

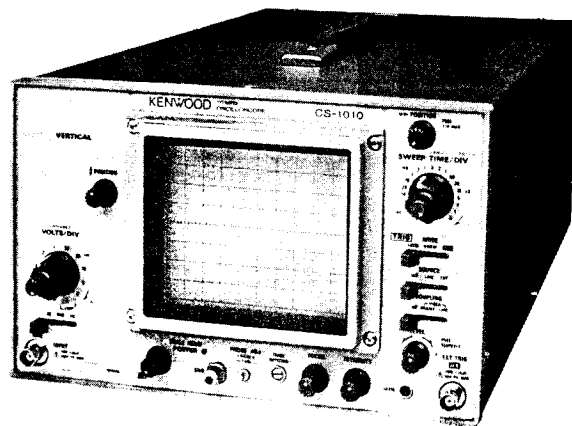
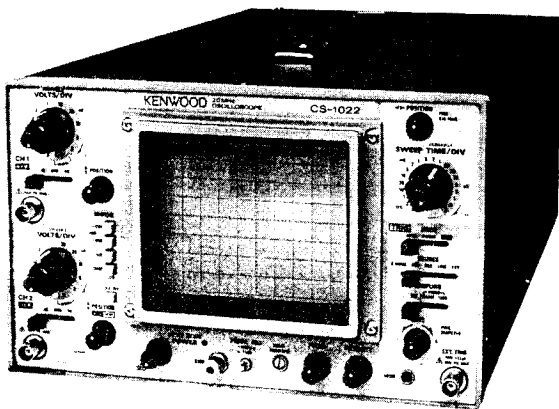
SERVICE MANUAL

CS-1022, CS-1021, CS-1012
(DUAL TRACE OSCILLOSCOPE)

CS-1020, CS-1010
(SINGLE TRACE OSCILLOSCOPE)

14627

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
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KENWOOD

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WARNING

1. The following instructions are for use by qualified personnel only. To avoid electric shock, do not perform servicing other than contained in the operating instructions unless you are qualified to do so.
2. High voltage up to 6000 volts (for CS-1021, 1012, 1010, 2000 volts) dc is present when the oscilloscope is operating. Line voltage (100

to 240 VAC) is present on the power transformer, on-off switch, fuse holder, and line voltage selector any time the oscilloscope is connected to an ac power source, even if turned off. Always observe caution when the housing is removed from the unit. Contacting exposed high voltage could result in fatal electric shock.

NOTE:

The description of the dual-trace oscilloscope in this Service Manual is based on CS-1021.
The shaded parts cannot be applied to CS-1021.

SPECIFICATIONS

	CS-1022	CS-1021	CS-1012	CS-1020	CS-1010
CRT	150FTM31	150GTM31A	150GTM31A	150FTM31	150GTM31A
Acceleration Voltage	6 kV	2 kV	2 kV	6 kV	2 kV
Display Area	8 × 10 div (1 div = 10 mm)				
Type	Rectangular, with internal graticule				
VERTICAL AXIS	CH1 and CH2			—	
Sensitivity	1 mV/div to 5 V/div, ± 3%				
Attenuator	12 steps, 1 mV/div to 5 V/div in 1-2-5 sequence. Vernier control for fully adjustable sensitivity between steps.				
Input Impedance	1 MΩ ± 2%, approx 35pF				
Frequency Response 2 mV/div to 5 V/div, 1 mV/div	DC; DC to 20 MHz, — 3 dB AC; 5 Hz to 20 MHz, — 3 dB DC; DC to 10 MHz, — 3 dB AC; 5 Hz to 10 MHz, — 3 dB	DC; DC to 10 MHz, — 3 dB AC; 5 Hz to 10 MHz, — 3 dB DC; DC to 7 MHz, — 3 dB AC; 5 Hz to 7 MHz, — 3 dB	DC; DC to 20 MHz, — 3 dB AC; 5 Hz to 20 MHz, — 3 dB DC; DC to 10 MHz, — 3 dB AC; 5 Hz to 10 MHz, — 3 dB	DC; DC to 10 MHz, — 3 dB AC; 5 Hz to 10 MHz, — 3 dB DC; DC to 7 MHz, — 3 dB AC; 5 Hz to 7 MHz, — 3 dB	
Rise Time	17.5 nsec or less (20 MHz) 35 nsec or less (10 MHz)	35 nsec or less (10 MHz) 50 nsec or less (7 MHz)	17.5 nsec or less (20 MHz) 35 nsec or less (10 MHz)	35 nsec or less (10 MHz)	35 nsec or less (10 MHz) 50 nsec or less (7 MHz)
Crosstalk	— 40 dB minimum			—	
Operating Modes	CH1; single trace CH2; single trace ADD; CH1 + CH2 added display ALT; two waveforms alternating CHOP; two waveforms chopped			For Service Manuals Contact MAURITRON TECHNICAL SERVICES 8 Cherry Tree Rd, Chinnor Oxon OX9 4QY Tel:- 01844-351694 Fax:- 01844-352554 Email:- enquiries@mauritron.co.uk	
Chop Frequency	Approx. 250 kHz			—	
Channel Polarity	Normal or inverted, CH2 only inverted			—	
Maximum Input voltage	500 Vp-p or 250 V (DC + AC peak)				
Non-Distorted Maximum Amplitude	More than 8 div, DC to 20 MHz	More than 6 div, DC to 20 MHz	More than 6 div, DC to 10 MHz	More than 8 div, DC to 20 MHz	More than 6 div, DC to 10 MHz
HORIZONTAL AXIS	(input thru CH2, × 10 MAG not included)			(× 10 MAG not included)	
Operating Mode	With TRIG MODE switch, X-Y operation is selectable. CH1; Y axis CH2; X axis			With TRIG MODE switch, X-Y operation is selectable. VERT. INPUT; Y axis EXT TRIG INPUT; X axis	
Sensitivity	Same as vertical axis (CH2)			100 mV/div	
Input Impedance	Same as vertical axis (CH2)			1 MΩ ± 2%, approx. 32pF	1 MΩ ± 2%, approx. 35 pF
Frequency Response	DC; DC to 1 MHz, — 3 dB AC; 5 Hz to 1 MHz, — 3 dB	DC; DC to 500 kHz, — 3 dB AC; 5 Hz to 500 kHz, — 3 dB		DC; DC to 1 MHz, — 3 dB	DC; DC to 500 kHz, — 3 dB
X-Y Phase Difference	3° or less at 100 kHz	3° or less at 50 kHz		3° or less at 100 kHz	3° or less at 50 kHz
Maximum Input Voltage	Same as vertical axis (CH2)			50 V (DC + AC peak)	
SWEEP					
Type	NORM	Triggering sweep			
	AUTO	Sweep free runs in absence of trigger			

SPECIFICATIONS

	CS-1022	CS-1021	CS-1012	CS-1020	CS-1010											
Sweep Time	0.2 μ s/div to 0.5 s/div, $\pm 3\%$ in 20 ranges, in 1-2-5 sequence. Vernier control provides fully adjustable sweep time between steps.	0.5 μ s/div to 0.5 s/div, $\pm 3\%$ in 19 ranges, in 1-2-5 sequence. Vernier control provides fully adjustable sweep time between steps.		0.2 μ s/div to 0.5 s/div, $\pm 3\%$ in 20 ranges, in 1-2-5 sequence. Vernier control provides fully adjustable sweep time between steps.	0.5 μ s/div to 0.5 s/div, $\pm 3\%$ in 19 ranges, in 1-2-5 sequence. Vernier control provides fully adjustable sweep time between steps.											
Sweep Magnification	$\times 10$ (ten times) $\pm 5\%$															
Linearity	$\pm 3\%$ all ranges, $\pm 5\%$ on 0.2 μ s/div range at $\times 10$ magnification.															
TRIGGERING																
Internal Sync	V. MODE; CH1; CH2; LINE;	Triggered by input signal selected by vertical MODE setting. Triggered by CH1 signal Triggered by CH2 signal Triggered by line voltage		INT; Triggered by vertical input signal LINE; Triggered by line voltage												
External Sync	EXT; Triggered by signal applied to EXT TRIG INPUT jack															
External sync Input Impedance	1 M Ω , $\pm 2\%$ approx 32pF	1 M Ω , $\pm 2\%$ approx 35pF		1 M Ω , $\pm 2\%$ approx 30pF												
Maximum External Trigger Voltage	50 V (DC + AC peak)															
Coupling	AC, VIDEO FRAME, VIDEO LINE															
Tigger Sensitivity																
	FREQ. RANGE	INT	EXT	FREQ. RANGE	INT	EXT	FREQ. RANGE	INT	EXT	FREQ. RANGE	INT	EXT	FREQ. RANGE	INT	EXT	
	AUTO	20Hz to 20MHz	1div	0.1Vp-p	20Hz to 20MHz	1div	0.2Vp-p	20Hz to 10MHz	1div	0.1Vp-p	20Hz to 20MHz	1div	0.1Vp-p	20Hz to 10MHz	1div	0.1Vp-p
	NORM	10Hz to 20MHz	1div	0.1Vp-p	10Hz to 20MHz	1div	0.2Vp-p	10Hz to 10MHz	1div	0.1Vp-p	10Hz to 20MHz	1div	0.1Vp-p	10Hz to 10MHz	1div	0.1Vp-p
	VIDEO	FRAME, LINE	1div	0.1Vp-p	FRAME, LINE	1div	0.2Vp-p	FRAME, LINE	1div	0.1Vp-p	FRAME, LINE	1div	0.1Vp-p	FRAME, LINE	1div	0.1Vp-p
PROBE ADJ. VOLTAGE	0.5 V, $\pm 6\%$, square wave, positive polarity, approx 1 kHz															
INTENSITY MODULATION																
Sensitivity	TTL compatible Positive voltage increases brightness. Negative voltage decreases brightness.															
Input Impedance	Approx 10 k Ω															
Usable Frequency Range	DC to 2 MHz	DC to 1 MHz		DC to 2 MHz	DC to 1 MHz											
Maximum Input Voltage	50 V (DC + AC peak)															
VERTICAL AXIS SIGNAL OUTPUT	CH1 SIGNAL OUTPUT	—		CH1 SIGNAL OUTPUT	VERTICAL SIGNAL OUTPUT											
Output Voltage	Approx. 50mV/div (50 Ω load)	—		Approx 50 mV/div (50 Ω load)												
Output Impedance	Approx 50 Ω	—		Approx 50 Ω												
Frequency Response	100 Hz to 20 MHz, —3 dB (50 Ω load)	—		100 Hz to 10 MHz, —3 dB (50 Ω load)	100 Hz to 20 MHz, —3 dB (50 Ω load)	100 Hz to 10 MHz, —3 dB (50 Ω load)										
TRACE ROTATION																
Electrical, adjustable from front panel																
POWER REQUIREMENT																
AC 100/120/220/240 V $\pm 10\%$ 50/60 Hz																
Power Consumption	Approx 43 W	Approx 39 W	Approx 41W	Approx 38W	Approx 36W											
DIMENSIONS																
() dimensions include protrusions from basic outline dimensions.																
	Width	260 mm (260 mm)														
	Height	160 mm (180 mm)														
	Depth	400 mm (460 mm)														

SPECIFICATIONS

	CS-1022	CS-1021	CS-1012	CS-1020	CS-1010
WEIGHT	Approx. 8.8 kg	Approx. 8.4 kg			Approx. 8.1 kg
ENVIRONMENT					
Operating Temperature and Humidity for Guaranteed Specifications	0°C to 40°C, 85% maximum RH				
Full Operating Temperature and Humidity	0°C to 50°C, 90% maximum RH				
ACCESSORIES					
Probe	2			1	
Instruction Manual	1				
Replacement Fuse 0.8 A	2				
0.5 A	2				

■ Circuit and rating are subject to change without notice due to developments in technology.

STANDARD ACCESSORIES INCLUDED

Probe (PC-20)Y87-1840-00
 Attenuation.....1/10, 1/1
 Input Impedance
 1/1010 MΩ, 18pF or less
 1/11 MΩ, 100pF or less
 Instruction Manual.....B50-7570-00
 Replacement Fuse
 0.8 AF05-8015-05
 0.5 AF05-5013-05

OPTIONAL ACCESSORIES

Probe Pouch (MC-78).....Y87-1600-00
 Service ManualB51-1033-10

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SPECIFICATIONS

CRT 150FTM 31 SPECIFICATIONS (150GTM31A)

Screen and Shape

Dimensions;

Overall length; 330 mm max. (355mm max)

Face plate dimensions; 149.3 ± 3 mm max.

(149 ± 3 mm)

Screen shape; Rectangular flat face, internal graticule, non-metal back

Deflection and focusing system; Electrostatic deflection, electrostatic focusing and post-deflection acceleration (150FTM 31 only)

Color; Green

Persistence; Medium short

Useful display area Y axis.....80 mm

X axis.....100 mm

Heating

Heater voltage 6.0 V (6.3 V)

Heater current 75 mV (95 mA)

Weight 900 gr (1000 gr)

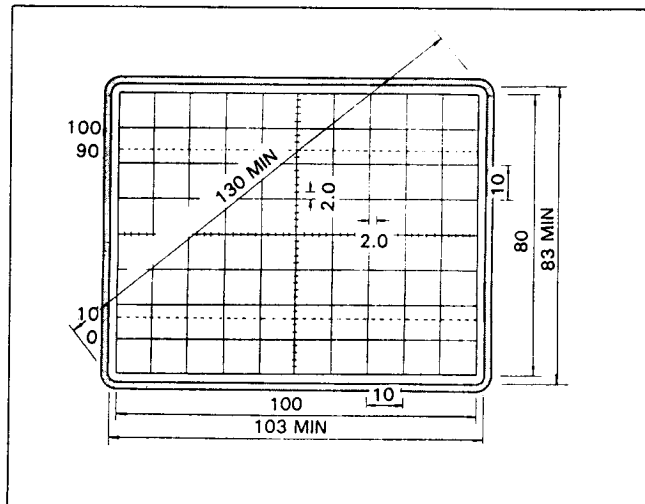


Fig. 1 150GTM31A Graticule
150FTM31

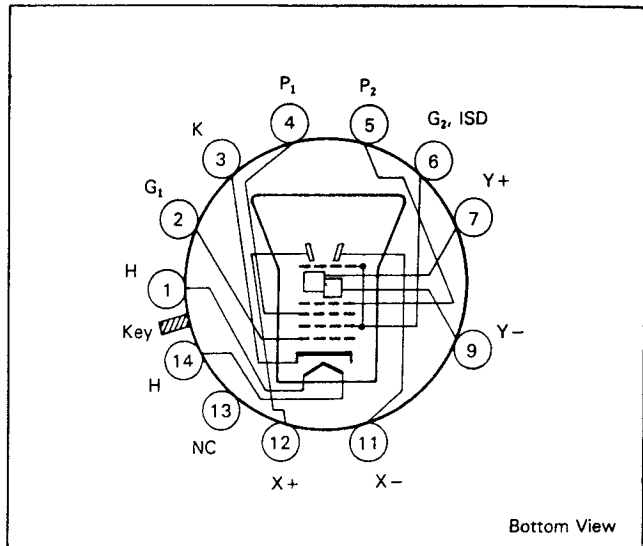


Fig. 2 150GTM31A Basing

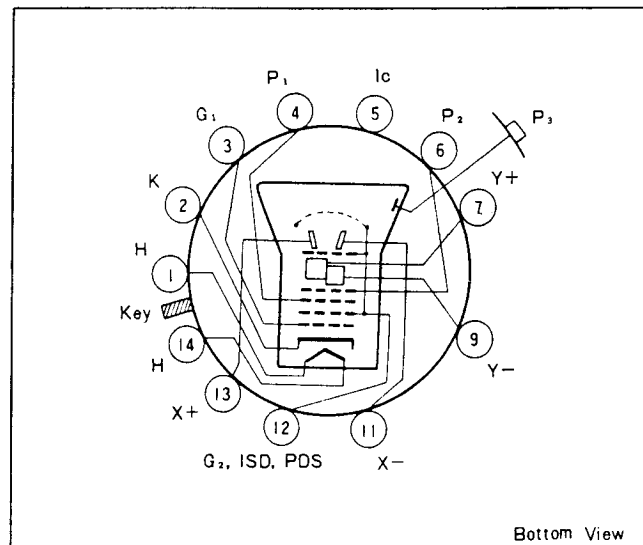


Fig. 3 150FTM31 Basing

SAFETY

SAFETY

Before connecting the instrument to a power source, carefully read the following information, then verify that the proper power cord is used and the proper line fuse is installed for power source. The specified voltage is shown at the left side of the power cord on the rear panel. If the power cord is not applied for specified voltage, there is always a certain amount of danger from electric shock.

Line voltage

This instrument operates using ac-power input voltages that 100/120/220/240 V at frequencies from 50 Hz to 60 Hz.

Power cord

The ground wire of the 3-wire ac power plug places the chassis and housing of the oscilloscope at earth ground. Do not attempt to defeat the ground wire connection or float the oscilloscope; to do so may pose a great safety hazard. The appropriate power cord is supplied by an option that is specified when the instrument is ordered.

The optional power cords are shown as follows in Fig. 4.

Line fuse

The fuse holder is located on the rear panel and contains the line fuse. Verify that the proper fuse is installed by replacing the line fuse.

Voltage conversion

This oscilloscope may be operated from either a 100 V to 240 V, 50/60 Hz power source. Use the following procedure to change from 100- to 240 volt operation or vice versa.

1. Remove the top section of case.
2. Unplug the leadwire of the voltage selector P5 located on the connection unit (X77-1260).
3. Reinsert it for appropriate voltage range.
4. Replace fuse F 1 with a fuse of appropriate value, 0.8 amp for 100 VAC to 120 VAC operation, 0.5 amp for 220 VAC to 240 VAC operation.
5. When performing the reinsertion of leadwire for the voltage conversion the appropriate power cord should be used. (See Fig. 4.)

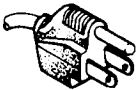
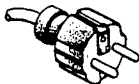
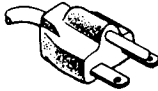
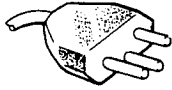
Plug configuration	Power cord and plug type	Factory installed instrument fuse	Line cord plug fuse	Parts No. for power cord and plate
	North American 120 volt/60 Hz Rated 15 amp (12 amp max; NEC)	0.8 A, 250 V Fast blow AGC/3AG	None	Cord: E30-1854-05 Plate: J21-2977-04
	Universal Europe 220 volt/50 Hz Rated 16 amp	0.5 A, 250 V Fast blow 5 x 20 mm	None	Cord: E30-1852-05 Plate: J21-2973-04
	U.K. 240 volt/50 Hz Rated 13 amp	0.5 A, 250 V Fast blow 5 x 20 mm	0.5 A Type C	—
	Australian 240 volt/50 Hz Rated 10 amp	0.5 A, 250 V Fast blow 5 x 20 mm	None	Cord: E30-1853-05 Plate: J21-2972-04
	North American 240 volt/60 Hz Rated 15 amp (12 amp max; NEC)	0.5 A, 250 V Fast blow AGC/3AG	None	—
	Switzerland 240 volt/50 Hz Rated 10 amp	0.5 A, 250 V Fast blow AGC/3AG 5 x 20 mm	None	—

Fig. 4 Power Input Voltage Configuration

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CIRCUIT DESCRIPTION CS-1021, CS-1022, CS-1012

VERTICAL ATTENUATOR

The attenuators of channel 1 and channel 2 are mounted on two independent circuit board which are the same.

The vertical input signal coming to the BNC input receptacle enters a first-stage attenuator with path selected with the AC-GND-DC switch.

It then comes to one of the 1:1, 1:10, 1:100 attenuators which the vertical rotary switch selects before it enters the attenuator of the second stage. This attenuator consists of U1 and U2 and provides an attenuation sequence of 1-2-5. For the ranges of 1, 2, and 5mV/div, an amplifier consists of U3 and Q2 - 4 is used. For the adjustment of step ATT balance, VR2 is used in the ranges of 10 mV/div or more. For the ranges of 1, 2, 5mV/div, VR3 adjusts coarsely and VR4 does finely. VR2 and VR4 are accessible from the outside.

Trimmer TC 5 adjusts frequency response of the amplifier operating for ranges of 1, 2, and 5mV/div. It should be adjusted to obtain square wave and frequency response of the 10 mV/div range also in the other three ranges.

VERTICAL AMPLIFIER

The signal which has passed the attenuators comes to a preamplifier consisting of U1 and Q2 - 4 (CH2 ; U101 and Q102 - 104). Variable resistor VR1 (101) provided for the preamplifier allows to vary vertical position.

The preamplifier output comes to not only the vertical mode selector but in CH1, the CH1 OUTPUT circuit consisting of Q6 - 8 from which it is sent to the outside via a 22 μ F capacitor for AC coupling.

Another component of the preamplifier output comes to the base of Q5 (105) and after being selected with the TRIG SOURCE switch, passes through the emitter follower Q5 (105) over to a trigger amplifier which generates a trigger signal from the input. The channel 2 signal is used also as X-signal and VR102 adjusts offset for X POSITION centering.

The vertical mode switching circuit is a cascode amplifier comprising Q9 - 12 (107 - 110) whose outputs to Q13, 14 are controlled by two signals, CH1 - ENABLE and CH2 ENABLE, supplied from the vertical switching signal generator of the horizontal & high voltage unit.

Channel 2 is provided with the CH2 polarity inverter which comprises Q111, 112 and switched by switch S102.

VR104 allows to center during CH2 INVERT in relation to the condition during NORMAL.

Two cascode amplifiers of channel 1 and channel 2 of the vertical mode switching circuit are provided with trimmer capacitors TC101 (102) permitting adjustment of square wave and frequency response at high frequencies and semi-fixed variable resistor VR103 permitting to adjust channel 1 gain.

Since both channels are on during ADD, current is supplied to the vertical switching circuits from the circuits of Q113, 114 which are controlled by CH1-E and CH2-E signals. The

vertical switching output is given not only to the vertical output amplifier but also to the base of Q115 from which it goes as the V MODE trigger signal to the trigger amplifier.

The output amplifier is a cascode amplifier comprising Q15 - 18 and provided with VR4 permitting CRT center adjustment, VR3 permitting operating level adjustment, VR5 permitting gain adjustment, and VR6 plus TC1, 2 permitting square wave and frequency response adjustment.

TRIGGER AND SWEEP CIRCUITS

The trigger (or X-axis) signal coming from the vertical amplifier enters the trigger amplifier of Q101 - 104 with path selected by the TRIG SOURCE switch. During X-Y mode, the channel 2 signal passes Q117 to the horizontal output amplifier comprising Q118 and Q120 - 127.

During sweep mode, the trigger signal entering the trigger amplifier divides into AC and VIDEO signals. The VIDEO signal passes the video-sync signal separator which separates vertical and horizontal sync signals from the video signal. Then it comes to the TRIG COUPLING switch and appears, after shaped by a Schmitt circuit, as the clock signal of sweep control gate U102b.

The auto-sweep circuit comprising U101a, b, d and U103a checks for the presence of the output of U101c and performs free-run operation if the signal is absent and mode is AUTO.

The output of the sweep control gate is controlled by the auto sweep and Schmitt circuits. When Q116 turns off, the Miller integrator starts to charge at the speed which time-base C and R determine. SWEEP VARIABLE VR103 permits to vary sweep speed. The sweep stop circuit of Q113, 114 detects the output voltage of the Miller integrator and controls a gate to invert state and stop sweep. The holdoff circuit Q119 determines when to stop sweep. The sawtooth wave output of the Miller integrator is, with sweep speed controlled by VR104, sent to the horizontal output amplifier.

VR111 and TC101 permit sweep time adjustment respectively of 10 msec/div and 50 μ sec/div ranges. VR106, 107 permit adjustment respectively of gain and center during $\times 10$ MAG mode. VR105 adjusts X-axis gain during X-Y mode.

CRT CIRCUIT

U104a ANDs the $\bar{Q}$ output of sweep control gate U102b with the CHOP blanking signal of U104c, d to generate the blanking signal.

Its amplitude is controlled in Q128, 129 by voltage coming from the INTENSITY control before the signal is sent to the blanking amplifier of Q1, 2. After amplified in the blanking amplifier and high acceleration DC component regenerated by D4 - 7, the blanking signal applies to a grid of the CRT. High voltages of 6 kV (for CS-1012, 2 kV) needed for trace in the CRT are generated by the DC - DC converter comprising T1 and Q3. Operational amplifier U1b performs

CIRCUIT DESCRIPTION / BLOCK DIAGRAM

feedback to obtain high stability.

POWER SUPPLY

The regulated power supply requires no adjustment.
+5, -15, and +15 V are generated by 3-terminal regulators. +100 and +140 V are stabilized against line voltage fluctuation by feedback applied by an operational amplifier.

CALIBRATION VOLTAGE

No adjustment is needed for the calibration voltage.
An oscillator composed of operational amplifier U1 generates a stable signal.

VERTICAL FINAL AMPLIFIER (applied for CS-1021 only)

The output amplifier is a cascode amplifier and comprised Q15, 16 (V. AMP. X73-1490) and Q1, 2 (V. FINAL X73-1630). The buffer amplifier is comprised with Q3 ~ 6. This output amplifier is provided with VR4 permitting crt center adjustment, VR3 permitting operating level adjustment, VR5 permitting gain adjustment and VR6 plus TC1, 2 permitting square wave and frequency response adjustment.

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CS-1021 (1022, 1012) BLOCK DIAGRAM

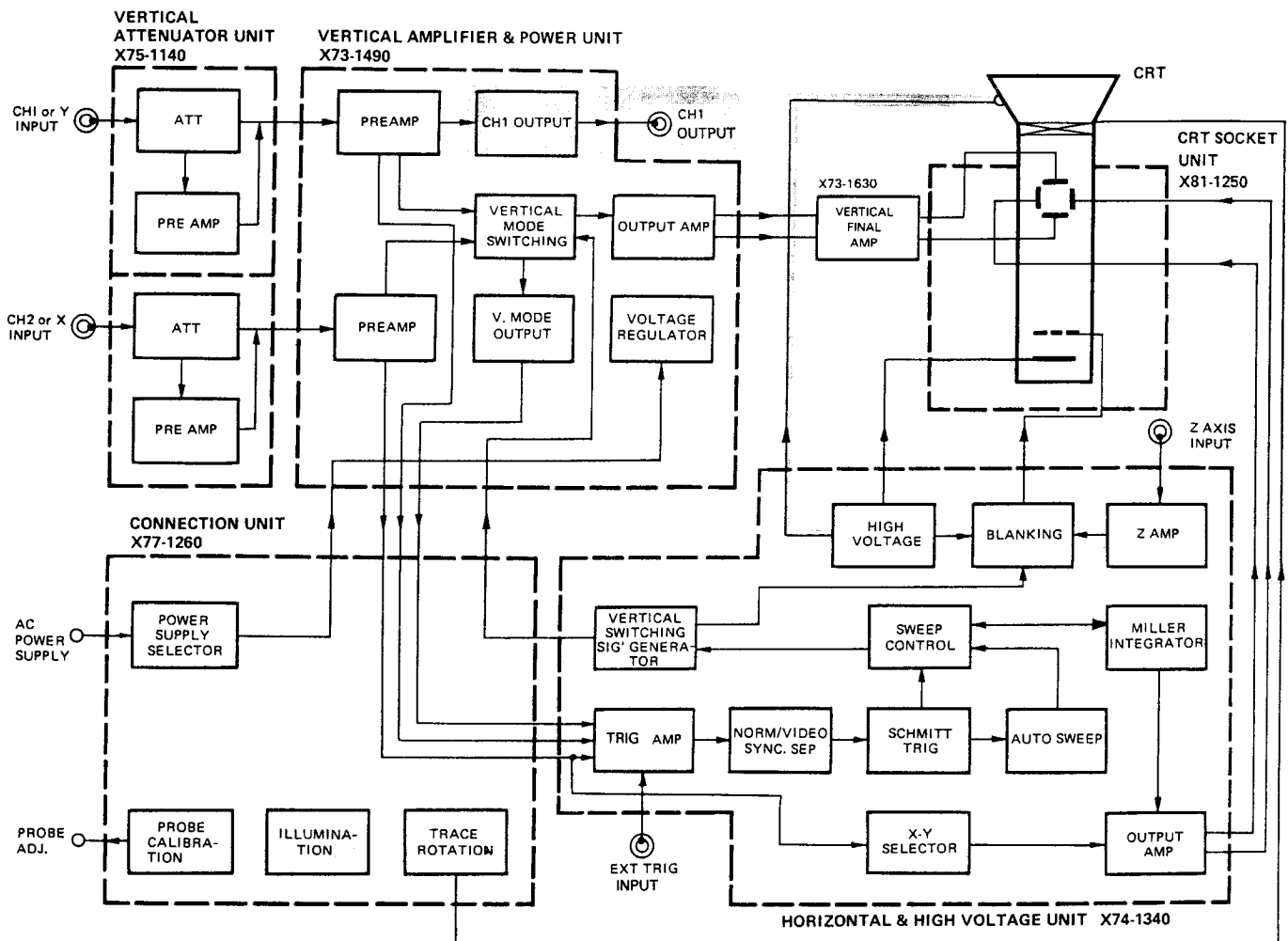


Fig. 5

Note: The shaded parts cannot be applied to CS-1021.

CIRCUIT DESCRIPTION CS-1020, CS-1010

VERTICAL ATTENUATOR

The vertical input signal coming to the BNC input receptacle enters a first-stage attenuator with path selected with the AG-GND-DC switch.

It then comes to one of the 1:1, 1:10, 1:100 attenuators which the vertical rotary switch selects before it enters the attenuator of the second stage. This attenuator consists of U1 and U2 and provides an attenuation sequence of 1-2-5. For the ranges of 1, 2, and 5 mV/div, an amplifier consists of U3 and Q2 - 4 is used.

For the adjustment of step ATT balance, VR2 is used in the ranges of 10 mV/div or more. For the ranges of 1, 2, 5 mV/div, VR3 adjusts coarsely and VR 4 does finely. VR2 and VR4 are accessible from the outside.

Trimmer TC 5 adjusts frequency response of the amplifier operating for ranges of 1, 2, and 5 mV/div. It should be adjusted to obtain square wave and frequency response of the 10 mV/div range also in the other three ranges.

VERTICAL AMPLIFIER

The signal which has passed the attenuators comes to a preamplifier consisting of U1 and Q2 - 4.

Variable resistor VR1 provided for the preamplifier allows to vary vertical position.

The preamplifier output comes to not only the vertical mode selector but in CH1, the VERT OUTPUT circuit consisting of Q6 - 8 from which it is sent to the outside via a 22 μ F capacitor for AC coupling. Another component of the preamplifier output comes to the base of Q5 and after being selected with the TRIG SOURCE switch, passes through the emitter follower Q5 over to a trigger amplifier which generates a trigger signal from the input.

The second stage amplifier is a cascode amplifier comprising Q9 - 12 whose switched to differential signal and it is fed to emitter follower of Q13 and 14.

The cascode amplifier is provided with trimmer capacitor TC101 permitting adjustment of square wave and frequency response at high frequencies.

The signal from Q13 and 14 is fed to vertical output amplifier.

The output amplifier is a cascode amplifier comprising Q15 - 18 and provided with VR4 permitting CRT center adjustment, VR3 permitting operating level adjustment, VR5 permitting gain adjustment, and VR6 plus TC1, 2 permitting square wave and frequency response adjustment.

TRIGGER AND SWEEP CIRCUITS

The trigger signal coming from the vertical amplifier enters the trigger amplifier of Q101 - 104 with path selected by the TRIG SOURCE switch. During X-Y mode, the signal applied to EXT TRIG input is X-signal which passes sweep X-Y selector consisting of S106, Q117, 130 and 131 and then applies to horizontal output amplifier comprising Q118 and Q120 - 127.

VR103a of X-Y selector adjusts X-axis gain coarsely and VR110 adjusts X-axis DC balance.

During sweep mode, the sync signal entering the sync amplifier divides into AC and VIDEO signals. The VIDEO signal passes the video-sync signal separator which separated vertical and horizontal sync signals from the video signal. Then it comes to the TRIG COUPLING switch and appears, after shaped by a Schmitt circuit, as the clock signal of sweep control gate U102b.

The auto-sweep circuit comprising U101a, b, d and U103a checks for the presence of the output of U101c and performs free-run operation if the signal is absent and mode is AUTO.

The output of the sweep control gate is controlled by the auto sweep and Schmitt circuits. When Q116 turns off, the Miller integrator starts to charge at the speed which time-base C and R determine. SWEEP VARIABLE VR103b permits to vary sweep speed. The sweep stop circuit of Q113, 114 detects the output voltage of the Miller integrator and controls a gate to invert state and stop sweep. The holdoff circuit Q119 determines when to stop sweep. The sawtooth wave output of the Miller integrator is, with sweep speed controlled by VR104, sent to the horizontal output amplifier.

VR111 and TC101 permit sweep time adjustment respectively of 10 msec/div and 50 μ sec/div ranges. VR106, 107 permit adjustment respectively of gain and center during $\times 10$ MAG mode. VR105 adjusts X-axis gain during X-Y mode.

CRT CIRCUIT

Q output of sweep control gate U102b generates the blanking signal.

Its amplitude is controlled in Q128, 129 by voltage coming from the INTENSITY control before the signal is sent to the blanking amplifier of Q1, 2.

After amplified in the blanking amplifier and high acceleration DC component of regenerated by D4 - 7, the blanking signal applies to a grid of the CRT. High voltages of 6 kV (for CS-1010, 2 kV) needed for trace in the CRT are generated by the DC-DC converter comprising T1 and Q 3. Operational amplifier U1b performs feedback to obtain high stability.

POWER SUPPLY

The regulated power supply requires no adjustment.

+5, -15, and +15 V are generated by 3-terminal regulators. +100 and +140 V are stabilized against line voltage fluctuation by feedback applied by an operational amplifier.

CALIBRATION VOLTAGE

No adjustment is needed for the calibration voltage.

An oscillator composed of operational amplifier U1 generates a stable signal.

BLOCK DIAGRAM

CS-1020 (1010) BLOCK DIAGRAM

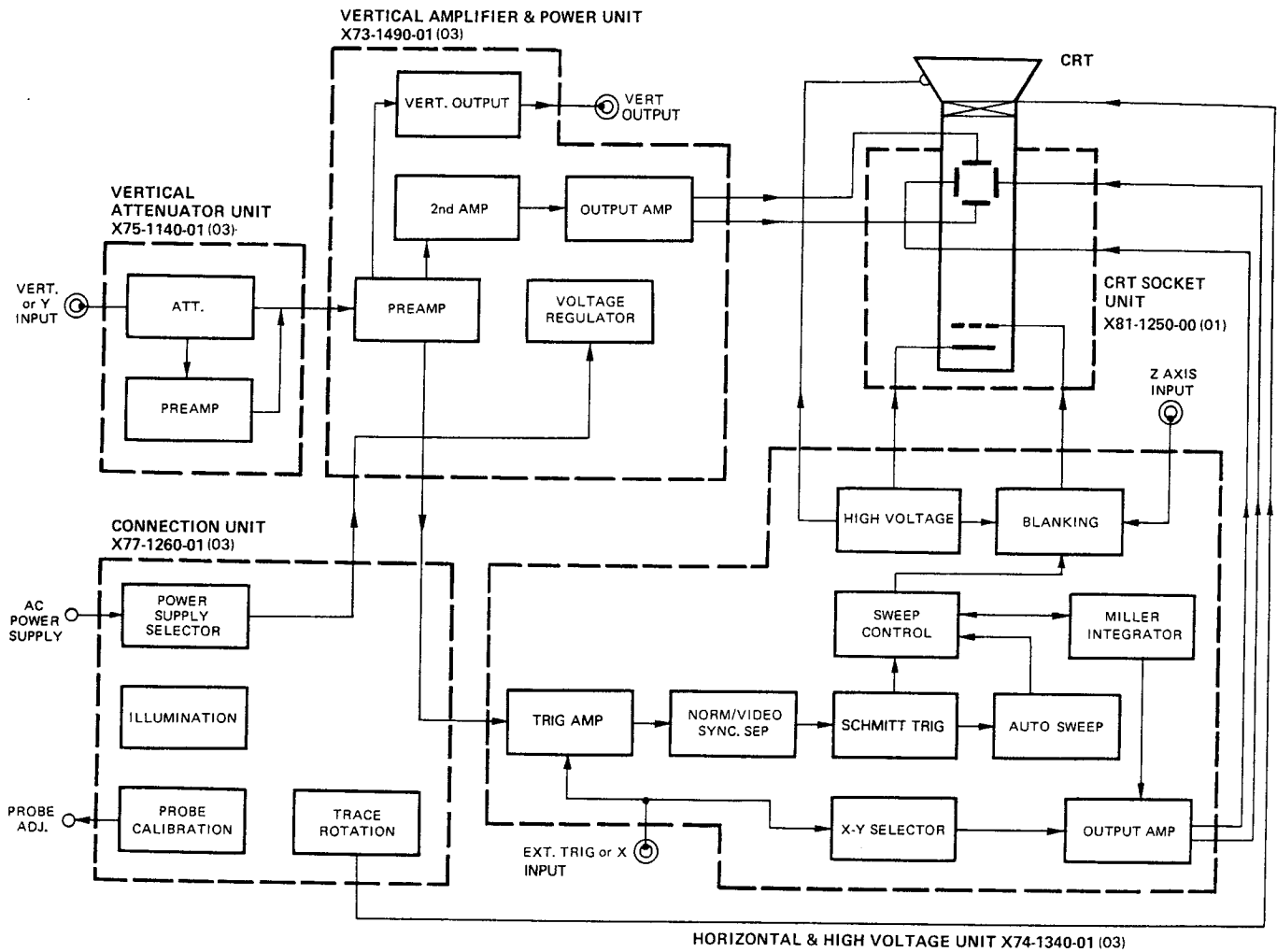


Fig. 6

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ADJUSTMENT

To obtain the best performance, periodically calibrate the unit. Sometimes, only one mode need be calibrated, while at other times, all modes should be calibrated. When one mode is calibrated, it must be noted that the other modes may be affected. When calibrating all modes, perform the calibration in the specified sequence.

The following calibration required an accurate measuring instrument and an insulated adjusting flat blade screwdriver. If they are not available, contact your dealer. For optimum adjustment, turn the power on and warm up the this equipment sufficiently (more than 30 minutes) before starting.

Before calibrating the unit, check the power supply voltage.

TEST EQUIPMENT REQUIRED

The following instrument or their equivalent should be used for making adjustment.

