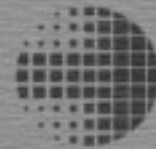


DPS PERSONAL TBC III



DIGITAL
PROCESSING SYSTEMS INC.

DPS PERSONAL TBC III



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Introduction

The DPS Personal TBC III card is designed to work in any IBM PC or 100% compatible 8 or 16-bit type expansion slot. The card obtains its power from the expansion slot, but does not require any other bus signals. Serial control data is fed to the card via a rear panel RJ-14 connector or via an on-board RS-232 input header. When used in a Commodore Amiga[®] 2000/3000/4000 series computer, the DPS Personal TBC III should be installed in one of the available PC slots—no bridgeboard is required.

Chapter 1

Why Are TBCs Necessary?

A TBC is a necessary piece of video production hardware because time base errors (the video equivalent of audio "wow and flutter") are inherent in mechanical video storage devices such as video tape recorders. The primary function of a TBC is to correct these playback errors that occur due to the elasticity of the recording medium and the mechanical movement of the motors, guides and rollers. Such errors create differences in the length and position of the individual horizontal lines which comprise a complete video frame, preventing the various picture elements from lining up precisely.

Perhaps of more interest to the average video producer is the fact that non-time base corrected VCRs cannot be mixed with other sources in a video production switcher. In order to produce transitions such as dissolves and wipes between two or more video signals without objectionable picture tearing or rolling, the relative timing of each signal must be precisely synchronized. Stable, genlockable video sources such as cameras and graphics systems can easily be timed into a production switcher, but VCRs require a TBC to provide the missing link to accomplish this task.

Time base correction is done electronically by digitizing or sampling the video picture as it comes from the recorder, storing this digital information momentarily and then reconstructing it into an error free analog image. Video is clocked out of the TBC memory according to a stable timing reference provided by an external genlock signal or by an internal TBC sync generator. Once corrected, the video can safely be broadcast, used for editing or combined with other sources in a video production switcher.

The larger the size of the correction window, the greater the ability of the TBC to correct for gross variations such as gyroscopic errors that result from abrupt movements of the tape machine during recording. The digital memory of the DPS Personal TBC III can store more than 525 lines of video and is therefore considered a full frame or infinite window device. A full frame TBC provides other advantages including freeze frame effects and the ability to work with virtually any VCR. Because the DPS Personal TBC III can store an entire frame of video, a one wire connection is possible between the VCR and the TBC. This eliminates the need to feed external sync from the TBC to the VCR and enables the DPS Personal TBC III to work with a wide range of professional, consumer and "prosumer" VCRs.

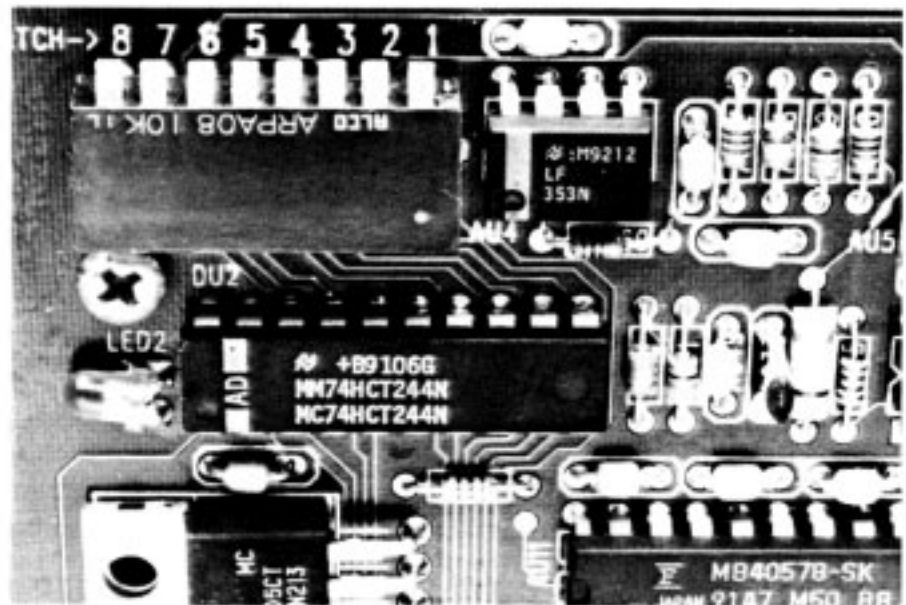
Chapter 2

Configuration

Before installing the Personal TBC III in your computer, it may be necessary to move some of the DIP switches or jumpers on the card to configure the TBC for your particular application.

Figure 2 - 1

DIP
Switches



DIP Switch Settings

The eight-position DIP switch, labeled DSW1 on the TBC card, is used to set the various operating modes of the TBC card described below. The factory default position for each of these switches is the UP position (away from the circuit board). Please read over this section carefully. Such factors as the number of TBC cards in your computer, the baud rate limitations of your serial port and the type of remote control scheme chosen will determine the proper settings for these DIP switches.

Switch 1 - Reserved

Leave this switch in the UP position.

Switch 2 - Serial Baud Rate

This switch selects the baud rate for the serial control interface. It is normally set to the UP position for 31,250 BPS operation (the MIDI standard baud rate). When moved to the DOWN position, a 9600 BPS baud rate is selected.

When using the TBC III control software, the baud rate selected by this switch (usually 31,250 BPS) MUST match the baud rate specified in your software parameters. 31,250 BPS is typically used when the DPS TBC is connected to the built-in serial port of an Amiga computer. 9600 baud is commonly used for IBM PC compatible computers and for most Amiga serial expansion boards. When using the TBC III with the optional RC-2000 desktop remote control, choose the same baud rate as you have selected at the remote control. The factory default baud rate for the RC-2000 is 31,250 BPS.

Switches 3, 4, 5 - TBC Address

When installing multiple TBCs in a system, it is necessary to establish a unique address for each card. This address is used by the software control program to direct commands to individual TBCs. The table below indicates how the switch settings correspond to the TBC buttons on the TBC III software control screen. If you only have one DPS TBC in your system, you can leave these three switches in the UP position.

Switch-3	Switch-4	Switch-5	TBC III Unit ID
UP	UP	UP	1st TBC
DOWN	DOWN	DOWN	2nd TBC
DOWN	DOWN	UP	3rd TBC
DOWN	UP	DOWN	4th TBC
DOWN	UP	UP	5th TBC
UP	DOWN	DOWN	6th TBC
UP	DOWN	UP	7th TBC
UP	UP	DOWN	8th TBC

Normally, the first TBC installed is assigned as TBC-1, the second as TBC-2, etc. See Chapters Six and Seven for more information on TBC III control software.

Switch 6 - Hot Switch Enable

This switch controls the TBC card hot switching feature. It is normally set in the UP position, which causes the card to automatically go into a freeze mode whenever the input video signal is lost. If this switch is moved to the DOWN position, the automatic freeze will be disabled.

Switch 7 - Vertical Blanking Width

This switch sets the number of video lines blanked by the TBC during the vertical blanking interval. This switch is normally set in the UP position, which causes the card to blank the first 21 lines of each field. Video lines 9 through 21 normally contain signals which are not related to the active video image. If these signals are not blanked, they may appear at the top of the picture when certain DVE type effects are used. When Switch 7 is moved to the DOWN position, only the first nine lines of each field will be blanked.

Switch 8 - Remote Enable

This switch is used to enable/disable the serial remote control feature of the card. This switch is normally set in the UP position, which enables full serial control of all TBC card parameters.

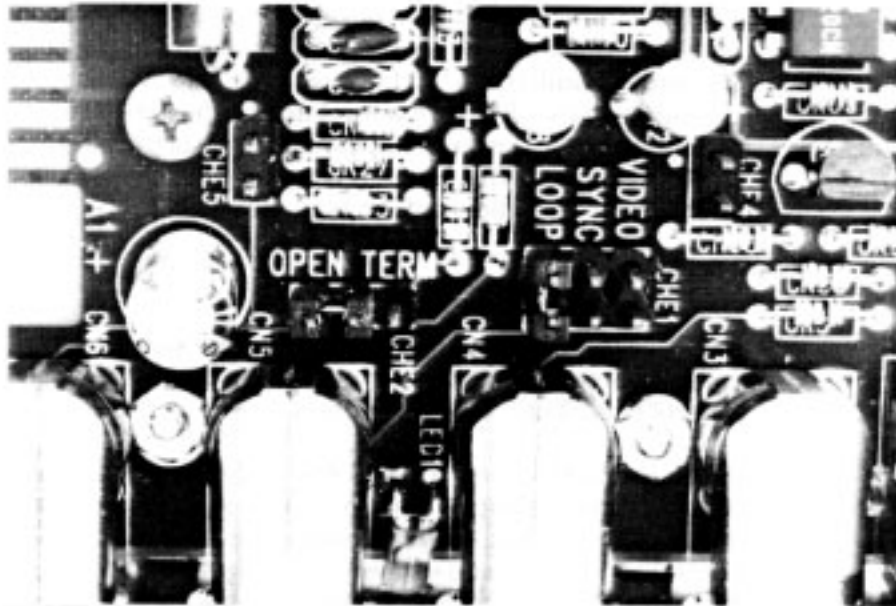
If you DO NOT intend to use DPS TBC III control software or a DPS RC-2000 desktop remote control unit, move this switch to the DOWN position. This will disable the RS-232 interface and force all of the video parameters (normally controlled via software) to a unity setting. When operating the card in this mode, you can still adjust genlock timing by using the rear panel genlock timing switch. When the serial interface is disabled, DIP Switch 3 can be used to select between the NTSC and S-Video inputs (UP = NTSC, DOWN = S-Video).

Jumpers

The DPS Personal TBC III contains a group of jumpers which can be used to modify the characteristics of the multi function I/O and genlock BNC connectors. A jumper is also provided to control the transmit/receive characteristics of the TBC serial data port.

Figure 2 - 2

Jumpers



Multi I/O Jumpers

This three-position jumper field, labeled CHE1 on the TBC card, is used to establish the function of the rear panel multi I/O connector. It is normally installed in the position labeled GENLOCK LOOP, which enables the multi I/O connector to become a "loop-through" output for the genlock video input. This allows the same reference video signal to be routed or "looped" to multiple devices.

If jumper CHE1 is installed at the position labeled VIDEO OUT, the multi I/O connector will become a second video output. This is useful when you need to connect the output of the TBC card to multiple devices.

If jumper CHE1 is installed at the position labeled ADV SYNC, the multi I/O connector will contain an advanced sync output. Advanced sync can only be used with playback VCRs which have an advanced sync input. The use of advanced sync is recommended when using a SMPTE time code based editing system. See Appendix C for more information about using the advanced sync mode of the TBC III.

Genlock Termination Jumper

This two-position jumper, labeled CHE2 on the TBC card, allows the genlock video input to be either high impedance or terminated in 75 ohms. This jumper is normally installed in the OPEN position, which makes the genlock video input high impedance, allowing the signal to be "looped" via the multi I/O connector to multiple destinations.

If the TBC III card is to be the last device on a genlock reference loop, then jumper CHE2 should be set for TERM. Many users prefer to leave this jumper in the factory default OPEN position and provide for the necessary loop termination using an external 75 ohm precision BNC terminator.

If genlock "loop through" is required in a system where the multi I/O jumper has been set for VIDEO OUT or ADV SYNC, then an external BNC "T" connector can be installed on the bottom REF IN BNC connector. When operating in this manner, be sure that jumper CHE2 is set for OPEN.

Serial Data Transmit Jumper

This two-position jumper, labeled DHE4 on the TBC card, controls the TBC card's RS-232 data transmit function. It is normally installed in the MT position, which puts the TBC card into a "listen only" mode. This enables the computer's RS-232 port to be shared by other applications while still allowing full TBC control when using the TBC III software program provided. When DHE4 is installed in the TX position, the TBC card uses the RS-232 transmit data line to send status information when requested according to the protocol outlined in Appendix F. For normal operation, this jumper should remain in the factory default MT position.

Please note that some devices, particularly animation and edit controllers, cannot operate in a "shared" mode and thus cannot be used on the same serial port with a DPS Personal TBC III in either the MT or TX mode. If your system contains such devices, a serial expansion board must be added to your computer to provide a separate port for the TBC. Alternately, a DPS RC-2000 desktop remote control can be used.

Chapter 3

Installation In Amiga Computers

This section describes the procedures for installing the Personal TBC III card in an Amiga[®] A2000/3000/4000 series computer or in a NewTek Video Toaster[®] Workstation. If you intend to install your TBC in an IBM PC compatible computer, please skip ahead to Chapter Four.

Physical Installation

1. Turn off the computer and disconnect the power cord.
2. Refer to the instructions accompanying your computer for information on removing the cover.
3. Locate an empty IBM type expansion slot inside the Amiga computer. If the rear panel slot is covered, remove the screw that holds the slot cover and then remove the metal cover itself.
4. Insert the TBC card into the expansion slot at an angle so that the four BNC connectors exit the slot in the rear panel of the computer. Slide the front of the TBC card into the card guide. Lock the board in place by fastening the retaining bracket with the screw from the slot cover.
5. Install any additional DPS TBC or V-Scope cards in the same manner.

Serial Port Connection

In order to control one or more DPS Personal TBC III cards with software, it is necessary to connect the TBC card to an available serial port. This connection can either be made internally via a header connector located on the Amiga mother board or externally using the supplied RJ-14 to DB-25 cable. Even though the Amiga offers internal and external serial connections, they are both electrically connected to the same port. Whichever method you choose, please make sure that the Amiga serial port is not already connected to a non-sharable device such as an edit or animation controller. If your system contains such hardware, it will be necessary to add a serial port expansion board in order to provide a separate interface for the TBC III.

Connecting The TBC To An Internal Serial Port

1. Locate the 12-inch, 3-conductor data cable that is provided with the TBC III card.
2. Connect one end of this cable to the Amiga internal serial data header. This connector, shown in Figure 3-1, can be found on the Amiga mother board near the rear panel DB-25 serial connector. If your computer contains an accelerator board, it may be necessary to temporarily remove it in order to gain access to the internal Amiga serial header. Verify that the 3-pin connector is aligned with the proper pins of the Amiga serial header and that the small tab is oriented as shown in Figure 3-2.

Figure 3 - 1

Amiga
Serial
Header

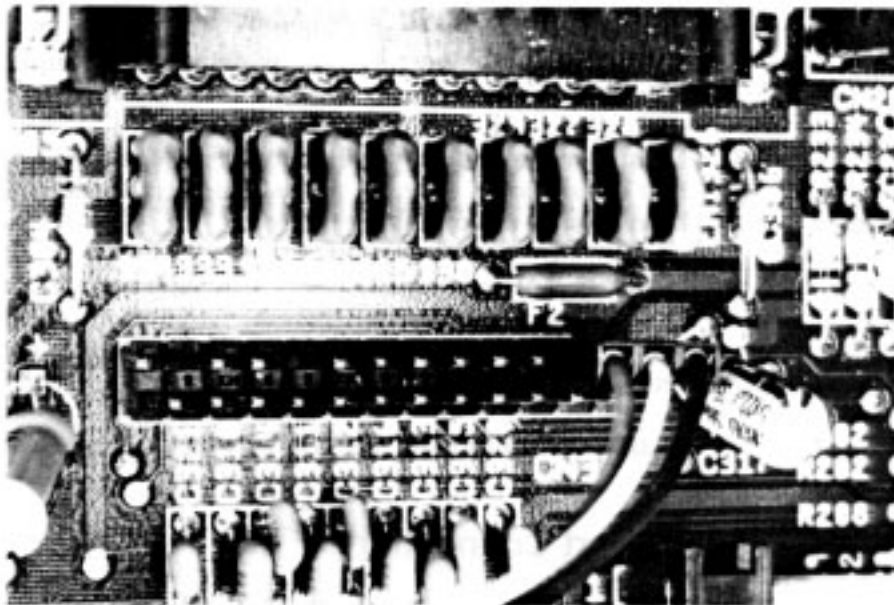


Figure 3 - 2

Amiga
Serial
Header

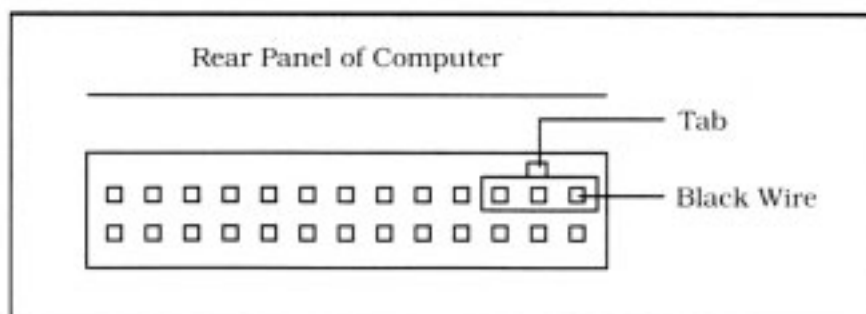
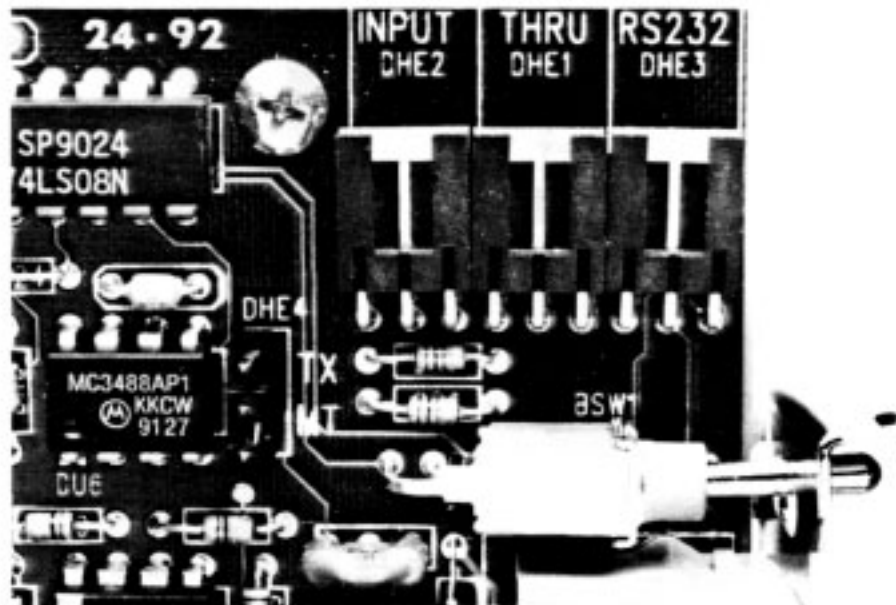


Figure 3 - 3
TBC III
Header



3. Connect the free end of the 12-inch serial data cable to the 3-pin RS-232 header connector labeled DHE3 on the TBC card (see Figure 3-3). Make absolutely certain that the cable is connected to the TBC RS-232 connector (DHE3) and not to the INPUT (DHE2) or THRU (DHE1) connectors.
4. If there are no other DPS TBC or V-Scope cards in the system, replace the computer cover and skip ahead to Chapter Five. Otherwise, follow the instructions in this chapter for installing multiple cards in one computer.

