AMPEX

# AVR-1 Automated Videotape Recorder

# AVR-1... a unique standard for playback performance.

## Just load it... play it!

- **Shuttles tape faster** . . . saves time. Shuttle speed variable. Minimizes tape wear.
- **More automatic features** . . . playback is completely under automatic control.
- **Computer reliability** . . . digital techniques achieve long-term stability.
- **Simplified operation** . . . except for loading and threading, no operator attention is required.
- **"Instant" video** . . . fully-framed playback in less than 200 milliseconds.
- **Fully-synchronous operation** . . . switch and mix output like a camera.
- **Extended time-base correction range** . . . covers a full video line . . . 64 microseconds.
- **Plays and records 2-hour reels** . . . for greater program flexibility.
- **Easy threading** . . . waist-high loading and simplified tape path speed loading.
- **Compatible with all SMPTE and EBU standards** . . . NTSC, PAL or SECAM, Color or Monochrome, High-Low Band. 525 or 625.

From its vacuum-column constant tape tension system to its stable computer-type circuitry, the AVR-1 offers a range of capabilities that place it in a class by itself. Every design feature in this third-generation machine serves to save time and man-effort — and provide unequalled stability and dependability — in recording, playback, and post-production.

Probably no other capability of the AVR-1 is more dramatic than its tape handling efficiency. This machine literally saves hours (and consequently, many dollars) in production time because of its extremely fast shuttle speed (up to 400 ips) and its 200-millisecond lockup. In production operations with constant shuttling, previewing, editing, and double-checking, the time savings are dramatic. Yet despite these extremely high speeds, tape wear is held to a minimum by the vacuum tape handling system.

Automatic adjustments pay off in consistently superior recordings and playbacks. Even tapes recorded elsewhere that are unplayable on conventional recorders can be saved by the AVR-1, a fact that has been proved countless times in actual use.

Combine unequalled tape handling, automatic adjustment features, instant lockup, and extended time base correction in one VTR and you have defined the AVR-1, clearly the most advanced reel-to-reel recorder available.

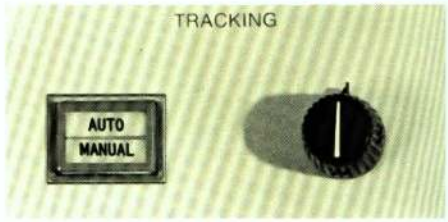
# AVR-1 automatic features:

**Fully-synchronous operation**
is automatic because reference sync, blanking and color burst are added to the AVR-1 output. No adjustments need be made to achieve full signal mixing capability.

No operator attention required.


**Playback standards selection**
is made automatically. Sensors detect proper standard to match recording on tape . . . HIGH BAND or LOW BAND color or LOW BAND monochrome.

No operator attention required.



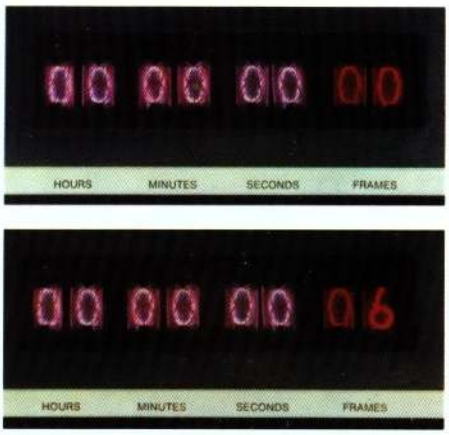

**Automatic tracking**
is another feature. In the AVR-1, head transducers track video precisely. Tapes play back even with poor or missing control tracks. A valuable option. Automatic tip penetration control is standard on the AVR-1.

No operator attention required.

**Precision Auto-Chroma**
provides fast, tight automatic equalization of all four head output channels. Chroma-noise effects are reduced to negligible levels . . . saturation banding is eliminated. Corrections are made both on a LINE-BY-LINE and BAND-BY-BAND basis.

No operator attention required.

