PowerVu *Plus*™
Commercial Headend Receiver
Model D9229

Please read this entire guide
Veuillez lire entièrement ce guide
Bitte das gesamte Handbuch durchlesen
Sírvase leer completamente la presente guía
Si prega di leggere completamente questa guida

Important

Please read this entire guide before you install or operate this product. Give particular attention to all safety statements.

Important

Veuillez lire entièrement ce guide avant d'installer ou d'utiliser ce produit. Prêtez une attention particulière à toutes les règles de sécurité.

Zu beachten

Bitte lesen Sie vor Aufstellen oder Inbetriebnahme des Gerätes dieses Handbuch in seiner Gesamtheit durch. Achten Sie dabei besonders auf die Sicherheitshinweise.

Importante

Sírvase leer la presente guía antes de instalar o emplear este producto. Preste especial atención a todos los avisos de seguridad.

Importante

Prima di installare o usare questo prodotto si prega di leggere completamente questa guida, facendo particolare attenzione a tutte le dichiarazioni di sicurezza.

Quick Setup Guide

If receiver setup details are unavailable, you can perform a Quick Setup of your Commercial Headend Receiver by following the step-by-step instructions in this Quick Setup Guide. After performing the Quick Setup, you can change the current settings to better suit your receiver operating requirements. If you are unsure about which settings to use, contact your dealer/reseller or local service provider for assistance. For complete receiver setup information, see the Model D9229 Commercial Headend Receiver Installation and Operation Guide.

...About the Video Standard

The Video Standard used to operate the receiver is preset at the factory to either NTSC (525-line) or PAL (625-line), depending on factory-installed options.

> ⚠ IMPORTANT! The current Video Standard setting is used by the receiver for correct display of the video (picture) only. The satellite receiver does not convert from one Video Standard to another, such as from NTSC (525-line) to PAL-B (625-line).

Receiver Startup

Step 1. Check your installation: (a) Check that the receiver is correctly installed and connected to the satellite LNB antenna, to other A/V equipment (as required) and to AC power.

(b) Verify that the satellite LNB power switch at the receiver rear panel is correctly set (OFF to use the external LNB power source, or ON to use the internal receiver LNB power source).

Step 2. Power-on the receiver: (a) Press the STANDBY button at the receiver front panel (see Figure A). The Installer Channel (i.e., channel O) is displayed.

Quick Setup instructions (front panel)

Follow these quick setup instructions to set up the receiver, and to find a signal using the built-in Find function. To operate the menu interface, a cable must be connected from the receiver VIDEO output to a TV monitor video input. (see Figure B). Complete all steps in order.

> ⚠ IMPORTANT! After completing each numbered step, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting. Saved settings are automatically restored when the receiver is restarted after AC power is switched off or interrupted.

Perform the following actions for front panel setup

Step 1. If required, press O to display the Installer Channel.

Step 2. Press ALT once to change from normal operation to Alt 1 Mode. The ALT LED flashes OFF and ON, continuously.

Step 3. Set the operating frequency Band: (a) Press 1 (C/Ku) to display the current operating band (C or U [Ku]). (b) Press 1 again to change the current setting, as required. The default setting is C.

Step 4. Set the Symbol Rate: (a) Press 5 (SYM) to display the current Symbol Rate setting. (b) Pressing 5 repeatedly displays higher Symbol Rates (Symbol Rates are displayed from 3 MS/s to 30.8000 MS/s in 10 KS/s steps). You can also press and hold the 5 button down to rapidly increase the Symbol Rate. The default setting is 28.3465 MS/s.
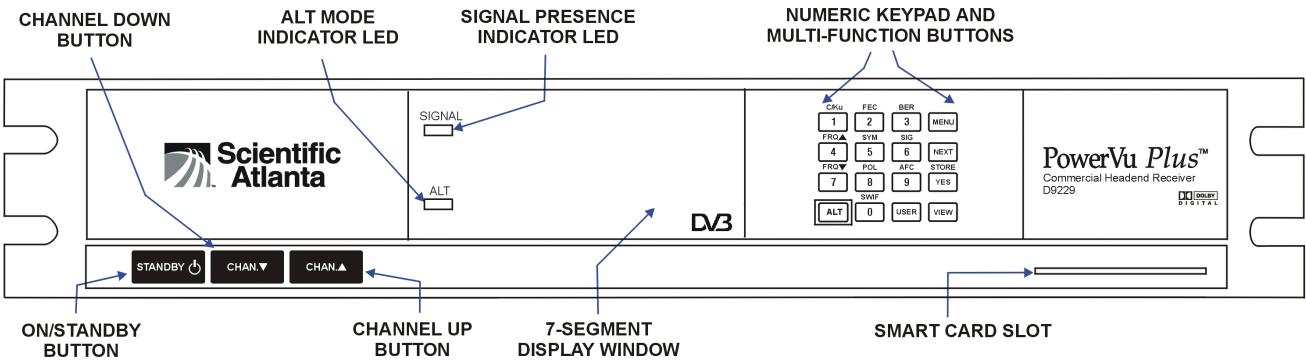

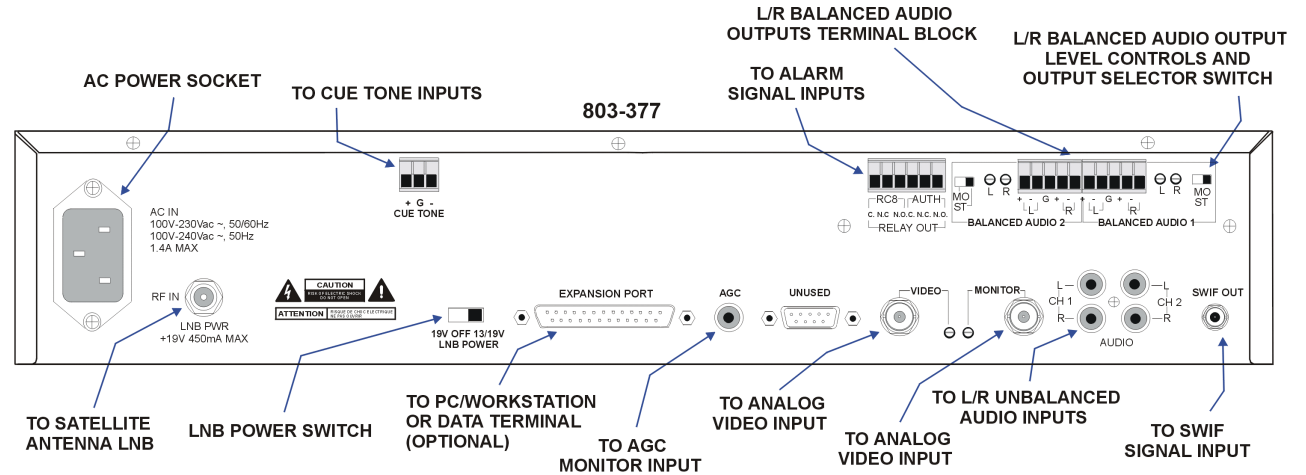Figure A. Front panel controls and display
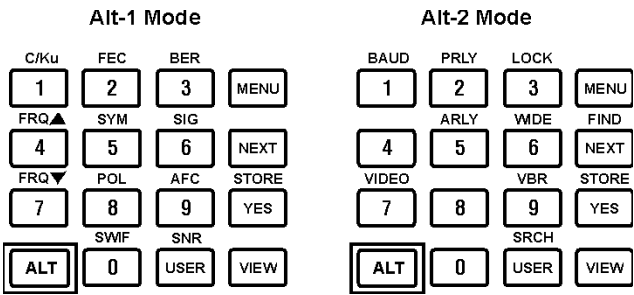

Figure B. Rear panel connectors

Figure C. Front panel Alt-1 and Alt-2 Mode functions

Step 5. Set the FEC Rate: (a) Press 2 (FEC) to display the current FEC Rate.
(b) Pressing 2 repeatedly displays available settings (1-2, 2-3, 3-4, 5-6, or 7-8), which correspond to 1/2, 2/3, 3/4, 5/6, or 7/8, respectively. The default setting is 7/8.

Step 6. Set the Signal Polarization: (a) Press 8 (POL) to display available settings (H [Horizontal] or V [Vertical]). The default setting is H (Horizontal).

Step 7. Set the signal input to RF or SWIF: (a) Press O (SWIF) to display the current SWIF signal input setting.
(b) Pressing O repeatedly displays available settings (ON or OFF). The default setting is OFF (i.e., the input signal from the RF IN rear panel connector is used).

Step 8. **Video Standard (if required):** (a) Press ALT once to change from Alt 1 Mode (ALT LED flashes OFF and ON continuously) to Alt 2 Mode (ALT LED is ON).
(b) Press 7 (VID) to display the current Video Standard setting.
(c) Pressing 7 repeatedly displays available settings(525A, 625A, 525 and 625). The default setting is 525A (i.e., automatic switching from 525-line NTSC to 625-line PAL/B).

Step 9. **Activate the signal search to "Find" the signal** (use only if frequency is unknown):
(a) Press ALT twice to change from normal operation (ALT LED OFF) to Alt 2 Mode (see Figure C). The ALT LED is ON.
(b) Press NEXT (FIND) until Find is displayed to search for a signal immediately (available settings are Find or OFF). The default setting is OFF.
(c) When the desired signal is found (i.e., "LOCKED" status displayed on-screen), press YES to save (STORE) the setting.
The front panel display flashes OFF and ON several times to confirm the new setting.
(d) Optional (use only if frequency known): Enter the correct frequency by pressing the numbered front panel buttons. Repeat if necessary, using a different frequency.

Repeat the above action to Find another signal. When a signal is found, the Find option is automatically set to OFF. You can also terminate the search manually by setting the Find option to OFF. The Find setting can only be displayed or changed from the Installer Channel. This option is also available at the Installer menu.

After the signal is found, you may need to change the current receiver settings to correctly match the Installer Channel signal being used. The above Quick Setup instructions can also be performed using menus (see "Quick Setup instructions (menus)".

> ⚠️ IMPORTANT! The Local Oscillator frequency must be set according to your LNB manufacturer's instructions (for default receiver settings, see Table A). If default factory settings must be changed, see "Quick Setup instructions (menus)". Local Oscillator frequency options are only available at the Installer menu.

Quick Setup instructions (menus)

Follow these quick setup instructions to set up the receiver, and to find a signal using the built-in Find function. To operate the menu interface, a cable must be connected from the receiver VIDEO output to a TV monitor video input. (see Figure B). Complete all steps in order.

> ⚠️ IMPORTANT! After completing each numbered step, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting. Saved settings are automatically restored when the receiver is restarted after AC power is switched off or interrupted.
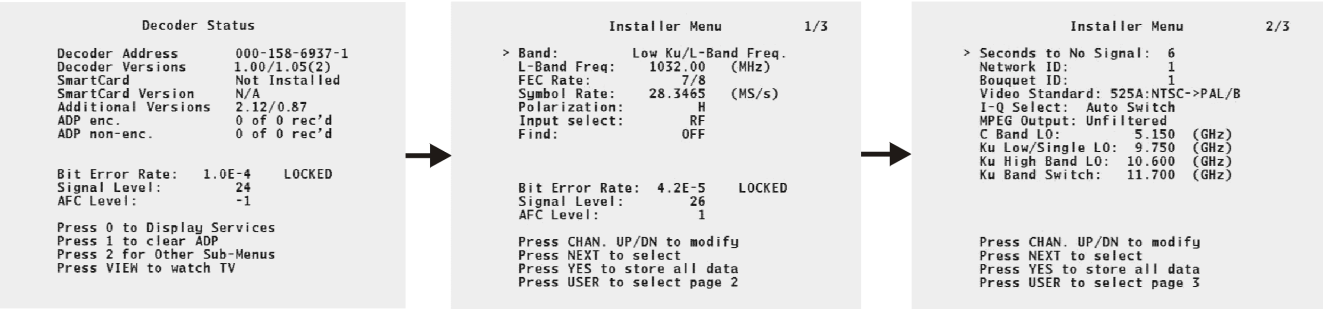

Figure D. Receiver Status menu and Installer menu (pages 1 and 2 only)

Perform the following actions for menu setup

Step 1. Display the Receiver Status menu by pressing MENU (see Figure D).

Step 2. **Display the INSTALLER menu** by pressing 2 and then 9.

Step 3. **Set the frequency Band:** Press CHAN. ▲/CHAN.▼ (front panel) to display available settings (C/L-Band Freq., C/Downlink Freq., Low Ku/L-Band Freq., High Ku/L-Band Freq., Single Ku/Downlink Freq. or Dual Ku/Downlink Freq.). The default setting is C/L-Band Freq.

Step 4. **Set the Symbol Rate:** (a) Move to Symbol Rate by pressing NEXT.
(b) Press CHAN.▲/CHAN.▼ (front panel) to display available settings (Symbol Rates are displayed from 3 MS/s to 30.8000 MS/s in 10 KS/s steps). You can also press and hold down CHAN.▲/CHAN.▼ to rapidly increase/decrease the Symbol Rate. The default setting is 28.3465 MS/s.

Step 5. **Set the FEC Rate:** (a) Move to FEC Rate by pressing NEXT.
(b) Press CHAN.▲/CHAN.▼ to display available settings (1/2, 2/3, 3/4, 5/6, or 7/8). The default setting is 7/8.

Step 6. **Set the Signal Polarization:** (a) Move to Polarization by pressing NEXT.
(b) Press CHAN.▲/CHAN.▼ to display available settings (H [Horizontal] or V [Vertical]). The default setting is Horizontal.

Step 7. **Set the signal input to RF or SWIF:** (a) Move to Input Select by pressing NEXT.
(b) Press CHAN.▲/CHAN.▼ to display available settings (RF or SWIF). The default setting is RF (i.e., the input signal from the RF IN rear panel connector is used).

Step 8. **Set the Video Standard (if required):** (a) Display page 2 of the Installer menu by pressing USER once (see Figure D).
(B) Move to Video Standard by pressing NEXT.
(c) Press CHAN.▲/CHAN.▼ to display available settings. The default setting is 525A:NTSC>PAL/B (see "Quick Setup instructions (front panel), step #7" for standard settings). For a complete list of available settings (menus), refer to the Model D9229 Commercial Headend Receiver Installation and Operation Guide.

Step 9. **Activate the signal search to "Find" the signal** (use only if frequency is unknown): (a) Move to Find by pressing NEXT.
(b) Press CHAN.▲/CHAN.▼ until ON is displayed (available settings are ON and OFF). The default setting is OFF.
(c) When the desired signal is found (i.e., "LOCKED" status displayed on-screen), press YES to save (STORE) the setting.
(d) Optional (use only if frequency known): Enter the correct frequency by pressing the numbered front panel buttons, or you can press CHAN.▲/CHAN.▼ until the desired frequency is displayed. Repeat if necessary, using a different frequency.

Repeat the above action to Find another signal. When a signal is found, the Find option is automatically set to OFF. You can also terminate the search manually by setting the Find option to OFF. The Find setting can only be displayed or changed from the Installer Channel. This option is also available at the front panel. After the signal is found, you may need to change the current receiver settings to correctly match the Installer Channel signal being used. The above Quick Setup instructions can also be performed using the front panel in Alt Mode (see "Quick Setup instructions (front panel)".

> ⚠️ IMPORTANT! The Local Oscillator frequency must be set according to your LNB manufacturer's instructions (for default receiver settings, see Table A). If default factory settings must be changed, Local Oscillator frequency options are only available at the Installer menu.

Table A. Factory default settings (Quick Setup)

Option	Front Panel	Default
Band	YES	C-Band
L-Band Freq.	YES	950 MHz
FEC Rate	YES	7/8
Symbol Rate	YES	28.3465 Msymbols/s
Polarization	YES	H (Horizontal)
Input Select	YES	RF
Find	YES	OFF
Video Standard	YES	525A: NTSC->PAL/B
C Band LO	NO	5.150 GHz
Ku Low/Single LO	NO	9.750 GHz
Ku High Band LO	NO	10.600 GHz
Ku Band Switch	NO	11.700 GHz
Factory Reset	YES	N/A

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Installation and Operation Guide

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Items may include refurbished goods, subassemblies or components which we warrant as provided in this section.

Warranty Period

The Warranty Period begins on the date the Item is delivered and extends for 12 months for hardware and 90 days for software, parts and services. We will repair or replace, at our option, any product returned to us by the purchaser of such Item at the purchaser's expense during the Warranty Period, which fails to satisfy this Warranty, unless the failure was the result of shipping; improper installation, maintenance or use; abnormal conditions of operation; attempted modification or repair by the purchaser; or an act of God. We will reperform any services which do not conform to this Warranty provided we have received notice of non-conformance within the Warranty Period.

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Year 2000 Statement

Certain Items may require upgrades to accept and correctly process dates before, on and after January 1, 2000 ("Year 2000 Ready"). In addition, we cannot warrant that any Items, even though themselves Year 2000 Ready will operate correctly when used in conjunction with hardware, software, data, applications or services of third parties or products previously purchased from us. We cannot be responsible for the interoperability of our equipment with hardware, software, data, applications or other services of third parties and advise the purchaser to contact all other third party suppliers and to perform its own testing adequately in advance.

Warranty and Disclaimer, Continued

Purchaser's Responsibility

The purchaser must pay packing, crating, and transportation costs to and from the factory.

At the purchaser's request, we will make reasonable efforts to provide warranty service at the purchaser's premises, provided the purchaser pays our then current rates for field services and the associated travel and living expenses.

Claims Under This Warranty

In case of a claim under this warranty, the purchaser should do the following:

1. Notify us by giving the Item model number, serial number and details of the difficulty.

2. On receipt of this information, the purchaser will be given service data or shipping instructions.

3. On receipt of shipping instructions, forward the Item prepaid.

4. If the Item or fault is not covered by warranty, an estimate of charges will be furnished before work begins.

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Safety precautions

Protect yourself from electric shock and your system from damage!

- This product complies with international safety and design standards. Observe all safety procedures that appear throughout this guide, and the safety symbols that are affixed to this product.
- If circumstances impair the safe operation of this product, stop operation and secure this product against further operation.

Avoid personal injury and product damage! Do not proceed beyond any symbol until you fully understand the indicated conditions!

⚠	You will find this symbol in the literature that accompanies this product. It indicates important operating or maintenance instructions.
⚡	You may find this symbol in the literature that accompanies this product. It indicates a live terminal; the symbol pointing to the terminal device.
⏚	You may find this symbol in the literature that accompanies this product. It indicates a protective earth terminal.
♨	You may find this symbol in the literature that accompanies this product. It indicates excessive or dangerous heat.

Power

- Important! If this product is a Class I product, you must earth this product.
- This product plugs into a socket-outlet. The socket-outlet must be near this product, and must be easily accessible.
- Connect this product only to the power source that is indicated on the back panel of this product.
- If this product does not have a mains power switch, the power cord serves this purpose.

Safety precautions (continued)

Enclosure

- Do not allow moisture to enter this product.
- Do not open the enclosure of this product unless otherwise specified.
- Do not push objects through openings in the enclosure of this product.

Cables

- Always disconnect all power cables before you service this product.
- Always pull on the plug or the connector to disconnect a cable. Never pull on the cable itself.
- Do not walk on or place stress on cables or plugs.

Fuse

- Always use a fuse that has the correct type and rating. The correct type and rating is indicated on this product.
- Always disconnect all power cables before you change a fuse.

Factory service

- Refer service only to service personnel who are authorized by the factory.

Règles de sécurité

Protégez-vous des risques d'électrocution et protégez votre système contre les endommagements éventuels.

- Ce produit respecte les standards internationaux de sécurité et de conception. Veuillez observer toutes les procédures de sécurité qui apparaissent dans ce guide, ainsi que les symboles de sécurité qui figurent sur le produit.

- Si, du fait des circonstances, ce produit cesse de fonctionner normalement, cessez de l'utiliser et empêchez-en l'utilisation future.

Évitez le risque de blessures et de dommages aux produits! Ne procédez à aucune tâche tant que vous n'aurez pas entièrement assimilé les conditions indiquées par un symbole!

⚠	Ce symbole figure dans la documentation accompagnant ce produit. Il indique d'importantes instructions de fonctionnement ou d'entretien.
⚡	Ce symbole peut être attaché à ce produit. Il indique une borne sous tension; la direction indique la borne.
⏚	Ce symbole peut être attaché à ce produit. Il indique une borne de terre de protection.
♨	Ce symbole peut être attaché à ce produit. Il indique une température excessive ou dangereuse.

Alimentation

- Important! Si ce produit fait partie de la classe I, vous devez le mettre à la terre.

- Ce produit se branche dans une prise murale. Cette dernière doit être placée à proximité du produit et doit être facilement accessible.

- Ne branchez ce produit qu'à la source d'alimentation indiquée sur son panneau arrière.

- Si ce produit n'a pas d'interrupteur d'alimentation générale, le cordon d'alimentation remplit ce rôle.

Règles de sécurité (suite)

Enceinte

- Ne laissez pas l'humidité pénétrer dans ce produit.
- N'ouvrez pas l'enceinte de ce produit, sauf instructions contraires.
- Ne forcez pas d'objets dans les ouvertures du boîtier.

Câbles

- Débranchez toujours tous les cordons d'alimentation avant de réparer ce produit.
- Tirez toujours sur la prise ou le connecteur pour débrancher un câble, Ne tirez jamais directement sur le câble.
- Ne marchez pas sur les câbles ou les prises et n'y exercez aucune pression.

Fusibles

- Utilisez toujours un fusible de type et de valeur corrects, indiqués sur le produit.
- Débranchez toujours tous les cordons d'alimentation avant de changer un fusible.

Réparations effectuées à l'usine

- Ne confiez les travaux de réparations qu'au personnel autorisé par l'usine.

Sicherheitsvorkehrungen

Schützen Sie sich gegen elektrischen Schlag, und Ihr Gerät gegen Beschädigung!

- Dieses Gerät entspricht internationalen Sicherheits-und Ausführungsnormen. Beachten Sie alle in diesem Handbuch enthaltenen Sicherheitshinweise sowie die am Gerät angebrachten Warnzeichen.

- Sollten örtliche Umstände den sicheren Betrieb dieses Gerätes beeinträchtigen, schalten Sie es ab und sichern es gegen weitere Benutzung.

Vermeiden Sie Verletzungen sowie Beschädigung des Gerätes! Wenn Sie zu einem der folgenden Warnzeichen gelangen, nicht weiterarbeiten, bis Sie seine Bedeutung voll verstanden haben!

⚠	Dieses Symbol erscheint auf dem Gerät und/oder in der ihm beiliegenden Literatur. Es bedeutet wichtige, zu beachtende Betriebs-oder Wartungsanweisungen.
⚡	Wenn dieses Zeichen am Gerät angebracht ist, warnt es vor einer spannungsführenden Stelle.
⏚	Dieses Symbol erscheint auf dem Gerät und/oder in der ihm beiliegenden Literatur. Es bedeutet wichtige, zu beachtende Betriebs-oder Wartungsanweisungen.
♨	Wenn dieses Zeichen am Gerät angebracht ist, warnt es vor heißen Stellen, die zu Verbrennungen führen können.

Netzspannung

- Wichtig! Wenn dieses Gerät ein Produkt der Schutzklasse I ist, muß es geerdet werden

- Das Gerät ist an einer Steckdose anzuschließen. Diese muß sich leicht zugänglich in unmittelbarer Nähe des Gerätes befinden.

- Die Netzversorgung muß den auf der Rückwand des Gerätes angegebenen Werten entsprechen.

- Falls sich kein Hauptschalter am Gerät befindet, dient das Netzkabel diesem Zweck.

Fortsetzung nächste seite

Sicherheitsvorkehrungen (fortsetzung)

Gehäuse

- Das Innere des Gerätes ist vor Feuchtigkeit zu schützen.
- Das Gehäuse ist nicht zu öffnen.
- Niemals einen Gegenstand durch die Gehäuseöffnungen einführen!

Kabel

- Vor jeglicher Wartung des Gerätes sind alle Kabel zu entfernen.
- Hierzu grundsätzlich am Stecker oder Verbindungsstück und niemals am Kabel selber ziehen.
- Nicht auf die Kabel oder Stecker treten oder diese einer Zugbelastung aussetzen.

Sicherung

- Grundsätzlich eine Sicherung der richtigen Ausführung und Leistung verwenden. Diese sind am Gerät angegeben.
- Vor Auswechseln der Sicherung stets alle Netzkabel entfernen.

Hersteller-Wartung

- Wartungsarbeiten sind nur durch vom Hersteller autorisierte Techniker vorzunehmen.

Precautiones de seguridad

¡Protéjase contra la electrocución y proteja su sistema contra los daños!

- Este producto cumple con los criterios internacionales de seguridad y diseño. Observe todas los procedimientos de seguridad que aparecen en esta guía, y los símbolos de seguridad adheridos a este producto.

- Si las circunstancias impiden la operación segura de este producto, suspenda la operación y asegure este producto para que no siga funcionando.

¡Evite lastimarse y evite dañar el producto! No avance más allá de cualquier símbolo hasta comprender completamente las condiciones indicadas!

Encontrará este símbolo en el impreso que acompaña a este producto. Este símbolo indica instrucciones importantes de funcionamiento o mantenimiento.

Es posible que este símbolo esté pegado al producto. Este símbolo indica un terminal vivo, la flecha apunta hacia el aparato terminal

Podría encontrar este símbolo pegado al producto. Este símbolo indica un terminal de protección de tierra.

Podría encontrar este símbolo pegado al producto. Este símbolo indica calor excesivo o peligroso.

Power

- Importante! Es necesario poner el producto a tierra si es un producto de Clase I.

- Este producto se conecta a un enchufe. El enchufe necesita estar cerca del producto y ser fácilmente accesible.

- Conecte este producto únicamente a la fuente de suministro eléctrico indicada en el panel posterior del producto.

- Si el producto no tiene interruptor para la linea principal, utilice el cordón toma de corriente para este propósito.

Sigue en la próxima página

Precautiones de seguridad (continuación)

Cubierta

- No permita que la humedad penetre en este producto.
- No abra la cubierta del producto a menos que se indique lo contrario.
- No introduzca objetos a través de las aberturas de la cubierta del producto.

Cables

- Desconecte siempre todos los cables eléctricos antes de revisar o reparar el producto.
- Tire siempre del enchufe o del conector para desconectar un cable. Nunca tire del cable mismo.
- No camine ni aplique presión sobre los cables o enchufes

Fusible

- Use siempre un fusible del tipo y clasificación correctos. El tipo y la clasificación correctos están indicados en el producto.
- Desconecte siempre todos los cables eléctricos antes de cambiar un fusible.

Revisión y reparación de fábrica

- Solo personal aprobado por la fábrica puede darle servicio al producto.

Precauzioni di sicurezza

Proteggetevi da scosse elettriche e proteggete il vostro sistema da possibili danni!

- Questo prodotto soddisfa le norme internazionali per la sicurezza ed il design. Seguite tutte le procedure di sicurezza contenute in questa guida e i simboli di sicurezza applicati al prodotto.

- Se circostanze avverse compromettono la sicurezza d'uso di questo prodotto, interrompetene l'uso e assicuratevi che il prodotto non venga più utilizzato.

Evitare infortuni alla persona e danni al prodotto! Non procedere oltre a qualunque simbolo fino a quando non si siano comprese pienamente le condizioni indicate!

⚠	Questo simbolo, che appare nella letteratura di accompagnamento del prodotto, indica importanti istruzioni d'uso e di manutenzione.
⚡	Sul prodotto potete vedere questo simbolo che indica un dispositivo terminale sotto tensione; la freccia punta verso il dispositivo.
⏚	Potrete trovare il presente simbolo applicato a questo prodotto. Questo simbolo indica un terminale protettivo di messa a terra.
♨	Potrete trovare il presente simbolo attaccato a questo prodotto. Questo simbolo indica un calore eccessivo o pericoloso.

Alimentazione

- Importante! Se questo prodotto è di Classe I, va messo a terra.

- Questo prodotto si inserisce in una presa di corrente. La presa di corrente deve essere in prossimità del prodotto, e deve essere facilmente accessibile.

- Collegare questo prodotto solamente alla fonte di alimentazione indicata sul pannello posteriore di questo prodotto.

- Se questo prodotto non è dotato di un interruttore principale, il cavo di alimentazione funge a questo scopo.

Continua alla pagina seguente

Precauzioni di sicurezza (continua)

Chiusura

- Proteggete da umidità questo prodotto.
- Non aprire la chiusura di questo prodotto a meno che non sia specificato diversamente.
- Non inserire oggetti attraverso le fessure della chiusura.

Cavi

- Staccare sempre tutti i cavi di alimentazione prima di svolgere l'assistenza tecnica al prodotto.
- Per scollegare un cavo tirate la spina o il connettore, non tirare mai il cavo stesso.
- Non calpestare o sottoporre a sollecitazioni i cavi o le prese.

Fusibile

- Utilizzare sempre un fusibile che sia di tipo e potenza nominale corretta. Il tipo e la potenza nominale corretta sono indicati su questo prodotto.
- Staccare sempre tutti i cavi di alimentazione prima di sostituire un fusibile.

Riparazionoi di fabbrica

- Per le riparazioni contattate solamente personale tecnico autoizzato dalla fabbrica.

CAUTION

This symbol alerts you to the presence of uninsulated dangerous voltage inside the product enclosure that poses a risk of electric shock.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

This symbol alerts you to important operating and maintenance (servicing) instructions included with this product.

CAUTION

TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVERS FROM THIS UNIT. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL. SEE ADDITIONAL SAFETY INSTRUCTIONS BELOW.

WARNING

TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.

