TCR™ Series
User's Manual

Professional Production Recorders

TCR™ Series • User's Manual

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Company Address

Please use the following addresses for shipping and correspondence. At the Corporate Office in California, the switchboard is open Monday through Friday, from 8:00 AM to 5:00 PM.

Corporate Office and Customer Services
5321 Sterling Center Drive
Westlake Village, CA 91361-4613 USA
Telephone: (+1) 818-991-0360
Fax: (+1) 818-991-1360

European Office
H. Meijerstraat 13
1444HA Purmerend, Netherlands
Telephone: (+31) 2994-37250
Fax: (+31) 2994-33627

E-mail info@360systems.com

Website www.360systems.com

Warning Symbols

The following warning symbols are used on the product in this manual:

English	**ATTENTION**: Refer to Owner's Manual for important information
Français	**ATTENTION**: Veuillez vous référer au Mode d'Emploi pour une information importante.
Italiano	**ATTENZIONE**: Fate riferimento al manuale per informazioni importanti.
Español	**ATENTCION**: Favor de referir al manual de operacion por informacion importante.

English	**WARNING*:*** Electrical shock hazard.
Français	**AVERTISSEMENT**: Danger de choc électrique.
Italiano	**AVVERTIMENTO**: Pericolo di shock elettrico.
Español	**ADVERTENSIA**: Peligro de choque electrico.

Cautions

Please heed the following important cautions regarding the TCR4 and TCR8:

- Do not remove the cover. No user serviceable parts inside. Refer servicing to qualified service personnel.
- The TCR4 and TCR8 recorders contain a hard disk drive. While today's hard disks are very reliable, they may be vulnerable to shock. Please handle with care, and exercise caution not to drop or bump the TCR recorder — damage to the internal hard disk may result. Ensure that power is off before moving the unit.
- To reduce the risk of fire or electric shock, do not expose this unit to rain or moisture.

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Safety Compliance

TCR is currently being investigated for compliance with the following safety standards:

- UL 1950, Standard for Safety of Information Technology Equipment, Including Electrical Business Equipment.
- EN 60950, Standard for Safety of Information Technology Equipment, Including Electrical Business Equipment.

EU Declaration of Conformity

Type of Equipment: **Professional Use Audio Equipment.**

Conforms to the Following Standards:

- EN55022 (1995) with amendments 1 and 2
  (Limits and methods of measurement of radio disturbance characteristics of information technology equipment)
- EN50082-1 (1997) (Generic immunity standard, Part 1: Residential, commercial and light industry).
- IEC950 2nd Edition, Amendment 1 (1992), Amendment 2 (1993) and Amendment 3 (1995); Safety of Information Technology and Business Equipment.

FCC Compliance

This equipment complies with Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the owners manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

This device will accept any interference received, including interference that may cause undesired operation. The user is cautioned that changes made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment. It is suggested that only shielded and grounded cables be used to ensure compliance with FCC Rules.

Notice

This Class A digital apparatus meets all requirement of the Canadian Interference-Causing Equipment Regulations.

Français: Cet appariel numérique de la classe A respecte toute les exigences du Reglement sur le matériel brouilleur du Canada.

Warranty and Repair Policy

TCR4 and TCR8 are warranted against defects in material and workmanship for a period of one year from date of original purchase. This warranty includes parts and labor. This warranty excludes units that have been modified, repaired by unauthorized personnel, or damaged by rough handling, abuse, improper operation, dirt, or static electricity.

360 Systems assumes no liability whatsoever for real or consequential damages, loss of profits, inconvenience or any other losses due to non-operation of the TCR4 and TCR8 recorders. 360 Systems' sole liability under this limited warranty shall be the repair or replacement of defective product or components. Products being returned under warranty shall be sent to 360 Systems or one of its foreign service centers, freight prepaid, in the original or equivalent packaging. Please call 360 Systems for a return authorization number *before* returning any merchandise for any reason.

Product Improvements and Upgrades

360 Systems reserves the right to make changes and/or improvements to its products, without incurring any obligation to incorporate such changes or improvements in units previously sold or shipped.

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- TCR, TCR4 and TCR8 are trademarks of 360 Systems.
- Zip® is a registered trademark of Iomega Corp.
- Flex® is a registered trademark of Altera Corp.
- All other product and brand names and any registered and unregistered trademarks mentioned in this manual are used for identification purposes only and remain the exclusive property of their respective owners.

`Introduction

A Word of Thanks

Thank you and congratulations on choosing 360 Systems' **TCR™ Series** synchronous digital multi-track production recorder. You have purchased the power, versatility and creativity of the industry's leading digital multi-track audio recorder — a system ready to take on all creative challenges in today's competitive production environments.

You'll be pleased at how easily the TCR integrates into your overall working environment — and the marked increase in the quality and quantity of your production.

Product Registration

Important — Please take a moment now to fill out your Warranty Card and either mail it, or fax it to 360 Systems Offices in the USA. By completing your Warranty Card, you will be able to receive new software upgrades and periodic Technical Support Bulletins about product enhancements and upgrades. Your warranty registration is the only way we know that you own a TCR.

In This Manual

This manual provides installation, setup and operating instructions for 360 Systems' **TCR Series** of digital audio production recorders. Instructions are provided for both the **TCR4** and the **TCR8**.

TCR recorders perform the complex tasks of synchronous audio production and editing — using a well designed, simple-to-use set of menus and buttons. This manual is organized to provide the user with a quick understanding of how to use the TCR to accomplish those production and editing tasks.

If you are already familiar with synchronous audio production, you should find TCR to be nearly intuitive. As such, an extensive index is provided at the end of this manual to assist you in locating information quickly.

However, we recommend that you read the *entire manual* so that you will become familiar with all of the features and helpful tools built into the TCR — each of which is designed to make your use of the TCR more productive and enjoyable.

Introducing the TCR Production Recorders

In the realm of audio recording, 360 Systems' family of synchronous audio recorders represents a "next generation" technical development. Moving beyond "tapeless," the TCR series couples an entirely new machine architecture with the feature set *most requested* by industry professionals.

The **TCR4** and **TCR8** are *production* recorders, designed specifically for television broadcast, video production and professional audio recording. As professional grade machines, they deliver premium quality audio and precise time code synchronization in a robust, carefully engineered package.

- **Speed and Versatility**

  The TCR's design introduces speed and versatility to a variety of audio tasks. TCR recorders are not just "playout" machines for dubbing — they include many production features such as auto-locate, seamless punch-in, read-modify-write (RMW), looping, editing and offsets — features that make the TCR a first choice as the primary studio recorder.

- **24-bit Performance**

  To deliver the 24-bit performance expected of a new generation product, 360 Systems has designed entirely new "ultra-low jitter" clock generation circuits. In addition to professional analog and digital input circuitry, XLR connectors are provided as standard.

- **A Versatile Platform**

  With the industry in transition in regard to file formats and media, the TCR is built to accept many kinds of media and play many types of files. Using TCR, files will be able to be directly transferred to and from leading workstations, on media of the user's choice.

Choice of TCR Models

360 Systems offers two TCR models, each designed for different audio production requirements.

- **Model TCR8 Eight Track Recorder**

  The TCR8 is designed for synchronous recording and playback in video, television production, cinema sound and broadcast applications. The TCR8 is also the ideal choice for surround-sound production, handling six channels (5.1) plus Lt-Rt. As a fast non-linear recorder, TCR8 is a natural upgrade from tape, and provides easy file interchange with popular workstations.

  As your primary studio and mastering machine, TCR8 functions in standalone mode or, in the future, it can be combined with up to seven other recorders for transparent 64-track operation using the TCR's multi-machine sync bus. Time code gives the TCR8 unprecedented editing power, including automated punch-in punch-out capability with variable length crossfade and Undo. Best of all, and unlike any other system, the TCR8 can record an entire working day of 24-bit audio — without reloading media.

- **Model TCR4 Four Track Recorder**

  The TCR4 precisely answers the need for a machine to replace time code DAT and "audio-only" VTRs. It includes the third and fourth tracks so often needed in video production, and provides greatly improved audio quality, cost-effective removable media and the instant response of a hard-disk recorder. Most important, TCR4 delivers a degree of reliability unattainable with tape-based systems.

Note that recorded files and sync connections are compatible between the TCR4 and TCR8.

Product Highlights

This section outlines many of the superb features designed into the TCR series of digital multi-track recorders. All of these features apply to both the TCR4 and TCR8.

- **Unlimited Storage**

  Today's projects result in very large audio files, particularly when they are multi-track, 24-bit, or recorded at high sample rates. With the advent of affordable very high capacity drives, the file size limitation has been removed. TCR can accept an internal hard disk of unlimited size, with individual file size extending to the 24-hour limit of SMPTE/EBU time code.

- **High Density Removable Media**

  TCR recorders include a 250 MB Zip® drive as standard equipment. Each 250 MB Zip® cartridge provides a half-hour of low-cost file storage. Additionally, a 5_" drive bay accepts many user-selected drives, including removable hard disks, magneto-optical disks, and the emerging ultra-high density cartridges. A rear-panel SCSI port connects as many as five additional drives to the TCR system.

- **Programmable Hardware**

  360 Systems brings an entirely new design concept to the TCR platform — Programmable Hardware. To allow the system to be reconfigured as needs arise, much of TCR's internal architecture is built with programmable Flex® logic, which can be reconfigured under software control. Using the built-in Zip drive, new hardware and software tools can be loaded. Overall, this superb capability means that TCR can be upgraded, modified and reconfigured with minimal disruption to your schedule.

- **Word Size Flexibility**

  As top quality audio becomes an increasing priority in the entertainment industry, 360 Systems selected 24-bits as the standard word size for all TCR recordings. However, optional 16 and 20-bit digital outputs can be generated for compatibility with older equipment.

- **Control Panel Clarity**

  The TCR's control panel is designed for ease-of-use, with features specifically tailored for audio and video professionals. The large illuminated LCD screen provides clear and concise data for each system mode, including file names, machine status, edit operations, task prompts and operator "alerts." A separate large LED readout is provided for clarity in reading time code position. For metering, a precise 14-segment LED meter array shows each channel's level. For further operator comfort, intuitive VTR-like controls including the familiar Jog/Shuttle Wheel are provided.

- **Time Code Synchronization**

  TCR recorders include a complete set of SMPTE-EBU time code capabilities. They can lock to all common NTSC and PAL sync formats, including VITC, LTC, word clock, AES/EBU, internal crystals, or the multi-machine bus. Sample and playback rates can incorporate a ±0.1% pull-up or pull-down to accommodate any format conversion.

- **Standard Editing Functions**

  The TCR series includes a standard array of editing functions, including Cut, Copy, Insert, Paste, Erase and time offsets for individual tracks and for the entire machine. The convenient Jog Wheel, interactive LCD screen and track markers all combine to make editing easy. In addition, there's an UNDO button for quickly correcting mistakes.

- **Remote Control Capability**

  All TCR recorders include a 9-pin serial port for seamless interfacing with edit controllers — just like a VTR. Using standard RS-422 VTR control protocol, the TCR provides the instant response of a non-linear recorder when used in a multi-machine editing configuration. TCR can emulate several common types of VTR and Time Code DAT transports.

TCR Options

TCR recorders may be configured with a choice of high-capacity drives for both the internal drive and the optional drive in the **Drive Bay**.

The following table lists recording times for each size drive including the standard 250 MB Zip® drive, in various multi-track recording modes. The recording times listed are approximate, and are based on continuous recording of all tracks simultaneously. Use of fewer tracks, or intermittent audio, will yield an increase in the available storage time.

Calculated TCR4 and TCR8 Recording Times at 48kHz Sample Rate

Track Count	250 MB Zip Disk	9 GB Hard Disk	18 GB Hard Disk	36 GB Hard Disk	50 GB Hard Disk
Eight Track Recording	3 min. 20 sec	2 hr 10 min.	4 hr 20 min.	8 hr 40 min.	12 hr 3 min.
Four Track Recording	6 min. 52 sec	4 hr 20 min.	8 hr 40 min.	17 hr 21 min.	24 hr 6 min.
Two Track Recording	14 min. 10 sec	8 hr 40 min.	17 hr 21 min.	34 hr 43 min.	48 hr 13 min.
Single Track (mono)	28 min. 20 sec	17 hr 20 min.	34 hr 42 min.	69 hr 26 min.	96 hr 26 min.

Important

The **Drive Bay** assembly, including the drawer, drive and associated connectors, is an optional item that should be pre-configured at 360 Systems' factory. If you wish to upgrade your system to include an optional drive for the Drive Bay, please contact 360 Systems **Customer Support** at the location listed in the front of this manual. Only qualified service personnel should perform the upgrade procedure.

Overview

In This Chapter

The operating philosophy of the TCR™ recorder is presented here, with an eye to giving the reader a view of what can be accomplished without going into fine detail about its how each task is performed. It is our intention to convey the "design idea" for the machine, so the user can work on the same level as TCR's design group.

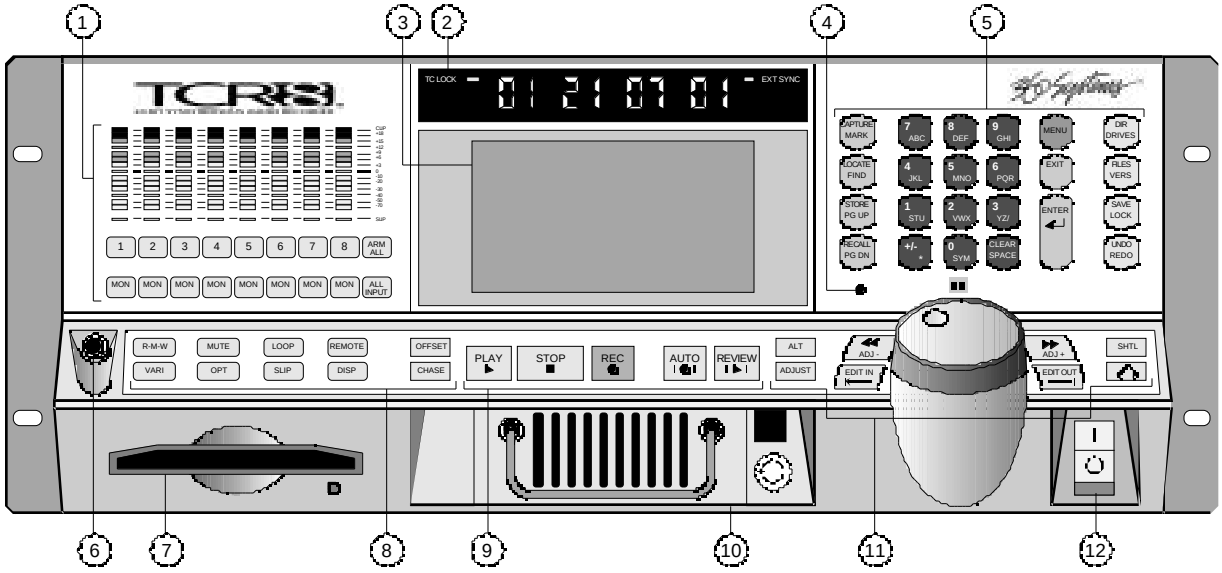
Important

This chapter should be reviewed *before* proceeding to the Operations chapter.

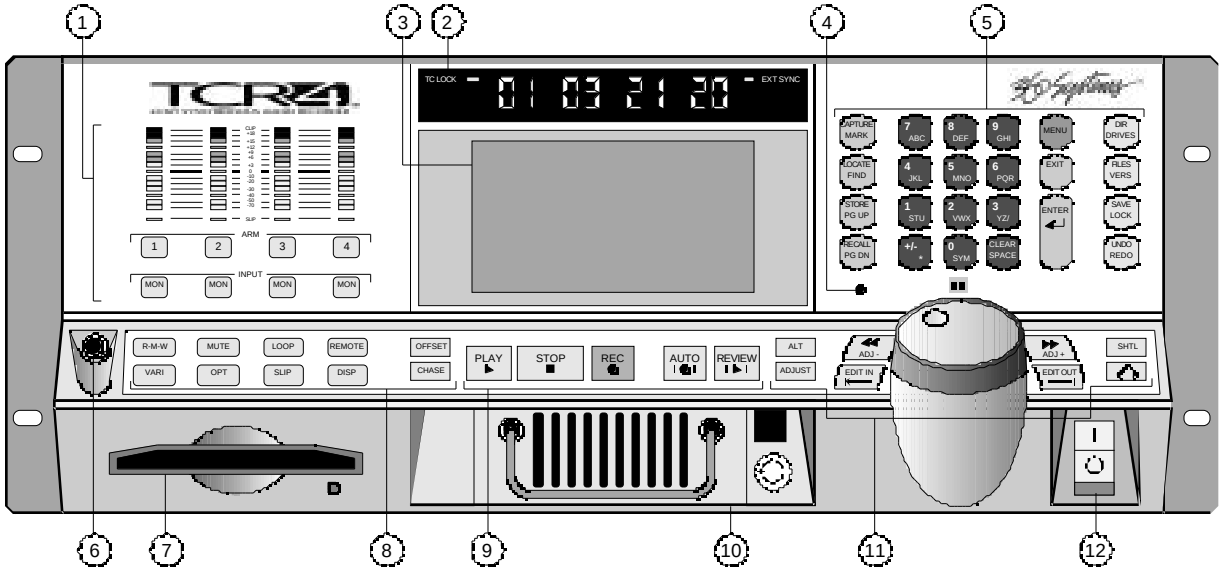
- The buttons, displays, and disk drives on the front panel will be presented, and their functions will be defined.
- Rear panel components such as connectors and switches are described as they relate to the TCR's capabilities.
- This chapter presents an introduction to the TCR's menu system, and explains how the control panel is used for navigation.

Control Panel Description

The TCR4 and TCR8 control panels are divided into sections intended to logically group related controls together. Except for the **Monitoring Section**, the panel sections are *identical* between models.



TCR8 Control Panel Sections

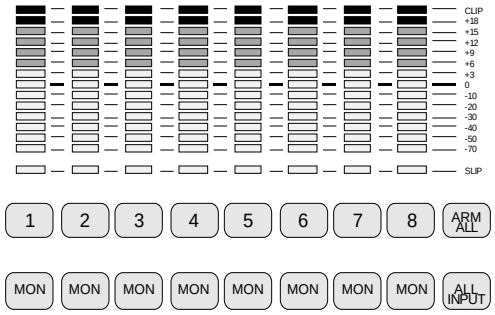


TCR4 Control Panel Sections

1) Monitoring Section	5) Keypad Section	9) Transport Control Section
2) Time code Display	6) Headphone Jack	10) Drive Bay
3) Main Display	7) ZIP Drive	11) Jog Section
4) Contrast Adjustment	8) Function Section	12) Power Switch

Monitoring Section

The **Monitoring Section**, as shown below for the TCR8, includes eight peak-responding audio level meters, plus buttons for arming tracks and monitoring their status.



LED VU Meters

Fourteen LEDs display the recording level, covering a range from +20 dB to –70 dB. The headroom displayed between the "zero" reference and "clip" level can be programmed to conform to the common standards of 16 dB and 20 dB.

The **CLIP** LED lights when the input level for the associated track has peaked. It remains on until **STOP, PLAY, ARM** or **MON** is pressed.

The **SLIP** LED below the level display lights when that track has been offset in time with respect to others.

Track Arm Buttons

Eight numbered track ARM buttons are provided on the TCR8 — four on the TCR4. When lit RED, the selected tracks are armed for recording.

Monitor Buttons

Eight **MON** (monitor) buttons are provided on the TCR8 — four on the TCR4.

When **MON** is toggled on (RED) that channel's input will be passed through to the output.

When **MON** is toggled off, that channel's output will be from disk.

Time Code Display

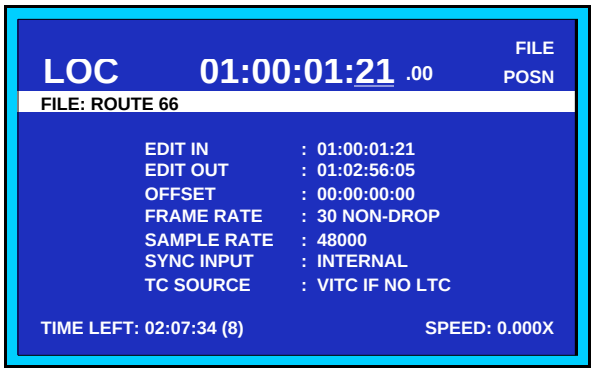
The Time Code Display provides several kinds of information, depending on the operating mode of the recorder. The display can present external time code, time code with offset, or the output of the internal time code generator.

Two status LEDs are also provided in this section:

- TC Lock — the TC LOCK LED lights whenever the TCR is locked to incoming time code, either LTC or VITC.
- External Sync — the EXT SYNC LED lights whenever the TCR is referenced to an external sample rate. When this LED is off, the TCR is running on its internal sample rate reference.

Main Display

The TCR's LCD **Main Display** provides information about the machine's current mode of operation.

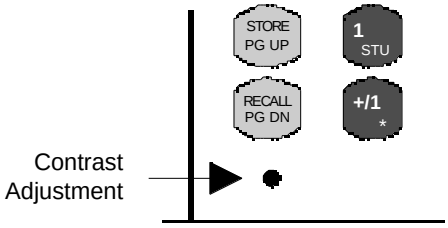


Transport Screen

Four basic displays are provided, each with associated sub-menus: the **Drive List**, **Directory List**, **File List** and **Transport Screen**. Each of these will be introduced in detail later in this chapter.

Contrast Adjustment

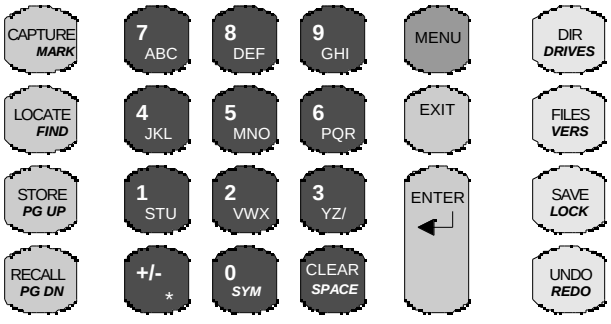
Immediately below the **RECALL** button, a **Contrast Adjustment** is provided to adjust the LCD viewing angle for optimum legibility.



A small flat-blade screwdriver or similar tool is needed for adjustment; one is shipped with each TCR.

Keypad Section

The **Keypad Section** provides buttons for entering numbers, as in time-code values. It can also enter alphabetic characters, so that files may be given "real" names. Other buttons give fast access to Drives, Directories, Files and Menus.



Many buttons have both large and small legends. These are dual-function — the key's function depends on the *context* of the current operation. It is *not* necessary to use a "shift" key for the second command.

Capture / Mark

The **CAPTURE** button "grabs" a time code for use on the **Transport Screen**. When pressed, the value in the red **Time Code Display** is transferred to the **Time Code Register** on the Main display.

The **MARK** button places a checkmark (✓) after a filename on the File List. The marks are used to group files together for functions such as copy and erase.

Locate / Find

The **LOCATE** button instantly "cues" to the time code value shown in the Time Code Register.

The **FIND** button allows you to quickly find files. When pressed, the name of the desired file can be entered, and the file immediately retrieved.

Store / Page Up

The **STORE** button will store the time code value that currently appears in the Time Code Register, in a "Location Register", so it may be retrieved for future use.

The **PG UP** (page up) button pages upward when a list is longer than the screen.

Recall / Page Down

The **RECALL** button allows you to recall a time code value from a Location Register, and place it in the Time Code Register.

The **PG DN** (page down) button pages downward when a list is longer than the screen.

Keypad / Alpha

TheKeypad is designed for both numeric and alphanumeric entry modes, depending upon the current operating context.

- The **KEYPAD** buttons (**0** through **9**) will select numbered menu items directly, and enter time code values.
- The **KEYPAD** buttons can also become **ALPHA** keys (**ABC** through **YZ/**), allowing files, drives, and directories to be given "real" names.
- The **+/-** key toggles the **Time Code Register** between positive and negative values.
- The ***** (star) key gives access to special Location Registers.
- The **SYM** button allows you to enter special symbols that do not appear on the keypad's **ALPHA** keys.
- The **CLEAR** button clears the **Time Code Register** to **00:00:00:00**.
- In alphanumeric entry modes, the **SPACE** button enters a blank space.

Menu

The **MENU** button will present the menus associated with the Drive, Directory, File or Transport Screens.

Exit

The **EXIT** button has four primary functions:

- To return from a menu *back* to its associated display
- To return from a display *back* to the *previous* display in the menu system
- To safely cancel a machine operation currently in progress
- To end an editing session and close the file

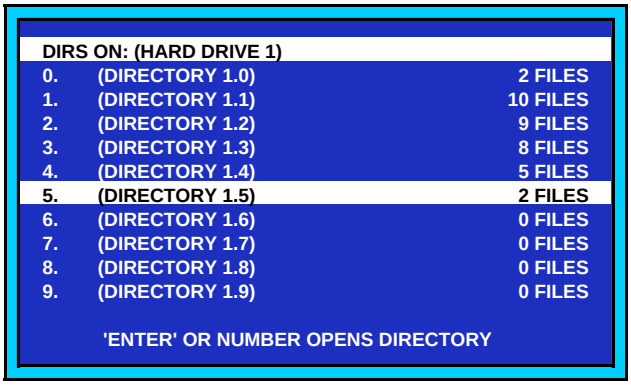
Enter

The **ENTER** button confirms (or accepts) a data entry procedure. The button will also access a highlighted drive, directory, file or menu function.

Directory / Drives

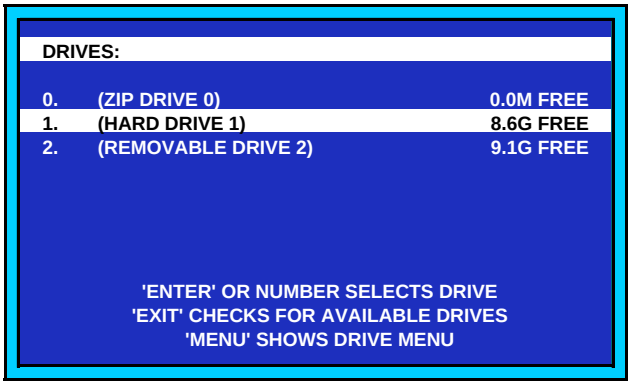
The **DIR** button calls up a list of Drives or Directories, from which a selection can be made. The button is dual-function: pressing it *once* presents a Directory List; Pressing DIR again toggles to the Drive List.

As shown below, the **Directory List** presents all the Directory names for the selected drive.



Directory List

As shown below, the **Drive List** presents all the Drive names currently on line in the TCR recorder.

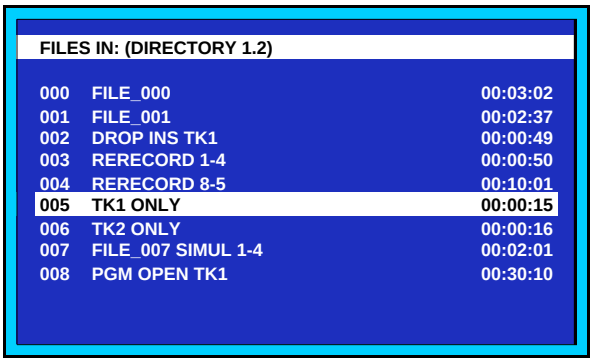


Drive List

Files / Version

The **FILES** button calls up a list of files present.

As shown below, the **File List** presents all audio files, by name and index, present in the current directory. Additional information, such as time, can also be displayed.



File List

The TCR recorder offers a simple "Audition" Mode, allowing any file to be highlighted and played directly from the File menu. Just press **PLAY**.

The version button displays the software version number and machine I.D.

Save / Lock

The **SAVE** button will save a file you are working on, *without* closing it. The button lights as a reminder when changes have been made to the file.

The **LOCK** button changes the *attributes* of a file to "read-only," and places a small **Lock Icon** (🔒) on the display. In this mode, the file can be played but not altered.

Undo / Redo

The **UNDO** button will reverse the last operation and restore the previous version of a file. Whenever changes have been made to a file, the **UNDO** button lights to indicate that the operation may be undone.

The **REDO** button reverses the "undo" operation.

Headphone Jack

A standard 1/4" (6.3 mm) **HEADPHONE JACK** is provided on the left side of the front panel. The **HEADPHONE** button can be used in conjunction with the **JOG WHEEL** for convenient single-handed level adjustment.

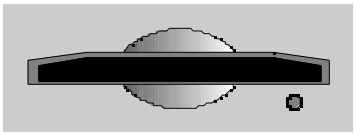
The headphone channel assignment is:

- Tracks 1, 3, 5 and 7 to the left
- Tracks 2, 4, 6 and 8 to the right.

The **MON** (monitor) buttons under the meters also function as channel-enable selectors for the headphones.

ZIP® Drive

A 250 MB **ZIP®** **Drive** is provided as standard equipment on the front panel.



The drive may be used as an audio source, and for economical storage of small projects.

Approximately 14 track-minutes of 24-bit audio can be stored on a 250 MB Zip® disk. It is also used to load new TCR operating software.

Function Key Section

The function key section provides an array of ten buttons:

R-M-W

When Read-Modify-Write is enabled, only playback audio is available at a channel output, rather than the usual input signal. Audio may then be externally modified and re-recorded to disk, all in a single operation. The **R-M-W** button toggles the mode on and off.

Varispeed Play

When Varispeed playback is active, audio is played at an *adjustable off-speed rate*. Varispeed processing is accomplished by the DSP so that a standard output sample rate is always produced. The **VARI** button toggles varispeed mode on and off.

Mute

The **MUTE** button toggles the track Mute function on and off.

- When **MUTE** is on, the **MON** buttons are re-defined as **MUTE** buttons. When a track is muted, its meters still function in the record mode.
- When **MUTE** is turned off, any tracks that had been muted will remain muted, and blink their **MON** buttons as a reminder. All other **MON** buttons return to their standard purpose.

Option

This is a “spare” button for future use. It is presently used for Lamp Test whenever the **File List** is displayed.

Loop

When **LOOP** is active, playback will repeat indefinitely, with a small pause between cycles. The **LOOP** button toggles the Loop Mode on and off.

Slip

The **SLIP** button allows individual time offsets to be introduced in selected tracks. When a track is slipped, the SLIP LED lights at the bottom of the track's associated meter.

Remote

When remote control is active, an external device can control TCR. All Control Panel buttons with the exception of **REMOTE** are disabled. The **REMOTE** button toggles this function on and off.

Display

The **DISP** (Display) button activates a menu used for selecting display modes for the Transport Screen and the Time Code Display.

Offset

The **OFFSET** button enables and disables any time-offset that is currently set.

Chase

When enabled, the TCR is controlled by incoming time code, and the **PLAY** button blinks. The **CHASE** button toggles Chase Mode on and off.

Transport Control Section

Although the TCR recorder shares no technical kinship with tape-based products, it is convenient to continue many of the operational traditions, such as the notion of a “tape transport”, referred to in this book as just “transport”. Other tape terminology, as in the words “rolling”, “punch-in”, “punch-out”, “rewind” and “varispeed”, are to be taken in the spirit of analog ancestry.

The **Transport Control Section** contains five buttons, used to control the delivery of audio in a VTR-like fashion:

Play

The Play button’s primary purpose is to initiate playback of a recorded file. In the TCR recorder, it can also operate in concert with other keys, or operating modes:

- Press **PLAY** to play back any highlighted file on the **Files Menu**. The file will play from the **Head Point** to the **Tail Point** at normal speed.
- While editing, press **PLAY** to play back a file from the cursor’s current position (that is, the value shown in the **Time Code Display**).
- In the Loop Mode, press **PLAY** to repeat the file continuously.
- Press **PLAY + REC** while the transport is rolling to punch-in to record mode.
- While recording, press **PLAY** to punch-out of the record mode and keep rolling.

Stop

The **STOP** button will always stop all transport functions.

When working with menus, press **STOP** to exit from the menu.

Record

Press **REC** + **PLAY** to start recording at the cursor’s current position.

From the File List, pressing **REC** + **PLAY** will create a *new file* in the current directory.

Auto-Record

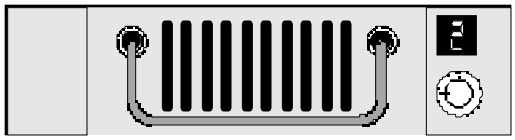
The Auto-Record feature permits accurately pre-planned insert recordings to be made in an existing track. In practice, the user determines a punch-in point and a punch-out point. On pressing **AUTO,** the system will pre-roll, enter record at the Edit-In point, exit the record mode at the Edit-Out point, post-roll , and come to a stop.

Review

Similar to the “replay” mode in an editing system, the **REVIEW** key will place the TCR in an automatic review mode. The system will pre-roll and enter Play at the Edit-In point; playback continues through the Edit-Out point, and after a post-roll, the transport stops.

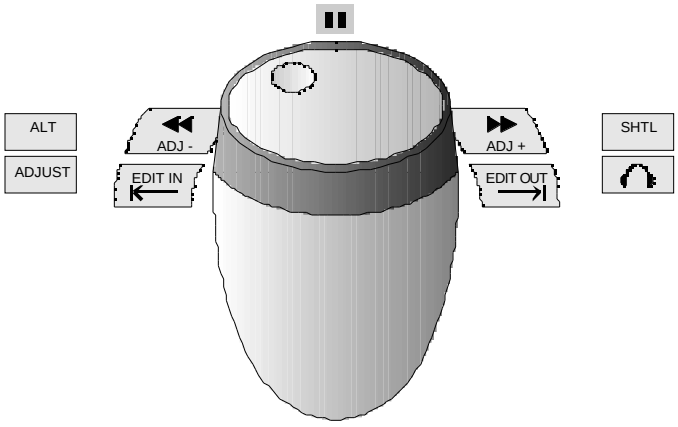
Drive Bay

The **Drive Bay** located below the control panel can house an optional hard disk drive, either as a fixed unit or installed in a removable drive carrier. When a drive carrier is installed, an illuminated digit above the drive lock indicates the drive's numeric ID.



Jog Section

The **Jog Section** is used for transport control, and for making adjustments to other machine settings. As in the **Keypad Section**, many buttons have a dual-function.



The Jog Wheel

The Jog Wheel in TCR is heavily weighted to provide a better tactile response than a light plastic knob. It combines the traditional video functions of Jog and Shuttle, and also the audio function of "Scrub" editing.

- The **Jog Wheel** may be used to jog audio forward or backward at a *variable* speed, proportional to the rate at which the wheel is turned.
- The wheel may be used in Shuttle Mode to play audio forward or backward, at a *fixed* speed proportional to the rotational position of the wheel. Play speeds up to 60x normal may be selected in Shuttle Mode.
- Within Menus and Displays, the wheel may be used to scroll through a list of selections; to adjust a time code value; or to select alphabetic characters for text entry.

Pause LED

The **PAUSE** LED lights momentarily in both Jog and Shuttle modes when the transport is at zero speed.

Shuttle

Press **SHUTTLE** to change the function of the **Jog Wheel** from a jog control to a shuttle control. In this mode, rotate the **Jog Wheel** to shuttle the transport forward and backward at a speed proportional to the direction and position which the wheel is turned (up to 60x play).

ALT

The **ALT** button is provided for future enhancements.

Adjust

Many keys in the Jog Section change from transport controls to *adjustment* controls: On the Transport Screen, press **ADJUST** to display the Adjust Menu.

- **<< (Rewind)** changes to **ADJ-**, which allows you to "nudge" a value down by one increment.
- **>> (Fast-forward)** changes to **ADJ+**, which allows you to "nudge" a value up by one increment.
- **EDIT IN** changes to |←, which allows you to move the Time Code Register's underline to the left.
- **EDIT OUT** changes to →|, which allows you to move the Time Code Register's underline to the right.

The **Jog Wheel** changes to allow you to "dial in" values.

