



BCD *DVD-C7* DVD Player with BCD C7 Controller

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BCD DVD-C7 DVD Player with BCD C7 Controller

Introduction

Welcome to the BCD DVD-C7 DVD Player with the BCD C7 Controller! This document will show you how to connect, configure, operate, and if required, reprogram the BCD DVD-C7 equipped with the BCD C7 controller.

About BCD Associates, Inc.

BCD has manufactured controller systems for video since 1980. BCD is known for *frame-accurate* time code control of video tape machines for computer-controlled interactive applications. In fact the first two interactive videodiscs produced by Sony were developed using BCD interactive systems. (Remember the big, 12" Videodiscs? Also called Laserdiscs?)

What is a BCD C7?

BCD modifies DVD players by installing a BCD C7 controller. The BCD C7 is an RS-232 interface that mimics most of the commands found on the hand-held remote control. All BCD Commands are 4-characters like PLAY and STOP. Units may be "daisy-chained" together to operate multiple units simultaneously from a single serial port:

DECK 2; STOP makes deck # 2 stop.

Components

- 1 BCD C7 Controller installed in the BCD DVD-C7
- 1 "Button" cable w/9-Pin (DB-9) Connector
- 1 RS-232 Serial Cable (9-pin to 1/8" mini-stereo)
- 1 "Program" 1/8" mini-plug (shorted) to activate programming mode
- 1 3.5" Floppy Disc

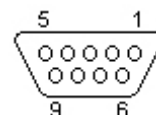
Button Hookup

Find the DB-9 jack on the rear of the machine. This is for the BUTTONS. It is NOT the RS-232 Serial Port! Plug the DB-9 (9-Pin) plug into the rear of the machine.

Connect your buttons to the appropriate conductors of the cable.

NOTE: The single Ground (GND) conductor is shared by all 'buttons.

We worked hard to make the C7 easy to connect to your buttons. Here is the diagram of the 9-pin connector when looking at the back of the deck.



Below is the connection chart for Buttons & Cables.

NOTE: The DB-9 Pin Numbers are correct, but the conductor colors may vary (if our cable manufacturer changes).

Button # (Cmd)	DB-9 Pin #	Cable Color	Function
1 (BT01)	1	Black	STUP (Up)
2 (BT02)	2	Brown	STDN (Down)
3 (BT03)	3	Red	STLF (Left)
4 (BT04)	4	Orange	STRT (Right)
5 (BT05)	5	Yellow	ENTR (Enter)
6 (BT06)	6	Green	PREV (Previous)
7 (BT07)	7	Blue	NEXT (Next)
	8	Violet	Ground (GND)
	9	Reserved	Reserved

RS-232 Hookup

You need to do this *only* if :

- You want to use commands different from those that are pre-programmed.
 - You need to update the controller with a new program.
 - You want to control the machine via RS-232
-
- Plug the 9-pin end of the RS-232 cable into a serial port of your computer.
 - Plug the mini-plug marked “RS-232” into the jack on the rear of the deck marked “RS-232”. RS-232 Mini-Plug to DB-9 Pins
 - “Shaft” = BCD Gnd = DB-9 #5 Gnd
 - “Ring” = BCD RxD = DB-9 #2 TxD
 - “Tip” = BCD TxD = DB-9 #3 RxD



- The extra mini-plug labeled “Program” is **NOT REQUIRED for RS-232 communication & control**. It is only required for the rare occasion of a total firmware update. This plug activates an internal programming switch for updating the C7 firmware. It is physically attached to the RS-232 cable so it won’t get lost, but is not electrically connected.

Computer Communication Setup

The BCD C7 communication configuration process is not difficult, but it is a bit of a hassle. Fortunately, you only have to do it once...unless you change to a different Make/Model DVD machine or you wish to re-assign the functions of the buttons.

You should know how to:

- Operate a computer
- Find the computer’s RS-232 Serial Port (9-Pin)

- Operate a “Terminal Communications Program” like Windows *HyperTerm*, *Telix*, *Procomm*, or BCD’s *BCDComm* for DOS, or something like *Kermit* for Unix/Linux.

If you ever need to install completely new firmware, you must also know how to install the FlashMagic software for Windows. FlashMagic is available for free download from Embedded Systems Academy www.esacademy.com

Computer Communication

The *Host Serial Cable* has 9-pin (DB-9) female connector on one end and a 1/8” mini-stereo plug on the other end. Plug the 9-Pin end into your RS-232 Serial Port (Com1 or Com2), and plug the mini-plug connector into rear jack marked “RS-232”.

