15984

Oscilloscope
Main Frame OS2100/OS2100R
Instruction Manual

GOULD

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Contents

Introduction

Section 1

The high performance OS2100 and OS2100R series oscilloscope main frames provide a bandwidth of at least 30MHz with high brilliance and readily accepts all OS2000 series plug-in modules. The main frame contains the cathode ray tube with the appropriate brilliance and focus controls, power supplies, main X and Y amplifiers together with a 170nS delay line and 1kHz calibrator. Semiconductors are used throughout and all power rails are fully stabilised against power line voltage fluctuations by means of a constant voltage transformer (CVT). Separate plug-in modules are used for the X and Y deflection thereby ensuring maximum versatility.

The cathode ray tube operating at 10kV ensures a clear bright trace at fast writing speeds. The display area is 10 x 6cm and a P31 general purpose phosphor is fitted as standard, with a P7 long persistance phosphor being available as an option. Graticule illumination, focus and brilliance are provided as front panel controls with astigmatism and trace rotation, as front panel pre-set controls.

A 170nS delay line in the Y deflection system enables the leading edge of the triggering waveform to be observed. Dual trace display is achieved by chopped/alternate sweep methods; the beam switch circuit being integral with the dual trace Y plug-in and the operating mode selected automatically by the position of the time base range switch. The X amplifier is normally driven from the time-base plug-in module and is capable of providing sweep speeds of up to 20nS/cm. Alternatively, using the oscilloscope in the XY mode a horizontal bandwidth of at least 200kHz is achievable. Full Z MODULATION facilities are provided; via a socket on the rear panel.

A noteable feature of the main frame is the use of a constant voltage transformer to stabilize the power rails. Apart from providing adjustment-free operation over the line input range 95 to 130V or 190-260V, its transient suppressing capabilities ensures faultless triggering in the presence of substantial power line noise. It should be noted, however, that the line frequency should be specified when ordering.

The construction of the main frame and the availability of blank plug-in modules makes the OS2100MF ideally suited for special purpose applications.

DISPLAY
Single gun 5 in rectangular cathode ray tube with helical PDA operating at 10kV overall. Display area 10cm x 6cm. P31 phosphor standard - a general purpose phosphor with a green trace and green persistence giving a bright clear display.
P7 phosphor optional - a long persistence phosphor for slow speed displays with a blue trace and yellow after glow.

CALIBRATION ACCURACY
±5% with any OS2000 series plug-in module

'Y' BANDWIDTH
Greater than 30MHz (-3dB) with wide band 'Y' plug-in OS2001Y or OS2002Y

CALIBRATOR
1kHz square wave with five outputs of 250mV, 100mV, 50mV, 5mV, and 0.5mV peak to peak. Accuracy ±2% for both frequency and amplitude.

'Z' MODULATION
OS2100: Serial No's 1 - 600
70V peak to peak fully modulates the trace via sockets on the rear panel

OS2100: Serial No's 601 upward and all OS2100R
A positive input gives brightening of the trace a ±5V signal giving noticeable modulation. At normal viewing intensity approximately 40V is required to fully blank the trace. The bandwidth is DC to at least 5MHz and maximum input is 150V RMS, 200V pk

SIGNAL DELAY
Approximately 170nS

GRATICULE ILLUMINATION
Variable by front panel control

POWER SUPPLY
95 to 130V, 190 to 260V, 50 ±2% or 60Hz ±2%, 60 to 70VA depending on plug-in units. All supply rails are stabilised by a constant voltage transformer
NB The line frequency should be specified when ordering

OPERATING TEMPERATURE RANGE
0 to 40°C

DIMENSIONS AND WEIGHT

OS2100:	10in (25cm) wide
	11½in (29cm) high
	17½in (44.5cm) deep
	25½lb (11.6kg)
OS2100R:	17in (43cm) wide
	7in (17.5cm) high
	17¼in (44cm) deep
	18¾in (47.5cm) (including handle)
	25½lb (11.6kg)

ACCESSORIES

Standard:	Instruction Manual Part No	28136
	Connector BNC/BNC (2')	PL43
	Connector BNC/BNC (8")	PL81
	Connector BNC/Crocodile	PL44
	Plug 2mm Red	26802
	Plug 2mm Black	26803
	Filter Amber	23103
	Filter Blue	23131
	Filter Green	23132
	Filter Grey	27830
	Rack Mount Brackets (OS2100R only)	27852
Optional:	Adaptor BNC - binding post	26234
	Lead Plug-in extender	PL82
	Viewing Hood	26974
	Passive Probe Kit	25362
	Oscilloscope Trolley	TR2
	Padded Protective Cover	26608

PLUG-IN UNITS
All OS2000 series plug-in modules may be used

Y Units	
OS2001Y	Single Trace Wide Band
OS2002YA	Dual Trace Wide Band
OS2004Y	Single Trace Differential

X Units	
OS2001X	X Amplifier
OS2003X	Standard Time Base
OS2005X	Delay Sweep Time Base
OS2006X	Wide Range Time Base

3.1 PREPARATION FOR USE
WARNING The power supply employs a constant voltage transformer for the stabilisation of the supply rails. It is essential that only the specified line frequency be used. NO OTHER FREQUENCY MUST EVER BE USED.
When despatched from the factory, the transformer tappings will be set for 190-260V on 50Hz models and 95-130V on 60Hz models. Access to the transformer may be obtained by removing the bottom panel. The AC power input is always connected to terminals 1 and 3. For 190-260V working, link; terminal 2 to 4; for 95-130V working, link terminals 1 to 2 and 3 to 4.

3.2 MAIN FRAME CONTROLS
The main frame requires that both X and Y plug-in modules be fitted before use. Both units are automatically held in place after being firmly pressed into the main frame. Withdrawal is by means of a lever fitted to each module.

The instrument is switched on by clockwise rotation of the BRILLIANCE control.

NOTE The instrument relies on convention cooling. It is essential that the air flow through and around the instrument should not be impeded. In particular the ventilation holes must not be blocked.

The main frame controls which are located on the right hand side of the cathode ray tube of the OS2100 and below that on the OS2100R, are associated with the cathode ray tube display.

BRILL Adjusts the brilliance of the display giving a brighter trace as the control is turned clockwise. An associated switch is opened in the fully counter-clockwise position to switch off the power.
FOCUS Controls the sharpness of the trace and should be set for minimum spot size.
ASTIG This preset control should be adjusted with a screwdriver to equalise focussing at all parts of the screen.
GRAT Controls graticule illumination
TRACE ROTATION The preset control on the front panel may be adjusted with a screwdriver; it should be set so that the time base runs horizontally, aligned with the graticule.
CALIBRATION OUTPUTS Five 2mm sockets at the bottom right hand corner of the OS2100 front panel and bottom left hand corner of the OS2100R carry calibration voltages at 1kHz. These may be connected to the 'Y' amplifier input to check amplitude and time calibration.
Z MODULATION OS2100 Serial No's 1-600: A switch on the back panel selects EXTernal or INTernal modulation. It should normally be left in the INT position for control by the relevant plug-in unit. When set to EXT the Z MOD socket, adjacent to the switch, is AC coupled to the CRT cathode and a 70V pk/pk signal will fully modulate the beam.
OS2100 Serial No's 601 upward and all OS2100R: Two terminals on the rear panel provide means of DC coupling to the CRT Grid via the Bright up amplifier. A positive input gives brightening of the trace and ±5V gives noticeable modulation. The input resistance is approximately 50K. The maximum voltage which should be applied is 150V RMS or 200V pk.
OTHER CONTROLS All other controls, input sockets etc. are mounted on the plug-in units and reference should be made to the relevant handbook for further operation.

3.3 PHOTOGRAPHY
Suitable cameras utilising Polaroid or 35mm film may be obtained from D Shackman & Sons or Telford Products Limited. Adaptors are available for attaching the camera to the oscilloscope.

Almost any other oscilloscope camera may be used with the OS2100/OS2100R, but a suitable adaptor must be obtained and reference should be made to the camera manufacturer on this subject.

It is important that in all enquiries concerning cameras, the serial number of the instrument should be quoted.

3.4 CRT PHOSPHORS
The OS2100 Oscilloscope is normally fitted with a P31 cathode ray tube, although a P7 may be fitted.

Phosphor	GH(P31)	GH(P7)
Use	General purpose High brightness High writing speed photography	DC & Low frequency below 30Hz Long persistence
Light Output Comparison	100%	25%
Persistence	Medium Short 100μS - 1mS	Long 1 - 5S
Colour	Green at low brilliance Blue-green at high brilliance	Blue flash Yellow persistence
Filter	Green or Grey	Blue to reduce persistence, orange to enhance persistence
Availability	Standard	Optional

4.1 GENERAL INFORMATION AND LOCATION OF CIRCUITS

The cathode ray tube provides a 10 x 6cm display area with a P31 phosphor as standard, P7 phosphor (long persistence) optional. The CRT is run with -1130V on its cathode, +9kV on the PDA and contains a mesh to prevent the PDA field reaching the X and Y deflection systems. The face plate is rectangular and a coil is provided around the tube to enable the display to be rotated. This is necessary to take up the alignment error between the deflection plate structure and the face plate.

The instrument is powered by a constant voltage transformer to stabilise all internal supply rails against wide variations of the power line voltage. Transient suppressing features of this type of transformer also ensure faultless triggering in the presence of substantial power line voltage fluctuations. The grid and cathode supplies for the CRT are obtained from half wave rectifiers run from separate windings on the constant voltages transformer.

The +9kV PDA voltage is obtained from an oscillator mounted in a metal box on the right hand side of the instrument.

In the OS2100 the X deflection amplifier printed circuit board is mounted behind the front panel on the right hand side. Also on this board is the 1kHz calibrator oscillator which feeds, via a dividing chain, the five 2mm sockets on the front panel.

The Y output amplifier is mounted on the left hand side towards the rear. The delay line is of the twin helix type and is wound on a spool which is located under the cathode ray tube shield.

The delay line driver is mounted on the left hand side under the Y output amplifier.

The bright-up amplifier is on the same board as the CRT cathode and grid supplies and is mounted at the rear immediately behind the CRT.

The low voltage power supply is a self contained sub-unit mounted at the bottom rear of the instrument.

The OS2100R uses the same sub-assemblies as the OS2100 but mounted as follows.

The 9KV oscillator and the delay line driver board are mounted on the left hand side of the instrument behind the Y Plug-in Module.

