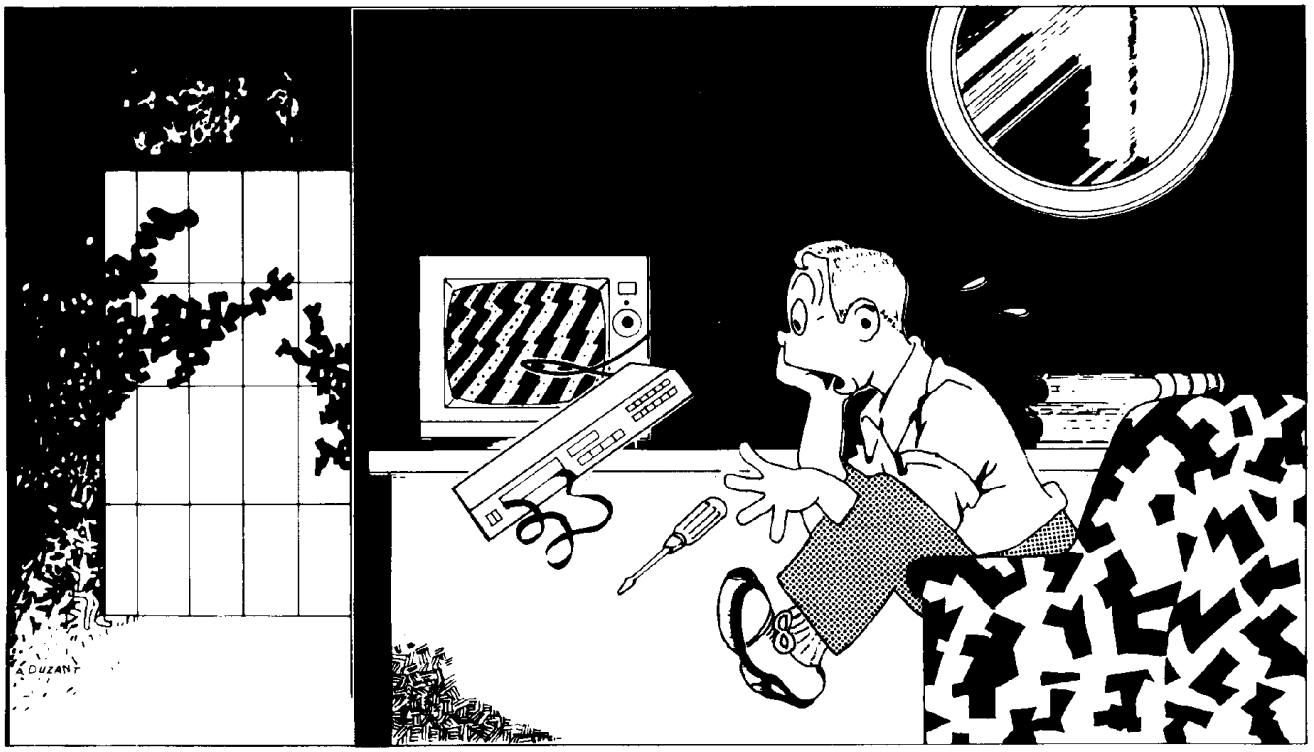

VCR SERVICING BASICS

This quick six-step approach can help you to isolate VCR failures.

BRIAN PHELPS

PEOPLE OFTEN HAVE QUESTIONS DEALING with VCR problems. One of the most frequent is: "How can I tell which circuit in my VCR is causing the symptoms I see on my TV or monitor?" This article will provide some of the answers to that question, and also discuss some valuable servicing tips.

One reason why it's sometimes so difficult to isolate a VCR failure is that almost any circuit can cause many different problems, and, quite often, the symptoms are misleading. Sometimes something unusual, such as a shorted switching transistor or a capstan- or cylinder-servo problem, may confuse a servicer into replacing a good component. Therefore, to avoid any unnecessary procedures, some kind of step-by-step process is required.

A step-by-step method

One way to isolate problems is by checking out the unit in the following order:

1—Visual inspection
2—Check microprocessor
3—Servos (cylinder and capstan)
4—Luminance
5—Chrominance
6—Audio

Visual inspection

Looking for the obvious includes things such as foreign objects that may be jammed inside the VCR. (You would be surprised what children might manage to stick inside an appliance). The tracking control may be out of the center-detent position, or the consumer may have locked-up their VCR in a program mode. At any rate, failure to check for the obvious problems first can send you on a wild goose chase.

Microprocessor analysis

There are some very basic things to check that concern the microprocessor.

