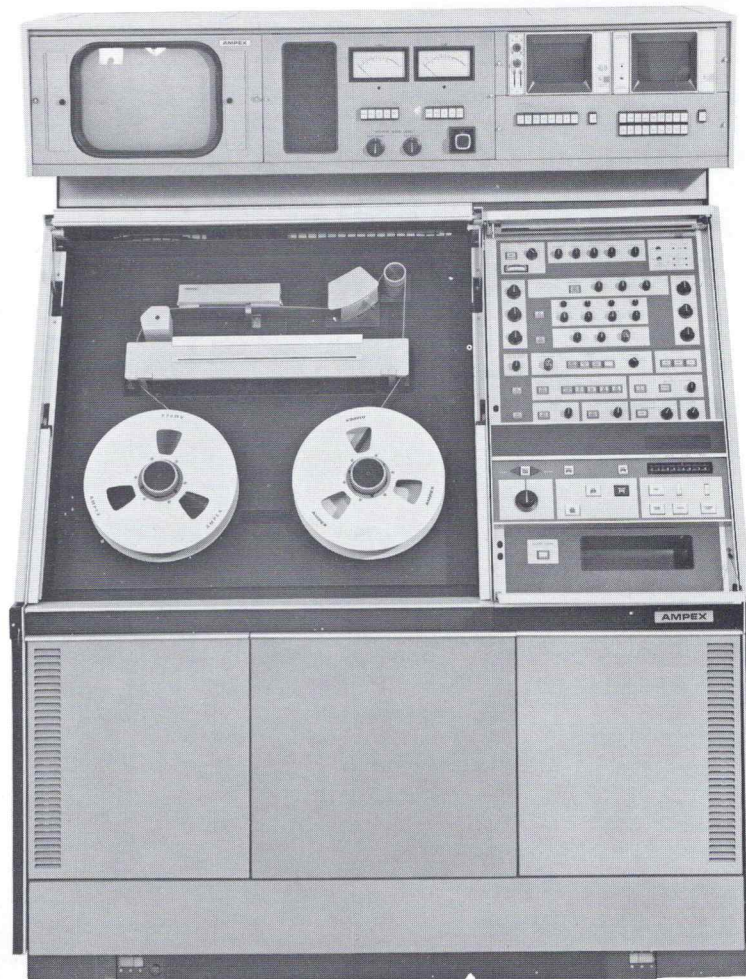


AMPEX

AVR-1 Automated Color Broadcast Teleproduction Recorder



AVR-1



The world's most advanced videotape recorder

A new generation broadcast recorder/reproducer that sets new highs in performance, stability, and operator convenience.

- Complexity is designed out of the AVR-1 . . . simplified controls are all located at the control panel.
- Instant video in 200 milliseconds . . . Just push the play button or "take" from a switcher.
- Fully automated selection of high-band, low-band color or low-band monochrome.
- New tape path makes the AVR-1 the easiest loading videotape recorder.
- The MARK XX videohead for greater performance and simple maintenance.
- Special vacuum columns keep tape tension constant, keep tape acceleration forces down, keep tape clean.
- New single shuttle control moves tape at continuously variable speeds in either direction.

- Completely universal by pushbutton selection: 525 lines or 625 lines . . . NTSC, PAL or SECAM color.
- Special indicator panel shows location and urgency of any malfunction.
- Complete monitoring of both video and audio. Four VTR operating parameters displayed at once on a scope.
- New no-adjustment servo provides more accurate recordings.
- Wider time base error correction range, ± 32 microseconds.

The industry's foremost videotape recording design engineers are at Ampex.

Since pioneering the technique in 1956, they have added major advances: color videotape recording, a direct color recovery system, electronic editing, high-band color recording and many others. The next important goal was to greatly sim-

plify operation and to automate where possible, while continuing to improve specifications and performance. These ambitious goals have been achieved with the AVR-1—an Ampex product that is new from the ground up. It is the most advanced, efficient, and *stable* videotape recorder ever produced.

