Instruction Manual for Oscilloscopes Type CD518, CD568

Issue : Three

Mod. Ref : 518/50 568/36

THE SOLARTRON ELECTRONIC GROUP LTD

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1.3 Minimum trigger voltages required

(1) Time-base delay inoperative:—
1v trigger pulse.

(2) Time-base delay in use:—
2v trigger pulse.

(3) Triggering from sine wave:—
5v r.m.s.

1.4 Time measurement

CD 568 Sinusoidal calibration waveforms are provided at 1 Mc/s, 100 kc/s and 10 kc/s. Accuracy ± 5%.

CD 518 A sinusoidal calibration waveform at 1 Mc/s or calibration pulses at 1μsec or 10μsec intervals may be selected. Accuracy ± 5%.

1.5 Power supplies

The Oscilloscope requires 230v r.m.s. at 50 c/s, and consumes approximately 100 watts.

1.6 Size and weight

The Oscilloscope is in one box, approximately 8½" × 11" × 20", and weighs 40 lb.

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2. THE Y-PLATE AMPLIFIER

Reference should be made to the simplified circuit diagram, Fig. 2, and the complete circuit diagram, Fig. 8.

The Y-plate amplifier has 6 fixed gain positions enabling signals from 500v to 1v peak amplitude to be handled. On gain positions 1 and 2, for 500v and 100v Y-input signals, a capacity-corrected resistance attenuator precedes the cathode follower (V21), thereby limiting the maximum input signal to the cathode follower to 30v peak. On the other gain positions, the Y-input signal is less than 30v peak amplitude and is fed direct to the grid of the cathode follower which provides a low output impedance to drive the main amplifier (V23 and V22). The main amplifier is of the anode follower type in which the feed back impedance (R96 and C57) remains fixed and the various gains are obtained by switching the input impedance (R91-94 and C51-56). The main amplifier is followed by a similar anode follower of unity gain which provides a paraphase signal enabling the Y-plates of the cathode-ray tube to be fed in push-pull.

The amplifiers differ from the conventional anode follower circuit by using a valve (V22) as the anode load instead of the usual fixed resistor. This modification has the advantage, when the amplifier has a capacity load on the output (such as is presented by the Y-plates),

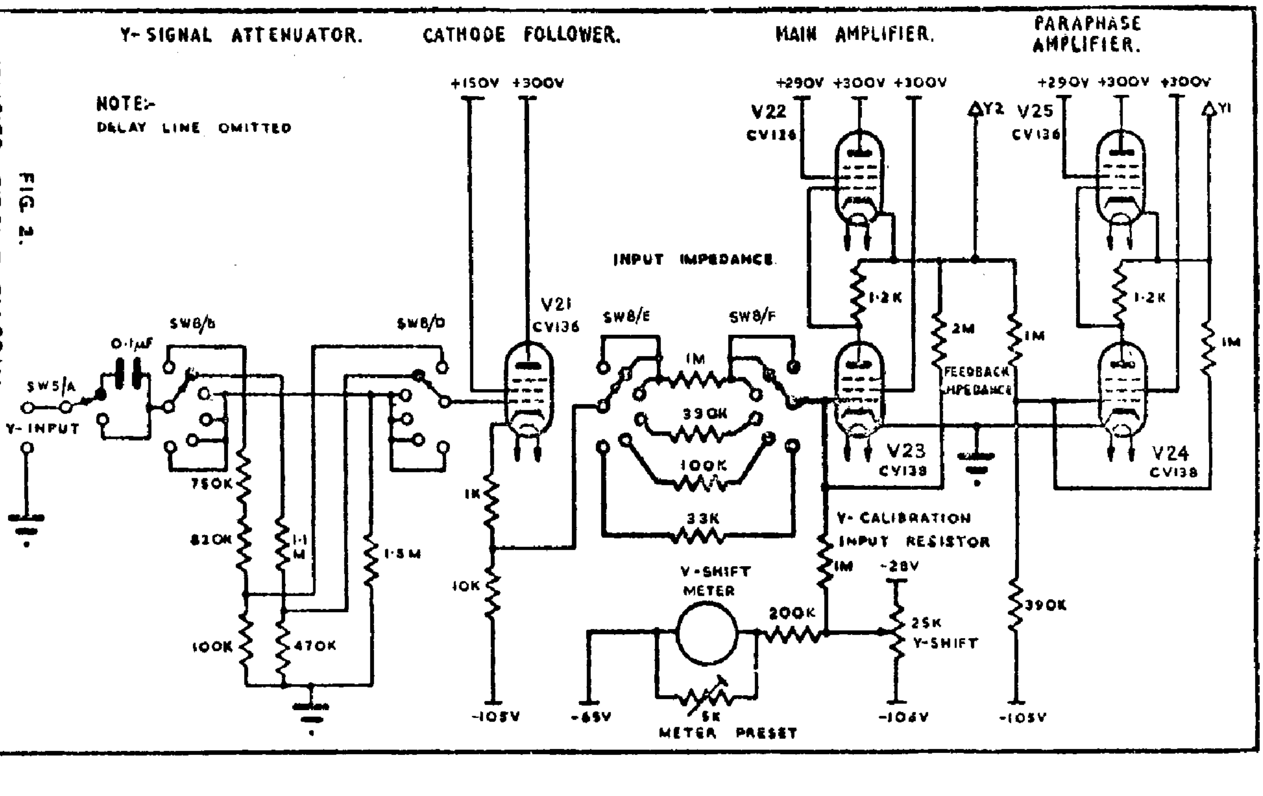


FIG. 2. SIMPLIFIED CIRCUIT DIAGRAM MAIN AMPLIFIER.

of producing an improvement in the frequency response and a greater maximum rate of change of output voltage for a given power consumption. Briefly, the operation of the amplifier is analogous to that of a Class AB amplifier. If the input signal demands that the output voltage shall fall rapidly, the bottom valve (V23) discharges the load capacity on the output, while for a rapidly rising output voltage, the load capacity is charged by the top valve (V22). In the static condition the standing current of V22, V23 is 9 mA, but the current available to charge and discharge the capacity load on the output is approximately 25 mA—i.e., the maximum current V22 or V23 will pass when operating near zero grid bias. Thus for a given maximum rate of change of output voltage this type of amplifier effects a considerable economy in HT current compared with the usual amplifiers employing a fixed resistor as the anode load.

The calibrated Y-shift is obtained by injecting a D.C. voltage (which is measured by the Y-shift meter) into the amplifier by means of R97. On range 3 of the gain switch, the Y-input signal and the Y-calibrating voltage are fed into the " virtual earth " of the amplifier by equal resistors (R91 and R97) so that the voltage measured at the slider of the Y-shift potentiometer (RV10) gives a direct calibration of the sensitivity of the amplifier. On the other gain positions, either the Y-signal input resistor is of a different value from that feeding the calibration voltage or the Y-signal is attenuated by the attenuator preceding the cathode follower so that the voltage measured by the Y-shift meter has to be multiplied by the appropriate scale factor. The Y-signal is slightly attenuated by the cathode follower and in order to keep the Y-calibration correct this is compensated by the adjustment of a preset variable resistor (RV9) which shunts the Y-shift meter.

The Y-signal can be delayed 0·6μS by a distributed delay line which is switched between the cathode follower and the input impedance of the main amplifier. Since the delay line is matched at both the input and output, it introduces 6 dB attenuation in the amplifier gain. The method of construction of this delay line is described in T.R.E. Memo. 807.

3. THE TIME-BASE CIRCUIT—TRIGGER SIGNAL AMPLIFIER, GATE CIRCUIT AND TIME-BASE DELAY

3.1 Reference should be made to the simplified circuit diagram, Figs. 3 and 4, and to the complete circuit diagram, Fig. 8.

3.2 Trigger signal amplifier

The trigger signal is fed into the left-hand grid of the double triode V2 which forms a long-tailed pair amplifier, and produces an amplified version of the trigger signal in push-pull at the anodes.

Switch SW1/A selects one of the anode waveforms of V2 and enables a negative pulse to be fed to the gate valve (V5) irrespective of the sign of the trigger input pulse. The gate valve produces a suitable pulse to trigger the time-base generator and rejects any input trigger pulses occurring during the period of the time-base sweep and fly-back.

Provision is also made to enable the time-base to be triggered by a sinusoidal input signal. (See Fig. 4.) The trigger amplifier (V2) is changed into a cathode-coupled multivibrator by condenser-coupling a tap on the anode load of the left-hand valve to the grid of the right-hand valve. With no trigger input the multivibrator has a relaxation oscillation time of 50 mS. This circuit behaves as a regenerative squaring circuit and the injection of a sinusoidal trigger signal of amplitude greater than 5v r.m.s. causes the multivibrator to change state at the same frequency as the input signal, producing a pulse to drive the gate valve, and so trigger the time-base generator.

3.3 Gate circuit

The gate valve (V5) is a short suppressor base pentode, which, in the quiescent condition, is passing current through the primary of the differentiating pulse transformer (T1) in its anode circuit. On receiving a negative pulse

