

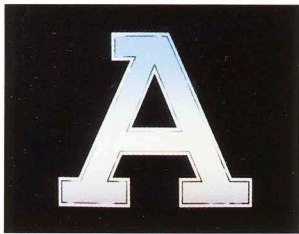
AMPEX GRAPHICS INNOVATIVE GRAPHICS THROUGH SYSTEM INTEGRATION



AMPEX

SYSTEM SOLUTIONS FOR THE VIDEO GRAPHICS DESIGNER PROVIDE POWER AND FLEXIBILITY FROM CREATION TO RECORDING.

THIS BROCHURE and its associated data sheets describe a new way of thinking about the art, and the job, of creating video graphics. It begins with the premise that the artistic task *itself* should be the preeminent consideration when a designer begins to think about the goals and objectives of a particular graphics job. We believe that, too often, the first consideration is with the hardware and software requirements that may, or may not be, applicable to the job at hand.



Vector-based fonts allow easy manipulation of text.

With this in mind, you'll find these pages devoted to graphics as a set of artistic tasks—tasks to be accomplished in the easiest, fastest and most imaginative ways possible, and then to be combined by the artist into the graphic that was, after all, the original thought.

Ampex is in a unique position to support the artist in these directions. We manufacture a full range of equipment that was *designed to be integrated* in many different ways to accomplish virtually any artistic task that comes to mind. (Most of our customers have made a point to let us know we only opened the door for them—their creative solutions with Ampex systems, once they “got creating” provided capabilities and looks far beyond the scope of the system designer's original expectations.)

Ampex gear talks to each other in the digital domain, so you don't have to worry about video quality degradation as you use generation after generation to come up with the best look. And speaking of video quality, “internal digital processing” may sound like hardware talk again, but if you're going to do the kind of work you're capable of (the kind of work that's going to put your facility “on the map”), then you need technology that doesn't saddle you with hardware limitations—technology that is the most advanced in the industry. And that's what you get with Ampex graphics systems.

You don't get nine Emmy Awards for technological excellence by building Edsels.



You note that the linear key output matches the image exactly...



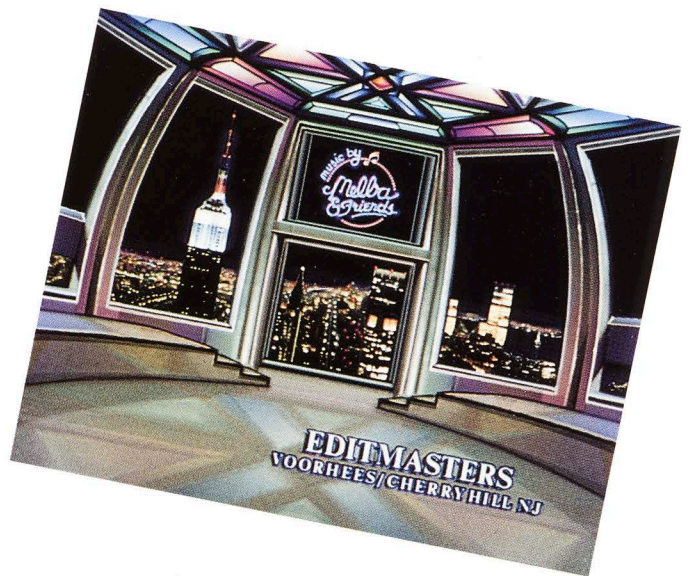
stencil is applied simultaneously with all AVA-3 functions, including brushes...



then magnify 8 times and roam around the frame as you like with no image degradation.



Cut-and-paste in true ADO-like perspective



Electronic sets provide creative, cost effective environments.

ROTOSCOPING MADE EASY

Rotoscope, with its beginnings in film, is normally a very time-consuming process. In the technology of video, "rotoscoping" is the digitizing of sequential frames of video into a paint system, the alteration of those frames, and the return of them to tape in the same location, to create an effect. In practice, it's a method of correcting or enhancing elements of scenes and/or producing effects on a frame-by-frame basis. To most video producers, rotoscoping is an expensive technique that is mainly used to supply special effects that today's clients have come to expect. However, to the producer who shoots in film and posts in video, it can mean a tremendous cost savings, and at the same time can provide aesthetic effects not previously possible.

How the AVA™3 Ampex Video Art system and the VPR-3 Type C high performance video tape recorder work together to simplify and cost-reduce the process of rotoscoping.