- The B + supply for DC level, ripple, and any high-frequency glitches.
- The clock input for any DC voltage that should be there, the amplitude of the clock signal, and the frequency.
- The data inputs and outputs. We're mostly concerned that there is activity on those lines, and that the activity changes when different functions of the VCR are selected, rather than how the actual signals look.
- The reset pulse; it usually occurs between 0.5 and 1 second after B + is applied to the microprocessor. If the reset pulse is absent, the microprocessor may start its routine at any point, yielding some strange symptoms—if anything at all.

Servos

When troubleshooting servos, it is often helpful to use a block diagram (see Fig. 1). Before you start, however, you must decide which servo or servos you should be looking at.

You can determine if the problem is caused from the capstan or the cylinder servos by listening to the audio. The audio quality is dependent upon the rate at which the tape is being pulled by the capstan across the audio head. If the speed is incorrect, the

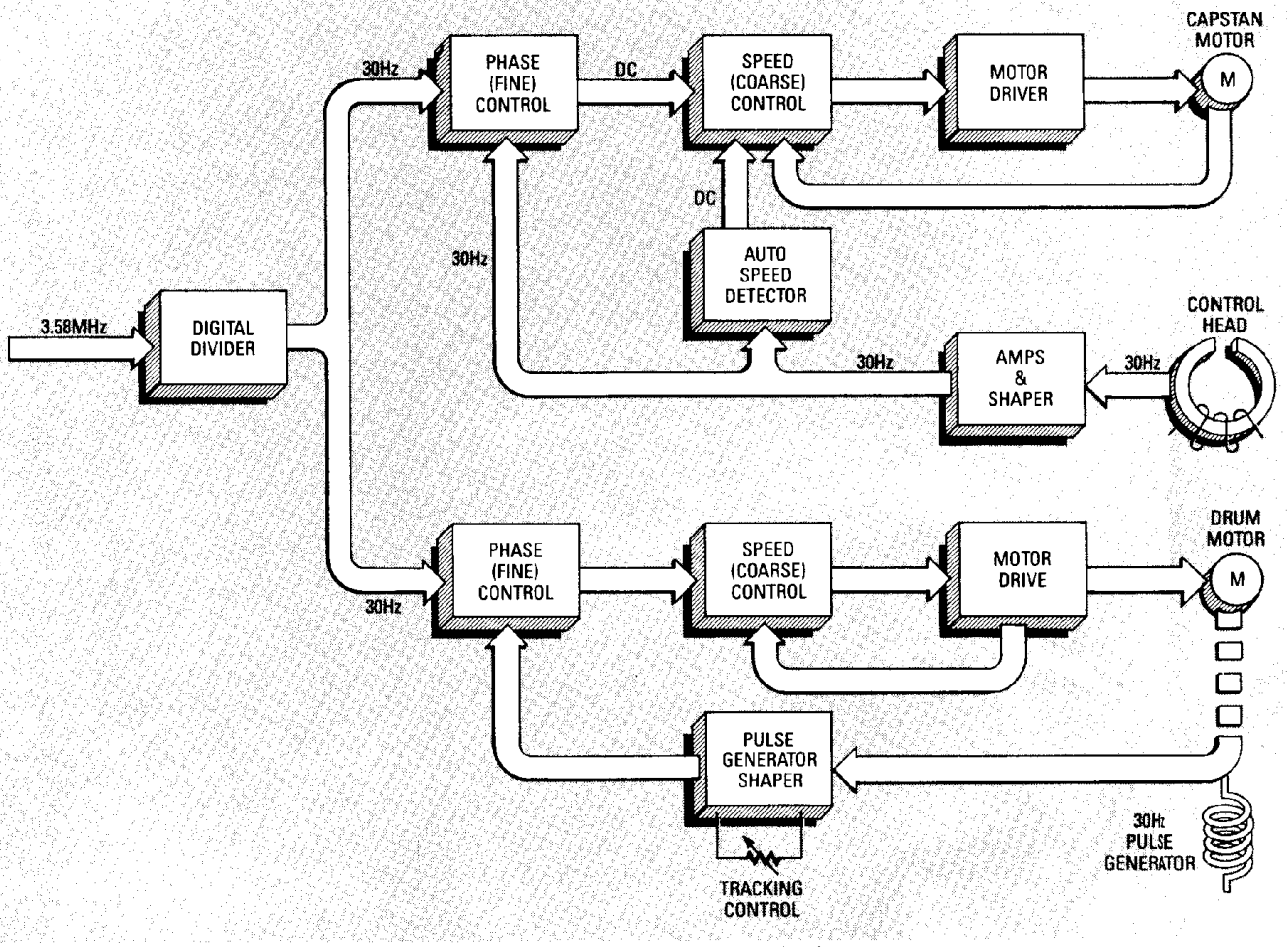

FIG. 1—THE BLOCK DIAGRAM of the servo circuits inside a VCR. A block diagram is often very helpful in troubleshooting because it shows you how the different sections of a circuit are interconnected.

