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StarGuide III
Satellite Receiver



User's Guide

StarGuide DIGITAL

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SGN 71001-1017
August, 1999
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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 radiates radio frequency energy and, if not installed and used in accordance with the instruction guide, 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 or her own expense.

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Warranty Statement

StarGuide Digital Networks warrants that its products are free from defects in material and workmanship at the time of shipment and that they conform to applicable specifications. In no event will StarGuide Digital Networks be liable for consequential misuse or damages.

The StarGuide Digital Networks; StarGuide III Digital Multimedia Satellite Receiver is warranted against any above-mentioned defects that appear within one year of shipping date.

Should it be necessary to make a claim against the warranty, the buyer shall first notify StarGuide Digital Networks' Customer Service Department to define the nature of the problem. When returning products, please be aware of the following:

1. Products returned to StarGuide Digital Networks, whether for upgrade, warranted or out-of-warranty repair work, or maintenance, must comply with the StarGuide Digital Networks Return Policy.
2. Products shall be forwarded to the StarGuide Digital Networks Technical Center, transportation prepaid.
3. Products returned to StarGuide Digital Networks freight collect or without a Return Material Authorization (RMA) number will NOT be accepted.
4. StarGuide Digital Networks shall not accept responsibility for returned products that are improperly packaged and/or damaged in shipment. If possible, please use original shipping and packing materials.
5. Original product identification markings and labels must not be removed, defaced or altered. Further, to preserve the warranty, the product should not be subjected to abuse, improper installation or operation, alteration, accident or negligence in use, storage, transportation or handling.
6. Any returned product shall be completely evaluated in an attempt to duplicate the problem so that the appropriate corrective action and repair may be completed. Following repair, the product shall be thoroughly tested for compliance with the appropriate specifications. The process will be handled in an expedient and prompt manner but may be subject to available labor and material resources.

The StarGuide Digital Networks warranty, as stated herein, is in lieu of all other warranties, expressed, implied or statutory.

For further information, please contact:

StarGuide Digital Networks Customer Service at
(775) 858-3600 Phone
(775) 858-3610 Fax
1-800-847-8391 Phone
StarGuide Digital Networks, Inc.

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Return Procedure

If it is necessary to return a product for out-of-warranty repair, upgrade, or any modification, the following procedures must be followed:

1. Contact StarGuide Digital Networks Customer Service, located in the Untied States via phone or fax.
   - Phone (775) 858-3600 or 1-800-847-8391
   - Fax (775) 858-3610
2. Speak to a StarGuide Digital Networks customer service representative about any questions, issues, or problems. Quite often equipment problems can be corrected over the phone, which keeps your equipment in service and avoids unnecessary and costly downtime.
3. Should it be necessary to return a product to StarGuide Digital networks for any reason, the StarGuide Digital Networks customer service representative will issue you a Return Material Authorization (RMA) number. To issue an RMA number the StarGuide Digital Networks representative will need the product's serial number, model number, and a description of the problem.
4. You may be returning a product for either repair, upgrade, or modification:
   - If returning the product for repair, please include a complete description of the problem, the operating conditions that caused the problem, and any circumstances that may have led to the problem. This information is essential for StarGuide Digital Networks repair technicians to reproduce, diagnose, and correct the problem.
   - If the product is being returned for upgrade or modification, please include a complete description of the current configuration and the desired change(s). This information will allow a StarGuide Digital Networks customer service representative to provide a formal quote for the upgrade.
5. Include a purchase order for any upgrade or out-of-warranty repair work to be performed. StarGuide Digital Networks will begin repair work only after a purchase order is received.
6. Reference the RMA number on all paperwork that accompanies the equipment, and write the RMA number clearly on the outside of the shipping container.
7. Ship your module in the original shipping carton and packing (or its equivalent), prepaid to the following address:

   StarGuide Digital Networks, Inc.
   4840 Mill Street
   Reno, NV 89502 USA
   Ref: RMA Number

Do **not** include product accessories such as installation and operation guides or rack mount brackets.



Caution! When handling or shipping static-sensitive equipment, observe anti-static procedures and always use anti-static bags for shipment. Upon Request, StarGuide Digital Networks will provide you with ESD bags for your use.

All equipment upgrade and repair requests will be completely evaluated and the required work performed in an expedient and prompt manner. The equipment will then be thoroughly tested for compliance with appropriate specifications.

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1 INTRODUCTION

Welcome to the future of digital audio for the radio industry. This User's Guide is your guide to the StarGuide III digital audio receiver. This receiver is capable of delivering multiple audio services in high quality, full 20 kHz, digital audio for your radio station. It has been designed to make use of all the digital features of today, and to be able to be upgraded to take advantage of new features in the future.

1.1 Important Information

Throughout this guide, you will find icons designed to help you identify important information. These icons are:



Note! The note icon identifies information for the proper operation of your equipment, including helpful hints, shortcuts, or important reminders



Caution! The caution icon identifies information that requires careful attention in order to prevent equipment damage.



Warning! The warning icon identifies a procedure or practice that could result in personal injury if not performed correctly.

1.2 Hardware Flexibility

The StarGuide receiver has been designed to provide easy configurability and flexibility. Six expansion slots in the rear of the receiver allow you to receive any combination of audio, multi-media, software, or data services simultaneously with specially designed, low cost, plug-in cards. Currently available option cards include: a high quality Musicam Audio card; a sixteen Relay Expansion card to be used in conjunction with an Audio card; a Video/Audio Output card; an eDAS card; and a 100BaseT Ethernet Interface card.

1.3 Upgradeability

StarGuide can upgrade its main control software and audio decoder algorithms over-the-air. This means your receiver will always have the most up to the minute features and algorithms.

1.4 Automation-Ready

The receiver can deliver audio, data, and dry contact closures for an individual audio service, reducing the amount of equipment needed to automate your radio station. Each audio card comes standard with four contact closures. The optional Relay Expansion card provides a total of 16 contact closures.

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2 GETTING STARTED

Please take a few minutes to read through the User's Guide before setting up and using the unit. If you are in a hurry there is a Quick Start section below but please be sure to read this section before proceeding.

2.1 Unpacking the Receiver

When you first receive the unit, please make sure that all the necessary parts are included.

2.1.1 List of Contents

Table 1 lists the items included in the StarGuide III shipping box.

Table 1. Shipping List

Item	Quantity
Receiver	1
Power Cord	1
User's Guide	1
Option Cards	As Ordered
Card Extraction Tool	1

Please pay particular attention to the option cards shipped with your order. Take a moment to make sure that they are the same as those you ordered.

2.2 Safety Precautions



Caution! The following sections provide a list of general hazards to be avoided for safe, reliable use of the StarGuide III receiver.

2.2.1 Excessive Temperature

The StarGuide III receiver has been designed to operate safely and reliable in an ambient temperature of 50°C. Once the receiver is located in a closed or rack environment, the ambient temperature may be greater than room temperature. Please take this into consideration when installing the receiver making sure that the ambient temperature around the receiver does not exceed the 50°C maximum.

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2.2.2 Proper Ventilation

Air vents located on the sides and rear of the StarGuide receiver are provided for proper ventilation. In order to ensure proper operation the StarGuide receiver should be located such that it's ventilation is not impeded. In a rack environment, at least two inches on the sides and at least 5 inches in the rear should be provided. Proper ventilation will help ensure that the receiver performs both safely and reliably.

2.2.3 Heat, Humidity, and Dust

In order to avoid unnecessary internal damage, do not place the receiver next to heat sources such as heaters, direct sunlight, heating ducts, etc. Also avoid locations that have high humidity, dust and vibration.

2.2.4 Card Options

When installing option cards on the StarGuide III receiver, make sure power is off and the cards are fully seated and secured with mounting screws. Unused card slots must have the filler plates installed to maintain emissions integrity and proper cooling of the receiver. Refer to Appendix A for further details on installing the option cards

Port shields (SGN P/N 61000-6006) must be reinstalled in order to maintain emissions integrity of the receiver chassis.

A Card Extractor Tool (SGN P/N 28882-3005) may be required to assist option card removal. See Appendix A for further details.

2.2.5 Use the Correct Power Source

For StarGuide III units equipped with a North American power cord, the power cord has an IEC 320 female plug at one end, and a NEMA 5-15P male plug on the other end. This cord is UL and CSA approved up to 125 VAC at 10A and is ready to use with no user wiring required.

For StarGuide III units equipped with an International power cord, the cord has an IEC320 female plug on one end, and three stripped and tinned bare wires on the other end. This cord is HAR approved, up to 250 VAC at 6A, and complies with the international color codes of green/yellow (ground), blue (neutral), and brown (line).

If these color codes do not correspond to the colored markings on the terminals in the plug, use the following standards:

- The green/yellow wire must be connected to the plug terminal marked by the letter E, or the earth symbol:  or color-coded green and yellow.
- The blue wire must be connected to the plug terminal marked with the letter N or color-coded black.
- The brown wire must be connected to the plug terminal marked with the letter L or color-coded red.

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An AC plug must be attached to the international power cord in accordance with the government standards and codes in effect at the StarGuide III installation site. If an unterminated power cord is supplied with the unit, the appropriate certified termination plug must be installed.



Warning! Refer to a qualified electrician for proper installation of the power cord.

Table 2 is a list of the required certifying agencies for various countries:

Table 2. Certifying Agencies of Various Countries

Country	Agency
Australia	SAA
Austria	OVE
Belgium	CEBEC
Canada	CSA
Denmark	DEMKO
Finland	FEI
France	UTE
Germany	GDE
India	ISI
Ireland	IIIRS
Italy	IMQ
Japan	MITI
Netherlands	KEMA
New Zealand	SECV, SECQ, SECWA, EANSW, ETSA, HECT
Norway	NEMKO
Rep. S. Africa	SABS
Spain	AEEE
Sweden	SEMKO
Switzerland	SEV
UK	ASTA, BSI

2.2.6 Power Cord Cabling

Avoid running the cord across floors where it can be crimped or tripped over. Make sure that the ends of the cord, at the outlet or power strip and the receiver are installed securely. Avoid placing objects on or leaning objects against the power cords.

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2.2.7 Proper Grounding

When the receiver is installed, make sure that the antenna and coaxial cable is properly grounded to avoid static build up and voltage spikes that can occur due to lightning and other types of power surges. Proper earth grounding of the rack system should be maintained and particular attention should be paid to connections that go through power strips.



Warning! Make sure all power strips are properly grounded.

2.2.8 Circuit Overloading

The StarGuide III receiver can draw up to 1.5 Amps at 120VAC as labeled on the back of the receiver. Care should be exercised when installing the receiver into an existing rack so that the maximum current rating of the circuit is not exceeded. Do not exceed over-current protection and supply wiring specifications.

2.2.9 Foreign Objects



Warning! Do not insert any type of object, including fingers, into the ventilation holes of the receiver. Doing so could result in shock and serious injury to the operator.

If a foreign object is accidentally introduced into the receiver, immediately remove power and call StarGuide Digital Networks technical support. Do not try to open the receiver since there are no serviceable parts in the receiver. Opening the receiver will void the receiver's warranty.

2.3 Physically Installing the StarGuide III Receiver

The StarGuide III receiver should be installed in a standard 19-inch rack. The following sections provide information on the physical installation of the receiver.

