Press the ENTER button at the "Active Port" prompt. Use the ▲ ▼ buttons to scroll between 1 and 8 to select the active port. Press SAVE to store the desired port selection.
9. Press the ENTER button at the "Frequency" prompt to select the frequency of the carrier to which you are tuning. The ▲ ▼ buttons will toggle the display between C-Band Transponder #, C-Band Frequency, and Ku-Band Frequency. If the satellite is North American C-Band standard, you may select the transponder number using the C-Band Transp #. Otherwise use the C-Band or Ku-Band direct frequency entry method. Press the ◄ ► buttons followed by the ▲ ▼ buttons to enter your selection. Press the SAVE hot button to store your selection.
10. Press the ENTER button at the "Symbol:Code:Bit:" prompt to select the specific parameters of the carrier to which you are tuning. The default selection is "Auto". *Note: if you do not know what the desired Symbol:Code:Bit rate is for the service you are looking for, you may leave the unit in "Auto" and it will search the various combinations stored in the DSR-4500X. This method may take longer to acquire the signal.* The ▲ ▼ buttons will scroll through the available combinations of symbol rate, code rate, and whether it's a split or combined mode transport stream. Press the SAVE hot button to store the selection and begin the manual tune process.
11. The DIGICIPHER LED will be lit after several seconds if the IRD detects a DigiCipher II signal.
12. If you are tuning more than one RF input port you will need to repeat steps 4 - 10 for each port.
13. To select the service (VCT number and the virtual channel) you wish to receive, press the MAIN MENU (hot) button to return to the main selection screen. Move the cursor to the "Channels" prompt and press the SELECT hot button.
14. Press the ENTER button at the "Channel Number" prompt. Using the ▲ ▼ ◄ ► buttons, enter the channel number for the desired service. Press the ENTER or SAVE hot button to select this channel.
15. Move the cursor to the VCT ID prompt and press the ENTER button. Using the ▲ ▼ ◄ ► buttons, enter the VCT number for the desired service. Press the SAVE hot button to store this VCT number. It may take several minutes to receive a complete VCT download, depending on other message traffic.
16. Once you have locked to a DigiCipher II signal, contact the programmer for an electronic message to authorize your DSR-4500X for programming service on this channel. You must give the programmer the 16-digit address (xxx-xxxxx-xxxxx-xxx) from the rear panel label. This same unit address information can also be found within the Status menu tree.
17. The programmer will be able to provide you with any additional set-up requirements regarding video, audio and data.

The Operator Guide will take you through each menu and show you how to configure the flexible DSR-4500X for your specific needs. We suggest you read it now.

DSR-4500X DigiCipher® II Commercial Receiver/Decoder Operator Guide

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1

Introducing the DSR-4500X

WELCOME TO THE DIGICIPHER® II SYSTEM WORLD

Congratulations on your purchase of the DSR-4500X. The DSR-4500X is the latest in commercial satellite equipment. Incorporating cutting edge advances in technology, the DSR-4500X is sure to be the work horse for cable networks for years to come. Building on its predecessor product, the DSR 4500, the DSR-4500X is an easy to set up and operate Integrated Receiver Decoder (IRD). Most of the controls of the DSR-4500X are maintained by the program provider, while leaving specialized controls available for you to set for your own network operation.

WHAT IS THE DSR-4500X?

The Motorola DSR-4500X digital satellite receiver is an IRD designed for cable operators and other commercial satellite operations. It allows the program provider to perform many of the complex setup tasks. The DSR-4500X can then receive instructions from the satellite as part of the signal. You can also configure it to your exact needs using the extensive front panel menus.

Key Features

- Variable front end allows the DSR-4500X to be used in either full or partial transponder mode. This is a valuable feature for programmers and cable affiliates where transponder bandwidth is a premium.
- VBI re-insertion on lines 10-21 to support such data services as World Standard Teletext, North American Broadcast Teletext, SID/AMOL I & II.
- Bypass video and audio inputs, enables connections of analog or other digital signals to be passed through the unit and switched on or off by your control. Invaluable feature for integration of service to DigiCipher II, which facilitates the migration of your service to

DigiCipher II.

- MPEG-2 video and Dolby® AC-3® audio are employed for video decode/ decompression and audio compression respectively.
- Multiple VCT (Virtual Channel Table) maps can be stored in the DSR-4500X so that the unit can be moved to various satellites/transponders.
- DHEI (DigiCable Headend Expansion Interface) and ASI (Asynchronous Serial Interface) output for connection to headend equipment. The DHEI and ASI allow for connection to external HDTV equipment and DigiCipher IRTs (Integrated Receiver Transceiver), among other equipment. The DHEI and ASI can be configured to output a consistant PID mapping regardless of service input.
- Isochronous, and asynchronous data outputs
- Ethernet port for IRD control and IP data output
- The receiver automatically handles fixed, limited statistical, as well as full statistical multiplexing to provide the best video performance.
- The DSR-4500X outputs two stereo pairs of audio signals at a time, which the programmer may configure as two mono channels. When the programmer provides multiple audio choices, you can select which audio pair will be output.
- Programmers can tag audio channels with a language, and the receiver will select the audio material based on the language you select.
- DTMF output, based on uplink control
- Three sets of contact closures
- Switchable LNB power on port 1
- One video output and one video output with OSD, two stereo pair audio outputs, and eight L-band inputs.
- Outputs either 525 line NTSC/PAL M or 625 line PAL video formats, automatically matching the programmer's input format. (The receiver does not convert from 525- to 625-line video or from 625- to 525-line video.)
- Memory to recall the operating configuration when power sags or is removed.
- Security features, including Motorola's proven security system. The unit does not require a TvPass® card to operate with security. In the unlikely event that the code is broken, security can be renewed by inserting a card with a new code into the receiver. Programmers may also utilize fingerprinting techniques to aid in piracy control.
- A 4 line 40 character front panel with a timeout backlit liquid crystal display (LCD).

2

Connecting the DSR-4500X

UNPACKING AND CONNECTING THE DSR-4500X

Cable connections described in this chapter are made to the rear panel of the DSR-4500X.

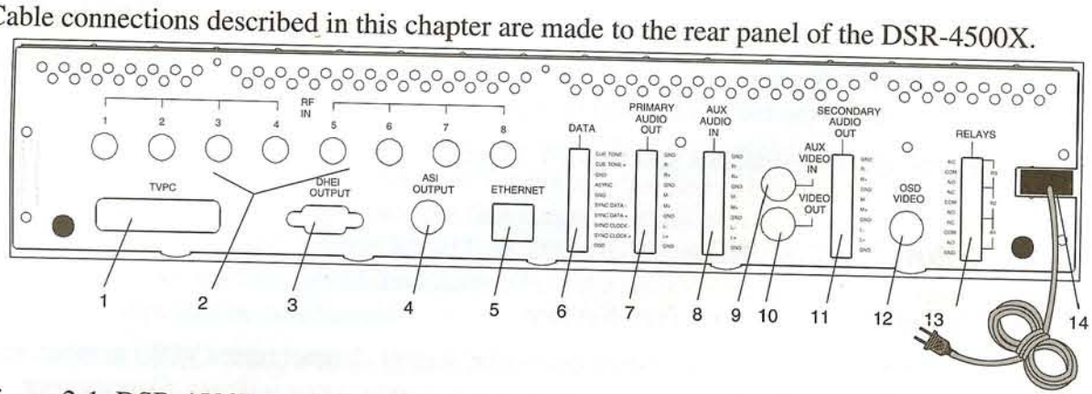


Figure 2-1: DSR-4500X Back Panel

1. TVPass Card
2. RF Input Ports
3. DHEI Output
4. ASI Output
5. Ethernet Port
6. Data
7. Primary Audio Out
8. Aux Audio In
9. Aux Video In
10. Video Out
11. Secondary Audio Out
12. Video Out (with OSD)
13. Relays
14. Power

UNPACKING AND MOUNTING

The shipping carton should contain the DSR-4500X, five (5) quick disconnect terminals and this Operator Guide.

This unit is designed for installation in a standard 19-inch equipment rack. If you plan to mount it in a rack, be sure to use pan or round head screws and washers in all four front panel mounting locations. This ensures a secure mount for the size and weight of the unit. You must supply screws matching your rack.

The IRD should be installed in an EIA compliant 19" rack. It is recommended that the IRDs have 1U spacing for airflow. Mounting with an air gap between receivers or alternating receivers with low power consumption equipment that does not block the front to back air flow of the receiver chassis is suggested.

The units can be installed with no spacing under the following conditions:

- Altitude of installation is less that 3,000 ft. above sea level.
- Maximum operating ambient (room air) temperature does not exceed 90 deg F.
- The rack is ventilated with a fan that produces a pressure differential from the front of the unit to the back of the unit of better than 0.02 inches of water.

For all other conditions a spacing of 1.75 inches above the IRD is necessary.

CONNECTING A UNIT

To Connect a Unit for a New Service

First determine which satellite, transponder, virtual channel table (VCT) number, virtual channel, and audio mode (stereo, mono, or dual mono) you will use. Contact your programmer for this system information so that you can receive the desired services.

Connect the L-band inputs from the dish antenna and LNB. Use a DC block if necessary to prevent another receiver's LNB power output from shutting down the DSR-4500X. Only Port 1 of the DSR-4500X provides LNB power.

- For a single polarity L-band satellite connection, connect the coax from the LNB (either horizontal or vertical) to port 1 through port 8.
- It is important for you to record which polarities and ports are connected to the LNB for later use when inputting information in the front panel menus. Labeling the coax at the rear panel is also a good practice.

To view video and on-screen diagnostics during installation, connect the Video Output on the unit to a 75 ohm video monitor. Diagnostic data is output only on Video 2 Output.

To allow you to listen to audio during installation, connect the audio outputs to a local amplifier and speakers. A standard stereo system will suffice, but the lack of differential audio inputs may make the audio appear degraded. After the unit is authorized and outputting the desired service, you must reconnect these outputs to your channel modulator or other inputs to your cable plant. Since these are differential pairs, it is recommended to use two pair shielded audio cables rather than the single wire and shield type. For best quality audio, please take care to ground the shield on both the IRD GND terminal and at the channel modulator end.

- For services transmitted in stereo and used in your plant as stereo, connect the LEFT AUDIO OUT terminals (L+ and L-) to the left audio inputs on the channel modulator, and connect the RIGHT AUDIO OUT terminals (R+ and R-) to the right audio inputs on the channel modulator.
- For services transmitted in stereo and used in your plant as mono, connect the MONO AUDIO OUT terminals (M+ and M-) to the audio inputs on the channel modulator. This mono output sums both left and right to derive mono for you.
- For services transmitted in a single mono, connect the LEFT AUDIO OUT terminals (L+ and L-) to the audio inputs on the channel modulator. RIGHT AUDIO OUT terminals (R+ and R-) will also contain the single mono.
- For services transmitted in dual mono mode (for example, English and Spanish) connect the LEFT AUDIO OUT terminals (L+ and L-) to the mono audio inputs on the channel modulator where the first language of the pair is to be used (English in the example), and connect RIGHT AUDIO OUT terminals (R+ and R-) to the mono audio inputs on the channel modulator where the second language of the pair is to be used (Spanish in the example).

Your DSR-4500X will be able to generate cue tones when commanded over the satellite link. If these internally generated cue tones are used, connect the 600 ohm differential CUE TONE+ and CUE TONE- terminals on the DSR-4500X to the device that will be accepting the tones. The cautions on cable and grounding noted in the audio instructions (above) also apply to cue tones.

If ASYNC data services are to be used, connect the ASYNC and GND terminals on the to the appropriate connector on the RS232 device that will be accepting the data.

If DHEI connection is being made, use HD-22 standard cable to connect.

Plug the DSR-4500X into a power source. Verify that the LCD is lit.

Proceed with the installation using the front panel menus. Remember to reconnect the VIDEO OUT and AUDIO OUT to the cable plant when the desired services have been verified.

