621.317.755

SERIAL No.	PHILIPS ELECTRICAL INDUSTRIES OF AUSTRALIA PTY. LTD.	SHEET No. 1
304	TA155	6 SHEETS

PHILIPS CATHODE RAY OSCILLOSCOPE TA155

DESCRIPTION:

The Philips Cathode Ray Oscilloscope, type TA155, is a compact general purpose instrument of wide scope for measurement and testing. It has been specially designed for the industrial and commercial user, and no effort has been spared in obtaining ease of operation and robust construction, but, at the same time, without sacrificing electrical performance. The unit is housed in a steel container 12 ins. long, 7⅜ ins. high and 9¼ ins. deep, these measurements including a protective front cover which is readily removed by means of two snap catches. It is fitted with a standard carrying handle and four rubber feet. The instrument is suitable for a power supply of 220, 240, 260 volts ± 10%, 50 to 60 c/sec. A.C. A 6 ft. length of rubber-covered power cord has been provided for mains connection, and the power required is approximately 40 watts. The unit is completely self-contained with inbuilt amplifiers and time base unit, as described below. Connection can be made through standard terminals to the horizontal and vertical plates of the cathode ray tube, either directly or through the amplifiers.

APPLICATIONS:

The Oscilloscope is an extremely versatile instrument and it is difficult to cover every possible use dealing with its field of application. Fundamentally, the oscilloscope can be regarded as an inertialess indicator capable of depicting on a graduated screen a plot of the instantaneous sum of any two electrical potentials in two directions at right angles to each other, usually horizontal and vertical. Commonly, this is arranged for an indication of amplitude vertically against a chosen time interval horizontally. The instrument has a high input impedance so that only a minute quantity of power is drawn from the signal source.

Since the oscilloscope responds to instantaneous changes, it will be seen that the image developed on the screen shows the exact shape of the signal impulse, and also that it can be used to indicate wave forms up to very high frequencies.

Although the signal input to the instrument must necessarily be electrical, other physical quantities can be observed by means of relatively simple energy converters which generate electrical potentials when energy is supplied in some other form. Typical examples of quantities, other than electrical, that can be examined with the oscilloscope, are mechanical vibrations, pressure variations, sound, light and time intervals.

OPERATING INSTRUCTIONS:

The following information is intended to give the reader a general idea of the operation and use of the PHILIPS TA155 Oscilloscope. For a more detailed theoretical consideration of the principles involved, reference should be made to the many standard textbooks available on the subject.

Power Transformer:

The TA155 Oscilloscope, as despatched, is complete with all valves and ready

to operate. Before leaving the factory, the power transformer is set to the 240-volt tapping; and if the voltage supply differs from this value, the tapping should be changed accordingly. In order to do this, it is necessary to take the transformer from its case.

Image Control:

Plug the instrument into a power supply of the correct voltage, and allow a few minutes for warming up. Adjust the horizontal shift, vertical shift and focus controls to their approximate mid positions, and all other controls to their minimum position (anti-clockwise direction). Then slightly advance the intensity control clockwise until a luminous spot begins to appear on the screen of the cathode ray tube. The spot can be brought to a sharp point by means of the focus control, and adjusted to the middle of the screen with the horizontal and vertical shift controls. If desired, the preliminary centering of the spot may be carried out with the horizontal amplifier switch on "time base" and the horizontal amplifier gain control slightly advanced. This will produce a luminous line on the cathode ray tube which may be easier to locate than the single spot.

Warning:

A HIGH INTENSITY SPOT OR LINE, IF ALLOWED TO REMAIN STATIONARY ON THE SCREEN FOR A LENGTHY PERIOD, WILL BURN OFF ACTIVE MATERIALS AND REDUCE THE LIFE OF THE CATHODE RAY TUBE. IT IS DESIRABLE AT ALL TIMES TO AVOID OPERATING WITH A HIGHER INTENSITY ON THE SCREEN THAN IS NECESSARY FOR A CLEAR IMAGE.

