



PIONEER COMMUNICATIONS OF AMERICA, INC.



See Inside this Reference Guide for:

*Level I — Manual Control of the LD-V8000 Videodisc Player*

*Level III — Computer Control of the LD-V8000 Videodisc Player*

# LD-V8000

INDUSTRIAL LASERDISC PLAYER

**LEVEL I & III**

USER'S MANUAL

PROGRAMMER'S REFERENCE GUIDE

**LD-V8000 Level I & III Documentation**  
**For Manual and Computer Control**

**Note to Users**

This manual is based on the most up-to-date information for Level I and Level III program development and delivery on the LD-V8000 available at the time of publication. It is subject to change without notice. Although every reasonable effort has been made to include accurate information, the statements in this document are not warranties.

Pioneer Communications of America, Inc., makes no warranty or claims as to the accuracy, completeness or fitness for any particular purpose of the technical information provided herein. Throughout this manual **NOTES** appear reflecting details of the particular player functions which may be different on future players. The **NOTES** are included to aid understanding, but should not be depended upon in designing applications.

Please fill out the Registration Form on the next page and return it to us to insure that you receive updated versions of the Level I & III Manual for the LD-V8000, and related support materials as they become available. Also, comments, observations, and/or corrections regarding this document would be appreciated.

As of October 17, 1990, Pioneer implemented a version upgrade to the LD-V8000, all players manufactured after that date, with the serial numbers above KJ3906076, contain software modifications on EPROMS, #DYW 1119 & #DYW 1120 and above. The LD-V8000 version upgrade player returns the model name #P150604 when queried under external computer control. An EPROM Upgrade Kit is available for customers with LD-V8000's manufactured before October 17, 1990. Since then there have been several running EPROM Upgrades. EPROMs #DYW 1202 and #DYW 1194 and above contain two new features, Interleaved Video Playback capability and LaserBarcode 2 capability.

Please see **Appendix F** of this manual for information about the Version Upgrade; **Appendix G** for information about ordering the latest EPROM Upgrade Kit; **Appendix H** for information about Interleaved Video Playback; **Appendix I** for information on LaserBarcode 2 Standard Command Set and Logo.

For more information on Level II Internal Program Control for the LD-V8000, refer to the **LD-V8000 Level II User's Manual /Programmer's Reference Guide**. The Level II Manual for the LD-V8000 is available from Pioneer New Media Technologies, Inc., Multimedia Systems Division, Technical Support/systems Integration.

For additional information or technical support call: Pioneer New Media Technologies, Inc., Multimedia Systems Division, Technical Support/Systems Integration

**Pioneer New Media Technologies, Inc.** 310/952-2111.

**Level I & III Documentation  
For Manual and Computer Control**

**Registration Form**

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Comments:

Please return this registration form and any comments to:

Pioneer New Media Technologies, Inc.  
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**LD-V8000 LEVEL I & III DOCUMENTATION**  
***For Manual and Computer Control***

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# **1. Introduction**

**1.1 Scope of Level I & III Manual**

**1.2 Three Player Control Methods**

**1.3 Chapter Highlights**

**CHAPTER**

**1**

**LD-V8000**

**LEVEL I & III**

USER'S MANUAL

Programmer's Reference Guide

# 1 Introduction

Please refer first to the **Operating Instructions**, packaged with the LD-V8000, for essential information about player operation and safety.

## 1.1 Scope

This manual is a reference guide to assist programmers and developers in using the Pioneer Industrial Laser Videodisc Player, Model LD-V8000, marketed by PioneerNew Media Technologies, Inc., Long Beach, California. It contains information for basic Level I direct player control using the front panel buttons, either of two remote control units (the RU-V6000T or the RU-V103), or a Pioneer LaserBarcode Reader (UC-V104BC, UC-V108BC or the UC-V109BC). It also contains technical information to assist programmers in the design and development of Level III program applications to run under computer control.

The LD-V8000 is the most advanced videodisc player on the market today. It's video memory buffer enables a whole new range of "CLV interactive" capabilities. The LD-V8000's video memory buffer makes possible: CLV "freeze frame", sound-over-still, CLV multi-speed play; and "Frame Accurate" searches on CLV discs with extended 24-bit code.

As of May 1992, players with EPROMs #DYW 1202 and #DYW 1194 and above offer interleaved video playback to extend the length of playing time on a CAV or CLV disc. Two new commands were added to the Level III command set to make interleaved video playback possible. See Chapter 4 and Appendices G and H for details.

Other features that set the LD-V8000 player apart are: Four channels of audio output, two analog and two digital; an internal composite sync generator for syncing multiple players together; two video output signals for playback on two monitors simultaneously; built-in LaserBarcode capability; and an EFM port, for connection to the LD-ROM Adapter (DA-V1000).

All Pioneer Industrial Laser Videodisc Players (Models LD-V8000, LD-V4400, CLD-V2400, LD-V2200, LD-V2000 and the discontinued LD-V4200, LD-V6000A and LD-V6010A series) can be used as stand-alone systems. When connected to a television or video monitor, they become self-contained interactive audio-video retrieval and display systems for Level I use. They may also be connected to and controlled by an external computer for Level III applications, often working in conjunction with computer databases. How to control the LD-V8000 as part of a Level I or Level III delivery system is the main focus of this Manual.

The LD-V8000 also has Level II capabilities: Programs can be created and loaded into the player's memory so that complex interactive instructional materials may be presented, without requiring a computer at every workstation. Those planning to develop Level II programs for the LD-V8000, should familiarize themselves with

the concepts and operational details in this manual and then refer to Pioneer's **LD-V8000 Level II User's Manual/Programmer's Reference Guide, V. 1.1 8/92**, for internal program control.

The LD-V8000 player can be used for **Level I**, **Level II**, and **Level III** control. The three control methods are: **Level I** — Control using a Remote Control Unit (RU-V6000 or RU-V103), using the player's Front Panel Buttons or using a Pioneer Barcode Reader (UC-V104BC, UC-V108BC or UC-V109BC). **Level II** — Control by loading Level II programs into the player's memory. **Level III** — Control by sending commands from an external computer to the player via the RS-232 serial interface.

The LD-V8000 supports the LaserVision Standard for CAV or CLV discs allowing development of either Level I, II or III applications. It supports the LaserBarcode 2 Command Set for Level I control. It also has an RS-232 interface and uses the same Level III mnemonic command protocol introduced in the LD-V4200 and also available in the LD-V2200, CLD-V2400, LD-V4400 and the LD-V4300D. See **Technical Bulletin #143A**, for Pioneer Industrial LaserDisc Player Command Comparison Chart.

## 1.2 Level I, Level II, and Level III

Levels I, II and III describe delivery platforms for interactive videodisc applications:

- A **Level I** system consists of a videodisc player and a monitor. It is controlled by using the front panel buttons on the player, a remote control unit or a Pioneer Barcode Reader. Level I is used mainly for playing videodiscs continuously, for simple searches, for searching to a specific series of frames and stepping through them, or for playing discrete motion video segments.
- **Level II** systems are comprised of various hardware configurations. A Level II system may consist of only a videodisc player with a programmable memory and a monitor, or a programmable videodisc player, a monitor, a touch screen, printer, etc. In Level II, these systems are controlled by loading a Level II program into the memory of the player from either a program encoded on a videodisc, or by sending ASCII-Hex commands to the player's memory from the remote control unit or via the RS-232 interface from an external computer. Not all videodisc players support Level II applications. See **LD-V8000 Level II User's Manual/Programmer's Reference Guide V. 1.1 8/92**.
- A **Level III** system generally consists of an LD player, a monitor and a computer. The system is controlled by the computer. This is a complex interactive system allowing access to computer data as well as access to audio-video material on the videodisc.

See **Figures 1-A, 1-B, 1-C, 1-D** on pages 1-3 through 1-6.

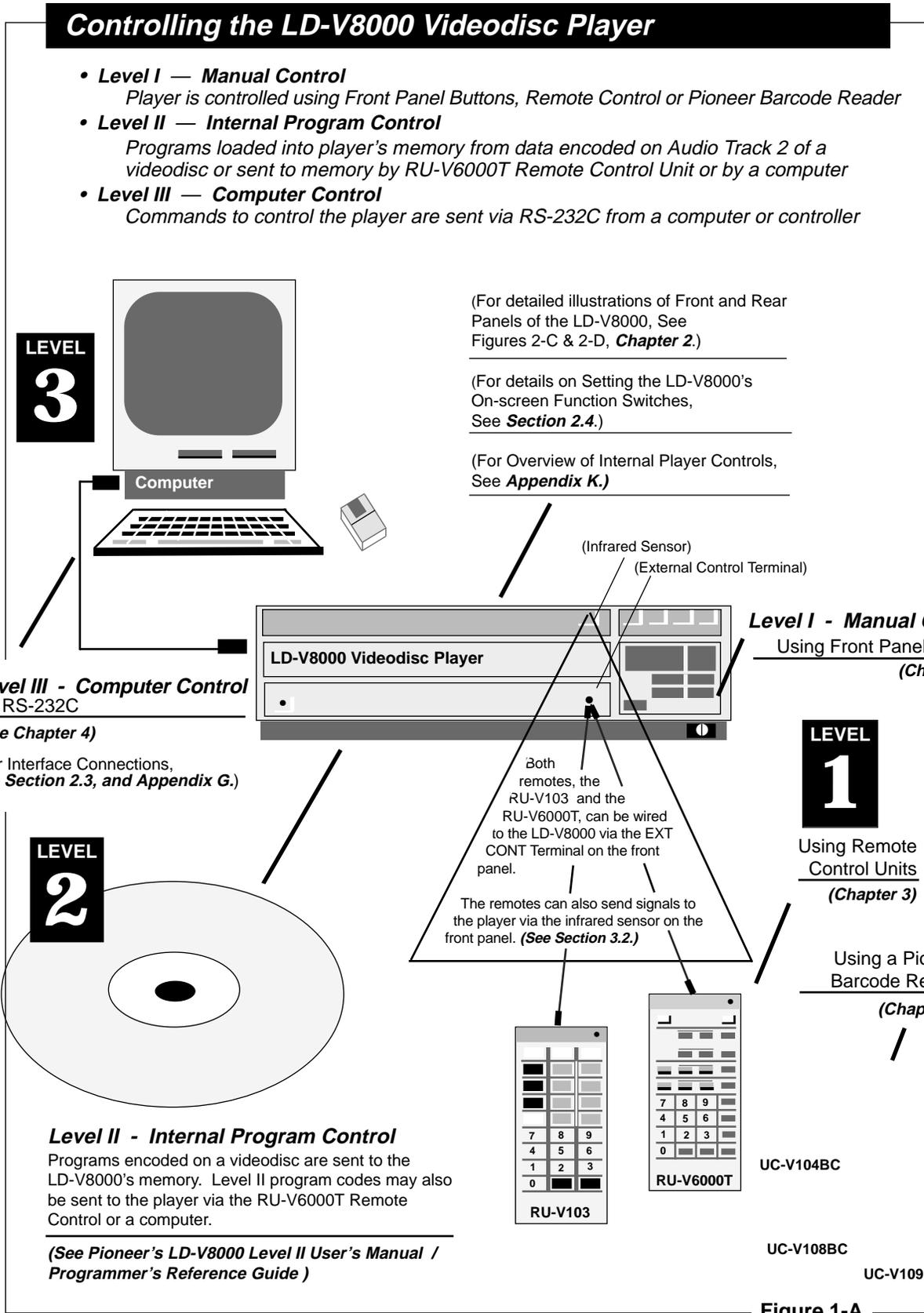
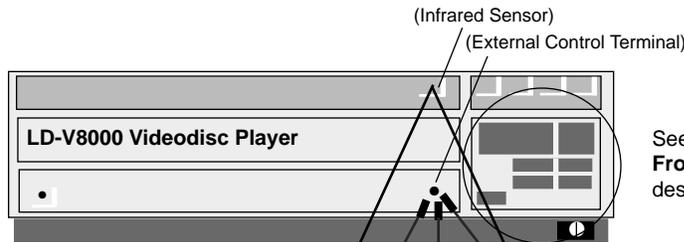


Figure 1-A

## Level I — Manual Control

In Level I, the player is controlled by using Front Panel Buttons, Remote Control Units on the RU-V6000T or the RU-V103, or scanning LaserBarcode2 commands. Manual Control (Level I) allows simple control of the videodisc player using such commands as Play, Stop, Still, Step Forward, etc.

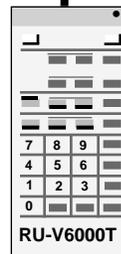
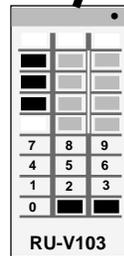
**LEVEL**  
**1**



See **Front Panel Buttons** described below

### Remote Control Units

For Manual Control, either of two optional remote control units, the RU-V6000T or the RU-V103, can be used to control the LD-V8000 by sending an infrared signal to the player's infrared sensor, or by sending signals via a wired connection to the EXT CONT Terminal on the front of the player.



### Barcode Readers

Pioneer Barcode Readers, UC-V104BC, UC-V108BC, and UC-V109BC can also be used to send commands to the LD-V8000 via infrared signal. These units can also send the signal through the EXT CONT Terminal on the front of the player.

UC-V104BC

UC-V108BC

UC-V109BC

#### OPEN /CLOSE

Opens and closes disc drawer.

#### DISPLAY

Turns on-screen display ON / OFF. (Also used with Power-ON button to set On-Screen Function Switches.)

#### POWER ON/OFF

Powers the player ON / OFF.

#### PLAY

Spins-up & plays videodisc.

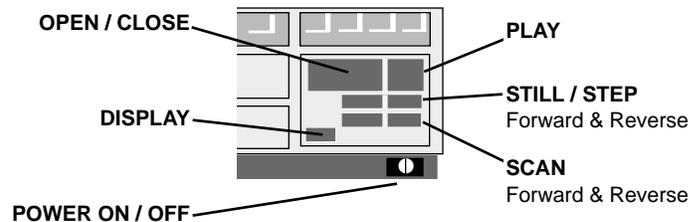
#### STILL/STEP forward & reverse

Holds a still frame / and steps forward or back one frame at a time.

#### SCAN forward & reverse

Moves rapidly forward or backward through video material on a disc.

### LD-V8000 Front Panel Buttons



For information about using the Front Panel Buttons, the Remote Control Units (RU-V6000T and RU-V103) or Pioneer Barcode Readers (UC-V104BC, UC-V108BC or UC-V109BC), or for Manual Control (Level I Control) of the LD-V8000, see **Chapter 3**.

Figure 1-B

## Level II — Internal Program Control

Usually, a Level II Program is developed and then encoded on a videodisc during manufacturing. When a Level II disc is inserted into the player, the Level II Program can be loaded into the memory of the LD-V8000 to provide pre-programmed control, allowing viewer input from a remote control or a keypad. Level II Programs may also be loaded into the player's memory from the RU-V6000T Remote Control, or from a computer. The player retains the Level II program in its memory until it is overwritten, as long as the player is plugged into a power source. If the player is unplugged, a lithium battery can maintain the Level II program in memory up to 5 years.

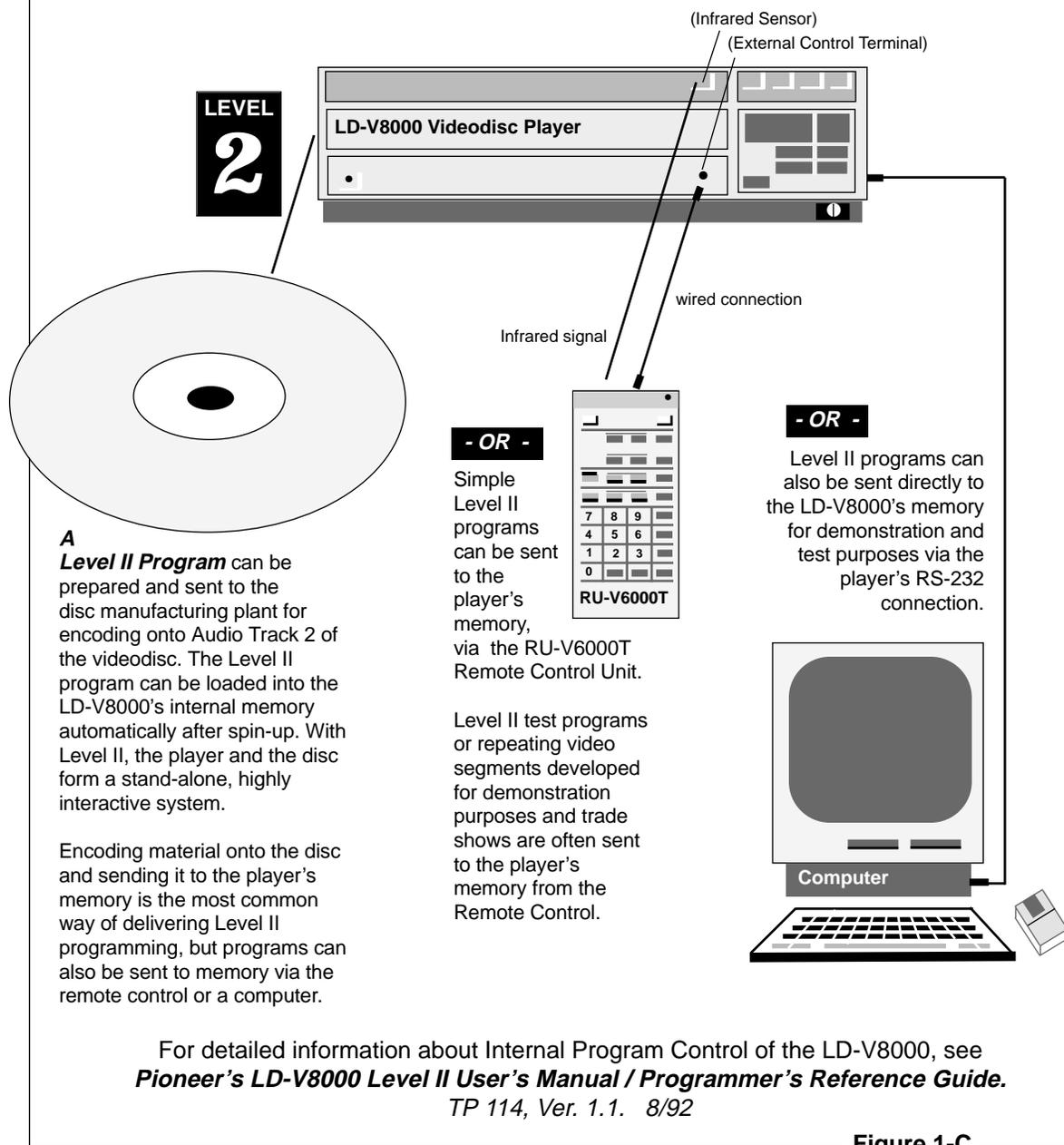
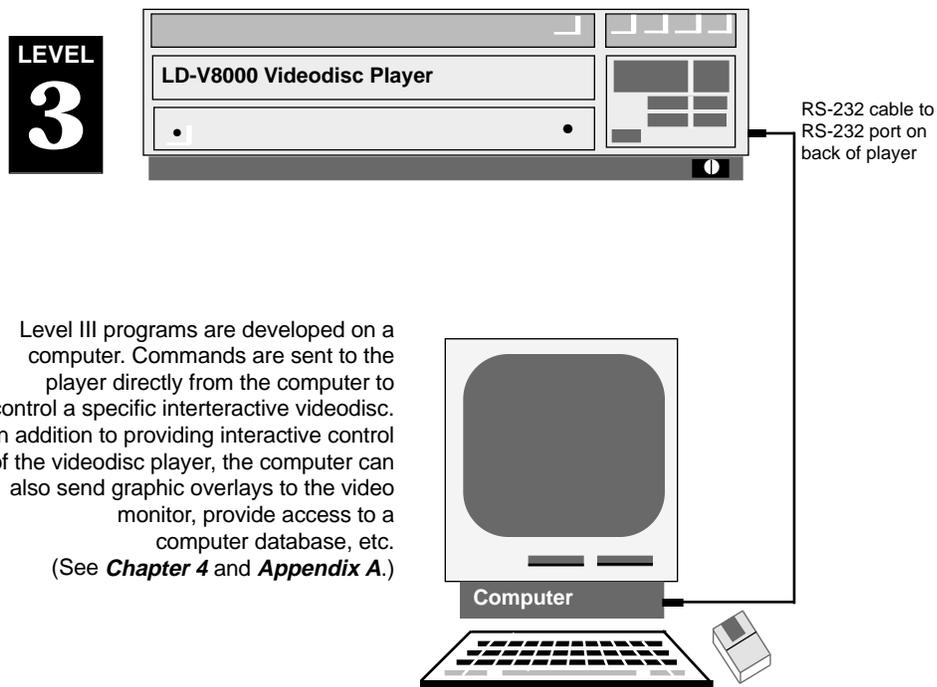


Figure 1-C

### Level III — External Computer Control

Level III programs are used to control the videodisc player from a computer attached to the player's RS-232C port. The Level III mnemonic command set is used to develop interactive programs for the LD-V8000. (See **Appendix A** for the list of mnemonic commands available on the LD-V8000.) Level III mnemonic commands are also used to control the LD-V4400, CLD-V2400, LD-V2200, LD-V4300D, and the discontinued LD-V4200. Level III is used when a program designer wants users to have access to a large computer database, along with video and audio material. Level III requires that a computer be connected to every videodisc player. A file server may be used to network the computers at the various workstations.



For detailed information about External Computer Control of the LD-V8000, see **Chapter 4** and **Appendix A** of this manual.

Figure 1-D

### 1.3 Chapter Highlights

This manual provides:

- An overview of player operating processes.
- How to customize player functions by using On-Screen Function Switches and On-Screen Status Displays.
- Specific information on Manual and Computer control.

It is divided into chapters providing the following information:

#### **Chapter One — Introduction**

This chapter describes the scope and overview of the *Pioneer LD-V8000 Level I and III User's Manual* and explains how information is organized. It also defines Level I, II, III as they relate to three different hardware configurations, each allowing different methods of player control.

#### **Chapter Two — Operational Basics**

This chapter gives an overview of the player's internal operating processes, describing *Operating Modes* and *Active States*, and the front panel indicators. It also describes player interfaces: The infrared sensor, used to receive infrared remote control signals; the External Control (EXT CONT) terminal, used to receive wired remote control signals; and the RS-232C serial interface connector. There is also a detailed section about On-Screen Function Switches. On the LD-V8000 the function switches are set on-screen, rather than with dip switches, as on previous players. The last section describes the On-Screen Status Displays.

#### **Chapter Three — Manual Control — Level I**

This chapter describes the player's front panel buttons, the remote control buttons on the RU-V6000T and the RU-V103, and Pioneer Barcode Readers. All of these can be used for Level I control of the LD-V8000.

#### **Chapter Four — External Computer Control — Level III**

This chapter explains how commands are sent to the LD-V8000 from an external computer, what error messages may be returned, the default settings, a basic list of Level III commands and descriptions of each command.

Commands are described by categories: Player Control Commands, Player Control Switch Commands, Display Control Commands, Request Commands, Video Memory Commands, Communication Control Commands, Register Control Commands, Input/Output Device Commands and Commands to prepare the player for Level II Programming.

For additional information see the attached Appendices:

- Appendix A:** *Level III Commands for the LD-V8000*
- Appendix B:** *Alphabetical Listing of Level III Commands*
- Appendix C:** *LD-V8000 Remote Control Units*
  - *RU - V6000T*    • *RU - V103*
- Appendix D:** *LD-V8000 Cable Specifications*
- Appendix E:** *Establishing RS-232C Communications for Level III Player Control*
- Appendix F:** *LD-V8000 EPROM Upgrades; 1990 Version Upgrade*
- Appendix G:** *Sound-Over-Still Operations*
- Appendix H:** *Interleaved Video Playback*
- Appendix I:** *LaserBarcode 2 Commands & Logo*
- Appendix J:** *Using Pioneer Barcode Readers*
  - *UC-V104BC* • *UC-V108BC* • *UC-V109BC*
- Appendix K:** *LD-V8000 Internal Player Control*

Further questions should be referred to Pioneer New Media Technologies, Inc.,  
**Phone: 310-952-2111; FAX: 310-952-3031.**

## **2. Operational Basics**

**2.1 Internal Operations**

**2.2 Player Indicators**

**2.3 Interfaces**

**2.4 On-Screen Function Switches**

**2.5 On-Screen Status Displays in Manual Mode**

**CHAPTER**

**2**

**LD-V8000**

**LEVEL I & III**

USER'S MANUAL

Programmer's Reference Guide

## 2 LD-V8000 Operational Basics

This chapter provides an overview of the player's internal operations — Operating Modes and the player's Active States; Diagrams of the player's Front and Rear panels; a description of the player's Front Panel Indicators, Player Interfaces, and On-Screen Function Switches and details about each specific switch. Before developing or presenting programs on the LD-V8000, the user should read this chapter and become familiar with the introductory concepts, illustrations and operational basics. (See **Appendix K, LD-V8000 Internal Player Controls**, for more details.)

### 2.1 Internal Operations

The player's internal operating processes are classified into two groups: *Operating Modes* indicating player operation status, and *Active States* indicating player processing status.

#### 2.1.1 Operating Modes

The LD-V8000 has the following six *Operating Modes*:

- *Normal Control Mode*
- *Function Switch Setting Mode*
- *Test Mode*
- *Automatic Mode*
- *Program Mode*
- *Register Mode*

These modes are defined as follows:

##### 1) Normal Control Mode

When the LD-V8000 player power is turned on, the player enters *Normal Control Mode*. In this mode, the player can be controlled by pressing buttons on the front panel of the player, by pressing buttons on the remote control unit, by sending commands via a Pioneer Barcode Reader, or by sending commands from a computer via the RS-232C connector.

##### 2) Function Switch Setting Mode

The player enters *Function Switch Setting Mode* when the LD-V8000 player is powered-on while simultaneously pressing the front panel DISPLAY button. In this mode, function switch parameters are confirmed or modified. See **Section 2.4 On-Screen Function Switches** for details.

##### 3) Test Mode

The *Test Mode* is used for player maintenance and management. This mode is used primarily by Authorized Service Center personnel to determine key part numbers of the player and to service the player. Generally, the player is not controlled in this mode. Select or deselect *Test Mode* from page - 2 of

the on-screen function switch settings. (See **Section 2.4 On-Screen Function Switches** for details.) Or turn ON (1) bit 7 of Register C via computer control to make the LD-V8000 enter this mode. Turn OFF (0) bit 7 of Register C to change the operating mode from *Test Mode* to *Normal Control Mode*.

#### 4) Automatic Mode

In *Automatic Mode*, a Level II program stored in player memory is automatically executed. To make the LD-V8000 player enter *Automatic Mode*, spin up a Level II disc that has been encoded with a Level II program, press the RUN button on the RU-V6000T remote control unit, or send a RUN command via the RS-232C when the player is in *Normal Control Mode*. The player will look for Level II encoded data, automatically place it into memory and execute the program.

The “Level II Auto Start” On-Screen Function Switch can also be set to “Load from Disc”, “Load from Memory”, or to “OFF”. When this switch is set to “Load from Disc”, and a disc encoded with a Level II program is placed in the player and spun-up, the player will automatically load the program into memory and execute the program. (See **Section 2.4.1 Setting On-Screen Function Switches**.)

The operating mode of the player changes from *Automatic Mode* to *Normal Control Mode* when a HALT command is executed.

#### 5) Program Mode

In *Program Mode*, a Level II program is written and modified in memory. Press the PROGRAM button on the RU-V6000T remote control unit or send commands from a computer via the RS-232C when the player is in *Normal Control Mode* to make it enter *Programming Mode*. Input an END command from the RCU to stop programming and to change back to *Normal Control Mode*. Press any key on the computer keyboard to exit *Programming Mode*. Press the RUN button on the RU-V6000T remote control unit to execute the program entered, or send the RUN command from an external computer.

#### 6) Register Mode

In this mode, the registers referred to during the execution of a Level II program are written or modified. Send a RECALL command from the RU-V6000T to make the player enter *Register Mode*. Input a CLEAR command from the RU-V6000T to change from *Register Mode* to *Normal Control Mode*.

(For information about Level II Programming on the LD-V8000, see Pioneer’s **LD-V8000 Level II User’s Manual/Programmer’s Reference Guide v.1.1 8/92**.)

See **Figure 2-A** on the next page, describing LD-V8000’s operating modes.

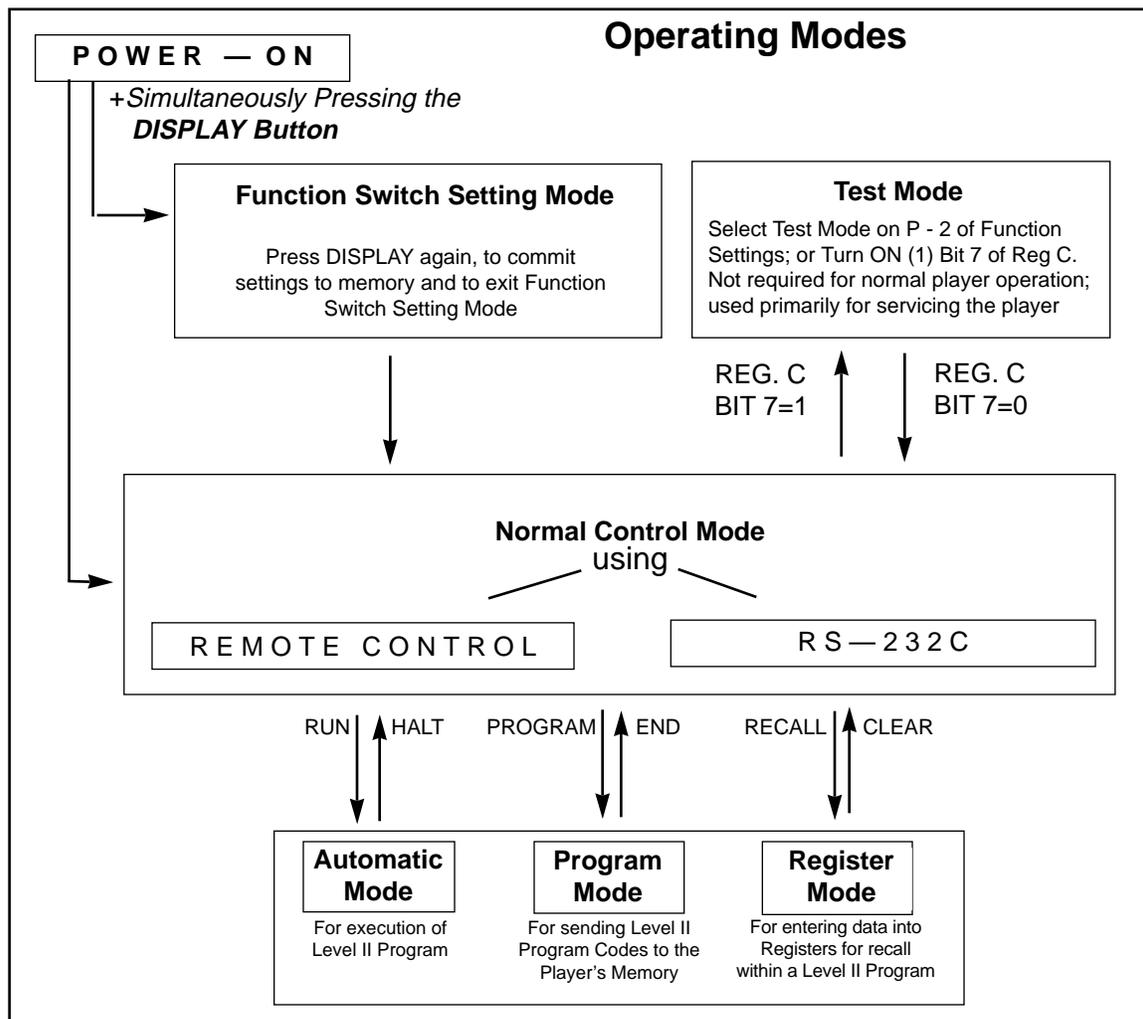


Figure 2-A

### 2.1.2 The Player's Active States

LD-V8000 processing is performed within several distinct *Active States*. When a command is executed, the *Active State* changes inside the player. If you consider player processing as a series of events within the *Active States* listed below, it is easier to understand the effects of various commands.