<< / Adjust -

- Press **<<** to rewind the transport at a fixed speed, ranging up to -60x play.
- Press **<<** twice to locate immediately to the next stop point earlier in time.
- In "adjustment" mode, press **ADJ-** to "nudge" a value down by one increment.

>> / Adjust +

- Press **>>** to fast-forward the transport at a fixed speed, ranging up to +60x play.
- Press **>>** twice to locate immediately to the next stop point later in time.
- In "adjustment" mode, press **ADJ+** to "nudge" a value up by one increment.

Edit In / |←

The **EDIT IN** button is used in combination with other buttons to perform special functions, such as storing and recalling a time value related to an Edit-In location.

- For example, press **RECALL**, **EDIT IN** to recall a stored Edit-In point.
- Press **STORE**, **EDIT IN** to store the current Time Code Register value.
- In "adjustment" mode, the |← symbol will move the Time Code Register's underline to the left.

Edit Out / →|

The **EDIT OUT** button is used in combination with other buttons to perform certain special functions, such as storing and recalling a time value related to an Edit-Out location.

- For example, press **RECALL**, **EDIT OUT** to recall a stored Edit-Out point.
- Press **STORE**, **EDIT OUT** to store the current Time Code Register value.
- In "adjustment" mode, the →| symbol will move the Time Code Register's underline to the right.

Headphones

The **HEADPHONE** button is used in combination with the **Jog Wheel** to select the desired volume. A **Headphone Menu** is appears, superimposed over the current display.

Power Switch

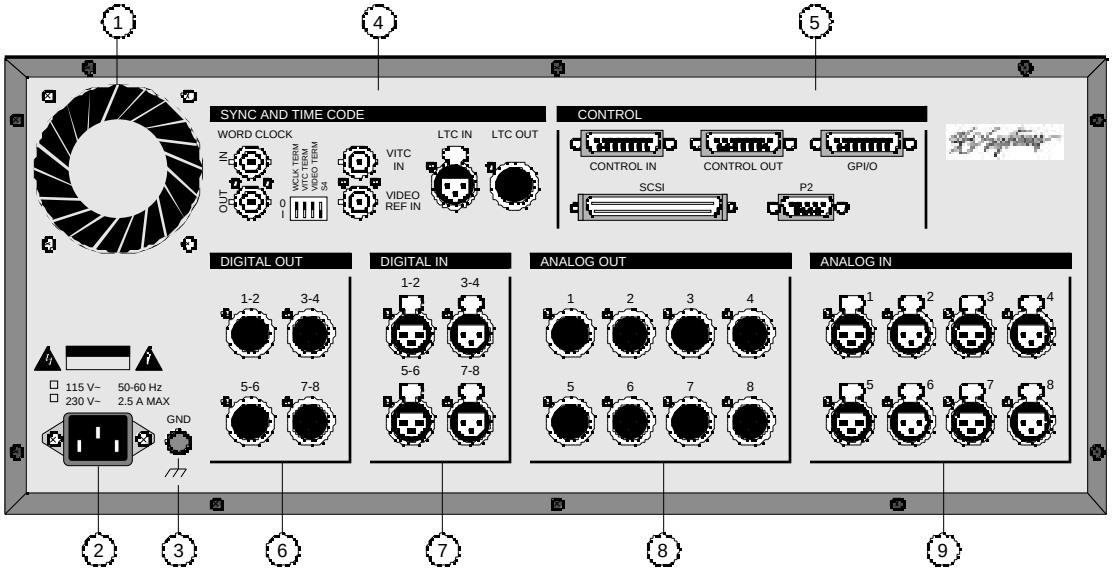
Use the **POWER** switch to turn power on or off.

Note

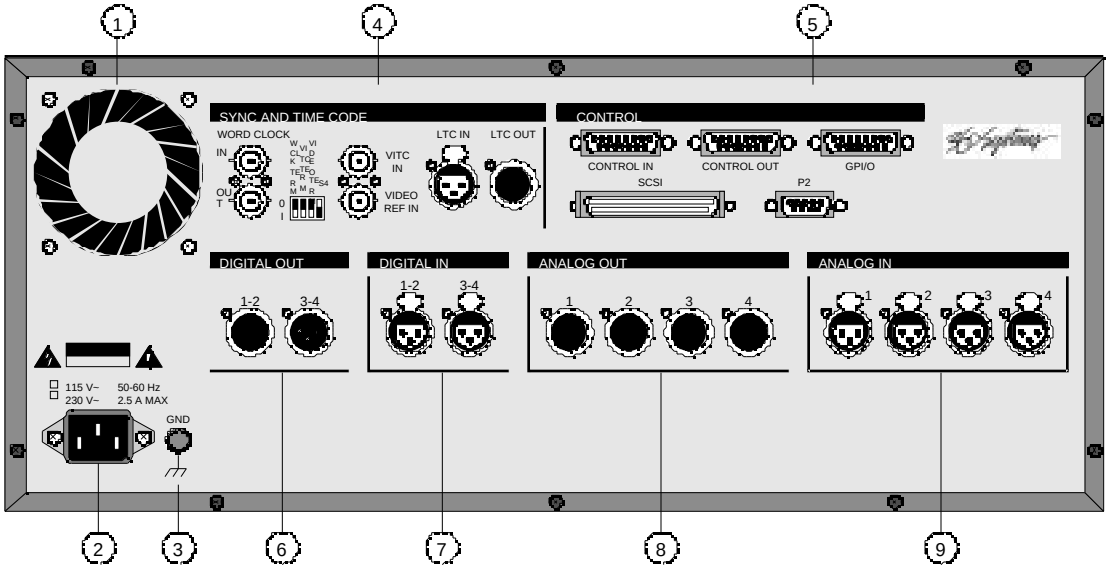
The TCR can be powered off at *any* time from any screen. When power is restored, the system returns to the same *non-menu* screen that was active at power- down. If TCR is recording during a power loss, all but the last few seconds of audio will be saved. If power is lost during an edit operation, the edit will *not* be saved.

Rear Panel Description

The TCR4 and TCR8 rear panels are divided into sections as illustrated below. The sections are *identical* between the four and eight track models, except for the different number of connectors in the audio input and output sections.



TCR8 Rear Panel Sections



TCR4 Rear Panel Sections

1) Exhaust Fan	4) Sync and Time code Section	7) Digital Audio Inputs
2) AC Power	5) Control Section	8) Analog Audio Outputs
3) Ground Post	6) Digital Audio Outputs	9) Analog Audio Inputs

Following are more detailed descriptions of each rear panel section.

Cooling Fan

A single fan is provided for cooling. Air intakes are located on the side panels. To provide optimum air flow, do not obstruct the air intakes or block the rear fan outlet.

AC Power

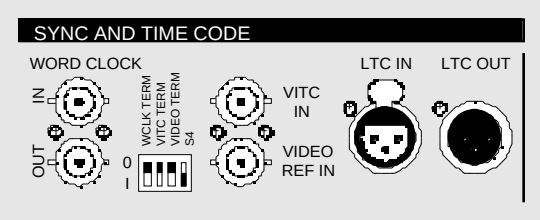
The TCR recorder includes a dedicated power supply that is pre-configured at the factory for the proper line voltage. Please verify that the voltage, as checked off above the AC connector, matches your country's voltage standard.

Ground Post

A Ground Post (GND) is provided to allow you to tie the TCR unit to your facility's technical ground reference. This ground post is not intended to be used in place of the safety ground wire in the mains power cord.

Sync and Time Code Section

The Sync and Time Code Section provides connectors for reference, synchronization and timing.



Note

The TCR's **Setup Sync and Time Code Menu** is used to select the desired reference and sync inputs.

Word Clock In

The **WORD CLOCK IN** connector (BNC) accepts a TTL signal, typically generated by another digital audio recorder or workstation. Word Clock is a 5 V p-p square wave at the sampling frequency.

Word Clock Out

The **WORD CLOCK OUT** connector (BNC) is an independent TTL-level output, not a loop-through, that is clocked at the sample rate of the TCR's current operating mode. The output operates at all times, even when there is no Word Clock input connected or when TCR is idle.

VITC Input

The **VITC IN** connector (BNC) accepts an analog video signal with embedded VITC (Vertical Interval Time Code). This signal is used by the TCR as a positioning and synchronization input.VITC can be used in place of LTC (Longitudinal Time Code) to synchronize to a VTR that does not provide an LTC output.

Video Reference Input

The **VIDEO REF IN** connector (BNC) accepts an analog video signal such as Black Burst, for synchronizing the TCR to a common "house" reference.

LTC Input

The **LTC IN** connector accepts a standard longitudinal time code input signal.

LTC Output

The **LTC OUT** connector provides a standard longitudinal time code output signal, that matches the current time code display.

Note In Appendix C, refer to the "**Connector Pinouts**" section for details and diagrams of all sync and reference connections.

Termination Switches

A four-position DIP switch is provided for termination.

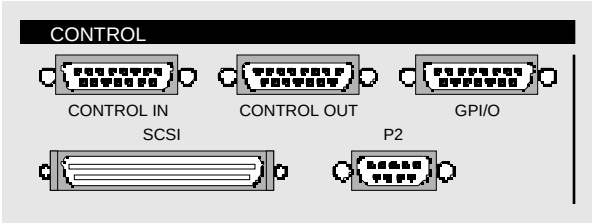
- **UP** = unterminated
- **DOWN** = terminated

Termination DIP Switch Positions

Switch	Name	Description
S1	WCLK TERM	Selects a 75 ohm termination for the Word Clock input
S2	VITC TERM	Selects a 75 ohm termination for the VITC input
S3	VIDEO TERM	Selects a 75 ohm termination for the Video Reference input
S4	S4	Unused

Control Section

The **Control Section** provides a group of connectors used for remote control, ganging multiple machines, and connecting external drives.



Control Input

The **CONTROL IN/OUT** connectors are a proprietary bus used to control and synchronize multiple TCR units. For example, two TCR8 recorders might be interconnected to produce 16-channel capability.

The **CONTROL IN** port is connected to the previous **CONTROL OUT** port in line.

Control Output

The **CONTROL IN/OUT** connectors are a proprietary bus used to control and synchronize multiple TCR units.

The **CONTROL OUT** port is connected to **CONTROL IN** port of the next TCR in line.

Note Multi-machine operation is not available as of Fall 1999.

General Purpose Input/Output

The **GPI/O** connector provides six "general purpose" inputs for triggering selected TCR functions.

The six GPI/O inputs can be assigned to specific TCR functions by using an assignment menu. When a contact closure is received the selected function is activated.

Three outputs are provided to confirm input commands, and are often used to operate an external "tally" LED. The outputs reflect commands received on GPI/O inputs 1, 2, and 3.

SCSI

The **SCSI** port (high density 68-pin) is used to interconnect the TCR with external Wide-SCSI-2 hard drives and certain removable drives.

P2 Remote

The TCR recorder provides a standard "9-pin" or "P2" remote control port to connect with an external edit controller or serial remote control.

Digital Audio Outputs

The Digital Audio Outputs section provides four AES/EBU output pairs on the TCR 8, and two on the TCR 4.

Digital Audio Inputs

The Digital Audio Inputs section provides four AES/EBU input pairs on the TCR 8, and two on the TCR 4. Inputs 1-2 and 3-4 can be used for AES/EBU reference input.

Analog Audio Outputs

The Analog Audio Outputs section provides eight line level analog outputs on the TCR 8, and four on the TCR 4.

Analog Audio Inputs

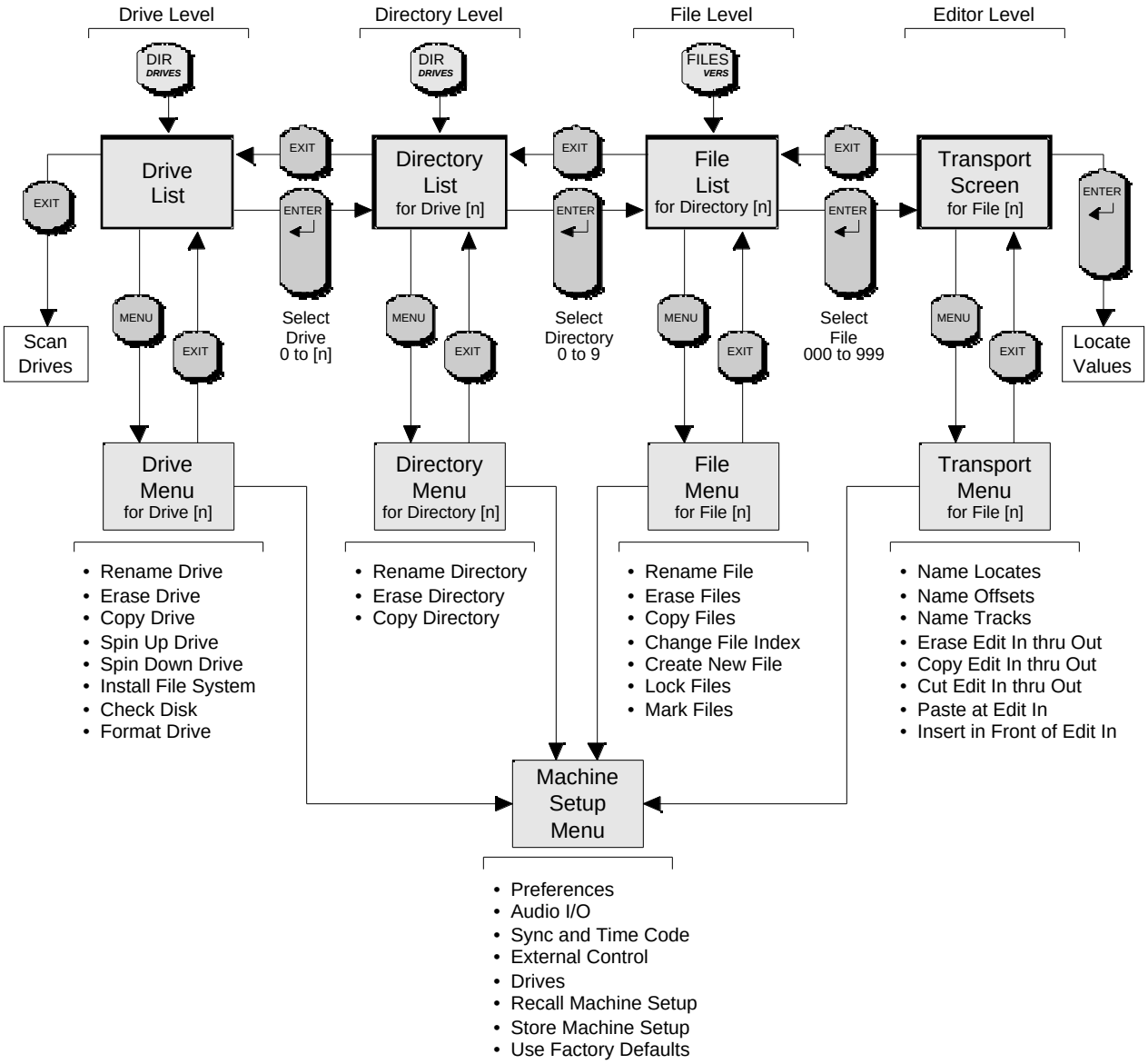
The Analog Audio Inputs section provides eight standard analog inputs on the TCR 8, and four on the TCR 4.

Note In Appendix C, refer to the "**Connector Pinouts**" sections for details and diagrams of all audio connectors.

TCR Menu System

The TCR recorder's menu system is arranged to make it quick and easy to find any file. Unlike earlier machines, the large main display can present an entire list, allowing the operator to rapidly review the contents of a directory.

Knowing how the menu system functions will help you work efficiently, and quickly arrive at the function you need. The figure below illustrates a simplified view of the TCR's menu system — which you can use for reference during the following sections in this chapter.



Menu Navigation

The TCR menu system will be familiar to everyone having some experience with computers. It will be helpful to refer to the previous menu diagram while reading the next sections.

TCR is organized into two principle tasks. First is managing files, directories and drives. Secondly, the tasks of recording, editing and playing individual audio files.

1. The underlying principle of TCR's file organization is simple. Like a computer, files are organized into directories, which are organized on drives. TCR recorders contain several drives, each of which has ten directories.

   Disk drives and directories are numbered and may be named by the user.

   Each Directory may contain many audio Files, each of which has a unique ID number and name.

   The location of any specific File is therefore defined by the *File* name, the *Directory* it is in, and the *Drive* containing that Directory. TCR's menu system is designed so that navigation through this storage system will be quite easy.

   While there are always ten directories, there is no fixed-size requirement or limit to the size of any directory. Each directory can hold up to 1,000 files. The only limit to file storage is the drive size.

   The **DIR/DRIVES** button may be pressed to view a list of Directories or Drives. The button toggles between the two views.

   Press the **FILES** button to view the **File List** of the current directory.

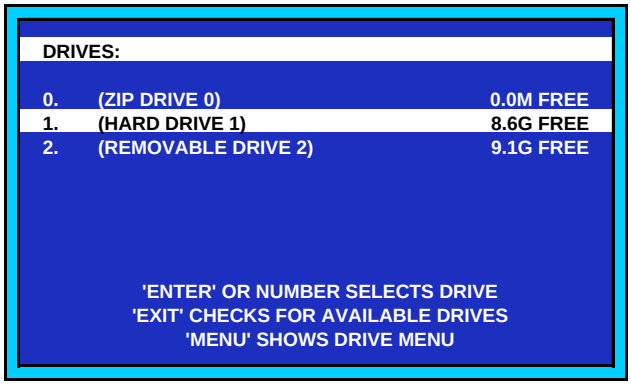
   From any of these lists, press **MENU** to perform related functions.

2. The **Transport** mode allows recording, playback, and editing. To edit a file, select the file on the **File List** and press **ENTER.** The Transport mode makes machine controls active for recording, playback, editing, marking edit points, marking location points, slipping tracks and setting offsets.

   The **MENU** button may be pressed while the **Transport Screen** is active to access the **Transport** menu for specific file-related functions such as cutting, copying, pasting and inserting audio clips.

Introduction to the Drive List

The **Drive List** allows you to select drives and perform a variety of drive-related functions. The display presents a list of the internal and external drives, numbered 0 through 7, attached to the TCR.

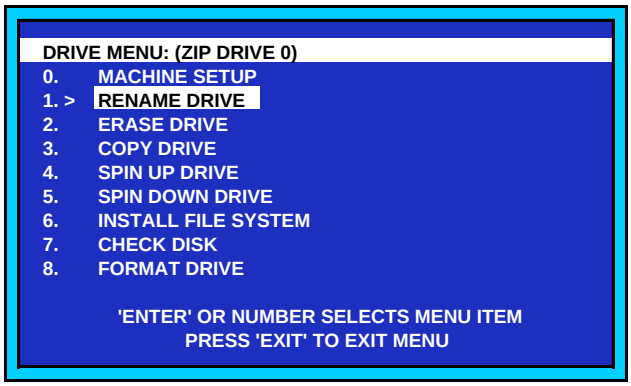


Drive List

- The first two columns list each drive's logical number and name.
- The right column can display the drive's free space, the total number of files, the total run time or the total size.

About the Drive Menu

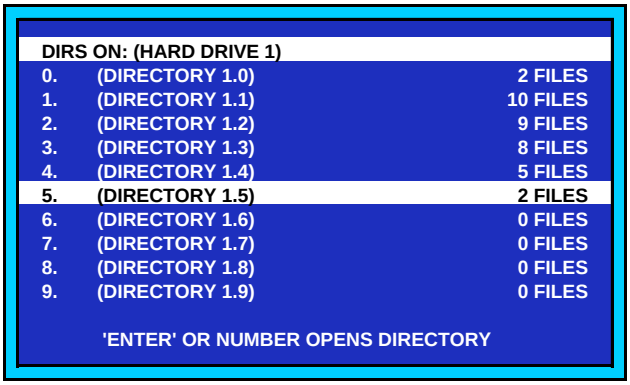
The **Drive Menu** presents operations you can perform for the selected drive. The title bar at the top shows which drive is selected. The most commonly used Drive Menu operations are naming it, copying its contents to another drive, and on completion of a project, erasing its contents.



Drive Menu

Introduction to the Directory List

Each TCR disk drive has ten directories, numbered 0 through 9. Directories are presented in the DIRECTORY LIST with their index, followed by their name and an information field.



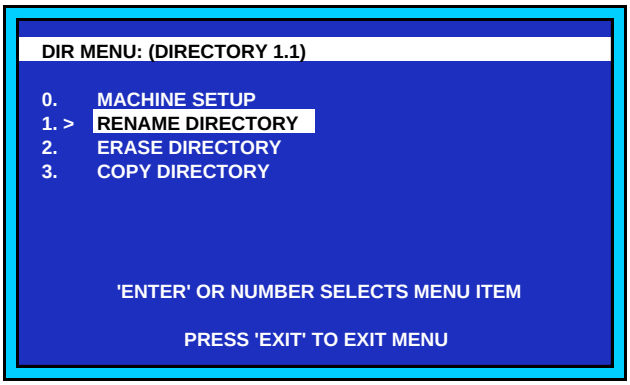
Directory List

- The title bar at the top indicates which drive the Directory List is associated with.
- The first two columns list each directory's logical number and current name. Either the default name (1.1, 1.2, etc.) or a custom user name will be shown.
- The right column can list the directory's total size, the total number of files, or the total run time.

About the Directory Menu

The **Directory Menu** contains of a list of operations that can be performed on the selected directory. The title bar at the top shows the name of the selected directory.

The Menu provides tools used to assign a unique Directory name, to copy the Directory to another location, or to erase the Directory's contents.



Directory Menu

Introduction to the File List

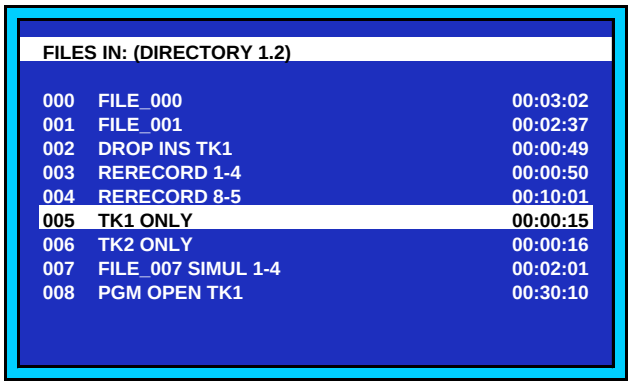
Files have an index (000-999) and a name of up to 27 characters, which appear in the FILE LIST. An additional field shows the file start time, running time or size.

The File List may contain up to 1,000 files for each directory.

Every file has a head point and a tail point. The default head point is the *earliest time* at which audio occurs, and the default tail point is just beyond *the latest point* containing audio.

The head and tail points can be changed manually, by recording, or by editing the file. The displayed running time is the amount of time between the head and tail. Disk space is used only by sections of each file that contain audio.

From the File List, you can audition a file (play it to determine its contents) or open the file for editing.



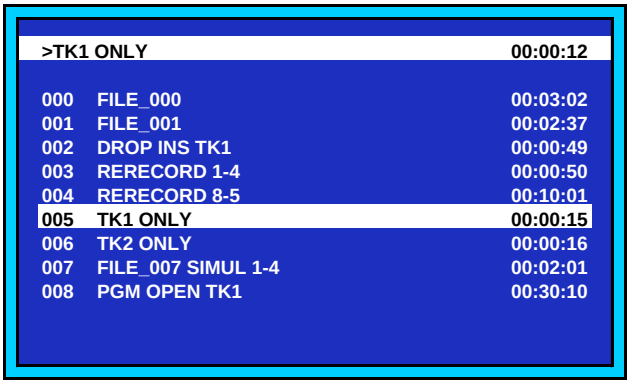
File List

- The title bar (at the top) shows the selected directory.
- The first two columns list each file's logical number and name. Either a default name (File 001, File 002, etc.) or a custom name will be shown.
- The right column can list the file's running time, start time or file size.

Auditioning a File

From the **File List**, you can play (audition) any file by pressing PLAY. You can also select the next file to play while one is auditioning. Auditioning is a quick way to check what one or more files contain, without opening them for editing.

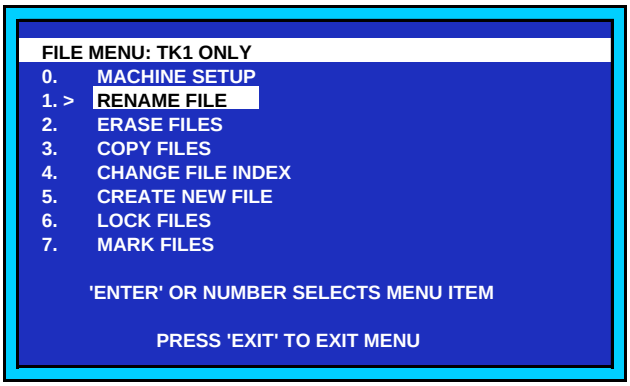
To audition a file, simply select it from the File List screen and press PLAY.



FILE LIST during audition

About the File Menu

The File Menu relates to the *specific file* that you highlight on the File List. It presents operations that can be performed on a selected file, or to a group of marked files. For example, new files may be created, existing ones can be locked to prevent alteration, or marked for later copying or erasure.



File Menu

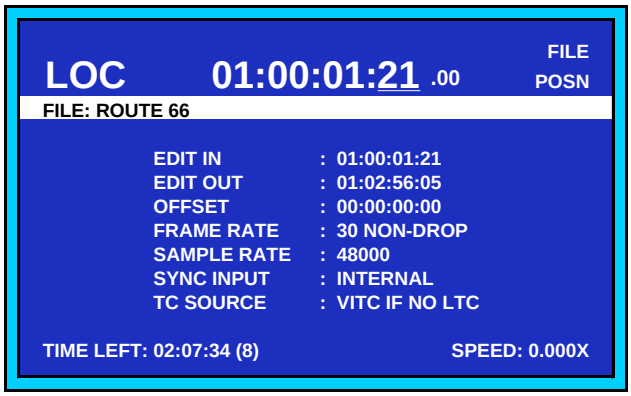
- The title bar at the top shows the selected file name.
- The columns list each file function by number and name.

Introduction to the Transport Screen

The **Transport Screen** allows you to play, record, chase, and edit all aspects of a file, including its in-point, out-point and a variety of other location registers. The display and associated sub-menus are *specific* to the file that is open.

Opening a File

A file must be *opened* to use the transport for anything more than playback at 1X speed. To open a file, select it from the File List and press ENTER. The Transport Screen will be displayed, and all transport buttons and indicators will become functional.



Transport Screen

The large **Time Code Register** at the top of the screen shows the present location in the file. This register serves as a placeholder for time code values being transferred to and from storage, or used as "marks" within the file for time codes to cue to. It can also hold offsets and slip values.

The register displays time in **HH:MM:SS:FF.sf** format:

- **HH** = Hours (0 to 23)
- **MM** = Minutes (0 to 59)
- **SS** = Seconds (0 to 59)
- **FF** = Frame (0 to 29 in **NTSC**, 0 to 24 in **PAL**)
- **sf** = Sub-frames (0 to 79)

To the left of the Time Code Register, several large labels may appear, depending upon the TCR operating mode:

- The label "LOC" indicates that you are working with time code *locations*.
- The label "OFST" indicates that you are in the Offset Register mode, which is used to enter, store, and recall time offset values.
- The label "SLIP" indicates that you are in the Slip Value mode, which allows you to set, change, enable and disable individual track slip values.

In the upper right corner of the display, two words appear to label the current Display Mode. The six possible labels are:

- OFFSET REG (Offset Register)
- REL (Relative)
- OFFSET POSN (File Position - Offset)
- FILE POSN (File Position)
- GEN (Internal Time Code Generator)
- EXT TC (External Time Code)

One of these Display modes may be selected with the **DISP** button, and the associated Display Mode Menu.

Below the Time Code Register, the title bar lists the name of the file that has been opened.

The center of the display lists seven parameters for the selected file:

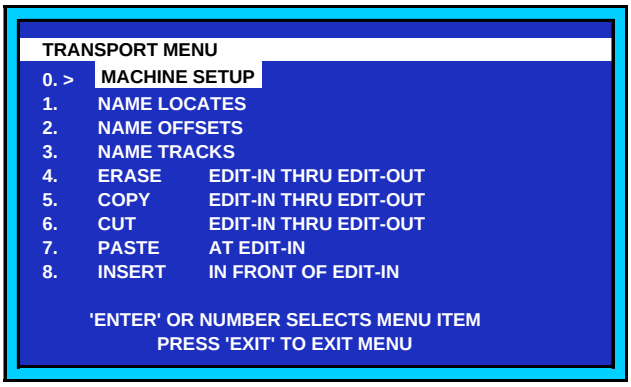
- EDIT IN — The edit in-point is the time code at which the edit will begin during an auto-record.
- EDIT OUT — The edit out-point is the time code at which the edit will end during an auto-record.
- OFFSET — this field displays a time offset that affects all tracks.
- FRAME RATE — this field displays the current frame rate.
- SAMPLE RATE — this field displays the current audio sample rate.
- SYNC INPUT — this field indicates whether the TCR is running on internal or external reference.
- TC SOURCE — this field displays the current time code source.

At the bottom of the display, the Time Left field indicates the recording time remaining on the current drive, based on the number of machine tracks.

At the bottom of the display, the Speed field indicates the file's current playback speed.

The Transport Menu

TheEdit Menu presents eight editing operations that can be performed on the file currently open. The title bar at the top identifies this as the Transport Menu.



Transport Menu

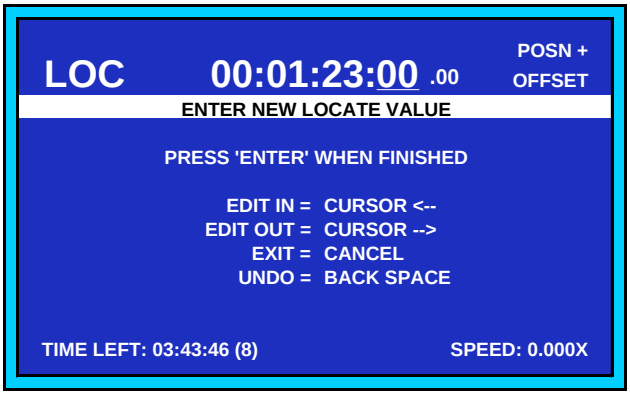
Operations that may be performed include:

- SETUP — Provides a shortcut to the global TCR setup menus.
- NAME LOCATES — Give Location Points an alphanumeric name.
- NAME OFFSETS —Give Offsets an alphanumeric name.
- NAME TRACKS —Give individual tracks a name.
- ERASE
- COPY
- CUT
- PASTE
- INSERT

Detailed procedures for using editing operations will be found in the Operations chapter.

Locate Value Prompt

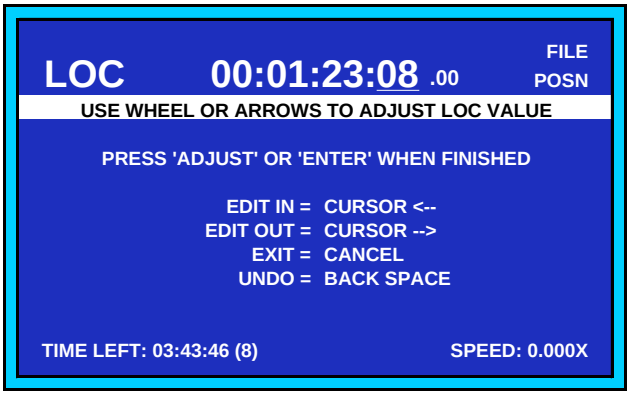
The **Locate Value** prompt allows you to enter a time value into the **Time Code Register**. This value can be used to cue the transport, or it can be stored as the Edit-In point or the Edit-Out point in one of 100 **Locate Registers**.



Locate Value Prompt

Adjusting Values

The **Adjust Prompt** allows you to make precise changes to the underlined value in the Time Code Register. The **ADJUST** key provides quick access to this screen.



Adjust Prompt

Installation

In This Chapter

This chapter provides installation instructions for the TCR™ recorder. Instructions are identical for both the TCR4 and TCR8. The following topics are discussed:

- Unpacking and Inspection
- Preparing Your Site
- Installing Hardware
- Connecting Signals

Important When performing the following installation procedure, always observe proper safety, handling and anti-static precautions.

Unpacking and Inspection

When you receive your TCR system, inspect the shipping carton for signs of physical damage. Contact your dealer and the shipper immediately if you suspect any damage has occurred during shipping. Check the contents of the box to ensure that all parts are included. If any items are missing, contact your dealer immediately. After unpacking all equipment, please save the packing materials for future shipping convenience.

Preparing Your Site

When preparing to install your TCR system, attention should be given to **Environmental**, **Power** and **Location** requirements. Refer to Appendix C for mechanical and environmental specifications.

- **Environmental Requirements**

  The TCR is designed to operate in normal “machine room” or “control room” conditions. Care must be taken to avoid temperature and humidity extremes.

- **Location and Power Requirements**

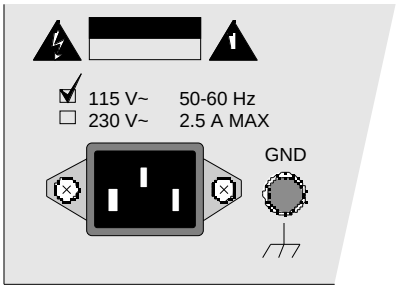
  When connecting the TCR, care should be taken to avoid power lines that are subject to noise and voltage spikes. Do not install the system on a power circuit that is common to such equipment as air conditioners and refrigeration units. An uninterruptable power supply (UPS) is recommended if unstable power conditions are present.

Installing Hardware

The TCR can be installed in tabletop fashion, or in a standard 19" equipment rack. Whichever method you choose, ensure that there is adequate room for cables and proper ventilation for the chassis.

Please note the following important points:

- Each TCR model includes a dedicated power supply that is pre-configured at the factory for the proper line voltage. Please verify that the voltage, as checked above the AC connector, matches your supply line voltage.



- For rack mounting, the TCR chassis requires 7 inches of vertical rack space (4 RU).
- Provide a sufficient service loop for all rear chassis power, audio, sync and communications cables.
- The TCR can be installed at any angle, per the requirements and space limitations of your facility.
- Four 10-32 threaded holes located on the bottom of the chassis may be used as alternate mounting points. Fasteners should not enter the chassis more than 0.5 inches [12 mm].

Safety Cautions

Please note the following important cautions:

- Connect the TCR only to a grounded 50/60 Hz AC outlet providing the correct voltage (115 VAC or 230 VAC as delivered).

- Do not remove or defeat the grounding pin on the AC Power Cord. A serious shock hazard may result from failing to make connection to a properly grounded electrical outlet. **Use of the reference grounding post is not a substitute for the safety ground conductor.**
- Do not use this product in rain, or in damp or wet environments.
- If necessary, replace the power cord only with Underwriters Laboratories recognized cord of the same ratings.
- To provide optimum air flow and maximum chassis cooling, do not obstruct the side air intakes or block the rear exhaust fan. Failure to provide proper ventilation may cause early component failure and/or create a fire hazard and can *void your warranty*.

Connecting Signals

This section provides instructions for connecting signals to the TCR. The following topics are discussed:

- Audio I/O Connection
- Sync and Reference Connections
- Control Connection

In Chapter 1, refer to the "**Rear Panel Description**" section for an illustration and explanation of all rear chassis connectors.

See Chapter 5, "**Machine Setup**" for detailed information on configuring I/O.

Audio I/O Connection

During system setup, you can specify which combination of TCR digital and analog inputs that you wish to use.

Digital I/O Connection

To connect digital inputs and outputs to the TCR, plug 3-pin XLR cables from the digital I/O sections of the TCR's rear panel to the digital I/O sections of your other equipment. TCR digital I/O is AES/EBU standard, only.

