

HIGH PERFORMANCE ONE-INCH VIDEO TAPE RECORDER



TH-900

- SMPTE/EBU Type C one-inch format
- Uncompromised video and audio performance
- Automatic optimization of record parameters
- Menu-identified "soft keys" organize and display important operational control and diagnostic functions
- Continuously variable play from -1X to +3X play speed
- Three-hour reel capability
- Individually replaceable video and sync head assemblies

TECHNOLOGICAL SUPERIORITY DELINEATES THE TH-900

Ultra-Gentle Tape Handling

The gentle tape handling characteristics of the TH-900 result from the use of air lubricated transport elements to provide optimum tape guiding with a minimum of friction. The air guides virtually eliminate the friction build-up normally found within a "C" format videotape recorder. In locations where air guides are not employed, precision rotary guides are used.

Responsive Tape Guidance System

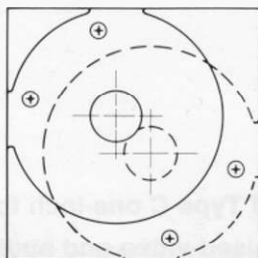
This configuration of all active guide assemblies reduces the effect of friction changes from forward to reverse or changes due to different tapes, thus permitting very rapid changes in tape direction regardless of tape type or environmental conditions. This low friction tape guiding system protects valuable "master" tapes, and makes possible the use of a vacuum capstan, thus eliminating the need for a pinch roller.

Dynamic, Servo-Controlled Braking

In the event of an inadvertent power failure even at full shuttle speed the servo system brings the tape to a controlled, fully servoed stop without excessive strain being placed on the delicate tape medium. The typical parking brakes normally associated with a tape transport of this type have been completely eliminated to increase reliability and reduce the complexity and to prevent any potential for tape damage.

Selectable Reel Size

The reel motors on the TH-900 have a unique mounting base which allows the motor position to be changed. In the outer position the three hour, 14-inch reels are accommodated. The inner position which permits mounting the TH-900 in a 19" rack has a 2 hour or 11¾-inch maximum reel size. A simple modification of a standard 19" rack will permit the outer or 3 hour position to be used, if desired.



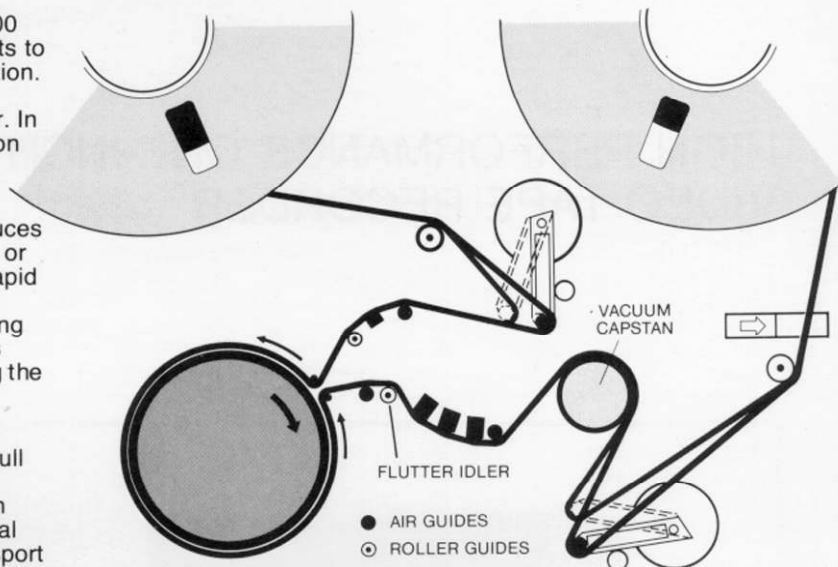
Precision AST System For Variable Speed Play

Using precision capstan reference directly coupled to the AST system permits the "dither" of the AST head to be reduced to only 20% or previous values. This results in a cleaner video signal in all normal and variable tape speed modes. Another benefit of the combination high resolution capstan tach and the direct coupled AST system is an extremely precise method of controlling the variable speeds in the time-compression/time expansion mode. The system allows speed variations as small as one second per hour up to $\pm 15\%$ to be entered without disturbances, and with complete accuracy. Also variable speed playback as a "programmed mode" has been included, which can learn and memorize a variable play sequence, allowing a complex function to be rehearsed, stored and used at a subsequent time, with field accuracy.

