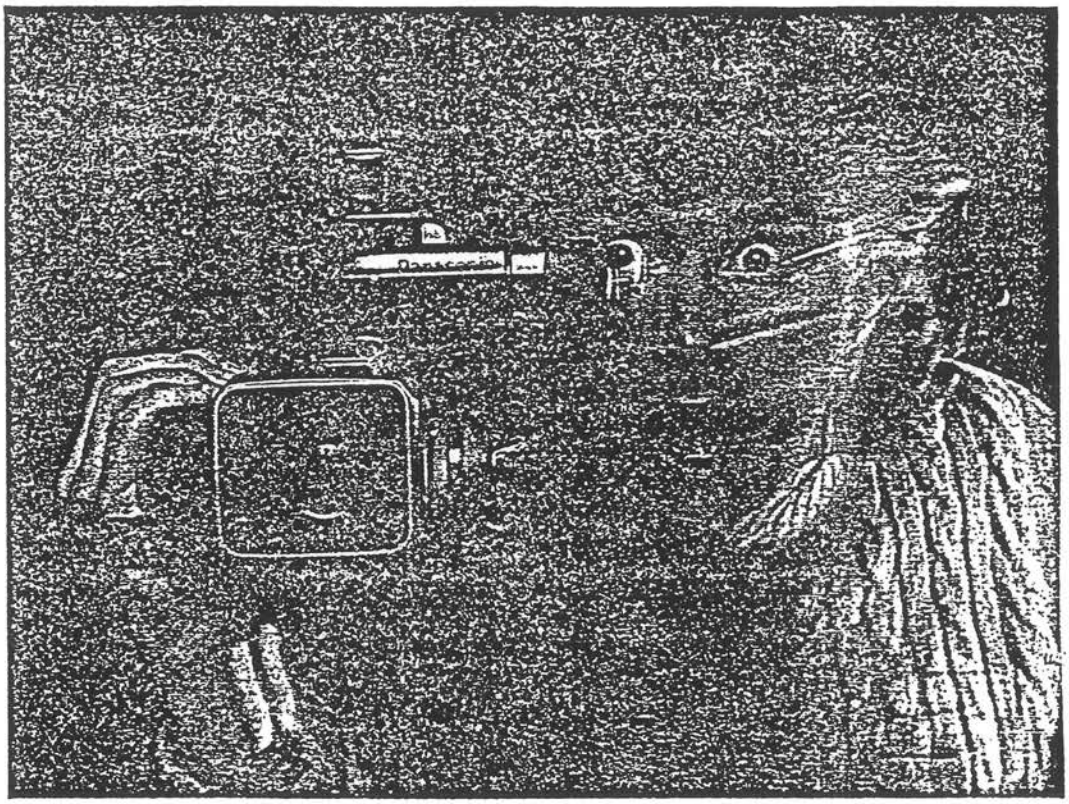
BY LANCELOT BRAITHWAITE

THE STEADYCAM



Smooth Shooter: Panasonic's PV-460 VHS camcorder reduces the onscreen effect of camera shake.

ROD COOK

Shoot jitter-free home videos with an innovative new camcorder that smooths the shakiest shots.

Unsteady hands have long hindered amateur moviemaking; the switch to video has only introduced the difficulty to a new corps of home movie enthusiasts. Amateur videos wobble and bob across so many living-room TVs that the problem can be said to be endemic to the medium. Professional cinematographers have help from the Steadicam, an ingenious but cumbersome device made of springs, braces and counterweights. So elegantly does a Steadicam suppress unwanted motion that its operator can race across a rocky ledge to pursue a subject, yet deliver the illusion of utterly fluid motion.

Videophiles are about to get the Steadicam advantage, but without the Steadicam's weight, complexity or high cost. An innovative new VHS camcorder by Panasonic, the PV-460, reduces by up to 75 percent the onscreen effect of superfluous body motion. Miniature motors move the lens and image sensor assembly to stabilize the camcorder while a tape is recording. Panasonic calls its new technology Electronic Image Stabilization (EIS).

In an exclusive demonstration for *Video Magazine*, the camcorder lived up to Panasonic's claims.

STEADYCAM

The EIS system can reduce image motion by up to 75 percent.

If it lives up to its promise and catches on with consumers, EIS has the potential to energize home videomaking. It should begin appearing in stores this summer.

