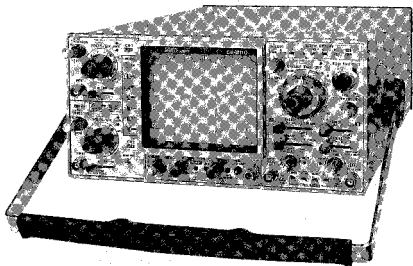


# CS-2110

**100MHz  
QUAD-TRACE  
OSCILLOSCOPE**



## KENWOOD

## 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 20000 volts dc is present when the oscilloscope is operating. Line voltage (90 to 264 VAC) is present on the power supply UNIT, on-off switch, and fuse holder, 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.

## CONTENTS

SPECIFICATIONS .....	3	HORIZONTAL OUTPUT AMP UNIT.....	62
SAFETY .....	7	A TRIG SWITCH UNIT .....	63
CIRCUIT DESCRIPTION .....	8	B TRIG SWITCH UNIT .....	64
BLOCK DIAGRAM .....	11	POWER BLANKING UNIT .....	65
MAINTENANCE .....	13	FILTER UNIT .....	66
ADJUSTMENT.....	14	ASTIG UNIT .....	66
ADJUSTMENT OF POWER SUPPLY AND CRT.....	15	SWITCHING POWER SUPPLY .....	66
ADJUSTMENT OF VERTICAL AXIS (I) .....	17	<b>PC BOARD AND SCHEMATIC DIAGRAM .....</b>	<b>67</b>
ADJUSTMENT OF VERTICAL AXIS (II) .....	23	VERTICAL PREAMP UNIT.....	68
ADJUSTMENT OF HORIZONTAL SWEEP .....	25	VERTICAL OUTPUT AMP UNIT .....	70
ADJUSTMENT OF X-Y OPERATION .....	29	CH3, CH4 AMP UNIT .....	72
ADJUSTMENT OF TRIGGERING .....	29	CPU UNIT .....	74
OPERATING CHECKS.....	32	SWEEP ROTARY UNIT .....	76
LOCATION OF ADJUSTMENT CONTROL.....	37	TRIG SWEEP UNIT .....	78
TROUBLESHOOTING .....	38	HORIZONTAL OUTPUT AMP UNIT.....	80
<b>PARTS LIST .....</b>	<b>49</b>	A TRIG SWITCH UNIT .....	82
MAIN CHASSIS.....	50	B TRIG SWITCH UNIT .....	84
VERTICAL PREAMP UNIT.....	51	POWER BLANKING UNIT .....	86
VERTICAL OUTPUT AMP UNIT .....	55	FILTER UNIT AND ASTIG UNIT .....	88
CH3, CH4 AMP UNIT .....	56	SWITCHING POWER SUPPLY .....	89
CPU UNIT .....	57	<b>DISASSEMBLY .....</b>	<b>91</b>
SWEEP ROTARY UNIT .....	58	<b>SEMICONDUCTORS .....</b>	<b>93</b>
TRIG SWEEP UNIT .....	58		



# SPECIFICATIONS

## CRT

Model:	150KTM31
Type:	Rectangular, with internal graticule
Accelerating potential:	20kV
Display area:	8 div x 10 div (1 div = 1 cm)

## VERTICAL AXIS (Channel 1 and Channel 2 identical specifications)

Sensitivity	5mV/div to 5V/div (X1 mode) 1 mV/div to 1V/div (X5 mode) 500 $\mu$ V/div (Cascaded operation, CH1 to CH2)
Accuracy:	$\pm 2\%$ (10 ~ 35°C) $\pm 4\%$ (0 ~ 50°C) $\pm 7\%$ (Cascaded operation, CH1 to CH2)
Attenuator:	5mV/div to 5V/div in 1-2-5 sequence, all 10 ranges with fine adjustment. between steps.
Input resistance:	1 M $\Omega$ $\pm$ 1%
Input capacitance:	Approx 22pF
Frequency response	
DC:	DC to 100 MHz (-3 dB) DC to 140 MHz (-6 dB) (unapplied x 5 GAIN mode) DC to 70 MHz (-3 dB) Cascaded operation, CH1 to CH2
AC:	5 Hz to 100 MHz (-3 dB) 5 Hz to 140 MHz (-6 dB) (unapplied x 5 GAIN mode) 7 Hz to 70 MHz (-3 dB), Cascaded operation, CH1 to CH2
Risetime:	3.5ns
Signal delay time:	Approx 10ns as displayed on CRT screen
Crosstalk:	-40 dB minimum
Operating modes:	
CH1	CH1, single trace
CH2	CH2, single trace
DUAL	CH1 and CH2, dual trace
ADD	CH1 + CH2 (added) display
QUAD	CH1 ~ CH4, quad trace
ALT	Dual or quad trace alternating
CHOP	Dual or quad trace chopped
CHOP frequency:	Approx 250 kHz, adjustable
Channel polarity:	Normal or inverted, CH2 only inverted

$\Delta$ Maximum input voltage:	800 Vp-p or 400V (dc + ac peak)
Maximum undistorted amplitude:	8 divisions, minimum (DC to 100 MHz)

Bandwidth limiting:	Vertical system bandwidth with the 20 MHz BW pushbutton switch pushed is approximately 20 MHz
---------------------	---

Delay time difference	
CH1 to CH2:	Less than 0.5ns
CH1, CH2 to CH3, CH4:	Less than 1ns

## VERTICAL AXIS (Channel 3 and Channel 4 common specifications)

Sensitivity	0.1V/div, 1V/div $\pm$ 2%
Attenuator:	1/1, 1/10
Input resistance:	1 M $\Omega$ $\pm$ 1%
Input capacitance:	Approx. 22 pF
Input coupling mode:	DC only
Frequency response:	DC to 100 MHz (-3 dB) DC to 140 MHz (-6 dB)
Risetime:	3.5ns
Signal delay time:	Same as CH1 and CH2
Maximum allowable voltage	
DC component:	$\pm 0.5V$ or less (ac + dc) ( $\pm 5V$ , 1/10 attenuated)
AC component:	1 Vp-p (10 Vp-p, 1/10 attenuated) or less
$\Delta$ Maximum input voltage:	400V (dc + ac peak)

## HORIZONTAL AXIS (Channel 2 input)

Modes:	X-Y mode is switch selectable (HORIZ DISPLAY) CH1: Y-axis CH2: X-axis
X-Y mode:	
Sensitivity:	Same as CH2
Accuracy:	Same as CH2
Input resistance:	Same as CH2
Input capacitance:	Same as CH2
Frequency response:	
DC:	DC to 5 MHz (-3 dB) DC to 7 MHz (-6 dB)
AC:	5 Hz to 5 MHz (-3 dB) 5 Hz to 7 MHz (-6 dB)
X-Y phase difference:	Less than 3° at 100 kHz

## SWEEP

Modes	(switchable with the HORIZ DISPLAY switch):
A	A sweep
ALT	B sweep waveform is displayed as an intensified portion of the A sweep and B sweep alternating
A-INT-B	B sweep waveform is displayed as an intensified portion of the A sweep.
B DLY'D	Delayed B sweep

# SPECIFICATIONS

DUAL	Dual sweep – A and B sweeps, independently
X-Y	X-Y display mode
A sweep time:	20 ns/div to 0.5s/div in 23 ranges, in 1-2-5 sequence, vernier control provides fully adjustable sweep time between steps.
B sweep time:	20ns/div to 50ms/div in 20 ranges, in 1-2-5 sequence.
Accuracy:	± 2% (10 ~ 35°C) ± 4% (0 ~ 50°C)
Sweep magnification:	X10 ± 5% (10 ~ 35°C) ± 6% (0 ~ 50°C)
Linearity:	20ns/div to 0.5s/div ± 3% (± 5% with X10 magnification)
HOLDOFF:	Continuously adjustable for A sweep from NORM to X5
Trace separation:	B positionable up to 4 divisions separated from A sweep, continuously adjustable.
Delay method:	Continuous delay, Trigger delay
Delay time:	0.2 to 10 times the sweep time from 200ns to 0.5s, continuously adjustable.
Time difference measurement accuracy:	± (1% of measurement + 0.1% of full scale) (10 ~ 35°C) ± 4% (0 ~ 50°C)
Delay jitter:	1/20000 of the full scale sweep time.

## TRIGGERING

### A TRIG

A trigger modes:	AUTO, NORM, SINGLE, FIX: at the center of the waveform
Trigger source:	V MODE, CH1, CH2, (EXT) CH3 1/1 and 1/10, LINE
Coupling modes:	AC, LFREJ, HFREJ, DC, VIDEO VIDEO-LINE sync automatically selected at sweep times of 50 μs/div to 20ns/div. VIDEO-FRAME sync automatically selected at sweep times of 0.5s/div to 0.1ms/div.
Trigger level:	± 90° adjustable
Polarity:	+/-

### B TRIG

B trigger modes:	STARTS AFTER DELAY, TRIGGERABLE AFTER DELAY
Trigger source:	CH1, CH2, (EXT) CH4 1/1 and 1/10

Coupling modes:	AC, LFREJ, HFREJ, DC
Trigger level:	± 90° adjustable
Polarity:	+/-

## TRIGGER SENSITIVITY (A AND B)

COUPLING	FREQ RANGE	MINIMUM SYNC AMPLITUDE		
		INT	EXT	EXT 1/10
DC	DC ~ 20 MHz	0.5 div	50 mV	0.5V
	DC ~ 50 MHz	1.0 div	100 mV	1.0V
	DC ~ 100 MHz	1.5 div	210 mV	2.1V
AC	Same as for DC but with increased minimum level for below 20 Hz.			
AC HFREJ	Increased minimum level below 20 Hz and above 30 kHz.			
AC LFREJ	Increased minimum level below 30 kHz.			
VIDEO	FRAME/LINE	0.5 div	50 mV	0.5V

Table-1

AUTO:	Same as above specifications for above 50 Hz.
FIX:	40 Hz ~ 20 MHz 1.0 div (100 mV) 40 Hz ~ 100 MHz 1.5 div (210 mV)
Jitter:	0.5ns maximum at 100 MHz 2ns/div sweep rate (X10 MAG on)

## CALIBRATING VOLTAGE AND CURRENT

1 kHz	± 3% Positive square wave
1V	± 1% (10 ~ 35°C) ± 2% (0 ~ 50°C)
10 mA	± 2% (10 ~ 35°C) ± 4% (0 ~ 50°C)

## INTENSITY MODULATION

Input signal:	TTL level, intensity decreasing with more positive levels
Input impedance:	Approx. 10 kΩ
Usable frequency range:	DC to 10 MHz

Δ Maximum input voltage: 50V (dc + ac peak)

## VERTICAL AXIS OUTPUT

	Sampled CH1 output
Output voltage:	50 mVp-p/div (into 50Ω load)
Output impedance:	Approx. 50Ω
Frequency response:	DC to 100 MHz (-3 dB) (into 50Ω load)

## GATE OUTPUT (A and B)

Output voltage:	Approx. 1.5V positive gate (into 500Ω load)
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## TRACE ROTATION

Electrical, adjustable

## POWER SUPPLY

Line voltage:	90 ~ 264 V
Line frequency:	45 ~ 400 Hz
Power consumption:	Approx. 55 W (into 100 V, 50 Hz)

# SPECIFICATIONS

## DIMENSIONS

Width:	284 mm (328 mm)
Height:	138 mm (150 mm)
Depth:	400 mm (471 mm)
	( ) dimensions include protrusions from basic case outline dimensions.

## WEIGHT

7.4 kg

## ENVIRONMENT

Operating temperature and humidity for guaranteed specifications:	10 ~ 35°C, 85% maximum RH
Full operating range:	0 ~ 50°C, 90% maximum RH
Storage temperature and humidity range:	-20 ~ +70°C 80% maximum
Altitude:	
Operating:	5000 m
Non-operating:	12000 m

## ACCESSORIES

### STANDARD ACCESSORIES INCLUDED

Probe (PC-29) × 2.....	Y87-1250-00
Attenuation.....	1/10
Input Impedance.....	10MΩ, 18 pF of less
Instruction Manual.....	B50-7519-00
Handbook.....	B50-7521-00
AC Power Cord.....	See Fig. 3
Panel Cover.....	F07-0923-02
Probe Holder.....	J21-2903-03

### OPTIONAL ACCESSORIES

Probe Pouch (MC-78).....	Y87-1600-00
Service Manual.....	B51-1035-00
AC Power Cord.....	See Fig. 3

# SPECIFICATIONS

## CRT 150KTM31 SPECIFICATIONS

### Screen and shape

#### Dimensions

Overall length;	380 mm Max.
Face plate dimensions;	149.3 ± 3.0 mm
Screen shape;	Rectangular flat face, internal graticule, metal back

Deflection and focusing system;	Electrostatic deflection, electrostatic focusing and post-deflection acceleration
---------------------------------	---

Color;	Green
Persistence;	Medium short
Useful display area;	Y axis.....80 mm X axis.....100 mm

#### Heating

Heater voltage;	6.0 V
Heater current;	75 mA
Weight;	Approx. 1.1 kg

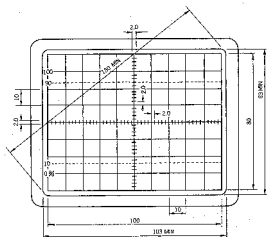


Fig. 1

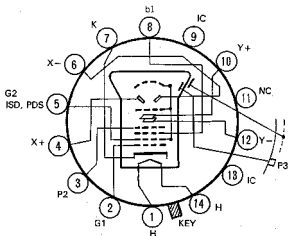


Fig. 2

# 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. 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 90 V to 264 V at frequencies from 45 Hz to 400 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. 3.

### 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.







Plug configuration	Power cord and plug type	Factory installed instrument fuse	Line cord plug fuse	Parts No. for power cord
	North American 120 volt/60 Hz Rated 15 amp (12 amp max; NEC)	1.2 A, 250 V Fast blow AGC/3AG	None	E30-1820-05
	Universal Europe 220 volt/50 Hz Rated 16 amp	1.2 A, 250 V Fast blow 5 x 20 mm	None	E30-1819-05
	U.K. 240 volt/50 Hz Rated 13 amp	1.2 A, 250 V Fast blow 5 x 20 mm	1.2 A Type C	—
	Australian 240 volt/50 Hz Rated 10 amp	1.2 A, 250 V Fast blow 5 x 20 mm	None	E30-1821-05
	North American 240 volt/60 Hz Rated 15 amp (12 amp max; NEC)	1.2 A, 250 V Fast blow AGC/3AG	None	—
	Switzerland 240 volt/50 Hz Rated 10 amp	1.2 A, 250 V Fast blow AGC/3AG 5 x 20 mm	None	—

Fig. 3 Power Input Voltage Configuration

# CIRCUIT DESCRIPTION

## VERTICAL ATTENUATOR

The input attenuator unit has a three stage configuration; the attenuation factor of the first stage is 1/100, of the second stage 1/10 and of the third stage 1/2 and 1/4. In combination, these comprise a 10 point input attenuator in 1, 2 and 5 sequence.

The attenuator consists of resistors and capacitors only and does not vary the gain of amplifiers. For this reason, step attenuator balance adjustment is not required.

In addition, since a 1/1000 attenuator is not used, the frequency response is good. The attenuators in both channel 1 and channel 2 use the same configuration.

## VERTICAL PRE-AMPLIFIER CIRCUIT

Since this model employs four channel operation, four pre-amplifiers are used.

In the first stage amplifier of channel 1, single-ended transistor amplifiers (Q1 - Q5) with improved high-frequency response are applied with the dc feedback by low offset, low drift op-amp (IC1) to produce a low drift wide-band amplifier.

From the second stage amplifier onward, the amplifier is of a differential configuration. In the second stage amplifier circuit, switching transistors Q13 and Q14 are switched to vary gain to perform X5 gain operation.

In the third stage amplifier circuit, the vertical position control (VR) is connected. Q17 is provided as a constant current source so that the average potential of the output of this stage will not vary if the vertical position control is turned. In channel 2, the phase is inverted by switching transistors Q49 and Q50 to perform channel 2 INV.

Q24 and Q25 are trigger amplifiers whose output passes through buffer output amplifiers Q27 and Q29, and the output signal with an output impedance of 50 ohms is fed to A trigger switch PC board. In channel 1, the CH1 OUT signal is output to the rear panel via Q26 and Q28.

The fourth stage amplifier circuit comprises a cascade amplifier together with mixing amplifiers Q62 and Q63. Channel 2 has a similar circuit configuration to that of channel 1. The second amplifier of channels 3 and 4 has a similar circuit configuration to that of the fourth amplifier of channel 1 and 2.

The four signals of channel 1 through 4 are selected by diode switches D7 through D10, D21 through D24 and D29 through D36 and are connected to the emitter of Q62 and Q63.

Q67 and Q68 are buffer amplifiers to obtain matching with the delay line. These amplifiers have superb CMRR (common mode rejection ratio) in order to provide a balanced output to the delay line and reduce distortion in the waveform of the delay line.

Q73 and Q74 are trigger amplifiers which output the output signal of the mixing amplifier to the A trigger switch unit and are V MODE trigger source. Q64 is a load resistor switching transistor during ADD mode.

Q69 through Q72 make up a 20 MHz band width circuit which sets the frequency response of the vertical axis to 20 MHz, (-3 dB).

The signals of channel 1 through 4 are appropriately switched by a combination of the vertical and horizontal modes by means of the logic circuit consisting of IC3 through IC7.

## CH3, CH4 AMPLIFIER CIRCUIT

This circuit consists of the attenuator unit, buffer amplifier, first stage amplifier and trigger amplifier. Q1 drives relay RL1 to switch the attenuator unit to 1/1 and 1/10.

The output signal from this attenuator unit is converted in impedance by Q2 through Q4, amplified by Q5 and Q6, and fed to the second amplifier of the vertical pre-amplifier circuit. At the same time, the trigger signal is passed through trigger amplifiers Q7 and Q8, and applied to the A trigger switch unit.

Although channel 4 has an identical circuit to that of channel 3, the trigger signal is fed to the B trigger switch unit. On the same PC board, the wiring network connecting the CPU unit and trigger sweep unit to the HORIZ DISPLAY and TRIG MODE PC board is incorporated.

## VERTICAL OUTPUT AMPLIFIER CIRCUIT

The signal passed through the delay line is applied to the vertical output amplifier. Q1 through Q4 are the cascade connection differential amplifiers. Q14 is a constant current biasing circuit. Q7 through Q12 are final stage output amplifiers; as the cases of Q11 and Q12 are mounted on the chassis to draw off heat, the heat radiation effect is improved compared with former final stage amplifiers. Q15, Q16 and Q17 make up the trace separation circuit, and Q13 and Q18 make up the beam finder circuit.

## A TRIGGER SWITCH CIRCUIT

CH1, CH2, CH3, V MODE and LINE trigger signals are fed to the A trigger switch circuit. S1 is a trigger source select switch and S2 is a trigger coupling select switch. Q1 and Q2 are fixed sync circuits which detect the peak value of the trigger input signal to automatically set the trigger level.

Q3 is a dual FET to prevent temperature drift during the dc sync. Q4 and Q5 make up the emitter follower circuit which serves to lower the driving impedance for the following stage. Q6 and Q7 are feedback amplifiers which improve the CMRR (common mode rejection ratio) of both polarities of the trigger signal. Q8 and Q9 are circuits which prevent temperature drift. Q10 through Q15 are cascode amplifiers and make up a switching circuit of the negative and positive polarities of the trigger signal.

# CIRCUIT DESCRIPTION

Q17 through Q25 are video sync circuits. Q17 through Q19 make up a switching circuit of the negative and positive polarities of the trigger signal and Q21 and Q22 make up a trigger waveshape circuit. Separation and selection of the vertical and horizontal sync signals are performed by Q24 which is interlocked with the SWEEP TIME/DIV control. Q16 receives the trigger signals from Q10 through Q15 or Q25 and feeds the trigger signal to the trigger sweep unit with an output impedance of 50 ohms.

## B TRIGGER SWITCH CIRCUIT

Basically, this is the same as the A trigger switch circuit. However, the B trigger switch circuit does not have the video sync circuit and fixed sync circuit.

Q1 extracts the trigger signal of channel 2, then feeds the X signal to the trigger sweep unit during the X-Y operation.

## ROTARY SWITCH CIRCUIT

This is part of the sweep circuit and is mounted on a separate PC board which the rotary switch for selecting the sweep time resistors and the resistors for the holdoff circuit are installed.

## TRIGGER SWEEP CIRCUIT

The sweep circuit employs a constant current integrating circuit which charges capacitors with a constant current to provide sawtooth waves. Q13, Q15 and Q17 are switching transistors of capacitors for A sweep time. In the case of the B sweep, Q43, Q45 and Q47 operate in the same manner as in the A sweep.

Q12, Q14 and Q16 are switching transistors for holdoff capacitors of the A sweep. In the case of the B sweep, Q42, Q44 and Q46 operate in the same manner as in the A sweep. The voltage supplied from the constant voltage circuit is converted into the constant current source by the voltage setting circuit consisting of IC3a and Q7 and resistors switched by the rotary switch. The capacitor for the sweep time is charged by this current and its terminal voltage is increased. This voltage is fed to the high impedance buffer amplifier consisting of Q18 and Q19. When the output of this amplifier reaches a certain voltage, IC7d is turned on and the flip-flop IC2b is reset; at the same time, IC2a is set. The output of IC2a turns Q6 on, then short-circuits the capacitor for the sweep time with the result that its terminal voltage is decreased. The constant current circuit formed by Q20 charges any one of holdoff capacitors C12, C16 or C20. The terminal voltage of the capacitor gradually increases and when it reaches a certain value, Q22 turns on. The output of Q22 turns on the Schmitt trigger consisting of IC7c, setting IC2b. The output from IC2b releases IC2a setting and starts sweeping again.

The trigger signal is passed through IC1a and IC1b, then triggers IC2a and releases the set flip-flop to start the sweep which is in sync with the trigger signal. IC1a and

IC1b make up the Schmitt trigger circuit.

The trigger signal shaped by IC1a and IC1b is applied to IC1c, Q1 and Q2. When the trigger signal is present, the gate of IC1d is closed and IC2a acts as a master-slave flip-flop. When the trigger signal disappears, as the gate of IC1d opens, IC2a acts as an R-S flip-flop. This is an auto free-running circuit.

Q24 through Q26 are the detection circuit for delayed sweep. When a voltage level determined by the delay time multiplier is reached, Q24 turns on and the gate of IC8a is triggered. IC8a and IC10b make up the logic differentiating circuit which produces a pulse with a certain pulse width. This pulse sets IC5b and starts the B sweep. The B sweep circuit is almost the same as the A sweep circuit except that the B sweep circuit does not have three ranges of low speed sweep.

The B STARTS AFTER DELAY switch permits the gate of the IC4d to switch from the trigger priority master-slave flip-flop to the R-S flip-flop, and it is possible to start sweep from the voltage level determined by the delay time multiplier.

The A sweep is adjusted in horizontal position by Q53 while the B sweep is adjusted in horizontal position by Q54 and the horizontal display is switched by Q55 through Q58. The A and B sweep waveforms are synthesized at the collectors of Q55 and Q58. The X-Y signals also pass through Q59 where they are synthesized. The signal passed through Q60 is improved in CMRR with Q62 before it is fed to the following stage. The signals at Q64, Q65 and Q66, Q68 are switched by Q69 and Q68 respectively to X1 and X10, then converted in impedance to 50 ohms and fed to the horizontal final stage amplifier.

Q77 through Q79 is a trace separation circuit which supplies two types of bias voltage to the vertical output amplifier by means of the select signals of the A and B sweeps. IC8d is a reset pulse generating circuit during single sweep operation.

IC13a, 14a, and 14e also produce a blanking control signal when the horizontal axis is displayed. This signal is combined by IC11 and 12d with the sweep signal and chop signal, then converted in impedance by Q72 through Q75 to become an input signal to the blanking circuit.

The channel select signal during dual and quad traces in the vertical axis mode is produced by IC12a, IC12b, IC13b, IC14c, IC15a, IC15b, IC15c, IC15d, Q76 and D62 through D64.

IC12a and IC12b are chop oscillators. The on/off of these oscillators is controlled by the vertical axis mode logic and the signal from the CPU unit. While the oscillation is stopped, these oscillators output the alternate signal by receiving the signal from Q76. The output from IC12a and IC12b turns off during vertical axis single trace, and is output in all other modes. The output from IC15d is fed to the vertical pre-amplifier and becomes the chop signal and alternate signal.

# CIRCUIT DESCRIPTION

## CALIBRATION VOLTAGE GENERATOR CIRCUIT

Q80 and Q81 make up a multivibrator circuit, and the signal decreased in impedance by Q82 is output as a calibration voltage. This voltage is changed into constant current by R307 and R308 and output to the current calibration loop on the rear panel. The power sources to all these circuits are stabilized by IC16 before being supplied.

## HORIZONTAL OUTPUT AMPLIFIER CIRCUIT

The sweep signal supplied from the trigger sweep circuit is amplified by differential amplifier Q1 and Q2. The output from Q1 and Q2 is converted in impedance by the emitter-follower circuit Q3 and Q4 and drives Q5 and Q6. Q7 and Q8 make up a constant current circuit. These circuits each serve as a dc load for Q5 and Q6, and are provided with ac peaking by means of C11 and C12. Q9 and Q10 make up an auto biasing circuit which automatically determines the operation point of the output stage. These circuits also serve as a beam finder circuit; when the base of Q11 is grounded, the operation point of the output stage decreases and serves to compress the output waveform.

## CPU CIRCUIT

The control of vertical MODE, HORIZ DISPLAY and TRIG MODE is performed by the CPU.

By means of the software key scanning system, the signal corresponding to the mode switch pressed is processed, and "L" output is sent to each LED indicator and each unit as a control signal.

The CH2 INV signal and 20 MHz B.W. switching signal are individually fed to the CPU, and their LED indicators are activated by the circuit in the vertical pre-amplifier.

As the lithium battery serves as a memory back-up power supply, information is held in memory even when the power is switched off.

## SWITCHING POWER SUPPLY UNIT

Although this unit aims is compact and lightweight, it consumes nearly 55 W power. Therefore, the conventional series regulator system using a power transformer is not able to meet the specification. For this reason, a switching regulator is employed in this unit.

This switching regulator directly rectifies a voltage of 90 - 264 V, whose output is then converted into a dc current by smoothing capacitors. Next, this dc current is switched by power transistors and converted into ac current to drive the converter transformer. The converter transformer has six taps on its secondary winding. The six ac outputs are each rectified and filtered and supply dc outputs to the power blanking unit. However, the voltage at the control winding is compared with the reference voltage, then amplified by the differential amplifier. The output from the differential amplifier controls the base of the power transistor as the control winding is separate and isolated from

the primary winding, thereby stabilizing the output voltage from the secondary winding.

## POWER BLANKING UNIT

Of the six voltages output from the switching power supply unit, five are stabilized by the series regulator again. Q1 and Q3 through Q6 are control transistors. IC1a, IC1b, IC2a and IC2b are differential amplifiers. With respect to the +20 V supply, as its stabilization is not so important, a voltage divider type regulator is used.

The dc-dc converter for high voltage employs the same circuit as conventional models. Q24 through Q26 make up a differential amplifier and Q28 is a control transistor. This scope allows the brightness of the A and B sweep to be varied independently. Q11 through Q13 are responsible for this operation.

Q14 is a beam finder circuit and even if the INTENSITY control is set to CCW, this circuit serves to provide trace on the CRT.

Q15 and Q16 make up an external intensity modulation circuit which darkens the screen of the CRT with "H" level signal of the TTL level.

These signals are synthesized at the base of Q17, and drive Q18. Q19 is a dc load for Q18 and is provided with ac peaking by C25.

Q20 and Q21 are an auto-focus circuit, and opposite phase signal to phase the blanking waveform is applied to the focus electrode of the CRT.

Q22 and Q23 are dc restorer circuit for the blanking and auto-focus circuits and configured as a differential amplifier, so that an isolated signal can be fed to each circuit. Q8 is a transistor for scale illumination, and Q9 and Q10 are transistors for trace rotation.

## FILTER UNIT

L1 and C1 through C3 make up a line filter which prevents noise entering from the power line; the line filter also prevents the unit's internal signal radiating through the power line.

IC1 is a photocoupler which provides the trigger source for the line sync.

## HIGH VOLTAGE BLOCK

The acceleration voltage at the subsequent stage of the unit extends to as much as 18 kV. Therefore, if the high voltage rectifier section is exposed, it is potentially dangerous. Besides, leakage current would not meet the safety standards. So, the unit employs a high voltage block whose high voltage rectifier section is solidified with resin. The dc-dc converter transformer and the rectifier circuit for 2 kV cathode voltage are incorporated in this block. The external output includes -2 kV dc, 6 V ac and 18 kV, which are output from the anode cap. Therefore, unless the anode cap is intentionally removed, as all other voltages are dc output, the high voltages are in the order of approx. 1/2



# CIRCUIT DESCRIPTION

to 1/3 as compared with our former oscilloscope models, thereby eliminating danger.

## **ASTIGMATISM CONTROL UNIT**

In the power blanking unit, the variable resistor for trace rotation and the variable resistor for astigmatism control are mounted on a separate PC board to allow these controls to be adjusted on the front panel.

# BLOCK DIAGRAM

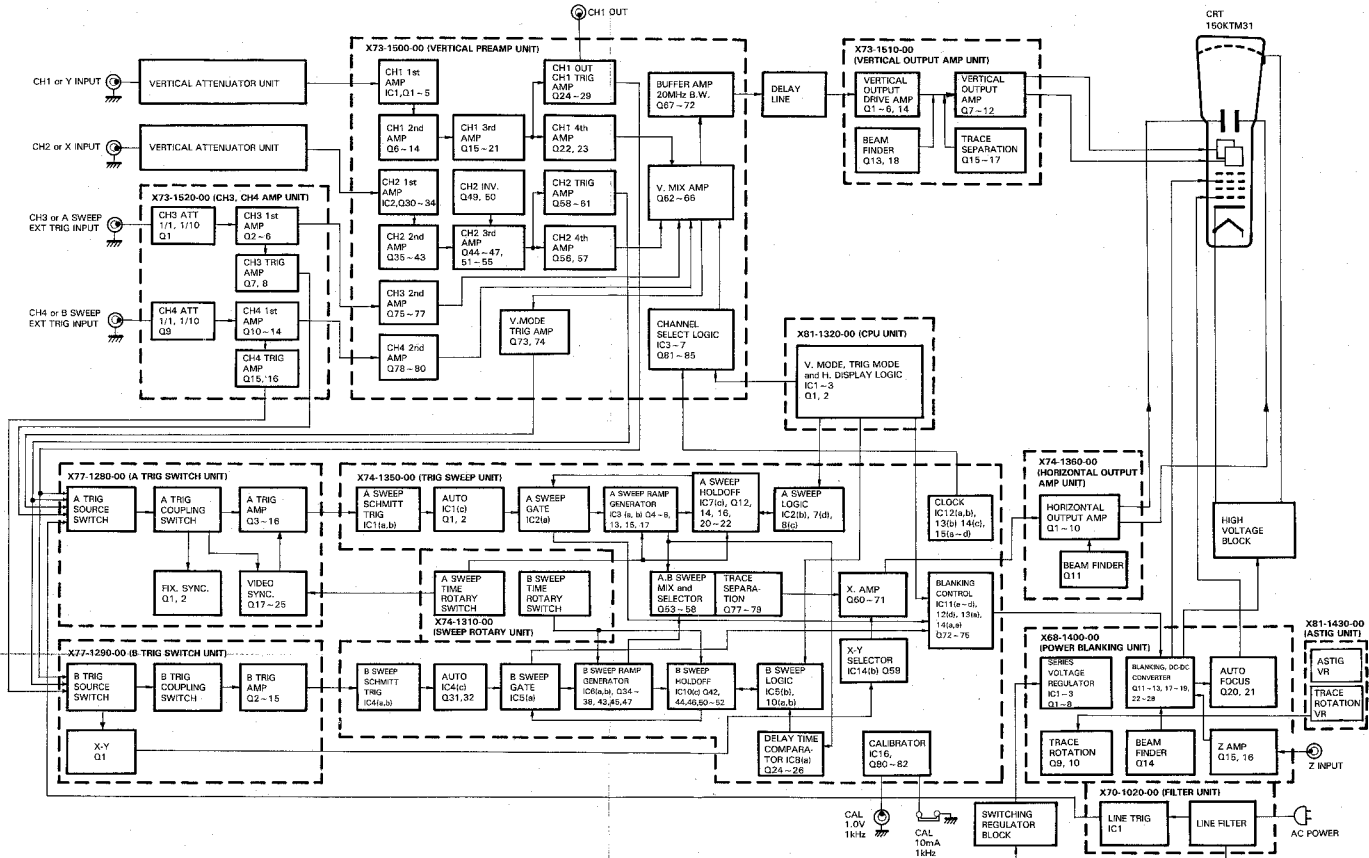


Fig. 4

# MAINTENANCE

## REMOVAL OF CASE

1. Remove the 4 screws located at the rear of the case and the 1 located at bottom with a  $\oplus$  screwdriver. Carefully slide the body forward from the case.
2. To install the body in the case, place the case horizontally and slide the body into the case using the rails located at the bottom of the case. Then, place the body vertically and engage the case front edge into the front panel groove.

3. Temporarily insert the case retaining screws and then tighten them evenly.

### CAUTION:

A voltage of 20 kV is applied to the CRT socket and anode cap. Before removing the case, turn the power off and pull out the power plug. After removing the case, take care not to touch them.

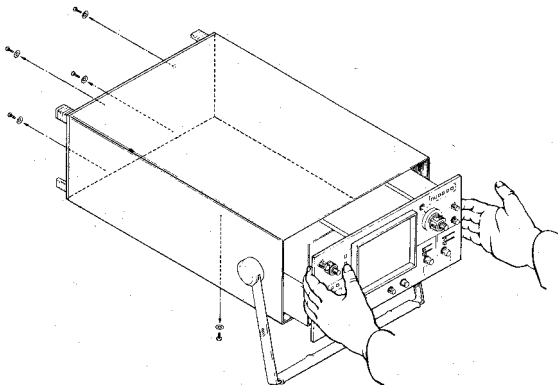


Fig. 5

## REMOVING/INSTALLING CRT

1. To remove the cathode ray tube for servicing, disconnect the parallel cord connector located at the top of the shield case. Remove the screws securing the shield case.

Remove the bracket screws without loosening the CRT band, move the CRT backward and remove the CRT by lifting up the socket.

2. To install the CRT, move the CRT together with the shield case to the front and tighten the screws securing the CRT band and shield case.
3. As slots are provided in the CRT brackets and the brackets are inclined by 45°, the CRT can be moved back and forth and right and left and positioned at any position.  
Always secure the CRT band first, then the CRT brackets.

### CAUTION:

There is a high tension voltage at the anode of the CRT. Before removing the CRT, connect the anode to the ground via a 100 k $\Omega$  load for 5 seconds to discharge the voltage.

## TROUBLESHOOTING

1. If one of the mode LEDs does not light, the unit will not operate correctly. When using the unit, confirm that the LED lights up.
2. To service the unit effectively, isolate the failure first. Then, remove the case and check the wiring, P.C.B. pattern and parts.

# ADJUSTMENT

To obtain the best performance, periodically accurately 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 are warm up the scope sufficiently (more than 30 minutes) before starting.

## NOTE:

Calibrate the unit under the following condition.

Temperature: 10 - 35°C

Humidity: Less than 85%

## POWER SUPPLY VOLTAGE

Before calibrating the unit check the power supply voltage. (90 - 264 V).

## TEST EQUIPMENT REQUIRED

The following instruments of their equivalent should be used for making adjustments.

Test Equipment	Model	Minimum Specification
Digital Multi-Meter	DL-720 (TRIO)	Impedance: More than 10MΩ, Measuring range: 0.01 V to 199V
Sine Wave Generator	SG-502 (Tektronix)	Frequency: 10 Hz to 10MHz, constant voltage over tuning range
Sine Wave Generator	SG-503 (Tektronix)	Frequency: 50kHz to 100MHz, 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 ± 1%, Rise time: 35ns or less (1 MHz, 1ns or less)
Q Meter	4343B (YHP)	--
Color Pattern Generator	CG-911A (TRIO)	--
Oscilloscope	475A (Tektronix)	Sensitivity: More than 5 mV Frequency response: More than 250 MHz
Time Marker Generator	TG-501 (Tektronix)	Time mark: 0.5s to 0.1 μs repetitive waveform, Accuracy: within 0.1%
High Voltage Probe	--	Input Impedance: 1000 MΩ
Termination	TA-57 (TRIO)	Impedance: 50 Ω
Attenuator	011-0059-02 (Tektronix)	-20 dB attenuation (50 Ω)

Test Equipment	Model	Minimum Specification
Power Meter	2041 (YEW)	--
Auto transformer (variable)	SD-265 (Matsunaga)	--
Current Probe	P6302 AM-503 (Tektronix)	--
Frequency Counter	FC-766 (TRIO)	--

Table-3

## PREPARATION FOR ADJUSTMENT

### Control Setting

The control settings 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.

### Power Section

POWER ON

### CRT Control Section

A INTENSITY Between 12 and 3 o'clock position  
 B INTENSITY Between 12 and 3 o'clock position  
 FOCUS Optimum position  
 SCALE ILLUM Arbitrary position  
 BEAM FIND OFF

### Vertical Section

VARIABLE (CH1 and CH2) CAL  
 ▽ POSITION (CH1 - CH4) 12 o'clock position  
 AC-GND-DC (CH1 and CH2) AC  
 VOLTS/DIV (CH1 and CH2) 5V/DIV  
 ×5 GAIN OFF (PUSH)

### Horizontal Sweep Section

A SWEEP TIME/DIV 0.1ms/DIV  
 B SWEEP TIME/DIV 0.1ms/DIV  
 A VARIABLE CAL  
 DELAY TIME MULT Arbitrary position  
 ▽ TRACE SEP. Fully CCW  
 HOLDOFF NORM  
 B ENDS A OFF  
 ◀▶ POSITION 12 o'clock position  
 FINE PULL × 10 MAG 12 o'clock position (× 10 MAG OFF)  
 PULL CHOP F. SELECT OFF (PUSH)

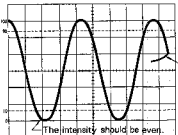
### TRIG. Section

A SOURCE V MODE  
 A COUPLING AC  
 A LEVEL 12 o'clock position  
 A SLOPE +  
 FIX (PUSH)  
 B SOURCE CH1  
 B COUPLING AC  
 B LEVEL 12 o'clock position  
 B SLOPE +  
 STARTS AFTER DELAY (PUSH)

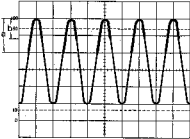
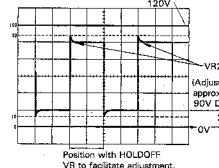
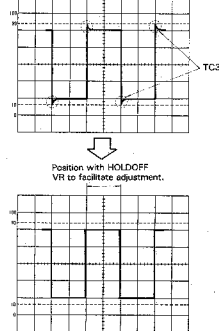
### Mode Section

Vertical MODE CH1  
 20 MHz BW OFF  
 CH2 INV OFF  
 TRIG MODE AUTO  
 HORIZ DISPLAY A

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark																											
<b>ADJUSTMENT OF POWER SUPPLY AND CRT</b>																																		
Check of Power Supply		X68-1400	475A DL-720		(1) Measurement and checking of voltages at P27 and P30 pins <table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>1P</th> <th>2P</th> <th>3P</th> <th>4P</th> <th>5P</th> <th>6P</th> <th>7P</th> <th>8P</th> </tr> </thead> <tbody> <tr> <td>P27</td> <td>+120V</td> <td>+55±1V</td> <td>20V</td> <td></td> <td></td> <td>5.2V</td> <td>10V</td> <td>-10V</td> </tr> <tr> <td>P30</td> <td>+130V±3V</td> <td>55V</td> <td>24V±2V</td> <td></td> <td>12V +1.5V-0.5V</td> <td>7V±0.5V</td> <td>-12V</td> <td>+0.5V-1.5V</td> </tr> </tbody> </table>		1P	2P	3P	4P	5P	6P	7P	8P	P27	+120V	+55±1V	20V			5.2V	10V	-10V	P30	+130V±3V	55V	24V±2V		12V +1.5V-0.5V	7V±0.5V	-12V	+0.5V-1.5V		
	1P	2P	3P	4P	5P	6P	7P	8P																										
P27	+120V	+55±1V	20V			5.2V	10V	-10V																										
P30	+130V±3V	55V	24V±2V		12V +1.5V-0.5V	7V±0.5V	-12V	+0.5V-1.5V																										
Adjustment of -2.0 kV	VR3	X68-1400	DL-720 High voltage probe		(2) Measure the voltage on 2P of P33 and adjust VR3 to obtain -2.00kV (-2.00kV ~ -2.005kV).																													
Coarse Adjustment of ASTIG and FOCUS	VR9 FOCUS Knob	X81-1430		HORIZ DISPLAY: X-Y CH1, CH2 AC-GND-DC: GND A INTENSITY: 3 o'clock 20MHz BW: ON	(1) Operate $\updownarrow$ POSITION knobs for CH1 and CH2 to position the spot in the center of the CRT screen. (2) Adjust VR9 to make the spot round and smaller.																													
Adjustment of A INTENSITY	VR1	X68-1400		HORIZ DISPLAY: X-Y A INTENSITY: 9 o'clock CH1, CH2 AC-GND-DC: GND 20MHz BW: ON	Adjust VR1 so that the spot on the CRT screen disappears when A INTENSITY is set in the position of 9 o'clock. <b>&lt; Check &gt;</b> Make sure that the spot on the CRT screen increases in brightness when A INTENSITY is turned CW and that the trace becomes almost extinguished when A INTENSITY is turned CCW (9 o'clock position).																													
Check of B INTENSITY				HORIZ DISPLAY: ALT Vertical MODE: CH1 TRIG MODE: AUTO STARTS AFTER DELAY: PULL CH1 AC-GND-DC: AC B SWEEP TIME/DIV: 0.1ms	(1) Operate $\updownarrow$ TRACE SEP to cause B sweep line in the center of the CRT screen. (2) Make adjustment so that the trace on the CRT screen increases in brightness when B INTENSITY is turned CW and that the trace becomes extinguished when B INTENSITY is turned to fully CCW. (3) Make adjustment so that the trace becomes extinguished when B INTENSITY is turned to fully CCW.																													
Adjustment of Blanking	TC2	X68-1400	SG-502	HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO A SOURCE: V MODE A COUPLING: AC A INTENSITY: Fully CW CH1 AC-GND-DC: AC A SWEEP TIME/DIV: 0.02 $\mu$ s	(1) Apply a sine wave signal of 10 MHz to CH1 INPUT and operate $\updownarrow$ POSITION, $\leftarrow$ POSITION and CH1 VOLTS/DIV to bring out a waveform with a vertical amplitude of 6 div on the screen. (2) Make adjustment so that there is no unevenness in intensity of the trace at the waveform starting point and there is no retrace.																													
Adjustment of Z-axis Input Blanking	TC1	X68-1400	SG-503	HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO A SOURCE: V MODE CH1 AC-GND-DC: DC VOLTS/DIV: 2V	(1) Set A SWEEP TIME/DIV at 0.5 $\mu$ s and apply a 1 MHz sine wave signal of 10Vp-p to CH1 INPUT so that a waveform with a vertical amplitude of 5 div appears on the screen. (2) Apply the same signal above to the Z INPUT, and turn A INTENSITY CCW so that the dark and bright area of the waveform are distinct. (3) Adjust so that the bright area of the sine waveform is symmetrical to the peak point.																													

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
							
Adjustment of Auto FOCUS Level	VR2	X68-1400	475A Probe (1/10)	HORIZ DISPLAY: A A INTENSITY: Fully CW TRIG MODE: AUTO Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 20 $\mu$ s HOLDOFF: NORM	<ol style="list-style-type: none"> <li>(1) Set the oscilloscope (475A) for the vertical axis sensitivity at 2V/div.</li> <li>(2) Observe the waveform of AUTO FOCUS circuit (Autofocus test point FTP marked pattern) with a probe and make adjustment so that DC level of top of the square wave is approx. 90V (4.5 - 5 div.)</li> </ol>		<p>&lt;Note&gt; Be sure that the AC-GND-DC selector switch of the oscilloscope (475A) is at "DC" position.</p>
Adjustment of Auto FOCUS Wave Forming	TC3	X68-1400		HORIZ DISPLAY: A A INTENSITY: Fully CW TRIG MODE: AUTO Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 20 $\mu$ s HOLDOFF: NORM	Make adjustment so that the above-mentioned circuit has an ideal waveform.		
Adjustment of ASTIG and FOCUS	VR9 FOCUS Knob	X81-1430		HORIZ DISPLAY: X-Y CH1, CH2 AC-GND-DC: GND A INTENSITY: 3 o'clock	<ol style="list-style-type: none"> <li>(1) Operate <math>\uparrow</math> POSITION for CH1 and CH2 so that the bright spot is brought into the center of the CRT screen.</li> <li>(2) Make adjustment to make the spot round and smaller.</li> </ol> <p>&lt;Check&gt;</p> <ol style="list-style-type: none"> <li>(1) Make sure that the bright spot grows larger when the FOCUS knob is turned CW or CCW.</li> <li>(2) Make sure that the FOCUS knob is in a position within the range of 9 and 3 o'clock when the spot is smallest.</li> <li>(3) The most ideal point should be obtained by repeating the above operations and adjustment.</li> </ol>		<p>&lt;Note&gt; Be sure to bring the bright spot into the center of the CRT screen. It may be difficult to obtain the correct adjusting position near the edge of the screen due to the CRT peripheral blur.</p>

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark		
Adjustment of Trace Rotation	VR8	X81-1430		HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: GND	(1) Operate $\updownarrow$ POSITION for CH1 to move the trace to the center of the CRT screen. (2) Make adjustment to align the trace with the horizontal center graticule line. <b>&lt;Check&gt;</b> (1) Make sure that the trace moves more than 0.5 div ( $10^{\circ}$ ) up and down from the horizontal center graticule line at its righthand end.		<b>&lt;Note&gt;</b> When the trace does not appear fully across the screen, make proper adjustment by operating VR9 (X74-1350) and VR7 (X74-1350).		
Adjustment of CRT Center	VR3	X73-1510		HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: GND	Short-circuit the test point of X73-1500 and adjust VR3 so that the trace becomes aligned with the horizontal center graticule line.				
<b>ADJUSTMENT OF VERTICAL AXIS (II)</b>									
Adjustment of CH1 DC BAL	VR2	X73-1500		HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: GND CH1 VOLTS/DIV: 5mV CH1 X5 GAIN: PULL	(1) Turn CH1 VARIABLE knob to fully CCW. (2) Adjust CH1 $\updownarrow$ POSITION so that the trace becomes aligned with the horizontal center graticule line on the CRT screen. (3) Turn CH1 VARIABLE to CAL and make adjustment so that the trace becomes aligned with the horizontal center graticule line on the CRT screen. (4) Repeat the above procedure. <b>&lt;Check&gt;</b> <table border="1" style="margin-left: 20px;"> <tr> <td>Movement of trace</td> <td>less than 0.3 div.</td> </tr> </table>	Movement of trace	less than 0.3 div.		<b>&lt;Note&gt;</b> If the trace does not come to the center of the screen even when $\updownarrow$ position is operated, adjust VR6 (X73-1500).
Movement of trace	less than 0.3 div.								
Adjustment of CH2 DC BAL	VR12	X73-1500		HORIZ DISPLAY: A Vertical MODE: CH2 TRIG MODE: AUTO CH2 AC-GND-DC: GND CH2 VOLTS/DIV: 5mV CH2 X5 GAIN: PULL	Same with the adjustment of CH1 DC BAL.		<b>&lt;Note&gt;</b> CH2 position center can be adjusted by VR16 (X73-1500).		
CH1 Waveform Shaping in the Low Range (5mV range)	VR1	X73-1500	BNC-BNC cord PG-506	HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO A SOURCE: V MODE CH1 AC-GND-DC: DC CH1 VOLTS/DIV: 5mV CH1 VARIABLE: CAL	(1) Apply a 1 kHz square wave signal to CH1 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen. (2) Adjust VR1 to shape the square waveform in the low range.				
CH2 Waveform Shaping in the Low Range (5mV range)	VR11	X73-1500		HORIZ DISPLAY: A Vertical MODE: CH2 TRIG MODE: AUTO A SOURCE: V MODE CH2 AC-GND-DC: GND CH2 VOLTS/DIV: 5mV CH2 VARIABLE: CAL	With vertical MODE selected to CH2, perform the same operations as described above to make adjustment.				

## ADJUSTMENT

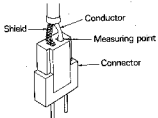
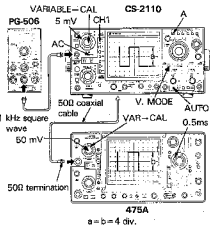
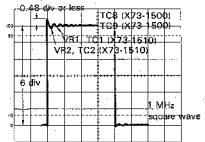
Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of CH1 Gain	VR7	X73-1500	BNC-BNC cord (T junction) PG-506	HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO A SOURCE: V MODE CH1 AC-GND-DC: DC CH1 VOLTS/DIV: 5mV CH1 VARIABLE: CAL 20MHz BW: ON	<p>(1) Apply a square wave signal of 20 mVp-p, 1 kHz to CH1 and CH2 INPUT.</p> <p>(2) Vertical MODE select to CH1 and operate CH1 <math>\updownarrow</math> POSITION to produce a waveform in the center of the CRT screen.</p> <p>(3) Synchronize by operating A trigger LEVEL.</p> <p>(4) Adjust VR7 so that the vertical amplitude of the waveform becomes 4 div.</p> <p>&lt;Check&gt; Turn CH1 VOLTS/DIV and input a reference signal so that the vertical amplitude will be 4 to 6 div in each range.</p> <p style="border: 1px solid black; padding: 2px;">Sensitivity error    within <math>\pm 2\%</math></p>		<p>&lt;Reference&gt; Method of calculation of sensitivity error</p> $\text{Sensitivity error} = \frac{a-b}{b} \times 100\%$ <p>a = CRT screen amplitude b = Input signal voltage (VOLTS/DIV) (Example): CRT screen amplitude: 4.2 div Input signal: 20mVp-p 1 kHz square wave VOLTS/DIV: 5mV Sensitivity error = <math>\frac{4.2\text{div} - 20\text{mV}/5\text{mV}}{20\text{mV}/5\text{mV}} \times 100 = 5\%</math></p>
Adjustment of CH2 Gain	VR18	X73-1500		HORIZ DISPLAY: A Vertical MODE: CH2 TRIG MODE: AUTO A SOURCE: V MODE CH2 AC-GND-DC: DC CH2 VOLTS/DIV: 5mV CH2 VARIABLE: CAL 20MHz BW: ON	<p>(1) With vertical MODE selected to CH2, turn VOLTS/DIV to 5 mV and perform the same operations as described above to make adjustment and check.</p> <p>&lt;Check&gt; (1) Select vertical MODE to DUAL and ALT position and turn VOLTS/DIV for CH1 and CH2 and apply a square wave of 20 mVp-p, 1 kHz to CH1 and CH2 INPUT jacks. Make sure that CH1 and CH2 have the same amplitude.</p> <p>(2) Switch vertical MODE to ADD and A SOURCE to CH1 (CH2) and press CH2 INV pushbutton switch (the lamp will go on when this switch is pressed). Operate <math>\updownarrow</math> POSITION for CH1 and CH2 to produce a single trace in the center of the CRT screen. If a single and straight trace cannot be obtained, adjust VR7 again.</p> <p style="border: 1px solid black; padding: 2px;">Channel error    within 2%</p>		<p>&lt;Note&gt; Overshoot or tilt might appear to the reference signal of 1 kHz square wave. In this case, make coarse adjustment of square wave characteristics.</p>
Adjustment of CH3 Gain and CH4 Gain	VR21 VR23	X73-1500 X73-1500	PG506	HORIZ DISPLAY: A Vertical MODE: QUAD, ALT A SOURCE: 1/1 B SOURCE: 1/1 A SWEEP TIME/DIV: 0.2ms TRIG MODE: AUTO CH1, CH2 AC-GND-DC: GND	<p>(1) Apply a 0.5Vp-p, 1 kHz square wave signal simultaneously to CH3 and CH4 INPUT jacks and adjust A trigger LEVEL and B trigger LEVEL to obtain synchronization. Operate CH3 and CH4 <math>\updownarrow</math> POSITION controls to bring the pattern to the center of the CRT screen.</p> <p>(2) Make adjustment so that the amplitude of CH3 and CH4 waveforms becomes 5 div respectively.</p> <p>&lt;Check&gt; (1) Sensitivity error must be within <math>\pm 2\%</math>. (See to reference for the adjustment of CH1 Gain) (2) With A SOURCE and B SOURCE switches set to 1/10, make the 1 kHz square wave signal 5 Vp-p and operate CH3 and CH4 <math>\updownarrow</math> POSITION controls to bring the waveform to the center of the CRT screen. The amplitude at this time must be within the range of 4.9 - 5.1 div.</p>		<p>&lt;Note&gt; If tilt or overshoot occurs to the 1 kHz waveform, refer to the section devoted to CH3 and CH4 waveform shaping.</p>



## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of CH1 $\updownarrow$ POSITION and CH2 $\updownarrow$ POSITION	VR6 VR16	X73-1500 X73-1500		Vertical MODE: DUAL, ALT HORIZ DISPLAY: A TRIG MODE: AUTO CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 AC-GND-DC: GND CH1, CH2 $\updownarrow$ POSITION: 12 o'clock A SWEEP TIME/DIV: 0.1ms	Adjust VR6 and VR16 so that the CH1 and CH2 traces become aligned with the horizontal center graticule line on the CRT screen. <b>&lt;Check&gt;</b> (1) The deviation from the horizontal center graticule line on the CRT screen must be within $\pm 1$ div. (2) When $\updownarrow$ POSITION controls for both CH1 and CH2 are turned fully CW, each trace must move upward more than 4 div and when the knobs are turned fully CCW the trace must move downward more than 4 div.		
Adjustment of CH2 INV Position	VR17	X73-1500			Press CH2 INV (the lamp is on) and adjust VR17 to bring the trace to its position at CH2 NORM (the lamp is off). <b>&lt;Check&gt;</b> (1) Vertical deviation between CH2 NORM and INV must be within $\pm 0.5$ div (2) Press CH2 INV and turn CH2 $\updownarrow$ POSITION fully CW and see if the trace moves more than 4 div upward and it moves more than 4 div downward when the knob is turned fully CCW.		
Adjustment of CH3 $\updownarrow$ POSITION and CH4 $\updownarrow$ POSITION	VR22 VR24	X73-1500 X73-1500		HORIZ DISPLAY: A Vertical MODE: DUAD, ALT A SOURCE: 1/1 B SOURCE: 1/1 TRIG MODE: AUTO CH3, CH4 $\updownarrow$ POSITION: 12 o'clock A SWEEP TIME/DIV: 0.1ms	Adjust VR22 and VR24 so that the CH3 and CH4 traces become aligned with the horizontal center graticule line on the CRT screen. <b>&lt;Check&gt;</b> (1) The deviation from the horizontal center graticule line on the CRT screen must be within $\pm 1$ div. (2) When $\updownarrow$ POSITION controls for both CH3 and CH4 are turned fully CW, each trace must move upward more than 4 div and when the knobs are turned fully CCW, each trace must move downward more than 4 div.		
Adjustment of CH1 X5 Gain and CH2 X5 Gain	VR4 VR14	X73-1500 X73-1500	PG-506	HORIZ DISPLAY: A Vertical MODE: DUAL, ALT TRIG MODE: AUTO CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 AC-GND-DC: DC CH1, CH2 X5 GAIN: PULL A SWEEP TIME/DIV: 0.2ms CH1, CH2 VARIABLE: CAL	(1) Apply a square wave signal of 5 mVp-p, 1 kHz to CH1 INPUT and make adjustment so that the CRT screen amplitude becomes 5 div. (2) Apply the same signal to CH2 and make the similar adjustment. <b>&lt;Check&gt;</b> (1) The sensitivity error must be within $\pm 2\%$ (2) For both CH1 and CH2, the lamp must go on when PULL X5 GAIN is pulled and go off when the knob is pressed. (3) The UNCAL lamp must go off when CH1 and CH2 VARIABLE controls are operated to CAL and go on when the knobs are turned to UNCAL. (CCW)		<b>&lt;Note&gt;</b> If no waveform appears on the screen when the knob is pulled, make coarse adjustment by operating X5 Gain Position Adjustment. CH1: VR5 (X73-1500) CH2: VR15 (X73-1500)
Adjustment of CH1 X5 Gain Position and CH2 X5 Gain Position	VR5 VR15	X73-1500 X73-1500		HORIZ DISPLAY: A Vertical MODE: DUAL, ALT TRIG MODE: AUTO CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 AC-GND-DC: GND CH1, CH2 X5 GAIN: PULL CH1, CH2 $\updownarrow$ POSITION: 12 o'clock A SWEEP TIME/DIV: 0.1ms	Adjust VR5 and VR15 so that the traces of CH1 and CH2 become aligned with the horizontal center graticule line on the CRT screen. <b>&lt;Check&gt;</b> The distance from the center graticule line must be within $\pm 1$ div.		<b>&lt;Note&gt;</b> If sometimes happens that the trace grows thicker at X5 GAIN, thus making it difficult to obtain proper adjustment. In this case, press 20 MHz BW (the lamp is on) button switch to make the line thinner.

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark								
Adjustment of CH1 DC Trigger Level CH2 DC Trigger Level CH3 DC Trigger Level CH4 DC Trigger Level	VR10 VR19 VR1 VR2	X73-1500 X73-1500 X73-1520 X73-1520	DL-720	HORIZ DISPLAY: A Vertical MODE: QUAD CH1, CH2 AC-GND-DC: GND TRIG MODE: AUTO	(1) Operate CH1 and CH2 $\updownarrow$ POSITION and CH3 and CH4 $\updownarrow$ POSITION controls to align the trace with each other on the center of the CRT screen. (2) Make adjustment so that the voltage at all the check points may be zero ( $-0.008 \sim +0.008$ V).		<Note> Use the connector lead for making measurement at the check points. Adjust the voltage in the conductor to zero.								
				<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Item of Adj</th> <th>Adj control</th> <th>Check point</th> </tr> </thead> <tbody> <tr> <td>CH1 DC Trigger Level</td> <td>VR10</td> <td>P15 (X73-1500)</td> </tr> <tr> <td>CH2 DC Trigger Level</td> <td>VR19</td> <td>P16 (X73-1500)</td> </tr> <tr> <td>CH3 DC Trigger Level</td> <td>VR1</td> <td>P17 (X73-1520)</td> </tr> <tr> <td>CH4 DC Trigger Level</td> <td>VR2</td> <td>P18 (X73-1520)</td> </tr> </tbody> </table>	Item of Adj			Adj control	Check point	CH1 DC Trigger Level	VR10	P15 (X73-1500)	CH2 DC Trigger Level	VR19	P16 (X73-1500)
Item of Adj	Adj control	Check point													
CH1 DC Trigger Level	VR10	P15 (X73-1500)													
CH2 DC Trigger Level	VR19	P16 (X73-1500)													
CH3 DC Trigger Level	VR1	P17 (X73-1520)													
CH4 DC Trigger Level	VR2	P18 (X73-1520)													
Adjustment of V MODE Trigger DC Level	VR20	X73-1500		Vertical MODE: CH1 CH1 AC-GND-DC: GND	(1) Operate CH1 $\updownarrow$ POSITION to align the trace with horizontal center graticule line on the CRT screen. (2) Make adjustment so that the voltage in the conductor of the connector P19 is zero ( $-0.008 \sim +0.008$ V).										
Adjustment of CH1 OUT Gain	VR8	X73-1500	475A 50 $\Omega$ Termination 50 $\Omega$ Coaxial cable PG-506	HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: AC CH1 VOLTS/DIV: 5mV CH1 VARIABLE: CAL	(1) Set the vertical axis sensitivity of oscilloscope (475A) to 50 mV and AC-GND-DC to DC. (2) Connect the cable to CH1 OUT on the rear panel of CS-2110 and oscilloscope (475A) via the 50 $\Omega$ termination. (3) Apply a 1 kHz square wave signal to CH1 INPUT and adjust the oscillator output and $\updownarrow$ POSITION so that the amplitude may be 2 div upward and downward from the horizontal center graticule line on the CRT screen. (4) Make adjustment so that the oscilloscope (475A) waveform becomes 4 div.										
Adjustment of CH1 OUT DC Level	VR9	X73-1500	DL-720	HORIZ DISPLAY: A Vertical MODE: CH1 CH1 AC-GND-DC: GND TRIG MODE: AUTO	(1) Operate CH1 $\updownarrow$ POSITION to align the trace with the horizontal center graticule line on the CRT screen. (2) Make adjustment so that the voltage in the connector P21 (X73-1500) becomes less than 0V ( $\pm 10$ mV).										
Adjustment of Square wave Characteristics of CH3	VR1 TC1 VR2 TC2 TC8	X73-1510 X73-1510 X73-1510 X73-1510 X73-1500	PG-506 50 $\Omega$ Termination	HORIZ DISPLAY: A Vertical MODE: QUAD, ALT TRIG MODE: AUTO CH1, CH2 AC-GND-DC: GND A SOURCE: CH3 1/1 A COUPLING: AC A SLOPE: +	(1) With A SOURCE to 1/1 (CH3) apply a 1 MHz square wave signal to CH3 INPUT and adjust the oscillator output to produce a square waveform of 6 div on the CRT screen. (2) Adjust VR1 and TC1 to shape the square waveform in the medium range. (3) Adjust VR2 and TC2 to shape the square waveform in the high range. (4) Adjust TC8 to shape the square waveform in the ultra-high range. <Check> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>Overshoot</td> <td>less than 8%</td> </tr> </table>	Overshoot	less than 8%		<Note> When shaping the waveform, terminate the input terminal of oscilloscope to match the output impedance of the oscillator.						
Overshoot	less than 8%														

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of Square wave Characteristics of CH4	TC9	X73-1500	PG-506 50Ω Termination	HORIZ DISPLAY: B DLY'D Vertical MODE: QUAD, ALT TRIG MODE: AUTO CH1, CH2 AC-GND-DC: GND B SOURCE: CH4 1/1 B COUPLING: AC B SLOPE: +	Apply a 1 MHz square wave signal to CH4 INPUT and take the same steps as in (4) above to shape the waveform. < Check > Overshoot    less than 8%		
Adjustment of Square wave Characteristics of CH1 5 mV Range	TC3 TC2	X73-1500 X73-1500	PG-506 50Ω 20dB Attenuator 50Ω Termination 50 Ω Coaxial cable (BNC-BNC)	HORIZ DISPLAY: A TRIG MODE: AUTO CH1 AC-GND-DC: DC CH1 VOLTS/DIV: 5mV A SOURCE: CH1 A COUPLING: AC A SLOPE: + CH1 VARIABLE: CAL	(1) Set vertical MODE to CH1 and repeatedly apply a 1 MHz square wave signal to CH1 INPUT from the square wave oscillator and adjust the oscillator output so that the amplitude becomes 6 div. In doing this, the input terminal must be terminated to match the output impedance of the oscillator. When the output impedance is 50 Ω terminate the 50 Ω termination. (2) Adjust TC3 to shape the square waveform in the high range. (3) Adjust TC2 to shape the square waveform in the ultra-high range. Overshoot    less than 3%		(1) Adjust A SWEEP TIME/DIV between 20 ns and 0.2 μs so that the waveform is visible. (2) As all measuring instruments are affected, repeat the adjustment individually.
Adjustment of Square wave Characteristics of CH2 5 mV Range	TC7 TC6	X73-1500 X73-1500		HORIZ DISPLAY: A TRIG MODE: AUTO CH2 AC-GND-DC: DC CH2 VOLTS/DIV: 5mV A SOURCE: CH2 A COUPLING: AC A SLOPE: + CH2 VARIABLE: CAL	Set vertical MODE to CH2 and make adjustment as in the case of CH1. < Check > With VOLTS/DIV remaining at 5 mV, check the waveform quality when A SWEEP TIME/DIV is changed by varying the square wave frequency, from 100 kHz to 10 kHz, 1 kHz and back to 100 Hz sequentially. Overshoot    less than 3%		
CH1, CH2 Waveform Shaping in the Low Range (10 mV range)	TC1 TC5	X73-1500 X73-1500	PG-506 BNC-BNC cord	HORIZ DISPLAY: A Vertical MODE: CH1 or CH2 TRIG MODE: AUTO A SOURCE: V MODE CH1, CH2 AC-GND-DC: DC CH1, CH2 VOLTS/DIV: 10mV CH1, CH2 VARIABLE: CAL	(1) Apply a 1 kHz square wave signal to CH1 INPUT and adjust the oscillator output to produce a waveform of 5 – 6 div. In doing this, make adjustment so that the waveform quality of the 10mV range is equal to that of the 5 mV range. (2) Set vertical MODE to CH2 and make adjustment as in the case of CH1.		

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark																											
Adjustment of CH1 ATT and CH2 ATT		S02-4602-05	4343B PG-506	HORIZ DISPLAY: A CH1, CH2 AC-GND-DC: DC A SOURCE: V MODE A SWEEP TIME/DIV: 0.2 ms CH1, CH2 VARIABLE: CAL	<p>(1) Shaping of waveform Apply a 1 kHz square wave signal to CH1 and CH2 INPUT jacks and adjust the oscillator output to produce a waveform of 5-6 div. In doing this, make adjustment so that the waveform quality of each range is equal to that of the 5 mV range.</p> <p>(2) Input capacity (22 pF ± 3 pF) Connect a Q-meter (4343B) to CH1 and CH2 INPUT jacks and make adjustment so that the input capacity of each range is equal to that of the 5mV range.</p> <p>CH1 and CH2 Reference range: 5mV Range</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sequence</th> <th>Adjustment</th> <th>Adj. control</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>10mV range Wave Shape</td> <td>TC6</td> </tr> <tr> <td>2</td> <td>20mV range Wave Shape</td> <td>TC8</td> </tr> <tr> <td>3</td> <td>10mV range Input Capacity</td> <td>TC5</td> </tr> <tr> <td>4</td> <td>20mV range Input Capacity</td> <td>TC7</td> </tr> <tr> <td>5</td> <td>50mV range Wave Shape</td> <td>TC3</td> </tr> <tr> <td>6</td> <td>50mV range Input Capacity</td> <td>TC4</td> </tr> <tr> <td>7</td> <td>5V range Wave Shape</td> <td>TC1</td> </tr> <tr> <td>8</td> <td>5V range Input Capacity</td> <td>TC2</td> </tr> </tbody> </table>	Sequence	Adjustment	Adj. control	1	10mV range Wave Shape	TC6	2	20mV range Wave Shape	TC8	3	10mV range Input Capacity	TC5	4	20mV range Input Capacity	TC7	5	50mV range Wave Shape	TC3	6	50mV range Input Capacity	TC4	7	5V range Wave Shape	TC1	8	5V range Input Capacity	TC2		<Note> Be sure to make the adjustment with the shield case being fitted in place.
Sequence	Adjustment	Adj. control																																
1	10mV range Wave Shape	TC6																																
2	20mV range Wave Shape	TC8																																
3	10mV range Input Capacity	TC5																																
4	20mV range Input Capacity	TC7																																
5	50mV range Wave Shape	TC3																																
6	50mV range Input Capacity	TC4																																
7	5V range Wave Shape	TC1																																
8	5V range Input Capacity	TC2																																
CH3 Waveform Shaping	TC2 (A SOURCE 1/10)	X73-1520	PG-506	HORIZ DISPLAY: A Vertical MODE: QUAD, ALT A SOURCE: CH3 1/1 A SWEEP TIME/DIV: 0.2ms TRIG MODE: AUTO CH1, CH2 AC-GND-DC: GND	<p>(1) Apply a 1 kHz square wave signal of fast rise time to CH3 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen.</p> <p>(2) With A SOURCE set to 1/10, produce a waveform of 6 div in the same manner and adjust TC3 to obtain the similar waveform as (1) above.</p>																													
CH4 Waveform Shaping	TC6 (B SOURCE 1/10)	X73-1520		HORIZ DISPLAY: DUAL Vertical MODE: QUAD, ALT A SOURCE: CH3 1/1 B SOURCE: CH4 1/1 A SWEEP TIME/DIV: 0.2ms B SWEEP TIME/DIV: 0.2ms	<p>(1) Apply a 1 kHz square wave signal of fast rise time to CH4 INPUT and take the same steps as in (1) above to shape the waveform.</p>																													
Adjustment of CH3 Input Capacity	TC3 (1/10)	X73-1520	4343B	A SOURCE: CH3 1/1	<p>(1) Check that the input capacity of CH3 becomes equal to the value of CH1 5mV range (22 pF ± 3 pF).</p> <p>(2) Make adjustment so that the input capacity of CH3 setted to 1/10 to become equal to that at 1/1.</p> <p>&lt;Check&gt; The difference between A SOURCE 1/1 and A SOURCE 1/10: less than 1pF. It shall be the same with B SOURCE.</p>		<Note> Be sure to make adjustment of input capacity after making 1kHz square waveshape.																											

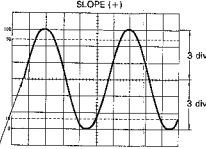
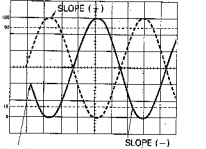
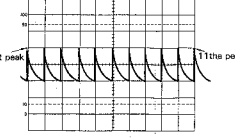
## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark		
Adjustment of CH4 Input Capacity	TC7(1/10)	X73-1520	4343B	B SOURCE: CH4 1/1	Adjust the input capacity in the same manner as CH3. <Check> Check the input capacity in the same manner as CH3.		<Note> Be sure to make adjustment of input capacity after making 1 kHz square waveshape.		
ADJUSTMENT OF VERTICAL AXIS (II)									
Check of 1 MHz Square wave Characteristics Square wave Characteristics of CH1 and CH2			PG-508 50Ω Termination	HORIZ DISPLAY: A A SOURCE: V MODE A SWEEP TIME/DIV: 0.2 μs ~ 20 ns TRIG MODE: AUTO A COUPLING: AC	(1) Check the square wave characteristics of CH1 and CH2 5 mV range. Turn the VOLTS/DIV knob for each channel to adjust the oscillator output so that CH1 and CH2 will produce a waveform of 6 div, respectively. (2) The overshoot must be less than 3% for each range.		<Note> As the VOLTS/DIV is manually rotated, the amplitude of 6 div cannot be obtained amplitude.		
				HORIZ DISPLAY: DUAL, ALT Vertical MODE: QUAD, ALT A SOURCE: CH3 1/1 B SOURCE: CH4 1/1	(1) Apply a 1 MHz square wave signal to CH3 and CH4 INPUT jacks and see if the overshoot is less than 3% at this time. (2) The overshoot must be less than 3% when A SOURCE is turned from 1/1 to 1/10 and B SOURCE from 1/1 to 1/10.				
Check of CH1 and CH2 Frequency Characteristics			SG-503 50Ω Coaxial cable (BNC-BNC) 50Ω 20dB Attenuator 50Ω Termination	HORIZ DISPLAY: A TRIG MODE: AUTO A SOURCE: V MODE A COUPLING: AC CH1, CH2 AC-GND-DC: DC A SWEEP TIME/DIV: 2μs ~ 20 ns	(1) With CH1 VOLTS/DIV set to 5 mV, apply a sine wave signal of 50 kHz to INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen. (2) When the frequency is varied to 100 MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div and there must be no sudden dips and peaks during attenuation. (3) Perform the same operations for CH2. <table border="1" style="margin-left: 20px;"><tr><td>Frequency characteristic</td><td>100 MHz, less than -3 dB</td></tr></table> (4) When the specification are not satisfied, readjust the 1 MHz square wave characteristics.	Frequency characteristic	100 MHz, less than -3 dB		
Frequency characteristic	100 MHz, less than -3 dB								
Adjustment of CH3 and CH4 Frequency Characteristics	TC4 (CH3 1/10) TC8 (CH4 1/10)	X73-1520	SG-503 50Ω Termination 50Ω Coaxial cable (BNC-BNC)	HORIZ DISPLAY: DUAL Vertical MODE: QUAD, ALT TRIG MODE: AUTO A SOURCE: CH3 1/1 B SOURCE: CH4 1/1	(1) Apply a sine wave signal of 50 kHz to CH3 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen. (2) When the frequency is changed to 100 MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div. (3) With A SOURCE to 1/10 position adjust TC4 so that the amplitude at 100 MHz is within the specification limits. <table border="1" style="margin-left: 20px;"><tr><td>Frequency characteristic</td><td>100 MHz, less than -3 dB</td></tr></table> (4) Perform the same operations for CH4. (5) When the specification is not satisfied, readjust the 1 MHz square wave characteristics. (6) Perform the same adjustment for B SOURCE (TC8).	Frequency characteristic	100 MHz, less than -3 dB		
Frequency characteristic	100 MHz, less than -3 dB								

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Check of CH1 and CH2 X5 GAIN Frequency Characteristics			SG-503 500 Termination	HORIZ DISPLAY: A A SOURCE: V MODE TRIG MODE: AUTO CH1, CH2 AC-GND-DC: DC CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 X5 GAIN: PULL	(1) With vertical MODE set to CH1, apply a sine wave signal of 50 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen. (2) When the frequency is varied to 100 MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div. (3) Set vertical MODE to CH2 and make a similar check. <u>X5 GAIN frequency characteristic</u> 100 MHz, less than -3 dB.		
Check of 20 MHz BW Frequency Characteristics			SG-503 500 Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE CH1 AC-GND-DC: DC CH1 VOLTS/DIV: 5mV 20 MHz BW: ON TRIG MODE: AUTO	(1) Apply a sine wave signal of 50 kHz to CH1 INPUT to produce a waveform of 6 div. (2) Vary the frequency of the input signal without changing to oscillator output and read the frequency at which the amplitude on the screen becomes 4.25 div. This frequency must be within the specification limits. <u>20 MHz BW frequency characteristic</u> frequency of -3dB:15MHz to 25MHz.		
Adjustment of CH1 OUT Frequency Characteristics	TC4	X73-1500	475A 500 Termination (through type) 500 Coaxial cord (BNC-BNC) SG-503	CH1 AC-GND-DC: AC CH1 VOLTS/DIV: 5mV CH1 $\downarrow$ POSITION: 12 o'clock	(1) With the vertical axis sensitivity of 475A set to 50 mV, lead a 500 coaxial cable from CH1 OUT and terminate it with 500 termination and connect it to CH1 IN of 475A. (2) Apply a sine wave signal of 50 kHz to CH1 INPUT and adjust the oscillator output so that the vertical amplitude of 475A becomes 6 div. When the frequency is varied to 100 MHz without changing the oscillator output, adjust TC4 so that the amplitude on the CRT screen of 475A becomes over 4.25 div. <u>CH1 OUT frequency characteristic</u> 100 MHz, less than -3 dB		<b>&lt;Note&gt;</b> If the square wave characteristics of CH1 PRE-AMP and V. OUTPUT AMP are readjusted the square wave characteristic and frequency characteristic will also change.
Adjustment of CAL Output	VR16 VR17	X74-1350 X74-1350	475A FC-756 DL-720		(1) Short-circuit TP1 (X74-1350) and adjust VR17 so that the voltage at CAL output terminal becomes $1.0 \text{ V} \pm 1\%$ . (2) Set the vertical axis sensitivity of 475A to 20 mV and the sweep time to 0.2 ms. (3) Lead a probe from the calibration voltage output terminal (CAL) of CS-2110 and connect it to CH1 INPUT of 475A. (4) Adjust VR16 so that the frequency becomes 1 kHz. <b>&lt; Check &gt;</b> Frequency: within $1 \text{ kHz} \pm 3\%$ . Output voltage: within $1.0 \text{ Vp-p} \pm 1\%$ . Duty ratio: within $(50 \pm 2)\%$		<b>&lt;Note&gt;</b> For checking the frequency, a frequency counter (FC-756) may be used.

