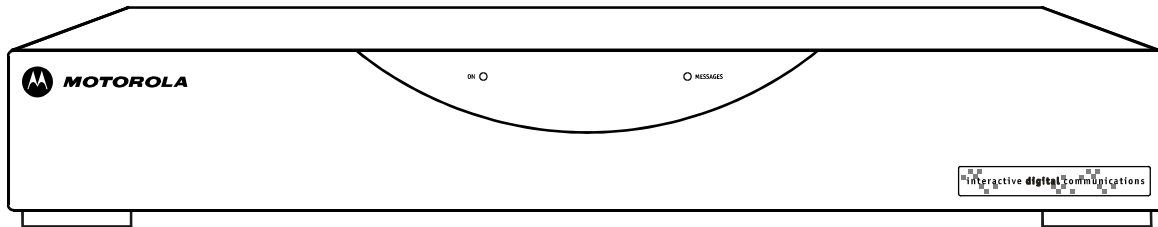


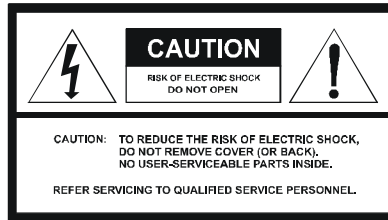
Installation Manual

DCT1700 Digital Consumer Terminal





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Graphical symbols and supplement warning marking locations on the bottom of the appliance.

	This symbol indicates that dangerous voltage levels are present within the equipment. These voltages are not insulated and may be of sufficient strength to cause serious bodily injury when touched. The symbol may also appear on schematics.
	This symbol calls attention to a critical procedure, or means refer to the instruction manual for opening or service information. Only qualified service personnel are to install or service the equipment. The symbol may also appear in text and on schematics.

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION:

TO PREVENT ELECTRICAL SHOCK, DO NOT USE THIS PLUG WITH AN EXTENSION CORD, RECEPTACLE, OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

FCC Compliance: Federal Communications Commission Radio and Television Interface Statement for a Class 'B' Device

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in the residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiver antenna
- Increase the separation between the equipment and the affected receiver
- Connect the equipment into an outlet or on a circuit different from that to which the receiver is connected
- Consult the dealer or experienced radio/TV technician for help
- Ensure that the cover plate for the security card is secured and tight

Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Declaration of Conformity: According to 47 CFR, Parts 2 and 15 for Class B Personal Computers and Peripherals; and/or CPU Boards and Power Supplies used with Class B Personal Computers, Motorola, Inc., 6450 Sequence Drive, San Diego, CA 92121, 1-800-225-9446, declares under sole responsibility that the product identifies with 47 CFR Part 2 and 15 of the FCC Rules as a Class B digital device. Each product marketed is identical to the representative unit tested and founded to be compliant with the standards. Records maintained continue to reflect the equipment being produced can be expected to be within the variation accepted, due to quantity production and testing on a statistical basis as required by 47 CFR 2.909. Operation is subject to the following condition: This device must accept any interference received, including interference that may cause undesired operation. The above named party is responsible for ensuring that the equipment complies with the standards of 47 CFR, Paragraphs 15.107 to 15.109

Repairs: If repair is necessary, call the Motorola Repair Facility at 1-800-227-0450 for a Return for Service Authorization (RSA) number before sending the unit. The RSA number must be prominently displayed on all equipment cartons. Pack the unit securely; enclose a note describing the exact problem, and a copy of the invoice that verifies the warranty status. Ship the unit PRE-PAID to the following address:

Motorola, Inc.
Attn: RSA # _____
c/o Rudolph Miles and Sons
2500 Courage Boulevard
Brownsville, TX 78521

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

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Section 1 Introduction

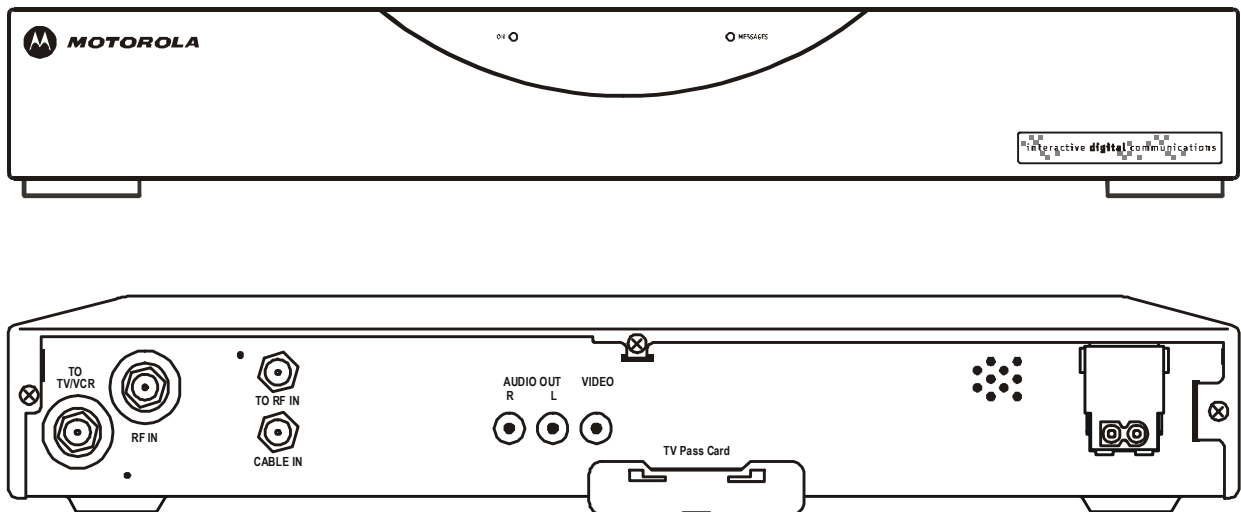
The Motorola DCT1700 is an analog/digital set-top that supports 64 and 256 QAM digital signal formats. The DCT1700 is compatible with existing Motorola analog and digital set-top products.

The Motorola DCT1700 offers:

- 54 through 860 MHz integrated tuner
- Integrated RF return (using built-in STARVUE II® module)
- RF and baseband audio/ video ports

Figure 1-1 illustrates front and rear views of the DCT1700:

Figure 1-1
DCT1700 advanced set-top



Using This Manual

This manual provides instructions to install and configure a DCT1700:

Section 1	Introduction provides a product description, a list of related documentation, the technical helpline telephone number, and the repair/return procedure.
Section 2	Overview describes the DCT1700 and provides an overview of its use. This section also identifies the front-panel displays and switches and describes the rear-panel features.
Section 3	Installation provides instructions on how to install the DCT1700 in a subscriber location and perform operational tests.
Section 4	Troubleshooting provides guidelines for troubleshooting the equipment.
Appendix A	Specifications provide the technical specifications for the DCT1700.
Appendix B	Diagnostics provide instructions on accessing and interpreting the built-in diagnostics.
Abbreviations and Acronyms	The Abbreviations and Acronyms list contains the full spelling of the short forms used in this manual.

Related Documentation

Separate instruction manuals are available for associated components. Although these may be useful, they are not necessary to install or operate the DCT1700:

- *DCT1700 User Guide*

Document Conventions

Before you begin working with this manual and using the DCT1700, familiarize yourself with the stylistic conventions used in this manual:

SMALL CAPS	Denotes silk screening on the equipment, typically representing front- and rear-panel controls, input/output (I/O) connections, and LEDs
* (asterisk)	Indicates that several versions of the same model number exist and the information applies to all models; when the information applies to a specific model, the complete model number is given
<i>Italic type</i>	Used for emphasis
<code>Courier font</code>	Displayed text

If You Need Help

If you need assistance while working with the DCT1700, contact the Motorola Technical Response Center (TRC):

- Inside the U.S.: **1-888-944-HELP (1-888-944-4357)**
- Outside the U.S.: **215-323-0044**
- Online: <http://broadband.motorola.com/noflash/websupport.html>.

The TRC is open from 8:00 AM to 2:00 AM Eastern Time, Monday through Friday and 10:00 AM to 5:00 PM Eastern Time, Saturday. When the TRC is closed, emergency service *only* is available on a call-back basis. Web Support offers a searchable solutions database, technical documentation, and low priority issue creation/tracking 24 hours per day, 7 days per week.

Calling for Repairs

If repair is necessary, call the Motorola Repair Facility at **1-800-227-0450** for a Return for Service Authorization (RSA) number before sending the unit. The RSA number must be prominently displayed on all equipment cartons. The Repair Facility is open from 8:00 AM to 5:00 PM Central Time, Monday through Friday.

When calling from outside the United States, use the appropriate international access code and then call **956-541-0600** to contact the Repair Facility.

When shipping equipment for repair, follow these steps:

- 1 Pack the unit securely.
- 2 Enclose a note describing the exact problem. Complete and enclose the checklist provided with the unit.
- 3 Enclose a copy of the invoice that verifies the warranty status.

Ship the unit **PREPAID** to the following address:

Motorola, Inc.
Broadband Communications Sector
Attn: RSA # _____
c/o Rudolph Miles and Sons
2500 Courage Boulevard
Brownsville, TX 78521

Section 2

Overview

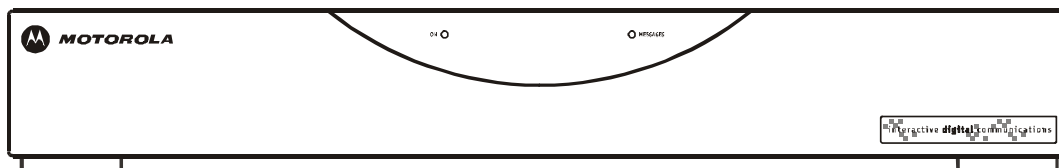
The DCT1700 uses digital compression technology to provide new revenue generating services. The DCT1700 can be configured to support real time reverse path communications, providing a gateway to interactive services such as Video on Demand (VOD), Internet access, e-mail, home shopping, and more.