Vertical Amplifier:

The signal to be examined is normally applied to the oscilloscope so that it produces a vertical movement of the cathode ray tube spot. The appropriate input terminals are located at the right hand bottom corner of the panel. One terminal is connected to a common earth. Of the other two, one marked "VP" is connected directly to the cathode ray tube deflection plates. This terminal may be used for large signals or when very high frequencies are involved. Smaller signals may be applied to the "VA" terminal, which is connected to the cathode ray tube through a single stage 6J7G resistance-coupled amplifier, the gain being adjusted with the control labelled "vertical amplifier". The characteristics of this amplifier are as set out in the general specification.

If a small A.C. signal is applied to the "VA" terminal and the gain control advanced, the luminous spot on the cathode ray tube will move vertically up and down at a rate dependent on the frequency of the signal. Due to persistence of vision, this will result in the appearance of a straight vertical line on the screen, the length of which will be proportional to twice the peak value of the A.C. signal voltage. (It may be necessary to increase the intensity slightly when the spot is moving over the screen.)

Horizontal Amplifier:

The 3-position switch on the bottom left corner of the panel controls the

input to the horizontal deflection circuit. With the switch on "external", a signal may be applied to the left-hand terminals and controlled by the 'horizontal amplifier' control through a 6J7G stage in a manner identical to that previously described. In this case, however, a horizontal line is produced on the screen.

With the switch on '50 cycles', the "H.A." terminal is disconnected and a small 50 c/sec. signal applied internally to the input of the horizontal amplifier. This is useful for identifying low frequency signals, such as amplifier hum, which are applied to the vertical amplifier input. If the frequency of this signal is 50 c/sec., an ellipse is formed on the screen.

When the switch is on "time base", the horizontal amplifier serves to control the amplitude of the linear time base signal generated by the time base unit. This is probably the most common use for the horizontal deflection circuit.

Time Base Unit:

The linear time base, or "saw-tooth", signal in this instrument is generated by an 884 gas triode through the charging and discharging of a series of condensers and resistors. When applied to the cathode ray tube through the horizontal amplifier, the time base signal causes the spot to travel linearly with time from left to right across the screen, and then snap back quickly to its starting point. The frequency of this cycle is adjusted by the two controls labelled "time base frequency", giving with the "coarse" and "fine" controls a complete coverage from 35 to 40,000 c/sec.

It will be seen that if the spot is already moving vertically under the influence of a sinusoidal signal at, say, 50 c/sec., and then, at the same time, is caused to move horizontally by the saw-tooth signal at the same frequency, the spot will move over the same path each cycle and thus appear as a continuous, complete sine wave, representing the shape of the input signal.

The final operation in producing a steady image is the adjustment of the synchronising control. As this is advanced, a small amount of the input signal is applied to the time base circuit, causing it to 'lock' in exact synchronism with the frequency or with any desired harmonic or sub-harmonic of the frequency of the test signal.

Summary:

The complete sequence of operations necessary to produce a stationary image of an A.C. test signal may be summarised as follows:-

1. Adjust the position, intensity and focus of the cathode ray tube spot with all controls at their minimum positions.
2. Apply the test signal to the vertical deflection circuit input terminals. If the "VA" terminal is used, adjust the vertical amplifier gain until the image is of a convenient height.

3. Switch the horizontal amplifier on 'time base' and adjust the gain control to give a convenient length of image.

4. Start with the time base frequency controls both at a minimum, and advance the frequency slowly until the image resolves into one or more complete A.C. cycles, as desired, drifting very slowly across the screen.