The constant voltage transformer is mounted in the right hand side panel behind the X Plug-in Module with its associated capacitor on the rear panel.

The Y deflection amplifier X deflection amplifier and low voltage power supply printed circuit board are all mounted on a pair of bars running across the width of the instrument. The cable forming to these boards is arranged so that by removing the two rear screws the entire assembly can be pivoted up about the front bar to give access to the underside of the boards (See fig. 11). The X and Y deflection connections should first be unplugged from the CRT.

The delay line is mounted above the CRT at the front and the bright-up amplifier below the CRT at the rear.

4.2 THE EHT OSCILLATOR

The EHT oscillator consists of transistors VT2 running as a class C oscillator developing automatic bias across C4, such as to make the average current through R6 equal the average current taken by base VT2 and emitter VT1. Oscillation amplitude is limited by the feedback network MR3, R1 and VT1 which prevents VT2 bottoming. By controlling the current through R1 the amplitude of oscillation can be varied.

The secondary winding produces a sine wave of 6kV peak to peak and the tripler circuit MR6, MR7 and MR8 provides +9kV.

4.3 BRIGHTNESS MODULATION AND CATHODE SUPPLY

a) OS2100 Serial No's 1-600

Anode Modulator and Cathode Supply

The -1.3kV supply is obtained by half wave rectification of the 2.6kV peak to peak waveform from the high voltage winding on the constant voltage transformer. The bright-up system is of the anode modulator type, using a pair of small deflection plates in the gun structure of the CRT. When the voltage between the plates exceeds 70V the electron beam is deflected and does not reach the screen. The bright-up waveform from the timebase plug-in is applied to pin 1. When this voltage is zero VT601 is cut off, and pin 2 which is connected to one anode modulator plate, is held at +90V by R604 and R605. When the input voltage is +10V, VT601 turns on, its collector falling to about +4V. The second modulator plate is connected to ground and thus when VT601 turns on, the electron beam reaches the screen.

Z modulation is accomplished by AC coupling to the CRT grid. The feed to this capacitor is taken either internally (to blank the transistions when using switched beam operation) or externally. This is the function of the slide switch S2 on the rear panel.

b) CRT Cathode and Grid Supply, Bright up Amplifier
The cathode supply is derived from a winding on the constant voltage transformer via a half wave rectifier D101, C205 and the ripple filter TR101, C206. In order to provide stabilisation of this supply the amplifier TR104, TR103 is placed in series with the cathode supply. The CRT cathode current return is via R119 and R120, an increase in this current tends to turn TR104 off, turning TR103 on hence reducing collector potential of TR103. Since TR103 is in series with the supply a reduction in collector potential compensates for the fall in supply voltage resulting from an increase in beam current.

The grid supply is derived from a separate winding on the constant voltage transformer via half wave rectifier D103, C207. R108 provides adjustment of the output level of this supply.

The Bright-up Amplifier controls the CRT brightness level from a number of inputs. The effect of these inputs is to increase or decrease the trace intensity or to blank out portions of the display.

Normal Bright-up pulses are fed to the emitter follower TR110, current normally flowing via D109 and D110 from the +150V line is all diverted via D109 and R138 to the input of the inverting amplifier TR108. The junction of D109 and R138 is clamped at the zener voltage of D106 (4.7V) via D108, this gives a maximum input current to the amplifier of approximately 3mA.

TR105, TR106 and TR107 form a feedback amplifier in which the output voltage is given by the product of the input current and the feedback resistor, in this case approximately 75 volts.

R133 provides a means for setting the quiescent DC level of the output.

The chop-blanking input is taken direct to the input of the inverting amplifier, this is a negative going pulse and ensures that the CRT is blanked during beam switching at low time base speeds.

External Z Modulation is fed in via R137 a positive going signal giving brightening of the trace, and a 5V signal giving noticeable modulation on the trace.

When a timebase plug-in OS2005X is used in the Delay Mode the bright-up pulses from the A & B time bases are fed to the Mod 2 and Normal Bright-up inputs respectively.

High frequency components of the Bright-up pulse are taken direct to the CRT grid via C202. Low frequencies and the DC component are taken to the bottom end of the grid power supply via the emitter follower TR102. The emitter follower provides a low impedance at the bottom of the grid supply to reduce 50c/s pickup on the floating supply which would give unwanted brightness modulation.

4.4 X OUTPUT AMPLIFIER AND CALIBRATOR
The timebase ramp for the plug-in 'X' unit is applied to base VT401 and the shift voltage to base VT402. These two are connected as an emitter coupled amplifier, the emitter currents being supplied by VT407 as a constant current source. This stage has a voltage current gain determined by R429 (set X1 gain) or R430 (set X5 gain). The current outputs of VT401 and VT402 are fed to the base of emitter followers VT403 and VT404, which in turn drive the high voltage transistors VT405 and VT406. Feedback resistors R412 and R413 determine the current-to-voltage gain of the pairs VT403/VT405 and VT404/VT406. VT405 and VT406 are prevented from saturating by the networks MR401/R435 and MR402/R436, which limit the current drive into each virtual ground point (bases VT403 and VT404). The overall voltage gain of the amplifier is very nearly the ratio of the shunt feedback resistor (i.e. R413) divided by half the series feedback resistance (total resistance between VT401 and VT402 emitters). MR405 prevents VT402 saturating.

The calibrator oscillator is a cross coupled astable VT408/VT409, with C405, C406, R422 and R423 as timing elements. The output is taken to the precision dividing chain on the front panel (wired on the calibrator output sockets) from collector VT409. R427 sets the amplitude. R428 is a small variable resistor in series with the timing resistors R422 and R423 to give frequency adjustment.

Resistor R424 supplies the recharging current for C406, so that the waveform on the collector of VT409 is square.

4.5 DELAY LINE AMPLIFIER
The differential signal from the plug-in 'Y' amplifier is connected to the bases of VT501 and VT502 (an emitter coupled differential amplifier). VT503 provides a constant current source for the differential amplifier and helps to ensure a balance drive to the delay line when the single trace 'Y' plug-in is in use. The collectors of VT501 and VT502 drive the delay line and matching adjustment is provided by RV501. The collector loads consist of R506/R508 in parallel and R507/R508 in parallel. The output of the delay line drives the bases of VT504 and VT505 and matching adjustment is provided by RV505. VT504 and VT505 are an emitter coupled differential amplifier feeding emitter followers VT506 and VT507 to provide a low impedance drive to the 'Y' output amplifier. Frequency compensation for the delay

line is provided by one fixed (C505/R529) and two variable (C501/RV502 and C507/RV504) time constants in the emitter circuits of the two differential amplifiers.

4.6 Y OUTPUT AMPLIFIER

The main 'Y' amplifier which drives the 'Y' plates of the CRT consists of an emitter coupled differential amplifier driving a balanced cascade amplifier. The differential input amplifier consists of VT307 and VT308 with a constant current source VT309. The current in VT309 may be adjusted by means of R336 to set the mean potential on the Y plates. R317 in the emitter circuit of VT307 and VT308 may be adjusted to set the gain of the amplifier to the required level. The networks, C310/311/R318 and C312/R319, provide compensation for the low frequency characteristics of the high voltage transistors VT301 and VT302. The outputs from the collectors of VT307 and VT308 drive the lower transistors VT303 and VT304 of the cascade pairs via emitter followers VT305 and VT306. The lower transistors are low voltage, high frequency types which drive the emitters of the high voltage output transistors VT301 and VT302. The collector loads of VT301 and VT302 are each made up of four resistors in series-parallel in order to give the required dissipation with minimum stray inductance and capacitance. The main high frequency compensation is provided by the tapped inductances L301 and L302 supplemented by the networks C307, C308, R314, C309 and R315 in the emitter circuit of VT 303 and VT304. The inductances are made adjustable to allow the optimum response to be obtained.

4.7 THE LOW VOLTAGE POWER SUPPLIES

The constant voltage transformer provides an output approximating to a square wave. As well as the previously mentioned 2.6kV peak to peak output, 158V, 19V-0-19V, and 12.6V peak to peak are provided. A bridge rectifier (MR101, 102, 103 and 104) provides 155V from the 158V winding and a second bridge (MR105/8) connected as two full wave rectifiers, provides ±18V from the 19V-0-19V winding. Two lines (±12V) are derived from these by the zener diode and emitter follower systems MR109/MR112/VT3 and MR111/MR110/VT4. The 12.6V peak to peak winding supplies the CRT heater.

4.8 POWER SUPPLIES AND SENSITIVITIES

(a) POWER SUPPLIES

The supplies generated in the main frame and available for the plug-in units are as follows:-

	Limits					
Line	Min	Max	Ripple Max	Current Available	Y Skt A Pin No	X Skt B Pin No
Ground					12, 24	1, 13
+12V	11.8V	12.7V	10mV P/P	200mA	9	16
-12V	11.8V	12.7V	10mV P/P	200mA total	21	4
-18V	Unstabilised				3	22
+150V	145V	165V	2V P/P	60mA	8	17
36V p-p	34V	37V	37	100mA	7	18

SENSITIVITIES

The necessary deflection signal for the 'Y' channel is a differential voltage between pins 11 and 23 of Skt. A. The mean DC level of the input should be -3.5V and the sensitivity to differential signals about this level is 70mV/cm. The maximum excursion of voltage of either pin should be limited between -5.5V and -1.5V.

The necessary deflection signal for the 'X' channel is a differential voltage between pins 2 and 14 of Skt. B. The mean DC level of the input should be +2.0V and the normal sensitivity to differential signals about this level is 400mV/cm. This is increased to 80mV/cm if pins 3 and 15 are grounded. The maximum excursion of voltage on either pin should be limited between -1.0V and +5.0V.

5.1 FUSE REPLACEMENT
The fuse holder is mounted at the rear of the instrument and is easily accessible. A 1A fuse (size 0 Part No. 4732) is fitted for 230 volt operation. A 2A fuse (Part No. 21180) is fitted for 110 volt operation.

5.2 ACCESS TO INSTRUMENT
(a) OS2100
Removal of side covers:-
Remove the vertical trim bars at the rear of the instrument. Remove the fixing screws at front edge of the covers. The side covers are now free to slide backwards.

Removal of bottom cover:-
Turn the instrument over, and disengage the 'instrument rest' from its clip. Take out the two screws at the rear of the bottom cover. The bottom cover can now be drawn backwards.