This section provides illustrations and tables showing the DCT1700 controls, displays and connectors. Before you begin to install the DCT1700, familiarize yourself with the various controls and displays.

Front Panel

The front panel of the DCT1700 has two LED displays: one to indicate the unit is turned on and one to indicate a message is present. Figure 2-1 illustrates the front panel:

Figure 2-1
DCT1700 front panel



The DCT1700 is operated by using the Motorola universal remote control. See "Remote Controls" in this section for information on operating the DCT1700.

Rear Panel

Figure 2-2 illustrates the rear panel of the DCT1700, which contains a power inlet and connectors for video, audio, and RF cabling:

Figure 2-2
DCT1700 rear panel

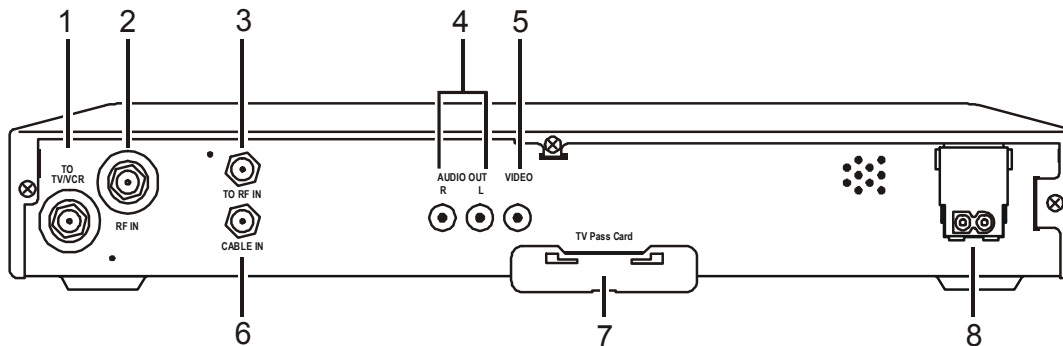






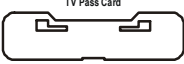



Table 2-1 describes each of the rear-panel features:

Table 2-1
Rear panel

Key	Item	Function
1		F-type connector used to connect the DCT1700 to a standard TV or VCR
2		F-type connector used for DCT1700 input from the TO RF IN connector
3		F-type connector used to connect the TO RF IN port to the RF IN port (output from integrated RF return)
4		Left and right audio RCA jacks used for stereo audio output
5		RCA jack used to connect the DCT1700 to a composite (baseband) video TV or a monitor; in some configurations this jack connects to a VCR
6		F-type connector used for the coaxial cable input port from plant (input to integrated RF return)
7		Cover for an area reserved for future use
8		AC power connection

Remote Controls

The DCT1700 uses a Motorola universal remote control to operate. If your system offers optional interactive applications, such as an interactive program guide, a different remote control may be required. The application provider should supply user instructions for each interactive application.

Motorola Universal Remote Control

Figure 2-3 illustrates the remote control:

Figure 2-3
Motorola universal remote control

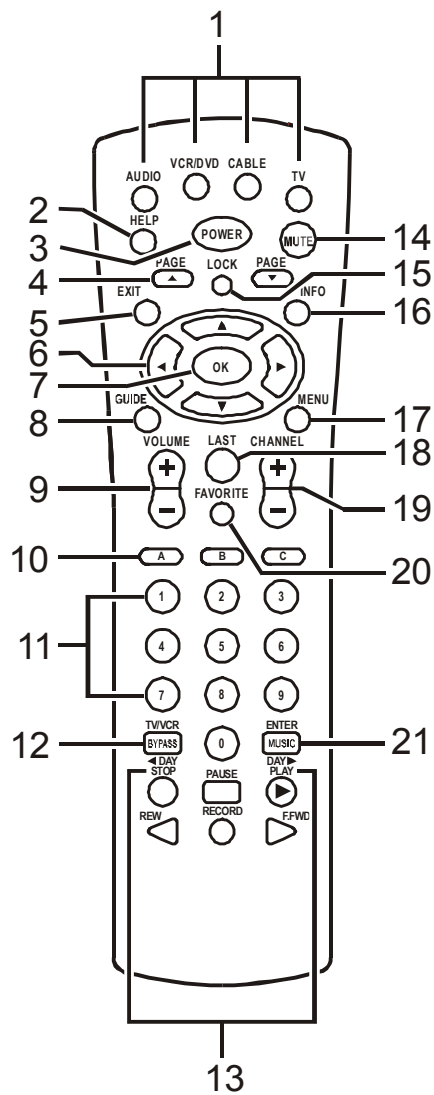
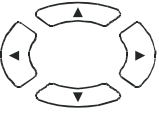


Table 2-2 describes the remote control keys:

Table 2-2
Remote control keys

Key	Item	Description
1	AUDIO, VCR/DVD, CABLE, or TV	Selects a desired device to control. The selected mode will remain active until you press another device key.
2	HELP	Displays the help screen.
3	POWER	Turns the selected home entertainment component on or off.
4	PAGE ▲ or PAGE ▼	Pages through menu screens and the program guide.
5	EXIT	Exits a menu or program guide.
6		Moves the cursor around the program guide and menu screens.
7	OK	Selects menu options, Pay-Per-View events or tune programs from the program guide. Your remote may only have OK; this key still performs the same functions.
8	GUIDE	Displays the program guide.
9	VOLUME + or VOLUME -	Increases or decreases the volume of the currently selected device.
10	A, B, or C	Functionality is determined from services offered by the service provider.
11	NUMBER KEYS	Directly selects a channel.
12	TV/VCR BYPASS	When in VCR mode, toggles between television and VCR. Bypass is not available.
13	◀ Day Day ▶	Moves the program guide ahead or back 24 hours.
	STOP, PAUSE, PLAY, REW, RECORD, F.FWD	Controls the VCR.
14	MUTE	Toggles the sound on and off.
15	LOCK	Limits viewing of selected programs; and is used to view the Pay-Per-View menu. Your remote may have only LOCK; this key still performs the same functions.
16	INFO	Displays the current channel and program information (not supported by all applications).
17	MENU	Displays the Main menu.
18	LAST	Recalls the last channel or goes back one screen in the menu.
19	CHANNEL + or -	Changes the channels by moving up or down.
20	FAVORITE	Displays preset favorite cable channels.
21	ENTER/MUSIC	Displays digital music channel menus. On some TV models, press to enter channels.

Installing Batteries in Remote Control

Before using the remote control, you must install two AA (1.5 V) alkaline batteries. Figure 2-4 illustrates battery access on the back of the remote control.

To install batteries in an DRC 450:

- 1 Press and slide the battery compartment cover off.
- 2 Place the batteries in the compartment; be careful to observe the correct polarity.
- 3 Slide the battery compartment cover back into place.

Battery installation will vary with each style of remote control. Refer to the instructions included with your remote control for installing batteries.

Figure 2-4
Back view of remote control



NOTE!



Use and dispose of batteries in accordance with all applicable laws, rules and regulations. Motorola will not be liable to anyone for the user's failure to use and/or dispose of batteries in the proper manner and in accordance with such laws, rules and regulations, or for any defect contained in batteries that may cause injury damage to persons or property.

Section 3

Installation

This section provides instructions for installing and cabling the DCT1700. To complete the installation, you must:

- Connect the cables
- Supply power to equipment
- Download configuration information and software
- Run operational check and diagnostics

This section also includes the procedure for performing a cold initialization of the DCT1700.

Before You Begin

Before you begin, review the installation instructions, gather the required items, and complete the tasks listed below:

- Verify that you have 75-ohm coaxial cables with F-type connectors and RCA baseband phono-type cables.
- Determine if you are connecting the DCT1700 to a standard TV or a composite (baseband) monitor.
- Place the DCT1700 on a smooth, flat surface and remove any obstructions that could interfere with the free flow of air over, under, or around it. Advise the subscriber not to place anything on top of the unit.

