ELECTRONIC TUBE CORP. MODEL H-21

FREQUENCY RESPONSE

Vertical and Horizontal Amplifiers
Capacitive Input 10 cps to 100 kc, ± 1 db
Conductive Input d.c. to 100 kc, 1 db down
Sweep Circuit 2 cps to 50 kc
Triggered Sweep ½ second to 20 microseconds

DEFLECTION FACTORS

Horizontal Amplifiers 0.75 d-c volts/inch
Direct to Horizontal Plates 69 d-c volts/inch
Vertical Amplifiers 0.1 d-c volts/inch
Direct to Vertical Plates 80 d-c volts/inch

LINE RATING 115 volts, 50-60 cps

The schematic circuit diagram of Model H-21 is shown in Fig. 22-24. The instrument is particularly suited for simultaneous comparison of two electrical waveshapes in amplitude, phase, or frequency, since it contains a dual-gun cathode-ray tube. Four amplifiers, two horizontal and two vertical, are provided for the two channels. Each amplifier is independent, having separate gain adjustments. Either capacitive or conductive input coupling may be used with any of the amplifiers; differential input can also be used with the Y-amplifiers.

The intensity of either or both cathode-ray-tube beams may be modulated by time marker pulses if desired. A blanking switch for suppressing the retrace of the cathode-ray beam is provided. The circuits employed in the H-21 are of conventional design.

FEILER MODEL TS-7A

FREQUENCY RESPONSE

Vertical Amplifier 20 cps to 100 kc, ± 20%
Horizontal Amplifier 20 cps to 100 kc, ± 20%
Sweep Circuit 10 cps to 35 kc

DEFLECTION FACTORS

Vertical Amplifier 0.5 rms volts/inch
Vertical-Deflection Plates 18 rms volts/inch, ± 20%
Horizontal Amplifier 0.5 rms volts/inch
Horizontal-Deflection Plates 18 rms volts/inch, ± 20%

LINE RATING 105-125 volts, 50-60 cps

The Feiler TS-7A "Stethoscope" consists of a special signal-tracing probe and a standard oscilloscope. The circuits are conventional and are shown in the schematic diagram, Fig. 22-25. The probe uses a *6C4* grid-leak detector which has only slight loading effect on the circuit under test due to the use of a very small coupling capacitance in the probe tip circuit.

GENERAL ELECTRIC MODEL CRO-3A

FREQUENCY RESPONSE

Vertical Amplifier 20 cps to 100 kc, ±10%
Horizontal Amplifier 20 cps to 100 kc, ±10%
Sweep Circuit 20 cps to 30 kc

DEFLECTION FACTORS

Vertical Amplifier 0.3 rms volts/inch
Vertical-Deflection Plates 22 d-c volts/inch
Horizontal Amplifier 0.3 rms volts/inch
Horizontal-Deflection Plates 20 d-c volts/inch

LINE RATING 105-125 volts, 50-60 cps

TUBE COMPLEMENT

Type	*Function*
3AP1A (V1)	Cathode-Ray Tube
5Y3GT (V2)	High-Voltage Rectifier
5Y3 (V3)	Low-Voltage Rectifier
6AC7 (V4)	Vertical Amplifier
6AC7 (V5)	Horizontal Amplifier
884 (V6)	Sweep Oscillator

The schematic circuit diagram of Model CRO-3A is shown in Fig. 22-26. This is a portable, general-purpose oscilloscope.