Removal of the top cover:-
Remove the screws holding the handle and remove handle assembly. Remove the two screws at the rear of the top cover. The top cover can now be withdrawn.

(b) OS2100R
Remove the vertical trim bars at the rear of the instrument. Remove the fixing screws at the front edge of the top and bottom covers. These covers are now free to slide backwards.

Further access can be obtained, if necessary, by removing the rear fixing screws and slackening the front fixing screws of the upper board assembly, after removing the side covers.

If the deflection plate connections are removed from the CRT the assembly can be hinged upward about the front fixing screws. This is not necessary during re-calibration or to obtain access to any of the preset controls.

5.3 FAULT LOCATION
There are four basic systems in the oscilloscope.

(1) Power Supplies
(2) 'Y' Amplifier
(3) Timebase and 'X' amplifier
(4) Bright-up Amplifier

The procedure adopted for a complete loss of trace will be described.

a) Remove all covers and switch on.
b) Check all supply lines (see recalibration section 5.4) and CRT heater voltage.
c) Put timebase in EXT X mode and meter the voltage difference between the second pair of contacts from top (Pin No's 2 and 14) of X compartment 24 way socket. Adjust shift control to bring this potential to zero. If this cannot be done there is a fault in the timebase plug-in.
d) Meter the potential difference between the 'X' plates. Fine adjustment of the X shift should bring this to zero. If this cannot be done there is a fault in the 'X' output amplifier.
e) Meter the potential on pin 8 of 'X' compartment socket. This should be about +10V. If not, there is a fault in the timebase plug-in.
f) OS2100 Serial No. 1-600
Meter the potential on collector (can) of VT601. This should be +5V. If it is not, there is a fault in the bright-up amplifier.
Serial No. 601 upward and all OS2100R
Put timebase to 200mS/cm and set LEVEL control so that timebase does not run, meter potential at G(C202) point on Grid Mod Amp board. This should be +15V, switch timebase to EXT X, potential should rise to approximately +90V, if either of these conditions are not met there is a fault in the Grid Mod Amp.
g) Meter the voltage difference between the second pair of contacts from the top (Pin No's 11 and 23) of the Y compartment 24 way socket. With single channel operation of the plug-in, adjust the appropriate shift control to bring this potential difference to zero. If this cannot be done, there is a fault in the 'Y' plug-in.
h) Meter the voltage difference between signal input pins on the 'Y' output board. This should be adjustable to zero with the 'Y' shift control. If not, there is a fault on the delay driver board.
i) Meter the potential difference between 'Y' plates. If this cannot be brought to zero with the 'Y' shift control, there is a fault in the 'Y' output amplifier.

5.4 RECALIBRATION
Equipment required:
20,000Ω/Volt multimeter
AC digital voltmeter with 1mV resolution
10kV electrostatic voltmeter
Audio frequency sine wave oscillator
1kHz ±1% square wave source
Fast rise time square wave source with good pulse shape. Rise time<3nS.

1) Plug in OS2002YA and any OS2000 series time base.
2) OS2100 Serial No's 1-600
Check line potential. CRT cathode voltage 1.3kV; HT line +155V; LT lines +12V, -12V, +18V and -18V. All ±7%. Check PDA voltage with electrostatic voltmeter. Should be within range +8.5 to 9.5kV.
2a) OS2100 Serial No's 601 upward and all OS2100R
Check potentials as in (2) except CRT cathode voltage 1050V and CRT grid voltage 1175V.

3) OS2100 Serial No's 1-600
Switch timebase to FREE RUN at 0.5mS/cm. Obtain trace. Adjust FOCUS and TRACE ROTATION.
3a) OS2100 Serial No 601 upward and all OS2100R
Put timebase to 200mS/cm and set LEVEL control so that timebase does not run, meter potential at G(C202) point and set to +15V by R133.

Switch timebase to FREE RUN at 0.5mS/cm set BRILLIANCE control to mid-position, adjust R108 so that trace just disappears.
4) Switch timebase to EXT X. Adjust X shift control to centre spot. Adjust R431 on X O/P board for mean X plate potential of +65V. Check both plates with multimeter. Pull for X5 magnifier and swing X shift control fully clockwise and then anti-clockwise. Check each plate falls to between +25V and +8V. R435/R436 will have to be altered if this is not so.
5) Adjust Y shift to centre spot and adjust R336 for mean Y plate potential of +55V.
6) Apply 1kHz sine wave to Y amplifier and set timebase to 0.5mS/cm. Trigger internally and obtain trace. Adjust astigmatism (ASTIG) and FOCUS. Adjust display for minimum pin cushion or barrel distortion with the geometry control (R114) on 1.3kV rectifier board.
7) Apply 1kHz (approx. frequency) sine wave to EXT X. Measure amplitude of signal at pin marked ⌐ on X output board, with an AC digital voltmeter. Pull for X5 magnification. Adjust signal level to 283mV RMS. Adjust R429 to obtain a 10cm line length. Return X gain to normal and increase signal level by five times to 1.41V RMS. Adjust R430 to obtain a 10cm line length.
8) Apply fast rise time generator to Y plug-in, with repetition rate of between 0.5MHz and 1MHz. Set timebase to 0.2μS/cm. Adjust amplitude of display to about 4cm.
9) Set RV501 on Delay board fully clockwise, and adjust RV505 to remove step in waveform and note its position. Set RV505 fully clockwise and repeat using RV501. Then reset RV505 to its previous position.
10) Apply 1kHz sine wave to Y plug-in, and measure signal amplitude differentially at main frame plug-in interface (second pair of contacts from the top of the 24 way plug and socket). Adjust amplitude to 150mV RMS. Adjust R307 on Y output board to give 6cm Y deflection.
11) Set Y plug-in to 0.5V/cm fine control to CAL, and apply 1MHz signal, adjust input level to give approx. 4cm deflection.
12) Set RV503 on Delay Board to approx. mid-position. Capacitor C308 on 'Y' Board should be 22pF initially.
13) Adjust L301 and L302 for best pulse shape, this should be carried out in conjunction with small adjustments of RV503 to remove residual overshoot.
14) Adjust RV502 on Delay Board for optimum flatness over the top of the pulse.
15) Repeat 13 if necessary.

6.1 OS2100Main Frame

Ref	Value	Description			Part No.
RESISTORS					
R201	900	Welwyn 4014A	1%		26592
R202	300	Welwyn 4014A	1%		26590
R203	300	Welwyn 4014A	1%		26590
R204	8.2K	Welwyn 4014A	1%		26593
R205	820	Welwyn 4014A	1%		26591
R206	91	Welwyn 4014A	1%		26589
R207	10	Cr. Carbon	5%	1/8W	2259
R208	100	Cr. Carbon	10%	½W	3416
R209	47	Carbon	10%	½W	1818
R210	250	Linear			A22145
R211	10M	Carbon	5%	½W	24921
R212	1K	Cr. Carbon	5%	1/8W	384
R213	500+ 500	Dual			A22147
R214	1M	Linear			A22144
R215	1M	Linear Morgan 30N			A23628
R216	250K	R/Log AB Type 45S (including S201)			23631
R217	100	Cr. Carbon	5%	1/8W	11504
R218	100	Cr. Carbon	5%	1/8W	11504
R219	1M	Carbon	10%	½W	1171
R220	220K	Erie 16	10%	½W	6703
R221	150	Cr. Carbon	5%	1/8W	301
R222	150	Cr. Carbon	5%	1/8W	301
R223	10K	Cr. Carbon	5%	1/8W	11503
R224	1K	Davall Pot 80P			25226
R225	10K	Cr. Carbon	5%	1/8W	11503
R226	47	Cr. Carbon	5%	1/8W	727
CAPACITORS					
C201	5μF	Dubilier	+10% -5%	360V	8882
C202	.02μF	Erie CP3E		1.5kV	25223
C203	1μF	Metfoil		160V	2364
C204	1μF	Metfoil		160V	2364
C205	1μF	TMC S118711		1500V	27898
C206	1μF	TMC S118711		1500V	27898

Ref.	Value	Description	Part No.
MISCELLANEOUS			
L201		Delay	24915
L202		Coil CRT Twist GB Elect	24914
LP201		Lamp 14V Les .56W	24910
LP202		Lamp 14V Les .56W	24910
SKA		24 way McMurdo RS24	24610
SKB		24 way McMurdo RS24	24610
SKC		B9A Plessey CP18025	21602
SKD		Socket B/L L1413 Black	23636
SKE		Socket B/L L1413 Red	23635
SKF		Socket B/L L1737 Black	26588
SKG		Socket B/L L1737 Black	26588
SKH		Socket B/L L1737 Black	26588
SKJ		Socket B/L L1737 Black	26588
SKK		Socket B/L L1737 Black	26588
SKL		Socket B/L L1737 Black	26588
N201		Neon West Hyde Type Q	26586
PLA		B9A Carrs 79/345	23637
T201		60Hz Transformer CVT CV75/194 50Hz Transformer CVT CV75/191	
F201		Fuse B/L L1055 1A	4732

6.1a OS2100 Main Frame Serial No 601 upward and all OS2100R

Ref	Value	Description			Part No.
RESISTORS					
R201	900	Welwyn 4014A	1%		26592
R202	300	Welwyn 4014A	1%		26590
R203	300	Welwyn 4014A	1%		26590
R204	8.2K	Welwyn 4014A	1%		26593
R205	820	Welwyn 4014A	1%		26591
R206	91	Welwyn 4014A	1%	1	26589
R207	10	Cr. Carbon	5%	1/8W	2259
R208	100	Carbon	10%	½W	3416
R209	470	Carbon	10%	½W	1818
R210	250	Linear			A22145
R211					
R212					
R213	500+ 500	Dual			A22147
R214	1M	Linear			A22144
R215	1M	Linear Morgan 30N			A23628
R216	1M	Erie Type 61 (including S201)			29233
R217	100	Cr. Carbon	5%	1/8W	11504
R218	100	Cr. Carbon	5%	1/8W	11504
R219	1M	Carbon	10%	½W	1171
R220	220K	Erie 16	10%	½W	6703
R221	150	Cr. Carbon	5%	1/8W	301
R222	150	Cr. Carbon	5%	1/8W	301
R223					
R224					
R225					
R226	47	Cr. Carbon	5%	1/8W	727
CAPACITORS					
C201	5μF	Dubilier	+10% -5%	360V	8882
C202	.02μF	Erie CP3E		1.5kV	25223
C203					
C204	1μF	Metfoil		160V	2364
C205	1μF	TMC S118711		1500V	27898
C206	1μF	TMC S118711		1500V	27898
C207	1μF	TMC S118711		1500V	27898

