

AMPEX

VR-1200B high-band color/monochrome videotape recorder

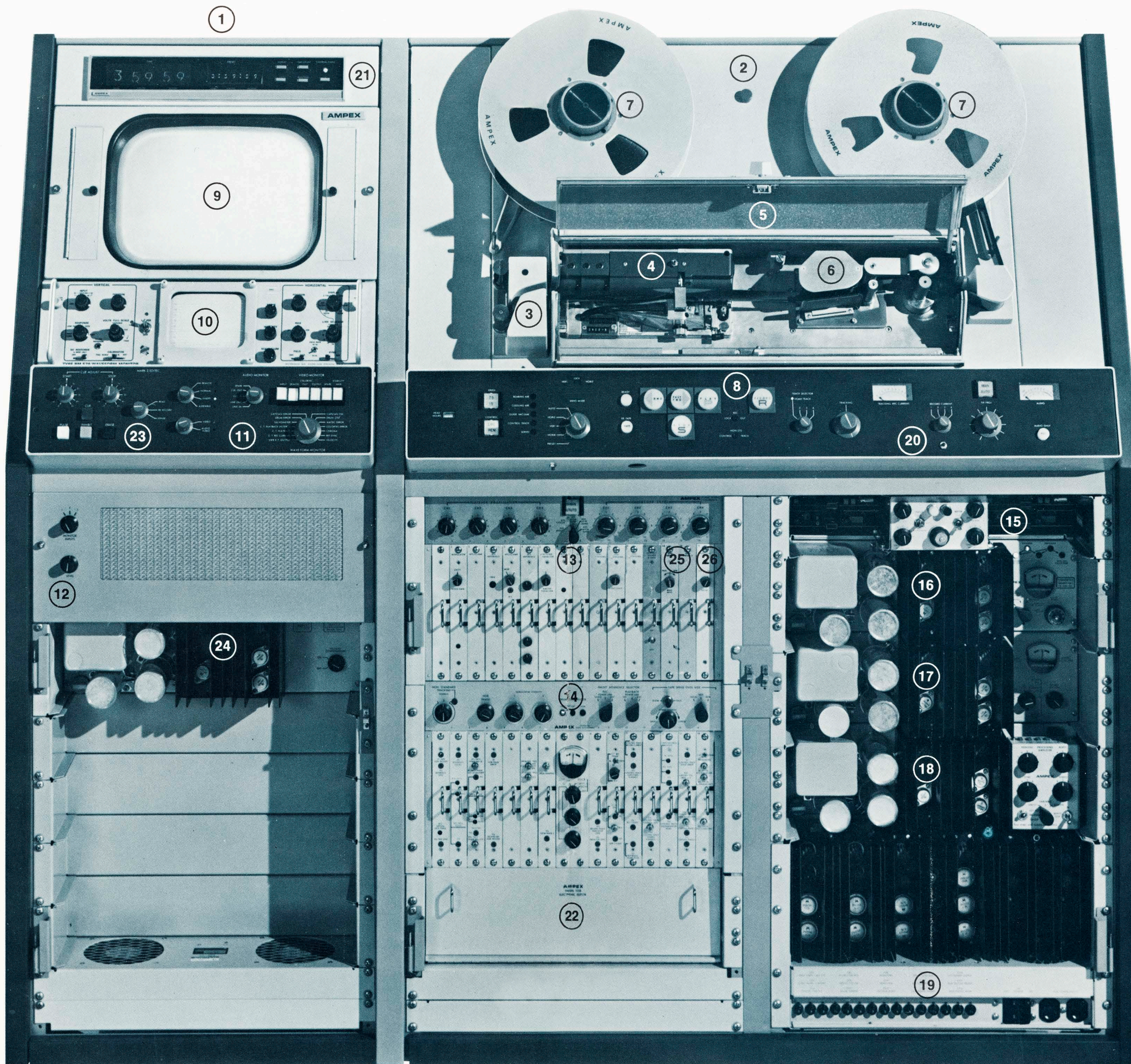


VR-1200B offers superior high-band color with full production capability

The Ampex VR-1200B provides the top color/monochrome performance available today — exceeded only by the VR-2000 Series. It offers complete television production capability, including multiple generation copies (four or more generations) and electronic editing in color or monochrome.

Fully solid-state design contributes greatly to the VR-1200B's modest size, increased reliability and low power consumption. It incorporates many of the same features as the VR-2000 Series VTR's: switchable high/low-band, color/monochrome operation; zoned operating controls; meaningful tally lights; new Video Head Optimizer (optional); new non-scratch video erase head; Mark Ten rotary transformer video head; complete built-in picture, audio and waveform monitoring.

- Built and tested as a complete color/monochrome system . . . with integral Amtec* and Colortec* unit
- Improved K-Factor, signal-to-noise, bandwidth, differential phase and gain . . . reduced moire
- New monitor console configurations allow more convenience . . . provide additional space for optional equipment
- Optional new Video Head Optimizer permitting video head optimization in 5 to 15 seconds.
- Improved signal system offers extended bandwidth, plus additional adjustment capability
- Accepts all Ampex accessories on a "plug-in" basis, including Electronic Editor, Mark II Editec*, Velocity Compensator, Auto-Chroma and One-Line Delay
- Optional Electronic Timer gives accurate elapsed-time or remaining-time reading on illuminated display
- Other new features: non-scratch video erase head, easily removed head cover, front access power supply with reset-type circuit breakers, precision centering reel hold-down knobs



VR-1200B... performance features

The standard VR-1200B is built and tested as a complete color/monochrome system. It incorporates a Colortec direct color recovery unit, Intersync* servo and Amtec time element compensator. High-band or low-band, color or monochrome operations are instantly switchable.

On high-band, extended bandwidth provides more room for color and an adequate guard band. This dramatically increases signal-to-noise ratio and reduces moire. Overall performance is expressed as K-Factor — a measurement of an electronic transmission system's performance in terms of frequency, phase and transient response. On the VR-1200B, an extremely good K-Factor of better than 1.5% is typical.

To meet a broad range of user performance requirements the VR-1200B is offered in many different configurations, all the way from a simple monochrome unit to a complete international color system for PAL and SECAM standards. It is compatible with all previous 4-head recorders.

1 monitor configurations

For added flexibility, the new VR-1200B is offered in two different physical configurations: in an overhead assembly or in a side-mounted console. The monitor package can be positioned in a "sidecar console" on either right or left side of the recorder — or, in an independent console separate from the recorder. The photo at the left shows a "sidecar" configuration.