Superior Audio

With the TH-900 you get full audio confidence monitoring on all longitudinal tracks. The system permits dual channel stereo monitoring with individual track selection for extra flexibility.

Automatic computer setup of all audio record parameters (record current, bias current, equalization and pre-distortion) is provided. This allows fast and easy optimi-



zation for improved audio performance automatically with any audio tape. And these setup parameters are stored for three different tape types for quick access without re-optimization.

Other audio features include: selectable peak or VU metering response, a convenient red LED "peak" warning indicator, adjustable azimuth alignment and controlled phase response for optimum stereo separation and crosstalk. Plus unequalled low flutter specs for "transparent" audio, the console option of higher power amplifiers, full differential transformerless I/O and a convenient I/O processing port for easy interface with audio processing equipment when you need noise reduction or equalization or time compression/expansion.

Internal Audio Monitoring

The TH-900 includes internal 1.5 watt per channel amplifiers and speakers when used in a tabletop or rack mount configuration. In addition there is an optional high-fidelity power amplifier and speaker system which can be incorporated into the console.

Dual Serial Communication Ports

The dual RS422 serial communication ports conform to the "draft recommended practice RP113" as published by the SMPTE. These will allow a fast, direct and plug-compatible interface with any advanced editing system based on the SMPTE serial communications concept.

This serial communications system will provide added flexibility for future machine control systems.

Multiple Machine Editing

The TH-900 now makes multiple machine editing from a single machine control panel a reality. The combination of the full time synchronized transport and the "SMPTE" communication buss provide the basis for this exclusive feature. The "menu" based display allows the machines to be controlled in a fast but extremely effective manner. This system which does not require time code will control 4 additional TH-900s from the record unit's panel. All that is required is a simple external audio and video switcher to route the selected signals to the recorder. The operator can select segments from any of the playback machines. The edits can be previewed, trimmed or shifted, performed and then reviewed using only the simple single function controls on the record TH-900.

This feature allows precise multiple machine editing for many facilities which previously would have required an expensive external edit controller.



Bright, Fluorescent Display Window

A unique, interactive window is used for a bright display of system information. This is designed to vastly improve operator communications and efficiency, and to unclutter the control panel area. This dot matrix display (26 × 256 dots) can display alphanumeric characters or any graphic element. The upper two-thirds of this dot matrix display is normally used to display various position information or status messages related to the operation of the TH-900. The remaining line on the display is used as a "MENU" to identify the "SOFTKEY" directly below it.

By using this menu system, many control functions previously relegated to either card edge or other control areas can be instantly available at the operator's

fingertips. The function selected can range from a simple on/off type function through the selection and display of various modes of operation and ultimately to selecting the shuttle knob for variable control functions. The menu portion of the display combined with the upper area will guide the operator through this function and also provide error messages if the TH-900 cannot perform the desired function. A good example of an error message would be the indication that tells the operator that he has attempted to enter an edit at a location later than the edit exit point which had been selected.

This system is extremely flexible yet very simple for an operator to use while maintaining very efficient use of his valuable time.

TH-900: ACCESSORY EQUIPMENT COMPLEMENT

Time Base Corrector, TBC-900

The TBC-900 is a new high performance, high reliability Time Base Corrector designed as a matched component for the TH-900.

The TBC-900 allows the widest possible range of full color, broadcast stable, slow motion, playback from -1X reverse to 3X forward. No competitive TBC/VTR combination available today can exceed this range. For time savings in edit decision making, the TBC-900 lets you see pictures at full shuttle up to 500 inches per second in both the forward and reverse direction.

