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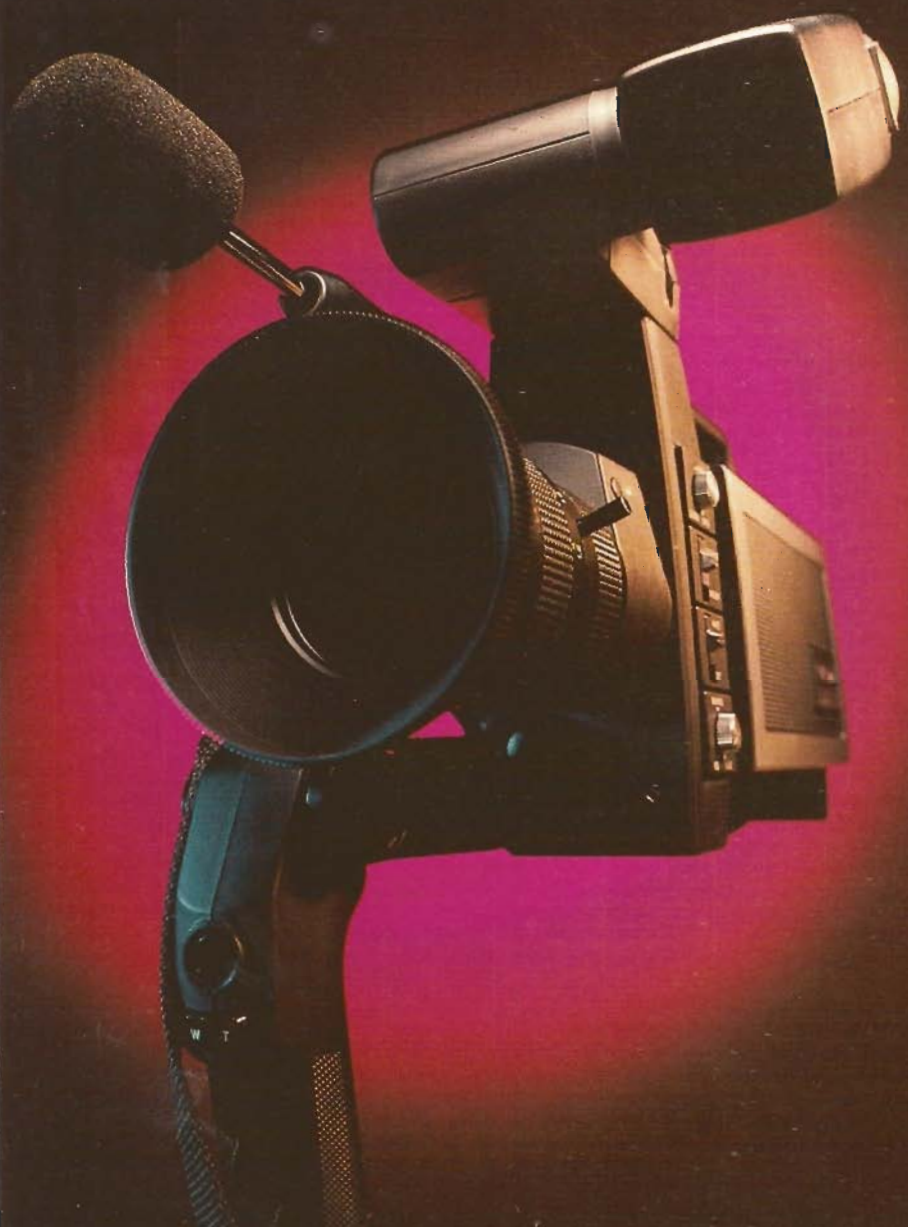★ Video News
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MARCH 1987

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Camera! *Action!*

A GUIDE TO

VIDEO MOVIE MAKING

BASICALLY, a video camera is no more than a movie camera using electronic "film," and you can use it in much the same way. Thus, almost anything you know about movie-making, whether from experience or books, is useful. On the other hand, there are significant differences between the formats as well as the cameras that should be respected.

First, since a TV camera tube can be damaged by too much light, one should never point the camera directly at a concentrated light source such as a lamp or the sun. (You can point it at the sky, however.) Also, whenever you're not actually shooting, your lens should be capped, or its iris closed completely if possible. Using the lens cap offers the bonus of protecting the lens as well as the camera tube.