Ampex engineers have designed complexity out of the AVR-1's operation and replaced it with operational simplicity. Tape transport design, control functions and placement, electronics—all are new. Dozens of controls that complicated the operation of earlier recorders are no longer necessary—they're gone. *Every* adjustment is made at the control panel, which can be removed and operated remotely.

The desirable result of these important design innovations is better utilization of operator skill and time and a major step forward in video technology.

The AVR-1 delivers these major cost-saving benefits:

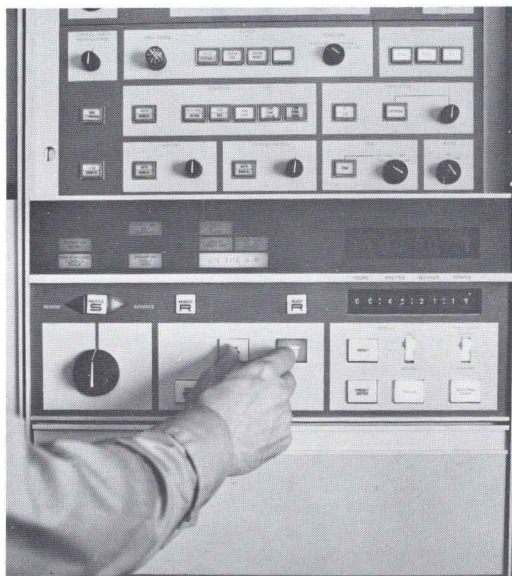
Simplicity and stability are the key operational features. Many of the AVR-1's unique innovations are aimed at a massive reduction in operation complexity. Above all, it is *stable*; absolutely no secondary adjustments are needed once the machine is set up. It may be operated completely from a remote location. It is no longer necessary for the machine to be attended continuously.

Playback is an automated function. The push of a button switches the AVR-1 to the proper broadcast standard and color system—NTSC, SECAM, or PAL. High Band, Low Band Color and Low Band Monochrome selection is fully automatic. Used as a video source, the AVR-1 is placed in the READY mode. The time correction range of $\pm \frac{1}{2}$ line, produces synchronous video instantly, the picture never breaks up. No pre-roll time is needed. To put it another way: instant video is now available from a quadruplex head broadcast videotape recorder.

Tape threading? With the AVR-1, "threading" is hardly the right word. A toe bar sets it up; the operator has both hands free. The vacuum guide at the video head retracts automatically. The operator flips *one* head cover, which opens almost 90 degrees. He just lays the tape across the path—from left to right, so that polyester, not the oxide surface, falls across the transport. The vacuum columns draw the tape in automatically; no threading needed here, either. A single spring-loaded knob controls shuttle speed in either direction, bringing it back to zero at a programmed rate when released. It, too, may be remotely operated.

Controls are logically grouped for simple set up. Drawing on years of close contact with broadcasters and their requirements, Ampex engineers have made every effort to group setup and operational controls logically and conveniently. All are under the waveform and "A" scope monitors, so that setup can be done quickly. Because settings remain stable, less attention is needed for dependable video quality over extended time periods.

All setup adjustments are made at the control panel. No need for access to the machine's electronics to monitor meter readings. The only adjustments for playback, once heads are optimized and bias is adjusted, are for non-standard recordings—and even these adjustments are made at the control panel. A warning light tells the operator when a non-standard setting may produce a non-standard recording.



Maintenance and trouble-shooting are quick and simple. A panel of warning lights, color-coded to indicate the degree of urgency, immediately tells the operator when any functional problem arises. He can decide at a glance whether to shut down, proceed, or turn to the waveform monitor or "A" scope for more specific information. The "A" scope can present 18 different waveforms, singly or in a group of four, with parameters selectable by pushbutton.

All maintenance and trouble-shooting are accomplished from the front of the machine. The AVR-1 can be backed up to a wall and left there. Roll-out drawers below the tape transport hold the circuit boards; the drawers interlock to prevent component damage. Trouble spots can be quickly pinpointed (even in closed-loop systems) through the operator's controls and the numerous check points provided. Another important maintenance benefit: the AVR-1's plug-in video head assembly is replaceable in *seconds*.