The Player's five main *Active States* are:

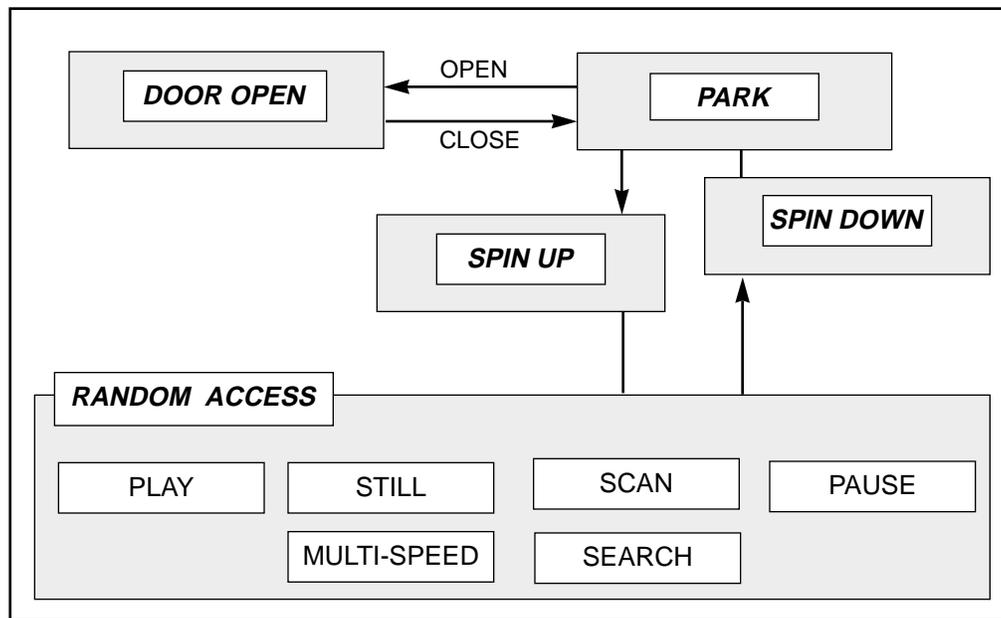
- *Door Open*
- *Park*
- *Spin Up*
- *Spin Down*
- *Random Access*

The player is in *Door Open* before the disc is loaded into the disc tray. If a disc is in the disc tray and Power-On Start and Load Start On-Screen Functions are OFF, and the door is closed, the player enters *Park*. When a START or PLAY command is input while the player is in *Park*, the disc starts rotating and the player enters *Spin Up*. When the player is ready to play images, it enters *Random Access*. *Random Access* is further divided into *Play*, *Still*, *Scan*, *Pause*, *Multi-Speed*, and *Search*.

Special effects such as Freeze Frame, Multi-Speed, Sound-Over-Still, etc. are possible only when the player is in *Random Access*.

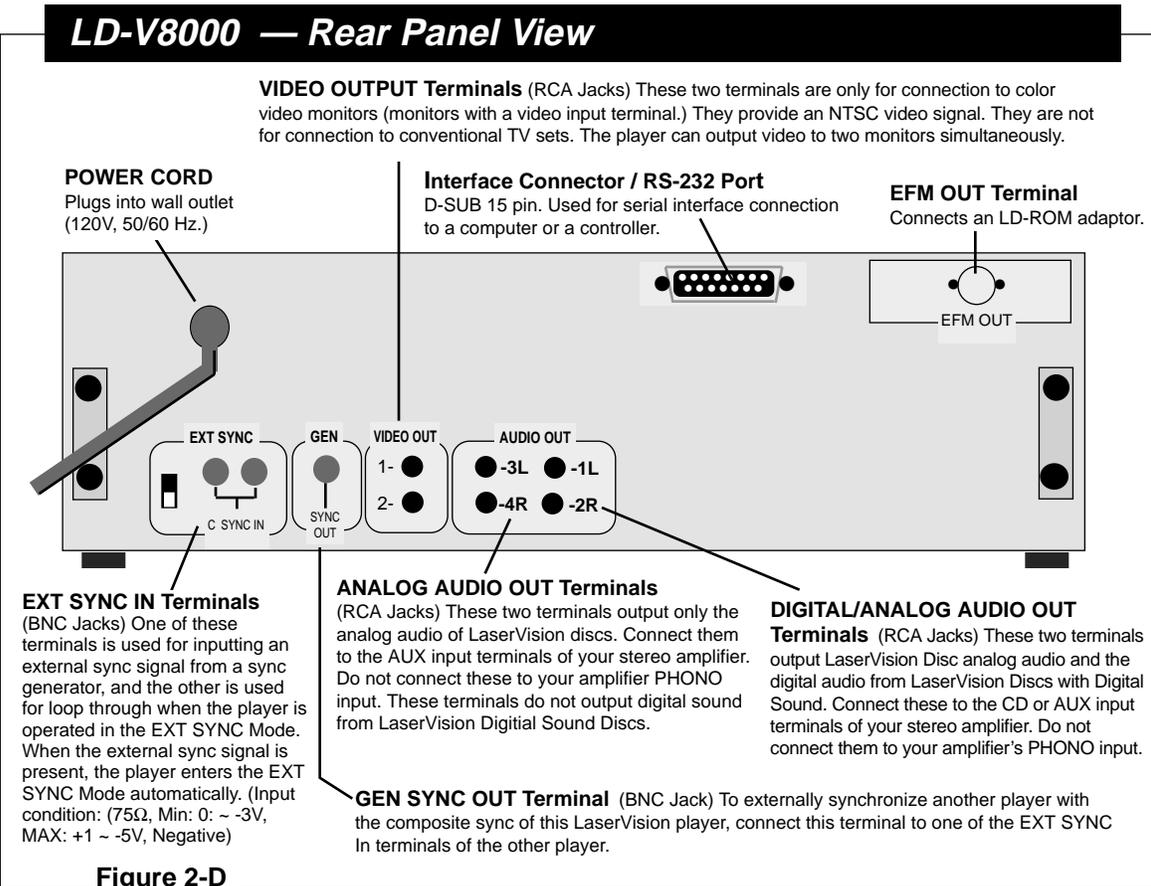
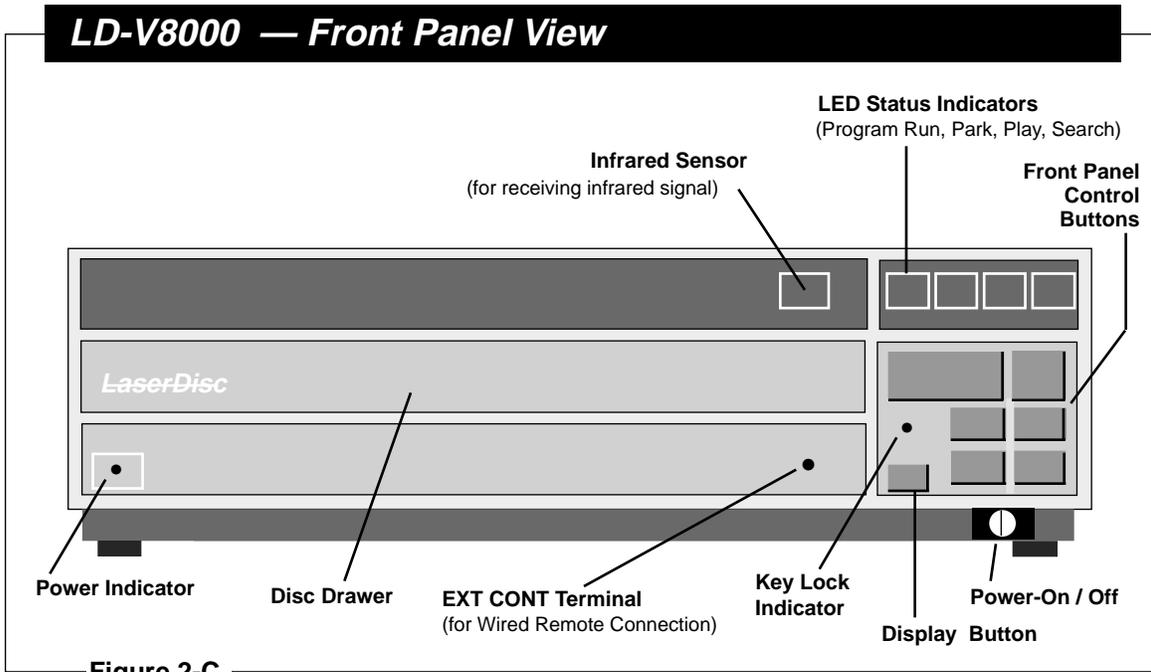
When a REJECT command is input, the player enters *Spin Down*, image playback stops immediately, and disc rotation is gradually stopped, then the player enters *Park*. The **Figure 2-B**, below, describes how the active states change within the player.

*Transitions from one Active State to another*



**Figure 2-B**

See illustrations of the front and rear panels of the LD-V8000 videodisc player on the next page. These will be referred to in subsequent sections of this manual.



## 2.2 Player Indicators

The LD-V8000 has six indicator lights on the front panel. This section explains these indicators. (See diagram of LD-V8000's Front Panel, **Figure 2-C**, on page 2-5.)

### **Power Indicator (red)**

The Power Indicator lights up when the player power is turned on.

**Program Run Indicator (green)** — Depending on the active mode, the Program Indicator light provides different information. In *Random Access Mode*, the Program Indicator is on only when a Level II program is being executed. In other modes, this light indicates whether a Level II program is automatically being loaded and executed. The Program Indicator is OFF if there is no Level II program to be automatically loaded or executed.

**Park Indicator (green)** — The Park Indicator lights up if the player is in *Park* and a disc has been placed in the drawer. It blinks while the player door is opening or closing.

**Play Indicator (green)** — The Play Indicator lights up when the player is in *Random Access Mode* and a search is not being executed. It blinks when the player is in *Spin Up*, *Spin Down*, or *Random Access Mode* and when the lead-in or lead-out area is reached.

**Search Indicator (green)** — The Search Indicator lights up only when the player is searching.

**Key Lock Indicator (red)** — The Key Lock Indicator lights up if a command has been sent to the player to lock the front panel control buttons, preventing them from being used during execution of a Level II or Level III program.

## 2.3 Interfaces

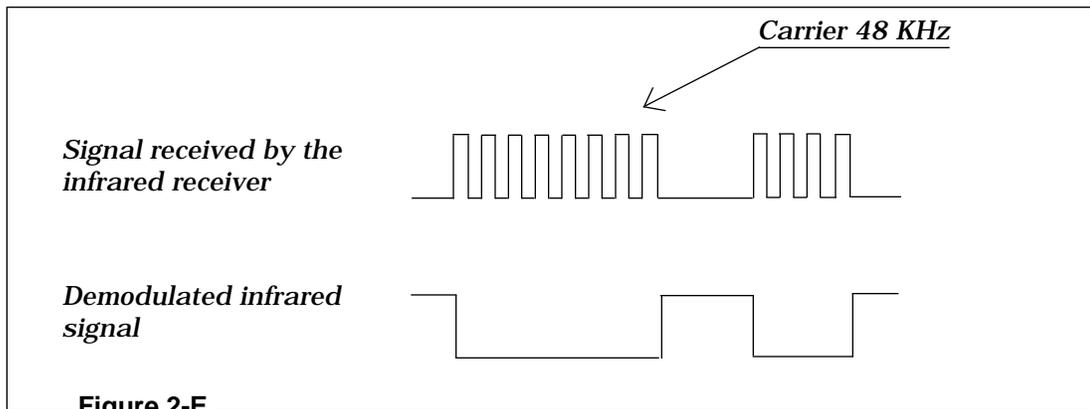
This Chapter explains the LD-V8000's three interfaces that allow control signals to be received by the player:

- The **remote sensor** receives infrared signals from the either of the RU-V60000T or the RU-V103 remote control units, or from Pioneer Barcode Readers;
- The **EXT CONT terminal** receives signals from a wired connection to either of the remote control units, or to a Pioneer Barcode Reader.
- The **RS-232C port** receives signals from a computer via the appropriate RS-232C cable. See **Section 2.3.2**, page 2-9, and **Appendix D** for more information about cable connections.

(Please refer to diagrams of the Front and Rear Views of the player **Figures 2-C** and **Figure 2-D** on page 2-5 to locate each interface.)

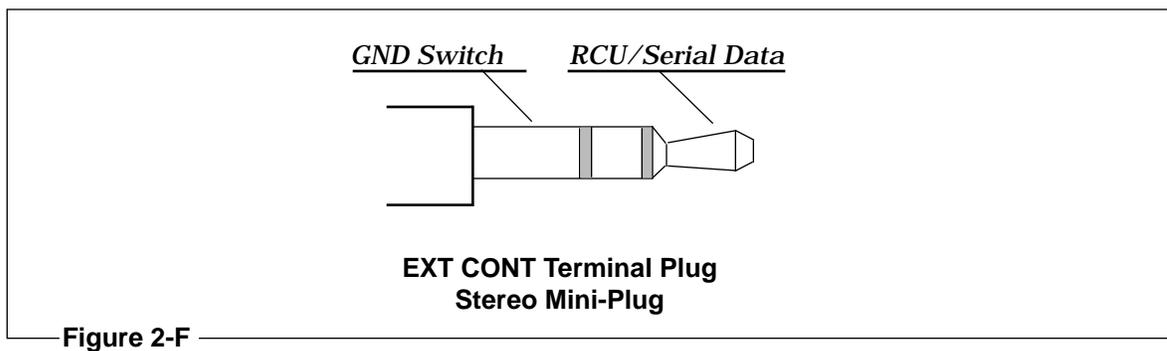
### 2.3.1 Remote Sensor and the External Control Terminal

The infrared sensor and the external control (EXT CONT) terminal on the front of the player are the interfaces that receive input from the remote control units RU-6000T, RU-V103 and Pioneer Barcode Readers. Both remote control and barcode



commands sent from these units are transmitted in serial data streams. **NOTE:** The remote sensor and the EXT CONT terminal cannot be used simultaneously. The infrared sensor receives the RCU signals on a 48-KHz carrier, removes the carrier, shapes the waveform, and outputs the shaped waveform. (See **Figure 2-E.**)

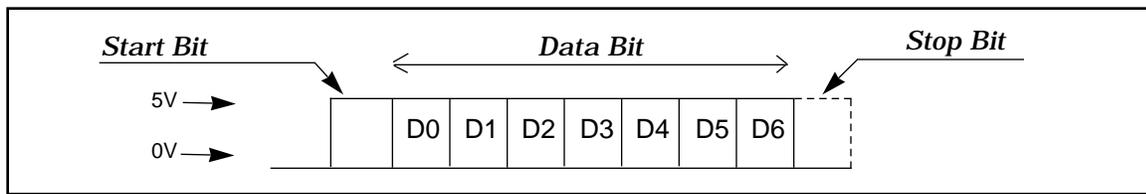
The stereo mini-plug (**Figure 2-F**) is used to input a signal to the EXT CONT terminal providing a wired connection for the remote control units (RU-V6000T, RU-V103) or a Pioneer Barcode Reader. GND Switch Data, or RCU/Serial Data are input as signals as shown in **Figure 2-G**, on the next page. RCU/Serial Data is an active-low signal. The input serial data must be asynchronous, 1200-baud, no parity, 7-bit, and 1-stop bit serial data. The TTL level is used for the signal level.



**Serial Signal**

The Ground Switch Signal is used to make either the infrared sensor or EXT CONT terminal active. The TTL level is used for the input level. The EXT CONT terminal becomes active when the signal is low (or is closed). The infrared sensor becomes active when the signal is high (or is open).

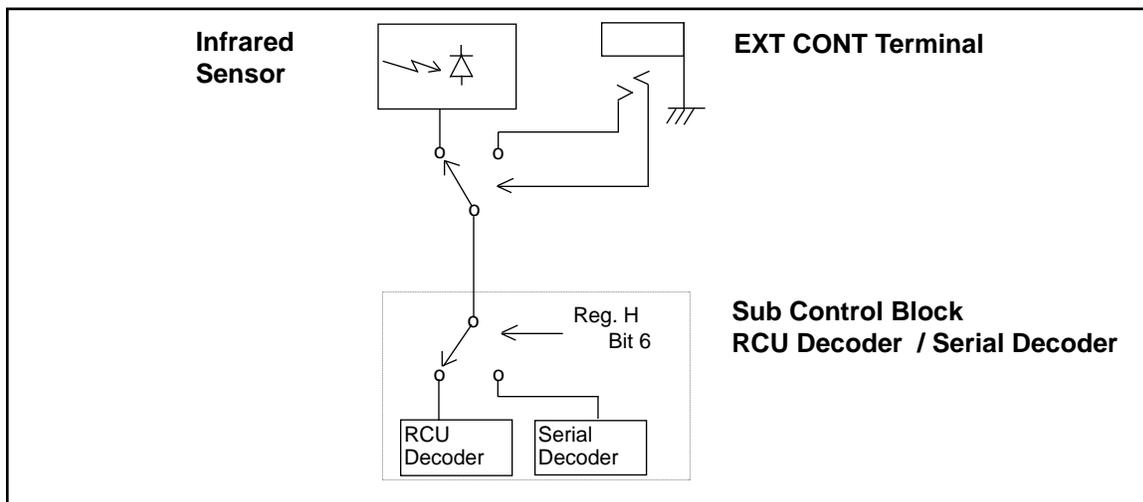
RCU/Serial Data input is decoded by the RCU Decoder or by the Serial Decoder of the sub control block. (See **Appendix K, LD-V8000 Internal Player Controls** for details; page K-4 for Control Block Diagram.) Whether the input data is RCU Data or Serial Data is determined according to bit 6 of the player's internal Register H. The RCU Decoder is selected if bit 6 is 0. The Serial Decoder is selected if bit 6 is 1.



Serial Signal

Figure 2-G

The RCU Decoder interprets both commands and responses from an input device but the Serial Decoder only interprets responses from an input device. **NOTE:** The player's RCU decoder cannot simultaneously decode signals received via the remote sensor and EXT CONT Terminal.



Infrared Sensor and EXT CONT Terminal block diagram

Figure 2-H

**2.3.2 Interface connector**

The LD-V8000 can be controlled by a computer connected to the RS-232 port on the back of the player. This section gives specific information about: 1.) The RS-232 Connector; 2.) The pin outs of the Serial Interface; 3.) Signal level of the Signal Output; 4.) Signals used for connection to a computer

**1) The RS-232 Connector:**

15-pin D-SUB connector (JAE DALC-J15SAF)

Fitting plug: JAE DA-15PF-N

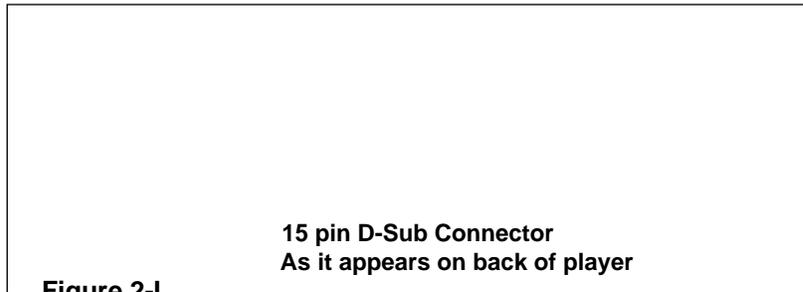


Figure 2-I

**2) Serial Interface**

**Pin Outs**

Pin #	Terminal	Input/Output	Level
1	GND		
2	TXD	OUTPUT	RS-232C
3	RXD	INPUT	RS-232C
4	DTR	OUTPUT	RS-232C
5	CTS	INPUT	RS-232C
6	No Connection		
7	No Connection		
8	No Connection		
9	TXD	OUTPUT	TTL
10	RXD	INPUT	TTL
11	GND		
12	No Connection		
13	AUX 1	OUTPUT	TTL
14	AUX 2	OUTPUT	TTL**

Figure 2-J

\* DOC = Drop Out Compensated

\*\* Internally pulled high to 5v when not used.

**2) The Serial Interface** (cont.)

**The Signal Level**

RS-232C or TTL levels can be used. The signal level for the RS-232C is  $\pm 12v$  and the TTL levels are 0 to 5v, with 5v having a logic "1" value. Signals in both levels cannot be used or connected at the same time.

**The Data type**

Parity bit: No parity, odd parity, or even parity can be selected.

Data length: 8 or 7 bits can be selected.

Stop bit: 1 or 2 bits can be selected.

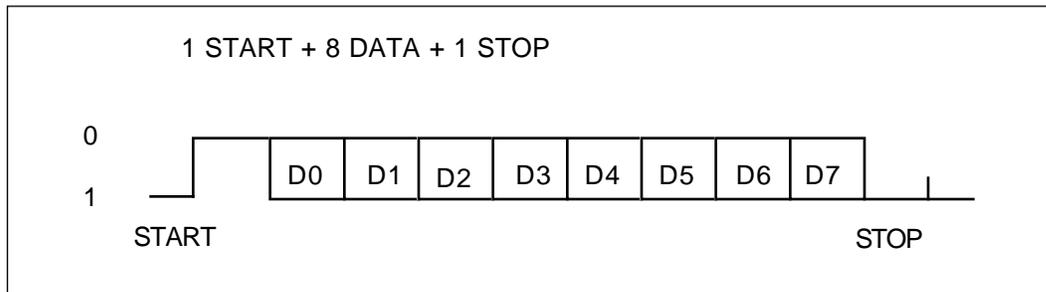


Figure 2-K

**The Transmission speed**

9600, 4800, or 1200 baud can be selected.

**3) Other Signal Output**

**The Signal Line**

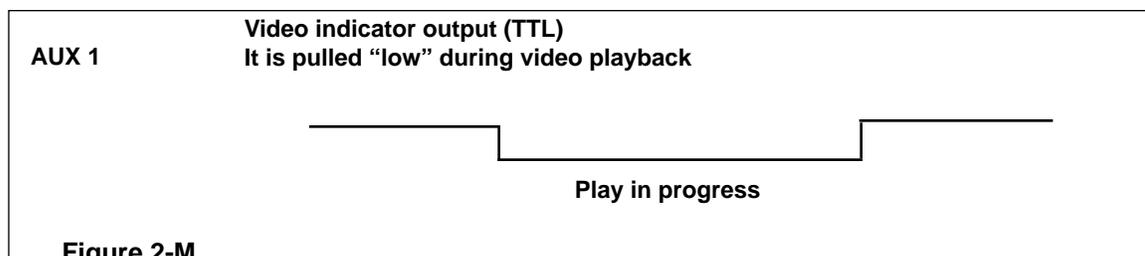
Pin #	Terminal	Input/Output	Level
11	GND		
12	No Connection		
13	AUX 1	OUTPUT	TTL
14	AUX 2	OUTPUT	TTL
15	GND		

Figure 2-L

\* DOC = "Drop Out Compensated"

### 3) Other Signal Output

#### The Signal Level



AUX 1 is pulled low only during playback or in still mode. It is not valid during a squelch or search. During these operations it is off, or pulled high. AUX 2 is an alternate output (TTL) and is pulled “high” to 5v when not in use. **Note:** The AUX 1 and AUX 2 output can be controlled by an external computer through Register H. Use the “Set Auxiliary Port” command to set the levels of AUX 1 and AUX 2.

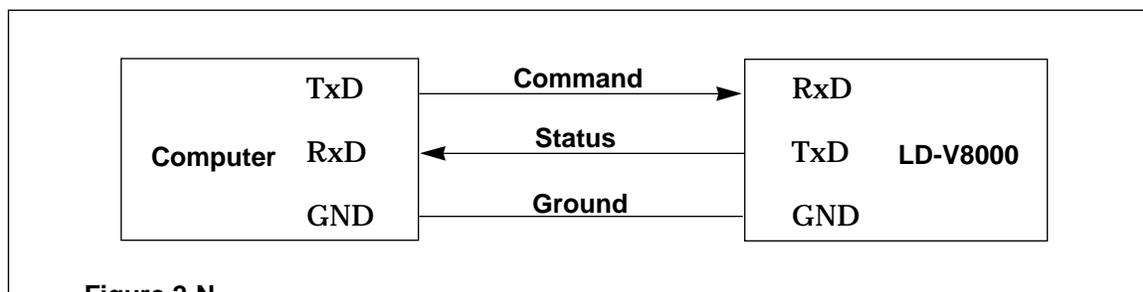
### 4) Connection with a Computer

The LD-V8000 player is connected to a computer via the RS-232C port as shown below. It is connected with three lines allowing commands to be sent from the computer to the player to control operations.

The player does not use hardware handshaking. Therefore, control or “handshaking” lines other than TxD and RxD are not required, even if the computer uses them.

Some computers, however, may require hardware handshaking. The player makes a line available to be used, as needed, by the computer. The DTR signal is always pulled high internally, within the LD-V8000.

The player is connected to the standard RS-232C port of the computer as follows:



See **Appendix D** for specific interface cable pin configurations to use to connect various computers to the LD-V8000.

## 2.4 On-Screen Function Switches

The LD-V8000 videodisc player contains no physical dip-switches for setting various function parameters. Instead, the function parameters can be set by controlling on-screen menus with the buttons on the front panel of the player, or with buttons on an RU-V6000T or RU-V103 remote control unit.

**NOTE:** Some settings can be modified by entering data into Registers from a computer via the RS-232 port. (See **Section 4.7.7 Register Control Commands.**)

### 2.4.1 Setting Function Switches

Use the following steps to set the on-screen function switches:

#### 1) Function Switch Setting Mode

First, turn the player OFF using the power button on the front of the player. Then press the DISPLAY button on the front panel of the player while turning the power back ON. This sets the *Function Switch Setting Mode* and prepares the player to receive inputs to set the on-screen function switches. (In *Function Switch Setting Mode*, the LD-V8000's front panel LEDs cycle ON and OFF.)

You will see a screen titled "KEY OPERATION P-0." This on-screen "page" explains which buttons on the front panel of the player allow you to locate, select and set the function switches. (See **Figure 2-0**, next page.)

#### 2) Setting Switches Using The Player's Front Panel Buttons or Remote Control

##### **Page Selection**

By pressing the SCAN FORWARD button you can move forward through each of the 13 pages, one at a time. The SCAN REVERSE button lets you move through the pages in reverse order. Page 1 is titled "CONTENTS P-1." This tells you the particular page on which to find the function you want to set.

##### **Item Selection**

When you locate the page that contains the function you want, press the STEP FORWARD button. This will highlight the top function on the page. Press the STEP FORWARD button until the function you want to set is highlighted. Pressing the STEP REVERSE button will toggle through the available options/parameters for that particular function, allowing you to select the setting.

##### **Modifying the Settings**

Continue through additional pages (P-2 through P-7) to set the switches to your required default settings.

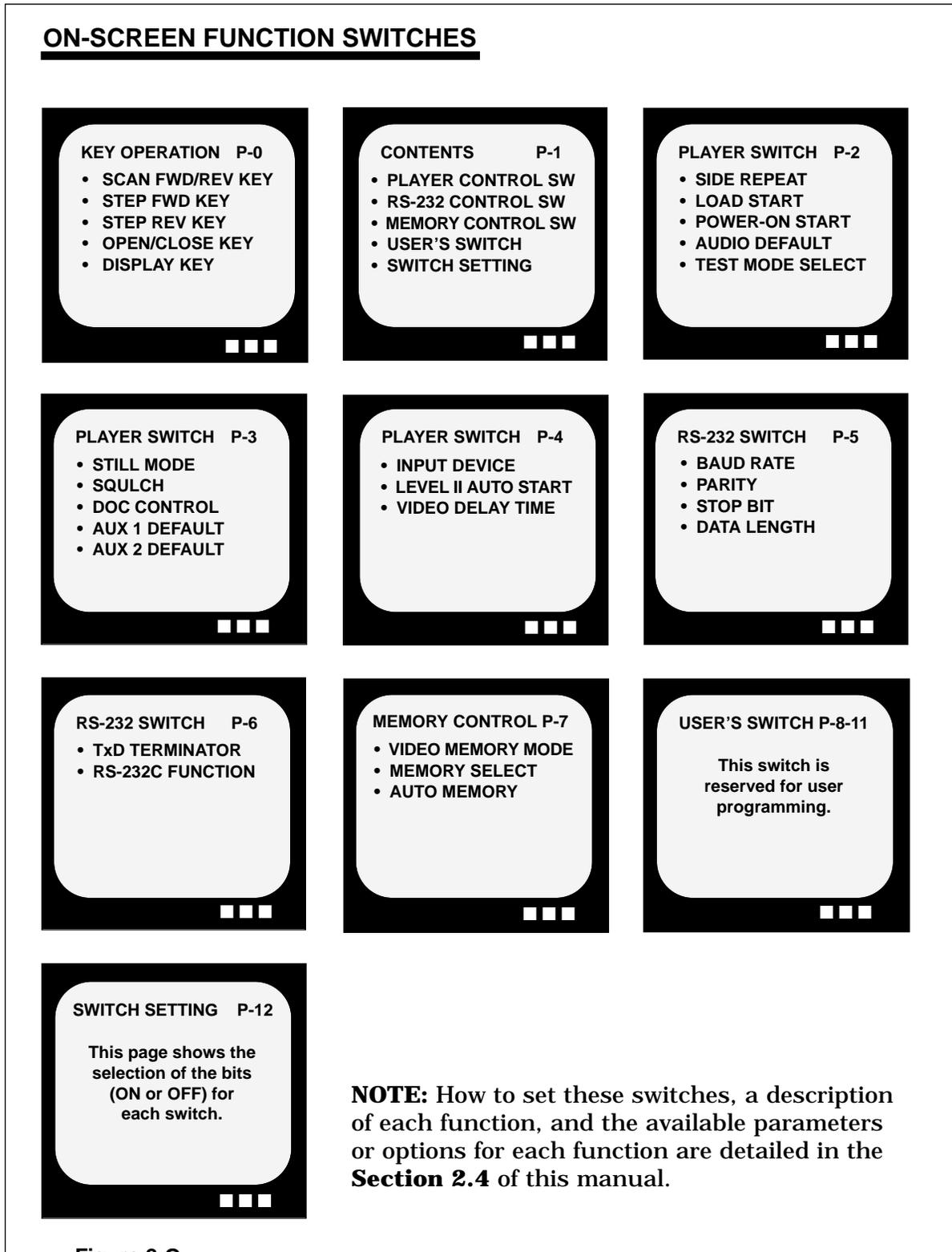


Figure 2-0

Pages P-8 through P-11 allow you to set switches 3 and 4. These switches can be set by the user and used to identify a particular player or store other information. They are not necessary for most normal player operation. Page P-12 contains a summary of the seven switch settings. This chart reflects the parameters selected in the previous pages.

***Initialization; Exiting Switch Setting Mode***

When all your switches have been set, press DISPLAY. This does two things. It saves the settings you have selected to the player's memory, and it exits *Function Switch Setting Mode*, returning the player to *Normal Control Mode*.

**NOTE:** *Turning OFF the player before the DISPLAY button is pressed will ignore any changes made and the player will default to the previous settings. Pressing the OPEN/CLOSE Button returns all settings to their defaults.*

**3. Setting the Baud Rate Using The Player's Front Panel Buttons**

Enter *Function Switch Setting Mode* by pressing Power-ON and the DISPLAY button simultaneously. Press SCAN FORWARD to move through the on-screen "pages" to page five. The top of page five reads "RS-232 Switch P-5". You will see the following functions listed:

- \* BAUD RATE (9600 is the default setting; other options are 4800 and 1200.)
- \* PARITY (No Parity is the default setting; other options are EVEN or ODD.)
- \* STOP BIT (1 Stop Bit is the default setting; the other option is 2 Stop Bits.)
- \* DATA LENGTH (8 Bit is the default setting; the other option is 7 Bit.)

Press the STEP FORWARD button to highlight the specific function you wish to change (ie. BAUD RATE, PARITY, STOP BIT, or DATA LENGTH). Then press the STEP REVERSE Button to toggle through and select the correct setting, as indicated by software you may be using with the player. Press the DISPLAY button to commit the settings to the player's memory and to exit *Function Switch Setting Mode*, returning the Player to *Normal Control Mode*.

Follow the general steps described in Sub-Point 2 (*Setting Switches*) of this section to change the settings of any of the On-Screen Function Switches included on Pages P-2 to P-7.

#### 4) Functions Listed on each On-Screen “Page”

Here is a short explanation of each of the terms you will find listed on each on-screen “page” while in *Function Switch Setting Mode*:

**NOTE:** In the descriptions of the On-Screen Menus for pages 2 - 7 that follow, the options listed under each function have the factory set default listed first. If at any time while in *Function Switch Setting Mode* you want to return to the player’s default settings, press the OPEN/CLOSE button on the front panel of the player or press the REJECT Button on the remote control. The parameters will “default” to those listed first in the following descriptions.

