MEDIA

VIDEOTAPE VERSUS FILM Half-Inch, 16MM, and Super 8

by Louis Jaffe

In both film and videotape the moving picture is a series of still images. Actually, the film picture is still because the whole frame is exposed to light in a single flash of the shutter, but in video the different areas of the picture are traced at different times by the tip of a sweeping electron beam. One sweep of the entire picture is called a field.

Sixty fields appear each second. Two phosphorescent points continually trace the screen, using the same scanning pattern the reader's eye uses on a page. As one field fades, a second is being drawn. The constantly regenerating image on the screen is an exact reproduction of how motion is scanned electronically in the camera.

Watching sound film, we see twenty-four different pictures a second, interspersed with instants of darkness. In fact, the screen is dark about half the time, but the flicker rate meshes with the human eye's retinal image retention, and we see a persistent picture. This picture is the wall-sized, optically focused shadow of the image on the film.

The movie image is the light of the projector reflected off the screen, as the TV image is a surface of phosphorescent bits. Greys in the projected film are the light being kept from shining through the film by a barrier of silver grains. The light that does get through projects the pattern of the grain in the film which is the fabric of the image. The brightest part of a projected film image is white light passed through clear film and a lens and reflected off the white screen.

Watching television we see a sheet of glass, its far side coated with phosphors, being swept by the tips of two electron beams. The phosphorescence excited by the passage of the beams in several hundred geometrically exact lines is the television image. Its brightest part is the flash set off by the strongest electronic pulse recorded on the tape. It is an image with brilliance and luminosity that film can't achieve.

Of the many formats in film and video, there are just three in which the equipment for recording picture with sync sound can be carried and operated by one or two people and these formats are also the cheapest. The three, half inch tape, 16MM and super 8, are compared for vital statistics in the following table. The figures given are rough means and will vary widely among the many makes of equipment. The evaluation of image sharpness is based on just informal observation.

	½ IN. TAPE		16MM		SUPER 8	
CONTINUOUS RECORDING TIME:	30 min.		11 min. (400 ft. magazine)		2 min. 40 sec.	
SHARPNESS:	slightly below Super 8		double that of Super 8		slightly better than ½ in. tape	
PRICE OF MATERIALS:	$12/½ hour		$40/11 min. (B&W mag stripe processed) $110/½ hour		$4.00/2 min.–40 sec. (processed) $45/½ hour	
PRICE OF EQUIPMENT:	camera & port. deck	$1500	camera	$1400	camera	$250
	editor	1000	editor	150	editor	30
	monitor	250	tape recorder	400	projector	250
		$2750		$2650		$630
WEIGHT:	camera	4 lb.	camera	9 lb.	camera	3 lb.
	port. deck	16 lb.	tape recorder	6 lb.	tape recorder	4 lb.
		20 lb.		15 lb.		7 lb.

What these figures don't show is the production time difference between film and tape. Film takes hours or days to arrive at the point where tape is the instant after it is recorded.

No sync sound film process is as simple as video where sound and picture are recorded side by side on the same piece of tape and can be played back in sync immediately. The film process which comes closest uses a strip of magnetic emulsion on the film so that sound can be recorded in the camera. Using this method, you can have a sync-sound original ready for showing in a few hours. Other processes all have to go through the step of transferring separately-recorded sound onto the film, which means two separate trips to the lab with the cutting-room time in between.

At present, there are no battery-powered half inch portable video recorders that can record color. The first low-cost half inch color decks appeared recently, but there is still no portable color camera. All the figures in the table are for black and white.

In general it seems that half-inch tape is taking over from 16MM in documentary or reporting functions where easy sync-sound, long recording time, and immediate playback and replication are important, and film is holding its own with color and the big screen.

Because videotape stores information as electronic code, it interfaces with a wide variety of electronic systems. The television signal can be analyzed by a computer, just as information stored by a computer can be displayed on TV. The film process interfaces directly only with other photographic processes: film is printed onto film to make duplicates, individual frames are printed on paper to make photographs. For showing on TV, film is translated into electronic code and stored on videotape.
In film, copies are always inferior in quality to the original. When video is duplicated the signal can be electronically cleaned by a processing amplifier resulting in a second-generation image sharper and tonally richer than the original.

Video cameras have no moving parts and are silent. The 1/2" portable deck produces a low hum whether recording or not, so that people nearby don't know they are being recorded unless they see the tape reels turning. Some of the 1/2" portables are so silent that they do not seem to intrude on quiet conversations. People notice when a movie camera is running, because the system makes no noise at rest, but whirrs during filming.

Special effects such as fades from one image to another or superimposition of two images are accomplished in film by double exposure in the camera or special printing techniques in the lab. In video these effects are produced by electronic mixing of signals.

The film method is time consuming, and if a mistake is discovered after processing, the whole process must be repeated again on new film. In video, you just fiddle around with mixing controls, record, and re-record until you get the effect you want.

