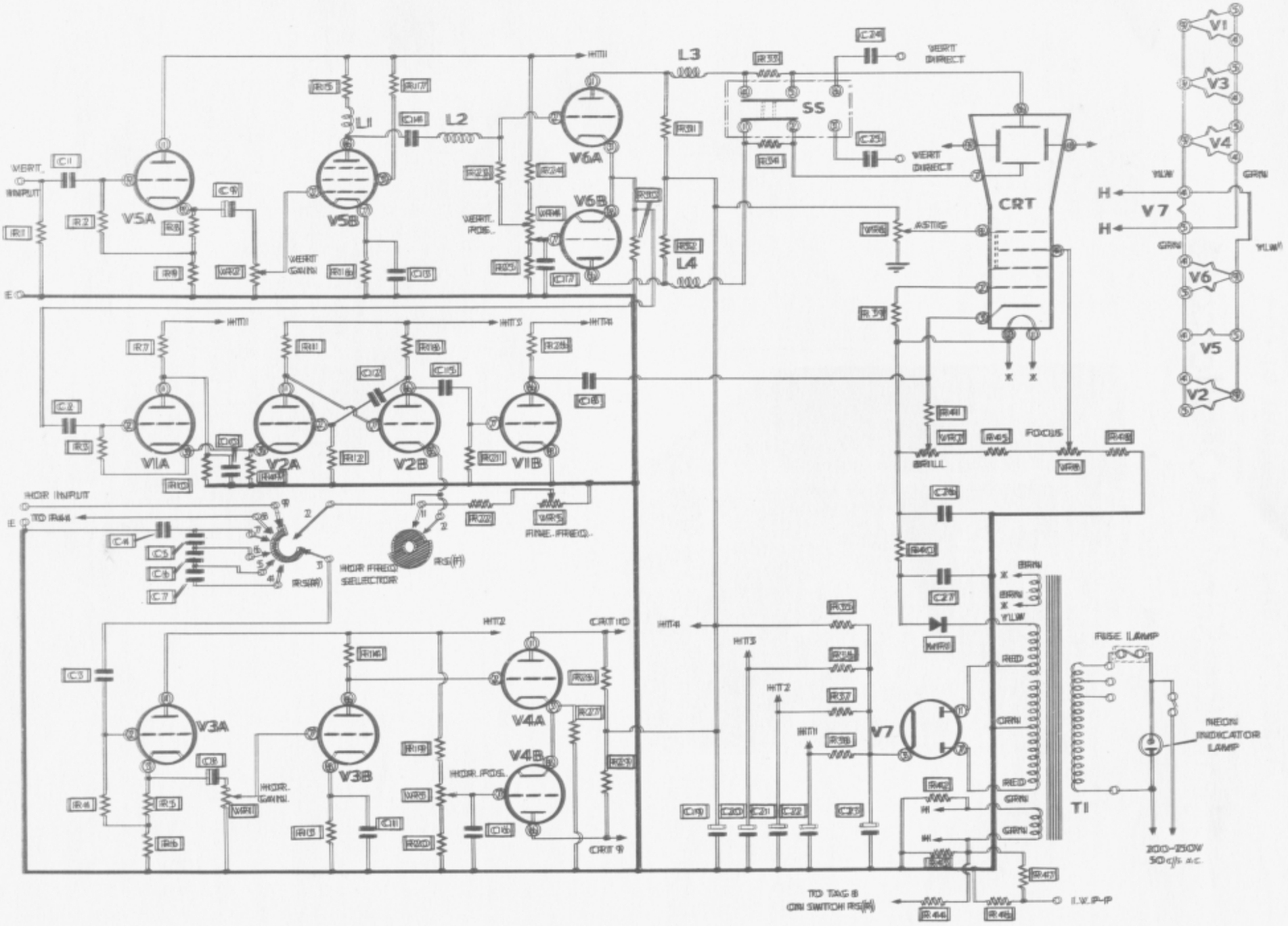

CIRCUIT DIAGRAM

HEATHKIT SERVICE OSCILLOSCOPE

Model OS-2

Inputs:	VERTICAL INPUT HORIZONTAL INPUT Input to vertical plates of CRT, via .002 μF 1 kV capacitors, at rear of oscilloscope
Voltage Calibrator:	1 volt peak-to-peak
Power Requirements:	200-250V, 40-60 c/s a.c., 40 watts
Dimensions:	5" wide x 7.3/8" high x 12" deep
Net Weight:	$9\frac{3}{4}$ lb.
Shipping Weight:	12 lb.