To further ensure that the output picture remains disturbance free, regardless of the time base error, the TBC-900 has 20 horizontal lines of digital picture memory on the 625 line standard, and 16 horizontal lines of memory on the 525 line standard.

Features that were once optional on TBCs—including the fully color-phased 1 line dropout compensator and the 2nd order velocity compensator—are standard in the TBC-900. So is built-in heterodyne processing which lets you dub up 3/4-inch VTR playbacks to "C" format.

The TBC-900 fully meets on-air broadcast standards. The built-in color sync generator has been designed for SCH phase stabilized operation to eliminate cycle hopping. You'll also find both horizontal and vertical blanking widths are fully adjustable. This means picture centering can be established in the camera and maintained through the VTR to the TBC output.

Transparent Data Conversion

The TBC-900 gives you the most transparent A/D and D/A conversion available. VLSI technology has been incorporated in the A/D converter where single chip construction achieves exceptional freedom from drift, as well as unexcelled transparency in signal processing.

OPTIONAL ACCESSORIES

Time Code Reader-Generator/Character Generator

This TH-900 accessory is a single, plug-in PWA that generates or reads time code on audio track 3 or in the vertical interval. In addition, the character generator provides for time code display on a picture monitor. These characters are added in a multiple output internal distribution amplifier for the maximum system flexibility.

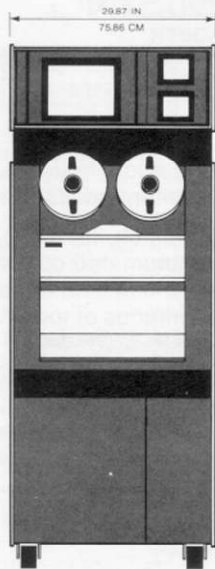
High-Powered Audio System/Speakers

A 15-watt per channel amplifier and high-fidelity speakers are available for use in the console configuration of the TH-900.

Digital Line-By-Line Autochroma

Line-by-line digital autochroma can be supplied for the TH-900 for better multiple generation tape duplication. This automatically corrects any minute chroma errors present within a field, on a line-by-line basis.

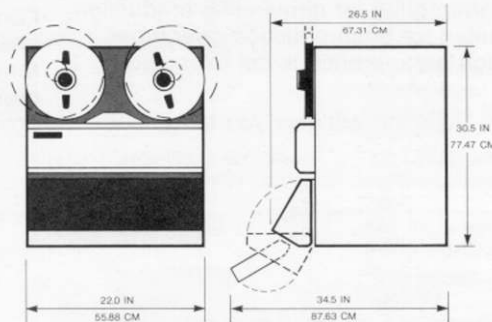
TH-900 CONFIGURATION FLEXIBILITY



Console

The optional console has provisions for mounting the TH-900, TBC-900, a picture monitor, waveform and vector monitors, and the high power audio system.

Table Top/Rack Mount



TH-900: STURDY AND ACCESSIBLE, WITH ADVANCED DIAGNOSTICS

A Sturdy Chassis

The TH-900 uses a rugged aluminum alloy die casting that mounts to the chassis side panels for exceptional structural support and rigidity. Torsional deflections are virtually eliminated. This VTR has been designed for the ultimate in reliability in its reel motors, gentle air-guided tape transport, video scanner heads, audio heads, and capstan assembly.

Accessibility

Access to the TH-900 does not require hindering any of the controls. Printed circuit cards can be accessed while the control panel is in use. The majority of the system's printed circuit boards are right behind the control panel. This panel swings down for simple checks and then is quickly inverted if system operation with a circuit board extended is required.