The PV-460—in effect, a video steadycam—also has another camcorder first, linear motor autofocus, that calculates focal distance by vibrating selected lens elements. In other respects, the PV-460 resembles Panasonic's PV-330 and PV-S350, minus their digital circuitry and the latter's Super-VHS capability. Panasonic's suggested price for the PV-460 will be $1,999.

Before getting into more detail about the camcorder, consider the problem Panasonic scientists are struggling to overcome. We hardly ever notice how much we move our heads and bodies as we go about normal activities because our eyes and brains compensate for their motion. If we fix our attention on a subject, our eyes track it automatically. Even if we move quickly our gaze snaps back to a subject so fast we hardly notice our head has moved. For example, while driving a car our eyes remain glued to the road ahead even when the car and our bodies are jarred by bumps or potholes.

When we point a camcorder at a scene we try to hold it steady, but some unconscious body movement often sneaks through. As we try to follow an action, our movements are jerky and our eyes, glued to the viewfinder, compensate for the subject's movement, so we rarely notice the camcorder may be waving around like a conductor's baton.

While a tripod may be a satisfactory solution for some subjects, few amateurs want the bother of lugging yet another piece of gear everywhere they take their camcorders. Tripods have other disadvantages. Many subjects freeze or become inhibited at the sight of a camcorder. Mounting it on a tripod often only increases adverse reactions. Tripods also cut a camcorder's mobility, so there is less of the fluid feeling that hand-held operation can bring to shots. Even professionals know that at times they *must* take their cameras off their tripods to follow the action more freely.

Numerous ways of reducing camera shake have been used over the years. The simplest is to hold your breath during short takes. This reduces some of the rise and fall of your chest and shoulders. For longer takes try to breathe evenly and slowly. Other techniques include tucking the elbows against the torso for better support and moving the camcorder by swivelling at the waist rather than at the shoulders.

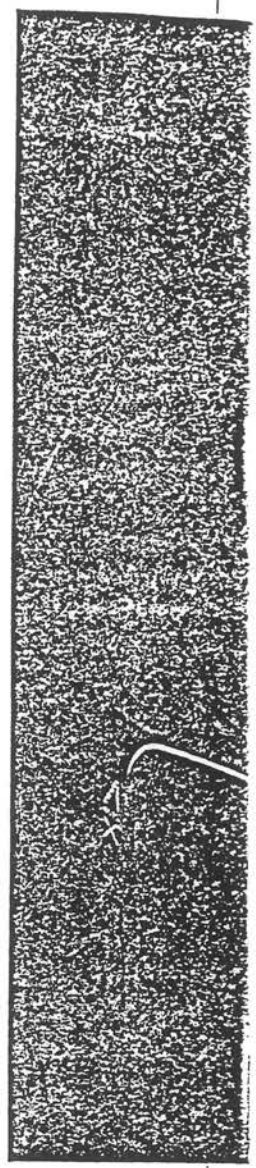
Professionals train hard to master these techniques. But even they found such tricks were not enough to get smooth, steady shots with hand-held cameras, so they eagerly latched onto the Steadicam when it became available in the late '70s. The Steadicam employs a body harness and weights strapped to a camera operator. The system damps unwanted motion, but is much too cumbersome for amateurs and so expensive that it is rented on a day-by-day basis.

PITCH AND YAW

Panasonic's EIS system is not a bulky external device, but a small, light mechanism built right into the camcorder. It consists of separate sensors and motors, called actuators, to compensate for vertical and horizontal motion, or pitch and yaw. The pitch sensor measures the quantity of vertical angular motion. The pitch actuator responds by moving the lens and sensor assembly an equal but opposite vertical angle to compensate. Similarly, the yaw sensor measures and the yaw actuator compensates for lateral angular motion. Since most motion is to some degree vertical and horizontal, both sensors operate at the same time.

This system would not have been practical before the invention of the solid state image sensor because earlier tube-type image sensors were long, bulky and heavy. The actuators would have had to be much bigger to move a lens-plus-tube assembly, and the camcorder would have needed extra room inside for the tube and the lens to swing. This would have meant much larger, heavier, costlier camcorders.