THE QUESTION OF COLOR. Another significant difference is the way video and film cameras deal with light's changing colors. Sunlight is blue, cloudy light is bluer, lightbulbs are reddish, and fluorescents have a green cast. Your eye and brain correct for this in real life, but not when you're looking at a picture. Photographers compensate by using films corrected for daylight or tungsten (bulb) light, or by using filters. Some video cameras use filters, too, but most balance color via switches or controls.

If your camera has only an Indoor/Day switch and a red/blue adjustment knob, just check the switch position, and set the knob to its center click-stop. If the camera has a color-balance meter or if you have a color monitor screen for viewing the image, you can use it to set the color fine adjustment more precisely. To use built-in color meters or automatic color-setting circuits, the camera must be aimed at a white object—color will cause imbalance.

Fluorescent light demands special

I. Using a Video Camera

measures, especially if your camera has only a red/blue adjustment. To tame the excess green, you might try a photographic filter (an FL-D with the camera set to daylight or an FL-B with an indoor setting) designed for that purpose. While not perfect, the results should be acceptable.

When shooting out of doors, remember that light changes color as the day progresses. Avoid shooting actions at different times of day if they are supposed to be contiguous in time—the color of the light may give you away. If you have a color meter or a monitor, recheck your color every half-hour or so (more at the beginning and end of the day), between sequences. If the color of the light has drifted, don't correct it till the action has shifted to a different time or place.

VERTIGO. Amateur movie makers make mistakes, through carelessness or misplaced enthusiasm, that can make audiences dizzy. The worst of these is forgetting to focus. Electronic, video-screen view-finders make that one rather obvious, and hence easy to avoid. Even so, some amateurs may forget to refocus when the subject moves after the shot begins, and even auto-focus cameras can be fooled when that happens.

Refocusing on a moving target isn't easy. It helps to mark the lens with spots of thick, easily removed tape (such as drafting or gaffer tape) at the near and far focus points. Then you can refocus by feel, with less chance of overshooting. If you can get someone to operate the focus control during the shot for you, so much the better—professionals sometimes use assistants this way.

Camera shake, too, is dizzying, so make sure your camera is as steady as possible. Use a good tripod whenever you can. For shots that require more mobility; use shoulder-pods or shoulder-pods with belly-rest attachments (Akai just introduced one) to steady the camera. When hand-holding the camera, find a stable body position, and use any available rests such as fences, lamp-posts, and parked cars.

Do your best to keep vertical lines vertical and horizontal ones horizontal. When you can't do both at once—as you can't when shooting at an angle to your subject—it's usually best to keep the vertical lines straight and let the horizontal tilt.

Flitting around by use of a zoom is a popular way to send the audience scurrying for motion-sickness pills. Zooming is marvelous where appropriate, but it doesn't go with everything. Don't zoom unless it really contributes to visual imagery. An occasional slow zoom can make a nice transition between long-shot and closeup. A fast zoom can exaggerate the rush as a roller-coaster heads downhill, or serve as a visual exclamation point by suddenly isolating a significant detail. But most often, it's best to zoom between shots, not during them.

Panning and tilting—horizontal and vertical camera movement—should be used only when there is no other choice. They are best executed with the camera on a tripod with a pan and tilt head (which includes most tripods, nowadays).

MAKE THE MOST OF YOUR LENS. Change a lens's focal length—which is what zooming does—and you change both its magnification and its angle of view. Increase the focal length (from 12 mm to 72 mm, for instance), and the angle of view narrows, picking up less and less of the scene, but showing it larger and larger. Decreasing the focal length makes objects within the field look smaller and smaller, but picks up more of them.

By still-photography standards, video shots aren't very wide. The widest angle available on home-video zoom lenses is just about equal to that of a "normal" lens on a still camera. The telephoto effects possible, though, are more extensive than in still photos.

Lens settings can be used in two ways. The simpler is to shoot from any convenient spot and use the zoom to frame the shot. The more subtle and satisfying way is to use lens setting to control perspective.

Image size depends on both the camera's distance from the subject and the lens setting. As you back away, you can use a longer focal length to compensate. That keeps the image size the same, but the perspective changes. Apparent distance between objects depends on their relative distance from the camera. If two people are 10 feet apart, and you're shooting five feet from the nearer one, the other one is three times as far away, and looks it—he'll look considerably smaller, too. But at a distance of 100 feet from the first, the second one is only 10 percent farther away, and both look about the same size.

