BCD

ASSOCIATES

BCD VC-16b Controller
Product Rev. 0

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Introduction

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.) BCD continues to design and manufacture controllers for various types of machines.

Welcome to the BCD VC-16b Controller!

> The VC-16b is a wired infrared remote control that is operated with pushbuttons or via RS-232. This document will show you how to connect, configure, operate, and if required, reprogram the BCD VC-16b controller. The BCD VC-16b is a small controller that operates infrared-controlled devices by emulating most, if not all of the commands found on the hand-held remote control. In turn, the BCD VC-16b is operated either by connection of closed-contact pushbuttons or via RS-232 commands.

Nomenclature

> **Device** or **Machine** or **Deck**: The BCD VC-16b can control many different types of *devices* including DVD Players, DVD Recorders, and VCRs. This manual refers to the controlled device as the *device* or the *machine* or the *deck*.

> **RS-232** or **Serial**: The method to control, re-program or communicate with the BCD VC-16b. All BCD commands are 4-characters long, terminated by a Carriage Return and Line Feed (<CR><LF>). Example commands are PLAY, STOP, STUP (STep UP, the DVD Up Arrow Button), and ENTR.

> **Button**: A momentary closed-contact switch, similar to a doorbell button. A variety of attractive push buttons are available form BCD Associates and other vendors. A BCD command is pre-assigned to each button, so that pressing a button is the same as sending a BCD RS-232 command.
> Pre-assigned DVD Commands by Button Number:
> 1. STUP (STep UP, DVD Up Arrow key)
> 2. STDN (STep DOWN, DVD Down Arrow key)
> 3. STLF (STep LeFt, DVD Left Arrow key)
> 4. STRT (STep RighT, DVD Right Arrow key)
> 5. ENTR (ENTeR, DVD Enter key)
> 6. PREV (PREVious, DVD Previous key)

7. NEXT (NEXT, DVD Previous key)
8. RETN (RETurN, DVD Return Key)
9. NUMB 1 (Numeral 1 Key)
10. NUMB 2 (Numeral 2 Key)
11. NUMB 3 (Numeral 3 Key)
12. NUMB 4 (Numeral 4 Key)
13. NUMB 5 (Numeral 5 Key)
14. NUMB 6 (Numeral 6 Key)
15. NUMB 7 (Numeral 7 Key)
16. NUMB 8 (Numeral 8 Key)

Components & Accessories

With your BCD VC-16b you receive:
(clockwise from top)

- 3.5" Floppy Disc with the BCD RS-232 Terminal program *BCDComm.exe (*MS-DOS only)
- Infrared Emitter Cable (1/16" sub-mini phone plug on one end, black IR emitter on the other end)
- 25-Pin male DB-25 connector with ribbon cable for connecting your Buttons.
- Computer Serial Cable (Telephone type RJ-11)
- BCD-Comp9 RJ-11 to DB-9 adapter for your computer serial port
- 9VDC Power Supplied (US & Canadian clients only)

Button Hookup

The arrangement of the button connectors on the DB-25 connector is not intuitive, so here is the diagram of the Buttons as they relate to the Ribbon cable and the DB-25 connector on the rear.

Button	Ribbon	DB-25	Button	Ribbon	DB-25
1	6	16	2	7	4
3	8	17	4	9	5
5	10	18	6	11	6
7	12	19	8	13	7
9	14	20	10	15	8
11	16	21	12	17	9
13	18	22	14	19	10
15	20	23	16	21	11
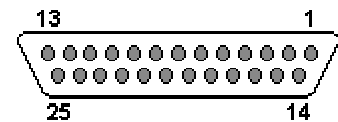
On the *DB-25 connector*, Ground Pins are # 24 & # 25. Pins #14 & #15 are 5VDC.   Pins #1, #2, # 12 & # 13 are open, NC.

On the *Ribbon Cable* the colored edge conductor is Pin #1, Conductor #1, on the right. . Ground wires are #22 & #24. 5VDC wires are #2 & #4.

If you use **one button only**, connect terminal of that button to a ground pin and the other terminal of that button to the pin for the desired function.

Example: Connect Pin # 5 (ENTR) and Pin # 8 (Ground).

If you use **several buttons**, connect the appropriate pins to a terminal on each button as required and "daisy chain" the ground connector to the other terminals on the butttons, or you may use more than one ground connector. All of the "grounds" are tied together internally.

- Each button conductor should go to one button only.
- The Ground conductor may go to several buttons.