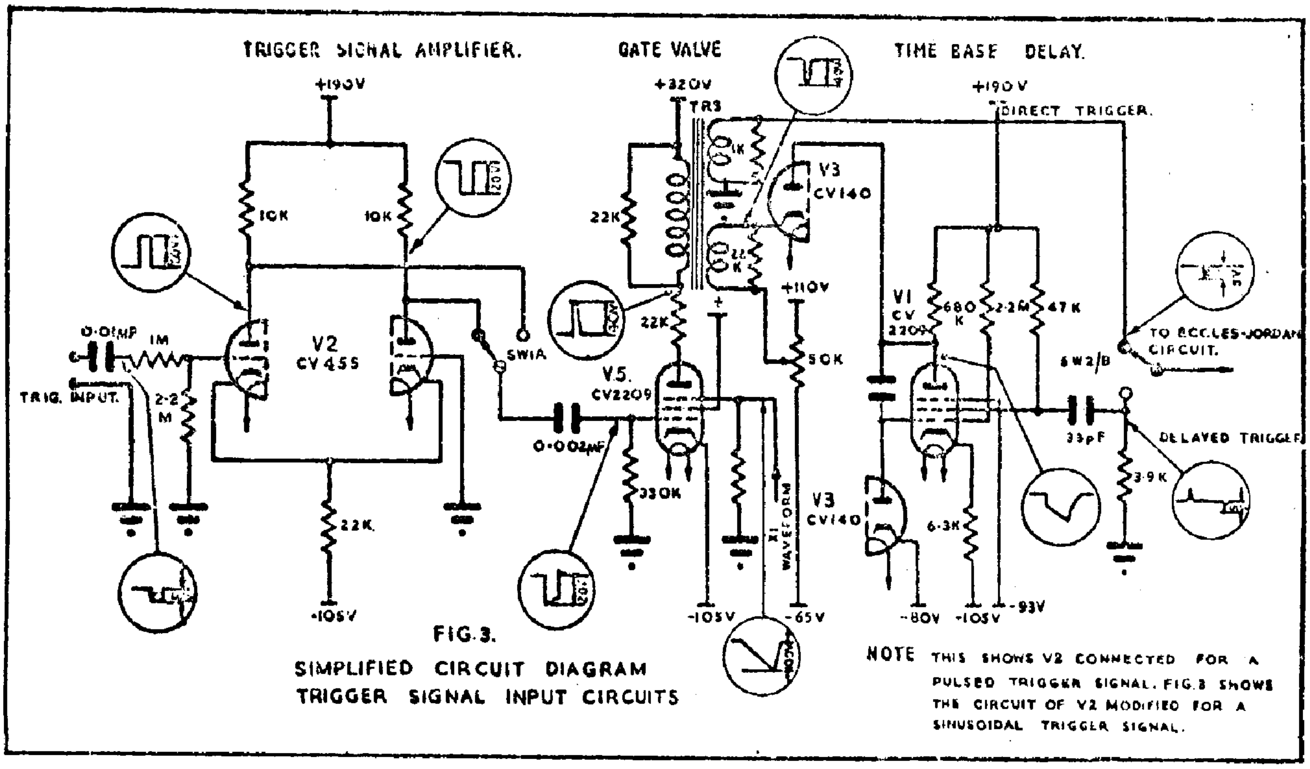


FIG.3.
SIMPLIFIED CIRCUIT DIAGRAM
TRIGGER SIGNAL INPUT CIRCUITS

from the trigger amplifier the valve is cut off on the grid, creating a positive pulse at the anode, which is phase-inverted and differentiated by the transformer. The negative differentiated pulse is used to trigger the time-base generator. The negative-going saw-tooth waveform from the time-base generator is fed to the suppressor of the gate valve (V5) which maintains the gate valve cut off, and prevents any succeeding trigger pulses being passed to the time-base generator until a time-base sweep and fly-back has been completed. This enables the time-base generator to be triggered satisfactorily when the period of the time-base is adjusted to be several times greater than the interval between trigger pulses.

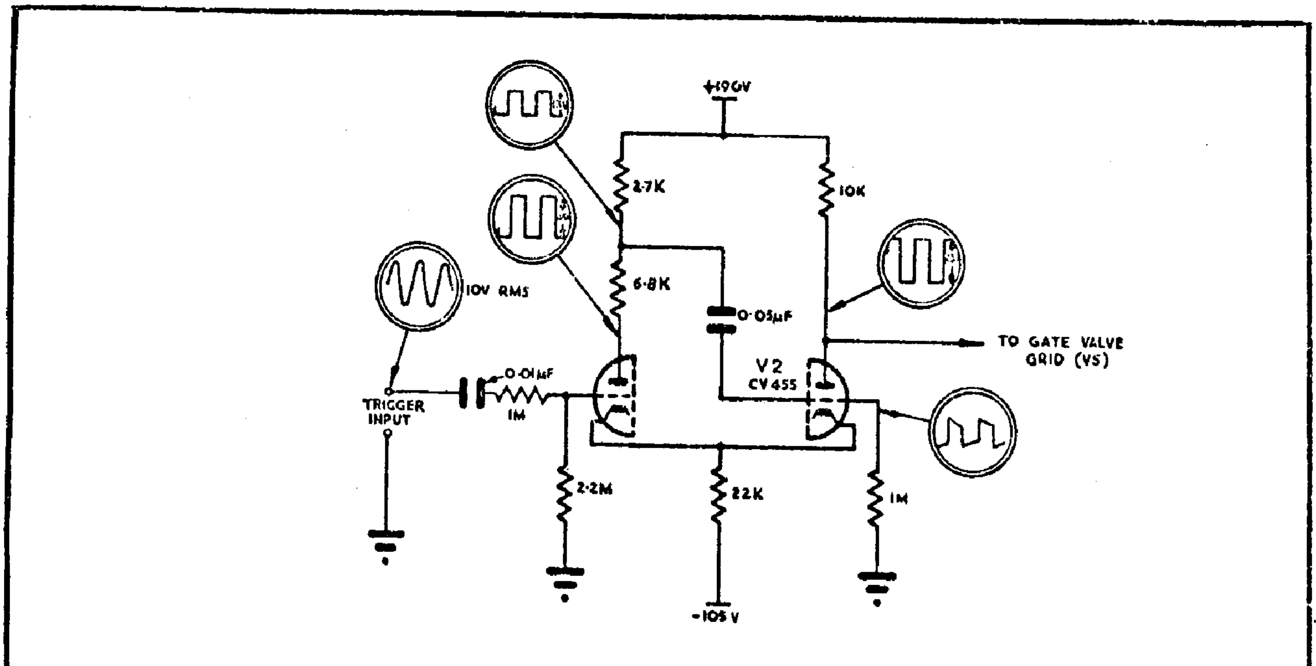


FIG.4 SIMPLIFIED CIRCUIT DIAGRAM.
TRIGGER AMPLIFIER MODIFIED
FOR SINUSOIDAL TRIGGER SIGNAL.

3.4 The time-base delay

The time-base delay consists of a conventional Phantastron (Ref. 2) which is "anode triggered" by a negative pulse from a secondary winding on the pulse transformer (T1). A negative, delayed pulse to trigger the time-base generator is obtained by differentiating the screen waveform of V1. The time-base delay is brought into operation by SW2/B. Three ranges of delay are provided by switching (SW2/A) the anode-to-grid condensers, and fine adjustment of the delay is obtained by controlling (by means of RV1) the voltage at which the anode run-down commences.

4. THE TIME-BASE CIRCUIT—TIME-BASE GENERATOR

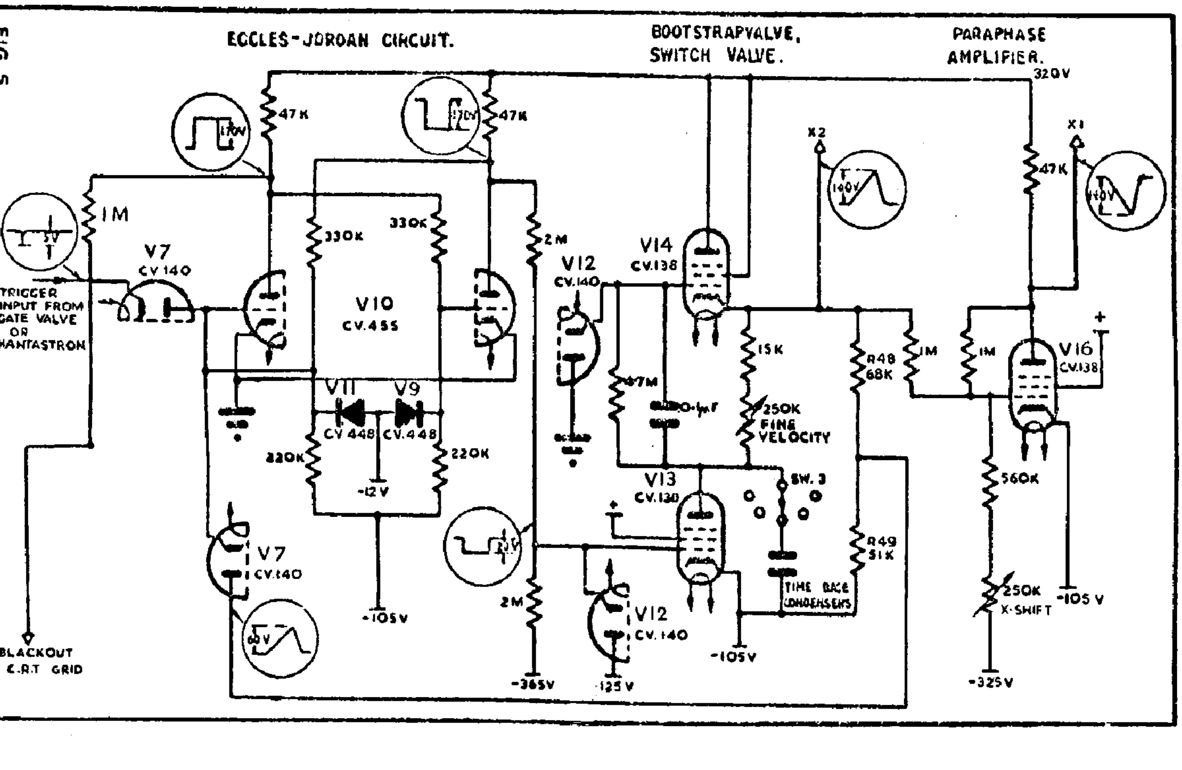
4.1 Reference should be made to the simplified circuit diagram, Fig 5, and to the complete circuit diagram, Fig. 8.

4.2 The time-base generator uses the bootstrap principle (Ref. 1). V14 produces an approximately constant current to charge the time-base range condensers (C23 to C26), and they are discharged by V13 which functions as a switch. The double triode (V10) is connected as an Eccles-Jordan trigger circuit and is used to control the switch valve (V13).

In the absence of a trigger signal, the left-hand grid of V10 is at earth potential; therefore, the right-hand triode (V10) is not conducting, and its anode is at approximately HT potential. This anode is D.C. coupled by a resistance potentiometer to the grid of the switch valve (V13), and in the quiescent condition V13 is conducting and the time-base range condenser is discharged. The grid of the bootstrap valve (V14) is prevented from falling below earth potential by a diode (V12), and the magnitude of the cathode current can be controlled by the variable resistor (RV2) which provides a fine velocity control for the time-base generator.

On injecting a trigger signal, a negative pulse is fed into the left-hand grid of the Eccles-Jordan circuit (V10) via a diode (V7), causing it to change over so that the left-hand valve is cut off and the right-hand valve conducting. This change of state drives the grid of the switch valve (V13) negative, and the constant current produced by the bootstrap

FIG. 5
SIMPLIFIED CIRCUIT DIAGRAM.
TIMEBASE GENERATOR



valve (V14) flows into the time-base condenser, resulting in a linear voltage rise at the cathode of V14 which is fed to the X2 plate of the cathode ray tube.