Relative distance has other effects, too. If you're filling the TV frame with someone's face, don't get too close. Stand about 10 feet away and adjust focal length for proper framing. Moving in closer (which would require a wide-angle setting to avoid cropping the face) will make the subject's nose stand out like a miniature mountain.

CAMERA SHOTS AS LANGUAGE. Lens settings and angles convey messages. For example, a tight close-up head shot concentrates our attention on the subject, and drops the surroundings out of the frame. A wide-angle shot emphasizes the relationship between subject and surroundings. A high-angle shot shrinks things and people; a low-angle, makes them look larger, more imposing.

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Standard film structure is to start scenes with a long-shot, to establish everyone's relationship to the scene and each other, then cut to a medium-shot to concentrate attention, then to close-ups. "Standard" shouldn't mean invariable, though. You can change the order of these shots. (Starting with the close-up and leaving its setting a bit of a mystery until the long-shot is a popular trick.) You can omit a shot (long-shots are rarely needed to establish two people talking in a car). And you must vary the timing of each shot according to the action on the screen.

Comic strips are full of artfully mixed long-shots, medium-shots, and close-ups; observe them carefully and you'll learn a lot about how to give a story visual flow. Also, watch and rewatch the best of the shows you've taped. Running at fast-motion speeds sometimes helps one concentrate on structure this way. But once you've learned the structure, go back and relate it to the content: don't stop at learning how a program was put together, keep on till you think you know why.

You'll probably use more close-ups and moderate long-shots for video's small screen than you would if shooting for the movie theater's large one. And don't forget that many video lenses, today, have macro settings that let you shoot small objects large enough to fill the screen. Macrophotography, too, can wear out its welcome quickly, so don't overuse it. Also, at extreme macro settings, your subject may be so close to the lens that you can't light it properly.

A shot with a normal camera angle is shown at left above. At center, a low camera angle was used, making the subject loom large. The chin and nostrils are accented, giving an unflattering rendition of the face. At right, the shot is taken from a high angle so that the subject is compressed and the observer towers above it.

Even when the action is being staged for you, varying your shots takes extra work. The best way to do it is to start the action for the first shot, tape a little past the point where you intend to edit in the next, roll back the tape a little, start the action over for the new shot, then re-start the tape when the action reaches your edit point. The action runs smoother that way than if

Comic strips can be useful as models for sequences of shots. In this example, radical changes of viewing angle—tight closeup to long-shot from the opposite direction and finally to a medium closeup with another reversal of direction—adds tension and suggests action.

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your actors have to start and stop at the very instant that your tape does.

When the action isn't being staged for you, you can't use the above technique. What you can do is zoom between long-shot and close-up (when you must, you must). Or use cutaways: cover up gaps in your action by cutting away from it to something else. Is the character in your medium-shot staring out the window? Then show what he sees before cutting to a close-up or long-shot. Show something silent, and you can dub in more dialogue or narration to go with that shot later.

EXPOSURE. Most video cameras have an autoiris, which opens or closes the lens's diaphragm to keep the amount of light reaching the camera tube relatively constant even when the light on the scene changes. Many also have automatic sensitivity controls, which vary how much light the tube needs. Under normal circumstances, these will be enough to keep you out of serious trouble.

But circumstances aren't always normal. Take the common case of a backlit subject, dark against a bright background like the sky. The camera will set its exposure to the average brightness of the subject and its background. Where the background is big enough to dominate, the result will be a picture whose background is a bit too bright and whose subject so dark as to be in silhouette. The backlight switch on some cameras opens the lens a bit, to give the subject enough exposure (this washes out the background, of course, but that matters

Shot at top was taken with lens with a 35-mm focal length. Since the pinwheels at right are closer to the camera, they are rendered much larger. Using an 180-mm (telephoto) lens, in the lower shot, distance between pinwheels is almost negligible compared to distance to camera so the objects appear to be about the same size and sense of depth is reduced.

less). Opening a manual iris control about one stop past the exposure that the camera's auto-exposure system would set does the same thing. A manual iris control can also be closed a bit to compensate for the rarer case of a bright subject against a dark background.

If your camera has either a manual diaphragm and auto sensitivity control, or vice versa, you can also play tricks with depth of field—the depth of the in-focus zone at any distance setting. The sensitivity control varies the amount of light the tube needs or will accept. The more sensitive the setting, the more you can close down the iris and the greater the depth of field.