IMPORTANT SAFEGUARDS

1. **Read Instructions:** All the safety and operating instructions should be read before this product is operated.

2. **Retain Instructions:** The safety and operating instructions should be retained for future reference.

3. **Heed Warnings:** All warnings on the product and in the operating instructions should be adhered to.

4. **Follow Instructions:** All operating and use instructions should be followed.

5. **Cleaning:** Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

6. **Attachments:** Do not use attachments not recommended by Scientific-Atlanta as they may cause hazards.

7. **Water and Moisture:** Do not use this product near water - for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, and the like.

PORTABLE CART WARNING

8. **Accessories:** Do not place this product on an unstable cart, stand, bracket, or table. The product may fall causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, bracket, or table recommended by Scientific-Atlanta. Any mounting of the product should follow the instructions, and should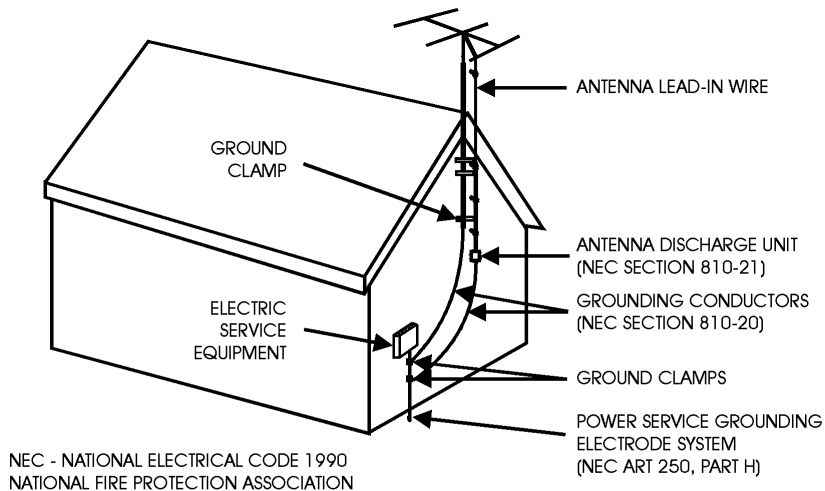 use a mounting accessory recommended by Scientific-Atlanta. An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

9. **Ventilation:** Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product, and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the instructions have been adhered to.

10. **Heat:** This product should be located away from heat sources such as radiators, heat registers, stoves or other products (including amplifiers) that radiate heat.

11. **Power Sources:** This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply in your home or business, consult your appliance dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions supplied with the product. For applications other than in North America, a suitable attachment plug adapter should be used for connection to the power source. For determining the appropriate attachment adapter type, refer to qualified technical personnel.

12. **Polarization:** This product may be equipped with a polarized alternating current line plug (i.e., a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.

13. **Power Cord Protection:** Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

14. **Lightning:** For added protection for this product during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.

15. **Power Lines:** An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.

16. **Overloading:** Do not overload wall outlets, extension cords or integral convenience receptacles, as this can result in a risk of fire or electric shock.

17. **Object and Liquid Entry:** Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

18. **Servicing:** Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

19. **Damage Requiring Service:** Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    (a) When the power-supply cord or plug is damaged.
    (b) If liquid has been spilled, or objects have fallen into the product.
    (c) If the product has been exposed to rain or water.
    (d) If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
    (e) If the product has been dropped or damaged in any way.
    (f) The product exhibits a distinct change in performance.

20. **Replacement Parts:** When replacement parts are required, be sure the service technician uses replacement parts specified by Scientific-Atlanta, or parts having the same operating characteristics as the original parts. Unauthorized part substitutions made may result in fire, electric shock or other hazards.

21. **Safety Check:** Upon completion of any service or repairs made to this product, ask the service technician to perform safety checks to determine that the product is in safe operating condition.

22. **Outdoor Antenna Grounding:** If an outside antenna or cable system is connected to this product, ensure that the antenna or cable system is properly grounded to provide protection against voltage surges and built-up static charges. Appropriate sections of the National Electrical Code (NFPA 1990) provide information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode (see Figure 1).

ANTENNA LEAD-IN WIRE

GROUND CLAMP

ANTENNA DISCHARGE UNIT (NEC SECTION 810-21)

GROUNDING CONDUCTORS (NEC SECTION 810-20)

ELECTRIC SERVICE EQUIPMENT

GROUND CLAMPS

POWER SERVICE GROUNDING ELECTRODE SYSTEM (NEC ART 250, PART H)

NEC - NATIONAL ELECTRICAL CODE 1990
NATIONAL FIRE PROTECTION ASSOCIATION

TO CATV SYSTEM INSTALLER
This reminder is provided to call the CATV system installer's attention to Article 820-40 of the National Electrical Code (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 entry as practical.

Figure 1. Outdoor antenna grounding

Important notice for Class I apparatus

Important

This notice is applicable only if this apparatus has a three-pin power plug.

Warning

This apparatus must be earthed.

Mains lead colours

The following is applicable to Class I apparatus supplied with a flexible cord having cores coloured green-and-yellow, brown, and blue.

Important! The wires in this mains lead are coloured in accordance with the following code.

Colour	Mains lead wire
Green and yellow	Earth
Blue	Neutral
Brown	Live

Connecting the mains lead

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows.

IF the wire is coloured…	THEN connect it to…
Blue	…the Neutral terminal Note: The Neutral terminal is typically marked N or coloured black.
Brown	…the Live terminal Note: The Live terminal is typically marked L or coloured red.
Green and yellow	…the Earth terminal Note: The Earth terminal is typically marked E (or marked with the safety earth symbol, or coloured green and yellow.

Preface

Table of Contents

1
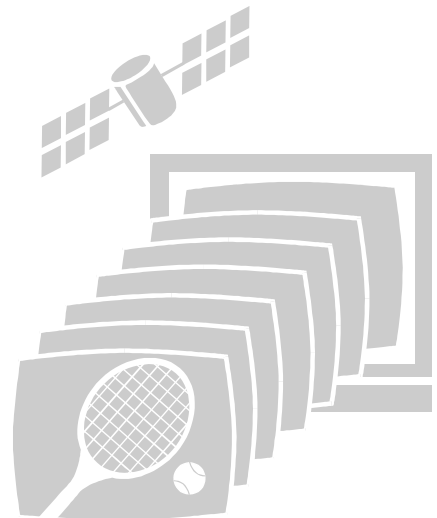
Introduction

Chapter 1 Introduction

About this guide

This guide provides installation and operating instructions, plus user servicing and maintenance procedures for the PowerVu *Plus* Model D9229 Commercial Headend Receiver. Service problems not identified in this manual should only be corrected by qualified service technicians. This is not a complete system operation guide.

Commercial Headend Receiver

Welcome to the world of PowerVu *Plus* direct-broadcast satellite services. Your Commercial Headend Receiver provides the ultimate in digital-quality video, audio and data services. Designed using state-of-the-art MPEG-2 digital compression and broadcast satellite technology, your PowerVu *Plus* Model D9229 Commercial Headend Receiver is quality-built for trouble-free operation, and comes equipped with many built-in features and capabilities. Depending on the country or jurisdiction where it is used, your Commercial Headend Receiver may be slightly different from other models.

Contents

Main features

- MPEG-2/DVB digital video and audio signals in 525-line or 625-line systems

- Single- or multiple-channel per carrier operation

- Variable symbol rates from 3.0 to 30.8 Msymbols/s

- Selectable Viterbi Forward Error Correction rates of 1/2 2/3, 3/4, 5/6 or 7/8 (installer-selectable or downloadable over satellite)

- PowerVu conditional access with DES or DVB scrambling

- MPEG 4:2:0 video decoding

- MPEG and Dolby Digital (AC-3) audio decoding

- Two pairs of balanced audio outputs with detachable connectors for easy installation

- Non-encrypted utility data output at rates up to 38.4 kb/s

- Separate text and video output, allowing the operator to access diagnostic menus without disrupting the decompressed video signal output

- Supports VBI reinsertion of NABST, AMOL I AND II (Nielsen), and WST data

- Supports reinsertion of VBI lines 10 to 22 in NTSC (fields 1 and 2), or PAL lines 7 to 22 (fields 1 and 2)

- Eight programmable open-collector outputs and two Form C contact closures for control of external devices such as VTRs and transmitters

- Downloadable software capability via the satellite uplink providing site upgradability

- Smart Card receptacle for field-upgradable security

- Remote serial interface for receiver monitoring, diagnostics and tuning control

- Cue tones feature provides real-time control of external ad-insertion devices.

2

Installation

Chapter 2 Installation

About this chapter

This chapter provides installation and preliminary setup instructions for the PowerVu *Plus* Model D9229 Commercial Headend Receiver. Service problems not identified in this manual should only be performed by qualified service technicians. This is not a complete system operation guide.

Contents

Introduction

Unpacking and inspection

When removing the PowerVu *Plus* Model D9229 Commercial Headend Receiver protective packaging, inspect the shipping carton for damage. If any signs of damage are evident, notify the carrier immediately before accepting the consignment. Contact your local S-A representative if any signs of damage or defects are discovered.

Retain the packaging in the event of return, or for equipment storage. Scientific-Atlanta will not be held liable for equipment damage plus any shipping and/or repair charges resulting from inadequate packing, or use of packing materials that do not meet S-A specifications.

⚠ **WARNING!** The PowerVu *Plus* Model D9229 Commercial Headend Receiver is designed for rack-mount applications. Install the product in a dry, well ventilated location to allow adequate air circulation. Ensure that sufficient clearance is maintained at the chassis rear panel for connecting input/output and AC power cables.

Do not obstruct the chassis (top) ventilation holes. Prolonged operation with reduced ventilation may result in equipment damage.

Rear panel connections

All input and output signal connections are made at the receiver rear panel. The accompanying table summarizes all standard and optional rear panel I/O connections. Figure 2–1 shows the rear panel view of PowerVu *Plus* Model D9229 Receiver P/N 803-377.
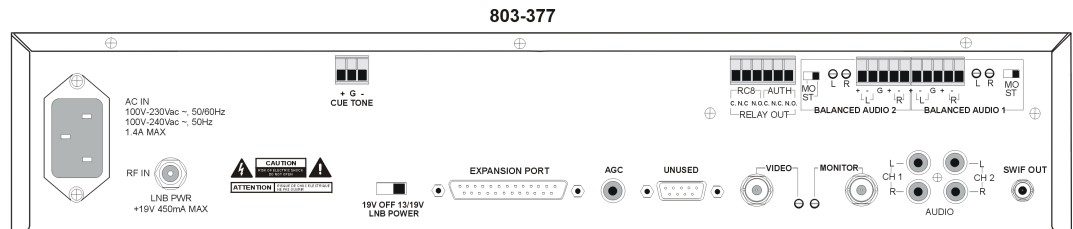
Figure 2–1. Rear panel view

Table 2-1. Rear panel controls and connectors

Control/Connector	Type	Function/Description
AC IN	NEMA 5-15p	• Voltage input 100-230 VAC (±10%), 50/60 Hz or 100-240 VAC (±10%), 50 Hz only
RF IN	F	• Provides LNB signal input, remote LNB power (see LNB POWER below) for use when no external LNB power source is available plus automatic 22 kHz tone signaling (LNB selection) for dual-LNB operation
LNB POWER	Slide Switch	• Provides a +13V or +19V DC signal output at RF IN when set to ON (external LNB power source not used), and no output when set to OFF (external LNB power source used)
EXPANSION PORT	DB25F	• Multi-function connector supports asynchronous utility data at rates up to 38,400 baud, eight (8) auxiliary outputs for external Serial Remote Control plus computer diagnostics and remote tuning control
AGC	RCA	• Provides an output voltage proportional to the RF input signal level for antenna peaking
VIDEO	BNC	• Provides video output for connection to a cable headend or external TV modulator
MONITOR	BNC	• Provides video output for connection to a TV monitor
AUDIO CH1, CH2 (L/R)	RCA	• Provides two unbalanced stereo audio channels or four monaural audio channels (CH1 and CH2)
SWIF OUT	ST (Fiber Optic)	• SWIF port typically used to output transport data for re-multiplexing pr retransmission
BALANCED AUDIO 1 & 2	Euro-Type (Pluggable)	• Provides two (2) Balanced Audio outputs with adjustable gain controls (see L/R below) for use with an external audio amplifier, cable headend or external modulator
MO/ST	Slide Switch	• Provides (Balanced Audio) combined L+R channel monaural output when set to MO, and discrete Left and Right channel stereo output at the terminal strip when set to ST
L/R (Balanced Audio)	Trim Potentiometer	• Trimpot adjustment provides balanced audio output levels (left and right audio channels) is factory set to provide 0 dBm out for 0 dBm in

Control/Connector	Type	Function/Description
RELAY OUT	Euro-Type (Pluggable)	• Two separate terminal blocks (i.e., RC8 and AUTH) provide alarm output signals for connecting to alarm/signal detection, VCR or other/broadcast equipment for automatic equipment control (e.g., in the event of a receiver error condition due to signal loss, receiver de-authorization, or non-video service selection), where an alarm output signal connected to alarm detection equipment can switch signal output to a spare or auxiliary (standby) receiver
Cue Tone Output	Euro-Type (Pluggable)	• Provides Cue Tone (DTMF) output for connection to external user devices, such as VTR equipment.

Equipment installation and setup

The instructions that follow are provided to assist with setup and installation of the Model D9229 Commercial Headend Receiver for a typical commercial application. If a TV monitor connection is used, additional receiver setup is required. The pages that follow provide equipment setup information.

Receiver equipment interconnection

The following instructions are provided for unpacking and setup of the receiver, to connect external signals and equipment and to activate the receiver.

> ⚠️ **IMPORTANT!** Automatic 22 kHz tone signaling (LNB selection) is provided for dual-LNB operation if the receiver setup includes certain settings. The presence or absence of this signal (at the receiver RF IN connector) depends on the frequency settings used. For more information about frequency settings, see Chapter 3.

Step 1.   Unpack and mount the receiver

Remove the receiver from the shipping carton in preparation for installation. Install in a dry, well ventilated location to allow proper air circulation in and around the unit. Always maintain sufficient clearance at the chassis rear panel for connecting input/output and AC power cables.

Step 2.   Connect the LNB RF signal cable

Using the correct polarization, connect the LNB RF signal output cable to the receiver rear panel RF IN connector.

Step 3. Set the LNB POWER switch

Set the LNB POWER switch to 19V, 13V/19V, or OFF. The default setting for the rear panel LNB POWER switch is OFF. When set to 19V or 13V/19V, a +13 or +19V DC signal is output at the RF IN connector (no external LNB power source available). When set to OFF, there is no DC signal output at this connector (external LNB power source used).

Step 4. Connect the VIDEO output signal to your cable system

Connect a RF cable from the receiver VIDEO output connector to your cable modulator VIDEO IN connector. This output signal can also be connected to a PowerVu Digital Video Encoder for re-encoding, or to a TV monitor.

Step 5. Connect the BALANCED AUDIO output to modulator or switcher equipment

Connect a multi-conductor cable from the receiver BALANCED AUDIO 1 and 2 (Left and Right) screw terminal outputs to your cable modulator or audio switcher inputs. This output can also be connected to a PowerVu Video Encoder for re-encoding, or to a TV monitor.

Step 6. Connect the AUDIO outputs to a TV monitor

Connect separate RCA cables from the receiver unbalanced AUDIO CH1 and CH2 (Left and Right) audio outputs to the audio inputs of your TV monitor, if required.

Step 7. Connect the MONITOR output to a TV monitor

Connect a cable from the receiver MONITOR output to the input of your TV monitor.

Step 8. Connect the RELAY OUT (AUTH) output to alarm detection equipment

Connect a multi-conductor cable from the receiver RELAY OUT-AUTH screw terminal outputs to your alarm detection equipment, if required (see "terminals "for additional information).

Step 9. Connect the RELAY OUT (RC8) output to remote control equipment

Connect a multi-conductor cable from the receiver RELAY OUT-RC8 screw terminal outputs to your Remote Control equipment, if required (see "**terminals "**for additional information).

Step 10. Connect the EXPANSION PORT I/O cable to remote PC/Workstation or terminal equipment

Connect a multi-conductor cable from the receiver EXPANSION PORT to a remote PC/Workstation or terminal (see Appendix B for additional information).

If you are going to configure your receiver for Cue Tone operation and are going to connect user devices to the Cue Tone output, do NOT use the EXPANSION PORT for Cue Trigger purposes.

⚠️ **IMPORTANT!**. Be sure that any cable you attach to the expansion port is fully shielded.

Step 11. Connect the receiver to AC power

Connect the socket end of the supplied AC power cable to the receiver AC cable input socket, and connect the other (plug) end of this cable to a proper AC power source.

Step 12. Power ON the receiver

Press the STANDBY button on the receiver front panel to activate the receiver. When AC power is first applied (AC power cord connected), the receiver starts up in STANDBY mode. This state is confirmed by the flashing character segment on the front panel alpha-numeric display. When in normal operating mode, the current channel is displayed.

NOTE: If connecting the receiver to a TV monitor, or to a PC/workstation or terminal, see this chapter for complete setup information.

⚠️ **IMPORTANT!** Following successful startup, you can change the current/default receiver settings using the front panel buttons in Alt Mode (via the Installer Channel), or using menus. When the receiver is tuned to the installer channel, "0"appears on the front panel display. If channel 0 is not displayed, press 0 to display the Installer Channel. If you are unable to display the Installer Channel, contact your dealer/reseller or local service provider, or your nearest Scientific-Atlanta Customer Service Center for assistance.

Other connections

The topics that follow provide details for other ways to connect to external equipment.

> ⚠️ **IMPORTANT!** Application-related information provided in this chapter includes setup instructions for operating the receiver using front panel buttons (i.e., Alt Mode). For complete information about how to use the front panel to operate the receiver, see Chapter 3. Additional application and product reference information is provided in Appendix F and Appendix G.

EXPANSION PORT

The EXPANSION PORT provides support for asynchronous utility data I/O from 300 to 38,400 baud (8 bits, 1 stop bit, no parity) via a 25-pin, D type connector (i.e., 300, 1200, 2400, 4800, 9600, 19200 and 38400 baud). Eight separate remote control ports are available for remote diagnostics and receiver setup, or for controlling external user equipment. For EXPANSION PORT connector pin-out information, see Table 2-2 (see also "Appendix B").

Table 2-2. EXPANSION PORT connector pin-out

Pin	Function	Pin	Function
1	Chassis Ground	15	NO CONNECTION
2	Utility Data Output	16	Remote Control output #8
3-6	NO CONNECTION	17	Remote Control output #7
7	Signal Ground	18	Remote Control output #6
8	NO CONNECTION	19	Remote Control output #5
9	NO CONNECTION	20	+5 VDC control output via 1K Ω pull-up resistor
10	Not Authorized Flag	21	+5 VDC control output via 47 Ω pull-up resistor
11	NO CONNECTION	22	Remote Control output #4
12	Serial Remote Control interface Rx data	23	Remote Control output #3
13	Serial Remote Control interface Tx data	24	Remote Control output #2
14	NO CONNECTION	25	Remote Control output #1

All EXPANSION PORT outputs are open-collector type except for Utility Data and Serial Remote Control interface Rx/Tx data I/O (pins 2, 12, and 13, respectively). Pin 2 (Utility Data) can provide Utility Data service only if the receiver is authorized and a signal authorized via PCC Control System software is being received. When this authorized service is present, pin 10 is low (open collector output).

For Cue Trigger purposes, use pins 22 to 25 and pins 16 to 19. If you are going to configure your receiver for Cue Tone operation and are going to connect user devices to the optional Cue Tone output, do NOT use these pins for remote control or Cue Trigger purposes. The receiver cannot be used for Cue Tone and Cue Trigger output concurrently.

⚠ **IMPORTANT!**. Ensure that any cable you attach to the expansion port is fully shielded.

NOTE: If the receiver is connected to a TV monitor, PC/workstation or terminal for remote diagnostics and receiver setup, refer to "Appendix D".

CUE TONE output

The CUE TONE terminal provides balanced, low output impedance (< 50 Ω), standard audio DTMF tones for the purposes of cueing insertion of localized commercial messages. The output level is -3.0 dBu ±3 dB. High band frequencies have approximately 2.0 dB pre-emphasis.

If you are going to configure your receiver for Cue Tone operation and are going to connect user devices to the optional Cue Tone output, do NOT use the EXPANSION PORT for Cue Trigger purposes. The receiver cannot be used for Cue Tone and Cue Trigger output concurrently.

BALANCED AUDIO output (terminal blocks and controls)

The BALANCED AUDIO terminals provide two (or four) balanced, low impedance audio sources that include independent monaural or stereo output and Left/Right channel signal level adjustment for each source. Channel Left, Right and Ground signals are available via pluggable Euro-type terminals. A screwdriver-adjustable potentiometer is available for Left and Right channel output level adjustment of ±6 dB (maximum output of +18 dBM into a 600 Ω load). Signal level output is factory set to unity gain (i.e., 0 dBm out for 0 dBm in) for each channel. The accompanying figure shows the BALANCED AUDIO output terminals, Left/Right channel trim potentiometers and monaural/stereo selector switches. For BALANCED AUDIO terminal pin-out information, see the accompanying table. Note that the pin-out for both BALANCED AUDIO 1 and 2 terminals is identical.

Table 2-3. BALANCED AUDIO terminal pin-out

Pin	Function
1	Left Channel (+)
2	Left Channel (-)
3	Ground
4	Right Channel (+)
5	Right Channel (-)

Figure 2–2 shows the BALANCED AUDIO 1 and 2 terminal block connections plus audio level controls and monaural/stereo selector switches.

⚠ **CAUTION!** Audio outputs are balanced, low impedance signals driven by active devices. For single-ended (i.e., monaural) operation, connect only the positive (+) and ground terminal to audio equipment. Unused signals must never be grounded.
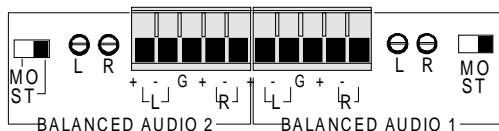
Figure 2–2. BALANCED AUDIO channel output and control

AUTH relay terminals

AUTH relay terminal contacts are controlled by the operating state of the receiver. Under normal operating conditions (i.e., receiver is authorized), the AUTH NC (Normally Closed) relay contact is open. If an alarm condition occurs (i.e., if AC power is disconnected or interrupted, or if loss of signal authorization takes place), the AUTH NC relay contact is closed, and the AUTH NO relay contact is opened. This NO terminal signal which indicates a change of operating state for the receiver can be used to activate remote alarm detection equipment connected between the NO and C terminals. When connecting external equipment to RELAY OUT, use the Normally Open (NO) and Common (C) terminals. For typical alarm relay connections between the receiver and other equipment, see **Error! Reference source not found.**.

⚠ **IMPORTANT!** The alarm signal available at the AUTH NO relay terminal is present when AC power is disconnected or interrupted, or if loss of signal authorization occurs. This signal is identical to that found on pin 10 of the EXPANSION PORT connector.

RC8 relay terminals

RC8 relay terminal contacts are controlled via uplink (PCC Control System software), and can also be controlled via Serial Remote Control commands when the receiver is connected to a PC/workstation or terminal. The RC8 NO (Normally Open) relay contact is controlled via the receiver front panel using the PRLY (i.e., Remote Control Port Relay) setting. The Remote Control RC8 relay provides an output signal that tracks the current Remote Control ports setting (i.e., 1 through 8 or OFF). Each Remote Control port when selected can be used to control remote broadcast or other equipment connected to the receiver EXPANSION PORT (see "EXPANSION PORT"). When connecting external equipment to RELAY OUT, use the Normally Open (NO) and Common (C) terminals.

System interconnections

For a Single-LNB system, the vertically or horizontally polarized RF input signal from the satellite LNB is routed via RF coaxial cable to the RF IN rear panel connector. Other/optional connections can also be made (see "Receiver equipment interconnection" and "Other connections"). Figure 2–3 shows a typical single-LNB system interconnection.
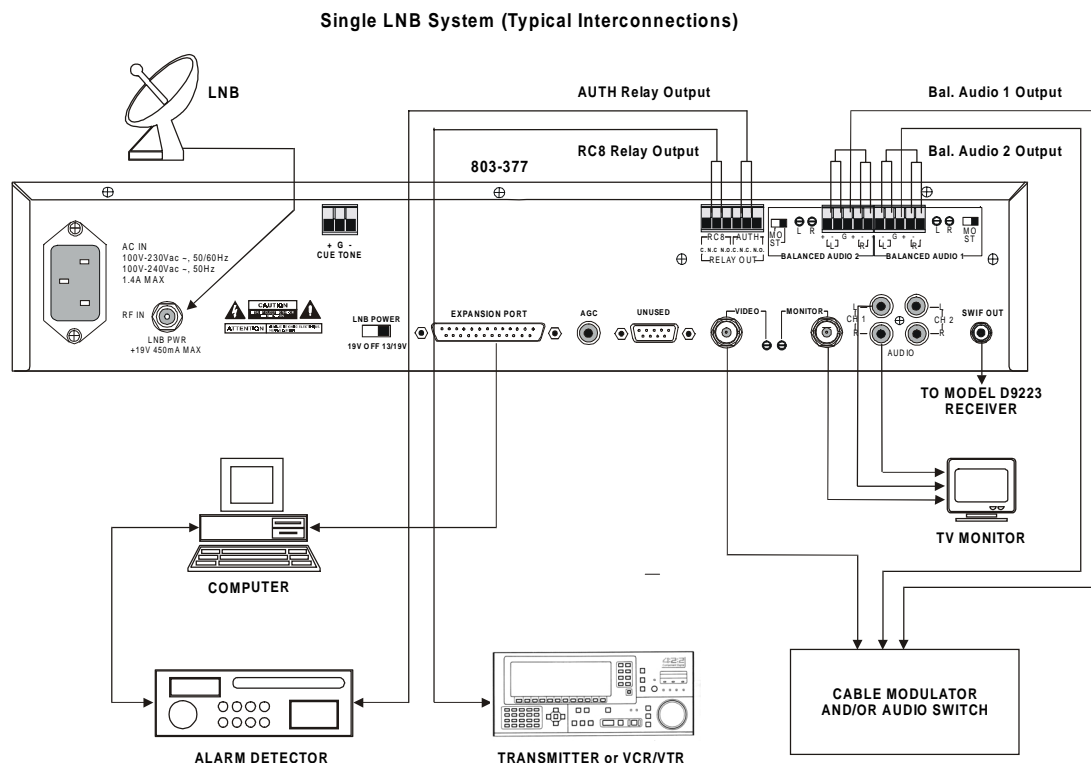
Figure 2–3. Typical single-LNB system interconnection

3

Operation

Chapter 3 Operation

About this chapter

This chapter provides complete operating instructions for the PowerVu *Plus* Model D9229 Commercial Headend Receiver using menus via the menu interface, and using the front panel via the Alt Mode interface.

Contents

Front panel controls & display

The front panel of your Model D9229 Commercial Headend Receiver provides controls for switching the receiver on and off, switching the receiver to Alt Mode operation, activating and navigating menus, and for interfacing with the Smart Card. A Signal presence LED and an Alternate Mode indicator LED are provided. A four (4)-digit, seven (7)-segment display provides visual identification of current receiver settings, and also provides user feedback when changing the current receiver setup via the front panel. An introduction to each of the front panel buttons and indicators follows.
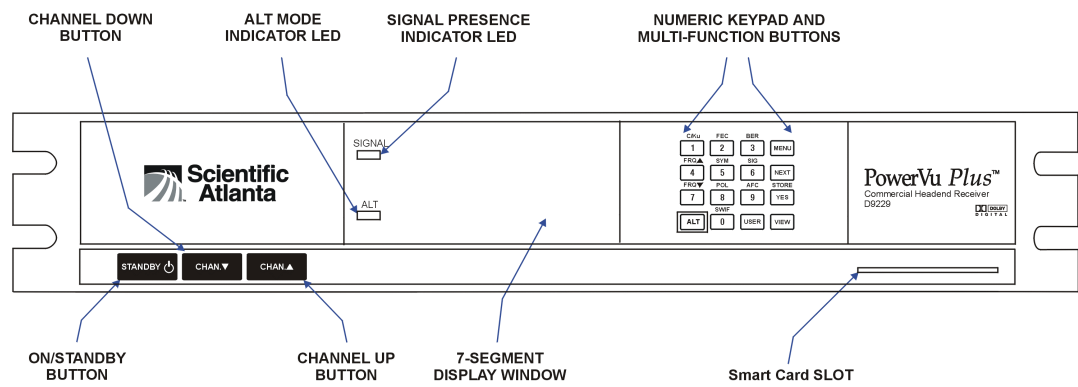
STANDBY button

The STANDBY button switches the Commercial Headend Receiver on and off (standby).

To switch the receiver on or off from the front panel...

Press STANDBY .... STANDBY ⏻

When the receiver is switched on, the front panel LED display is ON. When switched off (standby), all indicator and display LEDs are OFF, except for the flashing decimal point on the front panel seven (7)-segment display.

CHAN.▼ button

While viewing any channel you can use the CHAN.▼ button (front panel) to change channels (lower) one channel at a time.

To display the next channel (lower)...

Press CHAN.▼ .... CHAN.▼

You can also change channels directly by entering the channel number using the front panel buttons, and then pressing VIEW (see "NUMERIC keypad").

To change channels directly using front panel buttons...

Press 0 to 9 .... | 0 | 9 |

Press VIEW.. VIEW

If three buttons (numbers) are pressed for a channel (e.g., 009), the channel change takes place immediately. If only one or two buttons (numbers) are pressed for a channel, the channel change takes place after a short delay (approximately four (4) seconds). If the channel number entered corresponds to a virtual channel outside the frequency plan range, no channel change takes place, and the original channel number is redisplayed.