# ADJUSTMENT

Item	Adjustment Control	P. C. B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
<b>ADJUSTMENT OF HORIZONTAL SWEEP</b>							
<p>Coarse Adjustment of A and B Trigger Center and SLOPE</p> <p>Coarse Adjustment of A Trigger Center and SLOPE</p>	<p>VR2 VR4</p>	<p>X77-1280 X77-1280</p>	<p>SG-502</p>	<p>HORIZ DISPLAY: A Vertical MODE: CH1 TRIG MODE: AUTO CH1 AC-GND-DC: AC A SWEEP TIME/DIV: 0.2ms A SOURCE: V MODE A COUPLING: AC A trigger LEVEL: 12 o'clock A SLOPE: +</p>	<p>(1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscilloscope output and <math>\updownarrow</math> POSITION to produce a waveform of amplitude 3 div above and below the horizontal center graticule line on the CRT screen.</p> <p>(2) Adjust VR2 so that the starting point of the waveform is aligned with the horizontal center graticule line on the CRT screen.</p> <p>(3) Set A SLOPE to (-) and adjust VR4 to bring the starting point of the position of the starting point of the waveform produced when A SLOPE is set to (+).</p>	<p style="text-align: center;">SLOPE (+)</p>  <p style="text-align: center;">Align the starting point with the horizontal center graticule line</p> <p style="text-align: center;">SLOPE (+)</p>  <p style="text-align: center;">Align SLOPE (-) with the starting point of SLOPE (+)</p>	
<p>Coarse Adjustment of B Trigger Center and SLOPE</p>	<p>VR2 VR3</p>	<p>X77-1290 X77-1290</p>	<p>SG-502</p>	<p>HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 B COUPLING: AC B trigger LEVEL: 12 o'clock B SLOPE: + A SWEEP TIME/DIV: 0.5 ms B SWEEP TIME/DIV: 0.2 ms TRIG MODE: AUTO <math>\updownarrow</math> TRACE SEP: NORM</p>	<p>(1) Set A INTENSITY to fully CCW.</p> <p>(2) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output and <math>\updownarrow</math> POSITION to produce a waveform of amplitude 3 div above and below the horizontal center graticule line on the CRT screen.</p> <p>(3) Adjust VR2 so that the starting point of the waveform is aligned with the horizontal center graticule line on the CRT screen.</p> <p>(4) Next, set B SLOPE to (-) and adjust VR3 to bring the starting point of the waveform to the position of the starting point of the waveform produce when B SLOPE is set to (+).</p>		
<p>Adjustment of A Sweep Time</p>	<p>VR9</p>	<p>X74-1350</p>	<p>TG-501 500 Termination</p>	<p>HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A VARIABLE: CAL</p>	<p>(1) Apply a marker signal of 0.5 ms to CH1 INPUT.</p> <p>(2) Operate <math>\leftarrow</math> POSITION to bring the first peak of the marker signal to the left end of the graticule line and adjust VR9 for the 11th peak to the right end of the graticule line.</p>		<p>&lt;Note&gt;</p> <p>(1) When TG-501 is used, set CH1 AC-GND-DC to AC, VOLTS/DIV to 0.5 V/div, thru 500 termination.</p> <p>(2) If the 11th peak is not visible, adjust VR7 (X74-1350) for A sweep length adjustment.</p>

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of B Sweep Time	VR10	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A SWEEP TIME/DIV: 0.5ms B SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 0.20	<ol style="list-style-type: none"> <li>Apply a marker signal of 0.5 ms to CH1 INPUT.</li> <li>On the screen A and B sweeps of CH1 input signal will appear. Operate <math>\updownarrow</math> TRACE SEP to bring these sweeps into the positions where they can be easily adjusted.</li> <li>Make adjustment so that the first peak of B sweep is brought to the left end of the graticule line on the screen and the 11th peak to the right end of graticule line on the screen.</li> <li>Make sure that A and B TRIG'D lamps are on.</li> </ol>		<p>&lt;Note&gt;</p> <ol style="list-style-type: none"> <li>When TG-501 is used, the knobs must be operated in the same manner as described above.</li> <li>If the 11th peak is not visible adjust VR8 (X74-1350) for B sweep length adjustment.</li> <li>The B sweep time will not change even if A VARIABLE is turned.</li> </ol>
Adjustment of A Sweep Length	VR7	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO	<ol style="list-style-type: none"> <li>Apply a marker signal of 0.5 ms to CH1 INPUT.</li> <li>Make adjustment so that the total length is 12 div.</li> </ol>		<p>&lt;Note&gt;</p> <p>Turn <math>\leftarrow</math> POSITION to shift the base line two markers to the left then you can see the 12th time marker with the graticule area.</p>
Adjustment of B Sweep	VR8	X74-1350		HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A SWEEP TIME/DIV: 0.5ms B SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 0.20	<ol style="list-style-type: none"> <li>Apply a marker signal of 0.5 ms to CH1 INPUT.</li> <li>A and B sweeps will appear on the screen. Use <math>\updownarrow</math> TRACE SEP to separate them.</li> <li>Make adjustment so that the total length of B sweep is 12 div.</li> </ol>		
Adjustment of A Sweep Position	VR11	X74-1350		HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO	<ol style="list-style-type: none"> <li>Set CH1 AC-GND-DC to GND to bring the trace to the center of the CRT screen.</li> <li>Set the FINE knob of <math>\leftarrow</math> POSITION to 12 o'clock.</li> <li>Turn <math>\leftarrow</math> POSITION fully CW without turning the FINE knob and note the deviation between the starting point of the trace and the center of the screen. Next, turn <math>\leftarrow</math> POSITION fully CCW and measure the distance between the ending point of the trace and the center of the screen. Make adjustment so that these deviations will have the same width. Width error <span style="border: 1px solid black; padding: 2px;">less than 1 div.</span></li> </ol>		



# ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of B Sweep Position	VR12	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A,B SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 0.20	<ol style="list-style-type: none"> <li>Apply a marker signal of 0.5 ms to CH1 INPUT and align the first peak of A sweep to the leftmost division of the CRT screen.</li> <li>Operate <math>\uparrow</math> TRACE SEP to separate A sweep and B sweep and set A VARIABLE to CAL.</li> <li>Make adjustment so that the starting point of B sweep is aligned with that of A sweep in the horizontal position.</li> </ol> <p>&lt;Check&gt; Operate <math>\uparrow</math> TRACE SEP so that A sweep and B sweep are superimposed on one another and make sure that their starting points coincide with each other.</p>		
Adjustment of X10 MAG Gain	VR13	X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.1ms TRIG MODE: AUTO CH1 VOLTS/DIV: 1V CH1 AC-GND-DC: DC	<ol style="list-style-type: none"> <li>Apply a marker signal of 0.1 ms to CH1 INPUT to produce a waveform of vertical amplitude of about 2 div.</li> <li>Align the first peak of the marker signal with the left end of the graticule line on the CRT screen and the 11th peak with the right end and pull the X10 MAG switch.</li> <li>Make adjustment so that the peak-to-peak distance is 10 div.</li> </ol> <p>&lt;Check&gt; Specification    10 times <math>\pm 5\%</math></p>		
Adjustment of X10 MAG Center	VR14	X74-1350		HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 0.1ms A VARIABLE: CAL TRIG MODE: AUTO A SLOPE: +	<ol style="list-style-type: none"> <li>Apply a marker signal of 0.5 ms to CH1 INPUT to produce 3 peaks waveform on the CRT screen.</li> <li>Operate <math>\leftarrow</math> POSITION to bring the central peak to the vertical center graticule line on the screen.</li> <li>Make adjustment so that the waveform will be aligned with the vertical center graticule line on the screen when the FINE knob is pulled out (X10 MAG position).</li> </ol> <p>&lt;Check&gt; Repeatedly push and pull the FINE knob to make sure that the center of the waveform does not move.</p> <p>Deviation    less than 1 div.</p>	<p>Align with center vertical graticule line.</p>	
Adjustment of MAG Center and Gain					Recheck the center at X10 MAG and Gain.		
Adjustment of A Sweep Time, 50ms, 5μs and 0.1μs.	VR2 (50ms) VR1 (5μs) TC1 (0.1μs)	X74-1350 X74-1350 X74-1350	TG-501 50Ω Termination	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE TRIG MODE: AUTO A VARIABLE: CAL	<ol style="list-style-type: none"> <li>With A SWEEP TIME/DIV set to 50ms apply a marker signal of 50ms to CH1 INPUT.</li> <li>Adjust VR2 so that the first peak of the marker signal is aligned with the left end of the graticule on the screen and the 11th peak with the right end.</li> <li>Next, rotate the A SWEEP TIME/DIV to 5μs and apply a 5μs time marker to CH1 INPUT and adjust VR1 in the same manner as (2).</li> <li>Next, A SWEEP TIME/DIV to 0.1μs and with 0.1μs time marker to CH1 INPUT, adjust TC1 in the same manner as (2).</li> </ol>		

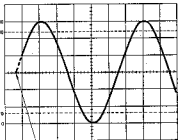
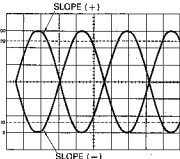
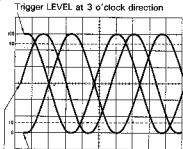
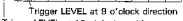
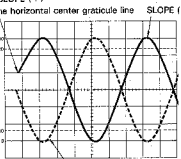
## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of B Sweep Time 50ms, 5 $\mu$ s and 0.1 $\mu$ s	VR4 (50ms) VR3 (5 $\mu$ s) TC2 (0.1 $\mu$ s)	X74-1350 X74-1350 X74-1350	TG-501 50 $\Omega$ Termination	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A,B SWEEP TIME/DIV: 0.5ms TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 0.20	<ol style="list-style-type: none"> <li>Set A and B SWEEP TIME/DIV to 50ms and apply a marker signal of 50ms to CH1.</li> <li>Operate <math>\nabla</math> TRACE SEP to separate A sweep and B sweep to be in the positions where adjustment can be made easily.</li> <li>Adjust VR4 so that the first peak of the marker signal is aligned with the left end of the graticule line on the screen and the 11th peak with the right end.</li> <li>Rotate A and B SWEEP TIME/DIV to 5<math>\mu</math>s and apply a 5<math>\mu</math>s time marker to CH1 INPUT and adjust VR3 in the same manner as (3).</li> <li>Next, A and B SWEEP TIME/DIV to 0.1<math>\mu</math>s and with 0.1<math>\mu</math>s times marker to CH1 INPUT, adjust TC2 in the same manner as (3).</li> </ol>		
Adjustment of 20ns A Sweep Linearity	TC3	X74-1350		HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A SWEEP TIME/DIV: 20ns A VARIABLE: CAL TRIG MODE: AUTO A SLOPE: +	<ol style="list-style-type: none"> <li>Apply a marker signal of 20ns to CH1 INPUT.</li> <li>Make adjustment so that the total length of the waveform is 11 div.</li> </ol>		
Adjustment of 20ns B Sweep Linearity	TC4	X74-1350		HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 1.00	<ol style="list-style-type: none"> <li>With A and B SWEEP TIME/DIV to 20ns, apply a marker signal of 20ns to CH1 INPUT.</li> <li>Operate <math>\nabla</math> TRACE SEP to separate A sweep and B sweep into the positions where they can be easily adjusted.</li> <li>Make adjustment so that the total length of the waveform is 11 div.</li> </ol>		
Check of Sweep Time Error in All the Range	(I)			HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE TRIG MODE: AUTO A VARIABLE: CAL	<ol style="list-style-type: none"> <li>Apply a reference time marker signal for each range of A SWEEP TIME/DIV.</li> <li>Measure the time error rate and make sure it is within the specification limits.</li> </ol> <p style="text-align: center;">Specification    within <math>\pm 2\%</math>.</p>		
				HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A VARIABLE: CAL TRIG MODE: AUTO A, B SLOPE: + A, B INTENSITY: Fully CW DELAY TIME MULT: 1.00	<ol style="list-style-type: none"> <li>Operate <math>\nabla</math> TRACE SEP to separate A sweep and B sweep into the positions where they can be easily adjusted.</li> <li>Apply a reference time marker signal in each of all the ranges (50ms - 20ns) of B sweep.</li> <li>Measure the time error rate and make sure it is within the specification limits.</li> </ol> <p style="text-align: center;">Specification    within <math>\pm 2\%</math>.</p>		

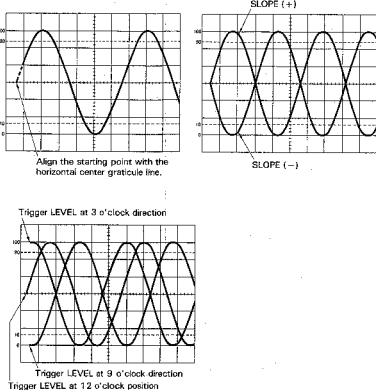
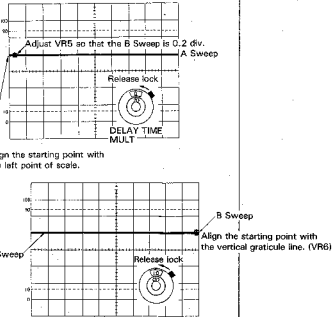
## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark		
<b>ADJUSTMENT OF X-Y OPERATION</b>									
Adjustment of X Position Center	VR15	X74-1350		HORIZ DISPLAY: A Vertical MODE: DUAL, ALT CH1, CH2 VOLTS/DIV: 5mV CH1, CH2 AC-GND-DC: GND A SOURCE: CH1 TRIG MODE: AUTO A SWEEP TIME/DIV: 0.1ms	(1) Operate $\updownarrow$ POSITION for both CH1 and CH2 to superimpose the two traces on one another in the center of the CRT screen. (2) Make adjustment so that the bright spot comes to the center of the screen when HORIZ DISPLAY is switched in X-Y.  <Check> Operate CH2 $\updownarrow$ POSITION and make sure that the spot will move as described below: (1) When the knob is turned counterclockwise, the spot moves leftward more than 5 div. (2) When the knob is turned clockwise, the spot moves rightward more than 5 div. <table border="1" style="width: 100%;"><tr><td>Distance between the spot and the center of</td><td>within <math>\pm 1</math> div from the center of the screen.</td></tr></table>	Distance between the spot and the center of	within $\pm 1$ div from the center of the screen.		<Note> When making X-Y adjustment, do not set both CH1 and CH2 to X5 GAIN.
Distance between the spot and the center of	within $\pm 1$ div from the center of the screen.								
Adjustment of X Gain	VR25	X73-1500	PG-506	HORIZ DISPLAY: X-Y CH2 AC-GND-DC: AC CH2 VOLTS/DIV: 5mV	Apply a square wave signal of 20 mVp-p, 1 kHz to CH2 INPUT and make adjustment so that the horizontal amplitude is 4 div.				
Readjustment of X Position Center and X Gain					Readjust X position Center and X Gain.				
Check of X Axis Frequency Characteristic			SG-502	HORIZ DISPLAY: X-Y CH2 AC-GND-DC: DC CH2 VOLTS/DIV: 5mV	(1) Apply a sine wave signal of 1 kHz to CH2 INPUT and adjust the oscillator output to produce a waveform of 10 div. (2) When the frequency is varied to 5 MHz without changing the oscillator output, the amplitude must be over 7.1 div ( $-3$ dB). <table border="1" style="width: 100%;"><tr><td>Frequency characteristic:</td><td>DC to 5 MHz, less than <math>-3</math> dB.</td></tr></table>	Frequency characteristic:	DC to 5 MHz, less than $-3$ dB.		
Frequency characteristic:	DC to 5 MHz, less than $-3$ dB.								
<b>ADJUSTMENT OF TRIGGERING</b>									
Adjustment of A Slope	VR4	X77-1280	SG-502	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A COUPLING: AC CH1, CH2 AC-GND-DC: AC CH1, CH2 VOLTS/DIV: 5mV A SWEEP TIME/DIV: 0.2ms A SLOPE: + TRIG MODE: AUTO	(1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4-6 div on the CRT screen. (2) Operate A trigger LEVEL and CH1 $\updownarrow$ POSITION so that the waveform may have an amplitude equally above and below the horizontal center graticule line on the CRT screen. (3) Set A SLOPE to (-) and make adjustment so that the starting point of the waveform will be in the position of the starting point of the waveform when A SLOPE is in the (+) position.  <Check> (1) Repeatedly turn the A SLOPE knob from (+) to (-) and make sure that the starting points are in the same positions. (2) Make sure that the rise slope of the waveform will be synchronized when the A SLOPE knob is in the (+) position and the fall slope will be synchronized when the knob is in the (-) position. (3) Feed the same signal to CH2 and set vertical MODE to CH2 to produce a waveform of CH2 and make sure that the rise slope of the waveform is synchronized when the A SLOPE knob is at (+) and the fall slope is synchronized when it is at (-) position.	<p>Align SLOPE (+) with the horizontal center graticule line</p> <p style="text-align: center;">SLOPE (-)</p>			

## ADJUSTMENT

Item	Adjustment Control	P. C. B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
<b>Adjustment A Trigger Level Center and Fix Sensitivity</b>	VR2 VR3	X77-1280 X77-1280	SG-502	HORIZ DISPLAY: A Vertical MODE: CH1 A SOURCE: V MODE A COUPLING: AC CH1, CH2 AC-GND-DC: AC CH1, CH2 VOLTS/DIV: 5mV A SWEEP TIME/DIV: 0.2ms A SOURCE: + TRIG MODE: AUTO	<ol style="list-style-type: none"> <li>(1) Set A trigger LEVEL to 12 o'clock.</li> <li>(2) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4 ~ 6 div on the CRT screen.</li> <li>(3) Operate CH1 <math>\uparrow</math> POSITION to move the waveform so that its amplitude is equally above and below the horizontal center graticule line on the CRT screen.</li> <li>(4) Adjust VR2 so that the starting point of the waveform is on the horizontal center graticule line on the CRT screen.</li> <li>(5) Pull FIX knob and adjust the sine wave input signal of CH1 to obtain a waveform of 1 div.</li> <li>(6) When A SLOPE is alternately turned to (+) and (-), adjust VR3 to synchronize.</li> <li>(7) Repeat (2) ~ (6) procedures for several times.</li> </ol> <p>&lt;Check&gt;</p> <ol style="list-style-type: none"> <li>(1) When A SLOPE is alternately turned to (+) and (-), the starting point must be always on the horizontal center graticule line.</li> <li>(2) With A SLOPE remaining in the position of (+), turn trigger LEVEL clockwise toward 3 o'clock from near 9 o'clock and see if the waveform is as shown at right.</li> <li>(3) Adjust the oscillator output so that the waveform amplitude becomes 0.5 div and make sure that synchronization can be obtained by A trigger LEVEL.</li> </ol>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Align the starting point with the horizontal center graticule line</p> </div> <div style="text-align: center;">  <p>SLOPE (+) SLOPE (-)</p> </div> </div> <div style="text-align: center; margin-top: 10px;">  <p>Trigger LEVEL at 3 o'clock direction</p> </div> <div style="text-align: center; margin-top: 10px;">  <p>Trigger LEVEL at 9 o'clock direction</p> </div> <p style="text-align: center; font-size: small;">Trigger LEVEL at 12 o'clock position</p>	
<b>Adjustment of 100 MHz Trigger</b>	TC1 TC1	X77-1280 X77-1290	SG-503	A, B SOURCE: CH1	<ol style="list-style-type: none"> <li>(1) Apply a 100 MHz sine wave signal to CH1 INPUT and adjust the oscillator output to produce a waveform of 0.8 div on the CRT screen.</li> <li>(2) Adjust TC1 so that the waveform is synchronized at 0.8 div.</li> </ol> <p>&lt;Check&gt;</p> <p>Adjust the oscillator output so that the waveform amplitude becomes 0.5 div and make sure that synchronization can't be obtained by trigger LEVEL.</p>		
<b>Adjustment of B Slope</b>	VR3	X77-1290	SG-502	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A SOURCE: V MODE B SOURCE: CH1 A, B COUPLING: AC CH1, CH2 AC-GND-DC: AC CH1, CH2 VOLTS/DIV: 5mV A, B SWEEP TIME/DIV: 0.2ms A VARIABLE: CAL A, B SLOPE: + TRIG MODE: AUTO A, B INTENSITY: Fully CW	<ol style="list-style-type: none"> <li>(1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4 ~ 6 div on the CRT screen.</li> <li>(2) Operate A trigger LEVEL, B trigger LEVEL and CH1 <math>\uparrow</math> POSITION to move waveform so that its amplitude is equally above and below the horizontal center graticule line on the screen.</li> <li>(3) Set A INTENSITY to CCW and B INTENSITY to an arbitrary position near 3 o'clock.</li> <li>(4) Set B SLOPE to (-) and make adjustment so that the starting point of the waveform comes to the same position of the starting point of waveform when B SLOPE is in the (-) position.</li> </ol> <p>&lt;Check&gt;</p> <ol style="list-style-type: none"> <li>(1) Turn B SLOPE knob alternately to (+) and (-) and make sure that the starting point is always on the horizontal center graticule line.</li> <li>(2) When B SLOPE is in the (+) position, the rise slope of the waveform should be synchronized and its fall slope be synchronized at (-).</li> <li>(3) Apply the same signal to CH2 and set vertical MODE to CH2 to produce a waveform of B sweep of CH2 on the screen to make sure that the rise slope of the waveform is synchronized when B SLOPE is at (+) and the fall slope is synchronized at (-).</li> </ol>	<p>Align SLOPE (+) with the horizontal center graticule line</p>  <p>SLOPE (+) SLOPE (-)</p>	

## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
Adjustment of B Trigger Level Center	VR2	X77-1290	SG-502	HORIZ DISPLAY: DUAL Vertical MODE: CH1 A, B COUPLING: AC CH1, CH2 AC-GND-DC: AC CH1, CH2 VOLTS/DIV: 5mV A, B SWEEP TIME/DIV: 0.2ms A VARIABLE: CAL B SOURCE: CH1	<ol style="list-style-type: none"> <li>Turn B trigger LEVEL knob to 12 o'clock.</li> <li>Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4 – 6 div on the CRT screen.</li> <li>Operate CH1 <math>\updownarrow</math> POSITION so that the waveform has an amplitude equally above and below the horizontal center graticule line on the screen.</li> <li>Turn A INTENSITY to CCW and B INTENSITY to position near 3 o'clock and make adjustment so that the starting point of the waveform is on the horizontal center graticule line.</li> </ol> <p>&lt;Check&gt;</p> <ol style="list-style-type: none"> <li>Turn B SLOPE alternately to (+) and (-) and make sure that the starting point of the waveform is always on the horizontal center graticule line.</li> <li>With B SLOPE knob remaining in the (+) position, turn trigger LEVEL knob clockwise toward 3 o'clock from near 9 o'clock and see if the waveform appear as shown at right.</li> <li>Adjust the oscillator output so that the waveform amplitude becomes 0.5 div and make sure that synchronization is obtained at this time by operating B trigger LEVEL.</li> </ol>	 <p>Align the starting point with the horizontal center graticule line.</p> <p>Trigger LEVEL at 3 o'clock direction</p> <p>Trigger LEVEL at 9 o'clock direction Trigger LEVEL at 12 o'clock position</p>	
Adjustment of DELAY TIME MULT	VR5 VR6	X74-1350 X74-1350		HORIZ DISPLAY: ALT Vertical MODE: CH1 CH1 AC-GND-DC: GND TRIG MODE: AUTO A SWEEP TIME/DIV: 0.1ms B SWEEP TIME/DIV: 1 $\mu$ s $\updownarrow$ TRACE SEP: NORM STARTS AFTER DELAY: PULL	<ol style="list-style-type: none"> <li>Set DELAY TIME MULT to 0.20.</li> <li>Operate A INTENSITY and B INTENSITY properly to make B trace brighter and A trace light dimmer.</li> <li>Operate <math>\blacktriangleleft</math> POSITION to bring the starting point of A trace to the left end of the graticule line on the CRT screen.</li> <li>Make adjustment so that B trace may appear as shown at right.</li> <li>Next, set DELAY TIME MULT to 10.00.</li> <li>Repeat (1) thru (5) 2 or 3 times.</li> </ol> <p>&lt;Check&gt;</p> <p>Set DELAY TIME MULT to 5.00 and make sure that the starting point of B trace is in a position within 5 div <math>\pm</math> 0.2 div from the left end of the screen.</p>	 <p>Adjust VR5 so that the B Sweep is 0.2 div. A Sweep</p> <p>Align the starting point with the left end of scale.</p> <p>Align the starting point with the vertical graticule line. (VR6)</p>	

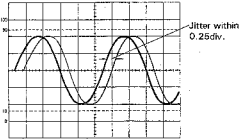
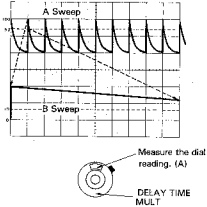
## ADJUSTMENT

Item	Adjustment Control	P. C. B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
<b>OPERATING CHECKS</b>							
Check of Current CAL			Current probe P6302 AM503 475A		Touch a current probe to current CAL terminal on the rear panel to make sure that the calibration current is $1 \text{ kHz} \pm 3\%$ and $10 \text{ mA} \pm 2\%$ .		
Check of Trigger Sensitivity			SG-502 SG-503 475A	Vertical MODE: CH1 CH1 VOLTS/DIV: 5mV A, B SWEEP TIME/DIV: arbitrary position CH1 AC-GND-DC: AC TRIG MODE: NORM	<p>(1) Make measurements of trigger sensitivity according to the table given next page. (For both A and B sweeps)</p> <p><b>[I] A Sweep, INT</b></p> <p>(1) Set HORIZ DISPLAY to A and A SOURCE to CH1.</p> <p>(2) Apply a sine wave signal to CH1 INPUT, vary the oscillator output and operate A trigger LEVEL to measure the minimum synchronizing amplitude on the CRT screen. When doing this, make sure that the A TRIG' D lamp is on.</p> <p>Check synchronization by each check frequency.</p> <p><b>[II] B Sweep, INT</b></p> <p>(1) Set HORIZ DISPLAY to B DLY'D, A SOURCE to CH1 and B SOURCE to CH1.</p> <p>(2) Apply a sine wave to CH1 INPUT, vary the oscillator output and operate B trigger LEVEL to measure the minimum synchronizing amplitude. When doing this, make sure that the A TRIG'D and B TRIG'D lamps are on.</p> <p>Check synchronization by each frequency.</p> <p><b>[III] A Sweep, EXT</b></p> <p>(1) Set HORIZ DISPLAY to A and A SOURCE to EXT 1/1 or 1/10.</p> <p>(2) Apply a signal of the same voltage simultaneously to CH1 and CH3 INPUT jacks.</p> <p>(3) Operate CH1 VOLTS/DIV to produce a waveform of 6 div on the CRT screen.</p> <p>(4) Vary the oscillator output and operate A trigger LEVEL to measure the minimum synchronizing amplitude by the oscilloscope (475A). Check synchronization by each check frequency. When doing this, make sure that A TRIG'D lamp is on.</p> <p><b>[IV] B Sweep, EXT</b></p> <p>(1) Set HORIZ DISPLAY to ALT, A SOURCE to CH1 and B SOURCE to EXT 1/1 or 1/10.</p> <p>(2) Apply a signal of the same voltage simultaneously to CH1 and CH4 INPUT jacks.</p> <p>(3) Operate CH1 VOLTS/DIV to produce a waveform of 6 div on the CRT screen.</p> <p>(4) Operate B trigger LEVEL and A trigger LEVEL to synchronize both A sweep and B sweep.</p> <p>(5) Vary the oscillator output and operate B trigger LEVEL and measure the minimum synchronizing amplitude by the oscilloscope (475A). Check synchronization by each check frequency.</p> <p>(6) Make sure that the B TRIG'D lamp is on.</p>		

# ADJUSTMENT

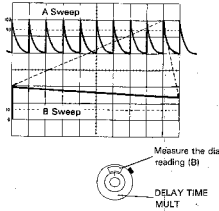
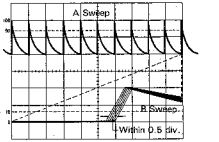
Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark																																																																																							
					<p><b>[V] Check of trigger sensitivity</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">COUPLING</th> <th rowspan="2">FREQ. RANGE (Hz)</th> <th colspan="3">Trig. sensitivity (Min. sync amplitude)</th> </tr> <tr> <th>SOURCE V. 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RANGE (Hz)</th> <th colspan="3">Trig. sensitivity (Min. sync amplitude)</th> </tr> <tr> <th>SOURCE V. 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MODE</td> <td>                     Vertical MODE—CH1, The signal of CH1 is synchronized with A sweep                      Vertical MODE—CH2, The signal of CH2 is synchronized with A sweep                      Vertical MODE—DUAL, ALT                      When the signals of CH1 and CH2 are superimposed on one another they are synchronized with the A sweep of CH1 and CH2, respectively, but there will be no synchronization when there is no signal.                      Vertical MODE—DUAL, CHOP, No Sync.                      Vertical MODE—ADD                      Synchronized with the signal of CH2 when CH1 + CH2 (CH1 --- CH2 at CH2 INV)                      Vertical MODE—QUAD, ALT                      When the signals of CH1 ~ CH4 are superimposed on one another on the CRT screen, the signals will be synchronized with the A sweep of CH1 ~ CH4 respectively but there will be no sync when there is no signal.                      Vertical MODE—QUAD, CHOP, No Sync.                 </td> </tr> <tr> <td>CH1</td> <td>The signal of CH1 is synchronized with A sweep</td> </tr> <tr> <td>CH2</td> <td>The signal of CH2 is synchronized with A sweep</td> </tr> <tr> <td>EXT1/1</td> <td>The signal of CH3 is synchronized with A sweep</td> </tr> <tr> <td>EXT 1/10</td> <td>The signal of CH3 is attenuated to 1/10 and synchronized with A sweep.</td> </tr> </tbody> </table> <p><b>3 Check sync by the lighting of A TRIG'D lamp.</b></p>	COUPLING	FREQ. RANGE (Hz)	Trig. sensitivity (Min. sync amplitude)			SOURCE V. MODE (CH1 or CH2)	SOURCE EXT 1/1	SOURCE EXT 1/10	AC	20Hz ~ 20MHz ~ 50MHz ~ 100MHz	0.5div	50mVp-p	0.5Vp-p	1div	100mVp-p	1Vp-p	1.5div	210mVp-p	2.1Vp-p	DC	DC ~ 20MHz ~ 50MHz ~ 100MHz	0.5div	50mVp-p	0.5Vp-p	1div	100mVp-p	1Vp-p	1.5div	210mVp-p	2.1Vp-p	AC HF <sub>ext</sub>	1kHz 1MHz	0.5div Not to be synchronized at 1div	50mVp-p Not to be synchronized at 100mVp-p	0.5Vp-p Not to be synchronized at 1Vp-p	0.5div Not to be synchronized at 1div	50mVp-p Not to be synchronized at 100mVp-p	0.5Vp-p Not to be synchronized at 1Vp-p	AC LF <sub>ext</sub>	1MHz 1kHz	0.5div Not to be synchronized at 1div	50mVp-p Not to be synchronized at 100mVp-p	0.5Vp-p Not to be synchronized at 1Vp-p	0.5div Not to be synchronized at 1div	50mVp-p Not to be synchronized at 100mVp-p	0.5Vp-p Not to be synchronized at 1Vp-p	VIDEO	VIDEO signal FRAME LINE	0.5div	50mVp-p	0.5Vp-p	TRIG MODE	FREQ. RANGE (Hz)	Trig. sensitivity (Min. sync amplitude)			SOURCE V. MODE (CH1 or CH2)	SOURCE EXT 1/1	SOURCE EXT 1/10	AUTO	30Hz ~ 20MHz ~ 50MHz ~ 100MHz	0.5div	50mVp-p	0.5Vp-p	1div	100mVp-p	1Vp-p	1.5div	210mVp-p	2.1Vp-p	FIX	40Hz ~ 20 MHz ~ 80MHz	1.0div 1.5div	100mVp-p 210mVp-p	1.0Vp-p 2.1Vp-p	A SOURCE	Operation	V. MODE	Vertical MODE—CH1, The signal of CH1 is synchronized with A sweep Vertical MODE—CH2, The signal of CH2 is synchronized with A sweep Vertical MODE—DUAL, ALT When the signals of CH1 and CH2 are superimposed on one another they are synchronized with the A sweep of CH1 and CH2, respectively, but there will be no synchronization when there is no signal. Vertical MODE—DUAL, CHOP, No Sync. Vertical MODE—ADD Synchronized with the signal of CH2 when CH1 + CH2 (CH1 --- CH2 at CH2 INV) Vertical MODE—QUAD, ALT When the signals of CH1 ~ CH4 are superimposed on one another on the CRT screen, the signals will be synchronized with the A sweep of CH1 ~ CH4 respectively but there will be no sync when there is no signal. Vertical MODE—QUAD, CHOP, No Sync.	CH1	The signal of CH1 is synchronized with A sweep	CH2	The signal of CH2 is synchronized with A sweep	EXT1/1	The signal of CH3 is synchronized with A sweep	EXT 1/10	The signal of CH3 is attenuated to 1/10 and synchronized with A sweep.		
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## ADJUSTMENT

Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark										
					<p>[VIII] Check of trigger source (B sweep)</p> <p>(1) Set HORIZ DISPLAY to A, TRIG MODE to AUTO, Vertical MODE to DUAL, ALT and A SOURCE to V MODE.</p> <p>(2) Apply different signals to CH1, CH2 and CH4 and superimpose the signals of CH1 and CH2 on one another on the CRT screen and synchronize them by A trigger LEVEL.</p> <p>(3) Set HORIZ DISPLAY to B DLY'D and operate B SOURCE as described below to check the synchronization.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">B SOURCE</th> <th style="width: 70%;">Operation</th> </tr> </thead> <tbody> <tr> <td>CH1</td> <td>The signal of CH1 is synchronized with B sweep.</td> </tr> <tr> <td>CH2</td> <td>The signal of CH2 is synchronized with B sweep.</td> </tr> <tr> <td>EXT 1/1</td> <td>The signal of CH4 is synchronized with B sweep.</td> </tr> <tr> <td>EXT 1/10</td> <td>The signal of CH4 is attenuated to 1/10 and synchronized with B sweep.</td> </tr> </tbody> </table> <p>(4) Make sure that the B TRIG'D lamp is on.</p>	B SOURCE	Operation	CH1	The signal of CH1 is synchronized with B sweep.	CH2	The signal of CH2 is synchronized with B sweep.	EXT 1/1	The signal of CH4 is synchronized with B sweep.	EXT 1/10	The signal of CH4 is attenuated to 1/10 and synchronized with B sweep.		
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EXT 1/1	The signal of CH4 is synchronized with B sweep.																
EXT 1/10	The signal of CH4 is attenuated to 1/10 and synchronized with B sweep.																
Check of Jitter			SG503 50Ω Termination	HORIZ DISPLAY: A A SOURCE: CH1 TRIG MODE: NORM A COUPLING: AC A SWEEP TIME/DIV: 20ns CH1 VOLTS/DIV: 0.1V CH1 AC-GND-DC: AC X10 MAG: PULL HOLDOFF: NORM	<p>(1) Apply a sine wave signal of 100 MHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4 div on the CRT screen.</p> <p>(2) Operate A trigger LEVEL to find a point where the jitter is minimized.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="width: 30%;">Jitter</td> <td style="width: 70%;">less than 0.25 div</td> </tr> </table>	Jitter	less than 0.25 div										
Jitter	less than 0.25 div																
Check of DELAY TIME MULT			TG-501 50Ω Termination	HORIZ DISPLAY: ALT A, B SOURCE: CH1 TRIG MODE: AUTO Vertical Mode: CH1 STARTS AFTER DELAY: PULL CH1 AC-GND-DC: AC A SWEEP TIME/DIV: 1ms B SWEEP TIME/DIV: 5μs	<p>(1) Apply a marker signal of 1 ms to CH1 INPUT to produce a waveform of 2 ~ 3 div on the CRT screen.</p> <p>(2) Operate <math>\updownarrow</math> TRACE SEP to separate B sweep and A sweep.</p> <p>(3) Operate <math>\leftarrow \rightarrow</math> POSITION to align the first peak of the waveform with the left end of the screen.</p> <p>(4) Adjust A INTENSITY and B INTENSITY to bring the waveform into the positions where they can be easily visible.</p> <p>(5) Operate DELAY TIME MULT so that the patterns of the screen appear as shown at right (the second peak of the A sweep should be intensity modulated and should be aligned with the left end of B sweep scale) and note the dial reading at this time.</p>		<p>&lt;Note&gt;            When TG-501 is used, CH1 VOLTS/DIV should be set to 0.5V thru 50Ω termination.</p>										

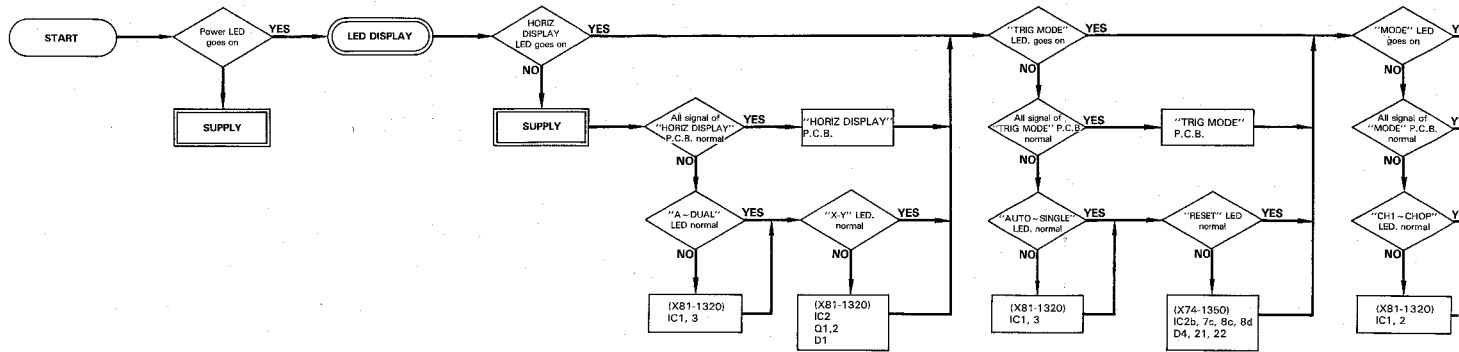


## ADJUSTMENT

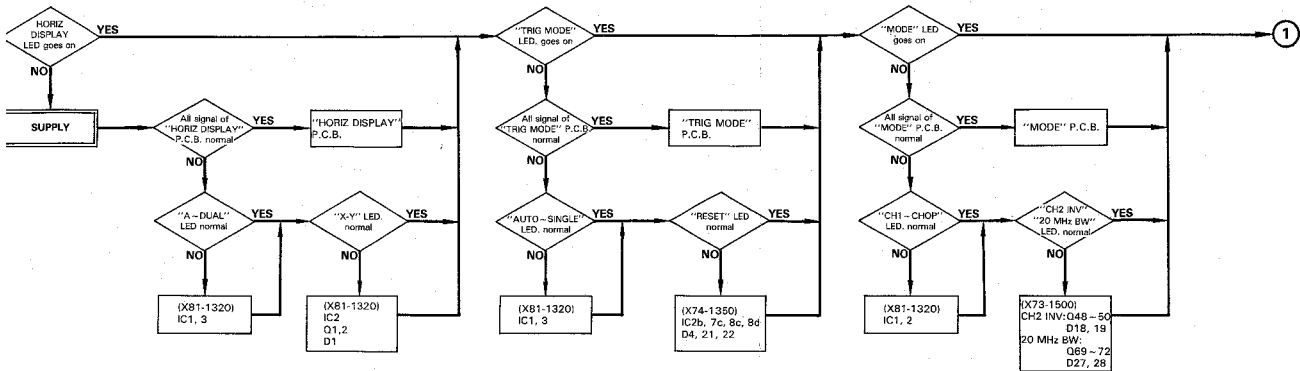
Item	Adjustment Control	P.C.B. No.	Test Equipment	Control Setting	Adjustment and Check	Illustration	Remark
					<p>(6) Turn DELAY TIME MULT and operate <math>\leftarrow \rightarrow</math> POSITION so that what is shown at right will happen at the 10th peak and note the dial reading at this time.</p> <p>(7) Make the following calculation from the dial reading to make sure that the error is within the specification limits.</p> <p>(B) - (A) = 8.00 ± 0.2</p> <p style="border: 1px solid black; padding: 2px;">Time multiplication error within ±(1% of measurement + 0.1% of full scale)</p>		
Check of Delay Time Jitter			TG-501 50Ω Termination	HORIZ DISPLAY: ALT A SOURCE: CH1 B SOURCE: CH2 TRIG MODE: AUTO Vertical MODE: CH1 STARTS AFTER DELAY: PULL  B ENDS A: ON CH1 AC-GND-DC: AC A SWEEP TIME/DIV: 1ms B SWEEP TIME/DIV: 1μs	<p>(1) Apply a marker signal of 1 ms to CH1 INPUT to produce a waveform of 2 - 3 div on the CRT screen.</p> <p>(2) Operate <math>\updownarrow</math> TRACE SEP to separate A sweep and B sweep.</p> <p>(3) Operate DELAY TIME MULT to obtain the patterns as shown at right. (DELAY TIME MULT is to be set to about 10.00).</p> <p>(4) Make sure that the jitter of B sweep is less than 0.5 div at this time.</p> <p style="border: 1px solid black; padding: 2px;">Specification less than 1/20,000</p>		
Check of BEAM FIND				HORIZ DISPLAY: ALT A SOURCE: CH1 B SOURCE: CH2 TRIG MODE: AUTO Vertical MODE: CH1 STARTS AFTER DELAY: PULL B ENDS A: ON CH1 AC-GND-DC: AC A SWEEP TIME/DIV: 1ms B SWEEP TIME/DIV: 1μs	Make sure that the trace length is fully covered the screen when rotated SWEEP TIME/DIV to each range:		



# TROUBLESHOOTING

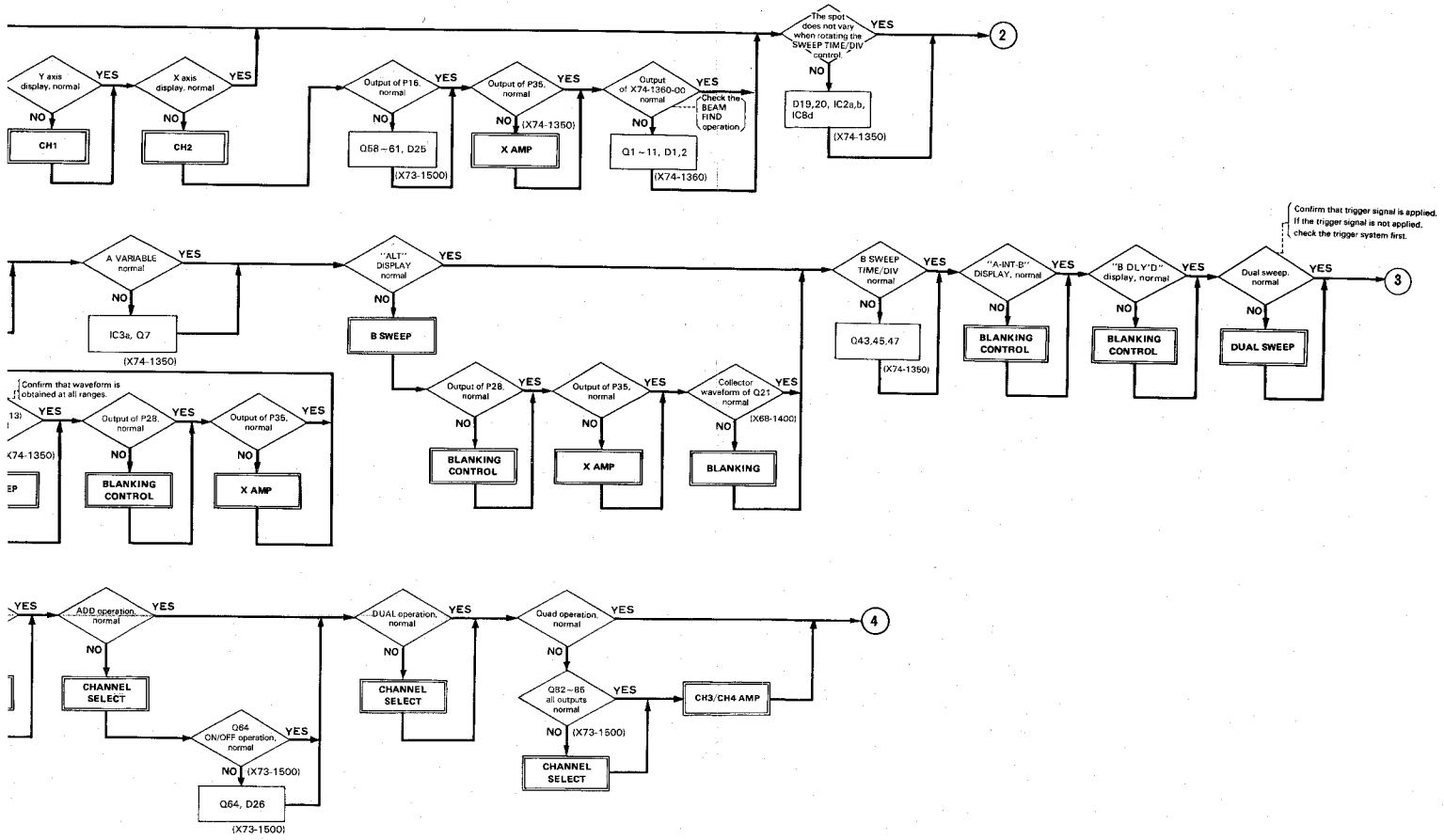


# TROUBLESHOOTING

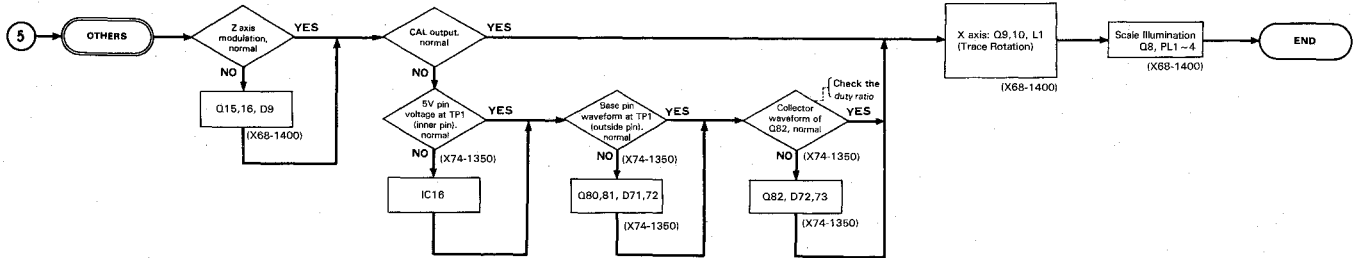
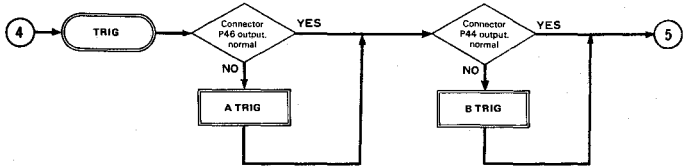




# TROUBLESHOOTING



# TROUBLESHOOTING



# TROUBLESHOOTING

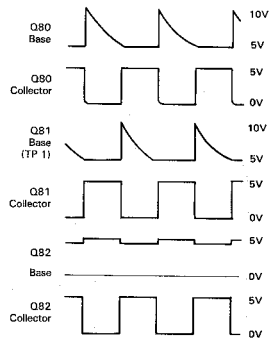
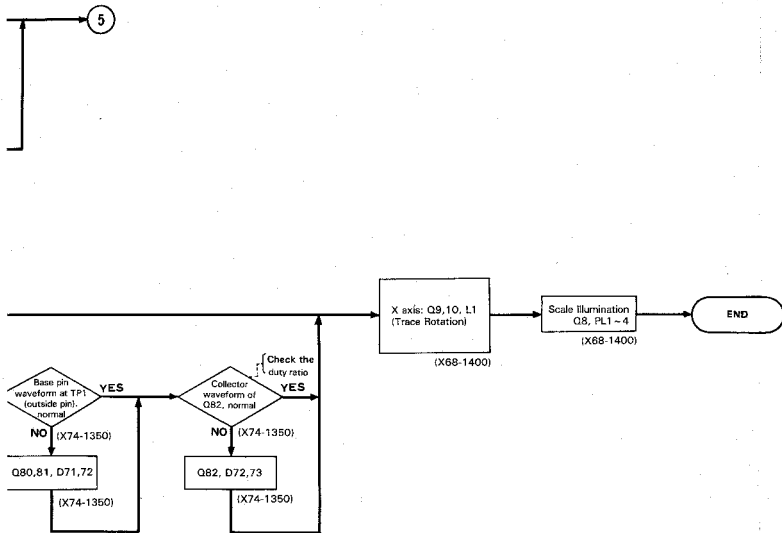


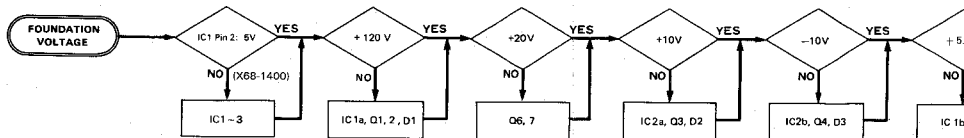
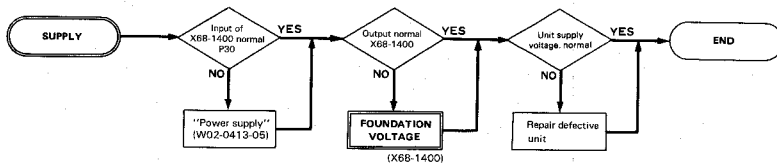
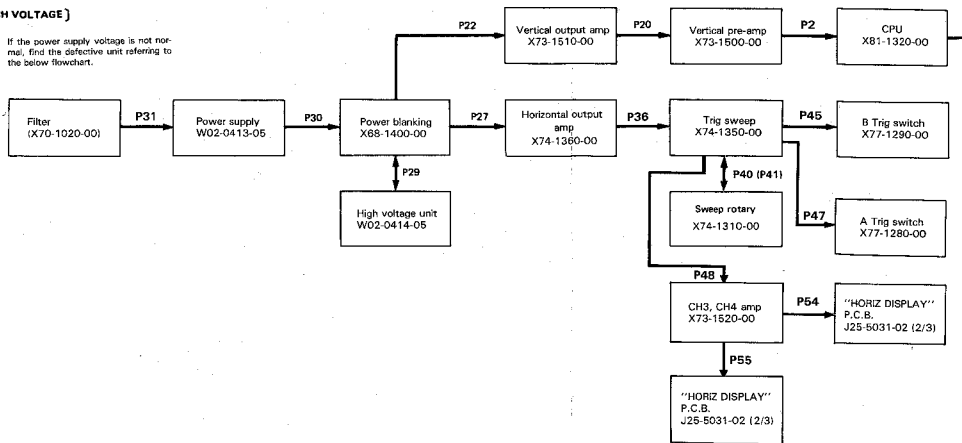
Fig. 7 CAL CIRCUIT WAVEFORMS



# TROUBLESHOOTING

## ( POWER SUPPLY OF EACH VOLTAGE )

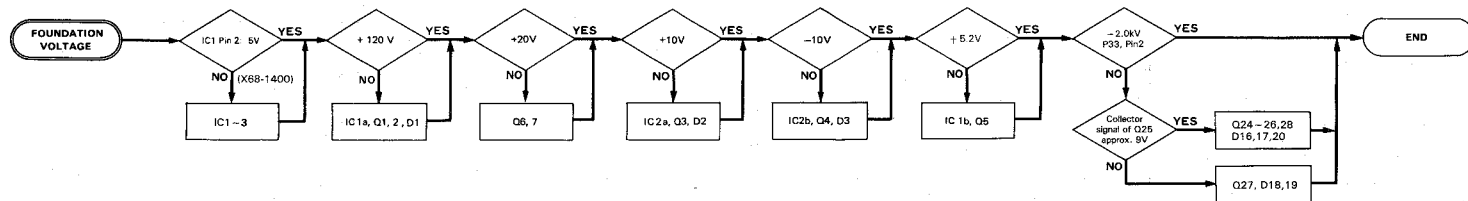
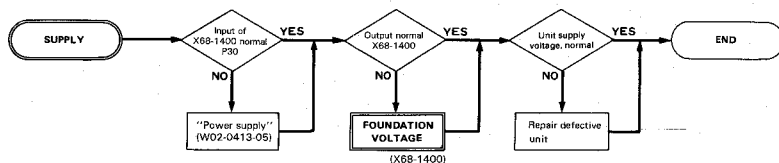
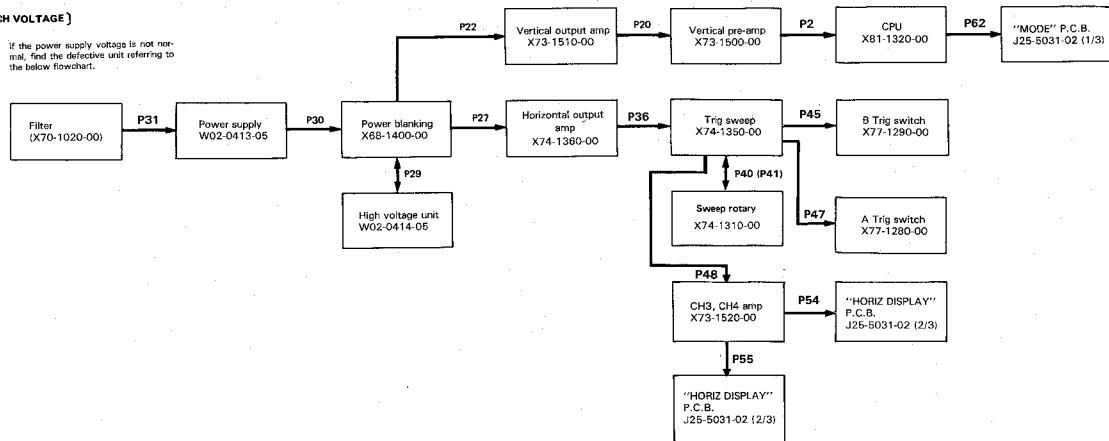
If the power supply voltage is not normal, find the defective unit referring to the below flowchart.

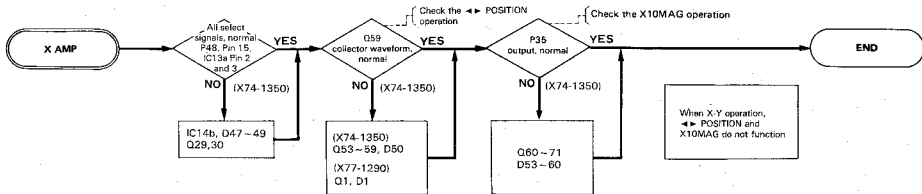
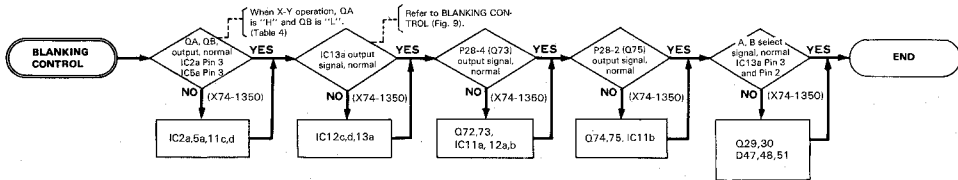
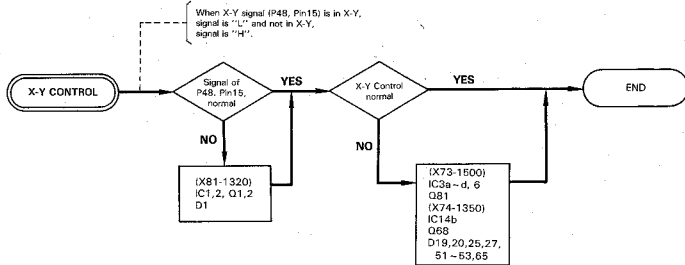


# TROUBLESHOOTING

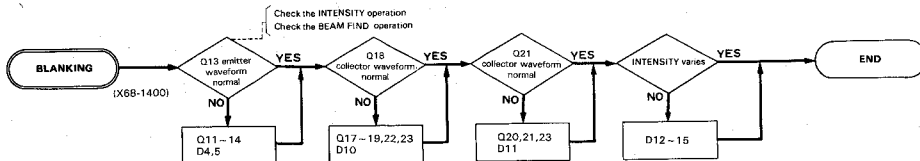
## IN VOLTAGE ]

If the power supply voltage is not normal, find the defective unit referring to the below flowchart.





# TROUBLESHOOTING



## BLANKING CONTROL

HORIZ DISPLAY	P48 X-Y BUFFER I5P in	IC13a				IC12d OUT	P28	
		IN		OUT			A blanking 4 P in	B blanking 2 P in
		S	R	O	$\bar{O}$		QA*	QB*
A	H	H	L	H	L	H	QA	H
ALT	H	L	L	TOGGLE	H	H	QA*	QB
A-INT-B	H	H	L	H	L	H	QA	QB
B'DLY'D	H	L	H	L	H	H	H	QB
DUAL	H	L	L	TOGGLE	TOGGLE	QA*	QB*	
X-Y	L	H	L	H	L	H	L	H

Complex waveform IC11b output. When CHOP operation, output of P28 is complex CHOP signal waveform.

Table 4

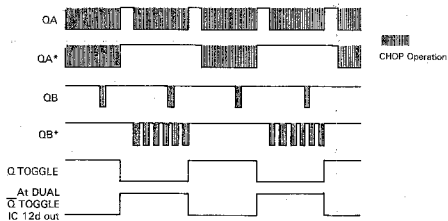


Fig. 8 RELATIONSHIP BETWEEN A, B SWEEP AND QA, QB

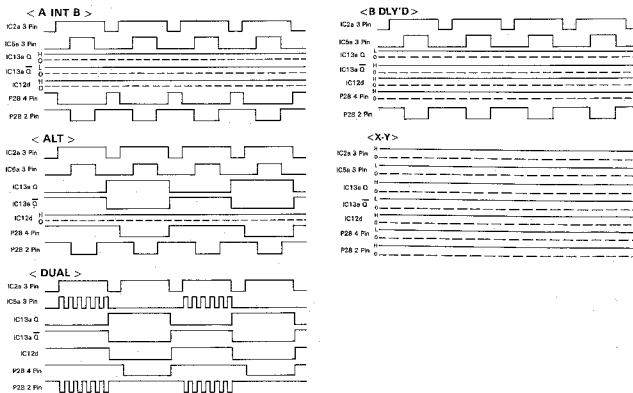
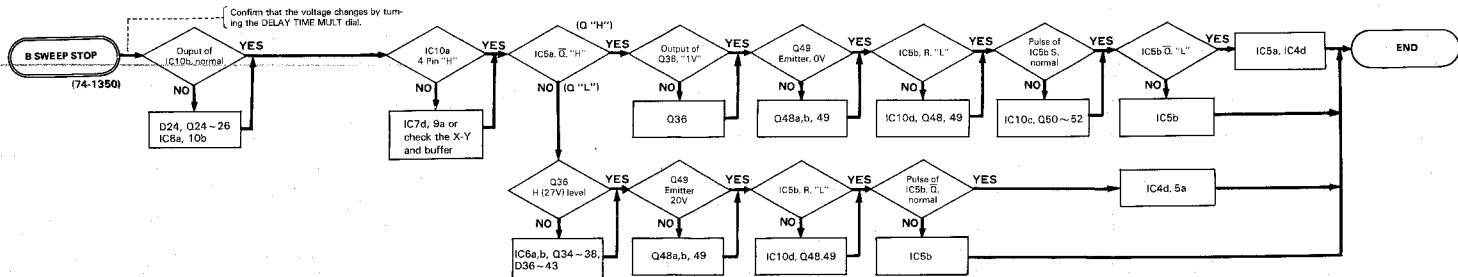
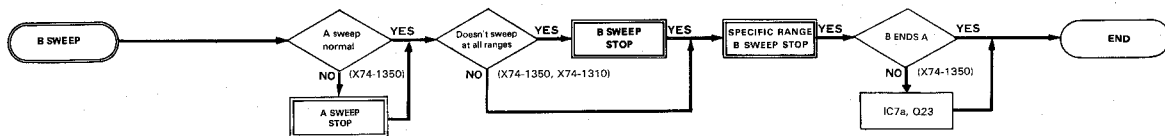
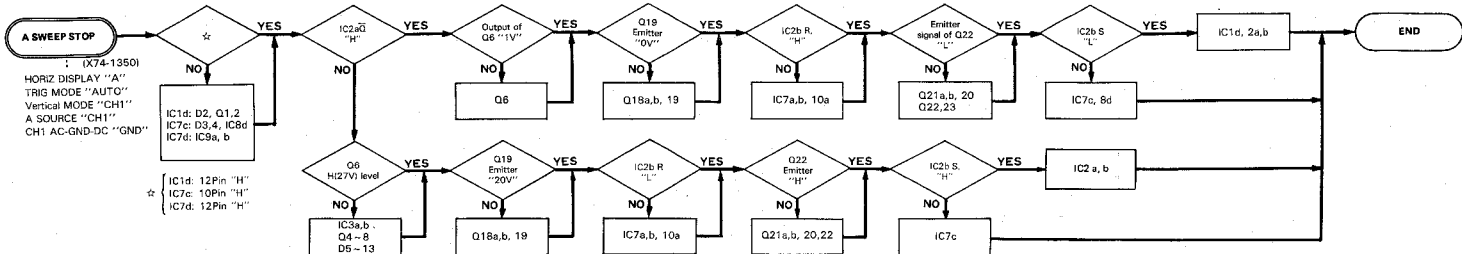
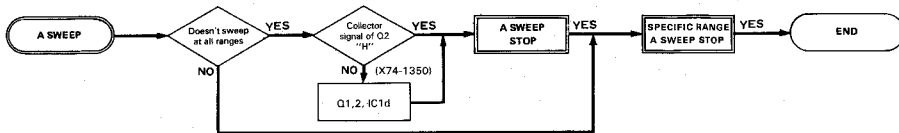
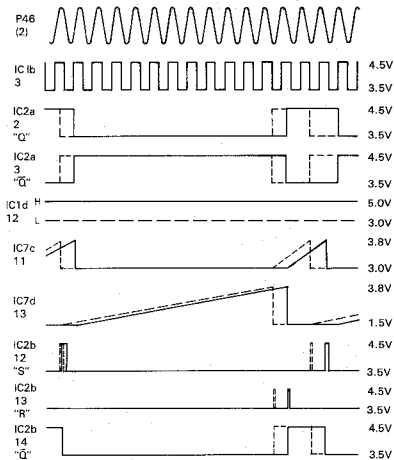


Fig. 9 BLANKING CONTROL

# TROUBLESHOOTING



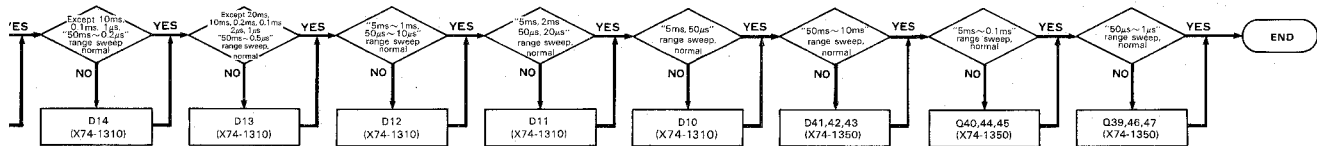
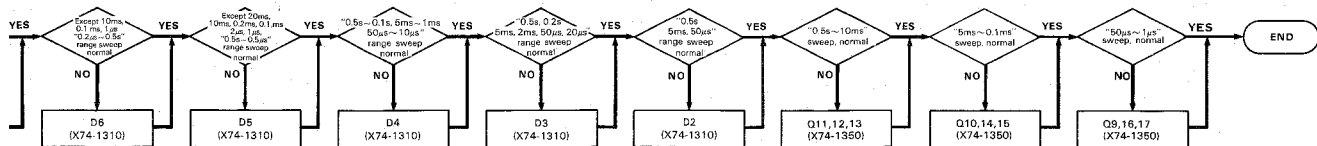


Note: Broke-line auto free run (at non-signal)

Fig. 10 Waveform in Sweep circuit (X74-1350-00)  
 (Input signal 1 kHz, SWEEP TIME 1 ms/div)

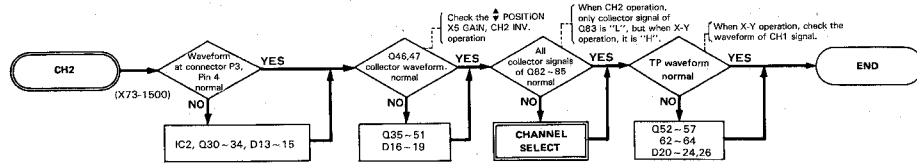
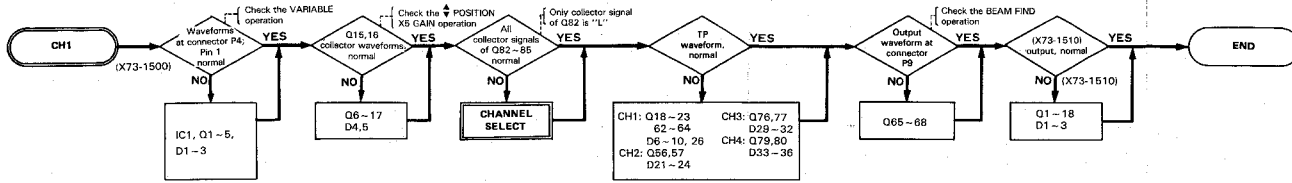


# TROUBLESHOOTING





# TROUBLESHOOTING

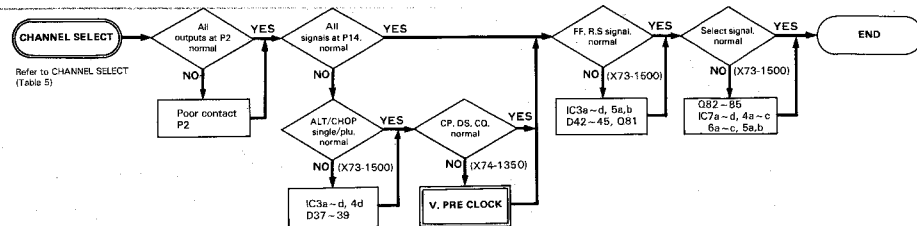


## CHANNEL SELECT

		MODE INPUT LOG OUTPUT signal (P2)						FLIP-FLOP PRESET CLEAR signal			CHAN
		CH1	CH2	DUAL	ADD	ALT	X-Y	R5a	S5a	R5b	CH1
SWEEP operation	CH1	L	H	H	H	H	H	H	L	L	H
	CH2	H	L	H	H	H	R	L	R	H	H
	DUAL	ALT	H	H	L	H	H	L	L	L	H
		CHOP	H	H	L	H	H	L	L	L	H
	ADD	H	H	H	H	L	H	L	L	L	L
QUAD	ALT	H	H	H	H	H	H	L	L	L	L
	CHOP	H	H	H	H	H	H	L	L	L	L
X-Y operation		Same as above						L	H	H	L

Note: Number of ○ is No. of time chart. (See Fig. 11)

\*1 Vertical MODE:  
DUAL (ALT)  
QUAD (ALT)  
HORIZ DISPLAY; DU  
Time chart No. ⑧.



Refer to CHANNEL SELECT (Table 5)

Table

## CHANNEL SELECT

		MODE INPUT LOG OUTPUT signal (P2)						FLIP-FLOP PRESET CLEAR signal			CHANNEL SELECT signal				FLIP-FLOP OUTPUT signal				VERTICAL CLOCK (P14)					
		CH1	CH2	DUAL	ADD	ALT	X-Y	R5a	S5a	R5b	CH1	CH2	CH3	CH4	Q5a	Q5a	Q5b	Q5b	ALT/CHOP	Single/Hi	CP**	DS	CQ**	
SWEEP operation	CH1	L	H	H	H	H	H	H	L	H	L	H	H	L	H	L	H	L	L	QA	H	H		
	CH2	H	L	H	H	H	H	L	H	H	H	L	H	H	L	L	L	H	L	L	QA	H	H	
	DUAL	ALT	H	H	L	H	L	H	L	L	H	①		H	H	①**		L	H	L	H	QA	L**	H
		CHOP					H	H				③				③			H	H	③			
	ADD	H	H	H	L	H	H	L	L	H	L	L	H	H	⑤		L	H	L	L	QA	H	H	
	QUAD	ALT	H	H	H	H	L	H	L	L	L	②			②**		②		L	H	QA	L**	H	
CHOP						H	H				④			④		④		H	H	④				
X-Y operation		Same as above.						L	H	H	L	H	H	H			L	H	L	L	L	H	H	

Note: Number of ○ is No. of time chart. (See Fig. 11)

\*1 Vertical MODE:  
DUAL (ALT)  
QUAD (ALT)  
HORIZ DISPLAY: DUAL  
Time chart No. ①.

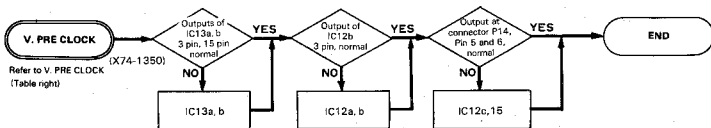
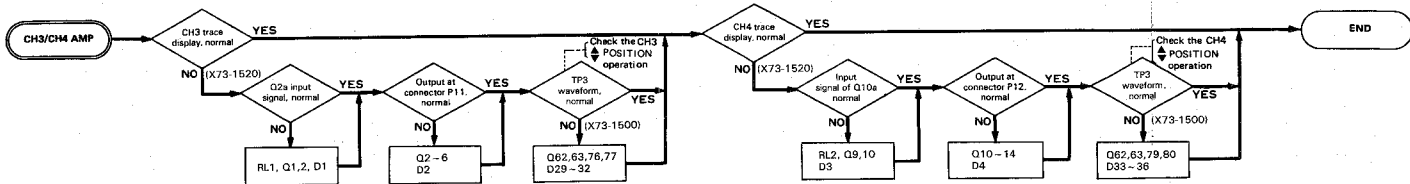
\*2 HORIZ DISPLAY;  
ALT, DUAL  
Time chart No. ⑤.

\*4 HORIZ DISPLAY;  
DUAL  
Signal level "L"

\*3 Vertical MODE;  
DUAL  
QUAD  
HORIZ DISPLAY:  
DUAL  
Time chart NO. ① - ④.

Table-5

# TROUBLESHOOTING

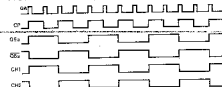


## ① Vertical MODE: DUAL (ALT)

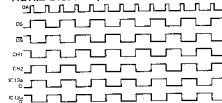
HORIZ DISPLAY: A, A-INT-B, B DLY'D



HORIZ DISPLAY: ALT

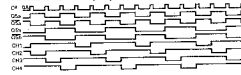


HORIZ DISPLAY: DUAL



## ② Vertical MODE: QUAD (ALT)

HORIZ DISPLAY: A, A-INT-B, B DLY'D



HORIZ DISPLAY: ALT

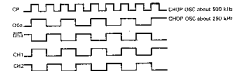


HORIZ DISPLAY: DUAL

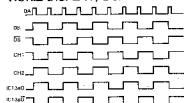


## ③ Vertical MODE: DUAL (CHOP)

HORIZ DISPLAY: A, ALT, A-INT-B, B DLY'D

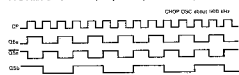


HORIZ DISPLAY: DUAL

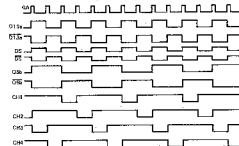


## ④ Vertical MODE: QUAD (CHOP)

HORIZ DISPLAY: A, ALT, A-INT-B, B DLY'D



HORIZ DISPLAY: DUAL



## ⑤ Vertical MODE: ADD

HORIZ DISPLAY: A, A-INT-B, B DLY'D, DUAL

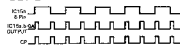


HORIZ DISPLAY: ALT



## ⑥ Vertical MODE: DUAL (ALT)

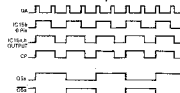
HORIZ DISPLAY: A, A-INT-B, B DLY'D



HORIZ DISPLAY: ALT



HORIZ DISPLAY: DUAL



Vertical MODE: CH1, CH2, ADD

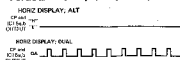


Fig. 11 Time Chart

## V. PRE CLOCK

	MODE	INPUT		OUTPUT				
		ALT/CHOP	Single/Plt	Q76	IC15a,b	CP**5	DS	
SWEEP operation	CN1	L	L	H	QA	QA	H	
	CH2	L	L	H		QA	H	
	DUAL	ALT	L	H		H	QA	L**
		CHOP	H	H		L	③	
	QUAD	ADD	L	L		H	QA	H
		ALT	L	H		H	QA	L**
	X-Y Operation	CHOP	H	H		L	④	
			L	L		H	L	L

Note; Number of ○ is No. of time chart. (See Fig. 11)

- \*5 HORIZ DISPLAY;  
ALT or  
DUAL  
Time chart No. ⑧.
- \*6 Vertical MODE,  
DUAL or  
QUAD
- \*7 HORIZ DISPLAY;  
DUAL  
Time chart No. ①-④.

## V. PRE CLOCK

HORIZ DISPLAY	IC15b 7 Pin	IC15b 6 Pin**	IC15a,b** OUTPUT	CQ	IC13a Q
A	L	L	QA	H	H
ALT	H	L	L	H	⑦**
A-INT-B	L	L	QA	H	H
B DLY'D	L	L	QA	H	L
DUAL	H	L	QA	L	⑦**
X-Y	H	L	L	H	H

\*7 Vertical MODE  
DUAL, or  
QUAD  
Time chart No. ⑧.

\*8 Vertical MODE  
DUAL or  
QUAD  
Time chart No. ①-④.

Table-6

⑦), QUAD (ALT)

B

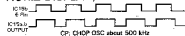
HORIZ DISPLAY; A, A-INT-B,  
B DLY'D



HORIZ DISPLAY; ALT



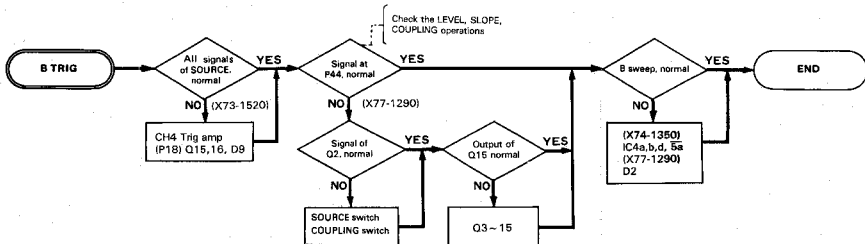
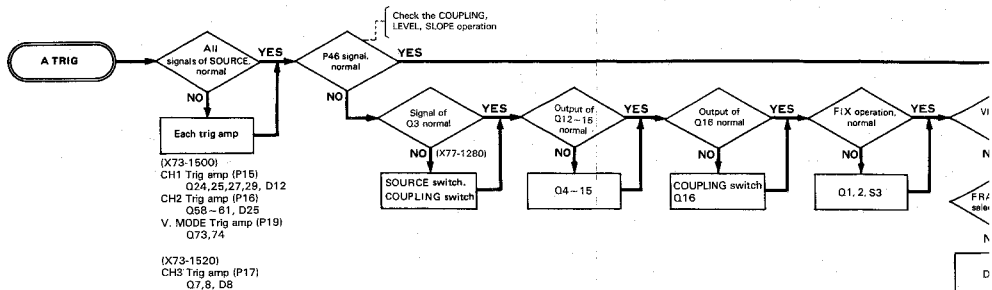
HORIZ DISPLAY; DUAL



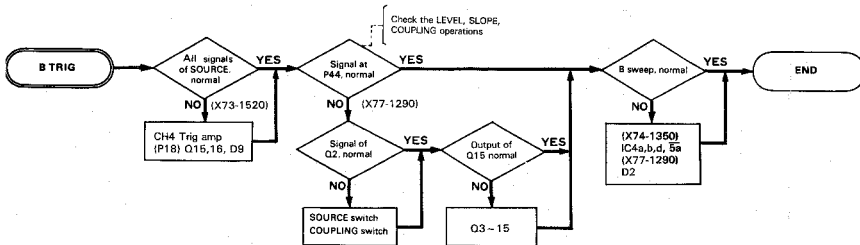
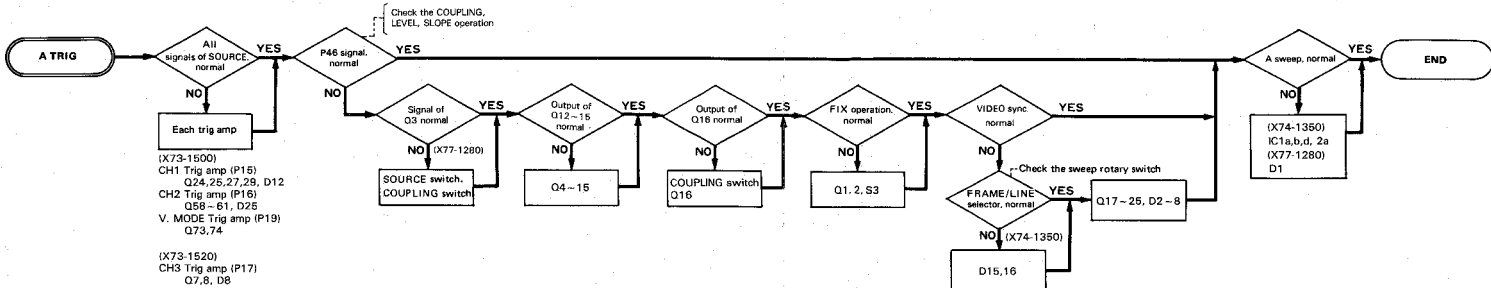
⑦) HORIZ DISPLAY; ALT, DUAL



# TROUBLESHOOTING



# TROUBLESHOOTING



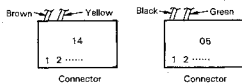
# PARTS LIST

The specifications and parts list and schematic diagram may be changed without notice owing to a technical innovation.