A sliding glass door and positive-air-pressure system protects the AVR-1's tape transport from contaminants. Gauges for the complete air system, including the rotary head bearing, capstan traction, and vacuum column systems, are just behind the operator's panel, which rolls easily forward for quick access.

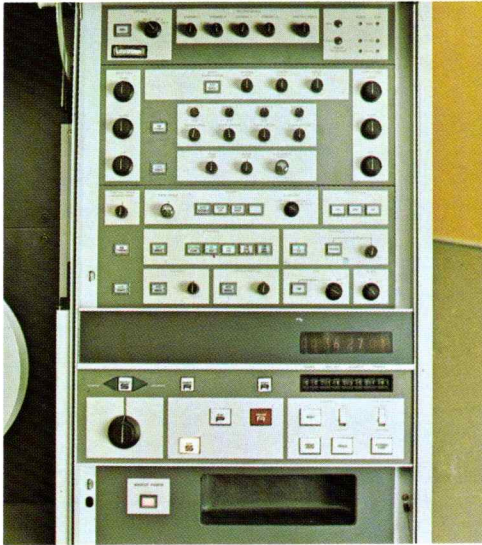
Traditional Ampex excellence and performance is very much a part of the AVR-1. In addition to the benefits mentioned above, it offers these significant advances in the state of the art: The AVR-1 has a revolutionary time-base error correction system that eliminates pre-roll requirements. It can also be purchased with optional auto tracking—meaning that tapes formerly considered lost because of poor control tracks can now be played back successfully.

The AVR-1 requires no processor; the recorder is continuously synchronous. Sync pulses are added from the station master generator. When breakup occurs, the AVR-1 recovers in 200 milliseconds by cutting to black, then restoring the picture in sync. No roll takes place.

The AVR-1 is truly universal. It permits standards selection, by either remote or local control, of NTSC, PAL or SECAM color; 525 or 625 lines; and high-band, low-band color or low-band monochrome recording. It produces both SMPTE-compatible and EBU-compatible tapes. Complete remote control of the input and output gain of the video, audio and cue channels is available. The differential gain of each video channel as well as the equalization can be adjusted remotely. In short, the entire machine can be set up and operated from a remote location. Each function is initiated or adjusted by DC voltage change, broadening the scope of control sources beyond all previous expectations.

The most outstanding quality of the AVR-1, however, is its unprecedented *stability*—its characteristic of holding adjustment settings over long periods of time. In combination with the many automatic features of the recorder, it makes the AVR-1 an unbeatable investment in terms of economy, operational flexibility, and dependability.

These are some of the features that make the AVR-1



LOGICAL CONTROL GROUPINGS:

All machine controls are at the control panel; there are no provisions for adjustments in the machine's electronics, and none are needed. Setup is simple and quick. Controls are grouped logically under the waveform and "A" scope monitors, at a convenient height. Primary controls are on a single small panel; secondary controls are grouped above and covered when not in use.



NEW ELECTRONIC TIMER:

Counts either elapsed time or time remaining in hours, minutes, seconds and frames. Thumb-wheels below the display panel permit the operator to enter any time factor before starting. The timer can be set to zero at any time, or can be used to freeze a reading that locates a position on the tape. It can also be used to trigger an external event. A remote timer display can also be provided for up to four locations.

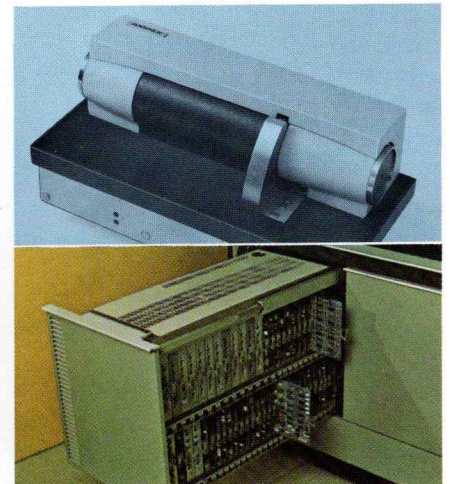
NEW VIDEO RECORD HEAD:

The Mark XX video head assembly is a new design, equipped with air bearings and a rotary transformer for long life, low noise, and high dependability. A new, single precision lock permits the operator to push a button and lift the Mark XX from its preamplifier sub-base, speeding up head replacement to a few seconds. The vacuum tape guide automatically withdraws from the head to make cleaning simple.