CHAN. ▲ button

While viewing any channel you can use the CHAN. ▲ button (front panel) to change channels (higher) one channel at a time.

To display the next channel (higher)...
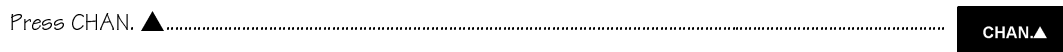
Press CHAN. ▲.. CHAN.▲

You can also change channels directly by entering the channel number using the front panel buttons, and then pressing VIEW (see "NUMERIC keypad").

To change channels directly using front panel buttons...

Press 0 to 9 .... | 0 | 9 |

Press VIEW.. VIEW

If three buttons (numbers) are pressed for a channel (e.g., 009), the channel change takes place immediately. If only one or two buttons (numbers) are pressed for a channel, the channel change takes place after a short delay (approximately four (4) seconds). If the channel number entered corresponds to a virtual channel outside the frequency plan range, no channel change takes place, and the original channel number is redisplayed.

Other Alt Mode functions are also available via the front panel. For complete information about viewing or changing the current receiver setup using Alt Mode functions, see "Front panel operation".

SIGNAL indicator LED

The Signal indicator LED is ON or OFF in response to the current operating state of your Commercial Headend Receiver. When the receiver is synchronized with the incoming digital signal, this LED is ON. If no incoming signal is detected or recognized by the receiver, or if the receiver setup is incorrect, this LED is OFF. If the incoming signal or signal synchronization is temporarily interrupted or lost, this LED may turn OFF and ON intermittently. For receiver troubleshooting information, see Appendix C.

Table 3-1. SIGNAL indicator LED operation

Receiver Status	LED State
Authorized	ON
Not Authorized	OFF
No Lock	OFF

ALT Mode indicator LED

The ALT Mode indicator LED flashes ON and OFF regularly when your Commercial Headend Receiver is operating in Alt 1 Mode, and is ON when operating in Alt 2 Mode. When operating the receiver in Alternate Modes, you can use the front panel keypad Alt Mode functions to change the current receiver setup. When the receiver is in normal operating mode, this LED is OFF. For information about using Alt Mode functions to operate your Commercial Headend Receiver, see "Setting up the receiver".

Alpha-Numeric display

Visual identification of current receiver settings is provided by a four (4)-digit, seven (7)-segment display. The display provides you with immediate feedback when making changes to the current receiver setup via front panel buttons.

When the receiver is switched on, the seven (7)-segment display indicates the current channel.

Numeric keypad

While viewing any channel you can use the front panel numeric keypad to change the current receiver setup by switching from normal receiver operation to one of two (2) alternate operating modes (i.e., Alt_Mode-1 and Alt Mode-2). For more information about Alt Modes, see "Setting up the receiver".

While in normal operating mode (i.e., front panel ALT LED OFF), you can use the front panel numeric keypad to change any channel from 001 to 999 (see also CHAN.▼ button and CHAN. ▲ button), or to enter information for Installer menu options (see **Error! Reference source not found.**).

To use the numeric keypad (normal mode operation)...

Press 0 to 9 .... | **0** | **9** |

Alt Mode functions are also available via the front panel. For complete information about viewing or changing the current receiver setup using Alt Mode functions, see "Setting up the receiver".

Smart Card slot

The Smart Card slot is provided for future security upgrades to preauthorized satellite broadcast services.

Setting up the receiver

This topic provides important operating information regarding the setup and operation of your PowerVu *Plus* Commercial Headend Receiver and satellite antenna signal source. Before you begin using the receiver, it is important that you read all of the information in this chapter. If you are modifying your receiver or system configuration, you may need to change the current settings to suit your operating requirements. If you are unsure about which settings to use, contact your dealer/reseller, or local service provider.

> ⚠️ **IMPORTANT!** Access to your PowerVu *Plus* Commercial Headend Receiver setup can be controlled via Lock Level. Depending on the current Lock Level setting, you may or may not be prevented from making changes to the current settings.

Using the receiver front panel buttons you can...

- Activate and navigate the on-screen menus via the menu interface

- Operate the receiver in Alt 1 or Alt 2 Mode via the Alt Mode interface

- View or change the current receiver setup

- Select and view available satellite programs or events

Both the menu interface and the Alt Mode interface can be used interchangeably for performing most receiver setup tasks, since both are operated via receiver operating system software. However, not all menu interface functions are duplicated by the Alt Mode interface. Depending on how you have installed and connected the Commercial Headend Receiver, you may or may not be able to use the menu interface. If the receiver is connected to a TV/video display monitor, you can view or change the current receiver setup via on-screen menus. Conversely, if no TV/video display monitor connection is available, only the front panel Alt Mode interface can be used for receiver setup, and you will not need to reference instructions provided for operating the various menus.

…About the Alternate Mode interface

While viewing any channel, you can use Alt Mode functions to view the current receiver setup, or you can view or change the current setup from the Installer Channel (see also "…About the current channel"). Alt Mode functions are available via receiver front panel buttons. Alt 1 function labels are printed directly on the keypad bezel above each button (see Figure 3-1). Alt 2 functions are also associated with front panel buttons, except that the function names are not printed on the keypad bezel (see ALT Mode indicator LED"). As with the menu interface, access to Alt Mode functions is controlled by system Lock Levels. More information about Lock Levels is contained in this chapter.

For detailed information about how each of the Alt 1 and Alt 2 functions are used to set up the receiver, see "Front panel operation".

…About operating the on-screen menus

While viewing any channel, you can display on-screen menus for viewing or changing the current receiver setup. While in menus, you can change the current receiver settings, and/or display other menus. Some menus contain setup information which is available for viewing only, and cannot be changed. Numbered menu options are used to display other menus. Access to menus and changeable menu options is controlled by system Lock Levels. For more information about Lock Levels, see "…About Lock Levels".

To display on-screen menus and view the current receiver setup…

Step 1.   Press the **MENU** button on the receiver front panel.
The Installer menu is displayed.

You can only change the current receiver setup if you have changed to the Installer Channel (i.e., channel 0) before pressing the MENU button. Otherwise, you will only be able to view the current receiver settings.

Step 2.   Move to the desired setting by pressing the NEXT button, or follow the on-screen instructions to display other menus.

For complete information about how to operate each of the on-screen menus, see "On-screen menu operation" (see also "…About saving changes").

To disable receiver lockout (if Lock Level 3 set)…

If the receiver is locked out (i.e., Lock Level 3 is set), you can display setup information at the front panel only, and menus cannot be displayed.

Perform the following actions to change the receiver Lock Level setting from 3 to 0 to disable lockout. When receiver lockout is disabled, you can display menus and/or make any changes to the current setup using front panel buttons.

Step 1.   Press **ALT** to change from normal operation to Alt 2 Mode.
The ALT LED is ON.

Step 2.   Press **3** (LOCK) <u>once</u> to display the current Lock Level (i.e., Loc 3). Pressing **3** again displays Loc 0.

Step 3. Press YES to save (STORE) the setting.
The front panel display flashes OFF and ON several times to confirm the new setting.

For more information about Lock Levels, see "…About Lock Levels".

…About entering numbers using front panel buttons

Alt Mode interface: The Alt Mode interface cannot be used for direct numeric entry. To operate the front panel for setting numeric functions while in Alt Mode, perform the following actions.

Step 1. Change to Alt 1 or Alt 2 Mode operation by pressing the ALT button on the receiver front panel (see "Front panel operation").

Step 2. Press the appropriate Alt Mode button to display/change the currently displayed value higher or lower, as required.

Step 3. Press YES to STORE (save) the new setting.

Each change made must be saved before exiting (see also "…About saving changes"). Repeat the above action to change the current setting. If a value is out of range or conflicts with another setting, a default value may be substituted.

Menu interface: Some menu options let you enter values directly using front panel buttons. To enter numbers directly and to operate numeric functions, perform the following actions.

Step 1. Move to the desired menu option by pressing the **NEXT** button.

Step 2. Press the CHAN. ▲ or CHAN.▼ button to change the currently displayed value higher or lower, as required, or press the front panel buttons to enter the number directly. Each number entered is displayed on-screen (decimal places may also display automatically). If you make a mistake while entering numbers, repeat the above using the correct buttons.

Any changes made must be saved before exiting the menu (see "…About saving changes"). Repeat the above action to change the current setting. If a value entered is out of range or conflicts with another setting, a default value may be substituted.

…About saving changes

Alt Mode interface: After making changes to the current setup via any Alt Mode function, you must save or discard the changes. Saved changes are used to update the current receiver settings which are stored in non-volatile memory. Discarding changes restores the previously saved settings. You can also cancel the operation to make further changes. For more information about Alt Modes, see "Front panel operation".

After changing the current receiver setup you can…

- **Save:** Press **YES** to save (STORE) the new setting
- **Cancel:** Press any other key to discard the change (restore previously saved setting)

Menu interface: After making a changes to the current receiver setup, you must save or discard changes (see "…About saving changes"). Saved changes are used to update the current receiver settings which are stored in non-volatile memory. Discarding changes restores the previously saved settings. For more information about menus, see "On-screen menu operation".

After changing the current receiver setup you can…

- **Save:** Press **YES** to save (STORE) the new settings
- **Cancel:** Do not press **YES** before exiting from menus

> ⚠ **IMPORTANT!** Saved settings are automatically restored when the receiver is restarted after AC power is switched off or interrupted (see also "…About Lock Levels").

…About the current channel

When you change from normal receiver operation to Alt Mode (or navigate to menus from video), the information displayed is associated with the current (virtual) channel. If no changes are made to the current setup, you are automatically returned to the previously-watched channel when you exit to video. If any changes are made which affect the received digital signal, exiting to video after saving changes is preceded by the Installer Channel banner display (i.e., channel 0). The current channel is displayed on-screen when in video, at the front panel when using the Alt Mode interface, and at the Services menu. For more information about the Installer Channel, see "Front panel operation".

…About changing the Video Standard

The Video Standard used to operate the receiver is preset at the factory to either NTSC (525-line), or PAL (625-line), depending on factory-installed options. Changing the Video Standard is normally required only for operating the receiver in a network or jurisdiction that uses the alternate Video Standard, and/or when new (or different) subscriber services are made available.

> ⚠ **IMPORTANT!** The receiver for correct display of the video (picture) uses the current Video Standard setting only. The satellite receiver does not convert from one Video Standard to another, such as from NTSC (525-line) to PAL-B (625-line) formats. When receiving a 525-line signal, the default Video Standard can be set to NTSC, or PAL-M. Similarly, when receiving a 625-line signal, the default Video Standard can be set to PAL-B, or PAL-N (Argentina).

Changing the Video Standard or resetting the receiver to the default factory settings may cause the TV video to display improperly. If the current Video Standard setting is incompatible with subscriber/network services, it must be changed. For information about factory default settings, see "Default receiver settings".

…About the Network ID

Operating the Commercial Headend Receiver in a DVB[1] network requires a valid Network ID. This number must be correctly set to match the Network ID associated with the uplink signal. Similarly, if your subscriber/network services require a Bouquet ID[2], it must also be correctly set to match the uplink signal Bouquet ID. Loss of service will result if the receiver Network ID and/or Bouquet ID does not match the uplink signal Network/Bouquet ID information.

The Network ID used to operate the receiver is preset at the factory (i.e., to 1). The Bouquet ID (if used) is also preset at the factory (i.e., to 1). Changing the Network/Bouquet ID or resetting the receiver to the factory default settings may cause loss of service. If the Network/Bouquet ID required for your uplink service is unknown or is incorrect, it must be correctly identified and set. For information about factory default settings, see "Default receiver settings".

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[1] Digital Video Broadcasting

[2] Subnetwork ID required by some DVB networks

…About Lock Levels

Four (4) user-selectable Lock Levels (Loc 0, 1, 2 and 3) are available for protecting your Commercial Headend Receiver and the current receiver settings against unauthorized use or modification (see "Table 3-2"). A Lock Level 0 setting lets you make any changes to the current receiver setup. A Lock Level 1 setting is the same as 0, except that Factory Reset is disabled. A Lock Level 2 setting disables all settings that can compromise the video signal, except Authorization Relay, Baud Rate, Lock Level, and Port Control Relay settings. A Lock Level 3 setting prevents any changes to the current receiver setup by blocking access to menus and disabling all front panel (i.e., Alt Mode) functions, except the Lock Level setting. A Lock Level 4 setting can only be changed via remote terminal (Serial Remote Control commands) or PCC uplink signal, and displays N/A[1] if set. When the receiver configuration is protected via Lock Level 4, front panel operation is locked out or disabled, and menus cannot be displayed (see also Appendix D).

> ⚠ **IMPORTANT!** For Alt Mode operation only: The Lock Level setting can be changed from any channel, including the Installer Channel (i.e., channel 0). To return to the previously-watched (virtual) channel after changing the Lock Level setting to 3 in Alt Mode, be sure that the desired virtual channel is displayed before changing to this Lock Level setting.

If a change made to the current Lock Level setting is not saved, the previously-saved setting is restored (see "…About saving changes").

Table 3-2. Available Lock Levels

Lock Level	Description
0	All front panel and menu operation enabled
1	Factory Reset disabled (see Table 3-3)
2	Critical settings disabled (see Table 3-3)
3	Front panel and menu operation disabled, except Lock Level (accessible from front panel only)
4	Front panel and menu operation disabled (accessible via Remote Control Commands and PCC uplink control only)

Table 3-3 summarizes Lock Level settings associated with receiver front panel buttons for both front panel (i.e., Alt Mode) and menu operation.

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[1] Not Applicable

Table 3-3. Lock Level summary

Label	Function/Description	Press	Lock	Label	Function/Description	Press	Lock
STANDBY	On/Standby	STANDBY	0, 1 & 2	–	–	–	–
CHAN. ▲	Channel /Option ↑	CHAN. ▲	0 & 1	–	–	–	–
CHAN. ▼	Channel /Option ↓	CHAN. ▼	0 & 1	–	–	–	–
0-9	Direct (numeric) entry	#0 - 9	0 & 1	–	–	–	–
F. Reset	Factory Reset	ALT 1[1]	0	–	–	–	–
ALT 1	ALT 1 Mode	ALT (once)	0, 1, 2 & 3	ALT 2	Alt 2 Mode	ALT (twice)	0, 1, 2 & 3
C/Ku	Band Select	ALT 1 + 1	0 & 1	BAUD	Baud Rate	ALT 2 + 1	0, 1 & 2
FEC	FEC Rate	ALT 1 + 2	0 & 1	PRLY	Rem. Ctrl. Port Relay	ALT 2 + 2	0, 1 & 2
BER	BER (Signal Quality)	ALT 1 + 3	0, 1, 2 & 3	LOCK	Lock Level	ALT 2 + 3	0, 1, 2 & 3
FRQ▲	Frequency	ALT 1 + 4	0 & 1	–	–	ALT 2 + 4	–
SYM	Symbol Rate	ALT 1 + 5	0 & 1	ARLY	Authorization Relay	ALT 2 + 5	0, 1 & 2
SIG	Signal Level	ALT 1 + 6	0, 1 & 2	WIDE	Aspect Ratio	ALT 2 + 6	0, 1, 2 & 3
FRQ▼	Frequency	ALT 1 + 7	0 & 1	VID	Video Standard	ALT 2 + 7	0 & 1
POL	Signal Polarization	ALT 1 + 8	0 & 1	–	–	ALT 2 + 8	–
AFC	Auto Frequency Control	ALT 1 + 9	0, 1, 2 & 3	VBR	Video Bit Rate	ALT 2 + 9	0, 1, 2 & 3
SWIF	Input Select	ALT 1 + 0	0 & 1	–	–	ALT 2 + 0	–
USER	Next (Installer) menu	USER	0, 1 & 2	SRCH	Signal Search	ALT 2 + USER	0 & 1
MEN U	Receiver Status menu	MEN U	0, 1 & 2	–	–	–	–
NEXT	Next (menu) option	NEXT	0, 1 & 2	NEXT	Find	NEXT	0 & 1
STORE	Saves each change	YES	0, 1, 2 & 3	–	–	–	–
VIEW	Exit to video	VIEW	0, 1 & 2	–	–	–	–

…About frequency settings

As you make changes to the current setup, the receiver checks that the various C-Band and Ku-Band LO (Local Oscillator), Ku Band Switch (Crossover) plus operating Band frequency settings are compatible with each other, and with other settings. The settings required depend on the type of LNB system installed and on subscriber/network services available, which may vary. Use only those settings specified by your antenna/LNB manufacturer, dealer/reseller or local service provider.

You can enter a valid frequency using the numbered front panel buttons, and/or you can use the CHAN.↑/CHAN.↓ front panel buttons to display available settings. If the current setting is out of range or is incompatible with other settings, it may be changed automatically. After making changes to the current receiver setup, it must be saved. For information about saving changes, see "…About saving changes".

---

[1] After changing to Alt 1 Mode, press the CHAN.▲ and CHAN.▼ buttons simultaneously

The relationships between the Downlink, L-Band and Local Oscillator frequencies are shown in Table 3-4 for both C-Band (3.7 GHz to 4.2 GHz) and Ku-Band (10.7 GHz to 15 GHz) operation.

Table 3-4. C and Ku-Band frequency calculations

Frequency Band	L-Band (operating) frequency calculation
C-Band	L-Band frequency = f^1 (Local Oscillator) - f (Downlink)
Ku-Band	L-Band frequency = f (Downlink) - f (Local Oscillator)

A Ku Band Switch (Crossover) frequency is required only if you are using a dual-band LNB. If used, the Ku High Band LO frequency must be greater than the C-Band LO or the Ku Lo/Single LO (or Ku High Band LO) frequencies.

Automatic 22 kHz tone signaling (LNB selection) is provided for dual-LNB operation if the receiver setup includes certain settings. The presence or absence of this signal (at the receiver RF IN connector) depends on the frequency settings used. The relationship between the various frequency settings and 22 kHz tone signal output are shown in Table 3-5.

Table 3-5. LO frequency settings vs. 22 kHz tone signal output

Frequency 'Band' setting	22 kHz Tone
C/L-Band Freq.	OFF
C/Downlink Freq.	OFF
Lo Ku/L-Band Freq.	OFF
High Ku/L-Band Freq.	ON
Single Ku/Downlink Freq.	OFF
Dual Ku/Downlink Freq.	ON or OFF

When using a dual-band (universal) LNB and the Dual Ku/Downlink Freq. setting is used, the receiver compares the current Downlink Freq. setting (value) with the Ku Band Switch (Crossover) frequency setting (value). If the Downlink Freq. setting associated with the Installer Channel (i.e., Channel 0) is lower than the Dual Ku/Downlink Freq. setting, the 22 kHz tone signal is OFF (i.e., not present at the receiver RF IN connector). Consequently, if the Downlink Freq. setting is higher, the 22 kHz tone signal is ON (i.e., present). When the receiver is operated in a multiple-transport network, the Downlink Freq. value associated with other virtual channel services is used by the receiver for comparison, as above (see also "Installer menu").

For receiver setup the required Band, Frequency and Local Oscillator settings are shown in Table 3-6.

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[1] Frequency

Table 3-6. Band, Frequency and Local Oscillator settings

Band	Frequency	Local Oscillator	LO Crossover
C/L-Band Freq.	L-Band	C Band LO	N/A
C/Downlink Freq.	Downlink	C Band LO	N/A
Low Ku/L-Band Freq.	L-Band	Ku Low/Single LO	N/A
High Ku/L-Band Freq.	L-Band	Ku High Band LO	N/A
Single Ku/ Downlink	Downlink	Ku Low/Single LO or Ku High Band LO	N/A
Dual Ku/ Downlink	Downlink	Ku Low/Single LO plus Ku High Band LO	Ku Band Switch

…About Signal Searches

Searching for a signal with the "Search" option is used for restoring normal receiver operation if the received signal is interrupted or lost, or is changed by the local broadcast satellite services provider.

A signal search is enabled by setting the Search option to ON, and is activated automatically only if the carrier signal is interrupted or lost for more than 20 seconds, and only if the receiver is operating in normal mode (i.e., menus are not displayed). If the lost carrier signal is recovered within 20 seconds, the receiver will attempt to synchronize with the last locked channel. If unavailable, the "NO SIGNAL" banner is displayed. If the lost carrier signal is not recovered within this time, a signal search is activated automatically.

Once activated, the receiver begins searching for a signal associated with the current Network ID. When a possible match is found, the search is temporarily interrupted while the receiver attempts to synchronize with the found signal. If synchronization is successful, the "LOCKED" status is displayed on-screen. Settings can be saved, as required, before exiting to video (current channel). If receiver synchronization cannot be achieved, the signal is discarded and the signal search is automatically resumed. If no signal is found, the signal search continues indefinitely, and must be manually terminated. A signal search can also be manually terminated, or interrupted and resumed with different settings. To disable the search, set the Search to OFF. A search is also terminated automatically if the current channel is changed, or if the MENU button is pressed.

Signal Searches are constrained or limited by the current Search Type and the boundary settings for the Lower and Upper Range frequencies. Default Search Type, Lower Range and Upper Range (frequency) criteria used for conducting the Signal Search can only be changed via the menu interface. For information about factory default settings, see "Default receiver settings".

…About the Find option

Searching for a signal with the "Find" option can be used if you are installing the Commercial Headend Receiver for the first time, or if you are modifying the current receiver setup. Activating the Find function forces the receiver to search for a signal immediately.

Once activated, the receiver begins searching for a signal associated with <u>any</u> Network ID. When a possible match is found, the search is temporarily interrupted while the receiver attempts to synchronize with the found signal. If synchronization is successful, the "LOCKED" status is displayed on-screen, and the settings can be saved, as required, before exiting to video (current channel). If receiver synchronization cannot be achieved, the signal is discarded and the signal search is automatically resumed. If no signal is found, the signal search continues indefinitely, and must be manually terminated.

Receiver startup

To activate the receiver, press the STANDBY button on the receiver front panel. When AC power is first applied, the receiver starts up in STANDBY mode. This operating mode is confirmed by the flashing character segment on the front panel display. When in normal operating mode, the current channel is displayed.

Default receiver settings

When the receiver is first powered on, the default factory receiver settings stored in non-volatile memory are used for receiver operation. Current settings can be displayed via the Alt Mode Interface by pressing the appropriate front panel buttons, or in menus via the Menu Interface.

A Factory Reset (available via the front panel only) is available for resetting the receiver to the factory default settings. When executed , the current receiver settings are replaced by the default settings (see Table 3-7). After the factory defaults are restored, you can make any changes, as required. Current receiver settings can be replaced at any time. For information about how to perform a Factory Reset, see "Front panel operation".

The accompanying table lists each of the Model D9229 Commercial Headend Receiver factory default settings by Menu. "YES" indicates front panel operation (see "Front panel operation").

Table 3-7. Factory default settings

Option	Menu	Front Panel	Default
Band	Installer menu 1/3	YES	C-Band
L-Band Freq.	Installer menu 1/3	YES	950 MHz
FEC Rate	Installer menu 1/3	YES	7/8
Symbol Rate	Installer menu 1/3	YES	28.3465 Msymbols/s
Polarization	Installer menu 1/3	YES	H (Horizontal)
Input Select	Installer menu 1/3	YES	RF
Find	Installer menu 1/3	YES	OFF
Bit error Rate (BER)	Installer menu 1/3	YES	N/A
Signal Level	Installer menu 1/3	YES	N/A
AFC Level	Installer menu 1/3	YES	N/A
Seconds to NO SIGNAL	Installer menu 2/3	NO	5
Network ID	Installer menu 2/3	NO	1
Bouquet ID	Installer menu 2/3	NO	1
Video Standard	Installer menu 2/3	YES	525A: NTSC->PAL/B
I-Q Select	Installer menu 2/3	YES	Auto Switch
MPEG Output	Installer menu 2/3	NO	Unfiltered
C Band LO	Installer menu 2/3	NO	5.150 GHz
Ku Low/Single LO	Installer menu 2/3	NO	9.750 GHz
Ku High Band LO	Installer menu 2/3	NO	10.600 GHz
Ku Band Switch	Installer menu 2/3	NO	11.700 GHz
Subtitle Language	Installer menu 2/3	NO	Disabled
Search	Installer menu 3/3	YES	OFF
Search Type	Installer menu 3/3	NO	Frequency Only
Upper Search Limit	Installer menu 3/3	NO	1450.00 MHz
Lower Search Limit	Installer menu 3/3	NO	950.00 MHz
Baud Rate	NO	YES	9600
Remote Control Port Relay	NO	YES	OFF
Authorization Relay	NO	YES	OFF
Aspect Ratio	NO	YES	4-3 (Normal)
VBR (Video Bit Rate)	NO	YES	N/A
Factory Reset	NO	YES	N/A

Front panel operation

Setting up your Commercial Headend Receiver via the Alt Mode interface requires setup of frequency-related and other options. These settings are used by the receiver for locking onto the signal, and for optimizing receiver performance. Most menu interface functions are also available via the Alt Mode interface. For a summary of Alt Mode functions, see Table 3-8.
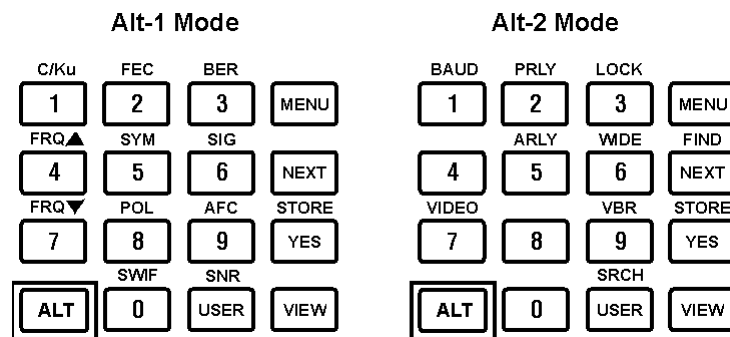
Figure 3-1. Front panel Alt 1 and Alt 2 Mode function buttons

…About Alt Modes

While viewing any channel, you can use Alt Mode functions to view the current receiver setup, or you can view or change the current setup from the Installer Channel (see also "…About the current channel"). Alt Mode functions are available via receiver front panel buttons. Alt 1 function labels are printed directly on the keypad bezel above each button (see Figure 3-1). Alt 2 functions are also associated with front panel buttons, except that the function names are not printed on the keypad bezel (see "ALT Mode indicator LED"). As with the menu interface, access to Alt Mode functions is controlled by system Lock Levels. More information about Lock Levels is contained in this chapter.

To operate the receiver in Alt 1 Mode…

Step 1. Press the ALT button on the receiver front panel <u>once</u>. If you are already operating in Alt 2 Mode, press the ALT button <u>twice</u>.
The ALT LED flashes to confirm Alt 1 Mode operation.

While the receiver is operating in Alt 1 Mode, the ALT LED flashes regularly, and only Alt 1 functions are available via front panel buttons. Pressing ALT twice returns the receiver to normal operation (i.e., the ALT LED is OFF).

To operate the receiver in Alt 2 Mode...

Step 1. Press the ALT button on the receiver front panel <u>twice</u> . If you are already operating in Alt 1 Mode, press the ALT button <u>once</u>.
The ALT LED is ON to confirm Alt 2 Mode operation.

While the receiver is operating in Alt 2 Mode, the ALT LED is ON, and only Alt 2 functions are available. Pressing ALT once returns the receiver to normal operation (i.e., the ALT LED is OFF).

To change a receiver setting...

Step 1. Change to the Installer Channel (i.e., channel 0) using front panel buttons.

Step 2. Choose the desired Alt Mode function by pressing the appropriate front panel buttons. For some Alt Mode functions, you press the same button repeatedly to display available options. For other functions, you press (a) different button(s). The current setting is displayed on the receiver front panel.

Step 3. After displaying the desired option, press YES to save (STORE) the setting.

For more information about using front panel buttons, see **"Front panel operation"**.

⚠	**IMPORTANT!** Certain (critical) receiver setup options can only be changed from the Installer Channel (i.e., channel 0). Before making changes, verify that channel 0 is the current channel, if required (see also "…About the current channel").

After changing the current receiver setup you can...

- **Save:** Press **YES** to save (STORE) the new setting
- **Cancel:** Press any other key to discard the change (restore previously saved setting)

⚠	**IMPORTANT!** Saved settings are automatically restored when the receiver is restarted after AC power is switched off or interrupted (see also "…About Lock Levels").

To exit from Alt Mode to video...

- Press the VIEW button

Table 3-8 shows available Alt Mode functions.

Table 3-8. Available Alt Mode functions

Alt 1	Description	Press	Alt 2	Description	Press
F. Reset	Factory Reset	ALT1[1]	–	–	–
ALT	Alt 1 Mode	ALT[2]	ALT	Alt 2 Mode	ALT[3]
C/Ku	Band Select	1	BAUD	Baud Rate	1
FEC	FEC Rate	2	PRLY	Remote Control Port Relay	2
BER	BER (Signal Quality)	3	LOCK	Lock Level	3
FRQ▲	Frequency ↑ (L-Band)	4	–	NA	4
SYM	Symbol Rate	5	ARLY	Authorization Relay	5
SIG	Signal Level	6	WIDE	Aspect Ratio	6
FRQ▼	Frequency ↓ (L-Band)	7	VID	Video Standard	7
POL	Signal Polarization	8	–	NA	8
AFC	Auto Frequency Control	9	VBR	Video Bit Rate	9
SWIF	Input Select	0	–	NA	0
USER	NA[4]	–	SRCH	Signal Search	USER
MENU	Displays Receiver Status menu	MENU	MENU	Displays Receiver Status menu	MENU
NEXT	NA	NEXT	FIND	Find	NEXT
STORE	Saves each change	YES	STORE	Saves each change	YES
VIEW	Exit to video	VIEW	VIEW	Exit to video	VIEW

AFC Level

Display only: The AFC (Automatic Frequency Control) Level display option is an Alt 1 Mode function. The displayed AFC Level (any number from -50 to +50) is the current relative offset from the set center frequency of the decoded digital signal. The receiver automatically compensates for a ±2.5 MHz frequency offset which is equivalent to an AFC Level of approximately ±12.