Test Equipment	Model	Minimum Specification
Digital Multi-Meter	DL-706 (TRIO)	Impedance: More than 10 M Ω , Measuring range: 0.01 V to 199 V
Sine-Wave Generator	651 B (YHP)	Frequency: 10 Hz to 10 MHz, constant voltage over tuning range
Sine-Wave Generator	SG-503 (Tektronix)	Frequency: 50 kHz to 100 MHz, Output impedance: 50 Ω , constant voltage over tuning range.
Square-Wave Generator	PG-506 (Tektronix)	Output signal: 1 kHz, Amplitude: 10 mVp-p to 10 Vp-p, Accuracy: within $\pm 1\%$, Rise time: 35ns or less 100 kHz, Rise time: 1 ns or less
Q Meter	4343B (YHP)	—
Color Pattern Generator	CG-911A (TRIO)	—
Oscilloscope	CS-2100A (TRIO)	Sensitivity: more than 5 mV Frequency response: More than 100 MHz
Time-Marker Generator	TG-501 (Tektronix)	Time mark: 0.5 s to 0.1 μ s repetitive waveform
High-Voltage Probe	—	Input Impedance: 1000 M Ω
Termination	—	Impedance: 50 Ω Accuracy: within 3%
Termination	—	3 watts type impedance: 50 Ω
Attenuator	—	— 20 dB attenuation (50 Ω)

PREPARATION FOR ADJUSTMENT

Control Setting

The control setting listed below must be used for each adjustment procedure.

Exceptions to these settings will be noted as they occur.

After completing a adjustment, return the controls to the following settings.

NAME OF KNOBS	POSITION
INTENSITY	3 o'clock
FOCUS	Optimum position
CH1, CH2 POSITION	Mechanical center
◀▶ H. POSITION/PULL x 10MAG	Mechanical center, push
VARIABLE	CAL
(SWEEP TIME/DIV, VOLTS/DIV)	
AC-GND-DC (CH1 and CH2)	DC (GND at no signal)
MODE	CH1
CH2 POLARITY	NORM
COUPLING	AC
SOURCE	V.MODE
TRIG. LEVEL	Mechanical center, push
TRIG. MODE	AUTO
VOLTS/DIV	10 mV/DIV
SWEEP TIME/DIV	0.2 ms/DIV

ADJUSTMENT

Item	Control setting	Test equ.	Adjustment control				P.C.B	Procedure
			1021 1022	1012	1020	1010		
POWER SUPPLY SECTION ADJ.								
ASTIG, FOCUS	TRIG MODE; X-Y	—	ASTIG, FOCUS					For the sharpest and roundest spot.
INTENSITY	AC-GND-DC; GND TRIG MODE; X-Y	—	VR1				X74	Spot disappears in 9 to 10 o'clock position.
TRACE ROTATION	AC-GND-DC; GND	—	TRACE ROTATION VR					Trace is in parallel with horizontal graduation line.
CRT CENTER		DL-706	VR4				X73	Short the short terminal (P2). Trace should be in the CRT center.
58 V ADJ.		DL-706	VR3	—	VR3	—	X73	Short the short terminal (P2). The voltage of +Y (–Y) should be 58 V ± 0.5 V.
63 V ADJ.		DL-706	—	VR3	—	VR3	X73	Short the short terminal (P2). The voltage of +Y (–Y) should be 63 V ± 0.3 V.
VERTICAL AMPLIFIER SECTION ADJ.								
CH1 DC BAL	VOLTS/DIV; 10 mV AC-GND-DC; GND		VR2	VR2	VR2	VR2	X75	Trace does not move vertically when rotating CH1 variable control.
			VR1	VR1	—	VR1	X75	
CH2 DC BAL	VOLTS/DIV; 10 mV AC-GND-DC; GND		VR2	VR2	—	—	X75	Trace does not move vertically when rotating CH2 variable control.
			VR1	VR1	—	—	X75	
CH1 ATT BAL	VOLTS/DIV; 1 mV AC-GND-DC; GND		VR3	VR3	VR3	VR3	X75	Trace does not move vertically when rotating CH1 variable control.
			VR4	VR4	VR4	VR4	X75	
CH2 ATT BAL	VOLTS/DIV; 1 mV AC-GND-DC; GND		VR3	VR3	—	—	X75	Trace does not move vertically when rotating CH2 variable control.
			VR4	VR4	—	—	X75	
CH2 INVERT	MODE; CH2 AC-GND-DC; GND		VR104	VR104	—	—	X73	Trace should be overlapped in the center of the graduation.
CH2 GAIN	MODE; CH2 VOLTS/DIV; 10 mV		VR5	VR5	VR5 (CH1 GAIN)	VR5 (CH1 GAIN)	X73	When applying a 1 kHz, 50 mVp-p square wave signal, vertical amplitude should be 5 div.
CH1 GAIN	MODE; CH1 VOLTS/DIV; 10 mV		VR103	VR103	—	—	X73	When applying a 1 kHz, 50 mVp-p square wave signal, vertical amplitude should be 5 div.
CH1 WAVESHAPE		PG-506	TC1	TC1	TC1	TC1	X75	Same as 10 mV range, a best flat top waveform should be obtained. TC1.....0.1 V TC3.....1 V
			TC3	TC3	TC3	TC3	X75	
CH2 WAVESHAPE		PG-506	TC1	TC1	—	—	X75	Same as 10 mV range, a best flat top waveform should be obtained. TC1.....0.1 V TC3.....1 V
			TC3	TC3	—	—	X75	
CH2 INPUT CAPACITY		4343B	TC2	TC2	—	—	X75	Input capacity should be 35pF ± 3pF. TC2.....0.1 V TC4.....1 V
			TC4	TC4	—	—	X75	
CH1 INPUT CAPACITY		4343B	TC2	TC2	TC2	TC2	X75	Input capacity should be 35pF ± 3pF. TC2.....0.1 V TC4.....1 V
			TC4	TC4	TC4	TC4	X75	

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
 8 Cherry Tree Rd, Chinnor
 Oxon OX9 4QY
 Tel:- 01844-351694 Fax:- 01844-352554
 Email:- enquiries@mauritron.co.uk

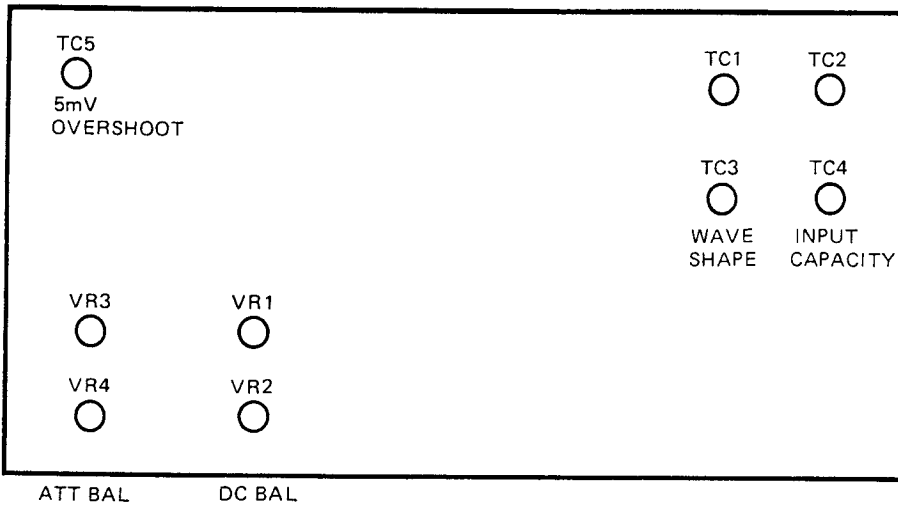
ADJUSTMENT

Item	Control setting	Test equ.	Adjustment control				P.C.B	Procedure
			1021 1022	1012	1020	1010		
CH1 OVERSHOOT	SWEEP TIME/DIV; 2 μ s PULL $\times$ 10MAG; PULL VOLTS/DIV; 10 mV	PG-506	TC101	TC101	TC101	TC101	X73	When applying a 100 kHz, square wave signal, vertical amplitude should be 6 div. Set TC101 at mechanical center and with VR6, for the sharpest waveform. TC1...mid range flat top waveform TC2...high range flat top waveform Set VOLTS/DIV to 5 mV for 6 div $\pm$ 3% vertical amplitude waveform. Overshoot should be $\pm$ 3%. TC5...best flat top waveform.
			VR6	VR6	VR6	VR6	X73	
			TC1	TC1	TC1	TC1	X73	
			TC2	TC2	TC2	TC2	X73	
			TC5	TC5	TC5	TC5	X75	
CH2 OVERSHOOT	SWEEP TIME/DIV; 2 μ s	PG-506	TC102	TC102	—	—	X73	When applying a 100 kHz square wave signal for 6 div vertical amplitude, overshoot should be $\pm$ 3%.
HORIZONTAL HIGH VOLTAGE SECTION ADJ.								
1 ms SWEEP TIME	SWEEP TIME/DIV; 1 ms	TG-501	VR104	VR104	VR104	VR104	X74	Pulse should be on each division on the graduation line.
MAG GAIN	SWEEP TIME/DIV; 1 ms PULL $\times$ 10MAG; PULL	TG501	VR106	VR106	VR106	VR106	X74	Interval of pulses should be 10 div when applying a 1 ms time marker signal.
MAG CENTER	SWEEP TIME/DIV; 1 ms PULL $\times$ 10MAG; PUSH	TG-501	VR107	VR107	VR107	VR107	X74	The center of pulse should be center of the graduation scale when applying a 5 ms marker signal. H.POSITION...mechanical center.
10 ms SWEEP TIME	SWEEP TIME/DIV; 10 ms	TG-501	VR111	VR111	VR111	VR111	X74	11th pulse should correspond to the right end of the graduation line.
20 μ s SWEEP TIME	SWEEP TIME/DIV; 20 μ s	TG-501	TC101	TC101	TC101	TC101	X74	11th pulse should correspond to the right end of the graduation line.
X POSITION	TRIG MODE; X-Y $\Rightarrow$ AUTO AC-GND-DC; GND		VR102	VR102	—	—	X73	(1) Adjust the trace for center graduation line. (2) Spot should be the center of the screen.
X GAIN	TRIG MODE; X-Y VOLTS/DIV; 10 mV (CH2)	PG-506	VR105	VR105	VR105	VR105	X74	When applying a 1 kHz, 50 mV square wave signal, horizontal amplitude should be 5 div.

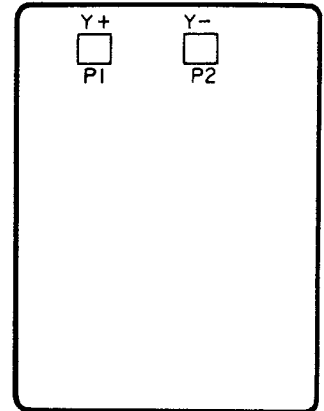
For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
 8 Cherry Tree Rd, Chinnor
 Oxon OX9 4QY
 Tel:- 01844-351694 Fax:- 01844-352554
 Email:- enquiries@mauritron.co.uk

ADJUSTMENT

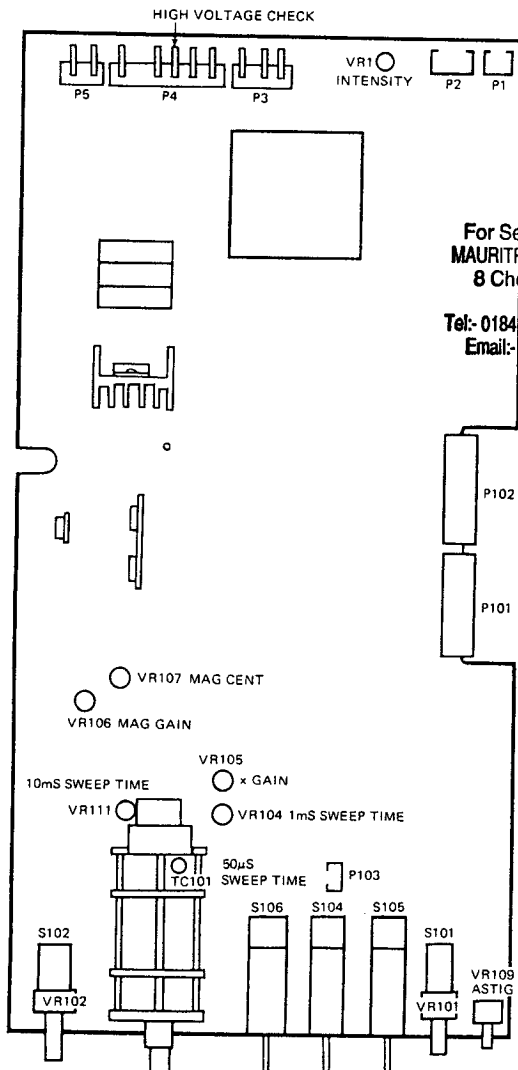
VERTICAL ATTENUATOR UNIT (X75-1140)



V. FINAL AMP UNIT (X73-1630)



HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340)



VERTICAL AMPLIFIER & POWER UNIT (X73-1490)

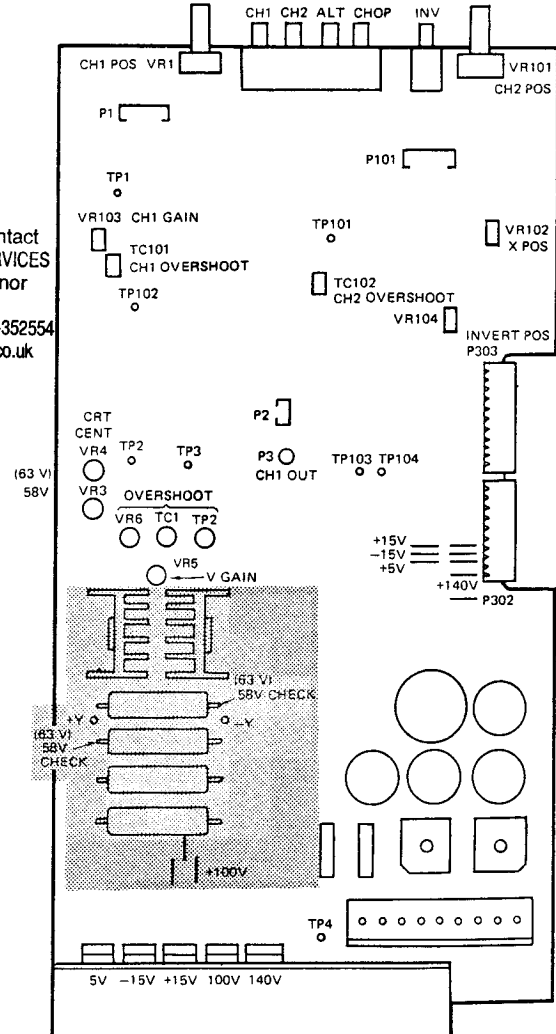
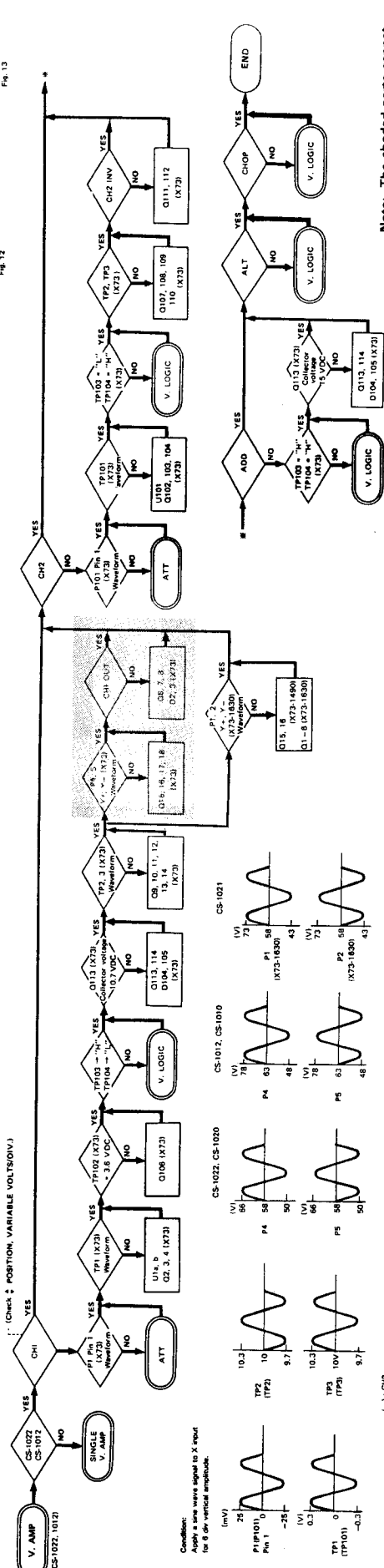
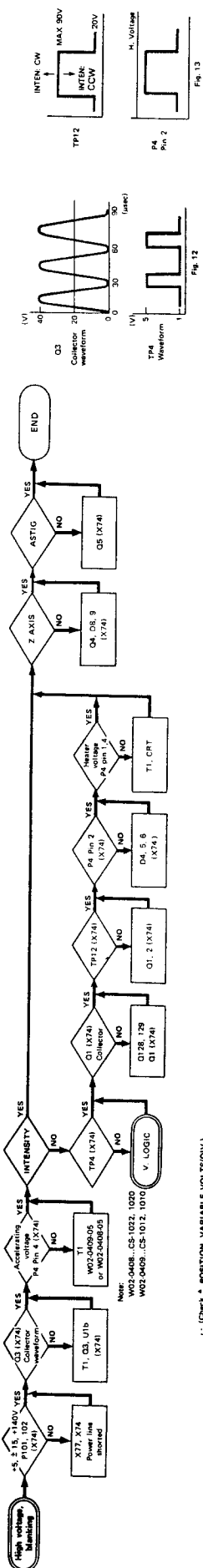
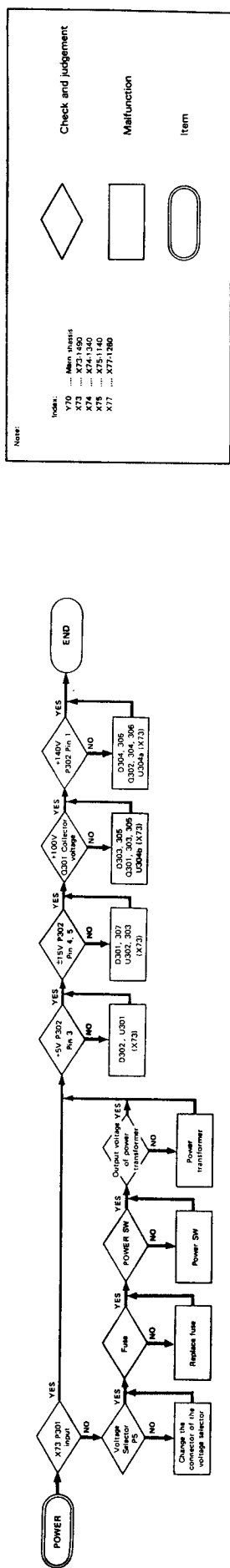
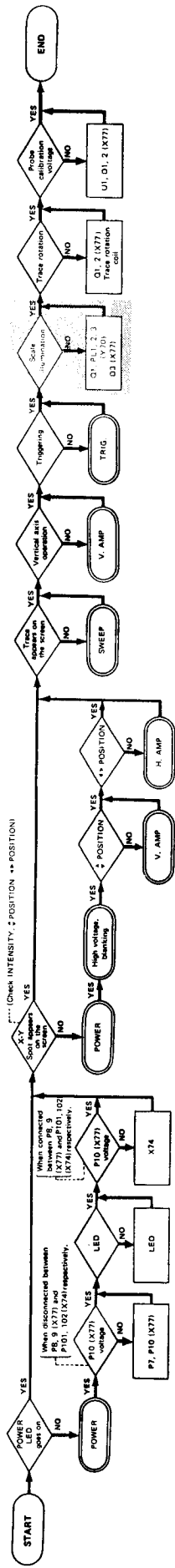


Fig. 7 Location of adjustment control

TROUBLESHOOTING



Note: The shaded parts cannot be applied to CS-1021.

PARTS LIST

MAIN CHASSIS

CS-1022 Y70-1400-21

REF.NO	PARTS NO	NAME & DESCRIPTION
1	A01-0897-12	CASE (TOP)
2	A01-0898-02	CASE (BOTTOM)
3	A10-1435-12	CHASSIS
4	A20-2761-02	PANEL (MOLDED)
5	A21-1026-12	DECORATIVE PANEL
6	A22-0826-02	SUB PANEL
7	A22-0827-13	SUB PANEL
8	A23-1642-02	REAR PANEL
9	A33-0502-05	REFLECTOR (FOR LAMP ASS'Y)
10	A33-0503-05	REFLECTOR (FOR LAMP ASS'Y)
11	B07-0712-13	ESCUTCHEON FOR FILTER
12	B19-0726-04	FILTER
13	B30-0903-15	LED LAMP (RED)
14	B30-0940-05	LAMP ASS'Y
15	B30-0941-05	LAMP
16	B39-0407-04	SPACER
17	B40-2765-04	NAME PLATE (SERIAL NO)
18	B41-0710-04	CAUTION LABEL (HIGH VOLTAGE)
19	B41-0748-13	CAUTION LABEL
20	B50-2998-00	INSTRUCTION MANUAL
21	E04-0251-05	BNC RECEPTACLE
22	E21-0657-04	TERMINAL (GND)
23	E21-0660-04	TERMINAL (CAL)
24	E23-0043-04	EARTH LUG
25	E23-0513-05	EARTH LUG
26	E23-0524-04	EARTH LUG
27	E23-0525-14	EARTH PLATE
28	E30-0545-05	POWER CORD (JIS)
29	E30-1851-05	POWER CORD ASS'Y (JIS)
30	E31-2371-05	LEAD WIRE WITH CONNECTOR
31	E31-2372-05	LEAD WIRE WITH CONNECTOR
32	E31-2373-15	LEAD WIRE WITH CONNECTOR
33	F05-5013-05	FUSE 0.5A
34	F05-8015-05	FUSE 0.8A
35	F11-0990-13	SHIELD CASE
36	F15-0733-04	BLIND PLATE
37	F20-0622-05	INSULATOR
38	G02-0607-04	SPRING FOR CRT
39	G13-0716-04	CUSHION
40	G16-0602-04	REFLECTOR SHEET(L)
41	G16-0603-04	REFLECTOR SHEET(R)
42	G16-0607-04	REFLECTOR SHEET
43	H01-2986-04	CARTON BOX
44	H10-2815-02	FOAMED STYRENE PAD
45	H10-2816-02	FOAMED STYRENE PAD
46	H20-1719-04	VINYL COVER
47	H25-0029-04	BAG
48	J02-0089-05	LEG
49	J02-0510-14	LEG
50	J10-0100-22	BEZEL
51	J13-0033-15	FUSE HOLDER
52	J19-1313-05	LEAD HOLDER
53	J19-1633-13	HOLDER FOR CRT
54	J19-1634-04	HOLDER FOR LEAD
55	J19-1635-04	HOLDER FOR LED
56	J21-2573-04	HOLDER FOR LEG
57	J21-2970-23	BRACKET FOR CRT
58	J21-2972-04	PLATE FOR POWER CORD
59	J21-4512-04	BRACKET FOR CRT
60	J25-3000-05	P.C.BOARD (FOR LAMP ASS'Y)
61	J31-0603-04	COLLAR
62	J42-0083-05	BUSHING
63	J42-0523-04	BUSHING
64	J59-0403-05	NYLON RIVET
65	J61-0408-05	WIRE WRAPPING BAND
66	J61-0515-05	SUPPORT (I TYPE)
67	J61-0516-05	SUPPORT (T TYPE)
68	J61-0517-05	STADOFF CLIP
69	K01-0518-05	HANDLE
70	K21-0851-03	KNOB
71	K21-0853-13	KNOB
72	K21-0854-13	KNOB
73	K21-0855-14	KNOB
74	K21-0856-13	KNOB
75	K27-0526-04	KNOB FOR LEVER
76	K27-0528-04	KNOB FOR PUSH
77	L01-9344-15	POWER TRANSFORMER
78	L39-0518-05	ROTATOR COIL
79	N08-0611-04	DRESSED SCREW
80	N09-0715-04	SCREW, PAN HD M 4X31
81	N09-0716-05	SCREW
82	N09-0717-05	SCREW, TRUSS HD M 3X12
83	N09-0720-05	SCREW, SEMS PAN HD
84	N10-2070-46	NUT, HEX
85	N15-1030-41	WASHER, FLAT FOR M3
86	N15-1040-41	WASHER
87	N19-0191-05	WASHER NONMETAL
88	N30-3004-46	SCREW, PAN HD M 3X4
89	N30-3006-46	SCREW, PAN HD M 3X6
90	N88-3006-46	SCREW, FLAT HD TAP TITE
91	N89-3006-41	SCREW, BINDING TAP TITE
92	R03-3502-15	V.R. 10K B

REF.NO	PARTS NO	NAME & DESCRIPTION
54	R05-3504-05	V.R. 10K B
55	R05-3505-05	V.R. 20K B
56	R05-8001-05	V.R. 3M B
57	Y01-0503-04	CORD WRAP
58	X73-1490-00	VERTICAL POWER SUPPLY UNIT
59	X74-1340-00	HORIZONTAL UNIT
60	X75-1140-00	VERTICAL ATTENUATOR UNIT
61	X77-1260-00	CONNECTION UNIT
62	X81-1250-00	C.R.T SOCKET UNIT
63	Y87-1840-00	PROBE PC-20
	150FTM31	CRT
	212-2014-05	TUBE (PLASTIC)
	212-3017-05	TUBE (PLASTIC)
Q001	2SD613(E)	TR. SI, NPN
R100	RD148B2E331J	RES. CARBON 330 5% 1/4W

CS-1020 Y70-1410-21

REF.NO	PARTS NO	NAME & DESCRIPTION
	A01-0897-12	CASE (TOP)
	A01-0898-02	CASE (BOTTOM)
	A10-1435-02	CHASSIS
	A20-2761-02	PANEL
	A21-1027-12	DECORATIVE PANEL
	A22-0826-02	SUB PANEL
	A22-0827-13	SUB PANEL
	A23-1642-02	REAR PANEL
	A33-0502-05	REFLECTOR (FOR LAMP ASS'Y)
	A33-0503-05	REFLECTOR (FOR LAMP ASS'Y)
	B07-0712-13	ESCUTCHEON FOR FILTER
	B19-0726-04	FILTER
	B30-0903-15	LED LAMP (RED)
	B30-0940-05	LAMP ASS'Y
	B30-0941-05	LAMP
	B39-0407-04	SPACER
	B40-2765-04	NAME PLATE (SERIAL NO)
	B41-0710-04	CAUTION LABEL (HIGH VOLTAGE)
	B41-0748-13	CAUTION LABEL
	B50-2998-00	INSTRUCTION MANUAL
	E04-0251-05	BNC RECEPTACLE
	E21-0657-04	TERMINAL (GND)
	E21-0660-04	TERMINAL (CAL)
	E23-0043-04	EARTH LUG
	E23-0513-05	EARTH LUG
	E23-0524-04	EARTH LUG
	E23-0525-14	EARTH PLATE
	E30-0545-05	AC POWER CORD
	E30-1851-05	POWER CORD ASS'Y (JIS)
	E31-2371-05	LEAD WIRE WITH CONNECTOR
	E31-2372-05	LEAD WIRE WITH CONNECTOR
	E31-2373-15	LEAD WIRE WITH CONNECTOR
	F05-5013-05	FUSE 0.5A
	F05-8015-05	FUSE 0.8A
	F11-0981-03	SHIELD CASE FOR CRT
	F20-0622-05	INSULATOR
	G02-0607-04	SPRING FOR CRT
	G13-0716-04	CUSHION
	G16-0602-04	REFLECTOR SHEET(L)
	G16-0603-04	REFLECTOR SHEET(R)
	G16-0607-04	REFLECTOR SHEET
	H01-2987-04	CARTON BOX
	H10-2815-02	FOAMED STYRENE PAD
	H10-2816-02	FOAMED STYRENE PAD
	H20-1719-04	VINYL COVER
	H25-0029-04	BAG
	J02-0089-05	LEG
	J02-0510-14	LEG
	J10-0100-12	BEZEL
	J13-0033-15	FUSE HOLDER
	J19-1313-05	LEAD HOLDER
	J19-1633-03	HOLDER FOR CRT
	J19-1634-04	HOLDER FOR LEAD
	J19-1635-04	HOLDER FOR LED
	J21-2573-04	HOLDER FOR LEG
	J21-2970-13	BRACKET FOR CRT
	J21-2972-04	PLATE FOR POWER CORD
	J25-3000-05	P.C.BOARD (FOR LAMP ASS'Y)
	J31-0603-04	COLLAR
	J42-0083-05	BUSHING
	J59-0403-05	NYLON RIVET
	J61-0401-05	WIRE BAND
	J61-0515-05	SUPPORT (I TYPE)
	J61-0516-05	SUPPORT (T TYPE)
	J61-0517-05	STADOFF CLIP
	K01-0518-05	HANDLE
	K21-0851-03	KNOB
	K21-0853-03	KNOB
	K21-0854-03	KNOB
	K21-0855-14	KNOB
	K21-0856-03	KNOB
	K27-0526-04	KNOB FOR LEVER

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
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 Email:- enquiries@mauritron.co.uk

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
	L01-9344-15	POWER TRANSFORMER
	L39-0518-05	ROTATOR COIL
	N08-0611-04	DRESSED SCREW
	N09-0715-04	SCREW, PAN HD M 4X31
	N09-0716-05	SCREW
	N09-0717-05	SCREW, TRUSS HD M 3X12
	N09-0720-05	SCREW, SEMS PAN HD
	N10-2070-46	NUT, HEX
	N15-1030-41	WASHER, FLAT FOR M3
	N15-1040-41	WASHER
	N19-0191-05	WASHER NONMETAL
	N30-3004-46	SCREW, PAN HD M 3X4
	N30-3006-46	SCREW, PAN HD M 3X6
	N33-4012-41	SCREW M 4X12
	N88-3006-46	SCREW, FLAT HD TAP TITE
	N89-3006-41	SCREW, BINDING TAP TITE
	R03-3502-15	V.R. 10K B
	R05-3504-05	V.R. 10K B
	R05-3505-05	V.R. 20K B
	R05-8001-05	V.R. 3M B
	W01-0503-04	CORD WRAP
	X73-1490-01	VERTICAL, POWER SUPPLY UNIT
	X74-1340-01	HORIZONTAL UNIT
	X75-1140-01	VERTICAL ATTENUATOR UNIT
	X77-1260-01	CONNECTION UNIT
	X81-1250-00	C.R.T SOCKET UNIT
	Y87-1840-00	PROBE PC-20
	150FTM31	CRT
Q001	2SD613(E)	TR. SI, NPN
R100	R0148B2E331J	RES. CARBON 330 5% 1/4W

CS-1012 Y70-1420-21

REF.NO	PARTS NO	NAME & DESCRIPTION
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	A01-0898-02	CASE (BOTTOM)
	A10-1435-12	CHASSIS
	A20-2761-02	PANEL (MOLDED)
	A21-1028-12	DECORATIVE PANEL
	A22-0826-02	SUB PANEL
	A22-0827-13	SUB PANEL
	A23-1642-02	REAR PANEL
	A33-0502-05	REFLECTOR (FOR LAMP ASS'Y)
	A33-0503-05	REFLECTOR (FOR LAMP ASS'Y)
	B07-0712-13	ESCUTCHEON FOR FILTER
	B19-0726-04	FILTER
	B30-0903-15	LED LAMP (RED)
	B30-0940-05	LAMP ASS'Y
	B30-0941-05	LAMP
	B39-0407-04	SPACER
	B40-2765-04	NAME PLATE (SERIAL NO)
	B41-0749-13	CAUTION LABEL
	B50-2998-00	INSTRUCTION MANUAL
	E04-0251-05	BNC RECEPTACLE
	E21-0657-04	TERMINAL (GND)
	E21-0660-04	TERMINAL (CAL)
	E23-0043-04	EARTH LUG
	E23-0513-05	EARTH LUG
	E23-0524-04	EARTH LUG
	E23-0525-14	EARTH PLATE
	E30-0545-05	POWER CORD (JIS)
	E30-1851-05	POWER CORD ASS'Y (JIS)
	E31-2371-05	LEAD WIRE WITH CONNECTOR
	E31-2372-05	LEAD WIRE WITH CONNECTOR
	E31-2373-15	LEAD WIRE WITH CONNECTOR
	F05-5013-05	FUSE 0.5A
	F05-8015-05	FUSE 0.8A
	F10-1565-04	SHIELDING PLATE
	F11-0982-23	SHIELD CASE
	F15-0734-04	BLIND PLATE
	F20-0622-05	INSULATOR
	G02-0607-04	SPRING FOR CRT
	G13-0716-04	CUSHION
	G16-0602-04	REFLECTOR SHEET(L)
	G16-0603-04	REFLECTOR SHEET(R)
	G16-0607-04	REFLECTOR SHEET
	H01-2988-04	CARTON BOX
	H10-2815-02	FOAMED STYRENE PAD
	H10-2816-02	FOAMED STYRENE PAD
	H20-1719-04	VINYL COVER
	H25-0029-04	BAG
	J02-0089-05	LEG
	J02-0510-14	LEG
	J10-0100-22	BEZEL
	J13-0033-15	FUSE HOLDER
	J19-1313-05	LEAD HOLDER
	J19-1633-13	HOLDER FOR CRT
	J19-1634-04	HOLDER FOR LEAD
	J19-1635-04	HOLDER FOR LED
	J21-2573-04	HOLDER FOR LEG
	J21-2970-23	BLACKET FOR CRT

REF.NO	PARTS NO	NAME & DESCRIPTION
	J21-2972-14	PLATE FOR POWER CORD
	J21-4512-04	BLACKET FOR CRT
	J25-3000-05	P.C.BOARD.(FOR LAMP ASS'Y)
	J31-0603-04	COLLAR
	J42-0083-05	BUSHING
	J42-0524-04	BUSHING
	J59-0403-05	NYLON RIVET
	J61-0408-05	WIRE WRAPPING BAND
	J61-0515-05	SUPPORT (I TYPE)
	J61-0516-05	SUPPORT (T TYPE)
	J61-0517-05	STADOFF CLIP
	K01-0518-05	HANDLE
	K21-0851-03	KNOB
	K21-0853-13	KNOB
	K21-0854-13	KNOB
	K21-0855-14	KNOB
	K21-0856-13	KNOB
	K27-0526-04	KNOB FOR LEVER
	K27-0528-04	KNOB FOR PUSH
	L01-9344-15	POWER TRANSFORMER
	L39-0518-05	ROTATOR COIL
	N08-0611-04	DRESSED SCREW
	N09-0715-04	SCREW, PAN HD M 4X31
	N09-0716-05	SCREW
	N09-0717-05	SCREW, TRUSS HD M 3X12
	N09-0720-05	SCREW, SEMS PAN HD
	N10-2070-46	NUT, HEX
	N15-1030-41	WASHER, FLAT FOR M3
	N15-1040-41	WASHER
	N19-0191-05	WASHER NONMETAL
	N30-3004-46	SCREW, PAN HD M 3X4
	N30-3006-46	SCREW, PAN HD M 3X6
	N88-3006-46	SCREW, FLAT HD TAP TITE
	N89-3006-41	SCREW, BINDING TAP TITE
	R03-3502-15	V.R. 10K B
	R05-3504-05	V.R. 10K B
	R05-3505-05	V.R. 20K B
	R05-8001-05	V.R. 3M B
	W01-0503-04	CORD WRAP
	X73-1490-02	VERTICAL, POWER SUPPLY UNIT
	X74-1340-02	HORIZONTAL UNIT
	X75-1140-02	VERTICAL ATTENUATOR UNIT
	X77-1260-02	CONNECTION UNIT
	X81-1250-01	C.R.T SOCKET UNIT
	Y87-1840-00	PROBE PC-20
	150GTM31	CRT
	212-2014-05	TUBE (PLASTIC)
	212-3017-05	TUBE (PLASTIC)
Q001	2SD613(E)	TR. SI, NPN
R100	R0148B2E431J	RES. CARBON 430 5% 1/4W

CS-1010 Y70-1430-21

REF.NO	PARTS NO	NAME & DESCRIPTION
	A01-0897-12	CASE (TOP)
	A01-0898-02	CASE (BOTTOM)
	A10-1435-12	CHASSIS
	A20-2761-02	PANEL (MOLDED)
	A21-1029-12	DECORATIVE PANEL
	A22-0826-02	SUB PANEL
	A22-0827-13	SUB PANEL
	A23-1642-02	REAR PANEL
	A33-0502-05	REFLECTOR (FOR LAMP ASS'Y)
	A33-0503-05	REFLECTOR (FOR LAMP ASS'Y)
	B07-0712-13	ESCUTCHEON FOR FILTER
	B19-0726-04	FILTER
	B30-0903-15	LED LAMP (RED)
	B30-0940-05	LAMP ASS'Y
	B30-0941-05	LAMP
	B39-0407-04	SPACER
	B40-2765-04	NAME PLATE (SERIAL NO)
	B41-0750-13	CAUTION LABEL
	B50-2998-00	INSTRUCTION MANUAL
	E04-0251-05	BNC RECEPTACLE
	E21-0657-04	TERMINAL (GND)
	E21-0660-04	TERMINAL (CAL)
	E23-0043-04	EARTH LUG
	E23-0513-05	EARTH LUG
	E23-0524-04	EARTH LUG
	E23-0525-14	EARTH PLATE
	E30-0545-05	POWER CORD (JIS)
	E30-1851-05	POWER CORD ASS'Y (JIS)
	E31-2371-05	LEAD WIRE WITH CONNECTOR
	E31-2372-05	LEAD WIRE WITH CONNECTOR
	E31-2373-15	LEAD WIRE WITH CONNECTOR
	F05-5013-05	FUSE 0.5A
	F05-8015-05	FUSE 0.8A
	F10-1565-04	SHIELDING PLATE
	F11-0982-23	SHIELD CASE
	F15-0734-04	BLIND PLATE
	F20-0622-05	INSULATOR

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
VR107	R12-1517-05	RES. SEMI FIXED 1K B
VR108	NO USE	
VR109	R12-5518-05	RES. SEMI FIXED 200K OHM B
VR110	R12-1517-05	RES. SEMI FIXED 1K B
VR111	R12-0540-05	RES. SEMI FIXED 500 B

CONNECTION UNIT

(X77-1260-00)

REF.NO	PARTS NO	NAME & DESCRIPTION
	E33-4037-00	WIRE ASSY
	J25-2995-03	PCB (UNMOUNTED)
	R92-0150-05	JUMPING RES. ZERO OHM
C001	C093M1H103J	CAP. MYLAR 0.01 5% 50V
C002	CK45B1H103K	CAP. CERAMIC 0.01 10% 50V
D001	DS442X	DIODE
D002	DS442X	DIODE
D003	S1VB40	DIODE
J001	E31-2374-05	LEAD WIRE WITH CONNECTOR
P001	E40-7203-05	PIN CONNECTOR 3P
P002	E40-7204-05	PIN CONNECTOR 4P
P003	E40-0604-05	PIN CONNECTOR 6P
P004	E40-0804-05	PIN CONNECTOR 8P
P005	E40-0804-05	PIN CONNECTOR 8P
P006	E40-1111-05	PIN CONNECTOR 11P
P007	E40-1111-05	PIN CONNECTOR 11P
P008	E40-1111-05	PIN CONNECTOR 11P
P009	E40-1111-05	PIN CONNECTOR 11P
P010	E40-0273-05	PIN CONNECTOR 2 P
P011	E40-0373-05	PIN CONNECTOR 3 P
P012	E40-0273-05	PIN CONNECTOR 2 P
P013	E40-0273-05	PIN CONNECTOR 2 P
P014	E40-0273-05	PIN CONNECTOR 2 P
P015	E40-0673-05	PIN CONNECTOR 6 P
Q001	2SC1384	TR. SI, NPN
Q002	2SA684	TR. SI, PNP
R001	RD14BB2E331J	RES. CARBON 330 5% 1/4W
R002	RD14BB2E103J	RES. CARBON 10K 5% 1/4W
R003	RD14BB2E103J	RES. CARBON 10K 5% 1/4W
R004	RD14BB2E103J	RES. CARBON 10K 5% 1/4W
R005	RD14BB2E330J	RES. CARBON 33 5% 1/4W
R006	RN14BK2E1300F	RES. METAL FILM 130 1% 1/4W
R007	RN14BK2E4302F	RES. METAL FILM 43K 1% 1/4W
R008	RN14BK2E9102F	RES. METAL FILM 91K 1% 1/4W
R009	RN14BK2E1003F	RES. METAL FILM 100K 1% 1/4W
R010	RN14BK2E3601F	RES. METAL FILM 3.6K 1% 1/4W
R011	RD14BB2E392J	RES. CARBON 3.9K 5% 1/4W
R012	NO USE	
R013	RD14BY2H100J	RES. CARBON 10 5% 1/2W
R014	RD14BB2E222J	RES. CARBON 2.2K 5% 1/4W
R015	RD14BB2E101J	RES. CARBON 100 5% 1/4W
U001	NJM4558D	IC

CONNECTION UNIT

(X77-1260-01)

REF.NO	PARTS NO	NAME & DESCRIPTION
	E33-4037-00	WIRE ASSY
	J25-2995-03	PCB (UNMOUNTED)
	R92-0150-05	JUMPING RES. ZERO OHM
C001	C093M1H103J	CAP. MYLAR 0.01 5% 50V
C002	CK45B1H103K	CAP. CERAMIC 0.01 10% 50V
D001	DS442X	DIODE
D002	DS442X	DIODE
D003	S10B40	DIODE
D004	WZ-120	DIODE
J001	E31-2374-05	LEAD WIRE WITH CONNECTOR
P001	E40-0373-05	PIN CONNECTOR 3P
P001	E40-7203-05	PIN CONNECTOR 3P
P002	E40-7204-05	PIN CONNECTOR 4P
P003	E40-0604-05	PIN CONNECTOR 6P
P004	E40-0804-05	PIN CONNECTOR 8P
P005	E40-0804-05	PIN CONNECTOR 8P
P006	E40-1111-05	PIN CONNECTOR 11P
P007	E40-1111-05	PIN CONNECTOR 11P
P008	E40-1111-05	PIN CONNECTOR 11P
P009	E40-1111-05	PIN CONNECTOR 11P
P010	E40-0273-05	PIN CONNECTOR 2P
P011	NO USE	
P012	E40-0273-05	PIN CONNECTOR 2P

REF.NO	PARTS NO	NAME & DESCRIPTION
P013	E40-0273-05	PIN CONNECTOR 2P
P014	E40-0273-05	PIN CONNECTOR 2P
P015	E40-0673-05	PIN CONNECTOR 6P
Q001	2SC1384	TR. SI, NPN
Q002	2SA684	TR. SI, PNP
R001	RD14BB2E331J	RES. CARBON 330 5% 1/4W
R005	RD14BB2E330J	RES. CARBON 33 5% 1/4W
R006	RN14BK2E1300F	RES. METAL FILM 130 1% 1/4W
R007	RN14BK2E4302F	RES. METAL FILM 43K 1% 1/4W
R008	RN14BK2E9102F	RES. METAL FILM 91K 1% 1/4W
R009	RN14BK2E1003F	RES. METAL FILM 100K 1% 1/4W
R010	RN14BK2E3601F	RES. METAL FILM 3.6K 1% 1/4W
R011	RD14BB2E392J	RES. CARBON 3.9K 5% 1/4W
R012	RD14BB2E222J	RES. CARBON 2.2K 5% 1/4W
R013	RD14BY2H100J	RES. CARBON 10 5% 1/2W
U001	NJM4558D	IC DUAL OP AMP.