## "Instant" Video




A fully-framed video output occurs in less than 6 frames, and these 6 frames can be easily cued by means of the AVR-1 timer display and a convenient knurled capstan grip.

Fully-framed playback in less than 200 milliseconds (350 in 625 line systems). Fast-response servos, the vacuum-column tape handling system and the time-base correction system combine to permit instantaneous lock-up. Reframing after a "wild switch" occurs in a fraction of a second with the upset itself being covered in black. Video is automatically restored when reframing is complete.

## Simplified operation

Far less operating controls are required in the AVR-1. Set-ups are quick and easy, saving valuable time. Optimum playback conditions are achieved by "zeroing" a few easily-accessed control knobs. Tape loading and threading take less time. Mark XX Video Head Assembly requires no adjustments.

## Extended time-base correction range

In the AVR-1, the conventional relationship between servo systems and time-base correction circuitry has been reversed. No longer must the time-base correction range be restricted to a narrow band inside servo correction range. Instead, the AVR-1 time-base correction circuitry operates in the center of a ±32 microsecond range, correcting all errors within the expanded range. AVR-1 servo systems control tape speed, tape tension, and headwheel positioning to bring everything into range for the AVR-1 time-base system. Upsets greater than ±32 microseconds are covered in Black as described under "INSTANT" start.

Many other features contribute to the playback superiority of the AVR-1. Long play time is provided by an ability to handle 16-inch diameter reels. Time-saving features include a high-speed tape search and rewind using a continuously variable shuttle control. To-the-frame cueing is aided by vacuum capstan with hand-grip.

First videotape recorder designed for the automated system, the AVR-1 can be completely computer-controlled with proper interface.

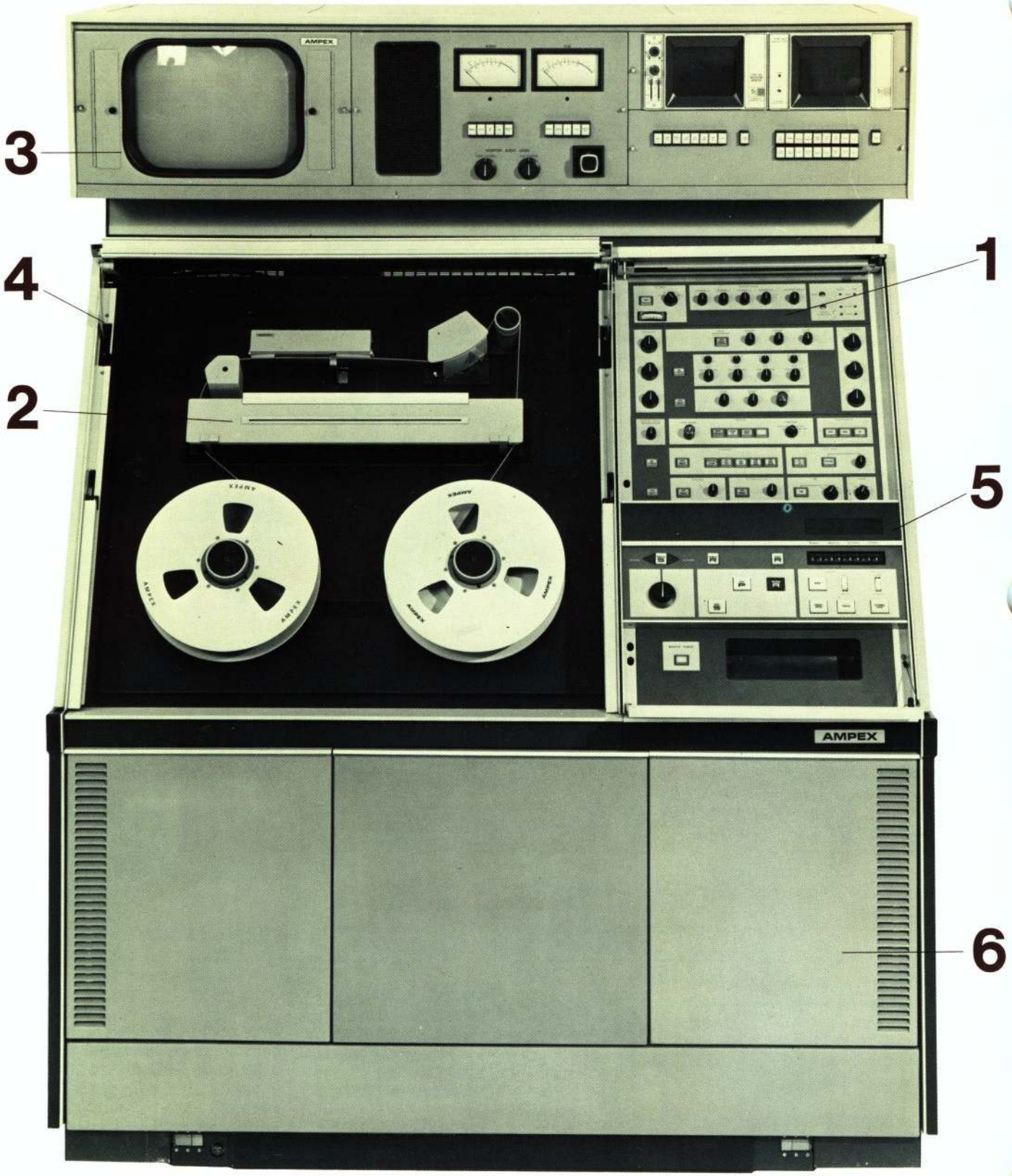
## Computer technology for unmatched stability