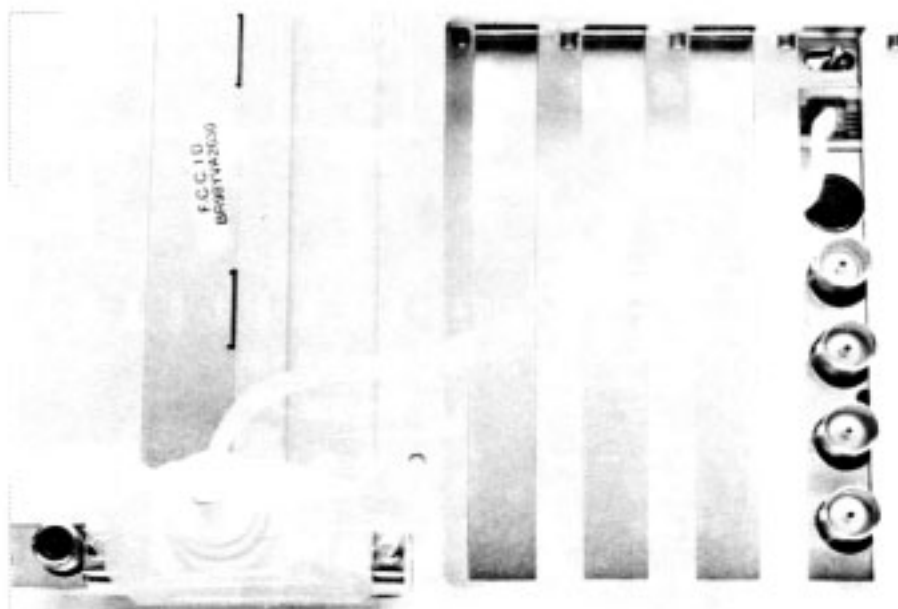
Connecting The TBC To An External Serial Port

In lieu of using the internal mother board header, the DPS Personal TBC III can be connected to the Amiga's external serial port.

1. Locate the RJ-14 to DB-25 adapter cable that is provided with the DPS Personal TBC III.
2. Insert the RJ-14 plug into the mating connector on the edge of the TBC card. It looks like the modular connector found on a telephone handset.
3. Connect the DB-25 connector to the Amiga's rear panel serial port.

Figure 3 - 4

External
Serial
Port
Connection



If the Amiga serial port is already connected to a non-sharable device such as an editing controller, then the cable must be connected to a serial port expansion board instead. If the expansion board uses 9-pin serial connectors, it will be necessary to acquire a DB-25 to DB-9 serial adapter. Such items are readily available from computer and electronics retailers.

4. If there are no other DPS TBC or V-Scope cards in the system, replace the computer cover and skip ahead to Chapter Five. Otherwise, follow the instructions below for installing multiple cards in one computer.

Installing Multiple TBC Cards In The Same Computer

When installing multiple TBCs in the same computer, it is necessary to connect all of them together to enable the TBC III software to communicate with all of the cards.

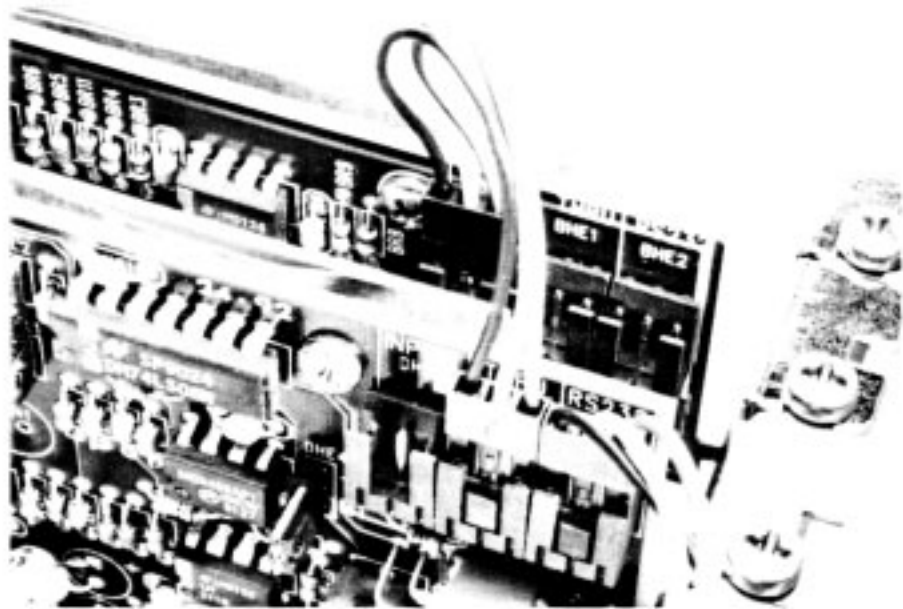
1. Verify that unique addresses have been set for each of the TBC cards. Refer to Chapter Two for information on setting the TBC card DIP switches.
2. Verify that the first TBC is connected to the computer's internal or external RS-232 serial port as previously described.
3. Locate the short (3-inch, 3-wire) data cable provided with the TBC III.

INSTALLATION IN AMIGA COMPUTERS

4. Connect the THRU data output (DHE1) from the first TBC (the card which is already connected to the computer's RS-232 port) to the INPUT data connector (DHE2) on the second TBC card. (refer to Figure 3-5).

Figure 3 - 5

Multiple Card Connections



5. Connect any additional cards in the same manner. The same procedure applies when installing a DPS Personal V-Scope Waveform/Vectorscope card in your system.
6. Replace the computer chassis cover.

Now that the TBC cards have been physically installed in your computer and connected to an available serial port, it is time to connect your external video equipment to the card. Please skip ahead to Chapter Five.

Chapter 4

Installation In IBM Compatibles

This section describes the procedure for installing the DPS Personal TBC III in an IBM compatible (ISA bus) computer. If you are using an Amiga computer, please refer to the instructions in Chapter Three instead.

Physical Installation

1. Turn off the computer and disconnect the power cord.
2. Refer to the instructions accompanying your computer for information on removing the cover.
3. Locate an empty 8 or 16-bit expansion slot inside the computer. If the rear panel slot is covered, remove the screw that holds the slot cover and then remove the metal cover itself.
4. Insert the TBC card into the expansion slot at an angle so that the four BNC connectors exit the slot in the rear panel of the computer. Slide the front of the TBC card into the card guide. Lock the board in place by fastening the retaining bracket with the screw from the slot cover.
5. Install any additional DPS TBC or V-Scope cards in the same manner.

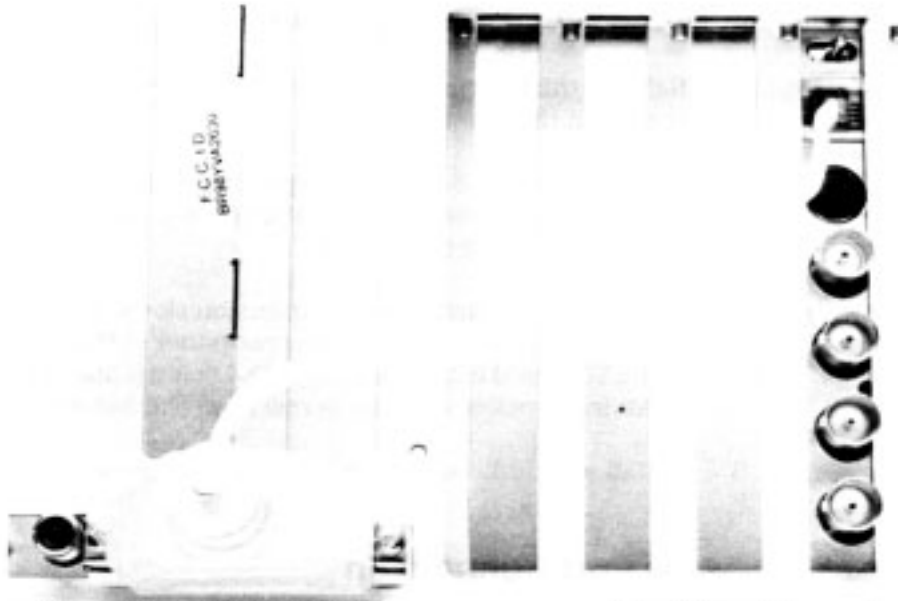
Serial Port Connection

In order to control one or more DPS Personal TBC III cards with software, it is necessary to connect the TBC card to an available serial port. If you will also be controlling other serial devices while running DPS Personal TBC III software, you should make sure that the serial port assigned to the TBC card does not utilize the same hardware interrupt as the other serial port(s) that you intend to use concurrently.

Connecting The TBC To An External Serial Port

1. Locate the RJ-14 to DB-25 adapter cable that is provided with the DPS Personal TBC III.
2. Insert the RJ-14 plug into the mating connector on the edge of the TBC card.
3. Connect the DB-25 connector to the computer's rear panel serial port. (refer to Figure 4-1).

Figure 4 - 1
External
Serial
Port
Connections



Your actual serial port may be terminated in a 9-pin connector instead of the 25-pin connector shown. If so, it will be necessary to acquire a DB-25 to DB-9 serial adapter. Such items are readily available from computer and electronics retailers.

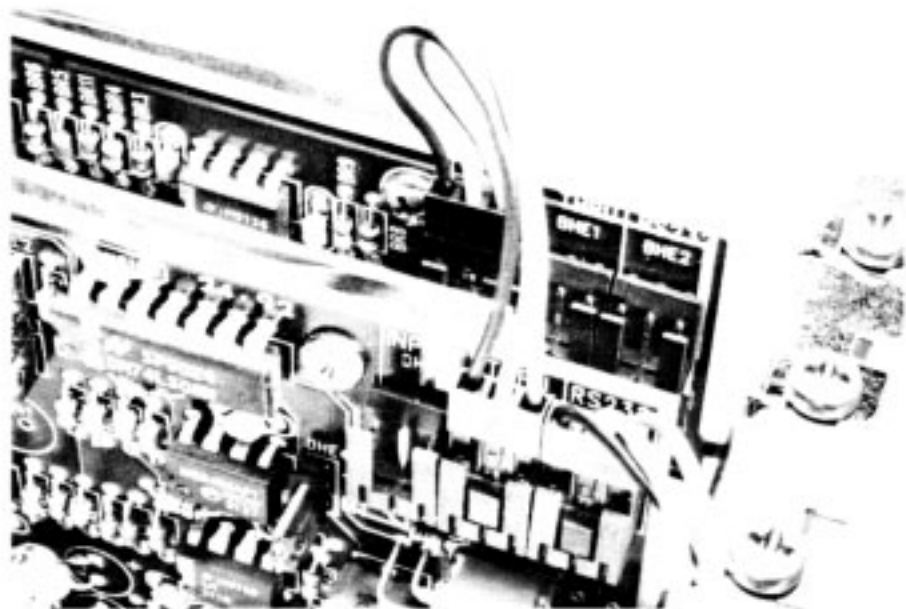
4. If there are no other DPS TBC or V-Scope cards in the system, replace the computer cover and skip ahead to Chapter Five. Otherwise, follow the instructions below for installing multiple cards in one computer.

Installing Multiple TBC Cards In The Same Computer

When installing multiple TBCs in the same computer, it is necessary to connect all of them together to enable the TBC III software to communicate with all of the cards.

1. Verify that unique addresses have been set for each of the TBC cards. Refer to Chapter Two for information on setting the TBC card DIP switches.
2. Verify that the first TBC is connected to an available RS-232 serial port as previously described.
3. Locate the short (3-inch, 3-wire) data cable provided with the TBC III.
4. Connect the THRU data output (DHE1) from the first TBC (the card which is already connected to the computer's RS-232 port) to the INPUT data connector (DHE2) on the second TBC card. (refer to Figure 4-2).

Figure 4 - 2
Multiple
Card
Connections



5. Connect any additional cards in the same manner. The same procedure applies when installing a DPS Personal V-Scope Waveform/Vectorscope card in your system.
6. Replace the computer chassis cover.

Now that the TBC cards have been physically installed in your computer and connected to an available serial port, it is time to connect your external video equipment to the card as described in the next chapter.

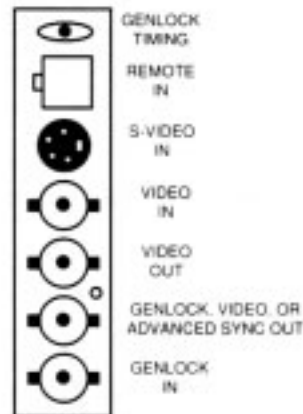
Chapter 5

Video Connections

This section describes how to interface the Personal TBC III card with other video equipment in your system. Figure 5-1 shows the location and function of the Personal TBC card I/O connectors and switches.

Figure 5 - 1

TBC III I/O External Connectors



Serial Data Input (RJ-14)

This jack is used to connect the Personal TBC III card to an available computer RS-232 serial port using the supplied RJ-14 to DB-25 cable. If the TBC III card is connected to the internal serial header of an Amiga computer (as described in Chapter Three), then this RJ-14 connector is not used. To use the DPS TBC III control software, one TBC in each system must be connected to the computer's RS-232 port and the other TBC or V-Scope cards (if any) must be daisy-chained off the first card.

S-Video Input

This 4-pin connector is used to input S-Video (S-VHS or Hi8) to the TBC card. It is normally connected to the S-Video output of a playback VCR using a standard 4-pin to 4-pin S-Video cable. Some JVC industrial type S-VHS players use a 7-pin connector for their S-Video output. To interface with such machines, a 7-pin to 4-pin adapter cable is required.

NTSC Video Input

This BNC connector is used to feed composite NTSC video to the TBC card. It is normally connected to the video output of a playback VCR. It can also be connected to any composite NTSC source such as a TV tuner, laser disc player, camera, etc.

NTSC Video Output

This BNC connector provides a timebase corrected version of the video input signal.

Genlock OK LED

This LED will light when a valid genlock video signal is connected to the TBC genlock video input.

Multi Input/Output (I/O) Connector

The function of this connector is determined by the TBC card jumper block CHE1 as detailed in Chapter Two. Normally the multi I/O connector provides a "loop-through" for the genlock video signal. This allows the same genlock signal to be "looped" to a number of devices.

The multi-function I/O connector may also be used as an advanced sync output by moving CHE1 to the ADV SYNC position. The advanced sync signal can then be fed to the EXT SYNC input of a suitably equipped playback VCR. For more information on using the advanced sync, please refer to Appendix C.

The thru mode for the multi I/O connector is obtained by moving jumper CHE1 to the VIDEO OUT position. In this case, the multi I/O connector will provide a second time base corrected video signal.

Genlock Video Input

The genlock video input is used by the TBC card to establish the timing for its video output signal. The signal connected to this input must always be STABLE, such as the output from a black burst or color bar generator. DO NOT attempt to use a non-time base corrected VCR for your genlock reference. When a valid signal is connected to this input, the video output of the TBC card will be co-timed (genlocked) to this signal and the rear panel genlock OK LED will light. When no external reference is supplied to the genlock input, the TBC III will operate using its internal sync generator.

Genlock Timing Adjustment

The rear panel genlock timing adjustment is **ONLY** used when the TBC III control software is **NOT** used. Do not adjust this switch if you are operating the TBC III via software or an RC-2000 remote control.

The genlock timing adjustment is a three-position momentary switch which allows the timing of the TBC card output video signal to be shifted (either advanced or retarded) with respect to the genlock reference video signal. Adjustment of this control is explained in Chapter Eight. Any timing adjustments made with this switch are stored in non-volatile memory on the TBC card and are retained when the computer power is turned off.

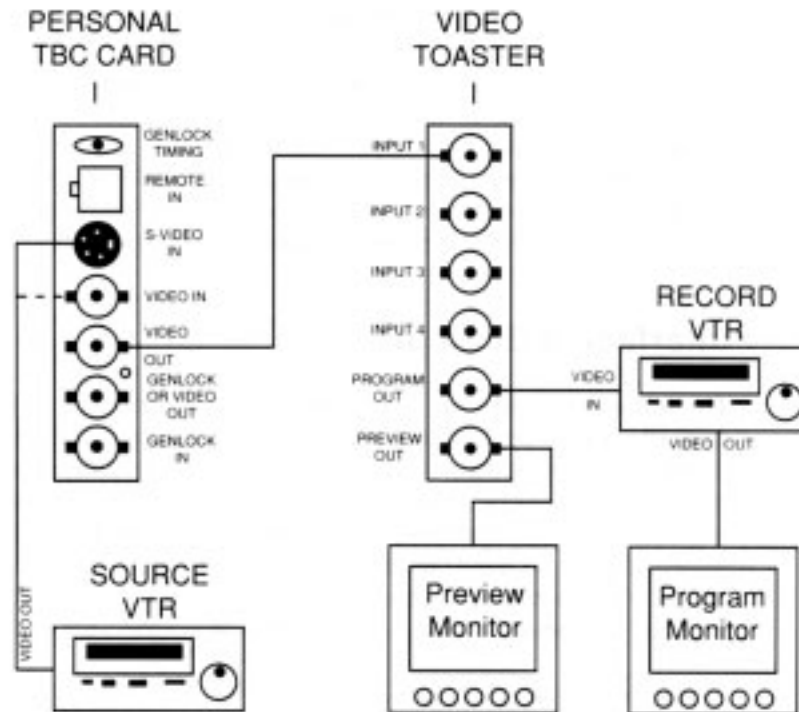
Interfacing Examples

The following examples illustrate the correct method of interfacing the Personal TBC III card to several different types of video sources. In each case, the output of the TBC card is shown connected to a NewTek Video Toaster. The Video Toaster is typical of most professional video switcher/effects units in that all of its video inputs **MUST** be time base corrected and co-timed (genlocked). It is important to note that the Video Toaster derives all of its internal timing from number one input. In each example, the connections are made so that all of the Toaster inputs will be "genlocked" to whatever signal is connected to this input.

Please note that in each of the diagrams, the dotted line between the NTSC and the S-Video inputs of the TBC III card indicates that the VCR can be connected to **EITHER** of these inputs. If your VCR or camcorder provides an S-Video output, you should always use the TBC's 4-pin S-Video input instead of the BNC composite input.