Ref	Value	Description	Part No.
MISCELLANEOUS			
L201		Delay	24915
L202		Coil CRT Twist GB Elect	24914
LP201		Lamp 14V LES. 56W	24910
LP202		Lamp 14V LES. 56W	24910
SKA		24 way McMurdo RS24	24610
SKB		24 way McMurdo RS24	24610
SKC		B9A Plessey CP18025	21602
SKD		Socket B/L L1413 Black	23636
SKE		Socket B/L L1413 Red	23635
SKF		Socket B/L L1737 Black	26588
SKG		Socket B/L L1737 Black	26588
SKH		Socket B/L L1737 Black	26588
SKJ		Socket B/L L1737 Black	26588
SKK		Socket B/L L1737 Black	26588
SKL		Socket B/L L1737 Black	26588
S201		On/Off Mounted on R216	
N201		Neon West Hyde Type Q	26586
PLA		B9A Carrs 79/345	23637
T201		60Hz Transformer CVT	CV100 /150S
		50Hz Transformer CVT	CV100 /149S
F201		Fuse B/L L1055 1A	4732

6.2 OS2100 Y OUTPUT

Ref	Value	Description			Part No.
RESISTORS					
R301	56	Cr. Carbon	5%	1/8W	2411
R302	180	Cr. Carbon	5%	1/8W	1517
R303	1.2K	Cr. Carbon	5%	1/8W	2087
R304	270	Cr. Carbon	5%	1/8W	2716
R305	390	Cr. Carbon	5%	1W	19038
R306	820	Erie Type B	5%	1W	27300
R307	820	Erie Type B	5%	1W	27300
R308	820	Erie Type B	5%	1W	27300
R309	820	Erie Type B	5%	1W	27300
R310					
R311	47	Cr. Carbon	5%	1/8W	727
R312	100	Cr. Carbon	5%	1/8W	11504
R313	4.7K	Cr. Carbon	5%	1/8W	386
R314	100	Cr. Carbon	5%	1/8W	11504
R315	15K	Cr. Carbon	5%	1/8W	315
R316	100	Cr. Carbon	5%	1/8W	11504
R317	100	Control Pot. Davall Type 80			25228
R318	4.7K	Cr. Carbon	5%	1/8W	386
R319	4.7K	Cr. Carbon	5%	1/8W	386
R320	47	Cr. Carbon	5%	1/8W	727
R321	820	Erie Type B	5%	1W	27300
R322	820	Erie Type B	5%	1W	27300
R323	820	Erie Type B	5%	1W	27300
R324	820	Erie Type B	5%	1W	27300
R325	1.8K	RWV4-J	5%		3394
R326	270	Cr. Carbon	5%	1/8W	2716
R327	180	Cr. Carbon	5%	1/8W	1517
R328	56	Cr. Carbon	5%	1/8W	2411
R329	10	Cr. Carbon	5%	1/8W	2259
R330	390	Cr. Carbon	5%	1W	19038
R331	10	Cr. Carbon	5%	1/8W	2259
R332	47	Cr. Carbon	5%	1/8W	727
R333	180	Cr. Carbon	5%	1/8W	1517
R334	680	Cr. Carbon	5%	1/8W	309
R335					
R336	220	Control Pot. Davall Type 80			25229
R337	1.2K	Cr. Carbon	5%	1/8W	2087
R338	47	Cr. Carbon	5%	1/8W	727
R339	10	Cr. Carbon	5%	1/8W	2259
R340	10	Cr. Carbon	5%	1/8W	2259
R341	47	Cr. Carbon	5%	1/8W	727
R342	56	Cr. Carbon	5%	1/8W	2411
CAPACITORS					
C301					
C302	0.1μF	Met/Poly	10%		2385
C303	.01μF	GP Ceramic			22395
C304					
C305					
C306	1000pF	GP Ceramic			22387
C307	1000pF	GP Ceramic			22387

Ref	Value	Description			Part No.
CAPACITORS (Cont)					
C308	33pF	Sil/Mica	AOT		4779
C309	.01μF	GP Ceramic			22395
C310	50μF	Wima Printilyt		6V	1746
C311	50μF	Wima Printilyt		6V	1746
C312	0.68μF	Met/Poly	10%		4540
C313	.01μF	GP Ceramic			22395
C314	.01μF	GP Ceramic			22395
C315	.01μF	GP Ceramic			22395
C316	.01μF	GP Ceramic			22395
TRANSISTORS					
VT301		ZT66			27481
VT302		ZT66			27481
VT303		BSX20			23307
VT304		BSX20			23307
VT305		BSX20			23307
VT306		BSX20			23307
VT307		BSX20			23307
VT308		BSX20			23307
VT309		BSX20			23307
MISCELLANEOUS					
L301		Coil Peaking			A27299
L302		Coil Peaking			A27299

6.3 OS2100 EHT OSCILLATOR

Ref	Value	Description			Part No.
RESISTORS					
R1	1.5K	Cr. Carbon	5%	1/8W	385
R2	3.3K	Cr. Carbon	5%	1/8W	1638
R3	22K	Cont. Pot. Davall 80P			25230
R4	47	Cr. Carbon	5%	1/8W	727
R5	1.2K	Cr. Carbon	5%	1/8W	2087
R6	1.5K	Cr. Carbon	5%	1/8W	385
R7	10	Solid Carbon	10%	½W	1903
R8	47	Cr. Carbon	5%	1/8W	727
R9	1M	Cr. Carbon	5%	1W	19073
R10	27	Cr. Carbon	5%	1/8W	724
R11	150	Cr. Carbon	5%	1/8W	301
CAPACITORS					
C1	.01μF	Erie Type CP3E		30V	19647
C2	25μF	Elect	25	25V	20776
C3	50μF	Elect		40V	20778
C4	.1μF	Erie Type CP3E		30V	19647
C5	25μF	Elect		25V	20776
C6	.01μF	Ceramic GP			22395
C7	.01μF	Ceramic GP			22395
C8	500pF	Erie CHV417		8kV	26862
C9	4700pF	Erie K600041 CD8		4kV	26863
C10	4700pF	Erie K600041 CD8		4kV	26863
C11	500pF	Erie CHV417		8kV	26862
C12	500pF	Erie CHV417		8kV	26862

Ref	Value	Description	Part No.
DIODES			
MR1		1S44	18970
MR2		1S44	18970
MR3		1S44	18970
MR4		1S44	18970
MR5		1S44	18970
MR6		Westinghouse K37 EL150	26861
MR7		Westinghouse K37 EL150	26861
MR8		Westinghouse K37 EL150	26861
TRANSISTORS			
VT1		2N3905	20818
VT2		2N3055	21942
MISCELLANEOUS			
L1		Cambion 3635-25	27590
T1		Transformer	MT608

6.4 OS2100 ANODE MODULATOR/EHT

Ref	Value	Description			Part No.
RESISTORS					
R601	100	Cr. Carbon	5%	1/8W	11504
R602	2.2K	Cr. Carbon	5%	1/8W	425
R603	2.2K	Cr. Carbon	5%	1/8W	425
R604	10K	Iskra	5%	2W	24743
R605	18K	Cr. Carbon	5%	½W	18565
R606	22K	Cr. Carbon	5%	1/8W	1544
R607	10K	Cr. Carbon	5%	1/8W	11503
R608	10K	Cr. Carbon	5%	1/8W	11503
R609	1M	Cr. Carbon	5%	1/8W	766
R610	22K	Cr. Carbon	5%	1/8W	1544
R611	68K	Cr. Carbon	5%	1/8W	1636
R612	820	Carbon	10%	½W	408
R613	1M	Carbon	10%	½W	1171
R614	1M	Cont. Pot Davall 80P			25224
R615	100	Cr. Carbon	5%	1/8W	11504
CAPACITORS					
C601	120pF	GP Ceramic			22377
C602	.01μF	GP Ceramic			22395
C603					
C604					
C605					
C606					
C607					
C608					
C609	1μF	PF/MF		160V	807

Ref	Value	Description	Part No.
DIODES			
MR601		1N914	23802
MR602		1N914	23802
MR603		1N914	23802
MR604		1N914	23802
MR605		BY237	23605
MR606		BY237	23605
MR607		BY237	23605
MR608		OA95	23318
TRANSISTOR			
VT601		BF170	24745

6.4a GRID MOD AMP CIRCUIT FOR OS2100
Serial No's 601 upward and all OS2100R

Ref	Value	Description	Part No.
RESISTORS			
R101	150K		4018
R102	4.7M		597
R103	4.7M		597
R104	120K		5332
R105	10K		11503
R106	2.2M		1180
R107	2.2M		1180
R108	1M	Plessey Cont Pot MPD/PC	26867
R109	5.6M		17767
R110	5.6M		17767
R111	3.3M		1181
R112	1M		766
R113	100K		319
R114	47K		318
R115	22K		19053
R116	12K		1685
R117	56K		756
R118	1.8K		310
R119	2.7K		311
R120	1.5K		385
R121	47		727
R122	27K		316
R123	5.6K		787
R124	10K		11503
R125	24K		28807
R126	100		11504
R127	390		2410
R128	47		727
R129	1K		384
R130	470		1373
R131	1K		384
R132	2.2K		425
R133	1K	Plessey Cont. Pot. MPD/PC	26870
R134	1K		384
R135	2.7K		311
R136	6.8K		313
R137	47K		18570
R138	1.5K		26733
R139	470		1373
R140	220		304
R141	1K		384
R142	2.2K		1638
R143	27K		19054
R144	2.2K		425
R145	470		1373
R146	47		727
R147	1M	Plessey Cont. Pot. MPD/PC	26867
R148	15		2085
R149	15		2085
R150	4.7K		386
CAPACITORS			
C101	5600pF		22394
C102			
C103	1μF	160V	2364
C104	0.1μF	160V	2740
C105	.01μF		22395
C106	.01μF		22395
C107	4μF	350V	23599
C108	.02μF	1.5kV	25223
C109	.01μF		22395
C110	.01μF		22395
DIODES			
D101		MR994A	29053
D102		Zener ZF33	21010
D103		MR994A	29053
D104		1N916	18970
D105		1N916	18970
D106		Zener ZF4.7	4073
D107		1N916	18970
D108		1N916	18970
D109		1N916	18970
D110		1N916	18970
D111		1N916	18970
D112		1N916	18970
TRANSISTORS			
TR101		2N3906	21533
TR102		BFW44	28976
TR103		C407	20388
TR104		BSX20	23307
TR105		BFW44	28976
TR106		BF179	29055
TR107		BSX20	23307
TR108		BSX20	23307
TR109		2N3905	20818
TR110		BSX20	23307