Easy Back Access For Maintenance

All major servo drive and power supply components are located on convenient plug-in assemblies. These sub-

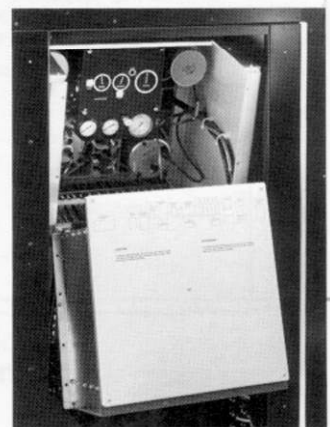
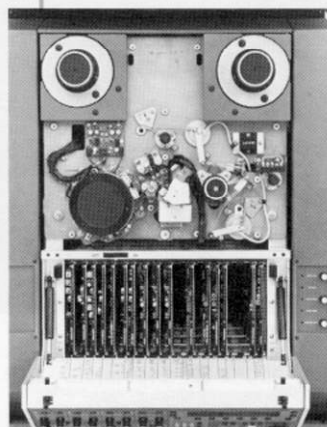
assemblies can be easily extended for problem analysis, and replacement components installed with minimum downtime. Repairs can be accomplished faster, with less component damage or costly delays.

Advanced Self-Diagnostics

The diagnostics for the TH-900 provide instant identification of the problem source. The system's central "UNITY" switch permits the operator to put the machine to a known reference and check to see if the problem is human or electronic—and UNITY helps isolate what and where the problem is. UNITY is a powerful testing tool, as it forces all video, TBC and audio variables to adhere to an established standard.

The basic diagnostic functions include the monitoring and display of all critical voltages as measured by the internal digital voltmeter circuitry. Also many error voltages are monitored and if they exceed their limits a warning is provided in the display.

Additional advanced diagnostics will exercise the buss systems for the various microprocessors, and display any faults present. The SMPTE serial ports, I/O functions can also be exercised and the results displayed independent from the system. This allows fast isolation of communication problems in a computer based editing system. An optional probe based diagnostic system allows digital circuit faults to be traced to the component level.



TH-900: CREATED FOR THE UNCOMPROMISING NEW VIDEO PRODUCTION WORLD

Versatile. Flexible. Precise.

The TH-900 is the most efficient, sophisticated and powerful VTR available today for demanding production work. It is ideally suited for teleproduction operations where consistent high performance is the expected norm.

Day-in, day-out, this machine will give you air-guided

tape handling, superior video and audio features, simplified control and easy adjustment accessibility.

Functionally, the TH-900 has no match. Its micro-processor-based operation and automated control functions make it the time-efficient machine needed to cope with the uncompromising demands of today's video production arena.

TH-900

ADDITIONAL FEATURES

- Air lubricated transport elements provide fast, gentle and precise tape control
- 500 IPS² acceleration/deceleration profile for fast re-cues
- Master Unity Control
- SCH phase meter built-in to assure fast edits without picture shift
- 20-millisecond lockup for re-play
- Audio input and output processing ports to interface with noise reduction and time compression/expansion systems
- Five machine editing control
- Optional line-by-line auto chroma



TH-900 Specifications

	NTSC/PAL-M 525/60	PAL/SECAM 625/50
Video and Sync		
Bandwidth	Flat to 4.2 MHz ±0.5 dB -3 dB at 5.0 MHz	Flat to 5.0 MHz ±0.5 dB -3 dB at 6.0 MHz
S/N (Rhode & Schwarz unweighted with bandpass filter) using TBC-3	-46 dB peak-to-peak video to RMS noise on inter-change basis	-43 dB peak-to-peak video to RMS noise on inter-change basis
LF Linearity	2% blanking to white (maximum)	2% blanking to white (maximum)
Differential Gain	4% blanking to white (max)	4% blanking to white (max)
Differential Phase (40 IEEE units of sub-carrier through TBC-3)	4° at 3.58 MHz off-tape (max)	4° at 4.43 MHz off-tape (max)
Chrominance/Luminance Delay	20 nsec (max)	25 nsec (max)
2T sin ² Pulse & Bar	1% K-factor max	1% K-factor max
Moire	-40 dB color bars 75% amplitude 3.58 MHz subcarrier	-36 dB color bars 75% amplitude 4.43 MHz subcarrier

Audio (Channels 1, 2 & 3)