CONNECTION UNIT

(X77-1260-02)

REF.NO	PARTS NO	NAME & DESCRIPTION
	E33-4037-00	WIRE ASSY
	J25-2995-03	PCB (UNMOUNTED)
	R92-0150-05	JUMPING RES. ZERO OHM
C001	C093M1H103J	CAP. MYLAR 0.01 5% 50V
C002	CK45B1H103K	CAP. CERAMIC 0.01 10% 50V
D001	DS442X	DIODE
D002	DS442X	DIODE
D003	S1VB40	DIODE
J001	E31-2374-05	LEAD WIRE WITH CONNECTOR
P001	E40-7203-05	PIN CONNECTOR 3P
P002	E40-7204-05	PIN CONNECTOR 4P
P003	E40-0604-05	PIN CONNECTOR 6P
P004	E40-0804-05	PIN CONNECTOR 8P
P005	E40-0804-05	PIN CONNECTOR 8P
P006	E40-1111-05	PIN CONNECTOR 11P
P007	E40-1111-05	PIN CONNECTOR 11P
P008	E40-1111-05	PIN CONNECTOR 11P
P009	E40-1111-05	PIN CONNECTOR 11P
P010	E40-0273-05	PIN CONNECTOR 2 P
P011	E40-0373-05	PIN CONNECTOR 3 P
P012	E40-0273-05	PIN CONNECTOR 2 P
P013	E40-0273-05	PIN CONNECTOR 2 P
P014	E40-0273-05	PIN CONNECTOR 2 P
P015	E40-0673-05	PIN CONNECTOR 6 P
Q001	2SC1384	TR. SI, NPN
Q002	2SA684	TR. SI, PNP
R001	RD14BB2E331J	RES. CARBON 330 5% 1/4W
R002	RD14BB2E103J	RES. CARBON 10K 5% 1/4W
R003	RD14BB2E103J	RES. CARBON 10K 5% 1/4W
R004	RD14BB2E103J	RES. CARBON 10K 5% 1/4W
R005	RD14BB2E221J	RES. CARBON 220 5% 1/4W
R006	RN14BK2E1300F	RES. METAL FILM 130 1% 1/4W
R007	RN14BK2E4302F	RES. METAL FILM 43K 1% 1/4W
R008	RN14BK2E9102F	RES. METAL FILM 91K 1% 1/4W
R009	RN14BK2E1003F	RES. METAL FILM 100K 1% 1/4W
R010	RN14BK2E3601F	RES. METAL FILM 3.6K 1% 1/4W
R011	RD14BB2E392J	RES. CARBON 3.9K 5% 1/4W
R012	NO USE	
R013	RD14BY2H100J	RES. CARBON 10 5% 1/2W
R014	RD14BB2E222J	RES. CARBON 2.2K 5% 1/4W
R015	RD14BB2E101J	RES. CARBON 100 5% 1/4W
U001	NJM4558D	IC

CONNECTION UNIT

(X77-1260-03)

REF.NO	PARTS NO	NAME & DESCRIPTION
	E33-4037-00	WIRE ASSY
	J25-2995-03	PCB (UNMOUNTED)
	R92-0150-05	JUMPING RES. ZERO OHM
C001	C093M1H103J	CAP. MYLAR 0.01 5% 50V
C002	CK45B1H103K	CAP. CERAMIC 0.01 10% 50V
D001	DS442X	DIODE
D002	DS442X	DIODE
D003	S10B40	DIODE
D004	WZ-120	DIODE
J001	E31-2374-05	LEAD WIRE WITH CONNECTOR

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
P001	E40-0373-05	PIN CONNECTOR 3P
P001	E40-7203-05	PIN CONNECTOR 3P
P002	E40-7204-05	PIN CONNECTOR 4P
P003	E40-0604-05	PIN CONNECTOR 6P
P004	E40-0804-05	PIN CONNECTOR 8P
P005	E40-0804-05	PIN CONNECTOR 8P
P006	E40-1111-05	PIN CONNECTOR 11P
P007	E40-1111-05	PIN CONNECTOR 11P
P008	E40-1111-05	PIN CONNECTOR 11P
P009	E40-1111-05	PIN CONNECTOR 11P
P010	E40-0273-05	PIN CONNECTOR 2P
P011	NO USE	
P012	E40-0273-05	PIN CONNECTOR 2P
P013	E40-0273-05	PIN CONNECTOR 2P
P014	E40-0273-05	PIN CONNECTOR 2P
P015	E40-0673-05	PIN CONNECTOR 6P
Q001	2SC1384	TR. SI, NPN
Q002	2SA684	TR. SI, PNP
R001	RD14BB2E331J	RES. CARBON 330 5% 1/4W
R005	RD14BB2E221J	RES. CARBON 220 5% 1/4W
R006	RN14BK2E1300F	RES. METAL FILM 130 1% 1/4W
R007	RN14BK2E4302F	RES. METAL FILM 43K 1% 1/4W
R008	RN14BK2E9102F	RES. METAL FILM 91K 1% 1/4W
R009	RN14BK2E1003F	RES. METAL FILM 100K 1% 1/4W
R010	RN14BK2E3601F	RES. METAL FILM 3.6K 1% 1/4W
R011	RD14BB2E392J	RES. CARBON 3.9K 5% 1/4W
R012	RD14BB2E222J	RES. CARBON 2.2K 5% 1/4W
R013	RD14BY2H100J	RES. CARBON 10 5% 1/2W
U001	NJM4558D	IC DUAL OP AMP.

CRT SOCKET UNIT

(X81-1250-00)

REF.NO	PARTS NO	NAME & DESCRIPTION
	E01-0103-05	CRT SOCKET
	J25-2996-14	PCB (UNMOUNTED)
	R92-0150-05	JUMPING RES. ZERO OHM
J016	E31-2366-05	LEAD WIRE WITH CONNECTOR
J017	E31-2366-05	LEAD WIRE WITH CONNECTOR
J018	NO USE	
J019	E31-2364-05	LEAD WIRE WITH CONNECTOR
J020	NO USE	
J021	E31-2363-05	LEAD WIRE WITH CONNECTOR
J022	NO USE	
J023	E31-2365-05	LEAD WIRE WITH CONNECTOR
L001	L40-2292-13	FIXED INDUCTOR 2.2UH
L002	L40-2292-13	FIXED INDUCTOR 2.2UH
R001	RD14BB2E151J	RES. CARBON 150 5% 1/4W
R002	RD14BB2E151J	RES. CARBON 150 5% 1/4W

CRT SOCKET UNIT

(X81-1250-01)

REF.NO	PARTS NO	NAME & DESCRIPTION
	E01-0103-05	CRT SOCKET
	J25-2996-14	PCB (UNMOUNTED)
C001	CC45CH2H010C	CAP. CERAMIC 1P 0.25P 500V
C002	CC45SL1H050C	CAP. CERAMIC 5P 0.25P 50V
J016	E31-2366-05	LEAD WIRE WITH CONNECTOR
J017	E31-2366-05	LEAD WIRE WITH CONNECTOR
J018	NO USE	
J019	E31-2364-05	LEAD WIRE WITH CONNECTOR
J020	NO USE	
J021	E31-2363-05	LEAD WIRE WITH CONNECTOR
J022	NO USE	
J023	E31-2365-05	LEAD WIRE WITH CONNECTOR
L001	L40-2792-13	FIXED INDUCTOR 2.7UH
L002	L40-2792-13	FIXED INDUCTOR 2.7UH
R001	RD14BB2E681J	RES. CARBON 680 5% 1/4W
R002	RD14BB2E681J	RES. CARBON 680 5% 1/4W

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
8 Cherry Tree Rd, Chinnor

Oxon OX9 4QY
Tel: 01844-351604 Fax: 01844-352554
Email: enquiries@mauritron.co.uk

REF.NO	PARTS NO	NAME & DESCRIPTION
	A01-0897-22	CASE
	A01-0898-12	CASE
	A10-1444-02	CHASSIS
	A20-2761-02	PANEL (MOLDED)
	A21-1076-02	DECORATIVE PANEL
	A22-0826-02	SUB PANEL
	A22-0827-13	SUB PANEL
	A23-1643-02	REAR PANEL
	B07-0712-13	ESCUTCHEON FOR FILTER
	B19-0726-04	FILTER
	B30-0903-15	LED LAMP (RED)
	B39-0407-04	SPACER
	B40-2765-04	NAME PLATE (SERIAL NO)
	B41-0774-03	CAUTION LABEL
	B50-7570-00	INSTRUCTION MANUAL
	E04-0251-05	BNC RECEPTACLE
	E21-0657-04	TERMINAL (GND)
	E21-0660-04	TERMINAL (CAL)
	E23-0043-04	EARTH LUG
	E23-0513-05	EARTH LUG
	E23-0524-04	EARTH LUG
	E23-0525-14	EARTH PLATE
	E30-1852-05	POWER CORD ASS'Y (CEE)
	E31-2370-05	LEAD WIRE WITH CONNECTOR
	E31-2384-15	LEAD WIRE WITH CONNECTOR
	F05-5013-05	FUSE 0.5A
	F05-8015-05	FUSE 0.8A
	F10-1565-04	SHIELDING PLATE
	F11-0995-03	SHIELD CASE
	F15-0733-04	FELT
	G02-0607-04	SPRING FOR CRT
	G13-0716-04	CUSHION
	H01-5769-04	CARTON BOX
	H10-2815-02	FOAMED STYRENE PAD
	H10-2816-02	FOAMED STYRENE PAD
	H20-1719-04	VINYL COVER
	H25-0029-04	POLYETHYLENE BAG
	J02-0089-05	RUBBER LEG
	J02-0510-14	SUB LEG
	J10-0100-22	BEZEL
	J11-0046-05	CABLE CLAMP
	J13-0033-15	FUSE HOLDER
	J19-1634-04	HOLDER FOR LEAD
	J19-1635-04	HOLDER FOR LED
	J21-2573-04	HOLDER FOR LEG
	J21-2970-23	BLACKET FOR CRT
	J21-2973-14	AC VOLTAGE PLATE220V
	J21-4512-04	BLACKET FOR CRT
	J31-0603-04	COLLAR
	J42-0085-05	BUSHING (FOR AC CORD)
	J42-0523-04	BUSHING
	J61-0038-05	FREE UP BELT (FOR CABLE TIE)
	J61-0408-05	WIRE WRAPPING BAND
	J61-0515-05	SUPPORT (I TYPE)
	J61-0516-05	SUPPORT (T TYPE)
	K01-0518-05	HANDLE
	K21-0851-03	KNOB
	K21-0853-23	KNOB
	K21-0854-23	KNOB
	K21-0855-14	KNOB
	K21-0856-23	KNOB
	K27-0526-04	KNOB FOR LEVER
	K27-0528-04	KNOB FOR PUSH
	L01-9344-15	POWER TRANSFORMER
	L39-0518-05	ROTATOR COIL
	N08-0611-04	DRESSED SCREW
	N09-0715-04	SCREW, PAN HD M 4X31
	N09-0716-05	SCREW M 4X10
	N09-0717-05	SCREW, TRUSS HD M 3X12
	N09-0720-05	SCREW, SEMS PAN HD
	N10-2030-46	NUT, HEX
	N10-2070-46	NUT, HEX
	N15-1030-41	WASHER, FLAT FOR M3
	N15-1040-41	WASHER
	N17-1030-46	TOOTHED LOCK WASHER FOR M3
	N30-3004-41	SCREW, PAN HD M 3X4
	N30-3006-41	SCREW, PAN HD M 3X6
	N30-3008-41	SCREW, PAN HD M 3X8
	N88-3006-41	SCREW, FLAT HD TAP TITE
	N89-3006-41	SCREW, BINDING TAP TITE
	R05-3504-05	V.R. 10K B
	R05-3505-05	V.R. 20K B
	R05-8001-05	V.R. 3M B
	S59-2503-05	SWITCH
	W01-0503-04	CORD WRAP
	X73-1490-04	AMPLIFIER UNIT
	X73-1630-00	AMPLIFIER UNIT
	X74-1340-04	SWEEP CIRCUIT UNIT
	X75-1140-04	ATTENUATOR UNIT
	X77-1261-61	CONNECTION UNIT
	X81-1250-04	CRT SOCKET UNIT
	Y87-1840-00	PROBE PC-20
	1506TM31A	CRT
	212-2014-05	TUBE (PLASTIC)
	212-3017-05	TUBE (PLASTIC)
R100	RD14BB2E431J	RES. CARBON 430 5% 1/4W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
R210	RD148B2E101J	RES. CARBON 100 5% 1/4W
R211	RD148B2E470J	RES. CARBON 47 5% 1/4W
R212	RD148B2E101J	RES. CARBON 100 5% 1/4W
R213	RD148B2E152J	RES. CARBON 1.5K 5% 1/4W
R214	RN148K2E5101F	RES. METAL FILM 5.1K 1% 1/4W
R217	RD148B2E562J	RES. CARBON 5.6K 5% 1/4W
R221	RD148B2E133J	RES. CARBON 13K 5% 1/4W
R222	RD148B2C102J	RES. CARBON 1K 5% 1/6W
R223	RD148B2E103J	RES. CARBON 10K 5% 1/4W
R224	NO USE	
R225	RD148B2E222J	RES. CARBON 2.2K 5% 1/4W
R226	NO USE	
R227	RD148B2C102J	RES. CARBON 1K 5% 1/6W
R228	RD148B2C133J	RES. CARBON 13K 5% 1/6W
S103	S02-2507-15	ROTARY SW. W/V.R2K B
S104	S33-2501-05	LEVER SWITCH
S105	S32-2012-05	LEVER SWITCH
S106	S32-4007-05	LEVER SWITCH
T001	L19-0413-05	CONVERTOR TRANSFORMER
TC101	C05-0422-05	CAP. TRIMMER 20P
TC102	C05-0420-05	CAP. TRIMMER 6P
U001	NJM4556D	IC
U101	MC10103L	IC, QUAD 2-INPUT OR GATE
U102	SN74LS112N	IC
U103	SN74LS02N	IC
U104	SN74LS00N	IC
U105	SN74LS08N	IC
VR001	R12-5516-05	RES. SEMI FIXED 100K B
VR101	R01-3510-05	V.R. WITH SW. 10K B
VR102	R01-3510-05	V.R. WITH SW. 10K B
VR103	S02-2507-15	ROTARY SW. W/V.R2K B
VR104	R12-3520-05	RES. SEMI FIXED 10K B
VR105	R12-1518-05	RES. SEMI FIXED 2K B
VR106	R12-0421-05	RES. SEMI FIXED 100 B
VR107	R12-1517-05	RES. SEMI FIXED 1K B
VR108	NO USE	
VR109	R12-5518-05	RES. SEMI FIXED 200K B
VR110	NO USE	
VR111	R12-0540-05	RES. SEMI FIXED 500 B

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V. FINAL AMP UNIT

(X73-1630-00)

REF.NO	PARTS NO	NAME & DESCRIPTION
	F01-0821-04	HEAT SINK
	F02-0514-04	HEAT SINK
	J21-2950-04	BRACKET FOR P.C.B
	J21-2951-04	BRACKET FOR P.C.B
	J25-5097-04	PCB (UNMOUNTED)
	J32-0780-04	BOSS
	J61-0516-05	SUPPORT (T TYPE)
	N09-0709-05	SCREW
	N30-3004-46	SCREW, PAN HD M 3X4
	N30-3006-46	SCREW, PAN HD M 3X6
	N30-3008-46	SCREW, PAN HD M 3X8
	R92-0150-05	JUMPING RES. ZERO OHM
C001	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V
C002	CE04W2C3R3	CAP. ELECTRO 3.3 160V
C003	CK45B1H103K	CAP. CERAMIC 0.01 10% 50V
C004	CE04W1E101M	CAP. ELECTRO 100 20% 25V
C005	CK45B1H472K	CAP. CERAMIC 4700P 10% 50V
C006	CK45B1H472K	CAP. CERAMIC 4700P 10% 50V
C007	CK45B1H472K	CAP. CERAMIC 4700P 10% 50V
C008	CK45B1H472K	CAP. CERAMIC 4700P 10% 50V
D001	DS442X	DIODE
D002	DS442X	DIODE
D003	DS442X	DIODE
D004	DS442X	DIODE
P001	E40-0202-05	PIN CONNECTOR 2 P
P002	E40-0202-05	PIN CONNECTOR 2 P
P003	E40-0374-05	PIN CONNECTOR 3 P
P004	E40-0274-05	PIN CONNECTOR 2 P
Q001	2SC2912(R,S)	TR. SI, NPN
Q002	2SC2912(R,S)	TR. SI, NPN
Q003	2SA1210(S)	TR. SI, PNP
Q004	2SC2912(R,S)	TR. SI, NPN
Q005	2SA1210(S)	TR. SI, PNP
Q006	2SC2912(R,S)	TR. SI, NPN
R001	RD148B2E101J	RES. CARBON 100 5% 1/4W
R002	RD148B2E101J	RES. CARBON 100 5% 1/4W
R003	R92-1130-05	RES. FIXED 2.4K 5W
R004	R92-1130-05	RES. FIXED 2.4K 5W
R005	RD148B2E470J	RES. CARBON 47 5% 1/4W
R006	RD148B2E470J	RES. CARBON 47 5% 1/4W
R007	RD148B2E470J	RES. CARBON 47 5% 1/4W
R008	RD148B2E470J	RES. CARBON 47 5% 1/4W
R009	RD148B2E150J	RES. CARBON 15 5% 1/4W
R010	RD148B2E150J	RES. CARBON 15 5% 1/4W
R011	RD148B2E150J	RES. CARBON 15 5% 1/4W
R012	RD148B2E150J	RES. CARBON 15 5% 1/4W

CONNECTION UNIT

(X77-1261-61)

REF.NO	PARTS NO	NAME & DESCRIPTION
	E33-4037-00	WIRE ASSY
	J25-2995-03	PCB (UNMOUNTED)
	R92-0150-05	JUMPING RES. ZERO OHM
C001	C093M1H103J	CAP. MYLAR 0.01 5% 50V
C002	CK45B1H103K	CAP. CERAMIC 0.01 10% 50V
D001	DS442X	DIODE
D002	DS442X	DIODE
P001	E40-7203-05	PIN CONNECTOR 3 P
P002	E40-7204-05	PIN CONNECTOR 4 P
P003	E40-0604-05	PIN CONNECTOR 6 P
P004	E40-0804-05	PIN CONNECTOR 8 P
P005	E40-0804-05	PIN CONNECTOR 8 P
P006	E40-1111-05	PIN CONNECTOR 11P
P007	E40-1111-05	PIN CONNECTOR 11P
P008	E40-1111-05	PIN CONNECTOR 11P
P009	E40-1111-05	PIN CONNECTOR 11P
P010	E40-0273-05	PIN CONNECTOR 2 P
P013	E40-0273-05	PIN CONNECTOR 2 P
P014	E40-0273-05	PIN CONNECTOR 2 P
P015	E40-0673-05	PIN CONNECTOR 6 P
Q001	2SC1384	TR. SI, NPN
Q002	2SA684	TR. SI, PNP
R001	RD148B2E331J	RES. CARBON 330 5% 1/4W
R002	RD148B2E103J	RES. CARBON 10K 5% 1/4W
R003	RD148B2E103J	RES. CARBON 10K 5% 1/4W
R004	RD148B2E103J	RES. CARBON 10K 5% 1/4W
R005	RD148B2E221J	RES. CARBON 220 5% 1/4W
R006	RN148K2E1300F	RES. METAL FILM 130 1% 1/4W
R007	RN148K2E4302F	RES. METAL FILM 43K 1% 1/4W
R008	RN148K2E9102F	RES. METAL FILM 91K 1% 1/4W

PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
R009	RN14BK2E1003F	RES. METAL FILM 100K 1% 1/4W
R010	RN14BK2E3601F	RES. METAL FILM 3.6K 1% 1/4W
R011	RD14BB2E392J	RES. CARBON 3.9K 5% 1/4W
R014	RD14BB2E222J	RES. CARBON 2.2K 5% 1/4W
R015	RD14BB2E101J	RES. CARBON 100 5% 1/4W
U001	NJM4558D	IC

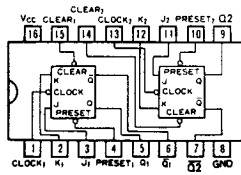
CRT SOCKET UNIT

(X81-1250-04)

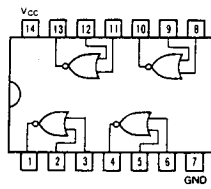
REF.NO	PARTS NO	NAME & DESCRIPTION
	E01-0103-05	CRT SOCKET
	J25-2996-24	PCB (UNMOUNTED)
	R92-0150-05	JUMPING RES. ZERO OHM
C001	CC45CH2H010C	CAP. CERAMIC 1P 0.25% 500V
C002	CC45SL1H050C	CAP. CERAMIC 5P 0.25P 50V
J016	E31-2390-15	LEAD WIRE WITH CONNECTOR
J017	E31-2390-15	LEAD WIRE WITH CONNECTOR
J018	NO USE	
J019	E31-2364-05	LEAD WIRE WITH CONNECTOR
J020	NO USE	
J021	E31-2363-05	LEAD WIRE WITH CONNECTOR
J022	NO USE	
J023	E31-2365-05	LEAD WIRE WITH CONNECTOR

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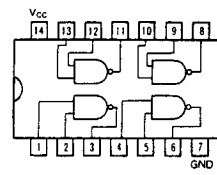
SEMICONDUCTORS



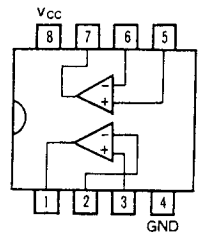
SN74LS112N



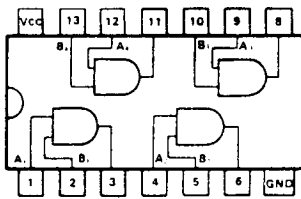
LS74LS02N



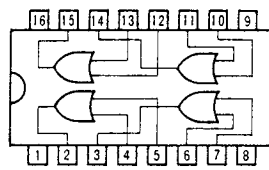
SN74LS00N



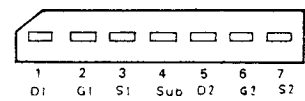
NJM4558D



SN74LS08N



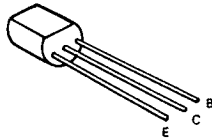
MC10103L



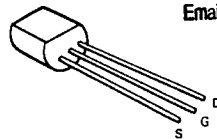
M47F(B)
M47F(C)

Bottom View

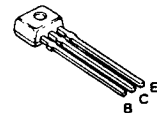
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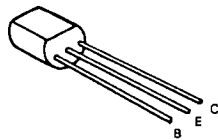
2SA684 2SC1384
2SA838 (C) 2SC2271 (D or E)
2SA1005 (K)



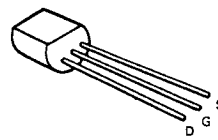
2SK30A (O)



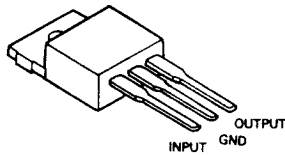
2SA1175 (F)
2SC2785 (F)
2SC2786 (K)



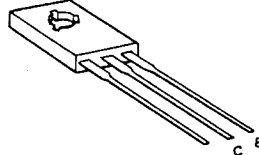
2SC2407



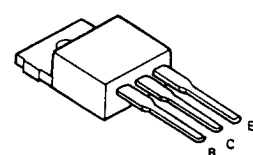
2SK117 (Y)



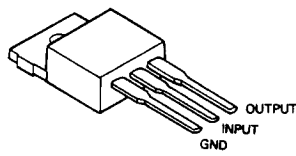
μPC7805H
NJM7815



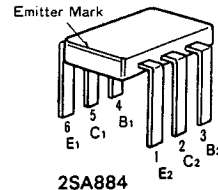
2SA1210 (R or S)
2SC2912 (R or S)



2SA1009 (L, K)
2SD613E

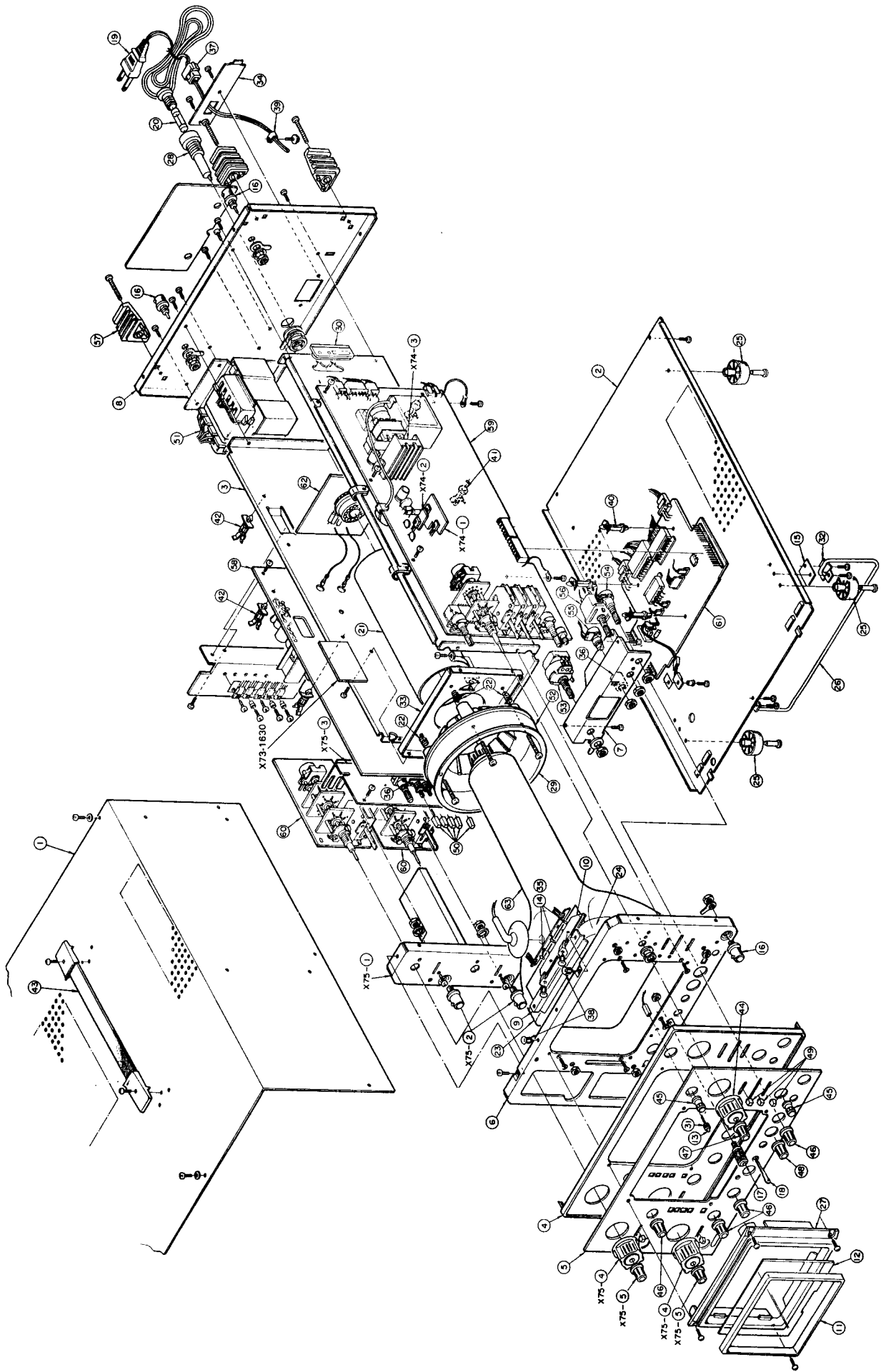


μPC7915HA



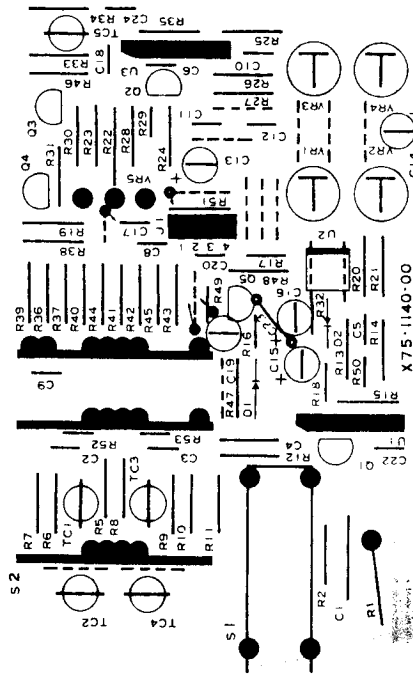
2SA884

DISASSEMBLY

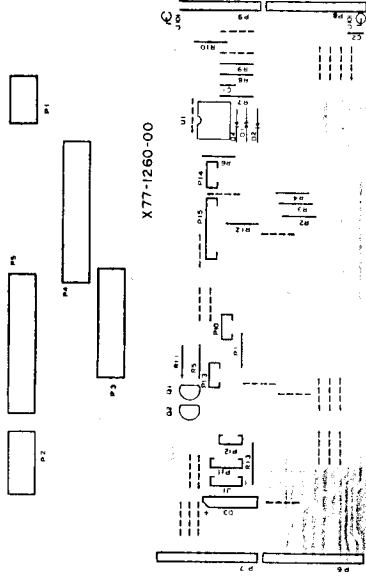


P.C. BOARD

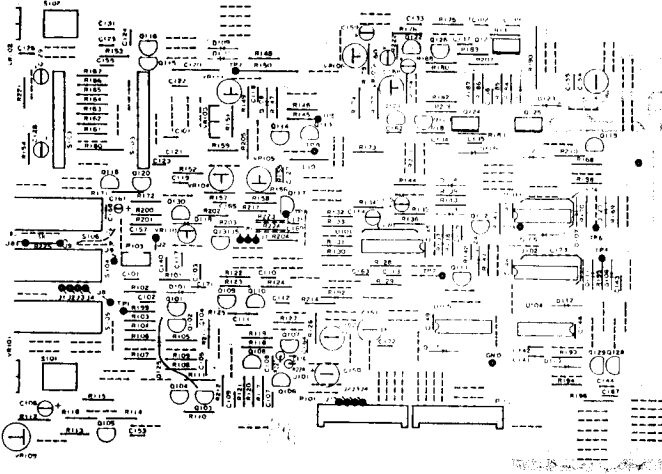
VERTICAL ATTENUATOR UNIT (X75-1140-00)



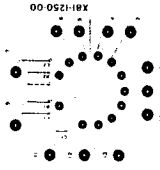
CONNECTION UNIT
(X77-1260-00)



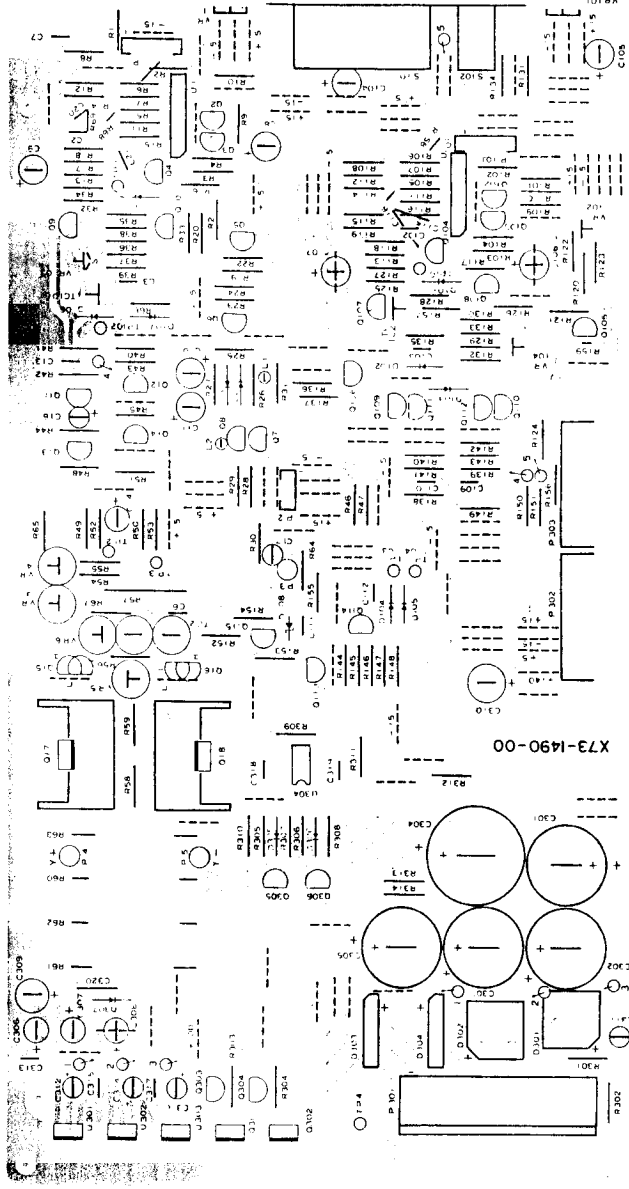
HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-00)



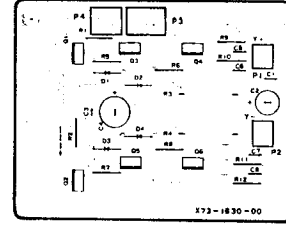
CRT SOCKET UNIT
(X81-1250-00)



VERTICAL AMP & POWER UNIT (X73-1490-00)



