

## COMMERCIAL OSCILLOSCOPES AND RELATED EQUIPMENT

### HICKOK MODEL 195

#### FREQUENCY RESPONSE

Vertical Amplifier 10 cps to 50 kc  
Horizontal Amplifier 10 cps to 50 kc

#### DEFLECTION FACTORS

Vertical-Deflection Plates 0.05 rms volts/inch  
Vertical Amplifier 15 rms volts/inch  
Horizontal Amplifier 0.3 rms volts/inch  
Horizontal-Deflection Plates 30 rms volts/inch

LINE RATING 105-125 volts, 50-70 cps

#### TUBE COMPLEMENT

| Type       | Function                 |
|------------|--------------------------|
| 6SJ7 (V1)  | Horizontal Amplifier     |
| 884 (V2)   | Sweep Circuit Oscillator |
| 6AC7 (V3)  | Vertical Amplifier       |
| 6X5GT (V4) | Low-Voltage Rectifier    |
| 5Y3GT (V5) | High-Voltage Rectifier   |
| 5UP1       | Cathode-Ray Tube         |

The schematic circuit diagram of Model 195 is shown in Fig. 22-32. One feature of this otherwise conventional instrument is the use of a phasing control, *R3*, to apply a voltage derived from the *V4* plate circuit to *C8* through the *S1* horizontal selector switch. *C11*, *C9*, *R8*, *R4*, *C6*, and *R3* make up the phasing network. There is a voltage division of the 350-volt, 60-cycle signal, between *C11* and *C9*. The signal voltage across *C9* is applied to *R12* through *S1*, *C8*, and *R8*. *R3* affects the amplitude and phase by changing the circuit impedance.

### HICKOK MODEL 195B

#### FREQUENCY RESPONSE

Vertical Amplifier 30 cps to 1,000 kc  
Horizontal Amplifier 10 cps to 50 kc  
Sweep Circuit 10 cps to 25 kc

#### DEFLECTION FACTORS

Vertical Amplifier 0.03 rms volts/inch  
Vertical-Deflection Plates 15 rms volts/inch  
Horizontal Amplifier 0.3 rms volts/inch  
Horizontal-Deflection Plates 30 rms volts/inch

LINE RATING 105-125 volts, 50-70 cps

#### TUBE COMPLEMENT

| Type       | Function                                  |
|------------|-------------------------------------------|
| 6SJ7 (V1)  | Horizontal Amplifier                      |
| 884 (V2)   | Sweep Circuit Oscillator                  |
| 6SN7 (V3)  | Vertical Cathode-Follower Input Amplifier |
| 6AC7 (V4)  | Vertical Amplifier                        |
| 6X5GT (V5) | Low-Voltage Rectifier                     |
| 5Y3GT (V6) | High-Voltage Rectifier                    |
| 5UP1       | Cathode-Ray Tube                          |

The schematic circuit diagram of Model 195B is shown in Fig. 22-33. This oscilloscope provides for external Z-axis or intensity grid modulation of the cathode-ray tube. A signal may be fed to pin 2 of the cathode-ray tube through *C31* and *S5*, using either external or internal modulation. The horizontal sweep and remaining circuits are very much like those of Hickok Model 195. However, the phasing control and filter circuits are a little different. Two filters, *C32* and *C33*, are used instead of four filters. The phasing voltage is derived from the transformer primary rather than from the high-voltage secondary.

### HICKOK MODEL 305

#### FREQUENCY RESPONSE

Vertical Amplifier 30 cps to 1 Mc  
Horizontal Amplifier 10 cps to 50 kc  
Sweep Circuit 10 cps to 25 kc  
F.M. Oscillator 0-30 kc, and 0-450 kc

LINE RATING 115 volts, 60 cps

The tube complement and tube functions of Model 305 are given in the schematic diagram, Fig. 22-34. This oscilloscope is similar to Hickok Model RFO-5. It should be noted, however, that Model RFO-5 uses 1,000 kc and 23 Mc for the r-f oscillator, while Model 305 uses 1,000 kc and 50 Mc. The use of the *V6* cathode-follower also permits the employment of a low-impedance vertical gain control *R50* of 10,000 ohms in place of the high-impedance control *R114* in Model RFO-5. The low-impedance control has less frequency discrimination and is, therefore, an improvement. The signal tracer jack *J1* is in the low-impedance cathode circuit of *V5*, rather than in the high *Z*-plate circuit of *V103* in the RFO-5. A connection to it, therefore, is a less critical matter. High-frequency compensation in the form of *L2* and *L3* is used to give a wide-band characteristic in the vertical-amplifier stage.

### HICKOK MODEL 505A

#### FREQUENCY RESPONSE

Vertical Amplifier 30 cps to 1 Mc  
Horizontal Amplifier 10 cps to 50 kc  
Sweep Circuit 10 cps to 25 kc

#### DEFLECTION FACTORS

Vertical Amplifier 0.08 rms volts/inch  
Vertical-Deflection Plates 15 rms volts/inch  
Horizontal Amplifier 0.13 rms volts/inch  
Horizontal-Deflection Plates 30 rms volts/inch

LINE RATING 105-125 volts, 50-70 cps

The tube complement and its functions for Model 505A are shown in the schematic circuit diagram, Fig. 22-35. Model 505A is very similar to the 305 electrically.