6.5 OS2100 POWER SUPPLY

Ref	Value	Description			Part No.
RESISTORS					
R101	47	Carbon	10%	½W	1818
R102	120	Cr. Carbon	5%	1/8W	735
R103	120	Cr. Carbon	5%	1/8W	735
R104	120	Cr. Carbon	5%	1/8W	735
R105	120	Cr. Carbon	5%	1/8W	735
CAPACITORS					
C101	100+ 200µF	CCL EN61/S		275V	24740
C102	1250µF	Elect		25V	19215
C103	1250µF	Elect		25V	19215
C104	4000µF	Elect		25V	4850
C105	4000µF	Elect		25V	4850

Ref	Value	Description			Part No.
DIODES					
MR101		1N4003			23462
MR102		1N4003			23462
MR103		1N4003			23462
MR104		1N4003			23462
MR105		Rectifier P1V 1.5A		200V	19725
MR106		Rectifier P1V 1.5A		200V	19725
MR107		Rectifier P1V 1.5A		200V	19725
MR108		Rectifier P1V 1.5A		200V	19725
MR109		Zener ZF6.2	5%		4032
MR110		Zener ZF6.2	5%		4032
MR111		Zener ZF6.2	5%		4032
MR112		Zener ZF6.2	5%		4032
TRANSISTORS					
VT201		MJE370			24738
VT202		MJE520			24739

6.6 OS2100 X OUTPUT

Ref	Value	Description			Part No.
RESISTORS					
R401	5.6K	Cr. Carbon	5%	1/8W	787
R402	5.6K	Cr. Carbon	5%	1/8W	787
R403	15K	Cr. Carbon	5%	1/8W	315
R404	15K	Cr. Carbon	5%	1/8W	315
R405	1K	Cr. Carbon	5%	1/8W	384
R406	1K	Cr. Carbon	5%	1/8W	384
R407	3.9K	Cr. Carbon	5%	1/8W	312
R408	3.9K	Cr. Carbon	5%	1/8W	312
R409	6.8K	Cr. Carbon	5%	1/8W	313
R410	47	Cr. Carbon	5%	1/8W	727
R411	680	Cr. Carbon	5%	1/8W	309
R412	47K	Cr. Carbon	5%	1/8W	19148
R413	47K	Cr. Carbon	5%	1/8W	19148
R414	100	Cr. Carbon	5%	1/8W	11504
R415	100	Cr. Carbon	5%	1/8W	11504
R416	5.6K	Welwyn F75	5%		27321
R417	5.6K	Welwyn F75	5%		27321
R418	330	Cr. Carbon	5%	1/8W	1894
R419	330	Cr. Carbon	5%	1/8W	1894
R420	100	Cr. Carbon	5%	1/8W	11504
R421	4.7K	Cr. Carbon	5%	1/8W	386
R422	68K	Cr. Carbon	5%	1/8W	1636
R423	68K	Cr. Carbon	5%	1/8W	1636
R424	4.7K	Cr. Carbon	5%	1/8W	386
R425	4.7K	Cr. Carbon	5%	1/8W	386
R426	56K	Cr. Carbon	5%	1/8W	756
R427	22K	Control Pot. Davall Type 80P			25230
R428	4.7K	Control Pot. Davall Type 80P			25232
R429	1K	Control Pot. Davall Type 80P			25226
R430	4.7K	Control Pot. Davall Type 80P			25232
R431	470	Control Pot. Davall Type 80P			25225
R432	100	Cr. Carbon	5%	1/8W	11504
R433	100K	Cr. Carbon	5%	1/8W	319
R434	100K	Cr. Carbon	5%	1/8W	319
R435	15K	Cr. Carbon	5%	1/8W	315
R436	15K	Cr. Carbon	5%	1/8W	315

Ref	Value	Description		Part No.
CAPACITORS				
C401	.01μF	GP Ceramic		22395
C402	.01μF	GP Ceramic		22395
C403	.01μF	GP Ceramic		22395
C404	1μF	Lemlac +80-20%	30V	19647
C405	.01μF	LCR Type 1722 1%	160V	24886
C406	.01μF	LCR Type 1722 1%	160V	24886
C407	5μF	C426 AR/H5	64V	20773
C408	.01μF	GP Ceramic		22395
DIODES				
MR401		1N916		1949
MR402		1N916		1949
MR403		ZF4.7		4073
MR404		ZF4.7		4073
MR405		1N916		1949
MR406		1N916		1949
MR407		1N916		1949
MR408		1N916		1949
TRANSISTORS				
VT401		BSX20		23307
VT402		BSX20		23307
VT403		BSX20		23307
VT404		BSX20		23307
VT405		BF170		24745
VT406		BF170		24745
VT407		BSX20		23307
VT408		BSX20		23307
VT409		BSX20		23307

6.7 OS2100 DELAY DRIVE

Ref	Value	Description			Part No.
RESISTORS					
R501	10	Cr. Carbon	5%	1/8W	2259
R502	10	Cr. Carbon	5%	1/8W	2259
R503	56	Cr. Carbon	5%	1/8W	2411
R504	56	Cr. Carbon	5%	1/8W	2411
R505					
R506	220	Cr. Carbon	5%	1/8W	304
R507	220	Cr. Carbon	5%	1/8W	304
R508	1K	Cr. Carbon	5%	1/8W	384
R509	1K	Cr. Carbon	5%	1/8W	384
R510	10	Cr. Carbon	5%	1/8W	2259
R511	1.8K	Cr. Carbon	5%	1/8W	310
R512	820	Cr. Carbon	5%	1/8W	1637
R513	270	Cr. Carbon	5%	1/8W	2716
R514	10	Cr. Carbon	5%	1/8W	2259
R513	820	Cr. Carbon	5%	1/8W	1637
R516	68	Cr. Carbon	5%	1/8W	1640
R517	68	Cr. Carbon	5%	1/8W	1640
R518	220	Cr. Carbon	5%	1/8W	304
R519	220	Cr. Carbon	5%	1/8W	304
R520	100	Cr. Carbon	5%	1/8W	11504
R521	100	Cr. Carbon	5%	1/8W	11504
R522	680	Cr. Carbon	5%	1/8W	309
R523	10	Cr. Carbon	5%	1/8W	2259
R524	1.8K	Cr. Carbon	5%	1/8W	310
R525	1.8K	Cr. Carbon	5%	1/8W	310
R526	10	Cr. Carbon	5%	1/8W	2259
R527	10	Cr. Carbon	5%	1/8W	2259
R528					
R529	680			1/8W	309
R530	10	Cr. Carbon	5%	1/8W	2259

Ref	Value	Description		Part No.
CONTROL POTS				
RV501	470	Davall 80P		25225
RV502	2.2K	Davall 80P		25227
RV503	1K	Davall 80P		25226
RV504				
RV505	470	Davall 80P		25225
CAPACITORS				
C501	18pF	GP Ceramic	SOT	22367
C501	68pF	GP Ceramic	SOT	22374
C502	.01μF	GP Ceramic		22395
C503	.01μF	GP Ceramic		22395
C504	.01μF	GP Ceramic		22395
C505	18pF	GP Ceramic		22367
C506	.01μF	GP Ceramic		22395
C507	18pF	GP Ceramic		22367
TRANSISTORS				
VT501		BSX20		23307
VT502		BSX20		23307
VT503		BSX20		23307
VT504		2N3905		20818
VT505		2N3905		20818
VT506		BSX20		23307
VT507		BSX20		23307

