

# ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES

## WATERMAN MODEL S-10-A

### FREQUENCY RESPONSE

Vertical Amplifier 20 cps to 100 kc, —2 db  
Horizontal Amplifier 20 cps to 100 kc, —2 db  
Sweep Circuit 10 cps to 50 kc

### DEFLECTION FACTORS

Vertical Amplifier 1 rms volts/inch  
Vertical-Deflection Plates 30 rms volts/inch  
Horizontal Amplifier 1 rms volts/inch  
Horizontal-Deflection Plates 24 rms volts/inch

LINE RATING 105-125 volts, 50-60 cps

### TUBE COMPLEMENT

| Type        | Function                                  |
|-------------|-------------------------------------------|
| 6AU6 (X1)   | Vertical Amplifier                        |
| 2AP1-A (X2) | Cathode-Ray Tube                          |
| 6J6 (X3)    | Sweep Oscillator and Horizontal Amplifier |
| 6X4 (X4)    | Rectifier                                 |

The schematic circuit diagram of Model S-10-A is shown in Fig. 22-72.

## WATERMAN MODEL S-10-B

### FREQUENCY RESPONSE

Vertical Amplifier 20 cps to 150 kc, —2 db  
Horizontal Amplifier 20 cps to 150 kc, —2 db  
Sweep Circuit 10 cps to 50 kc

### DEFLECTION FACTORS

Vertical Amplifier 1 rms volts/inch  
Vertical-Deflection Plates 30 rms volts/inch  
Horizontal Amplifier 1 rms volts/inch  
Horizontal-Deflection Plates 30 rms volts/inch

LINE RATING 105-125 volts, 50/60 cps

### TUBE COMPLEMENT

| Type         | Function                               |
|--------------|----------------------------------------|
| 12AT7 (V1)   | Vertical and Horizontal Amplifier      |
| 6J6 (V2)     | Time-Base Generator                    |
| 117Z6GT (V3) | High- and Low-Voltage Supply Rectifier |
| 2AP1A (V4)   | Cathode-Ray Tube                       |

The schematic circuit diagram for Model S-10-B is shown in Fig. 22-73.

## WATERMAN MODEL S-11-A

### FREQUENCY RESPONSE

Vertical Amplifier 0 cps to 200 kc, —2 db  
Horizontal Amplifier 0 cps to 200 kc, —2 db  
Sweep Circuit 3 cps to 50 kc

### DEFLECTION FACTORS

Vertical Amplifier 0.1 rms volts/inch  
Vertical-Deflection Plates 28 rms volts/inch  
Horizontal Amplifier 0.1 rms volts/inch  
Horizontal-Deflection Plates 28 rms volts/inch

LINE RATING 105-125 volts, 50/60 cps

### TUBE COMPLEMENT

| Type     | Function                  |
|----------|---------------------------|
| 6J6 (V1) | Vertical-Input Amplifier  |
| 6J6 (V2) | Vertical-Output Amplifier |

6J6 (V3)

6J6 (V4)

6J6 (V5)

117Z6/GT (V6)

3MP1 (V7)

Horizontal-Input Amplifier

Horizontal-Output Amplifier

Time-Base Oscillator, Blanking and Intensity Amplifier

Low- and High-Voltage Rectifier Cathode-Ray Tube

The schematic circuit diagram for Model S-11-A is shown in Fig. 22-74. The instrument uses balanced directly coupled vertical and horizontal amplifiers consisting of dual-triode 6J6's to assure wide frequency response.

### Intensity Modulation

Upon rotation of the FUNCTION switch S2 to HOR, the horizontal-input posts are connected to the horizontal amplifier, the linear time-base generator is made inoperative, and V5 becomes an intensity amplifier for modulating the intensity of the beam. The plate of the intensity amplifier V5 is coupled to the cathode of the cathode-ray tube; thus a positive signal will produce intensification of the beam.

## WATERMAN MODEL S-12-A

### FREQUENCY RESPONSE

Vertical Amplifier dc to 200 kc, —2 db  
Horizontal Amplifier dc to 200 kc, —2 db  
Sweep Circuit 0.5 cps to 50 kc