Single VCR System Example

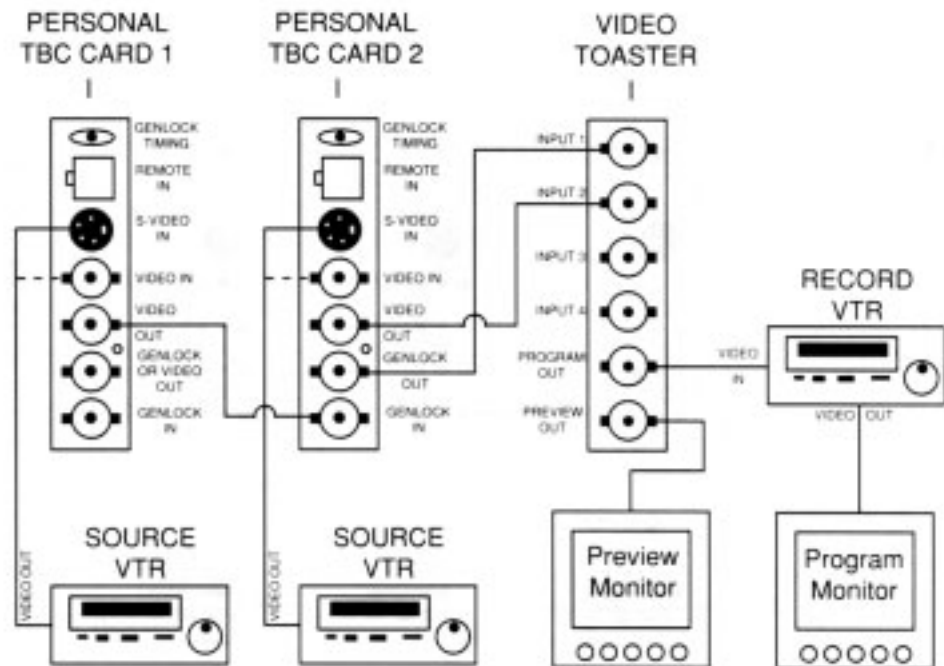
Figure 5 - 2
Single
VCR/TBC
Example



In Figure 5-2, a single VCR is connected to the Video Toaster using the Personal TBC III card. Since there is only one input to the Toaster (Input-1), there is no need to adjust the genlock timing on the TBC. Video Input-1 on the Toaster is always the master timing reference. Since only a single video source (the VCR) is being utilized, there is no need to feed a signal to the TBC genlock input. In this example, the TBC can operate in a "free running" mode.

Two VCR System Example

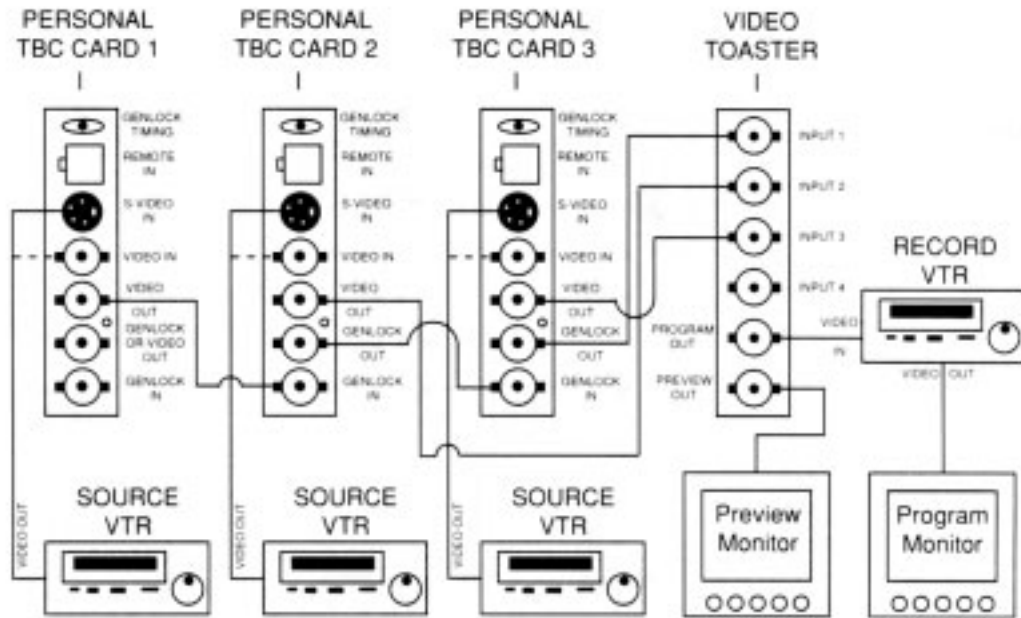
Figure 5 - 3
Two
VCR/TBC
Example



In Figure 5-3, two VCRs are connected to the Video Toaster using two TBC cards. VCR-1 is connected to TBC-1 which is operated in the "free running" mode. VCR-2 is connected to TBC-2 which is genlocked to the video output of TBC-1. (The multi I/O connector must be configured for genlock video "loop through" on TBC-2.) In this example, it will be necessary to adjust the genlock timing control on TBC-2 so that the two signals entering the Video Toaster are exactly co-timed. Please refer to Chapters Six and Seven for details on how to use the TBC III control software to perform this adjustment. If you are NOT using TBC III control software or an RC-2000 remote control, refer to Chapter Eight for details on using the rear panel genlock timing adjustment switch.

Three VCR System Example

Figure 5 - 4
Three
VCR/TBC
Example

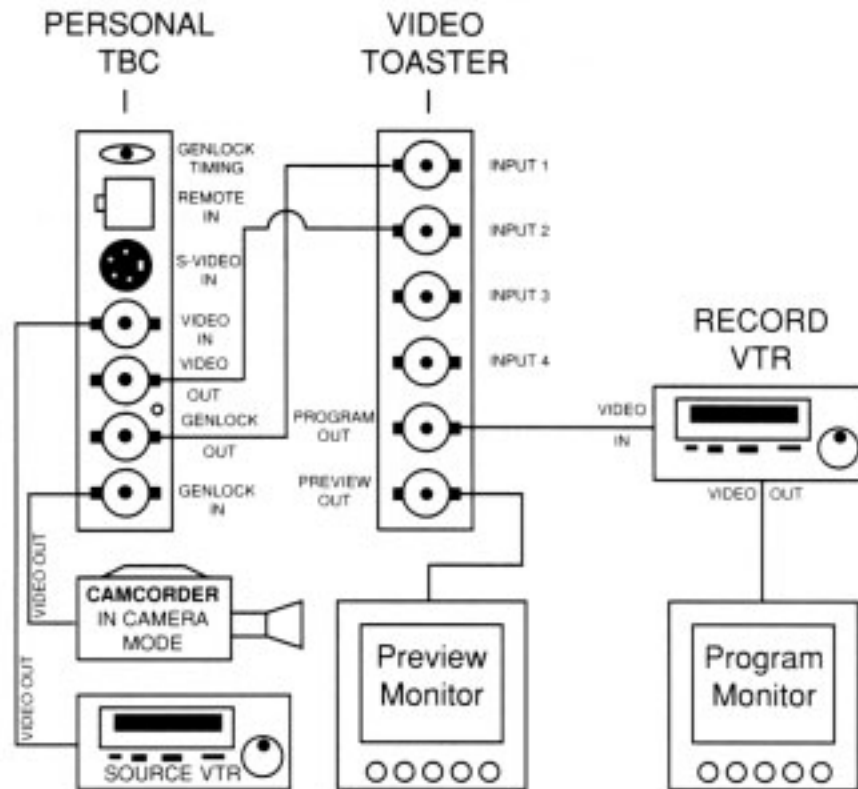


In Figure 5-4, three VCRs are connected to the Video Toaster using three TBC cards. As in the previous examples, TBC-1 (which processes the signal from VCR-1) is the master timing reference (i.e. connected to the Toaster Input-1) and is operated in the free running mode. TBC-2 and TBC-3 obtain their genlock input references from the TBC-1 video output (using the multi I/O connector as a "loop through").

In this example, it will be necessary to adjust the genlock timing controls on both TBC-2 and TBC-3. See Chapters Six and Seven for details on how to use TBC III control software to perform this adjustment. If you are NOT using TBC III control software or an RC-2000 remote control unit, refer to Chapter Eight for details on using the rear panel genlock timing adjustment switch.

One Camera And One TBC Example

Figure 5 - 5
One
Camera
One
TBC
Example



In Figure 5-5, a color camera is being used as the master genlock reference. The camera's output is "looped through" the genlock input of the TBC before it is connected to the Video Toaster Input-1. Since both the Video Toaster and the TBC are referenced to the camera, the camera must always be present and operational for this system to work. Some amount of re-cabling would be required if you were to operate this system without the camera.

In this example, it is necessary to adjust the genlock timing controls on the TBC. Please refer to Chapters Six and Seven for information on using TBC III control software to perform this adjustment. If you are NOT using TBC III control software or an RC-2000 remote control unit, refer to Chapter Eight for details on using the rear panel genlock timing adjustment switch.

Using Devices Other Than VCRs

The DPS Personal TBC III can be used with any composite NTSC or S-Video device including cameras, camcorders and laser disc players. To use any of these items in your system, merely substitute the particular device for one of the VCRs shown in the preceding examples.

You can connect both composite and S-Video devices to the same TBC, but only one input can be used at the same time. For example, you could connect a VCR to the TBC III S-Video input and a camera to the composite input. You could then use the COMPOSITE/S-VIDEO input gadget in the TBC III software to switch between the two different sources.

Chapter 6

Amiga Control Software

TBC III control software provides for the operation of up to four Personal TBC III, TBC II or DPS-230 time base correctors as well as a DPS Personal V-Scope. The software can be run as a stand alone program or operated in conjunction with a NewTek Video Toaster. Provisions have been made in the software to instantly switch between the DPS control screen and the Video Toaster Switcher screen.

Serial Port Requirements

In order to use the TBC III software to control one or more TBCs, you must connect one of them directly to an Amiga serial port. This procedure is detailed in Chapter Three. In many cases, the TBC III can share the serial port with another application as long as both applications are not running at the same time. If the serial port on your Amiga mother board is not available, you may have to add an expansion serial card to run the TBC III software. Please refer to Appendix D for details.

TBC III Software Installation

The procedures for installing and running the TBC III Amiga software vary depending on whether or not your system includes a NewTek Video Toaster and whether or not the Toaster program automatically boots upon powerup. Please follow the installation procedures below which apply to your particular system.

Installing TBC III Software From Amiga Workbench

This installation procedure pertains to Amiga computers without Video Toasters and Amiga computers with Toasters which launch the Toaster program from the Amiga Workbench. If your computer contains a Video Toaster which autoboots at powerup, you should skip ahead to the section entitled "Installing TBC III Software In Autoboot Toaster Systems." Otherwise, perform the following steps to install Personal TBC III Amiga software on your hard drive:

1. Turn on your computer and go to the Amiga Workbench screen.
2. Insert the supplied Personal TBC III diskette in an internal Amiga floppy disk drive (typically df0:).

3. When the DPS disk icon appears on the Workbench, double click on it to open it.
4. Double click on the INSTALL icon and follow the instructions provided. If your system contains a Video Toaster, the DPS installation program will automatically place the TBC III program icon in the same drawer as your Video Toaster. Otherwise, the DPS software will be installed in a new drawer labeled "DPS."

Installing TBC III Software In Autoboot Toaster Systems

If your Video Toaster system automatically loads the Video Toaster Switcher screen at powerup, you should perform the following steps to install and run the DPS TBC III software. These procedures are necessary because autoboot Toaster systems do not normally provide direct access to the Amiga Workbench screen.

1. Turn on your computer and let the Toaster Switcher program load normally.
2. Quit the Toaster Switcher program by clicking on PREFERENCES (the "?" disk icon) located above Input-1 on the "Overlay" bus. From the preferences screen, click on the EXIT icon and then click YES to quit. You should now be at the Amiga Workbench screen.
3. Insert the supplied DPS Personal TBC III diskette in an internal Amiga floppy disk drive (typically df0:).
4. When the DPS disk icon appears on the Workbench, double click on it to open it.
5. Double click on the INSTALL icon and follow the instructions provided. Be sure to answer YES when asked if you wish to modify the Toaster auto startup sequence to include the DPS TBC III program. If you don't, you will be required to load, quit and reload the Video Toaster program every time you run TBC III software. By permitting the DPS installation program to modify the Toaster startup sequence, the TBC III program will automatically be loaded into the background each time you boot your computer.
6. When the installation program is complete, reboot your computer. The DPS TBC III control software and the Video Toaster program will load automatically. After both programs have finished loading, the Video Toaster Switcher screen should display a "DPS" button, located near the Toaster 3D application button. Whenever you click on the "DPS" button, the TBC III program screen will appear. You can toggle back and forth between the TBC III program screen and the Video Toaster Switcher screen by alternately pressing the "DPS" and "Switcher" buttons.

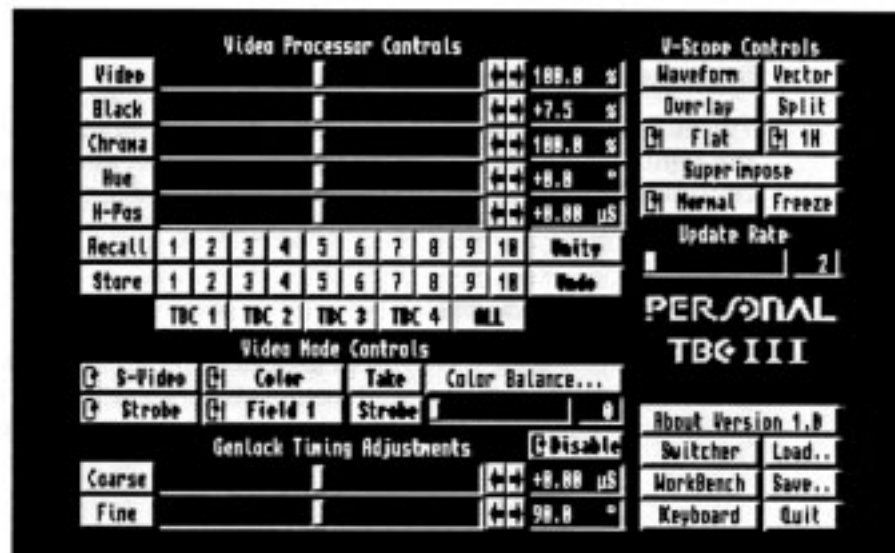
Running TBC III Software

To run the TBC III program by itself, simply double click on the TBC III program icon from the Amiga Workbench screen. To access the TBC III software with an autobooting Toaster system, merely click on the "DPS" gadget located near the 3D application button on the Toaster Switcher screen. To run the TBC program with a non-autobooting Video Toaster system, follow the steps listed below:

1. Locate the drawer containing the Video Toaster program. Start your Toaster by double clicking on the VIDEO TOASTER program icon. When the Video Toaster finishes initializing, you should see the normal Video Toaster switcher screen.
2. Press the following keys on your Amiga keyboard in sequence: <Ctrl> <Ctrl> <Alt> <Alt>. You must press the <Ctrl> key twice and then press the <Alt> key twice. Remember this sequence as it can be used at any time to toggle between the Video Toaster switcher screen and the Amiga Workbench screen.
3. When the Amiga Workbench screen appears, load the TBC III software by double clicking on the TBC III program icon. After the program loads, you will see the TBC III main control screen.

Figure 6 - 1

TBC III
Amiga
Control
Screen



4. To return to the Video Toaster switcher screen, click on the SWITCHER gadget located on the TBC III screen. When the Video Toaster screen reappears, it will contain a small gadget labeled "DPS" located near the Toaster 3D application button. When you click on the "DPS" button, the TBC III program screen will reappear.
5. You can toggle back and forth between the TBC III program screen and the Video Toaster Switcher screens by alternately pressing the "DPS" and SWITCHER buttons.
6. If you ever need to free up the memory used by the TBC control software, you can quit the TBC III program without quitting the Toaster program itself.

Controls And Indicators

Before we examine the individual functions of the DPS software controls, let's take a look at the screen itself and the types of adjustment gadgets provided. These items are shown in Figure 6 - 1.

Control Sliders

The control sliders are used to change proc amp and genlock settings. Sliders are normally moved by dragging them with the mouse. They may also be moved by clicking in front of or behind them.

Increment/Decrement Gadgets

The increment/decrement gadgets are the left and right pointing arrows located to the right of each of the control sliders. They can also be used to move any of the control sliders. If one of these gadgets is held down, the associated slider will move continuously in the direction of the arrow.

Direct Entry Gadgets

The direct entry gadgets normally provide a numerical readout of the current slider position for each of the associated controls. If you click the mouse inside any of the direct entry string gadgets, you can use the keyboard to enter a new value for that control.

TBC III Video Proc Amp Controls

Figure 6-2 shows the area of the TBC III control screen which contains the video proc amp controls and TBC select gadgets. This area is the most often used since it allows you to manipulate the various video signal levels to obtain optimum picture quality. Each of the proc amp sliders contain numerical readouts which indicate the relative position of the controls.

Figure 6 - 2

Proc Amp
Controls

Video Processor Controls				
Video		←	100.0	%
Black		←	+7.5	%
Chroma		←	100.0	%
Hue		←	+0.0	°
H-Pes		←	+0.00	μS

The only way to precisely measure video levels is with a device called a waveform monitor. Another piece of test equipment called a vectorscope can be used to measure the color portion (chrominance phase and amplitude) of the video image. Both of these precision devices have been combined into one affordable plug-in PC card manufactured by DPS called the Personal V-Scope.

The use of a DPS Personal V-Scope (or a traditional waveform monitor/vectorscope combination) will ensure that the TBC proc amp controls are always set correctly. Lacking such equipment, it is critical that your color program monitor is properly adjusted (using SMPTE color bars and a blue filter). Once your monitor is correct, make sure that its setup controls (particularly the hue control) are never disturbed.

Video Level Control

This control is used to change the overall amplitude of the video signal which produces a change in the contrast of the displayed picture. If you are using the DPS Personal V-Scope, the VIDEO LEVEL control should be used to adjust the peak video amplitude to 100 IRE. Overdriving the video level beyond 100 IRE units will cause distortions while low video levels will increase the noise in the picture. Chroma levels can legitimately exceed 100 IRE units, however, so the use of the "Low Pass Filter" mode on the DPS Personal V-Scope is recommended to ensure that you are viewing only the luminance portion of the video signal.

Black Level Control

This control is used to change the DC (or pedestal) level of the active video signal which produces a change in the brightness of the displayed picture. If you are using a DPS Personal V-Scope, this control should be used to adjust the black level of the video signal to 7.5 IRE. Setting the BLACK LEVEL below 7.5 IRE units will "squash" the dark portions of the video image, causing a loss of black detail. If you set the BLACK LEVEL too high, the black areas of the picture will appear to be gray.

Chroma Level Control

This control is used to change the chrominance amplitude (saturation) of the video signal which produces a change in the amount of color in the displayed picture. If you are using the DPS Personal V-Scope, the CHROMA LEVEL control (in combination with the HUE control) should be used to position the amplitude of the SMPTE color bar vectors in the appropriate vectorscope graticule targets.

Hue Control

This control is used to alter chrominance phase which produces a change in the hue (tint) of the displayed picture. If you are using the DPS Personal V-Scope, the HUE control (in combination with the CHROMA LEVEL control) should be used to position the color bar vectors in the vector scope graticule targets.

Horizontal Position Control

This control allows you to change the horizontal position of the video signal with respect to horizontal sync. It should not be confused with the genlock timing adjustment controls. The HORIZONTAL POSITION control moves the active video portion of the signal only, leaving all genlock timing unaffected. It can be used in certain production situations where the exact position of a video signal is important. If your picture is significantly off center, you probably have a system timing problem. If so, please refer to Chapter Nine for detailed genlock adjustment procedures.

Proc Amp Store Buttons

The STORE buttons, labeled 1-10, are used to save the following proc amp settings: video level, black level, chroma level, hue, horizontal position and red and blue color balance. After setting these controls for a particular tape or scene, you can memorize their values (for later recall) by clicking on one of the ten STORE buttons. A small "tick" mark will appear just before the number on the STORE button to indicate that the location holds a set of non-unity proc amp settings.