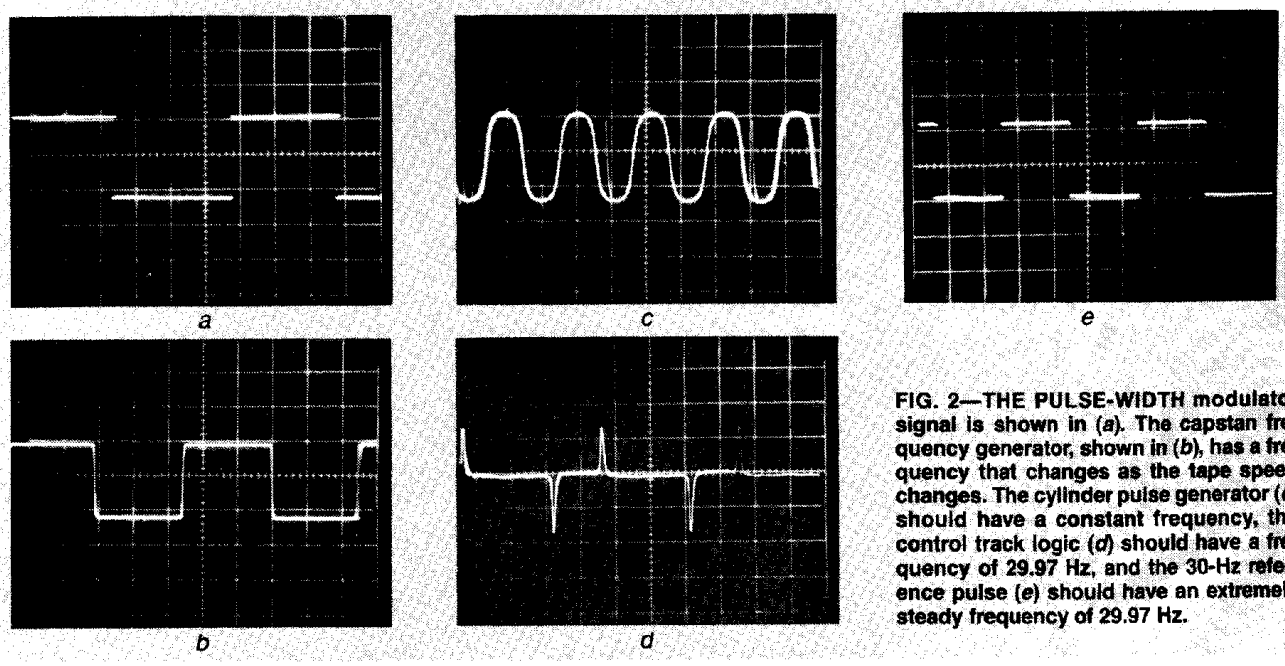

FIG. 2—THE PULSE-WIDTH modulator signal is shown in (*a*). The capstan frequency generator, shown in (*b*), has a frequency that changes as the tape speed changes. The cylinder pulse generator (*c*) should have a constant frequency, the control track logic (*d*) should have a frequency of 29.97 Hz, and the 30-Hz reference pulse (*e*) should have an extremely steady frequency of 29.97 Hz.

audio will sound distorted. But, if the audio sounds good, you should look at the cylinder servo circuitry.

When analyzing the servo circuits, there are some key signals to check. Those include the pulse-width modulator signal (PWM), the capstan frequency-generator signal (FG), the cylinder pulse-generator signal (PG),