IR Emitter

The IR Emitter assembly consists of a small-diameter cable with a sub-mini plug on one end and a black shell on the other end which contains the actual emitter.

Plug the IR Emitter sub-mini plug into the jack marked "IR".
We have equipped the emitter with an adhesive black Velcro® disc. One half of the Velcro has adhesive and sticks to, over, and covers up the IR receiver of the deck. (Yes, infrared passes through the black Velcro.)

FIRST - Experiment with the placement of the emitter to locate the IR receiver on the front of the player. (Sony marks their players with the symbol "IR" which is just above the actual IR receiver. The Pioneer DVD-7400 has the symbol "SR" just above the IR receiver.)

Attaching the IR Emitter to the player is one of the **last steps** in the hookup procedure. (Bookmark this section and come back to it when you are REALLY READY to attach the Velcro® because it is very sticky and difficult to reposition!) Remove the adhesive-sided Velcro disc and adhere it to the front of the player DIRECTLY ON the IR receiver of the deck. (Infrared light can penetrate the Velcro® just fine.) Attach the Velcro of the Emitter to the Velcro on the player.

RS-232 Hookup

This section is required for changing the assignments of the buttons and for re-programming the BCD VC-16b.

- Plug the 9-pin end of the RS-232 cable into a serial port of your computer.
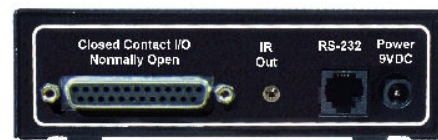
- Plug the RJ-11 end of the RS-232 cable into the jack on the rear of the VC-16 marked "RS-232".

Computer Communication Setup

The BCD VC-16b communication configuration process is not difficult, but it is a bit of a hassle. Fortunately, you only have to do it once...unless 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 telephone-type RJ-11 plug on the other end. Plug the 9-Pin end into your RS-232 Serial Port (Com1 or Com2), and plug the RJ-11 plug connector into rear jack marked "RS-232".

Communications Parameters

The controller is set up for
> 9600 bits per second (Baud)
> 1 Start Bit
> 8 Data Bits
> 1 Stop Bit
> No Parity
> No Handshaking, no Flow Control

The BAUD command permits you to change the Baud rate and SAVE that Baud rate semi-permanently in the Flash ROM.

Baud Rate Switch

The Baud Rate Switch is Switch # 8 (far right) on the switch bank on the front of the VC-16b box.

- Fixed Baud Rate = Down or Off
- Autobaud = Up or On

In the Fixed position, the VC-16b will communicate at 19.2KB or whatever rate **you have set with the BAUD command. Factory Default is 9600bps.**

In the Autobaud position, the VC-16b will listen for a series of carriage returns and set its own Baud rate from 2400 bits per second to 38,400 bps. (From your

terminal program, hit the computer's Enter key several times until you see the BCD ">" prompt character.)

Important Switch Setting

FOR DAILY BUTTON OPERATION, the Baud Rate Switch MUST be in the Fixed position. (Switch # 8 DOWN or OFF. Buttons are not active in Autobaud unless a computer is connected and Baud Rate has been established!

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.*
- Set the "Bits per second" window to be 9600).
- Be certain that "Flow Control" is set to *None*
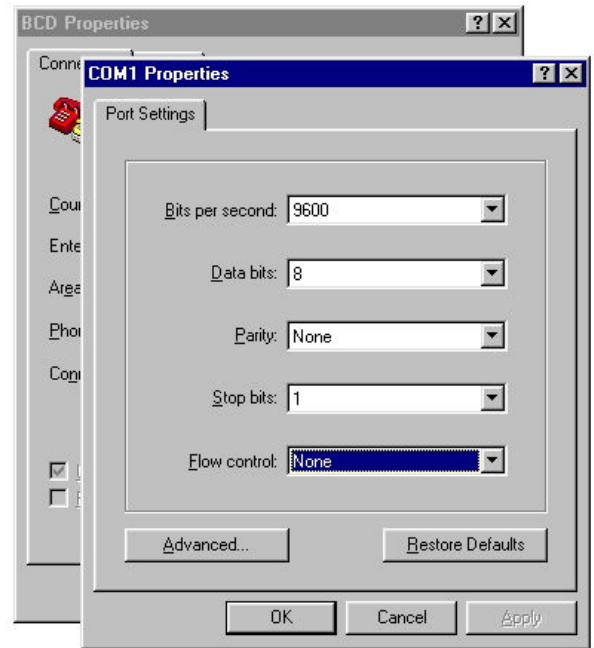
HyperTerm Properties showing 9600 Baud

BCDComm Settings

BCDComm is an MS-DOS terminal program that we use all the time to talk through the RS-232 port because it provides very fast, direct communication with BCD controllers without Windows™ getting in the way. It is configured with a text file called BCD.PRM.