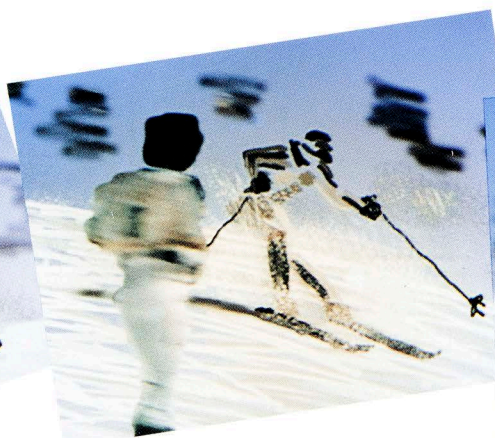
Because the AVA-3 system's magnification is hardware-based, it is capable of magnification without loss of image quality. This means that you can use *magnify* to work in close as many times as you care to without fear of image degradation. (You'll get no "rounding errors" or soft focus from AVA-3.)

Another unique advantage of using AVA-3 for rotoscoping shows up when dealing with objects in motion. With most equipment, fluctuation between fields creates "jitter." But the AVA-3 system's *field and frame-grab* modes eliminate jitter and add information into frames and fields. AVA offers two different techniques, each optimized for the different requirements of either static or moving images, using both full-frame and line-to-line comb filters to offer the highest quality picture.

What about cost? Well, rotoscope work can be accomplished more efficiently with AVA-3 than any other system in its price class because it's truly an integrated system. This means that you have full control of the recording process from the drawing tablet—no extra equipment to work with, or worry about! Rotoscoping is, by the nature of the beast, a *systems process*. With AVA-3, Ampex delivers a *systems solution*. Because other systems require more hardware to produce the same results, it stands to reason that a facility, using a non-integrated system, will be forced to bill out work at a higher rate to cover their costs. So, with AVA-3, you have a powerful competitive price advantage when bid time comes along.



Rotoscoping...



rotoscoping...



rotoscoping!

How about AVA-3, a VPR-3, and an ADO™ Digital Special Effects system for the ultimate rotoscoping/special effects system?

Of course, we've saved the best until last. The ADO system's Digi-Matte™ combined with the AVA-3 system's realistic soft-edged linear key output streamlines the process considerably by performing certain real-time traveling mattes. Because the key generated in the AVA-3 can actually have edges that taper or "feather off" from 100% to 0% opacity, the AVA-3 key will blend into backgrounds smoothly. As the scene or object changes frame-by-frame, the ADO will follow the object the artist is rotoscoping, and will use the key out of AVA-3 to fix or touch-up video. For intricate movements, the key will follow all the popular rotation and perspective changes possible with ADO.

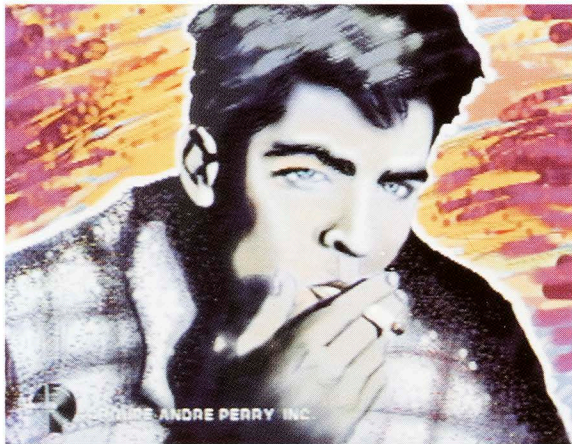
A Digi-Matte processor is the best possible device to accept the AVA-3 system's key because it provides an 8-bit key signal and maintains the quality of the key generated by the AVA. The quality of the key is also maintained through an RGB transfer, or through our 4:2:2:4 component digital transfer process. (The "4" at the end represents the alpha key channel which preserves a full bandwidth, separate 8-bit linear key.) Once the Digi-Matte processes the AVA key, all the detail and soft edges are preserved, so the quality is maintained.

This approach to rotoscoping is actually more of a real-time matting process that many people using ADOs are already familiar with. The benefit of using the AVA-3 source key in this application lies in its detail, its blending capability and its ability to smooth itself realistically into a background. Because edit suites have come to rely on the ADO for these elegant and cost-effective solutions, moving this matting capability into the graphic suite makes sense.

Some questions worth asking yourself.