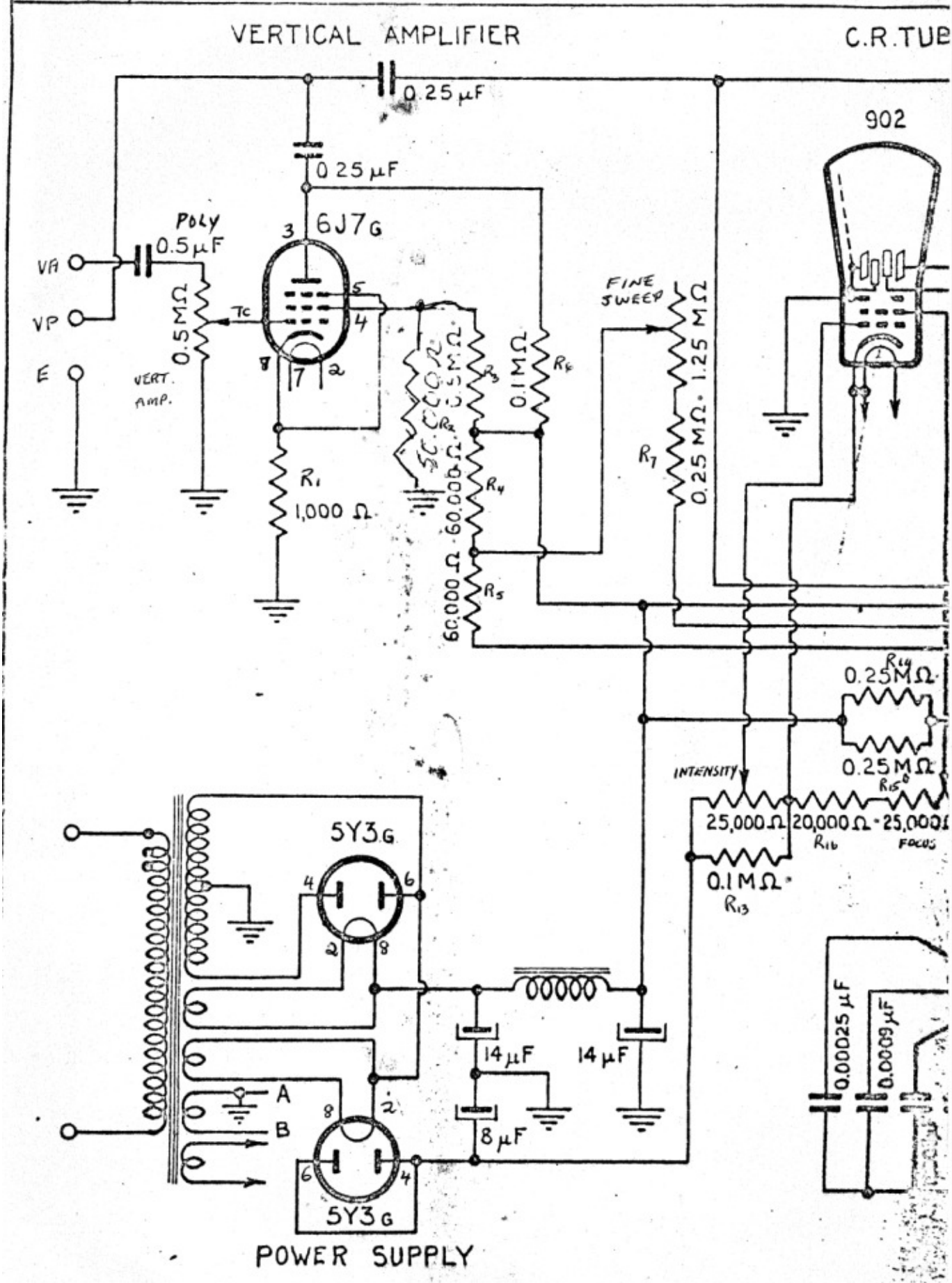
5. Slowly advance the synchronising control until the image becomes stationary. Always use the smallest synchronising signal possible in order to avoid distortion of the image.