The fly-back is initiated by feeding the X2 waveform via a resistance potentiometer (R48 and R49) through a diode (V7) to the left-hand grid of the Eccles-Jordan circuit. The voltage at the cathode of V14 continues to rise linearly until the voltage at the junction of R48 and R49 reaches a potential such that the left-hand triode of V10 begins to pass current again. This causes the Eccles-Jordan circuit to be triggered back to its original state, the switch valve conducts, and the time-base condenser is discharged. The time-base generator is now back in the quiescent condition ready to be retriggered by the next input trigger pulse.

A paraphase version of the X2 waveform is obtained from a unity-gain anode follower (V16) enabling the X plates of the cathode ray tube to be fed in push-pull. X-shift is introduced by controlling the D.C. current fed into the " virtual earth " of the paraphase amplifier (V16) by means of the variable resistor RV4.

5. TIME CALIBRATOR

CD 568 only

5.1 Reference should be made to the simplified circuit diagram, Fig. 6, and the complete circuit diagram, Fig. 8.

5.2 The calibrator consists of a triode (V20) with a parallel-tuned circuit in the cathode. In the quiescent state, the grid is at earth and the cathode resistor (R76) is chosen so that a current of approximately 5 mA flows through the tuned circuit. The grid of the calibrator is driven negative for the duration of the time-base sweep by a rectangular waveform, fed from the right-hand anode of the Eccles-Jordan circuit. During this time the energy stored in the cathode tuned circuit produces a damped sinusoidal oscillation at the resonant frequency of the tuned circuit, which is fed into the Y-plate amplifier via switch SW6/C. Three calibration frequencies are provided by switching the tuned circuit in the cathode.

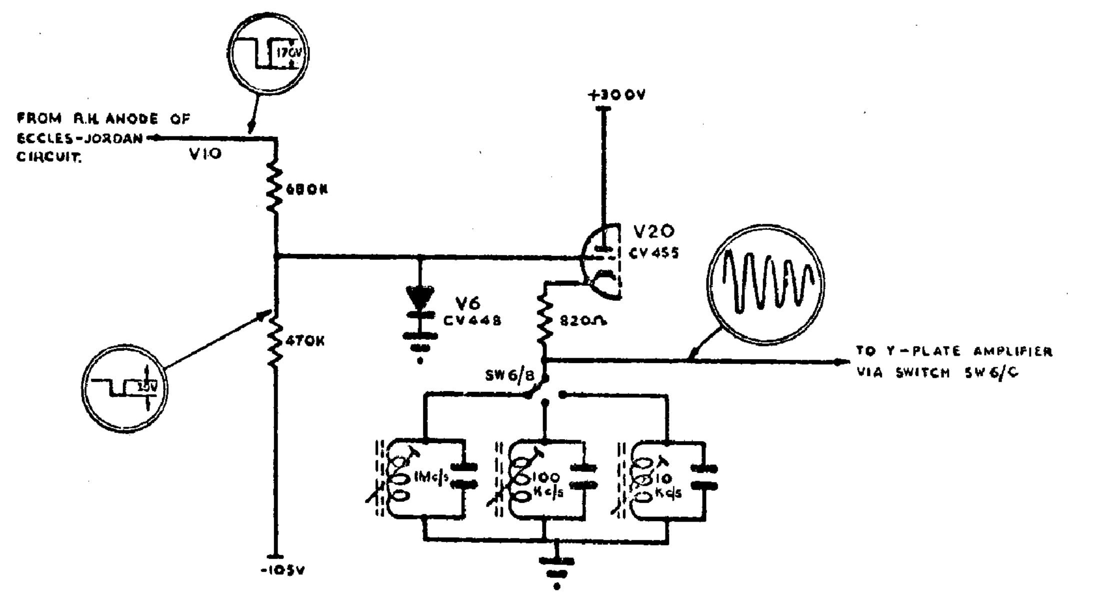


FIG. 6.
SIMPLIFIED CIRCUIT DIAGRAM. CALIBRATOR

CD 518 only

5.3. To measure the interval between a phenomena occurring during the time base delay period and a phenomena on the trace, markers must be generated from the occurrence of the trigger phenomena until the end of the time-base sweep. The marker oscillator must be stopped during the time-base flyback, in order to synchronise the markers to the oscilloscope trace. A block diagram of the time-base and marker generator system is given in Fig. 10; the block capital letters refer to the waveforms given in Fig. 11, circuit components are designated in accordance with the CD 518 circuit diagram (Drawing No. DC 518).

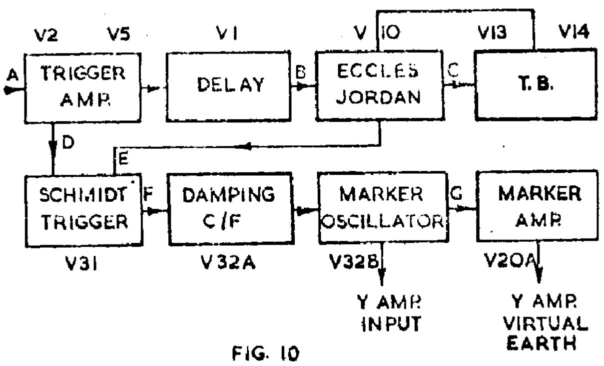


FIG. 10

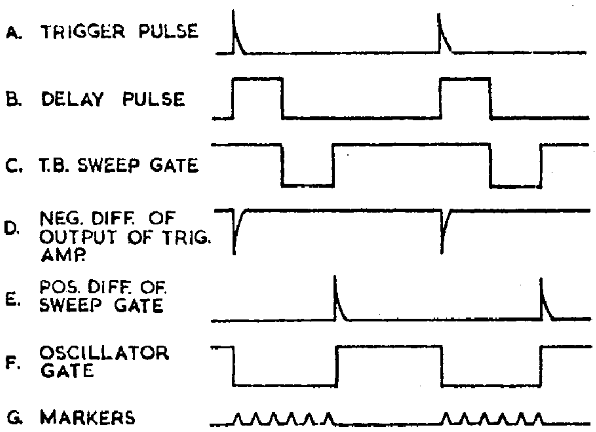


FIG. 11

5.4 Marker Generator and Damping Cathode Follower (V32–12AT7)

Half of a 12AT7 valve (V32A) is employed in a conventional tuned grid Class C oscillator circuit. Tuning is achieved by L8, C72 on the 10μSec. position, and by L6, C71 on the 1μSec. and 1 Mc/s ~ positions. When the time marker switch is set to 1 Mc/s ~, the oscillator tank circuit is coupled via C84 to the Y-amplifier input, and C85 (39pF) is disconnected from the tank circuit to compensate for the Y-amplifier input capacitor. The oscillator can be tuned approximately ± 10% of its nominal frequency, by the adjustment of the cores of L6 and L8. The grid coupling capacitors C73, C74, are selected by a switch SW6D, to reduce the build-up time of the oscillator to a minimum, while maintaining Class C operation.

The left-hand section of V32 operates as a cathode follower, which is connected across the tuned circuit to quench the oscillator during the resting and flyback periods of the time base.

In order to synchronise the markers to the cathode ray tube trace, the valve is switched on and off by the waveform from the Schmidt trigger (V31).

5.5 Time-Marker Amplifier (V20A–½12AT7)

The time markers which are developed across R135 (47Ω) in the cathode of the oscillator are applied to the grid of V20A. This stage, which operates as a Class A amplifier, also inverts the markers before they are injected into the Y-amplifier paraphase stage, via blocking capacitor C77, video coupling components R138, C78, and switch SW6E.

5.6 Oscillator Gate (V31–12AT7)

During the resting and fly back periods of the time base, the Schmidt trigger (V31) is in a condition where the anode current of the left-hand section of V31 is cut off. The potential at the grid of the damping cathode follower (V31B) is such that this valve conducts, placing a low impedance across the oscillator tank circuit.

When a trigger pulse is applied to the oscilloscope, the negative differential of the output waveform of the trigger amplifier (V2) cuts off the right-hand section of V31, thus reversing the state of the Schmidt trigger. The grid coupling network of the damping cathode follower is between the output of V31 and the —105V rail. This, plus the reversal of the trigger, is sufficient to cut off the damping cathode follower, allowing the marker generator to oscillate. Oscillation continues until the Eccles Jordan valve (V10) is reset by the time base, when the positive differential of the sweep gate returns the Schmidt trigger to its original state.

The diodes V29 and V30 suppress the negative differential of the sweep gate and the positive differential of the trigger waveform respectively. Resistors R119, R124 and R129 limit the potential variations caused by the build-up of tolerances.

6. H.T. POWER SUPPLIES

6.1 Reference should be made to the simplified circuit diagram, Fig. 7, and to the complete circuit diagram, Fig. 8.

6.2 The Oscilloscope circuits require a stable --105v negative HT line, to simplify the circuit design and to obtain reliable operation, but are not critical with regard to the HT positive lines.

The main HT supply is unstabilised and consists of a common 400-0-400v r.m.s. secondary winding on the mains transformer (T2) supplying two separate full-wave rectifiers (V27 and V17). Each rectifier has its own condenser input filter, thus providing two HT lines. The time-base circuit, which takes a fluctuating current and modulates the time-base HT line, especially when the time-base is operating at or near minimum velocity, is supplied from one HT line, and the Y-plate amplifier, which takes a steady current, is supplied from the other HT line. The steady current taken by the amplifier passes through a 105v neon (V26), the positive electrode of which is earthed, thus providing a stable −105v line.

A stable and smooth HT supply for the screen of the input cathode follower (V21) is provided by a shunt stabilising valve (V20).

The Oscilloscope will work satisfactorily on mains voltages which are ± 10% of the nominal 50 c.p.s./ 230v r.m.s. input.