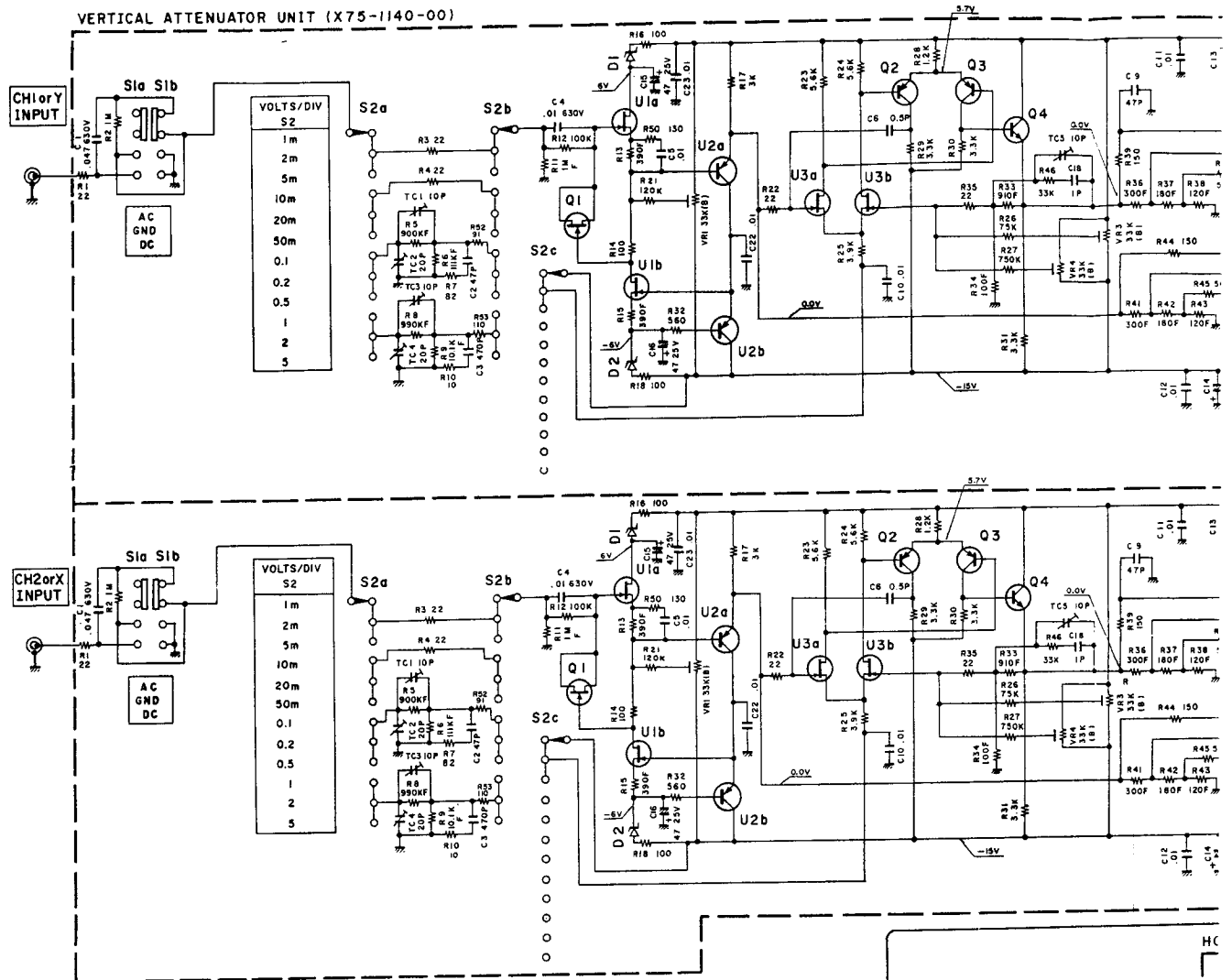
V. FINAL AMP UNIT
(X73-1630-00)



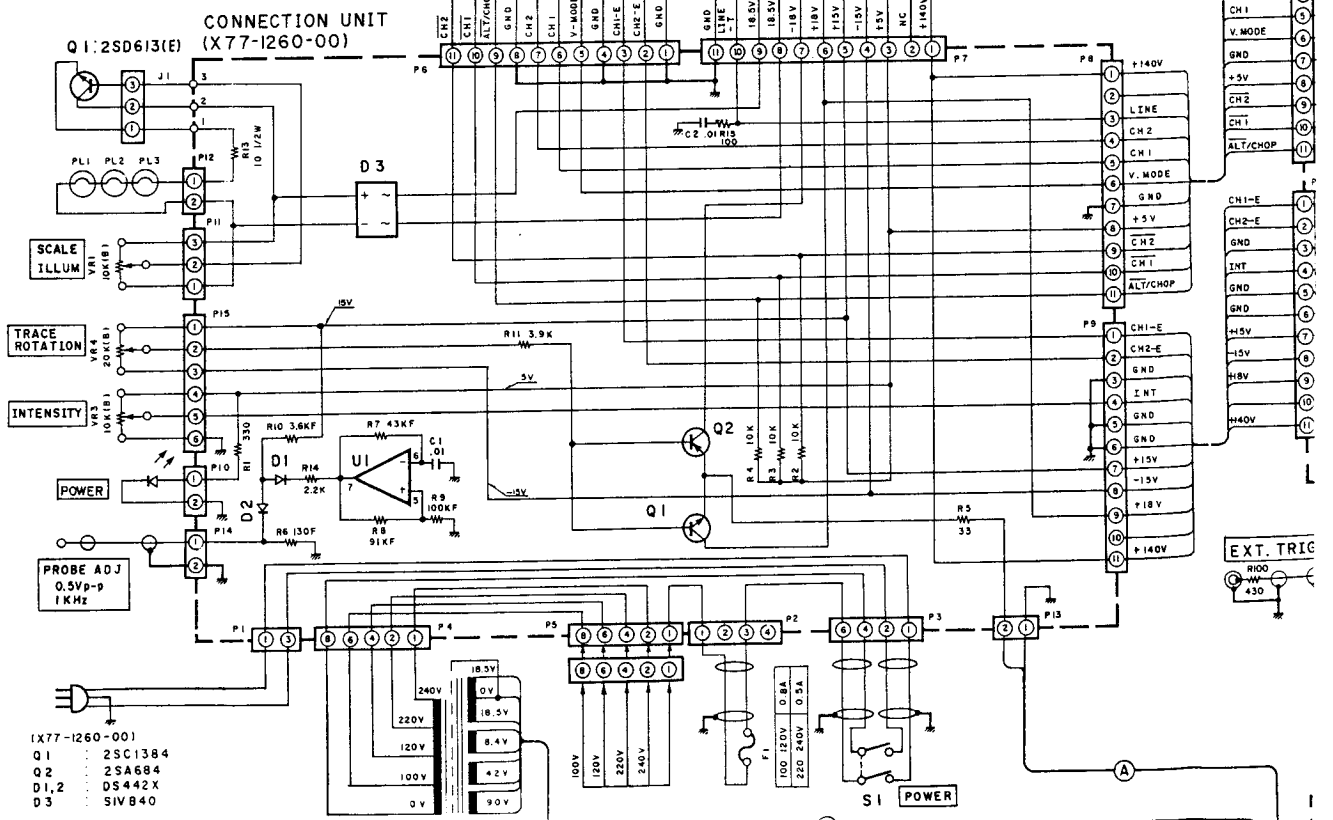
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CS-1022 SCHEMATIC DIAGRAM

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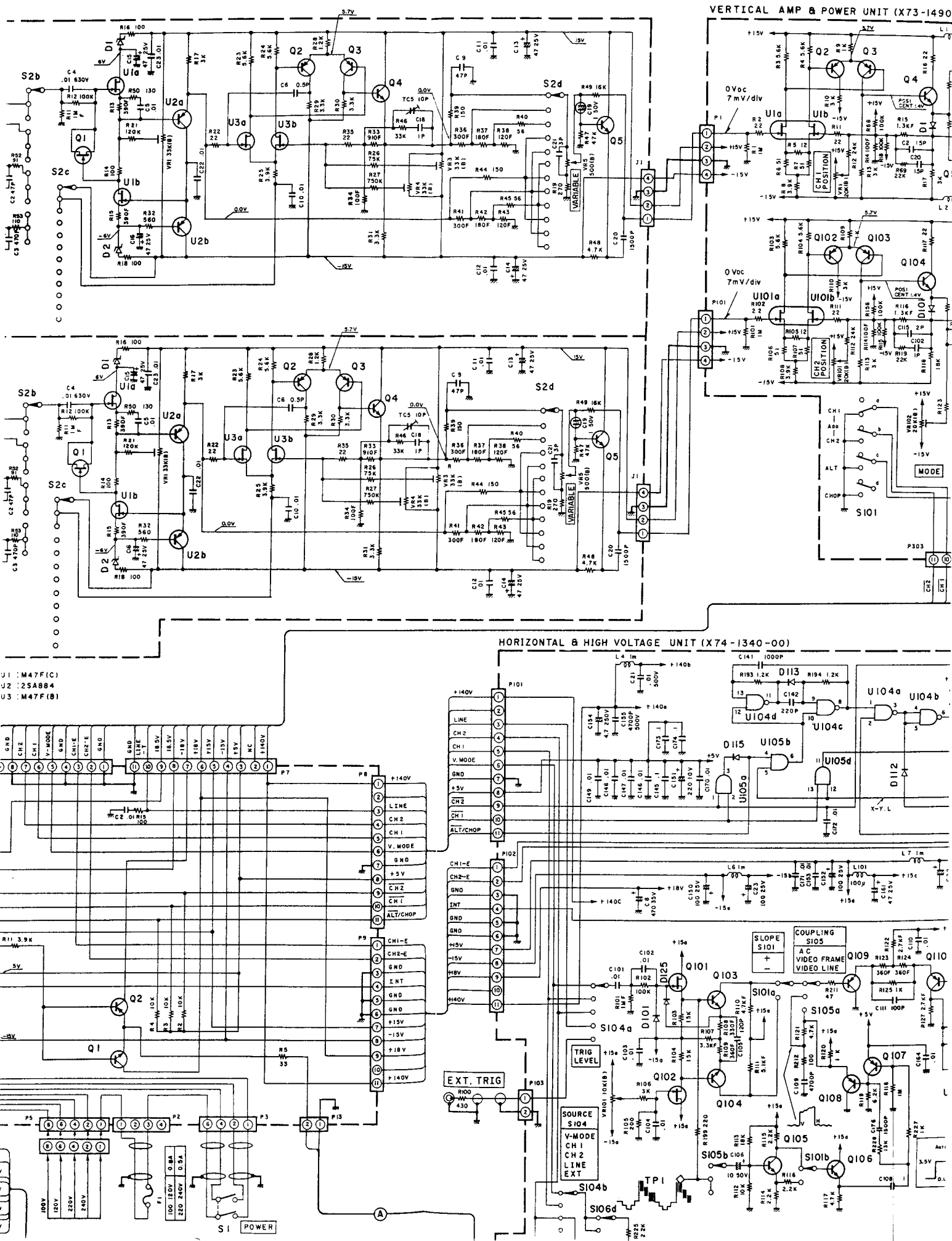


(X75-1140-00)
Q1 : 2SK30A10
Q2,3 : 2SA1005(K)
Q4,5 : 2SC2786(K)
D1,2 : MTZ91JC
U1 : M47F(C)
U2 : 2SA684
U3 : M47F(B)

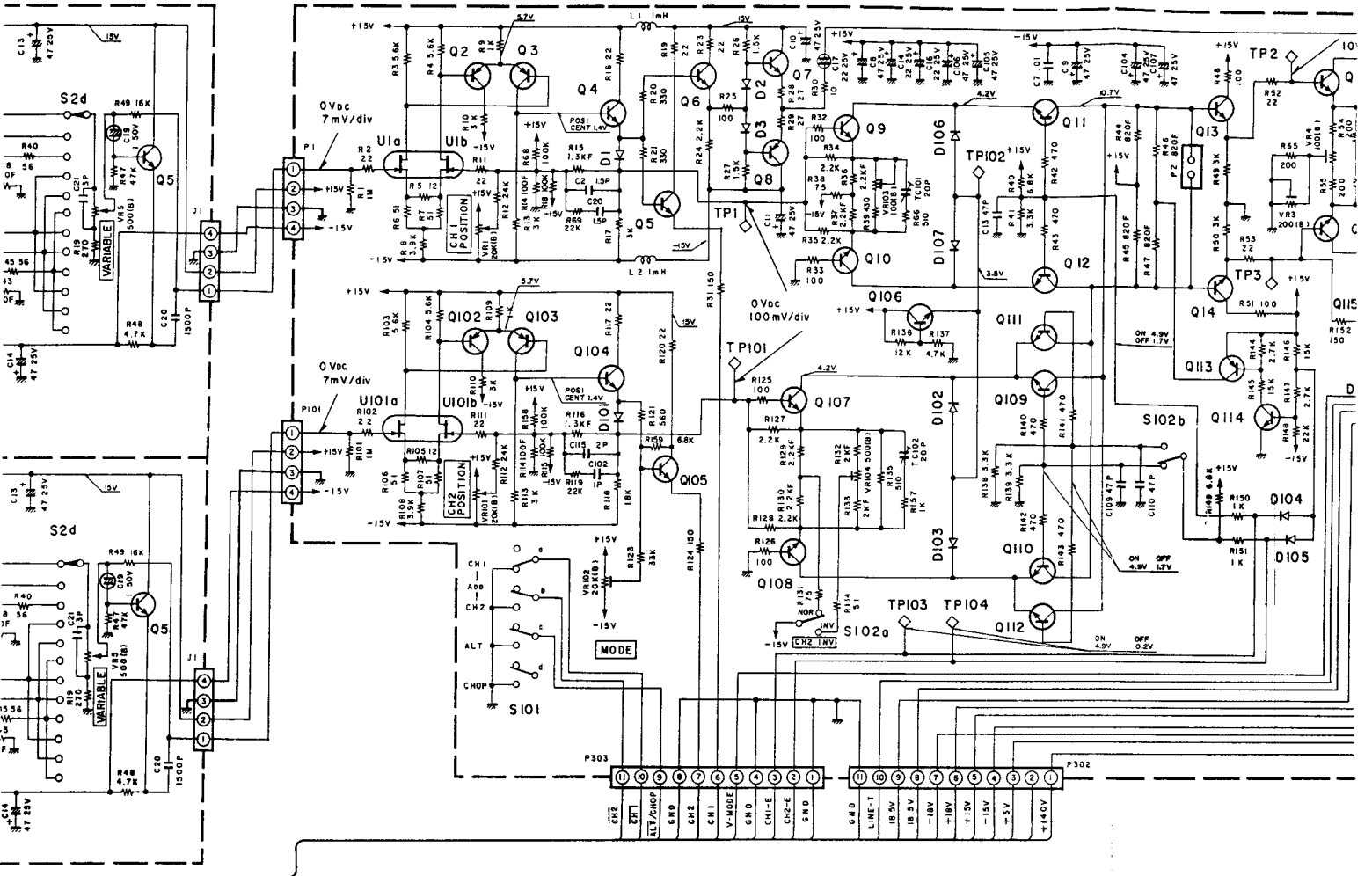


(X77-1260-00)
Q1 : 2SC1384
Q2 : 2SA684
D1,2 : DS442X
D3 : SIV840

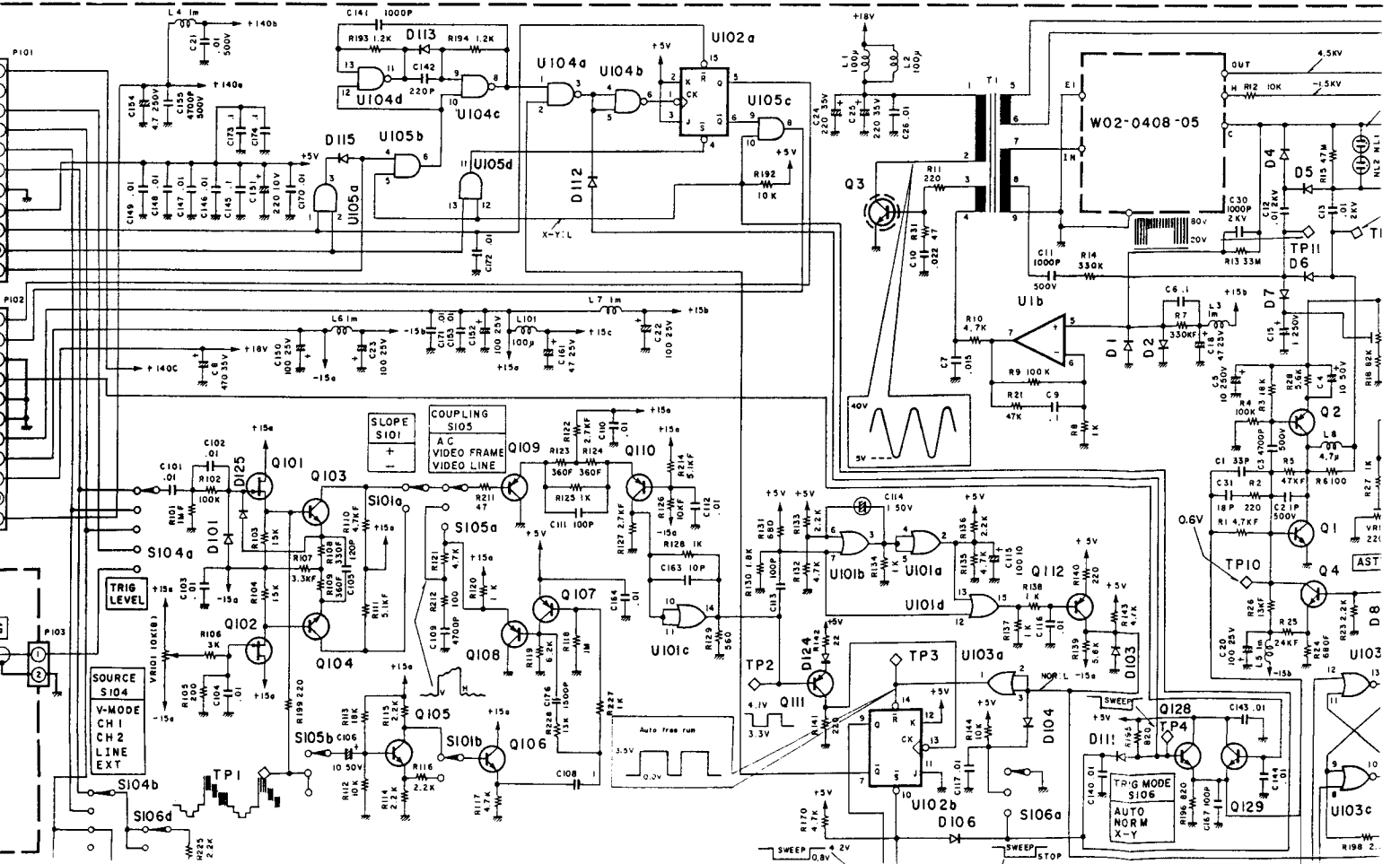
DIAGRAM

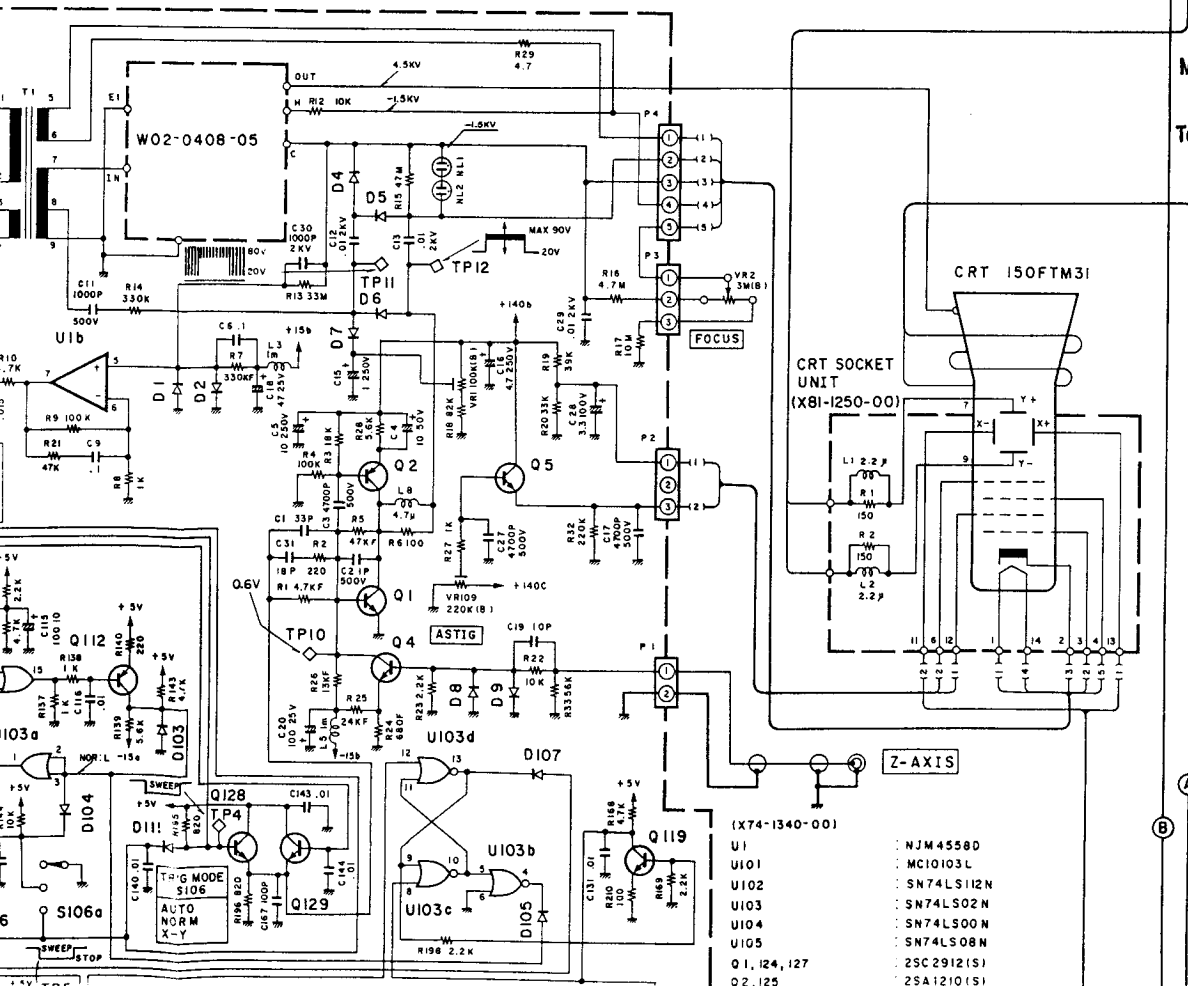
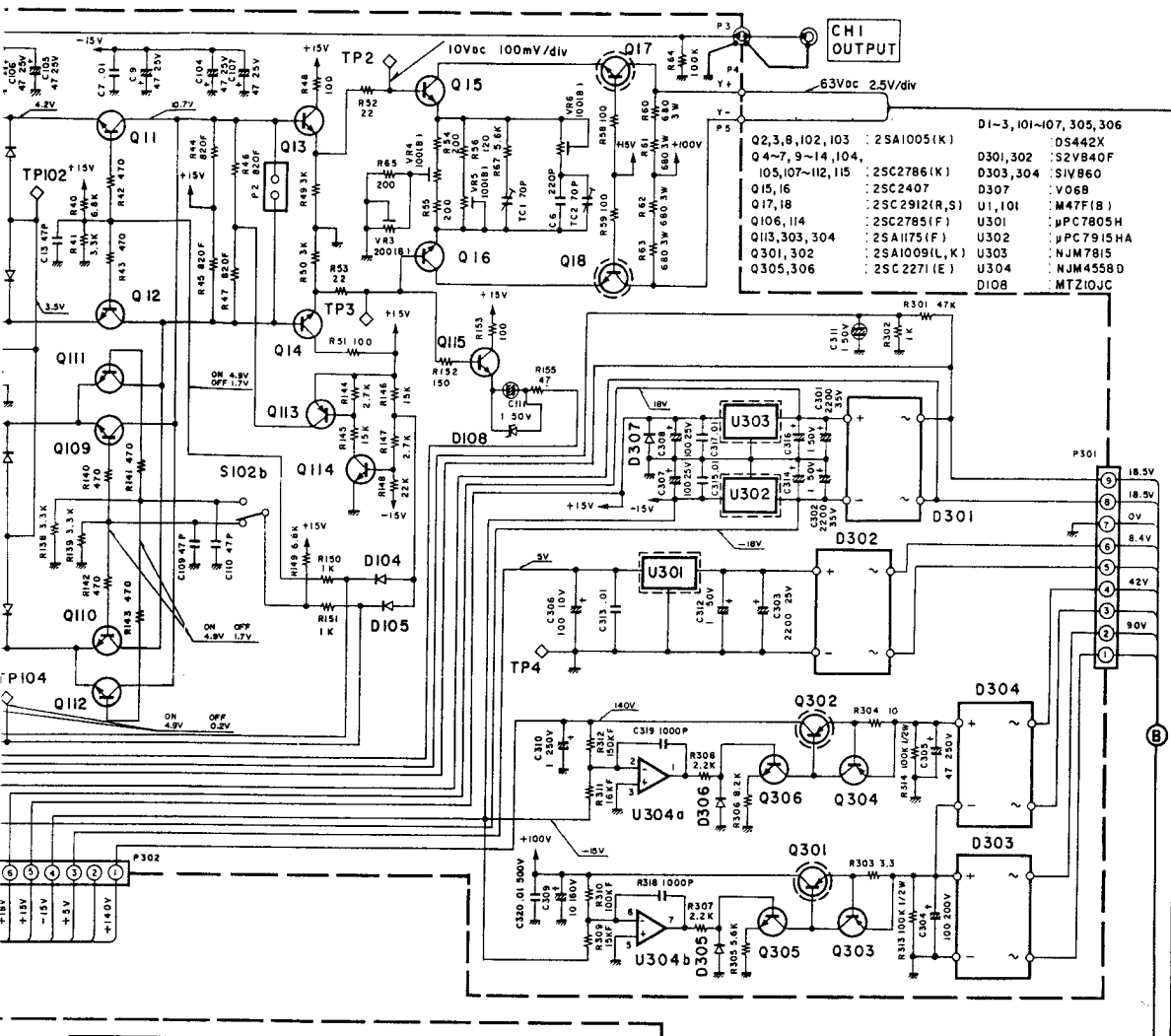


VERTICAL AMP & POWER UNIT (X73-1490-00)



HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-00)

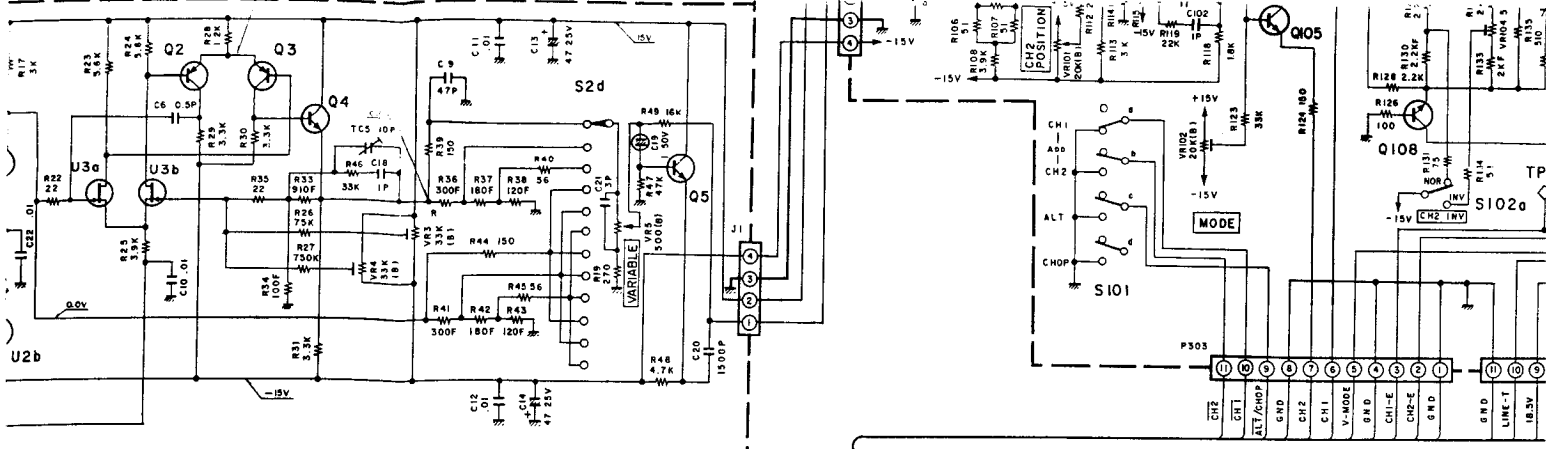




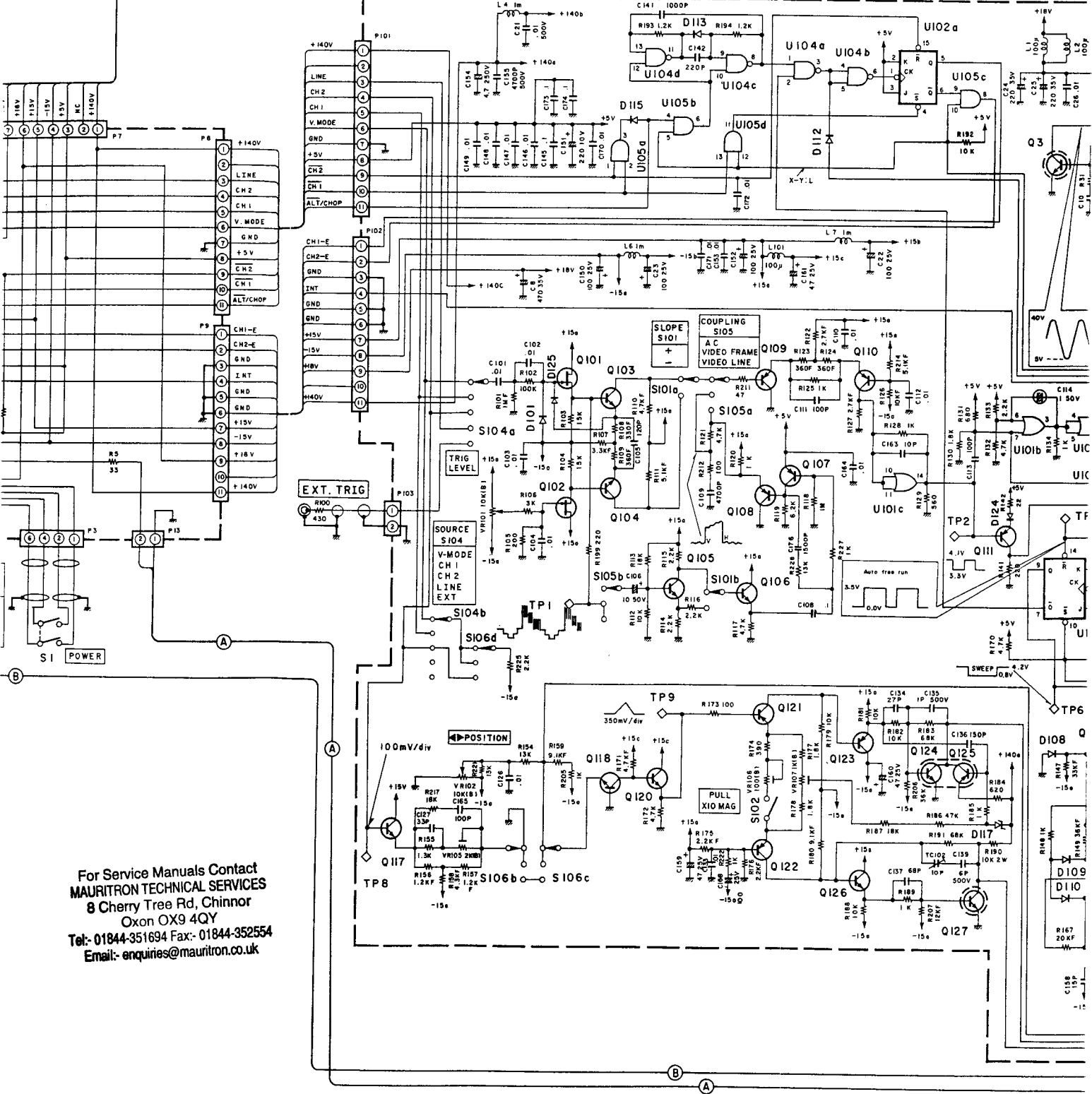
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(X74-1340-00)

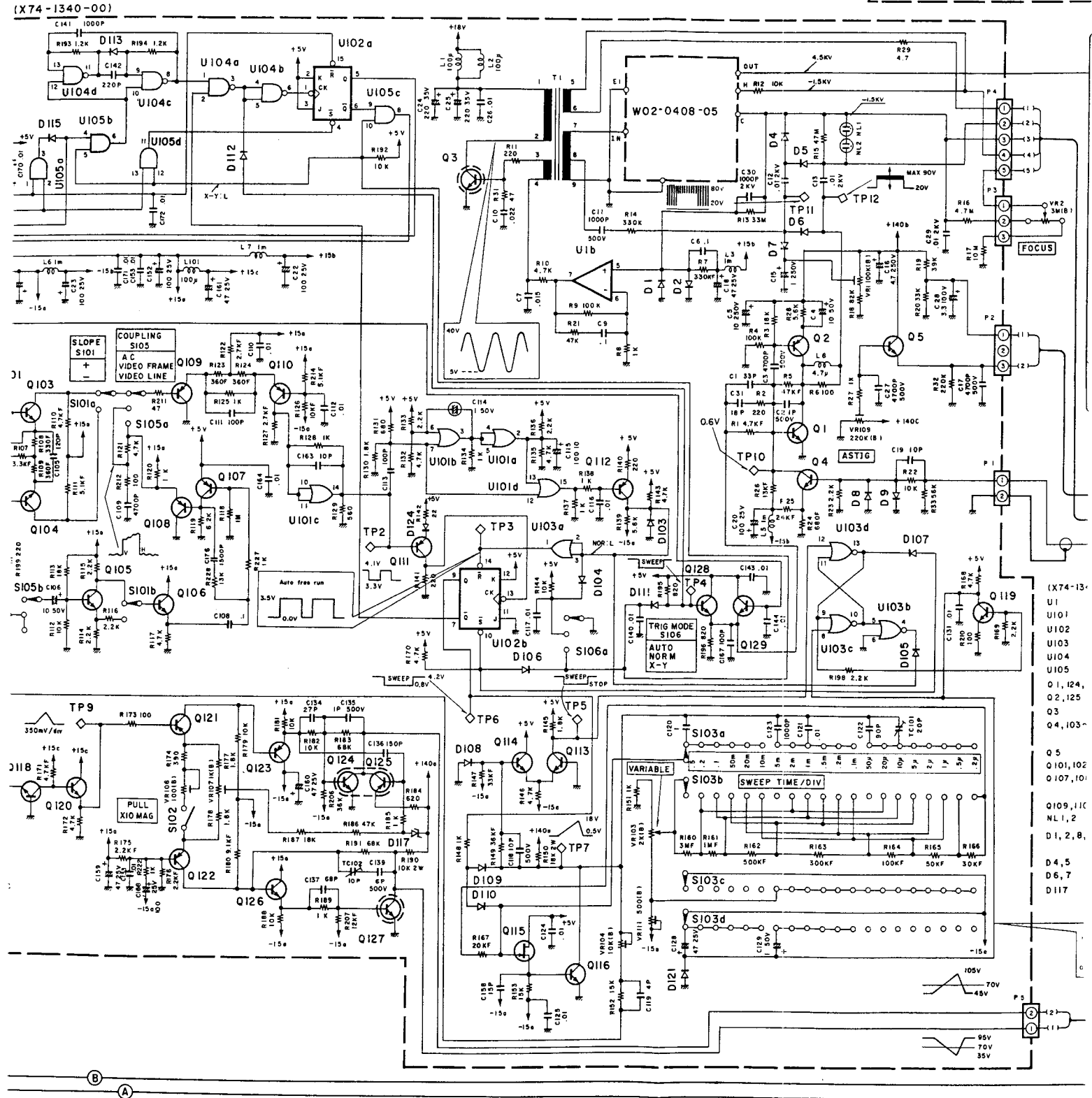
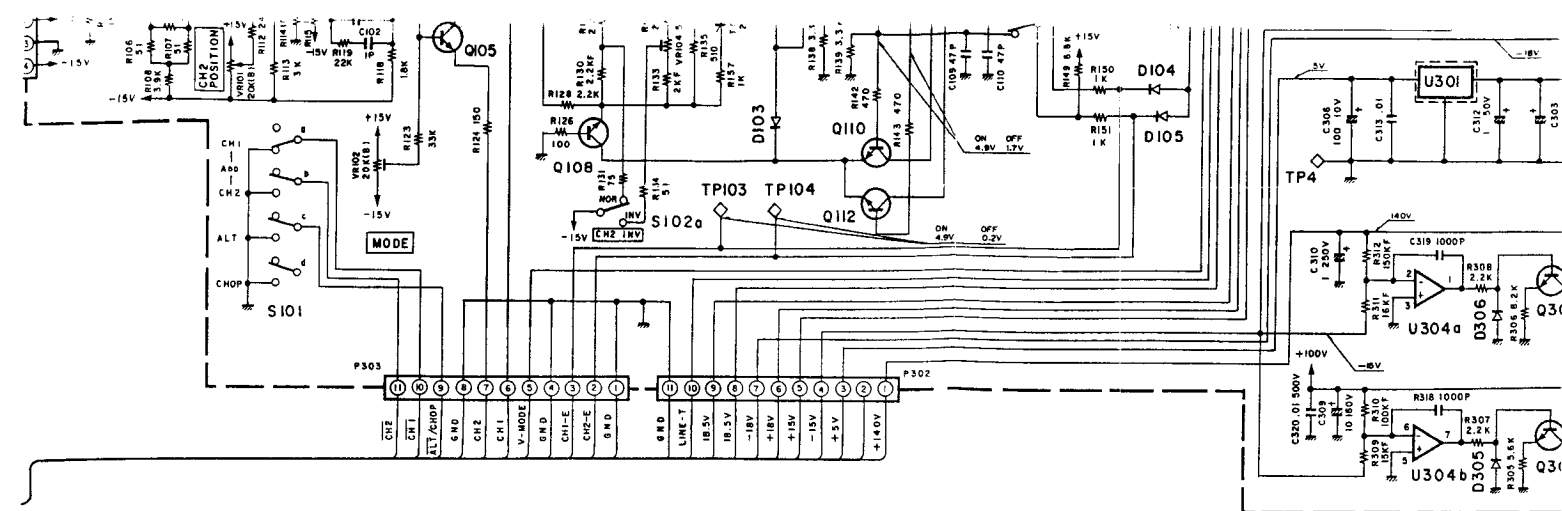
U1	NJM4558D
U101	MC10103L
U102	SN74LS112N
U103	SN74LS02N
U104	SN74LS00N
U105	SN74LS08N
Q1, 124, 127	2SC2912(S)
Q2, 125	2SA1210(S)

