

Time Tailor 3500AP Advanced Processing

Operations Manual

August 2020



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IMPORTANT SERVICE NOTICE

Effective April 1, 2019, Prime Image will no longer provide support for the TT3500AP.

California Media Engineering (Cal Media) will be assuming all responsibility for product maintenance and support of all Prime Image's hardware solutions.

Cal Media will be offering maintenance and support directly to customers that continue to rely on these proven hardware solutions. Cal Media will also be offering refurbished equipment, under license from Prime Image, for those customers needing additional equipment to support their project requirements.

Cal Media's co-founder is the original designer of the Time Tailor product series and co-inventor on eight patents covering Time Tailor technology. Cal Media and its founders were also instrumental in the creation and development of the Time Tailor 3500AP and file-based prototypes.

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Disclaimer

I. RECOMMENDED OPERATING PARAMETERS

This new version of the Time Tailor has significantly improved the upper bounds of time reduction. As with previous versions of the Time Tailor, content remains the primary driver to how much time can be removed from a program while still preserving playout quality. The previous metric of 2-3% of time reduction in a one-hour program has now been increased to 5-7%. Having said that, it is important our customers establish their own operating parameters and reduction metrics after extensive testing with program content. The new “Tempo Regulator” is one of the components now available in the product to help achieve time reduction goals. When enabled, the “Tempo Regulator” will allow operators to include program openings, credits, and other program segments where background music might have previously experienced undesirable shifts in tempo during playout. The added program time now available to the Time Tailor, coupled with significant improvements in video signal processing increases our recommended time reduction to 30 seconds in 10 minutes of program time. Depending on content type, operators can successfully remove 45 seconds from a 10-minute program segment or 30 seconds from a 7-minute program segment. Again, this would be the upper bound of the TT3500AP, and it is highly recommend that a thorough QC of content be performed to ensure the product meets broadcast and playout requirements. Prime Image is not responsible for the creation of artifacts or other degradations in video quality resulting from Time Tailor processing.

II. SOURCE MATERIAL

- A. Supports live feeds with no required time delay (live programming)
- B. Supports most video servers, played out thru SDI port
- C. Supports tape deck and other linear feeds thru SDI port
- D. Works with filmed feeds
- E. Not recommended to be used with noisy audio and/or video feeds

Please see Appendix A for setup examples.

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Section 1 General Information

Scope of this Manual

This manual provides the operator with information necessary to install and operate the Time Tailor serial digital unit, manufactured by Prime Image, Inc.

Manual Improvements

Changes to this manual are documented by numbered engineering change orders. Individual users of this manual are encouraged to report any errors, omissions, or suggestions for improvement to the following address:

California Media Engineering Inc.
support@calmedia.com

Proprietary Information

The information in this manual is furnished solely for the purpose of providing instructions for installation and operation of the equipment described herein. Any other use of this information without the written consent of Prime Image, inc. is strictly prohibited.

Section 1.1 Product Description

The Time Tailor is a self-contained, solid-state solution that automatically reduces the length of a real-time SD/HD program. The Time Tailor achieves real-time processing by incorporating a variable video/audio delay. The length of the delay is initially equal to the amount of time the program will be reduced. Over the course of the program, the delay is slowly reduced to zero by dropping small segments of video, audio and caption data, using a process called “intelligent micro editing.” To describe this process in its simplest terms; the Time Tailor analyzes both the video and audio programs and drops segments of video and audio which contain identical or “like” information to that of the neighboring segment. By design, this process does not affect the pitch of the audio. Pitch correction technology is never used nor needed.

The Time Tailor consists of a main frame which houses the memory and all the electronics necessary for processing the video, audio, and closed caption data.

The standard unit comes equipped with 5 minutes SD or 2 minutes HD processing, and 16 channels of embedded or AES audio.

Options include an additional minute (3 minutes total) of HD processing, and up to 4 Dolby-E processors. These options are mutually exclusive and require the available slots in the chassis. Prime Image will work with customers to optimize their required solution.

Section 1.2 Application

A basic application of the Time Tailor is to create an additional 30 seconds of commercial time within a 30 minute program. The operator programs the Time Tailor with the amount of time to be inserted (the length of the additional commercial), and the total length of the original program (30 minutes). The START button is pressed at the beginning of the original program. The Time Tailor will output black video and silence for a period equal to the programmed insertion time. This is the time that the additional commercial is run. At the end of the insertion period, the Time Tailor will output the beginning of the program now delayed by the insertion time. Over the course of the program, the Time Tailor will automatically reduce the output's delay back to zero, so the program will finish in time with the original.

Section 1.3 Accuracy of Delay

The Time Tailor system has an inherent 3-frame video delay (when synchronized) in addition to the time indicated in the upper right hand corner of the display. To maintain proper lip sync between the audio and the video, an equivalent 3-frame delay has been added to the audio path. For Dolby-E signals only 1-Frame of delay is added due to the Dolby-E decoder's 1-Frame processing delay and the Dolby-E encoder's 1-Frame processing delay.

Section 1.4 Specifications

The Time Tailor is compiled of several embedded processors and a micro controller. The chassis design is 6U and rack mountable. Dual power supplies and fans are standard; no additional cooling is required during operation. There are no compute assets or licensed software integral to the solution, the boot time is typically less than 2 seconds. The spec sheet (Appendix E) provides additional detail to both physical measurements and operating features.

Section 2 Unpacking and Assembly

This section contains the information necessary for you to unpack, inspect, repack and assemble the Time Tailor unit.

Section 2.1 Unpacking

The Time Tailor unit is shipped in a re-usable cardboard shipping carton, which may be opened with a sharp, short-blade knife. Within the carton, the Time Tailor frame is supported in foam packing material and wrapped in a poly bag. The power supply, I/O, and memory boards are already inside the frame. Accessories are contained in a separate bag beside the frame. An external pouch contains a packing list showing the contents of the carton. Shipping weight of the Time Tailor unit with carton is less than 70 lbs.

Section 2.2 Inspection

The individual parts of your unit were inspected prior to shipment, and the unit should be in good operating order. Carefully inspect the chassis and accessories for any physical damage sustained in transit. If the unit is received in a damaged condition, notify your dealer or the factory immediately, and file a claim with the carrier.

Please verify that you have received all the items that should accompany the unit. Refer to Table 2-1 for a list of components and accessories. If you have any difficulties with the unit, if it is not operating properly, or if accessories are missing, contact the factory Customer Service Department.

Retain the carton and original packing materials in case the unit must be shipped.

Section 2.3 Packing

When repacking the unit for shipping, be sure that the unit and accessories are secured in the configuration described in Section 2.1. Check that all seams are securely sealed with tape, and the carton is clearly marked.

Section 2.4 Components and Accessories

The following table lists the components and accessories you should have received with the Time Tailor:

Table 2-1. List of Components and Accessories

Description	Quantity
Time Tailor Frame	1
Power Supply (Installed)	2
Line Cord, AC Power	2
Time Tailor Operations Manual	1
Packing Carton (with spacers and bags)	1

Section 3 **Installation**

This section gives you the information necessary to properly install the Time Tailor unit including power, environmental, and interconnection requirements.

Section 3.1 Power and Environmental Requirements

The Time Tailor unit is designed to operate from a power source providing 100 -240 VAC, 50/60 Hz.

To protect operating personnel and equipment, the unit should only be connected to a three-pronged grounded receptacle using the power cables provided. See Figure 3-1 for the location of the power cable connectors and the main power switch.

The Time Tailor unit is cooled by internal fans that draw cool external air in through the slots at the top of the front panel and exhausts warmed air out the rear panel, if unobstructed. When installing the Time Tailor, leave a minimum of 6 inches clearance behind the unit to provide maximum airflow for cooling.

Section 3.2 System Interconnection

All connections to the Time Tailor unit are made at the rear panel, as follows:

Table 3-1. Interconnection Requirements

Name	Characteristics	Function
AC Power (2)	100 – 240 VAC, 50/60Hz	On/Off rocker switches (O/I) on rear panel.
Serial In	SDI, 75Ω, BNC	Serial digital video input
Serial Out 1 & 2	SDI, 75Ω, BNC	Delayed serial digital video output
Buffered Monitor Output	Equalized, re-clocked SDI, 75Ω, BNC	Non-delayed digital video output
Genlock Loop	Hi-Z looping, BNCs	Reference input from external generator. Video output will be locked to this input
Digital Audio In	AES/EBU, 75Ω, BNCs	Digital audio input (see section 4.2 for source selection)
Digital Audio Out	AES/EBU, 75Ω, BNCs	Delayed digital audio output (outputs active regardless of source)
GPI	25-pin D connector (female)	GPI control (see Appendix A for information)
Remote	9-pin D connector (female) RS422 interface	Remote connection from controlling device (see Appendix B for information)

Figure 3-1 shows the rear panel connectors for a system that includes digital video and AES audio.



Figure 3-1. Rear Panel Connectors

The unit may be connected to a system according to the desired application using RG-56 (or equivalent) coaxial cable terminated with BNC connectors.

Section 3.3 Genlock

For best performance, the TT3500AP should be genlocked to a stable “Black” video reference. Either standard definition “Black-Burst”, or high definition “Tri-Level” signals without active video may be used (Note: 24.00 or 23.98 formats requires a “Tri-Level” signal if used). When a valid signal is connected to the Genlock input, the word “GENLOCK” appears on the display. If no Genlock signal is present, “NO REF” appears on the display.



If a Genlock signal is not present, the TT3500AP will either Free-Run or “Lock to Input” depending on the menu selection for “NonGenlock Mode” found under the SYSTEM menu.

The output’s horizontal phase may be adjusted using the SYSTEM menu item “SDI Horz Phase.”

Section 4 Operation

This section provides the information necessary to operate the Time Tailor unit. It includes descriptions of the operating controls and indicators.



Figure 4-1. Front Panel Controls and Indicators

Section 4.1 Controls and Indicators

Figure 4-1 shows the location of the front panel controls and indicators. Manual control of the time reduction process is possible with the ENABLE, START, HOLD, and STOP buttons. The ENABLE button prevents accidental activation of a control since it must be held down to enable the START, HOLD and STOP buttons.