2 proven video transport

Proven reliable, the VR-1200B transport is the ultimate refinement of a basic design in use in over 3000 Ampex videotape recorders throughout the world.

3 new non-scratch video erase head

An entirely new kind of video erase head has been designed for the VR-1200B — to eliminate the problem of tape-scratch caused by head-to-oxide erase methods. This novel erase assembly eliminates all possibility of scratch lines because it contacts tape on the non-oxide (base film) side *only*. It erases through the base film with no loss of erase efficiency. This new head retains the selective erase capability required by the optional Electronic Editor system.

4 Mark Ten video head

All VR-1200B's are equipped with the rotary transformer, transistor preamp Mark Ten Video Head. This outstanding video head is equipped with air bearings, and is interchangeable with all other Mark Ten transverse head assemblies in Ampex VTR's (simply by changing plug-in preamp modules). The transistorized preamp used in the VR-1200B *does not* require an FM test facility for alignment.

Rotary transformers in the Mark Ten assembly provide long-life, trouble-free and low-noise coupling to built-in transducers. Unitized transducers permit close matching of individual "dimes" on any head drum — for similarity of electrical and mechanical characteristics. Transducers utilize long-life AlFeSi pole tip material, plus special "high efficiency" construction to provide high output. This, coupled with the transistor preamp, results in extremely good signal-to-noise and low differential noise.

5 new, removable video head cover

The video head cover on the new VR-1200B is held down by only *one* captive thumbscrew. When this screw is removed, the cover easily lifts off to allow complete access to components mounted on the transport main deck.

6 new audio head assembly

The new audio head assembly on the VR-1200B offers improved audio performance, and has a convenient flip-down shield to facilitate head cleaning.

7 new reel hold-down knobs

New design of VR-1200B reel hold-down knobs permits rapid tape loading and unloading. They are precision-centering with positive lock action — and prevent distortion when using plastic reels.

8 functionally grouped controls

Functionally grouped operating controls and tally lights on the VR-1200B are designed for smooth, convenient, safe and error-free operation. There are no controls in illogical sequence, in awkward corners or recesses. Meaningful tally lights indicate either CAUTION (yellow), OK (green) or WARNING (red). Other fail-safe features include: complete front panel servo control, safety-interlocked operating controls, and front panel control/metering of all four tracking modes.

9 built-in picture monitor

The VR-1200B in a "sidecar console" configuration has a built-in Conrac 14-inch picture monitor with expanded pulse cross display and dual 525-625 standard. The overhead monitor assembly contains a Conrac General Purpose 14-inch monitor.

10 built-in waveform monitor

Complete waveform monitoring is available on the new VR-1200B, via the built-in Tektronix RM529 Waveform Monitor.

11 new monitoring switch panel

This new panel (and associated circuitry) offers complete monitoring capability of pictures, audio and important internal

VTR functions. It includes a built-in video distribution amplifier to drive external picture monitors. Unit shown has combined monitoring/editing panel.

12 audio monitor controls

13 signal system controls

Signal system adjustments are conveniently located (and protected from inadvertent handling) behind a flip-down panel in the cover door. They permit compensation for improperly recorded tapes.

14 improved Intersync servo

15 audio cue track controls

16 Colortec direct recovery unit

17 Amtec compensator

18 Ampex processing amplifier

19 new system power supply

This new power supply has easily reached, reset-type circuit breakers and convenience outlets that are available from the front of the recorder.

capability-extending options

20 new video head optimizer

Now available as an option is the new Ampex Video Head Optimizer. This unique pushbutton device is so fast and easy to use that it is now practical, for the first time, to optimize video heads before each recording. Optimization with the VHO takes a mere 5-15 seconds, as compared to 15 minutes or more required by previous methods. Use of the convenient new VHO guarantees peak performance on EVERY VR-1200B video tape.

21 electronic timer

A new, sophisticated Electronic Timer is now available as an option on the VR-1200B. The all-electronic unit replaces mechanical timers. It provides accurate, easily read ELAPSED TIME or TIME REMAINING on its illuminated readout and allows VTR control of other station/studio equipment. The new timer reads correct time for all line standards and both tape speeds; it automatically switches itself to give correct time at whatever standard or speed is selected. It also has an easy-to-use ZERO RESET. Preset provisions permit automatic "turn-on" or "turn-off" of other VTR's, film chains, slides, cue lights, etc. Its illuminated readout can be remoted to up to four locations — allowing station-wide cueing and timing from tape.

22 Mark III Electronic Editor

23 Mark II Editec program unit

Any VR-1200B can be factory or field equipped with the optional Ampex Electronic Editor and Editec system. The Electronic Editor permits electronic splicing of program material, color or monochrome. Scenes can be assembled or substituted at will — without discontinu-

ity of video, audio or sync. Editing is accomplished with pushbutton ease at either 7½ or 15 ips.

Addition of the Mark II Editec system to the VR-1200B allows assembly or substitution of material. It offers precise editing control. Simultaneously, it can activate other equipment or cue performers "on camera."

24 automatic velocity compensator

VTR velocity errors may result from differences in head tip velocities that are caused by variances in female guide height and recording radii. Velocity errors appear as color hue banding in pictures. This banding is effectively nullified by adding the optional Ampex Velocity Compensator to the VR-1200B. Operating in conjunction with the Amtec compensator and Colortec unit, the Velocity Compensator is designed for fully automatic, unattended operation. It is a particularly vital option for color production and duplication.

25 auto-chroma

Color videotape operation presents a greater tape interchangeability problem than monochrome. Addition of the optional Ampex Auto-Chroma to the VR-1200B greatly minimizes these problems. It provides fast, continuous and automatic control of color saturation from each of the four video heads — without the need for head readjustment. For playback of tapes made on other machines, Auto-Chroma assures tighter, faster control of chroma, reduced head banding and minimal need for operator attention.

26 one-line delay

The optional One-Line Delay can be used with the VR-1200B to compensate for video tape dropouts. When a dropout is sensed by the unit, the previous good line (stored in the One-Line Delay) is substituted for the bad line.

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VR-1200B specifications†

PHYSICAL

Dimensions

Height: 60½" (SCM) 76" (OHM)
 Width: 63" (SCM) 42½" (OHM)
 Depth: 30" (SCM) 30" (OHM)
 Weight: under 1000 pounds

Temperature and Humidity

Temperature: 0°C to 45°C
 Humidity: 10% to 90% R.H.

