SEASIDE TV

DCT 2500

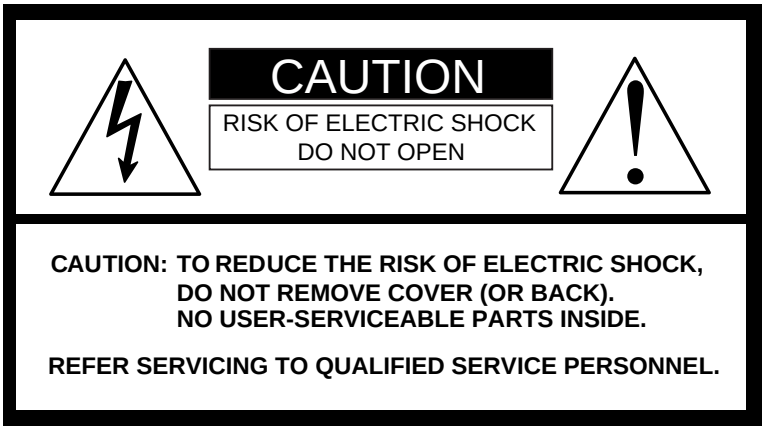
Wiring Instructions

Additional Information

Digital Cable Box

USER MANUAL

Seaside communications



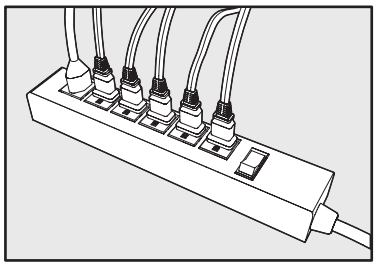
Graphical Symbols and supplemental warning marking locations on bottom of terminal.

WARNING

TO REDUCE THE RISK OF FIRE OR SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION

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



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

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

CANADIAN COMPLIANCE/DISCLAIMER

This Class B digital apparatus meets all requirements of the Canadian Interference - Causing Equipment Regulations. Cet appareil numérique de la classe B respects toutes les exigences du Règlement sur le matériel brouilleur du Canada.

www.ic.gc.ca/eic/site/ic1.nsf/eng/home
www.ic.gc.ca/eic/site/ic1.nsf/fra/accueil

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Section 1

Introduction

This manual provides instructions to install the Motorola DCT2500 digital cable set-top box. The DCT2500:

- Supports 64 and 256 QAM digital signal formats
- Is compatible with existing Motorola analog and digital set-tops, which are not affected by the new data the addressable controller sends to the DCT2500s
- Uses digital compression technology to provide new revenue generating services
- Supports interactive services such as Video on Demand (VOD)

Features, Options, and Interfaces

The Motorola DCT2500 offers the following standard features:

- 54 to 860 MHz integrated tuner
- Integrated RF return (using built-in STARVUE II module)
- RF and baseband audio/ video ports
- IR Blaster port
- Switched accessory outlet
- RS 232 serial data port (provides a high speed serial data interface)
- Coaxial digital audio output

Optional features include:

- A/B In switch
- RF Bypass switch
- IR Blaster cable
- S-Video output
- TOSlink optical digital audio output

Figure 1-1 illustrates front and rear views of the DCT2500:

Figure 1-1
Front and rear views

Using This Manual

This manual provides instructions to install and configure a DCT2500:

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 DCT2500 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 DCT2500 in a subscriber location and perform operational tests.
Section 4	**Adding the IR Blaster Option** provides instructions on how to install the IR Blaster option for controlling VCR recording through the DCT2500.
Section 5	**Troubleshooting** provides guidelines for troubleshooting the equipment.
Appendix A	**Specifications** provide the technical specifications for the DCT2500.
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

Seperate instruction manual for the Seaside Universal Remote Control is available for download.

Documents Conventions

Before you begin working with this manual and using the DCT2500, 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
Italic type	Used for emphasis
`Courier font`	Displayed text

If You Need Help

For technical assistance, please call Seaside Communications: 539-6250

Calling for Repairs

If repair is necessary, please call Seaside Communications: 539-6250

Section 2

Overview

This section provides illustrations and tables showing the controls, displays and connectors. Before you begin to install the DCT2500, familiarize yourself with its controls and displays.

Front Panel

The front panel contains selection keys, tuning keys, various displays, and the power switch. These controls provide minimum yet functional capability if the remote control is lost or temporarily out of service. Functions requiring a numeric entry are not available without a remote control.

Figure 2-1
Front panel

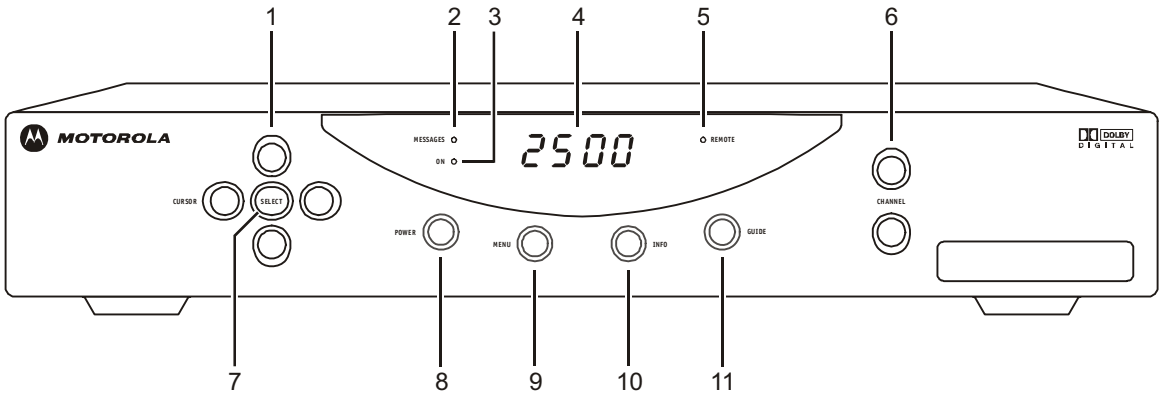
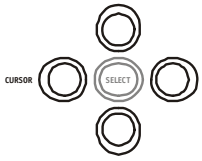
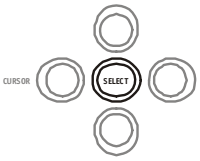


Table 2-1
Front panel controls and LEDs

Key	Feature	Function
1		Moves the cursor in menus and electronic program guide (EPG) screens
2	MESSAGES	Lights to indicate that a message is present
3	ON	Lights when the unit is turned on
4	2500	Displays current channel number or time of day
5	REMOTE	Flashes when a signal is received from the remote control
6		Changes the channel up and down

Key	Feature	Function
7		Selects menu options, Pay-Per-View (PPV) events, and tunes channels from the EPG
8		Turns the DCT2500 on and off
9		Displays the main menu
10		Displays current channel and program information
11		Displays the EPG

Rear Panel

The rear panel contains a switched power outlet and connectors for video, audio, RF cabling, data output, and the IR Blaster:

Figure 2-2
Rear panel

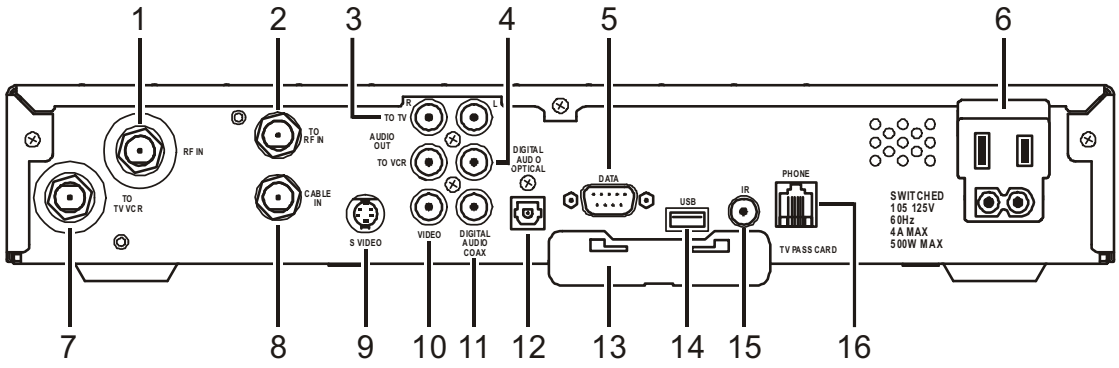
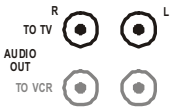
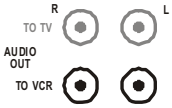
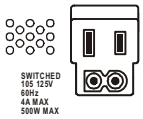


Table 2-2
Rear panel features

Key	Item	Function
1		A coaxial input that is connected to the TO RF IN.
2		A coaxial input that directs the cable signal to other connections on the DCT2500.