To erase settings from a location, click on the unity gadget and then click on the STORE button for the location you want to clear. The "tick" mark will disappear and all non-unity proc amp values will be erased.

Proc amp values for the ten STORE buttons will be saved in the "S:TBC.Defaults" file if you answer "Yes" to the "Update" file prompt when the TBC III program is exited. Memory settings can also be written to disk using a filename of your choice. This procedure, which provides virtually unlimited scene capacity, is explained later in this chapter under the headings "Save" and "Load."

Proc Amp Recall Buttons

The RECALL buttons labeled 1-10 are used to recall proc amp settings previously saved using one of the STORE buttons. When one of the RECALL buttons is selected, the video level, black level, chroma level, hue, horizontal position and red and blue color balance are all instantly updated to reflect the setting stored by the selected RECALL button.

TBC Select Buttons

The TBC SELECT buttons are used to select which TBC you are controlling. The TBC III software can control up to four TBCs at once. Each TBC card has a unique address which is determined by DIP switch settings (see Chapter Two). When the ALL gadget is selected, any adjustments will be sent to all installed TBC cards. It is possible to rename these four buttons from the Amiga Workbench by editing the software "tool type" data. This procedure is described in detail at the end of this chapter.

The Undo Button

When the UNDO button is selected, the most recent change made to each proc amp setting will be cancelled and the settings will revert to those present before the last change. The UNDO button also affects the genlock COURSE and FINE Phase controls.

The Unity Button

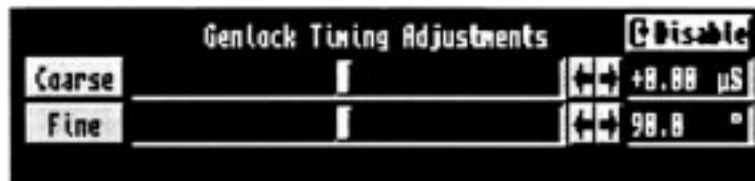
When the UNITY button is selected, all of the proc amp settings will be returned to their unity (factory preset) positions. The controls affected are video level, black level, chroma level, hue phase, horizontal position and red and blue color balance. The UNITY button DOES NOT affect the genlock timing settings.

Genlock Timing Controls

Figure 6-3 shows the genlock timing control area of the TBC III software screen. The genlock timing controls are used to position the TBC output with respect to its reference video input. This allows the outputs of multiple TBCs to be positioned exactly in time. Chapter Nine of this manual provides detailed instructions for correctly adjusting these genlock controls.

Figure 6 - 3

Genlock
Timing
Controls



Genlock Coarse Control

The GENLOCK COARSE control is used to change the genlock timing in large steps. When this control is adjusted, the output video moves in steps of 270 nsec, which is equal to one cycle of the color subcarrier frequency. Because of this, the GENLOCK COARSE control will move the displayed video horizontally but will not change the hue (chroma phase) of the picture.

Genlock Fine Control

The GENLOCK FINE control is used to change the genlock timing in small steps. Each increment of this control changes the output video timing by 0.55 nsec. When using this control, if you get to the end of its range and then continue to move the slider, the COURSE PHASE control will automatically be incremented or decremented and the FINE slider will jump to the opposite end of its range. For example, if you move the GENLOCK FINE slider all the way to the right, the GENLOCK COURSE slider will increment by one-half step and the GENLOCK FINE slider will jump to the extreme left hand position.

Enable/Disable Button

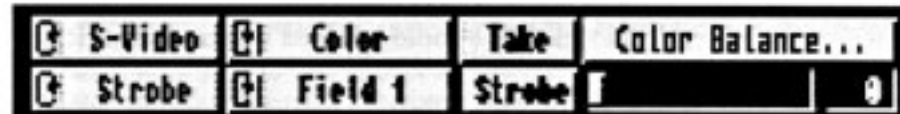
The genlock timing ENABLE/DISABLE cycle gadget is used to enable or disable the genlock control sliders. The default setting for this gadget is disabled, because genlock timing controls are normally used only when a system is being initially set-up. Leaving the ENABLE/DISABLE button in the disabled mode will prevent accidental changes to the genlock timing controls.

Video Mode Controls

Figure 6-4 shows the video mode control area of the TBC III software screen.

Figure 6 - 4

Video
Mode
Controls



Composite Video/S-Video Select

This control is used to select the appropriate video input for each TBC. The COMPOSITE mode causes the TBC to process the video input signal connected to the composite video (NTSC) input. The S-VIDEO mode causes the TBC to process the video input signal connected to the 4-pin S-Video input connector. If you are using the TBC with a playback VCR that has an S-Video output (S-VHS or Hi8 type machines), better picture quality will be obtained when using the S-Video input.

Mono Mode Select

This control is used to place the TBC III into "Forced Monochrome" mode. In Mono mode, all chroma picture detail is suppressed, creating a black and white image. This monochrome video can be combined with color sources in a production switcher since the color "burst" information is still present. The forced monochrome effect is useful for bringing the popular "retro '60s" look to your productions. For an "old time Super-8 movie" look, try combining the TBC III's mono and strobe modes (use a low strobe rate) with the Video Toaster's "Scratched Film" effect.

Freeze/Live Take Toggle

This control toggles the TBC between Freeze and modes. The type of freeze is determined by the Field/Frame/Strobe mode control.

Field/Frame/Strobe Mode Selector

This control is used to select the DPS Personal TBC III's various freeze modes. The different freeze modes are described below:

- FIELD FREEZE should be used whenever moving video is to be frozen.
- FRAME FREEZE produces a frozen image consisting of two video fields. If the picture contains any motion, a Frame Freeze will produce objectionable jitter due to the different information contained in each frame.
- STROBE produces a variable freeze and release effect that can be varied with the "Strobe Rate" slider. As a production tool, strobe can produce effects ranging from "Old Time Movie Flicker" all the way up to "Pseudo Time Lapse Photography."

If your system contains a mixture of DPS TBC II and TBC III time base correctors, only the TBC III will be able to process Freeze Field, Strobe and Forced Mono commands.

The TBC III will not actually invoke a selected freeze mode until the FREEZE/LIVE gadget is depressed. Once an image has been frozen, you can toggle between the Freeze Field and Freeze Frame modes by clicking on the FIELD/FRAME/STROBE button. Strobe mode can only be selected when the TBC is in "live" mode.

Field Select Gadget

The FIELD SELECT button enables the selection of a particular field from a frozen video frame. An NTSC frame contains only two fields but the DPS TBC III can display three due to its extra field of buffer memory. When a moving image is frozen, the FIELD SELECT gadget can be used to pick the most stable of three possible still fields.

Strobe Rate Slider

The STROBE RATE slider determines how often the continuous freeze and release action of the Strobe mode takes place. The strobe action will not commence until the FREEZE/LIVE TAKE gadget is depressed.

The STROBE RATE slider can be positioned anywhere in its window by dragging the slider indicator. You can also move the slider one number at a time by clicking just to the right of the slider position indicator. A strobe rate between one and three will produce an effect that resembles motion picture film. This flicker effect is often used to add a dash of "hard news reality" to otherwise tranquil video images. The best way to get acquainted with the TBC III Strobe mode is to experiment with the many slider settings.

Freeze Hot Keys

Freeze and Strobe mode can also be activated from the Amiga keyboard using hot keys. These hot keys enable you to instantly select TBC freeze or strobe mode while operating the Video Toaster. DPS TBC III hot keys cannot be used when the TBC III program screen is in the foreground.

Freeze and Strobe Hot Keys can only be used when the Video Toaster Switcher screen is active.

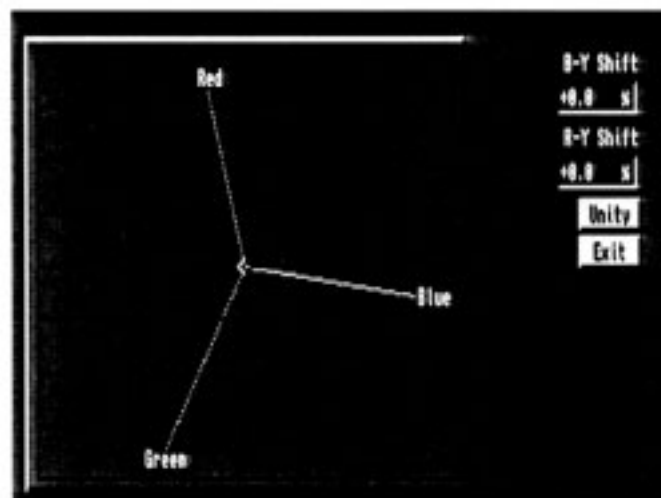
- The FREEZE hot key is the "Amiga" key located to the right of the space bar. Pressing this key will toggle the selected TBC between live video and a freeze frame or a freeze field, depending on which freeze mode was selected on the TBC III program screen. Pressing the "Amiga" hot key a second time will restore live video.
- The STROBE mode hot key is the <Alt> key located to the right of the space bar. Pressing this key will activate strobe mode on the selected TBC. If the TBC is already locked in freeze mode, you will have to press this hot key twice. Strobe rate is determined by the slider value on the TBC III program screen. Pressing the <Alt> hot key while in strobe mode will restore live video.

Color Balance Screen

When this control is selected, the TBC III color balance screen shown in Figure 6-5 will be displayed.

Figure 6 - 5

Color
Balance
Screen



The color balance screen is used to perform color balance correction to the processed video signal. The horizontal axis of the color balance window represents the B-Y component of the video signal. The vertical axis of the color balance window represents the R-Y component. The red, green and blue color vectors provide a guide for using the color balance window.

The color balance feature is used mainly to correct for videotape footage shot with an incorrectly white balanced camera. If the white areas of a particular tape or scene do not appear white, you can use the color balance control to correct them. The control may also be used to add a "color wash" to a given scene.

To change the color balance, place the mouse pointer in the center of the X/Y graticule and then drag the pointer while holding down the left mouse button. As you move the mouse pointer toward one of the vectors, the amount of the color indicated will increase. The converse is also true. For example, to correct the white area of a particular scene that was shot with a blue "tint," move the pointer away from the blue color vector.

The use of a DPS Personal V-Scope or a traditional vectorscope can assist you when setting the color balance control. A properly white balanced video signal will be concentrated around the center of the vectorscope display.

Two buttons, labeled UNITY and EXIT, can also be found on the color balance screen. Pressing the UNITY button will reset the red and blue video levels to their factory preset positions. Pressing the EXIT button will return you to the main TBC control screen.

V-Scope Control Panel

Figure 6-6 shows the V-Scope control area of the TBC III software screen. For these controls to have any effect, you must have a DPS Personal V-Scope card installed in your system. The V-Scope allows you to superimpose waveform monitor and vectorscope displays on a standard video monitor. For more information on the V-Scope, please contact your authorized DPS Personal Series dealer.

Figure 6 - 6

V-Scope Controls



Waveform Mode Select Gadget

When this gadget is selected, the V-Scope is placed in full screen Waveform display mode.

Vector Mode Select Gadget

When this gadget is selected, the V-Scope is placed in full screen Vectorscope mode.

Waveform + Vector Overlay Gadget

When this gadget is selected, the V-Scope is placed in full screen Waveform + Vectorscope overlay mode. This produces a simultaneous full screen waveform and vectorscope display.

Waveform + Vector Split Screen Gadget

When this gadget is selected, the V-Scope is placed in Waveform + Vectorscope split screen mode. This produces a display in which the top half of the screen shows live video and the bottom half of the screen consists of side by side quarter sized waveform monitor and vectorscope displays.

Flat/Low Pass Cycle Gadget

This gadget cycles the V-Scope waveform monitor between flat and low pass frequency response modes. The low pass mode is normally used when setting white or black levels while viewing the V-Scope waveform monitor display. Low pass mode filters out chrominance information and high frequency noise to allow for more accurate video level settings.

1H/2H Waveform Cycle Gadget

This gadget cycles the V-Scope waveform monitor between 1H (single video line) and 2H (dual video line) display modes. The 2H mode is not supported when the V-Scope is in split screen mode. The 1H mode is normally used, since it provides the best display resolution. The 2H mode is used when it is desirable to view the horizontal blanking interval of the video signal.

Superimpose Enable Gadget

When this gadget is selected, the superimpose output from the V-Scope card will contain the synthesized waveform/vector display as determined by the other gadgets. When this gadget is deselected, the superimpose output contains only a copy of the V-Scope video input signal.

Trace Mode Cycle Gadget

The TRACE MODE cycle gadget determines the trace mode for the V-Scope synthesized beam. The various modes are described below:

- NORMAL mode causes the V-Scope display to be updated every two frames. Old data is constantly erased.
- PEAK HOLD mode causes old data NOT to be erased resulting in a cumulative display. This can be used to show all peak video excursions.
- VARIABLE mode enables the display update rate to be changed by moving the variable trace rate slider. Increasing the rate will produce a display which is more fully "colored in." This can improve the readability in certain modes (such as waveform + vector overlay with 2-H selected).

Variable Trace Rate Slider

This slider is used to set the variable trace update rate. This control only has an effect when the TRACE MODE cycle gadget is in the variable setting.

Variable Trace Value

This gadget provides a numerical readout (the actual trace update rate in frames) of the variable trace rate selected by the VARIABLE TRACE RATE slider.

Trace Freeze Gadget

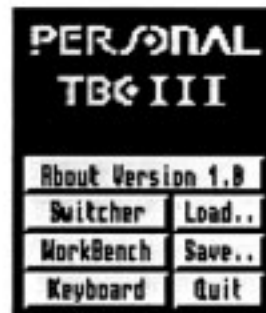
This gadget freezes the V-Scope trace, providing an instantaneous "snap shot" of the current waveform/vector display.

TBC III File And Video Toaster Access Controls

Figure 6-7 shows the TBC III file controls utilized to save settings to a disk file for subsequent use. On the Amiga, the default file used for saving the TBC settings is "S:TBC.Defaults". When the TBC III program is started, this file is read and all TBCs are automatically updated to reflect the contents of this file. The format of this file is consistent with the ARexx command interface supported by the TBC III program (as described in Appendix G of this document).

Figure 6 - 7

File
and
Toaster
Access
Controls



Go To Video Toaster Switcher

The SWITCHER gadget is used to go directly from the TBC III screen to the Video Toaster switcher screen. To use this gadget, the Video Toaster software must be loaded into memory. When this gadget is selected and the Video Toaster screen appears, a small button labeled "DPS" will appear next to the Video Toaster 3D slice buttons. Use this button to go from the switcher screen back to the TBC III screen. If you do not have a Video Toaster or if the Video Toaster software is not loaded, pressing this gadget will have no effect.

Go To Amiga Workbench

The WORKBENCH gadget is used to go directly from the TBC III screen to the Amiga Workbench screen. Use this gadget to access the Amiga Workbench screen while the TBC III program is running. You can return to the TBC III program by double clicking on the TBC III program icon on the Workbench screen. If you use this gadget to access the Amiga Workbench screen while the Video Toaster is loaded and want to return to the Video Toaster without first returning to the TBC III screen, use the <Ctrl> <Ctrl> <Alt> <Alt> key sequence described earlier. If your Video Toaster system is configured for autobooting, the WORKBENCH gadget cannot be used.

Keyboard Control Enable

The KEYBOARD gadget is used to enable keyboard control of the TBC III sliders. This feature is most useful for adjusting the genlock sliders while the Video Toaster switcher screen is displayed.

To use the KEYBOARD feature, click on the Keyboard gadget. Next select the TBC III slider that you want to control by clicking on it once. Then depress the CAPS LOCK key on the Amiga keyboard so that it is illuminated. Now you can use the arrow keys on the Amiga keyboard to manipulate the slider you have selected. If you hold the SHIFT key before pressing one of the arrow keys, the rate of slider movement will be increased. Keyboard control will remain in effect even if the TBC III screen is in the background behind the Video Toaster switcher screen. Complete information concerning the use of keyboard mode can be found in the system timing example presented in Chapter Nine.

Display Program Info

When this gadget is selected, information about the particular release of the TBC III program you are using will be displayed including version information and customer service phone numbers. Please have your particular software version number available if you contact DPS customer service for technical support.

Load TBC Settings

This gadget is used to load TBC settings from a disk file. When a file is selected, all TBC settings will be updated. The default file on the Amiga is "S:TBC.Defaults." This file is automatically read when the TBC III software is started.

Save TBC Settings

This gadget is used to save TBC settings to a disk file. When a file is selected, all TBC settings will be saved. The default file on the Amiga is "S:TBC.Defaults." You can also enter a file name of your choice in the requester window. This feature will enable you to store a virtually unlimited number of TBC setups for future recall.

Quit TBC III Program

This gadget is used to exit the TBC III program and remove it from memory. If you have changed some of the TBC settings, you will be presented with the option to save the current settings to a disk file.

Customizing Your TBC III Software

It is possible to change the names of the TBC SELECT buttons and other TBC III parameters such as the serial port device and baud rate. If your system is configured so that you load the TBC III software from the Amiga Workbench, the procedure involves modifying the TBC III software program tool types. If your system autoboots the Video Toaster and TBC III software, the changes must be made by adding command line switches to the S:STARTUP-SEQUENCE file. Choose the procedure below which corresponds to your particular system.

Modifying TBC III Tool Types

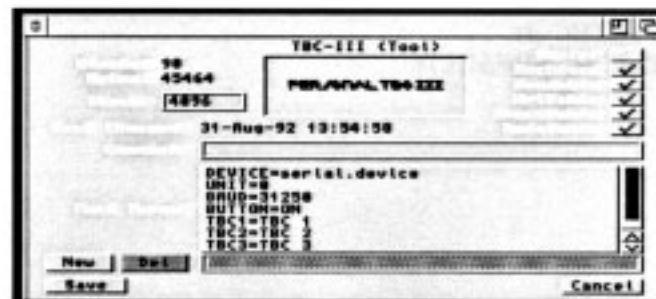
If you invoke TBC III software from the Amiga Workbench, you can change certain parameters by modifying the program's tool types. The example outlined below will describe the procedure for renaming the TBC SELECT buttons.

Let's assume that your system contains two source VCRs and a camcorder, all of which are connected to a DPS TBC III (or TBC II) card. When the TBC III program is first run, the TBC SELECT gadgets are labeled TBC-1, TBC-2, TBC-3 and TBC-4. Here is how you can rename them to reflect your actual source configuration.

1. Exit the TBC III program so that the Amiga Workbench screen is showing.
2. Locate the TBC III icon on the Workbench screen. Click on the icon so that it becomes highlighted.
3. Press and hold the right mouse button to drag down the Workbench menu bar and select the "Information" item. On Workbench version 1.3, "Info" will be found in the "Project Menu." With Workbench version 2.0 and higher, the word "Information" will be found under the "Icons" menu.

Figure 6 - 8

Info
and
Tool
Types
Window



Remember, if the DPS TBC software is still loaded, you won't be able to see the new button names until you quit the TBC program and reload it.

4. At the tool types area of the info screen, use the scroll gadget to select the "TBC1=" tool type. Edit this entry to display any new name you desire.

```
TBC1=VCR-1
TBC2=VCR-2
TBC3=CAM
```

5. After editing the TBC button names, be sure to save them by clicking on the SAVE gadget at the bottom of the info screen. As you scroll through the various tool type options, you will also find listings for the default baud rate and serial port. These parameters can be changed in the same manner.