Power Requirements

Input Power: 117V ±10%, 60Hz, 25A (taps at 105-115-125V), or 230V ±5%, 50Hz, 12.5A (taps at 210-220-230-240-250V)
 Convenience Outlets: four 115V outlets fused for 16A total

Signal Requirements

Video Composite Signal: 0.5 to 1.5V p-p composite, sync negative, EIA-FCC standard or 625 line standard 75 ohm unbalanced

Sync Input: 2 to 8V p-p, 75 ohm

Video Output Signals

Composite Program Line Output: resistive 75 ohms impedance ±1%, unbalanced; switchable for 1.0V or 1.4V p-p

Non-composite Program Line Output: resistive 75 ohms impedance ±1%, unbalanced; switchable for 0.7V or 1.0V p-p

Utility Sync Output: 75 ohms impedance ±5%, unbalanced at a fixed level of 4.0V p-p

Audio Input

Program Line: high impedance balanced

bridge for 500/600 ohm line at -10 dBm level min., or, high impedance unbalanced (15K)

Cue Line: high impedance balanced bridge (15K) at -10dBm min. with built-in microphone

Audio Output Signals

Balanced or Unbalanced: 600 ohms at +8dBm (0V) level; maximum output level +16dBm

Unbalanced Monitor: high impedance to feed external monitoring amplifier 1.0V rms

Cue Output Signal: 600 ohms balanced or unbalanced at +8dBm nominal level

OPERATING

Tape Speed

- a. 7½ or 15 ips (60Hz operation)
- b. 19.85 or 39.7 cm/sec (50Hz operation)

Recording Time 14" (35.6 cm), 7200' Reel

15 ips: 96 minutes

7½ ips: 192 minutes

NOTE: Normally supplied with 12½" (31.75 cm) reels

Picture and Sound Separation

15 ips: 18½ frame sound leads

7½ ips: 37 frame sound leads

Stability

Jitter (disturbance greater than 1Hz): ±0.075 μsec

Drift (disturbance less than 1Hz): ±0.1 μsec

Geometric: less than ±0.15 μsec during replay of a recording on the tracks selected to produce maximum error

Standards

Six position switch provides 525 low-band monochrome, 525 low-band color, 525 high-band monochrome/color, 625 low-band and 625 high-band monochrome/color. Sixth position is provided for test purposes.

AUDIO

Bandwidth

15 ips: ±2dB, 50Hz to 12kHz

7½ ips: ±2dB, 50Hz to 10kHz

Signal-to-Noise Ratio

53dB below 3% distortion at 400Hz

Flutter and Wow

15 ips: 0.10% rms

7½ ips: 0.15% rms

NOTE: Measuring components from 0.6 to 250Hz

CUE TRACK

Bandwidth

15 ips: ±2dB, 60Hz to 5kHz

7½ ips: ±2dB, 60Hz to 4kHz

NOTE: Response has a 16dB notch at 240Hz on 60Hz systems; 16dB notch at 250Hz on 50Hz systems

Flutter and Wow

Same specifications as audio channel

VIDEO RESPONSE (VR-1200B/3)

†Subject to change without notice.

Monochrome	Domestic		International	
	525/60 Low-Band	525/60 High-Band	625/50 Low-Band	625/50 High-Band
Bandwidth:*	Flat to 4.1MHz; -3dB at 4.5MHz; Tolerance ±1dB	Flat to 4.1MHz; -3dB at 4.5MHz; Tolerance ±0.5dB	Flat to 5.5MHz; -3dB at 6.0MHz; Tolerance ±1dB	Flat to 5.5MHz; -3dB at 6.0MHz; Tolerance ±0.5dB
Signal-to-Noise Ratio:	45dB peak-to-peak video to rms noise on interchange basis (Monochrome)	46dB peak-to-peak video to rms noise on interchange basis (Monochrome and Color)	42dB peak-to-peak video to rms noise on interchange basis (Monochrome)	43dB peak-to-peak video to rms noise on interchange basis (Monochrome and Color)
Transient Response:	Maximum K-Factor 2% (Utilizing 2T sine ² pulse)	Maximum K-Factor 1.5%	Maximum K-Factor 1.5% (Utilizing 2T sine ² pulse)	Maximum K-Factor 1.5%
Low Frequency Linearity:	2% Blanking to White (max.)	2% Blanking to White (max.)	2% Blanking to White (max.)	2% Blanking to White (max.)
Rise Time:	0.13 μsec maximum (0.02 μsec or less rise time on input pulse)	0.12 μsec maximum	0.12 μsec maximum (0.02 μsec or less rise time on input pulse)	0.10 μsec maximum

Color	525/60 Low-Band	525/60 High-Band	625/50 Low-Band	625/50 High-Band
Signal-to-Noise Ratio:	40dB peak-to-peak video to rms noise on interchange basis	46dB peak-to-peak video to rms noise on interchange basis	—	43dB peak-to-peak video to rms noise on interchange basis
Differential Gain:	Less than 4% Blanking to White	Less than 4% Blanking to White	—	Less than 4% Blanking to White
Differential Phase:	Less than 4° at 3.58MHz off tape	Less than 4° at 3.58MHz off tape	—	Less than 4° at 4.43MHz off tape
Maximum Color Phase Error (due to Differential Phase):	2° maximum (75% Color Bars, 3.58MHz Subcarrier)	2° maximum	—	2° maximum (75% Color Bars, 4.43MHz Subcarrier)
Moire:	—	-40dB maximum (Color Bars 75% amplitude, 3.58MHz)	—	-28dB maximum (Color Bars 75% amplitude, 4.43MHz Subcarrier)

* Bandwidth determined by corresponding Bode filter.

VR-1200B zoned controls for convenient, safe, error-free operation

SET-UP AND TEST MONITORING ZONE

The uppermost zone of the VR-1200B's front panel contains all transport and test monitoring functions — functions that are most often required before, after or between "live" operational periods with the VTR. Once a tape has been loaded on the transport, and key functions checked, the operator is free to leave this zone and concentrate on primary and secondary controls.

PRIMARY CONTROL ZONE

All frequently used operating controls are clustered in the highly accessible primary zone of the VR-1200B. Unless there is a deficiency in the tape, the operator never has to leave this zone. Primary controls are arranged in a logical sequence so minimal operator training is required. They incorporate safeguard interlocks, meaningful tally lights, monitor switching and controls needed for electronic editing.

SECONDARY CONTROL ZONE

Immediately below the zone of most frequently used controls, a secondary zone contains controls needed only when adjustment is required to play an improperly recorded tape — or for cueing and dubbing. Video signal system and audio cue controls in this zone are located behind flip-down panels to discourage inadvertent knob "twiddling." Audio monitor adjustments are accessible from the front panel.

