THE AMPEX VPR-6: WHAT USERS ASKED FOR IN A TYPE C VTR

AMPEX

USERS FROM ALL OVER the world helped Ampex set the original design goals for the VPR-6, and they have also contributed to the enhancements that make this Type C VTR one of the most practical video recorders available. In any application requiring a recorder in the most popular price-performance range, the VPR-6 steps up to the job and delivers performance in the true tradition of Ampex VTRs.

To meet the growing needs of users, Ampex continues to enhance the capabilities of the VPR-6. Standard audio processing ports, the Status At A Glance™ display, VITC, Multi-Gen setup, and the many benefits of the Zeus™ advanced video processor are important additions to the versatility of the VPR-6. In keeping with the Ampex goal of customer investment protection, all of these enhancements are available to every VPR-6 in service.

The VPR-6 is an appealing blend of machine intelligence and ease of operation, combined to allow operators to be more productive. "User friendly," a term often applied to computers, applies well to the VPR-6, with its convenient operational controls and efficiency-enhancing features such as the Status At A Glance display.

As part of an integrated Ampex system, the VPR-6 functions efficiently and reliably. It smoothly interfaces with Ampex ACE™ editors, switchers and graphics systems in delivering performance you can count on every working day.

The VPR-6 is one of the family of Ampex Type C recorders. By tailoring these VTRs to a wide variety of user applications, rather than trying to adapt one basic machine to all needs, Ampex provides broadcasters and post-production facilities with the most cost-effective line of VTRs available today.

FEATURES

- ☐ All machine operational configuration from control panel
- ☐ Status At A Glance display enhances human interface and speeds operation
- ☐ Full range variable play speeds (−1 to +3 × play)
- ☐ AST™ Automatic Scan Tracking with True Frame is standard
- ☐ Zeus™ Decode mode allows replay of non-color framed edits without picture shifts
- ☐ Multi-Gen Setup and Zeus video processor dramatically improve multi-generation video performance
- ☐ Shuttle speeds approach 500 ips with viewable picture
- ☐ Gentle tape handling for reel sizes from spot to two hours
- ☐ Video and audio record confidence playback
- ☐ Optional sync channel
- ☐ Optional fourth audio channel (EBU systems)
- ☐ Extensive non-standard and fault condition detection and reporting system

Control Where You Want It

AMPEX LISTENED TO users worldwide describe the ideal VTR control panel. You wanted all operator controls up front and a minimal number of board edge controls. You asked for controls to be grouped logically by function. You said you needed the sophistication of software control, but you insisted that the VTR be user-friendly. Ampex listened...and designed the control panel you wanted.

1 Metering and Monitoring

Audio level control — Three independent audio channels have unity detented input and output level controls (fourth channel EBU option). The dual scale meters are selectable for VU or PPM response.

Video level control and indication — Monitors playback video/sync RF level or input level. Meter function (sync or video) is established by the METER SEL switch.

Record Lockouts — Selects video and/or audio channels for recording or inhibiting.

Audio Monitor Select This group of controls allows any channel or combination of channels to be monitored on the integral speaker or headphone jack.

2 Keypad Controls

INSERT/ASSEM — enables insert or assemble editing.

EE — switches output between tape and input signal.

SET UP — activates Status At A Glance display; allows operator to configure machine operational parameters via the numeric keypad.

+/− switches — When the numeric keypad is active, these switches can be used to trim an edit point by any number of frames.

The primary function of the keypad cluster of buttons is labelled above the button:

TT Zero — zeroes the tape timer.

TCR — displays time code in numeric display.

AUTO — enables auto edit (two-machine editing).

EDIT OPT — rephases scanner to on-tape video signal for perfect interchange edits.

SERVO/FAULT/SYSTEM LEDS indicate an unlocked servo, machine fault or non-standard system condition.

CHROMA MAN — permits manual control of video response (equalization).

CLR FMR INVERT — Permits operator control of automatic color framing circuitry.

REC LOCK — master record lockout.

MARK — enters tape time or time code into cue point register.