The part No. of each connector is stamped or color-coded. The color-coding is as follows.

Black	Brown	Red	Orange	Yellow	Green	Blue	Purple	Grey	White
0	1	2	3	4	5	6	7	8	9

## Example



Each connector can be classified by the color of pin 1 and pin 2.

# PARTS LIST

## MAIN CHASSIS

Y70-1460-21

REF. NO	PARTS NO	NAME & DESCRIPTION	REF. NO	PARTS NO	NAME & DESCRIPTION
	A01-1109-02	CASE	68	K21-0872-04	KNOB
1	A11-0763-02	FRAME	69	K21-0873-04	KNOB
2	A13-0744-02	FRAME	70	K21-0874-03	KNOB
3	A20-2767-05	DIE-CAST PANEL	71	K27-0524-14	KNOB FOR PUSH SW
4	A21-1045-04	DECORATIVE PANEL	72	K27-0530-04	KNOB FOR LEVER
5	A21-1046-04	DECORATIVE PANEL		N08-0611-04	DRESSED SCREW
6	A21-1047-14	DECORATIVE PANEL	73	N09-0402-05	SCREW
7	A22-0817-33	SUB PANEL		N09-0705-05	HEX SOCKET FLAT HD
8	A22-0833-03	SUB PANEL	74	N09-0707-05	SCREW
9	A23-1645-12	REAR PANEL	75	N09-0709-05	SCREW
10	B33-0501-14	REFLECTOR	76	N09-0710-05	SCREW, SENS PAN HD
	B01-0711-03	READ ESCUTOHEON	77	N09-0711-05	SCREW
	B19-0729-03	FILTER	78	N09-0720-04	SCREW
12	B20-0927-04	RING ANTIURUN	79	N10-2030-41	NUT
	B40-2765-04	NAME PLATE (SERIAL NO)	80	N10-2060-46	NUT
	E41-0710-04	CAUTION LABEL (HIGH VOLTAGE)	81	N14-0602-34	NUT
	E50-1519-00	INSTRUCTION MANUAL	82	N14-0609-04	NUT
	E50-1521-00	INSTRUCTION MANUAL	83	N14-0617-05	NUT
13	D21-0906-04	EXTENSION SHAFT		N15-1030-41	WASHER, FLAT FOR M3
14	D27-0801-04	SPACER	84	N16-0026-46	SPRING WASHER
15	E01-1404-05	CRT SOCKET	85	N16-0030-46	SPRING WASHER
16	E04-0251-05	BNC RECEPTACLE	86	N16-0050-46	SPRING WASHER
17	E21-0654-04	TERMINAL (CAR)	87	N17-1030-41	LOCK WASHER
18	E21-0657-04	TERMINAL (GND)	88	N19-0191-05	WASHER NONMETAL
19	E21-0659-12	TERMINAL (CURRENT)	89	N19-0704-04	WASHER
20	E23-0015-04	EARTH LUG		N19-0710-05	WASHER
21	E23-0018-04	EARTH LUG	90	N30-2608-46	SCREW, PAN HD M 2.6X8
22	E23-0513-05	EARTH LUG	91	N30-2608-41	SCREW, PAN HD M 2.6X8
23	E23-0520-05	EARTH LUG	92	N30-3006-46	SCREW, PAN HD M 3X8
24	E23-0528-04	EARTH PLATE	93	N30-3008-41	SCREW, PAN HD M 3X8
25	E23-0629-14	EARTH LUG	94	N32-2006-46	SCREW, FLAT HD M 2.6X6
	E30-1818-05	POWER CORD (JIS)	95	N32-2606-46	SCREW, FLAT HD M 2.6X6
	E31-2440-05	LEAD WIRE WITH HARNESSSES	96	N32-3008-41	SCREW, FLAT HD M 3X8
	E31-2473-05	LEAD WIRE WITH CONNECTOR	97	N32-3009-41	SCREW, FLAT HD M 3X8
	E31-2474-05	LEAD WIRE WITH CONNECTOR	98	N39-3008-46	SCREW, BINDING TAP TITE
	E33-6047-00	WIRE ASSY	98	N39-3010-41	SCREW, BINDING TAP TITE
28	F05-1224-05	FUSE 1.2A		R02-0150-05	JUMPING RES. ZERO OHM
	F07-0908-14	PROTECTION COVER	100	S02-4502-05	ROTARY SWITCH
	F07-0923-02	PROTECTION COVER		U01-0503-04	CORR WRAF
27	F10-1933-14	SHIELD PLATE (FOR CH3)	101	W02-0413-05	SWITCHING POWER SPLY
28	F10-1567-14	SHIELD PLATE	102	W02-0414-05	HIGH VOLTAGE BLOCK
29	F10-1568-04	SHIELD PLATE (FOR SW)		W09-0405-05	LITHIUM BATTERY 3V 0.2PH
30	F10-1569-04	SHIELD PLATE (FOR CPU)	103	X68-1400-00	POWER BLANKING UNIT
31	F11-0983-02	SHIELD CASE (FOR CRT)	104	X70-1020-00	TRIG UNIT
32	F11-0984-04	SHIELD CASE (FOR CRT)	105	X73-1500-00	V.PRE AMP UNIT
33	F11-0985-04	SHIELD CASE	106	X73-1510-00	V.OUTPUT AMP UNIT
	F15-0178-04	BLIND PLATE	107	X73-1520-00	CH3, CH4 AMP UNIT
	F15-0716-24	BLIND PLATE	108	X74-1310-00	SWEEP ROTARY UNIT
36	F20-0621-04	INSULATOR	109	X74-1350-00	TRIG SWEEP UNIT
37	F20-0624-04	INSULATOR (FOR BLANKING)	110	X74-1360-00	HORIZONTAL OUTPUT UNIT
38	F20-0627-04	INSULATOR (FOR BATTERY)	111	X77-1280-00	A TRIG SWITCH UNIT
39	F20-0639-04	INSULATOR	112	X78-1290-00	B TRIG UNIT
	G02-0606-14	SPRING FOR HANDLE	113	X81-1320-00	CP UNIT
40	G16-0602-04	REFLECTOR SHEET (L)	114	X81-1430-00	ASTIG UNIT
41	G16-0603-04	REFLECTOR SHEET (R)		Y87-1250-00	PROBE (PC-29)
42	G16-0609-04	RUBBER SHEET	002	0001-05	BRIDGED WIRE
	H01-5713-04	CARTON BOX		002-0006-05	BRIDGED WIRE
	H10-2012-12	FIBRED STYRENE PAD	150	K701	CRT
	H12-0333-03	PAD	212	2014-05	TUBE (PLASTIC)
	H12-0536-03	PAD	212	2017-05	TUBE (PLASTIC)
	H20-1719-04	VINYL COVER	420	0010-05	ADHESIVES
43	F10-1572-04	SHIELD PLATE	490	0007-05	TAPE
	J02-0507-05	LEG	490	0010-05	TAPE
44	J19-0933-15	FUSE HOLDER	490	0021-05	TAPE
45	J19-0934-15	CORD CLAMP	001	C91-0501-05	CAP. METAL FILM 0.047 10% 630V
46	J19-1622-05	CORD CLAMP	002	C91-0501-05	CAP. METAL FILM 0.047 10% 630V
47	J19-1639-04	HOLDER FOR CRT	003	CC45CH1866J	CAP. CERAMIC 68P 5% 50V
48	J21-0392-04	HOLDER FOR LEAD	004	C91-0500-05	CAP. CERAMIC 0.01 0.25P 3KV
49	J21-2671-14	HOLDER FOR D.LINE	004	C91-0500-05	CAP. CERAMIC 68P 5% 50V
	J21-2903-05	HOLDER FOR PROBE	D001	K14LN222RP	DIODE, LED
	J21-2906-05	GEAR FOR HANDLE	D002	K14LN322P	DIODE, LED
	J21-2907-05	RING FOR HANDLE	D003	K14LN222RP	DIODE, LED
50	J21-2925-13	BLACKET FOR CRT	D004	K14LN322GP	DIODE, LED
51	J21-2926-13	BLACKET FOR CRT	D005	K14LN322BP	DIODE, LED
52	J21-2927-04	BLACKET	D006	K14LN322SP	DIODE, LED
53	J21-2989-04	BLACKET	D007	K14LN222RP	DIODE, LED
54	J25-5031-02	PCB (UNMOUNTED)	115	D008	LED LAMP (RED)
55	J29-0503-04	GND EQUIP			
56	J32-0836-04	BOSS	J002	E31-2445-05	LEAD WIRE WITH CONNECTOR
57	J39-0504-04	SPACER FOR V.R.	J003	E31-2441-05	LEAD WIRE WITH CONNECTOR
58	J42-0512-14	CRT MOUNTING RUBBER	J004	E31-2441-05	LEAD WIRE WITH CONNECTOR
59	J42-0513-14	CRT MOUNTING RUBBER	J005	E31-2444-05	LEAD WIRE WITH CONNECTOR
60	J42-0514-04	BUSHING	J006	E31-2444-05	LEAD WIRE WITH CONNECTOR
61	J42-0515-05	BUSHING	J007	E31-2443-05	LEAD WIRE WITH CONNECTOR
	J61-0040-05	WIRE BAND	J008	E31-2443-05	LEAD WIRE WITH CONNECTOR
	J61-0511-05	SADDLE FOR WIRE			
63	J61-0520-05	SADDLE	J030	E31-2464-05	LEAD WIRE WITH CONNECTOR
	K01-0522-05	HANDLE	J031	E31-2468-05	LEAD WIRE WITH CONNECTOR
64	K21-0368-03	KNOB	J032	E31-2465-15	LEAD WIRE WITH CONNECTOR
65	K21-0369-04	KNOB	J033	E31-2466-05	LEAD WIRE WITH CONNECTOR
66	K21-0870-04	KNOB			
67	K21-0871-04	KNOB	J044	E31-2452-15	LEAD WIRE WITH CONNECTOR



# PARTS LIST

REF. NO	PARTS NO	NAME & DESCRIPTION
J045	NO USE	
J046	E31-2449-15	LEAD WIRE WITH CONNECTOR
J049	E31-2446-05	LEAD WIRE WITH CONNECTOR
J051	E31-2451-13	LEAD WIRE WITH CONNECTOR
J052	NO USE	
J053	E31-2446-15	LEAD WIRE WITH CONNECTOR
J054	E31-2471-05	LEAD WIRE WITH CONNECTOR
J055	E31-2472-05	LEAD WIRE WITH CONNECTOR
J056	E31-2479-25	LEAD WIRE WITH CONNECTOR
J059	E31-2448-05	LEAD WIRE WITH CONNECTOR
J060	E31-2479-25	LEAD WIRE WITH CONNECTOR
J061	E31-2470-05	LEAD WIRE WITH CONNECTOR
J062	E31-2469-05	LEAD WIRE WITH CONNECTOR
L001	L39-0514-15	Y ALIGNMENT COIL
L002	L76-0100-25	DELAY LINE
R001	R0148B2C105J	RES. CARBON 1M 5% 1/4W
R002	R0148B2E105J	RES. CARBON 1M 5% 1/4W
R003	R0148B2C330J	RES. CARBON 33 5% 1/6W
R004	R0148B2C470J	RES. CARBON 47 5% 1/6W
R005	R0148B2C330J	RES. CARBON 33 5% 1/6W
R006	R0148B2C330J	RES. CARBON 33 5% 1/6W
R007	R0148B2C100J	RES. CARBON 10 5% 1/6W
R008	R0148B2C100J	RES. CARBON 10 5% 1/6W
R012	R0148B2C330J	RES. CARBON 33 5% 1/6W
R013	R0148B2C330J	RES. CARBON 33 5% 1/6W
S001	S40-1504-05	PUSH SWITCH
S002	S40-1504-05	PUSH SWITCH
S003	S40-1504-05	PUSH SWITCH
S004	S40-1504-05	PUSH SWITCH
S005	S40-1504-05	PUSH SWITCH
S006	S40-1504-05	PUSH SWITCH
S007	S40-1504-05	PUSH SWITCH
S008	S40-1504-05	PUSH SWITCH
S009	S40-1504-05	PUSH SWITCH
S010	S40-1504-05	PUSH SWITCH
S011	S40-1504-05	PUSH SWITCH
S012	S40-1504-05	PUSH SWITCH
S013	S40-1504-05	PUSH SWITCH
S014	S40-1504-05	PUSH SWITCH
S015	S40-1504-05	PUSH SWITCH
S016	S40-1504-05	PUSH SWITCH
S017	S40-1504-05	PUSH SWITCH
S018	S40-1504-05	PUSH SWITCH
S019	S40-1504-05	PUSH SWITCH
S020	S40-1505-05	PUSH SWITCH
110 S023	S33-1501-05	LEVER SWITCH
S024	S33-1501-05	LEVER SWITCH
117 VR001	R23-1502-05	V.R. 1K B
VR002	R23-1502-05	V.R. 1K B
118 VR005	R23-2501-05	V.R. 5K B X2
119 VR006	R06-2302-05	V.R. WITH PUSH SW
120 VR007	R29-0504-05	V.R. 1K B

## VERTICAL PREAMP UNIT

### X73-1500-00

REF. NO	PARTS NO	NAME & DESCRIPTION
E-2	C001	E23-0012-04 CAP. METAL FILM 0.01 20% 630V
E-1	C002	E23-0014-05 CAP. CERAMIC 0.01 50% 50V
E-1	C003	J25-5036-12 CAP. CERAMIC 150P 5% 50V
E-1	C004	001-0801-05 CAP. ELECTRO 47 20% 10V
E-1	C005	002-0001-05 CAP. CERAMIC 0.01 50V
E-1	C006	003-0298-05 CAP. CERAMIC 0.01 50V
D-1	D007	C90-0298-05 CAP. CERAMIC 0.1 20% 12V
D-1	D008	C90-0298-05 CAP. CERAMIC 0.1 20% 12V
D-1	C009	C045F1H103Z CAP. CERAMIC 10P 5% 50V
E-2	E010	CW93B02A680J CAP. NICA 68P 5% 100V
E-2	E011	CK45FF1H103Z CAP. CERAMIC 0.01 50V
E-2	E012	CK45FF1H103Z CAP. CERAMIC 0.01 50V
E-2	E013	CK45FF1H472K CAP. CERAMIC 4700P 10% 50V
D-1	D015	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-1	D016	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-1	D017	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-2	D018	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-2	D019	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-1	D020	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-1	D021	CK45B1H102K CAP. CERAMIC 1000P 10% 50V
D-1	D022	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-1	C023	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-1	C024	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-1	C025	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-2	C026	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-2	C027	CK45CH1390J CAP. CERAMIC 39P 5% 50V
C-1	C030	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-1	C031	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-1	C032	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-1	C033	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-1	C034	CK45SL14470J CAP. CERAMIC 47P 5% 50V
C-1	C035	CK45SL14470J CAP. CERAMIC 47P 5% 50V
E-2	E036	C90-0298-05 CAP. CERAMIC 0.1 20% 12V
E-3	E037	CK45FF1H103Z CAP. CERAMIC 0.01 50V
E-3	E038	CK45CH1H151J CAP. CERAMIC 150P 5% 50V
E-3	E039	CE04M14470M CAP. ELECTRO 47 20% 10V
E-3	E040	CK45FF1H103Z CAP. CERAMIC 0.01 50V
E-2	E041	CK45FF1H103Z CAP. CERAMIC 0.01 50V
E-3	E042	CK45FF1H103Z CAP. CERAMIC 0.01 50V
E-3	E043	C90-0298-05 CAP. CERAMIC 0.1 20% 12V
D-3	D044	C045M1010M CAP. ELECTRO 10P 5% 50V
E-2	E045	CW93B02A680J CAP. NICA 68P 5% 100V
E-2	E046	CK45FF1H103Z CAP. CERAMIC 0.01 50V
E-2	E047	CK45FF1H103Z CAP. CERAMIC 0.01 50V
E-2	E048	CK45B1H472K CAP. CERAMIC 4700P 10% 50V
E-1	E049	NO USE
D-3	D050	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-3	D051	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-2	D052	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-2	D053	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-2	D054	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-3	D055	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-3	C056	CK45B1H102K CAP. CERAMIC 1000P 10% 50V
C-3	C057	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-2	D059	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-2	C060	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-3	C061	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-2	C062	CK45CH1390J CAP. CERAMIC 39P 5% 50V
D-1	D063	CK45CH1H020C CAP. CERAMIC 2P 0.25P 50V
C-3	C064	CK45CH1H120J CAP. CERAMIC 12P 5% 50V
C-3	C065	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-3	C066	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-3	C067	CK45FF1H103Z CAP. CERAMIC 0.01 50V
C-3	C068	CK45SL14470J CAP. CERAMIC 47P 5% 50V
B-2	B069	CK45FF1H103Z CAP. CERAMIC 0.01 50V
B-2	B070	CK45FF1H103Z CAP. CERAMIC 0.01 50V
B-2	B071	CK45CH1H020C CAP. CERAMIC 2P 0.25P 50V
B-2	B072	CK45CH1H020C CAP. CERAMIC 2P 0.25P 50V
B-1	B073	CK45CH1H00D CAP. CERAMIC 10P 0.5P 50V
B-1	B074	CK45CH1H00D CAP. CERAMIC 10P 0.5P 50V
B-1	B075	CK45SL1H151J CAP. CERAMIC 150P 5% 50V
B-1	B076	CK45SL1H151J CAP. CERAMIC 150P 5% 50V
B-1	B077	CK45FF1H103Z CAP. CERAMIC 0.01 50V
B-3	B080	CK45FF1H103Z CAP. CERAMIC 0.01 50V
B-1	B081	CK45FF1H103Z CAP. CERAMIC 0.01 50V
B-1	B082	CK45FF1H103Z CAP. CERAMIC 0.01 50V
B-1	B083	CK45CH1H050C CAP. CERAMIC 5P 0.25P 50V
B-2	B084	CK45FF1H103Z CAP. CERAMIC 0.01 50V
B-2	B085	CK45FF1H103Z CAP. CERAMIC 0.01 50V
B-3	B086	CK45CH1H050C CAP. CERAMIC 5P 0.25P 50V
B-3	B087	CK45FF1H103Z CAP. CERAMIC 0.01 50V
D-2	D088	CE04M1C100M CAP. ELECTRO 10 20% 10V
D-2	D089	CE04M1C100M CAP. ELECTRO 10 20% 10V
C-2	C090	CE04M1C100M CAP. ELECTRO 10 20% 10V

# PARTS LIST

REF. NO	PARTS NO	NAME & DESCRIPTION	10	20X	16V	REF. NO	PARTS NO	NAME & DESCRIPTION	4.7UH	
C-2	C091	CE04M1C100M	CAP. ELECTRO	10	20X	16V	D-2	L002	L40-4791-02	FERRI INDUCTOR
C-2	C092	CE04M1C100M	CAP. ELECTRO	10	20X	16V	D-2	L003	L40-4791-02	FERRI INDUCTOR
C-2	C093	CE04M1C100M	CAP. ELECTRO	10	20X	16V	C-2	L004	L40-4791-02	FERRI INDUCTOR
C-2	C094	CE04M1C100M	CAP. ELECTRO	10	20X	16V	C-2	L005	L40-4791-02	FERRI INDUCTOR
B-1	C095	CE04M1C100M	CAP. ELECTRO	10	20X	16V	C-2	L006	L40-4791-02	FERRI INDUCTOR
B-3	C096	CE04M1C100M	CAP. ELECTRO	10	20X	16V	C-2	L007	L40-4791-02	FERRI INDUCTOR
B-3	C097	CE04M1C100M	CAP. ELECTRO	10	20X	16V	B-3	L008	L40-4791-02	FERRI INDUCTOR
A-3	C098	CE04M1C101M	CAP. ELECTRO	160	20X	16V	B-1	L009	L40-4791-02	FERRI INDUCTOR
B-3	C099	CK45FFH103Z	CAP. CERAMIC	0.01	50V		B-3	L010	L40-4791-02	FERRI INDUCTOR
D-2	C100	CE04M1A707M	CAP. ELECTRO	100	20X	10V	A-3	L011	L40-1011-04	FERRI INDUCTOR
D-2	C101	CE04M1A707M	CAP. ELECTRO	47	20X	10V	D-2	L012	L40-4791-02	FERRI INDUCTOR
D-2	C102	CE04M1A707M	CAP. ELECTRO	47	20X	10V	D-2	L013	L40-4791-02	FERRI INDUCTOR
D-2	C103	CE04M1C100M	CAP. ELECTRO	10	20X	16V	D-2	L014	L40-4791-02	FERRI INDUCTOR
D-2	C104	CE04M1C100M	CAP. ELECTRO	10	20X	16V	D-2	L015	L40-4791-02	FERRI INDUCTOR
D-2	C105	CE04M1C100M	CAP. ELECTRO	10	20X	16V	B-1	L016	L40-4791-02	FERRI INDUCTOR
D-2	C106	CE04M1C100M	CAP. ELECTRO	10	20X	16V	C-2	L017	L40-4791-02	FERRI INDUCTOR
B-1	C107	CE04M1C100M	CAP. ELECTRO	10	20X	16V	B-2	L018	L40-4791-02	FERRI INDUCTOR
C-3	C108	CE04M1C100M	CAP. ELECTRO	10	20X	16V	-	L019	NO USE	
B-2	C109	CE04M1C100M	CAP. ELECTRO	10	20X	16V	D-2	L020	L40-4791-02	FERRI INDUCTOR
A-3	C110	CE04M1C101M	CAP. ELECTRO	160	20X	16V	D-2	L021	L40-4791-02	FERRI INDUCTOR
D-2	C111	CE04M1A707M	CAP. ELECTRO	100	20X	10V	D-2	L022	L40-4791-02	FERRI INDUCTOR
D-2	C112	CE04M1A707M	CAP. ELECTRO	47	20X	10V	D-2	L023	L40-4791-02	FERRI INDUCTOR
D-2	C113	CE04M1A707M	CAP. ELECTRO	47	20X	10V				
A-1	C114	CK45FFH103Z	CAP. CERAMIC	0.01	50V		P001	E40-0473-05	PIN CONNECTOR	4 CONTACT
A-2	C115	CK45FFH103Z	CAP. CERAMIC	0.01	50V		P002	E40-1273-05	PIN CONNECTOR	12 CONTACT
A-2	C116	CK45FFH103Z	CAP. CERAMIC	0.01	50V		P003	E40-0473-05	PIN CONNECTOR	4 CONTACT
A-2	C117	CK45 F1H103Z	CAP. CERAMIC	0.01	50V		P004	E40-0473-05	PIN CONNECTOR	4 CONTACT
A-2	C118	CK45FFH103Z	CAP. CERAMIC	0.01	50V		P005	E40-0373-05	PIN CONNECTOR	3 CONTACT
C-2	C119	NO USE					P006	E40-0373-05	PIN CONNECTOR	3 CONTACT
C-2	C120	CK45FFH103Z	CAP. CERAMIC	0.01	50V		D-1	E40-0573-05	PIN CONNECTOR	5 CONTACT
C-2	C121	CC45SL1H221J	CAP. CERAMIC	220P	5Z	50V	P008	E40-0573-05	PIN CONNECTOR	5 CONTACT
C-2	C122	CC45SL1H221J	CAP. CERAMIC	220P	5Z	50V	P009	E40-0315-05	PIN CONNECTOR	3P
D-2	C123	CE04M1A707M	CAP. ELECTRO	47	20X	10V	P010	NO USE		
D-2	C124	CE04M1A707M	CAP. ELECTRO	47	20X	10V	P011	E40-0473-05	PIN CONNECTOR	4 CONTACT
D-2	C125	CE04M1A707M	CAP. ELECTRO	160	20X	16V	D-1	E40-0315-05	PIN CONNECTOR	4 CONTACT
D-3	C126	CC45CH1H050C	CAP. CERAMIC	5P	0.25P	50V	P013	NO USE		
B-1	C127	CC45CH1H050C	CAP. CERAMIC	1P	0.25P	50V	P014	E40-0773-05	PIN CONNECTOR	7P
C-1	C128	CK45FFH103Z	CAP. CERAMIC	0.01	50V		P015	E40-0273-05	PIN CONNECTOR	2 CONTACT
C129	CC45CH1H020C	CAP. CERAMIC	2P	0.25P	50V	P016	E40-0273-05	PIN CONNECTOR	2 CONTACT	
E-2	P001	1S1544A	D1ODE				P019	E40-0273-05	PIN CONNECTOR	2 CONTACT
E-2	P002	1S1544A	D1ODE				P020	E40-0573-05	PIN CONNECTOR	5 CONTACT
E-1	P003	RT23.3JA	D1ODE, ZENER	3.2V			P021	E40-0273-05	PIN CONNECTOR	2 CONTACT
B-1	P004	GMA-01	D1ODE							
C-1	P005	GMA-01	D1ODE							
B-2	P007	GMA-01	D1ODE							
B-2	P008	GMA-01	D1ODE							
B-2	P009	GMA-01	D1ODE							
B-2	P010	GMA-01	D1ODE							
C-1	P011	MT23.3JA	D1ODE, ZENER	3.2V						
C-1	P012	MT23.3JA	D1ODE, ZENER	3.2V						
E-2	P013	1S1544A	D1ODE							
E-2	P014	1S1544A	D1ODE							
E-3	P015	MT23.3JA	D1ODE, ZENER	3.2V						
D-2	P016	GMA-01	D1ODE							
D-2	P017	GMA-01	D1ODE							
D-2	P018	MT27.5JA	D1ODE, ZENER	7.1V						
C-2	P019	1N40	D1ODE, GERMA							
C-2	P020	GMA-01	D1ODE							
B-2	P021	GMA-01	D1ODE							
B-2	P022	GMA-01	D1ODE							
B-2	P023	GMA-01	D1ODE							
B-2	P024	GMA-01	D1ODE							
B-2	P025	MT23.3JA	D1ODE, ZENER	3.2V						
B-2	P026	MT27.5JA	D1ODE, ZENER	7.1V						
A-1	P027	GMA-01	D1ODE							
A-1	P028	MT27.5JA	D1ODE, ZENER	7.1V						
B-2	P029	GMA-01	D1ODE							
B-2	P030	GMA-01	D1ODE							
B-2	P031	GMA-01	D1ODE							
B-2	P032	GMA-01	D1ODE							
B-2	P033	GMA-01	D1ODE							
B-2	P034	GMA-01	D1ODE							
B-2	P035	GMA-01	D1ODE							
B-2	P036	GMA-01	D1ODE							
A-1	P037	GMA-01	D1ODE							
A-1	P038	GMA-01	D1ODE							
A-1	P039	GMA-01	D1ODE							
A-1	P040	GMA-01	D1ODE							
A-1	P041	GMA-01	D1ODE							
A-1	P042	GMA-01	D1ODE							
A-1	P043	GMA-01	D1ODE							
A-1	P044	GMA-01	D1ODE							
A-1	P045	GMA-01	D1ODE							
A-2	P046	GMA-01	D1ODE							
E-2	IC001	LF4418CN	IC, LOW-POWER JFET OP-AMP							
E-2	IC002	LF4418CN	IC, LOW-POWER JFET OP-AMP							
A-2	IC003	SN7418N	IC, QUAD 2-INPUT NAND							
A-2	IC004	MC10104L	IC, QUAD 2-INPUT AND GATE							
A-2	IC005	MC10131L	IC, DUAL D-FFS							
A-2	IC006	MC10102L	IC, QUAD 2-INPUT NOR GATE							
A-2	IC007	MC10102L	IC, QUAD 2-INPUT NOR GATE							
D-2	IC008	LM317LZ	IC, REGULATOR							
D-2	IC009	LM317LZ	IC, REGULATOR							
D-2	L001	L40-4791-02	FERRI INDUCTOR	4.7UH						

# PARTS LIST

REF. NO	PARTS NO	NAME & DESCRIPTION	REF. NO	PARTS NO	NAME & DESCRIPTION
C-2	0095	25C3315(C,D)	C-1	R065	RD148B2C821J
C-2	0082	25C2671(H)	C-1	R066	RD148B2C821J
C-2	0097	25C2671(H)	C-1	R067	RD148B2C472J
C-3	0059	25C2671(H)	C-1	R068	RD148B2C470F
C-3	0060	25C2671(H)	C-2	R069	RD148B2C352A
C-3	0060	25C3315(C,D)	C-1	R070	RD148B2C220J
C-3	0061	25C3354(T,S)	C-1	R071	RD148B2C101J
B-2	0062	25C3354(T,S)	C-1	R072	RD148B2C220J
B-2	0065	25C3354(T,S)	C-2	R073	RD148B2C700F
B-2	0064	25A1309(O,R)	C-1	R074	RD148B2C470F
B-2	0065	25C3354(T,S)	C-1	R075	RD148B2C391J
B-2	0066	25C3354(T,S)	C-1	R076	RD148B2C222J
B-2	0067	25C3311(R)	C-1	R077	RD148B2C220J
B-2	0068	25A1161	C-1	R078	RD148B2C101J
B-1	0069	25C3315(C,D)	C-2	R079	RD148B2C220J
B-1	0070	25C3315(C,D)	C-2	R080	RD148B2C222J
A-1	0071	25A1309(O,R)	C-2	R081	RD148B2C101J
A-1	0072	25C3311(R)	C-2	R082	RD148B2C101J
B-3	0075	25A1161	C-2	R083	RD148B2C822J
B-3	0076	25A1161	C-2	R084	RD148B2C471J
B-1	0077	25C3311(R)	C-2	R085	RD148B2C1600F
B-1	0078	25C2671(H)	C-2	R086	RD148B2C7500F
B-1	0077	25C2671(H)	C-2	R087	RD148B2C7500F
B-2	0078	25C3311(R)	C-1	R088	RD148B2C470J
B-3	0079	25C2671(H)	C-1	R089	RD148B2C470J
B-3	0080	25C2671(H)	C-1	R092	RD148B2C470J
A-3	0081	25C3311(R)	C-1	R093	RD148B2C101J
A-3	0082	25A1309(O,R)	C-1	R094	RD148B2C7500F
A-3	0083	25A1309(O,R)	C-1	R095	RD148B2C7500F
A-3	0084	25A1309(O,R)	C-1	R096	RD148B2C7500F
A-3	0085	25A1309(O,R)	C-1	R097	RD148B2C472J
B-2	0086	25C3311(R)	C-1	R098	RD148B2C101J
B-2	0087	25C3311(R)	C-1	R099	RD148B2C101J
E-2	R001	RD148B2E684J	C-1	R100	RD148B2C821J
E-2	R002	RD148B2E1802J	C-1	R101	RD148B2C821J
E-2	R003	RD148B2E203D	C-1	R102	RD148B2C821J
E-1	R004	RD148B2C101J	B-1	R103	RD148B2C562J
E-1	R005	RD148B2C392J	C-1	R104	RD148B2C220J
E-1	R006	RD148B2C220J	C-1	R105	RD148B2C220J
E-1	R007	RD148B2C101J	C-1	R106	RD148B2C430J
E-1	R008	RD148B2C272J	C-1	R107	RD148B2C430J
E-1	R009	RD148B2C220J	B-1	R108	RD148B2C821J
E-1	R010	RD148B2C271J	C-1	R109	RD148B2C430J
E-1	R011	RD148B2C101J	E-2	R110	RD148B2E684J
E-1	R012	RD148B2C700F	E-2	R111	RD148B2E1803D
E-1	R013	RD148B2C1100F	E-2	R112	RD148B2E203D
E-1	R014	RD148B2C5600F	E-2	R113	RD148B2C101J
E-1	R015	RD148B2C3901F	E-2	R114	RD148B2C392J
E-1	R016	RD148B2C220J	E-2	R115	RD148B2C220J
E-1	R017	RD148B2C101J	E-3	R116	RD148B2C101J
E-1	R018	RD148B2C101J	E-2	R117	RD148B2C272J
D-1	R019	RD148B2C100J	E-3	R118	RD148B2C220J
D-2	R020	RD148B2C821J	E-3	R119	RD148B2C271J
D-1	R021	RD148B2C101J	E-3	R120	RD148B2C100J
D-1	R022	RD148B2C510J	E-3	R121	RD148B2C5600F
E-1	R023	RD148B2C102J	E-3	R122	RD148B2C1100F
E-1	R024	RD148B2C103J	E-3	R123	RD148B2C5600F
E-2	R025	RD148B2C471J	E-3	R124	RD148B2C3901F
E-2	R026	RD148B2C470F	E-3	R125	RD148B2C220J
D-2	R027	RD148B2C9100F	E-2	R127	RD148B2C101J
D-2	R028	RD148B2C3001F	E-3	R129	RD148B2C100J
D-1	R029	RD148B2C204J	D-2	R129	RD148B2C821J
D-1	R030	RD148B2C660J	E-3	R130	RD148B2C510J
D-1	R031	RD148B2C2700F	D-3	R131	RD148B2C510J
D-1	R032	RD148B2C4700F	E-2	R132	RD148B2C102J
D-1	R033	RD148B2C4700F	E-2	R133	RD148B2C103J
D-1	R034	RD148B2C680J	D-2	R134	RD148B2C220J
D-1	R035	RD148B2C220J	E-2	R135	RD148B2C4700F
D-1	R036	NO USE	D-2	R136	RD148B2C9100F
D-1	R037	RD148B2C151J	D-2	R137	RD148B2C3001F
D-1	R038	RD148B2C4700F	D-3	R138	RD148B2C204J
D-2	R039	RD148B2C4700F	D-3	R139	RD148B2C680J
D-1	R040	RD148B2C700F	D-3	R140	RD148B2C220J
D-1	R041	RD148B2C622J	D-3	R141	RD148B2C4700F
D-1	R042	RD148B2C392J	D-3	R142	RD148B2C4700F
D-1	R043	RD148B2C101J	D-3	R143	RD148B2C580J
D-1	R044	RD148B2C101J	D-3	R144	RD148B2C220J
D-1	R045	RD148B2C101J	-	R145	NO USE
D-1	R046	RD148B2C4700F	D-3	R146	RD148B2C151J
D-1	R047	RD148B2C4700F	D-2	R147	RD148B2C4700F
D-1	R048	RD148B2C220J	D-3	R148	RD148B2C470J
D-1	R049	RD148B2C220J	D-2	R149	RD148B2C4700F
D-2	R050	RD148B2C124J	D-3	R150	RD148B2C622J
D-2	R051	RD148B2C332J	D-3	R151	RD148B2C392J
D-2	R052	RD148B2C472J	D-3	R152	RD148B2C101J
D-2	R053	RD148B2C332J	D-3	R153	RD148B2C220J
D-2	R054	RD148B2C700F	D-3	R154	RD148B2C101J
D-1	R056	RD148B2C132J	D-3	R155	RD148B2C4700F
D-2	R057	RD148B2C472J	D-3	R156	RD148B2C4700F
C-1	R058	RD148B2C220J	D-3	R157	RD148B2C220J
D-1	R059	RD148B2C220J	D-3	R158	RD148B2C220J
D-1	R060	RD148B2C223J	D-3	R159	RD148B2C332J
C-1	R061	RD148B2C3300F	D-3	R160	RD148B2C332J
C-1	R062	RD148B2C06200F	D-2	R161	RD148B2C472J
D-1	R063	RD148B2C06200F	D-2	R162	RD148B2C332J
C-2	R064	RD148B2C391J	D-2	R163	RD148B2C3300F

# PARTS LIST

REF NO	PARTS NO	NAME & DESCRIPTION	REF NO	PARTS NO	NAME & DESCRIPTION
D-2	R164	RD148B2C472J	B-3	R262	RN148K2C600F
D-2	R165	RD148B2C132J	B-3	R263	RN148K2C7500F
D-2	R166	RD148B2C472J	B-2	R264	RN148K2C900F
C-3	R167	RD148B2C220J	B-3	R265	RD148B2C100J
C-3	R168	RD148B2C220J	B-2	R266	RD148B2E181J
C-3	R169	RD148B2C220J	B-2	R267	RN148K2C900F
C-3	R170	RD148B2C225J		R268	NO USE
C-3	R171	RN148K2C3500F	B-3	R269	RN148K2C7500F
C-3	R172	RN148K2C6000F	B-3	R270	RD148B2C100J
C-3	R173	RN148K2C7500F	B-3	R271	RN148K2C6000F
C-2	R174	RD148B2C220J	B-1	R272	RD148B2C102J
C-2	R175	RD148B2C220J	B-1	R273	RD148B2C132J
D-3	R176	RD148B2C220J		R274	NO USE
D-3	R177	RD148B2C220J	B-1	R275	SD-48B2C102J
D-3	R178	RD148B2C225J	B-1	R276	RD148B2C102J
D-3	R179	RN148K2C3500F	B-1	R277	RD148B2C101J
D-2	R180	RN148K2C6000F	B-1	R278	RD148B2C101J
D-2	R181	RN148K2C6000F	B-1	R279	RD148B2C101J
C-3	R182	RD148B2C220J	B-1	R280	RD148B2C100J
D-2	R183	RD148B2C391J	B-1	R281	RD148B2C332J
D-2	R184	RD148B2C103J	B-1	R282	RD148B2C311J
D-2	R185	RD148B2C272J	B-1	R283	RN148K2C1001F
C-2	R186	RD148B2C103J	B-1	R284	RN148K2C1001F
C-2	R187	RD148B2C102J	B-2	R285	RN148K2C1001F
D-2	R188	RD148B2C102J	B-2	R286	RD148B2C132J
C-2	R189	NO USE	B-2	R287	NO USE
C-2	R190	RD148B2C391J	B-2	R288	RD148B2C102J
C-3	R191	RD148B2C821J	B-2	R289	RD148B2C102J
C-3	R192	RD148B2C821J	B-3	R290	RD148B2C101J
C-2	R193	RD148B2C332J	B-3	R291	RD148B2C101J
C-2	R194	RD148B2C472J	B-3	R292	RD148B2C101J
C-2	R195	RD148B2C472J	B-3	R293	RD148B2C101J
C-3	R196	RD148B2C220J	B-3	R294	RD148B2C332J
C-3	R197	RD148B2C101J	B-3	R295	RD148B2C311J
C-3	R198	RD148B2C220J	B-3	R296	RN148K2C1001F
C-3	R199	RD148B2C4700F	A-2	R297	RN148K2C1001F
C-3	R200	RN148K2C4700F	A-2	R298	RD148B2C103J
C-3	R201	RD148B2C391J	A-2	R299	RD148B2C222J
C-3	R202	RD148B2C222J	A-2	R300	RD148B2C153J
C-3	R203	RD148B2C220J		R301	NO USE
C-3	R204	RD148B2C220J	A-2	R302	RD148B2C222J
C-2	R205	RD148B2C222J	A-2	R303	RD148B2C222J
C-2	R206	RD148B2C222J	A-2	R304	RD148B2C222J
C-2	R207	RD148B2C101J	A-2	R305	RD148B2C222J
C-2	R208	RD148B2C101J	A-2	R306	RD148B2C102J
C-2	R209	RD148B2C101J	A-2	R307	RD148B2C102J
C-2	R210	RD148B2C471J	A-2	R308	RD148B2C102J
C-2	R211	RN148K2C1600F	A-2	R309	RD148B2C102J
C-2	R212	RN148K2C6800F	A-2	R310	RD148B2C102J
C-2	R213	RN148K2C9000F	A-2	R311	RD148B2C102J
C-2	R214	RD148B2C220J	A-3	R312	RD148B2C102J
C-2	R215	RD148B2C220J	A-3	R313	RD148B2C103J
C-2	R216	RD148B2C471J	A-3	R314	RD148B2C220J
A-1	R217	RD148B2C470J	A-3	R315	RD148B2C270J
C-2	R218	RD148B2C101J	A-3	R316	RD148B2C331J
C-2	R219	RD148B2C101J	A-3	R317	RD148B2C103J
C-2	R220	RD148B2C202J	A-3	R318	RD148B2C220J
C-3	R221	RD148B2C202J	A-3	R319	RD148B2C270J
C-3	R222	RD148B2C440J	A-3	R320	RD148B2C331J
C-3	R223	RD148B2C471J	A-3	R321	RD148B2C103J
C-3	R224	RD148B2C112J	A-3	R322	RD148B2C220J
C-3	R225	RD148B2C332J	A-3	R323	RD148B2C270J
C-3	R226	RD148B2C220J	A-3	R324	RD148B2C331J
C-3	R227	RD148B2C220J	A-3	R325	RD148B2C103J
C-3	R228	RD148B2C430J	A-3	R326	RD148B2C100J
B-2	R229	RD148B2C622J	A-3	R327	RD148B2C270J
B-2	R230	RD148B2C332J	A-3	R328	RD148B2C331J
B-2	R231	RD148B2C332J	A-3	R329	RD148B2C132J
B-2	R232	RD148B2C101J	C-2	R330	RD148B2C102J
B-2	R233	RN148K2C4700F	D-2	R331	RN148K2C400F
B-2	R234	RN148K2C4700F	D-2	R332	RN148K2C1101F
B-2	R235	RD148B2C820J	D-2	R333	RN148K2C400F
B-2	R236	RD148B2C470J	D-2	R334	RD148B2C101F
B-2	R237	RD148B2C472J	A-2	R335	RD148B2C222J
B-2	R238	RN148K2C4700F			
B-2	R239	RN148K2C4700F			
B-2	R240	RD148B2C200J	E-2	T0001	C05-0030-15
B-2	R241	RD148B2C220J	E-1	T0002	C05-0033-15
B-2	R242	RD148B2C220J	C-2	T0003	C05-0030-15
B-2	R243	RD148B2C470J	E-2	T0004	C05-0030-15
B-2	R244	RN148K2C3500F	E-2	T0005	C05-0030-15
B-2	R245	RN148K2C7500F	E-3	T0006	C05-0031-15
B-2	R246	RN148K2C2700F	B-1	T0007	C05-0031-15
B-2	R247	RN148K2C3300F	B-3	T0009	C05-0031-15
B-2	R248	RN148K2C7500F			
B-2	R249	RD148B2C470J	D-1	T0001	E25-0050-04
B-1	R250	RN148K2C6000F	D-3	T0002	E25-0050-04
B-1	R251	RD148B2C470J	B-2	P0003	E40-0211-05
B-1	R252	RN148K2C6000F			
B-2	R253	RD148B2C470J	D-2	VR001	R12-0539-05
A-1	R254	RD148B2C103J	D-1	VR002	R12-0421-05
A-1	R255	RD148B2C103J	E-1	VR003	R12-0421-05
A-1	R256	RD148B2C225J	D-1	VR004	R12-0421-05
B-1	R257	RD148B2C472J	D-2	VR005	R12-0421-05
B-1	R258	RD148B2C472J	D-2	VR006	R12-0421-05
B-1	R259	RD148B2C473J	D-2	VR007	R12-0421-05
B-1	R260	RD148B2C473J	D-2	VR008	R12-0421-05
-	R261	NO USE	C-1	VR009	R12-0530-05

## PARTS LIST

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT	REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT	
B-1	VR010	R12-3520-05	RES. SEMI FIXED	10K B						
D-2	VR011	R12-0539-05	RES. SEMI FIXED	200 B						
D-2	VR012	R12-3520-05	RES. SEMI FIXED	100 B						
E-3	VR015	R12-0421-05	RES. SEMI FIXED	100 B						
D-2	VR014	R12-0421-05	RES. SEMI FIXED	100 B						
D-2	VR015	R12-0421-05	RES. SEMI FIXED	100 B						
D-2	VR016	R12-0421-05	RES. SEMI FIXED	100 B						
D-2	VR017	R12-0421-05	RES. SEMI FIXED	100 B						
C-2	VR018	R12-0421-05	RES. SEMI FIXED	100 B						
B-3	VR019	R12-3520-05	RES. SEMI FIXED	100K B						
B-3	VR020	R12-0539-05	RES. SEMI FIXED	200 B						
B-1	VR021	R12-0540-05	RES. SEMI FIXED	200 B						
B-1	VR022	R12-0539-05	RES. SEMI FIXED	200 B						
B-3	VR023	R12-0540-05	RES. SEMI FIXED	200 B						
B-3	VR024	R12-0539-05	RES. SEMI FIXED	200 B						
C-3	VR025	R12-0539-05	RES. SEMI FIXED	200 B						
<b>VERTICAL OUTPUT AMP UNIT</b>										
<b>X73-1510-00</b>										
REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT						
	E23-0512-05	TERMINAL								
	F02-0501-04	HEAT SINK								
	F02-0502-05	HEAT SINK								
	G25-5039-12	PIES (UNMOUNTED)								
	L02-0110-05	BEAD CORE								
	N09-0709-05	SCREEN								
	N09-3000-46	SCREEN BINDING								
	Z12-0474-06	TUBE (PLASTIC)								
C-1	C001	CC45CH14680J	CAP. CERAMIC	68P	5%	50U				
C-2	C002	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
E-2	C003	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
D-2	C004	OK452H1221J	CAP. CERAMIC	220P	5%	50U				
-	C005	NO USE								
D-2	C006	CC45GH1H120J	CAP. CERAMIC	12P	5%	50U				
E-2	C007	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
C-3	C008	OK452H472K	CAP. CERAMIC	4700P	10%	500U				
B-2	C009	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
B-2	C010	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
B-2	C011	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
C-3	C012	OK452H472K	CAP. CERAMIC	4700P	10%	500U				
D-3	C013	OK452H472K	CAP. CERAMIC	4700P	10%	500U				
B-3	C014	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
C-3	C015	CE04F1U1303M	CAP. ELECTRO	33	20%	35V				
C-3	C016	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
B-3	C017	C90-0296-05	CAP. CERAMIC	0.1	20%	12V				
B-2	C018	CE04F1U10470M	CAP. ELECTRO	47	20%	16V				
C-1	C019	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
B-1	C020	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
-	C021	NO USE								
A-3	C022	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
A-3	C023	CE04F1U10470M	CAP. ELECTRO	47	20%	16V				
E-2	C024	CC45LL1H531J	CAP. CERAMIC	330P	5%	50U				
E-3	C025	CC45SL1H531J	CAP. CERAMIC	330P	5%	50U				
B-1	C026	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
B-2	C027	OK45FF1H103Z	CAP. CERAMIC	0.01		50U				
B-2	D001	MT224JC	DIODE, ZENER	24V						
D-1	D002	1S2686	DIODE							
D-2	D003	1S2686	DIODE							
E-1	L001	L33-0806-05	CHOKE COIL							
E-3	L002	L33-0806-05	CHOKE COIL							
E-3	L003	L40-2282-13	FERRI INDUCTOR	0.22UH						
E-3	L004	L40-2282-13	FERRI INDUCTOR	0.22UH						
C-3	L005	L40-4701-03	FERRI INDUCTOR	47UH						
C-3	L006	L40-4701-03	FERRI INDUCTOR	47UH						
C-3	L007	L40-4701-03	FERRI INDUCTOR	47UH						
A-3	L008	L40-4701-03	FERRI INDUCTOR	47UH						
-	L009	NO USE								
F010	E40-0315-05	PIN CONNECTOR	3P							
F013	E40-0273-05	PIN CONNECTOR	2 CONTACT							
F020	E40-0573-05	PIN CONNECTOR	5 CONTACT							
F021	NO USE									
F022	E40-0773-05	PIN CONNECTOR	7P							
B-1	0001	25C2671 (H)	TR. S1, NPN							
B-2	0002	25C2671 (H)	TR. S1, NPN							
C-1	0003	25A1206	TR. S1, PNP							
C-2	0004	25A1506	TR. S1, PNP							
C-1	0005	25C2673 (H)	TR. S1, NPN							
C-3	0006	25C2671 (H)	TR. S1, NPN							
C-1	0007	25C2644	TR. S1, NPN							
C-1	0008	25C2644	TR. S1, NPN							
C-3	0009	25C2644	TR. S1, NPN							
C-3	0010	25C2644	TR. S1, NPN							
E-1	0011	25C1164	TR. S1, NPN							
E-3	0012	25C1164	TR. S1, NPN							
B-2	0013	25A1309 (D, R)	TR. S1, PNP							
B-2	0014	25C3311 (D, R)	TR. S1, NPN							
B-2	0015	25A1309 (D, R)	TR. S1, PNP							
C-2	0016	25A1309 (D, R)	TR. S1, PNP							
C-3	0017	25C3311 (D, R)	TR. S1, NPN							
B-2	0018	25A1309 (D, R)	TR. S1, PNP							
A-2	R001	RD148B2C200F	RES. METAL FILM	200	1%	1/6W				
A-1	R002	RD148B2C220J	RES. CARBON	22	5%	1/6W				
A-2	R003	RD148B2C220J	RES. CARBON	22	5%	1/6W				
C-1	R004	RD148B2C332J	RES. CARBON	33K	5%	1/6W				
B-1	R005	RD148K2C275R0F	RES. METAL FILM	75.0	1%	1/6W				
B-2	R006	RD148K2C275R0F	RES. METAL FILM	75.0	1%	1/6W				
B-1	R007	RD148B2C470J	RES. CARBON	47	5%	1/6W				
B-2	R008	RD148B2C470J	RES. CARBON	47	5%	1/6W				
C-2	R009	RD148B2C101J	RES. CARBON	100	5%	1/6W				
C-2	R010	RD148K2E3900F	RES. METAL FILM	390	1%	1/4W				
C-2	R011	RD148K2E3900F	RES. METAL FILM	390	1%	1/4W				
C-1	R012	RD148B2C220J	RES. CARBON	22	5%	1/6W				
C-2	R013	RD148B2C220J	RES. CARBON	22	5%	1/6W				
C-2	R014	RD148B2C361J	RES. CARBON	360	5%	1/4W				
C-2	R015	RD148B2C361J	RES. CARBON	360	5%	1/4W				
C-1	R016	RD148B2C220J	RES. CARBON	22	5%	1/6W				
C-1	R017	RD148B2C220J	RES. CARBON	22	5%	1/6W				

## PARTS LIST

## CH3, CH4 AMP UNIT

X73-1520-00

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT	PRICE
C-3	R018	RD148B2C220J	22	5X	1/6W
C-3	R019	RD148B2C220J	22	5X	1/6W
D-2	R021	RD148B2C153J	15K	5X	1/6W
-	R022	NO USE			
D-2	R023	RD148B2C661J	660	5X	1/6W
C-2	R024	RN148K2C68ROF	68.0	1X	1/4W
C-2	R025	RN148K2C68ROF	68.0	1X	1/4W
C-2	R026	RD148B2C82J	82	5X	1/4W
D-1	R027	RD148B2C220J	22	5X	1/4W
D-3	R028	RD148B2C220J	22	5X	1/4W
E-2	R029	RD148B2C471J	470	5X	1/6W
E-2	R030	RD148B2C471J	470	5X	1/6W
E-2	R031	RS148B3H561J	560	5X	5W
E-2	R032	RS148B3H561J	560	5X	5W
E-1	R033	RD148B2C471J	470	5X	1/6W
E-3	R034	RD148B2C471J	470	5X	1/6W
B-2	R035	RD148B2C473J	47K	5X	1/6W
B-2	R036	RD148B2C682J	6.8K	5X	1/6W
B-2	R037	RN148K2C4701F	4.7K	1X	1/6W
B-2	R038	RN148K2C4701F	4.7K	1X	1/6W
B-2	R039	RN148K2C3300F	330	1X	1/6W
A-2	R040	RN148K2C2001F	2K	1X	1/6W
B-3	R041	RN148K2C2401F	2.4K	1X	1/6W
C-2	R042	RD148B2C220J	22	5X	1/6W
B-2	R043	RN148K2C47ROF	47.0	1X	1/6W
B-2	R044	RD148B2C220J	22	5X	1/6W
C-3	R045	RN148K2C47ROF	47.0	1X	1/6W
B-2	R046	RN148K2C91ROF	91.0	1X	1/6W
C-3	R047	RN148K2C2201F	2.2K	1X	1/6W
C-3	R048	RN148K2C2201F	2.2K	1X	1/6W
C-3	R049	RD148B2C101J	100	5X	1/6W
B-3	R050	RD148B2C470J	47	5X	1/6W
B-2	R051	RD148B2C103J	10K	2X	1/6W
B-2	R052	RD148B2C133J	13K	5X	1/6W
D-2	R053	RD148B2C201J	200	5X	1/6W
D-1	R054	RD148B2C133J	13K	5X	1/6W
B-1	R055	RD148B2C681J	680	5X	1/6W
B-2	R056	RD148B2C681J	680	5X	1/6W
D-1	R057	RD148B2C223J	22K	5X	1/6W
D-1	R058	RD148B2C101J	100	5X	1/6W
B-1	TC001	C05-0412-05	CAP. TRIMMER	20P	
B-1	TC002	C05-0412-05	CAP. TRIMMER	20P	
D-1	TH001	SDT1000	THERMISTOR		
B-2	VR001	R12-0543-05	RES. SEMI FIXED	500 B	
C-2	VR002	R12-0543-05	RES. SEMI FIXED	500 B	
A-2	VR003	R12-0543-05	RES. SEMI FIXED	500 B	
B-2	C001	J21-2990-04	PCB (UNMOUNTED)		
B-2	C002	N09-0709-05	SCREEN		
B-2	C003	CK45FF1H103Z	CAP. CERAMIC	39P 5X	50V
B-2	C004	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-2	C005	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-2	C006	C91-0502-05	CAP. METAL FILM	0.01 20X	630V
C-2	C007	CK45FL1H101J	CAP. CERAMIC	100P	50V
C-2	C008	CK45CH1H050C	CAP. CERAMIC	5P	0.25P 50V
-	C009	NO USE			
B-1	C010	CC45CH3900J	CAP. CERAMIC	39P 5X	50V
B-1	C011	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-2	C012	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-1	C013	C91-0502-05	CAP. METAL FILM	0.01 20X	630V
C-1	C014	CK45FL1H101J	CAP. CERAMIC	100P	50V
C-1	C015	CC45CH1H050C	CAP. CERAMIC	5P	0.25P 50V
-	C016	NO USE			
B-3	C015	CE04F1C470M	CAP. ELECTRO	47	20X 16V
B-3	C016	CE04F1C470M	CAP. ELECTRO	47	20X 16V
B-3	C017	CE04F1C470M	CAP. ELECTRO	47	20X 16V
B-2	C018	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-2	C019	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-2	C020	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-2	C021	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-2	C022	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-2	C023	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-2	C026	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-2	C027	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-1	C028	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-1	C029	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-1	C030	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-2	C031	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
D-2	C034	CC45CH1H220J	CAP. CERAMIC	22P	5X 50V
D-2	C035	CC45CH1H220J	CAP. CERAMIC	22P	5X 50V
B-1	D001	99A-01	DIODE		
B-2	D002	1S1544A	DIODE		
B-2	D003	99A-01	DIODE		
C-2	D004	1S1544A	DIODE		
D-3	D005	99A-01	DIODE		
D-3	D006	99A-01	DIODE		
D-3	D007	99A-01	DIODE		
D-2	D008	99A-01	DIODE		
D-1	D009	99A-01	DIODE		
B-3	L001	L40-2201-03	FERRI INDUCTOR	23UH	
B-3	L002	L40-2201-03	FERRI INDUCTOR	23UH	
B-3	L003	L40-2201-03	FERRI INDUCTOR	23UH	
P011	E40-0473-05	PIN CONNECTOR	4 CONTACT		
P012	E40-0473-05	PIN CONNECTOR	4 CONTACT		
P017	E40-0273-05	PIN CONNECTOR	2 CONTACT		
P018	E40-0273-05	PIN CONNECTOR	2 CONTACT		
P046	E40-1816-05	PIN CONNECTOR	18P		
P054	E40-7414-05	PIN CONNECTOR	14P		
P055	E40-7416-05	PIN CONNECTOR	16P		
P056	E23-0503-05	TERMINAL			
P057	NO USE				
P058	E40-0273-05	PIN CONNECTOR	2 CONTACT		
P059	NO USE				
P060	E23-0503-05	TERMINAL			
P061	E40-7416-05	PIN CONNECTOR	16P		
B-2	0001	2SD338(F)	TR. SI, NPN		
C-2	0002	DN1901	FET, DUAL SI, N-CHANNEL		
C-2	0003	2SC3354(T,S)	TR. SI, NPN		
C-2	0004	2SC3354(T,S)	TR. SI, NPN		
C-2	0005	2SA1206	TR. SI, PNP		
C-2	0006	2SA1206	TR. SI, PNP		
D-2	0007	2SC2671(H)	TR. SI, NPN		
D-2	0008	2SC2671(H)	TR. SI, NPN		
B-2	0009	2SD338(F)	TR. SI, NPN		
C-1	0010	DN1901	FET, DUAL SI, N-CHANNEL		
C-1	0011	2SC3354(T,S)	TR. SI, NPN		
C-2	0012	2SC3354(T,S)	TR. SI, NPN		
C-1	0013	2SA1206	TR. SI, PNP		
C-1	0014	2SA1206	TR. SI, PNP		
D-1	0015	2SC2671(H)	TR. SI, NPN		
D-1	0016	2SC2671(H)	TR. SI, NPN		
B-2	R001	RD148B2C470J	RES. CARBON	47	5X 1/6W
B-2	R002	RN148K2C9000S	RES. METAL FILM	900K	0.5X 1/4W
B-2	R003	RN148K2E1130J	RES. METAL FILM	111K	0.5X 1/4W
B-2	R004	RD148B2C560J	RES. CARBON	56	5X 1/6W
B-2	R005	RD148B2C122J	RES. CARBON	1.2K	5X 1/6W
B-2	R006	RN148K2E1004D	RES. METAL FILM	10K	0.5X 1/4W
B-7	R007	RD148B2E684J	RES. CARBON	680K	5X 1/6W
C-2	R008	RD148B2C181J	RES. CARBON	180	5X 1/6W

# PARTS LIST

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT
C-2 R009	RD148B2C181J	RES. CARBON	180	5% 1/6W
C-2 R010	RD148B2C220J	RES. CARBON	22	5% 1/6W
C-2 R011	RD148B2C220J	RES. CARBON	22	5% 1/6W
C-2 R012	RD148B2C101J	RES. CARBON	100	5% 1/6W
C-2 R013	RD148B2C392J	RES. CARBON	3.9K	5% 1/6W
C-2 R014	RD148B2C392J	RES. CARBON	3.9K	5% 1/6W
C-2 R015	RD148B2C101J	RES. CARBON	100	5% 1/6W
C-2 R016	RN148M2C1001F	RES. METAL FILM	1K	1% 1/6W
C-2 R017	RN148M2C1001F	RES. METAL FILM	1K	1% 1/6W
C-2 R018	RN148M2C1101F	RES. METAL FILM	1.1K	1% 1/6W
C-2 R019	RN148M2C1101F	RES. METAL FILM	1.1K	1% 1/6W
C-2 R020	RN148M2C6800F	RES. METAL FILM	680	1% 1/6W
C-2 R021	RN148M2C3600F	RES. METAL FILM	360	1% 1/6W
C-2 R022	RN148M2C3600F	RES. METAL FILM	360	1% 1/6W
C-2 R023	RD148B2C220J	RES. CARBON	22	5% 1/6W
C-2 R024	RD148B2C220J	RES. CARBON	22	5% 1/6W
C-2 R025	RD148B2C220J	RES. CARBON	22	5% 1/6W
D-2 R026	RD148B2C122J	RES. CARBON	1.2K	5% 1/6W
D-2 R027	RD148B2C431J	RES. CARBON	430	5% 1/6W
D-2 R028	RD148B2C220J	RES. CARBON	22	5% 1/6W
D-2 R029	RD148B2C101J	RES. CARBON	100	5% 1/6W
D-2 R030	RD148B2C821J	RES. CARBON	820	5% 1/6W
D-2 R031	RD148B2C330J	RES. CARBON	33	5% 1/6W
B-2 R032	RN148M2C470J	RES. METAL FILM	47	5% 1/6W
B-1 R033	RN148M2C9000D	RES. METAL FILM	9000	5% 1/4W
B-2 R034	RN148M2C1113D	RES. METAL FILM	111K	0.5% 1/4W
B-2 R035	RD148B2C560J	RES. CARBON	56	5% 1/6W
B-2 R036	RD148B2C122J	RES. CARBON	1.2K	5% 1/6W
C-1 R037	RN148M2C1004D	RES. METAL FILM	10	0.5% 1/4W
B-1 R038	RD148B2C684J	RES. CARBON	680K	5% 1/4W
C-1 R039	RD148B2C181J	RES. CARBON	180	5% 1/6W
C-2 R040	RD148B2C181J	RES. CARBON	180	5% 1/6W
C-1 R041	RD148B2C220J	RES. CARBON	22	5% 1/6W
C-2 R042	RD148B2C220J	RES. CARBON	22	5% 1/6W
C-1 R043	RD148B2C101J	RES. CARBON	100	5% 1/6W
C-1 R044	RD148B2C392J	RES. CARBON	3.9K	5% 1/6W
C-2 R045	RD148B2C392J	RES. CARBON	3.9K	5% 1/6W
C-1 R046	RD148B2C101J	RES. CARBON	100	5% 1/6W
C-1 R047	RN148M2C1001F	RES. METAL FILM	1K	1% 1/6W
C-2 R048	RN148M2C1001F	RES. METAL FILM	1K	1% 1/6W
C-1 R049	RN148M2C1101F	RES. METAL FILM	1.1K	1% 1/6W
C-2 R050	RN148M2C1101F	RES. METAL FILM	1.1K	1% 1/6W
C-1 R051	RD148B2C600F	RES. METAL FILM	600	1% 1/6W
C-2 R052	RN148M2C3600F	RES. METAL FILM	360	1% 1/6W
C-2 R053	RN148M2C3600F	RES. METAL FILM	360	1% 1/6W
C-1 R054	RD148B2C220J	RES. CARBON	22	5% 1/6W
C-1 R055	RD148B2C220J	RES. CARBON	22	5% 1/6W
C-1 R056	RD148B2C220J	RES. CARBON	22	5% 1/6W
D-2 R057	RD148B2C122J	RES. CARBON	1.2K	5% 1/6W
D-2 R058	RD148B2C431J	RES. CARBON	430	5% 1/6W
D-1 R059	RD148B2C220J	RES. CARBON	22	5% 1/6W
D-1 R060	RD148B2C101J	RES. CARBON	100	5% 1/6W
D-1 R061	RD148B2C821J	RES. CARBON	820	5% 1/6W
D-1 R062	RD148B2C330J	RES. CARBON	33	5% 1/6W
D-1 R063	RD148B2C391J	RES. CARBON	390	5% 1/6W
D-1 R064	RD148B2C391J	RES. CARBON	390	5% 1/6W
D-1 R065	RD148B2C391J	RES. CARBON	390	5% 1/6W
E-1 R066	RD148B2C391J	RES. CARBON	390	5% 1/6W
E-1 R067	RD148B2C391J	RES. CARBON	390	5% 1/6W
E-1 R068	RD148B2C391J	RES. CARBON	390	5% 1/6W
D-2 R069	RD148B2C391J	RES. CARBON	390	5% 1/6W
E-2 R070	RD148B2C391J	RES. CARBON	390	5% 1/6W
E-2 R071	RD148B2C391J	RES. CARBON	390	5% 1/6W
D-3 R072	RD148B2C222J	RES. CARBON	2.2K	5% 1/6W
D-3 R073	RD148B2C121J	RES. CARBON	120	5% 1/6W
B-1 R074	RD148B2C121J	RES. CARBON	120	5% 1/6W
R075	RD148B2C470J	RES. CARBON	47	5% 1/6W
R076	RD148B2C470J	RES. CARBON	47	5% 1/6W

B-1 RL001	SS1-2505-05	RELAY		
B-2 RL002	SS1-2505-05	RELAY		
B-2 TC002	C05-0062-05	CAP. TRIMMER	6P	
B-2 TC003	C05-0031-15	CAP. TRIMMER	10P	
B-2 TC004	C05-0030-15	CAP. TRIMMER	20P	
TC005	NO USE			
B-1 TC006	C05-0062-05	CAP. TRIMMER	6P	
B-1 TC007	C05-0031-15	CAP. TRIMMER	10P	
B-1 TC008	C05-0030-15	CAP. TRIMMER	20P	
D-2 VR001	R12-0421-05	RES. SEMI FIXED	100 B	
D-2 VR002	R12-0421-05	RES. SEMI FIXED	100 B	

## CPU UNIT

### X81-1320-00

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT
B-4 C001	CE040114470M	CAP. ELECTRO	47	20% 10V
D-2 C002	CE0455L1H820J	CAP. CERAMIC	82P	5% 50V
D-2 C003	CE0441H820M	CAP. ELECTRO	2.2	20% 50V
D-2 C004	C90-0298-05	CAP. CERAMIC	0.1	20% 12V
C-2 C005	C90-0298-05	CAP. CERAMIC	0.1	20% 12V
B-3 D001	6W01	DIOIDE		
D-2 D002	6W01	DIOIDE		
D-1 D003	6W01	DIOIDE		
D-2 D004	6W01	DIOIDE		
C-2 IC001	M7M5010	MPU, 4-BIT MICROCOMPUTER		
B-2 IC002	AN90820	IC. TR. ARRAY		
D-3 IC003	AN90820	IC. TR. ARRAY		
J001	E31-2429-05	LEAD WIRE WITH CONNECTOR		
P002	E40-1274-05	PIN CONNECTOR		
P049	E40-0273-05	PIN CONNECTOR	2	CONTACT
P061	E40-7516-05	PIN CONNECTOR	16P	
P062	E40-7526-05	PIN CONNECTOR	26P	
C-4 Q001	2SA1309(G,R)	TR. SI. PNP		
B-4 Q002	2SC3311(R)	TR. SI. NPN		
B-2 R001	RD148B2C621J	RES. CARBON	620	5% 1/6W
B-3 R002	RD148B2C391J	RES. CARBON	390	5% 1/6W
B-3 R003	RD148B2C391J	RES. CARBON	390	5% 1/6W
B-3 R004	RD148B2C391J	RES. CARBON	390	5% 1/6W
B-3 R005	RD148B2C391J	RES. CARBON	390	5% 1/6W
B-3 R006	RD148B2C391J	RES. CARBON	390	5% 1/6W
B-2 R007	RD148B2C621J	RES. CARBON	620	5% 1/6W
B-3 R008	RD148B2C391J	RES. CARBON	390	5% 1/6W
B-3 R009	RD148B2C391J	RES. CARBON	390	5% 1/6W
C-2 R010	RD148B2C512J	RES. CARBON	5.1K	5% 1/6W
C-3 R011	RD148B2C103J	RES. CARBON	10K	5% 1/6W
C-3 R012	RD148B2C103J	RES. CARBON	10K	5% 1/6W
C-2 R013	RD148B2C103J	RES. CARBON	10K	5% 1/6W
D-2 R014	RD148B2C103J	RES. CARBON	10K	5% 1/6W
B-3 R015	RD148B2C474J	RES. CARBON	4.7K	5% 1/6W
B-3 R016	RD148B2C103J	RES. CARBON	10K	5% 1/6W

# PARTS LIST

## SWEEP ROTARY UNIT

X74-1310-00

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT
	E31-0001-15	LEAD WIRE WITH CONNECTOR		
	F20-0640-04	INSULATOR		
	J25-2971-03	PCB (UNMOUNTED)		
	001-0004-05	COATING WIRE		
D-1	0001	0K45B1H103K	0.01	10X 50V
D-2	0002	0K45B1H103K	0.01	10X 50V
D-3	0003	0K45B1H103K	0.01	10X 50V
D-3	0004	0K45B1H103K	0.01	10X 50V
D-2	0001	0W6-01	D/DIODE	
D-2	0002	15S135	D/DIODE	
D-2	0003	15S135	D/DIODE	
F-2	0004	15S135	D/DIODE	
F-2	0005	15S135	D/DIODE	
F-2	0006	15S135	D/DIODE	
F-2	0007	15S135	D/DIODE	
F-2	0008	15S135	D/DIODE	
D-3	0009	0W6-01	D/DIODE	
D-3	0010	15S135	D/DIODE	
D-3	0011	15S135	D/DIODE	
E-3	0012	15S135	D/DIODE	
E-3	0013	15S135	D/DIODE	
E-3	0014	15S135	D/DIODE	
F-3	0015	15S135	D/DIODE	
F-3	0016	15S135	D/DIODE	
	P015	E40-0973-05	FIN CONNECTOR	9 CONTACT
	F019	E40-1073-05	FIN CONNECTOR	10P
	P040	E40-0873-05	FIN CONNECTOR	8 CONTACT
	P041	E40-0873-05	FIN CONNECTOR	8 CONTACT
	F042	E40-0473-05	FIN CONNECTOR	4 CONTACT
	P051	E40-0773-05	FIN CONNECTOR	7P
	P057	E40-0373-05	FIN CONNECTOR	3 CONTACT
D-2	R001	RN148K2B3603F	RES. METAL FILM	360K 1% 1/8W
D-2	R002	RN148K2B3603F	RES. METAL FILM	120K 1% 1/8W
E-2	R003	RN148K2B3603F	RES. METAL FILM	30K 1% 1/8W
F-2	R004	RN148K2B3603F	RES. METAL FILM	30K 1% 1/8W
E-2	R005	RN148K2B3603F	RES. METAL FILM	36K 1% 1/8W
F-2	R006	RN148K2B1202F	RES. METAL FILM	12K 1% 1/8W
F-2	R007	RN148K2B3001F	RES. METAL FILM	3K 1% 1/8W
F-2	R008	RN148K2B3001F	RES. METAL FILM	3K 1% 1/8W
F-2	R009	RN148K2B3601F	RES. METAL FILM	3.6K 1% 1/8W
D-2	R010	RD148B2C124J	RES. CARBON	120K 5% 1/6W
D-2	R011	RD148B2C395J	RES. CARBON	39K 5% 1/6W
E-2	R012	RD148B2C205J	RES. CARBON	20K 5% 1/6W
E-2	R013	RD148B2C125J	RES. CARBON	12K 5% 1/6W
F-2	R014	RD148B2C392J	RES. CARBON	3.9K 5% 1/6W
F-2	R015	RD148B2C202J	RES. CARBON	2K 5% 1/6W
F-2	R016	RD148B2C202J	RES. CARBON	2K 5% 1/6W
D-1	R018	RD148B2C103J	RES. CARBON	10K 5% 1/6W
D-2	R019	RD148B2C103J	RES. CARBON	10K 5% 1/6W
D-3	R020	RN148K2B3603F	RES. METAL FILM	360K 1% 1/8W
D-3	R021	RN148K2B1203F	RES. METAL FILM	120K 1% 1/8W
D-3	R022	RN148K2B3002F	RES. METAL FILM	30K 1% 1/8W
E-3	R023	RN148K2B3002F	RES. METAL FILM	30K 1% 1/8W
E-3	R024	RN148K2B3602F	RES. METAL FILM	36K 1% 1/8W
E-3	R025	RN148K2B1202F	RES. METAL FILM	12K 1% 1/8W
E-3	R026	RN148K2B3001F	RES. METAL FILM	3K 1% 1/8W
F-3	R027	RN148K2B3001F	RES. METAL FILM	3K 1% 1/8W
F-3	R028	RN148K2B3601F	RES. METAL FILM	3.6K 1% 1/8W
D-4	R029	RD148B2C124J	RES. CARBON	120K 5% 1/6W
D-4	R030	RD148B2C395J	RES. CARBON	39K 5% 1/6W
E-4	R031	RD148B2C205J	RES. CARBON	20K 5% 1/6W
E-4	R032	RD148B2C125J	RES. CARBON	12K 5% 1/6W
E-4	R033	RD148B2C392J	RES. CARBON	3.9K 5% 1/6W
F-4	R034	RD148B2C202J	RES. CARBON	2K 5% 1/6W
F-4	R035	RD148B2C202J	RES. CARBON	2K 5% 1/6W
F-3	R036	RD148B2C103J	RES. CARBON	10K 5% 1/6W
D-3	R037	RD148B2C103J	RES. CARBON	10K 5% 1/6W
D-3	R038	RD148B2C103J	RES. CARBON	10K 5% 1/6W

	S001	S02-2503-05	ROTARY SWITCH
	S002	S02-2503-05	ROTARY SWITCH
B-5	S003	S02-2503-05	ROTARY SWITCH
B-5	S004	S02-2503-05	ROTARY SWITCH
B-5	VR001	S02-2503-05	ROTARY SWITCH

## TRIG SWEEP UNIT

X74-1350-00

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT
	E31-0040-00	WPC (UNMOUNTED)		
	J25-5039-12	WIRE WRAPPING BAND		
	J6-0400-05	JUMPING RES.	ZERO	OHM
	R02-0150-05	TUBE (PLASTIC)		
	213-1010-05	TUBE (PLASTIC)		
	479-0000-05	ADHESIVES		
A-1	C001	C045S1L4350J	CAP. CERAMIC	33P 5% 50V
B-1	C002	CE04M1E103M	CAP. ELECTRO	10 20X 25V
B-1	C003	CE04M1E103M	CAP. ELECTRO	1.0 20X 25V
C-2	C004	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C005	C91-0549-05	CAP. TANTALUM	1 20X 35V
C-1	C006	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C007	0K45F1V103Z	CAP. CERAMIC	22 20X 35V
C-1	C008	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-1	C009	C91-0549-05	CAP. TANTALUM	1 20X 35V
C-2	C010	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C011	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C012	0K45F1V103Z	CAP. CERAMIC	22 20X 35V
D-1	C013	C91-0549-05	CAP. TANTALUM	3.3 20X 50V
D-1	C014	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C015	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C016	0K45M1C330M	CAP. MYLAR	0.033 10X 50V
C-2	C017	C91-0549-05	CAP. TANTALUM	0.1 5X 50V
C-2	C018	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C019	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C020	C045S1L4350J	CAP. CERAMIC	330P 5% 50V
C-2	C021	C045S1L4350J	CAP. CERAMIC	1000P 10X 50V
C-2	C022	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-1	C023	M93BD2A121J	CAP. MICA	120P 5X 100V
C-2	C024	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C025	C045S1L4350J	CAP. CERAMIC	120P 5X 50V
	B-2	04 USE		
B-2	C027	C91-0549-05	CAP. TANTALUM	1 20X 35V
B-3	C028	C045S1L4350J	CAP. CERAMIC	33P 5% 50V
C-3	C029	C045S1L4350J	CAP. CERAMIC	33P 5% 50V
C-3	C030	C045S1L4350J	CAP. CERAMIC	1.01 50V
A-3	C031	C045S1L4350J	CAP. CERAMIC	33P 5% 50V
B-3	C032	CE04M1E103M	CAP. ELECTRO	10 20X 25V
B-3	C033	CE04M1E103M	CAP. ELECTRO	1.0 20X 25V
C-3	C034	C91-0549-05	CAP. TANTALUM	1 20X 35V
C-3	C035	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-3	C036	0K45F1V103Z	CAP. ELECTRO	22 20X 35V
C-3	C037	C91-0549-05	CAP. TANTALUM	1 20X 35V
C-2	C038	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C039	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C040	0K45M1C330M	CAP. ELECTRO	3.3 20X 50V
D-3	C041	C91-0549-05	CAP. PLASTIC	1.0 10X 10V
D-2	C042	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C043	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C044	M93BD2A121J	CAP. MYLAR	0.033 10X 50V
C-2	C045	C91-0549-05	CAP. CERAMIC	0.1 5X 50V
C-2	C046	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C047	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C048	C045S1L4350J	CAP. CERAMIC	330P 5% 50V
C-2	C049	C91-0549-05	CAP. CERAMIC	1000P 10X 50V
C-2	C050	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C051	0K45F1H103Z	CAP. CERAMIC	0.01 50V
C-2	C052	C045S1L4350J	CAP. CERAMIC	120P 5% 50V
C-2	C053	C91-0549-05	CAP. CERAMIC	1.0 5X 50V
D-2	C054	0K45F1H103Z	CAP. CERAMIC	0.01 50V
E-2	C055	CE04M1C330M	CAP. ELECTRO	33 20X 16V
E-2	C056	CE04M1C330M	CAP. ELECTRO	33 20X 16V
D-2	C057	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-1	C058	0K45F1H103Z	CAP. CERAMIC	0.01 50V
D-2	C059	0K45M1H061K	CAP. CERAMIC	680P 10X 50V
B-2	C060	M93BD2A470J	CAP. MICA	47P 5X 100V
A-2	C061	M93BD2A390J	CAP. MICA	39P 5X 100V
C-2	C062	C045S1L4350J	CAP. CERAMIC	22P 5X 50V
B-2	C063	0K45F1H103Z	CAP. MYLAR	1000P 5X 50V
B-2	C064	0K45F1H103Z	CAP. MYLAR	1000P 5X 50V
B-2	C065	C90-0290-05	CAP. CERAMIC	0.1 20X 12V
E-1	C066	C903RH1472J	CAP. MYLAR	4700P 5X 50V
E-1	C067	C903RH1472J	CAP. MYLAR	4700P 5X 50V
E-1	C068	CE04FV1C470M	CAP. ELECTRO	47 20X 16V
E-1	C069	C045S1L4471J	CAP. CERAMIC	470P 5X 50V
A-1	C070	CE04M1C330M	CAP. ELECTRO	33 20X 16V
A-1	C071	CE04M1C330M	CAP. ELECTRO	33 20X 16V
A-1	C072	CE04M1C330M	CAP. ELECTRO	33 20X 16V
C-1	C073	CE04FV1C470M	CAP. ELECTRO	47 20X 16V
C-1	C074	CE04FV1C470M	CAP. ELECTRO	47 20X 16V
C-3	C075	CE04FV1C470M	CAP. ELECTRO	47 20X 16V
C-3	C076	CE04FV1C470M	CAP. ELECTRO	47 20X 16V
C-2	C077	CE04FV1C470M	CAP. ELECTRO	47 20X 16V
E-3	C078	0K45F1H103Z	CAP. CERAMIC	0.01 50V
E-1	C079	CE04M1C330M	CAP. ELECTRO	33 20X 16V
E-3	C080	CE04M1C330M	CAP. ELECTRO	100 20X 16V
E-3	C081	0K45F1H103Z	CAP. CERAMIC	0.01 50V
E-3	C082	0K45F1H103Z	CAP. CERAMIC	0.01 50V
A-3	C083	0K45F1H103Z	CAP. CERAMIC	0.01 50V
A-2	C084	0K45F1H103Z	CAP. CERAMIC	0.01 50V
B-1	C085	CE04M1E103M	CAP. ELECTRO	22P 20X 16V
B-1	C086	CE04M1E103M	CAP. ELECTRO	100 20X 16V