MAINTENANCE ZONE

The bottom section of the VR-1200B, behind hinged doors, contains all adjustments needed for VTR alignment, periodic maintenance or emergencies. Test points and set-up adjustments are easily reached; unitized, printed circuit construction permits use of small extender boards to save floor space. Normally, this zone is never entered by operating personnel. The only entry that might be needed would be to make corrections for non-standard tapes.



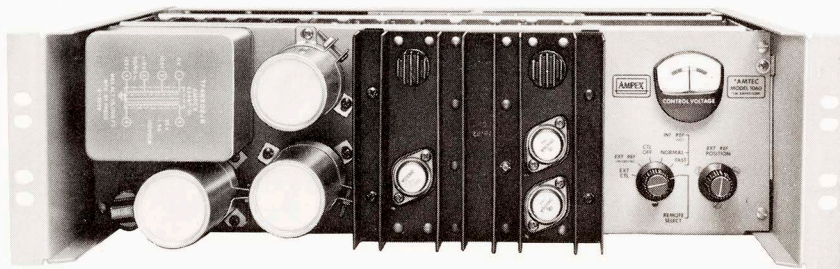
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Amtec* Time Element Compensator

*For eliminating distortions
in picture geometry,
and for greatly extending
the utility of your
videotape recorder*



Description

The Amtec Time Element Compensator provides line-by-line compensation for timing errors in the composite video signal. In this way, the Amtec System eliminates picture geometric distortions from all causes: skewing, scalloping, quadrature, essing and waterfall. Additionally, the Amtec System extends the tolerance for error in video head alignment and effects instant correction at splice points—even when the two tapes are from recorders of differing head alignments. When a videotape recorder is equipped with the Intersync* Television Signal Synchronizer, the Amtec System will provide a rock-steady picture lock with the external sync. When certain trick effects are desired, provision is made for altering the geometry of the picture. The entire equipment, complete with power supply, is contained in a single chassis requiring only 5¼" of rack space. The unit may be installed in less than two hours; slide-out design permits easy access to circuit cards, yet the mounting arrangement is rugged enough for mobile applications.

Features

525/625 operation standard • 405/525/625 operation optional • External bypass relay eliminated • No fixed delay line • Greatly improved video response • All solid state construction, for low power consumption, high reliability • Only two operating controls • Slide-out chassis mounting and plug-in circuit cards for easy maintenance • Circuit card extender provided • Built-in power supply

Operating Controls

Only two controls appear on the front panel; all other adjustments are pre-set and rarely need adjustment.

Function Selector—This six position control selects one of the following modes:

EXTERNAL CONTROL: A special test position, and where an external waveform may be applied to modulate the variable delay line for special effects.

EXTERNAL REFERENCE: Selects station sync as correction reference when the Intersync System is used. Provides for simultaneous geometric correction and time base stabilization.

CONTROL OFF: At this point the Amtec operates as a unity gain amplifier only.

NORMAL: Normal geometric correction.

FAST: An emergency position when video contains an abnormal amount of hum or similar deformity.

REMOTE SELECT: Provides selection of operating modes remotely when used on VR-1200 and VR-2000.

Phasing Control—A variable control used when the Function Select Switch is in the "External Reference" position. It adjusts timing of the system output signal to coincide with the external reference.

Theory of Operation

AMTEC accomplishes line-by-line compensation of timing errors in the composite video signal by sampling the timing accuracy of the signal once each horizontal interval, with respect to a stable timing reference. An internal AFC controlled oscillator is used as the refer-

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ence signal when the unit is operated in the NORMAL or FAST modes, and external station sync is used when operated in the INTER-SYNC mode. The instantaneous time difference between the sampled and reference signals is converted to a proportional voltage which controls the delay time of a voltage controlled delay

line in the video signal path. The unit is inserted between the demodulator and the processing amplifier of the videotape recorder. It has unity gain with high performance characteristics necessary to pass color or monochrome video unaltered, except for time-base correction.

Specifications

Environmental

Operating temperature: 0 to 50°C

Power Requirements

Power input: 117 volts, 50 or 60 cps, 50 watts maximum

Input Impedances

Video: 75 ohms $\pm 2\%$ unbalanced

External reference sync: High impedance, bridging

External control: 10,000 ohms (approx.), bridging

Output Impedances

Video: 75 ohms $\pm 2\%$ unbalanced

Horizontal trigger: 75 ohms $\pm 2\%$ unbalanced

Error waveform monitor: High impedance

Input Signal Levels

Standard video: 1.0 volt peak-to-peak, composite sync negative

External reference sync: 2.5 to 8.0 volts peak-to-peak, negative

External control: 1.8 volts peak-to-peak produces
1.0 microsecond $\pm 5\%$ peak-to-peak change of delay

Output Signal Levels

Standard video: 1.0 volt peak-to-peak, composite sync negative

Horizontal trigger: 2.0 microseconds wide, negative pulse,
4.0 volts peak-to-peak into 75 ohms load

Error waveform monitor: 1.0 volt peak-to-peak (equivalent to
1.0 microsecond $\pm 5\%$ peak-to-peak error)

Video Performance at Mid-Delay

Video gain: Fixed at unity $\pm 5\%$, output terminated in 75 ohms

High frequency response: Flat ± 0.25 db to 6 mc,
relative to 100 kc

Frequency response variation: 0.5 db maximum at 3.58 mc,
and/or 4.43 mc through a 1.0 microsecond delay range

Low frequency tilt: 2% maximum on 50 cps square wave
with composite sync and blanking

Transient response: K factor is $\frac{1}{2}\%$ maximum with 0.2 μ sec.
H.A.D. sine-squared pulse

Differential gain: 1% maximum at 3.58/4.43 mc,
independent of duty cycle

Differential phase: 0.5° maximum at 3.58/4.43 mc,
independent of duty cycle

Signal delay: 3.0 μ sec, $\pm 5\%$

Time Base Compensation Performance

Total range of correction: 1.0 μ sec minimum for any
combination of geometric and jitter errors

Remaining repetitive

geometric timing error: .02 μ sec peak-to-peak, or less, with
0.5 μ sec peak-to-peak input error containing no false sync
timing or differential velocity error

Equivalent positional noise: 0.006 μ sec rms maximum, with
E-E simulated 40 db signal-to-noise ratio and input
sync pulse rise time of 0.25 μ sec, or less