EASIEST TAPE LOADING EVER:

Instead of lifting the reels to shoulder level, the operator places them on the AVR-1 down at his waist level—a natural and comfortable maneuver. A touch of the toe bar with his foot sets up the complete loading and threading condition and leaves his hands free. The vacuum guide at the video head retracts automatically. He loads in one left-to-right movement—up, across, down—with no threading. He releases the toe bar, pushes the READY button, and it's done.

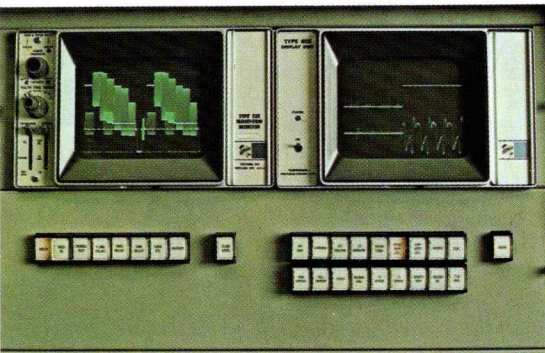


QUICK ACCESS TO CIRCUIT BOARDS:

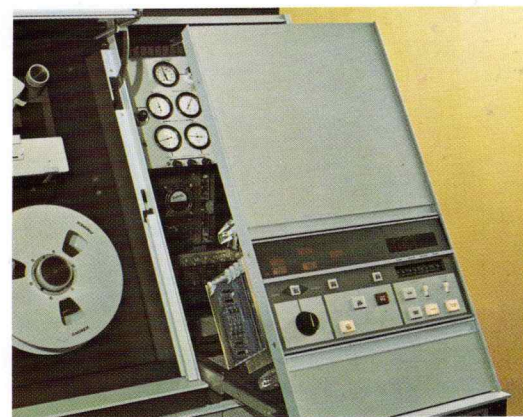
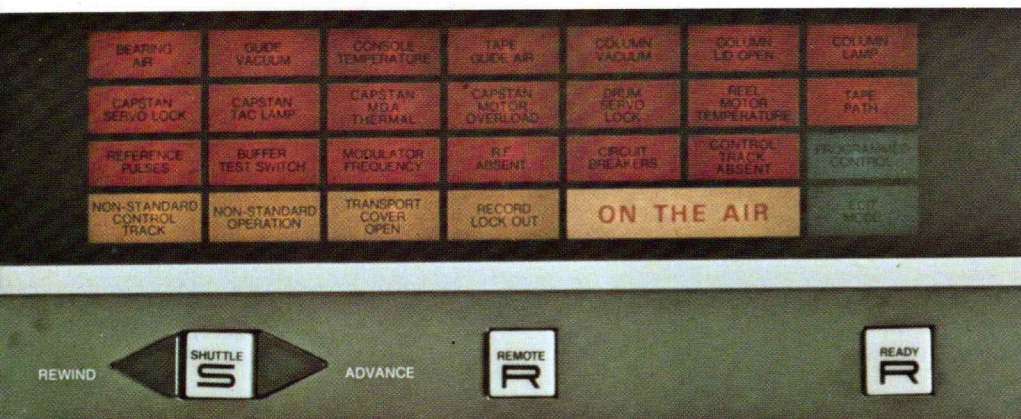
The large bays in the base of the AVR-1 contain printed circuit boards, power supplies, and air systems. Circuit boards, mounted at right angles to the drawer, are easily found and quickly replaced. The drawers are interlocked so that no two side-by-side drawers may be open at once, protecting circuit boards from damage when mounted on extender cards. There is never a need for access to the rear of the machine.