Analog I/O Connection

To connect analog inputs and outputs to the TCR, plug 3-pin XLR cables from the analog I/O sections of the TCR's rear panel to the analog I/O sections of your other equipment. TCR analog I/O is a line level signal, only.

Sync and Reference Connections

The following topics are discussed in this section:

- VITC Connection
- Video Connection
- LTC Connection
- Word Clock Connection

For reference termination requirements in the connection procedures, refer to the following diagram:

Signals will be terminated when their corresponding switch is set to the "**|**" position.

VITC Connection

Use the following steps to connect a VITC signal to the TCR.

1. Connect a stable analog VITC signal from the desired source to the **VITC IN** connector. Most contemporary VTRs and DTRs are capable of recording and outputting a VITC signal.
2. If the TCR is in the *middle* of your VITC loop, you can "**T**" the signal to the next device in the chain — using a **BNC T** connector.

   If the TCR is the *last device* in your VITC loop, terminate the chain using the VITC termination DIP switch on the rear panel.

Video Connection

Use the following steps to connect a video reference to the TCR.

1. Connect a stable analog reference signal (such as **Video Black Burst**) from the appropriate reference source to the **VIDEO REF IN** connector.

   Ensure that the selected reference source feeds the same reference signal to *all devices* in your TCR system.
2. If the TCR is in the *middle* of your reference loop, you can "**T**" the signal to the next device in the chain — using a **BNC T** connector.

   If the TCR is the *last device* in the chain, terminate the input using the VIDEO termination DIP switch on the rear panel.

LTC Connection

Use the following steps to connect an LTC signal to the TCR.

1. Connect an LTC signal from the appropriate source to the **LTC IN** connector. Typical LTC sources are a "house" master time code generator, or the LTC output from a VTR or DTR.
2. As required, connect the **LTC OUT** port to the desired LTC input connector on a target device (such as a mixing console, workstation, VTR, DTR or audio tape recorder).

Word Clock Connection

Use the following steps to connect a Word Clock signal to the TCR.

1. Connect a stable Word Clock signal from the appropriate reference source to the WORD CLOCK IN connector.
2. If the TCR is in the middle of your reference loop, you can "T" the signal to the next device in the chain — using a BNC T connector.

   If the TCR is the last device in the chain, terminate the input using the WCLK termination DIP switch on the rear panel.
3. If you wish to reference another device (such as an audio workstation) to the TCR, connect the WORD CLOCK OUT port to the Word Clock input connector on the target device.

Note

The **WORD CLOCK OUT** connector is an independent TTL-level output (not a loop-through) that is clocked at the sample rate of the TCR's current operating mode. The output operates at all times, even when there is no Word Clock input present. It is derived from the currently selected sync source.

Control Connection

The following topics are discussed in this section:

- P2 Connection
- SCSI Connection
- GPI/O Connection
- Control In Connection
- Control Out Connection

P2 Connection

Use a customer-supplied RS-422 cable to connect the TCR's **P2** port to an external controller, such as an editing system or a mixing console. In Appendix C, see the "**P2 Connector Pinouts**" section for details.

SCSI Connection

Use customer-supplied SCSI cables to connect external SCSI disk drives to the TCR's **SCSI** port. Please note:

- Ensure that each SCSI ID is unique. TCR uses some SCSI IDs internally — IDs **3**, **4**, **5** and **6** are available for the user.
- Ensure that the last drive in the SCSI chain is properly terminated.
- Upon power-up, the system automatically scans all drives to determine which drives are available for use. During operation, from the **Drive Display**, press **EXIT** to scan all drives manually.

GPI/O Connection

Use a customer-supplied cable to connect GPI input and output triggers to the TCR's **GPI/O** port. See "**General Purpose I/O**" in Chapter 5 for configuration details. In Appendix C, refer to the "**GPI/O Connector Pinouts**" section for connection details.

Control In Connection

This connector is currently not implemented.

Control Out Connection

This connector is currently not implemented.

Operations

In This Chapter

This chapter provides instructions for all modes of TCR™ operation. The following major topics are discussed:

- 24 Hour Time Line Concept
- Preparing to Play and Record
- Setting Up to Record
- Basic Recording
- Automatic Recording
- Recording from the File List
- Basic Playback
- Chasing External Time Code
- Off-line Editing Operations
- Saving Your Work

Note

Throughout this chapter, the triangle symbol ► followed by a series of button and screen labels indicates the "path" of keystrokes required to access a particular function.

24 Hour Time Line Concept

Each file in the TCR may be viewed as a long reel of tape, pre-striped from zero to 24 hours with a track of timing information. This track establishes accurate time points for positioning within the file, and provides a means of synchronizing with external time code sources.

In practice, many different frame rates are used in the video and film industry: 24-frame, 25-frame, or 30-frame. The TCR synthesizes a "real" time code exactly representing any one of these industry standards. The menu selection RATE/FORMAT is used to select the desired time code standard. By this means, all time code formats are available to the user, along with the ability to change format after commencing a project.

A key concept in production of audio with time code is the notion of *offsetting* the audio with respect to its original time position. The 24-hour time line may be shifted forward or backward by up to 12 hours relative to the file's absolute time line. For example, by setting an Offset value to *minus* 1 hour (-1:00:00:00) and pressing the **OFFSET** button, audio recorded to the file at 3:00:00:00 will appear at 2:00:00:00.

One should bear in mind that since the time line is always exactly 24 hours, offsets can have the effect of pushing material at either end off the end of the time line, making it unavailable. (It will not be irretrievably lost.) For this reason, audio tracks often start at 1 hour (1:00:00:00) rather than at zero, so they may be offset without disappearing before "zero time".

Even though a recording can be made anywhere along the file's 24-hour time line, disk space is utilized only when audio is actually recorded. Each file does, however, use a relatively small amount of disk space for overhead, even if the file contains no audio data.

Machine Setup for Play and Record

Audio recordings for pictorial use must, by nature of their usage, conform to the technical requirements of the film or video production they are a part of. This section describes how to make appropriate selections for sync, frame and sample rates.

Before playing or recording, first highlight the file to be opened on the **File List Screen**, then press **ENTER**. The **Transport Screen** will be displayed. Verify that the following items are set correctly:

- Sync Reference
- Frame and Sample Rates
- External Sync Validity Indicators

Use the **MENU** button to change the settings to a desired state, as described below.

Sync Reference

► MENU | Machine Setup | Sync and Time Code | **Sync Ref**

The sync reference determines the source of the sample clock used for playback and recording of digital data. The sync reference can be sample based, such as Internal, Word Clock, AES 1-2, or AES 3-4. In these cases, frame boundaries are derived from the sample clock. The sync reference can also be frame based, such as Video or LTC, in which case the sample clock is derived from the frame signal using a low jitter phase locked loop (PLL.)

When monitoring or recording digital data, it is important that the frequency of the incoming samples exactly match the frequency of the system sample clock. If the frequencies are not exactly the same, occasional pops and clicks may be heard as samples are either repeated or dropped. This might occur, for example, when trying to monitor incoming digital data when the sync reference is the internal crystal, since this clock is typically not synchronous to the external AES source, even though the sample rates are nominally the same. By changing the sync reference to be the AES source, the system clock becomes synchronous with the incoming sample rate, eliminating the problem.

If digital audio inputs are to be recorded using a video reference, the incoming sample rate should also be generated from the same video reference. When the external sample rate differs from the internal sample clock, you can still record the digital data by routing it through the sample rate converter.

Frame and Sample Rates

► MENU | Machine Setup | Sync and Time Code | **Rate/Format**

The Rate/Format menu item selects which time code format is to be used.

External Sync Validity Indicators

Upon returning to the Transport Screen after exiting the setup menus, the TCR activates the selected sync reference and rate/format selections. If the desired sync source is *invalid*, then the **EXT SYNC** indicator in the Time Code Display flashes, and the **STOP** button blinks. To help spot incorrect sync rates, the percentage frequency error for the selected external sync source is shown on the Sync Input line of the Transport Screen. If the signal is missing entirely, then "BAD" is shown.

Setting Up to Record

Recording with the TCR will be similar to many other machines. Every effort has been made to incorporate established industry traditions, such as the way **ARM** and **RECORD** buttons operate. Some of TCR's features are new and extremely useful; it is in the reader's interest to take advantage of these capabilities. This section discusses each record-related issue. Topics include:

- Audio input selection
- Track arming
- Signal levels using the track monitoring features
- Headroom selection
- Crossfade time
- Process delays
- RMW selection

Audio Input Selection

► MENU | Machine Setup | Audio I/O | **Track Input**

You can record from either the analog inputs or the digital inputs for any track pair. A track pair may be routed through a sample rate converter if desired.

Examine the TRACK INPUT menu. Note that you can route the ANALOG inputs, the AES digital inputs, or the output of the SAMPLE RATE CONVERTER to a selected track pair.

Sample Rate Conversions

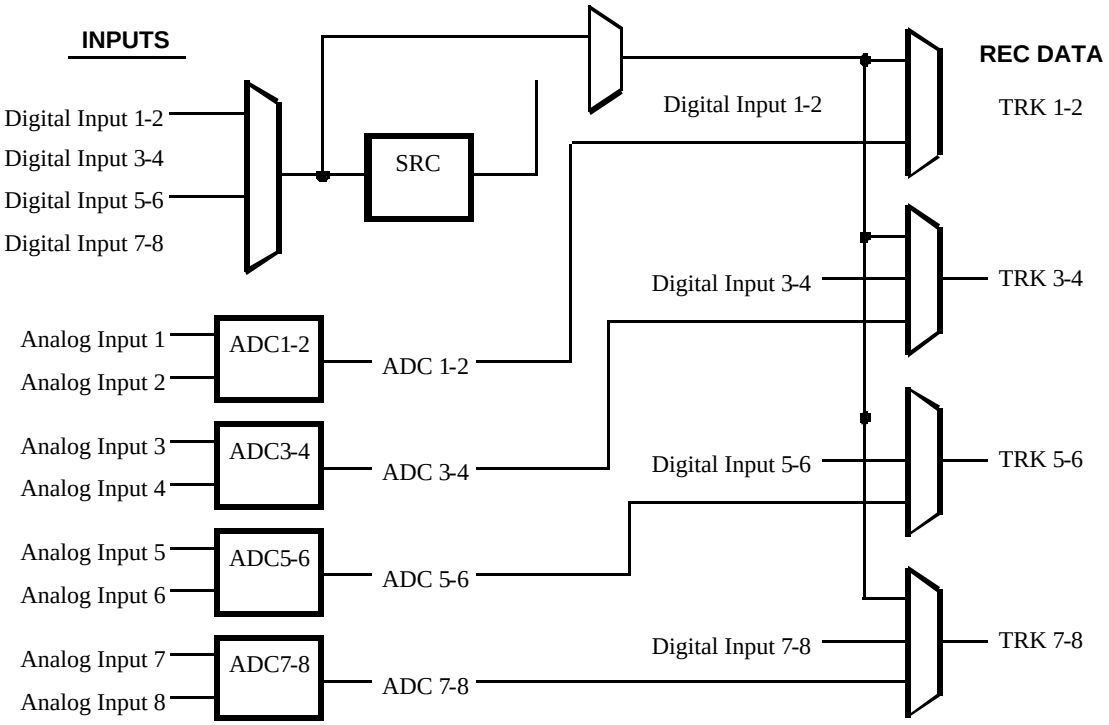
► MENU | Machine Setup | Audio I/O | **Sample Rate Converter**

The sample rate converter (SRC) permits incoming digital audio to be accepted, even if at a different sample rate than TCR's current setting. For example, 44.1 kHz digital audio may be recorded at 48 kHz by routing it through the internal sample rate converter.

The diagram below represents TCR's data path for incoming audio. It will be seen that any pair of digital audio inputs may be routed to the sample rate converter. Note that although the SRC may be placed in the signal path, and may either:

- Perform a sample rate conversion, or
- Pass the data through, not converted.

TCR Record Data Routing



Track Arming

Eight numbered track **ARM** buttons are provided on the TCR8 — four on the TCR4. When lit RED, the selected track(s) are armed for recording. Each button stays lit during the record interval, and remains lit until it is *manually* disarmed.

On the TCR8 only, an **ARM ALL** button is provided to arm or disarm all channels. If selected channels (but *not all* channels) are armed, the *first press* disarms all channels and the *second press* arms all channels.

The **ARM** buttons and the **ARM ALL** button can also be used for punching in and punching out during a record pass. When a button is lit red, the selected track is recording. When a button is off, the track is playing back.

Track Monitoring, Metering and Muting

The **MON** buttons and meters allow you to check recording levels before starting to record.

With the **MUTE** button off, press the **MON** buttons to monitor the incoming audio for specific tracks. Alternatively, the **RECORD** button may be pressed when the transport is stopped to momentarily monitor the inputs for the armed tracks.

Monitoring and Muting Rules

The function of each **MON** button depends on the state of the **MUTE** button.

- With the **MUTE** button off:

  All meters function normally, showing input or playback levels, regardless of the state of the **MON** button.

  If a selected track is muted, its **MON** button flashes and the **MUTE** button also flashes. A muted track *overrides* all monitoring functions and thus, monitoring status can not be changed in this mode. To un-mute the track, press **MUTE**, toggle the track's **MON** button off, and then turn **MUTE** off again.

  On the TCR8 only, press **ALL INPUT** to toggle the monitoring of all channels on and off. If **MON** is on for selected channels, but *not all* channels, the *first press* turns all monitoring off and the *second press* turns it on.

- With the **MUTE** button on:

  The monitor status of *all tracks* is hidden.

  When **MON** is toggled on for a track, its output is muted (silence). Note that you *can* record on a muted track.

  When **MON** is toggled off for a track, its output is on and its monitor status is enabled (although hidden).

  The meters for a muted track show input levels *only* when the track is recording. No level is shown for a muted track that is in the playback mode.

  On the TCR8 only, press **ALL INPUT** to toggle the muting of all channels on and off. If the **MON** button is on for selected channels, but *not all* channels, the *first press* turns all muting off and the *second press* turns it on.

Note

The TCR allows you to monitor a mix of analog, digital and SRC (sample rate converted) inputs on a per-pair basis (1-2, 3-4, etc.).

Important

Track muting states are stored on a per-file basis so muted tracks are not heard when auditioning a file from the **File List Screen**. However, the **MUTE** function and the track muting status via **MON** buttons are only active when the **Transport Screen** is active.

Monitoring and Metering Rules

Please note the following important rules regarding the function of the **MON** buttons in conjunction with the meters:

- When a track is armed and recording, its meter shows the input levels that are being recorded.
- When a track is *not recording*, the input monitor state determines whether the meter shows input or playback levels.

  When **MON** is toggled on, you will hear the track's input, regardless of the state of the track's **ARM** button, and the meter will show input levels.

  When **MON** is toggled off, monitoring and metering is determined by two factors: the state of the **ARM** button, and the status of the MON ARMED TRACKS function in the **Machine Setup** | **Audio I/O** menu:

  - When a track is armed and MON ARMED TRACKS is set to WHEN NOT PLAYING, you will monitor and meter the input when the TCR is stopped.
  - When a track is armed and MON ARMED TRACKS is set to WHEN RECORDING, you will monitor and meter the input only when the TCR is recording.

  When a track is *not* armed and **MON** is toggled off, its meter shows the track's output (playback) levels.
- When a track is muted, its meter shows input levels *only* when the track is recording. No level is shown for a muted track that is in the playback mode.

Headroom Selection

► MENU | Machine Setup | Audio I/O | **Headroom**

The headroom selection specifies one of two gain structures for analog I/O. When a +4dBu reference signal is applied to an analog input, the amplitude of the resulting digital signal may be configured to be either 16dB or 20dB below digital full scale. Unity gain is always maintained from analog input to analog output.

Crossfade Time

► MENU | Machine Setup | Preferences | **Crossfade**

The crossfade duration is programmable over a wide range. It specifies the length of the crossfade between playback audio and input audio when a track punches in or out of record. Programmed crossfades are terminated when **STOP** is pressed. That is, if you pressed **STOP** in the middle of a long crossfade, then it would be aborted when the button was pressed. Use the **PLAY** button to punch out and obtain the full crossfade out period.

Process Delays

► MENU | Machine Setup | Audio I/O | **Set Process Delays**

The processing delay for each pair of tracks can be shifted by a user-specified period to accommodate delays in special effects equipment and mixers.

Suppose, for example, that you wanted to copy track 1 to track 4. One way of doing this would be to connect a cable from digital outputs 1-2 to digital inputs 3-4, arm track 4 only, and press Record. The resulting audio on track 4 would be in phase with track 1 when it was played back.

If, however, you were to route the track 1 digital output through an external device, such as an effects processor or digital mixer, then the processing delays in the external equipment would cause the playback of track 4 to lag behind the audio on track 1. The TCR can compensate for these external delays during the recording process so that the delayed signal recorded on track 4 plays back in phase with track 1.

The amount of delay incurred by the external equipment is specified in sample times for the track being recorded using the **Set External Process Delays** menu.

You can establish the appropriate process delay value by trial and error, making trial recordings with different process delay values until the source track and newly recorded track play back in phase. Alternatively, you can measure the process delay and compute the delay value for the track to be recorded.

To measure the process delay, record a test signal such as periodic clicks on to a reference track, say track 1. Then route the output of this reference track through the external equipment to the input of, say, track 4. Set the process delay for track 4 to be zero, arm track 4 only, and record on track 4 for several seconds (while track 1 is playing). Now, playback the recording and measure the phase difference between the analog outputs of tracks 1 and 4 using a dual trace oscilloscope. Divide this time measurement by the sample period (20.833 microseconds, when the sample rate is 48000Hz) to obtain the number of samples to be used in the process delay menu.

For example, suppose you observed during playback that the clicks on track 4 lag behind the clicks on track 1 by 800µsec. The value to be entered for the Process Delay for Tracks 3-4 would be computed to be (800µsec / 20.833µsec per sample) = 38 samples. The next time a recording is made using this process delay, you will see that upon playback, tracks 1 and 4 will be in phase.

RMW Selection

The **R-M-W** button toggles the Read-Modify-Write mode on and off. When R-M-W is enabled, playback audio is available at channel outputs directly off of disk (without going through the channel's crossfader). This allows you to route a channel's output through external processing equipment and back to the same channel's input for re-recording, without the associated delay and feed back problems. When R-M-W is off, the audio being recorded may be heard on the track outputs.

For example, you may want to add some echo effects to certain parts of a voice recording on track 1. You can route the analog or digital output of track 1 to an effects generator, and send the output of the effects box to the analog or digital input of track 1. When you punch-in on track 1, the original voice material will be replaced by the echoed voice. Note that if there are any delays associated with the external effects generator, then the appropriate process delay should be applied to track 1 as discussed above.

Basic Recording

Full Record

Arm the desired tracks, then press **REC + PLAY** to place the TCR in record mode. The recording starts at the position that is indicated in the **Time Code Display**. To conclude the recording:

- Press **STOP** to end the recording and stop the transport.
- Press **PLAY** to punch-out of record mode, but keep the transport rolling.

Punch-In Record

Arm the desired tracks, then press **PLAY** to place the TCR in play mode. Press **PLAY + REC** at any point to punch-in to record mode at the current time line location. To conclude the recording:

- Press **STOP** to end the recording and stop the transport.
- Press **PLAY** to punch-out of record mode, but keep the transport rolling.

Punch-In Recording using the Arm Buttons

While recording is in progress, you may toggle any of the ARM buttons to punch-in or out of record on specific tracks.

Automatic Edit Point Updates

You can continue to punch in and out of record mode as often as required. When done, the Edit-In register contains the location of the start of the crossfade of the first punch-in point. The Edit-Out register has the location of the end of the crossfade of the last punch-out. Thus, you can press Review after the recording operation to playback the new material between Edit-In and Edit-Out

Automatic Recording

In addition to setting the normal recording parameters discussed above, the following parameters should be established before Auto Recording:

- Edit-In and Edit-Out points
- Pre-roll and post-roll duration

Setting Edit Points

The Edit-In and Edit-Out points are included in the list of special time code locate values that may be stored and recalled. See the section “Using the Locate Register” below. They may also be accessed quickly using the Edit-In and Edit-Out buttons.

Jog to the desired edit point and use the **CAPTURE** button to place the current position into the LOC Register. Then press **STORE** followed by **EDIT IN** or **EDIT OUT** to establish the edit point.

Selecting Pre-roll and Post-roll Duration

► MENU | Machine Setup | Preferences | **Pre-Roll, Post-Roll**

Pre-Roll and Post-Roll values can be set so that certain record and play operations start *ahead* of the Edit-In point and stop *after* the Edit-Out point. This allows listening to the surrounding audio and crossfades during Auto Recording or Reviewing operations.

For example, if the Pre-Roll value is set to 10 seconds and the Post-Roll to 5, and you start an Auto Record, the transport jumps to a point 10 seconds ahead of the Edit-In point and begins playing. At the Edit-In point, armed tracks are recorded until the Edit-Out point is reached. The transport will continue to play for 5 seconds past the Edit-Out point.

Press **REVIEW** to play between the Pre-Roll and Post-Roll times.

Values for Pre-Roll and Post-Roll can be set independently from NONE to 10 Seconds in 1 sec increments.

Auto Record

Arm the desired tracks, set the desired Edit-In point and Edit-Out point, then press **AUTO** to place the TCR in automatic record mode. In this "hands-off" mode, the system pre-rolls, then goes into record at the selected Edit-In point. It exits from record at the selected Edit-Out point, and continues to play for the post-roll interval. It then stops and relocates to the Edit-Out point. You can press **STOP** or **PLAY** during Auto-Record to cancel the auto function.

Recording from the File List

From the **File List**, press **REC + PLAY** to create a *new file* in the current directory. The **Transport Screen** appears, and the file begins recording at the time code indicated by the DEFAULT TIME selection on the **Machine Setup | Preferences** menu on the tracks indicated by DEFAULT TRACKS in the same menu. Press **STOP** to stop recording and return the system to the **File List**.

Playback

Locating Audio in the File

There are three ways to use the transport to locate audio in an open file: using the fast-forward/rewind buttons, using the wheel to jog and using the wheel to shuttle.

Jog Mode

When the shuttle button is not illuminated, the *speed* of the wheel determines the speed and direction of the transport. Speed can be controlled from approximately **.**1X to 2X in the forward or reverse direction. This "scrub" capability allows accurate positioning of the transport for both audible cueing and time code positioning. Once the speed drops below **.**1X the pause indicator illuminates to indicate the transport is paused. If the wheel is not moved within three seconds, the transport switches from pause to stopped.

Shuttle Mode

When the **SHTL** (shuttle) button is illuminated, the *position* of the wheel determines the transport speed and direction. Speed can be controlled from approximately **.**1X to 60X in the forward or reverse direction. The speed is displayed in the lower right hand corner of the TRANSPORT SCREEN. Negative values indicate reverse movement. When reversing direction, the speed passes through 0X, during which time the transport does not move and the pause indicator above the wheel is illuminated. If the wheel position is not changed within three seconds, the transport switches from pause to stopped.

Fast Forward and Rewind

The double arrow button (**>>**) to the right of the wheel is used to activate fast-forward. When pressed, the button illuminates and the transport rolls forward at the configured Fast-Forward/ Rewind speed. Pressing the fast-forward button again causes an immediate jump to the nearest fast-forward stop position.

Current Fast Forward Position	Fast Forward Stop Position
In front of Head Point	Head Point
Between Head and Tail	Tail Point
Beyond the Tail Point	23:59:59...

The double arrow button (<<) to the left of the wheel is used to activate rewind. When activated, the button illuminates and the transport rolls in reverse at the configured Fast-Forward/Rewind speed. Pressing the rewind button again causes an immediate jump to the nearest rewind stop position.

Current Rewind Position	Rewind Stop Position
Beyond the Tail Point	Tail Point
Between Head and Tail	Head Point
In front of Head Point	00:00:00...

There is no rollover from 23:59:59:29 to 00:00:00:00.

Changing the Rewind Speed

The fast-forward/rewind speed can be configured in the MORE PREFERENCES section of the MACHINE SETUP | PREFERENCES menu. It can be set between 1X to 60X in 2X steps. For speeds above 2X, the audio is played at 2X and the speed is increased by "chunking," i.e., skipping the appropriate amount of audio between the short sections that are played.

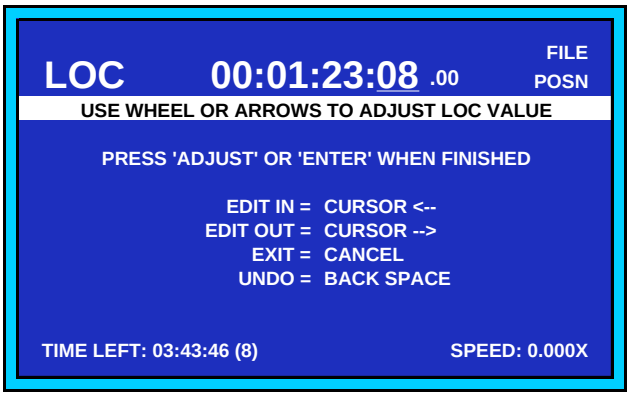
Using the Locate Register

Entering Locate Values Directly

From the **Transport Screen** enter the desired time code position using the numeric keypad. After typing the first digit (or by pressing ENTER) the value entry prompt appears. Continue entering the desired location, then press ENTER when finished.

Adjusting Locate Values Using the Knob

From the **Transport Screen**, press **ADJUST** todisplay the prompt for the Locate (LOC) value.



Adjust Prompt

With the **Adjust Prompt** active, the following keys in the **Jog Section** change from transport controls to *adjustment* controls:

- **<<** (**Rewind**) changes to **ADJ-**, which allows you to nudge a value down by one increment.
- **>>** (**Fast-forward**) changes to **ADJ+**, which allows you to nudge a value up by one increment.
- **EDIT IN** changes to |←, which allows you to move the Time Code Register's underline to the left.
- **EDIT OUT** changes to →|, which allows you to move the Time Code Register's underline to the right.
- The **Jog Wheel** changes to allow you to dial in values.

Press **ADJUST** again to return the buttons to transport functions.

Capturing Locate Values

When the **CAPTURE** button is pressed, the current position as shown on the Time Code Display is copied into the LOC Register. It can now be stored away, and used to reposition to this spot later. You can capture positions whether the transport is running or not.

Storing and Recalling Locate Values

Press **STORE** to access the **Store Locate Point Prompt**, which allows you to store the value that currently appears in the **LOC Register** to one of 100 general purpose locate points in the open file, or to a *special* locate point such as the head point, edit in-point, edit out-point, etc.

Press **RECALL** button to present the **Recall Locate Point Prompt**, which allows you to recall a value from a locate point and place it in the **LOC Register**. You can also recall *special* time code points as mentioned above.

Locating

Press **LOCATE** to instantly cue to the time code currently shown in the **LOC Register**. To cue to a specific time code, enter the value in the LOC Register using one of the above methods and press **LOCATE**.

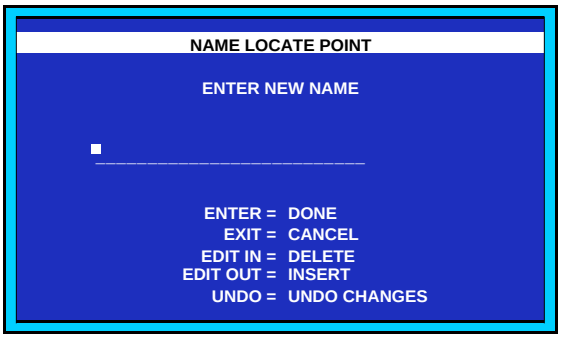
The **LOCATE** button can also be used as a transport control. When **LOCATE** is pressed during play or shuttle modes, for example, the transport immediately cues to the value in the LOC Register.

Naming Locates

Each file has 100 locate points, each of which can be named using the **Name Locates** function — to serve as notes, or simply to assist in easily spotting the desired locate point in the list.

► [Transport Screen] | MENU | **Name Locates**

From the **Transport Screen**, press **MENU**, select item **1**, NAME LOCATES, to display the locate points for the current file. Use the **Jog Wheel** to highlight the locate point that you want to name, then press **ENTER.** The **Name Locate Prompt** is then displayed allowing you to enter the new offset name using the keypad.



Name Locate Point Prompt

Review Playback

The REVIEW button provides a way to play a selected portion of the file. It is normally used after a punch-in or an auto record operation to hear the result of the recording.

Edit Points

The Edit-In and Edit-Out points define the range of audio played during a review. When **REVIEW** is pressed, the transport cues to the Edit-In point minus the configured pre-roll duration and begins playback. Playback continues to the Edit-Out point plus the configured post-roll duration. Edit-In and Edit-Out points are typically set manually prior to performing an auto record or a preview. Edit-In and Edit-Out points are set automatically during a punch-in recording. They can also be set by STORING the contents of the Locate Register directly to Edit-In or Edit-Out.

Pre-roll and post-roll duration

The pre-roll or post-roll duration can be configured in the PREFERENCES section of the MACHINE SETUP menu. The range of values can be from zero to 10 seconds.

Performing the Review

To review a punch-in recording or an auto record, press **REVIEW** once the transport has stopped. To review an arbitrary file section, first set the Edit-In and Edit-Out points and then press **REVIEW**. The selected audio plays at 1X unless varispeed playback is enabled for some other speed.

Variable-Speed Playback

Playback speed can be adjusted from 0.1X to 2X in 0.1 percent increments for non-time code applications. The audio pitch correlates to the selected speed. This stretches or compresses the time line making time code synchronization inaccurate. However, variable speed playback can be triggered by time code using the CHASE UNTIL LOCKED, THEN FREERUN option.

Initiating Off-Speed Playback

Press the VARI button to enable variable speed playback then press PLAY or REVIEW to initiate playback. Press VARI again to switch between variable speed playback and 1X playback.

Adjusting the Playback Speed

Press ADJUST while the VARI button is illuminated to adjust the playback speed. During VARI ADJUST the function of the wheel changes from jog/shuttle to speed adjustment. The VARI speed value is displayed in the lower right hand corner of the TRANSPORT SCREEN. The speed can be adjusted during playback. Press ADJUST again to confirm the adjustment and restore normal jog/shuttle function to the wheel.

Digital Output Dithering

► MENU | Machine Setup | Audio I/O | **Output Word Size**

The TCR always records audio using a digital word size of 24 bits. However, it is sometimes desirable to play out using a smaller digital output word size for use by external equipment, such as a 16-bit DAT recorder. If the output material is anything but white noise, its sample stream will be correlated. This is particularly true of music. The effect of simply truncating the 24 bit samples to 16 bits results in the quantization error being correlated to the signal, producing signal distortion.

Dithering is a technique of adding an appropriate random noise source to the 24-bit digital output stream before reducing the word size. This effectively decorrelates the quantization error from the signal, resulting in a very low-level broadband hiss being added to the signal, rather than the more objectionable signal distortion.

The TCR uses a zero-mean random noise source with a triangular probability distribution. Its peak level corresponds to the magnitude of the least significant bit of the reduced word size within the 24-bit field. The method is called “LSB TPDF dither” for Least Significant Bit Triangular Probability Density Function.

The OUTPUT WORD SIZE selection in the **Machine Setup | Audio I/O** menu gives you three choices: 24 BITS (no dithering), 20 BITS (4 bit dithering), or 16 BITS (8 bit dithering.)

Chasing External Time Code

The **CHASE** button will synchronize the TCR to either an LTC or VITC external time code source.

Time Code Input Selection

► MENU | Machine Setup | Sync and Time Code | **TC Input**

The TC INPUT selection specifies the source of the external time code to be used for time code triggering, either LTC, VITC, or VITC IF NO LTC.

Time Code and Sync Reference Relationships

► MENU | Machine Setup | Sync and Time Code | **Sync Ref**

► MENU | Machine Setup | Sync and Time Code | **TC Input**

The **Sync Reference Menu** selects the clock source used to generate the TCR's audio sample rate. Hence, the TCR plays synchronously to this reference signal. The **Time Code Input** (TC Input) **Menu** selects the time code source used to start playing the TCR at a specific location.

Each of these selections is made independently, but certain combinations may produce undesirable results. For example:

Sync Reference = INTERNAL; TC Input = LTC

When the TCR is using its internal crystal as the clock source it cannot be synchronized to the time code input. However, if an external LTC source is present, the TCR will attempt to phase lock its frame edges with those of the incoming LTC when the TCR is stopped. In this way, when it starts to chase, it will start playing with its frame edges aligned with those of the external LTC. Since the frame boundaries in the TCR are derived from its internal crystal and are *asynchronous* to external LTC, they will start to drift apart as playback continues. To chase LTC and remain locked to it, set the SYNC REF to LTC.

Sync Reference = VIDEO; TC Input = LTC or VITC

The time code source must be synchronized externally to the video reference signal.

Sync Reference = Non-VIDEO; TC Input = VITC

If the Sync Reference is *not* VIDEO when chasing VITC, there may be a phase error between the TCR frames and the VITC frames of up to one-half frame. When using VITC as the time code source, the Sync Reference should be set to VIDEO, and a synchronized video reference signal should be applied to the VIDEO REF IN connector. Alternately, the VITC signal can be split with a "T" adaptor and applied to both VITC IN and VIDEO REF IN connectors.

Sync Reference = WORD CLOCK; TC Input = LTC

The LTC signal must be locked to the incoming sample clock (word clock) externally.

Sync Reference = AES 1-2 or AES 3-4; TC Input = LTC

The external time code source must be synchronized to the external AES sample clock. If not, the frame boundaries associated with the TCR playback will start in phase, but will drift from the incoming LTC signal as playback progresses.

Internal Time Code Generator

Five menu items control setup and operation of the internal time code generator. Their names and locations are given in the following list:

- MENU | Machine Setup | Sync and Time Code | **Generator**
- MENU | Machine Setup | Sync and Time Code | **Set Gen.**
- MENU | Machine Setup | Preferences | **Default Time**
- MENU | Machine Setup | Preferences | **File Info to Show**
- MENU | Machine Setup | Preferences | **Sort Files By**

The internal generator may be used as an approximate time of day indicator. You can set the generator to a specific time, and turn it on and off from the **Machine Setup | Sync and Time Code** menu.

By setting the **DEFAULT TIME** in the **Machine Setup | Preferences** menu to FROM INT GEN, each new file that is recorded will have a unique time stamp as long as the generator is running. In addition, if **FILE INFO TO SHOW** is set for **START TIME**, the starting time of each file will be displayed in the file list. If **SORT FILES BY** is set to **INFO THEN NAME** or **INFO THEN INDEX**, files will appear in the File List in the order they were created.

To place new recordings in the File List so they correspond to the time of day, set the TCR to chase to the internal time code generator.

Chase Modes

You can configure the behavior of chase operations using selections in the **Machine Setup | Sync and Time Code** menu.

Chase What

- MENU | Machine Setup | Sync and Time Code | **Chase What**

To synchronize the TCR to external LTC or VITC, select EXTERNALTIME CODE. To use the internal generator to place new recordings at times within the file corresponding to the time of day, select INTERNAL GENERATOR.

Chase When

- MENU | Machine Setup | Sync and Time Code | **Chase When**

The **CHASE** button may be configured to begin chasing whenever it is pressed, providing incoming time code is valid. You may also have it enable chasing only when **PLAY** is pressed.

Chase Until

- MENU | Machine Setup | Sync and Time Code | **Chase Until**

This chase configuration parameter determines when chasing will stop. If set to LOCK, THEN FREE RUN, the TCR will synchronize to valid incoming time code, and continue to roll *even if the time code source becomes invalid*. The CHASE button will automatically be turned off when external time code is lost.

When chasing until TC LOSS OR ERROR, the TCR will stop playing when time code values are corrupted or lost. The chase mode will then be automatically turned off.

If chasing until CHASE CANCELLED, the TCR will stop playing when time code values are bad or lost, but *will resume playing when the external time code becomes valid again*. Recordings, however, are terminated at the first loss of time code.