Modifying TBC/Toaster Startup Sequence

If you have an autobooting Video Toaster system that has been configured to automatically load both the Toaster and the TBC III software, you cannot use the "tool type" procedure to customize your TBC III software. You can, however, accomplish the same result by adding a series of command line switches to the S:STARTUP-SEQUENCE file that is used to autoboot your system.

A typical S:STARTUP-SEQUENCE file for an autobooting Video Toaster plus TBC III system should contain the following line:

```
[Hard Drive Name]:TOASTER/TBC-III
```

You can edit this line to insert any or all of the following command line switches after the word "TBC-III." The normal default values are shown in parenthesis.

```
BAUD=(31250)
SERIAL=(serial.device)
UNIT=(0)
TBC1=(TBC-1)
TBC2=(TBC-2)
TBC3=(TBC-3)
TBC4=(TBC-4)
FILE=(TBC.DEFAULT)
```

Default values will be maintained for all parameters not specifically defined by a command line switch. Here is an example of a complete command line that has been edited to rename three of the TBC SELECT buttons.

```
[Hard Drive Name]:TOASTER/TBC-III TBC1=VTR-1 TBC2=VTR2 TBC3=CAM
```

Additional parameters could have been defined in the same manner. A complete discussion of startup sequence command line editing is beyond the scope of this manual. Please refer to your Amiga DOS Reference manual for complete instructions on accessing and editing the S:STARTUP-SEQUENCE file. The programs ED and EDIT are in the C directory and will perform the word processing functions necessary.

Chapter 7

MS-DOS Control Software

This chapter describes the Personal TBC III Version 3.0 and later MS-DOS[®] control software which can be used to control the DPS Personal TBC III, TBC II, DPS-230 and the DPS Personal V-Scope waveform monitor/vectorscope products. This program is also compatible with the DPS ES-2000 series rackmount expansion systems.

Hardware Requirements

The TBC III MS-DOS software requires the following minimum hardware configuration:

- IBM compatible (ISA bus) computer
- VGA graphics adapter (color or B/W)
- Microsoft compatible mouse and driver
- 1 spare serial port
- 640K memory

If you want to run the TBC III program from a floppy disk, you must move the write protect tab on the distribution disk to the write "enable" position. Most users will find it more convenient to install the TBC III software on their hard disk drives, as indicated below.

Hard Disk Installation

If you want to run the TBC III software from your hard disk, use the install program found on the distribution diskette to copy all of the required files to your hard disk.

1. Insert the supplied micro-floppy DPS Personal TBC III in the micro-floppy disk drive on your computer.
2. At the DOS prompt, type A:INSTALL (or B:INSTALL if you are using your B drive) and follow the instructions provided. The installation program will ask you to specify a serial port for TBC control.

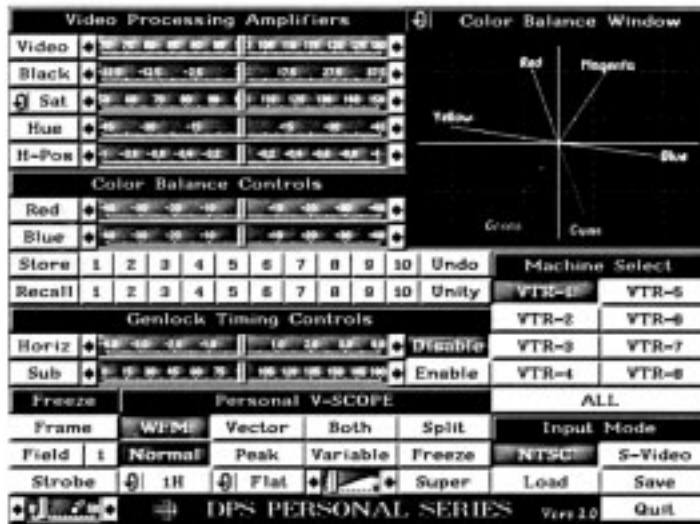
Don't specify a serial port which you use with your mouse.

Running TBC III Software

To run the TBC III program, type CD\DPS from the DOS prompt to change to the DPS directory. Then type TBCIII.D to run the TBC III program.

Figure 7 - 1

MS-DOS
Control
Screen



The default COM port for controlling the DPS Personal TBC III is COM-2. If you have connected the TBC to another COM port, you will have to start the program using a command line switch as indicated in the next section.

Serial Port Selection

*If the program
won't load,
suspect a
serial port
conflict.*

To use the TBC III software to control your DPS Personal TBC, the device must be connected to a serial port on your computer. A single serial port may be used to control many DPS products because of the "daisy chain" data interface between devices. The default serial port is COM2. To change this setting you may add a COM=1 or COM=2 switch to the command line.

For example, to specify the use of COM1 when starting the TBC III program, you would issue the following command:

```
TBCIII.D COM=1
```

Because the communications port setting is maintained in the TBC defaults file, you can save the value used in the command line switch by choosing to update the file when you quit the program. This setting will then remain in effect for subsequent program executions unless it is changed explicitly using another command line switch. If you don't save the TBC defaults file, the program will revert to the previous COM port selection the next time it is run.

Default File Selection

The TBC III software normally saves the default TBC settings in a file named TBCIII.INI. If you want to change the name of this file, you should use the F=Filename command line switch. This option can be used to save an alternate set of default TBC settings. For example, you may want to save alternate genlock timing or TBC input modes for a particular hardware configuration. To start the TBC III program and load a set of default settings from the file "ALT.DAT," you would type:

```
TBCIIID F=ALT.DAT
```

This will cause all TBC III "LOAD" and "SAVE" operations to use the specified file name (ALT.DAT in this example). The first time you specify a new filename, the program will load with all proc amp and timing settings at their unity positions.

Control Sliders

The control sliders are used to change proc amp settings. They are normally moved by dragging them with the mouse. They may also be moved by clicking in front of or behind them.

Decrement Buttons

The decrement (left pointing arrow) buttons may be used to decrement any of the control sliders. If one of these buttons is held down, the associated slider will move continuously.

Increment Buttons

The increment buttons (right pointing arrow) may be used to increment any of the control sliders. If one of these buttons is held down, the associated slider will move continuously.

Video Proc Amp Controls

Figure 7-2 shows the area of the TBC III control screen which has the video proc amp controls and color balance controls. This is the area of the TBC III screen which is most often used, as it allows you to manipulate the various video signal levels to obtain optimum picture quality.

Figure 7 - 2

Proc
Amp
Controls



Video Level Control

This control is used to change the overall amplitude of the video signal which varies the contrast of the displayed picture. If you are using the DPS Personal V-Scope, this control should be used to adjust the peak video amplitude to 100 IRE.

Black Level Control

This control is used to change the DC (or pedestal) level of the active video portion of the signal which provides a change in the brightness of the displayed picture. If you are using the DPS Personal V-Scope, this control should be used to adjust the black level of the video signal to 7.5 IRE.

Chroma Saturation Level Control

This control is used to change the chrominance amplitude (or saturation) of the video signal which varies the amount of color in the displayed picture. If you are using the DPS Personal V-Scope, then this control should be used (in conjunction with the hue control) to position the color bar vectors in the vectorscope graticule targets.

Sat/Mono Mode Selector

This selector button is located just to the left of the SAT control. This control puts the TBC III into "Forced Monochrome" mode whenever the "B/W" legend is displayed. In monochrome mode, the chroma picture detail is suppressed creating a black and white image. The color burst is still present, so the monochrome image can be combined with other color sources in a production switcher. Pressing the button a second time returns the TBC to normal color mode.

Hue Control

This control is used to change chrominance phase which provides variation in the hue (tint) of the displayed picture. If you are using the DPS Personal V-Scope, this control should be used (in conjunction with the chroma level control) to position the color bar vectors in the vectorscope graticule targets.

Horizontal Position Control

This control allows you to change the horizontal position of the processed video signal. It should not be confused with the genlock timing adjustment controls. Horizontal position moves the active video portion of the signal only, leaving all genlock timing unaffected. It can be used in certain editing situations when the exact position of two signals being edited is important.

Red Color Balance Control

The RED color balance control is used to change the amount of R-Y signal in the processed video. This control is normally used in conjunction with the blue color balance control to perform color balance correction operations. When the white areas of a particular scene or tape do not appear white (for instance, have a "blue" tint), the color balance controls can be used to eliminate this problem. Also, these controls can add a "color wash" to a video signal. This usually works best when the SAT control is moved to its minimum setting. The color correction controls may also be adjusted by clicking and dragging the "cross hair" cursor in the color balance window.

Blue Color Balance Control

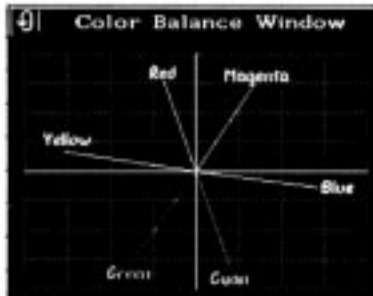
The BLUE color balance control is used to change the amount of B-Y signal in the processed video. This control is normally used in conjunction with the red color balance control to perform color balance correction operations. See above for details.

Color Balance Window

Figure 7-3 shows the TBC III color balance control window. This area of the screen provides an alternate method for adjusting the color balance settings described above. When you move the "cross hair" cursor in this window, you can adjust both R-Y and B-Y controls at the same time. Clicking on the COLOR BALANCE window button causes the system STATUS WINDOW to be displayed

Figure 7 - 3

Color
Balance
Window



B-Y Axis

The horizontal axis of the color balance window represents the B-Y component of the video signal. When you move the "cross hair" cursor horizontally, you are affecting the B-Y signal component.

R-Y Axis

The vertical axis of the color balance window represents the R-Y component of the video signal. When you move the "cross hair" cursor vertically, you are affecting the R-Y signal component.

Color Vectors

The color vectors provide a guide for using the color balance window. When you move the "cross hair" toward one of the vectors, you increase the amount of the color indicated. If you are trying to correct the white area of a particular scene (for instance, if the white areas have a blue "tint"), you would move the "cross hair" away from the blue color vector.

Cross Hair Cursor

The cross hair cursor is used as an alternate method to change the settings for the R-Y and B-Y color balance controls. To move the cursor, just click the mouse anywhere inside the color balance window and then drag the cross hair to the new desired location.

Proc Amp Memory Buttons

Figure 7-4 shows the TBC III proc amp memory buttons. This area of the screen is used to store and recall proc amp settings. The setting affected by these buttons are:

- Video level
- Black level
- Chroma level
- Hue
- Horizontal position
- Red color balance
- Blue color balance

There are ten locations in which you can store settings. When a non-unity group of settings is stored in a location, the STORE button associated with that location will appear highlighted. To return a location to the non-highlighted state, click on the UNITY button and then click on the store location you want to normalize. Any proc amp settings stored in these ten locations will automatically be stored in the disk file "TBCIII.STR" when the program is exited.

Figure 7 - 4

Store
Recall
Buttons

Store	1	2	3	4	5	6	7	8	9	10	Undo
Recall	1	2	3	4	5	6	7	8	9	10	Unity

Store Buttons

The STORE (1-10) buttons are used to save proc amp settings so they may be later restored using the RECALL buttons.

Recall Buttons

The RECALL (1-10) buttons are used to recall proc amp settings previously stored using the STORE buttons.

Unity Button

The UNITY button forces all proc amp settings to their factory default values. The "ALL" TBC Select may be used in conjunction with the UNITY button to force all TBCs in the system to their unity values.

Undo Button

When the UNDO button is selected, the most recent change made to any proc amp setting will be canceled.

Genlock Timing Controls

Figure 7-5 below shows the genlock timing control area of the TBC III software screen. The genlock timing controls are used to position the TBC output with respect to its reference video input. This function allows the outputs of multiple TBCs to be positioned exactly in time so that video editing operations, such as the mixing of two video signals, can be performed.

Figure 7 - 5

Genlock
Timing
Controls



Genlock Horizontal Control

The genlock HORIZONTAL control is used to change the genlock timing in large steps. When this control is adjusted, the output video moves in steps of 270 nsec, which is equal to one cycle of the color subcarrier frequency. Because of this, the genlock HORIZONTAL control will move the displayed video horizontally but will not affect the chrominance phase of the picture.

Genlock Subcarrier Control

The genlock SUBCARRIER control is used to change the genlock timing in small steps. Each increment of this control changes the output video timing by 0.55 nsec. When using this control, if you get to the end of its range and then continue to move the slider, the HORIZONTAL phase control will automatically be incremented or decremented and the SUBCARRIER slider will jump to the opposite end of its range. For example, if you move the genlock SUBCARRIER slider all the way to the right, the genlock HORIZONTAL slider will increment by one-half step and the genlock SUBCARRIER slider will jump to the extreme left hand position.

Genlock Enable Button

The ENABLE button is used to enable the genlock control sliders. The default setting for this button is disabled, because the genlock timing controls are normally used only when a system is being initially set-up. This prevents accidental changes to the genlock timing controls.

Genlock Disable Button

The DISABLE button is used to disable the genlock control sliders. You should select this button after you finish adjusting your genlock timing so as to prevent accidental changes.

TBC Select Buttons

Figure 7-6 below shows the TBC SELECT buttons used to choose which TBC you are controlling. The TBC III software can control up to eight TBCs and one V-Scope. Each TBC III card (or DPS-230) has a set of DIP switches which determine its address.

Figure 7 - 6

TBC
Select
Buttons

Machine Select	
VTR-1	VTR-5
VTR-2	VTR-6
VTR-3	VTR-7
VTR-4	VTR-8
ALL	

Individual TBC Select Buttons

These buttons are used to select a single TBC to control. When a new TBC is selected, the TBC III screen will automatically be updated to reflect the current status of that TBC.


ALL TBC Select button

When the ALL TBC button is selected, any parameter change made will be sent to all TBCs.

Input Mode Selection And File Operations

Figure 7 - 7

Input
Mode
And
File
Controls

Input Mode	
NTSC	S-Video
Load	Save
 Vers 3.0	Quit

Input Mode Buttons

The input mode buttons are used to select the proper input signal mode for each TBC. When NTSC is selected, the TBC will process the video signal applied to its composite BNC input connector. When S-Video is selected, the TBC will process the video signal applied to its S-Video input connector. If you are using the TBC with a VCR that has both S-Video and NTSC type outputs, then use the S-Video mode as this will provide the optimum performance.

Save Defaults Button

The SAVE defaults button is used to save the current settings for all TBCs to a disk file. This operation should be performed after you configure your TBC input modes and genlock timing so that these settings will be automatically loaded whenever the TBC III program is started.

Load Defaults Button

The LOAD defaults button is used to load all TBCs with a complete set of initialization data from a disk file. This disk file is created using the SAVE defaults button. This operation occurs automatically when the TBC III program is started.

Quit Button

The QUIT button is used to exit the TBC III program and return to DOS. If you have made any changes to any of the TBC settings, then you will be prompted with the option of updating the TBC defaults file.

You can change the default data filename using the "F=" command line switch.

Freeze Controls

Figure 7-8 below shows the TBC III freeze controls. If you are using the TBC III control software with a DPS-230, then all of the freeze modes are available. If you are using a TBC III card, then only the freeze FIELD mode is operational and when it is engaged, the displayed picture will "jitter" horizontally. Also, when using the TBC III card, the freeze FIELD select button will not function.

Figure 7 - 8

Freeze
Controls



Freeze Frame Button

When the freeze FRAME button is engaged, a complete 525-line frame will be displayed. This mode should be used to freeze pictures when the video signal contains no motion. This freeze mode provides the best possible vertical resolution.

Freeze Field Button

When the freeze FIELD button is engaged, a single field of video will be displayed. This mode should be used to freeze pictures when the video signal contains motion.

Freeze Field Select

The freeze field SELECT button is used to cycle through the three video fields captured when the freeze field function is initially engaged. The number on the button indicates the chosen field.

Strobe Button

When the STROBE button is engaged, a single field of video will be frozen at regular intervals. This produces the traditional strobe effect.

Strobe Rate Slider





The strobe rate slider is used to control the strobe freeze interval. The range of this slider is from 0 (full motion) to 50 frames (approximately one new picture every two seconds).

V-Scope Control Panel

Figure 7-9 shows the V-Scope control area of the TBC III software screen. To use these controls, you must have a DPS Personal V-Scope. The V-Scope allows you to superimpose waveform monitor and vectorscope displays on a processed video signal.

Figure 7 - 9

V-Scope
Controls

Personal V-SCOPE			
WFM	Vector	Both	Split
Normal	Peak	Variable	Freeze
 1H	 Flat		 Super

Display Mode

The V-Scope display mode buttons are used to select between WFM, VECTOR, BOTH and SPLIT modes. These four choices are explained below:

- WFM mode provides full screen waveform monitor.
- VECTOR mode provides full screen vectorscope.
- BOTH mode provides full screen waveform monitor plus an overlaid full screen vectorscope.
- SPLIT mode provides quarter screen waveform and vectorscope images on the bottom of the screen with live video displayed at the top.

Trace Mode

The V-Scope trace mode buttons are used to select one of four supported modes:

- NORMAL mode causes the trace to be updated every two frames.
- PEAK mode disables the trace erase function. This provides a continuous display of peak video level excursions.
- VARIABLE mode enables the trace update rate to be controlled via the Variable Rate slider.
- FREEZE mode causes the waveform/vector trace to be frozen.

The 2H mode cannot be selected when the V-Scope is in split screen mode.

1H/2H Waveform Button

This button cycles the V-Scope waveform monitor between 1H (single video line) and 2H (dual video line) display modes. Normally, the 1H mode is used, as this provides the best display resolution.

Flat/Low Pass Button

This button cycles the V-Scope waveform monitor between flat and low pass frequency response modes. The low pass mode is normally used when setting white or black levels while viewing the V-Scope waveform monitor display. This mode eliminates most of the chrominance information and high frequency noise which allows for more accurate level settings.

Variable Trace Rate Slider

This slider is used to set the variable trace update rate whenever the trace mode is in the variable setting.

Superimpose Enable Button

When this button is selected, the superimpose output from the V-Scope card is enabled and will contain the synthesized waveform/vector display as determined by the other V-Scope controls. When this button is deselected, the superimpose output will only contain the V-Scope video input signal.

Chapter 8

Operating Without Software

The Amiga and MS-DOS control software programs supplied with the DPS Personal TBC III offer a flexible and intuitive means of controlling multiple TBC cards. Some users may prefer to use a DPS RC-2000 Desktop Remote Control or even to operate their TBC III without any external control. Both of these options are explored in this chapter.

Using The TBC III With An RC-2000 Remote Control

The RC-2000 is a self-contained remote control unit which is compatible with the DPS Personal TBC II and TBC III cards, the DPS-230 rackmount TBC and the DPS Personal V-Scope. Here are some of the reasons why users may choose to operate their TBC III using the optional DPS RC-2000 Desktop Remote Control instead of with Amiga or MS-DOS software.