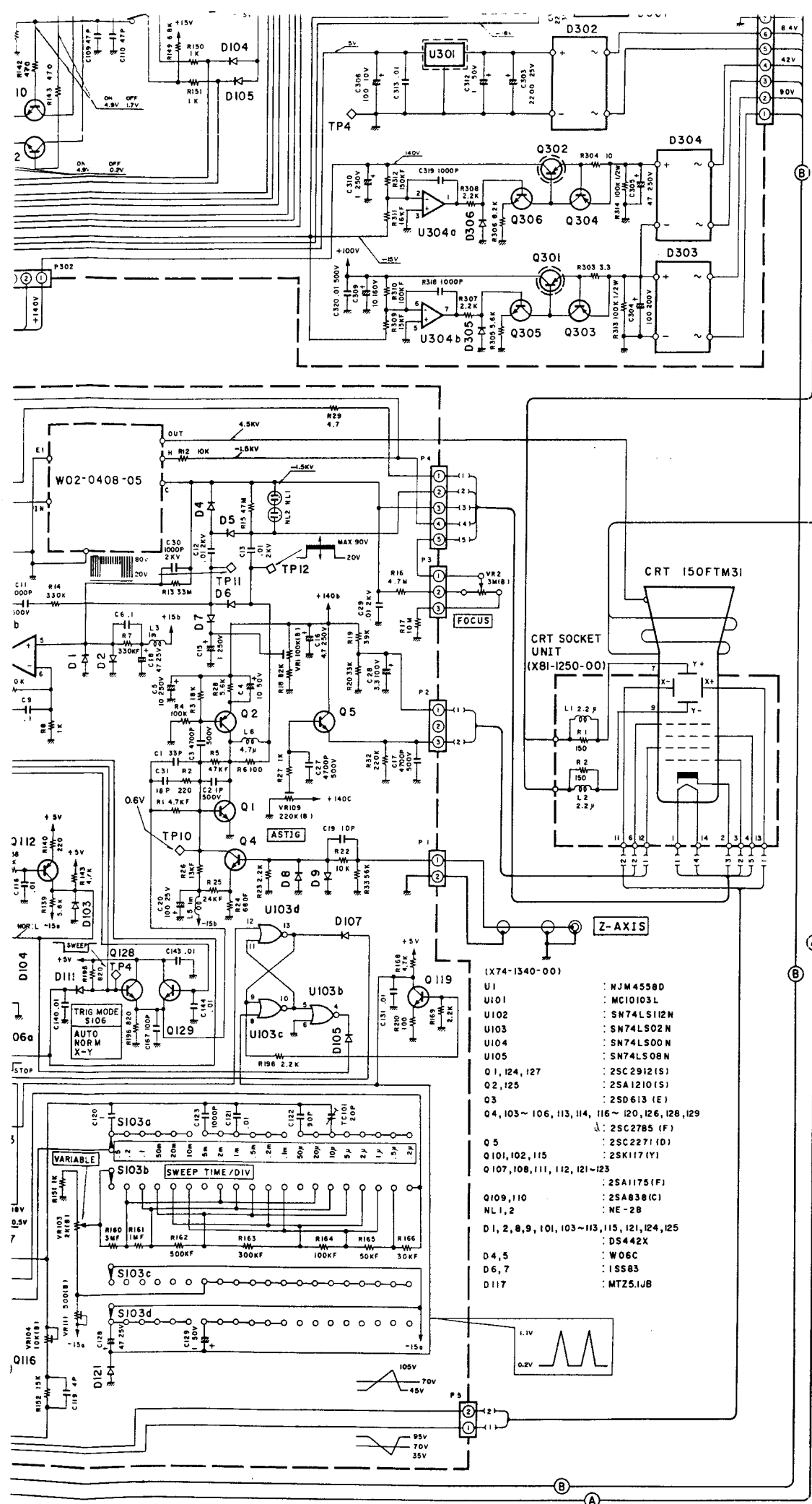


HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-00)



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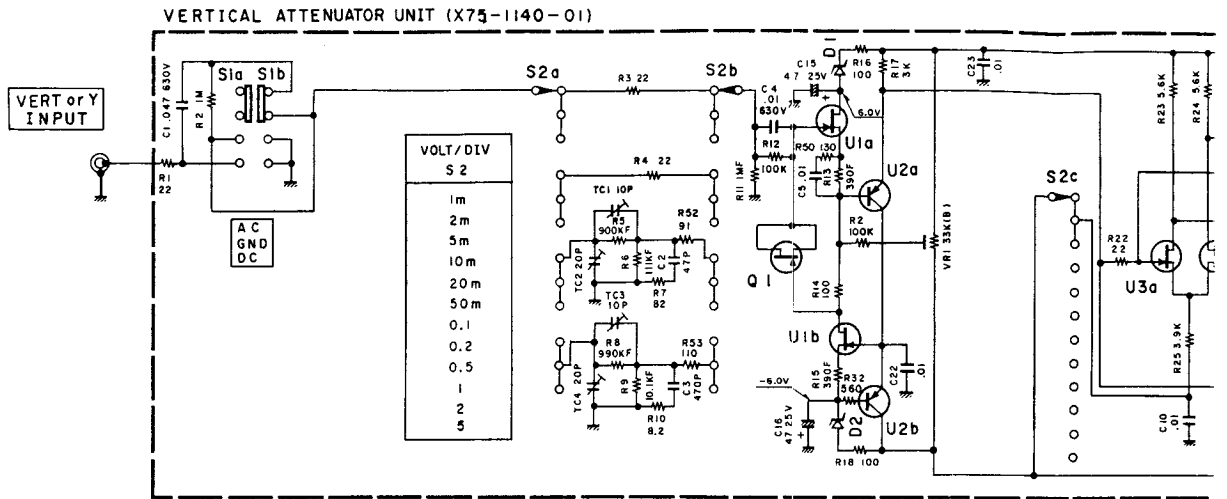




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CS-1020 SCHEMATIC DIAGRAM

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(X75-1140-01)

Q1 : 2SK30A (O)

Q2,3 : 2SA1005 (K)

Q4,5 : 2SC2786 (F)

U1 : M47F (C)

U2 : 2SA884

U3 : M47F (B)

D1,2 : MTZ9.1JC

(X73-14

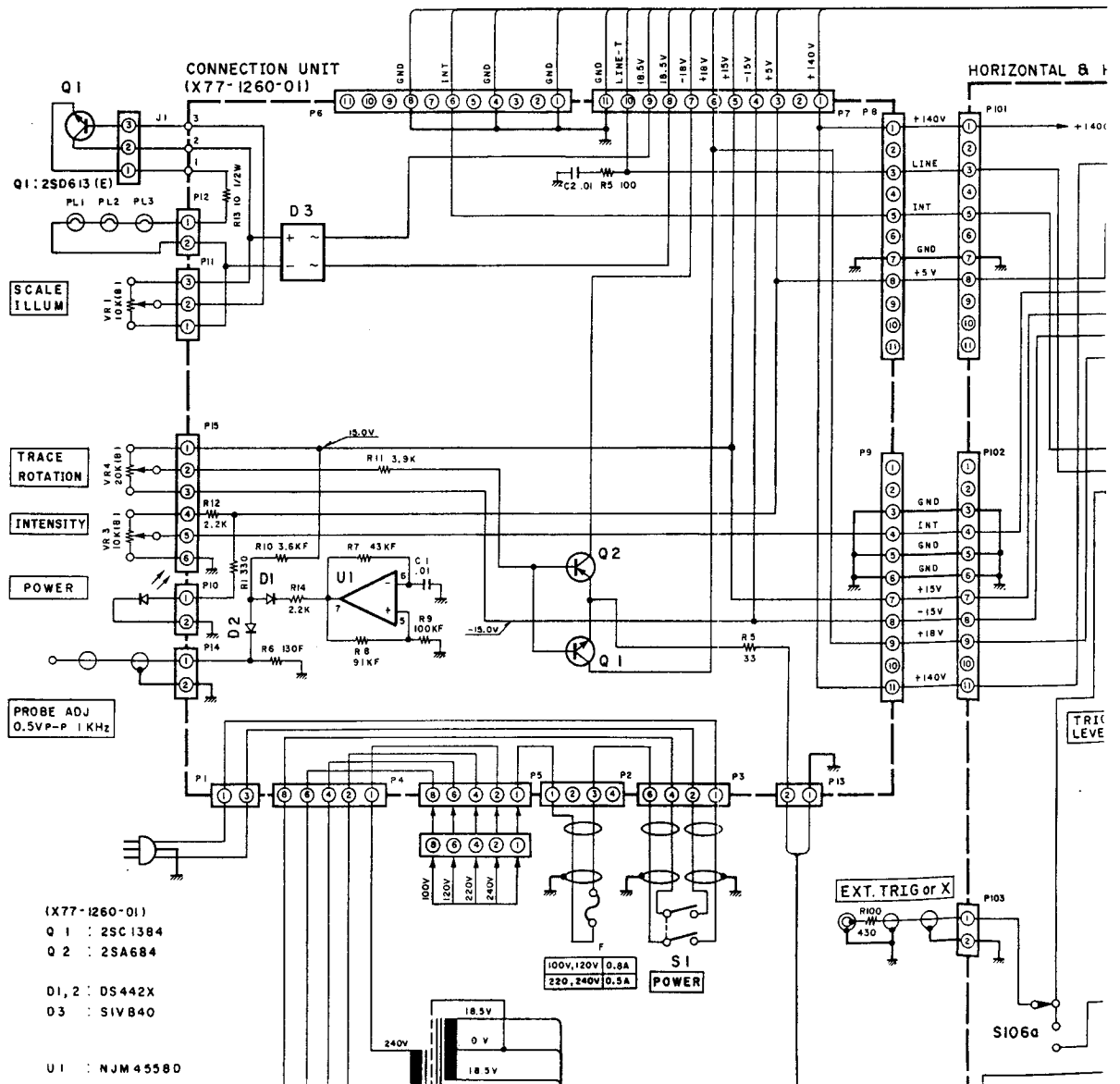
Q2,3,8

Q4~7,9~

Q15,16

Q17,18

Q301, 302



(X77-1260-01)

Q1 : 2SC1384

Q2 : 2SA684

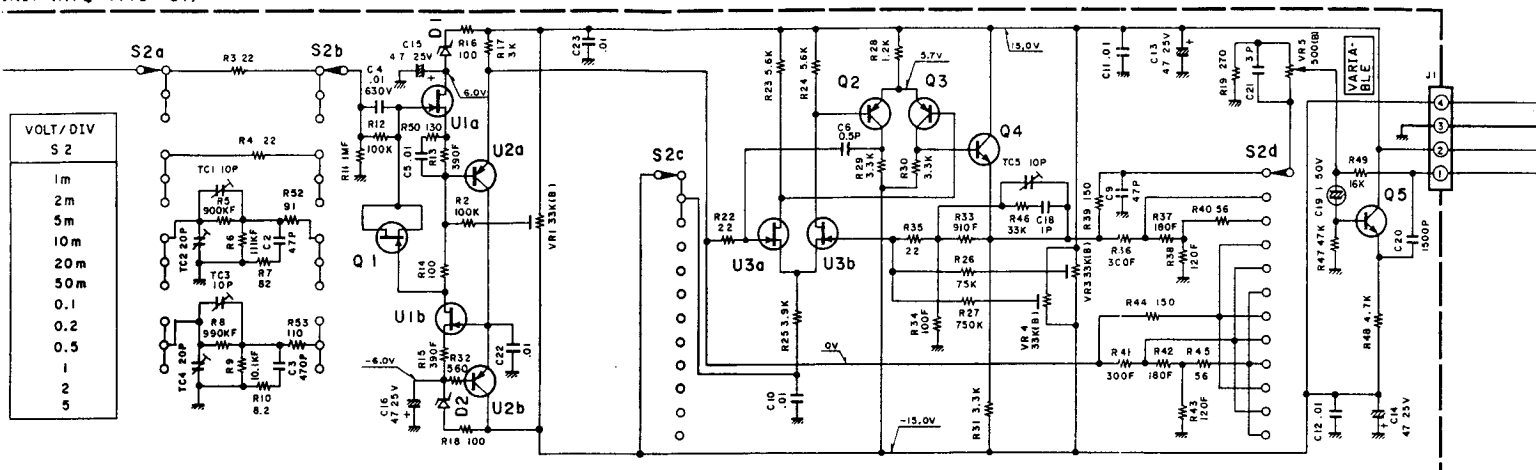
D1,2 : DS442X

D3 : SIVB40

U1 : NJM4558D

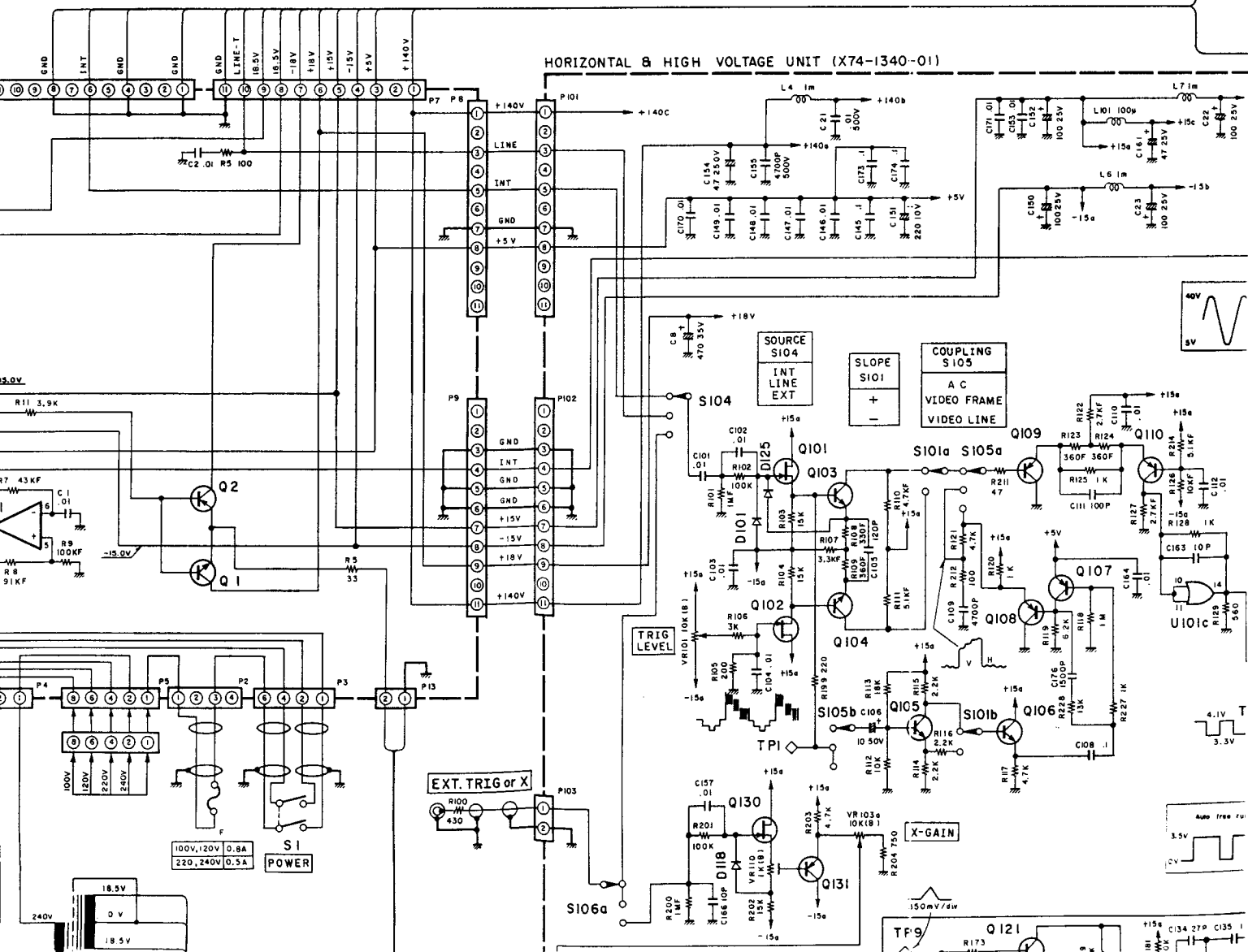
ATIC DIAGRAM

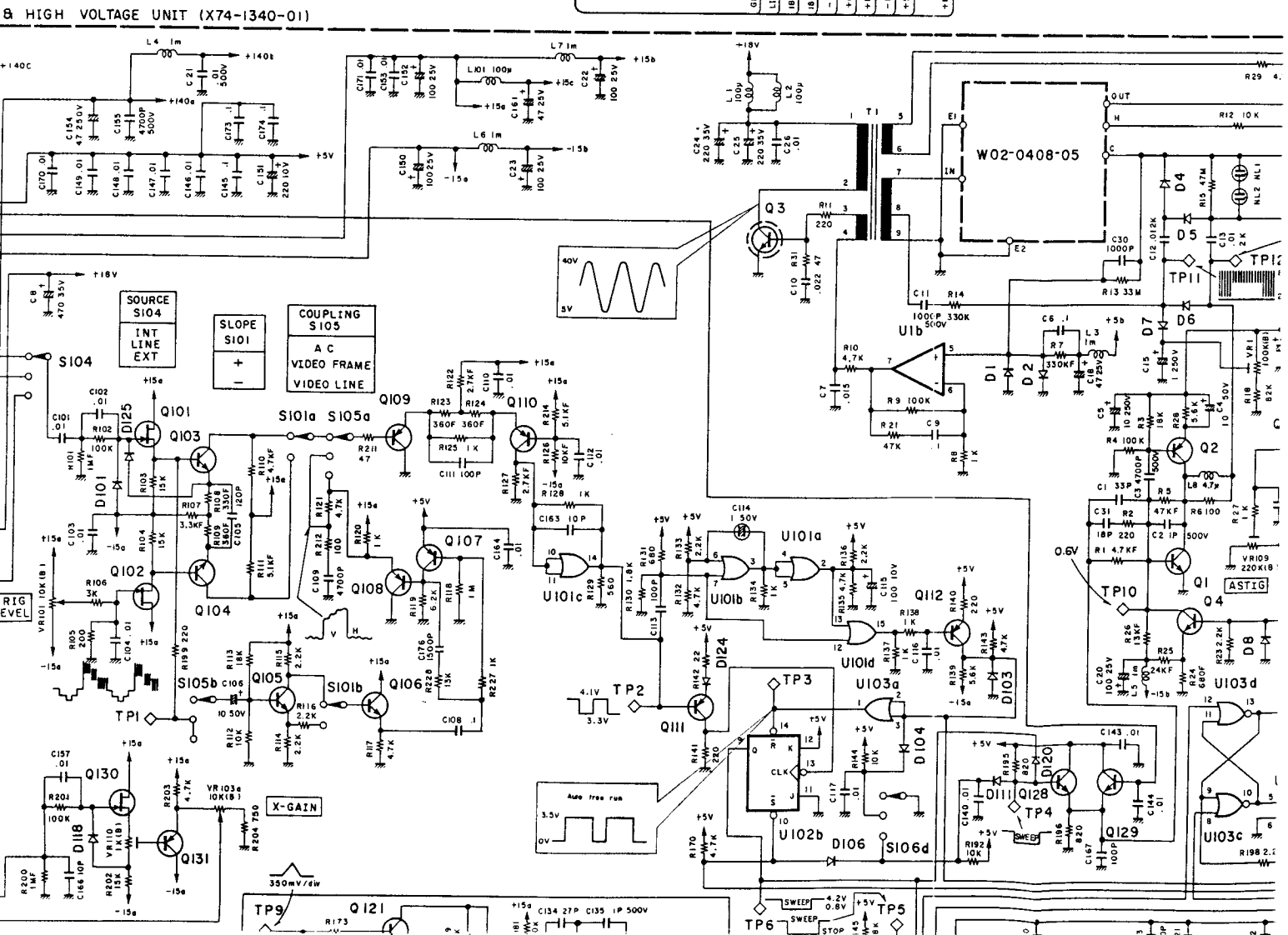
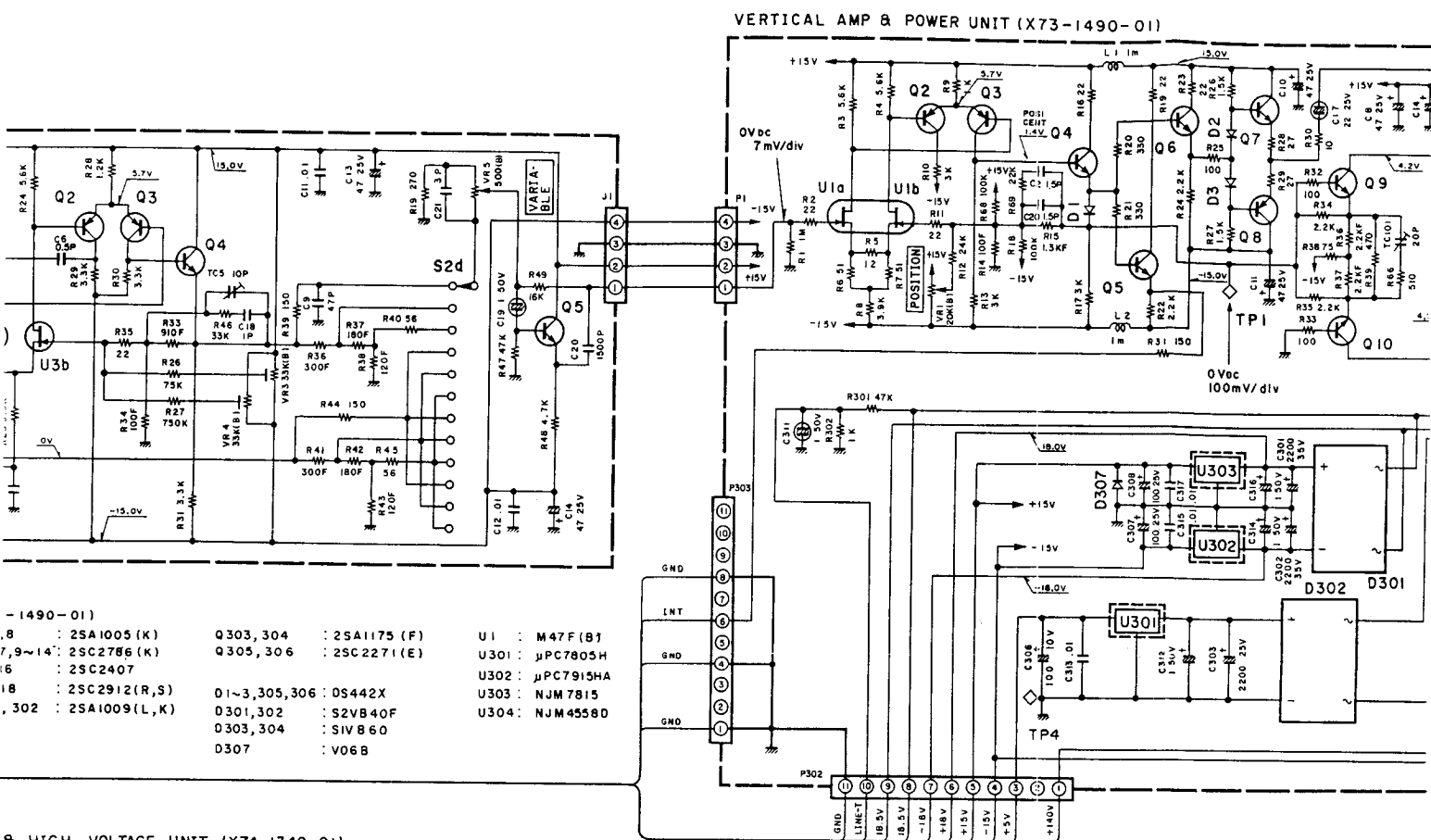
UNIT (X75-1140-01)

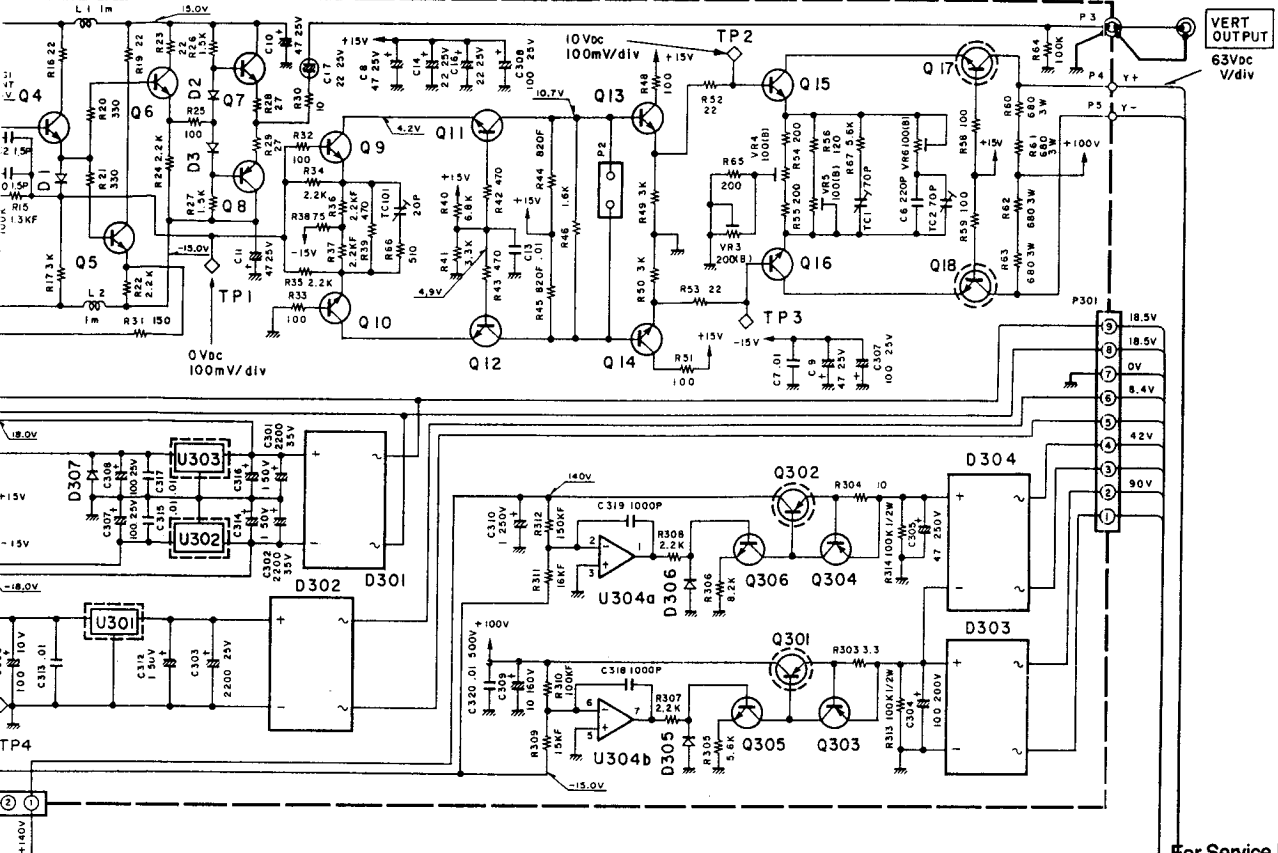


(X73-1490-01)

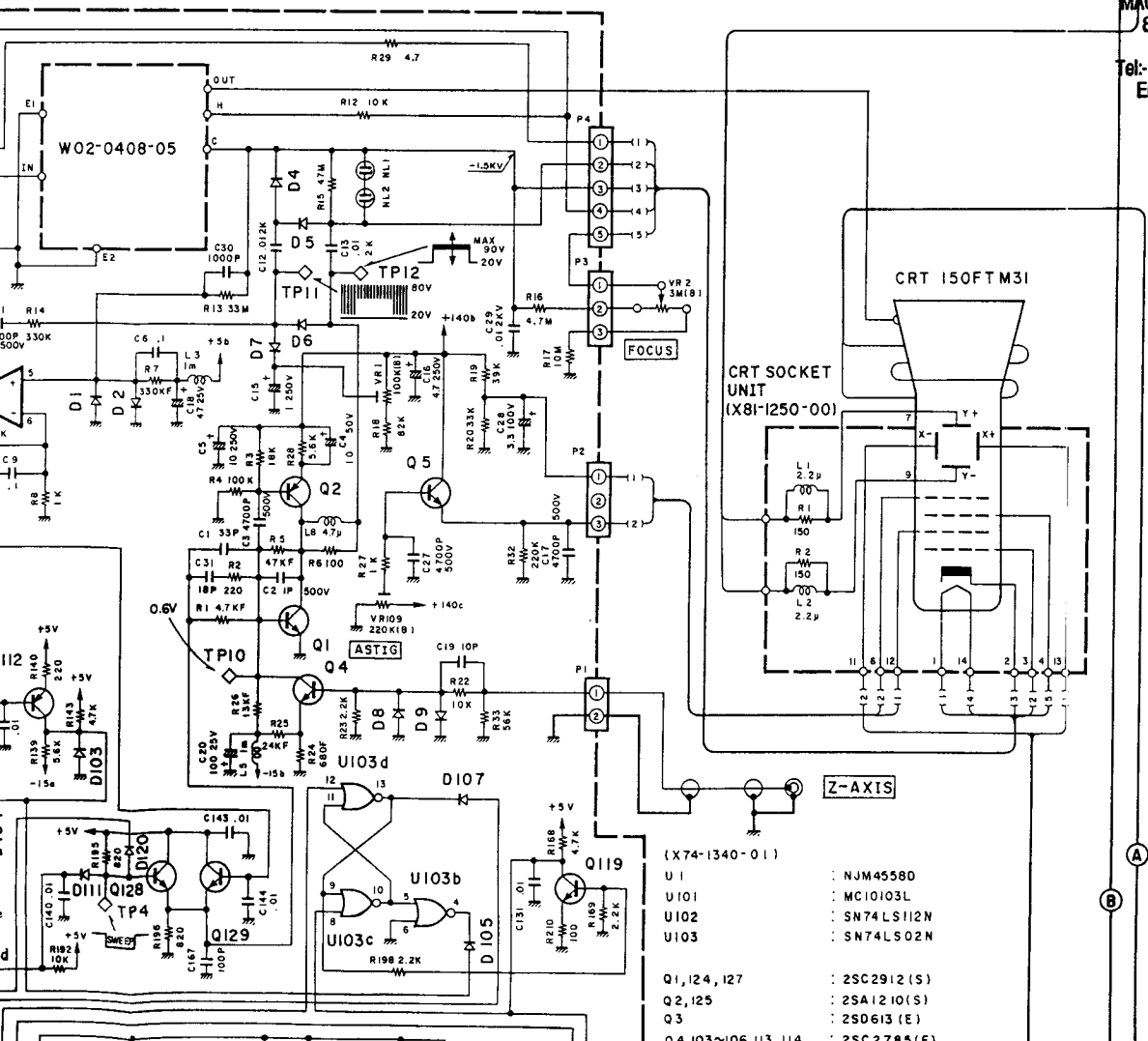
Q2,3,8	: 2SA1005 (K)	Q303,304	: 2SA1175 (F)	U1	: M47F81
Q4~7,9~14	: 2SC2786 (K)	Q305,306	: 2SC2271 (E)	U301	: μ PC7805H
Q15,16	: 2SC2407			U302	: μ PC7915HA
Q17,18	: 2SC2912 (R,S)	Q1~3,305,306	: 05442X	U303	: NJM7815
Q301,302	: 2SA1009 (L,K)	Q301,302	: S2VB40F	U304	: NJM4558D
		Q303,304	: SIVB60		
		D307	: V06B		







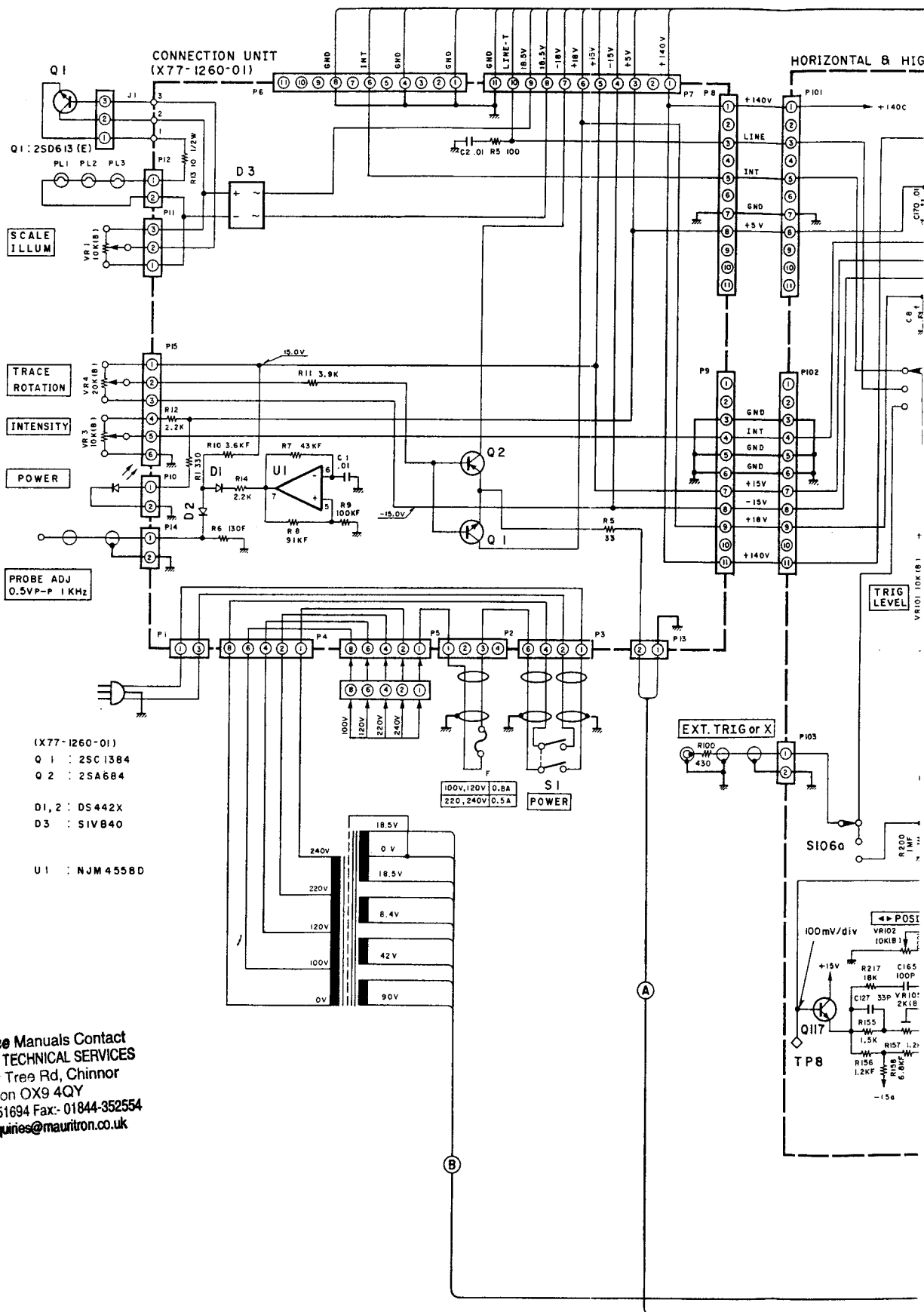
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- (X74-1340-011)
- | | |
|--------------------|--------------|
| U1 | : NJM4558D |
| U101 | : MC10103L |
| U102 | : SN74LS112N |
| U103 | : SN74LS02N |
| Q1,124,127 | : 2SC2912(S) |
| Q2,125 | : 2SA1210(S) |
| Q3 | : 2SD613(E) |
| Q4,103~106,113,114 | : 2SC2785(F) |

(X75-1140-01)
 Q1 : 2SK30A (O)
 Q2,3 : 2SA1005 (K)
 Q4,5 : 2SC2786 (F)
 U1 : M47F (C)
 U2 : 2SA884
 U3 : M47F (B)
 D1,2 : MTZ91JC

(X73-1490-01)
 Q2,3,8
 Q4~7,9~14
 Q15,16
 Q17,18
 Q301,302



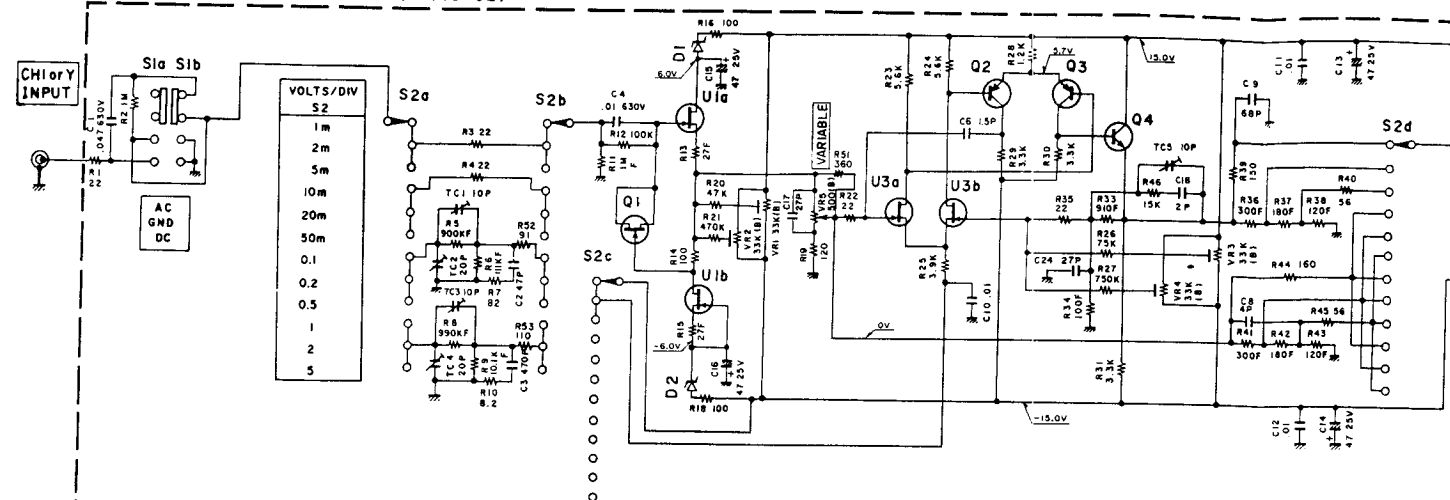
(X77-1260-01)
 Q1 : 2SC1384
 Q2 : 2SA684
 D1,2 : DS442X
 D3 : SIV840
 U1 : NJM4558D

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CS-1012 SCHEMATIC DIAGRAM

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VERTICAL ATTENUATOR UNIT (X75-1140-02)



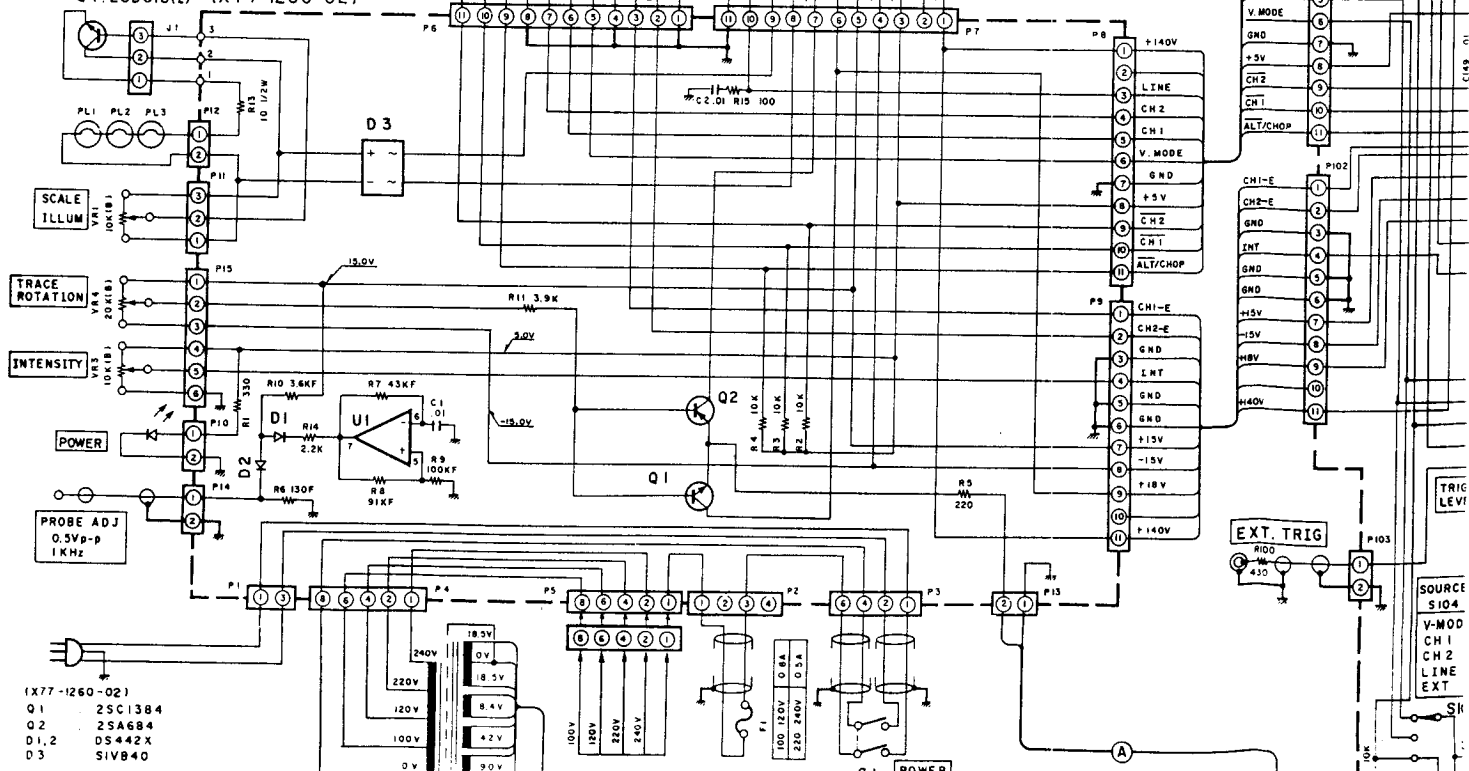
(X75-1140-02)
Q1 : 25K30A(0)
Q2,3 : 25A1005(K)
Q4 : 25C2786(K)