# PARTS LIST

REF. NO	PARTS NO	NAME & DESCRIPTION	REF. NO	PARTS NO	NAME & DESCRIPTION
B-2	C067	CE04FUJ1A01M	B-3	D067	GMA-01
B-3	C068	CE04FUJ1A01M	B-3	D068	GMA-01
D-3	C089	CE04AG1A221M	B-2	D069	GMA-01
C-3	C090	C90-0298-05			NO USE
C-3	C091	CE04SFF1H103Z	E-1	D071	GMA-01
B-1	C092	C90-0298-05	E-1	D072	GMA-01
B-1	C093	C90-0298-05	E-1	D073	1N60
B-1	C094	C90-0298-05			
B-2	C095	C90-0298-05	B-1	IC001	MC10H103L
B-1	C096	C90-0298-05	B-1	IC002	MC10H131L
B-1	C097	C90-0298-05	B-1	IC003	LF4120N
B-2	C098	C90-0298-05	B-3	IC004	MC10H103L
B-2	C099	C90-0298-05	B-3	IC005	MC10H131L
B-3	C100	C90-0298-05	C-3	IC006	LF4120N
B-3	C101	C90-0298-05	B-1	IC007	MC10106L
B-3	C102	C90-0298-05	B-2	IC008	MC10102L
A-2	C103	C90-0298-05	B-2	IC009	MC10106L
E-1	C104	CE04WLE220M	B-3	IC010	MC10104L
C-1	C105	CE04WLE220M	B-2	IC011	MC10104L
C-3	C106	CE04WLE220M	B-2	IC012	MC10102L
D-3	C107	CE04WLE101M	B-2	IC013	MC10133L
E-3	C108	CE04SFF2H103Z	A-2	IC014	SN7406N
C-2	C109	CE04WLE330M	B-2	IC015	MC10104L
D-1	C110	CE04WJ4R7M	E-2	IC016	MC78L05CP
D-3	C111	CE04WJ1J00M	C-2	IC017	MC78L19AC
C-3	C112	CE04S2B472K	C-1	L001	L40-1001-01
C-3	C113	CE04S2B472K	C-1	L002	L40-1001-01
D-3	C114	CE04S2B472K	C-3	L003	L40-2201-03
	C115	NO USE			
E-2	C116	CE04FUJ1C470M			
C-3	C117	CE04S1H220J	P-1	P013	E40-0273-05
C-3	C118	CE04S1H4331J	P-14	P014	E40-0773-05
			P028	E40-0473-05	PIN CONNECTOR 4 CONTACT
B-1	D002	GMA-01	P035	E40-0473-05	PIN CONNECTOR 4 CONTACT
B-1	D003	GMA-01	P036	E40-0673-05	PIN CONNECTOR 6 CONTACT
B-1	D004	MT23.0UB	P037	E40-0773-05	PIN CONNECTOR 7P
B-1	D005	GMA-01	P040	E40-0373-05	PIN CONNECTOR 3 CONTACT
C-1	D007	D5442X	P039	E40-0773-05	PIN CONNECTOR 7P
C-1	D008	GMA-01	P040	E40-0873-05	PIN CONNECTOR 8 CONTACT
C-1	D009	D5442X	P041	E40-0873-05	PIN CONNECTOR 8 CONTACT
C-1	D010	GMA-01	P042	E40-0473-05	PIN CONNECTOR 4 CONTACT
C-1	D011	GMA-01	P043	E40-0273-05	PIN CONNECTOR 2 CONTACT
C-1	D012	D5442X	P044	E40-0274-05	PIN CONNECTOR 2P
D-2	D013	MT1164A	P043	E40-0473-05	PIN CONNECTOR 4 CONTACT
D-1	D014	GMA-01	P046	E40-0274-05	PIN CONNECTOR 2P
D-3	D015	GMA-01	P048	E40-1811-05	PIN CONNECTOR 18P
D-3	D016	GMA-01	P049	NO USE	
D-3	D017	GMA-01	P050	E40-0473-05	PIN CONNECTOR 4 CONTACT
D-3	D018	GMA-01	P051	NO USE	
B-2	D021	GMA-01	P052	E40-0273-05	PIN CONNECTOR 2 CONTACT
B-2	D022	NO USE	P053	E40-0273-05	PIN CONNECTOR 2 CONTACT
D-2	D023	GMA-01	P057	E40-0373-05	PIN CONNECTOR 3 CONTACT
B-3	D024	GMA-01			
B-3	D025	GMA-01			
A-2	D026	GMA-01			
A-3	D027	GMA-01			
A-2	D028	GMA-01			
A-3	D029	GMA-01			
A-3	D030	GMA-01			
	D031	NO USE			
B-3	D032	GMA-01	B-1	D001	2SC3311(R)
A-3	D033	GMA-01	B-1	D002	2SC3311(R)
B-3	D034	GMA-01	B-1	D003	2SC3311(R)
B-3	D035	GMA-01	B-1	D004	2SA1323(B)
B-3	D036	GMA-01	C-1	D005	2SC3354(T,S)
C-3	D037	D5442X	C-1	D006	2SC1973(T)
C-3	D038	GMA-01	D-1	D007	2SA1309(G,R)
C-3	D039	D5442X	D-1	D008	2SD438(F)
C-3	D040	GMA-01	D-1	D009	2SC3311(R)
C-3	D041	GMA-01	D-1	D010	2SC3311(R)
D-3	D042	D5712K	D-1	D011	2SC3311(R)
D-3	D043	MT1164A	C-2	D012	2SC3311(R)
B-3	D044	MT23.0UB	C-2	D013	2SC3311(R)
C-3	D045	GMA-01	D-2	D014	2SC3311(R)
C-2	D046	GMA-01	D-2	D015	2SC3311(R)
C-2	D047	GMA-01	C-2	D016	2SC3311(R)
D-2	D048	GMA-01	D-2	D017	2SC3311(R)
D-2	D049	GMA-01	C-1	IC018	N47F(C)
D-2	D050	GMA-01	C-1	IC019	2SC3315(G,D)
D-2	D051	GMA-01	C-2	IC020	2SA1309(G,R)
D-2	D052	MT1212C	C-1	IC021	N47F(C)
D-2	D053	MT1212C	C-2	IC022	2SC3315(G,D)
D-1	D054	SV03Y	C-2	IC023	2SC3311(R)
D-1	D055	GMA-01	B-1	IC024	2SC3311(R)
D-1	D056	GMA-01	B-1	IC025	2SC3311(R)
D-1	D057	GMA-01	B-2	IC026	2SC3311(R)
D-1	D058	GMA-01	B-2	IC027	2SA1323(B)
D-1	D059	GMA-01	D-2	IC029	2SA1323(B)
D-1	D060	SV03Y	D-2	IC030	2SA1323(B)
A-2	D061	GMA-01	A-3	IC031	2SC3311(R)
A-3	D062	GMA-01	A-3	IC032	2SC3311(R)
A-3	D063	GMA-01	B-3	IC034	2SA1323(B)
A-3	D064	GMA-01	C-3	IC035	2SC1973(T,S)
A-3	D065	GMA-01	C-3	IC036	2SC1973(T,S)
B-3	D066	GMA-01	C-3	IC037	2SA1309(G,R)
			D-3	IC038	2SD438(F)
			D-3	IC039	2SC3311(R)
			B-3	IC040	2SC3311(R)
			D-3	IC041	2SC3311(R)

# PARTS LIST

REF. NO	PARTS NO	NAME & DESCRIPTION	REF. NO	PARTS NO	NAME & DESCRIPTION
C-2	0042	25C3311(R)	D-2	R095	R0148B2C103J
D-2	0043	25C3311(R)	C-1	R056	R0148B2C470J
C-2	0044	25C3311(R)	C-1	R057	R0148B2C101J
C-2	0045	25C3311(R)	C-1	R058	R0148B2C101J
C-2	0046	25C3311(R)	C-1	R059	R0148B2C470J
D-2	0047	25C3311(R)	C-1	R060	R0148B2C472J
C-3	0048	M477(C)	C-1	R061	R0148B2C124J
C-2	0050	25A1309(C-D)	C-1	R062	R0148B2C182J
C-2	0051	M477(C)	C-2	R063	R0148B2C102J
C-2	0052	25C3315(C-D)	B-2	R064	R0148B2C222J
E-2	0054	25C3311(N)	C-1	R065	R0148B2C152J
E-2	0054	25C3311(N)	B-1	R066	R0148B2C511J
D-2	0055	25C3315(C-D)	B-1	R067	R0148B2C102J
D-2	0056	25C3315(C-D)	C-2	R068	R0148B2C222J
D-2	0057	25C3315(C-D)	C-2	R069	R0148B2C470J
D-2	0058	25C3315(C-D)	C-2	R070	R0148B2C101J
D-2	0059	25C3315(C-D)	C-1	R071	R0148B2C101J
D-2	0060	25C3315(C-D)	C-2	R072	R0148B2C101J
D-2	0061	25C3315(C-D)	C-2	R073	R0148B2C102J
D-2	0062	25A1259(F)	C-2	R074	R0148B2C101J
D-2	0063	NO USE	B-1	R075	R0148B2C511J
D-1	0064	25C3315(C-D)	B-1	R076	R0148B2C102J
D-1	0065	25C3315(C-D)	B-1	R077	R0148B2C511J
D-1	0066	25C3315(C-D)	B-1	R078	R0148B2C102J
D-1	0067	25C3315(C-D)	B-1	R079	R0148B2C222J
D-2	0068	25C3311(R)	B-2	R080	R0148B2C102J
D-1	0069	25C3311(R)	B-2	R081	R0148B2C302J
E-1	0070	25C3315(C-D)	C-2	R082	R0148B2C152J
E-1	0071	25A1323(B)	C-2	R083	R0148B2C393J
A-2	0072	25A1323(B)	B-2	R084	R0148B2C373J
A-2	0073	25C3354(T-S)	C-2	R085	R0148B2C472J
A-1	0074	25A1323(B)	C-2	R086	R0148B2C102J
A-1	0075	25C3354(T-S)	C-3	R087	R0148B2C162J
A-2	0076	25A1309(O-R)	B-2	R088	R0148B2C362J
C-2	0077	25A1323(B)	C-1	R089	R0148B2C302J
D-2	0078	25C3311(R)	C-1	R090	R0148B2C102J
C-2	0079	25A1309(O-R)	B-1	R091	R0148B2C5100F
E-1	0080	25A1309(O-R)	B-1	R092	R0148B2C4701F
E-1	0081	25A1309(O-R)	B-1	R093	R0148B2C4701F
E-1	0082	25A1309(O-R)	B-1	R094	R0148B2C221J
B-1	0083	25A1323(B)	B-2	R095	R0148B2C101J
B-3	0084	25A1323(B)	B-2	R096	R0148B2C102J
A-1	R001	R0148B2C561J	B-2	R097	R0148B2C311J
A-1	R002	R0148B2C470J	B-3	R099	R0148B2C362J
A-1	R003	R0148B2C511J	B-3	R100	R0148B2C222J
B-1	R004	R0148B2C471J	B-2	R101	R0148B2C101J
A-1	R005	R0148B2C471J	B-2	R102	R0148B2C351J
B-1	R006	R0148B2C102J	B-2	R103	R0148B2C101J
B-1	R007	R0148B2C751J	B-2	R104	R0148B2C470J
B-1	R008	R0148B2C182J	B-2	R105	R0148B2C102J
B-1	R009	R0148B2C351J	B-2	R106	R0148B2C102J
B-1	R010	R0148B2C182J	B-2	R107	R0148B2C371J
B-1	R011	R0148B2C102J	B-2	R108	R0148B2C101J
B-1	R012	R0148B2C181J	B-2	R109	R0148B2C470J
B-1	R013	R0148B2C181J	B-2	R110	R0148B2C101J
B-1	R014	R0148B2C181J	B-2	R111	R0148B2C102J
B-1	R015	R0148B2C332J	B-1	R112	R0148B2C181J
B-1	R016	R0148B2C152J	D-2	R113	R0148B2C220J
B-1	R017	R0148B2C352J	D-2	R114	R0148B2C101J
A-1	R018	R0148B2C152J	D-2	R115	R0148B2C371J
A-1	R019	R0148B2C272J	D-2	R116	R0148B2C220J
B-1	R020	R0148B2C102J	D-2	R117	R0148B2C101J
B-1	R021	R0148B2C101J	D-2	R118	R0148B2C371J
B-1	R022	R0148B2C132J	B-3	R119	R0148B2C351J
C-1	R023	R0148B2C271J	A-3	R120	R0148B2C470J
B-1	R024	R0148B2C472J	A-3	R121	R0148B2C511J
C-1	R025	R0148B2C271J	B-3	R122	R0148B2C511J
C-1	R026	R0148B2C181J	A-3	R123	R0148B2C471J
C-1	R027	R0148B2C361J	B-3	R124	R0148B2C470J
C-1	R028	R0148B2C152J	B-3	R125	R0148B2C751J
C-1	R029	R0148B2C100J	B-3	R126	R0148B2C182J
C-1	R030	NO USE	B-3	R127	R0148B2C751J
C-1	R031	R0148B2C511J	B-3	R128	R0148B2C102J
C-1	R032	R0148B2C361J	A-3	R129	R0148B2C102J
C-1	R033	R0148B2C220J	A-3	R130	R0148B2C181J
C-2	R034	R0148B2C5101F	A-3	R131	R0148B2C181J
C-1	R035	R0148B2C401F	B-3	R132	R0148B2C101J
D-1	R036	R0148B2C401F	A-3	R133	R0148B2C182J
D-1	R037	R0148B2C123J	A-3	R134	R0148B2C332J
D-1	R038	R0148B2C402F	B-3	R135	R0148B2C332J
D-1	R039	R0148B2C500F	A-3	R136	R0148B2C511J
D-1	R040	R0148B2C1202F	B-3	R137	R0148B2C201J
D-1	R041	R0148B2C1501F	C-3	R138	R0148B2C101J
D-1	R042	R0148B2C103J	C-3	R139	R0148B2C103J
D-1	R043	R0148B2C5001F	C-3	R140	R0148B2C271J
D-1	R044	R0148B2C103J	C-3	R141	R0148B2C271J
D-1	R045	R0148B2C5001F	C-3	R142	R0148B2C361J
D-1	R046	R0148B2C105J	C-3	R143	R0148B2C361J
D-2	R047	R0148B2C104J	C-3	R144	R0148B2C152J
D-2	R048	R0148B2C105J	C-3	R145	R0148B2C100J
D-2	R049	R0148B2C103J	C-3	R146	R0148B2C103J
D-2	R050	R0148B2C104J	C-3	R147	R0148B2C103J
D-2	R051	R0148B2C103J	C-3	R148	R0148B2C260J
D-2	R052	R0148B2C103J	C-3	R149	R0148B2C220J
D-2	R053	R0148B2C104J	C-3	R150	R0148B2C220J
C-2	R054	R0148B2C103J	C-3	R151	R0148B2C5101F
			C-3	R152	R0148B2C401F

## PARTS LIST

REF ID	REF ID	REF ID	REF ID	REF ID	REF ID	REF ID	REF ID	REF ID	REF ID		
D-3	D-3	D-3	D-3	D-3	D-2	D-2	D-2	D-2	D-2		
R153	R154	R155	R156	R157	R158	R159	R160	R161	R162		
R153	R154	R155	R156	R157	R158	R159	R160	R161	R162		
R148	RN482C123J	RN1482C2402F	RN1482C3001F	RN1482C1202F	RN1482C1501F	RN1482C1030F	RN1482C3001F	R1482C103J	R1482C3001F		
NAME & DESCRIPTION	NAME & DESCRIPTION	NAME & DESCRIPTION	NAME & DESCRIPTION	NAME & DESCRIPTION	NAME & DESCRIPTION	NAME & DESCRIPTION	NAME & DESCRIPTION	NAME & DESCRIPTION	NAME & DESCRIPTION		
1.2K	FILM	FILM	FILM	FILM	FILM	FILM	FILM	FILM	FILM		
5X	1X	1X	1X	1X	1.5K	1X	1X	1X	1X		
1/6W	1/6W	1/6W	1/6W	1/6W	1/6W	1/6W	1/6W	1/6W	1/6W		
A-2	A-2	A-2	A-2	A-2	A-2	A-2	A-2	A-2	A-2		
R5F	R5F	R5F	R5F	R5F	R5F	R5F	R5F	R5F	R5F		
102J	102J	102J	102J	101J	102J	102J	102J	102J	102J		
CARBON	CARBON	CARBON	CARBON	CARBON	CARBON	CARBON	CARBON	CARBON	CARBON		
5X	5X	5X	5X	5X	5X	5X	5X	5X	5X		
D-3 R155	RN1482C2402F	RES. METAL FILM	4.7K	1X	1/6W	A-2 R252	R1482C102J	RES. CARBON	1K	5X	1/6W
D-3 R155	RN1482C3001F	RES. METAL FILM	3K	1X	1/6W	A-2 R253	R1482C471J	RES. CARBON	47K	5X	1/6W
D-3 R156	RN1482C1202F	RES. METAL FILM	1.2K	1X	1/6W	A-2 R254	R1482C101J	RES. CARBON	100	5X	1/6W
D-3 R157	RN1482C1501F	RES. METAL FILM	1.5K	1X	1/6W	A-2 R255	R1482C310J	RES. CARBON	330	5X	1/6W
D-3 R158	RN1482C1030F	RES. METAL FILM	1.0K	1X	1/6W	A-2 R256	R1482C272J	RES. CARBON	2.7K	5X	1/6W
D-3 R159	RN1482C3001F	RES. METAL FILM	3K	1X	1/6W	A-2 R257	R1482C272J	RES. CARBON	2.7K	5X	1/6W
D-3 R160	R1482C103J	RES. CARBON	10K	5X	1/6W	A-2 R258	R1482C470J	RES. CARBON	47	5X	1/6W
D-3 R161	R1482C3001F	RES. METAL FILM	3K	1X	1/6W	B-2 R259	R1482C102J	RES. CARBON	1K	5X	1/6W
D-2 R162	R1482C103J	RES. CARBON	10K	5X	1/6W	A-2 R260	R1482C101J	RES. CARBON	100	5X	1/6W
D-2 R163	R1482C104J	RES. CARBON	100K	5X	1/6W	A-2 R261	R1482C102J	RES. CARBON	1K	5X	1/6W
D-2 R164	R1482C103J	RES. CARBON	10K	5X	1/6W	A-1 R262	R1482C471J	RES. CARBON	470	5X	1/6W
D-2 R165	R1482C103J	RES. CARBON	10K	5X	1/6W	A-1 R263	R1482C101J	RES. CARBON	100	5X	1/6W
D-2 R166	R1482C104J	RES. CARBON	100K	5X	1/6W	A-1 R264	R1482C331J	RES. CARBON	330	5X	1/6W
D-2 R167	R1482C103J	RES. CARBON	10K	5X	1/6W	A-1 R265	R1482C101J	RES. CARBON	100	5X	1/6W
D-2 R168	R1482C103J	RES. CARBON	10K	5X	1/6W	A-1 R266	R1482C272J	RES. CARBON	2.7K	5X	1/6W
D-2 R169	R1482C104J	RES. CARBON	100K	5X	1/6W	A-2 R267	R1482C470J	RES. CARBON	47	5X	1/6W
C-2 R170	R1482C103J	RES. CARBON	10K	5X	1/6W	B-2 R268	R1482C222J	RES. CARBON	2.2K	5X	1/6W
D-2 R171	R1482C103J	RES. CARBON	10K	5X	1/6W	B-2 R269	R1482C222J	RES. CARBON	2.2K	5X	1/6W
C-3 R172	R1482C470J	RES. CARBON	47	5X	1/6W	B-2 R270	R1482C102J	RES. CARBON	1K	5X	1/6W
C-3 R173	R1482C101J	RES. CARBON	100	5X	1/6W	B-2 R271	R1482C102J	RES. CARBON	1K	5X	1/6W
C-3 R174	R1482C101J	RES. CARBON	100	5X	1/6W	A-2 R272	R1482C331J	RES. CARBON	330	5X	1/6W
C-3 R175	R1482C470J	RES. CARBON	47	5X	1/6W	A-2 R273	R1482C331J	RES. CARBON	330	5X	1/6W
C-3 R176	R1482C472J	RES. CARBON	4.7K	5X	1/6W	E-2 R274	R1482C102J	RES. CARBON	1K	5X	1/6W
C-3 R177	R1482C122J	RES. CARBON	1.2K	5X	1/6W	B-2 R275	R1482C102J	RES. CARBON	1K	5X	1/6W
C-3 R178	R1482C182J	RES. CARBON	1.8K	5X	1/6W	A-2 R276	R1482C472J	RES. CARBON	4.7K	5X	1/6W
C-3 R179	R1482C152J	RES. CARBON	1.5K	5X	1/6W	A-2 R277	R1482C472J	RES. CARBON	4.7K	5X	1/6W
C-3 R180	R1482C102J	RES. CARBON	10K	5X	1/6W	B-2 R278	R1482C102J	RES. CARBON	1K	5X	1/6W
C-1 R181	R1482C622J	RES. CARBON	6.2K	5X	1/6W	B-2 R279	R1482C472J	RES. CARBON	4.7K	5X	1/6W
C-2 R182	R1482C339J	RES. CARBON	39K	5X	1/6W	B-2 R280	R1482C222J	RES. CARBON	2.2K	5X	1/6W
C-2 R183	R1482C242J	RES. CARBON	2.4K	5X	1/6W	B-2 R281	R1482C472J	RES. CARBON	4.7K	5X	1/6W
C-2 R184	R1482C700F	RES. METAL FILM	4.7K	5X	1/6W	B-2 R282	R1482C222J	RES. CARBON	2.2K	5X	1/6W
C-3 R185	R1482C101J	RES. CARBON	100	5X	1/6W	C-3 R283	R1482C222J	RES. CARBON	2.2K	5X	1/6W
C-3 R186	R1482C101J	RES. CARBON	100	5X	1/6W	A-3 R284	R1482C202J	RES. CARBON	2K	5X	1/6W
C-2 R187	R1482C101J	RES. CARBON	100	5X	1/6W	A-2 R285	R1482C202J	RES. CARBON	2K	5X	1/6W
C-2 R188	R1482C102J	RES. CARBON	1K	5X	1/6W	B-3 R286	R1482C222J	RES. CARBON	2.2K	5X	1/6W
C-2 R189	R1482C101J	RES. CARBON	100	5X	1/6W	C-2 R287	R1482C102J	RES. CARBON	1K	5X	1/6W
B-3 R190	R1482C102J	RES. CARBON	1K	5X	1/6W	C-2 R288	R1482C220J	RES. CARBON	22	5X	1/6W
B-3 R191	R1482C511J	RES. CARBON	510	5X	1/6W	C-2 R289	R1482C101J	RES. CARBON	100	5X	1/6W
B-3 R192	R1482C102J	RES. CARBON	1K	5X	1/6W	B-2 R290	R1482C331J	RES. CARBON	330	5X	1/6W
B-3 R193	R1482C250J	RES. CARBON	2.5K	5X	1/6W	B-2 R291	R1482C220J	RES. CARBON	22	5X	1/6W
E-2 R194	R1482C222J	RES. CARBON	2.2K	5X	1/6W	D-2 R292	R1482C351J	RES. CARBON	350	5X	1/6W
E-2 R195	R1482C122J	RES. CARBON	1.2K	5X	1/6W	C-2 R293	R1482C222J	RES. CARBON	2.2K	5X	1/6W
E-2 R196	R1482C102J	RES. CARBON	1K	5X	1/6W	C-2 R294	R1482C222J	RES. CARBON	2.2K	5X	1/6W
E-2 R197	R1482C751J	RES. CARBON	750	5X	1/6W	B-2 R295	R1482C102J	RES. CARBON	1K	5X	1/6W
E-1 R198	NO USE					B-2 R296	R1482C102J	RES. CARBON	1K	5X	1/6W
E-2 R199	RN1482C4701F	RES. METAL FILM	4.7K	1X	1/6W	B-2 R297	R1482C162J	RES. CARBON	1.6K	5X	1/6W
R200	R1482C472J	RES. CARBON	4.7K	5X	1/6W	B-2 R298	R1482C102J	RES. CARBON	1K	5X	1/6W
E-1 R201	RN1482C6501F	RES. METAL FILM	6.8K	1X	1/6W	B-2 R299	R1482C327J	RES. CARBON	2.7	5X	1/6W
E-2 R202	RN1482C4701F	RES. METAL FILM	4.7K	1X	1/6W	A-1 R300	R1482C331J	RES. CARBON	330	5X	1/6W
E-2 R203	RN1482C4701F	RES. METAL FILM	4.7K	1X	1/6W	E-1 R301	R1482C472J	RES. CARBON	4.7K	5X	1/6W
E-2 R204	R1482C472J	RES. CARBON	4.7K	5X	1/6W	E-1 R302	RN1482C9102F	RES. METAL FILM	91K	1X	1/6W
C-3 R205	RN1482C6901F	RES. METAL FILM	6.8K	1X	1/6W	E-1 R303	RN1482C1003F	RES. METAL FILM	100K	1X	1/6W
D-2 R206	RN1482C1201F	RES. METAL FILM	1.2K	1X	1/6W	E-1 R304	RN1482C3001F	RES. METAL FILM	300	1X	1/6W
D-2 R207	RN1482C1201F	RES. METAL FILM	1.2K	1X	1/6W	E-1 R305	R1482C103J	RES. CARBON	10K	5X	1/6W
D-2 R208	RN1482C3301F	RES. METAL FILM	3.3K	1X	1/6W	E-1 R306	R1482C223J	RES. CARBON	2.2K	5X	1/6W
D-2 R209	RN1482C1201F	RES. METAL FILM	1.2K	1X	1/6W	E-1 R307	RN1482C3000F	RES. METAL FILM	300	1X	1/6W
D-2 R210	R1482C392J	RES. CARBON	3.9K	5X	1/6W	E-1 R308	RN1482C1000F	RES. METAL FILM	100	1X	1/6W
D-2 R211	R1482C102J	RES. CARBON	1K	5X	1/6W	C-2 R309	R1482C222J	RES. CARBON	2.2K	5X	1/6W
D-2 R212	R1482C132J	RES. CARBON	1.3K	5X	1/6W	B-3 R310	R1482C472J	RES. CARBON	4.7K	5X	1/6W
D-2 R213	RN1482C2201F	RES. METAL FILM	2.2K	1X	1/6W	E-2 R311	R1482C101J	RES. CARBON	100	5X	1/6W
D-2 R214	RN1482C2001F	RES. METAL FILM	2K	1X	1/6W	B-3 R312	R1482C102J	RES. CARBON	1K	5X	1/6W
D-2 R215	RN1482C4701F	RES. METAL FILM	4.7K	1X	1/6W	D-1 R313	R1482C101J	RES. CARBON	100	5X	1/6W
E-3 R216	R1482C470J	RES. CARBON	4.7K	5X	1/6W	D-1 R314	R1482C101J	RES. CARBON	100	5X	1/6W
E-2 R217	R1482C682J	RES. CARBON	6.8K	5X	1/6W	D-1 R315	R1482C391J	RES. CARBON	390	5X	1/6W
E-2 R218	R1482C470J	RES. CARBON	47	5X	1/6W	D-1 R316	R1482C391J	RES. CARBON	390	5X	1/6W
E-2 R219	RN1482C3501F	RES. METAL FILM	3.5K	1X	1/6W	B-1 R317	R1482C102J	RES. CARBON	1K	5X	1/6W
E-2 R220	RN1482C101J	RES. METAL FILM	1.0K	1X	1/6W	B-1 R318	R1482C102J	RES. CARBON	1K	5X	1/6W
E-2 R221	R1482C102J	RES. CARBON	1K	5X	1/6W	B-1 R319	R1482C101J	RES. CARBON	100	5X	1/6W
D-2 R222	R1482C472J	RES. CARBON	4.7K	5X	1/6W	B-1 R320	R1482C331J	RES. CARBON	330	5X	1/6W
D-2 R223	R1482C472J	RES. CARBON	4.7K	5X	1/6W	B-3 R321	R1482C102J	RES. CARBON	1K	5X	1/6W
D-2 R224	RN1482C700F	RES. METAL FILM	4.7K	5X	1/6W	B-3 R322	R1482C102J	RES. CARBON	22	5X	1/6W
D-2 R225	RN1482C4700F	RES. METAL FILM	470	1X	1/6W	B-3 R323	R1482C101J	RES. CARBON	100	5X	1/6W
D-2 R226	R1482C621J	RES. CARBON	6.2K	5X	1/6W	B-3 R324	R1482C331J	RES. CARBON	330	5X	1/6W
D-2 R227	RN1482C2201F	RES. METAL FILM	2.2K	1X	1/6W	B-3 R325	R1482C102J	RES. CARBON	1K	5X	1/6W
D-2 R228	RN1482C2201F	RES. METAL FILM	2.2K	1X	1/6W	B-3 R326	R1482C101J	RES. CARBON	1K	5X	1/6W
D-2 R229	RN1482C1001F	RES. METAL FILM	1.6K	1X	1/6W	B-3 R327	R1482C103J	RES. CARBON	18K	5X	1/6W
D-2 R230	RN1482C1601F	RES. METAL FILM	1.6K	1X	1/6W	C-1 T0001	005-0209-05	CAP. TRIMMER	40P		
D-1 R231	RN1482C470J	RES. CARBON	47	5X	1/6W	C-1 T0002	005-0309-05	CAP. TRIMMER	40P		
D-1 R232	R1482C100F	RES. CARBON	47	5X	1/6W	C-1 T0003	005-0402-05	CAP. TRIMMER	6P		
D-1 R233	RN										

# PARTS LIST

## HORIZONTAL OUTPUT AMP UNIT

X74-1360-00

REF. NO	PARTS NO	NAME & DESCRIPTION
D-1	VR014	R12-0540-05
D-2	VR015	R12-3520-05
E-1	VR016	R12-3516-05
E-1	VR017	R12-0539-05

RES. SEMI FIXED 500 B	RES. SEMI FIXED 10K B	RES. SEMI FIXED 100K OHM B	RES. SEMI FIXED 200 B
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REF. NO	PARTS NO	NAME & DESCRIPTION			
	E23-0312-05	TERMINAL			
	F01-0827-04	HEAT SINK			
	J25-3039-12	POB (UNMOUNTED)			
	J50-0605-05	SPACER			
C-2	C001	CK45B2H472K	CAP. CERAMIC	4700P	10X 500V
D-1	C002	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
D-1	C003	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
D-2	C004	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
D-3	C005	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-1	C006	CC45CH2H010C	CAP. CERAMIC	1P	0.25P 500V
D-1	C007	CC45CH2H010C	CAP. CERAMIC	1P	0.25P 500V
C-2	C008	CC45CH2H010C	CAP. CERAMIC	1P	0.25P 500V
D-3	C009	CC45CH2H010C	CAP. CERAMIC	1P	0.25P 500V
B-2	C010	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
	C011	CK45B2H472K	CAP. CERAMIC	4700P	10X 500V
E-2	C012	CK45B2H472K	CAP. CERAMIC	4700P	10X 500V
D-2	C013	CK45B2H472K	CAP. CERAMIC	4700P	10X 500V
E-2	C014	C91-0549-05	CAP. TANTALUM	1	20X 35V
E-2	C015	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
E-2	C016	C91-0549-05	CAP. TANTALUM	1	20X 35V
F-2	C017	CK45B2H472K	CAP. CERAMIC	4700P	10X 500V
B-2	C018	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-1	C019	CE04W1C101M	CAP. ELECTRO	100	20X 16V
B-2	C020	CE04W1C101M	CAP. ELECTRO	100	20X 16V
B-2	C021	CE04W2R100M	CAP. ELECTRO	10	20X 100V
B-1	C022	CE04W2C2CR2	CAP. ELECTRO	2.2	160V
D-2	C023	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-2	C024	CC45CH1R070B	CAP. CERAMIC	7P	0.5P 50V
E-2	D001	D5442X	DIODE, SILICON		SWITCHING
E-2	D002	NTZ5-1J8	DIODE, ZENER		5V
B-1	L001	L40-1011-04	FERRI INDUCTOR		1000H
B-2	L002	L40-1011-04	FERRI INDUCTOR		1000H
B-2	L003	L40-1011-04	FERRI INDUCTOR		1000H
B-2	L004	L40-1011-04	FERRI INDUCTOR		1000H
	P027	E40-0873-05	PIN CONNECTOR		8 CONTACT
	P035	E40-0473-05	PIN CONNECTOR		4 CONTACT
	P036	E40-0673-05	PIN CONNECTOR		6 CONTACT
C-2	Q001	25A1323(B)	TR. SI, PNP		
C-2	Q002	25A1323(B)	TR. SI, PNP		
D-1	Q003	25A1323(B)	TR. SI, PNP		
D-2	Q004	25A1323(B)	TR. SI, PNP		
D-1	Q005	25C095A-(2,2,3)	TR. SI, NPN		
D-3	Q006	25C095A-(2,2,3)	TR. SI, NPN		
E-1	Q007	25A923-2(2,3)	TR. SI, PNP		
E-3	Q008	25A923-2(2,3)	TR. SI, PNP		
B-2	Q009	25C331(R)	TR. SI, NPN		
B-2	Q010	25C331(R)	TR. SI, NPN		
B-2	Q011	25C331(R)	TR. SI, NPN		
C-1	R001	RD148B2C272J	RES. CARBON	2.7K	5% 1/6W
C-3	R002	RD148B2C272J	RES. CARBON	2.7K	5% 1/6W
C-1	R003	RD148B2C470J	RES. CARBON	47	5% 1/6W
C-2	R004	RD148B2C470J	RES. CARBON	47	5% 1/6W
C-2	R005	RD148B2C152J	RES. CARBON	1.5K	5% 1/6W
C-2	R006	RD148Y2H473J	RES. CARBON	47K	5% 1/2W
C-2	R007	RD148Y2H473J	RES. CARBON	47K	5% 1/2W
D-2	R008	RD148B2C821J	RES. CARBON	820	5% 1/6W
D-2	R009	RD148B2C821J	RES. CARBON	820	5% 1/6W
D-1	R010	RD148B2C102J	RES. CARBON	1K	5% 1/6W
D-2	R011	RD148B2C102J	RES. CARBON	1K	5% 1/6W
C-1	R012	RS148B3A223J	RES. METAL FILM	22K	5% 1W
D-3	R013	RS148B3A223J	RES. METAL FILM	22K	5% 1W
C-1	R014	RD148B2C134J	RES. CARBON	130K	5% 1/6W
C-3	R015	RD148B2C134J	RES. CARBON	130K	5% 1/6W
E-2	R016	RD148Y2H123J	RES. CARBON	12K	5% 1/2W
E-2	R017	RD148B2C102J	RES. CARBON	1K	5% 1/6W
E-2	R018	RD148B2C102J	RES. CARBON	1K	5% 1/6W
E-1	R019	RD148B2C220J	RES. CARBON	22	5% 1/6W
E-3	R020	RD148B2C220J	RES. CARBON	22	5% 1/6W
E-2	R021	RD148B2C471J	RES. CARBON	470	5% 1/6W
E-2	R022	RD148B2C471J	RES. CARBON	470	5% 1/6W
B-2	R023	RD148B2C471J	RES. CARBON	470	5% 1/6W
B-2	R024	RD148B2C472J	RES. CARBON	4.7K	5% 1/6W
B-2	R025	RD148B2C472J	RES. CARBON	4.7K	5% 1/6W
B-2	R026	RD148B2C271J	RES. CARBON	270	5% 1/6W
B-2	R027	RD148B2C312J	RES. CARBON	5.1K	5% 1/6W

## PARTS LIST

## A TRIG SWITCH UNIT

X77-1280-00

REF. NO	PARTS NO	NAME & DESCRIPTION	REF. NO	PARTS NO	NAME & DESCRIPTION
	J25-5039-12	PCB (UNMOUNTED)	D-2	9024	28K20A(0)
	L92-0111-05	BEAD CORE	D-2	9025	28A1309(0.R)
A-2	0001	C91-0502-05	B-2	R001	R0148B2C510J
B-2	0002	CA45F1H103Z	A-2	R002	R0148B2C101J
B-3	0003	CC45C1H600J	A-1	R003	R0148B2C101J
B-3	0004	CE04M1E100M	A-2	R004	R0148B2C510J
B-3	0005	CE04M1E100M	B-1	R005	R0148B2C103J
C-3	0006	CK45F1H103Z	B-2	R006	R0148B2C103J
D-3	0007	CK45F1H103Z	B-3	R007	R0148B2C473J
D-4	0008	CC45C1H070D	B-4	R008	R0148B2C103J
E-3	0009	C90-0298-05	B-4	R009	RN148K2C4702F
D-2	C010	CK45F1H103Z	C-3	R010	RN148K2C5102F
E-3	C011	CK45F1H103Z	C-3	R011	RN148K2C103J
	C012	ND USE	B-4	R012	RN148K2C4702F
E-3	C013	CK45F1H103Z	B-3	R013	R0148B2C622J
C-2	C014	C90-0298-05	C-3	R014	R0148B2C103J
C-2	C015	CE04M1C330M	C-3	R015	R0148B2C431J
	C016	ND USE	C-3	R016	R0148B2C103J
C-2	C017	CE04M1H010M	C-3	R017	R0148B2C914J
D-1	C018	C90-0298-05	C-3	R018	R0148B2C914J
D-2	C019	CE04M1H010M	C-3	R019	R0148B2C914J
D-2	C020	CA45B1H102K	C-3	R020	RN148K2C3001F
E-2	C021	CE04M1C330M	C-3	R021	RN148K2C3001F
E-2	C022	CE04M1C330M	C-3	R022	R0148B2C220J
E-2	C023	CE04M1C330M	C-3	R023	R0148B2C220J
E-2	C024	CE04M1C330M	C-3	R024	R0148B2C562J
	C025	ND USE	D-3	R025	R0148B2C562J
E-2	C026	CK45F1H103Z	D-3	R026	R0148B2C470J
E-3	C027	CK45F1H103Z	D-3	R027	RN148K2C2200F
E-3	C028	CK45F1H103Z	D-3	R028	RN148K2C2200F
E-3	C029	CK45F1H103Z	D-4	R029	RN148K2C2200F
E-3	C030	CK45F1H103Z	D-2	R030	RN148K2C1501F
D-2	C031	CK45F1H103Z	D-3	R031	RN148K2C1001F
D-3	C032	CK45F1H103Z	D-3	R032	RN148K2C2700F
D-4	C033	CK45F1H103Z	D-3	R033	RN148K2C2700F
D-2	C034	CK45F1H103Z	D-3	R034	R0148B2C220J
D-3	C035	CK45F1H103Z	D-3	R035	R0148B2C220J
D-3	C036	CK45F1H103Z	D-3	R036	R0148B2C151J
D-3	C037	CK45F1H103Z	E-3	R037	R0148B2C601J
C-3	C038	CK45F1H103Z	E-3	R038	R0148B2C621J
			E-3	R039	R0148B2C512J
			D-2	R040	R0148B2C472J
			D-2	R041	R0148B2C472J
			E-4	R042	R0148B2C472J
			D-4	R043	R0148B2C141J
E-2	C042	CK45F1H103Z	D-3	R044	R0148B2C131J
	C043	ND USE	D-3	R045	R0148B2C111J
D-2	C044	CK45F1H103Z	E-3	R046	R0148B2C220J
D-1	C045	CK45F1H103Z	E-2	R047	R0148B2C220J
	C046	ND USE	E-3	R048	R0148B2C103J
B-2	C047	CK45F1H103Z	E-3	R049	R0148B2C473J
A-1	C048	CK45F1H103Z	D-3	R050	R0148B2C220J
	C049	CE04M1C330M	D-2	R051	R0148B2C220J
			D-2	R052	R0148B2C561J
C-2	D001	SV03Y	D-2	R053	R0148B2C561J
C-2	D002	6M901	D-2	R054	R0148B2C220J
C-2	D003	6M901	D-2	R055	R0148B2C470J
C-1	D004	RT216JA	B-2	R056	R0148B2C133J
D-1	D005	6M901	B-2	R057	R0148B2C622J
D-1	D006	6M901	B-1	R058	R0148B2C202J
D-1	D007	6M901	B-1	R059	R0148B2C202J
D-1	D008	6M901	C-1	R060	R0148B2C123J
D-2	D009	SV04Y	C-1	R061	R0148B2C123J
			C-1	R062	R0148B2C103J
E-2	L001	L40-1011-03	C-1	R063	R0148B2C472J
E-2	L002	L40-1011-03	C-2	R064	R0148B2C103J
			D-2	R065	R0148B2C103J
			C-1	R066	R0148B2C914J
			D-1	R067	R0148B2C512J
			D-2	R068	R0148B2C163J
			D-1	R069	R0148B2C163J
			D-2	R070	R0148B2C220J
			D-2	R071	R0148B2C163J
			D-2	R072	R0148B2C473J
			C-2	R073	R0148B2C912J
			B-1	R074	R0148B2C473J
			E-3	R075	R0148B2C2221J
			S001	S35-2504-05	LEVER SWITCH
			S002	S52-4008-05	LEVER SWITCH
E-4	T0001	C05-0412-05			
B-3	UR001	R01-9502-05	V.R.		200K B
C-4	UR002	R12-8525-05	RES.		SEMI FIXED 10K B
E-4	UR003	R12-1519-05	RES.		SEMI FIXED 1K B
D-3	UR004	R12-1520-05	RES.		SEMI FIXED 2K B

# PARTS LIST

## B TRIG SWITCH UNIT

X77-1290-00

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT	REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT		
	J25-5023-04	PCB (UNMOUNTED)			C-3	R021	R0148B2C562J	RES. CARBON	5.6K 5% 1/6W		
	J61-0506-05	BOARD SUPPORT			C-3	R022	R0148B2C470J	RES. CARBON	47 5% 1/6W		
	92-0110-05	BEAD			C-3	R023	R0148B2C2200F	RES. METAL FILM	220 1% 1/6W		
	212-2014-05	TUBE (PLASTIC)			C-2	R024	R0148B2C2200F	RES. METAL FILM	220 1% 1/6W		
C-2	C001	CE0441C100M	CAP. ELECTRO	10	20X	160V	C-2	R025	R0148B2C470J	RES. CARBON	47 5% 1/6W
D-2	C002	C91-0502-05	CAP. METAL FILM	0.01	20X	630V	C-2	R026	R0148B2C1501F	RES. METAL FILM	1.5K 1% 1/6W
D-2	C003	CE450H16690J	CAP. CERAMIC	68P	5X	50V	C-2	R027	R0148B2C1501F	RES. METAL FILM	1.5K 1% 1/6W
D-2	C004	CE450H16690J	CAP. CERAMIC	68P	5X	50V	C-3	R028	R0148B2C2200F	RES. METAL FILM	220 1% 1/6W
D-3	C005	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	C-3	R029	R0148B2C2700F	RES. METAL FILM	270 1% 1/6W
C-3	C006	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	C-2	R030	R0148B2C151J	RES. CARBON	150 5% 1/6W
C-3	C007	CK45FCH10700	CAP. CERAMIC	7P	0.5P	50V	A-2	R036	R0148B2C472J	RES. CARBON	4.7K 5% 1/6W
C-2	C008	CK45FCH10700	CAP. CERAMIC	7P	0.5P	50V	B-2	R037	R0148B2C472J	RES. CARBON	4.7K 5% 1/6W
C-2	C009	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	C-2	R038	R0148B2C822J	RES. CARBON	8.2K 5% 1/6W
C-2	C010	C90-0298-05	CAP. CERAMIC	0.1	20X	120V	B-3	R039	R0148B2C161J	RES. CARBON	160 5% 1/6W
B-2	C011	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	B-3	R040	R0148B2C131J	RES. CARBON	130 5% 1/6W
C-3	C012	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	B-3	R041	R0148B2C131J	RES. CARBON	130 5% 1/6W
D-2	C013	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	B-3	R042	R0148B2C220J	RES. CARBON	22 5% 1/6W
B-3	C014	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	B-2	R043	R0148B2C220J	RES. CARBON	22 5% 1/6W
B-2	C015	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	B-3	R044	R0148B2C473J	RES. CARBON	47K 5% 1/6W
D-2	C016	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	B-3	R045	R0148B2C473J	RES. CARBON	47K 5% 1/6W
A-2	C017	CE0441C100M	CAP. ELECTRO	33	20X	120V	B-3	R046	R0148B2C220J	RES. CARBON	22 5% 1/6W
A-3	C018	CE0441C1330M	CAP. ELECTRO	33	20X	160V	B-2	R047	R0148B2C220J	RES. CARBON	22 5% 1/6W
A-3	C019	CE0441C1330M	CAP. ELECTRO	33	20X	160V	B-2	R048	R0148B2C561J	RES. CARBON	560 5% 1/6W
D-3	C020	CE0441C1330M	CAP. ELECTRO	33	20X	160V	B-2	R049	R0148B2C561J	RES. CARBON	560 5% 1/6W
A-3	C021	CE0441C1330M	CAP. ELECTRO	33	20X	160V	B-2	R050	R0148B2C220J	RES. CARBON	22 5% 1/6W
A-3	C022	CE0441C1330M	CAP. ELECTRO	33	20X	160V	B-2	R051	R0148B2C470J	RES. CARBON	47 5% 1/6W
D-3	C023	CE0441C1330M	CAP. ELECTRO	33	20X	160V					
A-2	C024	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	S001	S37-2009-05	LEVER SWITCH		
C-2	C025	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	S002	S37-2009-05	LEVER SWITCH		
C-2	C026	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V					
C-3	C027	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	B-3	TC001	C05-0412-05	CAP. TRIMMER	20P
A-2	C028	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V					
B-2	C029	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	D-3	VR001	R01-5503-05	V.R.	100R8
C-3	C030	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	D-3	VR002	R12-3522-05	RES. SEMI FIXED	10K B
A-3	C031	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V	C-2	VR003	R12-1520-05	RES. SEMI FIXED	20B
C-3	C032	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V					
C-3	C033	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V					
C-3	C034	CK45F1H103Z	CAP. CERAMIC	0.01	50V	50V					
D-2	C035	CK45B1H102K	CAP. CERAMIC	1000P	10X	50V					
	C036	CK45B1H102K	CAP. CERAMIC	1000P	10X	50V					
	C037	CK45B1H102K	CAP. CERAMIC	1000P	10X	50V					
C-2	D001	HT28-238	DIODE, ZENER	8.1V							
A-2	D002	SV03Y	DIODE								
	D003	SV04Y	DIODE								
A-3	L001	L40-2201-03	FERRI INDUCTOR	22UH							
A-3	L002	L40-2201-03	FERRI INDUCTOR	22UH							
	P043	E40-0273-05	PIN CONNECTOR	2 CONTACT							
	P044	E40-0273-05	PIN CONNECTOR	2 CONTACT							
	P045	E40-0473-05	PIN CONNECTOR	4 CONTACT							
	P051	E40-0573-05	PIN CONNECTOR	5 CONTACT							
	P058	E40-0273-05	PIN CONNECTOR	2 CONTACT							
C-2	C001	2SC3354(T,S)	TR. SI, NPN								
C-3	C002	2N1901	PET. DUAL SI, N-CHANNEL								
C-3	C003	2S-3354(T,S)	TR. SI, NPN								
C-2	C004	2SC3354(T,S)	TR. SI, NPN								
C-2	C005	2SA1116P	TR. SI, PNP								
C-2	C006	2SA1161	TR. SI, PNP								
C-2	C007	2SA1309(O,R)	TR. SI, PNP								
C-2	C008	2SC3066	TR. SI, NPN								
B-3	B009	2SC2671(H)	TR. SI, NPN								
B-3	B010	2SC2671(H)	TR. SI, NPN								
B-3	B011	2SC3354(T,S)	TR. SI, NPN								
B-3	B012	2S-3354(T,S)	TR. SI, NPN								
B-2	B013	2SC3354(T,S)	TR. SI, NPN								
B-2	B015	2SC2671(H)	TR. SI, NPN								
D-1	R001	R0148B2C101J	RES. CARBON	100	5%	1/6W					
D-1	R002	R0148B2C110J	RES. CARBON	110	5%	1/6W					
C-2	R004	R0148B2C222J	RES. CARBON	2.2K	5%	1/6W					
C-2	R005	R0148B2C470J	RES. CARBON	47	5%	1/6W					
C-2	R006	R0148B2C821J	RES. CARBON	820	5%	1/6W					
D-2	R007	R0148B2C103J	RES. CARBON	10K	5%	1/6W					
D-2	R008	R0148B2C473J	RES. CARBON	47K	5%	1/6W					
D-2	R009	R0148B2C473J	RES. CARBON	47K	5%	1/6W					
D-3	R010	R0148B2C622J	RES. CARBON	8.2K	5%	1/6W					
D-3	R011	R0148B2C103J	RES. CARBON	10K	5%	1/6W					
D-3	R012	R0148B2C431J	RES. CARBON	430	5%	1/6W					
D-3	R013	R0148B2C220J	RES. CARBON	22	5%	1/6W					
D-3	R014	R0148B2C101J	RES. CARBON	100	5%	1/6W					
D-3	R015	R0148B2C914J	RES. CARBON	910K	5%	1/6W					
C-3	R016	R0148B2C2001F	RES. METAL FILM	3K	1%	1/6W					
C-3	R017	R0148B2C2001F	RES. METAL FILM	3K	1%	1/6W					
C-3	R018	R0148B2C220J	RES. CARBON	22	5%	1/6W					
C-2	R019	R0148B2C220J	RES. CARBON	22	5%	1/6W					
C-3	R020	R0148B2C562J	RES. CARBON	5.6K	5%	1/6W					

## PARTS LIST

## POWER BLANKING UNIT

X68-1400-00

REF. NO	PARTS NO	NAME & DESCRIPTION	REF. NO	PARTS NO	NAME & DESCRIPTION
			B-1	REF. NO D620	NAME & DESCRIPTION
			B-2	D620	DIODE, SILICON SWITCHING
			B-3	1C001	N4M45580 IC, DUAL OP-AMP
			B-3	1C002	N4M45590 IC, DUAL OP-AMP
			B-3	1C003	LK560462S.0 IC-REGULATOR
			B-4	L001	L40-1011-04 FERRI INDUCTOR 100UH
			B-4	L002	L40-1011-04 FERRI INDUCTOR 100UH
			C-3	L003	L40-1011-04 FERRI INDUCTOR 100UH
			C-3	L004	L40-1011-04 FERRI INDUCTOR 100UH
			C-3	L005	L40-1011-04 FERRI INDUCTOR 100UH
			C-2	L006	L40-1011-04 FERRI INDUCTOR 100UH
			C-2	L007	L40-1011-04 FERRI INDUCTOR 100UH
			C-2	L008	L40-1011-04 FERRI INDUCTOR 100UH
			C-1	NL001	NE-28 NEON LAMP
			C-1	NL002	NE-28 NEON LAMP
			C-1	NL003	NE-28 NEON LAMP
			C-1	NL004	NE-28 NEON LAMP
B-2	C001	045FFH103Z	P022	E40-0773-05	PIN CONNECTOR 7P
B-2	C002	045FFH103Z	P023	E40-0473-05	PIN CONNECTOR 4 CONTACT
B-2	C003	CE041V100M	P024	NO USE	
B-2	C004	CE041V100M	P025	E40-0273-05	PIN CONNECTOR 2 CONTACT
B-3	C005	CE041V100M	P026	E40-0273-05	PIN CONNECTOR 2 CONTACT
B-3	C006	CE041V100M	P027	E40-0873-05	PIN CONNECTOR 6 CONTACT
B-3	C007	CE041V100M	P028	E40-0473-05	PIN CONNECTOR 4 CONTACT
B-3	C008	C91-0549-05	P029	E40-0703-05	PIN CONNECTOR 7P
C-3	C009	CE041E101H	P030	E40-0740-05	PIN CONNECTOR 7P
C-3	C010	CE041E101H	P031	NO USE	
B-3	C011	CE041A221M	P032	E40-0273-05	PIN CONNECTOR 2 CONTACT
B-4	C012	CE041V100M	P033	E40-0332-05	PIN CONNECTOR 3 CONTACT
B-4	C013	045FFH103Z	P034	E40-0273-05	PIN CONNECTOR 2 CONTACT
A-2	C014	045FFH103Z	P063	E40-0673-05	PIN CONNECTOR 6 CONTACT
A-2	C015	045FFH103Z			
D-4	C016	045FFH103Z			
D-4	C017	045CHM101J	D-3	PL001	B50-0927-15 LAMP
D-4	C018	045CHM101J	D-3	PL002	B50-0927-15 LAMP
D-4	C019	C90-0298-05	D-3	PL003	B50-0927-15 LAMP
D-4	C020	C90-0298-05	D-3	PL004	B50-0927-15 LAMP
D-4	C021	C91-0549-05	B-3	0001	25C291(G,R) TR. SI. NPN
D-4	C022	CE041E101H	B-3	0002	25C1905(L) TR. SI. NPN
C-3	C023	C90-0298-05	B-3	0003	25B633(E) TR. SI. NPN
D-3	C024	045SH2472K	B-3	0004	25D613(E) TR. SI. NPN
D-3	C025	045SH2472K	B-3	0005	25B633(E) TR. PNP
D-3	C026	045SH2472K	B-4	0006	25C1905(L) TR. SI. NPN
D-3	C027	045SH2472K	B-4	0007	25C331(R) TR. SI. NPN
D-2	C028	045FFH103Z	B-2	0008	25C331(R) TR. SI. NPN
D-2	C029	045FFH103Z	B-2	0009	25C331(R) TR. SI. NPN
D-2	C030	045FFH103Z	B-2	0010	25A1309(G,R) TR. SI. PNP
C-3	C031	CE041E101H	D-3	0011	25C335(A,T,S) TR. SI. NPN
C-3	C032	CE041A221M	D-3	0012	25C335(A,T,S) TR. SI. NPN
C-3	C033	045FFH103Z	B-3	0013	25C335(G) TR. SI. PNP
C-3	C034	CE041E101H	C-3	0014	25C331(R) TR. SI. NPN
C-2	C035	045FFH103Z	C-3	0015	25C335(G,D) TR. SI. NPN
C-2	C036	C91-0580-05	D-3	0016	25C335(G,D) TR. SI. NPN
C-2	C037	C91-0580-05	C-3	0017	25C335(G,D) TR. SI. NPN
C-2	C038	C91-0580-05	D-2	0018	25C805A-(2,X,3) TR. SI. NPN
D-2	C039	C91-0580-05	C-2	0019	25A923-(2,X,3) TR. SI. PNP
B-1	C040	K45EE3102P	B-3	0020	25C291(G,R) TR. SI. NPN
B-1	C041	C9931H125K	C-2	0021	25A1298(S,T) TR. SI. PNP
B-1	C042	045FFH103Z	C-2	0022	25C291(G,S,T) TR. SI. NPN
B-2	C043	045FFH103Z	C-2	0023	25C291(G,S,T) TR. SI. NPN
B-2	C044	CE041E101H	B-1	0024	25C331(R) TR. SI. NPN
B-2	C045	045FFH103Z	B-1	0025	25C331(R) TR. SI. NPN
B-2	C046	CE041E101H	B-1	0026	25A1309(G,R) TR. SI. PNP
B-1	C047	CE041E101H	B-1	0027	25K192A(L) FET, N-CHANNEL
B-1	C048	045SH2472K	B-1	0028	25D613(E) TR. SI. NPN
B-2	C049	C9931H125K	B-2	R001	RD148BC512J RES. CARBON 5.1K 5% 1/4W
B-2	C050	CE041E101H	B-3	R002	RD148BC512J RES. CARBON 1K 5% 1/4W
B-1	C051	045FFH103Z	B-3	R003	RD148BC562J RES. CARBON 5.6K 5% 1/4W
D-1	C052	C91-0580-05	B-3	R004	RD148BC601J RES. CARBON 60.1K 5% 1/4W
D-1	C053	C91-0580-05	B-3	R005	RD148BC102J RES. CARBON 1K 5% 1/4W
D-1	C054	K45EE3102P	B-3	R006	RN148GC2303F RES. METAL FILM 130K 1% 1/4W
D-2	C055	045SH2222K	B-3	R007	RN148GC5601F RES. METAL FILM 5.6K 1% 1/4W
D-3	C059	045FFH103Z	B-3	R008	RD148BC561J RES. CARBON 560 5% 1/4W
C-3	C060	045FFH103Z	B-3	R009	RD148GC292J RES. METAL FILM 29.2K 5% 1/4W
B-3	C061	CE041E101H	B-3	R010	RN148GC5101F RES. METAL FILM 5.1K 1% 1/4W
B-3	D001	D5442X	B-3	R011	RN148GC5101F RES. METAL FILM 5.1K 1% 1/4W
B-3	D002	MT72JC	B-3	R012	RN148GC2100F RES. METAL FILM 100 1% 1/4W
B-2	D003	MT72JC	B-3	R013	RD148GC292J RES. METAL FILM 29.2K 5% 1/4W
B-3	D004	MT73.5JA	B-2	R014	RD148BC561J RES. CARBON 560 5% 1/4W
B-3	D005	D5442X	B-2	R015	RN148GC2101F RES. METAL FILM 1.2K 1% 1/4W
B-3	D006	D5442X	B-2	R016	RN148BC3901F RES. METAL FILM 3.9K 1% 1/4W
C-4	D007	MT73.5JB	B-3	R017	RD148BC222J RES. CARBON 2.2K 5% 1/4W
C-2	D010	1SS83	B-3	R019	RN148GC2200F RES. METAL FILM 220 1% 1/4W
D-2	D011	1SS83	B-3	R020	RN148GC5101F RES. METAL FILM 5.1K 1% 1/4W
C-2	D012	W06C	B-4	R021	RD148GC292J RES. METAL FILM 29.2K 5% 1/4W
C-2	D013	W06C	B-4	R022	RN148GC1362F RES. METAL FILM 13K 1% 1/4W
D-2	D014	W06C	B-4	R023	RN148GC2802F RES. METAL FILM 2.8K 1% 1/4W
D-2	D015	W06C	C-3	R024	RD148BC427J RES. CARBON 4.27K 5% 1/4W
D-1	D016	D5442X	C-3	R025	RD148BC223J RES. CARBON 22K 5% 1/4W
D-1	D017	D5442X	C-3	R026	RD148BC223J RES. CARBON 22K 5% 1/4W
B-1	D018	MT73.5JA	C-3	R027	RD148BC2101J RES. CARBON 10K 5% 1/4W
B-1	D019	MT76.2JA	C-4	R028	RD148FC512J RES. CARBON 5.1K 5% 1/4W

# PARTS LIST

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT
C-4	R029	RES. CARBON	5.1K	5% 1/6W
C-4	R030	RES. CARBON	2.7K	5% 1/6W
C-4	R031	RES. CARBON	880	5% 1/6W
C-4	R032	RES. METAL FILM	2.2K	1% 1/6W
C-4	R033	RES. METAL FILM	9.1K	1% 1/6W
D-4	R034	RES. CARBON	5% 1/6W	5% 1/6W
D-4	R035	RES. CARBON	51	5% 1/6W
D-4	R036	RES. CARBON	100	5% 1/6W
D-4	R037	RES. CARBON	100	5% 1/6W
D-4	R038	RES. CARBON	1.3K	5% 1/6W
E-4	R039	RES. CARBON	1K	5% 1/6W
D-4	R040	RES. CARBON	1K	5% 1/6W
D-3	R041	RES. CARBON	750	5% 1/4W
D-3	R042	RES. CARBON	2.4K	5% 1/6W
-	R043	NO USE		
D-3	R044	RES. CARBON	360	5% 1/6W
D-3	R045	RES. CARBON	220	5% 1/6W
D-3	R046	RES. CARBON	2.7K	5% 1/6W
C-3	R047	RES. CARBON	6.2K	5% 1/6W
C-3	R048	RES. CARBON	1K	5% 1/6W
D-3	R049	RES. CARBON	75K	5% 1/6W
C-3	R050	RES. CARBON	120K	5% 1/6W
C-3	R051	RES. CARBON	5.6K	5% 1/6W
C-3	R052	RES. CARBON	560	5% 1/6W
D-2	R053	RES. CARBON	47	5% 1/6W
D-3	R054	RES. CARBON	240K	5% 1/6W
D-3	R055	RES. CARBON	220	5% 1/6W
D-3	R056	RES. CARBON	5.6K	5% 1/6W
D-3	R057	RES. CARBON	5.6K	5% 1/6W
D-2	R058	RES. CARBON	120K	5% 1/6W
D-2	R059	RES. CARBON	47	5% 1/6W
D-2	R060	RES. CARBON	3.3K	5% 1/6W
D-2	R061	RES. CARBON	550	5% 1/6W
C-2	R062	RES. CARBON	68K	5% 1/6W
C-2	R063	RES. CARBON	68K	5% 1/6W
C-2	R064	RES. CARBON	1K	5% 1/6W
C-2	R065	RES. CARBON	1K	5% 1/6W
C-2	R066	RES. CARBON	10K	5% 1/6W
C-2	R067	RES. CARBON	1K	5% 1/6W
C-1	R068	RES. METAL FILM	62K	1% 1/6W
B-1	R069	RES. CARBON	10K	5% 1/6W
B-1	R070	RES. CARBON	10K	5% 1/6W
B-1	R071	RES. CARBON	10K	5% 1/6W
B-1	R072	RES. CARBON	4.7K	5% 1/6W
A-1	R073	RES. CARBON	68	5% 1/6W
C-2	R074	RES. FIXED	15K 5% 1/2W	
D-1	R075	RES. FIXED	5.1K 5% 1/2W	
D-2	R076	RES. FIXED	4.7M 5% 1W	
D-1	R077	RES. FIXED	4.3M 5% 1W	
D-1	R078	RES. FIXED	3M 5% 1/2W	
C-1	R079	RES. FIXED	4.7M 5% 1/2W	
A-3	R080	RES. CARBON	5.6K	5% 1/6W
A-3	R081	RES. CARBON	3K	5% 1/6W
A-2	R082	RES. CARBON	3K	5% 1/6W
C-2	R083	RES. CARBON	1K	5% 1/6W
E-4	R084	RES. CARBON	220	5% 1/6W

C-4	R091	RES. CARBON	100	5% 1/6W
C-4	T0001	CAP. TRIMMER	20P	
D-3	T0002	CAP. TRIMMER	20P	
D-3	T0003	CAP. TRIMMER	2P	
C-3	VR001	RES. SEMI FIXED	4.7K B	
D-3	VR002	RES. SEMI FIXED	10K B	
C-1	VR003	RES. SEMI FIXED	4.7K B	
E-1	VR004	V.R.	3M B	
-	VR005	V.R.	10K B	
E-3	VR006	V.R.	1K B	

## FILTER UNIT

### X70-1020-00

REF. NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT
C-3	C001	INLET TERMINAL	3P	
C-3	C002	CAP. POLYESTER	0.22	10% 630V
B-3	C003	CAP. CERAMIC	1000P	630
A-3	C004	CAP. CERAMIC	1000P	630
A-3	D001	CAP. ELECTRO	1	20% 50V
A-2	I0001	DIODE		
C-2	L001	CHOKER COIL		
A-3	P024	PIN CONNECTOR	2	CONTACT
A-3	R001	RES. CARBON	220K	5% 1/2W
C-3	R002	RES. SOLID	2.2M	5% 1/2W

## ASTIG UNIT

### X81-1430-00

REF. NO	PARTS NO	NAME & DESCRIPTION
J063	J25-5038-12	PCB (UNMOUNTED)
	ES1-2467-15	LEAD WIRE WITH CONNECTOR
VR008	R12-3526-05	RES. SEMI FIXED 10K B
VR009	R12-5519-05	RES. SEMI FIXED 150K B

## SWITCHING POWER SUPPLY

### W02-0413-05

REF. NO	PARTS NO	NAME & DESCRIPTION
D1	DBA20G	Diode
D2	DFA01	Diode
D3	DTA-10ER	Triac
D4	DS42X	Diode
D5	GF10E	Diode
D6	GF10E	Diode
D7	GF10G	Diode
D8	HZ3.8CP	Diode Zener
D9	GZA6.2Z	Diode Zener
Q1	2SC536KN(P)	Transistor
IC1	STK7308	IC
IC2	STK732	IC
L1	L19-0415-08	Line filter
L2	L19-0414-08	Pulse Transformer
L3	L33-0809-08	Coil
L4	L33-0810-08	Coil
L5	L33-0809-08	Coil
L6	L40-4791-14	Ferr-inductor
L7	L40-4791-14	Ferr-inductor
L8	L40-4791-14	Ferr-inductor
C1	C91-0589-08	Polyester cap
C2	C91-0587-08	Ceramic cap
C3	C91-0587-08	Ceramic cap
C4	C91-0587-08	Ceramic cap
C5	C91-0587-08	Ceramic cap
C6	C90-0925-08	Electrolytic cap
C7	C90-0928-08	Electrolytic cap
C8	C90-0927-08	Electrolytic cap
C9	C90-0928-08	Electrolytic cap
C10	CK4581H103K	Ceramic cap
C11	C91-0588-08	Ceramic cap
C12	C90-0929-08	Electrolytic cap
C13	C90-0930-08	Electrolytic cap
C14	C90-0929-08	Electrolytic cap
C15	C90-0931-08	Electrolytic cap
C16	C90-0932-08	Electrolytic cap
C17	C90-0933-08	Electrolytic cap
C18	C90-0934-08	Electrolytic cap
C19	C90-0931-08	Electrolytic cap
C20	C90-0935-08	Electrolytic cap
C21	C90-0938-08	Electrolytic cap
C22	C90-0933-08	Electrolytic cap
C23	C91-0640-08	Ceramic cap
C24	C91-0588-08	Ceramic cap
C25	C91-0598-08	Ceramic cap
C26	C90-0937-08	Electrolytic cap
R1	R92-1111-08	Winding res
R2	R92-1112-08	Winding res
R3	RD148B2E910J	Carbon res
R4	R92-1113-08	Metal oxide res
R5	RD148B2E562J	Carbon res
R6	RD148B2E103J	Carbon res
R7	R92-1114-08	Metal oxide res
R8	RD148B2E102J	Carbon res
R9	RD148B2E100J	Carbon res
R12	RD148B2E2201F	Metal film
VR1	R12-3532-08	Semi-fixed res

VR1	R12-3532-08	Semi-fixed res	10kΩ
	E40-7011-08	Pin connector	3P
	E40-7012-08	Pin connector	7P
	F20-0643-08	Insulating sheet	(STK7308)
	F20-0644-08	Insulating sheet	(STK732)



# VOLTAGES AND WAVEFORMS

voltages and waveforms are measured on each  
atic diagram as follows;

## EQUIPMENT

multimeter : DL-720 (TRIO)  
scope : 475A (TEKTRONIX)  
wave generator : SG-502 (TEKTRONIX)

## ROL SETTINGS

TENSITY	Midrange
US	Midrange
3ND-DC	GND for voltage measurement DC for waveform measurement
POSITION	Midrange
, CH2 GAIN	OFF
, CH2 ABLE	CAL
, CH2 TS/DIV	0.2 V
INV	OFF
ODE	Unless otherwise specified CH1
/Hz BW	OFF
COUPLING	AC
SLOPE	+
i. MODE	AUTO
DOFF	NORM
VEEP TIME/DIV	0.2 ms
VEEP TIME/DIV	50 $\mu$ s
ARIABLE	CAL
POSITION	Midrange
IZ DISPLAY	A
MAG	OFF

## Voltage Measurements

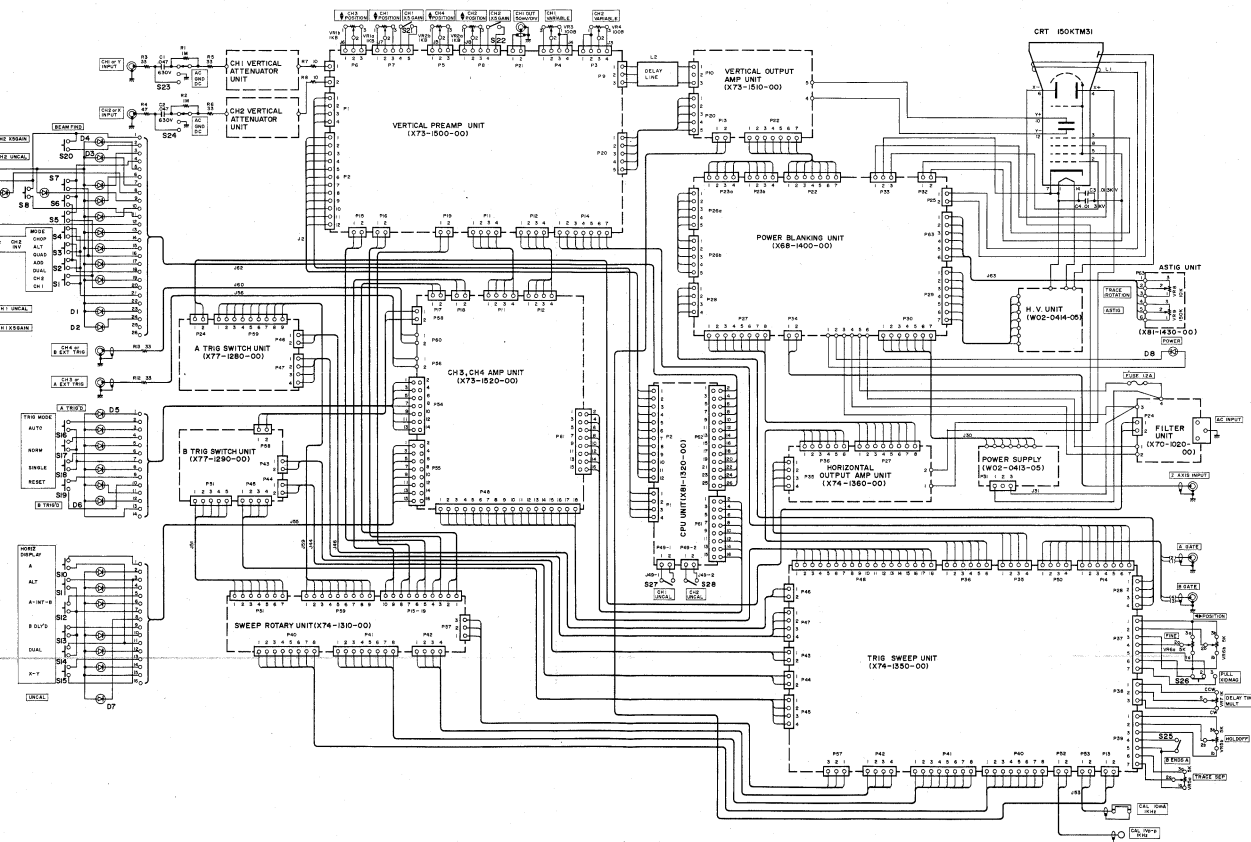
Voltage measurements are taken with no signal applied and the trace positioned to the center horizontal graticule line. The digital multimeter common should be connected to chassis ground at the nearest measurement point.

## Waveform Condition

Waveforms are measured with 1 kHz 1 Vp-p sine wave applied CH1 input and 1 kHz 500 m Vp-p applied CH3 input.

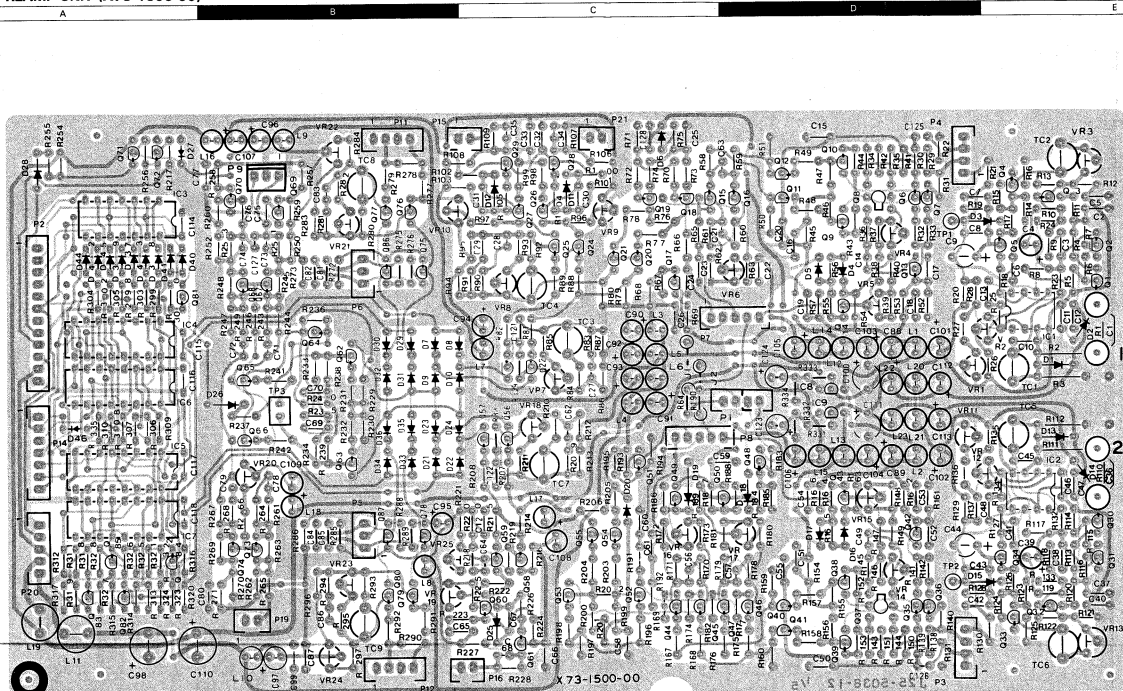
ferential circuit, the voltages and waveforms are  
only CH1 and CH3.