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[1] After changing to Alt 1 Mode, press the CHAN.▲ and CHAN.▼ buttons simultaneously
[2] Press ALT (once) to change from normal receiver operation to ALT 1 Mode
[3] Press ALT (twice) to change from normal receiver operation to ALT 2 Mode
[4] No Action

To display the AFC Level...

> **Step 1.** Press **ALT** to change from normal operation to Alt 1 Mode.
> The ALT LED flashes OFF and ON, continuously. .

> **Step 2.** Press **9** (AFC) to display the AFC Level.

> The AFC Level can be displayed from any channel. This option is also available at the In-
> staller menu, and at the Receiver Status menu.

Alt 1 Mode

To operate the receiver in Alt 1 Mode...

> **Step 1.** Press **ALT** on the receiver front panel <u>once</u>. If you are already operating in Alt 2
> Mode, press the ALT button <u>twice</u>.
> The ALT LED flashes to confirm Alt 1 Mode operation.

> Repeat the above action to change from normal receiver operation to Alt 1 Mode. The re-
> ceiver can be operated in Alt 1 Mode from any channel. While operating in Alt 1 Mode, the
> ALT LED flashes ON and OFF, and only Alt 1 functions are available via front panel but-
> tons. Pressing ALT twice (or pressing VIEW) returns the receiver to normal operation (i.e.,
> the ALT LED is OFF).

Alt 2 Mode

To operate the receiver in Alt 2 Mode...

> **Step 1.** Press **ALT** on the receiver front panel <u>twice</u> . If you are already operating in Alt 1
> Mode, press the ALT button <u>once</u>.
> The ALT LED is ON to confirm Alt 2 Mode operation.

> Repeat the above action to change from normal receiver operation to Alt 2 Mode. The re-
> ceiver can be operated in Alt 2 Mode from any channel. While operating in Alt 2 Mode, the
> ALT LED is ON, and only Alt 2 functions are available via front panel buttons. Pressing
> ALT once (or pressing VIEW) returns the receiver to normal operation (i.e., the ALT LED is
> OFF).

Aspect Ratio

Display only: The Aspect Ratio option is an Alt 2 Mode function. The selected Aspect Ratio lets you view programming broadcast in normal (4 X 3) or wide (16 X 9) format on your TV monitor. Wide format is available when wide aspect ratio information is included with the broadcast, and only if enabled at the uplink.

To display the Aspect Ratio...

Step 1. Press **ALT** <u>twice</u> to change from normal operation to Alt 2 Mode.
The ALT LED is ON.

Step 2. Press **6** (WIDE) to display the current Aspect Ratio setting. Available settings are (4-3 [4X3 or Normal] or 16-9 [16X9 or Wide]). The default setting is 4X3 (Normal).

The Aspect Ratio can be displayed from any channel. This option is only available at the front panel.

Authorization Relay

The Authorization Relay option is an Alt 2 Mode function. The selected setting enables or disables the receiver rear panel (AUTH terminals) Authorization Relay output signal. In the event of loss of signal authorization, this output signal can be used for switching in redundant receiver backup or other equipment (see also "Remote Control Port Relay").

To set the Authorization Relay operating state...

Step 1. Press **ALT** <u>twice</u> to change from normal operation to Alt 2 Mode.
The ALT LED is on.

Step 2. Press **5** (ARLY) to display the current Authorization Relay operating state setting. Pressing **5** repeatedly displays available settings (ON or OFF). The default setting is OFF.

Step 3. When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes to confirm the new setting.

Repeat the above action to change the Authorization Relay operating state. The Authorization Relay operating state can be displayed or changed from any channel. This option is only available at the front panel.

Band Select

The Band Select option is an Alt 1 Mode function. The selected operating (frequency) band is the operating frequency band (C-Band or Ku-Band) used by the receiver for tuning the received digital signal.

To display or change the operating band...

Step 1. Press **ALT** <u>once</u> to change from normal operation to Alt 1 Mode.
The ALT LED flashes OFF and ON, continuously.

Step 2. Press **1** (C/Ku) to display the current operating band (C or U [Ku]). Press **1** again to change the current setting, as required. The default setting is C.

Step 3. When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change to another operating Band. This option is also available at the Installer menu.

Baud Rate

The Baud Rate option is an Alt 2 Mode function. The selected Baud Rate sets the Baud Rate for the serial Expansion Port (if used).

To display or change the Baud Rate...

Step 1. Press **ALT** to change from normal operation to Alt 2 Mode.
The ALT LED is ON.

Step 2. Press **1** (BAUD) to display the current Baud Rate. Pressing 1 repeatedly displays available settings [150, 300, 600, 1200, 2400, 4800 or 9600 baud]). The default setting is 9600.

Step 3. When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change to another Baud Rate. The Baud Rate can be displayed or changed from any channel. This option is only available at the front panel.

Factory Reset

The Factory Reset option is an Alt 1 Mode function, and is used to replace the current receiver settings with the factory default settings. For information about factory default receiver settings, see "Default receiver settings" (see also Table 3-7).

To restore the factory default settings...

Step 1. Press the ALT <u>once</u> to change from normal receiver operation to Alt 1 Mode. The ALT LED flashes OFF and ON, continuously.

Step 2. Press the CHAN. ▲ and CHAN.▼ buttons simultaneously (front panel). The front panel displays "**do?**".

Step 3. Press the YES button (front panel) to initiate the Factory Reset (pressing any other key aborts the action).

Repeat the above action to restore the factory default settings (see "Default receiver settings"). Once initiated, a Factory Reset cannot be interrupted or reversed. A Factory Reset can be performed from any channel (see "…About the current channel"). This option is only available at the front panel.

FEC Rate

The FEC Rate option is an Alt 1 Mode function. The selected FEC Rate must match the FEC Rate associated with the received digital signal.

To display or change the FEC rate...

Perform the first step if you are changing the FEC Rate.

Step 1. If required, press **0** to display the Installer Channel.

Step 2. Press **ALT** <u>once</u> to change from normal operation to Alt 1 Mode. The ALT LED flashes OFF and ON, continuously.

Step 3. Press **2** (FEC) to display the current FEC Rate. Pressing **2** repeatedly displays available settings (1-2, 2-3, 3-4, 5-6, or 7-8), which correspond to 1/2, 2/3, 3/4, 5/6, or 7/8, respectively. The default setting is 7/8.

Step 4.   When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change the FEC Rate. The FEC Rate can be displayed from any channel, but can only be changed from the Installer Channel (see "…About the current channel"). This option is also available at the Installer menu.

Find

The Find option is an Alt 2 Mode function. The selected setting enables or disables the automatic Find feature used for recovering a digital signal (see "…About the Find option"). See also "…About Signal Searches".

To display or change the Find setting...

Step 1.   If required, press **0** to display the Installer Channel.

Step 2.   Press **ALT** <u>twice</u> to change from normal operation to Alt 2 Mode. The ALT LED is ON.

Step 3.   Press **NEXT** (FIND) to display the current Find setting. Pressing **NEXT** repeatedly displays available settings (FIND or OFF). The default setting is OFF.

Step 4.   When the desired signal is found (i.e., "LOCKED" status displayed on-screen), press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to Find another signal. When a signal is found, the Find option is automatically set to OFF. You can also terminate the search manually by setting the Find option to OFF. The Find setting can only be displayed or changed from the Installer Channel (see "…About the current channel"). This option is also available at the Installer menu.

Frequency

The Frequency option is an Alt 1 Mode function. The displayed Frequency setting is the current C/Ku (L-Band) frequency used by the receiver for tuning the received digital signal.

Perform the first step if you are changing the operating (L-Band) Frequency.

Step 1.   If required, press **0** and then press SELECT to display the Installer Channel.

Step 2.   Press **ALT** <u>once</u> to change from normal operation to Alt 1 Mode.
The ALT LED flashes OFF and ON, continuously.

Step 3.   Press **4** (FRQ ▲) or **7** (FRQ▼) to display the current frequency setting. Pressing **4** (FRQ ▲) or **7** (FRQ▼) repeatedly displays higher or lower settings (frequencies are displayed from 950 MHz to 2050 MHz [L-Band] in 1 MHz steps. The default setting depends on the currently selected operating band (see …About frequency settings).

Step 4.   When the desired setting is displayed at the front panel, press SELECT to save the setting.
The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to display or change the operating frequency. The operating frequency can be displayed from any channel, but can only be changed from the Installer Channel (see "…About the current channel"). A valid operating Frequency is always required (see also "Band Select"). Note that only L-Band frequencies can be displayed or changed via Alt Mode. This option is also available at the Installer menu.

Lock Level

The Lock Level option is an Alt 2 Mode function. The Lock Level setting determines what receiver/interface options are available for viewing and/or modification.

> ⚠ **IMPORTANT!** (For Alt Mode operation only) The Lock Level setting can be changed from any channel, including the Installer Channel (i.e., channel 0). To return to the previously-watched (virtual) channel after changing the Lock Level setting to 3 in Alt Mode, be sure that the desired virtual channel is displayed before changing the Lock Level setting.

Performing the first step may or may not be required if you are changing the Lock Level to 3 (see IMPORTANT).

Step 1. If required, press **0** to display the Installer Channel.

Step 2. Press **ALT** to change from normal operation to Alt 2 Mode.
The ALT LED is ON.

Step 3. Press **3** (LOCK) to display the current Lock Level . Pressing **3** repeatedly displays
available settings (Lock Levels are displayed from 0 to 3). The default setting is 0.

Step 4. When the desired setting is displayed, press YES to save (STORE) the setting.
The front panel display flashes OFF and ON several times to confirm the new
setting.

Repeat the above action to change the Lock Level setting. The Lock Level setting can be
displayed or changed from any channel. Note that if Lock Level 4 is set (via uplink only),
"Loc 4" is displayed when any front panel button is pressed. For more information about
Lock Levels, see "…About Lock Levels". This option is only available at the front panel.

Menu

The Menu option is a front panel function provided for displaying the Receiver Status
menu. The Receiver Status menu displays information about the current receiver setup.
Other menus can also be displayed via this menu (see "On-screen menu operation").

To display the Receiver Status menu…

- Press **MENU** to display the Receiver Status menu.

Repeat the above action to display menus. Menus can be displayed from any channel. Re-
ceiver settings can also be displayed or changed when the MENU button is pressed from
any virtual channel, including the Installer Channel.

To exit from the Receiver Status menu…

- Press **VIEW** to exit from the Receiver Status menu to video.

For information about the VIEW button, see "View".

Next

The NEXT option is a menu function, and is provided for moving to the next Installer menu option (see also "Menu").

- Press **NEXT** to move to (or select) the next option. Pressing next repeatedly moves continuously to the changeable menu options. A ">" character appears beside the currently selected option.

Repeat the above action to move to (or select) the next (changeable) menu option. The NEXT button can only be operated when changeable options are displayed (menus), or when operating the receiver in Alt 2 Mode (see "Find").

Remote Control Port Relay

The Remote Control Port Relay option is an Alt 2 Mode function. The selected setting enables or disables the receiver rear panel (RC8 terminals) Remote Control Port Relay output signal in response to the current operating state of Remote Control port pins. When a Remote Control Port is selected (receiver rear panel EXPANSION PORT), the Remote Control Port Relay output signal can be used to provide ON/OFF control of remote equipment (see also "Appendix D Serial Remote Control Command Set").

Step 1. Press **ALT** to change from normal operation to Alt 2 Mode.
The ALT LED is ON.

Step 2. Press **2** (PRLY) to display the current Remote Control Port Relay operating state setting. Pressing **5** repeatedly displays available settings (1, 2, 3, 4, 5, 6, 7, 8 or OFF). Settings 1 to 8 enable the selected port pin, and OFF disables all Remote Control Port pins. The default setting is OFF.

Step 3. When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change the Remote Control Port Relay operating state. The Remote Control Port Relay operating state can be displayed or changed from any channel. This option is only available at the front panel.

Input Select

The Input Select setting determines if RF or the transport input is used by the receiver for tuning the received digital signal. The selected signal input must match the input of the received digital signal. The input setting can also be set via the Menu interface.

Step 1. Press **ALT** to change from normal operation to Alt 1 Mode.
The ALT LED flashes OFF and ON, continuously.

Step 2. Press **0** (SWIF) to display the current transport signal input setting. Pressing **0** repeatedly displays available settings (ON or OFF). The default setting is OFF (i.e., RF mode selection).

Step 3. When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change the RF/transport input setting. When set to ON, the input signal from the transport input rear panel connector is used. When set to OFF, the input signal from the RF IN rear panel connector is used. When transport input is set, this signal can also be used for connecting two or more receivers together in a network for signal monitoring. For more information about interconnecting receivers using SWIF signal output, see Chapter 2 (see also "MPEG Output"). This option is also available at the Installer menu.

Signal Level

Display only: The Signal Level option is an Alt 1 Mode function. The displayed Signal Level (any number from 0 to 99) is associated with the Symbol Rate and signal input level.

Step 1. Press **ALT** to change from normal operation to Alt 1 Mode.
The ALT LED flashes OFF and ON, continuously.

Step 2. Press **6** (SIG) to display the Signal Level.

The Signal Level can be displayed from any channel (see also "Signal Polarization"). This option is also available at the Installer menu, and at the Receiver Status menu.

　　　　　　　　　　　　　　　Model D9229 Commercial Headend Receiver

Signal Polarization

The Signal Polarization option is an Alt 1 Mode function. The selected Signal Polarization must match the polarization of the received digital signal.

To display or change the Signal Polarization...

Perform the first step if you are changing the Signal Polarization.

Step 1. If required, press **0** to display the Installer Channel.

Step 2. Press **ALT** to change from normal operation to Alt 1 Mode.
The ALT LED flashes OFF and ON, continuously.

Step 3. Press **8** (POL) to display available settings (H [Horizontal] or V [Vertical]). The default setting is H (Horizontal).

Step 4. When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change the Signal Polarization. The Signal Polarization can be displayed from any channel, but can only be changed from the Installer Channel. When Horizontal polarization is set, a 19V DC signal is output from the receiver rear panel SATELLITE connector. When Vertical polarization is set, a 13V DC signal is output from this connector. Observe the effect of the Polarization change by checking the displayed relative Signal Level value (see "Signal Level"). Higher (Signal Level) numbers are better. This option is also available at the Installer menu.

Signal Quality (BER)

Display only: The BER display option is an Alt 1 Mode function. The displayed value (any number from 0 to 9) is related to the Bit Error Rate (higher numbers are better).

To display the Signal Quality...

Step 1. Press **ALT** to change from normal operation to Alt 1 Mode.
The ALT LED flashes OFF and ON, continuously.

Step 2. Press **3** (BER) to display the Signal Quality (Bit Error Rate).

The Signal Quality (BER) can be displayed from any channel. This option is also available at the Installer menu, and at the Receiver Status menu.

Signal Search

The Signal Search option is an Alt 2 Mode function. The selected setting enables or disables automatic Signal Search for the receiver (see "…About Signal Searches").

To display or change the Signal Search setting...

Step 1. Press **ALT** twice to change from normal operation to Alt 2 Mode.
The ALT LED is ON.

Step 2. Press **USER** (SRCH) to display the current Signal Search setting. Pressing **USER** repeatedly displays available settings (SRCH or OFF). The default setting is OFF.

Step 3. When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change (i.e., enable or disable) the Signal Search setting. A signal Search can be executed from any channel. This option is also available at the Installer menu.

Store (Save)

The STORE option is a front panel/Alt Mode function (i.e., available with menu, Alt 1 or Alt 2 Mode operation), and is provided for saving changes made to the current receiver setup.

To store (save) changes...

Step 1. When the desired setting is displayed, press YES to save (STORE) the setting. The front panel display flashes OFF and ON several times to confirm the new setting.

Step 2. Pressing YES replaces the previous setting with the setting displayed at the front panel. Not pressing YES (i.e., pressing any other key) after making a change to the current receiver setup discards the change and restores the previously-saved setting.

Repeat the above action to save each new change made to the current setup. The YES button operates only after a change is made to the current receiver setup (see also "On-screen menu operation"). This option is also provided for saving changes made in menus.

Symbol Rate

The Symbol Rate option is an Alt 1 Mode function. The selected Symbol Rate must match the Symbol Rate associated with the received digital signal.

To display or change the Symbol Rate...

Perform the first step if you are changing the Symbol Rate.

Step 1. If required, press **0** to display the Installer Channel.

Step 2. Press **ALT** to change from normal operation to Alt 1 Mode.
The ALT LED flashes OFF and ON, continuously.

Step 3. Press **5** (SYM) to display the current Symbol Rate setting. Pressing **5** repeatedly displays higher Symbol Rates (Symbol Rates are displayed from 3 MS/s to 30.8000 MS/s in 10 KS/s steps). You can also press and hold the **5** button down to rapidly increase the Symbol Rate. The default setting is 28.3465 MS/s.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change to another Symbol Rate. The Symbol Rate can be displayed from any channel, but can only be changed from the Installer Channel. This option is also available at the Installer menu.

> ⚠ **IMPORTANT!** Certain (critical) receiver settings can only be changed from the Installer Channel (i.e., channel 0). Before making changes, verify that channel 0 is the current channel, if required. Changes made to the current setup in menus are not saved (stored) automatically (see also "Store (Save)"and "…About saving changes").

User

The USER option is a front panel/Alt Mode function (i.e., available with menu, Alt 1 or Alt 2 Mode operation), and is provided for displaying Installer menu Pages 1, 2 or 3, or for setting the Signal Search option (see "…About Signal Searches").

To display the Installer menu…

Step 1. Press **MENU** to display the Receiver Status menu.

Step 2. Press **2** to enable Installer menu options (instructions are displayed on-screen), and then press **9** to display the Installer menu (page 1 displays automatically).

Step 3. Press **USER** to display page 2. Pressing USER repeatedly displays pages 1, 2 and 3 of the Installer menu.

Repeat the above action to display page 1, page 2 or page 3 of the Installer menu. The USER button operates when menus are displayed, or when Alt 2 Mode is used to operate the receiver (see "Signal Search").

Video Standard

The Video Standard option is an Alt 2 Mode function. The selected Video Standard must match the Video Standard associated with the received digital signal (see "…About changing the Video Standard").

⚠ **IMPORTANT!** The current Video Standard setting is used by the receiver for correct display of the video (picture) only. The satellite receiver does not convert from one Video Standard to another, such as from NTSC (525-line) to PAL-B (625-line) formats. When receiving a 525-line signal, the default Video Standard can be set to NTSC, or PAL-M. Similarly, when receiving a 625-line signal, the default Video Standard can be set to PAL-B, or PAL-N (Argentina).

To display or change the Video Standard…

Step 1. Press **ALT** to change from normal operation to Alt 2 Mode.
The ALT LED is on.

Step 2. Press **7** (VID) to display the current Video Standard setting. Pressing **7** repeatedly displays available[1] settings (see "Table 3-9"). The default setting is 525A: NTSC->PAL/B (i.e., automatic switching from 525-line NTSC to 625-line PAL/B).

Step 3. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
The front panel display flashes OFF and ON several times to confirm the new setting.

Repeat the above action to change the Video Standard. The Video Standard can be displayed or changed from any channel. This option is also available at the Installer menu.

Table 3-9. Available Video Standards (Alt Mode only)

Option	Description
525	NTSC 525-line
625	PAL/B 625-line
525A	Auto-switching from NTSC to 625-line PAL/B
625A	Auto-switching from PAL/B to 525-line NTSC

Video Bit Rate

Display only: The Video Bit Rate display option is an Alt 1 Mode function. The displayed Video Bit Rate (any number from 1 to 15 Mb/s [Megabits/second]) is the maximum speed at which video information can be transmitted from the uplink.

To display the Video Bit Rate...

Step 1. Press **ALT** to change from normal operation to Alt 2 Mode.
The ALT LED is ON.

Step 2. Press **9** (VBR) to display the Video Bit Rate.

The Video Bit Rate can be displayed from any channel. This option is only available at the front panel.

View

The View option is an Alt Mode function (i.e., Alt 1 or Alt 2 Mode), and is provided for exiting from Alt Mode to video (current channel).

---

[1] Additional Video Standard settings are available via the menu interface

Step 1. Press **VIEW** to exit from Alt Mode to video (i.e., return to normal receiver operation).

You can also exit from Alt Mode to the current channel by pressing the ALT button until the ALT LED is OFF). The VIEW button operates only if menus are displayed.

On-screen menu operation

Setting up your Commercial Headend Receiver via the menu interface requires setup of frequency-related and other options. These settings are used by the receiver for tuning the received digital signal, and for optimizing receiver performance. Not all Alt Mode interface functions are available via the menu interface.
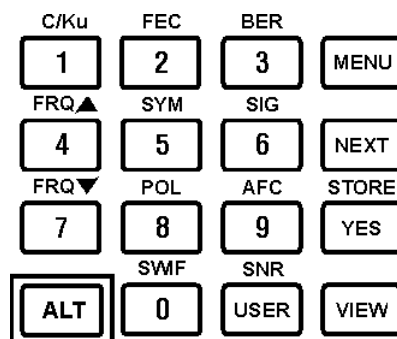
Figure 3-2. Front panel keypad

…About on-screen menu operation

While viewing any channel, you can display on-screen menus for viewing or changing the current receiver setup. While in menus, you can change the current receiver settings, and/or display other menus. Some menus contain setup information which is available for viewing only, and cannot be changed. Numbered menu options are used to display other menus. Access to menus and changeable menu options is controlled by system Lock Levels. For more information about Lock Levels, see "Setting up the receiver".

> ⚠️ **IMPORTANT!** The functions of certain front panel buttons are changed when on-screen menus are used to operate the Commercial Headend Receiver.

On-screen menus available for display are…

- Receiver Status menu
- Configuration menu
- Installer menu (pages 1, 2 and 3)
- Services menu
- Cue tone/trigger menu
- Subtitle menu

To display on-screen menus and view the current receiver setup…

Step 1. Press the **MENU** button on the receiver front panel.
The Receiver Status menu is displayed.

You can only change the current receiver setup if you have changed to the Installer Channel (i.e., channel 0) before pressing the MENU button. Otherwise, you will only be able to view the current receiver settings.

Step 2. Move to the desired setting by pressing the NEXT button, or follow the on-screen instructions to display other menus.

Complete information about how to operate each of the on-screen menus is found on the pages that follow (see also "…About saving changes").

To disable receiver lockout (if Lock Level 3 set)…

If the receiver is locked out (i.e., Lock Level 3 is set), you can display setup information at the front panel only, and menus cannot be displayed.

Perform the following actions to change the receiver Lock Level setting from 3 to 0 to disable lockout. When receiver lockout is disabled, you can display menus and/or make any changes to the current setup using front panel buttons.

Step 1. Press **ALT** to change from normal operation to Alt 2 Mode.
The ALT LED is ON.

Step 2. Press **3** (LOCK) <u>once</u> to display the current Lock Level (i.e., Loc 3). Pressing **3** again displays Loc 0.

Step 3. Press YES to save (STORE) the setting.
The front panel display flashes OFF and ON several times to confirm the new setting.

For more information about Lock Levels, see "…About Lock Levels".

> ⚠ **IMPORTANT!** Certain (critical) receiver settings can only be changed from the Installer Channel (i.e., channel 0). Before making changes, verify that channel 0 is the current channel, if required. Changes made to the current setup in menus are not saved (stored) automatically (see also "Store (Save)"and "…About saving changes").

Menus at a glance


```
              Decoder Status

Decoder Address       000-158-6937-1
Decoder Versions      1.00/1.05(2)
SmartCard             Not Installed
SmartCard Version     N/A
Additional Versions   2.12/0.87
ADP enc.              0 of 0 rec'd
ADP non-enc.          0 of 0 rec'd

Bit Error Rate:   1.0E-4    LOCKED
Signal Level:         24
AFC Level:            -1

Press 0 to Display Services
Press 1 to clear ADP
Press 2 for Other Sub-Menus
Press VIEW to watch TV
```

```
Program:    1 Service Menu

Services:NoScr,NoECM ,AUTH
Video :    ON  ( 1160)     MPEG
Audio1:    ON  ( 1120)     MPEG
Audio2:    ON  ( 1122)     MPEG
Audio3:    OFF (    0)     MPEG
Audio4:    OFF (    0)     MPEG
Utility:   ON  ( 4062)
High Speed: ON ( 4060)
VBI:       OFF (    0)
Dnld:  DCP: OFF (    0)
           CCP: OFF (    0)
Transport ID:        0
PMT PID:          5001
PCR PID:          1160
Port: 00       1070.00 MHz

Press VIEW to watch TV
Press MENU for Main Menu
```

```
              Sub-Menu

0)  Cue Tone/Trigger Control
1)  Subtitle Configuration
9)  Installer Menu










Press VIEW to watch TV
```

```
          Subtitles Menu        1/1

> Language:             English
  Foreground Color:       White
  Background Color:       Opaque






       Press CHAN. UP/DN to modify
       Press NEXT to select
       Press YES to store all data
```

```
     Cue Tone/Trigger Control    1/2
                                      2/2
> Cue Select: Tone

Entry  Tone Sequence     State
1      ----              Disabled
2      ----              Disabled
3      ----              Disabled
4      ----              Disabled
5      ----              Disabled
6      ----              Disabled
7      ----              Disabled
8      ----              Disabled

Press CHAN. UP to toggle selection

Press NEXT to advance '>'
Press YES to store all data
Press USER to select page 2
       Press USER to select page 1
```

```
          Installer Menu         1/3
> Band:          Low Ku/L-Band Freq.
  L-Band Freq:   1032.00   (MHz)   2/3
  FEC Rate:          7/8
  Symbol Rate:   28.3465   (MS/s)
  Polarization:        H
  Input select:       RF
  Find:              OFF


  Bit Error Rate:  4.2E-5    LOCKED
  Signal Level:       26
  AFC Level:           1

  Press CHAN. UP/DN to modify
  Press NEXT to select
  Press YES to store all data
  Press USER to select page 2
       Press USER to select page 3
           Press USER to select page 1
```

Figure 3-3. Menu map

Receiver Status menu

Setting up your Commercial Headend Receiver for normal operation requires setup of frequency-related and other options. Certain information about the current receiver setup can be displayed and/or changed via the Receiver Status menu, and from other menus. These settings are used by the receiver for tuning the received digital signal, and for optimizing receiver performance. Navigation to all menus is available only via the Receiver Status menu.

```
              Decoder Status

Decoder Address        000-158-6937-1
Decoder Versions       1.00/1.05(2)
SmartCard              Not Installed
SmartCard Version      N/A
Additional Versions    2.12/0.87
ADP enc.               0 of 0 rec'd
ADP non-enc.           0 of 0 rec'd


Bit Error Rate:   1.0E-4    LOCKED
Signal Level:          24
AFC Level:             -1

Press 0 to Display Services
Press 1 to clear ADP
Press 2 for Other Sub-Menus
Press VIEW to watch TV
```

Figure 3-4. Receiver Status menu

To display the Receiver Status menu...

Step 1. Press the **MENU** button at the receiver front panel (see Figure 3-4).

You can view information about the current setup. Press VIEW to return to video (i.e., the current channel).

Available options: Press 0 to display the Services menu. Press 1 to clear the ADP count. Press 2 to display the Sub-Menu (see Figure 3-5). Press VIEW to return to video (current channel).

The following receiver status information is displayed on-screen.

- Decoder Address

- Decoder Versions

- Smart Card

- Smart Card Versions

- Additional Versions

- ADP (enc)

- ADP (non-enc)

- Bit Error Rate

- Signal Level

- AFC Level

The current Bit Error Rate, Signal Level and AFC Level are also displayed at the Installer menu (see "Installer menu").
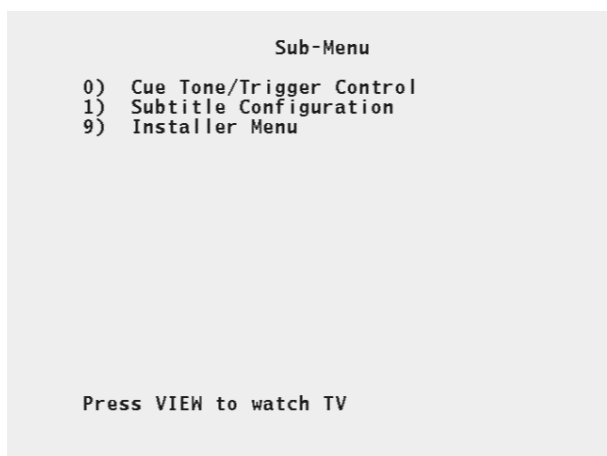
```
                    Sub-Menu

    0)   Cue Tone/Trigger Control
    1)   Subtitle Configuration
    9)   Installer Menu













    Press VIEW to watch TV
```

Figure 3-5. Sub-Menu

…About the ADP count

The encrypted and non-encrypted Address Data Packet (or ADP) count is continuously monitored by the receiver. The information displayed on-screen for each packet type indicates how much of the transmitted packet information is being accurately received and processed by the ISE (Inboard Security Element). Under ideal conditions, both of the displayed figures are identical. To assist with monitoring your receiver's performance, you can clear or reset the ADP count to zero (0) at any time using the Reset ADP option. The ADP count is also reset each time the receiver is switched ON.