Installing the DCT1700

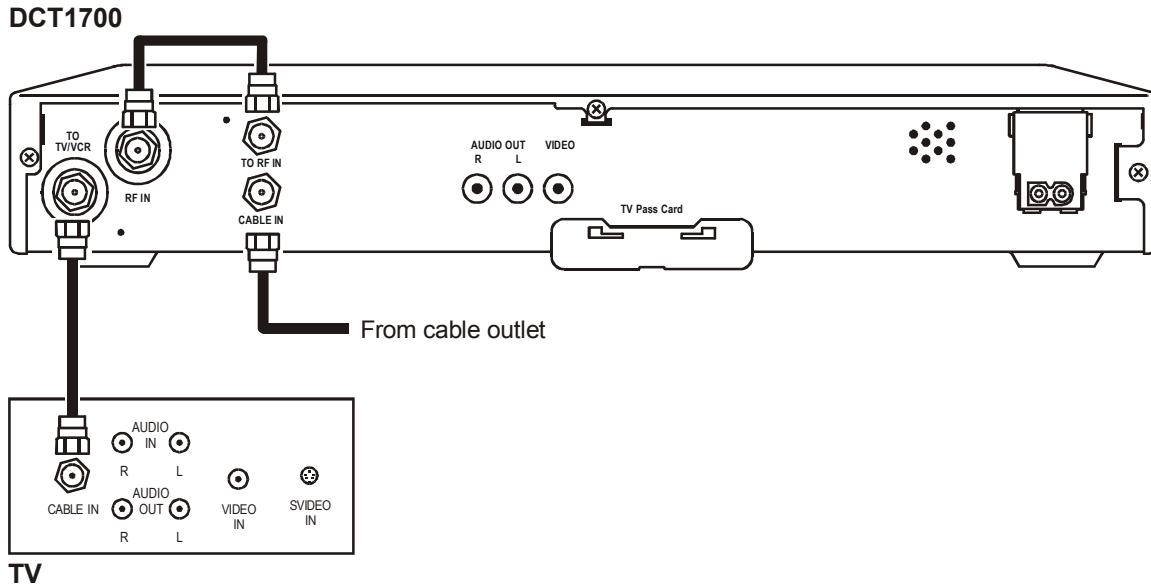
To install the DCT1700:

- 1 Determine if you are connecting the DCT1700 to a conventional TV or to a monitor. To install the video connection:
 - For a conventional TV, use a 75-ohm coaxial cable with F-type connectors.
 - For a monitor, use an RCA phono cable to connect the VIDEO connector to the monitor.
- 2 Locate the cabling diagram that matches the subscriber's configuration requirement.
- 3 Connect the cables as illustrated in the diagram.
- 4 Perform the basic operational check in this section after the DCT1700 is installed.

Standard Cabling Diagram

The DCT1700 outputs on either channel 3 or 4 depending on the configuration message from the control system. Figure 3-1 illustrates a standard diagram connecting the DCT1700 to a TV using RF connectors:

Figure 3-1
Standard cabling

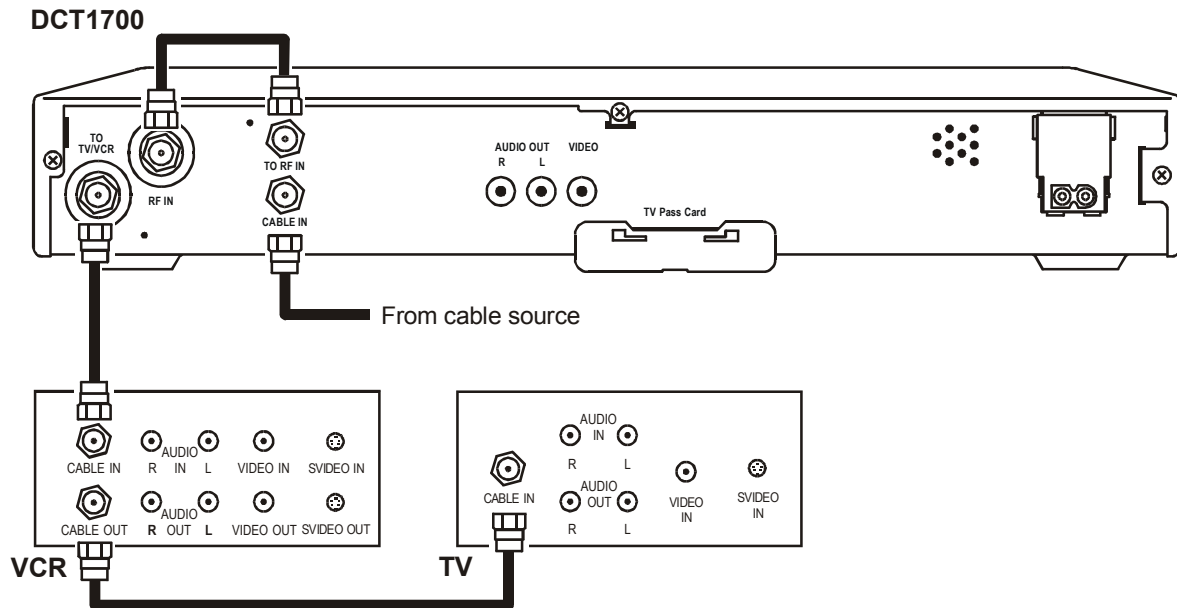


The remodulated channel, 3 or 4, does not carry stereo for digital channels. To receive stereo, connect the DCT1700 using RCA baseband connectors. These connections are illustrated later in this section.

Standard VCR Cabling Diagram

Figure 3-2 illustrates the basic cabling diagram that enables you to record the channel being viewed:

Figure 3-2
Standard VCR cabling



The remodulated channel, 3 or 4 does not carry stereo for digital channels. To receive stereo, connect the DCT1700 using RCA baseband connectors. These connections are illustrated later in this section.

Composite Baseband Cabling Diagrams

Connecting the DCT1700 using the baseband RCA type outputs enables the subscriber to experience stereo and Dolby Surround® sound when available on digital channels.

Figure 3-3 illustrates the standard baseband audio and video outputs of the DCT1700:

Figure 3-3
Standard baseband cabling

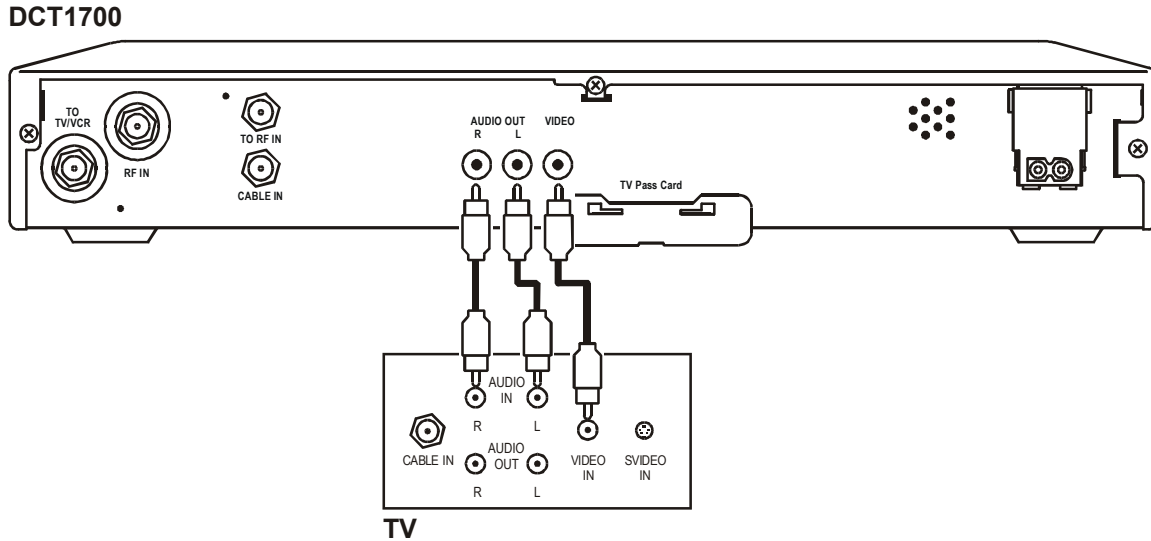
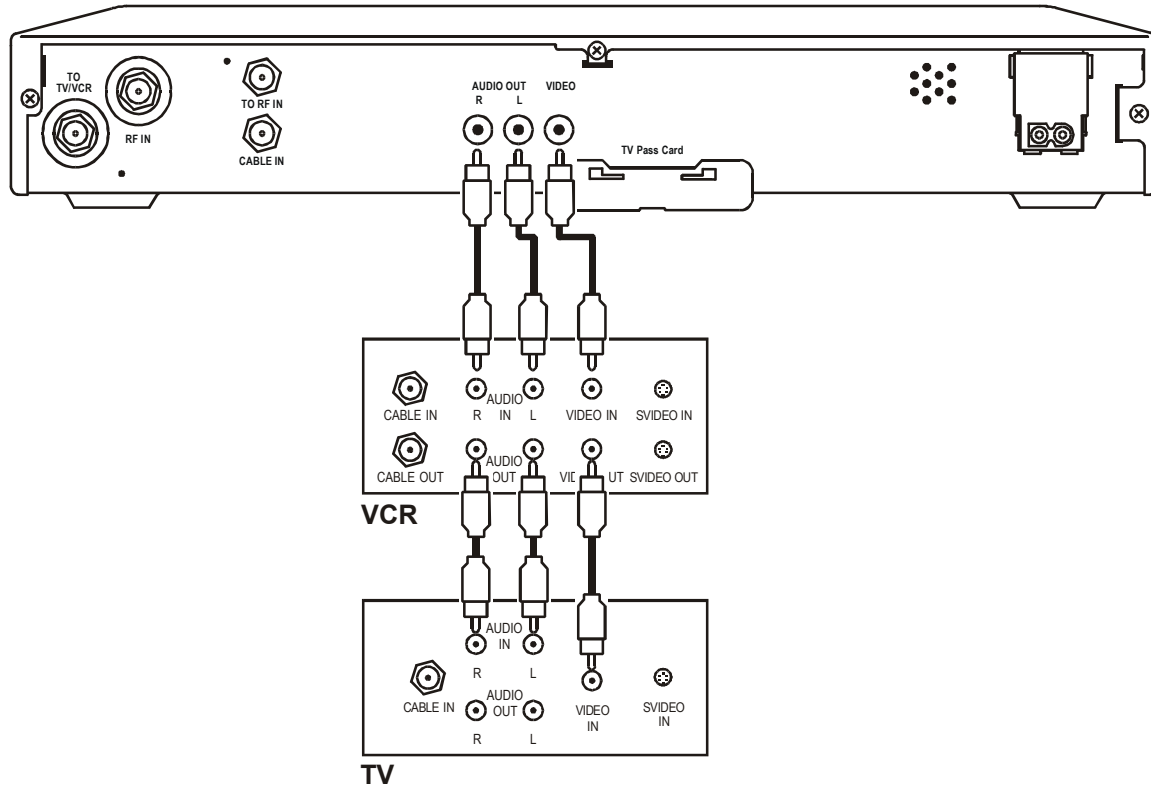