The sensitivity control's range isn't enough to let you vary depth of field much; but where you must either get foreground and background into focus at once or make your focus shallower to blur distracting backgrounds, that small difference may prove significant. Don't use the sensitivity control unless you have to, though. Raising the sensitivity makes the picture noisier and increases the camera tube's lagging or streaking when objects (especially bright ones) move.

If you keep the sensitivity constant, you can use a manual iris control to simulate night scenes by deliberately under-exposing. (You might also want to turn the camera's color control toward blue or use a filter.) Conversely, slight over-exposure gives the effect of a really bright desert or beach scene.

Many of the newer cameras have controls that automatically fade the image out to black at the end of a scene, then fade the next one back into full brightness. These are usually preset—nothing happens when you press the fade button, only when you start or stop the tape with the camera trigger. On many cameras, pushing the button at the wrong time will lead to such odd results as shots that start at full brightness, then immediately fade to black. To avoid such traps, read your camera's instructions carefully.

A   B   C   D

The importance of exposure: (A) An automatic camera, reading strong light from background, closes the lens, underexposing the subject in foreground. (B) With the lens opened 7 f-stops further, the subject is exposed, but the background washes out. (C) A fill light on the camera partially offsets strong backlight. Lens is open 3 stops wider than at (A). (D) When lens is set at f/16, depth of field is greater, and subject and background are both in focus.

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II. Lighting

WHAT YOU SEE on screen depends on what your camera sees—and that depends on how the scene is lit. Lighting for video or movies is harder than for still photography, because the camera and actors may move. Since you can't move the lights in midscene without attracting attention, you must light each scene in a way that will work for everything that goes on. It also pays to rehearse at least once with the lights and camera, to make sure the lighting works for the entire scene.

OUTDOOR LIGHTING. When we think of outdoor light, we think of the sun, but bright sun is not the easiest or best outdoor light to work with. It gives too much contrast—the camera can't show details in the shadows without letting the highlights wash out, or show highlight detail without having the shadows go to an undifferentiated black.

There are two ways to check contrast. If your camera has an electronic viewfinder, use it to judge how well the scene is registering. If not, use a photographic light meter (an incident type that measures the light falling on the subject rather than the light reflected from it is best), carrying it right up to the subject to check highlight and shadow areas separately. Video's contrast range is less than that of film; try to keep a ratio of about seven f-stops (and no more than 10) between the brightest and darkest areas where you want details. You may want some areas to go black or (less often) be washed out, depending on the dramatic effects desired. However, those must be unimportant areas.

If the sun's out, the contrast will be high, but there are ways to modify it. One is to shoot against the sun, so that the side of

the subject that is facing you is the shadow. That shadow won't be deep, since it's still illuminated by the broad, bright sky. And the contrast on this shadow side will be low, because the sky is such a broad light source.

Since your camera usually sees a small, dark subject against a broad, bright background, it will be fooled into exposing for a bright subject. To correct this, use the camera's backlight control, or open up the iris about one stop more than the auto-iris control would.. Be aware, too, that the background will wash out when you do this—so either look for a dark background or one whose details are completely unimportant to you. A washed-out background usually spells "bright day" to an audience; be sure that's the effect you want to give.

Whatever you do, the sun itself must *never* be in the camera's field of view. That can ruin a camera tube, and is certain to cause at least temporary burn spots.

Another way to tame outdoor contrasts is to wait for a cloudy moment or a cloudy day. You'll need backlight compensation if the sky is the background—cloudy skies are brighter than they seem. Make sure the sun is not where it can pop out from behind the clouds and burn the camera tube.

Still another trick is to pick an area of open shade, where the sun doesn't shine but the scene is open to the sky. This frequently has the advantage of providing an equally well-shaded background, but it may also result in too low a contrast ratio. Covered shade (under a tree, for instance) may give an even lower contrast, making the picture look dull and flat.

But you can manipulate outdoor lighting contrasts with a little extra gear. If the contrast is too high, you can use large reflec-

tors (large, white cardboard sheets or cardboards covered with crinkled aluminum foil) to fill in the shadows with extra light. If the contrast is too low, you can sometimes use the same reflectors to add extra illumination to the highlight areas. You'll have to find some way to aim these reflectors, and to keep them aimed should the wind blow. You can use light stands, but human assistants do a better job, especially when it's windy.