2.3.1 Rack Mounting the Receiver

The StarGuide III receiver has been designed to fit into a standard 19-inch rack. Four screw holes are provided on the front panel to directly mount the receiver in the rack. Be sure to install all four screws when mounting the receiver. See Figure 1. Rack Mounting the StarGuide III Receiver.



Caution! Do not paint mounting ears as they provide a grounding path to the rack.

2.3.2 Uneven Loading of Rack

When installing the StarGuide III receiver into a rack, ensure that the rack is loaded with heavier pieces of equipment at the bottom and lighter pieces at the top.



Caution! Uneven loading can cause hazardous conditions and may result in rack instability.

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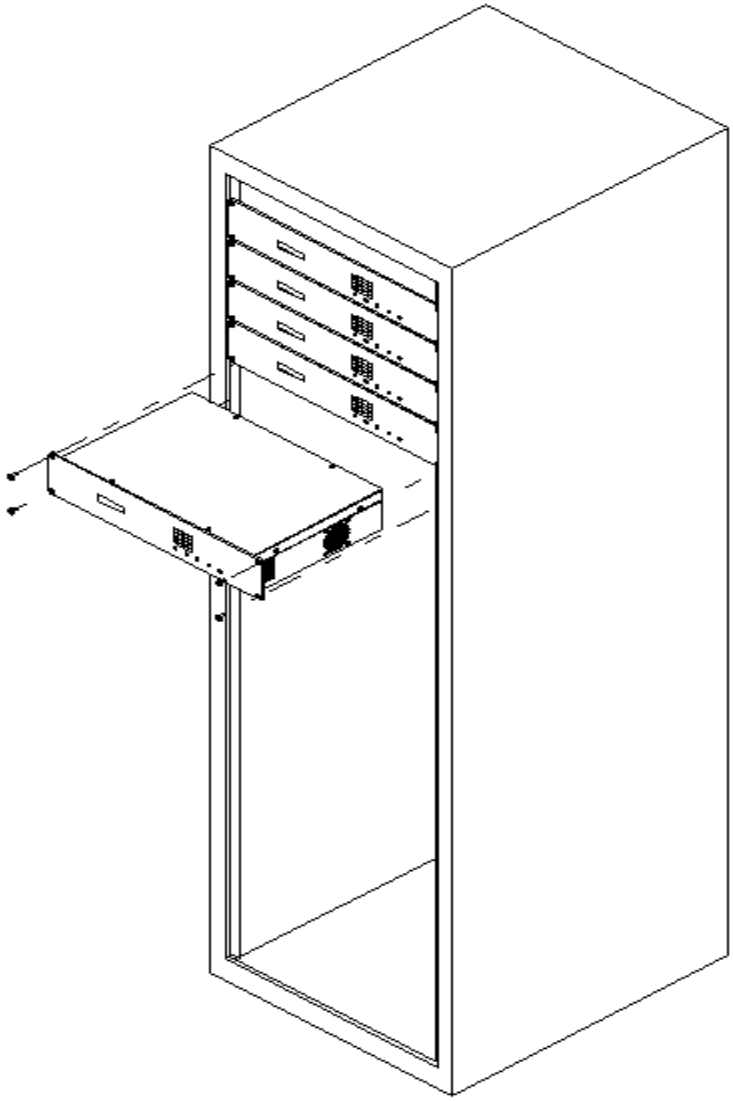


Figure 1. Rack Mounting the StarGuide III Receiver

2.4 Connecting the StarGuide III Receiver to a Satellite Dish

The following section contains the information needed to connect your StarGuide III receiver to the satellite hookup.

2.4.1 DC Voltage Requirement

You may need to have the StarGuide III receiver supply DC voltage to either an LNB or a block down-converter (used after an LNA). If so, the LNB Voltage switch on the back of the receiver should be in the ON position (the switch should be UP). If, however, you have another receiver that receives the L-Band version of the satellite signal (950-1450 MHz) then you may use a splitter with DC blocking circuitry to get the signal to the StarGuide III receiver. In this case place the LNB Voltage switch into the OFF position.

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2.4.2 Warnings About Shorting DC



Caution! If the LNB Voltage switch (located on the lower left rear panel of the receiver) is in the ON position, be careful not to short the signal. The voltage on this line is approximately +24V DC.

If the DC Voltage is shorted during installation, transient voltage may damage the Demodulator card. If this occurs, prepare to return the unit via an RMA (see *Return Procedure*, page x). If there is a "dead" short in the cable connecting the receiver to the satellite dish; the unit will not function properly. Remove the power cord from the rear of the unit, check the cable connecting the receiver to the satellite dish to make sure it has not been damaged and is installed correctly. Finally, reinstall the power cord and proceed with unit setup.

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3 QUICK START

This section is for those who want to get the receiver up and running as soon as possible. Please make sure to read the rest of the manual at some point, since it contains important information on menus and operation of the receiver that is not included in this brief section. This section assumes you have read the previous section and have connected the receiver to the satellite signal.

It is strongly recommended that you peak your dish during the receiver installation. The following quick start procedure does not describe or include peaking your dish but if you have problems installing the receiver please see Section 7 *StarGuide III Installation Supplement* for the peaking procedure and more detailed information regarding your installation. Also, Section 8, *Troubleshooting* may provide some additional answers

3.1 Getting the Receiver to Track

An audio amplifier needs to be connected to the AUDIO OUT connector on the installed Audio Card. This connector is a male DB-9 with a balanced output stereo pair (see Appendix A and refer to the connector pin out sections for more information). Once the audio connector is wired to an amplifier and the satellite receiver has been connected to the dish the receiver should be plugged into a standard 120/220 Volt AC wall outlet. The receiver will go through a short power-up sequence, which takes approximately 10 seconds. After the power-up sequence the receiver should acquire the satellite signal. The SIGNAL and SYNC LED's should turn on and the LCD should say

```
STARGUIDE III
TRACKING
```



Note! Tracking indicates the receiver has acquired the designated carrier. If tracking does not show, see Section 8, *Troubleshooting.*

3.1.1 Navigating the Menu

Once the signal is acquired, you are ready to select an audio service. To do this you will need to navigate the front panel menus (see the next section for more detailed information).

To select an audio service:

Press **ENTER** so that the LCD displays:

```
STARGUIDE III
PORT MENU
```


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Press **ENTER** so that the LCD displays:

```
PORT MENU
PORT A
```

Press the ➔ key until the Port that contains your audio card is displayed (normally Port C)

```
PORT MENU
PORT C
```

Press **ENTER**. The LCD displays:

```
PORT C
PROVIDER
```

Press **ENTER**. The LCD displays:

```
PROVIDER
PROVIDER NAME*
```

You have now entered the Provider "list". Menu "lists" allow you to select from various options. The currently selected option within the list is followed by an "*". Use the left and right arrow keys to scroll through the list. Press **ENTER** to select the desired option.

Select the desired Provider, by pressing **ENTER** while the desired Provider is displayed. Once the Provider is selected, the LCD will show

```
PORT C
PROVIDER
```

Press the ➔ key so that the LCD displays:

```
PORT C
SERVICE
```

Press ENTER so that the LCD displays:

```
SERVICE
SERVICE NAME*
```

The Service list allows you to look at the various services that are available that match the current card type and current provider.

If you are not authorized to receive a service, an "NA" will be displayed after the service name. You must call the service provider to be authorized for a particular service.

Press **ENTER** to select a desired service. If you have chosen an unauthorized service, no audio will be received. If you have chosen an authorized service audio should begin.



Note! The receiver should remain plugged in even when it is not being used on the air because the receiver continually receives network information that may affect your receiver.

Now that the receiver is installed, your dish should by peaked to ensure proper operation of the receiver. See Section 7 *StarGuide III Installation Supplement* for the peaking procedure as well as more detailed information for your particular installation.

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4 FRONT PANEL OPERATIONS

The Front Panel is used to control the basic functions of the StarGuide III Receiver. It consists of a 2-line by 16-character LCD window, a keypad, and a row of five status LED's. The LCD window is used to display the current receiver status or the current menu option. The keypad is used to navigate through the Front Panel menus and to enter specific parameters. The five status LED's give a quick indication of the current status of the receiver. Figure 2 illustrates the StarGuide III front panel.

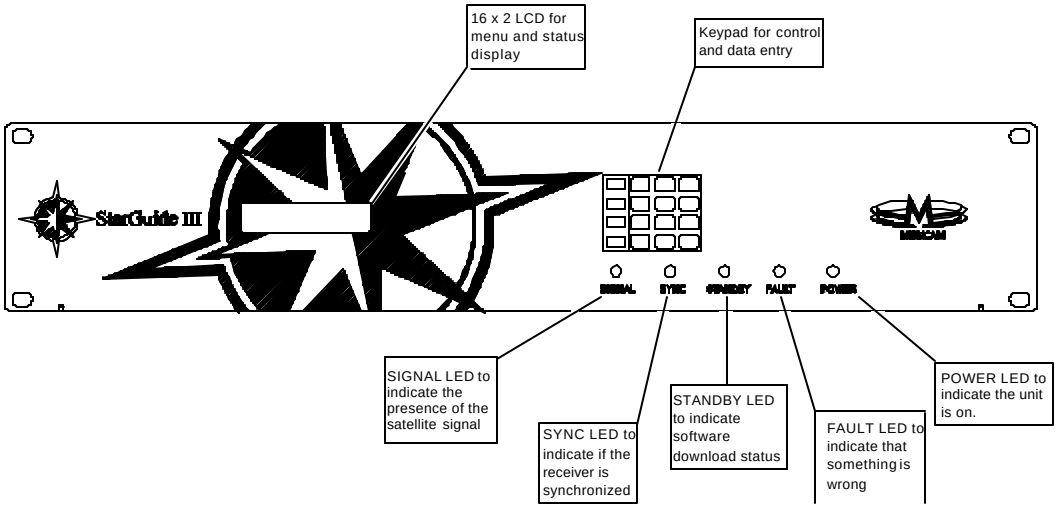


Figure 2. Front Panel Features

4.1 The Status LED's

There are five LED's on the StarGuide front panel. The following sections describe each LED and its significance.

4.1.1 The SIGNAL LED

The SIGNAL LED is used to indicate when the receiver has found the signal and determined its relative strength. When the receiver finds the satellite signal this LED will turn ON. If the signal strength drops below 5.0 dB E_b/N_0 (energy per information bit) the SIGNAL LED will begin to flicker. As the signal continues to drop the LED will continue to blink, however it will be OFF most of the time until the E_b/N_0 drops to 3.5 dB. Once the signal level drops below 3.5 dB the SIGNAL LED will remain OFF.

4.1.2 The SYNC LED

The SYNC LED indicates that the receiver has acquired the signal and obtained synchronization. This LED should be ON during normal operation.

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4.1.3 The STANDBY LED

The STANDBY LED indicates the state of any software upgrades currently occurring over the network. The StarGuide III receiver is capable of upgrading its software over-the-air. When this procedure begins the STANDBY LED will begin to blink slowly (about twice a second). After the software has been received and verified, the STANDBY LED will begin to blink very fast (10 times a second). This indicates that the software has been successfully received and can be loaded at your convenience. Please see Section 4.2.4.3 *Upgrading New Software* section for more information.

4.1.4 The FAULT LED

The FAULT LED is red and is only turned ON if there is a problem with the receiver. When the receiver is not acquired this LED will be ON. Once the receiver acquires the signal this LED should be OFF. If it is not, the receiver's status can be queried in the STATUS MENU, which is described in Section 4.2.5 *The Status Menu* to determine the problem.