Figure 3-4 illustrates baseband audio and video connections to a VCR and TV:

Figure 3-4
Composite VCR cabling

DCT1700

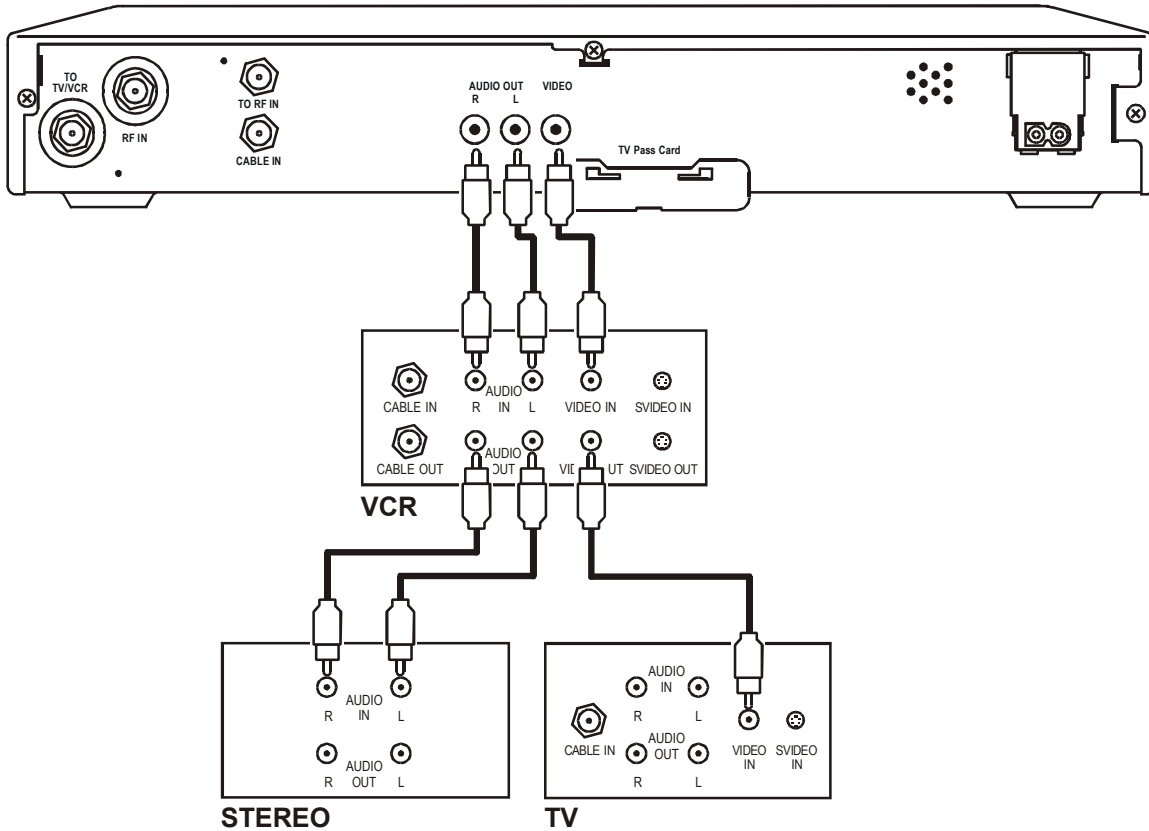


Stereo Cabling Diagram (Baseband)

This audio configuration does not provide for a TV playing through the stereo. Figure 3-5 illustrates how to connect the DCT1700 to a stereo using the audio connectors on the VCR:

Figure 3-5
Audio on the VCR

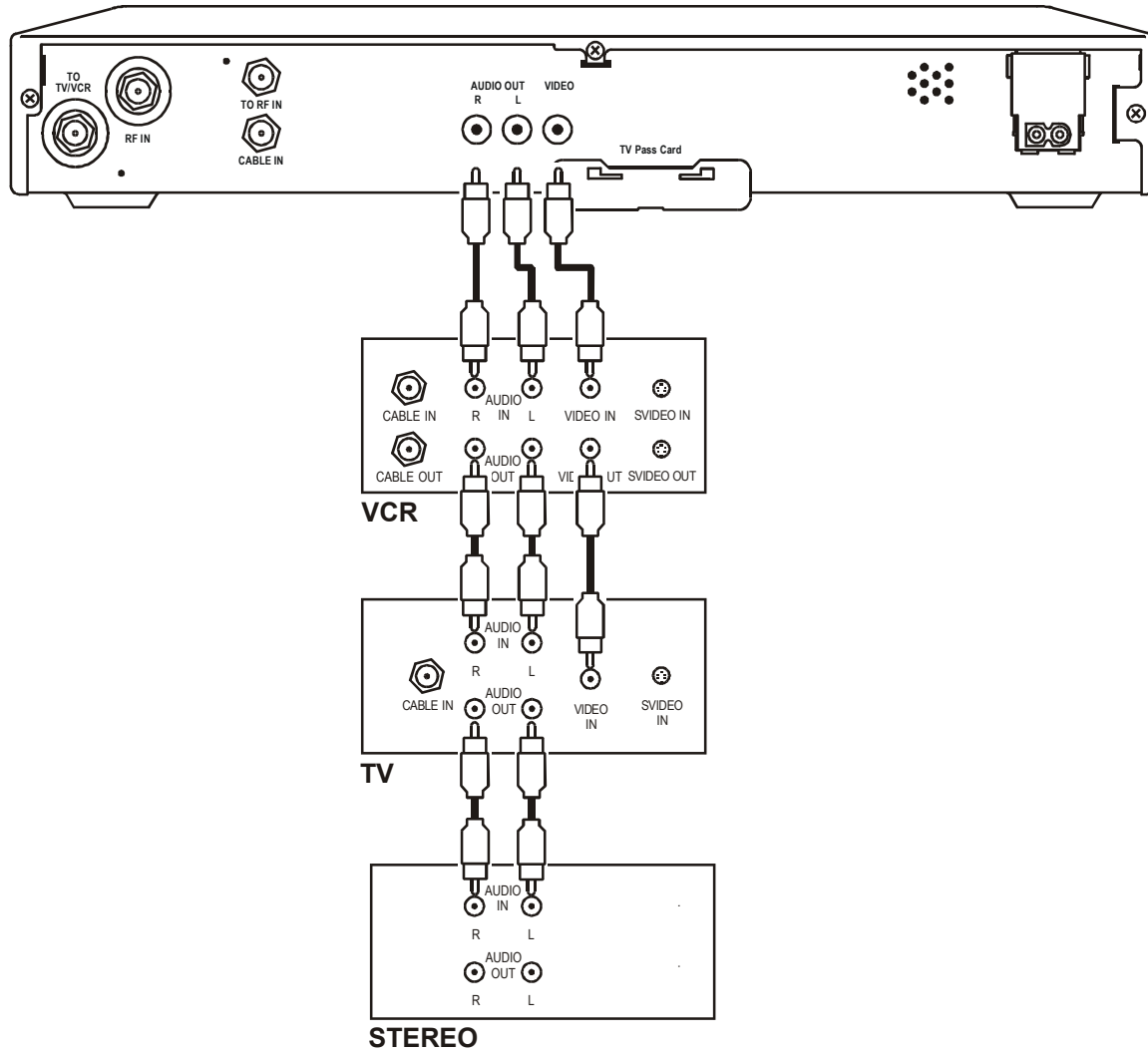
DCT1700



This audio configuration enables the TV to play through the stereo. Figure 3-6 shows how to connect the DCT1700 to a stereo using the audio loop-through connectors on the VCR and the audio output ports on the TV monitor:

Figure 3-6
Audio on VCR/Audio output on TV

DCT1700

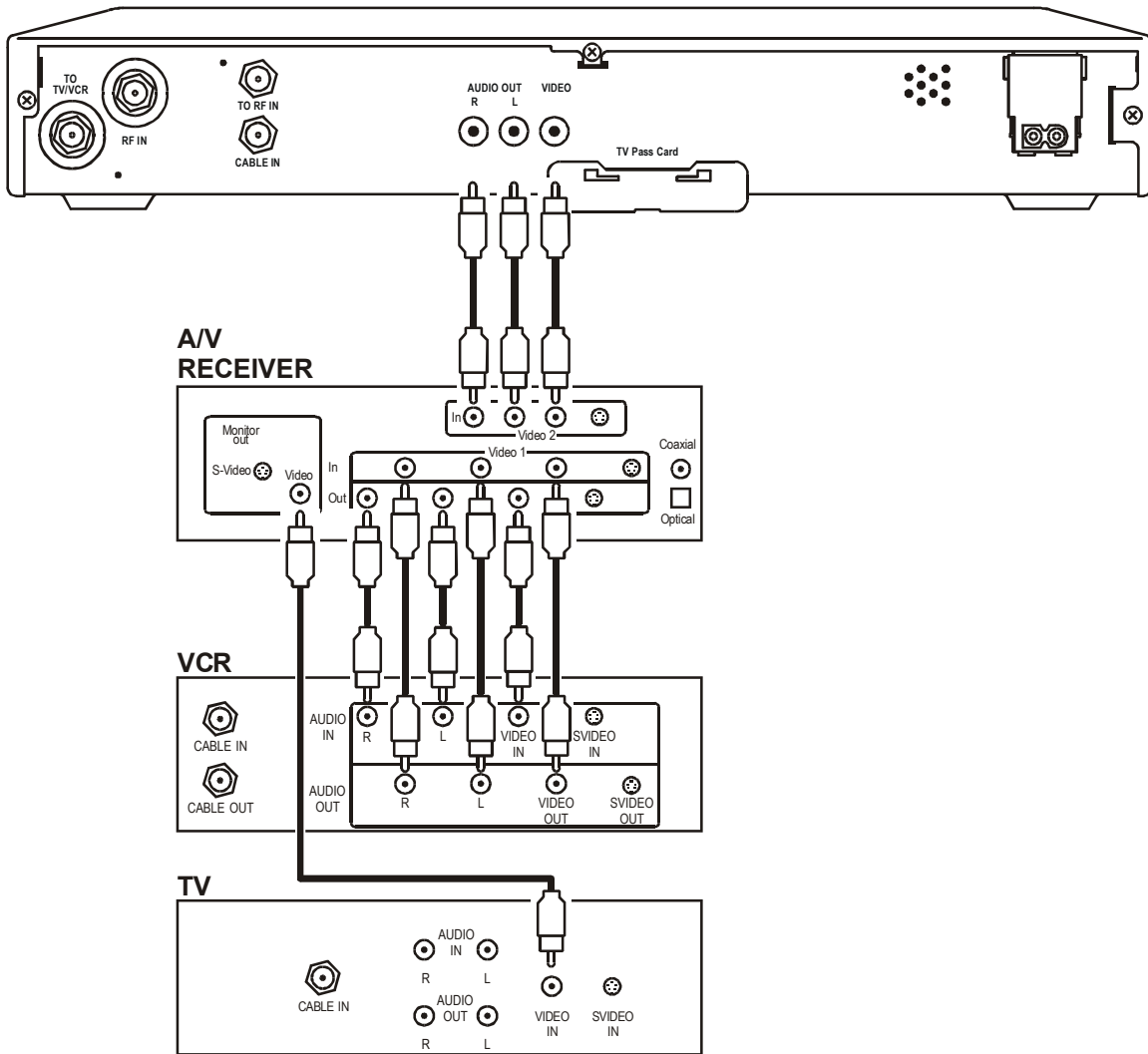


A/V Receiver Cabling Diagrams

Using this configuration the audio/video signals are passed through the digital receiver to enable the VCR record and playback features. Figure 3-7 illustrates audio/video connections for an A/V receiver:

Figure 3-7
Audio through A/V Receiver

DCT1700



Operational Check

The operational check tests the communication link between the remote control and the DCT1700. The procedures verify the DCT1700 response to remote control commands. Table 3-1 lists the operational check procedures:

Table 3-1
Operational check

Feature	Testing Procedure
Power on	<ul style="list-style-type: none"> ▪ Press POWER to turn on the DCT1700. ▪ Turn on the TV and tune it to the output channel of the DCT1700 (channel 3 or 4).
Channel Selection	Tune to several channels by entering the channel number with the numeric keys on the remote control.

If the DCT1700 does not operate properly, refer to Section 4, “Troubleshooting”.

Cold Initialization

The DCT1700 has no front panel buttons. To perform a cold initialization, or *reset*, use the remote control.

To execute a cold initialization:

- 1** Hold down any key on the remote control while disconnecting and reconnecting AC power to the DCT1700.

After booting up, the **POWER LED** on the DCT1700 front panel will flash.

- 2** Within 3 seconds, press the **3** key on the remote control.

The **POWER LED** on the DCT1700 front panel flashes at a decreased rate.

- 3** Within 3 seconds, press the **2** key on the remote control.

The **POWER LED** on the DCT1700 front panel flashes at an increased rate.

- 4** Within 3 seconds, press the **8** key on the remote control to initiate the cold reset.

During the cold initialization procedure, if the appropriate remote control key is not pressed within the three-second time period, the procedure terminates and the DCT1700 resumes normal operation.

Section 4

Troubleshooting

This section provides information to assist you in quickly detecting, isolating, and resolving error conditions that might occur when using the DCT1700. If you need assistance, call the Motorola Technical Resource Center (TRC):

- Inside the U.S.: **1-888-944-HELP (1-888-944-4357)**
- Outside the U.S.: **215-323-0044**

Table 4-1 is a list of possible problems and solutions:

Table 4-1
Troubleshooting guidelines

Problem	Possible Solution
No power to the DCT1700	Check the power outlet for AC power. Be sure the TV is tuned to the output channel of the DCT1700 (channel 3 or 4). Verify that cable connections are correct from the TV set or monitor to the DCT1700. Check that the power cord is properly plugged into the outlet and DCT1700.
Remote control is not responding	Check for an obstruction between the remote control and the DCT1700. Aim the remote control directly at the DCT1700, not the TV or VCR. Be sure you firmly and deliberately press and release operation keys one at a time. Check that the DCT1700 has been initialized correctly; refer to Diagnostics.
The DCT1700 is not receiving a cable signal	Check the cable connections and hand-tighten if necessary. Verify that the cable connections are correct. Verify the TV is working and has a clear picture.
Guide has no data	Unplug the power to the DCT1700 and plug in the unit again. Wait for the DCT1700 to collect the data.

Appendix A

Specifications

Input frequency	54 – 860 MHz (excluding data carrier frequency)
HRC/IRC frequency assignments	Downloadable
Number of channels:	136 carriers per cable
Analog	1 channel per carrier
Digital	More than 1 channel per carrier, content dependent
Input analog video level	0 dBmV – +15 dBmV
Input analog sound level	-17 dBmV – +2 dBmV
Average digital input level	-10 dBmV – +5 dBmV
Data carrier:	QPSK-modulated carrier
Frequency	Agile
Bandwidth	1.5 MHz
Level	-10 dBmV – +5 dBmV
Video s/n	49 dB @ 0 dBmV input level
Output frequency accuracy	±150 kHz
Return loss:	
Input	6 dB minimum
Output	8 dB minimum
Spurious output	-57 dBc maximum, in band
Cross-modulation distortion	-56 dB (136 channels, each @ +15 dBmV)
Composite second order distortion	-57 dB (136 channels, each @ +15 dBmV)
Second order distortion	-60 dB (136 channels, each @ +15 dBmV)
Composite triple beat distortion	-57 dB (136 channels, each @ +15 dBmV)
Set-top input beats (with all input signals)	-25 dB (136 channels, each @ +15 dBmV)
Hum modulation distortion	3 IRE
Output level	10 - 15 dBmV
Isolation (input/output)	70 dB minimum
Differential phase	10 degrees (maximum)
On-screen display (OSD):	
Screen size	352 x 480 pixels (configuration dependent)
Message/barker capacity	Up to 40 pages (configuration dependent)
Mechanical security	Standard: security screws, unichassis construction
Operating environment range:	
Temperature	0° – 40°C (32° through 104°F)
Humidity	5 – 95% (noncondensing)

AC voltage	105 – 125 V, 60 Hz
Power dissipation	16 W at 115 V
Surge protection	Provided on power supply and RF ports
Size	17.13 × 13.25 × 2.75 inches
Weight	8.6 pounds

Appendix B

Diagnostics

This section describes the diagnostics to confirm proper DCT1700 installation, including:

- Checking error states and signal integrity
- Identifying the set-top on the network
- Verifying communications with the headend

The diagnostic information is displayed on the on-screen display (OSD).

For the diagnostics provided here:

- All indicators are in decimal notation unless otherwise noted.
- All signal-level and quality indicators are based on a 0 to 100% scale, unless otherwise noted.
- All screens self-refresh at a minimum rate of once every five seconds.
- All sample displays are illustrative; actual data will differ from the examples.
- The screens are available for V7.72 code and higher.

Accessing Diagnostics

Use the Motorola universal remote control to operate the DCT1700.

To access and navigate the diagnostic mode:

- 1 Press **POWER** on the remote control to turn on the set-top.
- 2 Wait five seconds and then press **POWER** again to turn off the set-top.
- 3 Press **SELECT/OK** on the remote control within two seconds after powering off. The **DIAGNOSTICS** main menu (Figure B-1) is displayed on the OSD. The set-top is now in diagnostic mode.
- 4 Use the **CHANNEL** keys on the remote control to select the desired diagnostic.
- 5 Press **CURSOR <**, **CURSOR >**, **SELECT**, or **ENTER** to execute the selected diagnostic.
- 6 To exit the diagnostic mode, press **POWER** on the remote control. The set-top exits the diagnostic mode and powers off.