Communications Parameters

The C7 controller is set up for

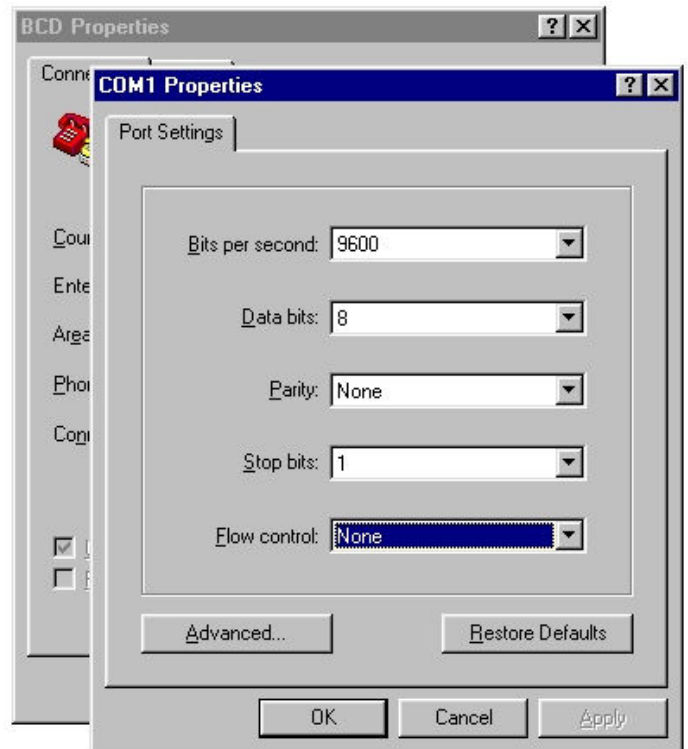
- 9,600 Baud
- 1 Start Bit
- 8 Data Bits
- 1 Stop Bit
- No Parity
- No Handshaking/Flow Control

An AutoBaud firmware version is available if required.

Windows HyperTerm Settings

- Cancel the *New Connection Window*.
- Click on the *File* menu and choose *Properties*.
- Choose *Direct to Com1* or *Direct to Com2*.
- Click *Configure*.
 - “Bits per second” = 9600.
 - “Data Bits” = 8
 - “Parity” = None
 - “Stop Bits” = 1

Be certain that “Flow Control” is set to *None*.



BCDComm Settings

BCDComm is an MS-DOS program that we use all the time because it provides very fast, direct communication with BCD controllers. It is configured with a text file called BCD.PRM.

For 38.4K Baud, the BCD.PRM file should be

```
mode = com1:38400,n,8,1
```

Note that the line is lower case and there are *spaces* on both sides of the “=” equal sign. Change “com1” to be “com2” if your are using Serial Comm Port #2.

Talking to the Deck

Be certain that you are hooked up and your communications parameters are correct. On your computer keyboard hit the ENTER key several times. You should see a series of BCD Prompt Characters (>) like this:

```
>  
>  
>
```

If you do not see this, something is wrong: terminal program parameters, the cable, the computer serial port, or the Controller (unlikely).

BCD Command Syntax

All BCD Commands are 4-characters long, terminated by a Carriage Return/Linefeed. In a terminal program, the Carriage Return/Linefeed is the same as the Enter key.

The first command you should type is VERS. This is short for VERSion, and it will display the version of the firmware that is in your controller. Something like:

```
BCD BCD C7 Control System Copyright 1986-2002  
C20331 Sunday March 31 2002 10:56am
```

The important part is the Version Number – in this case C20331. Write this down, and it’s also a good idea to tape it on the back of the deck.

When you see the VERSion, you know that the Controller is working and that communications are ok.

In this manual, when we issue a command like PLAY, it is assumed that we mean PLAY<CR>, or PLAY followed by the Enter key.

Most commands are **not** cAsE-sEnsitive.
(The exception is the LABL command)
Spaces do not matter.

You can issue several commands on the same line, with commands separated by a semicolon (;) like this:

```
PLAY ; TIME 100 ; STOP
```

This causes the unit to play for about 10 seconds, then stop. (Each unit of TIME is about 0.1 second.)

The Save Command

Some parameters are variable and SAVE-able. These include DEBG and RDLY. Typing or issuing the SAVE command will program all appropriate variables into the non-volatile Flash-ROM.