You can also use screens of thin or loosely woven white fabric to soften the light from the sun, creating a degree of artificial shade. These require less aiming than reflectors, but wind will still be a problem.

INDOOR LIGHT. There are at least three basic ways to light interior scenes: the studio approach, bounce lighting, and duplicating the room's existing light set-up. (A fourth way, putting a light weight movie light atop the camera, is simple, inexpensive, and looks terrible.)

The third way sounds odd. If the room is lit, why duplicate the lighting? Unfortunately, few rooms have enough illumination for good video or movie shooting. The minimum for good quality is about 200 foot-candles (enough to allow an exposure of 1/30 at f/4.0 on ASA-100 film, in case you want to check it with a light meter). If you replace the room's existing lights with brighter ones (one good way is to replace the existing light bulbs with floodlight bulbs, if the fuses will take it), you duplicate the original lighting effects, yet get enough light for good exposure. Another simulation technique is to leave the normal room lights up, but supplement them with bright lights coming from the same direction, set up outside the camera's field of view.

That may not always be enough, however. Important action may take place in portions of the room that are relatively unlit. Lights may cast distracting shadows on the walls, or there may be multiple shadows. These don't bother us when we just look at the room but they are terrible when seen through the camera's "eye."

Extra lights can cure the problem.

Washing the wall with light from a broad floodlight (preferably mounted very high, or, if that's impossible, quite low) will eliminate or soften shadows. Lights bounced from the ceiling will create an even, overall level of illumination between the pools of light cast by the main lamps.

Another alternative is to start out with bounce light, then add additional lights for accent. Plain bounce light isn't enough—the results are dull and flat, with soft but nonetheless unattractive shadows in people's eye sockets. Use enough bounce light to ensure that there will be at least 100 foot-candles everywhere that action

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must be visible, then use other lights to create a natural look.

The studio approach ignores "realism" and illuminates for good exposure and good modeling of facial and other shapes.

The minimum requirement is a two-light set-up: a main light (mounted as high as possible, so its shadows will fall below the camera's view) at 45 degrees from the camera position, and a weaker light (with about

A **B** **C** **D**

What lighting does for your camera work: (A) With light attached to camera, the face is fine but details are minimized, giving an impression of flatness. (B) One light 45° to the right of the camera gives more of a three-dimensional effect, but shadows are harsh. (C) A low-intensity fill light added to the set-up in (B) gives better illumination to the face leaving sense of depth. A single light 90° to the right of the subject (D) divides the face with a harsh shadow. (E) Fill light on camera added to (D) removes shadows.

one-half to one-fourth the light output) on the other side of the camera (it can also be nearer to the camera position), to fill in and soften the shadows. Additonal lights could be used to wash the background or as "rim

E

lights"—high-mounted lights shining down from behind subjects' heads, to illuminate the hair and keep the subjects from merging into the background.

Even indoors, it's important that the camera not point directly at bright lights. You can include the room's lights in the picture if the actual illumination is coming from much brighter lights that the camera can't see. When the overall illumination is bright enough, the camera's iris closes down, reducing the light that reaches the camera tube from the visible lamps. Use this technique only for brief shots, though, and be sure your main lights come from the room lamps. Don't move the camera during such shots, or the lights may leave "comet-tail" streaks due to camera lag.

Two other things to watch out for indoors are glare and color casts. Shiny surfaces like windows, mirrors and glass-covered pictures (even unglazed pictures on slick paper) can reflect hot-spots or glare patches into the lens. If that happens, move the lights till the glare is reflected away from the camera position.

Color casts are another type of reflection problem. Light bouncing from walls and ceilings picks up their color. If that color isn't white, your picture will have an off-color cast.

Color balance can cause problems, too. Daylight, after all, is blue and tungsten light is red. At least, that's how the camera sees them. While almost all cameras have switches to match either type of light (the exceptions can use light-balancing filters), sometimes that's not enough.

The classic case is the daytime interior shot. The scene is lit in tungsten orange, but daylight blue pours in the window. If the camera needn't see the scene outside, you can shade off the window to replace the missing daylight. Another solution is to cover the window with a sheet of Rosco filter gel (available from professional movie suppliers), which converts the blue outdoor light to match the interior. Daylight-color floods are also available, as are daylight filter gels to mount over the lights. Gels can be used for special color effects too.