4.1.5 The POWER LED

The POWER LED is ON whenever the receiver is plugged in. If the unit is plugged in but there is a short (generally from the cable connecting the receiver to the LNB), the POWER LED will flash indicating that there is a short.

4.2 The StarGuide Menus

The following sections will describe the various parts of the StarGuide Receiver menu tree (see Appendix B for a complete diagram of the menu).



Note! Use the ←,→, and ↑ arrow keys, to display menu options. ENTER is used to go down a level into the displayed menu option. The ← and → arrow keys are used to view options within a single menu level. The ↑ arrow key is used to go up a level.

Many menus culminate in a menu list, which is used to select a specific option or setting for the receiver. Menu lists are very similar to other menu levels with a few exceptions. First, the currently selected option within a list is followed by a "*" and second, the currently selected option is the first displayed option upon entering the list.



Note! Use the ← and →left and right arrow keys to scroll through menu lists. When the desired option is displayed, press ENTER to select the option.

4.2.1 Title Screen

When the receiver is first powered up the LCD will display the Title Screen. The first line of this screen will display the receiver's title and the second will display the current receiver status.

```
STARGUIDE III
TRACKING
```


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This screen represents the highest level of the receiver's menu tree. By pressing **ENTER** you can proceed down through the lower level menus. If you want to return to the Title Screen, simply press the ↑ arrow key until you reach the Title Screen once again. Table 3 indicates the various status messages that may be displayed on the second line of the Title Screen, with their descriptions.

Table 3. Screen Status Messages

Status Message	Description
CALIBRATING	The receiver is calibrating the demodulator and is not trying to acquire the satellite signal yet. This message occurs just after power up, before the unit has begun looking for the satellite signal.
ACQUIRING	The receiver is trying to find and lock on to the satellite signal according to the entered data rate and frequency.
GET FRAME SYNC	The receiver has found the satellite signal and is now trying to synchronize itself with the incoming data.
CHECKING TABLES	The receiver is downloading information from the satellite and is verifying that its configuration matches that of the data being sent over the satellite.
TRACKING	The receiver is operating properly and is following the incoming satellite signal.

Once you enter the Top Level menu, you are presented with four submenu options: the PORT MENU, the CARRIER MENU, the CONFIG MENU, and the STATUS MENU. Figure 3 shows the Title Screen and Top Level menu. The various submenus are described in the following sections.

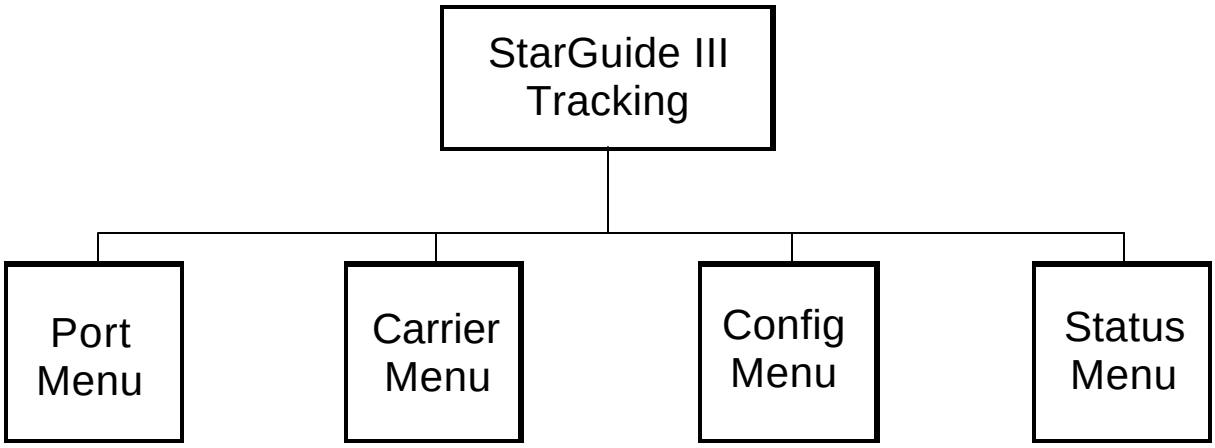


Figure 3. Title Screen and Top Level Menu

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4.2.2 The Port Menu

The PORT MENU is used to configure individual cards within the expansion card slots. Figure 4 shows the PORT MENU. Specific card settings are detailed in Appendix A under the specific card.

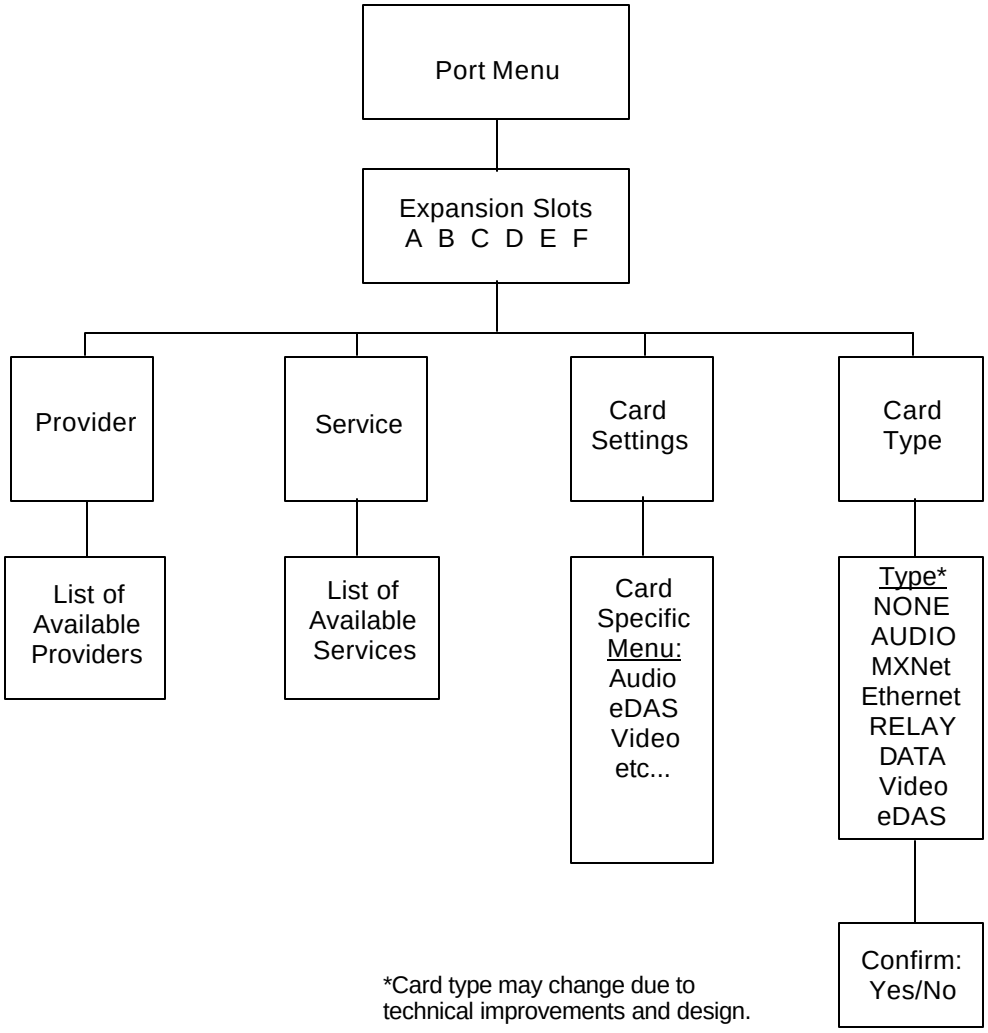


Figure 4. The Port Menu

4.2.2.1 Setting the Card Type

The CARD TYPE submenu is used to select the type of card installed in the associated expansion slot. The card type is set upon shipment so this submenu should only be necessary if new expansion cards are added. If a new card is added, simply enter the CARD TYPE submenu and select the card type from the available options. Once the card type is set, the other submenus in the PORT MENU will be set accordingly.

When the card type has been selected, you will be prompted for a confirmation of your selection. Use the ← and → arrow keys to select YES (for your selection to take effect) or NO (to cancel the selection).

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Selecting a new card type will erase any previous provider and service selections.

4.2.2.2 Selecting a Provider

The PROVIDER submenu allows to select the desired provider. Each service has an associated provider and this should be selected before the service is selected. The PROVIDER submenu is only available for ports with expansion cards that output a service, including Audio cards, DaX cards, and Data cards. If a relay card or other card that does not output a service is selected this submenu will not be available. In addition, this submenu may not be available if the receiver has not yet received its configuration tables from the satellite. Once the tables are received this menu will be available.

Selecting a new provider will erase any previous service selections.

4.2.2.3 Selecting a Service

The SERVICE submenu allows you to select the actual service to be output on an expansion port. The services available will depend on the selected provider and the card type (for example, a DaX card will only allow you to select a DaX service). Like the PROVIDER submenu, this submenu will only be available to ports with expansion cards that output a service (Audio, DaX, or Data). This submenu will not be available if the receiver has not received its configuration tables from the satellite.

4.2.2.4 Updating the Card Settings

The CARD SETTINGS submenu allows you to configure the settings for individual card types. For audio and relay cards, the following menus are available. For other cards, such as a video card, the menus are card specific and are described under the card's heading in Appendix A.

4.2.2.4.1 Relay Port Settings

The RELAY PORT submenu is available for Audio and Relay cards. It allows you to either view the current state of the relays or latch the relays manually for testing. Since the Relay expansion card is married to an Audio card, using the RELAY PORT submenu for either card will return the same values.

4.2.2.4.2 Viewing the Current Relay Status

To view the current state of the relays associated with the selected card simply enter the RELAY STATUS submenu. This submenu will actively update the current state of the relays. A "-" indicates the relay is inactive and the relay number will be displayed if the relay is active. For relays 10 through 15 the letters A-F will be used.

The current state of 16 relays are displayed from left to right (the furthest left being Relay 0 and the far right being Relay 15 which is represented as Relay F.

EXAMPLE: if the LCD displays:

```
RELAY STATUS
0----5----A------
```

Relays 0, 5, and 10 are currently active.

4.2.2.4.3 Manually Setting Relays

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The TEST RELAYS submenu allows you to manually set the state of the relays. This may be useful for testing any automation equipment connected to the Relay or Audio card. Upon entering the TEST RELAYS submenu, the LCD will display

```
TEST RELAYS
0000000000000000
```

The underline indicates the current cursor. The numbers indicate the current state of the relays (0 - inactive, 1- active).

The following procedure is used to set the relays to a desired state.

1. Use the ← and → arrow keys to move the cursor to the desired relay.
2. Enter a 1 to set the relay to ON, or a 0 to set the relay to OFF.
3. Repeat steps 1 and 2 until all 16 relays are set.
4. Press **ENTER** to cause the new settings to take effect.

While you are acquired the service provider may try to activate the relays. This may effect your test in the following ways:

Setting a relay ON will always activate the relay no matter what state the service provider has selected.

Setting a relay OFF will inactivate the relay UNLESS the service provider is activating the relay.

If the receiver is not acquired, any relay settings made by the user will be immediately effective.

Make sure you set ALL of the relays to OFF (0) after manually setting the relays. If you don't, the service provider's relay settings may be overridden.