Commands

All BCD Commands are 4-characters, terminated by a Carriage Return & Line Feed <CR><LF>. Some commands may have a parameter, like a number. Most commands are case insensitive and may be typed in UPPER or lower case letters because the controller converts all commands to upper case. The full list of commands keeps growing. See the latest at www.bcdusa.com/commands.

Here are some of the most popular commands

POWR

POWR toggles the power ON.or OFF

INI2

The command you assign to INI2 will happen when the machine is plugged into power. Use the BUTS command to display all of the button assignments. INI2 is at the end of the list.

Type:

```
INI2 PLAY  
SAVE
```

Now, when the deck is plugged into power, the controller will issue the PLAY command to wake it up.

BAUD

Displays or Sets the communications Baud rate. BAUD with no parameter will display the current Baud rate as 38400, 19200, 9600, 4800 or 2400.

BAUD 9600 will :

- set the new Baud rate to 9600
- save the new Baud rate in Flash Rom
- send what appears to be garbage to your computer.

YOU must change your terminal program's Baud rate to match the new setting. Set DEBG 1 before doing this to get some help.

PLAY

Plays the highlighted title

STOP

Stops PLAY, RECS, FFWD, REWD

FFWD

Fast scan forward

REWD

Fast Scan reverse

STUP

Up Arrow Key

STDN

Down Arrow Key

STLF

Left Arrow Key

STRT

Right Arrow Key

GDLY

How long must a 'button' be held before action happens. The default is 100, but you can go up to 255. This avoids "Button Bounce" of the button contacts and avoids inadvertent multiple presses.

MODF

MODF means MODE deFinition, which is a long way to say that there are too many commands available to assign each of them a 4-character command. So we do it with numbers. A full listing of command definitions, both MODE DEF and MOVE DEF (MOVF) are in the back of this manual, but here are some interesting ones.

MODF 32 (ANGL)

toggles the Angle DVD function

MODF 33 (AUDI)

toggles the DVD Audio function

MODF 85 (SUBT)

toggles the subtitle function on DVD players.

HELP

HELP lists ALL of the commands embedded in the controller. Some of the commands may not apply to your DVD-C7 deck. If in doubt you can try it (it won't hurt), or check www.bcdusa.com/commands or email support@bcdusa.com.

DVD Recorders

The BCD-C7 is also installed in some DVD Recorders, regularly those from Panasonic, including DMR-E55, ES20, ES-10, T3040, etc. (DMR-ES15 is not supported.) Panasonic changes model numbers frequently. Here are some commands typically used with Panasonic recorders.

RECS

RECOrd Start. Starts recording. Same as pressing the REC button.

STOP

Stops playback or recording. When STOP is issued after recording, the machine can take 20-30 seconds to complete the recording process and actually stop. Note: There is no way your RS-232 controller or computer program can know when this process is complete, so please allow enough time.

TMEN

Top MENU. (Also called Direct Navigator). Goes to the Top or Main menu of the disc which shows thumbnails of existing scenes.

RETN

RETurN Key. Puts the machine in "E-E" mode (Electronics-to-Electronics). This passes through the incoming video signal to the monitor.

FUNC

Function key. Provides access to additional commands, especially Disc Finalization.

FINL

FINALize the disc. Panasonic uses "-R" (dash R) discs which require Finalization before the discs can be played on other DVD players. The FINL command is a macro which automatically marches through the many button presses to achieve finalization (17 steps with DMR-ES10). Note: There is no way your RS-232 controller or computer program can know when this process is complete, so please allow enough time.

Complete Reprogramming

In the event that features are added or (perish the thought) bugs or errors are detected in the C7 firmware, you can easily update the controller firmware.

You will need:

- A BCD Hex File
- *FlashMagic* from Embedded Systems Academy – www.esacademy.com
- The 1/8” BCD Programming Plug, or something similar.

New hex files are available by email or at BCD’s website www.bcdusa.com/updates.

FlashMagic is a Windows program for programming the type of Philips microcontroller used in the C7 controller.

- After downloading *FlashMagic* from www.esacademy.com, install it in a Windows computer.
- Run *FlashMagic*
- Configure the program by setting set the COM Port of the program to be the same as the serial port used to control the DVD Player.
 - The Processor type is 89C668
 - The Clock Crystal is 16MHz
 - Check the boxes for “Erase All Flash” and “Verify After Programming”
- Insert the BCD Programming Plug into the jack on the rear of the machine called “Program”.
- UN-PLUG the BCD DVD-C7 and wait about 5 seconds.
- PLUG IN the BCD DVD-C7
- Click the Browse button on the FlashMagic Screen to select the BCD <filename>.hex file
- Click the Flashmagic Start button to begin programming.
- The program will briefly display “Finished” when programming is complete.
- UN-PLUG the BCD DVD-C7
- Remove the Programming Plug
- PLUG-IN the BCD DVD-C7 machine.