##### ***On Page Zero:***

###### **KEY OPERATION P-0**

- \* SCAN FWD/REV KEY----- Moves forward or backward through the pages.  
Select Page
- \* STEP FWD KEY----- Highlights the function with the parameter to be changed.  
Select Item
- \* STEP REV KEY----- Toggles through selectable options/parameters.  
Select Parameter
- \* OPEN /CLOSE KEY----- Returns all settings to the default settings.  
Initial Setting
- \* DISPLAY KEY ----- Saves settings to memory and exits *Function Switch Setting Mode*.  
Exit

##### ***On Page One:***

###### **CONTENTS P-1**

- \* PLAYER CONTROL SW. (Switch)  
P-2, P-3, P-4
- \* RS-232C CONTROL SW. (Switch)  
P-5, P-6
- \* MEMORY CONTROL SW. (Switch)  
P-7
- \* USER’S SWITCH  
P-8, P-9, P-10, P-11
- \* SWITCH SETTING  
P-12

This page describes the “Contents” of the *Function Switch Setting* menus. It identifies the pages where function settings are listed for each general topic.

For example, the functions that determine Player Control are found on pages 2, 3, 4.

**On Page Two:**

PLAYER SWITCH	P-2
* SIDE REPEAT ----- Off or On	When set to ON and the end of the videodisc is reached, the player automatically returns to the beginning of the disc.
* LOAD START----- Off or On	When set to ON and a loaded disc tray is pushed in, playback starts automatically.
* POWER-ON START----- Off or On	When set to ON and Power is turned on, and there is a disc in the drawer, playback is started automatically.
* AUDIO DEFAULT ----- Auto Digital or Analog	If AUTO DIGITAL is selected, and a disc has Digital Audio on it, digital is played; if not, Analog Audio is played. Selecting Analog plays only Analog Audio.
* TEST MODE SELECT ----- Off or On	This mode is usually left OFF. It is turned ON by Service Center personnel when servicing the player.

**On Page Three:**

PLAYER SWITCH	P-3
* STILL MODE ----- 2 Field or 4 Field	Either 2 fields or 4 fields are held in video memory. Usually 2 field is selected, 4 field is selected for broadcast output.
* SQUELCH ----- Blue Background or Black Background or No Video	Selects Blue or Black Squelch Screen seen during PAUSE or STOP.
* DOC CONTROL ----- On or Off	The Drop Out Compensator compensates for imperfections in the video signal, and makes adjustments to improve them.
* AUX 1 DEFAULT ----- Video Indicator or Output Port	AUX 1 is pulled "low" during video playback.
* AUX 2 DEFAULT ----- High Level Output or Output Port	AUX 2 is an alternate (TTL) output and is fixed to "high" level.

**On Page Four:**

PLAYER SWITCH	P-4
* INPUT DEVICE ----- Device 0 (RCU) or Device 1 (Serial)	Selects either the Remote Control or A controller as the device to send commands to the player under Level II.
* LEVEL II AUTO START----- Load from Disc or Back-up Memory or Off	Allows Level II programs to be loaded automatically from the disc, to be played automatically from memory or not to be accessed at all (OFF).
* VIDEO DELAY TIME----- 4.21 - 16.2 mSec. or 15.2 - 16.2 mSec.	Offers the option of a shorter video delay time, (15.2 - 16.2 mSec.) to provide for tighter synchronization when multiple players are used, but this option increases the spin-up time of the

**On Page Five:**

RS-232 SWITCH P-5

- \* BAUD RATE  
9600 or 4800 or 1200 Baud -- Sets the BAUD Rate.
- \* PARITY ----- Sets the PARITY.  
No Parity or Even or Odd
- \* STOP BIT----- Sets the STOP BIT.  
1 Stop Bit or 2 Stop Bits
- \* DATA LENGTH ----- Sets the DATA LENGTH.  
8 Bit or 7 Bit  
Refer to specific hardware and software specifications for proper communication settings.

**On Page Six:**

RS-232 SWITCH P-6

- \* TxD Terminator----- Establishes the terminator as either Carriage Return, or Carriage Return/Line Feed.  
<CR> or <CR> <LF>
- \* RS-232C FUNCTION----- Identifies the Serial Interface for inputting responses from a Level II or Level III program as either an input data device or as a controller. If sending a data response to player under Level II, input device must be selected.  
Controller or Input Device

**On Page Seven:**

MEMORY CONTROL P-7

- \* VIDEO MEMORY MODE----- Enables or Disables *Video Memory Mode*. This can also be set with the MM or RG command. This enables storing a Field or full Frame into the player's Video Memory Banks; makes possible sound-over still. See pg. 4-39+.  
Control Disable or  
Control Enable
- \* MEMORY SELECT----- Allows two single fields or one full frame to be held in video memory banks. (One Field freezes fast motion; single fields from two different frames can be stored.) Also set with RG cmd.  
Frame Memory or  
Field Memory
- \* AUTO MEMORY----- This selects memory video (OFF) or (ON).  
On or Off  
**NOTE:** Turn Video Memory and Auto Memory both OFF, to disable the video memory buffer during searches so that a blue or black squelch screen will appear instead of a still frame.

**On Page Eight, Nine, Ten & Eleven**

USER'S SWITCH ----- This switch is reserved for user programs.  
P-8, P-9, P-10, P-11

**On Page Twelve:**

SWITCH SETTING P-12

- SW. 1 = 00000000
  - SW. 2 = 00000000
  - SW. 3 = 00000000
  - SW. 4 = 00000000
  - SW. 5 = 00000000
  - SW. 6 = 00000000
  - SW. 7 = 00000000
- This page shows the selection of the bits (ON or OFF) for each switch. Contents of each switch are explained in the next section.
- NOTE:** The specific bit settings for one switch may be located on different menu pages within *Function Switch Setting Mode*.

### 2.4.2 Specific Switch Settings

#### SWITCH 1

This switch bank is set through the *Function Switch Setting Mode* and the settings are stored in Register C.

This switch sets the following player operating characteristics:

Switch Number 1 Bit Position	Function	On (=1)	Off (=0)
0	Side Repeat	On	Off
1	Load Start	On	Off
2	Power On Start	On	Off
3	Not Used		Off
4	Back Color Select	Black	Blue
5	Not Used		Off
6	Not Used		Off
7	Test Mode	On	Off

Figure 2-P

The default settings of the above bits are 0 (reset).

**Bit 0:** When this bit is set to ON, the player repeats playing the disc from the beginning to the end. When set to OFF, the player automatically Parks the disc after one side is played.

**Bit 1:** When this bit is set to ON, the player starts to play a disc if one is loaded.

**Bit 2:** When this bit is set to ON, the player starts to play a disc once power is turned on and if a disc is loaded.

**Bit 3:** This bit is not used; set to 0.

**Bit 4:** This bit is used to select the background color for squelch screens. ON selects Black, OFF selects Blue.

**Bit 5:** This bit is not used; set to 0.

**Bit 6:** This bit is not used; set to 0.

**Bit 7:** When this bit is set to ON, *Test Mode* is enabled. *Test Mode* is used for servicing the player and should always be set to OFF for normal operation.

**SWITCH 2**

This switch bank is set through the *Function Switch Setting Mode* and the settings are stored in Register D.

This switch sets the player's serial interface characteristics as follows :

Switch Number 2 Bit Position	Function	On (=1)	Off (=0)
0	Baud Rate Switch 0	See Figure 2-R, below	See Figure 2-R, below
1	Baud Rate Switch 1	See Figure 2-R, below	See Figure 2-R, below
2	Parity Enable/Disable	Enable	Disable
3	Even/Odd Parity	Odd	Even
4	Stop Bit	2 bits	1 bit
5	Data Length	7 bits	8 bits
6	TxD Terminator	<C/R> & <L/F>	<C/R>
7	Serial Port Setting	Input Device	Controller

Figure 2-Q

Bit 0 & Bit 1: These bits set the player's serial interface communication speed as follows:

Switch 1	Switch 0	Baud Rate
Off	Off	9600 bps
Off	On	4800 bps
On	Off	1200 bps

Figure 2-R

Bit 2: This bit selects parity enable or disable.

Bit 3: This bit selects even or odd parity.

Bit 4: This bit selects 1 or 2 stop bits.

Bit 5: This bit selects 7-bit or 8-bit data length.

Bit 6: This bit selects the termination code (<C/R> & <L/F> or <C/R> only).

Bit 7: This bit establishes the serial interface as either an input data device or a controller during Level II program execution. When a Level II program is not executed, there is no difference. When Input Device is selected, the player recognizes only ASCII 0 through 9 (Input Command Response) and ASCII A through J (Function Input Command Response).

**SWITCH 3 and SWITCH 4**

Switch 3 and Switch 4 settings are read and stored into Registers E and F.

These two switches are not pre-defined, and the stored values can be read by Registers E and F Request. Also, these values can be used by the Read Rear Switch Command in Level II. When the RRS command is executed, the return value is two bytes of data, Register E is the lower byte and Register F is the higher byte.

**SWITCH 5**

This switch bank is set through the *Function Switch Setting Mode* and the settings are stored in Register G.

Switch Number 5 Bit Position	Function	On (=1)	Off (=0)
0	Video Memory Mode SW 0	On	Off
1	Video Memory Mode SW 1		
2	Video Memory Mode SW 2		
3	Video Memory Mode SW 3		
4	Memory select	Field	Frame
5	Auto Memory	Off	Auto
6	Not Used		Off
7	Not Used		Off

**Figure 2-S**

This switch sets the following player operating characteristics :

**Bit 0 - Bit 3:** If bit 0 is OFF, memory control is disabled. If bit 0 is set to ON, memory control is enabled. This mode can be set by the Set Video Memory Control Mode (MM) command.

Bits 1, 2 and 3 are reserved for future use.

**Bit 4:** This bit selects the use of video memory (field or frame mode).

**Bit 5:** This bit selects the background video for display during a search. Squelch (blue or black) or memory video are available.

**SWITCH 6**

This switch bank is set through the *Function Switch Setting Mode* and the settings are stored into Register H.

This switch sets the following player operating characteristics :

Switch Number 6 Bit Position	Function	On (=1)	Off (=0)
0	Still Mode	4 Field	2 Field
1	AUX 1 Default Setting	Output	Video Indicator
2	AUX 2 Default Setting	Output	High State
3	Sync Out (During SQ)	Off	On
4	Drop Out Control	Off	On
5	Audio Default	Analog	Digital
6	Input Device	Device 1 (Serial)	Device 0 (RCU)
7	Video Delay Time	4.2-16.2 mSec.	15.2-16.2 mSec.

**Figure 2-T**

Bit 0: This bit selects 4 fields or 2 fields in still mode.

Bit 1: This bit assigns AUX 1 as the Output or as the Video Signal Indicator.

Bit 2: This bit assigns AUX 2 as the Output or as the High State Output.

Bit 3: This bit enables or disables sync insertion during squelch.

Bit 4: This bit enables or disables DOC (Drop Out Compensation).

Bit 5: This bit selects the digital or analog audio output as default. It is usually set to Digital. If there is no Digital on the disc, the player will default to analog.

Bit 6: This bit selects the input device to either 0 (RCU) or 1 (Serial)

Bit 7: This bit is used to set the Video Delay time to either 4.2 - 16.2 mSec. or to 15.2 - 16.2 mSec. The default setting is 4.2 - 16.2 mSec. For some applications, especially those requiring precise audio sync, a shorter delay time is required. (For more information, refer to Pioneer **Application Note #177A, Built-In Audio Sync Lock on the LD-V8000, 12/17/90.** Contact Pioneer LaserDisc Engineering and Technical Support, 201/327-6400. )

**SWITCH 7**

This switch bank is set through the *Function Switch Setting Mode* and the settings are stored into Register I.

This switch sets the player's Level II characteristics :

Switch Number 7 Bit Position	Function	On (=1)	Off (=0)
0	Dump Execution disable	On	Off
1	Dump Auto Load disable	On	Off
2	Not Used		Off
3	Not Used		Off
4	Not Used		Off
5	Not Used		Off
6	Not Used		Off
7	Not Used		Off

**Figure 2-U**

**Bit 0:** This bit enables or disables Level II program execution after spin up.

**Bit 1:** This bit enables or disables Level II program load after spin up.

**Bits 2 - 7:** These bits are not used and must be to set OFF.

## 2.5 On-Screen Status Displays in Manual Mode

The LD-V8000 displays messages on the monitor using its own internal character display. Display commands sent to the player by pressing the DISPLAY button on the remote control will cause the chapter and frame numbers (CAV discs) or chapter and time numbers (CLV discs) to be displayed in the upper left corner of the video monitor. **NOTE:** Chapter numbers will be displayed only if they have been encoded on the disc at the customer's request. **NOTE:** The LD-V8000 can also access extended time numbers (hours, minutes, seconds, and frame number) if they have been encoded on the disc.

Audio commands are sent by pressing the AUDIO button on the RU-V103 or the AUDIO 1/L and AUDIO 2/R buttons on the RU-V6000T. The current audio status of the player is displayed across the upper center of the video monitor. Speed commands are sent to the player by pressing the remote control SPEED Buttons (Up or Down on the RU-V103; Slow or Fast on the RU-V6000T). The player's current speed setting is displayed across the top of the video monitor.

The type of address the player will search to (Chapter, Frame, Time or Time frame number) are established and displayed on the screen in Level I by pressing the Frame/Chapter/Time button on the remote control unit. These can be toggled through by pressing the remote control Chapter/Frame/Time button repeatedly.

### 2.5.1 Chapter, Frame Number, and Time Displays

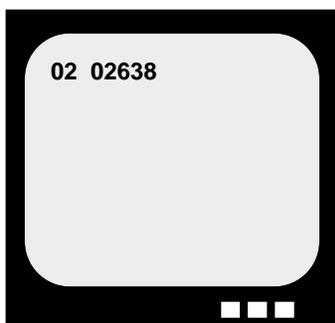


Figure 2-V

*While playing a CAV disc, the player displays Chapter and Frame numbers as follows:*

The two digit chapter number and five digit frame number are displayed on the top line of the monitor (display line 0) as in the example in **Figure 2-V**. The two digits indicating a chapter number are not displayed if a disc does not have chapter numbers.

During lead-in no chapter or frame numbers appear. The chapter and frame numbers can be displayed only when active video starts on the disc. During lead-out, the final frame and chapter numbers displayed are maintained on the screen.

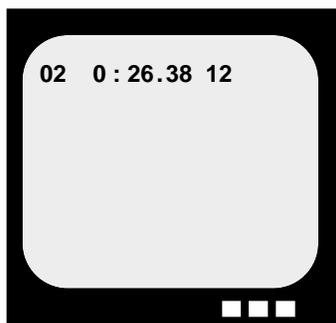


Figure 2-W

*While playing a CLV disc, the player displays chapters and time numbers as follows:*

The two digit chapter and seven digit time numbers are displayed on the top line (display line 0) in **Figure 2-W**. The two characters indicating a chapter number are not displayed if the disc does not have chapter numbers encoded on it.

Only the time number that indicates the hour and minutes is displayed if the disc is not encoded with

extended 24-bit code, which includes seconds and time number frame values. (CLV discs pressed prior to 1986 may not have extended 24-bit code; discs pressed since then usually do.) Extended 24-bit code includes not only hours and minutes, but also seconds and frame numbers. It also has status information in it. (**NOTE:** The time number *frame number* will be displayed, only if extended 24-bit code is encoded on the CLV Disc and if the player has been set to *Frame Mode*.)

### 2.5.2 Audio Status Display

Press the AUDIO button on the remote control unit to display the current audio output status on the two top display lines (display lines 0 and 1). See **Figure 2-X** and **Figure 2-Y**, below.

A/D	1/L	2/R	3/L	4/R
x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>	x <sub>4</sub>	x <sub>5</sub>
<hr/>				
x <sub>1</sub>	=	A (Analog) or D (Digital)		
x <sub>2</sub> - 5	=	ON or OFF		

Figure 2-X

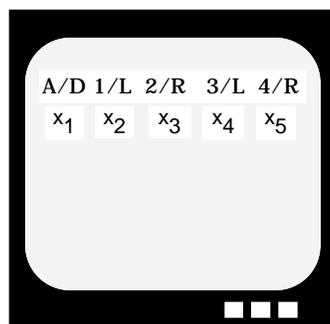


Figure 2-Y

The first item, A/D, indicates whether audio output from the audio 1/L and 2/R output terminals is analog or digital. The 1/L, 2/R, 3/L, and 4/R items indicate the status of signals output to the audio output terminals. These are set with remote control buttons. See **Figure 2-Z** and **Figure 2-A.1** on the next page for details.

**(Note:** The Analog or Digital (A/D) selection is set with the On-Screen Function Settings. Power-down the player, Press DISPLAY and Power-ON simultaneously, SCAN FORWARD to Page-2, STEP FORWARD to highlight AUDIO DEFAULT, STEP REVERSE to toggle Analog or Auto Digital ON. If Digital is ON, and there is no Digital audio on the disc, the player will automatically default back to Analog. Auto Digital is the default setting.)

Player's On-Screen Display			Audio Signal Output	
A/D	1/L	2/R	1/L	2/R
D	ON	ON	Digital Left Audio	Digital Right Audio
D	ON	OFF	Digital Left Audio	Digital Left Audio
D	OFF	ON	Digital Right Audio	Digital Right Audio
D	OFF	OFF	No Audio Output	No Audio Output
A	ON	ON	Analog Left Audio	Analog Right Audio
A	ON	OFF	Analog Left Audio	Analog Left Audio
A	OFF	ON	Analog Right Audio	Analog Right Audio
A	OFF	OFF	No Audio Output	No Audio Output

Figure 2-Z

Display			Audio Output	
A/D	3/L	4/R	3/L	4/R
D	ON	ON	Analog Left Audio	Analog Right Audio
D	ON	OFF	Analog Left Audio	Analog Left Audio
D	OFF	ON	Analog Right Audio	Analog Right Audio
D	OFF	OFF	No Audio Output	No Audio Output
A	—	—	Same as 1/L	Same as 2/R

Figure 2-A.1

### 2.5.3 Speed Status Display

To set the speed at which the player will play when it is instructed to play in Multi-Speed, press MULTI-SPEED SET (“Up” or “Down” on the RU-V103, “Fast” or “Slow” on the RU-V6000T). The current speed setting will be displayed in the upper left of the monitor on the first or second display line (display line 0 or 1). See the example below in **Figure 2-B.1**. The display in this example indicates the speed of the player in *Multi-Speed* will be 1/4 speed.

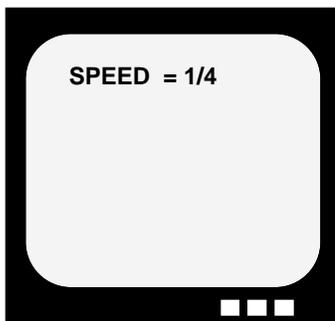


Figure 2-B.1

The table below shows the codes as they are displayed and corresponding speeds. (See **Figure 2-C.1**.)

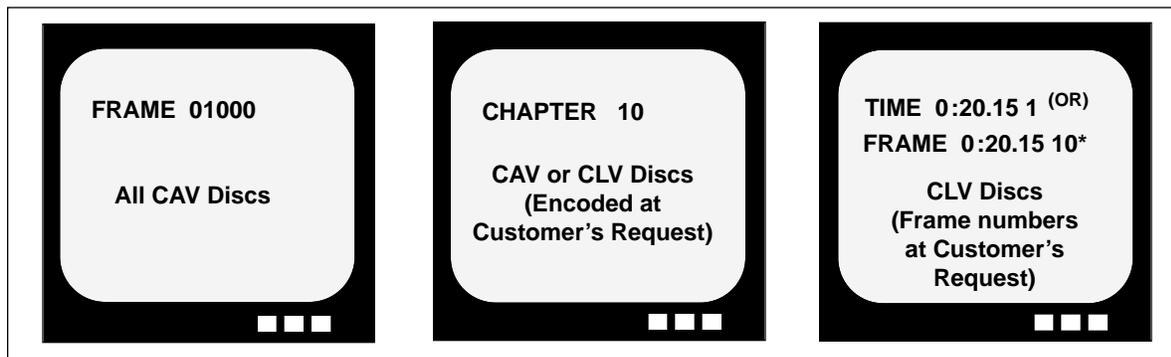
Displayed Code	Speed Set
x3	150 / 60 ~ 255 / 60
x2	91 / 60 ~ 149 / 60
x1	46 / 60 ~ 90 / 60
1 / 2	23 / 60 ~ 45 / 60
1 / 4	12 / 60 ~ 22 / 60
1 / 8	6 / 60 ~ 11 / 60
1 / 15	3 / 60 ~ 5 / 60
STEP 1	2 / 60      1 Fr. / Sec
STEP 2	1 / 60      2 Fr. / Sec.

Figure 2-C.1

### 2.5.4 Arguments Displayed in Manual Mode

An “argument” displayed in *Manual Mode* is the numeric information preceding a search command that provides the player with the exact location (address) on the disc to search or play. It is displayed in the upper left corner of the video screen on the first or second display lines (Line 0 or 1) when a search flag has been set, and after the numeric keys and then the SEARCH button on the remote control are pressed. (e.g. 1000 SEARCH.)

The numbers are displayed according to the type of address flag that has been set: Chapter, Frame, or Time number. (See **Figure 2-D.1.**) The LD-V8000 searches or plays to frame numbers on a CAV disc; to chapter numbers on a CAV or CLV disc that has chapters encoded; to time numbers or to extended time numbers on a CLV disc that has extended 24-bit code (including seconds and frames) on the disc.



**Figure 2-D.1** \*NOTE: It is possible to do CLV **Frame Accurate** Searches on the LD-V8000, if extended time numbers are encoded on the disc, and if the address flag is set to *Frame Mode*. The LD-V8000 will hold a still frame on the CLV disc after completing the search in *Frame Mode*.

### 2.5.5 Address Flag Displayed in Manual Mode

To send the correct “address” to the player to indicate where it should search to or play to, and to see the address accurately displayed on the video screen, the proper address *flag* must first be set by pressing the Frame/Chapter/Time button on the remote control. (On the RU-V103 the button labeled CHAP/FRAME TRACK/TIME is used to select the flag (Chapter, or Frame or Time) before inputting the exact location to which the player will search or play. On the RU-V6000T, the END button is also the FRAME/CHAP button, used to select Chapter, Frame, Time number or Time number frame value address flags. (For more information, see **Section 3.2.2 #13 & #19.**)

**NOTE:** Before a Search or Play command is sent from a computer, the Frame/Chapter /or Time number address flag must be set by first sending the appropriate command. Neither the address flag nor the characters of the address will be displayed on the screen during a computer transmitted Search or Play. See **Section 4.5** for more information on Command Formats; See **Section 4.7** for specific Level III Player Control Commands used to set the desired address flag.

**NOTE:** If address numbers are entered incorrectly in *Manual Mode*, press the CLEAR button to remove them, re-select the address flag, re-enter the numbers and then press the SEARCH button.

### 2.5.6 Program Display

When the PROGRAM button on the RU-V6000T remote control is pressed, the player enters *Programming Mode*. This mode is used to enter Level II commands/program code into the memory of the player. The program address or “location” is displayed on the top display line of the video screen and the program contents (i.e. specific Level II arguments and commands) are displayed on the next line of the video screen. **NOTE:** 0000 is the default program address location, unless a specific address is entered before the PROGRAM button is pressed. (For example: 1000 PROGRAM indicates the subsequent program code will be entered and stored in the player’s memory, beginning at location 1000.)

In the example in **Figure 2-E.1**, the Level II code for 1000 SEARCH, 1200 AUTO STOP would have been entered at program location 0000. At program location 0010, the player would wait for the next Level II command to be entered. To make the player exit *Programming Mode*, press the END button.

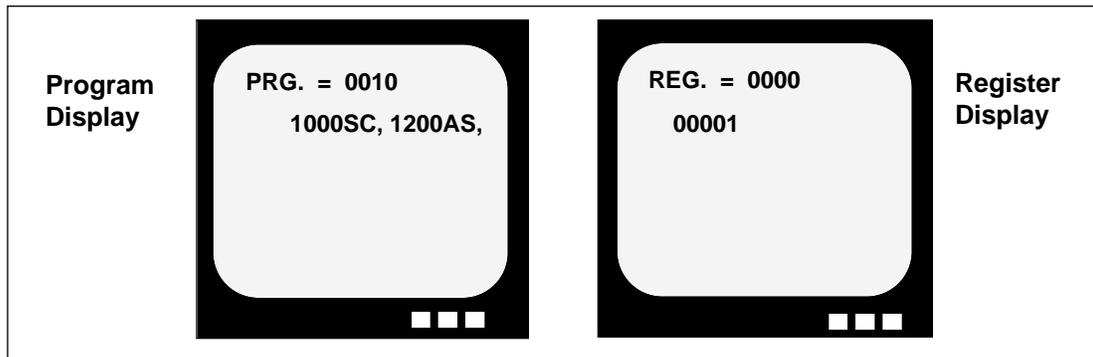


Figure 2-E.1

### 2.5.7 Register Display

When the RECALL button on the RU-V6000T remote control unit is pressed, the player enters the *Register Mode*. The register number is displayed on the top display line and the register contents are displayed on the next line. To make the player exit the *Register Mode*, press the CLR/HALT button.

**NOTE:** Of the two “optional” remote control units that may be used to control the LD-V8000, only the RU-V6000T remote control has Level II programming capabilities. The other remote, the RU-V103, is capable only of Level I player control.

**NOTE:** See **LD-V8000 Level II User’s Manual/Programmer’s Reference Guide v1.1 8/92** for more details on *Programming* and *Register Modes*.

## **3. Manual Control — Level I**

### **3.1 Front Panel Control Buttons**

### **3.2 Remote Control Buttons**

### **3.3 Barcode Control**

**CHAPTER**

**3**

**LD-V8000**

**LEVEL I & III**

USER'S MANUAL

Programmer's Reference Guide

## 3 MANUAL CONTROL — Level I

The LD-V8000 can be manually controlled by using the front panel buttons, by using either of two optional remote control units — The RU-V6000T or the RU-V103, or by using a Pioneer Barcode Reader (UC-V104BC, UC-V108BC or UC-V109BC).

### 3.1 Front Panel Buttons

On the front of the player are seven buttons: OPEN/CLOSE; PLAY; STILL/STEP (Forward and Reverse); SCAN (Forward and Reverse); and DISPLAY. This section describes how to use these buttons in *Manual Mode* for Level I control of the player. (Please refer to **Section 2.4 On-Screen Function Switches** for information on using these front panel buttons in *Function Switch Setting Mode*.)

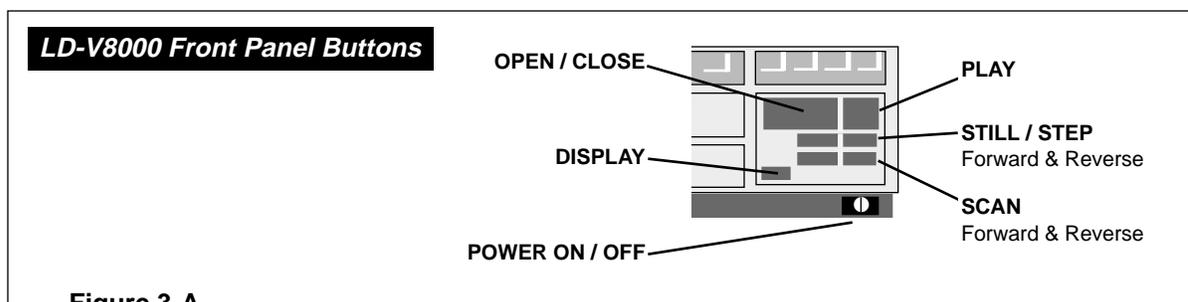


Figure 3-A

#### 3.1.1 OPEN/CLOSE

**Function:** Pressing this button opens or closes the disc drawer. If a disc is playing, pressing this button spins down the disc, pressing it again rejects the disc.

**Explanation:** The operation performed when the OPEN/CLOSE button is pressed depends on the active mode of the player.

*In Spin Up or Random Access Mode*

If the OPEN/CLOSE button is pressed when the player is in *Spin Up* or *Random Access Mode*, the active mode of the player changes to *Reject Mode* and the player enters *Park* when disc rotation stops.

*In Spin Down Mode*

If this button is pressed when the player is in *Spin Down Mode*, processing waits until the player enters *Park*. When the player enters *Park*, the door is opened.

*In Park Mode or while door is closed*

If this button is pressed when the player is in *Park* or while the door is closed, the player opens the door.

*In Door Open Mode or while door is opened*

If this button is pressed when the player is in *Door Open Mode* or while the door is opened, the player closes the door.

**NOTE:** To open the door when the player is in *Random Access* or *Spin Up Mode*, press the OPEN/CLOSE button twice.

### 3.1.2 PLAY

**Function:** This button is used to start player processing and to play the disc.

**Explanation:** Pressing this button has different effects, depending on the active mode of the player:

*In Door Open Mode or when door is opened*

If this button is pressed while the disc tray is opening or when it is open, the player closes the door. After the door is closed, the player enters *Park Mode* and then determines whether a disc is in the drawer. If there is no disc in the drawer, the player does nothing. If there is a disc in the drawer, it proceeds through the operations described in *Park Mode* below.

*In Park Mode*

In *Park Mode* the player determines whether or not there is a disc in the drawer. If there is no disc, the player does not operate. If there is a disc, the player enters *Spin Up Mode* and spins up the disc. When *Spin Up Mode* ends, the player performs an initial search. If the automatic dump program execution switch is on, the player reads the Level II program into memory and then executes the program. If there is no Level II program on the disc, if the program cannot be read or the automatic dump program execution switch is off, the player enters *Random Access Mode* and begins playing the disc.

*In Random Access Mode (when player is not searching)*

The player starts playing the disc.

*While a search is in progress*

The player starts playing the disc after searching.

**NOTE:** When the outer-most lead out area is reached during normal play, the player automatically returns and repeats playing the disc if the “Side Repeat” feature is selected among the On-Screen Function Settings.

### 3.1.3 STEP FWD / REV

**Function:** Pressing this button makes the player step forward or backward one frame at a time and then hold a still frame.

**Explanation:** This key is effective only in *Random Access Mode*. The effect of pressing this button differs depending when it is pressed.

*If pressed during a search*

The player presents a still frame after the search is completed.

*If pressed during a still frame*

The player steps forward or backward one frame at a time and then holds a still frame.

*If pressed during any other operation*

The player holds a still frame.

**NOTE:** During step and still frames, audio is squelched and not output. The command cannot be used with CLV discs that are not encoded with seconds.

### 3.1.4 SCAN FWD / REV

**Function:** Pressing this button makes the player scan forward or backward rapidly.

**Explanation:** The player scans as long as this button is pressed and audio is squelched during a scan. When the scan button is released, the player reverts to the mode it was in before scanning. The player clears an auto stop if it is in the process of searching to an auto stop when the scan button is pressed.

**Note:** If the player is in the process of playing to an auto stop target address when the SCAN button is pressed, the auto stop target frame number will be cancelled, and the player will not stop at the pre-set location.

### 3.1.5 DISPLAY

**Function:** During normal player operation, pressing this button turns ON or OFF the on-screen display.

**Explanation:** The display may be toggled ON or OFF. If it is turned ON, the chapter, frame or time numbers, and characters generated by the user will be displayed on the monitor. The items displayed depend on the setting for Register A. The initial value of Register A is 3. This allows the chapter, frame and time numbers to be displayed. For more information about Register A, see page 4-48 of this manual. If the display is turned OFF, the items indicated by Register A will not be displayed.

**NOTE:** The On-Screen Audio Status Display, Speed Status Display, and Program Status Display are not affected by DISPLAY ON and OFF. These will continue to present information as described in **Section 2.5 Status Displays in Manual Mode** whether DISPLAY is ON or OFF.

**NOTE:** The chapter, frame, and time numbers can be displayed only in *Random Access Mode*. If the power is turned on while the DISPLAY button is pressed, the player enters *Function Switch Setting Mode*. The player exits *Function Switch Setting Mode* when the DISPLAY button is pressed again. See **Section 2.4 On-Screen Function Switches** for details on *Function Switch Setting Mode*.

## 3.2 Remote Control

The LD-V8000 does not come with a remote control unit but a separate, optional remote control unit, either the RU-V103 or RU-V6000T, can be used with it. Both of these can be used to send signals to the player either via a wired connection or infrared signal. **NOTE:** The RU-V103 is sold as a wireless remote and is not packaged with a cable. It does include a mini-jack and a mono cable can be purchased separately.

### 3.2.1 Remote Control Units & Their Functions

The RU-V6000T offers a full range of player control. Beyond Level I control, it also has extra function keys for entering and editing Level II programs, for entering data into registers and for running Level II programs, etc. The RU-V6000T allows Level II programs to be developed and sent to the player's memory. It can also be used to select choices from within a Level II or Level III program applications.