To Connect a Unit that Replaces an Existing Service (Including Transition from DigiCipher I to DigiCipher II)

Set up the unit as described above (with monitors and local audio amplifiers), using test periods where the programmer provides a DigiCipher II signal intermittently. Verify that the desired service can be received during these test periods.

At a time least disruptive to your cable customers, disconnect the current service's video and audio inputs to the channel modulator or other input to your cable plant. Connect the video to the AUX VIDEO IN and the audio to the LEFT, RIGHT, or MONO AUX AUDIO inputs. Connect the DSR-4500X video output to your channel modulator or other input to your cable plant. Connect the DSR-4500X audio outputs to your channel modulator or other input to your cable plant. The AUX VIDEO and AUDIO inputs will be passed through the DSR-4500X until it is ready to output the DigiCipher II/MPEG-2 signal.

3

Operating the DSR-4500X

All operations described in this chapter require using the front panel. As illustrated in Figure 3-1, the front panel has a liquid crystal display (LCD), several indicator lights (LEDs, or light-emitting diodes) and eight (8) buttons.

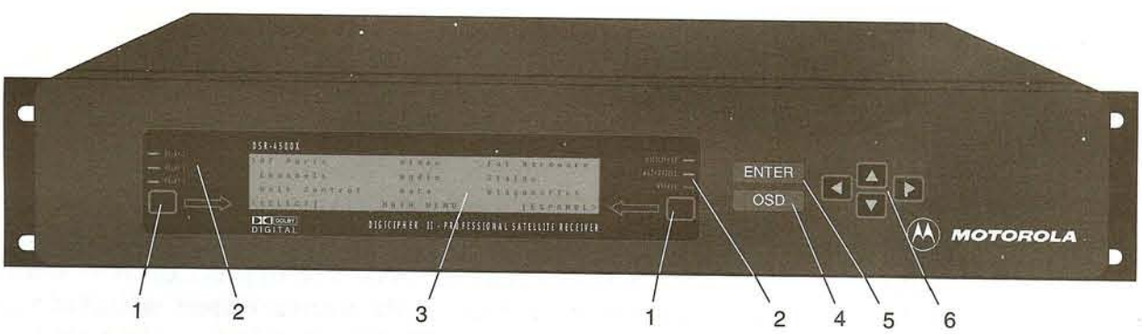


Figure 3-1: DSR-4500X Front Panel

The following items are located on the front panel:

1. Hot buttons (2)
2. LED Indicators (6)
3. 4 line LCD screen
4. OSD button
5. ENTER button
6. Navigational Arrows: Up, Down, Left, Right

LCD MENU DISPLAY

The front panel LCD screen displays a series of menus that you can use to configure and control the system. So that you can always identify what you are looking at, the name of the current menu is always in the center of the bottom row of the screen.

When you first turn on the unit, the Main menu will appear, and a cursor to the left of the words "RF Ports" should be blinking.

The LCD is momentarily backlit with circuitry that turns off the backlighting for three minutes after the last button press. To view the screen after backlighting has turned off, press any button once to turn on the backlighting, then press additional buttons to navigate around the menu.

LED INDICATORS

There are six (6) LED indicators that show the receiver's current status. The DIGICIPHER light will be lit when the receiver recognizes the DigiCipher II signal. The Authorized LED will be lit when the DIGICIPHER LED is lit and either (1) the programmer has transmitted the access messages to allow the receiver to decrypt the signal or (2) the signal has been transmitted in an unscrambled or fixed scrambled mode. The Bypass LED is on when the auxiliary video and audio inputs are being routed to the receiver outputs instead of a signal originating from the RF inputs. The RELAY 1 LED, RELAY 2 LED and RELAY 3 LED will reflect the state of the three contact closures. RELAY 3 can be configured to be based on the alarm state of the unit.

NAVIGATIONAL ARROWS

The navigational arrows allow the user to move the cursor among the fields within each menu. In the main menu the cursor will move to all nine (9) items to select a submenu. From all other menu screens, the ▲ ▼ will allow the cursor to move among fields that can be edited; while the ◀ ▶ will cycle the submenus.

ENTER BUTTON

The ENTER button is used from the submenus to enter EDIT mode or SAVE the selection. When in a submenu, pressing the ENTER button will allow editing of the field the cursor is pointing.

HOT BUTTONS

The Hot buttons are located to the right and left sides of the LCD screen. They are multi-purpose buttons whose definitions will change depending on the state of the unit. The text to the immediate left and right of them describes their current use.

ON SCREEN DISPLAY (OSD) BUTTON

The OSD button toggles display of the On Screen Display among three states: Fast Facts 1, Fast Facts 2, and Off. Note: the On Screen Display is only visible on Video 2 output.

BIRD'S EYE VIEW OF THE LCD PANEL MENU TREE.

The next several pages show how the front panel LCD menus are organized. The menus below the main menu have been organized into nine main groups:

1. RF Ports
2. Channels
3. Unit Control
4. Video
5. Audio
6. Data
7. Ext Hardware
8. Status
9. Diagnostics

MAIN MENU

```
>RF Ports          Video     Ext Hardware
 Channels          Audio     Status
 Unit Control      Data      Diagnostics
<SELECT]         MAIN MENU      [ESPANOL>
```

RF PORTS

```
>Satellite    =  G1R
  Polarity    =  Horizontal
  Status      :  Defined
<MAIN MENU]   PORT 1 SETUP(1/10)   [NEXT>
```

```
>Satellite    =  G1R
  Polarity    =  Vertical
  Status      :  Defined
<MAIN MENU]   PORT 2 SETUP(2/10)   [NEXT>
```

```
>Satellite    =  G5
  Polarity    =  Horizontal
  Status      :  Defined
<MAIN MENU]   PORT 3 SETUP(3/10)   [NEXT>
```

```
>Satellite    =  G5
  Polarity    =  Vertical
  Status      :  Defined
<MAIN MENU]   PORT 4 SETUP(4/10)   [NEXT>
```

```
>Satellite    =  G9
  Polarity    =  Horizontal
  Status      :  Defined
<MAIN MENU]   PORT 5 SETUP(5/10)   [NEXT>
```

```
>Satellite    =  G9
  Polarity    =  Vertical
  Status      :  Defined
<MAIN MENU]   PORT 6 SETUP(6/10)   [NEXT>
```

```
>Satellite    =  G10R
  Polarity    =  Horizontal
  Status      :  Defined
<MAIN MENU]   PORT 7 SETUP(7/10)   [NEXT>
```

```
>Satellite    =  G10R
  Polarity    =  Vertical
  Status      :  Defined
<MAIN MENU]   PORT 8 SETUP(8/10)   [NEXT>
```

```
>Port Test            =  Off
  Port Status on OSD  =  No
  Port 1 Power        =  Off
<MAIN MENU]   PORT CONFIG(9/10)    [NEXT>
```

```
>Active Port        =  1
 Frequency          =  C-Band Transp # 1
 Symbol:Code:Bit    =  29.26:3/4:Combined
<MAIN MENU]   MANUAL TUNE(10/10)   [NEXT>
```

CHANNELS

```
>Channel Number = 18
 VCT ID         = 192
 Provider ID    = Auto
<MAIN MENU]   CHANNEL SELECT(1/2)   [NEXT>
```

```
 Transponder : C-band #14
 Source      : Yankees vs. Padres
 Satellite   : Galaxy 1
<MAIN MENU]   CHANNEL STATUS(2/2)   [NEXT>
```

UNIT CONTROL

```
>Contrast          = 17
 Acq Recovery      = Transponder Mode
 Factory Reset     = No
<MAIN MENU]   UNIT CONTROL(1/3)     [NEXT>
```

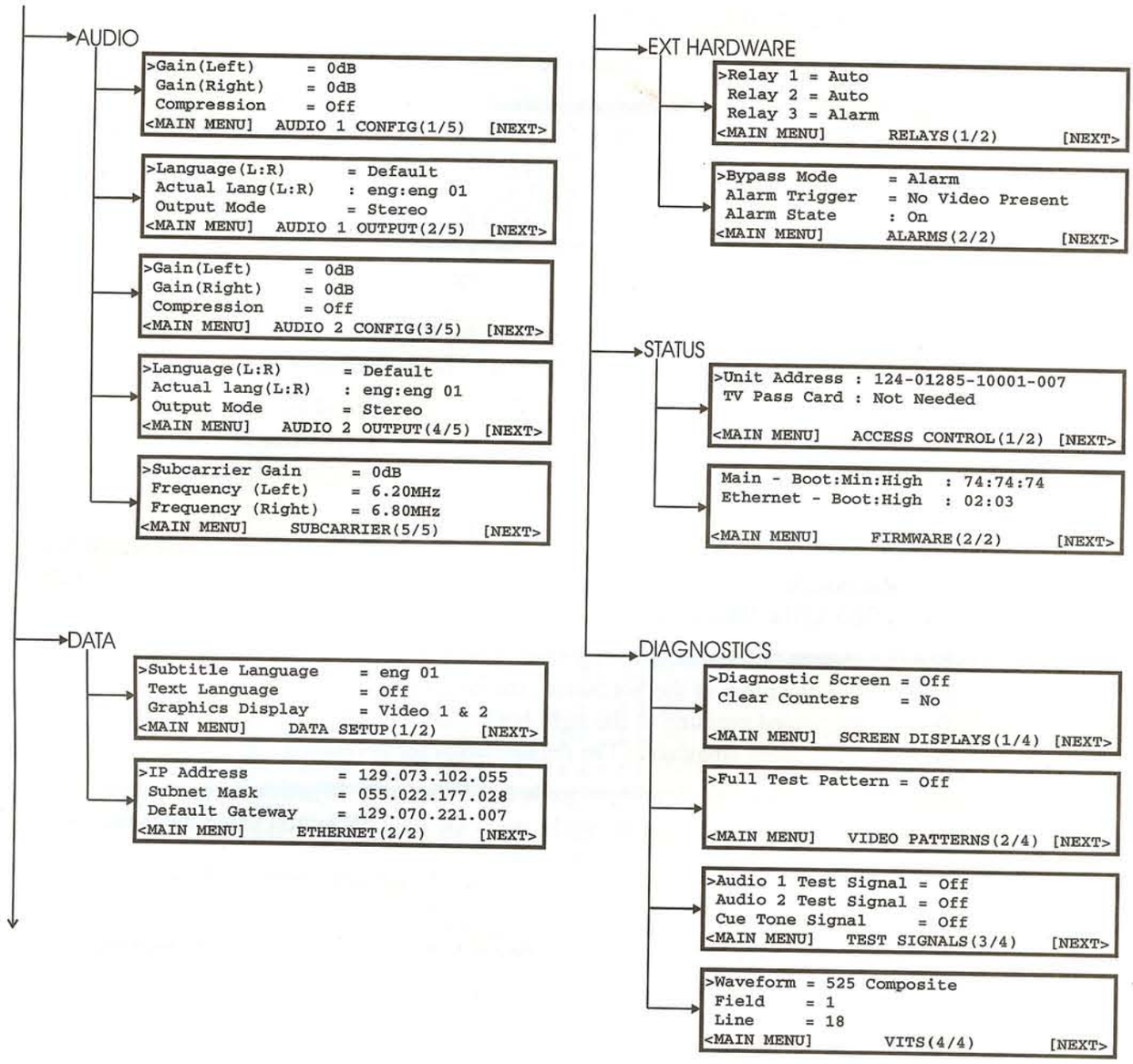
```
 Front Panel Lockout : No
>PID Aliasing        = Off

<MAIN MENU]    UNIT CONTROL(2/3)    [NEXT>
```

```
 Ethernet Control    = Disabled
 Data Outputs        = Enabled
 ASI & DHEI Outputs = Enabled
<MAIN MENU]   LOCKOUT STATUS(3/3)   [NEXT>
```