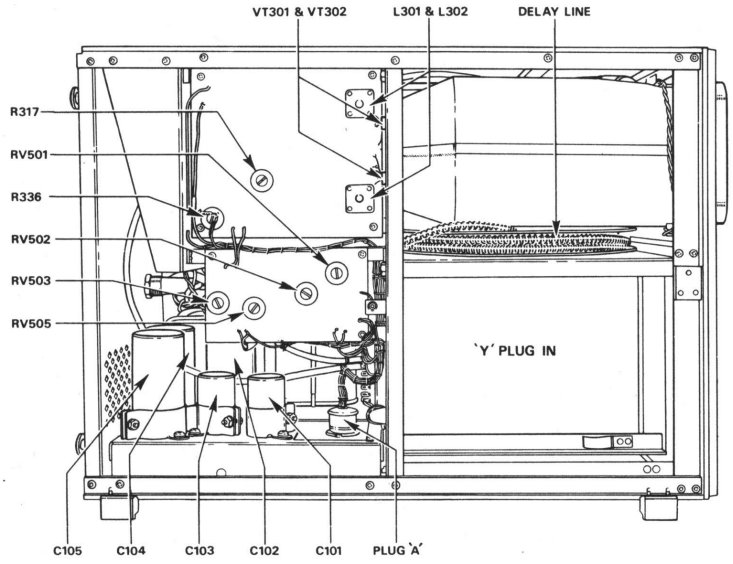


Fig. 8 Component Layout - Left Hand View

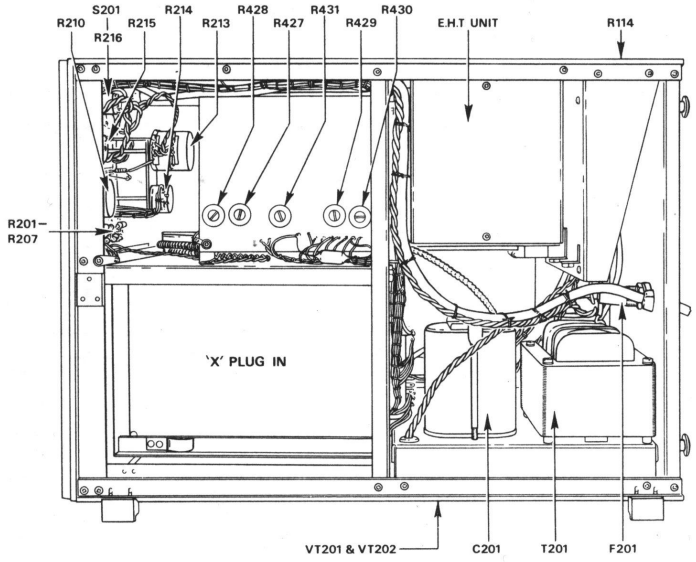


Fig. 9 Component Layout - Right Hand View

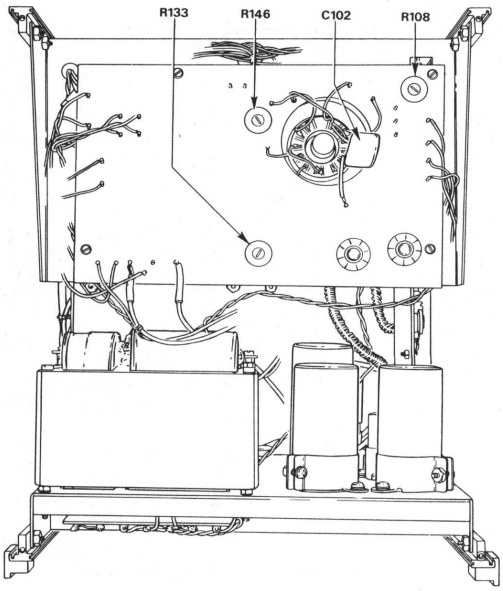


Fig. 10 Component Layout - rear view

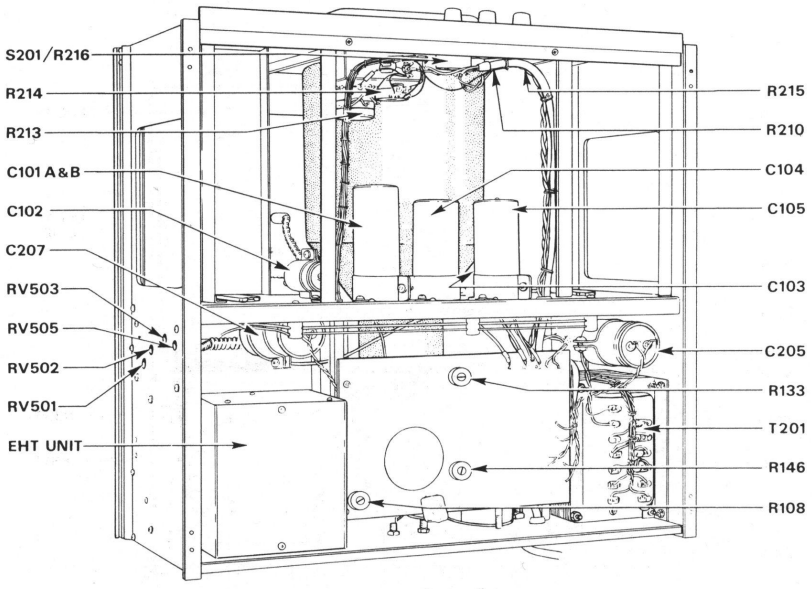
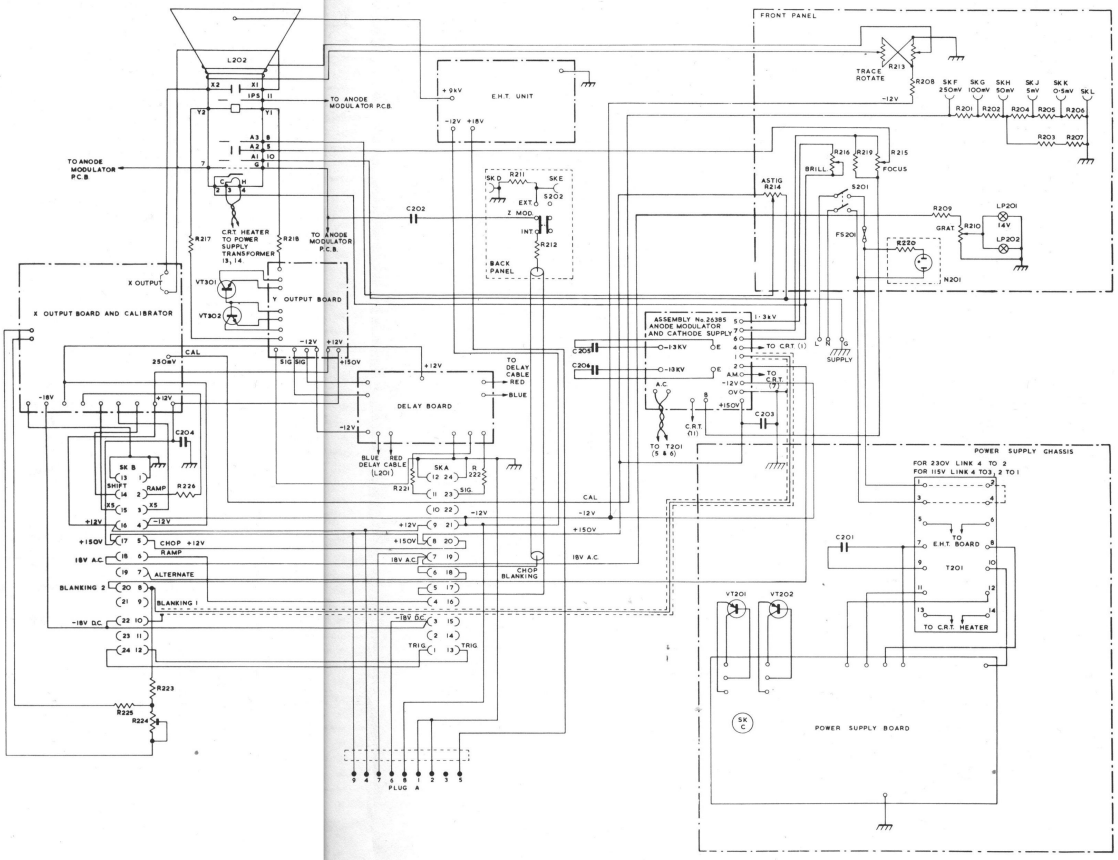


Fig. 11 Component Layout - bottom view (OS2100R)


FRONT PANEL
L202
TO ANODE MODULATOR P.C.B
E.H.T. UNIT
TRACE ROTATE
R213
R208
SK F 250mV
SK G 100mV
SK H 50mV
SK J 5mV
SK K 0·5mV
SK L
R201
R202
R204
R205
R206
R203
R207
R216
R219
R215
BRILL
FOCUS
ASTIG R214
S201
R209
GRAT
R210
LP201 14V
LP202
FS201
R220
N201
C202
SK D
R211
SK E
S202
EXT
Z MOD
INT
R212
BACK PANEL
CRT HEATER TO POWER SUPPLY TRANSFORMER 13, 14
R217
R218
TO ANODE MODULATOR P.C.B
X OUTPUT
VT301
VT302
Y OUTPUT BOARD
X OUTPUT BOARD AND CALIBRATOR
CAL 250mV
SIG SIG
-12V +12V
+150V
+12V
TO DELAY CABLE RED BLUE
DELAY BOARD
-18V
+12V
C204
SK B
SHIFT
RAMP
R226
-12V
+150V
CHOP +12V RAMP
18V A.C
ALTERNATE
BLANKING 2
BLANKING 1
-18V D.C
R223
R225
R224
BLUE DELAY CABLE (L201)
RED
SK A
R221
R222
SIG
CAL
-12V
+12V
+150V
18V A.C
CHOP BLANKING
-18V D.C
TRIG
-TRIG
PLUG A
ASSEMBLY No 2638S ANODE MODULATOR AND CATHODE SUPPLY
-13KV
A.C
C205
C206
1·3KV
TO C.R.T. (5)
G
E
A.M.
-12V
0V
+150V
C203
C.R.T. (11)
TO T201 (5 & 6)
TO C.R.T. (9)
L R T G SUPPLY
POWER SUPPLY CHASSIS
FOR 230V LINK 4 TO 2
FOR 115V LINK 4 TO 3, 2 TO 1
C201
TO E.H.T. BOARD
T201
TO C.R.T. HEATER
VT201
VT202
SK C
POWER SUPPLY BOARD