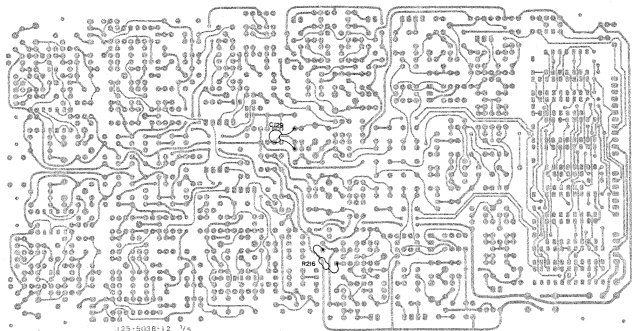
# SCHEMATIC DIAGRAM



# PC BOARD

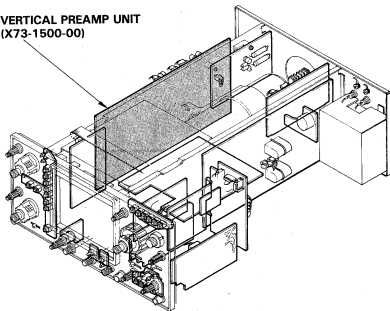
VERTICAL PREAMP UNIT (X73-1500-00)



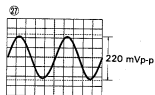
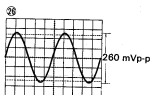
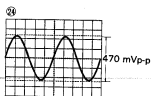
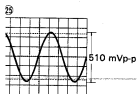
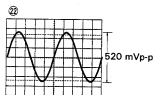
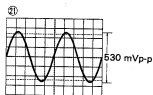
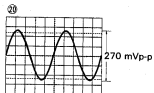
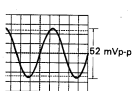
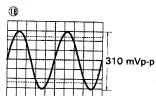
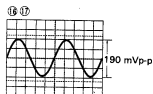
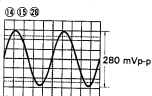
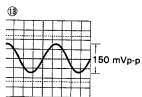
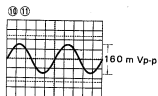
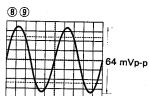
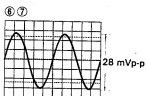
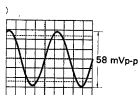
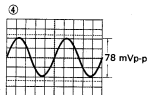
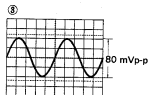
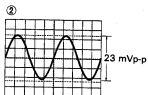
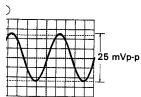


(FOIL SIDE VIEW)

**VERTICAL PREAMP UNIT  
(X73-1500-00)**

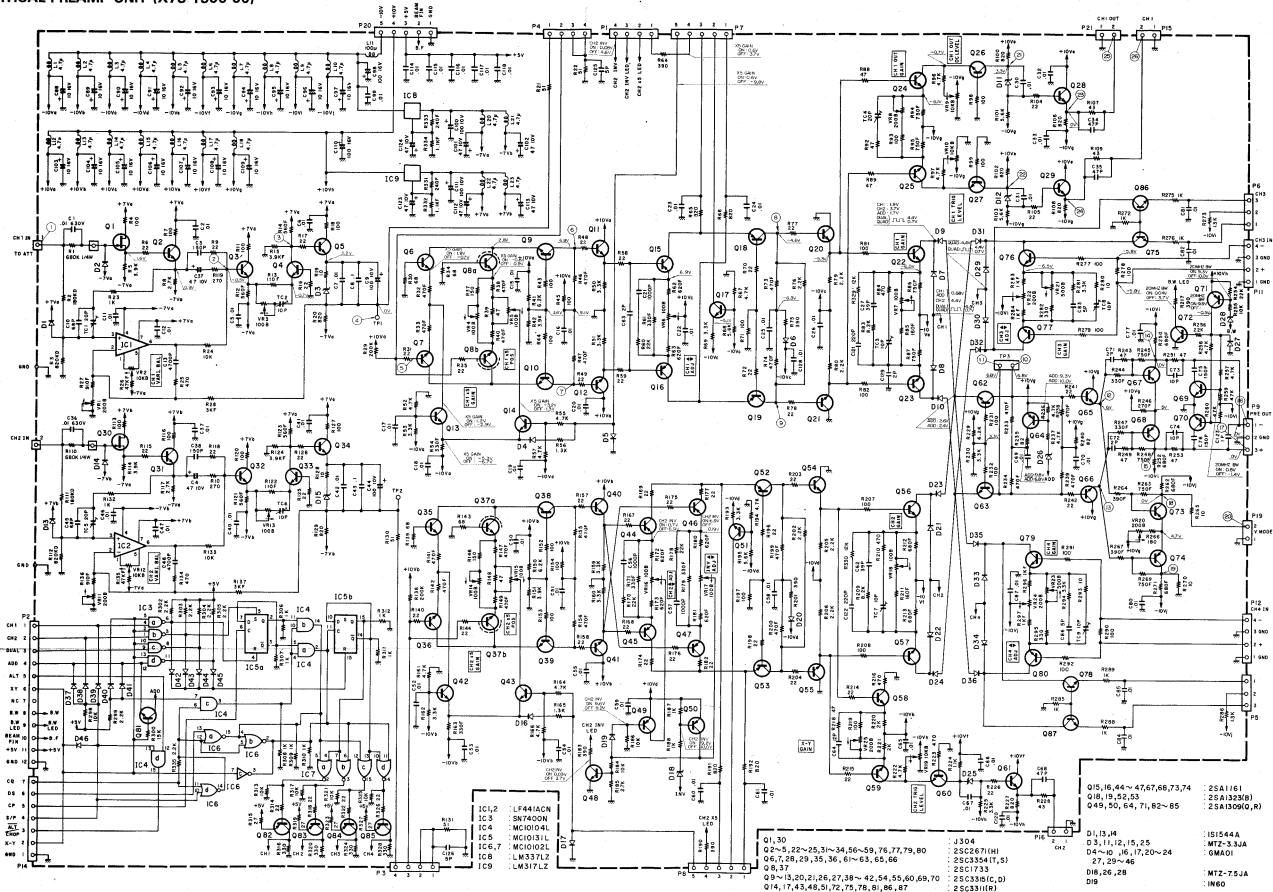


# WAVEFORMS



# SCHEMATIC DIAGRAM

## VERTICAL PREAMP UNIT (X73-1500-00)



- IC2-1 L944 IACN
- IC3-2 2N7000
- IC4 MCI01D1
- IC5 MCI01D1
- IC6 MCI01D2
- IC7 M3371Z
- IC8 M3371Z

- Q1-30
- Q2-5, 22-25, 31-34, 56-59, 76, 77, 79, 80
- Q6, 7, 28, 29, 35, 36, 61-63, 65, 66
- Q8, 17
- Q9-13, 20, 21, 26, 27, 38-42, 54, 55, 60, 69, 70
- Q14, 17, 43, 48, 51, 72, 75, 78, 81, 86, 87

- Q304
- 2SC2871(H)
- 2SC3354(T,S)
- 2SC1733
- 2SC3358(C,D)
- 2SC3311(H)

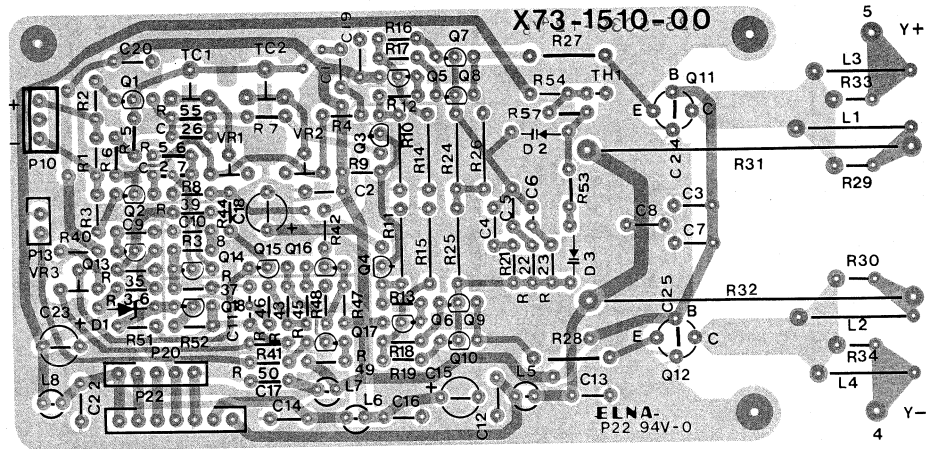
- Q15, 16, 44-47, 67, 68, 73, 74
- Q18, 19, 52, 53
- Q49, 50, 64, 71, 82-85

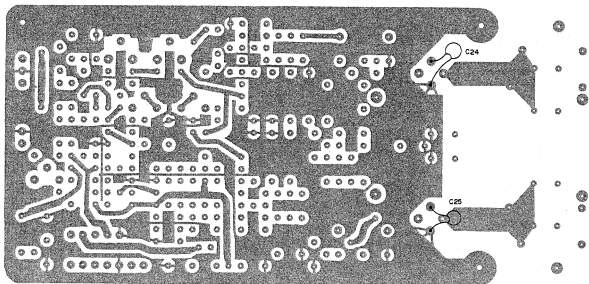
- D1, 13, 14
- D3, 11, 12, 15, 25
- D4-6, 10, 16, 17, 20-24
- 27, 29-46
- D18, 26, 28
- D19

- IS1544
- MTZ-3.3JA
- GMA01
- MTZ-75JA
- IN60

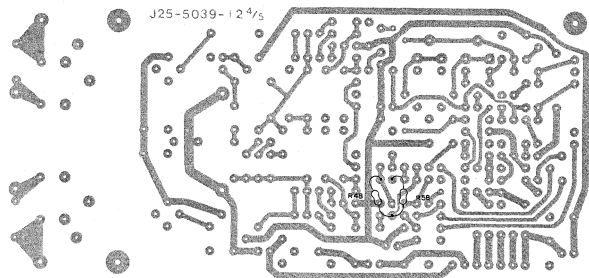
# PC BOARD

## VERTICAL OUTPUT AMP UNIT (X73-1510-00)

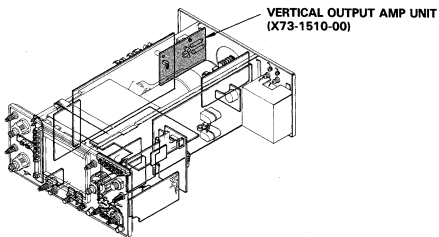




(COMPONENT SIDE VIEW)

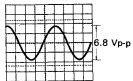
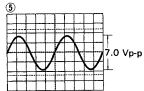
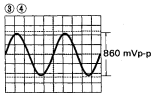
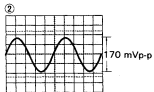
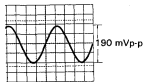


(FOIL SIDE VIEW)



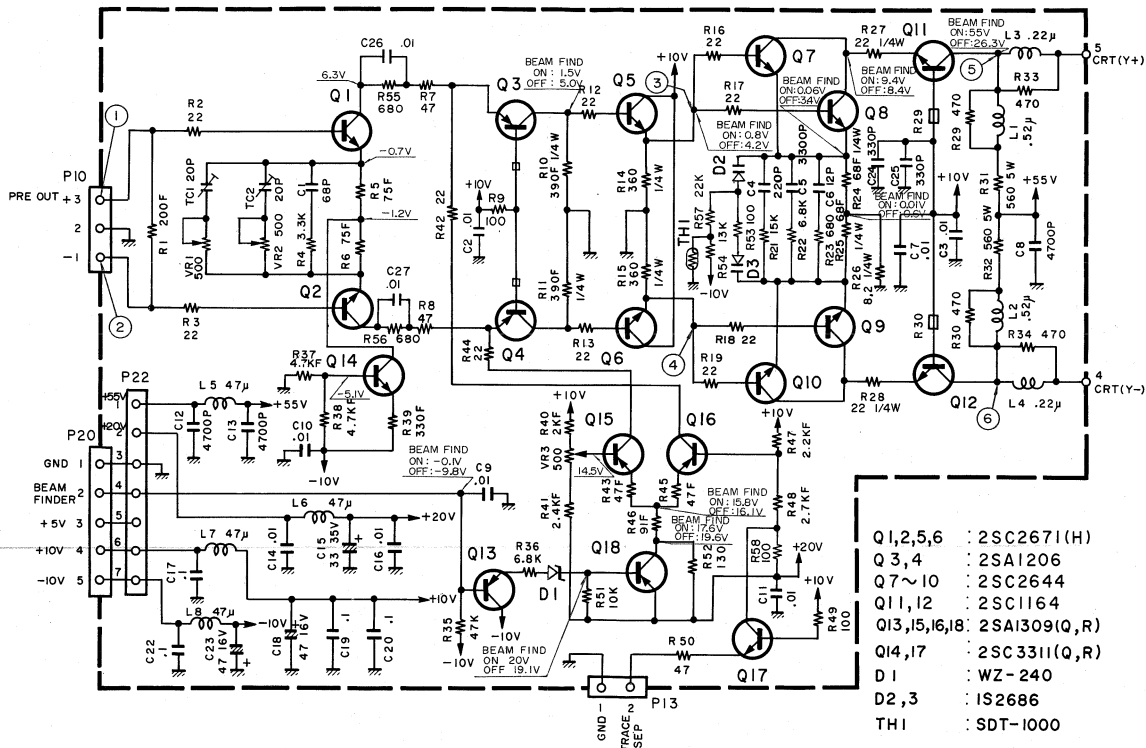


# WAVEFORMS



# SCHEMATIC DIAGRAM

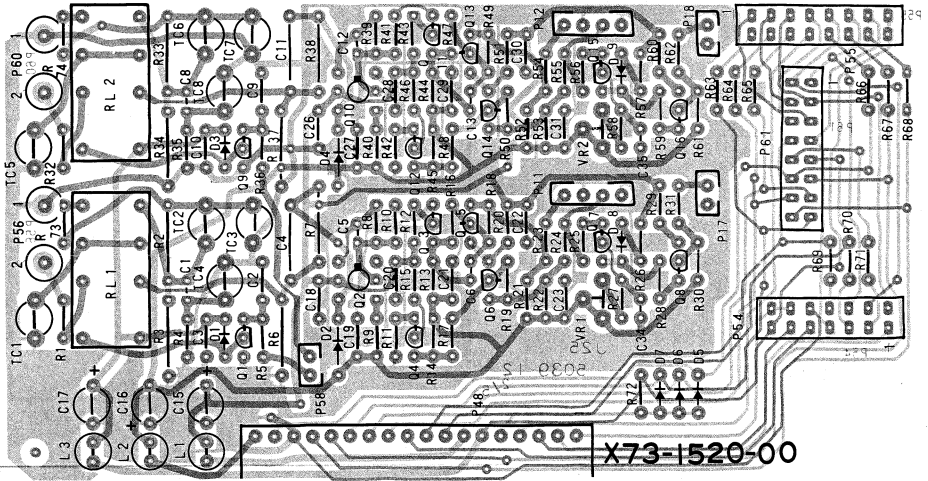
VERTICAL OUTPUT AMP UNIT (X73-1510-00)



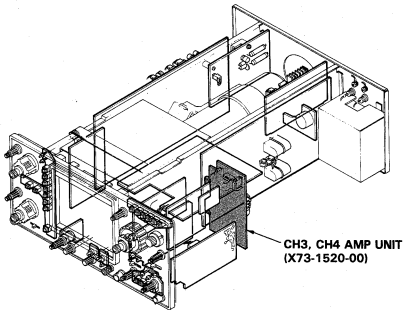
# PC BOARD

H3, CH4 AMP UNIT (X73-1520-00)

A B C D E

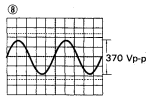
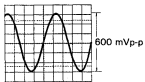
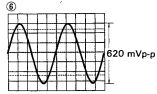
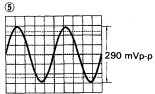
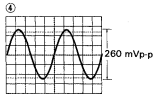
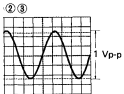


**X73-1520-00**



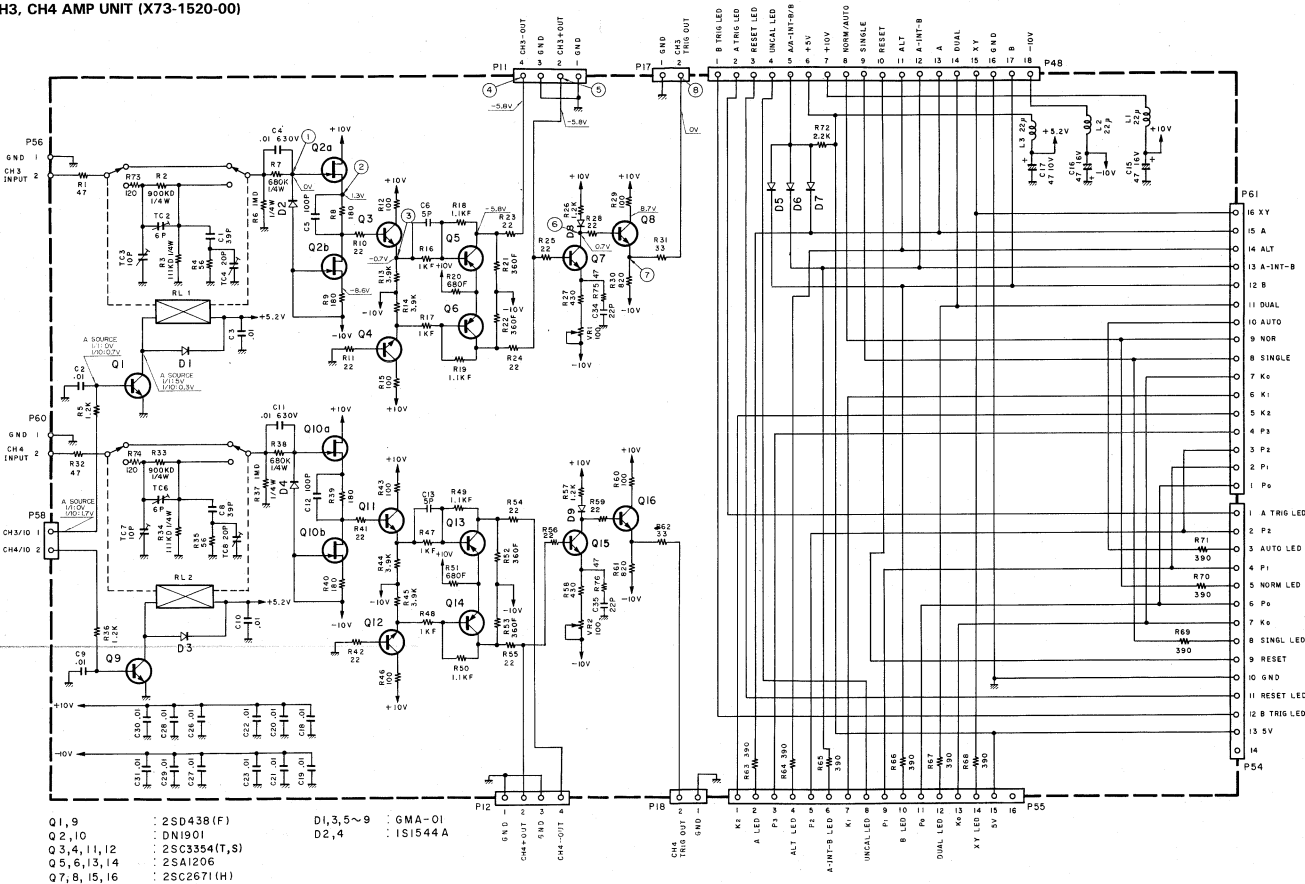
**CH3, CH4 AMP UNIT  
(X73-1520-00)**

# WAVEFORMS



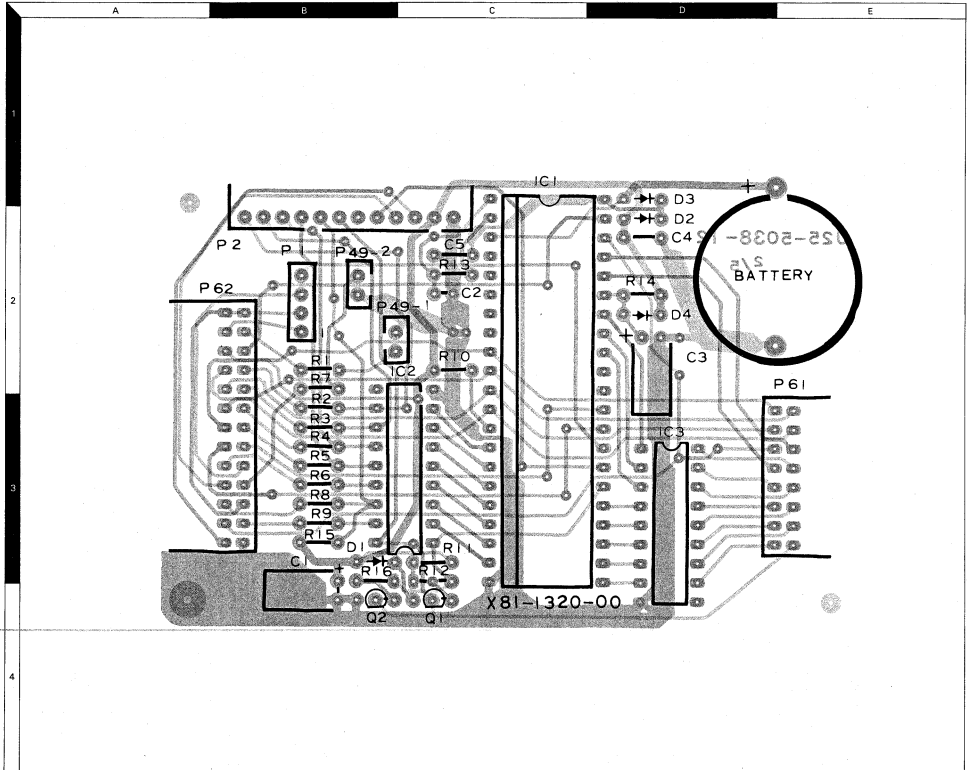
# SCHEMATIC DIAGRAM

CH3, CH4 AMP UNIT (X73-1520-00)

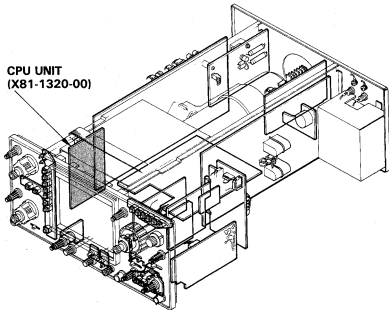


# PC BOARD

CPU UNIT (X81-1320-00)



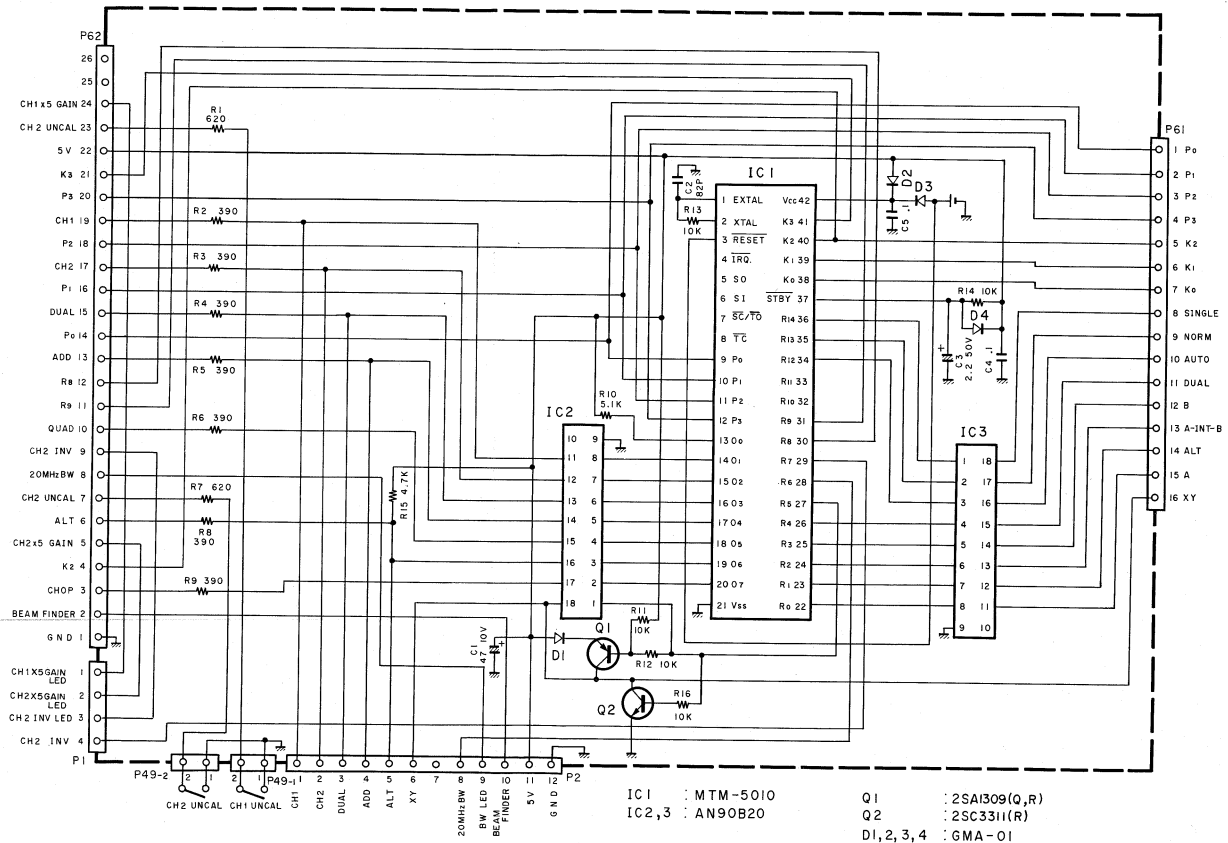
**CPU UNIT  
(X81-1320-00)**





# SCHEMATIC DIAGRAM

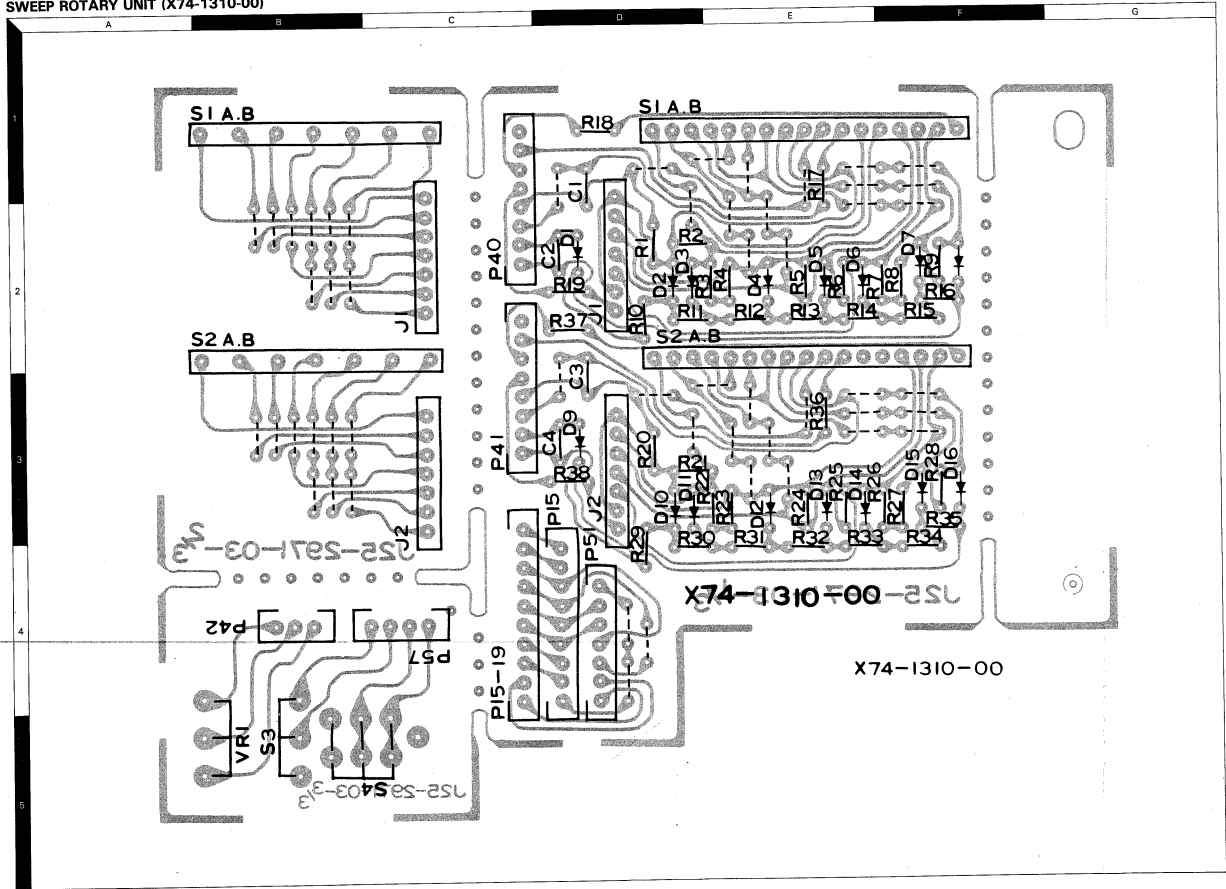
CPU UNIT (X81-1320-00)



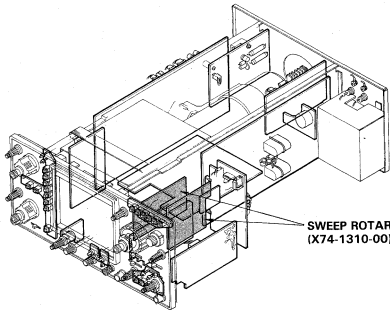
- |       |            |          |                |
|-------|------------|----------|----------------|
| IC1   | : MTM-5010 | Q1       | : 2SA1309(Q,R) |
| IC2,3 | : AN90B20  | Q2       | : 2SC3311(R)   |
|       |            | D1,2,3,4 | : GMA-01       |

# PC BOARD

SWEEP ROTARY UNIT (X74-1310-00)



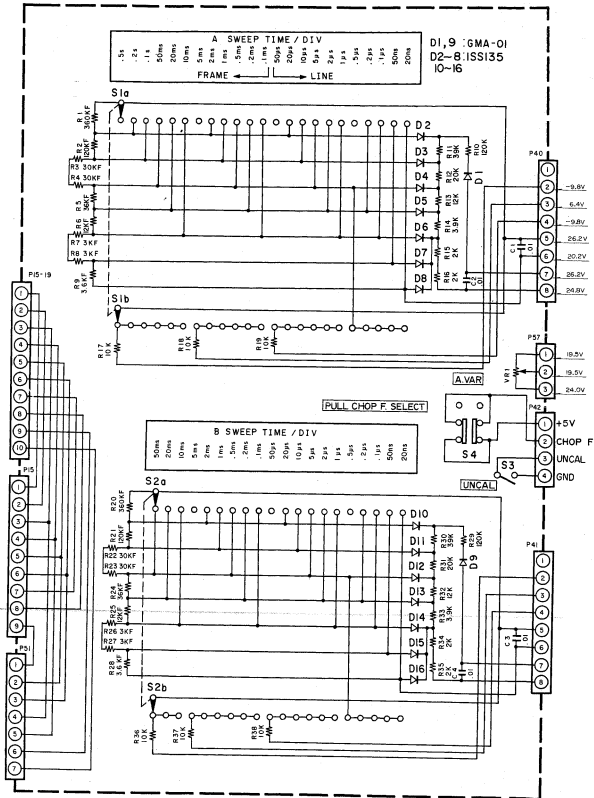
X74-1310-00



**SWEEP ROTARY UNIT  
(X74-1310-00)**

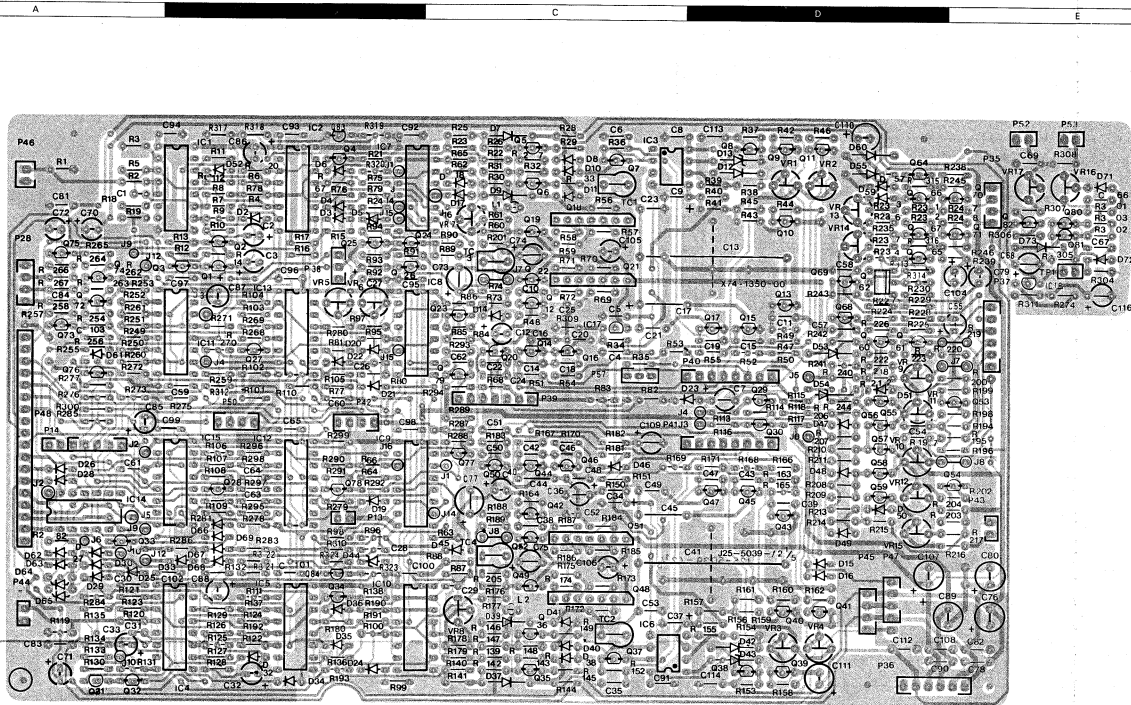
# SCHEMATIC DIAGRAM

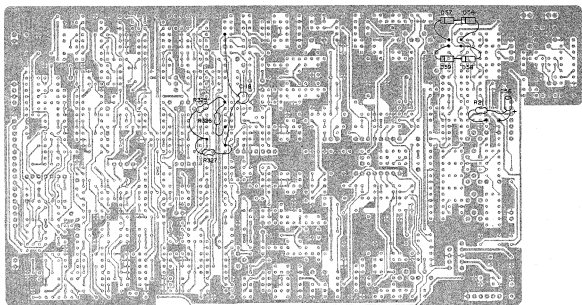
## SWEEP ROTARY UNIT (X74-1310-00)



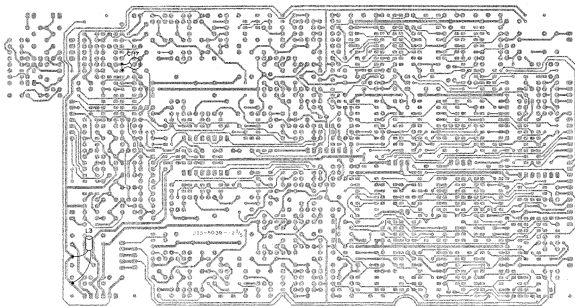
# PC BOARD

RIG SWEEP UNIT (X74-1350-00)

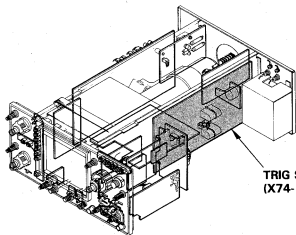




(COMPONENT SIDE VIEW)

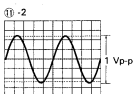
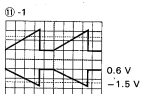
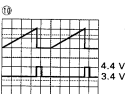
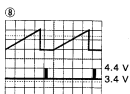
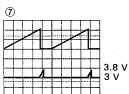
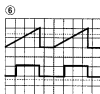
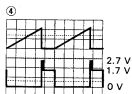
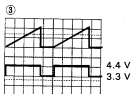
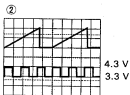
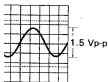


(FOIL SIDE VIEW)

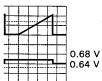


TRIG SWEEP UNIT  
(X74-1350-00)

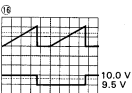
# WAVEFORMS



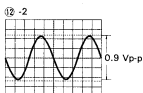
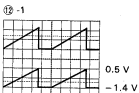
Input: CH2,  
H DISPLAY: X-Y



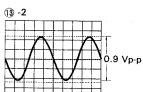
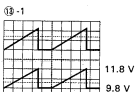
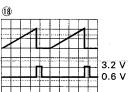
DISPLAY: ALT  
SEP: Fully CCW



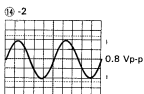
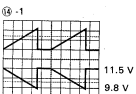
HORIZ DISPLAY: ALT  
TRACE SEP: Fully CCW



Input: CH2,  
H DISPLAY: X-Y



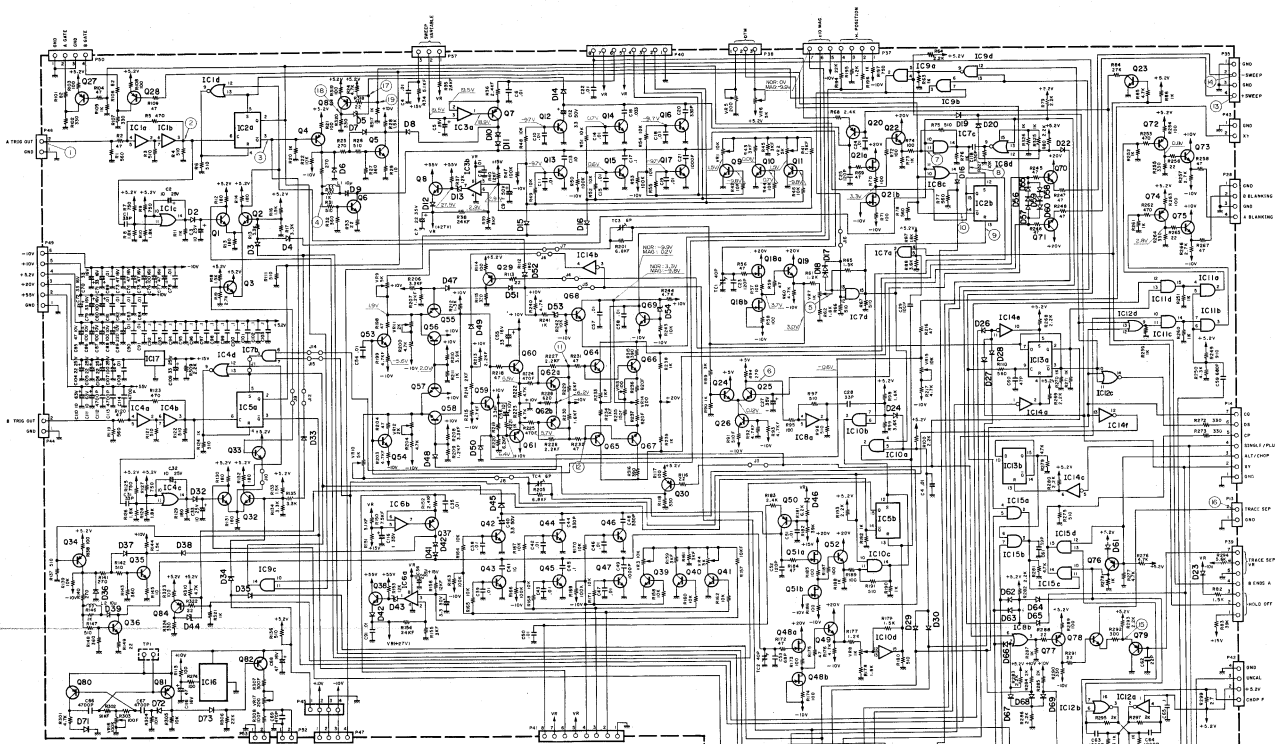
Input: CH2,  
H DISPLAY: X-Y



Input: CH2,  
H DISPLAY: X-Y

# SCHEMATIC DIAGRAM

## TRIG SWEEP UNIT (X74-1350-00)

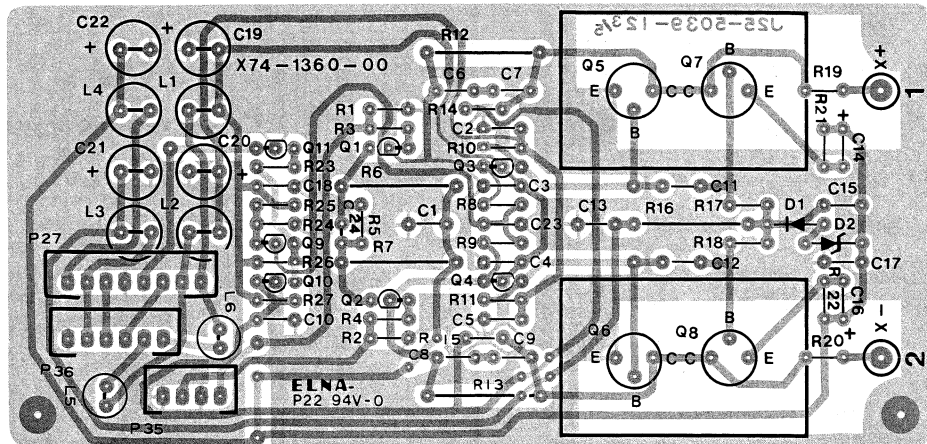


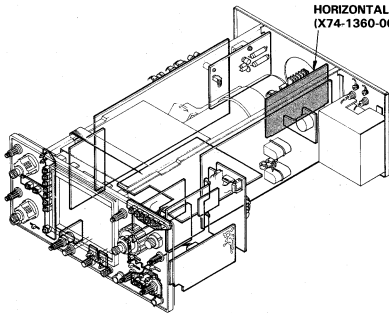
04, 27, 30, 34, 72, 74, 77, 85, 84	25AI12318	IC16	MC78L05CP	D7, 9, 12, 37, 39, 42	1S132
06, 16	25AI12309 (R)	IC17	MC78L10CP	D14, 4, 6, 9, 10, 11, 48-52	
09, 22, 49, 52, 55-61, 64-66, 70, 71	25C97311 (D)	IC18	LF412CN	23-36, 38, 40, 41,	
05, 35, 73, 75	25C3354 (T, S)	IC12	MC1002L	45-52, 56-59,	
08, 18, 8	25D4158 (F)	IC8	MC1003L	61-69, 71, 72	
Q1-9, -17, -23-26, 31-33, 39-47	28C331H (R)	IC7, 9-11, 15	MC1004L	D5, 44	MT2-30J8
53, 54, 69, 69, 78	M477 (C)	IC13	MC1005L	D70	MT2-10JC
018, 21, 48, 21	25AI1239	IC14	SN7406N	D53, 54	MT2-12JC
062		IC14, 4	MC10H03L	D33, 43	MT2-7JC
		IC2, 5	MC10H31L	D55, 60	SV06Y
				D73	1N60



# PC BOARD

## HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)

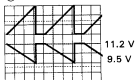




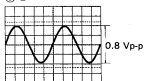
**HORIZONTAL OUTPUT AMP UNIT  
(X74-1360-00)**

# WAVEFORMS

①-1



①-2

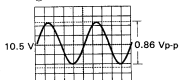


H. DISPLAY: X-Y

②-1

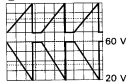


②-2

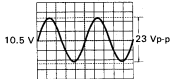


H. DISPLAY: X-Y

③-1

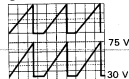


③-2

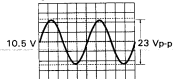


H. DISPLAY: X-Y

④-1



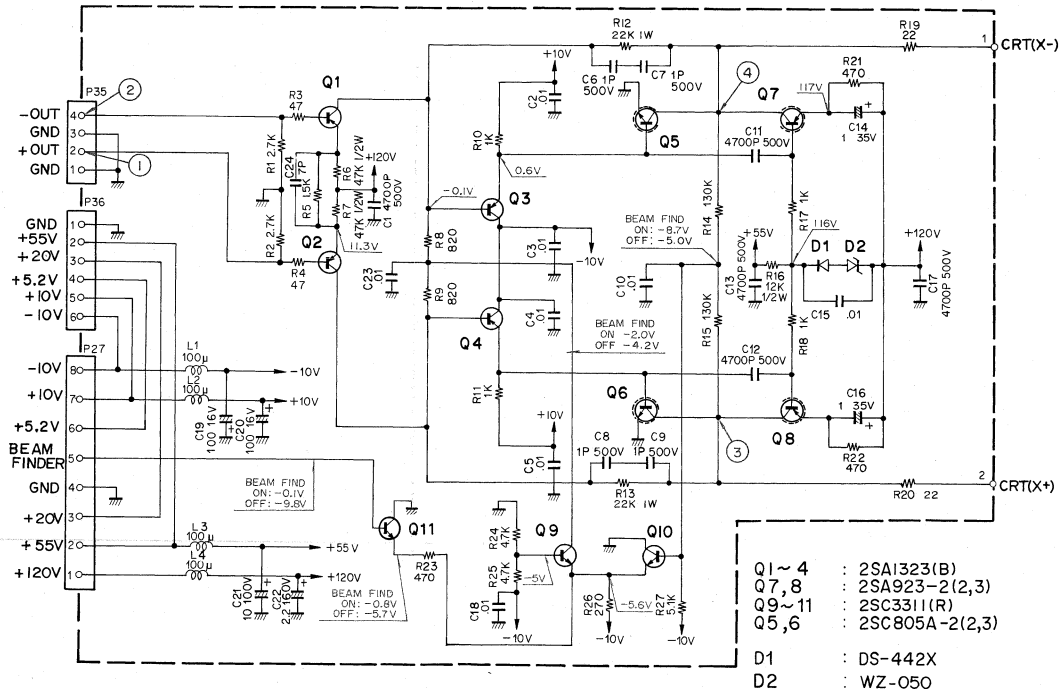
④-2



H. DISPLAY: X-Y

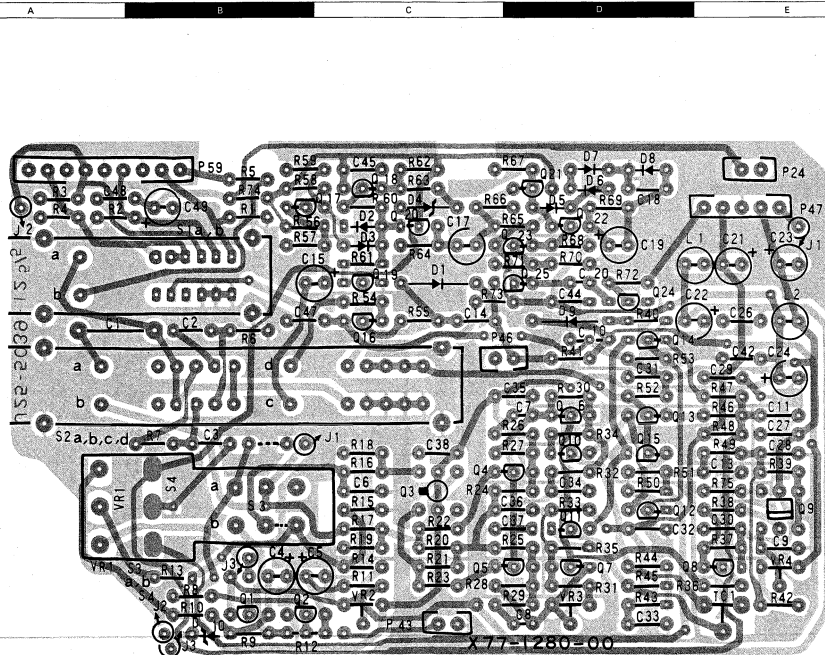
# SCHEMATIC DIAGRAM

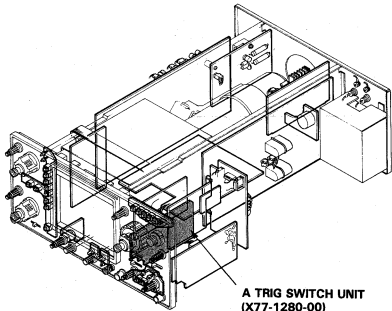
HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)



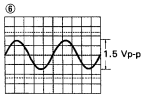
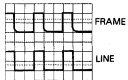
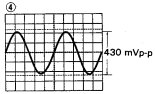
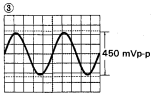
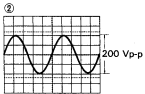
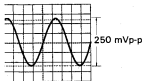
# PC BOARD

A TRIG SWITCH UNIT (X77-1280-00)



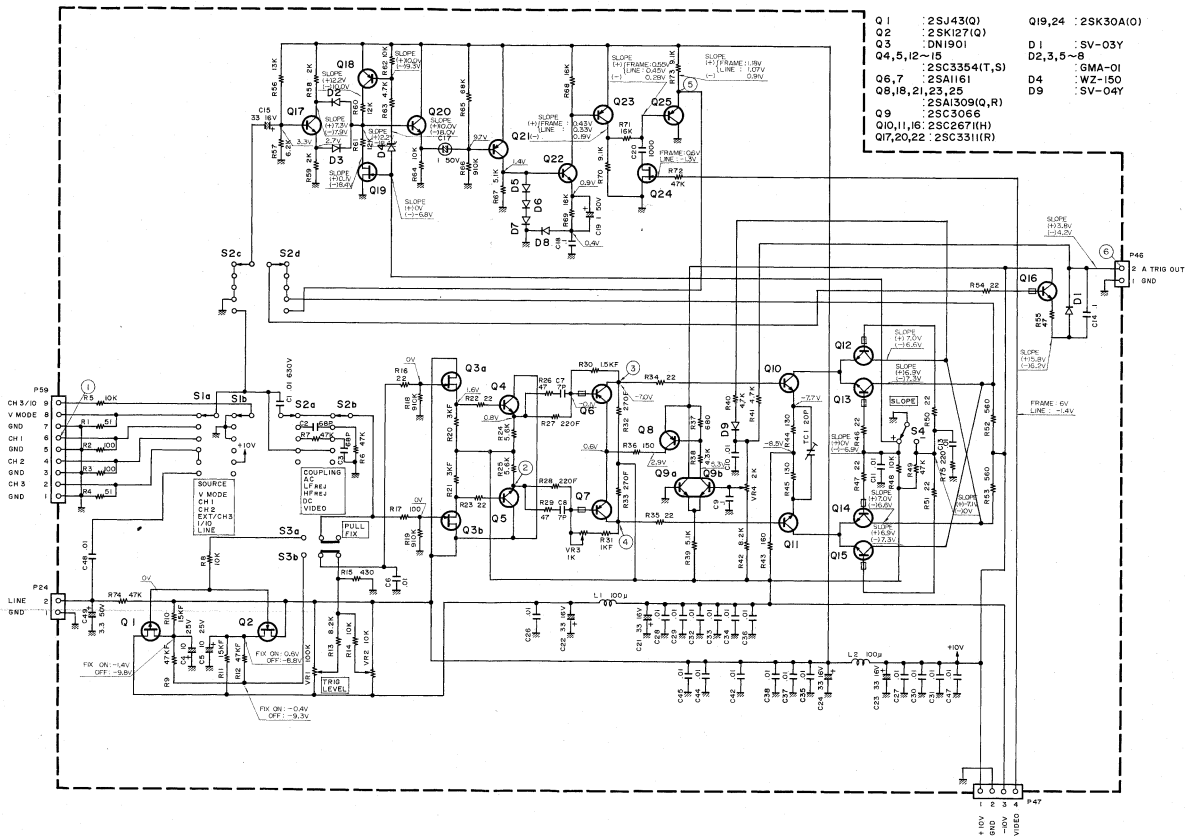


# WAVEFORMS



# SCHEMATIC DIAGRAM

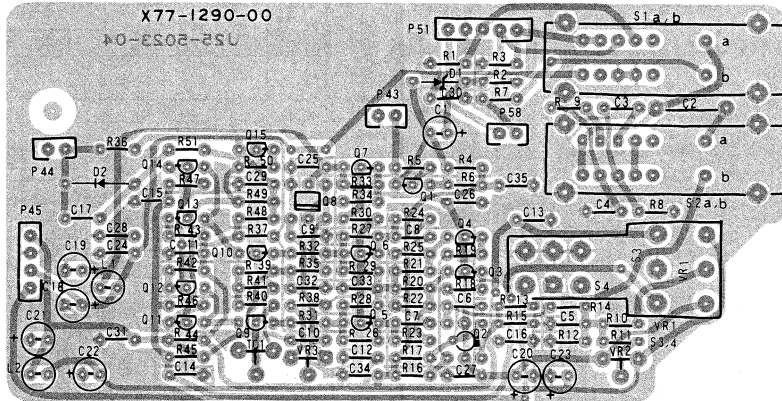
## A TRIG SWITCH UNIT (X77-1280-00)

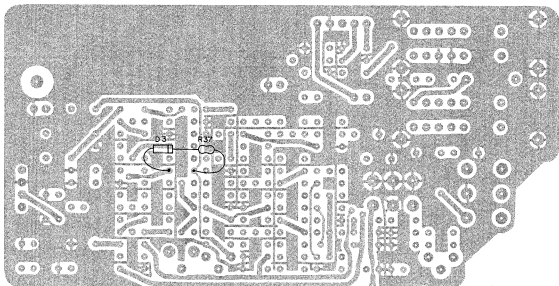




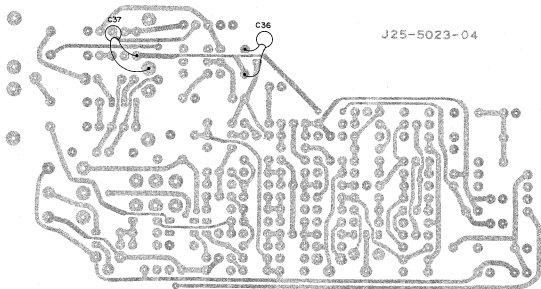
# PC BOARD

B TRIG SWITCH UNIT (X77-1290-00)

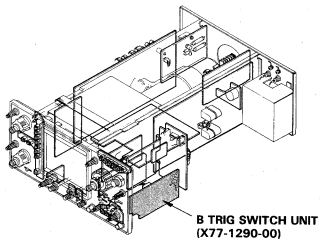




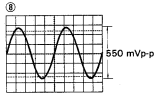
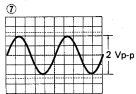
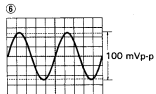
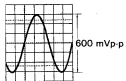
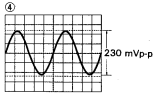
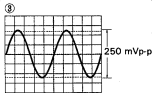
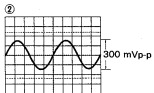
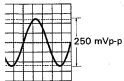
(COMPONENT SIDE VIEW)



(FOIL SIDE VIEW)

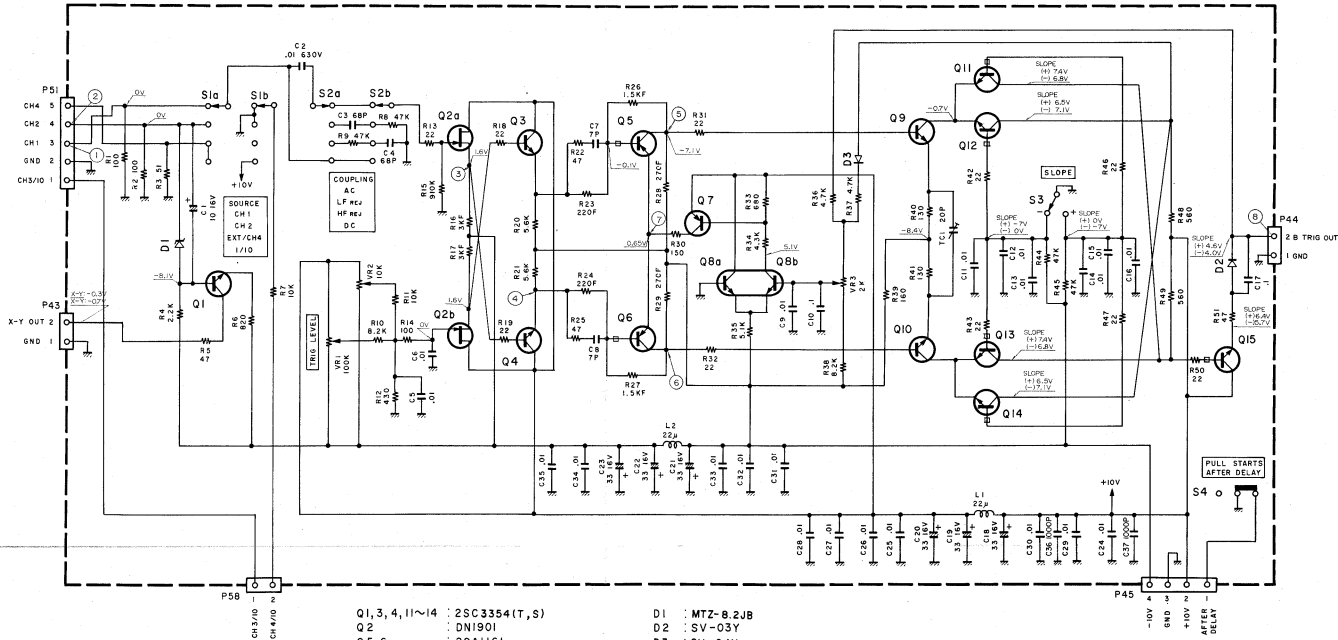


# WAVEFORMS



# SCHEMATIC DIAGRAM

## B TRIG SWITCH UNIT (X77-1290-00)



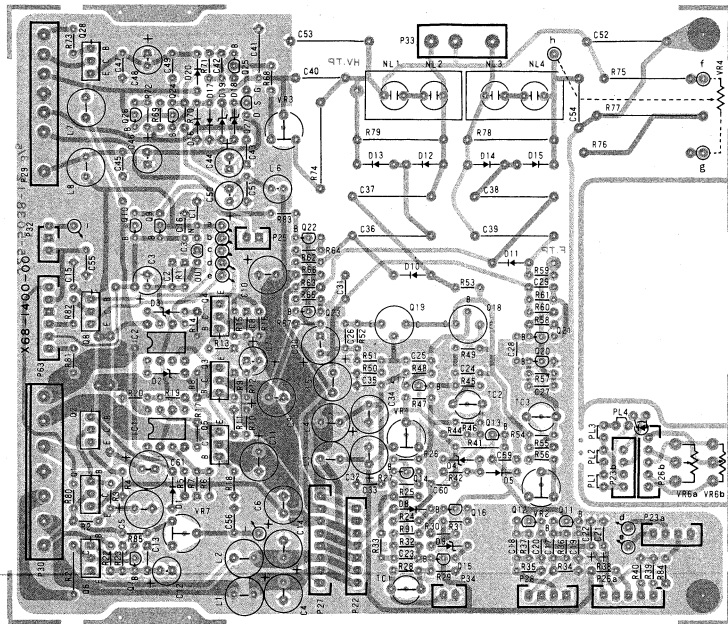
- Q1, 3, 4, 11~14 : 2SC3354(T, S)
- Q2 : DNI901
- Q5, 6 : 2SA1161
- Q7 : 2SA1309(Q, R)
- Q8 : 2SC3066
- Q9, 10, 15 : 2SC2671(H)

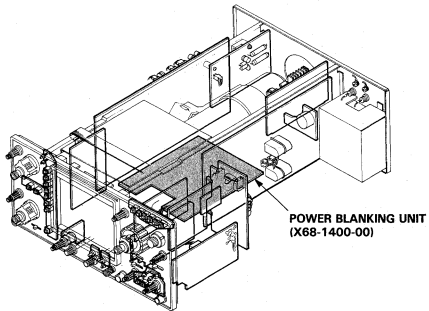
- D1 : MTZ-8.2JB
- D2 : SV-03Y
- D3 : SV-04Y

-10V 4  
GND 3  
+10V 2  
AFTER  
DELAY  
1

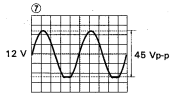
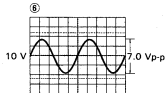
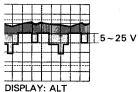
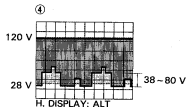
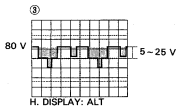
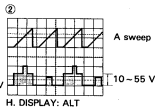
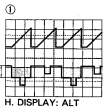
# PC BOARD

POWER BLANKING UNIT (X68-1400-00)





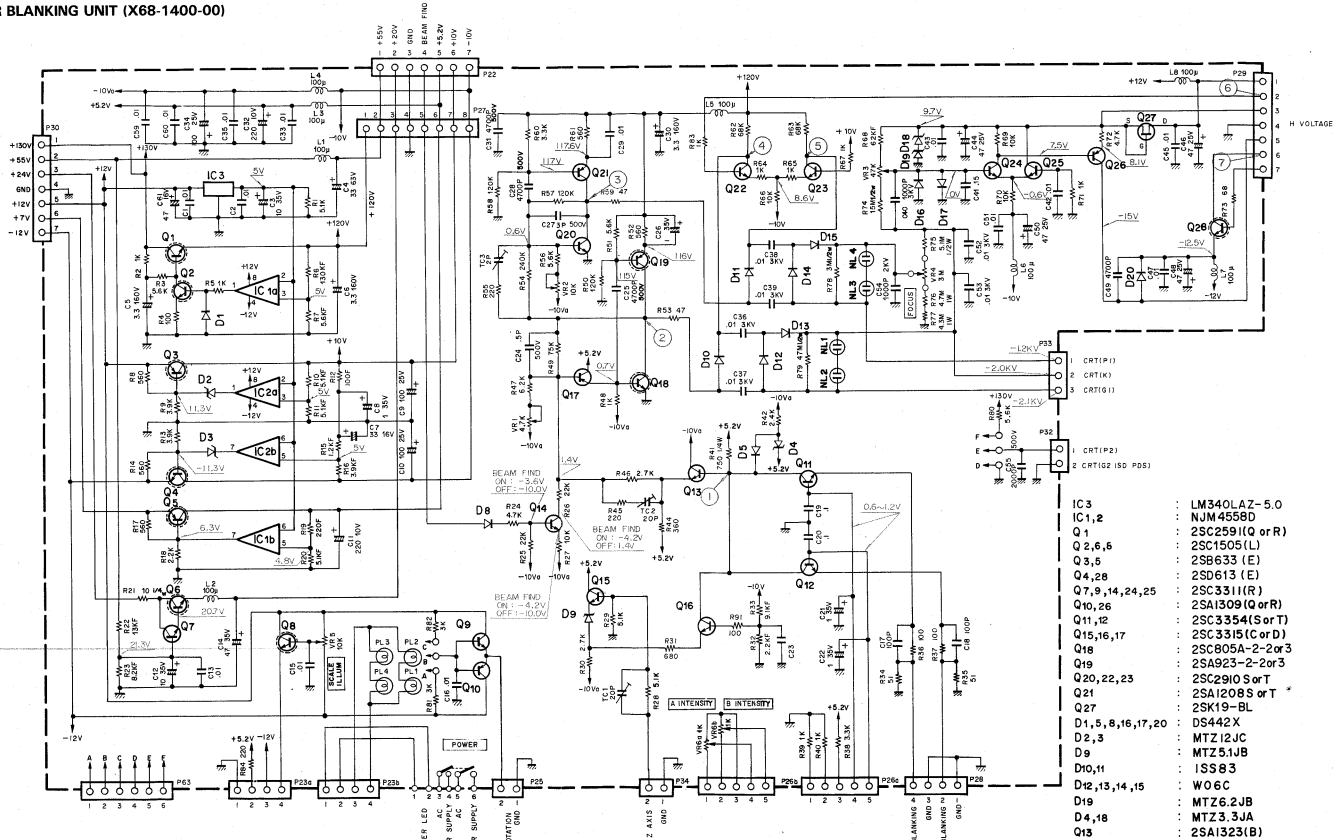
# WAVEFORMS



Note :  : CHOP Operation

# SCHEMATIC DIAGRAM

## POWER BLANKING UNIT (X68-1400-00)

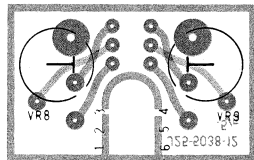
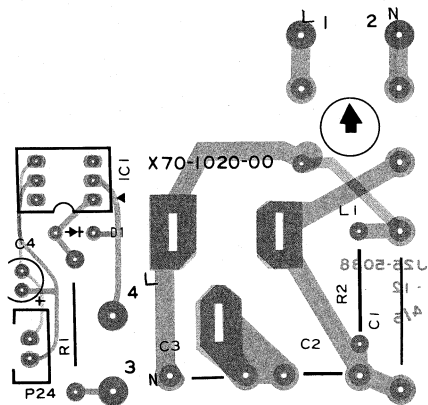


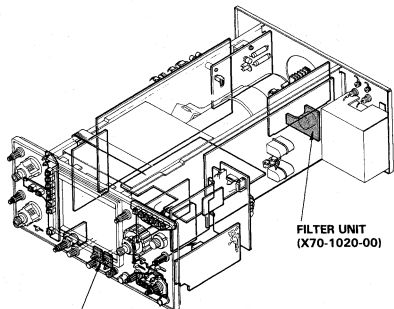


# PC BOARD

FILTER UNIT (X70-1020-00)

ASTIG UNIT (X81-1430-00)





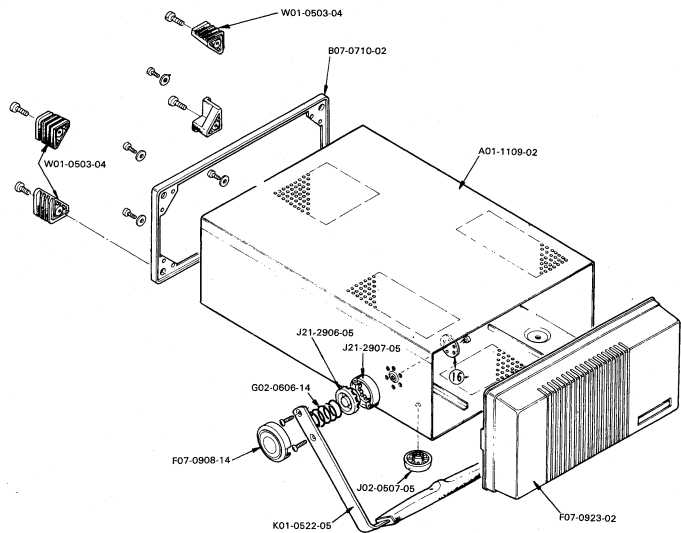
**ASTIG UNIT (X81-1430-00)**

**FILTER UNIT  
(X70-1020-00)**

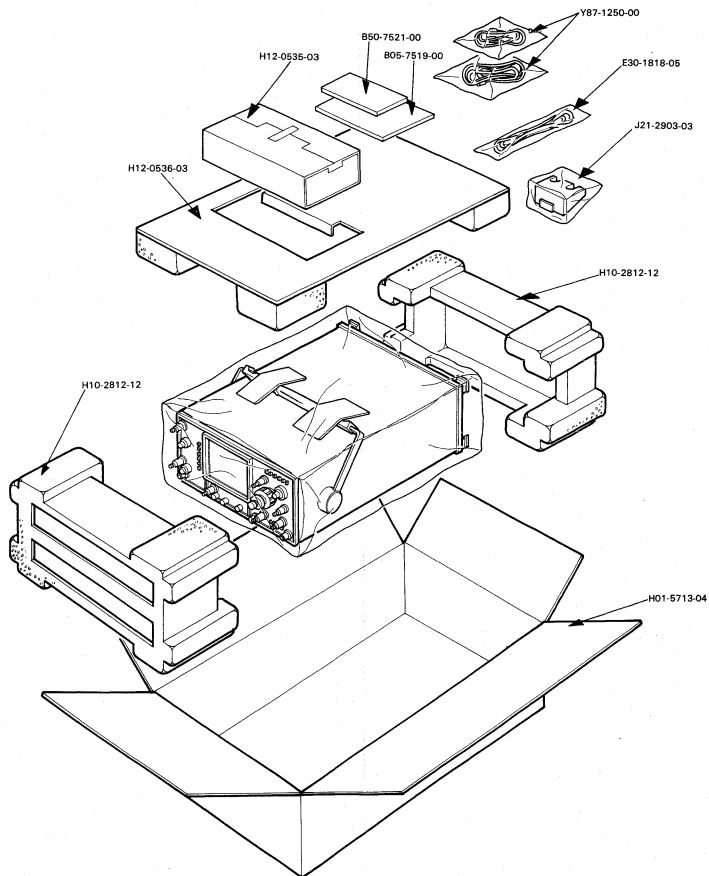




## DISASSEMBLY

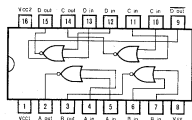


## PACKING

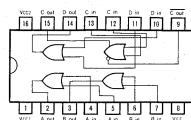


# SEMICONDUCTORS

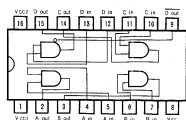
## C-MOS IC



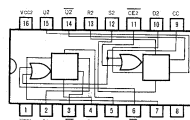
MC10102L



MC10103L  
MC10H103L



MC10104L

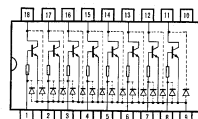


MC10131L  
MC10H131L

## CPU

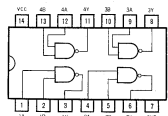


MTM-5010

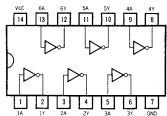


AN90820

## TTL IC

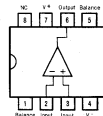


SN7400N

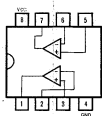


SN7406N

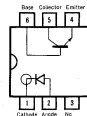
## OTHER



LF441ACN



LF412CN  
NJM4558D



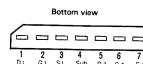
ON3101



LM340LAZ-5.0  
MC78L05CP  
MC78L15ACP

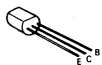


LM337LZ  
LM317LZ



M47F(C)

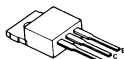
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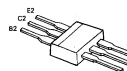
2SC1973(T)  
2SC2291(O/S or T)  
2SA1209(S or T)  
2SD438(F)



2SC3354(T, SI)  
2SC3315(C, D)  
2SC3311(O, R)  
2SA1309(O, R)  
2SA1323(B)



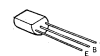
2SC2591(O, R)  
2SB633(E)  
2SD613(E)  
2SC1505(L)



2SC3066  
2SA1239



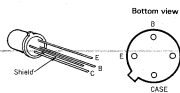
2SC2671(H)  
2SA1161  
2SC2644



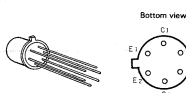
2SA1206



2SA923-2-2 or 3  
2SC805A2-2 or 3



2SC1164



2SC1733

## FET



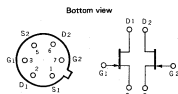
J304



2SK191(BL)



2SK30A(O)  
2SK127(O)  
2S143(O)



DN1901

**CS-2110**  
**100MHz QUAD-TRACE OSCILLOSCOPE**

**COMPOSITE**  
**(Revised Edition)**

Serial No. 5040001 ~

**KENWOOD**

## NOTE:

This composite (revised edition) consists of parts list, printed circuit board diagram and circuit diagram.

For the circuit description, adjustment, troubleshooting and waveform diagram, refer to CS-2110 Service Manual.