Navigating the Diagnostics

Figure B-1 illustrates the DIAGNOSTICS main menu:

Figure B-1
DIAGNOSTICS Main Menu

DIAGNOSTICS	
01	GENERAL STATUS
02	OOB STATUS
03	IN BAND STATUS
04	AUDIO/VIDEO STATUS
05	UNIT ADDRESS
06	FIRMWARE VERSION
07	CURRENT CHANNEL STATUS
08	RENEWABLE SECURITY
09	UPSTREAM MODEM
10	APP CODE MODULES
11	MEMORY CONFIG
12	INTERACTIVE INFO
13	MAC FREQUENCY TABLE
14	MESSAGE TYPES
15	IN BAND PAT
16	IN BAND PMT
17	TASK STATUS
18	IB MCA STATUS
19	KEYBOARD / LED

Table B-1
Operational keys using the diagnostics main menu or submenus

Key	Key function using the diagnostics main menu	Key function using a diagnostic
POWER	Exits diagnostic mode and enters OFF state	Exits diagnostic mode and enters OFF state
CH/CUR +, CURSOR UP	Moves the cursor up	Displays the DIAGNOSTICS main menu
CH/CUR - , CURSOR DOWN	Moves the cursor down	Displays the DIAGNOSTICS main menu
CURSOR RIGHT, CURSOR LEFT, SELECT, ENTER	Runs the selected diagnostic	Displays the DIAGNOSTICS main menu
GUIDE	No function	No function
MENU	No function	No function
INFO	No function	No function

d 01: General Status

The general status diagnostic displays the error code, a short description of the error, the purchase count, and specific model information:

Figure B-2
DCT1700 Status

```
01  DCT1700 STATUS

      ERROR           :  E 00

      NO ERROR

      PURCHASES       :  0

      Platform ID:    :  0x0060
      Family ID      :  0x0000
      Model ID       :  0x008F

      TUNER           :  V860DL

      Remod Channel   :  3
      Time Zone
      (hhhhhhhh)      MMMM min

      DS Entry Time
      1/1/1999         00:00 GMT

      DS Exit Time
      1/1/1999         00:00 GMT

      Current GPS
      Time
      1/1/1999         00:00 GMT
```

Table B-2
Diagnostic Main Menu Fields

Field	Description
Error Codes	A sequence of LED flashes communicates errors when they occur. The Error Code field displays the code for the active error when appropriate.
Connected State	The state of the set-top is connected or disconnected. The connected state of the set-top is set by a DCT-operations connect or disconnect message. The OSD displays DISCONNECTED when the set-top is in the disconnected state and CONNECTED when it is in the connected state.
Platform ID	A 16-bit hexadecimal number used to differentiate between digital platform images in the field. It is also called the ROM ID.
Family ID	A hexadecimal number that indicates the set-top manufacturer and product family.
Model ID	A hexadecimal number that indicates the set-top model.
Remod Channel	The Remod Channel number can be 3 or 4 (NA systems). The output port configuration displays the configuration of the set-top output or re-modulated (remod) port. The output port/remod port is the interface from the set-top to the subscriber TV.
Time Zone	Indicates the time zone offset (in minutes) relative to GMT.
DS Entry Time	Indicates the daylight savings entry time.
DS Exit Time	Indicates the daylight savings exit time.
Current GPS Time	Indicates the current time.

Error Codes

A sequence of LED flashes communicates errors when errors occur. **Error! Reference source not found.** lists the error codes, associated flash sequences, causes, and remedies:

Table B-3
Error codes

Initialization Status Errors

Code	Flash Sequence	Cause	Remedy
E 00	None; no error condition exists	Indicates normal condition after initialization	Not applicable
E 01	MSG LED flashes on and off	The set-top did not receive a connect message	Restore out-of-band signal Send a connect message
E 02	Repeating series of two MSG LED flashes, separated by a pause	Init Error	The set-top needs a power cycle to recover
E 03	Repeating series of three MSG LED flashes, separated by a pause	DRAM error	Not used at this time
E 04	Repeating series of four MSG LED flashes, separated by a pause	DP-SRAM error	Not used at this time

Initialization Status Errors

Code	Flash Sequence	Cause	Remedy
E 07	Repeating series of seven MSG LED flashes, separated by a pause	ROM verification failure	Power cycle the set-top; if repetitive, return for repair
E 08	Repeating series of eight MSG LED flashes, separated by a pause	Faulty RAM, ROM, EEPROM, or POST failure (this is a hardware failure)	Return the set-top for repair
E 09	Repeating series of nine MSG LED flashes, separated by a pause	Dead battery or the memory has not been initialized; occurs if the battery fails to keep the RAM alive during power-down; causes set-top to be disconnected	Return the set-top for repair; requires factory initialization message
E 10	POWER LED flashes on and off; MSG LED remains off	Invalid serial number	Not used at this time
E 11	POWER LED flashes once; MSG LED flashes once	Invalid unit address	Return the set-top for repair; requires a unit creation message
E 12	POWER LED flashes once; MSG LED flashes twice	POST failed	Not used at this time
E 13	POWER LED flashes once; MSG LED flashes three times	Sys_boot initialization failure	Power cycle the set-top; if repetitive, return for repair
E 14	POWER LED flashes once; MSG LED flashes four times	System startup failure	Power cycle the set-top; if repetitive, return for repair
E 15	POWER LED flashes once; MSG LED flashes five times	TSI structure is corrupted	Power cycle the set-top; if repetitive, return for repair
E 16	POWER LED flashes once; MSG LED flashes six times	Bad flash number specified for Initiate Flash Platform	Error logged, ignore
E 17	POWER LED flashes once; MSG LED flashes seven times	Bad platform validation step number	Error logged, ignore

Only the V860DL AND ACD2204 tuner appear on the on-screen display.

d 02: Out-of-Band (OOB) Status

This diagnostic indicates the status of the out-of-band control channel.

Figure B-3
OOB Diagnostic

02	OOB DIAGNOSTIC			
DATA	*	SNR	23 dB	GOOD
EMM DATA	*			
CARRIER LOCK	YES	COUNT		1
HUNT MODE	None			
CUR FREQ				
LKC				
EMM PRVDR ID	0x0001			

Table B-4
OOB Diagnostic Fields

Field	Description
Data	The OSD indicates with a "*" that data has been received. The indicators cover all packet processors regardless of which stream they are monitoring and are cleared when you enter the diagnostic.
EMM Data	Indicates whether the set-top is receiving a message on the EMM stream with the following variables: Blank No data received * Data received <i>The set-top can receive only six PIDs at once. Data on PIDs can be present on the out-of-band multiplex that the set-top is not receiving.</i>
Carrier Lock	The CARRIER LOCK is reset to "1" after an initialization from the DAC 6000 or a power cycle. Each time the <i>set-top</i> detects a drop in OOB connectivity, the counter increments. The following Carrier Lock variables can display: YES Carrier locked NO Carrier unlocked
Hunt Mode	Indicates the state of OOB stream acquisition. The Hunt Mode can be: None The set-top is locked to an OOB carrier. RR (Round Robin) The set-top is searching OOB frequencies trying to find an EMM Provider of 0 or 1. EMM The set-top received a Provider ID change and is searching OOB frequencies for the new ID. FIX The set-top has been commanded to attempt to lock onto a frequency. SRCH The set-top at some point had a valid Provider ID on the OOB frequency and is attempting to re-acquire it.

Field	Description
CUR Freq	Indicates the current out-of-band frequency.
LKC	Indicates the last known carrier (OOB frequency that had correct Provider ID).
EMM Provider ID	The ID of the provider of the Entitlement Management Message (EMM).

Selecting the OOB Frequency

To select the OOB frequency:

- 1 From the OOB STATUS diagnostic, press the **MENU** button to enter the frequency selection mode. The OSD displays a new **MANUAL FREQ** line at the bottom of the screen, indicating the LKC frequency.
- 2 Press the **MENU** key a second time to exit the frequency change mode.

Or

Press the **UP/DOWN** channel or cursor keys to scroll through the frequencies to locate the desired OOB frequency. The frequency selection appears on the **MANUAL FREQ** line of the OSD.

The first frequency to display is 75.25. The system scrolls through each frequency until it reaches the last, 103.75, and then scrolls back to the beginning. This diagnostic scrolls through the OOB frequencies in the following order:

- 75.25 MHz
- 104.20 MHz
- 72.75 MHz
- 92.25 MHz
- 98.25 MHz
- 107.25 MHz
- 107.40 MHz
- 110.25 MHz
- 116.25 MHz
- 103.75 MHz

- 3 Press **SELECT** to begin searching for the OOB frequency.

On the OSD the **MANUAL FREQ** line of text clears, the **HUNT MODE** displays **FIX** to indicate the fixed frequency search, and the **CUR FREQ** field changes to the frequency selected to search.

If the frequency is found with the proper EMM Provider ID, the OSD **LKC** field changes to display the new frequency.

If after 40 seconds the frequency search is not successful, the set-top performs a warm reset and returns to the last known carrier frequency.

- 4 To abort a search without waiting the 40 seconds, press **POWER** to cause a warm reset.

d 03: In-band Status

The in-band diagnostics display for the last attempted channel tune. If a digital carrier is not present, the diagnostics indicate the carrier lock is analog. When the carrier lock is analog, all fields for digital (other than a carrier lock channel) are blank.

Figure B-4
In-band Diagnostic

03	IN BAND DIAGNOSTIC	
	DATA	*
	EMM DATA	*
	CARRIER LOCK	YES
	PCR LOCK	YES
	SNR	36 dB ssss
	MODULATION MODE	QAM 64
	SHORT TERM ERROR COUNT	0000
	LONG TERM ERROR COUNT	9999
	TUNED FREQ	543.000

Table B-5
In-band Diagnostic Fields

Field	Description
Data Activity Indicator	Lights when the set-top is receiving data on the in-band channels. The indicator covers all packet processors regardless of which stream they are monitoring. The following variables can display: Blank No data received * Data received
EMM Data Indicator	Lights when the set-top is receiving a message on the EMM stream. The indicator is clear when entering this diagnostic. The following variables can display: Blank No data received * Data received
Carrier Lock	Indicates that the digital in-band receiver is locked to the carrier with the following variables: YES Carrier locked NO Carrier unlocked Analog Analog channel
PCR Lock	Indicates a program-clock-reference lock with the current digital data stream.