Time Code Output

Output Options

► MENU | Machine Setup | Sync and Time Code | **Output LTC**

The current file position (plus any offset) is outputted on the LTC OUT connector, either WHENEVER ROLLING or DURING 1X PLAY ONLY. If the former is selected, non-continuous time code values are generated even when jogging, shuttling, rewinding or fast forwarding.

Level Adjustment

► MENU | Machine Setup | Sync and Time Code | **LTC Level**

The LTC output is provided as a balanced signal pair, with programmable amplitudes from -18 dBv to +15 dBv in 3 dB steps.

Time Code Offsets

Entering an Offset

To enter a time code offset, press **DISP** from the **Transport Screen**. Using the numeric keypad, press **'0'** to display the Offset Register (OFST).

Then enter the desired offset using the numeric keypad. After typing the first digit (or by pressing ENTER) the value entry prompt appears. Continue entering the desired location, then press ENTER to confirm the time point.

Capturing an Offset

To capture a time code offset, press **DISP** from the **Transport Screen** and select option **'0'** to display the Offset Register (OFST). The value now shown in the **Time Code Display** is the difference between the *last received external time code value and the current file position.* When audio has been located (using the jog wheel, for example) that corresponds to the external time code position, press **CAPTURE** to load the OFST register with the displayed difference.

Next press **DISP, '2'** to select OFFSET POSN for the time code display mode. Note that when the **OFFSET** button is turned on, the desired offset takes effect.

Enabling the Offset

When the **OFFSET** button is turned on, the OFST value is subtracted from the *absolute file position* to yield the *current user position.* When the **OFFSET** button is off, the current user position is identical to the absolute file position.

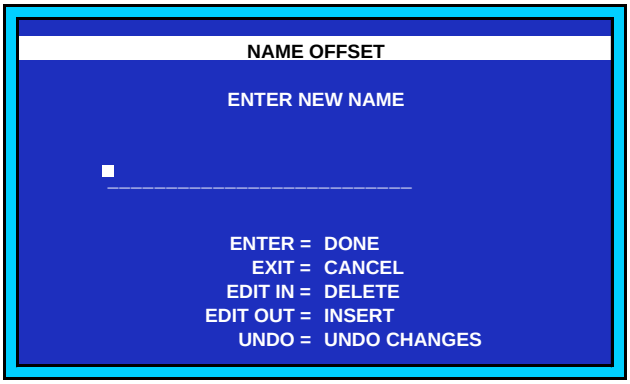
Storing and Recalling Offsets

When the OFST Register is displayed in the **Transport Screen** the **STORE** and **RECALL** buttons will save and recall up to 10 offset values to/from the audio file.

Naming Offsets

► [Transport Screen] | MENU | **Name Offsets**

From the **Transport Screen**, press **MENU** and select item **2**, NAME OFFSETS, to display the offsets for the current file. Use the **Jog Wheel** to highlight the offset to be named, then press **ENTER.** The **Name Offset** prompt will be displayed, and a new offset name may be entered using the keypad.



Name Offset Prompt

Track Slip

Individual tracks may be "slipped" (offset in time) forward or backwards with the track slip feature, even when the transport is playing. This may be used to compensate for delays in external processing inserted in the audio path, or for special effects.

From the **Transport Screen**, press **SLIP**. A prompt will request that one or more tracks be selected. Use the numeric keypad to select the desired tracks. A small check mark will appear beside the selected tracks. Press ENTER.

A prompt to select a track slip function will appear. Use the numeric keypad to make a selection:

- **0** = **Set Slip Value**: Enter a slip value from -9 to +9 seconds using the numeric keypad or the knob, then press ENTER.
- **1** = **Change Slip by Relative Amount**: Enter the amount of change for the current slip values, then press ENTER.
- **2** = **Enable Slip**: Activates the current slip value for the selected tracks.
- **3** = **Disable Slip**: Disables the current slip value for the selected tracks. This has the same effect as setting the slip value to zero.

Time Code Display Options

From the **Transport Screen**, press **DISP**. A prompt to select one of the following display modes will appear:

0 = Offset Register

1 = Relative to Zero Mark

2 = OFFSET POSN

3 = File Position

4 = Internal Generator

5 = External Time Code

Starting a Chase Operation

Assume the chase parameters (see Chase Modes above) are set to:

CHASE WHAT: EXTERNAL TIME CODE

CHASE WHEN: CHASE PRESSED

CHASE UNTIL: CHASE CANCELLED

From the **Transport Screen**, press **CHASE**. The TC LOCK indicator in the **Time Code Display** and the **PLAY** button will blink until the selected time code source is valid, at which time the transport will start playing synchronously to external time code. If the incoming time code stops, the transport will stop, blinking the TC LOCK indicator and the **PLAY** button. To terminate chasing press **STOP** or turn off the **CHASE** button.

Other variants of chase mode operate in a similar manner.

Punching In and Out During Chase

While playing synchronously to an external time code source (i.e. chasing) recording can be done in the normal manner –hold **REC** then press **PLAY** to punch in, or just press **PLAY** to punch out.

Auto-Recording During Chase

Pressing the **AUTO** button while chasing enables automatic punch-in and punch-out at the edit points. The TCR will locate to the beginning of the pre-roll period, and wait. When the external time code reaches this point, the TCR will begin to play. It will enter record mode at the edit-in point, and exit from record at the edit-out point. Playback will continue synchronously to external time code until the end of the post-roll period, at which point the TCR will stop, cancel the chase operation, and reposition to the edit-out point.

The **PLAY** or **STOP** button will cancel Auto Recording.

Reviewing During Chase

Pressing the **REVIEW** button while chasing will cause the TCR to locate to the beginning of the pre-roll period and wait. When external time code reaches this point, the TCR will enter play mode. It will continue to play synchronously to external time code until the end of the post-roll period, at which point it will stop, cancel the chase operation, and relocate to the edit-out point.

The **PLAY** or **STOP** button will cancel Review.

Synchronizing Multiple TCRs

Connect **WORD CLOCK OUT** on the master TCR to **WORD CLOCK IN** on the slave TCRs. Connect **LTC OUT** on the master TCR to **LTC IN** on the slave TCRs.

Select the following options on the *master* TCR using the **Machine Setup | Sync and Time Code** menu:

LTC Level: +15 DBV BAL

Output LTC: DURING 1X PLAY ONLY

Select the following options on the *slave* units, using the **Machine Setup | Sync and Time Code** menu:

Sync Ref: WORD CLOCK

Rate/Format: Same as master TCR

TC Input: LTC

Chase What: EXTERNAL TIME CODE

Chase When: CHASE PRESSED

Chase Until: CHASE CANCELLED

Press **CHASE** on the slave TCRs. When the master TCR plays, the slave units will follow synchronously.

Note

The slave machines do not track jog and shuttle operations on the master.

Off-line Editing Operations

The TCR provides a suite of functions for editing the contents of a file. The following editing operations are available:

- **Erase**

  ERASE wipes any audio from a marked area and replaces it with silence.

- **Copy**

  COPY makes a copy of a marked portion of audio in another file, for subsequent transfer to another destination.

- **Cut**

  CUT removes a marked portion of audio and transfers it to another file, for possible use in a subsequent edit operation. After the Cut operation, the surrounding audio joins together, creating a continuous file.

- **Paste**

  PASTE overwrites audio in the current file with audio from another location.

- **Insert**

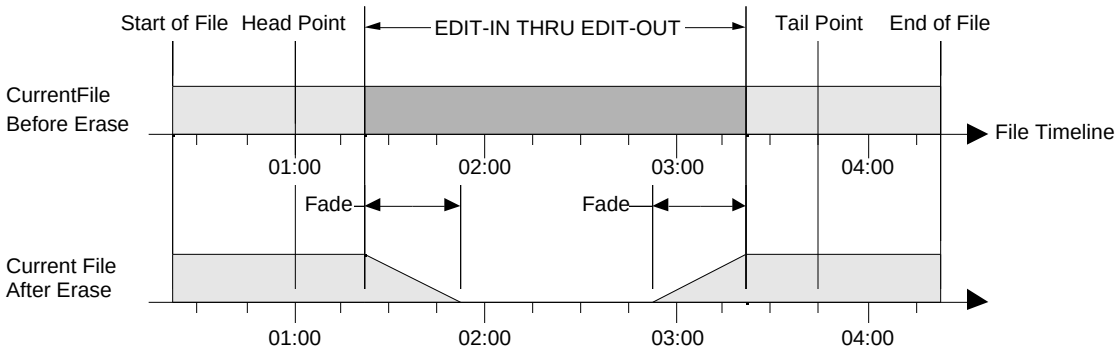
  INSERT inserts audio from another file into the current file.

All editing operations in the TCR are accomplished by defining a region of audio with Edit-In and Edit-Out. Once a region is defined, it is then possible to perform editing operations such as Cut, Copy, Erase, Insert, etc.

Erase Edit-In through Edit-Out

► [Transport Screen] | MENU | **Erase Edit In Thru Out**

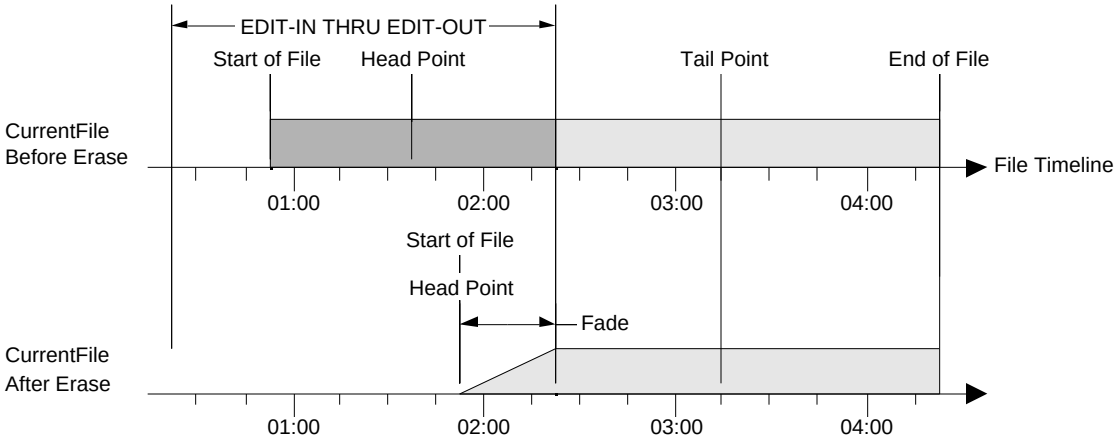
Erase Edit-In through Edit-Out will erase a segment of the current file defined by the Edit-In and Edit-Out points. Once erased, the segment is replaced by silence, as illustrated below.



The run time of the audio in a file is not normally reduced by an Erase operation. If the following conditions are met then the run time of the file will be reduced from the head end of the file.

1. The Head point of the file must be between the Edit-In and Edit-Out points.
2. The Edit-In point must be earlier on the timeline than the start of the audio in the file.

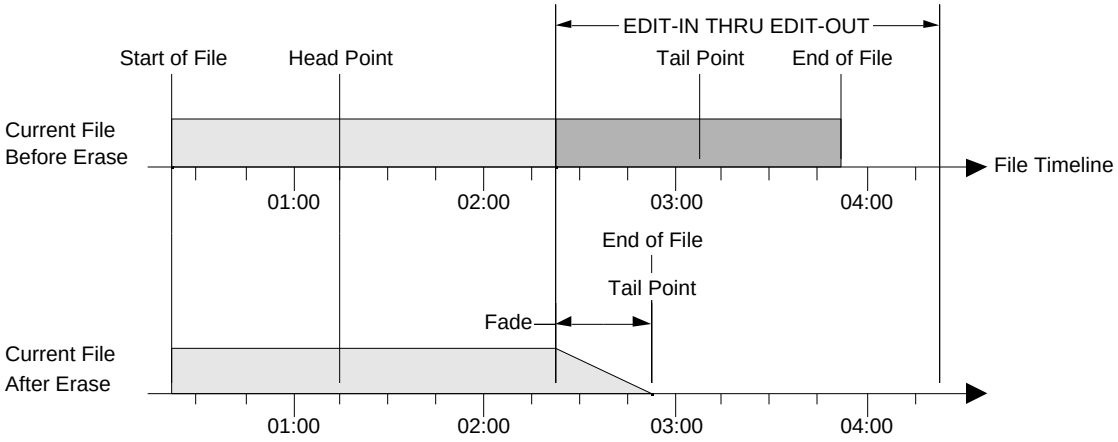
This behavior is shown in the illustration below.



The run time of a file can be reduced from the tail end of a file if these conditions are met.

1. The Tail Point of the file is between the Edit-In and Edit-Out points.
2. The Edit-Out point must be later on the timeline than the end of the audio in the file.

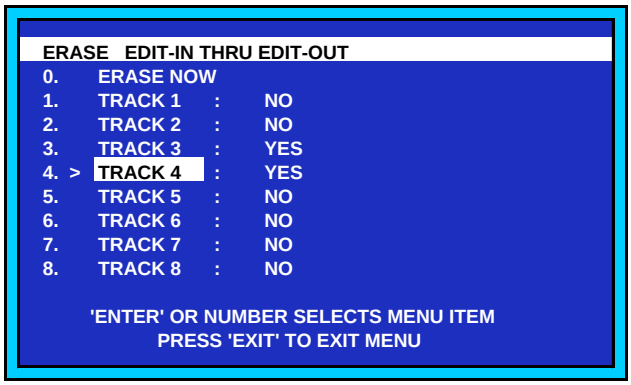
This behavior is shown in the illustration below.



Use the following steps to erase the Edit-In point through the Edit-Out point:

1. Open the desired file to access its **Transport Screen**.
2. Enter the Edit-In point and the Edit-Out point for the segment to be erased.
3. On the **Transport Screen**, press **MENU**.
4. On the **Transport** menu, select item **4**, ERASE EDIT-IN THRU EDIT-OUT.

The **Erase** menu will appear.



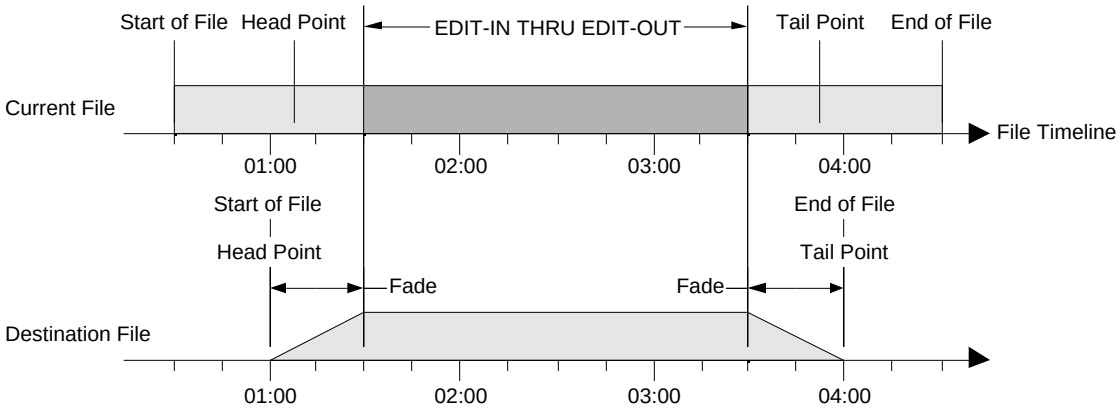
Erase Menu (TCR8 Display)

5. To select the tracks to be erased, use the **Jog Wheel** or the Arrow keys and then press **ENTER**; or simply press the number of the desired track to toggle its erase status between **YES** and **NO**.
6. When all desired tracks are enabled or disabled, press **0** to perform the erasure. During the erase function the **EXIT** button can be pressed to cancel the erase. If the erase function is canceled the file will be returned to the previous state.
7. At the conclusion of the process, an "OPERATION COMPLETE" message appears and the **UNDO** button lights. Press **ENTER** to return to the **Transport Screen**.
8. To undo the procedure and revert to the previous state of the file, press **UNDO**.

Copy Edit-In through Edit-Out

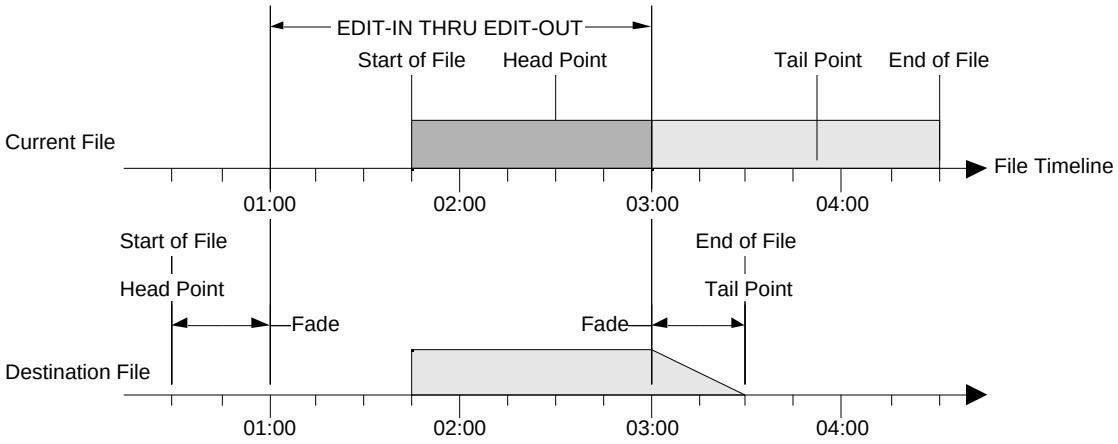
► [Transport Screen] | MENU | **Copy Edit In Thru Out**

Copy Edit-In through Edit-Out will copy a *segment* from the current file. The segment defined by the Edit-In point and the Edit-Out point can be copied to the default clipboard file, or to a named file as shown below. The copied segment's location on the time line is maintained in the destination file.

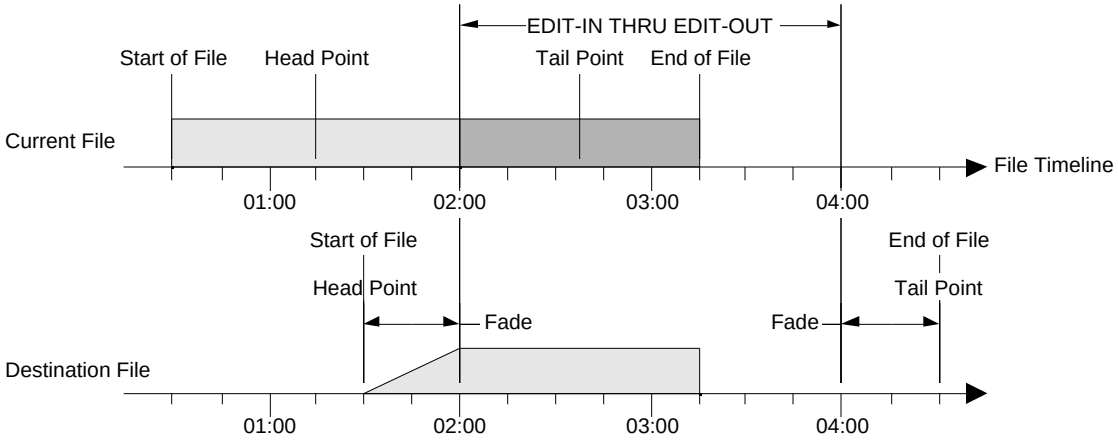


If the Edit-In point is set earlier on the time line than the start of the audio in the file, then silence will be copied into the destination file until the audio in the current file is reached.

The start of file, Head point and Edit-In point will be set to the start of the silence that was copied as shown in the illustration below.



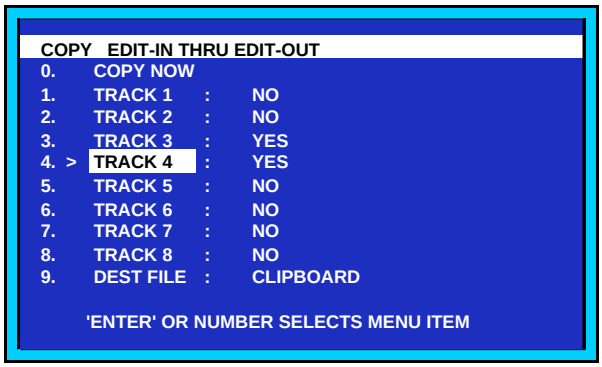
If the Edit-Out point is set later on the timeline than the end of the audio in the file, silence will be copied to the destination file until the Edit-Out point is reached. The end of file, Tail point and Edit-Out point will be set to the end of the silence as shown in the illustration below.



Use the following steps to copy the Edit-In point through Edit-Out point.

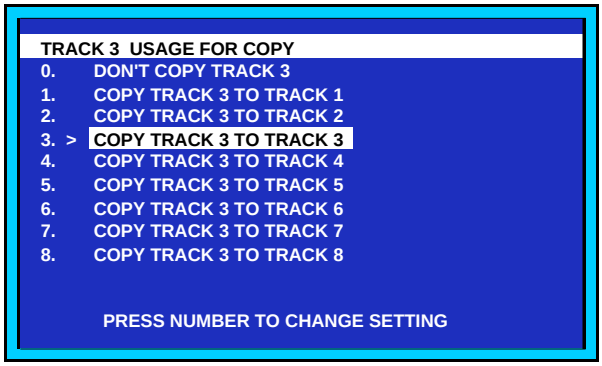
1. Open the desired file to access its **Transport Screen**.
2. Enter the Edit-In point and the Edit-Out point for the segment to be copied.
3. On the **Transport Screen**, press **MENU**.
4. On the **Transport** menu, select item **5**, COPY EDIT-IN THRU EDIT-OUT.

The **Copy** menu **will** appear, as shown below.



Copy Menu (TCR8 Display)

5. To select the track(s) to be copied, use the **Jog Wheel** or the Arrow keys and then press **ENTER**, or simply press the number of the desired track. The **Copy Track Usage** menu appears *for the selected track*. This menu presents options for the selected track, such as a straight 1:1 copy, a track bounce, or "don't copy." Note that the TCR4's **Copy Track Usage** menu lists tracks 1 - 4 as the destinations.



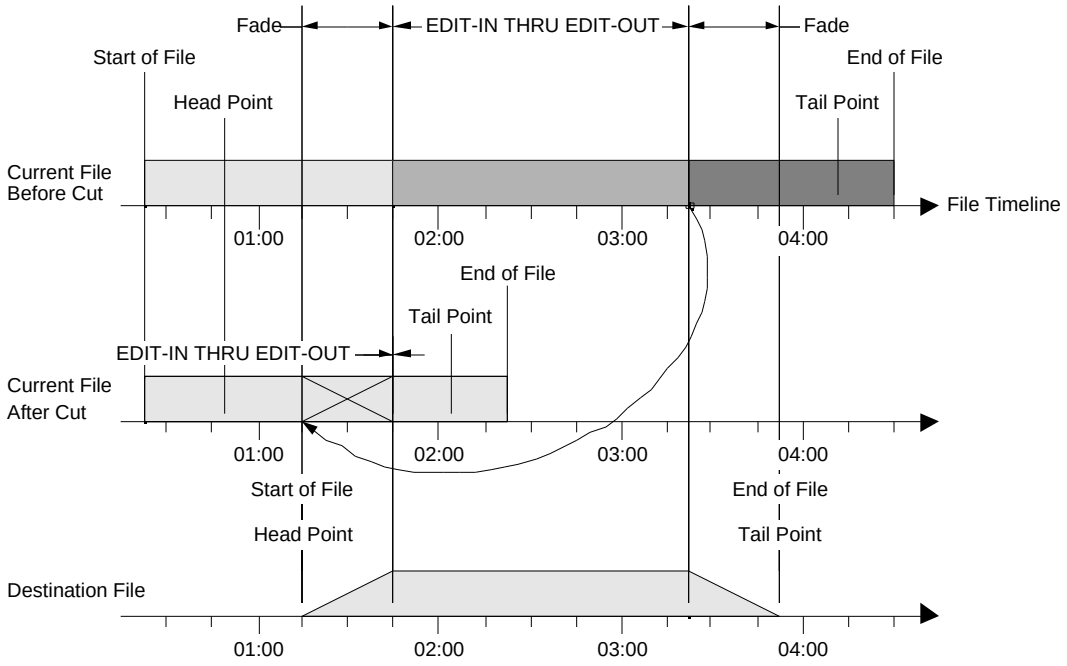
Copy Track Menu (TCR8 Display)

6. To select the copy option for the selected track, and press the number of the desired option on the keypad. The system will return to the **Copy** menu.
7. Repeat steps 5 and 6 for *each track* to be copied.
8. Select the destination file for the copy function:
   - If the default file (CLIPBOARD) is acceptable, no action is required. Note that this file is overwritten each time a copy or cut (to clipboard) is performed.
   - To create a new (unique) file as the destination, select item **9**, DEST FILE. The **Enter Destination File Name** menu will appear. Enter the file name in the normal manner and press **ENTER**. If the file already exists, an alert will appear with the option of continuing (using the existing file) or choosing another file name.
9. When all desired tracks are enabled or disabled, press **0** to perform the copy function. During the copy operation, the **EXIT** button can be used to cancel the copy. If the copy function is canceled, the destination file will be returned to the previous state.

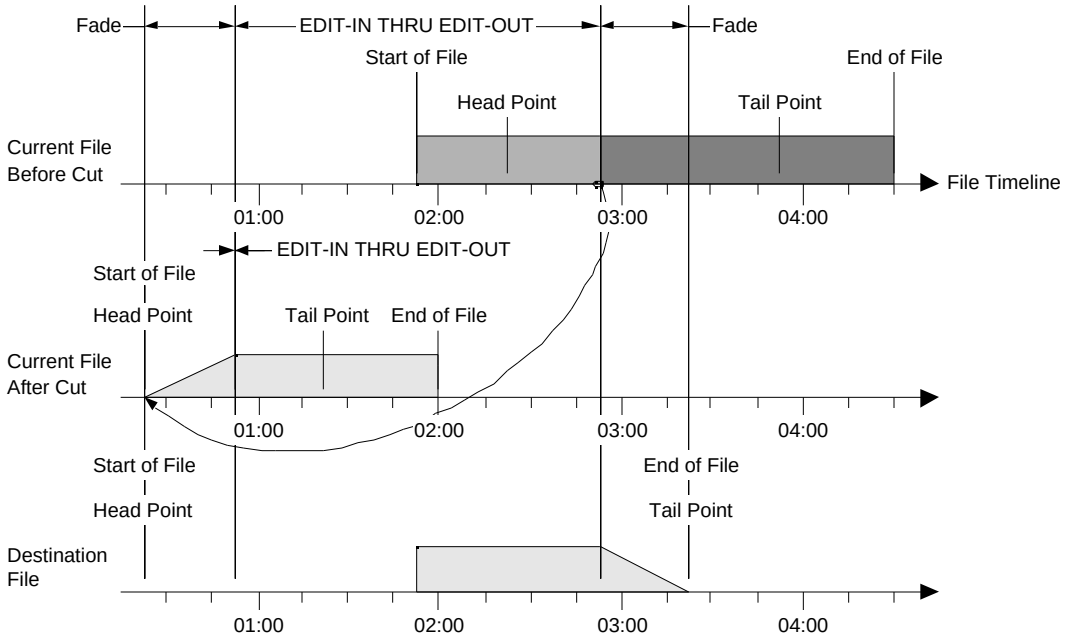
Cut Edit-In through Edit-Out

► [Transport Screen] | MENU | **Cut Edit In Thru Out**

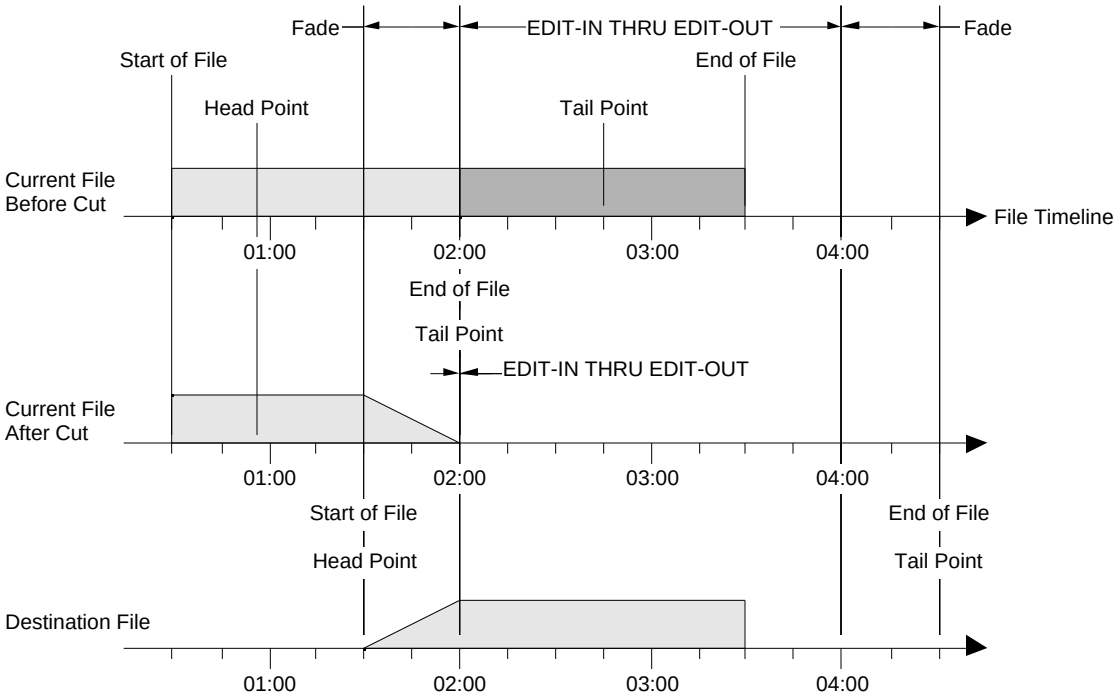
Cut Edit-In through Edit-Out will remove (delete) a segment of audio from the current file, and "pull up" (or *ripple* up) the subsequent audio, *earlier in time* to the Edit-In point, as shown below.



Normally a CUT operation will adjust the Head point of a file to maintain the Head point's position at the audio the Head point was set to. If the Head point is between the Edit-In and Edit-Out points, then the Head point will be moved to the beginning of the audio in the file as illustrated below.



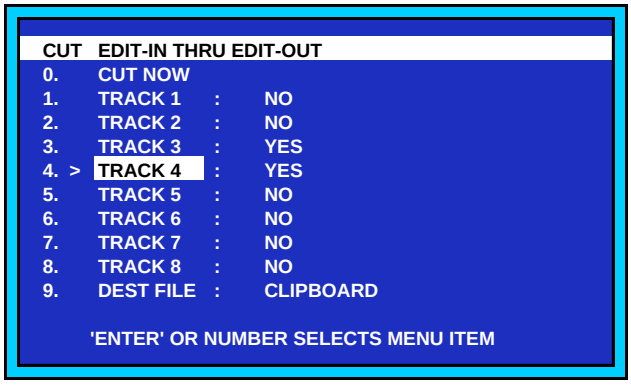
A CUT operation normally adjusts the Tail point to maintain the Tail point's position at the audio the Tail point was set to. If the Tail point of the file is between the Edit-In and Edit-Out points, then the Tail point will be moved to the end of the audio in the file as shown below.



The cut segment (as defined by the Edit-In point and the Edit-Out point) can be copied to the default clipboard file, or to a named file as shown below.

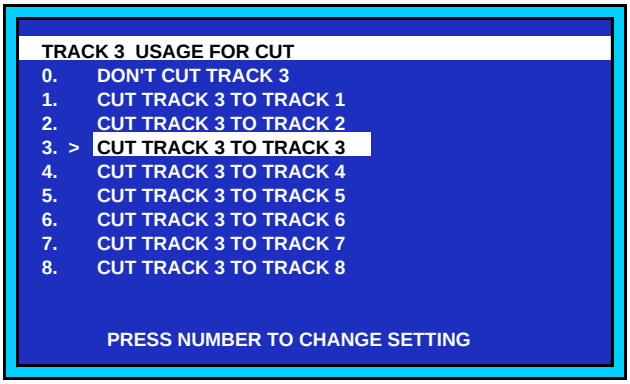
Use the following steps to cut the Edit-In point through the Edit-Out point.

1. Open the desired file to access its **Transport Screen**.
2. Enter the Edit-In point and the Edit-Out point for the segment to be cut.
3. On the **Transport Screen**, press **MENU**.
4. On the **Transport** menu, select item **6**, CUT EDIT-IN THRU EDIT-OUT. The **Cut** menu will appear, as shown below.



Cut Menu (TCR8 Display)

5. To select the track(s) to be cut, use the **Jog Wheel** or Arrow keys, followed by **ENTER**, or simply press the number of the desired track. The **Cut Track Usage** menu will appear *for the selected track*. This menu presents a variety of options for the selected track, such as a straight 1:1 cut, a track bounce, or "don't cut."



Cut Track Menu (TCR8 Display)

6. To select the cut option for the selected track, press the number of the desired option on the keypad. The system will return to the Cut Menu.
7. Repeat steps 5 and 6 for *each track* to be cut.
8. Select the destination file for the cut function:
   - If the default file (CLIPBOARD) is acceptable, no action is required. Note, however, that this file is overwritten each time a cut or copy to clipboard is performed.
   - To create a new (unique) file as the destination, select item **9**, DEST FILE. The **Enter Destination File Name** menu will appear. Enter the file name in the normal manner and press **ENTER**. If the file already exists, an alert will appear, with the option of continuing (using the existing file) or choosing another file name.
9. When all desired tracks are enabled or disabled, press **0** to perform the cut function. During the cut function the **EXIT** button can be pressed to cancel the cut. If the cut function is canceled, the current file and the destination file will be returned to their previous states.
10. At the conclusion of the process, an "OPERATION COMPLETE" message will appear, and the **UNDO** button will light. Press **ENTER** to return to the **Transport Screen**.

Note

On the **Transport Screen**, note that the Edit-In point and the Edit-Out point are now identical. This occurs because the removed segment's Edit-Out point (and all subsequent audio) has been pulled up to the segment's Edit-In point.

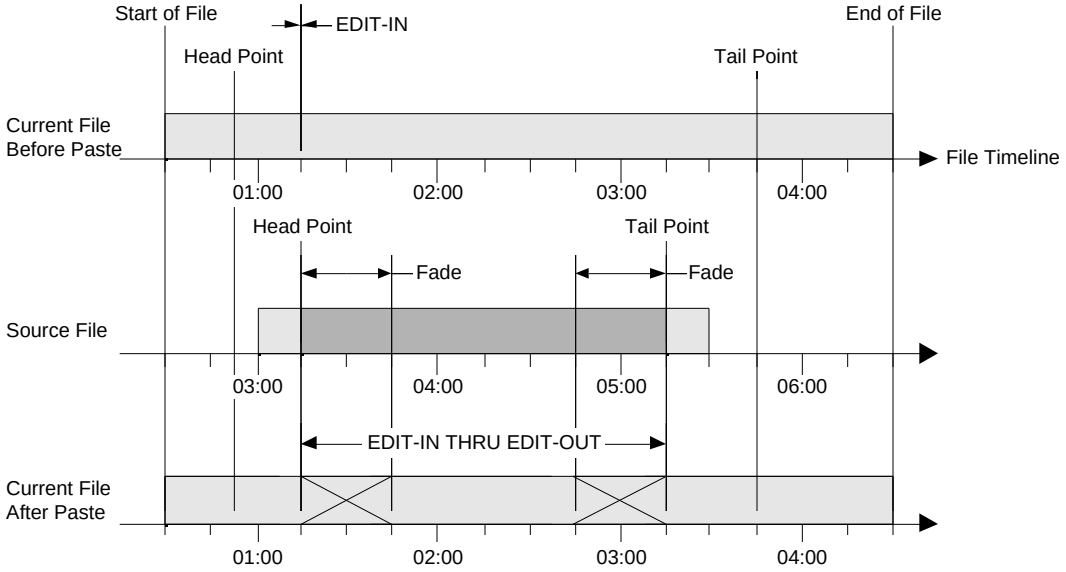
11. To undo the procedure and revert to the previous state of the file, press **UNDO**.