Fluorescent lighting can also cause trouble. Its greenish tint can be corrected by the color controls on some cameras (chiefly, those with fluorescent-light positions on their light-balance switches, or with separate red and blue controls), or with filters. But it's almost impossible to successfully mix fluorescent and other types of light in one scene. Once you've corrected for fluorescents, use them alone.

Even ordinary floodlights have pitfalls if they aren't matched. Not all floodlights put out exactly the same color of light, and all run somewhat bluer than ordinary room-light bulbs. You can match any given type of light, but a mixture of different bulb types will give you redder light in some parts of the shot than in others. You may want that effect sometimes, but probably seldom.

III. Sound Recording

T**HE EASIEST WAY** to record sound for your video productions is to use your camera's built-in microphone, but unfortunately, this way is not the best. The built-in microphone can pick up noises from the power-zoom and auto-focus motors, the camera operator's breath, or hands rubbing on the camera body. And it can never get closer to the subject than the camera does—which is disastrous in long shots.

However, with an extension microphone plugged into your camera's MIC jack, new vistas will be opened. With a low-impedance microphone on a long cable or a wireless microphone and receiver, you can get close-up sound from distant subjects. With cardioid, shotgun, or parabolic microphones, you can get reasonably close sound from the camera position and exclude noise originating behind the microphone—and, to a lesser extent, toward its sides. Your add-on microphone may also improve the built-in mike's frequency response; just don't expect too much from that improvement, since the VCR's frequency response is usually as limited as the mike's.

If the sounds to be picked up become complex, or if you want to mix in other sounds (voice-over narration, sound effects, or music) as you tape, you can plug in a microphone mixer, too. While it's often more convenient to plug microphones into the camera (especially if the camera has an earphone jack for monitoring), mixers usually plug into the VCR's audio input jack, which is line level.

For drama and documentary, you usually want to keep your microphone out of the picture. You can do that with a microphone hung on a cord or boom over the action (beware of shadows) or mounted below camera level, with directional microphones outside the camera's view, or with microphones hidden in performers' clothing. But body microphones have two problems: they pick up the rustle of fabrics; and layers of cloth may muffle the pickup of performers' voices. One advantage, though, is reasonable freedom from wind noise. (For other microphone types—especially cardioids—use windscreens religiously, whenever you're outdoors.)

When you want microphones in the shot, as in musical performance numbers or man-on-the-street interviews, technical requirements are easier to fulfill. Just be sure all visible microphones are dull and nonreflective—chrome ones can create hot-spots.

If the sound accompanying the original action isn't up to snuff, it may be possible to do it over without reshooting the scene. That's what the audio dub switch on most VCRs is for. Of course it's far easier to get it right the first time than having to go back and redo things from scratch if overdubbing doesn't work.

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IV. Accessories, Effects and Postproduction

PUTTING **TOGETHER** your production doesn't end when you stop shooting. There's a lot you can do with the tape in the camera and a bit you can do afterwards, too.

Take editing, for example. If you're shooting a straightforward sequence of events, or one you can put into sequence, it's usually easiest to edit in the camera. Shoot your shots in the proper order, recheck each with your electronic finder or a TV set (portables, for field work), and reshoot when necessary before going on to the next shot.

If working that way isn't possible and you're staging events that switch back and

In copying slides to video tape, keep the equipment as far as possible from the screen to avoid distortion

forth between two locations, it's far more convenient to shoot all scenes at one location first, then move to the other and edit them into sequence later. If you haven't the facilities or time to check your shots right after making them, you'll have to edit out the unsuccessful ones. In documenting real-life action, where you have no control, editing after you shoot will almost always be necessary.

Editing video tape is not at all like editing audio tape or movie film. The latter are edited by cutting and splicing—something you should never do with video (sync loss at the joint will make the picture break up, and the splice is most likely to injure or gum up the video heads). Video editting is done by dubbing the original shots to another deck, in the desired order.

Sometimes, you may even want to "edit" a tape without changing its order or content. For example, you can permanently record onto the copy tape special effects (slow- or fast-motion, freeze-frame, frame-by-frame advance) which VCRs can only perform in playback. This ensures that you'll get the same effects, in exactly the same way, each time you play the copy.

All these editing techniques take at least two VCRs. (You might want to pool resources with a friend at editing time.) If the shots to be assembled are on two different cassettes, it may even pay to have three VCRs, dubbing alternately from each of the first two to the third one. Sometimes, you can even shoot with such a setup in mind. If you're cutting back and forth between scenes shot at two different locations, for example, you can use a different tape for each location.