Key	Item	Function
3		Right/left RCA stereo outputs connect the DCT2500 to the TV. The audio output to the TV is volume controlled.
4		Right/left RCA stereo outputs connect the DCT2500 to the VCR. The audio output to the VCR is line level.
5		A high-speed serial interface for connecting an optional external high definition TV decoder (do not connect the PC to this interface)
6		This is a two-plug AC power connector: ▪ The bottom plug is an input for the AC power cord ▪ The top plug is a switched power outlet for another device such as a TV or VCR into
7		A coaxial output to connect the DCT2500 to the TV or VCR.
8		A coaxial input for the incoming signal from the wall outlet.
9		An S-Video connector for sending high quality video to external devices (high-end VCR or TV) that accept S-Video. (Optional)
10		This RCA video output connects the DCT2500 to an input on a TV, VCR, or other device.
11		A coaxial audio output to connect the DCT2500 to a digital home theater receiver or A/V receiver.
12		A Toslink connector to connect the DCT2500 to a digital home theater receiver. (Optional)
13		Reserved for future use
14		The Universal Serial Bus (USB) is used to connect to devices such as keyboards, joysticks, scanners, disk storage, PCs, printers, and digital cameras, if supported. (Optional)
15		A stereo mini-phone connector connecting the optional Infrared (IR) Blaster attachment for the DCT2500.
16		RJ-11 telephone modem output to connect to the telephone line for systems using telco-return. (Optional)

Options

The following options enable you to meet individual subscriber needs:

Figure 2-3
Options available for the DCT2500

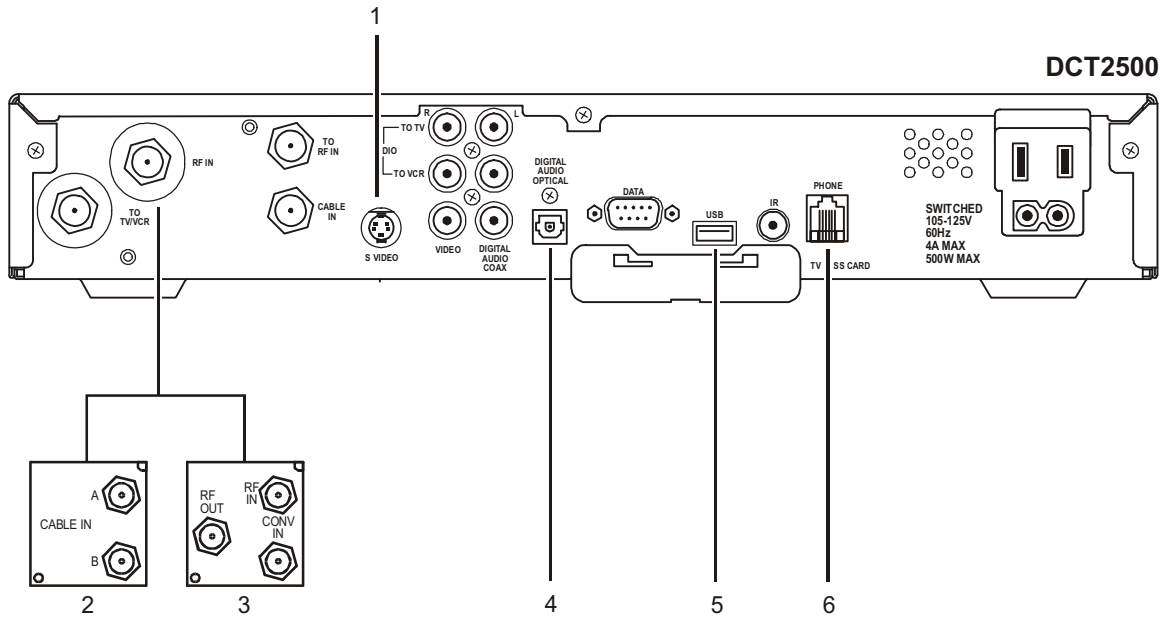
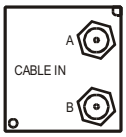
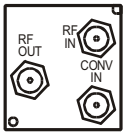


Table 2-3
Options

Key	Option	Name	Function
1		**S-VIDEO**	An S-Video connector for sending high quality video to external devices (high-end VCR or TV) that accept S-Video.
2		**A/B In**	Used in a dual cable system to receive both cables; verify the location of the A and B connectors on the A/B In module
3		**RF Bypass**	Enables the cable signal to bypass the DCT2500 and go directly to a TV or VCR
4		**Optical**	A Toslink connector to connect the DCT2500 to a digital home theater receiver.
5		**USB**	USB is used to connect to devices such as keyboards, joysticks, scanners, disk storage, PCs, printers, and digital cameras, if supported.

Key	Option	Name	Function
6		**PHONE**	RJ-11 telephone modem output to connect to the telephone line for systems using telco return

Audio Output Modes

For audio assistance, please call Seaside Communications at 539-6250.

Section 3

Installation

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

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

Before You Begin

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

- Determine if the subscriber requirements include an A/B In, or RF Bypass module. You can install these options before leaving the office following the instructions provided with each module.
- Verify that you have 75-ohm coaxial cables with F-type connectors and RCA baseband phono-type cables.
- Determine if you are connecting the DCT2500 to a standard TV or a composite (baseband) monitor.
- Place the DCT2500 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 DCT2500

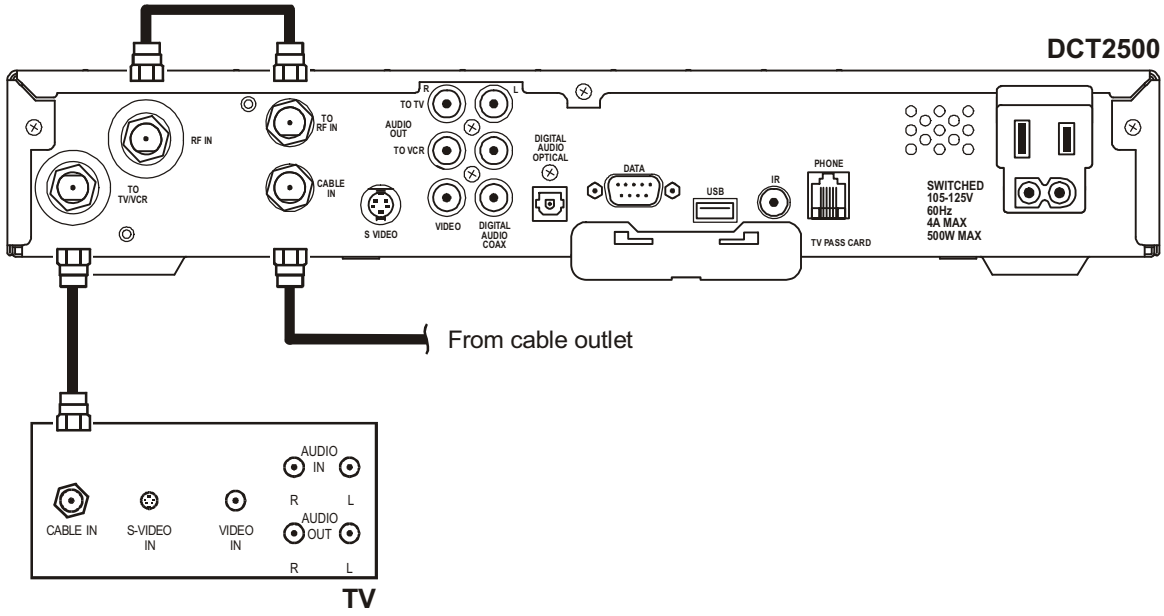
To install the DCT2500:

1. Determine if you are connecting the DCT2500 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 most closely 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 DCT2500 is installed.
5. If you are using the Telco return option, connect the DCT2500 to the subscriber's phone line.

Standard Cabling Diagram

The DCT2500 outputs on channel 3 or 4, depending on the configuration from the addressable controller:

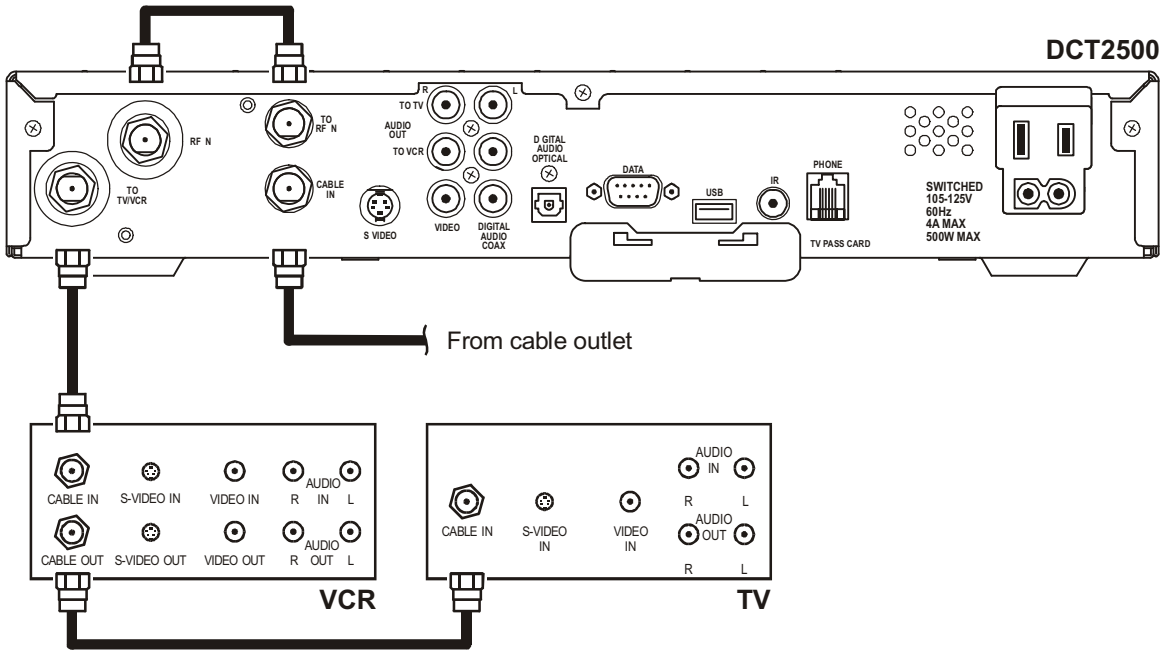
Figure 3-1
Standard cabling to a TV using RF connectors