To reset the ADP count…

Step 1.   Press 1 to clear the ADP count.
The ADP count is reset to zero (0).

Repeat the above action to reset the ADP count. The ADP count can be reset from any channel.

…About Signal Level and Signal Quality

Your Commercial Headend Receiver actively monitors and updates the strength (level) and quality characteristics of the incoming signal as it is decoded, and displays this information on-screen at the Receiver Status menu (and Installer menu). The Signal Level (displayed on a scale from 0 to 99) is associated with the Symbol Rate and signal input level. The displayed Bit Error Rate (i.e., corrected errors) is a measure of how much of the original signal information is being received, and is an indication of relative Signal Quality.

Certain receiver settings can cause signal loss or degradation which can compromise video or audio information. The effect of any changes you make to your satellite LNB antenna installation is immediately displayed. Signal Level and Signal Quality can also be affected by changes at the signal source, and/or by adverse environmental or terrestrial conditions. Taken in combination, certain receiver settings and signal conditions can cause the Signal Level and Signal Quality (or BER) values to increase or decrease accordingly.

Temporary, solar-related electromagnetic disturbances occur every year during the spring and autumn months. These disturbances usually persist for several minutes a day for approximately one week during these time periods. Your service provider can advise you about when authorized broadcast services may be adversely affected. For troubleshooting information, see Appendix C.

To verify your satellite LNB antenna installation or improve antenna reception, refer to your antenna equipment installation manual, or contact your dealer or service provider.

Decoder Address

The displayed Decoder Address is an 11-digit number used for equipment identification.

Decoder Versions

Displayed decoder version information identifies the versions of installed DCP and ISE decoder devices plus the network-specific algorithm code number (in brackets).

Smart Card

Displayed information indicates that a Smart Card is installed or not installed as part of the decoder. If installed, the smart card IDentification number is displayed similar to the Decoder Address.

Smart Card Version

Displayed information identifies the Smart Card version number only if a Smart Card is installed.

Additional Versions

Displayed version information identifies the versions of installed KBD[1] and CCP[2] devices.

ADP enc. and ADP non-enc.

Displayed information for each packet type indicates how much of the transmitted ADP (Address Data Packet) information is being accurately received and processed. Under ideal conditions, both of the displayed figures are identical (see "…About the ADP count").

---

[1] Keyboard Microcontroller

[2] Compression Control Processor

Bit Error Rate

Display only: Displayed information identifies the BER or Bit Error Rate for the received digital signal plus the signal status. The displayed Bit Error Rate BER is related to signal quality, and tends to increase when atmospheric conditions that cause signal fade exist. The BER is displayed in scientific notation. BER values ranges from 0.0E-6 under ideal conditions to 6.5E-2 under worst case conditions. The normal range for BER values is typically from 1.0E-5 to 1.0E-3 (see also Appendix F). This option is also available at the front panel.

When the receiver is locked onto the RF input signal, the signal status message "LOCKED" is displayed beside the BER value. If RF carrier signal synchronization is temporarily interrupted or lost, the message "SEARCH" is displayed while the receiver searches for this signal (see "…About Signal Searches").

Signal Level

Display only: Displayed Signal Level and signal status information indicate the relative level or strength of the received digital signal plus the current signal state. The Signal Level is useful for antenna setup (i.e., peaking). Signal Level values range from 0 (lowest) to 99 (highest). The normal Signal Level range is typically from 30 to 50 which corresponds to an input signal level of -40 and -60 dBm. Poor picture quality can be expected when the Signal Level is near 0 or 99. When the Signal Level is extremely low, the message "NO SIGNAL" displays which may indicate that the input signal cable is faulty. This option is also available at the front panel.

AFC Level

Display only: The Displayed AFC Level indicates the relative amount of LNB drift present in the received digital signal. AFC Level values range from -50 (lowest) to +50 (highest). The normal AFC Level range is typically from -10 to +10. This option is also available at the front panel.

Configuration menu

Information about installed receiver startup, download operating software and factory-installed options is available from the Configuration menu. Broadcast virtual channel services are authorized via PCC control system software to your dealer/reseller or local service provider.
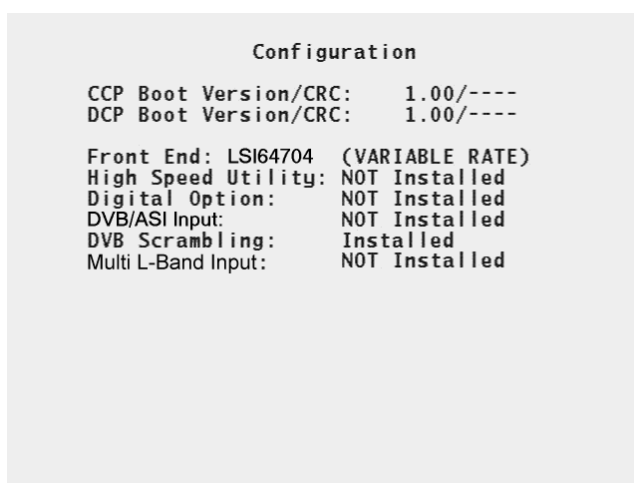
```
                    Configuration

        CCP Boot Version/CRC:    1.00/----
        DCP Boot Version/CRC:    1.00/----

        Front End: LSI64704  (VARIABLE RATE)
        High Speed Utility: NOT Installed
        Digital Option:     NOT Installed
        DVB/ASI Input:      NOT Installed
        DVB Scrambling:     Installed
        Multi L-Band Input:  NOT Installed
```

Figure 3-6. Configuration menu

To display the Configuration menu...

Step 1.   Press the MENU button at the receiver front panel to display the Receiver Status menu (see Figure 3-4).

Step 2.   Press 8 to display the Configuration menu (see Figure 3-6).

You can view information about receiver operating software and factory-installed options.

Available options: Press MENU to display the Receiver Status menu (i.e., Main Menu). Press VIEW to return to video (current channel).

The following receiver operating software and factory-installed options information is displayed on-screen.

- CCP Boot Version/CRC
- DCP Boot Version/CRC
- Front End status
- High Speed Utility status
- Digital Option status
- DVB/ASI Input status
- DVB Scrambling Option status
- Multi L-Band option status

Authorized uplink services are enabled via PCC control system software. Unauthorized uplink services and/or individual services which are OFF or disabled are not available and cannot be decoded by the receiver.

CCP Boot Version

Displayed CCP (Compression Control Processor) Boot Version/CRC status information indicates the current version of CCP Boot (startup) software plus the CRC (checksum), respectively. Software CRC information is not currently supported.

CCP Boot Version/CRC

The installed CCP Boot Version software provides initialization and startup for the Compression Control Processor software. CCP software operates together with DCP (Decoder Control Processor) software (see "DCP Boot Version").

DCP Boot Version

Displayed DCP (Decoder Control Processor) Boot Version/CRC status information indicates the current version of DCP Boot (startup) software plus the CRC (checksum), respectively. Software CRC information is not currently supported.

DCP Boot Version/CRC

The installed DCP Boot Version software provides initialization and startup for the Decoder Control Processor software. DCP software operates together with CCP (Compression Control Processor) software (see "CCP Boot Version").

Decoder front end

Displayed Front End status information identifies the installed LSI FEC (Forward Error Correction) decoder hardware and decoder type. Variable rate or fixed rate decoding capability is also indicated. All current Model D9229 Commercial Headend Receiver models support variable rate decoding.

LSIXXXXXX (VARIABLE RATE)

High Speed data

Displayed High Speed data status indicates if the High Speed data decoder hardware is installed. Note that Utility (low speed) data is a separately authorized service (see "Services menu").

NOT Installed/Installed

If installed, authorized High Speed (RS-422 synchronous) data service can be extracted/decoded by the receiver. If not installed, no High Speed data service can be decoded. If the High Speed data option is installed and High Speed data service is authorized at the uplink (i.e., associated with one or more virtual channels), a High Speed data service PID # displayed at the Services menu.

Digital Option

Displayed Digital data (D1 and AES3 output) status indicates if the digital hardware option is installed.

NOT Installed/Installed

If installed, a D1 digital video output signal (via D1 BNC connector) and AES digital audio output signals (via CH 1/CH 2 XLR3 connectors) can be supplied to other/external equipment (i.e., for signal monitoring or retransmission). No digital output signals are available if the digital option is not installed.

DVB/ASI Input

Displayed DVB/ASI Input option status indicates if the DVB/ASI IN factory option is installed (all Model D9229 Commercial Headend Receivers are equipped with a SWIF OUT connector).

DVB Common Scrambling

Displayed DVB Scrambling option status indicates if the DVB Common Scrambling decoding (hardware and software) option is installed.

NOT Installed/Installed

If installed, authorized DVB Common Scrambling services provided for video, audio and data can be decoded by the receiver. No DVB Common Scrambling services can be decoded if the DVB Scrambling option is not installed.

Multi L-Band

Displayed Multi L-Band status indicates if the two or more optional LNB inputs are installed.

NOT Installed/Installed

If installed, satellite signals can be received from any one of the connected LNB inputs, allowing for multiple satellite dishes to be connected to the receiver at the same time. If not installed, only one satellite dish can be connected to the receiver and the signal is received through the RF IN input. The number of LNB inputs available depends on the type of Multi LNB module selected.

Services menu

Information about available satellite broadcast services and the current setup is available from the Services menu. Broadcast virtual channel services are authorized via PCC control system software to your dealer/reseller or local service provider. The current setup is also affected by your LNB antenna (dish) installation.

```
Program:    1 Service Menu

Services:NoScr,NoECM ,AUTH
Video :     ON  ( 1160)      MPEG
Audio1:     ON  ( 1120)      MPEG
Audio2:     ON  ( 1122)      MPEG
Audio3:     OFF (    0)      MPEG
Audio4:     OFF (    0)      MPEG
Utility:    ON  ( 4062)
High Speed: ON  ( 4060)
VBI:        OFF (    0)
Dnld:  DCP: OFF (    0)
       CCP: OFF (    0)
Transport ID:       0
PMT PID:         5001
PCR PID:         1160
Port: 00      1070.00 MHz

Press VIEW to watch TV
Press MENU for Main Menu
```

Figure 3-7. Services menu

To display the Services menu...

Step 1. Press the MENU button at the receiver front panel to display the Receiver Status menu (see Figure 3-4).

Step 2. Press 0 to display the Services menu (see Figure 3-7).

You can view information about the current setup.

Available options: Press VIEW to return to video (i.e., the current channel). Press MENU to display the Receiver Status menu (i.e., main menu). You can also press the CHAN.▲ and CHAN.▼ buttons (front panel) to advance up or down to the available (virtual) channels. Displayed Services menu information is unique for each virtual channel.

⚠ **IMPORTANT!** Authorized uplink services (i.e., video, audio and data) available via receiver operating software and installed factory options are enabled via PowerVu Command Center control system software. Each of these services is associated with a unique PID number, and can be enabled or disabled separately.

The following available satellite broadcast services information is displayed on-screen for the current virtual channel.

- Services status

- Video and PID[1] status

- Audio 1 status and PID

- Audio 2 status and PID

- Audio 3 status and PID

- Audio 4 status and PID

- Utility data status and PID

- High Speed data status and PID

- VBI status and PID

- Download DCP status and PID

- Download CCP status and PID

- Transport PID

- PMT PID

- PCR PID

- Remote Control Port status and operating frequency

Unauthorized uplink services and/or individual services which are OFF or disabled are not available and cannot be decoded by the receiver.

The topics that follow describe each of the services available for virtual channels.

Services status

Displayed Services status information indicates the current status of the received uplink services. Services are identified in three (3) status fields which can contain the following messages.

- **Field 1:** Scr (Scrambled services) or No Scr (Non-Scrambled services) for the current channel

- **Field 2:** ENCon (encryption of Entitlement Control Messages [ECM] is enabled or ENCoff (ECM encryption is disabled) or NoECM (no ECMs are being transmitted) for the current channel

- **Field 3:** AUTH (receiver is authorized) or NOT AUTH (receiver is not authorized) for the current channel

_____

[1] Packet IDentification

Video status and PID

Displayed Video status and PID (Packet IDentification) information indicates the current status of the received uplink video services.

ON/OFF (PID #)

ON (PID #) indicates that video is available for the current channel. However, video packets associated with the displayed PID # must be present in the bitstream in order for video to display. OFF (PID # 0) indicates that uplink Video service is not authorized or is unavailable for the current virtual channel.

Audio status and PID

Displayed Audio status and PID information indicates the current status of the received uplink Audio 1, Audio 2, Audio 3 and Audio 4 services.

ON/OFF (PID #)

ON (PID #) indicates that Audio service is available for the current channel. However, audio packets associated with the displayed PID # must be present in the bitstream in order for audio to be present. OFF (PID # 0) indicates that uplink Audio services are not authorized or are unavailable for the current virtual channel.

Two-channel audio is provided as a standard feature. Audio streams will be identified as either MPEG, or AC3 streams.

Utility data status and PID

Displayed Utility (low speed) data status and PID information indicates the current status of the uplink utility data service.

ON/OFF (PID #)

ON (PID #) indicates that utility data service is available for the current channel. However, utility data packets associated with the displayed PID # must be present in the bitstream in order for utility data to be present. OFF (PID # 0) indicates that uplink utility data service is not authorized or is unavailable for the current virtual channel.

Utility data rates range from 600 to 38,400 baud, inclusive.

High Speed data status and PID

Displayed high speed (RS-422 synchronous) data status and PID information indicates the current status of the uplink High Speed data service.

ON/OFF (PID #)

ON (PID #) indicates that High Speed data service is available for the current channel. However, High Speed data packets associated with the displayed PID # must be present in the bitstream in order for High Speed data to be present. OFF (PID # 0) indicates that uplink High Speed data service is not authorized or is unavailable for the current virtual channel.

VBI status and PID

Displayed VBI (Vertical Blanking Interval) status and PID information indicates the current status of the uplink VBI service.

ON/OFF (PID #)

ON (PID #) indicates VBI service is available for the current channel. However, VBI packets associated with the displayed PID # must be present in the bitstream in order for VBI data to be present. OFF (PID # 0) indicates that uplink VBI service is not authorized or is unavailable for the current virtual channel.

Download DCP/CCP status and PID

Displayed Download (Dnld) DCP and CCP status and PID information indicates the current status of the uplink DCP/CCP software download service.

T/ON/OFF (PID #)

ON (PID #) indicates that Download (DCP and/or CCP) service is available for the current channel. However, Download packets associated with the displayed PID # must be present in the bitstream in order for Download data to be present. OFF (PID # 0) indicates that uplink Download service is not authorized or is unavailable for the current virtual channel. "T" indicates that a remote software download is currently in progress.

Transport ID

Displayed Transport ID information is the Transport stream ID number for uplink services.

ID #

Authorized virtual channel uplink services are controlled via PCC control system software, and are associated with a Transport ID number. A unique Transport stream ID is associated with each network.

PMT PID

Displayed PMT (Program Map Table) information is the PMT PID number for uplink services.

PID

A unique PMT PID number can be associated with each virtual channel. If used, the PMT PID identifies which packet ID contains the Program Map information.

PCR PID

Displayed PCR (Program Clock Reference) information is the PCR PID number for uplink services PCR synchronization.

PID

A unique PCR PID number is associated with each network, and identifies which packets are being used to update the decoder local clock to the PCR (program) clock.

Port status/Operating frequency

Displayed Remote Control Port number information indicates the status of the currently selected Remote Control Port. The displayed frequency (MHz) is the current L-Band frequency used for transport stream decoding. Displayed port status information can also indicate SWIF operation if the Input Select option is set to SWIF (Single Wire InterFace). See also "Installer menu".

Port #/Frequency

The Remote Control Port can be controlled via PCC control system software, via the receiver front panel or via Serial Remote Control commands. A total of eight (8) Remote Control Ports are available via the receiver rear panel EXPANSION PORT connector. One Remote Control Port can be enabled at any one time. The Remote Control Port is used in conjunction with Remote Control Relay output signals for remote operation of external broadcast or other equipment. The Remote Control Relay option is available at the front panel only (see "Remote Control Port Relay").

Installer menu

Setting up your Commercial Headend Receiver for normal operation requires setup of frequency-related and other options available from the Installer menu, and from other menus. Installer menu screens contain most of the functions needed for receiver setup. Each of the menu screens are displayed separately using receiver front panel buttons. The accompanying figure shows all pages (i.e., page 1, page 2 and page 3) of the Installer menu. Note that some receiver settings (i.e., the current Bit Error Rate, Signal Level and AFC Level) displayed at the Installer menu are also displayed at the Receiver Status menu (see "

⚠️ **IMPORTANT!** Certain (critical) receiver settings can only be changed from the Installer Channel (i.e., channel 0). Before making changes, verify that channel 0 is the current channel. Changes made to the current setup in menus are not saved (stored) automatically (see also "Store (Save)"and "…About saving changes").
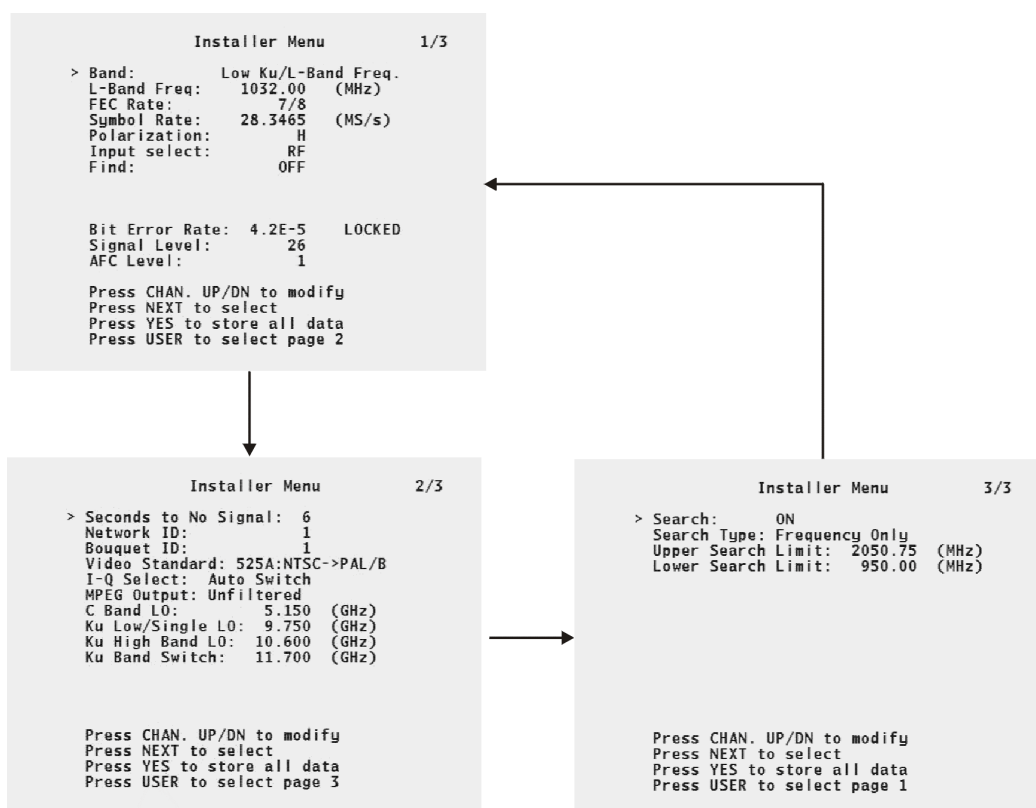
```
              Installer Menu        1/3

  > Band:          Low Ku/L-Band Freq.
    L-Band Freq:    1032.00   (MHz)
    FEC Rate:          7/8
    Symbol Rate:    28.3465   (MS/s)
    Polarization:        H
    Input select:       RF
    Find:              OFF



    Bit Error Rate:  4.2E-5    LOCKED
    Signal Level:        26
    AFC Level:            1

    Press CHAN. UP/DN to modify
    Press NEXT to select
    Press YES to store all data
    Press USER to select page 2
```

```
              Installer Menu        2/3

  > Seconds to No Signal:  6
    Network ID:            1
    Bouquet ID:           1
    Video Standard: 525A:NTSC->PAL/B
    I-Q Select:   Auto Switch
    MPEG Output: Unfiltered
    C Band LO:         5.150  (GHz)
    Ku Low/Single LO:  9.750  (GHz)
    Ku High Band LO:  10.600  (GHz)
    Ku Band Switch:   11.700  (GHz)




    Press CHAN. UP/DN to modify
    Press NEXT to select
    Press YES to store all data
    Press USER to select page 3
```

```
              Installer Menu        3/3

  > Search:        ON
    Search Type: Frequency Only
    Upper Search Limit:  2050.75  (MHz)
    Lower Search Limit:   950.00  (MHz)








    Press CHAN. UP/DN to modify
    Press NEXT to select
    Press YES to store all data
    Press USER to select page 1
```

Figure 3-8. Installer menu (pages 1, 2 & 3)

Step 1.   Press MENU to display the Receiver Status menu (see Figure 3-4).

Step 2.   Press 2 to display the Sub-Menu (Figure 3-5).

Step 3.   Press 9 to display the Installer menu. (Page 1 displays automatically.)

Step 4.   Press USER to display page 2 (pressing USER repeatedly displays Installer menu pages 1, 2 and 3, in order.

You can view or change the current setup. Press VIEW to return to video (i.e., the current channel).

Available options: Press the CHAN. ▲/CHAN.▼ button (front panel) to display available settings. Press NEXT to move to the next menu option. Press YES (STORE) to save the new settings. Press USER to display Installer menu Pages. Press VIEW to return to video (current channel).

Installer menu (page 1)

Information about how to use page 1 of the Installer menu for receiver setup follows. For Installer menu display instructions, see above. Page 1 of the Installer menu is shown in Figure 3-9.

```
              Installer Menu        1/3

  > Band:          Low Ku/L-Band Freq.
    L-Band Freq:    1032.00   (MHz)
    FEC Rate:           7/8
    Symbol Rate:    28.3465   (MS/s)
    Polarization:        H
    Input select:       RF
    Find:               OFF


    Bit Error Rate:  4.2E-5    LOCKED
    Signal Level:        26
    AFC Level:            1

    Press CHAN. UP/DN to modify
    Press NEXT to select
    Press YES to store all data
    Press USER to select page 2
```

Figure 3-9. Installer menu (page 1)

Band Select

The Band Select setting determines the Installer Channel operating frequency band used by the receiver (see also "…About the current channel"). This option is also available at the front panel.

To change the operating band...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Band** by pressing the NEXT button.

Step 3. Press the CHAN. ▲/CHAN.▼ button (front panel) to display available settings (C/L-Band Freq., C/Downlink Freq., Low Ku/L-Band Freq., High Ku/L-Band Freq., Single Ku/Downlink Freq. or Dual Ku/Downlink Freq.). The default setting is C/L-Band Freq.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the operating (frequency) band. The accompanying table lists the frequency spectrum for C and Ku-Bands.

Table 3-10. C/Ku-Band frequency ranges

Band	Frequency Range
C-Band	3.70000 GHz to 4.20000 GHz
Ku-Band (North America)	11.70000 GHz to 12.20000 GHz
Low Ku-Band (EU)	10.70000 GHz to 11.70000 GHz
High Ku-Band (EU)	11.70000 GHz to 12.75000 GHz

Frequency

The Frequency setting determines the current L-Band or Downlink frequency used by the receiver for tuning the received digital signal. This option is also available at the front panel.

To display or change the operating Frequency...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **L-Band/Downlink Freq.** by pressing the NEXT button.

Step 3. Enter a valid frequency using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (frequencies are displayed from 950 MHz to 2150 MHz [L-Band] and from 0 GHz to 15 GHz [Downlink] in 1 MHz steps). You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the Frequency. The default setting is 950 MHz.

Step 4. When the desired setting is displayed, press YES to save (STORE) the setting. A save message displays on-screen to confirm the new setting(s).

Repeat the above action to display or change the operating (Downlink/L-Band) Frequency (see also "Band Select"). A valid operating Frequency is always required.

FEC Rate

The FEC Rate setting determines the FEC (Forward Error Correction) Rate used by the receiver for tuning the received digital signal. The FEC Rate set must match the FEC Rate associated with the received digital signal. This option is also available at the front panel.

To display or change the FEC rate...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **FEC Rate** by pressing the NEXT button.

Step 3. Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (1/2, 2/3, 3/4, 5/6, or 7/8). The default setting is 7/8.

Step 4. When the desired setting is displayed, press YES to save (STORE) the setting. A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the FEC Rate.

Symbol Rate

The Symbol Rate setting determines the Symbol Rate used by the receiver for tuning the received digital signal. The Symbol Rate set must match the Symbol Rate associated with the received digital signal. This option is also available at the front panel.

To display or change the Symbol Rate...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Symbol Rate** by pressing the NEXT button.

Step 3. Enter a valid Symbol Rate using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (Symbol Rates are displayed from 3 MS/s to 30.8000 MS/s in 10 KS/s steps). You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the Symbol Rate. The default setting is 28.3465 MS/s.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to display or change to another Symbol Rate.

Signal Polarization

The signal Polarization setting determines the signal polarization used by the receiver for tuning the received digital signal. The selected signal Polarization must match the polarization of the received digital signal. This option is also available at the front panel.

To display or change the Signal Polarization...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Polarization** by pressing the NEXT button.

Step 3. Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (H [Horizontal] or V [Vertical]). The default setting is Horizontal.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the signal Polarization. When a Horizontal polarization is set, a 19 volt DC signal is output via the receiver rear panel RF IN connector. When a Vertical polarization is set, a 13 volt DC signals output via this connector. Observe the effect of the Polarization change by checking the displayed relative Signal Level value (see "Signal Level"). Higher Signal Level numbers are better.

Input Select

The Input Select setting determines if RF or the transport input is used by the receiver for decoding the received digital signal. The selected signal input type must match the input signal connection made at the receiver rear panel (e.g., RF made for RF IN). This option is also available at the front panel.

To display or change the RF/SWIF input setting...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Input Select** by pressing the NEXT button.

Step 3. Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (RF or SWIF). The default setting is RF.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the RF/SWIF input setting. When set to ON, the input signal from the SWIF IN rear panel connector is used. When set to OFF, the input signal from the RF IN rear panel connector is used. SWIF signal output (i.e., from the SWIF OUT connector) can be used for connecting two or more receivers together in a network for signal monitoring purposes. For more information about interconnecting receivers using SWIF signal output, see Chapter 2 (see also "MPEG Output").

Find

The Find setting determines if the automatic Find feature is used by the receiver for finding a digital signal (see also"…About the Find option"). This option is also available at the front panel.

To Find a signal...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Find** by pressing the NEXT button.

Step 3. Press the CHAN.▲/CHAN.▼ button (front panel) to Find a signal (set to ON). The default setting is OFF.

Step 4.   When the desired signal is found (i.e., "LOCKED" status displayed on-screen), press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to Find another signal. When a signal is found, the Find option is automatically set to OFF. You can also terminate the search manually by setting the Find option to OFF.

Bit Error Rate (Signal Quality)

Display only: The displayed Bit Error Rate identifies the relative Signal Quality for the received digital signal, and is a measure of how much of the original signal information is being received (see "…About Signal Level and Signal Quality"). The Bit Error Rate can also be displayed via the Alt Mode interface. The Bit Error Rate is continuously monitored and updated by the receiver (see also ". This display option is also available at the front panel.

To display the Bit Error Rate...

Step 1.   Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

The Bit Error Rate tends to increase when atmospheric conditions that cause signal fade exist. The BER (displayed in scientific notation) ranges from 0.0E-6 in ideal conditions to 6.5E-2 for worst case conditions. The normal range for BER values is typically from 1.0E-5 to 1.0E-3.

When the receiver is locked onto the RF input signal, the signal status message "LOCKED" is displayed beside the BER value. If RF carrier signal synchronization is temporarily interrupted or lost, the message "SEARCH" is displayed while the receiver searches for this signal (see "…About Signal Searches").

Signal Level

Display only: The displayed Signal Level indicates the relative level or strength of the received digital signal. The Signal Level can also be displayed via the Alt Mode interface. The Signal Level is continuously monitored and updated by the receiver. This display option is also available at the front panel.

To display the Signal Level...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

The Signal Level is useful for antenna setup (i.e., peaking), and ranges from 0 (lowest) to 99 (highest). The normal Signal Level range is typically from 30 to 50 which corresponds to an input signal level of -40 and -60 dBm. Poor picture quality can be expected when the current Signal Level is near 0 or 99. When the Signal Level is extremely low, the message "NO SIGNAL" displays which may indicate that the input signal cable is faulty.

AFC Level

Display only: The displayed AFC Level indicates the relative amount of LNB drift present in the received digital signal. The AFC Level is continuously monitored and updated by the receiver. This display option is also available at the front panel.

To display the AFC Level...

Step 1. Press USER to display page 1 of the Installer menu, if required (see Figure 3-8).

The AFC Level ranges from -50 (lowest) to +50 (highest). The normal AFC Level range is typically from -10 to +10.