- In your work, do you see art that looks "computerish" because the retouches are readily apparent?
- Does cut-and-paste work often distort the image and look "unnatural"?
- Are frame and field grabs awkward to make and often of poor quality?
- Do you often feel limited by the systems you've used and need more flexibility, especially in the geometric and paint functions?
- Is controlling the VTRs from the system difficult?
- Do you have to pass up many would-be clients because your investment in hardware requires that you charge a high dollar-per-hour figure?

An AVA-3/ADO combination will solve these problems, and a few dozen more that you've encountered. One more question, if you don't mind—why not get a demo from Ampex and check it out?



The AVA-3 system's single frame painting capability lets you add imagination to those "flat" frames.

GRAPHICS CREATION AND STORAGE FOR BROADCAST

This application sheet explores several different ways that an AVA™3 Video Art system and an ESS™ Graphic Composition and Storage system can be used as a combination problem-solver for the often frantic business of creating graphics for broadcast. We'll explore the needs of the broadcaster, from a fairly simple (but often occurring) requirement of upgrading a facility to handle increasing demands, all the way to a complete graphics suite required for a news environment.

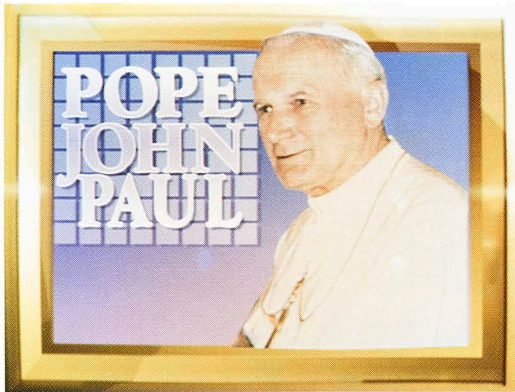
Growing pains, and a solution for them.

At this station, management wants the growing horde of graphic requests out of the control room and into a separate area, where it probably should be anyway. They need to layer graphics and are interested in animation. Let's assume they own an ADO™ 1000 Digital Effects system that is free a couple of hours in the afternoon and at night.

How would an AVA-3 and an ESS solve the problem? The AVA-3 and ESS stand alone as a news graphic system for still frames and over-the-shoulder graphics. While layering on the ESS, the artist is working completely within a 4:2:2 digital domain, so there is virtually no loss of quality with each additional layer. Even when a frame has been started in the AVA-3, it can

be digitally transferred to the ESS for further 4:2:2 digital layering of graphics.

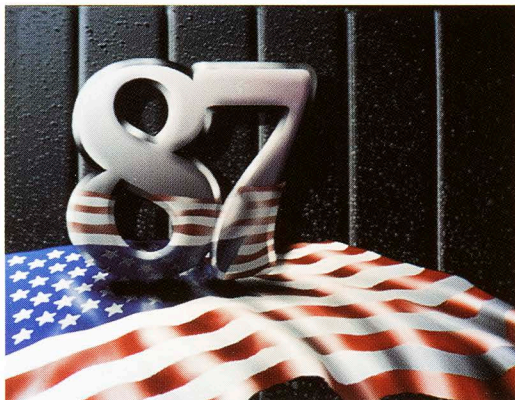
For animation, an AVA-3, with its *linear key* out, and an ADO-1000 with Digi-Matte™ offer a variety of possibilities for animating or manipulating an irregular shape in the X, Y, or Z axis. (The ADO has become a standard tool in post-production houses for doing real-time animation.) As an example of the power available, with standard "sector" animation, a "glint" to be animated on the edge of a letter has to be made cel-by-cel, then stacked and played back. With ADO and AVA-3, the artist would simply make the glint while applying stencil and, in *real-time*, animate the glint using the ADO.



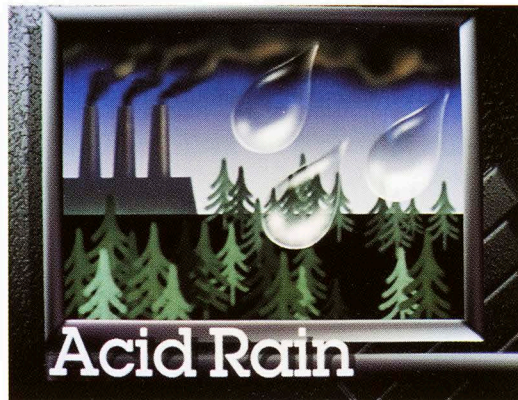
A standard background format is updated in the ESS system with the scissors mode to isolate the headshot.