## PARTS LIST

### MAIN CHASSIS

#### Y70-1490-21

REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION
—	A01-1109-22	CASE	—	H20-1719-04	VINYL COVER
1	A13-0763-22	FRAME(L)	—	J02-0507-05	LEG
2	A13-0764-22	FRAME(R)	44	J13-0033-15	FUSE HOLDER
3	A20-2767-05	DIE-CAST PANEL	45	J19-1620-05	CORD CLAMP
4	A21-1045-14	DECORATIVE PANEL	46	J19-1622-05	CORD CLAMP
5	A21-1046-04	DECORATIVE PANEL	47	J19-1639-14	CRT BAND
6	A21-1047-14	DECORATIVE PANEL	48	J21-0392-04	HOLDER FOR LEAD
7	A22-0817-33	SUB PANEL	49	J21-2871-14	HOLDER FOR D.LINE
8	A22-0833-03	SUB PANEL	—	J21-2903-03	HOLDER FOR PROBE
9	A23-1645-22	REAR PANEL	—	J21-2906-05	GEAR FOR HANDLE
10	A33-0501-14	REFLECTOR	—	J21-2907-05	RING FOR HANDLE
—	B07-0710-02	REAR ESCUTCHEON	50	J21-2925-13	BLACKET FOR CRT
11	B19-0735-03	FILTER	51	J21-2926-13	BLACKET FOR CRT
12	B20-0927-04	SCALE	52	J21-2927-14	BLACKET FOR CRT
—	B40-2765-04	NAME PLATE (SERIAL NO)	53	J21-2989-04	BLACKET
—	B41-0710-04	CAUTION LABEL (HIGH VOLTAGE)	54	J25-5031-02	PCB (UNMOUNTED)
—	B50-7541-10	INSTRUCTION MANUAL	55	J29-0505-04	GUIDE
—	B50-7543-10	INSTRUCTION MANUAL	56	J32-0838-04	BOSS
13	D21-0906-04	EXTENSION SHAFT	57	J39-0506-04	SPACER FOR V.R
14	D23-0801-04	SPACER	58	J42-0512-14	CRT MOUNTING RUBBER
15	E01-1404-05	CRT SOCKET	59	J42-0513-14	CRT MOUNTING RUBBER
16	E04-0251-05	BNC RECEPTACLE	60	J42-0514-04	BUSHING
17	E21-0654-04	TERMINAL (CAL)	61	J42-0515-05	BUSHING
18	E21-0657-04	TERMINAL (GND)	—	J61-0049-05	WIRE BAND
19	E21-0659-15	TERMINAL (CURRENT)	—	J61-0408-05	WIRE WRAPPING BAND
20	E23-0015-04	EARTH LUG	62	J61-0511-05	SADDLE FOR WIRE
21	E23-0018-04	EARTH LUG	63	J61-0520-05	SADDLE
22	E23-0513-05	EARTH LUG	—	K01-0522-05	HANDLE
23	E23-0520-05	EARTH LUG	64	K21-0868-03	KNOB
25	E23-0529-04	EARTH LUG	65	K21-0869-04	KNOB
—	E30-1818-05	POWER CORD (JIS)	66	K21-0870-04	KNOB
—	E31-2473-05	LEAD WIRE WITH CONNECTOR	67	K21-0871-04	KNOB
—	E31-2474-05	LEAD WIRE WITH CONNECTOR	68	K21-0872-04	KNOB
—	E31-2546-05	LEAD WIRE WITH CONNECTOR	69	K21-0873-04	KNOB
—	E33-4047-00	WIRE ASSY	70	K21-0874-03	KNOB
26	F05-1224-05	FUSE 1.2A	71	K27-0524-14	KNOB FOR PUSH SW
—	F07-0908-14	PROTECTION COVER	72	K27-0530-04	KNOB FOR LEVER
—	F07-0923-02	PROTECTION COVER	—	N08-0611-04	DRESSED SCREW
27	F10-1553-14	SHIELD PLATE (FOR CH3)	73	N09-0402-05	SCREW
28	F10-1567-14	SHIELD PLATE	—	N09-0705-05	SCREW, HEX SOCKET FLAT HD
29	F10-1568-04	SHIELD PLATE (FOR SW)	74	N09-0707-05	SCREW
30	F10-1569-14	SHIELD PLATE	75	N09-0709-05	SCREW
—	F10-1583-04	SHIELD PLATE	76	N09-0710-05	SCREW, SEMS PAN HD
31	F11-0983-12	SHIELD CASE(FOR CRT)	77	N09-0711-05	SCREW
32	F11-0984-04	SHIELD CASE (FOR CRT)	78	N09-0721-04	SCREW
33	F11-0985-04	SHIELD CASE	79	N10-2030-41	NUT
—	F15-0138-04	BLIND PLATE	80	N10-2060-46	NUT
—	F15-0716-24	BLIND PLATE	81	N14-0602-34	NUT
36	F20-0621-04	INSULATOR	82	N14-0609-04	NUT
37	F20-0624-04	INSULATOR (FOR BLANKING)	83	N14-0617-05	NUT
—	F20-0627-04	INSULATOR (FOR BATTERY)	—	N15-1030-41	WASHER, FLAT FOR M3
—	F20-0639-04	INSULATOR	84	N16-0026-46	SPRING WASHER
—	F20-0654-04	INSULATOR	85	N16-0030-46	SPRING WASHER
—	G02-0606-14	SPRING FOR HANDLE	86	N16-0060-46	SPRING WASHER
40	G16-0602-04	REFLECTOR SHEET(L)	87	N17-1030-41	LOCK WASHER
41	G16-0603-04	REFLECTOR SHEET(R)	88	N19-0191-05	WASHER NONMETAL
42	G16-0609-04	RUBBER SHEET	89	N19-0704-04	WASHER
—	H01-5734-04	CARTON BOX	—	N19-0710-05	WASHER
—	H01-5734-04	CARTON BOX	90	N30-2606-46	SCREW, PAN HD M 2.6X6
—	H10-2812-12	FOAMED STYRENE PAD	91	N30-2608-41	SCREW, PAN HD M 2.6X8
—	H12-0535-03	PAD	—	N30-3004-41	SCREW, PAN HD M 3X4
—	H12-0536-03	PAD	92	N30-3006-46	SCREW, PAN HD M 3X6
			93	N30-3008-41	SCREW, PAN HD M 3X8
			94	N32-2006-46	SCREW, FLAT HD M 2X6
			95	N32-2606-46	SCREW, FLAT HD M 2.6X6
			96	N32-3006-46	SCREW, FLAT HD M 3X6



# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
97	N32-3008-41	SCREW, FLAT HD M 3X8
98	N89-3006-46	SCREW, BINDING TAP TITE
99	N89-3010-41	SCREW, BINDING TAP TITE
	R92-0150-05	JUMPING RES. ZERO OHM
100	S02-4502-05	ROTARY SWITCH
	W01-0503-04	CORD WRAP
101	W02-0413-05	SWITCHING POWER SUPPLY
102	W02-0414-05	HIGH VOLTAGE BLOCK
	W09-0405-05	LITHIUM BATTERY 3V 0.2AH
103	X68-1400-00	POWER BLANKING UNIT
104	X70-1020-00	FILTER UNIT
105	X73-1500-03	AMPLIFIER UNIT
106	X73-1510-03	AMPLIFIER UNIT
107	X73-1520-00	CH3,CH4 AMP UNIT
108	X74-1310-00	SWEEP ROTARY UNIT
109	X74-1350-00	TRIG SWEEP UNIT
110	X74-1360-00	HORIZONTAL OUTPUT UNIT
111	X77-1280-00	A TRIG SWITCH UNIT
112	X77-1290-00	B TRIG UNIT
113	X81-1320-00	CPU UNIT
114	X81-1430-00	ASTI UNIT
	Y87-1250-00	PROBE(PC-29)
	001-0801-05	COATING WIRE
	002-0001-05	BRAIDED WIRE
	002-0006-05	BRAIDED WIRE
	150KTM31	CRT
	212-2014-05	TUBE (PLASTIC)
	212-3017-05	TUBE (PLASTIC)
	420-0010-05	ADHESIVES
	490-0007-05	TAPE
	490-0010-05	TAPE
	490-0012-05	TAPE
	490-0040-05	TAPE
	490-0127-05	TAPE
C001	C91-0501-05	CAP. METAL FILM 0.047 10% 630V
C002	C91-0501-05	CAP. METAL FILM 0.047 10% 630V
D001	LN222RP	DIODE
D002	LN322GP	DIODE
D003	LN222RP	DIODE
D004	LN322GP	DIODE
D005	LN322GP	DIODE
D006	LN322GP	DIODE
D007	LN222RP	DIODE
115 D008	B30-0903-15	LED LAMP (RED)
J002	E31-2445-15	LEAD WIRE WITH CONNECTOR
J003	E31-2441-05	LEAD WIRE WITH CONNECTOR
J004	E31-2441-05	LEAD WIRE WITH CONNECTOR
J005	E31-2444-05	LEAD WIRE WITH CONNECTOR
J006	E31-2444-05	LEAD WIRE WITH CONNECTOR
J007	E31-2443-15	LEAD WIRE WITH CONNECTOR
J008	E31-2443-15	LEAD WIRE WITH CONNECTOR
J030	E31-2464-05	LEAD WIRE WITH CONNECTOR
J031	E31-2468-05	LEAD WIRE WITH CONNECTOR
J032	E31-2465-15	LEAD WIRE WITH CONNECTOR
J033	E31-2466-05	LEAD WIRE WITH CONNECTOR
J044	E31-2452-15	LEAD WIRE WITH CONNECTOR
J045	E31-2471-05	LEAD WIRE WITH CONNECTOR
J046	E31-2449-15	LEAD WIRE WITH CONNECTOR
J049	E31-2446-15	LEAD WIRE WITH CONNECTOR
J050	NO USE	
J051	E31-2451-15	LEAD WIRE WITH CONNECTOR
J052	NO USE	
J053	E31-2460-15	LEAD WIRE WITH CONNECTOR
J054	NO USE	
J055	E31-2472-05	LEAD WIRE WITH CONNECTOR
J056	E31-2475-25	LEAD WIRE WITH CONNECTOR
J059	E31-2448-05	LEAD WIRE WITH CONNECTOR
J060	E31-2475-25	LEAD WIRE WITH CONNECTOR
J061	E31-2470-05	LEAD WIRE WITH CONNECTOR
J062	E31-2469-05	LEAD WIRE WITH CONNECTOR
L001	L39-0514-15	Y ALIGNMENT COIL
L002	L76-0108-25	DELAY LINE
R001	RD14BB2E105J	RES. CARBON 1M 5% 1/4W
R002	RD14BB2E105J	RES. CARBON 1M 5% 1/4W
R003	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R004	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R005	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R006	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R007	RD14BB2C680J	RES. CARBON 68 5% 1/6W
R008	RD14BB2C680J	RES. CARBON 68 5% 1/6W
R012	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R013	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R014	RD14BB2E473J	RES. CARBON 47K 5% 1/4W
S001	S40-1504-05	PUSH SWITCH
S002	S40-1504-05	PUSH SWITCH
S003	S40-1504-05	PUSH SWITCH

REF.NO	PARTS NO	NAME & DESCRIPTION
S004	S40-1504-05	PUSH SWITCH
S005	S40-1504-05	PUSH SWITCH
S006	S40-1504-05	PUSH SWITCH
S007	S40-1504-05	PUSH SWITCH
S008	S40-1504-05	PUSH SWITCH
S009	S40-1504-05	PUSH SWITCH
S010	S40-1504-05	PUSH SWITCH
S011	S40-1504-05	PUSH SWITCH
S012	S40-1504-05	PUSH SWITCH
S013	S40-1504-05	PUSH SWITCH
S014	S40-1504-05	PUSH SWITCH
S015	S40-1504-05	PUSH SWITCH
S016	S40-1504-05	PUSH SWITCH
S017	S40-1504-05	PUSH SWITCH
S018	S40-1504-05	PUSH SWITCH
S019	S40-1504-05	PUSH SWITCH
S020	S40-1505-05	PUSH SWITCH
116 S023	S33-1501-05	LEVER SWITCH
- S024	S33-1501-05	LEVER SWITCH
117 VR001	R23-1502-05	V.R. 1K B
VR002	R23-1502-05	V.R. 1K B
118 VR005	R23-2501-05	V.R. 5K B X2
119 VR006	R06-2502-05	V.R. WITH PUSH,SW
120 VR007	R29-0504-05	V.R. 1K B

## VERTICAL PREAMP UNIT

### X73-1500-00

REF.NO	PARTS NO	NAME & DESCRIPTION
E23-0015-04		EARTH LUG
E29-0504-05		TEFLON TERMINAL
J25-5038-22		PCB (UNMOUNTED)
L92-0110-05		BEAD CORE
001-0801-05		COATING WIRE
002-0001-05		BRAIDED WIRE
212-3017-05		TUBE (PLASTIC)
C001	C91-0502-05	CAP. METAL FILM 0.01 20% 630V
C002	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C003	CC45CH1H151J	CAP. CERAMIC 150P 5% 50V
C004	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C005	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C006	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C007	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C008	C90-0298-05	CAP. CERAMIC 0.1 20% 12V
C009	CE04FW1A101M	CAP. ELECTRO 100 20% 10V
C010	CM93BD2A680J	CAP. MICA 68P 5% 100V
C013	CK45B1H472K	CAP. CERAMIC 4700P 10% 50V
C014	CC45CH1H020C	CAP. CERAMIC 2P 0.25P 50V
C021	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V
C027	CC45CH1H390J	CAP. CERAMIC 39P 5% 50V
C028	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V
C034	CC45SL1H470J	CAP. CERAMIC 47P 5% 50V
C035	CC45SL1H470J	CAP. CERAMIC 47P 5% 50V
C036	C91-0502-05	CAP. METAL FILM 0.01 20% 630V
C037	NO USE	
C038	CC45CH1H151J	CAP. CERAMIC 150P 5% 50V
C039	CE04W1A470M	CAP. ELECTRO 47 20% 10V
C040	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C041	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C042	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C043	C90-0298-05	CAP. CERAMIC 0.1 20% 12V
C044	CE04FW1A101M	CAP. ELECTRO 100 20% 10V
C045	CM93BD2A680J	CAP. MICA 68P 5% 100V
C046	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C047	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C048	CK45B1H472K	CAP. CERAMIC 4700P 10% 50V
C049	CC45CH1H020C	CAP. CERAMIC 2P 0.25P 50V
C050	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C051	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C052	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C053	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C054	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C055	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C056	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V
C057	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V
C058	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C059	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C060	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C061	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C062	CC45CH1H330J	CAP. CERAMIC 33P 5% 50V
C063	NO USE	
C064	CC45CH1H120J	CAP. CERAMIC 12P 5% 50V
C065	CK45F1H103Z	CAP. CERAMIC 0.01 50V
C066	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C067	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C068	CC45SL1H470J	CAP. CERAMIC 47P 5% 50V

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION
C071	CC45CH1H020C	CAP. CERAMIC 2P 0.25P 50V	D023	1SS132	DIODE
C072	CC45CH1H020C	CAP. CERAMIC 2P 0.25P 50V	D024	1SS132	DIODE
C075	CC45SL1H181J	CAP. CERAMIC 180P 5% 50V	D025	MTZ3.3JA	DIODE, ZENER 3.2V
C076	CC45SL1H181J	CAP. CERAMIC 180P 5% 50V	D026	MTZ7.5JA	DIODE, ZENER 7.1V
C077	CK45F1H103Z	CAP. CERAMIC 0.01 50V	D027	1SS132	DIODE
C080	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	D028	MTZ7.5JA	DIODE, ZENER 7.1V
C081	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	D029	1SS132	DIODE
C082	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	D030	1SS132	DIODE
C083	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V	D031	1SS132	DIODE
C084	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	D032	1SS132	DIODE
C085	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	D033	1SS132	DIODE
C086	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V	D034	1SS132	DIODE
C087	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	D035	1SS132	DIODE
C088	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D036	1SS132	DIODE
C089	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D037	1SS132	DIODE
C090	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D038	1SS132	DIODE
C091	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D039	1SS132	DIODE
C092	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D040	1SS132	DIODE
C093	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D041	1SS132	DIODE
C094	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D042	1SS132	DIODE
C095	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D043	1SS132	DIODE
C096	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D044	1SS132	DIODE
C097	CE04W1C100M	CAP. ELECTRO 10 20% 16V	D045	1SS132	DIODE
C098	CE04W1C101M	CAP. ELECTRO 100 20% 16V	D046	1SS132	DIODE
C099	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	IC001	LF441ACN	IC, LOW-POWER JFET OP-AMP
C100	CE04F1A101M	CAP. ELECTRO 100 20% 10V	IC002	LF441ACN	IC, LOW-POWER JFET OP-AMP
C101	CE04W1A470M	CAP. ELECTRO 47 20% 10V	IC003	SN7400N	IC, QUAD 2-INPUT NAND
C102	CE04W1A470M	CAP. ELECTRO 47 20% 10V	IC004	MC10104L	IC, QUAD 2-INPUT AND GATE
C103	CE04W1C100M	CAP. ELECTRO 10 20% 16V	IC005	MC10131L	IC, DUAL D-FFS
C104	CE04W1C100M	CAP. ELECTRO 10 20% 16V	IC006	MC10102L	IC, QUAD 2-INPUT NOR GATE
C105	CE04W1C100M	CAP. ELECTRO 10 20% 16V	IC007	MC10102L	IC, QUAD 2-INPUT NOR GATE
C106	CE04W1C100M	CAP. ELECTRO 10 20% 16V	IC008	LM337LZ	IC, REGULATOR
C107	CE04W1C100M	CAP. ELECTRO 10 20% 16V	IC009	LM317LZ	IC, REGULATOR
C108	CE04W1C100M	CAP. ELECTRO 10 20% 16V	L001	L40-4791-02	FERRI INDUCTOR 4.7UH
C109	CE04W1C100M	CAP. ELECTRO 10 20% 16V	L002	L40-4791-02	FERRI INDUCTOR 4.7UH
C110	CE04W1C101M	CAP. ELECTRO 100 20% 16V	L003	L40-4791-02	FERRI INDUCTOR 4.7UH
C111	CE04F1A101M	CAP. ELECTRO 100 20% 10V	L004	L40-4791-02	FERRI INDUCTOR 4.7UH
C112	CE04W1A470M	CAP. ELECTRO 47 20% 10V	L005	L40-4791-02	FERRI INDUCTOR 4.7UH
C113	CE04W1A470M	CAP. ELECTRO 47 20% 10V	L006	L40-4791-02	FERRI INDUCTOR 4.7UH
C114	CK45F1H103Z	CAP. CERAMIC 0.01 50V	L007	L40-4791-02	FERRI INDUCTOR 4.7UH
C115	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	L008	L40-4791-02	FERRI INDUCTOR 4.7UH
C116	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	L009	L40-4791-02	FERRI INDUCTOR 4.7UH
C117	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	L010	L40-4791-02	FERRI INDUCTOR 4.7UH
C118	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	L011	L40-1011-04	FERRI INDUCTOR 100UH
C119	NO USE		L012	L40-4791-02	FERRI INDUCTOR 4.7UH
C120	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	L013	L40-4791-02	FERRI INDUCTOR 4.7UH
C121	CC45SL1H221J	CAP. CERAMIC 220P 5% 50V	L014	L40-4791-02	FERRI INDUCTOR 4.7UH
C122	CC45SL1H221J	CAP. CERAMIC 220P 5% 50V	L015	L40-4791-02	FERRI INDUCTOR 4.7UH
C123	CE04W1A470M	CAP. ELECTRO 47 20% 10V	L016	L40-4791-02	FERRI INDUCTOR 4.7UH
C124	CE04W1A470M	CAP. ELECTRO 47 20% 10V	L017	L40-4791-02	FERRI INDUCTOR 4.7UH
C125	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V	L018	L40-4791-02	FERRI INDUCTOR 4.7UH
C126	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V	L019	NO USE	
C127	NO USE		L020	L40-4791-02	FERRI INDUCTOR 4.7UH
C128	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	L021	L40-4791-02	FERRI INDUCTOR 4.7UH
C132	CC45SL1H101J	CAP. CERAMIC 100P 5% 50V	L022	L40-4791-02	FERRI INDUCTOR 4.7UH
C136	CC45CH1H010C	CAP. CERAMIC 1P 0.25P 50V	L023	L40-4791-02	FERRI INDUCTOR 4.7UH
C137	CC45CH1H010C	CAP. CERAMIC 1P 0.25P 50V	P001	E40-0473-05	PIN CONNECTOR 4 P
C138	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V	P002	E40-1273-05	PIN CONNECTOR 12 P
C139	CK45B1H102K	CAP. CERAMIC 1000P 10% 50V	P003	E40-0473-05	PIN CONNECTOR 4 P
C140	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V	P004	E40-0473-05	PIN CONNECTOR 4 P
C141	CC45CH1H100D	CAP. CERAMIC 10P 0.5P 50V	P005	E40-0373-05	PIN CONNECTOR 3 P
C142	CC45CH1H100D	CAP. CERAMIC 10P 0.5P 50V	P006	E40-0373-05	PIN CONNECTOR 3 P
C145	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V	P007	E40-0573-05	PIN CONNECTOR 5 P
C146	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	P008	E40-0573-05	PIN CONNECTOR 5 P
C147	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	P009	E40-0315-05	PIN CONNECTOR 3 P
C148	CC45CH1H010C	CAP. CERAMIC 1P 0.25P 50V	P010	NO USE	
D001	1S1544A	DIODE	P011	E40-0473-05	PIN CONNECTOR 4 P
D002	1S1544A	DIODE	P012	E40-0473-05	PIN CONNECTOR 4 P
D003	MTZ3.3JA	DIODE, ZENER 3.2V	P013	NO USE	
D004	1SS132	DIODE	P014	E40-0773-05	PIN CONNECTOR 7 P
D005	1SS132	DIODE	P015	E40-0273-05	PIN CONNECTOR 2 P
D006	1SS132	DIODE	P016	E40-0273-05	PIN CONNECTOR 2 P
D007	1SS132	DIODE	P019	E40-0273-05	PIN CONNECTOR 2 P
D008	1SS132	DIODE	P020	E40-0573-05	PIN CONNECTOR 5 P
D009	1SS132	DIODE	P021	E40-0273-05	PIN CONNECTOR 2 P
D010	1SS132	DIODE	Q001	J304	FET, N-CHANNEL
D011	MTZ3.3JA	DIODE, ZENER 3.2V	Q002	2SC2671(H)	TR. SI, NPN
D012	MTZ3.3JA	DIODE, ZENER 3.2V	Q003	2SC2671(H)	TR. SI, NPN
D013	1S1544A	DIODE	Q004	2SC2671(H)	TR. SI, NPN
D014	1S1544A	DIODE	Q005	2SC2671(H)	TR. SI, NPN
D015	MTZ3.3JA	DIODE, ZENER 3.2V	Q006	2SC3354(T,S)	TR. SI, NPN
D016	1SS132	DIODE	Q007	2SC3354(T,S)	TR. SI, NPN
D017	1SS132	DIODE	Q008	2SC1733	TR. SI, NPN
D018	MTZ7.5JA	DIODE, ZENER 7.1V	Q009	2SC3354(T,S)	TR. SI, NPN
D019	1N60	DIODE	Q010	2SC3354(T,S)	TR. SI, NPN
D020	1SS132	DIODE	Q011	2SC3354(T,S)	TR. SI, NPN
D021	1SS132	DIODE	Q012	2SC3354(T,S)	TR. SI, NPN
D022	1SS132	DIODE	Q013	2SC3315(C,D)	TR. SI, NPN
			Q014	2SC3311(R)	TR. SI, NPN
			Q015	2SA1161	TR. SI, PNP
			Q016	2SA1161	TR. SI, PNP

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION
Q017	2SC3311(R)	TR. SI, NPN
Q018	2SA1323(B)	TR. SI, PNP
Q019	2SA1323(B)	TR. SI, PNP
Q020	2SC3354(T,S)	TR. SI, NPN
Q021	2SC3354(T,S)	TR. SI, NPN
Q022	2SC2671(H)	TR. SI, NPN
Q023	2SC2671(H)	TR. SI, NPN
Q024	2SC2671(H)	TR. SI, NPN
Q025	2SC2671(H)	TR. SI, NPN
Q026	2SC3315(C,D)	TR. SI, NPN
Q027	2SC3315(C,D)	TR. SI, NPN
Q028	2SC3354(T,S)	TR. SI, NPN
Q029	2SC3354(T,S)	TR. SI, NPN
Q030	J304	FET. N-CHANNEL
Q031	2SC2671(H)	TR. SI, NPN
Q032	2SC2671(H)	TR. SI, NPN
Q033	2SC2671(H)	TR. SI, NPN
Q034	2SC2671(H)	TR. SI, NPN
Q035	2SC3354(T,S)	TR. SI, NPN
Q036	2SC3354(T,S)	TR. SI, NPN
Q037	2SC1733	TR. SI, NPN
Q038	2SC3354(T,S)	TR. SI, NPN
Q039	2SC3354(T,S)	TR. SI, NPN
Q040	2SC3354(T,S)	TR. SI, NPN
Q041	2SC3354(T,S)	TR. SI, NPN
Q042	2SC3315(C,D)	TR. SI, NPN
Q043	2SC3311(R)	TR. SI, NPN
Q044	2SA1161	TR. SI, PNP
Q045	2SA1161	TR. SI, PNP
Q046	2SA1161	TR. SI, PNP
Q047	2SA1161	TR. SI, PNP
Q048	2SC3311(R)	TR. SI, NPN
Q049	2SA1309(Q,R)	TR. SI, PNP
Q050	2SA1309(Q,R)	TR. SI, PNP
Q051	2SC3311(R)	TR. SI, NPN
Q052	2SA1323(B)	TR. SI, PNP
Q053	2SA1323(B)	TR. SI, PNP
Q054	2SC3354(T,S)	TR. SI, NPN
Q055	2SC3354(T,S)	TR. SI, NPN
Q056	2SC2671(H)	TR. SI, NPN
Q057	2SC2671(H)	TR. SI, NPN
Q058	2SC2671(H)	TR. SI, NPN
Q059	2SC2671(H)	TR. SI, NPN
Q060	2SC3315(C,D)	TR. SI, NPN
Q061	2SC3354(T,S)	TR. SI, NPN
Q062	2SC3354(T,S)	TR. SI, NPN
Q063	2SC3354(T,S)	TR. SI, NPN
Q064	2SA1309(Q,R)	TR. SI, PNP
Q065	2SC3354(T,S)	TR. SI, NPN
Q066	2SC3354(T,S)	TR. SI, NPN
Q067	2SA1161	TR. SI, PNP
Q068	2SA1161	TR. SI, PNP
Q069	2SC3315(C,D)	TR. SI, NPN
Q070	2SC3315(C,D)	TR. SI, NPN
Q071	2SA1309(Q,R)	TR. SI, PNP
Q072	2SC3311(R)	TR. SI, NPN
Q073	2SA1161	TR. SI, PNP
Q074	2SA1161	TR. SI, PNP
Q075	2SC3311(R)	TR. SI, NPN
Q076	2SC2671(H)	TR. SI, NPN
Q077	2SC2671(H)	TR. SI, NPN
Q078	2SC3311(R)	TR. SI, NPN
Q079	2SC2671(H)	TR. SI, NPN
Q080	2SC2671(H)	TR. SI, NPN
Q081	2SC3311(R)	TR. SI, NPN
Q082	2SA1309(Q,R)	TR. SI, PNP
Q083	2SA1309(Q,R)	TR. SI, PNP
Q084	2SA1309(Q,R)	TR. SI, PNP
Q085	2SA1309(Q,R)	TR. SI, PNP
Q086	2SC3311(R)	TR. SI, NPN
Q087	2SC3311(R)	TR. SI, NPN
R001	RD14BB2E684J	RES. CARBON 680K 5% 1/4W
R002	RN14BK2E1803D	RES. METAL FILM 180K 0.5% 1/4W
R003	RN14BK2E8203D	RES. METAL FILM 820K 0.5% 1/4W
R004	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R005	RD14BB2C392J	RES. CARBON 3.9K 5% 1/6W
R006	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R007	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R008	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
R009	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R010	RD14BB2C271J	RES. CARBON 270 5% 1/6W
R011	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R012	RN14BK2C5600F	RES. METAL FILM 560 1% 1/6W
R013	RN14BK2C1100F	RES. METAL FILM 110 1% 1/6W
R014	RN14BK2C5600F	RES. METAL FILM 560 1% 1/6W
R015	RN14BK2C3901F	RES. METAL FILM 3.9K 1% 1/6W
R016	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R017	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R018	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R019	RD14BB2C100J	RES. CARBON 10 5% 1/6W
R020	RD14BB2C821J	RES. CARBON 820 5% 1/6W
R021	RD14BB2C510J	RES. CARBON 51 5% 1/6W
R022	RD14BB2C510J	RES. CARBON 51 5% 1/6W
R023	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R024	RD14BB2C103J	RES. CARBON 10K 5% 1/6W

REF.NO	PARTS NO	NAME & DESCRIPTION
R025	RD14BB2C471J	RES. CARBON 470 5% 1/6W
R026	RN14BK2C4702F	RES. METAL FILM 47K 1% 1/6W
R027	RN14BK2C9100F	RES. METAL FILM 910 1% 1/6W
R028	RN14BK2C3001F	RES. METAL FILM 3K 1% 1/6W
R029	RD14BB2C204J	RES. CARBON 200K 5% 1/6W
R030	RD14BB2C680J	RES. CARBON 68 5% 1/6W
R031	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R032	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R033	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R034	RD14BB2C680J	RES. CARBON 68 5% 1/6W
R035	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R036	RD14BB2C471J	RES. CARBON 470 5% 1/6W
R037	RD14BB2C151J	RES. CARBON 150 5% 1/6W
R038	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R039	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R040	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R041	RD14BB2C622J	RES. CARBON 6.2K 5% 1/6W
R042	RD14BB2C392J	RES. CARBON 3.9K 5% 1/6W
R043	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R044	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R045	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R046	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R047	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R048	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R049	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R050	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
R051	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
R052	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R053	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
R054	RN14BK2C3300F	RES. METAL FILM 330 1% 1/6W
R055	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R056	RD14BB2C132J	RES. CARBON 1.3K 5% 1/6W
R057	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R058	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R059	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R060	RD14BB2C223J	RES. CARBON 22K 5% 1/6W
R061	RN14BK2C3300F	RES. METAL FILM 330 1% 1/6W
R062	RN14BK2C6200F	RES. METAL FILM 620 1% 1/6W
R063	RN14BK2C6200F	RES. METAL FILM 620 1% 1/6W
R064	RD14BB2C391J	RES. CARBON 390 5% 1/6W
R065	RD14BB2C821J	RES. CARBON 820 5% 1/6W
R066	RD14BB2C821J	RES. CARBON 820 5% 1/6W
R067	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R068	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W
R069	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
R070	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R071	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R072	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R073	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R074	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R075	RD14BB2C391J	RES. CARBON 390 5% 1/6W
R076	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R077	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R078	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R079	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R080	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R081	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R082	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R083	RD14BB2C822J	RES. CARBON 8.2K 5% 1/6W
R084	RD14BB2C471J	RES. CARBON 470 5% 1/6W
R085	RN14BK2C1200F	RES. METAL FILM 120 1% 1/6W
R086	RN14BK2C7500F	RES. METAL FILM 750 1% 1/6W
R087	RN14BK2C7500F	RES. METAL FILM 750 1% 1/6W
R088	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R089	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R090	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R091	NO USE	
R092	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R093	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R094	RD14BB2C681J	RES. CARBON 680 5% 1/6W
R095	RD14BB2C681J	RES. CARBON 680 5% 1/6W
R096	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
R097	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
R098	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R099	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R100	RD14BB2C821J	RES. CARBON 820 5% 1/6W
R101	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W
R102	RD14BB2C821J	RES. CARBON 820 5% 1/6W
R103	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W
R104	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R105	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R106	RD14BB2C821J	RES. CARBON 820 5% 1/6W
R107	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R108	RD14BB2C821J	RES. CARBON 820 5% 1/6W
R109	RD14BB2C330J	RES. CARBON 33 5% 1/6W
R110	RD14BB2E684J	RES. CARBON 680K 5% 1/4W
R111	RN14BK2E1803D	RES. METAL FILM 180K 0.5% 1/4W
R112	RN14BK2E8203D	RES. METAL FILM 820K 0.5% 1/4W
R113	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R114	RD14BB2C392J	RES. CARBON 3.9K 5% 1/6W
R115	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R116	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R117	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
R118	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R119	RD14BB2C271J	RES. CARBON 270 5% 1/6W
R120	RD14BB2C470J	RES. CARBON 47 5% 1/6W

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			REF.NO	PARTS NO	NAME & DESCRIPTION				
R121	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W	R217	RD14BB2C391J	RES. CARBON	390	5%	1/6W
R122	RN14BK2C1100F	RES. METAL FILM	110	1%	1/6W	R218	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R123	RN14BK2C5600F	RES. METAL FILM	560	1%	1/6W	R219	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R124	RN14BK2C3901F	RES. METAL FILM	3.9K	1%	1/6W	R220	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R125	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R221	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R126	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R222	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R127	RD14BB2C101J	RES. CARBON	100	5%	1/6W	R223	RD14BB2C471J	RES. CARBON	470	5%	1/6W
R128	RD14BB2C100J	RES. CARBON	10	5%	1/6W	R224	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R129	RD14BB2C821J	RES. CARBON	820	5%	1/6W	R225	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R130	RD14BB2C510J	RES. CARBON	51	5%	1/6W	R226	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R131	RD14BB2C510J	RES. CARBON	51	5%	1/6W	R227	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R132	RD14BB2C102J	RES. CARBON	1K	5%	1/6W	R228	RD14BB2C330J	RES. CARBON	33	5%	1/6W
R133	RD14BB2C103J	RES. CARBON	10K	5%	1/6W	R229	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W
R134	RD14BB2C471J	RES. CARBON	470	5%	1/6W	R230	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R135	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W	R231	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R136	RN14BK2C9100F	RES. METAL FILM	910	1%	1/6W	R232	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R137	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W	R233	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R138	RD14BB2C204J	RES. CARBON	200K	5%	1/6W	R234	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R139	RD14BB2C680J	RES. CARBON	68	5%	1/6W	R235	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R140	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R236	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R141	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W	R237	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R142	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W	R238	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R143	RD14BB2C680J	RES. CARBON	68	5%	1/6W	R239	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W
R144	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R240	RD14BB2C820J	RES. CARBON	82	5%	1/6W
R145	RD14BB2C471J	RES. CARBON	470	5%	1/6W	R241	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R146	RD14BB2C151J	RES. CARBON	150	5%	1/6W	R242	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R147	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W	R243	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R148	RD14BB2C470J	RES. CARBON	47	5%	1/6W	R244	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R149	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W	R245	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R150	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W	R246	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R151	RD14BB2C392J	RES. CARBON	3.9K	5%	1/6W	R247	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W
R152	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R248	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R153	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R249	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R154	RD14BB2C101J	RES. CARBON	100	5%	1/6W	R250	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R155	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W	R251	RN14BK2C7500F	RES. METAL FILM	75.0	1%	1/6W
R156	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W	R252	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R157	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R253	RN14BK2C7500F	RES. METAL FILM	75.0	1%	1/6W
R158	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R254	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R159	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W	R255	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R160	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W	R256	RD14BB2C223J	RES. CARBON	22K	5%	1/6W
R161	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W	R257	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R162	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W	R258	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R163	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W	R259	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R164	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W	R260	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R165	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W	R261	NO USE				
R166	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W	R262	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R167	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R263	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R168	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R264	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R169	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R265	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R170	RD14BB2C223J	RES. CARBON	22K	5%	1/6W	R266	RD14BB2C181J	RES. CARBON	180	5%	1/6W
R171	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W	R267	RN14BK2C3900F	RES. METAL FILM	390	1%	1/6W
R172	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W	R268	NO USE				
R173	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W	R269	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W
R174	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R270	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R175	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R271	RN14BK2C6800F	RES. METAL FILM	680	1%	1/6W
R176	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R272	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R177	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R273	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R178	RD14BB2C223J	RES. CARBON	22K	5%	1/6W	R274	NO USE				
R179	RN14BK2C3300F	RES. METAL FILM	330	1%	1/6W	R275	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R180	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W	R276	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R181	RN14BK2C6200F	RES. METAL FILM	620	1%	1/6W	R277	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R182	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R278	NO USE				
R183	RD14BB2C391J	RES. CARBON	390	5%	1/6W	R279	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R184	RD14BB2C103J	RES. CARBON	10K	5%	1/6W	R280	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R185	RD14BB2C272J	RES. CARBON	2.7K	5%	1/6W	R281	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R186	RD14BB2C103J	RES. CARBON	10K	5%	1/6W	R282	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R187	RD14BB2C102J	RES. CARBON	1K	5%	1/6W	R283	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R188	RD14BB2C102J	RES. CARBON	1K	5%	1/6W	R284	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R189	NO USE				R285	RD14BB2C102J	RES. CARBON	1K	5%	1/6W	
R190	RD14BB2C391J	RES. CARBON	390	5%	1/6W	R286	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R191	RD14BB2C821J	RES. CARBON	820	5%	1/6W	R287	NO USE				
R192	RD14BB2C821J	RES. CARBON	820	5%	1/6W	R288	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R193	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W	R289	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R194	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W	R290	NO USE				
R195	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W	R291	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R196	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R292	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R197	RD14BB2C101J	RES. CARBON	100	5%	1/6W	R293	RD14BB2C100J	RES. CARBON	10	5%	1/6W
R198	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R294	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R199	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W	R295	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R200	RN14BK2C4700F	RES. METAL FILM	470	1%	1/6W	R296	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R201	RD14BB2C391J	RES. CARBON	390	5%	1/6W	R297	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W
R202	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W	R298	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R203	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R299	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R204	RD14BB2C220J	RES. CARBON	22	5%	1/6W	R300	RD14BB2C153J	RES. CARBON	15K	5%	1/6W
R205	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W	R301	NO USE				
R206	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W	R302	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R207	RD14BB2C101J	RES. CARBON	100	5%	1/6W	R303	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R208	RD14BB2C101J	RES. CARBON	100	5%	1/6W	R304	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R209	RD14BB2C103J	RES. CARBON	10K	5%	1/6W	R305	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R210	RD14BB2C471J	RES. CARBON	470	5%	1/6W	R306	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R211	RN14BK2C1200F	RES. METAL FILM	120	1%	1/6W	R307	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R212	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W	R308	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R213	RN14BK2C7500F	RES. METAL FILM	750	1%	1/6W	R309	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R214	RD14BB2C101J	RES. CARBON	100	5%	1/6W	R310	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R215	RD14BB2C101J	RES. CARBON	100	5%	1/6W	R311	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R216	RD14BB2C471J	RES. CARBON	470	5%	1/6W	R312	RD14BB2C102J	RES. CARBON	1K	5%	1/6W

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT	1/6W
R313	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R314	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R315	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R316	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R317	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R318	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R319	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R320	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R321	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R322	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R323	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R324	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R325	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R326	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R327	RD14BB2C270J	RES. CARBON	27	5%	1/6W
R328	RD14BB2C331J	RES. CARBON	330	5%	1/6W
R329	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R330	RD14BB2C123J	RES. CARBON	12K	5%	1/6W
R331	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
R332	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
R333	RN14BK2C2400F	RES. METAL FILM	240	1%	1/6W
R334	RN14BK2C1101F	RES. METAL FILM	1.1K	1%	1/6W
R335	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R336	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R337	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R338	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R339	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R340	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R341	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R342	NO USE				
R343	RD14BB2C682J	RES. CARBON	6.8K	5%	1/6W
R344	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R345	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R346	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R347	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R348	RD14BB2C510J	RES. CARBON	51	5%	1/6W

TC001	C05-0309-05	CAP. TRIMMER	40P		
TC002	C05-0031-15	CAP. TRIMMER	10P		
TC003	C05-0031-15	CAP. TRIMMER	10P		
TC004	C05-0030-15	CAP. TRIMMER	20P		
TC005	C05-0309-05	CAP. TRIMMER	40P		
TC006	C05-0031-15	CAP. TRIMMER	10P		
TC007	C05-0031-15	CAP. TRIMMER	10P		
TC008	C05-0031-15	CAP. TRIMMER	10P		
TC009	C05-0031-15	CAP. TRIMMER	10P		

TP001	E23-0508-04	TEST TERMINAL			
TP002	E23-0508-04	TEST TERMINAL			
TP003	E40-0211-05	PIN CONNECTOR	2 P		

VR001	R12-0539-05	RES. SEMI FIXED	200 B		
VR002	R12-3520-05	RES. SEMI FIXED	10K B		
VR003	NO USE				
VR004	R12-0421-05	RES. SEMI FIXED	100 B		
VR005	R12-0421-05	RES. SEMI FIXED	100 B		
VR006	R12-0421-05	RES. SEMI FIXED	100 B		
VR007	R12-0421-05	RES. SEMI FIXED	100 B		
VR008	R12-0539-05	RES. SEMI FIXED	200 B		
VR009	R12-3520-05	RES. SEMI FIXED	10K B		
VR010	R12-3520-05	RES. SEMI FIXED	10K B		
VR011	R12-0539-05	RES. SEMI FIXED	200 B		
VR012	R12-3520-05	RES. SEMI FIXED	10K B		
VR013	NO USE				
VR014	R12-0421-05	RES. SEMI FIXED	100 B		
VR015	R12-0421-05	RES. SEMI FIXED	100 B		
VR016	R12-0421-05	RES. SEMI FIXED	100 B		
VR017	R12-0421-05	RES. SEMI FIXED	100 B		
VR018	R12-0421-05	RES. SEMI FIXED	100 B		
VR019	R12-3520-05	RES. SEMI FIXED	10K B		
VR020	R12-0539-05	RES. SEMI FIXED	200 B		
VR021	R12-0540-05	RES. SEMI FIXED	500 B		
VR022	R12-0539-05	RES. SEMI FIXED	200 B		
VR023	R12-0540-05	RES. SEMI FIXED	500 B		
VR024	R12-0539-05	RES. SEMI FIXED	200 B		
VR025	R12-0539-05	RES. SEMI FIXED	200 B		

## VERTICAL OUTPUT AMP UNIT X73-1510-00

REF.NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT	1/6W
	E23-0512-05	TERMINAL			
	F02-0501-04	HEAT SINK			
	F02-0502-05	HEAT SINK			
	J25-5039-12	PCB (UNMOUNTED)			
	L92-0110-05	BEAD CORE			
	N09-0709-05	SCREW			
	N89-3006-46	SCREW, BINDING TAP TITE			
	212-2014-05	TUBE (PLASTIC)			
C-1	C001	CC45CH1H680J	CAP. CERAMIC	68P	5% 50V
C-2	C002	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
E-2	C003	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
D-2	C004	CC45SL1H221J	CAP. CERAMIC	220P	5% 50V
	C005	NO USE			
D-2	C006	CC45CH1H120J	CAP. CERAMIC	12P	5% 50V
E-2	C007	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
D-2	C008	CK45B2H472K	CAP. CERAMIC	4700P	10% 500V
B-2	C009	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-2	C010	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-2	C011	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-3	C012	CK45B2H472K	CAP. CERAMIC	4700P	10% 500V
D-3	C013	CK45B2H472K	CAP. CERAMIC	4700P	10% 500V
B-3	C014	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
C-3	C015	CE04FW1V330M	CAP. ELECTRO	33	20% 35V
C-3	C016	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-3	C017	C90-0298-05	CAP. CERAMIC	0.1	20% 12V
B-2	C018	CE04FW1C470M	CAP. ELECTRO	47	20% 16V
B-1	C019	C90-0298-05	CAP. CERAMIC	0.1	20% 12V
C-1	C020	C90-0298-05	CAP. CERAMIC	0.1	20% 12V
	C021	NO USE			
A-3	C022	C90-0298-05	CAP. CERAMIC	0.1	20% 12V
A-3	C023	CE04FW1C470M	CAP. ELECTRO	47	20% 16V
E-2	C024	CC45SL1H331J	CAP. CERAMIC	330P	5% 50V
E-3	C025	CC45SL1H331J	CAP. CERAMIC	330P	5% 50V
B-1	C026	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-2	C027	CK45FF1H103Z	CAP. CERAMIC	0.01	50V
B-2	D001	MTZ24JC	DIODE, ZENER	24V	
D-1	D002	1S2686	DIODE		
D-2	D003	1S2686	DIODE		
E-1	L001	L33-0806-05	CHOKE COIL		
E-3	L002	L33-0806-05	CHOKE COIL		
E-3	L003	L40-2282-13	FERRI INDUCTOR	0.22UH	
E-3	L004	L40-2282-13	FERRI INDUCTOR	0.22UH	
D-3	L005	L40-4701-03	FERRI INDUCTOR	47UH	
C-3	L006	L40-4701-03	FERRI INDUCTOR	47UH	
C-3	L007	L40-4701-03	FERRI INDUCTOR	47UH	
A-3	L008	L40-4701-03	FERRI INDUCTOR	47UH	
	L009	NO USE			
	P010	E40-0315-05	PIN CONNECTOR	3P	
	P013	E40-0273-05	PIN CONNECTOR	2 CONTACT	
	P020	E40-0573-05	PIN CONNECTOR	5 CONTACT	
	P021	NO USE			
	P022	E40-0773-05	PIN CONNECTOR	7P	
B-1	Q001	2SC2671(H)	TR. SI, NPN		
B-2	Q002	2SC2671(H)	TR. SI, NPN		
C-1	Q003	2SA1206	TR. SI, PNP		
C-2	Q004	2SA1206	TR. SI, PNP		
C-1	Q005	2SC2671(H)	TR. SI, NPN		
C-3	Q006	2SC2671(H)	TR. SI, NPN		
C-1	Q007	2SC2644	TR. SI, NPN		
C-1	Q008	2SC2644	TR. SI, NPN		
C-3	Q009	2SC2644	TR. SI, NPN		
C-3	Q010	2SC2644	TR. SI, NPN		
E-1	Q011	2SC1164	TR. SI, NPN		
E-3	Q012	2SC1164	TR. SI, NPN		
B-2	Q013	2SA1309(Q,R)	TR. SI, PNP		
B-2	Q014	2SC3311(Q,R)	TR. SI, NPN		
B-2	Q015	2SA1309(Q,R)	TR. SI, PNP		
C-2	Q016	2SA1309(Q,R)	TR. SI, PNP		
C-3	Q017	2SC3311(Q,R)	TR. SI, NPN		
B-2	Q018	2SA1309(Q,R)	TR. SI, PNP		
A-2	R001	RN14BK2C2000F	RES. METAL FILM	200	1% 1/6W
A-1	R002	RD14BB2C220J	RES. CARBON	22	5% 1/6W
A-2	R003	RD14BB2C220J	RES. CARBON	22	5% 1/6W
C-1	R004	RD14BB2C332J	RES. CARBON	3.3K	5% 1/6W
B-1	R005	RN14BK2C75R0F	RES. METAL FILM	75.0	1% 1/6W
B-2	R006	RN14BK2C75R0F	RES. METAL FILM	75.0	1% 1/6W
B-1	R007	RD14BB2C470J	RES. CARBON	47	5% 1/6W
B-2	R008	RD14BB2C470J	RES. CARBON	47	5% 1/6W
C-2	R009	RD14BB2C101J	RES. CARBON	100	5% 1/6W
C-2	R010	RN14BK2E3900F	RES. METAL FILM	390	1% 1/4W
C-2	R011	RN14BK2E3900F	RES. METAL FILM	390	1% 1/4W
C-1	R012	RD14BB2C220J	RES. CARBON	22	5% 1/6W
C-2	R013	RD14BB2C220J	RES. CARBON	22	5% 1/6W
C-2	R014	RD14BB2E361J	RES. CARBON	360	5% 1/4W
C-2	R015	RD14BB2E361J	RES. CARBON	360	5% 1/4W
C-1	R016	RD14BB2C220J	RES. CARBON	22	5% 1/6W

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION
C-1	R017	RD14BB2C220J RES. CARBON 22 5% 1/6W	D001	1SS132	DIODE
C-3	R018	RD14BB2C220J RES. CARBON 22 5% 1/6W	D002	1S1544A	DIODE
C-3	R019	RD14BB2C220J RES. CARBON 22 5% 1/6W	D003	1SS132	DIODE
-	R020	NO USE	D004	1S1544A	DIODE
D-2	R021	RD14BB2C153J RES. CARBON 15K 5% 1/6W	D005	1SS132	DIODE
-	R022	NO USE	D006	1SS132	DIODE
D-2	R023	RD14BB2C681J RES. CARBON 680 5% 1/6W	D007	1SS132	DIODE
C-2	R024	RN14BK2E68R0F RES. METAL FILM 68.0 1% 1/4W	D008	1SS132	DIODE
C-2	R025	RN14BK2E68R0F RES. METAL FILM 68.0 1% 1/4W	D009	1SS132	DIODE
C-2	R026	RD14BB2E8R2J RES. CARBON 8.2 5% 1/4W	L001	L40-2201-03	FERRI INDUCTOR 22UH
D-1	R027	RD14CB2E220J RES. CARBON 22 5% 1/4W	L002	L40-2201-03	FERRI INDUCTOR 22UH
D-3	R028	RD14CB2E220J RES. CARBON 22 5% 1/4W	L003	L40-2201-03	FERRI INDUCTOR 22UH
E-2	R029	RD14BB2C471J RES. CARBON 470 5% 1/6W	P011	E40-0473-05	PIN CONNECTOR 4 P
E-2	R030	RD14BB2C471J RES. CARBON 470 5% 1/6W	P012	E40-0473-05	PIN CONNECTOR 4 P
E-2	R031	RS14AB3H561J RES. METAL FILM 560 5% 5W	P017	E40-0273-05	PIN CONNECTOR 2 P
E-2	R032	RS14AB3H561J RES. METAL FILM 560 5% 5W	P018	E40-0273-05	PIN CONNECTOR 2 P
E-1	R033	RD14BB2C471J RES. CARBON 470 5% 1/6W	P048	E40-1816-05	PIN CONNECTOR 18P
E-3	R034	RD14BB2C471J RES. CARBON 470 5% 1/6W	P054	E40-7414-05	PIN CONNECTOR 14P
B-2	R035	RD14BB2C473J RES. CARBON 47K 5% 1/6W	P055	E40-7416-05	PIN CONNECTOR 16P
B-2	R036	RD14BB2C682J RES. CARBON 6.8K 5% 1/6W	P056	E23-0503-05	TERMINAL
B-2	R037	RN14BK2C4701F RES. METAL FILM 4.7K 1% 1/6W	P057	NO USE	
B-2	R038	RN14BK2C4701F RES. METAL FILM 4.7K 1% 1/6W	P058	E40-0273-05	PIN CONNECTOR 2 P
B-2	R039	RN14BK2C3300F RES. METAL FILM 330 1% 1/6W	P059	NO USE	
A-2	R040	RN14BK2C2001F RES. METAL FILM 2K 1% 1/6W	P060	E23-0503-05	TERMINAL
B-3	R041	RN14BK2C2401F RES. METAL FILM 2.4K 1% 1/6W	P061	E40-7416-05	PIN CONNECTOR 16P
C-2	R042	RD14BB2C220J RES. CARBON 22 5% 1/6W	Q001	2SD438(F)	TR. SI, NPN
B-2	R043	RN14BK2C47R0F RES. METAL FILM 47.0 1% 1/6W	Q002	DN1901	FET, DUAL SI, N-CHANNEL
B-2	R044	RD14BB2C220J RES. CARBON 22 5% 1/6W	Q003	2SC3354(T,S)	TR. SI, NPN
C-3	R045	RN14BK2C47R0F RES. METAL FILM 47.0 1% 1/6W	Q004	2SC3354(T,S)	TR. SI, NPN
B-2	R046	RN14BK2C91R0F RES. METAL FILM 91.0 1% 1/6W	Q005	2SA1206	TR. SI, PNP
C-3	R047	RN14BK2C2201F RES. METAL FILM 2.2K 1% 1/6W	Q006	2SA1206	TR. SI, PNP
C-3	R048	RN14BK2C2701F RES. METAL FILM 2.7K 1% 1/6W	Q007	2SC2671(H)	TR. SI, NPN
C-3	R049	RD14BB2C101J RES. CARBON 100 5% 1/6W	Q008	2SC2671(H)	TR. SI, NPN
B-3	R050	RD14BB2C470J RES. CARBON 47 5% 1/6W	Q009	2SD438(F)	TR. SI, NPN
B-2	R051	RD14BB2C103J RES. CARBON 10K 5% 1/6W	Q010	DN1901	FET, DUAL SI, N-CHANNEL
B-2	R052	RD14BB2C131J RES. CARBON 130 5% 1/6W	Q011	2SC3354(T,S)	TR. SI, NPN
D-2	R053	RD14BB2C101J RES. CARBON 100 5% 1/6W	Q012	2SC3354(T,S)	TR. SI, NPN
D-1	R054	RD14BB2C133J RES. CARBON 13K 5% 1/6W	Q013	2SA1206	TR. SI, PNP
B-1	R055	RD14BB2C681J RES. CARBON 680 5% 1/6W	Q014	2SA1206	TR. SI, PNP
B-2	R056	RD14BB2C681J RES. CARBON 680 5% 1/6W	Q015	2SC2671(H)	TR. SI, NPN
D-1	R057	RD14BB2C223J RES. CARBON 22K 5% 1/6W	Q016	2SC2671(H)	TR. SI, NPN
	R058	RD14BB2C101J RES. CARBON 100 5% 1/6W	R001	RD14BB2C470J	RES. CARBON 47 5% 1/6W
B-1	TC001	C05-0412-05 CAP. TRIMMER 20P	R002	RN14BK2E9003D	RES. METAL FILM 900K 0.5% 1/4W
B-1	TC002	C05-0412-05 CAP. TRIMMER 20P	R003	RN14BK2E1113D	RES. METAL FILM 111K 0.5% 1/4W
D-1	TH001	SOT1000 THERMISTOR	R004	RD14BB2C560J	RES. CARBON 56 5% 1/6W
B-2	VR001	R12-0543-05 RES. SEMI FIXED 500 B	R005	RD14BB2C122J	RES. CARBON 1.2K 5% 1/6W
C-2	VR002	R12-0543-05 RES. SEMI FIXED 500 B	R006	RN14BK2E1004D	RES. METAL FILM 1M 0.5% 1/4W
A-2	VR003	R12-0543-05 RES. SEMI FIXED 500 B	R007	RD14BB2E684J	RES. CARBON 680K 5% 1/4W
<b>CH3, CH4 AMP UNIT</b>					
<b>X73-1520-00</b>					
REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION
	J21-2990-04	MOUNTING HARDWEAR	R008	RD14BB2C181J	RES. CARBON 180 5% 1/6W
	J25-5039-22	PCB (UNMOUNTED)	R009	RD14BB2C181J	RES. CARBON 180 5% 1/6W
	N09-0709-05	SCREW	R010	RD14BB2C220J	RES. CARBON 22 5% 1/6W
C001	CC45CH1H390J	CAP. CERAMIC 39P 5% 50V	R011	RD14BB2C220J	RES. CARBON 22 5% 1/6W
C002	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R012	RD14BB2C101J	RES. CARBON 100 5% 1/6W
C003	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R013	RD14BB2C392J	RES. CARBON 3.9K 5% 1/6W
C004	C91-0502-05	CAP. METAL FILM 0.01 20% 630V	R014	RD14BB2C392J	RES. CARBON 3.9K 5% 1/6W
C005	CC45SL1H101J	CAP. CERAMIC 100P 5% 50V	R015	RD14BB2C101J	RES. CARBON 100 5% 1/6W
C006	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V	R016	RN14BK2C1001F	RES. METAL FILM 1K 1% 1/6W
C007	NO USE		R017	RN14BK2C1001F	RES. METAL FILM 1K 1% 1/6W
C008	CC45CH1H390J	CAP. CERAMIC 39P 5% 50V	R018	RN14BK2C1101F	RES. METAL FILM 1.1K 1% 1/6W
C009	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R019	RN14BK2C1101F	RES. METAL FILM 1.1K 1% 1/6W
C010	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R020	RN14BK2C6800F	RES. METAL FILM 680 1% 1/6W
C011	C91-0502-05	CAP. METAL FILM 0.01 20% 630V	R021	RN14BK2C3600F	RES. METAL FILM 360 1% 1/6W
C012	CC45SL1H101J	CAP. CERAMIC 100P 5% 50V	R022	RN14BK2C3600F	RES. METAL FILM 360 1% 1/6W
C013	CC45CH1H050C	CAP. CERAMIC 5P 0.25P 50V	R023	RD14BB2C220J	RES. CARBON 22 5% 1/6W
C014	NO USE		R024	RD14BB2C220J	RES. CARBON 22 5% 1/6W
C015	CE04FW1C470M	CAP. ELECTRO 47 20% 16V	R025	RD14BB2C220J	RES. CARBON 22 5% 1/6W
C016	CE04FW1C470M	CAP. ELECTRO 47 20% 16V	R026	RD14BB2C122J	RES. CARBON 1.2K 5% 1/6W
C017	CE04FW1C470M	CAP. ELECTRO 47 20% 16V	R027	RD14BB2C431J	RES. CARBON 430 5% 1/6W
C018	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R028	RD14BB2C220J	RES. CARBON 22 5% 1/6W
C019	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R029	RD14BB2C101J	RES. CARBON 100 5% 1/6W
C020	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R030	RD14BB2C821J	RES. CARBON 820 5% 1/6W
C021	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R031	RD14BB2C100J	RES. CARBON 10 5% 1/6W
C022	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R032	RD14BB2C470J	RES. CARBON 47 5% 1/6W
C023	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R033	RN14BK2E9003D	RES. METAL FILM 900K 0.5% 1/4W
C026	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R034	RN14BK2E1113D	RES. METAL FILM 111K 0.5% 1/4W
C027	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R035	RD14BB2C560J	RES. CARBON 56 5% 1/6W
C028	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R036	RD14BB2C122J	RES. CARBON 1.2K 5% 1/6W
C029	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R037	RN14BK2E1004D	RES. METAL FILM 1M 0.5% 1/4W
C030	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R038	NO USE	
C031	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R039	RD14BB2C181J	RES. CARBON 180 5% 1/6W
C034	CC45CH1H220J	CAP. CERAMIC 22P 5% 50V	R040	RD14BB2C181J	RES. CARBON 180 5% 1/6W
C035	CC45CH1H220J	CAP. CERAMIC 22P 5% 50V	R041	RD14BB2C220J	RES. CARBON 22 5% 1/6W
			R042	RD14BB2C220J	RES. CARBON 22 5% 1/6W
			R043	RD14BB2C101J	RES. CARBON 100 5% 1/6W
			R044	RD14BB2C392J	RES. CARBON 3.9K 5% 1/6W
			R045	RD14BB2C392J	RES. CARBON 3.9K 5% 1/6W
			R046	RD14BB2C101J	RES. CARBON 100 5% 1/6W
			R047	RN14BK2C1001F	RES. METAL FILM 1K 1% 1/6W
			R048	RN14BK2C1001F	RES. METAL FILM 1K 1% 1/6W
			R049	RN14BK2C1101F	RES. METAL FILM 1.1K 1% 1/6W

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R050	RN14BK2C1101F	RES. METAL FILM 1.1K	1%	1/6W	
R051	RN14BK2C6800F	RES. METAL FILM 680	1%	1/6W	
R052	RN14BK2C3600F	RES. METAL FILM 360	1%	1/6W	
R053	RN14BK2C3600F	RES. METAL FILM 360	1%	1/6W	
R054	RD14BB2C220J	RES. CARBON 22	5%	1/6W	
R055	RD14BB2C220J	RES. CARBON 22	5%	1/6W	
R056	RD14BB2C220J	RES. CARBON 22	5%	1/6W	
R057	RD14BB2C122J	RES. CARBON 1.2K	5%	1/6W	
R058	RD14BB2C431J	RES. CARBON 430	5%	1/6W	
R059	RD14BB2C220J	RES. CARBON 22	5%	1/6W	
R060	RD14BB2C101J	RES. CARBON 100	5%	1/6W	
R061	RD14BB2C821J	RES. CARBON 820	5%	1/6W	
R062	RD14BB2C100J	RES. CARBON 10	5%	1/6W	
R063	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R064	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R065	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R066	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R067	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R068	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R069	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R070	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R071	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R072	RD14BB2C222J	RES. CARBON 2.2K	5%	1/6W	
R073	RD14BB2C121J	RES. CARBON 120	5%	1/6W	
R074	RD14BB2C121J	RES. CARBON 120	5%	1/6W	
R075	RD14BB2C470J	RES. CARBON 47	5%	1/6W	
R076	RD14BB2C470J	RES. CARBON 47	5%	1/6W	
R077	RD14BB2C330J	RES. CARBON 33	5%	1/6W	

RL001	S51-2505-05	RELAY
RL002	S51-2505-05	RELAY

TC002	C05-0062-05	CAP. TRIMMER 6P
TC003	C05-0031-15	CAP. TRIMMER 10P
TC004	C05-0030-15	CAP. TRIMMER 20P
TC005	NO USE	
TC006	C05-0062-05	CAP. TRIMMER 6P
TC007	C05-0031-15	CAP. TRIMMER 10P
TC008	C05-0030-15	CAP. TRIMMER 20P

VR001	R12-0421-05	RES. SEMI FIXED 100 B
VR002	R12-0421-05	RES. SEMI FIXED 100 B

## CPU UNIT

### X81-1320-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
C001	J25-5038-22	PCB (UNMOUNTED)			
C002	CE04W1A470M	CAP. ELECTRO 47	20%	10V	
C003	CC45SL1H820J	CAP. CERAMIC 82P	5%	50V	
C004	CE04W1H2R2M	CAP. ELECTRO 2.2	20%	50V	
C005	C90-0298-05	CAP. CERAMIC 0.1	20%	12V	
C005	C90-0298-05	CAP. CERAMIC 0.1	20%	12V	
D001	1SS132	DIODE			
D002	1SS132	DIODE			
D003	1SS132	DIODE			
D004	1SS132	DIODE			
IC001	MTM5010	MPU, 4-BIT MICROCOMPUTER			
IC002	AN90B20	IC, TR. ARRAY			
IC003	AN90B20	IC, TR. ARRAY			
J001	E31-2429-05	LEAD WIRE WITH CONNECTOR			
P002	E40-1274-05	PIN CONNECTOR			
P049	E40-0273-05	PIN CONNECTOR 2 P			
P061	E40-7516-05	PIN CONNECTOR 16P			
P062	E40-7526-05	PIN CONNECTOR 26P			
Q001	2SA1309(Q,R)	TR. SI, PNP			
Q002	2SC3311(R)	TR. SI, NPN			
R001	RD14BB2C621J	RES. CARBON 620	5%	1/6W	
R002	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R003	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R004	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R005	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R006	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R007	RD14BB2C621J	RES. CARBON 620	5%	1/6W	
R008	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R009	RD14BB2C681J	RES. CARBON 680	5%	1/6W	
R010	RD14BB2C512J	RES. CARBON 5.1K	5%	1/6W	
R011	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R012	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R013	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R014	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R015	RD14BB2C472J	RES. CARBON 4.7K	5%	1/6W	
R016	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	

## SWEEP ROTARY UNIT

### X74-1310-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
E31-2336-15		LEAD WIRE WITH CONNECTOR			
F20-0640-04		INSULATOR			
J25-2971-03		PCB (UNMOUNTED)			
Q01-0004-05		COATING WIRE			
D001	1SS132	DIODE			
D002	1SS135	DIODE			
D003	1SS135	DIODE			
D004	1SS135	DIODE			
D005	1SS135	DIODE			
D006	1SS135	DIODE			
D007	1SS135	DIODE			
D008	1SS135	DIODE			
D009	1SS132	DIODE			
D010	1SS135	DIODE			
D011	1SS135	DIODE			
D012	1SS135	DIODE			
D013	1SS135	DIODE			
D014	1SS135	DIODE			
D015	1SS135	DIODE			
D016	1SS135	DIODE			
P015	E40-0973-05	PIN CONNECTOR 9 P			
P019	E40-1073-05	PIN CONNECTOR 10P			
P040	E40-0873-05	PIN CONNECTOR 8 P			
P041	E40-0873-05	PIN CONNECTOR 8 P			
P042	E40-0473-05	PIN CONNECTOR 4 P			
P051	E40-0773-05	PIN CONNECTOR 7 P			
P057	E40-0373-05	PIN CONNECTOR 3 P			
R001	RN14BK2B3603F	RES. METAL FILM 360K	1%	1/8W	
R002	RN14BK2B1203F	RES. METAL FILM 120K	1%	1/8W	
R003	RN14BK2B3002F	RES. METAL FILM 30K	1%	1/8W	
R004	RN14BK2B3002F	RES. METAL FILM 30K	1%	1/8W	
R005	RN14BK2B3602F	RES. METAL FILM 36K	1%	1/8W	
R006	RN14BK2B1202F	RES. METAL FILM 12K	1%	1/8W	
R007	RN14BK2B3001F	RES. METAL FILM 3K	1%	1/8W	
R008	RN14BK2B3001F	RES. METAL FILM 3K	1%	1/8W	
R009	RN14BK2B3601F	RES. METAL FILM 3.6K	1%	1/8W	
R010	RD14BB2C124J	RES. CARBON 120K	5%	1/6W	
R011	RD14BB2C393J	RES. CARBON 39K	5%	1/6W	
R012	RD14BB2C203J	RES. CARBON 20K	5%	1/6W	
R013	RD14BB2C123J	RES. CARBON 12K	5%	1/6W	
R014	RD14BB2C392J	RES. CARBON 3.9K	5%	1/6W	
R015	RD14BB2C202J	RES. CARBON 2K	5%	1/6W	
R016	RD14BB2C202J	RES. CARBON 2K	5%	1/6W	
R017	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R018	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R019	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R020	RN14BK2B3603F	RES. METAL FILM 360K	1%	1/8W	
R021	RN14BK2B1203F	RES. METAL FILM 120K	1%	1/8W	
R022	RN14BK2B3002F	RES. METAL FILM 30K	1%	1/8W	
R023	RN14BK2B3002F	RES. METAL FILM 30K	1%	1/8W	
R024	RN14BK2B3602F	RES. METAL FILM 36K	1%	1/8W	
R025	RN14BK2B1202F	RES. METAL FILM 12K	1%	1/8W	
R026	RN14BK2B3001F	RES. METAL FILM 3K	1%	1/8W	
R027	RN14BK2B3001F	RES. METAL FILM 3K	1%	1/8W	
R028	RN14BK2B3601F	RES. METAL FILM 3.6K	1%	1/8W	
R029	RD14BB2C124J	RES. CARBON 120K	5%	1/6W	
R030	RD14BB2C393J	RES. CARBON 39K	5%	1/6W	
R031	RD14BB2C203J	RES. CARBON 20K	5%	1/6W	
R032	RD14BB2C123J	RES. CARBON 12K	5%	1/6W	
R033	RD14BB2C392J	RES. CARBON 3.9K	5%	1/6W	
R034	RD14BB2C202J	RES. CARBON 2K	5%	1/6W	
R035	RD14BB2C202J	RES. CARBON 2K	5%	1/6W	
R036	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R037	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
R038	RD14BB2C103J	RES. CARBON 10K	5%	1/6W	
S001	S02-2503-05	ROTARY SWITCH			
S002	S02-2503-05	ROTARY SWITCH			
S003	S02-2503-05	ROTARY SWITCH			
S004	S02-2503-05	ROTARY SWITCH			
VR001	S02-2503-05	ROTARY SWITCH			



# PARTS LIST

## TRIG SWEEP UNIT

### X74-1350-00

REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT	REF.NO	PARTS NO	NAME & DESCRIPTION	QTY	UNIT
	E33-4046-00	WIRE ASSY	C086	CE04W1A101M	CAP. ELECTRO	100	20%	10V				
	J25-5039-22	PCB (UNMOUNTED)	C087	CE04W1A101M	CAP. ELECTRO	100	20%	10V				
	R92-0150-05	JUMPING RES.	C088	CE04W1A101M	CAP. ELECTRO	100	20%	10V				
	212-1018-05	TUBE (PLASTIC)	C089	CE04W1A221M	CAP. ELECTRO	220	20%	10V				
	212-2014-05	TUBE (PLASTIC)	C090	CK45FF1H103Z	CAP. CERAMIC	0.01		50V				
	420-0008-05	ADHESIVES	C091	CK45FF1H103Z	CAP. CERAMIC	0.01		50V				
C001	CC45SL1H330J	CAP. CERAMIC	C092	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C002	CE04W1E100M	CAP. ELECTRO	C093	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C003	CE04W1E100M	CAP. ELECTRO	C094	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C004	CK45FF1H103Z	CAP. CERAMIC	C095	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C005	C91-0549-05	CAP. TANTALUM	C096	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C006	NO USE		C097	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C007	CE04FW1V220M	CAP. ELECTRO	C098	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C008	CK45FF1H103Z	CAP. CERAMIC	C099	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C009	C91-0549-05	CAP. TANTALUM	C100	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C010	CK45FF1H103Z	CAP. CERAMIC	C101	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C011	CK45FF1H103Z	CAP. CERAMIC	C102	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C012	CE04W1H3R3M	CAP. ELECTRO	C103	C90-0298-05	CAP. CERAMIC	0.1	20%	12V				
C013	C91-0583-05	CAP. PLASTIC	C104	CE04W1E220M	CAP. ELECTRO	22	20%	25V				
C014	CK45FF1H103Z	CAP. CERAMIC	C105	CE04W1E220M	CAP. ELECTRO	22	20%	25V				
C015	CK45FF1H103Z	CAP. CERAMIC	C106	CE04W1E220M	CAP. ELECTRO	22	20%	25V				
C016	CQ93M1H333K	CAP. MYLAR	C107	NO USE								
C017	C91-0584-05	CAP. CERAMIC	C108	CK45FF1H103Z	CAP. CERAMIC	0.01		50V				
C018	CK45FF1H103Z	CAP. CERAMIC	C109	CE04FW1E330M	CAP. ELECTRO	33	20%	25V				
C019	CK45FF1H103Z	CAP. CERAMIC	C110	CE04W1J4R7M	CAP. ELECTRO	4.7	20%	63V				
C020	CC45SL1H331J	CAP. CERAMIC	C111	CE04W1J100M	CAP. ELECTRO	10	20%	63V				
C021	C91-0581-05	CAP. CERAMIC	C112	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V				
C022	NO USE		C113	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V				
C023	CM93BD2A121J	CAP. MICA	C114	CK45B2H472K	CAP. CERAMIC	4700P	10%	500V				
C024	CK45FF1H103Z	CAP. CERAMIC	C115	NO USE								
C025	CC45SL1H221J	CAP. CERAMIC	C116	CE04FW1C470M	CAP. ELECTRO	47	20%	16V				
C026	NO USE		C117	CC45SL1H220J	CAP. CERAMIC	22P	5%	50V				
C027	C91-0549-05	CAP. TANTALUM	C118	CC45SL1H331J	CAP. CERAMIC	330P	5%	50V				
C028	CC45SL1H330J	CAP. CERAMIC	D002	1SS132	DIODE							
C029	CC45SL1H330J	CAP. CERAMIC	D003	1SS132	DIODE							
C030	CK45FF1H103Z	CAP. CERAMIC	D004	1SS132	DIODE							
C031	CC45SL1H330J	CAP. CERAMIC	D005	MTZ3.0JB	DIODE ZENER	3.0V						
C032	CE04W1E100M	CAP. ELECTRO	D006	1SS132	DIODE							
C033	CE04W1E100M	CAP. ELECTRO	D007	1SS132	DIODE							
C034	C91-0549-05	CAP. TANTALUM	D008	1SS132	DIODE							
C035	NO USE		D009	1SS132	DIODE							
C036	CE04FW1V220M	CAP. ELECTRO	D010	1SS132	DIODE							
C037	C91-0549-05	CAP. TANTALUM	D011	1SS132	DIODE							
C038	CK45FF1H103Z	CAP. CERAMIC	D012	1SS132	DIODE							
C039	CK45FF1H103Z	CAP. CERAMIC	D013	MTZ16JA	DIODE ZENER	15V						
C040	CE04W1H3R3M	CAP. ELECTRO	D014	1SS132	DIODE							
C041	C91-0583-05	CAP. PLASTIC	D015	1SS132	DIODE							
C042	CK45FF1H103Z	CAP. CERAMIC	D016	1SS132	DIODE							
C043	CK45FF1H103Z	CAP. CERAMIC	D017	1SS132	DIODE							
C044	CQ93M1H333K	CAP. MYLAR	D018	1SS132	DIODE							
C045	C91-0584-05	CAP. CERAMIC	D019	1SS132	DIODE							
C046	CK45FF1H103Z	CAP. CERAMIC	D020	1SS132	DIODE							
C047	CK45FF1H103Z	CAP. CERAMIC	D021	1SS132	DIODE							
C048	CC45SL1H331J	CAP. CERAMIC	D022	1SS132	DIODE							
C049	C91-0581-05	CAP. CERAMIC	D023	1SS132	DIODE							
C050	NO USE		D024	1SS132	DIODE							
C051	CK45FF1H103Z	CAP. CERAMIC	D025	1SS132	DIODE							
C052	CC45SL1H121J	CAP. CERAMIC	D026	1SS132	DIODE							
C053	CM93BD2A121J	CAP. MICA	D027	1SS132	DIODE							
C054	CK45FF1H103Z	CAP. CERAMIC	D028	1SS132	DIODE							
C055	CE04W1C330M	CAP. ELECTRO	D029	1SS132	DIODE							
C056	CE04W1C100M	CAP. ELECTRO	D030	1SS132	DIODE							
C057	CK45FF1H103Z	CAP. CERAMIC	D031	NO USE								
C058	CK45FF1H103Z	CAP. CERAMIC	D032	1SS132	DIODE							
C059	CK45B1H681K	CAP. CERAMIC	D033	1SS132	DIODE							
C060	CM93BD2A470J	CAP. MICA	D034	1SS132	DIODE							
C061	CM93BD2A390J	CAP. MICA	D035	1SS132	DIODE							
C062	CC45SL1H220J	CAP. CERAMIC	D036	1SS132	DIODE							
C063	CQ93M1H102J	CAP. MYLAR	D037	1SS132	DIODE							
C064	CQ93M1H102J	CAP. MYLAR	D038	1SS132	DIODE							
C065	C90-0298-05	CAP. CERAMIC	D039	1SS132	DIODE							
C066	CQ93M1H472J	CAP. MYLAR	D040	1SS132	DIODE							
C067	CQ93M1H472J	CAP. MYLAR	D041	1SS132	DIODE							
C068	CE04FW1C470M	CAP. ELECTRO	D042	1SS132	DIODE							
C069	CC45SL1H471J	CAP. CERAMIC	D043	MTZ16JA	DIODE ZENER	15V						
C070	CE04W1C330M	CAP. ELECTRO	D044	MTZ3.0JB	DIODE ZENER	3.0V						
C071	CE04W1C330M	CAP. ELECTRO	D045	1SS132	DIODE							
C072	CE04W1C330M	CAP. ELECTRO	D046	1SS132	DIODE							
C073	CE04FW1C470M	CAP. ELECTRO	D047	1SS132	DIODE							
C074	CE04FW1C470M	CAP. ELECTRO	D048	1SS132	DIODE							
C075	CE04FW1C470M	CAP. ELECTRO	D049	1SS132	DIODE							
C076	CE04W1C101M	CAP. ELECTRO	D050	1SS132	DIODE							
C077	CE04FW1C470M	CAP. ELECTRO	D051	1SS132	DIODE							
C078	CK45FF1H103Z	CAP. CERAMIC	D052	1SS132	DIODE							
C079	CE04W1C330M	CAP. ELECTRO	D053	MTZ12JC	DIODE ZENER	12V						
C080	CE04W1C101M	CAP. ELECTRO	D054	MTZ12JC	DIODE ZENER	12V						
C081	CK45FF1H103Z	CAP. CERAMIC	D055	SV06Y	DIODE							
C082	CK45FF1H103Z	CAP. CERAMIC	D056	1SS132	DIODE							
C083	CK45FF1H103Z	CAP. CERAMIC	D057	1SS132	DIODE							
C084	CK45FF1H103Z	CAP. CERAMIC	D058	1SS132	DIODE							
C085	CE04W1A470M	CAP. ELECTRO	D059	1SS132	DIODE							
			D060	SV06Y	DIODE							
			D061	1SS132	DIODE							
			D062	1SS132	DIODE							
			D063	1SS132	DIODE							



# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION
D064	1SS132	DIODE	Q033	2SC3311(R)	TR. SI, NPN
D065	1SS132	DIODE	Q034	2SA1323(B)	TR. SI, PNP
D066	1SS132	DIODE	Q035	2SC3354(T,S)	TR. SI, NPN
D067	1SS132	DIODE	Q036	2SC1973(T)	TR. SI, NPN
D068	1SS132	DIODE	Q037	2SA1309(Q,R)	TR. SI, PNP
D069	1SS132	DIODE	Q038	2SD438(F)	TR. SI, NPN
D070	NO USE		Q039	2SC3311(R)	TR. SI, NPN
D071	1SS132	DIODE	Q040	2SC3311(R)	TR. SI, NPN
D072	1SS132	DIODE	Q041	2SC3311(R)	TR. SI, NPN
D073	1N60	DIODE	Q042	2SC3311(R)	TR. SI, NPN
D074	1SS132	DIODE	Q043	2SC3311(R)	TR. SI, NPN
D075	1SS132	DIODE	Q044	2SC3311(R)	TR. SI, NPN
D076	1SS132	DIODE	Q045	2SC3311(R)	TR. SI, NPN
D077	1SS132	DIODE	Q046	2SC3311(R)	TR. SI, NPN
IC001	MC10H103L	IC, QUAD 2-INPUT OR GATE	Q047	2SC3311(R)	TR. SI, NPN
IC002	MC10H131L	IC, DUAL D-FFS	Q048	M47F(C)	FET
IC003	LF412CN	IC, DUAL JFET INPUT OP-AMP	Q049	2SC3315(C,D)	TR. SI, NPN
IC004	MC10H103L	IC, QUAD 2-INPUT OR GATE	Q050	2SA1309(Q,R)	TR. SI, PNP
IC005	MC10H131L	IC, DUAL D-FFS	Q051	M47F(C)	FET
IC006	LF412CN	IC, DUAL JFET INPUT OP-AMP	Q052	2SC3315(C,D)	TR. SI, NPN
IC007	MC10104L	IC, QUAD 2-INPUT AND GATE	Q053	2SC3311(R)	TR. SI, NPN
IC008	MC10103L	IC, QUAD 2-INPUT OR GATE	Q054	2SC3311(R)	TR. SI, NPN
IC009	MC10104L	IC, QUAD 2-INPUT AND GATE	Q055	2SC3315(C,D)	TR. SI, NPN
IC010	MC10104L	IC, QUAD 2-INPUT AND GATE	Q056	2SC3315(C,D)	TR. SI, NPN
IC011	MC10104L	IC, QUAD 2-INPUT AND GATE	Q057	2SC3315(C,D)	TR. SI, NPN
IC012	MC10102L	IC, QUAD 2-INPUT NOR GATE	Q058	2SC3315(C,D)	TR. SI, NPN
IC013	MC10131L	IC, DUAL D-FFS	Q059	2SC3315(C,D)	TR. SI, NPN
IC014	SN7406N	IC, HEX D.C. INVERTERS	Q060	2SC3315(C,D)	TR. SI, NPN
IC015	MC10104L	IC, QUAD 2-INPUT AND GATE	Q061	2SC3315(C,D)	TR. SI, NPN
IC016	MC78L05CP	VOLTAGE REGULATOR (5V, 100MA)	Q062	2SA1239(F)	TR. SI, PNP-DUAL
IC017	MC78L15ACP	VOLTAGE REGULATOR (5V, 100MA)	Q063	NO USE	
L001	L40-1001-01	FERRI INDUCTOR 10UH	Q064	2SC3315(C,D)	TR. SI, NPN
L002	L40-1001-01	FERRI INDUCTOR 10UH	Q065	2SC3315(C,D)	TR. SI, NPN
L003	L40-2201-03	FERRI INDUCTOR 22UH	Q066	2SC3315(C,D)	TR. SI, NPN
P013	E40-0273-05	PIN CONNECTOR 2 P	Q067	2SC3315(C,D)	TR. SI, NPN
P014	E40-0773-05	PIN CONNECTOR 7 P	Q068	2SC3311(R)	TR. SI, NPN
P028	E40-0473-05	PIN CONNECTOR 4 P	Q069	2SC3311(R)	TR. SI, NPN
P035	E40-0473-05	PIN CONNECTOR 4 P	Q070	2SC3315(C,D)	TR. SI, NPN
P036	E40-0673-05	PIN CONNECTOR 6 P	Q071	2SC3315(C,D)	TR. SI, NPN
P037	E40-0773-05	PIN CONNECTOR 7 P	Q072	2SA1323(B)	TR. SI, PNP
P038	E40-0373-05	PIN CONNECTOR 3 P	Q073	2SC3354(T,S)	TR. SI, NPN
P039	E40-0773-05	PIN CONNECTOR 7 P	Q074	2SA1323(B)	TR. SI, PNP
P040	E40-0873-05	PIN CONNECTOR 8 P	Q075	2SC3354(T,S)	TR. SI, NPN
P041	E40-0873-05	PIN CONNECTOR 8 P	Q076	2SA1309(Q,R)	TR. SI, PNP
P042	E40-0473-05	PIN CONNECTOR 4 P	Q077	2SA1323(B)	TR. SI, PNP
P043	E40-0273-05	PIN CONNECTOR 2 P	Q078	2SC3311(R)	TR. SI, NPN
P044	E40-0274-05	PIN CONNECTOR 2 P	Q079	2SA1309(Q,R)	TR. SI, PNP
P045	E40-0473-05	PIN CONNECTOR 4 P	Q080	2SA1309(Q,R)	TR. SI, PNP
P046	E40-0274-05	PIN CONNECTOR 2 P	Q081	2SA1309(Q,R)	TR. SI, PNP
P047	E40-0473-05	PIN CONNECTOR 4 P	Q082	2SA1309(Q,R)	TR. SI, PNP
P048	E40-1811-05	PIN CONNECTOR 18 P	Q083	2SA1323(B)	TR. SI, PNP
P049	NO USE		Q084	2SA1323(B)	TR. SI, PNP
P050	E40-0473-05	PIN CONNECTOR 4 P	R001	RD14BB2C561J	RES. CARBON 560 5% 1/6W
P051	NO USE		R002	RD14BB2C470J	RES. CARBON 47 5% 1/6W
P052	E40-0273-05	PIN CONNECTOR 2 P	R003	RD14BB2C511J	RES. CARBON 510 5% 1/6W
P053	E40-0273-05	PIN CONNECTOR 2 P	R004	RD14BB2C511J	RES. CARBON 510 5% 1/6W
P057	E40-0373-05	PIN CONNECTOR 3 P	R005	RD14BB2C471J	RES. CARBON 470 5% 1/6W
Q001	2SC3311(R)	TR. SI, NPN	R006	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
Q002	2SC3311(R)	TR. SI, NPN	R007	RD14BB2C751J	RES. CARBON 750 5% 1/6W
Q003	2SC3311(R)	TR. SI, NPN	R008	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W
Q004	2SA1323(B)	TR. SI, PNP	R009	RD14BB2C751J	RES. CARBON 750 5% 1/6W
Q005	2SC3354(T,S)	TR. SI, NPN	R010	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W
Q006	2SC1973(T)	TR. SI, NPN	R011	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
Q007	2SA1309(Q,R)	TR. SI, PNP	R012	RD14BB2C181J	RES. CARBON 180 5% 1/6W
Q008	2SD438(F)	TR. SI, NPN	R013	RD14BB2C181J	RES. CARBON 180 5% 1/6W
Q009	2SC3311(R)	TR. SI, NPN	R014	RD14BB2C181J	RES. CARBON 180 5% 1/6W
Q010	2SC3311(R)	TR. SI, NPN	R015	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
Q011	2SC3311(R)	TR. SI, NPN	R016	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
Q012	2SC3311(R)	TR. SI, NPN	R017	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
Q013	2SC3311(R)	TR. SI, NPN	R018	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
Q014	2SC3311(R)	TR. SI, NPN	R019	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
Q015	2SC3311(R)	TR. SI, NPN	R020	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
Q016	2SC3311(R)	TR. SI, NPN	R021	RD14BB2C101J	RES. CARBON 100 5% 1/6W
Q017	2SC3311(R)	TR. SI, NPN	R022	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
Q018	M47F(C)	FET	R023	RD14BB2C271J	RES. CARBON 270 5% 1/6W
Q019	2SC3315(C,D)	TR. SI, NPN	R024	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W
Q020	2SA1309(Q,R)	TR. SI, PNP	R025	RD14BB2C271J	RES. CARBON 270 5% 1/6W
Q021	M47F(C)	FET	R026	RD14BB2C511J	RES. CARBON 510 5% 1/6W
Q022	2SC3315(C,D)	TR. SI, NPN	R027	RD14BB2C361J	RES. CARBON 360 5% 1/6W
Q023	2SC3311(R)	TR. SI, NPN	R028	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
Q024	2SC3311(R)	TR. SI, NPN	R029	RD14BB2C100J	RES. CARBON 10 5% 1/6W
Q025	2SC3311(R)	TR. SI, NPN	R030	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
Q026	2SC3311(R)	TR. SI, NPN	R031	RD14BB2C511J	RES. CARBON 510 5% 1/6W
Q027	2SA1323(B)	TR. SI, PNP	R032	RD14BB2C361J	RES. CARBON 360 5% 1/6W
Q028	2SA1323(B)	TR. SI, PNP	R033	RD14BB2C220J	RES. CARBON 22 5% 1/6W
Q029	2SA1323(B)	TR. SI, PNP	R034	RN14BK2C5101F	RES. METAL FILM 5.1K 1% 1/6W
Q030	2SA1323(B)	TR. SI, PNP	R035	RN14BK2C2401F	RES. METAL FILM 2.4K 1% 1/6W
Q031	2SC3311(R)	TR. SI, NPN	R036	RN14BK2C2401F	RES. METAL FILM 2.4K 1% 1/6W
Q032	2SC3311(R)	TR. SI, NPN	R037	RD14BB2C123J	RES. CARBON 12K 5% 1/6W
			R038	RN14BK2C2402F	RES. METAL FILM 24K 1% 1/6W
			R039	RN14BK2C3001F	RES. METAL FILM 3K 1% 1/6W
			R040	RN14BK2C1202F	RES. METAL FILM 12K 1% 1/6W
			R041	RN14BK2C1501F	RES. METAL FILM 1.5K 1% 1/6W
			R042	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
			R043	RN14BK2C3001F	RES. METAL FILM 3K 1% 1/6W