The problem with using home equipment for this type of "assemble editing" is that you're liable to lose sync at each edit point. The key is to know your gear. Determine which of your two (or three) VCRs has the most glitch-free edits and whether it edits most cleanly when you enter record mode from STOP, PAUSE, or PLAY (which only some decks permit). Then always record onto the cleanest deck, using its cleanest mode. And always go directly from one deck's audio and video output jacks to the other's inputs—using the output and vhf antenna input degrades the signal needlessly.

In most major cities, you can rent special editing equipment. (Look in the Yellow Pages under "Recorders—Video" or "Video Recorders.") A typical, dedicated edit-

ing outfit might be a combination of two Sony SLO-383 Editing Betamax VCRs and RM-440 Editing Controller. The SLO-383 decks have special, automatic frame servo systems to ensure clean edits, rotary erase heads to erase old information field by field, and external sync inputs. The controller has a search dial for finding editing points easily, and a memory to help you relocate those points. It also lets you preview what an edit will look like.

SIGNAL PROCESSORS. Home VCR signals aren't great to begin with (signal-to-noise ratios for example, average between 35 and 45 dB), and dubbing only makes them worse. The problem can be minimized by using each deck's best performance speed (usually, but not always, its fastest one) at all times. You can reduce the degradation even more by dubbing through an enhancer, which can make the picture crisper and give you some color control.

Color processors and processing amps give you further color control, letting you adjust the color saturation, brightness, hue and flesh-tones.

Audio signal processors can also be used in video dubbing. Noise reduction can be used to clean up the original's output during dubbing and the final tape's sound in playback. Dolby or dbx can be used in making the final tape if you know decoders will be available for playback. Equalizers can also be used either to improve the sound or for special effects (such as narrowing the bandwidth for "telephone" response).

SPECIAL EFFECTS AND TITLING. Fade-ins, fade-outs, and color control aren't the only special effects available. A special-effects generator such as Sony's HVS-2000 lets you add a number of others to your creative arsenal. It has inputs for one color signal and one black-and-white one, which you can switch between or superimpose on one another. The black-and-white image can be colored, or reversed into a negative, for titling or other purposes. Panasonic has shown a prototype of a similar device, but with its own black-and-white camera built-in.

There are many other ways to title your productions. Sets of titling letters in many forms are available from home-movie equipment dealers, and press-on letters in a wide variety of sizes and type styles can be bought in art supply stores. Using a macro range, you can shoot the title and credits as they're being typed on a typewriter. (Better get a good typist for this, as you probably don't want to shoot mistakes being erased and retyped). You can even use the "random-note" technique of cutting and pasting letters from newspaper headlines, if that suits your production.
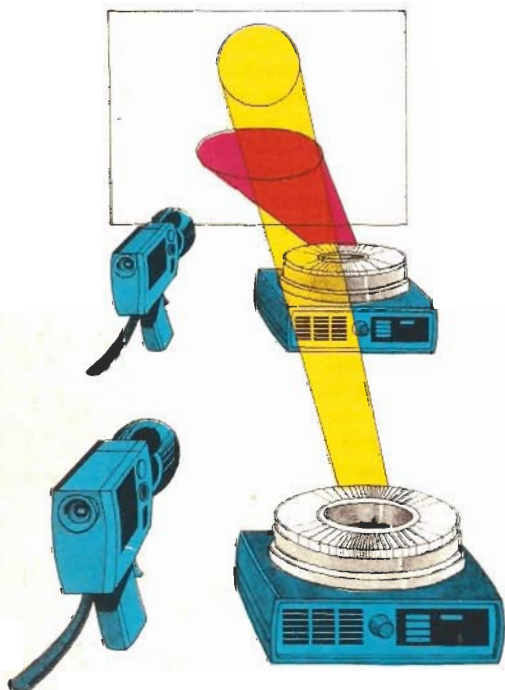
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V. Scripting, Continuity and Acting

My favorite technique also requires a macro lens: put the title on a 35-mm slide, mount the slide as close to the lens as you can focus, then focus out through the slide into the distance. By the time the camera is focused across the room, the slide will be so out of focus as to disappear.

Several companies, such as Quasar and JVC, sell "telecine" kits—special, rear-projection screen systems for use in copying movie films or slides onto video tape. The film or slide is projected on the screen, then shot with the camera. Lower-priced rear-projection screens are also available from many photo stores.