The RU-V103 has easy-to-use functions and large flat keys, but it's range of player control is limited to Level I, basic manual controls. It can also be used as an input device to select choices from within Level II or Level III program applications.

#### List of Remote Control Functions for Use with the LD-V8000

	Function	RU-V6000	RU-V103	Page #
1	REJECT	✓	✓	3-7
2	PLAY	✓	✓	3-7
3	STOP	✓	—	3-8
4	STEP FWD / REV	✓	✓	3-9
5	MULTI SPEED FWD / REV	✓	✓	3-9
6	FAST / SLOW SPEED SET	✓	✓	3-10
7	SCAN FWD / REV	✓	✓	3-10
8	SEARCH	✓	✓	3-11
9	AUTO-STOP	✓	—	3-11
10	PAUSE	—	✓	3-12
11	AUDIO 1/L, 2/R	✓	—	3-12
12	AUDIO	—	✓	3-13
13	CHAPTER / FRAME / TIME	Same as the END button	✓	3-14
14	RECALL	✓	—	3-15
15	CLEAR / HALT	✓	CLEAR	3-16
16	STORE	✓	—	3-16
17	RUN / BRANCH	✓	—	3-16
18	PROGRAM	✓	—	3-17
19	END	✓	—	3-17

Figure 3-B

**RU-V6000T Remote Control:****LEVEL I CONTROL**

**REJECT:** Ceases playback and spins-down the disc.

**PLAY:** Begins playing a disc, or resumes play. (In Level II, *Programming Mode*, prepares the player to receive code.)

**MULTI-SPEED SET (SLOW / FAST):** Sets the fixed speed at which multi-speed play will occur.

**STOP:** Freezes the image.

**SCAN (FWD / REVERSE):** Moves quickly forward or backward through the disc. Rapid scanning continues as long as the button is depressed.

**DISP:** Displays or removes the display of current chapter/frame/or time code numbers on the screen.

**SEARCH:** Specify the number to be searched to by using the digit buttons, then press the SEARCH button to execute. Set the "address flag" using the FRAME/CHAP button. (It is the same as the END button). After searching, the LD-V8000 presents a still frame.

**MULTI-SPEED (FWD / REVERSE):** Plays forward or reverse in the speed that is set with MULTI-SPEED.

**AUDIO 1/L & 2/R:** These are the ON/OFF buttons for up to four channels of audio. AUDIO 1/L turns ON/OFF 1/L and 3/L ; AUDIO 2/R turns ON/OFF 2/R and 4/R.

**AUTO STOP:** Plays to a specified chapter, frame or time number, then freezes the frame. Plays through picture stops. See command description on page 3-12.

**STEP (FWD / REVERSE):** Produces a still video image. Subsequent presses of the STEP FWD button advances to the next frame. STEP REV presents each preceding frame.

**NUMERIC BUTTONS (0-9):** Use these buttons to enter locations on the disc for searches and auto stops. (Enter 1000 SEARCH, 1200 AUTO STOP to play a specific video segment.) First, use the FRAME/CHAP to set an address flag, indicating chapter, frame or time code searches.

**CLEAR / HALT:** As CLEAR, this removes erroneous inputs.

**END / FRAME/ CHAP:** In *Normal Control Mode*, FRAME/CHAP establishes the type of address flag (chapter, frame or time code) to be used during a search or auto stop.

**LEVEL II PROGRAMMING / CONTROL****LETTERED BUTTONS (A-F)**

**and NUMERIC BUTTONS (0-9):** After the player is put into *Programming Mode* and the PLAY button is pressed, use these buttons to enter Level II HEX codes. These buttons are also used for viewer responses during Level II program execution.

**INPUT / DEC REG:** In *Programming Mode* allows INPUT or DEC REG commands to be entered into a Level II program.

**RECALL:** Preceded by numbers, this button is pressed to call up specific register locations for use in Level II programs.

**CLEAR / HALT:** As HALT, pressing this button stops Level II

See **Section 3.2.2** for descriptions of each specific remote control button. See **LD-V8000 Level II User's Manual/Programmer's Reference Guide** for more about using the RU-V6000T for Level II Programming.

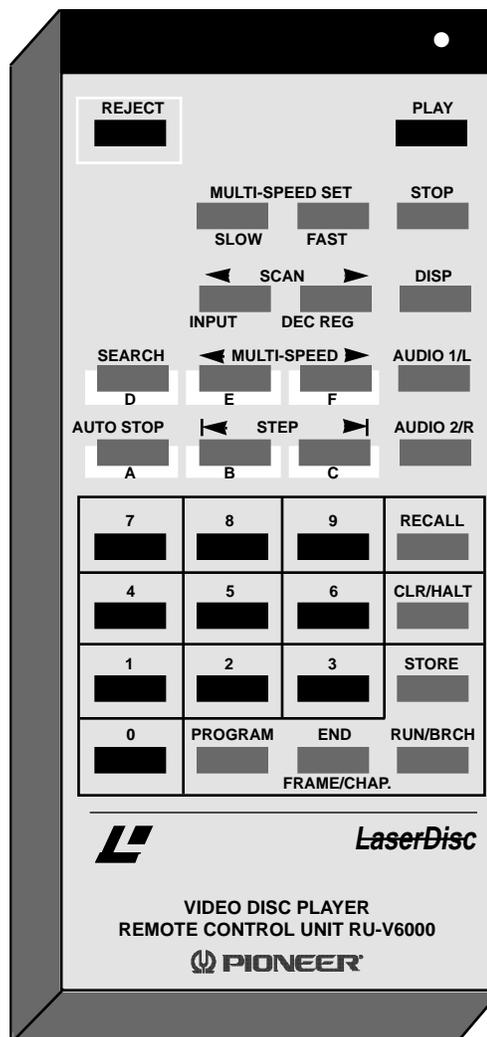


Figure 3-C

program execution. In *Programming Mode*, it enters a HALT command into a Level II program.

**STORE:** Stores data in registers for Level II Programs.

**PROGRAM:** Puts the player into *Programming Mode*, ready to receive Level II code.

**END / FRAME/ CHAP:** As END, exits *Programming Mode* and returns to *Normal Control Mode*.

**RUN/BRANCH:** In *Normal Control Mode*, RUN causes the player to execute a Level II program that has been

**NOTE:** The RU-V6000T remote is shipped with a plastic template covering some of the buttons. To gain access to all buttons on the RU-V6000T, remove the plastic template by lifting the side tabs.

**RU-V103 Remote Control:**

See **Section 3.2.2** for details about the use of each specific remote control button.

**LEVEL I CONTROL**

**REJECT:** Ceases playback and spins-down the disc.

**PAUSE:** Ceases playback and displays a squelch screen. Press any motion button to resume.

**PLAY:** Begins playing a disc, or resumes play.

**REPEAT MODE:** This button can only be used with the LD-V2200 for segment repeat play. It has no effect on the operation of the LD-V8000.

**STILL STEP (FWD / REVERSE):** Press either of these buttons to produce a still video image. Additional presses of the STEP FWD button moves the image forward one frame at a time. STEP REV moves the image back one frame at a time.

**DISP:** Displays or removes the display of current chapter/frame/or time numbers on the screen.

**SCAN (FWD / REVERSE):** Press either of these buttons to move quickly forward or backward through the disc. Rapid scanning continues as long as the button is depressed.

**AUDIO:** Press these buttons to select up to four channels of audio output. Audio 1/L turns ON & OFF 1/L & 3/L; Audio 2R turns ON/OFF 2/R and 4/R.

**SPEED (DOWN / UP):** Press these buttons to set the speed at which multi-speed play will occur.

**CLEAR:** Press this button to CLEAR erroneous inputs or to stop a Search operation.

**MULTI-SPEED (REV / FWD):** Press this button to initiate multi-speed play forward or reverse in the speed that has been set with the SPEED button.

**NUMERIC BUTTONS (0-9):** Use these buttons to enter locations on the disc for searches. (i.e. Enter 1000 SEARCH to move to a certain frame (CAV) or time location (CLV) on the disc.) Use the CHAP/FRAME TRACK/TIME button to set an "address flag", indicating chapter, frame, time or time number frame value. (These buttons can also be used for viewer responses during Level II program execution.)

**SEARCH:** Specify the number to be searched to by using the digit buttons. Press the SEARCH button to execute. (First set the "address flag" using the CHAP/FRAME TRACK/TIME button.) After searching, the LD-V8000 presents a still frame on CAV or CLV discs.

**CHAP / FRAME TRACK / TIME:** Press this button to set the address flag, indicating how a search will be performed, either by chapter or frame number, (CAV disc) or chapter number, time number or time number frame value.

**NOTE:** The RU-V103 remote control unit does not have Level II programming capabilities. It can be used, however, to provide viewer input to Level II or Level III programs. Also, it is not packaged with a cable for connection to the player. A stereo or mono-mini plug can be purchased separately,

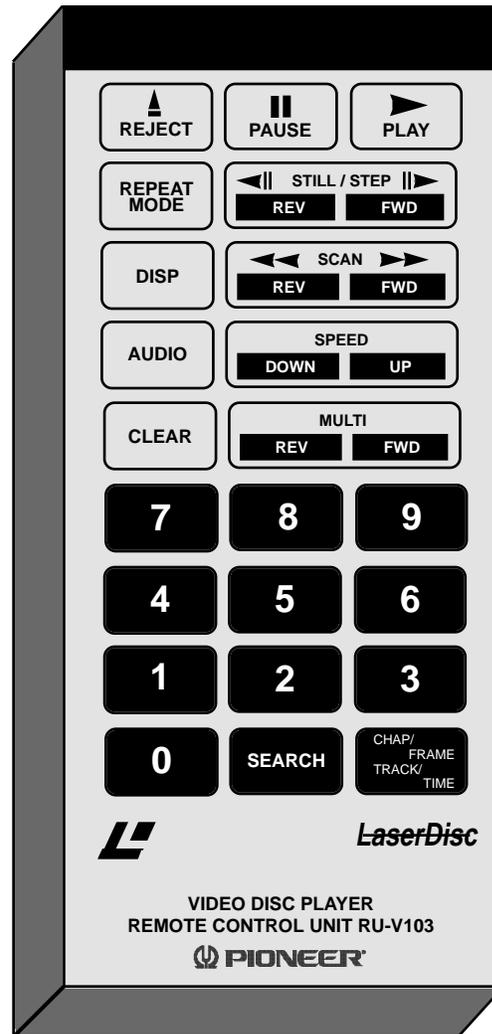


Figure 3-D

### 3.2.2. Description of Each Remote Control Function

Each remote control unit button associated with a corresponding command that may be used to control the LD-V8000 is described below. The symbols next to the description indicate whether the function is available on the RU-V103 and/or on the RU-V6000T. (See **Figures 3-C and 3-D and Appendix C for descriptive illustrations of the RU-V6000 and the RU-V103.**)

Commands available only on the RU-V6000T **RU-V6000T ONLY**

Commands available only on the RU-V103 **RU-V103 ONLY**

Commands available on both the RU-V6000T & RU-V103 **RU-V6000T & RU-V103**

#### 1) REJECT **RU-V6000T & RU-V103**

**Function:** Pressing this button is effective only when the player is in *Spin Up* or *Random Access Mode*. When this command is sent to the player, the active mode of the player is changed to *Spin Down*, processing waits until the spindle stops, and then the active mode is changed to *Park*.

**NOTE:** This button cannot be used to open or close the player's disc drawer; it is used to put the player into *Park*.

#### 2) PLAY **RU-V6000T & RU-V103**

**Function:** Pressing this button starts the player and plays the videodisc.

**Explanation:** The operation performed when the PLAY button is pressed differs depending on the active mode of the player:

*While the door is opening or when the door is open*

If this button is pressed while the door is opening or when the door is open, the player closes the door. After the door is closed, the player enters *Park Mode* and then determines whether a disc is in the drawer. If there is no disc in the drawer, the player does nothing. If there is a disc in the drawer, it proceeds through the operations described in *Park Mode* below.

*In Park Mode*

In *Park Mode* the player determines whether or not there is a disc in the drawer. If there is no disc, the player does not operate. If there is a disc, the player enters *Spin Up Mode* and spins-up the disc. When *Spin Up Mode* ends, the player enters *Random Access Mode* and begins playing the disc. If the automatic dump program execution switch is on, the player reads the Level II program into memory and then executes the program. If there is no Level II program on the disc, if the program cannot be read or if the

automatic dump program execution switch is off, the player enters *Random Access Mode* and begins playing the disc.

*In Random Mode (when search is not in progress)*

The player starts playing the disc.

*During a search*

After the search ends, the player starts playing the disc.

**NOTE:** Audio is not squelched while the disc is playing. When the lead-out is reached during normal play, the player automatically spins down the disc, enters *Park Mode* and waits for one of several specific instructions — to reject the disc (by pressing the OPEN/CLOSE button on the front of the player), to play the disc again (by pressing PLAY on the front of the player or on the remote control), or to turn off the player by pressing the Power-OFF button on the front of the player.

If the “Side Repeat” On-Screen Function has been set to ON, the player automatically searches to the beginning of the disc and plays it again. When a PLAY command is sent to the player either from the remote control, from the front panel buttons, from a computer, or from the player’s memory, the player enters *Random Access Mode*, and many other instructions can be sent to the player.

### 3) STOP **RU-V6000T ONLY**

**Function:** Pressing this button causes the player to stop playing the disc and to present a still frame.

**Explanation:** Stop is effective only in *Random Access Mode*. The result of pressing this button to send a stop command differs, depending on the operation being performed when it is sent. If it is sent during:

*A search*

After a search, the player holds a still frame.

*A still operation*

The player is not affected; the player continues to present a still frame.

*Any other operation*

The player presents a still frame.

**NOTE:** Audio is squelched while the player holds a still frame.

**4) STEP FWD / REV** **RU-V6000T & RU-V103**

**Function:** Pressing this button makes the player step one frame forward or backward and present a still frame.

**Explanation:** This command is effective only when the player is in *Random Access Mode*. The result of sending this command differs, depending on the operation being performed when it is sent:

*During a search*

After the search, the player holds a still frame.

*During a still operation*

The player performs step forward or reverse then holds a still frame.

*During any other operation*

The player holds a still frame.

**NOTE:** Audio is squelched during step forward or step reverse. This command is ineffective when used with CLV discs that do not have the Extended Philips Code, encoding seconds on the disc.

**5) MULTI SPEED FWD / REV** **RU-V6000T & RU-V103**

**Function:** Pressing this button plays the disc forward or backward at a speed determined by pressing the MULTI-SPEED SET button.

**Explanation:** This command is effective only when the player is in *Random Access Mode*. The player plays forward or backward at the speed that has been set, if a search is not in progress. The player starts playing with the set speed after a search if the command is sent while a search is in progress.

**NOTE:** Audio is squelched and not output during a multi-speed play. This command is ineffective on CLV discs that do not have Extended Philips Code, encoding seconds on the disc.

6) FAST SPEED SET , Fast / Up RU-V6000T & RU-V103  
 SLOW SPEED SET , Slow / Down

**Function:** Pressing this button sets the speed for Multi-Speed play.

**Explanation:** This command can set one of the nine speeds listed below. If the button is pressed once, the current set speed is displayed on the screen. Keep pressing the Fast or Slow button to select a faster or slower speed until the desired speed is displayed. The speed is set when the speed data is written in the Speed Register. (See **Figure 3-E**, below, for speed settings.)

6000T 103	FAST UP	SLOW DOWN	Code Displayed	Speed	x normal speed
	—	↓	x3	180 / 60	3 x normal speed
	↑	↓	x2	120 / 60	3 x normal speed
	↑	↓	x1	60 / 60	normal speed *
	↑	↓	1 / 2	30 / 60	1/2 normal speed
	↑	↓	1 / 4	15 / 60	1/4 normal speed
	↑	↓	1 / 8	8 / 60	1/8 normal speed
	↑	↓	1 / 15	4 / 60	1/16 normal speed
	↑	↓	STEP 1	2 / 60	1 fr. every second
	↑	—	STEP 2	1 / 60	1 fr. every 2 seconds

Figure 3-E

\*Normal speed is 30 frames per second.

7) SCAN FWD / REV RU-V6000T & RU-V103

**Function:** Pressing this button performs a rapid forward or reverse play.

**Explanation:** Pressing the SCAN FORWARD or REVERSE button is effective only when the player is in *Random Access Mode*. It is not effective if pressed during a search. The scan continues as long as the SCAN button is depressed. After the scan, the player enters the active mode it was in before scanning.

**NOTE:** The player will interrupt an auto stop and cancel the target frame number (play through an auto stop) if the SCAN FORWARD or REVERSE button is pressed while an auto stop is in progress. It will also scan through picture stops encoded on a disc. Audio is squelched during scanning. The scanning speed of the player is about 40 times the normal speed.

**8) SEARCH**    **RU-V6000T & RU-V103**

**Function:** Pressing this button instructs the player to search to the address specified by the argument. When the search is completed, the LD-V8000 displays a still screen on a CAV or CLV disc.

**Explanation:** This command searches for the address specified by the argument. Unless a button is pressed during the search, the player holds a still frame when the search is completed. If the CLEAR button is pressed during a search, the player stops the search when the CLEAR command is received and holds a still frame. If the REJECT button is pressed during a search, the player stops the search and enters *Reject Mode*. If the PLAY or MULTI-SPEED button is pressed, the player continues the search, then starts play or multi-speed after the search. A search is executed when a search address is written into the Search Register. The player then compares the current address with the address in the Search Register and moves the pickup at high speed until the difference between the search address and the current address becomes zero.

**NOTE:** If an argument is set to a chapter number larger than the ones stored on the disc, the player searches to the beginning of the chapter with the largest chapter number. If the argument is set to a frame number larger than the ones stored on the disc and the set frame number does not exceed 65535, the player searches to the final frame number encoded on the disc before lead-out. If the set frame number exceeds 65535, the player searches to the address which is the difference between the argument and 65536. (ie. If you enter 75,536 SEARCH, the player will search to frame 10,000.)

If the argument is set to a time or extended time number larger than the ones stored in a CLV disc, the player searches to the highest number located just before lead-out. **NOTE:** During a search, the video still frame is held in the player's memory and audio is squelched.

**9) AUTO STOP**    **RU-V6000T ONLY**

**Function:** Pressing this button instructs the player to play at normal speed up to the address specified by the argument and then hold a still frame.

**Explanation:** The player plays at normal speed up to the address specified by the argument. If the specified address is less than the current address, the player plays in reverse at normal speed. If the specified address is greater than the current address, the player plays forward at normal speed. When the specified address is reached, the player holds a still frame.

The auto stop is performed when the target address is written into the Auto Stop Register. When the target address is written into the Auto Stop Register, the player plays at the normal speed and compares the address in the Auto Stop Register with the current address. When the current address becomes equal to the address in the Auto Stop Register, the player enters *Still Mode*.

**NOTE:** If the argument is set to a chapter number larger than those encoded on the disc, the player finds the largest chapter number and holds a still frame. If the argument is set to a frame number larger than the ones encoded on the disc and the argument does not exceed 65535, the player finds the largest frame number on the disc and holds a still frame just before lead-out on the disc. If the set frame number exceeds 65535, the difference between the argument and 65536 is used as the target address.

If the argument is set to a time or extended time number larger than the ones stored on a CLV disc, the player finds the largest number and holds a still frame just before lead-out. Audio is not squelched during a forward auto stop operation. Audio is squelched during a reverse auto stop operation.

**NOTE:** If there is a picture stop encoded on the disc, in *Play Mode* the player will recognize it and stop. An auto stop command executed by the LD-V8000 will take precedence over picture stops encoded on a disc. For example, if there is a picture stop encoded on the disc at frame 1200, and the command 1500 AUTO STOP is sent to the player, the player will play through the picture stop at frame 1200 and stop on frame 1500. (This is also the case if the player is executing an Auto Stop command in a Level II program.)

#### 10) PAUSE RU-V103 ONLY

**Function:** Pressing this button causes the player to stop temporarily.

**Explanation:** The player enters *Pause Mode* when the PAUSE button is pressed. In *Pause Mode*, video is squelched. Press PLAY or any other motion button to exit *Pause Mode*.

**NOTE:** The player does not exit *Pause Mode* even if the PAUSE button is pressed again while in *Pause Mode*. (The PAUSE button does not toggle PAUSE ON and OFF.)

#### 11) AUDIO 1/L , 2/R RU-V6000T ONLY

**Function:** Pressing this button sets the audio switches.

**Explanation:** When the audio button is pressed, the current audio value is displayed. Press AUDIO 1/L to toggle audio switch 1/L ON and OFF. If there is digital audio information on the disc, Audio 3/L is set to the same status as Audio 1/L.

Press AUDIO 2/R to toggle audio switch 2/R ON and OFF. If there is digital audio information on the disc, Audio 4/R is set to the same status as Audio 2/R. The audio switch settings are written to the Audio Control Register. **Note:** See **Section 2.5 On-Screen Status Displays** for details on the relationship between the audio switches and audio output. Set Analog or Digital Output through the Audio Default setting on Page 2 of the On-Screen Function Settings. (Power Down, Press DISPLAY

and Power-ON simultaneously, SCAN FORWARD to Page 2 and STEP FORWARD to highlight Audio Default. STEP REVERSE to toggle Analog or Auto Digital. Auto Digital is the default setting. When Auto Digital is selected, the player will play digital audio information if it is encoded on the disc, if there is no digital audio on the disc, the player will revert to Analog.)

**12) AUDIO** RU-V103 ONLY

**Function:** Pressing this button sets the audio switches.

**Explanation:** The current audio set value is displayed when the audio button is pressed. Pressing this button successively will change the audio status display as shown below. The audio switch data is written into the Audio Control Register.

*Using a disc with digital sound*

A/D	1/L	2/R	3/L	4/R
D	ON	ON	ON	ON
D	ON	OFF	ON	OFF
D	OFF	ON	OFF	ON
D	OFF	OFF	OFF	OFF
A	ON	ON	—	—
A	ON	OFF	—	—
A	OFF	ON	—	—
A	OFF	OFF	—	—
D	ON	ON	ON	ON

Figure 3-F

*Using a disc without digital sound*

A/D	1/L	2/R	3/L	4/R
A	ON	ON	—	—
A	ON	OFF	—	—
A	OFF	ON	—	—
A	OFF	OFF	—	—
A	ON	ON	—	—

Figure 3-G

**NOTE:** See **Section 2.5.2 Audio Status Display** for information on the relationship between audio status display and audio output.

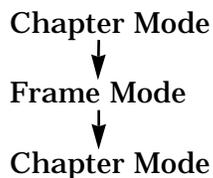
**13) CHAPTER / FRAME / TIME** **RU-V6000T & RU-V103**

**Function:** Use this button to set the RCU address specification flag to determine whether the player will interpret an address as a frame number (CAV), chapter number (CAV or CLV) or time or extended time numbers (CLV). On the RU-V6000T the END button, also serves as the FRAME/CHAP button and is used to set these address flags.

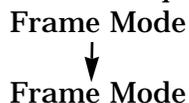
**Explanation:** The RCU address specification flag is displayed when this button is pressed. The flag changes from one mode to another, as shown below, when this button is pressed successively, depending on what type of disc has been spun-up, and what type of information has been encoded on the disc:

**CAV discs**

*Discs encoded with chapters*

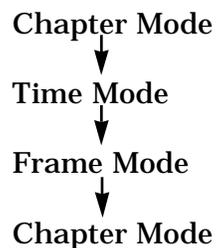


*Discs without chapters*



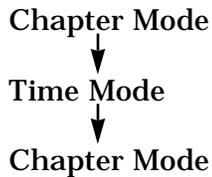
**CLV discs**

*Discs encoded with chapters and seconds*

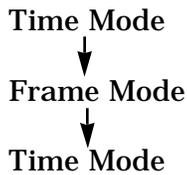


**CLV discs** (cont.)

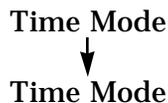
*Discs encoded with chapters but not seconds*



*Discs encoded with seconds but not chapters*



*Discs without chapters and seconds*



(Refer to **Section 2.5.5 Search Flag Displayed in Manual Mode.**)

**14) RECALL** RU-V6000T ONLY

**Function:** Use this button to call up a register to hold Level II program information.

**Explanation:** Press this button to call up a register to be used for Level II program codes. Only the numeric, STORE, and CLEAR buttons are effective after a register is called. If a register is called without using an argument, register 0 is called. If this button is pressed without using an argument after a register has been called, the next register number is called. If this button is pressed using an argument, the register number specified by the argument is called.

**NOTE:** When a register is called, the register number and the register contents are displayed on the screen. Press the CLR/HALT button to remove the register display from the screen. The STORE button is used to modify the register contents.

**Example:** Call up Register 100 and place the following arguments in successive registers. Place the value 200 in Register 100; 300 in Register 101; and 400 in

Register 102 and 500 in Register 103, by using the following RCU button presses: 100 RECALL; 200 STORE, 300 STORE, 400 STORE and 500 STORE. These numbers are stored in registers so they can be retrieved and used later in Level II programs. To remove the register display from the screen, press CLR/HALT. (For more information on the use of registers, refer to the **LD-V8000 Level II User's Manual/Programmer's Reference Guide v.1.1, 8/92**).

#### 15) CLR/HALT or CLEAR **RU-V6000T & RU-V103**

**Function:** Pressing CLEAR/HALT on the RU-V6000T or CLEAR on the RU-V103 will clear an argument input from the remote control unit or stop a search operation. It is a dual function button on the RU-V6000T: Pressing this button can also clear a register display, enter a halt command in a Level II Program or stop a Level II program execution.

**Explanation:** When the CLEAR button is pressed while an argument is being input, all arguments are cleared and the displayed arguments are removed from the screen. If this button is pressed during a search, the search is stopped and the player displays a still screen. If the CLEAR button is pressed after a register is called in Level II, the register display is removed from the screen and the register can no longer be written to. If HALT is pressed during a Level II program execution, program execution stops. In *Programming Mode*, pressing HALT enters a HALT command into a Level II program. (See the **LD-V8000 Level II User's Manual**.)

#### 16) STORE **RU-V6000T ONLY**

**Function:** Press this button to write a value into a register to be used in Level II programming.

**Explanation:** An optional value can be written in a register that has been called up. Enter the numbers of a specific argument and then press the STORE button to enter the argument value into the register. If STORE is pressed without an argument, zeros are written into the register. Every time STORE is pressed, the current register number is increased by one. (See the **LD-V8000 Level II User's Manual**.)

#### 17) RUN/BRANCH **RU-V6000T ONLY**

**Function:** Press the RUN button to execute Level II programs that have been sent to the player's memory.

**Explanation:** Pressing this button sends a program execution command. The address specified in the argument indicates where the program execution starts. If an argument is omitted, execution starts at address 0. **NOTE:** Press the CLEAR/ HALT button to stop program execution. This button is also used to enter a BRANCH command in *Programming Mode*. (See the **LD-V8000 Level II User's Manual**.)

**18) PROGRAM** **RU-V6000T ONLY**

**Function:** Pressing this button makes the player enter *Programming Mode*.

**Explanation:** This allows programming code to be input at the address specified by the argument. The program is input beginning from the address specified by the argument. If the argument is omitted, the program is input beginning from address 0. If this button is pressed in *Programming Mode*, the program is not rewritten but the current program address is increased by one. **Note:** Sending an END command instructs the player to exit *Programming Mode*. (See the **LD-V8000 Level II User's Manual**.)

**19) END / FRAME/CHAPTER** **RU-V6000T ONLY**

**Function:** Pressing this as the END button causes the player to exit *Programming Mode*. Using it as the FRAME/CHAP button changes the player's address flags.

**Explanation:** Pressing this button while the player is in *Programming Mode*, takes the player out of *Programming Mode*. (See the **LD-V8000 Level II User's Manual**.) If this button is pressed while the player is in *Normal Operating Mode*, the address flags and the corresponding screen displays are changed. Pressing the the FRAME/CHAP button successively will toggle through Chapter, Frame and Time as if the CHAPTER/FRAME/TIME button on the RU-V103 were pressed. Refer to Chapter/Frame/Time on page 3-14 and 3-15.

### 3.3 Barcode Control

Barcode control provides a simple method of quickly retrieving specific frames or video/audio segments from a videodisc. By scanning a LaserBarcode with a Pioneer Barcode Reader (UC-V104BC, UC-V108BC, UC-V109BC) and sending the code to the player via a wired connection or via infrared signal, the indicated frame or segment will appear on the monitor.

**NOTE:** All current Pioneer Industrial videodisc players support the original LaserBarcode standard commands. As of August 1, 1992 the LaserBarcode Association officially revised the LaserBarcode standard. This new standard, the LaserBarcode 2 Standard (LB2), has also been adopted by Pioneer. It includes all of the barcode functions available within the original LaserBarcode standard command set and provides "extended commands" for Time searches and time segment plays on CLV discs, slow motion playback on CAV discs, and access to digital audio. *LD-V8000 players with serial numbers greater than #ME3912276 are LB2 compatible.*

#### 3.3.1 LaserBarcode 2 Capability of the LD-V8000

The LD-V8000 players manufactured after October 17, 1990 with serial numbers KJ3906076 and above, have built-in LaserBarcode capabilities. The player

responds to official LaserBarcode Standard Commands that are scanned by a Pioneer Barcode Reader and transmitted to the player. EPROMS with LaserBarcode 2 capability are included in all players with serial numbers greater than #ME3912276. LD-V8000 players from September 1992 (serial #MJ3914776) carry the LB2 logo. See **Appendix I, LaserBarcode 2 Commands and Logo**, page I-10, for more on Player Compatibility.

An EPROM Upgrade Kit is also available to provide upgraded LaserBarcode 2 capability to older players. The kit, Pioneer Part #LD-V8EP92, contains EPROMs #DYW 1202 and #DYW 1194. These EPROMS (and above) provide LaserBarcode 2 features and can be ordered through the Pioneer Parts Department in Long Beach, CA. Dealers should call 1-800-457-2881; End Users should call 1-800-228-7221.

**NOTE:** *It is strongly recommended that EPROMs be replaced by a Pioneer Authorized Service Technician. If you decide to install Upgraded EPROMs yourself, you run the risk of voiding your player's warranty. Call 1-800-872-4159 for your nearest Pioneer Authorized Service Center.*

### 3.3.2 LaserBarcode 2 Standard Commands

**Appendix F, LD-V8000 EPROM Upgrades**, page F-3, provides a list of commands that comprise the LB2 Standard. Notice, the list is divided into "Original Commands" and "Extended Commands". LB2 includes all of the original LaserBarcode standard commands and 15 new LB2 "extended commands": 12 new independent commands, one additional search command and two new segment play commands.

### 3.3.3 Creating LaserBarcodes

Pioneer provides **Bar'n'Coder 3.0** software for creating LaserBarcode 2 extended commands and original LaserBarcode commands. **Bar'n'Coder 3.0**, Hypercard Barcode Printing Software for the Macintosh, is available through Authorized Pioneer Dealers.

The LaserBarcode Association strongly recommends that all extended LB2 barcodes include a subscript 2 next to the code. Pioneer Barcode creation software follows this recommendation: LB2 extended barcodes have a subscript 2 next to them. These LB2 extended commands must be played on LB2 compatible players. See **Appendix I, LaserBarcode 2 Commands and Logo**, for sample LB and LB2 barcodes. Notice the subscript 2 next to the LB2 barcodes on pages I-3 and I-4.

### 3.3.4 The LaserBarcode Logos

Developers and publishers of barcode applications should pay particular attention to the LaserBarcode and LaserBarcode 2 extended command sets and their respective logos. When creating applications that are intended to work with all

LaserBarcode (LB) compatible players, developers and publishers must use only the original LaserBarcode standard command set. When creating barcode applications to work with LB2 compatible players, developers and publishers can use original LB barcodes as well as LB2 extended commands.

**NOTE:** LaserBarcode standard commands are a sub-set of the LaserBarcode 2 Standard. Applications using only original LaserBarcode standard commands will play on all LB compatible players and on all LB2 compatible players. If, however, an application uses LB2 extended commands (distinguished by the subscript 2 next to the code), the LB2 extended commands will not play on LB-only compatible players.

The symbols below indicate that an application bearing it supports the LaserBarcode standard command set or the LaserBarcode 2 standard command set as established by the LaserBarcode Association. These symbol may be used *only* on applications that adhere to the LaserBarcode or LaserBarcode 2 standards. Customers look for these logos to assure the application can be used with their particular player that is LB or LB2 compatible.



Figure 3-H



Figure 3-I

**NOTE:** Contact Pioneer Communications of America Inc. Multimedia Systems Division, Engineering/ Technical Support, 201/327-6400, for more information on the LaserBarcode System and for information on licensing the LaserBarcode logos.