All parameters are controlled through menus, which are grouped into four categories: TIME, PROC, SYSTEM, and STATUS. To access each parameter item in a menu, press the desired category button and scroll through each item using the MODE+ and MODE- buttons. The front panel display shows the current setting for each parameter. Adjustments are made by using the SET+ and SET- buttons (for selections and coarse adjustment), or the dial control (for fine adjustment). Pressing SET+ and SET- simultaneously resets the parameter to its default value. Press the EXIT button to exit a parameter item and return to the home screen.

Table 4-1. Functions of Front Panel Controls and Indicators

Name	Characteristics	Function
Power Indicator	If the front panel display is lit then power is on. Green LED's on the rear power modules indicate when the power supply is operating normally	AC power
Genlock Indicator	On-screen indicator, lower left of display. If reference signal is present, "Genlock" is displayed. If not, "No Ref" is displayed.	Indicates presence of external Genlock reference signal.
Delay MIN: SEC: FRM	Upper right corner of front panel display.	Shows remaining time to be acquired. Starts at insertion time set in Time Menus.
ENABLE	Press to enable Start, Hold, and Stop functions.	Prevents accidental activation of front panel controls.

START	Press simultaneously with Enable button to launch Time Tailor.	Starts time reduction process.
HOLD	Press simultaneously with Enable button to temporarily suspend time reduction.	Stops dropping video until released. Note: Amount of time should be set with Total Hold Time menu (below).
STOP	To stop the Time Tailor's time reduction process, press both the Stop buttons while simultaneously pressing the Enable button.	Stops time reduction process; resets delay to zero, and immediately goes to real time. Note: All program material in delay is lost.
TIME	Press to access parameters used for time reduction.	Time Menu.
PROC	Press to access parameters used for video and audio processing.	Processor Menu.
SYSTEM	Press to access parameters used for system setup.	System Menu.
STATUS	Press to access status displays.	Status Menu.
EXIT	Press to exit current menu.	Closes open menu and returns to main display.

START

Press this button simultaneously with the Enable button to start the time reduction process. As soon as you activate Start, the Time Tailor unit begins loading the delay buffer and counting down from the amount of insertion time you set. When it counts down to zero, the delay buffer is full and the program now starts from the Time Tailor's output. During the program, the Time Tailor looks for frames it can drop in the video and audio. By the end of the program, it will have dropped video in an amount equal to the insertion time bringing the delay buffer to zero. The program will end at the same time it normally would have ended.

HOLD

Press this button simultaneously with the Enable button to pause the time reduction process. When the Hold command is active, no time reduction occurs. If, however, the hold time exceeds the programmed hold time, the display will indicate that hold will be released in 30 seconds. If desired, Forced Hold can be enabled by pressing the HOLD button (with Enable) for 3 to 5 seconds. If the total hold time is too great, the program will end before the time reduction is complete.

STOP

Press both stop buttons simultaneously with the Enable button to abort the time reduction process. **WARNING**, any program material passing through the delay buffer will be lost.

PRELOAD

Press the Start button simultaneously with both the Enable button and Hold button to preload the Time Tailor. Preload activates the delay buffer but does not start the time reduction process. Once preloaded, the Time Tailor waits for the START button to be pressed before beginning time reduction.

Section 4.2 System Configuration

This section describes all the SYSTEM parameters used to configure the Time Tailor

SYSTEM MODE

The Time Tailor has three modes of operation: “Time Reduction”, “Trim”, and “Time Expansion”.

“Time Reduction” mode (default) is the standard mode used for time reducing programs greater than a few minutes.

“Trim” mode is a special mode for very short programs less than two minutes thirty seconds long. Its intended use is to trim commercials which are slightly too long or too short to fit designated time slots. When trim mode is enabled, the front panel display will indicate “TRIMMODE” to alert the operator.

“Time Expansion” mode is used for time expanding programs greater than a few minutes. When expansion mode is enabled, the front panel display will indicate “TIME EXPANSION” to alert the operator.

The front panel displays an icon indicating the direction of the processor. A “→←” icon indicates reduction mode, and a “←→” icon indicates expansion mode. Trim mode will use either icon depending on settings (see section 4.4).

SYSTEM FORMAT

The Time Tailor uses two menu parameters to configure the system’s video format.

Use “FORMAT:” to select the video resolution.
Use “Frame Rate:” to select the video frame rate.
Available formats include:

23.98/24.00 Fps – 1080psF	
25.00 Fps – 1080i, 625i	50.00 Fps – 720p
29.97 Fps – 1080i, 525i	59.94 Fps – 720p
30.00 Fps – 1080i	60.00 Fps – 720p

(Note, these menu parameters are interdependent and may require changing one parameter before the other parameter’s options become available)



HDSD-SDI INPUT - This menu is reserved for a future interface with the TT4000.
“Primary” (default) should be selected for normal operation.

SYSTEM AUDIO - The Time Tailor has eight menu items for configuring the system's audio:

AUDIO MEMORY

Use "Audio Memory:" to select the maximum insertion time for the audio processor.

The Time Tailor's audio processor is limited to 5.5 minutes of *insertion time* when processing 16 channels of audio. This limit only effects standard definition when additional memory cards are installed. This control allows the maximum time to be doubled to 11 minutes by only using 8 channels of audio.

- Use "16ch x 5.5min" (default) when operating with an *insertion time* setting of less than 5.5 minutes.
- Use "8ch x 11min" when programming an *insertion time* greater than 5.5 minutes. Only channels 1-8 are active with this selection.

AUDIO DELAY OFFSET

Use "Delay Offset:" to adjust the audio to video delay.

This control is provided to correct existing lip-sync errors on the incoming source material and is normally set to zero (default).

AUDIO METER SOURCE

Use "Meter Source:" to select the audio source that is displayed on the front panel meter. Available sources include the primary 16 channels ("Chan 1-16") or one of the Dolby-E processors that are installed ("Dolby-1").

AUDIO CHANNEL SOURCE

The following four menu items are used to select the inputs to the 16 primary channels.

Note: audio channels are arranged in groups of 4.

- Use "Ch 1-4 Source" to select between AES 1-4 (module 1), SDI embedded Group 1,2,3 or 4.
- Use "Ch 5-8 Source" to select between AES 5-8 (module 1), SDI embedded Group 1,2,3 or 4.
- Use "Ch 9-12 Source" to select between AES 9-12 (module 2), SDI embedded Group 1,2,3 or 4.
- Use "Ch 13-16 Source" to select between AES 13-16 (module 2), SDI embedded Group 1,2,3 or 4.

AUDIO EMBEDDED OUTPUTS

Use "Embedded Outputs" to enable or disable each of the four SDI embedded output groups.

Rotate the dial control to select the group number.

Press SET+ to turn the selected group on.

Press SET- to turn the selected group off.

SYSTEM TIMING - The Time Tailor has two menu items for configuring genlock timing:

HORIZONTAL PHASE

Use "SDI Horz Phase" to adjust the SDI output's phase horizontally with respect to the genlock input.

NON-GENLOCK MODE

Use "NonGenlock Mode:" to configure the system when a genlock reference is absent. This selection is only relevant when the genlock signal is missing. The Time Tailor will always lock to the genlock input if a signal is present.

Selecting “freerun” will cause the Time Tailor’s outputs to become asynchronous if the genlock reference is absent.

Selecting “lock to input” will cause the Time Tailor to automatically lock to the SDI input signal if the genlock reference signal is absent (Note: in this mode the SDI outputs may become unstable if both the genlock and the input signals are absent).

SYSTEM REMOTE - There are three menu items for configuring remote control of the Time Tailor.

GPI CONTROL

Use “GPI Control” to enable or disable the GPI ports. When “ENABLED”, the operator can START, STOP, HOLD or PRELOAD the Time Tailor by using the defined GPI port pins (see appendix). Selecting “ENABLED+STATUS” will additionally cause defined pins on the GPI port to output status signals for external GPI remote indicators.

REMOTE ACCESS

Use “Allow Access to:” to assign parameters that will be controlled by the RS422 remote. This allows engineering to assign a selected group of controls to the operator while retaining local control over all other parameters.

Use the SET+ and SET- buttons to select each parameter category.

Turn the dial control clockwise to select Y (yes - control by remote).

Turn the dial control counter-clockwise to select N (no – control remains via front panel).

REMOTE MODE

Use “Remote Mode:” to enable or disable remote control via the RS422 port.

Select “LOCAL” to disable remote control. All parameters are controlled by front panel.

Select “REMOTE” to enable remote control. Parameters enabled by “Allow Access to:” can only be controlled by remote. Parameters not enabled by “Allow Access to:” will continue to be controlled by the front panel.

DISPLAY BRIGHTNESS

Use this menu item to control the brightness of the front panel display

RESET SYSTEM

This menu item is used to reset every Time Tailor parameter to its default value.

WARNING! This action cannot be undone.

To reset system:

1. - Use the dial control to select “YES”.
2. – Press both SET+ and SET- simultaneously to initiate reset.

When reset has completed, the message “Done” will appear on the display.

Section 4.3 Processor Configuration

The PROCESSOR parameters are used to control the quality of the time reduction process. This section describes each parameter in detail.

PROCESSOR MODE

This menu item is used to select which time reduction processor is used. The operator may choose either “Advanced” or “Original”.

ADVANCED MODE (default)

The Time Tailor 3500AP introduces the new “Advanced” processing mode. This new mode adds several improvements to the video and audio processing, adds new features such as tempo regulation and V-CUT correction, and utilizes a more aggressive algorithm for an increased percentage of time reduction. Select “Advanced” to enable advanced processing.

ORIGINAL MODE

Select “Original” to disable the advanced processing. The Time Tailor 3500AP will now perform like the previous model 3000.

TEMPO REGULATOR (*Advanced mode only)

The regulator reduces sudden changes in the audio’s tempo during segment with high motion content. Fluctuations in tempo are most noticeable in scenes that contain music. The tempo regulator adaptively balances the video’s quality with the audio’s quality to minimize sudden tempo changes. The tempo regulator has four settings:

“Off” - Tempo regulator is disabled.

“Low” - Best Video (Some tempo fluctuations may occur at higher reduction rates)

“Medium” - Best Overall

“High” - Best Audio (default)

(An increase in video artifacts may occur at higher reduction rates)

DOLBY PROCESSOR - The Time Tailor 3500AP supports up to four Dolby-E processors as options. Each processor contains one Dolby-E decoder, Prime Image’s time reduction processor, and one Dolby-E encoder. Three processing modes are provided.

DOLBY MODE

This parameter is used to select one of three processing modes.