Standard VCR Cabling Diagram

Figure 3-2 illustrates the basic cabling required to record the channel being viewed:

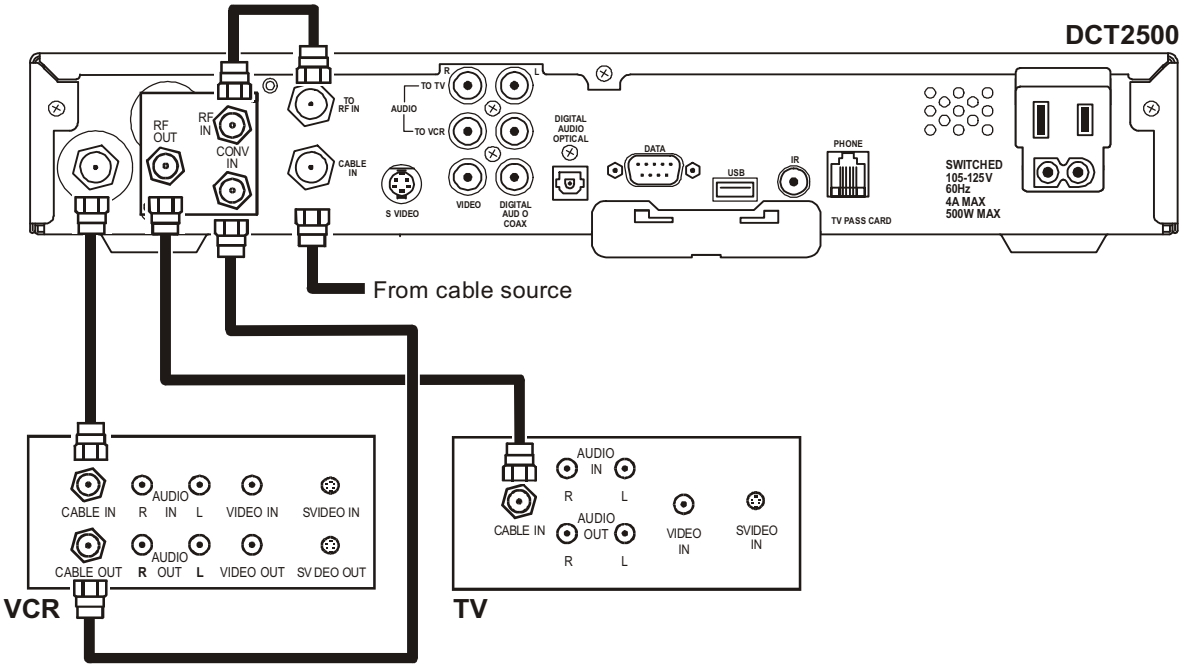
Figure 3-2
Standard VCR cabling



VCR Cabling With RF Bypass Switch Diagram

The RF Bypass module enables viewing of an unscrambled analog channel on TV while recording another channel through the DCT2500. Proper RF Bypass operation requires special configuration on the addressable controller and the EPG.

Figure 3-3
Cabling with the RF Bypass module (using RF return)



A/B In Module Cabling Diagrams

The A/B In module is commonly used in dual-cable systems.

Figure 3-4
A/B In module on a DCT2500 using optional telco return

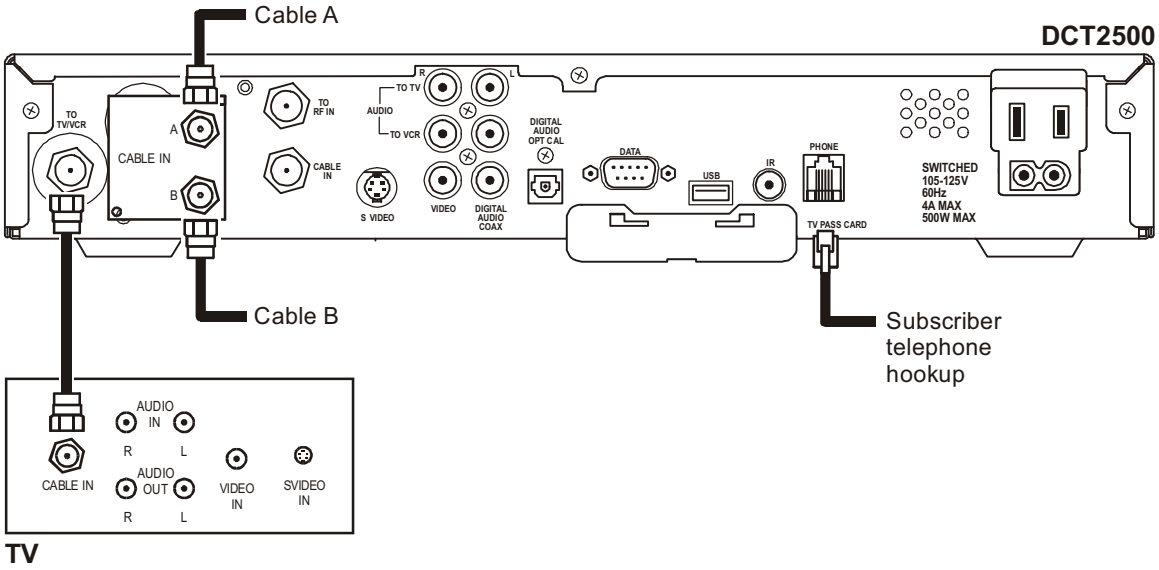


Figure 3-5
A/B In module on a DCT2500 with the return on Cable A

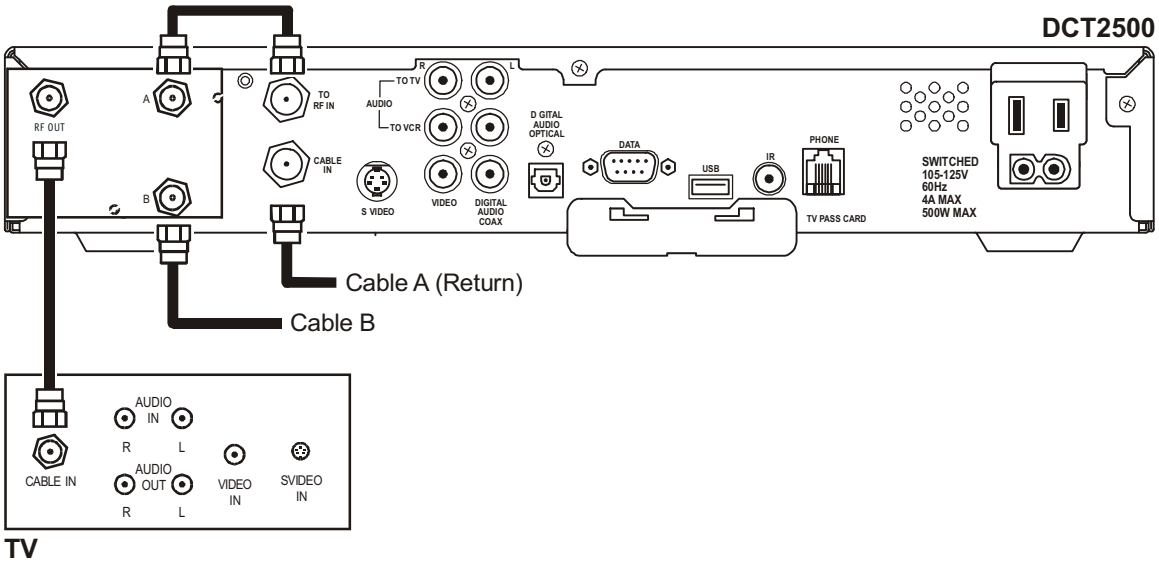
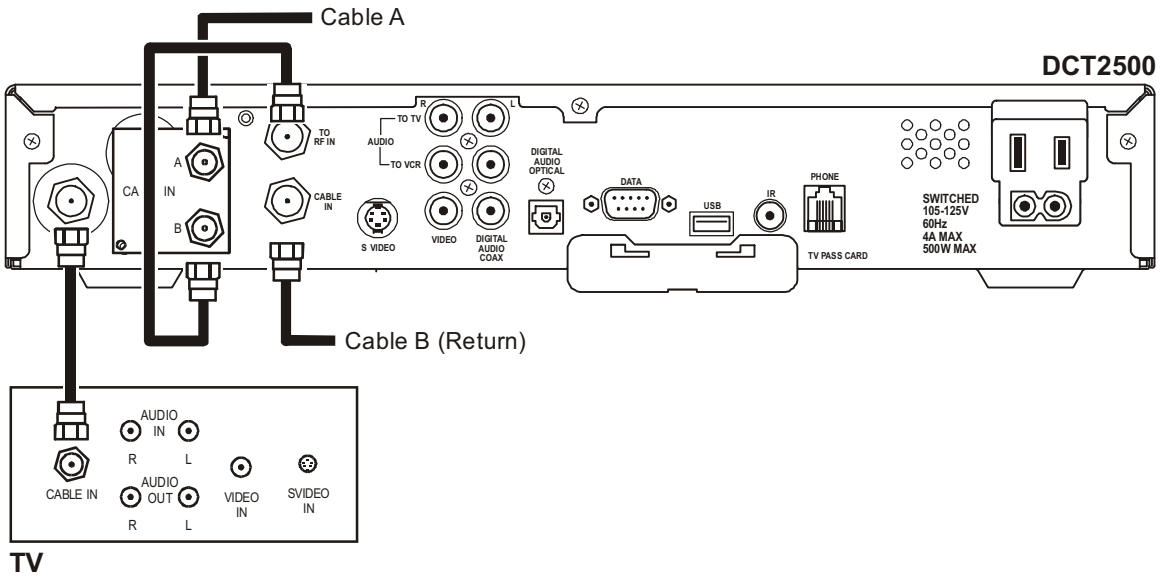