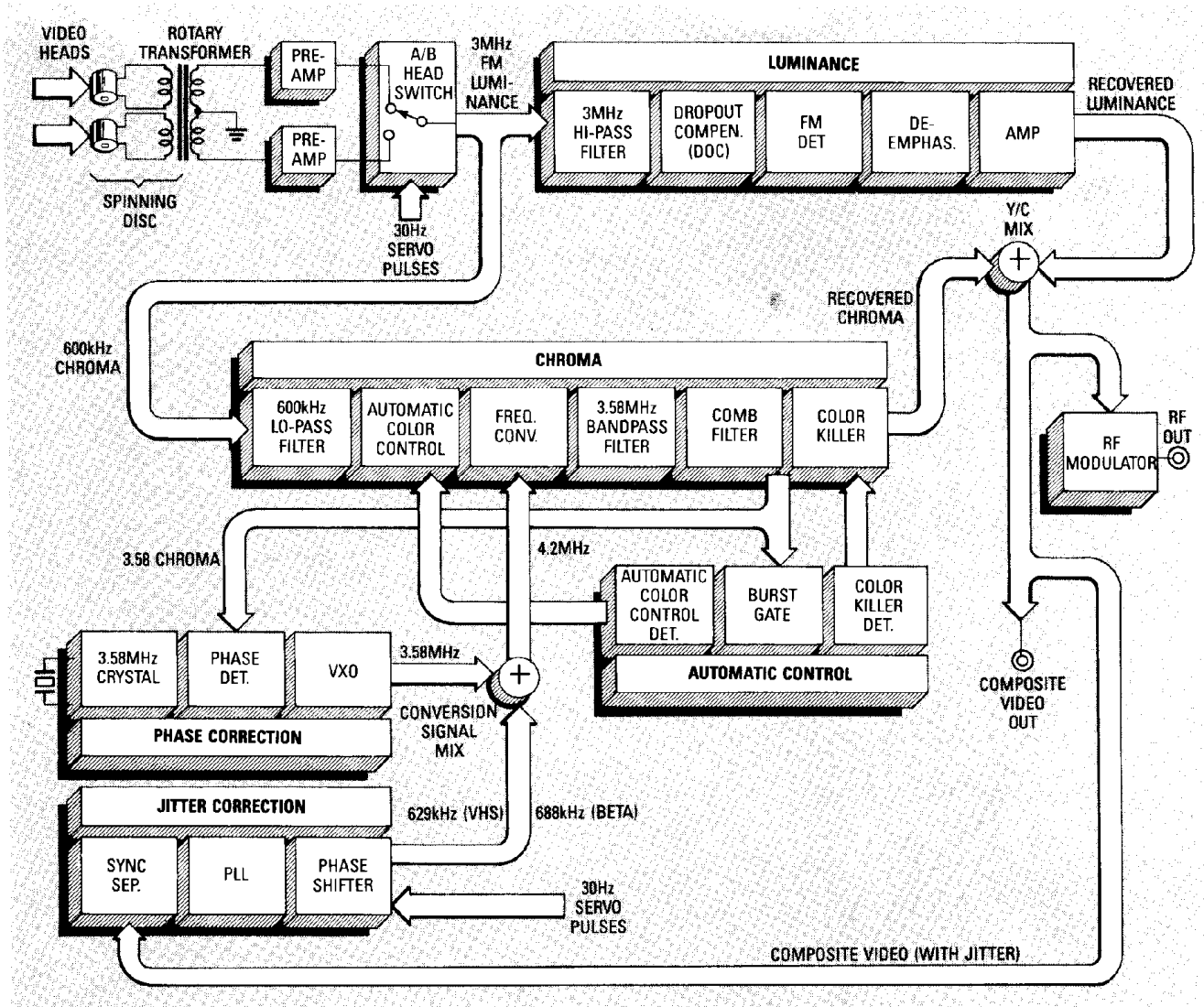

FIG. 3—THIS BLOCK DIAGRAM shows the video-processing circuitry inside a VCR. The circuitry inside all VCR's is similar.

the control-track logic pulse (CTL), and the 30-Hz reference signal. Figure 2 shows how those signals should look for proper servo operation.

Luminance circuitry

The luminance circuits typically produce failures ranging from noisy video to a lack of video. However, failures such as those can also be caused by anything from the video-head circuitry to the RF modulator.

A good approach to troubleshooting luminance circuits is to inject a signal that would be present at various test points if the VCR were operating properly. That way you can determine which circuits are and aren't working by checking every point where the signal is supposed to appear.

One example of troubleshooting by using signal injection is substituting a known good signal in place of the one coming from the video heads (see Fig. 3). Sencore's *VC63* VCR test accessory provides a signal to inject into the video preamps. (You should use equal levels for both preamp inputs and if one of the inputs needs a greater signal level, that's the path to follow.) That simple procedure tells you whether or not the preamps were receiving a good signal from the video heads. If everything checks out after the signal is injected, that would probably indicate a bad video head.

If, after injecting a signal into the preamps, there is still a problem, the chances are good that the video heads are all right. For example, suppose that one of the playback/record switching transistors has a short. That would put 10 ohms between the playback path for one of the heads and ground. The resulting picture on the monitor is similar to that of a bad video head, and many repairmen would prematurely clean and/or replace the video heads—a procedure that is costly and time-consuming.

Chrominance

Defects in the chrominance and audio circuits can be detected by looking at the color or listening to the audio. Quick checks for the chrominance include testing the 3.58-MHz oscillator, the 4.2-MHz conversion signal, the 30-Hz and 15-kHz reference signals, and the 629-kHz VHS color subcarrier.

If you troubleshoot a VCR following the procedures in the correct order, you can quickly and accurately isolate defective stages in the circuitry. After a couple of trial runs on known-good VCR's, you should be able to tackle the "Tough Dog" problems that you may come across. Just be sure that you learn any new techniques and procedures on a known good unit, so that you are not led astray by erroneous readings and strange results. **R-E**