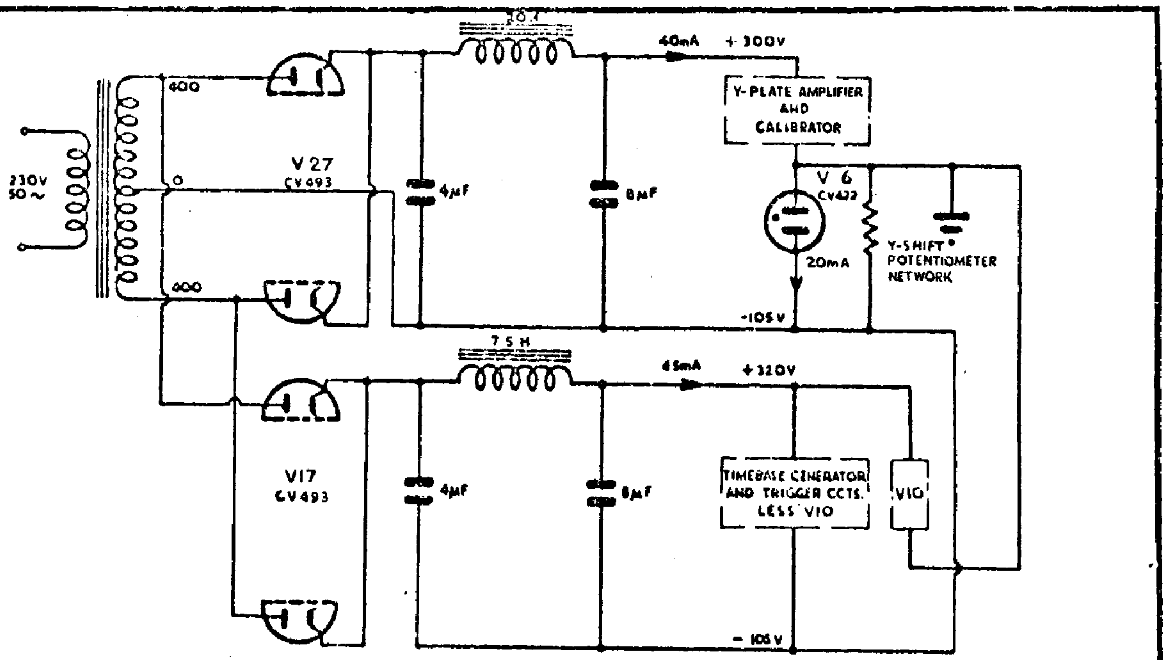


FIG. 7 SIMPLIFIED CIRCUIT DIAGRAM
H.T POWER SUPPLY

7. MECHANICAL CONSTRUCTION

The mechanical design of the Oscilloscope was undertaken by Mr. E. N. Shaw. As a result of Mr. Shaw's work, the accessibility of the components is very good and his careful attention to heat distribution has resulted in a reliable instrument. The principles and methods of construction used will be the subject of a future T.R.E. Memorandum.

8. REFERENCES

1. M.I.T. Radiation Laboratory, Volume 19, " Waveforms," Sec. 7, 8, p. 270.

2. Journal I.E.E., Vol. 93, Part IIIA, No. 7, 1946. " Ranging circuits, linear time-base generators and associated circuits." F. C. Williams and N. F. Moody, p. 1193, para. 5.1.

FAULT LOCATION CHART

SYMPTOM	POSSIBLE CAUSE	REMEDY
Complete failure.	Fuse open circuit. T3 primary winding open circuit.	Change the fuse. Check the continuity of T3. Check the wiring from the mains input socket to T3.
No spot or trace on the Cathode Ray Tube with the valve heaters lit.	No negative high tension.	Check the negative voltage rail (—105 volts).
	No extra high tension from V28.	Check the extra high tension from V28 to the cathode ray tube.
	Fault in the " Y " system V21, V22, V23, V24, V25.	Measure the D.C. voltage at Pin 2 of V22 and V25. These should balance at approximately 135 volts to centralise the trace. If this condition is not correct there is a fault in the " Y " amplifier circuit. Switch to " Y " delay. If the trace returns to the screen the fault is in V21 or its circuitry. Operate the " Y " shift control. If the trace is just apparent at the top of the screen then the V24 circuit is faulty. If the trace appears at the bottom of the screen then V25 circuit is faulty. If the " Y " shift control is inoperative the V22 or V23 circuit is faulty. Change the valves or other components which are faulty.
	Fault in the " X " system V13, V14.	Monitor the sweep waveform at Pin 2 of V14. If there is no sweep waveform the fault is in V13, V14 circuit. Change the valves or other faulty components.
No time base under any operating conditions.	No trigger V2, V5, T1, V7, V10, V13, V14. C27 short circuit.	If there is no spot on the screen with the brilliance control turned to maximum the fault is probably in V13 V14 circuit as foregone. If the spot is visible on the left of the screen, switch to AC trigger and monitor the output from V2 on pin 1 of V5. Refer to the circuit diagram in the handbook for correct waveshape. If the input waveform to V5 is correct, monitor the input waveform on V10 pin 7. If this is correct, measure the voltage at pin 1 of V10. If this is high then V10 circuit is faulty. Check C27 for short circuit.
No signal at pin 1 of V5.	V2 or circuitry.	Change V2. Check the circuit potentials and components. Change faulty components.
No signal at V10 grid pin 7.	V5; V7; T1, or circuitry.	Change V5; V7. Check the continuity of T1 windings. Check the suppressor cut-off on V5.
Short time base on the left hand side of the screen.	V16 or circuitry.	Change V16. Check the circuitry. Change the faulty component.
No time base on all delay switch positions.	R24 open circuit. C8 short circuit. V1, V3; T1, or circuitry.	Check the circuit voltages. Change the valves. Change any other faulty component.
No time base on any one delay switch position.	C6, C10, C7. SW2/A; SW2/B.	Check the relevant capacitor for the faulty range. Check the switch contacts and wiring on the faulty range switch position.
No " Y " presentation on the screen with vertical shift normal and the trace centred.	SW4; switched to external position. " Y " input attenuator switching C59 short circuit.	Turn switch 4 to Internal position. (SW4 is located at the rear of the unit.) Check the " Y " input attenuator and switching. Check C59 for short circuit.
No " Y " presentation on delay position.	Delay open circuit. R86 open circuit. C50 open circuit. SW7/B; SW7/c.	Measure the continuity of the delay line. Check R86 and C50. Check the switch contacts and wiring.

SYMPTOM	POSSIBLE CAUSE	REMEDY
" Y " sensitivity high on any one range or poor response to square wave signal.	C44; 45; 51; 54; 56; 52 either short circuit or wrongly adjusted.	Check the relevant capacitor for the faulty range and change if necessary. Re-adjust capacitors for best square wave response at 10 Kc/s. For poor square wave response on all ranges first adjust C57 and C59 on the 30-volt range.
No " Y " presentation or reduced amplitude on any one sensitivity range.	SW8/A.C.E. or F. R70; 73; 91; 75 on 500-volt range. R72; 75; 91 on 100-volt range. R69; 91 on 30-volt range. R69; 92 on 10-volt range. R69; 93 on 3-volt range. R69; 94 on 1-volt range.	If unit is faulty on 30 volts; 100 volts and 500-volt ranges, check R91. If unit is faulty on 30 volt; 10-volt; 3-volt and 1-volt ranges, check R69. If unit is faulty on only one range, check the relevant resistors for the faulty range from the list in the " possible cause " column.
No calibration at any position of SW6. *CD568 only.*	V20; V6 or circuitry.	Change valve V20. Change crystal V6. Check the circuit voltages. Change faulty components.
No calibration on any one range. *CD568 only.*	Relevant capacitor or coil for the faulty range.	Check the relevant capacitor and coil. Change if necessary.
No calibration. *CD 518 only.*	V31; V32 or circuitry.	Change the valves. Check the circuit voltages and triggering waveforms. Change any other faulty component.
Uncontrollable excessive brilliance.	V18; V19.	Change valves.

TYPICAL D.C. VOLTAGES AT VALVE ELECTRODES

These D.C. voltages are provided for guidance only during fault finding and should not be taken as mandatory requirements. All measurements were taken with a Model 8 Avometer and with the oscilloscope in the following condition:—

Time Base Coarse	...	Switched to Position 1.
Trigger...	...	Switched to A.C.
" Y " Input	...	Switched to A.C.
Sensitivity	...	30 Volts.
Calibration Switch	...	OFF.
Trigger Delay	...	OFF.

Valve	Pin No.	Voltage	Meter Range	Remarks
V1	1	−84	100	Variable with fine delay.
,,	2	−83	100	
,,	7	+5	25	
,,	6	−110	250	−95 with delay IN.
,,	5	+115	250	
V2	2	Virtual Earth	—	