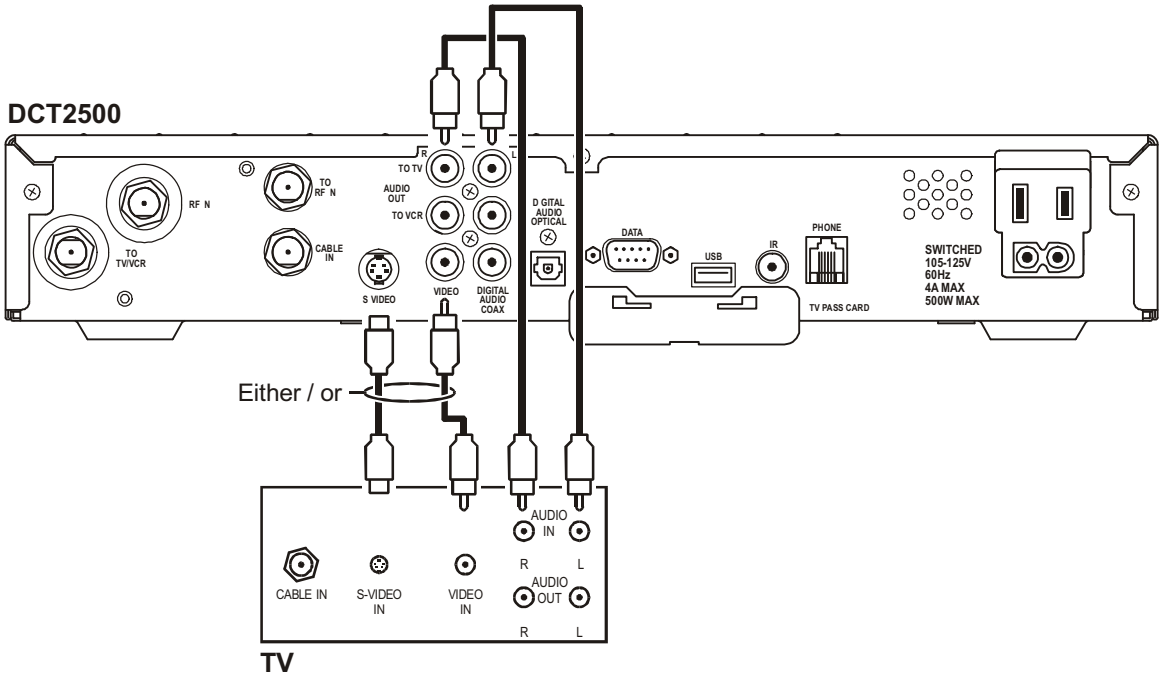
Figure 3-6
A/B In module on a DCT2500 with return on Cable B



Composite Baseband and S-Video Cabling Diagrams

Connecting the DCT2500 using the baseband RCA type outputs enables the subscriber to experience stereo and Dolby Surround sound on digital channels when available.

Figure 3-7
Standard baseband audio and video outputs

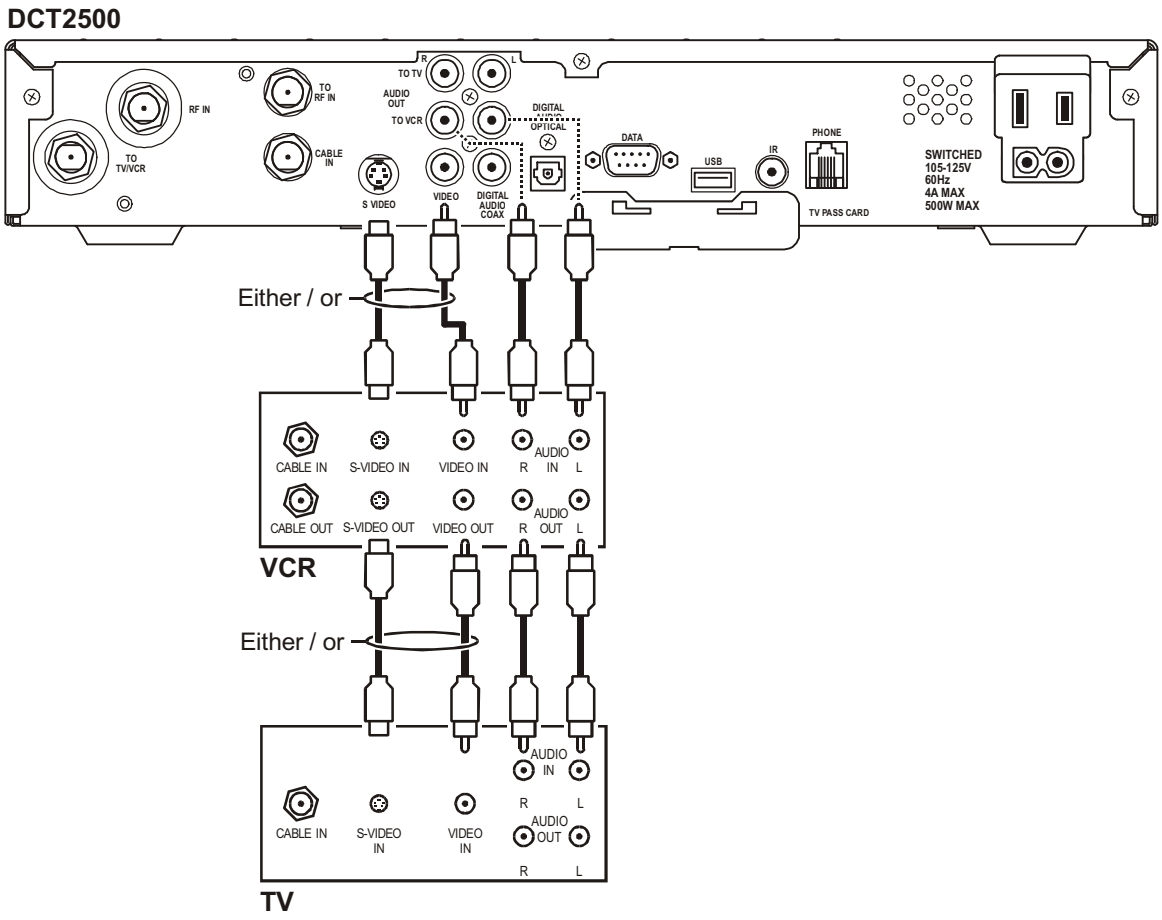


The S-Video connector is part of the Home Theatre option and is not included on all DCT2500s.

When connecting the video path, connect either the baseband composite video or S-video to the input device you plan to use. Do not connect both the baseband composite video and S-video. Some electronic equipment will not support both video inputs simultaneously.

Figure 3-8 illustrates the DCT2500 baseband audio and video outputs for connecting to a VCR:

Figure 3-8
Composite VCR cabling



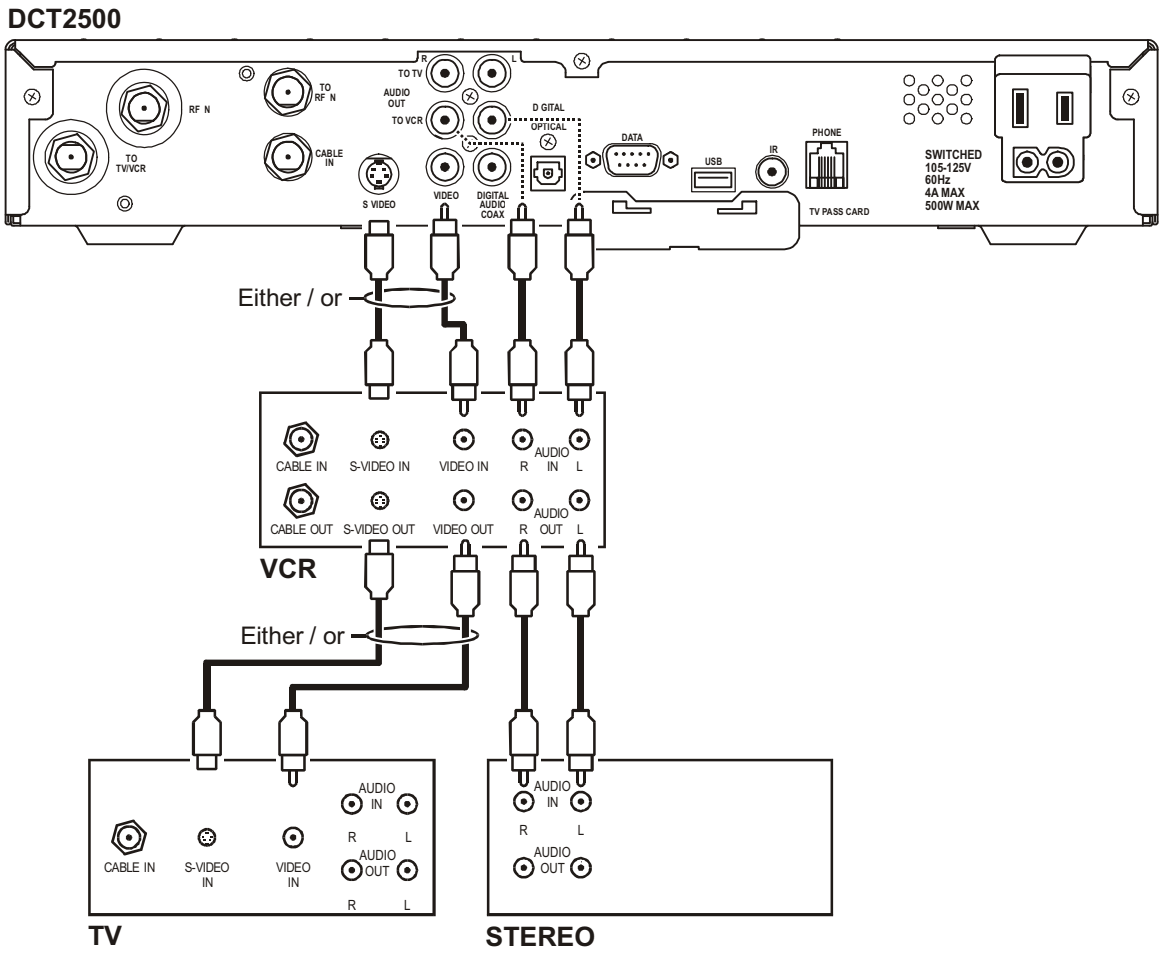
The S-Video connector is part of the Home Theatre option and is not included on all DCT2500s.