Frequency Response: (400 Hz Ref)	±1 dB 200 Hz to 12 kHz	
100 nWb/m reference level	±2 dB 50 Hz to 18 kHz	
S/N (with respect to 8 dB above reference level) 20 Hz to 20 kHz	-56 dB Audio 1 and 2 -54 dB Audio 3 (Note 1)	+56 dB Audio 1 and 2 -54 dB Audio 3 (Note 1) + Audio 4

Distortion (measured at 1 kHz) (3 HD):	
@ 100 nWb/m reference level (+8 dBm)	1% max
@ 251 nWb/m peak level (+16 dBm)	3% max
With predistortion at 200 nWb/m (+14 dBm)	1% max

Depth of erasure on its own recording -70 dB

Wow & Flutter	.07% NAB unweighted (flutter tape)	.07% DIN weighted (R/P)
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Playback Crosstalk (Audio 1 & 2) 1 kHz referenced to +8 dBm or 100 nWb/m -60 dB max

Signal Inputs

Video Input (75 ohm) BNC	0.5 to 2 volts peak-to-peak
Ref Video (75 ohm) BNC:	
Comp sync	0.7 to 4 volts
Comp video	0.5 to 2 volts
Audio line inputs	-24 to +24 dBm, +8 dBm nominal
Impedance, Transformerless, True Differential	balanced; 65 K ohm resistive

Signal Outputs

Video Output (75 ohm) BNC	1.0 Volt peak-to-peak
Audio Line Outputs, Transformerless, True Differential	+8 dBm nominal; balanced +24 dBm max (Note 3)

Impedance	less than 20 ohms
Headphone Audio Monitor	0 dBm to drive 600 ohms
Audio Meter Circuits	Switchable VU or PPM

General

Record Time	190 minutes nominal; 9200 feet of tape on 14" reel
Shuttle Time	less than 72 seconds for 60 minute tape, 3.6 minutes for a 3 hour tape
Tape-Timer Accuracy (Control track updated)	±0.1 Field with continuous control track
Tape Speed	244 ±0.5 mm/sec 239.8 ±0.5 mm/sec 9.606 ±0.02 in/sec 9.44 ±0.02 in/sec
Video Writing Speed	1009 in/sec nominal 842 in/sec nominal
FM Carrier Frequencies	7.9 MHz blanking 7.58 MHz blanking 10.0 MHz peak white 8.9 MHz peak white
Audio Equalization	15 microseconds 15 microseconds 3180 microseconds
Lock-up time from Ready Mode	20 milliseconds Lock-up time from Scanner Off 3 seconds

Physical Dimensions

	Rack Mount	Table Top	Studio Console w/Monitor Bridge & TBC
Height	29.75 in. 75.56 cm	30.5 in. 77.47 cm	75.5 in. 191.77 cm
Width	19.0 in. (Note #4) 48.26 cm	22.0 in. 55.88 cm	29.875 in. 75.86 cm
Depth	25.75 in. 65.4 cm	26.5 in. 67.31 cm	32.00 in. (Note 5) 81.28 cm
Weight	270 lb. 122.47 kg	275 lb. 124.74 kg	650 lb. 294.84 kg

Temperature & Humidity

Temperature	0-45°C
Humidity	10%-90% RH (non-condensing)

Power Input

Power Line Frequency	50 & 60 Hz single phase
Input Voltages	95/105/115/125/135 Volts AC ±5% 190/210/230/250/270 Volts AC ±5%
Input Current:	
Table Top	115 vac Nominal 3.5 Amps* 230 vac Nominal 1.8 Amps†
Lowboy Console TBC and Color Monitor Bridge	115 vac Nominal 7.0 Amps* 230 vac Nominal 3.5 Amps†

*Additional 12 Amp. 1 sec shuttle start surge

†Additional 6 Amp. 1 sec shuttle start surge

Note 1: Audio 3 channel has wide-band capability for Time Code (S/N WB-30 dB)

Note 2: All specifications are based on Ampex 196 Tape or equivalent

Note 3: Can be readjusted downward by 12 dBm

Note 4: +2" Front Mounting Trim & Control Panel

Note 5: Removable Control Panel reduces depth to 27"

Right reserved to make product and specification changes at any time without notice.