Remaining low frequency picture jitter and short term timing drift

with Inter-Sync: 0.01 μ sec peak-to-peak, maximum

**Total remaining timing error with Inter-Sync
(including all error components) as referred**

to external sync source: ± 0.03 μ sec, or less

Physical

Height: 5 $\frac{1}{4}$ inches (13 cm)

Width: 19 inches (48 cm)

Depth: 17 $\frac{1}{8}$ inches (43 cm) less mounting brackets

Weight: 35 pounds

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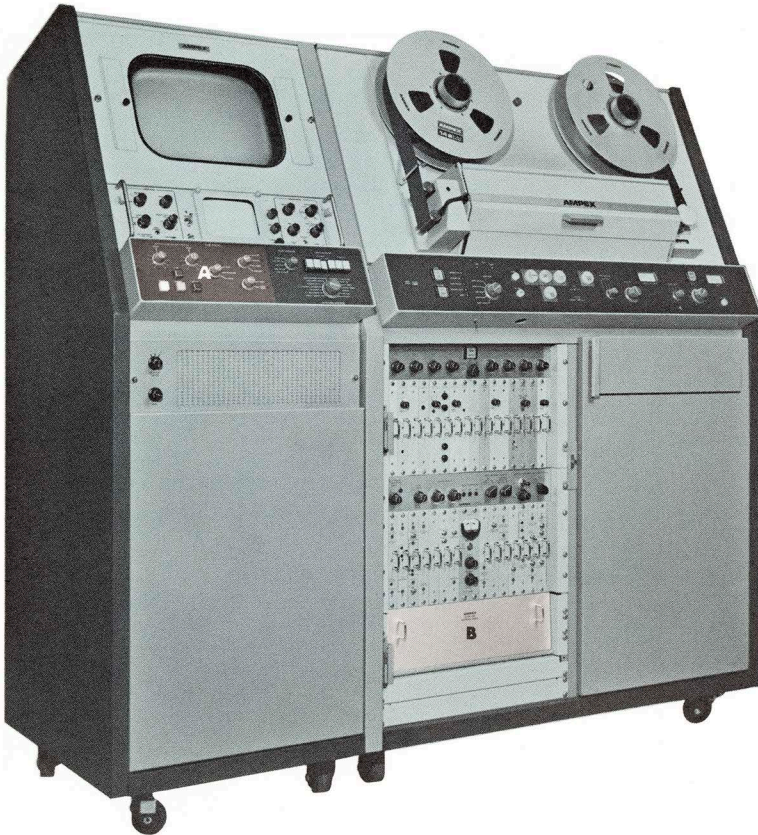
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AMPEX

Mark II Editec* System

*offers teleproduction
capability at low cost
when used with the Mark III
Electronic Editor...
permits precise timing control
of editing in either color
or monochrome*



Mark II Editec System as installed on the VR-1200B: (A) is Mark II Editec Control Panel mounted in same panel as VTR monitor switching; (B) is Mark III Electronic Editor. Editor also has one electronics card inside for program functions of the Mark II Editec.

Features

- With the Mark II Editec System, unwanted scenes may be selectively replaced at any point in a program tape
- Commercials may be replaced within their precise, original time period
- Scenes may be sequentially added in the production of a new program
- Segments as short as one-half second (or less) may be assembled in sequence
- External cueing devices can be programmed to give visual or aural warning of starts, recording periods, stops
- Start and stop points may be accurately shifted to coincide with a visual or audio cue
- Music may be recorded on the audio track and video splices made to the rhythm of the music

Description

The Mark II Editec System is designed for use on VR-1200 or VR-2000 Series VTR's. It combines all editing and programming functions on one easy-to-use operating panel. It allows precisely timed, undetectable electronic splices to be made by the Electronic Editor—both beginning and ending recorded segments.

Operation:

The Mark II Editec System utilizes the cue track on a program tape to mark the beginning and ending of segments or inserts. Edit markings are made with pre-recorded cue tones that are later converted to start/stop pulses for the Electronic Editor. Its control panel has seven controls that are used in combination with various Electronic Editor modes. These controls are: **mode selector, start cue adjust, stop cue adjust, cue, pulse, inhibit** and **erase** pushbuttons. These controls are all arranged for simple, error-free operation of the Mark II Editec System.

Complete systems for closed-circuit and broadcast television

Controls and Functions

MODE SELECTOR	<p>READ MODE — reproduces pre-recorded cues that alternately generate start and stop pulses for the Editor.</p> <p>RE-RECORD MODE — erases pre-recorded cues and records new cues that may be shifted in position by the Cue Adjust Controls. Start and stop pulses are generated in this mode.</p> <p>ERASE MODE — erases pre-recorded cues without generating start/stop pulses.</p>
START CUE ADJUST	Advances or delays start cues from their nominal position.
STOP CUE ADJUST	Advances or delays stop cues from their nominal position.
CUE	Records single tone burst, when pressed, in all modes of the Mark II Editec System. Pushbutton flashes each time it is pressed or when a cue tone is reproduced from tape.
PULSE	Alternately generates start and stop pulses, when pressed, to simulate a cue reproduced from tape. May be used to program the Editor in the absence of tape cues.
INHIBIT	When pressed, this switch lights and generation of start/stop pulses to the Editor are prevented. This switch also lights when servo is not locked.
ERASE	When pressed, this switch lights (if MODE SELECTOR is in the READ position) and cues are erased. This switch remains continuously lighted when the program unit is in RE-RECORD or ERASE modes, and the Editor is in PLAY or RECORD modes.

Specifications

Television Standard:

both 25 and 30 frame systems

Tape Speed:

15 inches per second, standard; 7.5 inches per second with component changes

Insert Duration:

two seconds minimum, no limit to maximum

Cueing Accuracy:

nearest frame

Cue Movement Range:

continuously variable from zero to plus or minus at least one-half second

Minimum Cue Spacing:

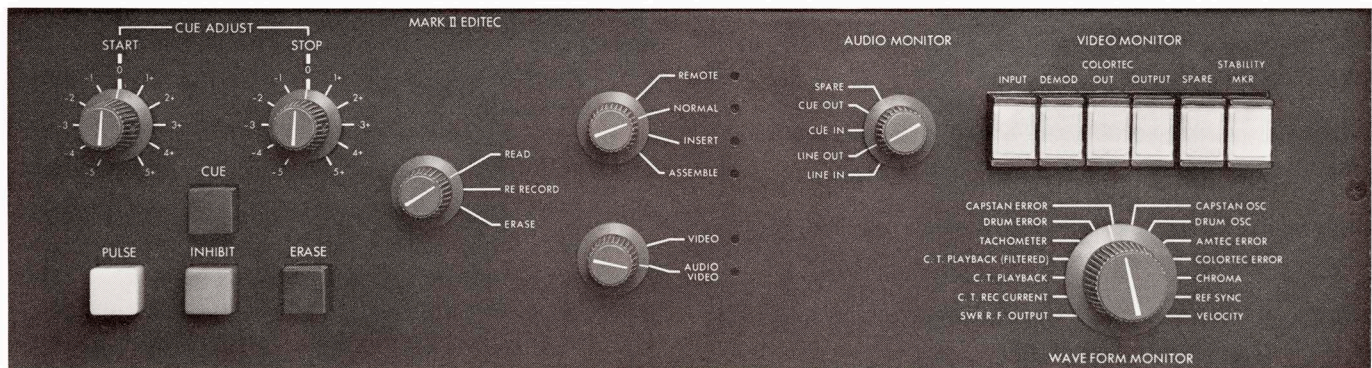
two seconds (insert mode)

Cue Tone Frequency:

4 kHz, nominal

Catalog Number

1805181 — Specify VTR: VR-1200A, VR-1200B, VR-2000, VR-2000B



Combined panel on VR-1200B — Mark II Editec Controls on the left, VTR monitor switching on the right.

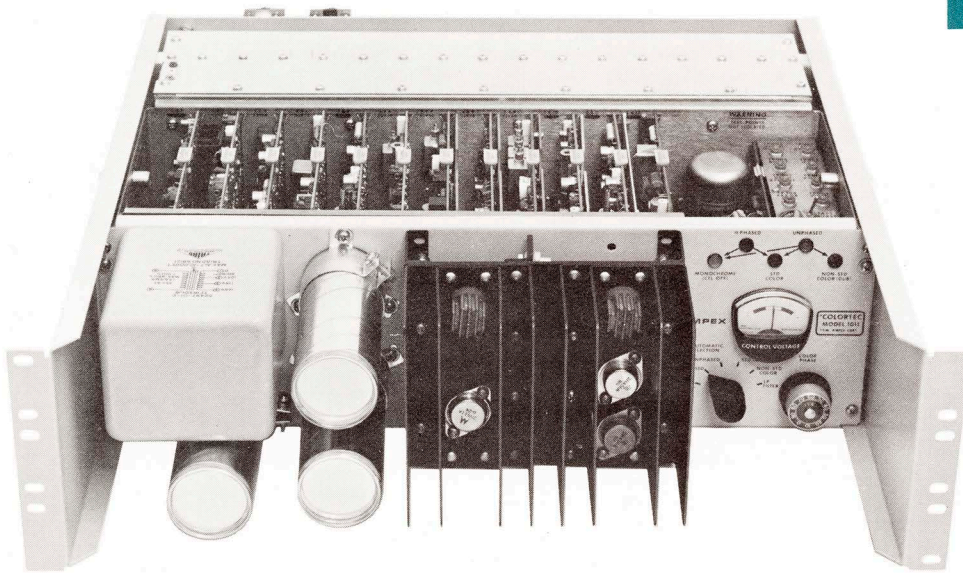
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AMPEX

Model 1011 Colortec*

*compact, direct
color recovery system
for Ampex VR-2000
and VR-1200 Series
videotape recorders*



Features

- Standard NTSC output signal . . . with subcarrier interlace and full bandwidth
- Extremely simple operation . . . only two operating controls
- Fully automatic "signal seeking" operation as well as manual operation . . . indicator lamps show when unit is operating automatically
- Burst output may be derived from either original tape burst or station subcarrier . . . choice of burst may be split between playback and standby
- Novel 360° error detector circuit guarantees correct color phase under all conditions . . . even when correction range of the unit is exceeded
- Includes provisions for reproducing non-standard color tapes (dubs of earlier encode-decode or heterodyne playbacks) . . . automatically recognizes these signals
- Built-in low pass filter permits monochrome reproduction of color signals
- Compact, slide-drawer construction requires only 5¼" of vertical space in VTR

Description

Colortec is a compact, direct color recovery system applying ultra-precise time-base compensation to tape signals — so resultant color output signals are highly stable. VTR's equipped with Colortec record and reproduce 525/60 FCC NTSC color signals with

full bandwidth luminance and chrominance, with standard subcarrier interlace. Signals are synchronous, line-by-line, to an external 3.58MHz subcarrier signal source. Colortec works as an integral part of VR-2000 and VR-1200 Series recorders; it can be *factory* or *field* installed (recorders in these Series are prewired for Colortec). Alignment controls are factory-set and normally need no adjustment. Should alignment be needed, however, the entire unit slides out on rails to allow rapid, convenient access to plug-in boards and set-up adjustments. Each unit is furnished complete — including power connector, color circuit boards for processing amplifier, subcarrier test detector and test extension board.

Operation

Colortec provides line-by-line compensation of timing errors in composite color signals. It samples burst phase of the signal at each horizontal interval, with respect to an external 3.58MHz signal. Instantaneous phase difference between sampled and reference signals is converted to a proportional voltage which adjusts the delay time of the voltage control delay line in the video signal path. Colortec is inserted between the Amtec* compensator and processing amplifier of VR-2000 and VR-1200 Series recorders.

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Colortec Operating Controls

There are two principal controls on the Colortec front panel, a FUNCTION SELECTOR and COLOR PHASE CONTROL. Directly above these controls, a control voltage meter indicates phase corrective action. Five indicator lamps above the meter show Colortec's mode of operation. A secondary control, located behind the front panel, selects burst signal source (either burst from tape or station subcarrier generator).

FUNCTION SELECTOR (6-POSITION SWITCH)

Control Off:

Removes control voltage. Unit operates as a unity gain amplifier only.

H-Phased:

Automatic mode. System is fully synchronous with external sync and subcarrier frequencies. Unit automatically selects appropriate mode for monochrome or standard color signals.

Unphased:

Automatic mode. System operates unphased to horizontal reference. Unit automatically selects appropriate mode for monochrome, standard color and non-standard color signals. This mode provides full compatibility with tapes dubbed from earlier non-NTSC color equipment of heterodyne or decode-encode type.

Standard Color:

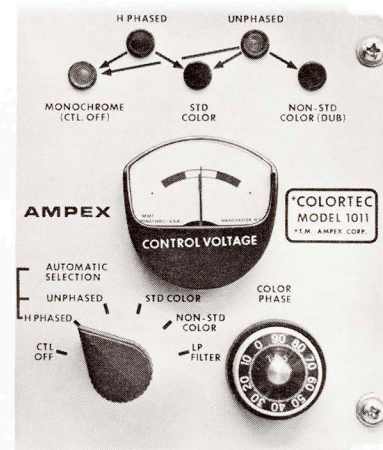
Manual mode for reproducing non-standard color signals. System not phased to horizontal reference.