Paste at Edit-In

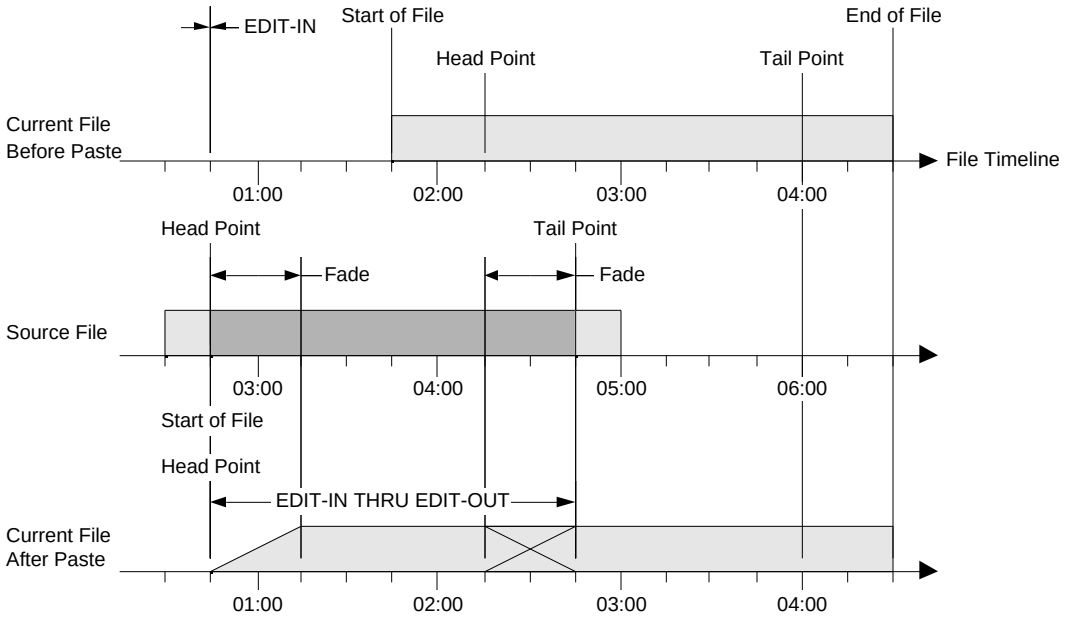
► [Transport Screen] | MENU | **Paste at Edit In**

Paste at Edit-In will paste a segment from a source file into the current file. The source file can either be the default clipboard file or a named file.

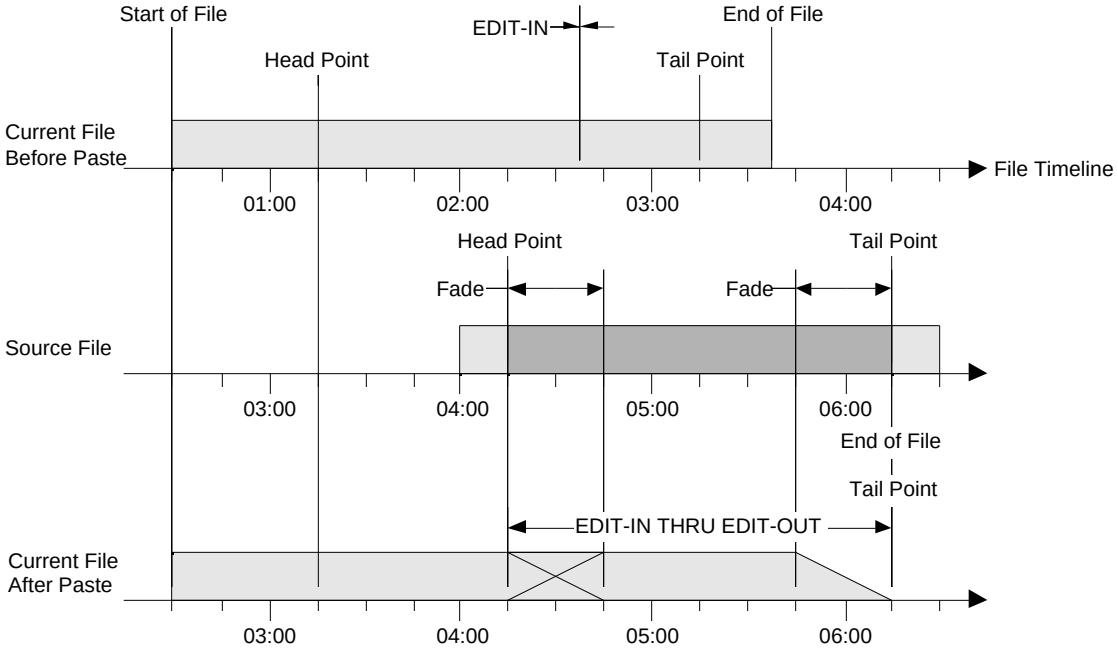
The paste function overwrites the audio at the current file's Edit-In point, as shown below. The pasted segment's length (as defined by the source file's Head point and Tail point) will determine the Edit-Out point along the current file's time line.



If the audio at the Head point of the current file is overwritten by the Paste operation, then the Head point of the current file will be moved to the start of the audio in the current file. This is shown in the illustration below.

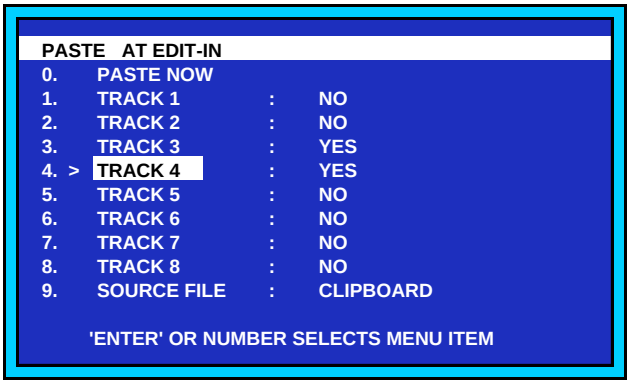


If the audio at the Tail point of the current file is overwritten by the Paste operation, then the Tail point of the current file will be moved to the end of the audio in the current file. This is shown in the illustration below.



Use the following steps to paste a segment at the in-point.

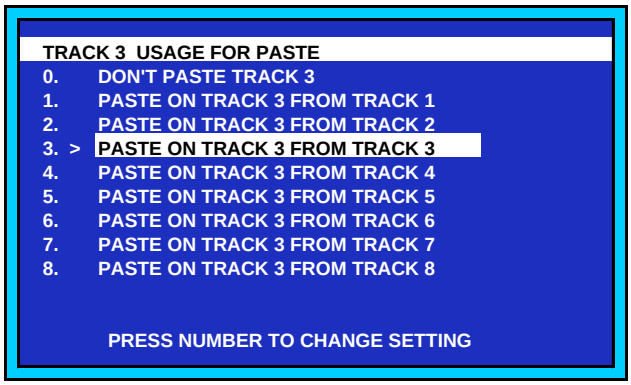
1. Ensure that the desired source file exists.
2. Open the desired file to access its **Transport Screen**.
3. Enter the desired Edit-In point — the location where the paste will be made.
4. On the **Transport Screen**, press **MENU**.
5. On the **Transport** menu, select item **7**, PASTE AT EDIT-IN. The **Paste** menu will appear as shown below.



Paste Menu (TCR8 Display)

6. To select the track(s) to be pasted, use the **Jog Wheel** or Arrow keys, and press **ENTER**; or simply press the number of the desired track.

The **Paste Track Usage** menu appears *for the selected track*. This menu allows you to choose options, such as a straight 1:1 paste, a track bounce, or "don't paste." Note that the TCR4's **Paste Track Usage** menu lists tracks 1 - 4.



Paste Track Menu (TCR8 Display)

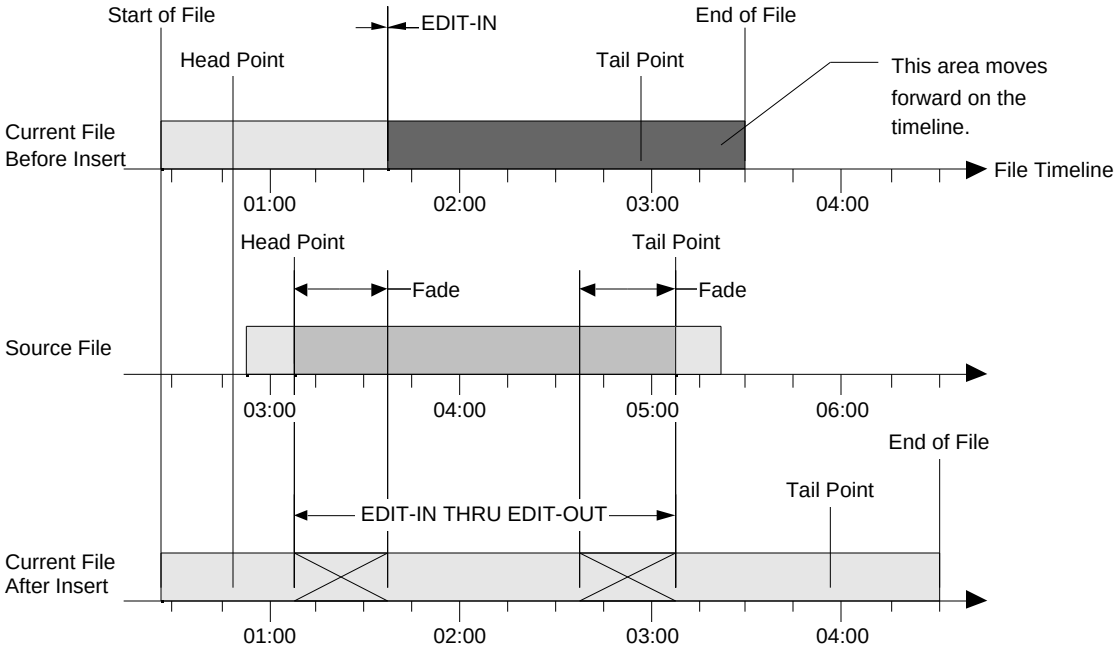
7. To choose the paste option for the selected track, press the number of the desired option on the keypad. The system will return to the **Paste** menu.
8. Repeat steps 6 and 7 for *each track* to be pasted.
9. Select the source file for the paste function:
   - If the default file (CLIPBOARD) is acceptable, no action is required.
   - To paste from a named file *other than* the clipboard file, select item **9**, SOURCE FILE. The **Choose File To Paste** menu appears. Use the **Jog Wheel** or Arrow keys to select the desired file, then press **ENTER**. The selected file name appears in the **Paste** menu.
10. When all desired tracks are enabled or disabled, press **0** to perform the paste function. During the paste function the **EXIT** button can be pressed to cancel the paste. If the paste function is canceled, the current file will be returned to the previous state.
11. At the conclusion of the process, an "OPERATION COMPLETE" message will appear, and the **UNDO** button will light. Press **ENTER** to return to the **Transport Screen**.
12. To undo the procedure and revert to the previous state of the file, press **UNDO**.

Insert in Front of Edit-In

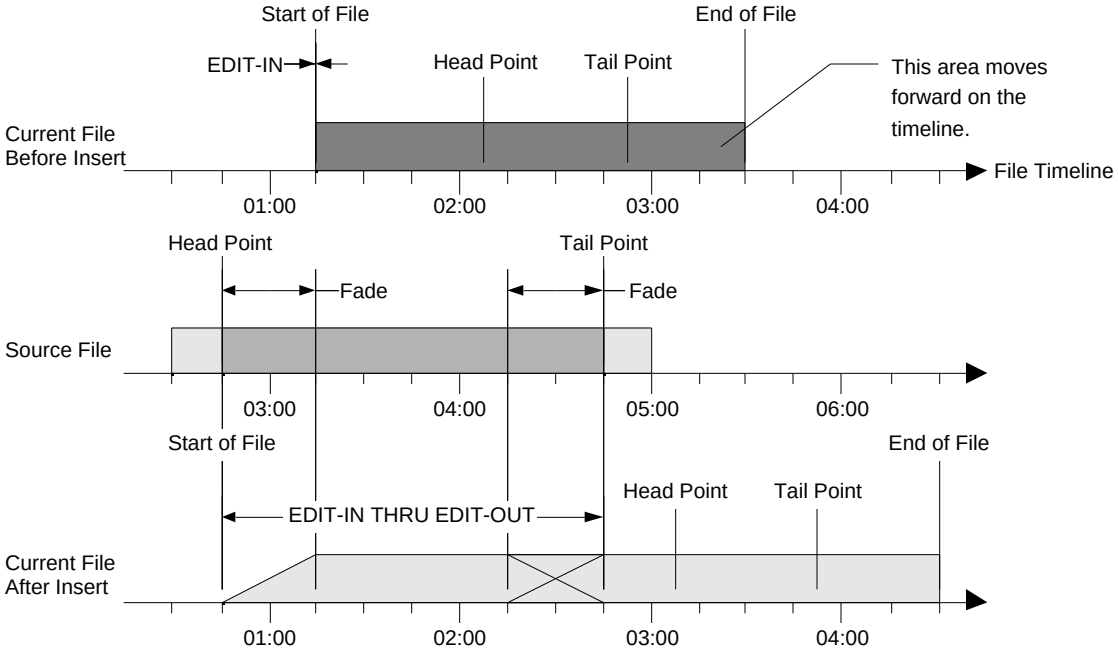
► [Transport Screen] | MENU | **Insert in Front of Edit In**

Insert in Front of Edit-In will insert a segment from a source file into the current file. The source file can either be the default clipboard file or a named file. The insert function "pushes down" (or *ripples* down) the audio from the current file's Edit-In point *later in time*, as shown below.

The inserted segment's length (as defined by the source file's Head point and Tail point) determines the Edit-Out point along the current file's time line. The inserted segment's length determines how far down the time line the previous audio will ripple.

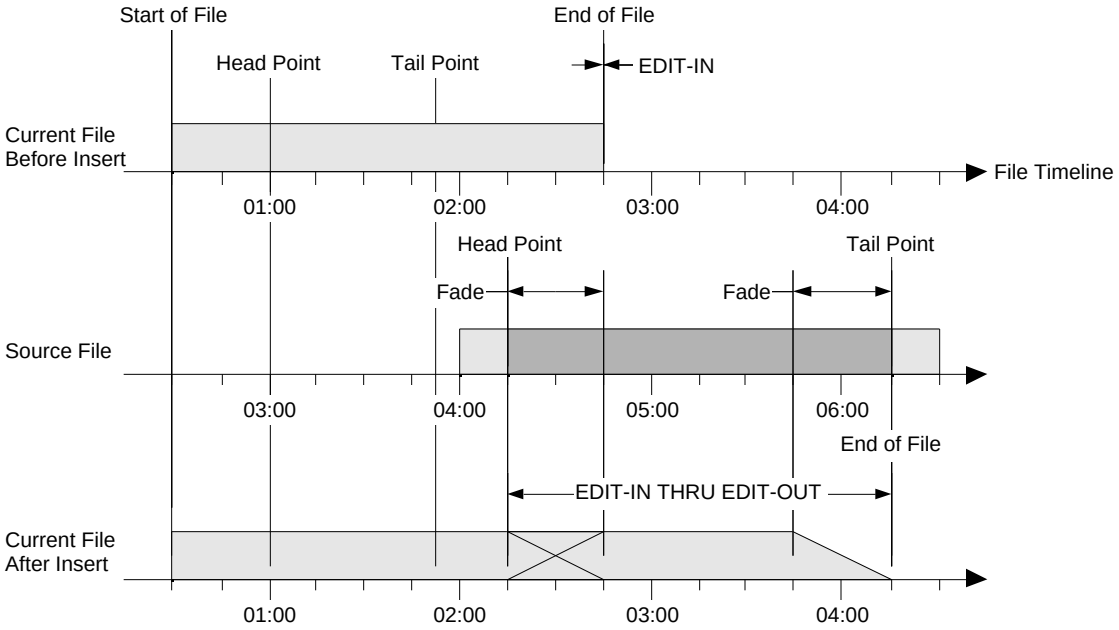


If the Edit-In point is set to the start of the audio in the file, then all of the audio in the file will be moved later on the timeline. This is shown in the illustration below.



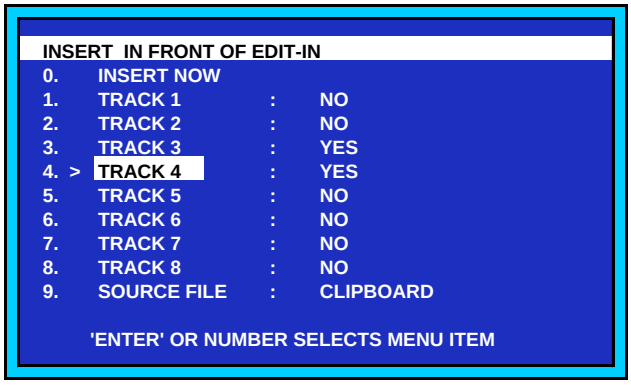
If the Edit-In point is set to the end of the audio in the current file, then none of the audio in the current file will be moved on the timeline.

This is shown in the illustration below.



Use the following steps to insert a segment in front of the Edit-In point:

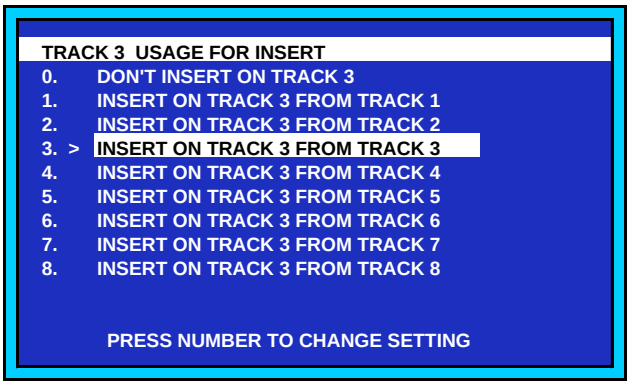
1. Ensure that the desired source file exists.
2. Open the desired file to access its **Transport Screen**.
3. Enter the desired Edit-In point.
4. On the **Transport Screen**, press **MENU**.
5. On the **Transport** menu, select item **8**, INSERT IN FRONT OF EDIT-IN. The **Insert** menu will appear, as shown below.



Insert Menu (TCR8 Display)

6. To select the track(s) to be inserted, use the **Jog Wheel** or Arrow keys, and press **ENTER**; or simply press the number of the desired track. The **Insert Track Usage** menu appears *for the selected track.*

This menu presents options, such as a straight 1:1 insert, a track bounce, or "don't insert." Note that the TCR4's **Insert Track Usage** menu lists tracks 1 - 4.



Insert Track Menu (TCR8 Display)

7. To choose an insert option for the selected track, press the number of the desired option on the keypad. The system will return to the **Insert** menu.
8. Repeat steps 6 and 7 for *each track* that to be inserted.
9. Select the source file for the insert function:
   - If the default file (CLIPBOARD) is acceptable, no action is required.
   - To insert from a named file other than the clipboard, select item **9**, SOURCE FILE. The **Choose File To Insert** menu will appear. Use the **Jog Wheel** or Arrow keys to select the desired file, then press **ENTER**. The selected file name will appear in the **Insert** menu.
10. When all desired tracks are enabled or disabled, press **0** to perform the Insert function. During the Insert function the **EXIT** button can be pressed to cancel. If the insert function is canceled, the current file will be returned to the previous state.
11. At the conclusion of the process, an "OPERATION COMPLETE" message will appear, and the **UNDO** button lights. Press **ENTER** to return to the **Transport Screen**.
12. To undo the procedure and revert to the previous state of the file, press **UNDO**.

Saving Your Work

The TCR recorder is equipped with a 250 MB Zip® drive and an optional removable hard drive for archiving audio, and for transferring material from one TCR to another.

It is easy to copy individual files, groups of files, directories, or the entire contents of one drive to another. Refer to the Drive Menu, Directory Menu, and Files Menu functions for further details.

Changing the Removable Drive

Warning

> If the removable drive is currently selected, go to the **Drive List** display by repeatedly pressing the **EXIT** button before changing the drive. Failure to do so may cause loss of audio data or severe file corruption on the replacement drive.

It is *not* necessary to remove power to the TCR to replace the removable drive. However, if this drive is currently selected, you must always display the **Drive List** before changing it. This ensures that all files have been properly closed before spinning down the drive, and that the TCR correctly initializes the file system on the replacement drive before it accesses any files. If the removable drive is *not* the current drive, you may change it at any time.

Turn the key on the drive bay *clockwise* to spin down the removable hard drive. The green drive number on the drive carrier blinks as the drive spins down. When the small **'u'** shows on the drive indicator, the drive may be pulled out from its frame.

After installing the replacement drive, turn the key *counter-clockwise* to spin up the drive. When the drive unit number on the drive bay stops blinking, press the **EXIT** button from the **Drive List** to register the drive. It is now ready for use.

Changing a Zip Disk

As long as there is no disk activity on the Zip disk — that is, no copy or format operations are in progress – then it is safe to press the button on the Zip drive to eject the disk.

After inserting a new Zip disk, register it for use by pressing the **EXIT** button from the **Drive List** display.

Machine Setup

In This Chapter

This chapter provides instructions for using the global **Setup Menu**. The following topics are discussed:

- Setup Menu Functions
- Preferences
- Audio I/O
- Sync and Time Code
- External Control
- Drives
- Load Named Settings
- Save Named Settings
- Use Factory Defaults

Note

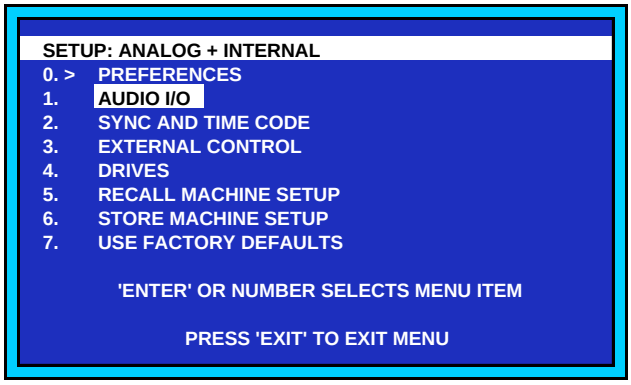
Throughout this chapter, the triangle symbol ► followed by a series of button and screen labels indicates the "path" of keystrokes required to access a particular function.

Setup Menu Functions

► MENU | **Machine Setup**

The **Setup Menu** provides a variety of important machine setup functions that pertain to the *entire* TCR™ system, rather than to specific functional modes. The *entire* machine setup can be saved in one of ten configurations using the **Store Machine Setup** function. Each configuration is stored in nonvolatile memory so that the settings are retained when TCR power is off.

To reach the **Setup Menu**, select item **0** (MACHINE SETUP) on the **Drive Menu**, the **Directory Menu**, the **File Menu** or the **Editor Menu**.



Setup Menu

The following setup functions are provided:

- **Preferences** — sets system operating preferences.
- **Audio I/O** — sets audio input and output parameters.
- **Sync and Time Code** — sets sync reference, time code and chase mode parameters.
- **External Control** — sets general purpose I/O and RS-422 (remote control) parameters.
- **Drives** — defines which drives are present and enabled.
- **Recall Machine Setup** — allows the user to recall one of ten stored configuration registers.
- **Store Machine Setup** — allows the user to store a machine setup.
- **Use Factory Defaults** — resets all TCR machine settings to factory default values

Each function is explained in the following sections.

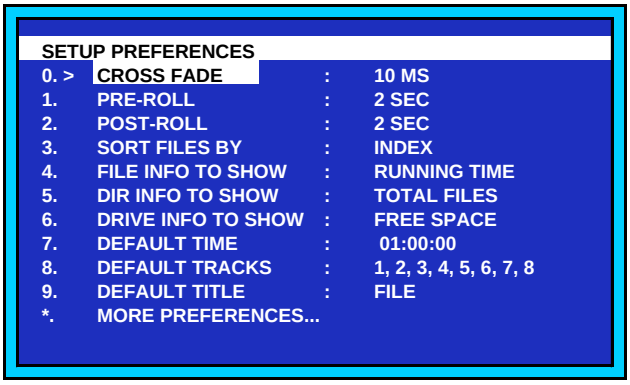
Note

Refer to the "**Selecting Menu Functions**" section in Chapter 3 for instructions on making menu and function selections.

Preferences

► MENU | Machine Setup | **Preferences**

The **Setup Preferences Menu** allows you to *customize* the TCR's performance. To reach the **Setup Preferences Menu**, select item **0** (PREFERENCES) on the **Setup Menu**.



Setup Preferences Menu

The choices in the **Setup Preferences Menu** are:

0. **Crossfade**

   Selects the cross-fade duration for edits and erasures (1 millisecond to 30 seconds).

1. **Pre-Roll**

   Selects how far in front of the edit in-point to begin playback for the **Auto Record** and **Audio Review** modes (0 to 10 seconds)

2. **Post-Roll**

   Selects how long to roll beyond the edit out-point, after the **Auto Record** or **Auto Review** interval (0 to 10 seconds)

3. **Sort Files By**

   Selects how to sort files in the **File List**. Choose by **Name**, **Index**, **Info then Index** or **Info then Name**.

4. **File Info to Show**

   Selects what information to show next to the file name in the **File List**. Choose **Running Time**, **Start Time**, or **File Size**.

5. **Dir Info to Show**

   Selects what information to show next to the directory name in the **Directory List**. Choose **Total Files**, **Total Running Time**, or **Total Size** (of all files)

6. **Drive Info to Show**

   Selects what information to show next to the drive name in the **Drive List**. Choose **Total Files**, **Total Running Time**, **Total Size** (of all files) or **Free Space** on the drive.

7. **Default Time**

   Selects the start time of newly created files. Choose a **Fixed Time**, or get the start time from the **Internal Generator** or from **Incoming Time Code**.

8. **Default Tracks**

   Selects which tracks to arm for newly created files

9. **Default Title**

   Chooses the default name of newly created files. The system automatically appends the file's index number to this name.

*. **More Preferences**

   Displays a second page of system preferences. The following items reside on the **More Preferences Menu**.

0. **Typed Time Values**

   Determines the resolution for typed time values — whether to include frames, sub-frames in addition to hours, minutes and seconds

1. **Rewind/FF Speed**

   Sets the fast transport speed limit (1x to 60x).

2. **Prompt on Exit**

   Selects whether to prompt the user before closing an open file.

3. **Screen Saver Off**

   Selects when to prevent the **LCD Screen** from going blank (after one hour without button presses). Choose **During Play and Record** or **During Record Only**.

Each "preference" function is explained in more detail the following sections.

Crossfade

► MENU | Machine Setup | Preferences | **Crossfade**

The **Crossfade** function sets the crossfade interval that is used each time the TCR enters and exits the record and erase modes — either with a manual record, an auto-record, or a punch-in / punch-out with the **ARM** buttons.

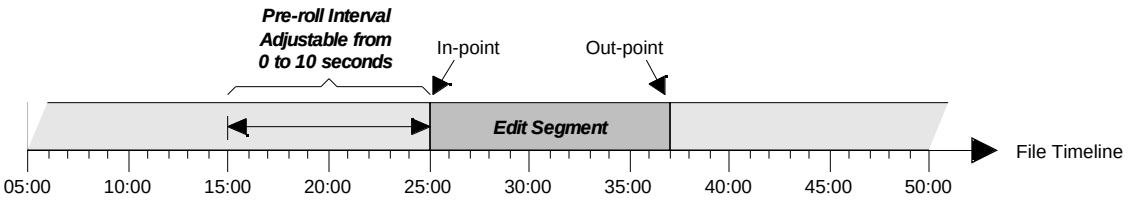
Use the following steps to set the crossfade interval.

1. On the **Setup Preferences Menu**, select item **0** (CROSSFADE). The current crossfade interval is highlighted.
2. Select the desired crossfade interval. The range is from **1 MS** (millisecond) to **30 seconds**.

Pre-Roll

► MENU | Machine Setup | Preferences | **Pre-Roll**

The **Pre-Roll** function sets the amount of time that the TCR plays (or "rolls") *prior* to the edit in-point (during an **Auto-Record** and **Auto Review** cycle).



With videotape editing systems, this interval is used to synchronize VTRs, but with the TCR having no tape transport, the pre-roll time is typically used to hear a portion of audio in context, just prior to an edit in-point — or to allow time for tape machines in the system to reach speed.

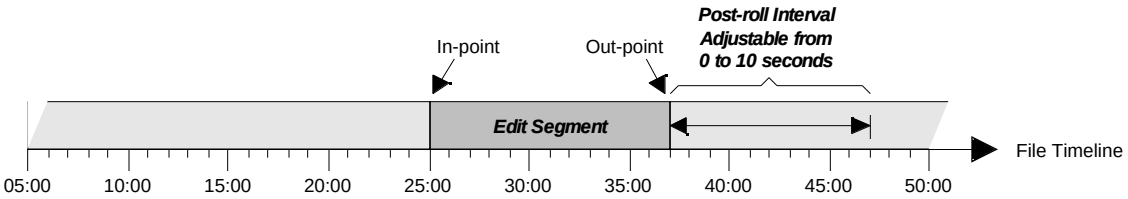
Use the following steps to set the pre-roll interval.

1. On the **Setup Preferences Menu**, select item **1** (PRE-ROLL). The current pre-roll interval is highlighted.
2. Select the desired pre-roll interval. The range is from **NONE** (no pre-roll) to **10 seconds**.

Post-Roll

► MENU | Machine Setup | Preferences | **Post-Roll**

The **Post-Roll** function sets the amount of time that the TCR plays (or "rolls") *after* the edit out-point (during an **Auto-Record** and **Auto-Review** cycle).



The post-roll time is typically used to hear a portion of audio in context, just after the edit out-point.

Use the following steps to set the post-roll interval.

1. On the **Setup Preferences Menu**, select item **2** (POST-ROLL). The current post-roll interval is highlighted.
2. Select the desired post-roll interval. The range is from **NONE** (no post-roll) to **10 seconds**.

Sort Files By

► MENU | Machine Setup | Preferences | **Sort Files By**

The **Sort Files By** function allows you to set the sort criteria that is used on the **File List**. Use the following steps to set the sort criteria.

1. On the **Setup Preferences Menu**, select item **3** (SORT FILES BY). The current "sort" setting is highlighted.
2. Select the desired setting. Four choices are available:
   - NAME: files are sorted alphabetically by name only.

- INFO THEN INDEX: files are first sorted by the data in the information column (**Running Time**, **Start Time** or **File Size**), and then sorted by the file's index number.
- INFO THEN NAME: files are first sorted by the data in the information column (**Running Time**, **Start Time** or **File Size**), and then sorted by the file's name.
- INDEX: files are sorted by index number only.

Note

Refer to the "**File Info to Show**" function for details on choosing the data in the **File Display**'s information column

File Info to Show

► MENU | Machine Setup | Preferences | **File Info to Show**

The **File Info to Show** function allows you to choose what information is shown in column 3 of the **File Display**. This function also works in conjunction with the **Sort Files By** function (which allows you to choose INFO as the primary sort criteria).

Use the following steps to set the **File List's** information column.

1. On the **Setup Preferences Menu**, select item **4** (FILE INFO TO SHOW). The current setting is highlighted.
2. Select the desired information setting. Three choices are available:
   - FILE SIZE.
   - RUNNING TIME.
   - START TIME: the file's "**Start of File**" point is shown. This point represents the earliest point along the file's timeline where audio is present.

Directory Info to Show

► MENU | Machine Setup | Preferences | **Dir Info to Show**

The **Directory Info to Show** function allows you to choose what information is shown in column 3 of the **Directory List**.

Use the following steps to set the **Directory List** information column.

1. On the **Setup Preferences Menu**, select item **5** (DIR INFO TO SHOW). The current setting is highlighted.
2. Select the desired information setting. Three choices are available:
   - TOTAL FILES
   - TOTAL RUN TIME
   - TOTAL SIZE

Drive Info to Show

The **Drive Info to Show** function selects the information shown in column 3 of the **Drive Display**.

► MENU | Machine Setup | Preferences | **Post-Roll**

Use the following steps to set the **Drive Display**'s information column.

1. On the **Setup Preferences Menu**, select item **6** (DRIVE INFO TO SHOW).

   The current setting is highlighted.

2. Select the desired information setting. Four choices are available:
   - FREE SPACE
   - TOTAL FILES.
   - TOTAL RUN TIME
   - TOTAL SIZE

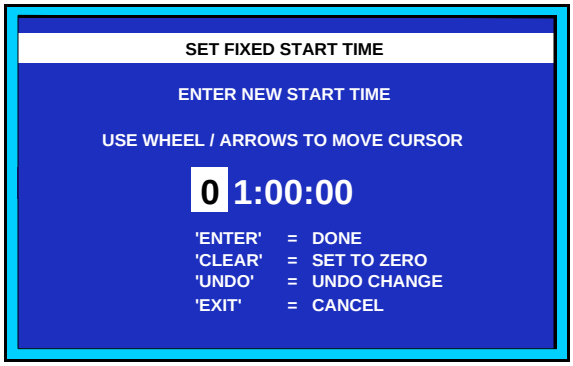
Default Time

► MENU | Machine Setup | Preferences | **Default Time**

The **Default Time** function sets the default time at which a file's time code starts (when you create a new file). Use the following steps to set a file's default start time.

1. On the **Setup Preferences Menu**, select item **7** (DEFAULT TIME). The current setting is highlighted.
2. Select the desired time code setting. Three choices are available:
   - FIXED TIME: The current fixed time code value is shown (e.g., **01:00:00**).
   - FROM EXT TC: the starting time code is captured from external time code input (based on the TC INPUT setting on the **Setup Sync and Time Code Menu**).
   - FROM INT GEN: the starting time code is captured from the internal time code generator (which must be *preset* to a value and set to FREE RUN on the **Setup Sync and Time Code Menu**). Typically, the time code generator is set to the current time of day.
3. Press **ENTER** to accept the new setting.

   If you selected the PRESET TIME CODE function, the **Set Fixed Start Time Prompt** appears.



Set Fixed Start Time Prompt

This menu allows you to enter the desired time code start time, in **HH:MM:SS** format. Select the digit that you wish to change (as indicated by the highlight), and enter the desired

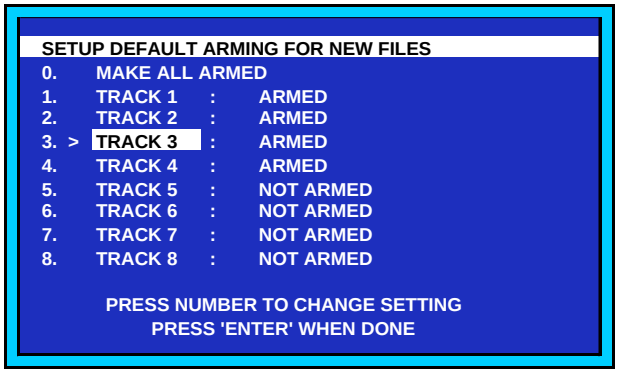
number. If required, press **CLEAR** to reset the *entire value* to zero, or **UNDO** to undo changes (the button steps back through *all* of your entries).

Default Tracks

► MENU | Machine Setup | Preferences | **Default Tracks**

The **Default Tracks** function sets the default tracks that are armed (when you create a file). When you access the **Transport Screen** for the first time, the selected tracks will automatically be armed, but all **ARM** buttons are fully functional. Use the following steps to set a file's default tracks.