(Note: the channel pair is assigned by the next parameter(s) “Dolby Proc#I:”)

PASS DOLBY-E

In “Pass Dolby-E” mode (default), when a Dolby-E signal is detected (within the assigned primary audio channel pair), it is automatically routed to the Dolby-E processor. The processor decodes the signal to eight channels, time reduces all eight channels, and re-encodes the eight channels back to Dolby-E.

DECODE DOLBY-E

“Decode Dolby-E” mode is used to decode a Dolby-E signal to channels 1-8. When a Dolby-E signal is detected (within the assigned primary audio channel pair), it is automatically routed to the Dolby-E processor. The processor decodes the signal to eight channels, and time reduces all eight channels. Output channels 1-8 are replaced by the decoded output of the processor.

ENCODE DOLBY-E

“Encode Dolby-E” mode is used to produce a Dolby-E signal from channels 1-8. Primary audio channels 1-8 are routed to the Dolby-E processor. The processor time reduces all eight channels, and encodes the eight channels to a Dolby-E signal. The assigned channel pair is then replaced with the Dolby-E signal at the Time Tailor’s output.

DOLBY CHANNEL PAIR ASSIGNMENT

Use “Dolby Proc#1:” parameter to assign the primary audio channel pair for use by the Dolby-E processor. Similar menu items (#2, #3, #4) will appear if additional Dolby processors are installed.

AUDIO PHASE GROUP

The Time Tailor 3500AP requires all related audio channels to be grouped together to maintain the stereoscopic phase relationships between channels. If some audio tracks are not phase related, such as Low Frequency Effects (LFE), a second language, or test tones, then separating them may improve the overall performance of the time reduction.

16 CHANNEL GROUP

Select “One 16-Ch Group” if the channel assignments are unknown, or will vary.
This is the default mode and will perform well for most audio content.

8 CHANNEL SURROUND (SMPTE 2035)

Select “Surround 8-Ch” if the channel assignments are known to match the SMPTE 2035 specification (case 11c - 11i) for 8-Ch surround:

1=Left, 2=Right, 3=Center, 4=LFE (Low Freq)*,
5=Left surround, 6=Right surround, 7-8=extra

**(Note: This mode separates LFE ch-4 from the group to improve the overall quality)*

12 CHANNEL SURROUND (SMPTE 2035)

Select “Surround 12-Ch” if the channel assignments are known to match the SMPTE 2035 specification (case 13a) for 12-Ch surround:

1=Lt,2=Rt, 3=Lt-M&E, 4=Rt-M&E, 5=Left, 6=Right, 7=Center,
8=LFE (Low Freq)*, 9=Left surround, 10=Right surround, 11-12=extra

**(Note: This mode separates LFE ch-8 from the group to improve the overall quality)*

8 CHANNEL GROUPS x 2

Select “Two 8-Ch Groups” if the audio signals in channels 1-8, are unrelated to the audio signals in channels 9-16.

CLOSED CAPTION OFFSET (NTSC – STANDARD DEFINITION)

This menu item controls the D.C. offset of the NTSC closed caption encoder.

“0 IRE” is the default offset specified in the CEA-608 specification.

Select “-7.5 IRE” to pre-compensate the signal if a +7.5 IRE pedestal will be added to the output video. This will produce a final correct output offset of 0 IRE.

VIDEO INDEX (STANDARD DEFINITION)

The video index signal is used by digital VTRs to store color framing for composite sources. During playback, some VTRs use the index signal (if present) to recreate the original composite color frame sequence at the output. Video that has been time reduced using the Time Tailor 3500AP may produce problems on some VTR’s composite output because the color framing sequence has been altered each time a frame was dropped. In these cases, it is best to remove (blank) the index signal and let the VTR treat the video as a component source.

Select “BLANK signal” (default) to blank the video index signal.

Select “Pass signal” to pass the video index signal if present.

INTERPOLATION MODE

The Time tailor 3500AP interpolates over frames as they are dropped in order to smooth over sections of the picture, which may be in motion. This menu item selects the type of interpolation that will be used.

MOTION ADAPTIVE

Select “Motion Adaptive” (default) for the best overall performance. This mode adaptively switches between field and frame modes, pixel by pixel, based on motion content. Field mode provides minimum artifacts during motion but softens vertical detail. Frame mode maintains vertical detail but produces greater artifacts with motion.

FIELD MODE

Select “field mode” for best motion. This mode forces the Time Tailor 3500AP into field mode. Field mode provides minimum artifacts during motion but softens vertical detail. This mode may be a benefit with soft dark scenes having heavy motion, where detail is difficult to detect.

FRAME MODE

Select “frame mode” for best detail. This mode forces the Time Tailor 3500AP into frame mode. Frame mode maintains vertical detail but produces greater artifacts with motion. This mode may be a benefit with noisy images with little motion, and having sharp graphics.

NONE

The mode “none” is not recommended. This mode disables all interpolation, and may produce an obvious jump in the image as frames as dropped.

HOLD ON BLACK

The Time Tailor 3500AP can be configured to HOLD time reduction if a black segment is detected. This allows “commercial black slugs” to be detected automatically and have their exact lengths preserved.

DISABLED

Use “Disabled” to turn off the Hold-on-black feature.

VIDEO + AUDIO

Use “Video + Audio” to enable the HOLD when video is black and audio is silent.
(Note: all audio channels must be below –55dBFS for HOLD to activate)

VIDEO ONLY

Use “Video Only” to enable the HOLD when video is black, ignoring all audio channels.

VERTICAL CUT DETECTOR

Enabling menu item “VCUT Detector”, allows the Time Tailor 3500AP to detect instant scene changes commonly referred to as vertical cuts. When detected, the time reduction process will align the dropped frame with the cut, and prevent any softening of the transition by halting the interpolation.

Use “Enabled” (default) to activate the VCUT detector.

Use “Disabled” to turn off the VCUT detector.

VCUT DETECTOR SENSITIVITY (*Advanced mode only)

The menu item “VCUT Sensitivity” controls the sensitivity of the VCUT detector.

“NORMAL” (default) is the recommended setting.

“HIGH” may be selected if the detector fails to see cuts during video segments with low light levels.

VCUT CORRECTION (*Advanced mode only)

This is a new feature that was added to the Time Tailor 3500AP to prevent de-interlace errors produced by some VTRs and flat screen monitors. Most equipment in use today relies on the 3:2 sequence (telecine) to correctly de-interlace video that was created from 24fps content. However, some equipment cannot adapt to a sudden change in the 3:2 sequence and will produce a “bad” frame containing two different images. Sudden changes to the 3:2 sequence are often caused by “bad edits” when the sequence is ignored during video editing. Because the Time Tailor also produces sudden changes in the 3:2 sequence as each frame is dropped, the time reduced output may lead to de-interlace errors on some equipment.

When a 24fps program is converted to 30fps with a 3:2 sequence, typically half of the vertical cut transitions will occur at the start of field 1, and half at field 2. Most errors occur when the sequence is changed (by dropping a frame) just ahead of a field 2 cut. If the de-interlace algorithm is unable to detect the change, it will assume based on the previous sequence that field 1 and field 2 contain the same image, and it will incorrectly combine both fields into the same frame. The resulting frame will appear as a 50/50 mix of two different scenes.

The VCUT corrector attempts to solve this problem by re-positioning (“correcting”) all vertical cuts to the start of field 1. This will prevent a de-interlace error from combining two different scenes into one frame.

NONE

Select “None” to disable VCUT correction.

FIX FLD-2 CUTS

Select “Fix fld-2 cuts” to enable VCUT correction.

DROP MODE (*Advanced mode only)

This menu item allows the operator to disable the motion detector and force the time reduction into a periodic drop mode.

MOTION ADAPTIVE

Use “Adaptive” (default) to enable full motion adaptive time reduction.

PERIODIC

The “Periodic” selection may provide improved performance at extremely high reduction rates (> 10%) and also provides maximum tempo regulation.

Section 4.4 Time Reduction Settings

The TIME parameters are used to set up the time reduction process. This section describes each parameter in detail.

Note: “⊘” is a space holder only and cannot be adjusted.

PROGRAM TIME

This menu item is used to set the total length of the original program. This includes all “black slugs” and sections that will be in hold mode such as pre-existing commercials. The Time Tailor is guaranteed to finish by this time. Program time has a range of 2 minutes to 4 hours adjustable in one minute increments. The operator should always round down to the nearest minute.

Program Time ⊘⊘:⊘⊘:⊘⊘:⊘⊘

Enter the total program time (hours and minutes) from beginning to end of the original program.

INSERTION TIME

This menu item is used to set the commercial insertion time. This is the additional time that is created by the time reduction process. In *expansion mode*, this is the additional time by which the program is lengthened. Insertion time has a range of 1 frame to typically 2 minutes (Maximum time depends on memory installed, standard is 2min in HD / 5min SD) adjustable in one frame increments.

Insertion Time ⊘:⊘⊘:⊘⊘

Enter the amount of additional time (minutes, seconds and frames) to be created.

TOTAL HOLD TIME

Hold mode is used to pause the time reduction process and preserve the length of “black slugs”, pre-existing commercials, or other areas of interest.

This menu item is used to set the total amount of time that the Time Tailor will be in hold mode, including “Hold-on-black”. Hold time has a range of 0 to 60 minutes adjustable in 30 second increments. The operator should always round up to the nearest 30 seconds.

Hold Time 00:00:00

Enter the total time (in minutes and seconds) that the Time Tailor will be in Hold mode.

PRESETS

The values used for PROGRAM TIME, INSERTION TIME, and HOLD TIME can be saved to one of four presets.

ORIGINAL TIME (TRIM MODE)

This menu item is used to set the total length of the original program.

Original Time 00:00:00:00

Enter the total time (hours and minutes) from beginning to end of the original program.

DESIRED TIME (TRIM MODE)

This menu item is used to set the desired length of the time altered program.

Desired Time 00:00:00:00

Enter the desired time (hours and minutes) from beginning to end of the time altered program.

WAIT ON BLACK (TRIM MODE)

If Wait-On-Black mode is enabled, the Time Tailor waits for the program to come out of black before starting the time reduction process.

Section 4.5 Status Information

The STATUS menu provides diagnostic information for various systems within the Time Tailor 3500AP.