GENERAL ELECTRIC MODEL CRO-5A

FREQUENCY RESPONSE

Vertical Amplifier 20 cps to 350 kc, 10% down
Horizontal Amplifier 20 cps to 200 kc, 10% down
Sweep Circuit 20 cps to 20 kc

DEFLECTION FACTORS

Vertical Amplifier 0.02 rms volts/inch
Vertical-Deflection Plates 33 d-c volts/inch
Horizontal Amplifier 0.2 rms volts/inch
Horizontal-Deflection Plates 31 d-c volts/inch

LINE RATING 105-125 volts, 60 cps

The schematic circuit diagram of Model CRO-5A is shown in Fig. 22-27. This instrument is intended for general-purpose test and development work. The vertical-input stage is a cathode follower which functions as an impedance transformer and cuts down the input-capacitive reactance. *V2, V3* and *V4* use adjustable plate-load inductances for high-frequency compensation. The grid excitation circuit for *V4* is somewhat unusual. A portion of the signal plate voltage at *V3* is picked off through *R15, R16,* and *C12,* and is applied to the *V4* grid approximately at 180° out of phase with the signal on the *V3* grid due to the phase shift in *V3*. Tubes *V3* and *V4,* therefore, act as push-pull output tubes. A similar circuit is used in the horizontal amplifier.

GENERAL ELECTRIC MODEL ST-2A

FREQUENCY RESPONSE

Vertical Amplifier (A.C.) (with probe) 20 cps to 500 kc —20%
Vertical Amplifier (D.C.) 0 cps to 500 kc, —20%
Horizontal Amplifier (D.C.) 0 cps to 100 kc, —20%
Sweep Circuit 10 cps to 100 kc

DEFLECTION FACTORS

Vertical Amplifier 0.035 rms volts/inch
Vertical Probe 0.45 rms volts/inch
Horizontal Amplifier 0.425 rms volts/inch

LINE RATING 105-125 volts, 50-60 cps

The schematic circuit diagram for Model ST-2A is shown in Fig. 22-28. The ST-2A is intended for general-purpose use in laboratories, but in addition has several features which make it applicable particularly to f-m and television servicing.

GENERAL ELECTRIC MODEL YNA-4

FREQUENCY RESPONSE

Vertical Amplifier 0 to 30 kc, within + 0% —15%
Horizontal Amplifier 0 to 30 kc
Sweep Circuit 4 cps to 20 kc

DEFLECTION FACTORS

Vertical Amplifier 0.18 rms volts/inch, max
Horizontal Amplifier 0.212 rms volts/inch, max