"A" SCOPE DISPLAYS 18 PARAMETERS:

The "A" scope monitor has two modes of operation. In the single-waveform mode, the operator selects one of 18 parameters for display. In the multi-waveform mode, RF envelope waveform, control track monitor head waveform, and velocity error waveform are always displayed, along with the operator's choice of one of 15 other parameters. Locating trouble sources is swift, easy.

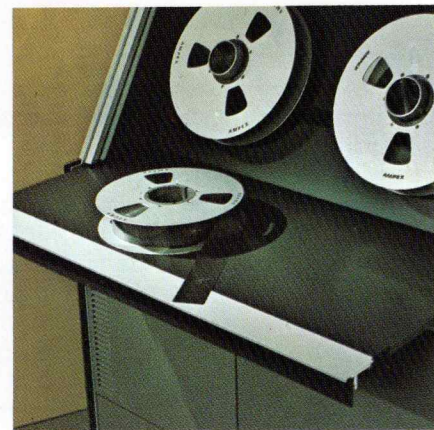


the world's most advanced video recorder:



EASY AIR SYSTEM ACCESS:

Gauges for the AVR-1's various air systems are conveniently mounted behind the operator's panel. The panel rolls forward easily for routine checking. Gauges monitor the air bearing system, vacuum columns, air-lubricated guides, and the capstan traction system. The actual systems are directly below the gauges, easily accessible from the front of the machine. Condensation from the air pressure system is caught and dissipated by a special evaporative system—to simplify routine maintenance.



PULL-OUT SPLICING TABLE:

A strong metal surface, normally out of sight beneath the tape transport section, pulls out to provide a convenient work surface for reel handling, editing or other tape-related functions.

WARNING LIGHT INDICATORS:

The AVR-1 provides a panel of warning indicators at the control panel that light up to indicate trouble spots. Lights are color-coded by degree of urgency to tell the operator instantly whether he should continue with the operation or shut down. The system also reminds the operator when the machine is set up for non-standard operation.

GLASS TRANSPORT COVER:

The tape transport of the AVR-1 is protected by a sliding glass cover. The AVR-1's air pressure system keeps the pressure beneath the glass slightly positive, protecting the mechanism and the tape from surface contaminants. The cover slides up and out of the way for loading.

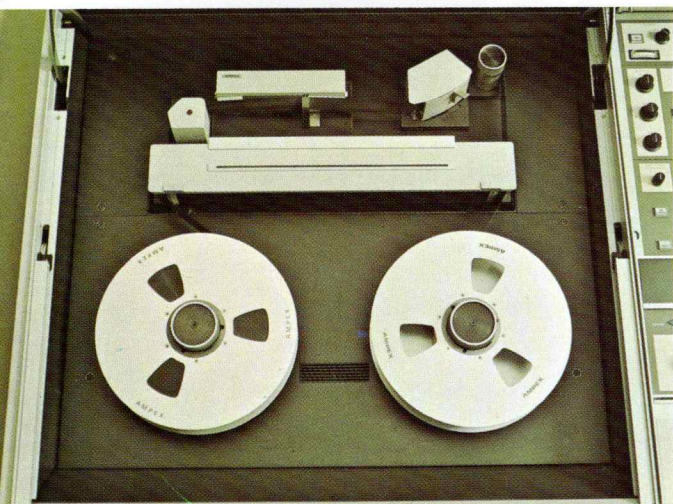
TOTALLY NEW TAPE TRANSPORT:

A unique advantage of the AVR-1's new tape transport is vacuum-controlled tape tension. Tape passes in front of two vacuum columns—one above each reel—and is drawn into

the columns during operation. When the control tape loop in either column shortens or lengthens, light falling on photocells causes the reel motor to accelerate or decelerate as needed. Accordingly, tape tension between the reels and the vacuum columns is held constant, in spite of tape speed and tape buildup on the reels. The operator can quickly accelerate the transport to maximum shuttle speed in either direction and maintain the speed for the full length of the reel if necessary, all by a single potentiometer control. The transport comes to a quick, controlled stop by means of dynamic braking. Shuttle speeds are substantially higher than for conventional recorders.

The vacuum system also maintains constant tape tension between the vacuum columns and the capstan, holding different tensions in leading and trailing columns to compensate for tape friction losses across the heads and idlers.