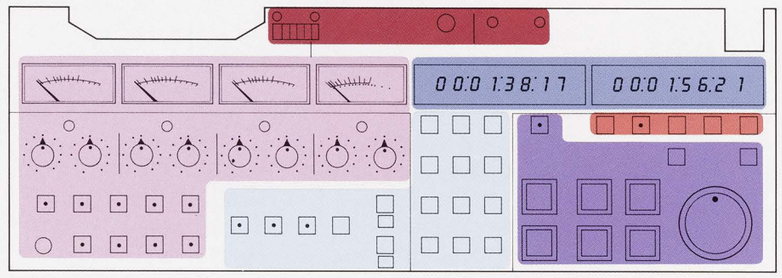
TRU FRM — enables true frame playback mode between stop and 2 times play speed.

XFR — transfers data from one cue point register to another.

The keypad switches are used for numeric entry only when SET-UP or one of the CUE/EDIT POINT switches are selected.

3 Dual Numeric Displays

Display of VPR-6's operational status is enhanced by the use of dual numeric readouts — one for tape time or time code; and the second for edit/cue point values, percentage of play speed, keypad input, setup codes, servo status and system fault and diagnostic codes.



4 Transport Controls

READY — turns on scanner.

RECORD — initiates record mode.

STOP — overrides all other mode commands.

PLAY — initiates playback; pressing switch twice initiates review mode when VTR is in auto edit mode.

CUE — automatically cues tape to selected cue point with preroll "A"; pressing switch twice cues tape to selected cue point with preroll "B."

VAR — initiates variable speed playback over a range of −1 to 3× normal speed; pressing switch twice allows tape to pause.

SHTL — initiates shuttle mode over a range of nearly 500 ips in reverse or forward direction.

TRANSPORT CONTROL KNOB — varies tape speed in shuttle or variable play modes.

TSO/JOG — tape speed override functions in play mode to vary tape speed by 7%. Single frame jog functions in any STOP mode.

5 Edit/Cue Points

These switches provide access to five independently selectable registers, storing five individual cue point values.

Additionally, if the VPR-6 is in AUTO edit mode, these switches serve as audio and video in and out edit points allowing a split edit to be set up quickly.

6 Secondary Controls

Head Hour Meter — indicates cumulative number of hours that scanner has been on with tape tensioned.

Tracking — provides adjustment of capstan servo to align center of track video head (in non-AST or edit mode).

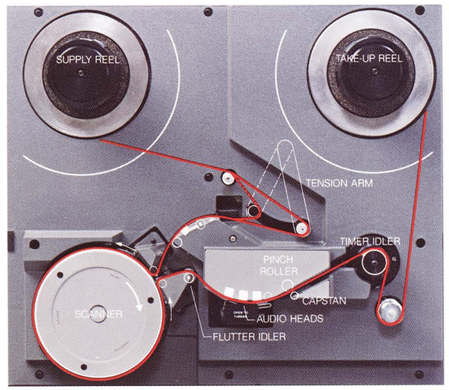
Video/Sync Rec RF level — allow RF level to be set.

MORE CAPABILITIES TO INCREASE EFFICIENCY

Editing Made Simple

VPR-6 makes "stand-up" two-machine editing simpler than ever. Built-in machine intelligence guides the operator through the editing process and alerts the operator to any conditions which will detract from the quality of the editing program. The editing features of the VPR-6 include:

- ☐ Pushbutton selection of insert or assemble modes
- ☐ Auto-Edit permits editing from pre-selected cues
- ☐ Edit optimize mode automatically rephases scanner tach to on-tape video signal for perfect interchange edits
- ☐ Pushbutton selection of entrance and exit edit points off tape
- ☐ Keypad entry of edit points and edit duration
- ☐ Pushbutton display of edit duration
- ☐ Auto tag feature transfers old exit point to new entrance point and recomputes duration
- ☐ "Split" button allows audio and video channels to be edited separately
- ☐ "XFR" button allows contents of any edit point register to be quickly transferred to another register
- ☐ Preview mode permits rehearsal of video and audio edits prior to edit recording
- ☐ "+/−" buttons permit edit point to be trimmed by any number of frames
- ☐ "JOG" buttons allow single frame jog in either direction for precise pinpointing of edit points
- ☐ Continuous diagnostic system warns of many non-standard conditions which can affect edit, such as:
  "not color framed"
  "excessive edit phase error"
  "auto record — edit off"
  "exit before enter"
  "cue point not found"
  "not cued"