Computer-type circuitry used in the AVR-1 provides long-term stability and reliability, eliminating the need for frequent adjustments. Ampex experience in computer memory field has been applied to achieve a new order of videotape recorder dependability.

Long-term stability of the AVR-1 is the result of borrowing digital techniques from the computer industry. Integrated circuitry is used throughout the AVR-1. Extensive use of advanced digital techniques minimizes drift effects.

In the AVR-1, control adjustments once made, stay put. DC control voltages simplify adjustments. Optimum conditions are factory set to occur at a 0 volts level. By "zeroing" the detent-type control knobs on the secondary control panel, the AVR-1 is brought into a standard set-up. Set-ups are quick, accurate, and repeatable. Since adjustments to AVR-1 controls will generally be those needed to match "non-standard" tapes, the AVR-1 can be considered as *always being set-up properly.* The digital techniques used also provide an easy method of achieving computer control of set-up — once interfaces are installed.

# The AVR-1 in detail



## 1

Logical AVR-1 control groupings provide for the ultimate in operating flexibility. Remote control capability is standard with primary transport and video controls; optional for most of the secondary controls. The secondary group of controls is divided into three sections: a setup panel, a standards control panel, and a maintenance panel.

## 2 Superior tape handling

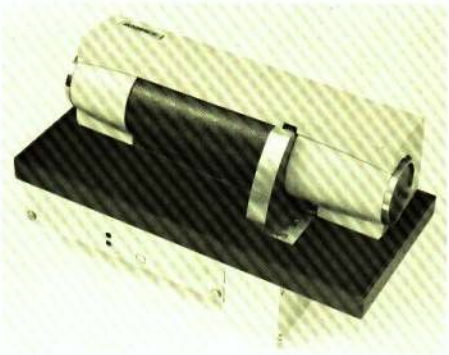
All the outstanding tape handling features of the AVR-1 contribute to its efficiency as both a production and playback machine. Tape is moved faster, more accurately, and with less friction and wear than on conventional transports.

- **Vacuum columns** maintain constant tape tension, isolate reels from capstan.
- **Air guides** provide air-foil on which tape rides at all times.
- **Vacuum capstan** makes pinch roller unnecessary, eliminates tape slippage.
- **Plexiglas transport cover** and positive air pressure contribute to longer tape and head life.
- **Tape shuttle control** moves tape rapidly in either direction, returns to zero when STOP or PLAY pushbutton is actuated.