D1,2 : MTZ91JC

U1 : M47F(C)

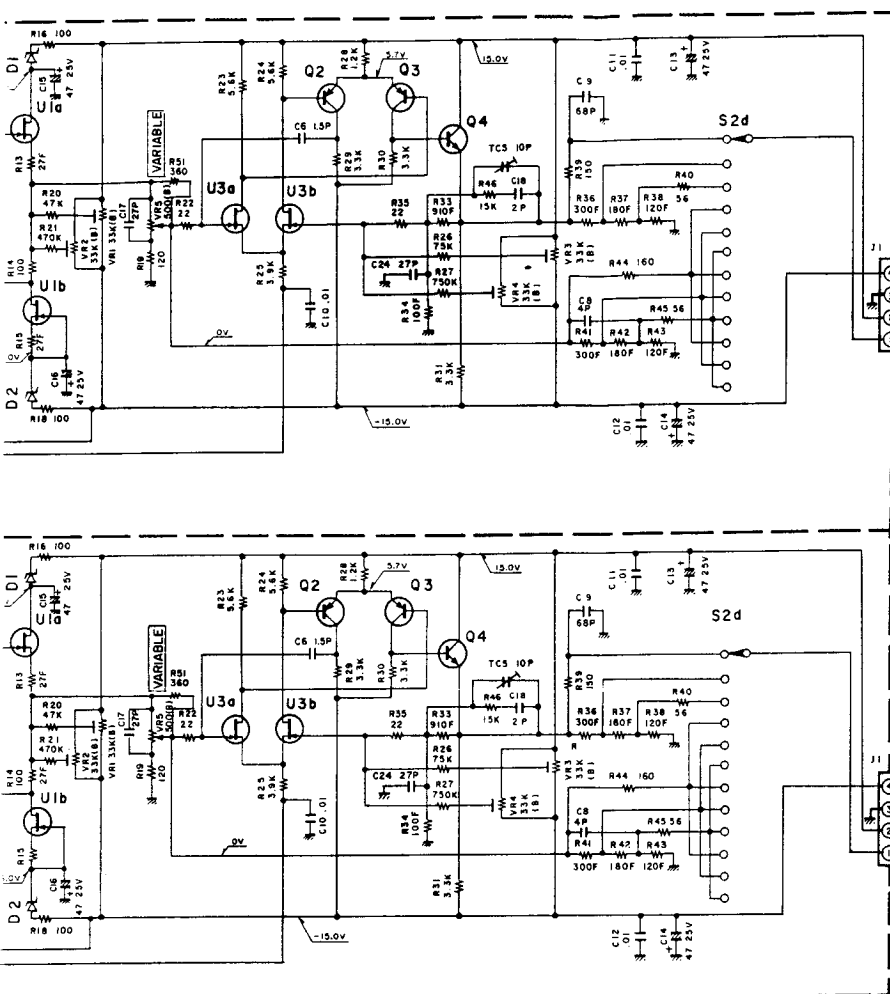
U3 : M47F(B)

CONNECTION UNIT (X77-1260-02)

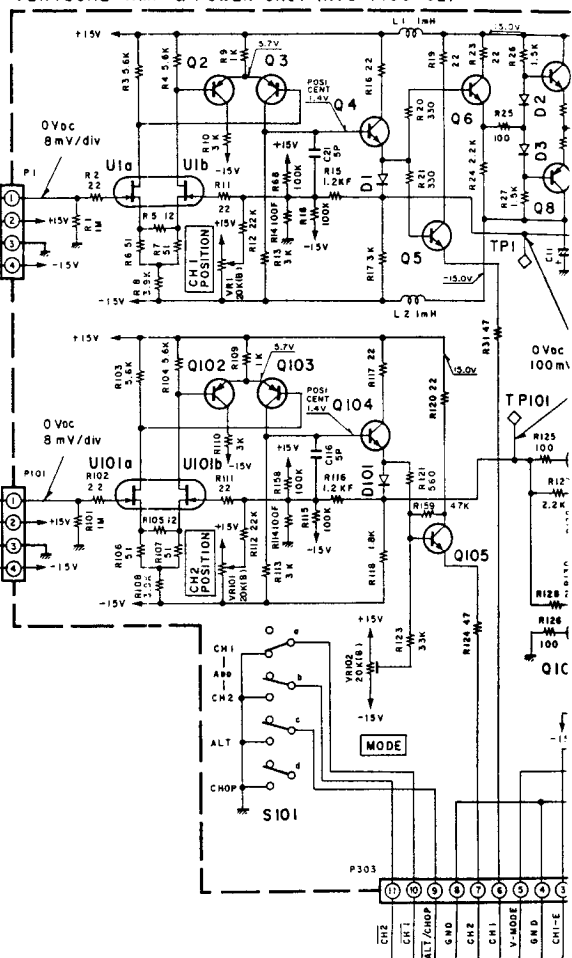


(X77-1260-02)
Q1 : 25C1384
Q2 : 25A684
D1,2 : 05442X
D3 : 51VB40

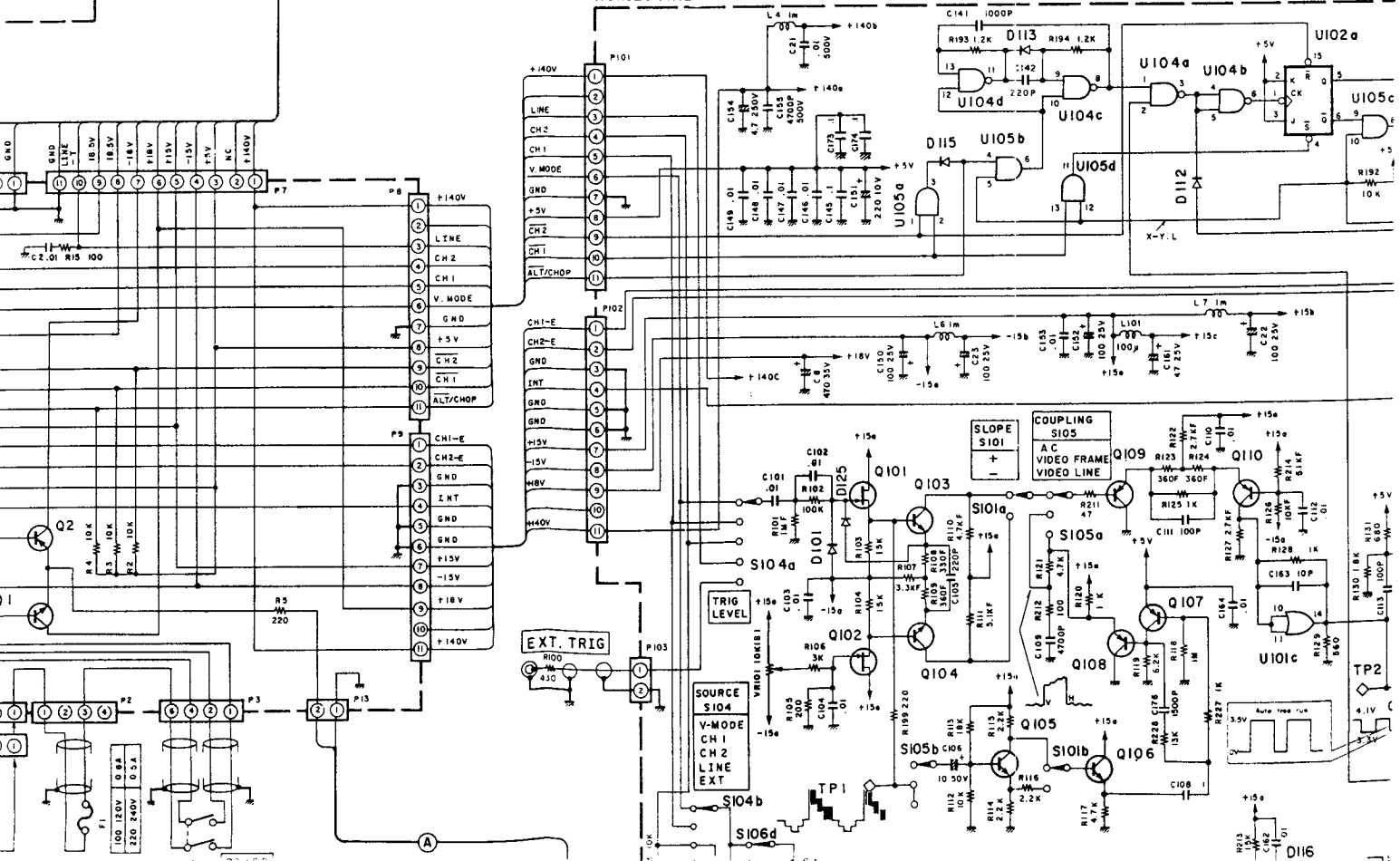
SOURCE
S104
V-MOD
CH1
CH2
LINE
EXT

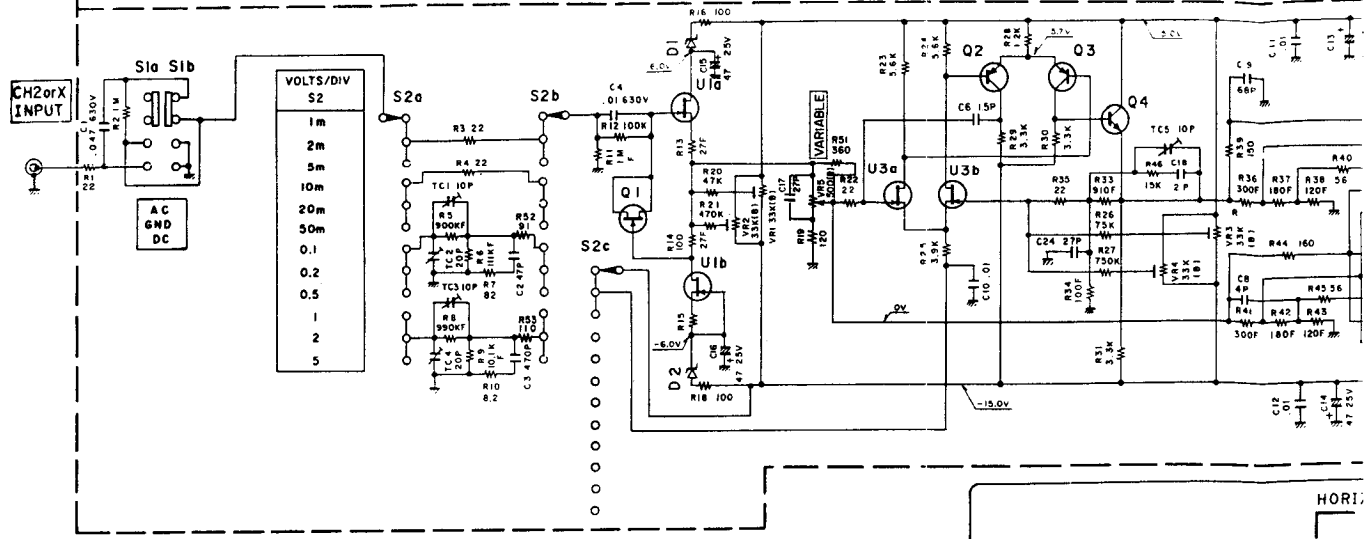


VERTICAL AMP & POWER UNIT (X73-1490-02)

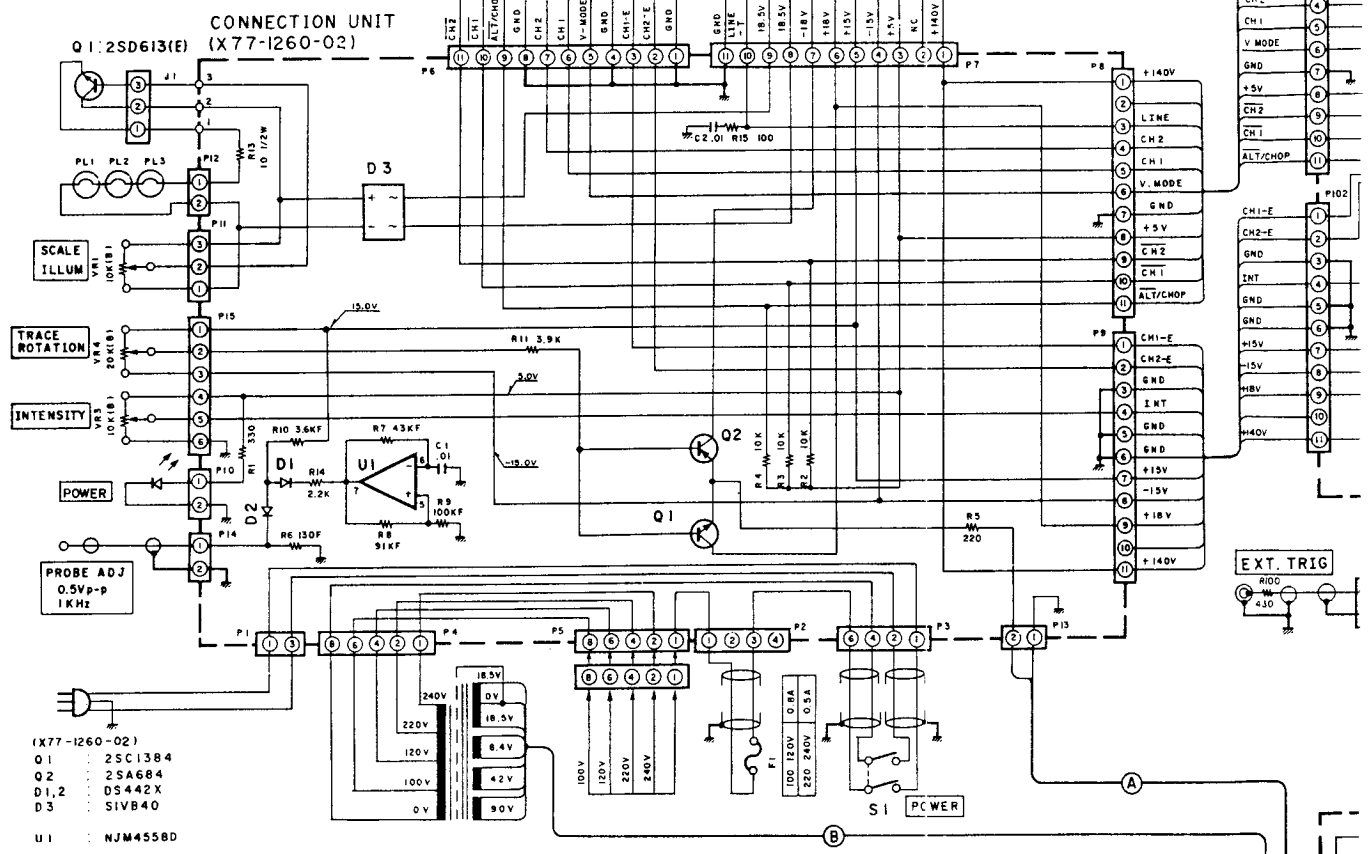


HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-02)



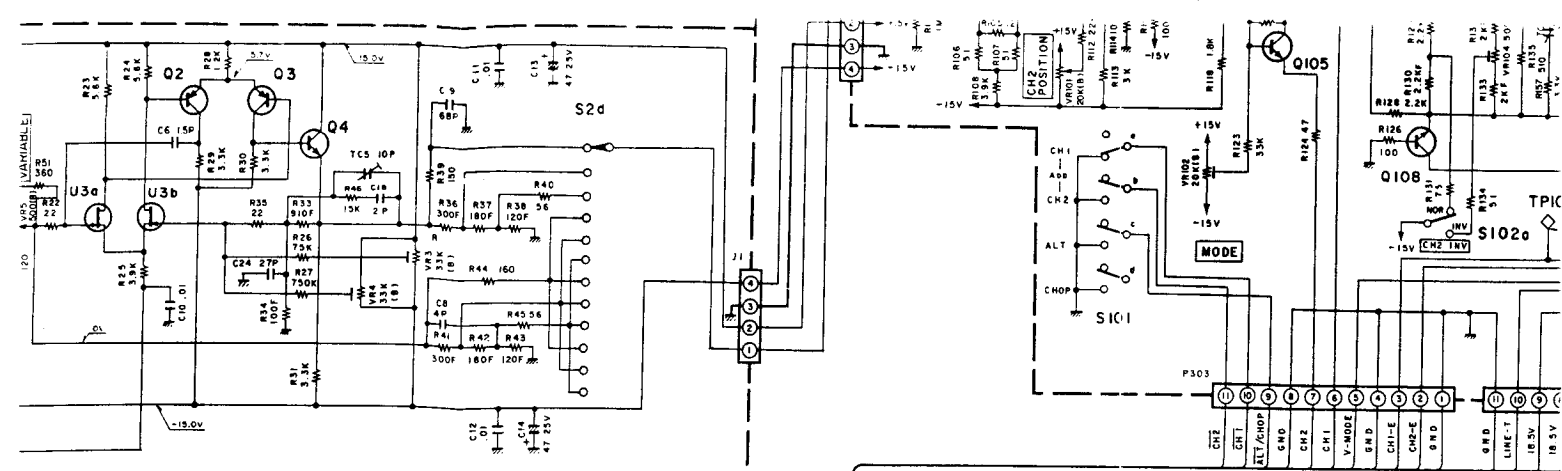


- (X75-1140-02)
- Q1 : 2SK30A(10)
- Q2,3 : 2SA1005(K)
- Q4 : 2SC2786(K)
- D1,2 : MTZ91JC
- U1 : M47F(C)
- U3 : M47F(B)

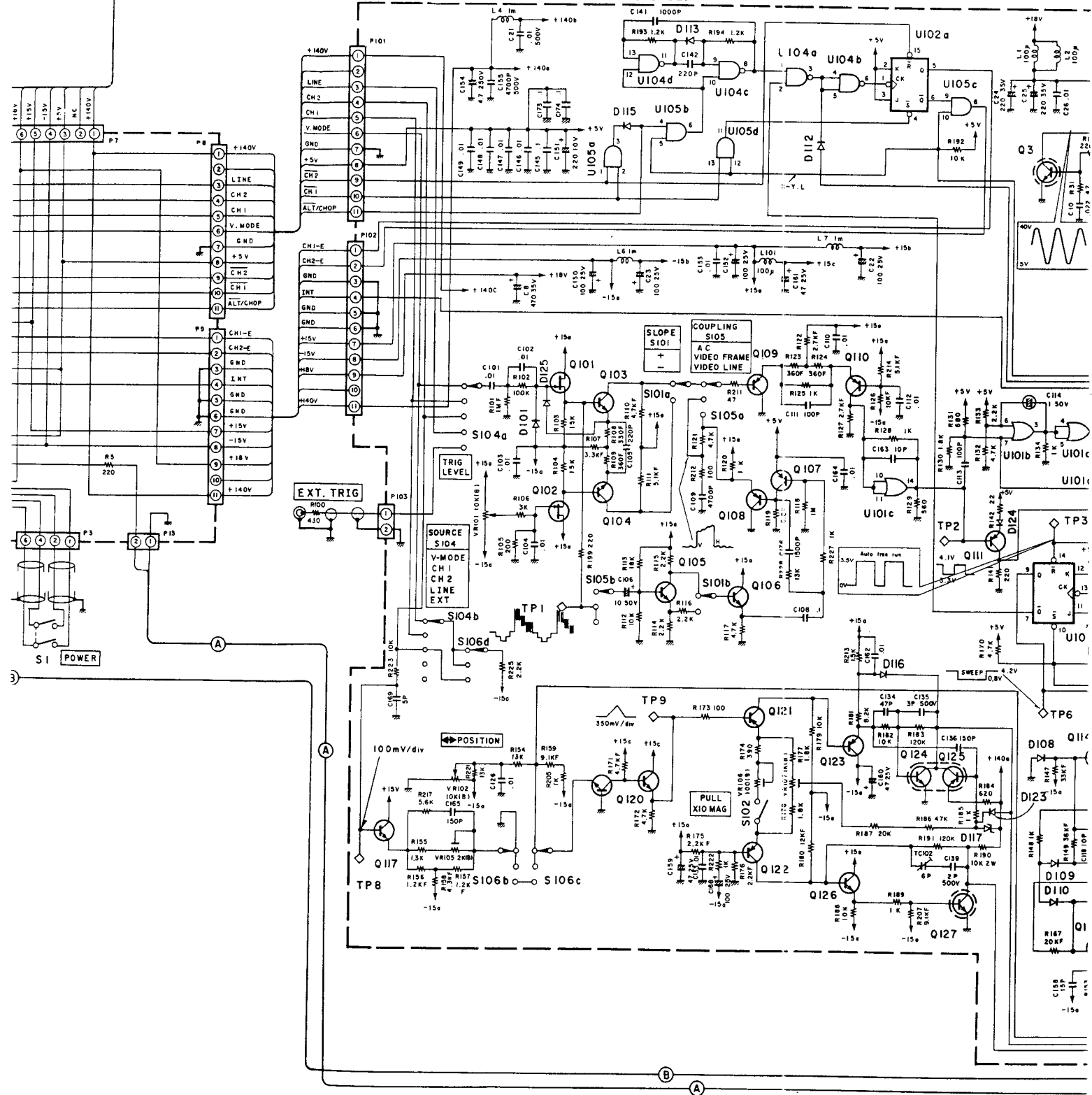


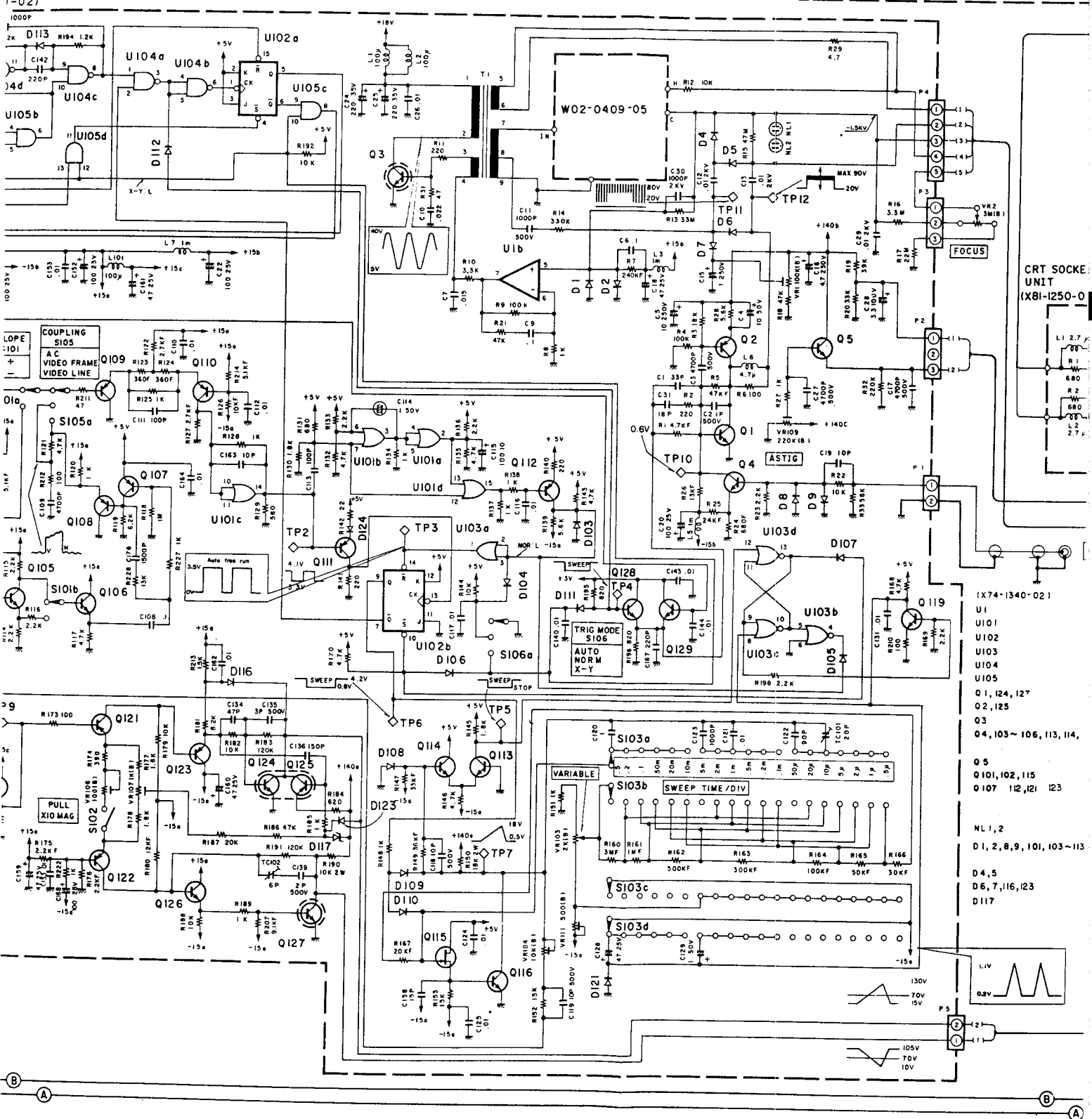
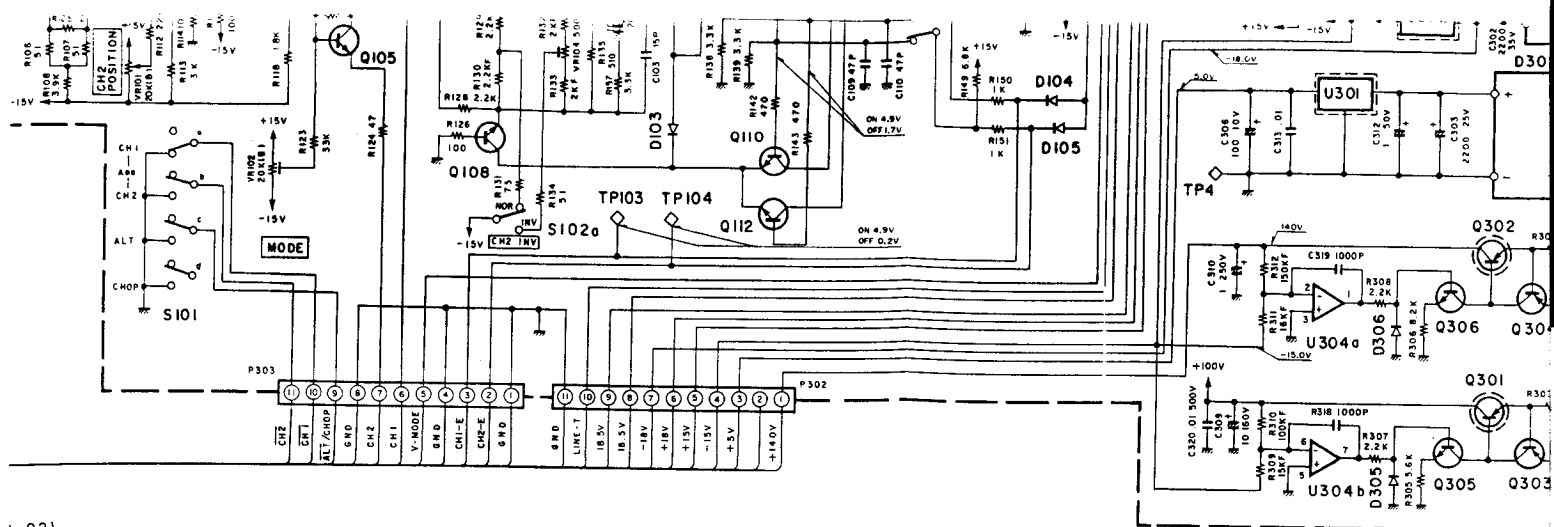
- (X77-1260-02)
- Q1 : 2SC1384
- Q2 : 2SA684
- D1,2 : DS442X
- D3 : SIVB40
- U1 : NJM4558D

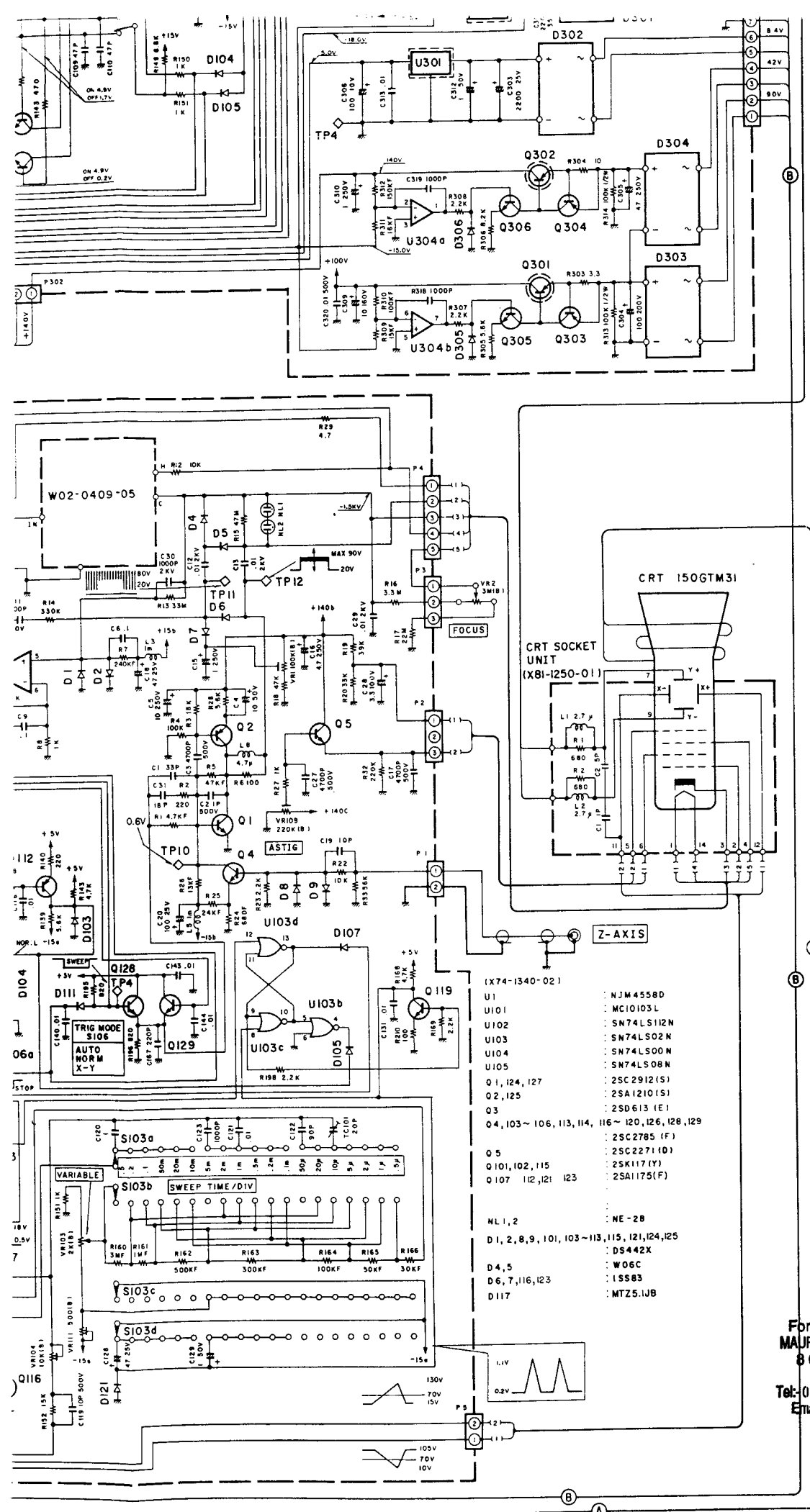
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HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-02)





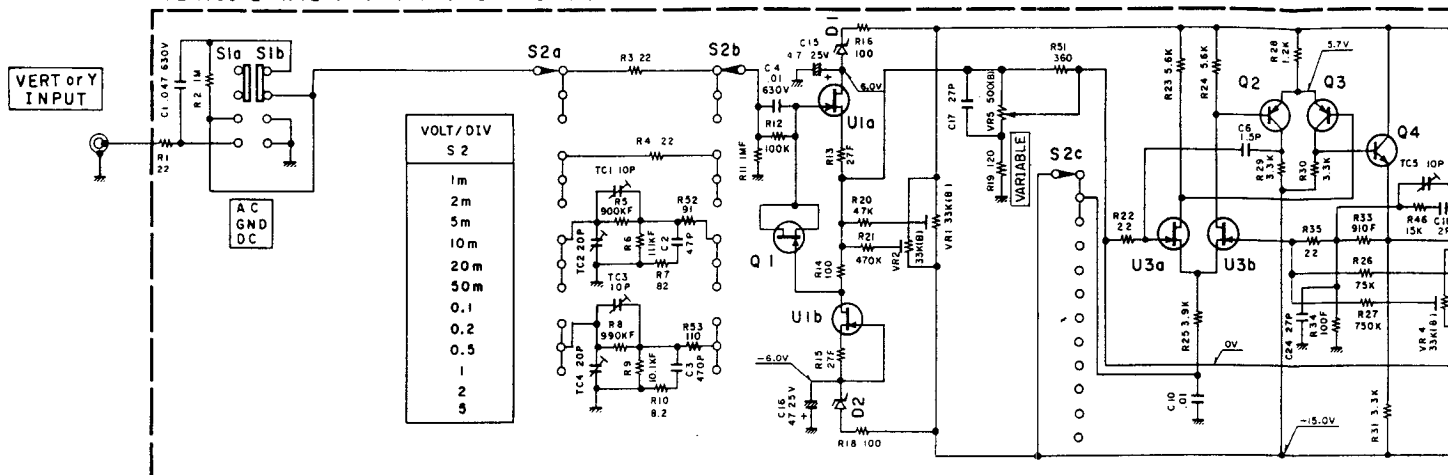


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CS-1010 SCHEMATIC DIAGRAM

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VERTICAL ATTENUATOR UNIT (X75-1140-03)



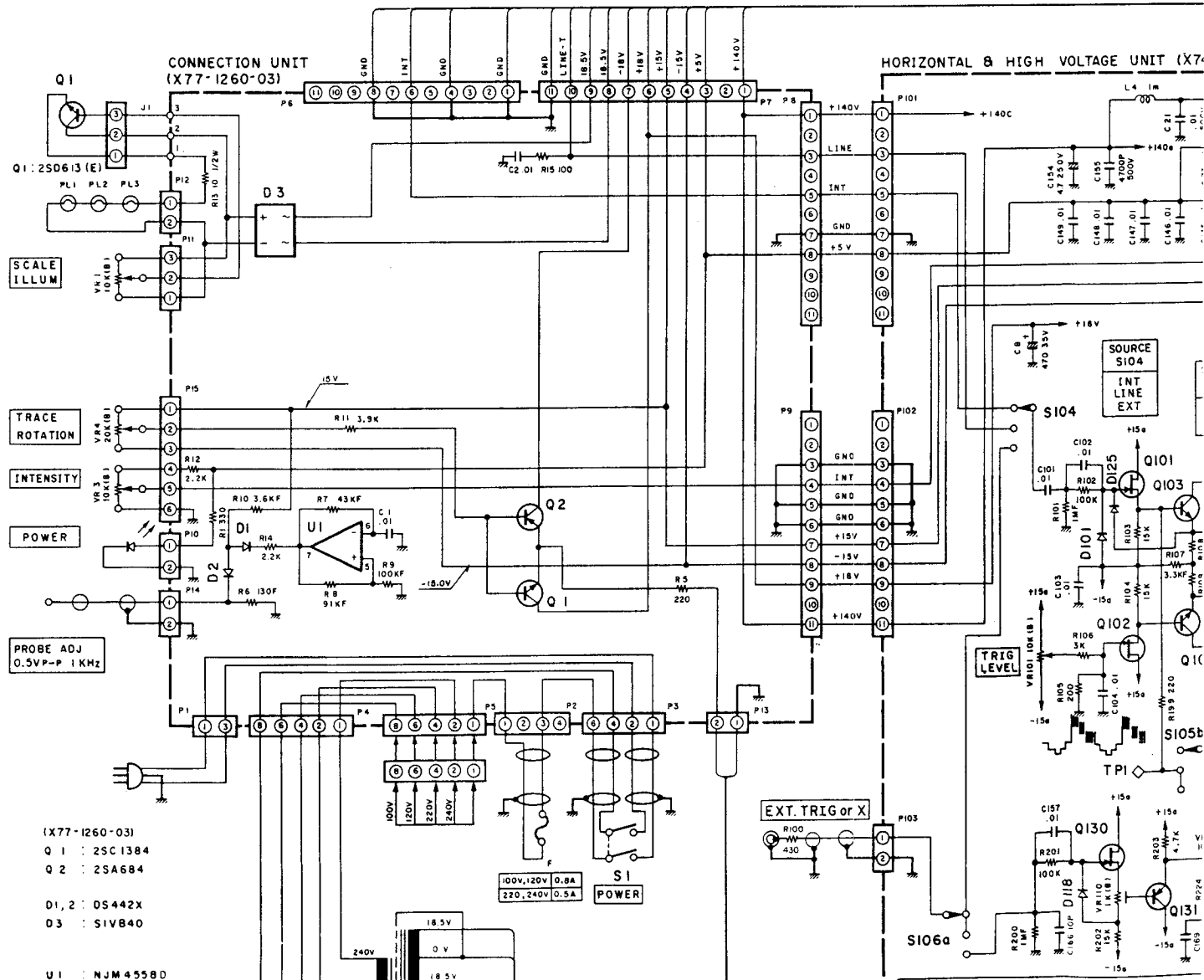
(X75-1140-03)