### 3.3.5 Pioneer Barcode Readers

All three Pioneer Barcode readers, the UC-V104BC, the UC-V108BC, and the UC-V109BC, can be used to send LB2 "original" and "extended" commands to the LD-V8000. For details about each reader, see **Appendix J, Pioneer Barcode Readers**.

## **4. External Computer Control — Level III**

- 4.1 Command and Status**
- 4.2 Error Messages**
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# **CHAPTER**

# **4**

**LD-V8000**

**LEVEL I & III**

USER'S MANUAL

Programmer's Reference Guide

## 4 External Computer Control — Level III

This chapter describes the computer control protocol and specific commands used for Level III control of the LD-V8000. To attach a computer to the LD-V8000 via the player's RS-232 port, refer to **Appendix C, Interface Cable Specifications**. See **Section 2.4 On-Screen Function Switches** to select Input Device, Baud Rate, etc.

### 4.1 Command and Status

In the LD-V8000 external computer control protocol, the computer transmits a command, and the player returns the execution completion status.

ASCII character codes are used for the actual commands and status responses. The command mnemonic is expressed as two ASCII characters.

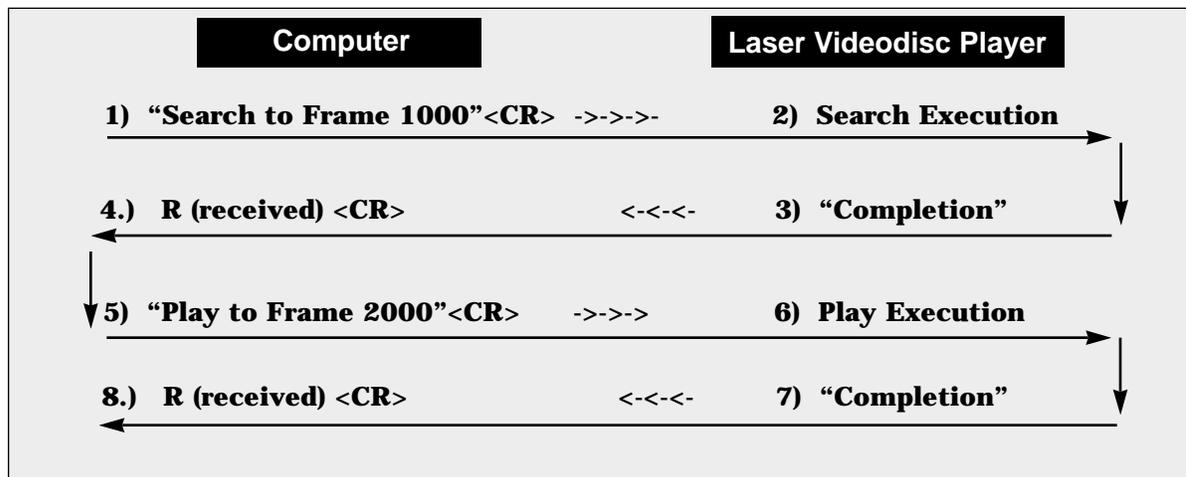


Figure 4-A

In most cases, there is no distinction between the use of uppercase or lowercase letters, and the use of uppercase letters is recommended.

Arguments may be set to specify the frame number, speed or other values for a command. The argument is always placed before the command. The command is also used as the terminator of the argument. In the simplest protocol, the player immediately executes one command as soon as the terminator of the command line, a <CR> (carriage return), is received.

**Example:** 1000SE<CR> : Search to frame 1000.

The player has a command buffer that allows multiple commands to be sent from the external controller in the same command string.

**Example:** 1000SE 2000PL <CR> : Search to frame 1000, then play to frame 2000.

In this example, when the <CR> is received, commands are executed sequentially from the first command of the buffer.

In the command line, codes such as <SPACE> or <LF> (line feed) that do not affect player operation are ignored. The length of the command line is limited to the buffer size. For the LD-V8000, the length of a command line is 20 characters. The <CR> or <LF> are not included in the buffer size.

When all the commands are completely executed, the player transmits the “completion” message. (It sends an “R” <CR>.) If an error occurs, an error message such as E04 <CR> is returned by the player. This indicates the error occurrence, along with the error code. See **Section 4.2 Error Messages**, page 4-3. The automatic return of an “R” following command execution is called *Automatic Status*. *Automatic Status* is very useful when working with some computer programs, because it allows the program to know the appropriate time to send the next command. If this function is not used, the command processing time must be taken into consideration before the next command is sent. To set Automatic Status ON or OFF, see the Level III command description for **Communication Control**, page 4-38.

#### 4.1.1 Request Status

When an error message is received, it may be necessary to determine the player’s current status in order to continue a program. A variety of conditions can occur which may cause an error code to be sent. Since actual hardware failure in the player is a relatively rare event, other conditions may be detected which would allow a program to recover and continue operation. Even when there is no error, there are occasions when player status or disc information is useful. In such cases, the *Request Status* function can be used.

The user may want to find out the current frame number even if there is no error. *Request Status* commands can be useful under these conditions. Nineteen *Request Status* commands are available on the LD-V8000.

The main *Request Status* commands in Level III are as follows:

- 1) To know the active mode of the player: ?P
- 2) To know the current frame number, time code, or chapter: ?F, ?T, ?C

**NOTE:** These and additional *Request Status* commands are described in **Section 4.7**

The status functions are summarized below.

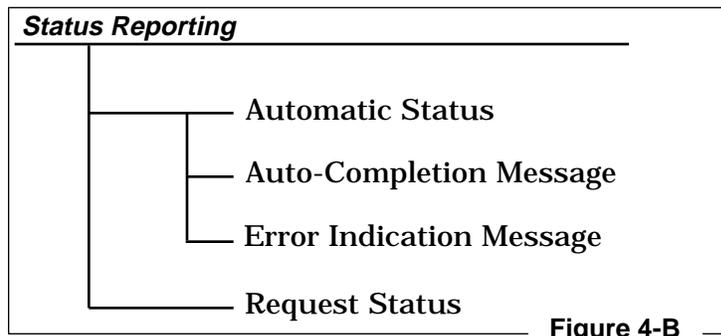


Figure 4-B

## 4.2 Error Messages

Code	Message	Meaning
E00	Communication error	Communication line error, framing error, buffer overflow error.
E04	Feature not available	Non-usable function has been tried. The command mnemonic is wrong. A command specific to CAV or CLV is sent while the wrong type of disc is in the drawer.
E06	Missing argument	Necessary parameter is not specified.
E11	Disc is not loaded	There is no disc in the drawer.
E12	Search error	Search or Stop Marker address cannot be found.
E13	De-focusing error	Laser error: Unfocused
E15	Picture stop	Playing has been stopped by a picture stop code.
E16	Other device input	The command(s) sent via the serial line, were not executed before commands were sent from the front panel keys, the RCU and/or before a Level II program could be executed.
E99	Panic	Unrecoverable error occurred. Disc cannot be loaded. Playing cannot be continued.

Figure 4-C

### 4.3 Initial Settings

The internal registers and switches are set to the following conditions when power is turned on. The settings are not re-initialized when the player is put into *Park* or *Door Open Mode*. Do not forget to set them to the parameters needed when creating an application program. Some of the switch settings can be set via Registers under computer control. For more information see **Section 4.7.7 Register Control Commands** and **Section 2.4 On Screen Switch Settings**.

Register/Switch	Initial Setting	Status
Key lock	0	Unlocked
Video switch	1	ON
Audio switch	3	Stereo
Display switch	0	OFF
Address flag		Frame (CAV); Time (CLV)
Speed parameter	60	Normal (X1) speed
CCR	3	Mode 3
REG. A	3	Frame/Chapter display
REG. B	0	Normal squelch
REG. C - H		Set to the value of the On-Screen function switches.
AUX Port	1: 2:	High High

Figure 4-D

#### 4.4 List of Level III Commands

The following commands are available in Level III with the LD-V8000. The page number refers to the page that contains a detailed description and examples of how to use the specific command. **NOTE:** An address or argument contained in parentheses can be omitted.

	Command	Mnemonic	Page
1	Door Open	OP	4-11
2	Door Close	CO	4-11
3	Reject	RJ	4-12
4	Start	SA	4-12
5	Play	(Address) PL	4-13
6	Pause	PA	4-14
7	Still	ST	4-14
8	Step Forward	SF	4-15
9	Step Reverse	SR	4-15
10	Scan Forward	NF	4-15
11	Scan Reverse	NR	4-15
12	Multi-Speed Forward	(Address) MF	4-16
13	Multi-Speed Reverse	(Address) MR	4-16
14	Speed Set	Integer SP	4-17
15	Search	Address SE	4-18
16	Multi-Track Jump Forward	Integer JF	4-19
17	Multi-Track Jump Reverse	Integer JR	4-19
18	Stop Marker	Address SM	4-20
19	Frame Set	FR	4-21
20	Time Set	TM	4-22
21	Chapter Set	CH	4-22
22	Clear	CL	4-23
23	Lead-Out Symbol	LO	4-23
24	Audio Control	Integer AD	4-24
25	Sub Audio Control	Integer AS	4-24
26	Video Control	Integer VD	4-28

Figure 4-E

	Command	Mnemonic	Page
27	Key Lock	Integer KL	4-29
28	Beep Control	Integer BP	4-30
29	Display Control	Integer DS	4-31
30	Clear Screen	CS	4-32
31	Print Character	Integer PR	4-33
32	Frame Number Request	?F	4-34
33	Time Code Request	?T	4-35
34	Chapter Number Request	?C	4-35
35	Player Active Mode Request	?P	4-36
36	Disc Status Request	?D	4-37
37	LDP Model Name Request	?X	4-37
38	User's Code Request (Disc ID)	?U	4-38
39	Set Video Memory Mode	Integer MM	4-42
40	Video Memory (Field or Frame)	Integer VM	4-42
41	Disable Memory Input	Integer DM	4-43
42	Enable Memory Input	Integer EM	4-44
43	Select Frame Interval	Integer RM	4-45
44	Select Playback Field	Integer IM	4-46
45	Communication Control	Integer CM	4-47
46	CCR Mode Request	?M	4-47
47	Register A Set (Display)	Integer RA	4-48
48	Register B Set (Squelch Control)	Integer RB	4-51
49	Register C Set (Miscellaneous)	Integer RC	4-52
50	Register D Set (RS-232)	Integer RD	4-53
51	Register E Set (User's Switch 1)	Integer RE	4-54
52	Register F Set (User's Switch 2)	Integer RF	4-55
53	Register G Set (Video Memory)	Integer RG	4-56
54	Register H Set (Extended Control)	Integer RH	4-57
55	Register I Set (Level II Program)	Integer RI	4-58
56	Register A Request (Display)	\$A	4-59
57	Register B Request (Squelch Control)	\$B	4-59

Figure 4-E (cont.)

	Command	Mnemonic	Page
58	Register C Request (Miscellaneous)	\$C	4-60
59	Register D Request (RS-232)	\$D	4-60
60	Register E Request (User Switch 1)	\$E	4-61
61	Register F Request (User Switch 2)	\$F	4-61
62	Register G Request (Video Memory)	\$G	4-62
63	Register H Request (Extended Control)	\$H	4-62
64	Register I Request (Level II Program)	\$I	4-63
65	Select Input Unit	Integer #S	4-64
66	Input Unit Request	#I	4-65
67	Input Number Wait	?N	4-66
68	Set AUX Port	Integer #P	4-67
69	Set Program Pointer	Address *S	4-68
70	Program Read	Integer *D	4-68
71	Program Write	Integer *W	4-69
72	Program Pointer Request	*P	4-70
73	Program Run	(Address) *R	4-70
74	Program Halt	*H	4-70

Figure 4-E (cont.)

## 4.5 Command Formats

Level III commands on the LD-V8000 are expressed as “Command Mnemonics”, so they are easier to remember. “Command Mnemonics” are also used for Level III control of the LD-V4400, CLD-V2400, LD-V2200, the LC-V330 and the discontinued LD-V4200. (See **Technical bulletin #143, Command Mnemonics for Pioneer Industrial LaserDisc Players.**) Some commands are preceded by an “argument” that may be a specific “address” or an “integer”.

**Command Mnemonic** — Each Level III mnemonic command is expressed as two ASCII alphabetic characters. There is no distinction between uppercase letters and lowercase letters. **Example:** PL (Play); Pl (Play); pl (Play)

**Argument** — An argument is expressed in ASCII digits and it is placed before the command. When a command requiring the argument has no argument, an error occurs. An argument consists of one of the following:

1) **An Address** — The address can be a frame, time or chapter number, depending on the address flag. When a value larger than the maximum allowable value is input, correct evaluation cannot be made.

Addresses may be expressed as frame, chapter, time or extended time numbers:

<b>Frame Set</b>	
<b>Frame number</b>	<b>CAV</b> N1 N2 N3 N4 N5 minimum = 00000 » maximum = 65535
<b>Extended time number</b>	<b>CLV</b> N1 N2 N3 N4 N5 N6 N7 (N1=hours, N2 N3=minutes, N4 N5=seconds, N6 N7= frame numbers) minimum = 00000 » maximum = 9595929
<b>Time Set</b>	
<b>Time number</b>	<b>CLV</b> N1 N2 N3 N4 N5 (N1=hour, N2 N3=minutes, N4 N5=seconds) minimum = 00000 » maximum = 95959
<b>Chapter Set</b>	
<b>Chapter number</b>	<b>CAV or CLV</b> N1 N2 minimum = 00 » maximum = 79

Figure 4-F

2) **Integer** — This indicates that the argument should be an integer. The value is used to set a control register to some specified value or condition.

N1 N2 N3  
minimum = 000 » maximum = 65535

3) **(Address) or (Integer)** — When an argument, an address or an integer, is indicated in parentheses, it is optional and can be omitted.

4) **Command String** — A command string consists of multiple commands. The maximum length of a command string is 20 characters and it is terminated by the <C/R> code (OD hex).

**Example:** FR2000SE 2300PL <C/R>

- After the termination, the command string is evaluated, and executed sequentially from the first command.
- The <L/F> code (OA hex) and <SPACE> code (20 hex), even if contained in the command string, will be ignored because <L/F>, <C/R> and <SPACE> are not included in the number of characters which can be transmitted in the command string.

- When an error occurs, the subsequent commands in the current string will not be executed.
- If a new command string is input before execution of a current string has been completed, the remaining commands are cleared and execution is cancelled. Thus, in order to cancel a currently executing string, simply send the <C/R> without a preceding command.
- When the player is put into *Spin-Up Mode*, *Spin-Down Mode* or *Search Mode*, by external commands SA, RJ or SE, subsequent commands issued will be executed after the *Spin Up*, *Spin Down* or *Search Mode* cycle is finished, due to the player's communication protocol. If the user wants to check the player's status or set player control flags while the mode cycles are in progress, a *Request Status* command (?P, ?D, etc.) or a command to set the address flag (CH, FR, TM) can be sent. The player will process the command, but won't send a completion status.

## 4.6 Status Returns

The player can return codes to the computer indicating certain status conditions:

### 1) *Completion Message*

The completion message used in Automatic Status is "R".

R <C/R>

### 2) *Error Message*

The error message is indicated by the letter "E" followed by a two-character error number.

E N1 N2 <C/R>

The error message occurs when a command is non-executable and hinders continued control. See list of the error messages, **Section 4.2 Error Messages**, page 4-3.

### 3) *Request Status Return*

In response to a single request command, the status is displayed as the appropriate character string with a termination code at the end. A termination code of either <C/R> or <L/F> can be selected by using function switch S6. **NOTE:** The termination code can be selected from among the On-Screen Switch Settings by pressing the DISPLAY and Power-ON buttons simultaneously on the front panel of the player. Press SCAN FORWARD to move to page 3 of the On-Screen Settings. Then press STEP FORWARD twice to select the TxD Terminator, then Press STEP REVERSE to toggle through the options. Press DISPLAY again to commit the selection to the player's memory.

- If multiple request commands are given within the same command string, each status value is returned as the appropriate character string and a <C/R> (or <C/R> <L/F>) termination code.

?C?F<C/R> 02 <C/R> 10260 <C/R>

- When the request command is at the end of the command string, the “R” of the completion message is omitted.

ST?F <C/R> 23005 <C/R>  
 ?FST <C/R> 23005 <C/R> R <C/R>

#### 4) Timing

The timing from the receipt of a command to the return of the status value is as follows:

- T1 is the time from the receipt of <C/R> at the end of the command string to the start of command execution, and is within a maximum of 20 ms.
- T2 is the command execution time, and is at least 14 ms. T2 before the <C/R> increases depending on the type of command.
- The minimum processing time for any command (total of T1 and T2) is 14 ms.
- In the LD-V8000, T2 may increase due to the video memory processing.

Timing Diagram

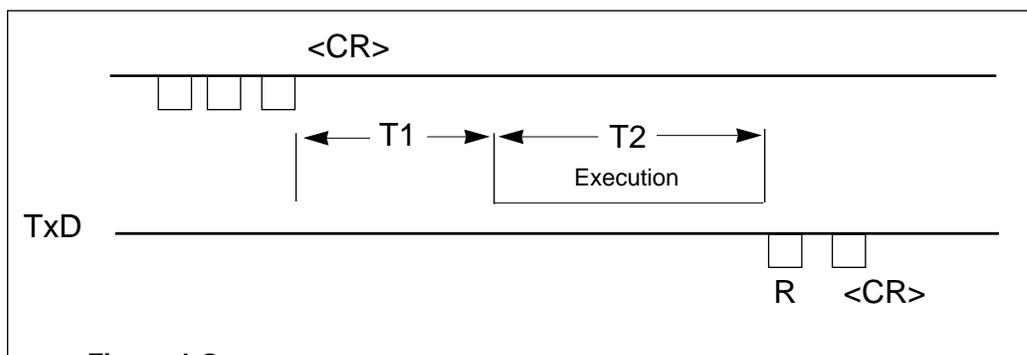


Figure 4-G

## 4.7 Level III Command Descriptions

This section of the manual contains a detailed explanation of each Level III command available for use when controlling the LD-V8000 from an external computer. The format used to describe each command is as follows:

- Function:** A description of what the command does.  
**Format:** The command mnemonic used to send the command to the player.  
**Explanation:** A description of how the command is executed.  
**Execution:** An example of how to execute the command.

### 4.7.1 Player Control Commands

#### 1) DOOR OPEN

Function: Door is opened.

Format: O P

Explanation: The *Door Open Mode* is the state where the drawer is opened to change the disc, or the tray is drawn out.

If this command is sent when the player is in *Park*, the door is opened and the *Door Open Mode* starts. This command is also effective in other modes. In such a case, the disc rotation stops and then the door is opened.

Execution: \* Park Mode  
 O P <C/R>                      R <C/R>  
 \* Door Open Mode

#### 2) DOOR CLOSE

Function: Door is closed.

Format: C O

Explanation: When the player door is open and this command is entered, the player closes the door and enters *Park*. The completion status is returned just after the door has closed. If this command is entered when the player is in some mode other than *Door Open*, an error message will be returned.

Execution: \* Door Open Mode  
 C O <C/R>                      R <C/R>  
 \* Park Mode

REJECT; START

**3) REJECT**

Function: Disc rotation is stopped.

Format: R J

Explanation: If this command is sent when the player is in *Random Access Mode* or *Setup Mode*, the *Reject Mode* starts and disc rotation stops. When disc rotation completely stops, the completion status is returned, and the player enters *Park*.

Execution: \* Random Access Mode  
R J <C/R>                      R <C/R>  
\* Park Mode

**4) START**

Function: Disc rotation is started.

Format: S A

Explanation: If this command is sent when the player is in *Park* or *Reject Mode*, the *Setup Mode* starts and disc rotation is started. When the player is ready to begin playing the audio and video content of the disc, it enters *Pause Mode* at the first position in the program area of the disc. Then the completion status is returned.

Execution: \* Park Mode  
S A <C/R>                      R <C/R>  
\* Pause Mode: Disc is successfully loaded.  
or  
\* Park Mode  
S A <C/R>                      E 11 <C/R>  
\* Park Mode: Disc is not loaded.

**5) PLAY**

**Function:** Pictures and sound are reproduced.

**Format:** (Address) P L

**Explanation:**

- 1) If this command is sent when the player is in *Random Access Mode*, *Play Mode* is the only mode in which sound is automatically reproduced simultaneously with video.
- 2) If an address is specified, the player will stop automatically. The specified address is written in the Mark Frame or Mark Chapter Register and compared with the current address. When both values are the same, the *Still Mode* (CAV or CLV) occurs; then the completion status is returned. Command completion also occurs when lead-out is found before the specified address is reached.

**IMPORTANT NOTE**

*When using the PLAY command with an address, the auto stop function will be released if any other command, including a status request, is sent to the player before the specified address is reached.*

*Use the Stop Marker command to achieve an auto stop PLAY function that will allow for status requests and maintain the end address marker.*

- 3) If this command is sent when the player is in *Park, Setup Mode* is executed and the disc plays from the beginning of the program area. As soon as the disc begins to play, the completion status is returned.

**Execution #1:** \* Pause Mode  
P L <C/R> R <C/R>  
\* Play Mode

**Execution #2:** \* Still Mode  
F R 3 2 4 0 0 P L <C/R>  
\* Play Mode  
Frame 32400 reached R <C/R>  
\* Still Mode

PAUSE; STILL

Execution #3: \* Park Mode  
P L <C/R>                      R <C/R>  
\* Play mode

**6) PAUSE**

Function:            Picture ceases and pausing occurs.

Format:             P A

Explanation:      If this command is sent to the player while it is in *Random Access Mode*, pausing occurs at that position and a blue (or black) screen appears.

Execution:        \* Play Mode  
P A <C/R>                      R <C/R>  
\* Pause Mode  
P L <C/R>                      R <C/R>  
\* Play Mode

**7) STILL**

Function:           Pausing occurs with picture displayed.

Format:             S T

Explanation:      If this command is sent to the player when it is in *Random Access Mode*, pausing occurs at that position and *Still Mode* occurs (CAV & CLV).

Execution:        \* Play Mode  
S T <C/R>                      R <C/R>  
\* Still Mode  
P L <C/R>                      R <C/R>  
\* Play Mode

**NOTE:**            When a CLV disc is playing without extended 24-bit code (which includes seconds and frame numbers), the player will execute a Still but will not execute a Step Forward or Step Reverse.

**8) STEP FORWARD**

**9) STEP REVERSE**

**Function:** Pictures are moved one frame forward or backward.

**Format:** S F - STEP FORWARD  
S R - STEP REVERSE

**Explanation:** If this command is sent to the player when it is in *Random Access Mode*, the pictures will move one frame forward or backward, and then *Still Mode* occurs.

**Execution:** \* Play Mode  
S F <C/R> R <C/R>  
\* Still Mode  
S R S R S R <C/R> R <C/R>  
\* Still Mode

**NOTE:** This command can not be executed if a CLV disc is played which does not have extended 24-bit code (seconds & frames encoded).

**10) SCAN FORWARD**

**11) SCAN REVERSE**

**Function:** Quick forward or reverse scanning of the disc.

**Format:** N F - SCAN FORWARD  
N R - SCAN REVERSE

**Explanation:** If this command is sent to the player when it is in the *Random Access Mode*, the pictures will move at high speed about 500 frames forward or backward. This movement is referred to as *Scan Mode*. When the *Scan* is completed, the original mode is restored and the completion status is returned.

**Execution:** \* Play Mode  
N F <C/R> R <C/R>  
\* Play Mode  
N R N R N R <C/R> R <C/R>  
\* Play Mode

MULTI-SPEED FWD & REV

12) MULTI-SPEED FORWARD

13) MULTI-SPEED REVERSE

Function: Playing is done at a speed set in the speed register.

Format: (Address) M F - MULTI-SPEED FORWARD  
(Address) M R - MULTI-SPEED REVERSE

Explanation: 1) If this command is sent to the player when it is in *Random Access Mode*, *Multi-Speed Mode* occurs (CAV & CLV). In *Multi-Speed Mode*, the pictures are reproduced at a speed specified by the Speed Register.

2) If an address is specified, playing is done at the speed specified in the Speed Register. The specified address is written in the Mark Frame Register or Mark Chapter Register and compared with the current address. When both values are the same, *Still Mode* occurs. Then the completion status is returned.

**IMPORTANT NOTE**

*When using the MULTI-SPEED command with an address, the auto stop function will be released if any other command, including a status request, is sent before the specified address is reached.*

*Use the Stop Marker command to achieve an auto stop MULTI-SPEED function to allow for status requests and maintain the end address marker.*

Execution #1: \* Play Mode  
M F <C/R> R <C/R>  
\* Multi-Speed Mode

Execution #2: \* Still Mode  
F R 3 4 5 0 0 M F <C/R>  
\* Multi-Speed Mode  
Frame 34500 reached R <C/R>  
\* Still Mode

**NOTE:** This command cannot be executed if a CLV disc is being played without extended 24-bit code (seconds & frames encoded).

**14) SPEED SET**

**Function:** Speed for Multi-Speed playing is specified.

**Format:** Integer S P

**Explanation:** Contents of the Speed Register are rewritten with this command. Immediately, the completion status is returned. The active mode of the player does not change. This command is accepted even when *Multi-Speed Mode* is in effect.

The relationship between the speed parameter specified by the integer and the actual play speed is as follows:

$$\text{Play speed} = \text{normal speed} \times \text{Parameter} / 60$$

The speed parameter indicates the number of fields moved per second, and can be specified in range from 1 to 255. It is 60 for normal play. A value of 0 is the same as 1. The initial value is 60.

The relationship between representative play speeds and parameters is as follows.

Integer	Speed	Integer	Speed
240	X4	30	1/2
180	X3	20	1/3
120	X2	15	1/4
60	X1	10	1/6

**Figure 4-H**

**Execution:**

- \* Play Mode  
3 0 S P M F <C/R> R <C/R>
- \* 1/2 speed Multi-Speed play  
2 0 S P <C/R> R <C/R>
- \* 1/3 speed Multi-Speed play



**NOTE:** If a CLV disc which does not have extended 24-bit code (seconds & frames encoded) is being played, the player will search to the beginning frame of the minute. This means the player will search to 56 minutes, even if it is set to *Frame Mode* and the command 5 6 3 4 1 2 S E <CR> was sent to the player.

**16) MULTI-TRACK JUMP FORWARD**

**17) MULTI-TRACK JUMP REVERSE**

**Function:** Jump the designated number of tracks.

**Format:** Argument J F - Jump Forward  
Argument J R - Jump Reverse

**Explanation:** When this command is sent to player, the player jumps in either a forward or reverse direction by the number of frames described in the argument. Compared to the search command, which is an absolute address search ending in *Still Mode*, track jump is a relative address search and does not change the player mode operating at the time the command is sent. The argument is limited to 99999. If the jump ends in the lead-in or lead-out area, the player will stop at the outer most or inner most picture in the program area.

During the jump execution, the squelch can be applied to the screen by special control. However, normally the last picture prior to the track jump is grabbed and held in the digital video memory until the jump is finished and no squelch is applied.

Detailed control features are explained in **Section 4.7.5 Video Memory Control Commands**.

The player mode does not change after track jump is executed and a completion status is returned after the jump is completed.

**Execution:** \* Play Mode (at frame# 1000)  
1 0 0 J F <C/R> R <C/R>  
\* Play Mode (from # 1100)

**NOTE:** This command cannot be executed if a CLV disc is being played which does not have extended 24-bit code (seconds & frames encoded).

STOP MARKER

**18) STOP MARKER**

Function: Stop marker is set to the specified address.

Format: Address S M

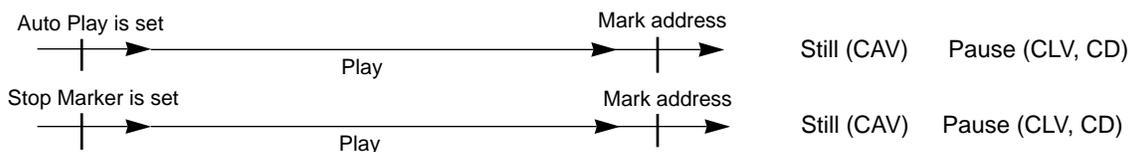
Explanation: The specified address is written in the Mark Frame Register (or Mark Chapter Register, in accordance with the addressing flag), the completion status is returned immediately. When the stop marker address is reached in *Play* or *Multi-Speed Mode*, *Still Mode* occurs and the stop marker is cleared. The stop marker is also cleared when the step command is issued to step through the address marker.

Here, the completion status is not returned when the address marker is reached. Whether the stop marker address is reached or not can be established by issuing the Frame or Chapter Number Request. If a CLEAR or a REJECT command is sent before the marker is reached, it is cleared. **NOTE:** A picture stop on a CAV disc takes precedence over a SM PL command, however, the stop marker will not be cleared when the player encounters the picture stop. When another motion command, such as PL, is issued, the stop marker that had been set, will be executed.

The stop marker is functionally similar to the auto stop operation of the play and the multi-speed commands. The auto stop and the stop marker return a completion status at different times. In an auto stop operation, the completion status is returned when the marked address is reached. In the stop marker operation, the completion status is returned when the stop marker is set.

The stop marker command is used when status requests are sent to the player before the address marker is reached; it is useful when the operation mode is to be changed before the marked address is reached.

Execution: \* Still Mode  
 F R 3 2 4 0 0 S M P L <C/R> R <C/R>  
 \* Play Mode  
 M F <C/R> R <C/R>  
 \* Multi-Speed Mode  
 P L <C/R> R <C/R>  
 \* Play Mode  
 \* Still Mode Frame 32400 was reached.



**NOTE:** If CLV disc which does not have extended 24-bit code (seconds and frame encoded) is being played, the marker will be set at the beginning frame of the minute.

### 19) FRAME SET

**Function:** Addressing flag is set to "frame."

**Format:** F R

**Explanation:** If this command is sent when a CAV disc is playing, the addressing flag is set to "frame" and the subsequent addresses are evaluated as frame numbers.

If this command is sent when a CLV disc is playing, the addressing flag is set to "frame," and the subsequent addresses to be handled are evaluated as time numbers that include frame numbers as in the example below.

F1 F2 F3 F4 F5 F6 F7

F1 = 1 digit for hour                      F2 & F3 = 2 digits for minutes  
F4 & F5 = 2 digits for seconds      F6 & F7 = 2 digits for frame numbers

Frame mode must be used when executing a CLV time number frame search, CLV multi-speed, etc.

**Execution:** \* CLV Play Mode

F R 0 0 1 2 4 1 6 S E <C/R>      R <C/R>

\* Searches to 0 hours. 01 minute, 24 seconds, 16 frames and enters still mode.

T M 1 2 4 1 6 S E <C/R>              R <C/R>

\* Searches to 1 Hr. 24 Min. 16 Sec. 00 Frame and enters still mode.

F R 0 1 0 8 0 34 S E <C/R>      R <C/R>

\* Searches to 0 Hr. 11 Min. 21 Sec. 04 Frame and enters still mode.

**NOTE:** This command cannot be executed if a CLV disc is being played which does not have extended 24-bit code (seconds & frames encoded).

*TIME SET; CHAPTER SET*

**20) TIME SET**

Function: Addressing flag is set to “time.”

Format: T M

Explanation: If this command is sent when a CLV disc is being played, the addressing flag is set to “time,” and the subsequent addresses to be handled are evaluated as time codes.

If a CAV disc is playing and this command is sent to the player, an error message will be returned.

Execution: \* CLV Play Mode

T M 1 2 4 1 6 S E <C/R> R <C/R>

\* Search 1 Hr. 24 Min. 16 Sec. 00 Frame.

**21) CHAPTER SET**

Function: Addressing flag is set to “chapter.”

Format: C H

Explanation: If this command is given, the addressing flag is set to “chapter,” and the subsequent addresses to be handled are evaluated as chapter numbers.

Execution: \* Addressing flag = frame

C H <C/R> R <C/R>

\* Addressing flag = chapter

1 5 S E <C/R> R <C/R>

F R 1 0 0 S E <SE> R <C/R>

\* Addressing flag = frame

**22) CLEAR**

Function: To clear a value entry or a player mode.

Format: C L

Explanation: 1) Contents of the digit buffer (input value) are cleared. Immediately, the completion status is returned.

2) *Search, Auto Stop, Auto Stop Multi-Speed or Stop Marker Mode* is released. If cleared during a search, the clearance is made near the current pickup position, and *Still Mode* occurs.

If cleared during auto stop or stop marker operation, normal play occurs. If cleared during auto stop multi-speed operation, regular multi-speed play occurs.