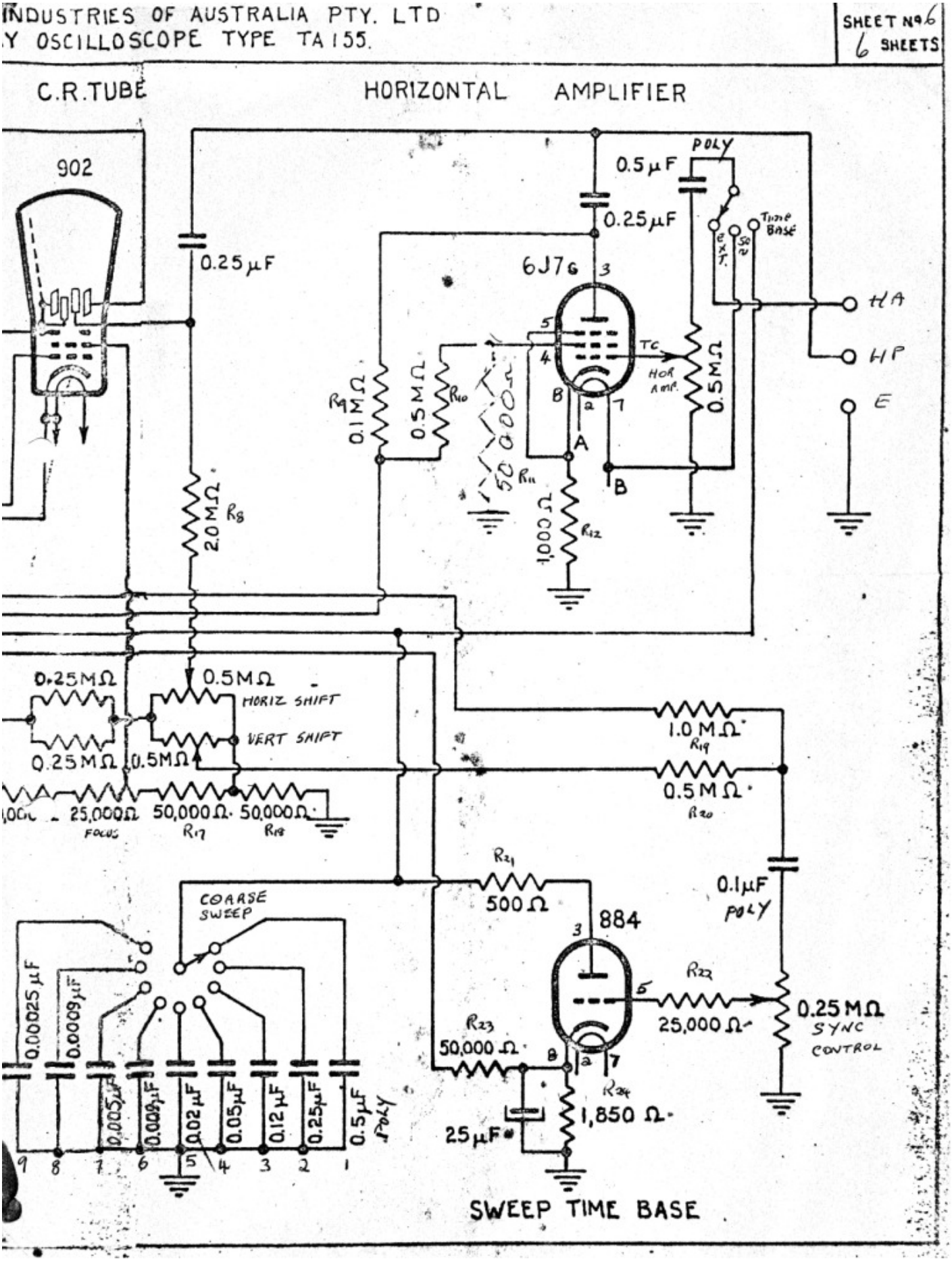
6. Finally adjust the intensity and focus to give a clear image and, if necessary, re-centre on the screen with the horizontal and vertical shift controls.