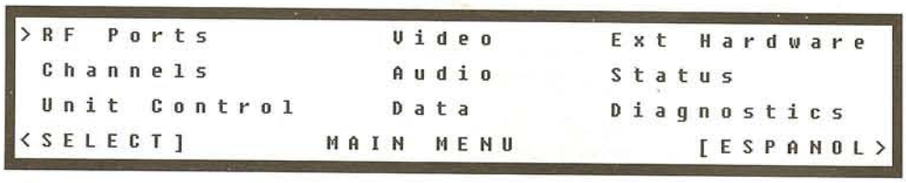
VIDEO

```
>Output Format for 525 Lines = NTSC
 Output Format for 626 Lines = PAL B
 Aspect Ratio Status         : 4x3
<MAIN MENU]    VIDEO OUTPUT(1/1)    [NEXT>
```


AUDIO
>Gain(Left) = 0dB
Gain(Right) = 0dB
Compression = Off
<MAIN MENU] AUDIO 1 CONFIG(1/5) [NEXT>
>Language(L:R) = Default
Actual Lang(L:R) : eng:eng 01
Output Mode = Stereo
<MAIN MENU] AUDIO 1 OUTPUT(2/5) [NEXT>
>Gain(Left) = 0dB
Gain(Right) = 0dB
Compression = Off
<MAIN MENU] AUDIO 2 CONFIG(3/5) [NEXT>
>Language(L:R) = Default
Actual lang(L:R) : eng:eng 01
Output Mode = Stereo
<MAIN MENU] AUDIO 2 OUTPUT(4/5) [NEXT>
>Subcarrier Gain = 0dB
Frequency (Left) = 6.20MHz
Frequency (Right) = 6.80MHz
<MAIN MENU] SUBCARRIER(5/5) [NEXT>
DATA
>Subtitle Language = eng 01
Text Language = Off
Graphics Display = Video 1 & 2
<MAIN MENU] DATA SETUP(1/2) [NEXT>
>IP Address = 129.073.102.055
Subnet Mask = 055.022.177.028
Default Gateway = 129.070.221.007
<MAIN MENU] ETHERNET(2/2) [NEXT>
EXT HARDWARE
>Relay 1 = Auto
Relay 2 = Auto
Relay 3 = Alarm
<MAIN MENU] RELAYS(1/2) [NEXT>
>Bypass Mode = Alarm
Alarm Trigger = No Video Present
Alarm State : On
<MAIN MENU] ALARMS(2/2) [NEXT>
STATUS
>Unit Address : 124-01285-10001-007
TV Pass Card : Not Needed
<MAIN MENU] ACCESS CONTROL(1/2) [NEXT>
Main - Boot:Min:High : 74:74:74
Ethernet - Boot:High : 02:03
<MAIN MENU] FIRMWARE(2/2) [NEXT>
DIAGNOSTICS
>Diagnostic Screen = Off
Clear Counters = No
<MAIN MENU] SCREEN DISPLAYS(1/4) [NEXT>
>Full Test Pattern = Off
<MAIN MENU] VIDEO PATTERNS(2/4) [NEXT>
>Audio 1 Test Signal = Off
Audio 2 Test Signal = Off
Cue Tone Signal = Off
<MAIN MENU] TEST SIGNALS(3/4) [NEXT>
>Waveform = 525 Composite
Field = 1
Line = 18
<MAIN MENU] VITS(4/4) [NEXT>

NAVIGATING THE MENUS

Main Menu

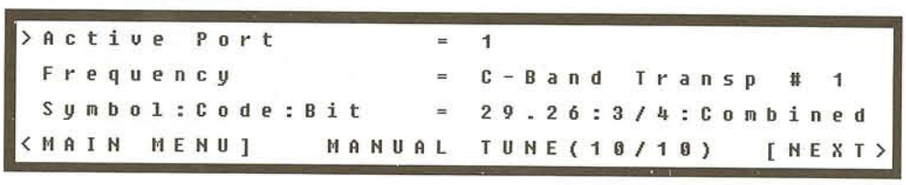


The following applies to the Main Menu:

- The menus are organized into nine main groups: RF Ports, Channels, Unit Control, Video, Audio, Data, Ext Hardware, Status, and Diagnostic menus. The Main Menu allows selection of one of the nine groups.
- The cursor is designated by a" >". It moves up, down, left, and right when the ▲ ▼ ◀ ▶ buttons are pressed. On power up the default cursor position is on "RF Ports".
- The left hot button is labeled "SELECT" and allows entry into the submenu so you can view and possibly change the settings within that submenu. The ENTER button has the same effect as the "SELECT" hot button.
- The right hot button is labeled "ESPANOL" and switches the language of the front panel. After one press of the hot button, the language of the front panel will switch to Spanish. Repeated pressing of the right hot button will toggle between English and Spanish front panel languages. The default language is English.

The submenus have two modes: View mode and Edit mode. When entering a menu, it is always in View mode. To enter Edit mode, press the ENTER button when the cursor is positioned on the item you would like to edit.

Lower Level Menus - View Mode

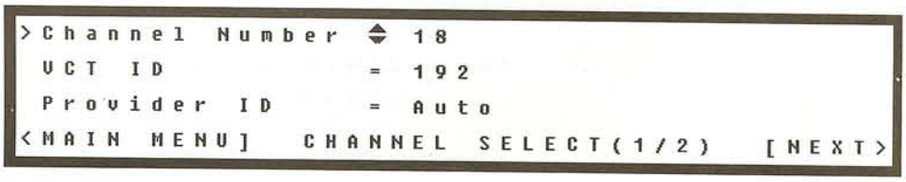


The following applies to all screens when in View mode:

- Entry from the main menu always enters the lower level menus in View mode.
- The cursor is shown to the left of the field and is only visible if the value can be edited.

- There are always two columns: 1) field title and 2) value.
- The value is shown to the right of the field. An "=" precedes the value if it can be edited. A":" precedes the value if it cannot be edited. A padlock symbol separates the field and the value to indicate a front panel lockout.
- The ▲ ▼ buttons move the cursor up and down through the field titles for the screen. The cursor only stops on lines that have an editable value.
- The ◀ ▶ buttons cycle through display of the lower level menus within the group. The ▶ button has the same effect as the "NEXT" hot button. The ◀ button is "previous".
- The "ENTER" button enters edit mode for the field to which the cursor is pointing.
- The left hot button is labeled "MAIN MENU" and signifies return to the Main Menu.
- The right hot button is labeled "NEXT" and signifies display of the subsequent menu within the current chosen submenu group.
- The number of the current submenu and the total number of submenus are listed immediately to the right of the menu title.

Lower Level Menus - Edit Mode



The following applies to all screens when in Edit mode:

- Edit mode only handles editing of the value next to the cursor selected field.
- Pressing either hot button takes the unit out of edit mode and returns it to view mode, with the cursor on the item just edited. The left hot button is labeled "SAVE" and permanently stores the changed value. The right hot button is labeled "CANCEL" and returns the value to the state prior to entering Edit mode.
- The ENTER button has the same effect as the "SAVE" hot button.
- If the blinking cursor is over the ⬍ then the ▲ ▼ buttons cycle through the list of possible values. The ◀ ▶ buttons may edit individual characters of this value.
- If each character of the value is edited separately then the cursor is on the first position of the character to be changed. The ◀ ▶ buttons move the cursor to the next position in the value and the ▲ ▼ buttons cycle through the possible values for the individual

character.

- Some fields allow both selection from a list and editing of individual characters. In this case, the ▲ ▼ buttons cycle through the list of options, when the cursor is on the ▲▼ character. When the cursor is not on the ▲▼ character the ▲ ▼ buttons cycle through the possible values for the individual character.

RF PORTS MENU

The purpose of the RF Ports menus is to configure the RF inputs so the unit can lock to a signal and begin downloading network data required for operation.

The steps to configure the RF ports include:

1. Enter the satellite name and polarity for each port that has an RF input connected to it. Note: for some customers the uplink may send a configuration message to the unit to handle this, rather than entering the information into the front panel.
2. If the uplink sent the port configuration information to the unit, then run a "Port Test" on the unit (see page 25) and verify that all ports have a "Confirmed" or "Undefined" status.
3. Manually tune the unit by entering a port number, frequency, symbol rate, coding rate, and bitstream selection. Verify that the DIGICIPHER LED is lit.
4. Use the Channel Select submenu to select a channel number and VCT ID on one of the installed ports.

Port 1 Setup Menu

```
>Satellite  =  G10R
 Polarity   =  Horizontal
 Status     :  Defined
<MAIN MENU]   PORT 1 SETUP(1/10)     [NEXT>
```

The following information applies for the Port 1 through Port 8 Setup menus.

Press the ◀ ▶ buttons until the desired Port Setup menu appears.

Satellite Field

The satellite field contains the two to four character abbreviation of the satellite name. To enter a value, use the ▲ ▼ buttons to move the cursor to the Satellite label. Press the ENTER button to begin editing the value. Scroll through the list of currently available satellite abbreviations, by using the ▲ ▼ buttons when the cursor is on the ◆ character. Select "Undefined" if there is no RF input attached to the port.

To edit each character individually, use the ◀ ▶ buttons to move the cursor and the ▲ ▼ buttons to change the character. Press the SAVE hot button to store the selection.

Polarity Field

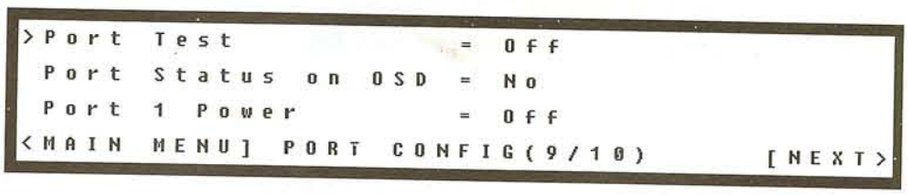
The Polarity field is the polarity of the RF input. The options are Horizontal or Vertical. To change the polarity, select Polarity with the cursor and press ENTER to enter edit mode. Use the ▲ ▼ buttons to toggle between Horizontal and Vertical. Press the SAVE hot button to store the selection.

Status Menu

The Status field is a read-only value. It describes the state of the port configuration. There are seven possible states:

- Undefined - The port does not have a configuration assigned to it. It should say "Undefined" if there is no RF input connection to the port. If there is an RF connection but the Status field says "Undefined", then the satellite and polarity of the port need to be entered before the unit can tune to the port.
- Defined - The port has been defined by the front panel operator and it is ready for either virtual channel tuning or manual tuning.
- Port Test Needed - The port configuration has been set by the uplink, so a port test needs to be run to verify the RF connections and definitions.
- Confirmed - The port test ran successfully for the port. The port is ready for virtual channel tuning or manual tuning.
- Wait for Map - A port test has been run, but the Virtual Channel maps have not been received by the unit so the port test has not been completed. Another port test will need to be run on the unit to get it out of this state.
- Check Connection - A port test has been run, but the unit could not find a signal on the port. Verify that the RF input is attached properly to the unit and that it is the correct cable that matches the satellite and polarity of the port.
- Bad Port Definition - There is an inconsistency among the information the uplink is sending to the unit. Call the provider.

Port Config Menu



Port Test

A Port Test verifies the uplink defined port information with the actual signal connected to the RF port. It is useful only after the uplink sends the port configuration information to the unit, not when the port is defined from the front panel.

The Port Test field turns on and off the port test. The port test can be run in either scan once mode or continuous mode. In scan once mode, the unit tries each defined port once to verify the existence of the expected signal on the port. In continuous mode, the port test cycles through all the defined ports indefinitely until it is either turned off or the Port Config menu is exited.

To change the state of the Port test, use the ▲ ▼ buttons to select Port Test and press ENTER to begin editing the state. Use the ▲ ▼ buttons to scroll through the list of options: Off, Continuous, or Scan Once. Press the SAVE hot button to store the new state. Typically, Continuous Mode would only be used to troubleshoot an error condition.