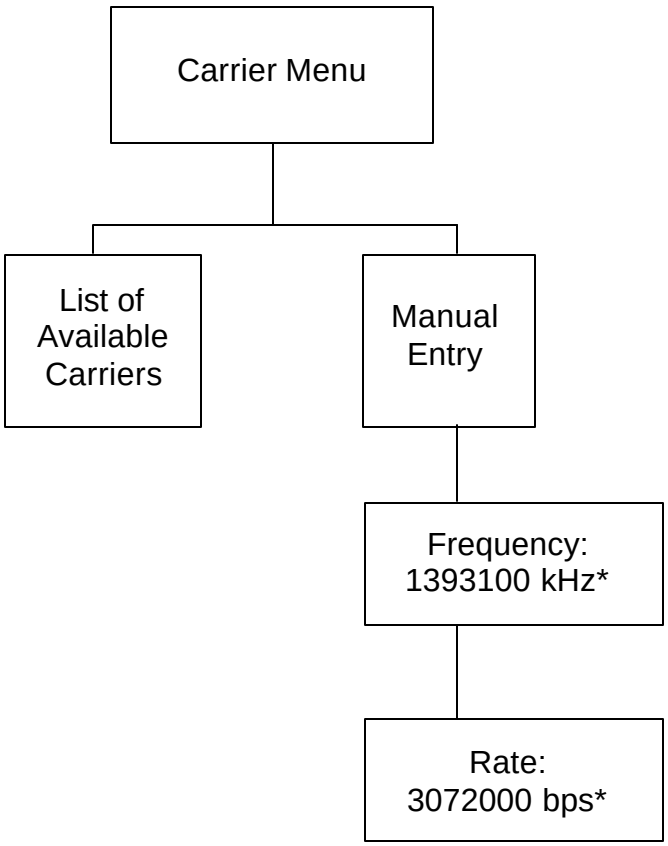
4.2.2.4.4 Async Port Settings

The ASYNC PORT submenu is only available if the expansion card type is set to Audio. This submenu allows you to set the baud rate of the asynchronous output port on the Digital I/F connector of the Audio card. The possible baud rates are 300,1200, 2400, 4800, 9600 and 19,200. The default is 1200 baud.

4.2.3 The Carrier Menu

The Carrier menu is used to the select the current satellite carrier. A list of the available carriers (by name) is provided for ease of use. If, however, you would like to change to a carrier that the receiver does not know about, the only information that must be supplied is the carrier's L-Band frequency (950-1450 MHz) and the carrier's data rate. Figure 5 shows the Carrier Menu.

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* These numbers are an example - actual numbers will vary from receiver to receiver.

Figure 5. The Carrier Menu

4.2.3.1 Selecting a Carrier

After a new carrier is selected (either by name or by manual entry) the receiver will attempt to acquire the specified carrier. If the carrier cannot be found, the receiver will return to the previous carrier.

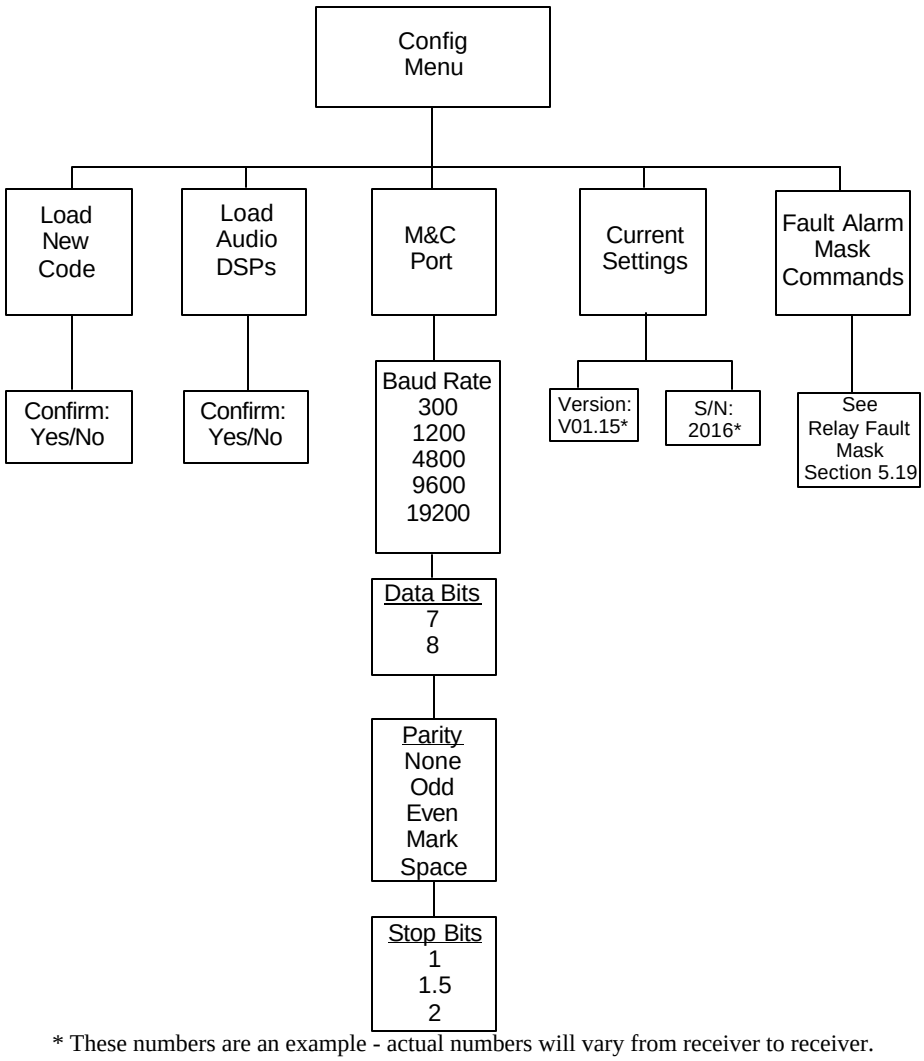
The L-Band Frequency and Data Rate are entered as numeric values. The receiver's numeric input procedure allows you to type over the existing information, use the ← and → arrow keys to move within the numeric input field, or use the ***** key to delete the number to the immediate left of the cursor. When the desired number is displayed, press **ENTER**.

4.2.4 The Configuration Menu

The Configuration menu allows you to make changes or observe the current configuration of system wide parameters. The types of things included in this menu include the M&C port configuration, the receiver software version, the receiver's serial number, and the configuration of any software downloaded over-the-air. Figure 6 shows the Configuration menu.

The menus for loading new software are normally hidden. They will only appear once new software has been downloaded (please see the Upgrading New Software section for more information).

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* These numbers are an example - actual numbers will vary from receiver to receiver.

Figure 6. The Configuration Menu

4.2.4.1 Configuring the Monitor and Control Interface

The M&C PORT menu option allows you to change the current settings for the monitor and Control asynchronous interface. Selecting this submenu presents a list of baud rates. After selecting the desired baud rate, a list of possible data bit settings is presented. After selecting a data bit setting, you will enter a list of parity settings. Finally, after selecting the desired parity, a list of stop bits will be presented. After selecting the stop bits the entire monitor and control settings will be activated. Note that at any time during this procedure, pressing the ↑ arrow key will exit the M&C port menu and none of the selections made will take effect.

Note! To make a change to the Monitor and Control interface, **ENTER** must be pressed in EVERY list for the Monitor and Control interface to be configured.

4.2.4.2 Checking the Receiver Settings

The CURRENT SETTINGS submenu allows you to view the current software version number and the receiver's serial number. Use the ← and → arrow keys to scroll through the settings.

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4.2.4.3 Upgrading New Software

The StarGuide III receiver has the capability to upgrade its internal software over-the-air. From time to time new features may be added which need to be downloaded. When the receiver is downloading software the STANDBY LED will blink slowly (approximately once a second). This indicates that the receiver should not be unplugged and the satellite signal should not be removed. Once the software has been downloaded the STANDBY LED will blink very fast (approximately 10 times a second) indicating that new software has been downloaded but has not been configured or loaded into the receiver. Depending on the type of download that was performed, a new menu option will be displayed: the LOAD NEW SOFTWARE submenu indicates that new main control processor software has been downloaded and the LOAD AUDIO DSPS submenu indicates that new audio decoder software has been downloaded.

In either event, the new software should be loaded as soon as it is convenient to do so. Loading the control processor will cause the receiver to go through its entire power up sequence so service on all ports will be interrupted for approximately 10 seconds. Loading the audio decoder software will cause a momentary lapse (approximately 2 seconds) in service to all of the audio cards in the receiver.

To load the new code simply enter the submenu where the LCD will display either:

```
LOAD NEW CODE
CONFIRM:  NO
```

Or:

```
LOAD AUDIO DSPs
CONFIRM:  NO
```

Depending on the type of the new software. Use the ← and → arrow keys to change the CONFIRM option from NO to YES. Once YES is displayed, press **ENTER**.

4.2.5 The Status Menu

The STATUS MENU allows you to check the receiver's current status, check and reset the fault log, and check the current signal strength. Figure 7 illustrates the Status menus.

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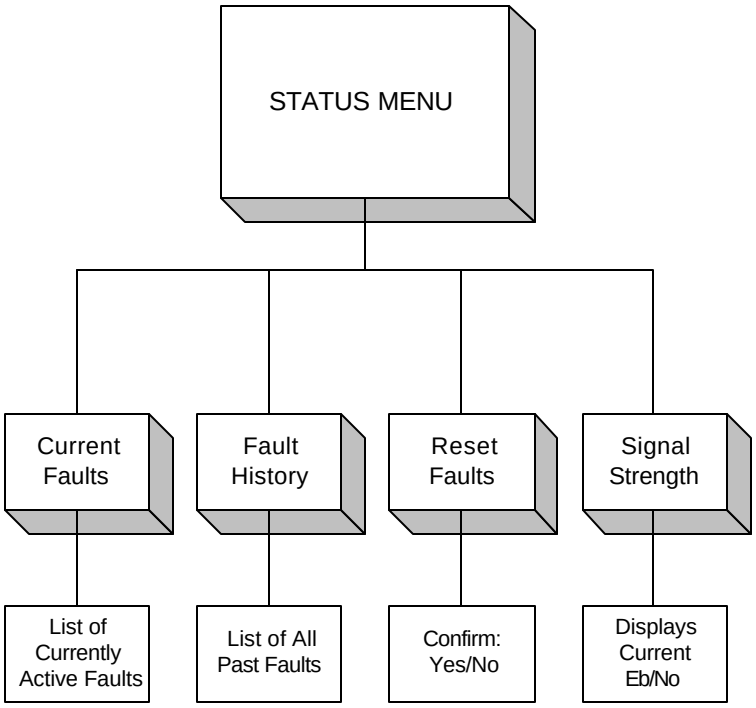


Figure 7. The Status Menu

4.2.5.1 Checking the Receiver Status

The receiver's current status can be checked in the CURRENT FAULTS submenu. Upon entering this submenu you will be presented with a list of all of the currently active faults. The possible faults are listed in Chapter 8. If there are no current faults the LCD will display

```
CURRENT FAULTS
NO FAULTS
```

4.2.5.2 Checking the Receiver Fault Log

The receiver fault log can be checked in the FAULT HISTORY submenu. This submenu is similar to the CURRENT FAULTS submenu described above. The fault log will display all of the faults occurring since the fault log was cleared, or since the unit was last powered on. The next section details how to reset the fault log.