The AVA-3 system's true perspective cut-and-paste.



Layering on the ESS system occurs entirely in a 4:2:2 digital domain, so there's virtually no loss of quality with each additional layer.



AVA-3 and ESS work together off-line from the control room and perform all the expected requirements of over-the-shoulder graphics.

The ESS provides animation the same way a switcher performs certain animation effects on "movement" and "transitioning." Using the programmable presets and play list functions in the ESS, an operator can take a series of 5 or 6 frames (that were created in AVA-3 and digitally transferred to the ESS) and dissolve and wipe between them.

Revenue—the name of the game.

Let's say you need news graphics, but you've also figured out a way to earn extra revenue by doing local commercial production. You currently own an ADO-2000 and you're planning to upgrade this year with the ADO options of Digi-Matte and Digi-Trail.™ Your commercial production would be done in a separate edit suite down the hall from the graphics area. The editors will need access to the frames created on AVA-3 at a moment's notice.

With AVA-3 and ESS, and a little help from ADO, you can have it all. A frame created on AVA-3 can be transferred digitally and stored in ESS. With the multi-user capability of ESS, an editor can retrieve the AVA-3 frame from the ESS and use it whenever he needs it—instantly! Your editor will be interested in the 8-bit digital linear key out of AVA-3 for use in conjunction with the ADO system's Digi-Matte. If the editor wants to use the AVA-3 on-line in the edit suite for a real-time write-on, the ESS system's *compose* mode can carry on with the creation of the night's news graphics without interrupting commercial production.

A complete solution for news graphics.

You've had it! Now you're going to do it right. You currently use a switcher and analog still-store to produce your news graphics. But more often than not, your production department doesn't get around to producing any over-the-shoulder graphics because of time constraints and outdated equipment.

How can AVA-3 and ESS help you? Simple: AVA-3 and ESS work together off-line from the control room and perform all the expected requirements of over-the-shoulder graphics. While the graphics department is making the graphics for the news program, the control room can continue with its standard pre-news activity. The AVA-3 is perfect for graphics that require retouching or painting and is a great help in establishing the news format. Meanwhile, the ESS-3 system's internal switching capabilities perform standard switcher production for simple reporter package animation. The ESS system's *compose* mode also offers *scissors* capability which allows the user to actually cut out an irregular shape from video and "scissor" the

image over another background, when the AVA-3 is in use on another project. This would be ideal for cutting out a famous "head" from a frame of video to place over a format frame created earlier with AVA-3. Your station will also benefit from the quality of its on-air look because your stills are created and transferred entirely in the digital domain—no video degradation regardless how creative your artists get with generation after generation of art work. In addition, there is no need for your graphics department to have access to the control room's character generator for titling stills because ESS has an internal character generator using vector-based fonts.

Now what did we tell you—a *total* graphics solution in just *two* pieces of hardware!



ESS can create the night's news graphics, while your AVA-3 produces this animated write-on in the edit suite.

ANIMATION, GRAPHICS, AND SPECIAL EFFECTS

"What used to take two or three days on film can now be accomplished in a couple of hours with video."

This quote, from the owner of a major post-production facility, reflected the state-of-the-art for animation and graphics/effects two years ago. Now, due to the fierce competition in the post-production industry, the situation described is not only "state-of-the-art," but is quickly becoming a business necessity.

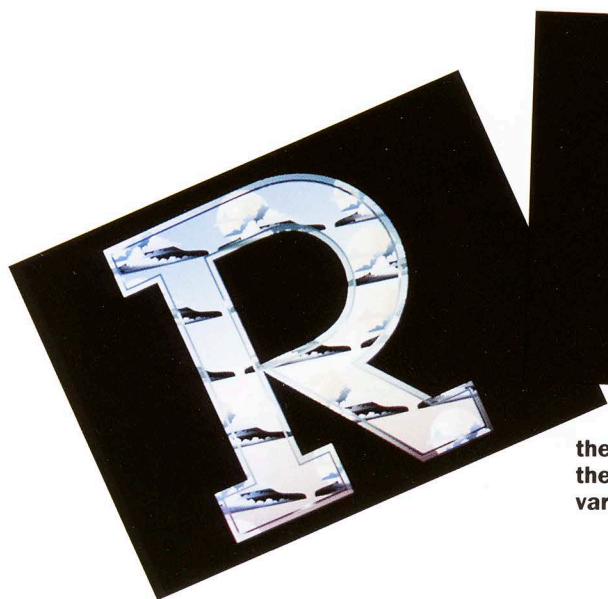
The Ampex AVA™ 3 Video Art system, the ADO™ Digital Special Effects system, and the VPR-3 Type C high performance video recorder have obviously been at the forefront of this "film-to-video revolution." This application sheet will, in some detail, describe to the video graphics designer and facility owner/manager what to expect from a true state-of-the-art system.