- ❖ System Version Number
- ❖ VBI Closed Caption Status (NTSC)
- ❖ DTV Closed Caption Status (CEA-708/608)
- ❖ Embedded Audio Input Status
- ❖ Time Reduction Processors Status
- ❖ Memory status
- ❖ Remote Status
- ❖ Board & Module I.D. and version numbers

Section 4.6 Basic Operation

Use the Time Menus to set up a time reduction process. The Time Tailor's capabilities can be pushed beyond the specifications, but forcing it to reduce a program by more than the recommended time will result in a degradation of the video and/or the audio output. The output quality varies by the type of video input.

Main Menu

This menu displays the operating status of the Time Tailor unit. The display may indicate that the machine is in the Starting, Run, Hold or Stop mode. It also shows the remaining time for the time reduction to reach completion.

1. Starting mode Displays the remaining time for the insertion beginning immediately when the Start activated, such as by pressing the START button.
2. Run mode Indicates that time reduction is active.
3. Hold mode Indicates NO time reduction.
4. Stop mode Indicates that either the unit was manually stopped or that the desired time reduction has been reached.

Programming Example

As an example, let's say you want to make a 30-second insertion at the beginning of a half hour program, and you know that the 30-minute program time includes 2 minutes of existing commercial time. Use the following information to program the Time Tailor unit.

1. Enter the Time Menu by pressing the TIME button on the front panel.
2. Press the MODE+ button until the "Program Time" is displayed. Using the SET+ and SET- buttons enter 30 minutes of program time.
3. Press the MODE+ button to advance to "Insertion Time". Using the SET+ and SET- buttons enter 30 seconds of insertion time.
4. Press the MODE+ button to advance to "Total Hold Time". Using the SET+ and SET- buttons enter 2 minutes of hold time.
5. Press the TIME button again to return to the Main Menu.
6. The Time Tailor unit is now ready to start. Press the START button on the front panel (while simultaneously pressing ENABLE) while simultaneously running your 30-second insertion.
7. Watch the incoming signal. When the existing commercials begin, enter the Hold mode by pressing the HOLD button on the front panel (while simultaneously pressing ENABLE). At the end of the commercial time, exit the Hold mode by again pressing ENABLE and HOLD (or START). Using the Hold mode maintains (does not reduce) the commercial time.



Maintenance & Support

This section gives you information about maintaining the Time Tailor unit, obtaining service, and troubleshooting.

Routine Maintenance

The Time Tailor unit is inherently a low maintenance unit that requires only a periodic dusting internally, when used in an unfiltered environment. The fan is a sealed bearing, brushless DC unit that should be replaced every 5 years of continuous duty operation.

Power Supply

The Time Tailor unit is designed for constant power. If one power supply fails, you can replace it without interruption of power or function. The extinguished indicator light shows which power supply has failed. To remove the failed power supply, unscrew the four screws and pull the handle to slide out the unit. Slide a new power supply unit into place and tighten the four screws. The indicator light for the new unit should be lit.

Unit Malfunction

All Time Tailor units are designed and tested to perform as outlined previously in this manual. The manufacturer does not assume any responsibility for damage or malfunction resulting from operation of this unit outside the published environmental or interface specifications, or improper operation resulting from custom interfacing or any unauthorized internal modification.

If you encounter a malfunction during the warranty period, call our Customer Service Department at the factory to arrange for service. **DO NOT** attempt to service this unit during the warranty period; to do so will void the warranty.

SERVICE INFORMATION

All inquiries relating to either parts replacement or warranty service should be directed to:

California Media Engineering Inc.

Phone: (805) 931-0857

Email: support@calmedia.com

Troubleshooting

The following table provides troubleshooting information for frequently encountered problems:

Table 5-1. Troubleshooting

Condition	Possible Cause
Intermittent alarm sounds.	One or both power supply units not turned on. Power supply unit has failed.
No video.	Wrong Video Format selected. Genlock frame rate mismatch Memory boards not installed.
No audio.	Incorrect Audio Source selected. Audio board not properly seated. Audio module not in correct position.
Problems with video such as rolling or no color.	Wrong video standard at Genlock Loop. Example: 25Fps reference connected to Genlock while unit has been configured for 29.97Fps output.
Front panel doesn't work but power appears to be on (fan runs).	Ribbon cable between control pad door and control board loosened. Control board not properly seated. Slide switch on front of control board not set to FP Enable.

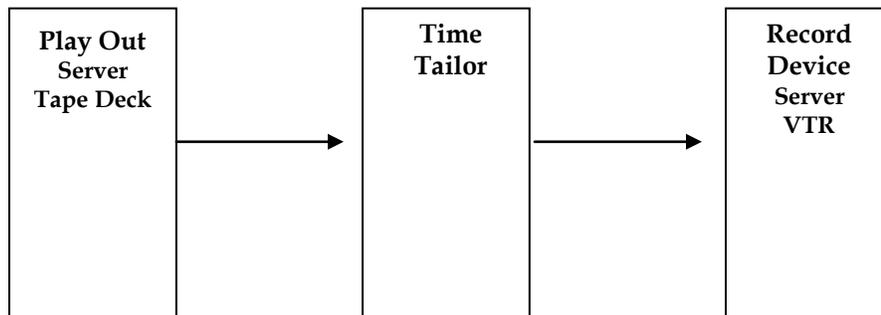
Power

If the intermittent alarm sounds, this is a warning of a power supply failure. Both power supplies must be turned on and must be operative. Check that both power switches are in the "On" position. If a power supply is on but the green LED is not lit, contact Technical Support. The power supply can be replaced while the Time Tailor unit is running, to avoid down time. To turn off the alarm, press the Reset button near the power switch.

If the Time Tailor unit stops working, but the power indicator is still on, contact Technical Support immediately. There are several troubleshoot operations that can be done in the field to avoid full replacement.

Appendix A Setup/Install Examples

Setup Example: Off-Line Use



This is perhaps the easiest way to use the Time Tailor. By utilizing the “Hold on Black” feature (see “Pref 5” in Table 4-1 on page 17), the broadcaster can time compress a show as it is being fed to the record VTR while maintaining the 2-minute black “slugs” that are built into the program.

The scenario below is based on a 30-minute program that contains 6 minutes of black. The desired time reduction is 30 seconds.

Settings for the Time Tailor:

Total Program Time	30 minutes
Insertion Time	30 seconds
Total Hold Time	7 minutes (always enter a bit more hold time than you expect to use)
Hold on Black	Enabled

At the start of the program, start the Time Tailor.

Return 30 minutes later, and the record device will contain a 30-minute program with 7 minutes of black and 22 ½ minutes of program (the program will have been reduced by 30 seconds).

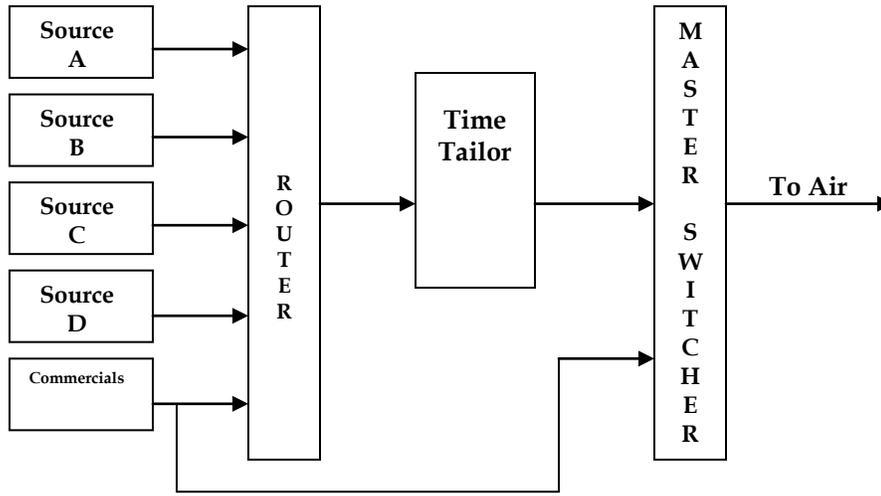
There is also a GPI feature – PRELOAD – which can be used in this configuration:

If the PRELOAD feature is activated, the unit will load its buffer and then output video delayed by the length of the Insertion Time, typically 30 seconds. While the unit is in the PRELOAD state, it will not be doing time reduction.

The unit can be switched from the PRELOAD mode to the START mode at any time. This allows the operator to be less precise with the START of the time reduction. Please note that the Program Time is calculated from the START time to the program end time. If you are going to use the PRELOAD feature and not activate the START command until 1 minute into the program, you must enter the Program Time as 29 minutes instead of 30 minutes.

Hints: It is always best to slightly underestimate the Program Time.
It is always best to slightly overestimate the Total Hold Time.

Setup Example: Live Environment



This is a typical operation with the following parameters:

Settings for the Time Tailor:

Program Time	30 minutes
Insertion Time	30 seconds
Total Hold Time	7 minutes
Hold on Black	Enabled

Program Start Time 7:00.00.

First break is 2 minutes long at 7:10.00.

No other commercials in the first 10 minutes.

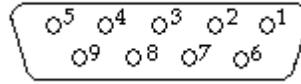
- At 7:00.00 Air your added 30-second spot.
- At 7:00.00 Start the Time Tailor (use GPI from router, if you choose).
- At 7:00.00 Input to the Time Tailor is regularly scheduled program.
- At 7:00.30 Air output of the Time Tailor (program delayed by 30 seconds).
- At 7:10.00 Input to the Time Tailor is first break material (this break will be delayed by approximately 15 seconds to viewing audience).
- At 7:10.00 Put the Time Tailor into HOLD (use GPI from router, if you choose).
- At 7:12.00 Input to the Time Tailor is program (second segment).
- At 7:12.00 Take the Time Tailor out of HOLD (remove GPI).
- At 7:30.00 You will have made up your 30-second spot time.

Hints: It is always best to slightly underestimate the Program Time.

It is always best to slightly overestimate the Total Hold Time.

Appendix B RS422 Control

RS422 Pin-out



<u>Pin</u>	<u>Signal</u>
1	GND
2	RA
3	TB
4	GND
5	AUX
6	GND
7	RB
8	TA
9	GND

Figure B-1. Remote Interface Pin-out

RS422 Control Codes

The Time Tailor unit uses control codes based on the Betacam series tape machines. The Time Tailor responds to BVW-35 commands for basic control. In addition, all Time Tailor functions are controllable through a subset of commands. For a document detailing all the Time Tailor commands, please contact customer support.