Port Status on OSD

The Fast Facts 2 On-Screen Display shows the status of the eight ports and is very useful to view while running the port test. For ease of operation, the Port Status on OSD field will turn on the Fast Facts 2 screen. To turn it on, select the Port Status on OSD field and press ENTER to change the value. Use the ▲ ▼ buttons to toggle between Yes and No, press the SAVE hot button to save the selection. The default is No.

Port 1 Power

The Port 1 Power field will turn on and off the power to RF Port 1. To change the setting, select the Port 1 Power label and press the ENTER hot button to change the value. Use the ▲ ▼ buttons to toggle the value On and Off. The change takes place immediately by Press the SAVE hot button to keep this setting permanently or press the CANCEL hot button to restore the value before editing.

Manual Tune Menu

This menu allows you to initially acquire a DigiCipher II signal and download virtual channel tables (VCTs) by selecting a transponder frequency, symbol rate, coding rate and bitstream for an L-band input.

Manual Tune Menu

```
>Active Port          = 1
 Frequency            = C-Band Transp # 1
 Symbol:Code:Bit      = 29.26:3/4:Combined
<MAIN MENU]   MANUAL TUNE(10/10)     [NEXT>
```

Active Port

The Active Port field is the RF port on which the operator is starting a manual tune. The options are 1-8. To change the Active Port, select the Active Port label and press ENTER to begin editing the value. Use the ▲ ▼ buttons to scroll through the list of ports. Press the SAVE hot button to store the selection.

Frequency Field

The Frequency field is used to enter the frequency and band at which to manually tune the unit. There are three ways to enter the information, which the operator can scroll between when the cursor is on the ◆ character: (1) C-band transponder number, (2) C-band frequency, (3) Ku-band frequency.

The North American C-band frequency plans are standardized, so the operator can directly enter a transponder number and the unit will translate that into a frequency as in option (1) above. The transponder options are from 1-24. If the operator wants an International C-band satellite or a Ku-band satellite, then the operator needs to enter the frequency directly in MHz; as in options (2) and (3) above. The frequency options are from 950 to 2150 MHz and can be adjusted in 125 kHz steps. The default setting for the Frequency field is C-band transponder #14. To change the Frequency field, select Frequency and press ENTER to edit. When the cursor is on the ◆ character, cycle through the three options of entering the frequency:

1. C-band transponder number
2. C-band frequency
3. Ku-band frequency

Once on the selected frequency entry mode, use the ◀ ▶ buttons to select the field character that needs to be changed and use the ▲ ▼ buttons to change the value. Once the value is correct, press the SAVE hot button to store the setting and the unit will begin the manual tune.

Symbol:Code:Bit

The Symbol:Code:Bit field is a concatenation of three values: the symbol rate, the coding rate and the bitstream selection. The operator may choose either a combination or Auto from the list. If Auto is selected, the unit will search all the combinations looking for a valid one. The symbol rate takes eight possible values: (1) 29.3 Msps, (2) 19.5 Msps, (3) 14.6 Msps, (4) 11.7 Msps, (5) 9.76 Msps, (6) 7.32 Msps, (7) 4.88 Msps, and (8) 3.25 Msps.

The Coding Rate takes eight possible values: (1) 7/8, (2) 5/6, (3) 4/5, (4) 3/4, (5) 2/3, (6) 3/5, (7) 1/2, and (8) 5/11.

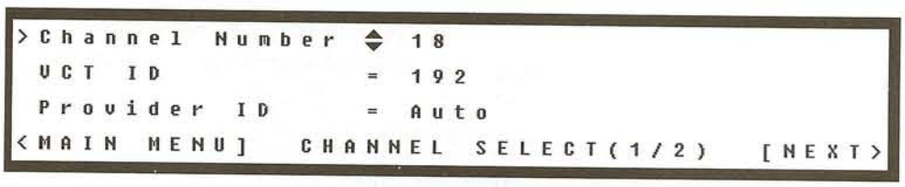
The Bitstream Select takes two possible values: (1) Combined and (2) Split.

The Symbol:Code:Bit field is a long list of possible combinations of the three values. To change it press ENTER to edit the field, then use the ▲ ▼ buttons to scroll through the list. Press the SAVE hot button to store the selection and begin the manual tune.

CHANNELS MENU

The Channels menus allow the user to select virtual channels and view information about the channel.

Channel Select Menu



This menu allows you to select the (Virtual) Channel Number, select the VCT ID (virtual channel table identification), and set the current Provider ID.

Channel Number

This field allows the user to select the virtual channel for the output service. Virtual channel options range from 1 to 4095. Press the ▲ ▼ buttons until the cursor is at the Channel Number label, and press the ENTER button to move to the value. When the cursor is over the ▲▼ character use the ▲ ▼ buttons to select from a list of available (virtual) channel numbers. Use the ◀ ▶ buttons to select the digit to change. Press the ▲ ▼ buttons to change a digit. Press the ENTER button or SAVE hot button to store the selection.

VCT ID

This field allows you to select a virtual channel table (VCT) number. Please contact the program provider for the correct VCT number to enter for that commercial system. Press the ▲ ▼ buttons until the cursor is at the VCT label, and press the ENTER button to begin editing the field. When the cursor is over ▲▼ character, use the ▲ ▼ buttons to select from a list of available VCT IDs then press the ◀ ▶ buttons to change that digit. Press the ▲ ▼ buttons to change a digit. The VCT ID number is an index number from 0 to 65535. Press the SAVE hot button to store the selection.

Provider ID Menu

The Provider ID menu allows for additional flexibility in access control for future needs. It allows you to enter a new EMM provider ID number if provided by the programmer. Press the ▲ ▼ buttons until the cursor is at the provider ID label, and press the ENTER button to begin editing the field. When the cursor is over ▲▼ character, use the ▲ ▼ buttons to select from a list of available Provider IDs then press the ◀ ▶ buttons to change that digit. Press

the ▲ ▼ buttons to display a new number. The Provider ID number is an index number from 0 to 65535. Press the SAVE hot button to store the selection. *Caution: if you do not know the EMM provider ID number use the default setting of zero.*

Channel Status Menu

This menu allows the user to view the status of the Transponder, Source and Satellite names.

Transponder Field

This non-editable field displays the current transponder name (alpha/ numeric) that is downloaded. If you change the VCT or the frequency this field will be invalid until the new VCT is received from the uplink. The unit will display dashes (--) until the name is available.

Source Field

This non-editable field displays the name of the current source signal as received from the uplink.

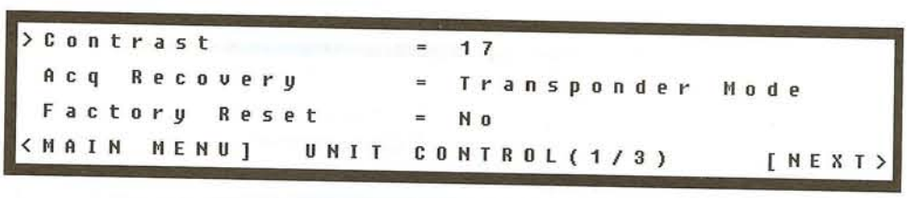
Satellite Field

This non-editable field displays the name of the current satellite as received from the uplink.

UNIT CONTROL MENU

The menus allow you to change the front panel LCD Contrast, set the Acquisition Recovery mode, reset the system to factory programmed values, change the PID Aliasing setting and view lockout status.

Unit Control Menu



Contrast

To adjust the LCD contrast, press the ▲ ▼ buttons until the cursor is at the Contrast label. Press the ENTER button to move into the field. Press the ▲ ▼ buttons to select a value between 1 and 32, with 1 representing the least contrast and 32 the most. Adjust the contrast so that the LCD panel can be read clearly from the angle at which you normally view the screen. Press the SAVE hot button to store the selection. The default is 16.

Acq Recovery

To change the acquisition recovery mode, press the ▲ ▼ buttons until the cursor is at the Acq Recovery label. Press the ENTER button to move into the field. The options are Disabled and Transponder Mode. The default is Transponder Mode. Disabled means that when a signal is lost, the unit will remain at the same RF configuration until the signal returns. Transponder mode means that after the signal has been lost for a significant length of time, the unit will use its internal channel definitions to retune the unit to alternate RF parameters until it finds another valid signal where it can find a new definition for its lost channel.

Factory Reset

The Reset field lets you reset the system to the programming values originally set by the factory firmware. *Caution: Pressing reset will delete all setups you have entered and all downloaded information. Use this option cautiously. It will interrupt service output.* Press the ▲ ▼ buttons until the cursor is at the Reset label, and press the ENTER button to move into the field. Press the ▲ ▼ buttons to display the options. The options are Yes and No. The default is No. The Yes option resets the unit after the SAVE hot button is selected. Use the CANCEL hot button to leave the field without performing a factory reset.

Unit Control Menu

```
 Front Panel Lockout  :  No
>PID Aliasing         =  Off

<MAIN MENU]    UNIT CONTROL(2/3)    [NEXT>
```

Front Panel Lockout

The Front Panel Lockout is not a user selectable field. It must be set from the uplink. The values are Locked and Not Locked. The default is Not Locked. When Front Panel Lockout is Locked the uplink controls many parameters of the unit limiting the amount of configuration needed from the front panel.

PID Aliasing

To set the PID Aliasing mode, press the ▲ ▼ buttons until the cursor is at the PID Aliasing label. Press the ENTER button to move into the field.

The PID Aliasing field is used to enable and disable PID aliasing. When PID aliasing is disabled, the ASI and DHEI outputs will contain the entire transport stream with no adjustments done to the PID values. When PID aliasing is enabled, the ASI and DHEI outputs will contain only the selected service and the PID values will be adjusted to a consistent numbering scheme, regardless of the input services PID numbering.

Lockout Status Menu

```
 Ethernet Control     =  Disabled
 Data Outputs         =  Enabled
 ASI & DHEI Outputs   =  Enabled
<MAIN MENU]   LOCKOUT STATUS(3/3)   [NEXT>
```

Ethernet Control

Ethernet Control is a status only field; it cannot be edited. It must be set from the uplink. When in the Not Locked state, the unit will accept control commands via the Ethernet port. When in the Locked state, the unit will ignore control commands received over the Ethernet port. The default is Not Locked.

Data Outputs

The Data Outputs is a status only field; it cannot be edited. It must be set from the uplink. When in the Not Locked state, the unit will output asynchronous, isochronous and Ethernet data when available on the selected service. When in the Locked state, the unit will mute its data output ports. The default is Not Locked.

ASI & DHEI Outputs

ASI & DHEI outputs is a status only field; it cannot be edited. It must be set from the uplink. When in the Not Locked state, the unit will output a transport stream on the ASI output port and the DHEI output port. When in the Locked state the unit will mute its ASI and DHEI ports. The default is Not Locked.

VIDEO MENU

From the Main Menu, select the Video menu. The Video menu has two fields that allow you to modify the output format. Note that the receiver does not convert 525-line video to 625-line video or convert 625-line video to 525-line video. When the input to the uplink encoder is 525-line, the 525-line field selects the receiver output to be NTSC or PAL M, and the 625-line field has no impact. When the input to the uplink encoder is a 625-line, the 625-line field selects the type of PAL the receiver outputs, and the 525-line selection has no impact.

The Video menu also displays the aspect ratio of the output video.

Video Output Menu

```
>Output Format for 525 Lines = NTSC
 Output Format for 626 Lines = PAL B
 Aspect Ratio Status         : 4x3
<MAIN MENU]    VIDEO OUTPUT(1/1)    [NEXT>
```

525-Lines Field

Press the ▲ ▼ buttons until the cursor is at the 525-lines label, and press the ENTER button to move into the field. This field allows you to select the output format for 525-line video as either NTSC or PAL M. The default setting is NTSC. Press the ▲ ▼ buttons to display the options. Press the SAVE hot button to store the selection.