The first requirement— a high quality linear key.

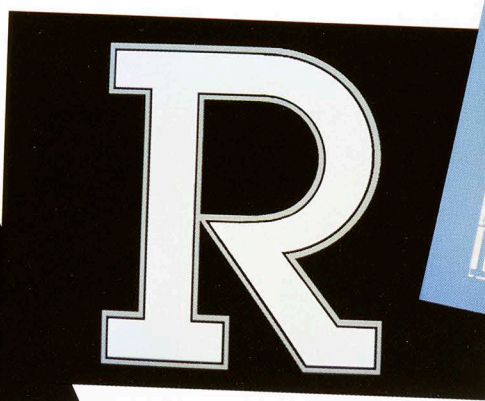
For example, consider the problem of keying high-quality, irregular shapes normally used in the layering or compositing process. In many cases, the matte that has been generated on the paint system will not exactly match the image or irregular shape to be keyed. AVA-3 has the capability to output both main video and, simultaneously, a linear key that is based on its stencil. So, rather than painting the graphic and then returning to create a white-on-black holdout matte, the AVA-3 allows you to apply stencil *and* simultaneously perform all other tasks required. (It's worthwhile noting that the AVA-3 system's linear key uses 716 pixel line resolution and internal R-G-B-A processing, offering the highest quality image possible.)

ADO enters the picture, literally.

The ADO system's Digi-Matte™ key processor was specifically designed to process very high quality irregular-shaped keys along with the associated video signal. Its 8-bit linear key channel is the best optical effects device to manipulate these keys while maintaining their original detail, transparency and artistic quality. Of course, the ADO offers a myriad of other artist tools, including posterization, pseudo light sourcing, solarization and mosaics, while the AVA-3 system's linear key allows for some exciting experimental design using the combination of these image manipulation tools. For example, it's possible to do *reveals* using the key out of AVA-3 to reveal a recorded AVA-3 graphic stored by the internal frame store in the ADO system. (Multiple layers of images may be stored in the ADO frame store with first generation quality maintained throughout the process. No external recording is required.)



This "R" required two graphic treatments: Images keyed within, and keyed over other imagery at varied transparencies...



the matte worked for both because the AVA-3 system's stencil mattes vary from 0% to 100% opacity...



and now, new looks! Variable transparency in keyed imagery represents the shape of things to come.

Animation—turbo style!

So you can get a feel for what *animation* is like with an AVA-3/ADO system, let's take a hypothetical case: An editor and an artist are working on a spot that will be completed in an edit suite. (The artist would normally prepare several hold-out mattes for the editor.) The kind of animation the director has asked for involves breaking apart a frame of video from the time it's picked up after the effect is performed. The effect that the director wants is fairly complicated. It involves taking the frame and making each element of the frame a separate key. Some of the objects that the director wants as separate keys would not only require very soft edges but also transparency in certain areas of the key. The director has also called for each key to have a painted treatment.

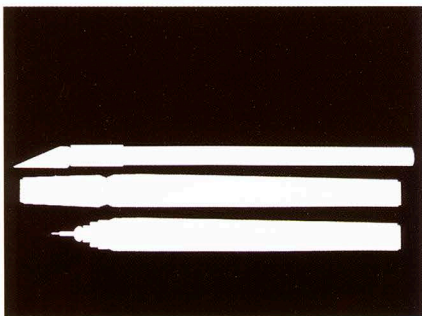
In this situation, the keys that the director wants to be able to manipulate will not only be very simple for the AVA-3/ADO combination to handle, but the final results will make any director smile. For example, the soft-edge keys can easily be done by applying the paint from the airbrush at the

same time the artist is applying stencil. Transparency is handled the same way. After the effect has been created or modified, the key-out will automatically be used the way the artist has defined the stencil—there is no need to produce a separate white-on-black holdout matte. This works also from the standpoint that the artist couldn't produce a perfectly matched white-on-black matte for many of the keys possible with the AVA-3 because the stencil (or key) is applied simultaneously in responding to the brush stroke of that moment, or the way in which a shape is filled. Rather than creating two things for a key, on the AVA-3 you simply do it once.