When connecting the video path, connect either the baseband composite video or S-video to the input device you plan to use. Do not connect both the baseband composite video and S-video. Some electronic equipment will not support both video inputs simultaneously.

Stereo Cabling Diagram (Baseband)

This audio configuration does not provide for a TV playing through the stereo:

Figure 3-9
Connecting the DCT2500 to a stereo using the audio connectors on the VCR



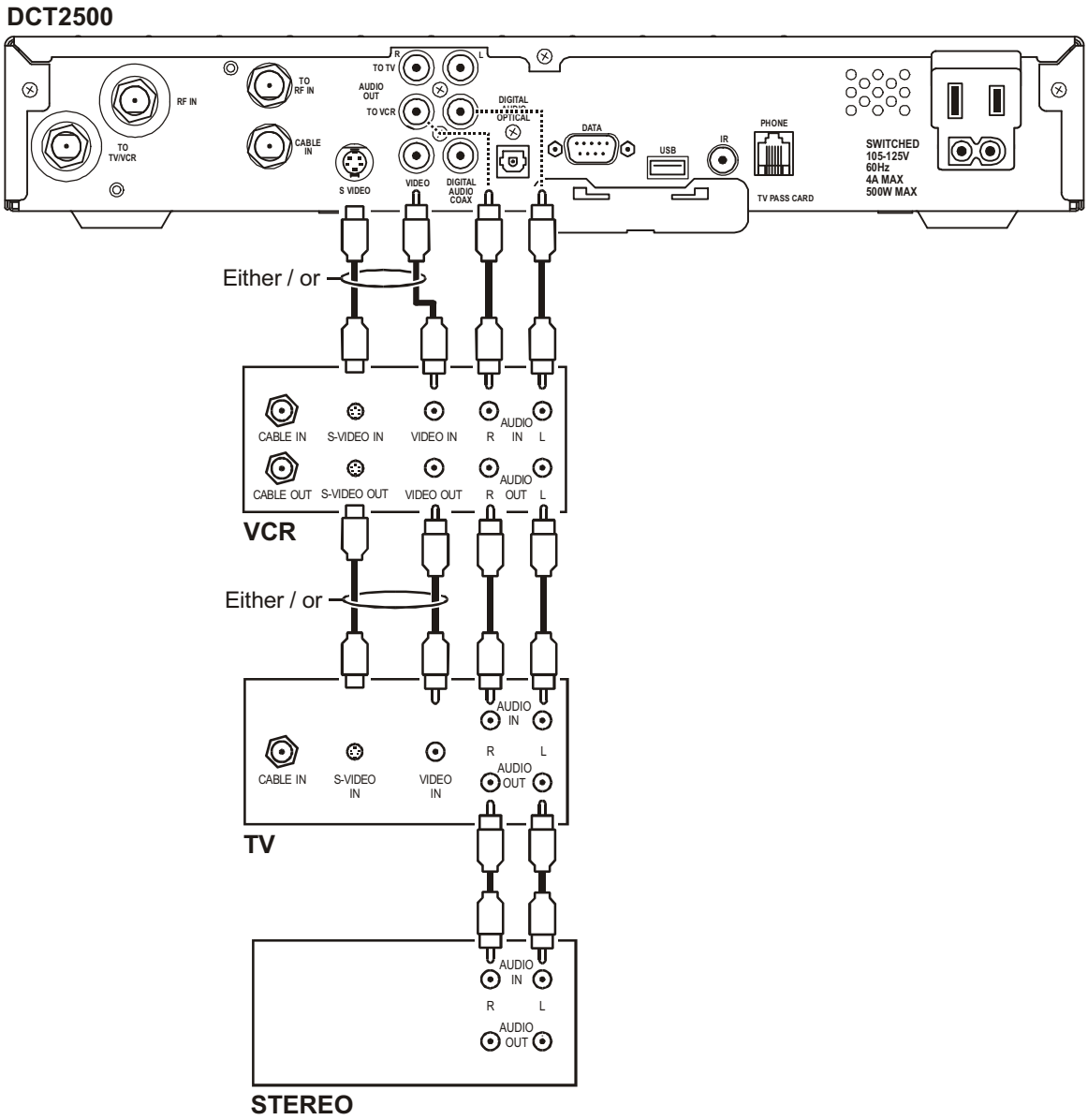
The S-Video connector is part of the Home Theatre option and is not included on all DCT2500s.

When connecting the video path, connect either the baseband composite video or S-video to the input device you plan to use. Do not connect both the baseband composite video and S-video. Some electronic equipment will not support both video inputs simultaneously.

Figure 3-10 shows connecting the DCT2500 to a stereo to enable the TV to play through the stereo:

- Audio loop-through connectors on the VCR
- Audio output ports on the TV monitor

Figure 3-10
Audio on VCR/audio output on TV



The S-Video connector is part of the Home Theatre option and is not included on all DCT2500s.

When connecting the video path, connect either the baseband composite video or S-video to the input device you plan to use. Do not connect both the baseband composite video and S-video. Some electronic equipment will not support both video inputs simultaneously.

Home Theater Receiver Cabling Diagram

Figures 3-11 and 3-12 show cabling for digital audio output. The DIGITAL AUDIO COAX and DIGITAL AUDIO OPTICAL connectors provide the same functionality.