Solartron CD518 & CD568 Oscilloscope

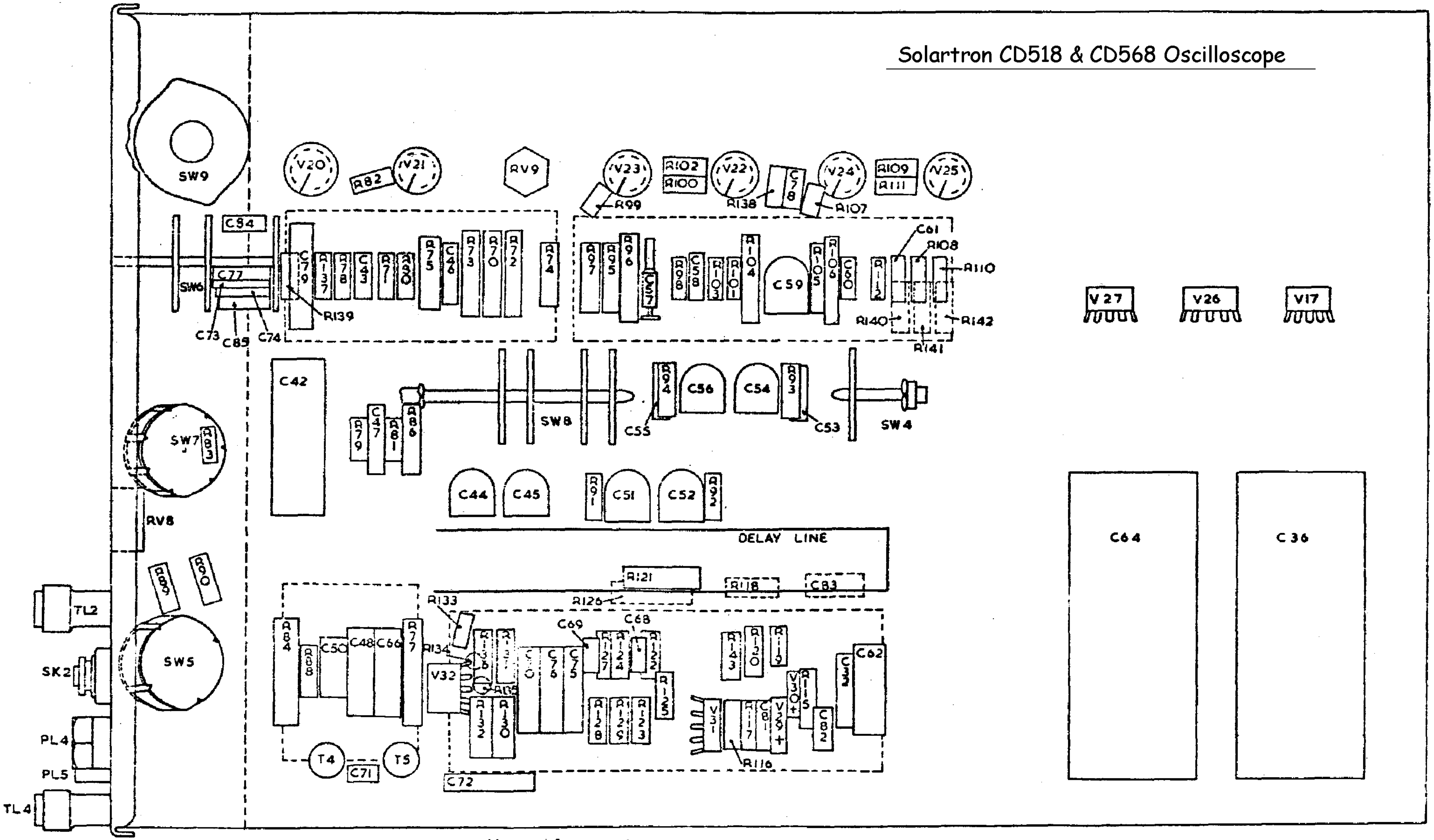
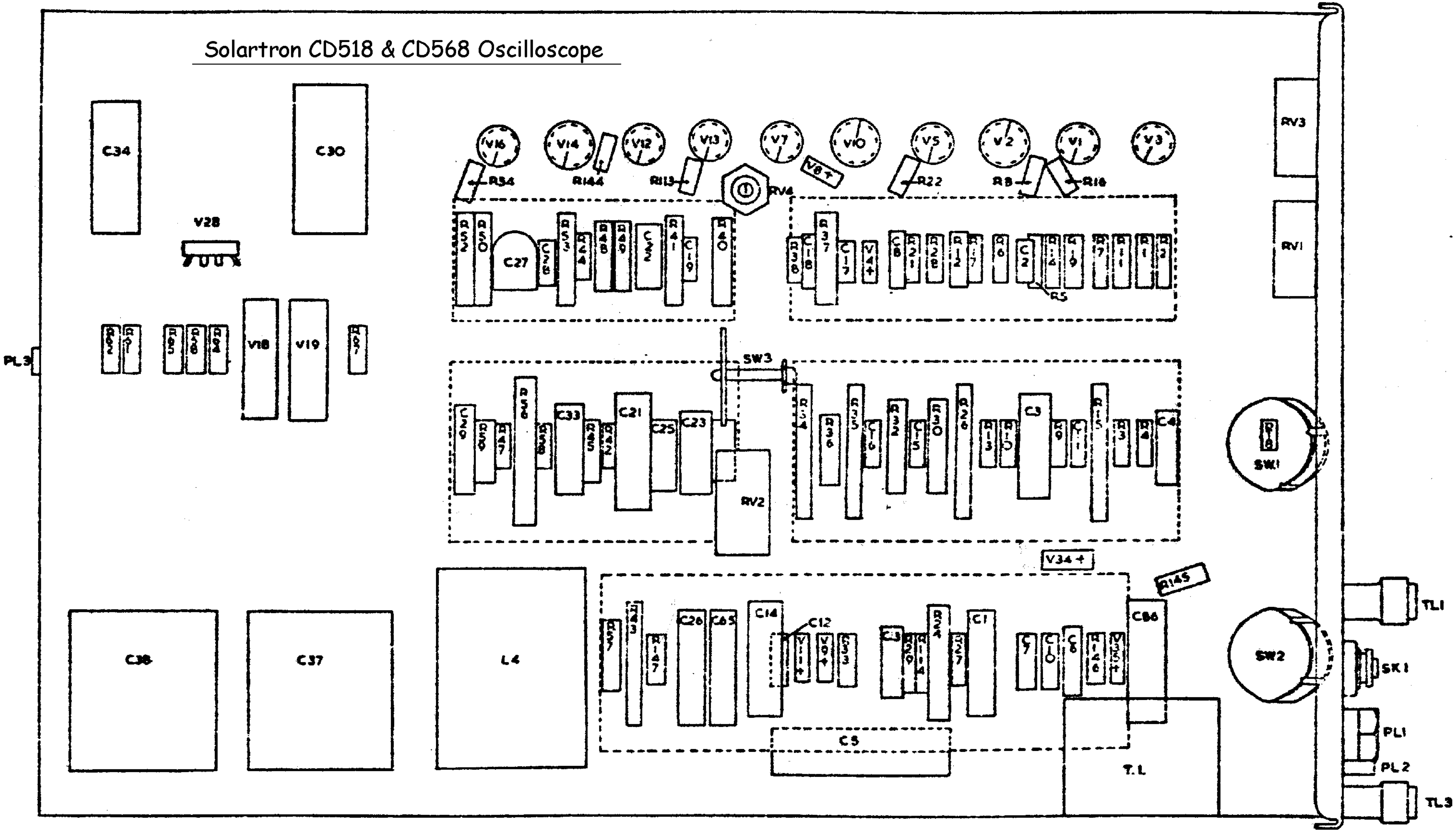
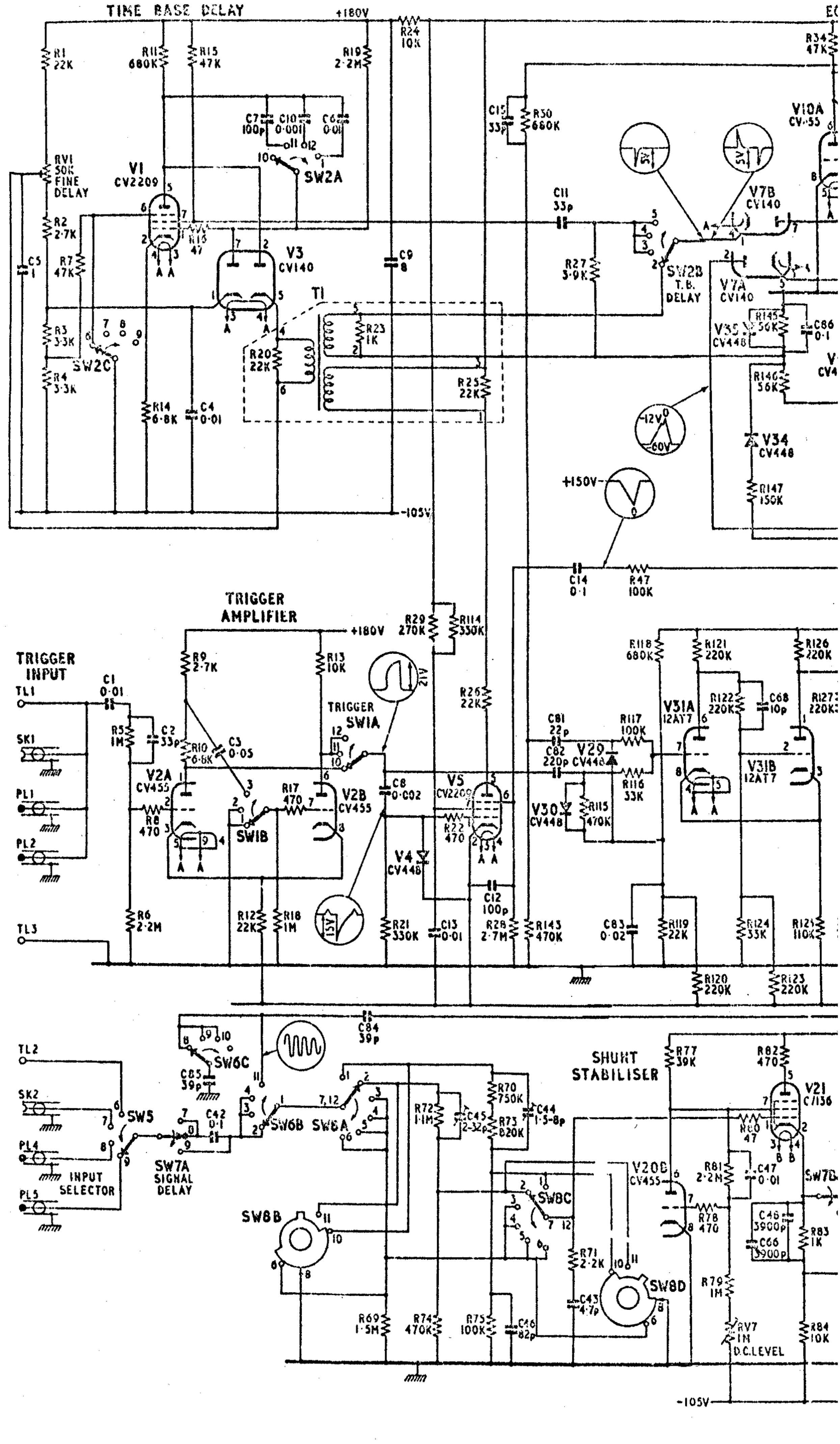
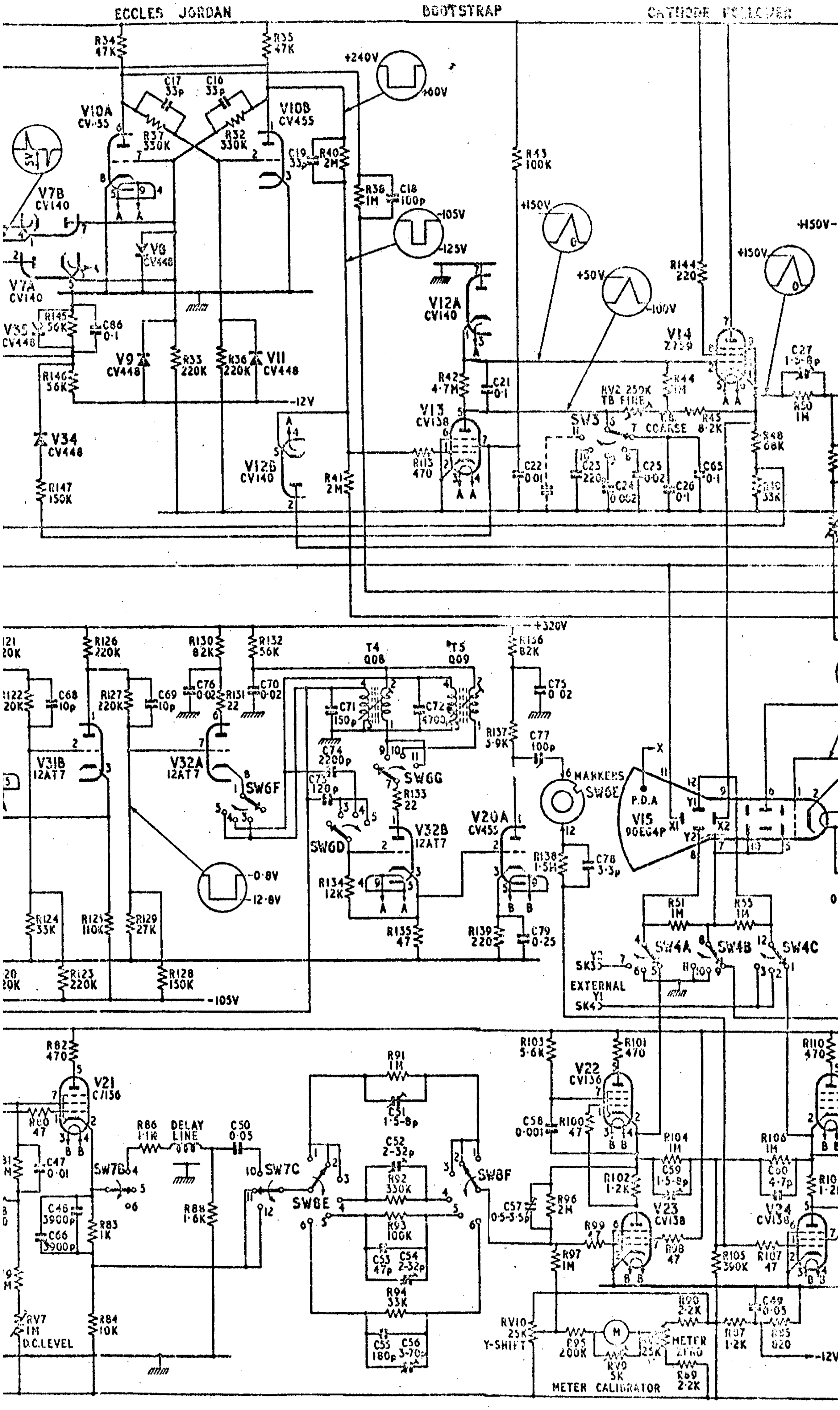