Execution: \* Play Mode  
 2 2 0 0 0 C L 2 3 0 0 0 S E <C/R>  
 \* Search mode  
 C L <C/R> R <C/R>  
 \* Still mode

**23) LEAD-OUT SYMBOL**

Function: Lead-out is set for an address.

Format: L O

Explanation: As a target address for search or auto stop, this symbol can be used in place of the value. At that time, the LO is evaluated as follows:

Frame number	65535 (CAV), 7595929 (CLV)
Time Code	75959 (7 hour 59 minutes 59 seconds)
Chapter number	79

In the LD-V8000, when the lead-out search is made, the convergence occurs immediately before the lead-out area, i.e. at the end of the program area.

Execution #1: L O S E <C/R> R <C/R>  
 ?F <C/R> 5 0 4 0 0 <C/R>

\* The last address of the program area is searched and the value is known.

Execution #2: L O P L <C/R> R <C/R>  
 \* Plays to the beginning of lead-out and address timing is known.

#### 4.7.2 Player Control Switch Commands

##### 24) AUDIO CONTROL

Function: The audio output condition is selected.

Format: Integer A D

Explanation: The contents of the Audio Control Register are rewritten. The completion status is returned immediately. The relationship between the contents of the register specified by the integer and the output audio channel is indicated in the diagram on the next page.

Execution: 3 A D <CR> R <CR>  
Set to play stereo analog tracks only

##### 25) SUB AUDIO CONTROL

Function: The sub audio output condition is selected.

Format: Integer A S

Explanation: The contents of the Sub Audio Control Register are rewritten. The completion status is returned immediately. The relationship between the contents of the register specified by the integer and the output audio channel when the digital audio output is selected by the Audio Control Register is indicated in the diagram on the next page. The initial value upon power-on is 3 (stereo).

Execution: 7 A D 2 A S <CR> R <CR>  
Set to play stereo digital and Ch 2 analog

The LD-V8000 has the ability to playback two analog audio tracks (right and left channels) and two digital audio tracks (right and left channels) if those tracks are present on the disc. With four channels of amplification and four speakers, many combinations of the four tracks are possible. The following chart shows the results of all possible commands and which track will appear at which speaker. Notice that if a single track is selected it may be directed to more than one speaker.

**NOTE:** The commands 7AD 3AS puts out all four channels of audio through the four audio jacks on the back of the player. The AUTO DIGITAL On-Screen Setting is over-ridden by Level III Audio commands.

		speaker			
		digital/analog		analog	
		1-L	2-R	3-L	4-R
<b>0 AD Off</b>					
0 AS Off	-----	-	-	-	-
1 AS Analog Ch 1	-----	-	-	-	-
2 AS Analog Ch 2	-----	-	-	-	-
3 AS Analog Stereo	-----	-	-	-	-
<b>1 AD Analog Ch 1</b>					
0 AS Off	-----	A-Ch 1	A-Ch 1	A-Ch 1	A-Ch 1
1 AS Analog Ch 1	-----	A-Ch 1	A-Ch 1	A-Ch 1	A-Ch 1
2 AS Analog Ch 2	-----	A-Ch 1	A-Ch 1	A-Ch 1	A-Ch 1
3 AS Analog Stereo	-----	A-Ch 1	A-Ch 1	A-Ch 1	A-Ch 1
<b>2 AD Analog Ch 2</b>					
0 AS Off	-----	A-Ch 2	A-Ch 2	A-Ch 2	A-Ch 2
1 AS Analog Ch 1	-----	A-Ch 2	A-Ch 2	A-Ch 2	A-Ch 2
2 AS Analog Ch 2	-----	A-Ch 2	A-Ch 2	A-Ch 2	A-Ch 2
3 AS Analog Stereo	-----	A-Ch 2	A-Ch 2	A-Ch 2	A-Ch 2
<b>3 AD Analog Stereo</b>					
0 AS Off	-----	A-Ch 1	A-Ch 2	A-Ch 1	A-Ch 2
1 AS Analog Ch 1	-----	A-Ch 1	A-Ch 2	A-Ch 1	A-Ch 2
2 AS Analog Ch 2	-----	A-Ch 1	A-Ch 2	A-Ch 1	A-Ch 2
3 AS Analog Stereo	-----	A-Ch 1	A-Ch 2	A-Ch 1	A-Ch 2
<b>4 AD Off</b>					
0 AS Off	-----	-	-	-	-
1 AS Analog Ch 1	-----	-	-	A-Ch 1	A-Ch 1
2 AS Analog Ch 2	-----	-	-	A-Ch 2	A-Ch 2
3 AS Analog Stereo	-----	-	-	A-Ch 1	A-Ch 2
<b>5 AD Digital Ch 1</b>					
0 AS Off	-----	D-Ch 1	D-Ch 1	-	-
1 AS Analog Ch 1	-----	D-Ch 1	D-Ch 1	A-Ch 1	A-Ch 1
2 AS Analog Ch 2	-----	D-Ch 1	D-Ch 1	A-Ch 2	A-Ch 2
3 AS Analog Stereo	-----	D-Ch 1	D-Ch 1	A-Ch 1	A-Ch 2
<b>6 AD Digital Ch 2</b>					
0 AS Off	-----	D-Ch 2	D-Ch 2	-	-
1 AS Analog Ch 1	-----	D-Ch 2	D-Ch 2	A-Ch 1	A-Ch 1
2 AS Analog Ch 2	-----	D-Ch 2	D-Ch 2	A-Ch 2	A-Ch 2
3 AS Analog Stereo	-----	D-Ch 2	D-Ch 2	A-Ch 1	A-Ch 2
<b>7 AD Digital Stereo</b>					
0 AS Off	-----	D-Ch 1	D-Ch 2	-	-
1 AS Analog Ch 1	-----	D-Ch 1	D-Ch 2	A-Ch 1	A-Ch 1
2 AS Analog Ch 2	-----	D-Ch 1	D-Ch 2	A-Ch 2	A-Ch 2
3 AS Analog Stereo	-----	D-Ch 1	D-Ch 2	A-Ch 1	A-Ch 2

Figure 4-I



Audio Switch Diagram

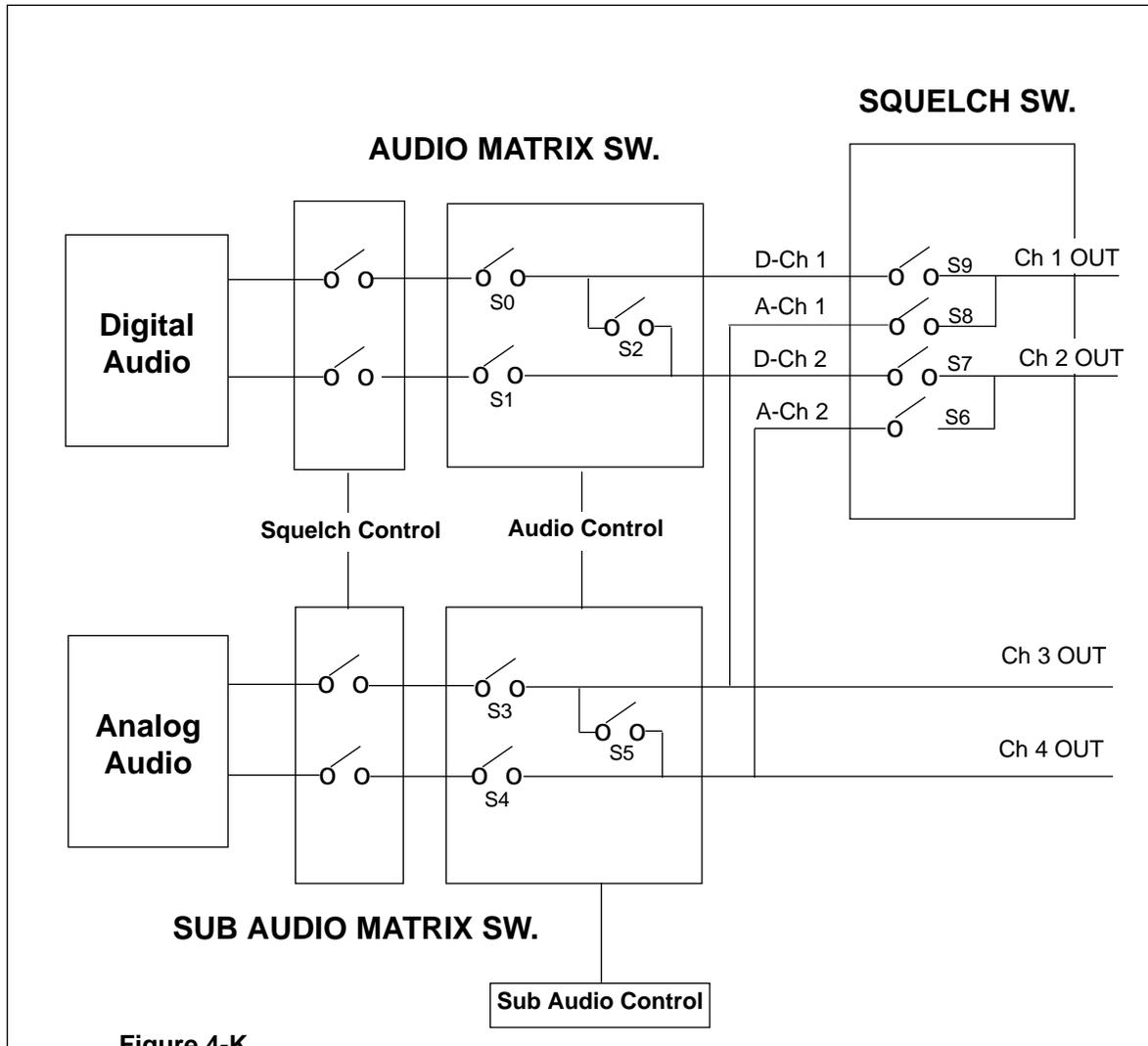


Figure 4-K

VIDEO CONTROL

**26) VIDEO CONTROL**

Function: Video switch is turned ON/OFF.

Format: Integer V D

Explanation: The Video Control Register is reset.

The initial value of the register is 1 (the video switch is ON). In this state, the video output is controlled by means of the squelch switch. When in *Park* or *Pause Mode*, the switch is set to 1.

When pictures are reproducible, the squelch condition is not active.

When the video switch is turned OFF, the screen is squelched at all times.

The squelch condition may be set to show a blue screen or a black screen by using the background color selection in Register C. Also, sync insert can be add or deleted by using the Flag Bit of Register H.

Integer	Function	Video Switch
0	Off	0
1	On (Normal)	1

**Video Control Diagram**

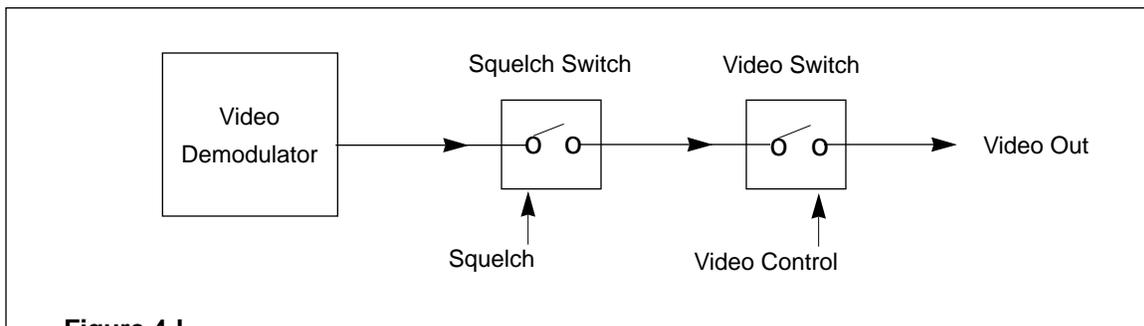


Figure 4-L

Execution: \* Video Switch = ON  
 O V D <C/R> R <C/R>  
 \* Video Switch = OFF

**27) KEY LOCK**

**Function:** The key lock switch is turned ON/OFF.

**Format:** Integer K L

**Explanation:** Operation of the front panel keys and RCU input are locked or unlocked.

The completion status is returned immediately. The initial value of OFF means the unlocked state exists. A value of 1 means ON, and the locked state is activated. At that time, the key lock LED is set ON and operation of all keys on the player (other than the power switch) and the remote control unit are not accepted.

Also Level II is halted, if it is running. However, when the remote control unit is recognized as the input device, then input remains active.

**KEY LOCK SWITCH**

Integer	Function
0	Unlock
1	Lock

**Execution:** 1 K L <C/R> R <C/R>  
\* Key Lock ON

**NOTE:** The Key Lock is on and the indicator light flashes when the player is in Function Switch Setting Mode. In this mode, the front panel or remote control buttons can only be used to set on-screen functions

*BEEP CONTROL*

**28) BEEP CONTROL**

Function: Mix beep sound into audio output.

Format: Integer B P

Explanation: When this command is sent, the player will mix a beep sound into audio line out for 100 ms. The sound level is determined by the argument of the command described in the chart below.

The beep sound is approximately an 880 Hz square wave form.

The completion status will be returned immediately.

Integer	Mix Level
0	6%
1	10%
2	20%
3	40%

Execution: 3 B P <C/R> R <C/R>  
\* 100 ms. beep on with a 40 % sound level.  
0 B P 0 B P <C/R> R <C/R>  
\* 200 ms. beep on with a 6 % sound level.

4.7.3 Display Control

29) DISPLAY CONTROL

Function: Character display is turned ON/OFF.

Format: Integer D S

Explanation: Contents of the Display Control Register are rewritten.

The initial value of the register is 0 and the display switch is OFF. If it is turned on, the chapter number, frame number or time code, and user's area can be displayed.

The actual items to be displayed are determined by the contents of the register.

Integer	Function	Display Switch
0	Off	0
1	On	1

Execution: \* Display switch = OFF.  
 1 D S <C/R> R <C/R>  
 \* Display switch = frame number

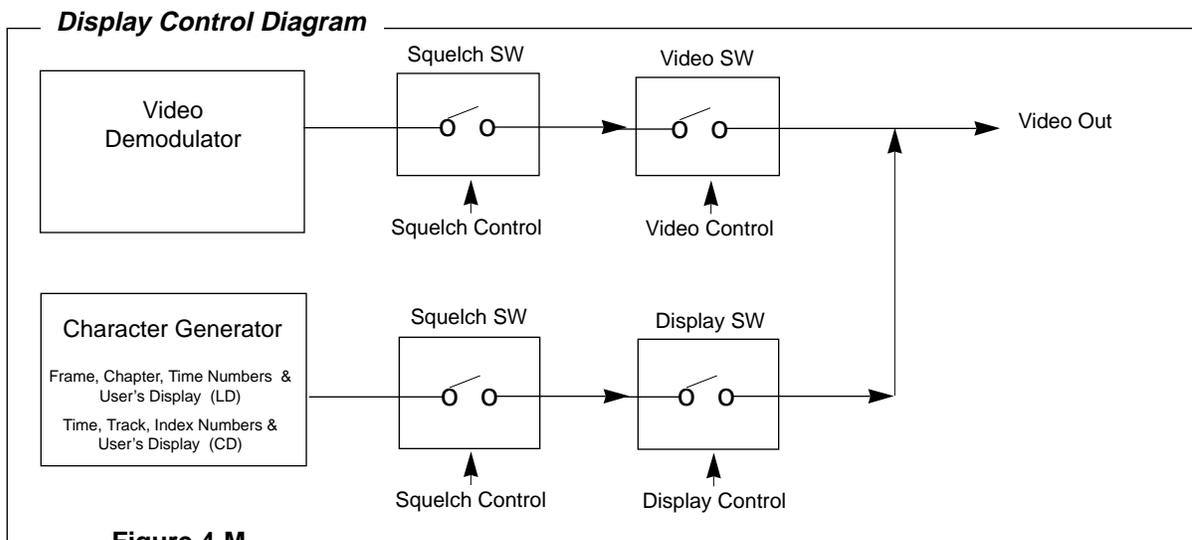


Figure 4-M

*CLEAR SCREEN*

**30) CLEAR SCREEN**

**Function:** The characters shown in the User Display Area are cleared.

**Format:** C S

**Explanation:** Characters on all of the lines are cleared. To clear only a particular line, overwrite the line with spaces by means of the PR command.

**Execution:** C S 3 P R <C/R>            R <C/R>  
HELLO ! <C/R>            R <C/R>  
After all the lines are cleared, a character string is written in  
Line 3.  
3 P R <C/R>            R <C/R>  
string of spaces <C/R>            R <C/R>  
Only line 3 is cleared.

**31) PRINT CHARACTER**

**Function:** Characters are written into the User's Display Area.

**Format:** Integer P R <C/R>  
 Character string <C/R>

**Explanation:** The character string for one line in the User Display Area is written with this command. It is effective when the user's display specification of Register A is set to ON.

First, specify the line number using an integer. The line numbers 0 to 11 are effective. After the command character PR is entered, it is terminated with the <C/R> code. In the next command line, specify the character string. A character string up to 20 characters is effective. Any commands subsequent to the command character (PR <CR>), but prior to the character string's <C/R>, are interpreted as characters to be printed to the User Display Area.

Usable characters are shown in the **Character Code Table** below.

		Low-order Byte															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
High-order Byte	2	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/	
	3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
	4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	5	P	Q	R	S	T	U	V	W	X	Y	Z	←	¥	→	■	—
	6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
	7	p	q	r	s	t	u	v	w	x	y	z	↑		↓		
	8	Ç	ü	é	â	ã	à	á	ç	ê	ë	è	ì	î	ï	Ä	Å
	9	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Å	Pt	f

The characters "7E" and "7F" are not available.

Figure 4-N

**Execution:** 4 R A 1 D S <C/R> R <C/R>  
 4 P R <C/R> R <C/R>  
 \*\*\*\*\* <C/R> R <C/R>  
 5 P R <C/R> R <C/R>  
 \* PROGRAM START \* <C/R> R <C/R>  
 6 P R <C/R> R <C/R>  
 \*\*\*\*\* <C/R> R <C/R>

#### 4.7.4 Request Commands

##### 32) FRAME NUMBER REQUEST

Function: The frame number which is currently being played is returned.

Format: ? F

Explanation: Contents of the current Frame Register are returned.

During the play of a CAV disc, a 5-digit frame number is returned. During the play of a CLV disc, a 7-digit time code (hours, minutes, seconds, frame numbers) is returned. As seen from the example, continuous frame numbers may not be received due to timing delays between the computer and the player.

Correct values will not be shown when in a mode other than the *Random Access Mode*, or when the player is in the lead-in or lead-out area of a disc. If a frame number code of the disc cannot be correctly read, the previous value is used.

Execution: \* Play Mode (CAV)  
? F <C/R> 0 2 0 4 4 <C/R>  
? F <C/R> 0 2 0 4 5 <C/R>  
? F <C/R> 0 2 0 4 5 <C/R>  
? F <C/R> 0 2 0 4 7 <C/R>

\* Play Mode (CLV)  
? F <C/R> 0 1 2 3 3 2 9 <C/R>  
(0 Hr 12 Min 33 Sec 29 Fr)  
? F <C/R> 0 1 2 3 4 0 0 <C/R>  
(0 Hr 12 Min 34 Sec 00 Fr)

**33) TIME CODE REQUEST**

**Function:** The time code which is currently being played is returned (CLV).

**Format:** ? T

**Explanation:** Contents of the current Frame Register are returned.

When a CLV disc is being played, time codes are contained in the Frame Register. Some time codes consist of hours and minutes, while most consist of Extended Phillips Code: hour, minutes, seconds, frames. When a disc not encoded with seconds is being played, the seconds unit is fixed to 0.

Correct values will not be shown when in a mode other than the *Random Access Mode*, or when the player is in the lead-in or lead-out area of a disc. If a time code on the disc cannot be correctly read, the previous number is used.

**Execution:** \* Play Mode  
 ? T <C/R>                    0 3 2 1 3 <C/R>  
 (0 hour, 32 minutes, 13 seconds)

**34) CHAPTER NUMBER REQUEST**

**Function:** The chapter number which is currently being played is returned.

**Format:** ? C

**Explanation:** Contents of the Chapter Number Register are returned.

The chapter number is a 2-digit integer. Some discs are not encoded with chapter numbers. When playing a disc without chapters, an error is returned when this request is issued. Correct values will not be shown when in some mode other than the *Random Access Mode*, or when the player is in the lead-in or lead-out area or a disc.

**Execution:** \* Play Mode  
 ? C <C/R>                    1 2 <C/R>

PLAYER ACTIVE MODE REQUEST

35) **PLAYER ACTIVE MODE REQUEST**

**Function:** The value representing the current active mode of the player is returned.

**Format:** ? P

**Explanation:** Active modes are returned according to the classification shown in the following table. This command is useful in confirming whether the player has already been started and placed in *Random Access Mode*.

<b>Player Active Mode Request Codes</b>			
<b>Code</b>	<b>Player Mode</b>	<b>Code</b>	<b>Player Mode</b>
P00	Door Open	P05	Still
P01	Park	P06	Pause
P02	Set Up	P07	Search
P03	Disc Unloading	P08	Scan
P04	Play	P09	Multi-Speed
P40	Data Collection	P41	Back-Up

Figure 4-O

- P00 (Door Open): Door is open
- P01 (Park): Disc rotation is stopped
- P02 (Set Up): Preparing to Play
- P03 (Disc Unloading): Disc tray is opened
- P04 (Play): Images and sound are reproduced at normal speed
- P05 (Still): Picture is displayed as a still
- P06 (Pause): Pausing occurs without picture display
- P07 (Search): Search is executed
- P08 (Scan): Scan is executed
- P09 (Multi-Speed): Playing in Multi-Speed
- P4X : Player is executing data collection or back-up operation

**Execution:**

- \* Play Mode
- ? P <C/R> P 0 4 <C/R>
- S T <C/R> R <C/R>
- \* Still Mode
- ? P <C/R> P 0 5 <C/R>

**36) DISC STATUS REQUEST**

**Function:** Attributes of the disc being played are returned.

**Format:** ? D

**Explanation:** Status information concerning the disc is returned in the following format.

C1	C2	C3	C4	C5	<C/R>
C1: disc loading		0 = not loaded		1 = loaded	
C2: CAV/CLV		0 = CAV		1 = CLV	X = unknown
C3: disc size		0 = 12 inch		1 = 8 inch	X = unknown
C4: disc side		0 = Side 1		1 = Side 2	X = unknown
C5: chapter code		0 = no		1 = yes	X = unknown

**Execution:** ? D <C/R>                    0 X X X X <C/R>  
 Disc is not loaded.  
 ? D <C/R>                    1 0 0 0 1 <C/R>  
 12-inch CAV disc.

**37) LDP MODEL NAME REQUEST**

**Function:** Player's model name is returned.

**Format:** ? X

**Explanation:** For the LD-V8000 the player's name is returned as follows:

P1506XX

First 5 characters (P1506) are the player series or model identification, and the last two characters (XX) represent the player version number. The LD-V8000 version upgrade returned the model number P150604. Please be advised that the version numbers are updated as running changes are made to the player.

**Execution:** ? X <C/R>                    P 1 5 0 6 0 1 <C/R>  
 In this example the last two digits (XX) = 01, which was the first version number of the LD-V8000.



### 4.7.5 Video Memory Control Commands

#### Introduction to Video Memory Control

The LD-V8000 has two video memory buffers — Memory Bank 0 and Memory Bank 1. On the LD-V8000, all video is continually passed through these video memory buffers before it is output. These two buffers allow a single video frame or one of two fields to be captured, stored and displayed. They make Sound-Over-Still operations possible, to playback audio from elsewhere on the disc while a single frame or field is held in memory and displayed. They also make possible Interleaved Video Playback.

When *Video Memory Mode / Frame Mode* is ON, one frame can be stored: Field 1 is stored in Bank 0 and Field 2 is stored in Bank 1.

When *Video Memory Mode / Field Mode* is ON, Bank 0 or Bank 1 can be selected to store Field 1. Field 2 is never stored in either Bank in Field Mode.

Writing data into the video memory and reading data out of the video memory are functions that operate independently. A selected field or full frame can be stored in the player's memory buffer and output as a still image, even as the player continues to play audio at normal speed.

#### Overview of Video Memory Control Commands

These are the Level III commands that are used to control the player's video memory buffer to capture a field or frame in memory and display it:

- **MM — Set Video Memory Mode** (See page 4-41.)  
This command is used to set *Video Memory Mode* ON or OFF.
- **RG — Register G Set** (See page 4-56.)  
This command is used to set Video Memory Mode ON or OFF and, in addition, it sets Frame or Field Mode.
  - 1RG** — Sets *Video Memory Mode / Frame Mode*.
  - 17RG** — Sets *Video Memory Mode / Field Mode*.
- **VM — Video Memory Control** (See page 4-42.)  
Selects the Bank from which to video will be output.
- **DM — Disable Video Memory Control**(See page 4-43.)  
Disables video from passing through the memory bank(s). In *Frame Mode*, it captures and stores Field 1 in Bank 0 and Field 2 in Bank 1. In *Field Mode*, the Field 1 of a frame is stored in Bank 0 and Field 1 of another frame can be stored in Bank 1. Select Bank 0 or 1 in *Field Mode*, and Bank 0 in *Frame Mode*.
- **EM — Enables Video Memory** (See page 4-43.)  
Enables video to again pass through the memory bank(s). Select Bank 0 or 1 in *Field Mode*, and Bank 0 in *Frame Mode*.

**Note:** Video Memory Mode and Frame Mode or Field Mode can be set by using the On-Screen Function Switches (P-7 of the On-Screen Menus.)

### Frame Mode

Selecting **1RG** turns ON Video Memory Mode / Frame Mode. In Frame Mode, each field of a single frame is held independently in the two field-sized memory banks. The first field of input video is always written into Bank 0 and the second field is always written into Bank 1. Sending the **ODM** command disables video from passing through the banks. It grabs and displays a single frame of video with Field 1 stored in Bank 0 and Field 2 stored in Bank 1. Use the **OEM** command to enable continuous video to again pass through the memory banks. Here is a sequence of commands that can be used to capture a frame of video into memory, display it and release it.

1000SE <CR> :Search to Frame 1000  
 1RG <CR> :Sets Video Memory ON, Frame Mode ON  
 ODM :Disables Video from passing through Banks 1 & 2.  
 The current frame number, FR 1000, is grabbed  
 Field 1 is displayed from Bank 0 and Field 2 from Bank 1.  
 PL <CR> :Outputs audio over the image.  
 OEM <CR> :Enables continuous motion video to again pass through  
 Bank 0 and Bank 1

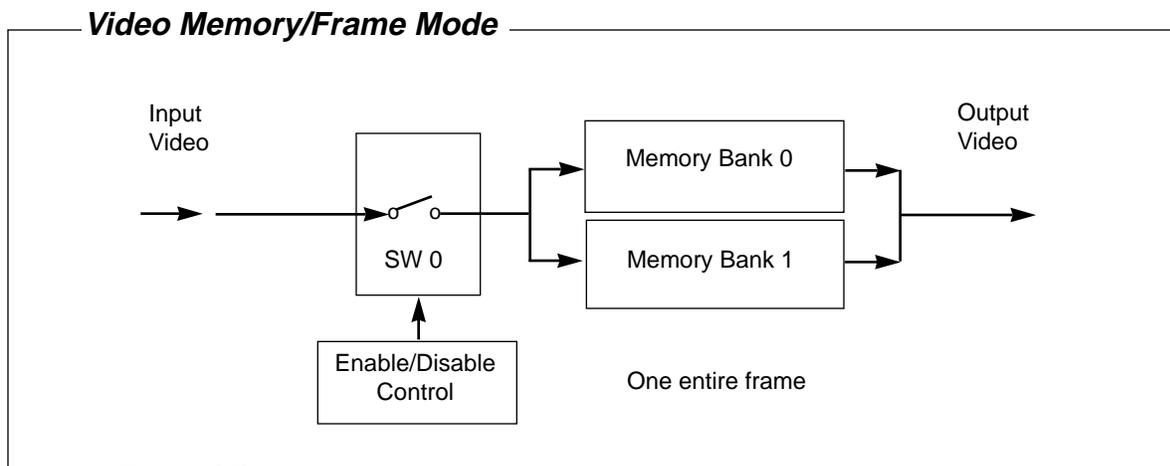


Figure 4-P

**Note:** In Video Memory Mode, Frame Mode the player ignores the VM command. Both **OVM** and **1VM** provide for playback from both memory banks so that the full frame of video is output. When the mode changes from Frame to Field, **OVM** or **1VM**, provided before the Field Mode command, become effective. For example, with the command string 1RG, ODM, OVM 17RG, the player will output Field 1 in Bank 0. With the command string 1 RG ODM 1VM 17RG, the player will output Field 2 in Bank 1.

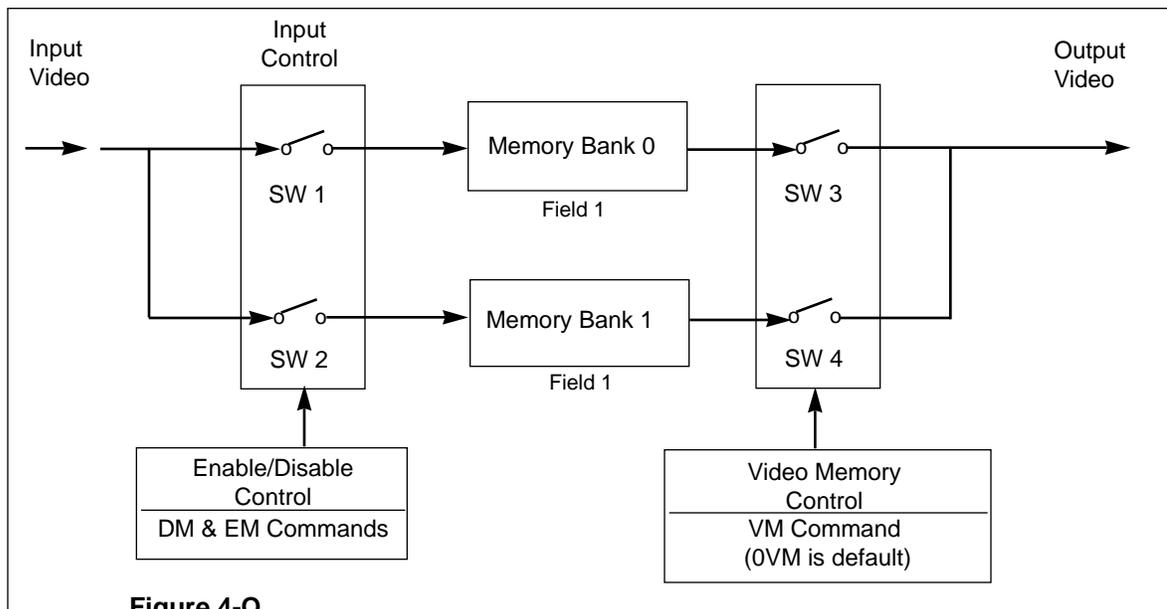
**Field Mode**

Issuing the **17RG** command puts the player into *Video Memory Mode, Field Mode*. In this mode, both banks always contain Field 1. Each bank can contain field one from the same frame of video or field one from two different frames of video. Only one bank outputs a field at any given time. **ODM** stores Field 1 in Bank 0. **1DM** stores Field 1 of the same frame or another frame in Bank 1. The **VM** command selects the bank from which video is to be displayed: **OVM** displays the Field 1 stored in Bank 0; **1VM** displays Field 1 stored in Bank 1. Use the **OEM** command to enable continuous video to again pass through Bank 0 or use the **1EM** command to allow continuous video to again pass through Bank 1.

Here is a sequence of commands that can be used to capture a field of video into memory, display it, then release it:

```

1000SE <CR>      :Search to Frame 1000
17RG<CR>         :Sets Video Memory ON, Field Mode ON
ODM <CR>         :Disables Video from passing through Bank 0
                  Field 1 of the current frame number, FR 1000, is grabbed
                  and stored in Bank 0. Full motion video continues to pass
                  through Bank 1.
OVM <CR>         :Selects the bank for video output, displays Field in Bank 0.
PL               :Outputs audio over the image displayed from memory
OEM<CR>         :Enables continuous motion video to again pass through Bank 0.
  
```

**Video Memory/Field Mode****Figure 4-Q**

**Note:** 1DM, 1VM, 1EM can be used if Bank 1 is selected as the bank to hold the field 1 of a frame.

**39) SET VIDEO MEMORY MODE**

Function: Sets the Video Memory Mode.

Format: Integer M M

Explanation: In normal player operation the *Video Memory Mode* is disabled and all video passes through the video memory buffer. The initial setting is 0. To grab a frame of video or a separate field and display it from memory, *Video Memory Mode* must be enabled. This can be done with the command "1MM."