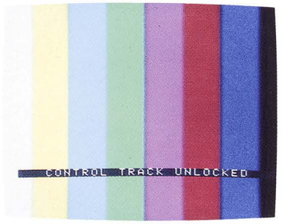
STATUS AT A GLANCE

THE STATUS AT A Glance display provides a simple two-page English language video character display of all VPR-6 operational set-up parameters, and a simple interactive menuing system that allows the operator to change setup parameters. The Status At A Glance feature also displays VPR-6 Servo, System and Machine fault messages as concise English language messages inserted into the VTR monitor video feed.

In earlier generation VTRs, operators accessed a maze of inconvenient board-mounted switches to confirm and/or configure operational modes. In most current generation VTRs, this control has been moved to the control panel, with setup modes entered through a numeric keypad. Such systems require setup reference cards for converting desired selections into appropriate setup numbers, and quick review of machine operational configuration is impossible.

The VPR-6 Status At A Glance feature is the next logical improvement in human interface. It eliminates the need for reference cards and allows machine operational configuration to be determined at a glance.

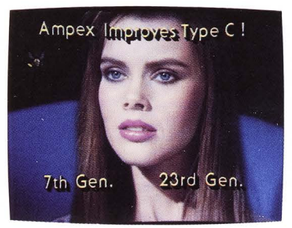
The Status At A Glance display is activated by the control panel Setup switch. A full page video character display, generated by the TCG/R and Character Display accessory, prompts correct operator actions.



MULTI-GEN SETUP

MULTI-GENERATION video performance degradation only significantly exhibits itself after it's too late to correct it — in the finished product. The VPR-6, when equipped with the Zeus Advanced Video Processor, provides an exclusive Multi-Gen Setup mode which helps eliminate operational setup errors — the major contributors to multi-generation performance degradation.

Typically, when an operator prepares a VTR for production use, the machine's various operational parameters, such as video level, are carefully adjusted until they "look" accurate. What is frequently not obvious is that the 1% residual error that the operator did not or could not notice will accumulate into a 6% error by the 6th generation of recording. A combination of 1% and 1°, or larger, first generation parameter errors can significantly degrade multi-generation video performance.



Multi-Gen Setup extends the multi-generation capabilities of the C format.

VPR-6/Zeus Multi-Gen Setup is accomplished through a series of play-record-play-record recirculations through the VPR-6 and Zeus processor. From pre-recorded 1st generation reference material (i.e., color bars) the VPR-6/Zeus system generates and displays, in real-time, a sequence that quickly duplicates 10 tape generations. This 10-generation sequence is continuously repeated, so that errors are clearly displayed and can be corrected by proper system adjustment.

With VPR-6/Zeus Multi-Gen Setup the operator can now easily optimize operational parameters about 10 times more accurately, and greatly improve even low generation video performance. This approach can increase both the number of tape generations routinely used, and the quality of the finished video product.

SUPERIOR AUDIO

THE VPR-6 AUDIO SYSTEM is designed to meet the needs of broadcasting, production and post-production environments and includes those features requested by most users.

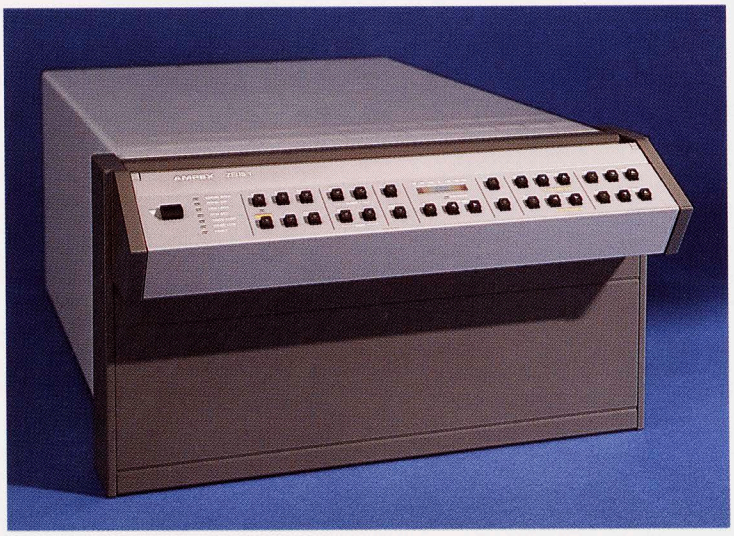
Just a few of the audio features of the VPR-6 are:

- ☐ Full audio confidence on all longitudinal tracks
- ☐ Optional EBU 4th audio channel
- ☐ Dual channel stereo monitoring
- ☐ Adjustable azimuth alignment for stereo playback
- ☐ Excellent crosstalk performance
- ☐ Selectable peak or VU metering response
- ☐ Audio processing ports for interface with noise reduction or compression/expansion devices
- ☐ Integral speaker and headphone jack

PERFORMANCE TO MEET YOUR NEEDS

ZEUS 1 ADVANCED VIDEO PROCESSOR

The Zeus Advanced Video Processor, when integrated with the VPR-6, provides a revolutionary improvement in video quality and flexibility of Type C videotape recording. Particularly significant is a dramatic improvement in multi-generation video quality. Among the many Zeus features are:



Processing Transparency

The Zeus system uses 4 × Fsc A/D sampling, with a 9-bit dynamic range, to provide exceptional bandwidth, linearity and signal-to-quantizing noise ratio for transparent signal processing.

Velocity Compensation

Velocity error measurement is taken from off-tape burst after the video has been digitized, with accuracy to a fraction of a degree. This precisely measured error is immediately applied to the A/D clock, forming a closed loop feedback system. Thus, the system continually monitors itself for residual errors and drift, and corrects them.

Head impact errors are corrected by the exclusive Zeus frame averaging velocity compensation. This system achieves a reduction of impact error amplitude by approximately 10 dB, or a three times reduction in visibility.

Dropout Compensation

A superior spatial-averaging dropout compensation technique is employed that analyzes video information around the missing dropout video to produce an optimum, transparent, video replacement.

Multi-Generation Setup

Multi-generation video performance degradation only significantly exhibits itself when it's too late to fix it — in the finished product. The VPR-6 with Zeus video processor provides an exclusive Multi-Gen Setup mode which helps eliminate operational setup errors — major contributors to multi-generation performance degradation.

Decode Mode

When the Zeus Decode mode is activated, an adaptive digital comb filter decoder is inserted into the digital video path. This decoder corrects the off-tape SCH inversions of non-color framed edits, totally eliminating normally expected horizontal picture shifts.

Variable Speed Processing

Variable speed picture processing is greatly improved by means of a unique line-by-line interpolation process that eliminates both vertical picture bounce and periodic defocusing effects. An adaptive digital comb filter is used to preserve picture detail without generating significant degrading video artifacts.

Frame Storage

The Zeus system utilizes a full frame store to capture a frame of video on command. Field 1, field 2 or the full frame may be displayed as desired. Freeze and unfreeze may be commanded from the local Zeus control panel, remote control panel or General Purpose Interface input.

TBC-6 TIME BASE CORRECTOR

With the VPR-6, the TBC-6 delivers reliable, broadcast quality, variable speed playback...from 1X reverse to 3X forward play speed. In shuttle, it generates viewable pictures at all speeds. The TBC-6 can even time-share playback correction between the VPR-6 and a ½″ or ¾″ capstan-servoed heterodyne recorder.

The TBC-6 uses 4 × Fsc A/D sampling, with 8 bits of amplitude accuracy for transparent operation. Its memory size of 32 horizontal lines provides a wide correction window for slow motion playback and the most erratic errors from ENG portable recorders.

Full color dropout compensation and a line-by-line velocity error correction are built in. The TBC-6's sync generator meets RS-170A standards and includes fully adjustable horizontal and vertical blanking. Using the stability of an SCH phased design and an edit-ready calibration control, consistent and repeatable picture positioning is ensured in an editing environment.