Fig. 12. Right hand side view. Component location.

Solartron CD518 & CD568 Oscilloscope




TIME BASE DELAY
+180V
R24 10K
R1 22K
R11 680K
R15 47K
R19 2.2M
C7 100p
C10 0.001
C6 0.01
SW2A
RV1 50K FINE DELAY
V1 CV2209
R2 2.7K
R7 47K
R13 47
V3 CV140
C9 8
C5 1
R3 3.3K
R4 3.3K
SW2C
T1
R20 22K
R23 1K
R25 22K
R14 6.8K
C4 0.01
-105V
C15 33p
R30 680K
C11 33p
R27 3.9K
SW2B T.B. DELAY
V7B CV140
V7A CV140
V10A CV.55
R34 47K
R145 56K
C86 0.1
V35 CV448
R146 56K
V34 CV448
R147 150K
-12V
-60V
+150V
C14 0.1
R47 100K
TRIGGER AMPLIFIER
R29 270K
R114 330K
TRIGGER INPUT
TL1
C1 0.01
R5 1M
C2 33p
R9 2.7K
R10 6.8K
C3 0.05
R13 10K
TRIGGER SW1A
21V
SK1
PL1
PL2
V2A CV455
R8 470
SW1B
R17 470
V2B CV455
C8 0.002
V5 CV2209
R22 470
R26 22K
C81 22p
C82 220p
V29 CV448
R117 100K
R116 33K
V30 CV448
R115 470K
R118 680K
R121 220K
R122 220K
C68 10p
R126 220K
V31A 12AT7
V31B 12AT7
V4 CV448
C12 100p
R6 2.2M
TL3
R12 22K
R18 1M
R21 330K
C13 0.01
R28 2.7M
R143 470K
C83 0.02
R119 22K
R124 33K
R120 220K
R123 220K
C84 39p
TL2
SW6C
C85 39p
SHUNT STABILISER
R77 39K
R82 470
V21
SK2
SW5
C42 0.1
SW6B
SW6A
R72 1.1M
C45 2-32p
R70 750K
R73 820K
C44 1.5-8p
PL4
INPUT SELECTOR
SW7A SIGNAL DELAY
V20B CV455
R80 47
R81 2.2M
C47 0.01
SW8C
R78 470
PL5
SW8B
C48 3900p
C66 3900p
R83 1K
R71 2.2K
C43 4.7p
SW8D
R79 1M
RV7 1M D.C. LEVEL
R69 1.5M
R74 470K
R75 100K
C46 82p
R84 10K
-105V



ECCLES JORDAN
BOOTSTRAP
CATHODE FOLLOWER
R34 47K
R35 47K
C17 33p
C16 33p
V10A CV455
V10B CV455
R37 330K
R32 330K
C19 33p
R40 2M
+240V
+60V
V7B CV140
V7A CV140
V8 CV448
R36 1M
C18 100p
-105V
-125V
R43 100K
+150V
+50V
-100V
V12A CV140
R145 56K
C86 0·1
V35 CV448
V9 CV448
R33 220K
R36 220K
V11 CV448
R146 56K
-12V
V34 CV448
R147 150K
V12B CV140
R41 2M
R42 4·7M
C21 0·1
V13 CV138
R113 470
C22 0·01
SW3
C23 220p
C24 0·002
C25 0·02
C26 0·1
C65 0·1
RV2 250K TB FINE
T.B. COARSE
R44 1M
R45 8·2K
R144 220
V14 Z759
+150V
C27 1·5-8p
R50 1M
R48 68K
R49 33K
-150V
+320V
R126 220K
R130 82K
R132 56K
T4 Q08
T5 Q09
R136 82K
C75 0·02
R122 220K
C68 10p
R127 220K
C69 10p
C76 0·02
R131 22
C70 0·02
C71 150p
C72 4700p
R137 3·9K
C77 100p
V31B 12AT7
V32A 12AT7
SW6F
C74 2200p
C73 120p
SW6G
R133 22
V32B 12AT7
SW6D
MARKERS SW6E
V20A CV455
R138 1·5H
C78 3·3p
V15 90EG4P
P.D.A
X
Y1
Y2
X1
X2
-0·8V
-12·8V
R134 12K
R135 47
R139 220
C79 0·25
R124 33K
R125 110K
R129 27K
R123 220K
R128 150K
-105V
R51 1M
R55 1M
SW4A
SW4B
SW4C
SK3
EXTERNAL Y1
SK4
R82 470
V21 CV136
R80 47
C47 0·01
SW7D
R86 1·1K
DELAY LINE
C50 0·05
SW7C
R91 1M
C51 1·5-8p
C52 2-32p
R92 330K
R93 100K
SW8E
SW8F
C53 47p
C54 2-32p
R94 33K
C55 180p
C56 3-70p
C48 3900p
C66 3900p
R83 1K
R88 1·6K
RV7 1M D.C.LEVEL
R84 10K
R103 5·6K
R101 470
V22 CV136
C58 0·001
R100 47
R104 1M
C59 1·5-8p
R102 1·2K
C57 0·5-3·5p
R96 2M
R99 47
V23 CV138
R98 47
R97 1M
RV10 25K Y-SHIFT
R95 200K
RV9 5K
METER CALIBRATOR
METER ZERO 25K
R90 2·2K
R69 2·2K
R105 390K
R107 47
R106 1M
C60 4·7p
R110 470
V24 CV138
C49 0·05
R87 1·2K
R85 820
-12V