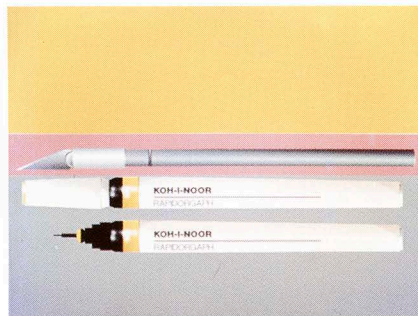
In terms of the shapes the director wants to use, it will be easy to highlight and provide a painted treatment by using the *polygon-stream* mode of the AVA-3. This lets the artist define an irregular shape not only by point-to-point, but also by drawing an outline of the shape. Once the shape has been defined, this area can be filled with a solid color or a blend of any opacity from 0 to 100%, as well as applied with stencil at the same time. In the case of blends of lighter or full opacity, the stencil can actually follow the gradation of the blend.

Add a VPR-3 recorder to this and magic begins to happen, for real! Its speed and accuracy allow animation processing (called *turbo* animation) in a play-speed, real-time relationship. Unlike stationary mode recording, the VPR-3 does not require the complex (and often picture degrading) pre-processing of the video signal to rearrange the video frequencies before recording. The VPR-3's play-speed recording is purely a video edit. With a one second pre-roll, and a 3 frame post-roll and re-cue, it can accomplish a 6 frame animation sequence in only 1.6 seconds (required for one cell), plus only a tenth of a second longer to complete the remaining 5 frames!

This all comes together, of course, in an edit suite or graphics suite. Depending on your needs, remote record/playback control of the VPR-3 recorder, Betacam™ CVR-75 recorder, and the VPR-6 recorder is possible. Or if you have a digital disc recorder with internal keying capabilities, the post-ing can be handled off-line in a graphics suite.



The AVA-3 system's linear key provides a high quality irregular shape graphic that's perfect for an ADO Digi-Matte or a switcher...



and keying irregular shapes is fundamental to the layering process.

AVA-3

VIDEO ART SYSTEM

The AVA™3 Video Art system provides powerful design capabilities to the video artist. 716 pixels/line resolution, an 8-bit *linear key*, true perspective and rotation (derived from ADO™ technology), and a set of computer graphic design tools is only part of the story.

All-digital processing techniques and an internal 4:4:4:4, R-G-B-A system ensure the sharpest images and reduced chroma crawl. The result is a significantly better picture that holds up in the production process.

Layout Mode

The AVA-3 system's *Layout* mode and other geometric drawing aids offer significant time-savings and creative flexibility in developing graphics. Computer power lets you quickly develop many versions of an art work, and then change color, shape, size, or whatever, without redrawing the graphic each time.

Text Generation

You have full control over type style, height, width, color, and kerning. An *auto-emboss* and *solid* mode allows for rapid creation of these popular text styles. In short, the AVA-3 system provides the easiest and most powerful text creation available on any paint system!

Integrated Record Machine Control

Control the record VTR or Disk Recorder right from the tablet! You'll be amazed at the time you save, not to mention the money. A real plus for both the artist, and for management.

Magnify . . . with No Image Degradation!

Work in *magnify* as many times as you wish (to 1/64th of the picture) with no image degradation. And the *track-ball* gives you precise control in painting or retouching as you move around within the image. You'll also find that our small-size airbrushes maintain their even flow and provide detail power.



Powerful Cataloging and Storage

It's easy for you to organize and file completed images or work in progress, including the brushes and colors you work with. A user-friendly picture file management system operates like a still-store, providing a quick and easy method for storing, reviewing and retrieving your tools and work. The file manager stores images alphanumerically, and searches for them using "key" words.

8-Bit Linear Key

Imagine a single irregular shape floating into position on your frame. Imagine that it is partially transparent, partially opaque, and is resting on a perfectly keyed, airbrushed cloud with very soft edges. Now use AVA-3 and ADO with Digi-Matte™ with unparalleled keying power to make your imagination come to life!

CCIR-601 Digital I/O*

No image degradation when transferring images between the AVA-3 system and other digital CCIR-601 compatible machines, including VTRs and special effects systems. It's done entirely in the digital domain!