625-Lines Field

Press the ▲ ▼ buttons until the cursor is at the 625-lines label, and press the ENTER button to move into the field. This field allows you to select the output format for 625-line video as either PAL B, PAL D, PAL G, , PAL H, PAL I, or PAL N. The default setting is PAL B. Press the ▲ ▼ buttons to display the options. Press the SAVE hot button to store the selection.

Aspect Ratio Status Field

The Aspect Ratio Status is a read-only display; it cannot be edited. The Aspect Ratio Status displays the aspect ratio of the input and output video signal. The unit does not do any aspect ratio conversion.

AUDIO MENU

On the Main menu select the Audio menu. This menu has five sub-menus that allow you to customize the audio output based on options provided by the Dolby AC-3 compression system. *NOTE: Audio 1 is Primary Audio and Audio 2 is Secondary Audio.*

Audio 1 Config Menu

```
>Gain (Left)      = 0dB
 Gain (Right)     = 0dB
 Compression      = Off
<MAIN MENU]  AUDIO 1 CONFIG(1/5)  [NEXT>
```

The following information applies to both AUDIO 1 CONFIG and AUDIO 2 CONFIG menus.

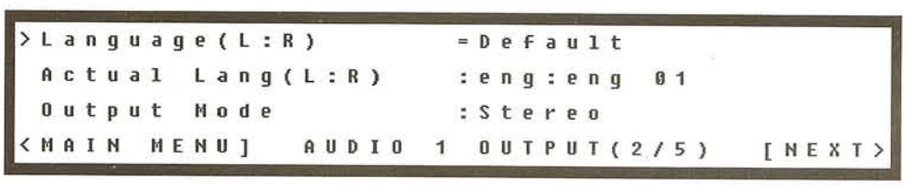
Gain

This field is used to adjust the value of the audio signal output level from -15 dB to 1 dB in 1dB increments. Press the ▲ ▼ buttons until the cursor is at the Gain label, and press the ENTER button to edit the value. Press the ▲ ▼ buttons to display the options from -15 dB to 0 dB. Press the SAVE hot button to store the selection.

Compression

This field is used to control the degree of audio level compression. Press the ▲ ▼ buttons until the cursor is at the Compression label, and press the ENTER button to edit the value. Press the ▲ ▼ buttons to display the options and press the SAVE hot button to store the selection. The options are Off, Moderate, and Heavy. The default is Off.

Audio 1 Output Menu



The following information applies to both AUDIO 1 OUTPUT and AUDIO 2 OUTPUT menus.

Language (L:R)

The Language field allows the user to select the language of the audio outputs. The user can select different languages for the left and the right channels (Dual Mono case) or the user can select the same language for the left and right channels (Mono, Stereo, Surround cases). The user can also enter a number directly after the language value that will designate which audio stream to output if there are multiple input audio streams of the same language.

Press the ▲ ▼ buttons until the cursor is at the Language (L:R) label. To edit the value, press the ENTER button. In Edit mode, when the cursor is on the ▲▼ character, press the ▲ ▼ buttons to cycle through the list of available languages on the currently selected service. To move the cursor off the ▲▼ character, use the ◀ ▶ buttons. When the cursor is on another character, the user can use the ▲ ▼ buttons to change that character's value to any other legal value. The audio languages are represented as the three-character ISO 639 code. See chapter 10. To save the new value, press the SAVE hot button. The default value is Default, which chooses the first audio stream for audio one and the second audio stream for audio two listed in the service definition from the uplink. If the selected audio language is not available, the default audio will be output.

Note*: The two digit numbers in the language fields indicate the occurrence of the specified language. The range is from 00 to 99. For example, "eng:13" for the 13th version of English. This feature is used when there are multiple dialects within a language.*

Actual Lang (L:R)

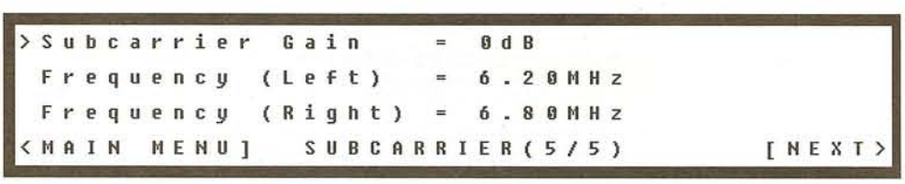
The Actual Language field is a read-only status field. It displays the language of the actual audio output of the unit. If the Language (L:R) field is set to default, the Actual Lang (L:R) field can be used to determine the output language. The language is displayed in the same ISO-639 language code described in the Language (L:R) section.

Output Mode

The Output Mode field is a read-only status field. It displays the mode that the audio is output. The options are mono, dual mono, stereo and surround.The unit does not perform any mode conversion, so the output audio mode is the same as the input audio mode.

Note: *Dual Mono indicates two completely different audio outputs on the left and right channels, usually in different languages. For this reason, when dual mono is output, the center (L&R) output will be garbled. Only the left and right outputs will be useful.*

Subcarrier Menu



The Subcarrier Menu is used for adjustment of the audio subcarrier gain and frequency for analog (not DigiCipher II) channels.

Subcarrier Gain

The Subcarrier Gain field can be accessed using the ▲ ▼ buttons to select it and pressing ENTER to edit the value. The Subcarrier Gain is used to adjust the audio level on analog channels. The values range from -15 dB to 0 dB, with a default of 0 dB. The gain is adjusted in 1dB increments.

Frequency (Left) / (Right)

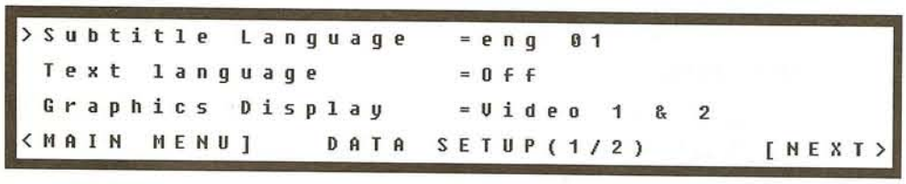
The following information applies to both Frequency (Left) and Frequency (Right) fields:

The Frequency field is used for adjusting the frequency of the subcarrier audio on analog channels. It is only necessary to set the values when selecting an analog channel manually. If the analog channel is selected by virtual channel number, then the necessary subcarrier frequency information is available in the virtual channel table. To change the value, select the label with the cursor using the ▲ ▼ buttons then press ENTER to edit the value. Use the ◀ ▶ buttons and the ▲ ▼ buttons to change the individual character values as needed. The frequency can be changed in 0.01 MHz increments. When finished, press the SAVE hot button to store the new value. The default values are 6.20 MHz for Frequency (Left) and 6.80 MHz for Frequency (Right).

DATA MENU

The Data Menus allow the user to configure the data channels available in the unit.

Data Setup Menu



The menu has three fields that allow the user to view and modify the textual displays on the video output of the unit. The available fields are Subtitle Language, Text Language and Graphics Display.

Subtitle Language

The field allows the user to select the language for subtitle output. The Subtitle languages are represented as the three-character ISO 639 code. See chapter 10. Press the ▲ ▼ buttons until the cursor is at the Subtitle Language label, and press the ENTER button to begin editing the value. Press the ▲ ▼ buttons when the cursor is on the ◆ character to display the options on the currently selected service.

Use the ◀ ▶ buttons and the ▲ ▼ buttons to edit the individual characters. Press the SAVE hot button to store the new language. The default is Off. If the exact language match is not available, the unit will not display any subtitles.

Note: The two digit numbers in the Subtitle, and Text language fields indicate the occurrence of the specified language. The range is between 00 and 99. For example, "eng13" for the 13th version of English. This feature is used when there are multiple dialects within a language.

Text Language

The field allows the user to select the language for on screen text output displays. The Text languages are represented as the three-character ISO 639 code. See chapter 10. Press the ▲ ▼ buttons until the cursor is at the Text label, and press the ENTER button to begin editing the value. Press the ▲ ▼ buttons when the cursor is on the ◆ character to display the options on the currently selected service.

Use the ◀ ▶ buttons and the ▲ ▼ buttons to edit the individual characters. Press the SAVE hot button to store the new language. The default is Off. If the exact language match is not available, the unit will not display any text.

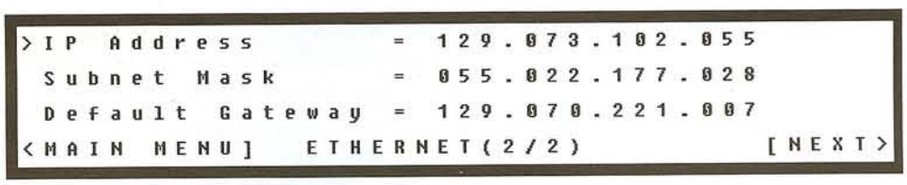
Note*: The two digit numbers in the Text language fields indicate the occurrence of the specified language. The range is from 00 to 99. For example, "eng:13" for the 13th version of English. This feature is used when there are multiple dialects within a language.*

Graphics Display

The Graphics Display field allows the user to select whether subtitles and text will be displayed on both video output 1 and 2 or only on video output 2.

Press the ▲ ▼ buttons until the cursor is at the Graphics Display label, and press the ENTER button to begin editing the field. Press the ▲ ▼ arrow buttons to display the options and press the SAVE hot button to store the new selection. The default is Video 1 & 2.

Ethernet Menu



This menu is used to configure the Ethernet port on the unit. The fields are IP Address, Subnet Mask, and Default Gateway.

IP Address

The IP Address is the address of the Ethernet port. The value is split into four sections and represented in decimal values. Each of the four numbers separated by periods is from 0 to 255. Press the ▲ ▼ buttons until the cursor is at the IP Address label, and press the ENTER button to begin editing the field. Use the ◀ ▶ buttons to select the field character that needs to be changed and use the ▲ ▼ buttons to change the value. Once the value is correct, press the SAVE hot button to store the setting.

Subnet Mask

The Subnet Mask is the mask that is used for distinguishing subnets within the host portion of the IP Address on the Ethernet port. The value is split into four sections and represented in decimal values. Each of the four numbers separated by periods is from 0 to 255. Press the ▲ ▼ buttons until the cursor is at the Subnet Mask label, and press the ENTER button to

begin editing the field. Use the ◀ ▶ buttons to select the field character that needs to be changed and use the ▲ ▼ buttons to change the value. Once the value is correct, press the SAVE hot button to store the setting.

Default Gateway

The Default Gateway is the IP address of the gateway that should be used as the default by the Ethernet port. Press the ▲ ▼ buttons until the cursor is at the Default Gateway label, and press the ENTER button to move into the field. The value is split into four sections and represented in decimal values. Each of the four numbers separated by periods is from 0 to 255. Press the ▲ ▼ buttons until the cursor is at the Default Gateway label, and press the ENTER button to begin editing the field. Use the ◀ ▶ buttons to select the field character that needs to be changed and use the ▲ ▼ buttons to change the value. Once the value is correct, press the SAVE hot button to store the setting.

EXTERNAL HARDWARE MENU

The External Hardware menu controls configuration of contact closures (relays), alarms and bypass.

Relays Menu

The Relays menu allows the user to configure the operation of the three contact closures.

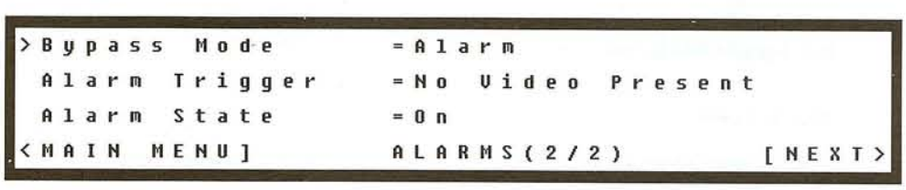
Relay 1 / Relay 2

The Relay 1 and Relay 2 fields allow the operator to set the contact closure On, Off, or into Automatic mode. Automatic Mode means that the contact closure position is based on configuration messages sent from the uplink. To change Relay 1 (Relay 2), press the ▲ ▼ buttons to select then ENTER to begin editing the value. Use the ▲ ▼ buttons to cycle through the list of choices. Press the SAVE hot button to store the selection. The default value is Auto.