Figure 3-11
Connections to a home theater receiver using DIGITAL AUDIO COAX

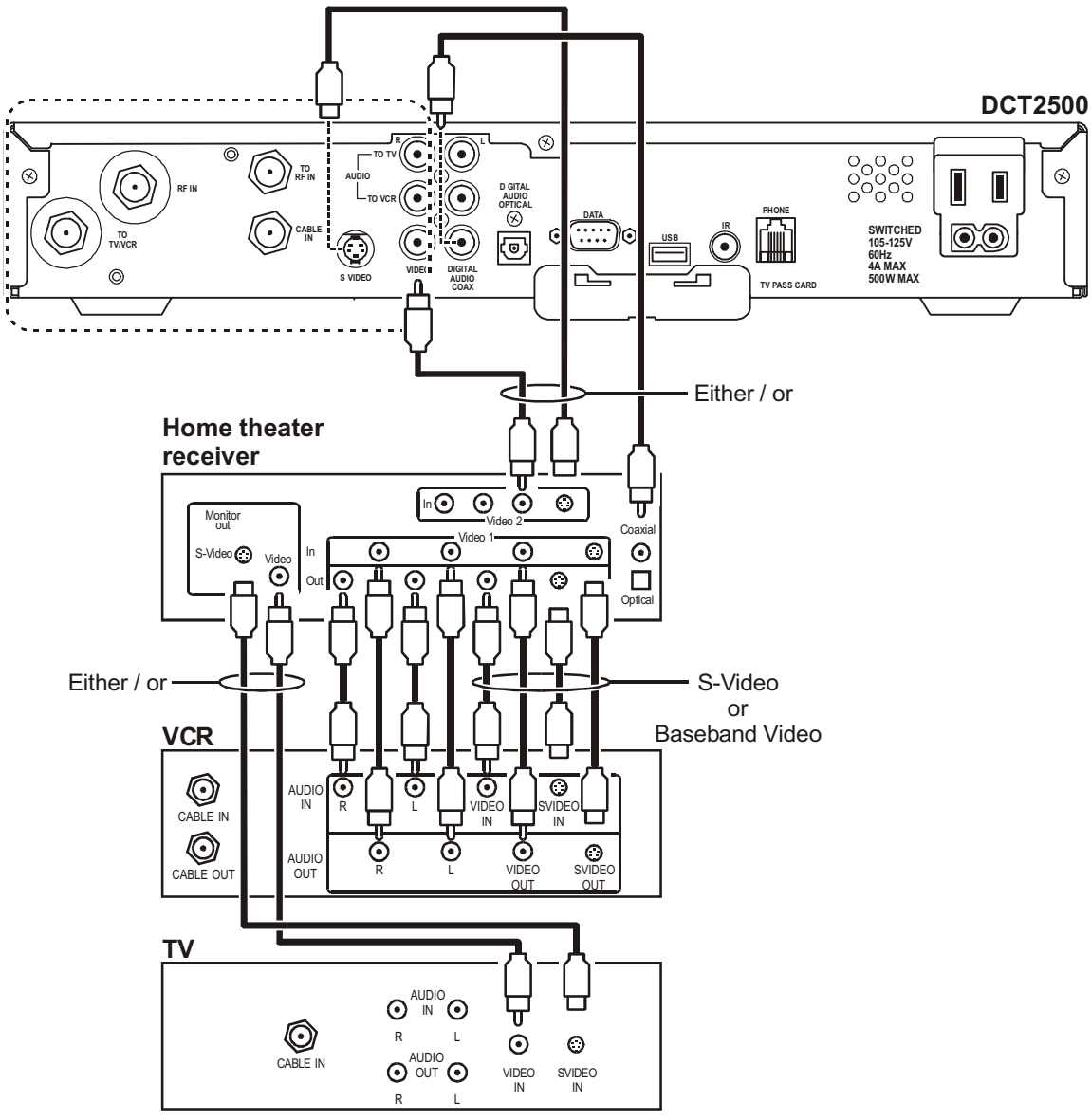
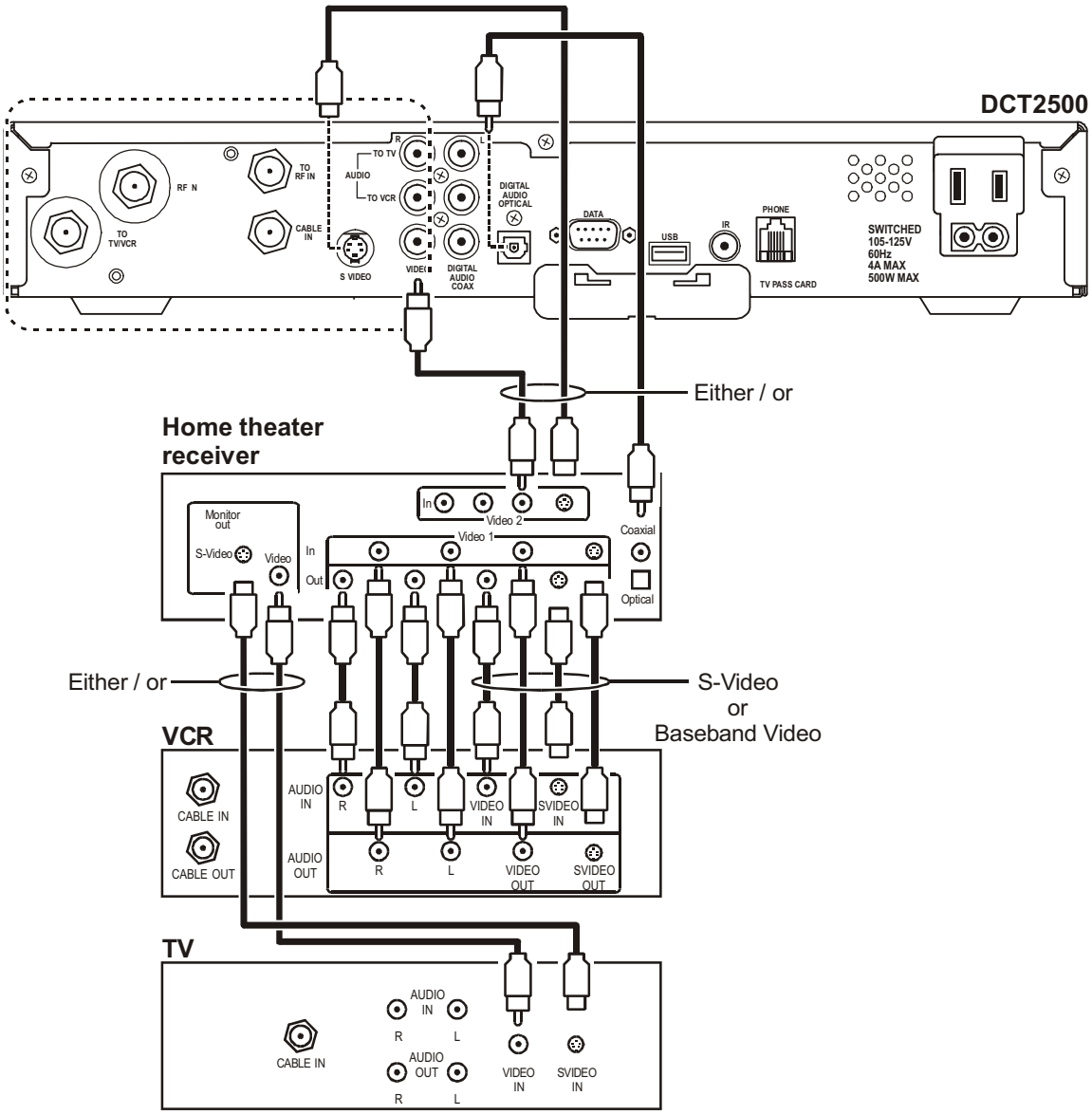


Figure 3-12
Connections to a home theater receiver using DIGITAL AUDIO OPTICAL



Operational Check

The operational check tests the communication link between the remote control and the DCT2500 to verify the DCT2500 response to remote control commands:

Table 3-1
Operational check procedures

Feature	Testing Procedure
Power on	▪ Press POWER to turn on the DCT2500. ▪ Turn the TV on and tune it to the DCT2500 output channel 3 or 4.
Channel Selection	▪ Scan through the channels using the CHANNEL ▲ ▼ keys on the DCT2500 and the CHANNEL + - keys on the remote control. ▪ Tune to several channels by entering the channel number with the numeric keys on the remote control.
Volume Control	▪ Use the TV volume control to adjust the sound volume to a moderate level. ▪ Press VOLUME + - on the remote control to increase the volume to its upper limit, lowest level, and to a comfortable level. ▪ Press MUTE to turn the sound completely off. Press MUTE again to restore the sound.

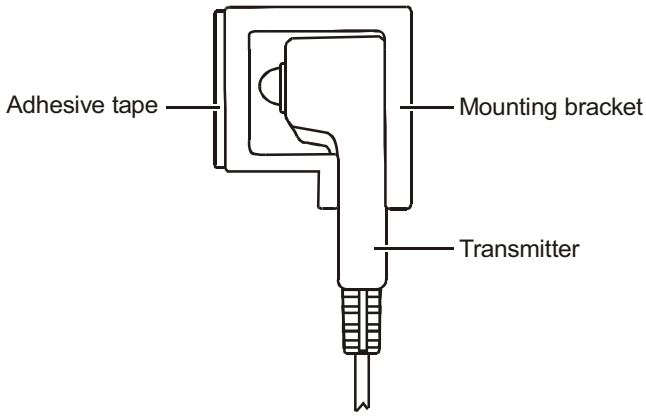
If the DCT2500 does not operate properly, refer to Section 5, “Troubleshooting.”

Section 4

Adding the IR Blaster Option

The IR Blaster provides control of the subscriber's VCR from the DCT2500. It consists of a low-power infrared transmitter attached to a six-foot cord and a mounting bracket. The mounting bracket is a clear plastic holder with a pad of adhesive tape for installing the IR Blaster near the VCR IR receiver. A mini-pin connector at the end of the cord connects the IR Blaster to the DCT2500.

Figure 4-1
IR transmitter installed in mounting bracket



The IR Blaster is controlled by the interactive program application on the DCT2500. Not all applications support the optional IR Blaster.

The IR Blaster is automatically activated through the EPG. Individual VCR codes are broadcast through the out-of-band data channel and are updated periodically as new codes are added.

Locating the IR Receiver on the VCR

The IR receiver is not visible on some VCRs.

To locate the receiver:

1. Obtain a piece of opaque material, such as a 3- by 5-inch index card.
2. Use the card to block areas of the VCR where the receiver might be located. Turn the VCR on and off, while pointing the remote control at the card blocking the VCR. Be sure the remote control is close to the VCR to reduce reflections the receiver may pick up.
3. Note the area where the VCR is unresponsive to the remote control. This region contains the receiver and can be marked by loosely taping the index card to the area.

Because the IR Blaster radiates an area approximately 40 degrees wide, it is not necessary to be precisely on target with the remote control. Offset the location of the IR Blaster transmitters from the VCR receiver to reduce interference with operation of the VCR remote control.