4.2.5.3 Resetting the Receiver Fault Log

The fault log can be reset in the RESET FAULTS submenu. After entering the submenu the LCD will display:

```
RESET FAULTS
CONFIRM:  NO
```

Use the ← and → arrow keys to change the CONFIRM option to YES. Once YES is displayed, press **ENTER** to reset the fault log.

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4.2.5.4 Checking the Receiver Signal Strength

Use the SIGNAL STRENGTH submenu to check the receiver's signal strength. This menu will display the receiver's E_b/N_o in dB. While the signal strength is being viewed, the submenu will update periodically.

The receiver's signal strength threshold is 4.5 dB. If the signal strength is low, make sure your antenna has been peaked correctly. The SIGNAL LED will blink if the signal strength drops below 5.0 dB.

The front panel display is shown as:

```
SIGNAL STRENGTH
EB  N/A  AG 192
```

Where:

AG	AGC value ranging from 0 to255 It is inversely proportional to the signal level received on the coaxial cable. Nominal Range: 110-170

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5 MONITOR AND CONTROL INTERFACE

The monitor and controls use an asynchronous serial interface in either a standard ASCII format or in the StarGuide Digital Networks Packet Mode. The monitor and control interface is located on the rear panel on a DB-9 connector labeled M&C. The default settings for the port are 9600 baud, no parity, 8 data bits, and 1 stop bit. These settings can be changed from either the front panel or the monitor and control interface itself.

In ASCII mode the syntax for commands is shown below.



Note! Every command is terminated with a carriage return (labeled <CR>).

A query is formed by the command followed by either a question mark or no parameter:

XX ?<CR> or XX<CR>

A command with one parameter is formed by the command followed by a space and then the parameter:

XX Y<CR>

Commands with additional parameters are formed by appending the additional parameters separated by commas:

XX Y,Z,...<CR>

Table 4 lists single commands that can be issued through the M&C interface. The table provides a brief description and action brief of the listed commands.

Table 4. M&C Interface Commands

CMD	DESCRIPTION	ACTION BRIEF
AG	AGC Value	Queries the current AGC reading from the demodulator.
AM	Audio Mode	Changes audio output on a port-by-port basis.
AQ	Acquisition Mode	Queries the state of the acquisition process.
CLR	Clear Channel	Queries or sets the state of the receiver's clear channel mode.
CM	Current Multiplexer	Used when acquiring an unknown mux to determine the current mux ID.
DR	Data Rate	Sets or queries the data rate of the carrier being acquired.

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CMD	DESCRIPTION	ACTION BRIEF
EB	Signal Strength	Queries the current Eb/No signal strength estimation.
FBC	Fall Back Carrier	Sets up a backup carrier in cases where the carrier is lost for a number of seconds specified by the timeout.
FC	Fade Counter	Increments every time the demodulator enters a fade acquisition.
LCD	Set the LCD	Helpful in determining if a remote receiver is receiving In Band Signaling commands.
LOG	Event LOG	Keeps track of the last 256 system events by time stamping the event and putting it into non-volatile memory.
LPB	Load Parameter Block	Takes critical receiver settings stored in flash memory and overwrites the current settings in non-volatile memory.
MC	Monitor and Control Port Settings	Queries the current communications settings of the M&C port.
MUX	Changing Multiplexes	Starts acquisition for another mux; used in conjunction with the CM command.
PID	Physical ID	Queries the receiver's current physical ID.
PORT	Port Settings Query	Provides quick indication of the desired port's (ports A thru F) settings.
REV	Software Revisions	Provides current versions of software running the receiver.
RF	L-Band Frequency	Provides the receiver's current RF setting in kilohertz. Initiates acquisition.
RFM	Relay Fault Mask	Indicates all of the current faults that will activate the fault relay.
RLY	Port Relay Status	Queries the current state of the relays on a specified port (ports A thru F).
ROUT	Set Status Relay Output	Activates a relay on an audio card when the audio decoder loses lock for a continuous specified number of seconds.
RS	Receiver Status	Used to gather statistics (demodulator performance) on the demultiplexer and the Reed Solomon.
RST	Reset Receiver	Resets the receiver.
SCM	Set Carrier Manually	Sets the receiver frequency (kilohertz) and data rate (bits per second). Initiates acquisition.
SF	Display System Faults	Displays all of the faults that have occurred since the last time the fault value was cleared.
SP	Set Port	Sets or queries port specific parameters.

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CMD	DESCRIPTION	ACTION BRIEF
SPB	Save Parameter Block	Takes critical receiver settings and stores them in flash memory.
SS	System Status	Queries the current faults.
TS	Timestamp	Used to keep track of events entered into the log. Displays current value of the 32-bit timestamp.
TZF	Time Zone Feed	Feature used to copy a particular channel to both output channels based on relay closures.
VER	Software Version	Used to display statistics on the currently running software.
VR	Viterbi Rate	Sets or queries the Viterbi Rate.

The following sections each describe a single command that can be issued through the M&C interface.

5.1 AGC Value – AG

The AGC value displays the demodulator's automatic gain control voltage reading. The AGC reading indicates how much signal is present at the input to the demodulator. This can be helpful when trying to point/peak the satellite dish.

The **AGC** command comes in the query form only:

AGC This form of the command queries the current AGC reading from the demodulator.

5.2 Audio Mode - AM

The **AM** command changes the audio output on a port-by-port basis. This command does NOT work if the **TZF** mode is set to any non-zero value since the **TZF** and the **AM** commands manipulate the same copy/swap bits in the audio decoder.

The audio mode command comes in the following formats:

AM port — This form of the command queries the audio mode set for the specified port.

Port valid values range from "A" to "F"

AM port,mode — This form of the command sets the audio mode on a specific port to the specified value. If the **TZF** value is non-zero then this command will not be executed and a "Not Available" response will be issued.

Port: valid values range from "A" to "F"

Mode: valid values range from "0" to "3"

The following shows the definitions of each of the audio modes:

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0: Normal
1: Copy left channel to right channel
2: Copy right channel to left channel
3: Swap left and right channels

The **AM** settings are saved in non-volatile memory.

5.3 Acquisition - AQ

The **AQ** command can be used to query the state of the receiver's acquisition process. The acquisition states are:

0	Acquisition stopped
1	Acquisition started
2	Receiver locked and tracking
3	A Fade is in progress

5.4 Clear Channel – CLR

The **CLR** command can be used to either query or set the state of the receiver's clear channel mode. Clear channel mode allows a non-MX3 multiplexer carrier to be acquired.

The clear channel modes are:

0	Non-Clear channel only (MX3 mux acquisition required)
1	Clear channel only (aggregate data out to all ports)

This command is set in non-volatile memory. Default mode is CLR 0.

5.5 Current Multiplexer - CM

The **CM** command is used when acquiring an unknown mux to determine the current mux ID. All of the download tables are based on the mux ID. The current mux ID is saved in non-volatile memory.

The **CM** command is also used to verify that the correct carrier has been acquired when the mux being acquired in already known. The **CM** command returns the value of the current multiplexer that the receiver is locked on (or trying to lock on). If the receiver is performing a manual acquisition and, thus, doesn't know what mux it is trying to acquire, the **CM** command responds with "255."

5.6 Data Rate - DR

The **DR** command can be used to either query or set the current data rate of the receiver. Valid data rates range from 512000 to 25000000 bits per second. After a **DR** command has been issued the receiver will try to acquire using the new data rate. A carrier is defined by data rate and frequency, as set with the RF command.

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5.7 Signal Strength - EB

The **EB** command can be used to query the current signal strength as estimated by the demodulator. This command returns the E_b/N_0 (a signal strength measurement) in dB. If the current version of software in the demodulator does not support this feature the result of the query will be a "Not Supported" error. If the demodulator is not acquired, the result of the query will be "Not Available."

5.8 Fall Back Carrier - FBC

The **FBC** command is used to setup a carrier in cases where the carrier is lost for a number of seconds specified by the timeOut. The **FBC** command is used on carriers that have backup transponders.

The **FBC** command comes in two forms:

FBC	Query the current **FBC** settings. The response will display the frequency, data rate, and timeOut set for the FBC.
FBC	Frequency, data rate, timeOut

Where the parameters are defined as:

Frequency:	The fallback carrier L-Band frequency	
	920000 to 2050000:	The carrier frequency in kilohertz.
	0:	No fallback carrier
Data Rate:	The fallback carrier data rate	
	512000 to 25000000:	The data rate in hertz.
	0:	No fallback carrier
TimeOut:	The TimeOut before the fallback carrier is tried	
	20 to 4294967295:	Number of seconds to wait before trying the fallback carrier.
	0:	No fallback carrier

If any of the fallback carrier parameters are zero the receiver will not attempt to find a fallback carrier. The **FBC** settings are saved in non-volatile memory.

5.9 Fade Counter - FC

The **FC** command keeps track of the number of fades the receiver has undergone since the last time the counter was cleared. The counter can be cleared by issuing this command with a parameter of 0. The **FC** value is stored in non-volatile memory. The counter is capable of counting up to 4 billion fades.

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5.10 Set the LCD - LCD

The **LCD** command is a helpful tool to verify that a receiver is receiving In Band Signaling (IBS) commands. It is also useful in sending information (short messages) to remote receivers.

LCD string The string parameter will be displayed on the front panel LCD of the receiver. To add a carriage return to the second line a back-slash character (“ \ “) is used. The string can contain any characters including commas (“ , “), double quotes commas (“ “ “), and spaces. The following examples show how the LCD command is used:

LCD FIRST LINE\SECOND LINE produces the following:

FIRST LINE
SECOND LINE
On the LCD

LCD “LCD,MSG” produces the following:

“LCD,MSG”
On the LCD

5.11 Event Logging - LOG

The **LOG** command is used to keep track of all significant events that occur within the receiver. The network broadcasts the current time of day to each receiver. The receiver uses this time-to-time stamp events that occur. The **LOG** command is used to start, stop, and query the current event log. The receiver can maintain one event log that will store the last 256 events in non-volatile memory. To start a log simply issue a **LOG 1** command. This will write over any existing log. To stop the log simply issue a **LOG 0** command. Once the **LOG 0** command has been issued the current log can still be accessed but it cannot be continued. To start the log again issue a **LOG 1** command which will then overwrite the stopped log.

The current status of the event log can be queried. When the **LOG** command is queried it returns the log’s current state and the number of events that are stored in the log. A log state of 0 means the log is turned off and a log state of 1 means the log is turned on. For example, if the response to a **LOG** query is

LOG 1,16

The log is turned on and there are currently 16 events in the log.

The events stored in the log are stored with a timestamp and an event type. The log results can be queried in two different ways. The easiest way to view the log is by issuing a **LOG 3** command. This will dump the current contents of the log in a text-based form. The first number is the timestamp of the event (the number of seconds since January 1, 1970) and the next item is the event type (in English). Each event is displayed on a single line. Although the timestamp may be confusing, it is useful for computing relative times and elapsed times.

The current timestamp can be queried with the **TS** command. To determine the time since a specific event, subtract the event’s timestamp from the current timestamp. This provides the elapsed seconds since the event.

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The second way of accessing the log information is by issuing the **LOG 2** command. This command will list the event type by numeric value. The numeric value is shown in Table 5 below, which lists all of the possible event types. If the **LOG 2** command is issued with a second parameter, a specific event can be displayed. For example, issuing a **LOG 2,3** command will display the fourth event in the log (the first is event 0).