The capstan drive motor is a printed circuit, low inertia DC motor which gives the finest tape speed regulation available and permits quick response for stops and starts. The single potentiometer control activates the DC reel motors and the capstan motor simultaneously and is especially adaptable to remote operation. The vacuum system holds tape to the capstan to give it positive traction.



AVR-1 capability-extending options

COLOR ONE-LINE DELAY:

When a dropout occurs, this accessory senses it and replaces it in the proper phase with video and chroma information from the previous line. Color One-Line Delay operates at the video level of the signal and may be used universally on both 525 and 625-line standards.

VELOCITY COMPENSATOR:

The Ampex Velocity Compensator is fully automatic in operation. It corrects recorder playback to eliminate color hue banding caused by mechanical differences between recorders and compensates for other velocity errors. It promotes greater interchangeability of color tapes between all videotape recorders. The velocity compensator is essential to multiple operation color tape duplication.

NEW AUTO-CHROMA:

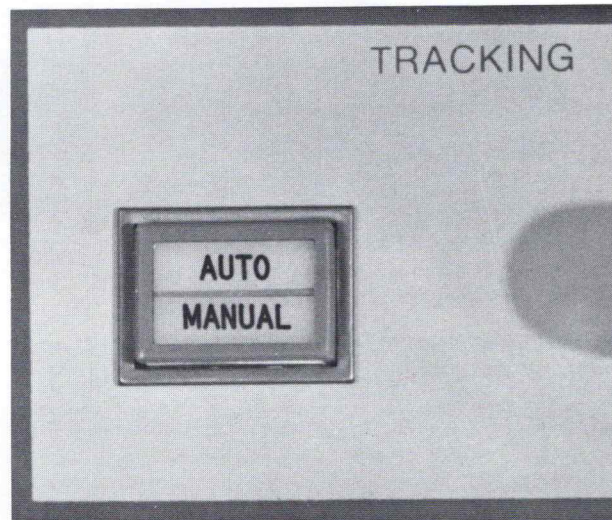
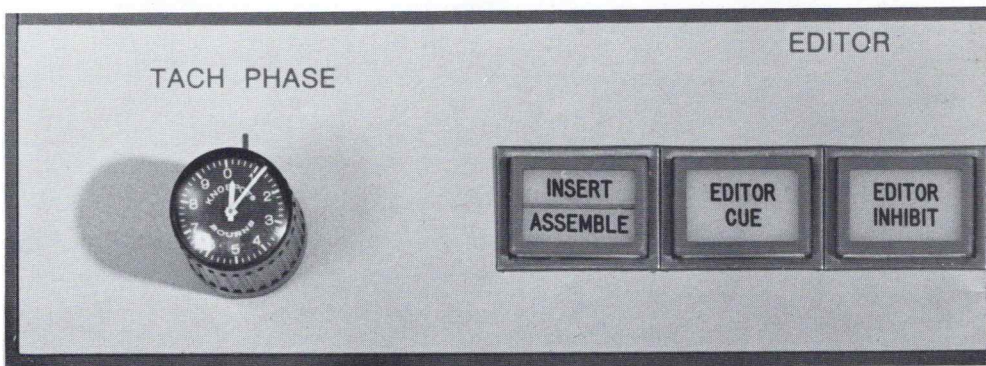
Auto-Chroma provides the AVR-1 with continuous, high-speed automatic control of color saturation from each of the four video heads — with no need for head adjustment. It assures tighter, quicker chroma control, reduced head banding, and reduced operator time when tapes made on other machines are played back. This new accessory extends color saturation control to a *line-by-line* basis as well as a *band-by-band* basis. The effects of chroma noise are appreciably reduced with this new approach to color saturation control.