### JACKSON MODEL CRO-1

#### FREQUENCY RESPONSE

Vertical Amplifier—Wideband 20 cps to 4½ Mc  
Vertical Amplifier—High Sensitivity 20 cps to 100 kc  
Horizontal Amplifier 20 cps to 150 kc  
Sweep Circuit 20 cps to 50 kc

#### DEFLECTION FACTORS

Vertical Amplifier—Wideband 0.25 rms volts/inch  
Vertical Amplifier—High Sensitivity 0.018 rms volts/inch  
Vertical-Deflection Plates 12 rms volts/inch  
Horizontal Amplifier 0.55 rms volts/inch  
Horizontal-Deflection Plates 15 rms volts/inch

LINE RATING 100-125 volts, 50-60 cps

#### TUBE COMPLEMENT

| Type             | Function          |
|------------------|-------------------|
| 5Y3 (V1, V2)     | Rectifiers        |
| 6J6 (V3, V4, V5) | Amplifiers        |
| 6J6 (V6)         | Sweep Oscillator  |
| 6C4 (V7, V8)     | Cathode Followers |
| 5UP1 (V9)        | Cathode-Ray Tube  |

The schematic circuit diagram for Model CRO-1 is shown in Fig 22-36. The vertical amplifiers are operated in a high-gain circuit to provide a sensitivity of 0.018 volts per inch in the *high-sensitivity* position. They are switched to video-type amplifiers in the *wideband* position and provide 0.25 volts per inch sensitivity with a frequency response within 1.5 db to 4.5 Mc. Intensity modulation may be applied to the grid of the cathode-ray tube at 60 cps internally, or an external voltage may be applied to a binding post on the front panel.

# ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES

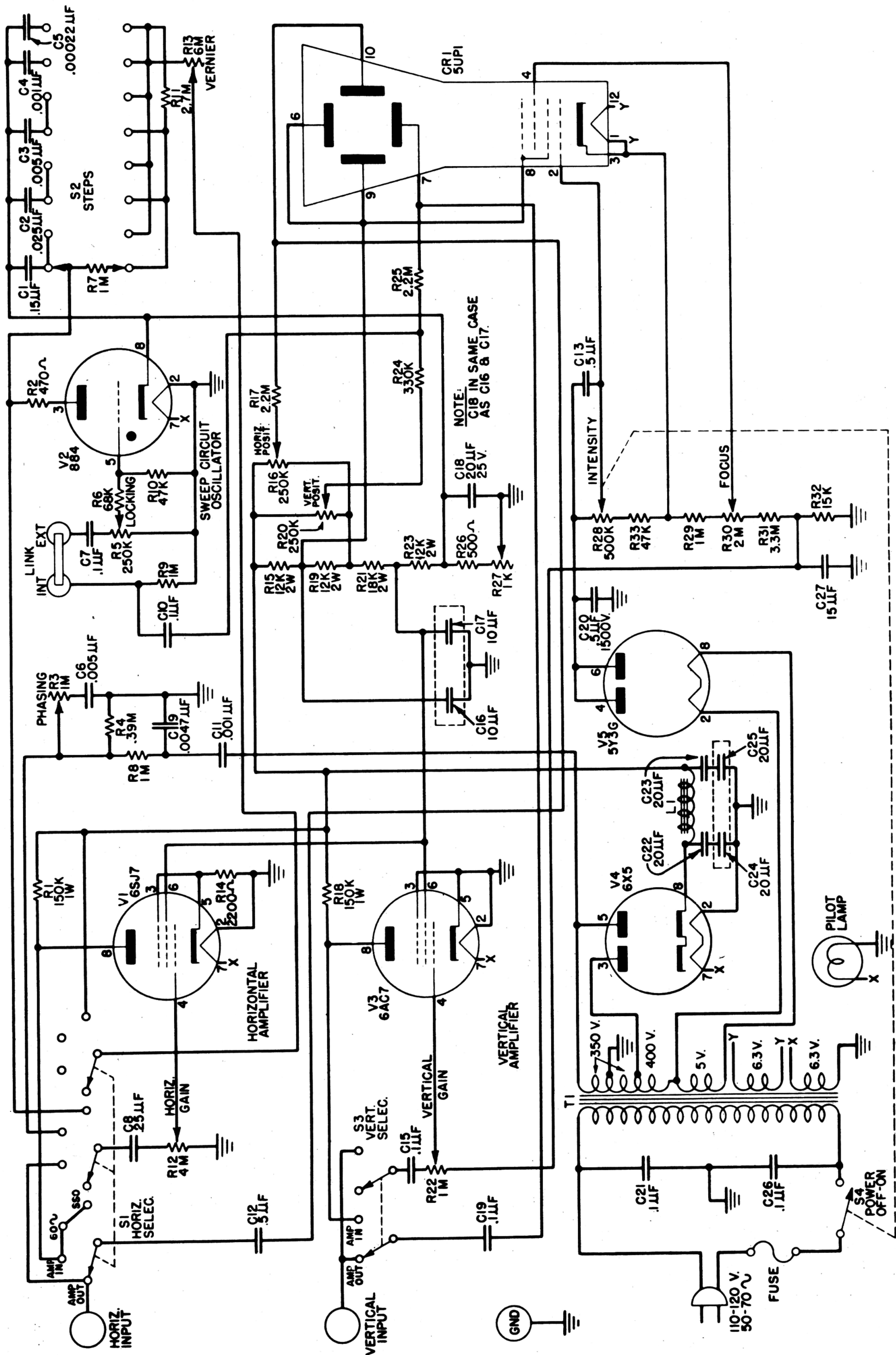


Fig. 22-32.—Schematic of Hickok Model 195.

Courtesy Hickok Elec. Inst. Co.