The protocol is based on the EIA RS-422-A signal standard, at 38.4 kBits/s.
 The data are sent as 1 start bit + 8 data bits + 1 parity bit + 1 stop bit.
 Parity is odd: the sum of data bits 0-7 and the parity bit is an odd number.
 The DTM is always in "DEVICE" mode.

START BIT	D0 (LSB)	D1	D2	D3	D4	D5	D6	D7 (MSB)	PARITY (ODD)	STOP BIT
-----------	----------	----	----	----	----	----	----	----------	--------------	----------

Command Block Format

The communications between the CONTROLLER and the DEVICE (the Time Tailor unit) is composed of CMD1/DATA-COUNT, CMD2, DATA, and CHECKSUM, and transmitted in that order. When DATA-COUNT is zero, the DATA is not transmitted. When it is not zero, the corresponding DATA BYTE is inserted between CMD2 and CHECKSUM.

CMD1	DATA COUNT	CMD2	DATA1 (if any)		DATA N (N-MAX 15)	CHECKSUM
- 1 BYTE-		-1 BYTE-			-1 BYTE-	-1 BYTE-

CMD1 (the upper 4 bits of CMD1/DATA-COUNT) indicates the function and direction of the command, according to:

CMD1	FUNCTION	DIRECTION	
		CONTROLLER	DEVICE
0	SYSTEM CONTROL	----->	
1	SYSTEM CONTROL RETURN	<-----	
2	TRANSPORT CONTROL	----->	
4	PRESET & SELECT CONTROL	----->	
6	SENSE REQUEST	----->	
7	SENSE RETURN	<-----	

DATA-COUNT (the lower 4 bits of CMD1/DATA-COUNT) indicates the number of data bytes (max 15) inserted between CMD2 and CHECKSUM.
 CMD2 indicates the command to the device or from the device.
 DATA1-DATA N is the data defined by the command (CMD2).
 CHECKSUM is the sum of all bytes:

$$CMD1/DATA-COUNT + CMD2 + DATA1 + \dots + DATA N$$

PROTOCOL

The protocol is initiated by the CONTROLLER. The Time Tailor will respond within 9 msec.
 The response from the Time Tailor will be:

ACK	if the CONTROLLER did not request data
COMMAND + DATA	if the controller requested data
NAK + ERROR DATA	if an undefined command was received or there was a communication error

The CONTROLLER shall not transmit additional commands prior to receiving an appropriate response from the Time Tailor.

The CONTROLLER shall not interrupt transmission of a command block for more than 10 msec.

TIME TAILOR BVW-35 COMMAND SET

The following chart lists all the BVW-35 commands. Those which produce some action by the Time Tailor unit are listed first, followed by the inactive commands which are only used for BVW-35 identification and acknowledgement.

COMMAND	BVW-35 NAME	RETURN	TT ACTION
20 00 [20]	Stop	10 01 [11] ack	STOP
20 01 [21]	Play	10 01 [11] ack	START/unHOLD
20 02 [22]	Record	10 01 [11] ack	START/unHOLD
21 11 00 [32]***	Jog Fwd (still)	10 01 [11] ack	HOLD
21 12 00 [33]***	Var Fwd (still)	10 01 [11] ack	HOLD
21 13 00 [34]***	Shuttle Fwd (still)	10 01 [11] ack	HOLD
21 21 00 [42]***	Jog Rew (still)	10 01 [11] ack	HOLD
21 22 00 [43]***	Var Rew (still)	10 01 [11] ack	HOLD
21 23 00 [44]***	Shuttle Rew (still)	10 01 [11] ack	HOLD
20 30 [50]	Preroll	10 01 [11] ack	PRELOAD
44 00 FF SS MM HH [??]*	Timer-1 Preset	10 01 [11] ack	Hold Time
44 14 FF SS MM HH [??]*	In Preset	10 01 [11] ack	Insert Time
44 15 FF SS MM HH [??]*	Out Preset	10 01 [11] ack	Program Time
00 11 [11]	Device Type Request	12 11 20 00 [43] M standard 12 11 21 00 [44] N standard	None
20 04 [24]	Standby Off	10 01 [11] ack	None
20 05 [25]	Standby On	10 01 [11] ack	None
20 0F [2F]	Eject	10 01 [11] ack	None
20 10 [30]	Fast Fwd	10 01 [11] ack	None
20 20 [40]	Rewind	10 01 [11] ack	None
24 31 XX XX XX XX [??]	Cue Up with Data	10 01 [11] ack	None
20 60 [80]	Full EE Off	10 01 [11] ack	None
20 61 [81]	Full EE On	10 01 [11] ack	None
20 63 [83]	Selected EE Off	10 01 [11] ack	None
20 64 [84]	Edit Off	10 01 [11] ack	None
20 65 [85]	Edit On	10 01 [11] ack	None

'XX' represent data which is variable.

'[??]' indicates the checksum needs to be calculated based on the chosen data (XX).

TIME TAILOR BVW-35 COMMAND SET (continued)

COMMAND	BVW-35 NAME	RETURN	TT ACTION
44 04 XX XX XX XX [??]	Time Code Preset	10 01 [11] ack	None
44 05 XX XX XX XX [??]	U-bit Preset	10 01 [11] ack	None
40 08 [48]	Timer-1 Reset	10 01 [11] ack	None
40 10 [50]	In Entry	10 01 [11] ack	None
40 11 [51]	Out Entry	10 01 [11] ack	None
40 18 [58]	In + Shift	10 01 [11] ack	None
40 19 [59]	In – Shift	10 01 [11] ack	None
40 1A [5A]	Out + Shift	10 01 [11] ack	None
40 1B [5B]	Out – Shift	10 01 [11] ack	None
40 20 [60]	In Flag Reset	10 01 [11] ack	None
40 21 [61]	Out Flag Reset	10 01 [11] ack	None
40 24 [64]	In Recall	10 01 [11] ack	None
40 25 [65]	Out Recall	10 01 [11] ack	None
41 30 XX [??]	Edit Preset	10 01 [11] ack	None
44 31 XX XX XX XX [??]	Preroll Time Preset	10 01 [11] ack	None
41 32 XX [??]	Tape/Auto Select	10 01 [11] ack	None
41 36 XX [??]	Time Mode Select	10 01 [11] ack	None
41 37 XX [??]	Input Check	10 01 [11] ack	None
40 40 [80]	Auto Mode Off	10 01 [11] ack	None
40 41 [81]	Auto Mode On	10 01 [11] ack	None
61 0A 01 [6C]	TC Gen Data Sense	74 08 Tf Ts Tm Th [??]**	None
61 0A 10 [7B]	TC Gen Data Sense	74 09 00 00 00 00 [7D]	None
61 0A 11 [7C]	TC Gen Data Sense	78 08 Tf Ts Tm Th 00 00 00 00 [??]**	None
61 0A XX [??]	TC Gen Data Sense	70 0D [7D] bad request	None
61 0C 01 [6E]	Current Time Sense	74 04 Tf Ts Tm Th [??]**	None
61 0C 02 [6F]	Current Time Sense	74 06 Tf Ts Tm Th [??]**	None
61 0C 03 [70]	Current Time Sense	74 06 Tf Ts Tm Th [??]**	None
61 0C 04 [71]	Current Time Sense	74 00 Tf Ts Tm Th [??]**	None
61 0C 10 [7D]	Current Time Sense	74 05 00 00 00 00 [79]	None
61 0C 20 [8D]	Current Time Sense	74 07 00 00 00 00 [7B]	None
61 0C 30 [9D]	Current Time Sense	74 07 00 00 00 00 [7B]	None
61 0C 11 [7E]	Current Time Sense	78 04 Tf Ts Tm Th 00 00 00 00 [??]**	None
61 0C 22 [8F]	Current Time Sense	78 06 Tf Ts Tm Th 00 00 00 00 [??]**	None
61 0C 33 [A0]	Current Time Sense	78 06 Tf Ts Tm Th 00 00 00 00 [??]**	None
61 0C XX [??]	Current Time Sense	70 0D [7D] bad request	None
60 10 [70]	In Data Sense	10 01 [11] ack	None
60 11 [71]	Out Data Sense	10 01 [11] ack	None
60 20 XX [??]	Status Sense	(See BVW-35 status table)	None
60 30 [90]	Edit Preset Sense	71 30 00 [A1] ret	None
60 31 [91]	Preroll Time Sense	74 31 00 00 00 00 [A5] ret	None
60 36 [96]	Time Mode Sense	71 36 00 [A7] ret	None

Notes for BVW-35 command set:

- All numbers are in hexadecimal format.
- The commands listed in the table are given in the form:
 CMD1/DATA-COUNT CMD2 DATA (if any) [CHECKSUM]
 For example, the PLAY command is described as 20 01 [21]
 (note, there are no data bytes)
 Another example, Insert Time of 30 seconds is described as
 44 14 00 30 00 00 [88]*
 (note, the checksum is calculated by 44+14+00+30+00+00 = 88)
- If the command is other than is listed in the table, the Time Tailor units returns with:
 11 12 01 [24] = 'undefined command'
- If an error is detected, the Time Tailor unit returns a NAK (not-acknowledge) as follows:
 11 12 04 [27] = 'checksum error'
 11 12 10 [33] = 'parity error'
 11 12 80 [A3] = 'timeout error'
- * Time data is given in the format FF SS MM HH, where:
 FF = Frames BCD data, upper 4 bits are tens place, lower 4 bits are ones place.
 SS = Seconds BCD data, upper 4 bits are tens place, lower 4 bits are ones place.
 MM = Minutes BCD data, upper 4 bits are tens place, lower 4 bits are ones place.
 HH = Hours BCD data, upper 4 bits are tens place, lower 4 bits are ones place.
- ** Time Delay data, given in the format Tf Ts Tm Th, where:
 Tf = Frames BCD data, upper 4 bits are tens place, lower 4 bits are ones place.
 Ts = Seconds BCD data, upper 4 bits are tens place, lower 4 bits are ones place.
 Tm = Minutes BCD data, upper 4 bits are tens place, lower 4 bits are ones place.
 Th = Hours BCD data, upper 4 bits are tens place, lower 4 bits are ones place.
- *** Jog, Var, and Shuttle can also use two data bytes for more accuracy of the speed.
 The Time Tailor unit will only respond to a speed of 0. Therefore, the HOLD command using 2 data bytes would be: 22 11 00 00 [33]

61 20 XX [??] = BVW-35 Status Table

The Time Tailor unit returns data from the following table according to the DATA1 byte received.