The TBC-6's output processing circuitry provides a full range of composite video parameter adjustment. Optional remote control panels allow custom location of appropriate video controls.

DESIGNED-IN RELIABILITY

THE VPR-6 TRANSPORT is built upon proven designs. It begins with an aluminum alloy die casting that mounts to the chassis side panels for exceptional structural support and rigidity. Torsional deflection is virtually eliminated. Mechanical components are discrete subassemblies, pre-tested and individually adjustable. Each is precisely indexed to the front surface of the base casting.

Reel Motors — Arrangement of the large, high-torque dc reel motor offers the benefit of two-hour recording on 11-3/4 inch NAB reels. Yet the high-response servo will handle the lightest "spot" reels with equal gentleness. Microprocessor control allows the VPR-6 to adapt instantly and automatically to the proper tape handling speed. Both motors contain bi-directional tachometers and permit shuttle speeds approaching 500 ips, with rapid acceleration, while preserving the system's gentle tape handling characteristics.

Tape Tension — A high storage, low mass tension arm responds quickly and smoothly to transitions between Play, Stop and Shuttle modes. Only one tension setting is required. All further tensioning is microprocessor controlled.

Capstan — The capstan and direct drive motor assembly is an integral assembly containing a high resolution tachometer and flywheel. The microprocessor-controlled servo subsystem produces smooth slow motion and rapid play lock-up.

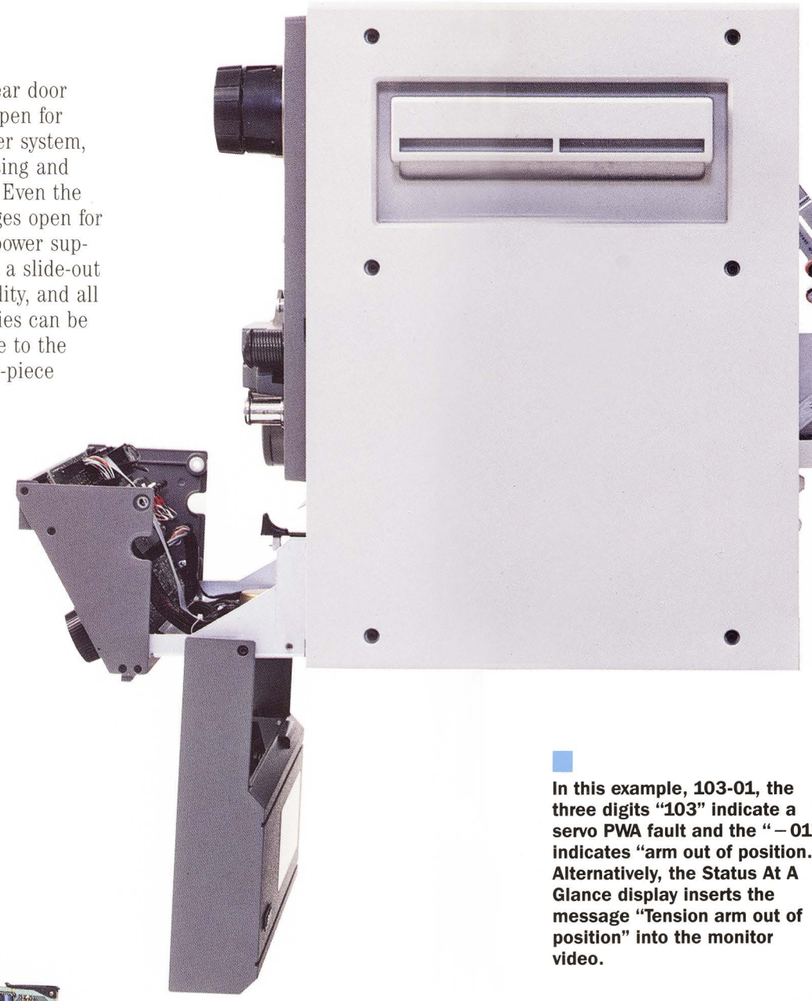
Scanner — The scanner assembly features a brushless dc motor for reliable performance. A new totally encapsulated slip ring assembly assures dramatically improved reliability and reduced maintenance. Long-term helical interchange is preserved by a wear resistant anodized scanner surface and stainless steel guide band. Heads are quickly and easily replaced without complicated alignment requirements.