ELECTRONIC EDITOR:

With the Ampex AVR-1 equipped with a Mark IV Electronic Editor, you can insert commercials or new scenes in previously recorded videotapes. Or, you can correct production errors with undetectable, electronically spliced inserts. The Editor is also useful in combining program material to make original tapes. For example, you can assemble a collection of "live" shots, prerecorded sequences and cuts from film or slides. The AVR-1 Editor has precision synchronism of audio and video editing. It is capable of inserting a single frame. Standard with the AVR-1 Editor is a cue tone

programmer and a rehearse mode, combining some Editec* functions with the editor. Editor setup is simple too; no extra test equipment or tape development is required. Editing of the audio and video channels can be done separately or together, as desired, and the incoming video does not have to be synchronous to the local reference, giving even greater editing flexibility. The Editor, when used with the Ampex RA-4000 Automatic Programmer, delivers the industry's most complete automatic editing system.

*TM Ampex Corp.

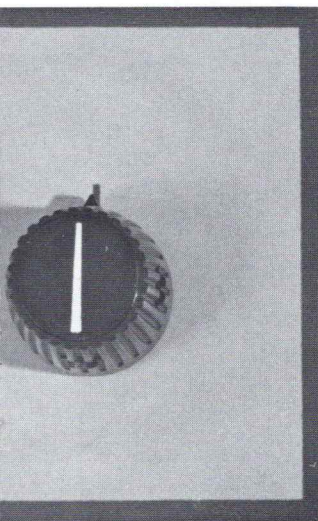




COLOR FRAMING ACCESSORY:

The Color Framing Accessory is used in combination with the AVR-1 Editor. This device matches the color phase of new video frames being edited into a tape to video frames already recorded. The resulting recording conforms in all respects to every SMPTE and EBU requirement.

AUTO TRACKING:



The Auto Tracking Accessory permits the machine to automatically position the tape during playback to optimize the signal level recovered from the tape. It positions the recorded video track beneath the head automatically, with no need for operator attention (*manual* adjustment by potentiometer is standard on the AVR-1). Automatic tip penetration control is standard on the AVR-1, but control can be switched to manual if desired.

COLOR PROCESSING ACCESSORIES:

The NTSC Color Processing Accessory provides the electronics necessary to recover the direct color video broadcast signal meeting NTSC standards; the Universal Color Processing Accessory includes electronics needed to recover the direct color of NTSC, PAL and SECAM broadcast signals.

VERTICAL INTERVAL TEST SIGNAL PROCESSOR (VITS):

This accessory preserves the signals inserted into the vertical interval by test purposes by broadcast networks to check the performance of "long haul" communication systems. The VITS processor preserves these signals by allowing them to be gated through, recorded and reproduced in their original condition.

CUE TRACK TIME CODE READOUT ACCESSORIES:

These accessories permit the frame-by-frame time code and the special address codes for the RA-4000 Automatic Programmer, recorded on the cue track, to be read out on the Electronic Tape Timer.