Rear-projection screens are used so that the camera and projector can both face the image head-on. With front-projection screens, the camera would either have to be directly in front of or behind the projector for this. If all you have is a a front-projection screen, use the longest projection lens you have, and set the camera's zoom lens to its longest settings. Then the few inches the projector and camera must be offset to clear each other's field of view will cause minimal parallax error.

ANY PRODUCTION—documentary, drama, or simple how-to-—must flow, dramatically and logically, or your audience will tune out. Generating that flow may or may not require a full-fledged script, but it will require deep and careful thought prior to shooting.

Consider first the purpose of your video production: What are you trying to say? Why are you saying it? Are you trying to instruct, inform, persuade?

Don't stop at generalities. *Romeo and Juliet* can be considered boy-meets-girl—but—boy-meets-girl isn't *Romeo and Juliet*. If it's romance, which boy? Which girl? And where? If it's engine repair, which section of which engine?

Then think in terms of a beginning, a middle, and an end. Beginnings aren't as sim-

ple as they sound. Do you start with how to change an alternator or how to tell if it needs to be changed? With the boy meeting the girl, or with background on both so you'll know what attractions and conflicts there will be between them? With the chicken or the egg?

Middles sometimes grow from beginnings, sometimes from ends. In nonfiction, the middle is usually straightforward; in fiction, you may have to invent complications to keep the beginning from launching you straight into the end—but those complications should grow naturally, since they're often the meat of the story.

Ends are sometimes preordained. In a how-to tape, for instance, the best end is usually a demonstration of the final result. If you've shown how to build a birdhouse, for

example, show the finished house in place, preferably with birds visibly endorsing it. But even surprise endings should seem preordained —in retrospect. Let the viewer see why your ending came out as it did, even if led to expect something else. And unless you're looking for an O. Henry effect (i.e., a surprise-ending), it's frequently best to put the big surprise just before the end, and give the viewers a chance to wind down from it.

There's room here only for generalities; but the airwaves are full of specifics. The best way to learn scripting is to tape a wide variety of programs of the type you want to make, then view and review the tapes till you understand how each one's script works. See what they have in common, how they differ, and why.

That last applies even to documentaries, where you have very limited control over what you shoot. Though you can sometimes stage a shot, you usually are stuck with what's there when your camera is ready. So find out as much as possible about what will be there. Are there regularly scheduled activities, and which ones do you think you'll want to tape? Are there people you know in advance you'll want to interview? (If so, have a list of questions ready beforehand, but be prepared to follow new trails their answers open up.) What kind of lighting will there be, and can you add more of your own? Are there good places to shoot from? How many hours' worth of tape and batteries will you need? (Bring more than you think you'll need.) Will you need any special permissions to shoot? Where and how do you get them?

Whether you're working from a script or not, be prepared to seize whatever picture opportunities arise. For example, a friend of mine, taping at a hospital, got the idea of shooting from a wheelchair, to show the world from that point of view. That meant shooting some scenes twice—once from the wheelchair and once from the normal, scripted viewpoint—but the results were worth it.

In some documentary situations, it may pay to start with film and convert to videotape after the editing is completed. Movie equipment is more portable (you carry just the camera, no shoulder-pack recorder, except with double-system sound). Movie film is easier to edit with precision, and there are many special effects available on film that aren't readily available on tape. Some of these, like cross-fading, can even be done in the camera. The drawback is that most film cameras only hold about 3½ minutes of film per load, and film and processing cost nearly as much per minute as video tape does per hour.

Whenever possible, there should be at least a short rehearsal beforehand, to make sure the action works and can be shot as planned. This will also let your cast concentrate on saying their lines with conviction, not worrying about whether they'll trip over the unfamiliar furniture or block one another from the camera's view. Don't overdo it, though—too much rehearsal loses spontaneity—and if you have an improvisational group, so much the better.

Be vigilant against continuity errors. If you don't shoot in strict sequence, make sure that a character who's supposed to have rushed from one scene to another hasn't mysteriously changed clothes between shots, and that any visible clocks show script time, not real time. Watch screen direction, too—if a character is traveling across the screen from right to left in one shot, he shouldn't go from left to right in the next unless you want to give the impressio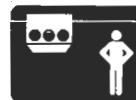n that he's headed back where he came from. **By Ivan Berger**