Relay 3

The Relay 3 field allows the operator to set the third contact closure On, Off, into Automatic mode or into Alarm mode. Automatic mode means that the contact closure position is based on configuration messages sent from the uplink. Alarm mode means that the relay closes when the unit enters an alarm condition and opens when the alarm condition is no longer present. To change Relay 3, press the ▲ ▼ buttons to select then ENTER to begin editing the value. Use the ▲ ▼ buttons to cycle through the list of choices. Press the SAVE hot button to store the selection. The default value is Auto.

Alarms Menu



The Alarms menu allows the user to set up the Bypass and Alarm modes in case the unit loses signal lock. There are three fields: Bypass Mode, Alarm Trigger, and Alarm State.

Bypass Mode Menu

The Bypass Mode field allows the user to configure the bypass modes. There are three choices: Alarm, Bypassed, and Disabled. The default is Alarm.

Press the ▲ ▼ buttons until the cursor is at the Bypass Mode label, and press the ENTER button to begin editing the value. Press the ▲ ▼ buttons to cycle through the options. If Bypassed is selected, the bypass mode will be activated, and the unit will route through the auxiliary video and audio inputs to the outputs regardless of DigiCipher II service authorization status. The Bypass On LED on the front panel will be lit when the unit is in bypass state.

If Disabled is selected, the unit will ignore the auxiliary inputs for video and audio. It will always attempt to output the satellite data regardless of authorization status.

If Alarm is selected, the units will automatically switch to the bypassed state when the Alarm Trigger condition is met. At such times, the auxiliary Video and Audio inputs will be routed to the unit's output, and the Bypass LED will be lit. When the Alarm condition is not met, the unit will switch back to satellite video and audio.

Alarm Trigger

The Alarm Trigger field allows the user to configure the condition under which the unit will activate its alarm. There are three options: No Video Present, No Authorization and Alarm Disabled. The default is No Video Present.

No Video Present means that the unit will be in an alarm condition any time the video is lost.

No Authorization means that the unit will be in an alarm condition whenever the DigiCipher II authorization is not synchronized.

Alarm Disabled means that the unit will never be in an alarm state.

To change the Alarm Trigger, select the Alarm Trigger label and press ENTER to begin editing the value. Use the ▲ ▼ buttons to cycle through the list of options. Press the SAVE hot button to store the selection.

Alarm State

The Alarm State field is a read-only status field. It shows whether the unit is in an alarm condition or not.

STATUS MENU

Status menus provide information regarding the current status of the unit.

Access Control Menu

```
>Unit Address : 124-01285-10001-007
 TV Pass Card : Not Needed

<MAIN MENU   ACCESS CONTROL(1/2)    [NEXT>
```

Unit Address

The Unit Address field displays the unit's electronic address in decimal digits. The program provider uses this address to identify the specific unit for authorization and configuration messages. The display enables you to see the address from the front panel rather than moving to the unit's rear panel to read the label.

TV Pass Card

The unit does not initially require a TvPass card, but if one is required, the program provider will supply one. The program provider uses the TvPass card's address and decoder address to identify the specific unit for authorization and configuration messages. The display enables you to see the TvPass card address from the front panel of the unit. There are three options: (1) Not Needed, (2) xxx-xxxxx-xxxxx-xxx (the unique TvPass card address), and (3) xxx-xxxxx-xxxxx-xxx Needed (instructing you to insert a TVPass Card with the address shown).

Firmware Menu

```
 Main - Boot:Min:High : 74:74:74
 Ethernet - Boot:High : 02:03

<MAIN MENU]   FIRMWARE(2/2)         [NEXT>
```

This menu displays the unit's firmware release information, which is equivalent to the product version number. This field cannot be changed, but since the firmware is periodically updated, this field will confirm that the update was successful. This is used most commonly in troubleshooting.

Main - Boot:Min:High

These three values describe the firmware versions for the unit's main processor.

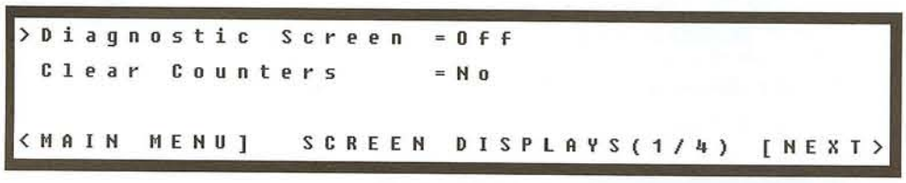
Ethernet - Boot:High

These two values describe the firmware versions for the unit's auxiliary processor, used for processing Ethernet messages.

DIAGNOSTICS MENU

The unit's DIAGNOSTIC menus allow you to isolate problems to the unit or the satellite using the front panel. They also enable you to test waveforms and use other diagnostic information displayed on an NTSC television monitor connected through the rear panel Video Output. *Caution: Turning on diagnostics will change the video or audio output, and these diagnostic screens or tones may be transmitted to the cable customers if the receiver is connected to the cable plant.*

Screen Displays Menu



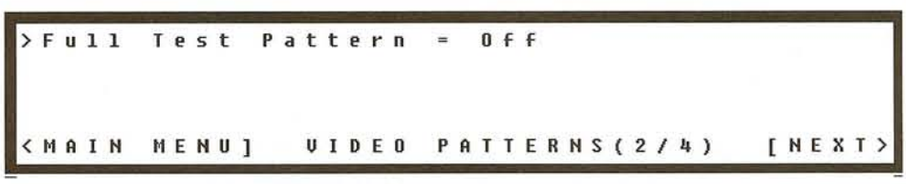
Diagnostic Screen

The Diagnostics Screen field allows the user to enable and disable on-screen diagnostics. The diagnostic screens will be available only on the Video 2 output. Press the ▲ ▼ buttons until the cursor is at the Diagnostic Screen label, and press the ENTER button to move into the field. Press the ▲ ▼ buttons to display the options. Changes take place immediately. While in edit mode, the ◀ ▶ buttons may display alternate diagnostic screens. Press the SAVE hot button to store the selection. The options are Off and A-E.

Clear Counters

This field allows you to reset selected counters in the on-screen diagnostics to zero. This field is primarily for use with Hotline troubleshooting, and we recommend that you use it only when so directed. If you do use it, it will not affect receiver operation, but it may give misleading troubleshooting results. To clear counters, press the ▲ ▼ buttons until the cursor is at the Clear Counters label, and press the SAVE hot button to clear counters on that diagnostic screen. The options are Yes and No. The default is No. NOTE: *This field cannot be changed when the diagnostic screen setting is Off.*

Video Patterns Menu



Full Test Pattern

A full field video test signal is available, and you can display different test patterns by selecting the Pattern field. Press the ENTER button to move into the field. Press the ▲ ▼ buttons to display the test patterns. Changes take place immediately.

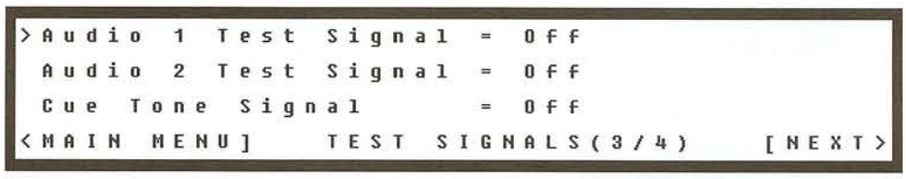
You can choose from the following options in the Pattern field:

Table 3-1

NTSC/PAL M	PAL
525 Composite	625 CCIR 17
525 Combination	625 CCIR 18
525 Color Bar	625 CCIR 330
525 Y Ramp	625 CCIR 331
525 Matrix	625 Matrix
525 VP	625 VP
Program (Off)	Program (Off)

Test signals override any active service component, and the unit displays diagnostics over the video test patterns if diagnostics are enabled. You can disable the selected signals by exiting this menu. Press the SAVE hot button to store the selection.

Test Signals Menu



This menu allows you to enable audio test signals and a Cue Tone test signal.

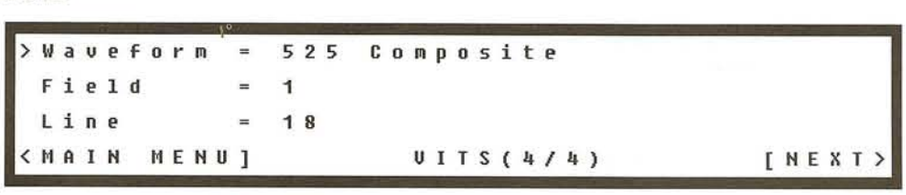
Audio 1 Test Signal / Audio 2 Test Signal

There are three options in the field: (1) 1000 Hz at +16 dBm (for mono), (2) 4040,3960 Hz at + 4 dBm each (for Left and right), or (3) Off. Test signals override any active service component. *Caution: Audio output to the customers may be interrupted.* In order to terminate an audio test signal, scroll to Off or select another menu. The default is Off.

Cue Tone Signal

Cue tones are signals generated by the unit but controlled by the uplink programmer. Local cable companies use cue tones to control and to queue the insertion of commercials in cable headends. There is one dedicated digital DTMF differential output for cue tones. The cue tone test field allow the operator to turn cue tones on and off for testing purposes. *Caution: Output to the customers may be interrupted.* When turned on, the signal can be sent to the local headend equipment. Press the ▲ ▼ buttons until thecursor is at the Cue Tone Signal label. It has three options Off, Once and Repeating. If you select Once, the unit will generate one DTMF code sequence of 0-15 on the cue tone output. Selecting Repeating will have this sequence repeat indefinitely with a short pause between sequences. (Note: entering edit mode for either Audio 1 or 2 will temporarily pause the repeating sequence.) Repeating Cue tone signal will stop when you select another menu. Press the SAVE hot button to activate the selection.

VITS Menu



This menu configures the unit to insert VITS on lines 17 or 18, field 1 or 2.

Waveform Field

The Waveform field allows you to insert a VITS from several internally stored patterns, from a pattern transmitted over the satellite link, or to turn off VITS insertion. Press the ▲ ▼ buttons until the cursor is at the Waveform label, and press the ENTER button to move into the field. Press the ▲ ▼ buttons to display the options. The options are Transmitted, Disabled, 525 composite, 525 Combination; 525 Color Bar; 525 Y Ramp; 625 CCIR 17; 625 CCIR 18; 625 CCIR 330; 625 CCIR 331. The default waveform is "Transmitted" (indicating whatever signal is provided over the satellite link by the programmer, if one is present). Press the SAVE hot button to storethe selection.

Field Field

The Field field allows you to select the field on which the VITS is reinserted by the receiver. It is available only when Waveform field is not Transmitted or not Disabled. You have two choices, field 1 or field 2. Press the ▲ ▼ buttons until the cursor is at the Field label, and press the ENTER button to move into the field. Press the ▲ ▼ buttons to alternate between the two options. Press the SAVE hot button to store the selection.

Line Field

The Line field allows you to select the line on which the VITS is reinserted by the receiver. It is available only when the Waveform field is not Transmitted or not Disabled. Press the ▲ ▼ buttons until the cursor is at the Line label, and press the ENTER button to move into the field. Press the ▲ ▼ buttons to display the options. The available line numbers are 17 or 18. Press the SAVE hot button to store the selection.