Complete System Flexibility

The AVA-3 system is designed to work as an integral part of a system with other Ampex products like ESS, VPR-3, Betacam, and the ADO.

*optional

Specifications

MAIN OUTPUT FEATURES

Analog composite with selectable Analog RGB or Y, R-Y, B-Y
All digital encoder design
No adjustments
High reliability
Minimum drift
True IQ encoding (NTSC)
NTSC, PAL AND PAL-M available
Sub pixel H position/timing
Digital comb filter (minimizes cross color artifacts)
NTSC, PAL, PAL-M

AVA-3 VIDEO I/O PERFORMANCE SPECIFICATIONS

ELECTRICAL		
Power consumption		2000 W max
Line variation limits	Amplitude	90-130 V or 180-260 V
	Frequency	47 Hz to 60 Hz
ENVIRONMENTAL		
Temperature range (operational)		10 to 40°C
Relative humidity (non-condensing)		10%–90%
GENERAL		
Inputs	Composite (NTSC, PAL, PAL-M) Reference (black burst) RGB (optional) Y,R,Y,B-Y (optional) Key (optional) CCIR-601 and Digital Key (optional)	1 Vp-p into 75 Ohms terminating 300 mV non-terminating 700 mV into 75 Ohms terminating 700 mV into 75 Ohms terminating 700 mV into 75 Ohms terminating
Outputs	Menu RGB Menu sync Main RGB Main Y,R,Y,B-Y Main composite NTSC (2 each) Main composite PAL (2 each) Main composite PAL-M (2 each) Key NTSC, PAL and PAL-M are available but exclusive of each other CCIR and Digital Key (optional)	700 mVp-p 75 Ohms 300 mV 75 Ohms 1 Vp-p (300 mV sync) 75 Ohms 1 Vp-p (300 mV sync) 75 Ohms 1 Vp-p (286 mV sync) 75 Ohms 1 Vp-p (300 mV sync) 75 Ohms 1 Vp-p (300 mV sync) 75 Ohms 700 mVp-p 75 Ohms

PERFORMANCE (Video output only, measured using internal test signals)

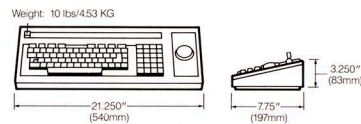
	Composite	RGB/Y,R-Y,B-Y	Key
Differential phase/gain	<1 /1%	—	—
Non-linear distortion	<1%	<1%	<1%
K factor	<1%	<1%	<1%
S/N	>60 dB	>60 dB	>60 dB
Frequency response (Pr and Pb only)	0 – 5.0 MHz + / – 0.5 dB	0 – 5.0 MHz + / – 0.5 dB 0 – 2.5 MHz + / – 0.5 dB	0 – 5.0 MHz + / – 0.5 dB
C/L delay and gain	+ / – 10 ns & <0.2 dB	—	—

PERFORMANCE (Video throughput, measured using external legal test signals)

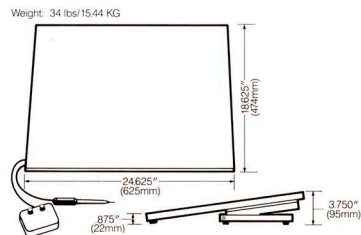
	Composite	RGB/Y,R-Y,B-Y	Key
Differential phase/gain	<2 /2%	—	—
Non-linear distortion	<2%	<2%	<2%
K factor	<2%	<2%	<2%
S/N	>50 dB	>50 dB	>46 dB
Frequency response 0 – 5.0 MHz + / – 0.5 dB (Pr and Pb only)	0 – 5.0 MHz + / – 0.5 dB	0 – 2.5 MHz + / – 0.5 dB	0 – 5.0 MHz + / – 0.5 dB
C/L delay and gain	+ / – 10 ns & <0.2 dB		

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

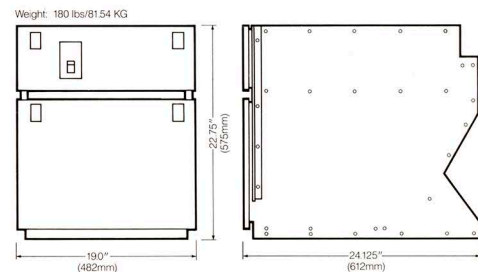
Keyboard



Tablet



Signal System



AMPEX

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