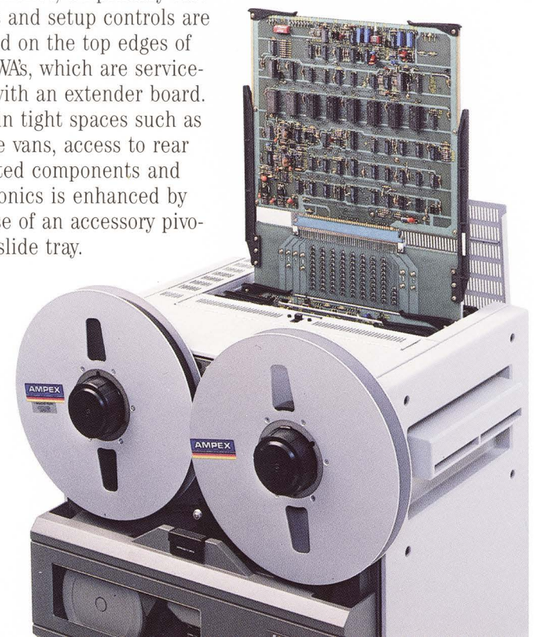
Audio — Long-wearing, anti-stiction, audio head stacks are easily removed and replaced without complicated mechanical alignment. An adjustable head base allows optimum stereo phase performance.

Maintenance Has Never Been Easier

The VPR-6 is designed to be reliable but also easy to maintain. Top doors provide access to the audio system and major plug-in printed wiring assemblies. For added convenience, all primary test points and setup controls are located on the top edges of the PWA's, which are serviceable with an extender board. Even in tight spaces such as mobile vans, access to rear mounted components and electronics is enhanced by the use of an accessory pivotable slide tray.

The entire rear door assembly hinges open for access to the power system, transport, harnessing and audio electronics. Even the control panel hinges open for easy access. The power supply is mounted on a slide-out tray for serviceability, and all transport assemblies can be serviced easily due to the quick-removal one-piece transport trim.

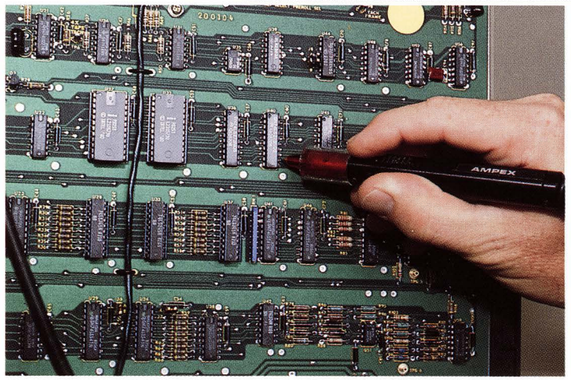




ADVANCED DIAGNOSTICS

AT POWER-UP, AND CONtinuously during normal operation, the VPR-6 checks its operational status. Six Servo status, 25 System status and 55 Machine fault conditions are detectable. If a non-standard condition is detected, a control panel LED illuminates and, on demand, an error code is displayed. Alternatively, in a VPR-6 equipped with its accessory TCG/R and Character Display, the Status At A Glance display inserts a concise English language descriptive message into the monitor video.

In this example, 103-01, the three digits "103" indicate a servo PWA fault and the "–01" indicates "arm out of position. Alternatively, the Status At A Glance display inserts the message "Tension arm out of position" into the monitor video.



EXPANDED DIAGNOSTICS

A hand-held diagnostic probe along with a special diagnostic program allow a technician to easily examine every integrated circuit which is in direct communication with the two microprocessors. This powerful tool precludes the need for expensive external test equipment and technical knowledge of microprocessor electronics.