Installer menu (page 2)

Information about how to use page 2 of the Installer menu for receiver setup follows. For Installer menu display instructions, see "Installer menu". Page 2 of the Installer menu can only be displayed from page 1, and is shown in Figure 3-10.
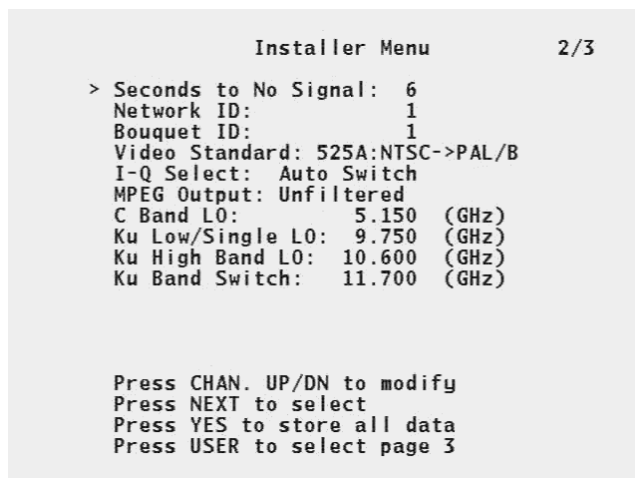
```
              Installer Menu          2/3

   > Seconds to No Signal:  6
     Network ID:            1
     Bouquet ID:            1
     Video Standard: 525A:NTSC->PAL/B
     I-Q Select:  Auto Switch
     MPEG Output: Unfiltered
     C Band LO:           5.150   (GHz)
     Ku Low/Single LO:  9.750   (GHz)
     Ku High Band LO:   10.600   (GHz)
     Ku Band Switch:    11.700   (GHz)




     Press CHAN. UP/DN to modify
     Press NEXT to select
     Press YES to store all data
     Press USER to select page 3
```

Figure 3-10. Installer menu (page 2)

Seconds to NO SIGNAL

The "Seconds to NO SIGNAL" setting determines the preset time-out period (in seconds) following a loss of signal to the receiver after which the "NO SIGNAL" message is displayed (see also "Signal Level").

To display or change the NO SIGNAL time-out...

Step 1. Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2. Enter a valid time-out value using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (settings are displayed from 0 to 30 seconds). The default setting is 5 seconds. You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the settings. The default setting is 5 seconds.

Step 3. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to display or change the "Seconds to NO SIGNAL" time-out.

Network ID

The Network ID setting determines the Network ID used by the receiver for tuning the received digital signal. The Network ID set must match the Network ID associated with the received digital signal (see also "…About the Network ID").

To display or change the Network ID...

Step 1. Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Network ID** by pressing the NEXT button.

Step 3. Enter a valid Network ID using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (Network ID values are displayed from 0 to 65535). You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the settings. The default setting is 1.

⚠ **IMPORTANT!** Although the Network ID is preset at the factory to a default of 1, contact your service provider to find out what your network ID is and enter that number in the Network ID field.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to display or change to another Network ID. A valid Network ID is required for operating the Commercial Headend Receiver in a DVB network.

Bouquet ID

The Bouquet ID setting determines the Bouquet ID used by the receiver for tuning the received digital signal, if existing. The Bouquet ID set must match the Bouquet ID associated with the received digital signal, if required (see also "…About the Network ID").

To display or change the Bouquet ID…

Step 1. Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Bouquet ID** by pressing the NEXT button.

Step 3. Enter a valid Bouquet ID using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (Bouquet ID values are displayed from 0 to 65535). You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the settings. The default setting is 1.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to display or change to another Bouquet ID. A valid Bouquet ID may be required for operating the Commercial Headend Receiver in a DVB sub/network.

Video Standard

The Video Standard setting determines the Video Standard used by the receiver for decoding the received digital signal. The Video Standard set must match the Video Standard associated with the received digital signal (see also "…About changing the Video Standard"). This option is also available at the front panel.

⚠ **IMPORTANT!** The current Video Standard setting is used by the receiver for correct display of the video (picture) only. The satellite receiver does not convert from one Video Standard to another, such as from NTSC (525-line) to PAL-B (625-line) formats. When receiving a 525-line signal, the default Video Standard can be set to NTSC, or PAL-M. Similarly, when receiving a 625-line signal, the default Video Standard can be set to PAL-B, or PAL-N (Argentina).

To display or change the Video Standard...

Step 1. Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Video Standard** by pressing the NEXT button.

Step 3. Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (see Table 3-11). The default setting is 525A:NTSC>PAL/B.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Video Standard. Table 3-11 lists available Video Standard options.

Table 3-11. Available Video Standards

Option	Description
525:NTSC	NTSC 525-line Video Standard
525:PAL/M	PAL/M 525-line Video Standard
625:PAL/B	PAL/B 625-line Video Standard
625:PAL/N	PAL/N 625-line Video Standard
625:PAL(N)	PAL/(N) 625-line Video Standard
525A:NTSC>PAL/B	Auto-switching from NTSC to 625-line PAL/B
525A:NTSC>PAL/N	Auto-switching from NTSC to 625-line PAL/N
525A:NTSC>PAL/(N)	Auto-switching from NTSC to 625-line PAL/N
525A:PAL/M>PAL/B	Auto-switching from PAL/M to 625-line PAL/B
525A:PAL/M>PAL/N	Auto-switching from PAL/M to 625-line PAL/N
525A:PAL/M>PAL/(N)	Auto-switching from PAL/M to 625-line PAL/(N)
625A:PAL/B>NTSC	Auto-switching from PAL/B to 525-line NTSC
625A:PAL/B>PAL/M	Auto-switching from PAL/B to 525-line PAL/M
625A:PAL/N>NTSC	Auto-switching from PAL/N to 525-line NTSC
625A:PAL/N>PAL/M	Auto-switching from PAL/N to 525-line PAL/M
625A:PAL/N>NTSC	Auto-switching from PAL/N to 525-line NTSC
625A:PAL/(N)>PAL/M	Auto-switching from PAL/(N) to 625-line PAL/M

…About I-Q signal inversion

The I-Q Select function provides automatic or manual tracking and selection of inverted and non-inverted digital QPSK signals. When set to Automatic, the I-Q Select function tracks the received digital signal and inverts the signal automatically for correct selection, as required. When set to Inverted, the received digital signal is always inverted. Conversely, when set to Non-Inverted, the received digital signal is never inverted. The I-Q Select function is normally set to Automatic/Auto Switch. The I-Q Select Inverted and Non-Inverted settings can be used to automatically reject or filter out unwanted QPSK signals.

To display or change the I-Q Select option...

Step 1. Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **I-Q Select** by pressing the NEXT button.

Step 3. Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (Automatic/Auto Switch[1], Inverted or Non-Inverted). The default setting is OFF.

---

[1] Some versions not equipped with Auto Switch fixed delay and variable delay (2-60 second)

> **Step 4.** When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
> A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Signal Search setting. Unless otherwise recommended, I-Q Select should normally be set to Automatic (default). For information about default receiver settings, see "Default receiver settings".

MPEG Output

The MPEG Output setting determines if the signal appearing at the SWIF OUT connector contains the complete incoming MPEG-2 transport stream (i.e., all authorized virtual channel services), or a filtered transport stream (i.e., current channel virtual services only). The MPEG Output setting is valid only if the SWIF output signal is used (see also "Input Select").

To display or change the MPEG Output filter setting...

> **Step 1.** Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

> **Step 2.** Move to **MPEG Output** by pressing the NEXT button.

> **Step 3.** Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (Filtered or Unfiltered). The default setting is Unfiltered.

> **Step 4.** When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
> A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the MPEG Output setting. When set to Unfiltered, all service PID (Packet IDentifier) and PSI (Program-Specific Information) received as part of the encoded digital signal appears at the SWIF OUT connector. If set to Filtered, service PID information associated with the current virtual channel only appears at the SWIF OUT connector. The MPEG Output setting does not affect receiver operation even if the SWIF signal output is not used, regardless of whether a RF or transport input signal is used to operate the receiver.

C-Band LO frequency

The C-Band Local Oscillator frequency setting determines the Local Oscillator frequency used by the receiver for tuning the received digital signal only when C-Band operation (i.e., C/L-Band Freq. or C/Downlink Freq.) is set (see also "Band Select").

Step 1. Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **C-Band LO** by pressing the NEXT button.

Step 3. Enter a valid frequency using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (frequencies are displayed from 0 GHz to 15 GHz in 1 MHz steps). You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the frequency. The default setting is 5.150 GHz.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the C-Band Local Oscillator frequency.

Ku-Band Low/Single LO frequency

The Ku Low/Single LO frequency setting determines the Local Oscillator frequency used by the receiver for tuning the received digital signal only when Low Ku/L-Band Freq. or Single Ku/L-Band Freq. operation is set for use with a single LNB system (see also "Band Select").

Step 1. Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Ku Low/Single LO** by pressing the NEXT button.

Step 3. Enter a valid frequency using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (frequencies are displayed from 0 GHz to 15 GHz in 1 MHz steps). You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the frequency. The default setting is 9.750 GHz.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Ku Low/Single LO frequency.

Ku High Band LO frequency

The Ku High Band LO frequency setting determines the Local Oscillator frequency used by the receiver for tuning the received digital signal only when High Ku/L-Band Freq. or Single Ku/L-Band Freq. operation is set (see also "Band Select").

To display or change the Ku High Band LO frequency …

Step 1.   Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2.   Move to **Ku High Band LO** by pressing the NEXT button.

Step 3.   Enter a valid frequency using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (frequencies are displayed from 0 GHz to 15 GHz in 1 MHz steps). You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the frequency. The default setting is 10.600 GHz.

Step 4.   When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Ku High Band LO frequency.

Ku Band Switch LO Crossover frequency

The Ku Band Switch frequency setting determines the Local Oscillator crossover frequency used by the receiver for tuning the received digital signal only when Dual Ku/L-Band Freq. is set for dual-LNB system operation (see also "Band Select"). Dual-LNB system operation also requires correct setup of the Ku Low/Single LO plus the Ku High Band LO frequencies.

To display or change the Ku Band LO Crossover frequency…

Step 1.   Press USER to display page 2 of the Installer menu, if required (see Figure 3-8).

Step 2.   Move to **Ku High Switch** by pressing the NEXT button.

Step 3.   Enter a valid frequency using front panel buttons. You can also press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (frequencies are displayed from 0 GHz to 15 GHz in 1 MHz steps). You can also press and hold down the CHAN.▲/CHAN.▼ buttons to rapidly increase/decrease the frequency. The default setting is 11.700 GHz.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Ku Band Switch LO crossover frequency.

Installer menu (page 3)

Information about how to use page 3 of the Installer menu for receiver setup follows. For Installer menu display instructions, see "Installer menu". Page 3 of the Installer menu can only be displayed from page 2, and is shown in Figure 3-11.
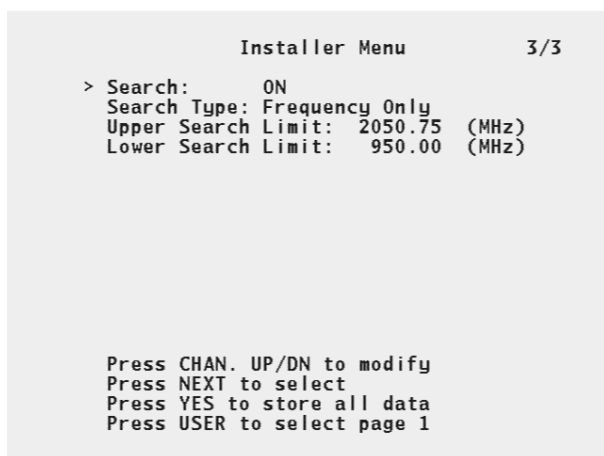
```
              Installer Menu          3/3
 > Search:       ON
   Search Type: Frequency Only
   Upper Search Limit:  2050.75  (MHz)
   Lower Search Limit:   950.00  (MHz)




   Press CHAN. UP/DN to modify
   Press NEXT to select
   Press YES to store all data
   Press USER to select page 1
```

Figure 3-11. Installer menu (page 3)

…About other Search Setup options

Signal searches are constrained or limited by the current Search Type and the boundary settings for the Lower and Upper Search Limit frequency (range). When searching for a signal, the receiver uses the Search Type as the primary search criteria. For example, if Frequency Only is set as the Search Type, only signals that match the current FEC Rate (set at the Installer menu, page 1) within the current Lower/Upper Search Limit frequency boundaries are examined for a possible match. Signals associated with all other FEC Rates are ignored (see also "…About I-Q signal inversion").

Signal Search

The Search setting determines if automatic Signal Search is used by the receiver for recovering the digital carrier signal if signal loss occurs (see also "…About Signal Searches"). This option is also available at the front panel.

To display or change the Signal Search setting...

Step 1. Press USER to display page 3 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Search** by pressing the NEXT button.

Step 3. Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (ON or OFF). The default setting is OFF.

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Signal Search setting.

Search Type

The Search Type setting determines the primary search criteria used with automatic Signal Search for recovering the digital carrier signal if signal loss occurs (see also "…About Signal Searches").

To display or change the Search Type...

Step 1. Press USER to display page 3 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Search Type** by pressing the NEXT button.

Step 3. Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (FEC Rate Only, Frequency & FEC or Frequency Only). The default setting is Frequency Only (see Table 3-12).

Step 4. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Search Type. Setting the Search Mode to ON enables the signal search for automatic activation. You can disable the signal search option by setting the Search Mode to OFF.

Table 3-12. Available Search Type options

Option	Description
FEC Rate Only	Search by FEC Rate
Frequency & FEC	Search by Frequency and FEC
Frequency Only	Search by Frequency

Upper Search Limit

The Upper Search Limit setting determines the highest frequency in the range used with automatic Signal Search for recovering the digital carrier signal if signal loss occurs (see also "…About Signal Searches").

To display or change the Upper Search Limit (frequency)…

Step 1. Press USER to display page 3 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Upper Search Limit** by pressing the NEXT button.

Step 3. Enter a valid frequency using front panel buttons only (the CHAN.▲ or CHAN.▼ [front panel] button cannot be used to display available settings). Frequencies from 0 GHz to 15 GHz can be set. The default setting is 1450.00 MHz.

Step 4. When the desired setting is displayed, press YES to save (STORE) the setting. A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Upper Search Limit frequency.

Lower Search Limit

The Lower Search Limit setting determines the lowest frequency in the range used with automatic Signal Search for recovering the digital carrier signal if signal loss occurs (see also "…About Signal Searches").

To display or change the Lower Search Limit (frequency)…

Step 1. Press USER to display page 3 of the Installer menu, if required (see Figure 3-8).

Step 2. Move to **Lower Search Limit** by pressing the NEXT button.

Step 3. Enter a valid frequency using front panel buttons only (the CHAN.▲ or CHAN.▼ [front panel] buttons cannot be used to display available settings). Frequencies from 0 GHz to 15 GHz can be set. The default setting is 950.00 MHz.

Step 4. When the desired setting is displayed, press YES to save (STORE) the setting. A save message displays on-screen to confirm the new setting(s).

Repeat the above action to change the Lower Search Limit frequency.

Subtitles menu

The Subtitles menu lets you make selections about the language of and the way in which subtitles are displayed on the video. You can choose the language that subtitles will be displayed in, the color of the subtitle text, and color of the background that the subtitle text is displayed on.
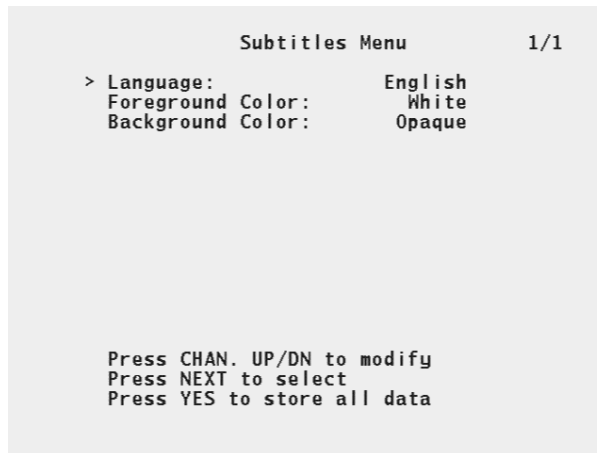
Figure 3-12. Subtitles menu

…About video subtitles

The PowerVu *Plus* Model D9229 Commercial Headend Receiver can decode and display video subtitles on-screen if this information is broadcast as part of the encoded digital signal. Video subtitling is defined at the uplink via PCC control system software, and can be set for display in a number of different languages, or can be disabled. Available video subtitle languages display subtitle text in the selected language (and/or from a pre-defined language group), depending on your network or jurisdiction. When available, subtitle text appears at the bottom of the TV monitor screen and is synchronized with the video program. If the current subtitle language setting is incompatible, unavailable or does not match the subtitle information in the received digital signal, no subtitles are displayed. When you disable video subtitling and exit to video from menus, a banner text message displays to confirm that no subtitles will display.

⚠ **IMPORTANT!** Subtitling is supported for all video resolutions except 704 X 576 (PAL), where it will not be displayed even if video subtitling is enabled and subtitles are present.

To display the Subtitles menu...

Step 1. Press the MENU button at the receiver front panel to display the Receiver Status menu (see Figure 3-4).

Step 2. Press 2 to display the Sub-Menu (Figure 3-5).

Step 3. Press 1 to display the Subtitles menu.

You can view or change the current setup. Press VIEW to return to video (i.e., the current channel).

Available options: Press the CHAN. ▲/CHAN.▼ button (front panel) to display available settings. Press NEXT to move to the next menu option. Press YES (STORE) to save the new settings. Press VIEW to return to video (current channel).

To display or change the video Subtitles Language...

Step 1. Move to **Language** by pressing the NEXT button.

Step 2. Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings (see Table 3-13). The default setting is Disabled (OFF).

Step 3. When the desired setting is displayed on-screen, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting(s).

Table 3-13. Available video subtitle languages

Language	Language	Language
Arabic	Hindi	Serbian
Batak	Hungarian	Sinhalese
Bengali	Indonesian	Spanish
Bulgarian	Irish	Swedish
Chinese	Italian	Tai
Czech	Japanese	Tamil

Language	Language	Language
Dutch	Korean	Thai
English	Malay	Ukrainian
Finnish	Multiple[1]	Vietnamese
French	Polish	Undefined 1, 2, 3, 4, 5 and 6
Gaelic	Portuguese	All
German	Romanian	Disabled (OFF)
Greek	Russian	
Hebrew	Sanskrit	

To display or change the Foreground Color setting...

Step 1.   Move to **Foreground Color** by pressing the NEXT button.

Step 2.   Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings. Choices are: Yellow, White, and Auto. (If you choose Auto, the color used for the text will be automatically chosen at the uplink.)

Step 3.   When the desired setting is displayed, press YES to save (STORE) the setting. A save message displays on-screen to confirm the new setting(s).

To display or change the Background Color setting...

Step 1.   Move to **Background Color** by pressing the NEXT button.

Step 2.   Press the CHAN.▲/CHAN.▼ button (front panel) to display available settings. (See Table 3-14 for descriptions of settings.)

Step 3.   When the desired setting is displayed, press YES to save (STORE) the setting. A save message displays on-screen to confirm the new setting(s).

Table 3-14. Available subtitle background color options

Option	Description
Auto	Subtitling background will be chosen automatically at the uplink.
None	No background used. Subtitles will be displayed directly over video.
Semi-trans	Subtitling background will partially obscure the video.
Opaque	Subtitling background will totally obscure the video.
Shadow	A drop shadow will be applied to the subtitling text. No other subtitling background will be used.

---

[1] Displays subtitle text in the selected language (from a pre-defined language group)

Cue Tone/Trigger Control menu
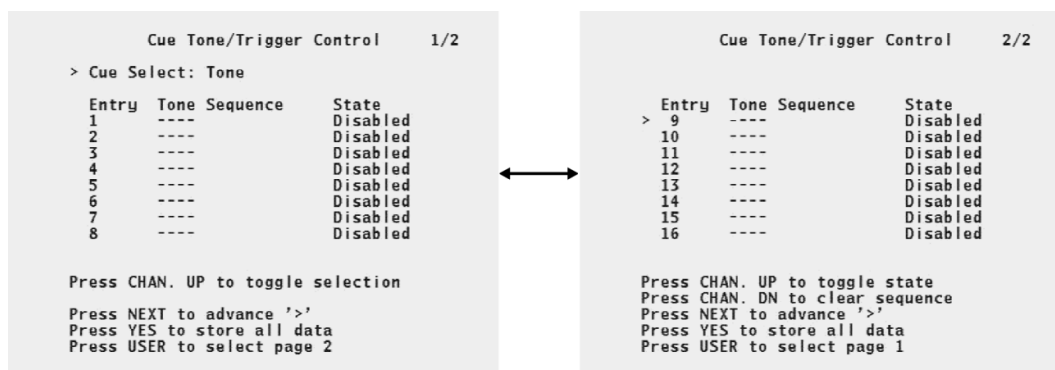
Figure 3-13. Cue Tone/Trigger Control menu (pages 1 & 2)

The Cue Tone/Trigger Control menu lets you configure the cue tone or cue trigger facility on your receiver. Cueing is typically used for automating the insertion and synchronization of localized commercial messages into video programming. Cue Tones are standard DTMF tones that are generated at the Cue Tone output on the rear panel of receivers that are equipped with the Cue Tone option. Cue Trigger refers to contact closures that can be generated at pins 22 to 25 and pins 16 to 19 of the expansion port on the receiver rear panel. These eight pins provide open collector/TTL outputs. The Cue Trigger facility is standard on all Commercial receivers. Cue Tone is available only on certain models.

> ⚠️ **IMPORTANT!** Cue Trigger requires a connection between the expansion port on the rear panel and external equipment. Be sure that any cable you attach to the expansion port is fully shielded.

> ⚠️ **IMPORTANT!** If you configure your receiver for Cue Tone operation and connect user devices to the optional Cue Tone output, do not use Expansion Port pins 16 to 19 and 22 to 25, which are normally used for Cue Trigger or Remote Control. The receiver cannot be used for Cue Tone and Cue Trigger output concurrently.

Step 1. Press the MENU button at the receiver front panel to display the Receiver Status menu (see Figure 3-4).

Step 2. Press 2 to display the Sub-Menu (Figure 3-5).

Step 3. Press 0 to display the Cue Tone/Trigger Control menu. (Page 1 displays automatically.)

Step 4. Press USER to switch between pages 1 and 2.

You can view or change the current setup. Press VIEW to return to video (i.e., the current channel).

Available options: Press the CHAN. ▲ button (front panel) to display the Cue settings. Press NEXT to move to the next menu option. Press YES (STORE) to save the new settings. Press USER to display the other menu page. Press VIEW to return to video (current channel).

To display or change the Cue Select setting...

Step 1. Move to **Cue Select** by pressing the NEXT button (if required).

Step 2. Press the CHAN.▲ button (front panel) to switch between Tone and Trigger.

Step 3. If you select Trigger, press YES to save (STORE) the setting.
A save message displays on-screen to confirm the new setting. (The rest of the information on page 1 and the information on page 2 does not apply to Cue Trigger.)

Step 4. If you select Tone, proceed to enter or change the Cue Tone settings.

To display or change the Cue Tone settings...

Step 1. Be sure the Cue Select field is set to Tone.

Step 2. To move from one Entry to the next, press the NEXT button. You can define as many as 16 Entries. To move between pages, press the USER button.

Step 3. To enter the DTMF tone sequence, use the key pad on the receiver front panel. The first three characters must be numeric. The last character must be either a * or a #. To enter a * as the fourth character, press 0. To enter a #, press 1. To clear or restore a tone sequence, press the CHAN.▼ button (front panel).

Step 4. To enable or disable an Entry, press the CHAN.▲ button.

Step 5. When the desired settings are displayed, press YES to save (STORE) the settings. A save message displays on-screen to confirm the new setting(s).

4

Maintenance

Chapter 4 Maintenance

Normal operation of the PowerVu *Plus* Model D9229 Commercial Headend Receiver requires periodic maintenance.

About this chapter

This chapter provides complete operating instructions for maintaining the Model D9229 Commercial Headend Receiver. It contains the following topics.

Contents

Maintenance

The Model D9229 Commercial Headend Receiver chassis has no internal, user-serviceable parts. Refer servicing of this product to qualified personnel only.

Preventative maintenance

The Model D9229 Commercial Headend Receiver can operate unattended for extended periods of time. However, periodic visual inspection is recommended to ensure continued and safe operation. Perform a quarterly visual inspection as per Table 4-1.

Table 4-1. Preventative maintenance

Inspect…	To ensure that…
Chassis	• Mechanical damage or evidence of overheating is not present • All chassis air vents are unobstructed and free of dust and debris (clean[1]/dust or vacuum when necessary) • Receiver is not operated in environments where air flow is restricted, or where ambient temperatures are outside the specified range
External cables and connections	• All cables are properly mated, and that all connectors and retainers are correctly installed and tightened • Cables and connectors are not stressed or subjected to abrasion or contact with sharp surfaces

---

[1] Do not permit any liquids to penetrate the chassis interior (use non-corrosive liquid cleaners only)

5

Appendix A

Appendix A Customer Support Information

About this Appendix

This Appendix provides important information about your PowerVu *Plus* Model D9229 Commercial Headend Receiver. Refer to this section for:

- Product support and contact information

- Product warranty/return details

Contents

Customer support information

This Appendix provides important information about your PowerVu *Plus* Model D9229 Commercial Headend Receiver. Refer to this section for:

- Product support and contact information
- Product warranty/return details

Product support

Scientific-Atlanta provides customers with 24-hour hotline support from anywhere in the world. If you require technical assistance or product training support, or if you have any questions concerning your Scientific-Atlanta product, contact the appropriate Customer Support Center from those listed below.

If you call from …	Support Location	Regular Hours	After Hours	Fax
USA or Canada	USA: Atlanta, Georgia Canada: Toronto, Ontario	Toll-free: 1-888-949-4786	Toll-free: 1-888-949-4786	1-770-903-5567
South America	Buenos Aires, Argentina	+54-1-342-0321	1-770-903-4786	+54-1-325-5900
Europe, Middle East or Africa	London, England	Toll-free (within Europe): 1-800-220-145 Direct: Return Material/tracking: +44-1923-271460 Decoder support: +44-1923-271467 Uplink/software support: +44-1923-271420	1-770-903-4786	+44-1923-269018
Asia or Australia	Sydney, Australia	Toll-free: 1-800-500-518 Direct: +61-2-9975-3678	1-770-903-4786	+61-2-9451-4432

Satellite Television Networks (STN) customers who call a Customer Support Center are asked specific questions in order to identify their needs. In this way, each call can be directed to the customer support representative most experienced with your Scientific-Atlanta product. Customer Support Centers also provide the following pre- and post-sales support services for Scientific-Atlanta products.

Hotline technical support

24-hour hotline technical support services are available to answer technical questions about the operation, maintenance and repair of Scientific-Atlanta products.

Training support

On and off-site training plus technical support services are available for both equipment operators and system administrators.

Warranty and post-warranty support

Warranty and post-warranty support services are available to assist customers returning Scientific-Atlanta products for service or repair. For complete product warranty information, see the beginning pages of this guide.

Customer responsibility

When returning equipment, the customer is solely responsible for equipment packaging and transportation costs both to and from the factory.

At the customer's request, Scientific-Atlanta will make reasonable efforts to provide warranty service at the customer's premises, provided that the customer pays current field service rates plus direct travel and accommodation expenses.

In case of a fault

If an equipment fault develops, perform following steps. For complete information, see "Product return".

1.	• Notify Scientific-Atlanta of the problem immediately, providing the model number and serial number of the equipment plus details of the problem. On receipt of this information, service information and shipping instructions will be provided.
2.	• On receipt of instructions, return the product by prepaid freight. • If the product or fault is not covered under warranty, Scientific-Atlanta will provide an estimate of repair charges in advance of any work performed.

Product return

To return any Scientific-Atlanta product for repair or replacement, follow the steps below. To be eligible for credit, a Material Return Authorization (RMA) number must accompany each product returned to Scientific-Atlanta. This number can only be obtained from your local Scientific-Atlanta Customer Support Center in advance of product return. Be sure to include this number in all correspondence.

1.	Telephone your regional Customer Support Center or call 1-416-299-6888, or fax Scientific-Atlanta and request a Material Return Authorization for product return.
2.	Tag or label the product with the following information. • Your name and full return address • Telephone contact number • RMA number • Sales order (if available) • Purchase order (if available) • Date the product was received • Brief description of problems
3.	Repackage the product using the original carton and packing materials, if possible. If the original packaging is not available, repackage the product using a suitable corrugated carton (or similar shipping container). Be sure to wrap the product in sufficient protective packaging to prevent damage to the equipment during shipment.
4.	Print or attach the following information on the outside of the carton or shipping container. • The full shipping address • Your name, your business name and full return address • Contact telephone number • RMA number
5.	Ship the product prepaid and insured to the Scientific-Atlanta Customer Support Center (or other repair location) as directed. If you are unsure about where to ship the product, contact your local Scientific-Atlanta Customer Support Center, Scientific-Atlanta dealer or distributor. Note: Scientific-Atlanta does not accept freight collect. Be sure to prepay all return shipments.

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Appendix B

Appendix B Technical Information

About this Appendix

This Appendix provides important information about your PowerVu *Plus* Commercial Headend Receiver. Scientific-Atlanta product specifications are subject to change without notice. Refer to this section for:

- Specifications

- Standard features and available options

Contents

Technical Information

Table B-1 lists standard features, available options and product specifications information for the PowerVu *Plus* Model D9223 Commercial Headend Receiver.