- Full time TBC control is needed. Multi-tasking between the TBC control program and the primary computer application may be cumbersome in some instances.
- An animation controller, edit controller or other device prevents the sharing of the computer serial port with the TBC III serial input. This problem can also be solved by installing another serial port in the computer as detailed in Appendix D.
- The TBC is to be operated without a host computer. Multiple TBC III cards can be installed in a passive back plane type expansion chassis and controlled by a single RC-2000. The DPS ES-2000 12-Channel Rackmount Expansion System is an example of such a device.

PERSONAL TBC III

Figure 8 - 1

RC-2000
Remote
Control



When using an RC-2000, make sure that your computer's serial port is not still attached to the TBC card via an internal (Amiga mother board) connection.

The DPS RC-2000 desktop remote is capable of controlling up to eight DPS Personal TBC III or TBC II cards as well as a DPS Personal V-Scope. The RC-2000 takes the place of the host computer's serial port and connects directly to the RJ-14 jack of the first TBC card. Power for the RC-2000 is provided by the DPS Personal TBC III.

All video proc amp and timing functions and setup memories can be accessed via the RC-2000's front panel controls. When using an RC-2000, set the TBC III and the remote control to the same serial baud rate. The default rate for both units is 31,250 BPS. Please refer to the RC-2000 instruction manual for specific instructions regarding its use.

Using The TBC III Without Any External Control

When the DPS Personal TBC III is operated without an external serial control device, all proc amp settings revert to their factory preset "unity" settings. In other words, if a 1 volt p-p composite video signal is connected to the TBC's video input, a 1 volt p-p signal will emerge from its output. If the input video level is low, then the output will be low as well.

There are applications where a TBC is needed to stabilize a video signal but where there is no need to further manipulate the video levels. If the DPS Personal TBC III is to be used in this manner, you should perform the following steps:

1. Set DIP switch 8 DOWN. This will disable the TBC's RS-232 interface and force all proc amp controls to their factory preset (unity) positions.
2. Use DIP switch 3 to select between the NTSC and S-Video inputs (UP for NTSC, DOWN for S-Video).

The only adjustment that can be made to the TBC card in this mode is genlock timing. The rear panel genlock timing control is a three-position switch which serves to advance or retard TBC output video in relation to the reference video input.

Course timing can be adjusted by holding this switch down in either direction. If the video moves in the wrong direction when you press the switch, release it and press it in the opposite direction. As the video shifts horizontally, the chroma phase will vary. Once the video signal has been properly aligned horizontally, chroma phase can be adjusted by tapping the switch until the colors are correct. A color bar signal and a DPS Personal V-Scope are useful tools for performing this operation. For more information on system timing, please refer to Chapter Nine.

Once adjusted, the TBC genlock settings will automatically be maintained in nonvolatile memory. This memory will be overwritten if you subsequently run the DPS TBC III control software or use a DPS RC-2000 remote.

Never use the rear panel genlock timing switch if you are operating the TBC III via software or with an RC-2000.

Chapter 9

Timing The TBC III

Depending on your particular setup, you may or may not have to adjust the genlock timing controls in order to use a TBC in your video system. If you are not supplying an external reference signal to the TBC or if the TBC is being used as your master system timing reference, there is no reason to adjust genlock timing. In fact, under such circumstances, adjusting the TBC genlock controls will have no effect.

Remember, if your system contains two TBC cards, at least one of them must be genlocked.

Assume, for example, that you are using a NewTek Video Toaster as your production switcher and that a single DPS TBC III is connected to Input-1. Since the Toaster automatically references itself to Input-1, its internal video sources (DV1 and DV2) will automatically be in phase with the TBC video. But, if you add a second TBC to Input-2, it **MUST** be referenced to Input-1. Under this revised scenario, the genlock controls on TBC-2 **WILL** need to be adjusted.

If this concept does not seem clear, you can refer back to the connection examples in Chapter Five. In those examples, the second and third TBCs in a system are referenced to the first TBC. It is also possible to reference all of the TBCs to some other stable video reference. Chapter Five includes an example of a single TBC which is genlocked to a color camera. Traditional video production facilities use the black burst output of a sync generator for a master reference. Lacking such a device in your own system, the internal sync generator in a DPS TBC will provide an adequately stable reference video source.

What Is System Timing Anyway?

As discussed in Chapter Two, video signals must be precisely synchronized before they can be mixed together. If the timing is not correct, the images will suffer from horizontal displacement, mismatched colors or both. In severely mistimed systems, video may completely break up, often appearing to run diagonally across the monitor. When two or more video signals are properly timed, they reach their destination (generally the input to a video switcher) in perfect horizontal and color phase alignment.

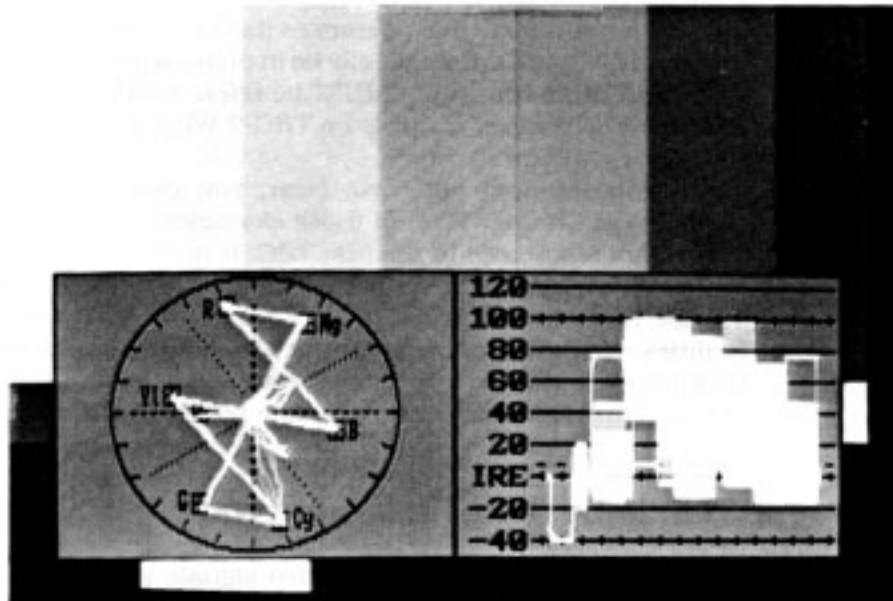
Taking The Mystery Out Of System Timing

Application specific test equipment has traditionally been employed in the professional video production industry to maintain proper video system timing. The tools of the trade are a color bar generator, a waveform monitor and a vectorscope.

Such tools are now available to the desktop video user as well in the form of the DPS Personal V-Scope Waveform Monitor/Vectorscope card. Such a device, used in conjunction with the DPS Personal TSG test signal software, can help take the guess work out of system alignment.

Figure 9 - 1

Personal
V-Scope
Display



If you are installing a DPS Personal V-Scope in conjunction with your Personal TBC III, you should refer to the V-Scope manual for instructions on system timing. For the benefit of those of you without a V-Scope, we will confine our system timing instructions in this manual to the following pieces of "test" equipment.

- Color picture monitor - properly adjusted
- Color bar source - Video Toaster color bars are fine
- Video cassette recorder
- Blank video tape

TIMING THE TBC III INTO YOUR SYSTEM

We will describe the procedure for timing a system which utilizes a NewTek Video Toaster as the production switcher. The versatile Toaster will also double as our color bar generator. If your system does not include a Video Toaster, you will have to generate color bars in some other manner. Luckily, there are many potential sources for color bars which include:

- Professional color cameras
- Sync and test signal generators
- Color bar/black burst generators
- Professionally recorded test tapes

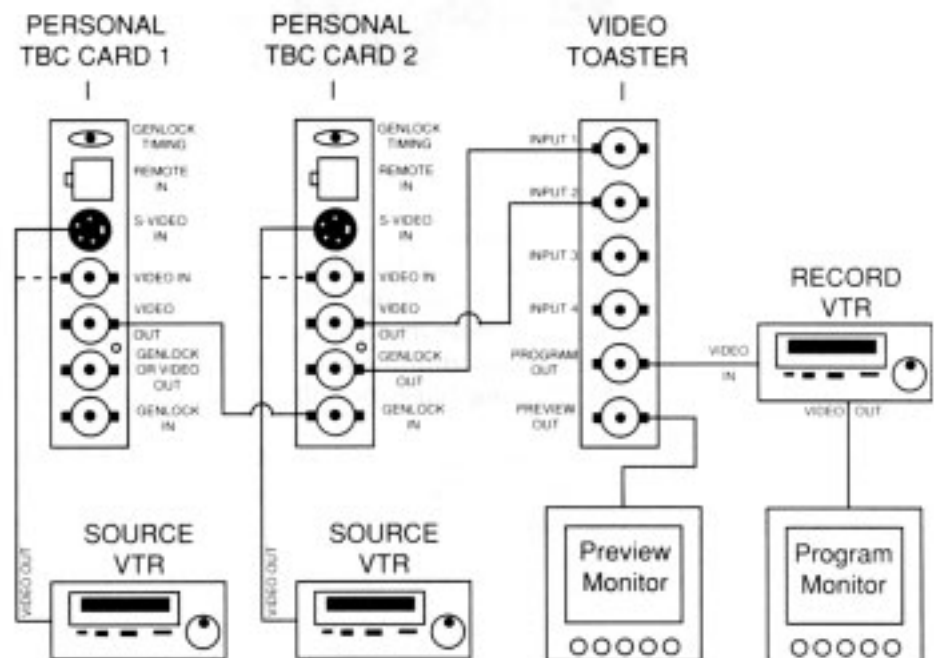
Armed with color bars, a switcher and a color monitor, let's go time a system.

Timing A TBC III Into A Video Toaster

Figure 9-2 details an A/B roll editing system consisting of two DPS Personal TBC III cards and a NewTek Video Toaster. The first TBC will be used as our master sync reference. It will be connected to the Video Toaster's Input-1 after first looping through the second TBC's genlock input.

Figure 9 - 2

Typical
A/B
Roll
System

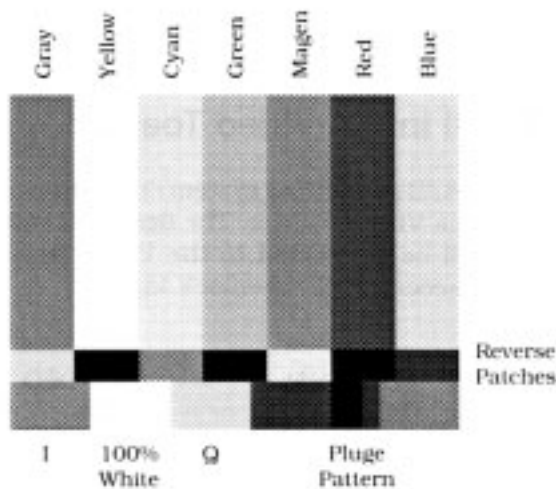


Here is the procedure for properly timing the system shown in the diagram.

1. Load the NewTek SMPTE color bar pattern into DV1 or DV2 on the Video Toaster Program bus. This test signal is automatically loaded into DV2 whenever the Video Toaster Program is first loaded. Otherwise, you can load the image by double clicking on the Color Bar icon which is provided on the last bank of Toaster Switcher Effects. Verify that the color bar pattern is being displayed on your program monitor and that the program output of the Video Toaster is connected to the input of your record VCR. The color bar signal should look like the pattern shown in Figure 9-3.

Figure 9 - 3

**SMPTE
Color
Bars**



2. Insert a blank video tape in your recorder and put the VCR into RECORD mode. Go to lunch. When you return, you will have a brand new "master" SMPTE color bar tape. You could record just a few minutes of color bars, but nothing is more frustrating than having the tape end before you finish making your timing adjustments. Label the tape and break out the record tab. Your SMPTE color bar tape will continue to prove useful in the future.
3. Insert your color bar tape into the playback VCR which is connected to TBC-2. Make sure that the video (or S-Video) output of the deck is connected to the TBC input. Put the VCR into PLAY mode. The next step involves setting up a vertical wipe between the VCR (TBC-2) color bars and the Video Toaster color bars.

TIMING THE TBC III INTO YOUR SYSTEM

4. If you are controlling the TBC III with DPS Amiga software, you will need to perform the following steps carefully. They describe a method of adjusting genlock timing using the cursor keys on the Amiga keyboard. This method is necessary because you cannot access the DPS software screen while the Video Toaster is in the process of performing an effect. If you are operating your TBC III with a DPS RC-2000 desktop remote, you can ignore the references to keyboard genlock control and merely concentrate on performing the actual genlock timing adjustments.
5. With both the Video Toaster and the TBC III software running, click on the DPS icon next to the Toaster 3D Application button. This will take you to the TBC III software screen.

Figure 9 - 4

TBC III
Software
Control
Screen



The "Keyboard" function enables you to adjust TBC genlock timing while the Video Toaster is performing a split screen wipe.

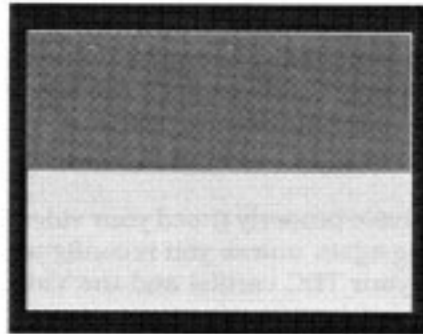
6. Position the mouse pointer over the KEYBOARD button in the lower right corner of the screen and click on it once with the left mouse button.
7. Click on the TBC-2 icon using the left mouse button. The four TBC SELECT buttons are located at the bottom of the Video Processor Control section of the TBC III software screen.
8. Depress the CAPS LOCK key on the far left side of the Amiga keyboard and verify the caps lock light is on. The DPS cursor key control feature will not work unless the CAPS LOCK key is depressed.
9. Click on the Genlock DISABLE button which is located above and to the right of the Genlock Timing sliders. The legend will change to ENABLED to signify that you can now move the genlock sliders. The ENABLE/DISABLE button is designed to prevent accidental misadjustment of genlock timing after it has been properly set.

10. Select the Course Genlock Timing function by clicking on the COARSE button located to the left of the Course Timing slider. Note how it changes color.
11. Press the LEFT arrow key on your computer keyboard. It is located under the HELP and DEL keys. Notice that the COURSE slider moves one tick to the left. Hold the SHIFT key and press the LEFT arrow key again. Note that the SHIFT key magnifies the movement by a factor of ten. Try tapping the RIGHT arrow key. It should move the slider to the right.
12. Now push the DOWN arrow key once. This will highlight the Genlock FINE slider. Verify that it is selected by tapping the LEFT arrow key. If there is no movement, make sure the KEYBOARD button is selected and that the CAPS LOCK key is still lit.
13. Press the UP arrow key once to re-select the COURSE genlock phase slider. By now you should see how the genlock phase sliders can be selected and manipulated using the keyboard arrow keys. It is now time to try the same procedure with the Video Toaster Switcher program running in the foreground.
14. Click on the SWITCHER button. You should now see the Toaster Switcher screen on the monitor.
15. Select the TBC-2 video source by clicking on the Toaster Program Bus Input-2. Tap the LEFT or RIGHT keyboard arrow key to verify that you have selected the correct input. You should notice a horizontal picture jump on the program monitor. If not, try holding down the shift key while tapping the LEFT or RIGHT arrow key. This magnifies slider movement by a factor of ten.
16. Load the SMPTE color bar test pattern into a framestore on the Toaster preview bus. This test signal can normally be found in DV2 when the Video Toaster software initializes. You can also load Toaster color bars by double clicking on the color bar icon located in the last Toaster Switcher effects bank.
17. Select the WIPE B effect from Toaster switcher bank D. Click with the left mouse button on the Toaster switcher T-BAR and pull it down half way. On the program monitor you should see a split screen between the video tape (TBC) bars and the Toaster bars.

When the Video Toaster Switcher is in the foreground, you CAN'T hold down the keyboard arrow keys to produce slider movement. You MUST tap the cursor keys or tap them while holding down the SHIFT key

Figure 9 - 5

WIPE B
Split Screen
Icon



If you fail to see a desired effect while pressing the keyboard arrow keys, complete the current Toaster effect and go back to the TBC software screen. Verify that you have selected the correct TBC and adjustment parameters. Also make sure that genlock timing is ENABLED.

18. The Video Toaster color bars should look correct but the tape color bars will probably appear off color and out of position. If the timing is significantly off, half of the screen may even appear scrambled. Use the LEFT and RIGHT keyboard arrow keys to adjust the horizontal position of the tape bars to match the Toaster color bars.
19. Once the two images are precisely lined up horizontally, tap the DOWN arrow on the keyboard one time. This will select the FINE genlock phase slider on the TBC III software which is running in the background.
20. Adjust fine phase by tapping the LEFT or RIGHT arrow keys until the colors of the bars on the top and bottom of the screen match exactly.
21. After setting the fine (chroma) phase, you may notice a slight horizontal shift between the images on each half of the screen. If so, use the H-POS control to bump the active video portion of the tape color bars into precise alignment with the Toaster bars. To do this, tap the UP arrow twice to move the background selection up to the H-POS position. If you lose your place, just complete the Toaster wipe and re-select the DPS TBC III software as outlined in the preceding note.
22. If your actual system contains additional TBCs on Video Toaster Inputs 3 or 4, you will need to repeat steps 7 through 21 for these TBCs as well. Just substitute the appropriate Video Toaster Program Bus input for Input-2 as described above.
23. Once all of these adjustments have been made, it is important to save them. To save the genlock timing data, complete the Toaster wipe effect and return to the TBC III software screen by clicking on the DPS icon. Save the software defaults by clicking with the left mouse button on the SAVE gadget located on the lower right side of the TBC software screen. The requestor window will highlight the name of the data file (TBC.Defaults) in use.

24. Click with the left mouse button on the SAVE button in the "Save TBC File" window. This will ensure that you don't have to perform this timing procedure again. If you fail to save these genlock settings, the TBC genlock phase will be wrong the next time you load the software.

Congratulations! You have properly timed your video system. You shouldn't have to adjust genlock timing again unless you reconfigure your system or change the cable lengths between your TBC card(s) and the Video Toaster.

Once a TBC has been properly timed into your system, you can vary the length of its input cables or change TBC sources without creating any timing problems. Just don't change the output or genlock reference cables.

Appendix A

Personal TBC III Specifications

Video Input (NTSC mode)	1V p-p
Y Input (S-Video mode)	1V p-p
C Input (S-Video mode)	286mV p-p burst level
Video Output	1V p-p
Reference Video Input	1V p-p
Advanced Sync Output	2V p-p
Bandwidth*	
(NTSC mode)	4.2 MHz
(S-Video mode)	5.5 MHz
Correction Window	Infinite
Signal-to-Noise	>58dB
Differential Phase	<2°
Differential Gain	<2%
K Factor:	
Y/C Input	1%
NTSC Input	3%
Residual Time Base Error	<15nS
Serial Data Input	RS-232 Levels @ 31.25 or 9.6 kB/s
Proc Amp Controls:	
Video Level	+/- 3dB
Black Level	+/- 20 IRE
Chroma Level	-40 to + 6dB
Chroma Phase (Hue)	+/- 45°
Horizontal Pos	+/- 1us
Color Balance:	
R-Y Shift	+/- 20%
B-Y Shift	+/- 20%
Genlock Timing:	
Coarse	+/- 4us
Fine	+/- 360°
Power Consumption	8.4 Watts
	+5V @ 500mA
	+12V @ 400mA
	-12V @ 90mA

*Heterodyne Luminance Bandwidth = 2.5 MHz in NTSC mode.