The film process is one in which variables can be changed one at a time through generations of experimentation where hours of cutting and calculation may be devoted to a few minutes on the screen, whereas the video image must be mixed while the tape is running in exactly the same length of time it takes to play it back. The tape can be re-recorded as many times as necessary to get it right, but the experimentation must be done in real time.

There is as yet no way to edit 1/2" tape as precisely as 16MM film. Editing film is a matter of cutting up the film, glueing it together in a new order, matching up the sound, and going to the lab for a new print. In 1/2" videotape there are complications to this method. First, the helical scan means that there is no one point on the tape where an editor can physically cut between pictures; they all over-lap. A second problem is the track of control pulses which lies next to the sound cut.

To circumvent these problems of physical cutting, videotape is edited by duplicating from one tape machine to another. The original tapes are played on one machine and selected sections from them are recorded on the other. This method creates the problem of timing the instant when, as the first tape recorder is playing, you switch the second onto "record." You have a sequence already copied down on the second machine which you want to end at a specific point, and you are going to add on a following sequence from the original tapes playing on the first machine which begins at a specific instant. With both machines rolling, how do you manage to reach the end of the sequence on machine two at the same instant you reach the beginning of the sequence on machine one?

In order to fix this instant, the machines would have to be rolling together with absolute interlock. At present, no interlock system exists in 1/2" tape, and you have to accept minimum half-second errors in cutting, which makes editing dialog very difficult. Although these editing problems have been completely solved by computerization of the process, the cost is high, and the solutions haven't been applied to 1/2".

To summarize the videotape process: optical image and sound are both translated to electronic code and recorded magnetically. They are played by the exact reverse of the recording process. One signal brings image to picture tube, the other brings sound to speaker.

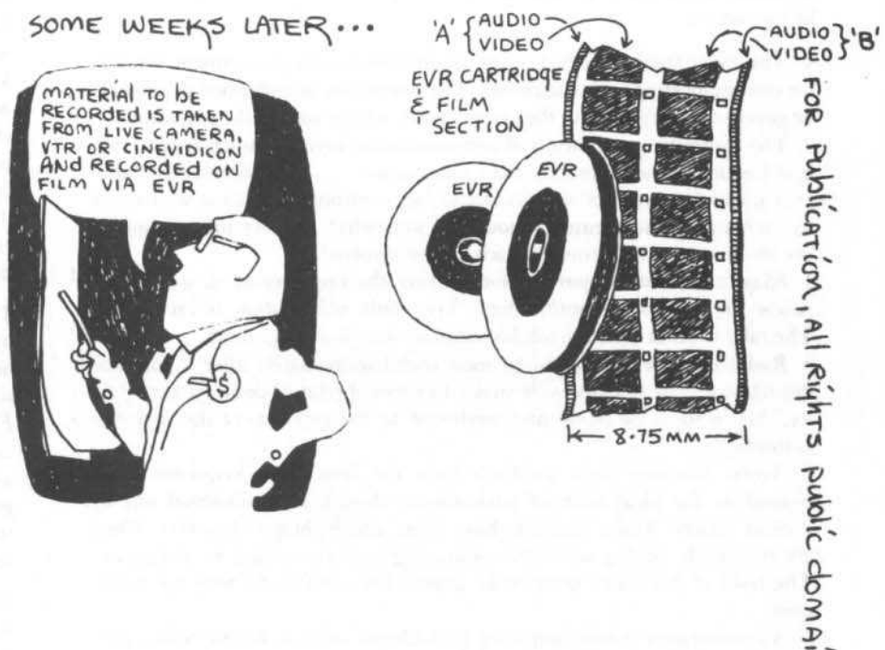
The film progression is: Optical image preserved on film through chemical processing becomes stencil for optical projection. Sound is recorded magnetically, translated to optical code stored on film beside image, and translated back to electronic signal for playback.

The film process is a one way avenue out from experience recorded, as tape is both an avenue out, and a circuit of immediate feedback into the experience as it occurs. Videotape can be played back as soon as it is recorded, and seen as part of the situation that produced it. It is this capability which gives tape a clear advantage over film for use in all forms of educational experience, from encounter groups to industrial training, where it is valuable for people to see themselves in action as others see them, while they still remember freshly how they felt as they were being recorded.

Film isolates events for people to see in a theatrical context at a later time. Tape can create the same contextual isolation of subject (if it is not played back right after recording) but it can never duplicate the theatrical setting of film. Going to theater, or even setting up home projector and screen, is a special excursion. To watch a film we drop what we are doing, darken the room, and gather in the dark with our attention focused on the screen, which is the only light in the room.

As movies are a theatrical experience, television is part of our "normal lives." The television set is a piece of furniture in everybody's house. We watch TV with the lights on and often leave it on at the edge of what we are doing. A face filling the largest home TV screen is just about life-size.

UNDERSTANDING



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