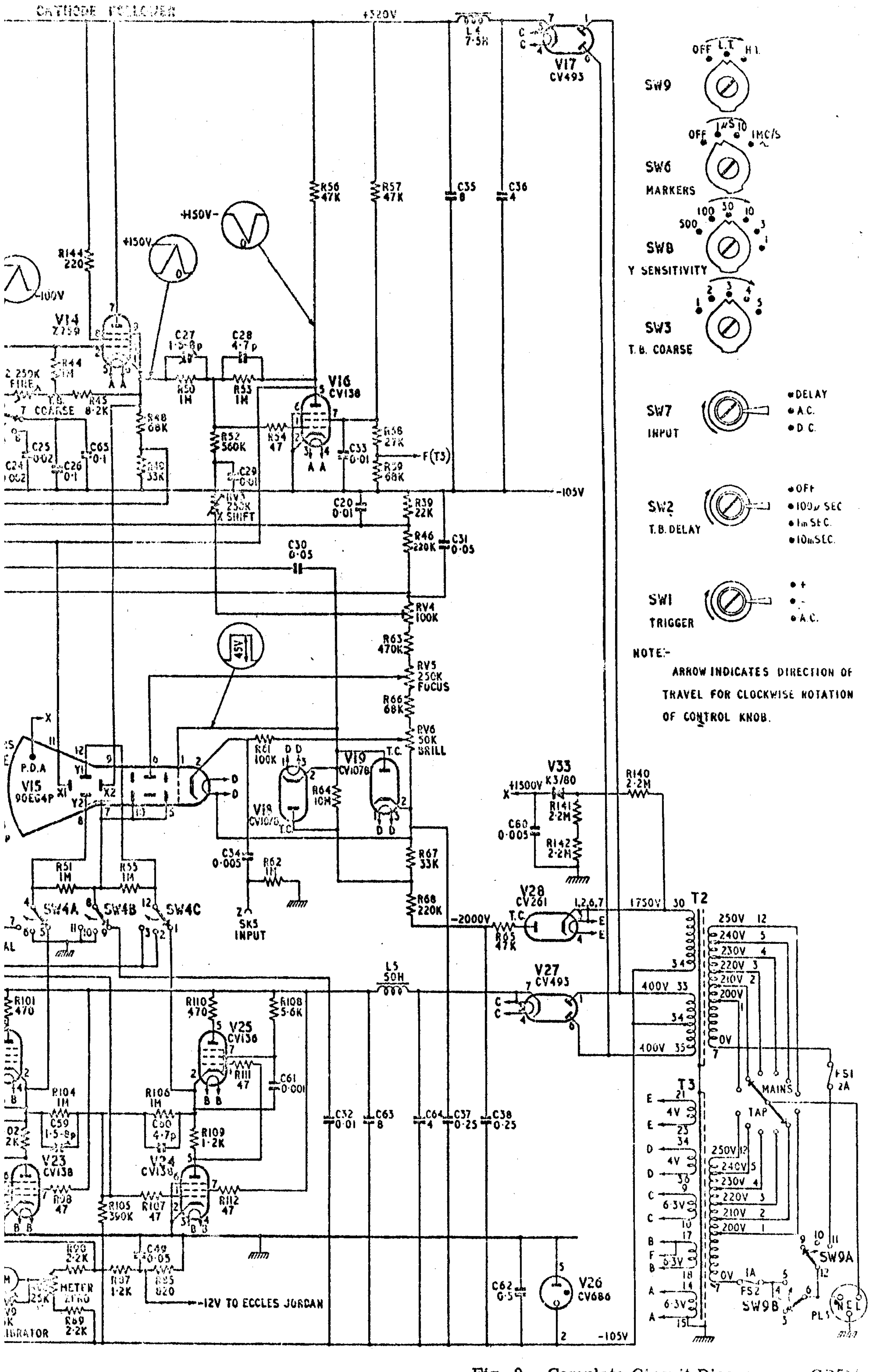
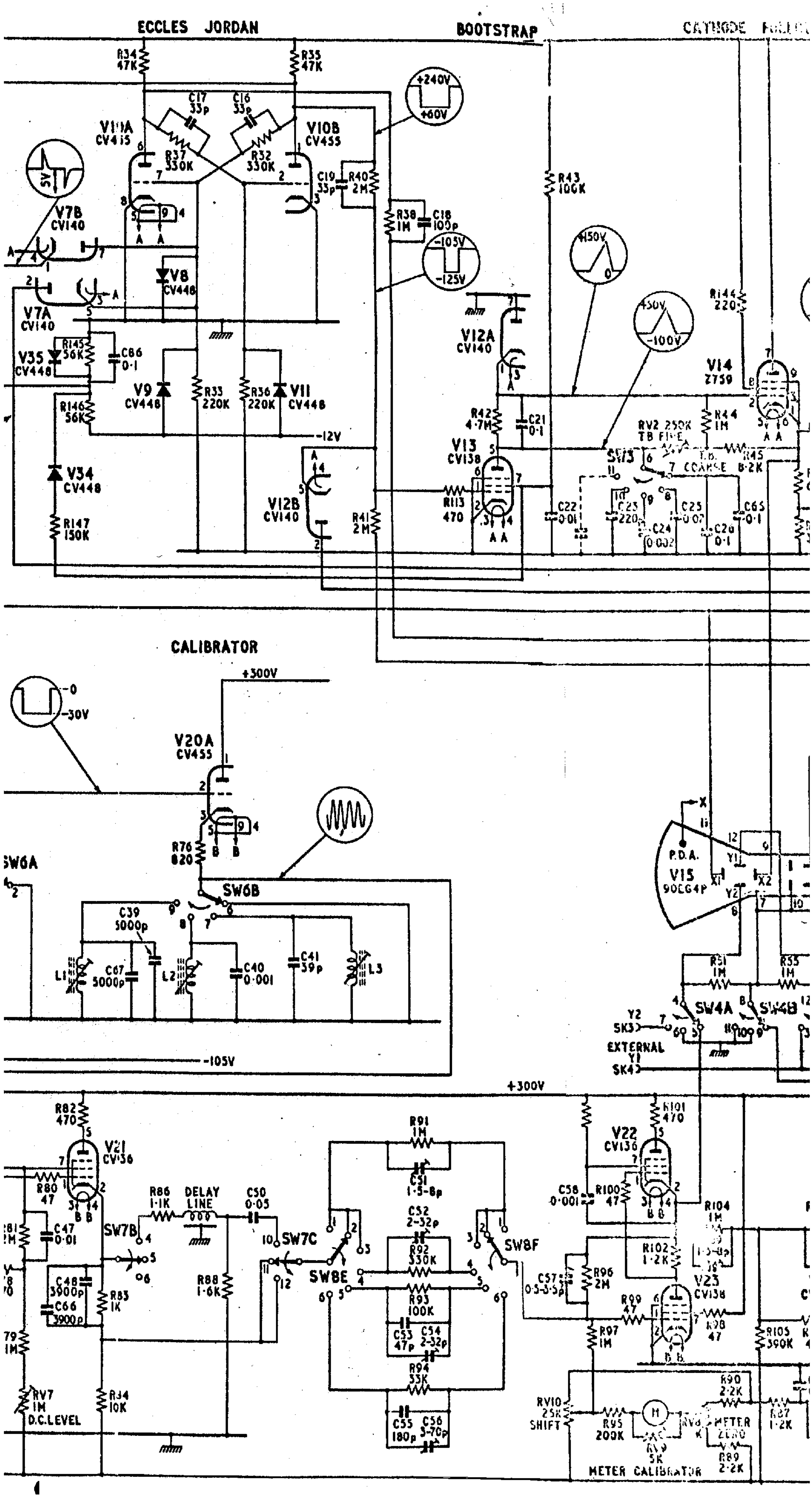
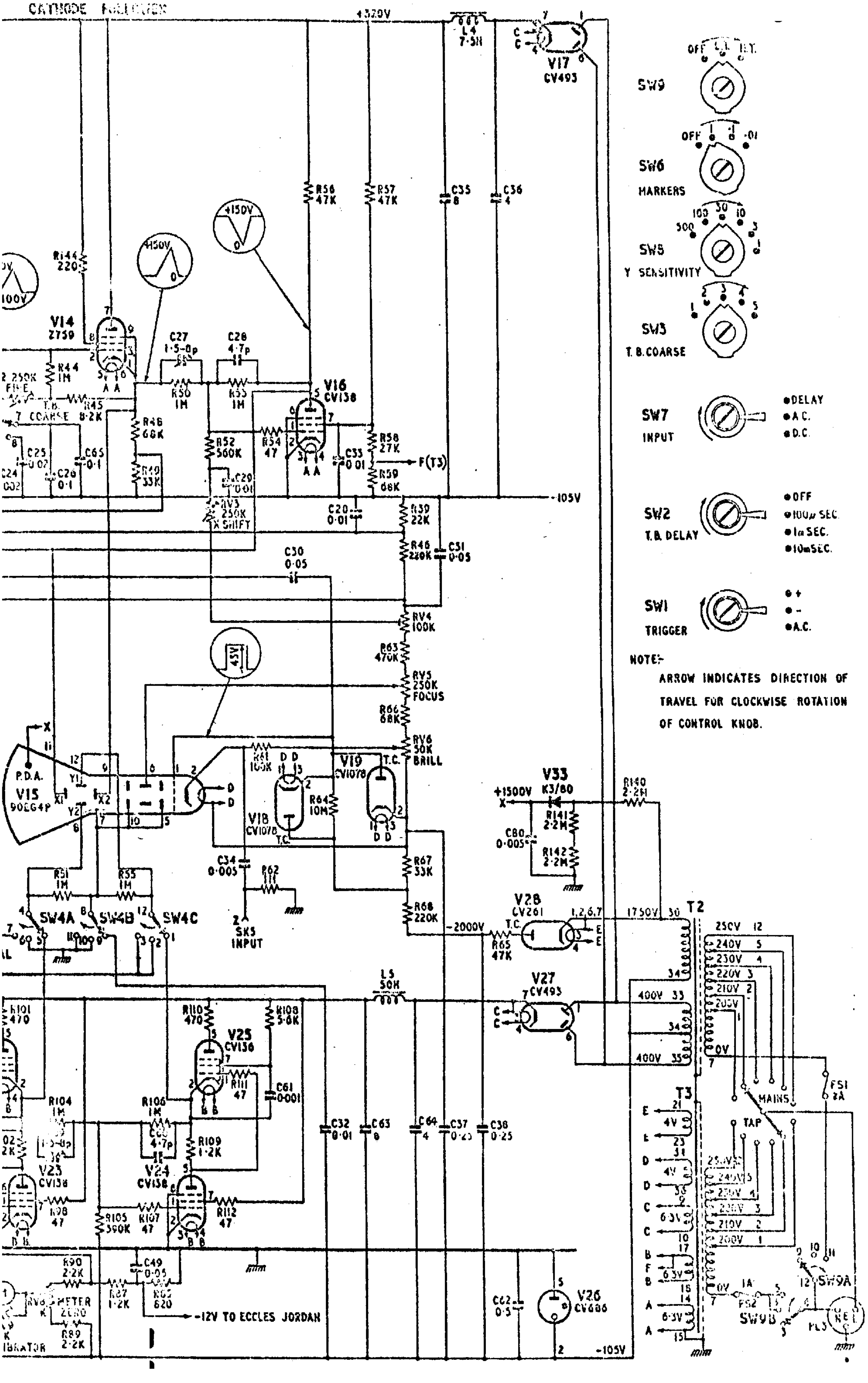


Fig. 9. Complete Circuit Diagram. CD518.