1. On the **Setup Preferences Menu**, select item **8** (DEFAULT TRACKS). The **Setup Default Tracks** menu appears. Note that the TCR4's menu lists tracks 1 - 4 only.



Setup Default Tracks Menu

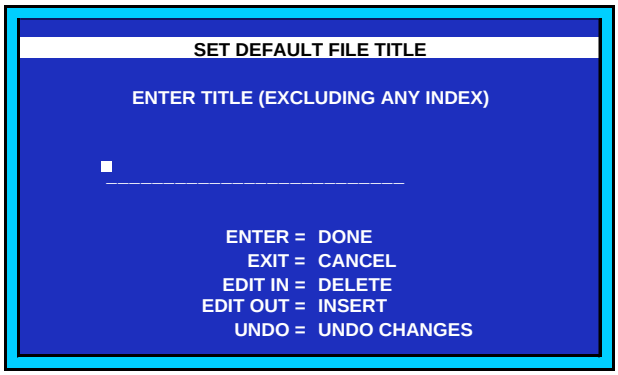
2. To change a track's status from ARMED to NOT ARMED, press its number on the keypad.
   - If all tracks are armed, item **0** reads MAKE ALL NOT ARMED.
   - If any tracks are not armed, item **0** reads MAKE ALL ARMED.

Default Title

► MENU | Machine Setup | Preferences | **Default Title**

The **Default Title** function sets the default file name that the system uses in the **File Display**, each time a new file is created. The base name is used (e.g., **MIX**), then the system appends an underscore plus the first available 3-digit number beginning with **000** (e.g., **MIX_000**, **MIX_001**). Use the following steps to set the default title.

1. On the **Setup Preferences Menu**, select item **9** (DEFAULT TITLE).



Set Default Title Prompt

2. Enter the desired letters using the keypad.

Note Do *not* enter any index numbers.

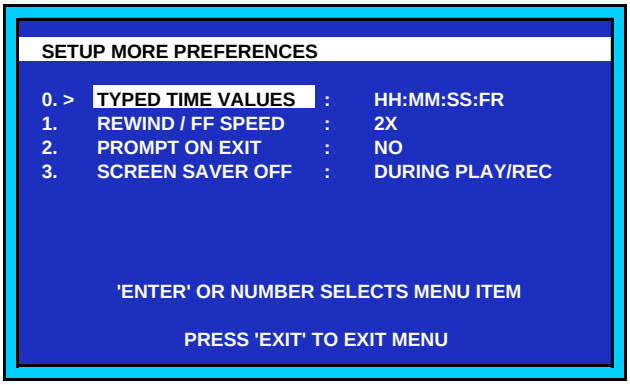
Typed Time Values

► MENU | Machine Setup | Preferences | * | **Typed Time Values**

The **Typed Time Values** function allows you to set the number of digits that are entered (and shown) on the **Transport Screen**, and on other menus that list time codes (such as the **Store Locate Registers Menu**).

Use the following steps to set the typed time values.

1. Onthe **Setup Preferences Menu**, select item ***** (MORE PREFERENCES). The **Setup More Preferences Menu** appears.



Setup More Preferences Menu

2. On the **Setup More Preferences Menu**, select item **0** (TYPED TIME VALUES). The current setting is highlighted.
3. Select the desired time code setting. Three choices are available:
   - HH:MM:SS
   - HH:MM:SS:FR
   - HH:MM:SS:FR.SF

Rewind/FF Speed

► MENU | Machine Setup | Preferences | * | **Rewind/FF Speed**

The **Rewind/FF Speed** function allows you to set the speed that is used when the **<<** (Rewind) and **>>** (Fast-forward) buttons are pressed.

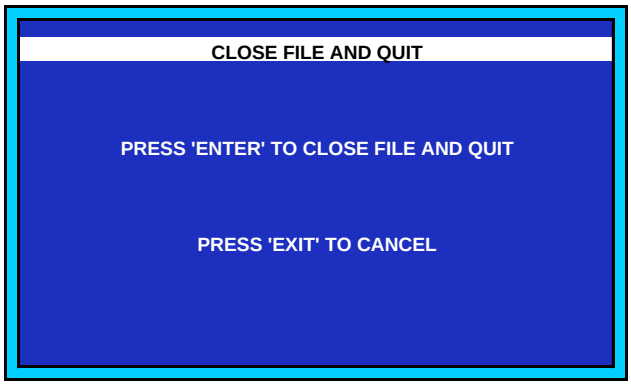
Use the following steps to set the rewind and fast forward speed.

1. On the **Setup Preferences Menu**, select item ***** (MORE PREFERENCES).
2. On the **Setup More Preferences Menu**, select item **1** (REWIND / FF SPEED).
3. Select the desired speed, which ranges from **1x** to **60x** normal play speed.

Prompt on Exit

► MENU | Machine Setup | Preferences | * | **Prompt on Exit**

The **Prompt on Exit** function allows you to set whether or not a "prompt" menu appears each time you exit the **Transport Screen**. When **Prompt on Exit** is enabled, the **Close File and Quit Prompt** appears.



Close File and Quit Prompt

When the function is disabled, you can exit the Transport Screen without the prompt menu appearing.

Use the following steps to set the **Prompt on Exit** function.

1. On the **Setup Preferences Menu**, select item ***** (MORE PREFERENCES).
2. On the **Setup More Preferences Menu**, select item **2** (PROMPT ON EXIT). The current setting is highlighted.
3. Select either YES (prompt menu enabled, or NO (prompt menu disabled).

Screen Saver Off

► MENU | Machine Setup | Preferences | * | **Screen Saver Off**

The **Screen Saver Off** function allows you to set the specific mode when the screen saver will *not* engage.

Use the following steps to set the screen saver mode.

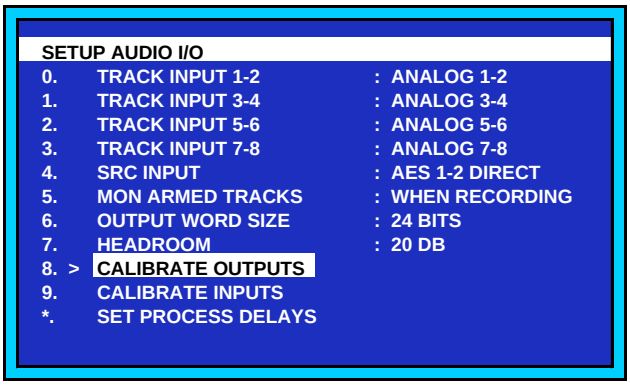
1. On the **Setup Preferences Menu**, select item ***** (MORE PREFERENCES).
2. On the **Setup More Preferences Menu**, select item **3** (SCREEN SAVER OFF). The current setting is highlighted.
3. Select the desired screen saver mode. Two choices are available:
   - DURING PLAY/REC: the screen saver will not engage during either the play mode or the record mode.
   - DURING RECORD: the screen saver will not engage during the record mode only.

Note that in all other "idle" modes, the screen goes blank after *one hour* without button presses.

Audio I/O

► MENU | Machine Setup | **Audio I/O**

The **Setup Audio I/O** (Input/Output) **Menu** provides setup and maintenance functions that allow you to *customize* and calibrate the audio performance of the TCR. To reach the **Setup Audio I/O Menu**, select item **1** (AUDIO I/O) on the **Setup Menu**.



Setup Audio I/O Menu (as shown for the TCR8)

Note that the TCR4's **Setup Audio I/O Status Menu** lists tracks 1 - 4 only.

The functions in the **Setup Audio I/O Menu** are listed below. Note that the function *numbers* differ for TCR4 and TCR8 systems.

- **Track Input Selection**

  Selects the audio input source for each track pair. Choose **Analog**, **Digital**, or **Sample Rate Converter**.

- **Sample Rate Converter Input**

  Select which digital input feeds the sample rate converter, and whether conversion is enabled or bypassed.

- **Mon Armed Tracks**

  Selects when the inputs to armed tracks are monitored. Choose only **When Recording**, or any time **When Not Playing** (for example, stopped or recording).

- **Output Word Size**

  Select dithered word size for digital outputs. Choose 24, 20 or 16 bit word size.

- **Headroom**

  Select headroom for +4dbU inputs. Choose –20dBFS or -16dBFS.

- **Calibrate Outputs**

  Trims output levels for uniform output.

- **Calibrate Inputs**

  Trims input levels for uniform input.

- **Set Process Delays**

  Sets "**pre-read**" delays to compensate for external process delays.

Each Audio I/O function is explained in greater detail in the following sections.

Track Input

► MENU | Machine Setup | Audio I/O | **Track Input**

The **Track Input** functions allow selection of which set of inputs is routed to the TCR's internal crossfader for actual use during recording and monitoring. The function applies to both TCR4 and TCR8.

Use the following steps to set the track inputs:

1. On the **Setup Audio I/O Menu**, select the appropriate track pair. The current setting is highlighted.
2. Select the desired track input:
   - ANALOG (Track pair): **Analog Input** connectors are used.
   - AES (Track pair): **Digital Input** connectors are used.
   - SAMPLE RATE CONVERTER INPUT: the TCR's internal SRC (Sample Rate Converter) input is used. Refer to the "Sample Rate Converter" section below for details.

Sample Rate Converter Input

► MENU | Machine Setup | Audio I/O | **SRC Input**

The **Sample Rate Converter** function selects which set of digital inputs is routed to the TCR's internal Sample Rate Converter**.** The Sample Rate Converter Input, in turn, can then be selected on any of the track input selection functions on the **Setup Audio I/O Menu**, with the ability to choose a *direct* or *converted* input.

Please note:

- The **Sample Rate Converter Input** function applies to digital inputs only.
- If an AES input is sample rate converted (by choosing the "converted" setting), the input does not have to be synchronous. In this way, mixing inputs at various sample rates is allowed. However, only *one pair* of AES inputs can be converted.
- With both the "direct" and "converted" options, you can assign an AES pair to *more than one* set of channels using the TCR's internal router. For example, If AES 1-2 DIRECT is selected and then SAMPLE RATE CONVERTER INPUT is selected on the **Track Input 3-4** and **Track Input 5-6** functions, AES 1-2 will be recorded on tracks 1 through 6.

Use the following steps to set the Sample Rate Converter input:

1. On the **Setup Audio I/O Menu**, select the SAMPLE RATE CONVERTER INPUT function. The current setting is highlighted.
2. Select the desired SAMPLE RATE CONVERTER input choice:
   - AES 1-2 CONVERTED: Digital inputs 1-2 are routed to the sample rate converter.
   - AES 1-2 DIRECT: Digital inputs 1-2 are used direct, with no conversion.

- AES 3-4 CONVERTED: Digital inputs 3-4 are routed to the sample rate converter.
- AES 3-4 DIRECT: Digital inputs 3-4 are used direct.
- AES 5-6 CONVERTED: Digital inputs 5-6 are routed to the sample rate converter.
- AES 5-6 DIRECT: Digital inputs 5-6 are used direct.
- AES 7-8 CONVERTED: Digital inputs 7-8 are routed to the sample rate converter.
- AES 7-8 DIRECT: Digital inputs 7-8 are used direct.

Monitor Armed Tracks

► MENU | Machine Setup | Audio I/O | **Mon Armed Tracks**

The **Monitor Armed Tracks** function determines how "armed" tracks are monitored and metered — when a track's **MON** button is toggled off.

Use the following steps to set how armed tracks are monitored:

1. On the **Setup Audio I/O Menu**, select the MON ARMED TRACKS function. The current setting is highlighted.
2. Select the desired monitor function choice:
   - WHEN NOT PLAYING: When a track is armed, you will monitor and meter the input when the TCR is stopped.
   - WHEN RECORDING: When a track is armed, you will monitor and meter the input only when the TCR is recording.

In Chapter 6, refer to the "**Monitoring and Metering Rules**" section for a discussion of how the **MON** and **ARM** buttons work with the meters.

Output Word Size

► MENU | Machine Setup | Audio I/O | **Output Word Size**

The **Output Word Size** function determines the number of bits used for the TCR's digital (AES) outputs. Use the following steps to set the output word size:

1. On the **Setup Audio I/O Menu**, select the OUTPUT WORD SIZE function.
2. Select 16 BITS, 20 BITS or 24 BITS output word size.

Headroom

► MENU | Machine Setup | Audio I/O | **Headroom**

The **Headroom** function determines the amount of headroom available when a +4dBu reference signal is injected into the TCR's analog inputs. The setting also establishes the zero point on the meters.

Use the following steps to set the headroom:

1. On the **Setup Audio I/O Menu**, select the HEADROOM function.

   The current setting is highlighted.
2. Select –16dBFS or –20dBFS headroom.

Calibrate Outputs

► MENU | Machine Setup | Audio I/O | **Calibrate Outputs**

The **Calibrate Outputs** function allows you to calibrate the TCR's analog output signal path to ensure that proper signal levels are recorded and reproduced.

In Appendix B, "**Maintenance**," refer to the "**Output Calibration**" section for complete instructions.

Calibrate Inputs

► MENU | Machine Setup | Audio I/O | **Calibrate Inputs**

The **Calibrate Inputs** function allows you to calibrate the TCR's analog input signal path to ensure that proper signal levels are recorded and reproduced.

In Appendix B, "**Maintenance**," refer to the "**Input Calibration**" section for complete instructions.

Set Process Delays

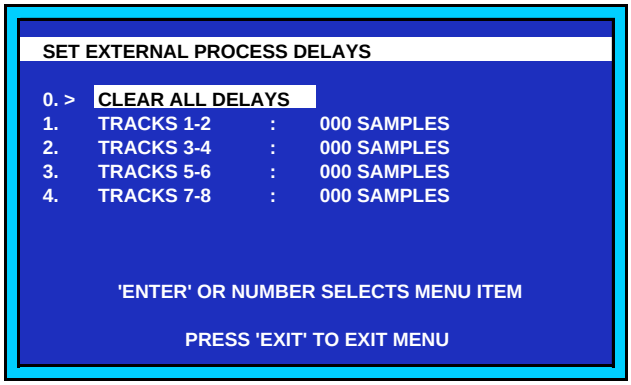
► MENU | Machine Setup | Audio I/O | **Set Process Delays**

The **Set Process Delays** function allows you to add delay to specific sets of inputs in order to compensate for delays generated by external audio processing equipment.

Use the following steps to set process delays:

1. On the **Setup Audio I/O Menu**, select the SET PROCESS DELAYS function. The **Set External Process Delays Menu** appears.

   Note that the TCR4's **Set External Process Delays Menu** lists tracks 1 - 4 only.



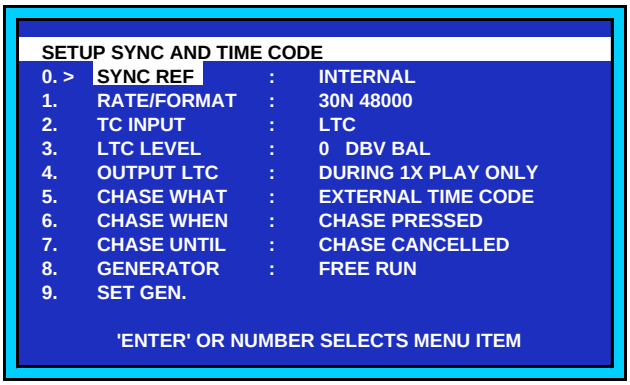
Set External Process Delays Menu (as shown for the TCR8)

2. Select the desired delay function — either "clear" all delays (item **0**), or "set" delays. If you choose to set delays, the **Track [n] Process Delay Prompt** appears.
   - Select the digit that you wish to change, and then enter the desired number of *samples*.
   - With all desired digits entered, press **ENTER** to accept the new value.
3. Press **ENTER** to accept the new setting.
4. Repeat steps 2 and 3 for all desired tracks.

Sync and Time Code

► MENU | Machine Setup | **Sync and Time Code**

The **Setup Sync and Time Code Menu** provides setup functions that allow you to *customize* the synchronization and time code performance of the TCR. To reach the **Setup Sync and Time Code Menu**, select item **2** (SYNC AND TIME CODE) on the **Setup Menu**.



Setup Sync and Time Code Menu

The functions in the **Setup Sync and Time Code Menu** are listed below.

0. **Sync Ref**

   Selects the reference from which audio sample clocks are derived. Choose **Internal** crystal, **Word Clock**, **AES Input 1-2**, **AES Input 3-4**, **Video**, or **Longitudinal Time Code**.

1. **Rate/Format**

   Selects the frame rate and sample rate. Choices include pull-up and pull down as well as drop frame and non-drop frame designations.

2. **TC Input**

   Selects the source of the time code input. Choose **LTC**, **VITC**, or **VITC If No LTC** (only when LTC has dropped out).

3. **LTC Level**

   Sets the output level of the LTC output (-18 to +15 dbV).

4. **Output LTC**

   Selects when to output LTC. Choose During 1x Play Only, or Whenever the Transport is Rolling.

5. **Chase What**

   Selects which time code source to chase. Choose **External Time Code** input or the **Internal Generator**.

6. **Chase When**

   Selects whether the **Chase Mode** begins when the **CHASE** button is pressed, or if the **CHASE** and **PLAY** buttons must be pressed simultaneously.

7. **Chase Until**

   Chooses when to cancel the **Chase Mode**. Choose **Chase until Locked** to time code (then free run — ignoring errors or discontinuities), chase until time code is lost or if an error occurs, or continue chasing until the mode is canceled by pressing **CHASE** or **STOP**.

8. **Generator**

   Starts or stops the TCR's internal time-of-day generator.

9. **Set Gen**

   Set the internal time code generator's start time.

Each sync and time code function is explained in more detail in the following sections.

Sync Ref

► MENU | Machine Setup | Sync and Time Code | **Sync Ref**

The **Sync Ref** function allows you to select the internal or external reference source that is used to lock (synchronize) the TCR.

Use the following steps to set the sync reference:

1. On the **Setup Sync and Time Code Menu**, select item **0** (SYNC REF). The current setting is highlighted.
2. Select the desired sync reference. Six choices are available:
   - INTERNAL: the TCR's internal crystal is used.
   - WORD CLOCK: the **Word Clock Input** connector is used. A valid Word Clock signal must be present.
   - AES 1-2: the **Digital Input 1-2** connector is used as the reference. A valid AES signal must be present.
   - AES 3-4: the **Digital Input 3-4** connector is used as the reference. A valid AES signal must be present.
   - VIDEO: the **Video Ref Input** connector is used as the reference. A valid analog video reference signal (such as **Black Burst**) must be present.
   - LTC: the **LTC Input** connector is used as the reference. A valid LTC signal must be present.

Please note the following important points:

- If the selected sync reference is good, the **EXT SYNC** LED lights steadily beside the **Time Code Display**.
- If the selected sync reference is bad, the **EXT SYNC** LED blinks, and one of the following messages appears in the **Editor Display**'s title bar:
  - For **Word Clock**, **Video**, and **LTC**: INCORRECT SYNC OR FRAME RATE
  - For **AES 1-2** and **AES 3-4**: SYNC INPUT BAD OR MISSING

Rate/Format

► MENU | Machine Setup | Sync and Time Code | **Rate/Format**

The **Rate/Format** function allows you to set the TCR's frame rate and sample rate. Use the following steps to set the sample and frame rates:

1. On the **Setup Sync and Time Code Menu**, select item **1** (RATE/FORMAT). The current settings are highlighted.
2. Select the desired rates. Ten choices are available.
   - 30N 48000: 30 fields per second frame rate, non-drop frame, 48000 Hz sample rate.
   - 30D 48000: 30 fields per second frame rate, drop frame, 48000 Hz sample rate.
   - 30N 48048 (VID/LTC): 30 fields per second frame rate, non-drop frame, 48048 Hz sample rate. The format is valid only when **Sync Ref** is set to VIDEO and **TC Input** is set to LTC. Audio recorded at this pulled-up sample rate can be played back at 29.97N 48000, keeping the same number of samples per frame.
   - 30D 48048 (VID/LTC): 30 fields per second frame rate, drop frame, 48048 Hz sample rate. The format is valid only when **Sync Ref** is set to VIDEO and **TC Input** is set to LTC.
   - 29.97N 48000: 29.97 fields per second frame rate, non-drop frame, 48000 Hz sample rate.
   - 29.97D 48000: 29.97 fields per second frame rate, drop frame, 48048 Hz sample rate.
   - 29.97N 47952 (VID/LTC): 29.97 fields per second frame rate, non-drop frame, 47952 Hz sample rate. The format is valid only when **Sync Ref** is set to VIDEO and **TC Input** is set to LTC. Audio recorded at this pulled-down sample rate can be played back at 30N 48000, keeping the same number of samples per frame.
   - 29.97D 47952 (VID/LTC): 29.97 fields per second frame rate, drop frame, 47952 Hz sample rate.
   - 25 FPS 48000: 25 fields per second frame rate, 48000 Hz sample rate.
   - 24 FPS 48000: 24 fields per second frame rate, 48000 Hz sample rate.

TC Input

► MENU | Machine Setup | Sync and Time Code | **TC Input**

The **TC Input** function allows you to select a time code input for use as a positioning indication — specifically for use in the "**Chase Mode**."

Use the following steps to select the time code input:

1. On the **Setup Sync and Time Code Menu**, select item **2** (TC INPUT). The current setting is highlighted.
2. Select the desired positioning indication.
   - LTC: the **LTC** port is used. A valid LTC signal must be present.
   - VITC: the **VITC** port is used. A valid VITC signal must be present.

- VITC IF NO LTC: either the **LTC** or **VITC** port will be used. A valid LTC or VITC signal must be present.

Note that the system uses LTC first, and when the LTC drop out (for example, during off-speed playback), the system defaults to the VITC signal.

LTC Level

► MENU | Machine Setup | Sync and Time Code | **LTC Level**

The **LTC Level** function allows you to set the output LTC level (in dBv), specifically to match the TCR's level to a destination device's LTC input requirements.

Use the following steps to select the LTC output level:

1. On the **Setup Sync and Time Code Menu**, select item **3** (LTC LEVEL). The current setting is highlighted.
2. Select the desired level, which ranges from **-18 dBV Bal** to **+15 dBV Bal**.

Output LTC

► MENU | Machine Setup | Sync and Time Code | **Output LTC**

The **Output LTC** function allows you to choose the modes in which the TCR outputs LTC (from the rear chassis **LTC OUT** port). Use the following steps to select the output LTC mode:

1. On the **Setup Sync and Time Code Menu**, select item **4** (OUTPUT LTC). The current setting is highlighted.
2. Select the desired output LTC mode:
   - DURING 1X PLAY ONLY: time code is output only during 1x play mode.
   - WHENEVER ROLLING: time code is output whenever the TCR is rolling.

Chase What

► MENU | Machine Setup | Sync and Time Code | **Chase What**

The **Chase What** function selects whether the TCR chases internal or external time code, when the **Chase Mode** is enabled. Use the following steps to select the time code source that is chased:

1. On the **Setup Sync and Time Code Menu**, select item **5** (CHASE WHAT). The current setting is highlighted.
2. Select the desired mode:
   - INTERNAL GENERATOR: the TCR chases the internal time code generator when **Chase Mode** is enabled.
   - EXTERNAL TIME CODE: the TCR chases external time code when **Chase Mode** is enabled. Note that this setting works in conjunction with the **TC Input** function. Refer to the "**TC Input**" section above for details.

Chase When

► MENU | Machine Setup | Sync and Time Code | **Chase When**

The **Chase When** function allows you to select the control panel button function(s) that enable the **Chase Mode** itself.

Use the following steps to select the **Chase Mode** enable button(s):

1. On the **Setup Sync and Time Code Menu**, select item **6** (CHASE WHEN). The current setting is highlighted.
2. Select the desired **Chase Mode** button(s):
   - CHASE PRESSED: the **Chase Mode** is enabled when the **CHASE** button is pressed.
   - CHASE+PLAY PRESSED: the **Chase Mode** is enabled only when the **CHASE** and **PLAY** buttons are pressed simultaneously.

Chase Until

► MENU | Machine Setup | Sync and Time Code | **Chase Until**

The **Chase Until** function allows you to select the system mode (or button) that is used to cancel the **Chase Mode**.

Use the following steps to select the **Chase Mode** cancel function:

1. On the **Setup Sync and Time Code Menu**, select item **7** (CHASE UNTIL). The current setting is highlighted.
2. Select the desired "chase until" function:
   - CHASE CANCELLED: the **Chase Mode** is canceled only when the **CHASE** button is turned off or **STOP** is pressed.
   - LOCK, THEN FREE RUN: the **Chase Mode** is canceled once the system locks to the selected time code source. Thereafter, the system is in free run.
   - TC LOSS OR ERROR: the **Chase Mode** is canceled if there is a loss of time code or a system error.

Generator

► MENU | Machine Setup | Sync and Time Code | **Generator**

The **Generator** function allows you to set the mode for the TCR's internal time code generator. Use the following steps to set the generator mode:

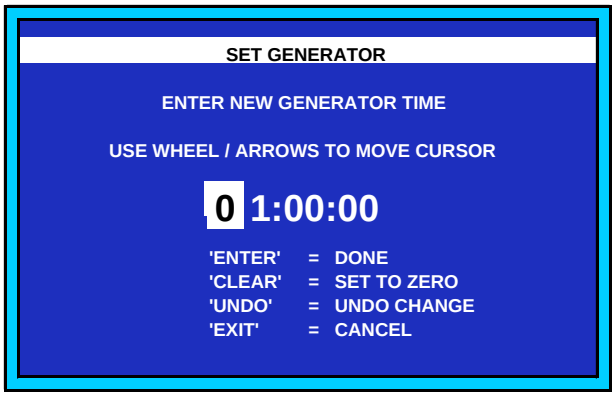
1. On the **Setup Sync and Time Code Menu**, select item **8** (GENERATOR). The current setting is highlighted.
2. Select the desired generator mode:
   - STOPPED: the TCR's internal time code generator is stopped.
   - FREE RUN: the TCR's internal time code generator is in free run mode.

Set Generator

► MENU | Machine Setup | Sync and Time Code | **Set Gen**

The **Set Generator** function allows you to preset the TCR's internal time code generator. Use the following steps to set the time code generator:

1. On the **Setup Sync and Time Code Menu**, select item **9** (SET GEN). The **Set Generator Prompt** appears:



Set Generator Prompt

   This menu allows you to preset the internal time code generator, in **HH:MM:SS** format.

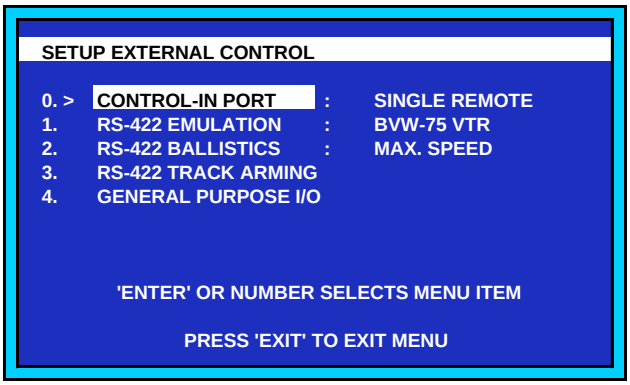
2. Select the digit that you wish to change, and enter the desired number.

Note that if the **Generator** function is set to STOPPED, the preset time remains on hold until the generator is started. If the **Generator** function is set to FREE RUN, the preset time is immediately loaded and the time code begins to increment, starting at the preset value.

External Control

► MENU | Machine Setup | **External Control**

The **Setup External Control Menu** provides setup functions that pertain to the TCR's RS-422 and GPI (General Purpose Interface) control ports. To reach the **Setup External Control Menu**, select item **3** (EXTERNAL CONTROL) on the **Setup Menu**.



Setup External Control Menu

The functions in the **Setup External Control Menu** are listed below.

0. **Control-In Port**

   Selects the function of the control input port.

1. **RS-422 Emulation**

   Selects the type of RS-422 (9-pin) emulation. Choose **BVW-75**, **DVW-500**, **PCM-7040**, or **TCR native**.

2. **RS-422 Ballistics**

   Selects the emulated ballistics. Choose **Standard**, **Maximum Speed**, or **Minimum Speed** for compatibility.

3. **RS-422 Track Arming**

   Assigns RS-422 channels to TCR tracks.

4. **General Purpose I/O**

   Assigns GPI input and output ports.

Each external control function is explained in detail in the following sections.

Control-In Port

The **Control-In Port** function allows you to set up the TCR's multi-machine control capability.

► MENU | Machine Setup | External Control | **Control-In Port**

Note

On the **Setup External Control Menu,** please leave the CONTROL IN function set to OFF.

RS-422 Emulation

► MENU | Machine Setup | External Control | **RS-422 Emulation**

The **RS-422 Emulation** function allows you to select the desired type of serial protocol to use when controlling the TCR via remote control. Note that the protocol of the transmitting (controlling) device must be set to *match* the TCR's selected remote control protocol

Use the following steps to set the remote control protocol:

1. On the **Setup External Control Menu**, select item **1** (RS-422 EMULATION).
2. Select the desired protocol. Four choices are available:
   - BVW-75 VTR
   - PCM-7040 DAT
   - DVW-500 VTR
   - TCR NATIVE MODE

RS-422 Ballistics

► MENU | Machine Setup | External Control | **RS-422 Ballistics**

The **RS-422 Ballistics** function allows you to modify the ballistics of the selected remote control protocol (as chosen with the **RS-422 Emulation** function). Use the following steps to set the remote control ballistics:

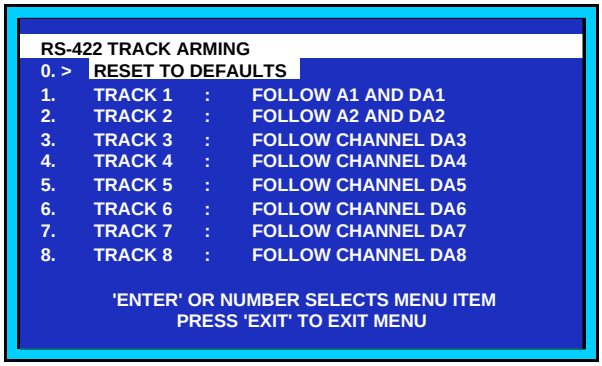
1. On the **Setup External Control Menu**, select item **2** (RS-422 BALLISTICS).
2. Select the desired ballistics. Three choices are available:
   - STANDARD: standard ballistics are used, as set by the selected protocol.
   - MIN. SPEED: the TCR's ballistics are modified for minimum transport speed.
   - MAX. SPEED: the TCR's ballistics are modified for maximum transport speed.

RS-422 Track Arming

► MENU | Machine Setup | External Control | **RS-422 Track Arming**

The **RS-422 Track Arming** function selects how each track is armed, when an "arm" command is received from the controlling device. Use the following steps to set the track arming:

1. On the **Setup External Control Menu**, select item **3** (RS-422 TRACK ARMING).



RS-422 Track Arming Menu

2. Select the desired track assignments.
   - Select item **0** (RESET TO DEFAULTS) to reset all track assignments to their default settings as listed below:

     Track 1: FOLLOW A1 AND DA1

     Track 2: FOLLOW A2 AND DA2

     Track 3: FOLLOW CHANNEL DA3

     Track 4: FOLLOW CHANNEL DA4

     Track 5: FOLLOW CHANNEL DA5

     Track 6: FOLLOW CHANNEL DA6

     Track 7: FOLLOW CHANNEL DA7

     Track 8: FOLLOW CHANNEL DA8

   - Select item **1** through **8** to set the assignments for tracks 1 through 8, respectively. The following selections are available for *each track*:

     FOLLOW A1 AND DA1: the selected track will arm when channels A1 (Analog Audio 1) or DA1 (Digital Audio 1) are enabled on the controlling device.

     FOLLOW A2 AND DA2: the selected track will arm when channels A2 or DA2 are enabled on the controlling device.

     IGNORE ARM COMMANDS: the track will not arm when channels are enabled on the controlling device.

     FOLLOW CHANNEL A1: the selected track will arm when channel A1 is enabled on the controlling device.

     FOLLOW CHANNEL A2: the selected track will arm when channel A2 is enabled on the controlling device.

     FOLLOW CHANNEL DA1: the selected track arms when channel DA1 is enabled on the controlling device.

     FOLLOW CHANNEL DA2: the selected track arms when channel DA2 is enabled on the controlling device.

     FOLLOW CHANNEL DA3: the selected track arms when channel DA3 is enabled on the controlling device.

     FOLLOW CHANNEL DA4: the selected track arms when channel DA4 is enabled on the controlling device.

     FOLLOW CHANNEL DA5: the selected track arms when channel DA5 is enabled on the controlling device.

     FOLLOW CHANNEL DA6: the selected track arms when channel DA6 is enabled on the controlling device.

     FOLLOW CHANNEL DA7: the selected track arms when channel DA7 is enabled on the controlling device.

     FOLLOW CHANNEL DA8: the selected track arms when channel DA8 is enabled on the controlling device.

General Purpose I/O

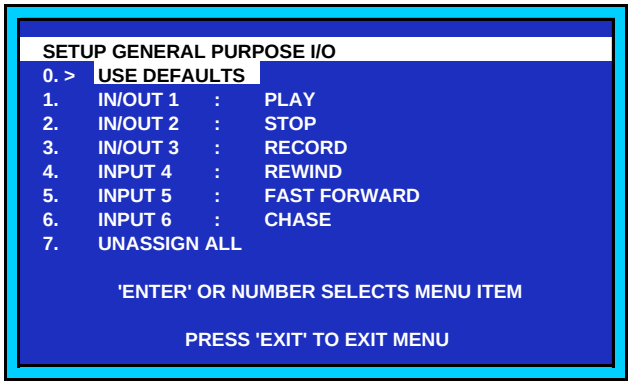
► MENU | Machine Setup | External Control | **General Purpose I/O**

The **General Purpose I/O** function allows you to assign each general purpose input and output ports. Six input and three output ports are provided on the **GPI/O** connector. Please note:

- The six input ports are typically assigned to specific transport functions, such as **PLAY**, **STOP**, and **RECORD**.
- The three output ports are typically assigned as tallies, for purposes of tracking input functions (e.g., by lighting an external LED).
- The three output ports are linked to input ports 1 through 3. When input port #1, 2, or 3 is triggered, for example, output port #1, 2, or 3 is automatically triggered, respectively.

Use the following steps to set the general purpose I/O port assignments:

1. On the **Setup External Control Menu**, select item **4** (GENERAL PURPOSE I/O). The **Setup General Purpose I/O Menu** appears.



Setup General Purpose I/O Menu

2. Select the desired GPI/O assignments.
   - Select item **0** (USE DEFAULTS) to reset all GPI/O assignments to their default settings as listed below:

     In/Out 1: PLAY

     In/Out 2: STOP

     In/Out 3: RECORD

     Input 4: REWIND

     Input 5: FAST FORWARD

     Input 6: CHASE
   - Select items **1** through **3** to set the assignments for input/output ports 1 through 3. The following selections are available for *each* GPI/O port.

Note Unless otherwise noted, each function indicates a button that is pressed on the TCR control panel.