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION
R044	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	R140	RD14BB2C271J	RES. CARBON 270 5% 1/6W
R045	RN14BK2C3001F	RES. METAL FILM 3K 1% 1/6W	R141	RD14BB2C271J	RES. CARBON 270 5% 1/6W
R046	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	R142	RD14BB2C511J	RES. CARBON 510 5% 1/6W
R047	RD14BB2C104J	RES. CARBON 100K 5% 1/6W	R143	RD14BB2C361J	RES. CARBON 360 5% 1/6W
R048	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	R144	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
R049	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	R145	RD14BB2C100J	RES. CARBON 10 5% 1/6W
R050	RD14BB2C104J	RES. CARBON 100K 5% 1/6W	R146	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R051	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	R147	RD14BB2C511J	RES. CARBON 510 5% 1/6W
R052	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	R148	RD14BB2C361J	RES. CARBON 360 5% 1/6W
R053	RD14BB2C104J	RES. CARBON 100K 5% 1/6W	R149	RD14BB2C220J	RES. CARBON 22 5% 1/6W
R054	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	R150	RN14BK2C7501F	RES. METAL FILM 7.5K 1% 1/6W
R055	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	R151	RN14BK2C5101F	RES. METAL FILM 5.1K 1% 1/6W
R056	RD14BB2C470J	RES. CARBON 47 5% 1/6W	R152	RN14BK2C2401F	RES. METAL FILM 2.4K 1% 1/6W
R057	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R153	RD14BB2C123J	RES. CARBON 12K 5% 1/6W
R058	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R154	RN14BK2C2402F	RES. METAL FILM 24K 1% 1/6W
R059	RD14BB2C470J	RES. CARBON 47 5% 1/6W	R155	RN14BK2C3001F	RES. METAL FILM 3K 1% 1/6W
R060	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W	R156	RN14BK2C1202F	RES. METAL FILM 12K 1% 1/6W
R061	RD14BB2C122J	RES. CARBON 1.2K 5% 1/6W	R157	RN14BK2C1501F	RES. METAL FILM 1.5K 1% 1/6W
R062	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W	R158	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R063	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R159	RN14BK2C3001F	RES. METAL FILM 3K 1% 1/6W
R064	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W	R160	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R065	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W	R161	RN14BK2C3001F	RES. METAL FILM 3K 1% 1/6W
R066	RD14BB2C511J	RES. CARBON 510 5% 1/6W	R162	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R067	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R163	RD14BB2C104J	RES. CARBON 100K 5% 1/6W
R068	RD14BB2C242J	RES. CARBON 2.4K 5% 1/6W	R164	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R069	RD14BB2C470J	RES. CARBON 47 5% 1/6W	R165	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R070	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R166	RD14BB2C104J	RES. CARBON 100K 5% 1/6W
R071	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R167	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R072	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R168	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R073	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R169	RD14BB2C104J	RES. CARBON 100K 5% 1/6W
R074	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R170	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R075	RD14BB2C511J	RES. CARBON 510 5% 1/6W	R171	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
R076	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R172	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R077	RD14BB2C561J	RES. CARBON 560 5% 1/6W	R173	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R078	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R174	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R079	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W	R175	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R080	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W	R176	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R081	NO USE		R177	RD14BB2C122J	RES. CARBON 1.2K 5% 1/6W
R082	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W	R178	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W
R083	RD14BB2C393J	RES. CARBON 39K 5% 1/6W	R179	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
R084	RD14BB2C273J	RES. CARBON 27K 5% 1/6W	R180	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R085	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W	R181	RD14BB2C622J	RES. CARBON 6.2K 5% 1/6W
R086	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R182	RD14BB2C393J	RES. CARBON 39K 5% 1/6W
R087	RD14BB2C162J	RES. CARBON 1.6K 5% 1/6W	R183	RD14BB2C242J	RES. CARBON 2.4K 5% 1/6W
R088	RD14BB2C362J	RES. CARBON 3.6K 5% 1/6W	R184	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R089	RD14BB2C302J	RES. CARBON 3K 5% 1/6W	R185	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R090	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R186	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R091	RN14BK2C5100F	RES. METAL FILM 510 1% 1/6W	R187	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R092	RN14BK2C4701F	RES. METAL FILM 4.7K 1% 1/6W	R188	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R093	RN14BK2C4701F	RES. METAL FILM 4.7K 1% 1/6W	R189	RD14BB2C101J	RES. CARBON 100 5% 1/6W
R094	RD14BB2C221J	RES. CARBON 220 5% 1/6W	R190	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R095	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R191	RD14BB2C511J	RES. CARBON 510 5% 1/6W
R096	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R192	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R097	RD14BB2C511J	RES. CARBON 510 5% 1/6W	R193	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
R098	RD14BB2C162J	RES. CARBON 1.6K 5% 1/6W	R194	RD14BB2C223J	RES. CARBON 22K 5% 1/6W
R099	RD14BB2C362J	RES. CARBON 3.6K 5% 1/6W	R195	RD14BB2C122J	RES. CARBON 1.2K 5% 1/6W
R100	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W	R196	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R101	RD14BB2C820J	RES. CARBON 82 5% 1/6W	R197	RD14BB2C751J	RES. CARBON 750 5% 1/6W
R102	RD14BB2C331J	RES. CARBON 330 5% 1/6W	R198	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R103	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R199	RN14BK2C4701F	RES. METAL FILM 4.7K 1% 1/6W
R104	RD14BB2C470J	RES. CARBON 47 5% 1/6W	R200	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R105	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R201	RN14BK2C6801F	RES. METAL FILM 6.8K 1% 1/6W
R106	RD14BB2C820J	RES. CARBON 82 5% 1/6W	R202	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R107	RD14BB2C331J	RES. CARBON 330 5% 1/6W	R203	RN14BK2C4701F	RES. METAL FILM 4.7K 1% 1/6W
R108	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R204	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R109	RD14BB2C470J	RES. CARBON 47 5% 1/6W	R205	RN14BK2C6801F	RES. METAL FILM 6.8K 1% 1/6W
R110	RD14BB2C561J	RES. CARBON 560 5% 1/6W	R206	RN14BK2C3301F	RES. METAL FILM 3.3K 1% 1/6W
R111	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R207	RN14BK2C1201F	RES. METAL FILM 1.2K 1% 1/6W
R112	RD14BB2C181J	RES. CARBON 180 5% 1/6W	R208	RN14BK2C3301F	RES. METAL FILM 3.3K 1% 1/6W
R113	RD14BB2C220J	RES. CARBON 22 5% 1/6W	R209	RN14BK2C1201F	RES. METAL FILM 1.2K 1% 1/6W
R114	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R210	RD14BB2C392J	RES. CARBON 3.9K 5% 1/6W
R115	RD14BB2C331J	RES. CARBON 330 5% 1/6W	R211	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R116	RD14BB2C220J	RES. CARBON 22 5% 1/6W	R212	RD14BB2C132J	RES. CARBON 1.3K 5% 1/6W
R117	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R213	RN14BK2C2201F	RES. METAL FILM 2.2K 1% 1/6W
R118	RD14BB2C331J	RES. CARBON 330 5% 1/6W	R214	RN14BK2C2001F	RES. METAL FILM 2K 1% 1/6W
R119	RD14BB2C561J	RES. CARBON 560 5% 1/6W	R215	RN14BK2C4701F	RES. METAL FILM 4.7K 1% 1/6W
R120	RD14BB2C470J	RES. CARBON 47 5% 1/6W	R216	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R121	RD14BB2C511J	RES. CARBON 510 5% 1/6W	R217	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R122	RD14BB2C511J	RES. CARBON 510 5% 1/6W	R218	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R123	RD14BB2C471J	RES. CARBON 470 5% 1/6W	R219	RN14BK2C3301F	RES. METAL FILM 3.3K 1% 1/6W
R124	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R220	RN14BK2C6201F	RES. METAL FILM 6.2K 1% 1/6W
R125	RD14BB2C751J	RES. CARBON 750 5% 1/6W	R221	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
R126	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W	R222	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R127	RD14BB2C751J	RES. CARBON 750 5% 1/6W	R223	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
R128	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W	R224	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R129	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R225	RN14BK2C4700F	RES. METAL FILM 470 1% 1/6W
R130	RD14BB2C181J	RES. CARBON 180 5% 1/6W	R226	RD14BB2C621J	RES. CARBON 620 5% 1/6W
R131	RD14BB2C181J	RES. CARBON 180 5% 1/6W	R227	RN14BK2C2201F	RES. METAL FILM 2.2K 1% 1/6W
R132	RD14BB2C181J	RES. CARBON 180 5% 1/6W	R228	RN14BK2C2201F	RES. METAL FILM 2.2K 1% 1/6W
R133	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W	R229	RN14BK2C1601F	RES. METAL FILM 1.6K 1% 1/6W
R134	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W	R230	RN14BK2C1601F	RES. METAL FILM 1.6K 1% 1/6W
R135	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W	R231	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R136	RD14BB2C511J	RES. CARBON 510 5% 1/6W	R232	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R137	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	R233	RN14BK2C1001F	RES. METAL FILM 1K 1% 1/6W
R138	RD14BB2C101J	RES. CARBON 100 5% 1/6W	R234	RN14BK2C1001F	RES. METAL FILM 1K 1% 1/6W
R139	RD14BB2C103J	RES. CARBON 10K 5% 1/6W			

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION
R235	RN14BK2C1500F	RES. METAL FILM 150 1% 1/6W	TC002	C05-0309-05	CAP. TRIMMER 40P
R236	RN14BK2C8200F	RES. METAL FILM 820 1% 1/6W	TC003	C05-0062-05	CAP. TRIMMER 6P
R237	RN14BK2C8200F	RES. METAL FILM 820 1% 1/6W	TC004	C05-0062-05	CAP. TRIMMER 6P
R238	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	TC005	C05-0031-15	CAP. TRIMMER 10P
R239	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	TC006	C05-0031-15	CAP. TRIMMER 10P
R240	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W	TP001	E40-0211-05	PIN CONNECTOR 2 P
R241	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	VR002	R12-2512-05	RES. SEMI FIXED 5K B
R242	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	VR003	NO USE	
R243	RD14BB2C103J	RES. CARBON 10K 5% 1/6W	VR004	R12-2512-05	RES. SEMI FIXED 5K B
R244	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W	VR005	R12-0539-05	RES. SEMI FIXED 200 B
R245	RD14BB2C470J	RES. CARBON 47 5% 1/6W	VR006	R12-2512-05	RES. SEMI FIXED 5K B
R246	RD14BB2C470J	RES. CARBON 47 5% 1/6W	VR007	R12-1517-05	RES. SEMI FIXED 1K B
R247	RD14BB2C470J	RES. CARBON 47 5% 1/6W	VR008	R12-1517-05	RES. SEMI FIXED 1K B
R248	RD14BB2C470J	RES. CARBON 47 5% 1/6W	VR009	R12-2512-05	RES. SEMI FIXED 5K B
R249	RD14BB2C911J	RES. CARBON 910 5% 1/6W	VR010	R12-2512-05	RES. SEMI FIXED 5K B
R250	RD14BB2C432J	RES. CARBON 4.3K 5% 1/6W	VR011	R12-1518-05	RES. SEMI FIXED 2K B
R251	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	VR012	R12-1518-05	RES. SEMI FIXED 2K B
R252	RD14BB2C102J	RES. CARBON 1K 5% 1/6W	VR013	R12-0421-05	RES. SEMI FIXED 100 B
R253	RD14BB2C471J	RES. CARBON 470 5% 1/6W	VR014	R12-0540-05	RES. SEMI FIXED 500 B
R254	RD14BB2C101J	RES. CARBON 100 5% 1/6W	VR015	NO USE	
R255	RD14BB2C331J	RES. CARBON 330 5% 1/6W	VR016	R12-5516-05	RES. SEMI FIXED 100K B
R256	RD14BB2C220J	RES. CARBON 22 5% 1/6W	VR017	R12-0539-05	RES. SEMI FIXED 200 B
R257	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W			
R258	RD14BB2C470J	RES. CARBON 47 5% 1/6W			
R259	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R260	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R261	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R262	RD14BB2C471J	RES. CARBON 470 5% 1/6W			
R263	RD14BB2C101J	RES. CARBON 100 5% 1/6W			
R264	RD14BB2C331J	RES. CARBON 330 5% 1/6W			
R265	RD14BB2C220J	RES. CARBON 22 5% 1/6W			
R266	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W			
R267	RD14BB2C470J	RES. CARBON 47 5% 1/6W			
R268	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W			
R269	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W			
R270	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R271	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R272	RD14BB2C331J	RES. CARBON 330 5% 1/6W			
R273	RD14BB2C331J	RES. CARBON 330 5% 1/6W			
R274	RD14BB2C101J	RES. CARBON 100 5% 1/6W			
R275	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R276	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W			
R277	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W			
R278	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R279	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W			
R280	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W			
R281	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W			
R282	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W			
R283	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W			
R284	RD14BB2C202J	RES. CARBON 2K 5% 1/6W			
R285	RD14BB2C202J	RES. CARBON 2K 5% 1/6W			
R286	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W			
R287	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R288	RD14BB2C220J	RES. CARBON 22 5% 1/6W			
R289	RD14BB2C101J	RES. CARBON 100 5% 1/6W			
R290	RD14BB2C331J	RES. CARBON 330 5% 1/6W			
R291	RD14BB2C220J	RES. CARBON 22 5% 1/6W			
R292	RD14BB2C301J	RES. CARBON 300 5% 1/6W			
R293	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W			
R294	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W			
R295	RD14BB2C162J	RES. CARBON 1.6K 5% 1/6W			
R296	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R297	RD14BB2C162J	RES. CARBON 1.6K 5% 1/6W			
R298	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R299	RD14BB2C2R7J	RES. CARBON 2.7 5% 1/6W			
R300	RD14BB2C331J	RES. CARBON 330 5% 1/6W			
R301	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W			
R302	RN14BK2C9102F	RES. METAL FILM 91K 1% 1/6W			
R303	RN14BK2C1003F	RES. METAL FILM 100K 1% 1/6W			
R304	RD14BB2C103J	RES. CARBON 10K 5% 1/6W			
R305	RD14BB2C103J	RES. CARBON 10K 5% 1/6W			
R306	RD14BB2C223J	RES. CARBON 22K 5% 1/6W			
R307	RN14BK2C3000F	RES. METAL FILM 300 1% 1/6W			
R308	RN14BK2C1000F	RES. METAL FILM 100 1% 1/6W			
R309	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W			
R310	RD14BB2C182J	RES. CARBON 1.8K 5% 1/6W			
R311	RD14BB2C101J	RES. CARBON 100 5% 1/6W			
R312	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R313	RD14BB2C101J	RES. CARBON 100 5% 1/6W			
R314	RD14BB2C101J	RES. CARBON 100 5% 1/6W			
R315	RD14BB2C391J	RES. CARBON 390 5% 1/6W			
R316	RD14BB2C391J	RES. CARBON 390 5% 1/6W			
R317	RD14BB2C511J	RES. CARBON 510 5% 1/6W			
R318	RD14BB2C220J	RES. CARBON 22 5% 1/6W			
R319	RD14BB2C101J	RES. CARBON 100 5% 1/6W			
R320	RD14BB2C331J	RES. CARBON 330 5% 1/6W			
R321	RD14BB2C511J	RES. CARBON 510 5% 1/6W			
R322	RD14BB2C220J	RES. CARBON 22 5% 1/6W			
R323	RD14BB2C101J	RES. CARBON 100 5% 1/6W			
R324	RD14BB2C331J	RES. CARBON 330 5% 1/6W			
R325	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R326	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
R327	RD14BB2C102J	RES. CARBON 1K 5% 1/6W			
TC001	C05-0309-05	CAP. TRIMMER 40P			

## HORIZONTAL OUTPUT AMP UNIT

### X74-1360-00

REF.NO	PARTS NO	NAME & DESCRIPTION
	E23-0512-05	TERMINAL
	F01-0849-05	HEAT SINK
	J25-5039-22	PCB (UNMOUNTED)
	J30-0605-05	SPACER
	N30-3006-41	SCREW, PAN HD M 3X6
C001	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V
C002	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C003	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C004	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C005	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C006	CC45CH2H010C	CAP. CERAMIC 1P 0.25% 500V
C007	CC45CH2H010C	CAP. CERAMIC 1P 0.25% 500V
C008	CC45CH2H030C	CAP. CERAMIC 3P 0.25% 500V
C009	CC45CH2H010C	CAP. CERAMIC 1P 0.25% 500V
C010	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C011	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V
C012	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V
C013	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V
C014	C91-0549-05	CAP. TANTALUM 1 20% 35V
C015	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C016	C91-0549-05	CAP. TANTALUM 1 20% 35V
C017	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V
C018	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C019	CE04W1C101M	CAP. ELECTRO 100 20% 16V
C020	CE04W1C101M	CAP. ELECTRO 100 20% 16V
C021	CE04W2A100M	CAP. ELECTRO 10 20% 100V
C022	CE04W2C2R2	CAP. ELECTRO 2.2 160V
C023	CK45FF1H103Z	CAP. CERAMIC 0.01 50V
C024	CC45CH1H070D	CAP. CERAMIC 7P 0.5P 50V
C025	CE04W2C3R3	CAP. ELECTRO 3.3 160V
D001	1SS132	DIODE
D002	MTZ5.1JB	DIODE ZENER 5V
D003	1SS132	DIODE
D004	1SS132	DIODE
L001	L40-1011-04	FERRI INDUCTOR 100UH
L002	L40-1011-04	FERRI INDUCTOR 100UH
L003	L40-1011-04	FERRI INDUCTOR 100UH
L004	L40-1011-04	FERRI INDUCTOR 100UH
P027	E40-0873-05	PIN CONNECTOR 8 P
P035	E40-0473-05	PIN CONNECTOR 4 P
P036	E40-0673-05	PIN CONNECTOR 6 P
Q001	2SA1323(B)	TR. SI, PNP
Q002	2SA1323(B)	TR. SI, PNP
Q003	2SA1323(B)	TR. SI, PNP
Q004	2SA3311(R)	TR. SI, PNP
Q005	2SC2912(S)	TR. SI, NPN
Q006	2SC2912(S)	TR. SI, NPN
Q007	2SA1210(S)	TR. SI, PNP
Q008	2SA1210(S)	TR. SI, PNP
Q009	2SA3311(R)	TR. SI, PNP
Q010	2SA3311(R)	TR. SI, PNP
Q011	2SA3311(R)	TR. SI, PNP
R001	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
R002	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
R003	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R004	RD14BB2C470J	RES. CARBON 47 5% 1/6W
R005	RD14BB2C152J	RES. CARBON 1.5K 5% 1/6W
R006	RD14BY2H473J	RES. CARBON 47K 5% 1/2W
R007	RD14BY2H473J	RES. CARBON 47K 5% 1/2W

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION	RES.	RES.	RES.	RES.	RES.
R008	RD14BB2C821J	CARBON	820	5%	1/6W		
R009	RD14BB2C821J	CARBON	820	5%	1/6W		
R010	RD14BB2C102J	CARBON	1K	5%	1/6W		
R011	RD14BB2C102J	CARBON	1K	5%	1/6W		
R012	RS14GB3A223J	METAL FILM	22K	5%	1W		
R013	RS14GB3A223J	METAL FILM	22K	5%	1W		
R014	RD14BB2C134J	CARBON	130K	5%	1/6W		
R015	RD14BB2C134J	CARBON	130K	5%	1/6W		
R016	RD14BY2H123J	CARBON	12K	5%	1/2W		
R017	RD14BB2C102J	CARBON	1K	5%	1/6W		
R018	RD14BB2C102J	CARBON	1K	5%	1/6W		
R019	RD14BB2C220J	CARBON	22	5%	1/6W		
R020	RD14BB2C220J	CARBON	22	5%	1/6W		
R021	RD14BB2C561J	CARBON	560	5%	1/6W		
R022	RD14BB2C561J	CARBON	560	5%	1/6W		
R023	RD14BB2C431J	CARBON	430	5%	1/6W		
R024	RD14BB2C472J	CARBON	4.7K	5%	1/6W		
R025	RD14BB2C472J	CARBON	4.7K	5%	1/6W		
R026	RD14BB2C271J	CARBON	270	5%	1/6W		
R027	RD14BB2C512J	CARBON	5.1K	5%	1/6W		

REF.NO	PARTS NO	NAME & DESCRIPTION
P059	E40-0973-05	PIN CONNECTOR 9 P
Q001	2SJ43(Q)	FET, P-CHANNEL
Q002	2SK127(Q)	FET,
Q003	DN1901	FET, DUAL SI, N-CHANNEL
Q004	2SC3354(T,S)	TR. SI, NPN
Q005	2SC3354(T,S)	TR. SI, NPN
Q006	2SA1161	TR. SI, PNP
Q007	2SA1161	TR. SI, PNP
Q008	2SA1309(Q,R)	TR. SI, PNP
Q009	2SC3066	TR. SI, NPN
Q010	2SC2671(H)	TR. SI, NPN
Q011	2SC2671(H)	TR. SI, NPN
Q012	2SC3354(T,S)	TR. SI, NPN
Q013	2SC3354(T,S)	TR. SI, NPN
Q014	2SC3354(T,S)	TR. SI, NPN
Q015	2SC3354(T,S)	TR. SI, NPN
Q016	2SC2671(H)	TR. SI, NPN
Q017	2SC3311(R)	TR. SI, NPN
Q018	2SA1309(Q,R)	TR. SI, PNP
Q019	2SK30A(O)	FET, N-CHANNEL
Q020	2SC3311(R)	TR. SI, NPN
Q021	2SA1309(Q,R)	TR. SI, PNP
Q022	2SC3311(R)	TR. SI, NPN
Q023	2SA1309(Q,R)	TR. SI, PNP
Q024	2SK30A(O)	FET, N-CHANNEL
Q025	2SA1309(Q,R)	TR. SI, PNP

## A TRIG SWITCH UNIT

### X77-1280-00

REF.NO	PARTS NO	NAME & DESCRIPTION	RES.	RES.	RES.	RES.	RES.
	J25-5039-22	PCB (UNMOUNTED)					
	L92-0110-05	BEAD CORE					
C001	C91-0502-05	CAP. METAL FILM	0.01	20%	630V		
C002	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V		
C003	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V		
C004	CE04W1E100M	CAP. ELECTRO	10	20%	25V		
C005	CE04W1E100M	CAP. ELECTRO	10	20%	25V		
C006	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C007	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V		
C008	CC45CH1H070D	CAP. CERAMIC	7P	0.5P	50V		
C009	C90-0298-05	CAP. CERAMIC	0.1	20%	12V		
C010	NO USE						
C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C012	NO USE						
C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C014	C90-0298-05	CAP. CERAMIC	0.1	20%	12V		
C015	CE04W1C330M	CAP. ELECTRO	33	20%	16V		
C016	NO USE						
C017	CE04BW1H010M	CAP. ELECTRO	1	20%	50V		
C018	C90-0298-05	CAP. CERAMIC	0.1	20%	12V		
C019	CE04W1H010M	CAP. ELECTRO	1	20%	50V		
C020	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V		
C021	CE04W1C330M	CAP. ELECTRO	33	20%	16V		
C022	CE04W1C330M	CAP. ELECTRO	33	20%	16V		
C023	CE04W1C330M	CAP. ELECTRO	33	20%	16V		
C024	CE04W1C330M	CAP. ELECTRO	33	20%	16V		
C025	NO USE						
C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C032	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C036	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C037	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C038	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C042	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C043	NO USE						
C044	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C045	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C046	NO USE						
C047	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C048	CK45FF1H103Z	CAP. CERAMIC	0.01		50V		
C049	CE04W1H3R3M	CAP. ELECTRO	3.3	20%	50V		
D001	SV03Y	DIODE					
D002	1SS132	DIODE					
D003	1SS132	DIODE					
D004	MTZ16JA	DIODE ZENER	15V				
D005	1SS132	DIODE					
D006	1SS132	DIODE					
D007	1SS132	DIODE					
D008	1SS132	DIODE					
D009	SV04Y	DIODE					
L001	L40-1011-03	FERRI INDUCTOR	100MH				
L002	L40-1011-03	FERRI INDUCTOR	100MH				
P024	E40-0273-05	PIN CONNECTOR	2 P				
P046	E40-0273-05	PIN CONNECTOR	2 P				
P047	E40-0473-05	PIN CONNECTOR	4 P				

R001	RD14BB2C510J	RES. CARBON	51	5%	1/6W		
R002	RD14BB2C101J	RES. CARBON	100	5%	1/6W		
R003	RD14BB2C101J	RES. CARBON	100	5%	1/6W		
R004	RD14BB2C510J	RES. CARBON	51	5%	1/6W		
R005	RD14BB2C103J	RES. CARBON	10K	5%	1/6W		
R006	RD14BB2C473J	RES. CARBON	47K	5%	1/6W		
R007	RD14BB2C473J	RES. CARBON	47K	5%	1/6W		
R008	RD14BB2C103J	RES. CARBON	10K	5%	1/6W		
R009	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W		
R010	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W		
R011	RN14BK2C1502F	RES. METAL FILM	15K	1%	1/6W		
R012	RN14BK2C4702F	RES. METAL FILM	47K	1%	1/6W		
R013	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W		
R014	RD14BB2C103J	RES. CARBON	10K	5%	1/6W		
R015	RD14BB2C431J	RES. CARBON	430	5%	1/6W		
R016	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R017	RD14BB2C101J	RES. CARBON	100	5%	1/6W		
R018	RD14BB2C914J	RES. CARBON	910K	5%	1/6W		
R019	RD14BB2C914J	RES. CARBON	910K	5%	1/6W		
R020	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W		
R021	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W		
R022	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R023	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R024	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W		
R025	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W		
R026	RD14BB2C470J	RES. CARBON	47	5%	1/6W		
R027	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W		
R028	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W		
R029	RD14BB2C470J	RES. CARBON	47	5%	1/6W		
R030	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W		
R031	RN14BK2C1001F	RES. METAL FILM	1K	1%	1/6W		
R032	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W		
R033	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W		
R034	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R035	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R036	RD14BB2C151J	RES. CARBON	150	5%	1/6W		
R037	RD14BB2C681J	RES. CARBON	680	5%	1/6W		
R038	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W		
R039	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W		
R040	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W		
R041	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W		
R042	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W		
R043	RD14BB2C161J	RES. CARBON	160	5%	1/6W		
R044	RD14BB2C131J	RES. CARBON	130	5%	1/6W		
R045	RD14BB2C131J	RES. CARBON	130	5%	1/6W		
R046	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R047	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R048	RD14BB2C103J	RES. CARBON	10K	5%	1/6W		
R049	RD14BB2C473J	RES. CARBON	47K	5%	1/6W		
R050	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R051	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R052	RD14BB2C561J	RES. CARBON	560	5%	1/6W		
R053	RD14BB2C561J	RES. CARBON	560	5%	1/6W		
R054	RD14BB2C220J	RES. CARBON	22	5%	1/6W		
R055	RD14BB2C470J	RES. CARBON	47	5%	1/6W		
R056	RD14BB2C133J	RES. CARBON	13K	5%	1/6W		
R057	RD14BB2C622J	RES. CARBON	6.2K	5%	1/6W		
R058	RD14BB2C202J	RES. CARBON	2K	5%	1/6W		
R059	RD14BB2C202J	RES. CARBON	2K	5%	1/6W		
R060	RD14BB2C123J	RES. CARBON	12K	5%	1/6W		
R061	RD14BB2C123J	RES. CARBON	12K	5%	1/6W		
R062	RD14BB2C103J	RES. CARBON	10K	5%	1/6W		
R063	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W		
R064	RD14BB2C103J	RES. CARBON	10K	5%	1/6W		
R065	RD14BB2C683J	RES. CARBON	68K	5%	1/6W		
R066	RD14BB2C914J	RES. CARBON	910K	5%	1/6W		
R067	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W		

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R068	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R069	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R070	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R071	RD14BB2C163J	RES. CARBON	16K	5%	1/6W
R072	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R073	RD14BB2C912J	RES. CARBON	9.1K	5%	1/6W
R074	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R075	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R076	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R077	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R078	RD14BB2C473J	RES. CARBON	47K	5%	1/6W

S001	S33-2504-05	LEVER SWITCH			
S002	S32-4008-05	LEVER SWITCH			

TC001	C05-0412-05	CAP. TRIMMER	20P		
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VR001	R01-5502-05	V.R.	100K B		
VR002	R12-3522-05	RES. SEMI FIXED	10K B		
VR003	R12-1519-05	RES. SEMI FIXED	1K B		
VR004	R12-1520-05	RES. SEMI FIXED	2K B		

## B TRIG SWITCH UNIT

### X77-1290-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	J25-5023-14	BOARD SUPPORT			
	J61-0506-05	BEAD CORE			
	L92-0110-05	CORE			
C001	CE04W1C100M	CAP. ELECTRO	10	20%	16V
C002	C91-0502-05	CAP. METAL FILM	0.01	20%	630V
C003	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C004	CC45CH1H680J	CAP. CERAMIC	68P	5%	50V
C005	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C006	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C007	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C008	CC45FCH1H070D	CAP. CERAMIC	7P	0.5P	50V
C009	NO USE				
C010	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C011	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C012	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C013	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C014	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C015	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C016	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C017	C90-0298-05	CAP. CERAMIC	0.1	20%	12V
C018	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C019	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C020	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C021	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C022	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C023	CE04W1C330M	CAP. ELECTRO	33	20%	16V
C024	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C025	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C026	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C027	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C028	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C029	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C030	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C031	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C032	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C033	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C034	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C035	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C036	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V
C037	CK45B1H102K	CAP. CERAMIC	1000P	10%	50V

D001	MTZ8.2JB	DIODE, ZENER	8.1V		
D002	SV03Y	DIODE			
D003	SV04Y	DIODE			

L001	L40-2201-03	FERRI INDUCTOR	22UH		
L002	L40-2201-03	FERRI INDUCTOR	22UH		

P043	E40-0273-05	PIN CONNECTOR	2 P		
P044	E40-0273-05	PIN CONNECTOR	2 P		
P045	E40-0473-05	PIN CONNECTOR	4 P		

P051	E40-0573-05	PIN CONNECTOR	5 P		
P058	E40-0273-05	PIN CONNECTOR	2 P		

Q001	2SC3354(T,S)	TR. SI, NPN			
Q002	DN1901	FET, DUAL SI, N-CHANNEL			
Q003	2SC3354(T,S)	TR. SI, NPN			
Q004	2SC3354(T,S)	TR. SI, NPN			
Q005	2SA1161	TR. SI, PNP			
Q006	2SA1161	TR. SI, PNP			
Q007	2SA1309(Q,R)	TR. SI, PNP			
Q008	2SC3066	TR. SI, NPN			
Q009	2SC2671(H)	TR. SI, NPN			
Q010	2SC2671(H)	TR. SI, NPN			
Q011	2SC3354(T,S)	TR. SI, NPN			

REF.NO	PARTS NO	NAME & DESCRIPTION			
Q012	2SC3354(T,S)	TR. SI, NPN			
Q013	2SC3354(T,S)	TR. SI, NPN			
Q014	2SC3354(T,S)	TR. SI, NPN			
Q015	2SC2671(H)	TR. SI, NPN			

R001	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R002	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R003	RD14BB2C510J	RES. CARBON	51	5%	1/6W
R004	RD14BB2C222J	RES. CARBON	2.2K	5%	1/6W
R005	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R006	RD14BB2C821J	RES. CARBON	820	5%	1/6W
R007	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R008	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R009	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R010	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R011	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R012	RD14BB2C431J	RES. CARBON	430	5%	1/6W
R013	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R014	RD14BB2C101J	RES. CARBON	100	5%	1/6W
R015	RD14BB2C914J	RES. CARBON	910K	5%	1/6W
R016	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R017	RN14BK2C3001F	RES. METAL FILM	3K	1%	1/6W
R018	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R019	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R020	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R021	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R022	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R023	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R024	RN14BK2C2200F	RES. METAL FILM	220	1%	1/6W
R025	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R026	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R027	RN14BK2C1501F	RES. METAL FILM	1.5K	1%	1/6W
R028	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R029	RN14BK2C2700F	RES. METAL FILM	270	1%	1/6W
R030	RD14BB2C151J	RES. CARBON	150	5%	1/6W
R031	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R032	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R033	RD14BB2C681J	RES. CARBON	680	5%	1/6W
R034	RD14BB2C432J	RES. CARBON	4.3K	5%	1/6W
R035	RD14BB2C512J	RES. CARBON	5.1K	5%	1/6W
R036	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R037	RD14BB2C472J	RES. CARBON	4.7K	5%	1/6W
R038	RD14BB2C822J	RES. CARBON	8.2K	5%	1/6W
R039	RD14BB2C161J	RES. CARBON	160	5%	1/6W
R040	RD14BB2C131J	RES. CARBON	130	5%	1/6W
R041	RD14BB2C131J	RES. CARBON	130	5%	1/6W
R042	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R043	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R044	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R045	RD14BB2C473J	RES. CARBON	47K	5%	1/6W
R046	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R047	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R048	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R049	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R050	RD14BB2C220J	RES. CARBON	22	5%	1/6W
R051	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R052	RD14BB2C333J	RES. CARBON	33K	5%	1/6W
R053	RD14BB2C333J	RES. CARBON	33K	5%	1/6W

S001	S37-2005-05	LEVER SWITCH			
S002	S37-2005-05	LEVER SWITCH			

TC001	C05-0412-05	CAP. TRIMMER	20P		
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VR001	R01-5503-05	V.R.	100KB		
VR002	R12-3522-05	RES. SEMI FIXED	10K B		
VR003	R12-1520-05	RES. SEMI FIXED	2K B		

## POWER BLANKING UNIT

### X68-1400-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E31-0762-05	LEAD WIRE WITH CONNECTOR			
	E33-0965-00	WIRE ASSY			
	F02-0414-05	HEAT SINK			
	F02-0503-14	HEAT SINK			
	F09-0506-05	PROTECTION COVER			
	F15-0727-04	HOLDER (NEON TUBE)			
	F20-0516-05	INSULATOR			
	F20-0623-05	INSULATOR			
	J21-2930-14	BRACKET FOR VR			
	J30-0605-05	SPACER			
	N09-0167-05	SCREW			
	N09-0711-05	SCREW			
	212-1018-05	TUBE (PLASTIC)			
	212-3017-05	TUBE (PLASTIC)			
C001	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C002	CK45FF1H103Z	CAP. CERAMIC	0.01		50V
C003	CE04W1A101M	CAP. ELECTRO	100	20%	10V
C004	CE04W1J330M	CAP. ELECTRO	33	20%	63V
C005	CE04W2C3R3	CAP. ELECTRO	3.3		160V
C006	CE04W2C3R3	CAP. ELECTRO	3.3		160V
C007	CE04W1C330M	CAP. ELECTRO	33	20%	16V

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION	REF.NO	PARTS NO	NAME & DESCRIPTION
C008	C91-0549-05	CAP. TANTALUM 1 20% 35V	P027	E40-0873-05	PIN CONNECTOR 8 P
C009	CE04W1E101M	CAP. ELECTRO 100 20% 25V	P028	E40-0473-05	PIN CONNECTOR 4 P
C010	CE04W1E101M	CAP. ELECTRO 100 20% 25V	P029	E40-0703-05	PIN CONNECTOR 7 P
C011	CE04W1A221M	CAP. ELECTRO 220 20% 10V	P030	E40-0746-05	PIN CONNECTOR 7 P
C012	CE04W1V100M	CAP. ELECTRO 10 20% 35V	P031	NO USE	
C013	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	P032	E40-0273-05	PIN CONNECTOR 2 P
C014	CE04W1V470M	CAP. ELECTRO 47 20% 35V	P033	E40-0332-05	PIN CONNECTOR 3 P
C015	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	P034	E40-0273-05	PIN CONNECTOR 2 P
C016	CK45FF1H103Z	CAP. CERAMIC 0.01 50V			
C017	CC45CH1H101J	CAP. CERAMIC 100P 5% 50V	P063	E40-0673-05	PIN CONNECTOR 6 P
C018	CC45CH1H101J	CAP. CERAMIC 100P 5% 50V			
C019	CC45SL1H681J	CAP. CERAMIC 680P 5% 50V			
C020	CC45SL1H681J	CAP. CERAMIC 680P 5% 50V			
C023	C90-0298-05	CAP. CERAMIC 0.1 20% 12V	PL001	B30-0927-15	LAMP
C024	CC45CH2H0R5C	CAP. CERAMIC 0.5P 0.25P 500V	PL002	B30-0927-15	LAMP
C025	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V	PL003	B30-0927-15	LAMP
C026	C91-0549-05	CAP. TANTALUM 1 20% 35V	PL004	B30-0927-15	LAMP
C027	CC45CH2H030C	CAP. CERAMIC 3P 0.25P 500V	Q001	2SC2591(Q,R)	TR. SI, NPN
C028	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V	Q002	2SC1505(L)	TR. SI, NPN
C029	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	Q003	2SB633(E)	TR. SI, PNP
C030	CE04W2C3R3	CAP. ELECTRO 3.3 160V	Q004	2SD613(E)	TR. SI, NPN
C031	CK45B2H472K	CAP. CERAMIC 4700P 10% 500V	Q005	2SB633(E)	TR. SI, PNP
C032	CE04W1A221M	CAP. ELECTRO 220 20% 10V	Q006	2SC1505(L)	TR. SI, NPN
C033	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	Q007	2SC3311(R)	TR. SI, NPN
C034	CE04W1E101M	CAP. ELECTRO 100 20% 25V	Q008	2SC1505(L)	TR. SI, NPN
C035	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	Q009	2SC3311(R)	TR. SI, NPN
C036	C91-0580-05	CAP. CERAMIC 0.01 0.25P 3KV	Q010	2SA1309(Q,R)	TR. SI, PNP
C037	C91-0580-05	CAP. CERAMIC 0.01 0.25P 3KV	Q011	2SC3354(T,S)	TR. SI, NPN
C038	C91-0580-05	CAP. CERAMIC 0.01 0.25P 3KV	Q012	2SC3354(T,S)	TR. SI, NPN
C039	C91-0580-05	CAP. CERAMIC 0.01 0.25P 3KV	Q013	2SA1323(B)	TR. SI, PNP
C040	CK45E3F102P	CAP. CERAMIC 1000P 3.1K	Q014	2SC3311(R)	TR. SI, NPN
C041	CQ93M1H154K	CAP. MYLAR 0.15 10% 50V	Q015	2SC3315(C,D)	TR. SI, NPN
C042	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	Q016	2SC3315(C,D)	TR. SI, NPN
C043	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	Q017	2SC3315(C,D)	TR. SI, NPN
C044	CE04W1E470M	CAP. ELECTRO 47 20% 25V	Q018	2SC2912(S)	TR. SI, NPN
C045	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	Q019	2SA1210(S)	TR. SI, PNP
C046	CE04W1E470M	CAP. ELECTRO 47 20% 25V	Q020	2SC2910(S,T)	TR. SI, NPN
C047	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	Q021	2SA1208(S,T)	TR. SI, PNP
C048	CE04W1E470M	CAP. ELECTRO 47 20% 25V	Q022	2SC2910(S,T)	TR. SI, NPN
C049	CQ93M1H472K	CAP. MYLAR 4700P 10% 50V	Q023	2SC2910(S,T)	TR. SI, NPN
C050	CE04W1E470M	CAP. ELECTRO 47 20% 25V	Q024	2SC3311(R)	TR. SI, NPN
C051	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	Q025	2SC3311(R)	TR. SI, NPN
C052	C91-0580-05	CAP. CERAMIC 0.01 0.25P 3KV	Q026	2SA1309(Q,R)	TR. SI, PNP
C053	C91-0580-05	CAP. CERAMIC 0.01 0.25P 3KV	Q027	2SK192A-BL	FET, N-CHANNEL
C054	CK45E3D102P	CAP. CERAMIC 1000P 2K	Q028	2SD613(E)	TR. SI, NPN
C055	CK45B2H222K	CAP. CERAMIC 2200P 10% 500V	R001	RD14BB2C512J	RES. CARBON 5.1K 5% 1/6W
C059	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R002	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
C060	CK45FF1H103Z	CAP. CERAMIC 0.01 50V	R003	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W
C061	CE04W1C470M	CAP. ELECTRO 47 20% 16V	R004	RD14BB2C101J	RES. CARBON 100 5% 1/6W
D001	1SS132	DIODE	R005	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
D002	MTZ12JC	DIODE, ZENER 12V	R006	RN14BK2C1303F	RES. METAL FILM 130K 1% 1/6W
D003	MTZ12JC	DIODE, ZENER 12V	R007	RN14BK2C5601F	RES. METAL FILM 5.6K 1% 1/6W
D004	MTZ3.3JA	DIODE, ZENER 3.2V	R008	RD14BB2C561J	RES. CARBON 560 5% 1/6W
D005	1SS132	DIODE	R009	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W
D008	1SS132	DIODE	R010	RN14BK2C5101F	RES. METAL FILM 5.1K 1% 1/6W
D009	MTZ5.1JB	DIODE ZENER 5V	R011	RN14BK2C5101F	RES. METAL FILM 5.1K 1% 1/6W
D010	1SS83	DIODE	R012	RN14BK2C1000F	RES. METAL FILM 100 1% 1/6W
D011	1SS83	DIODE	R013	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W
D012	W06C	DIODE	R014	RD14BB2C561J	RES. CARBON 560 5% 1/6W
D013	W06C	DIODE	R015	RN14BK2C1201F	RES. METAL FILM 1.2K 1% 1/6W
D014	W06C	DIODE	R016	RN14BK2C3901F	RES. METAL FILM 3.9K 1% 1/6W
D015	W06C	DIODE	R017	RD14BB2C561J	RES. CARBON 560 5% 1/6W
D016	1SS132	DIODE	R018	RD14BB2C222J	RES. CARBON 2.2K 5% 1/6W
D017	1SS132	DIODE	R019	RN14BK2C2200F	RES. METAL FILM 220 1% 1/6W
D018	UZ-3.0B	DIODE, ZENER 3.0V	R020	RN14BK2C5101F	RES. METAL FILM 5.1K 1% 1/6W
D019	UZ-6.2BL	DIODE, ZENER 6.2V	R021	RD14BB2E100J	RES. CARBON 10 5% 1/4W
D020	1SS132	DIODE	R022	RD14BK2C1302F	RES. METAL FILM 13K 1% 1/6W
D021	1SS132	DIODE	R023	RN14BK2C8201F	RES. METAL FILM 8.2K 1% 1/6W
IC001	NJM4558D	IC	R024	RD14BB2C472J	RES. CARBON 4.7K 5% 1/6W
IC002	NJM4558D	IC	R025	RD14BB2C223J	RES. CARBON 22K 5% 1/6W
IC003	LM340LAZ5.0	IC, REGULATORY	R026	RD14BB2C223J	RES. CARBON 22K 5% 1/6W
L001	L40-1011-04	FERRI INDUCTOR 100UH	R027	RD14BB2C103J	RES. CARBON 10K 5% 1/6W
L002	L40-1011-04	FERRI INDUCTOR 100UH	R028	RD14BB2C512J	RES. CARBON 5.1K 5% 1/6W
L003	L40-1011-04	FERRI INDUCTOR 100UH	R029	RD14BB2C512J	RES. CARBON 5.1K 5% 1/6W
L004	L40-1011-04	FERRI INDUCTOR 100UH	R030	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
L005	L40-1011-04	FERRI INDUCTOR 100UH	R031	RD14BB2C681J	RES. CARBON 680 5% 1/6W
L006	L40-1011-03	FERRI INDUCTOR 100MH	R032	RN14BK2C2201F	RES. METAL FILM 2.2K 1% 1/6W
L007	L40-1011-04	FERRI INDUCTOR 100UH	R033	RN14BK2C9101F	RES. METAL FILM 9.1K 1% 1/6W
L008	L40-1011-04	FERRI INDUCTOR 100UH	R034	RD14BB2C510J	RES. CARBON 51 5% 1/6W
NL001	NE-2B	NEON LAMP	R035	RD14BB2C510J	RES. CARBON 51 5% 1/6W
NL002	NE-2B	NEON LAMP	R036	RD14BB2C101J	RES. CARBON 100 5% 1/6W
NL003	NE-2B	NEON LAMP	R037	RD14BB2C101J	RES. CARBON 100 5% 1/6W
NL004	NE-2B	NEON LAMP	R038	RD14BB2C332J	RES. CARBON 3.3K 5% 1/6W
P022	E40-0773-05	PIN CONNECTOR 7 P	R039	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
P023	E40-0473-05	PIN CONNECTOR 4 P	R040	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
P024	NO USE		R041	RD14BB2E751J	RES. CARBON 750 5% 1/4W
P025	E40-0273-05	PIN CONNECTOR 2 P	R042	RD14BB2C242J	RES. CARBON 2.4K 5% 1/6W
P026	E40-0573-05	PIN CONNECTOR 5 P	R043	NO USE	
			R044	RD14BB2C361J	RES. CARBON 360 5% 1/6W
			R045	RD14BB2C221J	RES. CARBON 220 5% 1/6W
			R046	RD14BB2C272J	RES. CARBON 2.7K 5% 1/6W
			R047	RD14BB2C622J	RES. CARBON 6.2K 5% 1/6W
			R048	RD14BB2C102J	RES. CARBON 1K 5% 1/6W
			R049	RD14BB2C753J	RES. CARBON 75K 5% 1/6W
			R050	RD14BB2C124J	RES. CARBON 120K 5% 1/6W
			R051	RD14BB2C562J	RES. CARBON 5.6K 5% 1/6W

# PARTS LIST

REF.NO	PARTS NO	NAME & DESCRIPTION			
R052	RD14BB2C132J	RES. CARBON	1.3K	5%	1/6W
R053	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R054	RD14BB2C244J	RES. CARBON	240K	5%	1/6W
R055	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R056	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R057	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R058	RD14BB2C124J	RES. CARBON	120K	5%	1/6W
R059	RD14BB2C470J	RES. CARBON	47	5%	1/6W
R060	RD14BB2C332J	RES. CARBON	3.3K	5%	1/6W
R061	RD14BB2C561J	RES. CARBON	560	5%	1/6W
R062	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R063	RD14BB2C683J	RES. CARBON	68K	5%	1/6W
R064	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R065	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R066	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R067	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R068	RN14BK2C6202F	RES. METAL FILM	62K	1%	1/6W
R069	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R070	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R071	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R072	NO USE				
R073	RD14BB2C680J	RES. CARBON	68	5%	1/6W
R074	R92-0793-05	RES. FIXED	15M	5%	1/2W
R075	R92-1119-05	RES. METAL GLAZE FILM			
R076	R92-0778-05	RES. FIXED	7.5M	5%	1W
R077	R92-1052-05	RES. FIXED	4.3M	5%	1W
R078	R92-0755-05	RES. FIXED	3M	5%	1/2W
R079	R92-0756-05	RES. FIXED	47M	5%	1/2W
R080	RD14BB2C562J	RES. CARBON	5.6K	5%	1/6W
R081	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R082	RD14BB2C302J	RES. CARBON	3K	5%	1/6W
R083	RD14BB2C102J	RES. CARBON	1K	5%	1/6W
R084	RD14BB2C221J	RES. CARBON	220	5%	1/6W
R085	NO USE				
R086	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R087	RD14BB2C104J	RES. CARBON	100K	5%	1/6W
R088	RD14BB2C103J	RES. CARBON	10K	5%	1/6W
R091	RD14BB2C101J	RES. CARBON	100	5%	1/6W
TC001	C05-0405-05	CAP. TRIMMER	20P		
TC002	C05-0439-05	CAP. TRIMMER	40P		
TC003	C05-0438-05	CAP. TRIMMER	2P		
VR001	R12-1028-05	RES. SEMI FIXED	4.7K	B	
VR002	R12-3041-05	RES. SEMI FIXED	10K	B	
VR003	R12-3042-05	RES. SEMI FIXED	47K	B	
VR004	R05-8001-05	V.R.	3M	B	
VR005	R03-3502-15	V.R.	10K	B	
VR006	R23-1501-05	V.R.	1K	B	

## FILTER UNIT

### X70-1020-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
	E18-0351-05	INLET	3	P	
	E23-0503-05	TERMINAL			
	J25-5038-22	PCB (UNMOUNTED)			
C001	C91-0551-05	CAP. POLYESTER	0.22	10%	630V
C002	C91-0575-05	CAP. CERAMIC	1000P		630V
C003	C91-0575-05	CAP. CERAMIC	1000P		630V
C004	CE04W1H010M	CAP. ELECTRO	1	20%	50V
D001	1SS132	DIODE			
IC001	ON3101	PHOTO COUPLER			
L001	L33-0808-05	CHOKE COIL			
P024	E40-0273-05	PIN CONNECTOR	2	P	
R001	RD14BY2H224J	RES. CARBON	220K	5%	1/2W
R002	RC05GF2H225J	RES. SOLID	2.2M	5%	1/2W

## ASTIG UNIT

### X81-1430-00

REF.NO	PARTS NO	NAME & DESCRIPTION			
J063	J25-5038-22	PCB (UNMOUNTED)			
	E31-2467-15	LEAD WIRE WITH CONNECTOR			
VR008	R12-3526-05	RES. SEMI FIXED	10K	B	
VR009	R12-5519-05	RES. SEMI FIXED	150K	B	

## SWITCHING POWER SUPPLY

### W02-0413-05

REF. NO	PARTS NO	NAME & DESCRIPTION			
D1	DBA20G	Diode			
D2	DFA01	Diode			
D3	DTA-10ER	Triac			
D4	DS442X	Diode			
D5	GFD10E	Diode			
D6	GFD10E	Diode			
D7	GFD10G	Diode			
D8	HZ3.6CP	Diode Zener			
D9	GZA6.2Z	Diode Zener			
Q1	2SC536KNP(F)	Transistor			
IC1	STK7308	IC			
IC2	STK732	IC			
L1	L19-0415-08	Line filter			
L2	L19-0414-08	Pulse Transformer			
L3	L33-0809-08	Coil			20μH
L4	L33-0810-08	Coil			2.3μH
L5	L33-0809-08	Coil			20μH
L6	L40-4791-14	Ferri-inductor			4.7μH
L7	L40-4791-14	Ferri-inductor			4.7μH
L8	L40-4791-14	Ferri-inductor			4.7μH
C1	C91-0599-08	Polyester cap	0.22μF		400V
C2	C91-0597-08	Ceramic cap	2200pF		250V
C3	C91-0597-08	Ceramic cap	2200pF		250V
C4	C91-0597-08	Ceramic cap	2200pF		250V
C5	C91-0597-08	Ceramic cap	2200pF		250V
C6	C90-0925-08	Electrolytic cap	100μF		400V
C7	C90-0926-08	Electrolytic cap	4.7μF		50V
C8	C90-0927-08	Electrolytic cap	10μF		50V
C9	C90-0928-08	Electrolytic cap	47μF		25V
C10	CK45B1H103K	Ceramic cap	0.01μF		50V
C11	C91-0598-08	Ceramic cap	0.001μF		1kV
C12	C90-0929-08	Electrolytic cap	470μF		16V
C13	C90-0930-08	Electrolytic cap	1000μF		10V
C14	C90-0929-08	Electrolytic cap	470μF		16V
C15	C90-0931-08	Electrolytic cap	220μF		35V
C16	C90-0932-08	Electrolytic cap	100μF		63V
C17	C90-0933-08	Electrolytic cap	22μF		160V
C18	C90-0934-08	Electrolytic cap	220μF		16V
C19	C90-0931-08	Electrolytic cap	220μF		35V
C20	C90-0935-08	Electrolytic cap	22μF		50V
C21	C90-0936-08	Electrolytic cap	10μF		100V
C22	C90-0933-08	Electrolytic cap	22μF		160V
C23	C91-0600-08	Ceramic cap	0.01μF		630V
C24	C91-0598-08	Ceramic cap	0.001μF		1kV
C25	C91-0598-08	Ceramic cap	0.001μF		1kV
C26	C90-0937-08	Electrolytic cap	22μF		16V
R1	R92-1111-08	Widing res	10Ω		3W
R2	R92-1112-08	Widing res	2Ω		3W
R3	RD14BB2E910J	Carbon res	91Ω	±5%	1/4W
R4	R92-1113-08	Metal oxide res	220kΩ		1W
R5	RD14BB2E562J	Carbon res	5.6kΩ	±5%	1/4W
R6	RD14BB2E103J	Carbon res	10kΩ	±5%	1/4W
R7	R92-1114-08	Metal oxide res	33Ω		1W
R8	RD14BB2E102J	Carbon res	1kΩ	±5%	1/4W
R9	RD14BB2E100J	Carbon res	10Ω	±5%	1/4W
R12	RN14BK2E2201F	Metal film	2.2kΩ	±1%	1/4W
VR1	R12-3532-08	Semi-fixed res	10kΩ		
	E40-7011-08	Pin connector	3P		
	E40-7012-08	Pin connector	7P		
	F20-0643-08	Insulating sheet	(STK7308)		
	F20-0644-08	Insulating sheet	(STK732)		



# VOLTAGES

The voltages are measured on each schematic diagram as follows;

## TEST EQUIPMENT

Digital multimeter : DL-720 (TRIO)  
Oscilloscope : 475A (TEKTRONIX)  
Sine wave generator : SG-502 (TEKTRONIX)

## CONTROL SETTINGS

A INTENSITY	Midrange
FOCUS	Midrange
AC-GND-DC	GND for voltage measurement DC for waveform measurement
◆ POSITION	Midrange
CH1, CH2 × 5 GAIN	OFF
CH1, CH2 VARIABLE	CAL
CH1, CH2 VOLTS/DIV	0.2 V
CH2 INV	OFF
V. MODE	Unless otherwise specified CH1
20 MHz BW	OFF
A, B COUPLING	AC
A, B SLOPE	+
TRIG. MODE	AUTO
HOLDOFF	NORM
A SWEEP TIME/DIV	0.2 ms
B SWEEP TIME/DIV	50 $\mu$ s
A. VARIABLE	CAL
◀ ▶ POSITION	Midrange
HORIZ DISPLAY	A
X10 MAG	OFF

## NOTE:

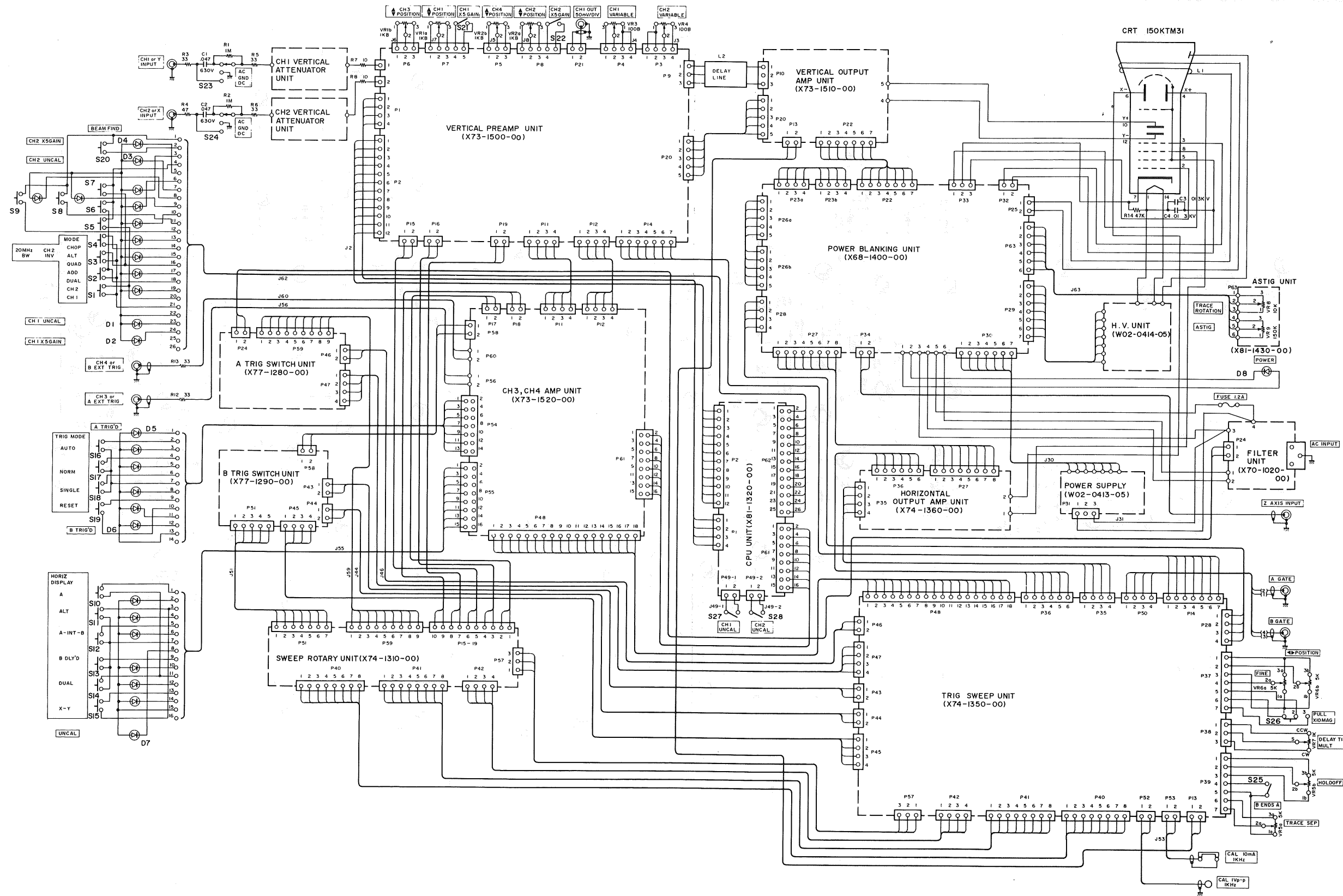
In differential circuit, the voltages and waveforms are shown only CH1 and CH3.

## Voltage Measurements

Voltage measurements are taken with no signal applied and the trace positioned to the center horizontal graticule line. The digital multimeter common should be connected to chassis ground at the nearest measurement point.



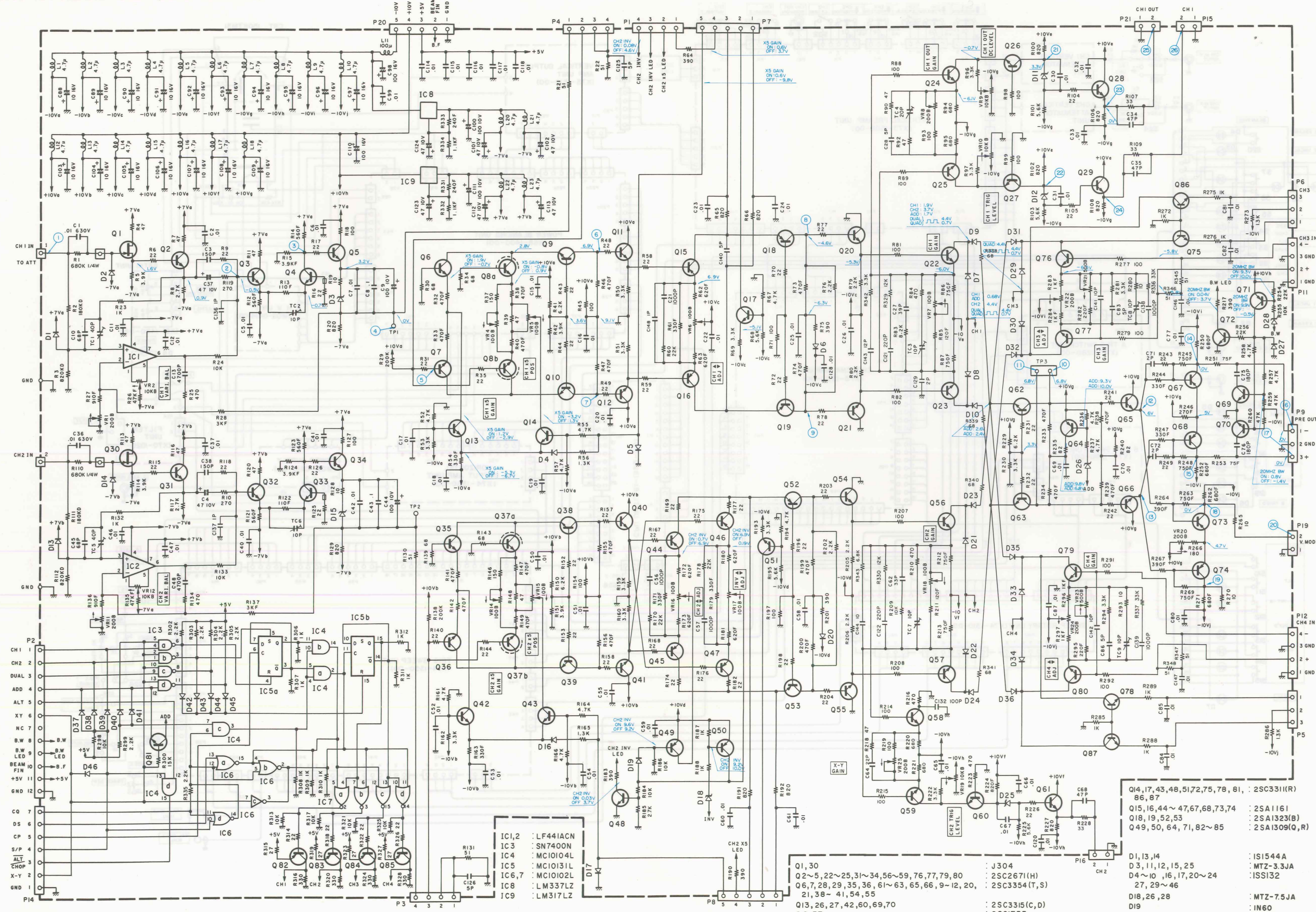
# SCHEMATIC DIAGRAM





# SCHEMATIC DIAGRAM

## VERTICAL PREAMP UNIT (X73-1500-00)



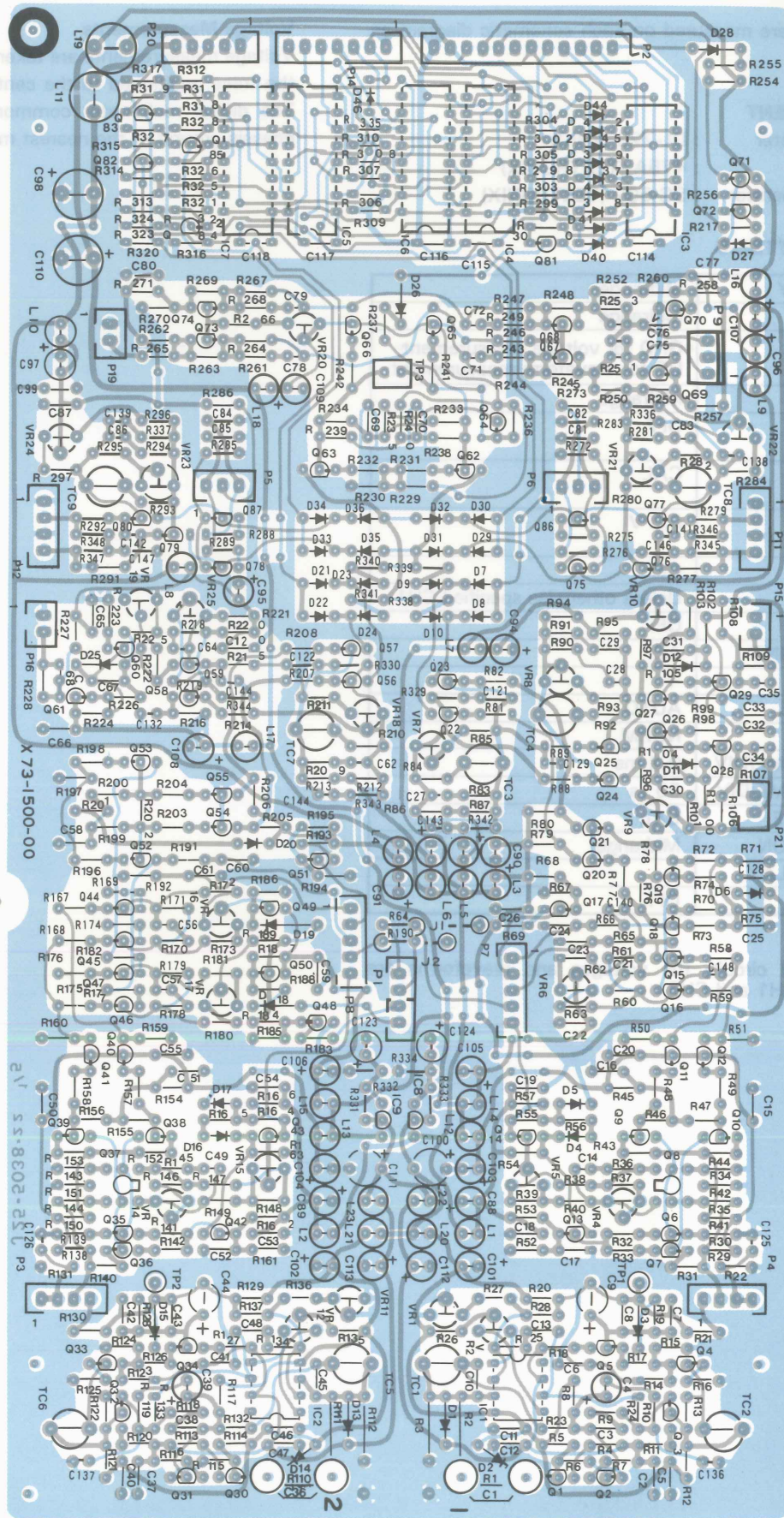
- IC1,2 : LF441ACN
- IC3 : SN7400N
- IC4 : MC10104L
- IC5 : MC10131L
- IC6,7 : MC10102L
- IC8 : LM337LZ
- IC9 : LM317LZ

- Q1,30 : J304
- Q2~5,22~25,31~34,56~59,76,77,79,80 : 2SC2671(H)
- Q6,7,28,29,35,36,61~63,65,66,9~12,20,21,38~41,54,55 : 2SC3354(T,S)
- Q13,26,27,42,60,69,70 : 2SC3315(C,D)
- Q8,37 : 2SC1733

- Q14,17,43,48,51,72,75,78,81 : 2SC3311(R)
- 85,87
- Q15,16,44~47,67,68,73,74 : 2SA1161
- Q18,19,52,53 : 2SA1323(B)
- Q49,50,64,71,82~85 : 2SA1309(O,R)
- D1,13,14 : IS1544A
- D3,11,12,15,25 : MTZ-3.3JA
- D4~10,16,17,20~24,27,29~46 : ISS132
- D18,26,28 : MTZ-7.5JA
- D19 : IN60

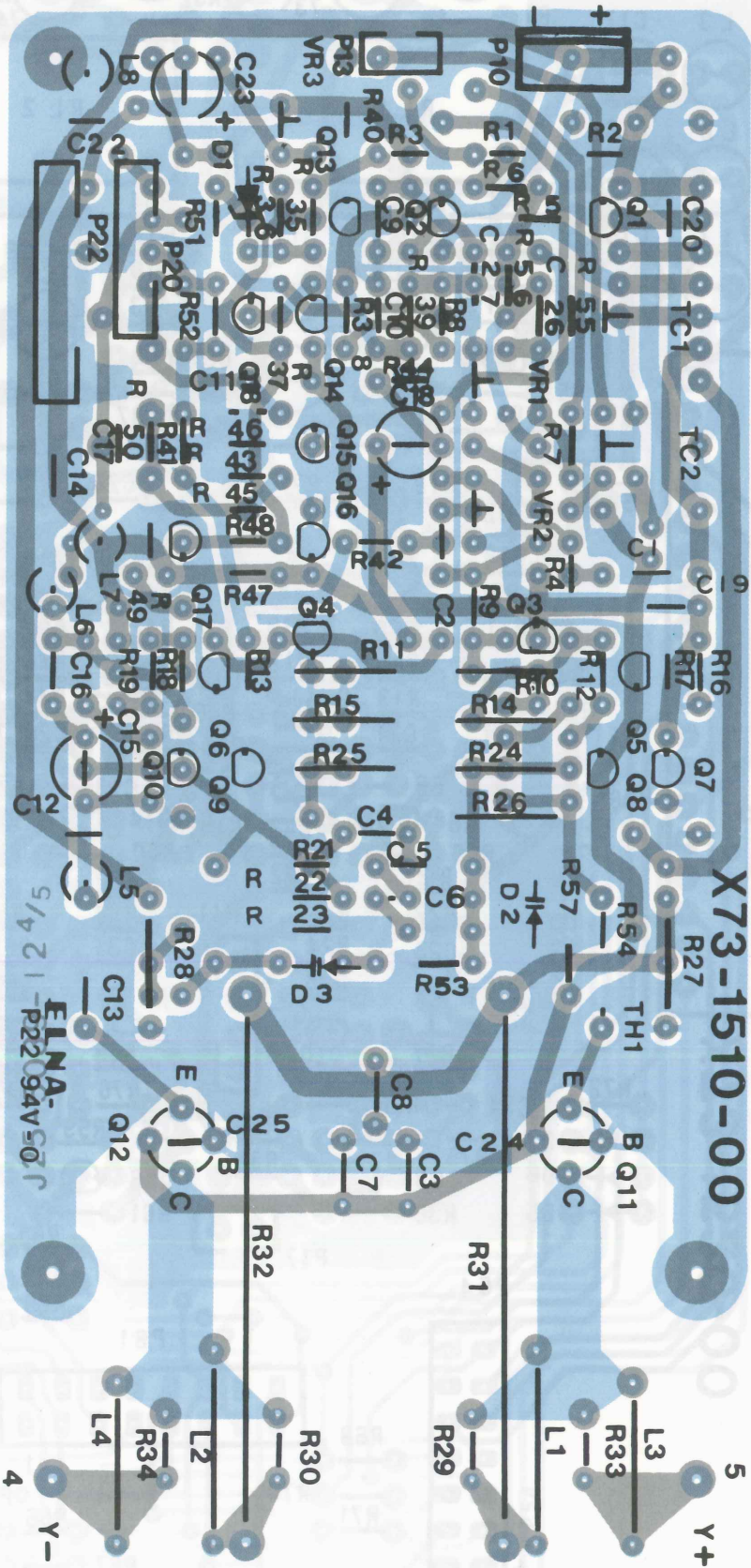


# PC BOARD PREAMP UNIT (X73-1500-00)





PC BOARD VERTICAL OUTPUT AMP UNIT (X73-1510-00)



X73-1510-00

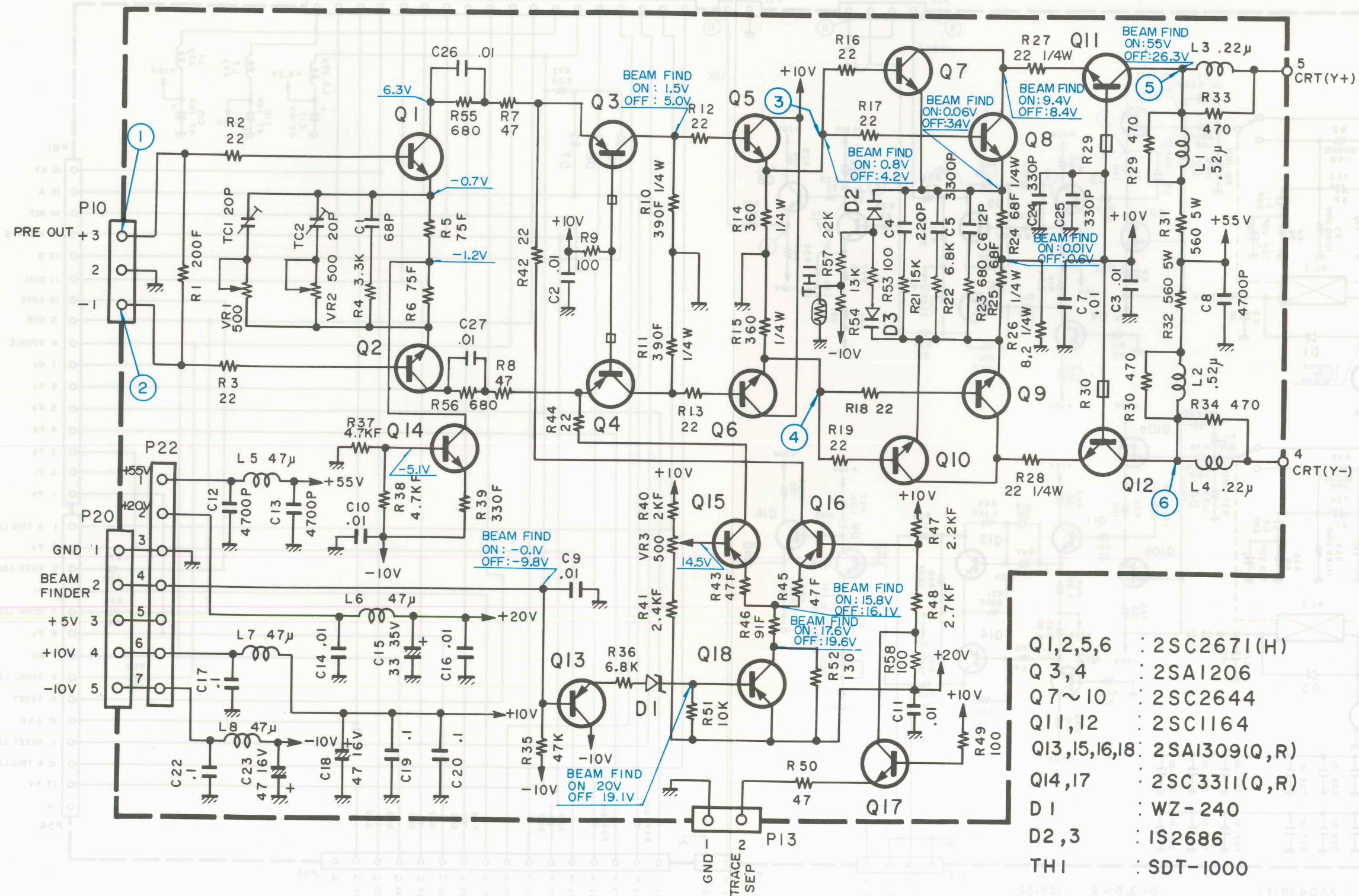
ELNA  
5/4 21 P22 94V50T



# SCHEMATIC DIAGRAM

VERTICAL OUTPUT AMP UNIT (X73-1510-00)

