

ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES

PRECISION MODEL ES-500

FREQUENCY RESPONSE

Vertical Amplifier 10 cps to 1 kc, within 6 db
Horizontal Amplifier 10 cps to 250 kc, within 1 db
Sweep Circuit 10 cps to 30 kc

DEFLECTION FACTORS

Vertical Amplifier 0.02 rms volts/inch, maximum
Horizontal Amplifier 0.5 rms volts/inch

LINE RATING 110-120 volts, 50-60 cps

TUBE COMPLEMENT

Type	Function
6J5	Vertical Input
6AK5	Vertical Amplifier
7W7	Vertical Amplifier
6SN7GT	Sweep Oscillator
7W7	Horizontal Amplifier
5Y3GT	Low-Voltage Rectifier
2X2	High-Voltage Rectifier
5CP1A	Cathode-Ray Tube

The schematic circuit diagram of Model ES-500 is shown in Fig. 22-45.

RADIO CITY PRODUCTS MODEL TV 90

FREQUENCY RESPONSE

Vertical Amplifier 5 cps to 200 kc, ± 2 db
Horizontal Amplifier 5 cps to 200 kc, ± 2 db
Sweep Circuit 10 cps to 45 kc

DEFLECTION FACTORS

Vertical Amplifier 0.285 rms volts/inch
Horizontal Amplifier 0.32 rms volts/inch

LINE RATING 115 volts, 50-60 cps

TUBE COMPLEMENT

Type	Function
7G7 (V1)	Vertical Amplifier
7G7 (V2)	Horizontal Amplifier
3BP1 (V3)	Cathode-Ray Tube
6X5GT (V4)	High-Voltage Rectifier
6X5GT (V5)	Low-Voltage Rectifier
884 (V6)	Sweep Oscillator
7A4 (V7)	F-M Oscillator
6SB7Y (V8)	R-F Oscillator

The schematic circuit diagram for Model TV 90 is shown in Fig. 22-46. This instrument, primarily designed for television alignment, contains also an r-f oscillator and reactance modulator, besides the basic oscilloscope section. There is also available a "travel" probe which may be used to pick up an r-f signal, demodulate it, and feed the signal to the vertical (Y) input of V1.

L4 in the V7 f-m oscillator circuit is a special variable-inductance component which goes through a 60-cps modulation action due to the voltage at R45. V7 is an ultra-audio type oscillator. Its f-m signal is fed into V8 through C25. V8 is also an oscillator, C29, C28, L5 and the generated signals are mixed in V8 to provide a high-frequency f-m output at R52. A marked generator can be connected to the marker jack.

RCA MODEL WO-27A

FREQUENCY RESPONSE

Vertical Amplifier 0 cps to 100 kc
Horizontal Amplifier 0 cps to 100 kc
Sweep Circuit 30 cps to 100 kc

DEFLECTION FACTORS

Vertical Amplifier 0.084 d-c volts/inch
Vertical-Deflection Plates Peak to peak 54 volts/inch
Horizontal Amplifier 0.105 volts/inch
Horizontal-Deflection Plates Peak to peak 67.5 volts/inch

LINE RATING 105-115, 115-125 volts, 50/60 cps

TUBE COMPLEMENT

Type	Function
6SN7-GT (V1, V2, V4, V5)	Synchronizing Amplifier, Keying, Rectifier, Blanking Amplifier
6N7 (V3)	Timing-Axis Oscillator
6SF5 (V6, V7, V9, V10, V11, V12, V14, V15, V17, V18, V19, V20)	Voltage Amplifiers
5UP1 (V13)	Cathode-Ray Tube
OD3/VR-150 (V21, V22)	Voltage Regulators

5V4G (V23)
6X5GT (V24, V25)
2X2A (V26)

Low-Voltage Rectifier
Voltage Doubler Rectifier
High-Voltage Rectifier

The schematic circuit diagram of Model WO-27A is shown in Fig. 22-47. The circuits are practically identical with those of Model 327-A, where a circuit analysis is given. The WO-27A uses a 5-inch rather than a 9-inch cathode-ray tube and a 2X2A rectifier rather than the 879 of the 327-A. The panel controls on the WO-27A and the general appearance of the instrument differ slightly from the 327-A. Other differences are negligible.

RCA MODEL WO-55A

FREQUENCY RESPONSE

Vertical Amplifier 7 cps to 40 kc, flat within $\pm 10\%$
Horizontal Amplifier 7 cps to 40 kc, flat within $\pm 10\%$
Sweep Circuit 15 cps to 50 kc

DEFLECTION FACTORS

Vertical Amplifier peak to peak, 1.33 volts/inch
Vertical-Deflection Plates peak to peak, 120 volts/inch
Horizontal Amplifier peak to peak, 1.5 volts/inch

Horizontal-Deflection Plates peak to peak, 135 volts/inch

LINE RATING 105-125 volts, 50-60 cps

TUBE COMPLEMENT

Type	Function
6AU6 (V1, V2)	Horizontal Amplifiers
6AU6 (V3, V4)	Vertical Amplifiers
6J6 (V5)	Sweep Oscillator
6X4 (V6)	Low-Voltage Rectifier
6X4 (V7)	High-Voltage Rectifier
3MP1 (V8)	Cathode-Ray Tube

The schematic circuit diagram of Model WO-55A is shown in Fig. 22-48. The vertical and horizontal amplifiers use a standard push-pull and phase inverter circuit V3 and V2 functioning as grounded-grid amplifiers. However, they are somewhat unusual with respect to the vertical- and horizontal-centering circuit arrangements. Examination of the V3-V4 section shows the electron flow from B—and ground is up through R11, R10 and R13 to pin 7 of V3 and V4 and from R11 through R8 and R9 to the common cathode circuit, R13. The bias on the V4 grid is always one-half of that across R10, since R8 and R9 are equal. The bias on V3 can be made any fraction of the voltage across R10. A minimum bias potential for both tubes, V3 and V4, is set by R13. In practice, R10 is adjusted visually for vertical centering by watching the beam spot on the cathode-ray-tube screen, increasing or decreasing the bias on V3, as required. V1 and V2, in conjunction with R23, afford similar action for the horizontal amplifier. The sweep circuit is a Potter oscillator using a high-vacuum 6J6 twin triode V5.

RCA MODEL WO-58A

FREQUENCY RESPONSE

Vertical Amplifier 5 cps to Mc, flat within $\pm 20\%$
Horizontal Amplifier 6 cps to 100 kc, flat within $\pm 10\%$
Sweep Circuit 10 cps to 100 kc

DEFLECTION FACTORS

Vertical Amplifier through Attenuating Probe peak to peak, 5 volts/inch
Vertical Amplifier, Direct Input Probe peak to peak, 0.5 volt/inch
Vertical-Deflection Plates peak to peak, 39 volts/inch
Horizontal Amplifier peak to peak, 2 volts/inch

LINE RATING 105-125 volts, 50-60 cps

The schematic circuit diagram for Model WO-58A is shown in Fig. 22-49. This model has been designed specifically for television servicing, and has some features that set it apart from the general run of oscilloscopes. First, three separate probes for connection to the vertical-amplifier input are provided: direct, attenuating, and crystal. The direct probe is used in low-level television stages where the shunting effect will not be excessive. Decreased coupling between the oscilloscope input and a television circuit is obtained with the attenuating probe, but there is some loss of signal due to the attenuation characteristic. The crystal probe is used for rectification action. The attenuating probe is useful for video-amplifier signal tracing in high levels because of its low input capacitance.

Courtesy RCA