Table B-1. Product specifications

System	Description
System:	MPEG-2/DVB Compatible
MPEG-2 Output:	Scientific-Atlanta SWIF link, MPEG-2 transport format with multiplexed video, audio and data
Modulation:	QPSK
Inner FEC:	Variable (1/2, 2/3, 3/4, 5/6 or 7/8)
Outer FEC:	Reed Solomon, T=8
Transport:	MPEG-2
Tuner	**Description**
Tuner Input Level:	-30 dBm through -65 dBm per carrier
Frequency Range:	950 MHz through 2050 MHz
Tuning Stepsize:	250 kHz
Symbol Rate Range:	3.0 to 30.8 Msymbols/s
Stepsize:	100 symbols/s
Carrier Capture Range:	±1.5 MHz
Carrier Acquisition Time:	< 2 seconds
Satellites:	C Band and Ku Band
Impedance:	75 Ω
Video Output	**Description**
Video Decompression Type:	MPEG-2
Video Output Level:	100 IRE ± 5% (NTSC) and 1.0 V p-p ± 5%
Frequency Response:	-2 dB @ 5.0 MHz, 704 X 480/576 sample density, and -2 dB @ 3.0 MHz, 544 X 480/576 sample density
Maximum Video Resolution :	704 x 576
Chroma-Luma Delay:	±26 ns
Field Time Distortion:	≤ 3 IRE (NTSC), and ≤ 2% (PAL)
Line Time Distortion:	≤ 1 % max.
Short Time Distortion:	≤ 2%
Luminance Non-Linearity:	≤ 5 %
Differential Gain:	≤ 4 IRE (NTSC), and ≤ 4% (PAL)
Differential Phase:	2 °
Signal-To-Noise-Ratio:	≥ 56 dB
VBI Line Insertion:	Lines 10-22 (NTSC) fields 1 and 2 or PAL lines 7 -22

Audio Outputs	Description
Number of Channels:	Two (2) stereo pairs, or four (4) monaural channels
Balanced Audio Output:	2 Balanced (adjustable) audio outputs are factory set for unity gain (0 dBm out for 0 dBm in). Range is adjustable from -6 to +6 dB, providing a maximum output of up to +18 dBm into 600 Ω.
Frequency Response:	± 2 dB (20 Hz to 20 kHz)
Unbalanced Stereo Audio Output:	2V rms @ 10 KΩ max.
Total Harmonic Distortion:	≤ 0.3 % @ 1 kHz
Dynamic Range:	75 dB (CCIR/Arm weighting)
Crosstalk:	60 dB
Expansion Port	**Description**
Utility Data:	RS-232 asynchronous data at rates up to 38400 b/s (settings of 300, 1200, 2400, 4800, 9600, 19200, and 38400)
Outputs:	Eight open-collector for control of external devices
Serial Remote Control : and monitoring outputs	RS-232 data at rates of 600, 1200, 2400, 4800 and 9600 b/s
Other Outputs	**Description**
MPEG-2 Output:	MPEG-2 transport format with multiplexed video, audio and data
Cue Tone	Balanced, less than 50 ohms output impedance, -3.0 dBu ± 3dB Three position detachable terminal block
Environmental	**Description**
Operating Temperature:	0° C to 50° C (32° F to 122° F)
Storage Temperature:	-40° C to 60° C (-40° F to 140° F)
Relative Humidity:	5% to 95% (non-condensing)
Physical	**Description**
Dimensions:	3.5 inches H X 19.0 inches W X 13.3 inches D (8.9 cm H X 48.3 cm W X 33.8 cm D)
Chassis:	2U height for EIA standard (19-inch wide rack) mounting
Weight:	11.5 lbs. (5.22 kg) approx.
Power Requirements	**Description**
Voltage Range:	100 VAC to 240 VAC ± 10 % nominal
Line Frequency:	50/60Hz (50Hz only for 240VAC)
Power Consumption:	63W max.
LNB Drive Voltage: (three-position slide switch)	Position 1 (19 VDC @ 450 mA max.) Position 2 (OFF) Position 3 (+13 VDC/+19 VDC @ 450 mA max.), H/V controlled output for dual mode applications

Connectors and Controls	Description
SATELLITE (input):	F type
VIDEO (output):	BNC type
AUDIO, L & R, unbalanced (output):	2 (RCA type)
AUDIO, L & R, balanced (output):	L (Left +/-), R (Right +/-), and G (Gnd) detachable terminal block
EXPANSION PORT (I/O):	25-pin D, female (Utility Data)
LNB PWR drive voltage (output): 19V OFF 3/19V	3-position slide switch
Level Control (output): L & R balanced	Trimmer potentiometers

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Appendix C

Appendix C Troubleshooting

About this Appendix

This Appendix provides important information about your PowerVu *Plus* Model D9229 Commercial Headend Receiver. Refer to this section for:

- Troubleshooting Guide

Product troubleshooting information is provided in this Appendix to help resolve operating problems with the PowerVu *Plus* Model D9229 Commercial Headend Receiver. Servicing of installed equipment should only be performed by qualified technical personnel. For complete operating instructions and other important information about your receiver, refer to this Installation and Operation Guide. For additional application and troubleshooting information, see Appendix F. For additional reference information, see Appendix G.

Contents

Troubleshooting Guide

The information in this troubleshooting guide is provided to help you resolve operating problems with the PowerVu *Plus* Model D9229 Commercial Headend Receiver. If you have any questions about this product, contact your local Customer Support Center. For information about how to contact Scientific-Atlanta for customer service or technical assistance, see Appendix A Customer Information. For product warranty information, see the beginning pages of this manual.

> ⚠ **IMPORTANT!** Note that temporary, solar-related electromagnetic disturbances occur every year during the spring and autumn months. These disturbances usually persist for several minutes a day for approximately one week during these periods. Your service provider can advise you about when authorized services may be adversely affected. If you are unable to resolve your problem after consulting this Troubleshooting guide, contact your dealer/reseller or local service provider for assistance, or contact your local Scientific-Atlanta Customer Support Center.

Table C-1. Troubleshooting Checklist

Symptom	Possible Causes	Remedies
Front panel display is off	Receiver is unplugged or AC power is interrupted	• Check the AC power cord and electrical outlet
Front panel displays "•" only	Receiver is OFF (on stand-by)	• Press the STANDBY button on the front panel to activate the receiver
No signal Signal Level <20	No DC power supplied to LNB	• Check external LNB DC power source (if external power supply used), or verify that the LNB power switch (receiver rear panel) is set to ON (if internal power supply used)
	Faulty LNB or cable connection	• Check cable, and measure LNB power output voltage (normally 13V or 19V DC ±10%) (see also Appendix B) • Check that LNB cable does not exceed maximum length, and/or that signal splitters do not have missing terminations which can cause excessive signal loss
No signal Signal Level >20	Incorrect receiver settings	• Check RF frequency and other front panel/menu setup options
	Incorrect LNB polarity	• Verify/Connect proper LNB polarity (H or V) • Contact your dealer/reseller or local service provider for assistance
	Incorrect antenna orientation	• Aim antenna for peak reception according to manufacturer's instructions (you can use a standard analog receiver tuned to a NTSC or PAL signal to confirm correct antenna position)
	Line-of-Sight obstruction	• Relocate antenna or remove obstruction
Signal with high BER Signal Level >20	Signal weak and/or error rate very high (receiver synchronized to a valid digital signal)	• Aim antenna for peak reception according to manufacturer's instructions (peak for lowest possible BER) • Check that LNB cable does not exceed maximum length, and/or that signal splitters do not have missing terminations which can cause excessive signal loss (see also Appendix G)
Signal with high BER Signal Level >50	Signal too strong due to block converter and/or line amplifiers installed after LNA/LNB	• Remove extra amplifier(s) and/or add signal attenuator pads (see also Appendix F and G)
No video or audio SIGNAL LED flashing regularly	Receiver not authorized to receive the signal (receiver synchronized to a valid digital signal)	• Contact your dealer/reseller or local service provider for assistance
No response when front panel buttons are pressed	Front panel operation is disabled by Lock Level setting	• Receiver Lock Level set to Loc3 or Loc4 (if Lock Level 3, change setting, as required)

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Appendix D

Appendix D Serial Remote Control Command Set

About this Appendix

This Appendix provides important information about your PowerVu *Plus* Commercial Headend Receiver. Refer to this section for:

* Serial Remote Control commands information

Complete information required for operating your PowerVu *Plus* Model D9229 Commercial Headend Receiver via Serial Remote Control commands is provided in this Appendix. Remote operation of the receiver is performed via the rear panel Expansion Port RS-232 link.

Use the information provided in this Appendix to familiarize yourself with Remote Control command operation and for quick reference when needed. For complete operating instructions and other important information about your receiver, refer to this Installation and Operation Guide. Reading all of this guide is recommended before you begin using the Serial Remote Control commands.

Contents

Expansion Port interface

The Expansion Port interface is used by the receiver to carry remote control command data to and from the Model D9229 Commercial Headend Receiver and the host computer.
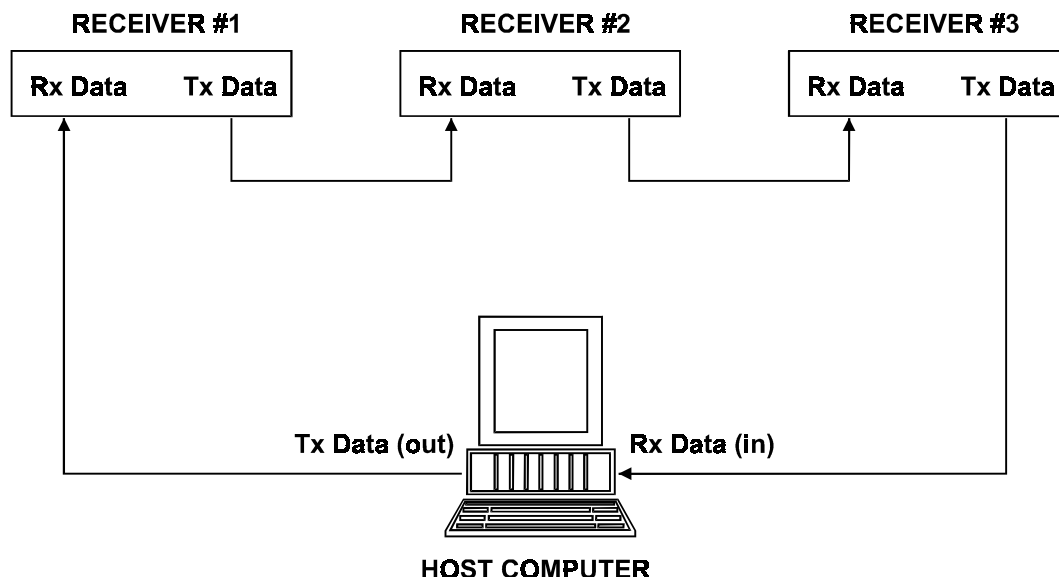
Figure D-1. Daisy-Chain receiver network configuration

…About the Expansion Port interface

The Model D9229 Commercial Headend Receiver can be operated and monitored remotely via the Expansion Port (DB-25 female connector) when connected to a host computer (i.e., PC workstation or data terminal) The Expansion Port interface operates at standard RS-232 interface signal levels (data lines only), and uses non-standard pin connections to permit internal signal sharing. Pins marked NC (No Connection) or Reserved must not be connected for normal operation. No support is provided for external protocols (e.g., XON/XOFF). The default data format used for port operation is ASCII, 8 bits, no parity, 1 start bit and 1 stop bit. Both receive and transmit baud rates are equal. The default Baud Rate (9600) can be changed using receiver front panel buttons.

Remote receiver operation via the Expansion Port requires installation of a PC/data communications program. Note that certain program settings may vary, depending on the type of workstation/terminal equipment being used. Data interface cables connected between the Commercial Receiver and some customer equipment may require a unique pin-out for proper operation. For Expansion Port pin-out information, see Table D-1.

Table D-1. Expansion Port pin-out

Pin	Function	Pin	
#1	Ground (RS-232)	#14	Reserved
#2	Utility Data Output	#15	Reserved
#3	NC (RS-232 RxD)	#16	RC-8
#4	NC (RS-232 RTS)	#17	RC-7
#5	NC (RS-232 CTS)	#18	RC-6
#6	NC (RS-232 DSR)	#19	RC-5
#7	Ground (RS-232)	#20	+5 VDC control output via 1K Ω pull-up resistor
#8	Download input	#21	+5 VDC control output via 47 Ω pull-up resistor
#9	Reserved	#22	RC-4
#10	Auth Flag	#23	RC-3
#11	Reserved	#24	RC-2
#12	Serial Remote (RxD)	#25	RC-1
#13	Serial Remote (TxD)		

…About networking

When connected to a host computer (i.e., PC workstation or data terminal), the Model D9229 Commercial Headend Receiver can be operated as part of a multiple-receiver network. This is accomplished by interconnecting each of the receivers with the host computer in a daisy-chain configuration (see Figure D-1). In a daisy-chain network, command information (data) transmitted from the host computer is received by the first receiver in the loop, which in turn, retransmits the data to the second receiver in the loop, and so on. This action continues until the last receiver completes the loop by re-transmitting the data back to the host computer. With daisy-chain networks, the network address assigned to each receiver is not used. Instead, the logical address of each receiver is determined by its position in the chain.

When operating the receiver as part of a daisy-chain network, note the following limitations and operating constraints.

- **Response time:** The time required to receive a response from a remote control command issued from the host computer increases with each receiver added to the network.

- **Performance:** Since every character transmitted across the network must be received and retransmitted by every receiver in the chain, the increased response time can affect remote configuration and monitoring the performance, especially when low baud rates are used in a large daisy-chain network.

- **Software downloading not networkable:** Because the downloading of receiver operating software requires a Scientific-Atlanta proprietary protocol, the receiver must first be removed (disconnected) from the network before a software download can be performed.

Expansion Port operation

Remote control and monitoring of the Model D9229 Commercial Headend Receiver via the rear panel Expansion Port is performed using Serial Remote Control commands. The commands are used to control the following Expansion Port (and other) subsystem components.

- Authorization Relay
- Port Control Relay
- Expansion Port Remote Control pins

…About the Authorization Relay

The Authorization Relay (together with the Authorization Flag) is used to control the receiver authorization state. This relay can be controlled externally using the remote ARLY command. When the receiver is authorized, the operating state of the Authorization Flag (pin #10) is low, which energizes the relay. When the receiver is deauthorized, the operating state of the Authorization Flag is high (open-collector), which de-energizes the relay. For complete information about this command, see "Authorization Relay".

…About the Port Control Relay

The Port Control Relay is used to operate external appliances/devices connected to the receiver by energizing the relay independently, or via port control pins. The PRLY command is used to energize the relay, or to set one of the designated port control pins (i.e., RC-1 to RC-8) to operate the relay (see also "…About the Port Control pins"). For complete information about this command, see the next topic.

…About the Port Control pins

The Expansion Port is externally controlled via one of the designated Remote Control pins (i.e., RC-1 to RC-8) using the PCTL command. Each Remote Control pin can be set to operate under remote (uplink encoder) control, or under local (PCTL command) control. A separate command is required for controlling or changing the operating state of each Remote Control pin. For complete information about this command, see the next topic.

The accompanying figure shows how the Authorization Relay (ARLY), Port Control Relay (PRLY) and Port Control (PCTL) commands are used to control and operate the Commercial Receiver Expansion Port.
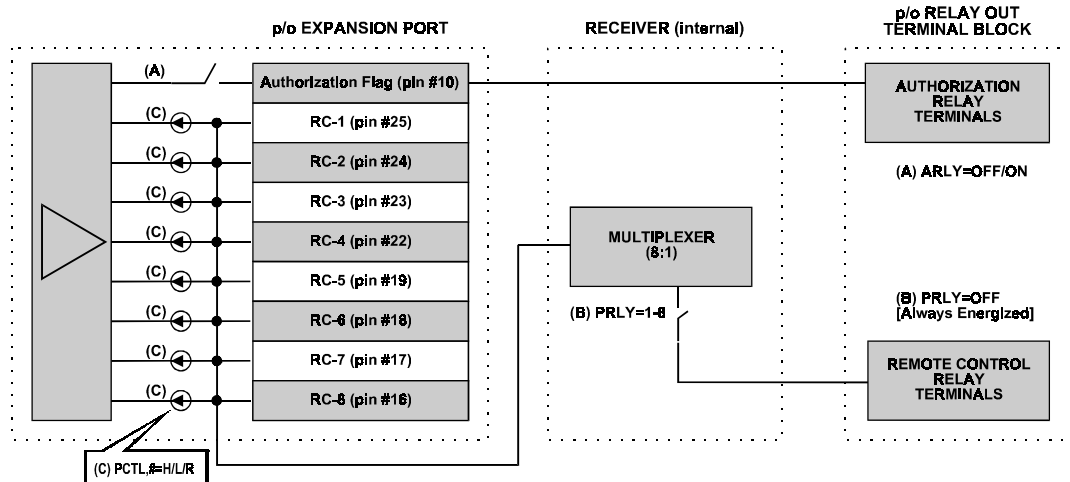

Figure D-2. Expansion Port operation and control

Serial Remote Control commands

Your Model D9229 Commercial Headend Receiver is equipped for remote control using Serial Remote Control commands via a host computer (i.e., PC/workstation or data terminal) connection. This optional connection can be made at the receiver rear panel serial data port labeled EXPANSION PORT. Serial Remote Control commands can be used in place of the user interface (front panel buttons) for remote receiver control and monitoring.

General information about how Serial Remote Control commands are used is followed by detailed information about each command, including syntax and command options.

Command protocol

Each of the Serial Remote Control commands is executed using a unique protocol or rules. These rules control command syntax (i.e., how a command must be sent to the receiver) and how the receiver responds. The receiver can only interpret commands if upper case characters are used. When sending commands, observe the following.

- Use only upper case ASCII characters

- All Serial Remote Control commands begin with the characters "SA1"

- A command is executed only after a carriage return character is sent (i.e., the Enter or Return key is pressed)

The following conventions are used for identifying the command options found in this Appendix.

- Left and right parenthesis characters "{ }" and the forward slash character "/" are used to separate the command option(s) from the main command characters, and must not be entered

- The forward slash character "/" used to separate command options indicates that one of the available options must be specified, and must not be entered

The following example shows correct command usage.

SA1VER<CR>

In the above example, the VER command causes the receiver model number to display only after the Enter key is pressed (i.e., carriage return [<CR>]). The command is valid only if the characters "VER" are used (i.e., "ver" is not a valid command, even though the characters are the same). If command or syntax is invalid, the receiver responds with "?". If an internal overflow condition exists when executing a command, the receiver responds with "V". Note that all Serial Remote Control commands begin with the characters "SA1".

Command/Response messaging

A specific protocol is used for constructing and processing all Serial Remote Control commands and resulting response messages. Table D-2 shows Commercial Receiver command frame and response frame information.

Table D-2. Remote control command and response frames

Command frame			
Byte	Length	Data	Description
1	1	"S"	Start character #1
2	1	"A"	Start character #2
3	1	"1-9"[1] "."	Unit Number (in chain)[1] Next ASCII character if more than 9 units in chain
4	n		Command code and parameters
4 + n	1	<CR>[2]	End of message
Response frame			
1	1	<LF>[3]	Line Feed
2	n		Command Response
2 + n	1	<CR>	Carriage Return
3 + n	1	<LF>	Line Feed
4 + n	1	">"	Ready for next message

All transmitted command characters must be upper case ASCII. All characters are echoed by the receiver, except for the Unit Number (i.e., byte #3) which is decremented if greater than zero (0).

---

[1] Receiver is addressed when first unit (1) received

[2] Carriage Return

[3] Line Feed

Error responses

Table D-3 shows receiver command error and overrun error response frame information.

Table D-3. Command/Overrun errors

Command error frame			
Byte	Length	Data	Description
2	1	"?"	Command error response
Overrun error Frame			
2	1	"&"	Overrun error response

The command error message may display if the receiver cannot recognize the command, or if an internal microprocessor operating error or error condition exists.

?

The overrun error message may display if the receiver cannot process the command completely, and/or if the command becomes corrupted during transmission.

&

Authorization Relay

The ARLY command is available for polling the receiver to display the current operating state of the Authorization Relay, and for enabling or disabling external control over the relay state. Observe the following syntax.

SA1ARLY={ON/OFF}

ARLY polls the receiver for the current operating state. **ARLY=ON** enables external control over receiver authorization via the Authorization Relay. **ARLY=OFF** disables external control over receiver authorization by energizing the relay. The receiver responds by displaying the following.

ARLY=ON/OFF

When set to ON, Authorization Relay contacts are closed (energized) when the receiver is authorized and active, and are open (de-energized) if the receiver becomes deauthorized. When set to OFF, the receiver is always authorized.

Automatic Frequency Control

The AFC command is available for polling the receiver to display the current relative offset from the set center frequency of the decoded digital signal. Observe the following syntax.

SA1AFC

AFC polls the receiver for the current relative offset from the set center frequency (decoded digital signal), where ## can be any number from -50 to +50. The receiver responds by displaying the following.

AFC={+/-}##

The receiver automatically compensates for a +/- 2.5 MHz frequency offset which is equivalent to an AFC value of approximately +/- 12.

Bit Error Rate

The BER command is available for polling the receiver to display the current Bit Error Rate of the decoded digital signal (errors per second). Observe the following syntax.

SA1BER

BER polls the receiver for the current Bit Error Rate (digital signal). The receiver responds by displaying the following.

BER=#.#E-#

#.#E-# is the Bit Error Rate expressed in scientific notation.

Channel

The Channel command is available for polling the receiver to display the current channel, or for changing the channel. Observe the following syntax.

SA1CH=###

CH polls the receiver for the current channel. **CH=###** changes the current channel. The receiver responds by displaying the following.

CH=###

can be any virtual channel number from 0 to 500.

Corrected Errors

The CE command is available for polling the receiver to display the current Corrected Error count, and for clearing or resetting the current error count. Observe the following syntax.

SA1CE=0

CE polls the receiver for the current Corrected Error count. **CE=0** clears or resets the current error count. The receiver responds by displaying the following.

CE=###

can be any number from 0 to 65536, and is the number of Corrected Viterbi Errors counted since the last reset. The corrected error count depends on the Signal Quality, and is automatically reset each time the receiver is restarted. This command is available only with DCP (Decoder Control Processor) software v 1.22 or greater (see also "Decoder Control Processor version").

Installer

The INST command is available for displaying current receiver settings, or for changing the receiver settings. Observe the following syntax.

SA1INST=#,{##.#####/####.##},#,##.####,##.###,##.###,##.###,##.###,#,#,#####,#####,{#,#}

The receiver responds by displaying the following.

INST=#,{##.#####/####.##},#,##.####,##.###,##.###,##.###,##.###,#,#,#####,#####,{#,#}

Table D-4 identifies each of the command parameters as displayed (from left to right), in order.

Table D-4. INST command options

	Parameter	Options
1.	# (Band Select)	0 (C/L-Band 1), 1 (C/Downlink), 2 (Low-Ku/L-Band), 3 (High-Ku/L-Band), 4 (Single-Ku/Downlink) or 5 (Dual-Ku/Downlink)
2.	##.##### (Downlink Frequency) or ####.## (L-Band frequency)	Range (0-15 GHz) Range (950-2150 MHz, with 250 kHz resolution)
3.	# (FEC Rate)	1 (1/2), 2 (2/3), 3 (3/4), 4 (5/6) or 5 (7/8)
4.	##.#### (Symbol Rate)	Range (3-30 Ms/s [variable-rate receivers only]) ignored in fixed-rate receivers
5.	##.### (C-Band Local Oscillator fre-	Range (0-15 GHz)

	Parameter	Options
	quency)	
6.	##.### (Low Ku-Band Local Oscillator frequency)	Range (0-15 GHz)
7.	##.### (High Ku-Band Local Oscillator frequency)	Range (0-15 GHz)
8.	##.### (Crossover frequency)	Range (0-15 GHz) for Dual-Ku/Downlink Mode only)
9.	# (Polarization)	H (Horizontal) or V (Vertical)
10.	# (Input Select)	0 (RF) or 1 (SWIF)
11.	##### (Network ID, DVB)	Range (0-65535)
12.	##### (Bouquet ID, DVB)	Range (0-65535)
13.	# (MPEG Output Select) OPTIONAL PARAMETER	0 (Unfiltered) or 1 (Filtered)
14.	# (Tuner Gain) OPTIONAL PARAMETER	0 (Low Gain Mode) or 1 (High Gain Mode)

When using the INST command, a valid Downlink frequency or L-Band frequency must be specified. Also, if the MPEG Output Select or the Tuner Gain command option (parameter) is required, both must be specified.

The **INST** command is valid only if Channel 0 is the current channel. No parameters may be omitted when using this command. This command is available only with DCP (Decoder Control Processor) software v 1.22 or greater (see also "Decoder Control Processor version").

The **INST2** command displays current status of L-Band inputs. Observe the following syntax.

SA1INST2=#

can be 1 or 2. If 1, L-band input 1 will be selected. If 2, L-Band input 2 will be selected.

The receiver responds by displaying the following.

INST2=#

If the receiver returns a 1, L-Band input 1 has been selected. If the receiver returns a 2, L-Band input 2 has been selected. If the receiver returns a 0, the dual L-Band option is not installed on the receiver

The INST2 command is valid only if Channel 0 is the current channel. This command is available only with DCP (Decoder Control Processor) software v 2.11 or greater (see also "Decoder Control Processor version").

Lock level

The LOCK command is available for polling the receiver to display the current Lock Level setting, and for changing the Lock Level setting. Observe the following syntax.

`SA1LOCK=#`

LOCK polls the receiver for the current Lock Level. **LOCK=#** changes the receiver Lock Level.

The receiver responds by displaying the following.

LOCK=#

can be 0, 1, 2, 3 or 4. When set to 0, receiver lockout is disabled (all options are available). When set to 1, menus and current receiver settings are displayed, and all options are available except Factory Reset. When set to 2, menus and current receiver settings are displayed, and all receiver functions are locked out or disabled except Authorization Relay, Baud Rate, Lock Level, and Port Control Relay settings. When set to 3, menus are not displayed and all user interface receiver functions are locked out or disabled except for the Lock Level setting. When set to 4, no menus are displayed and all receiver functions are locked out or disabled, and menus cannot be displayed (i.e., accessible via remote terminal or PCC uplink signal).

The Lock Level setting does not affect external remote command operation in any way.

Port Control

The PCTL command is available for polling the receiver to display the current operating state of Expansion Port control pins, and for enabling or disabling external control over Expansion Port control pins. Observe the following syntax.

`SA1PCTL,#={H/L/R/T}`

PCTL,# polls the receiver for the current state of (specific) Expansion Port control pins.

PCTL,#=H forces the specified port pin HIGH (open collector).

PCTL,#=L forces the specified port pin LOW (grounded).

PCTL,#=R sets the specified port pin for remote (uplink) control over the HIGH and LOW states.

PCTL,#=T sets the specified port pin to the state of the corresponding bit in the transmitted Cue Trigger byte.

The receiver responds by displaying the following.

PCTL,#={H/L/R/T}

can be any pin (number) from 1 to 8.

Port Control Relay

The PRLY command is available for polling the receiver to display the current operating state of the port control relay, and for enabling or disabling external control over the relay state. Observe the following syntax.

SA1PRLY={#/OFF}

PRLY polls the receiver for the current relay operating state. **PRLY=#** sets a specific port pin to control the Authorization Relay. **PRLY=OFF** energizes the Authorization Relay contacts. The receiver responds by displaying the following.

PRLY=#/OFF

can be any pin (number) from 1 to 8. When set to a valid port pin, Authorization Relay contacts are closed (energized) when the pin set goes HIGH and the receiver is authorized and active. Relay contacts are open (de-energized) if the pin set goes LOW, or if the receiver becomes deauthorized. When set to OFF, the port control relay is always energized.

Power

The PW command is available for polling the receiver to display the current operating (power) state, or for powering the receiver on and off. Observe the following syntax.

SA1PW={ON/OFF}

PW polls the receiver for the current operating state. **PW=ON** powers the receiver on, and **PW=OFF** powers the receiver off. The receiver responds by displaying the following.

PW=ON/OFF

The receiver is in standby mode when powered OFF.

Product version

The Version command is available for polling the receiver to display the product model identification number. Observe the following syntax.

SA1VER

VER polls the receiver for the model number. The receiver responds by displaying the following.

VER=#### CDSR

Reset

The RESET command is available for resetting the receiver hardware (i.e., main microprocessor). Observe the following syntax.

SA1RESET=YES

RESET=YES resets the receiver (i.e., warm boot only). The receiver responds by displaying the following.

RESET=RECV

Note that the RESET command *does not* reset the receiver operating software, or reset the receiver to factory default settings.

Signal State

The STATE command is available for polling the receiver for the current receiver operating/Signal State. Observe the following syntax.

SA1STATE

STATE polls the receiver for the current operating/ Signal State. The receiver responds by displaying the following.

STATE=#

can be (see Table D-5). Returned status codes represent all possible operating states. Note that each command response (instance) reflects the instantaneous operating state of the receiver which may indicate a response which is erroneous or unexpected. If an unexpected response is received, the steady or normalized operating state of the receiver can best be determined if this command is executed repeatedly.

Table D-5. Possible signal status codes and descriptions

State Code	Response
0	No lock
10	Search Mode Active
20	Loss of Signal Time-out
30	Channel Change in Progress
40	Digital Lock, No Signal
50	Digital Lock, and Signal
60	Unauthorized Program Active
70	Authorized Program Active

Uncorrected Errors

The UE command is available for polling the receiver to display the current Uncorrected Error count, and for clearing or resetting the current error count. Observe the following syntax.

SA1UE=0

UE polls the receiver for the current Uncorrected Error count. **UE=0** clears or resets the current error count. The receiver responds by displaying the following.

UE=###

can be any number from 0 to 65536, and is the number of uncorrected Viterbi errors counted since the last reset. The uncorrected error count depends on the Signal Quality, and is automatically reset each time the receiver is restarted. This command is available only with DCP (Decoder Control Processor) software v 1.22 or greater (see also "Decoder Control Processor version").

Tone/Trigger

The TONE command remotely toggles the configuration between the Cue Trigger and Cue Tone modes. Observe the following syntax.