4

Troubleshooting

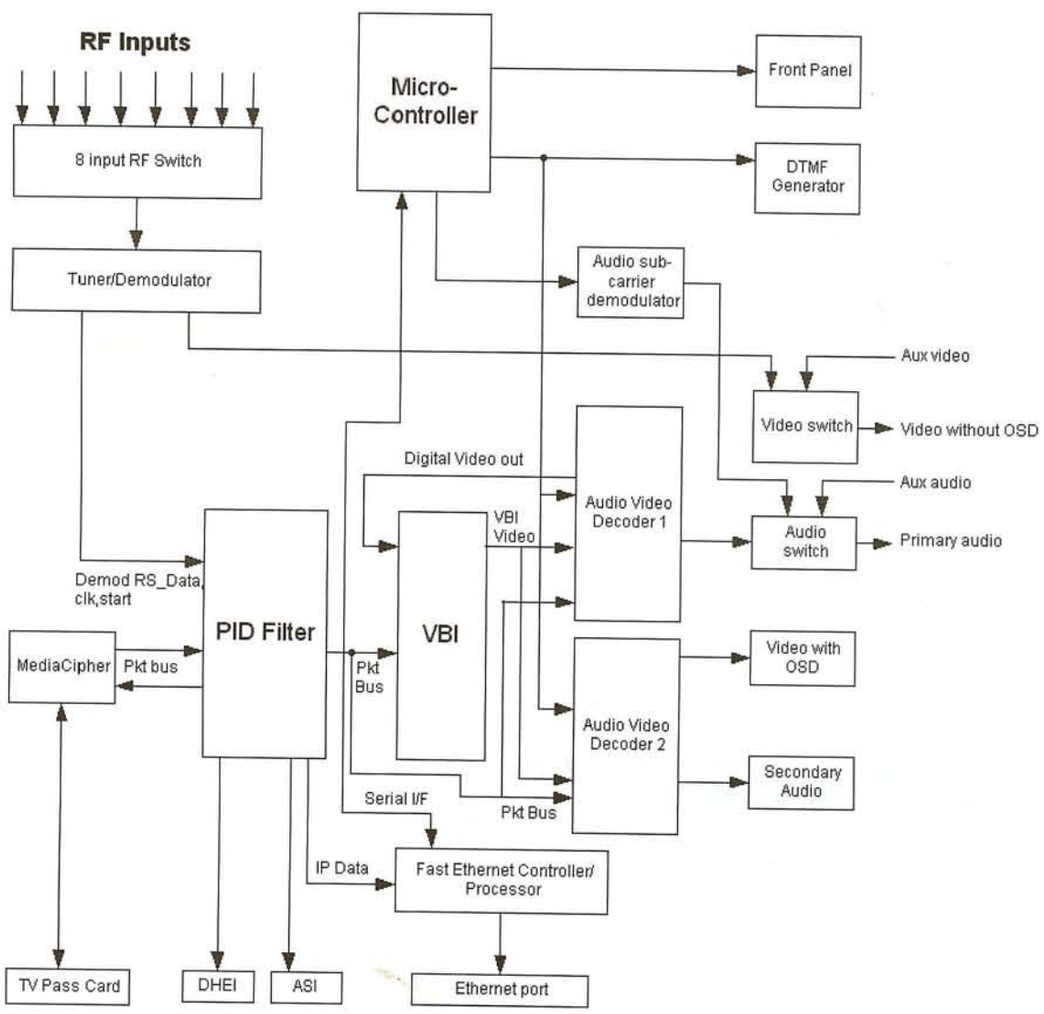
Before contacting the Hotline, please review the following problems and suggested solutions.

Table 4-1

PROBLEM	POSSIBLE CAUSE	SOLUTION	REFERENCE
LCD blank; no LEDs lit	No power to unit	Plug in the unit	
LEDs lit but LCD blank or too dark to read	LCD contrast out of adjustment	Adjust LCD contrast	See: UNIT CONTROL menu, Contrast field
No picture; no level indication	No LNB signal port	Connect LNB coax	See: Connecting a Unit
Poor audio quality or low audio level	Audio levels incorrect	Adjust audio levels	
No video or Bypass Video is present	Unit set in bypass mode	Change to channel available	See CHANNEL SELECT menu
No audio or Bypass Audio is present	Unit set in bypass mode	Change to channel available	See CHANNEL SELECT menu
Will not acquire	Port not configured	Check port configuration; Verify satellite configuration	
Incorrect language	Wrong language setting	Check language on MAIN menu setting	

5

Signal Flow



6

Product Support

PRODUCT SUPPORT AND EQUIPMENT RETURNS

PRODUCT SUPPORT

For assistance on setup and operation, contact the Customer Service Hotline (8:30 a.m. to 8:30 p.m. Pacific Time).

From the United States, the Caribbean, or Canada

Dial toll-free: 1-800-457-1210

From Other Countries

If you are located outside the United States, dial the toll-free number shown in column two of the chart below. Next, you will either be prompted to enter the toll-free Hotline number 1-800-200-6059, or an operator will ask you for it.

Table 6-1

COUNTRY	IN-COUNTRY TOLL-FREE NUMBER	COMMENTS
Argentina	001-800-200-1111	
Belize	555	Note 1
Bolivia	0-800-1112	
Brazil	000-8010	
Chile	123-0-0311	

Table 6-1

COUNTRY	IN-COUNTRY TOLL-FREE NUMBER	COMMENTS
China (PRC)	10810	
Colombia	980-11-0010	
Costa Rica	114	
Ecuador	000-119	
El Salvador	190	
Guatemala	190	
Guyana	165	
Honduras	123	Note 2
Hong Kong	800-1111	
Korea	00911	
Mexico	95-800-462-4240	Note 3
Nicaragua	174	
Panama	109	
Paraguay	0081-800	Note 2
Peru	191	Note 2
Suriname	156	
Taiwan (ROC)	008-010-288-0	
Uruguay	00-0410	
Venezuela	80-011-120	

Note 1: Not available from public phones

Note 2: May not be available from every phone/pay phone

Note 3: When calling from public phone, use phones marked "Ladatel"

Note 4: Public phone requires deposit of coin or phone card

COMMENTS

If You Can't Reach Us Toll Free

If you cannot reach us by using the toll-free numbers, use the following U.S. number: (858) 455-1210.

Additional Assistance

Your program supplier may provide you with additional technical assistance, including network operational procedures.

DIGICIPHER II IRD REPAIR PROCEDURES

Motorola Inc. has established policies and procedures for servicing and repairing its IRD products. As a system operator, you must return an IRD to a Motorola Repair Center in accordance with the procedures outlined below.

Shipping IRDs for Repair

- Call the Motorola Technical Assistance Center (phone numbers listed above) within the applicable warranty period at: Motorola Inc., 6450 Sequence Drive, San Diego, CA 92121, 1-800-457-1210. The Technical Assistance Center is open 7 days a week, 24 hours a day.
- When you call or write, explain the problem. Ask whether the IRD should be returned for service or retained by you for servicing in place. Ask for a Return Material Authorization (RMA) number and for the address to send the IRD if the IRD is to be returned. If you write, be sure to include a copy of your sales receipt or other proof of purchase date, a copy of your warranty, your phone number and return address. If the Technical Assistance Department instructs you to return the IRD, pack it safely and securely, preferably in the original shipping carton. Put the RMA number on the outside of the shipping carton. Enclose a letter explaining the problem. Be sure to include a copy of your sales receipt or other proof of purchase date, a copy of your warranty, and your phone number and return address. Ship it insured to the authorized service center specified by Motorola. All packing, shipping and insurance to return the IRD to Motorola must be prepaid by you. Motorola shall pay return shipping charges.
- Ship multiple IRDs covered by the same RMA number at the same time.
- If there is no RMA number and cover letter with your IRD, there may be a delay in repair or replacement.

Receipt and Processing of Returned IRDs

- When Motorola returns the repaired or replaced IRD to you, it will reference the RMA number in the packing slip. Motorola will prepay shipping costs on warranty returns. Return freight charges on non-warranty repairs will be charged C.O.D. The packing slip will include information regarding the old and new IRDs' address codes and repair determination.

- If the warranty on your IRD is expired, voided or inapplicable as determined by Motorola Inc. in its reasonable discretion, Motorola will not repair the IRD until you agree to pay for quoted charges. If you do not agree within 30 days to pay the quoted charges, the IRD will be returned to you unrepaired. You are responsible for transportion charges both ways on IRDs, which are not under warranty or on which the warranty has been voided or is inapplicable.
- Motorola charges for the following services:
  - All non-warranty IRD repairs.
  - IRDs returned with failures that Motorola cannot duplicate (CND).
  - Repair or replacement of IRDs that, in Motorola's sole discretionary judgment, have undergone tampering (voided warranty).
- IRDs returned during the original warranty period that are repaired or replaced will carry either a 90-day warranty or the remaining period of the original warranty calculated from the date the IRD is received at Motorola's repair facility, whichever is longer. The IRD limited warranty policy appears on the last page of this *Guide.*
- Non-warranty repaired or replacement IRDs will carry a 90-day limited warranty.
- Motorola will replace at full price and with a 90-day limited warranty any IRD returned for repair (warranty or non-warranty) that determines, in its sole discretionary judgment, has undergone tampering.
- These procedures shall not extend or modify the warranty terms and conditions set forth in the warranty policy herein.

System Update Caution Screens

This caution screen provides a 30-second warning before a system update takes place. You can abort the update by pressing any front panel button - returning the unit to its previous state. In addition to this screen, the LCD back light will blink off and on for the duration of the 30-second countdown period. In most cases, you should NOT abort the update by pressing any front panel button. Only under unusual circumstances (troubleshooting, reinstallation, etc.) would a programmer or the Hotline direct you to abort the update.

After the 30-second countdown period, the system update will start if you did not press any button. The update may take from several minutes to an hour to complete. During the update, the above screen will appear, and the unit will be nonfunctional and will not respond to front panel button presses. *Do not unplug the unit during a system update, or you may receive only a partial update.*

7

Conversion Tables

DOWNLINK/L-BAND FREQUENCY CONVERSIONS

Your distributor or programmer can provide the latest C-band and Ku-band frequency plans at purchase time.

The following formulas have been provided if you wish to perform your own calculations for both C-band and Ku-band transponders or if you are installing for a new satellite.

Calculation for C-Band Transponders

Formula for L-band frequency:	Example calculation if downlink frequency = 3,740 MHz:
5,150 MHz	5,150 MHz
-Downlink frequency (MHz)	-3,740 MHz
L-band frequency (MHz)	1,410 MHz

Calculation for Ku-Band Transponders

Formula for Ku-band frequency:	Example calculation if downlink frequency = 12,019 MHz:
Downlink frequency (MHz)	12,019 MHz
-10,750 (MHz)	-10,750 MHz
L-band frequency (MHz)	1,269 MHz

8

Diagnostic Display

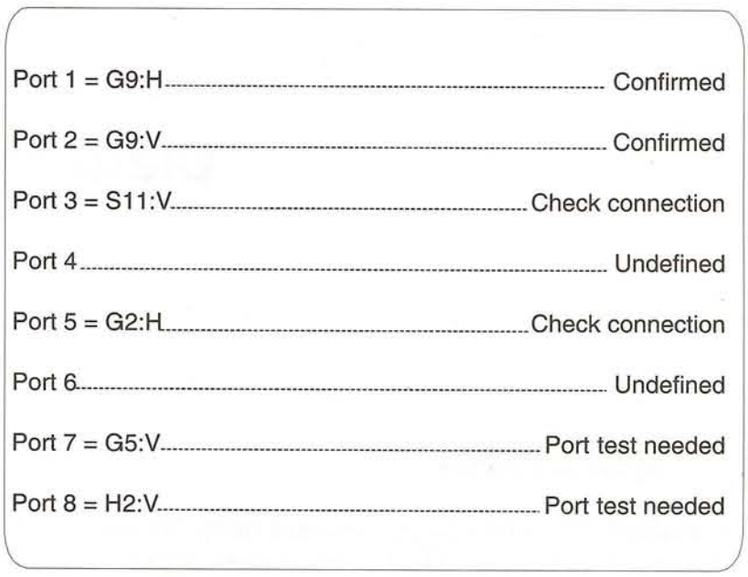
On-Screen Diagnostic Display

The on-screen diagnostic (OSD) display contains many fields of information that indicate the status and history of the receiver. The Fast Facts menu is a summary of the information contained in the other menus.