The receiver's signal strength can be placed into the log by issuing a **LOG 6** command. For monitoring purposes the uplink may be programmed to issue **LOG 6** commands to take "snapshots" of the network as a whole (each receiver would log their signal strength simultaneously which would allow monitoring of the network's performance).

The receiver's signal strength can be dumped into the log periodically with the **LOG 7** command. The **LOG 7** command requires a parameter (the time interval, in seconds) for the signal strength to be logged. For example, issuing a **LOG 7,60** command will place the signal strength into the log every minute. Remember that only 256 events will be logged so the log should be retrieved and reset often enough so the **LOG 7,0** command does not fill the log. The **LOG 7** command should be turned off when not in active use to prevent filling the log.

A user event can be inserted into the log by issuing a **LOG 4** command. This event has no predefined meaning. For example, a **LOG 4** could be issued whenever the log was queried but not restarted which would indicate the last time the log was viewed.

Table 5. LOG Event Types

Event Type	Event Value	Event Description
START	0	The log was started.
BER	1	An uncorrected bit error has occurred.
FADE	2	The receiver began a fade acquisition.
SYNC LOSS	3	The demultiplexer lost lock.
ACQUIRED	4	The receiver acquired the signal.
EBNO	5*	The signal strength was placed in the log.
USER	6	A user event was placed in the log.
RELAY	7	An audio card has all relays in the ON position (FFFF)
POWER	8	The receiver lost power or was reset.
CRC	9	A block of non-volatile memory had a bad CRC
AUTH	11	One of the current services changed authorization state.
NVCMP	12	The receiver's automatic NV Correction detected an error

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The EBNO event (5*, above) is reported differently from other events. In LOG 3 mode, the event will be displayed as “EBNO XXX” where XXX is the signal strength without the decimal point. For example, if the signal strength was 10.3 dB, the event in LOG 3 would be displayed as “EBNO 103”.

In LOG 2 mode the event type is computed using the following equation:

event type = EB ´ 256 + 5

So a signal strength of 10.5 dB would be reported as:

= 105 ´ 256 + 5 = 26885.

5.12 Load Parameter Block - LPB

The **LPB** command takes critical receiver settings stored in flash memory and overwrites the current settings in non-volatile memory. This command is used to restore a default configuration that was saved with the **SPB** command.

The following parameters are restored from flash memory upon issuing the **LPB** command (corresponding commands are shown in **bold**):

Current Satellite Frequency:	**RF**
Current Data Rate:	**DR**
Fall back Carrier:	**FBC**
Port Parameters:	**SP**
Provider:	**SP X,P**
Service:	**SP X,S**
Type:	**SP X,T**
Anc. Data Mode:	**SP X,ANC**
Anc. Data Baud Rate:	**SP X,BAUD**
Current Multiplexer ID:	**CM**

5.13 Monitor and Control Port Settings - MC

The **MC** command is used to query or configure the Monitor and Control Interface settings. The format of the command is **MC** baud, parity, data, stop. Table 6 lists indicate the possible choices for each parameter:

Table 6. MC Settings

Baud	**Parity**	**Data**	**Stop**
300	N - None		
1200	O - Odd	7	1
2400	E - Even	8	1.5
4800	M - Mark		2
9600	S - Space		
19200			

The port will be configured when the command is entered. The parameters are stored in non-volatile memory. The default values are 9600, N, 8, 1. Current settings may be obtained by query.

5.14 Changing Multiplexes - MUX

The **MUX** command allows you to query or set the currently selected multiplex (carrier). The multiplex is listed by its ID, but the multiplex’s name is listed in brackets. The receiver will list all multiplexes of which it is aware.

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5.15 Physical ID - PID

The **PID** command returns the current PID value.

5.16 Displaying Port Parameters - PORT

The **PORT** command queries the state of selected output ports. The valid port parameters are "A" to "F". Port information provided includes the port type, provider, service, and service bandwidth (data rate). The **SP** command is used to change any of the ports settings.

Bandwidth will equal zero if the service is not authorized

5.17 Software Revisions - REV

The **REV** command is used to determine the software currently downloaded into the receiver. This command identifies the current code being executed (CP1 or CP2).

The **REV** command comes in two forms:

REV The **REV** query returns the current versions of software running on the receiver. The query responds with the following information:

CP1: **www**

CP2: **xxx**

DSP1: **yyy**

DSP2: **65535**

DMOD: **zzzz**

The bold values indicate receiver specific values. They represent the current versions of software. The control processor code is stored in both the CP1 and CP2 banks. The bank with the latest version of code will be executed. If a bank holds invalid code the version is displayed as "000". The DSP1 bank is used for the audio decoder software. To date, there is no code in DSP2. DSP2's value is returned as ("65535" indicating that it has not been downloaded). The demodulator version is a 16 bit hex number that consists of the 8-bit software version and 8-bit demodulator type.

REV # The # version of the **REV** command returns a single line response in the form:

REV x.xx,dmod,dsp1

Where x.xx represents the currently running CP version, the demodulator software version, and the DSP1 (audio) software version.

5.18 L-Band Frequency - RF

The **RF** command can be used to either query or set the current L-Band frequency in kilohertz. The valid values for the **RF** command are from 920,000 to 2,050,000, which represent 920 MHz to 2050 MHz. Once a new **RF** value has been entered the receiver will begin an acquisition using the new frequency. A carrier is defined by its data rate (set with the DR command) and its frequency.

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5.19 Relay Fault Mask – RFM

The relay fault mask command is used to activate the fault relay and RTS line when a specified fault occurs.

The relay fault mask command comes in the following formats:

RFM	This form of the command queries the current RFM value. The response will indicate all of the faults that will activate the relay. This display is the same form as the text display of the **SS** or **SF** commands.
RFM #	This form of the command queries the current RFM value in its numeric form (in decimal).
RFM value	This form of the command sets the faults that will activate the fault relay (located on the new motherboard's AUX connector) and the RTS line of the M&C port. This value is a 32 bit decimal value of all of the faults to activate the relay.

The relay fault mask value is a sum total of all of the faults that will activate the relay. Table 7 shows the decimal values of the individual faults. The value to set RFM is a total of all the faults' values. For example, to activate the relay when an acquisition failure or a nv read failure occurs you add their values (4+1=5) and would set the RFM value to 5. This command was added in version 3.51.

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Table 7. Relay Fault Value

Value	String	Description
0	“NO FAULTS”	There are no faults
1	“NV READ FAIL”	The non-volatile memory read failed on power up.
2	“NV WRITE FAIL”	The non-volatile memory could not be written correctly. This may indicate a bad part.
4	“ACQUISITION FAIL”	The receiver went through its entire acquisition cycle and did not acquire.
8	“SWDL SEQ FAIL”	An out-of –order SWDL command was received. Possibly a packet was dropped.
16	“FLASH WRITE FAIL”	A write to the flash memory failed. This may indicate a bad part.
32	“FLASH BUSY FAIL”	The flash memory was busy writing a previous value when a write was initiated.
64	“FLASH INIT FAIL”	The flash memory initialization sequence failed. This may indicate a bad part.
128	“SWDS CS FAIL”	The checksum of an attempted code download was invalid.
256	“DEMUX ACK FAIL”	The demultiplexer failed to acknowledge a command.
512	“PLL LOCK FAIL”	The PLL lost lock. This will occur normally when the demodulator loses lock.
1024	“DEMOD LOCK FAIL”	The demodulator lost lock (fade).
2048	“DEMUX LOCK FAIL”	The demultiplexer lost lock.
4096	“CODE SWDL READY”	A new version of code has been successfully downloaded.
8192	“DSP SWDL READY”	A new version of DSP code has been successfully downloaded.
16384	“SWDL ACTIVE”	A software download is in progress.
32768	“BANK A FAIL”	Code bank CP1 is invalid.
65536	“BANK B FAIL”	Code bank CP2 is invalid.
131072	“RAM FAIL”	A RAM power-on self-test failed. This may indicate a bad part.
262144	“IBS0 FAIL”	No commands were received on the IBS0 channel.
524288	“IBS1 FAIL”	No commands were received on the IBS1 channel.
1048576	“LOG NV FAIL”	A non-volatile memory error occurred in the LOG area of the part.
2097152	“NV CORRECTED”	A bad bank of non-volatile memory was detected AND corrected.
0x00400000	“HDLC XSUM”	An incoming IBS command had an invalid checksum.
0x00800000	“NV COMPARE”	A periodic check of the non-volatile memory detected a bad NV location and it was corrected.

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5.20 Port Relay Status - RLY

The **RLY** command is used in conjunction with the ancillary data stream being sent over the audio channel. Relays are set from the headend by means of ancillary data messages.

The RLY command comes in two forms:

RLY port	This form of the RLY command queries the current state of the relays on a specified port. Valid port values are from `A´ to `F´ and must also contain an audio card. The query will respond with the hex value of all 16 relays that the audio card controls (bit 0 maps to relay 0 and bit 15 maps to relay 15).
RLY port,value	This form of the command sets the relays controlled by the specified port to the value specified. The value should be in hex (bit 0 represents relay 0) and the port must be between “A” to “F”. The port specified must also contain an audio card.

5.21 Relay Output - ROUT

The **ROUT** command activates a relay on an audio card when the audio decoder loses lock for a continuous specified number of seconds (timeOn 0 to 255 seconds). The relay deactivates after the decoder is locked for a continuous specified number of seconds (timeOff 0 to 255 seconds).

A relay can be specified for all ports that contain an audio card. For audio cards with associated relay cards, the audio card should be specified in the **ROUT** command. Specify Relay 0 - 15. A relay setting of 255 indicates that no relay should be activated.

Set the Status Relay Output using up to 8 parameters in the following order:

ROUT [TimeOn: 0 - 255],[TimeOff: 0 – 255],[Port A-F: 0 – 15, 225]

Unspecified ports will default to 255 (no relay activated).

For example, for a receiver with an Audio decoder card in Port B and an associated Relay card in Port A; to activate Relay 15 on the Relay card in Port A when the Audio decoder card in Port B loses lock for 10 seconds, and deactivate Relay 15 after lock is attained for continuous 10 seconds, issue the following command:

ROUT 10,10,255,15,255,255,255,255

5.22 Reed Solomon Status - RS

The **RS** command allows you to query the Reed-Solomon lock statistics, including the number of uncorrected and corrected errors. The statistics are cleared upon an acquisition. These statistics provide an indication of the receiver’s performance. Uncorrected bit errors may or may not produce adverse effects in the audio output, however, if this number is increasing it is a sign that the system is operating marginally.

5.23 System Reset - RST

The **RST** command will start a soft reset procedure. It is similar to cycling the power off and then on again. This command does not require a parameter.

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5.24 Set Carrier Manually - SCM

The **SCM** command initiates an acquisition. The command does not have a query form..

The **SCM** command comes in one form:

SCM freq,dataRate The frequency (freq) is the RF frequency in kilohertz (exactly like the **RF** command). Valid values for frequency are from 920,000 to 2,050,000 (920 to 2050 MHz).

The data rate (dataRate) is the data rate of the carrier in bits per second (exactly like the **DR** command). Valid values for the data rate are from 512,000 to 25,000,000.