Appendix B

Troubleshooting

General

When a problem occurs in a complex setup involving multiple pieces of video equipment, you should always try to reduce the complexity of the setup by disconnecting pieces of equipment until you can obtain a minimum configuration which still exhibits the problem. For the TBC III card, try to isolate the problem by performing the following steps.

1. Connect your picture monitor directly to the VCR or other device that is feeding the input of the TBC. If the problem still exists at the source, chances are that you don't have a TBC problem.
2. Next, reconnect your VCR to the TBC's input and connect the picture monitor directly to the TBC's video output. This will enable you to determine whether the TBC itself is correctly processing VCR video independent of other equipment that may be in your system. If the video output of the TBC appears normal on the monitor yet produces a distorted image when connected to your production switcher, chances are that you have either a system timing problem or a switcher problem.
3. If the video directly out of the TBC looks distorted, try temporarily disconnecting the TBC genlock reference signal (if any) to see if that helps. If the TBC video output quality improves, you probably have a problem with your genlock reference signal and not the TBC itself.
4. If the video output of the TBC still looks bad, you can try operating it without external control to isolate software and serial port problems. Turn off the power to your computer and temporarily set TBC DIP switch number 8 DOWN. This resets the TBC microprocessor and disables the serial port. If necessary, use DIP switch 3 to select between the NTSC and S-Video inputs (UP for NTSC, DOWN for S-Video).

Now turn your computer power back on and observe the video output of the TBC directly on a color monitor. If the output of the TBC looks OK, suspect a software installation or serial port problem. In any case, be sure to reset DIP switches 8 and 3 to their original positions.

TBC III Software Problems

If the TBC card does not respond to the TBC III software, ensure that the following steps have been performed:

1. One of the TBCs must be connected to the computer serial port and all other TBCs must be connected together internally using the on-card data THRU and INPUT connectors. Refer to Chapters Three and Four for more details.
2. The TBC address for each TBC card must be unique and correspond to the TBC-1, TBC-2, TBC-3 and TBC-4 button selected on the TBC III control screen. See Chapter Two for DIP switch settings.
3. The computer's RS-232 serial port must be connected to the TBC card at either the rear panel RJ-14 connector or at the internal RS-232 header connector. Do not connect the computer's RS-232 line to the TBC's INPUT or THRU header connectors. These TTL level ports are used exclusively for looping multiple DPS TBC or V-Scope cards together.
4. The RS-232 baud rate selected with DIP switch 2 on the TBC card (UP for 31,250 BPS, DOWN for 9600 BPS) must match the speed of your computer or serial expansion port hardware. DPS Amiga TBC control software automatically sets your computer serial preferences to 31,250 BPS with No Parity and No Handshaking. If you are using an Amiga serial expansion card, you will have to modify the software tool types (or the Video Toaster startup sequence) to choose an alternate serial port name and baud rate. This procedure is detailed in Appendix D.
5. If you are using DPS TBC control software in an Amiga computer, make sure that there are no other non-sharable devices connected to the serial port that you are using to drive the TBC cards. The DPS TBC III card is normally configured to "listen only" to RS-232 commands and can share an Amiga serial port with other "sharable" serial devices.

The internal and external Amiga serial ports are connected together electrically.

It is our experience that most computer based editing and animation controllers are "non-sharable" and require the full time use of the serial port to which they are connected. A typical problem would result when a DPS TBC card is connected to the Amiga's internal serial port while an editing controller system is connected to the external serial port. Under these conditions, one or both of the units will fail to operate reliably. The only solution is to add a serial expansion port or to purchase a DPS RC-2000 desktop remote control unit. The procedure for adding a serial expansion port is described in Appendix D.

Video Break-Up Or Loss Of Lock

If the TBC output looks fine when connected directly to a picture monitor, but appears distorted when connected to your system, you are probably experiencing a system timing or reference video signal problem.

1. Observe the genlock LED which is located on the rear panel of the TBC card. If you are feeding a reference signal to the TBC, the Genlock OK LED should be on. If it is not on or if it is flashing, something is wrong with your genlock video feed. The genlock signal must always be a stable video feed such as from a camera, another TBC or a black burst signal generator. Never use a non-timebase corrected VCR as your black burst reference.
2. If the genlock OK LED is illuminated, check your genlock timing. System timing values are stored in the TBC.Defaults file. Try reloading the defaults file to see if anything changes. You can also try enabling genlock adjustment and moving the course genlock phase slider to see if the picture improves. If so, you will need to go back and re-time the TBC into your system according to the procedures outlined in Chapter Nine. Once the system timing is correct, be sure to save the settings in the TBC.Defaults file.

The TBC input mode is stored as a part of the TBC.Defaults file. If you find that the TBC always boots up in the wrong mode, just select the desired input and then re-save the TBC.Defaults file.

Video Output Is Frozen

If the video output from the TBC card appears as a frozen picture, the input video has probably disappeared or you have selected the wrong input via software. Whenever the TBC card detects that the input video signal is missing, it freezes on the last good picture and will continue to display this field until the input signal returns. This is referred to as "hot switching." The hot switching feature can be disabled by moving DIP switch 6 DOWN. See Chapter Two for more details.

The picture will also freeze if you select a TBC input that is not connected to an active source. For example, if you have an S-VHS source deck connected to the TBC III's S-Video input but have nothing connected to the NTSC input, the picture will freeze whenever you select the NTSC input. If an unused input is selected when the TBC is first powered up, you will often see horizontal bars frozen on the screen. The solution is to switch to the active TBC input.

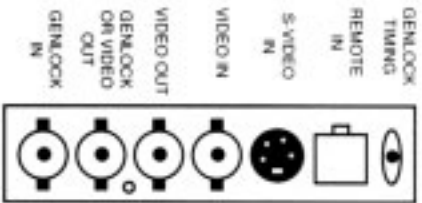
Your System Wiring

If you are still having problems with your DPS Personal TBC III after trying these suggestions, you are welcome to contact the DPS Customer Service Department for technical assistance. In order to help you, we need to know about the other equipment in your video system and how the TBCs are connected. It is also important that we know the serial numbers of your TBC cards and the type (Amiga or MS-DOS) and release of your DPS control software.

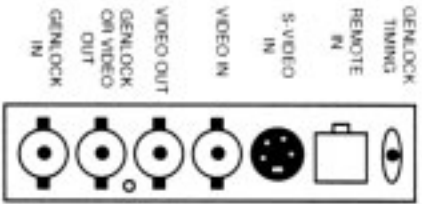
For your convenience, we have provided a generic system diagram (Figure B-1) on the following page. Please complete this diagram by drawing lines to represent your actual video connections. Be sure to indicate the make and model number for all of your system components.

Have this diagram ready when you call us. For even faster service, fax the diagram to us and we'll call you back. DPS Customer Service telephone and fax numbers can be found in Appendix I.

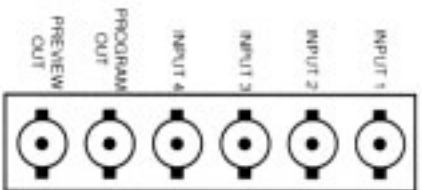
PERSONAL
TBC CARD 1



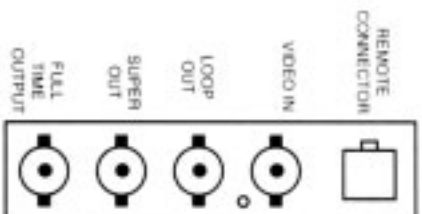
PERSONAL
TBC CARD 2



VIDEO
TOASTER



PERSONAL
V-SCOPE



SOURCE
VTR



SOURCE
VTR



BLACKBURST
GENERATOR

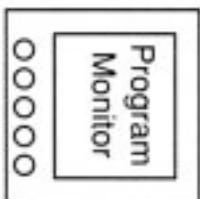
RECORD
VTR



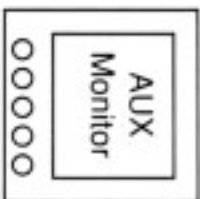
PRODUCTION
SWITCHER



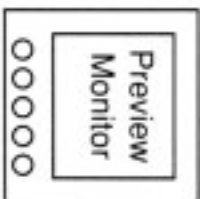
Program
Monitor



AUX
Monitor



Preview
Monitor



Appendix C

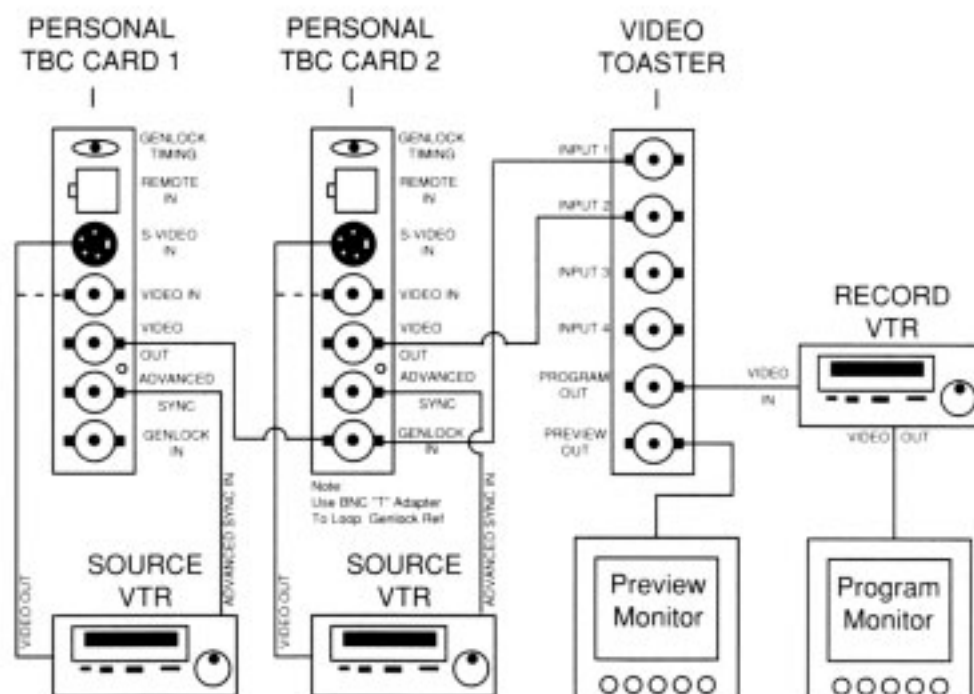
Advanced Sync Output

The Personal TBC card has the ability to generate an advanced sync signal which can be selected via a jumper (see Chapter Two) to appear on the multi I/O connector. This signal can be connected to the EXT SYNC input of a playback VCR. The external sync connection will force the playback VCR to maintain a speed which, on average, is correct for the TBC.

Without an external sync connection, the TBC will occasionally have to either repeat or delete frames of video in order to maintain genlock with the reference video input. This normally is not a problem, as the "frame stuffing" occurs so infrequently (perhaps every thirty minutes or so) that it is not noticeable. The advanced sync connection is normally used when precise "time-code" editing is being performed.

If you want to use the advanced sync output, you need to move jumper CHE1 on the TBC III card to the ADV SYNC position as detailed in Chapter Two. Also, be sure to select the external sync mode on your playback VCR. Refer to your VCR operating instructions if necessary.

Figure C - 1
Advanced Sync Example



The physical space limitations of a PC expansion slot opening make it impossible to provide dedicated BNC connectors for all possible signals. If you are currently using the multi I/O connector to provide a genlock reference "loop through," you will lose the "loop" connector when you reconfigure your TBC card for Advanced Sync Output. You can still "loop" a genlock reference signal to the TBC, but you must acquire a BNC "T" connector and install it on the Genlock Reference Input (bottom) BNC connector. So long as the TBC III Genlock Termination Jumper (CHE2) is still set for OPEN, the reference input will remain a high impedance "looping" connection.

Appendix D

Serial Port Expansion Boards

Serial Port Conflicts

The Amiga and MS-DOS control software for the Personal TBC III require that the TBC be connected to an available computer serial port. In the case of the Amiga computer, this is generally the built-in serial port on the mother board. With IBM compatible computers, the serial ports may either be on the mother board or on an I/O expansion card.

The TBC serial communication link cannot be connected to a serial port which will be used concurrently with some other device. On IBM compatible systems, problems sometimes arise when the TBC software attempts to use the same port as a serial mouse or when the TBC serial port shares the same hardware interrupt with another device that is being addressed simultaneously with the TBC card.

On Amiga computers, similar conflicts can arise when the internal TBC serial connection conflicts with something else connected to the Amiga's external serial port. In most cases, the standard Amiga serial port may be shared between the TBC III and other devices. This is because the TBC III uses a "listen only" type of serial interface which permits the TBC III's internal serial connection to be maintained while some other task, such as a serial printer or modem, is connected to the external DB-25 serial connector.

In cases where the built in Amiga port cannot be shared, it will be necessary to interface to the TBC III using a serial expansion card. From past experience, we have learned that the most common serial port conflicts arise when an Amiga serial port is being shared with an editing controller or animation controller. There are two general solutions to serial port conflicts.

- Install another serial port in your computer.
- Purchase a DPS RC-2000 Desktop Remote Control Unit.

Whichever method you choose, remember that multiple DPS TBCs (up to eight) plus a DPS Personal V-Scope can be daisy-chained together for control by a single serial port. So long as you can provide one uncontested RS-232 port for the TBC III, you will have no problem operating multiple channels of time base correctors.

Installing Serial Expansion Cards In An Amiga Computer

The following instructions are provided to assist you when installing and configuring two popular serial expansion cards, the Commodore A2232 and the ASDG Dual Port Serial card. If you are using an IBM compatible computer or a different brand of Amiga serial expansion card, please refer to the instructions provided with that particular device. If you choose to use a DPS RC-2000 desktop remote control instead, you will find complete installation instructions provided with the unit.

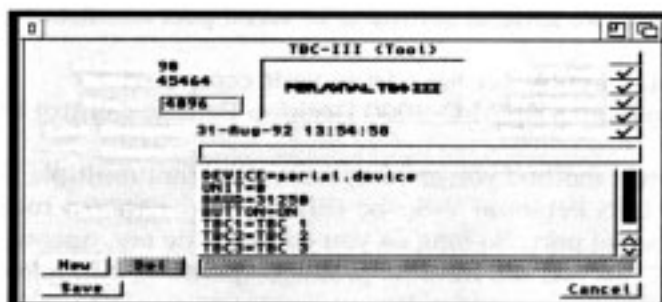
Commodore A2232 Serial Card

To use the Commodore A2232 card to control the TBC III, you should perform the following steps:

1. Install the A2232 card in your computer as detailed in the instructions accompanying the card.
2. Run the A2232 install program provided with the A2232 board.
3. Locate the Personal TBC III icon on your Workbench screen. Click on the icon so that it becomes highlighted. Push and hold the right mouse button and drag down the Workbench menu and select the info item. When using Workbench versions 2.0 and higher, the "information" item can be found under the "Tools" menu.
4. At the tool types area of the info screen, use the scroll gadget to select the "UNIT=" tool type. Edit this entry to select the unit number associated with the serial port on the A2232 card that you want to use. [Refer to the A2232 documentation for more details.]

Figure D - 1

Amiga
Info
Window
And
Tooltypes



5. Use the scroll gadget to select the "BAUD=" tool type. Edit this entry to 9600. This is important because the A2232 does not support the default 31,250 BPS rate normally used by the TBC III card.
6. Select the Save item on the info screen.
7. On the TBC III card, move DIP Switch 2 to the down position to select 9600 BPS operation. See Chapter Two for more information on setting DIP switches.

ASDG Dual Port Serial Board

To use the ASDG Dual Port serial board to control the TBC III, you should perform the following steps:

1. Install the ASDG card in your computer as detailed in the instructions accompanying the card.
2. Run the ASDG install program provided with the board.
3. Locate the Personal TBC III icon on your Workbench screen. Click on the icon so that it becomes highlighted. Then push and hold the right mouse button and drag down the Workbench menu and select the "info" item. If you are using Workbench version 2.0 or higher, the "information" item can be found under the "Tools" menu.
4. At the tool types area of the info screen, use the scroll gadget to select the "DEVICE=" tool type. Edit this entry to "DEVICE=siosbx.device".
5. Use the scroll gadget to select the "BAUD=" tool type. Edit this entry to 9600. This is important because most of the newer ASDG boards do not support the default 31,250 BPS (MIDI) rate normally used by the TBC III card. Don't forget to set DIP switch number 2 on the TBC III card DOWN as well. Refer to Chapter Two for more information.
6. Use the scroll gadget to select the "UNIT=" tool type. Edit this entry to select the unit number associated with the serial port on the ASDG card you want to use. (Refer to the ASDG documentation for more information.)
7. Select the Save item on the info screen.

This entry is case sensitive so be sure to enter the ASDG device name in lower case.

Appendix E

Adjusting The Video Toaster

Many DPS TBCs are used in conjunction with NewTek Video Toaster systems. It is fairly common to have a Video Toaster that appeared to be working properly until the TBCs were installed in the system. Often the first sign of trouble is when the Video Toaster fails to boot and instead displays the error message, "Video Toaster Not Responding."

Usually this error results when the Video Toaster's color subcarrier frequency varies too much with regard to that of the TBC. Many video devices, including the NewTek Video Toaster and the DPS Personal TBC, contain an oscillator crystal which runs at a frequency of four times that of the video color subcarrier signal. Operating independently, either device may work just fine, but when the frequency of the TBC and the Video Toaster vary by more than 20 Hertz, the Video Toaster may not lock up properly. Any of several symptoms may appear:

- A "tear" may be visible on the interface or RGB computer monitor. This tear appears to be a horizontal line about half way down the screen.
- You might see black bars on the program and preview monitors which cover approximately 1/8 to 1/4 of the screen.
- Crosstalk (ghosting) between either of the two frame buffers or between any other two video inputs may be present.
- The toaster interface screen on the RGB monitor may flash red or green, and then come up with a requestor stating "Toaster Not Responding."

A Real World Example

Let's assume you are connecting two TBC IIIs to a Toaster where the first TBC is plus 5 Hertz and the second TBC is minus 5 Hertz with respect to the Toaster oscillator frequency which is operating 20 Hertz higher than the nominal NTSC color subcarrier of 3.58 Megahertz.

The first TBC will probably work since there is only 15 Hertz difference between its frequency and that of the Toaster. The second TBC will probably not work

since the 25 Hertz difference between its subcarrier frequency and that of the Toaster will exceed the Toaster's nominal capture window. It will be necessary to adjust the oscillator frequency of the Toaster back to the nominal subcarrier frequency in order to make this system work.

The Fix

The only equipment needed to properly adjust the frequency of the Toaster is a consumer VCR with a tuner, an antenna and a small flat blade screwdriver. By using a broadcast television station as a reference, you can correctly adjust the Toaster's color subcarrier frequency to match that of the TV station, which by law must be accurate.

The Alignment Procedure

Always let equipment warm up to a stable operating temperature before making adjustments.

Only use a broadcast VHF station as your reference.