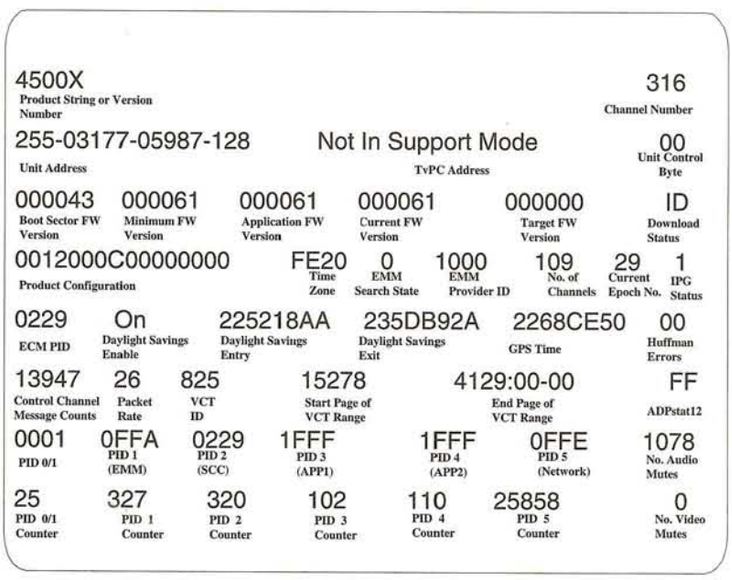
Fast Facts 1 Screen

Unit:255-03177-05987-128	VC# = 132
Firmware: 00008A 00008A	VCT ID = 0010
Encryption = ZeroKey	Service # = 18
Auth State = Authorized	Eb/No = +15.0
Signal State = Locked	Sat/Xpndr = S1/17
Signal Quality = 100	Virtual Network = 251
Symbol Rate = 29.27 Msps	Polarization = H
Frequency = 1010.000 MHz	FEC Rate = 1/2

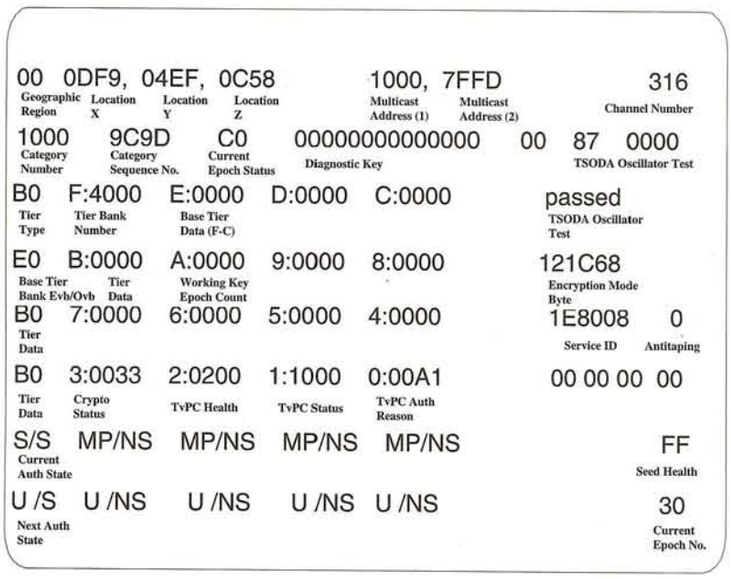
Fast Facts 2 Screen



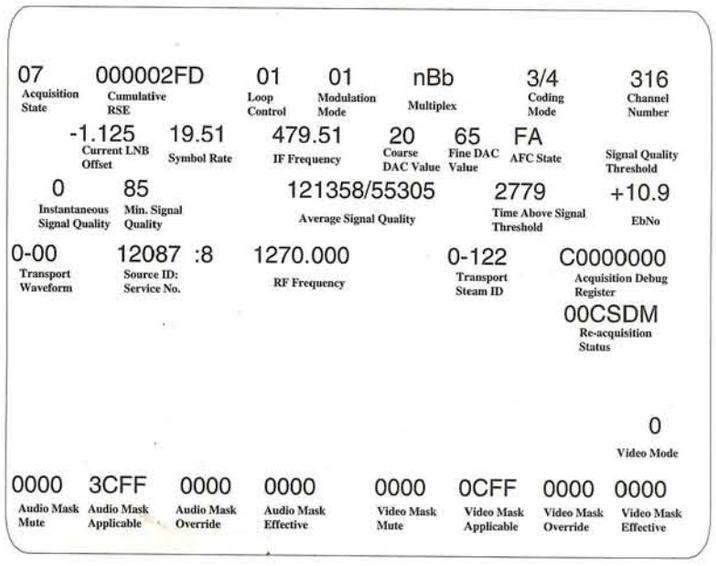
Diagnostic Screen A



Diagnostic Screen B



Diagnostic Screen C



Diagnostic Screen D

							316 Channel Number
0001 CCP 0	14	1	3+0	0	0	0	0
0001 CCP 1 (EMM)	14	1	3+0	0	0	0	0
0001 CCP 2 (SCC)	14	1	3+0	0	0	0	0
0001 CCP 3 (APP1)	14	1	3+0	0	0	0	0
0001 CCP 4 (APP2)	14	1	3+0	0	0	0	0
0001 CCP 5 (Network)	14	1	3+0	0	0	0	0

Diagnostic Screen E

0210 TSODA slot 0	10010	00000001 Download Primary Error	na Opportunity Day Count	023830 Free Memory	206 Channel Number
0210 TSODA slot 1	10010	00000000 Download Secondary Error	na Opportunity Window Count	02B9C0 Max Block	3 Reset Counter
1FFF TSODA slot 2	00000	22AB4567 Download Time			22897654 Reset Time
1FFF TSODA slot 3	00000	80123456 ODVARC/AVI MCN			00010008 Reset Type
1FFF TSODA slot 4	00000	886655 TSODA MCN			0004BF42 Reset Address
1FFF TSODA slot 5	00000				0011DA66 Faulted Address
0229 ECM slot 0	1xxx0				15 20:56 Days, Hours, Min since Boot
1FFF ECM slot 1	0xxx1				

9

Renewable Security

The DSR-4500X is factory equipped with an internal security system and does not require additional cards or a TvPass card. For security renewals and upgrades, however, the DSR-4500X is equipped with a dedicated connector. It can be used if the basic security system is breached in the future or if a programmer elects to use an alternative security system.

The DSR-4500X's security connector is located on the right side of the rear panel. If you must renew security, a programmer will contact you with information about how to obtain a TvPass card and the details of when and how to install it. The following is a general description of the process:

- Remove the TvPass card from its packaging. Be careful not to touch the gold connectors; static and grease from your fingers can degrade TvPass card reliability.
- Unplug the receiver.
- Orient the TvPass card correctly - with the connector to the inside, the label on the outward end, and the label positioned to be read without being inverted. Press the TvPass card into the security connector smoothly and firmly until sealed. The TvPass card will extend beyond the rear panel when correctly installed.
- Restore power to the receiver.
- Check the Status menu to determine if the receiver has accepted the TvPass card. The address shown should match the address label on the TvPass card. If the menu displays "XXX-XXXXX-XXXXX-XXX Needed" then insert the corresponding TvPass card. If the menu continues to show "XXX-XXXXX-XXXXX-XXX Needed" after the passcard insertion then repeat. If the address shown on the menu for TvPass card is different than the one on the card label, use the address shown on the menu when contacting the programmers, and ignore the printed label.

- Contact your programmer(s) using the TvPass card address to obtain authorization to receive their programming. The "XXX-XXXXX-XXXXX-XXX Needed" message will go away when the correct authorization messages have been received from the programmer.
- If several attempts to install the TvPass card are not successful (if you cannot obtain an address display on the Status menu), the TvPass card or receiver is probably defective. Follow the instruction with the TvPass card or contact our Hotline for a replacement.

WARNING: Do not remove the TvPass card until another TvPass card is issued and installed. Once authorized by one or more programmers, the TvPass card is permanently mated to the receiver and may not be moved to another receiver.

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Language Abbreviations

Note: This list of languages was recommended to system operators as the appropriate identifiers for audio, subtitle, and text information.

LANGUAGE	ISO 639 CODE	LANGUAGE	ISO 639 CODE
Arabic	ara	Japanese	jpn
Armenian	arm	Javaneses	jav
Balinese	ban	Kashmiri	kas
Basque	Baq	Korean	kor
Batak (Indonesian)	btk	Kurdish	kur
Bengali	ben	Latin	lat
Bhojpuri	bho	Malay	may
Bulgarian	bul	Mandar	mdr
Burmese	bur	Marathi	mar
Catalan	cat	Miscellaneous Lang.	mis
Chinese	chi	Mongolian	mon
Croatioan	scr	Nepali	nep
Cue (Tones)	cue	Norwegian	nor
Czech	cze	Otomian Lang.	oto
Danish	dan	Pahlavi	pal

LANGUAGE	ISO 639 CODE	LANGUAGE	ISO 639 CODE
Dutch	dut	Panjabi	pan
Egyptian	egy	Persian	per
English	eng	Philippine (Other)	phi
Esperanto	epo	Polish	pol
Faroese	fao	Portuguese	por
Finnish	fin	Rajasthani	raj
French	fre	Romanian	rum
German	ger	Russian	rus
Greek	gre	Samoan	smo
Gujarati	guj	Scots	sco
Hebrew	heb	Sindhi	snd
Hindi	hin	Swahili	swa
Hiri Motu	hmo	Swedish	swe
Hungarian	hun	Tagalog	tgl
Indonesian	ind	Tamil	tam
Interlingua	ina	Thai	tha
Iranian	ira	Urdu	urd
Irish	iri	Vietnamese	vie
Italian	ita	Welsh	wel

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DSR-4500X Specifications

RF	
Input frequency range	950 MHz to 2150 MHz
RF port impedance	75 Ohms
Port-to-port isolation	40 dB minimum
VIDEO - DigiCipher Signals Only	
Frequency response	±0.8 dB (1kHz to 4.2 MHz) NTSC ±1.0 dB (1kHz to 5.5 MHz) PAL
Chrominance-luminance delay inequality	±40 nsec
Differential gain	5% p-p maximum (10 to 90% APL)
Differential phase	5% p-p maximum (10 to 90% APL)
Signal-to-noise ratio	57 dB luminance weighted
AUDIO - DigiCipher Signals Only	
Output level	+16.0 dBm ±1.0 dB into 600 Ohms, attenuation adjustable (0 to -15 dB)
Frequency response	± 1.0 dB, 20 Hz to 20 kHz
Total harmonic distortion	0.25% at 1 kHz
S/N	85 dB at 1 kHz RE: + 16 dBm measured at 20-20 kHz

Isolation	70 dB, 2 kHz, measured at 20-20 kHz

ELECTRICAL/MECHANICAL

Power requirements	90 to 240 VAC, 47/63 Hz, 40 W 90 to 140 VAC, 57-63 Hz, 40 W
LNB power supply	19-21 V minimum, 400 mA loaded
Connectors:	
RF IN	F-type
DHEI OUTPUT	15 Pin HD22 Connector
ASI OUTPUT	BNC
ETHERNET	RJ45
DATA	Screw Terminal
PRIMARY AUDIO OUT	Screw Terminal
AUX AUDIO IN	Screw Terminal
AUX VIDEO IN	BNC
VIDEO OUT	BNC
SECONDARY AUDIO OUT	Screw Terminal
OSD VIDEO	BNC
RELAYS	Screw Terminal
Dimensions	H 3.1" (4.4 cm) x W 19.0" (48.3 cm) x D 20.50" (52 cm)
Weight	12 lb