For 19.2 K 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.

Troubleshooting

- Verify that the RS-232 cable is really connected to the selected Com port.
- Verify that the RS-232 cable is really connected to the VC-16b's RS-232 port.
- Verify that the VC-16b is plugged into power. The front Red LED should be on.
- Verify that all front panel switches are off or that ONLY Switch #8 is on.

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 VC-16b Control System Copyright 1986-2002
V20331 Sunday March 31 2002 10:56am
```

The important part is the Version Number – in this case V20331. Write this down, and it's also a good idea to tape it on the bottom of the controller.

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 for DVD Recorders.)
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

Many parameters are variable and SAVE-able. These include TYPE, DECN, 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 exception is the LABL command when the underscore "_" modifier is used.

You can see ALL of the available commands by typing HELP. Please note that some commands listed by HELP may not be available for your particular machine.

The Online Command Database is regularly updated. see
www.bcdusa.com/commands.

Some DVD Commands:

VERS

VERSion command. Returns the current firmware version in the Flash ROM. This is very important to know if you contact BCD about your controller.

DEBG

Debugging level. DEBG 0 is the default. No messages. DEBG 1 causes errors to be printed to your terminal and also presents lots of interesting (to us) information.

DEBG 10 followed by VERS will display the machine type(s) available within the controller.

TYPE

Sets or displays the make and model number of the machine being controlled.
TYPE 23 sets the TYPE to '23' for the Panasonic DVD-D27 DVD player.
TYPE (by itself with no parameter) displays the current deck TYPE
Use the SAVE command after setting the TYPE to save or program all of the save-able variables to the Flash ROM.

SAVE

The SAVE command saves variables into the Flash ROM. SAVE-able values include: Button values (BT01 – BT16), TYPE, DEBG, DECN, REPT, GDLY, .

POWR

POWR Toggles the player machine's power on or off.
POWR (by itself with no parameter) displays 1 or 0 depending on whether the VC-16b thinks the power might be on or off. Usually it's always on.

STUP

Up Arrow Key

STDN

Down Arrow Key

STLF

Left Arrow Key

STRT

Right Arrow Key

ENTR

Enter key

PREV

Previous key

NEXT

Next key

RETN

Return key (not found on all machines)

GDLY

How long must one hold a button before the action really happens. (Also called button "debouncing".) Default us 100.

RECS

Begins recording at the next available section. Valid only on Recorders.

PLAY

Plays the highlighted title, or from the current position. Often the same as ENTR.

STOP

Stops PLAY, RECS, FFWD, REWD

FFWD

Fast scan forward

REWD

Fast Scan reverse

MENU

The Menu key on the remote

TITL or TMEN

The Title or Top Menu key on the remote

BUTS

Shows how all the buttons are programmed.

BT01 (<command>)

Displays or sets a BCD Commands associated with that button.
Use BT02 ... BT16 in similar fashion.

LABL

Applies a label or Name to a video segment after recording. See Specific commands for the machine TYPE.

BAUD

Displays the current Baud rate (38400, 19200, 9600, 4800, 2400) or sets a new Baud Rate.

BAUD Example: "BAUD 9600" sets the new rate to 9600 bps and SAVEs that value in the Flash ROM. During the SAVE, garbled characters will appear on the screen. You should then change your terminal program's Baud rate, and just because, repower the controller.

HELP

Displays ALL commands available in this controller, even those not specifically relevant to your application.

NUMB x

NUMB lets you enter numbers up to 6 digits, for frame searching (Pioneer 7400 only) or single digits to select Menu Items by number.

FRMS

toggles the Frame-Search on Pioneer DVD-7400 players. FRMS xxxx performs FRMS and enters the number xxxx. Alternately you can enter FRMS followed by NUMBx to enter the desired frame number.

MODF

MODF means MODe deFiniton, which is a long way to say that there are too many commands avilable to assign each of them a 4-character command. So we di 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 19 (SRCH)

is the Search key for Pioneer DVD-7400 to activate the Frame Search function:
   FRMS 1000; MODF 19
searches to and stills on frame 1000.

MODF 85 (SUBT)

toggles the subtitle function on DVD players.

Assigning Commands to Buttons

BUTS

First you can see what ALL the buttons are set for with the BUTS command.
You will see something similar to this
```
BT01 STUP
BT02 STDN
...
BT16 NUMB8
INI2 PLAY
```

BSET

The BSET command returns all button assignments to their factory defaults.

To see an individual button assignment, type the button name, like BT07.