LINE RATING 105-125 volts, 50-60 cps

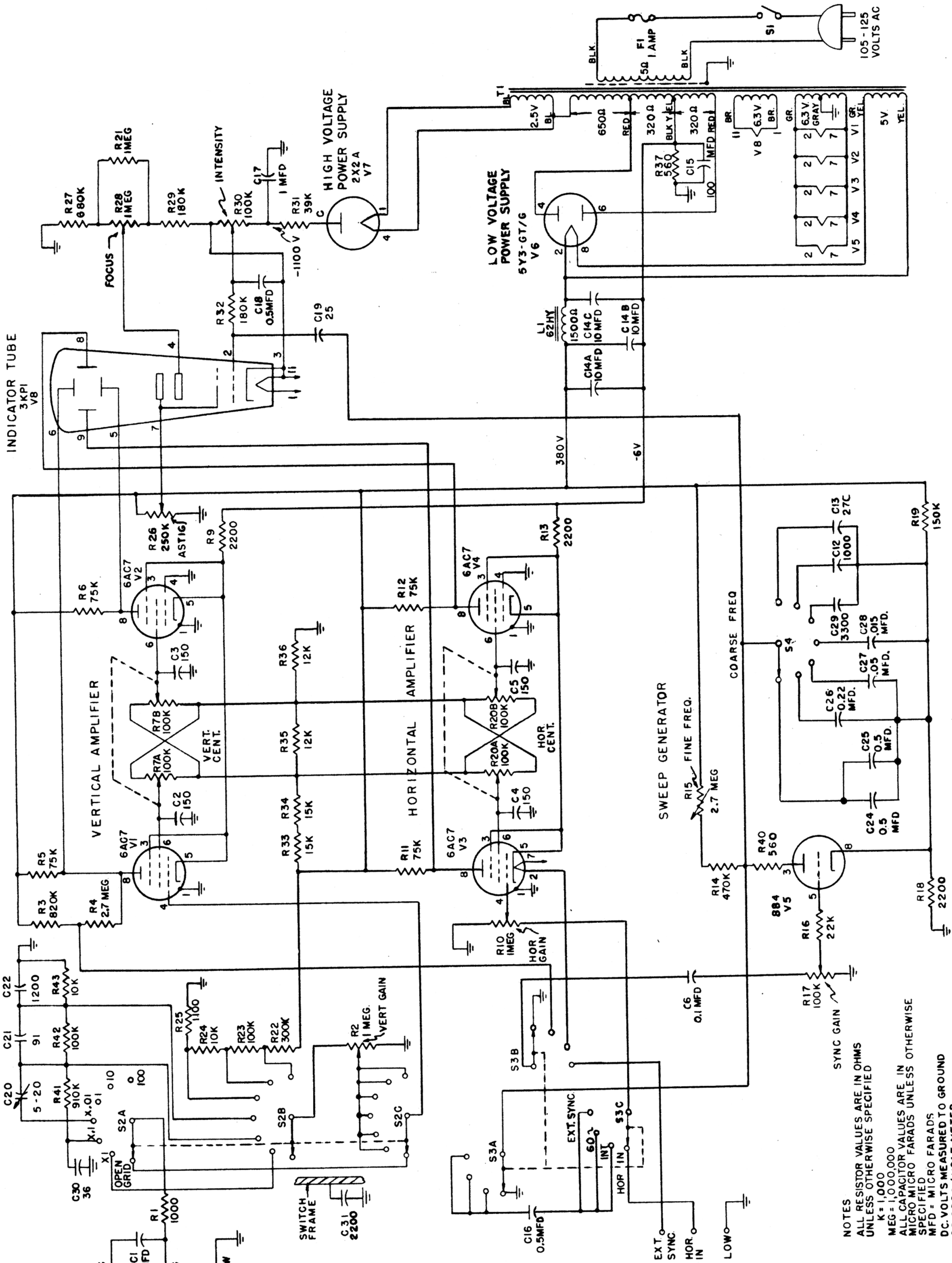
The schematic circuit diagram for Model YNA-4 is shown in Fig. 22-29. This oscilloscope is a portable unit designed specifically for service applications on industrial electronic equipment such as welding controls, motor control circuits, servo mechanisms, photoelectric circuits, etc.

Deflection Amplifiers

The deflection stages are somewhat unusual. *V1* is the vertical-amplifier input tube which, with *V2,* forms the push-pull vertical amplifier. *V2* is a grounded-grid amplifier. If a positive voltage is applied to the grid of *V1,* its cathode, as well as the cathode of *V2* to which it is tied, will go more positive. This effectively *decreases* the grid potential on *V2,* since its grid is grounded and cannot change. Thus a push-pull effect is obtained from plates of *V1* and *V2* which is applied to the deflection plates of the cathode-ray tube.

Centering Controls

R7A and *R7B* form a ganged vertical-centering control, to vary the screen potentials and, therefore, the plate potentials of *V1* and *V2*. The plates are directly coupled to the 3KP1 deflection plates. When the screen of *V1* is made more or less positive with respect to ground by adjustment of *R7A,* the *V1* plate becomes more or less positive with respect to ground, and hence the spot on the screen is moved. A similar action occurs for *V2* and *R7B*. If the *V2* plate has a higher positive potential to ground than the *V1* plate, the *V1* plate is negative with respect to *V2* and the spot on the cathode-ray-tube screen moves away from the deflection plate connected to the *V1* plate. Thus, the spot may be moved up or down on the vertical axis. The horizontal positioning is controlled similarly by *R20A* in conjunction with *V3,* and *R20B* in conjunction with *V4*.



NOTES
ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED
K = 1,000
MEG = 1,000,000
ALL CAPACITOR VALUES ARE IN MICRO MICRO FARADS UNLESS OTHERWISE SPECIFIED
MFD = MICRO FARADS
DC VOLTS MEASURED TO GROUND WITH 20,000Ω/VOLT METER.

Fig. 22-29.—Schematic of G.E. Model YNA-4.

Courtesy General Electric