RESISTOR AND CAPACITOR CHART

R1	4.7 MΩ	R26	100 KΩ	C1	.1 μF 400V	C26	.1 μF 1000V
R2	1 MΩ	R27	6.8 KΩ 2W	C2	.1 μF 250V	C27	.1 μF 1000V
R3	470 KΩ	R28	22 KΩ 1W	C3	.1 μF 400V		
R4	2.2 MΩ	R29	22 KΩ 1W	C4	.2 μF		
R5	1.2 KΩ	R30	3.3 KΩ 2W	C5	.02 μF		
R6	56 KΩ	R31	6.8 KΩ 2W	C6	.002 μF	V1	12AU7
R7	150 KΩ	R32	6.8 KΩ 2W	C7	200 pF	V2	12AX7
R8	470Ω 5%	R33	1 MΩ	C8	16 μF 150V	V3	12AU7
R9	10 KΩ	R34	1 MΩ	C9	16 μF 150V	V4	12AU7
R10	33 KΩ	R35	470Ω 1W	C10	.1 μF 250V	V5	ECF80
R11	6.8 KΩ	R36	39 KΩ 1W	C11	.002 μF	V6	12AU7
R12	2.2 MΩ	R37	27 KΩ 1W	C12	.02 μF	V7	EZ80
R13	1.2 KΩ	R38	18 KΩ 5W	C13	1000 pF		
R14	100 KΩ	R39	100 KΩ	C14	.1 μF 250V		
R15	6.8 KΩ	R40	470 KΩ	C15	1000 pF		
R16	220Ω	R41	1 MΩ	C16	.02 μF	VR1	20 KΩ HOR.GAIN
R17	270Ω	R42	47Ω	C17	.25 μF	VR2	20 KΩ VERT.GAIN
R18	3.3 KΩ	R43	47Ω	C18	.03 μF	VR3	100 KΩ HOR.POS.
R19	240 KΩ 5%	R44	56 KΩ	C19	50 μF	VR4	100 KΩ (C/TAP) VERT.POS.
R20	47 KΩ 5%	R45	470 KΩ	C20	20 μF	VR5	7.5 MΩ FINE FREQ.
R21	22 MΩ	R46	62Ω 5%	C21	40 μF	VR6	250 KΩ (preset) ASTIGMATISM
R22	220 KΩ	R47	470Ω 5%	C22	40 μF	VR7	500 KΩ (w.switch) BRILL.
R23	1 MΩ	R48	2.2 MΩ	C23	50 μF	VR8	1 MΩ FOCUS
R24	100 KΩ	R49	330Ω	C24	.002 μF		
R25	100 KΩ			C25	.002 μF		

All resistors are 10% unless otherwise stated.

INTRODUCTION

The Model OS-2 Oscilloscope was designed as a small, compact instrument for use by the electronic service engineer, laboratory technician or by amateur radio enthusiasts and hobbyists.

A number of useful facilities are incorporated including push-pull horizontal and vertical amplifiers, automatic lock-in synchronisation circuit, retrace blanking amplifier, provision for connection to vertical plates of CRT, etc.

CIRCUIT DESCRIPTION

In order to obtain a better understanding of the circuit, follow the CIRCUIT DIAGRAM while reading the CIRCUIT DESCRIPTION.

Vertical Amplifier.

A signal applied to the VERT. INPUT sockets is coupled to the grid of the input cathode follower valve, V5A, through C1. The signal from the cathode of V5A is coupled through C9 and VERT. GAIN control VR2 to amplifier stage V5B. This valve is frequency compensated by L1 and partly by C13. From the anode of V5B, the amplified signal is passed through the series peaking coil L2 and coupled to the push-pull output stage V6A and V6B. Positioning of the trace in the vertical direction is accomplished by adjusting the VERT. POS. control VR4. This varies the relative d.c. voltages between the two halves of the push-pull amplifier, the fixed tap on control VR4 providing the reference voltage for V6A. The coupling of the cathodes of V6A and V6B accomplishes the necessary phase-splitting between the two halves of the push-pull amplifier which drives the CRT vertical plates to provide a balanced deflection of the electron beam. Series compensation is provided by L3 and L4. The signal at the cathodes is taken to the synchronising cathode follower via C2.

Connecting the vertical input switch to the EXT. position allows the oscilloscope to be used, via sockets at the rear of the oscilloscope, for monitoring the quality of modulated RF signals and similar uses.

Horizontal Amplifier.

The HORIZONTAL/FREQUENCY SELECTOR switch is used to select the desired input signal to the cathode follower V3A. This signal may be from the time base generator, 50 c/s ∿ sweep, or an external signal from the HOR. INPUT socket. The signal is coupled from V3A to the HOR. GAIN control VR1 and thence to the amplifier stage V3B. The amplified signal at V3B is d.c. coupled to the push-pull stage and horizontal positioning of the trace is accomplished by adjusting the HOR. POS. control VR3. Common cathode coupling is used to provide a push-pull output and provides a balanced deflection of the electron beam.

Time Base Generator.

The time base generator consists of V2A and V2B arranged as a multivibrator. The timing capacitor that is switched into the cathode circuit of V2B with the HOR./FREQ. SELECTOR switch determines the time base frequency range. The FINE FREQ. control VR5 provides fine frequency adjustment. The time base waveform, a sawtooth, has a fixed amplitude which is synchronised by the internal sync. signal.

The synchronisation signal from V6A/B is coupled to the sync. cathode follower V1A which is coupled to the time base generator by means of the common cathode resistor R49. A retrace blanking signal is taken from the time base generator, amplified at the blanking amplifier stage V1B and coupled to the CRT via C18.

Cathode Ray Tube (CRT).

The operating voltages for the cathode ray tube are supplied by a resistor network connected between the EHT supply and earth. This network contains the BRILLIANCE and FOCUS controls VR7 and VR8 respectively. VR6 is the ASTIGMATISM control and is adjusted in conjunction with the BRILLIANCE and FOCUS controls to produce a well defined trace.

Power Supplies.

The high voltage supply (EHT) for the cathode ray tube is obtained from an overwind on the secondary of the mains transformer. It is rectified by the selenium EHT rectifier MR1, smoothed by R40, C27 and C26 and thence coupled to the CRT.

The normal HT voltage is supplied by full wave rectifier V7 and its associated smoothing circuitry, R38, R37, R36, R35, C23, C22, C21, C20 and C19.

The 1 volt peak-to-peak calibrating voltage is derived from the 6.3 volt heater supply by means of a potential divider R47 and R46. The heater supply also supplies an a.c. voltage to the HOR./FREQ. SELECTOR switch for the sine sweep (∿) facility.