LP Filter:

Removes control voltage and inserts low pass filter in video path. Removes all subcarrier components from color signal, thereby converting color to monochrome.

COLOR PHASE CONTROL

Sets the color phase of the system's output signal with respect to a 3.58MHz reference. This control is used in fully synchronous operation for matching color phase with that of external signal sources.



Colortec Control Panel

Colortec Specifications

PHYSICAL CHARACTERISTICS

Dimensions:

5.5" x 19" x 17.5" (13cm x 48cm x 44.5cm)

Operating Temperature:

32° to 122°F (0° to 50°C)

Input Power:

117 VAC, 50 or 60Hz, 60 watts continuous

INPUT SIGNALS

Standard Video (FCC NTSC 525 Line):

1.0V p-p, composite, sync negative, 75 ohms $\pm 2\%$ unbalanced

External Horizontal Reference:

2.5V to 8.0V p-p, negative, high impedance bridging; may be horizontal drive or reference sync

External Reference Subcarrier:

1.0V to 4.0V p-p, 75 ohms $\pm 2\%$ unbalanced

Vertical Gate:

4.0V p-p, negative, high impedance bridging

Proc Amp H Drive:

4.0V p-p, negative, 75 ohms $\pm 2\%$ unbalanced

OUTPUT SIGNALS

Standard Video (Two):

1.0V p-p, composite, sync negative, 75 ohms $\pm 2\%$ unbalanced

Delayed Horizontal Reference:

2.0 microseconds wide, negative pulse, 4.0V p-p into 75 ohms $\pm 2\%$ unbalanced

Color Burst:

0.286V p-p into 75 ohms $\pm 2\%$ unbalanced

Error Waveform Monitor:

1.0V p-p (equivalent to 280 nanoseconds $\pm 5\%$ p-p error) into high impedance load

VIDEO PERFORMANCE AT MID-DELAY

Video Gain:

Adjustable to unity with outputs terminated in 75 ohms

High Frequency Response:

Flat ± 0.25 dB to 6MHz, ± 0.4 dB from 6MHz to 7MHz (relative to 100kHz)

Low Frequency Tilt:

2% maximum on 50Hz square wave, with composite sync and blanking

Transient Response:

K factor is $\frac{1}{4}\%$ maximum with 0.2 microsecond H.A.D. sine-squared pulse

Differential Gain:

0.4% maximum at 3.58MHz, between 10% and 90% A.P.L.

Differential Phase:

0.5% maximum at 3.58MHz, between 10% and 90% A.P.L.

Signal Delay:

3.4 microseconds $\pm 10\%$

TIME-BASE COMPENSATION

Total Range of Correction:

280 nanoseconds

Total Remaining Timing Error:

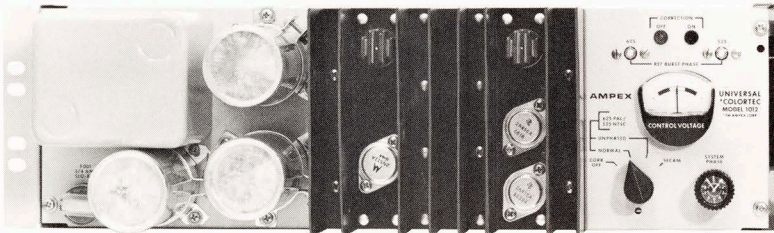
± 2.5 nanoseconds at the end of the burst period (including all components of error referred to external subcarrier source)

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AMPEX

Model 1012 Universal Colortec*



FCC-NTSC, PAL and SECAM compatible direct color recovery system . . . for outstanding videotape recording/reproduction of composite color signals . . . with full bandwidth, ultra-precise time base compensation, automatic color/monochrome mode change-over.

Features

- Output signals can be either 525-line/60-field FCC-NTSC or 625-line/50-field PAL or SECAM
- Output for NTSC or PAL formats are derived from either original tape burst or reference color subcarrier
- Output color phase is adjustable for NTSC and PAL formats . . . settable in EE or Record modes
- Servo lockup is rapid, fully synchronous in PAL or SECAM color . . . with or without edit pulses
- Automatically generates appropriate 12.5, 25 or 30 Hz pulses for electronic editing
- Unique memory circuitry provides immunity to transients which may be caused by monochrome inserts in PAL or SECAM color programs
- Prevents hue error in PAL signals by compensating for 90° burst-phase switching angle errors in signal to be recorded
- Allows full use of Ampex Intersync* Synchronizer and Amtec* Compensator

Description

Ampex Universal Direct Color Recovery System (Universal Colortec) transfers full bandwidth luminance and chrominance signals from video tape to output cables — with ultra-precise time base compensation and subcarrier interlace for outstanding

color/monochrome reproduction. The system operates with any of the accepted world color standards: FCC-NTSC, PAL or SECAM. It provides essentially flat response to 6 MHz, excellent transient response and minimal low frequency tilt. System mode changes from color to monochrome are automatically sensed via presence of color bursts. Universal Colortec is complementary to Ampex Intersync* Synchronizer and Amtec* Time Element Compensator. A system incorporating all three provides extremely stable signals, stabilized line-by-line to an external 3.58 or 4.43 MHz subcarrier source.

Novel circuitry in the Universal Colortec allows rapid, fully synchronous servo lockup in PAL or SECAM operation — with or without 12.5 Hz edit pulses. Normal editing and splicing procedures for color (and monochrome) may be used in systems equipped with Ampex VR-2000 and Universal Colortec — plus Electronic Editor and Editec*. Videotape editing is accomplished with pushbutton ease, only requiring tapes with the correct edit pulses for the type of standard being used.

Universal Colortec mounts in standard 19" (483 mm) racks and requires only 5.25" (133 mm) of vertical rack space. Slide-out construction permits rapid access to plug-in boards and internal adjustments. Alignment controls are factory set and normally need no adjustment. Ampex furnishes each unit complete with power connector, extension board and instruction book.

