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 **0DM** 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 **0EM** 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
0DM	: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.
0EM <CR>	:Enables continuous motion video to again pass through Bank 0 and Bank 1

Video Memory/Frame Mode

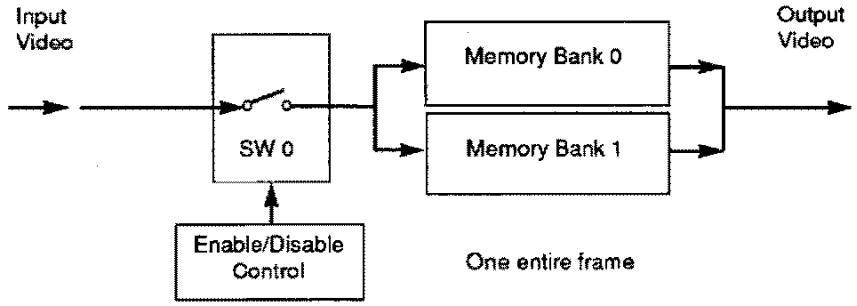

Figure 4-P

Note: In *Video Memory Mode, Frame Mode* the player ignores the VM command. Both **0VM** 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, **0VM** or **1VM**, provided before the Field Mode command, become effective. For example, with the command string 1RG, 0DM, 0VM 17RG, the player will output Field 1 in Bank 0. With the command string 1 RG 0DM 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: **0VM** displays the Field 1 stored in Bank 0; **1VM** displays Field 1 stored in Bank 1. Use the **0EM** 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
0DM <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.
0VM <CR>	:Selects the bank for video output, displays Field in Bank 0.
PL	:Outputs audio over the image displayed from memory
0EM<CR>	:Enables continuous motion video to again pass through Bank 0.

Video Memory/Field Mode

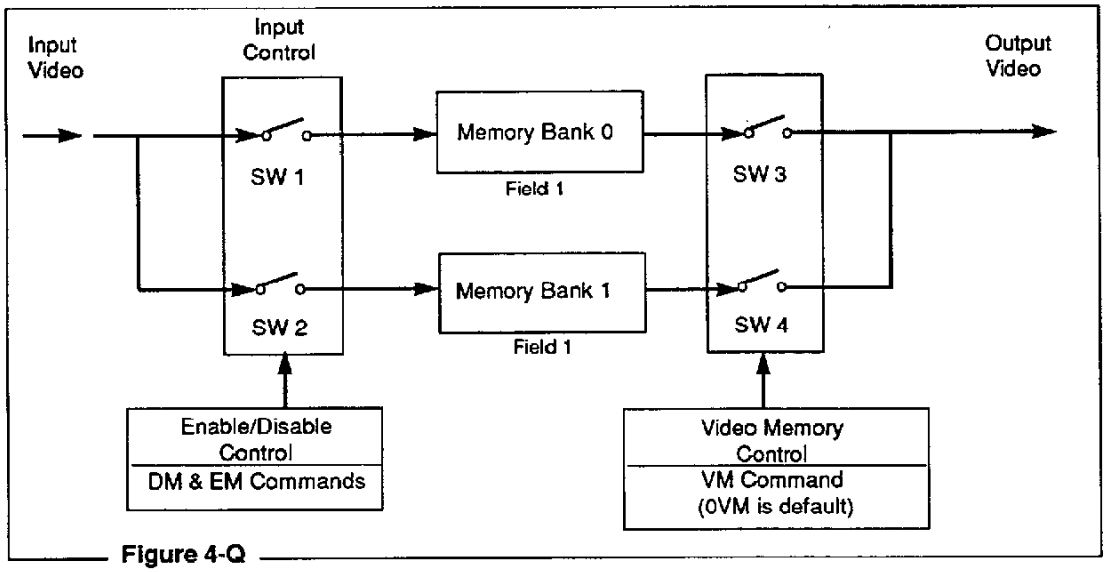

Figure 4-Q

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 **OEM** 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 **0DM**. 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 **OEM** 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)

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 0VM 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, 0EM. The completion status is returned immediately.

Execution:
* Field Mode=17RG, Bank 0 Disabled =0DM,
  Bank 0 activated for video output=0VM
  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, **0DM**. To then access both Field 1 and Field 2 of that specific frame, Set *Video Memory Mode, Field Mode*, and send **0VM** 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.