The upper 4 bits of DATA1 indicate the start location in table, the lower 4 bits indicate how many bytes in table to return.

	D7	D6	D5	D4	D3	D2	D1	D0
Data 0	0	0	0	0	0	0	0	Local
Data 1	Remote	0	/RUN	0	0	0	Record * RUN	RUN * /Record
Data 2	RUN * /HOLD	0	0	HOLD	0	0	HOLD + /RUN	0
Data 3	0	0	0	0	0	0	0	0
Data 4	0	0	0	0	0	0	0	0
Data 5	0	0	0	0	0	0	0	0
Data 6	0	0	0	0	0	0	0	0
Data 7	0	0	0	0	0	0	0	0
Data 8	0	0	0	0	1	0	0	0
Data 9	0	0	0	0	0	0	0	0
Data A	0	0	0	0	0	0	0	0
Data B	0	0	0	0	0	0	0	0
Data C	0	0	0	0	0	0	0	0
Data D	0	0	0	0	0	0	0	0
Data E	0	0	0	0	0	0	0	0
Data F	0	0	0	0	0	0	0	0

TIME TAILOR 3500AP COMMAND SET (FULL CONTROL)

The Time Tailor 3500AP uses a subset of commands to control all functions. This subset is based around the BVW special command: 0X F0

0X F0 normally indicates special commands in ASCII for BVW-50's. Prime Image uses this command to indicate Time Tailor settings. There should not be any confusion since the Time Tailor I.D.s itself as a BVW-35, which does not use this command.

The DATA1 byte is FF, which is a non-ASCII text character, to further eliminate mistaken commands.

The DATA2 byte is the function to be controlled.

The DATA3 - DATA_n are the data for the function.

The Time Tailor acknowledges with the function and data of the Time Tailor's modified value.

- If DATA3 - DATA_n is not sent, then no change occurs and the current value in the Time Tailor is returned as the acknowledge.
- If the function is locked-out from remote control, then no change occurs and the current value, starting with 9x instead of 1x, is returned as the acknowledge. For example:
acknowledge = 93 F0 FF 00 XX [??] = System Format locked out.
- If the function is unknown or the corresponding option is not present, then the acknowledge is 11 12 01 = 'undefined command'.

COMMAND	FUNCTION	DATA TYPE/RANGE	ACKNOWLEDGE
03 F0 FF 00 XX [??]	System Format	(see note 1)	13 F0 FF 00 XX [??]
03 F0 FF 01 XX [??]	Audio Mode - Dolby	(see note 3)	13 F0 FF 01 XX [??]
03 F0 FF 02 XX [??]	Audio Source Ch 1-8	(see note 2)	13 F0 FF 02 XX [??]
03 F0 FF 03 XX [??]	Meter / Audio Mode	(see note 4)	13 F0 FF 03 XX [??]
03 F0 FF 04 XX [??]	Audio Source Ch 9-16	(see note 2)	13 F0 FF 04 XX [??]
03 F0 FF 05 XX [??]	Non-Genlock Mode	bit0 = Input/Freerun	13 F0 FF 05 XX [??]
03 F0 FF 06 XX [??]	VBI CC Control	bit0 = norm/-7.5IRE	13 F0 FF 06 XX [??]
03 F0 FF 07 XX [??]	SDI Horz Phase	-32 to + 31*	13 F0 FF 07 XX [??]
04 F0 FF 08 XX XX [??]	Insert Time	0 to 32767 frames	14 F0 FF 08 XX XX [??]
03 F0 FF 08 XX [??]	Insert Time LSB	0 to 32767 frames	13 F0 FF 08 XX [??]
03 F0 FF 09 XX [??]	Insert Time MSB	0 to 32767 frames	13 F0 FF 09 XX [??]
03 F0 FF 0A XX [??]	Program Time	0 to 240 minutes	13 F0 FF 0A XX [??]
03 F0 FF 0B XX [??]	Hold Time	0 to 120 ½ minutes	13 F0 FF 0B XX [??]
03 F0 FF 0C XX [??]	Interpolation Control	(see note 5)	13 F0 FF 0C XX [??]
03 F0 FF 0D XX [??]	Vert Cut Control	(see note 6)	13 F0 FF 0D XX [??]
03 F0 FF 0E XX [??]	Hold on Black Control	(see note 7)	13 F0 FF 0E XX [??]
03 F0 FF 0F XX [??]	GPI Control	(see note 8)	13 F0 FF 0F XX [??]
03 F0 FF 10 XX [??]	System Control	(see note 9)	13 F0 FF 10 XX [??]
03 F0 FF 15 XX [??]	Dolby Processors 1-2	(see note 10)	13 F0 FF 15 XX [??]
03 F0 FF 16 XX [??]	Dolby Processors 3-4	(see note 10)	13 F0 FF 16 XX [??]
03 F0 FF 17 XX [??]	Misc Control	(see note 11)	13 F0 FF 17 XX [??]
04 F0 FF 18 XX XX [??]	Trim Original Time	0 to 4500 frames	14 F0 FF 18 XX XX [??]
03 F0 FF 18 XX [??]	Trim Original Time LSB	0 to 4500 frames	13 F0 FF 18 XX [??]
03 F0 FF 19 XX [??]	Trim Original Time MSB	0 to 4500 frames	13 F0 FF 19 XX [??]
04 F0 FF 1A XX XX [??]	Trim Desired Time	0 to 4500 frames	14 F0 FF 1A XX XX [??]
03 F0 FF 1A XX [??]	Trim Desired Time LSB	0 to 4500 frames	13 F0 FF 1A XX [??]
03 F0 FF 1B XX [??]	Trim Desired Time MSB	0 to 4500 frames	13 F0 FF 1B XX [??]

TIME TAILOR COMMAND SET (continued)

COMMAND	FUNCTION	DATA TYPE/RANGE	ACKNOWLEDGE
03 F0 FF 1C XX [??]	Audio Delay Offset	+/- 64ms in 0.5 steps*	13 F0 FF 1C XX [??]
03 F0 FF 1D XX [??]	Embedded Audio Ctrl	(see note 12)	13 F0 FF 1D XX [??]
03 F0 FF 1E XX [??]	Wait on Black Control	(see note 13)	13 F0 FF 1E XX [??]
03 F0 FF 1F XX [??]	Time Reduction Mode	(see note 14)	13 F0 FF 1F XX [??]
03 F0 FF 26 XX [??]	Elastic Audio Detect T/H	-40 to +20 dBm*	13 F0 FF 26 XX [??]
03 F0 FF 27 XX [??]	Elastic Audio Detect Ctrl	(see note 15)	13 F0 FF 27 XX [??]
03 F0 FF 28 XX [??]	Elastic Delay LSB	0 to 1020 frms (see 16)	13 F0 FF 28 XX [??]
03 F0 FF 29 XX [??]	Elastic In Time LSB	0 to 600 sec (see 16)	13 F0 FF 29 XX [??]
03 F0 FF 2A XX [??]	Elastic Out Time LSB	0 to 600 sec (see 16)	13 F0 FF 2A XX [??]
03 F0 FF 2B XX [??]	Elastic MSBs	(see note 16)	13 F0 FF 2B XX [??]
03 F0 FF D0 XX [??]	Store Preset 1	(see note 17)	13 F0 FF D0 XX [??]
03 F0 FF D1 XX [??]	Store Preset 2	(see note 17)	13 F0 FF D1 XX [??]
03 F0 FF D2 XX [??]	Store Preset 3	(see note 17)	13 F0 FF D2 XX [??]
03 F0 FF D3 XX [??]	Store Preset 4	(see note 17)	13 F0 FF D3 XX [??]
03 F0 FF D4 XX [??]	Recall Preset	(see note 18)	13 F0 FF D4 XX [??]
03 F0 FF E0-EF XX [??]	Reserved		
02 F0 FF F0 [E1]	Request Product Info	(see note 19)	16 F0 FF F0 xID v1. v2 v3 [??]
02 F0 FF F1 [E2]	Request Status	(see note 20)	18 F0 FF F0 X0 X1 X2 X3 X4 X5 [??]
02 F0 FF F2 [E3]	Request Delay Time	(see note 21)	14 F0 FF F2 XH XL [??]
02 F0 FF F3 [E4]	Request Quality Factor	(see note 22)	13 F0 FF F3 XX [??]
02 F0 FF F4 [E5]	Request Audio Meter Chan 1-8	-20 to + 20dBm	1A F0 FF F4 X1 X2 X3 X4 X5 X6 X7 X8 [??]
02 F0 FF F5 [E6]	Request Start Timer	0 to 32767 Frm (see 23)	14 F0 FF F5 XH XL [??]
02 F0 FF F6 [E7]	Request Hold Timer	0 to 900 Frame (see 24)	14 F0 FF F6 XH XL [??]
02 F0 FF F7 [E8]	Request Audio Meter Chan 9-16	-20 to + 20dBm	1A F0 FF F7 X1 X2 X3 X4 X5 X6 X7 X8 [??]
0X F0 FF FF... [??]	Reserved for Multi Remote		

Notes:

'XX' represents data which is variable.

'[??]' indicates the checksum needs to be calculated based on the chosen data (XX).

DATA values with +/- indicate 2's complement format, else binary.

Note 1 - 03 F0 FF 00 XX [??] : System Format

DATA VALUE	FORMAT	SIGNAL
00	525i/29.97	SDI - 270Mb/s
30	720p/59.94	HD-SDI
38	720p/60.00	HD-SDI
40	1080i/29.97	HD-SDI
48	1080i/30.00	HD-SDI
80	625i/25.00	SDI - 270Mb/s
B0	720p/50.00	HD-SDI
C0	1080i/25.00	HD-SDI
E0	1080psF/23.98	HD-SDI
E8	1080psF/24.00	HD-SDI

Note: DATA values not shown, or values for options not present, will be ignored by TT3500AP.