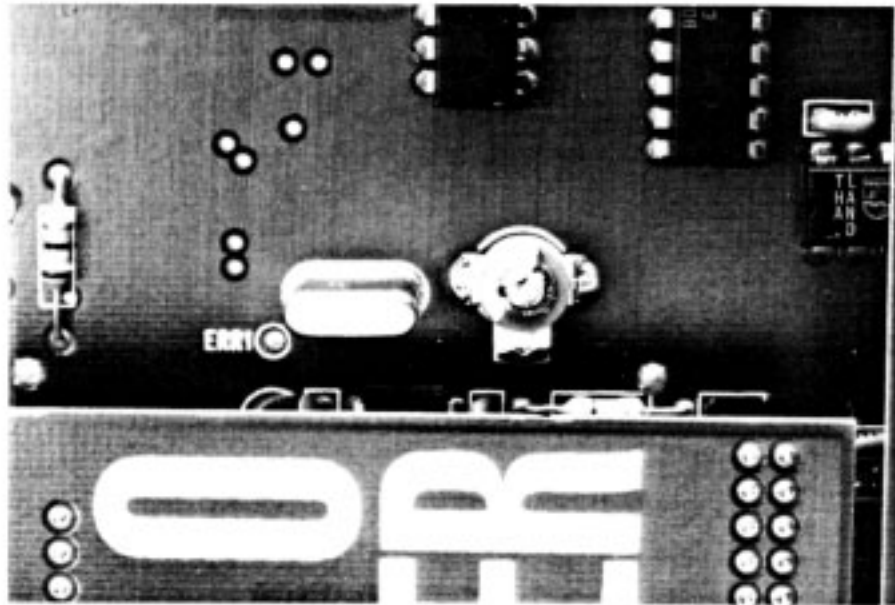
1. Turn off your computer. Disconnect all of the video inputs to the Toaster. Remove the cover from the Amiga computer.
2. Turn on the computer and boot the Toaster normally. Let both the computer and the toaster warm up for 30 minutes.
3. With the VCR in STOP, choose "TV" mode with your VCR's TV/VCR selector. Tune the VCR to a broadcast television station. Do not use a cable station, as they are not required to maintain strict broadcast specifications. Verify that the TV station's video signal is present on your VCR's "Video Output" connector.
4. With the Video Toaster logo displayed on the program monitor (it will be loaded into DV1), connect the Video Output of your VCR to Input-2 of the Video Toaster.
5. Select DV2 on the Toaster's Program Bus and Input-2 on the Preview Bus.
6. Select the horizontal split screen effect.
7. Pull the effects bar down halfway. You should see one half of the frame buffer image and one half of the broadcast video signal. The broadcast image will not be locked. This is what you want. The off-air picture will spin horizontally (either left-to-right or right-to-left) and its color will repeatedly cycle through 360 degrees of phase.

ADJUSTING THE VIDEO TOASTER

8. Locate the Toaster oscillator adjustment. It looks like a small screw just above the letter R of the stamped Video Toaster logo. It may appear to be soldered, but it is not. It is located about an inch to the right of the test point labeled ERR 1. Refer to Figure E-1.

Figure E - 1

Toaster
Oscillator
Capacitor
Adjustment



To adjust the oscillator frequency, turn this screw until you achieve minimum movement of the broadcast signal, the slowest possible crawl. Don't worry about trying to correct the color cycling.

9. Turn off the computer. Reassemble the case. Reconnect all video inputs.
10. Now restart the computer and rerun the Video Toaster "Auto Hue" adjustment program.

With a little luck, you should now find the Toaster's operation to be much more stable and reliable. Now that you have aligned the Video Toaster, you can reconnect the DPS TBC cards as indicated in Chapter Five. In most cases, the TBC cards and the Video Toaster will now work properly.

If you still experience problems (and if your system contains more than one TBC), try swapping them in your system. The local TBC oscillator frequency is only critical when the TBC is used as the main genlock reference. TBCs which are genlocked to another unit should easily be able to track another genlock reference signal.

Appendix F

TBC III Serial Protocol

This appendix describes the serial data interface to the TBC III card. This information is not normally required since the TBC III Amiga and MS-DOS software programs provided with the card are typically used to control the TBC. This information is intended for users and programmers who want to develop their own custom control (driver) software for the card. An example of a custom application would be a special driver for a computer-based editing controller which could poll and manipulate TBC proc amp parameters in order to store these values as part of an edit decision list.

The DPS Personal TBC III is equipped with a jumper (labeled "MT/TX") which normally forces the RS-232 transmit data output to be high impedance. This permits other applications to use the RS-232 port on an Amiga computer. The DPS Amiga TBC III program uses a one-way communications design and does not make use of the TBC card command responses (usually ACK characters). If you want to use two-way protocol, the transmit data control jumper on the TBC card must be moved to the "TX" position. This will allow certain types of status data to be transmitted from the TBC to your application. See Chapter Two for more information on setting this jumper.

Electrical Interface

The electrical interface for the TBC III is RS-232 using a computer's built in RS-232 port or any other RS-232 port which may reside on an expansion card. The bit rate is set to 31.250 BPS or 9600 BPS (DIP switch selectable, see Chapter Two), with 8 data bits, 1 stop bit and no parity.

Protocol

The software protocol is a MIDI compatible format, using the system exclusive feature of the MIDI interface. Communication with the TBCs is initiated when the system exclusive command byte (F0 hex) is received, followed by the TBC ID code (67 hex).

The next byte sent is the TBC address byte, which determines which TBC is being addressed by the command. This is followed by a TBC function select byte and one or more data bytes. The communication is completed when the MIDI end system exclusive byte is sent (F7 hex).

The following table summarizes the protocol:

Host:

- System Exclusive Byte (= F0 hex)
- TBC ID Byte (= 67 hex)
- TBC Address Byte (= 00-7F hex)
- Function Select Byte (= 00-7F hex)
- Data Byte 1
- Data Byte 2
- ...
- Data Byte N
- End System Exclusive (= F7 hex)

TBC Response:

- ACK Byte (= 40h) or NACK Byte (= 45h)

System Exclusive Byte

This byte is used in the MIDI protocol to allow manufacturers of MIDI equipment to define messages specific to their own equipment. The system exclusive mode remains in effect until the end system exclusive command is sent.

TBC ID Byte

This byte is the unique code which identifies the exclusive data for the particular personal TBC.

TBC Address Byte

This byte determines to which TBC the following command is directed. Each TBC card is equipped with a DIP switch which determines its address according to the table below.

Address Byte	DIP SW-3	DIP SW-4	DIP SW-5
00	DOWN	DOWN	DOWN
01	DOWN	DOWN	UP
02	DOWN	UP	DOWN
03	DOWN	UP	UP
04	UP	DOWN	DOWN
05	UP	DOWN	UP
06	UP	UP	DOWN
40	UP	UP	UP (Master)
7F	All (Ack'ed by master only)		

Note that the last entry in the table selects all TBCs. This allows the parameters of all installed TBCs to be simultaneously updated. If used, this command will be acknowledged by the master TBC only. Normally, when an individual TBC is addressed, the command will be acknowledged by that TBC.

TBC Function Select Byte/Data Byte(s)

The Function byte determines which function on the addressed TBC card will be affected by the command. Most commands follow this byte with two characters that represent the new hex value for the selected function. The following table lists each function with the associated data bytes.

TBC Function Select Byte/Data Byte(s)

<u>Function Byte</u>	<u>Data Byte(s)</u>	<u>Description</u>
01h	2 (0,0-F,F)	Set luminance level command 00 = Minimum luminance level FF = Maximum luminance level
02h	2 (0,0-F,F)	Set black level command 00 = Minimum black level FF = Maximum black level
03h	2 (0,0-F,F)	Set chroma level command 00 = Minimum chroma level FF = Maximum chroma level
04h	2 (0,0-F,F)	Set hue command 00 = Max counter clockwise FF = Max clockwise
05h	2 (0,0-F,F)	Set genlock timing fine 00 = Most retarded setting FF = Most advanced setting (0.55 ns/increment)
06h	2 (0,0-3,F)	Set genlock timing coarse 00 = Most retarded setting 3F = Most advanced setting (140 ns/increment)
07h	2 (0,0-F,F)	Set Horizontal position 00 = Most retarded setting FF = Most advanced setting
08h	1 (0-1)	Input mode select 0 = NTSC input mode 1 = S-Video input mode
0Ch	1 (0-1)	Freeze/Live mode select 0 = Live mode 1 = Freeze mode
0Dh	0	Request TBC brief status info.
0Eh	0	Request TBC full status info

<u>Function Byte</u>	<u>Data Byte(s)</u>	<u>Description</u>
10h	2 (0,0-F,F)	Set Blue color balance 00 = Most neg blue 80 = No blue FF = Most pos blue
11h	2 (0,0-F,F)	Set Red color balance 00 = Most neg red 80 = No red FF = Most pos red
13h	1 (0-2)	Select Freeze Mode 0 = Frame mode 1 = Field mode 2 = Strobe mode
14h	1 (0-2)	Freeze Field Select 0 = Select field 0 1 = Select field 1 2 = Select field 2
37h	1 (0-1)	Forced monochrome mode 0 = Color 1 = Mono

Proc Amp Control

The first four commands will be used most often. They allow each of the TBC proc amp functions to be individually manipulated.

Genlock Timing

Commands 05 and 06 are used to adjust the genlock timing of the TBC card. When the genlock timing fine control is incremented from FFh - 00h, the coarse control should be incremented to maintain a continuous control effect. Similarly, when the fine setting is decremented from 00h - FFh, the coarse control should be decremented. Whenever the genlock timing is to be adjusted, the TBC status should be read (see command 0Ah) to ensure that the addressed TBC is in genlock mode. The system phase is not significant when the TBC is in free-running mode.

The genlock timing control on the TBC card adjusts BOTH horizontal (i.e. sync timing) and subcarrier phase simultaneously in such a manner as to ALWAYS maintain a zero SCH relationship at the TBC video output. This is unlike some equipment which permits separate sync and subcarrier adjustments. The correct adjustment procedure is to first obtain the closest possible horizontal phasing. (Typically a waveform monitor or DPS Personal V-Scope would be used. Lacking a calibrated waveform monitor, the adjustment can be performed using a split monitor.)

Horizontal phasing should be done by incrementing/decrementing the genlock timing coarse setting in steps of 2 ($2 \times 140 \text{ ns} = 1 \text{ subcarrier cycle}$) which will move the picture without changing the color phasing.

The fine setting and the LSB of the coarse setting can now be adjusted for correct color phase. If this adjustment is performed without a vectorscope (i.e. by observing the color phase on a picture monitor), it is important that the TBC hue setting first be centered (Set to 80h) so that correct system timing is achieved.

Horizontal Position

The horizontal position control moves the active video portion of the picture without affecting the output sync and burst. When proper genlock timing is set, this control can be used to move the active video portion of the signal as may be required for certain editing situations. This control should be set to unity (80 hex) when the system phase is manipulated.

Brief TBC Status

Command 0D is used to request status information from the TBC. The TBC responds with the following status byte (followed by the normal ACK byte).

Bit 7	Always 0	
Bit 6	(Genlock Status)	1 = Genlocked 0 = Free-running
Bit 5	(Input Video Pres)	1 = Input present 0 = No Input present
Bit 4	(Freeze/Live Mode)	1 = Freeze mode 0 = Live mode
Bit 3-0	(Software Version ID)	

Full TBC Status

Command 0Eh requests a complete status dump from the addressed TBC. The status information consists of the brief status byte (see command 0Dh), followed by two ASCII characters for each of the proc amp and system phase settings. These represent the hex value of their current setting as indicated.

<u>Byte</u>	<u>Description</u>
1	Brief status byte (see command 0Dh)
2	MSN of Video Level
3	LSN of Video Level
4	MSN of Black Level
5	LSN of Black Level
6	MSN of Chroma Level
7	LSN of Chroma Level
8	MSN of Hue Level
9	LSN of Hue Level
10	MSN of Fine System Phase
11	LSN of Fine System Phase
12	MSN of Coarse System Phase
13	LSN of Coarse System Phase
14	MSN of Horizontal Position
15	LSN of Horizontal Position
16	Input Mode (0 = NTSC, 1 = S-Video)
17	MSN of Blue Color Balance
18	LSN of Blue Color Balance
19	MSN of Red Color Balance
20	LSN of Red Color Balance
21	TBC ACK byte

Note: MSN = Most Significant Nibble (ASCII 0 - 9 or A - F)
LSN = Least Significant Nibble

Programming Example

Some confusion has resulted from the fact that actual data bytes sent to the TBC card must be in ASCII. The following is an example of the actual data that would be sent to the TBC III card to force it into monochrome mode. Please note that the data bytes are always transmitted in ASCII.

0xF0	MIDI Start of Exclusive
0x67	DPS ID
0xAA	AA = TBC Address
0x37	Forced Monochrome Function Select
0x31	= ASCII for "1"
0xF7	MIDI End of Exclusive

Note: All TBC settings are maintained upon power down in non-volatile memory on the TBC card.

Appendix G

TBC III ARexx Commands

In Amiga systems, the DPS Personal TBC III can be controlled using ARexx commands. When the Amiga TBC III program is running, a public message port is opened which responds to ARexx messages in the function call format. The address of this message port is "TBC". The command format is as described by the table below:

ARexx Command Summary (Address: TBC)

<u>Command</u>	<u>Argument(s)</u>	<u>Result</u>
TBC	[1-4 MASTER ALL]	[1-4 ALL]
UNITY	<no args>	
INPUT	[COMPOSITE SVIDEO]	[COMPOSITE SVIDEO]
FREEZE	[ON OFF]	[ON OFF]
VIDEO	70.0 to 130.0	70.0 to 130.0
BLACK	-22.5 to +37.3	-22.5 to +37.3
CHROMA	50.0 to 150.0	50.0 to 150.0
HUE	-45.0 to +45.0	-45.0 to +45.0
HORIZONTAL	-1.00 to +1.00	-1.00 to +1.00
COARSE	-4.47 to +4.33	-4.47 to +4.33
FINE	0.0 to 180.0	0.0 to 180.0
BLUE	-40.0 to +40.0	-40.0 to +40.0
RED	-40.0 to +40.0	-40.0 to +40.0
RECALL	1 to 10	
STORE	1 to 10	
UNDO	<no args>	
QUIT	<no args>	
LOAD	<name> (will be "S:TBC.Defaults" if no name given)	
SAVE	<name> (will be "S:TBC.Defaults" if no name given)	
ANALYZER	[VECTOR WAVE OVERLAY SPLIT] [1H 2H] <<- returns same	
EXCITER	[NORMAL FREEZE PEAK VARIABLE] <<- returns same	
SUPERIMPOSE	[ON OFF]	[ON OFF]
RESPONSE	[FLAT LOWPASS]	[FLAT LOWPASS]
RATE	[2 to 127]	[2 to 127]

Command	Argument(s)	Result
VERSION	<no args>	[PersonalBC-III Vx.x]
KEYINPUT	[ON OFF]	[ON OFF]
KEYMODE	[VIDEO BLACK CHROMA HUE HORIZ BLUE RED] <<-returns one	
PROCAMP	[1-10][VIDEO, BLACK, CHROMA, HORIZONTAL, BLUE, RED] <<- returns same	
TOFRONT	<no args>	pops to front/closes switcher
TOBACK	<no args>	pops screen to back
TOSWITCHER	<no args>	opens switcher if it's running
TOPROCAMP	<no args>	switches to proc amp screen
TOBALANCE	<no args>	switches to balance screen
TOWB	<no args>	pops Workbench to front
WAIT	<numbers of frames>	
SEND	For test purposes only (sends 7 bytes of binary data) i.e. SEND "F06700013030F7"x	

Notes

- The UNITY keyword can replace any numeric argument for individual reset.
- Commands can be shortened to two or three characters or lengthened to any size. Some commands (BLA, BLU, RED, REC, REQ) require three characters due to name similarity. The same is true for keyword arguments.
- Commands do not require arguments. If no argument is given, the status will be unchanged (See example below). All commands return current status in "RESULT." "OPTIONS RESULTS" must be set to receive these. This excludes commands which do not require arguments and do not need to return status.
- All commands and arguments are case insensitive.
- Numeric results may not be returned exactly as sent. This is due to scaling factors of the specific function.

Example

OPTIONS	RESULTS
Address TBC	
TBC 1	
Hue Unity	Reset hue to unity
Say RESULT	==> 0.0
Hue (-1.7)	(ARexx needs parentheses for negatives as arguments)
Say RESULT	==> -1.8
Hue (-4.9)	
Say RESULT	==> -4.9
Hue	Request current setting
Say RESULT	==> -4.9

Appendix H

FCC Compliance Statement

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Notes:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Shielded cables must be used with this unit to ensure compliance with the Class A FCC limits.

Warning:

Changes or modifications to this unit not expressly approved by Digital Processing Systems, Incorporated could void the user's authority to operate the equipment.

Appendix I

Warranty

Digital Processing Systems Incorporated (DPS) warrants the original purchaser that this product is in good working condition for a period of two years from the date of purchase. Should this product, in DPS' opinion, malfunction within the warranty period, Digital Processing Systems will repair or replace this product without charge. Any replaced parts become the property of DPS. This warranty does not apply to those products which have been damaged due to accident, unauthorized alterations, unauthorized repairs or modifications.

Limitations

All warranties for this product, expressed or implied, are limited to two years from the date of purchase and no warranties, expressed or implied, will apply after that period. The distributor, its dealers and customers agree that Digital Processing Systems shall not be liable for any loss of use, revenue or profit.

Digital Processing Systems makes no other representations of warranty as to fitness for purpose of merchantability or otherwise in respect to any of the products sold to the distributor pursuant to this agreement.

The liability of Digital Processing Systems with respect to any defective products will be limited to the repair or replacement of such products.

In no event shall Digital Processing Systems be responsible or liable for any damages arising from the use of such defective products, whether such damages be direct, indirect, consequential or otherwise and whether such damages are incurred by the distributor or third party.

Warranty Service

Units requiring repair under warranty may be sent directly to Digital Processing Systems. To obtain service under this warranty, the purchaser must first contact the DPS customer service department in order to receive a return for repair authorization number. Purchasers should contact the appropriate repair location from the two listed below:

U.S.A.	Digital Processing Systems Customer Service Department 11 Spiral Drive, Suite 10 Florence, KY 41042 Phone (606) 371-5533 Fax (606) 371-3729
Canada and International:	Digital Processing Systems Customer Service Department 55 Nugget Avenue, Unit 10 Scarborough, Ontario M1S 3L1 Canada Phone (416) 754-8090 Fax (416) 754-7046

Units returned for repair must display the return authorization number clearly on the packaging. Units shipped without an RMA number will not be accepted. Proof of purchase (including the date of purchase) and a detailed note describing the nature of the problem must be included.

IMPORTANT:

When shipping your unit, pack it securely and ship it prepaid and insured. Digital Processing Systems will not be held liable for damage or loss to the product in shipment. Repaired items will returned to the purchaser prepaid via a surface freight carrier of DPS' choice. If another method of shipping is desired, it must be clearly specified in writing and all priority return freight charges are the responsibility of the purchaser.