Field	Description
SNR	<p>Displays an estimate of the carrier signal-to-noise ratio. The SNR displayed is a measure of the QAM cluster variance, which is proportional to the SNR.</p> <p>Analog channels display <code>analog</code> for carrier lock. The SNR displays a number for the numeric value and blank for the <code>ssss</code> value.</p> <p>The following variables can display:</p> <p>Blank The digital section is still in the initial state. If this occurs, check diagnostic <code>d07</code>.</p> <p>GOOD Good value</p> <p>FAIR Marginal signal level – check the signal</p> <p>POOR Unusable signal</p>
Modulation Mode	<p>Indicates the modulation modes for analog and digital channels with the following variables:</p> <p>Channels Modulation Mode</p> <p>Analog channels Analog</p> <p>Digital channels QAM 64</p> <p style="padding-left: 100px;">QAM 256</p>
Short Term Error Count	<p>Indicates the FEC errors (maximum count of 65535) at 5-second intervals. The Short Term Error Count is cleared after polling.</p>
Long Term Error Count	<p>Indicates the accumulation of the Short Term Error Count (maximum count of 65535). The Long Term Error Count is cleared every 24 hours.</p>
Tuned Frequency	<p>Indicates the actual frequency the tuner is programmed (Carrier Definition Frequency + 1.75 MHz).</p>

d 04: Audio/Video Status

This diagnostic displays the audio and video information for the current tuned channel.

Figure B-5
Audio/Video Status

04	AUDIO/VIDEO STATUS	
	ADP Lock	YES
	Audio Mode	STEREO
	Audio SPDIF	N/A
	VP Lock	YES
	MPEG Method	MUTE BLACK

Table B-6
Audio Video Status fields

Status	Description
ADP Lock	The Audio Processor locked status: YES or NO
Audio Mode	The audio modes are: <ul style="list-style-type: none"> ▪ N/A ▪ Mono ▪ Stereo ▪ Surround
VP Lock	The Video Processor locked status: YES or NO
MPEG Method	The MPEG Method selected. The MPEG Methods are: <ul style="list-style-type: none"> ▪ Unmuted ▪ Mute Still ▪ Mute Black

d 05: Unit Address

This diagnostic displays the 16-digit (40-bit) unit address of the set-top.

On the unit address OSD, the unit, network, and TV PassCard (TVPC) addresses are in decimal form (13 address digits and three check digits). The multicast 16-bit address is in TCP/IP decimal byte form.

Figure B-6
Unit Address

```

05 DCT1700 UNIT ADDRESS:
    000-02831-99902-038

    Network Address:
    085-14316-55765-159

    TVPC:
    000-00000-00000-000

    Multicast 16 Address:
    085.085  102.102
    119.119  136.136
    DATA
    068.068  051.051
    034.034  017.017

    Seed Health      0xFF
  
```

Table B-7
Unit Address Fields

Field	Description
DCT1700 Unit Address	Indicates the unit address
Network Address	Indicates the network address
TVPC	Indicates the TV Passcard Address.

Field	Description
Multicast 16 Address	<p>The Multicast 16 address numbers change to display the values for each data stream. The following is a list of Multicast 16 addresses:</p> <ul style="list-style-type: none"> ▪ NET ▪ EMM ▪ SCC ▪ DWLD ▪ DATA ▪ VCN ▪ POLL
Seed Health	<p>This value represents the health of the set-top and should be 0xFF. If it is not 0xFF, see the “Troubleshooting” section for more information.</p>

d 06: Firmware Version

The FIRMWARE VERSION diagnostic displays the:

- Dena firmware version or revision number
- Build date and time
- TSODA firmware version number
- CAMEL (CMLBK) firmware version number (always 0000)

The BOOT is the lowest level of firmware code that can be used on the DCT1700.

Figure B-7
Firmware Version

```

06  FIRMWARE VERSION
    07.72                BOOT 07.71
    Sep 13, 2002
    10:40:21

    TSODA t16

    CMLBK 0000

```

d 07: Current Channel Status

This diagnostic displays the instantaneous status of the last attempted channel tune on the in-band tuner. The status shows channel type (analog/digital), acquisition state, purchasable indicator, preview indicator, parental control status, and mute status.

Figure B-8
Current Channel Status

07	CURRENT CHANNEL STATUS		
	TYPE DIGITAL	aaa	bb
	STATUS	cccc	
	CONNECTED	dddd	
	PREVIEW	NO	
		CURR	NEXT
	PURCHASABLE	NO	--
	PURCHASED	NO	--
	EPOCH NUM	0X0	1
	EPOCH TYPE	0x0	0x0
	AUTH	0X0	0X0
	SERVICE 0	STATUS 1	ID 0X0004 0X00
	CH 204	TUNED	FREQ 543.000

Table B-8
Current Channel Status Fields

Field	Description
Type	Indicates whether the current channel is analog or digital.
Status	Indicates the channel type with the following variables: <ul style="list-style-type: none"> ▪ Authorized ▪ Unauthorized ▪ Encrypted ▪ Unencrypted
Connected	Indicates whether the set-top is connected or disconnected. If the value is connected, the program is viewable.
Preview	Indicates whether the program is in the free preview state (YES or NO).
Purchasable	Indicates whether the current or next program can be purchased (YES or NO).
Purchased	Indicates whether the current or next program has been bought (YES or NO).
EPOCH Number	For Motorola use only.
EPOCH Type	For Motorola use only.
Authorization	For Motorola use only.
Service	For Motorola use only.
Status	For Motorola use only.
ID	For Motorola use only.
CH	Indicates the channel currently tuned when the OSD appeared.
Tuned Frequency	Indicates the actual frequency the tuner is programmed (Carrier Definition Frequency + 1.75 MHz).

Current Channel Variables

Table B-9 lists the CURRENT CHANNEL STATUS variables:

Table B-9
Current Channel Status Variables

OSD Variable	State
aaa	Analog – blank
	For digital only:
	ENC – encrypted
	UNE – unencrypted
bb	Current epoch authorization reason in the current_epoch_auth_reason field. This is displayed in hex:
	00 missing program re-key
	01 missing working key epoch message
	02 missing event blackout message
	03 missing category rekey
	04 old category sequence in program, rekey message
	10 program bought
	11 program bought without taping
	12 subscribed with taping
	13 subscribed without taping
	14 subscribed with taping purchasable
	15 IPPV with taping
	16 IPPV without taping
	20 bad seed checksum
	21 bad debit buffer checksum
	30 IPPV not enabled
	31 insufficient credit to purchase
	32 show count limit exceeded
	33 debit register will overflow
	34 no AFP records available
	36 maximum package cost exceeded
37 no IPPV overlay in message	
40 not subscribed	
41 regional blackout	
42 event blackout	
cccc	INIT – Initialized state
	CONF – Configured
	ACQUI – Acquiring the program
	AUTH – Authorized for the program
	Not A – Not authorized for the program
ddd	blank – Connected
	NOT – Not connected

d 08: Renewable Security System

The renewable security system includes a TVPC card that returns the security status to current.

Figure B-9
Renewable Security

08	RENEWABLE SECURITY
	TVPC NOT REQUIRED
CRYPTO	NOT MATED
STATUS	00
VERSION	00

Table B-10
Renewable Security Fields

Field	Description
TVPC Required / Not Required	Indicates whether further operation of the set-top requires the TVPC.
CRYPTO	Lists the current mode as displayed on the CRYPTO OSD (Stand Alone, Support, or Not Mated).
Status	Indicates the TVPC status with the following variables: <ul style="list-style-type: none"> 00 OK 01 TVPC communication problem 02 TVPC required 03 Validator does not match between GK and TVPC 04 Invalid unit key number 05 Old TVPC unit address 0a TVPC not mated 0b TVPC /base module unit address mismatch 0C New TVPC, but wrong version number 0d TVPC unit address mismatch
Version	Indicates the version of renewable security being used.

d 09: Upstream Modem (STARVUE II Diagnostics)

This diagnostic shows the status and operating parameters for the STARVUE II RF return.