Q1 : 2SK30A (O)
Q2,3 : 2SA1005 (K)
Q4 : 2SC2786 (F)
U1 : M47F (C)
U3 : M47F (B)
D1,2 : MTZ9.1JC

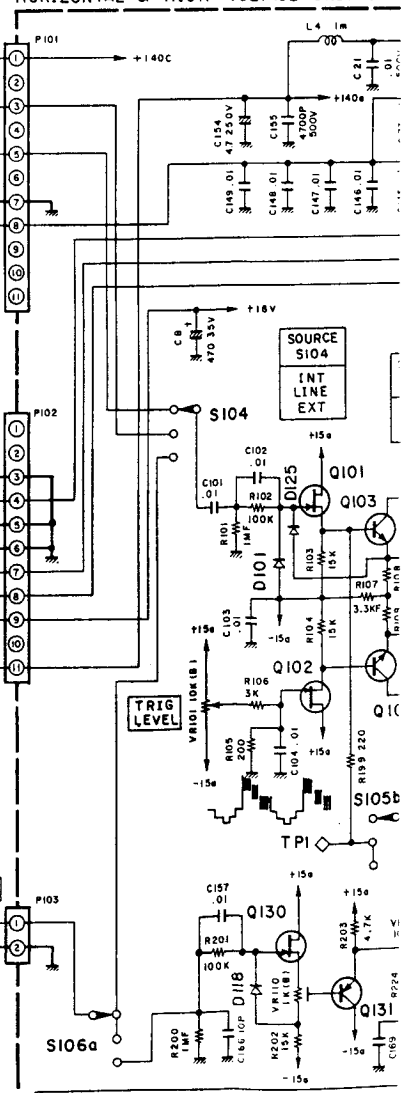
(X73-1490-03)

Q2,3,8 : 2SA1005 (K) Q303
Q5~7,9~14 : 2SC2785 (F) Q305
Q15,16 : 2SC1973
Q17,18 : 2SC2912 (R,S) D1~3
Q301, 302 : 2SA1009 (L,K) D301,
Q4 : 2SC2786 (K) D303,
D307

CONNECTION UNIT (X77-1260-03)



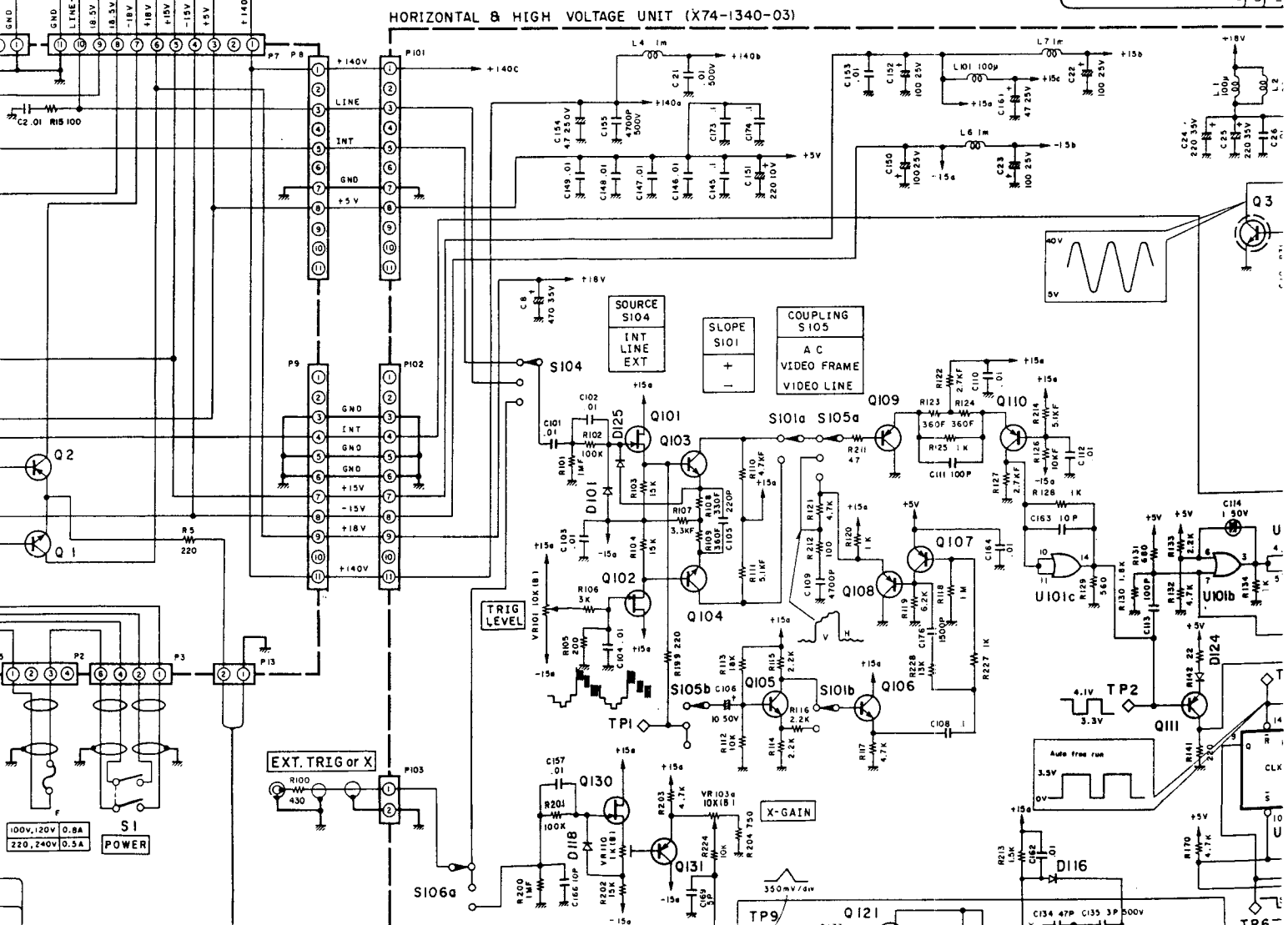
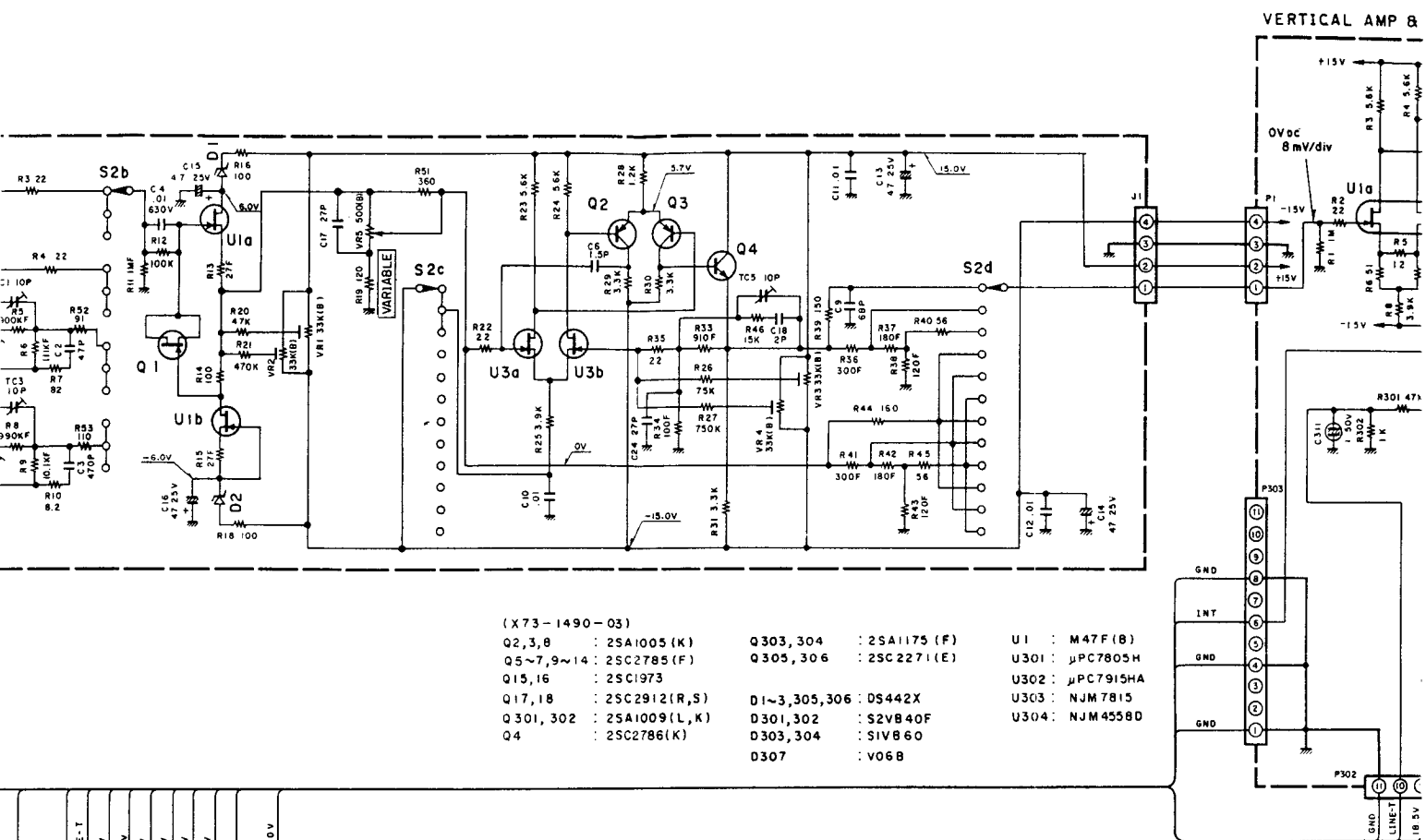
HORIZONTAL & HIGH VOLTAGE UNIT (X77-1490-03)



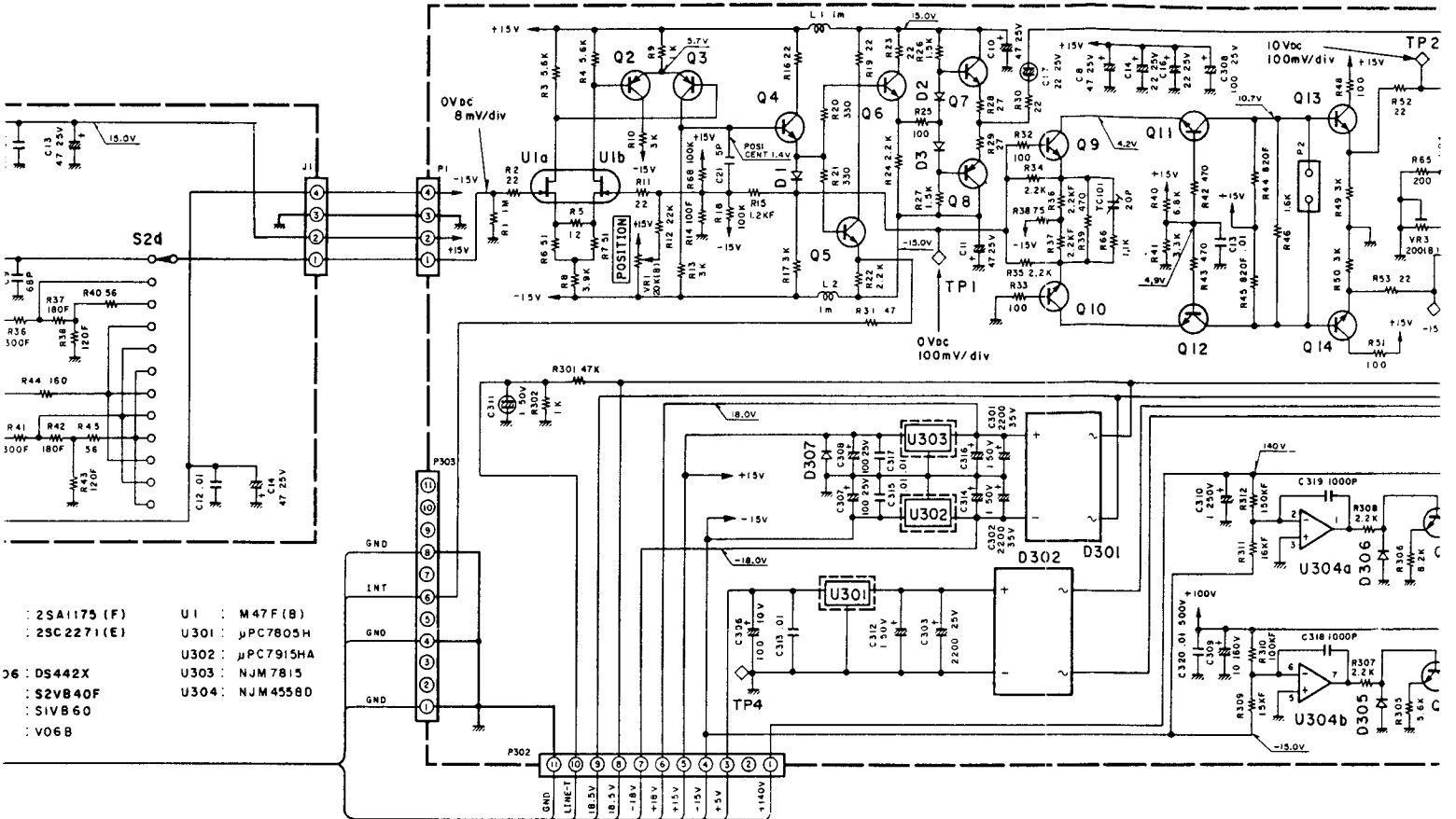
(X77-1260-03)

Q1 : 2SC1384
Q2 : 2SA684
D1,2 : DS442X
D3 : SIVB40

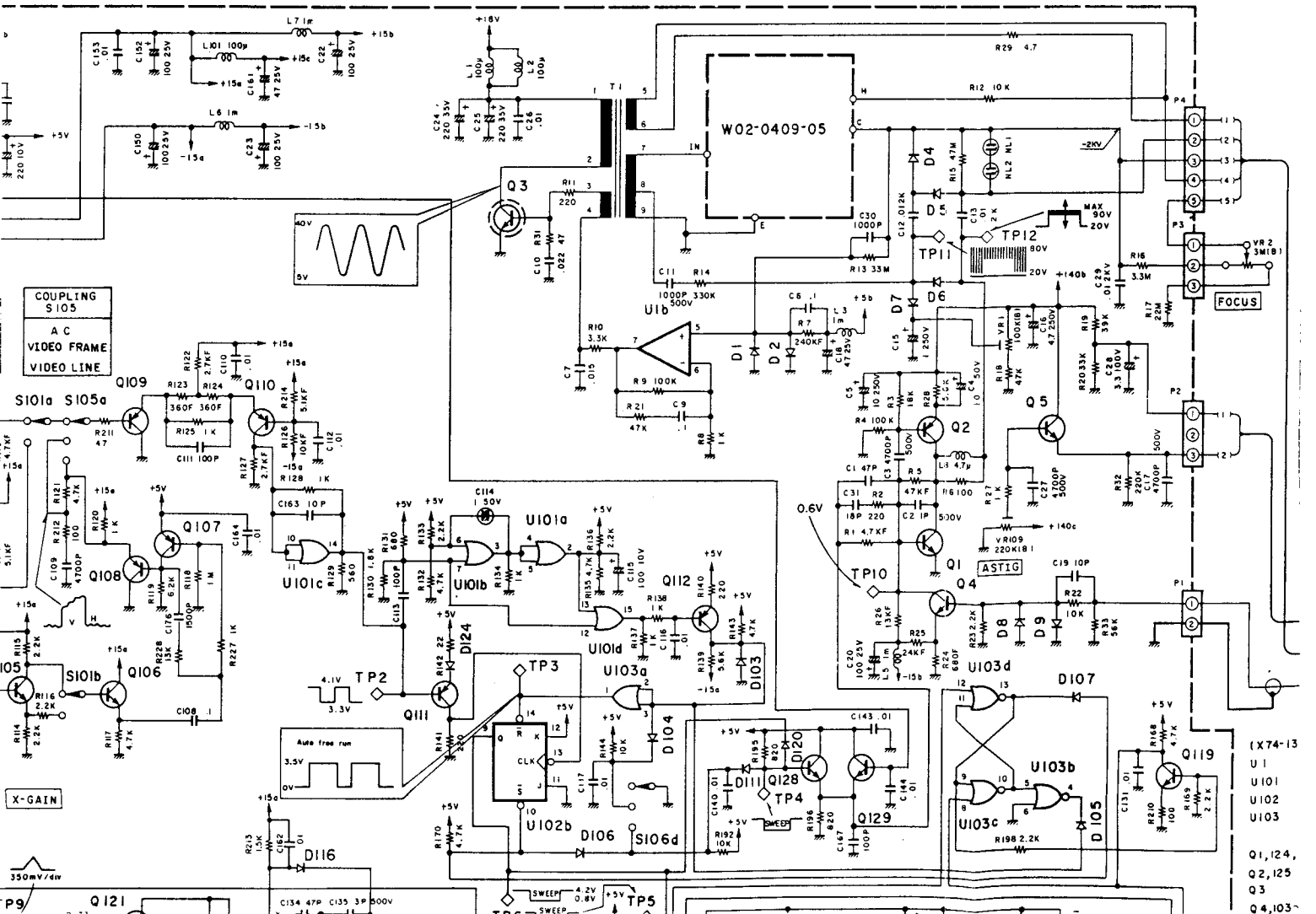
U1 : NJM4558D

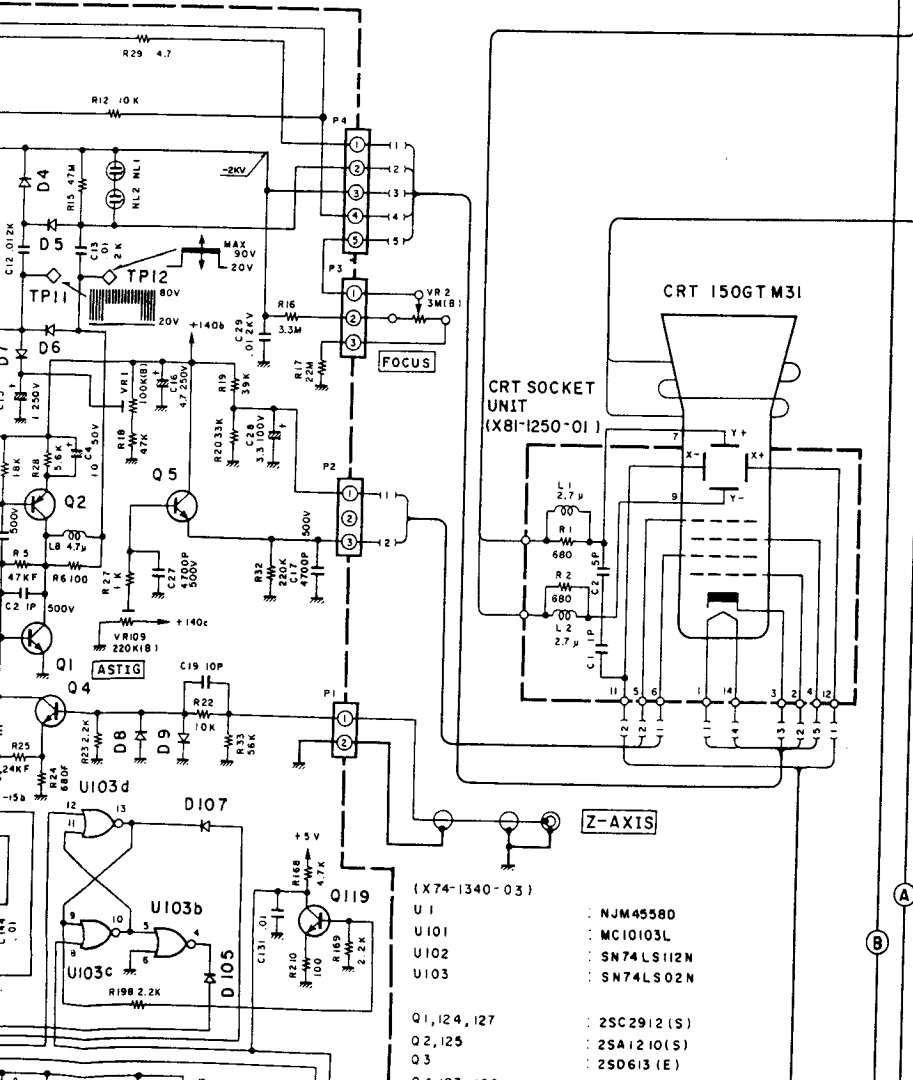
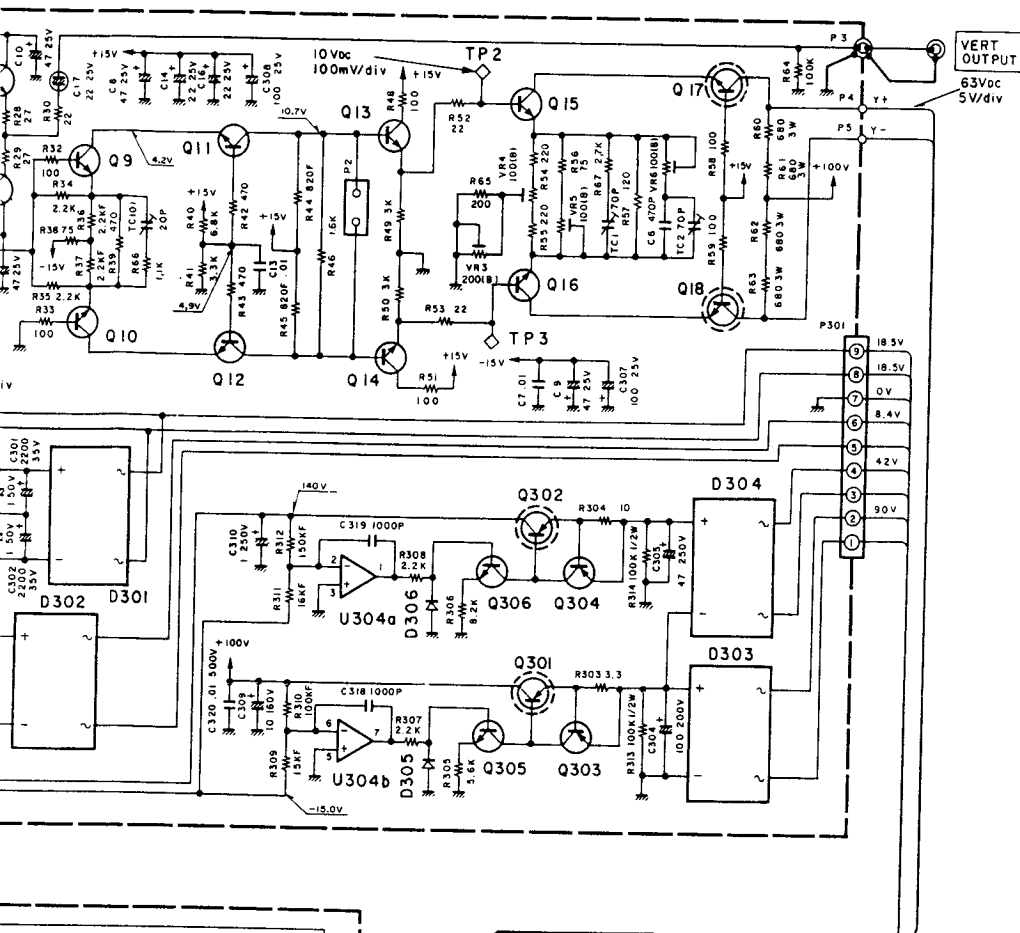


VERTICAL AMP & POWER UNIT (X73-1490-03)



0-03)

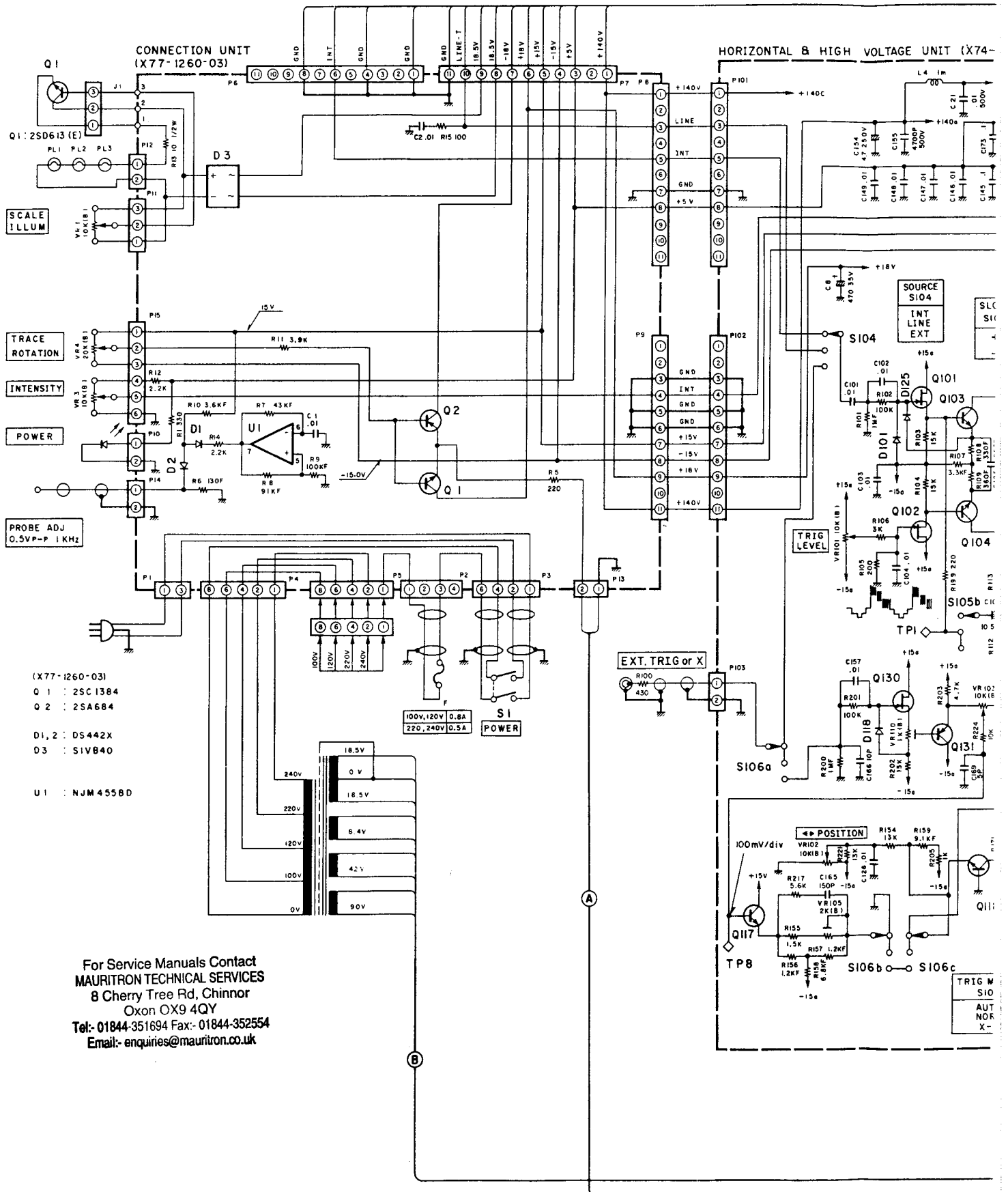




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(X75-1140-03)
 Q1 : 2SK30A (O)
 Q2,3 : 2SA1005 (K)
 Q4 : 2SC2786 (F)
 U1 : M47F (C)
 U3 : M47F (B)
 D1,2 : MTZ91JC

(X73-1490-03)
 Q2,3,8 : 2SA1005 (K) Q303,3
 Q5~7,9~14 : 2SC2785 (F) Q305,3
 Q15,16 : 2SC1973
 Q17,18 : 2SC2912 (R,S) D1~3,30
 Q301,302 : 2SA1009 (L,K) D301,30
 Q4 : 2SC2786 (K) D303,30
 D307



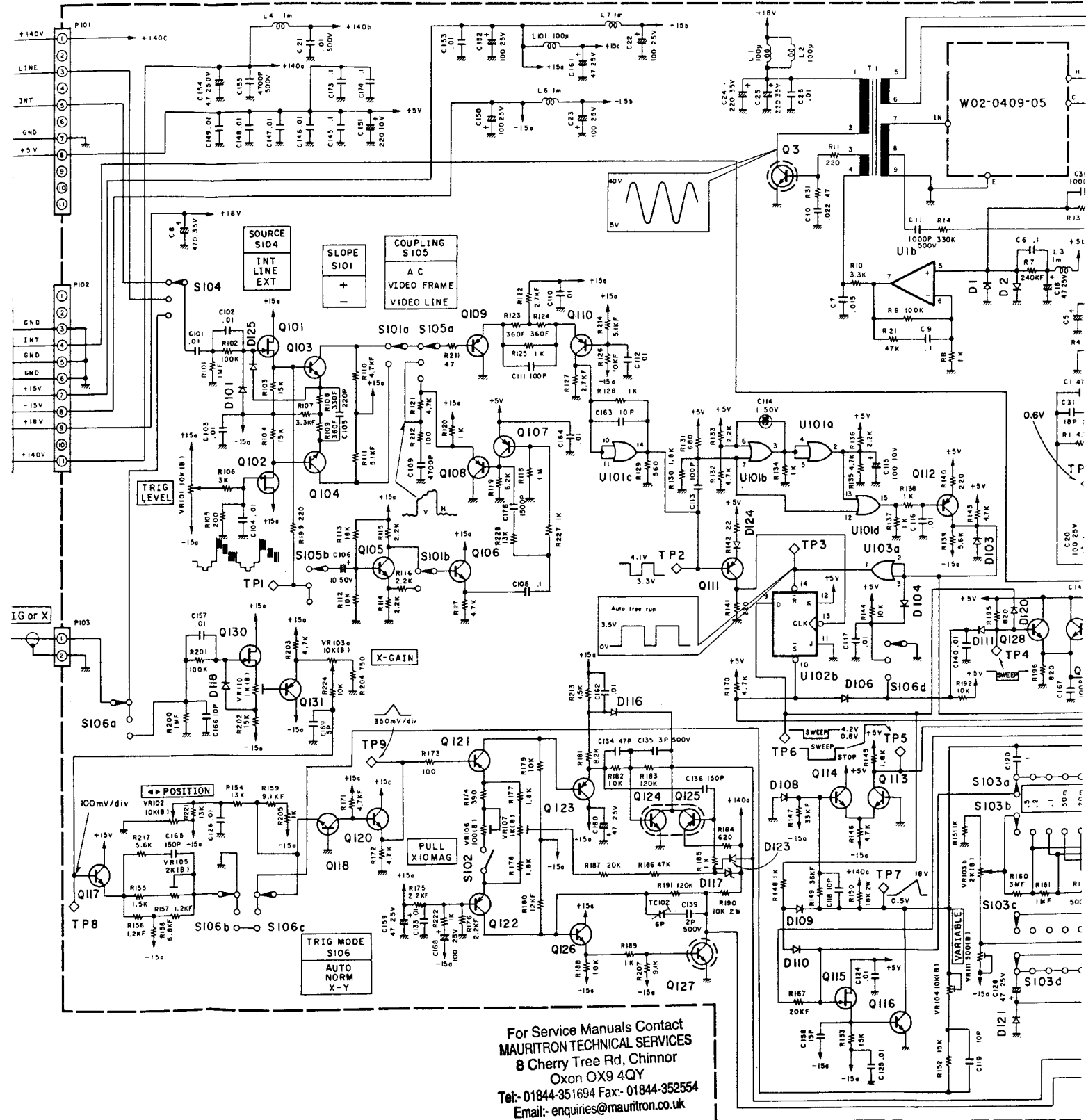
(X73-1490-03)

Q2,3,8 : 2SA1005 (K)
Q5~7,9~14 : 2SC2785 (F)
Q15,16 : 2SC1973
Q17,18 : 2SC2912 (R,S)
Q301,302 : 2SA1009 (L,K)
Q4 : 2SC2786 (K)

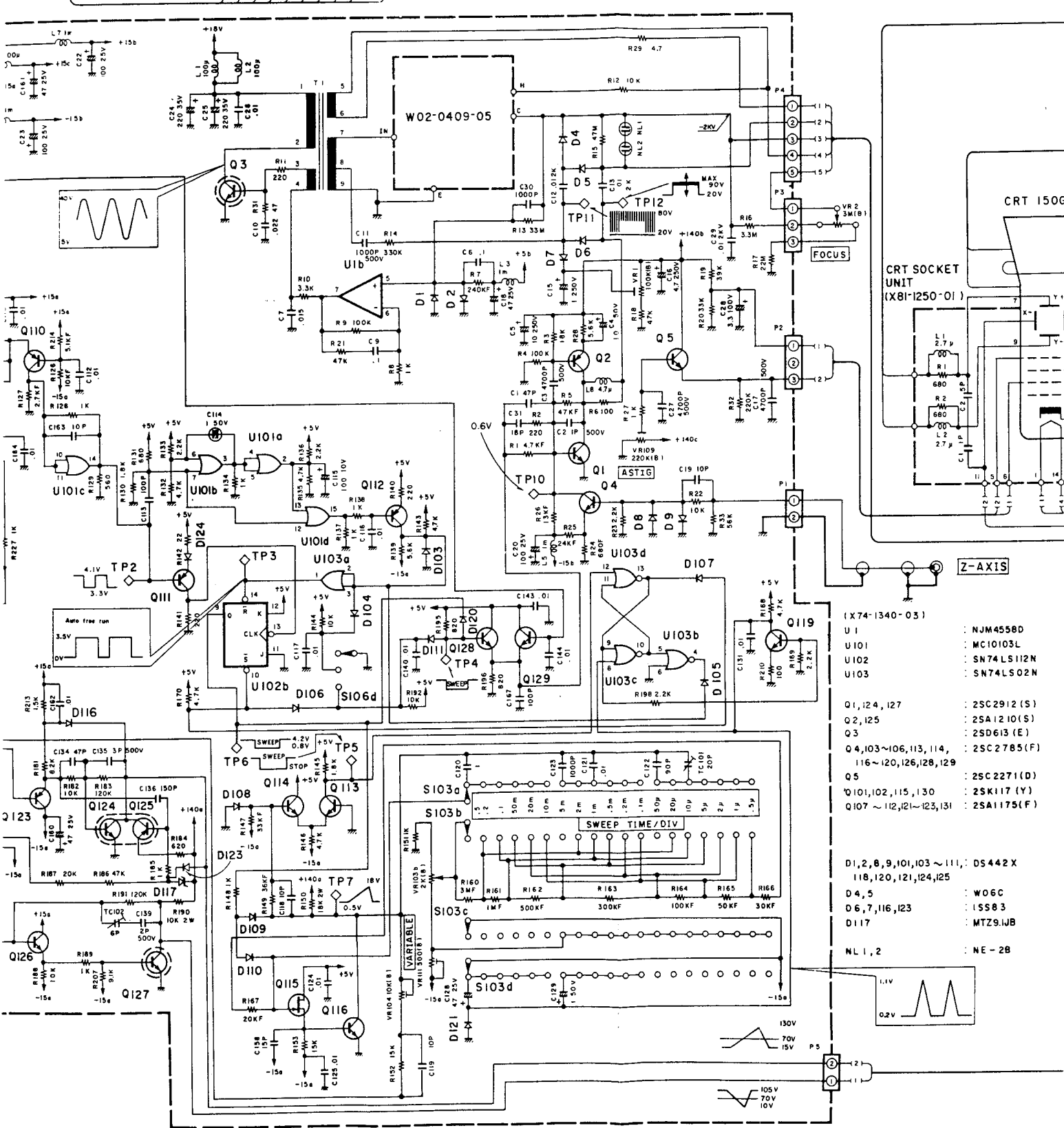
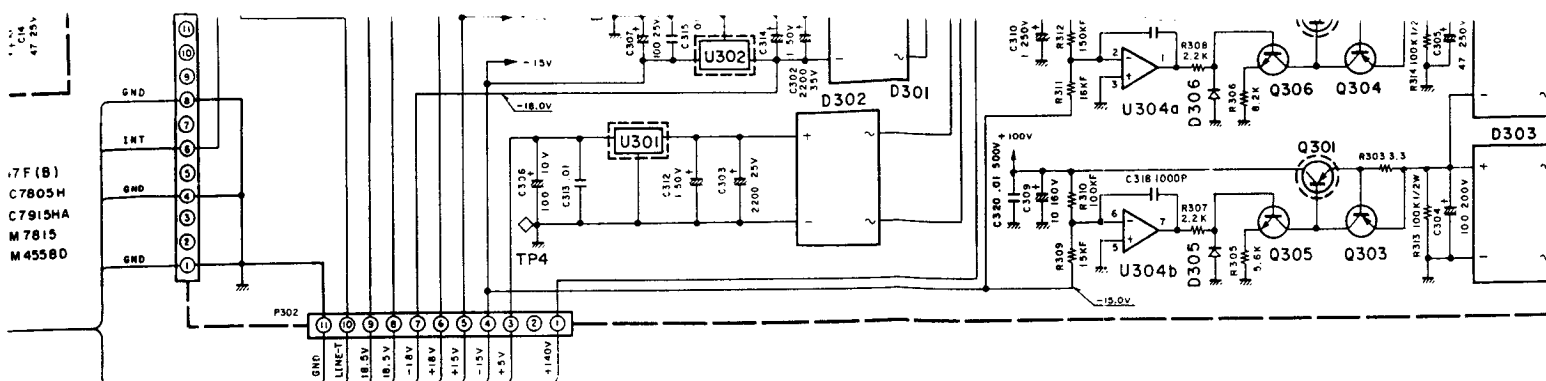
Q303,304 : 2SA1175 (F)
Q305,306 : 2SC2271 (E)
D1~3,305,306 : DS442X
Q301,302 : S2VB40F
D303,304 : S1VB60
D307 : V06B

U1 : M47F(B)
U301 : μ PC7805H
U302 : μ PC7915HA
U303 : NJM7815
U304 : NJM4558D

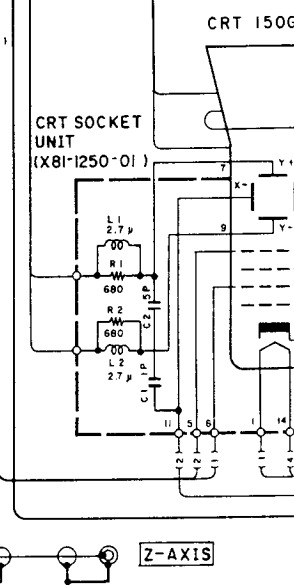
HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-03)