5.25 System Faults - SF

The **SF** command allows the user to query or clear the system fault history. If the command is issued as a query the fault history will be displayed in text form. If the command is given the single parameter "#" (i.e. **SF #**) the fault history will be displayed as a hexadecimal number corresponding to the fault bit map. If the command is issued with a "0" as the parameter the fault history will be reset. The bit-mapped values of each fault are shown in Section 8.1, *Fault and Status Bit Maps.*

5.26 Setting Port Configuration - SP

The **SP** command is used to set the various parameters associated with each output port. These parameters include the port type, the provider, and the service. Setting each of these parameters requires different parameters as defined below:

SP PORT,SUB,PARAM

where PORT is the desired output port ("A" through "F"); SUB is T for type, P for provider, or S for service; and PARAM is the desired setting for the parameter. For example, to change the service of Port C to service 5, issue the following command:

SP C,S,5

The provider and service are selected from the front panel using their names, but the Monitor and Control interface requires the provider and service ID's. This information can be obtained from the service provider if it is needed but the port settings should be set from the front panel menus.

5.27 Save Parameter Block - SPB

The **SPB** command saves critical receiver settings and stores them in flash memory. The saved parameters will be accessed again if the non-volatile memory fails or if the user issues a **LPB** command to restore the saved defaults.

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The following parameters are saved into flash memory upon issuing the SPB command:

Current Satellite Frequency:	**RF**
Current Data Rate:	**DR**
Fall Back Carrier:	**FBC**
Port Parameters:	**SP**
Provider:	**SP X,P**
Service:	**SP X,S**
Type:	**SP X,T**
Anc. Data Mode:	**SP X,ANC**
Anc. Data Baud Rate:	**SP X,BAUD**
Current Multiplexer ID:	**CM**

5.28 System Status - SS

The **SS** command is used to query the system status. If the command is issued as a query the current system status will be displayed in a text form. If the command is issued with "#" as the parameter the status will be returned as a hexadecimal value corresponding to the status bit map. The bit-mapped values of each fault are shown in Section 8.1, *Fault and Status Bit Maps*.

5.29 Timestamp - TS

The **TS** command is used to query the current timestamp used in the event log (see the **LOG** command). This command can only be queried and it reports the current time in a form that indicates the number of seconds that have elapsed since January 1, 1970. This command is most useful when trying to determine the length of time that has elapsed since an event in the log. The time is derived from the current carrier. If a receiver is not locked to a carrier, the receiver's internal clock continues clocking from the last value.

5.30 Time Zone Feed - TZF

The **TZF** command is used to copy a particular channel to both output channels. This allows the user to broadcast two channels simultaneously (one on the left channel and one on the right channel). The **TZF** setting is global to the receiver. This means that if the **TZF** is enabled it will operate identically for ALL Audio decoders in the receiver. When a receiver has **TZF** enabled, the **AM** command cannot be used. The **TZF** setting is saved in non-volatile memory.

The **TZF** command comes in two forms:

TZF — The query form of the command displays the current state of the **TZF** setting.

TZF — This form of the command sets the **TZF** to the specified value. Valid values are:

value from 0 to 2 and have the following definitions:

0: None
1: Left channel copied to right channel
2: Right channel copied to left channel

The **TZF** is enabled when relay 7 is activated on an audio decoder. It is cancelled when relay 0 is fired

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5.31 Software Version - VER

The **VER** command is used to query the current version of software being run in the receiver. This command gives details on the current software including the version number, the user version, the date the code was made, the size of the code, and the checksum of the code.

5.32 Viterbi Rate – VR ?

VR 2 Rate 1/2

VR 3 Rate 2/3

VR 4 Rate 3/4

VR 5 Rate 4/5

VR 6 Rate 5/6

VR 7 Rate 7/8

This is a Non-volatile command.

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6 SPECIFICATIONS[1]

The following specifications are partitioned into sections corresponding to the various functional blocks within the receiver.

6.1 System Specification

Maximum number of service providers	32
Maximum number of carriers per network	32
Maximum number of channels per carrier	128
Channel granularity	8 kbps
Carrier data rate	512 kbps to 25 Mbps
Initial acquisition time	1 minute from power up
Channel switchover time	
Carrier to carrier	500 ms
Within same carrier	250 ms
Receiver address modes	Physical: Unique address, 24 bits Logical: 32 per receiver Ad-hoc: 1 per receiver, dynamic

6.2 Receiver Interface Specification

LCD	16 characters, 2 lines
Keypad	Full 10 key-pad, decimal point, arrow keys, enter key
Monitor and Control	RS-232 compatible, DB-9 female, ASCII command protocol

[1] Specifications subject to change without notice.

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6.3 Mechanical/Electrical Specification

Dimensions	Height: 8.7 cm Width: 48.2 cm Depth: 28.6 cm rack mountable (2RU)
Weight	5.9 kg (13 lbs)
Input voltage	90 VAC to 264 VAC, 47 Hz to 63 Hz
Power consumption	48 W maximum

6.4 Environmental Specifications

Temperature	operating: 0 °C to +50° C gradient: 2° C/minute storage: -20° C to +70° C
Humidity	operating: 5% to 95% noncondensing storage: 0% to 100% noncondensing

6.5 Demodulator Specification

The demodulator receives input at L-band and provides base band data to the demultiplexer.

L-band input frequency range	920 - 2020 MHz
Impedance	75 Ω
Minimum Return Loss	8 dB
Power Levels	-20 dBm to -80 dBm
Input Noise Figure	12 dB maximum at minimum input level
Maximum Composite Input level	0 dBm
Acquisition Frequency Uncertainty	± 2 MHz
Connector	“F” type
Demodulation type	QPSK
Data rate	512 kbps to 25 Mbps
FEC Decoding	Concatenated code Viterbi rates: 1/2, 2/3, 3/4, 4/5, 5/6, 7/8 Reed-Solomon 187/204
Descrambling	CCITT V.35

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6.6 Demultiplexer

The demultiplexer receives a base band data stream from the demodulator and directs selected data services to the output channels.

Demultiplexing rate	512 kbps to 25 Mbps
Channel granularity	8 kbps
Number of simultaneous outputs	6 maximum consisting of any combination of audio, video and data
Input / Output mapping	Any input service may be mapped to any output module

6.7 Contact Closures

Latency	Less than 100 ms
Load: Resistive	10 VA
Switching Current and Voltage	0.5 A 60 VDC
Maximum Carry Current	1.5 A

6.8 Interface Connector Pin-Outs

There are two interface connectors found on the back of the StarGuide III receiver. The M&C and Alarm Relay ports connect the receiver to the control and output functions and are detailed in Figure 8, with the pin-out tables in sections 6.8.1 and 6.8.2 below.

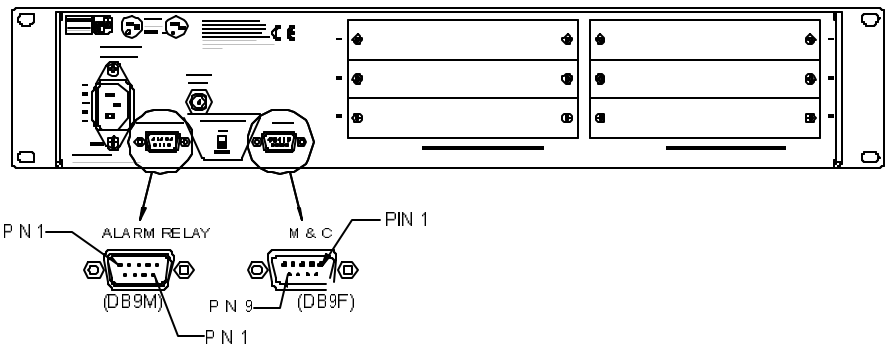


Figure 8. Rear Panel Interface Connectors

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6.8.1 M&C Port (DB9-Female)

Table 8. M&C Port Pin Out

PIN	Function
1	GND
2	TXDOUT
3	RXDIN
4	NC
5	GND
6	NC
7	CTSIN
8	RTSOUT
9	NC

6.8.2 Alarm Relay Port (DB9-Male)

Table 9. Alarm Relay Port Pin Out

PIN	Function
1	GND
2	NC
3	RLYOUT
4	RLYCOM
5	GND
6	NC
7	NC
8	RLYNO
9	RLYNC

6.9 Output Module Option Cards

The output modules receive data from the demultiplexer and present a module specific output to the user. Output module varieties include Musicam Audio, MPEG-2 video, and clear channel data presented as RS-422 or RS-232.

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7 StarGuide III Installation Supplement

The information contained in this section refers specifically to receiver installation, station wiring, and operation of the StarGuide III receiver within a standard commercial radio environment.

Read through the StarGuide Digital Networks receiver Guide Sections 1 through 3 *Introduction*, *Getting Started*, *Quick Start* to get an idea of what work needs to be completed before you are ready to continue with any additional installation requirements.

7.1 Satellite Transmission Information

Most commercial radio station feeds within the United States transmit on SatCom C5. This satellite is located at 139° West Longitude. Please check with you service provider for the correct polarization of the exact transponder being used. Please insure that your antenna is properly aligned to this (or the correct) satellite. Review Section 7.2.1 below for more information.

7.2 Antenna (Dish) Requirements

The StarGuide receiver can operate in multiple satellite environments including C-Band and Ku-Band systems. The antenna requirements are based on your service provider's frequency band and the power being transmitted. Please check with your service provider to determine your minimum dish requirements.

In the existing C-Band environment within the United States, a commercial grade, 3.8-meter antenna is mandatory. Antennas of smaller sizes do not have sufficient gain to achieve consistent results. Additionally, the antenna must be certified for 2° spacing. If your antenna is not certified for this spacing requirement, you may experience adjacent satellite interference, which may have detrimental results in your signal quality.

7.2.1 Align Receiving Antenna

It is strongly recommended that a professional installer aligns the receiving antennal. A professional installer is experienced at making the proper adjustments (azimuth, elevation, and polarization), required to align the antenna properly. Your antenna should be aligned when the satellite is in the center of its oscillation. See the following section for more information.

To have StarGuide Digital Networks calculate the appropriate antenna azimuth and elevation angles (look angle) for your particular site, contact us at 800-847-8391. The technician will need the longitude and latitude shown on your station license.

If you align your antenna yourself, it is best to align the elevation and azimuth independently. Once the antenna is pointed at the satellite, minor adjustments should be made to "peak" the antenna, which will maximize your signal strength. The power from the satellite can be maximized using a spectrum analyzer to determine the peak power. The receiver STATUS MENU can be used to obtain a measurement of the signal strength. See Section 4.2.5.4 *Checking the Receiver Signal Strength* to check the receiver's signal strength reading.

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To use the receiver's signal strength measurement, the receiver MUST be locked onto the signal, with the antenna pointed so that the receiver has enough of the signal to acquire.

If you use the STATUS MENU display, make a slight adjustment on the antenna and wait approximately 15 seconds so the signal strength reading can be accurately updated. Try to maximize the signal strength reading.

If you are peaking the dish with a spectrum analyzer, you will be able to see if your antenna is picking up any interference around the carrier. If you see any interference, it may be better to MINIMIZE the interference instead of MAXIMIZING the carrier's signal strength.

7.2.2 Center of the Box

Ideally, the antenna should be aligned when the satellite is in the center of its oscillation or "center of the box". For information on the next predicted center of the box for SatCom C5 or any other GE satellite, call 800-526-4214. Follow the menus to select your satellite (you will Enter 1, then Enter 4 for SatCom C5). For best long term alignment results, follow the instruction given on the help line.

