Signal Explorer

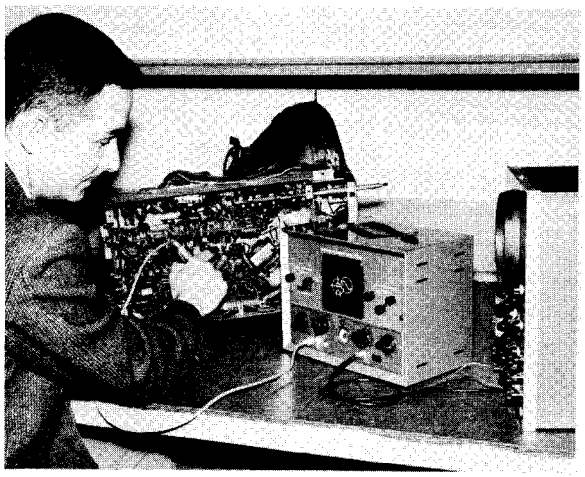

Fig. 4. Precision Electronics' *Signal Tracer* isolates audio, video troubles.

Where is most of your time spent when fixing a radio or TV set? It's not in the customer's home, nor in the mechanics of replacing a faulty part, to be sure. So the answer is, of course, in isolating the trouble to one particular section, stage, or group of components.

There are a number of troubleshooting procedures that can ease the task of isolation, but the most versatile and perhaps most expedient yet devised is known as signal-tracing. Precision Electronics, Inc., of Franklin Park, Ill., has an instrument, the Model 202 Signal Tracer shown in Fig. 4, that helps you trace signals from the antenna to the speaker or picture tube.

Specifications are:

1. *Power Requirements — 110/120 volts, 60 cps; power consumption approximately 40 watts; panel off-on switch combined with wattage control.*
2. *Monitoring Features — built-in eye tube and 5" speaker plus output jack for monitoring signals with scope; input attenuator, speaker switch, and gain control provided; output cable for scope also supplied.*

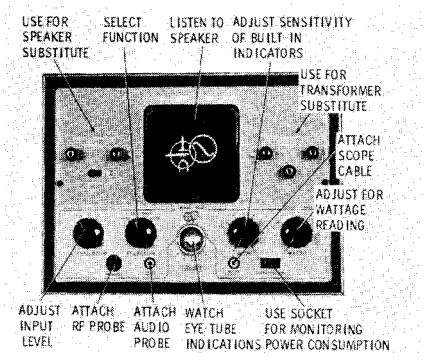

Fig. 5. Front panel of the Model 202 actually tells own operational story.

3. *RF Tracer—includes sensitive amplifier-detector stage; frequency response to 300 mc; separate plug-in RF probe and cable supplied.*
4. *AF Tracer — includes three-stage preamplifier featuring cascode circuit with over-all feedback; frequency response flat from 2 cps to 300 kc into eye-tube indicator or scope output; separate plug-in audio probe and cable supplied; system may be used as audio amplifier and speaker for testing tuners, phono cartridges, microphones, etc.*
5. *Noise Tracer — special position for noise test provided on function selector; audio probe supplies test voltage; eye tube and built-in speaker used as indicators.*
6. *Wattmeter — power consumption of apparatus under test indicated by eye tube and calibrated watts control; AC receptacle provided on front panel.*
7. *Substitution Unit — built-in speaker and/or transformer available for external use; individual jacks provided on front panel; transformer serves as substitute in either single-ended or push-pull applications.*
8. *Size and Weight — case 11½" x 8½" x 6½", 11 lbs. less probes and cables.*

After using the Model 202 in the lab, I soon discovered that its usefulness was not merely confined to troubleshooting conventional radios and sound systems, but extends to transistor portables, TV receivers, test equipment, and just about any other electronic gear you care to mention. Its sensitivity and frequency response impose little or no limitations on the types of signals it can handle, and it has about all you could ask for in the way of indicating devices. Visual presentations, for example, include a panel eye-tube and scope output connection, while aural monitoring is accomplished through the instrument's built-in speaker.

The *Signal Tracer* acts as a convenient sensing device capable of sampling either signals developed within the apparatus under test or those supplied from an external generator source. By probing a circuit at various points and using a little deductive reasoning, one can isolate a fault to a certain stage or even a specific component. About the simplest way to picture the instrument's over-all operating features is to take a closer look at its front panel. The location and use of each item is pointed out in Fig. 5.

Since signal-tracing a radio is very elementary, I thought I would concentrate on checking some of the TV troubleshooting uses outlined in the 202 manual. When tracing the signals in various TV stages, for example, I plugged the RF probe (Fig. 6) into the instrument panel and placed the function selector in its PROBE position. With power applied to both the set under test and the *Signal Tracer*, I tuned in a station and adjusted the input attenuator and gain control as required for each point I explored with the probe.

In the IF strip, I found it best to sample the signal across the cathode resistor of each stage, and to use a scope to monitor the signal. When encountering a stage without a cathode resistor, I noted the signal could be picked up on the grid; however, this often detuned the circuit. By placing the probe tip on the body of a plate or grid component, I was usually able to detect the signal satisfactorily.

Examining the video and sync sections, I found I could pick up a signal on the grid or plate of each stage and monitor it through the instrument's speaker. The audible frequency present is derived from the 60-cps vertical sync signal. Since the vertical sweep energy likewise produces an audible buzz, the speaker can also be used as an indicator in troubleshooting the vertical oscillator, output, and yoke circuits.

In the horizontal sweep section, I could place the RF probe on the plate of the oscillator and obtain a high-frequency whistle from the Model 202 speaker; but this is not always easy to detect, so I found it more accurate to use the eye tube or scope as an indicator. When signal-tracing beyond the grid of the horizontal output tube, the probe should not be brought in direct contact with high-voltage points; instead, you need only bring the probe near the plate-cap lead or flyback to obtain a usable signal.

The instruction manual pictures typical waveforms found in certain sections of a TV receiver, and also describes methods for aligning FM sets, checking noisy components, and employing the instrument as a wattmeter. After using the Model 202 on a few normally-operating receivers, you'll find it easy to single out the faulty stage or group of components interrupting a signal path. ▲

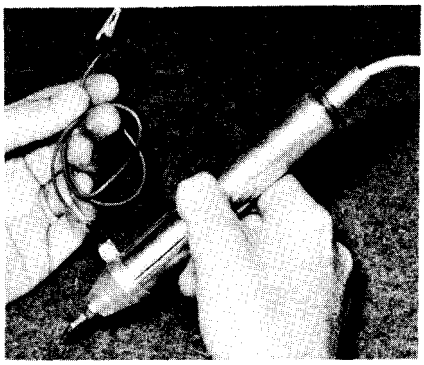

Fig. 6. RF probe for Model 202. Audio probe and scope probe also supplied.