Note 2 - 03 F0 FF 04 XX [??] : Audio Source Ch 9-16
03 F0 FF 02 XX [??] : Audio Source Ch 1-8

(13-16) Ch 5-8	bits 7-4	(9-12) Ch1-4	bits 3-0
	0X = none		X0 = none
	3X = AES/EBU Mod 1		X3 = AES/EBU Mod 1
	4X = AES/EBU Mod 2		X4 = AES/EBU Mod 2
	5X = SDI Group1		X5 = SDI Group1
	6X = SDI Group2		X6 = SDI Group2
	7X = SDI Group3		X7 = SDI Group3
	8X = SDI Group4		X8 = SDI Group4

Note 3 - 03 F0 FF 01 XX [??] : Audio Mode - Dolby

	D7	D6	D5	D4	D3	D2	D1	D0
DATA	x*	x*	DM1	DM0	x*	x*	x*	x*

x = not used, should be set to 0 for future compatibility.

- 00 = Pass Dolby-E
- 10 = Decode Dolby-E
- 20 = Encode Dolby-E

Note 4 - 03 F0 FF 03 XX [??] : Audio Meter Source / Processor Mode

	D7	D6	D5	D4	D3	D2	D1	D0
DATA	x*	AMS2	AMS1	AMS0	x*	x*	PM1	PM0

x = not used, should be set to 0 for future compatibility.

- | | |
|-------------------------|---------------------------------------|
| 0X = Chan 1-16 | X0 = One 16 Ch Group [1-16] |
| 1X = Dolby Processor #1 | X1 = Surround 8 Ch [1-3,5-8] [4=LF] |
| 2X = Dolby Processor #2 | X2 = Surround 12 Ch [1-7,9-12] [8=LF] |
| 3X = Dolby Processor #3 | X3 = Two 8 Ch Groups [1-8] [9-16] |
| 4X = Dolby Processor #4 | |

Note 5 - 03 F0 FF 0C XX [??] : Interpolation Mode

	D7	D6	D5	D4	D3	D2	D1	D0
DATA	x*	x*	x*	x*	x*	x*	IM1	IM0

x = not used, should be set to 0 for future compatibility.

- 00 = Motion Adaptive (Default)
- 01 = Field Mode
- 02 = Frame Mode
- 03 = none

Note 6 - 03 F0 FF 0D XX [??] : Vertical Cut Detector Control

	D7	D6	D5	D4	D3	D2	D1	D0
DATA	OVD	x*	x*	x*	AVC	x*	AVS	AVD

x = not used, should be set to 0 for future compatibility.

- Bit0 = Advanced Processor VCUT Detector 0 = disabled, 1 = enabled
- Bit1 = Advanced Processor VCUT Sensitivity 0 = normal, 1 = high
- Bit3 = Advanced Processor VCUT Correction 0 = off, 1 = on

- Bit7 = Original (legacy) Processor VCUT Detector 0 = disabled, 1 = enabled

Note 7 - 03 F0 FF 0E XX [??] : Hold on Black

- 00 = disabled
- 01 = Video + Audio silence
- 02 = Video only

Note 8 - 03 F0 FF 0F XX [??] : GPI Control

- 00 = off
- 01 = enabled
- 02 = enabled + status

Note 9 - 03 F0 FF 10 XX [??] : System Control

	D7	D6	D5	D4	D3	D2	D1	D0
DATA	x*	x*	x*	x*	PRELOAD	Forced HOLD	HOLD	RUN

x = not used, should be set to 0 for future compatibility.

**Note 10 - 03 F0 FF 16 XX [??] : Dolby Processor Source #4, #3
03 F0 FF 15 XX [??] : Dolby Processor Source #2, #1**

- | | |
|---|---|
| (#4) #2 bits 7-4
0X = use Ch Pair 1-2
1X = use Ch Pair 3-4
2X = use Ch Pair 5-6
3X = use Ch Pair 7-8
4X = use Ch Pair 9-10
5X = use Ch Pair 11-12
6X = use Ch Pair 13-14
7X = use Ch Pair 15-16 | (#3) #1 bits 3-0
X0 = use Ch Pair 1-2
X1 = use Ch Pair 3-4
X2 = use Ch Pair 5-6
X3 = use Ch Pair 7-8
X4 = use Ch Pair 9-10
X5 = use Ch Pair 11-12
X6 = use Ch Pair 13-14
X7 = use Ch Pair 15-16 |
|---|---|

Note 16 - 03 F0 FF 2B XX [??] : Elastic MSBs

	D7	D6	D5	D4	D3	D2	D1	D0
DATA	EO9	EO8	EI9	EI8	x*	x*	ED9	ED8

x = not used, should be set to 0 for future compatibility.

This register contains the 2 MSBs for Elastic Delay, Elastic In Time, and Elastic Out Time.

Note 17 - 0E F0 FF Dn c1 c2 c3 c4 c5 c6 c7 InL InH Prg Hld [??] : Store Preset N

c1 - c7 = Preset Name character string (see below)

InL = Insert time LSB

InH = Insert time MSB

Prg = Program time

Hld = Hold time

Character codes: 80h - 8Fh = 0 thru 9, space, period, comma, : , ! , ?

90h - A9h = A thru Z

AAh - C3h = a thru z

C4h - CDh = \$, @ , & , % , # , + , - , * , / , =

Note 18 - 03 F0 FF D4 XX [??] : Recall Preset

00 = Recall Preset 1

01 = Recall Preset 2

02 = Recall Preset 3

03 = Recall Preset 4

The acknowledge will return 00, 01, 02, or 03 if Preset is loaded,
and FF if Preset is no longer loaded.

Note 19 - 02 F0 FF F0 [E1] : Request Product Info

return = 16 F0 FF F0 xID v1 v2 v3 [??]

xID = Product I.D.

00 = Digital Time Tailor

01 = Trimmer

02 = Dual (Time Tailor/Trim)

80 = Time Tailor with Data Card

81 = Trimmer with Data Card

82 = Dual with Data Card

v1. v2 v3 = Version Number

i.e. v1 = 01, v2 = 02, v3 = 00 for version 1.20

Note 20 - 02 F0 FF F1 [E2] : Request Status

return = 18 F0 FF F1 x0 x1 x2 x3 x4 x5 [??]

x0 = Status 0

- Bit7 1 = Hold auto-release timeout active
- Bit6 1 = Hold active due to Black level detector
- Bit5 1 = Forced Hold active
- Bit4 1 = GPI Hold active
- Bit3 1 = Hold active
- Bit2 1 = Preload mode, 0 = normal run mode
- Bit1 1 = Starting mode, 0 = normal run mode
- Bit0 1 = Run/Start/Preload/Hold mode, 0 = Stopped (ready mode)

x1 = Status 1

- Bit7 1 = Failsafe
- Bit6 X = Interpolate rate 0=4 0=8 1=12 1=16 Frm
- Bit5 X = Interpolate rate 0 1 0 1
- Bit4 1 = Motion detected
- Bit3 1 = Video drop processor busy
- Bit2 1 = Audio drop processor busy
- Bit1 1 = Black level detected
- Bit0 1 = Genlock Reference present

x2 = Status 2

- Bit7 1 = Not Authorized
- Bit6 1 = TT-PROC board detected
- Bit5 1 = Audio Ch 9-16 detected
- Bit4 1 =HD/SD module detected
- Bit3 1 = License Expiring
- Bit2 1 = HD-SDI module detected
- Bit1 1 = Analog video module detected
- Bit0 1 = SDI module detected

x3 = Status 3

- Bit7 1 = Remote, 0 = Local
- Bit6 1 = not used
- Bit5 X = Flash 2
- Bit4 X = Flash
- Bit3 1 = Waiting
- Bit2 1 = Elastic
- Bit1 1 = Direction
- Bit0 1 = Trim Mode, 0 = Normal

x4 = MaxL

x5 = MaxH

MaxH,L = Maximum Frame Delay - 0 to 32767 frames

Note 21 - 02 F0 FF F2 [E3] : Request Delay Time

return = 14 F0 FF F2 xH xL [??]

xH,L = Delay Time - 0 to 32767 frames

Note 22 - 02 F0 FF F3 [E4] : Request Quality Factor

return = 13 F0 FF F3 XX [??]

XX = Quality Factor - 0 to 63h = 0 to 99 decimal

Note 23 - 02 F0 FF F5 [E6] : Request Start Timer

return = 14 F0 FF F4 xH xL [??]

xH,L = Start Timer - 0 to 32767 frames

Note 24 - 02 F0 FF F6 [E7] : Request Hold Timer

return = 14 F0 FF F5 xH xL [??]

xH,L = Hold auto timeout Timer - 0 to 900 frames

PROGRAMMING EXAMPLES

System Control (START, STOP, HOLD,PRELOAD)

The TT3500AP can be controlled by two methods; the BVW-35 commands, or the TT3500AP System Control command.

Note, for remote control of these commands to occur, the TT3500AP must be in REMOTE mode, and the Remote Access menu "STRT/STOP/HLD.." must be enabled ("Y").

BVW-35

To preload the TT3500AP, send the Preroll command: 20 30 [50]
this will execute a PRELOAD command.

To start the TT3500AP, send the Play (or Record) command: 20 01 [21] (or 20 02 [22])
this will execute a START command.

To hold or pause the TT3500AP, send the Still command. This can be done using any of the Jog, Variable, or shuttle commands, as long as the speed value is zero.
i.e. Jog zero speed: 21 11 00 [32] (or 22 11 00 00 [33])
this will execute a HOLD command.

To stop the TT3500AP, send the Stop command: 20 00 [20]
this will execute a STOP command.

TIME TAILOR 3500AP COMMAND

This single command controls all functions (START,STOP,HOLD,PRELOAD).

System Control = 03 F0 FF 10 XX [??]

The Data byte (XX) that is sent contains bits which represent each of these functions.

	D7	D6	D5	D4	D3	D2	D1	D0
DATA	x	x	x	x	PRELOAD	Forced HOLD	HOLD	RUN

x = not used, should be set to 0 for future compatibility.

Bit D0 = RUN

If this bit is “0” then the TT3500AP will be in STOP mode, regardless of the other bits. For all modes other than stop (PRELOAD,START,HOLD), this bit must remain a “1”.

Bit D1 = HOLD

If D0 = “1”, then this bit will generate a HOLD command if set to “1” (Note, HOLD will auto-release when the programmed hold time is depleted.)

Bit D2 = Forced HOLD

If D0 = “1”, then this bit will generate a Forced HOLD command if set to “1” (Note, Forced HOLD will remain in HOLD mode regardless of the programmed hold time, and disables the failsafe. This command should be used with caution.)