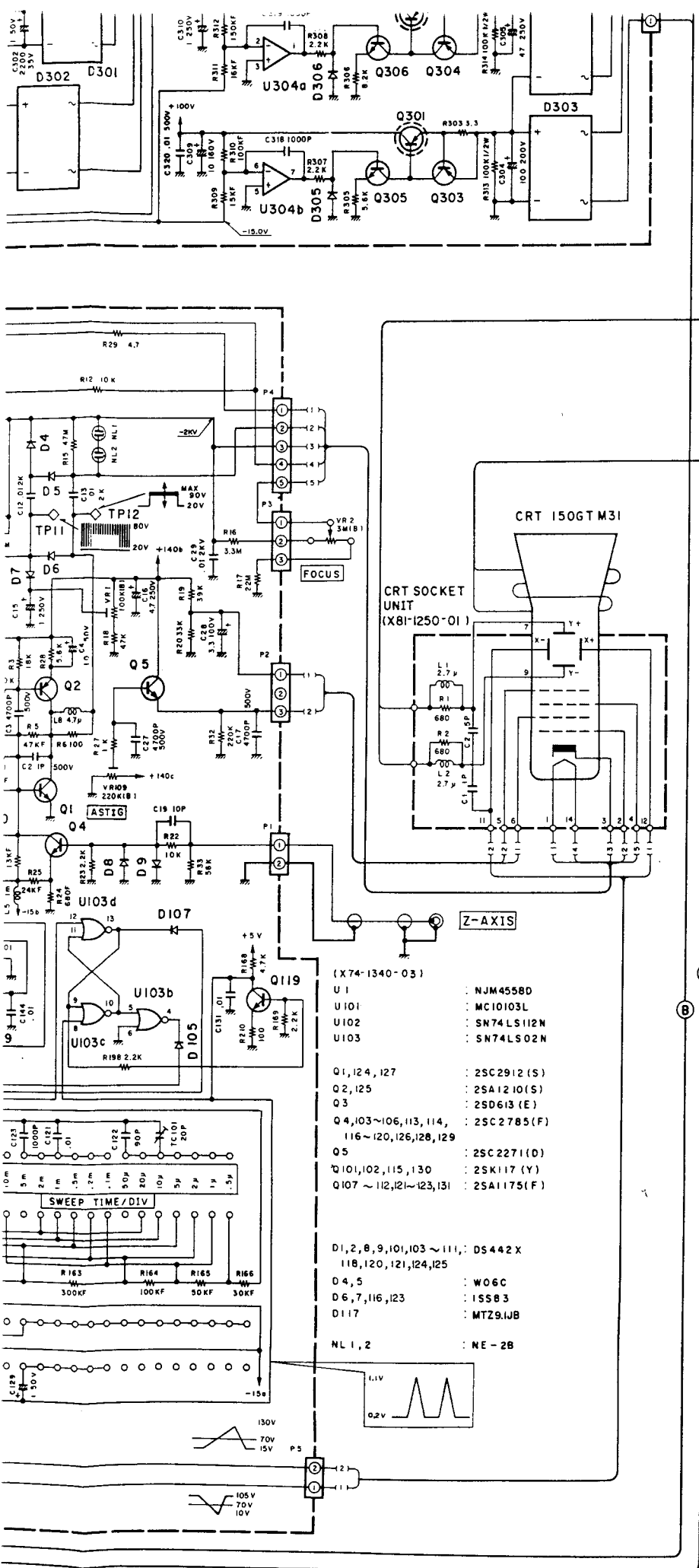


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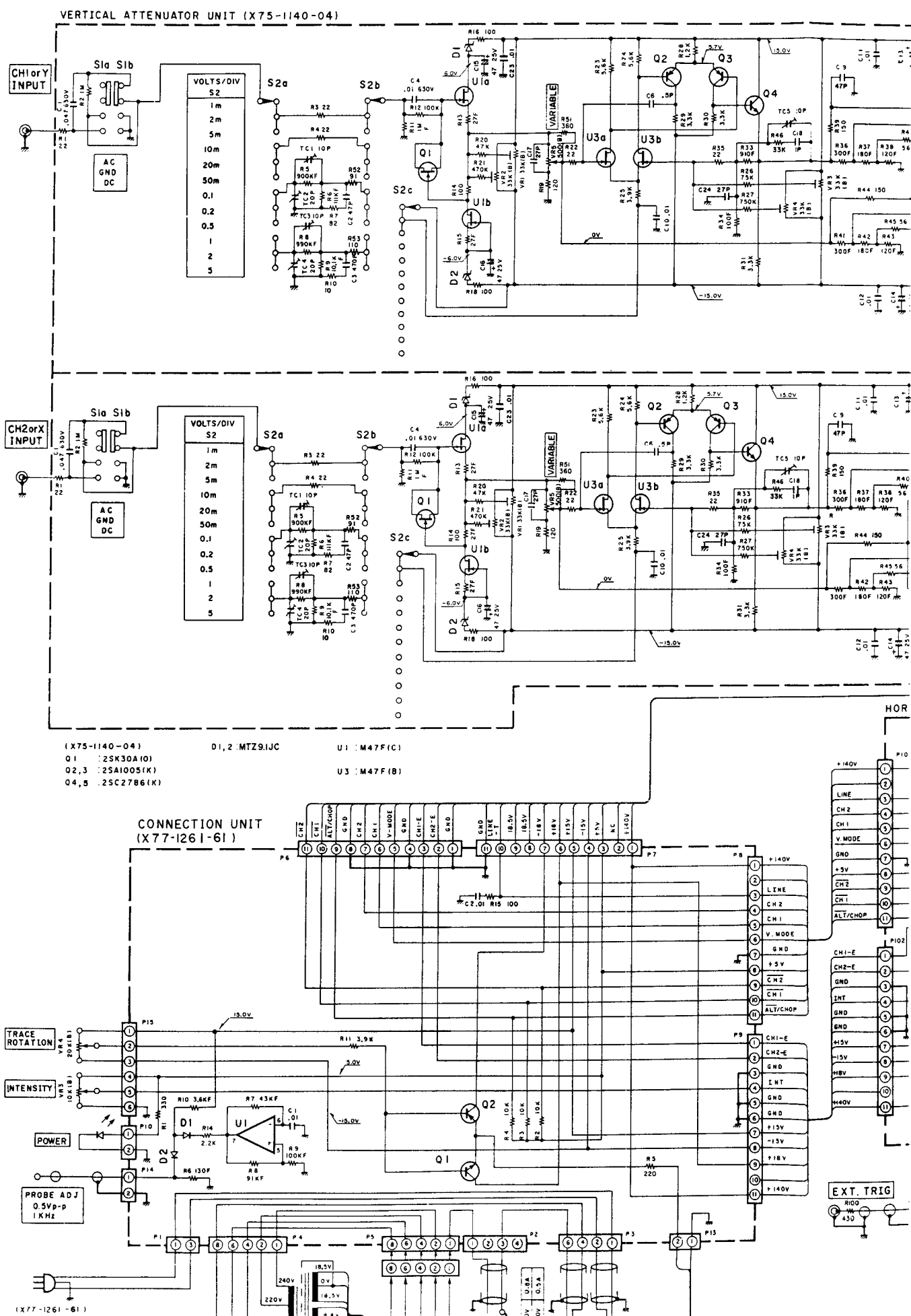
- (X74-1340-03)
- U1 : NJM4558D
 - U101 : MC10103L
 - U102 : SN74LS112N
 - U103 : SN74LS02N
- Q1,124,127 : 2SC2912(S)
- Q2,125 : 2SA1210(S)
- Q3 : 2SD613(E)
- Q4,103~106,113,114,116~120,126,128,129 : 2SC2785(F)
- Q5 : 2SC2271(D)
- Q101,102,115,130 : 2SK117(Y)
- Q107~112,121~123,131 : 2SA1175(F)
- D1,2,8,9,101,103~111,118,120,121,124,125 : DS442X
- D4,5 : W06C
- D6,7,116,123 : 1SS83
- D117 : MTZ91JB
- NL1,2 : NE-28

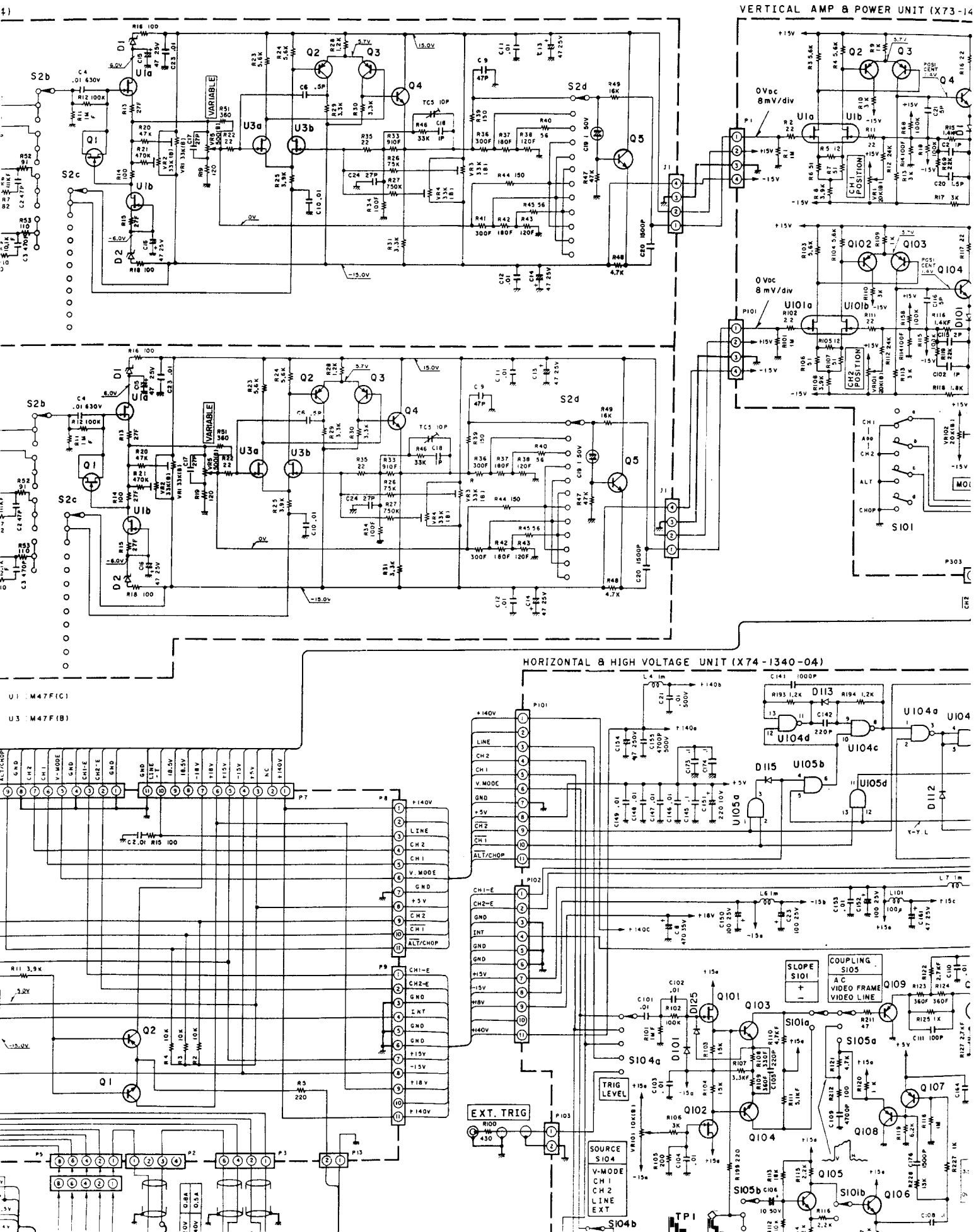




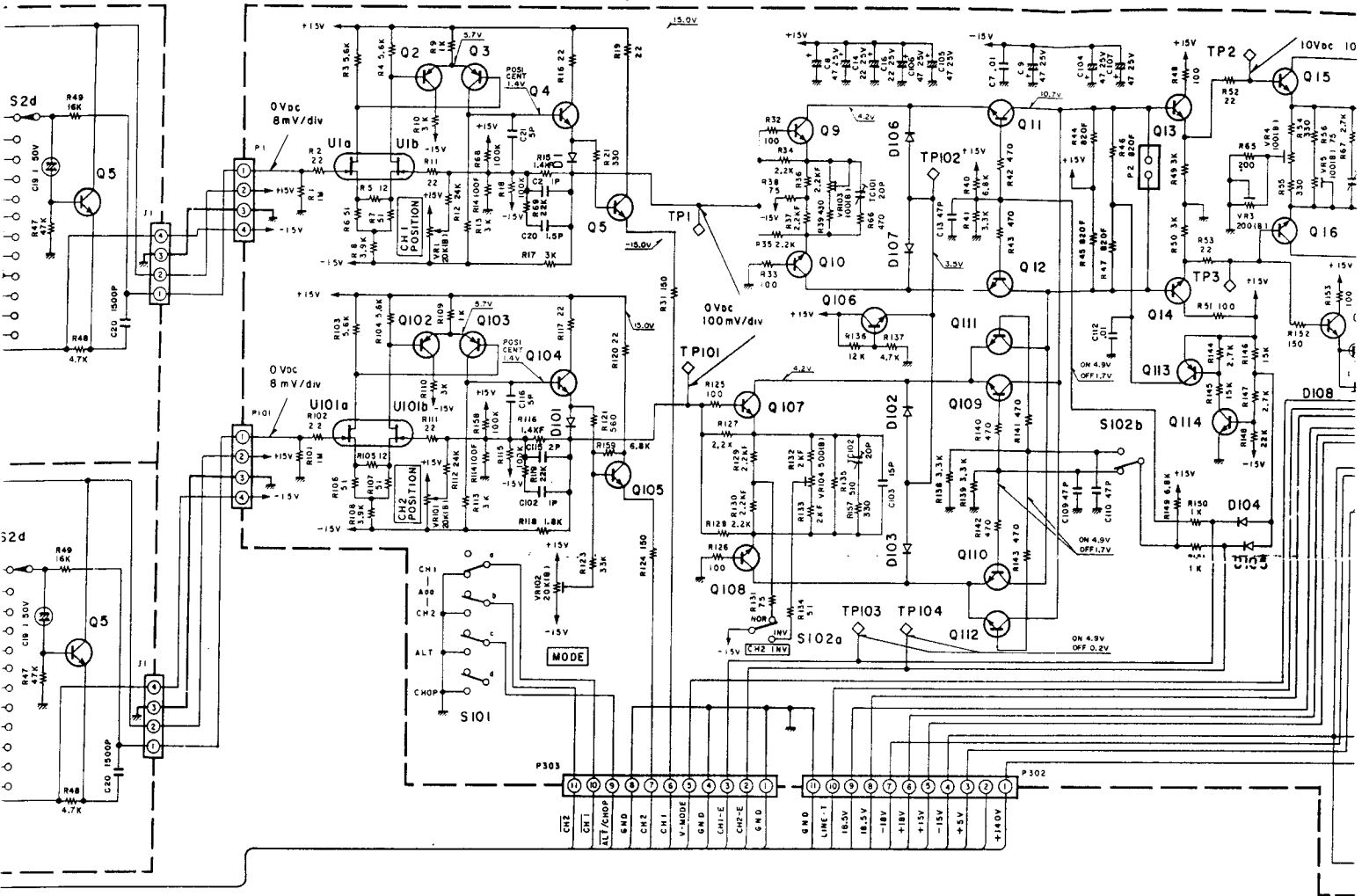
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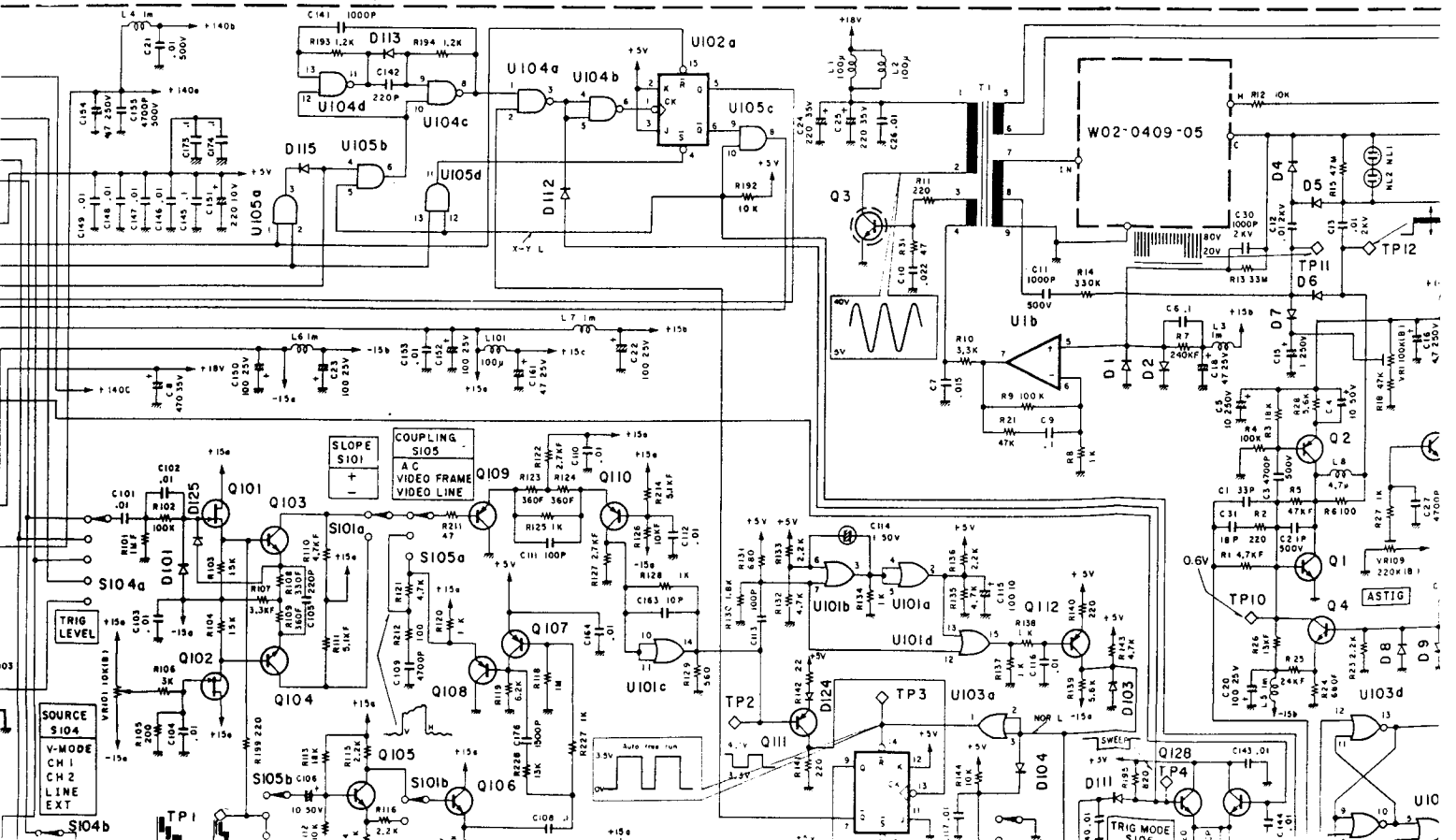


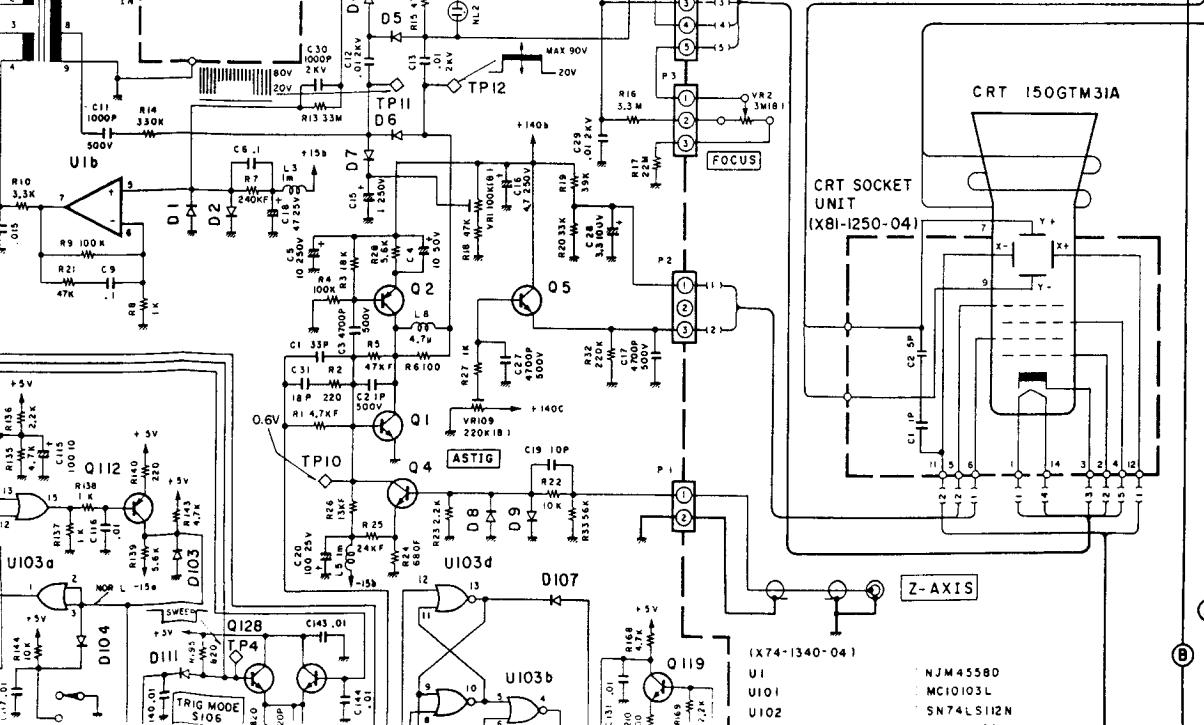
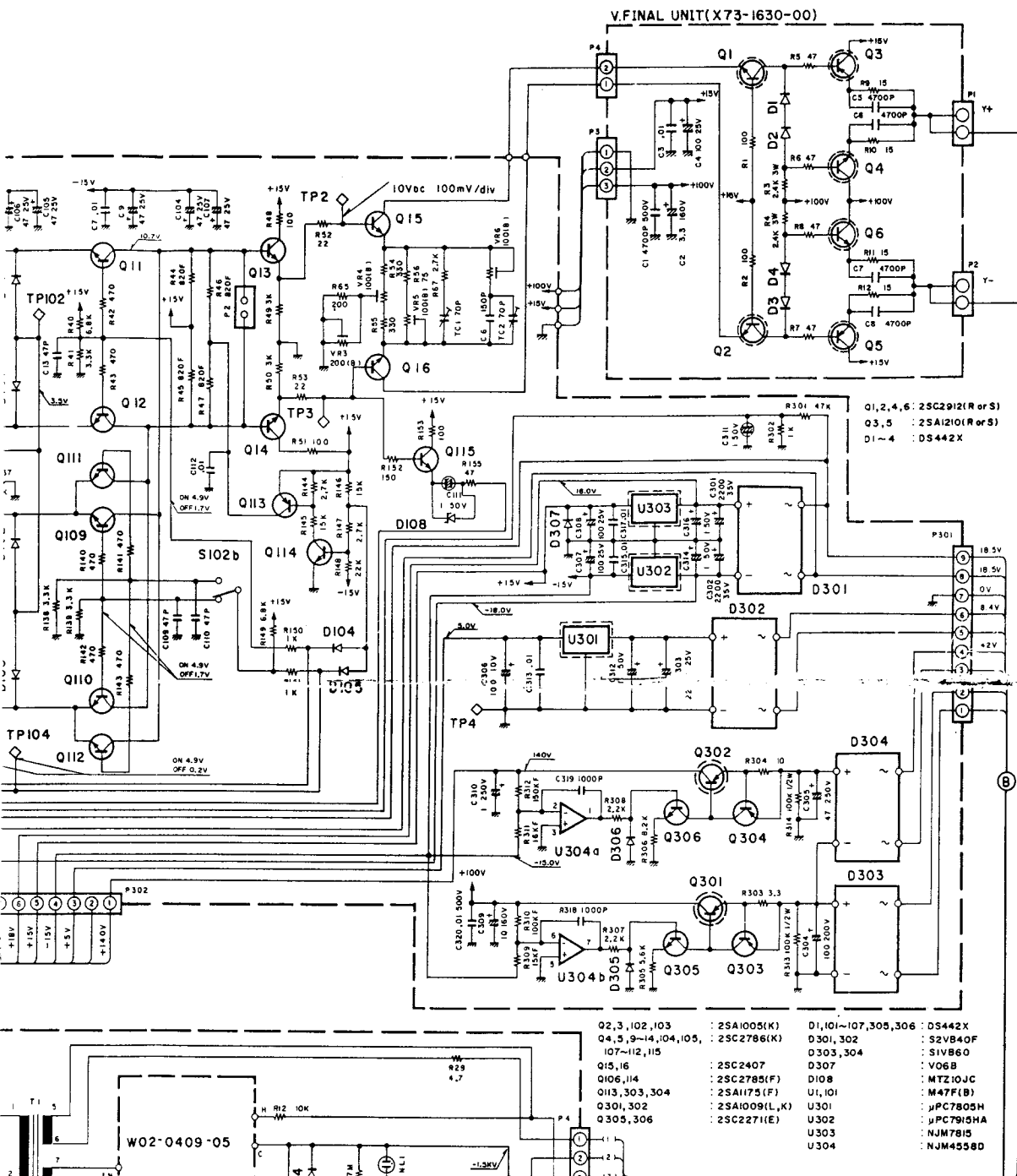


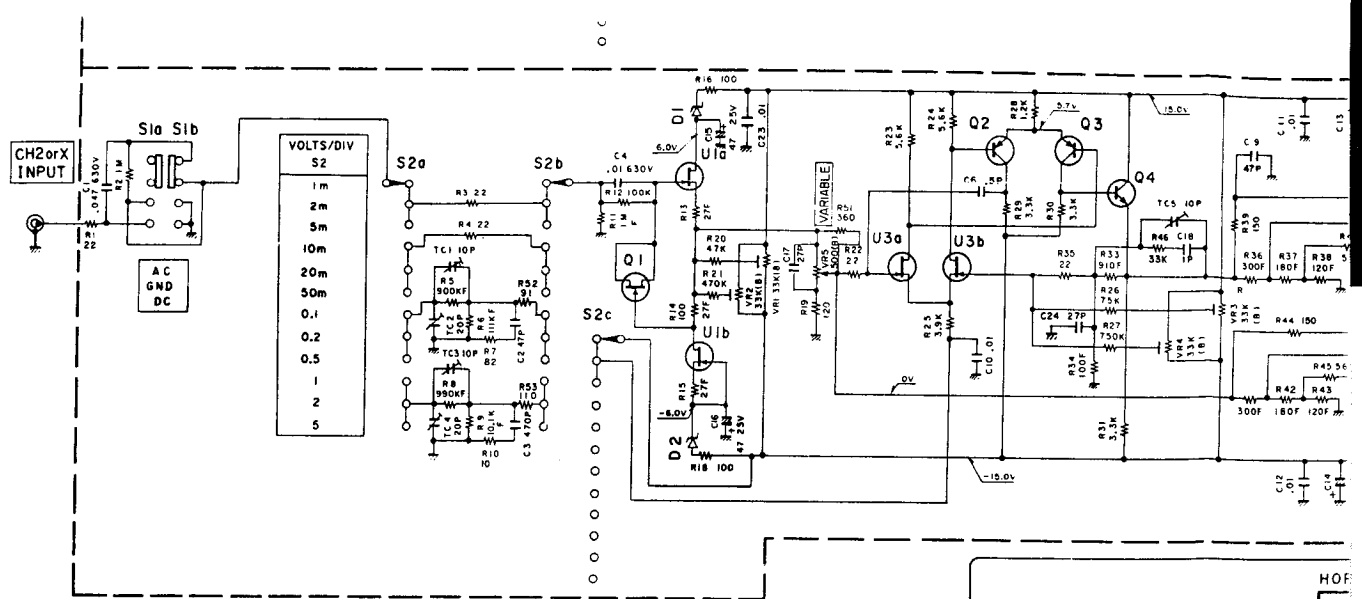
VERTICAL AMP & POWER UNIT (X73-1490-04)



VERTICAL & HIGH VOLTAGE UNIT (X74-1340-04)







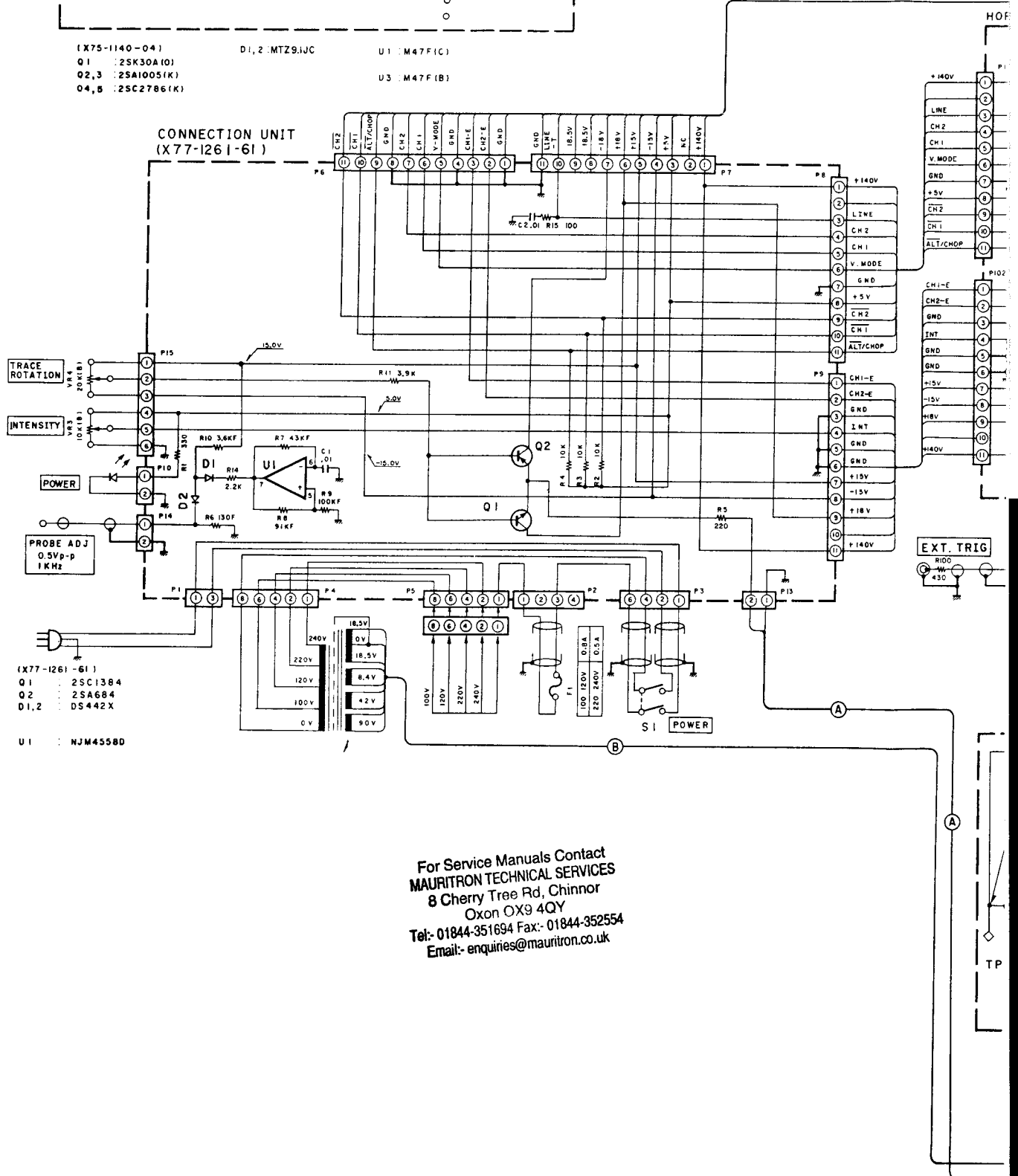
(X75-1140-04)
Q1 : 2SK30A (IO)
Q2,3 : 2SA1005 (K)
Q4,5 : 2SC2786 (K)

D1,2 : MTZ91JC

U1 : M47F (C)

U3 : M47F (B)

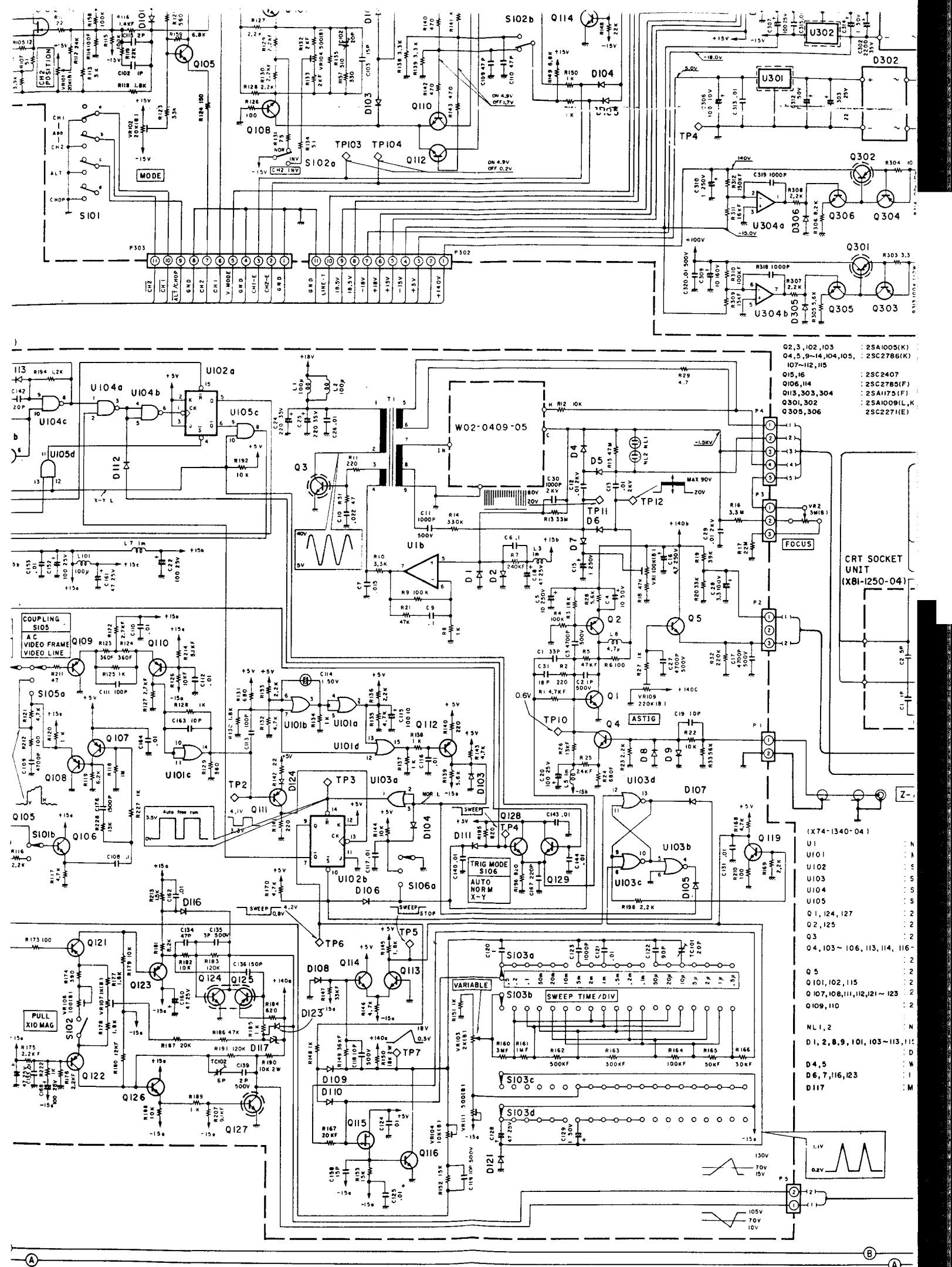
CONNECTION UNIT (X77-1261-61)

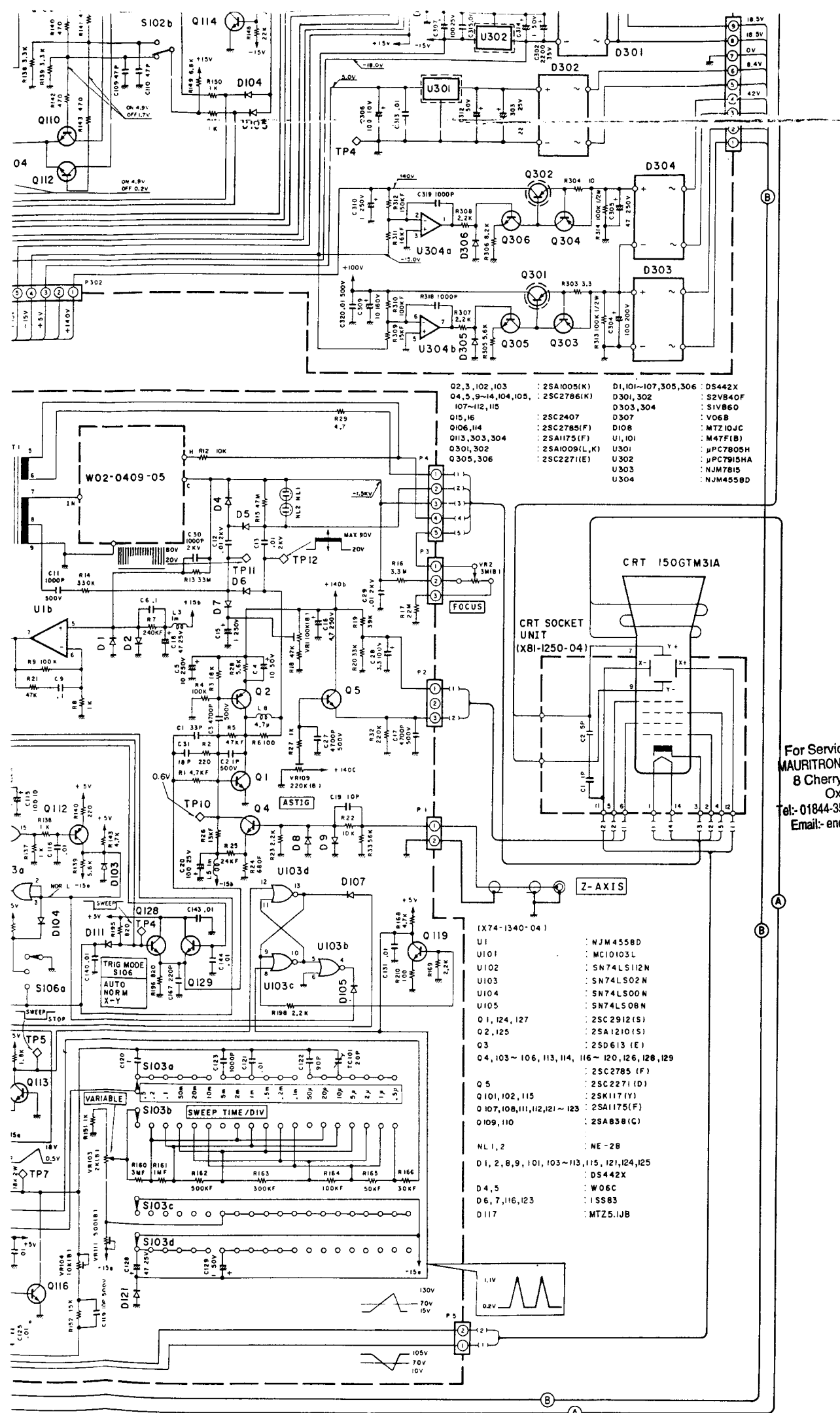


(X77-1261-61)
Q1 : 2SC1384
Q2 : 2SA684
D1,2 : DS442X

U1 : NJM4558D

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