## 3 Complete monitoring and test facilities

Included in the AVR-1 complete battery of monitoring and test facilities are:

- **Professional pulse-cross video monitor,** standard on the AVR-1.
- **Optional Tektronix color monitor** package including vector display.
- **Dual waveform monitors** for display of both signal and system waveforms.
- **Audio monitoring** including a high-quality acoustic-suspension speaker/amplifier with audio and cue level controls.
- **Warning light system** on primary control panel.
- **Test system** in machine electronics drawer.



## 4 Mark XX video head assembly

On the AVR-1, a single precision lock permits the operator to push a button and easily lift the Mark XX video head from its preamp sub-base. Equipped with air bearings and a rotary transformer, the Mark XX offers long life, high dependability and low noise performance. The vacuum guide automatically withdraws from the head for tape threading and for easy cleaning.

## 5 Accurate tape timing

Dependable, repeatable accuracy in tape timing is provided by the Ampex Electronic Tape Timer. Counting either elapsed or remaining times in hours, minutes, seconds, and frames, this timer can freeze a reading to locate a position on tape. Thumbwheels permit the operator to enter an address and shuttle to that point on the tape. Up to four remote displays can be driven by the electronic timer.

## 6 Integral sync generator

The sync generator performs two basic functions. First, it adjusts the output timing of the recorder to match other video sources in the television station. Second, it reduces the number of timing feeds to the machine, requiring inputs only of composite sync and subcarrier. Sync generator outputs include composite sync, burst key, horizontal drive, vertical drive, and subcarrier. For PAL 625-line operation, it also requires a 7.8 kHz (1/2H) signal and provides an output retimed 7.8 kHz signal.

# AVR-1 accessories

Capability extending options add versatility to the AVR-1 regardless of whether the machine is used in an automated system or operated manually.

## Automatic tracking control

A must for automated operations, this accessory automatically positions the tape during playback so that recorded video tracks are centered under the headwheel transducers. It eliminates need for operator tracking adjustment, simplifies playback operations, and provides a means of playing tapes with poor or missing control tracks. A control-track inhibit feature is provided to by-pass the recovered signal of a poor control track. A manual tracking control is provided as standard equipment on the AVR-1.

## Velocity compensator

Fully automatic, the Ampex Velocity Compensator is another essential for automated operations. Line-by-line color hue banding caused by mechanical differences between recorders is eliminated by Ampex Velocity Compensator operating on a line-by-line basis. It promotes greater interchangeability of color tapes and is essential in multiple generation color tape duplication.


## Auto-chroma

Continuous, high-speed automatic equalization of color saturation from each of the four video headwheel transducers is provided by the new Auto-Chroma accessory. Correcting on a line-by-line basis as well as a band-by-band basis, the new Auto-Chroma assures quicker, tighter chroma control, an appreciable reduction in chroma-noise effects, and reduced head banding in playback. A must for automated operations.

## Color drop-out compensator

Operating at video level this accessory senses drop-outs and replaces them with video and chroma information from the previous line. Both saturation and hue are correctly matched to the line in which the drop-out occurs. Another quality-control accessory for both automated and manual operations.

## Ampex time and control code readout

This accessory permits the frame-by-frame time code and special address cues for the RA-4000 Automatic Programmer (when recorded in the cue track) to be read out on the electronic tape timer.

## AVR-1 Editec*

This accessory provides normal editor functions such as single-frame insert capability, the use of cue tones, and a rehearse mode to improve edit accuracy. In addition, the Editec provides for movement and verification of cue tone placement prior to editing. All functions are controlled from a single panel, and editing procedures are simple, yet accurate to the nearest frame.

Entrance and exit cues can be shifted as much as one-half second ahead or back by the Editec. The cues on a tape may be erased either singly or all at once at the option of the operator.