Let's say you want Button # 1 to be the PLAY command.
Type   **BT01 PLAY**
(Generally, upper case/lower case doesn't matter. Spaces don't matter.)
Button # 1 is now assigned to be the PLAY command.

SAVE

Type SAVE to save this assignment into the Flash ROM.

INI2

The INI2 command acts like a button command but it is issued ONLY when the
VC-16b is powered up. This is frequently used to play a disc automatically on
startup. (The VC-16b and the DVD Player(s) are all powered from the same AC
power strip.)

INI2 by itself will display the current INI2 value. (Default value is NULL or
sometimes PLAY.)

To make a DVD Play upon power up type
INI2 PLAY; PLAY; TIME 30; PLAY
SAVE

PLAY sends the play command twice to be certain that is it issued after power up.
TIME 30 waits 3 seconds.
PLAY issues the play command again.

For Multiple Machine control, one can use several IR emitter cables with "Y"
adapters or an optional "IR Breakout Box" to send the same command to several
machines at once. A typical command string might be

INI2 PLAY; TIME50; PLAY; TIME 300; LOOP FOREVER; PREV; TIME 2130 ; LEND

PLAY sends the first play command. TIME 50 waits 5 seconds. PLAY sends the second play command. TIME 300 waits 30 seconds for the DVD player to spin up. LOOP FOREVER does the following commands… forever. PREV issues the "Previous" command to the player causing all of the the video segments to start over. TIME 2130 waits 213 seconds.   LEND means Loop END.

So… the DVD players will play for 213 seconds, then start over.
The video segment should be LONGER than 213 seconds… maybe 225 seconds.
This makes sure that the re-start is caused by the VC-16b, not by the ending of the video.

This will happen every time the VC-16b is powered up. To abort, use Hyperterminal and press the ESCape key. To return to "Normal" operation, set INI2 PLAY or INI2 NULL, then SAVE.

Reprogramming the Whole Box

In the event that features are added or (perish the thought) bugs or errors are detected in the VC-16b firmware, you can easily update the controller firmware.

You will need:
- A BCD Hex File, downloaded from www.bcdusa.com or sent to you via email.
- *FlashMagic* from Embedded Systems Academy – www.esacademy.com
- The 1/8" BCD Programming Plug, or something similar.

New hex files and *FlashMagic* are both available by email or at BCD's website www.bcdusa.com

FlashMagic is a Windows™ program for programming the type of Philips microcontroller used in the VC-16b controller.
- After downloading *FlashMagic* from www.esacademy.com, install it in a Windows™ computer.
- Run *FlashMagic*
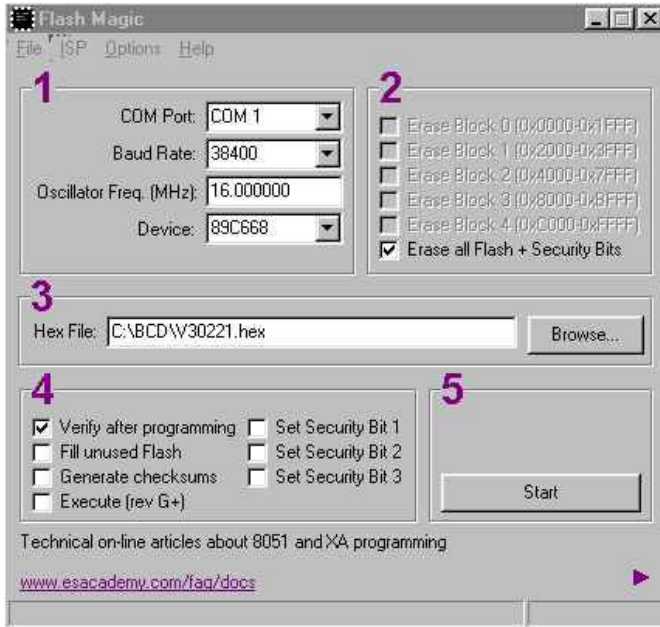
The FlashMagic™ Window

- Set the COM Port
- Set the Baud to 38400 or 19200
- Oscillator Freq. defaults to 16.
- Device is 89C668
- Checkmark Erase all Flash…
- Browse for the BCD Hex file
- Checkmark Verify
- UNCheck all other checkboxes

Configure the program by setting set the COM Port of the FlashMagic program to be the same as the serial port used to control the VC-16b. A fast Baud Rate is desirable, like 38.400 or 19,200. The Processor Type is 89C668. Verify should be checked. Erase All Flash + Security bits should be checked. Other checkboxes, empty.

- UN-PLUG the controller and wait about 5 seconds.
- Switch #6 and Switch #7 should be ON for Programming (OFF for normal use.)
- PLUG IN the controller
- 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 controller
- Switch #6 and Switch #7 should be OFF for normal use.
- PLUG-IN the controller.

Now you're ready to go.

If, for some reason, programming fails, just do the procedure again. The microprocesor in the VC-16b has its own Boot ROM, and we do not believe that you can harm the system by mis-programming if someone disconnects the computer from power or for any other reason.

Advanced Features

Multiple Deck Control

You can control several (up to 10) DVD Players or recorders at one time from a single VC-16b controller. This is useful for pseudo-video wall and panorama applications. The Rules are:

- All decks must be of the same make and model
- The same command is *always* sent to all of the decks at the same time.

The "IR" output jack on the VC-16b is of the "Subminiature" size. For simple 2-deck control, use a "Y" adapter for Subminiature plugs (1 Male plug with 2 Female jacks.) We use the "Radio Shack # 274-948 3/32" Stereo-to-Stereo Audio Adapter". (The IR Jack is really mono, but this works.) It is a single Plug with two Jacks. This is available from BCD Associates.

You will need one or more extra IR Emitter Cables from BCD Associates.
BCD Part # BCD IR-EMIT.

You can use as many "Y" Adapters as you want, but it quickly becomes cumbersome. We suggest ordering a BCD IR Breakout Box. Part Number BCD IRBB-x. (The x is the number of decks you will control.) A BCD IRBB-6 actually has 7 submini jacks, because one jack is needed to get from the BCD VC-16b to the Breakout Box.