SA1TONE=a

a is either ON or OFF. ON enables Cue Tone. OFF enables Cue Trigger. The receiver responds by displaying one of the following:

Tone mode is active.　or　**Trigger mode is active.**

If this command is locked out, the mode cannot be changed.

Tone sequence

The CUESEQ command lets you define and store Cue Tone sequences in the receiver. Observe the following syntax.

SA1CUESEQ,a,b,c,d,e,f,g,hijk

Table D-6 describes each of the parameters.

If this command is locked out, information can still be read back from the receiver but cannot be written to the receiver.

Table D-6. CUESEQ command options

Parameter	Description
a	Tone sequence number. Valid range: 1 to 16.
b	Tone sequence enable. 1 = enabled; 0 = disabled.
c	Playmode. Valid range: 0, 1, or 3.
d	Delay to start. Valid range: 0 to 255 (seconds). Relevant only if Playmode is 1 or 3.
e	Delay to stop. Valid range: 0 to 255 (seconds). Relevant only if Playmode is 3.
f	Tone duration. Valid range: 0 to 9 ([f+1] x 10ms).
g	Silence duration. Valid range: 0 to 9 ([g+1] x 10ms).
h	First DTMF tone. Valid range: 0 to 9, *, #
i	Second DTMF tone. Valid range: 0 to 9, *, #
j	Third DTMF tone. Valid range: 0 to 9, *, #
k	Fourth DTMF tone. Valid range: 0 to 9, *, #

Receiver microprocessor versions

Serial Remote Control commands can be used to display current version information for receiver subsystem control microprocessors. These subsystems are:

- Compression Control Processor (CCP)
- Decoder Control Processor (DCP)
- Inboard Security Element (ISE)
- Keyboard (KBD)
- Outboard Security Element (OSE)

Compression Control Processor version

The CCP command is available for polling the receiver to display the installed software version for the CCP (Compression Control Processor) microprocessor. Observe the following syntax.

SA1CCP

CCP polls the receiver for installed software version information (CCP microprocessor). The receiver responds by displaying the following.

CCP=V#.##

V#.## is the installed software version

Decoder Control Processor version

The DCP command is available for polling the receiver to display the installed software version for the DCP (Decoder Control Processor) microprocessor. Observe the following syntax.

SA1DCP

DCP polls the receiver for installed software version information (DCP microprocessor). The receiver responds by displaying the following.

DCP=V#.##

V#.## is the software version number. Note that some command options may differ slightly, depending on the installed receiver DCP software version.

Inboard Security Element version

The ISE command is available for polling the receiver to display the network address plus the installed software version for the Internal Security Element microprocessor, including algorithm information. Observe the following syntax.

SA1ISE

ISE polls the receiver for network address and installed software version information (Inboard Security Element microprocessor and algorithm). The receiver responds by displaying the following

ISE=###-###-####-#, V#.##(#) -

###-###-####-# is the network address, V#.## is the software version and (#) is the decryption algorithm type, and "-" is displayed only if the ISE is not installed.

Keyboard Control Processor version

The KBD command is available for polling the receiver to display the installed software version for the (front panel) Keyboard microprocessor. Observe the following syntax.

SA1KBD

KBD polls the receiver for installed software version information (Keyboard control microprocessor). The receiver responds by displaying the following.

KBD=V#.##

V#.## is the software version number.

Outboard Security Element version

The OSE command is available for polling the receiver to display the network address plus the installed software version for the Outboard Security Element (Smart Card) microprocessor, including algorithm information. Observe the following syntax.

SA1OSE

OSE polls the receiver for network address and installed software version information (Outboard Security Element and algorithm [Smart Card]). The receiver responds by displaying the following

OSE=###-###-####-#, V#.##(#) -

###-###-####-# is the network address, V#.## is the software version, (#) is the decryption algorithm type, and "-" is displayed only if the Smart Card is not installed.

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Appendix E

Appendix E Product Identification

About this Appendix

This Appendix provides important information about your PowerVu Plus Commercial Headend Receiver. Refer to this section for:

- Product identification information

The label affixed to the receiver rear panel contains a 16-digit product identification code number that identifies your receiver, including factory options. Use this information to help identify your receiver. For more information about product ordering, contact your local Scientific-Atlanta Customer Support Center, Scientific-Atlanta dealer or distributor. Figure E–1 shows the product identification code with available factory options.
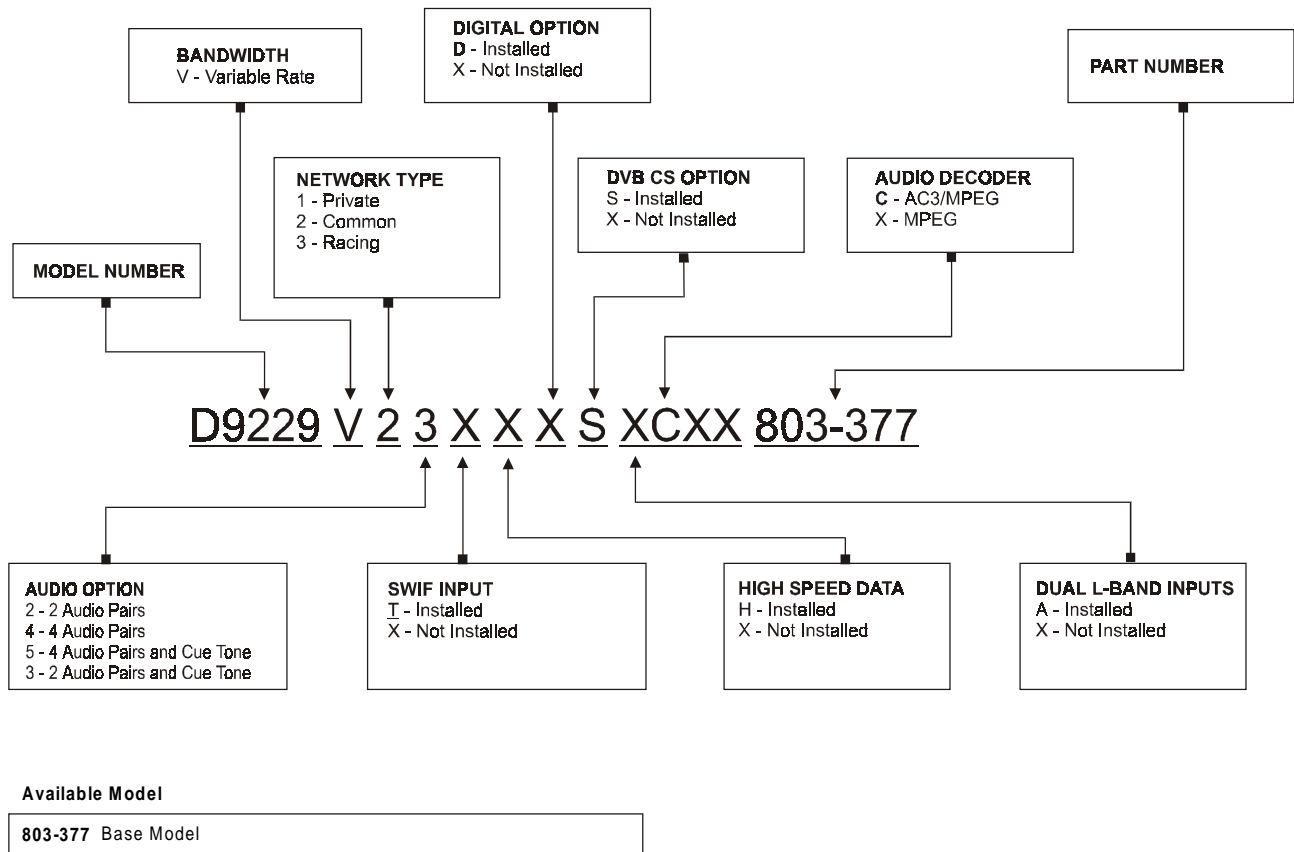
Figure E–1. Example product identification codes
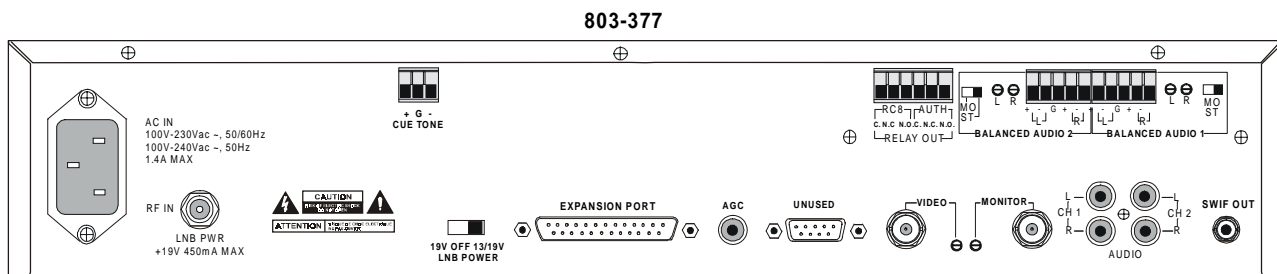
Figure E–2. Rear panel of available unit

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Appendix F

Appendix F Application Notes

About this Appendix

This Appendix provides important information about your PowerVu *Plus* Commercial Headend Receiver. Refer to this section for:

- Comparison of compressed digital vs. analog FM satellite signal delivery

- Application Brief

Additional application and troubleshooting information is provided in this Appendix for optimizing your PowerVu *Plus* Model D9229 Commercial Headend Receiver equipment installation. Servicing of installed equipment should only be performed by qualified technical personnel. For complete operating instructions and other important information about your receiver, refer to this Installation and Operation Guide. For additional troubleshooting information, see Appendix C.

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Digital vs. analog FM satellite signal delivery

The PowerVu *Plus* Model D9229 Commercial Headend Receiver tunes digital video, audio and data signals transmitted over C and Ku-Band satellites. It differs from traditional FM Video receivers in that it receives this information as a compressed, Quadrature Phase Shift Keyed (QPSK) digital signal. This signal compression technique permits the transmission and reception of high-quality, video channels and associated audio per transponder. In comparison, traditional analog FM modulation permits only one video signal (plus associated audio and data) to be transmitted by each transponder.

Because of the increased capacity achieved using digital compression and transmission, special error protection is used to correct errors and provide error concealment when the error rate exceeds the capability of the decoder to provide complete error correction. To detect and correct errors caused by thermal noise, an encoding technique called soft decision convolutional encoding is used. The Model D9229 Commercial Headend Receiver and associated up-link equipment use a convolutional encoder to provide error correction to decrease the error rate. To protect against burst noise interference, special data interleave and Reed-Solomon block decoders are used.

Because there may be instances when the error rate is high enough so that not all errors can be corrected, the receiver contains sophisticated software algorithms that provide image concealment for small uncorrected errors, and freeze frame or black-frame substitution for larger, uncorrected errors.

The FM Analog equivalent to digital errors is the well-known "sparkle" that appears on the TV screen when the received signal level drops below the FM Threshold of about 10 dB C/N. Unlike analog transmission where the "sparkles" are superimposed on the video, uncorrected digital errors can create a loss of digital synchronization resulting in signal outages that can last longer than the actual duration of the interference. It is during these instances that image concealment is most important. Typically, instead of a single sparkle, a digital error can result in generation of artifacts ranging from "no perceptible error" to "multiple block errors" that appear similar to FM threshold sparkles to "freeze frames or black screens" for greater, more significant errors.

Scientific-Atlanta supplies digital satellite receivers in existing C-Band TVRO systems ranging from Broadcast Affiliate systems to Hotel/Motel SMATV systems. Experience has shown that the C-Band environment is susceptible to local in-band and out-of-band interference, whereas the Ku-Band environment is not.

Industrial/Microwave equipment interference

This form of microwave interference typically originates from industrial microwave ovens operated in factories and commercial sites, and interferes primarily with transponder #24. Microwave signal levels produced by these sources can be high enough to saturate the LNB and/or receiver. Generally, replacement of the offending Magnetron RF output tube will solve this problem.

Adjacent-Band radar altimeter interference

Aircraft radar altimeters do not operate in the 3.7 to 4.2 GHz band, but are close enough in frequency that they can produce interference strong enough to saturate the LNB and/or receiver.

Radar altimeter interference can be eliminated by installing an off-the-shelf microwave filter designed specifically for out-of-band signals. These microwave filters are installed between the feed assembly of the antenna and the LNB or LNA.

Ignition noise interference

Ignition noise interference is typically broadband in nature and can interfere with the received signal. Ignition noise can be generated by faulty combustion engine ignition systems, hand-held electric dryers/blowers, or other electromagnetic equipment operated near the receive antenna. In most cases, the noise energy within the received channel can be tolerated provided that receive/line amplifiers do not become saturated.

A signal input level of approximately -50 dBm is recommended for normal receiver operation. This allows sufficient receiver headroom so that any interference that takes place within the 3.7-4.2 GHz band (as well as adjacent bands) does not cause the receiver to become saturated. If other parts of the receive system become saturated, steps should be taken to eliminate the unwanted interference.

Ignition noise can be reduced or eliminated by restricting the use of combustion engines, hand-held electric dryers/blowers, or other electromagnetic equipment near the receive antenna.

Application brief

This application brief is provided to assist users with the installation, setup and mainte-nance of the PowerVu *Plus* Model D9229 Commercial Headend Receiver.

Digital compression signals react differently to problems caused by saturation and/or ter-restrial interference (TI) in the downlink path as compared with analog signals. Where ter-restrial interference can cause random sparkles, or black and white lines or hum and pic-ture noise in analog satellite receivers, the same interference in the digital domain can cause digital artifacts such as "blocking", "freeze frame" and/or a "black screen" depending upon the magnitude and duration of the interfering signal.

Specific actions you can take to minimize the effects of local terrestrial interference are dis-cussed in the pages that follow.

Minimizing signal interference

Types of terrestrial interference known to cause problems with digital compression signals are out-of-band interference such as aircraft radar altimeters, commercial microwave ov-ens, and/or in-band interference from hand-held electrical or combustion engine equip-ment operated near the receive antenna.

Maintain an adequate signal level

The input signal level as provided to the receiver from the satellite LNB should be main-tained between the values of 20 to 50 as displayed on-screen at the Installer menu.

Avoid signal saturation

If signal saturation is a problem, a Low-Noise Amplifier (LNA) followed by a blockcon-verter may require a C-Band attenuator installed before the blockconverter. Signal attenua-tion between approximately 6 to 20 dB can effectively reduce or eliminate the effects of sig-nal saturation.

Signal levels should range from 20 to 40 for the lower power type carriers (<10 Msymbols/s), and from 30 to 50 for larger, high power carriers; especially those which occupy a full transponder. Low signal levels accompanied by a high Bit Error Rate usually indicate excessive signal loss between the receiver and the satellite antenna. High signal levels accompanied by a high Bit Error Rate usually indicate signal overloading at the receiver and/or line amplifier RF input.

To test for a low signal BER problem, perform the following actions.

Step 1. Connect the receiver before any splitters, if existing.

Step 2. Connect the decoder as close to the LNB output as possible.

Step 3. Connect a line amplifier between the LNB and the receiver.

Connect and compare the performance of a second receiver, if possible.

Local Oscillator stability

To minimize the time required for synchronizing to a target carrier frequency, PowerVu *Plus* variable rate satellite receivers are optimized for operation with LNBs having the following LO frequency stability (see Table F-1).

Table F-1. LNB Local Oscillator stability vs. carrier Symbol Rate

Symbol Rate	LNB LO Stability
> 3 MS/s and ≤ 6 MS/s	±1.0 MHz
> 6 MS/s	±1.5 MHz

Using line amplifiers, isolators and filters

If you are using line amplifiers as part of your equipment installation, avoid saturating the line amplifier or overloading the receiver by locating the line amplifier at the appropriate distance from the LNA/LNB. Line amplifiers typically offer a gain of 20 dB, and should only be installed if the signal input cable length is approximately 50 to 100 Meters.

The line amplifier used must be able to amplify the composite power of all the satellite transponders without distortion. An output 1 dB compression point of 0 to 10 dBm is usually sufficient in most cases. If installed, line amplifiers with noise figures under 7 dB provide the best Signal-to-Noise ratio.

Antenna cross-polarization isolation should always be checked at the downlink. A misaligned LNB can introduce interference from other satellite signals.

If you are experiencing interference causing LNB overload from a Radar signal existing outside the normal 3.7 to 4.2 GHz C-Band, a C-Band "block filter" can be installed before the LNA/LNB input. If installed, this type of filter can effectively reduce out-of-band interference and the effects of downlink path compression, and should not exceed 0.3 dB signal loss.

Be sure to terminate all splitter outputs, power dividers and unused connectors, where necessary. Signal cables used should be low loss RG-6, with L-Band or equivalent rating.

Terrestrial in-band and out-of-band interference

The received signal level can be weakened and degraded due to local Terrestrial Interference (TI) originating from earth-based, C-Band signal sources. Higher frequency Ku-Band signals are not affected by this type of interference. Both in-band and out-of-band local TI can adversely affect receiver operation.

Local, in-band interference that affects certain channels only is often caused by the satellite antenna (dish) being located in or adjacent to the path of a microwave telecommunication signal tower. This source of interference can usually be identified with spectrum analyzer equipment. C-Band radar scatter originating from airport control towers can intermittently overload the satellite LNB, and can be difficult to detect. The most common form of in-band interference is caused by noise spikes from electrical power or ignition systems which are amplified by active components in the LNB and receiver (tuner). For this and other reasons, over-amplification of the LNB output signal can adversely affect the received digital signal. If local, in-band interference is present, installing 10 dB C-Band attenuator pad at the input of the LNA/blockconverter will prevent signal saturation and compression.

It should be noted that some types of two-way radios or walkie-talkies can destructively interfere with a receiver due to use of identical bands within the receiver IF frequency. Use of walkie-talkies should be restricted in the vicinity of the receiver.

Out-of-band interference can originate from a variety of sources. Aircraft radar altimeters are a common problem near airports. Commercial microwave ovens operating adjacent to earth station antennas have been known to interfere with digital compression signals. Purchase of a C-Band bandpass filter to be installed at the antenna prior to the LNA or LNB is recommended where there are known out-of-band interfering sources.

High Bit Error Rates

The Bit Error Rate (BER) associated with the received digital signal is extremely important, as it indicates how much of the received signal information contains errors that must be corrected due to electrical noise/interference. The BER is displayed in scientific notation (e.g., a received signal BER of 1E-5 [or 1.0 x 10-5] is less than a signal BER of 2E-3 [or 2.0 x 10-3]). The BER threshold for the Model D9229 Commercial Headend Receiver ranges from 5E-3 to 2E-2, depending on the FEC Rate setting used. For example, the BER threshold for a FEC Rate of 1/2 is 2E-2, 1E-2 for 3/4, and 5E-3 for 7/8. For safe operation, the BER associated with the received signal should be at least 1/10 of the threshold (i.e., for a FEC Rate of 3/4, a BER of from 1E-3 to 1E-5 is considered ideal).

The received signal level can be weakened and degraded due to precipitation (i.e., rain, ice and snow), and from snow accumulation on the satellite antenna (dish). Using the BER display is the best method for accurate antenna peaking. For information about how to operate the receiver front panel to display current BER information, see Chapter 3 of this guide.

Common problems associated with a high Bit Error Rate are:

- Unterminated splitter port
- Poor cabling or impedance mismatch
- Marginal RF downlink signal level
- Cross polarization
- Improperly pointed satellite antenna (dish)

If no improvement in the BER is obtained after investigating the above, faulty antenna or LNB equipment may be responsible for the problem. BER problems caused by low signal levels can be effectively improved by performing one or more of the following actions:

- Using higher-quality cable and connectors
- Reducing the number of signal splitters and/or line amplifiers
- Replacing the low gain LNA/LNB, if found to be faulty
- Installation of a line amplifier after a long cable run

High BER caused by a high signal level

A 10 dB attenuator pad installed before the receiver RF input (external LNB power switch set to OFF) can determine if the high BER is being caused by an unusually high signal level. Also, powering the LNB from a separate receiver/decoder using a splitter connection can assist in determining if the BER problem is being caused by the input signal level. If, after taking the above steps there is no marked improvement in BER, the problem is likely the satellite antenna (dish) or LNB. A LNB operating with an unstable or noisy local oscillator can adversely affect receiver performance (see also "Using line amplifiers, isolators and filters".

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Appendix G

Appendix G Reference

About this Appendix

This Appendix provides important information about your PowerVu *Plus* Model D9229 Commercial Headend Receiver. Refer to this section for:

- Operating performance graphs and product application (reference) information

Additional (reference) information is provided in this Appendix about the Model D9229 Commercial Headend Receiver pertaining to equipment performance. For complete operating instructions and other important information about this receiver, refer to this Installation and Operation Guide.

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Receiver performance

Operation and performance of the PowerVu *Plus* Model D9229 Commercial Headend Receiver is directly affected by the overall quality and input level of the received digital signal. The receiver provides a continuously updated display of the following key operating parameters.

- Bit Error Rate (Signal Quality)
- Signal Level
- AFC Level

The following is a brief discussion of how each of these operating parameters can be used as performance indicators.

Bit Error Rate (Signal Quality)
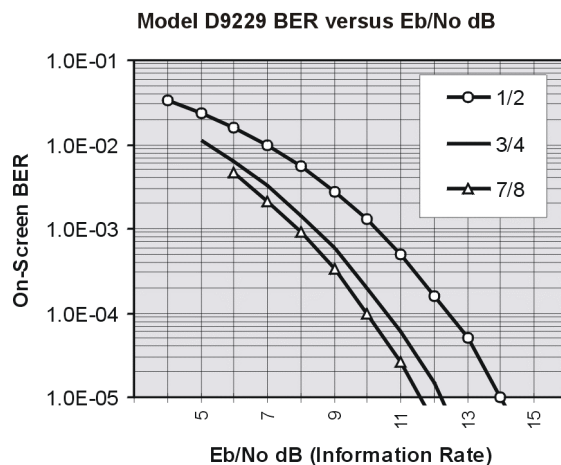
Figure G-1. BER vs. Information Rate (typical)

Figure G-1 shows typical Signal Quality (BER) values obtained for various FEC rates as displayed on-screen at the Installer menu.

The Eb/No (Information Rate) is normalized as the energy-per-bit for a 1 Hz noise bandwidth, and applies to any data rate. The Information Rate is the useful data rate following Forward Error Correction (FEC) as defined by the DVB standard. The threshold for Eb/No depends on the Viterbi FEC rate associated with the uplink signal.

Table G-1 lists the threshold Eb/No for each of the available FEC Rates.

Table G-1. FEC Rate and corresponding threshold Eb/No

FEC	Threshold Eb/No (based on information rate)
1/2	4.5 dB
2/3	5.0 dB
3/4	5.5 dB
5/6	6.0 dB
7/8	6.4 dB

For example, if the receiver is operating at 3/4 FEC, reference the middle curve (see Figure G-1). If the displayed BER is near 1.0E-2, this corresponds to an Eb/No of 5.5 dB (threshold). Below this threshold the video display is likely to break up, or signal synchronization can be lost. If the displayed BER is 1E-4, the receiver is operating at an Eb/No of 10.5 dB, which is approximately 5 dB over the threshold. If the received downlink signal is Ku (i.e., clear sky conditions), the displayed BER may be approximately 1E-4. With heavy precipitation the BER is likely to increase to 1E-2, corresponding to a loss of 5 dB. The 1/2 FEC Rate threshold corresponds to a BER of 3.0E-2, and the 7/8 FEC threshold to a BER of 3.0E-3.

The BER threshold for the Model D9229 Commercial Headend Receiver ranges from 5E-3 to 2E-2, depending on the FEC Rate used. For safe operation, the BER for the received signal should be at least 1/10 of the threshold (i.e., for a FEC Rate of 3/4, a BER of from 1E-3 to 1E-5 is considered ideal).

Signal Level
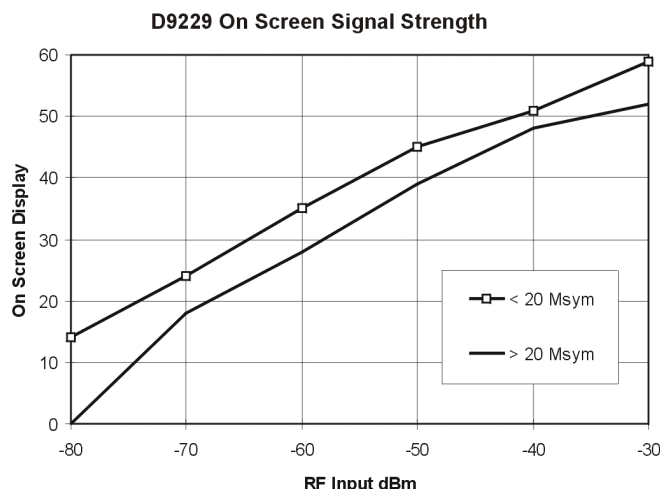
D9229 On Screen Signal Strength

Figure G-2. Signal Level vs. RF signal input (typical)

Figure G-2 shows typical Signal Level values obtained for Symbol Rates above and below 20 MSymbols/s as displayed on-screen at the Installer menu. Note that displayed Signal Level values appear slightly higher for Symbol Rates below 20 MSymbols/s than for Symbol Rates above 20 MSymbols/s.

To reduce the possibility of tuner overload and the signal quality degradation that would result, the maximum RF signal input to the receiver is limited to -30 dBm for a full transponder RF carrier. A RF carrier of 3 MSymbols/s is a narrower bandwidth and will carry approximately 10 dB less power than a full transponder RF carrier of 30 MSymbols/s.

For a Symbol Rate of 3.0 MSymbols/s, the maximum RF input to the tuner should be -40 dBm assuming that other full transponder (-30 dBm) signals may also be present at the tuner input. If sufficient cable/distribution loss exists between the LNB and the receiver, then the RF signal level will be significantly reduced, and the overall signal quality will be further degraded by the receiver tuner noise figure.

Example 1: If the displayed Symbol rate is 30 MSymbols/s, a Signal Level of 50 corresponds to approximately -30 dBm maximum RF input for this carrier. Similarly, a Signal Level of 25 corresponds to approximately -65 dBm RF input. Normally, the receiver would be operated somewhere between these two extremes.

Example 2: If the displayed Symbol rate is 3.0 MSymbols/s, a Signal Level of 60 is too high, and a Signal Level of 50 corresponds to approximately -40 dBm maximum RF input for this carrier. Similarly, a Signal Level of 30 corresponds to approximately -65 dBm for a minimum RF input level. Normally, the receiver would be operated somewhere between these two extremes.
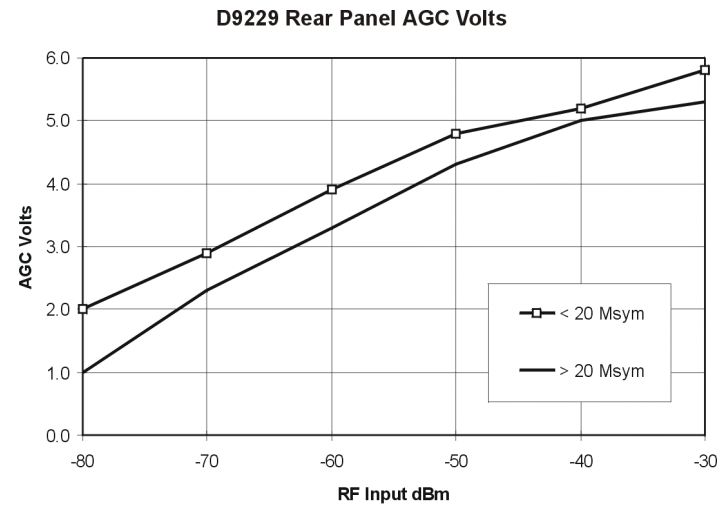
AGC Level

D9229 Rear Panel AGC Volts

Figure G-3. AGC voltage vs. RF signal input (typical)

Figure G-2 shows typical AGC voltage output available at the receiver rear panel AGC (RCA) connector. AGC voltage output corresponds approximately to 10% of the Signal Level on-screen display at the Receiver Status menu. The AGC output signal (>10KΩ high impedance load) can be used for operating antenna tracking devices, for offset inclined satellites that drift with time, and for antenna peaking.

USA and Canadian Emissions Notices

This equipment is a composite device which contains a satellite receiver and a digital decoder module packaged in a single enclosure. This equipment is intended exclusively for use in a commercial environment and should not be operated in a residential installation.

Different notices apply to each module, as follows.

FCC notice for the Digital Decoder portion

The digital decoder incorporated into 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 operated in a commercial environment. The digital decoder generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions supplied in this 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.

Industry Canada notice for the Digital Decoder portion

This Class A digital apparatus meets the requirements of the Canadian Interference Causing Equipment Regulations.

Cet appareil numerique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

FCC Declaration of Conformity for the Receiver portion

Manufacturer's Name:	Scientific-Atlanta Canada, Inc. Satellite Television Networks
Corporate Headquarters:	Scientific-Atlanta, Inc. One Technology Parkway South, Norcross, GA 30092-2967
Contact:	Customer Service 1-888-949-4786, select 3 (technical support), option 3 (network operator support)

The satellite receiver incorporated into this equipment has been tested at a NIST NVLAP accredited Test Laboratory and found to comply with the limits for Class B digital devices according to Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

Unauthorized modifications

The manufacturer is not responsible for any radio or TV interference resulting from unauthorized modification of this equipment. It is the responsibility of the user to correct such interference at his expense.

Cables

Shielded cables should be used to interconnect this product with any peripheral equipment (e.g. video monitors, data terminals, etc.) to ensure compliance with Class A limits. Failure to do so may result in radio or TV interference.