SERIAL Nº 304

TA 155

PHILIPS ELECTRICAL INDUSTRIES
CATHODE RAY OSCILLO

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POLY
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Time Base
Ext.
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6J7G
HA
HP
E
TC
HOR AMP.
0.5MΩ
0.1MΩ
0.5MΩ
50,000Ω
1,000Ω
2.0MΩ
0.25MΩ
0.5MΩ
HORIZ SHIFT
VERT SHIFT
0.25MΩ
0.5MΩ
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FOCUS
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POLY
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SYNC CONTROL
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25µF
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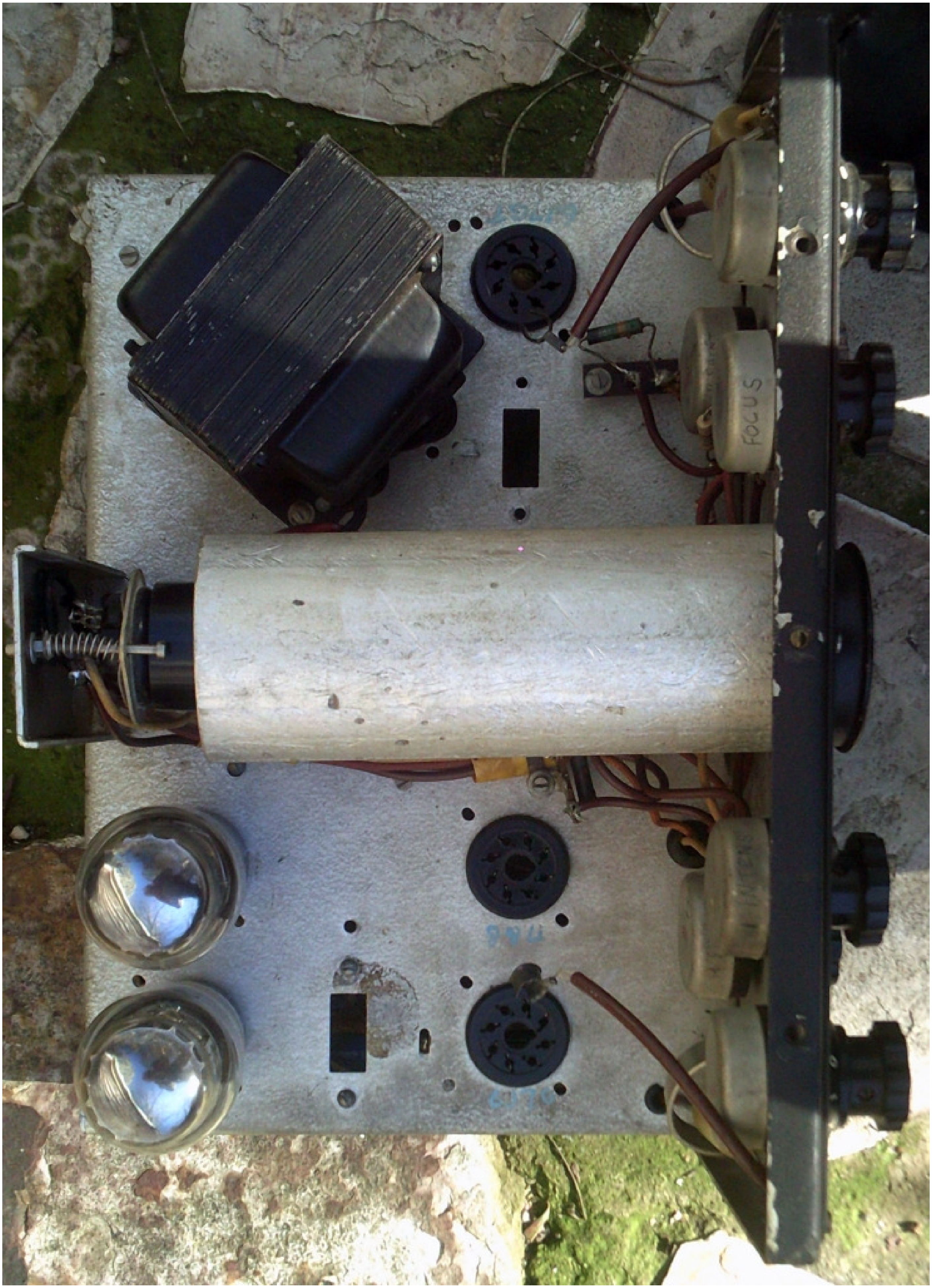
0.02µF
0.05µF
0.12µF
0.25µF
0.5µF
POLY
SWEEP TIME BASE


INTENSITY
HORIZONTAL SHIFT
VERTICAL SHIFT
CATHODE RAY OSCILLOSCOPE
PHILIPS
TYPE Nº
T.A. 155
SERIAL Nº 304
MADE IN AUSTRALIA
50~
TIME BASE
EXTERNAL
COARSE
FINE
SYNCHRONISE
V.A.
V.P.
TIME BASE FREQUENCY


FOCUS