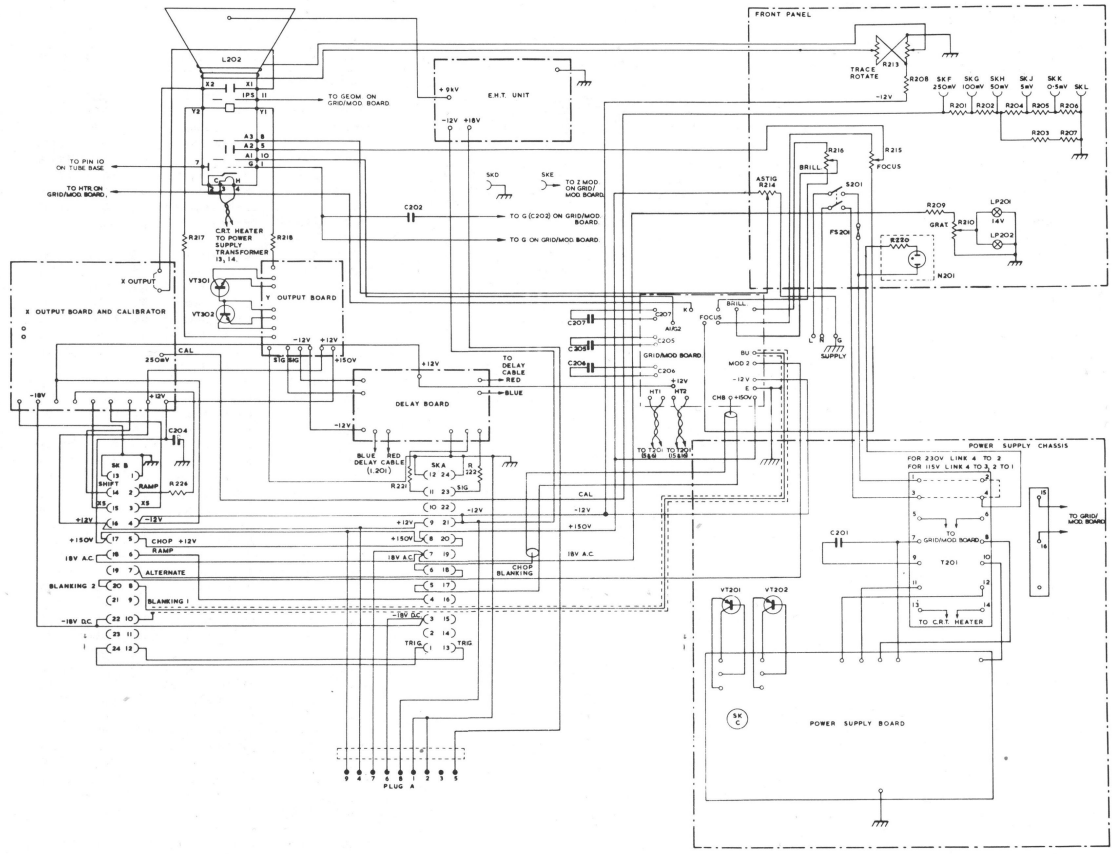


Fig. 1a Main Frame Serial No. 601 upwards and all OS2100R Circuit Diagram

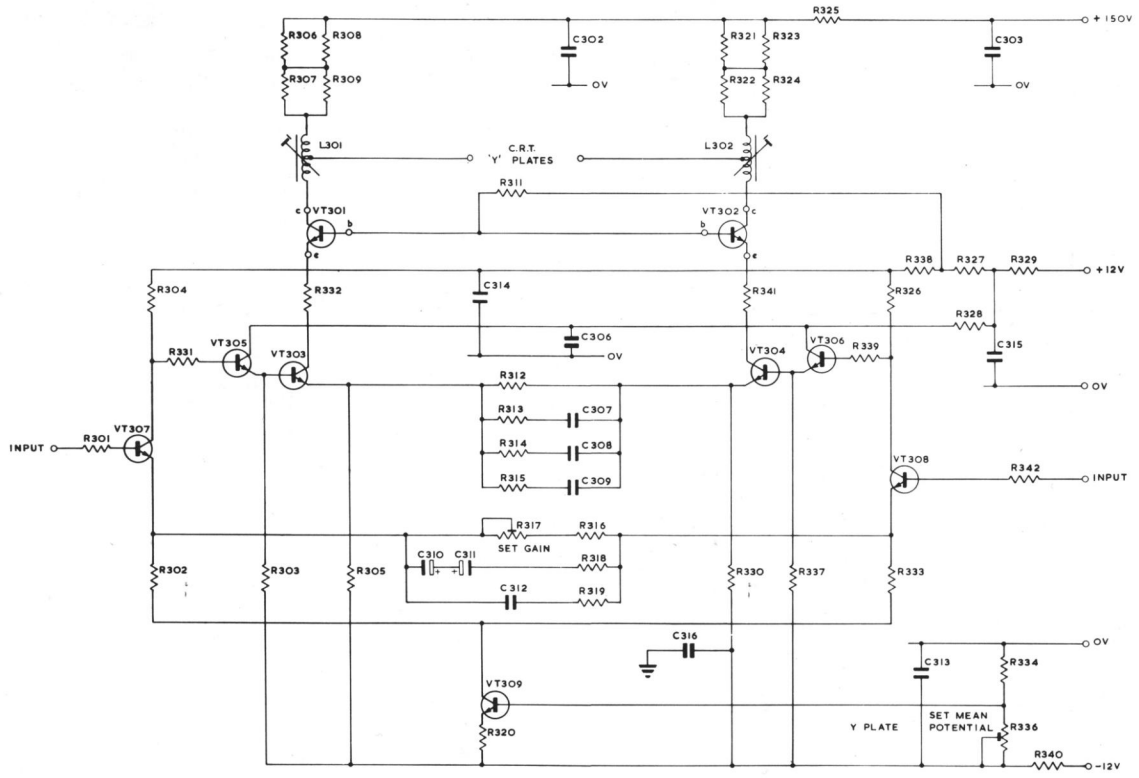


Fig. 2 Y Output Circuit Diagram

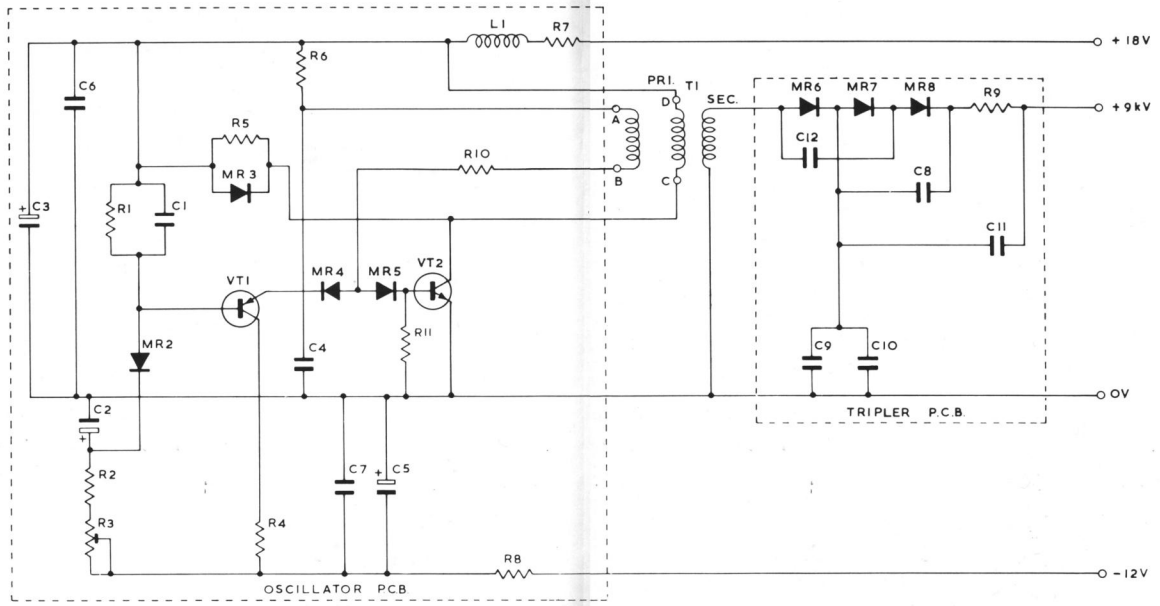


Fig. 3 EHT Oscillator Circuit Diagram

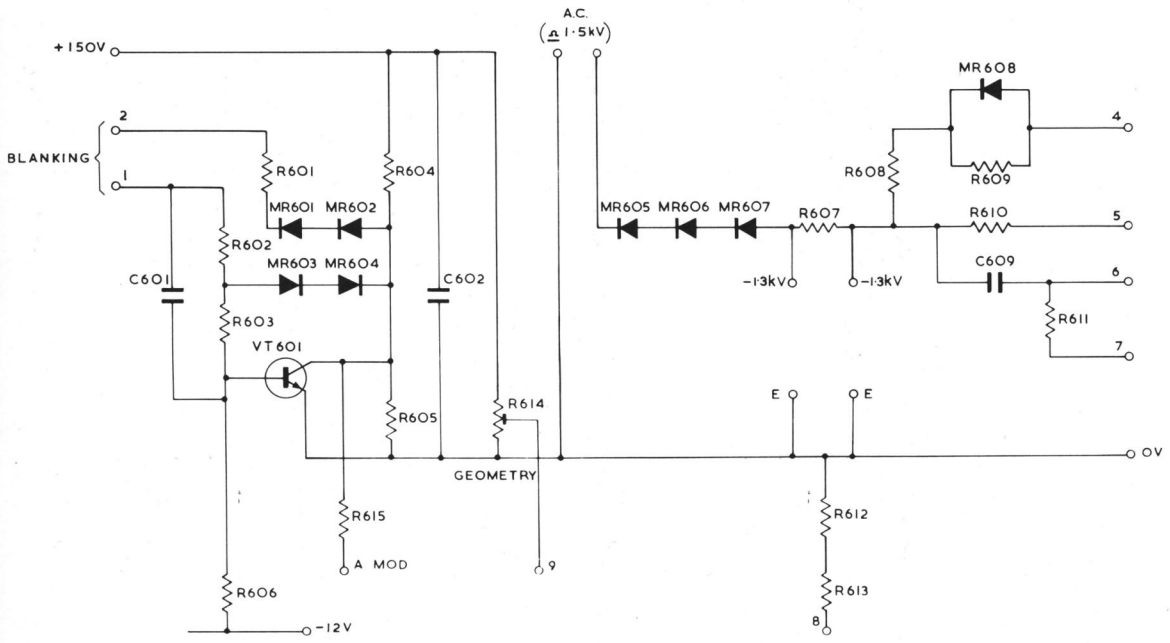


Fig. 4 Anode Modulator and Cathode Supply Circuit Diagram

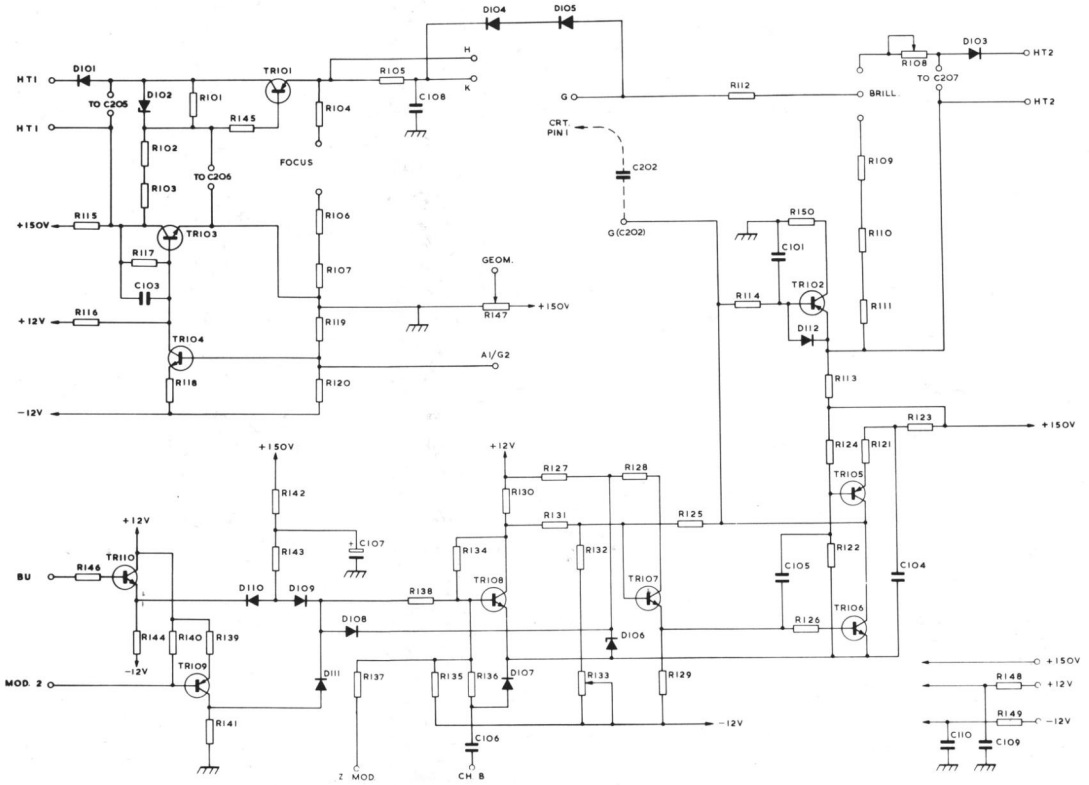


Fig. 4a Grid, Mod. Amp Board OS2100 serial no 601 upward and all OS2100R Circuit Diagram