This command is the first in a sequence of commands that allows holding a still frame or field in memory and displaying it. The command "0MM" is sent to return the player to *Video Memory Mode* disable. The completion status is returned immediately.

**NOTE:** *Video Memory Mode* can also be enabled by using Register G, the RG command. See description of Register G on page 4-56.

Execution: \* Initial Setting 0MM (*Video Memory Mode* disabled)  
1 M M <C/R> R <C/R>  
\* *Video Memory Mode* enabled  
1 RG <C/R> R <C/R>  
\* Sets *Video Memory Mode* ON, *Frame Mode* ON.  
or 17RG <C/R> R <C/R>  
• Sets *Video Memory Mode* ON, *Field Mode* ON  
0 DM <C/R> R <C/R>  
\* Captures the image and stores it in Bank 0.  
0 V M <C/R> R <C/R>  
\* Bank 0 is selected to display the stored image.  
0 EM <C/R> R <C/R>  
\* The image held in Bank 0 is released and video again passes through the video memory.

**40) VIDEO MEMORY OUTPUT**

Function: Selects the memory bank from which a field of stored video or continuous video is output. Or Bank 0 is selected to output Field 1 and Field 2 of a full Frame.

Format: Integer V M

Explanation: The LD-V8000 has two video memory banks (0 and 1). Playback video is always passed through the video memory buffer. The VM command is used to select Bank 0 or Bank 1 for output video. Bank 0 or 1 are selected when *Video Memory Mode/Field Mode* is selected. If *Frame Mode* is selected, there is no need to use this command. (In *Frame Mode*, 0 and 1 VM have the same effect). The default setting is 0. The completion status is returned immediately.

**NOTE:** When *Video Memory Mode / Field Mode*, **17RG**, is set, send a **0** or **1 DM** command to grab a field from a specific frame of video and store it into either Bank 0 or Bank 1. Use the VM command to output stored video from either Bank 1 or Bank 0 or continuous motion video from a Bank where no field has been stored. Send **0EM** or **1 EM** later to release the field stored in Bank 0 or Bank 1. When in *Video Memory Mode / Frame Mode*, **1RG**, grab, store and display the frame by sending **ODM**. Remember, in frame mode, Field 1 will be stored in Bank 0 and Field 2 will be stored in Bank 1. To release the video frame and to activate full motion video at normal playback speed, send the **0EM** command.

Execution:       \* Field mode=17RG and memory bank 0=0DM are selected  
                   1 V M <C/R>                   R <C/R>  
                   \* Video is output from memory Bank 1.

#### 41) DISABLE VIDEO MEMORY

Function:        This command grabs and stores a frame or field of video into either Bank 0 and/or Bank 1 (depending whether *Frame Mode* or *Field Mode* has been set). In *Frame Mode*, Field 1 is stored in Bank 0 and Field 2 is stored in Bank 1. In *Field Mode*, only Field 1 of a specific Frame is stored in either Bank 0 or 1, as indicated by the argument.

Format:         Memory Bank Number D M

Explanation:   When *Video Memory Mode, Frame Mode* is on (1RG), and the DM command is sent, a full frame is held in memory. Field 1 of the Frame is held in Bank 0 and Field 2 is held in Bank 1. 0DM and 1DM result in the same full-frame capture.

When *Video Memory Mode, Field Mode* are selected (17RG) and Memory Bank 0 is selected (0DM), the player captures Field 1 of a Frame and stores it in Bank 0. 0VM outputs the contents of Bank 0 as a still image. 0EM allows continuous motion video to again pass through Bank 0. When 1DM is sent to the player in *Field Mode*, Field 1, of a Frame is captured and stored in Bank 1. 1VM outputs the contents of Bank 1 as a still image. 1EM allows continuous motion video to again pass through Bank 1. The completion status is returned immediately. Power-on default is Enable Video Memory 0EM. **Note:** in *Field Mode*, Field 1 from the same or different Frames can be stored in the banks.

Execution:       \* Field Mode=17RG, Bank 0 Enabled=0EM  
                   0 D M <C/R>                   R <C/R>  
                   \* Bank 0 Disabled (Field 1 is captured and stored in Bank 0)

*ENABLE VIDEO MEMORY; Interleaved Video Playback Mode*

**NOTE:** When Field 1 of a Frame has been stored in one of the Banks for output as a still image, Field 1 from another frame can be stored on the other Bank or the second Bank can remain “Enabled” and full motion video can be passed through. Use the OVM and 1VM command to toggle between the two banks.

**42) ENABLE VIDEO MEMORY**

Function: Enables video to again pass through the Memory Bank selected.

Format: Memory Bank Number E M

Explanation: This command “releases” the image that was grabbed and stored with the DM command and permits continuous video to again pass through the buffer for output to the monitor at normal playback speed. Its arguments are the same as those used with the Disable Video Memory command, either 0 or 1.

Power-on default setting is Enable Video Memory, OEM. The completion status is returned immediately.

Execution: \* Field Mode=17RG, Bank 0 Disabled =ODM,  
Bank 0 activated for video output=OVM  
0 E M <C/R> R <C/R>  
\* Bank 0 Enabled, allowing video to again pass through the memory buffer at normal playback speed.

**Note:** To store two fields of one Frame, set *Video Memory Mode, Frame Mode, 1RG*, then grab and store the Frame, **ODM**. To then access both Field 1 and Field 2 of that specific frame, Set *Video Memory Mode, Field Mode*, and send **OVM** or **1VM** to access either Bank 0 or Bank 1.

**Overview Interleaved Video Playback Mode**

The LD-V8000's video memory buffer also makes possible **Interleaved Video Playback** when used with a series of three commands: the **RG** command to select *Interleaved Video Playback Mode /Frame or Field*, the **RM** command, *Select Frame Interval*, and **IM** command, *Select Playback Field*. **Interleaved Playback Mode** of the LD-V8000 allows playback of materials that have been recorded onto video tape in interleaved fashion and then pressed to disc. By placing the video material on the disc in an interleaved fashion, skipping one, two or three frames, the user can effectively double, triple or quadruple the amount of video material on the disc. e.g. Program 1 is placed on every even frame number of the disc, and Program 2 is placed on the odd frame numbers. Play back of Program 1 is achieved by playing the even numbered Frames and displaying each one from memory one Frame count. The player effectively outputs the image two “frame counts”, while it skips the odd numbered frame. Audio, however, is output continually.

**Note:** In *Interleaved Mode*, the player holds the playback frame in memory and outputs the image for the number of frames that it has been instructed to skip. For example, at 30 Frames per second, playing every 60th frame would result in a playback time of 2 seconds per frame, providing a slide-show effect. A maximum of 64 different “slide shows” could be interleaved onto a video tape and mastered to disc, each “slideshow” could be approximately 840 frames in length.

These are the Level III commands that are used to control Interleaved Video Playback:

- **2RG & 18 RG — Register G Set** (See page 4-56.)  
2RG sets *Interleaved Video Mode / Frame Mode*.  
18RG sets *Interleaved Video Mode / Field Mode*.
- **RM — Select the Frame Interval**, (See page 4-45.)  
Indicates the number of frames to be skipped during interleaved playback.
- **IM — Selects the Playback Field**, (See page 4-46.)  
Indicates the field from which interleaved playback is started.

After reviewing the command descriptions in this section, we strongly recommend that user's read **Appendix H, Interleaved Video Playback**. Examples in Appendix H describe in more detail how Interleaved Video Playback commands are implemented.

### 43) SELECT FRAME INTERVAL

**Function:** Selects the number of frames to be skipped during interleaved video playback. **NOTE:** *Interleaved Video Playback* must first be selected with the command 2RG or 18RG.

**Format:** Integer R M

**Explanation:** This command sets up the number of frames to be skipped to implement the interleaved video playback. Frames 0-64 can be selected. See **Appendix H, Interleaved Video Playback**.

**Execution:** \* Initial Condition: Memory Control OFF.  
2RG 2RM 0IM 1AD 1SE 500PL <C/R> R <C/R>

\* *Interleave Video Playback, Frame Mode* is selected, “Select Frame Interval” **RM**, is set to playback every third frame, “Select Playback Field” **IM**, is set to the first field of every selected frame (See next command description). Audio Channel 1 is ON. Search to Frame 1 (where the specific program materials begins), playback the first field of every third frame to Frame 500.

SELECT PLAYBACK FIELD

44) SELECT PLAYBACK FIELD

Function: Selects the field from which interleaved video playback is started.  
**NOTE:** Both the RM and IM commands are used in *Interleaved Video Playback, Frame Mode, and Field Mode.*

Format: Integer I M

Explanation: This command indicates the field from which interleaved video playback is started. Integers 0-127 can be selected. See **Appendix H, Interleaved Video Playback**, for details.

Execution: \* Initial Condition: Memory Control OFF, Frame Mode Selected  
 18RG 1RM 2IM 1AD 1SE 500PL <C/R> R <C/R>  
 \* *Interleaved Video Playback, Field Mode* is selected, Select Frame Interval is set to play every other Frame. "Select Playback Field" is set to play back the first field of every second frame, Audio channel 1 is ON. Search to the beginning of the program material at Frame 1, play back the first field of every second frame starting at Frame 2, up to Frame 500.

**NOTE:** When Field 1 of every other frame of video is played, the player plays Field 1 of Frame 1, holds that field in it's memory and displays it, then displays it again for a second field time. Then Field 1 of Frame 3 is held in memory and displayed two field times, and so forth, through Frame 5,7, 9 etc. This allows the player to play at a constant rate of 30 frames per second and put out un-interrupted audio from channel 1 or 2 to accompany the interleaved video playback. (The player is actually playing through the full frame, while holding one field in memory. Audio is output without interruption.) **NOTE:** One Frame = 1/30th of a second; One Field = 1/60th of a second.

**Interleaved Video Playback Program Example**

Three different programs are laid down on tape in interleaved fashion and encoded to LaserDisc for interleaved access using the *Interleaved Mode* control commands.

Frame A-1		Frame B-1		Frame C-1		Frame A-2		Frame B-2		Frame C-2		Frame A-3		Frame B-3		Frame C-3	
Fld 1	Fld 2																
Frame 1		Frame 2		Frame 3		Frame 4		Frame 5		Frame 6		Frame 7		Frame 8		Frame 9	

Here are some sample commands for **Interleaved Playback**. The RM command indicates how many Frames to skip; the IM command indicates the field on which playback will start.

*Frame Mode, playback every frame, skipping no fields:*  
 2RG 0RM 0IM 1SEPL Plays back A1 B1 C1 A2 B2 C2 A3 B3 C3, etc.

*Frame Mode, playback every 2nd frame, skipping 2 fields:*  
 2RG 1RM 2IM 1SEPL Plays back B1 B1 A2 A2 C2 C2 B3 B3, etc.

*Frame Mode, playback every 3rd frame, skipping 4 fields:*  
 2RG 2RM 4IM 1SEPL Plays back C1 C1 C1 C2 C2 C2 C3 C3 C3 etc.

Figure 4-R

**4.7.6 Communication Control Commands**

**45) COMMUNICATION CONTROL**

Function: Communication mode is selected.

Format: Integer C M

Explanation: Contents of the communication control register (CCR) are rewritten. For the LD-V8000, selection of ON/OFF of the Auto Status can be made.

Integer	Mode	Auto-Status
2	MODE-2	OFF
3	MODE-3	ON

The initial value (default value) of the CCR is set to Mode 3. With this command, it is possible to change the communication mode as required. If an unsupported mode is specified, an error occurs.

Execution: \* CCR = 3                      Communication Mode 3  
 2 C M <C/R>                      Note: an "R" is not returned  
 \* CCR = 2                      Communication Mode 2  
 3 C M <C/R>                      R <C/R>  
 \* CCR = 3

**46) CCR MODE REQUEST**

Function: Current communication mode is returned.

Format: ? M

Explanation: Contents of the communication control register (CCR) are returned.

CM2	MODE-2
CM3	MODE-3

Execution: \* CCR = 3  
 ? M <C/R>                      CM3 <C/R>

4.7.7 Register Control Commands

47) REGISTER A SET

Function: Changes the current setting of Register A. (Display)

Format: Integer R A

Explanation: In Register A, detailed attributes concerning the display are set. The LD-V8000 has three types of display settings: Frame Number or Time (depending whether a CAV or CLV disc is being played), Chapter Number, and User's Display. Available combinations of the three display settings are shown in the following table. The initial value is 3.

Integer	Function	User's	Chapter	Frame
0	Display Off	0	0	0
1	Frame Number or Time Number	0	0	1
2	Chapter Number	0	1	0
3	Frame or Time and Chapter	0	1	1
4	User's Display	1	0	0
5	User's Display, Frame or Time	1	0	1
6	User's Display and Chapter	1	1	0
7	User's Display, Frame or Time, Chapter	1	1	1

Figure 4-S

All the character displays are turned ON/OFF by the display control command. The display contents are determined by Register A.

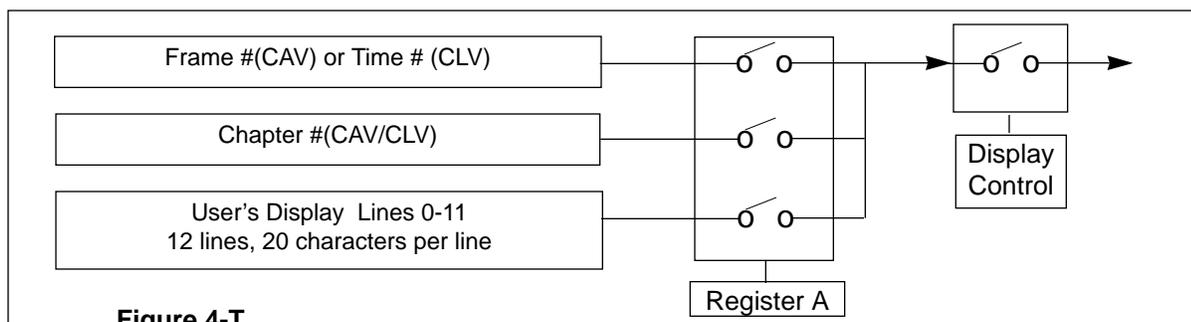


Figure 4-T

The display positions on the screen for LD-V8000 are pictured below:

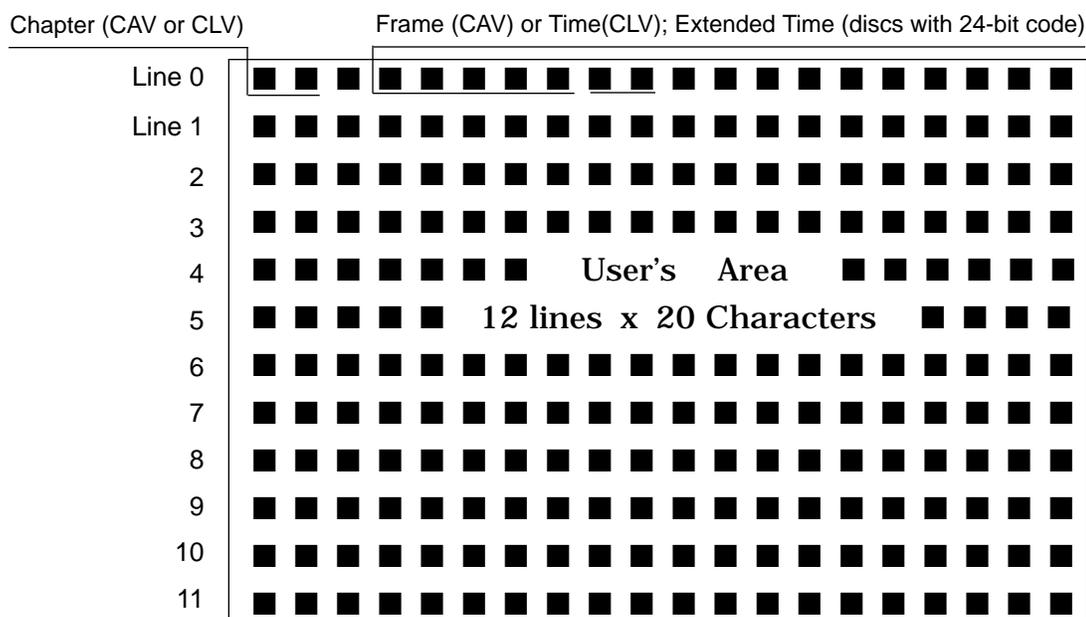


Figure 4-U

Line 0 is used for displaying chapter number and frame number or time code.

Line 0 and 1 are sometimes used for displaying remote control inputs.

Line 2 to 11 are used exclusively as the User's Display Area. If Line 0 and 1 are not used for the player's display system; if there is no data input to be displayed from the remote control; and if the frame or time code or chapter number display is disabled, then those two lines can also be used as part of the User's Display Area.

**To activate the User Display Area:**

- Set the User's Display using the Register A command.
- Turn ON the display switch.
- Identify the line that the characters will appear on by means of an integer (0-11, usually 2-11) and the Print Character command (PR) <CR>.
- Then send the character string to be displayed followed by <C/R>.

The display switch can be turned ON or OFF at any time. However, if Register A is changed so that the User's Display Area is disabled, the contents of the User's Display Area will be cleared. Also, if the Print Character command is issued before Register A is set for the User's Display Area, the character string will not be seen.

*REGISTER A SET*

The Power-on default for display control is 3RA. This allows Frame/Time/Chapter numbers to be seen when the display is turned on, depending on the type of disc that is in the tray. Register A may be changed for different displays. (See execution example below.)

Execution:       \* Display OFF  
                  1DS <C/R>               R <C/R>  
                  \* Display ON - Frame, Chapter Display  
                  1RA <C/R>               R <C/R>  
                  \* Only frame number is displayed  
                  7RA <C/R>               R <C/R>  
                  3PR <C/R>               R <C/R>  
                  HELLO WORLD            R <C/R>  
                  \* Frame, Chapter and "HELLO WORLD" message on Line 3 of  
                  User's Display Area is displayed.

**48) REGISTER B SET**

**Function:** Changes the current setting of Register B. (Squelch Control)

**Format:** Integer R B

**Explanation:** In Register B, attributes concerning the squelch switch for video and audio are set. The squelch switch is normally controlled automatically in accordance with the operating mode of the player.

In the modes where pictures and sound are not clearly reproduced, the squelch switch prevents the noise from being displayed or heard. (i.e. During scanning, audio is squelched.)

By rewriting the contents of the Register B, it is possible to make the squelch switch invalid. In this state, the video and audio signals are always going out.

The initial value is 0.

It must be noted that these signals may contain noise components which may adversely affect equipment connected to the output of the player. Therefore, the operation must be fully understood before this function is used.

Integer	Function	Video	Audio
0	Normal	0	0
64	Audio Squelch Invalid	0	1
128	Video Squelch Invalid	1	0
192	VD/AD Squelch Invalid	1	1

**Figure 4-V**

**Execution:** \* Avoid the video squelch during searching.  
128 R B 23000 S E 0 R B <C/R> R <C/R>

\* Play at 1/2 speed while issuing sound.  
64 R B 30 S P M F <C/R> R <C/R>

\* Set to Still and return to normal squelch.  
STORB <C/R> R <C/R>

REGISTER C SET

**49) REGISTER C SET**

Function: Changes the current setting of Register C. (Miscellaneous)

Format: Integer R C

Explanation: Register C contains the settings of the function switches which are stored in the EPROM. These settings are copied to this register when power is turned on or after they have been selected in the *Function Switch Setting Mode*. Once power is turned on or you have exited the *Function Switch Setting Mode*, the settings cannot be changed. This command can be used to temporarily change the settings of the functions. It must be noted that changes to some functions may suspend playback or disable further control.

The following functions can be set. To set a function to 1 (ON), give the value indicated by the integer.

Integer	Function	1	0
1	Side-Repeat	AUTO	OFF
2	Load-Start	AUTO	OFF
4	Power-on-Start	AUTO	OFF
8	(Not Used)		OFF
16	Background Color	BLACK	BLUE
32	(Not Used)		OFF
64	(Not Used)		OFF
128	Test Mode	ON	OFF

Figure 4-W

To set multiple functions to 1, the integer values must be added up. All eight functions can be specified in combination by using the decimal values from 0 to 255.

The completion status is returned immediately.

Execution: \* Initial value 0  
 3 R C <C/R> R <C/R>  
 \* Side-Repeat, Load-Start to ON  
 1 6 R C <C/R> R <C/R>  
 \* Background Color BLACK; Side-Repeat and Load-Start to OFF

**50) REGISTER D SET**

Function: Changes the current setting of Register D. (RS-232)

Format: Integer R D

Explanation: Register D contains the settings of the function switches which are stored in the EPROM. These settings are copied to this register when power is turned on or when they are selected in the *Function Switch Setting Mode*. Once power is turned on or you have exited the *Function Switch Setting Mode*, the settings cannot be changed. This command can be used to temporarily change the settings of the functions. It must be noted that changes to some functions may suspend playback or disable further control.

The following functions can be set. To set a function to 1 (ON), give the value indicated in the Integer.

To set multiple functions to 1, the integer values must be added up. All eight functions can be specified in combination by using the decimal values from 0 to 255.

The completion status is returned immediately.

Integer	Function	1	0
1	Baud Rate	9600 (00)	4800 (01)
2		1200 (10)	NOT USED (11)
4	Parity	Enable	Disable
8	Parity	Odd	Even
16	Stop Bit	2	1
32	Data Length	7	8
64	TXD Terminator	<C/R> & <L/F>	<C/R>
128	Serial Port Setting	Controller	Input Device

Figure 4-X

Execution: \* Initial value 9600 Baud, No Parity, 1 Stop Bit (00H)  
 12 R D <C/R> R <C/R>  
 \* 9600 Baud, Even Parity, 1 Stop Bit.

**NOTE:** Once the serial port is set to Input Device by Register D bit 7, the player cannot be controlled by the port during a Level II program execution. The only way to recover from this condition is to halt the Level II program execution.

REGISTER E SET

**51) REGISTER E SET**

Function: Changes the current setting of Register E. (User's Switch 1)

Format: Integer R E

Explanation: Register E contains the settings of the function switches which are stored in the EPROM. These settings are copied to this register when power is turned on or when they are selected in the *Function Switch Setting Mode*. Once power is turned on or you have exited *Function Switch Setting Mode*, the settings cannot be changed. This command can be used to temporarily change the settings of the functions. It must be noted that changes to some functions may suspend playback or disable further control.

To set each bit to 1 (ON), give the value indicated in the integer.

Integer	Function	1	0
1	Bit 0	ON	OFF
2	Bit 1	ON	OFF
4	Bit 2	ON	OFF
8	Bit 3	ON	OFF
16	Bit 4	ON	OFF
32	Bit 5	ON	OFF
64	Bit 6	ON	OFF
128	Bit 7	ON	OFF

Figure 4-Y

To set multiple bits to 1, the integer values must be added up. All eight functions can be specified in combination by using the decimal values from 0 to 255.

The completion status is returned immediately.

Execution: These bits are reserved for specific use by programmers.

**52) REGISTER F SET**

**Function:** Changes the current setting of Register F. (User's Switch 2)

**Format:** Integer R F

**Explanation:** Register F contains the settings of the function switches which are stored in the EPROM. These settings are copied to this register when power is turned on or when they are selected in the *Function Switch Setting Mode*. Once power is turned on or you have exited *Function Switch Setting Mode*, the settings cannot be changed. This command can be used to temporarily change the settings of the functions. It must be noted that changes to some functions may suspend playback or disable further control.

To set each bit to 1 (ON), give the value indicated in the Integer.

To set multiple bits to 1, the integer values must be added up. All eight functions can be specified in combination by using the decimal values from 0 to 255.

The completion status will be returned immediately.

Integer	Function	1	0
1	Bit 8 (Bit 0)	ON	OFF
2	Bit 9 (Bit 1)	ON	OFF
4	Bit 10 (Bit 2)	ON	OFF
8	Bit 11 (Bit 3)	ON	OFF
16	Bit 12 (Bit 4)	ON	OFF
32	Bit 13 (Bit 5)	ON	OFF
64	Bit 14 (Bit 6)	ON	OFF
128	Bit 15 (Bit 7)	ON	OFF

**Figure 4-Z**

**Execution:** These bits are reserved for specific use by programmers.

REGISTER G SET

**53) REGISTER G SET**

**Function:** Changes the current setting of Register G. (Video Memory)

**Format:** Integer R G

**Explanation:** Register G contains the settings of the function switches which are stored in the EPROM. These settings are copied to this register when power is turned on or when they are selected in the *Function Switch Setting Mode*. Once power is turned on or you have exited the *Function Switch Setting Mode*, the settings cannot be changed. This command can be used to temporarily change the settings of the functions. It must be noted that changes to some functions may suspend playback or disable further control.

The following functions can be set. To set a function to ON, give the value indicated in the Integer.

To set multiple functions to ON, the integer values must be added up. All eight functions can be specified in combination by using the decimal values from 0 to 255.

The completion status will be returned immediately.

Integer	Function	1	0
1	Video Memory Mode	ON	OFF
2	Interleaved Video Mode	ON	OFF
4			
8		Not Used	
16	Memory Select	FIELD	FRAME
32	Auto Memory	OFF	ON
64	Not Used		OFF
128	Not Used		OFF

**Figure 4-A.1**

**Execution:** \* Initial »» Video Memory OFF, Frame Mode68 selected

17 R G <C/R> R <C/R>

\* Video Memory ON, Field Mode

50 R G <C/R> R <C/R>

\* Interleaved Video Mode On, Field Mode selected, AUTO MEMORY OFF

\* 1RG = Video Memory Mode / Frame Mode ON; 17 RG = Video Memory Mode / Field Mode ON

\* 2RG = Inteleaved Video Playback / Frame Mode ON; 18 RG = Interleaved Video Playback / Field Mode.

**54) REGISTER H SET**

**Function:** Changes the current setting of Register H. (Extended Control)

**Format:** Integer R H

**Explanation:** Register H contains the settings of the function switches which are stored in the EPROM. These settings are copied to this register when power is turned on or when they are selected in the *Function Switch Setting Mode*. Once power is turned on or you have exited the *Function Switch Setting Mode*, the settings cannot be changed. This command can be used to temporarily change the settings of the functions. It must be noted that changes to some functions may suspend playback or disable further control.

The following functions can be set. To set a function to 1 (ON), give the value indicated in the Integer.

To set multiple functions to 1, the values must be added up. All eight functions can be specified in combination by using the decimal values from 0 to 255.

The completion status will be returned immediately.

Integer	Function	1	0
1	Still Mode Select	4 Field	Normal
2	AUX 1	Port	Video Ind.
4	AUX 2	Port	High State
8	Sync On SQ Video	Off	On
16	D O C	Off	On
32	Audio Default	Analog	Digital
64	Input Device Set	Device 1	Device 0
128	Not used		

**Figure 4-B.1**

**Execution:** \* Normal Mode  
 1 R H <C/R> R <C/R>  
 \* 4 Field still Mode

REGISTER I SET

**55) REGISTER I SET**

Function: Changes the current setting of Register I. (Level II Program)

Format: Integer R I

Explanation: Register I contains the settings of the function switches which are stored in the EPROM. These settings are copied to this register when power is turned on or when they are selected in the *Function Switch Setting Mode*. Once power is turned on or you have exited the *Function Switch Setting Mode*, the settings cannot be changed. This command can be used to temporarily change the settings of the functions. It must be noted that changes to some functions may suspend playback or disable further control.

The following functions can be set. To set a function to 1 (ON), give the value indicated in the Integer.

To set multiple functions to 1, the integer values must be added up. All eight functions can be specified in combination by using the decimal values from 0 to 255.

The completion status will be returned immediately.

Integer	Function	1	0
1	Dump Execution	OFF	ON
2	Dump Load from Disc	OFF	ON
4	Not used	OFF	
8	Not used	OFF	
16	Not used	OFF	
32	Not used	OFF	
64	Not used	OFF	
128	Not used	OFF	

Figure 4-C.1

Execution: \* Normal Mode  
 1 R H <C/R> R <C/R>  
 \* 4 Field still Mode

**56) REGISTER A REQUEST**

Function: Returns the contents of Register A. (Display)

Format: \$ A

Explanation: Returns detailed attributes of Register A in the following format:

A            C8 C7 C6 C5 C4 C3 C2 C1 <C/R>  
C1:            Frame number display on  
C2:            Chapter number display on  
C3:            User Area display on  
C4 to C8 are set to "0".

Execution:    7 R A <C/R>            R <C/R>  
               \$ A <C/R>            A 0 0 0 0 1 1 1 <C/R>

**57) REGISTER B REQUEST**

Function: Returns the contents of Register B. (Squelch Control)

Format: \$ B

Explanation: Returns Register B video and audio squelch attributes in the following format:

B            C8 C7 C6 C5 C4 C3 C2 C1 <C/R>  
C8:            Video squelch disabled  
C7:            Audio squelch disabled  
C1 to C6 are set to "0".

Execution:    1 2 8 R B <C/R>            R <C/R>  
               \$ B <C/R>            B 1 0 0 0 0 0 0 <C/R>

**58) REGISTER C REQUEST**

Function: Returns the contents of Register C. (Miscellaneous)

Format: \$ C

Explanation: Returns function switch setting data in the following format:

C	C8	C7	C6	C5	C4	C3	C2	C1	<C/R>
C1:	Side Repeat on								
C2:	Load Start on								
C3:	Power On Start on								
C4:	Not Used								
C5:	Back Color Select (0 = Blue)								
C6:	Not Used								
C7:	Not Used								
C8:	Test Mode on								

Execution: \* R C = 0  
8 R C <C/R> R <C/R>  
\$ C <C/R> C 0 0 0 0 1 0 0 0 <C/R>

**59) REGISTER D REQUEST**

Function: Returns the contents of Register D. (RS-232)

Format: \$ D

Explanation: Returns function switch data in the following format:

D	C8	C7	C6	C5	C4	C3	C2	C1:	<C/R>
C1 & C2:	Baud Rate								
	00: 9600 Baud				01: 4800 Baud				
	10: 1200 Baud				00: Not used				
C3:	Parity (1 = Enable, 0 = Disable)								
C4:	Parity (1 = Odd, 0 = Even)								
C5:	Stop Bit (1 = 1 Bit, 0 = 2 Bit )								
C6:	Data Length (1 = 7 Bits, 0 = 8 Bits)								
C7:	TxD Terminator (1 = C/R & L/F, 0 = C/R)								
C8:	RS-232C Port Set (1= Controller, 0 = Input Device)								

Execution: \* Field Mode (R D = 16)  
0 R D <C/R> R <C/R>  
\$ D <C/R> D 0 0 0 0 0 0 0 0 <C/R>

**60) REGISTER E REQUEST**

**Function:** Returns the contents of Register E. (User's Switch 1)

**Format:** \$ E

**Explanation:** Returns function switch data in the following format:

E            C8 C7 C6 C5 C4 C3 C2        C1        <C/R>

C1:        Bit 0

C2:        Bit 1

C3:        Bit 2

C4:        Bit 3

C5:        Bit 4

C6:        Bit 5

C7:        Bit 6

C8:        Bit 7

**Execution:** 2 4 R E <C/R>        R <C/R>

\$ E <C/R>    E 0 0 0 1 1 0 0 0 <C/R>

**61) REGISTER F REQUEST**

**Function:** Returns the contents of Register F (User's Switch 2)

**Format:** \$ F

**Explanation:** Returns function switch data in the following format:

F            C8 C7 C6 C5 C4 C3 C2        C1            <C/R>

C1:        Bit 8        (Bit 0)

C2:        Bit 9        (Bit 1)

C3:        Bit 10       (Bit 2)

C4:        Bit 11       (Bit 3)

C5:        Bit 12       (Bit 4)

C6:        Bit 13       (Bit 5)

C7:        Bit 14       (Bit 6)

C8:        Bit 15       (Bit 7)

**Execution:** 2 4 R F <C/R>        R <C/R>

\$ F <C/R>    F 0 0 0 1 1 0 0 0 <C/R>

**62) REGISTER G REQUEST**

Function: Returns the contents of Register G. (Video Memory)

Format: \$ G

Explanation: Returns function switch data in the following format:

G C8 C7 C6 C5 C4 C3 C2 C1 <C/R>

C1 - C4: Video Memory Mode

0: Memory Control Off

1: Memory Control On

2: Interleaved Video Mode

3: Not Used

C5: Field or Frame Memory Select (1 = Field, 0 = Frame)

C6: Auto Memory

C7: Not Used

C8: Not Used

Execution: \* Frame Memory Mode

1 6 R G <C/R> R<C/R>

\$ G <C/R> G 0 0 0 1 0 0 0 0 <C/R>

**63) REGISTER H REQUEST**

Function: Returns the contents of Register H. (Extended Control)

Format: \$ H

Explanation: Returns function switch data in the following format:

H C8 C7 C6 C5 C4 C3 C2 C1 <C/R>

C1: Still Mode (1 = 4 Field, 0 = Normal)

C2: AUX 1 (1 = Port 1, 0 = Video Indicator)

C3: AUX 2 (1 = Port 2, 0 = High Output)

C4: No Sync insert on Squelch Video

C5: DOC Off

C6: Audio Default (1 = Analog, 0 = Auto Digital)

C7: Input Device ( 1 = Serial Port, 0 = RCU)

C8: Not Used

Execution: 8 R H <C/R> R<C/R>

\$ H <C/R> H 0 0 0 0 1 0 0 0 <C/R>

\* No Sync Insert on Squelch Video

**64) REGISTER I REQUEST**

**Function:** Returns the contents of Register I. (Level II Program)

**Format:** \$ I

**Explanation:** Returns function switch data in the following format:

I                    C8   C7   C6   C5   C4   C3   C2   C1   <C/R>

C1:                Dump Execution Disable

C2:                Dump Auto Load Disable

C3:                Not Used

C4:                Not Used

C5:                Not Used

C6:                Not Used

C7:                Not Used

C8:                Not Used

**Execution:** \* Dump Auto Load and auto execution (RI = 0)

3 R I <C/R>                    R<C/R>

\$ I <C/R>                    I 0 0 0 0 0 1 1 <C/R>

\* Disable Dump Auto Load and Execution

4.7.8 Input/Output Device Control Commands

65) SELECT INPUT UNIT

Function: Selects the kind of input device to be used.