Figure B-10
STARVUE II Diagnostic

09	STARVUE II DIAGNOSTICS
STATUS :	DISABLED
FREQUENCY :	23.000 MHz
LEVEL :	39
IPPV :	DISABLED
LAST POLL REQ :	170
6-15-2001 20:49:33	
LAST POLL ACK :	170
6-15-2001 20:49:33	

Table B-11
STARVUE II Transmitter Fields

Field	Description
Status	Indicates the transmitter status with the following variables: <ul style="list-style-type: none"> - Idle t Transmitting
Frequency	Indicates the transmitting frequency.
Level	Indicates the approximate power value of the STARVUE II transmitter in dBmV. The difference between the power value on the diagnostic screen and the actual power of the STARVUE II module may be ± 5 dBmV.
IPPV	Indicates the Interactive Pay-Per-View status with the following variables: ENABLED IPPV enabled UNSENT – ## The set-top contains unsent IPPV transactions. <i>The variable –## is the number of unsent transactions.</i> DISABLED IPPV disabled
Last Poll Req.	Indicates the sequence number of the last poll request received by the set-top. The time stamp of the last poll request is displayed under LAST POLL REQ: <ul style="list-style-type: none"> ▪ If the set-top has received no poll request, , the sequence number and time stamp fields display N/A. ▪ If the set-top has received a poll request set-top but its system time has not yet been initialized, the time stamp field displays NOT AVAILABLE.
Last Poll Ack.	Indicates the sequence number of the last poll acknowledge received by the set-top. The time stamp of the last poll acknowledge is displayed under LAST POLL ACK. <ul style="list-style-type: none"> ▪ If the set-top has received no poll acknowledge, the sequence number and time stamp fields display N/A. ▪ If the set-top has received a poll acknowledge but its system time has not yet been initialized, the time stamp field displays NOT AVAILABLE.

d 10: Application (APP) Code Modules

This diagnostic displays the currently downloaded code modules. This can be a multi-page display. Press **SELECT** to display additional pages. Figure B-11 is an example of an OSD screen for a set-top that contains ROM:

Figure B-11
APP Code Modules

10	APP CODE MODULES			
	MODULE	VER	STATUS	ID
	0-8-0772	07.72	ENABLED	0001
	App1_____	02.00	DOWNLD	07DA

Table B-12
APP Code Modules Fields

Field	Description
Module	Indicates the object name
Version	Indicates the object version
Status	The <i>STATUS</i> modes available are: <ul style="list-style-type: none"> ▪ LOADING ▪ DELETED ▪ ENABLING ▪ ENABLED ▪ DSABLING ▪ DISABLD ▪ DELETNG ▪ POSTPND ▪ ENNORUN ▪ DISNORUN
ID	Indicates the object AppID

d 11: Memory Status

This diagnostic displays the DCT1700 memory status. The format of the OSD depends on the installed memory types.

Figure B-12
Memory Status

11	MEMORY STATUS				
	EEPROM VER.NO.				00.00
		PLATFORM		APPLICATION	
	NVMEM	236k		20k	
	DRAM	512k		1.5M	
	FLASH	768k		1.25M	
	ROM	n/a		n/a	
	SYSTEM HEAP				
	PgSz	PgCnt	Alloc	Used	Fail
	256	594	n/a	237	0
	8	1	32	0	0
	16	1	16	5	0
	32	3	24	9	0
	64	76	304	289	0
	128	13	26	20	0

Table B-13
Memory Status Fields

Field	Description
EEPROM Version Number	Indicates the EEPROM version (never used, should always be 00.00).
Platform	Indicates sizes of memory types allocated to platform code.
Application	Indicates sizes of memory types allocated to application code.
System Heap	Indicates breakdown of DRAM allocations.

d 12: Interactive Info

The INTERACTIVE INFO menu is a diagnostic tool used to gather data about your system:

Figure B-13
Interactive Info

```

12  INTERACTIVE INFO

      IP                :   0.0.0.0
      UPM               :   0X000021
      UPSTREAM ID       :   0X0000
      DOWNSTREAM ID     :   0X0000
      STATE             :   UNCONFIG
      MAC ABORT CNTR    :   0000

      GOOD PACKETS :
      ERROR PACKETS :

      SOCKET PORT STATE

      0                UNUSED
      1                UNUSED
      2                UNUSED
      3                UNUSED
      4                UNUSED
      5                UNUSED

```

Table B-14
Interactive Info Fields

Field	Description
IP	Indicates the set-top IP address assigned by the NC 1500, in dotted-decimal format; for example, <i>xxx.xxx.xxx.xxx</i> where each <i>xxx</i> ranges from 000 to 255.
UPM	Indicates the upstream modem address. This UPM value is the same as the terminal ID assigned by the DAC 6000. The UPM is a unique, system-generated, eight-digit integer between 1 and 16777215 displayed in hexadecimal format.
Upstream ID	Indicates the set-top transmission parameter assigned by the DAC 6000 for the interactive set-top. The Upstream ID is a four-digit value ranging from 0000 to 9999 displayed in hexadecimal format.
Downstream ID	Indicates the set-top transmission parameter assigned by the DAC 6000 for the interactive set-top. The Downstream ID is a four-digit decimal value ranging from 0000 to 9999 displayed in hexadecimal format.

Field	Description
State	The state modes are: <ul style="list-style-type: none"> ▪ MAC CONNECT ▪ UNCONFIG ▪ INIT_WAIT_DC_OR_ ▪ WAIT_LM_ACK ▪ WAIT_SO_ACK ▪ WAIT_LA_OR_SO ▪ INIT_STOPPED ▪ RUN_WAIT-DC-OR-C ▪ RUNNING ▪ RUN_STOPPED ▪ INVALID
MAC Abort Cntr	The MAC Abort Counter increments every time the MAC layer reaches the Cell Abort Count limit. The MAC Abort Counter is reset by the successful upstream transmission of a cell, for example, when an ACK is received by the set-top.
Good Packets	Not implemented.
Error Packets	Not implemented.
Socket Port State	The different Socket Port State modes available are: <ul style="list-style-type: none"> ▪ UNUSED ▪ OPENED ▪ READY ▪ RECVING ▪ SENDING

d 13: MAC Frequency Table

The set-top uses a range of frequencies set by the host for upstream communications. Figure B-14 is an example of the MAC FREQUENCY TABLE that displays your frequency and signal power:

Figure B-14
MAC Frequency Table

13 MAC FREQUENCY TABLE	
FREQ	POWER

Table B-15
MAC Frequency Table Fields

Field	Description
Frequency	Indicates the frequency, in Hz, for an upstream channel.
Power	Indicates the power level, in dBmV, used on a particular upstream channel to send data to the RPD.

d 14: Message Types

This diagnostic displays a listing of PIDs and counts. In addition the message types with IDs and counts are shown:

Figure B-15
Message Types

14 MESSAGE TYPES (hex data)						
OOB :			INB :			
PID	Cnt		PID	Cnt	Lost	DRAM
0000	0		0000	4	0	0
0000	0		0000	2	0	0
—			—			
Msg	Id	Cnt	Msg	Id	Cnt	
0	-	216	9A	E	0	
1	2	89	A0	15	0	

Table B-16
Message Types Fields

Field	Description
OOB PID	Indicates out-of-band PID.
OOB Cnt	Indicates the number of messages received.
INB PID	Indicates the in-band PID.
INB Cnt	Indicates the number of messages received.
INB Lost	Indicates the number of messages lost due to errors.
DRAM	Indicates the count of in-band ring buffer overflows.
MSG	Indicates the message type.
ID	Indicates the low order byte of the Connection ID.
Cnt	Indicates the number of messages received.

d 15: In-band Program Association Table (PAT)

This diagnostic displays the Program Association Table Information. (For Motorola use only.)

Figure B-16
In-band PAT

15 IN BAND PAT (hex data)			
PAT	SN	PID	
001	0001	0029	

d 16: In-band Program Map Table (PMT)

This diagnostic displays the Program Map Table information. (For Motorola use only.)

Figure B-17
In-band PMT

16 IN BAND PMT (hex data)			
PMT	TYPE	PID	
001	0080	0210	

d 17: Task Status

This diagnostic displays a listing of tasks. (For Motorola use only.)

Figure B-18
Task Status

17 TASK STATUS (hex data)						
TID	RID	PRI	STARTS	RUNTIME	STK%	
64	00	2	21553	47441	26	
63						
...						
0						

d 18: In-band Multicast Address Filter

This diagnostic displays in-band multicast filter information:

Figure B-19
In-band Multicast Address Filter

18 IN BAND MULTICAST ADDRESS FILTER							
Filter Table:							
	DMCA	MCA	PQ	RQ	APP	CID	
NA	0000	0000	-01	-01	0000	0000	0000
NA	0000	0000	-01	-01	0000	0000	0000
NA	0000	0000	-01	-01	0000	0000	0000
NA	0000	0000	-01	-01	0000	0000	0000
REGISTER VALUES:							
	MCA	PID					
	0000	0000					
	0000	0000					
	0000	0000					
	0000	0000					

Table B-17
In-Band Multicast Address Filter Fields

Field	Description
Filter Table	
DMCA	Indicates the default multicast 16 address.
MCA	Indicates the current multicast 16 address.
PQ	Indicates the preemption notification queue ID.
RQ	Indicates the response queue ID.
APP	Indicates the application ID.
CID	Indicates the connection ID.
Register Values	
MCA	Indicates Multicast 16 filter register contents.
PID	Indicates PID filter register contents.

d 19: Keyboard / LED Diagnostics

This diagnostic does not apply to the DCT1700:

Figure B-20
Keyboard / LED Diagnostics

19	KEYBOARD / LED DIAGNOSTICS										
G	<	>	V	^	î	M	S	B	-	+	P

Abbreviations and Acronyms

CSR	Customer Service Representative
DCT1700	Digital Consumer Terminal 1700
EMM	entitlement management message(s)
HRC	harmonically related carriers
IPG	interactive program guide
IPPV	Impulse Pay-Per-View
IRC	incrementally related carriers
MPIAA	Motion Picture Advisory Association
NVOD	Near Video on Demand
NVRAM	Non-volatile random-access memory
OSD	on-screen display
PCR	program clock reference
PID	packet identifier
PPV	Pay-Per-View
QAM	quadrature amplitude modulation
QPSK	quadrature phase shift keying
RSA	Return for Service Authorization
TCP/IP	Transmission Control Protocol/Internet Protocol
TRC	Technical Response Center
TvPC	TV PassCard
VOD	Video on Demand

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