VPR-6 ACCESSORIES AND OPTIONS

A NUMBER OF ACCESSORIES and options are available from Ampex to expand the operational capabilities of the VPR-6. These may be purchased with the machine, or added after as operational needs change. They include:

Sync Channel
An option to permit all vertical sync information to be recorded according to the SMPTE/EBU Type "C" formats.

Four Channel Audio
This EBU option provides a fourth high quality audio channel in the track space-normally alloted to the sync channel.

Time Code Generator/Reader & Character Display with Status At A Glance
This accessory adds longitudinal time code generation and reading, character display and Status At A Glance capabilities to the VPR-6. Total control of these features is conveniently available at the VPR-6's control panel. The TCG/R offers a full complement of operational modes including slave and jam operation, as well as support of user bits, time code parity bit and time code color flag. The character display function allows selection of any one of nine possible displays of tape time, time code or edit point information as characters inserted in the monitor video output. The Status At A Glance system provides two major operational functions:

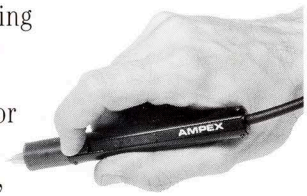
1) A simple two-page English language video character display of all VPR-6 operational setup parameters, and a simple interactive menuing system that allows the operator to change setup parameters,
2) A system for the display of VPR-6 Servo, System and Machine fault messages as concise English language messages inserted into the monitor video feed.

Vertical Interval Time Code
A Vertical Interval Time Code option adds VITC capabilities to the Time Code Generator/Reader and Character Display accessory.

Parallel Remote Interface
This accessory provides comprehensive, 75-pin connector, parallel remote control pin-compatible with Ampex VPR-2Bs and VPR-80s.

Serial Remote Interface
This accessory provides RS-422A compatible connection to the serial control bus of serial machine controllers such as Ampex ACE editors and the VRC-2.

Diagnostic Probe
Standard diagnostics capability in the VPR-6, consisting of wakeup and background tests, can identify system malfunctions to assembly or subassembly level. The accessory diagnostic probe, used in conjunction with an instruction manual, allows the maintenance engineer to diagnose all of the integrated circuits which are in communication with the microprocessor.

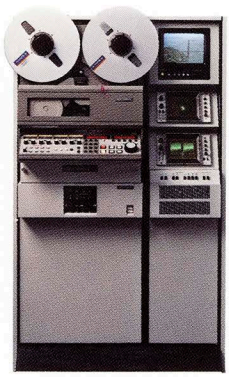


VRC-2
The VRC-2 is a flexible machine controller that uses RS-422A serial communications to remotely control a combination of up to four VTRs. It can control the VPR-3, VPR-6, VPR-80, and BVU, CVR and BVW series studio recorders. Available operational modes include VTR control, two-machine editing and gang roll. Dual alphanumeric displays provide operational mode and status display.

Mounting Configurations
The VPR-6 is available in a variety of physical configurations to suit individual facility requirements.