(100-0587-57X) THRU 99A AND 99C

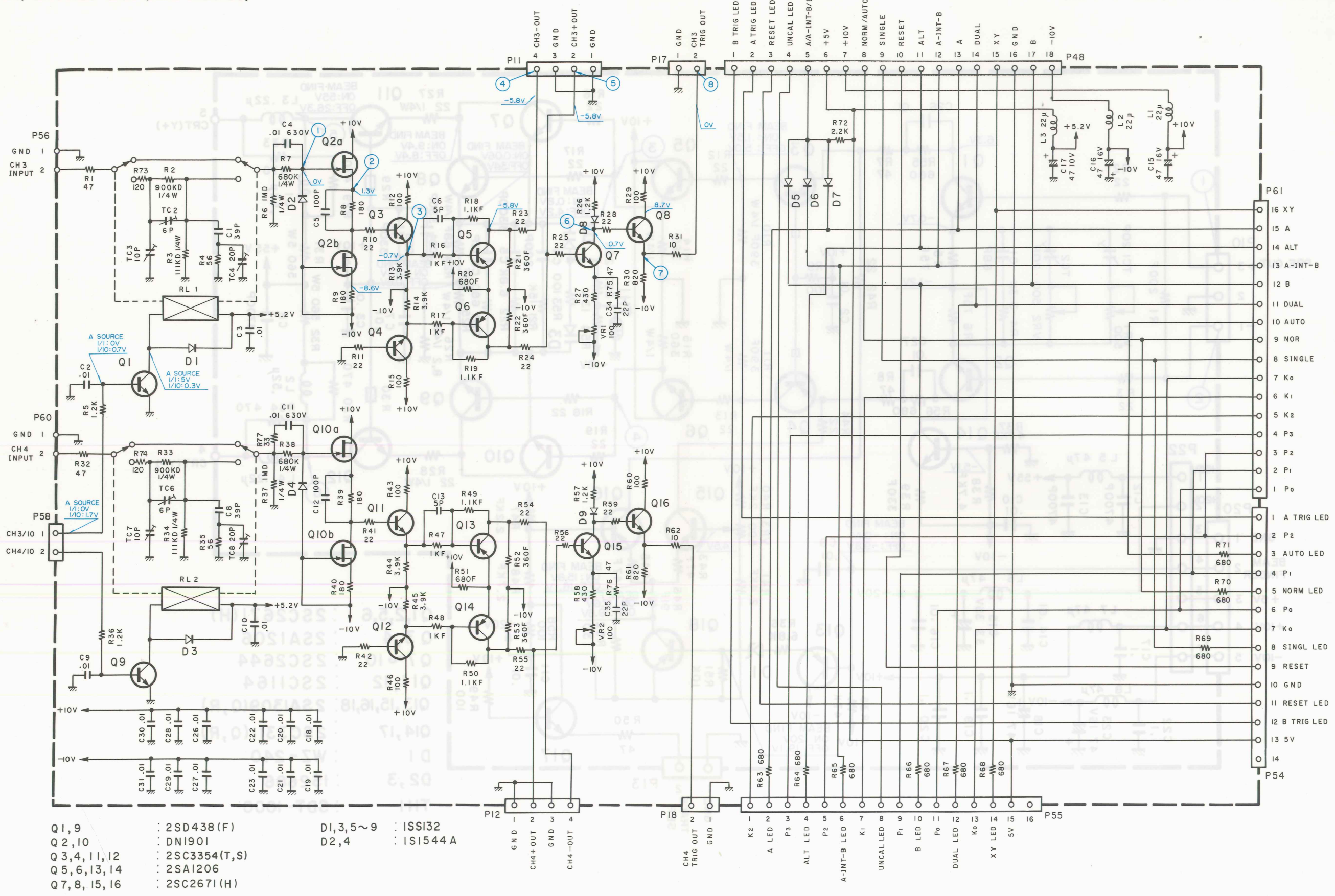




# SCHEMATIC DIAGRAM

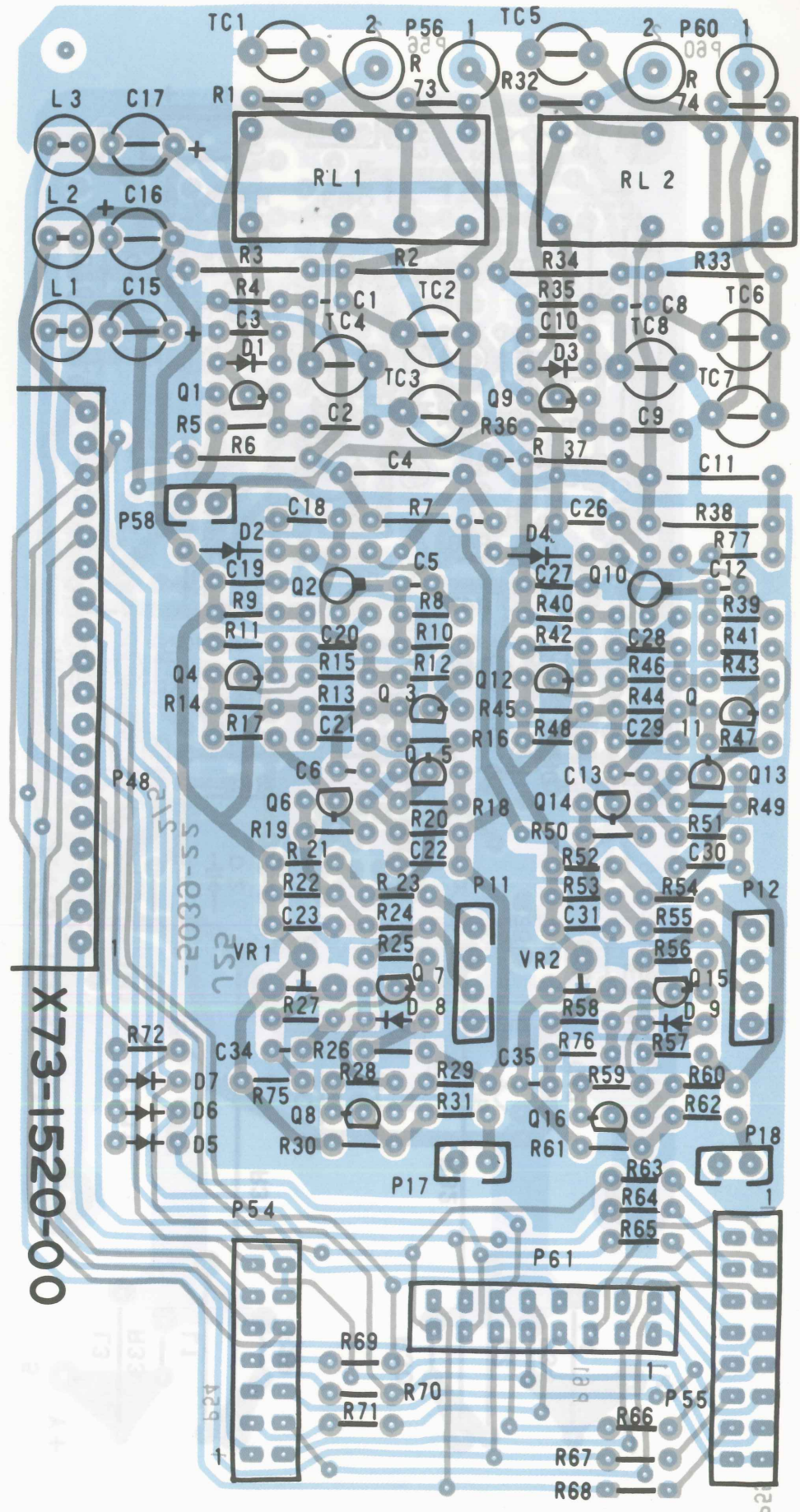
CH3, CH4 AMP UNIT (X73-1520-00)

VERTICAL OUTPUT AMP UNIT (X73-1510-00)

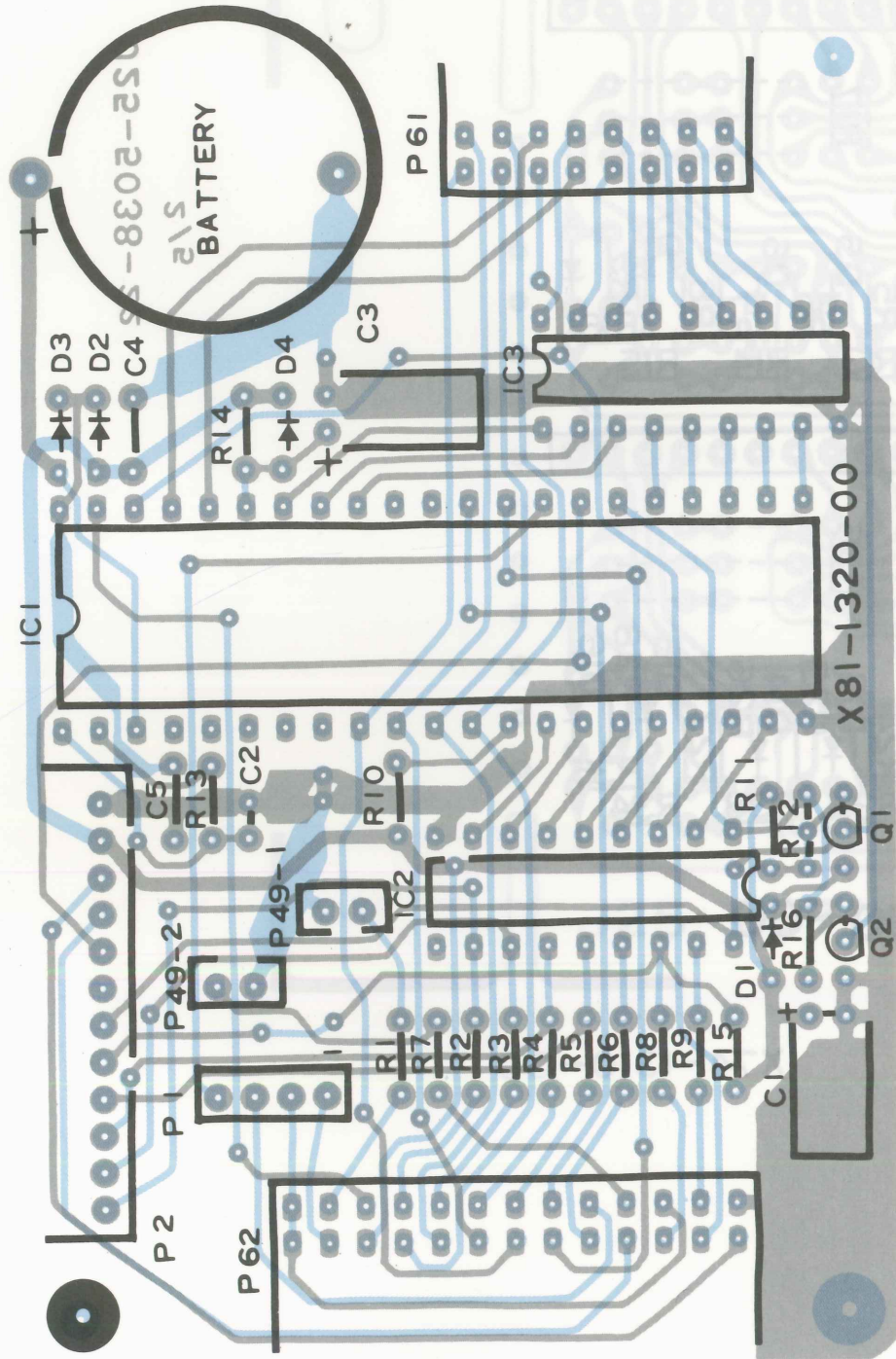




# PC BOARD CH3, CH4 AMP UNIT (X73-1520-00)



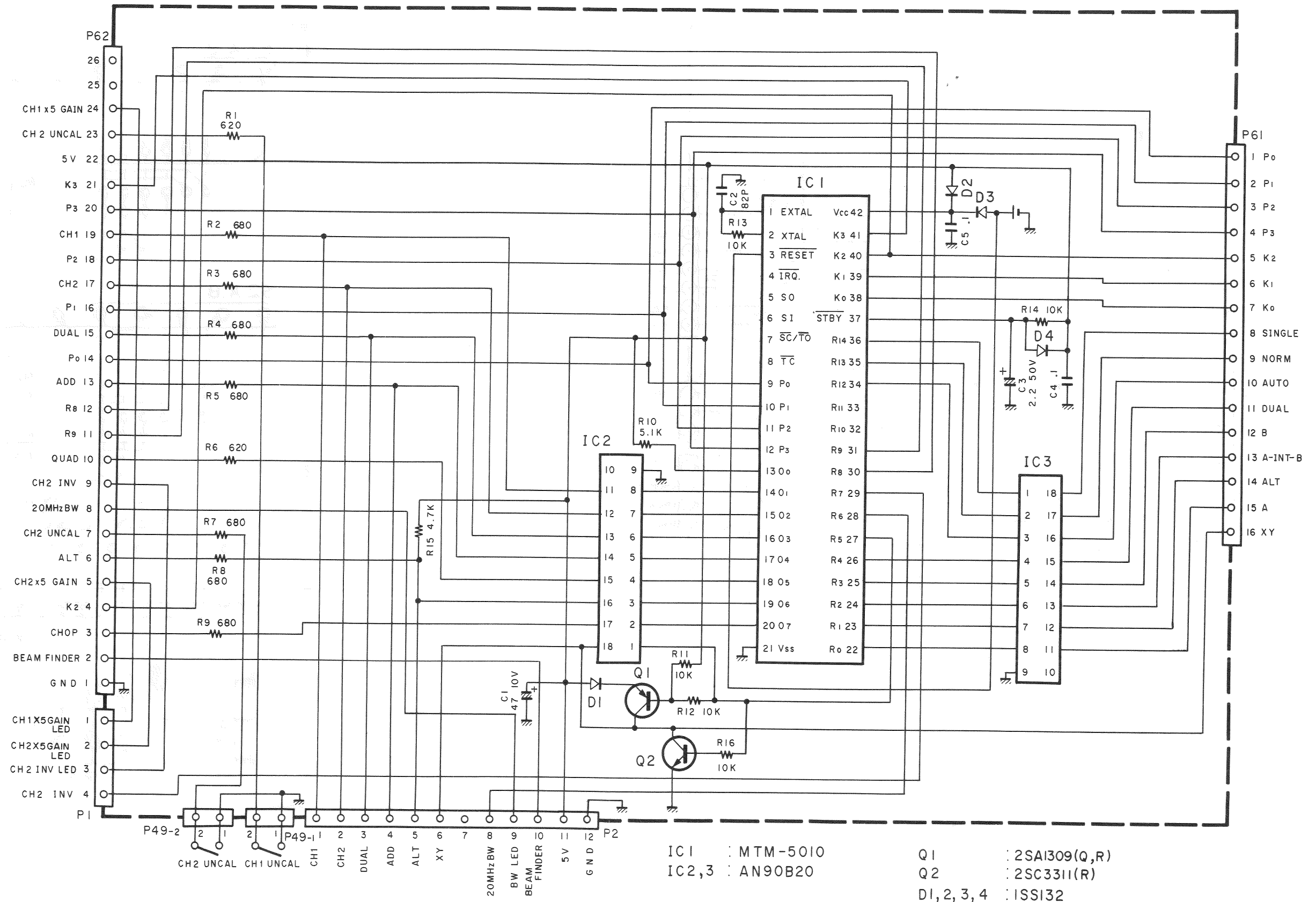
PC BOARD CPU UNIT (X81-1320-00)





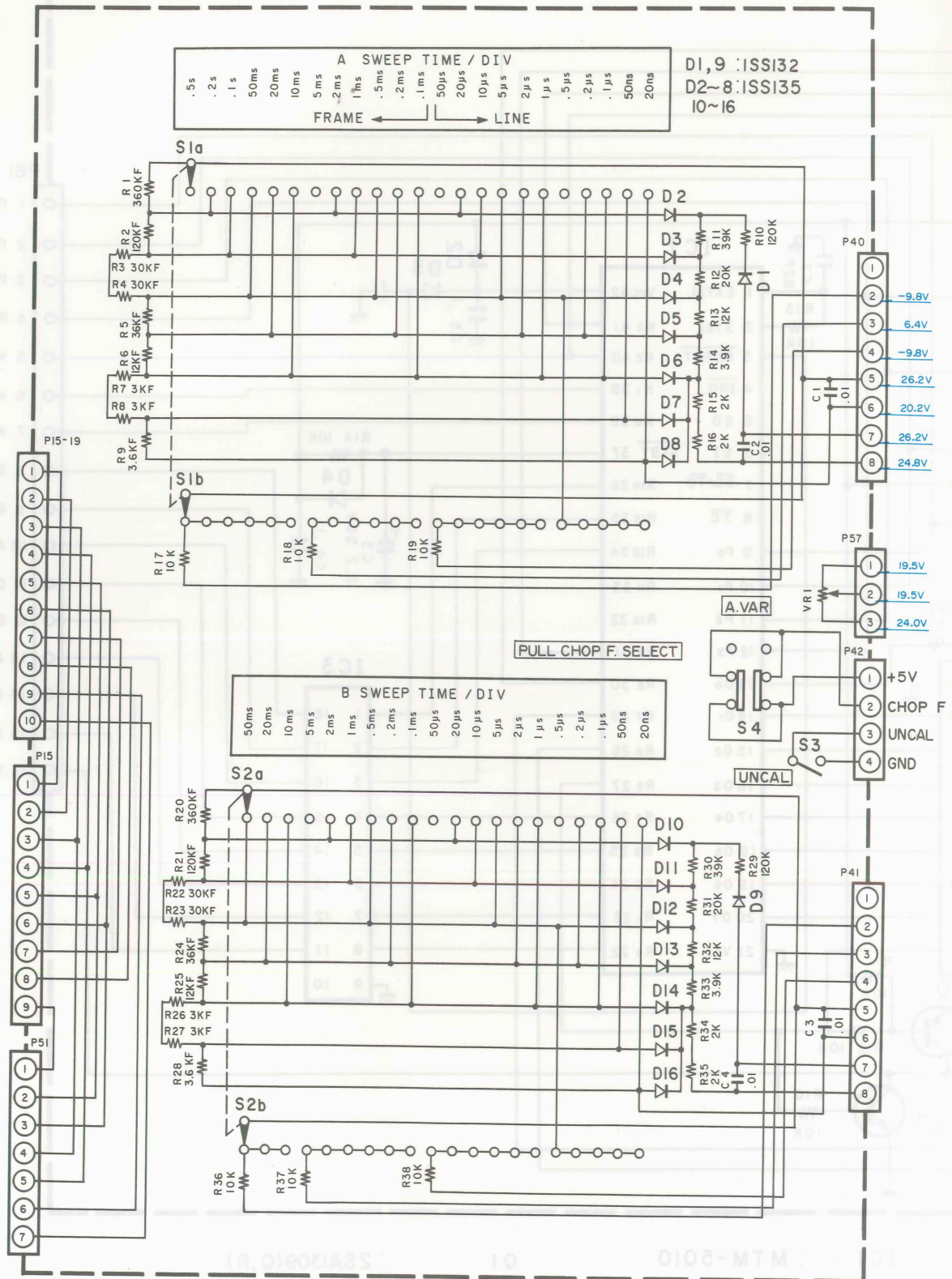
# SCHEMATIC DIAGRAM

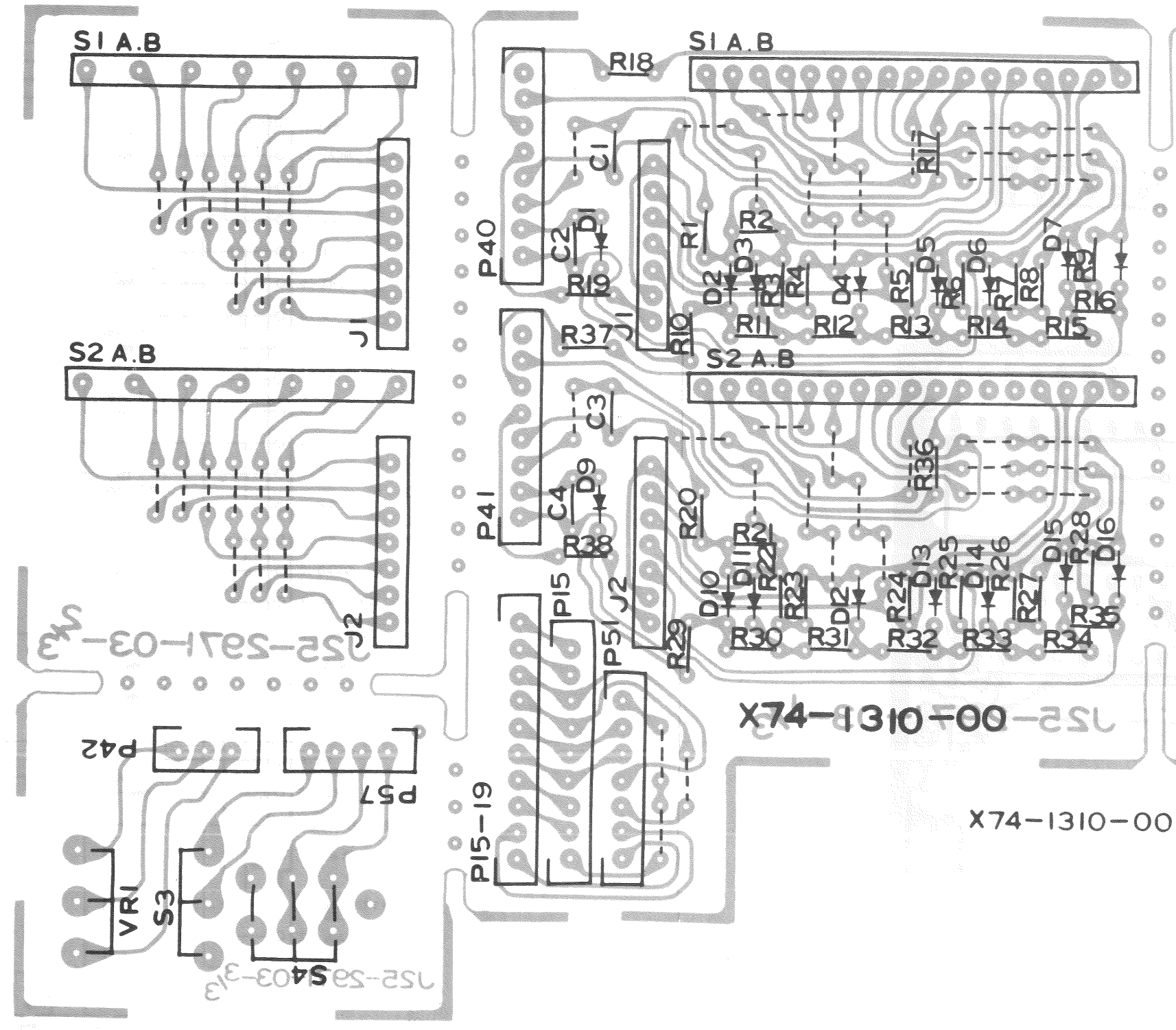
CPU UNIT (X81-1320-00)



# SCHEMATIC DIAGRAM

## SWEEP ROTARY UNIT (X74-1310-00)





152-521-03-3

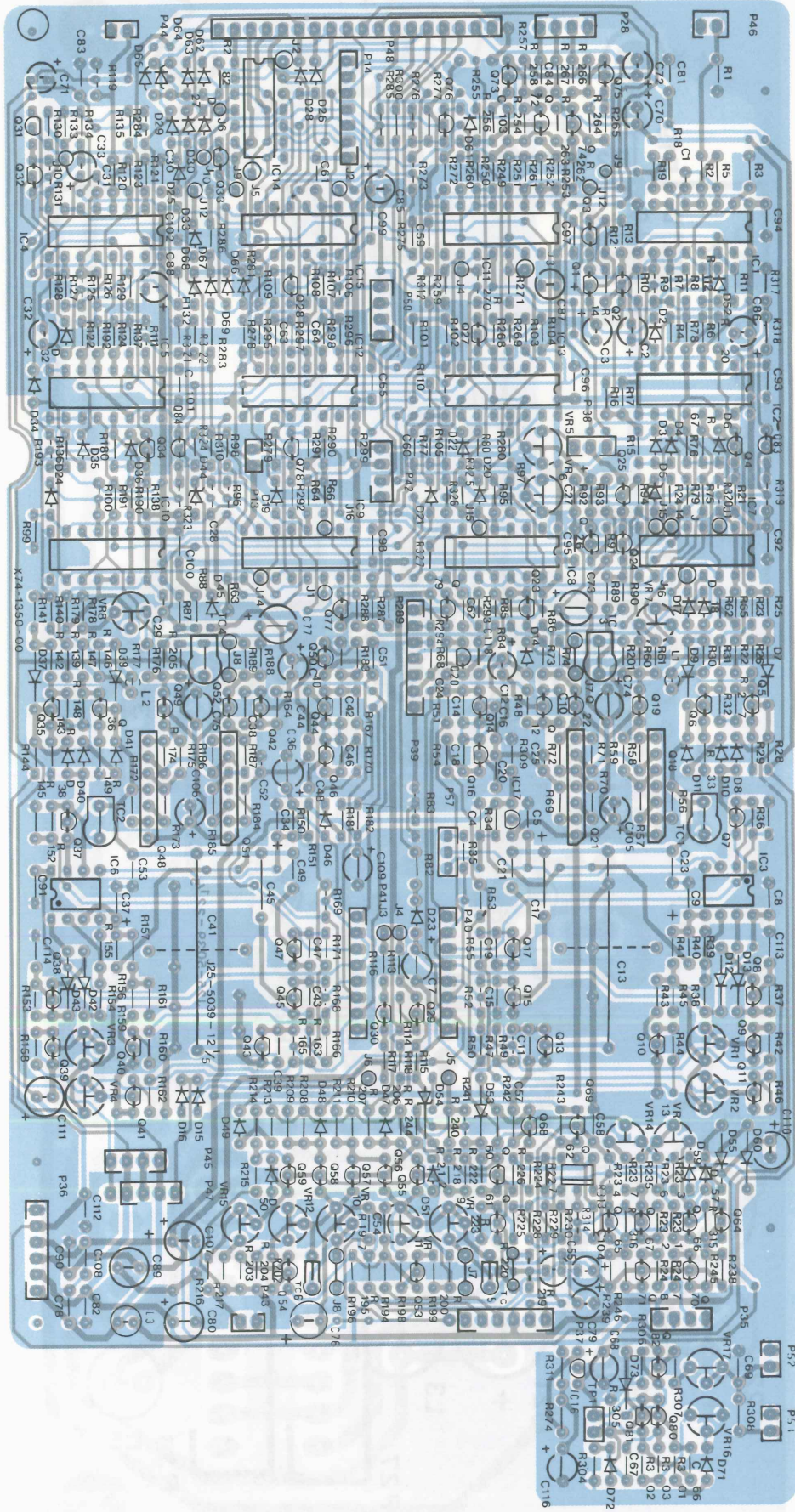
152-52403-313

152-00-0131-47X

00-0131-47X



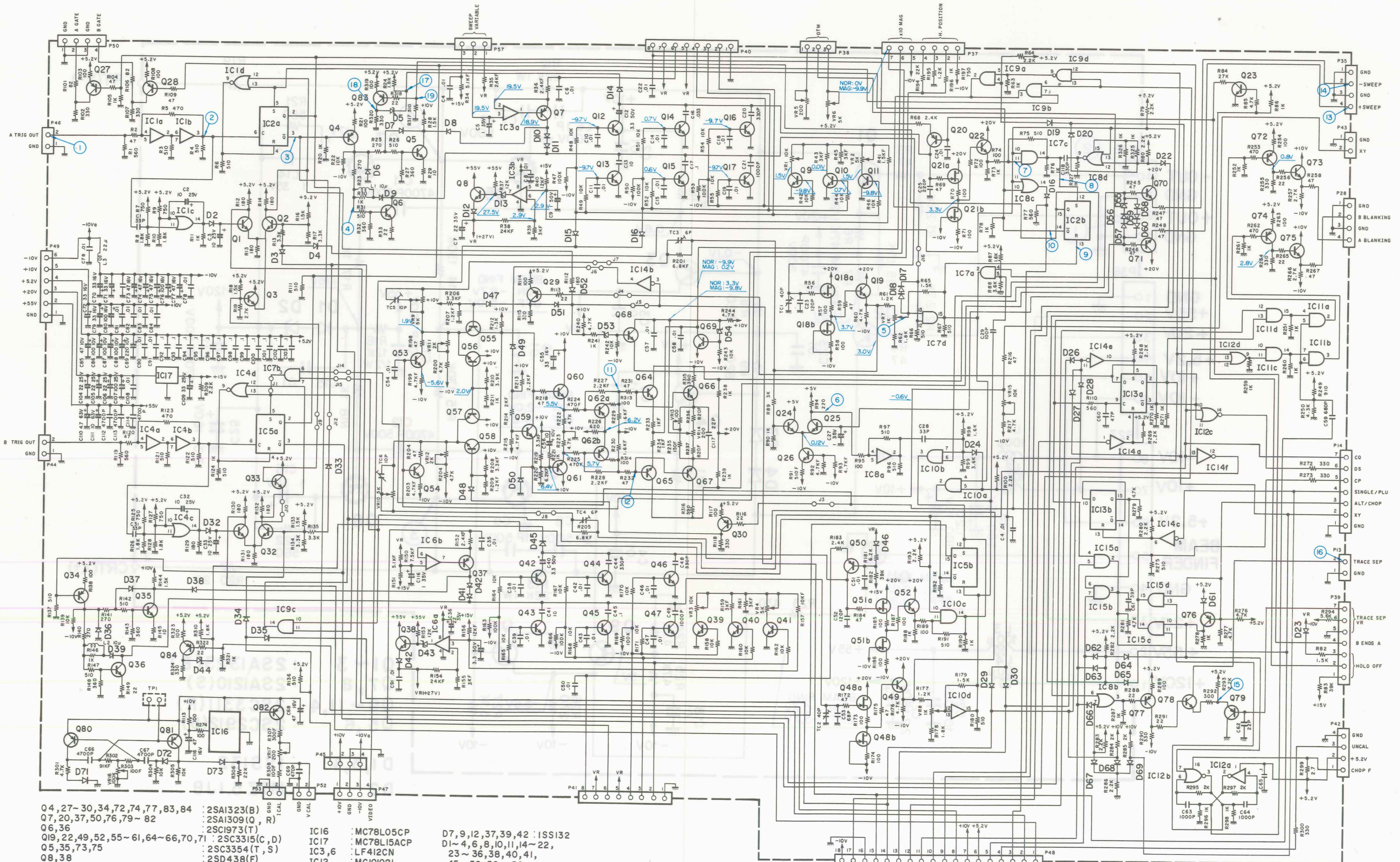
# PC BOARD TRIG SWEEP UNIT (X74-1350-00)





# SCHEMATIC DIAGRAM

## TRIG SWEEP UNIT (X74-1350-00)



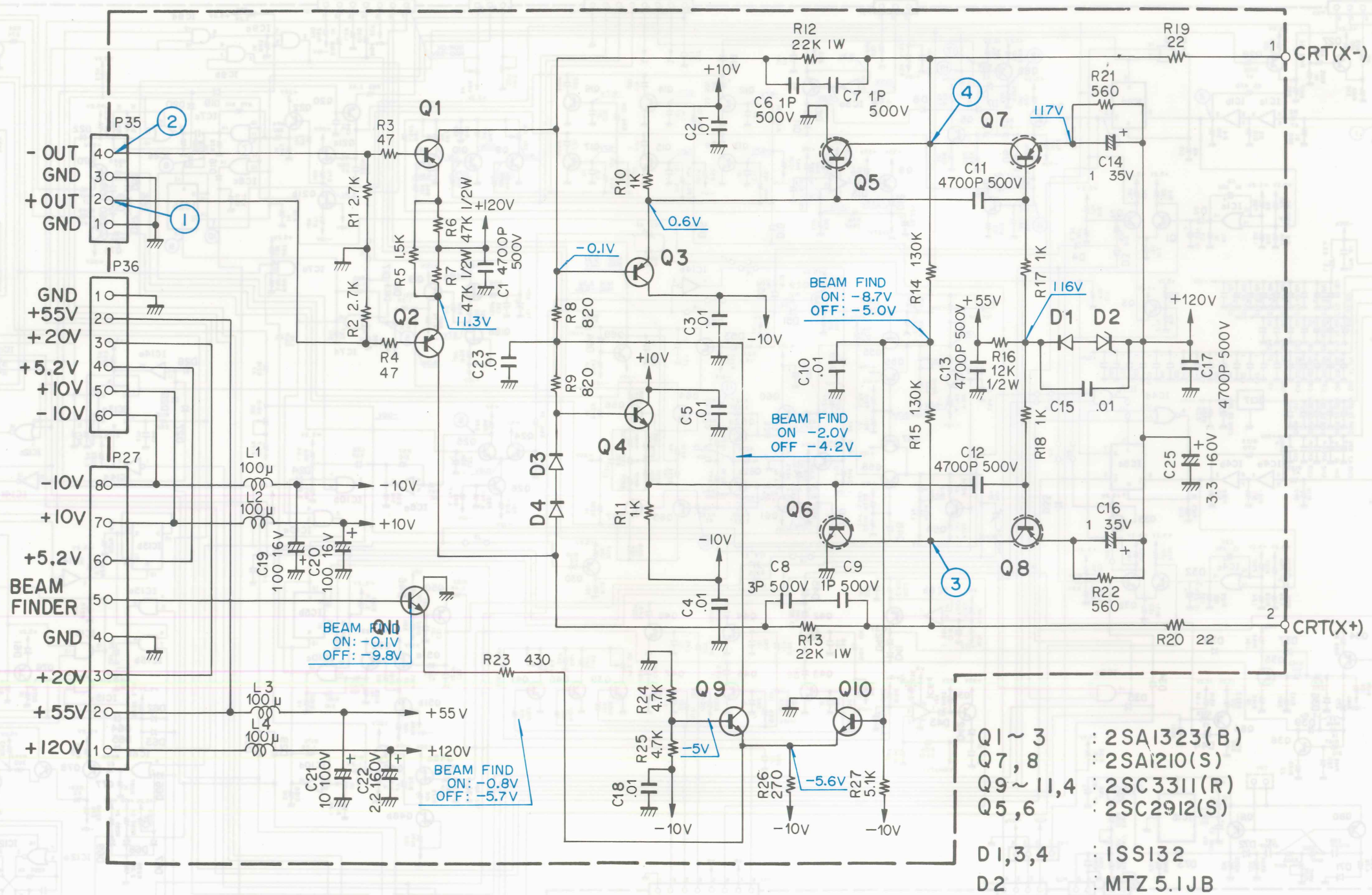
- |                                       |                 |
|---------------------------------------|-----------------|
| Q4, 27-30, 34, 72, 74, 77, 83, 84     | : 2SA1323(B)    |
| Q7, 20, 37, 50, 76, 79-82             | : 2SA1309(I, R) |
| Q6, 36                                | : 2SC1973(T)    |
| Q19, 22, 49, 52, 55-61, 64-66, 70, 71 | : 2SC3315(C, D) |
| Q5, 35, 73, 75                        | : 2SC3354(T, S) |
| Q8, 38                                | : 2SD438(F)     |
| Q1-3, 9-17, 23-26, 31-33, 39-47       | : 2SC3311(R)    |
| 53, 54, 68, 69, 78                    |                 |
| Q18, 21, 48, 51                       | : M47F(C)       |
| Q62                                   | : 2SA1239       |
| IC16                                  | : MC78L05CP     |
| IC17                                  | : MC78L15ACP    |
| IC3, 6                                | : LF412CN       |
| IC12                                  | : MC10102L      |
| IC8                                   | : MC10103L      |
| IC7, 9-11, 15                         | : MC1014L       |
| IC13                                  | : MC1013L       |
| IC14                                  | : SN7405N       |
| IC1, 4                                | : MC10103L      |
| IC2, 5                                | : MC10103L      |
| D7, 9, 12, 37, 39, 42                 | : ISS132        |
| D1-4, 6, 8, 10, 11, 14-22,            |                 |
| 23-36, 38, 40, 41,                    |                 |
| 45-52, 56-59,                         |                 |
| 61-69, 71, 72                         |                 |
| D5, 44                                | : MTZ-3.0JB     |
| D70                                   | : MTZ-10JC      |
| D53, 54                               | : MTZ-12JC      |
| D13, 43                               | : MTZ-15JC      |
| D55, 60                               | : SV06Y         |
| D73                                   | : IN60          |



# SCHEMATIC DIAGRAM

HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)

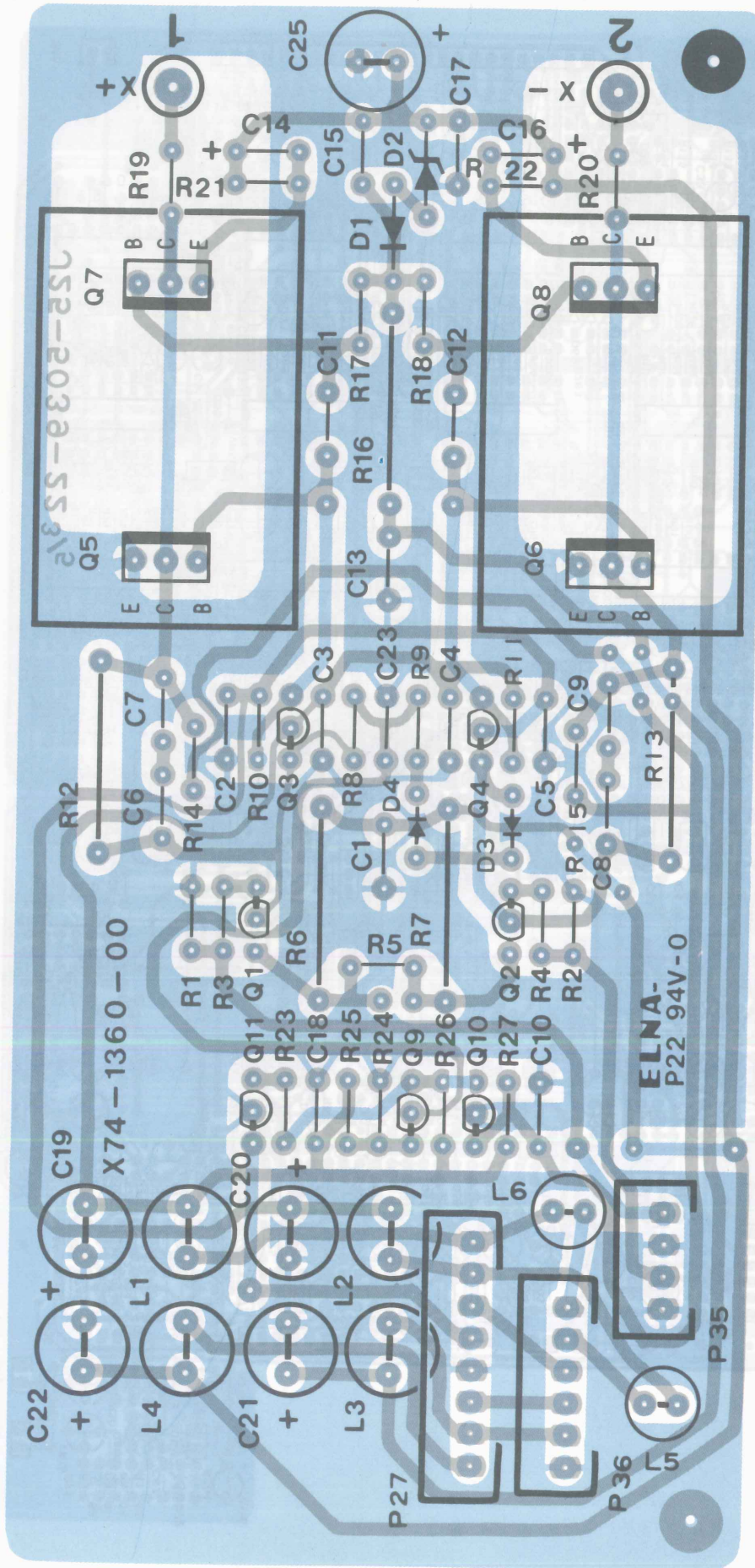
(00-081-47X) TRNG SWEEP UNIT (X74-1360-00)



- Q1 ~ 3 : 2SA1323(B)
- Q7, 8 : 2SA1210(S)
- Q9 ~ 11, 4 : 2SC3311(R)
- Q5, 6 : 2SC2912(S)
- D1, 3, 4 : ISS132
- D2 : MTZ 5.1JB



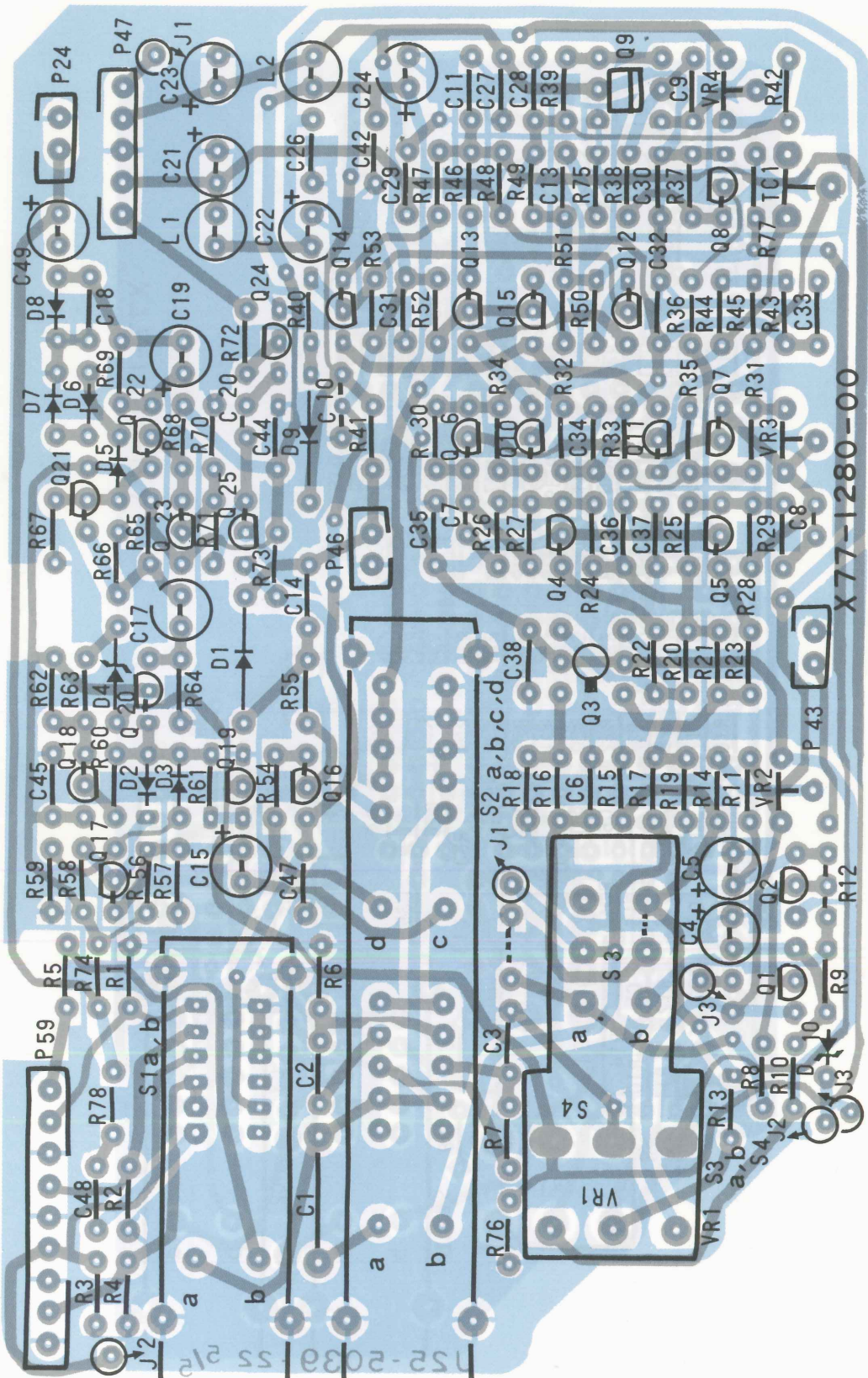
PC BOARD HORIZONTAL OUTPUT AMP UNIT (X74-1360-00)





PC BOARD A TRIG SWITCH UNIT (X77-1280-00)

PC BOARD B TRIG SWITCH UNIT (X77-1280-00)



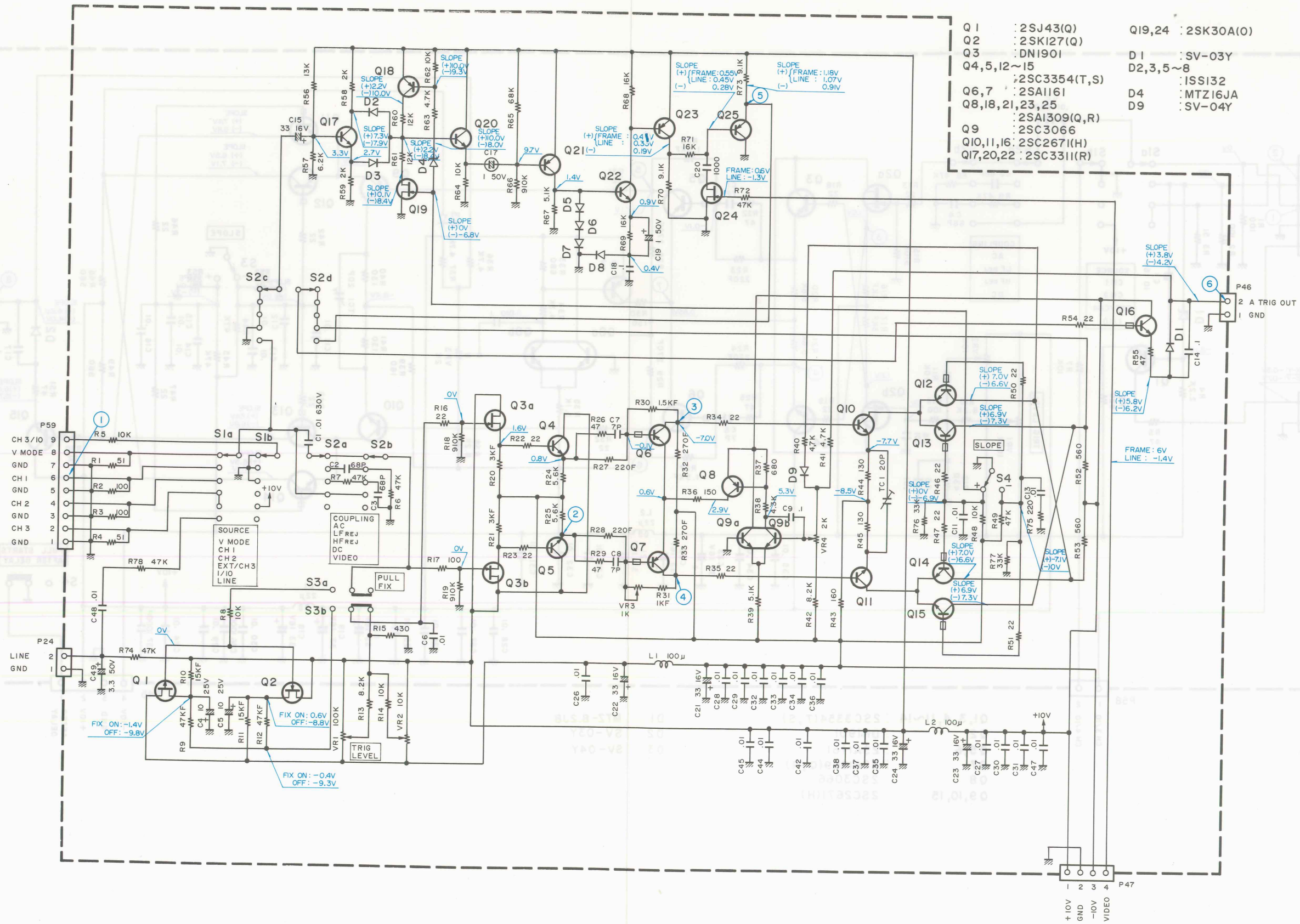
X77-1280-00



# SCHEMATIC DIAGRAM

## A TRIG SWITCH UNIT (X77-1280-00)

(00-0851-TTX) TRIG SWITCH UNIT (X77-1280-00)



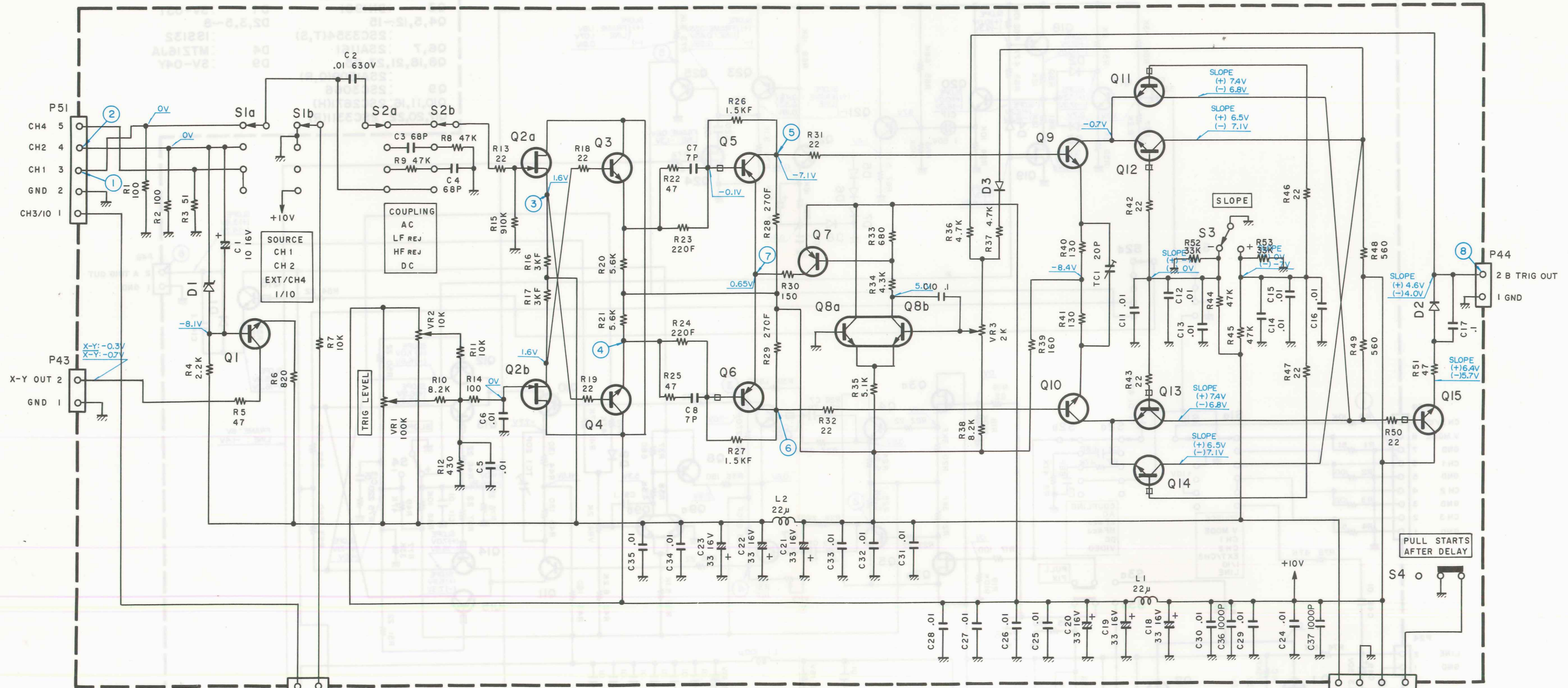
- |                |                |          |             |
|----------------|----------------|----------|-------------|
| Q1             | : 2SJ43(Q)     | Q19,24   | : 2SK30A(O) |
| Q2             | : 2SK127(Q)    | D1       | : SV-03Y    |
| Q3             | : DN1901       | D2,3,5~8 | : ISS132    |
| Q4,5,12~15     | : 2SC3354(T,S) | D4       | : MTZ16JA   |
| Q6,7           | : 2SA1161      | D9       | : SV-04Y    |
| Q8,18,21,23,25 | : 2SA1309(Q,R) |          |             |
| Q9             | : 2SC3066      |          |             |
| Q10,11,16      | : 2SC2671(H)   |          |             |
| Q17,20,22      | : 2SC3311(R)   |          |             |



# SCHEMATIC DIAGRAM

**B TRIG SWITCH UNIT (X77-1290-00)**

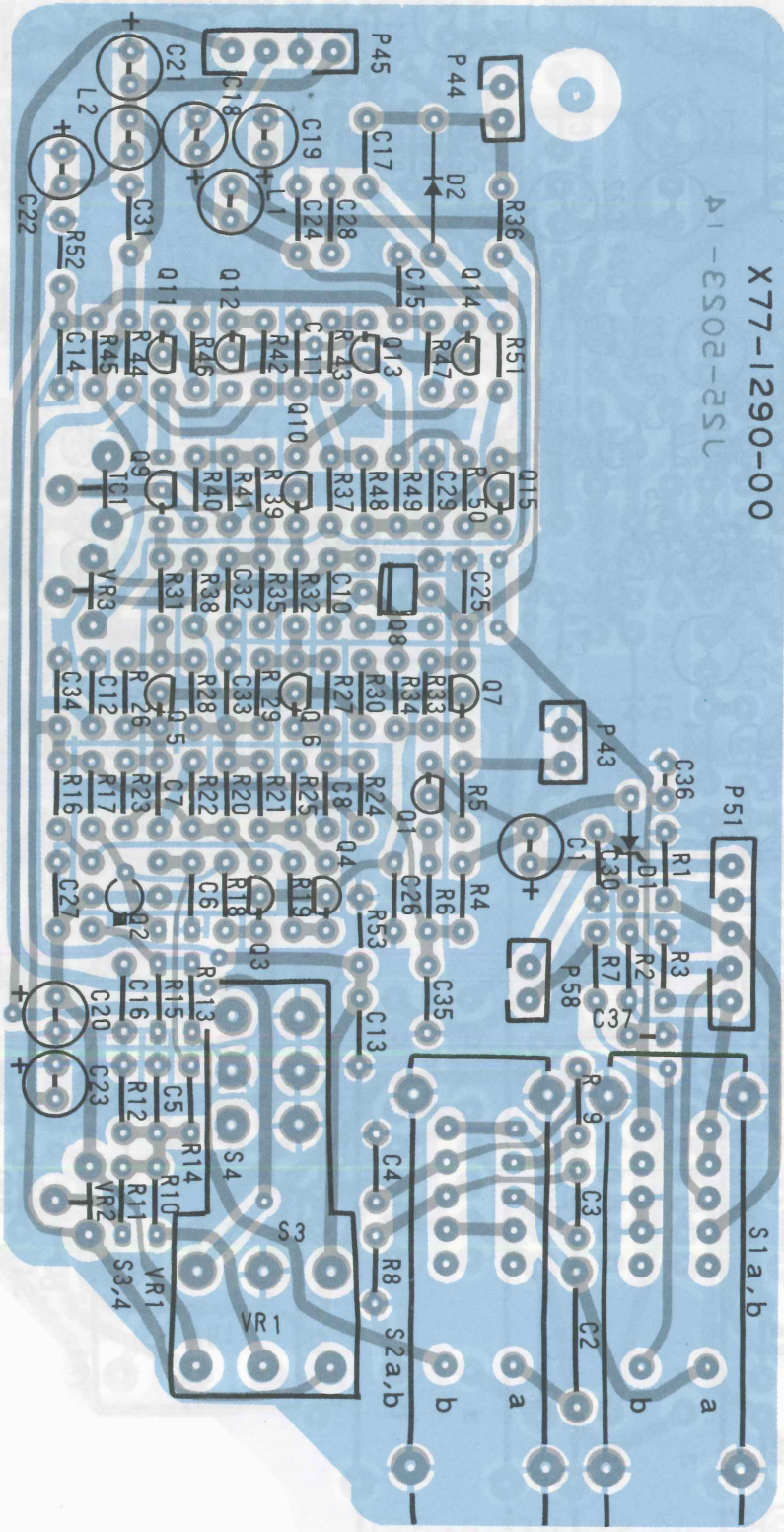
A TRIG SWITCH UNIT (X77-1280-00)



- |                 |                 |    |             |
|-----------------|-----------------|----|-------------|
| Q1, 3, 4, 11~14 | : 2SC3354(T, S) | D1 | : MTZ-8.2JB |
| Q2              | : DNI901        | D2 | : SV-03Y    |
| Q5, 6           | : 2SA1161       | D3 | : SV-04Y    |
| Q7              | : 2SA1309(Q, R) |    |             |
| Q8              | : 2SC3066       |    |             |
| Q9, 10, 15      | : 2SC2671(H)    |    |             |

PC BOARD B TRIG SWITCH UNIT (X77-1290-00)

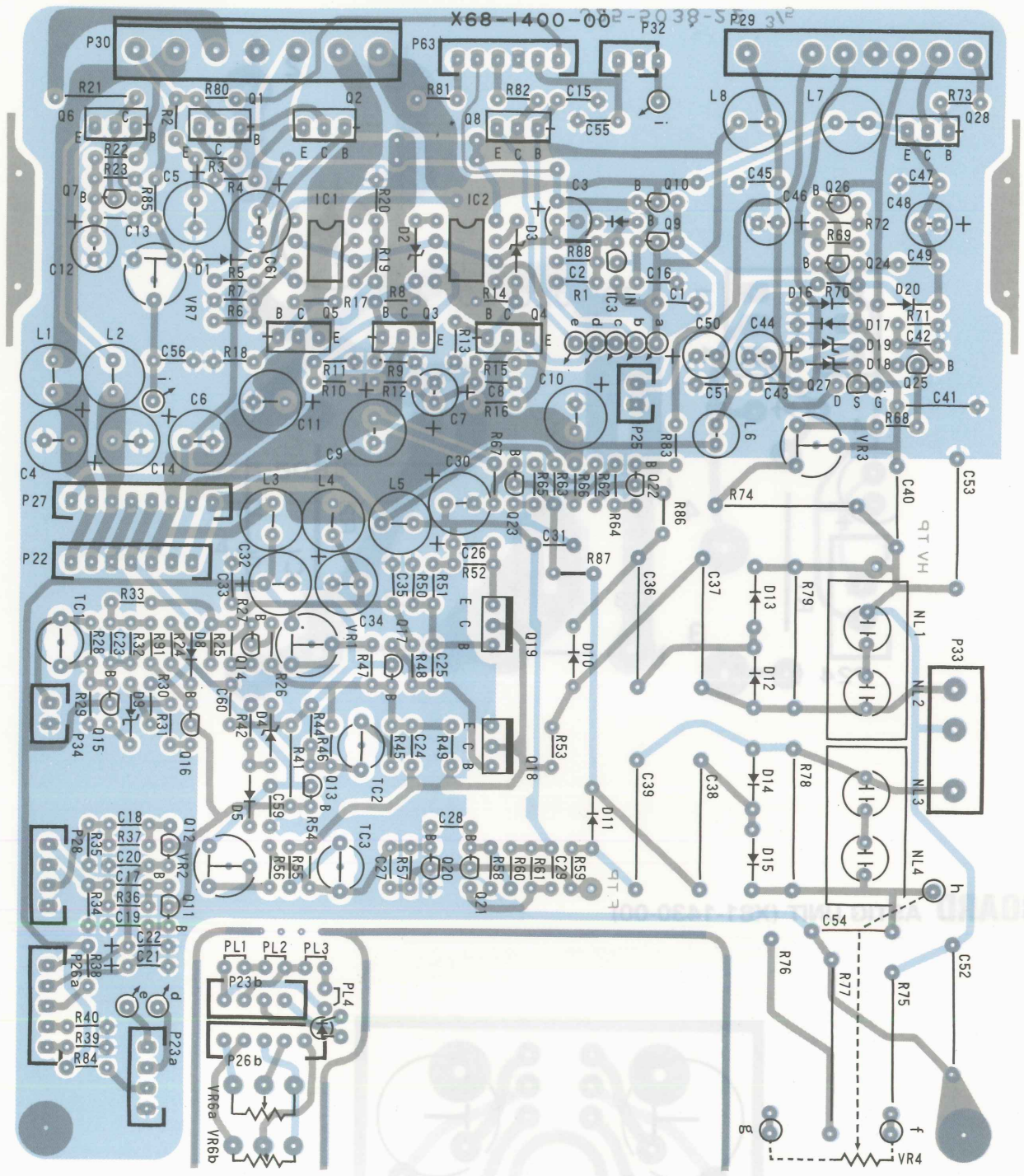
PC BOARD A TRIG SWITCH UNIT (X77-1290-00)





# PC BOARD POWER BLANKING UNIT (X68-1400-00)

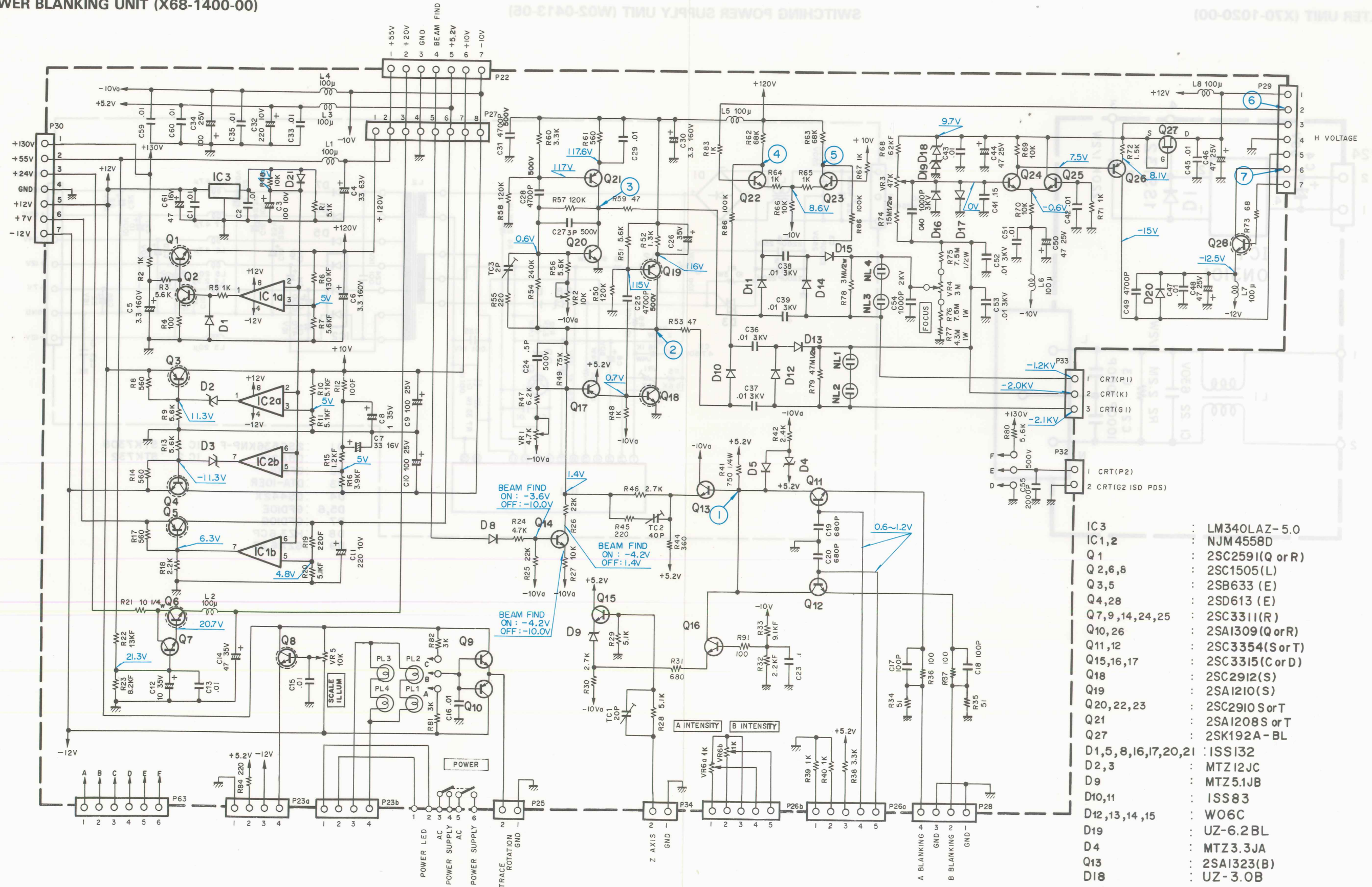
PC BOARD FILTER UNIT (X70-1050-00)





# SCHEMATIC DIAGRAM

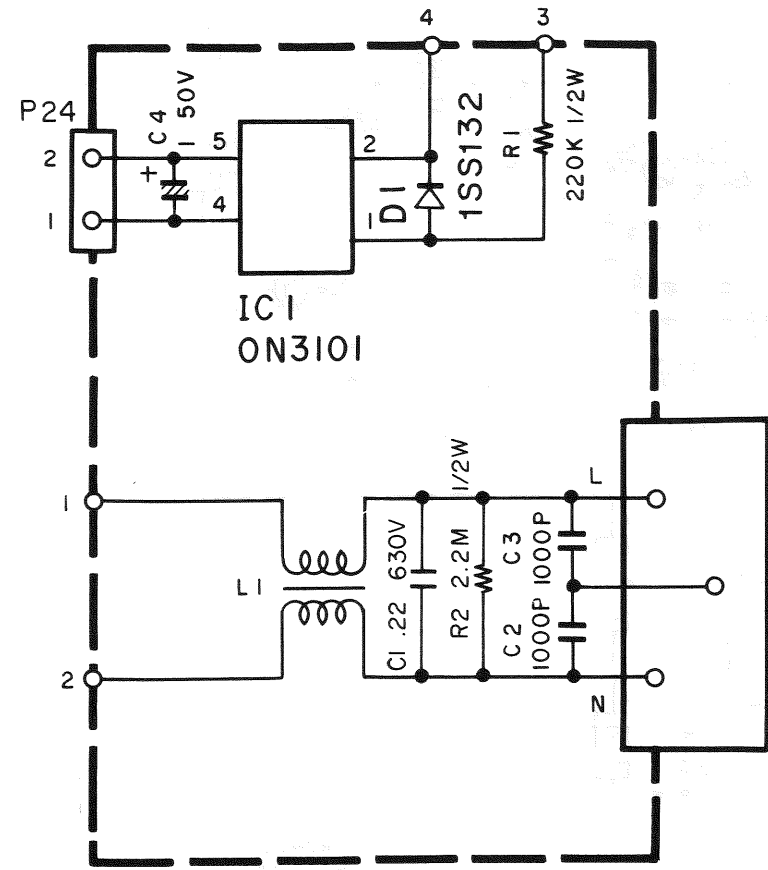
## POWER BLANKING UNIT (X68-1400-00)



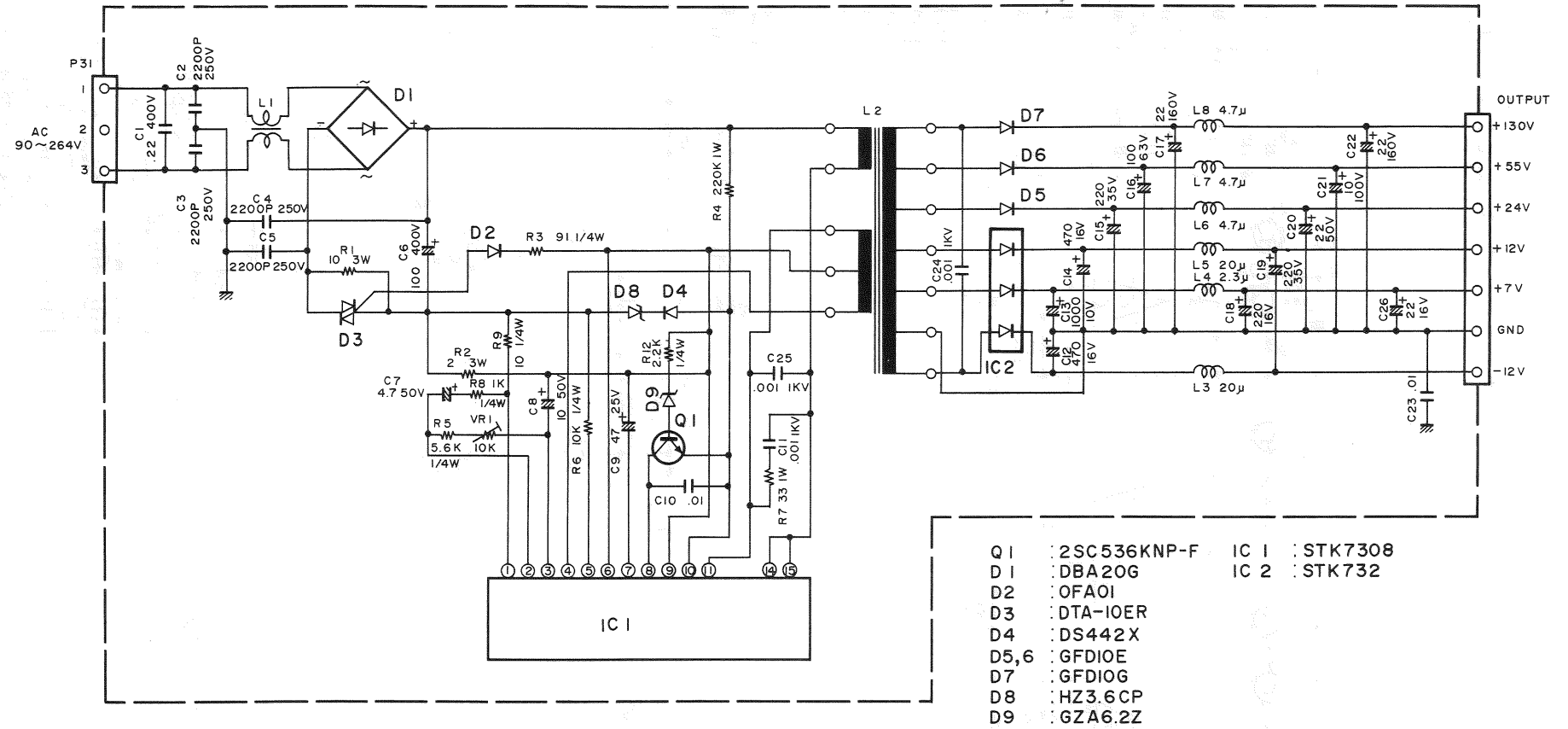
- |                           |                   |
|---------------------------|-------------------|
| IC 3                      | : LM340LAZ-5.0    |
| IC 1, 2                   | : NJM4558D        |
| Q 1                       | : 2SC2591(Q or R) |
| Q 2, 6, 8                 | : 2SC1505(L)      |
| Q 3, 5                    | : 2SB633 (E)      |
| Q 4, 28                   | : 2SD613 (E)      |
| Q 7, 9, 14, 24, 25        | : 2SC3311(R)      |
| Q 10, 26                  | : 2SA1309(Q or R) |
| Q 11, 12                  | : 2SC3354(S or T) |
| Q 15, 16, 17              | : 2SC3315(C or D) |
| Q 18                      | : 2SC2912(S)      |
| Q 19                      | : 2SA1210(S)      |
| Q 20, 22, 23              | : 2SC2910(S or T) |
| Q 21                      | : 2SA1208(S or T) |
| Q 27                      | : 2SK192A-BL      |
| D 1, 5, 8, 16, 17, 20, 21 | : ISS132          |
| D 2, 3                    | : MTZ12JC         |
| D 9                       | : MTZ5.1JB        |
| D 10, 11                  | : ISS83           |
| D 12, 13, 14, 15          | : W06C            |
| D 19                      | : UZ-6.2BL        |
| D 4                       | : MTZ3.3JA        |
| Q 13                      | : 2SA1323(B)      |
| D 18                      | : UZ-3.0B         |

# SCHEMATIC DIAGRAM

**FILTER UNIT (X70-1020-00)**

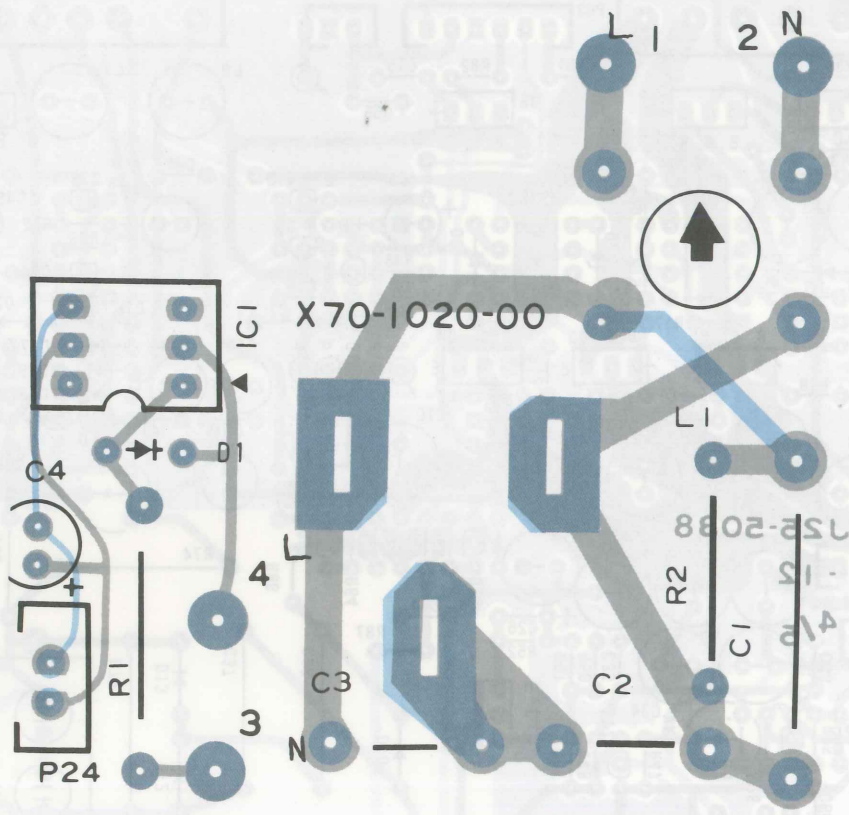


**SWITCHING POWER SUPPLY UNIT (W02-0413-05)**

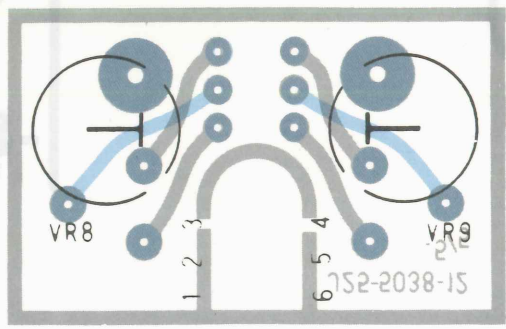


- |      |               |      |           |
|------|---------------|------|-----------|
| Q1   | : 2SC536KNP-F | IC 1 | : STK7308 |
| D1   | : DBA20G      | IC 2 | : STK732  |
| D2   | : OFA01       |      |           |
| D3   | : DTA-10ER    |      |           |
| D4   | : DS442X      |      |           |
| D5,6 | : GFDIOE      |      |           |
| D7   | : GFDIOG      |      |           |
| D8   | : HZ3.6CP     |      |           |
| D9   | : GZA6.2Z     |      |           |





PC BOARD ASTIG UNIT (X81-1430-00)



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