Commands which may be assigned to GPI/O	
(UNASSIGNED): no function is assigned to the port.	ADJUST
ALT	ARM ALL (**TCR8 only**)
AUTO RECORD	CAPTURE
CHASE	CLEAR
DIR	DISP
EDIT-IN	EDIT-OUT
ENTER	EXIT
FAST FORWARD	FILES
INPUT ALL (**TCR8 only**)	LOCATE
LOOP	MENU
MUTE	NUM PAD 0
NUM PAD 1	NUM PAD 2
NUM PAD 3	NUM PAD 4
NUM PAD 5	NUM PAD 6
NUM PAD 7	NUM PAD 8
NUM PAD 9	OFFSET
OPTION	PHONE (Headphone button)
PLAY	RECALL
RECORD	REMOTE
REVIEW	REWIND
RMW	SAVE
SHUTTLE	SIGN (+/-)
SLIP	STOP
STORE	UNDO
VARI	

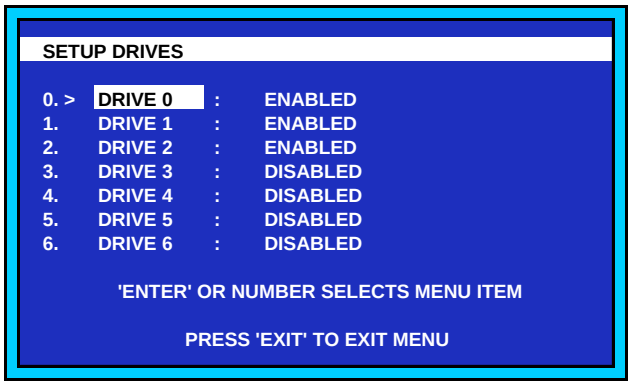
- Select items **4** through **6** to set the assignments for input ports 4 through 6. The available selections are *identical* to those listed above.
- Select item **7** (UNASSIGN ALL) to set all six port to (UNASSIGNED).

Drives

► MENU | Machine Setup | **Drives**

The **Setup Drives Menu** allows you to selectively enable or disable each system drive. This function in turn sets which drives are checked whenever drives are scanned. Only "enabled" drives are scanned, and only those actually present are listed on the **Drive List**.

To reach the **Setup Drives Menu**, select item **4** (DRIVES) on the **Setup Menu**.



Setup Drives Menu

Use the following steps to enable or disable a drive:

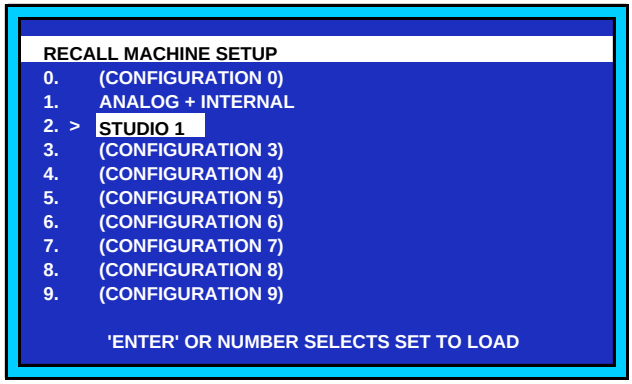
1. On the **Setup Drives Menu**, select the number of the drive that you wish to setup (**0** through **6**). The drive's current status is highlighted.
2. Toggle the selected drive between ENABLED and DISABLED.

Recall Machine Setup

► MENU | Machine Setup | **Recall Machine Setup**

The **Recall Machine Setup Menu** allows you to load one of ten stored machine setup configurations. Configurations are stored in non-volatile memory using the **Store Machine Setup Menu**. Refer to the "**Store Machine Setup**" section for details.

To reach the **Recall Machine Setup Menu**, select Recall Machine Setup (item **5**) on the **Machine Setup Menu**.



Recall Machine Setup Menu

To recall a configuration, on the **Recall Machine Setup Menu** select the number of the configuration that you want to load (**0** through **9**).

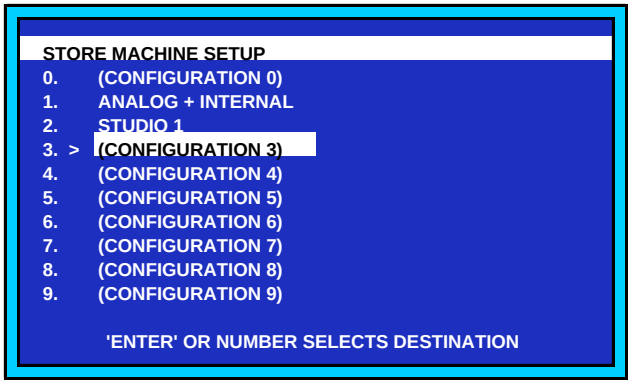
A "Standby" message is displayed while the configuration is loading, and when complete, the system returns to the **Setup Menu**. The new configuration name is shown in the **Setup Menu**'s Title Bar.

Store Machine Setup

► MENU | Machine Setup | **Store Machine Setup**

The **Store Machine Setup Menu** allows you to save machine setup into one of 10 configurations in non-volatile memory. All settings are retained when TCR power is off. Configuration files can be named, or the default name (MACHINE SETUP [0 - 9]) can be used.

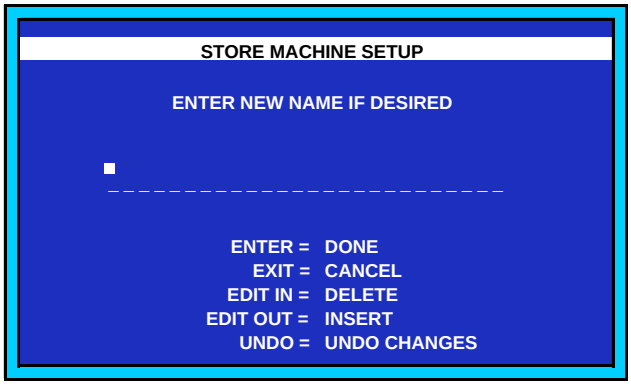
To reach the **Store Machine Setup Menu**, select Store Machine Setup (item **6)** on the **Machine Setup Menu**.



Store Machine Setup Menu

Use the following steps to save a configuration file:

1. On the **Store Machine Setup Menu**, select the number of the configuration that you want to save (**0** through **9**). The **Store Machine Setup Prompt** appears.



Store Machine Setup Prompt

2. Choose the desired "save" option:
   - To retain the current name (either default or custom) and overwrite the selected configuration with new settings, press **ENTER**. The system returns to the **Setup Menu**.
   - To choose a *new* configuration name, enter the desired letters using the keypad. Press **ENTER** to accept.

Use Factory Defaults

► MENU | Machine Setup | **Use Factory Defaults**

The **Use Factory Defaults** function allows you to load a preset factory configuration. All settings are restored except for calibration trim values, which remain unchanged.

To load the factory default configuration, select item **7** (USE FACTORY DEFAULTS) on the **Setup Menu**.

A "Restoring Factory Defaults" message is displayed while the file is loading, and when complete, all system settings have been restored to the factory default condition.

Press **EXIT** to return to the display on which you were previously working.

System Management

In This Chapter

This chapter provides detailed instructions for managing drives, directories and files. Also included is a section about installing TCR™ program file updates. The following topics are discussed:

- Using the Keypad for Renaming
- Drive Menu Functions
- Directory Menu Functions
- File Menu Functions
- Installing TCR Program Updates

Note

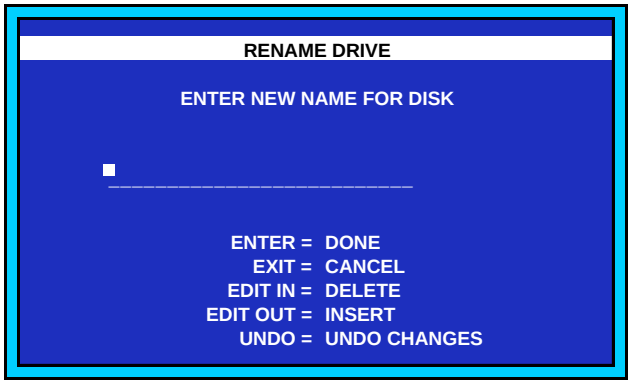
Throughout this chapter, the triangle symbol ► followed by a series of button and screen labels indicates the "path" of keystrokes required to access a particular function.

Using the Keypad for Renaming

Throughout the various system management menus, the TCR allows you to enter *custom names* for various files and functions. These functions (such as Rename Drive, Rename Directory and Rename File) all use a similar operating procedure as detailed below. In these procedures, the keypad changes from the standard numeric mode to *alphanumeric* mode.

Use the following steps to rename a function with the keypad:

Access the desired "renaming" function. The function's specific Rename prompt appears — each of which is similar to the sample shown below:



Rename Drive Prompt

Enter the desired letters using the keypad (which is now in alphanumeric mode) — up to 27 characters in length. Each press of a button rotates in sequence through the letters and number (as labeled on the button itself). For example, pressing the **7** button types **A**, **B**, **C**, **7**.

- Press **+/-** to enter a **+** or **-** character.
- Press **SYM** to enter a variety of symbols:

  0 , ' . ! ? : " & ( ) [ ] < > ; = @ # $ % ^ _ \ / ` { | } ~

Note that symbols may also be selected by holding the SYM button while rotating the jog wheel, release the SYM button to confirm the selection. Pausing during the entry process automatically advances the cursor by one place.

To edit the name, several options are available:

- Press **SPACE** to enter a space and advance the cursor.
- Rotate the **Jog Wheel** or use "Arrows" (**<<** and **>>**) to move the cursor forwards and backwards.
- Press **EDIT IN** to delete the highlighted character and pull up all subsequent letters.
- Press **EDIT OUT** to insert a space and push down all subsequent letters.
- Press **UNDO** to undo changes (the button steps back through *all* of your entries).

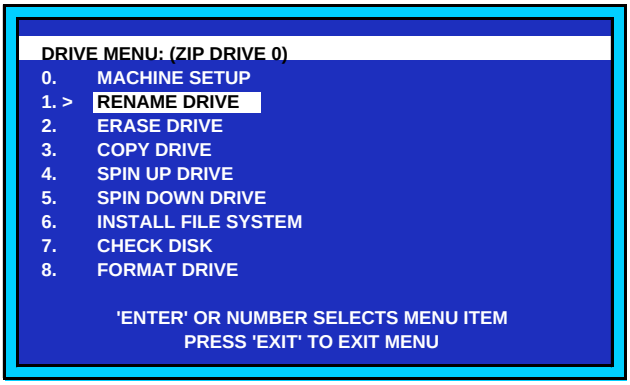
To complete the procedure:

- Press **ENTER** to accept the new name.
- Press **EXIT** to cancel and retain the previous name.

Drive Menu Functions

► [Drive List, Select Drive] | **MENU**

The **Drive** menu allows you to perform a variety of setup and installation functions for the *selected drive*.



Drive Menu

The following functions are provided:

- Machine Setup
- Rename Drive
- Erase Drive
- Copy Drive
- Spin Up Drive
- Spin Down Drive
- Install File System
- Check Disk
- Format Drive

Each function is described in the following sections.

Machine Setup

► [Drive List, Select Drive] | MENU | **Machine Setup**

The global **Machine Setup** menu can be reached by selecting MACHINE SETUP (item **0**) on the **Drive** menu. Refer to Chapter 5, "**Machine Setup**" for full instructions on all **Setup** menu functions.

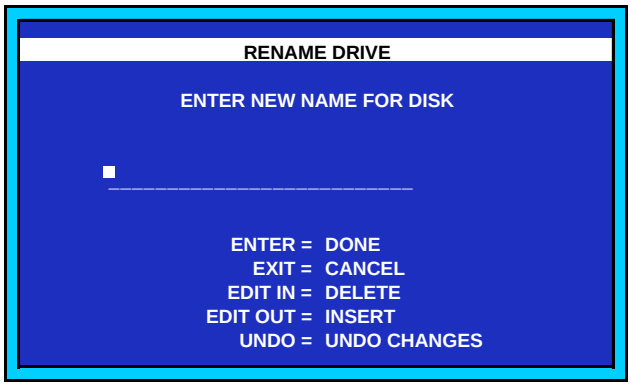
Rename Drive

► [Drive List, Select Drive] | MENU | **Rename Drive**

The **Rename Drive** function allows you to enter a custom name for any drive in the system, and display that name on the **Drive List** and at the top of the **Drive** menu. The custom name will also appear in other menu functions that relate to that drive (such as the **Copy Drive** function).

Use the following steps to rename a drive:

1. On the **Drive List**, highlight the drive that you want to rename and press **MENU**.
2. On the **Drive** menu, select RENAME DRIVE (item **1**). The **Rename Drive** prompt appears.



Rename Drive Prompt

3. Enter the new drive name using the keypad. Once entered, the new name will be shown on the **Drive List** and the **Drive** menu.

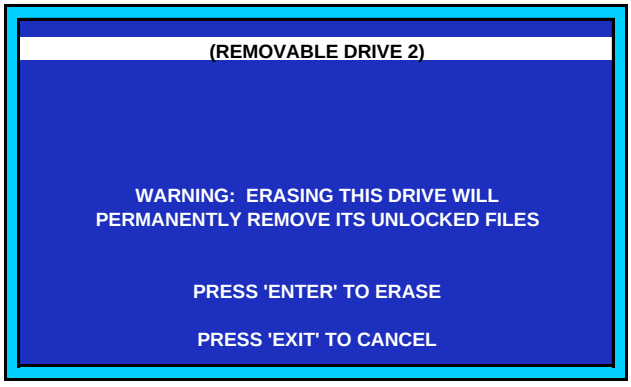
Erase Drive

► [Drive List, Select Drive] | MENU | **Erase Drive**

The **Erase Drive** function allows you to erase all unlocked files on any drive in the system. Note that the function is *destructive* and there is no "undo" feature once the drive is erased.

Use the following steps to erase a drive:

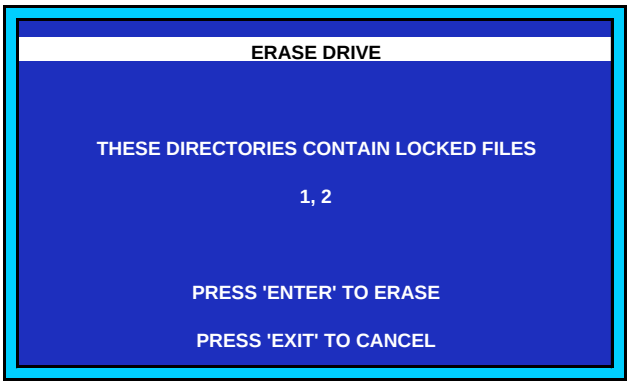
1. Ensure that any files that you want to retain are locked. To lock a file, access the directory's File List, highlight each desired file and press **LOCK**. The Lock Icon appears (🔓).
2. On the **Drive List**, highlight the drive that you want to erase and press **MENU**.
3. On the **Drive** menu, select ERASE DRIVE (item **2**). The **Erase Drive** prompt appears.



Erase Drive Prompt

4. Press **ENTER** to proceed or **EXIT** to cancel.

5. If any locked files are present on the drive, a warning screen appears, indicating the location of the locked files.



Erase Drive Warning

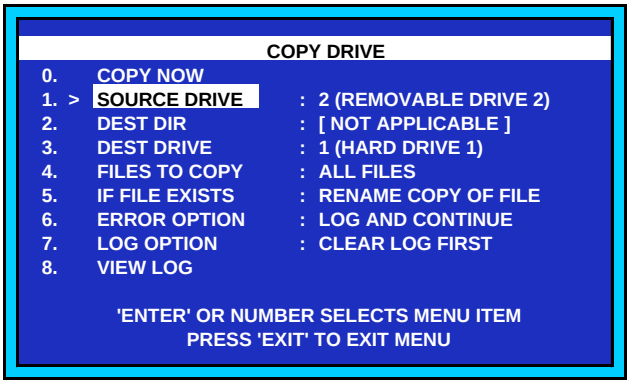
6. Press **ENTER** to erase or **EXIT** to cancel.

Copy Drive

► [Drive List, Select Drive] | MENU | **Copy Drive**

The **Copy Drive** function allows you to copy all files (or all marked files) from one drive to another. Use the following steps to copy a drive:

1. To copy a *subset* of all files, ensure that the desired files are "marked." To mark a file, access the **File List**, highlight each file and press **MARK**. A check mark appears (✓).
2. On the **Drive List**, press **MENU**.
3. On the **Drive** menu, select COPY DRIVE (item **3**). The **Copy Drive** menu appears.



Copy Drive Menu

4. Select the desired copy options as follows:
   - Choose the **Source Drive** (item **1**, SOURCE DRIVE).
   - Choose the **Destination Drive** (item **3**, DEST DRIVE).
   - Choose the **Files** to copy (item **4**, FILES TO COPY). Choose between ALL FILES and MARKED FILES.

- Choose the desired action if a **File exists** on the destination drive (item **5**, IF FILE EXISTS). Choose between:

  SKIP FILE: the file will be skipped.

  RENAME COPY OF FILE: the file that is copied will renamed, for example, **007 (COPY) ROUTE 66**.

  RENAME EXISTING FILE: the file that already exists on the destination drive will be renamed, for example, **000 (OLD) ROUTE 66**.

  REPLACE IT: the existing file will be overwritten.

- Choose the desired **Error Option** (item **6**, ERROR OPTION). Choose between:

  LOG AND CONTINUE: errors (if any) will logged but the procedure will continue.

  STOP ON ERROR: the procedure halts if an error occurs.

- Choose the desired Log Option (item 7, LOG OPTION). Chose between CLEAR LOG FIRST and DON'T CLEAR LOG.
- If you want to view the contents of the current log, select VIEW LOG (item **8**).

5. Select COPY NOW (item **0**), to begin the procedure.

Note

All 10 source directories are copied to the *same numbered directories* on the destination drive. To *change* the destination directory, use the **Copy Directory** or **Copy File** function.

Spin Up Drive

► [Drive List, Select Drive] | MENU | **Spin Up Drive**

The **Spin Up Drive** function allows you to spin up a selected drive, typically, after installing a removable hard drive in the **Drive Bay**. Use the following steps to spin up a drive:

1. On the **Drive List**, highlight the drive that you want to spin up and press **MENU**.
2. On the **Drive** menu, select SPIN UP DRIVE (item **4**).
   - If the drive is already spun up, no action is taken.
   - If the drive is currently spun down, the **Drive Spin Up** message temporarily appears, during which time the drive spins up to speed. When the drive reaches speed, the system returns to the **Drive List**.

Note

If you select a drive for use that is currently spun down, the system automatically spins up the drive.

Spin Down Drive

► [Drive List, Select Drive] | MENU | **Spin Down Drive**

The **Spin Down Drive** function allows you to spin down a selected drive, typically, prior to removing a removable hard drive from the **Drive Bay**.

Use the following steps to spin down a drive:

1. On the **Drive List**, highlight the drive that you want to spin down and press **MENU**.
2. On the **Drive** menu, select SPIN DOWN DRIVE (item **5**).
   - If the drive is already spun down, no action is taken.
   - If the drive is currently spun up, the **Drive Spin Down** message temporarily appears, during which time the drive spins down.

Install File System

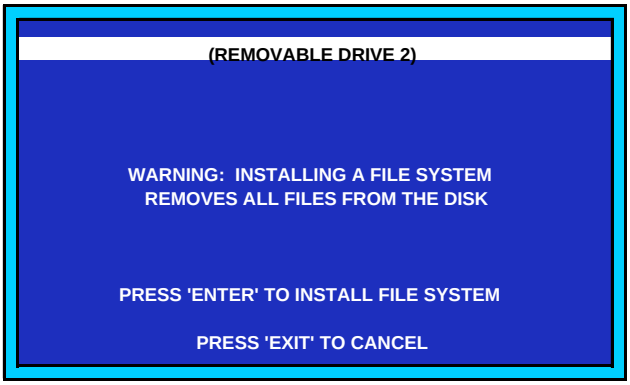
► [Drive List, Select Drive] | MENU | **Install File System**

The **Install File System** function allows you to install a new file system on a selected drive (usually a removeable disk that has not yet been used in a TCR). *All files* (both locked and unlocked) will be removed from the drive. Note that the function is *destructive* and there is no "undo" feature once the new file system is installed.

Another reason to use the Install File System utility is that disk media errors or loss of power during writes to the disk can cause the file usage table and/or audio files to be stored incorrectly on disk. You may become aware of disk/file errors if you notice that the reported free space and total file size don't correlate with the known physical disk size. Use CHECK DISK from the menu to check for file system errors. Installing (or re-installing) the file system will correct file errors by performing a quick high-level format of the disk.

Use the following steps to install a new file system:

1. On the **Drive List**, highlight the drive on which you want to install a new file system and press **MENU**.
2. On the **Drive** menu, select INSTALL FILE SYSTEM (item **6**). The **Install File System** prompt appears.



Install File System Prompt

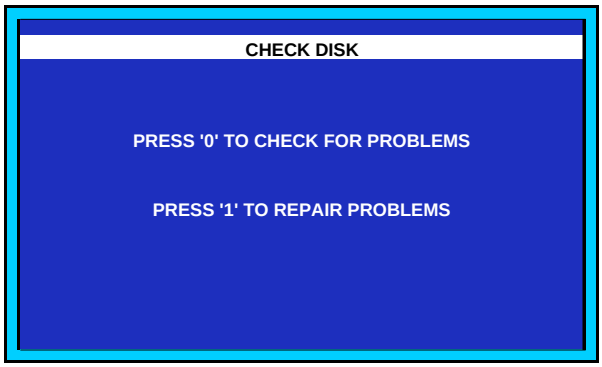
3. Press **ENTER** to proceed. A menu alerts you to the number of megabytes available on the selected drive.
4. Press **ENTER** to erase all files and install a new file system.

Check Disk

► [Drive List, Select Drive] | MENU | **Check Disk**

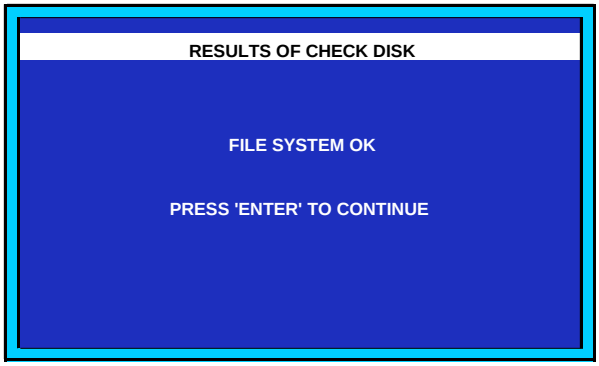
The **Check Disk** function allows you to check a selected disk drive for problems, and if problems are found, repair them. You may choose to run Check Disk routinely or whenever you suspect that the the reported free space and total file size don't correlate with the known physical disk size. Use the following steps to check the disk:

1. On the **Drive List**, highlight the drive that you want to check and press **MENU**.
2. On the **Drive** menu, select CHECK DISK (item **7**). The **Check Disk** menu appears.



Check Disk Menu

3. Press **0** to check for disk problems. If no problems are encountered, the **Check Disk Results** menu appears. Press **ENTER** to return to the **Drive List**.



Check Disk Result

4. If problems *were* encountered in step 3, repeat the procedure from step 1. In step 3, press **1** to repair the disk problems.

Format Drive

► [Drive List, Select Drive] | MENU | **Format Drive**

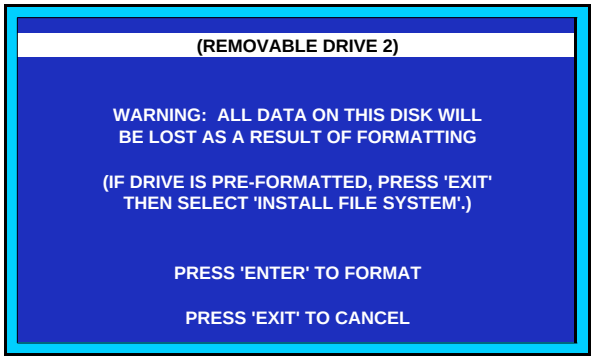
Disk media errors can cause the file usage table and/or audio files to be stored incorrectly on disk. You may become aware of disk/file errors if you notice that the reported free space and total file size don't correlate with the known physical disk size.

Use CHECK DISK from the menu to check for file system errors. Installing (or re-installing) the file system will attempt to correct file errors by performing a quick high-level format of the disk. If you believe that there may be physical defects on the disk, you may run Format Drive to perform a low-level disk format. Format Drive may take over an hour to complete.

The **Format Drive** function allows you to format a newly installed disk drive if required (typically, the removable drive in the **Drive Bay**). All TCR systems from the factory are delivered with *all drives* pre-formatted. Note that the function is *destructive* and there is no "undo" feature.

Use the following steps to format a disk drive:

1. On the **Drive List**, highlight the drive that you want to format and press **MENU**.
2. On the **Drive** menu, select FORMAT DRIVE (item **8**). The **Format Drive Alert** appears.



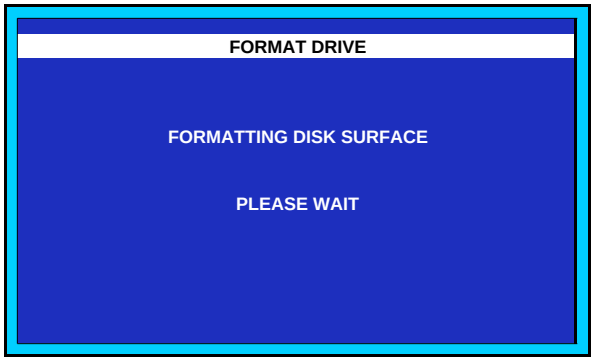
Format Drive Alert

3. Press **ENTER** to proceed.

Note

If the drive is pre-formatted, press **EXIT** and use the **Install File System** function. See the "**Install File System**" section above.

When **ENTER** is pressed, the **Format Drive** message appears, during which time the selected drive is formatted. Be patient, as this process may take over an hour to complete.



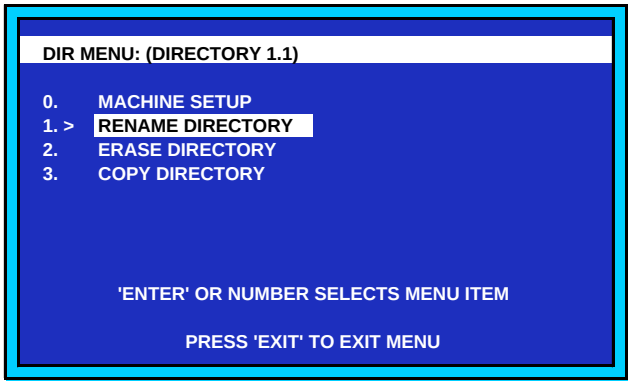
Format Drive Message

At the conclusion of the formatting procedure, a menu alerts you to the number of megabytes now available on the selected drive.

Directory Menu Functions

► [Directory List, Select Directory] | **MENU**

The **Directory** menu allows you to perform a variety of "management" functions to the selected directory.



Directory Menu

The following functions are provided:

- Machine Setup
- Rename Directory
- Erase Directory
- Copy Directory

Each function is described in the following sections.

Machine Setup

► [Directory List, Select Directory] | MENU | **Machine Setup**

The global **Machine Setup** menu can be reached by selecting MACHINE SETUP (item **0**) on the **Directory** menu. Refer to Chapter 5, "**Machine Setup**" for full details on all setup functions.

Rename Directory

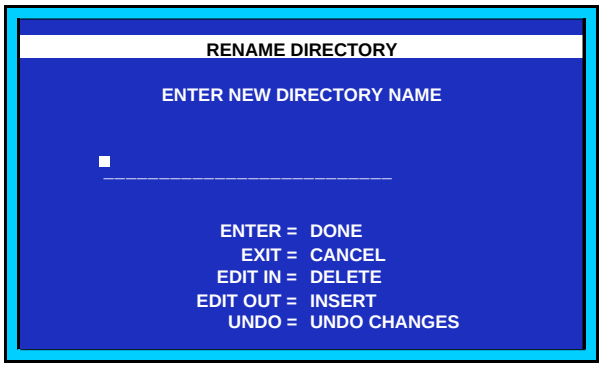
► [Directory List, Select Directory] | MENU | **Rename Directory**

The **Rename Directory** function allows you to enter a custom name for any directory in the system.

Use the following steps to rename a directory:

1. On the **Directory List**, highlight the directory that you want to rename and press **MENU**.
2. On the **Directory** menu, select RENAME DIRECTORY (item **1**).

The **Rename Directory** prompt appears, as shown below:



Rename Directory Prompt

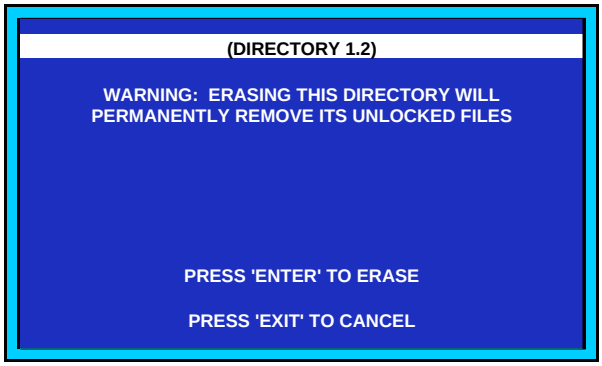
3. Enter the new directory name using the keypad.

Erase Directory

► [Directory List, Select Directory] | MENU | **Erase Directory**

The **Erase Directory** function erases all unlocked files in any directory. The function is *destructive* and there is no "undo" feature. Use the following steps to erase a directory:

1. In the directory that you want to erase, ensure that any files that you want to retain are locked. To lock a file, access the directory's **File List**, highlight each desired file and press **LOCK**. The **Lock Icon** appears ( ).
2. On the **Directory List**, highlight the directory that you want to erase and press **MENU**.
3. On the **Directory** menu, select ERASE DIRECTORY (item **2**).



Erase Directory Prompt

4. Press **ENTER** to erase or **EXIT** to cancel.

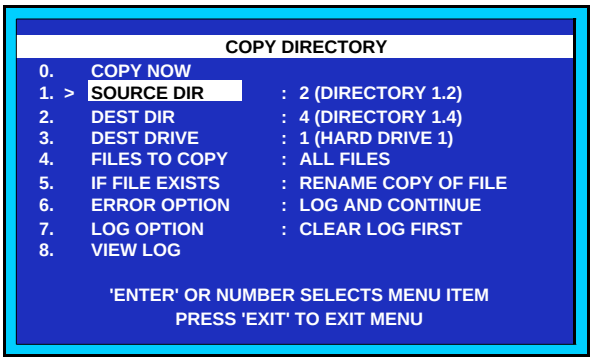
Copy Directory

► [Directory List, Select Directory] | MENU | **Copy Directory**

The **Copy Directory** function allows you to copy all files or all marked files from one directory to another in the same drive or in a different drive.

Use the following steps to copy a directory:

1. To copy a *subset* of all files, ensure that the desired files are "marked." To mark a file, access the **File List**, highlight each file and press **MARK**. A check mark appears (✓).
2. On the **Directory List**, press **MENU**.
3. On the **Directory** menu, select COPY DIRECTORY (item **3**). The **Copy Directory** menu appears.



Copy Directory Menu

4. Select the desired copy options as follows:
   - Choose the **Source Directory** (item **1**, SOURCE DIR).
   - Choose the **Destination Directory** (item **2**, DEST DIR). If you want to *change* drives, use item **3**, DEST DRIVE.
   - Choose the **Destination Drive** (item **3**, DEST DRIVE).
   - Choose the **Files** that you wish to copy (item **4**, FILES TO COPY). Choose between ALL FILES and MARKED FILES.
   - Choose the desired action if a **File exists** in the selected destination directory (item **5**, IF FILE EXISTS). Choose between:

     SKIP FILE: the file will be skipped if it exists in the destination directory.

     RENAME COPY OF FILE: the file that is *copied* will renamed, for example, **007 (COPY) NIGHT BLUES**.

     RENAME EXISTING FILE: the file that *already exists* in the destination directory will be renamed, for example, **000 (OLD) NIGHT BLUES**.

     REPLACE IT: the existing file will be *overwritten*.
   - Choose the desired **Error Option** (item **6**, ERROR OPTION). Choose between:

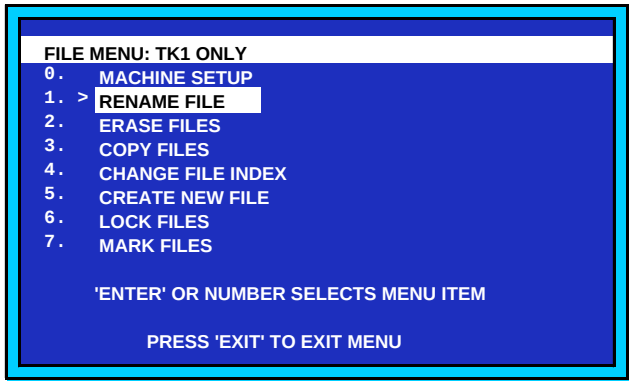
     LOG AND CONTINUE: errors will logged but the procedure will continue.

     STOP ON ERROR: the procedure will halt if an error occurs.
   - Choose the desired **Log Option** (item **7**, LOG OPTION). Choose between CLEAR LOG FIRST and DON'T CLEAR LOG.
   - If you want to view the contents of the current log, select VIEW LOG (item **8**).
5. Once all options are set, select COPY NOW (item **0**).

File Menu Functions

► [File List, Select File] | **MENU**

The **File** menu allows you to perform setup and miscellaneous functions to a selected file.



File Menu

Note

If the file is currently locked, the **Lock Icon** ( ) appears after the file name in the **File** menu's title bar.

The following functions are provided:

- Machine Setup
- Rename File
- Erase Files
- Copy Files
- Change File Index
- Create New File
- Lock Files
- Mark Files

Each function is described in the following sections.

Machine Setup

► [File List, Select File] | MENU | **Machine Setup**

The global **Machine Setup** menu can be reached by selecting MACHINE SETUP (item **0**) on the **File** menu. Refer to Chapter 5, "**Machine Setup**" for full details on all setup functions.

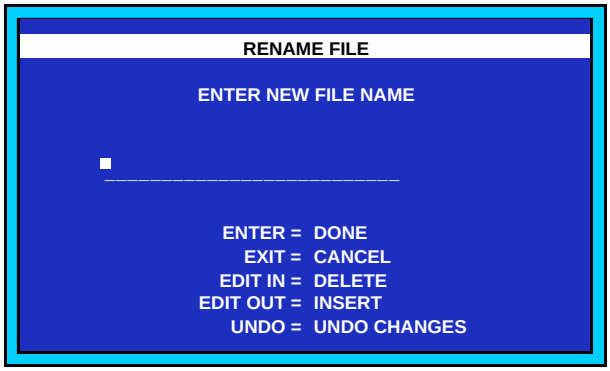
Rename File

► [File List, Select File] | MENU | **Rename File**

The **Rename File** function allows you to enter a custom name for any file in the system, and display that name on the **File List** and at the top of the **File** menu.

The custom name will also appear in other menu functions that relate to that file (such as the **Copy File** function). Use the following steps to rename a file:

1. Navigate to the **File List** in which you want to rename files.
2. Ensure that the file that you want to rename is *unlocked*. If the desired file has a **Lock Icon** (🔓), highlight the file and press the **LOCK** button. The **Lock Icon** disappears.
3. On the **File List**, highlight the file that you want to rename and press **MENU**.
4. On the **File** menu, select RENAME FILE (item **1**). The **Rename File** prompt appears.



Rename File Prompt

5. Enter the new file name using the keypad.

Erase Files

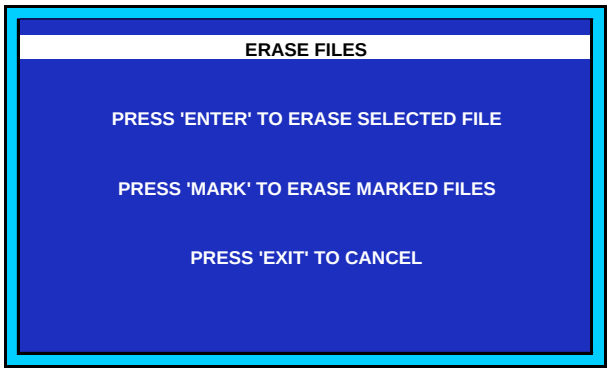
► [File List, Select File] | MENU | **Erase Files**

The **Erase Files** function allows you to erase a *selected* file, or *all marked files* in the current directory. Note that the function is *destructive* and there is no "undo" feature.