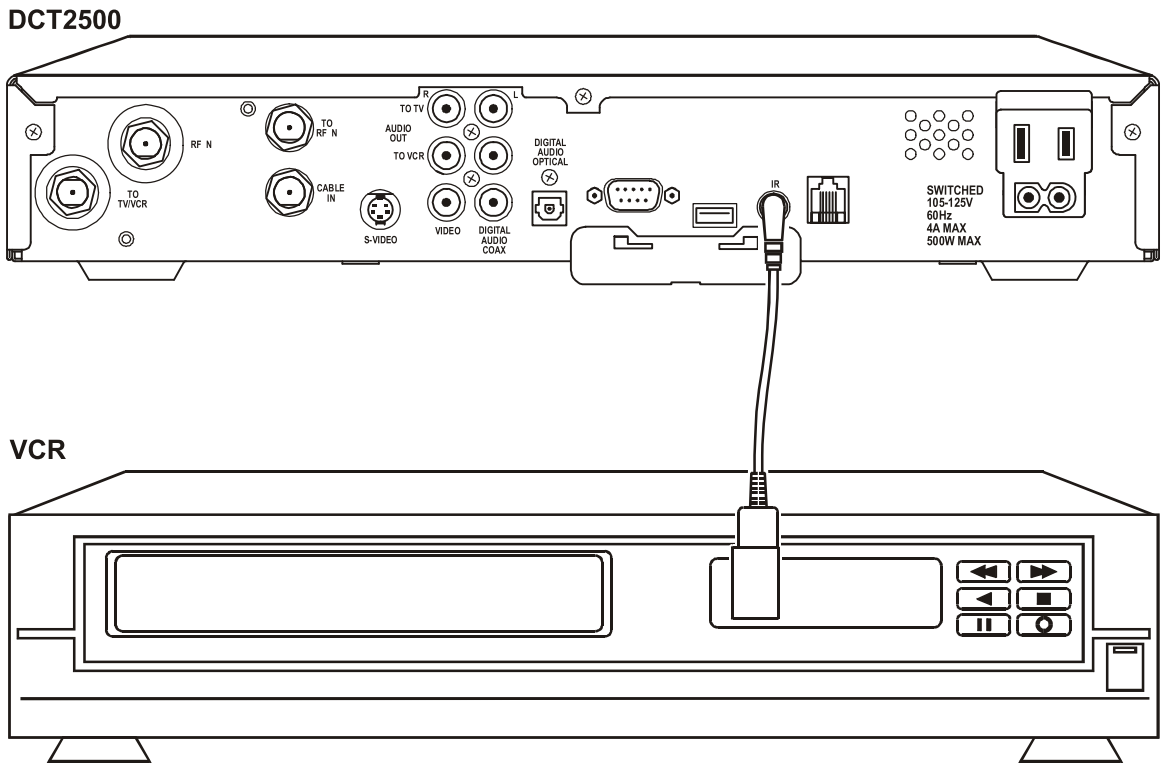
Installing the IR Blaster

To install the IR Blaster:

1 Fit the transmitter into the mounting bracket (refer to Figure 4-1).

2 Plug the mini-phone connector into the IR jack on the rear panel of the DCT2500 rear panel (refer to Figure 4-2).

Figure 4-2
IR Blaster installed



3 Remove the adhesive tape cover from the mounting bracket.

4 Position the IR receiver off center of the VCR receiver and then press firmly attaching the mounting bracket on the VCR. Be careful to route the wire so that it does not prevent loading videotapes.

Checking the Installation

The IR Blaster is now located near the receiver and the VCR can be controlled through the DCT2500. As a final check, operate the VCR using the remote control from various positions in the room. If the IR Blaster is obstructing the IR receiver on the VCR, move it slightly.

Section 5

Troubleshooting

This section provides information to help you quickly detect, isolate, and resolve errors that might occur when using the DCT2500. If you need assistance, call Seaside Communications:

- **539-6250**

Table 5-1 lists possible problems and solutions:

Table 5-1
Troubleshooting guidelines

Problem	Possible Solution
No power to the DCT2500	Check the power outlet for AC power.
	Be sure the TV is tuned to the output channel of the DCT2500 (channel 3 or 4).
	Verify that cable connections are correct from the TV set or monitor to the DCT2500.
	Check that the power cord is properly plugged into the outlet and DCT2500.
Remote control is not responding	Check for an obstruction between the remote control and the DCT2500. Aim the remote control directly at the DCT2500, not the TV or VCR.
	Be sure you firmly and deliberately press and release operation keys one at a time.
	Verify that channels can be changed using the keys on the front panel and then check that the batteries have been installed properly. Replace with new batteries if necessary.
	Check that the DCT2500 has been initialized correctly; refer to Diagnostics.
The DCT2500 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 DCT2500 and plug in the unit again. Wait for the DCT2500 to collect the data.
VCR did not record	Turn the VCR off when you are not using it.
	Be sure the IR Blaster is correctly placed.
	Check the Scheduled Events list to be sure programs are scheduled for recording.

Appendix A

Diagnostics

This appendix describes the on-screen diagnostics used to confirm proper DCT2500 installation, including:

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

For the diagnostics provided here:

- All indicators are in decimal notation, unless otherwise noted.
- All signal-level and quality indicators are 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 V1.08 code and higher.

Using Diagnostics

To operate the set-top, use the Motorola universal remote control. 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 To enable diagnostic mode, press **SELECT /OK** on the remote control within two seconds after powering off. The DIAGNOSTICS main menu is displayed on the OSD:

```
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     CONTROL CHANNELS
15     MESSAGE TYPES
16     IN BAND PAT
17     IN BAND PMT
18     TASK STATUS
19     USB STATUS
20     IB MCA STATUS
21     KEYBOARD / LED
```

4 Use the **CHANNEL** keys on the remote control to select the desired diagnostic.

5 Press **CURSOR <**, **CURSOR >**, **SELECT**, or **ENTER** to run 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.

The complete list of remote control buttons you can use to navigate the diagnostics is:

Button	Function using the diagnostics main menu	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	None	None
MENU	None	None
INFO	None	None

d 01: General Status

This diagnostic displays the error code and description, purchase count, and other information:

```
DCT2500 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
```

The General Status fields are:

Field	Description
Error Codes	When there is a problem, the error code is displayed and LEDs on the unit flash, as described in “Error Codes.” E 00 means there is no error.
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	The time zone offset (in minutes) relative to GMT.
DS Entry Time	The daylight savings entry time.
DS Exit Time	The daylight savings exit time.
Current GPS Time	The current time.

Error Codes

The front panel of the DCT2500 displays error codes when error conditions occur. The errors, causes, and remedies are:

Code	OSD	Cause	Remedy
E 00*	NO ERROR	Indicates normal condition after initialization	None
E 01*	NOT CONNECTED	The set-top did not receive a connect message	Restore out-of-band signal Send a connect message
E 02	PWR CYCLE	Init Error	The set-top needs a power cycle to recover
E 03	DRAM	DRAM error	Not used
E 04	DPSRAM	DP-SRAM error	Not used
E 07	ROM	ROM verification failure	Power cycle the set-top; if repetitive, return for repair
E 08	RAM	Faulty RAM, ROM, EEPROM, or POST failure (this is a hardware failure)	Return the set-top for repair
E 09	BATTERY	Dead battery or memory has not been initialized; occurs if battery fails to keep the RAM alive during power-down; disconnects the set-top	Return the set-top for repair; requires factory initialization message
E 10	SERIALNO	Invalid serial number	Not used
E 11	INVALID UNIT ADDRESS	Invalid unit address	Return the set-top for repair; requires a unit creation message
E 12	POST ERROR	POST failed	Not used
E 13	BOOT	Sys_boot initialization failure	Power cycle the set-top; if repetitive, return for repair
E 14	STARTUP	System startup failure	Power cycle the set-top; if repetitive, return for repair
E 15	TSI INVALID	TSI structure is corrupted	Power cycle the set-top; if repetitive, return for repair
E 16	FLASH BAD NUMBER	Bad flash number specified for Initiate Flash Platform	Error logged, ignore
E 17	BAD PLATVAL	Bad platform validation step number	Error logged, ignore

* E 00 and E 01 cannot be displayed on the LED when the set-top is off. All other errors display on the LED when the set-top is off.

Only the *V860DL and ACD2204* tuner appear on the on-screen display.

V860DLd 02: Out-of-Band (OOB) Diagnostic

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

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

The OOB Diagnostic fields are:

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 *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.*
Carrier Lock	The CARRIER LOCK is reset to "1" after an initialization from the DAC 6000 or a power cycle. Each time the *set-top* detects a drop in OOB connectivity, the counter increments. The following Carrier Lock variables can display: **YES** — Carrier locked **NO** — Carrier unlocked
Hunt Mode	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.
CUR Freq	The current out-of-band frequency.
LKC	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** search 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.

```
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
```

The In-band Status fields are:

Field	Description
Data Activity Indicator	Lights when the set-top is receiving data on the in-band channels for 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 whether 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.
SNR	Displays an estimate, in dB, of the carrier signal-to-noise ratio (SNR). This estimate is based on the QAM cluster variance, which is proportional to the SNR. *ssss* can be: **GOOD** Good signal **FAIR** Marginal signal level – check the signal **POOR** Unusable signal
Modulation Mode	Displays the following variables: **Analog** Analog channel **QAM 64** **QAM 256** Digital channel

Field	Description
Short Term Error Count	The FEC errors (maximum count of 65535) at 5-second intervals. The Short Term Error Count is cleared after polling.
Long Term Error Count	The accumulation of the Short Term Error Count (maximum count of 65535). The Long Term Error Count is cleared every 24 hours.
Tuned Frequency	The actual frequency the tuner is programmed (Carrier Definition Frequency + 1.75 MHz).

d 04: Audio/Video Status

This diagnostic displays the audio and video status for the tuned channel.

```
AUDIO/VIDEO STATUS
ADP Lock            YES
Audio Mode          STEREO
Audio SPDIF         2/0 LFE 0

VP Lock             YES
MPEG Method         MUTE BLACK
```

The Audio/Video Status fields are:

Field	Description
ADP Lock	The Audio Processor locked status: YES or NO
Audio Mode	The audio modes are: ▪ N/A ▪ Mono ▪ Stereo ▪ Surround
Audio SPDIF	For analog channels, SPDIF output is in IEC958PCM format. For digital channels, the possible Dolby Digital modes are: ▪ 1+1 — left is channel 1, right is channel 2 ▪ 1/0 — center ▪ 2/0 — left, right ▪ 2/1 — left, center, right ▪ 3/1 — left, right, surround ▪ 2/2 — left, right, left surround, right surround ▪ 3/2 — left, center, right, left surround, right surround ▪ LFE 0 — low frequency effects (subwoofer) channel not available ▪ LFE 1 — low frequency effects (subwoofer) channel available
VP Lock	The Video Processor locked status: YES or NO
MPEG Method	The MPEG Method selected: ▪ Unmuted ▪ Mute Still ▪ Mute Black

d 05: Unit Address

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

```
DCT2500 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
```