Panasonic's first version of the EIS system will reduce image motion to about 25 percent of actual camcorder motion. Panasonic demonstrated its capability by mounting the camcorder on a shake table similar to the devices that shake cans of paint in paint stores. The camcorder was pointed at a grid with identifiable lines. With the EIS off, the image moved about half the width of the screen. When the EIS was turned on, image motion was reduced to about one-tenth the width of the screen.



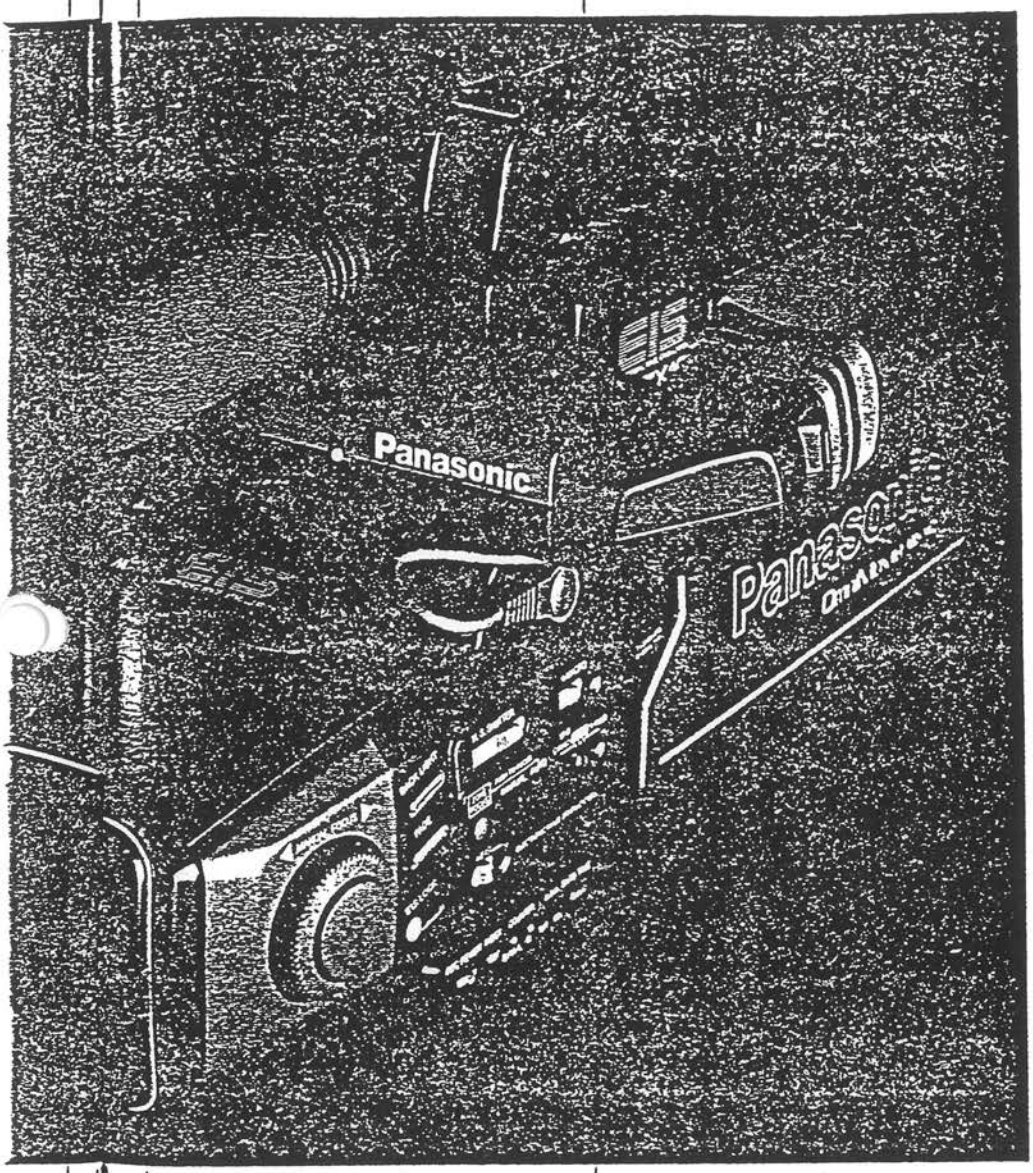
Shoot to Thrill: The EIS system, set inside a boxy lens housing (right), increases control over the PV-460's 10x zoom lens.