Use the following steps to erase files:

1. Navigate to the **File List** in which you want to erase files.
2. Ensure that the file(s) that you want to erase are *unlocked*. If the desired file(s) have a **Lock Icon** (🔓), highlight each file and press the **LOCK** button. The **Lock Icon** disappears.
3. On the **File List**, select the number of files to erase:
   - To erase one file only, highlight the file that you want to erase.
   - To erase a *group* of files, mark each desired file by highlighting it — then pressing the **MARK** button. A check mark appears (✓) by each file name.
4. Once the file(s) are selected (or marked), press **MENU** to access the **File** menu.

5. On the **File** menu, select ERASE FILES (item **2**). The **Erase Files** prompt appears.



Erase Files Prompt

6. Select the desired option and confirm if required.

Copy Files

► [File List, Select File] | MENU | **Copy Files**

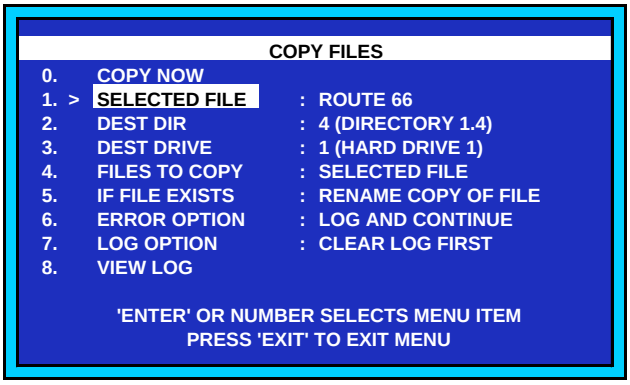
The **Copy Files** function allows you to copy a "selected" file, *all* files in the directory or all *marked* files — from one directory to another in the same drive or in a different drive.

Note

Locked files can be copied. The copy of the locked file will be *unlocked* in the destination directory.

Use the following steps to copy files:

1. Navigate to the desired directory and **File List** from which you want to copy files.
2. If you want to copy a *subset* of all files, ensure that the desired files are "marked." To mark a file, highlight each file and press the **MARK** button. A check mark appears (✓) by each file name.
3. On the **File List**, press **MENU**.
4. On the **File** menu, select COPY FILES (item **3**). The **Copy Files** menu appears.



Copy Files Menu

5. Select the desired copy options as follows:
   - Choose the **Selected File** (item **1**, SELECTED FILE).

> **Note** This function is valid only if FILES TO COPY (item **4**) is set to SELECTED FILE.

   - Choose the **Destination Directory** (item **2**, DEST DIR). If you want to change drives, use item 3, DEST DRIVE.
   - Choose the **Destination Drive** (item **3**, DEST DRIVE).
   - Choose the **Files** to copy (item **4**, FILES TO COPY). Choose between SELECTED FILE, ALL FILES and MARKED FILES.
   - Choose the desired action if a **File exists** (item **5**, IF FILE EXISTS). Choose between:

     SKIP FILE: the file will be skipped if it exists in the destination directory.

     RENAME COPY OF FILE: the file that is *copied* will renamed, for example, **007 (COPY) NIGHT BLUES**.

     RENAME EXISTING FILE: the file that *already exists* in the destination directory will be renamed, for example, **000 (OLD) NIGHT BLUES**.

     REPLACE IT: the existing file will be *overwritten*.
   - Choose the desired **Error Option** (item **6**, ERROR OPTION). Choose between LOG AND CONTINUE and STOP ON ERROR.
   - Choose the desired **Log Option** (item **7**, LOG OPTION). Choose between CLEAR LOG FIRST and DON'T CLEAR LOG.
   - If you want to view the contents of the current log, select VIEW LOG (item **8**).
6. Once all options are set, select COPY NOW (item **0**).

Change File Index

► [File List, Select File] | MENU | **Change File Index**

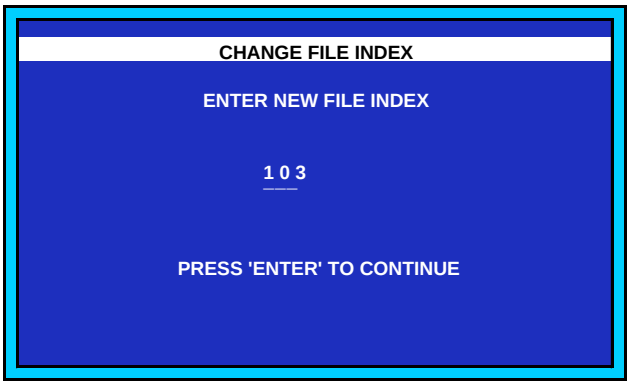
The **Change File Index** function allows you to change the three-digit index number that appears in column 1 of the **File List**. By changing the index number, you can re-sort the files in the **File List** as required.

> **Note** Files are sorted either by **Index**, **Name**, **Info then Index** or **Info then Name**. In Chapter 5, refer to the "**Sort Files By**" section for instructions.

Use the following steps to change file index numbers:

1. Access the **File List** where you want to change an index.
2. In the **File List**, highlight the file and press **MENU**.

3. On the **File** menu, select CHANGE FILE INDEX (item **4**). The **Change File Index** prompt menu appears, as shown below:



Change File Index Prompt

4. Enter the new index number using the keypad.

Create New File

► [File List, Select File] | MENU | **Create New File**

The **Create New File** function allows you to create an empty file in the current directory. The following rules apply:

- When a file is created, the system uses the lowest numbered *available* index number. For example, if index numbers **000**, **001**, **004** and **101** are currently in the directory, the system assigns index number **002** to the new file.
- The new file's *attributes* are based on three functions in the **Machine Setup | Preferences** menu:

  DEFAULT TIME: determines the default time code at which the file starts.

  DEFAULT TRACKS: determines the default tracks that are armed when the file is opened.

  DEFAULT TITLE: determines the default prefix that the system uses. For example, if you enter "**MIX**" as the default title, the system will create files with the name **MIX_000**, **MIX_001**, etc., each time the "create file" function is used.

  In Chapter 5, refer to the "**Preferences**" section for instructions on all file *default* functions.

Use the following steps to create a new file:

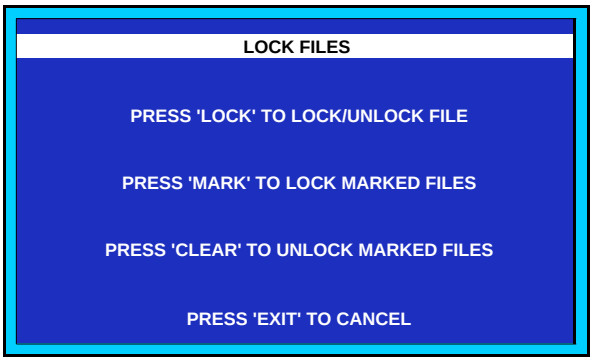
1. Navigate to the desired directory and **File List** in which you want to create a new file.
2. In the **File List**, press **MENU**.
3. On the **File** menu, select CREATE NEW FILE (item **5**).

Lock Files

► [File List, Select File] | MENU | **Lock Files**

The **Lock Files** function provides a menu that allows you to easily lock and unlock *groups* of marked files, rather than perform the function individually with the **LOCK** button itself. Use the following steps to lock files:

1. Navigate to the desired directory and **File List** in which you want to lock files.
2. Select the desired file *group*. If you want to lock or unlock a file, highlight it. If you want to perform a lock function to a *group* of files, ensure that the desired files are marked. To mark a file, highlight it — then press the **MARK** button. A check mark appears (✓) by the file name.
3. In the **File List**, press **MENU**.
4. On the **File** menu, select LOCK FILES (item **6**). The **Lock Files** prompt appears.



Lock Files Prompt

5. Select the desired lock/unlock action.

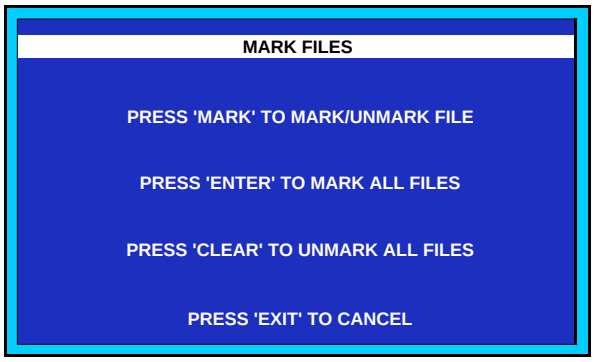
Mark Files

► [File List, Select File] | MENU | **Mark Files**

The **Mark Files** function allows you to easily mark and clear all files or just the selected file — rather than perform the function individually with the **MARK** button itself. Use the following steps to mark files:

1. Navigate to the desired directory and **File List**.
2. Select the desired file *group*. If you want to mark or unmark a file, highlight it. If you want to mark or unmark *all files*, see step 3.
3. In the **File List**, press **MENU**.
4. On the **File** menu, select MARK FILES (item **7**).

The **Mark Files** prompt appears.



Mark Files Prompt

5. Select the desired mark/unmark action.

Installing TCR Program Updates

TCR hardware includes programmable logic, microprocessors and Digital Signal Processors. The programming instructions for each of these elements is stored in non-volatile FLASH memory. It is possible to update any or all of these components by installing a TCR program disk in the Zip drive and either turning on the power or holding STOP and pressing FILES while the DRIVE LIST is displayed. If the installed Zip disk contains a program update, a prompt is displayed to allow loading of the update or continuing without loading. Program updates can be transferred via email, "unzipped" and placed in the root directory of a DOS formatted Zip disk and then installed in TCR.

Appendix A.
VTR Emulation and Remote Control

In This Appendix

This appendix provides details on VTR emulation and system remote control.

- Machine I.D. Number
- Emulating VTRs
- Serial Control Protocol

Machine I.D. Number

The serial communications protocol often referred to as “P2” or “9-pin” supports the use of unique ID numbers for machines placed under its control. Since each manufacturer’s product models expects commands unique to its feature set, the use of ID numbers permits a controller (such as a video editor) to detect the type of device and transmit appropriate commands.

360 Systems’ TCR™ recorders possess unique device I.D. numbers that distinguish these machines from all other devices:

Model	Operating Mode	Device ID Number
TCR/4	30 FRAME NTSC	F0 43
TCR/4	25 FRAME PAL	F1 43
TCR/4	24 FRAME FILM	F2 43
TCR/8	30 FRAME NTSC	F0 44
TCR/8	25 FRAME PAL	F1 44
TCR/8	24 FRAME FILM	F2 44

Emulating VTRs

TCR recorders can emulate several common serially controlled VTR and DAT machines. To do this, configure the TCR Emulation mode in the **SETUP | EXTERNAL CONTROL** menu to the desired device type. The TCR recorder will then simulate the behavior of the selected machine.

Model	Operating Mode	Device ID Number
PCM-7040	30 FRAME NTSC	70 04
PCM-7040	25 FRAME PAL	71 04
PCM-7040	24 FRAME FILM	72 04
BVW-75	30 FRAME NTSC	20 25
BVW-75	25 FRAME PAL	21 25
BVW-75	24 FRAME FILM	22 25
DVW-500	30 FRAME NTSC	B0 30
DVW-500	25 FRAME PAL	B1 30
DVW-500	24 FRAME FILM	B2 30

Serial Control Protocol

The serial control protocol and command set for TCR recorders appears on 360 Systems’ web site as a PDF file, and may be downloaded and printed by the user for reference. Knowledge of the protocol and command set is not essential for operation of the recorder. The address of 360 Systems web site is: www.360systems.com.

Appendix B. Maintenance

In This Appendix

This appendix provides maintenance procedures for the TCR™ recorders. The following topics are discussed:

- Calibration Procedure
- Calibration Accuracy
- Cleaning

Note

Throughout this appendix, the triangle symbol ► followed by a series of button and screen labels indicates the "path" of keystrokes required to access a particular function.

Calibration Procedure

This procedure will calibrate the TCR's analog signal path to ensure that proper signal levels are recorded and reproduced. Calibration compensates for normal gain variations for each channel that result from the manufacturing process. Calibration is performed in two steps:

- Adjustment of analog output gain to a known value using an internally generated reference
- Adjustment of analog input gain, using an externally applied reference.

The input gain may be adjusted ±9.99% from nominal. The TCR is calibrated before leaving the factory.

Note

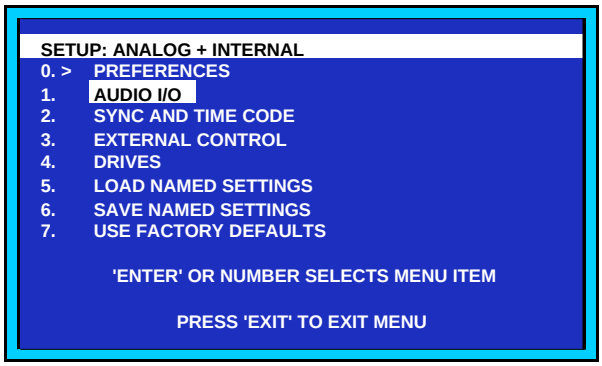
To ensure the accuracy of the TCR calibration, the audio converter circuits inside the machine must warm up for at least 15 minutes before calibration. It is also recommended that the TCR be turned ON and allowed to warm up before each use, to ensure that you are working with the calibrated settings.

Output Calibration

► MENU | Machine Setup | Audio I/O | **Calibrate Outputs**

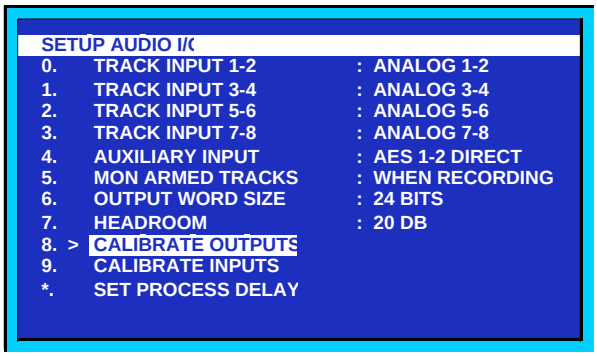
The following procedure will calibrate the analog outputs.

1. From any location within the menu tree, press **MENU**.
2. Select item 0, SETUP, to display the **Setup Menu**.



Setup Menu

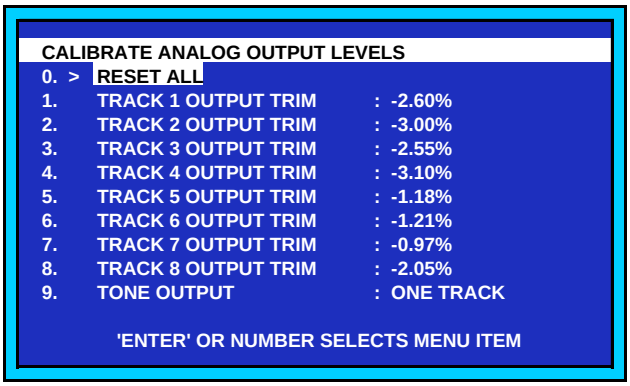
3. Select item 1, AUDIO I/O to display the **Setup Audio I/O Menu**.



Setup Audio I/O Menu (as shown for the TCR8)

4. Choose the CALIBRATE OUTPUTS item:
   - (**TCR4**) Select item 6.
   - (**TCR8**) Select item 8.

   The **Calibrate Analog Output Levels Menu** appears.



Calibrate Analog Output Levels Menu (as shown for the TCR8)

5. Select item 0, RESET ALL, to reset the current output gain trim settings for all outputs. A prompt appears requesting that all output gain trim settings should be reset.

Note	Resetting the output gain trim settings is not required.

6. Choose whether or not the test tone should be routed to all analog outputs — or only to the analog output for the selected track:
   - (**TCR4**) Select item 5.
   - (**TCR8**) Select item 9.

   Use the **Arrows** or the **Jog Wheel** to change the setting. Press **ENTER** to accept. The TCR will now play an internally generated 1 kHz tone at +4.00 dBu to the selected output(s).

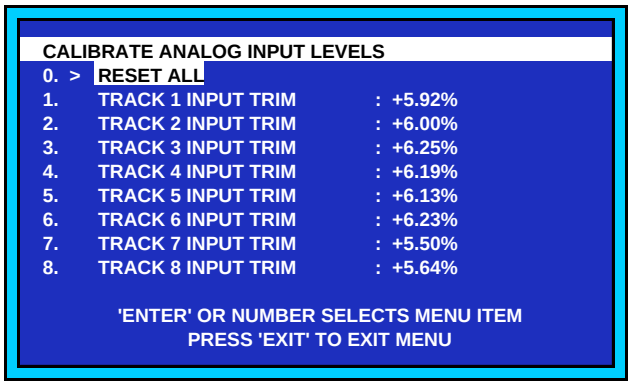
7. Select a track to calibrate:
   - (**TCR4**) Select item 1 to 4.
   - (**TCR8**) Select item 1 to 8.
8. Adjust the analog output level using the **Jog Wheel** for coarse adjustments and the **ADJ+** and **ADJ-** buttons for fine adjustments. When the desired output level is reached, you have two options:
   - Press **ENTER** to save the current output gain trim value and stop the test tone.
   - Press **EXIT** to return the output gain trim value to the original setting and stop the test tone.
9. Repeat steps 6 through 8 until all tracks have been calibrated.

Input Calibration

► MENU | Machine Setup | Audio I/O | **Calibrate Inputs**

The following procedure will calibrate the analog inputs.

1. Apply a 1 kHz signal at +4.00 dBu to the input being calibrated.
2. From any location within the menu tree, press **MENU** to access that display's specific menu of commands.
3. Select item 0, SETUP, to display the **Setup Menu**.
4. On the **Setup Menu**, select item 1, AUDIO I/O.
5. Choose the CALIBRATE INPUTS item to display the **Calibrate Analog Input Levels Menu**.
   - (**TCR4**) Select item 7.
   - (**TCR8**) Select item 9.



Calibrate Analog Input Levels Menu (Sample)

6. Select item 0 to reset the current input gain trim settings for all inputs. A prompt appears requesting that all input gain trim settings should be reset.

Note	Resetting the input gain trim settings is not required.

7. Select a track to calibrate:
   - (**TCR4**) Select item 1 to 4.
   - (**TCR8**) Select item 1 to 8.
8. Adjust the input gain trim level using the **Jog Wheel** for coarse adjustments and the **ADJ+** and **ADJ-** buttons for fine adjustments. When the desired level is measured at the analog output, you have two options:
   - Press **ENTER** to save the current input gain trim value.
   - Press **EXIT** to return the input gain trim value to the original setting.
9. Repeat steps 7 and 8 until all tracks have been calibrated.

Calibration Accuracy

The gain accuracy of a recording and playback system depends on *more than* the gain accuracy of each unit connected to the TCR recorder. Although you can calibrate the TCR to within .01 dB as an isolated device, it is necessary to take into account the load that each unit in the recording chain places on other connected units.

Input Gain Accuracy

The input resistance of *each leg* of the TCR input amplifier is 21 kΩ. This value is typical of bridging inputs, and is appropriate for low-noise circuit design. Note that when TCR is driven by a source with a *non-zero* output impedance, a voltage divider is formed between the output resistance of the source and the 21 kΩ input resistance of TCR. This relationship exists in almost all real-world applications.

Assuming an output resistance of 51.1Ω for the source (instead of zero ohms), the resulting loss will be -0.02 dB. Should the source resistance become 1,000Ω or more, as is often the case with consumer equipment, larger gain errors will result. When good gain accuracy is required in an entire system, it is advisable to perform calibrations with knowledge of the output impedance presented by the signal source.

Output Gain Accuracy

The output resistance of *each leg* of the TCR output amplifier is 51.1Ω. As in the case described above, this output resistance and the input resistance of the equipment being driven form a resistive voltage divider. In most cases this will be a bridging input and the losses will be minimal. However, when calibrating the TCR's gain (and that of the entire system), these losses should be considered. Note that in most studio systems, a good fraction of a dB of gain error *will be* created through resistive losses between equipment.

If TCR's 51.1Ω output is used to drive a 10k bridging input, the loss would be -.04 dB. However, if it is used to drive a 600Ω load, the loss would rise to -.7 dB.

When calibrating TCR using test equipment, where it is not inserted into the studio system, remember that impedance variations may occur. In the case of an Audio Precision® test set, the generator output impedance will usually be 50Ω, and the input amplifier impedance will usually be 100kΩ.

Cleaning

Your TCR may be cleaned periodically with glass cleaner and a soft cotton cloth. Please note the following important cleaning tips:

- Do not use paper tissue wipes as these may scratch the display window.
- It is recommended that you spray cleaning solutions onto a cloth before wiping the TCR. *Do not* spray fluids directly on the TCR.
- Silicon rubber keypads may be cleaned with mild soap and water, using a soft sponge. Be certain to wring excess solution from the sponge prior to wiping the TCR.

Appendix C. Specifications

In This Appendix

This appendix provides technical specifications and connector pinout diagrams for all TCR recorders. The following topics are discussed:

- General Specifications
- Audio Specifications
- Mechanical Specifications
- Audio I/O Connector Pinouts
- Control Input and Output Connector Pinouts
- P2 Connector Pinouts
- GPI/O Connector Pinouts
- AC Power Connector Pinouts

General Specifications

Time Code, Sync and Remote Control

Frame Rates	30DF/ND, 29.97DF/ND, 25, 24 fps
LTC Input	XLR-3F, balanced, -18 dBv to +12 dBv
LTC Output	XLR-3M, balanced, adjustable from –18 dBv to +15 dBv
VITC Input	BNC, 1 volt P-P nominal, 75Ω termination w/ switch
Video Reference Input	BNC, 1 volt P-P nominal, 75Ω termination w/ switch
Word Clock Input	BNC, TTL level, 75Ω termination w/switch
Word Clock Output	BNC, TTL level, 75Ω source

Control I/O

Serial Control	9-pin “D” female, RS-422, P2 command set. Emulates industry standard VTR and DAT machines.
GPI Control	15-pin “D” female; 6 active-low inputs; each assignable to any front panel function. Three 500 mA sink outputs.
Control In	15-pin “D” female, control input from ganged TCR Recorders or remote control
Control Out	15-pin “D” female, control signals to ganged TCR Recorders
Alphanumeric Keyboard	Standard PC keyboard connects to GPI with adapter cable.

Data Storage

Internal SCSI Hard Disk	9GB (standard); 18-, 36-, or 50GB optional
Optional Removable Hard Disk	9-, 18-, 36-, or 50GB in Kingston carrier
Optional DVD RAM Drive	5.2GB
Zip® Drive	250 MB, standard equipment; will read 100 MB Zip disks
Recording Time, any medium	Approx. 01:55:40 (HH:MM:SS) per GB/track @ 48kHz
Maximum File Size	24-hours (time code limit)
Rear Panel SCSI	68-pin connector w/Wide SCSI-2 implementation, for connection of approved hard drives. SCSI addresses 3, 4, 5, and 6 available.
Transfer Rate between Hard Drives	Approx. 4.7 MB/Sec
Transfer Rate to/from Zip Drive	Approx. 1.6 MB/Sec
Removable Drive Option	Available upgrade kit from 360 Systems.
Removable Disk Drive Drawer	Kingston P/N DE100I-CSW
Software and Logic Upgrades	E-mail upgrades to a PC may be copied to Zip disk and loaded to TCR.

Miscellaneous

Main Display	Blue/white liquid crystal with backlight. 240 x 128 pixels.
Time Code Display	Red LED display HH:MM:SS:FF
Stored Machine Profiles	Ten; includes all menu selections
Hardware Platform	360 Systems design, Motorola “Coldfire®” and 56K processors.
Physical Dimensions	7” x 19” x 16” [176 x 482 x 406mm] HWD, 24 lbs [10.9 kg]
Power	115/230 V, 50-60 Hz, 75 W

Audio Specifications

CONDITIONS: Audio Precision® System One, Fs=48 kHz, measurement BW 20Hz-22kHz, average response, results are typical.

Converter Re-calibration After 15 min. Continuous Operation, FS = 48 kHz, Ta = 25°C, Measurement Bandwidth = 22 Hz to 22 kHz, RL = 100k, Averaging Mode.

Analog Input / ADC

Word Size	24 bits, linear PCM, sigma-delta converters
Analog Inputs	+24 dBu max. electronically balanced, XLR-3 female. Z=20kΩ/leg
Input CMRR	>80 dB, 10 Hz to 22 kHz, RF suppressed
Channel Gain Matching	Within .01dB, menu item trim
Interchannel Crosstalk, 1 kHz	<-114 dB
Interchannel Phase Deviation	.01 degree
Frequency Response	20 Hz to 22 kHz ±.1 dB
Dynamic Range, A-wtd.	114 dB
THD + N, 1 kHz, Fs –1 dB	.001%

Analog Output / DAC

Word Size, Output Only	24-bit standard; 20 and 16-bit dithered word size selectable
Analog Output (Max)	+24 dBu or +20dBu, balanced, XLR-3 male. Z=51Ω/leg. Min load 600Ω
Frequency Response	20 Hz to 22 kHz ±.1 dB
Dynamic Range, A-wtd.	116 dB
THD + N, 1 kHz, Fs –1 dB	.001%
Channel Gain Matching	Within .01 dB, menu item trim

Digital Audio Signals

Format	AES/EBU, XLR-3 connectors
Channel Grouping	1-2, 3-4, 5-6, 7-8
Mixed Digital and Analog Inputs	Yes
Sample Rates	44,100 kHz, 48,000 kHz, 47,952 kHz, 48,048 kHz, 88,200 kHz, 96,000 kHz, 95,904 kHz, 96,096 kHz
Sample Rate Converter, Input	24 kHz to 56 kHz, assignable to any AES/EBU input pair.

Metering / Monitoring

Meter Type	14-LED bar graph, VU with simultaneous PPM indication per ANSI 16.5 and DIN 45406
Levels Indicated	Clip, +18, +15, +12, +9, +6, +3, 0, -10, -20, -30, -40, -50, -70 dBFS
Headphone Output	Front panel _" (6.3mm) jack. Tracks 1,3,5,7 left; 2,4,6,8 right.
Headroom Standard	-20 or -16 dBFS, menu selectable

Mechanical Specifications

Refer to Appendix D for mechanical drawings.

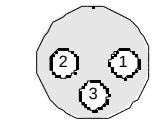
Parameter	Specification
Dimensions	7" (H) x 19" (W) x 16.25" (D) 177mm (H) x 483mm (W) x 428mm (D) Rack mounts in 4U (7") x 19" EIA equipment rack.
Weight	24 lb. (10.9 kg) without removable drive
Power	115/230 volts, 50-60 Hz, 2.5A

Audio I/O Connector Pinouts

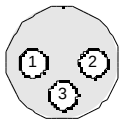
3-Pin XLR wiring table

Pin #	Signal
1	Ground
2	+ Line
3	– Line

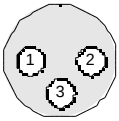
Connector type: XLR-3



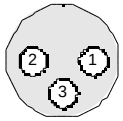
Female on Chassis
Face View



Male on Cable
Face View



Male on Chassis
Face View



Female on Cable
Face View

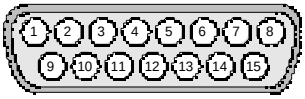
Note

360 Systems recommends bonding the ground pin to the cable shield at both ends.

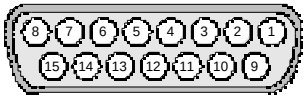
Control Input and Output Connector Pinouts

Cables for the input and output ports are identical.

Connector type: 15-pin D



Female on Chassis

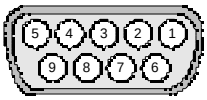


Male on Cable

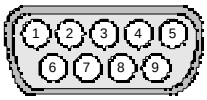
Pin #	Signal	Pin #	Signal
1	TX0	9	RX0
2	TX1	10	RX1
3	TX2	11	RX2
4	VD	12	GND
5	—	13	—
6	—	14	GND
7	GND	15	+ 12V
8	+ 12V		

P2 Connector Pinouts

Connector type: 9-pin D Female



Female on Chassis

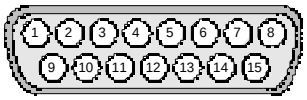


Male on Cable

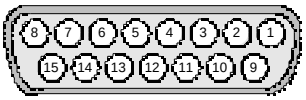
Pin #	Signal	Pin #	Signal
1	Chassis	6	Chassis
2	RxA (Rx-)	7	RxB (Rx+)
3	TxB (Tx+)	8	TxA (Tx-)
4	n/c	9	n/c
5	Ground		

GPI/O Connector Pinouts

Connector type: 15-pin D



Female on Chassis



Male on Cable

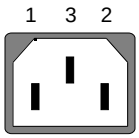
Pin #	Signal	Pin #	Signal
1	Ground	9	In 1
2	N/C	10	In 2
3	N/C	11	In 3
4	N/C	12	N/C
5	In 4	13	Out 1
6	In 5	14	Out 2
7	In 6	15	Out 3
8	+ 5V, 100 mA Max		

Note: N/C = not connected

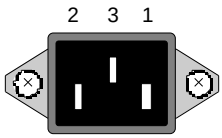
AC Power Connector Pinouts

The table below lists pinouts for the AC POWER connector.

Connector type: 3-Pin IEC Male, latching.



Female on Cable



Male on Chassis

Pin #	Function
1	Neutral/Line 2
2	Line
3	Ground

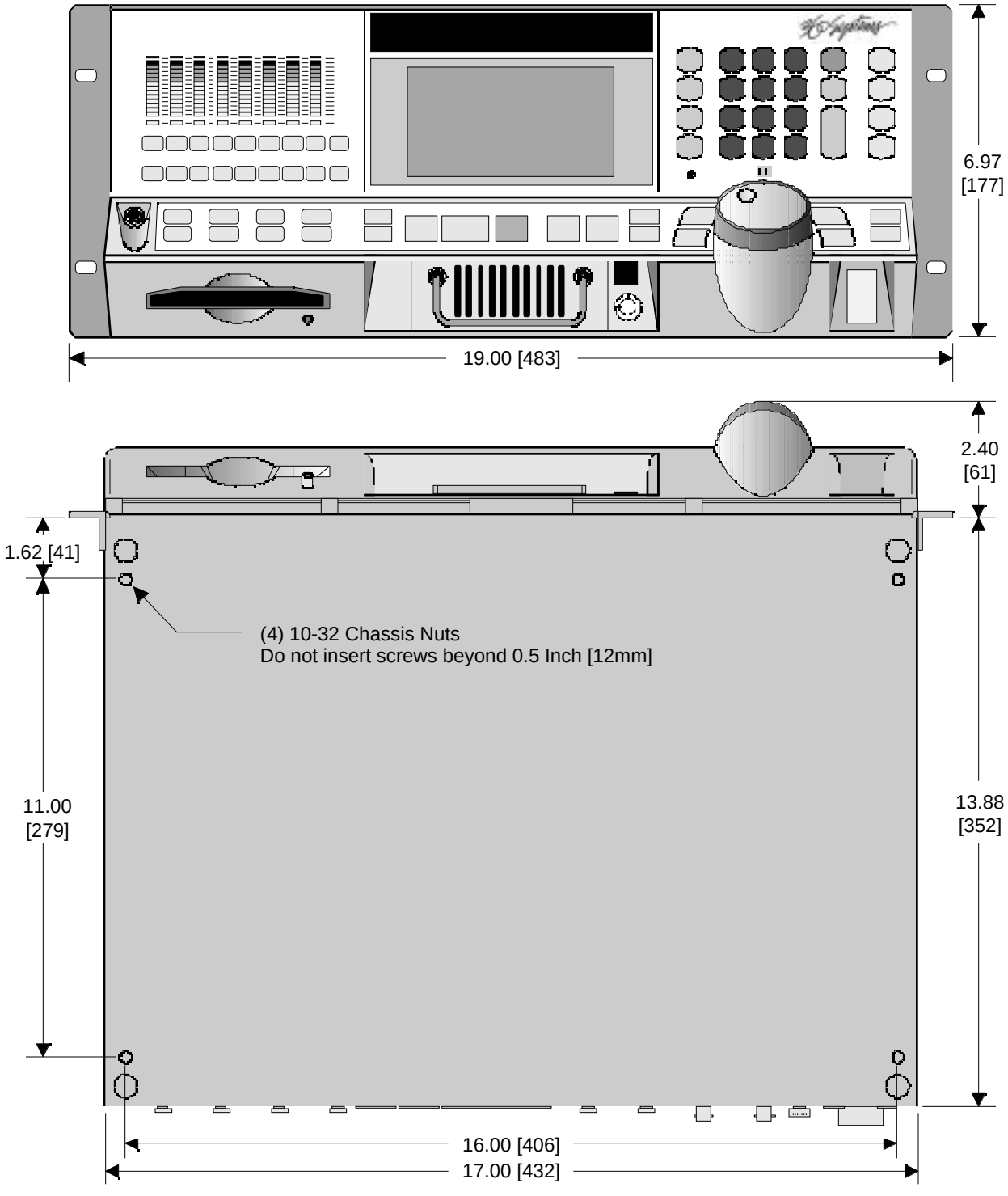
Note

Latching works only with factory-supplied latching cord. Standard non-latching IEC-320 cords will fit, but will not latch. If necessary, replace the power cord only with Underwriters Laboratories Listed cord of the same ratings.

Appendix D.
Mechanical Drawings

In This Appendix

This appendix provides TCR mechanical drawings.


6.97
[177]
19.00 [483]
2.40
[61]
1.62 [41]
(4) 10-32 Chassis Nuts
Do not insert screws beyond 0.5 Inch [12mm]
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[279]
13.88
[352]
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17.00 [432]

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TCR Recorders and Accessories

Available Models, October 1999

MODEL	DESCRIPTION
TCR4-115	**TCR4 24 bit synchronous digital audio multi-track recorder** Four audio tracks with time code, 9-pin serial and GPI control. Includes 250 Mbyte Zip drive and one internal 9 gigabyte hard disk. Additional removable drives optional. For operation at 115 VAC, 60 Hz.
TCR4-230	**TCR4 24 bit synchronous digital audio multi-track recorder** Four audio tracks with time code, 9-pin serial and GPI control. Includes 250 Mbyte Zip drive and one internal 9 gigabyte hard disk. Additional removable drives optional. For operation from 230 VAC, 50-60 Hz.
TCR8-115	**TCR8 24 bit synchronous digital audio multi-track recorder** Eight audio tracks with time code, 9-pin serial and GPI control. Includes 250 Mbyte Zip drive and one internal 9 gigabyte hard disk. Additional removable drives optional. For operation at 115 VAC, 60 Hz.
TCR8-230	**TCR8 24 bit synchronous digital audio multi-track recorder** Eight audio tracks with time code, P2 (9-pin) and GPI control. Includes 250 Mbyte Zip drive and one internal 9 gigabyte hard disk. Additional removable drives optional. For operation at 230 VAC, 50-60 Hz.
TCHD-18	**18 Gigabyte Internal Hard Disk Option** Optional internal hard disk upgrade for TCR4 or TCR8.
TCHD-36	**36 Gigabyte Internal Hard Disk Option** Optional internal hard disk upgrade for TCR4 or TCR8.
DF-109	**Drive Frame Upgrade Kit** Optional upgrade kit provides hot-swappable SCSI hard drive bay on the front of TCR recorders. Includes power supply, cooling system, wiring, and installation instructions. For use with DC109, DC118, DC136 Drive Carriers.
DC-109	**Drive Carrier with 9 Gigabyte Hard Disk** Optional 9GB hard disk installed in carrier (drawer) for use in TCR recorders equipped with a DF-109 Drive Frame.
DC-118	**Drive Carrier with 18 Gigabyte Hard Disk** Optional 18GB hard disk installed in carrier (drawer) for use in TCR recorders equipped with a DF-109 Drive Frame.
DC-136	**Drive Carrier with 36 Gigabyte Hard Disk** Optional 36GB hard disk installed in carrier (drawer) for use in TCR recorders equipped with a DF-109 Drive Frame.