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Specifications

Input Signals

Video: composite color signal, sync negative, 1.0 volts peak-to-peak and 75-ohms unbalanced impedance; conforms to the following standards:

1. 525-line/60-fields FCC-NTSC
2. 625-line/50-fields PAL
3. 625-line/50-fields SECAM

External Reference Subcarrier: 3.58 or 4.43 MHz, 0.5 to 4.0 volts peak-to-peak and 75-ohms unbalanced impedance

External Horizontal Reference: horizontal drive or composite sync, 1.5 to 6.0 volts peak-to-peak; negative going polarity and high-impedance bridging

Vertical Gate: vertical burst gating signal from Processing Amplifier; high-impedance bridging

H Drive: gating signal from Processing Amplifier; 75-ohms unbalanced impedance

Output Signals

Video: two identical outputs, 1 volt peak-to-peak composite, sync negative, and 75-ohm unbalanced impedance; conforms to the following standards:

1. 525-line/60-fields FCC-NTSC
2. 625-line/50-fields PAL
3. 625-line/50-fields SECAM

Color Burst: for Processing Amplifier; 75-ohm unbalanced impedance:

1. NTSC — 0.286 volt peak-to-peak
2. PAL — 0.30 volt peak-to-peak

Delayed H Reference: negative pulse for Intersync Servo, 75-ohm unbalanced impedance, 4.0 volts peak-to-peak

7.8 KHz: square wave derived from input signal for the Intersync Servo; 1.0 volt peak-to-peak and 75-ohm unbalanced impedance

"A" Scope Error Monitor: error signal for oscilloscope display; 1 volt = 360 degrees on both 525-line NTSC and 625-line PAL

Error WFM Out: error signal to Velocity Compensator, 1 volt = 279 ns

Video Performance

Video Gain: adjustable to unity with output terminated with 75 ohms

High Frequency Response: flat within ± 0.25 dB to 6 MHz, ± 0.4 dB from 6 to 7 MHz, relative to 100 KHz

Low Frequency Tilt: 2% maximum on 50 Hz square wave with composite sync and blanking

Transient Response: K factor 0.25%, maximum, with 0.2 microsecond sine-squared pulse (measured at 50% amplitude)

Differential Gain: 0.4% maximum at 3.58 MHz, or 4.43 MHz; between 10% and 90% A.P.L.

Differential Phase: 0.5 degree maximum at 3.58 MHz, or 4.43 MHz; between 10% and 90% A.P.L.

General

Power Input: 117 volts $\pm 5\%$, 50 or 60 Hz, 60 watts maximum

Size: height 5.25" (133 mm), width 19" (483 mm), depth 17.5" (445 mm)

Weight: 35 pounds (16 Kg)

Operating Controls and Switches

The front panel contains system phase control, function selector, a meter for indication of phase correction action and two indicator lamps. Screwdriver adjustments for reference burst phase are also located on the front panel. Secondary switches behind the panel include control voltage mode selection and output burst selector.

System Phase: Sets color phase of output signal with respect to external color subcarrier reference. Used with fully synchronous operation for matching color phase to external color signal sources.

Function Selector: (Four-position switch) Selects operating mode.

1. CORRECTION OFF—removes control voltage; unit operates as unity gain amplifier.
2. NORMAL — output synchronous with reference NTSC or PAL signals; fully synchronous or servo may be operated in horizontal mode.
3. UNPHASED—for playback of color signals having severe burst phase-to-sync timing errors; horizontal servo mode must be used.
4. SECAM — for recording or reproducing SECAM color signals; all servo modes usable.

Reference Burst Phase 525: (Screwdriver adjustment) Sets 3.58 MHz reference burst phase.

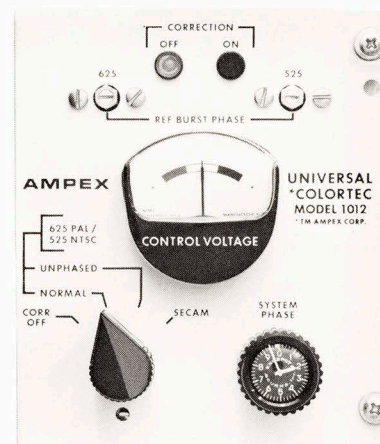
Reference Burst Phase 625: (Screwdriver adjustment) Sets 4.43 MHz reference burst phase.

Control Voltage: (Three-position switch)

1. EXTERNAL — applies external modulating voltage to correction circuits for test purposes.
2. NORMAL — activates correction circuits by presence of burst on video signal; circuits deactivated during monochrome signals.
3. CORRECTION ON — control voltage is on at all times even in absence of burst; for test purposes or marginal burst conditions.

Output Burst: (Three-position switch)

1. REFERENCE — new burst on output signal created from reference subcarrier.
2. TAPE — burst on output signal derived from time-base corrected video signal.
3. REF. P.B./TAPE EE — new burst created from reference subcarrier during playback and burst during EE and RECORD is derived from video signal.



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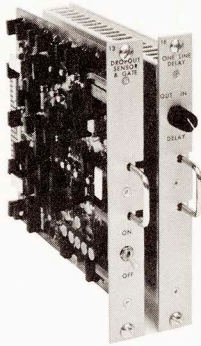
AMPEX

One-Line Delay

... the near-perfect answer to dropouts



VR-2000



VR-1200

Auto-Chroma

... eliminates a major obstacle to color tape interchangeability



VR-2000



VR-1200

One-Line Delay

The Ampex One-Line Delay is available for the Ampex VR-2000 and VR-1200 Videotape Recorders. Operating in conjunction with the dropout sensor, the one-line delay substitutes the previous line of information for the one in which the dropout occurred. The one-line delay operates in the RF portion of the signal system over the full bandwidth; no video gain matching is required. Where a line of color information is to be substituted, the chroma is restored at the correct level of saturation, but at random hue. In all cases, a line *without* a dropout is substituted—never a defective line. The one-line delay requires no operator attention. The only controls are the IN-OUT switch and a setup potentiometer. This accessory is available as a single module plug-in for the VR-2000 and as a two-module plug-in for the VR-1200 Videotape Recorder.

Auto-Chroma

The Ampex Auto-Chroma System is a two-module accessory for the Ampex VR-2000 and VR-1200 Videotape Recorders. It provides fast, continuous, automatic control of color saturation from each color head band. The interchangeability of tapes is greatly improved, since there is no need to readjust equalizers for tapes made on different machines. The over-all results of the action of this accessory are tighter, faster control of chroma, reduced saturation banding, and reduced need for operator attention. Only one control, a burst ratio control, is provided to compensate for tapes made with a nonstandard ratio of burst to picture chroma. The IN-OUT switch is mounted on the Signal System control panel. The Auto-Chroma automatically comes into operation when a color signal is being reproduced. On a monochrome signal it automatically reverts to manual equalization.

For complete data and pricing information on these two Ampex accessories, contact your Ampex sales office.

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