Multiple VC-16b Control

You can control several VC-16b controllers from a single RS-232 serial port..... from a computer or other controller like AMX or Crestron. The RS-232 control signals are "daisy-chained" from one unit to another to another, etc.

Hookup with Adapters
The VC-16b has only one RJ-11 jack for communication, but this configuration requires **two RJ-11 jacks**. We use a telephone "Y" adapter (Splitter, Modular 3-way Line Coupler). It is the same device you would use to plug 2 phones into a single jack, or to plug in **both** your phone and an answering machine into a single jack. This is also available from BCD Associates.

Cables
Line Cable is the name we give to the cable we use to connect the computer to the VC-16b. It is an ordinary Telephone Line Cord, probably the same type that goes from the wall to your telephone. It conductors and connectors are arranged like this:
Black   ------   Black
Red   ------   Red
Green ------   Green
Yellow -----   Yellow

Data Cable is the name we give to the cable that goes between multiple VC-16b controllers. It is the same type of cable, except that we remove one of the connectors and put on another one....upside down.... so that the wires are reversed.

Black   ------   Yellow
Red   ------   Green
Green   ------   Red
Yellow -----   Black

Assigning Numbers to Each Controller
Each controller must be assigned a number so that it can be individually addressed by name via the serial port. We use numbers instead of calling them Bob, Fred, and Diane. To maintain syntax compatibility with our other controllers, DECK number refers to the Controller(VC-16b) number.

DECN
DECN x assigns the number x to that VC-16b.
SAVE will save that number until you change it, or the entire controller is re-programmed.

You must assign DECN numbers to the controllers **individually, one at a time, before they are connected together.**

Be certain to label your controllers so you will know which DECK/DECN numbers they are.

DECK
DECK x selects which deck (controller) is to be controlled.
All other decks/controllers will ignore commands sent to DECK x.
The DECK command, by itself with no parameters, will return that deck's number, IF that deck has been selected.   UNIT is a synonym for DECK.

Operational Example:
When we first power up a system using Hyperterminal or BCDComm, we hit the ENTER key several times expecting to see the ">" prompt character. In a multiple-box system, the ">" prompt will only come from a DECK that has been selected.   No prompt will appear until you type a valid deck number: DECK 1, etc.

DECK 1; PLAY; DECK 2; RECS
This command line causes DECK #1 to play and DECK #2 to record. Note that the commands are separated by ";" semicolons.

Help! I can't tell which DECK this is!
Hook up a single unit to your computer. Type DECK 0 (that's zero). Then type DECK by itself. The unit will tell you its number.

Questions? Features & Commands we didn't include?

See the BCD Associates, Inc. website http://www.bcdusa.com or contact us via email at support@bcdusa.com. or 800-223-6734 (800-BCD-MPEG).
Thank You!

Appendix A

This is miscellaneous information that may be useful.

Alternate Parsers

The Parser is the part of the firmware program that understands commands issued through the RS-232 port. The *BCD Parser* is the standard parser. "PLAY" means play. The VC-16b can also be equipped with an Alternate Parser so that it understands other commands.

Panasonic Parser
This parser understands the commands issued to the AG-5700, MD-830 and MD-835 VCR decks. "[STX]OPL[ETX]" means Play.

Switch #4 selects which parser the VC-16b will use: the BCD Parser or the Alternate Parser.
> DOWN/OFF (Default) is the BCD Parser
> UP/ON selects the Alternate Parser (currently Panasonic)
There is only one alternate parser available in one VC-16b, although downloadable updates for other parsers will be available.

Parser Version
When the Panasonic parser is active, you can see the Version of the VC-16b firmware with a special set of key presses using Hyperterminal on your computer.
STX, above, is achieved with the key combination ALT-02. **Hold** the ALT key and press 02 on your computer's numeric keypad. Then release all the keys.
Type VER or ver.
Hold the ALT key and press 03 (for STX) on your computer's numeric keypad. Then release all the keys.

You should see something like this:

input buffer:
⌐ V E R ∟
BCD VC-16b Core: VB41202a, Parser: Pan V41202a
10 Philips DVD+R 985a IR deck (TYPE 10) 040213
BCD Control System: Copyright 1986-2004 BCD Assoc., Inc.
Firmware Version Thu Dec 02 16:08:31 2004

In this case, the Parser VERsion is Pan V41202a.

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 flexability we use the MODF command which invokes various MOde DeFinitions. 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.