7.2.3 Antenna/Receiver Configurations

With the amount of equipment in use today, there are many set-up combinations installing the StarGuide III with existing gear and the antenna. Figure 9 diagrams four typical StarGuide III /antenna installations. Diagram A is a stand-alone set-up where just the StarGuide III receiver is utilized. Diagram B shows sharing the antenna with an L-band receiver. This set-up put the splitter and DC block inside. Diagram C is combining a set-up with a DATS/SEDAT receiver and the splitter and converter gear outside. Diagram D is similar to Diagram B, but uses a C-band receiver instead.

While many combinations are possible, it is beyond the scope of this manual to detail antenna installation past this small treatment. If any questions persist about the installation of the receiver, antenna or any combination of gear, contact a qualified satellite antenna installer in your area or contact StarGuide Digital Networks Customer Service.

7.3 Verifying Signal Quality (The E_b/N_0 Reading)

First familiarize yourself with the StarGuide III Front Panel Operations (Section 4). At this point the front panel LED's should indicate that the receiver is locked. If it is not, see Troubleshooting (Section 8).

Having confirmed the receiver has acquired satellite signal, and having read through Section 4, you should be able to locate the E_b/N_0 reading under the receiver "Status" menu. Your E_b/N_0 reading should be 7.5db or higher. If it is lower than 7.5db, you should pursue improving your signal to noise ratio (talk to your antenna installer). You will have constant and persistent problems if you do not keep this value well above the receiver's threshold of 4.5db. See Section 7.3.1 (below) for detailed information on what E_b/N_0 means and how it relates to the operation of your receiver.

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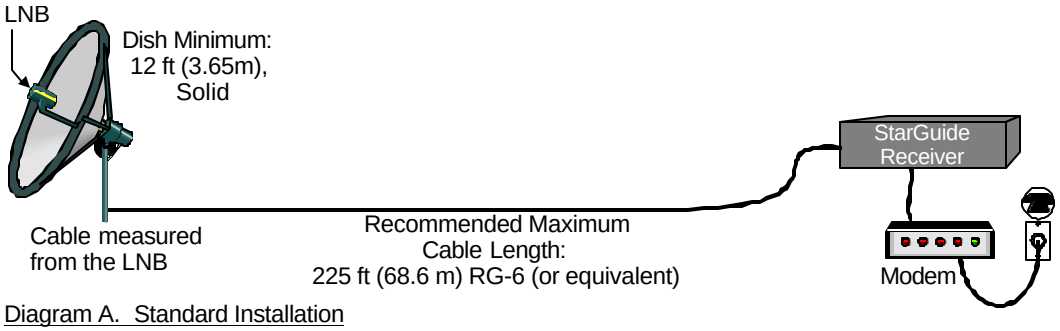


Diagram A. Standard Installation

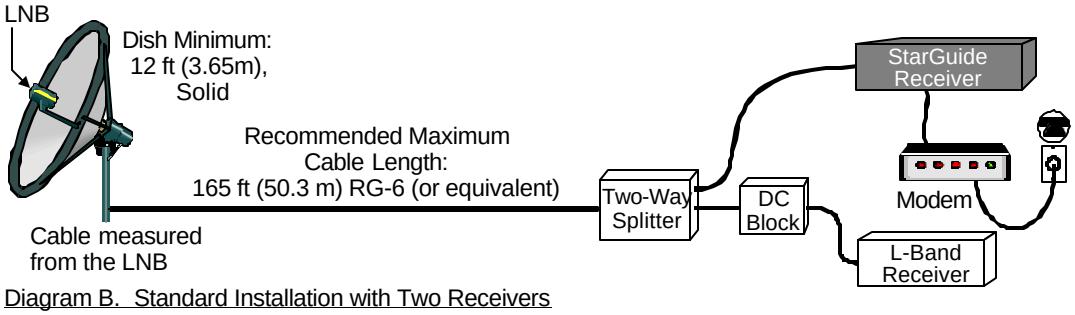


Diagram B. Standard Installation with Two Receivers

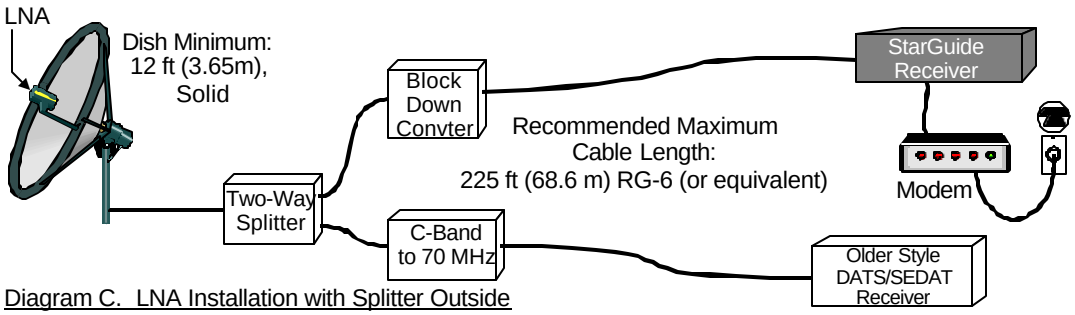


Diagram C. LNA Installation with Splitter Outside

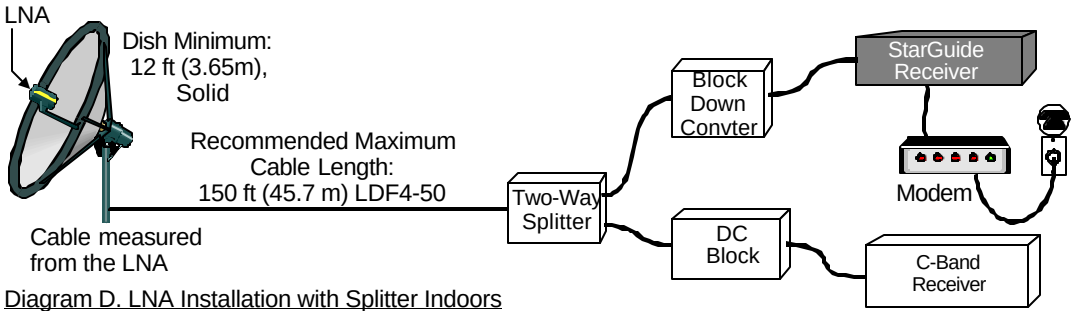


Diagram D. LNA Installation with Splitter Indoors

Figure 9. Antenna Installation Examples

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7.3.1 E_b/N_0 versus Signal to Noise (S/N)

Excerpt from: "Digital Communications, Fundamentals and Applications", Bernard Sklar, p.158.

E_b/N_0 is a ratio of two power readings so it can be expressed in dB this way: $10\log_{10}(E_b\backslash N_0)$

E_b =	Bit energy (only bits transmitting information are considered; framing and error correction bits are not.)
N_0 =	noise infinitesimal

For the mathematically minded:

S = avg modulating signal power

R = bit rate

T = 1/R = bit time duration

W = bandwidth

$N = N_0 W$ = avg noise power

From the above definitions:

$N_0 = N/W$ (For W approaching infinity)

$E_b = ST$

and*:*

$E_b/N_0 = S/N (W/R)$

because*:*

$E_b/N_0 = ST/N_0 = S/RN_0 = SW/RN_0W = S/N (W/R)$

E_b/N_0 is a standard measure of digital system modulation and detection quality. When two methods are being compared, the one with *the smaller* E_b/N_0 *is the more efficient*. The StarGuide's E_b/N_0 is 4.5dB.

$E_b\backslash N_0$ may also be used as a measure of signal quality in a particular downlink installation, in which case *the larger the* E_b/N_0 *the better*. Remember the threshold is 4.5dB - the receiver will mute if the signal drops any lower. Establish a 7.5dB reading or better.

Following receiver installation recommendations: dish size, LNB noise temperature, cable type and length, will keep system noise to a minimum, and received signal level to a maximum. These quantities will be reflected in the system's E_b/N_0 reading.

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8 TROUBLESHOOTING

Table 10 provides a list of possible problems and solutions.

Table 10. Troubleshooting Table

Problem	Possible Cause	Solutions
The unit doesn't lock.	The satellite signal is not reaching the receiver.	Check cabling. Make sure the antenna is pointed correctly. Peak if necessary.
	The receiver is set to the incorrect frequency/data rate.	Set the frequency through the MANUAL ACQUISITION menu described in *Section 4.2.3 The Carrier Menu.*
	The LNB or block down converter is not receiving power.	Make sure the LNB Voltage switch on the back of the receiver is in the UP (on) position.
		If all else fails, try cycling the power (OFF, then ON).
No audio present	The output port is not configured.	Configure the port for the desired provider and service (see *Section 4.2.2 The Port Menu*).
	The selected service is not authorized	Call your service provider to be authorized.
	The cabling is incorrect	Check the cabling (see *Appendix A, Audio Decoder Module*).
Audio is garbled or mutes frequently.	The signal strength is low.	Peak the antenna.
	Terrestrial interference is "jamming" your signal.	Install shielding. Consult a local dish installer.
	Your LNB/LNA is not adjusted correctly so you are experiencing cross-pole interference.	Rotate the LNA/LNB to optimize the polarity.
	You are experiencing adjacent satellite interference.	Make sure your dish is at least 3.8m with 2° spacing. Peak the antenna when the satellite is in the center of its box. See *Section 7.2.1 Align Receiving Antenna*

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8.1 Fault and Status Bit Maps

Table 11 lists the fault/status bit map for the StarGuide III receiver. The SF and SS commands can be used to return a hexadecimal value of the status and the following table shows the faults and their individual hexadecimal values. The fault hexadecimal values are all 32 bits.

Table 11. Fault/Status Bit Maps

Fault Name	Status Menu Name	Hex Value
Non Volatile Read Fault	NV READ FAIL	00000001
Non Volatile Memory Write Fault	NV WRITE FAIL	00000002
Acquisition Fault	ACQUISITION FAIL	00000004
Software Download Sequence Fault	SWDL SEQ FAIL	00000008
Flash Memory Write Fault	FLASH WRITE FAIL	00000010
Flash Memory Busy Fault	FLASH BUSY FAIL	00000020
Flash Memory Initialization Fault	FLASH INIT FAIL	00000040
Software Download Checksum Fault	SWDL CS FAIL	00000080
Demultiplexer Acknowledge Fault	DEMUX ACK FAIL	00000100
PLL Lock Fault	PLL LOCK FAIL	00000200
Demodulator Lock Fault	DEMOD LOCK FAIL	00000400
Demultiplexer Lock Fault	DEMUX LOCK FAIL	00000800
Code Download Ready	CODE SWDL READY	00001000
DSP Download Ready	DSP SWDL READY	00002000
Download Active	SWDL ACTIVE	00004000
Flash Bank A Fault	BANK A FAIL	00008000
Flash Bank B Fault	BANK B FAIL	00010000
RAM Fault	RAM FAIL	00020000
In Band Channel 0 Fault	IBS0 FAIL	00040000
In Band Channel 1 Fault	IBS1 FAIL	00080000
Log Corruption Fault	LOG NV FAIL	00100000
NV Corrected Fault	NV CORRECTED	00200000
HDLC Checksum Fault	HDLC XSUM	00400000
NV Compare Fault	NV COMPARE	00800000

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