AVR-1 PRELIMINARY SPECIFICATIONS*

Video Response:					
MONOCHROME	DOMESTIC		INTERNATIONAL		
	525/60 Low-Band	525/60 High-Band	625/50 Low-Band	625/50 High-Band	
Bandwidth:	Flat to 4.1 MHz; -3dB at 4.5 MHz; Tolerance ± 1 db	Flat to 4.1 MHz; -3db at 4.5 MHz; Tolerance ± 0.5 db	Flat to 4.5 MHz; -3db at 5.0 MHz; Tolerance ± 1 db	Flat to 5.5 MHz; -3db at 6.0 MHz; Tolerance ± 0.5 db	
Signal-to-Noise Ratio:	45 db peak-to-peak video to rms noise on interchange basis (monochrome)	47 db peak-to-peak video to rms noise on interchange basis (monochrome and color)	42 db peak-to-peak video to rms noise on interchange basis (chrome)	44 db peak-to-peak video to rms noise on interchange basis (monochrome and color)	
Transient Response:	Maximum K-factor 2%	Maximum K-factor 1%	Maximum K-factor 2%	Maximum K-factor 1%	
(Utilizing 2T sine ² Pulse)					
Low Frequency Linearity:	1% Blanking to White (max.)	1% Blanking to White (max.)	1% Blanking to White (max.)	1% Blanking to White (max.)	
COLOR	DOMESTIC		INTERNATIONAL		
	525/60 Low-Band	525/60 High-Band	625/50 Low-Band	625/50 High-Band	
Signal-to-Noise Ratio:	40 db peak-to-peak video to rms noise on interchange basis	47 db peak-to-peak video to rms noise on interchange basis	—	44 db peak-to-peak video to rms noise on interchange basis	
Differential Gain:	Less than 2% Blanking to white	Less than 2% Blanking to white	—	Less than 2% Blanking to white	
Differential Phase:	Less than 2° at 3.58 MHz off tape	Less than 2° at 3.58 MHz off tape	—	Less than 2° at 4.43 MHz off tape	
Transient Response Max. K-factor					
2T sine ² Pulse	1%	1%		1%	
20T modulated sine ² Pulse	1%	1%		1%	
Moire:	-34 db maximum	-43 db maximum	—	-35 db maximum	
		(Color bars 75% amplitude, 3.58 MHz Subcarrier)	(Color bars 75% amplitude, 4.43 MHz Subcarrier)		
Physical Dimensions: Height: 70 inches Width: 58 inches Depth: 33 inches Temperature and Humidity: Temperature 0°C to 45°C Relative Humidity 10% to 90% (non-condensing) Power Input: Prime Power Frequency — 50 Hz and 60 Hz single phase Input Voltages — 105, 115, 125, 210, 230, 250V 115V Nominal 45 amps 230V Nominal 22.5 amps Video Signal Input (75 ohms impedance): Composite Video 0.7 to 1.8V p-p Sync 1.0V to 8.0V Blanking 1.0V to 8.0V H. Drive 1.0V to 8.0V Vertical Drive 1.0V to 8.0V Burst Key 1.0V to 8.0V Subcarrier 1.5V to 2.5V Video Signal Output (75 ohms impedance): Composite Video Signal 1.0V p-p Non-Composite Switches with the scanning standard between 0.7 and 0.714 volts		Audio Input Signal: Impedance 15000 ohms balanced or unbalanced bridging input Amplitude -24 dbm to +16 dbm Source Line, microphone, oscillator Audio Output Signal: Output Impedance Less than 30 ohms Peak Output Level +30 dbm Nominal Output at +8 dbm 0 VU on level meter Playback Equalization ANSI 2000/35 microsec. CCIR 0/35 microsec. Cue Input Signal: Impedance 15000 ohms balanced or unbalanced bridging input Amplitude +8 dbm nom., -10 dbm min. Source Line, microphone, cue tone, oscillator Cue Output Signal: Impedance Less than 30 ohms Peak Output Level +30 dbm Nominal Output at +8 dbm 0 VU on level meter Playback Equalization ANSI 2000/35 microsec. CCIR 0/35 microsec. Operation: Tape Speed 60 Hz 7½ ips or 15 ips 50 Hz 19.85 cm/s or 39.7 cm/s		Record Time—9600 Ft. Reel: 7.5 ips 256 min. 19.85 cm/s 246 min. 15.0 ips 128 min. 39.7 cm/s 123 min. Starting Time: From Ready Mode 200 millisc. From Stop Mode 1.0 sec. Stopping Time: 0.2 sec from record or playback mode Shuttle Speed: Adjustable 0 to 400 ips Transfer time—4800 ft: 2¼ minutes nom Tape Timer Accuracy: ± 1.0 sec. in 4800 ft. reel Audio Performance: Frequency Response (400 Hz reference) 15 ips ± 2 db 50 to 15,000 Hz 7.5 ips ± 2 db 50 to 10,000 Hz Signal to Noise Down 55 db from peak operating level Flutter and Wow 15 ips 0.10% rms max. 7.5 ips 0.15% rms max. Distortion (measured at 1 KHz) Operating Level less than 1% rms Cue Performance: Frequency Response (Hz Reference) 15 ips ± 2 db 60 to 10,000 Hz 7.5 ips ± 2 db 60 to 8,000 Hz A 30 db notch filter is provided at the control track frequency. Distortion (measured at 1 KHz) Operating Level 5% rms max.	
*Subject to change without notice.					

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