Now you-re ready to go.

If, for some reason, programming fails, just do the procedure again. The microprocessor in the C7 has its own Boot ROM, and we do not believe that you can harm the system by mis-programming even if someone disconnects the computer from power or for any other reason.

Questions? Commands you want?

Contact BCD Associates, Inc. <http://www.bcdusa.com> or via email support@bcdusa.com. or 800-223-6734 (800-BCD-MPEG)

Thank You!

Appendix

This is miscellaneous information that may be useful.

Paper Labels on DVD discs

In a word, NO!

Paper labels are fine for home movies or presentations that are played only occasionally. DO NOT USE paper labels for discs used in museum, trade show or other venues where the machine will run for a long time.

Paper labels cause the DVD disc to be out-of-balance, and over time, this condition will destroy the DVD players motors and bearings.... even so-called *Industrial* players. Authoritative people at Pioneer recommend against paper labels and so do we.

Mode Definitions (MODF command)

There are many commands we could include in the FlashROM firmware, but each command takes a certain amount of space. To increase flexibility we use the MODF command which invokes various M_od_e D_ef_in_it_io_ns. The MODF command is always followed by a number. For example, to issue the "NEXT" command you could say "MODF 22" (without the quotes, of course).

Please note: only a few of these values are valid for ALL machines, namely the Arrows(STUP, etc.), NEXT, PREVIOUS, RETURN, and ENTER. Others may be specific to only one machine.

If you use the "MODF x" command, please use the associated Number. We use the words in the left column internally within our program as mnemonics. Some of the words may actually be commands, but most are not.

Note: This is a fairly comprehensive list and includes MODF values available for other brands of players. Not all of these values are appropriate for your player

NEXT '22' Next Key
PREV '23' Previous Key
STUP '24' Step Up (Arrow Up) to next box
STDN '25' Step Down (Arrow Down) to next box
STLF '26' Step Left (Arrow Left) to next box
STRT '27' Step Right (Arrow Right) to next box
OKOK '28' OK or ENTER or Select
ENTR '28' OK or ENTER or Select
CLOS '30' Close
TSEL '31' Philips DVD-170 T-C Select
ANGL '32' Angle
AUDI '33' Audio track sel
CMEN '34' Chapter Menu (Philips)
TITL '35' Title Menu (or TMEN, Top Menu)
MENU '36' Menu Key
RETN '37' Return Key
STAT '38' Status request
CHPS '50' Chapter Status
CHPP '51' Chapter Play
TMEN '52' Top Menu (See also TITL)
DTYP '53' What disc type-Philips
TITS '54' TitleStatus

/* Sony DVD */

FL_A '56' Sony Changer Folder A cmd
FL_B '57' Sony Changer Folder B cmd
FL_C '58' Sony Changer Folder C cmd
FL_D '59' Sony Changer Folder D cmd
FLAL '60' Sony Changer Folder ALL cmd
FLDV '61' Sony Changer Folder DVD cmd
FLCD '62' Sony Changer Folder CD cmd

/* Panasonic DVD Players */

DISC1 '63' Pan Changer direct DISC Select
DISC2 '64' Pan Changer direct DISC Select
DISC3 '65' Pan Changer direct DISC Select
DISC4 '66' Pan Changer direct DISC Select
DISC5 '67' Pan Changer direct DISC Select
SLOAD '68' Sony Load (Disc Explorer) check for all discs

/* Pioneer DVD-7400 */

GT10 '69' Pioneer 7400 Greater than 10 for Chapters * VideoCD
FRMS '70' Pioneer 7400 Frame Search Button
TSCH '71' Pioneer 7400 Title-Chap. Srch button

/* Myron & Davis (MD) Mobile */
RSUM '73' M&D Resume
MUTE '74' M&D Mute

/* Panasonic DMR-E50 - DMR-E80 */
VCRP '112' VCR Plus
TVVC '113' TV-Video
RECM '114' Record Mode
VOLU '115' Volume Up
VOLD '116' Volume Down
FUNC '117' Function
PCHK '118' Prog Chek
CMSK '119' CM SKIP
TMSL '120' Time Slip
ERAS '121' Erase
PMEM '122' Position Memory
MARK '123' Marker
FREC '124' Marker
DHDD '125' HDD rec-play select
DDVD '126' DVD rec-play select