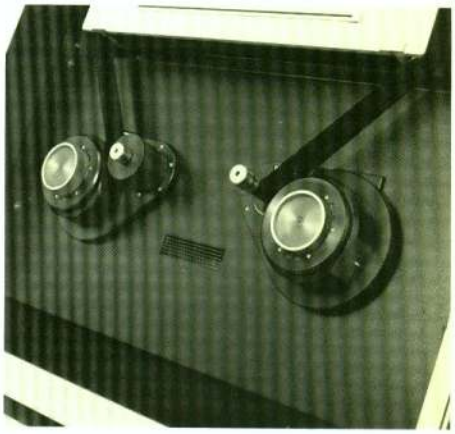
*TM Ampex Corporation

## Color framing accessory

Matches color phase of new video frames to tape phase. Edits so made conform to all SMPTE and EBU requirements.

## Vertical interval test signal processor

Gates VIT signals through so they may be recorded and reproduced in original condition.

## Spool adapter

This time-saving accessory offers several useful capabilities. With the adapter, ACR-25 cassette tapes can be played on the AVR-1 without prior rewinding onto a standard reel. Cassette tapes can be recorded, edited, or previewed on the AVR-1, which is especially valuable when the ACR-25 is being used on-line for playback of spot commercials and program material. It is also an ideal tailoring device for the duplicator who produces multiple copies of spot commercials.

The spool adapter kit is easily installed in the field, and the adapter itself can then be slipped over either reel hub. By using two spool adapters, both the supply and takeup spools from an ACR-25 cassette can be removed and mounted on an AVR-1.

All industry-standard 3-minute spools may be mounted on the adapter, as well as the unique 6-minute ACR-25 spool.

# AVR-1 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 4.5 MHz; −3db at 5.0 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: | 46 db peak-to-peak video to rms noise on interchange basis (monochrome) | 46 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 (monochrome) | 43 db min. peak-to-peak video to rms noise on interchange basis (monochrome and color) |
| Transient Response: | Maximum K-factor 1% | Maximum K-factor 1% | Maximum K-factor 1% | Maximum K-factor 1% |
| | (Utilizing 2T sine² Pulse) | | (Utilizing 2T sine² Pulse) | |
| Low Frequency Linearity: | 2% Blanking to White (max.) | 2% Blanking to White (max.) | 2% Blanking to White (max.) | 2% 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: | 42 db peak-to-peak video to rms noise on interchange basis | 46 db peak-to-peak video to rms noise on interchange basis | — | 43 db peak-to-peak video to rms noise on interchange basis |
| Differential Gain: | 3% max. Blanking to white | 3% max. Blanking to white | — | 4% max. Blanking to white |
| Differential Phase: | 3° max. at 3.58 MHz off tape | 3° max. at 3.58 MHz off tape | — | 4° max. at 4.43 MHz off tape |
| Transient Response Max. K-factor 2T sine² Pulse | 1% | 1% | | 1% |
| Moire: | −32 db min. | −40 db min. | — | −36 db min. |
| | (Color bars 75% amplitude, 3.58 MHz Subcarrier) | | (Color bars 75% amplitude, 4.43 MHz Subcarrier) | |

**Physical Dimensions:**
Height: 78 inches
Width: 58 inches
Depth: 33 inches
Weight: 2200 pounds

**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 |
| 7.8 KHz Ref. 625 PAL | 1.0V to 8.0V |

**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 0 VU on level meter +8 dbm
Playback Equalization
ANSI 2000/35 microsec.
CCIR 0/35 microsec.

**Cue Input Signal:**
Impedance 15000 ohms balanced or unbalanced bridging input
Amplitude −24 dbm to +16 dbm
Source Line, microphone, cue tone oscillator

**Cue Output Signal:**
Impedance Less than 30 ohms
Peak Output Level +30 dbm
Normal Output at 0 VU on level meter +8 dbm
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 millisec.
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 (400 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.

Your investment in Ampex equipment yields maximum returns when operated and maintained by Ampex-trained people. Live and videotape training courses available worldwide. For brochure, write Ampex Technical Institute, 401 Broadway, Redwood City, California 94063, U.S.A.

AMPEX
Ampex Corporation Audio-Video Systems Division
401 Broadway
Redwood City, California 94063

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