ECCLES JORDAN
BOOTSTRAP
CALIBRATOR
R34 47K
R35 47K
C17 33p
C16 33p
V10A CV455
V10B CV455
R37 330K
R32 330K
+240V
+60V
C19 33p
R40 2M
R38 1M
C18 100p
-105V
-125V
V7B CV140
V7A CV140
V8 CV448
V35 CV448
R145 56K
C86 0·1
V9 CV448
R33 220K
R36 220K
V11 CV448
R146 56K
-12V
V34 CV448
R147 150K
V12B CV140
R41 2M
R43 100K
150V
450V
-100V
V12A CV140
R42 4·7M
C21 0·1
V13 CV138
R113 470
C22 0·01
RV2 250K TB FINE
R44 1M
SW3
T.B. COARSE
R45 8·2K
C23 220
C24 0·002
C25 0·02
C20 0·1
C65 0·1
R144 220
V14 Z759
+300V
-30V
V20A CV455
R76 820
SW6A
SW6B
C39 5000p
C67 5000p
C40 0·001
C41 39p
L1
L2
L3
-105V
P.D.A.
V15 90CG4P
R51 1M
R55 1M
SW4A
SW4B
Y2 SK3
EXTERNAL
Y1 SK4
R82 470
V21 CV136
R80 47
C47 0·01
SW7B
R86 1·1K
DELAY LINE
C50 0·05
SW7C
C48 3900p
C66 3900p
R83 1K
R88 1·6K
RV7 1M D.C. LEVEL
R84 10K
R91 1M
C51 1·5-8p
C52 2-32p
R92 330K
R93 100K
C53 47p
C54 2-32p
R94 33K
C55 180p
C56 5-70p
SW8E
SW8F
R101 470
V22 CV136
C58 0·001
R100 47
R104 1M
R102 1·2K
C57 0·5-3·5p
R96 2M
V23 CV138
R99 47
R98 47
R97 1M
R105 390K
RV10 25K SHIFT
R95 200K
RV9 5K METER CALIBRATOR
R90 2·2K
METER ZERO
R89 2·2K
R87 1·2K



CATHODE FOLLOWER
+320V
L4 7·5H
V17 CV493
SW9
SW6 MARKERS
SW5 Y SENSITIVITY
SW3 T.B.COARSE
SW7 INPUT
DELAY
A.C.
D.C.
SW2 T.B. DELAY
OFF
100μ SEC.
1m SEC.
10m SEC.
SW1 TRIGGER
NOTE:- ARROW INDICATES DIRECTION OF TRAVEL FOR CLOCKWISE ROTATION OF CONTROL KNOB.
V14 Z759
V16 CV138
R56 47K
R57 47K
C35 8
C36 4
C27 1·5-8p
C28 4·7p
R50 1M
R53 1M
R46 68K
R49 33K
R52 560K
R54 47
R58 27K
R59 68K
C33 0·01
F(T3)
-105V
RV3 250K X SHIFT
C20 0·01
R30 22K
R48 220K
C31 0·05
C30 0·05
RV4 100K
R63 470K
RV5 250K FOCUS
R66 68K
RV6 50K BRILL
V15 90EG4P
P.D.A.
V18 CV1078
V19 CV1078
R61 100K
R64 10M
C34 0·005
SK5 INPUT
R67 33K
R68 220K
SW4A
SW4B
SW4C
R51 1M
R55 1M
V33 K3/80
+1500V
R140 2·2M
R141 2·2M
R142 2·2M
C80 0·005
V28 CV261
-2000V
R65 47K
1750V
T2
L5 50H
V27 CV493
400V
250V
240V
230V
220V
210V
200V
0V
MAINS
TAP
FS1 2A
T3
4V
6·3V
V25 CV138
V24 CV138
V23 CV138
R110 470
R108 5·6K
R111 47
C61 0·001
R106 1M
C60 4·7p
R109 1·2K
R105 390K
R107 47
R112 47
R104 1M
R98 47
C32 0·01
C63 8
C64 4
C37 0·25
C38 0·25
C49 0·05
R90 2·2K
R87 1·2K
R89 2·2K
METER ZERO
-12V TO ECCLES JORDAN
C62 0·5
V26 CV686
SW9A
SW9B
FS2 1A
PL5
NEL

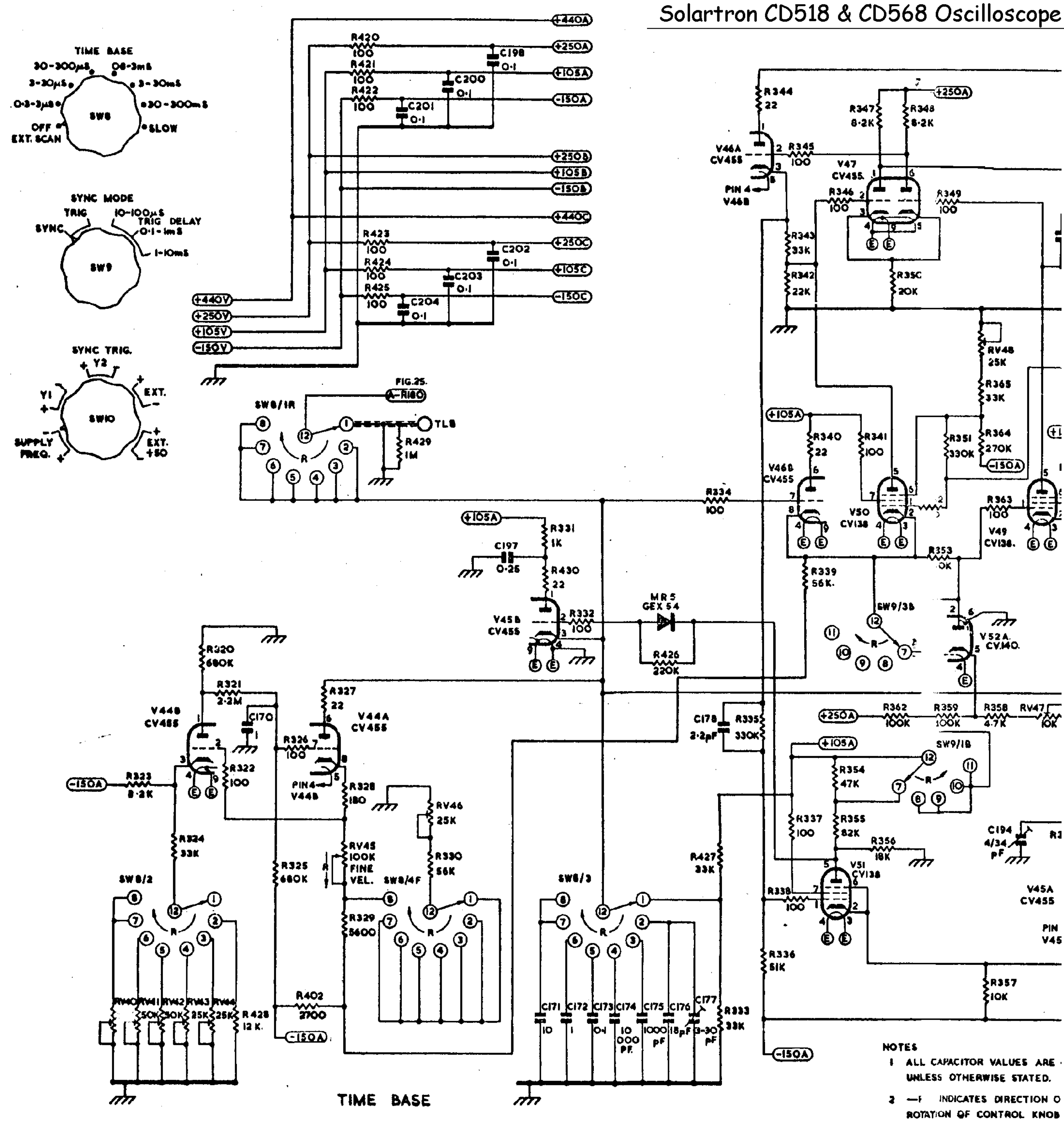
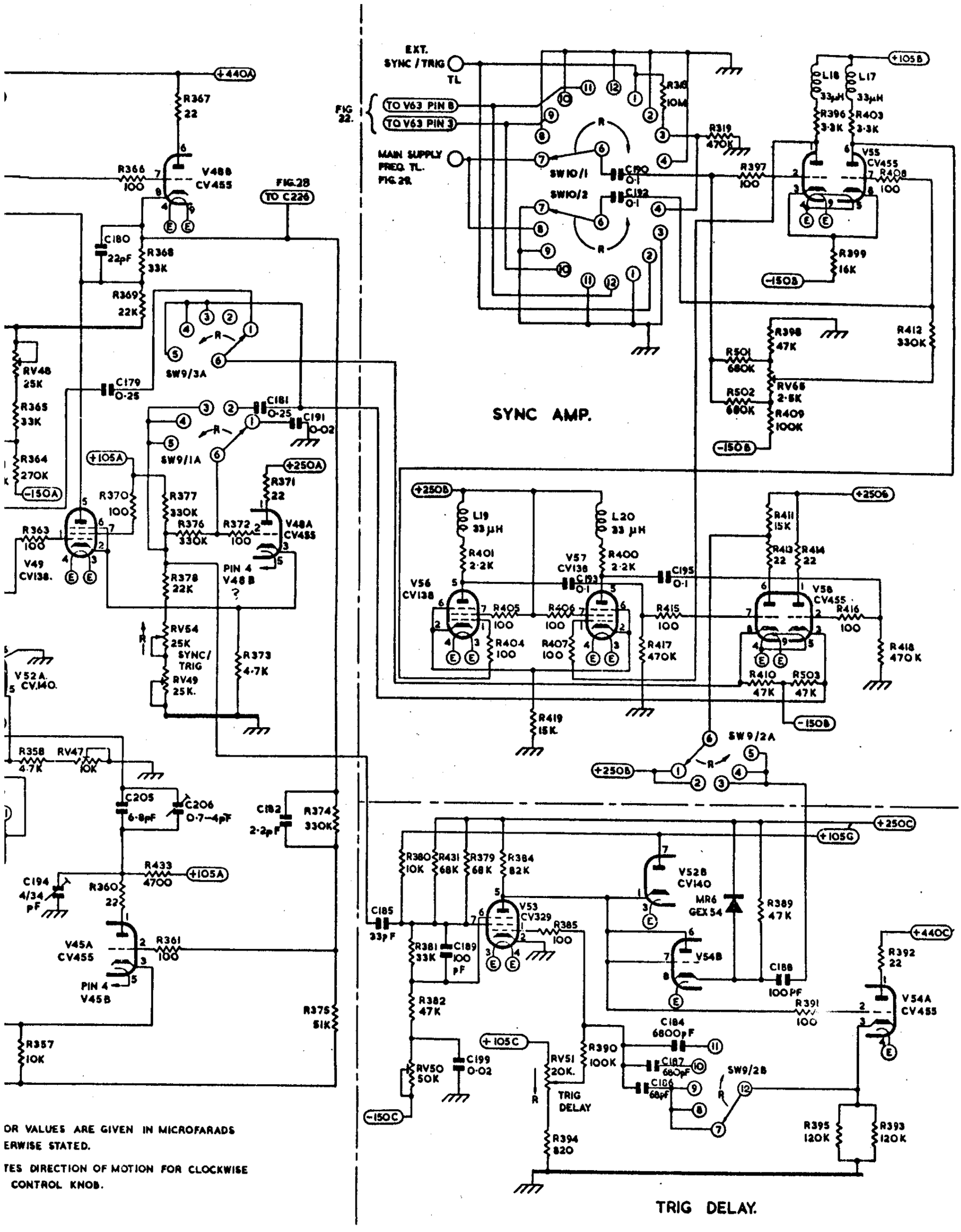


Fig. 24. Time base & Sync Amplifier Circuit Diagram



Solartron CD518 & CD568 Oscilloscope