Format: Integer #S

Explanation: The LD-V8000 accepts two types of input through the mini jack located on the front panel. One is the Pioneer standard remote (SR) RCU signal (defined as input device number 0); the other is asynchronous serial input (1200 bps, 1 stop bit, no parity, 8 bit). The default setting can be selected by Register H bit 6.

When serial input is selected, both infrared and wired RCU control are disabled.

The completion status will be returned immediately.

Input Device Selection Diagram

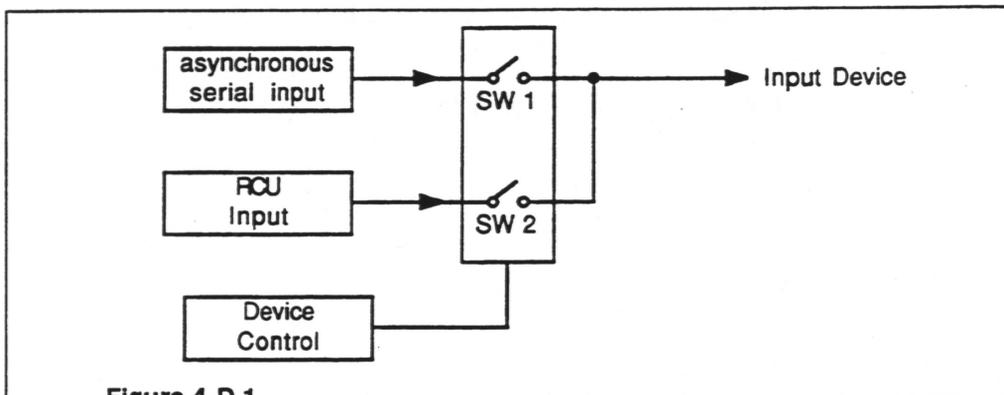


Figure 4-D.1

- Execution:
- \* Input Device = RCU (SW 1 = off, SW 2 = on)  
1 # S <C/R> R <C/R>
  - \* Input Device = serial input (SW 1 = on, SW 2 = off)

**66) INPUT UNIT REQUEST**

**Function:** Reads input data from the input device.

**Format:** # I

**Explanation:** When this command is entered, the player reads the data from the input device.

**NOTE:** The input data format is different for each device.

The RCU input (Device 0) data is always two ASCII-HEX codes. If many buttons are pressed since the last data has been read, the latest data will be returned.

If no buttons are pressed since the last data has been read, a No Input Code (FF) will be returned.

The serial input (Device 1) data is string character data with a terminator <C/R>. The buffer size is 20 characters, including the <C/R> and <C/R> is converted to "/". If several strings have been input since the last data has been read, only the latest data string will be returned.

If no data have been input since the last data has been read, then a <C/R> code will be returned, indicating no data input.

**Execution:**

- \* Input Device = RCU
  - # I <C/R>                    F F <C/R>
- \* Play Key Input
  - # I <C/R>                    1 7 <C/R>
- \* Input Device = Asynchronous serial input
  - # I <C/R>                    <C/R>
  - \* <C/R> input
    - # I <C/R>                    / <C/R>
  - \* /X100/Y0211/<C/R> input
    - # I <C/R>                    / X 1 0 0 / Y 0 2 1 1 / / <C/R>

*INPUT NUMBER WAIT*

**67) INPUT NUMBER WAIT**

**Function:** Awaits digit input data from input device.

**Format:** ? N

**Explanation:** When this command is entered, the player returns the first digit that is entered through the input device. Only one digit is returned and the other character is ignored.

**Execution:** \* Input Device = RCU

? N <C/R>

\* Digit 0 Input

0 <C/R>

\* Input Device = Asynchronous serial input

? N <C/R>

\* Character String "246<C/R>" input

2 <C/R>

? N <C/R>

\* Character String "No. 10<C/R>" input

1 <C/R>

**68) SET AUXILIARY PORT**

**Function:** Sets the auxiliary output port level.

**Format:** Integer # A

**Explanation:** When this command is sent, the player sets the output level (TTL) on each of the two output ports, AUX 1 and AUX 2. The relationship between the integers and settings are shown below. The default setting is 0.

AUX 1 can be used either as a TTL output port or as Video Signal Indicator. AUX 2 can be used as a TTL high level output. For this command to be effective, use the Register H command to set one or both ports as the TTL output port.

The completion status is returned immediately.

Integer	AUX 1	AUX 2
0	Low	Low
1	High	Low
2	Low	High
3	High	High

**Figure 4-E.1**

**Execution:**

- \* AUX Output = Output Port Mode (RH = 6)
- 0 # P <C/R>
- \* AUX1 = 0, AUX2 = 0
- 3 # P <C/R>
- \* AUX1 = 1, AUX2 = 1

**4.7.10 Level II Program Control Commands**

**69) SET PROGRAM POINTER**

**Function:** Sets address of the program pointer.

**Format:** Address \* S

**Explanation:** The program pointer is used for writing to and reading from the player's RAM.

The available pointer addresses are from 0 to 65545.

The completion status is returned immediately.

**70) PROGRAM READ**

**Function:** Transmits program data

**Format:** Data Length \*D

**Explanation:** When this command is entered, the player transmits the contents of RAM. The data transmitted is the length indicated by the argument and transmission begins at the address defined by the Set Program Pointer.

The data length can be set from 0 to 64. A unit length is one byte. Since the output data format is ASCII-HEX, each command is two bytes so the actual length of data is twice as long as the commands entered. (A program of 20 commands is 40 bytes long.) Also the end of the data string terminator <C/R> is attached.

**71) PROGRAM WRITE**

**Function:** Writes the program data into the player's RAM.

**Format:** Data Length \* W

**Explanation:** When this command is entered, the player prepares the RAM data area to receive a data block. The length of the block is defined by the argument to this command and is limited to 64 bytes. The data is entered beginning at the current program pointer address. The actual data block length is two times longer than the integer, since the data is entered in ASCII-HEX format and each command is two bytes long. The command must be terminated by a <C/R>, and the data must be entered just after the completion status is returned by the player. The data string must be terminated by a <C/R>.

**Execution:**

0 * S <C/R>	R <C/R>
11 * W <C/R>	R <C/R>
000102030405060708090A <C/R>	R <C/R>
7 * S <C/R>	R <C/R>
4 * D <C/R>	0708090A <C/R>

**72) PROGRAM COUNTER REQUEST**

**Function:** Transmits the value of the program pointer.

**Format:** \* P

**Explanation:** When this command is entered, the player transmits the current value of the program counter. This command makes it possible to monitor the condition of program execution. The output format is ASCII Decimal 4 byte data.

**73) PROGRAM RUN**

**Function:** Starts Level II program execution.

**Format:** (Address) \*R

**Explanation:** When this command is entered, the player starts the execution of a Level II program. If no address is specified, execution of the program starts at address 0.

The completion status is returned once program execution starts.

**74) PROGRAM HALT**

**Function:** Halts Level II program execution.

**Format:** \* H

**Explanation:** When this command is entered, the player stops execution of the Level II program.

The completion status is returned when the program is halted.

## **Appendix A: Level III Commands for the LD-V8000**

**APPENDIX**

**A**

**LD-V8000**

**LEVEL I & III**

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# Level III Commands for LD-V8000

	Command		Mnemonic	Page
<b>Player Control Commands</b>				
1	Door Open		OP	4-11
2	Door Close		CO	4-11
3	Reject		RJ	4-12
4	Start		SA	4-12
5	Play	(Address)	PL	4-13
6	Pause		PA	4-14
7	Still		ST	4-14
8	Step Forward		SF	4-15
9	Step Reverse		SR	4-15
10	Scan Forward		NF	4-15
11	Scan Reverse		NR	4-15
12	Multi Speed Forward	(Address)	MF	4-16
13	Multi Speed Reverse	(Address)	MR	4-16
14	Speed	Integer	SP	4-17
15	Search	Address	SE	4-18
16	Multi Track Jump Forward	Integer	JF	4-19
17	Multi Track Jump Reverse	Integer	JR	4-19
18	Stop Marker	Address	SM	4-20
19	Frame		FR	4-21
20	Time		TM	4-22
21	Chapter		CH	4-22
22	Clear		CL	4-23
23	Lead Out Symbol		LO	4-23
<b>Control Switch Commands</b>				
24	Audio Control	Integer	AD	4-24
25	Sub-Audio Control	Integer	AS	4-24
26	Video Control	Integer	VD	4-28
27	Key Lock	Integer	KL	4-29
28	Beep Control	Integer	BP	4-30

# Level III Commands for LD-V8000 (cont.)

	Command		Mnemonic		Page
<b>Display Control Commands</b>					
29	Display Control	Integer	DS		4-31
30	Clear Screen		CS		4-32
31	Print Character	Integer	PR		4-33
<b>Request Control Commands</b>					
32	Frame Number Request		?F		4-34
33	Time Code Request		?T		4-35
34	Chapter Number Request		?C		4-35
35	Player Active Mode Request		?P		4-36
36	Disc Status Request		?D		4-37
37	LDP Model Name Request		?X		4-37
38	User's Code Request		?U		4-38
<b>Video Memory Control Commands</b>					
39	Set Video Memory Mode	Integer	MM		4-39
40	Video Memory (Field or Frame)	Integer	VM		4-40
41	Disable Memory Input	Integer	DM		4-40
42	Enable Memory Input	Integer	EM		4-41
43	Select Frame Interval	Integer	RM		4-41
44	Select Playback Field	Integer	IM		4-41
<b>Communication Control Commands</b>					
45	Communication Control	Integer	CM		4-47
46	CCR Mode Request		?M		4-47
<b>Register Control Commands</b>					
47	Register A Set (Display)	Integer	RA		4-48
48	Register B Set (Squelch Control)	Integer	RB		4-51
49	Register C Set (Miscellaneous)	Integer	RC		4-52
50	Register D Set (RS-232 Parameter)	Integer	RD		4-53
51	Register E Set (User's Switch 1)	Integer	RE		4-54
52	Register F Set (User's Switch 2)	Integer	RF		4-55
53	Register G Set (Video Memory)	Integer	RG		4-56

# Level III Commands for LD-V8000 (cont.)

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	<b>Command</b>	<b>Mnemonic</b>		<b>Page</b>
54	Register H Set (Extended Control)	Integer	RH	4-57
55	Register I Set (Level II Program)	Integer	RH	4-58
<b>Register Request Commands</b>				
56	Register A Request (Display)		\$A	4-59
57	Register B Request (Squelch Control)		\$B	4-59
58	Register C Request (Miscellaneous)		\$C	4-60
59	Register D Request (RS-232)		\$D	4-60
60	Register E Request (User Switch 1)		\$E	4-61
61	Register F Request (User Switch 2)		\$F	4-61
62	Register G Request (Video Memory)		\$G	4-62
63	Register H Request (Extended Control)		\$H	4-62
64	Register I Request (Level II Program)		\$I	4-63
<b>Input/Output Device Control Commands</b>				
65	Select Input Unit	Integer	#S	4-64
66	Input Unit Request		#I	4-65
67	Input Number Wait		?N	4-66
68	Set AUX Port	Integer	#P	4-67
<b>LEVEL II Program Control Commands</b>				
69	Set Program Pointer	Address	*S	4-68
70	Program Read	Integer	*D	4-68
71	Program Write	Integer	*W	4-69
72	Program Pointer Request		*P	4-70
73	Program Run	(Address)	*R	4-70
74	Program Halt		*H	4-70

## **Appendix B: Alphabetical Listing of LD-V8000 Level III Commands**

**APPENDIX**

**B**

**LD-V8000**

**LEVEL I & III**

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# Alphabetical Listing of Level III Commands for LD-V8000

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	Command	Mnemonic	Page
24	Audio Control	Integer AD	4-24
28	Beep Control	Integer BP	4-30
46	CCR Mode Request	?M	4-47
21	Chapter	CH	4-22
34	Chapter Number Request	?C	4-35
22	Clear	CL	4-23
30	Clear Screen	CS	4-32
45	Communication Control	Integer CM	4-47
41	Disable Memory Input	Integer DM	4-43
36	Disc Status Request	?D	4-37
29	Display Control	Integer DS	4-31
1	Door Open	OP	4-11
2	Door Close	CO	4-11
42	Enable Memory Input	Integer EM	4-44
19	Frame	FR	4-21
32	Frame Number Request	?F	4-34
66	Input Unit Request	#I	4-65
67	Input Number Wait	?N	4-66
27	Key Lock	Integer KL	4-29
37	LDP Model Name Request	?X	4-37
23	Lead Out Symbol	LO	4-23
12	Multi Speed Forward	(Address) MF	4-16
13	Multi Speed Reverse	(Address) MR	4-16
16	Multi Track Jump Forward	Integer JF	4-19
17	Multi Track Jump Reverse	Integer JR	4-19
6	Pause	PA	4-14
5	Play	(Address) PL	4-13
35	Player Active Mode Request	?P	4-36
31	Print Character	Integer PR	4-33
74	Program Halt	*H	4-70

# Alphabetical Listing of Level III Commands for LD-V8000 (cont.)

	Command	Mnemonic	Page
72	Program Pointer Request	*P	4-70
70	Program Read	Integer *D	4-68
73	Program Run	(Address) *R	4-70
71	Program Write	Integer *W	4-69
56	Register A Request (Display)	\$A	4-59
57	Register B Request (Squelch Control)	\$B	4-59
58	Register C Request (Miscellaneous)	\$C	4-60
59	Register D Request (RS-232)	\$D	4-60
60	Register E Request (User Switch 1)	\$E	4-61
61	Register F Request (User Switch 2)	\$F	4-61
62	Register G Request (Video Memory)	\$G	4-62
63	Register H Request (Extended Control)	\$H	4-62
64	Register I Request (Level II Program)	\$H	4-63
47	Register A Set (Display)	Integer RA	4-48
48	Register B Set (Squelch Control)	Integer RB	4-51
49	Register C Set (Miscellaneous)	Integer RC	4-52
50	Register D Set (RS-232 Parameter)	Integer RD	4-53
51	Register E Set (User's Switch 1)	Integer RE	4-54
52	Register F Set (User's Switch 2)	Integer RF	4-55
53	Register G Set (Video Memory)	Integer RG	4-56
54	Register H Set (Extended Control)	Integer RH	4-57
55	Register I Set (Level II Program)	Integer RH	4-58
3	Reject	RJ	4-12
10	Scan Forward	NF	4-15
11	Scan Reverse	NR	4-15
15	Search	Address SE	4-18
43	Select Frame Interval	Integer RM	4-45
65	Select Input Unit	Integer #S	4-64
44	Select Playback Field	Integer IM	4-46

# Alphabetical Listing of Level III Commands for LD-V8000 (cont.)

---

	Command		Mnemonic	Page
68	Set AUX Port	Integer	#P	4-67
69	Set Program Pointer	Address	*S	4-68
39	Set Video Memory Mode	Integer	MM	4-42
14	Speed	Integer	SP	4-17
4	Start		SA	4-12
8	Step Forward		SF	4-15
9	Step Reverse		SR	4-15
7	Still		ST	4-14
18	Stop Marker	Address	SM	4-20
25	Sub-Audio Control	Integer	AS	4-24
20	Time		TM	4-22
33	Time Code Request		?T	4-35
38	User's Code Request		?U	4-38
26	Video Control	Integer	VD	4-28
40	Video Memory (Field or Frame)	Integer	VM	4-42

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## **Appendix C: LD-V8000 Remote Control Units**

*The RU-V6000T & The RU-V103*

**APPENDIX**

**C**

**LD-V8000**

**LEVEL I & III**

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# LD-V8000 Remote Control Units

## RU-V6000T & RU-V103

### RU-V6000T Remote Control:

#### LEVEL I CONTROL

**REJECT:** Ceases playback and spins-down the disc.

**PLAY:** Begins playing a disc, or resumes play. (In Level II, *Programming Mode*, prepares the player to receive code.)

**MULTI-SPEED SET (SLOW / FAST):** Sets the speed at which multi-speed play will occur. (CAV or CLV on LD-V8000.)

**STOP:** Freezes the image.

**SCAN (FWD / REVERSE):** Moves quickly forward or backward through the disc. Rapid scanning continues as long as the button is depressed.

**DISP:** Displays or removes the display of current chapter/frame/or time numbers on the screen.

**SEARCH:** Specify the number to be searched to by using the digit buttons, then press the SEARCH button to execute. Set the "address flag" using the FRAME/CHAP button. (It is the same as the END button). After searching, the player presents a still frame.

**MULTI-SPEED (FWD / REVERSE):** Plays forward or reverse in the speed that is set with MULTI-SPEED. (CAV or CLV on LD-V8000.)

**AUDIO 1/L & 2/R:** These are the ON/OFF buttons for up to four channels of audio. AUDIO 1/L turns ON/OFF 1/L and 3/L; AUDIO 2/R turns ON/OFF 2/R and 4/R.

**AUTO STOP:** Plays to a specified chapter, frame or time code number, then freezes the frame.

**STEP (FWD / REVERSE):** Produces a still video image. Subsequent presses of the STEP FWD button advances to the next frame. STEP REV presents each preceding frame. (CAV or CLV on LD-V8000.)

**NUMERIC BUTTONS (0-9):** Use these buttons to enter locations on the disc for searches and auto stops. (Enter 1000 SEARCH, 1200 AUTO STOP to play a specific video segment.) First, use the FRAME/CHAP to set an address flag, indicating chapter, frame or time code searches.

**CLEAR / HALT:** As CLEAR, this removes erroneous inputs.

**END/FRAME/CHAP:** In *Normal Control Mode*, FRAME/CHAP establishes the type of address flag (chapter, frame or time

#### LEVEL II PROGRAMMING / CONTROL

##### LETTERED BUTTONS (A-F)

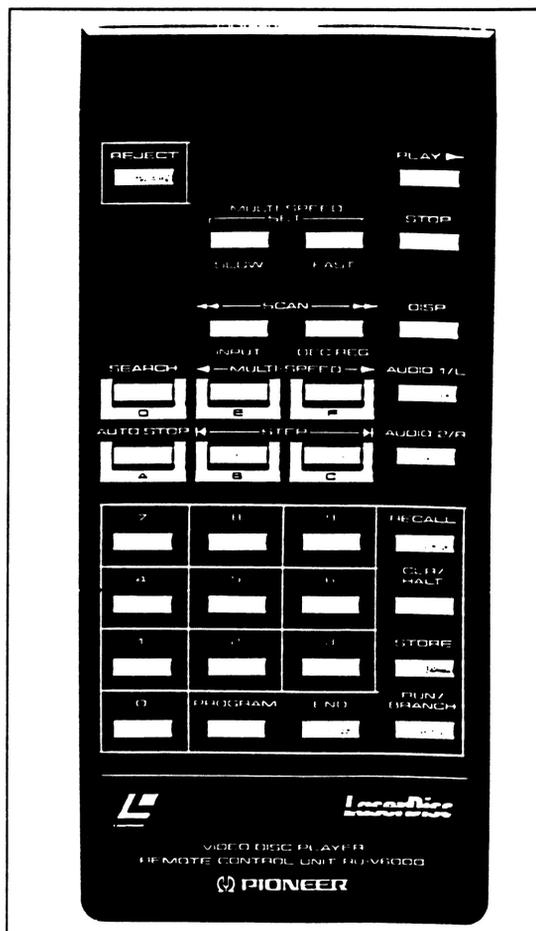
**and NUMERIC BUTTONS (0-9):** After the player is put into *Programming Mode* and the PLAY button is pressed, use these buttons to enter Level II HEX codes. These buttons can also be used for viewer responses during Level II program execution.

**INPUT / DEC REG:** In *Programming Mode* allows INPUT or DEC REG commands to be entered into a Level II program.

**RECALL:** Preceded by numbers, this button is pressed to call up specific register locations for use in Level II programs.

**CLEAR / HALT:** As HALT, pressing this button stops Level II program execution. In *Programming Mode*, it enters a HALT command into a Level II program.

See **Section 3.2.2** for descriptions of each specific remote control button. See **LD-V8000 Level II User's Manual/Programmer's Reference Guide** for more about using the RU-V6000T for Level II Programming.



The RU-V6000T Remote Control Unit

number) to be used during a search or auto stop.

**STORE:** Stores data in registers for Level II Programs.

**PROGRAM:** Puts the player into *Programming Mode*.

**END / FRAME/ CHAP:** As END, exits *Programming Mode* and returns to *Normal Control Mode*.

**RUN/BRANCH:** In *Normal Control Mode*, RUN causes the player to execute a Level II program that has been entered into Memory. In *Programming Mode*, it is used to enter a BRANCH command into the program code.

**NOTE:** The RU-V6000T remote is shipped with a plastic template covering some of the buttons. To gain access to all buttons on the RU-V6000T, remove the plastic template by lifting the side tabs.

# LD-V8000 Remote Control Units

## RU-V6000T & RU-V103 (cont.)

### RU-V103 Remote Control:

#### LEVEL I CONTROL

**REJECT:** Ceases playback and spins-down the disc.

**PAUSE:** Ceases playback and presents a squelch screen. Press any motion button to resume.

**PLAY:** Begins playing a disc, or resumes play.

**REPEAT MODE:** This button can only be used with the LD-V2200, 2400, 4400 for segment repeat play. It has no effect on the operation of the LD-V8000.

**STILL STEP (FWD / REVERSE):** Press either of these buttons to produce a still video image. Additional presses of the STEP FWD button moves the image forward one frame at a time. STEP REV presents each preceding frame. (Works with CAV or CLV discs on the LD-V8000.)

**DISP:** Displays or removes the display of current chapter/frame/or time numbers on the screen.

**SCAN (FWD / REVERSE):** Moves quickly forward or backward through the disc. Rapid scanning continues as long as the button is depressed.

**AUDIO:** These are the ON/OFF buttons for up to four channels of audio. Analog turns ON & OFF 1/L & 2/R; Digital turns ON/OFF 1/L and 3/L; turns ON/OFF 2/R and 4/R.

**SPEED (DOWN / UP):** Press these buttons to set the speed at which multi-speed play will occur. (Works with CAV or CLV discs on the LD-V8000.)

**CLEAR:** Press this button to CLEAR erroneous inputs.

**MULTI-SPEED (REV / FWD):** Press this button to play forward or reverse in the speed that is set with the SPEED button.

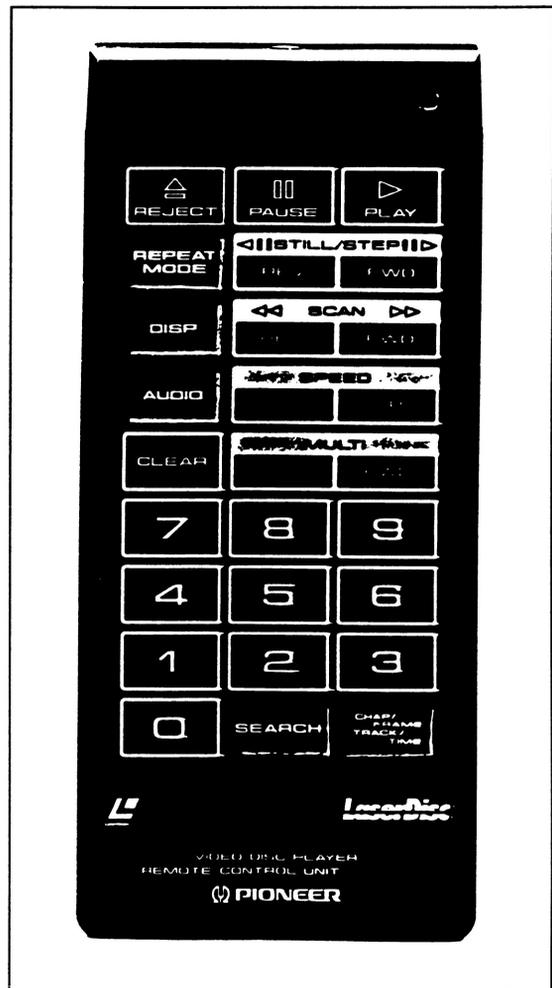
**NUMERIC BUTTONS (0-9):** Use these buttons to enter search points on a disc. Use the CHAP/FRAME TRACK/TIME button to set an "address flag", indicating chapter, frame or time number. Then enter the numeric digits for the location and press Search or Play. (Digits 1-9 can also be used for viewer responses during Level II program execution. See Level III Command Input Number Wait ?N.)

**SEARCH:** First set the "address flag" using the CHAP/FRAME TRACK/TIME button. Then specify the number to be searched to by using the digit buttons. Press the SEARCH button to execute. After searching, the player presents a still frame.

**NOTE:** The RU-V103 remote control unit does not have Level II programming capabilities. It can be used, however, to provide viewer input to Level II or Level III programs.

The RU-V103 / CU-V113 remote control units are not packaged with a cable for connection to the EXT CONT Terminal on the front of the player. A stereo or mono mini-plug cable can be purchased separately, however, and used to provide the wired connection.

See **Section 3.2.2** for details about the use of each specific remote control button.



The RU-V103 / CU-V113 Remote Control

**CHAP / FRAME TRACK / TIME:** Press this button to indicate how a search will be performed, either by chapter, frame number or time number.

## **Appendix D: LD-V8000 Interface Cable Specifications**

**APPENDIX**

**D**

**LD-V8000**

**LEVEL I & III**

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# Interface Cable Specifications

## Connecting the LD-V8000 to IBM & Compatible Computers

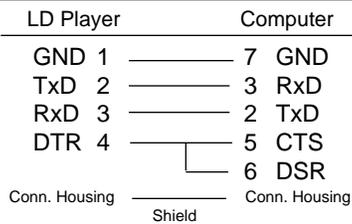
The LD-V8000 uses the following cables to attach to the computers listed below:

Computer	Pioneer Cable #	Connections
IBM PC/XT & Compatibles*	CC - 12	DB-15 male to DB-25 female
IBM PS/2 & Commodore Amiga	CC - 12	DB-15 male to DB-25 female
IBM AT & Compatibles**	CC - 13	DB-15 male to DB-9 female
IBM Info Window	CK - 15P	DB-15 male to DB-25 male

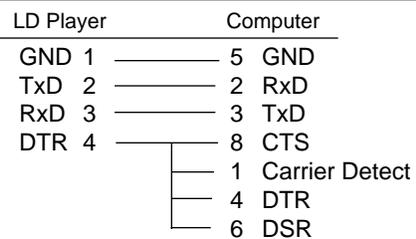
\*PC & PC/XT require a gender adapter. \*\*PC/AT requires a 25 to 9 pin adapter.

## Pin Configurations for Specific Cables

### CC-12 DB-15 male to DB-25 female



### CC-13 DB-15 male to DB-9 female

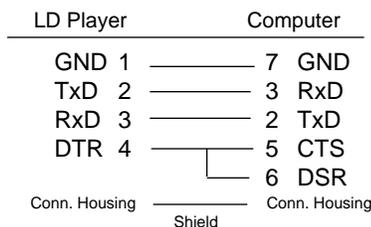


Jumper pins 1, 4, & 6 together on DB-9

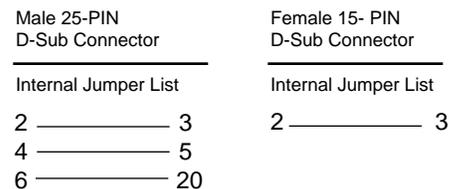
The CC-12 is an RS-232 cable which interfaces Pioneer's LD-V8000, LD-V4200 and LD-V2200 videodisc players and LC-V330 AutoChanger to Commodore Amigas and any IBM PC or compatible computer that supports a 25-pin male D-sub connector RS-232 port.

The CC-13 is an RS-232 cable which interfaces Pioneer's LD-V8000, LD-V4200 and LD-V2200 videodisc players and the LC-V330 AutoChanger to IBM PC/ATs or compatibles that support a 9-pin male D-Sub Connector RS-232 port.

### CK-15P Kit DB-15 male to DB-25 male



#### with two WRAP PLUGS



This kit contains the CC-03 cable, an RS-232 cable designed to interface Pioneer's LD-V8000, LD-V4200, LD-V2200 videodisc players to the IBM InfoWindow. However, the CC-03 can also be used to interface the above videodisc players to Pioneer's UC-V102 Videodisc Controller and, with a 25-pin female-to-female adapter, to an IBM PC or compatible that supports a 25-pin RS-232 port. Two wrap plugs, used to test the RS-232C cable in the InfoWindow configuration, are included.

# Interface Cable Specifications

## Connecting the LD-V8000 to Macintosh and Apple II Computers

The LD-V8000 uses the following cables to attach to the computers listed below:

Computer	Pioneer Cable #	Connection
Machintosh Plus, SE, II & Apple IIGS	CC - 04	DB-15 male to Mini-Din 8
Apple II, II+, IIE with Super Serial Card	CC - 03	DB-15 male to DB-25 male
Pioneer UC-V102 Controller	CC - 03	DB-15 male to DB-25 male

## Pin Configurations for Specific Cables

### CC-03

#### DB-15 male to DB-25 male

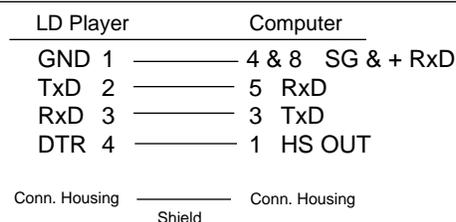


The CC-03 is an RS-232 cable which interfaces Pioneer's LD-V8000, LD-V4200 and LD-V2200 videodisc players and the LC-V330 AutoChanger to the IBM InfoWindow\*, the Apple II series Super Serial Card and to Pioneer's UC-V102 Videodisc Controller.

\* IBM InfoWindow does not support the LC-V330 AutoChanger.

### CC-04

#### DB-15 male to Mini-Din 8 male



The CC-04 is an RS-232 cable which interfaces Pioneer's LD-V8000, LD-V4200 and LD-V2200 videodisc players and the LC-V330 AutoChanger to the Macintosh Plus, SE, Macintosh IIs, and Apple II GS computers. It connects the 15-pin RS-232 port on the player to the Circular-8 Modem port on the Apple/Macintosh.

## **Appendix E: Establishing RS-232C Communications for Level III Player Control**

**APPENDIX**

**E**

**LD-V8000**

**LEVEL I & III**

USER'S MANUAL

Programmer's Reference Guide

# Establishing RS-232C Communications

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## RS-232C Player Control

By opening the communication port, and sending the command mnemonics, users can control the LD-V8000 (and other Pioneer Industrial Videodisc players) directly from the computer. Check to make sure that the BAUD Rate of the player is set to match the BAUD rate of the software you are using. Also, make sure you have the proper cable connected. (See **Appendix D, LD-V8000 Cable Specifications.**)

Communications software, such as Qmodem™, PROCOMM™ or the terminal program that is included with Microsoft Windows™ 3.xx, can be used to establish communications and send mnemonic commands to the player. This is a simple method of testing the com port to assure the computer and player are communicating.

Microsoft Windows is a Registered Trademark of Microsoft Corp.  
Qmodem is a Registered Trademark of Mustang, Inc.  
PROCOMM is a Registered Trademark of DataStorm Technologies, Inc.



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