### DEFLECTION FACTORS

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

LINE RATING 105-125 volts, 50-60 cps

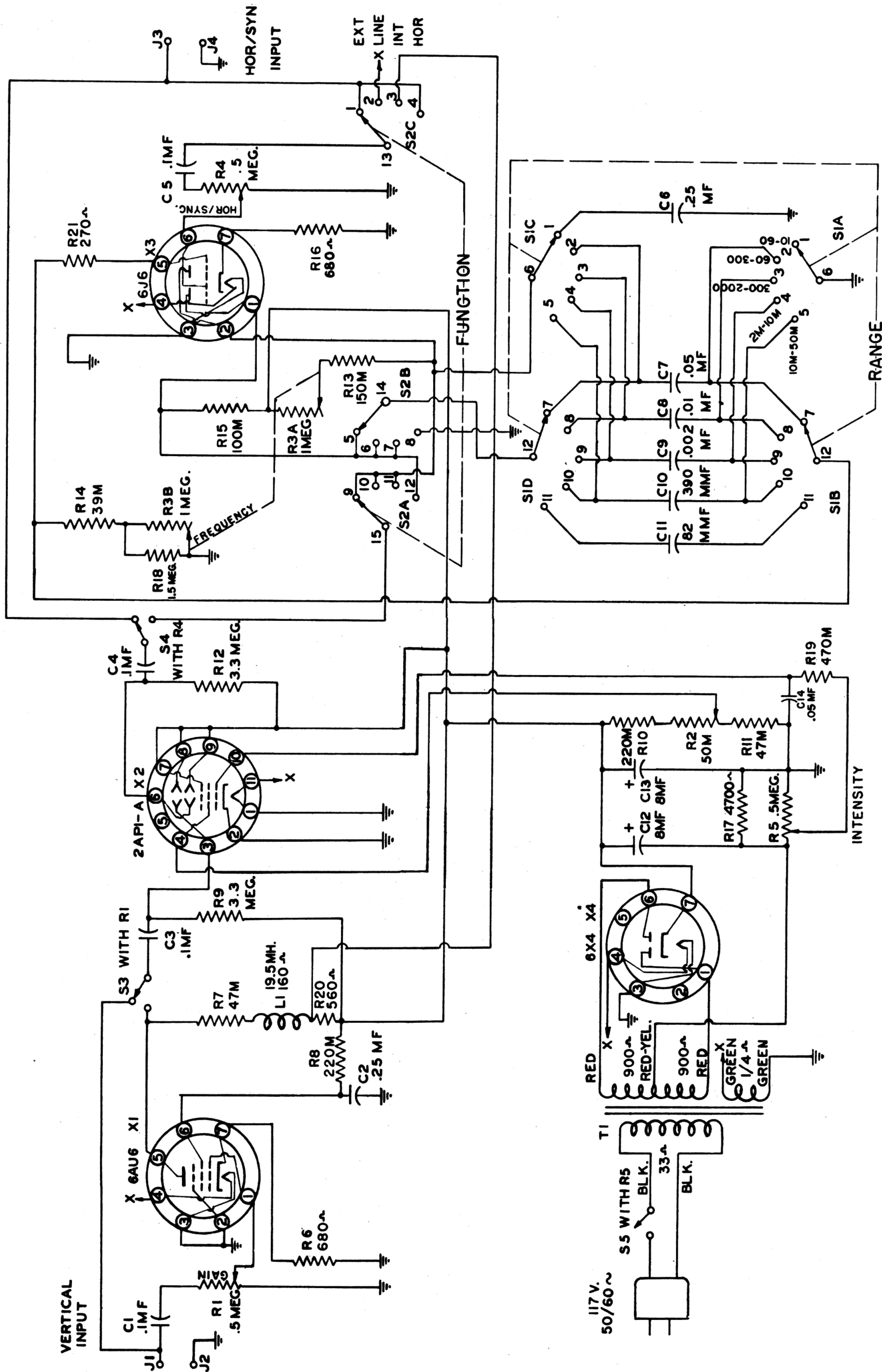
### TUBE COMPLEMENT

| Type        | Function                       |
|-------------|--------------------------------|
| 12AT7 (V1)  | Vertical-Input Amplifier       |
| 12AU7 (V2)  | Vertical Cathode Amplifier     |
| 12AT7 (V3)  | Vertical-Output Amplifier      |
| 12AT7 (V4)  | Horizontal-Input Amplifier     |
| 12AU7 (V5)  | Horizontal Cathode Follower    |
| 12AT7 (V6)  | Horizontal-Output Amplifier    |
| 12AU7 (V7)  | Sync Polarity                  |
| 12AT7 (V9)  | Sweep Generator                |
| 12AT7 (V10) | Sweep Generator                |
| 6X4 (11)    | Positive-Voltage Supply        |
| 6X4 (V12)   | Negative-Voltage Supply        |
| 12AX7 (V13) | Intensity-Modulation Amplifier |
| 3MP1 (V14)  | Cathode-Ray Tube               |

The schematic circuit diagram for Model S-12-A is shown in Fig. 22-75. The intensity-modulation control permits blanking of the return trace in the extreme counterclockwise position. When the control is rotated clockwise, it ties the input to the intensity binding post to the control grid of the intensity modulation amplifier V13. Hence, a signal applied to the INT binding post causes modulation of the cathode-ray-tube beam intensity.

Tube V2 is a duo-triode cathode follower which serves to isolate the output capacitance of the first stage from the input capacitance of the third stage. This action aids in the extension of the over-all frequency range of the amplifier. The third tube, a duo-triode 12AT7 V3 functions as a phase inverter and push-pull output stage.

# COMMERCIAL OSCILLOSCOPES AND RELATED EQUIPMENT



Courtesy Waterman Prod. Co.

Fig. 22-72.—Schematic of Waterman Model S-10-A.