The Unit Address fields are:

Field	Description
DCT2500 Unit Address	The unit address in decimal format (13 address digits and three check digits)
Network Address	The network address in decimal format (13 address digits and three check digits)
TVPC	The TV Passcard Address in decimal format (13 address digits and three check digits)
Multicast 16 Address	The Multicast 16 address numbers change to display the values for each data stream in TCP/IP decimal byte form. Here is a list of Multicast 16 addresses: ▪ NET ▪ EMM ▪ SCC ▪ DWLD ▪ DATA ▪ VCN ▪ POLL
Seed Health	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.

d 06: Firmware Version

This 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 firmware code level that can be used on the DCT2500.

```
FIRMWARE VERSION
1.09                                BOOT 1.06
Jun 9, 2003
10:40:21

TSODA t16

CMLBK 0000
```

d 07: Current Channel Status

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

```
CURRENT CHANNEL STATUS

TYPE  DIGITAL             aaa  bb
STATUS                    ccccc
CONNECTED                 ddd
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
```

The Current Channel Status fields are:

Field	Description
Type	Indicates whether the current channel is analog or digital*
Status	Indicates the channel type*
Connected	Indicates whether the set-top is connected*
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.
CH	Indicates the channel currently tuned when the OSD appeared.
Tuned Frequency	The actual programmed tuner frequency (Carrier Definition Frequency + 1.75 MHz).

The EPOCH Number and Type, Authorization, Service Status, and ID are for Motorola use *only*.

* The variables *aaa*, *bb*, *ccccc*, and *ddd* are:

aaa For analog, it is blank. For digital, *aaa* can be:
- ENC – encrypted
- UNE – unencrypted

bb The current epoch authorization reason in the current_epoch_auth_reason field (hexadecimal):

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

ccccc INIT – Initialized state
CONFI – 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

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

```
RENEWABLE SECURITY

TVPC NOT REQUIRED
CRYPTO                    NOT MATED
STATUS                    00
VERSION                   00
```

The Renewable Security fields are:

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: **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 Diagnostics

This diagnostic shows the upstream status and operating parameters. They differ depending on whether the STARVUE II RF return or the optional telephone modem return is in use.

RF Return (STARVUE II) Diagnostics

```
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
```

The STARVUE II Diagnostic fields are:

Field	Description	
Status	Indicates the transmitter status with the following variables:	
	-	Idle
	t	Transmitting
Frequency	The transmitting frequency.	
Level	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. *The variable –## is the number of unsent transactions.*
	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: ▪ 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. ▪ 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.	

Telephone Modem (STARFONE) Diagnostics

```
TELEPHONE MODEM

TYPE:                    STARFONE 14.4K

PARAMETERS             : VALID
BAUD RATE              : 300
DATA FRMT              : 8, EVEN

PHONE NUMBERS
#1                     : 3435556666
#2                     : 3435556667

LAST POLL REQ          : 170
6-15-2001  20:49:33
LAST POLL ACK          : 170
6-15-2001  20:49:33

BUSY COUNT             : 0
NO ANSWER COUNT        : 0
LOST CARRIER COUNT     : 0

CARRIER                :

STATUS:
  HANGUP-NORMAL
```

The Telephone Modem fields are:

Field	Description
Type	Displays the modem type and speed.
Parameters	The telephone parameter status: NOT SET, VALID, or SET
Baud rate	Displays the modem baud rate (300)
Data Frmt	Displays the modem protocol.
Phone Numbers	Displays the numbers that the modem will dial.
Last Poll Req	Displays the sequence number of the last poll request received by the set-top. The time of the last poll request is displayed immediately below `LAST POLL REQ`. If the set-top received no poll request, the sequence number and time stamp fields display N/A. If a poll request has been received by the set-top but the system time of the set-top has not yet been initialized, the time stamp field displays “Not available.”
Last Poll Ack	Displays the sequence number of the last poll acknowledge received by the set-top. The time stamp of the last poll acknowledge is displayed immediately below `LAST POLL ACK`. If the set-top received no poll acknowledge, the sequence number and time stamp fields display “N/A.” If the set-top received a poll acknowledge but its system time is not yet initialized, the time stamp field displays `NOT AVAILABLE`.

Field	Description
Busy Count	Number of detected line busy errors during phone modem dialing
No Answer Count	Number of detected no answer errors during phone modem dialing
Lost Carrier Count	Number of detected carrier lost during modem transmission
Carrier	N/A

The following diagnostics display on the front-panel LED *only:*

- STARFONE transmitter status:

1st Digit	2nd Digit	Meaning
h	*	On hook (* = hang-up code)
t	–	Test for line available
d	–	Dialing
A	–	Waiting for answer
c	**R**	Communicating, receiving
c	**T**	Communicating, transmitting
c	–	Communicating, idle
r	*	Waiting for retry (* = hang-up code)

- Hang-up code

Code	Status
–	Normal hang-up
A	Answer time-out
r	Phone ringing
c	Carrier loss
L	Line in use
E	Errors (data)
U	User line request
P	Parameters invalid
t	Data timeout
C	Communication protocol fault

- IPPV status indicator

OSD	Mode
ENABLED	IPPV enabled
UNSENT	This set-top contains unsent IPPV transactions
DISABLED	IPPV disabled

d 10: Application (APP) Code Modules

This diagnostic displays the downloaded code modules. This can be a multi-page display. Press **SELECT** to display additional pages. A sample OSD screen for a set-top containing ROM is:

```
APP CODE MODULES
MODULE      VER       STATUS      ID
050-0109    1.09      ENABLED     0001
Appl_____   02.00     DOWNLD      07DA
```

The APP Code Modules fields are:

Field	Description
Module	The object name
Version	The object version
Status	The STATUS modes available are: ▪ LOADING ▪ DELETED ▪ ENABLING ▪ ENABLED ▪ DSABLNG ▪ DISABLD ▪ DELETNG ▪ POSTPND ▪ ENNORUN ▪ DISNORUN
ID	The object AppID

d 11: Memory Status

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

```
MEMORY STATUS

EEPROM VER.NO.                00.00

                   PLATFORM     APPLICATION
NVMEM              236k         20k
DRAM               8192K        8192K
CODE/DATA
FLASH              1024K        1024K
```

The Memory Status fields are:

Field	Description
EEPROM Ver. No.	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.

d 12: Interactive Info

This diagnostic tool gathers data about your system:

```
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
```

The Interactive Info fields are:

Field	Description
IP	The set-top IP address assigned by the NC 1500, in dotted-decimal format; for example, *xxx.xxx.xxx.xxx* where each *xxx* ranges from 000 to 255.
UPM	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	The set-top transmission parameter assigned by the DAC 6000. It is a four-digit value ranging from 0000 to 9999 displayed in hexadecimal format.
Downstream ID	The set-top transmission parameter assigned by the DAC 6000. It is a four-digit decimal value ranging from 0000 to 9999 displayed in hexadecimal format.
State	The state mode can be 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, or 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 Socket Port State can be UNUSED, OPENED, READY, RECVING, or SENDING.

d 13: MAC Frequency Table

The set-top uses a range of frequencies set by the host for upstream communications. The MAC Frequency Table displays your frequency and signal power:

```
MAC FREQUENCY TABLE
FREQ        POWER
```

The MAC Frequency Table fields are:

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

d 14: Control Channels

This diagnostic lists channels, band types, PIDs, and counts.

```
Control Channel Info
CHN   BAND   PID    Cnt     Ovfl  Err
0     INB    0000   1       0     0
1     INB    00A9   2198    0     0
.
.
8     OOB    0777   15207   1     0
```

d 15: Message Types

This diagnostic lists message types, IDs, and counts:

```
MESSAGE TYPES (hex data)
Msg          Id     Cnt    Msg    Id    Cnt
0            -      216    9A     E     0
1            2      89     A0     15    0
```

The Message Types fields are:

Field	Description
Msg	The message type.
Id	The low order byte of the Connection ID.
Cnt	The number of messages received.

d 16: In-band Program Association Table (PAT)

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

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

d 17: In-band Program Map Table (PMT)

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

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

d 18: Task Status

This diagnostic lists tasks. (For Motorola use only.)

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

d 19: USB Diagnostics

This diagnostic is used to verify the functionality of the USB port. (For Motorola use only)

```
USB DIAGNOSTICS
Wind River Systems
OHCI   Root   Hub
```

d 20: In-band Multicast Address Filter

This diagnostic displays in-band multicast filter information:

```
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
```

The In-band Multicast Address Filter fields are:

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

d 21: Keyboard / LED Diagnostics

You can use this diagnostic to verify that the buttons on the set-top front panel are operational. For example, the "<" on the diagnostic should highlight when you press the left CURSOR button on the front panel.

```
     KEYBOARD / LED DIAGNOSTICS

G    <    >    V    ^    Î    M    S    B    -    +    P
```

Abbreviations and Acronyms

CSR	Customer Service Representative
DCT2500	Digital Consumer Terminal 2500
EMM	entitlement management message(s)
EPG	electronic program guide
HRC	harmonically related carriers
IPPV	Impulse Pay-Per-View
IR Blaster	Infrared Blaster
IRC	incrementally related carriers
MPAA	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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