Bit D3 = PRELOAD

If D0 = “1”, then this bit will generate a PRELOAD command if set to “1” Preload will only work correctly if D0 = “1” and D3 = “1” are sent when the previous mode was STOP (D0 = “0”). To release the PRELOAD condition and place the TT3500AP in RUN mode, send command with D0 = “1” and D3 = “0”.

Example of System Control (in order of use).

PRELOAD: 03 F0 FF 09 [FB] (Data = 00001001)

START: 03 F0 FF 01 [F3] (Data = 00000001)

HOLD: 03 F0 FF 03 [F5] (Data = 00000011)

Forced HOLD: 03 F0 FF 05 [F7] (Data = 00000101)

STOP: 03 F0 FF 00 [F2] (Data = 00000000)

Note: sending a HOLD (03) or Forced HOLD (05) command while the TT3500AP is currently in STOP (00) mode will START the unit and place it in HOLD mode.

Insert Time

The Insert Time can be loaded by two methods; the BVW-35 command, or the TT3500AP command. Note, for remote control of this command to occur, the TT3500AP must be in REMOTE mode, and the Remote Access menu "Time Settings.." must be enabled ("Y").

Note, the TT3500AP's Insert Time is limited by the amount of memory that is installed, with a maximum of approximately 20 minutes. Any DATA values greater than the available time, will produce unpredictable results.

BVW-35

To load the Insert Time, send the In Preset command: 44 14 FF SS MM HH [??]
this will load the Insert time register with the value FF SS MM HH.

In this command, the DATA (Insert time) is in time-code format.
FF = Frames, SS = Seconds, MM = Minutes, HH = Hours
Each byte is in BCD format, where the upper 4 bits represent the ten's value, and the lower 4 bits represent the one's value.

For example, if an insert time of 1 minute 59 seconds and 24 frames is desired, then FF = 24, SS = 59, MM = 01, and HH = 00

so the command will be: 44 14 24 59 01 00 [D6]
(the checksum [D6] is found by 44+14+24+59+01+00)

TIME TAILOR 3500AP COMMAND

To load the Insert Time, send the command(s):
03 F0 FF 08 XL [??], 03 F0 FF 09 XH [??]
or 04 F0 FF 08 XL XH [??]

In this command, the DATA (Insert time) is in binary format.

The DATA is represented by two bytes: XH XL which have a range of 0 to 32767 frames; XH is high order byte, XL is low order byte. The programmer must convert all minutes, seconds and frames to a total frame count for XH XL. The XH and XL data can be sent individually using two commands, or they may be sent together using one command.

For example, if an insert time of 1 minute 59 seconds and 24 frames is desired,
1 minute = 1800d frames
59 sec = 1770d frames
24 frms = 24d frames
Total = 3594d frames

The total must then be converted from decimal to hexadecimal
3594d = 0E0Ah Therefore, XH = 0E, and XL = 0A

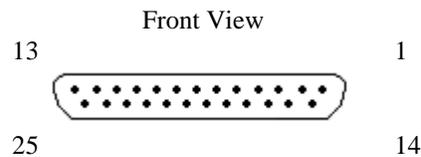
so the command will be: 04 F0 FF 08 0A 0E [13]
(the checksum [13] is found by 04+F0+FF+08+0A+0E)

GPI Interface

The Time Tailor unit has several GPI ports for remote control of a unit. These ports are part of the 25-pin D connector located on the rear panel (see Figure 3-1). The GPI pins are TTL-type inputs with internal pull-up resistors. Either a closure to ground or a TTL logic LOW level will activate the GPIs. Figure A-4 shows the pin-out for the GPI interface, a 25-pin D Connector (female).

Warning

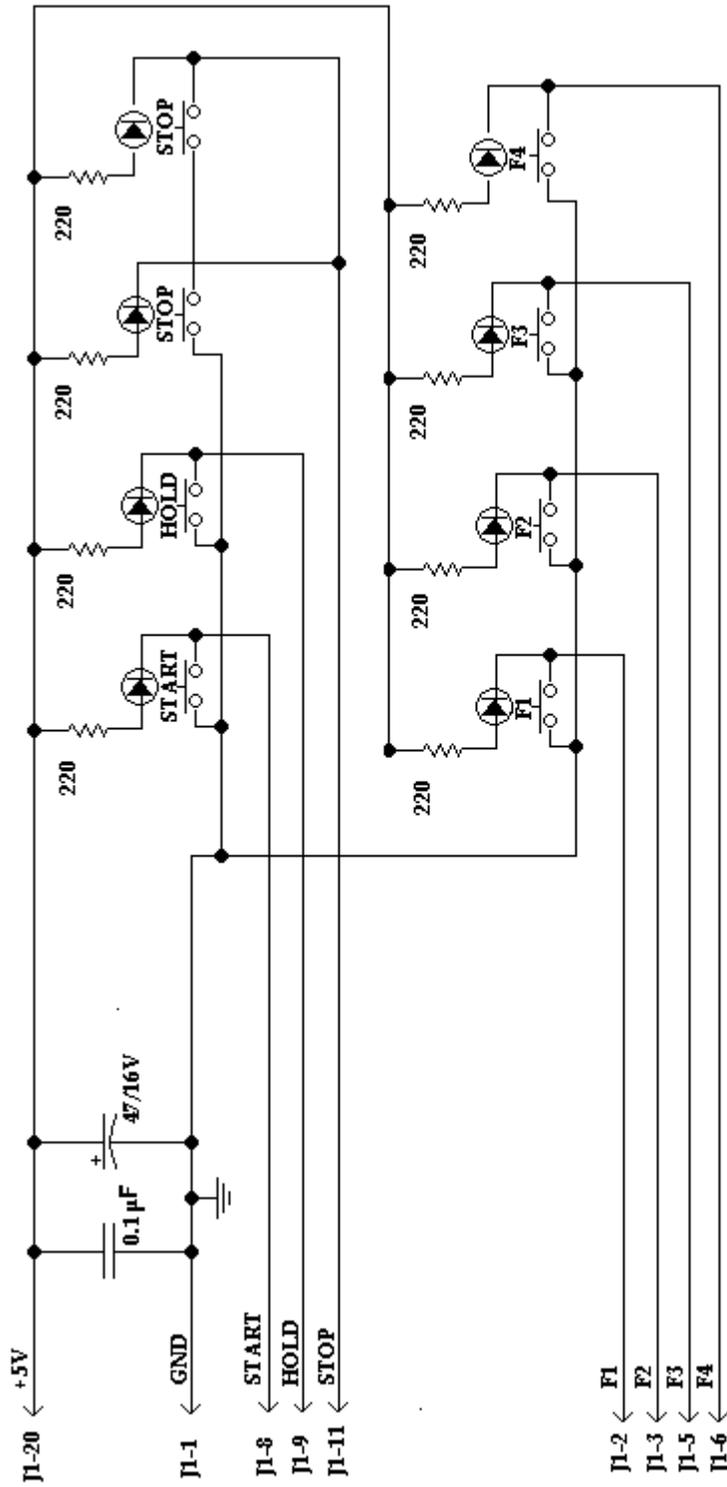
DO NOT EXCEED +5 volts or -0.5 volts on these pins.



Pin 1	GND	GROUND
Pin 2	GPI-P1	Load PRESET #1
Pin 3	GPI-P2	Load PRESET #2
Pin 4	GND	GROUND
Pin 5	GPI-P3	Load PRESET #3
Pin 6	GPI-P4	Load PRESET #2
Pin 7	No connection	Do not connect anything to this pin.
Pin 8	GPI-ST	Activate START
Pin 9	GPI-HD	Activate HOLD
Pin 10	GND	GROUND
Pin 11	GPI-SP	Activate STOP
Pin 12	GPI-LD	Activate PRELOAD
Pin 13	GND	GROUND
Pin 14	GND	GROUND
Pin 15	IND-P1	PRESET #1 Indicator output
Pin 16	IND-P2	PRESET #2 Indicator output
Pin 17	IND-P3	PRESET #3 Indicator output
Pin 18	IND-P4	PRESET #4 Indicator output
Pin 19	+5V	Power supply for LED indicators (500mA)
Pin 20	+5V	
Pin 21	IND-ST	START Indicator output
Pin 22	IND-HD	HOLD Indicator output
Pin 23	IND-SP	STOP Indicator output
Pin 24	IND-LD	PRELOAD Indicator output
Pin 25	GND	GROUND

Figure C-1. GPI Connector Pin-out

GPI Controller Example



START, STOP, and F1-F4 are momentary contact switches.
 HOLD is a latching switch (push on/push off).

Appendix D Time Tailor 3500AP Spec Sheet

SPECIFICATIONS

Time Reduction

HD:	0 to 2 minutes in 1 frame steps
SD:	0 to 5 minutes in 1 frame steps

Video Processing

Signal	HD – 1.485Gb/s (SMPTE 292M) SD – 270Mb/s (SMPTE 259M)
Input	BNC, 75Ω, 800 mVpp HD – Auto EQ to 100 meters (Belden 8281) SD – Auto EQ to 280 meters (Belden 8281)
Buffered Preview Output	BNC, 75Ω, 800 mVpp, Reclocked SDI input
Outputs	2 BNCs, 75Ω, 800 mVpp
Formats	1080i – 60/59.94/50 1080PsF-24/23.98 720p – 60/59.94/50 483i – 29.97 576i – 25

Closed Captioning

HD:	CEA-708 (frame accurate)
SD:	CEA-608 (frame accurate)

Audio Processing

Channels:	16, + Dolby-E (8 encoded channels)
Signal	Embedded, AES/EBU SD (SMPTE 272C) HD (SMPTE 299M)
AES/EBU	Inputs 8 BNCs, 75Ω, Transformer coupled
AES/EBU	Outputs 8 BNCs, 75Ω, Transformer coupled
Sample Rate	48KHz – synchronous
Resolution	24 bit

Dolby Processing

Format:	Dolby-E
---------	---------

Control

Signal	RS-422
Connector	DB-9 (Sony pin-out)

Environmental

Power Supply	100 - 240 VAC, 50/60Hz, Auto
Power Dissipation	300 Watts Max
Height	5 U, 8.75 inches (22.2 cm)
Length	19 inches (48.3 cm)
Depth	22 inches (55.9 cm)
Weight	38.5 lbs (17.5 kg)



All specifications subject to change without notice.