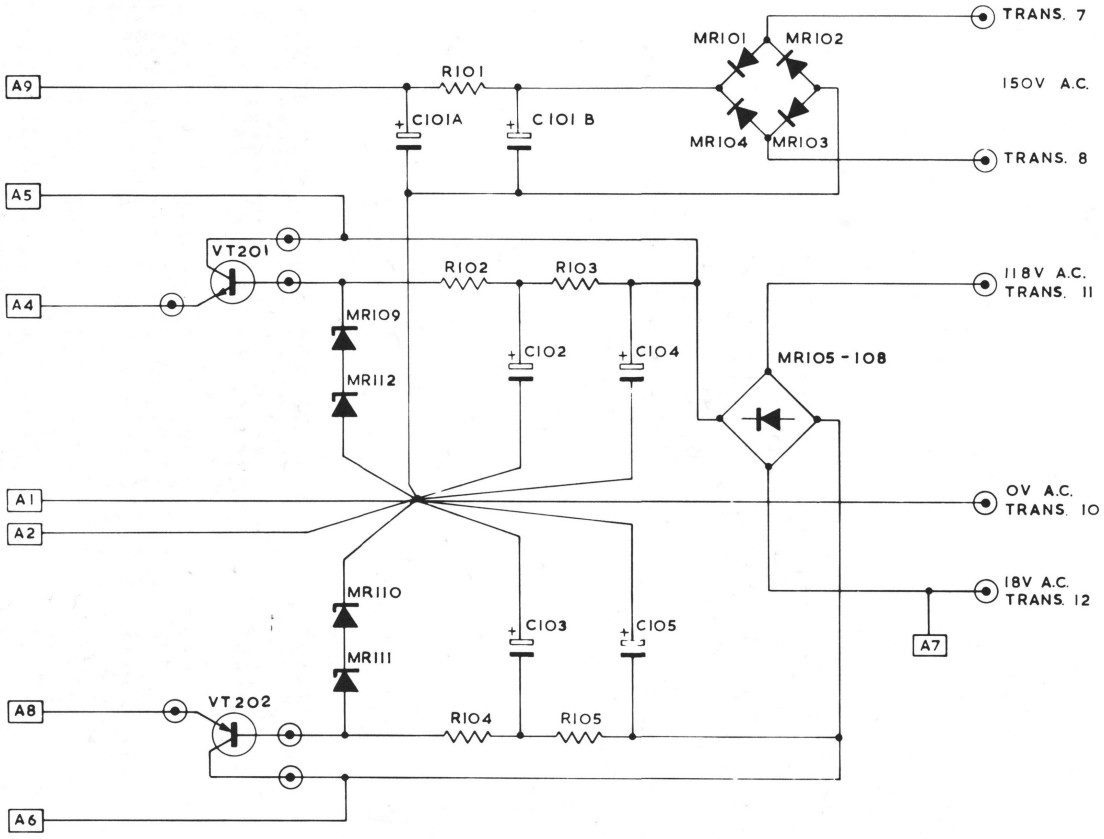


Fig. 5 Power Supply Circuit Diagram

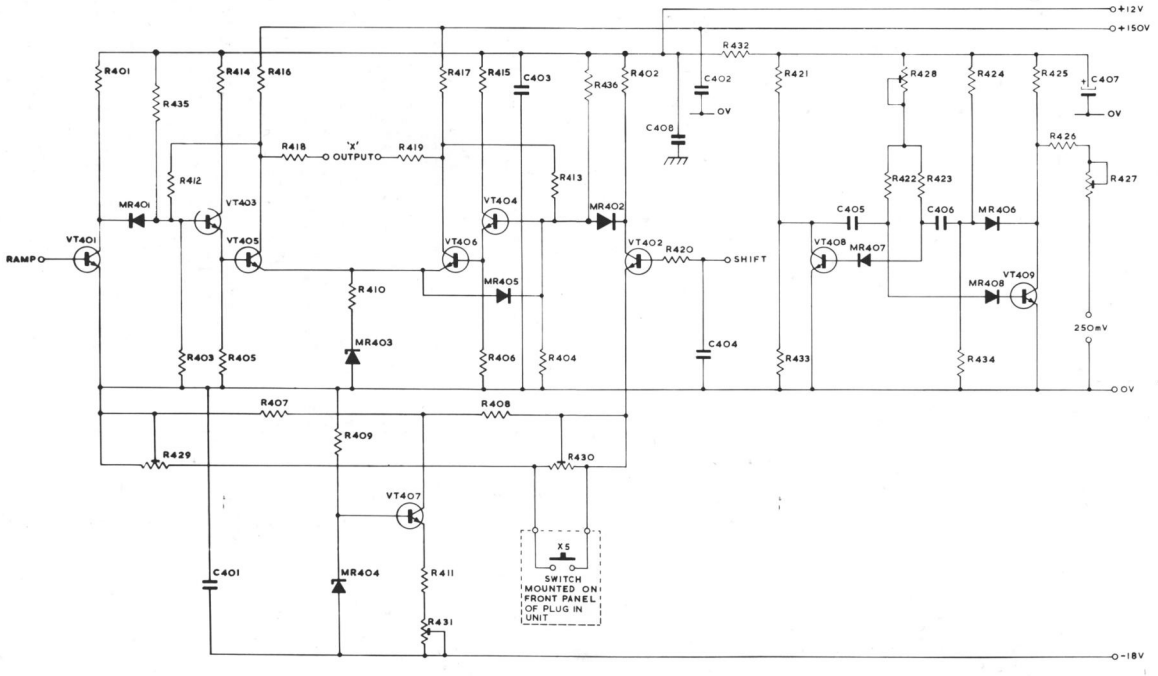


Fig. 6 X Output & Y Calibrator Circuit Diagram

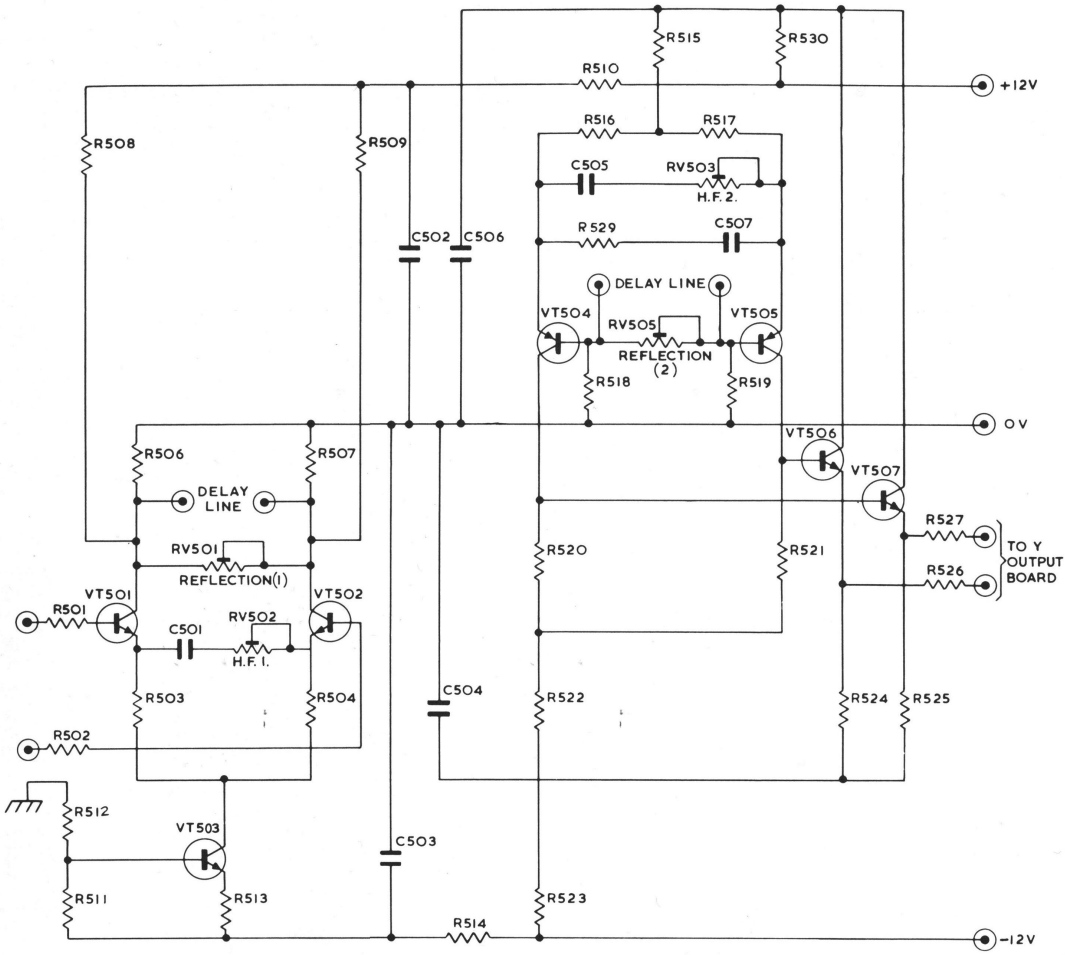


Fig. 7 Delay Drive Circuit Diagram