```
 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 */
 DISC1   literally '63'  Pan Changer direct DISC Select
 DISC2   literally '64'  Pan Changer direct DISC Select
 DISC3   literally '65'  Pan Changer direct DISC Select
 DISC4   literally '66'  Pan Changer direct DISC Select
 DISC5   literally '67'  Pan Changer direct DISC Select
 SLOAD   literally '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 VCR IR Type 3 */
 CHUP    75 /* Channel up  */
 CHDN    76 /* Channel down  */

/* Philips DVD-985 Type 10 */
 MONI    77 /* Monitor  */
 FSSS    78 /* Chapter Mark  */
 SYST    79 /* System Button  */
 LABL    80 /* LABL command in the type */
 SELE    81 /* Philips Select key */
 CLER    82 /* Philips Clear key */

/* dvd misc */
 DISP    83 /* Display */
 SUBT    84 /* Subtitle */


/* Pioneer DVD-7400 RS-232 */
 DSON    86 /* Display ON */
 DSOF    87 /* Display Off */
 CHAP    88 /* Chapter */

/* Pioneer DVD-7400 RS-232 status requests for MODEDEF */
 ADDR    89 /* ?A Current Address ?A  */
 TNUM    90 /* ?R Title-Track Num  */
 CNUM    91 /* ?C Chap num request */
 TCOD    92 /* ?T Time Code Request */
 INUM    93 /* ?I Index Number Request */
 FRAM    94 /* ?F Frame Number Request */
```

```
BLOK     95 /* ?B Block Number Request */
TFRM     96 /* ?Y Total Frame Number Request  */
TOCQ     97 /* ?Q TOC Info Request */
REGD     98 /* ?G DISC Region Code Request  */
STAD     99 /* ?V DVD Disc Status Request  */
STAL    100 /* ?D Laser Disc Status Request  */
STAC    101 /* ?K CD Disc Status Request  */
STAP    102 /* ?P Player Active Mode Request  */
STAM    103 /* ?X Player Model Name Request  */
CCRM    104 /* ?W CCR Mode Request  */
RTIM    105 /* ?H Real Time Mode Request  */
REGP    106 /* ?M PLAYER Region Code Request  */
INPQ    107 /* ?N Input Number Request  */
ERRQ    108 /* ?E Error Code Request  */

TITP    110 /* Title Play (like CHPP)  */
SETU    111 /* Setup */

/* Panasonic VCR AG-2580 TYPE 27 */
 SPED    112  /* Tape Speed Toggle  */
 VTTV    113  /* TV-VCR toggle  */


/* 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 */
 DDVD    126 /* DVD rec-play */
```

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