On this first EIS camcorder, the feature is switchable, but why anyone would want to turn it off is beyond me. We all shake a little even when we're trying hardest to hold a camcorder steady. We can always use some help.

EIS has a further benefit. Unwanted motion is most noticeable in telephoto shots. Indeed, the longer the focal length, the harder it is to control shake. A way to reduce jiggle makes longer telephoto lenses more practical. The PV-460 comes with a 10x zoom lens, and thanks to EIS you can use the lens more confidently at its longer focal lengths without worrying about making audiences seasick. It should even let you shoot relatively steady pictures from a moving car or boat.

The PV-460 looks like the PV-330 and PV-S350. However, instead of an exposed lens with an infrared autofocus window on

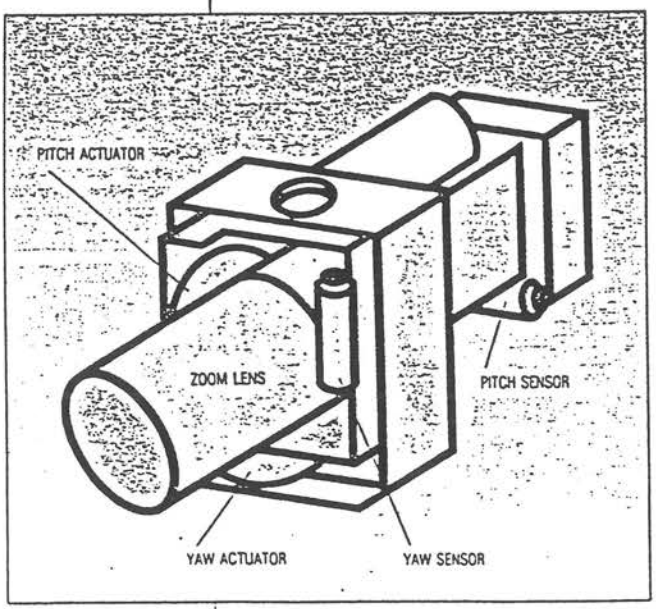
PHOTOS: ROD COOK



PHOTOS: ROD COOK

ILLUSTRATION: ELIOT BERGMAN

Jitter Enders: Pitch and yaw sensors in the lens housing of Panasonic's EIS camcorder (right) measure camera movement for which tiny motors, or actuators, compensate.



the lens support, a streamlined, glass-faced box covers the lens and the EIS mechanism. A large, comfortable knob on the left of the lens housing is for manual focus. There is no provision for manual zooming. It appears to weigh barely half a pound more than the previous models.

One of the benefits of full-sized VHS camcorders is that their size and weight help them deliver more stable pictures. Smaller camcorders could benefit from EIS even more than the PV-460. We're anxious to see if the EIS mechanism can be made small enough to steady VHS-Compact and 8mm camcorders, which tend to be waved around more than larger models.

The camcorder's linear motor autofocus is the latest of many efforts to improve focusing systems. Sonar-type systems use bursts of high-frequency sound and measure the time it takes to reflect from a subject. The camera translates the time into a distance and adjusts the focus accordingly. Infrared AF systems substitute IR beams to calculate distance, then adjust the lens to match. Newer piezo AF systems vibrate the image sensor and stop when the edges of objects deliver the sharpest peaks in the electrical images.

Linear motion AF vibrates selected lens elements to achieve sharp peaks in the electrical signal. It seemed to work quite well during our demonstration even when the shake table was briskly bouncing the camcorder.

The PV-460 is filled with other features to help make better tapes, including a flying erase head for in-camera edits without moire patterns and a high-speed shutter with 1/250-, 1/500- and 1/1000-second options. (If the EIS and a higher shutter speed are used, the camcorder will deliver very crisp pictures.) Its image sensor uses a 330,000-pixel CCD with a low-light sensitivity of 10 to 12 lux at f/1.6.

It has a full-sized head drum with two heads capable of only SP record and playback. Both video and audio dubbing are possible. Audio is mono linear track. Date and time generators are built in. A full character generator for titling is available as an accessory.

The PV-460 takes home videomaking a small step into the future and a giant step toward matching the fluid movements of professionally-shot tapes. ■