Tabletop or Rackmount


Consolette


Sidecar Console


Overhead Bridge Console

VPR-6 SPECIFICATIONS

VIDEO AND SYNC	NTSC/PAL-M 525/60	PAL/SECAM 625/50
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-6	−46 dB peak-to-peak video to RMS noise on interchange basis	−43 dB peak-to-peak video to RMS noise on interchange basis
LF Linearity	2% blanking to white (maximum)	2% blanking to white (maximum)
Differential Gain	4% blanking to white (maximum)	4% blanking to white (maximum)
Differential Phase (40 IEEE units of subcarrier through TBC-6)	4 degrees at 3.58 MHz off-tape (max)	4 degrees at 4.43 MHz off-tape (max)
Chrominance/Luminance Delay	20 nsec (maximum)	25 nsec (maximum)
2T $\sin^2$ Pulse & Bar	1% K-factor maximum	1% K-factor maximum
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) 100 nWb/m reference level	±1 dB 200 Hz to 12 KHz ±2 dB 50 Hz to 18 kHz	±1 dB 200 Hz to 12 KHz ±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) ANSI "A" weighted 60 dB	56 dB Audio 1 and 2 54 dB Audio 3 & 4 (note 1) CCIR/ARM weighted 60 dB
Distortion (measured at 1 KHz) (3 HD) at 100 nWb/m reference level (+8 dBu) at 251 nWb/m peak level (+16 dBu) With predistortion at 200 nWb/m (+14 dBu)	 1% maximum 3% maximum 1% maximum	 1% maximum 3% maximum 1% maximum
Depth of erasure on its own recording	−70 dB	−70 dB
Wow & Flutter	.08% NAB unweighted	.10% DIN weighted
Playback Crosstalk (Audio 1 & 2) 1 KHz referenced to +8 dBm or 100 nWb/m	−60 dB maximum	−60 dB maximum
SIGNAL INPUTS		
Video Input (75 ohm) BNC	0.5 to 2 volts peak-to-peak	0.5 to 2 volts peak-to-peak
Ref Video (75 ohm BNC) Comp sync Comp video	 0.7 to 4 volts 0.5 to 2 volts	 0.7 to 4 volts 0.5 to 2 volts
Audio line inputs	−14 dBu to +24 dBu	−14 dBu to +24 dBu
Impedance	balanced; 50 K ohm 50 Hz to 15 KHz	balanced; 50 K ohm 50 Hz to 15 KHz
SIGNAL OUTPUTS		
Video Output (75 ohm) BNC	1.0 Volt peak-to-peak	1.0 volt peak-to-peak
Audio Line Outputs	+8 dBu nominal; balanced +25 dBu maximum	+8 dBu nominal; balanced +25 dB maximum
Impedance	less than 50 ohms	less than 50 ohms
Headphone Audio Monitor	0 dBm to drive 600 ohms	0 dBm to drive 600 ohms
Audio Meter Circuits Switchable VU or PPM (EBU)		
GENERAL		
Record Time	124 minutes nominal; 6000 feet of tape on 11¾" reel	124 minutes nominal; 6000 feet of tape on 11¾" reel
Shuttle Time	less than 100 sec. for 60 minute tape	less than 100 sec. for 60 minute tape
Tape Timer Accuracy (control track updated)	±1 frame with continuous control track	±1 frame with continuous control track
Tape Speed	244 ±0.5 mm/sec 9.606 ±0.02 in/sec	239.8 ±0.5 mm/sec 9.44 ±0.02 in/sec
Video Writing Speed	1009 in/sec nominal	843 in/sec nominal
FM Carrier Frequencies	7.9 MHz blanking 10.0 MHz peak white	7.68 MHz blanking 8.9 MHz peak white
Audio Equalization	15 microseconds 3180 microseconds	15 microseconds
Lock-up Time from Ready Mode (color framed)	3 seconds	3 seconds

PHYSICAL DIMENSIONS

	Rack Mount	Table Top	Consolette with Monitoring	Side Car Monitoring Console	Overhead Monitoring Console
Height	21.0 in 533 mm	22.0 in 558.8 mm	70.5 in 1791 mm	56.4 in 1433 mm	74 in 1880 mm
Width	19.0 in 482.6 mm	22.0 in 558.8 mm	22.0 in 558.8 mm	33.0 in 838 mm	33.0 in 838 mm
Depth	21.0 in 533 mm	22.0 in 558.8 mm	26.5 in 673 mm	26.5 in 673 mm	26.5 in 673 mm
Weight	143 lb 65 kg	150 lb 68 kg	317 lb 144 kg	545 lb 247 kg	670 lb 304 kg

TEMPERATURE & HUMIDITY	
Temperature Humidity	0-45° C 10%-90% RH (non-condensing)
POWER INPUT	
Power Line Frequency Input voltages Input Current (Table Top)	50 & 60 Hz, single phase 100/110/120/130 Volts AC ±10% 200/220/240/260 Volts AC ±10% 115 vac Nominal 5.0A 230 vac Nominal 2.5A

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.

Ampex reserves the right to make product and specification changes at any time without notice.

FOR INFORMATION ON AMPEX BROADCAST VIDEO PRODUCTS CONTACT THE VIDEO SALES MANAGER NEAREST YOU.

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